AFS Estuaries Section News Winter 2022

In this issue:

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President's Message

Dear AFS Estuaries membership,

In reflecting on the past few months as the AFS Estuaries Section President, a few things come to mind: uncertainty, resilience, challenge, and opportunity. As our lives and professions are constantly affected by the pandemic, our American Fisheries Society will continue to adapt and respond to challenges in this unpredictable time. We see daily the role science plays in adapting to the challenge of the pandemic with shifting guidance and policies on state and federal levels. We, as the Estuaries Section of the American Fisheries Society must also be willing to adapt to achieve our mission: (1) to encourage the exchange of information pertinent to the broad scope of multidisciplinary estuarine issues among members of the Society who belong to this Section; (2) to support and inform the Society's mission and activities as they relate to estuaries and coastal ecosystems; and (3) to encourage, through awards, leadership opportunities, and other incentives, student participation in the Society and Section.

The increasing use of virtual and remote meetings does have benefits such as broader participation and attendance, but challenges such as personal engagement and technical difficulties. How should we address these challenges to best achieve our mission? It is my hope we can collectively envision the future of the AFS Estuaries Section by reflecting on our past and focusing on our strengths, while also planning for the unpredictable future. We must engage and recruit strong leaders from the next generation of fisheries professionals, including students and early career scientists. One path for reaching new AFS leaders is by engaging AFS student sub-units. If you are a current or previous member of a student sub-unit, please consider how the Estuaries Section can engage with your unit remotely or in person. This initiative will take teamwork and coordination so please contemplate how you can contribute to achieving this goal in the coming years.

The American Fisheries Society held its 151st meeting in Baltimore from November 6 to 10. The Society should be proud of 151 years of amazing contributions to the fisheries profession. I was fortunate to attend the meeting in person and it was great to see so many colleagues' smiling eyes and attend in person events. The poster session was fantastic, and two of our student travel award winners presented excellent posters. Details on the three student award winners research will be presented in upcoming newsletters. The Estuaries Section co-sponsored the symposium "Advances in life history and environmental reconstruction using biogenic structures from marine and aquatic organisms". The session spanned two days and included talks on otolith, vertebrae and eye lens chemistry, stable isotope analysis and bivalve increments. It was interesting to hear several talks on the use of fish eye lenses and several talks discussed using otolith, spine and vertebrae chemistry to enhance age estimates. We thank the organizers of the session for coordinating the latest science in fish biominerals.

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President's Message

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A consistent theme running throughout the conference was a consideration of if we can adapt and evolve to address the current challenges facing fisheries. New exploitable stocks are appearing in previously unfished areas, and ranges of traditional target species are rapidly changing. Can we keep pace with the rate of change? Are current management practices enough to keep our fisheries sustainable? These are some issues to consider as a Society moving forward in 2022.

In this winter 2022 newsletter, you will get introduced to our president-elect Justin Stevens, learn a historical perspective from our past-president Steve Jordan, get a preview of one our student travel award winner's research, and be encouraged to consider a symposium for the annual 2022 AFS meeting in Spokane WA. Best wishes for a healthy and productive 2022!

AFS Estuaries Section President
John Mohan

Get to Know our New President-elect: Justin Stevens

Why did you join the Estuaries Section?

I joined AFS in 2003 when I attended my first annual meeting in Quebec City. I joined the Estuaries section later on in 2017 after attending the annual meeting in Tampa, FL. See a theme? I am a member because I have seen first-hand the benefit of participating in a professional society including network building in research and career themes.

What are you currently working on?

My current work focuses on the ways that diadromous fish use estuaries and the changes that are occurring due to a range of positive and negative anthropogenic factors including river restoration, population recovery, pollution, and climate change. Specifically, I conduct a long-term monitoring survey of fish biomass in the Penobscot River Estuary where all the aforementioned factors are present. Also, I am interested in life history patterns for species like Rainbow Smelt and River Herring and how these might be changing. My passion is for the restoration of Atlantic Salmon and much of my work supports the efforts to protect this iconic species.

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Get to Know our New President-elect: Justin Stevens

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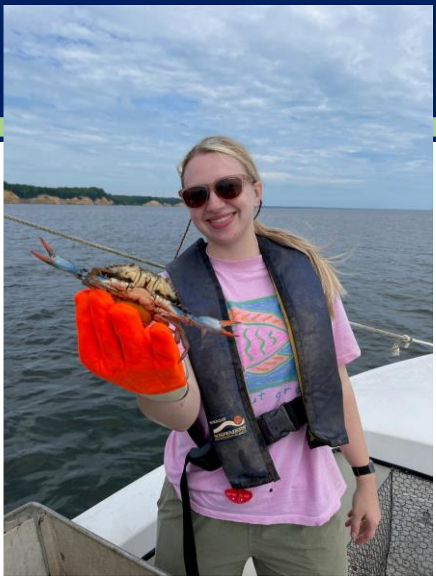
What do you hope to do with the Section when you are president?

As section president, I would like to continue the momentum of our past presidents in engaging the broader AFS network and make sure members know that this section exists and gives a home for the "saltier" members of AFS. I feel we should continue to engage our student subunits to grow membership in the Section. Finally, I want to work to foster interdisciplinary networks given the various technical and jurisdictional connections that working in estuaries provide. In my vision, I see future annual meetings where fish biologists, restoration practitioners, geochemists, hydrologists, meteorologists, climatologists, and fishermen, representing tribal, academic, state and federal entities are tackling the tough challenges of restoring and protecting our estuaries. Yes, I like to dream 'big'.

What is your favorite estuarine fish?

My favorite estuary fish is the Rainbow smelt. I grew up in New Hampshire and Maine and my fondest memories are fishing for smelt in the winter on Great Bay (NH) and Merrymeeting Bay (ME). As a professional, smelt idealize the plasticity of diadromous fish and their use of estuaries for growth and reproduction. I see them as the icon for coastal habitat restoration and climate change in the Gulf of Maine due to their vulnerability from degradation and direct benefit from positive action.

Student Travel Award Winner Article: Amanda Bevans



Amanda Bevans, MS student: Morgan State University
Forecasting Blue Crab Commercial Landings in the Chesapeake Bay: Using the PEARL Blue Crab Survey as a Pre-Recruit Index

The Blue Crab, Callinectes sapidus, is ecologically significant within the Chesapeake Bay and is the most valuable seafood species harvested in the estuary. Morgan State University's Patuxent Environmental & Aquatic Research Laboratory's (PEARL) Blue Crab Survey (BCS) is a 50+ year fishery-independent monitoring survey along the western shore of the Chesapeake Bay in southern Maryland that documents relative abundance and individual sizes of the Blue Crab, as well as environmental conditions. Unlike other annual Blue Crab monitoring surveys, the BCS samples the population while the crabs are active, using gear comparable to the commercial fishery.

Blue Crab are managed jointly by Maryland and Virginia through the Chesapeake Bay Stock Assessment Committee (CBSAC). A top priority outlined by CBSAC is the development of a recruitment index. A secondary priority is to relate recruitment variability to environmental factors. My research at PEARL looked at catch trends from the BCS, where I examined relative abundance, relationships to environmental factors, and the potential application of catch as a pre-recruit index of commercial harvests in the following year. Specifically, I looked at the BCS catch of sub-legal crabs in the fall, and spring commercial landings in Maryland, and annual harvests for the larger Chesapeake Bay.

To collect BCS data, sampling occurs from June to November. 30 Crab pots are baited with menhaden and distributed evenly at three different sites along the Western Shore of the Chesapeake Bay in Southern Maryland. These pots are fished bi-weekly, and the collected crabs are sexed, measured, and weighed.

To explore this potential application as an index of recruitment, a linear model and a Generalized Additive model (GAM) were used to perform lagged analyses. BCS fall catch of sub-legal crabs, or crabs under 5 inches, from 2000-2018 was compared to commercial landing from 2001-2019. To explore environmental trends, a dimensionality reduction technique called a principal component analysis (PCA) and a loess model were used.

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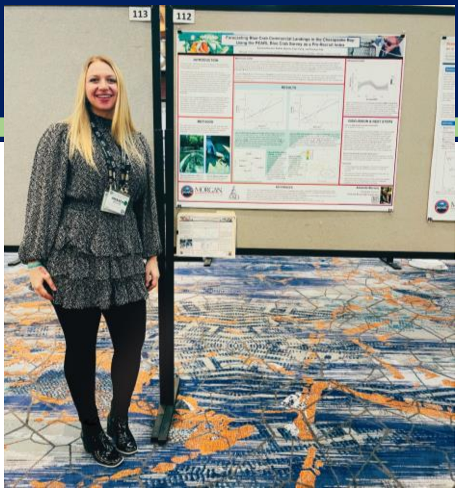
Student Travel Award Winner Article: Amanda Bevans



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Study results suggest that abundance of Blue Crab has declined over the last decade. Environmental variables examined were only weakly predictive of BCS catch, with the exception of the Atlantic Multi-decadal Oscillation (AMO). Our analyses indicate our data can predict commercial landings. There is a good relationship between BCS fall sub-legal catch of the previous year and commercial landings of the following year. This trend is present both Bay-wide and in the Maryland-bay during the spring. When BCS fall sub-legal catch is high, similarly high landings follow. Consequently, BCS catch could be a useful tool to assist Blue Crab management. Additionally, there is a relationship between AMO and BCS catch, and an interesting trend overtime, which could also be incorporated into the predictive model.

Future research to improve the models might include integration of environmental factors, development of an auto-regressive model, and finally the exploration of juvenile recruitment, indicated by BCS catch, and seagrass availability.

Perspectives from Past Presidents: Steve Jordan, Section President 2003-2004

This essay is an overview of the development of estuarine ecology from the 1970s to recent years, strictly from my own perspective and recollections. Two elements have been keys to this development: data and tools. But first, a bit of background.

My career in science started late (in my mid-30s), even later in estuarine science (about age 40). An undergraduate degree in music composition was hardly the best prerequisite. Perhaps the real prerequisite was—from early childhood to early adulthood—the summer days I spent fishing and swimming in Chesapeake Bay, its tributaries, or on mid-Atlantic beaches and back bays. I loved salt water and the ocean then, and still do. When not at the Bay or beach, I often played in freshwater creeks and small rivers in my neighborhood. No science was done, but in hindsight, a career in aquatic ecology was foreshadowed.

Unemployed and broke, between college and whatever, I took a temporary job with the Army Corps of Engineers, monitoring water quality and indicator organisms in reservoirs and streams in southern Ohio and Indiana. The job soon became permanent, and I spent the next six years with the Corps, including a six-month detail to USGS in West Virginia. For most of this period, I hardly knew what ecology was, much less that I was practicing it.

After the USGS detail, I was stationed in eastern Kentucky, where I established a rudimentary water quality laboratory, and did some on-the-job learning in aquatic chemistry and hydrology. Part of the job was collecting benthic macroinvertebrate samples from reservoir inflows and outflows. When I discovered these samples had just been sitting on shelves because there was no contract to analyze them, I took on the job as an MS project at Morehead State University, with support from the Corps.

The MS degree led to a doctoral fellowship at the University of Maryland, starting in 1980. A course in theoretical ecology introduced me to lots of academic literature from the 1960s and 1970s. Much of this literature (in my perception) involved armchair ecologists scratching their beards to come up with grand theories of how ecosystems work, with others arguing counter-theories. One example— mainly relating to terrestrial ecology—was a proposal that herbivores were food-limited, with the implication that ecosystems were regulated bottom-up, rather than top down, i.e. by predators. It is not hard to see the problem with such theories; we can easily conclude that some herbivores are food-limited in some places at some times, but in other circumstances are regulated by predators or the quality or quantity of physical habitat.

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Perspectives from Past Presidents: Steve Jordan, Section President 2003-2004

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Another example, from my years working on Chesapeake Bay: in the early days of the Bay restoration program (circa 1980-1985), it was assumed by EPA and others that eutrophication in the Bay was controlled (limited) by phosphorus. This naïve conclusion was based on the idea that the resource in shortest supply relevant to demand would always be limiting (Liebig's law of the minimum). Note that this principle is true, and thus a law, at any particular time and place. The law probably has useful applications in, say, agriculture. But in a system as dynamic as an estuary, it becomes a useless truism, crushed by the crucial questions of where, when, and at what scale.

By the late 1980s, scientific work based on careful observations implicated nitrogen as an important limiting factor in the Bay – in some places at some times. Eventually, the Bay Program set numerical goals for reducing both nitrogen and phosphorus, with allocations to individual watersheds.

Do we even hear about theoretical ecology anymore? It seems to me the height of hubris that ecologists would have tried to derive grand unified theories ala physics, especially in the data-poor mid-20th century. Observation is key. In those years, ecological data were sparse, especially for estuaries. A theory not based on ample data is a house of cards.

The availability of data is a key factor in the evolution of estuarine ecology. When I entered the field, there were very few relevant long-term data sets, and those tended to be idiosyncratic, local, and often poorly designed. Over the past four decades, rigorous, wide-scale, and in some cases, intensive monitoring programs have developed. Two examples I am familiar with are the Chesapeake Bay Monitoring Program (1985 to present), and EPA's Environmental Monitoring and Assessment Program (EMAP), which has provided national-scale, statistically rigorous data on the condition of estuaries, along with lakes, rivers, and wetlands. I have also worked with long-term fishery-dependent and fishery-independent monitoring data from estuaries. These monitoring programs generally were crude by today's standards, but when maintained over long time spans, they supplied valuable data for modeling and understanding ecological dynamics and relationships.

The tools we use in estuarine ecology have advanced enormously since 1980. The computers of the day were crude, with tiny memory space, and one had to be a pretty good coder to make them do anything useful. Now we have user-friendly software for just about any modeling or analysis one

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Perspectives from Past Presidents: Steve Jordan, Section President 2003-2004

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would want to do (though some colleagues were still using FORTRAN when I retired a few years ago). The use of geographical information systems (GIS) in estuarine ecology was pioneered in the late 1980s, and has expanded since to supply a geostatistical basis to almost every ecological investigation. Moreover, GIS facilitates rigorous design of monitoring programs and other data collection efforts. Remote sensing by satellites, field-based sensors, rovers, gliders, etc. supplies vast amounts of data from ecosystems, including estuaries.

In the 2010s, as I recall, some researchers were starting to apply neural network technology to ecological problems. If not now, then very soon, I expect artificial intelligence (AI) will take over much of the modeling and analytical work in estuarine ecology; it will be essential for efficient and effective use of the huge amounts of data that are being generated.

Given all the data and tools, is there any use for theory in ecology these days? Fundamentally, ecology is a science of emergence, i.e. from the interactions of physics, chemistry, biology, geology, etc. This observation leads me to conjecture that there are no first principles in ecology at any meaningful scale. Nevertheless, from data we can infer patterns that are repeatable in time and space and thus, can support predictions and extrapolations. These empirically-derived theories likely will become much more powerful as AI takes over the analytical work.
In closing, I want to convey my deepest gratitude to all of the people whose hard work in research and monitoring over many years has led to our current understanding of estuarine fisheries and ecosystems. With the data and tools now available, it should be possible to predict the consequences of a changing world for these systems and for their contributions to human welfare.

Stephen James (Steve) Jordan
AFS Estuaries Section President 2003-2004
US EPA, retired

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152nd Annual AFS Meeting in Spokane, WA: What do fish mean to us? Perspective above and below the water.

152nd ANNUAL MEETING
Spokane
AUGUST 21-25, 2022

If you're interested in developing a symposium sponsored by the Estuaries Section, please contact section president John Mohan (jmohan@une.edu) or president-elect Justin Stevens (justin.stevens@maine.edu). The current deadline to submit symposium proposals is January 28, 2022.

Estuaries Section Treasurer's Report

respectfully submitted on 01/09/2022 by
Dr. Konstantine J. Rountos (Treasurer)

Date	Balance	Credit	Debit	Note
11/02/21	3,754.52			Estuaries Section Pre-meeting Newsletter
11/02/21	3,554.52		200.00	Check #134 (Hutton Funding Challenge 2.0 donation)
12/09/21	4,667.52	1113.00		Deposit (2020 Estuaries Section dues)
01/09/22	4,667.52			Current balance

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