



Wednesday, January 29th, 8:25-8:45 a.m.

Comparing Machine Learning Approaches for Estimating Seabird Bycatch in U.S. Atlantic Pelagic Longline Fisheries

Iman Pakzad* and Yan Jiao

*Student Presenter

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In the Western North Atlantic U.S., the rate of seabird bycatch in the pelagic longline fishery continues to be a great concern. Previous analysis of the Pelagic Observer Program (POP), which monitors the Atlantic longline fishery bycatch, including seabirds, showed that there were significant differences in the gear usage between vessels that catch seabirds and those that do not. This study aims to compare the performance of 3 different machine learning models in predicting which vessels are likely to catch birds based on the gear and fishing tactics used. In total 18 different tactics across four categories: effort, depth, lures, and miscellaneous, as well as 9 environmental or spatial variables were used to create decision tree, random forest and XGBoost models. Because the events with seabird bycatch were relatively rare, both raw and weighted data sets ranging from 2x to 20x weighting were used. Each data set bootstrapped with 50 random stratified samples. Accuracy, sensitivity, recall, F-score and cross validation were used to evaluate the model performances. In all metrics, Random Forest and XGBoost models were nearly identical in performance at all data weightings. However, the XGBoost model was more parsimonious and favored spatial and environmental variables in it's selection, and had more skewed variable influence compared to the Random Forest model. All models and all weighting factors consistently identified number of hooks, fishing area, haul temperature, and haul year to significantly influence seabird bycatch probability.



Wednesday, January 29th, 8:45-9:05 a.m.

Estimating Recreational Catch and Release Mortality of Striped Bass

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Striped Bass, one of the most popular Atlantic coast recreational fisheries, is currently overfished with release mortality (CRM) constituting ~50% of recreational removals. This 50% is derived from a fixed CRM rate of 9% that does not account for seasonal variation resulting from fluctuations in temperature or other environmental factors. As a result, the fixed CRM rate is suspected to be inaccurate, especially as summer temperatures continue to increase. Therefore, the objectives of our study were to determine Striped Bass CRM and estimate the relationship of CRM with temperature. Considering the Chesapeake Bay is the greatest contributor to the coastal migratory stock, we conducted our study in a Chesapeake tributary amenable to study, the Patuxent River, MD. Following collection with hook and line (mimicking the recreational fishery), we tagged fish with a timed-release external acoustic tagging method and used detections to infer fish fates post-release. We tagged Striped Bass during spring (n = 47), summer (n = 28), and fall (n = 22) 2024 to capture a wide range of temperatures and modeled CRM during each season using a multistate capture recapture model, consisting of three states: (1) alive, (2) mortality, (3) emigration. Furthermore, we euthanized and tagged three Striped Bass to confirm detection histories representing a release mortality. Preliminary results follow expected patterns with the highest median CRM estimate in summer 16% (5% – 35%, 95% CrI), followed by spring 9% (4 – 20%, 95% CrI), and fall 2% (0 – 38%, 95% CrI), highlighting the importance of restricting Striped Bass fishing during the summer to reduce CRM in the Chesapeake Bay.



Wednesday, January 29th, 9:05-9:25 a.m.

Snorkel Surveys Reveal Previously Unknown Associations and Behaviors of *Erimystax* Chubs in Clinch and Powell Rivers, Virginia and Tennessee

Kyle Grundy^{*1}, Wynn E. Haslam¹, Emmanuel A. Frimpong¹, and Paul L. Angermeier^{1,2}

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Erimystax chubs are a small, scarcely studied genus of minnows (Leuciscidae) distributed disjunctly across the central and eastern United States. Slender Chub (*E. cahnii*) is federally Threatened, and possibly extinct, while other *Erimystax* face a range of threats. We documented key inter-species associations and behaviors for Streamline Chub (*E. dissimilis*) and Blotched Chub (*E. insignis*) to better understand their ecology and potentially inform their conservation. First, we mapped suitable habitat patches along segments in Powell River ($n = 1$) and Clinch River ($n = 2$) in the upper Tennessee River drainage. We mapped a mean of 10 patches per segment (range: 4-22 patches), with mean area of 239 m² per patch (range: 102-377 m²). Second, from August to October 2024, we conducted diurnal and nocturnal patch-specific snorkel surveys during which we observed interactions (e.g., schooling) between *Erimystax* and several other species (e.g., Whitetail Shiner [*Cyprinella galactura*], Stargazing Minnow [*Phenacobius uranops*], and Bigeye Chub [*Hybopsis amblops*]). We also saw *Erimystax* manipulate their benthic environment while foraging. Nocturnal surveys revealed that *Erimystax* rest on open gravel bars at night, where they risk being eaten by large, predatory fishes such as Longnose Gar (*Lepisosteus osseus*). We will conduct additional surveys in Spring 2025 to record spawning behaviors of *Erimystax*. Additional research questions raised by this preliminary work include: 1) Do *Erimystax* manipulate their benthic environment (e.g., build nests) during spawning? 2) Are *Erimystax* communal spawners with the associates described above? 3) Do predatory fishes prey upon *Erimystax* while they are resting on gravel bars at night?



Wednesday, January 29th, 9:25-9:45 a.m.

Assessing Factors that Contribute to Nest Abandonment of Bluehead Chubs (*Nocomis leptocephalus*)

Thomas Bustamante* and Emmanuel Frimpong

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Organisms that construct and guard nests are regularly faced with tradeoffs between offspring survival and their own survival. If environmental conditions become too dangerous or unpredictable, then organisms may choose to abandon their nests to ensure their survival at the cost of their current reproductive effort. As humans continue altering the environment, we must understand what factors contribute to nest abandonment to predict how populations of nesting organisms may respond to anthropogenic habitat change. In this study we investigated the factors that contribute to nest abandonment in the Bluehead Chub (*Nocomis leptocephalus*), a nesting minnow and critical keystone species in the Southeastern United States. We observed Bluehead Chub nesting activity in 2022 and 2023, visually assessed which nests were abandoned or successful, and measured environmental variables around each nest to determine which contribute to abandonment. Results show that temperature and the availability of nest associates appear to be important for determining nest fate, while siltation rate, stream depth and stream velocity are weaker factors. These variables all have the potential to be rapidly changed in anthropogenically altered environments; therefore, we may observe increased chub nest abandonment rates in disturbed environments. Future work in disturbed streams is needed to determine the extent to which Bluehead Chub nests are at risk to anthropogenic factors.



Wednesday, January 29th, 10:05-10:25 a.m.

If You Remove It, They Will Pass: Ashland Mill Dam, South Anna River

Alan Weaver

Virginia Department of Wildlife Resources, Richmond, VA

The modern Nature Conservancy fish passage prioritization tool ranked Ashland Mill Dam (AMD), an original Virginia top 10, on the South Anna River as the virtual top priority dam removal in the Chesapeake Bay. A lack of dam owner cooperation halted Virginia Department of Wildlife Resources' (DWR) attempt to construct a fishway in the 1990s. Through 2009 DWR continued documenting all four alosines, Striped Bass, Sea Lamprey and American Eel reaching AMD, but being blocked or hindered. Removal almost happened as permittee responsible mitigation for the then proposed King William Reservoir, but since it was not built AMD remained. However, removal became the only clear passage choice. In 2018 the U.S. Army Corps of Engineers (USACE) began allowing dam removal as a mitigation tool. In 2023 Davey Mitigation proposed removal as a mitigation bank in the York Watershed. In spring 2024 DWR and Randolph Macon College (RMC) joined forces to reinitiate pre-removal monitoring using boat electrofishing and eDNA. Hickory Shad was the most abundant anadromous target. American Shad, Alewife, Striped Bass and Sea Lamprey were also collected along with catadromous American Eel. The (USACE) and Virginia Department of Environmental Quality approved Davey's mitigation banking instrument and removal commenced September 24, 2024, and was completed in late October. DWR and RMC plan to monitor for 10 years to document passage success and expansion of target species' ranges. The criteria for releasing mitigation credits directly related to fish passage is that target species must be found upstream in at least two separate sampling seasons.



Wednesday, January 29th, 10:25-10:35 a.m.

**Evaluating the Spatial and Temporal Distribution of Alosine
Ichthyoplankton and Zooplankton Prey in the South Anna and Pamunkey
River Systems**

Brycen Boettcher

Rice Rivers Center, Virginia Commonwealth University, Charles City, VA

The match-mismatch hypothesis suggests that variations in spring plankton production can affect early feeding potential for larval fish, increasing the risk of starvation, and lead to class recruitment failure. As climate change effects and alter environmental conditions worldwide, there is increased concern that mismatch events may become increasingly prevalent. Many studies have been conducted on match-mismatch dynamics within ocean-spawning fisheries, but very few have been conducted on species that spawn in the freshwater and estuarine environments of the Mid-Atlantic. Blueback Herring (*Alosa aestivalis*), Alewife (*A. pseudoharengus*), American Shad (*A. sapidissima*) and Hickory Shad (*A. mediocris*) are anadromous fish species that have seen their once abundant populations diminished over the last 50 years. These species are culturally, commercially, and ecologically important throughout their range. Many attempts to restore these species to their historical populations have been made but have largely been unsuccessful. In this study, we are evaluating the spatiotemporal overlap of ichthyoplankton quantities in these four alosine species relative to the availability of zooplankton prey they depend upon throughout their early life stages. This study is currently taking place at several locations throughout the York River watershed in central Virginia. Preliminary results from the first year of sampling show a potential deficit between early spawning fish and zooplankton availability.



Wednesday, January 29th, 10:35-10:45 a.m.

Get the Dam Students Involved: Combining Monitoring Work with Education

Charles Gowan

Department of Biology, Randolph-Macon College, Ashland, VA

Training undergraduates for environmental careers is daunting because professionals work on interdisciplinary issues involving the natural sciences (e.g., biology), social sciences (e.g., public policy), and the humanities (e.g., ethics). Professional work is done by experts from different disciplines working together to solve problems. So, an undergraduate education must provide significant training in teamwork focused on problem-solving, foundational knowledge in a wide range of disciplines, and disciplinary expertise in an area that reflects the specific career goals of the student. The Environmental Studies Program (EVST) at Randolph-Macon College adopted a unique curriculum in 2006 to achieve these goals. Centerpieces of the curriculum are the 'problem-solving courses' in which students work for a real, off-campus client for a semester. The client provides a request for proposal and students work in teams to understand the problem, propose methods for analyzing it, and conduct the work. There are no lectures, and clients and their projects are new every semester. Each student completes three such courses, the first as a freshman. Students are also required to select an 'Area of Expertise' (any other major offered by the college) that reflects their specific career goals; courses in the AE double count as EVST courses. Upon graduation, students have significant skills in interdisciplinary problem solving and expertise in a specific discipline. The approach is demonstrated with a problem-solving course devoted to analyzing the effects of a dam removal project on the South Anna River in central Virginia. The client was a private mitigation-banking firm, Davey Mitigation.



Wednesday, January 29th, 10:45-10:55 a.m.

The Last Dam Summer: Pre-Removal Monitoring Related to Ashland Mill Dam

Jacob Langley* and Charles Gowan

*Student Presenter

Department of Biology, Randolph-Macon College, Ashland, VA

Mitigation banks are restored aquatic habitat used to offset environmental impacts from development. Davey Mitigation proposes to create a bank by removing Ashland Mill Dam on the South Anna River in central Virginia. For the bank to be approved by regulators, environmental benefits of removal must be quantified by comparing pre- to post-removal environmental conditions. We conducted pre-removal monitoring between January and July 2024 by measuring cross-sections to document depth and velocities above and below the dam, taking eDNA and electrofishing samples to evaluate presence/absence of seven target fish species, collecting water quality data, and evaluating macroinvertebrate communities. Results indicate that the impoundment behind the dam was deep (up to 3.6 m) with slow velocities (<0.2 m/s), six of the seven target fish species were present below the dam and only one, American Eel (*Anguilla rostrata*), was found above it, water quality was suitable for aquatic life above and below the dam, the impoundment caused the river to warm during summer, and macroinvertebrate communities outside the impoundment were healthy but were less so within it. Unexpectedly, gates on the dam failed in late May, allowing the reservoir to drain and returning the impoundment to a free-flowing river. Compared to the impoundment, the free-flowing river was shallow (<0.5 m) with faster velocities (>0.3 m/s). The dam was removed in October, 2024, and the major environmental benefit expected is the opening of over 300 km of spawning habitat for the target fish species currently blocked by the dam.



Wednesday, January 29th, 10:55-11:15 a.m.

Harnessing Genetics for Fisheries Management

Stephanie Coster

Department of Biology; Randolph-Macon College, Ashland, VA

Genetics can support fisheries management by providing powerful tools for monitoring fish populations, assessing biodiversity, and informing conservation strategies. This talk explores the diverse applications of genetic techniques in fisheries science, highlighting their potential to aid management. I will share several case studies of recent work in my lab, including the use of environmental DNA (eDNA) to track fish movement, parentage-based tagging to estimate broodstock success, and molecular sexing technology to study fish behavior. Together, these examples demonstrate how genetic tools can address complex challenges and contribute to more effective and sustainable fisheries practices.



Wednesday, January 29th, 11:15-11:35 a.m.

Stream Morphology and Habitat Adjustments Following Removal of Baber's Mill Dam

Louise Finger

Virginia Department of Wildlife Resources, Richmond, VA, USA

In April 2024, the long-defunct Baber's Mill Dam was removed on Rock Island Creek in Buckingham County, Virginia. This low-head dam impeded aquatic organism passage, altered hydrology, and impacted in-stream habitat in this tributary to the James River for close to 200 years. Affected species include the federally endangered James Spiny mussel (*Pleurobema collina*) and anadromous Sea Lamprey (*Petromyzon marinus*). After just a few flow events following dam removal, the channel morphology and in-stream habitat changed significantly as demonstrated by pre- and post-removal topographic and sediment-size data.



Wednesday, January 29th, 11:35-11:55 a.m.

**Dam Removal to Reconnect Diadromous Fish to Historical Habitats Across
the Rapidan—Rappahannock River Basin, Virginia**

Shawn Young

American Climate Partners, Rapidan, VA

American Climate Partners in collaboration with the National Oceanic and Atmospheric Administration (NOAA) Fisheries (Department of Commerce), Virginia Department of Wildlife Resources, and Ecotone, have been awarded funding to remove the Rapidan Mill Dam from the Lower Rapidan River, Virginia. Removing the Rapidan Mill Dam will reconnect almost 500 miles of the mainstem Rapidan River and its numerous tributaries, once spawning and rearing habitat for a suite of diadromous fishes of the mid-Atlantic region such as American Eel, Sea Lamprey, River Herrings, American Shad and Striped Bass. This dam removal will expand previous reconnection created by removal of Embrey Dam downstream on the mainstem Rappahannock River at Fredericksburg, Virginia. This presentation will outline the rationale, benefits, objectives and timelines for the removal of another of the multitudes of obsolete dams and infrastructure barriers across the Eastern United States.



Wednesday, January 29th, 1:20-1:40 a.m.

Quantifying Component Mortality Rates of Juvenile Salmonids using Predation Detection Acoustic Tags (PDATs)

Elizabeth Greenheck^{*1}, Cyril Michel², Brendan Lehman², Nicholas Demetras², Lance Takata²,
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Federally threatened Central Valley Steelhead (*Oncorhynchus mykiss*) have undergone significant population declines because of elevated water temperatures, poor water quality, limited habitat availability, and predation by non-native species. Juvenile recruitment is essential to recover adult abundances, yet previous studies have estimated that juvenile survival is as low as 5% with little empirical data to support main drivers of mortality. Thus, our study aimed to partition juvenile Steelhead mortality among component sources using Predation Detection Acoustic Tags (PDATs). From March–May 2024, we tagged 300 juvenile Steelhead and determined their fates using a passive receiver array along the San Joaquin River coupled with eight days of manual tracking following release. We categorized passive and active PDAT detections into five observations: (1) alive, (2) aquatic predation, (3) stationary tag, (4) outmigration, and (5) unobserved. We then used these observations in a multistate capture-recapture model to estimate component mortality of juvenile Steelhead from two different mortality sources: aquatic predation and other mortality. Our results indicate 16% aquatic predation mortality (i.e., predation detection sensor was triggered; 12–20% CrI), a 14% other mortality (i.e., unconfirmed terrestrial predation or “natural” mortality; 9–19% CrI), and overall high survival of 70% (63–76% CrI). The results of this study indicate that piscivorous predation represents the highest source of outmigration mortality for juvenile Steelhead, and survival estimates are higher than previously recorded in this region. We hypothesize that increased water height and flow due to recent rain events in the Central Valley likely resulted in increased Steelhead survival. The results of our study provide some of the first empirical estimates of juvenile Steelhead predation rates exemplifying the utility of PDAT tags while providing valuable information for management strategies aimed at increasing juvenile survival within this system and others.



Wednesday, January 29th, 1:40-2:00 a.m.

Understanding the Diverse Values of Shore-Based Recreational Fishing in Detroit, Michigan

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*Student Presenter

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Recreational fisheries are primarily managed as a leisure activity, however there is growing evidence that food may be a primary motivator for some anglers' participation in recreational fisheries. Using a values-based food systems framework, this paper analyzes the diverse values associated with production, provisioning, and consumption of recreationally caught fish from the Detroit River and Lake Erie in Michigan, United States for different marginalized, ethnic, and racialized groups (African American or black, Asian, Latinx or Hispanic, Caucasian or white). Focusing on shore-based anglers, this study uses intercept survey data to quantitatively assess the drivers of fish consumption and focus group data to qualitatively analyze the diverse benefits derived from the Lake Erie fish food system. We find that species preferences, consumption rates, and values vary between ethnic groups, with management implications for angler motivation and satisfaction and community level environmental justice.



Wednesday, January 29th, 2:00-2:20 a.m.

Availability of Viable Spawning Habitat in the Jackson River Tailwater

Owen Clarke¹, Julia McDonald², Camryn Bostick², John Santowski², and Robert Humston^{*,2}

*Presenter

¹Department of Biology, Virginia Military Institute, Lexington, VA

²Department of Biology, Washington and Lee University, Lexington, VA

The Jackson River tailwater between Lake Moomaw and the city of Covington in Alleghany County, Virginia has recently experienced decline of its wild trout population established in 1997. Drivers of this decline are unknown, and it is hypothesized that spawning/recruitment failures may be contributing. To investigate this, we assessed the distribution and quality of potential trout spawning habitat in the Jackson River tailwater. Bulk sediment samples were collected with a modified McNeil sampler and particle size distribution was evaluated by sequential sieve separation. We compared observed particle size distributions with published guidelines for their potential to facilitate successful spawning, embryo development, and fry emergence. These results were then applied to construct a multi-criteria habitat evaluation metric that considered riverbed composition, water velocity, depth, and potential for disturbance from human activity. We applied this tool to identify sites with high potential to support spawning across the study area. Results indicated that while spawning habitat is relatively abundant, it is distributed heterogeneously and least abundant in the lower 25% of the study area. Areas with high spawning potential were typically pool tails with a mix of gravel and coarser material (cobbles), while gravel-dominated areas often were accompanied by high levels of fine-grain sediment that could impede embryo development or emergence. Redd construction requires displacement of substrate and larger fish can move larger particles; therefore, coarseness of substrate in spawning areas may place constraints on the size of trout that can successfully spawn in the study area.



Wednesday, January 29th, 2:20-2:40 a.m.

Using a Combination of Habitat Modeling and Environmental DNA Surveillance to Determine the Presence and Distribution of Critically Imperiled, Benthic, and Cryptic Fish

Hannah Swain-Menzel^{*,1}, Robert T. R. Paine¹, and Amanda E. Rosenberger²

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²Tennessee Fisheries Cooperative Research Unit, Tennessee Tech University, Cookeville, TN

The Southeastern United States is the hotspot for aquatic diversity in the temperate world, with many small and endemic species. Information is limited but needed for many species, particularly those that are threatened and endangered with small distributions. Rapid and sensitive biomonitoring approaches such as molecular surveillance can demarcate the distribution of critically imperiled and cryptic species. Additionally, remotely-sensed data provides researchers with a means to further develop non-intrusive and rapid approaches for habitat assessment. The Duskytail Darter (*Etheostoma percnurum*) and Chucky Madtom (*Noturus crypticus*), two rare fishes on the brink, provide opportunities for the application of environmental DNA (eDNA) surveillance combined with habitat modelling to ascertain the current distribution of two rapidly declining, and potentially extirpated species. We propose the development of an extirpation decision framework using a combined approach of sensitive sampling with distributional modeling to incorporate uncertainty, thus allowing managers to identify range decreases or extirpation with measurable confidence. Our objectives are: (1) to assess the use of eDNA for detection of rare species, (2) understand limitations of the current distribution of the Duskytail Darter in Copper Creek, VA and the Chucky Madtom in Little Chucky Creek, TN, (3) and create a framework for an extirpation index. Successful development of this project will provide a new approach to surveillance for rare, cryptic species in the southeast United States, and will assist wildlife managers and agencies with decision making tools that can be applied towards allocation of conservation resources.



Wednesday, January 29th, 3:00-3:20 a.m.

A Review of Interspecific Hybridization in North American Leuciscids

Wynn Haslam^{*1}, Paul Angermeier², Dr. Emmanuel Frimpong¹, and Kyle Grundy¹

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Leuciscidae includes 90 genera and 672 species, collectively having broad ecological, cultural, and conservation importance. Many leuciscid species (>45%) are considered imperiled by the American Fisheries Society. Understanding the life histories of, and threats to, this group is crucial for their conservation. Many leuciscid species are known to hybridize, but there has been no synthesis of the research germane to this hybridization. We used a literature review to explore the association between interspecific hybridization and species imperilment, and how pairs of sympatric congeners maintain (or not) reproductive isolation. We used key terms and Boolean operators to limit our search to Leuciscidae, focusing on peer-reviewed publications that discussed imperilment status or reproductive isolation. Databases like Aquatic Sciences and Fisheries Abstracts, Fish, Fisheries & Aquatic Biodiversity Worldwide from EBSCOhost, Google Scholar, and Web of Science from Clarivate Analytics were used to conduct the search. We found 31 articles describing hybridization between leuciscid species. We then analyzed information therein on species imperilment status, species distributions, and characteristics of observed hybridization to meet our posed objectives. Only ~12% of the 30 hybridizing species we analyzed are imperiled, and no articles associated hybridization with imperilment. While most articles (58%) discussed hybridization between congeners, only the breakdown of reproductive isolation – not its maintenance – was discussed. Our findings illustrate a substantial gap in knowledge of leuciscid hybridization. Going forward, we are examining the relative roles of sympatry versus syntopy in hybridization among Leuciscids to understand the causal factors.



Wednesday, January 29th, 3:20-3:30 a.m.

Trout Population Declines, Forage Prey Abundance, and Ecosystem State in a Regulated River

John Santowski^{1,*}, Camryn Bostick², Julia McDonald², Owen Clarke², Robert Humston²

*Student Presenter

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The Jackson River tailwater, flowing from Gathright Dam at Lake Moomaw, supports a wild population of Rainbow Trout. However, recent data indicate declining Rainbow Trout abundance, raising concerns about the river's ecological health and productivity. This study aimed to quantify benthic macroinvertebrate (BMI) biomass density and assess biomass partitioning among functional feeding groups in the Jackson River tailwater upstream of the city of Covington. We compared our results with existing data from the Smith River in southwest Virginia. We collected BMI samples at five different sites using a Surber sampler. We identified specimens to the family level and measured wet weight of samples. We also estimated dry biomass based on published length-weight regression equations. Our findings revealed that the total BMI biomass in the Jackson River was higher overall compared to the Smith River, indicating a relatively productive ecosystem. Partitioning of BMI biomass among functional feeding groups indicates that the Jackson River is net heterotrophic as there is a greater proportion of organisms that feed primarily on allochthonous carbon. Our results also suggest that BMI abundance may be limited by the stability of stream bottom substrate, since there is a lower proportion of organisms that require stable benthic habitat. Lastly, we found that while useful for relative biomass comparisons, estimated dry biomass does not correlate well with laboratory wet weight measurements.



Wednesday, January 29th, 3:30-3:40 a.m.

The Role of Connectivity in Shaping Spatial-Temporal Ecological Dynamics: The Arapaima in Amazon floodplains

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Hydrological connectivity is expected to significantly influence the distribution and dynamics of fish populations. Understanding the interplay between hydrological connectivity and fish dynamics is essential, especially considering the imminent threat posed by its potential loss, driven by causes such as human-made infrastructure, land use changes, and climate change. This concern is particularly important in floodplain ecosystems, where hydrological connectivity varies substantially throughout the year due to pronounced fluctuations in water levels, and where the diminishing lateral connections between rivers and their floodplains emerge as a primary driver of ecosystem decline. Thus, our research aims to understand the influence of hydrological connectivity of floodplain lakes on the spatial and temporal dynamics of populations of *Arapaima* spp., an iconic large fish in the Amazon Basin. Drawing on 17 years of count data of *Arapaima* population, we used a spatially explicit dynamic N-mixture modeling framework to determine whether lake hydrological connectivity affects population dynamics through effects on migration rates. Connectivity is being assessed using both Euclidean distance and hydrological connectivity among lakes, the latter estimated by integrating data from radar imagery time series, water level, and bathymetry data. This presentation will showcase preliminary findings from the model and delve into how hydrological connectivity influences migration rates.



Wednesday, January 29th, 3:40-3:50 a.m.

Lessons Learned from Writing Fish, Fishing, and Conservation

Donald J. Orth

Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, VA

I always dreamed of teaching college students, who are not majors, about fish, fishing, and conservation. I held back because I was no expert in the many disciplines that constitute this broad area of interest. After receiving approval to teach such a course, I ventured to complete an appropriate textbook, and the lessons learned provide the basis for my talk. My objective was to reflect on my experiences, and reveal lessons I learned by doing. My methods involved five basic steps, namely Identify, Document, Analyze, Store, and Retrieve. These steps were facilitated by finding a quiet space with few distractions, ideally without work, family, or household chores. Retirement also helped. After retirement the many lessons and anecdotes I encountered seemed to be either essentially obvious, or of little importance, other than to begin a discussion with potential authors. The book was published in 2023 and eventually seven lessons emerged. Among these lessons, I emphasized that the value of a textbook should not be how much it's worth when resold to the bookstore, rather the value is in starting a conversation that continues. Listen and begin that conversation with me.



Thursday, January 30th, 9:00-9:20 a.m.

Restoring an Overcrowded Largemouth Bass Population in a Small Reservoir

Dan Wilson

Virginia Department of Wildlife Resources, Forest, VA

Mill Creek Lake is a 76-ha reservoir that supports a popular Largemouth Bass, sunfish, and Black Crappie fishery. The Largemouth Bass population maintained a “Balanced” population until 2010 but shifted to a “Bass Crowded” population by 2014. In an attempt to improve the Largemouth Bass size structure, bass less than 350 mm were removed in 2015 and 2016. However, bass recruitment increased and no improvements in the size structure were observed. Consequently, a Largemouth Bass index was developed from numerous small lake Largemouth Bass populations, in central Virginia, to guide future removals. This index described “Balanced” as having a PSD > 35 with fewer than 30% of the population containing \geq age-4 less than 350 mm. A second removal began in 2019 and continued until the index goals were achieved in 2022, no removals were conducted in 2022-2023 and the bass population remained “Balanced” through 2024.



Thursday, January 30th, 9:20-9:40 a.m.

Status of an Undescribed Sculpin in the New River Drainage, Virginia

Mike Pinder* and Maddie Cogar

*Presenter

Virginia Department of Wildlife Resources, Blacksburg, VA

Restricted to the upper Bluestone River system in Virginia and West Virginia, the Bluestone Sculpin (*Cottus* sp.) is one of eight endemic fish species in the New River drainage. Besides being undescribed, basic status, demographic, and habitat information is lacking resulting in shortcomings for its management and conservation. In 2021 and 2022, we sampled 24 sites in the Bluestone River watershed, Tazewell County, Virginia to elucidate on these deficiencies. Bluestone Sculpin was found at 18 sites and was the third most abundant species. It averaged 69.2 individuals at known sites with 44% of total specimens collected in three tributary sites. Compared to unoccupied sites, those with sculpin had higher pH and conductivity and lower species richness. Physical habitat variables were similar between occupied and unoccupied sites. Among occupied sites, the species was highly associated among riffles (75%), runs (69.3%) and to a lesser degree with pools 57.1%. Length frequency analysis demonstrated at two age-classes in addition to possible older outliers. Our study indicated that the species is secure from a single stochastic event; however, threats from residential and industrial pollution are still present. Future research will examine spawning, fecundity, and diet, and assess age by analyzing otoliths.



Thursday, January 30th, 10:00-10:20 a.m.

**Revitalizing Lake Ecosystems: Sediment Remediation, Nutrient Dynamics,
and Benthic Activity Improvements Using TryMarine Technology in
Brickhouse Lake**

David Beasley^{*.1} and Farshid.S Najafabadi²

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²TryGlobal IP holding and TryMarine, New York, NY

This study examines the specialized photocatalyst-based product, TryMarine, for nutrient remediation and revitalization of aquatic ecosystems, assessing its efficacy in a single aquatic environment – Brickhouse Farm Lake. Monthly measurements of sediment nutrients (TN and TP), texture, aerobic bacterial activity, benthic diversity, and microalgae were conducted across treated (10 acres) and adjacent untreated areas (30 acres). A tenfold increase in aerobic plate counts was observed at the bottom of the treated zone, accompanied by fluffier sediment and increased moisture content in the core sediment sample. Benthic organisms increased thirteenfold, and species diversity rose 160% in the treated area compared to the untreated area. Sediment permeability improved by one foot, allowing deeper water infiltration. Adjacent untreated areas showed gradual improvement, likely due to water turbulence. These findings demonstrate that TryMarine can stimulate healthier sediment and food web reactivation, positioning it as a promising candidate for sustainable aquaculture and ecosystem restoration.



Thursday, January 30th, 10:20-10:40 a.m.

Overcoming Challenges Faced by Private Sector Fisheries Managers

Tyler Meighan

SOLitude Lake Management

The market and need for private fisheries management services is growing nationally. Due to competition, there is a natural void in communication between competing biologists on the unique ways they accomplish stakeholder goals. Fisheries biologists face challenges throughout the management process, including the initial planning, implementation, and long-term commitment. Identifying obstacles early in the planning phase of a project lays the foundation for long-term success. Success involves flexibility when navigating planned and unplanned challenges that must be overcome by both the client and the project manager. Our goal is to improve communication between private sector biologists and raise the standard of service and value of fisheries management services for all clients. We discuss many of these challenges, how they can be identified, and share examples of our learned methods and techniques that have led to both project success and failure.



Thursday, January 30th, 10:40-11:00 a.m.

Comparison of Striped Bass Growth Among Native and Non-Native Ranges

T. Reid Nelson^{*1}, Joseph M. Smith², and Thomas P. Quinn³

* Presenter

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The comparative growth of fishes in their native and introduced ranges can provide insights into evolutionary processes and phenotypic plasticity, as well as inform management. Striped Bass (Atlantic native), were transplanted to the San Francisco Bay estuary in the late 19th century, quickly establishing self-sustaining populations and fisheries. To determine whether sex-specific growth and length-at-age differed among native and non-native populations and to investigate temporal changes in growth of exploited populations in shifting ecosystems, we used long-term, fishery independent length-at-age data from California (n = 234,248) and Maryland (n = 37,512). To address temporal variance prior to analyses, we divided data into ecologically meaningful periods (CA: 1 = 1969 – 1976, 2 = 1977 – 1995, 3 = 1996 – 2009, MD: 1 = 1985 – 1994, 2 = 1995 – 2012, 3 = 2013 - 2022). Based on von Bertalanffy growth curves and ANOVAs, both female and male CA fish were larger than respective MD fish at ages <10 and this trend generally held with pairwise comparisons across all periods. Furthermore, the length of young fish (both sexes and states) exhibited a negative relationship with time. The underlying causes driving growth differences remain unknown; however, milder estuarine temperatures in CA (e.g. 9 – 22 °C vs. 3 – 28 °C) could result in longer growing seasons. Other differences among coasts such as prey composition and migration patterns could contribute to growth differences. The mechanisms behind decreasing length-at-age across both ranges and sexes could result from fisheries impacts, changes in prey composition, habitat degradation and disease.



Thursday, January 30th, 11:00-11:10 a.m.

VA Freshwater Mussel Conservation Plan Update

Kayla Howard* and Kim Morgan

*Presenter

Virginia Department of Wildlife Resources, Marion, VA

The Virginia Department of Wildlife Resources' Freshwater Mussel Conservation Plan draft was recently completed in December of 2024. Virginia boasts a diverse freshwater mussel fauna, with 78 species currently recognized in the state. However, over 80% of these species maintain a regulatory status or are designated as a Species of Greatest Conservation Need. With so many species at risk, a conservation plan was developed to highlight gaps in knowledge and to guide future conservation and restoration efforts. This plan takes a species-based approach, identifying a goal and necessary actions for each species known to Virginia. However, we also provide a broad statewide strategy, identifying needs in various areas such as surveys and data management, host fish management, research and propagation, outreach, and habitat restoration.



Thursday, January 30th, 11:10-11:20 a.m.

Status of Spotfin Chub (*Erimonax monachus*) in Virginia

Madison Cogar* and Michael Pinder

*Presenter

Virginia Department of Wildlife Resources, Blacksburg, VA

Since its federal listing as threatened in 1977, the Spotfin Chub (*Erimonax monachus*) remains a rare and cryptic species in Virginia. First described from the North Fork Holston River, Virginia, this small minnow was known historically from Tennessee River tributaries in Virginia, North Carolina, Tennessee, Georgia, and Alabama. Today, it can be found in four isolated river systems in Virginia, North Carolina, and Tennessee. The primary threat to Spotfin Chub is habitat degradation resulting from dam development and water pollution. In 2023 and 2024, extensive snorkel surveys were conducted on the North Fork Holston River to assess Spotfin Chub distribution. These surveys focused on a 13-mile reach downstream of Saltville that was severely lacking in sampling efforts. Spotfin Chub were observed at four out of the total 13 sites surveyed. Three new populations were discovered along with the most recent upstream record for the species. Future restoration efforts for Spotfin Chub will include reintroductions to historic sites including the Clinch River in Scott County, VA.



Thursday, January 30th, 11:20-11:30 a.m.

Understanding Blue Catfish (*Ictalurus furcatus*) Expenditure in the James River, Virginia Using Creel Data Collected Between March 2024 to September 2024

Mitchell Brooks*, Margaret Whitmore, and Clinton Morgeson

*Presenter

Virginia Department of Wildlife Resources, Charles City, VA

The Blue Catfish were introduced into the James, Rappahannock, and York rivers during the 1970's and 1980's as a way to create a new fishery. Ever since then, it has been a prominent topic for conversation and management due to the damage it has done and continues to do to other fisheries it was introduced in. The creel started in March of 2024 and end in February of 2025, the data used will be from the time span of March to September. Anglers were asked several questions about their fishing trip, with the prominent topics being species targeted, how many caught, how much money was spent for the trip across multiple categories, and how Blue Catfish affects their fishing experience. This creel survey has a focus on Blue Catfish and covered 8 sites, spanning 50 miles of the James River, from the city of Richmond to the mesohaline line. The time of the surveys were either AM or PM, usually 8 am to noon for AM and noon to sunset for PM. This talk focuses on the following questions; how many people fish for Blue Catfish, how many anglers are local (<25 miles) vs nonlocal (>25 miles) on a monthly basis, how much money do anglers spend to go fishing for Blue Catfish and how it compares to other recreational anglers, and how much can the recreational fishery grow monetarily. Two hundred and seventeen Blue Catfish anglers were interviewed and 56% of the total were local, the month with the highest number of Blue Catfish anglers was march with a total of 47, the average trip for Blue Catfish anglers cost roughly \$96, and 56% Blue Catfish anglers would be willing to spend somewhere between \$1,630 to \$9,850. DWR hopes to use this information and more collected through the creel to understand and record economic expenditure and use it to influence management of this and other species.



Poster—Wednesday, January 29th, 6:00-7:00 p.m.—German Club

Optimizing Microsatellites for Smallmouth Bass (*Micropterus dolomieu*) Parentage Analysis

Collin Burwell* and Stephanie S. Coster

*Student Presenter

Department of Biology; Randolph-Macon College, Ashland, VA

Smallmouth Bass (*Micropterus dolomieu*) are important sportfish native to southwestern Virginia and introduced into all major fast flowing rivers and cool lakes in Virginia. Toxic waste and disease outbreaks have reduced the population and led to recent restocking efforts in the South Fork of the Shenandoah River. Our goal for this research was to design a panel of genetic markers (microsatellites) to estimate stocking success by matching wild-caught but hatchery reared juveniles to parental broodstock. We extracted DNA from 81 broodstock and 20 young of the year and used 47 broodstock samples to test the microsatellite loci. We tested a total of 12 microsatellite loci, seven designed for Smallmouth Bass and five designed for Largemouth Bass (*Micropterus salmoides*). We first tested all loci individually, and then combined them into several multiplex PCR reactions. Gel electrophoresis and genotyping data showed the Smallmouth Bass primers amplified consistently, although more optimization of the multiplex PCRs is required. In contrast, the Largemouth Bass primers did not amplify consistently and may not be useful for parentage analysis. Genetic techniques can help estimate the success of Smallmouth Bass stocking in place of less accurate and more invasive/lethal methods such as physical tagging or otolith analysis and offer promise for long-term monitoring in Virginia.



Poster—Wednesday, January 29th, 6:00-7:00 p.m.—German Club

Cage Experiments to Assess Detection Distance for Fish eDNA in Small Temperate Streams

Joe Buckwalter^{*1}, Paul Angermeier², Emmanuel Frimpong¹, and Eric Larson³

^{*}Student Presenter

¹Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, VA

²U.S. Geological Survey Virginia Cooperative Fish and Wildlife Research Unit

³Department of Natural Resources and Environmental Sciences, University of Illinois Urbana-Champaign, Urbana, IL

Environmental DNA (eDNA) metabarcoding is an emerging biomonitoring tool that non-invasively detects many species with similar or greater sensitivity but lower cost than conventional capture-based methods. However, eDNA interpretation is hampered by knowledge gaps regarding species- and habitat-specific detectability, the spatio-temporal extent represented by an eDNA sample, how eDNA read counts relate to abundance and biomass of source species, and how to optimize eDNA sampling and metabarcoding protocols. To address these knowledge gaps, we are conducting experiments in which we metabarcode eDNA collected from multiple distances downstream of caged fishes (American Eel, Goldfish, Redline Darter) in three 3rd-4th order streams varying in temperature, canopy cover, and slope. Preliminary findings indicate that some species are detectable at least 500 m downstream of cages, and detection is enhanced by increasing sequencing depth and PCR replicates. Findings will improve our understanding of eDNA spatial and temporal sampling extent, fish-community representation in eDNA samples, and environmental effects on eDNA interpretation across a range of conditions in small temperate streams.



Poster—Wednesday, January 29th, 6:00-7:00 p.m.—German Club

Mobility of Trout Spawning Gravels During Pulse Flows in the Jackson River Tailwater

Julia McDonald^{*,1}, Camryn Bostick¹, John Santowski¹, Owen Clarke², and Robert Humston¹

^{*}Student Presenter

¹Department of Biology, Washington and Lee University, Lexington, VA

²Department of Biology, Virginia Military Institute, Lexington, VA

The wild trout population in the Jackson River tailwater below Lake Moomaw, established in 1997, has recently shown signs of rapid decline. Periodic “pulse” flow release events from June to October are designed to mimic storms and remove benthic algae downstream. These abrupt high flows may destabilize spawning gravel, affecting trout reproduction. To evaluate these impacts, we surveyed the river to identify potential spawning habitats based on water velocity, gravel size, gravel bed depth, and isolation from human activity. The potential for bedload mobility in these areas was evaluated for different flow and depth combinations using published sediment transport equations. We then deployed scour chains to empirically measure gravel bed fill and scour during pulse flow events. ArcGIS and USGS StreamStats were used to map tributary input locations and their respective upstream watershed areas. Transport equations predicted that flows of typical pulse magnitude could destabilize spawning-size gravels in the river. Scour chain experiments documented scour ranging from 0 cm to 2.5 cm and fill from 0 cm to 3 cm. Results showed greater gravel fill near upstream tributaries, indicating these tributaries are critical for replenishing spawning gravel. Patterns of fill and scour varied with local bed conditions, with significant variability observed near gravel bars, boulders, and uneven flows. Farther downstream, smaller and more widely spaced tributaries contributed less gravel, potentially accelerating spawning habitat depletion. These findings highlight the role of tributary inputs in maintaining spawning sites and suggest upstream areas may be more resilient to gravel depletion than downstream sites.



Poster—Wednesday, January 29th, 6:00-7:00 p.m.—German Club

Evaluating Fish Distribution Resulting from Removal of Two VA Dams: Pre-Removal Phase

Matthias Gaffney*, Alex Holliday, and Alan Weaver

*Presenter

Virginia Department of Wildlife Resources, Richmond, VA

The Virginia Department of Wildlife Resources (DWR) was involved in the removal of two dams in 2024: Baber's Mill Dam (BMD) from Rock Island Creek (Buckingham County) and Ashland Mill Dam (AMD) from South Anna River (Ashland). Prior to removal, DWR's Fish Passage Program extensively sampled sites both below and above the dams to compile a fish species list. Fish were collected primarily with boat electrofishing below AMD. Tote barge and backpack electrofishing was used above AMD and both below and above BMD depending on stream level and crew size. Randolph-Macon College partnered on the South Anna. The primary focus was on anadromous American Shad, Hickory Shad, Alewife, Blueback Herring, Striped Bass, and Sea Lamprey. However, all observed species were recorded to create a complete picture of the pre-removal communities which will be used to compare post-removal data to judge the efficacy of removing the dams as a means of reconnecting fish to previously blocked habitat. Predicted migratory species passage and potential expansion of resident species will be evaluated. A total of 42 species were found in Rock Island Creek: 22 species were present above-BMD, all 42 below-BMD, with 18 species unique to below-BMD waters. A total of 35 species were found in the South Anna River: 18 species were present above-AMD (5 unique) and 30 species below-AMD (16 unique). Of the target species, only Blueback Herring was not observed below AMD. The only anadromous species observed below BMD was Sea Lamprey.



Poster—Wednesday, January 29th, 6:00-7:00 p.m.—German Club

Snails in the Diet of the Cutlip Minnow, *Exoglossum maxillingua*

Tess Taloumis* and Steven Powers

*Student Presenter

Biology Department, Roanoke College, Salem, VA

The Cutlip Minnow, *Exoglossum maxillingua* is an important component of the stream fish fauna of Virginia and has an unusual lower jaw. Some of the earliest hypothesized functions of this bizarre jaw included dislodging snails from their shells prior to ingestion. However, numerous studies of the diet of this species have never documented snails as a food item. Recent snorkel observations revealed *E. maxillingua* carrying snails in their mouths in the Roanoke River prompting an in-depth investigation of the diet of this species examining the gut contents of specimens from most months of the year. Standard length (SL) and mass of each specimen was recorded. Gut contents of each specimen were dissected out, weighed, and identified to the lowest practical taxonomic category. Digital images of gut contents were captured to aid in identification. Mass of gut contents increased with SL. Chironomidae and Trichoptera were common food items similar to the findings of other studies. A total of 57 of 145 specimens examined contained snail parts mostly as opercula from the family Pleuroceridae. Specimens containing snail parts were larger than those lacking snail parts. No shells of snails were found indicating *E. maxillingua* remove these snails from their shells before ingesting them. Our results suggest the unique lower jaw of this species does indeed play a role in removing snails from their shells allowing them to serve as an important food source for this charismatic minnow.



Poster—Wednesday, January 29th, 6:00-7:00 p.m.—German Club

How Regulated are Recreational Fisheries in the Great Lakes?

Matthew Louvet Jr.*, Mahatub Khan Badhon, and Leandro Castello

*Student Presenter

Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, VA

Rules and regulations are used to control and protect fish species commonly harvested by anglers through different tiers, including bag limit, size limit, and seasonal restriction. However, there is limited understanding of how fishing rules and regulations align with recreational anglers' actual behavior regarding the proportions of fish species they catch or harvest. To address this knowledge gap, we used a creel survey to collect data on commonly caught species by anglers from five metropolitan areas around Erie and Ontario Lakes. Intercept surveys were conducted at popular fishing spots, while online surveys were distributed through flyers in local tackle shops and angler Facebook groups. Overall, 15-34% of reported catch was species not regulated under any tiers of recreational fishing rules. Of the remaining catch reported by anglers, all reported species were subject to bag limits, 77% to seasonal restrictions, and 55% to size restrictions. We also found that 19% of the species that anglers reported were either incompletely or incorrectly identified. These findings indicate that while a notable portion (potentially one-third) of the fish caught by anglers are unmanaged, further research is needed to explore whether this indicates new recreational fishing opportunities or reflects changes in anglers' catch preferences in the Great Lakes. Additionally, the high rate of species misidentification suggests that anglers' limited knowledge of fish species could undermine the effectiveness of fishing regulations.



Poster—Wednesday, January 29th, 6:00-7:00 p.m.—German Club

ARIMA+NN: Using Machine Learning to Predict Offshore Aquaculture Mortality Rates

Iman Pakzad* and Yan Jiao

*Student Presenter

Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, VA

One major difficulty offshore aquaculture operations have to overcome is the delayed response time when problems arise. In order to address this, some farms are beginning to implement autonomous ROV's for pen management. In order to improve the AROV response time and aid fisheries managers, this study aims to use machine learning to develop a model to estimate future mortality rates so that managers can be more easily alerted to sudden deviations in mortality rate. The objective of this study was to compare the predictive performance of ARIMA and ARIMA + Neural Network models in predicting aquaculture mortality rates. In total data from 6 different pens from Open Blue's aquaculture operations were modeled using ARIMA and ARIMA+NN methods, first to fit the entire time series and then using only a portion of the data then adding each new day of data. The overall model fittings were compared using BIC and predictions were assessed using MSE of the residuals. While both ARIMA and ARIMA+NN models performed well, ARIMA+NN overall had the stronger fit in modeling the spikes in mortality rate. The prediction model performs the best during the middle of the growth period for each pen after the fish have acclimated to their new environment, as the models typically underestimate mortality in the first 100 days.



Poster—Wednesday, January 29th, 6:00-7:00 p.m.—German Club

Using Population Genetics to Inform Sustainable Aquaculture Governance in Lake Victoria, Uganda

Jonathan Low^{*1}, David C. Haak², Eric Hallerman¹, Emmanuel Frimpong¹, Elizabeth Nyboer¹,
Papius Dias Tibihika³, and Mark Olokotum⁴

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⁴ National Fisheries Resources Research Institute (NaFIRRI), Jinja, Uganda

As aquaculture expands in Lake Victoria, East Africa, concerns are rising over its potential impacts on biodiversity and wild fish stocks. Escaped genetically improved farmed Nile tilapia (*Oreochromis niloticus*) strains may threaten wild populations and native species through introgression and hybridization. To address these hazards, we collected wild and farmed Nile tilapia and closely related tilapiines from aquaculture farms and lake sites across the Ugandan waters of Lake Victoria. We also sampled fish from satellite lakes that harbour genetically isolated specimens. We plan to perform whole-genome sequencing (WGS) on 20 representative samples to identify informative single nucleotide polymorphisms (SNPs) and subsequent genotyping by sequencing (GBS) across the remaining samples. This approach will allow us to analyze genome-wide patterns of any admixture between farmed and wild populations and to detect instances of interspecific hybridization between Nile tilapia and native species. Survey of satellite lake populations will provide independent baselines for assessing introgression and unique hybridization patterns while offering insight into less-impacted native species. Our findings aim to inform aquaculture management strategies to mitigate genetic risks from farm escapes and preserve the ecological and economic integrity of wild fisheries in Lake Victoria.



Poster—Wednesday, January 29th, 6:00-7:00 p.m.—German Club

Navigating the Challenges of Cryptic Species Modeling: Insights from the Slender Chub and Co-Occurring Species

Mariana Castaneda-Guzman^{*1}, Kyle Grundy¹, Emmanuel Frimpong¹, Paul L. Angermeier^{1,2}

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Modeling the distribution of cryptic and rare species poses significant challenges, particularly for species like the Slender Chub (*Erimystax cahni*), a small, benthic fish endemic to the Powell River and Clinch River of Virginia and Tennessee. Historically found in clean, gravel-bottomed riffles and runs with moderate flow velocities, the Slender Chub has not been observed in over 25 years, making it potentially extinct and difficult to study. To address these challenges, we developed refined species distribution models (SDMs) using historical occurrence data, environmental predictors, and co-occurring species such as Streamline Chub (*E. dissimilis*) and Blotched Chub (*E. insignis*). Our ensemble modeling approach, integrating MaxEnt, generalized linear models, random forests, and boosted regression trees, identified high-suitability habitat patches across the Powell and Clinch rivers. Key environmental predictors included area of local catchment area, mean catchment slope, and minimum temperature. Field surveys guided by the SDMs confirmed the presence of associated species, indirectly validating the models and demonstrating their utility in targeting surveys for elusive taxa. Although no Slender Chubs were detected, the study underscores the value of leveraging co-occurring species data as proxies for addressing the complexities of modeling rare and data-deficient species. These findings provide a framework for improving survey strategies and conservation planning, offering insights into habitat suitability and ecological relationships for cryptic taxa. By combining ecological theory with advanced modeling, this research advances efforts to predict distributions of rare species and support their conservation.



Poster—Wednesday, January 29th, 6:00-7:00 p.m.—German Club

Looking for Lazarus: Environmental DNA (eDNA) Surveillance of the Federally Threatened Slender Chub (*Erimystax cahni*) in the Clinch and Powell Rivers

Robert T. R. Paine^{*1}, Mark W. Rogers², and Amanda E. Rosenberger²

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The Slender Chub (*Erimystax cahni*) is a federally threatened fish native to the Powell, Clinch, and lower Holston Rivers of Tennessee and Virginia. No individuals have been captured or reported for over two decades. We developed a species-specific environmental DNA (eDNA) assay to survey for its presence throughout its native distribution in new and historical sites. We detected Slender Chub eDNA in both the Powell and Clinch Rivers in 3 of 43 sites sampled during summer 2022. The presence of live individuals could not be confirmed, nor can positive eDNA matches preclude hybrid individuals. Our results may inform localities to focus more intensive survey efforts with conventional detection methods (e.g., snorkeling, seining) and, if captured, establish restoration and recovery sites.