



AFS Estuaries Section News

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Is It Wrong To Be a Mycophilic Fisheries Ecologist?

Many people at my college, the SUNY College of Environmental Science and Forestry (ESF for short), like to fish recreationally. Some in fact are serious anglers, and we have our share of student activities for the sport-fishing inclined. I, on the other hand, work with fish for a living, and even though I could grab a rod and bring it along, I'm usually too busy. So, what do I do to recreate? My hobbies turn out to be terrestrial. I ski in the winter, bike and hike in the summer, and forage in the woods. Nothing is quite as much fun as wandering around in deep woodlands, stalking the wild mushroom.

I have a top ten list of edible fungi, and they go around the seasons. Springtime brings up the morels, black, white, and in between. They are some of the most cryptic mushrooms, as they look like the substrate of dried leaves. Summer brings several kinds of chanterelles as well as numerous kinds of boletes. Other great mushrooms of the season include sulfur shelf, lobster mushroom (really an ectoparasite on another species), and sweet tooth.

Labor Day weekend is our time to hunt for the king bolete, a prized mushroom that has a common name in every language where it occurs (porcini in Italy, cêpes in France, steinpilze in Germany, and Karl Johan in Sweden are examples).

Look at the base of large oak trees in the fall, and you may luck out and find a hen-of-the-woods (known on the grocery store shelves as the exotic maitaki). None of these are your average, run of the mill white mushroom, and each has its own special flavor. Moreover, wild fungi develop their



A former springtime ritual: shad (fresh and smoked), fiddle-head ferns, and morels. Now the shad fishing is greatly reduced or closed in many rivers.

shapes and flavors from their environmental settings. We could call it "terroir," the term for the effect of soils and climate on wines.

This pursuit gets me out and observing my surroundings. Just as an angler reads the water, I read the forested landscape. Over there is a pit and mound from a tree long fallen and decomposed; here is a light patch where a tree was killed by lightning, opening up the canopy. Communities of forest floor plants can tell you about local conditions, whether wet or dry, acid or alkaline. In all this, fungi play a critical role in

Is It Wrong? (cont'd from page 1)

breaking down and recycling organic matter. Furthermore, the mycorrhizal mycelial networks can transport carbon and nitrogen around a forest stand, all invisible to the human observer.

Estuaries may be far downstream of these “fungal forests,” or they may be proximal. So many of our estuaries have been deforested for urban or industrial uses, that it might be tough to find them together. But if you are fortunate enough to visit a coastal preserve with forested wetlands and uplands, you can see the connections of small streams that might provide habitat for young anadromous fishes. Trees overhead moderate the stream temperatures, and the trees and soils mediate the hydrograph. The forested ecosystem feeds the streams, the streams put out the young fish, and

some of those enter the estuarine and marine food webs. Much has been written about the salmon’s “gift of the sea” to forests in terms of marine derived nutrients. Maybe we need to think a little more beyond the estuary edge, and consider the fungi.

At ESF, I’ve started to attend the Plant Ecology weekly lunch seminars. There is much to be gained by crossing boundaries. I encourage you to try it too, in whatever context makes sense to you. Read a book on a subject that you know little about; attend a university lecture on a topic that is foreign to you. You might learn something that sheds insight into what you work with, but from a different angle. Who knows, you may end up collaborating on projects with novel directions? Fish and fungi...

*Karin Limburg
Estuaries Section President*

Governing Board Mid-year Meeting

The AFS Governing Board met April 6-7 in Potomac, MD. The meeting was held there this year so that unit leaders could meet and interact with many of the AFS staffers.

There are some interesting things coming down the pike. New ideas about communicating the value of being a fisheries professional (and a member of AFS), are being developed by the new head of communications, Martha Wilson. The new website has been rolled out – same address as before (www.fisheries.org). You can examine it and send comments as to how you like it. Policy statements are going to be re-visited and the plan is to revitalize many and perhaps retire others. Additionally, the AFS is developing a briefing book for the next US presidential administration – a near-final draft will be shown at the Kansas City meeting. If you would like to have input, contact Tom Bigford (tbigford@fisheries.org).

There will be a number of interesting workshops offered at the KC meeting, so keep an eye out for those. Other things I will report on later include a developing initiative on distance learning.

*Karin Limburg
Estuaries Section President*

Out of breath and hungry: the effects of hypoxia on feeding dynamics of Atlantic croaker using natural chemical tags.



John Mohan, 2015 Student Travel Award Winner. University of Texas at Austin.

Hypoxia, or low dissolved oxygen, occurs in many aquatic ecosystems across the world. Hypoxia is a natural phenomenon that requires specific conditions to form. These factors include stratification between surface and bottom waters and increased primary production resulting in algal blooms due to increased nutrient inputs. Nutrients are delivered via river water, which transport agricultural fertilizers and urban wastewater from inland areas to distant coastal locations. When higher amounts of nutrients are put into an aquatic system, typically lower concentrations of dissolved oxygen occur in bottom waters. The Mississippi River drains one of the largest watersheds in the United States, which contributes to nutrient enrichment in the northern Gulf of Mexico coastal zone. The hypoxic zone in the northern Gulf is famously known as the 'Dead Zone,' referring to the high mortality of benthic organisms, especially for species with limited mobility.

Previous studies have demonstrated a wide diversity of effects of hypoxia exposure on Atlantic croaker, ranging from enhanced foraging to reproductive impairment. These studies have utilized short-term trophic and molecular markers such as stomach content analysis and expression of hypoxia-related genes, revealing exposure information on the scale of days. However, mobile fish may swim away and avoid hypoxia, aggregate near the edges of hypoxia to capitalize on stressed prey, or experience habitat compression to regions of suboptimal conditions resulting in reduced growth rates. Few studies to date have utilized long-term markers of hypoxia exposure, such as otolith (ear stone) chemistry, in combination with long-term markers of dietary history such as tissue stable isotopes, to link chronic sub-lethal hypoxia exposure to changes in food web dynamics.

Otoliths, calcified structures forming part of the inner ear organ, constantly accrete layers as fish grow and can be used to determine fish age, and reveal environmental exposure histories. As otoliths grow, dissolved elements from the environment pass through the gills, enter the blood, and get deposited into the calcified otolith layers, providing a permanent record of the environment a fish occupied. For example, the element barium is found in low concentration in marine habitats, but high concentration in freshwater habitats. When fish migrate across salinity gradients the barium concentration in the otolith layer reflects fish migration between habitats. The element manganese is redox sensitive,

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Effects of Hypoxia, cont'd

meaning it will display high dissolved concentration at low oxygen levels. It was hypothesized that fish exposed to hypoxic conditions would incorporate higher dissolved manganese into their otoliths, and thus otolith manganese could be used as a proxy of the oxygen conditions a fish experienced over its entire life.

This research utilized both controlled experiments and natural field collections to explore the effects of hypoxia on Atlantic croaker trophic ecology in the northern Gulf of Mexico using a dual natural chemical tag approach. Otolith chemistry was used to determine the level of hypoxia exposure fish experienced throughout life and muscle tissue stable isotopes were used to examine the long-term dietary history of the same fish. Laboratory experiments provided validation of otolith-water chemistry relationships and diet-tissue stable isotope relationships that were essential for accurate interpretation of data from natural croaker collections in the northern Gulf hypoxic zone.

In the northern Gulf of Mexico 'Dead Zone' Atlantic croakers and water samples were collected from locations with low oxygen and high oxygen concentrations during the fall and summer seasons. Trace element profiles in otoliths of croaker were

used to estimate environmental exposure histories over the 2-3 months prior to capture. Otoliths were analyzed using a laser across the growth bands to quantify profiles of manganese as an indicator of oxygen conditions and barium as a proxy of salinity conditions and estuarine habitat use. It was

important to differentiate between inshore estuarine and coastal habitat residence because the croaker are highly mobile. Estuarine residence and hypoxia exposure indices were developed based on otolith chemistry, and used to identify similar groups of fish that included late estuarine migrants, early estuarine migrants, coastal residents, and hypoxic coastal resident fish. Muscle tissue stable isotope values of carbon and nitrogen that also reflected 2-3 months of recent dietary history were

then used to estimate isotope niche areas that describe the overall diversity of fish diet. Fish demonstrating more estuarine habitat use displayed larger niche areas, while normoxic and hypoxic coastal resident fish exhibited small and statistically similar niche areas. Similarity in trophic measures between hypoxic and normoxic fish suggest trophic resilience of demersal croaker to hypoxia in the northern Gulf of Mexico over seasonal time scales. A combination of otolith chemistry and tissue stable isotopes further enhances our understanding of fish responses to sublethal hypoxia and the potential consequences for ecosystem functioning.



Author John Mohan measuring a spotted seatrout (*Cynoscion nebulosus*) before implanting an acoustic tag for a movement study sponsored by the Nature Conservancy at Half Moon Reef in Matagorda Bay, TX

John Mohan

Meet the Section's President-elect, Lynn Waterhouse

KL: You're a doctoral student at Scripps Institute of Oceanography. Tell us a little about what you're doing there, research-wise.

LW: I am currently a 4th year student in Brice Semmens' lab at the Scripps Institute of Oceanography (SIO). I am doing my PhD in the Biological Oceanography program. I am in the process of wrapping up the first statistical assessment of white seabass using stock synthesis for the

state of California. Dr. Juan Valero, research scientist at the Center for the Advancement of Population Assessment and Methodology (CAPAM), has been working on the assessment with me. At the start of March, my lab wrapped up our 2016 field project, which we call "Grouper Moon." It is a joint project between the Reef Environmental Education Foundation (REEF.org), SIO, and the Department of the Environment in the Cayman Islands. We have been monitoring the population of Nassau grouper around Little Cayman Island. Specifically, we study the population just after the full moon in January/February time frame each year, when the fish form a spawning aggregation. We are conducting a variety of studies to help



Reef Environmental Education Foundation field work 2014. From left to right – Lynn Waterhouse, Brice Semmens (advisor) and grouper moon volunteer Hal Peterson at aggregation site.

monitor the recovery of the population and to help evaluate the management regulations that the Cayman Islands government has in place. Part of my thesis work involves using

data from an in situ mark/re-sight study we do on the Nassau grouper to estimate population size. We do all of our external tagging and tag re-sighting while scuba diving.

I am also working on a project with Dr. James Thorson, NOAA Fisheries, in which we plan to evaluate the use of delay-difference models for assessing stock status in the US, as a tradeoff between simplistic models (e.g., surplus production models) and state of the art statistical catch-at-age models like those implemented stock synthesis.

KL: What did you do before that?

LW: Before I came to SIO, I completed a Master's degree in statistics at Pennsylvania State University. It was actually thanks to my first Master's advisor, Dr. John Hoenig at Virginia Institute of Marine Science (VIMS), who encouraged (tricked) my officemate at the time and me into taking some statistics and mathematics courses at the College of William and Mary (the parent university of VIMS). Statistics became one of those subjects where for me, the more I know the more I want to learn. It has been a really great skill to have. I believe the training and

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Waterhouse Interview, cont'd

degree in statistics has opened doors for me for research, funding, and also collaborations.

KL: What inspired you to get into marine and estuarine science?

LW: I was lucky enough to participate in an REU (Research Experience for Undergraduates) at the University of Alaska Southeast just after my sophomore year of college at University of Dayton. I helped work on a project monitoring populations of ringed seals living near Barrow, Alaska. I discovered that I really enjoyed field work and I enjoyed finding unique ways to analyze data. Since that time I have continued to have great advisors, mentors, and professors who have encouraged my interest in marine science along with statistics.

KL: How did you get so involved in the American Fisheries Society, and specifically, our Estuaries Section?

LW: When I was a graduate student at VIMS I was a recipient of one of the student travel awards from the Estuaries Section and during the business meeting I volunteered to be the secretary of the section. That year there were no other volunteers. It seemed like a great way to give back to the section, which had assisted me in being able to attend the AFS meeting and present my work, and also to find out more about how AFS and the Section works.

KL: What do you think are the most important things that the Section can do?

LW: Having been a recipient of one of the student travel awards, and as a current student, I can say that providing funding and opportunities to students is a very important thing for the Section to continue to support. I also hope that we can continue to put more of a spotlight on the excellent work that our members do. Konstantine [Rountos, Section Treasurer] has done a great job with the LinkedIn site, and I hope the Section continues to look forward for more ways to foster collaboration and discussion within the Section and also with the greater scientific community at large. I feel like science communication continues to grow in importance, so hopefully the Section can continue to support symposia at meetings, highlight members' work, and other forms of outreach.

KL: Do you have any cool ideas for the Section?

LW: We discussed this a bit during the last board meeting, but I think hosting video or photo essays on a "day in the life of" segments by our members could be really interesting. I think it would be a great way for us to engage in some outreach with K-12 schools and also publicize our own work.



Nassau grouper, Epinephelus striatus



2016 KANSAS CITY, MISSOURI

August 21-25
146th Annual Meeting



AFS Estuaries Section Sponsoring Three Symposia

Effects of Drought on Aquatic Resources, Fisheries Management, and Mitigation Strategies

Chairs:

Stephan Magnelia & Kevin Mayes, Texas Parks and Wildlife Department

Organizers:

Matthew Altenritter, Department of Life Sciences, Texas A&M University

Lindsay A. Campbell, Biological Sciences, North Carolina State University

Karin Limburg, State University of New York

Stephan Magnelia & Kevin Mayes, Texas Parks and Wildlife Department

Tom Lang, Texas Parks and Wildlife & AFS Fish Habitat Section

Ryan Roberts, Association of Fish and Wildlife Agencies

Prolonged and intense drought as a result of climate change is becoming a more frequent occurrence in many parts of the world with varying impacts to freshwater and marine fisheries resources. Coupled with increased human water demands reservoir, river, and estuarine systems face unprecedented drought-induced stress including reduced instream flows and freshwater inflows, reduced or fluctuating water levels, and altered water quality. Addressing these ecological issues however will need to occur in consideration of human water needs. Sustaining aquatic resources while balancing human need is challenging and innovative solutions are needed to maintain ecosystem and species health until the rains come again. Critical discussions that encompass water rights, other sector water needs (agricultural, power, municipal, etc.), and efforts to coordinate multifaceted water management plans are needed. Whether you are in drought conditions now, recovering from the last dry spell, or waiting for the next one there is much to learn about how fisheries managers might mitigate for these conditions. This symposium will draw from the experiences and examples of those involved in managing freshwater and estuarine fisheries, and water resources while attempting to bridge the gap between ecological and anthropogenic water needs. Primary aims are to provide examples of how fisheries scientists can more effectively navigate through droughts to make the best out of these difficult and complex situations and provide a platform for discussion of future water allocation challenges and how to reach collaborative solutions.

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Estuaries Section Symposia, cont'd

Inland Drivers of Coastal Hypoxia

Organizers:

Gwen White, U.S. Fish & Wildlife Service

Thomas Bigford, American Fisheries Society

Mary C. Fabrizio, Virginia Institute of Marine Science

Karin Limburg, State University of New York

Benjamin Walther, Texas A&M University

Major fisheries and aquatic habitat restoration efforts are stymied in coastal waters, such as the Long Island Sound, the Potomac and Gulf of Mexico, due to upstream land use impacts causing nutrient amplification, algal blooms and depleted oxygen in both local waters and many miles downstream. Hypoxia can exacerbate stress on commercial species, degrade habitat, shift ecological communities and destroy fisheries-dependent cultures and economies. Individual estuaries and species may differ in their response to eutrophication and hypoxic conditions. Fisheries biologists must understand and communicate these water quality impacts with other sectors that make decisions regarding working lands that cause habitat impairments. Similarly, fisheries allies may exist among sectors that also rely on high quality source water for drinking, industry, and recreation. For example, according to water quality models, Midwestern states within the upper Mississippi River watershed currently contribute the greatest nutrient load to the Gulf of Mexico hypoxic zone. Recent extensive new tile drainage and reversion of Conservation Reserve Program lands to row crops in the Dakotas and Minnesota, as well as increased irrigation in central and southwestern portions of the basin, may dramatically reduce fish and wildlife habitat across the Mississippi Basin and substantially increase nutrient loading to the Gulf. Properly positioned, upland and riparian wildlife conservation actions can also filter nutrients in addition to providing habitat. Conversely, water quality improvement practices can benefit fisheries and aquatic habitat. In the future, landscape scale challenges such as climate change and socioeconomic conditions will continue to drive both the causes and consequences of hypoxia. To reduce local and downstream water quality impacts to fisheries and aquatic resources, the conservation community must have reliable predictive models, optimization tools, and evaluation metrics to prioritize and adaptively manage the design and configuration of conservation actions that detect and alleviate hypoxic impacts.

Estuaries Section Symposia, cont'd

Fisheries Management from the Great Lakes to the Gulf: Sea Grant's Role in Research, Outreach, and Building Partnerships along the Mississippi River

Chair: Jayson Beugly, Illinois - Indiana Sea Grant and Purdue University

Organizers:

Laura Kammin, Illinois-Indiana Sea Grant

Matthew Bethel, Louisiana Sea Grant - Louisiana State University

Abigail Archer, Cape Cod Cooperative Extension & Woods Hole Sea Grant

C. Eliana Brown, Illinois-Indiana Sea Grant

In honor of the 50th anniversary of Sea Grant, this symposium will focus on inter-jurisdictional management issues along the Mississippi River and the research and outreach contributions made by Sea Grant programs. Nutrient loading, sedimentation, navigation, recreation, hydropower, water quality, and climate change all serve to impact aquatic biodiversity in the river. The introduction, spread and establishment of nonnative species is also widely regarded as a leading threat, as the river serves as a potential pathway for expansion of nonnative species between the Mississippi River and the Great Lakes Basin. Sea Grant and its partners are pursuing multiple initiatives to tackle these issues along the river from Minnesota to Louisiana. The proposed symposium aims to bring together researchers and managers from a wide range of disciplines to highlight ongoing research, discuss innovative tools to enhance fisheries management, and to explore opportunities for future partnerships in the region.



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Registration is now open at
<http://2016.fisheries.org/registration/>

Estuaries Section Treasurer's Report

submitted on 4/5/2016
by
Dr. Konstantine J. Rountos

Date	Balance	Credit	Debit	Note
10/29/2015	4052.42			Treasurer's Report (Winter newsletter)
10/29/2015	3992.42		60.00	Check #106 (AFS Invoice 7766, 7774, 7782)
11/03/2015	3741.13		250.69	Check #107 to L. Waterhouse "Monsters" t-shirts
12/03/2015	2711.60		1030.13	Check #109 to MFS for An- nual Mtg. costs
12/04/2015	2696.60		15.00	Check #108 (AFS invoice 7786)
04/05/2016	2696.60			CURRENT BALANCE

Note: AFS invoices are for 2015 AFS Annual Meeting plaques and certificates.

Check us out online!

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