AFS Estuaries Section News

Winter/Spring 2017

Newsletter Editors

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President's Corner

As I write this, WINTER is finally upon us in the Northeast. As the data tell us, it appears that winters are arriving later and later in these parts. I wonder if section members in other places see similar patterns? Despite what the new federal administration says, all of us who study nature know that climate change is real, and it is happening now. I'll share an anecdote with you at the end of this column.

As you know, we in the Executive Committee were preparing to go to paper ballot to hold our current elections and to revise our bylaws. Happily, that turns out not to be needed, as the bylaws were revised back in 2007. The revised version will be up on our website soon.

Speaking of candidates, we will be presenting you the slate of candidates and their statements in this issue of the newsletter.

In other news, we are fielding two symposia in co-sponsorship with other sections, and are also developing a new "Monsters" session, this time focused on habitat science. Our section is doing this in collaboration with the Marine Fisheries and Habitat sections, and progress is going well. Stay tuned for an announcement of this in *Fisheries Magazine* this spring.

The mid-year Governing Board meeting was held in Mystic, CT on the heels of the Southern New England Chapter (SNEC) meeting. Former section president Lee Benaka represented us there, and president-elect Lynn Waterhouse joined in by Skype.

Members, I want to share with you a little data in this column. I receive an email about once a month from the AFS Membership coordinator, with current

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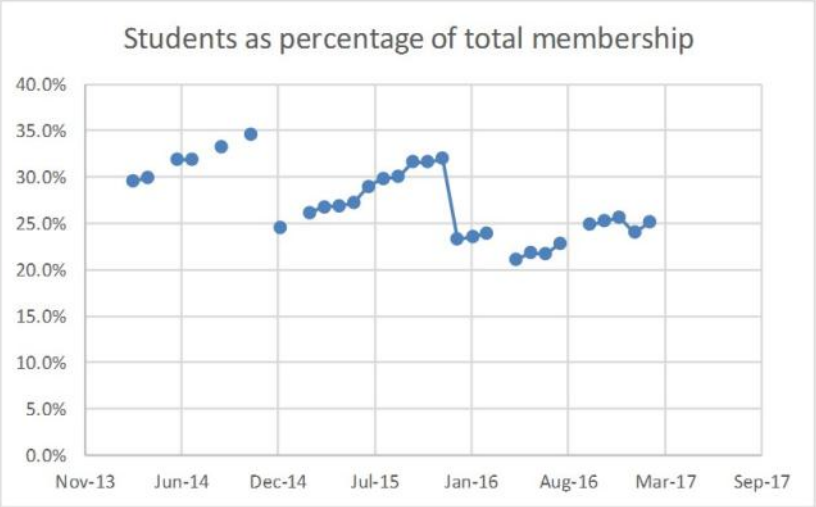
(cont'd from page 1)

membership lists. I started to receive them in 2014. I finally had a chance to synthesize and summarize some of the data so I could look at trends during my three years of involvement:

The total numbers more-or-less mirror trends in the Marine Fisheries Section, and appear to reflect the lower turnout in 2016 for the inland annual AFS meeting (nevertheless, it was a great meeting). I expect we will get better turnout in 2017, given that we'll be meeting in Tampa. In fact, our February numbers jumped considerably, so I am optimistic overall. Somewhat troubling are the data on student representation in the section, which seem to have leveled at 25%. Folks, how do we get students more involved? I'm open to ideas. But the silver lining appears to be that young professionals are being retained in the section, and may even be growing a bit. (The dips represent the end of year, when members haven't yet renewed.)



Now for the anecdote: it's a climate science tale. Way back in 1988, working for Cornell's Ecosystems Research Center, I participated in a climate change conference in New York City. The conference was to bring together ecosystem scientists with climate scientists to try and resolve the differences in scale of their models (basically, the climate models then treated the biosphere as a giant chloroplast). But the conference was held in parallel with the National Governors' Association meeting, also themed on climate change. We shared plenary talks and lunches – very interesting and exciting. Al Gore got a standing ovation from the electrified audience of scientists, and NASA's Jim Hansen told us worrisome things. Even Ted Turner showed up.

I happened to be sitting at lunch with some preeminent climate scientists who were trying to explain to some governor aides what their models were predicting. They said "Well, our models are crude, but tell us that there will be a transient period over the next 20-40 years in which energy from the heating will be distributed through ocean, land, and atmosphere. This will manifest as more variable climate. There will be harsher winters, hotter summers, more and larger storms, maybe more hurricane activity…*and then, after this, it will start to warm up*." This was back in 1988. Do you think they were on track, folks?

Karin Limburg
Estuaries Section President

Estuaries Section Treasurer's Report

submitted on 3/27/2017
by
Dr. Konstantine J. Rountos

NO TRANSACTIONS SINCE FALL 2016 NEWSLETTER

Recent transactions:

Date:	Balance	Credit	Debit	Note:
11/15/16	2,663.23			Fall 2016 Newsletter
03/27/17	2,663.23			Current balance

2017 Elections for Estuaries Section Executive Committee

The Estuaries Section is fortunate to have excellent candidates for our Officer elections. Section members will receive electronic ballots in April. Elected officers will be installed at our 2017 business meeting in Tampa, FL. And will serve a 2 year term. Following are candidate statements from President-Elect candidate Catherine Johnston, Secretary candidate Geoffrey Smith, and Treasurer candidate Konstantine Rountos.

Position: President-Elect

Candidate: Catherine Johnston

Educational Background:
B.A. Bowdoin College (2012)
M.S. in Marine Biology, University of Maine (graduated August 2016; thesis "Shortnose Sturgeon (*Acipenser brevirostrum*) Spawning Potential in the Penobscot River, Maine: Considering Dam Removals and Emerging Threats")

Current Employer/Student Status:
Fish Biologist, Delta Juvenile Fish Monitoring Program, U.S. Fish and Wildlife Service, Lodi, California

Please describe how you have been involved with AFS in general and with the Estuaries Section in particular:
I joined AFS in 2015, when I was a graduate student at the University of Maine in the School of Marine Sciences. At the same time, I joined the Education, Marine, and Estuaries Sections. In the summer of 2015, I received the Estuaries Section Student Travel Award to attend the annual meeting in Portland, OR. While in Portland, I went to the joint Estuaries and Marine Sections meeting and learned more about the Estuaries Section's activities and members. I wrote an article for the Winter 2015 Estuaries Section newsletter and helped review applications for the 2016 Estuaries Section Student Travel Award. As a graduate student, I was also active in the University of Maine Student Subunit of AFS and served as secretary from 2015 to 2016. During my time in the Student Subunit, I helped organize many local outreach activities, skills workshops, and two local 5k "Spawning Run" races.

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Catherine Johnston Candidate Statements cont'd

What goals do you have for the Estuaries Section in the next two years?
As the President-Elect, I would be excited to assist the rest of the executive committee with all the Estuaries Section's activities, from organizing symposia at the annual AFS meetings to producing content for the website and newsletter. As someone working in the San Francisco Estuary, I'd hope to strengthen the Estuaries Section's presence in my region. Estuarine health is a significant concern in the area, with a large volume of work done about estuaries, and this could be better represented in the Section with greater involvement from people in the area. As an early career scientist who just recently completed graduate school, I think my perspective on involvement in AFS activities as both a student and young professional could also be useful in guiding the Estuaries Section in promoting greater involvement of young people. Greater membership and involvement by young people would benefit both the Estuaries Section and AFS as a whole. I think that the Estuaries Section website can be a powerful tool to connect and inform members and others interested in estuaries. I'd like to see the website serve as a useful and current source of information, with news and announcements posted frequently. More frequent member contributions to the website, and other Estuaries Section products like the newsletter and Facebook page, can help keep members connected and up-to-date about the great work everyone does around the country concerning estuaries.

Position: Treasurer
Candidate: Konstantine J. Rountos

Educational Background:
PhD (Stony Brook University, 2014)
MS (Stony Brook University, 2008)
BS (Manhattan College, 2005)

Current Employer/Student Status:
Assistant Professor of Biology,
Department of Biology, St. Joseph's College,
Patchogue, NY

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K. Rountos Statement, cont'd

Please describe how you have you been involved with AFS in general and with the Estuaries Section in particular.

I have served as the Treasurer for the Estuaries section since 2014, when I volunteered to fill the position from Anthony Overton. During this time, I have enjoyed serving as the Treasurer and working with members of the Executive committee and membership. Throughout my term, I have aimed to 1) maintain a high level of transparency, 2) grow the section membership, and 3) organize interesting symposia for the annual meetings. Specifically, this includes creating secure online accounts that fellow Executive committee members can access to see any section transactions or reimbursements in real time. In terms of growing the section, I created and maintain the Estuaries sections LinkedIn account, which as of today has 122 members. I have also been involved in organizing Estuary related symposia at annual meetings, notably at the Portland meeting.

My first introduction to the Estuaries Section came in 2012 at the section business meeting. I was immediately drawn to this section because of its professional aims and friendly community. In 2013, I attended the business meeting again, this time to accept the Estuaries Section student travel award. I was happily surprised that people remembered me from the previous meeting in 2012. It is now fulfilling to be able to create opportunities for students to come to annual meeting with the support of the Estuaries section. I look forward to serving the section for many years to come if elected.

What goals do you have for the Estuaries Section in the next two years?

My two goals for the Estuaries Section are to 1) increase and maintain our membership of young professionals, and 2) further develop our section's role in supporting and developing interesting symposia, workshops, and online courses for AFS members. In particular, I would like to continue efforts to try and establish a special issue of Fisheries each year that is guest edited by the Estuaries Section.

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Position: Secretary
Candidate: Geoffrey Smith

Educational Background:
PhD Candidate (University of Florida)
MS (University of Florida)
BS (New College of Florida)

Current Employer/Student Status:
PhD Candidate (University of Florida)

Please describe how you have been involved with AFS in general and with the Estuaries Section in particular:
I have been a member of the Florida Chapter of AFS since my first year of graduate school in the spring of 2009, and have maintained that membership since then. My advisor for my master's research purchased an AFS membership for me as a birthday gift in 2009. Other than one brief period of time I have maintained that membership, and also subsequently joined both the Marine Fisheries and Estuaries Sections. I have presented and been a co-author on a number of presentations given at Florida Chapter, Southern Division, and parent society AFS meetings. At Florida Chapter meetings and the 2011 Southern Division Meeting held in Tampa, FL I have been a member of several committees that helped in the execution of those meetings. I have also reviewed papers for the AFS Journal: Marine and Coastal Fisheries. I have served as the Estuaries Section secretary for the past two years.

What goals do you have for the Estuaries Section in the next two years?
I would like to see the Estuaries Section maintain and possibly increase our current support for exceptional students attending the annual AFS meeting. This not only aids these student's travel but ultimately can lead to greater student participation in the Estuaries Section. I'd also like to continue our sponsorship of workshops and symposia at the annual meeting, as this helps fund travel grants and future workshops and draws attention to our section at the annual meeting.

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Position: Secretary
Candidate: Jim Vasslides

Educational Background:
PhD Ecology and Evolution (Rutgers University, 2016)
MS Ecology and Evolution (Rutgers University, 2007)
BS Natural Resource Management (Rutgers University, 1998)

What can I say, I really like New Jersey!

Current Employer/Student Status:
I am the Research Scientist for the Barnegat Bay Partnership, one of 28 National Estuaries Programs across the country.

Please describe how you have you been involved with AFS in general and with the Estuaries Section in particular:
I have been a member of AFS since 2005, when I transitioned from working primarily in freshwater wetlands to estuarine/marine systems. I immediately became active in the Mid-Atlantic Chapter, and have served that chapter as Treasurer and am currently serving as Student Judging coordinator. I was also part of the team that put together the winning bid for the 2018 AFS Annual meeting in Atlantic City, and will be the Spawning Run organizer. I have been a member of the Estuaries Section for several years, and was a moderator at the *Resolving the Multiple Impacts of Anthropogenic Eutrophication on Coastal Fish and Fisheries* session the Section sponsored in the 2015 National Meeting. I have also served as a reviewer for both *Fisheries* and *Transactions*.

What goals do you have for the Estuaries Section in the next two years?
Like many of you, I am always surprised that our section does not have a larger membership given the number of students and fisheries professionals that we all know who work in estuaries. Over the next two years I would like to focus on highlighting the benefits of section membership to students and early career professionals. While our section may not be the largest, it provides ample opportunities for those earlier in their fishery life histories to engage in meaningful leadership activities, including developing symposia and organizing special events (Monsters of…). I believe that continuing Karin's efforts to bring in fishery-minded members of CERF and its regional affiliates should be continued.

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I am also interested in offering educational/training opportunities on topics of interest to our members, and not just at national meetings. This could be particularly fruitful for cross-disciplinary themes, where we could use these opportunities to make ourselves better known to members of other sections.

FEATURE ARTICLE

Comparing qualitative and quantitative metrics for identifying forage fish in Pamlico Sound, North Carolina

By Samantha Binion-Rock
2016 Estuaries Section Student Travel Award Winner

Adviser: Jeff Buckel
North Carolina State University
Center for Marine Sciences and Technology
Department of Applied Ecology

In recent years, there has been an increased interest in identifying forage fish. Many forage fish are harvested and managed using single-species approaches. From a single -species perspective the stock may not be experiencing overfishing, but overfishing may be occurring at the ecosystem level. For example, the allowable harvest of Atlantic menhaden (*Brevoortia tyrannus*) along the Atlantic coast was reduced after their importance as forage species was accounted for (Williams et al. 2012). Several metrics and approaches have been developed to help fisheries managers identify forage fish. These metrics have been developed by analyzing food habits data and multispecies models that often come from oceanic environments. It is unknown how well these metrics translate to estuarine systems. Here we compared multiple metrics to identify forage fish in a North Carolina estuary.

We sampled 16,979 stomachs from 24 finfish species collected from two fisheries-independent surveys in Pamlico Sound, North Carolina in 2012 and 2013 conducted by the North Carolina Division of Marine Fisheries. The first survey is a gill net survey conducted from mid-February through mid-December and the second survey is a trawl survey conducted in June and September. We sampled a variety of

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predators that support commercial and/or recreational fisheries (e.g. southern flounder (*Paralichthys lethostigma*), spot (*Leiostomus xanthurus*), striped bass (*Morone saxatilis*), and red drum (*Sciaenops ocellatus*)). We also sampled fish that are not harvested, but are ecologically important in Pamlico Sound because they are higher trophic level predators (e.g. longnose gar (*Lepisosteus osseus*) and inshore lizardfish (*Synodus foetens*)) or are numerically abundant (e.g. silver perch (*Bairdiella chrysoura*) and pinfish (*Lagodon rhomboides*)). For both surveys, predators were stored on ice and brought back to the lab where length (TL or FL; mm), weight (0.1 kg), and sex were recorded. Predator stomachs were removed and frozen until they were ready to be processed. Frozen stomachs were thawed and the stomach contents were identified to the lowest possible taxa and individual prey items were weighed (0.01 g) separately.

Ms. Binion-Rock accepts the 2016 Student Travel Award from Estuaries Section President Karin Limburg.

Forage fish were identified using three metrics: qualitative, connectance, and SUpportive Role to Fishery ecosystem (SURF). Qualitative metrics have been independently developed by multiple groups, but typically share several of the same criteria that include: having small to moderate size as adults; comprising the largest vertebrate component of a system by both abundance and biomass; having high levels of predation on all life stages; occupying lower trophic levels, typically around 2 or 2.5; having high number of trophic linkages; forming schools; and high variable inter-annual recruitment (Pikitch et al. 2012; Houde et al. 2014).

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Connectance was quantified using diet data at the presence/absence level as

$$\text{connectance}_i = \frac{n_i}{L}$$

where n_i is the number of predators that consume prey *i* and *L* is the total number of links in the food web (Smith et al. 2011).

SURF is calculated as

$$\text{SURF}_i = \frac{\sum_{j=1}^{S} p_{ij}^2}{L}$$

The stomach contents of a longnose gar (*Lepisosteus osseus*)

where p_{ij} is the proportional contribution of prey *i* to predator *j*'s diet by weight, *L* is the total number of links in the food web, and *S* is the number of predators (Plagányi and Essington 2014). For each predator, p_{ij} was estimated using a spatially-explicit kernel density approach. This is a novel method we developed to account for *intra*- and *inter*- haul correlation of diet items when fish are sampled from nets. Forage fish analyses were performed separately for each survey. Each metric was calculated separately for each year and with the food habits data pooled across the two years.

We found several differences between the two surveys. Predators from the gill net survey were larger (μ ± sd; 397.8 ± 193.7 mm) than predators from the trawl survey (159.9 ± 43.6 mm). The diet composition of predators were also different between the two surveys. In both surveys, there were invertebrate and fish prey that were large contributors to the predators' diets, but there was a larger contribution of fish prey to gill net-collected predators. Mysids (Mysida), polychaetes (Polychaeta), Mollusks (Gastropoda and Bivalvia), and anchovy (*Anchoa mitchilli* and *A. hepsetus*) were some of the more dominant prey found in the trawl-collected predator stomachs. In the gill net survey, dominant prey include Atlantic menhaden, Atlantic croaker (*Micropogonias undulatus*), polychaetes, mysids, and gammarid amphipods (Gammaridae).

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Using the qualitative metric, three prey, Atlantic menhaden, anchovy, and silversides (*Menidia menidia*, *M. beryllina*, and *Membras martinica*) were identified as forage fish in Pamlico Sound. This metric places a strong emphasis on the life history characteristics of the prey which can result in prey types not heavily consumed being considered as forage. Except for bluefish (*Pomatomus saltatrix*) and spotted seatrout (*Cynoscion nebulosus*), silversides do not contribute more than 5% to any predator's diet and were only present in 10 of the 24 predator species sampled. Also, both surveys have the same prey identified as forage, despite there being distinct differences in the diets between surveys. Anchovies are mainly important contributors to predator diets in the trawl survey and Atlantic menhaden are important prey to predators collected in the gill net survey. For the majority of predators, these three prey contribute less than 50% to the total diet and there are many predators (e.g. black drum (*Pogonias cromis*), northern searobin (*Prionotus carolinis*), and pigfish (*Orthopristis chrysoptera*) that do not consume any of these species. The authors that developed the qualitative criteria acknowledge invertebrate prey, not just fish prey can be considered as forage, but it is very difficult to use these established criteria to identify invertebrate species as forage.

Samantha Binion-Rock in the lab.

Twelve prey were identified as forage fish using the connectance metric. These were anchovy, Atlantic menhaden, gammarid amphipods, mollusks, mysids, pea crabs (*Pinnixa* spp.), penaeid shrimp (Penaeidae), polychaetes, porcelain crabs (Porcellanidae), portunid crabs (Portunidae), seagrass, and spot. Only three of these prey (mollusks, polychaetes, and seagrass) were identified as connectance forage for both surveys and both years. Anchovies, gammarid amphipods, penaeid shrimp, and spot were important forage in both surveys, but not for all years. Mysids, porcelain crabs, and pea crabs were only considered as important forage for predators from the trawl survey. Mysids and porcelain crabs were important both years, but pea crabs were only important in 2012. Atlantic menhaden and portunid crabs were connectance forage for predators for both years, but only in the gill net survey. For the trawl survey, there were more prey identified as forage in 2012 (10) than in 2013 (7) when pea crabs, penaeid shrimp, and spot were no longer included as forage fish. Equal

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numbers of prey (7) were identified as forage in the gill net survey in both years, but it was not the same seven prey for both years. Anchovies and penaeid shrimp were forage fish only in 2012, while gammarid amphipods and spot were only forage in 2013. For most predators, forage identified from the connectance metric accounted for the majority of prey (by percent weight) for both years and surveys.

The SURF metric identified nine prey as forage fish. They were anchovy, Atlantic menhaden, gammarid amphipods, mollusks, mysids, penaeid shrimp, polychaetes, portunid crabs, and spot. Mollusks and polychaetes were identified as SURF forage for both surveys in both years. Gammarid amphipods were considered as SURF forage in both surveys, but not for all years. Anchovies, mysids, and penaeid shrimp were only identified as forage for predators in the trawl survey. Anchovies and mysids were SURF forage for both years, while penaeid shrimp were only forage in the 2012 trawl survey. Atlantic menhaden and spot were forage for both years in the gill net survey but portunid crabs were only SURF forage for this survey in 2012. Despite SURF identifying few prey as forage relative to connectance, SURF forage still accounted for the majority of the diet for most predators.

The choice of metric affected which prey were classified as forage fish. Among all three metrics, there was little agreement on identification of prey species as forage, but agreement was higher between the two quantitative metrics, connectance and SURF. Using all three metrics, anchovies were identified as forage fish in the trawl surveys and Atlantic menhaden were identified as forage fish in the gill net survey. For the trawl survey, all prey identified as forage using SURF (anchovy, gammarid amphipod, mollusks, mysids, penaeid shrimp, and polychaete) were also identified as forage using connectance. However, there were prey identified as connectance forage (pea crabs, porcelain crabs, seagrass, and spot) but not SURF forage. For the gill net survey, both metrics identified Atlantic menhaden, gammarid amphipods, mollusks, and polychaetes as forage. Both metrics also identified portunid crabs and spot as forage, but not for the same number of years. Connectance identified anchovy, penaeid shrimp, polychaetes, and seagrass as gill net forage, but SURF did not.

The quantitative metrics we used performed better at identifying the prey contributing the most to a wide array of predator diets than qualitative metrics. Connectance identified more prey as forage fish than SURF because it uses presence/absence data rather than proportional contribution of the prey. With connectance, prey that contribute small amounts to the diet of multiple predators will be considered forage. SURF was better at identifying only the prey that comprise large portions of the diet for multiple predators. When identifying forage fish, it may be

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wise to use both
quantitative metrics. Some of the prey identified as forage using connectance but not SURF may become important forage fish as their biomass increases or as the biomass of current dominant prey declines.

The gear used to sample the predators had an impact on which prey were identified as forage. The trawl survey sampled smaller predators and the prey identified as forage (anchovies and small invertebrates) are traditionally considered as forage. Spot, which are not typically considered forage were only identified as forage for predators collected in the gill net survey, which were larger on average. Spot support both commercial and recreational fisheries in Pamlico Sound. If only the trawl survey data were used to identify forage, the importance of spot to predators in this system would have been overlooked. We conclude that identification of forage should use food habits data from a wide range of predator sizes so that ontogenetic shifts in diet are accounted for.

Many factors affect which prey are identified as forage fish. It is important to analyze a wide array of predators from multiple data sources to ensure all forage are identified. Forage fish does not remain static through time, so analyses need to be revisited periodically to capture any temporal changes in forage fish. By analyzing multiple data sources using both connectance and SURF, fisheries managers will be able to gain a better understanding of what prey should be considered as forage and be managed conservatively to prevent ecosystem overfishing.

Works Cited

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Plagányi, É. E. and T. E. Essington. 2014. When the SURFs up, forage fish are key. Fisheries Research, 159: 68-74.

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AMERICAN FISHERIES SOCIETY
147TH ANNUAL MEETING
TAMPA, FLORIDA
AUGUST 20-24, 2017

Estuaries Section Proposes 2 Symposia for 2017 Annual Meeting

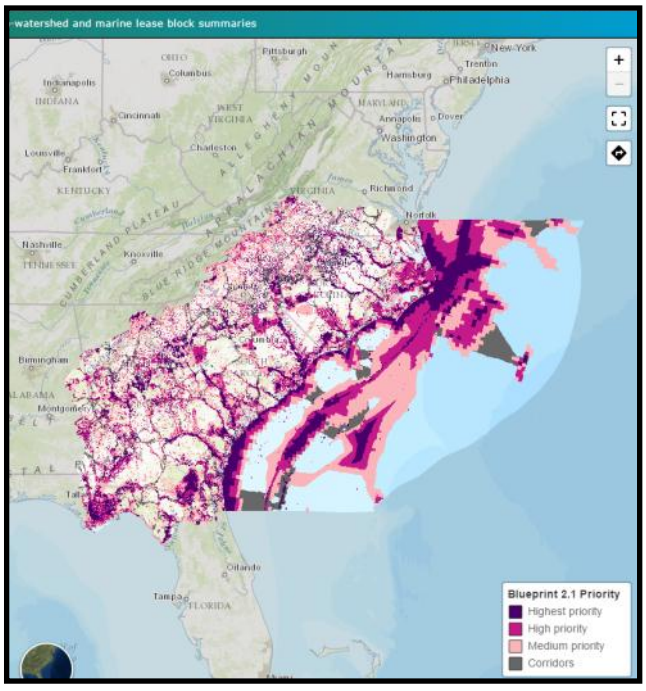
Title: Biology and management of aggregating species in freshwater and marine systems

Organizers:
Lynn Waterhouse, Ph.D, Candidate, University of California, San Diego, Scripps Institution of Oceanography
Selina Heppell, Oregon State University
Scott Heppell Oregon State University

Source: Grouper Moon

Title: Landscape Conservation Cooperatives and Fish Habitat Partnerships Facilitate Networks and Tools for Ecologically Connected Landscapes and Seascapes

Organizer: Gwen White, Science Coordinator, Eastern Tallgrass Prairie & Big Rivers LCC



South Atlantic Conservation Blueprint map.

Monsters of Fish Habitat Science Will Descend on Tampa in August!

Did you ever notice how successful monster movies often spawn sequels? Then it shouldn't be a surprise to hear that the wildly successful Monsters of Stock Assessment Workshop, which took place at the 145th AFS Annual Meeting in Portland, is being followed up by a Monsters of Fish Habitat Science Workshop at the 147th AFS Annual Meeting in Tampa.

Please plan to join the Monsters of Habitat Science for an afternoon of mayhem, mirth, and majorly informative presentations on different aspects of fish habitat science from 12:30-3:30pm on Sunday, August 20.

This event, organized by the AFS Estuaries, Fish Habitat, and Marine Fisheries Sections, will benefit student travel awards for the AFS Annual Meeting. Look for more details in the next Estuaries Section newsletter, and be sure to put this event on your calendar if you are heading to Tampa in August. If you have any questions, or suggestions for great presenters, please contact Abigail Archer (aarcher@barnstablecounty.org)

Check us out online!

Website: http://estuaries.fisheries.org ● Facebook: http://www.facebook.com/EstuariesSectionAFS

LinkedIn: https://www.linkedin.com/grps/Estuaries-Section-American-Fisheries-Society-7443198/