STAGES

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

Volume 38, Number 1 | Audrey J. Geffen & Cindy J.G. van Damme, Editors | February 2017

Inside this issue

President's Message 1
News from the Regions 2
Section Officers 2
Upcoming Events 9
Section Business 12
Editor's Ramblings 14



41st Annual Larval Fish Conference

July 12-16, 2017
Austin, Texas

YEEHAW!!! The 41st annual Larval Fish Conference, LFC2017, will be held July 12-16, 2017 as part of the Joint Meeting of Ichthyologists and Herpetologists (JMIH) in Austin – still 'the hippest town in Texas'. The meeting venue is the Renaissance Hotel in the Arboretum District of north Austin. If our last joint meeting with the 'Ichs and Herps' in Austin (17th ALFC) was any indication, it should be an event to remember for science, networking, and socials. Your LFC2017 co-conveners, Chris Chambers and Lee Fuiman, have been working with JMIH conference planners to put together another great conference program. The LFC2017 will include a number of timely theme sessions, opportunities for contributed papers and posters, a special Early Career (EC) event and, of course, LFC and JMIH socials.

Four LFC Theme Sessions are planned: 1) "The Effects of Climate Change on Marine Fish Early Life Stages: Which Stressors are Most Important and How Do They

...continued on p. 7

ELHS Back Then

10 years ago: 31st LFC held in St. John's, Newfoundland; at least one attendee mistakenly flew to St. John, New Brunswick.

15 years ago: LFC meets in Europe for the first time. The location: beautiful Os, Norway

25 years ago: Jeff Leis and Mike Kingsford distribute questionnaire to gauge interest in holding a LFC in Australia. 3 years later the LFC was in Sydney

30 years ago: 1st LFC, a symposium on Freshwater Larval Fish held in February in North Carolina

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

May 15, 2017

President's Message



Dear friends of larval fishes,

First, I would like to wish you all a Happy New Year. I hope everyone had a productive and fun-filled 2016 and is excited about the prospects for a great 2017. The hope associated with starting a new year leads many of us to form New Year's resolutions. I will share one of mine with you, and that is to make time to sit at a microscope and actually look at ichthyoplankton! The rewards of proposal writing and countless university and administrative demands are many, but my technicians and graduate students dutifully maintain a 'space' for me in my lab (and for this, I am thankful). There's a drawer with my name on it, filled with forceps, probes, and other sorting needs. The "Red Book" (Ahlstrom Symposium), "Blue Books" (Richards volumes), and other references are neatly arranged nearby. All that is missing is me. So this year, I resolve to use my well-appointed space and identify fish larvae. Please feel free to ping me on this when we meet at the Larval Fish Conference later this year to see how my resolution is going.

And how was that for a segue?! Of course one of the most anticipated events on my 2017 calendar (and hopefully yours) is our annual (and 41st) Larval Fish Conference (LFC).

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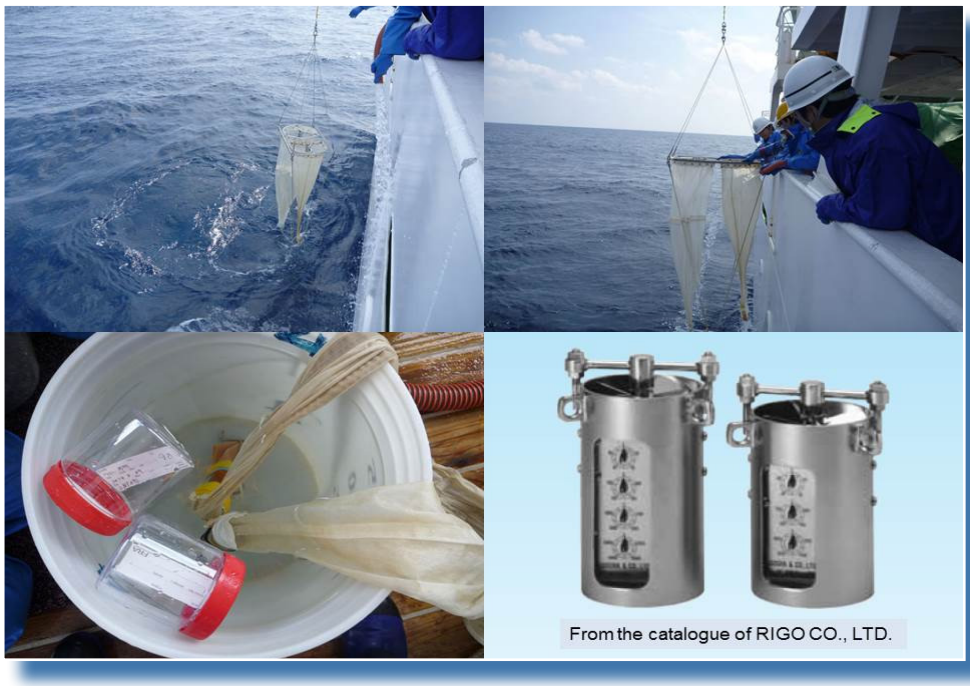
News from the Regions



Pacific Rim Region

Akinori Takasuka

Do plankton nets clog or over-filter in the sea?



Vertical tow of a NORPAC net during a winter egg and larval survey off the Pacific coast of Japan. A flow-meter is used to estimate density of eggs and larvae per unit area water column.

Some of you have experienced sampling of eggs and larvae by a vertical tow of plankton nets during ichthyoplankton surveys (see Figure). If so, you would have recognized a high variability of flow-meter revolutions under variable ocean conditions. You might have seen extremely high revolutions under some conditions such as strong winds or currents and/or very low revolutions when plankton nets clog with a lot of small plankton samples. However, do plankton nets clog or over-filter over large spatial and temporal scales in the sea? That is, what is the representative image of filtering rate when the data of flow meters are pooled over large spatial and temporal scales?

This question has long been kept in my mind during my experiences on board for the winter egg and larval surveys off the Pacific coast of Japan over 10 years. Accordingly, our study group hit upon the idea of examining the filtering rate variability of plankton nets based on a long-term data set of egg and larval surveys, to provide an answer to the question, even though sampling instruments and methods are out of my expertise. Recently, a brief paper of this topic has been published (Takasuka et al., 2017). Here is a summary of the paper.

In situ filtering rate variability was examined for vertical tows of plankton nets in egg and larval surveys off the Pacific coast of Japan, based on a data set pooled over large spatial and temporal scales (76,444 sampling tows from 1978 to 2013). The filtering rate was highly variable for several types of net. This would be in agreement with realizations of many fisheries oceanographers who have carried out plankton net samplings in field surveys.

However, the median values of the filtering rate for the overall data approximated the theoretical value of 1.0. In a sense, the filtering rate was almost on a balance of resistance effect of net and cod-end, clogging effect of collected organisms, and

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HELP KEEP STAGES INTERESTING...
Send us a report of your research activities.



North East Region

Katey Marancik

Early life history research at the Rutgers University Marine Field Station

Rutgers University Marine Field Station (RUMFS) and numerous collaborators are continuing to examine estuarine fish larval supply and the juvenile responses to urbanization, climate change, and other environmental factors. Our Coastal Collaboration on Recruitment (CCOR) efforts are continuing with an analysis of spot spawning areas and subsequent recruitment to estuarine inlets along the east coast. This effort is led by Dennis Allen (Belle Baruch Lab) and numerous collaborators from New Jersey (Ken Able-RUMFS), Delaware (Tim Targett-University of Delaware), Virginia (Eric Hilton-Virginia Institute of Marine Science), and North Carolina (Todd Kellison, Chris Taylor, and Jeff Govoni-NOAA-Beaufort Lab; Jeff Buckel-North Carolina State). In somewhat the same vein, we are attempting to expand the geographical range of these larval supply efforts in collaboration with the National Estuarine Research Reserve in Wells Maine, (Jason Goldstein, Jeremy Miller), VIMS (Eric Hilton) relative to offshore larvae in the Mid-Atlantic Bight as collected by NMFS-Narragansett Lab (Harvey Walsh, Jon Hare). The most recent effort included an ichthyoplankton gear comparison at RUMFS with the Wells investigators. In addition, the CCOR site Little Egg Inlet at RUMFS (now at 27 years of weekly larval collections) has proven to be representative for other inlets and thoroughfares in southern New Jersey over 3 years.

Other studies focusing on juvenile fish have examined the early life history of three Fundulus (F. heteroclitus, F. luciae, F. grandis) by analyzing daily growth patterns from sagittal otoliths in New Jersey (Steve Brown, Ken Able) and Mississippi (Debbie Vivian) (Brown et al. in review). Age and growth of older F. grandis was determined by combining tag-recapture with a chemical marker to stain otoliths (Vastano et al. in review). Other student M.S. theses at Rutgers are evaluating the effects of urbanization on Barnegat Bay juvenile fishes by Jessica Valenti (Ph. D., Graduate Program in Oceanography) with collaborators (Thomas Grothues, Ken Able). Another M. S. thesis project in the same graduate program by Katie Nickerson, with the same collaborators, is evaluating the effects of climate change on juvenile fish assemblages in the Mullica River-Great Bay estuary based on a 20 year otter trawl time series.

The impacts of Superstorm Sandy on RUMFS are still being felt four years later. The docks still need repair, especially because they host our seawater intake. As a result, we still do not have flow-through seawater. In addition, Sandy further compromised our boat basin and the lack of dredging has left us unable to use the basin except on high tides.

Recent Publications on Early Life History

Able, Kenneth W. 2016. Natural history: An approach whose time has come, passed, and needs to be resurrected. ICES Journal of Marine Science, doi: 10.1093/icesjms/fsw049.

Able, K. W., J. M. Smith, and J. F. Caridad. 2015. American eel supply to an estuary and its tributaries: Spatial variation in Barnegat Bay, New Jersey. Northeastern Naturalist 22(1):53-68.

Able, K. W., and F. J. Fodrie. 2015. Distribution and dynamics of habitat use by juvenile and adult flatfishes. Pp. 242-282 In: R. N. Gibson, R. D. M. Nash, A. J. Geffen, and H. W. Van der Veer (Eds.), Flatfishes: Biology and Exploitation (2nd edition), John Wiley and Sons Ltd., West Sussex, UK.

Able, K. W., T. M. Grothues, J. M. Morson and K. E. Coleman. 2014. Temporal variation in winter flounder recruitment at the southern margin of their range: Is the decline due to increasing temperatures? H. Hjort Memorial Issue, ICES Journal of Marine Science 71(8):2186-2191 (DOI: 10.1093/icesjms/fsu094).

Musumeci, V. L., K. W. Able, M. C. Sullivan, and J. M. Smith. 2014. Estuarine predator-prey interactions in the early life history of two eels (Anguilla rostrata and Conger oceanicus). Environmental Biology of Fishes 97:929-938.

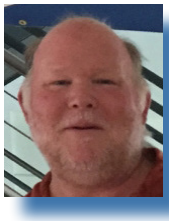
-- *Ken Able, Rutgers University Marine Field Station*

Fish eggs and international collaborations to development of a population wide index of spawning stock biomass for Atlantic mackerel

Atlantic mackerel are a schooling pelagic species found throughout the Northwest Atlantic Ocean from Cape Hatteras, North Carolina to the Gulf of St. Lawrence (Sette, 1943). Because of their migrations and spawning habitats, NW Atlantic mackerel are a transboundary stock managed separately by the United States and Canada. Atlantic mackerel are considered to have two separate spawning contingents; the northern contingent that spawns in Canadian waters and the southern contingent that spawns in US waters. The two spawning contingents are often assessed as a unit stock, though Fisheries and Oceans Canada also assesses just the northern contingent. In the United States, Atlantic mackerel stock status, as of 2009, is considered unknown due to a rejected joint U.S-Canada assessment. The main reason for the rejection was due to different signals between recent age truncation in commercial catch time series despite declining catch and the increasing trends in the bottom trawl survey index. In Canada, the northern contingent is assessed with an egg index, which shows a declining trend. However the U.S does not have a comparable egg index.

In 2015 a project was initiated to develop a U.S egg index with the ultimate intent to create a stock wide spawning stock biomass index for Atlantic mackerel. Our study focuses

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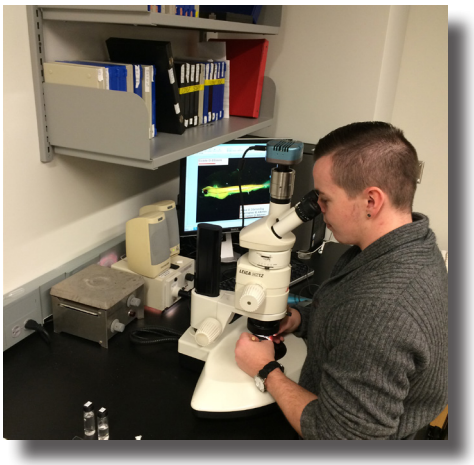


North Central Region

Ed Roseman

Growth and Diet of Larval Fishes in the St. Clair-Detroit River System

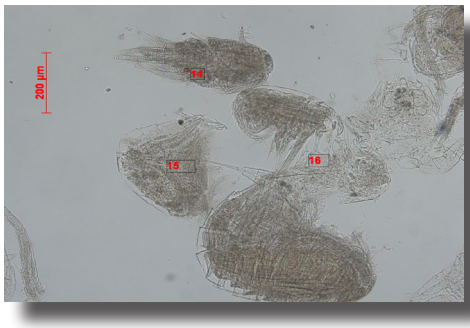
The St. Clair-Detroit River System (SCDRS) is utilized by fish for reproduction, as a conduit for transport of larvae, and as a nursery habitat. This Laurentian Great Lakes connecting channel has a history of environmental degradation and recent restoration efforts. The construction of shipping canals altered the benthic region of the SCDRS, degrading or completely eliminating spawning reefs for fish. This alteration of habitat greatly reduced fish populations of lithophilic fishes including lake whitefish, lake sturgeon, walleye, and numerous other native fishes. In recent years, artificial reefs have been installed in the region and other restoration projects have been implemented. Larval fish are sensitive to environmental degradation and may respond to habitat improvement.



Masters student Benjamin Coyle dissecting the otolith out of a larval lake whitefish (coregonus clupeaformis) collected from Lake Erie. The otolith will be viewed under high magnification to calculate the age of the fish. Gut contents of the fish will also be dissected and diet composition analyzed

Limited analyses of larval fish diets and growth rates in the SCDRS have been conducted. Through understanding the early life history requirements of SCDRS fishes, we can make more informed decisions on how to manage the system.

The objective of this study is to assess the growth and diet of larval lake whitefish, yellow perch, and rainbow smelt from the SCDRS on multiple spatio-temporal scales. This assessment will compare individual species growth and diet across time and among multiple habitats in the SCDRS. Larval fish specimens were



Gut contents of a larval lake whitefish. Contents include the rotifer Brachionus, invertebrate eggs, and assorted copepodites.

collected from the SCDRS from 2010 to present [by the USGS]. Using a simple model II linear regression larval growth rates will be determined by relating total length to age (measured using otolith analysis). Stomachs of these fishes will then be dissected to quantify diet composition. Diet selectivity will be calculated relative to ambient zooplankton composition. Spatial and temporal changes in fish diets will be analyzed using univariate tests (repeated measures ANOVA) as well as multivariate statistical analyses (NMDS, CA, MRPP) to perceive changes in the fishes diets. Comparisons of age, length and life stage of feeding fish will also be analyzed.

The analysis of larval fish diets, and determination of spatial and temporal variability within larval fish communities, will provide information on the trophic ecology of this system. Restoration of habitat in the SCDRS has been an objective of an international initiative. Analyses of larval fish diets and growth rates in the SCDRS may provide necessary insight into the evolvement of restoration efforts. Through this work I will help to explain trophic dynamics in the system, provide a benchmark for the evaluation of remediation projects and validate the hypothesis that the SCDRS has been undergoing general trophic restructuring since 2010. Understanding larval fish use of the SCDRS main channel will aid in providing recommendations for implementing science-based adaptive management plans to restore aquatic habitat and fish populations in the connecting channel.

- Benjamin Coyle,
Central Michigan University,
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...Pacific Region, continued from p. 2

over-inflow effect of currents over large scales. We suppose that this aspect may be unexpected by many fisheries oceanographers who have carried out plankton net samplings in field surveys. Further, the annual, monthly, and regional variabilities in the median values were small relative to the overall variability at the individual level. Hence, we concluded that the filtering rate is mainly influenced by small-scale transient variability of ocean conditions rather than large-scale variability. The information here will allow the utilization of historical data lacking flow-meter data for large-scale comparative analyses.

We wish that this paper will serve as a reference material for early life biologists who use plankton nets in ichthyoplankton surveys.

Reference

Takasuka, A., Tadokoro, K., Okazaki, Y., Ichikawa, T., Sugisaki, H., Kuroda, H., and Oozeki, Y. (2017) In situ filtering rate variability in egg and larval surveys off the Pacific coast of Japan: Do plankton nets clog or over-filter in the sea? Deep-Sea Research Part I. http://dx.doi.org/10.1016/j.dsr.2016.12.017

--Akinori Takasuka §



European Region

Hubert Keckheis

Importance of microalgae utilization in marine larval fish and crustacean nutrition and feeding



From Turkey:

One of the main limitations of the developing aquaculture sector is the availability of resources for fishmeal and fish oil production which are main components of fish feed. These two ingredients are indispensable for good nutrition at all life stages of fish. Several studies are being conducted in order to find out alternative ingredients for substituting both fishmeal and fish oil in diets. Among them marine microalgae are important candidates for replacing both lipid and protein sources depend on selected cultured species (Hemaiswarya et al. 2011; Roy and Pal, 2015).

Microalgae contain high levels of nutritional compounds such as fatty acids, amino acids, vitamin, minerals and antioxidants (Kovač et al. 2013), and their nutritional value differs among species. Many different species are used in bivalve, shrimp and marine larval fish culture. Alternative feed ingredients must contain the important nutritional components such as essential amino acids (EAA; orginated from fishmeal) and essential fatty acids (EFA; orginated from fish oil), vitamins, minerals and antioxidants. Evaluation of those compounds are the most studied nutritional components in fish nutrition so far (Izquierdo et al., 2009; Turchini et al., 2009).

Recently, it has been showed that replacement of fish oil by microalgae in weaning diets showed promising results on growth and survival in gilthead sea bream larvae (Eryalçın et al., 2013; Eryalçın et al., 2015). Lately, commercial microalgae production industries have been established in the USA, China and Japan. Thanks to developments in culture and processing industries, many commercial microalgae products are available worldwide. Microalgae biomass production is mainly dependant on phototrophic and hetetrophic culture methods (Spolaore et al. 2006). These commercial microalgae products are utilized for feed ingredients, bivalve



Fig. 1. Feeding manila clam (Ruditapes philippinarum) with fresh cultured microalgae

culture, direct utilization for greenwater technique at and enrichment process in marine aquaculture hatcheries (Fig. 1).

Fish eggs are high in essential fatty acids (EFA) such as arachidonic acid (20:4n-6; AA), eicosapentaenoic acid (20:5n-3; EPA) and docosahexaenoic acid (22:6n-3; DHA). After hatching, once exogenous feeding is started, the feed given to larvae should contain essential nutrients which are similar in quality and quantity to the egg nutrient profile. Therefore, live prey (rotifer, Artemia and copepod) must be enriched at first exogenous feeding.



Fig.2 Microalgae production unit, Nannochloropsis oculata, Istanbul University Department of Scientific Research Projects, Project No: 28086, (Kılıç Marine Fish Culture Company, 2005).

Currently, one of our projects at the Department of Fish Nutrition and Phytoplankton and Zooplankton Laboratory, Faculty of Fisheries, Aquaculture, Istanbul University, Turkey, is related to enrichment of rotifers and Artemia (Fig. 2). Within this project, formulated commercial enrichment products and freshly cultured microalgae biomass were evaluated with respect to the nutritional effects on fatty acid profile of live prey (Fig.3). We concluded that commercial products supported EPA and DHA contents whereas AA level was increased by utilization of freshly cultured microalgae, *Chlorella vulgaris* and *Dunaliella salina* (Eryalçın et al., 2016, 40th LFC, Maryland). AA is one of the most important EFA for marine fish larval metabolism, survival and growth (Bell and Sargent, 2003). This suggests that fresh

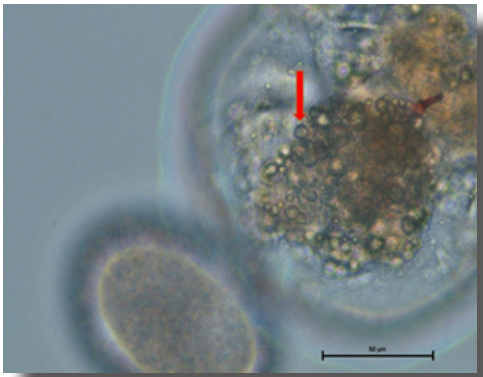


Fig.3. Enriched Rotifer (arrow indicates oil globule).

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.....European Region, continued from p.5



Fig. 4. Experimental Team. Grupo de Investigacion en Acuicultura (GIA), Las Palmas de Gran Canaria (Las Palmas, 2015).

microalgae biomass is still needed for larval culture.

Turkey has a great potential for microalgae production especially in the southern part of the country). The main problem of microalgae production is sustainability and bacteria free production, as well as the nutritional optimization of the product. Therefore, educated labor and the high cost of investments are the main obstacles to commercial production all over the world.

Experimental studies of microdiets for larval feeding after the live prey stage are still very important for the aquaculture sector. The goal is to remove live prey utilization in larval nursery stages without any negative effect on larval growth and survival. Therefore, a wide range of macro-ingredient replacement trials in weaning diets are underway (Fig. 4). Additionally, we still need knowledge about micro-ingredients such as minerals and vitamins (Fig. 5). Terrestrial and marine protein and lipid sources should be investigated in large-scale experiments involving both commercial and institutional partners.



Fig.5. Preparing microdiet for gilthead sea bream larval feeding experiment (Las Palmas, 2009).

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--- Dr. Kamil Mert Eryalçın

From Germany:



North and south meet again to expand on ideas and research efforts in South African estuaries using biochemical techniques

Collaboration on the early life history stages of fishes continues between the Northern and Southern

...continued on p.8

...LFC2017, continued from p.1

Interact?", Hannes Baumann and Marta Moyano, conveners; 2) "Complexity and Performance Change During Physiological Development of Larval Fishes", Warren Burggren and Prescilla Perrichon, conveners; 3) "Nutrition and Feeding of Fish Early Life Stages", Ken Webb, convener; and 4) "Assessing and Evaluating Phenotypic Variation in Fish Early Life History Stages: Field Studies, Experiments, and Modeling", Klaus Huebert, Tom Miller, and Chris Chambers, conveners. Further details on these theme sessions are below.

There will be a two-part, EC workshop with a key focus, "How to find the right scientific career for you." This event, organized by Alison Deary and Marta Moyano, will feature a speed-networking activity between students/EC scientists and more senior scientists. The event has a limited capacity (24 students/EC scientists, 12 senior scientists) so please sign up early at the JMIH registration webpage. More details about the EC event are below.

Contributed papers and posters on all things fish ELH are welcomed. Given the joint meeting format, especially with ASIH, and the location for this year's meeting, we expect many presentations and posters on freshwater themes and systematics.

Regarding the meeting schedule, on-site registration will begin on Wednesday, July 12. Thursday, July 13 is Day 1 of talks starting with a JMIH-wide plenary in the a.m., break-out sessions in the afternoon (LFC theme sessions and contributed presentations begin), and an evening reception at 'The Oasis' on Lake Travis. Break-out sessions will continue Friday through Sunday. Friday afternoon will be the poster session and the ELHS Business meeting. On Friday evening, the LFC participants will bus to downtown Austin (11 mi / 17 km) and 'reconvene' at Austin's must-sees – pubs, restaurants, music, 1.5 million bats departing Congress Avenue Bridge at sunset, and historic sites of the Lone Star State. The EC workshop is currently planned for Saturday (2 hours, students/EC and senior scientists) and Sunday (1 hour, students/EC scientists only).

ELHS Graduate Student Travel Grants are available (contact ELHS Secretary Dominique Robert at Dominique_Robert@uqar.ca). All JMIH/LFC2017 logistical details (i.e., registration, abstract submission, accommodations, travel, local area, etc.) can be found at the JMIH website (http://conferences.k-state.edu/JMIH-Austin-2017). Please register for the LFC (early rates are a bonus!), and make sure that you sign up for the EC Workshop and LFC bus transportation to downtown Austin.

See you in Austin!

-- Chris Chambers and Lee Fuiman

Larval Fish Conferences

Early Life History Section - American Fisheries Society

41st annual Larval Fish Conference, LFC2017, Theme Sessions:

The Effects of Climate Change on Marine Fish Early Life Stages: Which Stressors are Most Important and How Do They Interact?

Conveners: Hannes Baumann, University of Connecticut-Avery Point (hannes.baumann@uconn.edu) and Marta Moyano, University of Hamburg (marta.moyano@uni-hamburg.de)

Early life stages of fishes are particularly susceptible to the suite of ongoing, simultaneous changes in marine and freshwater environments, from rising temperatures and increasing acidification, to hypoxia, chemical pollution, and habitat alteration. While the concurrent nature of many of these stressors has been robustly documented, research on the combined effects of multiple stressors on important life history traits and their implications for future fish stock productivity and resiliency is still in its infancy. Here we invite contributions that address this knowledge gap. This session welcomes experimental, field, and modeling studies that explore the broad spectrum of potential responses to, and consequences of multiple stressors impacting larval fish ecology, physiology, and adaptive capacity.

Complexity and Performance Change During Physiological Development of Larval Fishes

Conveners: Warren W. Burggren, University of North Texas (warren.burggren@unt.edu) and Prescilla Perrichon, University of North Texas (prescilla.perrichon@gmail.com)

The physiology of adult fishes has been studied for centuries, but investigations of physiological processes in larval stages have only recently been a focus of study, even though these biological processes are crucial to our overall understanding of evolutionary history. Failure in development or homeostasis during these critical stages could lead to detrimental consequences for fish welfare/fitness in later stages. Furthermore, fish early life stages are now recognized as indispensable components in various world regulatory settings, as alternative animal

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...European Region, continued from p.6

Hemispheres. Prof Nadine Strydom of Nelson Mandela University in South Africa (left) is working closely with Dr Catriona Clemmesen Bockelmann (right) of the GEOMAR Helmhotz Centre for Ocean Research in Kiel, Germany, refining new applications for the RNA:DNA condition index, typically applied to pelagic marine fishery species, to further understand estuaries in South Africa as larval fish feeding areas. Prof Strydom believes that due to varying freshwater input and nutrient conditions within estuaries, different estuaries provide varying quality food patches to resident fish larvae. The species that is the focus of the work is the small estuary roundherring, Gilchristella aestuaria (Family Clupeidae) that completes its life cycle in South African estuaries and is a pivotal fodder fish in these ecosystems. Survival and success of this species underpins the estuarine food chain and biochemical techniques are proving a useful tool in expanding our knowledge of fish condition.

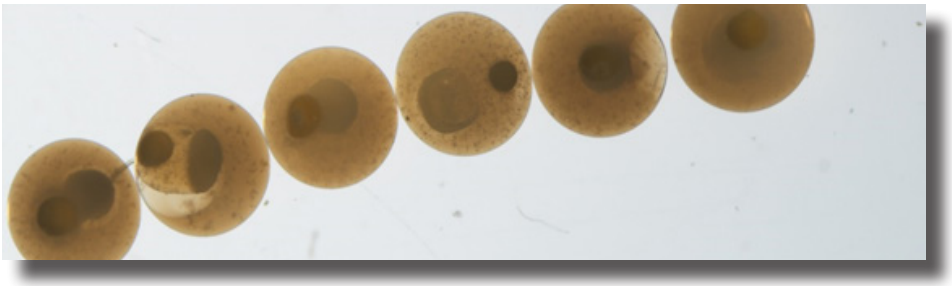
-- Dr Catriona Clemmesen Bockelmann §

...Northeast Region, continued from p.8

on an archive of unidentified eggs collected during the NOAA Northeast Fisheries Science Center's Ecosystem Monitoring (EcoMon) survey. Since 1999, sampling has been conducted up to 6 times per year using a random stratified design and collecting approximately 120 samples per cruise with a 60-cm bongo with a 333-micron mesh net. – I had something similar to this but then Dave changed the wording, but I like this better so I'm going to keep it.

Atlantic mackerel eggs have unique distinguishable characteristics that separate them from other species. They range in size from 1.01 to 1.28 mm with an average diameter of 1.13 mm and have one oil globule ranging from 0.25 to 0.35 mm. Eggs can be identified at 5 different developmental stages ranging from just fertilized to about to hatch with stage 4 and 5 identifying damaged and dead eggs, respectively.

Close coordination between scientists at the Maurice Lamontagne Institute (Division of Fisheries and Oceans lab) and US scientists at the Northeast Fisheries Science Center have occurred over the duration of the project. US scientists ventured up to Mont-Joli in order to learn how Canadian scientists identify eggs and calculate their Atlantic mackerel egg index with the goal of developing a comparable index for mackerel in US waters.



Stage 1 Atlantic mackerel eggs, within 36 hours post-fertilization

Historically, NW Atlantic mackerel spawn in two locations. The coast of Southern New England and the Gulf of St Lawrence (Sette, 1943). The early results of the project indicate that the spawning grounds within US waters have shifted northward, and the total egg production has declined substantially from 2000 to 2013. There is very little evidence of spawning left off the coast of Southern New England. The majority of spawning for the southern contingent now occurs within the western Gulf of Maine. Another product of this work is an estimate of the relative egg production in U.S. and Canadian waters. While historical work in the 1930s suggested that the Southern New England was the dominant spawning ground, our study indicates just the opposite, with Canadian egg production being about an order of magnitude more than U.S. egg production.

The goal moving forward is to finalize this work by the summer of 2017 in time for the Atlantic Mackerel stock assessment in the United States. The final product will include a stock wide index of spawning stock biomass from the year 2000 to present with the hope of continuing the index into the future.

References

Sette, O. 1943. Biology of the Atlantic mackerel (Scomber scombrus) of North America. Part I: Early life history, including the growth, drift, and mortality of the egg and larval populations. Fishery Bulletin 38.

-- Lauren Carter §

Newly published paper from the NEFSC

Simpson, C.A., M.J. Wilberg, H. Bi, A.M. Schueller, G.M. Nesslage, and H.J. Walsh. 2016. Trends in Relative Abundance and Early Life Survival of Atlantic Menhaden during 1977-2013 from Long-Term Ichthyoplankton Programs. Transactions of the American Fisheries Society. 145: 1139-1151.

.....President's message, continued from p.1

This year's LFC will be held in Austin, Texas (July 12-16, 2017) with the Joint Meeting of Ichthyologists and Herpetologists (JMIH). Lee Fuiman and Chris Chambers are our local points of contact, and they are working with the JMIH organizers to set the stage for another tremendous meeting (thank you Lee and Chris!). Details regarding registration, theme sessions, abstract submission and other information will be forthcoming. Here, I will provide a short list of reasons why this meeting promises to be a great one.

First, although I am most fond of our stand-alone LFCs, there is a measure of excitement and opportunity that comes from our joint meetings with larger societies. Clearly fish eggs, larvae and juveniles are the objects of our affection, but let's be honest--big fish are cool too! As are lizards, snakes, frogs, and yes, even sharks. This meeting will offer a wonderful opportunity to interact with colleagues from around the world who work in related and often overlapping fields of interests. So while you will plan your trip with every intention of sitting through a week's worth of larval fish presentations, you may find yourself drawn to an adjoining room to learn about the evolution of tree frog social behavior, or a phylogenetic reshuffling of cichlids. And, that's okay (really). We may also see some herpetologists at our talks. And, that's okay too!

Second, while a conference the size of the JMIH can be daunting, it is important to remember that we are in many ways having a "meeting within a meeting". All of the things you've come to enjoy about the LFC will be there. As a group, the ELHS will develop our own theme sessions, host our own banquet, and sponsor our own early career events. Student travel funds will again be available through the ELHS, and we'll have our usual Sally Richardson Award raffle and Blaxter Award flag auction. Having the LFC in conjunction with the JMIH allows us to showcase (in a large venue) the contributions of fish early life history research and excellent work being conducted by our section members. So while we will be doing our "own thing", I view this meeting as an excellent opportunity to reach out to other scientists who may not be familiar with the ELHS, and perhaps recruit a few new members.

In addition to having our own ELHS event for early career scientists, the joint meetings typically provide additional career development opportunities and resources for graduate students and postdocs. For example, in the past the JMIH has hosted workshops on using social media to communicate your science with the public, how to prepare for academic interviews, and introductions to R and GIS applications in natural sciences, among others. This year's offerings are still being planned, but students and postdocs should keep an eye out for these additional opportunities of interest.

...continued on p.10

Upcoming Events

The 10th International Flatfish Symposium, entitled "Ten International Flatfish Symposia and 30+ Years of Advanced Research: Flatfish Ecology in 2017"

Agrocampus Ouest and IFREMER are are pleased to announce 10th IFS Symposium, to be convened 11 - 16 November, 2017 in Saint Malo, France.

Following on from the previous meetings, IFS2017 aims to Present emerging research on the biology and ecology of flatfish species across the globe, Quantify linkages between flatfishes, atmospheric, oceanographic, and other abiotic and biotic components of the ecosystem, and Explore management tools for assessing and improving the sustainability of flatfish populations and related human activities (fisheries and aquaculture)

Symposium themes include topics in all areas of research concerning flatfish ecology. Contributions are welcome on:

Ecology (spatio-temporal connectivity along the life cycle, essential flatfish habitats, and understanding short to long term changes),

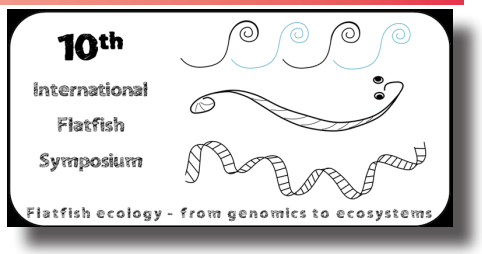
Interspecies comparisons and interactions (flatfish versus flatfish; flatfish versus other species),

Experimental ecology and evolution (observations in the field, common garden, caging etc.), biotechnology, and other research technologies, including aquaculture and other applications,

Anthropogenic pressures (multi-stress: global change, eutrophication, pollution) in addition to (or excluding) fisheries, and

Local- to global-scale issues in research and ecosystem-based management.§

More details on the fantastic IFS website: *www.flatfishsymposium.com/international-flatfish-symposium-2017*



XIth International Larval Biology Symposium

www.larvalbiology2017.org

Aug. 10-13, 2017
Honolulu, HI

The organizing committee welcomes proposals for symposia relevant to larval biology. Proposals must identify two co-chairs and include a symposium title and a short (200 words) session description. Other information about commitments from speakers may be included but is not necessary. Proposals will be reviewed by the local organizing committee:

Amy Moran (morana@hawaii.edu),§

...LFC 2017, continued from p.9

models for understanding vertebrate development, and as effective for assessment of pharmaceutical substances and/or environmental conditions. Study of physiological processes in larval fishes can be highly challenging due to their extremely small sizes and often an extremely rapid developmental progression. Methods and strategies of evaluation have to be constantly rethought and reinvented. The purpose of this session is to bring together expertise with foundational knowledge in the comparative and integrative physiology of larval fishes. A series of key physiological processes will be highlighted, including development and plasticity; regulation/osmoregulation, transport and gas exchange; genomic and DNA integrity; immuno/pathophysiology, respiration and homeostasis; sensory physiology and neuromechanisms; and control and defense of organisms. This session will provide an overview of abilities of larval fishes to face the physical and chemical challenges imposed by an often highly variable aquatic environment.

Nutrition and Feeding of Fish Early Life Stages

Convener: Kenneth A. Webb, University of Texas Marine Science Institute (ken.a.webb@utexas.edu)

Beginning with maternally deposited nutrients and ending with metamorphosis into juvenile forms, nutrition and feeding of early life stages are critical to successful growth and recruitment of all fishes. It is also imperative that we understand how the smallest changes in nutrient availability or timing can affect the physiology of fish larvae with effects possibly lasting into adulthood. This session invites contributions that seek a better understand how early life stages acquire and utilize food, deal with variations in nutrient availability, and respond to nutrients later in life following "programming" by diets consumed during early ages.

Assessing and Evaluating Phenotypic Variation in Fish Early Life History Stages: Field Studies, Experiments, and Modeling

Conveners: Klaus Huebert, University of Maryland Horn Point Laboratory (khuebert@umces.edu), Tom Miller, University of Maryland Chesapeake Biological Laboratory (miller@umces.edu), and Chris Chambers, NOAA Northeast Fisheries Science Center (chris.chambers@noaa.gov)

Phenotypic variation of early life history stages influences all aspects of fish biology from taxonomic definitions, to the fitness and fate of individuals, and to population dynamics. This session invites contributions that go beyond characterizing "average" individuals to explore ecological trade-offs among different morphological, physiological, behavioral, and other phenotypic traits of fish eggs, larvae, and juveniles. This includes research on causes (e.g., genetic or environmental) and consequences (e.g., condition or survival) of phenotypic variation as well as insights into the relationships among different traits (e.g., from modeling hypothetical phenotypes or comparing morphometrics of individuals observed in nature).

ELHS's Early Career Workshop: How to Find the Right Scientific Career for You

Do you wonder how and when to start planning your next career move? Are you aware of alternative career paths? This year, the EHLS Early Career (EC) Committee is organizing a 2-part workshop on Career Planning. Part 1 consists of a speed networking event (ca. 2 hours), during which each of 12 senior scientists will chat with 2 EC participants (students, young scientists) for 5 minutes. After 5 minutes, the EC participants will rotate to the next mentor. This pattern continues through the cycle of all 12 mentors. At the end of the event, attendees will gather to continue the discussion. In Part 2 (ca. 1 hour), the EC participants without senior scientists will discuss in small groups how their pre-conceived ideas about their career aspirations may have changed. This event is open to all ELHS members but with limited capacity (24 EC participants and 12 senior scientists). Please sign up early and participate!

For further details and questions about this EC Workshop, contact event organizers, Marta Moyano, University of Hamburg (*marta.moyano@uni-hamburg.de*) and Alison Deary, NOAA Alaska Fisheries Science Center (*alison.deary@noaa.gov*). §

...President's messge, continued from p.10

And then there is the meeting location, Austin, Texas. It was brought to my attention at last year's LFC that many of our international members know relatively little about Austin. So, here are a few "fun facts" about our host city.

Like many things in Texas, it's big. With a population exceeding 930,000, Austin is the 11th largest city in the United States. But the human population is small in comparison to the number of bats. That's right, Austin is home to the largest urban colony of bats in North America, and the LFC will be there in the middle of "bat season" when over 1.5 million Mexican free-tailed bats emerge daily at sunset from their slumber under the Congress Avenue bridge in downtown Austin and swarm the night sky to feed. Sounds like a must-see event! In addition to being the Texas state capital, Austin is also known as the "Live Music Capital of the World". Nearly 2,000 bands and musicians call Austin home, and there are nearly 200 live music venues in town. We should do our very best to check out a few of these!

So there you have it. Another wonderful Larval Fish Conference is in the planning stages, but this time with bats. Lots and lots of bats. What more can you want?

Best regards,

- Frank Hernandez, President (and bat aficionado)§

Early Career Committee: What are we up to now?

After another successful Larval Fish Conference, the Early Career Committee (ECC) would like to acknowledge members of the Early Life History Section and meeting attendees for their continued support. It is now time to start thinking about the 41st Annual Larval Fish Conference (LFC), which will be held in Austin, Texas with the Joint Meeting of Ichthyologists and Herpetologists (JMIH). To prepare for our Early Career events, we have been relying heavily on the feedback from the surveys that we have been circulating since the Quebec meeting in 2014. In addition, the surveys help us gather information for ExComm to recruit and retain early career researchers to our organization.



This year 90 people responded to our LFC follow-up survey: 18 graduate students, 23 postdoctoral/pre-tenure scientists and 49 senior scientists. One of the questions added to this latest survey addressed membership and some possible incentives to entice our affiliate members to become full members, which means that you have paid dues to our Section and also to the American Fisheries Society (AFS). Only full members can vote during the business meeting, which speeds up the decision-making process. The benefits of a full membership are not clear for early career (pre-tenure) members. They suggested incentive such as reduction in conference fees and participation in professional development activities to recruit more full members. Forty percent of the graduate students that completed the survey are affiliate members, with only a single student being a full member, whereas over 60% of our senior researchers are full members. For the postdoctoral/pre-tenure folks, over 40% of the participants were full members and 30% were affiliate members. The 41st LFC will be a great venue to recruit new members through our scientific presentations and professional development activities since we will be meeting with members of the JMIH.

Consistently, finances are a major obstacle preventing early career researchers from attending our annual conferences. Graduate students are often digging into their personal finances to fund their attendance, with some money being contributed from project budgets. However, graduate students did indicate the Grace Klein-MacPhee Graduate Student Travel Grant did reduce the financial burden of attending the conference. Having been students, ourselves, struggling to balance our budgets to attend the conference each year, the Grace Klein-MacPhee travel grant is an excellent and meaningful addition to the organization. Many postdoctoral researchers used external grants and project funds to their attendance, suggesting that they are not able to attend if funding is not available. For our senior researchers, many of them cited time as a reason why they cannot attend the conference annually. Curious about what other organizations our members are involved with, we found that many of the participants also attend meetings hosted by ICES, AFS (national and local chapter meetings), American Society of Limnology and Oceanography, American Society of Ichthyologists and Herpetologists, and the World Aquaculture Society. The allure of our annual meeting is that our meetings are small and filled with many interesting talks. However, as the surveys suggest, time and money is not always on our side.

After reviewing the results of the latest survey, we have decided to focus our upcoming event at the 41st LFC on career planning. We have previously developed workshops focused on grant writing and scientific writing at the Vienna and Solomons Islands meetings, respectively, but our early career researchers (and our more senior researchers too) identified career planning as a high priority topic. When registering for the 2017 meeting, don't forget to participate in our career planning event as a mentor or mentee!

In addition, the questions on surveys are evolving each year so let us know if you have suggestions to improve the surveys or for future workshop topics. We again want to thank you all for you participation and support of the ECC and the mentorship of our early career researchers.

-- Ali Deary and Marta Moyano, ECC Co-Chairs §

Section Business

Elections for Excom Officers

Elections were held for Excom members President-Elect and Secretary-Elect during January, as well as for Southern Regional Representative. Ninety-four members voted, which is less than 50% of the 219 full members that were invited to vote. Pierre Pepin is our new President-Elect, Hannes Baumann is our new Secretary-Elect, and the Southern Region ELHS members will soon be hearing from Trika Gerard to send in material for future issues of Stages. Congratulations and welcome to you all

Message from Pierre Pepin, President-elect,

I would like to express my gratitude to the members of the Early Life History Section (ELHS) for giving me the opportunity to represent them to the American Fisheries Society as well as the broader aquatic sciences community. The ELHS provides a forum through which we can highlight that early life stages of fish play a critical role in population dynamics and connectivity, provide unique insights into changes in biodiversity and the systematic



relationships among species, and offer opportunities to improve food security through enhancements in husbandry and greater understanding of physiology. There are many changes taking place in aquatic environments, from climate change to anthropogenic impacts on freshwater and marine systems, and the gaze of the scientific community has shifted away from the importance and value of early life stages to understanding the consequences of shifts in ecosystem state. I also see this as an opportunity to reach out to researchers by reminding the fish/fisheries community that the ELHS is more than just eggs and larvae; juveniles are also part of the story around what governs the life cycle of fishes. We can also think about providing our members involved in regional bodies (e.g. ICES, PICES) with 2-3 slide information presentations that can be used by to remind the broader community about our activities, newsletter and annual conference. I will do my best to take the opportunity you have given me to work with the Section's executive, regional representatives and members to foster greater understanding and recognition of their research and knowledge, and help enhance opportunities for communication of our activities within and beyond the membership.

Cheers, Pierre

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Message from Hannes Baumann, Secretary-elect

Dear ELHS members,

I would like to thank all of you for voting for me as your new secretary-elect of the Early Life History Section. Becoming more formally involved in the section and contributing towards its success carries a special meaning to me, as I owe much of my professional development over the past 16 years to the interactions I had with many of its members. I honestly would not be where I am today without this international group dedicated to quality science, promotion of young scientists and fun, collaborative ties. After all, I gave my first scientific presentation at the Larval Fish Conference in Bergen

...continued on p.13

Renew your membership for 2017

Please register and renew your membership. About 40% of our members still have not paid the 2017 dues, and our grace period ends soon

.....continued from p.12

in 2002, travelled to the U.S.for the first time to attend the Larval Fish Conference in Lake Placid in 2006, and serendipitously ended up with a research gig in Australia and a post-doc offer in the U.S. because I participated in the Larval Fish Conference in St.Johns in 2007. I'm therefore honored and committed to give back now and work tirelessly to continue ELHS' mission, promote young scientists, and strengthen professional relationships among the sections current and new members.

Cheerio, and greetings
from Avery Point,
Hannes

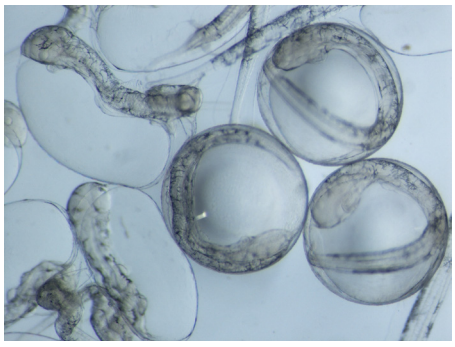
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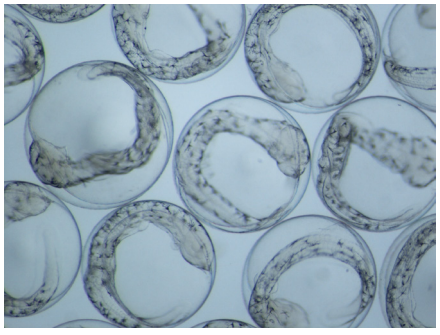
Southern Region Representative

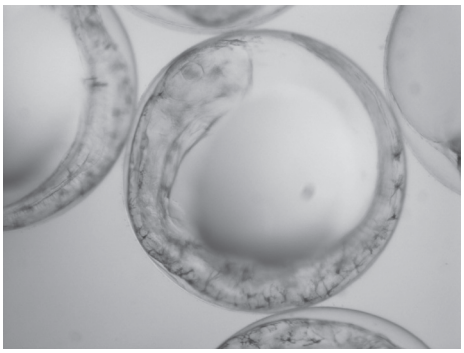
Trika Gerard



Trika is a marine ecologist with National Oceanic and Atmospheric Administration(NOAA), National Marine Fisheries Service (NMFS), Southeast Fisheries Science Center (SEFSC). Her expertise is early life history of fishes with particular focus on larval distribution and transport, food web dynamics influencing larval dispersal, otolith microchemistry of fishes, and recruitment connectivity of fishes. Trika's research is geographically centered in the southeast United States and extends out to the eastern and western Caribbean. As such, she has been afforded the opportunity to collaborate with colleagues nationally and internationally to include Mexico, Cuba and Spain. These research collaborations have been presented to the scientific community at conferences locally and abroad and have been published in peer reviewed journals. She presented results from her research at the 39th, 37th, 36th, 34th, 32nd and 30th Annual Larval Fish Conferences and served on the planning committee for the 37th Annual Larval Fish Conference in Miami, FL, summer 2013. Most recently, her lab participated in processing plankton samples collected in response to the Deep Water Horizon (BP) oil spill of 2010 for the purpose of assisting with the natural resource damage assessment process. Trika earned her Doctorate of Philosophy and Master of Science degrees in Environmental Science from Florida Agricultural and Mechanical University (FAMU) in Tallahassee, FL, where she now serves as an adjunct faculty. She also holds a Bachelor of Science degree in biology from Clark Atlanta University in Atlanta, GA. Currently, she is a professor of Environmental Science and Environmental Ethics at the University of Phoenix, South Florida Campus. She also serves on numerous thesis committees for graduate students at the University of Miami as well as mentor for NOAA Hollings Fellowship interns. Trika is a member of the American Fisheries Society (ELHS), American Chemical Society, and the National Organization for Black Chemists and Chemical Engineers. §







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.***

ELHS has a PayPal account to receive affiliate membership dues. To join ELHS as an affiliate or to renew affiliate status online, go to: *http://earlylifehistory.fisheries.org/how-to-join/* 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."

Editor's Ramblings



Yes, this IS the February 2017 issue, despite the actual date, having suffered a bout of technological and learning-curve problems. Looking out the window here in Bergen, I find plenty of reasons to think it is still mid-February. After all, it's been snowing off-and-on over the past three days. On the other hand, the larval season is gearing up for many of us, and members of the section are involved in a wide variety of projects. Their reports fill this issue, along with messages from our new section officers. Welcome to Pierre and Hannes to Excom, at full strength again. And an even bigger welcome to Trika, as regional representative for the Southern region, so our newsletter team is filled again as well. This issue is full of the details of LFC2017, the upcoming Larval Fish Conference, from the Theme Session descriptions to the attractiveness and highlights of the venue, Austin, Texas. The deadline for abstracts in close, but we're sure the words have been sitting in the back of your minds, ready to spring fully-formed to the submission form. We are looking forward to a great meeting, and a chance to learn more about frogs and lizards in our spare moments. Registration is through the JMIH website: http://conferences.k-state.edu/JMIH-Austin-2017.

Best wishes and come on spring!!

Cindy & Audrey

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