Signature Cover Sheet

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Proposal Title:

Tracking Invasive Round Gobies in the French Creek Watershed: A Novel Monitoring Approach for Targeted Management and Suppression

Amount Requested:

$12,465

Start and End Dates:

10/1/2025-9/30/2026

Signatory:

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Project Summary

Tracking Invasive Round Gobies in the French Creek Watershed: A Novel Monitoring Approach for Targeted Management and Suppression

Round gobies within Pennsylvania were previously restricted to the watershed of Lake Erie until their discovery in Lake LeBoeuf, part of the French Creek watershed, in 2013. This invasion presents a significant threat to one of the most biodiverse aquatic systems in the United States. While management strategies have largely focused on prevention of future introductions, effective eradication and control strategies remain undeveloped. In 2024, we initiated a study to better understand round goby movement to inform targeted suppression efforts. We tagged 109 round gobies with half-duplex passive integrated transponder tags (HD-PIT) and installed a Litz Cord monitoring array system at the outflow of Lake LeBoeuf to monitor movement between Lake LeBoeuf and LeBoeuf Creek. We collected data from August 8, 2024, until December 2, 2024, when water levels rapidly increased to record levels from a combination of intense rain and snowmelt, which destroyed the on-shore portions of our array system. The objective of this project is to replace damaged equipment and resume data collection for one year to identify periods of peak goby concentrations in Lake LeBoeuf. We will share our results with management agencies in Pennsylvania to directly inform suppression strategies, enabling targeted removal using electrified benthic trawl and electrofishing gear. We will incorporate our existing outreach activity, *The Round Goby Invasion,* into annual outreach events targeting K-12 students, such as the 4th Graders as Scientists program and the Creek Connections symposium. To our knowledge, this is the first use of an in-stream array monitoring system focused on round goby management, making this work novel and critical toward effective control methods to reduce established populations of round gobies. Understanding goby movement patterns in a high-biodiversity watershed is essential for guiding eradication efforts and preventing further spread to vulnerable stream systems.

Project Narrative

1) Project Description

Since 2021, The Watershed Conservation Research Center (WCRC) at Allegheny College has engaged in strategic conservation research, aiming to train the next generation of watershed stewards to protect, restore, and enhance our land and water resources for future generations in the French Creek watershed. In 2024, we began a new study to help inform management decisions on invasive round gobies (*Neogobius melanostomus*) for the state of Pennsylvania by monitoring round goby movement between Lake LeBoeuf and LeBoeuf creek. One hundred and nine gobies were tagged using half-duplex passive integrated transponder tags (HD-PIT; BioMark 8mm), which were implanted into the ventral side of the fish. A Litz Cord array was installed in LeBeouf Creek in August 2024 at the outflow of Lake LeBoeuf to monitor fish movement as individuals pass over the system. The system is powered by solar panels that have been installed near the array and data is recorded continually on a logger, housed in a weatherproof box with a circuit board and batteries. This project planned for continual data collection for a minimum of a full year. We were able to collect data from August 8, 2024, until December 2, 2024, when water levels rapidly increased from snowmelt and destroyed portions of our on-shore Litz Cord System.

Our objectives for this proposal are to replace the damaged on-shore array equipment and collect a full year of critical data on movement patterns of round gobies between Lake LeBeouf and LeBoeuf Creek. This data will inform management strategies aimed at reducing round goby populations by identifying peak movement periods for targeted control efforts. To accomplish this, we will position the new equipment farther from the creek to minimize damage from high water events. Data will be downloaded monthly on-site and transported to Allegheny College for analysis. This project will leverage previously acquired, undamaged equipment and an existing data analysis statistical package, maximizing the impact of prior investments. Additionally, the WCRC regularly applies for and receives grant funding in support of initiatives that are aligned with the outcomes of this grant, including a grant from a private foundation in December 2024. The funding from MAPAIS will complement and enhance these other secured funding sources.

Round gobies are a small benthic fish native to Eurasia, first introduced into North America through ballast water in the Laurentian Great Lakes over 30 years ago (Charlebois *et al.*, 2001) and quickly became the most dominant species in all five Great Lakes, altering food webs and posing significant threats to native species. Historically, round gobies within the state of Pennsylvania were restricted to the watershed of Lake Erie (Great Lakes Basin) until 2013, when they were discovered in Lake LeBoeuf, which resides in the French Creek watershed (Allegheny River/Upper Mississippi Basin) of northwestern PA. They were then discovered in LeBoeuf Creek and first noted in the mainstem of French Creek by 2016 (Mueller *et al.* 2017; Bradshaw-Wilson *et al.* 2019), and have since established reproducing populations of high abundances in Lake LeBoeuf (Byington 2022).

In Lake Erie tributaries, where the species has been intensively documented during its 30-year invasion, studies have indicated that round goby presence has negatively affected native darter species, which are a diverse group of benthic fishes indicative of high water quality (Reid and Mandrak 2008; Krakowiak and Pennuto 2008). Declines in native species such as mottled sculpin (*Cottus bairdi*), Johnny darter (*Etheostoma nigrum*), the federally-listed eastern sand

darter (*Ammocrypta pellucida*) and Pennsylvania state-listed Iowa darter (*Etheostoma exile*; Jansen and Jude 2001, Dubs and Corkum 1996), all of which are found within the French Creek watershed, have been documented in other locations following the round goby introduction. Furthermore, research suggests that round gobies alter the top-down and bottom-up forces acting on ecosystem conditions and food webs by inducing trophic cascades (e.g., Pagnucco *et al*. 2016; Henseler *et al*. 2021), which affect both non-game and game fishes as well as aquatic macroinvertebrates.

Management for round gobies, in general, has been challenging due to their high adaptability, aggressive nature, and prolific reproduction strategies. While management efforts have largely focused on prevention—such as public education, signage and regulations prohibiting transport and use as bait—effective eradication and control strategies remain undeveloped. Management for round gobies has been especially challenging in the Great Lakes, where the species has proliferated in both lake and stream environments (Philips *et al.* 2003; Krakowiak and Pennuto 2008). The French Creek invasion has garnered widespread concern, because French Creek has been touted as an aquatic biodiversity hotspot and was named the 2022 Pennsylvania River of the Year. The French Creek watershed has a regionally renowned diversity of freshwater mussels and freshwater fishes, especially with respect to native bottom-dwelling fishes (e.g., darters and madtoms in the genus *Etheostoma, Percina, Ammocrypta, Noturus spp.*; Smith and Crabtree 2010; Stauffer *et al.* 2016; Kirk and Wissinger 2019). Given the threat that the continual invasion of round gobies poses to this biodiversity hotspot, the French Creek watershed had served as a valuable model for understanding the dynamics of this global invader.

Over the past decade, emerging research on round gobies in French Creek has provided valuable insight that has been previously limited with respect to Lake Erie populations. Specifically, there have been notable differences in the patterns of invasion that are attributable to biotic differences (native diversity) and abiotic differences (habitat suitability). Regarding biological differences, the French Creek watershed has higher native biodiversity than the Lake Erie watersheds (Stauffer *et al.* 2016), and therefore higher potential threat to the native biodiversity. Prior empirical studies have quantified the predation threat that round gobies pose to the highly diverse *Unionidae* mussel assemblage of French Creek, which includes 26 species and eight threatened and endangered species (Bradshaw-Wilson *et al.* 2019; Clark *et al.* 2021, 2022). Gobies could also negatively impact mussels by affecting native fish hosts (Poos *et al.* 2010).

Regarding the influence of abiotic differences, there has been little evidence of round goby expansion in French Creek compared to the prolific expansion within the Great Lakes. Upstream dispersal into French Creek and surrounding tributaries has been virtually non-existent, and goby densities decrease rapidly as distance increases from Lake LeBoeuf (Kirk *et al. unpublished data*; Bradshaw-Wilson, *unpublished data*; see also Byington 2022). Instead, adults and juveniles have appeared solely limited to the mechanisms of downstream movement, with evidence of juvenile drift (Hemmelgarn *et al.* 2025). We conducted environmental DNA (eDNA) sampling with partners from the United States Fish and Wildlife Service (USFWS) and Erie National Wildlife Refuge in 2021-2024 which confirmed the invasion zone to be in the reaches downstream of Lake LeBoeuf (Bradshaw-Wilson *et al. unpublished data*). Specifically, round gobies were documented as far south as Cambridge Springs, roughly 32 km south of the confluence of LeBoeuf Creek with French Creek.

Anecdotal evidence is indicating that the limited expansion of round gobies may be attributable to habitat and behavioral preferences for the Lake LeBoeuf environment. Round gobies are found most often in rocky substrate to spawn and feed (Ray and Corkum, 2001; Stauffer *et al.*, 2016). They tend to use crevices of large rocks (MacInnis and Corkum, 2000) and large woody debris for protection (Bradshaw-Wilson, *unpublished data*), which are found in abundance along the shorelines and outflow of Lake LeBoeuf. However, the spatial distribution of round gobies within the lake and at the outflow also differ seasonally. A study conducted between April and August of 2021 showed that in April, 95% of all round gobies collected in LeBoeuf Lake were found at the outlet to LeBoeuf creek, 53% of which were immature juveniles. By contrast, 68% of round gobies were collected at the outlet in August, and 97% were immature juveniles (Byington 2022). A more recent study by Blair *et al.* (2018) investigated movement of round gobies from Lake Ontario to a tributary and found that adult round gobies moved seasonally with changing water temperatures, moving into the tributary to breed during summer and rapidly back into the lake in autumn.

Our study is novel in that it collects continuous, seasonal data on the movement of round gobies and does not require repeated effort to collect individuals. We hypothesize that goby movement activities out of the lake will be highest in late spring-early summer, and movements into the lake will be highest in late summer-early fall. Our preliminary data showed that of 109 tagged fish, movement peaked during mid- and late August, when five gobies moved from LeBoeuf Creek into LeBoeuf Lake in mid-August. By contrast, no gobies were detected after late October. These correspond to the breeding and foraging periods when gobies are most active.

2) Benefits or Results Expected

Expected results from this work include continual data for a year to determine if and how round gobies are moving between Lake LeBoeuf and LeBoeuf Creek. This is both novel work and critical data, allowing us to identify management strategies aimed at reducing as many round gobies as possible, targeting efforts when goby concentrations are the highest in the lake. At this time, strategies could include multiple participants utilizing electrified benthic trawl (Byington 2022) throughout Lake LeBoeuf, boat electrofishing and backpack electrofishing along the shore. Byington (2022) documented benthic electric trawl as being the most effective gear type for collection of round gobies in Lake LeBoeuf.

This work is especially important in the French Creek watershed, where Lake LeBeouf acts as a source population and disperses round gobies downstream through adult and juvenile drift (Hemmelgarn 2025). Within the United States, round goby research has largely been limited to the Laurentian Great Lakes, where the species has exhibited the longest and most prolific invasion history. Given the profound differences observed to date in the French Creek invasion, our research offers a promising approach to understanding another angle of life history strategies that round gobies in the French Creek watershed are utilizing. In addition, prior studies have indicated that PIT tags offer a means for monitoring rates of spread and movement (Kornis *et al.* 2012; Blair *et al.* 2018; Bergman *et al.* 2022); however, to our knowledge, no studies are using movement studies as a proxy for source-sink dynamics with direct implications for suppression strategies like ours.

The objectives of this study align with the mission of MAPAIS, specifically to understand the

natural history of a prolific invader, prevent the spread of aquatic invasive species through science and management, and to help implement action-oriented ways in which population suppression can occur. The information gained from this research is applicable not only in the state of Pennsylvania, but other geographic locations that are experiencing recent round goby invasion (i.e., New York) or may have a future invasion. We plan to communicate our results to Round Goby Working Groups, and appropriate agencies and nonprofits (i.e., French Creek Valley Conservancy), as well as work alongside these partners to implement suppression measures for round gobies in Lake LeBoeuf. We will incorporate this research into our curriculum at Allegheny College and engage in strategic outreach events with K-12 students on the topic of round goby invasion, and how to prevent future spread of the species.

3) Outreach Plan

Publications and presentations to professional scientific audiences: We will disseminate results from this study to management agencies in the state of Pennsylvania (i.e., PA Fish and Boat Commission; PA Invasive Species Council) as a technical report and will include recommendations for population suppression of round gobies in Lake LeBoeuf. The data will then be collated into a publication in an appropriate journal. We will be involved in organizing suppression measures and helping implement those management strategies after data is analyzed and recommendations are made. We will also present this research at regional research conferences, such as the Annual Research Symposium at the Regional Science Consortium and Pennsylvania Chapter of the American Fisheries Society.

K-12 outreach: We will use round goby invasion as a topic in courses at Allegheny College to demonstrate the potential trophic-level impacts of round goby invasions, and to highlight ways students can prevent future invasive species introductions and spread. This material will reach approximately 45 undergraduates per year. We have previously developed an active-learning activity, *The Round Goby Invasion,* which describes how to identify a round goby, how the round goby is spread into a new environment, the ecological impacts of the round goby on native fish populations and what students can do to prevent the spread. Over the grant period, we will continue to modify and incorporate this activity into annual outreach events, such as 4th Graders as Scientists and the Creek Connections Symposium (Allegheny's Creek Connections program works with regional K-12 schools to turn waterways into outdoor environmental laboratories.) Together, these efforts will reach approximately 300 K-12 students each year, many of whom come from underserved rural communities in western Pennsylvania.

4) Project Timeline

October 2025 – Purchase equipment and supplies from BioMark and install on-shore equipment
October 2025 – August 2026 – Periodic checks of equipment; data collection and analysis; attend outreach events; complete final technical report of recommended actions for a management plan; collate results into a publication
September 2026 – Disseminate and collaborate on a management plan with appropriate partners; submit a final technical report and publication.

5) Previous MAPAIS Funding

N/A

Note: Literature Cited available upon request.

Budget Table

1	Equipment	Item Number	Price per unit	Quantity	Total
a.	BioMark Litz System, Control Node	IS1001-24V	$2,195	1	$2,195
b.	BioMark Litz System, Data Logger USB	IS1001	$335	1	$335
c.	BioMark Litz System, Rec N Peake Block		$365	3	$1,095
d.	Battery Box, Small Green	BATTBOX	$1,450	1	$1,450
e.	Solar Panel Kit	VIC 150/45	$2,575	1	$2,575
f.	Exciter Cable Antenna	EXC IL-F20'	$595	1	$595
g.	Conduit- Superflex	Superflex 3/4	$20	4	$80
2	**Supplies**				
a.	BioMark Litz System, Battery 85aH	BATT 85AH	$385	4	$1,540
3	**Other**				
a.	Shipping and Handling		$600	1	$600
b.	Publication Costs		$2,000	1	$2,000
Total					**$12,465**

Budget Justification

1. **Equipment**
1a. BioMark Litz System, Control Node serves as the central processing unit that manages data acquisition and communication between the in-stream antenna and the pit tag components. This is essential for real-time monitoring and data collection in field conditions.

1b. BioMark Litz System, Data Logger USB is necessary for storing and transferring data collected from the BioMark Litz System to computers. This device ensures that all recorded information is safely stored and can be analyzed later.

1c. BioMark Litz System, Rec N Peake Block is a receiver and peak detection block that enhances the accuracy and efficiency by ensuring reliable detection of tagged species.

1d. Battery Box provides a secure and weather-resistant enclosure for the system's power source, ensuring continuous operation in remote field settings.

1e. A Solar Panel Kit, which includes a solar charge controller, the breakers, and associated wiring is required to connect to our existing solar panels, which provides a power source for the BioMark Litz System. This is particularly important for long-term deployment in field sites where conventional power sources are unavailable.

1f. Exciter Cable Antenna transmits signals within the BioMark Litz System.

1g. Litz Cord is designed to reduce power loss and improve signal efficiency, which enhances the overall performance of the BioMark Litz System. This component is necessary to maintain high-quality data transmission and system reliability.

2. Supplies
2a. BioMark Litz System, Battery 85aH battery provides the necessary power capacity to operate the BioMark Litz System efficiently. It is connected to the solar panel kit.

3. Other
3a. Shipping and Handling costs cover the transportation of all system components and accessories from BioMark. This is an estimate from BioMark.

3b. Publication costs: We plan to submit this work to a regional journal, and this will help to cover the publication costs associated with that.

CURRICULUM VITAE

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EDUCATION

PhD	The Pennsylvania State University, University Park PA
2015	Wildlife and Fisheries Sciences; Fisheries Focus
MS	Marshall University, Huntington WV
2010	Biological Sciences; concentration in Herpetology
BS	The Pennsylvania State University; Behrend College, Erie PA
2007	Biology; concentration in Ecology

RELEVANT PUBLICATIONS

- Hemmelgarn, G., **Bradshaw-Wilson, C**, and L. Demi. 2025.Juvenile Drift of Round Goby as a Means of Range Expansion in the French Creek Watershed, Pennsylvania. *Northeastern Naturalist*.
- Clark, K.H., Iwanowicz, D.D., Iwanowicz, L.R., Mueller, S.J., Wisor, J.M., **Bradshaw-Wilson, C.R**., Schill W.B., Stauffer Jr., J.R., E.W. Boyer. 2022. Freshwater unionid mussels threatened by predation of Round Goby (*Neogobius melanostomus*). *Scientific Reports* 12, 12859.
- Clark, K., Wisor, J., Mueller, S., **Bradshaw-Wilson, C**., Boyer E., and J. Stauffer Jr. 2021. Status of Freshwater Mussels (Unionidae) in the French Creek Watershed, USA at the Onset of Invasion by Round Goby, Neogobius melanostomus. Water. 13: 1-12.
- Mueller, S., **Bradshaw-Wilson, C.** and J. Stauffer. 2020. Dietary Variability of the Rainbow Darter (Etheostoma caeruleum) in Northwestern Pennsylvania. Northeastern Naturalist. 27(2): 236-271.
- **C Bradshaw-Wilson**, Sara Mueller, Jay R. Stauffer JR., Joshua Wisor and Kyle Clark. 2019. Documentation of Freshwater Mussels (Unionidae) in the Diet of Round Gobies (Neogobius melanostomus) within the French Creek Watershed, Pennsylvania. American Midland Naturalist. 181: 259-270.
- Sara Mueller, Jay R. Stauffer JR., Joshua Wisor and **Casey Bradshaw-Wilson**. 2017. Expansion of the invasive Round Goby (*Neogobius melanostomus*) into Allegheny River tributaries: LeBoeuf and French Creeks in Pennsylvania. Journal of the Pennsylvania Academy of Science.
- Jay R. Stauffer Jr., Jeanette Schnars, **Casey Wilson**, Richard Taylor, and Charles K. Murray. 2016. Status of Exotic Round Goby and Tubenose Goby in Pennsylvania. *Northeastern Naturalist*.

RELEVANT CONFERENCE PRESENTATIONS

- **Casey Bradshaw-Wilson,** Doug Fischer, Vicki Muller. 2024. Use of eDNA as a detection tool for prioritizing invasive round goby surveys in a Pennsylvania (USA) stream. International Conference on Aquatic Invasive Species. May 12-16, 2024. Halifax, Nova Scotia.

- **Casey Bradshaw-Wilso**n. Conference Plenary Speaker. 2023. Collaborations and Conservation: What we know about Invasive Round Gobies in the Upper Allegheny Watershed. Pennsylvania Chapter of the American Fisheries Society Spring Technical Meeting, February 23-24, 2023. Lock Haven, PA.
- **C. Bradshaw-Wilson**. 2018. Range Expansion and Diet of Round Gobies in Streams of Northwestern Pennsylvania. Upper Midwest Aquatic Invasive Species Conference. Rochester, MN; October 16, 2018.
- **Bradshaw-Wilson, C.** and J. Stauffer Jr. 2017. Determination of Invasive Round Goby (*Neogobius melanostomus*) Impact on Native Benthic Fishes in the Upper Allegheny Watershed. International Conference for Aquatic Invasive Species. Coral Springs, FL.
- Stauffer, J., Schnars, J., **Bradshaw-Wilson, C**., and R. Taylor. 2013. Status of Round Goby (Neogobius melanostomus) in Lake Erie Drainage System of Pennsylvania. Regional Science Consortium Annual Symposium. Erie, PA. November 7, 2013.

RELEVANT GRANTS RECEIVED

2024	Richard King Mellon Foundation PI: C. Bradshaw-Wilson, K.Pearce Project Title: Operational Funding for WCRC Total Amount Awarded: $934,877
2024	Pennsylvania Sea Grant/National Oceanic and Atmospheric Administration PI: **C. Bradshaw-Wilson**, K. Pearce, M. Kirk Project Title: Predicting the impacts and spread for an emerging invasion of non-native round gobies (*Neogobius melanostomus*) in a stream biodiversity hotspot (French Creek, Pennsylvania) Total Amount Awarded: $96,349
2018-2020	Pennsylvania Sea Grant/National Oceanic and Atmospheric Administration PI: E. Boyer, J. Stauffer Jr. and **C. Bradshaw-Wilson** Project Title: Impacts of Introduced Round Goby on Aquatic Community Structure in Pennsylvania Watersheds Total Amount Awarded: $125,000
2016-2018	Pennsylvania Sea Grant/National Oceanic and Atmospheric Administration PI: **C. Bradshaw-Wilson** & J. Stauffer, Jr. Project Title: Determination of Invasive Round Goby Populations within the Main Stem of French Creek & Their Potential Impact on the Native Benthic Fishes Total Amount Awarded: $56,165

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INSTITUTIONAL CV

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EDUCATION

2013- 2018 **Ph.D., University of Maryland Center for Environmental Sciences**
Appalachian Laboratory, Frostburg, MD
Ecology and Environmental Science, Co-Advisors: Dr. Thomas Serfass and Dr. Cathlyn Stylinski
Dissertation: The influence of the river otter (*Lontra canadensis*) on aquatic conservation in the Greater Yellowstone Ecosystem: A human-dimensions approach on evaluating conservation flagships

PROFESSIONAL EXPERIENCE

2021- **Co-Director**, Watershed Conservation Research Center, Allegheny College

2019- **Assistant Professor,** Environmental Science and Sustainability Department, Allegheny College

2018-2019 **Visiting Assistant Professor,** Environmental Science and Sustainability Department, Allegheny College

SCHOLARSHIP/RESEARCH **(Only most recent ones included)**

Publications and White-Paper Reports (* indicates Allegheny College student or alum)

Kirk, M, Coffield, K.M.*, Mumme, R. L., Bradshaw-Wilson, C., **Pearce, K.J.**, Whiteman, H.H., Wissinger, S.A. Patterns of sex- and condition-dependent migration timing and migration distance in two vernal pool amphibians. Herpetologica, *in review.*

Pearce K.J., Bowden, R.B, Choate, B., Boulton, K. 2024. *Expanding Sustainability to Include our Non-Human Partners: The Role of College Campuses in Supporting Wildlife Habitat* in World Sustainability Series. North American and European Perspectives on Sustainability in Higher Education, W.L. Filliho, Springer, *in press.*

Bowden, R., Choate, B., Pallant, E., **Pearce, K.J.,** Swann-Quinn, J., Byrnes, D., Bradshaw-Wilson, C., Carbone, I., Bensel, T., Betherum, M., Boulton, K., Shaffer, C., Ams, K., Brandby, L., Demi, L., Kedzierski, W. 2023. *Teaching beyond campus borders: Engaging students in community-based projects and research* in Educating the Sustainability Leaders of the Future, W. L. Fillho, A. Lange Salvia, B. Choate, E. Pallant and K.J. Pearce, Editors, Climate Change Management, Springer

Bricker, E.A, Serfass T.L., Ammer, F.K., Hanley, Z.L., **Pearce, K.J.**, and Stevens, S.S. 2022.Conservation status of the North American river otter (Lontra canadensis) in the United States and Canada: Management practices and public perceptions of the species. pgs. 509-536 E. D. Linh San, J.J. Sato, J.L. Belant and M.J. Somers, Editors, Small Carnivores: Evolution, ecology, behavior and conservation.

Pearce, K.J., Serfass, T.L., McCann, J.M., Feller. D.J. 2021 Status and distribution of the eastern spotted skunk (*Spilogale putorius*) in Maryland, Southeastern Naturalist, 20:52-63.

Professional Presentations (only most recent included, * indicates Allegheny College student)

Kirk, M.A., Bradshaw-Wilson, C.R., Pearce, K.J. *Watershed Conservation and Research: a history of community-, collaborative-, and undergraduate-based research in the French Creek watershed.* Department of Biological Sciences seminar at Mercyhurst University, 7 February 2025, Erie, PA.

Pearce, K.J, Bradshaw-Wilson, C.R., Kirk, M.A. *Instream habitat improvement and monitoring updates in the Woodcock Creek watershed.* Regional Science Consortium 20th Annual Research Symposium, 6-8 November 2024, Erie, PA.

Babcock, L*, Tovanche, L*., Houtz, J., and Pearce, K.J. Characterizing the Gut Microbiome of the River Otter (*Lontra canadensis)* in the French Creek watershed. Regional Science Consortium 20th Annual Research Symposium, 6-8 November 2024, Erie, PA.

Pearce, K.J., *Wildlife selfies: A snapshot into life of river otters.* Creek Connections Symposium, 19 April 2024, Meadville, PA.

Barney, M., Sebastian, B., Kirk, M.A., Bradshaw-Wilson, C.R., Pearce, K.J., and Brody, E.* *Evaluating the long-term success of two stream-bank restorations within the French Creek watershed*. Pennsylvania Chapter of the American Fisheries Society Spring Technical Meeting, 8-9 February 2024. Meadville, PA.

Brody, E.*, Kirk, M.A., Barney, M., Bradshaw-Wilson, C.R., Demi, L., and Pearce, K.J. *Impacts of sedimentation on brown trout populations in a high quality fishery.* Pennsylvania Chapter of the American Fisheries Society Spring Technical Meeting, 8-9 February 2024. Meadville, PA.

Kirk, M.A., Sebastian, B., Barney, M., Camarata, G.*, Shaffer, C., Bradshaw-Wilson, C.R., and Pearce, K.J. *Effects of stream crossing type on fish assemblages and stream ecosystem conditions: implications for culvert replacement*. Pennsylvania Chapter of the American Fisheries Society Spring Technical Meeting, 8-9 February 2024. Meadville, PA.

Barney, M., Kirk, M.A., Bradshaw-Wilson, C.R., and Pearce, K.J. *Evaluating the long-term success of two stream-bank restorations within the French Creek watershed*. RSC Annual Symposium, 10th November 2023. Erie, PA.

Kirk, M.A., Camarata, G.*, Shaffer, C.L., Sebastian, B., Bradshaw-Wilson, C.R., and Pearce, K.J. *Effects of stream crossing type on fish assemblages and stream ecosystem conditions: implications for culvert replacement.* North American Lake Management Society, October 22-26, 2023, Erie, PA.

Awarded Grants (Two most recent included, all with Dr. Casey Bradshaw-Wilson**)**

- Title: Watershed Conservation Research Center, Source: Richard King Mellon Foundation, Total Amount Awarded ($934,877)
- Title (*awarded*): Long-term monitoring of restoration sites in the French Creek Watershed using HOBO loggers. (2024), Source: Generating Awareness for Project Success (GAPS), Foundation for Pennsylvania Watersheds (FPW) and Three Rivers QUEST (3RQ), $9,026.64