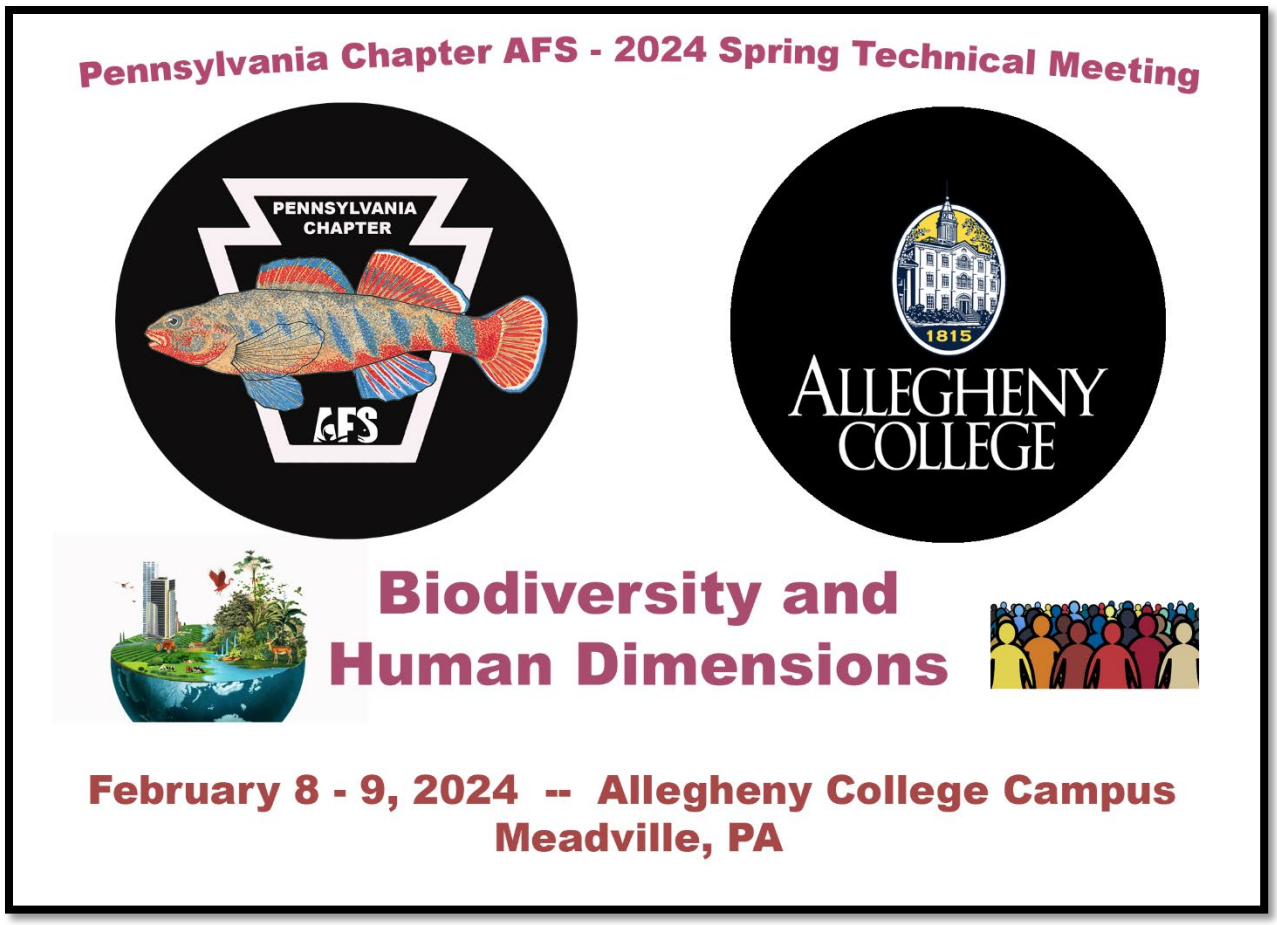


2024 Spring Technical Meeting Compendium

February 8-9, 2024

Allegheny College

Schultz Banquet Hall

Meadville, PA

Contents

Day 1 Meeting Schedule

Time	Thursday February 8th, 2024 Schultz Banquet Hall - 549 Park Ave, Meadville, PA 16335
7:00 – 8:30	**Technical set up: Check-in and registration**
8:30	Welcome and introductions: PA AFS Chapter President **Clayton Good**
8:40	Opening remarks: **Dr. Angela Haddad**, Provost of Allegheny College and **Dr. Casey Bradshaw-Wilson**, Watershed Conservation Research Center, Allegheny College
9:00	PLENARY: **Dr. Stuart A. Welsh,** Assistant Unit Leader, WVU Cooperative Fish and Wildlife Research Unit Hornyheads, Madtoms, and Darters: Appalachian Fish Diversity for a Diverse Audience
	MORNING TECHNICAL SESSION
	Session 1: Ecology and biodiversity
9:30	**John Tautin et al.** – Surveys of fish and mussels prior to removal of a low-head dam on Cussewago Creek
9:50	**Dakota J. Raab et al. --** Instream flow study for the maintenance of freshwater mussel populations in the Shenango River, Crawford County, Pennsylvania
10:10	**Mark Haffley** – The Pennsylvania Fish and Boat Commission's Lake Erie Walleye telemetry project
10:30	*Break*
	Session 2: Environmental conditions and impacts
10:40	**Gregory R. Moyer and Matthew K. Shank** – Assessing the influence of underlying bedrock geology on pH of Pennsylvania headwater streams
11:00	**Andrew Turner and Shane Hofius** – Chemical fragmentation of stream systems and fish species richness: The upstream effects of water pollution
11:20	**Mark A. Kirk et al.** – Effects of stream crossing type on fish assemblages and stream ecosystem conditions: Implications for culvert replacement
11:40	**Luanne Steffy** – Evaluating fish assemblages at four stream sites with increasing temperature trends over the last decade
12:00	*Lunch*
	AFTERNOON TECHNICAL SESSION
	Session 3: Student Presentations Session
1:00	**Eden Brody** – Mechanisms behind the decline of a Class A Brown Trout fishery (Caldwell Creek)
1:15	**Bridget Reheard** – Evaluation of shale gas development and wastewater spills as drivers of biological changes in second-order streams in northcentral Pennsylvania
1:30	**Etienne Pienaar et al.** – Spatial distribution of Eastern Sand Darter (*Ammocrypta pellucida*) in western Pennsylvania

	Session 4: Conservation principles and policy
1:45	**Logan Stenger and Maggie Ritchey** – A novel conservation approach: an introduction to the Rapid Stream De-listing Strategy
2:00	**Patrick D. Shirey and Susan A. R. Colvin** – Supreme Court ruling on Sackett v EPA redefining Waters of the United States (WOTUS): What does it mean for wetlands, streams, and fish?
2:20	*Break*
	Session 5: Restoration
2:30	**David Andrews** – Using citizen science to determine the effect of Thorn Creek habitat improvements
2:50	**Chuck Keeports** – Strategic wood additions in streams on the Allegheny National Forest
3:10	**Steve Seiler et al.** – Initial response of floodplain reconnection and wood addition to the fish community in the Little Arnot Run Watershed, Allegheny National Forest
3:30	**Meredith Barney et al.** – Evaluating the long-term success of two stream-bank restorations within the French Creek Watershed
3:50	**Brady Porter** – Recovery of fish community structure following the removal of a dam on Little Sewickley Creek
4:10	**Jim Grazio** – Lake Trout habitat rehabilitation in Lake Erie
4:30	Adjourn technical sessions
5:00 – 7:00	**Dinner on your own**

Plenary Speaker Bio

Dr. Stuart A. Welsh, Assistant Unit Leader, WVU Cooperative Fish and Wildlife Research Unit

Stuart Welsh is a native of Beckley, WV, and currently lives in Morgantown, WV. He completed his graduate education in the 1990s, including MS and PhD degrees from Frostburg State University and West Virginia University, respectively. Currently, he is a fisheries research scientist with the U.S. Geological Survey's Cooperative Fish and Wildlife Research Unit, where he addresses research and technical needs of the U.S. Geological Survey, West Virginia Division of Natural Resources, U.S. Fish and Wildlife Service, and other natural resource agencies and organizations. He also serves as an adjunct professor of ichthyology at West Virginia University, where he mentors graduate students and conducts fish research in the areas of taxonomy and systematics, species distribution, movement ecology, habitat use, and endangered species.

Evening Poster Session and Social

Schultz Banquet Hall – 7:00 – 9:00

EVENING POSTER SESSION and SOCIAL (*STUDENT PRESENTER)

Connor Haskins* , David Argent , Joe Ream, and Joel Dean – Age and growth of Smallmouth Bass (Micropterus dolomieu) in the Monongahela and Youghiogheny rivers

Liam Hanley*, Dr. Andrew W. Hafs, and Tyler Orgon – The effects of length, weight, age, and gender on total mercury concentrations in Burbot in North-Central Minnesota lakes

Keri Saulino*, Samuel Nutile, Lynne Beaty, and Adam Simpson – Examining catch methods, body condition, and age distribution of Round Goby (*Neogobius melanostomus*) in Lake Erie's Pennsylvania Tributaries

Mallory Causer*, Samuel Nutile, and Lynne Beaty – Discovering differences in eyespot size and color in invasive round gobies using local Erie populations

Autumn Holdsworth*, Abbi Fields*, and George Merovich – Evaluating Walleye (Sander vitreus) spawning effort on constructed rock rubble reefs in Raystown Lake

Jason Chen*, Lynne E. Beaty, Jason Bennett, and Samuel A. Nutile – Mercury and selenium in Round Goby from the Pennsylvanian waters of Lake Erie and its tributaries

Yasmine Florent*, **Mackenzie Nemoto***, Vanessa Pratt, Ana Rowley, **Maria Isabel Villegas*** -- Dangers of oxybenzone in sunscreens on coral reefs: Proposed policy approaches

Cole Pennington* and Gregory R. Moyer – Managing for Northern Pike in a small impoundment with an overabundant Bluegill Sunfish population

Graham Zechman*, Gregory R. Moyer, and Luanne Steffy – Understanding the fate of phosphorus in the acid mine drainage impacted Tioga River watershed

Lacey D. Rzodkiewicz* and Martin M. Turcotte – Common cyanotoxin alters tritrophic interactions among herbivores, macrophytes, and cyanobacteria

Luke Beall*, Nelson Squires, Brianna Frantz, Beth Dakin, Anthony Honick, and Brady Porter – Fish community surveys at the Union City dam of French Creek

Emily Bierer* and Dr. Brady Porter – Characterization of blue and green chromoproteins in percid fishes

Felicia Bedford*, Emily Bierer, and Brady Porter – Identification and validation of intraspecific haplotype variation using environmental DNA metabarcoding

Wendy Kedzierski, Blake Vowler, Kaitlyn Royal, Bianca Sanchez, and Ryan Crozier – Community science investigations of stream chloride and impacts to aquatic life: Creek connections and salt watch

Samuel A. Nutile, Adam M. Simpson, Olivia C. Hodgson, Ashley E. Russell, Jeremiah D. Keyes, Cody Wood , and Ronald J. Buckanovich -- Are you sure you want to eat that? Insights from environmental monitoring and physiologically-based pharmacokinetic modeling of trophic transfer of PCBs from fish to humans

Phil Thomas and Kathleen Lavelle – The why, where, and how of large wood additions and impacts on trout streams

Kyle H. Clark, Dakota J. Raab, Jordan R. Allison, Gregory P. Lech, and Nevin T. Welte – Summary of PFBC state-wide mussel surveys 2023

Greg Lemke, Adam Simpson, Lynne Beaty, and Samuel Nutile – Evaluating round goby's use of Lake Erie's tributaries using otolith elemental analysis

Brady Porter, **Beth Dakin**, and Mike Koryak – Improvement of the fish community of Nine Mile Run (Allegheny County PA) following reclamation

Nelson Squires, Luke Beall, Abigail Powell, Beth Dakin, Anthony Honick, and Brady Porter – Rediscovery of a relict population of brindled madtom in Crooked Creek

Day 2: Workshop Descriptions and Facilitator Bios

Time	Friday February 9th, 2024
7:00 – 8:00	**Technical set up: Check-in and registration**
	CONCURRENT WORKSHOPS
8:00 – 12:00	[1]Geospatial operations and workflows in R – Matt Shank - PA DEP
8:00 – 12:00	[1]The Identification of Central Appalachian Darters – Nate Owens WV DNR
8:00 – 12:00	[2]Freshwater mussels of the French Creek (Ohio basin) watershed – Rick Spear PA DEP, Dakota Raab PFBC, Nevin Welte PFBC, and Joe Brancato PA DEP
12:00	**Adjourn**

[1] R and darter workshops will be held in Carr Hall

[2] Mussel workshop will be held in Schultz Banquet Hall

All 4 hour workshops qualify for 2 PDPQs for AFS Professional Certification

Geospatial operations and workflows in R

R is a versatile programming language widely used in the data science and geospatial communities. This workshop will focus on leveraging R to perform simple, but powerful geospatial operations, including spatial clips and selections, buffers, and calculation of point, line, and polygon statistics. Accessing and importing spatial data from various sources will be covered. Presentation quality and interactive map creation will be included. Projections, transformation, and exporting geospatial features developed in R as shapefiles will also be covered. The workshop will follow tidy coding principles, utilizing sf and tidyverse packages. Workshop materials will be available online and fully reproducible. Participants will ideally have some experience with R, but newcomers are welcome.

Facilitator: Matt Shank (mattheshan@pa.gov)
Water Program Specialist
PA Department of Environmental Protection

Matt is a Certified Fisheries Professional with BS and MS degrees from Gettysburg College and Penn State University, respectively. He is currently employed at the PA Department of Environmental Protection, where he wrangles large datasets to answer complex environmental questions. In his free-time, Matt enjoys catching large trout on small flies, hunting, and taking photographs in Penn's woods.

Freshwater mussels of the French Creek (Ohio basin) watershed

Facilitators: Rick Spear (PADEP), Nevin Welte (WPC, PFBC), Dakota Raab (PFBC), Joe Brancato (PADEP)
(rspear@pa.gov), (c-nwelte@pa.gov), (draab@pa.gov), (jbrancato@pa.gov)

Learn about the ecology, biogeography, and identifying characteristics of French Creek's freshwater mussels. Workshop will include a lecture portion followed by a hands-on identification exercise and test of your knowledge.

Dakota Raab is a fisheries biologist with the Fish and Boat Commission. He earned an undergraduate degree at SUNY Cobleskill and a Master's at Kentucky State University. Originally interested in non-game fish management, he shifted interests to freshwater mussels after spending a summer surveying federally listed species with the Georgia DNR. As a member of the PFBC Division of Environmental Services, Dakota has surveyed mussels in each of Pennsylvania's major river basins.

Nevin Welte is a mussel biologist for the Pennsylvania Fish and Boat Commission. He earned his degrees at Mercyhurst and Tennessee Tech University and had his first mind blowing experiences with mussels while snorkeling 123 miles of the upper Delaware River with the U.S. Geological Survey. Nevin began working with PFBC in 2006 and currently helps guide agency mussel conservation actions. He is a member of the Pennsylvania Biological Survey Mollusk Committee and is a member of the Freshwater Mollusk Conservation Society.

Rick Spear is an Aquatic Biologist Supervisor for the PA DEP Pittsburgh Office. He earned a B.S. degree in Marine Biology from Stockton University. He has been working with mussels for 21 years and he is DEP's expert on freshwater mussels. He is the President of PA Biological Survey Mollusk Technical committee and is a member of the Freshwater Mollusk Conservation Society. He thinks mussel are fascinating animals and enjoys collecting, teaching, and learning about freshwater mussels.

Joe Brancato is an Aquatic Biologist Supervisor with the PA DEP Northwest Regional Office. He earned a BS Degree from Penn State University in Wildlife and Fisheries Science and an MS in Aquatic Biology from Clarion University. While primarily a bug guy, his interest shifted to freshwater mussels and how it relates to NPDES permits in the Allegheny River, Shenango River and French Creek watersheds. He has conducting extensive mussel survey work in these watersheds over the last several years and now finds it impossible to walk into a stream without picking up every piece of shell material on the river bottom.

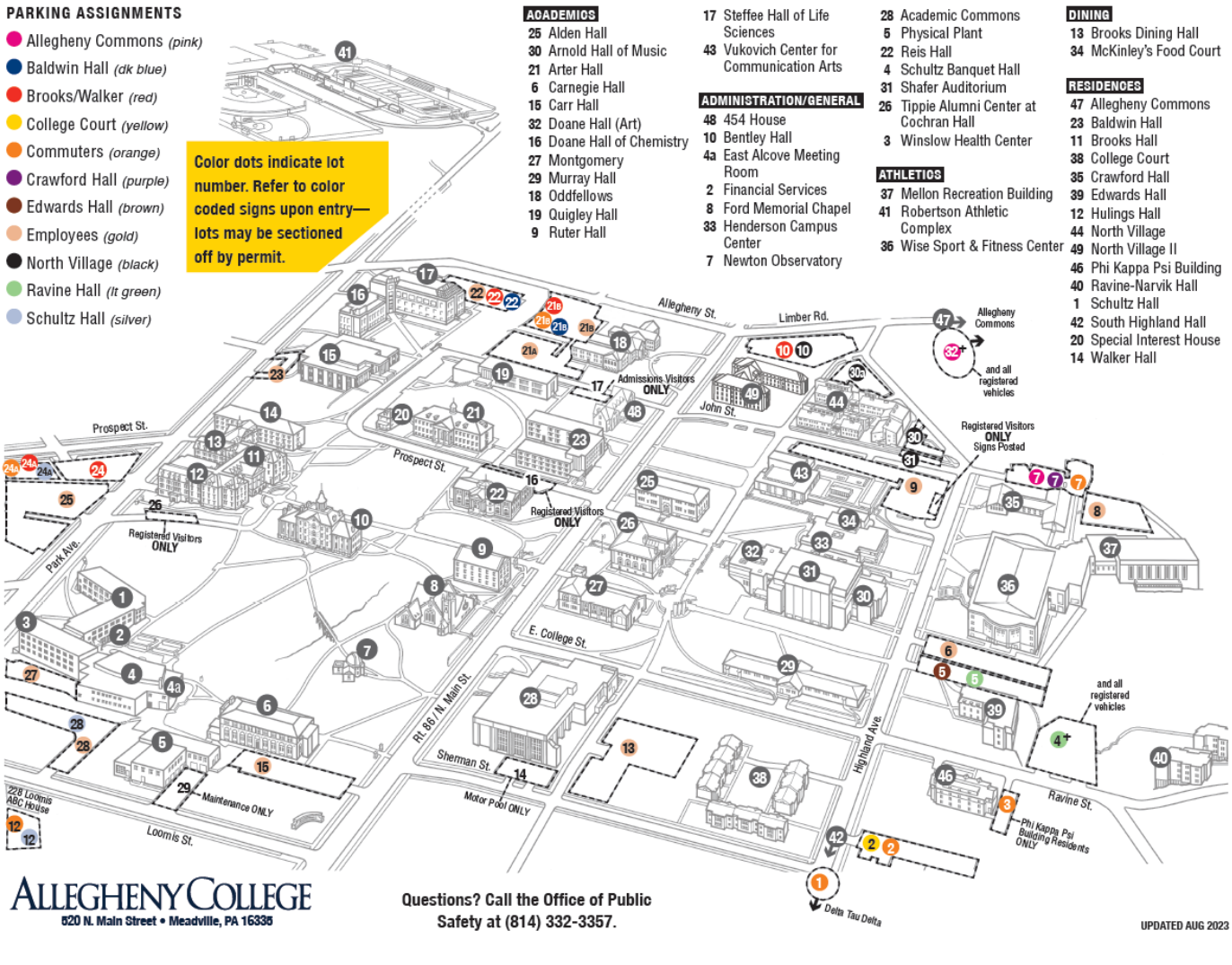
The Identification of Central Appalachian Darters

Facilitator: Nate Owens – West Virginia DNR (nathaniel.v.owens@wv.gov)

In this workshop, participants will receive hands-on training on fixing, preserving, and identifying the Mid- Atlantic darter fauna found on both sides of the Appalachian Divide. If possible, students should bring regional identification keys to actively participate the training session. Also, it is recommended that participants bring problematic/unknown specimens to the workshop so that the instructors may confirm their identification. Dissecting scopes will be available for workshop participants.

Nathaniel (Nate) Owens is the Wildlife Diversity Fish Program Leader with the West Virginia Division of Natural Resources in Elkins, WV. He earned both his B.S. and M.S. degrees at West Virginia University. Nate has worked within the WVDNR wildlife diversity fish program since 2014 and while doing so he has conducted a variety of fish community, habitat, and genetic evaluations to document the distributions and status of fishes within WV. His master's research focused on assessing the benthic fish assemblages and habitat use of small bodied benthic fishes in the large rivers of West Virginia. Currently, he spends a considerable amount of his time developing and implementing conservation plans and actions to conserve the fishes of greatest conservation need within West Virginia. In his off time he enjoys fishing, hunting, skiing, working on his family's farm and hunting property, scuba diving, and snorkeling. His favorite part of his current position is being able to provide as many learning opportunities as he possibly can to his employees, especially temporary ones, to help foster them into the next stage of their careers to hopefully become a contributing member of our profession.

Allegheny College Campus Map



Day 1 – February 8th – Activities will be held in Schultz Banquet Hall (**4 on map**)

Day 2 – February 9th – Mussel workshop will be held in Schultz Banquet Hall (**4 on map**)

R and darter workshops will be held in Carr Hall (**15 on map**)

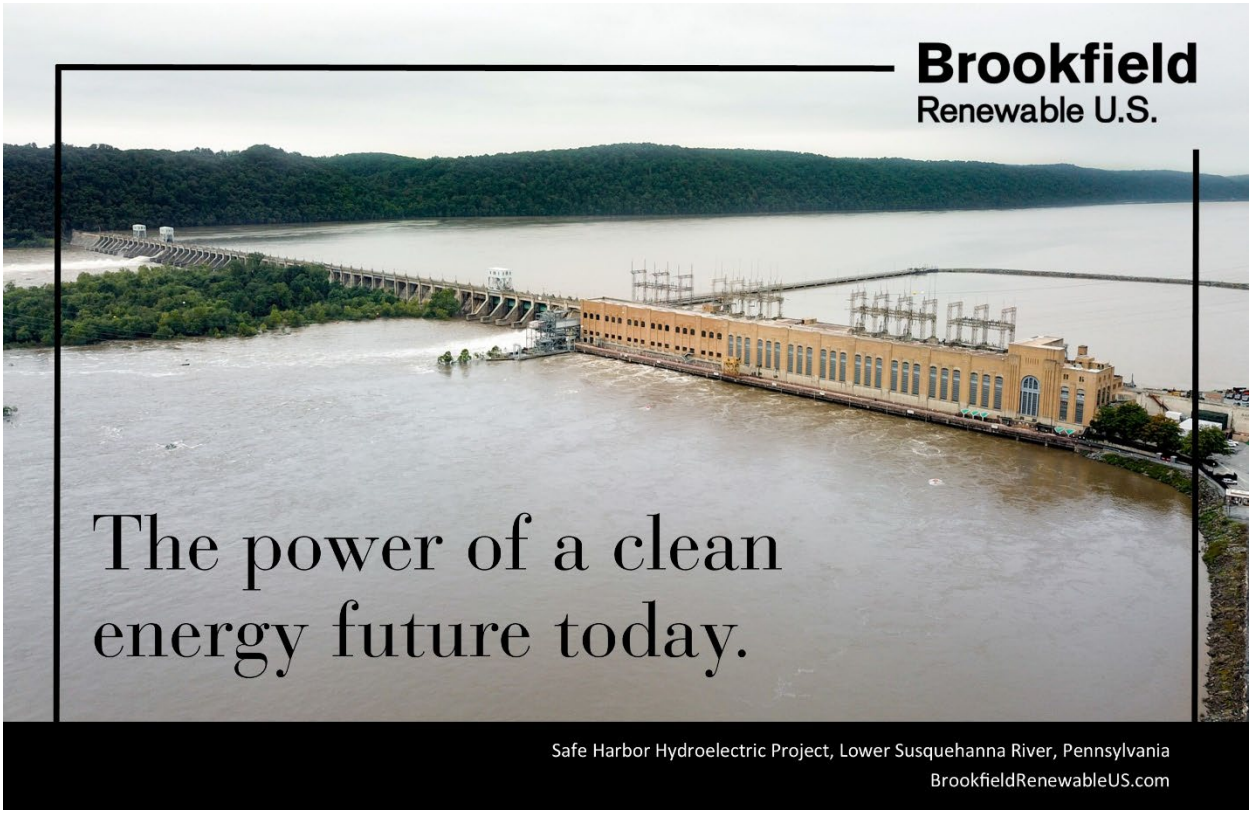
Parking available in lots 13, 25, and 27. Entry to Shultz Banquet Hall can be accessed via Park Avenue or through campus (see inset below)

Attendees can park in marked lots # 13, 25 & 27. There is a breezeway from Park Ave through the building.
There is a blue star indicating the entrance to Schultz East Alcove

Meeting Sponsors

Golden Redhorse MEETING SPONSORS

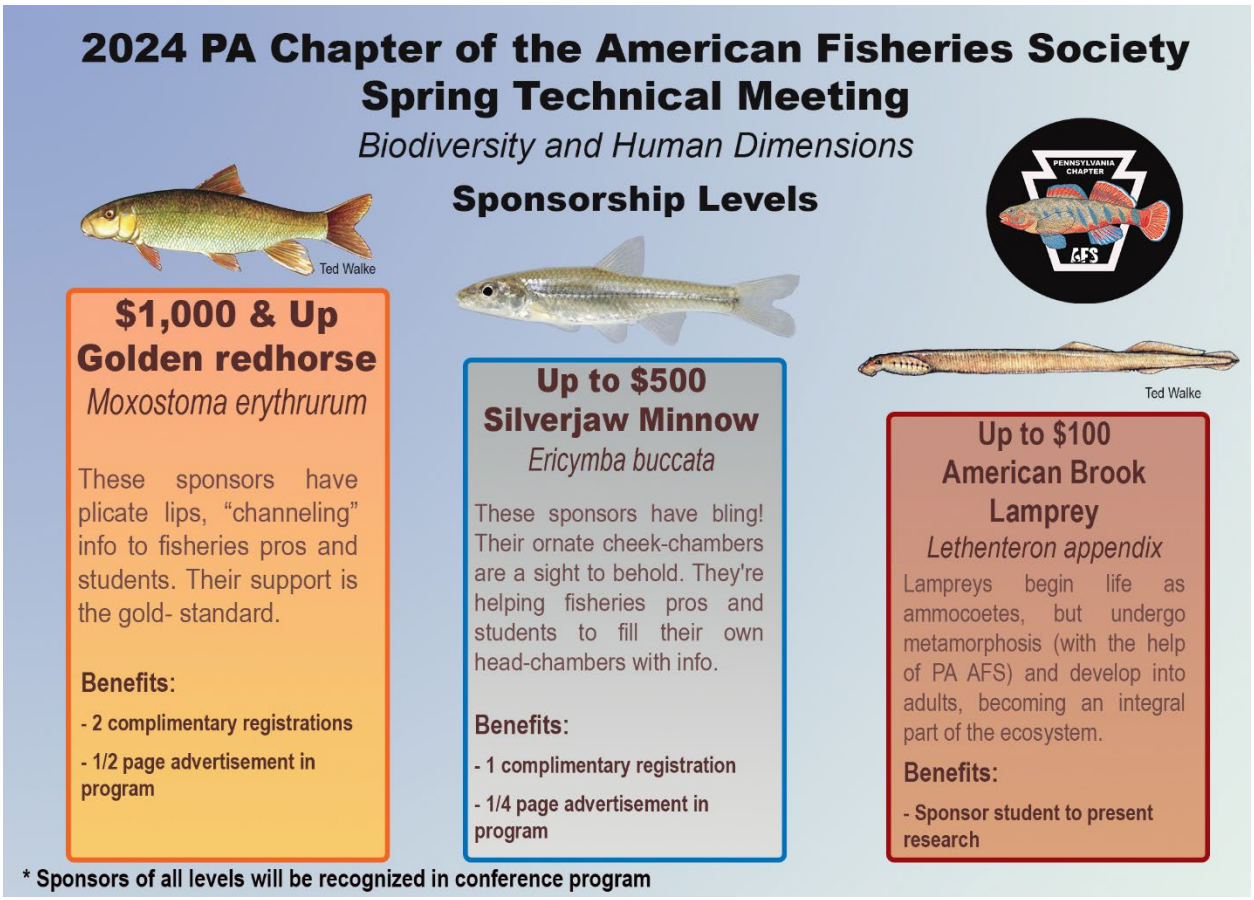
Foundation for Pennsylvania Watersheds



Silverjaw Minnow MEETING SPONSORS

Social Sponsors

SEVEN MOUNTAINS WINE CELLARS



Local Restaurants

We recommend checking out the following locally owned restaurants during your stay:

- **Voodoo Brewing Company** – 215 Arch Street, Meadville (4.5★, $$)
- **Firehouse Tap & Grille** – 875 Park Avenue, Meadville (4.5★, $$)
- **Julian's Bar and Grill** – 299 Chestnut Street, Meadville (4.5★, $$)
- **Triple Deuce Saloon** – 15755 US 6, Meadville (4.8★, $)
- **Kettle Lake Kitchen** – 910 Market Street, Meadville (4.8★, $$)
- **Hitchy's Tavern and Grille** – 18454 US Hwy 6 And 19, Saegertown (4.7★, $$)
- **McClure's Fish House** – 964 Park Avenue, Meadville (4.7★, $$)
- **Diamonds All Star Grille** – 272 Chestnut Street, Meadville (4.7★, $)
- **JT's SteamTable Restaurant** – 217 Chestnut Street, Meadville (4.6★, $$)
- **Pennsylvania Sandwich & Pizza Co.** – 342 North Street, Meadville (4.6★, $)
- **Timbercreek** - 11191 Highline Drive, Meadville (4.1★, $$)
- **Fat Eddy's (BBQ)** - 11142 Highline Drive, Meadville (4.1★, $)

Summer Social Info

The Pennsylvania Chapter

AFS 2024 Summer Social

Raystown Field Station

Saturday July 20, 2024

Lunch at Noon: Please bring a covered dish or dessert

Business Meeting at 3 PM

With introduction of new officers

14322 Field Station Lane, Entriken PA 16638
GPS Coordinates: 40.367336, -78.144544

Fun for the whole family by the lake!

Come early. Stay late – Hiking, canoeing, kayaking, fishing, fish collecting, swimming, sightseeing, conversation

Lodges available for a weekend stay on the RFS campus
Ask about lakeside camping as well

For more information about the event contact: **George Merovich** at MEROVICH@Juniata.edu
To learn more about the Juniata College Field Station visit: www.Juniata.edu/offices/field-station

Podium Presentation Abstracts

* INDICATES A STUDENT PRESENTER TO BE JUDGED

Surveys of fish and mussels prior to removal of a low-head dam on Cussewago Creek

John Tautin, Brenda Costa, French Creek Valley Conservancy
Douglas Fischer, Nevin Welte, Jordan Allison, Kyle Clark, Dakota Raab, Pennsylvania Fish and Boat Commission
Casey Bradshaw-Wilson, Allegheny College

Cussewago Creek, a main tributary of French Creek in Northwestern Pennsylvania, is recognized as having exceptional richness of fish and mussel species, particularly in the riffle-run-pool habitat of the last 1.4 km. before it enters French Creek at Meadville, PA. Above that, a 1.3 m. low-head dam constructed in 1935 had inundated similar habitat and restricted movement of fish (and the mussel larvae they host) until October, 2023, when the dam was removed. To meet permitting requirements, and in anticipation that some species recently found only below the dam would recolonize a 1.0 km. stretch above the dam after its removal, we conducted surveys of fish and mussels above and below the dam in the summer of 2022. Fish were surveyed following boat and backpack electro-fishing protocols, and mussels were surveyed following qualitative time search and grid protocols. Results indicated greater species richness below the dam (52 fish species; 15 mussel species) than above (32 fish species; 8 mussel species). We predict that in due time after sediment moves out and more rock and gravel substrate is exposed, repeat surveys will show that numerous species of fish and mussels recently found only below the dam will have recolonized the formerly inundated stretch of Cussewago Creek above the dam. Furthermore, we predict that some of these species will also utilize habitats upstream of the formerly impounded section, in particular riffles within the lower course of Cussewago Creek.

Presenter: John Tautin; jtautin@windstream.net

Instream Flow Study for the Maintenance of Freshwater Mussel Populations in the Shenango River, Crawford County, Pennsylvania

Dakota J. Raab, Jordan R. Allison, Katelynn M. Sallack, Kyle H. Clark, & Nevin T. Welte Pennsylvania Fish and Boat Commission – Division of Environmental Services

Mussels are vulnerable to altered flow conditions resulting from dam operations. Based on observations of altered flow regimes and at the recommendation of an interagency team consisting of the USFWS, the USACE, the DCNR and the PFBC, we studied Shenango River flows from 2017 to 2018 to formulate flow management recommendations for operation of the Pymatuning Dam that are protective of the state and federally listed mussels. Data from the USGS gauge at Pymatuning Dam in conjunction with HOBO level loggers that were deployed at three downstream sites were used to predict water surface elevation (WSE) changes as they relate to dam operations. WSE data were paired with mussel survey data to predict the level at which occupied mussel habitat would be dewatered, referred to as a stranding threshold. Data were also used to predict the lag time between decreases in discharge at the reservoir and the corresponding WSE drop at each established cross-section. Using relationships between site specific WSEs and USGS gauging data, we predict that mussel stranding will occur at discharges below 1.02 cms (36 cfs). Similarly, stranding thresholds are predicted to be exceeded after five hours without flow. Based upon these results, we recommend that a minimum discharge of 1.13 cms (40 cfs) be maintained at the USGS Pymatuning Dam gauging station, and that any reduction in discharge resulting in flows lower than 1.13 cms (40 cfs) should not persist for more than four hours to protect occupied mussel habitat.

Presenter: Dakota J. Raab; draab@pa.gov

The Pennsylvania Fish and Boat Commission's Lake Erie Walleye Telemetry Project

Mark Haffley, Pennsylvania Fish and Boat Commission

In 2017 the Pennsylvania Fish and Boat Commission (PFBC) started a grass roots campaign to solicit donations for financial support to begin an acoustic telemetry study in partnership with other Lake Erie resource agencies and Universities. The PFBC wanted to take part in an Eastern basin spawning site study called "Do Discrete Spawning Stocks Contribute Differentially to Lake Erie Walleye Production". It has been long believed that most of the Lake Erie Walleye production happens in the West basin but with recent climate shifts there was evidence of more spawning in the Central and Eastern basin. The PFBC embarked on a three-year tagging campaign with the intent of tagging 20 Walleye each year on a local spawning shoal around Walnut Creek starting in 2018. With the final tagging completed in 2021, there had been 67 Walleye tagged and numerous more caught.

The PFBC uses the results from this study to inform management decisions about season closures as well as spawning site fidelity and the impact that a "localized" stock has in and around the Erie region. Currently, Lake Erie Walleye is going through a period of unprecedented reproductive success and portions of that can be contributed to these Central and East basin stocks.

Presenter: Mark Haffley; mhaffley@pa.gov

Assessing the influence of underlying bedrock geology on pH of Pennsylvania headwater streams

Gregory R. Moyer, Department of Biology, Commonwealth University – Mansfield
Matthew K. Shank, PA DEP, Bureau of Clean Water

Forested, mountainous, headwater streams are extremely sensitive ecosystems. While small, headwater streams play an important role in maintaining hydrologic connectivity and ecosystem integrity at watershed and regional scales. Groundwater is a major source of streamflow in headwater systems and is influenced by the chemical composition of bedrock geologies. Watersheds with underlying bedrock with limited base cation content (e.g., calcium and magnesium) and acid neutralizing capacity (ANC) are termed base-poor geology. Streams originating from watersheds with large proportions of base-poor geology have decreased pH values when compared to streams whose watersheds are comprised of nonbase-poor geologies. Our goal was to identify base-poor geologic formations throughout Pennsylvania using stream pH as a measured response, since there is a paucity of direct analysis of ionic content of bedrock. We used GIS analyses to estimate the percent geologic formation contained in each watershed (0.1 – 23 square miles) and random forest regression to estimate the amount of variation in pH explained by percent of watershed comprised of a given geologic formation. To minimize the extent of human influences to stream pH, we filtered our original dataset of 271 streams to include only streams in least disturbed watersheds (i.e., those streams with limited road crossings, <10% anthropogenic land cover, and < 2.5% abandoned mine landcover). Our filtered dataset comprised 20 geologic formations containing >9 streams per formation for a total of 192 streams. Regression analysis estimated 42% of the variation in pH was explained by geologic formation. Nine base-poor geologic formations were identified across PA, where stream pH declined (6.4 to 5.8) with an increasing percentage of watershed represented by the formation. The remainder of the watersheds (n=11) were nonbase-poor, with no change in pH or, in one, case an increase in pH (6 to 7.5) when the percentage of watershed represented by the formation increased. This research demonstrates that pH and buffering capacity of PA headwater streams vary naturally due, in large part, to bedrock geology. This research empirically identifies base-poor geology formations, which can be used as a screening tool to rapidly prioritize watersheds where alkaline additions would be of most benefit to stream ecosystems.

Presenter: Gregory R. Moyer; gmoyer@commonwealthu.edu

Chemical Fragmentation of Stream Systems and Fish Species Richness: The Upstream Effects of Water Pollution

Andrew Turner, Pennsylvania Western University
Shane Hofius, Clarion Conservation District

The loading of chemical pollutants into stream systems can result in isolation of aquatic communities upstream of the discharge. Ecological theory suggests that isolation will result in a loss of species richness, but this potential indirect effect of stream pollution is not widely studied. Here I present a study of fish community structure in watersheds that have been longitudinally fragmented by abandoned mine drainage. A number of headwater streams in the Clarion River watershed have escaped any direct effects of abandoned mine drainage but have been isolated by severe pollution lower in the watershed. I evaluated the effects of watershed fragmentation on fish species richness and composition by comparing the fish assemblages of 22 headwater streams embedded in watersheds receiving mine effluent to 34 reference streams with no apparent blockages to dispersal. A General Linear Model was used to evaluate the effect of isolation on species richness while accounting for stream size and water quality. Controlling for the significant effects of stream size, reference streams had a mean richness of 3.63 species (SE = 0.27), but isolated streams had a mean species richness of just 1.02 (SE = 0.33), a 3.5-fold difference. Species occupying isolated stream systems were a nested subset of fish species in reference streams. Species composition was significantly different, as isolated streams had a higher relative abundance of Creek Chubs and a lower relative abundance of Mottled Sculpin and Brook Trout. These results illustrate an important indirect effect of water pollution in dendritic watersheds and provide evidence for the importance of connectivity in maintaining aquatic biodiversity.

Presenter: Andrew Turner; aturner@pennwest.edu

Effects of Stream Crossing Type on Fish Assemblages and Stream Ecosystem Conditions: Implications for Culvert Replacement

Mark A. Kirk, Grace Camarata, Chris L. Shaffer, Briana Sebastian, Casey R. Bradshaw-Wilson, and Kelly J. Pearce

Culverts are used as road crossings to connect the upstream and downstream reaches of stream ecosystems, but they can severely alter habitat and biotic integrity. For example, many culvert features decrease biodiversity by impeding the movement and survival of certain fish species. Hence, culvert replacements are a commonly used restoration method for improving stream biotic integrity. We completed paired upstream-downstream assessments to determine the effects of different stream crossing types and to determine the success of newly replaced culverts. We sampled 12 streams in Northwest Pennsylvania: four streams contained “old” culverts that are scheduled to be replaced in 2023 or 2024, four sites contained “new” culverts that have been recently replaced, and the last four streams contained bridges that serve as a reference sample. We also determined passability scores for the three different stream crossing classifications using surveys from the North Atlantic Aquatic Connectivity Collaborative (NAACC). We hypothesized that “old” culverts would have reduced biotic integrity relative to bridges and “new” culverts. Results from the NAACC passability tests show that “old” culverts had the lowest passability scores, and that “old” culverts had negative impacts by creating greater dissimilarity between upstream and downstream fish assemblages. We also will present preliminary results for post-replacement surveys on streams with “old” culverts. We plan to continue long-term monitoring of “old” and “new” culverts to determine the efficiency of these restorations for improving stream biotic integrity.

Presenter: Mark A. Kirk; mkirk@allegheny.edu

Evaluating Fish Assemblages at Four Stream Sites with Increasing Temperature Trends Over the Last Decade

Luanne Steffy, Aquatic Ecologist, Susquehanna River Basin Commission

Climate change has and will continue to impact aquatic ecosystems, including thermal impacts that may significantly change the fish species compositions in streams. The Susquehanna River Basin Commission (Commission) has been managing an extensive continuous instream monitoring network since 2010, collecting five basic water chemistry parameters, including stream temperature, every 15 minutes at 70 stream sites across the Susquehanna River Basin. During a recent ten-year trend analysis, four streams that are designated as High Quality-Cold Water Fishes (two with sections of Exceptional Value designations as well) showed a seasonal, flow-adjusted increasing trend in stream temperature as well as some shifts in percentage of days annually with a mean temperature above 20ºC. The sites; Driftwood Branch Sinnemahoning, Kitchen Creek, Long Run, and Sugar Run, range from 20-83 square miles in drainage area and from 65-93 percent forested land use. In addition to continuous data, at each site a minimum of one fish assemblage sample was collected prior to 2022. In 2023, Commission staff went back to each of these sites and completed an electrofishing survey to evaluate any shifts in fish assemblages, thermal fish index (TFI) values, functional feeding groups along with other metrics. Initial results show some marginal changes and shifts at three sites, while Long Run showed the greatest shifts in fish assemblage composition and TFI. While it is encouraging that to this point increasing stream temperature trends have not impacted fish communities at most sites, continued monitoring of both temperature and biological assemblages will be a focus of the Commission's climate change initiatives.

Presenter: Luanne Steffy; lsteffy@srbc.gov

Mechanisms Behind the Decline of a Class A Brown Trout Fishery (Caldwell Creek)

Eden Brody*, Allegheny College WCRC

In recent decades, the conversion of natural land cover for anthropogenic purposes has intensified. Modification of natural land cover is associated with increased erosion, leading to elevated levels of fine sediment entering streams. Increased fine sediment deposition has been linked to declines in the abundance of many Salmonid fishes; however, the particular mechanisms linking increased sediment to declines in salmonid abundance are stream-specific and difficult to identify. Caldwell Creek is a Class A Brown Trout (*Salmo trutta*) fishery in Northwest Pennsylvania that is reported to be experiencing a decline in trout abundance. This decline in trout populations is hypothesized to be associated with increased fine sediment inputs within the watershed. To evaluate the extent and potential causes of this decline in trout abundance, data on physical habitat, water quality, sedimentation levels, macroinvertebrate communities, and trout populations were collected from 10 sample sites in the Caldwell and Pine Creek watersheds. Data was analyzed to determine the differences in historic and current trout population metrics and the connections between abiotic stream inputs and trout populations. Results indicated a significant decline in the abundance of Brown Trout in Caldwell Creek. None of the 10 sampling sites met the criteria for a Class A Fishery (>400 trout/ha). Furthermore, analysis of abiotic inputs revealed that substrate embeddedness, water temperature, riparian protective zones, stormflow sediment loads, and water velocity were the primary factors influencing trout abundance in Caldwell Creek. While restorations could mitigate some effects of sedimentation on in-stream habitat, they would be ineffective at restoring the historic thermal regime of Caldwell Creek. Our results suggest that extensive restoration and mitigation work is needed for the sustainability of the Caldwell Creek Brown Trout Fishery.

Presenter: Eden Brody; brody01@allegheny.edu

Evaluation of shale gas development and wastewater spills as drivers of biological changes in second-order streams in northcentral Pennsylvania

Bridget Reheard*, The Pennsylvania State University

Shale gas development, which targets unconventional formations using horizontal drilling and hydraulic fracturing, has sparked controversy over its potential environmental impacts. Concerns focus on the effect of potential releases of saline wastewater or fracking fluids into small streams via wellpad spills or poorly constructed impoundments. The goal of this study was to evaluate how spills and development may alter water chemistry and biological communities of benthic macroinvertebrates (BMI) in small streams in northcentral Pennsylvania, where there are minimal confounding land uses. Second-order streams within HUC-12 watersheds were selected for water sampling and BMI collection based on whether upstream conditions contained: i) unconventional drilling including impoundment and spill violations; ii) unconventional drilling with impoundment violations only; iii) unconventional drilling with no documented violations; or iv) no history of drilling or violations. Water samples were analyzed for major cations and anions, including species indicative of shale gas wastewater (Br, Cl, Ba, Sr). Strontium isotopic compositions ($^{87}Sr/^{86}Sr$) were used to seek evidence for wastewater brines unique to the Marcellus formation. BMI samples were sorted and identified to family level to evaluate community structure using NMDS and RDA. Most sites did not exhibit a brine signature. However, Browns Run, which has a history of drilling, exhibited brine signals through a less radiogenic Sr isotopic signature and elevated Ba relative to Cl. In sites without a brine signal, BMI communities had more pollution sensitive taxa (Ephemeroptera, Plecoptera, and Trichoptera). Browns Run instead had a community shift to a more tolerant predator/filterer community (Coleoptera, Diptera, and Odonata). These changes in food availability could have wider-reaching trophic implications for the future viability of coldwater fisheries.

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Spatial Distribution of Eastern Sand Darter (Ammocrypta pellucida) in Western Pennsylvania

Etienne Pienaar*, Dr. Darren M. Wood, Grove City College
Jacob Green, Gomez and Sullivan

The Eastern sand darter, *Ammocrypta pellucida*, is a Pennsylvania state endangered freshwater sand specialist which has undergone substantial decline in its native range within the last century due to habitat loss mostly caused by siltation and chemical pollution. Although physical reports exist within the French Creek watershed, distribution of individuals is largely limited to the French Creek mainstem and some tributaries. This study sought to predict the distribution of the Eastern sand darter in the French Creek watershed using spatial modeling and to test those predictions with eDNA sampling. A MaxEnt model was constructed with the known locations of physical detections, as well as slope, flow accumulation, surficial geology, and land cover classes to determine areas most consistent with Eastern sand darter habitat. The MaxEnt model predicted Eastern sand darter habitat range larger than the range of current known physical detections. Maximum predictive cell values per HUC 12 watershed ranged between 0.04 and 0.966, with nine out of 35 HUC 12 watersheds showing maximum predictive values over 0.4. Five out of the nine watersheds with values over 0.4 were outside the current known range of the Eastern sand darter. Following model predictions, eDNA samples were collected from 33 HUC 12 watersheds within French Creek and analyzed with rt-PCR using a species-specific primer probe. Out of the nine HUC 12 watersheds with predictive values > 0.4, only three watersheds tested positive. None of the remaining 24 watersheds with values < 0.4 tested positive. The three positive HUC 12 watersheds were consistent with a dataset of known physical detections of Eastern sand darters. This study highlights the consistency of eDNA detections with known physical detections, the need for further habitat conservation in French Creek to enable regional recovery of the Eastern sand darter, and for further study to determine which critical habitat parameters will increase the predictive power of MaxEnt modeling for presence of Eastern sand darters.

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A novel conservation approach: an introduction to the Rapid Stream De-listing Strategy

Logan Stenger and Maggie Ritchey, Chesapeake Conservancy

In 2019, the Chesapeake Conservancy conceived the “30 x 30” Stream Restoration Strategy, now referred to as Rapid Stream De-listing. This conservation strategy aims to restore agriculturally impaired streams by accelerating the implementation of best management practices (BMPs) to improve stream habitat and water quality. The goal is to remove 30 streams from Pennsylvania’s impaired streams list per section 303(d) of the Clean Water Act by 2030. To trigger stream reassessments, our staff and partners conduct detailed water quality assessments to establish baseline conditions and track changes over time in our “priority” watersheds. Water quality data includes water chemistry, physical habitat, and benthic macroinvertebrates. Now entering its 5th year of implementation, the Conservancy is excited to share that monitoring data submitted to the Pennsylvania Department of the Environmental Protection was utilized to tentatively de-list five agriculturally impaired streams across three counties. While extensive work is still needed to achieve our “30 x 30” goal, these results show promise and the potential this strategy has to advance water quality improvement efforts in Pennsylvania, and ultimately, the Chesapeake Bay watershed.

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Supreme Court Ruling on Sackett v EPA Redefining Waters of the United States (WOTUS): What does it mean for Wetlands, Streams, and Fish?

Patrick D. Shirey, University of Pittsburgh, Department of Geology and Environmental Science, Environmental Studies Program and Susan A.R. Colvin, Minnesota State University Mankato, Department of Biological Sciences

The Clean Water Act was passed by Congress and signed into law by President Nixon in 1972 as an amendment to an earlier act, the 1948 Federal Water Pollution Act. The purpose of the act is “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters”. In Clean Water Act §404(g), Congress excluded from states the ability to issue permits for the discharge of dredged or fill material into wetlands adjacent to navigable waters used to transport interstate or foreign commerce. By its definition, the word adjacent means "near to" and not touching. Thus, it appeared Congress reserved the right of federal agencies to regulate wetlands near to navigable waters and not just those with continuous surface connection, as all presidential administrations had interpreted in rulemaking and in jurisdictional determinations. However, in Sackett v. EPA (2023), the Supreme Court ruled that a wetland, to be afforded CWA protection, must have a continuous surface connection with an ocean, river, stream, or lake. Therefore, the result of this case means that the onus is on the states to protect non-shoreline wetlands. We are investigating the differences between the states and federal government in terms of regulatory penalties for dredging and filling wetlands and will share the results that show states have much lower penalty provisions for wetland damage. For some polluters, the lower state fines could be the price of doing business. An important policy consideration for society to consider in addressing water quality is that the states cannot reach potential fisheries production in freshwater and marine environments without adequately addressing the problems of tributary pollution and nutrient pollution.

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Using Citizen Science to Determine the Effect of Thorn Creek Habitat Improvements

David Andrews, Connoquenessing Watershed Alliance
Drew King, Pennsylvania Fish and Boat Commission

Thorn Creek in Butler County has seen the installation of instream habitat devices on several sections of this trout-stocked waterway for the past 15 years. To help gauge the effectiveness of these devices, the Connoquenessing Watershed Alliance is using citizen science to track stocked trout movement throughout the watershed. The CWA has been purchasing commercially raised trout and stocking them throughout the watershed, with fish having numbered tags for reporting purposes. Anglers who catch these fish have been reporting their results to the CWA through conversations, email, phone calls, or social media. These fish catches are compiled within a database to gauge fish movement and use of habitat devices. These stocked fish have been giving us good data, with most fish staying within the improved areas. The fish are also showing the ability to holdover within the stream for long periods of time, as well as documenting the effects of catch and release fishing on individual fish. Habitat improvements are beneficial for stocked trout residency within the stream, and additional stocked fish have led to increased angler trips to our waterways.

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Strategic Wood Additions in Streams on the Allegheny National Forest

Chuck Keeports, Forest Hydrologist, Allegheny National Forest

Trees and fallen woody materials in streams and floodplains create a diversity of habitats for many species. Centuries of removing wood to straighten streams and reduce localized flooding negatively impacted stream habitats and exacerbated flooding downstream. The Allegheny National Forest, Western Pennsylvania Conservancy, and Trout Unlimited are working to reestablish historic densities of woody materials to restore habitat and natural flow regimes on streams throughout the Forest. This presentation will discuss the steps that are being taken to remediate the issue on the Allegheny National Forest. The preferred method for this treatment is the strategic felling of trees into streams. Each structure should be comprised of two to four trees that are twice the bankfull stream width. For maximum effectiveness, at least part of the structures should extend into the active channel and be packed with mix of small trees and fine branches. Using a naturally based approach, large wood projects place woody material at key locations to help enhance stream-floodplain connectivity, diversify habitat, increase cover, and re-establish functional roles of wood in streams.

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Initial Response of Floodplain Reconnection and Wood Addition to the Fish Community in the Little Arnot Run Watershed, Allegheny National Forest

Steve Seiler, Heather Bechtold, and Lydia Delp
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The Allegheny National Forest occupies over 500,000 square miles in northwestern PA and has been extensively influenced by human activity including timber harvest, resource extraction, and other impacts. Road building activities to support resource extraction has often left streams that are constrained by berms and disconnected from their floodplain (channelized). Historic timber practices in some watersheds have left even-aged trees along the riparian corridor that have not contributed wood to the stream channel and toward instream fish habitat. Multiple agencies and university have been cooperating since 2019 to reconnect the channelized portion of Little Arnot Run to its floodplain and to increase the amount of wood in the stream channel by careful installation of tree bundles in lower portions of the watershed and widescale, directional felling of riparian trees throughout the rest of the watershed. Floodplain reconnection in lower sites on Little Arnot Run was completed in August 2021 and directional felling of trees throughout the watershed was completed in early 2022. Here, we present fish community data from Little Arnot Run sites across four years spanning pre-restoration efforts (= 2 years pre-restoration and 2 years of post-restoration) and compare these data with the fish community from Cherry Run, a nearby watershed without restoration activity that serves as a control watershed. We conducted triple pass electrofishing surveys in late July-early August of each year to estimate the composition and biomass of the fish community at two locations in each watershed, one location near the downstream confluence and one location closer to the headwaters. We did not find strong trends in species richness or fish community diversity following restoration. Variation in the number and biomass of brook trout (*Salvelinus fontinalis*), and in the whole fish community, appears to be highly influenced by baseflow conditions. After correcting for the area sampled, fish biomass at locations in Little Arnot Run may be trending upward when compared to reference sites in Cherry Run. Continued monitoring is planned to verify any longer-term influences of this restoration work on the fish community.

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Evaluating the long-term success of two stream-bank restorations within the French Creek Watershed

Meredith Barney, Mark Kirk, Briana Sebastian, Casey Bradshaw-Wilson, Kelly Pearce
Watershed Conservation Research Center, Allegheny College

Streambank restorations are often implemented as responses to anthropogenic stressors that alter instream habitat and impair biotic integrity. However, the long-term benefits of these restoration projects are often understudied. The Watershed Conservation and Research Center (WCRC) at Allegheny College, in conjunction with local community partners, performed two restorations at locations struggling with issues of erosion, sedimentation, and streambank stability. These restorations occurred in lower Woodcock Creek, a tributary to French Creek, in Crawford County, PA. The first site was located on the mainstem of Woodcock Creek (Craig Road), while the second was on a small, unnamed tributary (Telliho). Pre- and post- restoration data were collected at these sites in order to document and measure restoration success, as well as observe the ecosystem's response to these changes. Sampling included biotic assessments of fish and macroinvertebrates, as well as abiotic measurements of hydrology, substrate, sedimentation, and water chemistry. The restorations are expected to elicit long-term improvements in the biotic integrity, water quality, and habitat heterogeneity of the streams, as well as increase recruitment of sensitive species. Early biotic results of fish and macroinvertebrates indicate an increase in fish diversity at Craig Road, which included the addition of a new darter species. However, the site did experience turnover of certain gamefish species. The second site, Telliho, saw a decrease in fish diversity, likely due to the loss of sizeable pools that previously housed larger fish species. Both sites saw no increases in macroinvertebrate diversity. Additional abiotic data is still being processed, and continued long-term monitoring is planned for both sites, to further evaluate how successful these restoration efforts have been for the French Creek Watershed.

Presenter: Meredith Barney; mbarney@allegheny.edu

Recovery of fish community structure following the removal of a dam on Little Sewickley Creek

Brady Porter, Duquesne University, Department of Biological Sciences

Little Sewickley Creek is a small third-order tributary to the Ohio River. Despite its close proximity to Pittsburgh, the 25 km^2 watershed has limited urban development, 70% forested landcover, and is the only designated High Quality stream in Allegheny County. Decades of trout stockings has supported natural reproduction by Brown Trout, *Salmo trutta*. In 2013 a petition to elevate the stream's designation to Exceptional Value was declined by the PA-DEP, in part due to poor fish diversity above a century-old dam near its mouth that prevented fish migration from the Ohio River. Prior to the dam removal in 2015, there were 41 documented fish species downstream of the dam, but only a handful of species upstream, and these residents were mostly comprised of pollution-tolerant omnivores. Students in the Stream Field Biology course at Duquesne University assisted with annual backpack electrofishing surveys to document the recovery following the dam removal. Fishes were sorted, identified and enumerated at three sites above the dam in order to examine changes in fish community structure through use of the Ohio Headwater Index of Biodiversity (IBI). IBI scores ranging from "poor" to "fair" all steadily increased to "exceptional" over the past eight years as the fish community diversified. The Central Stoneroller *Campostoma anomalum*, and Spotfin Shiner *Cyprinella spiloptera*, were some of the first species to colonize upstream habitats. Our most upstream monitoring site, 4.4 km above the dam, now supports a diverse coolwater assemblage of minnows, suckers, trout, darters, and sculpin.

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Running the Gauntlet: Lake Trout restoration in Lake Erie

James L. Grazio, PhD, Great Lakes Biologist, Pennsylvania Department of Environmental Protection

Lake Trout (*Salvelinus namaycush*) was historically the dominant native predator in the eastern basin of Lake Erie. As a result of overfishing and, later, predation by non-native Sea Lamprey (*Petromyzon marinus*), the species was completely extirpated from the lake by the 1960s. An artificial stocking program was initiated in 1982 but the goal of re-establishing a naturally reproducing population remains elusive. This presentation provides a brief overview of the myriad obstacles to recruitment faced by Lake Trout. A new initiative to address one of these obstacles in the Pennsylvania waters of Lake Erie- the loss of suitable spawning habitat- will be discussed.

Presenter: James L. Grazio; jagrazio@pa.gov

Poster Presentation Abstracts

Age and growth of Smallmouth Bass (*Micropterus dolomieu*) in the Monongahela and Youghiogheny rivers

Connor Haskins*, David Argent, Joe Ream and Joel Dean, Pennwest California

Both the Monongahela and Youghiogheny rivers support populations of Smallmouth Bass (*Micropterus dolomieu*), a target species by anglers. We were interested to see if differences existed in the length and age distribution between both rivers. We collected fishes during fall 2023 by angling, boat electrofishing, and gillnetting. Fishes were measured and scales pulled. Length frequency distributions were created and scales were read to determine ages. Fishes on average were slightly older and slower growing in the Monongahela River. PSD (proportional stock density) and RSD (relative stock density) values suggest a limited proportion of legal fish available to anglers in both systems.

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The Effects of Length, Weight, Age, and Gender on Total Mercury Concentrations In Burbot In North-Central Minnesota Lakes

Liam Hanley*, Dr. Andrew W. Hafs, Bemidji State University
Tyler Orgon, Red Lake Department of Natural Resources

Burbot Lota lota in north-central Minnesota lakes have the potential to reach large sizes and consume large volumes of prey. This caveat may make burbot susceptible to higher rates of biocontamination, bioaccumulation, and biomagnification. The objective of this study was to determine how changes in age, length, gender, weight, and lake affect total mercury concentrations in burbot. In this experiment 28 burbot were angled from three lakes: Cass (n = 17), Winnibigoshish (n = 4), and Bad Medicine (n = 7). Then tissue samples were taken from each fish and were lyophilized and homogenized. Homogenized tissue samples were analyzed by a Milestone TriCell Dual Beam Direct Mercury Analyzer (DMA-80evo) while following EPA protocol 7473. Average total mercury concentration was 0.1248 mg/kg (SD = 0.0717) in Cass Lake; 0.1022 mg/kg (SD = 0.0352) in Lake Winnibigoshish; and 0.0435 mg/kg (SD = 0.0176) in Bad Medicine Lake. Linear regression analysis using AIC scores was used to determine the effects of each variable on total mercury. Models attributed changes in total mercury with changes in length, weight, and lake. It was found that as fish weight and length increase total mercury concentration increased. Furthermore, consumption advisory guidelines place burbot in 1-2 servings a week for safe consumption.

Presenter: Liam Hanley; liam.hanley@live.bemidjistate.edu

Examining catch methods, body condition, and age distribution of Round Goby (*Neogobius melanostomus*) in Lake Erie's Pennsylvania Tributaries

Keri Saulino*, Samuel Nutile, Lynne Beaty, Adam Simpson
Pennsylvania State University – The Behrend College

Round gobies, *Neogobius melanostomus,* are an invasive fish found in Lake Erie and its tributaries, competing for space and food with native species. To reduce expansion, gobies can be captured and removed from invaded waters, but the most effective methods of removal from Lake Erie's tributaries are unknown. Our goal was to determine which of three collection methods, minnow traps, kick seining, or hook-and-line fishing, was the most efficient for capture of round goby within Pennsylvanian Lake Erie tributaries. We sampled four tributaries, Elk Creek, Walnut Creek, Fourmile Creek, and Sixteenmile Creek, three times over Summer 2023. During each collection, hook-and-line fishing and kick seining were used to actively collect goby, while minnow traps were deployed for passive collection. For each method and location, the catch-per-unit effort (CPUE) was calculated and compared to determine the most efficient collection method. Upon collection, fish were euthanized and returned to the lab to record the length, weight, and age through examination of otoliths. Significantly more round goby were caught using kick-seining compared to minnow traps and hook-and-line fishing regardless of location or month of collection. The size and body condition of round gobies varied with collection method and location. While weight and length varied between locations, the average age of round goby from each location was the same. The similarity in age structure of round goby between the tributaries suggests similar patterns of habitat use, possibly indicating tributaries serve as summer feeding grounds for smaller fish. Controlling the spread of round goby requires using the most efficient means of removal. By documenting the efficiency of different collection methods and understanding how the tributaries are used, this study advances management efforts related to control of round goby populations within Lake Erie's tributaries.

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Discovering differences in eyespot size and color in invasive round gobies using local Erie populations

Mallory Causer*, Samuel Nutile, Lynne Beaty

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The round goby (*Neogobius melanostomus*) is an invasive species that was first discovered in Lake Erie in the 1990s. The overwhelming increase in this invasive species has negatively impacted other aquatic life and has caused great concern for the fate of biodiversity in the region. An eyespot, a color pattern that mimics the eye of a vertebrate to intimidate predators, might be a trait that is augmenting invasive round goby success. To determine how the eyespot is contributing to the round goby invasion, variation in round goby eyespot size and color is documented to determine if this variation differs between local populations of round goby in the Pennsylvania waters of Lake Erie. Round gobies were collected from select areas in Erie County using various sampling methods and the size and color of their eyespots were analyzed from photos. From our results, it is apparent that eyespots are abundant in all the sampled locations, but the eyespots vary in size and color depending on the Lake Erie environment. We found that eyespots occur less frequently and are smaller in tributary goby populations compared to Lake Erie pier populations, but new data indicates a higher proportion of tributary goby populations have eyespots. Clear variation in eyespot size and color is seen between local round goby populations. This study helps us to explore the factors contributing to the success of invasive round gobies, to distinguish round gobies from native look-alikes, and to learn about the importance of an eyespot as an anti-predator defense.

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Evaluating Walleye (Sander vitreus) Spawning Effort on Constructed Rock Rubble Reefs in Raytsown Lake

Autumn Holdsworth*, Abbi Fields, Dr. George Merovich

Department of Environmental Science and Studies, Juniata College

In this study we evaluated the use of constructed rock rubble for walleyes spawning in 2 locations of Raystown Lake. We created custom mesh-covered traps and deployed these in April 2022 to collect eggs during the spawn in 18 different locations at mile markers (MM) 14 and 15 before construction of the reefs. Our pre-construction sampling accounted for a total area of 403.6 m^2 for over 2,800 trap-days from April 1st, 2022 to May 6th, 2022. During this time, we collected 49 walleye eggs. Numbers were highest from Apr 15 to Apr 29, with 40 eggs collected. Average water temperature at this time was 10^o C (50^o F). Non-target collections were dominated by amphipods (scuds) but we also collected a possible Esocid egg, white perch eggs, and a juvenile green sunfish. In April and May of 2023, after the rock rubble reefs were in place, we sampled the same areas again, over constructed reefs and in control areas, to complete this BACI-designed (before-after-control-impact) study. Our post-construction sampling accounted for a total area of 579.6 m^2 sampled for over 4,100 trap-days from March 29th, 2023 to May 15th, 2023 and 1,212 eggs were collected during this time. The highest number of eggs were caught between March 29th, 2023 to April 5th, 2023 with 831 walleye eggs collected. During this time average water temperature was 10.5 C° (51°F). Non-target collections were mostly bluegill, darter eggs, and virile crayfish. Overall, we found that rock rubble reefs did not attract greater walleye spawning efforts than control areas. More years of monitoring are likely needed to establish a consistent trend to conclude if these rock rubble reefs are working as intended. If we show they do, we hope future habitat restoration for walleye spawning continues to improve so that the walleye fisheries in the lake could depend less on stocking efforts and save management dollars for other needs.

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Mercury and Selenium in Round Goby from the Pennsylvanian Waters of Lake Erie and its Tributaries

Jason Chen*, Lynne E. Beaty, Jason Bennett, Samuel A. Nutile

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Round goby (*Neogobius melanostomus*), an invasive species in the Great Lakes, accumulate harmful contaminants like methyl mercury, primarily through a diet composed of zebra mussels (*Dreissena polymorpha*) and close association with sediments. The quasi-organic nature of methyl mercury leads to bioaccumulation within tissues of fish, such as round goby, which can lead to trophic transfer affecting more recreationally or commercially important fish species. Selenium, however, is known to reduce the bioavailability of mercury when considering dietary exposure. Higher selenium to mercury ratios within tissues results in reduced trophic transfer of mercury. Accumulation of mercury has been documented in round goby from the western basin of Lake Erie, but little is known about mercury accumulation in round goby from the central basin. Our objective was to assess the mercury concentrations and mercury:selenium ratio in round goby collected from Pennsylvania's Lake Erie waters and tributaries. Round gobies were collected from Lake Erie and its Pennsylvanian tributaries and euthanized. The tissues were then homogenized, and acid digested. Mercury and selenium in the tissues of round goby were quantified using an inductively coupled plasma mass spectrometer (ICP-MS). Findings reveal varying mercury levels (up to 17.3 ng/g) in round gobies obtained from Presque Isle Bay, with Lake Erie and tributary round goby showing much lower concentrations. A correlation analysis suggests that as gobies get larger the selenium to mercury ratio declines; therefore, increasing bioavailability of mercury for trophic transfer. Concerns arise for native Pennsylvanian game fish consuming round gobies, potentially facilitating trophic transfer of mercury and posing risks to human health upon game fish consumption. Understanding contaminant accumulation and transfer is crucial to mitigating the impact of invasive species and safeguarding the health of aquatic ecosystems, emphasizing the importance of comprehensive research and management strategies.

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Dangers of Oxybenzone in Sunscreens on Coral Reefs: Proposed Policy Approaches

Yasmine Florent*, **Mackenzie Nemoto***, Vanessa Pratt, Ana Rowley, **Maria Isabel Villegas***
University of Pittsburgh

Sunscreen was developed to combat the harmful effects of skin exposure to ultraviolet radiation, but this solution comes with potentially harmful costs. Organic UV filters like oxybenzone pose a threat to coral reefs by promoting bleaching incidents, damaging coral DNA, and interfering with coral larvae. They also have been found to cause a wide range of reproductive and developmental harm within other marine organisms like fish and invertebrates. While there are alternative sunscreens that are comparatively less detrimental to coral such as mineral-based products, toxic oxybenzone-based sunscreens are still popular among cosmetic companies and consumers. Scientific findings in the past decade have demonstrated a connection between high concentrations of chemical UV filters and the destruction of marine ecosystems. This knowledge has prompted action from governments in coastal regions such as the passage of legislation aiming to limit the use of sunscreens containing these chemicals. These regulations provide beneficial case studies that can be used to develop further effective policies to federally banning the use of these products in the United States. The jurisdictions of Hawaii, the US Virgin Islands, and Key West are particularly model examples of successful implementation of such laws domestically. Based on efforts from such coastal nations, the suggested best practices to eliminate the threat posed by harmful sunscreens are to promote alternative sunscreen use, define 'reef-safe' to include the phrase within the Federal Trade Commission's Green Guides, and a nationwide ban of oxybenzone can provide a comprehensive solution to protect the United States' fragile marine ecosystems.

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Managing for Northern Pike in a small impoundment with an overabundant Bluegill Sunfish population

Cole Pennington* and Gregory R. Moyer, Commonwealth University – Mansfield

Northern Pike are highly sought by anglers due to their size potential and status as a major sportfish. So much so, that private hatcheries in Pennsylvania now recommend stocking Northern Pike in private farm ponds. However, Northern Pike, when stocked, have been shown to act as a top-down predator that can undesirably alter fish communities; therefore, fisheries managers often deem Northern Pike unsuitable for small farm ponds. To understand the influence of Northern Pike in a small farm pond, we surveyed a 3.66 acres pond via boat electrofishing that is known to have a Northern Pike present. The pond offered both flooded and emergent vegetation along with a cool water thermal refuge (7m max. depth). A total of 428 fish, comprising nine species, were collected including four Northern Pike (35-79 cm). Bluegill Sunfish comprised 76% of fish caught - a catch dominated by small (10-12 cm) fish. Low (< 80) relative weights for most Bluegill Sunfish, few recently hatched Bluegill Sunfish, and a PSD-Q estimate of 8 (95% CI 4-13) showed that these fish were over abundant and of sub quality (< 15 cm). Largemouth Bass (n = 25) were also collected and ranged in size from 16-40 cm. Largemouth Bass relative weights declined with increasing length, suggesting that small bass are competing with Bluegill Sunfish for resources. The bass PSD-Q was 20 (95%CI 0-45) and below desired conditions of a balanced predator/prey lake. Interestingly, Yellow Perch in a variety of sizes were sampled during the survey. The Yellow Perch PSD estimate was 53 (95% CI = 31-76) and in the range of a balanced population (i.e., PSD = 30-50). The majority of Yellow Perch, however, had lower than expected relative weights suggesting that while the perch are of adequate length, they are not of adequate weight. This is probably due to the lack of forage for Yellow Perch, as was also seen with Bluegill Sunfish and Largemouth Bass. Northern Pike and Largemouth Bass densities in this pond are not sufficient to prevent Bluegill overabundance. Management strategies to maintain a more balanced fishery would be to harvest Bluegill Sunfish or stock more predators.

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Understanding the fate of phosphorus in the acid mine drainage impacted Tioga River watershed

Graham Zechman*, Greg Moyer Commonwealth University – Mansfield
Luanne Steffy, Susquehanna River Basin Commission

Harmful algal blooms (HABs) are fueled by excess nutrients that stimulate rapid algae growth in aquatic ecosystems. Nutrients, like phosphorus and nitrogen, enter watersheds from external sources including agriculture and wastewater treatment plants. Acid mine drainage impacted waters sequester nutrients due to elevated levels of iron and aluminum in the water; therefore, limiting HABs. AMD waters of the Tioga River, PA are scheduled to begin treatment in 2025 to minimize iron and aluminum concentrations and to restore the river's pH. The restored pH and decrease in heavy metal concentrations will lessen Tioga River's capacity to retain nutrients – nutrients that eventually will find their way to the Chesapeake Bay. The objective of our project is to better understand the fate of this legacy pollution in the Upper Tioga River watershed. Water quality data was collected by SRBC biologist at nine fixed sites spanning the upper Tioga River. From these data, we estimated concentrations of total phosphorus, aluminum, and pH. We also performed spatial analysis to estimate the percent landcover that was forested vs agriculture in the upper Tioga watershed. Above AMD sites we found that average phosphorous (0.016 mg/L) and pH (7) concentrations were like values well below AMD sites. As pH decreased (from 7 to 3.69) and aluminum concentrations increased (from 0.16 to 3.3 mg/L) due to AMD, phosphorus concentrations decreased to zero over the 16 mile stretch of AMD impacted Tioga River. As cleanup occurs, spatial analyses indicated that > 75% of the Upper Tioga watershed is forested with little agricultural (i.e., phosphorus) impacts (<13%). However, agriculture landcover increased (>50% agriculture) downstream for several Tioga River tributaries (Elk Run, Corey Creek, Canoe Camp, and Mill Creek). As AMD treatment occurs, we predict that phosphorus will readily be available for ecosystem use downstream and in the Tioga Reservoir. Also, agriculturally influenced tributaries should be of high priority to monitor for any excess nutrients that were once sequestered by AMD waters.

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Common cyanotoxin alters tritrophic interactions among herbivores, macrophytes, and cyanobacteria

Lacey D. Rzodkiewicz*, Martin M. Turcotte - University of Pittsburgh

Competitive interactions between cyanobacteria and macrophytes can alter the quality and quantity of both players through allelochemicals. Microcystin, a ubiquitous cyanotoxin, is known to suppress macrophyte growth. However, it is unknown how the presence of cyanotoxin alters additional interactions in the community. Such tritrophic interactions could lead to lowered ecosystem stability and potential eco-evolutionary dynamics. We tested the impact of microcystin concentration on macrophyte herbivory using duckweed (*Spirodela polyrhiza*), small, floating macrophytes frequently used in bioremediation, and the water lily aphid (*Rhopalosiphum nymphaeae*). Duckweed growth was determined by microcystin concentration (GLM, $p << 0.05$) though microcystin stress did not alter top-down herbivory pressure (GLM, $p = 0.89$). Despite the lack of increase in herbivory impact on duckweeds, herbivore populations achieved higher final populations when duckweeds were stressed by microcystin through both the changes in duckweed populations and their interaction with microcystin concentration (GLM, $p << 0.05$). Our results demonstrate that cyanotoxins may have far-reaching impacts in their community beyond players in which they engage in reciprocal interactions. Future work will explore how selection pressures may be exerted by the toxin amongst all three players in the tritrophic interaction, including the introduction of toxigenic and nontoxigenic ecotypes of cyanobacteria. Results will demonstrate the importance of evolutionarily informed management of cyanobacteria blooms.

Presenter: Lacey D. Rzodkiewicz; LDR27@pitt.edu

Fish Community Surveys at the Union City Dam of French Creek

Luke Beall*, Nelson Squires, Brianna Frantz, Beth Dakin, Brady Porter - Duquesne University
Anthony Honick -U.S. Army Corps of Engineers - Pittsburgh District

Union City Dam is a dry-bed reservoir impoundment in the Allegheny River watershed in northwestern Pennsylvania, managed as a flood-control facility by the U.S. Army Corps of Engineers. Situated on French Creek, one of the most biodiverse streams in the northeastern United States, it is known to be home to a wide variety of fish species. As the last USACE electrofishing survey at this site took place in 1989 and the invasive Round Goby *Neogobius melanostomus* have since entered the French Creek watershed, our understanding of the fish community at the dam needed updating. A 100-meter section of the dam outflow was surveyed by backpack electrofishing will all individuals sorted, identified, and enumerated. The survey reported 757 individuals across 32 species, with an Ohio IBI (Index of Biotic Integrity) score of 58, which falls into the Exceptional category and indicates a healthy fish community. The Round Goby was not detected, suggesting they have not yet expanded to the dam from the last known invasion front around 12 km downstream. The dam's position as a barrier between lower and upper reaches of French Creek make it especially important in containing the spread of this invader, whose further proliferation upstream could have negative impacts on threatened darter and mussel species. Future surveys at this site will be important for tracking the spread of the Round Goby, planning management and prevention actions, and documenting changes to the fish community if and when goby colonization takes place.

Presenter: Luke Beall; beallc@duq.edu

Characterization of blue and green chromoproteins in percid fishes

Emily Bierer* and Dr. Brady Porter - Duquesne University

Coloration plays an important role in communication, sexual selection, and speciation of fishes. Blue coloration in vertebrates is typically produced by structures that incoherently scatter light, however a true blue pigment has been discovered in a blue color mutant of Walleye *Sander vitreus* found in Canada. Researchers named the Walleye pigment Sandercyanin, a 21 kDa lipocalin chromoprotein that functions as a homotetramer, binding to the chromophore biliverdin IX-α. A similar pigment is found in other fishes in the family Percidae, in particular darters (Etheostomatinae). We predict the chromoproteins found in colorful species of darters are homologous to Sandercyanin. Here we focus on three species of darter, Rainbow Darter *Etheostoma caeruleum,* Greenside Dater *Etheostoma blennioides*, and Banded Darter *Etheostoma zonale* which are common to Western Pennsylvania. Absorbance patterns measured in these darters showed an overall similar absorption profile to Walleye but all four species showed variation in light absorbance associated with various hues of blue and green. Mass Spectral analysis of the Rainbow and Greenside Darter confirmed chromoproteins bind biliverdin IX-α, just like Sandercyanin. We hypothesize that the evolution of darter pigments involves variation in the protein structure of this biliverdin-binding lipocalin. We attempt to amplify and sequence the gene coding for darter proteins to examine potential differences in the protein primary structure. Using BLAST searches and sequence alignment of Sandercyanin to darter genomes, we have developed PCR primers to amplify the DNA gene for the lipocalin apolipoprotein D. Sequence analysis indicates the gene size is around 1158 bp for the Rainbow Darter, 1173 bp for the Greenside Darter, and 1461 bp for the Banded Darter. Due to the size limitations of Sanger sequencing, additional internal primers were designed to sequence across the amplicon and build a contiguous sequence for the entire gene. Additional sequencing was done with Walleye DNA for further comparison. Future Mass Spectral analysis of these pigments will be needed to support or reject our hypotheses that darter apolipoprotein D is homologous to Sandercyanin and that coloration differences result from protein variation. Ultimately these data will contribute to our understanding of the evolution of pigments in one of the most colorful groups of freshwater fishes.

Presenter: Emily Bierer; bierere@duq.edu

Identification and Validation of Intraspecific Haplotype Variation Using Environmental DNA Metabarcoding

Felicia Bedford*, Emily Bierer, Brady Porter
Duquesne University - Department of Biological Sciences

Environmental DNA (eDNA) can be sequenced through metabarcoding to reveal species identity, community assemblages, and intraspecific variation. One of the primary issues with this approach is the downstream phylogenetic analysis of eDNA metabarcoding data. For this project, we aim to use water samples for eDNA collection and tissue samples to compare phylogenetic analysis. Water samples were collected from Buffalo Creek, Armstrong County, in Southwestern Pennsylvania to amplify and sequence a 123 bp region of the mitochondrial COI gene. We analyzed the genetic haplotype variation of the Central Stoneroller *Campostoma anomalum* from Illumina MiSeq metabarcoding data from eDNA water samples of the mitochondrial COI gene. We then compared these variants to haplotypes recovered from field-collected tissue samples. After this delineation, we were able to validate true haplotypes from PCR and sequencing artifacts. While expected haplotypes range from 1-3 for this geographic region, we identified 28 unique sequences from eDNA samples. Implementing minimum copy thresholds allowed us to identify true haplotypes and engineer a programming pipeline to process data efficiently.

Presenter: Felicia Bedford; bedfordf@duq.edu

Rediscovery of a Relict Population of Brindled Madtom in Crooked Creek

Nelson Squires*, Luke Beall, Abigail Powell, Beth Dakin, Brady Porter, Duquesne University- Department of Biological Sciences
Anthony Honick, U.S. Army Corps of Engineers- Pittsburgh District

Crooked Creek is a mine-impacted tributary to the Allegheny River located in western Pennsylvania. Most of the stream lies upstream of a dam maintained by the US Army Corps of Engineers (USACE), as well as its reservoir; Crooked Creek Lake, a popular fishing and recreation area. Backpack electrofishing surveys conducted by Duquesne University and USACE from 2021-2022 revealed not only a healthy fish community but also a previously unknown population of Brindled Madtom *Noturus miurus*, a state-threatened catfish species that had not been recorded in the area since 1905. All of the Brindled Madtoms were found in the mainstem, upstream of the reservoir. The purpose of this study was to collect further information on the fish community upstream of Crooked Creek Lake as well as to gain further understanding of the newly-rediscovered Brindled Madtom population. Three backpack electrofishing surveys were conducted at different points along the stream using seine and dipnets. Results from 2023 indicate a relatively healthy fish community, and a persistent population of Brindled Madtom with multiple size classes indicating successful reproduction. Although the dam may genetically isolate this relict population, it can also protect it from invasive species. Future surveys will determine the upstream occupation of this state-threatened species and its habitat requirements.

Presenter: Nelson Squires, squiresn@duq.edu

Community Science Investigations of Stream Chloride and Impacts to Aquatic Life: Creek Connections and Salt Watch

Wendy Kedzierski, Blake Vowler, Kaitlyn Royal, Bianca Sanchez, Ryan Crozier - Allegheny College

Chloride has negative impacts on freshwater fish, aquatic macroinvertebrates as well as riparian and aquatic plants. Community science projects are an important tool within environmental education to bring impactful, hands-on science to participants. Creek Connections participates in the Izaak Walton League's Salt Watch program to monitor the chloride levels within the Mill Run watershed in Meadville, PA. Mill Run is a minor tributary of French Creek. College students lead the investigations with middle and high school student participants. Low-range Hach-brand Quantab test strips are used to determine chloride levels in samples taken regularly before and during the winter season. Students learn about the impacts of road salt on waterways through chloride testing and supplemental educational activities. Through repeated testing, they get to know baseline levels within the Mill Run mainstem as well as some tributaries. Data collected by students is shared with the Izaak Walton League through their Clean Water Hub. Students are engaged in this hands-on community science project. Through their participation, they can then recognize increases in chloride levels following snow events and determine if levels that are toxic to aquatic life are reached or surpassed. They learn about the impacts on aquatic plants and animals and how they can help spread the message that too much salt is not good for waterways. They learn about and experience some of the amazing diversity of fish and macroinvertebrates in both streams. Students are encouraged to participate in the Salt Watch program on their own and monitor streams close to their homes.

Presenter: Wendy Kedzierski; wkedzier@allegheny.edu

Are you sure you want to eat that? Insights from environmental monitoring and physiologically-based pharmacokinetic modeling of trophic transfer of PCBs from fish to humans

Samuel A. Nutile, Adam M. Simpson, Olivia C. Hodgson, Ashley E. Russell, Jeremiah D. Keyes, Cody Wood, Pennsylvania State University - The Behrend College
Ronald J. Buckanovich - Women's Cancer Research Center, Magee-Womens Research Institute

Documenting exposure routes and relative accumulation of legacy contaminants, such as polychlorinated biphenyls (PCBs), in humans is complicated by the ubiquity of contamination. While guidelines to limit exposure are disseminated to the public (i.e., consumption advisories), the efficacy of these guidelines in limiting exposure and accumulation are difficult to evaluate using human monitoring. Combining environmental monitoring of legacy contaminant sources with physiological-based pharmacokinetic (PBPK) modeling may provide an approachable mechanism to document accumulation based on consumption advisories. Using this novel approach, we evaluated PCB tissue concentrations in five Lake Erie fish species and used PBPK modeling to predict PCB accumulation in the tissues of men and women under different consumption scenarios according to Pennsylvania consumption advisories. Twenty-one congeners were detected between the five fish species at concentrations ranging from 56.0-411.7 ng/g. Accumulation in humans varied with tissue type, biological sex, the species consumed, and consumption rate, but following consumption advisories was expected to result in minimal adverse effects based on PCB toxic equivalencies. Therefore, our data support the utility of fish consumption advisories for limiting human exposure, if followed. Furthermore, this study demonstrates the potential of combining environmental monitoring with PBPK modeling when interested in tracking human exposure. The ability to modify model parameters based on the specific exposure scenario of interest are unlimited, such that factors that traditionally confound similar studies, such as finding willing test participants and determining the influence of multiple exposure routes on accumulation, can be avoided allowing insight into the effectiveness of existing and proposed guidelines.

Presenter: Samuel A. Nutile; san33@psu.edu

The Why, Where, and How of Large Wood Additions and Impacts on Trout Streams

Phil Thomas, Kathleen Lavelle - Trout Unlimited, Northeast Coldwater Habitat Program

Restoring large wood to streams can have a host of positive impacts on trout populations and their ecosystems. By providing cover, habitat for food sources like macro invertebrates, affecting hydraulics to promote a more dynamic stream, and enhancing access to the flood plain in higher flows, large wood additions (LWA) have become a more common tool in the stream restoration toolbox. Understanding the where, why, how, and results of LWA is important for community support of these projects. TU has completed many LWA projects, collected pre-post biological and physical habitat data for said projects, and compiled related scientific literature on the subject. TU hopes this poster presentation will 1) explain the process of LWA to restore/enhance trout habitat, 2) discuss TU's preliminary findings surrounding LWA and techniques to do so, 3) summarize findings in existing literature, 4) provide a PSA on the benefits and applications of LWA to restore/enhance trout habitat and ecosystems.

Presenter: Phil Thomas; Philip.Thomas@TU.org

Summary of PFBC State-wide Mussel Surveys 2023

Kyle H. Clark, Dakota J. Raab, Jordan R. Allison, Gregory P. Lech, and Nevin T. Welte Pennsylvania Fish and Boat Commission – Division of Environmental Services

The mission of the Pennsylvania Fish and Boat Commission (PFBC) is to protect, conserve, and enhance the Commonwealth's aquatic resources and to provide fishing and boating opportunities. As a partner of the Pennsylvania Natural Heritage Program, PFBC is tasked with protecting threatened, endangered, and special concern species, which includes completing inventory surveys to describe their distributions. Freshwater mussels are often characterized as one of the most imperiled taxonomic groups in North America; however, they are still largely overlooked and understudied. While the PFBC has a good grasp on fish species distributions throughout the Commonwealth, the tracking of freshwater mussel species occurrence and range is still young. The mussel communities of many Pennsylvania watersheds are unknown, underassessed, or have not been assessed in the last century. In 2023, the PFBC conducted timed visual surveys in three of Pennsylvania's six major watersheds to better determine the composition of those communities, as well as their distributions. These surveys resulted in the collection of several Species of Greatest Conservation Need (SGCN), range expansions, and reconfirmation of occurrence for several freshwater mussel species. In total, 3637 individuals representing 26 species were encountered. Of the 26 species, 13 are categorized as SGCN in the PA State Wildlife Action Plan. Overall, these efforts will help inform future species recovery projects and demonstrate the importance of continued survey efforts in understudied watersheds. Further, it highlights the need for collaboration amongst stakeholders to achieve the goal of freshwater mussel restoration in Pennsylvania.

Presenter: Kyle H. Clark; kyleclark@pa.gov

Evaluating round goby's use of Lake Erie's tributaries using otolith elemental analysis

Greg Lemke, Adam Simpson, Lynne Beaty, Samuel Nutile, Pennsylvania State University – The Behrend College

Non-native, invasive species introduced into native habitats can adversely affect native organisms through competition for resources. Round goby (*Neogobius melanostomus*) were introduced to Lake Erie in 1993 and have since become well established within this habitat. Round goby have recently spread into the tributaries connected to Lake Erie, but little is known about the permanence with which goby utilize these areas. The objective of this study is to utilize elemental analysis of round goby otoliths, calcified structures located in the brain cavity of fish, to examine how these fish utilize tributaries of Lake Erie in Pennsylvania. Round goby were collected from various locations within Lake Erie and its tributaries, including Fourmile Creek, Sixteenmile Creek, Elk Creek, Walnut Creek, and Trout Run. Otoliths were extracted and acid digested for elemental analysis via an inductively coupled plasma mass spectrometer. Otoliths accumulate elements, such as strontium, barium, zinc, and manganese, in ratios that reflect the waters in which they live. Comparisons of otolith elemental composition between round goby of different tributaries and locations within Lake Erie will provide evidence of round goby habitat use. Results of otolith elemental analysis suggest that there is limited migration between the Lake Erie population and the tributary population. A better understanding of how round goby utilize Lake Erie's tributaries will provide insight into how this species is spreading into new habitats, the threats posed to native species living in these areas, and inform management strategies related to the control of round goby within the Lake Erie watershed.

Presenter: Greg Lemke; greg_lemke@yahoo.com

Improvement of the fish community of Nine Mile Run (Allegheny County PA) following reclamation

Brady Porter, Beth Dakin, Mike Koryak - Duquesne University

Prior to 2002, Nine Mile Run was highly degraded by road runoff, leaking sewer systems, combined sewer overflows, and leachate from a large slag dump. In fish surveys conducted from 1946-1999, only a very few individuals of pollution tolerant species were found. However, in the last 20 years, several major restoration and reclamation projects have been undertaken in Nine Mile Run, including the capture and treatment of slag leachate, modifications of the stream channel, and improvements to stormwater management in the watershed. Here we compare historic and recent electrofishing survey results from two stations along Nine Mile Run and show that the stream has increased tremendously in both fish biodiversity and biomass. The sampling station closest to the mouth of Nine Mile Run shows higher diversity and variable species composition due to fish migration with the Monongahela River, while the upstream station has a moderate number of resident pollution tolerant species, and shows occasional fluctuations and extirpations. Despite the improvement that has taken place in the past two decades, Nine Mile Run will continue to face numerous challenges due to its urban location and the unavoidable continuing impacts of buried headwater drainages, runoff from impervious surfaces, and sedimentation. This highlights the need for continued monitoring and management actions in order to make long-lasting, system-wide improvements to Nine Mile Run's biology, hydrology, and geomorphology.

Presenter: Beth Dakin; dakine@duq.edu

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PA AFS would like to thank Allegheny College for graciously hosting the 2024 meeting. Faculty and staff were especially helpful planning this event, including Casey Bradshaw-Wilson and Lynn McManness-Harlan.

We'd also like to thank all of our workshop facilitators: Nevin Welte, Dakota Raab, Rick Spear, Joe Brancato, Nate Owens, Aaron Callis, and Matt Shank. Their efforts added a lot of value to the meeting and provided attendees with knowledge and skills they'll be able to use to improve fisheries science in PA and beyond.

Dakota Raab receives our sincere appreciation for designing a new logo for the chapter. His donation of his skill as an illustrator will allow the chapter to raise funds to provide opportunities for students in future years. Thanks also to Adam Slowik and family for producing hats and t-shirts with Dakota's great design.

Thanks to our Golden Redhorse Sponsors, the Foundation for PA Watersheds and Brookfield Renewable U.S. and Silverjaw Minnow Sponsor Civil & Environmental Consultants, Inc. Their generous donations helped increase student attendance and will be reflected in the advancement of fisheries science in PA. Thanks also to the Seven Mountains Wine Cellars for providing a selection of wine for our evening social.

Thanks to Dave Argent and the PennWest student chapter for their presence and contributions to the meeting.

And finally, thanks to the PA AFS Executive Committee who was so generous with their time to plan a great meeting.

2023-2024 Chapter Officers

President: ***Clayton Good***

Clayton is a Fisheries Biologist with the Pennsylvania Fish and Boat Commission in the Division of Environmental Services where he provides resource centric comments on state and federal encroachment permit applications and participates in a number of interagency working groups. A current focus has been on improving regulatory guidance and best management practices for aquatic organism passage at road stream crossings. Clayton has professional working experience with Trout Unlimited, Pennsylvania Department of Environmental Protection and a County Conservation District. Clayton is a graduate of Lycoming College with BS in Biology focusing on aquatic ecology, he was active in research with the Lycoming College Clean Water Institute. There he found his passion for working with salmonids in headwater ecosystems. Clayton is an avid angler and hunter enjoys fly fishing and archery hunting in particular. Clayton and his wife enjoy hiking, camping and introducing their two daughters to the abundant outdoor recreation opportunities that Pennsylvania has to offer.

President-Elect: ***Aaron Henning***

Aaron M. Henning (AFS Certified Fisheries Professional) works as a Fisheries Biologist for the Susquehanna River Basin Commission (SRBC) where he's been since 2010. Aaron's work includes various fisheries monitoring, restoration and management activities focused within the Susquehanna River Basin. He serves as the Commission's technical expert on migratory fish restoration, hydroelectric relicensing and invasive species management. Aaron currently leads studies monitoring the reintroduction of the American eel, tracking Northern snakehead & Blue catfish invasions via eDNA and is the creator of 'Eels in the Classroom', a pre-K-12 hands-on environmental education program. He also serves as a fish taxonomist for EPA's National Aquatic Resource surveys and is a member of the Pennsylvania Biological Survey's Fishes Technical Committee. Aaron frequently collaborates with fellow resources agencies, academic institutions and the regulated community to improve the fisheries of the Basin. When he's not staring at fish Aaron can be found recreating throughout Penn's woods & waters and feverishly cheering on Penn State athletic teams.

Secretary / Treasurer: *Adam Slowik*

Adam is a fisheries biologist and environmental compliance specialist currently employed with Brookfield Renewable. He received his BS in wildlife and fisheries biology from California University of Pennsylvania. Much of Adams experience is working with regulatory agencies in meeting common goals in compliance and fisheries restoration in the state of Pennsylvania. Currently, Adam performs research on much of the lower Susquehanna River and its tributaries. Most of the fisheries research he performs is very diverse and broad; however, Adam specializes in turbine passage survival, biotelemetry, and migratory fish passage. He utilizes PIT, radio, and acoustic-telemetry to perform large scale fish passage projects with anadromous and catadromous fishes. Adam has proudly served as a member of the PA AFS board since 2019. He has given multiple presentations for organizations and groups such as AFS, SRAFRC, EPRI, USACE, and many more. Additionally, he has co-authored several peer-review publications on anadromous fish passage and freshwater ecology. Locally, he aides and assists key stakeholders along the Susquehanna River in River Herring restoration, American Silver Eel re-introduction, and bio-monitoring. Adam resides in southeastern Pennsylvania with his wife, two daughters, and two dogs. When not working he enjoys target sports, hunting, fishing, and sharing his passion of fish with his two daughters.

Executive Committee Member: *Logan Stenger*

Logan is a Project Manager at the Chesapeake Conservancy, a non-profit organization dedicated to the conservation and improvement of the Chesapeake Bay watershed. Specifically, he is a part of the Pennsylvania restoration team where he develops and implements grants and projects to support water quality and habitat restoration work across central PA, including Centre, Clinton, Huntingdon, Lycoming, Snyder, and Union counties. He earned a B.S. in Environmental Science from Juniata College and a M.S. in Entomology from Penn State. Logan specializes in utilizing benthic macroinvertebrates for assessing water quality and is a certified taxonomist through the Society for Freshwater Science. Prior to working at the Chesapeake Conservancy, Logan most recently worked as a Watershed Specialist with the Huntingdon County Conservation District (2018-2023) where he coordinated stream restoration projects, water quality monitoring assessments, and environmental education programs. Logan has been an AFS member since 2018 and is an Associate Fisheries Professional working towards his Certified Fisheries Professional recognition.

As a central PA native, Logan enjoys spending time outdoors and is particularly passionate about hunting, trapping, and most recently, fly fishing. Logan and his wife, Francesca, reside in Tyrone with their two cats, Fish and Ion.

Executive Committee Member*: George Merovich, PhD*

I have been teaching and doing research in fisheries and aquatic sciences for almost 20 years. After receiving a BS in Wildlife and Fisheries Sciences from The University of Arizona and an MS in Applied Ecology and Conservation Biology from Frostburg State University, I taught in the biology department at Western Michigan University for 4 years. After that I attended West Virginia University where I completed my PhD in Forest Resources Sciences (Wildlife and Fisheries Program) in 2007 working on the aquatic ecology of coal-mined Appalachian watersheds. After a post-doctoral position from 2007-2008, I joined the faculty at WVU as a teaching assistant professor until 2015. Currently, I am an associate professor in the Environmental Science Department at Juniata College where I direct the Fisheries and Aquatic Sciences degree program. I have been a member of AFS since 1996. When not teaching, doing research, or analyzing data, I like archery hunting, taking the kids bluegill fishing, hiking, and playing baseball.

Student Representative: *Emily Bierer*

Emily is a graduate of Hiram College (2015) and Miami University (2017) with both an undergraduate and Masters degree in Biological Sciences with and emphasis on education. She is starting her PhD at Duquesne University in the fall with the intention to work with the coloration of darters in Pennsylvania. Emily's past research has focused on water quality and species diversity in aquatic environments. Outside of academics, Emily enjoys hiking, swimming, nature photography, playing with her dog and educating the public about science!

Past President: *Matt Shank*

Matt is a Certified Fisheries Professional that has served in various roles throughout environmental agencies in Pennsylvania. Matt is currently employed as a Water Program Specialist at the Pennsylvania Department of Environmental Protection, where he develops methods, biological indices, and analyzes data to inform management and restoration. He holds a B.S. degree (2008) in Environmental Studies from Gettysburg College and a M.S. degree (2013) in Fisheries Science from Penn State University. Matt serves on the Mid-Atlantic Panel on Aquatic Invasive Species and is currently an Executive Committee member of PA AFS. He has given numerous presentations at local, regional, and national conferences and has authored several peer-reviewed publications on freshwater ecology issues including invasive species and the effects of water withdrawals. Matt's primary responsibilities at DEP include leveraging large datasets to answer complex environmental questions. His current research includes investigating the physicochemical conditions in headwater streams impacted by acid deposition and the implications for biological communities. Matt is also using historic water chemistry datasets to contextualize present-day conditions, with a focus on mine drainage pollution and freshwater salinization. In his free-time, Matt enjoys catching large trout on small flies, hunting, and taking photographs in Penn's woods. He resides with his wife, three kids, and beagle in the Kishacoquillas Creek watershed in central Pennsylvania.