SDAFS ANNUAL MEETING

ASHEVILLE, NC 2025

Renaissance Asheville Downtown Hotel

February 18–21, 2025

WELCOME SDAFS MEMBERS!

We are so excited to welcome you to the 2025 Southern Division of the American Fisheries Society annual meeting! Our planning committee has worked hard to curate a program that highlights the diversity of our fisheries profession and the community of our host city, Asheville, NC! This year's program features workshop topics ranging from science communication to hatchery science, symposium topics including salmonids in the Southeast, climate change, and a full student presentation competition. All of it will kick off at Tuesday's Welcome Social featuring one of Asheville's top breweries, Highland Brewing Company, and some famous NC BBQ! While you're here, we hope you will have a chance to explore downtown and enjoy all of the local flavors that Asheville has to offer!

We also want to highlight all the activities occurring in the grand ballroom throughout the meeting. Wednesday night please join us to celebrate our vendors and students during the Poster Social. We encourage everyone to swing by, enjoy some food and beverages, and check out the vendors and student posters. We have assembled a great group of vendors and sponsors this year and their support is a big part of what makes this meeting happen. Be sure to check out our student-led raffle and grab your tickets for a chance to win some fantastic items and support NC fisheries students! We will wrap up our meeting Thursday night during the Grand Social where awards and raffle winners will be announced. Throughout the meeting the SDAFS EXCOM officers will be wearing red lanyards and we encourage you to pull them aside to engage in conversation with them!

Finally, as most of you know Hurricane Helene devastated our beloved Western North Carolina community just a few short months ago. We are so grateful that Asheville was able to host our group and want to do our part to support local residents. At the registration desk and within this program you will find a QR to help support the MANNA Foodbank, a non-profit disaster relief organization. This organization was vetted by local AFS members as one that is making a huge difference in the community. Please help SDAFS 2025 reach our goal of $3,000 to provide meals and supplies for WNC communities!

We look forward to a great couple of days celebrating and exploring all the facets of our fisheries world!

Cheers,

Kelsey Roberts and Jess Baumann
SDAFS 2025 General Meeting Co-Chairs

Thank you sponsors!

Roanoke Logperch $5,000 – $9,999

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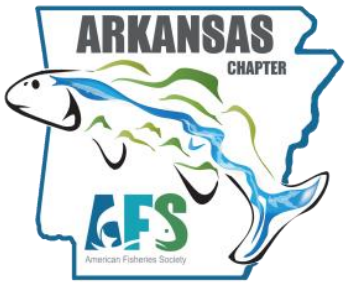
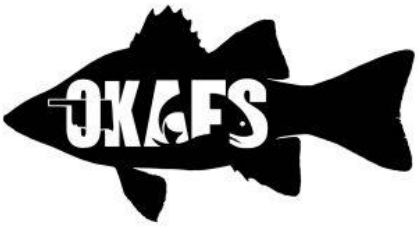




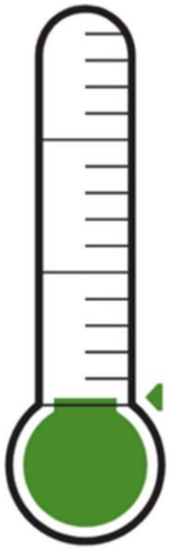
Join SDAFS in Supporting MANNA Food Bank

MANNA FoodBank is a not-for-profit disaster relief organization working to end food insecurity in the 16 counties of Western North Carolina, including the Qualla Boundary. Even before Hurricane Helene's devastating path across our mountains, MANNA was serving a record 158,000 people per month through our network of 200 partners, pantries, and other human service organizations.

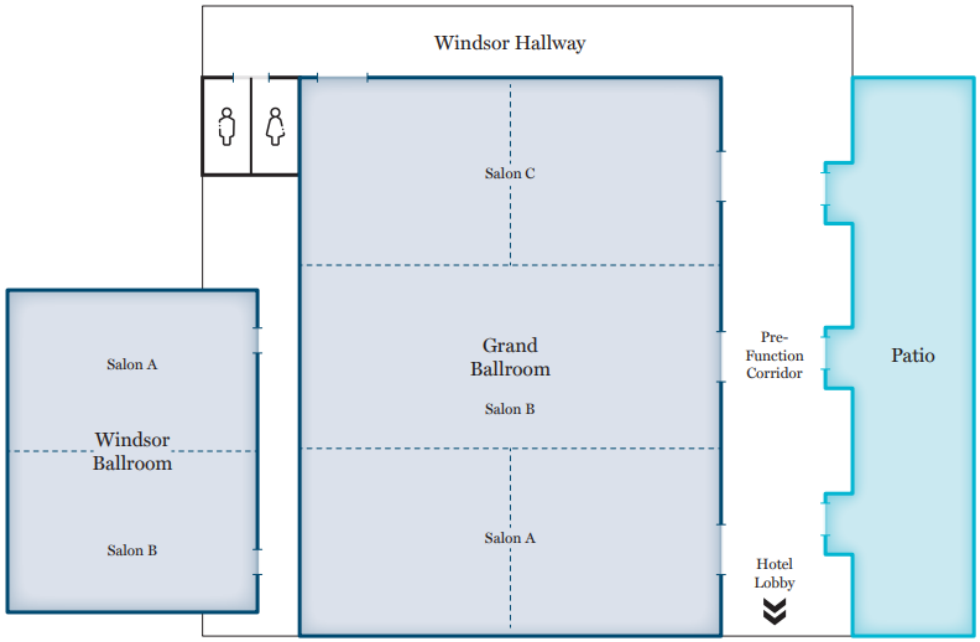
The donations you make go directly to support MANNA's work providing relief to those hit hard by September's storm. We are grateful for your contributions and are proud of our SDAFS members for joining with others to make a difference for the people of WNC. **For every $1 donated, MANNA helps provide 4 meals to our friends and neighbors struggling right now.**

SDAFS Fundraising Goal

$3,000

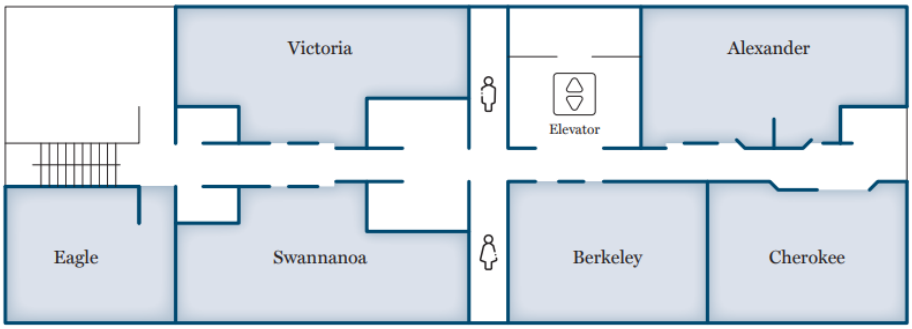


Floor Layout



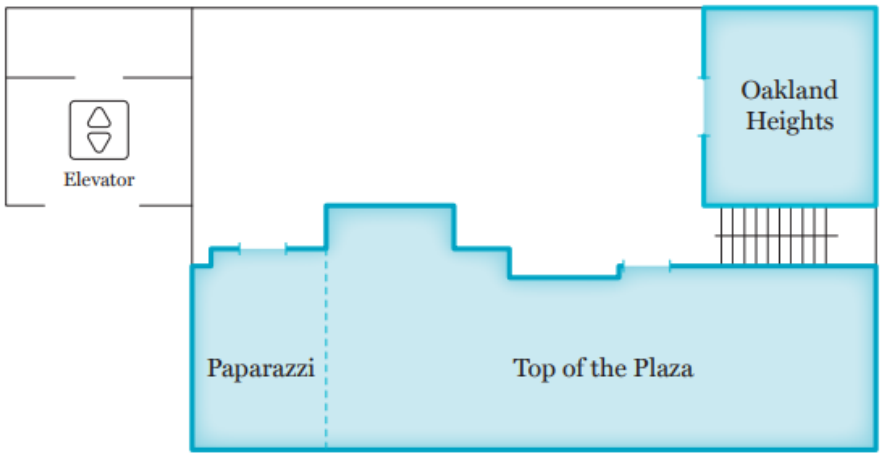
First Floor

Registration
Socials
Meeting Rooms



Second Floor

Meeting Rooms



12th Floor

Meeting rooms
Presentation loading

Schedule-at-a-Glance

Tuesday, February 18	Meeting Activity	Location
8:00 AM – 5:00 PM	Registration	Pre-function Corridor
8:00 AM – 5:00 PM	Presentation Loading	Oakland Heights
9:00 AM – NOON	Technical Committees	
NOON – 1:00 PM	Lunch (on your own)	
1:00 PM – 4:00 PM	Technical Committees	
4:00 PM – 5:30 PM	SDAFS EXCOM Meeting	Windsor A
6:00 PM – 10:00 PM	Welcome Social	Highland Brewing
Wednesday, February 19		
8:00 AM – 5:00 PM	Registration	Pre-function Corridor
7:00 AM – 5:30 PM	Presentation Loading	Oakland Heights
8:00 AM – 6:00 PM	Trade Show	Grand Ballroom
8:00 AM – NOON	Morning Workshops	
10:00 AM – 10:40 AM	Break	
NOON – 1:00 PM	Lunch (on your own)	
1:00 PM – 5:00 PM	Afternoon Workshops	
1:00 PM – 6:00 PM	Poster Set-up	
3:00 PM – 3:40 PM	Break	
5:15 PM – 6:45 PM	SDAFS Business Meeting	Windsor A & B
7:00 PM – 11:00 PM	Poster Social	Grand Ballroom
Thursday, February 20		
8:00 AM – 5:00 PM	Registration	Pre-function Corridor
7:00 AM – 5:30 PM	Presentation Loading	Oakland Heights
8:00 AM – 2:00 PM	Trade Show	Grand Ballroom
8:20 AM – 11:40 AM	Technical Sessions	
9:40 AM – 10:20 AM	Break	
11:40 AM – 1:00 PM	Student/Mentor Lunch	
11:40 AM – 1:00 PM	Lunch (on your own)	
1:00 PM – 5:00 PM	Technical Sessions	
3:00 PM – 3:40 PM	Break	
6:00 PM – 10:00 PM	Grand Social	
Friday, February 21		
8:00 AM – NOON	Registration	Pre-function Corridor
8:20 AM – NOON	Technical Sessions	
10:00 AM – 10:40 AM	Break	

Tuesday, February 18

Technical Committee	Time	Room	Floor
Alligator Gar	9:00 AM – 4:00 PM	Berkley	2
Catfish Management	9:00 AM – 4:00 PM	Alexander	2
Morone	9:00 AM – 3:30 PM	Windsor A	1
Pollution Committee	9:00 AM – 4:00 PM	Cherokee	2
Reservoir	9:00 AM – 4:00 PM	Victoria	2
Small Impoundments	9:00 AM – 4:00 PM	Swannanoa	2
Trout	9:00 AM – 4:00 PM	Top of Plaza	12
Warmwater Streams	9:00 AM – 4:00 PM	Windsor B	1
ExCom	4:00 PM – 5:30 PM	Windsor A	1

Welcome Social

Highlands Brewing Company

Where: 12 Old Charlotte Hwy #200, Asheville, NC 28803

When: 6:00 PM – 10:30 PM

What to eat: Bear's Smokehouse

How to get there: Transportation will be provided by Gray Line Trolley Tours of Asheville. Trolleys will begin loading at 5:30 PM in the lobby of the Renaissance Hotel. The first trolley leaves at 5:45 PM and the last trolley leaves Highland Brewing Company at 10:15 PM.

Wednesday, February 19

Workshop	Time	Room	Floor
Microsoft Excel for Fisheries Professionals	8:00 AM – 12:00 PM	Windsor B	1
Innovasea Acoustic Telemetry	8:00 AM – 12:00 PM	Windsor A	1
Hatchery Science and Research	8:00 AM – 5:00 PM	Offsite	1*
Breaking Barriers in Uncertainties: What does the future of Aquatic Connectivity Look Like?	8:00 AM – 5:00 PM	Alexander	2
Plain, Simple, and Concise Writing	8:00 AM – 5:00 PM	Berkley	2
Introductory GIS for Fisheries Biologists using Open-Source QGIS	8:00 AM – 5:00 PM	Victoria	2
Science Communication with Policymakers, Peers, and the Public	8:00 AM – 12:00 PM	Swannanoa	2
Continuous Stream Temperature Monitoring	8:00 AM – 12:00 PM	Cherokee	2
Introduction to Social Science for Fisheries Management	1:00 PM – 5:00 PM	Swannanoa	2
Getting Hired or Finding Graduate Schools	8:00 AM – 5:00 PM	Top of Plaza	12

*Hatchery Science and Research meets at Registration Booth at 8:00 AM

Thursday, February 20

	Windsor A	Windsor B	Victoria	Alexander	Swannanoa	Berkley	Cherokee
Start Time	Best Student Presentation Competition (undergrad & PhD)	Best Student Presentation Competition (MS)	Invasive Species I	Aquatic Connectivity I	Biodiversity I	Salmonids in the Southeast I	The 5th Biennial American Eel Symposum
	Moderator: Shawna Fix	Moderator: Gaby Shay	Moderator: Mike Kaller	Moderator: Kat Hoenke	Moderator: Mark Scott	Moderator: Dylan Owensby	Moderator: Robby Maxwell
8:00	Unraveling the drivers of multifaceted homogenization and differentiation of invaded stream fish communities across the conterminous United States *William Annis*	Sheepshead *Archosargus probatocephalus* movements across subsystems in the Mississippi Sound *Alyssa Pagel*					
8:20	Impact and introgression of invasive Alabama Bass on native Tennessee Black Bass *Thomas Miles*	Multiscale drivers of Beaded Darter occupancy in the Ouachita Highlands *Madeline Schumacher*	Blue Catfish diets in the Santee Cooper system *Zach Dailey*		Phylogenetic conservation priorities of freshwater fishes in North Carolina *Patrick Ciccotto*	Genomics in action: leveraging new insights for native Brook Trout management *Nadya Mamoozadeh*	A collaborative approach to assessing American Eel *Anguilla rostrata* recruitment in Texas *Stephen Curtis*
8:40	Fish freeways: how rock ramps are helping prairie streams flow again *Bryan Callahan*	Age structure, growth, and movement of Mangrove Snapper *Lutjanus griseus* in the mouth of the Pascagoula River, Mississippi *Joshua Perry*	Seasonal variation in invasive suckermouth armored catfish distributions and habitat use: an integrated approach with implications for broad-scale population control *Robert Mollenhauer*	NC Act and TACT - Dam removal lessons learned across state lines *Anabel Winitsky*	Evaluating the habitat suitability index for Bluenose Shiner populations in panhandle Florida rivers *Kallie Thornhill*	A framework for tracking spatial and temporal dynamics of North Carolina's Brook Trout populations *Maggie Coffey*	Recruitment of American glass eels *Anguilla rostrata* to northeast Florida: insights from a 25-year fishery-independent survey *Eric Johnson*
9:00	Age structured SIRS epidemiological model of Largemouth Bass Virus *Joseph Kingsbury*	Incorporation of acoustic telemetry data into per-recruit models for Southern Flounder *Calvin Chee*	Invasive fishes in Virginia - perspectives gained from managing Blue Catfish, Northern Snakehead, and Alabama Bass *Mike Bednarski*	Utilizing realtime water level monitoring to improve understanding of aquatic organism passage in road-stream crossings *Lesley Twiner*	Habitat use and reproductive dynamics reveal life-history differences among sympatric buffalofishes of the lower Red River *Jeff Stevens*	Using nature's own tools to expedite climate adaptation *Zachery Zbinden*	Age and growth of American Eel in lower St. Johns River in northeast Florida *Kimberly Bonvechio*
9:20	Dispersal, distribution, escapement, and survival of fry-stocked and advanced fingerling Walleye in an Iowa reservoir *W. Robert Cope*	Exploring the distribution and occupancy of the Rocky Shiner in Arkansas *Savannah Wise*	Current status of catfish in North Florida rivers *Morgan Winstead*	The gravel monster! Finding opportunities buried in the bedload *Eric Rahm*	Saving America's fish in the French Broad River: Gizzard Shad *Luke Etchison*	Brook Trout in a Virginia stream appear resilient to Brown Trout colonization *John Odenkirk*	Seasonal movements of Yellow and Silver American Eels within the Pensacola Bay complex *Chelsea Myles-McBurney*
9:40	**Break**						
10:00							
Start Time	Best Student Presentation Competition (undergrad & PhD)	Best Student Presentation Competition (MS)	Invasive Species II	Aquatic Connectivity II	Biodiversity II	Salmonids in the Southeast II	The 5th Biennial American Eel Symposum
	Moderator: Justin Dycus	Moderator: TJ Johnson	Moderator: Steve Midway	Moderator: Emily Granstaff	Moderator: Corey Dunn	Moderator: Jake Rash	Moderator: Robby Maxwell
10:20	Trophic ecology and perfluoroalkyl substance (PFAS) body burden in Dolphinfish across ocean basins *Alexandra Prouse*	Brown Trout population characteristics and dynamics in the Greers Ferry tailwater, Arkansas *Nolan Miller*	Continuation of a collaborative approach on an interjurisdictional Bighead Carp population in Grand Lake O' the Cherokees, Oklahoma *Kamdyn VanDorn*	Prioritizing aquatic connectivity activities for the recovery of the Slackwater Darter *Emily Granstaff*	Development of a standardized quantitative framework for evaluating imperilment of southeastern crayfishes *Sara Cathey*	Diets of stocked Rainbow Trout in West Virginia streams *Kyle Hartman*	American Eel Breakout Session
10:40	Assessing scales of temporal inference for stream fish assemblage structure in the San Saba and Llano rivers *Thomas Dodson*	Factors influencing long-term trends in Brook Trout production in West Virginia headwater streams *Halden Edwards*	Juvenile recruitment and habitat use of Silver Carp in the lower Arkansas and lower White rivers *Allison Copeland*	Effects of anthropogenic stream barriers on Sandhills Chub Semotilus lumbee population genetics *Riley Phelps*	Lessons learned after a decade of augmenting freshwater mussel populations in Eastern North Carolina *Langston Haden*	Using stationary radio telemetry to determine survival and large scale movement patterns of Brown Trout related to environmental variables in the Little Red River *Hayden Wall*	

Thursday, February 20

	Windsor A	Windsor B	Victoria	Alexander	Swannanoa	Berkley	Cherokee
11:00	Quantifying the bias associated with spatial vs temporal replication in single season occupancy models: an application for rare freshwater mussels *Michael Baker*	Assessing controls on stream fish assemblages across a flow-intermittency gradient *Mark Rine*	Population monitoring efforts of Bigheaded Carp in the Tennessee and Cumberland rivers *Jennifer Caudle*	American Shad passage on the Cape Fear River: evaluating the effects of environmental flows and a nature-like fishway *Margaret Gaither*	Refining Tar River Spinymussel *Parvaspina steinstansana* broodstock collection using eDNA *Michael Walter*	Longitudinal fish assemblage changes past the managed coldwater sport fishery on the Little Red River *Levi Olhausen*	American Eel Breakout Session
11:20	Using electron transport system to predict the thermal tolerance of SWAP listed fish species *Jacob Daley*	Recruitment patterns of larval fishes: influence of tributaries and temporal variation in the Lower Ogeechee River Basin, GA *Bridgette Nicolosi*	Comparison of coastal and inland Silver Carp *Hypophthalmichthys molitrix* trophic impacts on native fishes in southern river drainages of Louisiana *Bailey Pentz*	Dam removal to reconnect diadromous fish to historical habitats across the Rapidan - Rappahannock River Basin, Virginia *Shawn Young*	eDNA assisting in conservation of Robust Redhorse *Daniel Farrae*	Collaborating with stakeholders to develop the Arkansas Statewide Trout Management Plan *Christy Graham*	
11:40 12:00 12:20 12:40	**Student - Mentor Lunch 11:40 AM - 1:00 PM**						
Start Time	Best Student Presentation Competition (undergrad & PhD)	Best Student Presentation Competition (MS)	Stocking Evaluation and Use of Propagated Fish I	Striped Bass	Telemetry	Habitat and Water Quality	
	Moderator: Ryan Heise	Moderator: Luke Etchison	Moderator: Tanya Darden	Moderator: Mason Collins	Moderator: Amanda Rosenberger	Moderator: Jennifer Dunn	
13:00	Quantifying movements of five fish species in the lower Alabama River, Alabama, USA *Justin Kowalski*	Water temperature may be a limiting factor for species reintroductions in the upper Little Tennessee River Basin *Atley Elliott*	Brown Trout post stocking survival in Lake Jocassee, SC *William Wood*		Maintenance and upkeep of a large acoustic telemetry array on the greater Pensacola Bay system *Calvin Beech*	Long-term aquatic habitat monitoring of Florida lakes in support of fisheries management and research *Kevin Johnson*	
13:20	Barriers broken: genetic swamping in restored Brook Trout populations *Rebecca Smith*	Hidden in plain sight: high-resolution stream networks reveal habitats for petitioned burrowing crayfishes *Devin Raburn*	Evaluation of Shoal Bass stocking efforts on a Florida River impacted by Hurricane Michael *Ryan Henry*	Estimating recreational catch and release mortality of Striped Bass *Rachel Kelmartin*	Survival of age-0 Alligator Gar following surgical implantation of acoustic transmitters *Lisa Izzo*	Revitalizing lake ecosystems: sediment remediation, nutrient dynamics, and benthic activity improvements using TryMarine technology in Brickhouse Lake *David Beasley*	
13:40	Llano River Carpsucker or Hill Country Quillback? Molecular hypotheses reveal insights into the diversity of Texas Carpoides inhabiting the Edwards Plateau *Hayden Roberts*	Over the waterfall: phenotypic plasticity in four stream fishes across an intermittent waterfall *Risa McCollough*	A comparison of wild and stocked F1 Largemouth Bass in Smith Mountain Lake, Virginia *Daniel Wilson*	Finally fishing for a living: results of the Roanoke River Striped Bass catch-and-release mortality study *Jeremy McCargo*	Quantifying component mortality rates of juvenile salmonids using predation detection acoustic tags (PDATs) *Elizabeth Greenheck*	A statewide survey of pharmaceutical exposure: Red Drum in Florida estuaries *Andy Distrubell*	
14:00	Stream fish species richness and base flow in the United States *Matthew Zink*	Seasonal community occupancy of fishes in a South-Central Plain headwater stream *Tara Schnelting*	Evaluation of stocked Rainbow Trout as trophy bass forage in Florida Lakes *Andrew Dutterer*	Summer catch-and-release mortality of Striped Bass in Smith Moutain Lake, Virginia *Nathan Smith*	Independent testing of PIT tags: advancing biotelemetry standards for fisheries and wildlife management *Joshua Murauskas*	Regional variation in mercury among Brazos River Alligator Gar *Atractosteus spatula* *Zachary Moran*	
14:20	Evidence of primary nursery usage of the Lemon Shark on Georgia barrier islands *Andrew Lyons*	The co-occurrence and habitat characteristics of invasive Red Swamp Crayfish and two regionally-endemic Procambarus taxa in southeastern North Carolina *Robert Adams*	The utility of parentage-based tagging data in hatchery management and aquatics conservation *Kara Carlson*	First year movement and survival of stocked Striped Bass in the Great Pee Dee River inferred from individually marked fish *Jason Doll*	Examining size bias of Largemouth Bass electrofishing with new technologies *Nathanael Hull*	An update on the classification and determination of Striped Bass *Morone saxatilis* natal origins in the Arkansas RIver, OK *Alexis Whiles*	
14:40	Introgressive speciation and sympatry of Pirate Perches in the southeastern United States *Tyler Muller*	Estimating population abundance and growth rates of Sandhills Chub *Semotilus lumbee* from two NC Sandhills headwater streams *Zachary Ramsey*	The development of triploidy induction methods for hybrid Striped Bass production *Samuel Garcia Vazquez*	Movements of Gulf Striped Bass in the Pensacola Bay watershed *Bradford Warland*	Movement patterns and environmental factors influencing White Bass spawning migrations from a North Carolina reservoir *Seth Mycko*	Evaluating effects of lake renovation on growth rates of Largemouth Bass in Karick Lake Florida *Matt Wegener*	

Thursday, February 20

	Windsor A	Windsor B	Victoria	Alexander	Swannanoa	Berkley	Cherokee
15:00	**Break**						
15:20							
Start Time	Best Student Presentation Competition (undergrad & PhD)	Best Student Presentation Competition (MS)	Stocking Evaluation and Use of Propagated Fish II	Aquatic Connectivity III	Methods and Modeling I	General Session	
	Moderator: Margaret Gaither	Moderator: Kyle Rachels	Moderator: Clint Morgeson	Moderator: Kaelyn Fogelman	Moderator: Deon Kerr	Moderator: Nadya Mamoozadeh	
15:40	Measuring and predicting fish movement following large-scale river ecosystem restoration *Jacob Barrett*	Assessment of contaminants to freshwater mussels in the Conasauga River *Molly Martin*	Muskellunge use of constructed floodplain sloughs in western North Carolina *Amanda Bushon*	So, you want to purchase and remove a 100-year old FERC licensed hydropower dam: early reflections on the Ela Dam removal project, Oconaluftee River, North Carolina *David Brown*	Evaluating detection of temporal trends in long-term freshwater fisheries data to inform future monitoring efforts *Kimberly Bonvechio*	New vs. old: comparing eDNA metabarcoding with conventional electrofishing sampling in degraded headwaters of western Tennessee *Tony Kumetis*	
16:00	Ontogenetic shift in the diet of invasive Mayan Cichlids Mayaheros urophthalmus in Wolf Branch Creek Nature Preserve, Tampa, Florida *Adam Cieslik*	Paddlefish *Polyodon spathula* spawning substrate availability and movement in William "Bill" Dannelly Reservoir and the lower Cahaba River, Alabama *Kalli Parauka*	The strategy and science behind Walleye stocking and management in western North Carolina reservoirs *David Goodfred*	Bridging science and community: Troy University's role in the Elba Hydroelectric Dam removal project on the Pea River *Kaelyn Fogelman*	Using species distribution models to inform conservation of freshwater fish Species of Greatest Conservation Need *Colby Denison*	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*	
16:20	Variation in lateral-line shape in darters (Percidae: Etheostomatinae) *Randolph Bowman*		Restoring a population in decline: successes and challenges of southern Walleye management *Christopher McKee*	Exchange of juvenile Atlantic Tarpon Megalops atlanticus between a mosquito impoundment and the Indian River Lagoon Estuary *Eli Bradley*	Blue and Channel catfish gill net selectivity in Texas Reservoirs *Lynn Wright*	Evaulation of recruitment variability factors and indexing techniques for Channel Catfish in Oklahoma *Austin Griffin*	
16:40	Microhabitat use of Turqoise Darters *Etheostoma inscriptum* in piedmont streams of South Carolina *Kathryn Lusk*		Attempting biological control of White Perch in Oklahoma *Jeremy Duck*	Patterns of larval fish assemblage structure across a regulated river *Madison Niles*	Potential quick method to predict body composition in fish using dual-energy x-ray *Anthony Overton*	Proposed standard weight equation and standard length categories for Flier *Timothy Bonvechio*	

Friday, February 21

	Windsor A	Windsor B	Victoria	Alexander	Swannanoa	Berkley
Start Time	Hurricane Helene	Habitat, Thermal, and Climate Change	Sturgeon I	Fisheries Management I	Marine and Estuarine	Methods and Modeling II
	Moderator: Lucie Law	Moderator: Matthew Troia	Moderator: Jeremy McCargo	Moderator: Kevin Dockendorf	Moderator: TD VanMiddlesworth	Moderator: Hayden Wall
8:00						
8:20	Surviving Helene: an initial assessment of how some fish and mussel populations fared in western North Carolina *Dylan Owensby*		Shortnose Sturgeon leaving home: new insights into partial migration *Joseph Nolan*	Overcoming challenges faced by private sector fisheries managers *Tyler Meighan*	Movement patterns of Cubera Snapper *Lutjanus cyanopterus* along the southeast coast of Florida *Dayna Hunn*	Comparison of ages obtained from operculum bones and otoliths for Goldeye *Jory Bartnicki*
8:40	Stream and floodplain restoration lessons learned following 2024 Helene flooding in western North Carolina *Greg Jennings*	Reservoir Fisheries Habitat Partnership: improving habitat in our nation's reservoirs for 15 years strong *Michael Homer*	Describing the genetically distinct fall spawning population of Gulf Sturgeon *Acipenser oxyrinchus desotoi* in the Apalachicola River *Sarah Weaver*	Characterization of urban recreational fishermen in Birmingham, Alabama *Anthony Overton*	Assessment of fish spawning aggregations in southeast Florida: residency and movement patterns of Gray Snapper off southeast Florida *Ashton Lyon*	Cluster analysis of morphological traits of fishes of the lower Tallapoosa River *Zane Fuqua*
9:00	~~Conservation updates from the national forests of North Carolina~~ *John DeLuca*	Assessing the influence of microhabitats on estuarine fish species in the ACE Basin, SC using unoccupied aerial systems technology (UAS) and machine learning *Zoe Golden*	Migratory dynamics of adult Atlantic Sturgeon in the Cape Fear River *Joseph Mathews*	Using modified creel survey methods to estimate angler dynamics at Lake Okeechobee, FL *Daniel Nelson*	Juvenile sportfish as an indicator species for restoration planning and implementation and a metric of success *Alexis Trotter*	Comparing tagging study estimates of exploitation to virtual population analysis results for Black Crappie *Pomoxis nigromaculatus* in a natural Florida lake *Paul Ramsey*
9:20	Weathering the storm: a status update of Appalachian Elktoe *Alasmidonta raveneliana* and future plans following Hurricane Helene *Chantelle Rondel*	Thermal refugia and summer microhabitat selection in Edisto River, SC, Striped Bass *Morone saxatilis* *Jacob Hill*	Seasonal variation of riverine habitat use for adult Atlantic Sturgeon in South Carolina *David Hood*	Population characteristics of Muskellunge in the French Broad River, NC *Derek Crane*	Monitoring Cobia population recovery using eDNA *Ellen Reiber*	Characterizing growth and maximum ages of native suckerfishes (Catostomidae) in Georgia, USA: implications for bowfishing management needs *Hunter Rider*
9:40	Contextualizing Dam Removal, Aquatic Connectivity and Stream Restoration Projects Post-Helene *Jake McLean*	Coastal assessment of extreme thermal events (MHWs and MCSs) in South Carolina *Ashley Bobnar*	Habitat use of Gulf Sturgeon *Acipenser oxyrinchus desotoi* of Mississippi barrier islands following Ship Island restoration *Eugin Bornman*	Smallmouth Bass in Music City. Potential for another popular smallmouth fishery in Tennessee *Phillip Parsley*	Evidence for declining numbers of large Dolphinfish *Coryphaena huppurus* in the western North Atlantic *Brendan Runde*	Lab based estimates of long-term bowfishing shoot-and-release mortality with comparisons to prior work and considerations for future bowfishing research and managment *Douglas Zentner*
10:00	**Break**					
10:20						

Friday, February 21

	Windsor A	Windsor B	Victoria	Alexander	Swannanoa	Berkley
Start Time	Hurricane Helene	Habitat, Thermal, and Climate Change	Sturgeon II	Fisheries Management II		
	Moderator: Lucie Law	Moderator: David Young	Moderator: Aaron Gray	Moderator: Tyler Meighan		
10:40	Survey results: compilation of surveying efforts to assess impacts of Hurricane Helene *Lucie Law*	Environmental factors related to the hatch timing of riverine fishes affected by hydropower generation *Mariaguadalupe Vilchez*	Riverine movements of Gulf Sturgeon *Acipenser desotoi* in the Pearl and Pascagoula rivers *Michael Andres*	Gastric lavage shows promise as a non-lethal diet extraction method for darters (Etheostomatinae) *Kyler Hecke*		
11:00	Hurricane Helene Breakout Session	Leveraging a spatiotemporally large dataset to test predictions of life-history theory *Langston Haden*	Overwinter survival of juvenile Gulf Sturgeon in the Apalachicola River, Florida *Russell Wilson*	Black Crappie installed habitat utilization in Lake Keowee, SC *William Wood*		
11:20		Long term effects of climate change on ichthyoplankton populations of coastal Georgia *Bradley Cayson*	A robust design model to assess survival of Atlantic Sturgeon in the Altamaha River *Alan Bond*			
11:40						

SDAFS 2025 - Meeting Menu

Coffee and Tea will be served daily in the Ballroom from 7:30 AM – 8:20 AM and at morning breaks

Each guest will receive 2 drink tickets per social

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Tuesday - Welcome Social

Highland Brewery

* Pulled Pork and Chicken
* Macaroni and Cheese
* Baked Beans
* Vegetable Platter
* Slider Rolls
* Banana Pudding

Must wear SDAFS name badge for admittance!

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Wednesday – Poster Social

Renaissance Hotel – Grand Ballroom

* Angus Beef, Chicken, Pulled Pork Sliders
*Vegetarian (Mushroom) Sliders
*Hummus, Pita, Raw Vegetables
*Vegetable Spring Rolls

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Thursday - Grand Social

Renaissance Hotel – Grand Ballroom

Dinner Buffet

* Signature House Salad
* Corn Fritters
* Pimento Cheese Dip and Crackers
* Shrimp and Grits
* House Made Mama's Meatloaf
* Southern Fried Chicken
* Blackened Cauliflower
* Braised Cabbage *(with Bacon)*
* Mashed Potatoes and Gravy
* Buttermilk Biscuits
* Dessert *(Chef's Choice)*
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2025 SDAFS Raffle

North Carolina fisheries students coordinated this year's raffle. Proceeds will support student travel to this meeting and future meetings. Please consider supporting the students by participating in the raffle which will open on Wednesday afternoon and during the Poster Social on Wednesday night. The raffle will remain open through Thursday night and winners will be announced during the Grand Social. Thank you to all our donors who are listed below:

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Trailside Workshop
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Lunch Options

Restaurant	Walking time (min) from Renaissance Hotel
Mellow Mushroom	3
Twisted Laurel	3
The Gourmet Chip Company	4
Mela	5
Old Europe Pastries	5
Packs Tavern	5
Rosetta's Kitchen	5
Wasabi Japanese	5
Green Sage	6
Heiwa Shokudo	6
Farm Burger	7
Rankin Vault	7
Salsas	7
The Med	7
Mehfil	8
The Bier Garden	8
Twisted Crepe	8
White Duck Taco shop downtown	8
Chestnut	9
Foggy Mountain Brew Pub	9
Romans	9
Shanghai Dumpling House	9
Soda Fountain	9
The S&W Market	9
Tupelo Honey	9
Botiwalla	10
Claddagh Restaurant	10
Early Girl Eatery	10
Jerusalem Garden Café	10
RedGinger and Tapas	10
The Exchange Restaurant & Bar	10
Mamacito's Taqueria	11
Wicked Weed Brew Pub	11
Burgerworx	12
Chai Pani	17

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2024–2025 SDAFS Officers

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Poster Presentations

1. **Environmental Drivers of American Eel (*Anguilla rostrata*) Recruitment to Northeast Florida**
   Jonathan B. Simmons (University of North Florida), Angelo Cantu (University of North Florida), Ava Allen (University of North Florida), Adam Mann (University of North Florida), Avi Stevens (University of North Florida), Morgan Lattomus (University of North Florida), Kelly Smith (Elmira College), Eric Johnson (University of North Florida)

2. **Decadal Declines in Recruitment of American Eels (*Anguilla rostrata*) to a Northeast Florida Estuary**
   Kaylee M. Tallon (University of North Florida), Emily Cassidy (University of North Florida), Cassio DalMas (University of North Florida), Elijah Divine (University of North Florida), Morgan Lattomus (University of North Florida), Kelly Smith (Elmira College), Eric Johnson (University of North Florida)

3. **Evaluation of Passage Efficiency and Migration of Striped Bass in Relation to a Modified Nature-Like Fish Swimway and Elevated Flows in the Cape Fear River**
   Gabrielle P. Shay (University of North Carolina Wilmington), Maggie Gaither (North Carolina Wildlife Resources Commission), Aaron Bunch (The Nature Conservancy), Troy Farmer (Clemson University), Frederick Scharf (University of North Carolina Wilmington)

4. **Evaluating The Effects of Dams on A Riverine Food Web in Alabama, USA**
   Kate Norrid (Auburn University), Dennis DeVries (Auburn University), Rusty Wright (Auburn University), Matt Waters (Auburn University)

5. **Fish Assemblage Response to Habitat Restoration, Including an Innovative Grade Control Structure Designed for Fish Passage, in a Headwater Stream of the Lower Mississippi Region**
   Alexandra M. Scott (University of Tennessee), Alejandro Molina-Moctezuma (University of Tennessee), Augustin C. Engman (University of Tennessee), Kayla N. Key (West Tennessee River Basin Authority)

6. **Can Beaver Dam Analogs Provide a Rapid and Cost-Effective Method for Restoring Streams in the Southeastern US?**
   Emily B. Gillikin (Appalachian State University), Michael Gangloff (Appalachian State University), Grant Buckner (Foothills Conservancy)

7. **Nothing Fishy about the Bonnet Carré Spillway**
   Howard Dunleavy (Louisiana State University), Paul Miller (Louisiana State University), John White (Louisiana State University), Michael Dance (Louisiana State University), Stephen Midway (Louisiana State University)

8. **Species Distribution and Habitat Characteristics in Freshwater Streams of the U.S. Virgin Islands**
   Jacob T. Laurain (Clemson University), Brandon K. Peoples (Clemson University), Sean P. Kelly (U.S. Fish and Wildlife Service)

9. **The Impact of Limestone Treatment on Fish Communities in AMD-Affected Watersheds**
   Madison G. Jones (Fairmont State University), Kelley Flaherty (Fairmont State University)

10. **Water Weeds: A New Resource for Aquatic Plant Management**
    J. Wesley Neal (Mississippi State University), Gray Turnage (Mississippi State University), Dennis Riecke (Mississippi Department of Wildlife, Fisheries & Parks)

11. **Larval Fish Community in the Great Pee Dee River**
    Caroline M. Lucas (Francis Marion University), Timothy Shannon (Francis Marion University), Jason Doll (Francis Marion University)

12. **Exploring Species Richness in South Carolina's Low Country**
    Catherine A. Masatani (Clemson University), Brandon Peoples (Clemson University), Zanethia Barnett (United States Forest Service)

13. **Optimizing Sampling Designs for Rare Stream Fishes: A Simulation-Based Approach for Estimating Spotfin Chub Abundance**
    Avery M. Davis (Tennessee Technological University), Kit Wheeler (Tennessee Technological University), Allison Keever (Tennessee Technological University)

14. **Carolina Conundrum - Conserving the Carolina Madtom in North Carolina**
    Amber Olson (North Carolina Wildlife Resources Commission), Michael Fisk (North Carolina Wildlife Resources Commission), Michael Walter (North Carolina Wildlife Resources Commission)

15. ***Alloglossidium progeneticum*** **(Trematoda: Macroderoididae): A Parasitic Trematode of Native and Invasive Crayfish in an Urban Watershed**
    Tyler K. Bulot (Georgia Gwinnett College), Riccardo Fiorillo (Georgia Gwinnett College), Peter Sakaris (Georgia Gwinnett College)

16. **Dissemination of Carbapenem Resistant Enterobacteriaceae (CRE) in Fish Guts from Three Urban Rivers**
    Kenneth L. De Leon (Clemson University)

17. **Critical Thermal Maximum of Mussels in an Intermittent South Central Plains Ecoregion Watershed**
    Eli P. Schmidt (Arkansas Tech University), Zach R. Crain (Arkansas Tech University), Aaron A. Brady (Arkansas Tech University), Kyler B. Hecke (Arkansas Tech University)

18. **Quantifying Freshwater Mussel Biofiltration in a Flow-Through System.**
    Matthew D. Maguire (North Carolina State University), Sean B. Buczek (North Carolina State University), Chris B. Eads (North Carolina State University)

19. **Beta Diversity of Mussel Assemblages in Tributary Systems of the South Central Plains Ecoregion in Arkansas**
    Zachary Crain (Arkansas Tech University), Kyler Hecke (Arkansas Tech University), Kendall Moles (Arkansas Game and Fish Commission)

20. **Distribution and Abundance of Mussels in Two Intermittent Streams of the Arkansas Valley Ecoregion**
    Aaron Brady (Arkansas Tech University), Kyler B. Hecke (Arkansas Tech University), Zach Crain (Arkansas Tech University), Seth Drake (The Ohio State University), Kendall Moles (Arkansas Game and Fish Commission)

21. **Restoring Lost Diversity: A Comprehensive Approach to Mussel Fauna Reintroduction in Abrams Creek, Great Smoky Mountains National Park**
    Caleb M. Moses (University of Tennessee), Gus Engman (University of Tennessee), Gerry Dinkins (University of Tennessee), Matt Kulp (National Park Service)

22. **Freshwater Mussels of the Hatchie River: Distribution, Composition, and Abundance**
    Katelynn M. Sallack (Tennessee Tech University), Kayla N. Key (West Tennessee River Basin Authority), Kristin Irwin Womble (Tennessee Tech University), Amanda Rosenberger (Tennessee Tech University)

23. **Seeing Scars: Dive Into the Scars and Skin Conditions of Pacific Coast Feeding Group Gray Whales**
    Serina L. Lane (Georgia Gwinnett College), Natalie Chazal (Oregon State University), Leigh Torres (Oregon State University)

24. **An Ecological Characterization of Juvenile Tarpon and Snook Nursery Habitat in Texas**
    Isabel M. Tiller (Texas A&M University-Corpus Christi), Matthew Streich (Texas A&M University-Corpus Christi)

25. **Seascape Genomics of Eastern Oyster (Crassostrea virginica) in and around Beaufort Inlet, North Carolina**
    Molly M. Honecker (Duke University), Henry Sun (Duke University), Jilly Senk (Duke University), Ben Peed (Duke University), Juliet Wong (Nicholas School of the Environment, Duke University), Thomas Schultz (Nicholas School of the Environment, Duke University)

26. Population Assessment of the Invasive Weather Loach in the Sweetwater Creek Watershed at Club Drive Park, Gwinnett County, Georgia
Melissa A. Berry-Shelton (Georgia Gwinnett College), Peter C. Sakaris (Georgia Gwinnett College)

27. Trophic Dynamics of an Expanding Population of Blue Catfish in Albemarle Sound, North Carolina
Nolen Vinay (University of North Carolina Wilmington), Cami Miller (East Carolina University), James W. Morley (East Carolina University), Frederick S. Scharf (University of North Carolina Wilmington)

28. Assessing the Susceptibility of a Newly Discovered Barrens Topminnow (*Fundulus julisia*) Population to Western Mosquitofish (*Gambusia affinis*) Invasion
Kirsten N. Humphries (Tennessee Tech University), Kit Wheeler (Tennessee Tech University)

29. Evaluating Alternative Management Strategies for Black Crappie in Lake Murray, South Carolina
Jessie B. Kriner (Clemson University), Jason Bettinger (South Carolina Department of Natural Resources), Conner Owens (South Carolina Department of Natural Resources), Shari L. Rodriguez (Clemson University), Troy M. Farmer (Clemson University)

30. Measuring Management Intensity of State-Managed Marine and Coastal Fisheries
Apria N. Valenza (University of North Carolina at Wilmington), Frederick Scharf (University of North Carolina at Wilmington)

31. Building a West Texas Fishery from the Ground Up
Michael D. Homer Jr. (Texas Parks & Wildlife Department, Inland Fisheries Division)

32. Preliminary Assessment of Fish Assemblages in Natural Wetlands, NRCS Easement Wetlands, and Agricultural Ditches in the Mississippi Alluvial Valley of Arkansas
Benjamin S. Johnson (University of Arkansas at Pine Bluff), Michael A. Eggleton (University of Arkansas at Pine Bluff), Erin E. Thayer (University of Arkansas at Pine Bluff)

33. Spatial Variation in Young-Of-Year Brook Trout Body Size Across Their Native Range
Sean Ingram (Colorado Parks and Wildlife), Yoichiro Kanno (Colorado State University), Mevin B. Hooten (University of Texas Austin), Jacob Rash (North Carolina Wildlife Resources Commission)

34. Habitat Use and Spawning in Walleye (*Sander vitreus*) in Watts Bar Reservoir, Tennessee
Brittnany M. Graham (University of Tennessee – Knoxville), Joey Root (Tennessee Wildlife Resources Agency), Mike Jolley (Tennessee Wildlife Resources Agency), Lisa K. Izzo (University of Tennessee – Knoxville)

35. Analysis of Spawning Characteristics of Crappie Within Kentucky Lake
Emily A. Freeman (Murray State University), Timothy Spier (Murray State University)

36. Depth Patterns of Redear Sunfish *Lepomis microlophus* in Kentucky Lake
Justin Graben (Murray State University), Timothy Spier (Murray State University)

37. Monitoring and Prevalence of Visual Stressors in Two Tidal Largemouth Bass Fisheries
Ryan A. Gary (Maryland Department of Natural Resources)

38. Evaluation of Hole-Punching Operculums as a Marking Technique in Centrarchids
Shelby E. Jeter (Oklahoma Department of Wildlife Conservation), Alexis Whiles (Oklahoma Department of Wildlife Conservation), Doug Zentner (Oklahoma Department of Wildlife Conservation), Richard Snow (Oklahoma Department of Wildlife Conservation)

39. Accuracy and Precision of Scales and Dorsal Spines to Age Coastal Striped Bass
De'Asia L. Hill (Francis Marion University), Jason Doll (Francis Marion University)

40. Pondside Tanks as an Alternative Rearing Approach for Striped Bass Larvae
Erimi Kendrick (North Carolina State University), Brendan Leibert (North Carolina State University), Benjamin Reading (North Carolina State University)

41. Incorporating Environmental Effects Into Stock Assessment: A Case Study Using Spotted Seatrout
Manuel E. Coffill-Rivera (University of South Alabama), Jason M. Cope (NOAA Fisheries), John Mareska (Alabama Department of Conservation and Natural Resources), Sean P. Powers (University of South Alabama)

42. Patterns of Larval Fish Assemblage Structure Across a Regulated River
Madison Niles (Clemson University), Luke Bower (South Carolina Cooperative Fish & Wildlife Research Unit)

43. Comparing Aqueous Environmental DNA Metabarcoding to Sediment-Bound Environmental DNA Metabarcoding in Sand-Dominated Freshwater Systems
Eduardo Toala-Hidalgo (Tennessee Tech University), Tony Kumentis (Tennessee Tech University), Robert T. R. Paine (Tennessee Tech University), Kit Wheeler (Tennessee Tech University), Amanda Rosenberger (Tennessee Tech University)

44. Sampling Gear Effects on Estimates of Aquatic Insect Abundance and Diversity in a Southeastern River System
A. Henry Gasperecz (Louisiana State University), Michael D. Kaller (Louisiana State University)

Abstracts

The Co-Occurrence and Habitat Characteristics of Invasive Red Swamp Crayfish and Two Regionally-Endemic Procambarus Taxa in Southeastern North Carolina

Robert Adams, Appalachian State University
Elijah Thompson, Appalachian State University
Sidney Busch, Appalachian State University
Robert Creed, Appalachian State University
Michael Gangloff, Appalachian State University

Freshwater crayfish are important components of freshwater ecosystems and have high levels of diversity in North America. This high diversity likely results from a combination of limited ranges and habitat specialization. However, native crayfish populations are facing increasing pressure from multiple potential sources including the spread of invasive crayfish and habitat loss. The Red Swamp Crayfish (Procambarus clarkii) is an aggressive invader and can rapidly colonize a range of ecosystem types. Procambarus clarkii has colonized much of the eastern Carolinas in the last 20 years including the Lumber and Waccamaw River systems. These watersheds are also home to two native Procambarus species of state concern: the Sandhills crayfish (*Procambarus pearsei*) and the Waccamaw crayfish (*Procambarus braswelli*). These species have limited ranges and appear to be declining across their respective ranges. Although these native crayfish typically inhabit very different environments, both can co-occur with P. clarkii. We explored patterns of co-occurrence between native and invasive crayfishes and characterized the biotic and abiotic habitat variables associated with the occurrence of all three species. *Procambarus pearsei* and *P. braswelli* occupied very different habitats with *P. pearsei* being a specialist in intermittent streams, bay swamps and floodplain wetlands whereas *P. braswelli* inhabits primarily larger streams and medium sized rivers. Red Swamp Crayfish were more likely to co-occur with *P. braswelli* and less likely to be found in intermittent habitats alongside *P. pearsei*. Habitat variables associated with intermittency seem to be the best predictors of *P. pearsei* occupancy whereas in-stream habitat parameters are the best predictors of P. *braswelli* and *P. clarkii* occurrence. These data provide important insights that may help explain both the co-occurrence of P. clarkii and endemic crayfishes as well as habitat characteristics influencing presence and abundance.

Riverine Movements of Gulf Sturgeon (*Acipenser desotoi*) in the Pearl and Pascagoula Rivers

Michael J. Andres, Division of Coastal Sciences, The University of Southern Mississippi
Kasea L. Price, Division of Coastal Sciences, The University of Southern Mississippi
Olivia St. Germain, Division of Coastal Sciences, The University of Southern Mississippi
Cameron Bodine, School of Marine Science and Policy, University of Delaware
Morgan K. Segrest, Division of Coastal Sciences, The University of Southern Mississippi
Elizabeth M. Greenheck and Caleb Wilson, Center for Fisheries Research and Development, The University of Southern Mississippi, Ocean Springs, MS
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Brian R. Kreiser, Division of Biological Sciences, The University of Southern Mississippi
Mark S. Peterson, Division of Coastal Sciences, The University of Southern Mississippi
William T. Slack, Aquatic Ecology and Invasive Species Branch, U.S. Army Engineer Research and Development Center

Gulf Sturgeon (GS) natal to the Pearl and Pascagoula rivers comprise populations genetically more similar to each other than those east of Mobile Bay, AL, and are generally referred to as the Western Population Unit (WPU). The WPU are thought to be recovering more slowly than eastern populations and have data gaps associated with identification of spawning reaches and summer resting habitats. No spawning reaches within the Pearl River have been identified and only one within the Pascagoula River system (on the Bouie River tributary) has been confirmed by egg/larval collection. Additionally, the Pearl River has several mainstem modifications including low-head dams and a reservoir whereas only the Bouie River tributary has one low-head dam located just upstream of the only identified spawning site for the Pascagoula River population, which likely influences upriver migrations. Our study provides details on GS use of each of these river systems, the extent of upriver migration, characterization of riverbed habitat, frequency of migration, and crossing of low-head dams for each river. Spawning-like movements were observed on each river system including all three of the major upstream tributaries of the Pascagoula River (the Bouie, Leaf, and Chickasawhay rivers) in reaches containing fewer fine sediments and more hardbottom. Individual GS genetically assigned to the Pearl River and to the Choctawhatchee River (FL) were observed making spawning-like movements in tributaries of the Pascagoula River. Holding reaches for GS were found to occur in the lower 50 rkm of the Pascagoula River, with some individuals remaining in estuarine reaches during the summer resting period. Well defined holding reaches on the Pearl River remains elusive, particularly for adults. Pearl River holding reaches for juvenile occur in the lower 30 rkm, including consistent use of estuarine reaches. This study fills data gaps in WPU riverine use that are necessary for advancing GS conservation goals.

Unraveling the Drivers of Multifaceted Homogenization and Differentiation of Invaded Stream Fish Communities Across the Conterminous United States

William K. Annis, Clemson University
Lily M. Thompson, University of Missouri
Luke M. Bower, USGS SC Cooperative Research Unit
Stephen R. Midway, Louisiana State University
Julian D. Olden, University of Washington
Brandon K. Peoples, Clemson University

The introduction of nonnative species can lead to changes in beta diversity, which can be measured at the community level via local contribution to beta diversity (LCBD). When LCBD increases, a community becomes more distinct (differentiation) and less distinct when LCBD decreases (homogenization). Beta diversity can be measured in taxonomic, functional, and phylogenetic facets, as well as replacement and richness difference components. Considering these nine dimensions can give more mechanistic insights in homogenization/differentiation processes. Changes in beta diversity represent an intersection of historic biogeographic processes that shape native diversity and ecologically contemporary invasion drivers reassemble communities. Native multifaceted diversity can modulate the magnitude and direction of beta diversity change, invasion drivers determine which species are introduced to communities, and origins of nonnative species can affect if communities homogenize or differentiate. In this study, we calculated nine dimensions of change in LCBD (taxonomic, functional, and phylogenetic facets; total, replacement, and richness differences components) for 1,024 stream fish communities across the conterminous United States. We used multivariate analyses to determine drivers of changes in multifaceted LCBD, including measures of native diversity (alpha diversity and LCBD), invasion drivers (propagule pressure, habitat alteration, and habitat characteristics), and community invadedness (provincially, regionally, and continentally nonnative invadedness). We found that different factors drive

different dimensions of LCBD change. For example, communities that experienced taxonomic and functional homogenization, were high elevation streams that were invaded by regionally nonnative species. Alternatively, communities that experienced phylogenetic differentiation were streams with low recreational fishing demand that were invaded by continentally nonnative fish. In addition, communities with lower native LCBD values were more likely to differentiate and communities with higher native LCBD values were more likely to homogenize. Our findings illustrate that a multifaceted approach is important to unveil the mechanisms of homogenization and that explicitly defining nonnative status is important as the origin of nonnative species can affect the ecological and evolutionary consequences of nonnative introductions.

Quantifying the Bias Associated with Spatial Vs Temporal Replication in Single Season Occupancy Models: an Application for Rare Freshwater Mussels

Michael Baker, University of Georgia
Allison Roy, U.S. Geological Survey, Massachusetts Cooperative Fish and Wildlife Research Unit, and University of Massachusetts Amherst
Peter Hazelton, University of Georgia

Occupancy sampling is used in wildlife studies to assess species' presence and distribution. This method traditionally involves visiting sites multiple times to account for imperfect detection and recording at each visit whether the species was observed. An alternative to repeat visits involves breaking sites up into spatial replicates for assessing detection, which is appealing to managers because it requires only one visit to each site. Depending on the system and species, however, this substitution can result in biased estimates of occupancy because it fundamentally changes the assumption of the statistical model (i.e., from constant occupancy status across temporal replicates to constant occupancy status across spatial replicates). The objective of this study is to use simulated data to compare the bias associated with using spatially replicated vs temporally replicated occupancy models across a variety of input parameters. Sites were constructed and populated in Program R and sampled using specified detection probabilities using spatial and temporal replication. Capture histories were fitted in an occupancy framework to determine the difference between estimated and true values of watershed level occupancy. The spatial replication method resulted in positive bias in the occupancy estimates, especially at low values of true occupancy. The temporal method, in contrast, generally resulted in unbiased estimates. Consequently, estimates of occupancy were almost always greater when using the spatial method compared to the temporal method. While the motivation for this study arose from research on freshwater mussels, the trends observed are not unique to this taxonomic group, and this approach could be adapted to better understand the sampling dynamics of other species. This study can inform sampling protocol designs and potentially retroactive adjustments to previously derived estimates that may be useful for scientists and managers.

Measuring and Predicting Fish Movement Following Large-Scale River Ecosystem Restoration

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Thomas A. Dodson, Department of Ecology and Conservation Biology, Texas A&M University
Megan DiNicola, Department of Civil and Environmental Engineering, Utah State University
Belize Lane, Department of Civil and Environmental Engineering, Utah State University
Mitchell R. Magruder, San Antonio River Authority
Austin M. Davis, San Antonio River Authority

David L. Smith, Engineer Research and Development Center Environmental Laboratory, United States Army Corps of Engineers
Joshuah S. Perkin, Department of Ecology and Conservation Biology, Texas A&M University

In North America, Unionid mussels have exhibited severe declines, and reintroduction represents a valuable conservation tool. Freshwater fishes and mussels have coevolved a relationship whereby fishes serve as hosts for early life stages of mussels (glochidia), and successful recolonization is partially dependent on the ability of fish hosts to successfully disperse to suitable mussel habitat. The Mission Reach of the San Antonio River is an urban stream reach with a particularly 'flashy' hydrologic regime, and restoration projects have involved the construction of 31 erosion control structures across an eight-mile (12.8 km) segment. These structures have the potential to structurally fragment the riverscape but have yet to be evaluated for fish passage. Although juvenile mussels have been reintroduced, natural recolonization by sexually mature mussels that persist is yet to be documented. One hypothesis for the lack of recolonization success is that movement by fish hosts may be limited by installed structures or the unique hydrology, thereby reducing connectivity between established mussel populations and suitable rearing habitat. Our objective was to determine whether individual fish are successfully passing erosion control structures and evaluate intrinsic and extrinsic predictors of passage. We used passive integrated transponder (PIT) tags to evaluate movement across a subset of seven structures within the Mission Reach. We PIT tagged 1,140 individuals representing 20 species and used a mobile antenna system to redetect individuals biweekly from May to August in 2024. We redetected 229 individuals and documented 22 passage events, including several individuals which passed multiple structures since their previous observation. Passage was positively correlated with time at large, fish length, and Julian date, indicating that larger (and most likely older) individuals pass structures more frequently and that passage declined over the course of the summer months. Our results will be used to inform future mussel reintroduction efforts and indicate that erosion control structures comparable to those in the Mission Reach do not represent complete barriers to movement by fishes.

Comparison of Ages Obtained from Operculum Bones and Otoliths for Goldeye

Jory B. Bartnicki, Oklahoma Department of Wildlife
Richard A. Snow, Oklahoma Department of Wildlife

Goldeye (*Hiodon alosoides*) are found throughout the Mississippi River Drainage in the United States. In Oklahoma, populations are found throughout the Arkansas and Red River Drainages. Goldeye ages are typically obtained by using scales or operculum bones. In many other fish species, otoliths are the preferred aging structure. We wanted to investigate multiple processing techniques for goldeye otoliths and then compare the ages obtained from otoliths to those obtained from operculum bones. Preliminary results show better precision among readers for otoliths; however, processing plays a key role in obtaining favorable results.

Revitalizing Lake Ecosystems: Sediment Remediation, Nutrient Dynamics, and Benthic Activity Improvements using Trymarine Technology in Brickhouse Lake

David D. Beasley, SOLitude Lake Management
Farshid.S Najafabadi, TryGlobal IP holding and TryMarine

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.

Invasive Fishes in Virginia – Perspectives Gained from Managing Blue Catfish, Northern Snakehead, and Alabama Bass

Mike Bednarski, Virginia Department of Wildlife Resources
John Odenkirk, Virginia Department of Wildlife Resources
Alex McCrickard, Virginia Department of Wildlife Resources
Margaret Whitmore, Virginia Department of Wildlife Resources
Clint Morgeson, Virginia Department of Wildlife Resources

Managing invasive fishes presents unique challenges, as they often support popular and economically valuable recreational fisheries. We present three case studies from Virginia – blue catfish, northern snakehead, and Alabama bass. Blue catfish were purposely introduced by the Department of Wildlife Resources (DWR) in the late 1970s to provide sportfishing opportunities and created quality fisheries in tidal rivers. Since approximately 2005 blue catfish have been viewed as invasive by many stakeholders in the Chesapeake Bay watershed, creating interjurisdictional management conflict. Northern snakehead were introduced into Virginia around 2000. In response, DWR enacted regulations designed to control abundance and limit spread while concurrently researching population dynamics and general ecology of the species. Northern snakehead appear to co-exist with other species in Virginia and support an increasingly popular recreational fishery, creating management conflict as DWR works to manage to limit spread, maintain an appropriate amount of vigilance, and advance its mission to promote quality and unique recreational fishing opportunities. Alabama bass were introduced into Virginia, likely by anglers around 2010 and continue to spread through purposeful introduction. DWR's approach has been to liberalize regulations, encourage reporting, and directly engage stakeholders with an interest in minimizing impacts of Alabama bass. We discuss lessons learned, including the need for basic research, the importance of engaging stakeholders, invasive fatigue, and philosophical issues and perceptions associated with the subjective "invasive" label.

Maintenance and Upkeep of a Large Acoustic Telemetry Array on the Greater Pensacola Bay System

Calvin Beech, Florida Fish and Wildlife Conservation Commission

Acoustic telemetry arrays are essential tools for studying aquatic animal behavior, movement, and ecology. Maintenance of these arrays is critical to ensuring data quality, system functionality, and longevity. This presentation provides an overview of the technical and logistical challenges associated with the maintenance and upkeep of an extensive acoustic array encompassing the Greater Pensacola Bay system, as well as strategies for effective management. Key challenges include environmental

factors such as biofouling, sedimentation, and extreme weather, which can compromise equipment performance and data transmission. Additionally, equipment malfunctions, battery depletion, and damage from vessel activity or marine organisms require regular inspections and repairs. The vast spatial coverage of the large array often complicates maintenance schedules, particularly in remote or high-traffic aquatic environments. Effective maintenance protocols are crucial for minimizing data loss and ensuring system reliability. Regularly scheduled deployments and retrievals for cleaning, diagnostics, and battery replacement are critical. The use of anti-fouling coatings and robust mooring systems can mitigate environmental impacts. Advances in telemetry technology, such as improved battery life and detection range, are increasingly aiding in the efficient management of large arrays. This presentation will also highlight the importance of maintenance practices and discuss the importance of collaborative networks in sharing expertise, resources, and data. By implementing a systematic approach to array maintenance researchers and managers can enhance the reliability and longevity of acoustic telemetry systems. These efforts ultimately support more comprehensive and accurate ecological studies, enabling informed conservation and resource management decisions. This work aims to serve as a guide for those managing large-scale telemetry systems, emphasizing the critical role of maintenance in maximizing the scientific and operational potential of these valuable research tools.

Population Assessment of the Invasive Weather Loach in the Sweetwater Creek Watershed at Club Drive Park, Gwinnett County, Georgia

Melissa A. Berry-Shelton, Georgia Gwinnett College
Peter C. Sakaris, Georgia Gwinnett College

Our goal was to assess the abundance, size structure, condition, and age and growth of the invasive weather loach, *Misgurnus anguillicaudatus*, in the Sweetwater Creek Watershed at Club Drive Park in Lawrenceville, GA. We also aimed to develop a reliable method for using lapilli otoliths to estimate age of the weather loach. The weather loach was first discovered in Georgia in 2020. In 2022, biologists from the University of Georgia documented an established population at the Club Drive Park location. We used a combination of backpack electrofishing and minnow trapping to collect a total of 68 weather loach from this site between August and October 2024. Total length (TL) and weight of the weather loach ranged from 70 to 180 mm (mean = 134 ± 2.6) and 2.6 and 31.7 g (14.6 ± 0.8). Length-frequency analysis revealed four potential year classes in the population, including three age-0 loach ranging from 70 to 84 mm TL. Weather loach appeared to be in excellent condition at Club Drive Park, weighing, on average, 3.7 g more at a given length than loach in their native range (Philippines). Gonadosomatic index (GSI %) of mature female loach ranged from 0.31 to 12.81% (mean = 5.75 ± 1.33), although loach were likely collected towards the end of the spawning season. Otoliths were embedded in a two-part epoxy resin, sectioned out whole, glued in a position perpendicular to the plane of the microscope slide, and wet-sanded until the core and annuli were visible. Our fall sampling revealed a growing weather loach population that is actively reproducing, as indicated by the presence of age-0 loach in the sample. Future research will include estimating age of all loach that were collected during this sampling period. Backpack electrofishing and minnow trapping will continue at this site in spring 2025.

Coastal Assessment of Extreme Thermal Events (MHWs and MCSs) in South Carolina

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Marine heatwaves (MHWs) and marine cold-spells (MCSs) can induce severe and extended impacts on surrounding ecosystems, including forced migrations, physiological impacts (e.g., reduced energy efficiency) that affect behavioral patterns, and mass mortality. However, the prevalence and effects of extreme thermal events in shallow, coastal waters are not well-known. Herein, we identify and describe extreme thermal events within four South Carolina estuaries (Winyah Bay, Cape Romain, Charleston Harbor, and the ACE Basin) through the analysis of long-term environmental data collected through the ACE Basin and Winyah Bay Reserve System-Wide Monitoring Programs (SWMP) and the United States Geological Survey (USGS). Findings reveal spatial and temporal variability in event metrics (e.g., frequency, intensity, duration, and cumulative intensity) concurrent with climate change predictions. Ultimately, we hope to describe the impacts of extreme thermal events on fish abundance and recruitment success in South Carolina inshore habitat, information which is important for providing reserve coordinators, fisheries scientists, and regional policy makers a better understanding of the observed historic variability in fish habitat and populations relative to extreme climatic weather events. In the face of climate change, such information related to temperature may be used to facilitate management of estuarine resources by estimating responses at the individual, species, and ecosystem levels around a changing habitat.

A Robust Design Model to Assess Survival of Atlantic Sturgeon in the Altamaha River

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Atlantic Sturgeon suffered major declines from more than a century of overfishing and habitat degradation and fragmentation. Despite the closure of the fishery and their listing as an endangered species, Atlantic Sturgeon populations have been slow to recover, in part due to continued anthropogenic threats. Habitat degradation, diminished water quality, entrainment in dredging gear, and vessel strikes are thought to be leading factors affecting the survival of these fish. The effect of these threats are often exacerbated in a riverine system where habitat is limited and fish are in closer proximity to direct threats. As juvenile Atlantic Sturgeon do not fully develop salinity tolerance until 2 years of age, they are restricted to their natal riverine habitat. Older, marine migratory juvenile Atlantic Sturgeon still regularly use these riverine environments as they frequently move between their riverine, estuarine, and marine habitats. Thus, a better understanding of the survival of juvenile Atlantic Sturgeon in riverine habitats is imperative for the better management of the species. This study investigates the survival of juvenile Atlantic Sturgeon in the Altamaha River. Due to juvenile Atlantic Sturgeon's propensity for migration, this study uses a robust design model that utilizes primary and secondary periods to allow for temporary emigration. The model is based on a 20-year mark-recapture dataset and uses a Bayesian framework to assess overall survival of each juvenile age group (ages: 1, 2, 3), as well as the survival of age-1 fish at every year of the study.

Age and Growth of American Eel in Lower St. Johns River in Northeast Florida

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Little is known about American Eel *Anguilla rostrata* populations across much of the species' large geographic range. This study aimed to collect important information on the life history and population biology of American Eel in a northeast Florida river. During two 12-week periods, from August to November 2021 and September to December 2022, American Eel were collected from a ~90-km Stretch of the lower St. Johns River via boat electrofishing. Data on length, weight, age, *Anguillicoloides crassus* parasite infection, and swim bladder condition were recorded for American Eel collected in both years, and additional data on sex, sexual maturity, and fin and eye morphology were recorded for American Eel collected in 2022. Overall, biologists spent more than 63.5 h of effort over 42 sampling days to collect 297 American Eel, ranging in size from 150 to 705 mm total length (TL) with a continental age ranging from 0 to 8 years. American Eel catches were low and varied by section of river and over time; however, no differences in the length–weight relationship or size structure were observed between river sections. Adult parasites were observed in swim bladders of 36% of American Eel, and 57% of eel exhibited some level of swim bladder damage. Although length–weight relationships were similar regardless of swim bladder condition, relative swim bladder length was lower for fish with severe damage. Histological examination of gonads from 160 American Eel in 2022 revealed that the male : female sex ratio was 0.9:1 and nearly all eel were sexually immature. The majority of fish were 2–4 years of age; average growth was modeled with a von Bertalanffy curve for American Eel aged 1–8: TL = 740 × [1 – e^−0.12(age + 1.98)]. Given the paucity of information about American Eel in this region, the data provided in this study will be critical to informing future decisions on the management of the American Eel stock.

Evaluating Detection of Temporal Trends in Long-Term Freshwater Fisheries Data to Inform Future Monitoring Efforts

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A simulation framework was used to assess the utility of fish abundance and biomass indices for tracking fisheries trends and the effects of sampling intensity and frequency on the ability to detect these trends. Based on annual fall electrofishing samples collected for 21 lakes, count and weight data were simulated for a 10-year period with known trends in annual mean values ranging from -70 to 300%. In all, data were simulated for seven gamefish species and three management-relevant groups. For sampling intensity, data were simulated with a range of sample sizes, from 10 to 40 or the maximum number available for a given lake. For sampling frequency, data were simulated for different sampling regimes that included sampling one year with one- or two-year breaks (4–5 years out of 10), sampling two years with one- or two-year breaks (6–7 years out of 10), and sampling the first five years only. Weight and count data yielded similar results, but the effect of sampling frequency and sampling regime varied by species/group and lake. Further, trend detectability was less and more variable when average counts and weights of fish in electrofishing samples were low. Overall, at least a 60% increase or 40% decline over a 10-year period was typically needed for trends to be detected in at least half of the lakes.

Increasing effort from the current sampling level did not substantially improve trend detectability, but reducing effort to a minimum of 10 transects would have a large negative effect in almost all lakes. Trend detection improved as the number of years sampled increased, but ideally sampling should be spaced throughout the entire 10-year period to capture the full magnitude of change. Sampling every year generally resulted in better trend detectability and in many cases was the only sampling regime that resulted in all study lakes achieving the 80% target detection level. Of the alternative regimes considered, the two-year sampling regimes performed the best.

Proposed Standard Weight Equation & Standard Length Categories for Flier

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We developed a standard weight (Ws) equation for the Flier *Centrarchus macropterus* using the traditional regression-line-percentile (RLP) technique and the empirical-percentile-linear (EmP-L), and the empirical-percentile quadratic (EmP-Q) method. Individual length and weight data for 8,192 fish from 8.0 to 30.5 cm TL were obtained from 58 populations utilized in the analysis. These fish were collected from 1949 to 2024 by various state agencies, university personnel, power companies and private consultants from known populations across the species' native and introduced ranges in North America. The unofficial (not published yet) resulting Ws equations were log10W =3.150 log10L-5.033 for the RLP technique and log10W =2.604 log10L + 0.126(log10L)2 = 4.446 for the quadratic EMP technique, where W is weight (g) and L is TL (mm). We present the unofficial (not published yet) EmP-L-derived Ws equations for the Flier as log10W = 3.147 × log10L − 5.029, where W is weight (g) and L is total length (TL, mm). We also developed standard length categories for Flier with minimum lengths for five standard length categories of 8, 13, 15, 18, and 23 cm TL for stock, quality, preferred, memorable, and trophy sizes. Development of a Ws equation and standard length categories will aid biologists in assessing condition and size structure of wild Flier populations and those being potentially propagated for supplemental stocking into areas with depressed native populations.

Habitat Use of Gulf Sturgeon (*Acipenser oxyrinchus desotoi*) of Mississippi Barrier Islands Following Ship Island Restoration

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Gulf Sturgeon (GS), a federally threatened species, exhibit distinct anadromous migratory patterns within their range, from the Pearl River, Louisiana, to the Suwannee River, Florida. Despite historical range loss and critical habitat exclusion, recent restoration efforts have spurred renewed interest in understanding GS movement dynamics. In this study, we used Kernel Utilization Distribution (KUD) estimates from passive acoustic telemetry data to analyze the home range and core use areas of GS inhabiting the Mississippi Sound barrier islands. GS from both eastern and western populations were

acoustically tagged and tracked within a network of receivers deployed around the barrier islands from 2021-2024. Results revealed differences in space use between individuals tagged east and west of Mobile Bay. Of the 343 individuals tagged in river systems east of Mobile Bay, only 27 (7.9%) visited the Mississippi Sound barrier islands whereas 29.2% (253 of 866) of the western population used these islands. Eastern individuals exhibited larger mean (± SD) daily core use areas (1.83 ± 1.3 km^2) compared to their western counterparts (1.49 ± 1.1 km^2), perhaps suggestive of western fish using the area more broadly rather than immigrants from eastern rivers. The areas used by GS varied between individuals as well as over time. Individuals of both western and eastern origin had their largest home range estimates in 2021 following the completion of the Ship Island restoration project in late 2020, likely in response to the altered habitat. This work provides valuable insights into the nearshore spatial ecology of Gulf Sturgeon and highlights the importance of continued habitat restoration efforts for supporting their recovery.

Variation in Lateral-Line Shape in Darters (Percidae: Etheostomatinae)

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The lateral line is an innovative adaptation in fishes that allows them to sense changes in pressure in the water such as current, depth, and disturbances. Constructed of a line of mechanosensory hairs along the fish, these trigger an electric signal to the fish's brain that allows it to respond accordingly. Some fish use this adaptation to face into the current, allowing them to filter feed through the water, some use it to maintain a specific depth, and others use it to allow them to school, wherein they all swim as one through the instant reaction provided by the lateral line. This extreme variation in use can especially be shown in the darter family, a freshwater type of fish, they are famed for their morphological diversity correlated to their ecology. Studies have found that certain species of darters prefer certain current speeds, while others prefer calm pools, each species having varied adaptations that specify them for that habitat. This morphological variation is also prevalent in the lateral line, a study by Page & Swafford in 1984 hypothesized that darters in faster currents may have significantly differently shaped later lines than those in slower habitats. My study aims to first; quantify the variation found in darter lateral lines, this will be done using geometric morphometrics taking many darter samples of a select species and making an "average" lateral line for that species. My study will also take into account the ecological context of the darters and their lateral line shape, running tests to determine if there is a significant difference among darters of different habitats.

Exchange of Juvenile Atlantic Tarpon (*Megalops atlanticus*) Between a Mosquito Impoundment and the Indian River Lagoon Estuary

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Atlantic Tarpon (*Megalops atlanticus*) are an ecologically and culturally important species that depend on coastal wetlands for nursery habitat. The larvae remain in these protected areas until reaching a total length of at least 250 mm, at which point they emigrate to the main estuary, often coinciding with flood events. The Indian River Lagoon (IRL) on Florida's east coast has undergone significant habitat alterations due to coastal development. Mosquito impoundments, heavily managed mangrove areas designed to reduce mosquito populations, serve as critical refuges for juvenile Tarpon. Wetlands within

these impoundments are connected to the main estuary by culverts that are periodically opened. This study focuses on an impoundment in Jensen Beach, FL, where culverts remain open year-round as managers explore optimal strategies for mangrove restoration.
To investigate emigration from the impoundment, 19 juvenile Tarpon were acoustically tagged between 2021 and 2024 during the summer months with Innovasea V9 transmitters and monitored using an array of acoustic receivers. Detection data were collected from the impoundment and surrounding areas. Preliminary results indicate that juvenile Tarpon preferentially migrate to the North Fork of the St. Lucie River, likely using it as a secondary nursery habitat. Emigration occurred primarily between late June and late September, with peaks in fish movement during falling tides. Additionally, preliminary analyses suggest a correlation between emigration and declining water temperatures, indicating that temperature may play a key role in emigration timing. These findings enhance our understanding of Tarpon habitat use and the environmental factors influencing their movement in the IRL.

Distribution and Abundance of Mussels in Two Intermittent Streams of the Arkansas Valley Ecoregion

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Freshwater mussels are facing an increasing need for conservation due to their declining populations. In order to conserve and restore populations, more data is needed on mussel distributions, especially in tributaries of large rivers. Big Shoal Creek and Little Shoal Creek are two upland-tributaries of the Arkansas River (Lake Dardanelle) in which no records exist for freshwater mussel populations. In an effort to address this knowledge gap we sampled a total of 9 sites on Little Shoal Creek and 18 sites on Big Shoal Creek to determine the abundance and richness of mussels in these streams. Mussels were sampled using a timed-search approach. Little Shoal Creek yielded a total of 62 individuals across 10 species. Big Shoal Creek yielded a total of 63 individuals across 6 species. The most abundant species in Little Shoal Creek was Giant Floater (*Pyganodon grandis*, n=17), and the most abundant species in Big Shoal Creek was Yellow Sandshell (*Lampsilis teres*, n=42). Mussel communities in both of these watersheds were spatially different. Mussel species in Little Shoal Creek (Yellow Sandshell and Giant Floater) have a wider distribution of lengths than in Big Shoal Creek. Further analyses will assess environmental and habitat differences between these two watersheds. It appears that they are influenced by Lake Dardanelle reservoir, where mussel abundance and richness increased by site as sites got closer to the reservoir. Our data establish a baseline of understanding for future conservation and monitoring efforts in these streams.

So, You Want to Purchase & Remove a 100-Year Old FERC Licensed Hydro-Power Dam: Early Reflections on the Ela Dam Removal Project, Oconaluftee River North Carolina

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Following an inadvertent release of a sizable amount of sediment in the fall of 2021, a few parties asked the question, why not remove Ela Dam? During the winter of 2021-2022 and into the spring of 2022 a diverse coalition came together with the goal of removing the dam. This presentation is a reflection of the considerations and undertakings from those early “let’s take the dam down” notions to obtaining FERC license surrender ahead of potential dam removal. Ela Dam is located on the Oconaluftee River,

0.5 mile upstream of the confluence with the Tuckasegee River. A portion of the impoundment adjoins the Eastern Band of Cherokee Indians Qualla Boundary and parts of the impoundment are tribal waters. The dam was constructed in 1924-25 by the Smoky Mountain Power Company to generate power for the Town of Bryson City. The Oconaluftee River is home to the sicklefin redhorse (*Moxostoma* sp.; Ugi Datli ᎤᎵᏓ in Cherokee). This fish is culturally significant for the Cherokee and is found only in the western tip of North Carolina and north Georgia. Downstream waters of the Tuckasegee River are critical habitat and have known occurrences of the federal endangered Appalachian elktoe (*Alasmidonta raveneliana*). There are also records of state listed and rare species that occur in the Oconaluftee and Tuckasegee Rivers below the dam including eastern hellbender (*Cryptobranchus alleganiensis*), olive darter (*Percina squamata*), wounded darter (*Etheostoma vulneratum*), smoky dace (*Clinostomus sp*.), Little Tennessee crayfish (*Cambarus georgiae*), Tuckasegee stream crayfish (*Cambarus tuckasegee*), smallmouth redhorse (*Moxostoma breviceps*), and Highland shiner (*Notropis micropteryx*).

***Alloglossidium progeneticum* (Trematoda: Macroderoididae): A Parasitic Trematode of Native and Invasive Crayfish in an Urban Watershed**

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Alloglossidium progeneticum is a trematode originally described from the antennary glands of the white tubercled crayfish (*Procambarus spiculifer*) and typically uses a 3-host life cycle (snail, crayfish, catfish). In Georgia, several populations of this trematode show a precocious truncated 2 host life cycle (snail, crayfish) and have been reported in white tubercled crayfish from the Oconee and Flint River watershed (Kasl et al. 2015) and in the Ocmulgee watershed (De La Hoz and Fiorillo, 2016). In 2016, De La Hoz and Fiorillo sampled 3 localities on the Yellow River (Gwinnett Co., GA) and reported an overall prevalence of 57%. In this study, we sampled the yellow river and some of its tributaries. We collected a total of 62 white tubercled crayfish and also 8 red swamp crayfish (P. clarkii), an invasive recently reported in Gwinnett Co. GA. In the white tubercled crayfish, we collected 836 worms most of which were heavily gravid, showing again that A. progeneticum in this watershed is truncating its lifecycle. The overall prevalence of infection was 89% and greater than in 2016. Comparatively, 50% percent of red swamp crayfish were infected with 62 *A. progeneticum*. Sample size of these crayfish was low, but it is a new host record for this trematode. Overall, host sex and size does not appear to influence infection patterns.

Muskellunge Use of Constructed Floodplain Sloughs in Western North Carolina

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Muskellunge *Esox masquinongy* are native to the French Broad River in western North Carolina; however, they were extirpated by the 1950s following extensive floodplain channelization and other impacts to aquatic habitat and water quality. The North Carolina Wildlife Resources Commission re-introduced Muskellunge in 1970, but due to poor natural reproduction, the population is maintained through annual stockings. Reproductive success is likely limited by a lack of suitable spawning and nursery habitat. Two floodplain restoration projects have been completed on the French Broad River, Mud Creek in 2020 and Pleasant Grove in 2023, with the goal of restoring riverine connectivity to back-

water sloughs on the floodplain. Two sloughs (0.5 and 0.9 ha) were constructed at Mud Creek and one (2.4 ha) at Pleasant Grove to provide refugia, spawning, and nursery habitat for Muskellunge. This study evaluated Muskellunge use of the constructed sloughs using PIT tags and stationary pass-over antenna arrays. We PIT-tagged five cohorts (2018–2022) of juvenile Muskellunge (n=2744) prior to stocking in the French Broad River. In addition, we PIT-tagged 110 adult Muskellunge collected from the French Broad River during boat electrofishing surveys (2019–2024). To date, 24 juvenile (3 years old) Muskellunge have been detected at Mud Creek while 29 adults have been detected at Pleasant Grove. Adult male and female Muskellunge have been detected in the sloughs during the spawning period; however, seine hauls have failed to collect Muskellunge fry. PIT tag detections of both adult and juvenile fish confirm Muskellunge are using the two sloughs seasonally and during elevated river stages. Use of the constructed floodplain sloughs demonstrates the importance of river connectivity for high flow refugia. Monitoring will continue to document Muskellunge use and reproductive success in the constructed sloughs.

Fish Freeways: How Rock Ramps are Helping Prairie Streams Flow Again

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Human-made structures such as box culverts and similar road crossings can cause habitat fragmentation within stream networks and require remediation for effective aquatic organism passage. There is increasing interest in restoring habitat connectivity and aquatic organism passage for conservation purposes, along with assessing project effectiveness. Two, low-gradient rock ramps were installed in the forks of Little Creek in Harrison County, Missouri in 2022 to protect existing infrastructure and restore natural aquatic organism passage to over eight kilometers of headwater stream. These first order prairie streams had been eroded by head cutting to the base of each of the box culverts resulting in greater than one meter of drop on the downstream side of each culvert. Installation of the rock ramps at a natural grade sought to restore stream connectivity and allow for aquatic organism passage. We tagged multiple fish species downstream of each rock ramp using passive integrated responder (PIT) and visual implanted elastomer (VIE) tags in the spring of 2024 and used submersible PIT antennas and seining to detect fish movement. We determined that both rock ramps have allowed for fish passage of multiple fish species, including an experimental population of Topeka Shiners. We detected 14.5% of all PIT tagged fish successfully using the rock ramps to move upstream in the first two months of data collection. Three VIE tagged fish were recaptured upstream of the box culverts with seine nets. Our preliminary results highlight effective methods for monitoring aquatic organism passage in prairie streams and the ecological benefits of restored stream connectivity in fragmented habitats.

The Utility of Parentage-Based Tagging Data in Hatchery Management and Aquatics Conservation

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Parentage-based tagging (PBT) is the process of using broodfish genotypes to track cultivated offspring stocked into natural systems. Because of its broad applicability across organisms, PBT has been utilized successfully in numerous fish species to monitor hatchery contribution and has become standard practice within management agencies to track stocking success of both sport fish and imperiled species. Genetic tagging has proven to be more cost effective and more reliable than physical tagging such as

otoliths for monitoring hatchery contributions, and several types of genotyping technologies are now available to choose from to best suit management specific needs. Additionally, genotyping data generated by PBT can be used to answer questions regarding the genetic health and structure of populations of interest to provide important diversity metrics including inbreeding coefficients, effective population size, population connectivity, and bottlenecking, to name a few. These data can be especially important to maintaining the unique genetic makeup of distinct populations and to preserve genetic diversity and local adaptations within management units. Finally, since PBT datasets are often cumulative, they can be incredibly valuable for understanding how genetics in the system change over time in relation to stocking, which further guides management decisions including stocking targets and optimal stocking locations.

Development of a Standardized Quantitative Framework for Evaluating Imperilment of Southeastern Crayfishes

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Over 80 species of crayfish from the southeastern United States have been petitioned for listing under the Endangered Species Act. Species with credible petitions undergo a formal conservation risk assessment (Species Status Assessment) that is grounded in the 3R's principles from conservation biology: resiliency (distribution, demographics), redundancy (meta-population dynamics, risk concentration), and representation (long-term adaptability). To assist with the Species Status Assessments, we developed a Bayesian network model estimating crayfish imperilment based on the 3R's framework. We developed the model following a literature review of crayfish imperilment and used a structured elicitation approach allowing crayfish experts to refine and parameterize the model before an independent group of experts provided a peer review. This standardized quantitative model readily accounts for uncertainty when calculating current and future resiliency of populations within the species range. We performed sensitivity analyses and evaluated the model's performance using four case study species with recent Species Status Assessments: Slenderclaw Crayfish (*Cambarus cracens*), Chowanoke Crayfish (*C. virgineinsis*), Brawleys Fork Crayfish (*C. williami*), and Pristine Crayfish (*C. pristinus*). Sensitivity analyses revealed metapopulation connectivity and population resiliency were the most important variables driving predicted imperilment. There was strong agreement between SSA-reported and model-predicted resiliency of populations (Cohen's kappa = 0.93). Thus, the model provides a user-friendly risk assessment tool for population assessments based on the best available science.

Population Monitoring Efforts of Bigheaded Carp in the Tennessee and Cumberland Rivers

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Silver Carp (*Hypopthalmichthys molitrix*) and Bighead Carp (H. nobilis), collectively called bigheaded carp, are found throughout the Tennessee and Cumberland river systems. Young-of-year bigheaded carp were detected in 2015, prompting an intensive monitoring effort. Bigheaded carp invasion is concerning for native fish due to potential dietary overlap and habitat displacement and a danger for recreational lake activities. Long term monitoring programs are useful tools to understand how bigheaded carp distribution and population demographics are changing over time. Monitoring efforts

have been conducted seasonally each year since 2017 using overnight experimental gill nets and an electrified dozer trawl. Experimental gill nets are set overnight in Barkley, Kentucky, Cheatham, and Pickwick reservoirs. Timed dozer trawling transects targeted juvenile bigheaded carp in Kentucky and Barkley reservoirs. ANCOVA shows significant effects on total length among reservoirs, among years, and an interaction between reservoir and years. Mean length of bigheaded carps appear to be increasing over time across all reservoirs. Comparisons of overnight gillnetting and dozer trawling suggests similar selectivity with regards to length distribution of bigheaded carp collected. Selectivity similarities may be due to no fish less than 624 mm total length were collected. In summary, bigheaded carp appear to be growing larger with no evidence of recruitment in 2024. Monitoring should be continued to detect future bigheaded carp expansion and recruitment within Tennessee waterways.

Long Term Effects of Climate Change on Ichthyoplankton Populations of Coastal Georgia

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The presence of robust and stable fish stocks is a cornerstone of many important ecological mechanisms. These stocks are primarily supported by the recruitment of ichthyoplankton. Ichthyoplankton is the term used to describe the egg and larval stages of fishes and are the focal point of this research project. An increase in average global water temperatures can alter the composition of fish communities and thus the offspring found in planktonic stages. Using a large data set of ichthyoplankton surveys completed from 2009-2011, we aimed to replicate sampling for a six month period from May – November of 2024 to compare water quality and community composition data. Collection was conducted weekly to biweekly during night flood tides using a fixed suspension ichthyoplankton net (1mm mesh) in the Moon River of Savannah, GA. These methods were used in the 2024 sampling timeframe as well as in the historical data set. Each sampling date included the collection of environmental data and two to three 30-minute tows from which larval fishes were sorted and identified to at least the family level. We found no change in average air and water temperatures but did see that 2024 had significantly lower salinity levels ($p < 0.001$) and pH ($p < 0.001$) compared to the historical data set. There was also a significant increase in family level species richness ($p < .001$) in 2024 compared to 2009-2011. Although the average annual water temperature did not change, there was a difference in change in water temperature over Julian date in 2024 compared to all other years ($p < 0.005$). The decrease in salinity is likely due to the increase in hurricane or storm events which may be attributed to rising global ocean temperatures. Additionally, increases in global carbon dioxide emissions are likely the reason for decreased pH levels.

Incorporation of Acoustic Telemetry Data into Per-Recruit Models for Southern Flounder

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Southern Flounder, *Paralichthys lethostigma*, is an important fish in the northern Gulf of Mexico and has declined throughout its range. In this work, we evaluate a spatially- and temporally-integrated per-recruit model by incorporating information on movement dynamics and spatial differences in fishing pressure. A total of n = 80 Southern Flounder were tagged in Saint Louis Bay, Mississippi with acoustic transmitters. We classified n = 11 individuals as migrators, these individuals exhibiting movement to offshore spawning locations, and n = 16 individuals as residents, these individuals overwintering in

inshore habitats. Incorporating the total proportion of migrators, timing of egress from inshore habitats, and differences between inshore and offshore fishing pressure into the spatiotemporally integrated per-recruit model resulted in changes to reference points. In the traditional per-recruit model, at Mississippi's current minimum size limit of 305 mm, F0.4 = 0.41 y-1 and Fmax = 0.78 y-1; at a size limit of 381 mm, reference points increase to F0.4 = 0.64 y-1 and Fmax = 1.12 y-1. Under the current 305 mm size limit, F0.4 = 0.41 y-1 and Fmax = 0.78 y-1 in the traditional model, while F0.4 = 0.27 y-1 and Fmax = 0.52 y-1 in the integrated model. These contrasts indicate that the stock is more vulnerable when movement is explicitly considered in the model. The results of both traditional and spatiotemporally integrated per-recruit models indicate that changes to the current management regime could benefit the Southern Flounder stock.

Phylogenetic Conservation Priorities of Freshwater Fishes in North Carolina

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Facing a myriad of threats, freshwater fishes are among the most imperiled animal groups globally. North Carolina's freshwater fish assemblage serves as an example of this trend, with almost 30% of the state's native species in need of conservation. Generally, conservation efforts can either be focused on protecting individual species or preserving geographic regions (in this case, river basins) that have high biodiversity value. Establishing priorities can be challenging due to a range of both biological and practical considerations, although typically the rarest species or the river basin with the highest number of species are prioritized in freshwater fish conservation. An often-neglected component in establishing conservation priorities that is now receiving more attention is the incorporation of evolutionary information. Using phylogenetic and species distributional data, phylogenetic-based conservation priority statistics were calculated for North Carolina's freshwater fish species as well as for the 21 river basins spanning the state. The results of these analyses are discussed in the context of other measurements used in establishing conservation priorities and provide additional metrics that can aid in prioritizing conservation efforts for the state's imperiled freshwater fish fauna.

Ontogenetic Shift in the Diet of Invasive Mayan Cichlids (Mayaheros urophthalmus) in Wolf Branch Creek Nature Preserve, Tampa, Florida

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The Mayan Cichlid (*Mayaheros uropthalmus*) is a tropical fish native to Central America and southern Mexico. This aggressive cichlid, first recorded in 1983 in the Everglades, also has established and expanding populations in the Tampa Bay watershed. Its salinity and low dissolved oxygen tolerance has made this cichlid successful in Florida and a threat to its native wildlife. To better understand this fish's potential impact on native flora and fauna, a stomach content analysis was conducted. As in their native and introduced ranges, Mayan Cichlids in Wolf Branch Creek Nature Preserve (hereafter, Wolf Branch) near Tampa Bay were documented to be generalist omnivores – dipterans (adults, larvae, and pupae), gastropods, micro and macro crustaceans, actinopterygians, fish scales, macroalgae, and cyanobacteria were found in varying number, mass, and occurrence in 102 individuals. Although some previous studies documented an increased presence of fishes in the stomachs of larger Mayan Cichlids both in their native and introduced ranges, this was not observed at Wolf Branch. At Wolf Branch there was indeed a significant difference in the diets (prey mass) of juvenile and adult Mayan Cichlids; this difference, however, was attributed to a larger mass of dipteran larvae – not fishes – in the stomachs of juveniles

compared to adults. Due to the variety of prey types consumed, Mayan Cichlids may be competing with native fishes, especially considering their populations are expanding. The ontogenetic shift in diet, while only observed in one general prey type in this study, indicated a change in resource use with age. With this invasive species using multiple resources throughout its lifetime, their omnivorous trophic ecology is likely facilitating their expansion in Tampa's freshwater and estuarine habitats. Future work, therefore, will explore possible dietary overlap between Mayan Cichlids and native Centrarchids in habitats where their populations coincide.

A Framework for Tracking Spatial and Temporal Dynamics of North Carolina's Brook Trout Populations

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The North Carolina Wildlife Resources Commission (WRC) maintains a multi-decade dataset, dating back to 1964, regarding distribution of self-sustaining salmonid populations throughout the state. Beginning in 2023, effort was initiated to refine this dataset to help inform trout management and research in NC and the Southeastern United States. The first stage of the process gave emphasis to populations of NC's only native salmonid, Brook Trout (*Salvelinus fontinalis*). Due to the dataset's volume and geographic expanse, difficulties arose in differentiating between duplicated waterbody names, typically used to identify populations, without manual verification using geographic information systems (GIS). This challenge revealed the need for a system of unique identifiers (UIDs). Multiple methods for creating UIDs were compared, and a system was established by adapting existing identifiers from the United States Geological Survey's NHDPlus High Resolution and NC OneMap's Hydrography Flowlines datasets. As a result, it was discovered that 964 unique Brook Trout populations have been documented in NC since 1964, with occupancy spanning eight river basins and 24 counties. Of those populations, 47% (n=456) have been assessed genetically, with 68% (n=311) considered native Brook Trout. Furthermore, genotyped populations were mapped along an elevational gradient. All Brook Trout populations occupied an average elevation of 958 m (range = 348 – 1,1759), while native populations occurred at an average elevation of 959 m (range = 454 – 1,651). Additionally, annual sampling efforts continued to identify populations undocumented previously and document populations lost to local extirpation. Verification of population loss requires three independent sampling evaluations of the population, and as of 2024, roughly 2% (n=15) of populations have undergone this evaluation to confirm extirpation, and an additional 11% (n=110) are suspected to be extirpated and await confirmation. Consequently, the current number of known NC Brook Trout populations is 839. As the dataset continues to evolve, it is important for WRC personnel to not only maintain the framework but also to refine and expand across all salmonid-related datasets to form intuitive data relationships and provide easy access across all users; this will improve efficiency of management efforts and provide a long-term solution for rapid identification of populations.

Incorporating Environmental Effects Into Stock Assessment: A Case Study Using Spotted Seatrout

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Across the world, integrated stock assessments are used to determine the stock status of fishery species and provide catch advice. Life history, fishery removals, abundance indices, and biological composition

data can inform a stock's scale, status, and productivity in these assessments. An important process estimated in these assessments is recruitment - the number of young fish entering the population. Traditionally, it is assumed that spawning biomass holds some level of influence over recruitment, and given its impact on stock productivity and maximum sustainable yield reference points, investigating this relationship has been a focal point for stock assessment scientists. However, recent studies have indicated weak stock-recruitment relationships for many stocks and have proposed environmental covariates as having a stronger influence on recruitment dynamics. Additionally, recently discovered non-stationarity in the life history of many stocks (e.g., regime shifts) has been attributed to changing environmental conditions. Thus, this study proposes to investigate the incorporation of environmental covariates into the assessment of the Alabama Spotted Seatrout *Cynoscion nebulosus* (ALSPT) stock, which supports a highly popular inshore fishery across the state. Specifically, this study's objectives are to 1) develop an updated stock assessment of the ALSPT stock, 2) identify environmental covariates correlated with ALSPT recruitment, and 3) evaluate the ways and effects of incorporating environmental covariates into the ALSPT assessment. Results will explore the robustness of estimated ALSPT population dynamics to provide management advice and assist in identifying key environmental processes affecting the stock's recruitment dynamics. As climate change progresses, it will be increasingly important to identify the mechanisms affecting the population dynamics of fishery species to provide catch advice robust to environmental non-stationarity.

Dispersal, Distribution, Escapement, and Survival of Fry-Stocked and Advanced Fingerling Walleye in an Iowa Reservoir

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Stocking multiple hatchery products (e.g., fry versus fingerlings) to augment reservoir Walleye *Sander vitreus* populations is a common management practice. However, contribution of various stocked products to the adult population is variable due to losses through mortality and escapement and can differ among stocking locations and due to environmental conditions. We used acoustic telemetry to evaluate stocking success of juvenile Walleye in Rathbun Lake, Iowa to estimate temporal shifts in dispersal, distribution, escapement, and survival probability in relation to biotic (stocking product) and abiotic (stocking location, reservoir discharge, water temperature, short-term mortality, months since stocking) factors. We tagged Walleye stocked as fry during April and recaptured in October (referred to as fry-stocked Walleye; n = 59, 143-212 mm) and advanced fingerling Walleye reared entirely at Rathbun Hatchery (n = 100, 204-275 mm) during fall 2019-2021 and released them at two tributary arms either near Rathbun Dam (Buck Creek) or farther up lake near the Bridgeview Recreation Area (Bridgeview). More than half of individuals stocked at Bridgeview dispersed and entered the main reservoir body within one month of stocking, while fish stocked at Buck Creek arrived near the outlet tower within three months of stocking, and >80% of Buck Creek individuals resided near the outlet tower within four months post-stocking. Home range size varied temporally (1.84-67.5% of lake area) and advanced fingerlings used larger areas than fry. Home range overlap among individuals was lower for advanced fingerlings, but long-term spatial overlap among all individuals was high (>0.5 by six months post-stocking). Fry escaped less than advanced fingerlings and weekly escapement probability increased from <0.001 to 0.006 for fry and 0.002 to 0.070 for advanced fingerlings as discharge increased from 0.3 to 42 m3/s. Fry-stocked individuals had .017 higher survival than advanced fingerlings and both groups had lower initial survival that increased over the first six-weeks post-stocking. After six weeks, survival was inversely related to mean weekly water temperature. Information gained here may help managers

better manage stocking regimes by increased stocking of fry to help combat low post-stocking survival and high post-stocking escapement of advanced fingerlings due to hatchery habituation.

Juvenile Recruitment and Habitat Use of Silver Carp in the Lower Arkansas and Lower White Rivers.

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Boaters, anglers, and scientists all face challenges from the invasion of Silver Carp *Hypophthalmichthys molitrix* in the Arkansas and White Rivers. Silver Carp threaten the ecosystems by competing with native species, altering habitats, and because of their jumping behavior, damaging personal equipment or injuring boaters. Control measures are informed by life history information including juvenile habitat use. The objectives of this study were to use occupancy modeling to understand juvenile use of habitats in the two rivers and to compare small-bodied fish assemblages from the same habitats. An occupancy study was designed to analyze the distribution of juvenile Silver Carp in 'quiet backwaters' of the lower Arkansas and lower White Rivers during the protracted spawning season. Seining occurred at 25 sites during three surveys in August, September, and October of 2024. A 25 ft. seine with ¼ in. knotless nylon mesh size was used to collect three subsamples during each survey. Data collection included depth, temperature, macrohabitat description, sediment type, and vegetation amount. Juvenile Silver Carp were placed in ethanol and frozen for further analysis. All other species were identified, enumerated, and returned to the system. A total of nine juvenile Silver Carp were collected from two sites of the lower White River. No juveniles were collected from the lower Arkansas River. Although spawning and fertilization might be taking place in both rivers, the conditions there do not support significant habitat use by juveniles. To guide control efforts by the state's natural resource agency, it is important to identify the habitats used by juveniles and understand the conditions that enable this use.

Beta Diversity of Mussel Assemblages in Tributary Systems of the South Central Plains Ecoregion in Arkansas

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The Southeastern United States has the highest freshwater mussel diversity in the world, with approximately 234 species, nearly 90 of which can be found in Arkansas. Freshwater mussels are understudied, especially in tributaries of Arkansas. This study focused on assessing the abundance, distribution, and diversity of mussels in tributaries of the South Central Plains ecoregion in Arkansas (Champagnolle Creek, L'Aigle, and Moro Creek). Mussel surveys were conducted in the summer of 2024 using a timed-search approach. A total of 98 sites were surveyed across the three tributary systems (Moro=45, Champagnolle=27, L'Aigle= 26). These surveys yielded 17 species in Moro Creek, six species in Champagnolle Creek, and seven species in L'Aigle Creek. A suite of environmental and habitat variables (n=34) were collected at each site along with an estimated EPA Bioassessment score. NMDS was used to ordinate mussel assemblages that resulted in reliable stress1 values for Moro Creek (0.138), Champagnolle Creek (0.111), and L'Aigle Creek (0.112). The variables were fitted to z-scores and fit onto these ordinations using R. Each watershed had differing significant factors (p<.05) that contributed to their unique mussel assemblages (Moro: drainage area, average depth, TDS, % boulder, % gravel, % submerged woody debris, % canopy cover, EPA 5-channel flow status, and EPA 8-bank stability;

Champagnolle: drainage area, average width, EPA 2-pool substrate characterization, and EPA 8; L'Aigle: drainage area, TDS, % canopy cover, EPA 5, EPA 7-channel sinuosity, and EPA 8). Species presence/absence data were utilized in beta diversity analyses to determine nestedness (species addition) or species replacement (spatial turnover). In all three streams, it appears that spatial turnover (βsim) contributes substantially more to species turnover (βsor) than nestedness (βnes). It appears that in Moro Creek there is 85% species turnover and 15% nestedness (βsor=0.920; βsim=0.782; βnes=0.137), in Champagnolle Creek there is 78% species turnover and 22% nestedness (βsor=0.840; βsim=0.659; βnes=0.181), and in L'Aigle Creek there is 86% species turnover and 14% nestedness (βsor=0.852; βsim=0.736; βnes=0.116). This study will provide insights into the factors driving variation in mussel assemblage structure, including spatial and environmental influences.

Population Characteristics of Muskellunge in the French Broad River, NC

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Muskellunge are native to river systems of southern Appalachia, but unfortunately, they have been extirpated from many waters or populations are reliant on stocking. The upper French Broad River in NC represents the southeastern extent of the Muskellunge's native distribution, but the population was likely extirpated by the mid-20th century. Stocking of Muskellunge in the French Broad River began in the 1970s and currently annual stocking maintains a popular fishery in about 50 km of the upper river. Given the popularity of the fishery, estimation of contemporary population characteristics are needed to guide management actions and provide information to anglers about the resource. Additionally, data from this study will serve as a baseline for comparison in future studies that evaluate the effects of extensive, ongoing habitat restoration efforts. To estimate abundance, growth, and longevity we initiated a 5-year study based on late winter – early spring electrofishing of a 51.2 km reach between Brevard and Asheville, NC. Annual abundance was estimated for 3 years (2022-2024) with the Lincoln-Peterson closed population model, based on repeated sampling of the entire study reach over a 3-week period. Von Bertalanffy growth parameters and age distributions were estimated based on age assignments from anal fin rays, known age, or partial known age. Abundance of fish ≥762 mm was 78 (95% CI = 47–161) in 2022, 51 (95% CI = 38–77) in 2023, and 74 (95% CI = 33-210) in 2024. Estimates of $L\infty$ are comparable to other river populations in the southern portion of the Muskellunge's distribution ($L\infty$ male = 1069 mm TL, $L\infty$ female = 1175 mm TL), but fish in the French Broad River appear to live longer.

A Collaborative Approach to Assessing American Eel (*Anguilla rostrata*) Recruitment in Texas

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The American Eel *Anguilla rostrata* is a facultative catadromous species with a unique and complex life history. After hatching, larval eel begin their journey as leptocephalus in the Sargasso Sea and drift on ocean currents along the Atlantic coast, Gulf of Mexico, and Central and South America. They develop into glass eels as they reach the continental shelf and transform into elvers as they settle in estuaries or move upstream into rivers. This aspect of their life history is largely unknown throughout the Gulf of Mexico and further south. Collaborative efforts are underway to better understand the seasonal dynamics and recruitment window of American Eel in Texas. Two years of sampling have been conducted at multiple sites across the state using a variety of gear types including eel ramps, eel mops, and fyke nets. A total of 26 juvenile eels (19 glass eels and 7 elvers) were collected at two sites during the first year of sampling that occurred from April 2022 to July 2023. One individual was collected in April 2022 and 25 individuals were collected from January to April 2023 suggesting two cohorts of juveniles were observed with a preliminary recruitment window of Jan-Apr. Based on this information, a second year of sampling occurred from December 2023 to July 2024 during which a total of 190 juvenile eels (76 glass eels and 114 elvers) were collected at three sites suggesting a slightly longer recruitment season from as early as December to as late as June. A third year of sampling began in December of 2024 and will continue through at least April 2025. This presentation will focus on these catch data along with additional efforts to characterize juvenile recruits by developmental stage and morphometrics.

Blue Catfish Diets On The Santee Cooper System

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Blue Catfish management on the Santee Cooper system has long been a point of contention with local stakeholders. Concerns have been raised about the condition of Blue Catfish in the system as well as the eating habits of these fish. To answer these questions, SCDNR undertook a diet study on lakes Marion and Moultrie during the 2022-23 and 2023-2024 winter gillnet survey. Staff also took diet information from the 2023 and 2024 summer electrofishing survey on the Cooper River, which flows out of Lake Moultrie.

Using Electron Transport System to Predict the Thermal Tolerance of Swap Listed Fish Species.

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Natural flow regimes determine the distribution and abundance of local aquatic species and can contribute to the prediction of water quality and ecosystem integrity. However, the anthropogenic alteration of these flow regimes through increased water withdrawal and climate change can have severe ecological consequences. One of these consequences is an increase in temperature. Extreme temperatures can push fish towards their thermal limits and lead to mortality. As climate change

progresses, the quantification of thermal tolerances is essential in the conservation of thermal habitat for fish species. However, the methods used to quantify thermal tolerance vary and lack standardization. Luckily, novel methods such as electron transport system (ETS) experiments could provide a solution to this standardization problem. Electron transport system experiments take tissue samples from individuals and expose them to a wide range of water temperature treatments. After this treatment, the tissues are then assessed for enzyme activity to create thermal activity curves for the enzymes. The curves can indicate at what temperature enzyme activity severely declines which reveals the fish's potential upper thermal limit. Managers can then use this upper thermal limit data to preserve thermal refugia habitat to conserve fish populations of concern. All these issues regarding temperature and thermal limits can be found in the Edisto River in South Carolina. The Edisto River is the longest, free flowing, blackwater river in the United States. The river is of importance as it houses two fish species listed in the South Carolina State Wildlife Action Plan as of greatest conservation need in Striped Bass (*Morone saxatilis*) and Bannerfin Shiner (*Cyprinella leedsi*). These species may be at increased risk from altered flow regimes and their associated temperature shifts. Using ETS to quantify these SWAP species thermal tolerances would aid in conservation efforts for the preservation of these

Optimizing Sampling Designs for Rare Stream Fishes: A Simulation-Based Approach for Estimating Spotfin Chub Abundance

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Effective conservation and management of rare stream fishes require accurate estimates of population abundance, particularly when studying species with low detection probabilities. This study focuses on the Spotfin Chub (*Erimonax monachus*), a federally threatened minnow native to the Tennessee River system, specifically the Emory River Watershed in east Tennessee. While previous studies have examined this population, no abundance estimates have been generated. Our primary objective was to estimate Spotfin Chub abundance seasonally using snorkel survey data and develop an optimal sampling design (i.e., adequate sample size and sufficient replication) to ensure reliable estimates. To ensure reliability before field data collection, we developed an optimal sampling design through extensive simulations. Given the species' rarity and low expected detection probabilities, we anticipated requiring a larger number of sites and replicates. However, logistical challenges, including limited site access and the need for sufficient spatial coverage, necessitated balancing sampling costs with model accuracy. We simulated 1,000 datasets to evaluate the performance of our N-mixture model under various sampling designs and detection probabilities. The simulations tested combinations of site numbers (10 to 20) and replicates per site (2 to 5). Mean abundance was based on historical Spotfin Chub counts in the Emory River, and detection probabilities were drawn from a uniform distribution between 0.01 and 0.99. For each combination, we generated 1,000 datasets and fit the model under the assumption of constant detection probability and abundance. The model's performance was evaluated by comparing estimated abundance with true values for the simulated dataset. Results indicated that a sampling design encompassing 16 sites with 3 replicates per site would yield reliable estimates. Additional sites may be added during the summer survey to enhance spatial coverage. This simulation-based approach provides a framework for optimizing sampling designs in rare species studies. The results will aid managers and conservation practitioners in making informed decisions for monitoring and managing significant populations of Spotfin Chub.

Dissemination of Carbapenem Resistant Enterobacteriaceae (CRE) in Fish Guts from Three Urban Rivers

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Antimicrobial-resistant bacteria (ARB) in aquatic environments pose problems to the environment and human health. Carbapenem is a strong antibiotic belonging to the β-lactam family and is important because it has a broad spectrum of activity and great potency against infections by gram-positive and gram-negative bacteria. Carbapenem-resistant Enterobacteriaceae (CRE) are bacteria that belong to the Enterobacteriaceae family and can survive and grow against carbapenem antibiotics. Wastewater treatment plant (WWTP) effluents are the main source of those bacteria for surface waters in urban river settings. CRE genes have been shown to accumulate in different reservoirs in rivers such as periphyton, detritus, sediment, water, and micro- and macro-invertebrates, while they move through food webs. Fish serve as bioindicators of CRE genes in river surface water and can move these genes upstream and downstream while proliferating CRE genes in gut microbiota. The goal of this study is to investigate the environmental variables, particularly water quality factors, that predict or drive CRE gene concentrations in the gut of fish within the Ohio River Watershed. Fish samples were collected in the summer of 2021-2022 from rivers flowing through major cities in Ohio, including Columbus, Cincinnati, and Cleveland. Sampling occurred at six different WWTPs. A Generalized Linear Mixed Model (GLMM) was used to assess the relationship between environmental variables and CRE gene concentrations. The preliminary model revealed total phosphorus and specific WWTP locations were significantly ($p < 0.001$) and positively associated with CRE gene concentrations in fish. Moderate significance ($0.05 < p < 0.1$) was observed for dissolved oxygen and temperature. These results suggest that nutrients, such as phosphorus, can be a good predictor of CRE. This finding aligns with previous research indicating that phosphorus input from WWTPs can increase periphyton biomass, where CRE genes accumulate.

Conservation Updates from the National Forests in North Carolina

John J. DeLuca, United State Forest Service

The US Forest Service manages more than one million acres of National Forest in the state of North Carolina. What is the agency doing in terms of inventory, monitoring, and active management for the benefit of rivers, streams, riparian zones, whole floodplains, isolated wetlands, and other ecosystems? We'll cover what's happened recently, what's going on currently, and what's on the horizon.

Using Species Distribution Models to Inform Conservation of Freshwater Fish Species of Greatest Conservation Need

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An understanding of species' distribution and habitat requirements is essential for understanding their vulnerability to environmental change, such as habitat alteration or climate change. Currently under development, the Aquatic Planning Tool (APT) will provide a publicly available, web-based interface for users to visualize impacts to freshwater fish species of greatest conservation need (SGCN) across watersheds in the Carolinas and Georgia. Powering the APT are species distribution models: analytical tools that link observations of species to environmental predictors. In this presentation, we introduce the modelling approach and present preliminary results for selected species, including predictions of present-day distributions as well as forecasts under different land use and climate scenarios. By helping decision-makers understand the consequences of habitat alteration, we demonstrate how species distribution models can inform regional conservation planning for SGCNs.

A Statewide Survey of Pharmaceutical Exposure: Red Drum in Florida Estuaries

Andy Distrubell, Florida International University

Increased recognition of pharmaceuticals as emerging contaminants has led to growing evidence suggesting adverse health effects on wildlife and human populations. Despite growing proof of their harmful effects, these contaminants are not officially recognized as pollutants and there are no established regulations for their presence in the environment. Our research focused on assessing the exposure and risk from 94 tested pharmaceuticals and their potential threat to Red Drum (*Sciaenops ocellatus*) in nine Florida estuaries. Pharmaceuticals were detected in all estuaries sampled; 93% of 113 blood plasma samples and 61% of 109 muscle samples analyzed contained pharmaceuticals. This study highlights the presence of pharmaceuticals in Red Drum across Florida, pointing to issues related to statewide wastewater management and its potential impact on fisheries throughout the state.

Assessing Scales of Temporal Inference for Stream Fish Assemblage Structure in the San Saba and Llano Rivers

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The relative contributions of spatial and temporal dimensions of scale and their governance of ecosystem variation is an area of focus in ecology. From conservation, management, and monitoring perspectives, understanding assemblage fluctuations across temporal scales is of great interest. For example, most stream fish monitoring programs rely on data from single snapshots (e.g., one year) taken during a single time of year (e.g., summer low flows). Whether or not these snapshots are reflective of broader temporal variation is rarely tested. We surveyed stream fish assemblages at three longitudinally distributed locations in the San Saba River and the Llano River multiple times at two temporal scales. Surveys included annual samples of each site during the summers of 2021, 2023, and 2024 (i.e., annual scale), and seasonal samples of each site during March, May, June, August, and November of 2024 (i.e., seasonal scale). We used standardized seining protocols during each survey, and we identified and counted all fishes collected. We used permuted multivariate analysis of similarity and fourth root-transformed abundance data to test for temporal differences in assemblage structure at the annual and seasonal scales. Results revealed no significant difference in assemblage structure among years or seasons for the six sites in the analysis. These findings suggest that inference gained from a single survey conducted during summer is representative of broader seasonal and annual time scales. Our results support the loose equilibrium theory that fish assemblages remain within some bounds around a central tendency with temporal fluxes in species abundances. However, environmental disturbances and anthropogenic alterations can push assemblages outside of their loose equilibrium

state and into a state of directional change. Consequently, we suggest long-term monitoring programs be established in regions where future change is expected – and our results provide guidance for designing such programs.

First Year Movement and Survival of Stocked Striped Bass in the Great Pee Dee River Inferred from Individually Marked Fish

Jason C. Doll, Francis Marion University

Stock enhancement programs support many fisheries worldwide, including Striped Bass *Morone saxatilis* and success is often reliant on sufficient survival of stocked fish. The objectives of this study were to 1) determine daily movement and locations where Striped Bass congregate during their first year to infer potential nursery habitat; and 2) estimate first year survival post-stocking. Hydroacoustic tags were surgically implanted into 28 Phase-II striped bass prior to stocking in the Great Pee Dee River, South Carolina. Fish were tracked using a stationary receiver array between 16 December 2020 and 03 November 2021. A multi-state Cormack-Jolly-Seber model was used to estimate daily survival, capture probability, and persistence probability. Movement was assessed across four zones that correspond to the major rivers in the system and Winyah Bay. Daily persistence probability was high for all zones and most fish spent the majority of their time in the delta region. Median daily survival was greater than 0.986 across all days and cumulative survival after the 323-day period of the study was 0.22. This study suggests stocked Phase-II Striped Bass inhabit the delta region at the confluence of the Great Pee Dee River and Waccamaw River most of the year but will move into the lower reaches of the major tributaries near the estuaries.

Attempting Biological Control of White Perch In Oklahoma

Jeremy Duck, Oklahoma Department of Wildlife Conservation

Invasive White Perch (*Morone americana*) were first documented in Sooner Reservoir in 2006. Increasing abundance over the next few years led the Oklahoma Department of Wildlife Conservation (ODWC) to conduct a diet study to determine if a viable candidate for biological control of White Perch was present in the current species assemblage. The 2016 completion of that study found the foraging success of Saugeye (*Sander vitreus* x *S.canadensis*) to be significantly higher than that of the other predator species examined. Stocking Saugeye to control White Perch in Oklahoma is novel and no standard protocol existed for stocking rates and length limit regulations. After collecting two years of baseline data ODWC doubled Saugeye stocking rates to 40 fish per acre for five years beginning in 2019 in an attempt to lower the relative abundance of white perch in Sooner Reservoir. Growth rates, relative abundance and size structure data were obtained annually for Saugeye and White Perch. Yearly sampling was concluded the Fall of 2024 (2017-2024).

Nothing Fishy about the Bonnet Carré Spillway

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The Bonnet Carré Spillway (BCS) is a flood control structure on the Mississippi River that diverts freshwater into Lake Pontchartrain, a brackish, temperate estuary, during periods of high river flow. BCS openings happen inconsistently, because they are dictated by river flood levels which can vary from year to year. Although the magnitude, duration, and water characteristics differ for each opening, all openings represent a substantial input into Lake Pontchartrain that alters the temperature, salinity, and nutrient load in a portion of the lake. Lake Pontchartrain provides nursery habitat and fisheries for many commercial and recreational species in coastal Louisiana, yet formal studies into the BCS effect on fisheries have not been undertaken. This study hypothesizes BCS openings as a chain reaction: changes in temperature and salinity increase chlorophyll a, which then increases plankton and primary producers, which then increases primary consumers, and finally increases secondary consumers and other predators. Although this proposed model has been supported in individual components, we are exploring these direct and linked relationships when the BCS is both open and closed—in order to evaluate whether the relationships exist and if so at what strength. Preliminary findings suggest that relationships are stronger earlier in the sequence and weaker later in the sequence; the overall effect of the BCS opening appears to degrade both in time and level of ecosystem organization. BCS effects on plankton appear to be strong, while most fish species do not show increases or decreases in relative abundance. Opening the BCS has clear and obvious effects on the Lake Pontchartrain ecosystem; however, many commercial and recreational fish species show little to no effect from the BCS, likely due to their ability to tolerate direct changes in water quality and the overall degradation of the BCS effect through trophic and energy pathways.

Evaluation of Stocked Rainbow Trout as Trophy Bass Forage in Florida Lakes

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Stocking catchable-size Rainbow Trout (*Oncorhyncus mykiss*) in support of put-and-take fisheries is common across North America. In some cases, these fish unintentionally become abundant forage sources for large piscivorous fishes, boosting some individuals to exceptional trophy sizes. This phenomenon was likely responsible for catapulting trophy Florida Bass (*Micropterus salmoides* and *M. salmoides* x Largemouth Bass *M. nigricans* hybrids) fisheries in California into world renown during the 1980s and 1990s. During that time, anglers there caught and documented 19 of the world's largest known 25 bass from reservoirs regularly stocked with Rainbow Trout. We explored the utility of stocking Rainbow Trout as supplemental forage for Florida Bass in Florida, where trophy bass management is a high priority. Over the past four winters, we experimentally stocked Rainbow Trout in three North Florida waterbodies while incrementally increasing stocking rates. Each year, we monitored a subsample of stocked trout with telemetry tags to estimate predation rate. Our results have varied but have largely indicated that most trout were rapidly eaten. We also monitored survival as a function of water temperature by stocking trout into predator exclusion pens at each lake. Mortality of trout in the holding pens typically began after several consecutive days of water temperatures exceeding 70°F (mid-March). No trout remained alive after sustained water temperatures exceeding 75°F (early May). These results confirm that there is little risk of long-term survival of Rainbow Trout in Florida lakes due to warm summertime water temperatures, but our results also suggest that stocking them as supplemental forage for trophy bass is feasible over a 4–5-month period annually during winter and warrants further examination. Our current plan is to maintain experimental trout stocking at selected waterbodies for multiple consecutive years while monitoring Florida Bass populations via several fisheries-dependent and fisheries-independent mechanisms.

Factors Influencing Long-Term Trends in Brook Trout Production in West Virginia Headwater Streams

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Brook Trout (*Salvelinus fontinalis*) are an economically and ecologically important fish species across their native range. However, many Brook Trout populations across the southern and central Appalachians have declined over the last century due to a variety of anthropogenic impacts. The factors driving these declines, as well as the factors influencing natural variability in Brook Trout populations, vary by region and are sometimes poorly understood. Although West Virginia is considered a stronghold for Brook Trout in the central Appalachians, few studies have examined these populations over longer time scales due to difficulties coordinating and funding long-term monitoring projects. Additionally, even fewer studies have used secondary production, the biomass produced in an area over time, to evaluate differences in Brook Trout populations across the landscape despite the unique insight provided by the metric. Therefore, our primary objectives were to calculate Brook Trout production in a variety of streams in West Virginia and then evaluate long-term spatial and temporal trends in production. Using data collected as part of a two-decade (2003-2024) monitoring project, annual Brook Trout production (g/m2/yr), as well as biomass (g/m2) at the time of sampling, were calculated for 25 headwater streams in east central West Virginia. Additional environmental data from the study sites were collected as part of the project or compiled from state and federal agencies also working in the area; these data include in-stream habitat measurements, canopy cover, water quality, geology, precipitation, air temperature, large wood counts, and more. Variables were added stepwise to linear mixed effect models to determine which factors were driving changes in production and biomass over time and across the study area. Initial results show strong declines in Brook Trout production and biomass over the study period, possibly due to changes in precipitation and summer temperatures. There also appear to be significant differences in mean production across sites, likely driven by geology and water quality. Although analyses are still ongoing, these results should provide managers with a detailed view of the spatial and temporal variability exhibited by Brook Trout populations in WV and help elucidate the anthropogenic and natural factors driving that variability.

Water Temperature May Be a Limiting Factor for Species Reintroductions in the Upper Little Tennessee River Basin

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Water quality is vital to sustaining ecological integrity. Most water quality monitoring occurs infrequently (e.g., annually) to coincide with other monitoring efforts. These point samples can identify chronic degradation but often miss stochastic events or temporary extremes that can negatively affect aquatic biota. Continuous or high-frequency water quality monitoring often requires expensive equipment that needs regular maintenance and, therefore, is often logistically prohibitive to deploy. However, temperature loggers have become more robust and reasonably priced in recent years, allowing for improved data resolution on meaningful spatiotemporal scales. Many rare and sensitive species are intolerant of temperature extremes, especially during critical times of the year such as during early development or when other water quality parameters approach tolerance thresholds. We deployed temperature loggers throughout the Upper Little Tennessee River Basin (ULTRB) to elucidate

trends along the mainstems of major rivers and their tributaries. These water temperature data will be analyzed alongside land use and instream habitat data to help explain current species distributions and determine the viability of future reintroductions of rare and imperiled taxa. The two main river systems analyzed in this study are the Tuckasegee River (TKR) and the Little Tennessee River (LTR). Summer averages in the TKR were generally cooler than the LTR. However, the upstream portions of both systems were warmer in the winter compared to downstream reaches. Tributaries tended to be cooler year-round, with average temperatures rising to or slightly above mainstem water temperatures in late winter. Seasonal trends varied among tributaries in the ULTRB, with some showing little variation throughout the year. Further investigation of groundwater seeps and in-stream habitat characteristics is needed to better understand their influence on seasonal temperatures in smaller streams. These trends can influence the distribution and reintroduction success of rare species with narrow tolerances to temperature fluctuations. Long term trends of other important water quality parameters (e.g., pH, nutrient levels, conductivity, and dissolved oxygen) are necessary to fully understand water quality limitations. Trends and relationships will become clearer as technology improves and data loggers for other water quality parameters become more affordable and accessible.

Saving America's Fish in the French Broad River: Gizzard Shad

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The French Broad River is one of the oldest rivers in the world. From its headwaters in North Carolina to where it joins the Holston River to create the Tennessee River in East Tennessee, the French Broad River is home to an exceptionally high amount of aquatic biodiversity. The recent publication, An Annotated Atlas of Freshwater Fishes of North Carolina (Tracy et al. 2020), documented ~76 indigenous fish species from historical and recent collection data from the North Carolina sections of the French Broad River Basin. However, anthropogenic alteration over the last few centuries in the French Broad River and its tributaries have led to extirpations and population declines for many of its known and unknown historical species. Since Congress passed the Clean Water Act in 1972, the water quality of the French Broad River has drastically improved, but barriers to expansion (e.g. dams) limit the potential recovery of many historical fish species (e.g. Gizzard Shad) without stocking or translocation. Gizzard Shad is often vilified by biologists and anglers due to their dominance in natural lakes and reservoirs within and outside their native range. Gizzard Shad were historically stocked in lakes as a forage species for more popular game species. Unfortunately, their role in ecosystem function as a planktivore and potential mussel host is often overlooked. Starting in spring 2023, NC Wildlife Resources Commission biologists began the reintroduction of Gizzard Shad (*Dorosoma cepedianum*) into the upper French Broad River. A combination of long-term monitoring sites and PIT antenna arrays will help track this reintroduction into the future.

eDNA Assisting in Conservation of Robust Redhorse

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The Robust Redhorse Conservation Committee stocked the Ogeechee River with Robust Redhorse (*Moxostoma robustum*) with the intent to establish a refugial population for the Altamaha evolutionarily significant unit. However, spawning has not been documented in the Ogeechee River since 2011, and individuals have not been collected since 2014. South Carolina Department of Natural Resources was the lead on a project to develop, test, and optimize a species-specific qPCR-based eDNA tool for Robust Redhorse, with the intent for the new tool to function as an alternative passive detection method. Therefore, the Robust Redhorse Conservation Committee has identified environmental DNA surveys in the Ogeechee River as one of two eDNA tool application priorities. The purpose of the eDNA surveys is to determine if remnant populations of Robust Redhorse are persisting at undetectable levels within the Ogeechee River in order to guide allocation of future survey efforts. During May 2023, a total of 252 water samples across 12 sampling locations filtered a total of 534.90 L of water from the Ogeechee River. Of the 252 filters tested, 23 were equipment controls that tested negative, 202 field samples tested negative, and 27 field samples tested positive for the presence of Robust Redhorse DNA. All positive detections occurred at adjacent sites in the middle reach of the Ogeechee River that were downstream of an area where suitable substrate and spawning behavior of adult Robust Redhorse was observed in May 2011. Additionally, the closer the eDNA site was to the historic spawning area, the number of positive filters and technical replicates increased. Our results indicate that Robust Redhorse remain extant in the Ogeechee River and the newly developed eDNA tool was successful in its first full field application of detecting Robust Redhorse where traditional sampling had not over the past decade.

Bridging Science and Community: Troy University's Role in the Elba Hydroelectric Dam Removal Project on the Pea River

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Dam removal presents a unique opportunity to improve or restore river connectivity, enhance habitat quality, and improve ecological health, while also posing challenges related to community engagement, historical preservation, and biological monitoring. The Pea River watershed, home to a rich diversity of aquatic species including Gulf Sturgeon, Alabama Shad, and imperiled mussel species, is the site of a multi-agency collaborative effort to remove the Elba Hydroelectric Dam. The Elba Dam (constructed 1911-1914) is the oldest known example of a concrete hydroelectric dam in the state and allowed for the electrification of Troy, AL and surrounding areas, opening the way for the industrial and commercial development of this region. Presently, the dam is inoperable and presents a hazard to people, fish, and wildlife. Troy University is supporting the removal effort through pre- and post-removal biological assessments and promoting education and outreach initiatives. Our work focuses on evaluating the effects of dam removal on macroinvertebrate and mussel populations and associated habitat pre-and post- dam removal, while also engaging local schools and communities to promote understanding and support for the project. Biological assessments will include targeted mussel surveys, macroinvertebrate sampling, and habitat characterization along an ~8km reach above and below the existing Elba Dam 1y before dam removal and at annual warm-season sampling efforts after dam removal. Outreach efforts will include mentoring local secondary school teachers and student leaders to implement aquatic-based environmental projects in their respective schools and/or communities. This presentation will highlight the ecological goals of the project and proposed strategies for effective science communication, education and outreach, and community building activities. By sharing our objectives, we aim to foster

discussion, solicit expertise, and build partnerships to enhance the success of this project and ensure that our efforts serve as a model for future watershed restoration efforts in Alabama and beyond.

Analysis of Spawning Characteristics of Crappie Within Kentucky Lake

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Kentucky Lake is home to two of the most sought-after fish species in the United States: the White Crappie *Pomoxis annularis* and the Black Crappie *Pomoxis nigromaculatus*. The hydrology of the lake is believed to have an impact on the crappie population. For example, Kentucky Lake fluctuates from 107.9 meters in the winter to 109.4 meters in the summer, and the crappie spawn occurs during the transitional period between winter and summer pool. Crappie sometimes skip spawning due to environmental influences; however, environmental factors alone do not fully explain the variability in crappie spawning success observed from year to year. We collected mature crappies at biweekly intervals during the spawn and measured their size, age, GSI, liver color, and, for the females, egg number, size, and color. We intend to relate these values to the timing of the spawn, and we hope to use this information to understand the difference between female crappie which spawn and those which do not spawn. Understanding the intricate interplay of these factors is crucial for developing more effective management strategies to enhance crappie spawning success in Kentucky Lake.

Cluster Analysis of Morphological Traits of Fishes of The Lower Tallapoosa River

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The application of functional traits in fishes creates predictive information about the underlying mechanisms that drive the environmental filtering of assemblage structure. Trait combinations allow observational studies to expand their knowledge beyond the limitations imposed by a study area or specific species. When examining responses of assemblages, the first step is to combine traits across the assemblage in a meaningful way. Cluster analyses are commonly used, but it is important that group membership is both significant and has the appropriate balance between group size (i.e., large enough to ensure traits are driving the clustering but also not too large that it loses ecological meaning). To observe the effectiveness of different approaches, we selected three techniques to explore clustering patterns. First, a hierarchical cluster with multiscale bootstrapping (HCMB) was used to evaluate the Euclidean distance between traits. Second, hierarchical clustering using random forest (HCLUST-RF) proximity to capture non-linear trait relationships was evaluated. Lastly, we analyzed partitioning around medoids with random forest (PAM-RF). Linear discriminant analysis (LDA) was then used to determine the degree of separation in each technique. Preliminary results using 52 fish species collected from the lower Tallapoosa River indicate that HCLUST-RF presented the most intuitive groups that aligned with expected taxonomic membership consisting of 16 clusters with significant separation of traits. Most clusters embraced taxonomic similarities where blacktail redhorse, river redhorse, black redhorse, for example, made up one cluster, while some deviations from taxonomic groupings were also present (i.e., bowfin was grouped with banded sculpin). The application of the best suited clustering approach based on our data will be applied to the development of an occupancy model to observe the effects of altered hydrologic and thermal regimes on assemblage structure.

American Shad Passage on the Cape Fear River: Evaluating the Effects of Environmental Flows and a Nature-Like Fishway

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There is no "one-size-fits-all" prescription when it comes to fish passage solutions. On the Cape Fear River in North Carolina, several mitigation efforts and built structures create opportunities for anadromous species to pass three lowhead lock and dams (LDs) that impede their spawning migration. The first of these remedies is a nature-like fishway the base of LD1 (rkm 97) built in 2012 and modified in 2021. The modified nature-like fishway contains three routes leading to the top of the lowhead dam at LD1 to pass a diversity of fishes. The second mitigation effort was to create dam submerging environmental flows at all locks and dams by conducting timed water releases from an upstream hydroelectric facility (Jordan Dam). Dam submergence flows were especially important in creating passage opportunities at LD2 (rkm149) and LD3 (186) which are impassable during normal flows. Lastly, conservation locking was conducted at LD3 during April of 2024 to test the efficiency of passing fish when dam submergence flows were not feasible due to low flows. To evaluate the effectiveness of these mitigation efforts, 100 American Shad (*Alosa sapidissima*) were tagged with acoustic transmitters (Innovasea V9, 69 kHz) in 2023 and 2024 and monitored from March - May using a broad scale acoustic telemetry array. Raw passage during 2023 at LD1 for these fish were 77% in 2023 and 80% in 2024, 64% in 2023 and 51% in 2024 at LD2, and 21% in 2023 and 29% in 2024 (71% from conservation locking) at LD3. Passing fish spent an average duration of 8.26, 11.3 and 4.98 days downstream of LD1, LD2, and LD3, respectively. The modified fishway at LD1 was less size-selective for American Shad passage than it was prior to modification and passage occurred across a range of flow conditions from 50 – 650 m3 s-1. Using a generalized linear model to evaluate seasonal factors affecting passage at LD2 and LD3 found a significant year effect with 2023 (a wetter year) having higher passage compared to 2024.

The Development of Triploidy Induction Methods for Hybrid Striped Bass Production

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Sunshine bass are hybrids produced by crossing White Bass females and Striped Bass males. These bass hybrids are highly desirable sport fish and have been stocked in Southern States of the United States. Bass hybrids have a wider tolerance to environmental variables, better survival, better growth rates, and disease resistance than their counterparts. Triploidization is an effective method for the production of sterile fishes. Triploidy also increases the possibility to obtain trophy sport fish. Because Striped Bass hybrids are fertile and can backcross with Striped Bass, it is understood that backcrossing could affect the gene pools of parental species because of introgression. We can avoid this backcrossing with a sterile hybrid. This project aims to evaluate triploidy induction methods that have been used successfully with other commercial aquaculture species. Our goal is determining an optimum methodology for triploid production with special attention being placed on maximizing embryo survival and obtaining high triploidy induction in sunshine bass. Hydrostatic pressure shocks were evaluated for

the production of triploid sunshine bass embryos. Four pressures (5000, 6000, 7000, and 8000 PSI) and shock durations of 1.5, 2, 3, 4, and 5 minutes were evaluated. 5000 PSI was only evaluated at 5 and 6 minute shock durations. All shocks were administered 4 minutes post-fertilization. The produced fry were evaluated for triploidy using a flow cytometry. Thermal shock was evaluated at 3 and 4 minutes post-fertilization for 10 and 15 minute cold shocks and 2 and 3 minute heat shocks (cold = 2°C and 4°C; heat = 36°C and 38°C). Initial results indicated higher percentages of triploidy induction with heat shocks, relative to cold or pressure shocks. More trials are required to fine tune the triploidization procedure for hybrid Striped Bass.

Monitoring and Prevalence of Visual Stressors in Two Tidal Largemouth Bass Fisheries

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Fisheries with stressors such as poor water quality, poor habitat suitability, and high angling effort are likely to see increased mortality due to disease and fish handling among other factors. Fish subject to these may display visual characteristics of poor health manifested as skin lesions, fin abrasions, parasites, and hooking injuries. A visual health assessment index was used to identify the proportion of Largemouth Bass (*Micropterus nigricans*) displaying these characteristics in the two economic and recreationally important fisheries in Maryland, including hyperpigmented melanistic skin lesions (HPMSL). A total of 1,317 and 730 individuals were collected and inspected for visual health stressors between 2022 and 2024 in the Tidal Potomac and Upper Chesapeake Bay, respectively. Fish with at least one of the observed criteria amounted to 6.1% of all fish collected in the Tidal Potomac River and 9.0% of all fish collected in the Upper Chesapeake Bay. The health assessment index values for all years in the Tidal Potomac River were not statistically significant, however values in the Upper Chesapeake Bay were statistically significant from each other. Additionally, the proportions of fish displaying HPMSL's on both systems were not significantly different from year to year. Routine monitoring of the prevalence and severity of visual health characteristics can help identify changes in the population indicating whether a fishery is facing increased threats from environmental stressors.

Sampling Gear Effects on Estimates of Aquatic Insect Abundance and Diversity in a Southeastern River System

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Aquatic insects play critical ecological roles in aquatic and terrestrial ecosystems. Various species of fish, bats, and spiders rely on aquatic insects for essential nutrients and energy, and healthy aquatic insect assemblages can be strong indicators of ecosystem health. Many federal and state agencies collect aquatic insects to monitor aquatic system impairment because these insects are sensitive to changes in aquatic physiochemistry and habitat. Researchers estimate abundance and diversity of aquatic insects with a variety of sampling methods, but the specifics regarding how specimens are collected can be difficult to obtain, which limits standardization and data generalizability. Our goal was to collect aquatic insects with D-frame nets, a Hess sampler, a Malaise trap, and a light trap and identify differences in abundance and diversity across seasons at six sites on the Bogue Chitto River and two of its tributaries in southern Mississippi. These data highlight differences in aquatic insect family representation across sampling methods, and results will be important in the future design aquatic insect sampling protocols and the influence of sampling gear choice on the aquatic insect metrics used in biomonitoring programs.

Can Beaver Dam Analogs Provide a Rapid and Cost-Effective Method for Restoring Streams in the Southeastern US?

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Humans are the world's most prominent ecosystem engineers. Anthropogenic land use including cattle grazing, logging, and channelization can degrade stream habitats and lead to channel incision, stream bank erosion, sedimentation and eutrophication. These impacts are widespread in human-dominated landscapes and there are few cost-effective strategies for rapidly restoring stream ecosystems at broad spatial scales. In recent years, the reintroduction of extirpated keystone species and ecosystem engineers including the North American Beaver has resulted in profound changes to many degraded river systems. Beaver dams create habitat heterogeneity, moderate the impacts of floods and trap fine sediments as well as nutrients. Although the reintroduction of beavers has been used as part of efforts to restore stream ecosystems in rural parts of the American west, beavers create problems when they colonize human-dominated environments and their numbers are regulated in many southeastern states. One alternative is the use of beaver dam analogs (BDAs), essentially human-constructed, channel-spanning debris jams, to mimic, at a smaller and more manageable scale, the natural effects of beaver dams. BDAs, like natural beaver dams, help to moderate stream flows and stabilize stream banks while also trapping sediments. We followed a series of BDAs installed as part of a restoration project on a highly-incised, first-order tributary of Canoe Creek in Caldwell County, North Carolina. Over the course of %1 year we surveyed fish and crayfish assemblages to examine how the fauna of this small stream changed in response to BDA implementation. We observed substantial levels of sediment retention within the BDA reach that resulted in substantial changes to channel morphology. Fish diversity declined over time as this small stream reverted to its likely historical state as an intermittent channel. These results suggest that BDAs could be a cost effective and sustainable approach to restoring.

Assessing the Influence of Microhabitats on Estuarine Fish Species in the ACE Basin, SC Using Unoccupied Aerial Systems Technology (UAS) and Machine Learning

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Microhabitats provide nursery grounds, food sources, and refuge for the growth and reproduction of numerous ecologically and economically important estuarine fish species. Microhabitat structure can be used as a measure for distribution, abundance, and behaviors of fish communities in shallow estuaries. This study aims to assess the influence of microhabitats on economically- and ecologically- important estuarine fish species in the ACE Basin as a means to improve conservation and management methods. To accomplish this, unoccupied aerial systems (UAS) technology and machine learning techniques will be used to collect, process, delineate, and classify high resolution microhabitat imagery of survey sites. Long-term trammel net survey data collected by the South Carolina Department of Natural Resources Inshore Fisheries Group will then be analyzed to determine the spatial distribution and abundance of vital species in the ACE Basin sites. Combining these methods will allow for a better understanding of the associations between estuarine fish and microhabitat. Because estuaries are dynamic systems that

are constantly changing due to climate change and/or anthropogenic activity, understanding how habitats are utilized by fish communities will allow for predictions of how they may change over time. Using these predictions, fisheries managers will have the tools to implement beneficial management strategies for essential estuarine habitats and their key species.

The Strategy and Science Behind Walleye Stocking and Management in Western North Carolina Reservoirs

David W. Goodfred, North Carolina Wildlife Resources Commission

The North Carolina Wildlife Resources Commission (NCWRC) currently stocks over 300,000 Walleye *Sander vitreus* fingerlings (25.4–50.8 mm) to provide diverse angling opportunities in western resources of the state. Many of these stockings are required to off-set natural recruitment failures in Walleye populations affected by introduced invasive species, such as Alewife *Alosa psuedoharengus* and Blueback Herring *A. aestivalis*. Without consistent stocking from viable brood fish sources, many long-standing and culturally important Walleye fisheries would be lost or greatly diminished. As such, NCWRC fisheries biologists and production staff collaborate annually statewide to collect, propagate, and allocate appropriate Walleye numbers to support management stocking requests. From 2019–2024, the average number of female and male Walleyes collected during brood fish electrofishing surveys increased by 404% and 227%, respectively. The dramatic increase in riverine brood fish numbers over the last 6 years appears to correlate to the 6-fold stocking rate increase of Walleye fingerlings since 2019 into a connecting reservoir. Based on these results, NCWRC staff have recently developed and implemented a Walleye production allocation protocol that provides a stepwise approach to both evaluate and refine the quality and effectiveness of the state's stocked Walleye fisheries management program into the future.

Depth Patterns of Redear Sunfish *Lepomis microlophus* in Kentucky Lake

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Redear Sunfish *Lepomis microlophus* are a highly sought sportfish known for their size potential, but their ecological behavior in large reservoirs remain poorly understood. In this study, we looked at how Redear Sunfish move vertically in Kentucky Lake. We used acoustic tags with depth sensors to measure the movement of Redear Sunfish both diurnally and seasonally in within Kentucky Lake. During the day, Redear Sunfish occupied significantly deeper waters compared to dawn, dusk, and night ($p < 0.0001$.). Many fish, including the species in the Lepomis genus, may have a preference for specific light levels for optimal foraging and predation avoidance, even if predation is not the primary concern at larger sizes. This daily pattern was consistent through most seasons, except on average the fish were deeper during the winter season ($p < 0.0001$). Understanding the movement patterns of Redear Sunfish is essential for effective species management, especially as their popularity grows and they potentially compete with the invasive Black Carp *Mylopharyngodon piceus*.

Habitat Use and Spawning in Walleye (*Sander vitreus*) in Watts Bar Reservoir, Tennessee

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The Tennessee River is the largest tributary to the Ohio River and contains multiple reservoirs that have been formed by nine mainstem dams throughout the system. Watts Bar Reservoir, located in eastern Tennessee, has an area of 39,600 acres and is a popular recreation area for anglers targeting a variety of species. Historically, anglers often targeted the native sportfish sauger (*Sander canadensis*) in Watts Bar, which was the focus of a stocking program by the Tennessee Wildlife Resources Agency (TWRA) from the 1970s until 2010. Although TWRA continues to stock sauger in other reservoirs on the Tennessee River, in 2011, TWRA shifted their stocking practices in Watts Bar Reservoir, and began stocking walleye (*Sander vitreus*), which is also native to the Tennessee River. Compared to sauger, walleye live longer, achieve larger sizes, and provide greater opportunities for year-round fishing. There has been no research focusing specifically on walleye habitat use and movements within Watts Bar Reservoir since the change in stocking practices, and it is unknown if any natural reproduction is occurring or if the population is solely sustained by stocking. The objectives of this study are to (1) document the movement patterns and habitat use of walleye throughout the year and (2) determine if walleye are successfully spawning in Watts Bar and its tributaries. Beginning February 2024, 27 acoustic receivers will be deployed and 150 walleye will be acoustically tagged during the spawning run in February and March. Potential spawning sites will be monitored using egg mats to look for evidence of spawning. This study will assist managers by collecting baseline information on walleye movements and habitat use in the system and provide information on spawning potential and site fidelity patterns that could be used to refine stocking practices in Watts Bar and other Tennessee reservoirs.

Collaborating With Stakeholders to Develop the Arkansas Statewide Trout Management Plan

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Trout fisheries contribute greatly to fishing popularity and the economy in Arkansas. Thousands of anglers purchase trout permits each year and permit holders collectively spent nearly $237 million on Arkansas trout fishing trips and equipment in 2023. Because of those factors, the Arkansas Game and Fish Commission (AGFC) seeks to provide diverse, high quality, and widely accessible trout fishing opportunities. In 2024, agency personnel collaborated with stakeholders to develop the 2025-2034 Arkansas Statewide Trout Management Plan. The AGFC used a variety of engagement tools to solicit public input, including the 2023 Trout Permit Holder Survey, a 2023 online survey, public meetings, and formation of a Stakeholder Advisory Committee who represented the diverse interests of all Arkansas trout anglers. Committee members identified six key areas and articulated the current values and issues associated with each key area. A Technical Advisory Committee, composed of representatives from AGFC and partner agencies, developed the objectives and strategies designed to address keys areas and goals developed by the Stakeholder Advisory Committee. Ultimately, the plan created a vision for managing Arkansas's trout fisheries over the next 10 years.

Prioritizing Aquatic Connectivity Activities for the Recovery of the Slackwater Darter

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The Slackwater Darter (*Etheostoma boschungi*) is a federally threatened fish found in the middle Tennessee River drainage in Alabama and Tennessee. Two of the major reasons for the decline of the Slackwater Darter are habitat degradation, in the form of excessive sedimentation, and habitat fragmentation due to dams and road/stream crossings. As a first step to prioritize conservation actions to facilitate recovery of this species, we assessed over 1000 road/stream crossings to determine the extent they act as barriers to aquatic organism passage. We then conducted an action assessment to identify areas in need of restoration. Biologists from the US Fish and Wildlife Service, the Southeast Aquatic Resources Partnership, the Tennessee Wildlife Resources Agency, the Alabama Department of Conservation and Natural Resources' Wildlife and Freshwater Fisheries Division, and other partners then prioritized habitat restoration activities for the Slackwater Darter. This presentation highlights the results of the assessments and prioritization process.

Quantifying Component Mortality Rates of Juvenile Salmonids Using Predation Detection Acoustic Tags (PDATS)

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Federally threatened Central Valley Steelhead 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 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.

Evaluation of Recruitment Variability Factors and Indexing Techniques for Channel Catfish in Oklahoma

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Commonly, fisheries management decisions are based on one-time samples, which are generally adequate for assessing key rate functions, such as age and growth, but are limited when assessing recruitment. Recruitment variability has not been indexed for channel catfish (*Ictalurus punctatus*). Further evaluation of practical recruitment indexing methods from single sampling events and identification of potential drivers in recruitment variability could provide biologists with additional information needed for improved management of channel catfish populations. In this study, we assess the feasibility of indexing channel catfish recruitment variability with one-time samples using the recruitment variability index (RVI) and recruitment coefficient of determination (RCD). Then we examine spatial, abiotic, and biotic factors that influence recruitment variability across 15 study reservoirs in Oklahoma. Agreement among quartile range-based recruitment categories between RVI and RCD was 60%. The RVI was positively correlated to the CV in mean CPUE of channel catfish for all reservoirs combined. The strongest predictor of RVI from the candidate model set was longitude and no additional predictors fell within 2 ΔAICc of the longitude model. We see utility in using RVI as a ranking tool for multiple channel catfish populations in a given region, providing managers with an additional method to prioritize stocking needs or identify candidate reservoirs for habitat improvement efforts (e.g., spawning structure, nursery habitat). This method may also provide insight into the application of improvement efforts through the identification of systems that support self-sustaining populations.

Lessons Learned After a Decade of Augmenting Freshwater Mussel Populations in Eastern North Carolina

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Freshwater mussels are one of the most threatened group of organisms in the world, yet in comparison with other aquatic fauna such as fish, relatively little has been done to recover at risk populations through augmentation of hatchery propagated individuals. Given the overall lack of propagation in relation to fish, there are significant knowledge gaps associated with the success of augmentation and more research is needed to better understand how we might use this tool to recover at risk mussel populations. The state of North Carolina has pioneered some of this work as augmentation efforts for several species have now been ongoing for over a decade. This presents a novel opportunity to assess the success of our conservation efforts. Our goal in this study was to assess the success of augmentation efforts in recovering populations of four species threatened with extinction. Furthermore, we discuss successes, failures, and future directions after a decade of experience. To do this we used augmentation and monitoring data covering 60 sites across a 10-year period within the Tar and Neuse rivers in North Carolina. Our results suggest mixed success as some of the species responded positively to

augmentation through consistent survival, growth, and even reproduction. However, some species also exhibited poor survival both in propagation and in the wild once released. These results show the potential success of augmentation efforts but also highlight significant knowledge gaps in our understanding of freshwater mussel conservation. We recommend that managers utilize augmentation as a recovery tool but emphasize the need to develop clear stocking assessment protocols, a-priori population genomics, and mitigation of environmental threats.

Leveraging a Spatiotemporally Large Dataset to Test Predictions of Life-History Theory

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Identifying the mechanisms that underly how organisms respond to current and expected hydrologic alterations is essential to understanding the effects of climate change on riverine systems. Life history theory is one such mechanism and forms clear predictions about how certain traits (e.g. body size) or groups of traits (strategies) will be selected for by hydrological conditions. However, few researchers have tested hypotheses informed by life history theory across large spatial and temporal scales simultaneously or considered how selection acts on both individual traits and strategies. Our goal was to use a stream fish community dataset spanning five river basins and over two decades, to test the hypothesis that 1) individual traits would be selected for by environmental conditions, and 2) that life history strategies would be selected for by hydrological conditions. To test the first hypothesis, we used a permutation procedure to compare functional beta diversity between observed and randomized datasets. To test the second hypothesis, we first fit beta-binomial models with life history strategy (identified through archetype analysis) as the dependent variable and predictors of streamflow as independent variables and then identified interpretable models using model selection. Our results did not support the first hypothesis or the second hypothesis within both periodic and opportunistic strategies. However, we did find evidence that equilibrium strategists were selected for by less variable hydrology. Our results fill important data gaps in the southeastern U.S. and suggest that that the influence of life history traits on community structure is not as influential as in previous studies. We hypothesize that this is primarily due to the spatiotemporal scale and a lack of environmental extremes within the dataset. Future studies should expand on the current study by investigating how selection may act differentially on individual traits and life history strategies.

Diets Of Stocked Rainbow Trout in West Virginia Streams

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The central Appalachian streams are home to several threatened and endangered species including the Candy Darter (*Etheostoma osburni*), Guyandotte River Crayfish (*Cambarus veteranus*) and Big Sandy Crayfish (*C. callainus*). Some of these waters have also historically been stocked with trout to provide angling opportunities. Concern has been raised by USFWS that trout that persist in these waters may pose a predatory threat to the endangered species. Due to these concerns, WVDNR ceased stocking of Brown Trout (*Salmo trutta*) that are considered more piscivorous than other species. Recently, only Rainbow Trout (*Oncorhynchus mykiss*) have been stocked into waters where the T&E species occur. The

potential take of these T&E species by Rainbow Trout is unknown, so in 2024 we began a study to document the diets in 6 systems. Most fish diets were collected by roving surveys that contacted anglers, administering a short survey and asking if the stomachs could be removed from any fish they had caught. As expected, most stomachs were collected within 24-48 hours of stocking, coincident with angler effort and <70% of stomachs were collected from the Cranberry River and the Williams River and in March and April. In the Cranberry River (n = 100), none of the trout consumed fish or crayfish. In the Williams River (n = 71) the frequency of occurrence (F.O.) was 0.014 and 0.056 for fish and crayfish, respectively. Greater piscivory was observed in the Cherry River (0.118 F.O.) where 16/17 stomachs were collected in July via electrofishing. The two fish consumed in the Cherry River were identified as a Fantail Darter (*Etheostoma flabellare*) and a Longnose Dace (*Rhinichthys cataractae*). The data to this point show no incidence of fish in Rainbow Trout diets from March through June. However, sample sizes were low in April through June and all piscivory occurred in July. Further data is needed, particularly for persistence and diets of fish that survive in the systems for longer periods, to more fully address the question.

Gastric Lavage Shows Promise as a Non-Lethal Diet Extraction Method for Darters (Etheostomatinae)

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There are many levels of the aquatic food web that are not well understood due to a lack of knowledge of trophic interactions (i.e. diet data). This data gap is especially prevalent with small fishes such as Darters (Etheostomatinae), since collection of diet data is fatally invasive. This poses a problem as many darters are species of conservation concern. Alternative methods need to be explored for future diet studies on Darters. Our study explored small-scale gastric lavage on Darters as an alternative method of collecting diet data for these species. A total of four species were used to test gastric-lavage methodology: Banded Darter (*Etheostoma zonale*; BND), Fantail Darter (*E. flabellare*; FTD), Greenside Darter (*E. blennioides*; GSD), and Redfin Darter (*E. whipplei*; RFD). We employed gastric lavage methods on darters and assessed its efficiency and mortality. Lavage efficiency was determined by comparing lavaged diet items to diet items retained in the gut (including entire digestive tract) and we assessed short-term mortality in the field during a monitoring period following the gastric lavage of each individual fish. In total we captured and performed lavage on 128 individuals (GSD = 34, RFD = 50, FTD = 24, and BND = 19) of which a subset was used for validation. Short-term mortality rates were relatively low for all species except for Banded Darter (GSD = 3.0%, RFD = 8.0%, FTD = 12.5%, BND = 30%). The data outlined in this study provided the foundation for gastric lavage to be applied in future studies on Darter diets, which can further our knowledge of the ecology for this highly diverse and important species group.

Evaluation of Shoal Bass Stocking Efforts on a Florida River Impacted by Hurricane Michael

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Shoal Bass *Micropterus cataractae* are listed as a species of greatest conservation need by the Florida Fish and Wildlife Conservation Commission. The only known naturally reproducing population in Florida

is found in the Chipola River. Hurricane Michael devastated the Chipola River in 2018 and several fish kills were documented in the immediate aftermath of the storm. Severe declines (91%) in Shoal Bass relative abundance were observed in 2019. In response, a supplemental hatchery stocking program was initiated. In May 2022, 3,300 Shoal Bass fingerlings were stocked in the Chipola River. In May 2023, 7,800 Shoal Bass fingerlings were stocked. The objectives of this study were to (1 determine the relative abundance of the Shoal Bass population, 2) determine the percent of stocked Shoal Bass in the 2022 and 2023-year classes, and 3) observe movement of stocked fish from the stocking location. A relative abundance monitoring survey and preliminary stocking evaluation took place in fall 2022 and fall 2023. All Shoal Bass were collected using boat-mounted DC electrofishing from Yancey Landing to Johnny Boy Landing. Fin clips were taken from all Age-0 Shoal Bass for genetic parentage analysis to determine if they were wild or stocked fish. Estimates of relative abundance suggest that the population is beginning to recover from Hurricane Michael. Genetic parentage analysis revealed that 65% (41 out of 63) of Age-0 fish sampled in fall 2022 were stocked fish. A total of 63% (43 out of 68) Age-0 fish sampled in fall 2023 were stocked fish. The stocked fish were found as far as 10-km downstream of the stocking locations. Stocked fish were also larger on average than the wild produced fish. These results indicate that stocking hatchery produced fingerling Shoal Bass in the Chipola River has the potential to contribute to the recovery of the population.

Accuracy and Precision of Scales and Dorsal Spines to Age Coastal Striped Bass

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Striped Bass *Morone saxatilis* are distributed along the east coast of the United States from the St. Lawrence River in Canada to St. John's River in Florida and in the Gulf of Mexico from Florida to Louisiana. Northern populations are anadromous, while the Great Pee Dee River (GPDR) population in South Carolina is potamodromous. The age structure of Striped Bass in the GPDR is still uncertain and only known from a small sample size of otoliths. Studies have shown that otoliths are the most accurate way of aging Striped Bass, but obtaining the otoliths requires euthanizing the fish. The goal of this project is to determine the accuracy and precision of the scales and dorsal spines to age Striped Bass in the Great Pee Dee River, South Carolina. Fish were collected by rod and reel in the Atlantic Intracoastal Waterway near Little River, South Carolina. In 2022, otoliths and scales were taken from 19 fish, and in 2023-2024, scales and dorsal spines were taken from 77 fish. Each of these structures will be read and aged by three readers, consisting of two experienced and one novice reader. Otoliths will be aged whole, scales will be pressed on acetate slides, and the spines will be sectioned with a low-speed diamond-blade saw and read under a microscope. Accuracy of scales will be assessed by using percent agreement between scales and otoliths (true age) from 2022 samples. Precision of scales and dorsal spines will be assessed by using the coefficient of variation from 2023-2024 samples. We expect that by comparing the different aging structures, the scales will be as accurate as otoliths based on the population being mostly fish less than eight years of age. We further expect precision to be similar between scales and spines.

Thermal Refugia and Summer Microhabitat Selection In Edisto River, SC, Striped Bass (*Morone saxatilis*)

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Many fish use thermal refugia to avoid heat stress during the summer. Climate change is predicted to raise water temperatures, increasing the likelihood that fish species will experience thermal stress. Additionally, greater water withdrawals with continued human population growth will exacerbate this problem. With a higher risk of thermal stress, maintaining and conserving thermal refugia for cool and cold-water fish is an imperative need for conservation for these species. Much of the current research surrounding thermal refugia and summer microhabitat selection in fishes is focused on salmonids, with few studies examining the selection behaviors in other cool-water fish taxa such as Striped Bass (*Morone saxatilis*). The Edisto River Striped Bass population in South Carolina is listed in the State Wildlife Action Plan as a species of conservation concern and is threatened by increasing water withdrawals and extremely low flow events during summer, which may decrease the spatial extent of thermal refugia and increase thermal stress. Therefore, this study aims to identify the locations of critical summer microhabitat for Striped Bass in the Edisto River, as well as to quantify the parameters that drive summer microhabitat selection in this population. To accomplish these goals, we used radio and acoustic telemetry to quantify abiotic conditions (e.g., temperature, flow, depth, canopy cover) of both used and unused but available habitats. Next, we fit a set of discrete choice models comparing different hypotheses of summer microhabitat selection in Edisto River Striped Bass to determine key abiotic conditions driving summer habitat selection. Results from this work identified potential locations of summer thermal refugia in the Edisto River and identified key abiotic conditions driving Striped Bass summer microhabitat selection.

Building a West Texas Fishery from the Ground Up

Michael D. Homer Jr., Texas Parks & Wildlife Department, Inland Fisheries Division

Small impoundments in communities are important resources to provide fishing recreation and subsistence opportunities. Larger reservoirs are typically less convenient for individuals and families because of travel, lack of shoreline angling access, lack of amenities, as well as the need for vessels. Community fishing ponds are usually closer in proximity to homes, are situated in park spaces that offer a variety of amenities and features and may be less intimidating for families to partake in fishing, especially for those new to the sport. In West Texas, these waterbodies are crucial for attracting new anglers as well as keep active anglers engaged in fishing. In 2020, Texas Parks and Wildlife Department (TPWD) partnered with the City of Early to revitalize a fishery at site planned to create a new park and commerce space. In 2021, the TPWD's Habitat and Angler Access Program awarded $95,000 to install two fishing piers, create gravel spawning beds, armor shoreline, native vegetation and other fish habitat enhancements. In 2023, the City of Early received additional HAAP funding to create a kayak launch on the pond as well as a fishing pad. Planning, design, and implementation of the pond revitalization were collaborative efforts with the city and contracted engineers. In 2023, Texas B.A.S.S. Nation and Major League Fishing Black Bass Stewardship Group partnered with TPWD and City of Early to further habitat enhancement efforts. This presentation will highlight the project, particularly the planning and implementation processes, successes, challenges, and lessons learned.

Reservoir Fisheries Habitat Partnership: Improving Habitat in Our Nation's Reservoirs for 15 Years Strong

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Reservoirs are inextricable parts of our natural landscapes and are developed to several human needs. They impact almost every major river system in the United States, affecting habitat for fish and other aquatic species. Conservation of reservoirs is essential to maintaining the quality of life for the American people because they are focal points of recreation for tens of millions of Americans, especially fishing, and they generate tens of billions of dollars for local economies and national recreational industries. The Reservoir Fisheries Habitat Partnership (RFHP) is the only national collaborative partnership that supports reservoir fish habitat conservation, and it was established in 2009 to promote the protection, restoration, and enhancement of habitat for fish and other aquatic species and communities in reservoir systems through cooperative and voluntary actions. Friends of Reservoirs (FOR), the non-profit component of the RFHP, works to bring local groups together to assist with identifying, developing, and implementing reservoir habitat enhancement and restoration projects. Since the RFHP was founded, it has contributed to over 90 projects. During the last 15 years, 156 FOR members have been established across 32 states. RFHP provides strategic coordination and direction in the conservation of fish and aquatic habitat in reservoir systems and is committed to integrating watershed conservation, in-reservoir management, and the management of downstream flows to attain more holistic and coherent strategies for addressing aquatic habitat impairment issues in reservoir systems. RFHP has established partnerships to implement conservation actions needed to achieve and sustain healthy reservoir systems, and it does this by facilitating, informing, equipping, and supporting a bottom-up approach to implementation of conservation, which partners and members have been successful. This presentation will highlight these successes and challenges.

Seascape Genomics of Eastern Oyster (Crassostrea virginica) in and around Beaufort Inlet, North Carolina

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Complex interrelationships between biological traits and environmental conditions influence the genomic diversity and population structure of marine species. Offspring of broadcast spawning organisms are subject to oceanographic and benthic conditions that influence survival and population connectivity, with the potential to produce genomic divergence between populations at sites that are relatively close geographically. This study used restriction site-associated DNA sequencing (RADseq) to characterize genomic profiles of eastern oyster populations in and around Beaufort Inlet, North Carolina. RADseq libraries were prepared from %30 oysters from each of seven sites in Bogue Sound, Back Sound, North River, and surrounding bodies of water from a maximum of %20 km apart. These beds were selected from a geographic area spanning the swift flowing and well trafficked Beaufort Inlet entrance, and, additionally, represent a range of environmental conditions, including salinities and proximities to intense anthropogenic development. The resulting sequence data will be analyzed to determine genomic differentiation between sites and putative markers of selection. This research will

help elucidate connectivity patterns of oysters in the area of study as well as provide fine-scale insights on potential genomic adaptation in benthic marine species.

Seasonal Variation of Riverine Habitat Use for Adult Atlantic Sturgeon in South Carolina.

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Atlantic sturgeon (ATS), *Acipenser oxyrinchus*, populations along the East Coast of North America are threatened or endangered under the Endangered Species Act by the National Marine Fisheries Service. As part of the Federal Energy Regulatory Commission relicensing process for the Yadkin-Pee Dee River Project, Duke Energy contracted the South Carolina Department of Natural Resources to quantify presence, abundance, and seasonal reproductive behavior and habitat use of spawning adult ATS within this system. Between 2016–2022, 160 adult ATS were captured and transmitted, and are actively being monitored using a stationary receiver array in the Winyah Bay System, SC. Telemetry data are examined to determine overall watershed use and how it differs among two distinct spawning cohorts. Observed trends suggest the majority of the unimpounded river (river kilometers 44–265) may be important for spawning. Atlantic sturgeon use this area extensively during the spring and fall spawning runs, with fall sturgeon being detected more frequently in the upper reaches of the river than the spring spawning cohort. These efforts will help define the quality and use of existing habitat and offer insight into seasonal behavior differences between southern spring and fall spawning populations. Understanding the temporal variations in riverine habitat use helps managers tailor action plans geared to enhance conservation efforts for both populations.

Examining Size Bias of Largemouth Bass Electrofishing with New Technologies

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Boat electrofishing is the most common method used to sample Largemouth Bass populations as it can effectively sample a broad range of habitats while reducing by-catch or mortality. Anecdotally, fisheries managers have long observed a discrepancy in size classes observed in these samples and angling data whereby very large (i.e., memorable-trophy size) fish are more frequently encountered in angler catch data than electrofishing data (Horton and Gilliland. 1993, Pope et al. 2005, and De Jesus et al. 2009, Tyszko et al., 2017). Many rationales have been proposed to explain this, including but not limited to fish behavior and rarity (Bayley and Austen, 2002). As bass tournaments and trophy angling become more popular, it is increasingly important for fisheries managers to be better equipped to accurately evaluate abundance of memorable and trophy-size classes of Largemouth Bass. Thus, it is important to understand if electrofishing has a size bias against memorable and longer bass. Through the use of a mark-recapture experiment we determined the population dynamics and length distribution of largemouth bass in two small reservoirs utilizing angling and electrofishing. Utilizing this mixed method approach will give us insight into how electrofishing samples may bias against large individuals.

Additionally, radio telemetry and forward-facing sonar (FFS) will be used to explore behavioral differences between smaller and larger bass that could affect their vulnerability to electrofishing. Quantifying any size biases and understanding their causes will help managers adapt procedures to better sample larger individuals.

Assessing the Susceptibility of a Newly Discovered Barrens Topminnow (*Fundulus julisia*) Population to Western Mosquitofish (*Gambusia affinis*) Invasion

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The Barrens Topminnow (BTM; *Fundulus julisia*) is a federally endangered species in critical decline. In the fall of 2022, a new BTM population was discovered in the Middle Collins River that appears to be relatively isolated from Western Mosquitofish (WMF; *Gambusia affinis*), a species known to have significant negative impacts on BTM populations. In order to assess the possibility of WMF invasion, we used occurrence records from multiple databases to locate the closest known WMF populations (in terms of river distance) to the new BTM population. We used these locations as our initial starting points, and then sampled for WMF via seine in the general direction of the new BTM population. We sampled a total of 51 sites throughout roughly 75 kilometers of stream, and we found WMF at 27 of those sites. Based on these sampling results, we estimate there is approximately 45 kilometers of stream between the closest WMF population and the BTM population. To further evaluate the vulnerability of the BTM population to invasion, we also initiated assessments of the permeability of all fish passage barriers (culverts or dams) to WMF movement; these assessments are intended to encompass the entire 45-km stretch of river. To assess permeability, we will combine the Southeast Aquatic Resources Partnership (SARP) barrier assessment protocol, water velocity measurements at each barrier, and swimming performance data of WMF. When our assessment is complete, we will be able to identify barriers that appear most critical to the long-term protection of the new BTM population, thereby facilitating effective conservation of this highly imperiled species.

Movement Patterns of Cubera Snapper (*Lutjanus cyanopterus*) along the Southeast Coast of Florida

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Understanding fish movement patterns across different life stages is essential for effective species management. Cubera snapper *Lutjanus cyanopterus* is a large, reef-associated species distributed throughout the western Atlantic. While it is known Cubera Snapper form large spawning aggregations, little is understood about their movement patterns and habitat use during the sub-adult to adult stage. Since 2020, 29 Cubera Snapper ranging in size from 455mm to 765 mm total length were acoustically tagged with help from the West Palm Beach Fishing Club near the Jupiter Inlet and Loxahatchee River. A total of 28 of 29 individuals were detected with 13 indicating movement offshore. These individuals indicated a coverage range at sites along the east coast of Florida from Canaveral to Riley's Hump in the

Florida Keys. Preferred areas were identified for length of stay and repeated trips to these locations indicating critical habitats for feeding, shelter or spawning.

Spatial Variation in Young-Of-Year Brook Trout Body Size Across Their Native Range

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Brook Trout (*Salvelinus fontinalis*) are a species of ecological and recreational importance across their native range. Local biologists and managers collect brook trout population data to understand fisheries resources in their respective regions, but broad-scale syntheses remain elusive. Understanding the spatial variation among native populations (spanning from Georgia to Maine in the U.S.) is an important step in identifying key drivers of population dynamics and assessing their vulnerability to environmental change. In ectothermic species like brook trout, body size is heavily influenced by environmental conditions. Warming temperature is predicted to decrease body size of aquatic ectotherms due to higher metabolic demands, but other factors such as habitat size and biotic interactions can also affect their body size. Because trout body size varies across a range of environmental conditions and is important for individual fitness and population dynamics, we analyzed spatial variation in body size of age 0, or Young-of-Year (YOY) trout, which can be reliably distinguished from older individuals based on length-frequency histograms. Using backpack electrofishing data collected by biologists and managers in Maine, New York, Maryland and Great Smoky Mountains National Park, we analyzed the spatial variation in average YOY body size using a Bayesian hierarchical model. Our dataset consisted of ~39,000 individuals from 388 sites in New York, ~17,600 individuals from 295 sites in Maryland, ~12,500 individuals from 358 sites in Maine, and ~45,000 individuals from 75 sites in Great Smoky Mountains National Park. We modeled variation in mean body size of YOY brook trout using 5 covariates: latitude, elevation, watershed size, and presence/absence of invasive trout (Brown Trout and Rainbow Trout). Our research will help us understand how environmental factors as well as spatial trends influence brook trout populations across their native range and how they respond to a

Survival of Age-0 Alligator Gar Following Surgical Implantation of Acoustic Transmitters

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The Alligator Gar (*Atractosteus spatula*) is a long-lived, late-maturing, large-bodied species that was historically found in the Mississippi River basin and the Gulf Coastal Plain. Overexploitation, removal efforts, and habitat loss have caused extensive population declines, and in many parts of the historic range Alligator Gar are stocked in attempts to restore populations. Despite long-term (>20 years) stocking programs, limited research has attempted to quantify post-stocking survival rates. Acoustic telemetry combined with mark-recapture methods has been used to assess post-stocking survival of various species, but this technique has yet to be used in Alligator Gar because acoustic transmitter implantation in the age-0 life stage hasn't been investigated. In August of 2024, we conducted a trial at Natchitoches National Fish Hatchery to determine if surgical implantation of acoustic transmitters would cause mortality in age-0 alligator gar of stocking size (196 to 385 mm). The trial included five treatment groups of 25 Alligator Gar each: fish tagged with Innovasea (1) V6 transmitters, (2) V7 transmitters, or

(3) V9 transmitters, fish that underwent a sham surgery with no transmitter, and a control group. Fish were held at the hatchery for 2 weeks following surgery/tag implantation and tanks were checked daily for mortalities. We found no mortality in the control, sham surgery, or V7 treatment groups, and limited mortality in the V6 (n = 2) and V9 (n = 1) treatment groups. Preliminary analysis has indicated that fish total length, fish weight, and tag burden had no effect on survival during the trial period. Based on these results, we suggest that Alligator Gar greater than 200 mm can be successfully tagged using acoustic transmitters. Future research aims to use acoustically tagged Alligator Gar to assess post-stocking survival in Tennessee.

Stream and Floodplain Restoration Lessons Learned Following 2024 Helene Flooding in Western North Carolina

Greg Jennings, Jennings Environmental, PLLC

Extreme flooding occurred in September 2024 throughout Western North Carolina when Hurricane Helene produced unprecedented rainfall. Impacts to streams and rivers included erosion, deposition, loss of forest buffers, channel morphology changes, and pollution. This presentation describes post-flood observations of 40 ecosystem restoration projects implemented over the past decade in a variety of watershed settings. All projects included natural restoration techniques designed to enhance flood resilience through floodplain connectivity, native riparian vegetation, and in-stream wood and rock structures. Channel sizes range from 1 to 30 m in width and 0.2 to 3 m in depth. Flood inundation depths estimated based on visual indicators and nearby gages ranged from 1 to 6 m above top of bank. Floodplain widths ranged from 2 to 22 times the bankfull channel width of the restored stream channel. Post-flood site conditions were rated as successful, partially successful, or failing to meet flood resilience objectives in terms of maintaining natural channel forms and riparian vegetation. Of the 40 restoration projects assessed, 31 were successful, 7 were partially successful, and 2 were failing to maintain resilience. In general, successful projects were older and had wider floodplains with dense riparian forest buffers. Damaged projects were in more urbanized areas with local infrastructure such as bridges and had less available floodplain width for energy dissipation. Lessons learned from assessing restoration projects exposed to extreme flooding should be integrated into plans for future projects to optimize flood resilience and ecosystem functions.

Evaluation of Hole-Punching Operculums as a Marking Technique in Centrarchids

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Mark-recapture studies provide important information about fisheries. There are many ways to mark or tag fish, but some populations of fish, like Largemouth Bass (*Micropterus salmoides*) and sunfish (*Lepomis* spp.), will require a large number of fish to be tagged. The cost of tags could be prohibitive to these studies. Lower-cost methods help to reduce this barrier. This study was split into a lab and field trial to investigate the applicability of operculum hole-punching as a viable, low-cost option for Centrarchid mark-recapture studies. In the lab, 63 Largemouth Bass and 105 sunfish were collected and marked with a self-piercing tag on their left operculum. Of those, 32 bass and 53 sunfish were marked with a 6.4mm paper hole-punch tool on their right operculum then fish were held in pools to test growth rates, mortality, and longevity. Results showed no significant difference between hole-punch

and control fish for growth or mortality. Next, sixty Largemouth Bass and 328 sunfish were collected from a 6-acre pond. Fish were marked with a hole-punch and a fin clip. Hole-punch and fin clip locations varied based on the date collected. In both studies, hole-punch closure rate was observed in 25% increments. Overall, hole-punches closed faster in the lab study, suggesting environment can affect growth rates. Also, Largemouth Bass marks closed faster than sunfish showing a species-specific difference. Approximate operculum hole-punches closure rates take 26 days to close in Largemouth Bass and 164 days in sunfish. Our results suggest operculum hole-punching is a viable low-cost method for marking fish.

Preliminary Assessment of Fish Assemblages in Natural Wetlands, NRCS Easement Wetlands, and Agricultural Ditches in the Mississippi Alluvial Valley of Arkansas

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Inland freshwater wetlands are among the most diverse aquatic ecosystems and provide important ecosystem services. Wetlands filter pollutants, sequester carbon, buffer riverine ecosystems by capturing and storing flood water, and provide critical habitat for aquatic and terrestrial species alike. Wetlands provide crucial foraging, spawning, and nursery habitat for many inland freshwater fish species. Our objective is to sample and evaluate littoral fish assemblages in wetlands within the Mississippi Alluvial Valley of Arkansas. This study is part of a larger project with the USDA Natural Resources Conservation Service to evaluate the success of the Wetlands Reserve Easements (WRE) program in the Mississippi River basin. We plan to sample and compare fish assemblages at five natural wetlands, 20 WRE program wetlands, and five agricultural ditches in eastern Arkansas. We sampled fishes using mini-fyke nets with a minimum of three nets set overnight at each site. Backpack electrofishing and seining techniques were also used to limit the effects of gear selectivity on species detection. Preliminary catch data from the first sample season includes data from five agricultural ditches, two natural wetlands, and five WRE program artificial wetlands. Overall, trends show distinct differences between the agricultural ditch sites and the two wetland site types. Subtler differences between the assemblages of natural versus WRE wetland sites occurred. Specifically, natural sites and easement sites tended to have higher species richness overall. Mini-fyke nets captured the highest species richness at each site when compared to our supplementary gears. Additionally, several aquatic nuisance species appeared in agricultural ditches and easement wetland samples that were not present at natural wetland sites. Future work entails sampling the remaining project sites and comparing assemblage data to landscape-level variables to understand the primary factors driving species richness and fish assemblage structure in spatially-isolated wetlands.

Recruitment of American Glass Eels (*Anguilla rostrata*) to Northeast Florida: Insights From a 25-Year Fishery-Independent Survey

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The American Eel (*Anguilla rostrata*) is a catadromous species of ecological and economic importance to the western north Atlantic and Gulf of Mexico. Recent declines in American eel populations have

prompted concerns about overall population and conservation status with subpopulations at the southern end of the range declining most precipitously. To assess historic trends in abundance and to examine environmental and climate effects on glass eel recruitment in northeast Florida, we quantified annual glass eel recruitment (catch-per-unit-effort; CPUE) from 2001-2024. Glass eels were collected in northeast Florida in the GTMNEER on dark flood tides during winter. Overall, we observed (1) a significant decline in eel CPUE from a period of higher, but variable abundance in early years to a sustained period of low recruitment from 2005 to present, (2) an approximately 18-day advance in mean recruitment date during this period (-0.87 days year-1), and (3) significant relationships between a number of environmental drivers and eel recruitment at multiple spatial and temporal scales. Our results contribute to a growing understanding of American eel early life history and recruitment dynamics, the effects of climate change on coastal fishes and are critical for agencies seeking to effectively manage important fisheries. Moreover, this collaborative partnership allows for the cost-effective collection of valuable long-term fishery data while providing meaningful research opportunities for undergraduate and graduate students and training of the next generation of fisheries scientists.

Long-Term Aquatic Habitat Monitoring of Florida Lakes in Support of Fisheries Management and Research

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The Freshwater Fisheries Long Term Monitoring (LTM) Program of the Florida Fish and Wildlife Conservation Commission (FWC) began in 2006 with the intent to use standardized sampling protocols to obtain data that could be used by fishery managers and researchers to inform trends in population dynamics and species composition for Florida's important lentic freshwater fisheries (i.e., core lakes) on an annual basis. In 2015, the need to incorporate a lake-scale habitat monitoring project as part of the LTM Program was realized and standardized protocols were established. Protocols focused on collecting data that would generate whole-lake percent area covered and percent volume infested (i.e., biovolume) estimates for submersed vegetation and vegetation species-specific locations, frequency of occurrence, and density estimates annually in core lakes. Additionally in 2015, funding from FWC's Invasive Plant Management Section allowed for the expansion of habitat mapping to LTM Program non-core lakes. Annual habitat monitoring focuses on using boat hydroacoustic remote sensing with a Lowrance High-Definition sonar unit and BioBase's (www.biobasemaps.com) sonar data processing algorithms to map submersed vegetation coverage and biovolume along evenly spaced transects. We also use point-intercept grids along the same transects to collect species-specific aquatic vegetation data, typically between the months of June and September. These sonar and point-intercept data were then used to create whole-lake vegetation maps and summary statistics that were shared with management and research partners. To date we have collected aquatic vegetation mapping data at least once on 140 lakes, 14 of which have been mapped annually, and 76 of which have been mapped at least twice since 2015. Habitat mapping data from this project have proven invaluable for FWC and external partners in the monitoring, management, and research of Florida's lentic freshwater fisheries.

The Impact of Limestone Treatment on Fish Communities in AMD-Affected Watersheds

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West Virginia is a state that is well known for its enormous reserves of energy-rich bituminous coal, which it has capitalized on since the mid-1800s. Nonpoint source pollution is driven by particular land uses and abandoned mine drainage falls under this pollution category. Acid mine drainage (AMD). describes a natural process that is produced when mining activities expose sulfur-bearing materials to atmospheric oxygen, moisture, and acidophilic iron-oxidizing bacteria resulting in sulfuric acid, dissolved iron, and precipitation of ferric hydroxide. The acid runoff further dissolves heavy metals such as copper, lead, and mercury into groundwater or surface water. AMD causes severe chemical and biological degradation of aquatic habitats, and those that inhabit them. Treatment with limestone is a widely used method of neutralization for AMD and has been used to treat AMD Tygart Valley River watershed in North-Central West Virginia. We analyzed fish community samples collected by the WV Department of Environmental Protection using single-pass electrofishing before the limestone treatment was administered to the sites and 3, 5, 7, and 10 years after treatment. Using a repeated measures ANOVA test, it was determined that there is a statistically significant difference between the diversity ($F(7, 28) = 3.7454$, $p = 0.01665$) and species richness ($F(7, 28) = 4.7641$, $p = 0.005678$) of fish community within three years after limestone treatment. These values suggest that limestone treatment is effective in weakening the effects of AMD, leading to both species richness and diversity of fish communities to improve over time. Expansion of limestone treatment efforts and continued monitoring may help to further restore aquatic ecosystems in the Tygart Valley River watershed, as well as other impacted areas.

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.

Pondside Tanks as an Alternative Rearing Approach for Striped Bass Larvae

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This study evaluates the feasibility of using pondside tanks as an alternative rearing method for larval striped bass. In May 2024, six 414.35 L (110 gal) fiberglass tanks were installed at Pamlico Aquaculture Field Laboratory (PAFL), using pond water with plankton as a food source. Two stocking densities (15,000 and 25,000 fry) were tested, each with three replicates (120,000 fry total). Fry were stocked at 3 days post-hatch (dph) and monitored daily. A developmental staging chart was created using digital microscope images during the first 15 days of life. At 14 dph, 14,486 fry survived (12% survival), averaging 2,414 fry per tank. By 26 dph, survival dropped to 2,099 fry (1.83%), averaging 349 fry per tank. These fry were transferred to earthen ponds and fed crumble feed. At 49 dph, 937 fingerlings were harvested with a survival rate of 44.6% from the 26 dph transfer and roughly 1% of the initial 120,000 fry stocked. Comparison with traditional earthen ponds showed survival rates of 10% (5,000 fry from 50,000 stocked per 0.25-acre pond) versus 1% in tanks. However, tanks were more water-efficient, using 110 gallons compared to roughly 1 million gallons per pond. Fish harvested per gallon of water was 0.005 for ponds versus 11 for tanks. This experiment demonstrates the feasibility of pondside tanks for striped bass rearing, along with the creation of a developmental chart. Future work will focus on increasing plankton density in the tanks using light traps and reducing fry stocking density per tank.

Age Structured SIRS Epidemiological Model of Largemouth Bass Virus

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Largemouth bass virus (LMBV) is a ranavirus that can infect multiple fish species, particularly centrarchids, but is only known to be lethal to black bass, particularly Largemouth bass (*Micropterus nigricans*) and recently Smallmouth bass (*Micropterus dolomieu*). Initially detected in the early 1990s LMBV has caused several mass mortality events in the United States and continues to spread. Currently, the impact of LMBV on the age structure and population dynamics of wild black bass populations is not well understood. A modified SIRS epidemiological model was created that incorporates age-class based disease parameters and density dependent reproduction in conjunction with observed population dynamics from the Upper Ohio River was used to evaluate 4 potential disease scenarios. Using this model, we were able to ascertain that that the immunity rate within a simulated Largemouth bass population was a key factor in recruiting older individuals into the population. When immunity to the virus within the population is elevated (rate of 0.8) there is nearly a 6-fold increase in age-5 individuals regardless of disease mortality rates. However, when immunity to the virus is reduced to a rate of 0.2, there was a significant decrease in the number of Age-5 individuals (408-595 : 65-101). Further research is required to understand what factors influence the duration and robustness of immunity within Largemouth bass and if it can be engineered through vaccination or some other means.

Quantifying Movements of Five Fish Species in the Lower Alabama River Alabama, USA

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Dams can block, alter, and delay fish movement in river systems, ultimately affecting access by fish populations to suitable spawning, feeding, and nursery habitat. Because passage beyond dams is often

limited, management strategies have been implemented to facilitate fish movement past dams. However, often only passage and movement of species that make long-range migrations are studied. In this study we quantified movements below Claiborne Lock and Dam, the lowermost dam on the Alabama River, of five species that are not known to make long migrations. Species included were Channel Catfish (*Ictalurus punctatus*), Spotted Gar (*Lepisosteus oculatus*), Striped Mullet (*Mugil cephalus*), Highfin Carpsucker (*Carpiodes velifer*), and Quillback Carpsucker (*Carpiodes Cyprinus*). We tagged individual fish within each species with an acoustic transmitter and used an array of bank tethered acoustic receivers, and a fine-scale array of receivers in the Claiborne lock and dam tailrace, to passively track fish throughout the lower Alabama River. Striped Mullet had the largest movements of the five species with 48% of tagged fish leaving the Alabama River. Most Channel Catfish (68%) remained in the Claiborne Lock and Dam tailrace, although some individuals did make large movements including four fish that entered the Mobile-Tensaw River Delta or Tombigbee River. Most Spotted Gar (71%) left the Claiborne Lock and Dam tailrace, but did not move as far downstream as did Striped Mullet or Channel Catfish. Finally, Highfin Carpsucker and Quillback Carpsucker had limited detections on the bank tethered receivers with most Highfin Carpsuckers (70%) and Quillback Carpsuckers (79%) leaving the Claiborne Lock and Dam tailrace. Given that some individuals of the species included in this study moved substantial distances throughout the lower Alabama River, this research demonstrates that Claiborne Lock and Dam may limit the movement of lesser-studied species not known to move long distances.

Evaluating Alternative Management Strategies for Black Crappie in Lake Murray, South Carolina

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Black Crappie (*Pomoxis nigromaculatus*) is a highly valued sport fish throughout its native range, including South Carolina, where it plays an important role in the local economy and recreational fishing community. Given its popularity for both sport and table fare, effective management practices are crucial to ensure the sustainability and quality of the fishery for stakeholders. This study utilizes a long-term trap net dataset from Lake Murray provided by the South Carolina Department of Natural Resources and applies a yield-per-recruit model to assess the impacts of current and alternative management strategies on total yield-per-recruit, biomass-per-recruit, and spawning potential ratio (SPR). Specifically, the model will evaluate the potential benefits of increasing size limits and decreasing creel limits to identify the optimal age and/or size for harvest that maximizes yield without compromising population biomass (i.e. biomass-per-recruit) or the reproductive capacity (i.e. SPR). Preliminary expectations suggest that raising the minimum size limit from 8 inches to 10 inches, coupled with reducing the creel limit from 20 to 10 fish per person per day, will enhance yield by allowing fish to reach a larger size before harvest and reducing overall exploitation. In addition to stock assessment modeling, this project will include a creel survey of Lake Murray Crappie anglers to identify their: i) perceptions of the current status of the Lake Murray crappie fishery, ii) attitudes on current harvest regulations and potential changes, iii) perceptions of the impact of live imaging sonar on crappie harvest and the overall fishery and iv) total fishing effort, catch, and biological (length, weight, age) data to inform stock assessment efforts. Developing sustainable management strategies is anticipated to not only improve the quality and sustainability of the crappie fishery in Lake Murray but also boost its popularity, thereby amplifying its economic impact at both state and local levels.

New vs. Old: Comparing eDNA Metabarcoding with Conventional Electrofishing Sampling in Degraded Headwaters of Western Tennessee.

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The study of fish assemblage composition in headwater systems is vital for resource managers, as headwaters supply water, sediments, and nutrients downstream. Further, many fishes are unique to headwater ecosystems and are not typically found downstream, whether that is due to habitat specialization or biotic interactions. Headwater systems are also used by mainstem stream fishes as refugia or spawning habitat. Conventional aquatic sampling techniques (e.g., electrofishing and seining) are often used to survey fish assemblages; however, technological advances have facilitated the development and use of new molecular sampling approaches. One such approach is environmental DNA (eDNA) metabarcoding, which allows for rapid assemblage assessment. Presently, there is uncertainty about differences in effectiveness between molecular and conventional sampling approaches, and how such differences may be related to instream variables, e.g., low flow and sediment deposition load. Here, we will be discussing sampling results from eDNA metarbarcoding and backpack electrofishing in Cub Creek, a tributary of the Hatchie River in west Tennessee . Cub Creek has historically been degraded by logging and agriculture, resulting in channelization, incision, headcutting, and habitat complexity reduction, all of which may influence the effectiveness of different sampling approaches. Results from our study can be used to inform sampling plans designed to evaluate status and trends in stream fish assemblages, a critical component of effective freshwater resource management and conservation.

Seeing Scars: Dive Into the Scars and Skin Conditions of Pacific Coast Feeding Group Gray Whales

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A small subset of Eastern North Pacific gray whales (*Eschrichtius robustus*), called the Pacific Coast Feeding Group, utilize the foraging grounds off the coast of Oregon. Anthropogenic stressors such as vessel traffic and fishing are increasing in and around important gray whale ecological locations in this area. Adobe Bridge was used to photo-analyze 8,667 gray whale sighting photos from the years 2015 and 2023. Photos were scored for photo quality, type of scarring, skin condition presence or absence, and confidence in each entry. Results show there is a statistical difference in male and female mean cumulative scar counts. With the framework created, the Geospatial Ecology of Marine Megafauna Lab can continue this type of analysis which can be used to generate and maintain long-term monitoring programs. This method of fine-scale photo analysis and extensive documentation can also contribute to research relating to gray whale skin healing.

Species Distribution and Habitat Characteristics in Freshwater Streams of the U.S. Virgin Islands

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Streams in the U.S. Virgin Islands (USVI; St. Croix, St. John, and St. Thomas), known locally as "guts", historically exhibited perennial flows, which have diminished substantially in recent decades due to a number of factors. While an abundance of anecdotal evidence suggests guts once supported robust communities across the USVI, to date no study has sought to quantify them. This knowledge gap is a barrier to conservation and management efforts in the USVI as little information is known about the abundance and distribution of potential species of greatest conservation need (SGCNs). Moreover, human-made barriers to aquatic organism passage may also limit recolonization of critical habitats by SGCNs from the Caribbean Sea after drought/flood events. To fill this gap, we surveyed over 50 locations across the three islands for streamflow, physical and chemical habitat, and biological communities using backpack electrofishing. All native freshwater fish and decapod species known to the USVI have been detected in data collection to date. Analyses are in progress, and species distribution and occurrence are expected to illustrate habitat fragmentation caused by anthropogenic barriers among other habitat variables such as water quality, elevation, and land use. This study will provide a freshwater connectivity plan and the first comprehensive survey of freshwater fauna distribution in the USVI.

Survey Results: Compilation Of Surveying Efforts to Assess Impacts Of Hurricane Helene

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Hurricane Helene significantly impacted the Southern Appalachian Mountains, affecting biodiversity and physical aquatic habitats. As the 2025 field season approaches, it is important for agencies, universities, and organizations to understand the scope and nature of data being collected to evaluate these impacts. To understand on-the-ground surveying efforts throughout the region, conference participants were asked to complete a survey in the preceding days of the conference. An overview of the compiled survey data will be presented in this session. The session will begin with a brief presentation of the survey results, highlighting key findings and trends observed in the data. Following this, participants will engage in break-out group sessions designed to foster collaboration and the exchange of ideas. These discussions will help identify areas of overlap and gaps in current data collection efforts, promoting a more coordinated and effective approach to assessing the aftermath of Hurricane Helene across the region. By bringing together diverse partners and facilitating open dialogue, this session aims to enhance our collective understanding of the hurricane's impact and improve strategies for future data collection and analysis. Participants will gain a clearer picture of planned research efforts and identify opportunities for collaboration.

Larval Fish Community in the Great Pee Dee River

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Understanding larval fish (ichthyoplankton) dynamics is important to describe community structures, diversity, and to identify population viability. The goal of this project is to describe the ichthyoplankton community in the Great Pee Dee River. This was the first such assessment in this system. Ichthyoplankton was sampled at a fixed location at rkm189 weekly between April 8 and June 10 using a 500µmmesh plankton net (50cm diameter and 150cm long) towed at a 30-degree angle upstream across the river at a speed of 2kph. The net was towed by alternating between the banks for a total of 5 minutes. A General Oceanics mechanical flow meter was tied to the center of the plankton net hoop to

measure the volume of water sampled. A total of 6 samples were collected and combined during each sampling day. Larvae were identified to family using morphological characteristics and DNA barcoding. DNA barcoding includes the alignment and comparison of DNA from specimens for proper identification. This process includes the extraction and PCR amplification of DNA from individual larval fish which will be sequenced. These sequences were compared to already sequenced COI gene from known species using BLAST at NCBI. Ichthyoplankton were sampled a total of 11 days and yielded 399 larvae and eggs. Species sampled include *Ictiobus* sp., American Shad (*Alosa sapidissima*), Spotted Sucker (*Minytrema melanops*), Shorthead Redhorse (*Moxostoma macrolepidotum*), Common Carp (*Cyprinus carpio*), and the Tessellated Darter (*Etheostoma olmstedi*). Species in the genus Ictiobus could not be separated to species due to the similarities in their COI gene.

Microhabitat Use of Turquoise Darters (*Etheostoma inscriptum*) in Piedmont Streams of South Carolina

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Conservation of stream fishes requires conservation of their habitats. However, we lack critical knowledge of the habitat associations of many species. This is true for the Turquoise Darter (*Etheostoma inscriptum*), a species of greatest conservation need in South Carolina. To improve our understanding of the species' habitat associations, we quantified Turquoise Darter microhabitat use in seven South Carolina Piedmont streams in which they had been previously detected by stream fish community monitoring efforts. At each site, 30 to 35 1 m2 quadrats spaced at least 2 meters apart were sampled to collect Turquoise Darters and microhabitat data. Fish species and their numbers were recorded along with darter total length if present. Five points of substrate data consisted of samples from four corners and the center of each quadrat, along with depth and velocity at the center of these quadrats. Turquoise darters occupied all sites and were overrepresented in microhabitats with greater current velocities and more erosional substrata. A generalized linear modeling approach was used to estimate the effects of various microhabitat variables on darter presence and counts. Results from this study have increased understanding of Turquoise Darter habitat use and will be useful for managers working to protect or restore habitat for the species.

Assessment of Fish Spawning Aggregations in Southeast Florida: Residency and Movement Patterns of Gray Snapper off Southeast Florida

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Identifying and managing fish spawning aggregations (FSAs) is a top priority for fisheries and ecosystem management goals in Southeast Florida. This project builds upon previous research assessing FSAs with the objective of identifying species of interest, one of which being Gray Snapper (*Lutjanus griseus*). The purpose of this project is to examine residency and movement patterns in Gray Snapper suggestive of spawning aggregations by using an already established acoustic receiver array. A total of 75 Gray Snappers were acoustically tagged between the months of April and July in 2022 and 2023 in pre-determined locations near acoustic receiver stations within the boundaries of the Kristin Jacobs Coral Reef Ecosystem Conservation Area (ECA). Preliminary analysis revealed 63 of 75 individuals have been accounted for, with detections occurring across 21 acoustic receiver stations. On average, tagged individuals visited between one and three receiver stations with a range of movement varying between 0 and 17.64 km. These initial findings suggest a relationship between site fidelity, home range, and capture/release location.

Evidence of Primary Nursery Usage of the Lemon Shark on Georgia Barrier Islands

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The lemon shark, *Negaprion brevirostris*, is a large-bodied inshore species of shark that is well documented in tropical waters of the Western Atlantic. Until 2019, this species has been largely absent from coastal surveys in Georgia. In 2019, a lemon shark nursery was identified for the species on Little St. Simons Island (LSSI) – a first for the state. The lemon sharks around LSSI were determined to have a strong selectivity for surf and inlets, which likely offered shelter at high tides. In this study, we hypothesized that lemon sharks were also present on other Georgia barrier islands. Using aerial imagery, we selected habitats with similar characteristics to the lemon shark nurseries on LSSI and sampled them using the same methods used previously on LSSI. In 2021–2022, we captured 108 lemon sharks, including 28 recaptures, in surf and inlet habitat on Little St. Simons, Ossabaw, and St. Simons islands. Additionally, juvenile lemons were observed in 2022 on St. Catherines Island but were not successfully captured during sampling. These results suggest nursery habitats in those additional locations, and that Georgia has an underassessed presence of juvenile lemon sharks. The documentation of these novel nurseries provides important information about habitat preference and the geographic extent of nursery habitat for this species, which is critical to the proper management of these highly migratory sharks.

Quantifying Freshwater Mussel Biofiltration in a Flow-Through System.

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Quantifying the biofiltration capacity of freshwater mussels is crucial for understanding their ecosystem services. They remove suspended particulate matter and even some harmful contaminants from the water column, enhancing water quality. Mussels also can reduce turbidity, an important metric in assessing ecosystem health. To quantify mussels' impacts on turbidity and mimic in-stream conditions, we built a flow-through system fed by Yates Mill Pond water (Wake Co., NC). We conducted four trials to measure turbidity and particle counts across tanks containing two species of mussels (*Lampsilis radiata*

and *Atlanticoncha ochracea*), and control tanks without mussels. Each treatment consisted of two separate series of four aquaria each with 12 individual mussels in each of the mussel aquaria. Three trials were conducted with a flow rate of 0.50 liters/minute and one trial at 0.80 liters/minute. Initial temperature and turbidity varied with ambient pond conditions across trials. Across all temperatures, mussels reduced turbidity, with both species clarifying water more efficiently at higher temperatures. *Lampsilis radiata* reduced turbidity by up to 34% at higher temperatures (24 ℃), while *A. ochracea* achieved reductions of 26%. Particle counts were obtained using a Beckman Coulter® Multisizer 4e, but the results were less clear. We plan to conduct additional trials in Spring 2025 incorporating additional replication and fixing samples with Lugol's solution preventing further algal growth and better capturing accurate particle counts and sizes. These findings highlight the importance of temperature in mussel filtration rates, suggesting that seasonal variations may significantly affect the ecosystem services these species provide.

Genomics in Action: Leveraging New Insights for Native Brook Trout Management

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Studies aimed at understanding how genetic diversity is distributed across the landscape can offer important information on relationships central to fisheries management and conservation planning, ranging from delimiting genetically distinct populations and understanding spatial connectivity to evaluating the effectiveness of hatchery stocking and habitat restoration efforts. Similarly, studies to identify the factors influencing the spatial distribution of genetic diversity can provide novel insights into environmental adaptation and enable predictions about future changes to inform present-day planning. Here, we describe recent work to explore these relationships in native populations of brook trout (*Salvelinus fontinalis*), a cold-adapted species native to northeastern North America and the Great Lakes. Using examples from genomic studies of brook trout in locations across the native species range, we resolve fine-scale population structure and identify rivers that function as important sources of distinct life history forms. We also evaluate the effects of species introductions and habitat fragmentation caused by dams—common features in many of the freshwater habitats inhabited by brook trout and other aquatic biodiversity. Additionally, we explore adaptation to thermal conditions and make predictions about population vulnerability under climate change. Collectively, this work is refining our understanding of how environmental, ecological, and evolutionary factors shape genetic diversity in native populations of brook trout. This knowledge is expanding the ways in which genetic information can inform decision-making, prioritize populations for conservation planning, and guide active interventions.

Assessment of Contaminants to Freshwater Mussels in the Conasauga River

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Freshwater mussels are some of the most imperiled taxa in the world. Threats to mussel populations have been attributed to habitat degradation or loss from dams, pollution, invasive species, and siltation. These disturbances can be correlatively associated with declines, yet research has often lacked rigorous methods of testing for causative factors of enigmatic loss. We are using a combination of field and laboratory exposure trials to assess the effects of multiple contaminant stressors on freshwater mussel survival and growth in the Conasauga River, located in northwest Georgia and southern Tennessee. We conducted substrate-exposure studies in the laboratory using sediment collected from throughout the watershed following established sediment toxicity test conditions. During the summer of 2024, sediments were collected in the Conasauga River at 13 sites representing a gradient of expected municipal and agricultural contamination and varying land use practices. Sediment exposures were performed on juvenile mussels (average start length %1.5 mm) at the University of Georgia's Aquatic Biology and Ecotoxicology Lab. Average survival across all sites and the control was 96% for a 28-day duration. Average percent change in length was +72%. Average percent change in weight was +435%. Using simple linear models we found that nitrogen and magnesium had a significant effect on the change in length and weight, and Total Organic Carbon had a significant effect on weight. We also deployed juvenile mussels in silos from May to September at the 13 study sites to assess responses to waterborne contaminants in situ. Mussel silos are concrete structures that allow for containment and retrieval of mussels in natural habitats. Average percent survival was 92% for a five-month duration. Average percent change in length for this trial was +28%. Using simple linear models with a quadratic term on chlorophyll we found that the interaction between chlorophyll and temperature had a significant effect on the change in length and that chlorophyll had a non-linear effect. This study can inform reintroduction and conservation efforts for freshwater mussels in the Conasauga River. Additionally, data collected will further our understanding of the role sediment and waterborne contaminants play in the decline of freshwater mussels.

Exploring Species Richness in South Carolina's Low Country

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Aquatic Invasive Species (AIS) pose significant threats to biodiversity and ecological function in freshwater systems. There is little information known about the presence of AIS in South Carolina's low country streams, an area characterized diverse aquatic habitats that are increasingly threatened by anthropogenic impacts and climate change. This study aims to understand the presence and distribution of invasive crayfish and fishes within the Santee and Cooper watersheds. We conducted repeat sampling at 45 sites in the Francis Marion National Forest as well as its surrounding urban area on three separate occasions, utilizing traditional sampling techniques and collecting environmental DNA (eDNA). Our traditional method, electrofishing, provided data on observable AIS populations, while the eDNA analysis will offer us a more sensitive approach to detect any cryptic or low abundance populations. Target species included invasive Red Swamp Crayfish (*Procambarus clarkii*) and green sunfish (*Lepomis cyanellus*). While Red Swamp Crayfish was an important target species, we did not physically capture one at any of our sampling sites. Preliminary results indicate a strong correlation between AIS presence and anthropogenic factors, such as urbanization and channelization. Our electrofishing data yielded that AIS was only found at our urban sites and there were no physical detections at any of sites on US Forest Service land. We are still waiting on the results from our eDNA analysis, but we are hoping that those results will enhance our detection accuracy. This research contributes critical insights into AIS presence

in South Carolina's low country, emphasizing the need for proactive management and early detection strategies.

Migratory Dynamics of Adult Atlantic Sturgeon in the Cape Fear River

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Aaron Bunch, The Nature Conservancy
Troy Farmer, Clemson University
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The Atlantic sturgeon, *Acipenser oxyrinchus oxyrinchus*, is endangered throughout much of its geographic range due primarily to historic overfishing and impediments to migration. The Cape Fear River in southeastern North Carolina previously supported a commercial fishery but the current status of the population is unknown and migration timing and pathways used by adult sturgeon in this system have not been described. Beginning in 2021, targeted sampling for adults (>1300 mm FL) in the hypothesized spawning area (<3km below the first dam) was conducted each spring and fall. Acoustic tagging (Innovasea model V16) was used to monitor the timing and pathways of riverine entrance/exit, duration of riverine residency, repeat migratory behavior, and oceanic movements. The spring (Mar/Apr) spawning period produced thirty-two (32) adult Atlantic sturgeon that were captured in the Cape Fear River (2021: n = 5, all males, 1620 – 1820 mm FL; 2022: n = 9, 6 males, 1 female, 2 unknown, 1480 – 1940 mm FL; 2023: n = 5, all males, 1680 – 1970 mm FL; 2024: n = 13, 10 males, 3 unknown, 1450 – 2020 mm FL), and two captures occurred during fall (Sep/Oct) sampling (2022: 1435 mm FL, male; 2024: 1556 mm FL). Temporal patterns of detection in the lower river indicated entrance in Feb/Mar and directed upriver movements toward the hypothesized spawning area throughout March. The duration of residency in the region <3km below the lock and dam varied from 1-2 up to several weeks, with riverine emigration occurring between late April and early May each year. Three of the five adult males tagged in 2021 returned in the spring of both 2022 and 2023, and the single female tagged in 2022 also returned in spring 2023. Oceanic detections of adult Atlantic sturgeon tagged in the Cape Fear River, NC have been reported from as far as Long Island, NY and Winyah Bay, SC with many detections occurring between Onslow Bay, NC and Sandbridge, VA. Knowledge of adult migration timing and pathways can inform conservation plans to protect specific habitats and restrict activities that can negatively impact fish during vulnerable periods.

Finally Fishing for a Living: Results of the Roanoke River Striped Bass Catch-and-Release Mortality Study

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The Albemarle-Roanoke Striped Bass population is currently overfished from years of high fishing mortality and low recruitment. Despite reductions in season length and creel limits for recreational harvest, catch-and-release fishing continues to influence mortality of Striped Bass in the Roanoke River. The objectives of this study were to estimate release mortality of Striped Bass caught with live bait and artificial lures and to update the mortality rate established during a similar study in 1996. During four,

weekly mortality trials, a control group was collected with electrofishing and two experimental groups were collected by angling with live bait and artificial lures. Local fishing guides provided fish caught with live bait, while NCWRC staff and volunteer anglers caught fish with artificial lures. All fish were tagged in the dorsal musculature with uniquely numbered Floy T-bar anchor tags and were temporarily held in live wells before being transferred to two 4.5 m^3 net pens on a pontoon boat anchored in the river. A total of 97 Striped Bass was collected during the 4-week study; 40 were collected with electrofishing, 36 with live bait, and 21 with artificial lures. Hooking location was recorded for 46 of the 57 fish caught by hook-and-line. Striped Bass mortality was monitored daily for three days following the initial capture. None of the 40 fish collected with electrofishing died. After removing one anomalous angling mortality, 8 of 56 (14%) Striped Bass died from catch-and-release angling. A higher percentage of fish caught with artificial lures (21%; 4 of 19) died than those caught with live bait (11%; 4 of 36). At least one mortality occurred each week, and all mortalities occurred within 24 hours of capture. Hooking location and degree of bleeding were important for Striped Bass mortality. Sample sizes for catch-and-release treatment groups in this study were relatively small. More data are needed to statistically model catch-and-release mortality for Striped Bass in the Roanoke River and to update catch-and-release mortality rates for future stock assessments.

Over the Waterfall: Phenotypic Plasticity in Four Stream Fishes across an Intermittent Waterfall

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Kyler Hecke, Arkansas Tech University

Waterfalls can act as natural barriers in streams, possibly limiting diversity between upstream and downstream communities, leading to limited gene flow between populations. This isolation may lead to increased morphological variation over time. The study of phenotypic plasticity is widespread; however, the Southeast is lacking in studies examining variation in relation to natural stream barriers like waterfalls. Dare Creek, an intermittent stream with a stepped-bedrock waterfall in the Upper Illinois Bayou Watershed in Arkansas, was studied to investigate phenotypic variation amongst 4 common stream species. The Highland Stoneroller *Campostoma spadiceum*, Creek Chub *Semotilus atromacula*tus, Redfin Darter *Etheostoma whipplei*, and the currently undescribed Plains Orangethroat Darter *E. sp. cf. pulchellum* I/II were chosen to represent commonly occurring species in this watershed as well as different habitat preferences. Thirty individuals of each species were collected above and below (60 total) via electrofishing during July-August (2024). Individuals were preserved in formalin and photographed under standardized conditions. Using tpsDig, landmarks were digitized based on review of prior studies and tpsUtil was used to “unbend” specimens with those landmarks omitted prior to analyses. Using the geomorph package in R, General Procrustes Analyses (GPA) were conducted to remove non-shape variation followed by Principal Component Analyses (PCA). All four species exhibited higher morphological variation in the downstream reach compared to upstream. PCAs for each species were reduced to the first five PCs, which explained shape variation within a range of 75-81% across species. Location of fin insertion had the highest level of variation across all four species. Understanding how natural barriers influence fish morphology can provide insight into the role phenotypic plasticity plays in these intermittent stream systems.

Restoring a Population in Decline: Successes and Challenges of Southern Walleye Management

Christopher E. McKee, Alabama Department of Conservation and Natural Resources

The Mobile Basin is home to a genetically unique clade of Walleye (*Sander vitreus*), known as Southern Walleye. Southern Walleye were historically uncommon across six river drainages in Alabama, but records indicate higher catch rates and a more widespread distribution than those observed today. In Alabama, Southern Walleye are split into two genetic clades: the Alabama River and Tombigbee River clades. These clades are managed as separate units and genetics are not mixed among the drainages. By 2005, only one self-sustaining population of pure Southern Walleye was known. In response to this decline, the Alabama Division of Wildlife and Freshwater Fisheries (ADWFF) implemented a management plan in 2005 to restore these populations. Key objectives include collecting broodstock, establishing broodstock repositories, and developing stocking protocols. Efforts to create broodstock repositories for Alabama River fish have been unsuccessful, but three broodstock repositories were successfully established for Tombigbee fish. Between 2016 and 2022, Walleye fingerlings were also stocked into four free-flowing streams in the Tombigbee drainage. Recent sampling and angler reports have confirmed the presence of adult Walleye at each of these locations with evidence of natural recruitments at two locations in 2023. This presentation will provide an updated overview of Southern Walleye in Alabama, detailing management actions undertaken to restore populations, recent stocking outcomes, and surveys to locate relic populations.

Monitoring Cobia Population Recovery Using eDNA

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Matthew J. Walker, South Carolina Department of Natural Resources
Tanya Darden, South Carolina Department of Natural Resources
Aaron Watson, South Carolina Department of Natural Resources
Jason Broach, South Carolina Department of Natural Resources
Lenny Yong, South Carolina Department of Natural Resources
Rich Harrington, South Carolina Department of Natural Resources

Until recently, cobia fishing activity soared from late April through early June in the southern estuaries of South Carolina where a genetically distinct population segment aggregates for spawning in the Port Royal Sound estuary. This inshore migration exposes the distinct population segment to high fishing mortality due to their relative ease of access. Cobia's subsequent population decline resulted in regulatory protection of the spawning aggregation during May, and SCDNR developed guidelines for responsible restoration stocking to increase the speed of population recovery. As cobia are not susceptible to fishery-independent sampling gear and the conservation-minded fishing community in the PRS area are not routinely fishing on the inshore population, our access to DPS data and samples for biological assessment has significantly reduced after regulatory changes. An effective eDNA tool for cobia will provide a standardized methodology to assess the relative abundance of cobia, independent of fisheries collections in the inshore PRS area. We have successfully optimized an eDNA tool for cobia and conducted three years of spawning season surveys to increase our monitoring capabilities. Our field sampling is conducted during slack tides during the spawning season at three standardized stations in the Broad River using our standardized eDNA field sampling protocol. Optimization began in 2020 and our standardized protocol was implemented and has adapted from 2022-2024. We present results from our eDNA survey, showing patterns of cobia eDNA abundance in samples taken from PRS during spawning season.

Contextualizing Dam Removal, Aquatic Connectivity and Stream Restoration Projects Post-Helene

Jacob McLean, Wildlands Engineering

This presentation will discuss several restoration and aquatic passage projects from Western NC that experienced impacts from Hurricane Helene. Projects include dam removal, aquatic organism passage and stream restoration project types, and were at various phases of design, construction and post-construction. The presentation will explore the impacts of Helene on these projects, and discuss how impacts are being managed and how observations are being contextualized for current and future project work. The discussion will include design, repair and monitoring considerations as well as information that could be used to support advocacy for riverine connectivity and habitat restoration projects from a flood mitigation perspective. Flood reduction and other flood mitigation derived from these project types could be considered as a contributing rationale for justifying future projects of these types as nature based solutions to flooding. Methods of evaluation will be reviewed to help attendees understand potential scoping options to evaluate flood mitigation benefits at concept and detailed design project stages.

Overcoming Challenges Faced by Private Sector Fisheries Managers

Tyler W. Meighan, SOLitude Lake Management
Aaron Cushing, 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.

Impact and Introgression of Invasive Alabama Bass on Native Tennessee Black Bass

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Mark W. Rogers, Tennessee Cooperative Fishery Research Unit
Carla R. Hurt, Tennessee Technological University
Nathan V. Whelan, United States Fish and Wildlife Service Southeast Conservation Genetics Laboratory

Black bass *Micropterus* spp. are the most targeted gamefish species in the state of Tennessee. Alabama Bass *Micropterus henshalli* have been introduced into watersheds throughout the state, and are believed to be negatively impacting populations of native black bass. In particular, concern in Tennessee centers on native Smallmouth Bass *M. dolomieu* fisheries, as Smallmouth Bass are the official state fish and the world record Smallmouth Bass was caught in Dale Hollow Reservoir, TN. Alabama Bass and Smallmouth Bass readily hybridize, and, in surrounding states, reservoir Smallmouth Bass populations have been reduced or even extirpated following the introduction of Alabama Bass. Since 2017, the Tennessee Wildlife Resources Agency has collected fin clips from 3,000 non-largemouth black bass from 34 waterbodies across the state of Tennessee. Prior to 2023, samples were processed by Auburn University; as of 2023, samples are being extracted and sequenced at Tennessee Tech University. Both universities have used the same panel of 64 single-nucleotide polymerases to assess percentages of

genetic contribution to an individual by species, although differences in sequencing and bioinformatics methodology exist. Tennessee Tech has corroborated the effectiveness of the updated methodology by re-running a subset of samples processed at Auburn and verifying the results from both universities match. Sampling will continue until 2026. To help inform and guide management actions relating to black bass introgression in Tennessee, we aim to 1) assess the current state of introgression in reservoir black bass populations, 2) evaluate whether introgression between Smallmouth Bass and Alabama Bass is occurring in rivers in Tennessee and, if so, which factors may influence the levels of successful introgression, and 3) predict future range expansion potential for Alabama Bass and hybrid Alabama Bass X Smallmouth Bass across the United States using ecological niche modelling. We believe that the results of this study will assist managers in the state of Tennessee with targeting potential efforts to control Alabama Bass population growth and spread, as well as provide managers across the country with the tools necessary to understand and address invasive black bass in the future.

Brown Trout Population Characteristics and Dynamics in the Greers Ferry Tailwater, Arkansas

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In recent years, public concern has increased regarding survival and growth of Brown Trout *Salmo trutta* in the Little Red River, Arkansas. The Greers Ferry Tailwater has supported previous world record Brown Trout, and the notoriety has made it an economically valuable fishery to the state of Arkansas. We conducted a mark-recapture study to quantify survival and growth of Brown Trout in the Greers Ferry Tailwater. Boat mounted electrofishing samples were conducted over 13 seasonal sampling events from 2019-2022 to PIT tag and collect growth data from Brown Trout. Cormack Jolly-Seber modeling was used with mark-recapture data to quantify apparent survival rates of the population. Growth metrics were quantified using Faben's method and the Wang modification. During the study, 5,570 Brown Trout were tagged which resulted in 1,429 fish recaptured at least once. Seasonal apparent survival estimates from Cormack Jolly-Seber modeling ranged from 0.888 during fall to 1.000 during summer. Fall survival was significantly lower than other seasons. The von Bertalanffy growth coefficient, k ranged from 0.067 to 0.405 depending upon the model. Incremental growth for fish between 300 and 500 mm TL at capture averaged less than 25 mm/year. Creel data from the tailwater shows 97% of Brown Trout caught are released. The unique combination of high survival and slow growth presents a challenge to managers due to public desire for larger fish combined with an unwillingness to harvest smaller Brown Trout.

Seasonal Variation in Invasive Suckermouth Armored Catfish Distributions and Habitat Use: An Integrated Approach with Implications for Broad-Scale Population Control.

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Monica McGarrity, Texas Parks and Wildlife Department
Matthew Troia, The University of Texas at San Antonio

Introductions of suckermouth armored catfish (SAC) via the aquarium trade have led to established populations in springfed waterbodies of the southern US, where they threaten native ecosystems. Management strategies rely on identifying factors driving nonnative SAC distributions and habitat use at

multiple scales. Our objectives were to identify seasonal habitat relationships with SAC occurrence and site abundance and determine if spatial aggregations were associated with water temperature. We used snorkel surveys to count SAC at thalweg and margin transects (sites) in San Felipe Creek, TX (Val Verde County) various distances from thermal refugia in all four seasons. At each site, we measured instream habitat characteristics to characterize environmental variation among sites and across seasons. We used an integrated model to estimate occurrence and abundance while accounting for variable spatiotemporal detection. Species detection probability was consistently high (>0.9) across sites and seasons. Conversely, individual capture probability associated with abundance was highly variable despite clear water. The proportion of sites occupied by SAC was lower in spring (~0.65) compared to other seasons (~0.95), with a shift to almost exclusively margin habitat. Aggregations were more related to margin characteristics than longitudinal position or water temperature, though higher abundance was associated with warmer winter temperatures. There were also seasonal shifts in abundance associated with channel position and instream habitat interactions (e.g., increased autumn thalweg abundance with higher velocity and larger substrate). Our study reveals finer-scale SAC habitat associations and indicates that optimal locations for removal may vary seasonally and shows that sampling should account for variable SAC detection for unbiased abundance estimates. This information will also be incorporated into a broader integrated model for population-control decisions.

Regional Variation in Mercury Among Brazos River Alligator Gar (*Atractosteus spatula*)

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We compared mercury (Hg) and stable isotopic ratios of nitrogen (δ15N) in a long-lived apex predator, Alligator Gar (*Atractosteus spatula*), from a coastal region of the Brazos River to an inland population to explore Hg accumulation in a long-lived apex predator. We used generalized linear models (GLMs) to examine the effects of fish size (length, mm) and region (inland versus coastal) on Hg concentration and δ15N. Length had a significant positive effect on both Hg and δ15N. However, after accounting for the effect of length, both Hg and δ15N were significantly higher in the inland population (N=48; mean ± SE = 0.232 ± 0.020 mg/kg ww and 18.8 ± 0.184 ‰, respectively) than the coastal population (N=45; mean ± SE = 0.143 ± 0.012 mg/kg ww and 16.72 ± 0.291 ‰, respectively). We further estimated probabilities of Alligator Gar exceeding Hg consumption advisory guidelines used by the World Health Organization (WHO) and the United States Environmental Protection Agency (USEPA). WHO and USEPA exceedance probabilities were 0.048 for coastal, and 0.276 for Inland populations, respectively. However, USEPA exceedance probability estimates for fish ≥ 2000 mm climbed to 0.747 and 0.146 for Coastal and ≥ 0.999 and 0.559 for inland populations, respectively. These results suggest that variation in food web dynamics, and resultant impacts from biomagnification are important drivers of Hg uptake in Alligator Gar, and Alligator Gar often exceed consumption advisory Hg concentrations, particularly in the largest individuals. Our results also suggest Alligator Gar likely experience some level of reproductive toxicity because of sublethal Hg exposures. We observed that 36% (34/93) of Alligator Gar in our study exceeded 0.2 mg/kg, a threshold level associated with reproductive impairment, with inland region Alligator Gar representing a higher percentage of individuals over this threshold compared to the coastal population (57%, 26/45 versus 17%, 8/48).

Restoring Lost Diversity: A Comprehensive Approach to Mussel Fauna Reintroduction in Abrams Creek, Great Smoky Mountains National Park

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Gus Engman, University of Tennessee
Gerry Dinkins, University of Tennessee
Matt Kulp, National Park Service

Abrams Creek, a unique limestone stream in the Great Smoky Mountains National Park, experienced significant ecological disruption following a chemical reclamation in 1957 and the subsequent impoundment of the Little Tennessee River with the Chilhowee Dam. Despite this historical disturbance, recent restoration of fish populations has created an opportunity for mussel community recovery. Understanding the long-term effects of disrupting aquatic connectivity between populations and habitat is critical to managing these disjointed populations and maintaining genetic health in these populations. In lieu of connectivity being restored- this study aims to both improve management practices in this stream to make resident populations more resilient, and to expand the mussel diversity present in Abrams Creek to include extirpated former resident species. This is being accomplished through three key objectives: (1) time search surveys have been conducted along the entirety of Abrams Creek to fully characterize the mussel community present, (2) potential candidate species have been identified using archaeological data, historical surveys, and comparative analyses with similar nearby streams, and (3) two of these species are being evaluated through an in situ experiment to test the viability of both reintroduction methodology and release location. By comparing multiple restoration techniques and leveraging the creek's restored fish host populations, this research will provide critical insights for managing biologists seeking to restore mussel populations in Abrams Creek and potentially inform restoration strategies in similar ecosystems.

Introgressive Speciation and Sympatry of Pirate Perches in the Southeastern United States

Tyler A. Muller, North Carolina State University
Lily C. Hughes, North Carolina State University and NC Museum of Natural Sciences

Pirate Perches have recently been recognized as five species and exhibit widespread sympatry in the Southeastern United States with no evidence of gene flow. Further genomic analyses raises questions in a clade of three species of Gulf origin. Here we re-evaluate relationships between three species using fossil calibrations, geologic data, allele frequency and reticulation models. Our data suggests early to mid-Pleistocene introgression between *A. gibbosus* and *A. mesotrema* gave rise to contemporary sympatric sister species, *A. retrodorsalis*.

Independent Testing of Pit Tags: Advancing Biotelemetry Standards for Fisheries and Wildlife Management

Joshua G. Murauskas, Coosa FWI
Brian Beckley, Voda IQ

Passive Integrated Transponder (PIT) tags are a cornerstone of fisheries and wildlife biotelemetry, enabling precise tracking of species critical for conservation and management. This study presents a rigorous evaluation of Voda IQ's four new PIT tag models (12 mm, 10 mm, 9 mm, and 8 mm) using

standardized testing protocols to assess performance under diverse environmental conditions, including high turbulence, electromagnetic interference, and complex hydrodynamic environments. We evaluated physical dimensions, read range, electrical properties, and durability, highlighting tradeoffs between tag size and detection efficiency. Smaller tags minimize intrusion and are ideal for tagging smaller or more delicate species, while larger models excel in detection range and performance in challenging environments such as dynamic flow fields or areas with substantial metal infrastructure. These findings emphasize the importance of selecting the appropriate tag to balance species needs with study objectives. By adhering to regionally-applied standards and conducting independent evaluations, this research fosters transparency, builds stakeholder confidence, and provides a framework for integrating innovative PIT technologies into fisheries management and conservation. This presentation will offer actionable insights for optimizing PIT tag selection and deployment strategies in the Southeast, advancing the use of biotelemetry in ecological research, and enhancing conservation outcomes.

Movement Patterns and Environmental Factors Influencing White Bass Spawning Migrations from a North Carolina Reservoir

Seth A. Mycko, North Carolina Wildlife Resources Commission
Kelsey Roberts, North Carolina Wildlife Resources Commission

White Bass have been widely introduced throughout the United States. Within North Carolina, the species has been present since at least the 1950s. This species has since become a recreationally valuable sport fish within the state. The annual spring migration from Falls of the Neuse Reservoir to upper, riverine, habitats has become a prevalent time for both anglers and fishery managers to capture white bass. Little is currently known about the exact dynamics and timing of these potamodromous movements. Thus, 80 individuals were implanted with hydroacoustic tags whereafter 61 individuals were successfully monitored during at least two consecutive spawning seasons. Springtime parking lot use and casual conversations with local anglers led to the selection of two potential spawning sites within each river upstream. Then, beginning in 2020, biologists with the NC Wildlife Resources Commission began tracking the Springtime movements of the species. Arrival timing, sex ratios, and duration at presumed spawning sites was monitored each year for three consecutive Spring seasons. Males accounted for 80% of the fish tagged. Females were principally rare during tagging and were much rarer than males at most spawning sites during all annual spawning events. Water temperature and instream flow was plotted against spawning site activity. Statistical tests were not completed using these data, however, instream flow anecdotally appears to have a stronger impact than temperature especially for the lower gradients of the Flat River.

Seasonal Movements of Yellow and Silver American Eels Within the Pensacola Bay Complex

Chelsea E. Myles-Mcburney, Florida Fish and Wildlife Conservation Commission
Kallie Thornhill, Florida Fish and Wildlife Conservation Commission

The American Eel (*Anguilla rostrata*) is a facultatively catadromous species that occurs from Greenland to Venezuela and comprises a single panmictic population that exhibits random mating across its range. American Eels have a complex life history and undergo several morphological and physiological stages. Life history information on all life stages and habitat requirements of American Eels is limited, particularly for South Atlantic and Gulf of Mexico populations. In the 2017 American Eel Stock Assessment, the Atlantic States Marine Fisheries Commission cited a need for tagging studies of eels at different life stages to address habitat use, movement, migration, and behavior. Furthermore, little

information exists on seasonal movements and out-migration information of yellow and silver eels in Gulf Coast rivers. Therefore, this project will provide important information on movement patterns for American Eel populations within the Pensacola Bay complex by 1) examining movement patterns of yellow American Eels within the Escambia and Yellow Rivers; 2) examining if seasonal upstream and downstream movements are associated with environmental cues (i.e., stream flow, water temp, lunar phase); and 3) determining timing of outward migration of mature (silver) eels within the Pensacola Bay complex. Seventeen American Eels were collected between 13 October 2023 and 26 November 2024 and surgically implanted with acoustic transmitters (V9). This presentation will be focusing on preliminary analyses of American Eel movements within the Pensacola Bay Complex and potential patterns associated with high-flow events and lunar phases.

Water Weeds: A New Resource for Aquatic Plant Management

J. Wesley Neal, Mississippi State University
Gray Turnage, Mississippi State University
Dennis Riecke, Mississippi Department of Wildlife, Fisheries & Parks

Plants fulfill many natural functions and are vital in aquatic and wetland environments. They provide food, shelter, and reproductive habitat for fish and other aquatic and terrestrial species and help regulate water quality and produce oxygen. However, they can become overabundant and cause water quality issues and interfere with human use, ecosystem dynamics, and fish management. The Extension Service of Mississippi State University, with support and funding from the Aquatic Nuisance Species Program of the U.S. Fish and Wildlife Service and the Mississippi Department of Environmental Quality, has produced a new aquatic plant management platform that differs from similar platforms. First, it does not label all plants as inherently bad and in need of control. In addition to control options, the new resources indicate which species can be used for habitat and aesthetic enhancements with proper management. Also, the resources only recommend herbicides that have demonstrated the best control in peer-reviewed literature, real-world applications, and agency and third-party studies. Finally, herbicide recommendations have been simplified and scaled down for small-volume application. In most cases, the recommended quantity of herbicide is presented in a per gallon of water mixture (for foliar applications) or per acre-foot of water (for injection) basis. The resources include waterproof field guides and a new website (www.extension.msstate.edu/water-weeds) with individual printable factsheets for each plant species or group. These resources were designed for Mississippi application, but will be useful to managers anywhere these plant species are found.

Using Modified Creel Survey Methods to Estimate Angler Dynamics at Lake Okeechobee, FL

Daniel Nelson, Florida Fish and Wildlife Conservation Commission
Brandon Thompson, Florida Fish and Wildlife Conservation Commission

Lake Okeechobee is the largest lake in Florida at over 460,000 acres and one of the most economically important fisheries. The vast size and numerous access points at Lake Okeechobee limits feasibility of conducting traditional creel surveys. Therefore, fisheries managers have run a partial lake roving creel survey for over 40 years that included several fixed sections that comprised less than 15% of the lake area. Surveyed areas historically included a relatively high portion of the total effort. However, as water levels and quality of habitat changed over time, biologists have been concerned that fixed areas sampled may not accurately represent trends in angler effort and catch. There was a need to design a

creel that represented the entire lake and therefore, we developed an innovative creel design beginning in October 2022 that utilizes a combination of trailer counts, angler interviews at primary boat ramps and on-the-water interviews. Managers were also interested in estimating Florida Bass abundance for the lake as the regulation schedule for the lake will be changing. Biologists initiated a high reward tagging study in January 2023. With estimates of total angler catch of bass from the new creel design in combination with estimates of the proportion of all bass caught from the tagging study, we can estimate the bass abundance prior to regulation schedule changes. Using this technique of annual whole-lake creels with periodic tagging (e.g., every five years) can help detect changes in the bass population over time. We will present results from the first two years of these surveys and data will improve managers' ability to make informed decisions at Lake Okeechobee.

Recruitment Patterns of Larval Fishes: Influence of Tributaries and Temporal Variation in the Lower Ogeechee River Basin, GA

Bridgette R. Nicolosi, Georgia Southern University
Steve Vives, Georgia Southern University
James Roberts, Georgia Southern University

Environmental variability plays a critical role in shaping larval fish assemblages influencing habitat use in riverine ecosystems. Despite the importance to recruitment, the mechanisms driving larval distributions in southeastern coastal plain streams remain poorly understood. These systems are characterized by low-gradient channels, periodic flooding, and the presence of refugia habitats, including backwater sloughs and inundated floodplains. We investigated how environmental variation between mainstem and tributary influences larval fish assemblages in Georgia's Ogeechee River Basin. This study represents the largest larval fish survey conducted in the lower Ogeechee River to date, with nearly 9,000 larval fish collected from May to September 2024. Four paired sites, each consisting of one mainstem and one tributary location were sampled biweekly using light traps. Results indicate differences in family composition between mainstem and tributary sites, with Centrarchidae comprising a larger proportion in tributaries, while Leuciscidae and Atherinopsidae were more abundant in mainstem sites. These findings suggest differing habitat preferences and ecological roles between stream types. Temporal trends further delineated seasonal spawning patterns, with larval centrarchids peaking in tributaries during June and July, and larval atherinopsids peaking in mainstem sites from late June to mid-July. Observed declines in larval fishes after August indicate seasonal shifts in spawning activity. Our findings suggest that larval fish assemblages in the Ogeechee River Basin are related to habitat-specific dynamics, temporal variability, and differences in stream type, with tributaries functioning as essential drainage basin features that enhance resiliency by providing refugia and nursery habitats, which support larval survival and contribute to basin-wide recruitment. As we continue to analyze our data, we aim to address how these habitats function as sources or sinks for recruitment across the lower basin and how environmental gradients influence the spatial distribution of larval fish populations.

Patterns of Larval Fish Assemblage Structure Across a Regulated River

Madison Niles, Clemson University
Luke Bower, USGS, South Carolina Cooperative Fish & Wildlife Research Unit

In the southeastern United States, most rivers are impounded by at least one dam, significantly impacting freshwater fish biodiversity and assemblage patterns. While numerous studies have examined the effects of dams on adult fish, there is a critical knowledge gap regarding how these structures and

their associated environmental changes affect their most vulnerable life stage. Larval fish are particularly sensitive to flow regime alterations, unnatural temperature gradients, habitat fragmentation, and environmental homogenization caused by dams. This study aims to: (1) compare spatial patterns of larval fish assemblage structure across a highly regulated river system and assess how proximity to river impoundments influences these patterns, and (2) identify key environmental variables driving larval fish distribution and assemblage structure. Specifically, we will use the River Continuum Concept, the Serial Discontinuity Concept, and the Network Dynamics Hypothesis frameworks to examine the observed spatial patterns in larval fish metacommunies. Bimonthly sampling was conducted in the highly regulated Broad River, South Carolina, from March to mid-July in 2024 using ichthyoplankton nets and light traps. The results of this study provide valuable insights into periods of heightened vulnerability for larval fish, particularly in response to environmental disturbances such as dam releases. These findings can inform future management strategies and contribute to the conservation of at-risk fish populations and species of concern.

Comparative Assessment of Three Gear Types for Larval Fish Collection

Madison Niles, Clemson University
Charles Jackson, Clemson University,
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Understanding the early life stages of fishes is essential for effective conservation and management, as these critical and vulnerable stages significantly influence survival and recruitment. Accurate assessment of early life history traits and patterns requires efficient sampling methods tailored to the unique challenges of capturing larval fishes. Sampling gear often differs in efficiency depending on habitat type, environmental conditions, and species-specific traits such as size, life history strategies, developmental stages, and sensory biases. In this study, we compared the effectiveness of three passive sampling methods—ichthyoplankton bongo nets, benthic sleds, and light traps—for collecting freshwater larval fishes in a regulated temperate river. Sampling devices were deployed across diverse river habitats, with environmental variables recorded at each deployment site. Collected larvae were identified to the lowest possible taxonomic level. The objectives of this study are to: 1) Identify which gear type captures the greatest richness, abundance, and diversity of larval fishes. 2) Assess whether habitat type influences the effectiveness of each sampling gear in a regulated river. 3) Investigate the relationship between environmental variables and gear performance in larval fish collection. These findings aim to inform best practices for larval fish sampling in regulated river systems, enhancing data quality for conservation and management efforts.

Shortnose Sturgeon Leaving Home: New Insights into Partial Migration

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Shortnose Sturgeon (*Acipenser brevirostrum*) is an amphidromous species broadly distributed among the Atlantic coast rivers of North America. Throughout its range, the species has undergone drastic

population declines and regional extirpations, resulting in its listing as federally endangered. Shortnose Sturgeon populations are currently managed as individual rivers; however, genetic analyses suggest that river population connectivity exists due to regional genetic relatedness. Furthermore, acoustic telemetry has demonstrated the connectedness of Shortnose Sturgeon populations in geographically proximate rivers in the Gulf of Maine. Despite genetic relatedness and a plethora of anecdotal evidence of inter-river migration, the movement of Shortnose Sturgeon among rivers in the southeastern United States is largely unstudied. From 2010-2013, over 100 adult Shortnose Sturgeon were tagged with V13 acoustic transmitters (~5 year battery life) for various studies on spawning behavior and riverine habitat use in eight rivers in Georgia, South Carolina, and North Carolina. Detections from data sharing networks revealed that a subset of telemetered individuals were detected – often repeatedly – in rivers other than where they were tagged. In our post hoc analysis of these data, multiple sampled populations contained both resident and migrant fish, including highly mobile individuals that were detected in up to six different river systems within the migration event. Moreover, multiple telemetered fish traveled >425 km along the coast, surpassing the longest previously documented coastal migration for the species (estimated ~250 km). These results indicate that southeastern Shortnose Sturgeon populations exhibit partial migration, and that further delineation of the prevalence and behavior of migratory contingents is crucial for updated species management and ecological descriptions.

Evaluating The Effects of Dams on A Riverine Food Web in Alabama, USA

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Dams are a common feature of the landscape across most of the globe, providing a suite of benefits to humans, including but not limited to water supply, flood control, hydroelectric power, navigation, and recreational opportunity. However, they come at the cost of broad ecological effects such as reduced connectivity, altered flow regimes, and overall reductions in biodiversity. On a finer scale, the presence of a dam changes habitat attributes such as temperature, bottom composition, and nutrient availability in adjacent areas. Here we are assessing and quantifying whether the presence of a dam alters trophic dynamics and relative trophic positioning of five widespread fish species: threadfin shad (*Dorosoma petenense*), smallmouth buffalo (*Ictiobus bubalus*), freshwater drum (*Aplodinotus grunniens*), Alabama bass (*Micropterus henshalli*), and American paddlefish (*Polyodon spathula*). To do so, we have chosen sites directly upstream and downstream of three contiguous dams on the Alabama River. At each location, we are seasonally quantifying stable isotopes (δ13C, δ15N) of fish tissue (for all five species), sediment, and plankton to characterize and compare local trophic dynamics. Sediment collected from sites upstream of dams were significantly higher in organic carbon and total carbon, whereas total nitrogen did not differ between upstream versus downstream sites. Similar comparisons are being made for plankton and fish tissue samples, making this a unique lotic multi-trophic level comparison.

Brook Trout in a Virginia Stream Appear Resilient to Brown Trout Colonization

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Brook Trout have declined partially because of introduction of nonnative salmonids. Brook Trout biomass and relative weight in the Conway River, Virginia, were evaluated for 29 years using regression to discern trends potentially associated with Brown Trout colonization. The Rapidan River is adjacent to the Conway River, has only Brook Trout and served as a reference stream. Brook Trout biomass in the Conway River varied from 21.8 to 89.5 kg ha-1 and displayed a non-significant, increasing linear trend (r^2 = 0.17; P = 0.11) peaking in 2023. Concurrently, Brown Trout biomass varied from 5.5 to 59.9 kg ha^{-1} increasing to a peak in 2016 before declining to a near low in 2023. This relationship was best described by a nonlinear, peaking model (r^2 = 0.71; P = 0.0004). Total salmonid biomass increased linearly (r^2 = 0.56; P = 0.001) suggesting Brown Trout were additive and did not replace Brook Trout. Brown Trout composed <25% of salmonid biomass in the Conway River from 1995 to 2003, increasing to 40-55% from 2008 to 2019 before declining to 14% in 2023. Brook Trout biomass in the Rapidan River was approximately double that of the Conway River, but a similar non-significant increasing linear trend was observed (r^2 = 0.01; P = 0.76). Mean relative weight of Brook Trout was stable in the Rapidan River but declined in the Conway River (r^2 = 0.32; P = 0.04), likely from density-dependent factors, as relative weights for both were lowest the year biomass was highest. Flow extremes occurred during later years of the study which likely impacted recruitment and may have suppressed Brown Trout. Brook Trout populations in relatively pristine, headwater streams in the central Appalachians may be resistant to competitive pressures from Brown Trout colonization. Resource management agencies in such cases may wish to forgo intensive eradication efforts of Brown Trout in lieu of Brook Trout habitat protection (e.g., culvert retrofits to avoid fragmentation).

Longitudinal Fish Assemblage Changes Past the Managed Coldwater Sport Fishery on the Little Red River

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The AGFC Trout Program manages the Greers Ferry Tailwater trout fishery from the dam 48 km to the Monoghan-Womack Access (MWA). Coldwater habitat capable of supporting trout extends further downstream. The system eventually shifts to a warmwater stream. Understanding the transition will offer management alternatives and provide knowledge of how coldwater species interact with warmwater species in transition zones. Ten 30-min night electrofishing samples were conducted each season from December 2023 to October 2024 in a 30-km reach below the MWA to the Riverside Park Access (RPA). At the MWA, about 46% of individuals were coldwater species, 12% were coolwater species, and 42% were warmwater species. At 16.5 km downstream of the MWA, 5% were coldwater species, 17% were coolwater species, and 78% were warmwater species. At the RPA, 0% were coldwater species, 3% were coolwater species, and 97% were warmwater species. Most coolwater fishes sampled were darter species. Most warmwater fishes sampled were sucker species. The proportion of coldwater species declined relative to distance below the MWA. The last coldwater species collected occurred 22.5 km below the MWA but this was the only coldwater species caught more than 16.5 km below the MWA. Coldwater fishes were confined to pool/shoal habitat and did not occupy pool-only habitat. These results suggest the extent of the coldwater sport fishery is constrained by habitat type more so than temperature.

Carolina Conundrum - Conserving the Carolina Madtom in North Carolina

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The Carolina Madtom (*Noturus furiosus*) is a small catfish endemic to the Tar and Neuse River basins in North Carolina. Decades of impacts such as damming, water quality reduction, siltation, and the introduction of the invasive, piscivorous Flathead Catfish (*Pylodictis olivaris*) have led to population declines of this species. Key populations in the Neuse River basin are likely extirpated and greatly reduced in the Tar River basin. Currently, the North Carolina Wildlife Resources Commission (NCWRC) is devoting considerable effort into the conservation and recovery of this species, which was listed as federally endangered in 2021. The NCWRC, in conjunction with partners from Conservation Fisheries Inc., North Carolina State University, and the United States Fish and Wildlife Service are focused on population monitoring and propagation of individuals for release to conserve the species. Future conservation efforts are being developed and include augmentations and reintroductions with propagated individuals, development of parentage-based tagging, and eDNA primer development.

Potential Quick Method to Predict Body Composition in Fish Using Dual-Energy X-Ray

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Fisheries scientists use a broad range of morphological, biochemical and physiological metrics to determine the health and nutritional condition of fishes. Many of these currently used methods are very invasive and require the animal to be sacrificed. We compared dual-energy X-ray absorptiometry (DXA) measurements of fat, lean, bone mineral, and total tissue mass were compared with chemical analysis for fat, water, protein, total ash, and scale weight for five species of fish White Perch, Channel Catfish, Butterfish, Boston Mackerel, and Tilapia). The DXA measurement of the percentage of fat in was highly correlated (R^2=0.71) to the chemical measurements, but these patterns differed among species. The total percent fat estimated by DXA was significantly lower than the chemical analysis estimates for Boston Mackerel and Butterfish. However, for Channel Catfish, Tilapia, and White Perch, the total percentage fat estimated by DXA was significantly higher than the chemical analysis estimates. Although on average DXA compared very well to chemical analysis, individual errors were much greater. Individual errors in the lean tissue and fat tissue components were strongly correlated with the fat content of skeletal muscle and the lean content of mesenteric fat. These results indicate that DXA could be a valuable research tool for measuring the composition of fishes.

Characterization of Urban Recreational Fisherman in Birmingham Alabama.

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Urbanization is increasing worldwide, which may present challenges to fisheries management. Recreation managers are interested in understanding whether and how participation and avidity differ among demographic groups. To manage these fisheries, we need a better understanding of the human

dimensions of angler groups that participate in these fisheries. In this study, we characterized demographics and socioeconomic variables of anglers over 3 years at Lake Purdy, a public lake near Birmingham, Alabama. Males made up over 94% of the anglers surveyed. Caucasian (41%) and African Americans (52%) comprised most anglers surveyed. The average age of the angler was 48y, and >50% of all who were surveyed were 50+ years old. Anglers spent an average of just over 4 hours each time they fished at Lake Purdy, and Crappie and "Any Fish" were the most targeted species. Anglers who fished Lake Purdy spent an average of $72 on each fishing trip. Future fisheries management efforts will depend on the support of growing urban populations, and fisheries managers will need to consider the unique needs of these constituents strongly.

Surviving Helene: an Initial Assessment of How Some Fish and Mussel Populations Fared in Western North Carolina

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In late September 2024, Hurricane Helene combined with a predecessor rainfall event to produce up to 30 inches of rainfall in areas of western North Carolina in just four days. Catastrophic flooding in areas throughout the region resulted in lost homes, businesses, roads and over 100 fatalities. The excessive rainfall and wind also led to thousands of landslides, destroyed trees and riparian vegetation, and in some cases, caused streams to be completely re-routed. Although it will likely take years before the ecological consequences are better understood, fish biologists with the NC Wildlife Resources Commission in the western region of North Carolina were able to take an initial look at some of the hardest hit streams before temperatures dropped from changing seasons. We completed 19 semi-quantitative fish surveys and 5 qualitative mussel surveys in streams throughout the Nolichucky, French Broad, and Pigeon River Basins in October and November of 2024. Results from these surveys varied widely. Although there were several exceptions, the number of fish species encountered and overall fish densities were higher than expected at most of our survey sites. We plan to continue monitoring flooding impacts to fish, crayfish, and mussel populations throughout western North Carolina over the next several years.

Sheepshead (*Archosargus probatocephalus*) Movements Across Subsystems in The Mississippi Sound

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Sheepshead (*Archosargus probatocephalus*) are an estuarine dependent species inhabiting waters throughout the western Atlantic Ocean and Gulf of Mexico (GOM). Spawning occurs from late-February through April in the northern Gulf of Mexico with adults typically moving offshore to spawn and presumably returning inshore post-spawn. However, little is known about their intra-basin movement patterns despite their commercial and recreational harvest in the region. Mississippi Sound is a longitudinal estuary stretching across the Mississippi and part of the Alabama coastline, bordered to the north by a series of smaller bay systems and to the south by a chain of barrier islands. The assumed behavior of Sheepshead combined with the geomorphology of the system has led to concerns of localized depletion for the species in this estuary. Our study aims to fill these gaps by analyzing the

seasonal and spatial movement patterns of Sheepshead using acoustic telemetry. We analyzed the movement patterns of 60 adult Sheepshead tagged from two subsystems of the Mississippi Sound: St. Louis Bay (SLB; n = 25) and the Pascagoula River Estuary (PRE; n= 35). Our effort occurred from 2021 to 2024 and focused on intra-basin movements, site fidelity, and spawning behaviors across SLB, PRE, Back Bay of Biloxi, and the barrier islands. We found minimal movement of Sheepshead between subsystems, with all but 4 transitions between subsystems only occurring after presumed spawning related movements and only 23 total individuals using more than one subsystem during the study period. Most tagged individuals returned to their subsystem of capture after offshore spawning, indicating strong site fidelity. We found movements consistent with spawning runs (transitions from bay systems to barrier islands) occurred in the spring; however, 45% of the tagged individuals remained inshore throughout the spawning period, suggesting the possibility of inshore spawning. When taken in total, Sheepshead may be prone to localized depletion but movement between systems does occur after transition to barrier island habitat. The potential of inshore spawning complicates their movement paradigm and warrants further study.

Paddlefish *Polyodon spathula* Spawning Substrate Availability and Movement in William "Bill" Dannelly Reservoir and the Lower Cahaba River, Alabama

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Attempts to document Paddlefish *Polyodon spathula* reproduction date back to the early 20th century, yet the precise locations of spawning grounds for many populations remain unidentified. Our study area, Dannelly Reservoir in the Alabama River, extends from R.F. Henry Lock and Dam (RKM 380) to Millers Ferry Lock and Dam (RKM 214) and includes the lower reaches of the Cahaba River, an important tributary. Within this reach, two possible areas of suitable spawning habitat have historically been suggested: 1) the tailwaters of R.F. Henry L&D; 2) gravel bars of the lower Cahaba River. However, recent work suggests a third alternative may exist: an approximately 21-km reach in the upper portion of the reservoir known to contain extensive gravel bars. Between November 2021 and March 2024, we tagged and released 131 adult Paddlefish, including 44 individuals that were captured below Millers Ferry L&D and translocated into Dannelly Reservoir. We also deployed passive acoustic receivers throughout Dannelly Reservoir at approximately 6-10 km intervals and the lower Cahaba River at 6-7 km intervals. Tagged fish were frequently detected in the lotic middle and upper portions of the reservoir during predicted spawning windows, particularly in reaches known to contain large gravel bars. Three fish made extensive movements up the Cahaba River, including one previously translocated male. Ongoing work will include the generation of classified substrate maps using recreation-grade side-scan sonar to characterize the distribution of potential spawning substrates for Paddlefish in these reaches. This research offers valuable insight into Paddlefish spawning habitat availability and use and helps contextualize efforts to improve fish passage in the Alabama River.

Smallmouth Bass in Music City. Potential for Another Popular Smallmouth Fishery in Tennessee.

Phillip Parsley, Tennessee Wildlife Resources Agency

Tennessee is home to the world record Smallmouth Bass, *Micropterus dolomieu*, and has numerous sensational smallmouth bass fisheries statewide. One fishery that is lesser known is Cheatham

Reservoir, a mainstem Cumberland River impoundment in Middle Tennessee that flows through metropolitan Nashville. However, regular monitoring targeting smallmouth bass has not been performed historically. In 2021, Tennessee Wildlife Resources Agency (TWRA) began investigating the population dynamics, specifically age and growth and recruitment, of smallmouth bass on Cheatham Reservoir. Electrofishing samples were conducted in 2021 and 2022 on the upper 42 river miles of Cheatham Reservoir, collecting lengths and weights from 271 smallmouth bass. Sagittal otoliths, dorsal spines, and pectoral fin rays were collected from a subsample of fish for age estimates and for comparison of ageing structures. Among ageing structures, estimates obtained from otoliths were viewed as the representative age for that sample, and there was a general lack of precision in age estimates using dorsal spines and/or pectoral fin rays. On average, it took fish two and a half years to reach ten inches, five years to reach fifteen inches (preferred length limit), and seven years to reach eighteen inches (minimum length limit), with a maximum age estimate of thirteen. Von Bertalanffy growth models were created using current and historical data to compare Cheatham Reservoir with other popular smallmouth fisheries in Tennessee. In this study, growth rates for smallmouth bass were similar to other renown smallmouth bass destinations in the state such as Norris Reservoir and Dale Hollow Reservoir, revealing the potential for another trophy fishery in Tennessee.

Comparison of Coastal and Inland Silver Carp (*Hypophthalmichthys molitrix*) Trophic Impacts on Native Fishes in Southern River Drainages of Louisiana

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Since their introduction in the 1970s, invasive Silver Carp (*Hypophthalmichthys molitrix*) have significantly impacted aquatic ecosystems throughout Mississippi River watersheds. Anthropogenic factors such as modifications to stream connectivity and climate change-driven shifts in hydrology and temperature have facilitated rapid expansion by these highly invasive fish. Despite their spread in Louisiana waterbodies, effects of Silver Carp on trophic ecology of native species and food web dynamics in the lower Mississippi River (LMR) remain poorly understood. As efficient planktivores, Silver Carp can directly compete with native planktivorous species and disrupt nutrient cycling, water clarity, and primary production, leading to ecosystem imbalances in sensitive habitats. We performed stable isotope analysis on fishes collected in coastal and inland freshwater habitats between fall 2022 and fall 2024 to investigate trophic relationships among Silver Carp and multiple native fishes. Preliminary results indicated a significant trophic niche overlap between Silver Carp and native Bigmouth Buffalo (*Ictiobus cyprinellus*), Gizzard Shad (*Dorosoma cepedianum*), and Striped Mullet (*Mugil cephalus*). In addition, isotopic signatures suggested potential predation on Silver Carp by Largemouth Bass (*Micropterus nigricans*) based on overlapping trophic position estimates. Bigmouth Buffalo are an important component of Louisiana freshwater commercial fisheries, and Gizzard Shad are desired forage for recreational fisheries, which underscores the need to evaluate the Silver Carp trophic interactions, food web impacts, and broader ecological impacts. Developing effective management strategies is crucial to mitigating ecological disruptions caused by Silver Carp and preserving biodiversity and ecosystem health in southern river drainages.

Age Structure, Growth, and Movement of Mangrove Snapper (*Lutjanus griseus*) in the Mouth of the Pascagoula River, Mississippi

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Mangrove Snapper (*Lutjanus griseus*) are considered data limited by state and federal management agencies in the northern Gulf of Mexico. Life history and movement data are needed for this species as they are increasingly in demand from both the recreational and commercial sector. Mangrove Snapper are a euryhaline species that use brackish estuaries as a nursery habitat before undergoing an ontogenetic shift to offshore habitat as adults. Prior to moving to offshore habitat, they are generally thought to be a sedentary species and closely associated with structured (e.g., reef, rubble, mangrove) habitats. Our goal is to use acoustic telemetry in conjunction with age and growth data to fill knowledge gaps about when the transition from inshore to offshore habitats occurs, where juveniles overwinter, generate estimates of inshore movements, and determine how salinity changes impact habitat selection and spatial dynamics. Currently 218 individuals have been sampled (86 males, 89 females, 43 unknown) from the Pascagoula River for the age and growth study. Individuals were weighed and measured, sexed, had gonads weighed, and the sagittal otoliths were collected. A total of 47 juvenile Mangrove Snapper were implanted with Innovasea acoustic transmitters in the Pascagoula River (n=37) and Bayou Casotte Industrial Channel (n=10), Mississippi. Observed ages ranged from young-of-year to Age-6 with lengths ranging from 206 to 478mm. Previous studies have identified the 50% length of sexual maturity as 265mm (~Age-2) for males and 291mm (~Age-3) for females. Our results show a similar trend as to when the gonads for both sexes become visually identifiable. Initial telemetry analysis suggests that Mangrove Snapper show high site fidelity with limited movement between structured habitats, with nearly all individuals remaining within a 1.5 km2 area. Based upon our aging data, we estimate most tagged individuals to be age-1, suggesting Mangrove Snapper are nearing 50% maturity but not transitioning to offshore habitats where spawning should be occurring. Developing an understanding of population dynamics paves the ways to developing a further understanding of how future recruitment may be affected by increased fishing pressure of a population that may be exhibiting a delayed shift to offshore habitat.

Effects Of Anthropogenic Stream Barriers on Sandhills Chub (Semotilus lumbee) Population Genetics

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The Sandhills Chub, (*Semotilus lumbee*), is a small, headwater stream fish endemic to the Sandhills ecoregion of North Carolina and South Carolina. Habitat loss, fragmentation, and land use changes in the Sandhills are common, leading to possible extirpations. Additionally, fragmentation of streams can lead to a reduction in gene flow. The objective of this study was to quantify the role of anthropogenic stream barriers on genetic population structure, genetic diversity, effective population size, gene flow, and inbreeding rates of Sandhills Chub. Headwater streams in North Carolina and South Carolina were

backpack electrofished beginning in May 2022 through June 2024. Samples were taken from streams with a range of anthropogenic fragmentation, as well as in streams that are unfragmented. Bayesian generalized linear mixed models were used to test if population differentiation (pairwise FST) was related to the number of anthropogenic impoundments and distance between sites. Euclidean distance and pairwise stream distances were both used to understand population structure across multiple sub-watersheds and because historical stream connectivity was unknown. Additionally, Bayesian linear mixed models were used to test if indices of genetic diversity and health (He, HO, NA, Ne, and FIs) are related to upstream drainage area, number of anthropogenic barriers downstream and upstream of a site, and distance of free-flowing stream reach a site was within. This study will provide insight into the role anthropogenic barriers have in structuring Sandhills Chub population genetics, how diversity metrics of Sandhills Chub are related to stream site attributes and anthropogenic barriers, and guide conservation efforts.

Trophic Ecology and Perfluoroalkyl Substance (PFAS) Body Burden in Dolphinfish across Ocean Basins

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Dolphinfish (*Coryphaena hippurus*) are economically and ecologically important species that influence the structure of pelagic communities through top-down control. As pelagic predators, dolphinfish may experience negative biological and physiological effects due to the bioaccumulation of pollutants common in marine environments. Here, we assess trophic relationships and pollutant body burden of dolphinfish at the ocean-basin scale using three approaches: 1) bulk stable isotope analysis (SIA; δ15N and δ13C), 2) compound specific stable isotope analysis of amino acids (CSIA-AA; δ15NAA), and 3) perfluoroalkyl substances [PFAS] analysis. Dolphinfish muscle biopsies were collected during 2021-2023 from 10 regions: Caribbean Sea (n=26), Mediterranean Sea (n=5), equatorial Pacific Ocean (n=10), Gulf of Mexico (n=108), Indian Ocean (n=10), northcentral Pacific Ocean (n=10), northeast Pacific Ocean (n=23), northwest Atlantic Ocean (n=67), southwest Atlantic Ocean (n=20), and northwest Pacific Ocean (n=5). Results suggest that regional variation in SIA and CSIA-AA signatures was pronounced and influenced by the size/age of individuals. Additionally, a positive relationship between trophic position and pollutant body burden was observed, suggesting that biomagnification of PFAS with increasing trophic position may be occurring. These findings demonstrate a broad range in δ15N and δ15NAA signatures, indicating that dolphinfish are consumers with a high degree of trophic plasticity, and describe the relationship between their trophic position and pollutant body burden.

Hidden in Plain Sight: High-Resolution Stream Networks Reveal Habitats for Petitioned Burrowing Crayfishes

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Burrowing crayfishes are among the most data deficient crayfishes, partly because much of their life cycles occur underground. During dry periods, they typically rely on access to groundwater or moist soil to avoid desiccation, enabling them to inhabit temporarily wetted habitats such as roadside ditches and headwater streams. However, these habitats are often overlooked in conservation assessments and excluded from standardized monitoring programs. Though roadside ditches in particular may serve as proxy habitats for lost or degraded streams, their suitability for sustaining crayfish populations remains poorly understood. Our goal was to compare occupancy rates of rivulet crayfishes (*Hobbseus* spp.), a species complex of burrowing crayfishes in Mississippi, among three often-overlooked habitat types: small-sized, generally non-perennial, and previously non-georeferenced headwater streams (hereafter "unmapped" streams), larger-sized, previously georeferenced streams ("mapped" streams), and roadside ditches. Using Geographic Information Systems (GIS) and 1-m² LiDAR data, we developed a high-resolution stream network to identify unmapped streams (>300 m² watershed area) within five 12-digit Hydrologic Units. We identified mapped stream sites within the National Hydrography Dataset (NHD) and identified roadside ditches by discretizing roadsides at 50-meter intervals. Between February and May 2023, we conducted two-person dip-netting surveys using a removal occupancy design at 87 unmapped streams, 36 mapped streams, and 64 roadside ditches. To evaluate potential relationships between groundwater availability and crayfish occupancy, we installed groundwater wells in a random subset of roadside ditch sites. Rivulet crayfishes were detected at 66 sites, with peak densities in unmapped streams (max = 913 crayfish per 10-minute survey). Despite the small study area due to the restricted range of rivulet crayfishes, unmapped streams potentially contribute 1409 km of habitat compared to mapped streams (363 km) and roadside ditches (554 km). Our findings highlight the importance of often overlooked habitats, such as unmapped streams and roadside ditches, in conservation inventories and monitoring programs.

The Gravel Monster! Finding Opportunities Buried In The Bedload.

Eric Rahm, Missouri Department of Conservation

A key piece of the stream connectivity puzzle is bedload sediment. Especially in Ozark streams where a significant portion of the bedload consists of gravel and cobble. Across the Missouri portion of the Ozarks there are thousands of low water stream crossings disrupting the natural sediment transport process. These low water crossings are vented fords designed to pass baseflow discharge with all other flows going over the top of the structure. Essentially, these crossings can be considered poorly built dams with a hole in them that allow a small amount of water and sediment to pass through the structure. Generally, in Ozark streams, the bedload volume quickly overwhelms the capacity of the openings in the crossing to transport sediment and they clog shut. As a result, sediment accumulation and streambank migration upstream and scour downstream of these crossings become a major concern for the local communities. Efforts to address the sediment at these crossings, though excavation and gravel pushing, creates a continuous cycle that amplifies the sediment volume, accelerates streambank erosion and scour, increases the potential for damage to or failure of the crossing. Developing relationships, building trust, and implementing best management practices in these watersheds can help reduce the impacts of excess sediment, improve infrastructure, and improve overall watershed

conditions. This presentation will explore efforts in Missouri to identify, explain, and address the gravel monster to improve aquatic connectivity.

Comparing Tagging Study Estimates of Exploitation to Virtual Population Analysis Results for Black Crappie *Pomoxis nigromaculatus* in a Natural Florida Lake

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Fisheries biologists use Virtual Population Analyses (VPA) to estimate age class abundance and exploitation rates for fish populations. Although VPA use has been widespread, there is a lack of comparison between statistical estimates of exploitation and field-based tagging studies. We compared exploitation rates from a VPA model to those from a 10 year Black Crappie *Pomoxis nigromaculatus* tagging study in Lochloosa Lake, a eutrophic lake in north central Florida. VPA data were collected annually from 2006 to 2024 as part of Florida FWC's Freshwater Fisheries Long-Term Monitoring program. We relied on relative abundance estimates from trawl surveys, catch estimates from creel surveys and population age structure data from angler-harvested carcasses. The overall trends in annual exploitation estimates from the VPA matched those from the tagging study; however, the VPA tended to overinflate annual exploitation rates when compared to the tagging study. Future improvements to the model will add age class catch per unit effort data to determine if those data correct the overestimation of exploitation rates.

Estimating Population Abundance and Growth Rates of Sandhills Chub (*Semotilus lumbee*) from Two NC Sandhills Headwater Streams

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The Sandhills Chub (*Semotilus lumbee*) is a Leuciscid endemic to headwater streams in the Sandhills ecoregion of North and South Carolina, and restricted to the Cape Fear, Pee Dee, and Wateree River basins. Due to their limited range, the Sandhills Chub is considered a species of special concern and is vulnerable to population losses and decline from habitat modification and development within the region. Little is known about the ecology and population characteristics of Sandhills Chub. Therefore, the objective of this study was to estimate population abundance and growth rates of Sandhills Chub from October 2022-October 2024. We used a mark-recapture study in which Sandhills Chub were implanted with passive integrated transponder (PIT) tags in two streams in North Carolina. We estimated average and seasonal abundances and growth rates. Abundances were estimated using Jolly-Seber open population models, as well as annual mortality rates using the apparent survival rates from our models. For abundance estimates, a 900-m study reach was created in each stream and 756 Sandhills Chub were tagged across both streams. Average abundance across all seasons was higher in the Aberdeen tributary (204) compared to Gum Branch Creek (169). Seasonal abundance was highest in the Aberdeen tributary (255) in winter '24 and highest in Gum Branch Creek (265) in summer '24. Average Sandhills Chub growth rates were 0.131 mm/day in the Aberdeen tributary and 0.118 mm/day

in Gum Branch Creek. Across both streams, average seasonal growth rates were higher during the spring and summer, when water temperatures were warmest within our streams. These results will be used to help guide conservation of Sandhills Chub and designate potential population strongholds that need protection for the persistence of the species going forward.

Characterizing Growth and Maximum ages of Native Suckerfishes (Catostomidae) in Georgia, USA: Implications for Bowfishing Management Needs

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A diversity of native suckerfishes inhabits waterbodies throughout Georgia, USA, but little information is known about population demographics of these large-bodied fishes. Furthermore, these suckerfish populations are vulnerable to anthropogenic activities such as bowfishing. For example, bowfishing tournaments occur in Georgia water bodies that possess suckerfish populations, and social media posts have illustrated harvest of hundreds of native fishes from a single entrant. The liberal harvest rates of native, nongame fishes currently recognized in Georgia's fishing regulations, coupled with critical knowledge gaps in the life history characteristics of Georgia suckerfishes, raises the need to examine life history traits of species vulnerable to bowfishing. Therefore, from 2023 – 2024, we collected specimens of Black Redhorse *Moxosotma duquesnii* (n = 45), Blacktail Redhorse *Moxostoma poecilurum* (n = 44), Golden Redhorse *Moxostoma erythrurum* (n = 29), River Redhorse *Moxostoma carinatum* (n = 20), Smallmouth Buffalo *Ictiobus bubalus* (n = 41), and Spotted Sucker *Minytrema melanops* (n = 35) from various sites across Georgia. Morphometrics and sex determination were collected from each specimen, along with otolith structures for determining age estimates and growth characteristics. We determined variation in maximum ages among Georgia suckerfishes (8 – 56 years). We also found that differences in growth persisted between sexes, as females grew slower and obtained larger body sizes. Our results indicate that distinctive life history characteristics persist among Georgia suckerfishes and that some species have the capacity to reach old ages. Additionally, observed growth characteristics indicate that larger, older females will be more susceptible to bowfishing harvest. Collectively, our findings provide key life history information for these understudied fishes and suggest the need to establish species-specific management and harvest limits for Georgia suckerfishes.

Assessing Controls on Stream Fish Assemblages across a Flow-Intermittency Gradient

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Streams and rivers that naturally experience flow intermittency account for over half of all streams in the United States. Due to the dynamic attributes of intermittent fluvial systems (IFS), they harbor distinct fish assemblages. However, relatively few studies have investigated which ecological predictor variables influence IFS fish assemblages in the temperate regions of the Southeastern United States. Using the Roaring River watershed, a Cumberland River tributary system with dynamic spatiotemporal variability in flow intermittency, our objectives were to (1) identify predictor variables associated with distinct fish assemblages along a longitudinal gradient of flow permanence and (2) determine whether the assemblages tend to homogenize when exposed to temporal changes in connectivity. From June through September 2023, fish were sampled at nine sites in Roaring River, Spring Creek, and Blackburn Fork, three disparate subwatersheds within the Roaring River system. Canonical Correspondence

Analysis (CCA) was used to analyze the species assemblage along with a suite of environmental [E] and spatial [S] predictor variables. We first analyzed the relative importance of [E+S] predictor variables associated with fish abundance and species richness patterns for the three subwatersheds. Next, we examined the temporal variation in these patterns to determine if assemblage change patterns were associated with periods of flow intermittency. Fish abundance and species richness were greater at locations in Spring Creek, which experienced the most pronounced temporal occurrences of intermittent connectivity. Variation in fish abundance and species richness in Roaring River and Blackburn Fork indicated a temporally homogeneous pattern, which was associated with moderate and less pronounced levels of intermittency. Our results highlight the importance of maintaining natural flow regimes to preserve important stream habitat features for these distinct assemblages of fishes.

Llano River Carpsucker or Hill Country Quillback? Molecular Hypotheses Reveal Insights into the Diversity of Texas Carpiodes Inhabiting the Edwards Plateau

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In Texas hill country, there is evidence of a potentially undescribed catostomid, the Llano River Carpsucker (LRCS). The putative LRCS possess a more elongated body compared to sympatric River Carpsucker (*Carpiodes carpio*; RCS). Although abundant in the Edwards Plateau, its relationship with recognized species of Carpiodes is unknown. The objective of this study was to assess morphological and genetic differences between LRCS and RCS inhabiting Texas waterbodies and implement phylogenetic and population structure methods to determine evolutionary relationships between LRCS and other Carpiodes species. We collected 260 specimens, preserved them, and used photographs to develop homologous landmarks for a multivariate morphological analysis assessing gradients in body shape. We extracted DNA from tissues, amplified the mitochondrial cytochrome b (CYTB) and nuclear IRBP2 genes, and sequenced data for each specimen. Single nucleotide polymorphisms from each gene were analyzed using genetic clustering analysis (e.g., k-means clustering) and a permuted multivariate analysis of variance was performed with individual cluster identity used as a predictor variable and morphological principal components (PC) from a principal component analysis as response variables. There was evidence for a significant relationship between genetic clusters and the first PC, revealing LRCS had a significantly different genetic cluster and were more slender than RCS. Using additional sequences from Carpiodes across North America, phylogenetic and population structure analyses revealed that RCS populations in the Brazos and Colorado rivers were introgressed with LRCS populations. Further, LRCS populations were closely related to Carpiodes cyprinus populations west of the Appalachian Mountains. This study provides insight into the phylogenetic relationships among members of Carpiodes within Texas (and beyond) which is important for species conservation and delimitation.

Weathering the Storm: a Status Update of Appalachian Elktoe (*Alasmidonta raveneliana*) and Future Plans Following Hurricane Helene

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Appalachian Elktoe, *Alasmidonta raveneliana*, is a federally endangered freshwater mussel endemic to western North Carolina and eastern Tennessee. Historically, this species inhabited waters from the headwaters and tributaries to lower reaches of these river basins with little fragmentation. Appalachian Elktoe distribution is currently limited to small patches of suitable habitat within the Little Tennessee and French Broad drainages in western North Carolina. Direct threats to this species include pollution (chemical and thermal), altered flow conditions, dams, sedimentation, unstable or fragmented habitat, invasive species, and diseases. Biologists with the NC Wildlife Resources Commission and US Fish and Wildlife Service have documented several declines following significant disturbances from tropical storms and hurricanes over the last 20 years. In September 2024, Hurricane Helene brought severe flooding to western North Carolina and east Tennessee. Many streams with extant Appalachian Elktoe populations were impacted by the storm. As biologists continue to evaluate the impacts of Helene, NCWRC biologists will conduct targeted Appalachian Elktoe surveys to assess their current distribution and abundance in the impacted watersheds. Mussel and habitat surveys will be conducted at long-term monitoring sites throughout the impact area. Survey results will help guide future management and conservation actions to aid in species recovery.

Evidence for Declining Numbers of Large Dolphinfish (*Coryphaena hippurus*) in the Western North Atlantic

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Dolphinfish (*Coryphaena hippurus*) are a pelagic predator found in tropical and subtropical waters worldwide. They are a valuable recreational and commercial target off the United States, particularly along the southeast Atlantic coast. Recent studies have indicated declines in size and abundance of Dolphinfish in this region. We gathered data on citation-sized (>15.9kg) Dolphinfish from the North Carolina Division of Marine Fisheries and fishing effort data from the NOAA Marine Recreational Information Program. We generated species-specific annual values for trips-per-citation-Dolphinfish and compared these to the same values for a commonly co-targeted species, Wahoo (Acanthocybium solandri). Linear models were fitted to these data by regressing them against year. An analysis of covariance model with a separate regression slope for each species provided the best fit to the data for trips=per-citation-caught. Our dataset from 2000 to 2023 revealed a meaningful and roughly four-fold increase in the effort required to catch a citation-sized Dolphinfish, while no trend was observed for Wahoo. A substantial increase in effort required to catch a citation-sized Dolphinfish suggests the abundance of large individuals of this species has declined. In the context of no such trend for Wahoo, possible confounding causes (e.g., changing social norms) are unlikely to explain our finding. Causes of the decline for Dolphinfish may be related to increased exploitation of the stock.

Freshwater Mussels of the Hatchie River: Distribution, Composition, and Abundance

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Freshwater mussels are amongst the most imperiled faunal groups, but significant data gaps exist regarding their distribution and habitat requirements. In particular, West Tennessee (WT) has few historic mussel records, making conservation and restoration efforts in the area difficult. Further, the region's unique hydrology and habitat conditions have largely been altered by land use changes, channelization, and water control structures such as culverts and impoundments. Efforts in recent decades have attempted to restore streams in WT to a more natural state, but this restoration has not targeted or considered mussel conservation. The Hatchie River, a 238-mile tributary to the Mississippi River, remains one of the least degraded WT Rivers, escaping impoundment and much of the main-channel alteration that has occurred in the area. Historically serving as a home to over 30 species of freshwater mussels, the Hatchie River provides a unique opportunity to study mussel assemblages and to determine what habitats are associated with mussel aggregations in WT rivers without extensive channel alteration. Collaborators from Tennessee Tech University and the West Tennessee River Basin Authority conducted timed qualitative surveys and bank searches throughout three sections of the Hatchie to update the freshwater mussel distributions there. Physical habitat features such as sinuosity, side channel density, and the presence of peripheral habitat were found using remote sensing. Presented here are the findings of that work, including the distribution, composition, and abundance of the current freshwater mussel assemblage for the surveyed sections. Information gathered during these surveys will guide future restoration efforts and identify locations and methods that would most benefit mussels in the WT region.

Critical Thermal Maximum of Mussels in an Intermittent South Central Plains Ecoregion Watershed

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Mussels can survive in a wide variety of ecosystems, one of those being intermittent streams. However, little is known about their ecology associated with various ecosystems and how it varies (i.e. intermittent streams). We wanted to assess the thermal ecology of mussels in an intermittent stream. The Moro Creek system of South-Central Arkansas is an intermittent stream, and has high abundances of Pondmussel (*Sagittunio subrostratus*), Texas Lilliput (*Toxolasma texasiense*), and Louisiana Fatmucket (*Lampsilis hydiana*). A total of 90 individuals of each species were collected from Moro Creek across 3 sites, and used to determine their thermal critical thermal maximum CTmax. Sex and length (mm) were recorded for each individual. After collecting individuals, we split them into three acclimation temperatures (18˚C, 22˚C, 26˚C), with 30 (15 male and 15 female) individuals of each species per acclimation period. Mussels in each acclimation group were acclimated for two hours at their respective acclimation temperature. Each species' CTmax was estimated by placing 15 uniquely-coded individuals into a VWR International 17 x 13 x 17-inch water bath. The temperature was raised 0.3˚C/min during CTmax trials. Agitation temperature and the temperature that resulted in morality (CTmax) for each individual were recorded. CTmax varied by species, sex and size. Mean (±SE) CTmax for Louisiana Fatmucket was 51.7 (±0.4) ˚C at 26 ˚C acclimation, 54.0 (±0.30) ˚C at 22 ˚C, and 53.6 (±0.3) Celsius at 18° C. Mean CTmax for Texas Lilliput was 56.4 (± 0.4) ˚C at 26 ˚C acclimation, 57.1 (±0.5) Celsius at 22 ˚C, and 57.2 (±0.5) ˚C at 18 ˚C. Lastly, mean CTmax for Pondmussel was 48.6 (±0.3) ˚C at 26 ˚C acclimation, 48.9 (±0.5) ˚C at 22 ˚C, and 54.0 (±0.3) ˚C at 18 ˚C. These findings will give us greater insight for understanding mussels and provide a baseline for further critical thermal maximum studies on other mussel species.

Seasonal Community Occupancy of Fishes in a South-Central Plain Headwater Stream

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Among South Central Plains ecoregion fish communities, there is limited knowledge on the importance of headwaters. This information is needed to understand their role in fish communities. We addressed this gap by assessing seasonal changes of fish communities in headwater streams of the Moro Creek watershed, Arkansas. Sixteen sites were sampled seasonally (winter, spring, summer, fall) in four events from Jan.-Oct. 2023. Multiple sampling gears (backpack electrofishing, kick-nets, seines) were used to increase species detection. Fish presence/absence data, site, and survey covariates were analyzed using multi-season, community occupancy models to estimate μ (species probability), Ω (community occupancy mean), and p (detection probability). A total of 37 species from 10 families were observed. Of many models, we explored the best three: μ (canopy cover), Ω (canopy cover), p (.); μ (catchment area), Ω (catchment area), p (stream flow); μ (catchment area), Ω (catchment area), p (.). The model incorporating canopy cover suggests that median (range) μ varied by species (0.26, 0.10-0.78), Ω (±SE) varied by season (winter: 0.29 ±0.04, spring: 0.50 ± >0.01, summer: 0.29 ±0.04, fall: 0.50 ± >0.01), and that p was constant (0.50± >0.01). Overall, seasonal variation exits on the species and community levels, canopy cover and catchment area are the main drivers of μ and Ω, and stream flow is the main driver of p. This research aids in the understanding of fish patterns and species richness on a temporal scale, improving knowledge of headwater stream functionality in South Central Plains watersheds.

Multiscale Drivers of Beaded Darter Occupancy in the Ouachita Highlands

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Natural and anthropogenic landscape factors drive species distributions at multiple spatial scales. Identifying which factors are important at different scales can help identify current species distributions and predict changes resulting from environmental change. Identifying multi-scale drivers of species distributions is especially a priority for species with small ranges and of conservation concern. We assessed multi-scale drivers of Beaded Darter (*Etheostoma clinton*) distributions in the upper Ouachita and Caddo Rivers in Arkansas, USA. Of the 56 sites sampled, Beaded Darters were detected at 17 sites (11/29 in the Ouachita, 6/24 in the Caddo, 0/3 in the Little Missouri). Preliminary results of single-season, multiscale occupancy models suggest site level factors, including larger watershed size and slower water velocity, are positively associated with Beaded Darter occupancy. This finding aligns with current hypothesized preferences of the Beaded Darter, which is found in larger rivers in pool habit. It is currently predicted that Beaded Darter occupancy will be significantly positively associated with greater proportions of finer/sandier substrate, which is at risk from being covered in silt from increased agricultural use within the watersheds of the Ouachita and Caddo Rivers. Anthropogenic impacts to the environment are increasing every year—knowing the significance of habitat variables at different spatial levels will be important to inform conservation efforts for the Beaded Darter in the future, and to increase awareness of a riverscape ecology perspective in predicting species distributions.

Fish Assemblage Response to Habitat Restoration, Including an Innovative Grade Control Structure Designed for Fish Passage, in a Headwater Stream of the Lower Mississippi Region

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Globally, many freshwater streams have been severely altered by human activity, resulting in degraded systems and disrupted connectivity. Restoration projects that focus on reconnecting stream reaches and reinvigorating in-stream and riparian habitat are becoming more numerous, as these manipulated systems require further action to achieve conservation goals and improve ecological health. Many projects thus far have focused on fish passage for species of economic importance through ladders in large, dammed rivers, but there is a great need to evaluate connectivity improvement projects for non-commercial fish communities in smaller, warmwater streams. This is especially relevant in the Lower Mississippi water resource region where most streams have been channelized or otherwise altered since the 19th century. In this region, the use of grade control structures is common practice for stopping active head cutting and sedimentation issues; however, these structures can often act as barriers to small-bodied fishes. We are assessing the efficacy of an innovative grade control structure designed to allow for fish passage in Cub Creek – a small, newly restored stream in West Tennessee. Beginning in December 2024, we are tagging fish at least 65mm in length and 5g in weight with passive-integrated transponder (PIT) tags. At each of the two fish passes, we are installing seven radio frequency identification (RFID) compatible antennas to detect tagged fish and capture bidirectional movement upstream, within, and downstream of the structures. Additionally, we will collect point-of-detection data from tagged fish in restored microhabitat and characterize in-stream habitat. Our objectives are to (1) evaluate the efficacy of the innovative grade control design for reconnecting stream reaches and improving the ability of fish to move between habitats, and (2) assess fish assemblage habitat preferences among restored areas of microhabitat.

Evaluation of Passage Efficiency and Migration of Striped Bass in Relation to a Modified Nature-Like Fish Swimway and Elevated Flows in the Cape Fear River

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The construction of nature-like fish swimways is an increasingly common method to improve connectivity and mitigate physical barriers that restrict the movements of migratory fishes. In 2012, the USACE created a nature-like swimway to improve passage of anadromous fishes at the lowermost of three lock and dam structures (LD1) in the Cape Fear River, North Carolina. Acoustic telemetry studies conducted in 2013-2015 found passage rates of striped bass (*Morone saxatilis*) to be considerably lower than those achieved with previous locking procedures. In response, additional modification of the swimway was completed in 2021 to improve passage success. Starting in spring 2022, we re-evaluated the passage success of striped bass over the modified fishway and quantified fish movements above all three LD structures during high environmental flow events (supplemental water releases from an upriver reservoir following heavy precipitation). A large array (n > 60) of acoustic receivers, as well as receiver gates above and below each LD, informed the movements of tagged striped bass. The average raw upstream passage efficiencies of striped bass at the LD1 swimway from 2022-2024 were found to be slightly higher (30%) than passage rates of the original structure (2013-2015: 20-25%). Passage

efficiencies at the upriver LD structures, LD2 and LD3, where no nature-like swimways exist and no locking was conducted, were 44% and 14% respectively. Environmental flow events facilitated 83% and 67% of all passage events in 2023 and 2024 respectively. An additional 10 striped bass were confirmed to pass through a side creek channel that circumnavigates the swimway in 2024 during high flow events. The use of environmental flow events to supplement fish passage appears promising. The 2021 modifications to the nature-like fish swimway led to modest increases in passage success from 2022-2024, but have yet to meet original passage efficiency goals.

Environmental Drivers of American Eel (*Anguilla rostrata*) Recruitment to Northeast Florida

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The American Eel (*Anguilla rostrata*) is a catadromous species with a complex life history involving migration between freshwater and estuarine nurseries and oceanic spawning grounds. The species supports valuable commercial fisheries and is an important component of healthy coastal ecosystems. The most recent assessment (ASMFC) for American eels indicated that the stock is currently depleted, prompting concerns over conservation status and interest in the possible factors driving population declines. Because of their complex life history and long planktonic larval duration, juvenile eels recruiting to coastal estuaries are influenced by environmental factors at many spatial scales ranging from local drivers (e.g., rainfall) to long-term oceanic and climate forcing (e.g., ENSO). We used annual glass eel recruitment (catch-per-unit-effort; CPUE) from a long-term (25 year) fishery-independent young-of-year (YOY) survey to examine the relationships between eel recruitment and environmental drivers at local, regional, and oceanic scales. Glass eels were collected in northeast Florida at a single fixed station at the Guana-Tolomato-Matanzas (GTM) National Estuarine Research Reserve on dark flood tides during winter from 2001-2024 using dip nets. Environmental variables were recorded concurrently during sampling or available from GTMNERR system-wide monitoring programs. At a local scale, eel recruitment was positively correlated with flow and negatively correlated with water temperature. The relationship between lunar phase and CPUE was variable among years, with increased recruitment occurring with spring tides in some years, but not in others. At an oceanic scale, we examined correlations between annual eel recruitment and a number of long-term climatic indices (ENSO, NAO, AMO, BATS). These results contribute to a growing literature on American eel early life history and recruitment dynamics and are useful for agencies seeking to effectively manage this important commercial and recreational fishery species.

Summer Catch-and-Release Mortality of Striped Bass in Smith Mountain Lake, Virginia

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Recreational anglers have adopted catch-and-release practices in many sport fisheries. However, catch-and-release angling can still result in substantial mortalities that need to be considered when managing fisheries. The Striped Bass *Morone saxatilis* has been stocked in and supports popular fisheries in many reservoirs of the southeastern U.S. High summer mortality rates of caught and released Striped Bass have been documented in some southeastern reservoirs. However, the mortality rate of released Striped Bass is likely dependent on the availability of cool water with sufficient dissolved oxygen levels in each system. We are conducting a two-year hydroacoustic telemetry study to estimate catch-and-release mortality of Striped Bass in Smith Mountain Lake, Virginia. Smith Mountain Lake supports a popular Striped Bass fishery, with substantial angling occurring in the summer. However, Striped Bass in Smith Mountain Lake experience minimal "oxy-thermal squeeze" compared to Striped Bass in reservoirs where high summer mortality has been documented. In June−August 2024, 51 Striped Bass were angled with artificial baits and tagged externally with temperature sensing ultrasonic transmitters to determine their fates following release. Mortality of released fish ranged from 19−31%, depending on whether fish that could not be located (n = 5) were or were not assumed to have died. Presumed dead fish were found at temperatures <17°C except for recovered mortalities found floating (18% of mortalities). Surviving fish often occupied temperatures between 18−21°C and were highly mobile. The continuation of this project in 2025 will be conducted simultaneously with a tag-return exploitation study that began in December 2024. These studies will be used to estimate catch-and-release exploitation of Striped Bass in Smith Mountain Lake and inform growth model simulations to evaluate the effects of warm water catch-and-release mortality on Striped Bass trophy potential.

Barriers Broken: Genetic Swamping in Restored Brook Trout Populations

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Reintroductions are a conservation tool for restoring native species to their historical ranges. In fisheries, the effects of migratory behavior in restored fish populations are a concern for many managed taxa yet the effects of dispersal on population genetic structure is often overlooked. The Southern Appalachian Brook Trout (*Salvelinus fontinalis*) has been extirpated from much of its historical range due to anthropogenic impacts and competition with non-native species. In the Great Smoky Mountains National Park (GRSM), an ambitious reintroduction strategy aims to restore Brook Trout populations by removing non-native trout and selecting restoration streams with natural barriers to prevent recolonization. Wild populations are mixed together for reintroductions to avoid the use of hatchery-reared fish, prevent depletion of any single source population, and maximize genetic diversity. However, a miscommunication during a reintroduction in Anthony Creek undermined the goal of maximizing genetic diversity and inadvertently created an in-situ population genetics study. Fish from two source populations were stocked in one segment of the restoration site. Fish from a third source were stocked above an additional natural barrier. Unbeknownst to management, fish from the third source began dispersing downstream, overwhelming the genetic diversity of the first two populations. Population genetics theory predicts that unidirectional movement will lead to genetic swamping. Here we use genetic and population density data to verify that dispersal is unidirectional, estimate the rate of genetic swamping, and determine whether genetic diversity can be recovered by introducing additional fish above the second natural barrier. Understanding the interplay between dispersal behavior and genetic structure is crucial for planning reintroductions and improving strategies for conserving this iconic species.

Habitat Use and Reproductive Dynamics Reveal Life-History Differences among Sympatric Buffalofishes in the Lower Red River

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Buffalofishes are large-bodied, long-lived catostomids that are widely distributed in North America. Currently, conservation and management agencies are concerned about buffalofishes due to recent insights into their population demographics, increases in recreational angler harvest, and potential competition and displacement by invasive species. However, buffalofishes remain understudied relative to their habitat use and reproductive dynamics. Here, we examine occupancy and reproductive dynamics of three sympatric buffalofishes in the lower Red River using a multi-species occupancy model and histological analysis. Smallmouth and Black Buffalo were more widespread, whereas Bigmouth Buffalo tended to occur in more complex habitats, where greater densities of woody debris may increase adhesion and survival of their eggs. Histological analyses indicated that Black (October - May) and Smallmouth (August - May) Buffalo spawned multiple times over a longer season, whereas Bigmouth Buffalo had a shorter season (December - May) with higher rates of egg reabsorption (49% vs 34% and 27%). Overall, our results indicate that Black Buffalo and Smallmouth Buffalo in the lower Red River display opportunistic life-history traits, such as batch-spawning and opportunistic spawning periodicity, whereas Bigmouth Buffalo in the lower Red River display periodic life-history traits such as skip-spawning. Future work is needed to determine if our observed differences in life-history traits among buffalofishes is a response to the environmental conditions of the lower Red River, anthropogenic pressures such as flow regulation and commercial fishing, or natural, among-species variation.

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

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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. Further, remotely-sensed data provides researchers with a means to develop non-intrusive and rapid approaches for habitat assessment, using tools like MaxEnt modelling. The Duskytail Darter (*Etheostomas percnurum*) and Chucky Madtom (*Notorus 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. Here, we aim to develop a more structured approach to extirpation decision making by incorporating current framework with molecular surveillance and remotely-sensed data modelling, thereby allowing managers to identify range decreases or extirpation with measurable confidence. Our objectives are: (1) to develop and use of eDNA assays for detection of rare species, (2) develop species distribution models to inform eDNA sampling efforts, (3) and create a framework for an extirpation index. We detected Duskytail Darter eDNA at 8 of 27 sites over four different sampling events. We did

not detect Chucky Madtom in any of the 27 sampled sites across two sampling events. 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.

Decadal Declines in Recruitment of American Eels (*Anguilla rostrata*) to a Northeast Florida Estuary

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The American Eel (*Anguilla rostrata*) is a catadromous species inhabiting freshwater, estuarine and oceanic habitats during its complex life history. American eel both are valuable both economically as the target of a directed commercial fishery and ecologically in coastal ecosystems. American eel populations have been declining throughout much of their range prompting concerns over population and conservation status for this species. To assess historic trends in abundance and biological characteristics, we estimated annual glass eel recruitment (catch-per-unit-effort; CPUE) and quantified length, weight and pigment stage of recruiting glass eels. Glass eels were collected in northeast Florida at a single fixed station at the Guana Dam in the Guana-Tolomato-Matanzas (GTM) National Estuarine Research Reserve on dark flood tides during winter from 2001-2024. Catch data was used generate two annual indices of recruitment: (1) raw CPUE, and (2) adjusted CPUE generated from a generalized linear model to account for the effects of environmental covariates (temperature, salinity, flow) on recruitment. Overall, we observed a precipitous decline in eel CPUE from a period of high abundance and interannual variability in early years (2001-2004) to a persistent period of low abundance since 2005. We also assessed trends in recruit size and weight over time, and document a significant relationship between annual CPUE and eel size (total length) in a given year which may result from faster growth and increased survival in years of high food availability. These results contribute to a body of evidence documenting declines in Anguillid eel species globally, improve our understanding American eel early life history and recruitment dynamics, and are useful for agencies which require recruitment indices to adequately assess population trajectories and determine stock status.

Evaluating the Habitat Suitability Index for Bluenose Shiner Populations in Panhandle Florida Rivers

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The Bluenose Shiner (*Pteronotropis welaka*) is a small member of the minnow family (Cyprinidae) that occurs from Florida to Louisiana, extending northward into Georgia. In Florida, Bluenose Shiners have a disjunct distribution with populations in the St. Johns River drainage of peninsular Florida and populations in the Gulf coast river drainages in the western panhandle (Escambia, Yellow, Choctawhatchee Rivers and Holmes Creek). The Florida Fish and Wildlife Conservation Commission (FWC) has designated Bluenose Shiners as a threatened species due to their disjunct populations and sporadic distributions throughout their range. Water quality decline due to nutrient pollution, increased turbidity, and water withdrawals are all possible threats that could lead to habitat loss and population

decline. While a Habitat Suitability Index (HSI) has been developed for Bluenose Shiners via expert opinion, this HSI had not been empirically validated. Therefore, a two-year project was conducted across four river systems in the Florida panhandle for Bluenose Shiners to develop range-wide water velocity, water depth, and cover/substrate HSIs. This research has also helped identify new locations and update occurrence maps of Bluenose Shiners.

An Ecological Characterization of Juvenile Tarpon and Snook Nursery Habitat in Texas

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Atlantic Tarpon (*Megalops atlanticus*) and the snook species complex (*Centropomus* sp.; primarily fat snook and common snook) are highly revered sportfish in Texas' coastal waters and designated as "Species of Greatest Conservation Need" under the Texas Conservation Action Plan. Tarpon and snook once supported productive recreational and commercial fisheries until populations collapsed in the mid-1900s due to overfishing and reduced recruitment. While fishing mortality of adult fish has been reduced by a transition to a primarily catch and release recreational fishery, poor juvenile recruitment could be hindering recovery of these populations. Unfortunately, there is limited knowledge on the early life history of tarpon and snook in Texas. The goal of this study is to identify nursery habitats, describe the physical, biological, and environmental characteristics of these habitats, and provide novel information on the occurrence, abundance, and seasonal residency of juvenile tarpon and snook within identified nurseries using a combination of bimonthly field sampling, tag-recapture methods, acoustic telemetry, and citizen science. Juvenile tarpon and snook were sampled bimonthly with bag seines at five fixed sites with additional sampling occurring opportunistically or when new sites were identified by citizen scientists. Since April 2024, juvenile tarpon occurrence was verified at three of five sampling sites while juvenile snook occurrence was verified at all five sites. Fifty-seven juvenile tarpon were captured, ranging from 160–490 mm SL, and 48 juvenile snook were captured, ranging from 25–186 mm SL. Juvenile tarpon and snook were observed from April-December. At least three cohorts of juvenile tarpon have been captured within these nursery sites. Nineteen tarpon were acoustically tagged across two sites to monitor movement and seasonal residency within the nurseries. The results of this study will fill knowledge gaps and inform management strategies in Texas.

Comparing Aqueous Environmental DNA Metabarcoding to Sediment-Bound Environmental DNA Metabarcoding in Sand-Dominated Freshwater Systems

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The study of fish assemblage composition in headwater systems is vital for resource managers, as headwaters supply water, sediments, and nutrients downstream. Further, many fishes are unique to headwater ecosystems and are not typically found downstream, whether that is due to habitat specialization or biotic interactions. Headwater systems are also used by mainstem stream fishes as refugia or spawning habitat. Advances in technology have facilitated the development and use of new molecular sampling methods, such as environmental DNA (eDNA) metabarcoding. eDNA metabarcoding allows for the assessment of fish assemblages through the collection of water or sediment samples from

the stream. However, it is still to be determined if data from sediment bound eDNA is comparable to aqueous eDNA, particularly in headwater systems where there are small-bodied species in low abundance. Sediment bound eDNA may be detectable for longer periods of time but may be more localized to the original DNA source, than free-floating aqueous eDNA. Here, we will discuss sampling efforts to compare these two eDNA protocols in Cub Creek, a headwater tributary to the Hatchie River in west Tennessee. Cub Creek is a sand-dominated system that has been historically degraded by logging and agriculture, resulting in channelization, headcutting, incisions, and reduced habitat complexity. All of these may change the effectiveness of eDNA sampling, and the results from our study may be used to inform future sampling designs to evaluate the status and trends in headwater fish assemblages.

Juvenile Sportfish as an Indicator Species for Restoration Planning and Implementation and a Metric of Success

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Increasing human populations and urban development have led to losses of estuarine habitats for fish and wildlife. Where resource managers are restoring coastal wetlands, in addition to meeting goals related to hydrologic connectivity, biodiversity, and recreational opportunities, efforts are being made to provide habitat that is suitable for juvenile sportfish. A multi-site research approach is being used to 1) follow up on restoration already conducted to determine what is working best for juvenile sportfish, and 2) prioritize locations for future restoration. Juvenile sportfish densities at restored sites in west-central Florida were broadly comparable to natural sites and greater than at impacted sites. Growth and condition of juvenile snook, a flagship species for wetland conservation, did not vary among site type, suggesting that the species' needs were being met even at newly restored sites. To help prioritize restoration projects in southeastern Florida, a fisheries-independent monitoring dataset was analyzed to identify fish abundance across habitats. A stretch of river (St Lucie North Fork) that was comprised of braided river channels and mangrove backwaters was found to be a hot spot for juvenile snook. The same river stretch supported a suite of tropical species that contributes uniqueness to the region including opossum pipefish, fat snook, and bigmouth sleeper. Reconnection of floodplains that were disconnected during river channelization and restoration of relic oxbows should benefit these species.

Utilizing Realtime Water Level Monitoring to Improve Understanding of Aquatic Organism Passage in Road-Stream Crossings

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Anthropogenic barriers have led to aquatic habitat fragmentation and decreased fish diversity worldwide. Road crossing barriers such as culverts are a significant source of fragmentation and can impede aquatic organism passage (AOP). Many efforts to inventory road crossing barriers and prioritize removal and restoration efforts do not consider temporal variation in flow. Variations in flow can lead to changes in the physical characteristics of road crossings through increases in velocity. One of the greatest predictors of whether a road-stream crossing will act as a barrier to AOP is the presence of an outlet drop. An outlet drop is the distance between the bottom of a culvert and the water's surface. An outlet drop can decrease the likelihood of fish passage, especially for small-bodied fish with little to no

jumping ability. However, increased velocity caused by precipitation events can increase tailwater elevation, decreasing outlet drop height. This may improve AOP during precipitation events. We will use trail cameras to gain real-time water level monitoring data to quantify the relationship between precipitation events and outlet drop height. In the Spring of 2024, we selected 30 culvert sites within Pickens, Oconee, and Anderson counties in South Carolina and set up trail cameras at the outlets of all the sites. We set the cameras to take a picture every ten minutes and captured a time-lapse video of all records taken during the day. We used the data collected to quantify the relationship between precipitation events, increases in flow, and outlet drop size.

Measuring Management Intensity of State-Managed Marine and Coastal Fisheries

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The North Carolina Fisheries Reform Act of 1997 (FRA) was enacted to "protect, enhance, and better manage coastal fisheries in North Carolina" when the state recognized the need to conserve coastal fishery resources and achieve balance between the commercial and recreational sectors. The FRA mandated the creation of fishery management plans for state-managed species, with annual updates on the status of managed stocks, as well as re-assessment of the management plans every 5 years. Now, 27 years after the adoption of the FRA, the NC General Assembly has tasked the NC Collaboratory to evaluate the status of our coastal and marine fisheries and to develop policy recommendations to better manage the overall health and viability of NC's fisheries. To meet this objective, we developed an "Index of Management Intensity" (IMI) to assess the types of management strategies, and the frequency of regulatory actions applied to several coastal fisheries in both North Carolina and other jurisdictions in the southeastern US (Chesapeake Bay, South Carolina, Florida, Louisiana, and Texas). The primary goal is to quantify the evolution of fisheries management in NC, identify regulatory tactics with effective outcomes, and determine if management intensity is consistently linked to stock status. The stock with the highest management intensity score is North Carolina's Blue Crab fishery, with a total score 96%. Further, North Carolina holds the first three spots in the top five list of most intensely managed fisheries: Blue Crab being first, Southern Flounder second, and Striped Bass (ARMA) third. North Carolina is also the only state of the jurisdictions assessed that has a consistent average increase in management intensity across a roughly 40-year period. However, in many cases, biomass is not correlated to management intensity. Management intensity has a more complicated and nuanced relationship to stock status and varies depending on the fishery. For example, North Carolina Blue Crab management intensity is negatively correlated to both fishing mortality and stock status; in the Chesapeake Bay, management intensity is only negatively correlated to fishing mortality; and in Louisiana, management intensity is not correlated to any biological measures of stock status.

Continuation of a Collaborative Approach on an Interjurisdictional Bighead Carp Population in Grand Lake O' the Cherokees, Oklahoma

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Grand Lake O' the Cherokees is formed by three dammed convergent rivers, the Neosho, Spring and Elk rivers. Bighead carp were first reported in the Grand Lake system in the early 1990s with few, periodic

reports being made up until 2022. Being disconnected to any known invaded waters, this particular bighead carp population point source remains unknown. Starting in 2022, letters were sent to fishing guides requesting their assistance with the collection of bighead carp via angling throughout the Grand Lake system. Thanks to these outreach efforts and live imaging sonar advancements, substantially more fish have been caught throughout those years than all previous years combined. With an increased sample size in recent years, we have been able to gain greater insight on this population. Fin clips and ageing structures (i.e., otoliths) were obtained from the collected individuals. Fin clips will provide genetic insights into overall genetic structure and relatedness. Ages will be used to quantify population dynamics. Additionally, otolith microchemistry and telemetry components are underway. Preliminary results suggest that multiple year classes are present with variable recruitment patterns. However, spawning and recruitment success is largely unknown. Our goal with this project is to gain further insight on Grand Lake bighead carp population dynamics as well as their movement patterns and locating potential congregation hotspots in an effort to more efficiently target this population using more traditional sampling gears in the future (e.g. gillnets).

Environmental Factors Related to the Hatch Timing of Riverine Fishes Affected by Hydropower Generation

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Recent emphases on increasing water demands have influenced water-management strategies over the last decade. Particularly, effects on reproductive success as related to dam operations are of great concern. Regulated flows below dams can produce both upstream and downstream changes that alter natural flow regimes and result in atypical environmental conditions that can influence the reproductive success and survival of warmwater fishes. We evaluated the effects of discharge, temperature, and photoperiod on the hatch timing of Alabama Bass *Micropterus henshalli* (ALB), Largemouth Bass *Micropterus nigricans* (LMB), Bluegill *Lepomis macrochirus* (BG), Longear Sunfish *Lepomis megalotis* (LES), and Blacktail Shiner *Cyprinella venusta* (BTS). We collected fishes from both mainstem and tributary sites of the lower Tallapoosa River and backdated them to hatch using their otoliths. Our findings indicate that reproduction among many of the species differed in mainstem and tributary sites resulting from associated dam operations. Specifically, species in the Centrarchidae family, except for LES, in mainstem sites appear to hatch in fall and winter, whereas hatching occurs in the spring and summer in tributary sites, as would be expected. LES and BTS hatching in both mainstem and tributary sites appeared unaffected. It appears that spawning phenology by some species with shared reproductive traits are affected by hydropower operations. Thus, our results emphasize a greater need to understand both the spawning dynamics but also trait drivers associated with our observed differences. Collectively, this information would ensure managed flows allow successful recruitment and survival of age-0 fishes.

Trophic Dynamics of an Expanding Population of Blue Catfish in Albemarle Sound, North Carolina

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The blue catfish (*Ictalurus punctatus*) is a large, generalist omnivore native to the Mississippi River basin. They were first introduced to the Atlantic drainages of North Carolina in 1966 and their range has since expanded to most river basins in the state. They have experienced explosive population growth in other areas where they have been introduced and can have considerable impacts on local fauna and community structure. A relatively high salinity tolerance has enabled blue catfish to expand into brackish water ecosystems, such as the Albemarle sound, which has experienced rapid increases in blue catfish abundance in the past 10-15 years. The potential for predatory impacts by blue catfish on commercially valuable species, such as blue crab, American shad, river herring, and striped bass are unknown. The primary focus of this project is to characterize the diet of blue catfish in the Albemarle Sound ecosystem, including variation in food habitats among seasons, spatial locations (primarily a hypothesized east to west gradient), and predator body size. Field collections of blue catfish will occur through low frequency electrofishing in the Roanoke/Chowan rivers and western Albemarle Sound, and both active and passive gill netting in the central and eastern Albemarle Sound. Sampling was initiated in summer 2023 and will continue approximately bi-monthly for two years. Diets will be informed through both traditional stomach content analysis, with enhanced prey taxonomic resolution from DNA barcoding, and also the analysis of bulk stable isotopes (δN, δC, and δS) in muscle and liver tissue samples. Daily ration of blue catfish will be estimated in different seasons during diel surveys of gut fullness to assess predatory demand at the individual level. The work will provide the first comprehensive study of the trophic ecology of blue catfish in this ecosystem and is the first step toward understanding potential predatory impact.

Using Stationary Radio Telemetry to Determine Survival and Large Scale Movement Patterns of Brown Trout Related to Environmental Variables in the Little Red River

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Anglers and fisheries managers have shown interest in understanding the seasonal movement patterns of Brown Trout *Salmo trutta* in the Little Red River to inform sustainable fishing practices and Brown Trout management. Using stationary radio telemetry equipment has allowed insight to movement, survival, and locations of Brown Trout 10 months following tag implantation. We surgically implanted 150 ATS transmitters into Brown Trout across 70 km of the Little Red River during early December of 2023. Transmitters were covered in surgical mesh, dipped in bees wax, and sutured to the peritoneum membrane to reduce tag loss. Eleven ATS receiver arrays were deployed approximately every 8 km with the furthest upstream at the Greers Ferry Dam and the furthest downstream located above Riverside Park in Searcy, Arkansas. Arrays consisted of one ATS R4500s receiver, a switch box, two 4-element yagi antennae, and a 12 V battery. A 30-watt solar panel was used to keep the battery charged. Throughout the past 10 months, we have confirmed survival and documented movement for 124 of the 150 Brown Trout tagged in December. Movement was characterized three ways, total movement during the study,

movement rate (km/d), and linear home range. Total seasonal movement ranged from 0 to 83 km, average seasonal movement rate ranged from 0.91 km/d to 4.24 km/d, and seasonal linear home range was 8.3 to 21.3 km. Additionally, we attempted to correlate movements with environmental variables (water temperature, dam discharge, day length, and precipitation) to understand physical drivers of Brown Trout movement. Information collected during this study allows insight into Brown Trout movement characteristics and will allow for proper management decisions to be made for regulating Brown Trout populations.

Refining Tar River Spinymussel (*Parvaspina steinstansana*) Broodstock Collection using eDNA

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Captures of Wild Tar River Spinymussel have declined significantly in recent years. Captures often require >175 person hours of targeted survey effort to recover a single individual. Individuals may suddenly be detected in a frequently surveyed reach requiring sites with recent collections to be revisited many times in a field season to successfully collect an individual. The extreme survey effort required limits the time available for regional staff to dedicate to other State and Federally listed species in the region. Also, recent mortalities of hatchery held Tar River Spinymussel broodstock and the constant need to incorporate new, wild genetics into the broodstock pool have made regular collection of wild Tar River Spinymussels vital to the continued success of propagation efforts for the species. In recent years, Eastern region staff have explored alternative sampling schemes to increase the detection of wild individuals. These efforts include site scouting in under-surveyed reaches adjacent to recent records, incorporation of underlying geologic features to inform site selection, large scale sampling events involving many partners and refinement in identifying viable habitat for the species. These efforts have resulted in slightly increased detections in 2022 and 2023 and indicate that work to further increase the efficiency of survey efforts will continue to increase detections. Environmental DNA has been used effectively in the detection of rare Unionid mussels (Currier et al. 2018; Schmidt et al. 2021) and has the potential be a useful tool in the conservation of the Tar River Spinymussel as well. Decreases in per-sample costs and faster processing times make the application of eDNA sample collection on a sub-basin scale more possible than ever. Here, we hope to utilize a systematic eDNA sampling regime to identify reaches of Little Fishing Creek that are likely to contain wild Tar River Spinymussels. The results of this work will potentially result in increased broodstock collections, identification of new sites for broodstock surveys and optimization of survey efforts dedicated to the species.

Movements of Gulf Striped Bass in the Pensacola Bay Watershed

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Preliminary results of an ongoing acoustic telemetry project focused on Gulf Striped Bass (*Morone saxatillis)* in the Blackwater River, Yellow River, and the greater Pensacola Bay watershed. 36 individuals surgically implanted with acoustic tags exhibit various movements throughout the study area monitored by a passive acoustic telemetry array (~75 Receivers). The tagged individuals exhibited seasonal movements correlated with temperature changes and combined with manual tracking illuminated areas

of thermal refuge during periods of high water temperatures. Movements are also used by researchers to target sampling efforts for broodstock collection in the spring to aid hatchery production for the region and provide an alternate broodstock source within the state of Florida.

Describing the Genetically Distinct Fall Spawning Population of Gulf Sturgeon (*Acipenser oxyrinchus desotoi*) in the Apalachicola River

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Adam Kaeser, U.S. Fish and Wildlife Service
Brian Kreiser, University of Southern Mississippi
Jake Zona, University of Southern Mississippi
Adam Fox, University of Georgia

Gulf Sturgeon (*Acipenser oxyrinchus desotoi*) are threatened anadromous fish native to the northern Gulf of Mexico and the coastal rivers connected to it. Although they were historically thought to spawn in the spring, recent studies have indicated that some rivers, including the Apalachicola River in Florida, host a second, genetically distinct, population that spawns in the fall. Previous studies on population dynamics in this river have not distinguished between fall- and spring-spawning populations. The objective of this research is to determine the frequency of Apalachicola River fall spawning using newly available data from that population. For more than 10 years, Gulf Sturgeon were captured in anchored gill nets. Each fish was giving an individual mark and had a genetics sample taken, and a subset had pectoral fin rays taken for aging. Previously, it was difficult to separate fall- and spring-spawned juveniles. However, as part of a recent study, fish were genotyped and assigned to a seasonal spawning population. In a different recent study, ages were assigned based on collaborator's readings of fin rays. We combined these data and were able to determine the year each fall-spawned juvenile hatched. This approach has greatly increased the information available on when fall-spawning has occurred in this river, and is the first step towards better characterizing the Apalachicola River fall spawn.

Evaluating Effects of Lake Renovation on Growth Rates of Largemouth Bass in Karick Lake, Florida

Matthew G. Wegener, Florida Fish & Wildlife Conservation Commission
Summer Lindelien, Florida Fish & Wildlife Conservation Commission

The Florida Fish & Wildlife Commission (FWC) built several small- to moderate-sized impoundments to provide more fishing opportunities in the northwest region of the Florida Panhandle. These lakes are naturally low in primary productivity, so fertilization programs have been used to increase fish biomass to support the high amount of angler effort. However, fertilization programs were recently halted due to potential environmental issues, and these fisheries have reverted to low density populations with slow growth rates. To increase productivity and improve size structure of sport fish populations, Karick Lake (26 ha) was renovated by dewatering, removing excess muck, installing fish attractors and sculpting the lake bottom. Researchers measured the fishery response to this renovation by comparing several pre- and post-treatment metrics. Although the size structure of the population increased following renovation, it was discovered through non-lethal aging techniques that the majority of quality Largemouth Bass had survived the drawdown, and individual growth was slower after renovation than before. Although dewatering was unsuccessful at increasing growth of newly stocked individuals, the cohort that survived the drawdown reached large sizes and resulted in several trophy fish caught by anglers. However, these effects are likely short lived and additional research and management is needed if these trophy fishing opportunities are to persist at Karick Lake.

An Update on the Classification and Determination of Striped Bass (*Morone saxatilis*) Natal Origins in the Arkansas River, OK

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Oklahoma currently sustains two of the few land-locked naturally reproducing Striped Bass fisheries in the country. Reproduction in the Lake Texoma population is well documented. However, reproduction in the Arkansas River population is poorly understood. To help ascertain where Striped Bass reproduction occurs within this system we determined if distinct river segments contained unique chemical characteristics that could be used to estimate where Striped Bass spawning occurs. Assessment via a random forest model with a CART algorithm suggests strontium-calcium, magnesium-calcium, and barium-calcium ratios can be used to predict the segment a sample was collected from. This talk constitutes an assessment of model ability to determine seasonal variation in chemical signatures from the Arkansas River and its tributaries.

A Comparison of Wild and Stocked F1 Largemouth Bass in Smith Mountain Lake, Virginia

Daniel Wilson, Virginia Department of Wildlife Resources

First generation Northern Largemouth Bass and Florida Largemouth Bass intergrades (F1) were stocked annually since 2015 at relatively low densities (1.0-10.0 fish/ac.) to assess the potential for increasing both trophy-size abundance and ultimate size in a large reservoir. The Smith Mountain Lake Largemouth Bass population had an almost even split between Northern and Florida allele frequencies prior to stocking. We used boat electrofishing and angler tournaments to collect largemouth bass, and genetic analyses were utilized to determine origin. While stocked bass comprised less than 6% of the total population, their growth rates exceeded wild bass and accounted for the majority of bass over six pounds collected in 2024.

Overwinter Survival of Juvenile Gulf Sturgeon in the Apalachicola River, Florida

Russell T. Wilson, University of Georgia
Adam Fox, University of Georgia

The Gulf Sturgeon (*Acipenser oxyrinchus desotoi*) is an anadromous sturgeon found in the northern Gulf of Mexico. Habitat alteration and overharvest in commercial fisheries led to the species being listed as threatened under the Endangered Species Act in 1991. To accurately monitor populations trends and recovery, an accurate understanding of population dynamics – including survival – is necessary. Juvenile Gulf Sturgeon are migratory within their natal river system. Their survival is not well-studied, but the winter period when they inhabit more saline waters has been identified as a potential bottleneck to juvenile survival. The objective of this study was to quantify seasonal and annual survival of juvenile Gulf Sturgeon in the Apalachicola River system. From 2014–2023 we used acoustic telemetry and Cormack-Jolly-Seber models to estimate apparent survival rates in each seasonal period. Seasonal survival rates for age-1 Gulf Sturgeon ranged from 0.889 in the spring to 0.983 in the winter. Our results indicated that survival was high across all seasons and refuted our hypothesis of decreased survival during the winter

period. Additionally, we found annual survival to be high in most years. These findings suggest that overwinter mortality of juveniles is not a major bottleneck to Gulf Sturgeon population recovery within the Apalachicola River.

NC Act and TACT - Dam Removal Lessons Learned across State Lines

Anabel G. Winitsky, American Rivers

North Carolina and Tennessee were early adopters of Aquatic Connectivity Teams in the southeast, with the intent to increase aquatic connectivity of the state's streams and floodplains by removing dams and removing or replacing culverts, stream crossings, and other barriers that block the passage of aquatic wildlife. Teams in both states have had their share of successes and challenges while implementing river restoration projects. This presentation reviews some of the similarities and differences between the work of these two aquatic connectivity teams by drawing comparisons between dam removal projects across the states, including those completed and currently in progress.

Current Status of Catfish in North Florida Rivers

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Stephen Stang, Florida Fish & Wildlife Conservation Commission (DFFM)
Andy Strickland, Florida Fish & Wildlife Conservation Commission (FWRI)

Flatheads are a non-native ictalurid species that were first documented in Florida Panhandle rivers in the early 1950s. Since their introduction, Flathead have spread and can now be found in most major Florida Panhandle rivers. Catfish monitoring has been limited within Florida over the years. The most recent standardized catfish sampling was conducted in 2012 on the Choctawhatchee River. Other rivers such as the Ochlockonee have not been sampled since the late 2000s. In recent years biologists observed an abundance of Flatheads in systems where few were observed previously. This lead to concerns regarding the status of Flathead and native ictalurids in North Florida rivers. Recent catfish research has taken place on the Chipola, Ochlockonee, and Choctawhatchee rivers. In 2023, the Chipola was sampled within a 48-km section between Yancey and Johnny Boy Landing. A subsample of Flatheads were kept for diet analysis and aging. Seven ictalurid species were collected, with Flatheads being most abundant. The upper part of the Chipola had the highest abundance of Bullhead species (Ameiurus spp.) and lowest abundance of Flatheads. The abundance of Bullhead decreased as the abundance of Flathead increased downstream. Diet analysis showed that crayfish were the primary prey item of Flatheads in the Chipola. Flathead ages ranged from 0 to 10 years old with most being less than 5 years old. The Ochlockonee and Choctawhatchee were sampled in 2024, with 25 random sites selected. On the Ochlockonee, four ictalurid species were collected with Flathead being most abundant. When compared with historical data, all native ictalurid species decreased in abundance. On the Choctawhatchee, three ictalurid species were collected with Flathead being most abundant. In the Choctawhatchee, no Bullhead were observed or collected, though they were present in historical samples. This research allows biologists to better understand catfish populations, and establish a long-term monitoring program.

Exploring the Distribution and Occupancy of the Rocky Shiner in Arkansas

Savannah Wise, Arkansas Tech University

John Jackson, Arkansas Tech University

The Rocky Shiner (*Notropis suttkusi*) is a species endemic to the Little River and its tributaries in southwestern Arkansas and southeastern Oklahoma. This species is currently petitioned for listing under the Endangered Species Act (ESA) and is classified as a species of greatest conservation need in Arkansas. To clarify the distribution of *N. suttkusi* in Arkansas, we randomly sampled a combination of fifteen historical and novel sites in three tributaries of the Little River (Rolling Fork, Cossatot, and Saline) during the summer of 2023 and 2024, employing a conditional occupancy approach. This method entails resampling occupied sites and is useful for studying rare or cryptic species. Physical habitat and water quality data were collected across each site, and microhabitat characteristics were recorded for each seine haul. All fish caught were identified, and body measurements of *N. suttkusi* were documented. Eight out of the twenty-nine sites sampled were found to be occupied by our target species. Five of these sites were located on the Cossatot River, with two on the Rolling Fork and one on the Saline River. A total of 119 *N. suttkusi* were observed across 45 sampling events. After resampling, single-season, single-species occupancy modeling was performed to estimate occupancy rate ($\Psi = 0.75$) and probability of detection ($p = 0.37$) without covariates. The top occupancy models indicate that the predominance of smaller substrate across a site has the most significant effect on site occupancy, and higher discharge rates positively influence the probability of detection. Interestingly, our analysis shows a negative relationship between cobble substrate and *N. suttkusi* occupancy, contrasting previous descriptions of their habitat use in Oklahoma populations. Results of this study provide a broader understanding of this species' distribution across its entire range. These data will also contribute to the upcoming Species Status Assessment and help guide conservation strategies aimed at protecting the species.

Brown Trout Post Stocking Survival in Lake Jocassee, SC

William Wood, South Carolina Department of Natural Resources

Post stocking survival rate of recently stocked Brown Trout Salmo trutta (BNT) were estimated by tagging seventy-seven BNT with acoustic transmitters and tracking the tagged fish for 8 weeks post-stocking. Stocked trout were subdivided into diploid and triploid groups to estimate if one ploidy experienced better survival than the other. Trout were stocked at four different locations throughout Lake Jocassee to assess if stocking location affected survival rates.

Black Crappie Installed Habitat Utilization in Lake Keowee, SC

William Wood, South Carolina Department of Natural Resources

South Carolina Department of Natural Resources (SCDNR) staff tracked 41 Black Crappie *Pomoxis nigromaculatus* (BLC) during spring 2024 using acoustic telemetry to determine if BLC in Lake Keowee utilize artificial habitats installed by SCDNR management staff. Management staff detected a tagged BLC fifty-one times within 10m of installed habitat structures and one hundred nineteen times within 15m of installed habitat structures. This study was conducted from April to June 2024 during the post-spawn period. Based on this data SCDNR management staff believe BLC are utilizing installed habitats, but bottom structure availability is superseding cover availability. Future habitat enhancement projects should focus on deploying artificial habitats in areas with ideal structural elements.

Blue and Channel Catfish Gill Net Selectivity in Texas Reservoirs

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Gill nets are commonly used in freshwater systems to survey fish populations but are highly selective based on fish size. The Texas Parks and Wildlife Department (TPWD) frequently assesses Blue and Channel Catfish populations with gill nets in Texas Reservoirs, but size selectivity has not been evaluated for the TPWD gill net configuration. Our objectives were to calculate size selectivity for the TPWD gill net and evaluate differences in size structure (PSD, PSD-P, PSD-M) and mortality estimates between unadjusted and selectivity adjusted data. Ten Blue Catfish and six Channel Catfish populations were sampled from 2020-2023 and a total of 3,268 Blue Catfish and 2,087 Channel Catfish were used to calculate selectivity curves. Catch data was pooled among reservoirs for each species and five different log-linear selectivity curves were calculated. For both species the bimodal model was the best fit among model types. Blue Catfish peak selectivity was 575 mm while Channel Catfish peak selectivity was higher at 659 mm. We used the bimodal selectivity model to adjust length-frequency data from historical surveys to examine the impacts of gill net selectivity on Blue and Channel Catfish size structure indices. Meaningful changes to Blue Catfish size structure estimates (≥ 5 units) occurred for 11.1%, 10.1%, and 12.4% of all PSD, PSD-P, and PSD-M estimates, while meaningful changes to Channel Catfish size structure occurred for 63.4%, 1.4%, and 0.0% of all PSD, PSD-P, and PSD-M estimates, respectively. Selectivity adjustments had marginal impact on mortality estimates as over half of all estimates changed by less than 2% and no estimate changed more than 6.4%. The impacts of selectivity adjusted data were variable among species and metrics, however, adjusting catch data for size selectivity can provide more accurate assessments of length-based metrics.

Dam Removal to Reconnect Diadromous Fish to Historical Habitats across the Rapidan - Rappahannock River Basin, Virginia

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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. 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 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.

Using Nature's Own Tools to Expedite Climate Adaptation

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Global temperatures are steadily rising, posing a significant threat to biodiversity and ecosystems. Genetic modification holds the potential to help species adapt to these changes by enhancing their resilience—a strategy already underway for organisms like the American Chestnut and Black-footed Ferret. However, genetic modification is often seen as extreme or unnatural, creating barriers to funding, regulatory support, and public acceptance. This project seeks to offer a balanced, nature-driven alternative by focusing on Brook Trout, an iconic species native to the Appalachian region. Rather than introducing foreign genes or designing new traits, our work seeks to amplify naturally evolved adaptations already present within specific Brook Trout populations. Brook Trout span a North-South gradient, exposing them to a range of climate pressures, and they are distributed across thousands of discrete populations, making them an ideal "natural laboratory" for studying climate adaptation. Through landscape genomics, this research will identify the adaptive genes in Brook Trout populations facing extreme environmental conditions. The aim is to build a collaborative network to propagate these adaptations across the Brook Trout range using targeted genetic intervention and fish hatcheries. By using nature's own tools, this approach enhances resilience without creating anything artificial—giving species a chance to survive by amplifying what they already possess and setting the stage for broader applications in conservation.

Lab Based Estimates of Long-Term Bowfishing Shoot-and-Release Mortality with Comparisons to Prior Work and Considerations for Future Bowfishing Research and Management

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Bowfishing participation appears to be increasing across the United States of America. There is a need to further study bowfishing and its potential effect on fish populations, especially native nongame fishes. Currently only short-term shoot-and-release estimates are available for bowfishing. Our study objectives were to generate lab estimates of long-term shoot-and-release mortality estimates, determine if native nongame (NNG) or invasive fishes displayed differential mortality, and compare NNG, invasive, and overall bowfishing mortality rates from our study to prior estimates to determine the ability of lab-based studies to answer bowfishing specific questions. Fishes were collected from Lake Thunderbird, the Oklahoma River, and Lake Stanley Draper and transported to the Oklahoma Fishery Research Laboratory. Transport mortality was estimated, and fish were shot with an arrow and redistributed to convalescent holding pools. Short- (120 h) and long-term (89 d) mortality was estimated and compared to prior work. Mortality comparisons between shot and control NNG and invasive fishes along with mortality comparison between shot locations were conducted and compared to prior work. Transport mortality was higher for NNG fishes compared to invasive fishes. Short- and long-term mortality estimates were lower than prior short-term estimates. There was no difference in mortality rate for shot NNG and invasive fishes. Control mortality was different between NNG and invasive fishes. Shot NNG mortality was similar to prior work. Shot invasive mortality was lower than prior work. Mortality varied by shot location. Shot locations distribution varied from prior work. Bowfishing mortality from this study was lower than prior estimates but still among the highest estimates available for catch-and-release fishing, suggesting shoot-and-release may not be a viable management strategy. More information is needed on bowfishing and NNG fishes to confirm these findings. Several different regulatory options are available to managers if they become needed.

Stream Fish Species Richness and Base Flow in the United States

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Base flow is critical to lotic systems, providing refugia through droughts and buffering water temperatures from extreme thermal conditions. Relative to other flows, base flow is an understudied component in lotic systems as it relates to fish species richness. We used over 20,000 electrofishing surveys across 29 US states to build a Bayesian hierarchical model to test the relationship of base flow on fish species richness in wadable streams. At the stream reach scale, mean annual flow (MAF), the coefficient of variation (CV) of mean annual flow, and the hydrologic alteration index (HAI) were regressed against naïve species richness. The eight-digit hydrologic unit code (HUC-8) scale from the Watershed Boundary Dataset grouped streams with similar flow characteristics to model random slopes and intercepts for MAF by watershed. The second level of the model evaluated the effect of base flow (through the base flow index [BFI]; base flow as a percent of total flow) and the CV of BFI on the effect of MAF, effectively quantifying the effect of BFI while accounting for MAF. The 95% and 80% credible intervals identified strong and moderate effects. At the reach scale, both HAI and the CV of MAF had strong positive effects (0.12±0.06 [95% CI] and 0.31±0.16 [95% CI]) on naïve species richness, respectively. The effect of MAF on naïve richness differed across watersheds, with strong positive effects in 177, moderate positive effects in 31, and no effect in 61 HUC-8s. At the second level of the model, BFI and the CV of BFI had strong and moderate positive effects (0.01±0.01 [95% CI] and 0.54±0.51 [80% CI]), respectively. Our results indicate that while accounting for MAF, watersheds with greater mean and variation in base flow support greater fish diversity. Base flows in streams are often not considered in stream fish studies, yet our findings support the idea that base flow often has a positive effect on fish diversity and may be considered in future fish conservation.