AFS Estuaries Section News Fall 2022

In this issue:

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President's Message

Dear AFS Estuaries membership,

As the temperatures drop and the leaves transform to brilliant colors here in New England, the sense of change is palpable. With the predictable seasonal ecological changes, including the migration of fishes, we are reminded that with change comes opportunities for growth and renewal.

The opportunities for growth and renewal of our American Fisheries Society were also evident at AFS Spokane. A focused attention and recognition of the Indigenous Spokane Tribes, stories told of migrating salmon, the salmon release ceremony, and several indigenous fish and science symposia, provided a genuine examination of the question "What do fish mean to us", from both a science and cultural perspective. In the plenary sessions, we learned and listened about the experiences and the perspectives of minorities in fisheries and how our actions and attitudes can expand equity and inclusion in fisheries. It is highly encouraging to see broader diverse representation in our new AFS leaders, and an exciting time for growth in our Society.

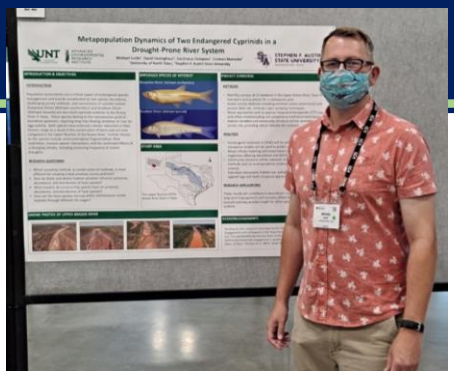
The Estuaries Section also had a strong presence at Spokane. We had three graduate students present original research in person, and three virtual international undergraduate attendees. Please enjoy research highlights and reflections on AFS attendance from our Student Travel Award winners in this and future newsletters. The Marine Fisheries, Estuaries Section and Living Marine Resources Cooperative Science Center cosponsored the symposia, "Bringing new perspectives to marine and estuarine fisheries", which featured many fascinating and informative presentations. It was great to mix and mingle at the joint social event and reconnect with old friends and make new connections. I would like to thank all those who organized AFS Spokane for a very successful and meaningful meeting.

The Estuaries Section is excited for the launch of our new website, and we will be sharing a new link soon. We are also seeking nominations for our spring election, so please consider nominating yourself or other up-and-coming leaders within AFS. Executive Committee positions include president-elect, treasurer, and secretary. Please consider nominating yourself for a leadership role in the Estuaries Section.

Looking forward, please mark your calendars for the Latin American and Caribbean Fisheries Congress (https://lacfc.fisheries.org/), being held May 15-18 in Cancun Mexico. The Estuaries Section plans to co-organize a symposium entitled "Advances in movement and population connectivity of highly migratory fishes in the Gulf of Mexico and Caribbean." Please consider submitting an abstract once the call is announced.

AFS Estuaries Section President
John Mohan

Student Travel Award Winner Article: Mike Curtis



Mike Curtis, PhD student: University of North Texas

Metapopulation Dynamics of Two Endangered Cyprinids in a Drought-Prone River System

Population surveys are crucial for implementing species management and recovery plans, but can be complicated depending on the target species, environmental conditions, anthropogenic impacts, and logistical concerns such as cost and feasibility. These issues are compounded further if the targeted species are threatened or endangered. The Sharpnose Shiner (*Notropis oxyrhynchus*) and Smalleye Shiner (*Notropis buccula*) are federally endangered Cyprinids that are endemic to the Brazos River, Texas. Both species' historical range included the mainstem of the Brazos River but have since been relegated to the upper portions as a result of habitat modifications such as installation of dams.

My dissertation research will include surveying 22 sites along the Upper Brazos monthly for two years and quarterly for a third additional year, collecting robust habitat, landscape, and species data. My research objectives are to: 1) Assess the distribution and abundance of Smalleye Shiner, Sharpnose Shiner, and cooccurring species within the Upper Brazos River in Texas. I will address this objective by using active, passive, and novel survey methods (including seines, minnow traps, eDNA, and PIT tagging) to generate robust data for rigorous multi-species occupancy-detection modelling. 2) Describe factors affecting abundance and distribution of focal species. I will quantify habitat, at local and landscape scales, that impact presence and distribution of these species and model these factors independently using a Generalized Additive Model (GAM). 3) Determine effects of drought-induced stream intermittency on focal, and cooccurring, species at different life stages in the Upper Brazos. Streamflow and species abundances will be quantified at multiple transects at each site and the response of each species, and life stages for each species, will be modelled using linear mixed effects models. Additionally, all fish tagged with PIT tags will have initial data from point of capture (size, location, habitat). Recaptured individuals will have additional data measurements including movement distance, rate, and directionality as well as growth rate. These analyses will help identify environmental drivers of

Mike Curtis and Master's student Jamie Stephan IDing and measuring fish collected from active and passive gears.

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Student Travel Award Winner Article: Mike Curtis

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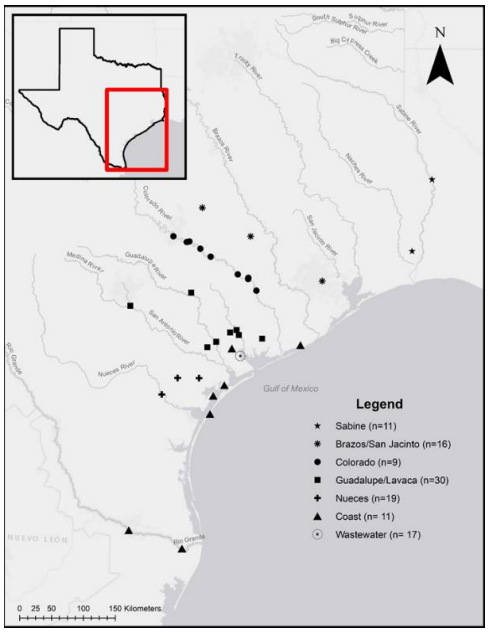
habitat use and movement ecology for focal species.

The goal of my research is to improve understanding of factors affecting the focal species' population dynamics and contribute to the development and implementation of a best practices management and recovery plan for these imperiled fishes.



Map of sampling locations in Texas. Individuals were collected opportunistically from citizen scientists and from targeted survey performed by Texas Parks and Wildlife and labs at Texas A&M University – Corpus Christi and The University of Texas at Austin.

Otolith Microchemistry Provides Insight Into Habitat Plasticity of American Eel in Texas

American Eel (*Anguilla rostrata*) are a catadromous fish with a vast range stretching from Greenland to Venezuela. Previous research has shown that American Eel individuals, and their congeners, undertake multiple migrations within and between freshwater and marine environments in temperate regions yet few studies have examined American Eel habitat use and movement in sub-tropical and tropical portions of their range.

Part of my Master's research objectives centered on: 1) If American Eel display facultative catadromy in Texas; and 2) If so, how frequently do individuals make trans-haline migrations. I analyzed the trace elemental ratio profiles of barium to calcium (Ba:Ca) and strontium to calcium (Sr:Ca), the former being the preferred proxy due to the geological make-up of Texas, of 113 American Eel individuals caught within 6 Texas river and coastal basins, including a sub-group of individuals confined to the outflow stages of a wastewater treatment plant, to delineate individual habitat use and plasticity in sub-tropical Texas. I then applied a sequential zone shift algorithm to each elemental ratio profile to detect quantitatively distinct regions within individual transects, helpful in detecting shifts between elementally distinct habitats.

The results revealed that elemental ratio profiles varied within and between collection locations (basins) with some individuals remaining in an elementally homogenous habitat (freshwater or marine)

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Student Travel Award Winner Article: Mike Curtis

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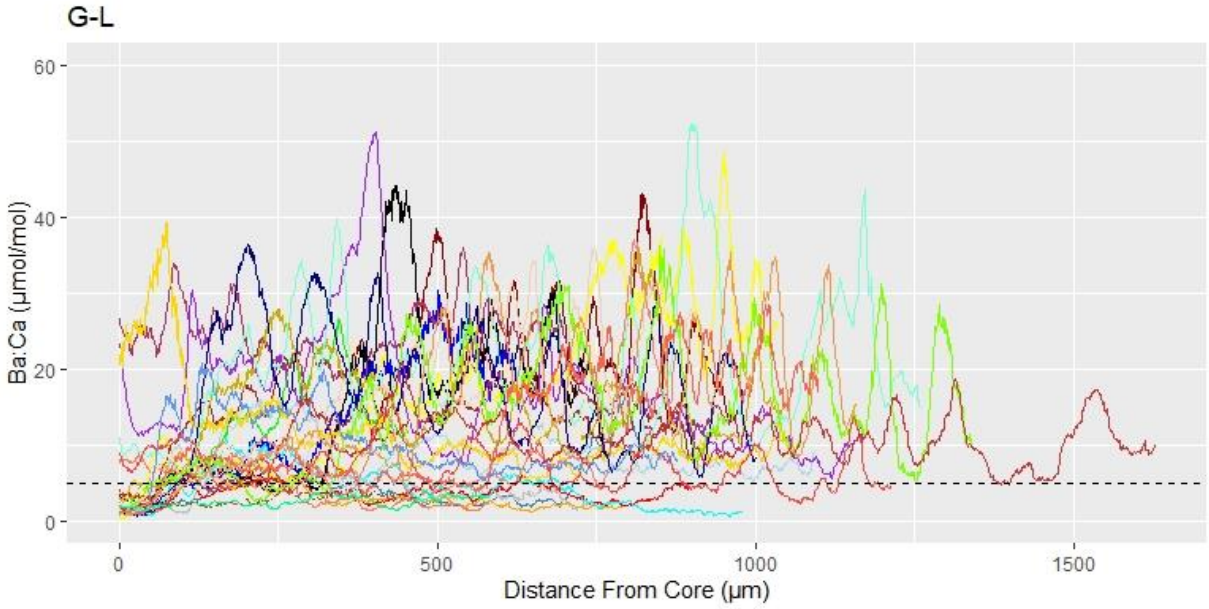
until capture while others appeared to make multiple shifts between elementally distinct habitats. These findings suggest that American Eel in sub-tropical Texas display facultative catadromy and some individuals make multiple shifts between freshwater and estuarine/marine habitats.



Individual Ba:Ca core-to-edge transects for Guadalupe – Lavaca American Eel. Dashed line represents our salinity threshold of 4.8895 µmol/mol. Values above the line indicate FW residence, below represents marine/estuarine.

Student Travel Award Winner Article: Benjamin LaFrereniere

Ben LaFreniere holding a White Hake (*Urophycis tenuis*, Male, TL = 53.3 cm) caught while rod and reel ground fishing, Fall of 2021.

Benjamin LaFreniere, MS Student: University of New England

Chemical Clocks: Enhancing Age and Growth Estimates of White Hake (Urophycis tenuis) using Otolith Geochemistry

White Hake (*Urophycis tenuis*) is an ecologically and economically important groundfish stock found within the Gulf of Maine (GoM). Like other groundfish in the GoM, White Hake can be caught through a variety of gear types, most commonly being trawls, gillnets, longlines, and rod and reel. This once highly productive fishery dominated other GoM groundfish species, with reports of higher abundance than Atlantic Cod (*Gadus morhua*) and Haddock (*Melanogrammus aeglefinus*) in the Fall months, as recent as 1992. However, between 1993 and 1996, commercial landings decreased by 62%, and continued to decrease, with populations unable to regain historic levels to this day. As of the most recent stock assessment in 2021, White Hake is classified as overfished but not subject to current overfishing.

In collaboration with the Northeast Fisheries Science Center and the Maine Department of Marine Resources, a chapter of my master's thesis aims to produce a revamped age and growth model for GoM White Hake. Specifically, this age and growth model will investigate potential sexual dimorphism between males and females, to produce more detailed growth estimates. With these new growth models, we aim to positively influence the regulation of White Hake in the GoM, with hopes of returning the fishery to historical numbers.

While most age and growth research on bony fish is straightforward using otolith cross sections and band counting, White Hake is more challenging. Due to a combination of both false and weak annuli, White Hake aging poses the potential for over and underestimating age. This causes major management concerns, leading us to seek alternative methods of age determination. Additional aging techniques may allow us to better understand the growth of these fishes, as well as give us confidence in our growth models which lack age-validated samples.

In collaboration with the MicroAnalytical Geochemistry and Isotope Characterization Lab at the University of Maine, we have generated 2-dimensional trace elemental maps of cross-sectioned White Hake otoliths. These maps are generated using LA-ICP-MS, a technique that runs a laser over the sample's surface, ablating otolith material that is then swept into a mass spectrometer to be elementally sorted by charge. Since otoliths are chemically inert structures,

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Student Travel Award Winner Article: Benjamin LaFrereniere

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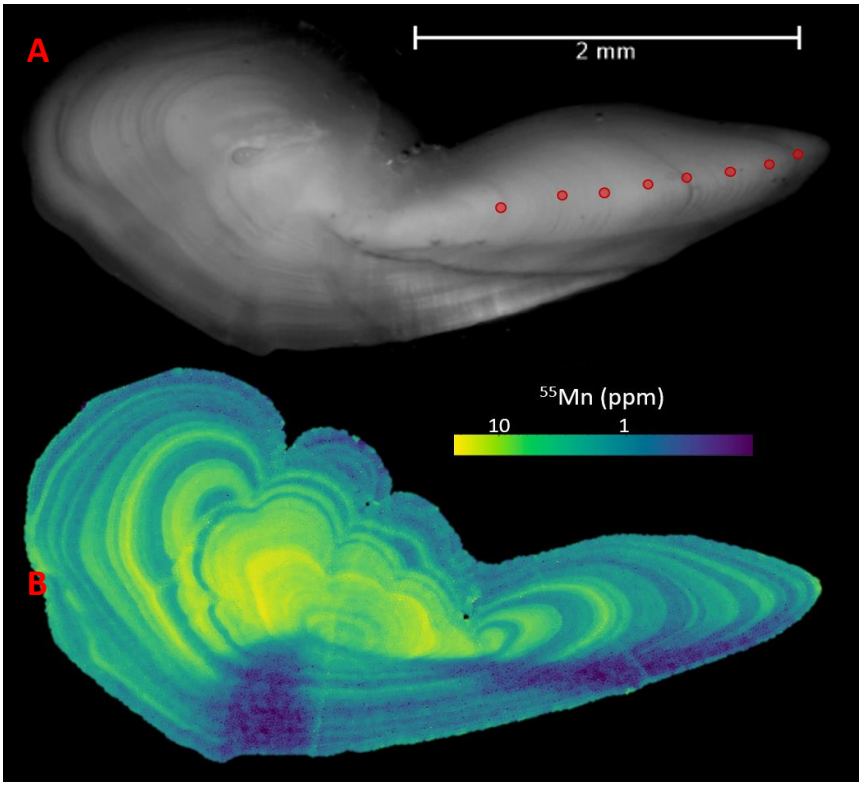
the chemical composition found within the otolith's layers can be assimilated into the individual's life history, allowing us to analyze their chemical history. This technique has been used on a range of species, investigating migration, reproduction, growth, diet, and many more areas of study.

The 2D maps generated by this process have allowed us to correlate specifically Manganese concentration fluctuations through time to annuli formation. This gives us an enhanced view of the chemical processes that correspond to annuli formation, potentially leading to an alternative route of fish aging in future projects. Due to the difficult nature of aging White Hake, this advanced understanding of the chemical makeup of these structures allows us to gain confidence in the aging techniques we employ.

The next steps in this project include running line transects along the section of the otolith commonly used for aging. We aim to develop a model that can predict the age of an individual sample based on the number of chemical peaks in concentration across the transect path. We aim to correlate these findings to the age and growth model we have developed using traditional annuli counting, with hopes of correlating our findings.



White Hake (*Urophycis tenuis*) otolith (A) and 2D elemental map for 55Mn (B) . (A) Red dots signify observed annuli by the primary ager. The otolith sample comes from the White Hake featured in the previous figure.

Student Travel Award Winner Article: Pelumi Ojo OKE

Pelumi Ojo OKE , Undergraduate student (international): Federal University of Technology, Akure, Department of Fisheries and Aquaculture Technology; Ondo State, Nigeria

As a member of the American Fisheries Society, I got the chance to attend the 2022 annual meeting of the society virtually. The 152nd annual meeting was titled “what do fish mean to us”. I feel lucky to have attended the conference even though it is virtual but I maximize my participation from the beginning till the end. The conference covered various topics related to fisheries conservation and sustainability as well as aquatic ecosystem.

I was exposed to various topics that covers marine, estuaries and freshwater fisheries management. I was privileged to hear about the latest research in fisheries as the researchers presented preliminary finding that has been published as well as those that has not been published. The methodologies and findings used were inspiring and serve as great inspiration for my present and future research. One of the biggest benefits I got was getting to know other people in my field. As I watched the presenters, I learned things like the speed at which you should talk and the amount of detail which you need to give in your explanations. I learned from the way they answered questions after their presentations.

More significantly than anything I learned during the streamlined workshop, conversation with other participants in the chat box and also during the sessions, however, is the overall sense of perspective that I gained from the conference. I appreciate the team for recording the talks as I look forward to digesting the sessions that I missed.

Finally, I am very much thankful to the estuaries section of the AFS for selecting me as a recipient of the student travel award which covers my virtual registration as well as 2023 student membership dues. I feel very much honored to receive the award.

Perspectives from Past Presidents: Lee Benaka, Section President 00, 11-13

20+ Years (!) with the AFS Estuaries Section

My over 20 years of involvement with the AFS Estuaries Section dates back to the early days of my career in fisheries. In 1997, fresh out of graduate school, I was selected as the first-ever Sea Grant Fellow with the AFS. During this Fellowship, which supported around five different Fellows before it was discontinued, I organized a two-day symposium on fish habitat held at AFS's 1998 Annual Meeting. I also edited an AFS book based on the symposium, entitled Fish Habitat: Essential Fish Habitat and Rehabilitation (1999).

Tom Bigford, of the NMFS Office of Habitat Conservation, was one of my main mentors during my Fellowship. I am pretty sure Tom steered me toward the Estuaries Section, and I became President in 2000. I'm not sure I was elected, because the Section had experienced a short time of inactivity due to its former President, a NMFS employee, taking a job with another agency. The fact that my predecessor had served as President for five years straight was not a sign of member enthusiasm to help lead the Section. My main goal as Estuaries Section President in 2000 seemed to be ensuring that someone would succeed me as President at some point.

As of summer 2001, I had achieved that goal by persuading Linda Bireley to run (unopposed) for President. Linda was a recently retired Senior Scientist with Northeast Utilities, the largest electric utility in New England, where she focused her research on assessing the impacts of power generation on ecosystems. Better yet, Stephen Jordan, who wrote this newsletter's previous "Past-President's Perspective" piece, agreed to run (also unopposed) as President-Elect. This allowed me to run, unopposed, as Secretary/Treasurer. I am grateful to Linda and Steve for stepping up to bail me out and provide some solid leadership for the Section at a time when its future was uncertain.

I received the opportunity to lead the Section again in 2011, mostly due to a lack of volunteers at our business meeting that year. It was an enjoyable couple of years where the Section had settled into a pleasant groove of funding student travel in collaboration with the Southern Association of Marine Laboratories, organizing Annual Meeting symposia, and supporting the Dr. Nancy Foster Habitat Conservation Award (administered by the NMFS Office of Habitat Conservation).

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Perspectives from Past Presidents: Lee Benaka, Section President 00, 11-13

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More significantly to me, however, was a changing trend in Estuaries Section leadership, which began to alternate between seasoned scientists and academics and emerging scientists and academics. This trend began when I leaned on Abigail Archer, a fairly recent Sea Grant Knauss Fellow, to succeed me as President. Abigail, with her fresh ideas and enthusiasm, was followed by Karin Limburg, a leading scientist in the field of otolith chemistry, who in turn was followed by Lynn Waterhouse, Catherine Johnson, and John Mohan. Over the past few years, the Section has been fortunate to have Konstantine Rountos as our trusted Treasurer and Abigail as our website manager. Many of our recent and upcoming leaders have been past student travel award recipients, and it has been extremely gratifying to see them step up to provide excellent guidance to the Estuaries Section in recent years.

Sure, our membership numbers could be a bit higher, and our treasury could be a bit larger, but with our great leaders and perhaps a "Monsters of" fundraising event at the 2023 AFS Annual Meeting, the Estuaries Section is poised to continue to promote estuarine science (and young scientists) in the 2020s (gosh I'm old!) and beyond.

Lee Benaka being presented the Distinguished Service Award by AFS Past President Joe Margraf.

Estuaries Section Treasurer's Report

respectfully submitted on 10/31/2022 by
Dr. Konstantine J. Rountos (Treasurer)

Date	Balance	Credit	Debit	Note
07/27/22	3,467.52			Treasurer's Report (Business Meeting)
10/31/22	3,467.52			*Current balance

*Note: this current balance does not reflect pending/forthcoming transactions below.

Pending Transactions

- Invoice for $180.00 from AFS Headquarters has not been received for the Estuaries Section's sponsorship of the three (3) virtual student travel awards. As such, it can not be paid.

- Estuaries Section co-sponsored the catering for the 2022 joint Marine Fisheries Section and Estuaries Section meetings. Invoice was received on 10/26/2022. A check for $250.00 was issued and should arrive to the vendor by 11/03/2022.

- Estuaries Section Exec. Board unanimously approved a $250.00 donation for the Latin America and Caribbean Fisheries Congress. Payment will be issued once payee details are known.

- The Estuaries Section has still not received our 2021 section dues.

Check us out online!

Website: http://estuaries.fisheries.org

Twitter: @Estuaries_AFS

Facebook: http://www.facebook.com/EstuariesSectionAFS

LinkedIn: https://www.linkedin.com/groups/7443198