WELCOME

Regional Science Consortium
15ᵗʰ *Annual Research Symposium*
November 6—8, 2019
Tom Ridge Environmental Center
at Presque Isle State Park

Welcome… to the celebration of our 15th Annual Regional Science Consortium Research Symposium! It is hard to believe it has been 15 years already. The first RSC Symposium was only half a day at the Stull Center on Presque Isle State Park, and I recall being a presenter discussing my research on Snapping Turtles and contaminants. This event has grown so much, and so has the RSC. The RSC now has a membership of 35 organizations which includes colleges and universities, state and federal agencies, school districts, and other non-profits. We have also grown geographically; RSC members are located across the state of Pennsylvania, in New York and Ohio, and even in South Africa. The research conducted by RSC staff, collaborators, and members has also grown tremendously… as you will learn from the presentations over the next three days.

Every year I look forward to the Symposium, and this year was no different. I am excited to report that the next three days will include 43 Oral Presentations and 44 Poster Presentations. The purpose of our Symposium is to provide a venue to present scientific research by our RSC researchers. The Symposium is the one time each year that the scientists and students in this region come together, inform others of their research, and also listen to their colleagues' research; thereby creating a great opportunity for collaboration among scientists from all disciplines, which I believe to be the spirit of the Consortium. We have a great variety of presentations that will interest everyone. Therefore, take the time to listen or view as many presentations as you can… they are impressive this year.

Please visit the Exhibitor Tables found throughout the 2nd floor Poster Area, featuring information on some of our vendors, partner organizations, and academic programs. We encourage everyone to attend our Poster Session on Wednesday evening from 6:00 – 8:00, providing the opportunity to discuss the projects with the poster presenters (*refreshments provided*). Also, there is still time to purchase your ticket for the Dinner on Thursday evening, which includes great food, drinks, a silent auction, and the *Salmon Frank* band. Visit our Registration Table for more details.

I would like to thank all of the participants of the Symposium this year. I would like to thank the researchers, professors, and especially the students for their hard work in preparing their PowerPoint and Poster presentations. I would also like to thank the PA DCNR staff of the TREC and the Sunset Café for the preparations. A special *Thank You* to our Sponsors this year that value and supported this event. I would especially like to thank the amazing RSC Team: Amber Stilwell, Jen Salem, Sean Dalton, and Sarah Magyan, for their hard work in making this event amazing... ***Thank you***!

I hope you all enjoy Symposium 2019!
Please mark your calendar for next year's Regional Science Consortium Research Symposium on November 4 – 6, 2020.

Cheers!
Jeanette

Jeanette Schnars, Ph.D.
Executive Director
Regional Science Consortium

FACILITIES

Regional Science Consortium
15th Annual Research Symposium
November 6-8, 2019
Tom Ridge Environmental Center
At Presque Isle State Park

Welcome back to the Tom Ridge Environmental Center. This year's Research Symposium will be utilizing several areas of the Center. If you have any questions, please do not hesitate to ask at the Registration Table in the lobby.

- TREC Lobby – Registration Table
- Room 112 – Oral Presentations
- Room 110 – Social Area
- Room 108 – Presentation Practice Area
- Second Floor – Poster Presentations
- Second Floor – Exhibitor Tables (around poster area)
- First Floor – Thursday evening Dinner
- Sunset Café – Lunch

SPONSORS

Regional Science Consortium
15th Annual Research Symposium
November 6-8, 2019
Tom Ridge Environmental Center
At Presque Isle State Park

Thanks to this year's Sponsors!

EXHIBITORS

Regional Science Consortium
15th Annual Research Symposium
November 6-8, 2019
Tom Ridge Environmental Center
At Presque Isle State Park

Please take the time to visit the many Exhibitor Tables throughout the first floor Visitor's Area of the TREC providing you with information on our partner organizations.

- Abraxis Inc.
- Cleveland Museum of Natural History
- Coastal Zone Management Program
- Flagship Niagara League
- Fondriest Environmental, Inc.
- Gannon University
- Go Native Erie!
- Natural History Museum at the Tom Ridge Environmental Center
- PA Department of Conservation and Natural Resources
- Shimadzu Scientific Instruments Inc.
- SONS of Lake Erie

SCHEDULE OF TALKS

Regional Science Consortium
15th Annual Research Symposium
November 6-8, 2019
Tom Ridge Environmental Center
at Presque Isle State Park

WEDNESDAY, NOVEMBER 6, 2019

7:30 – 8:20	**REGISTRATION OPENS** Register, upload presentations *Continental breakfast*
8:20 – 8:30	**Welcome** Jeanette Schnars, Ph.D., Executive Director, RSC

Presentations

Session Chair: Jeanette Schnars, RSC Executive Director

8:30 – 8:50	**An Epic War: Presque Isle State Park vs. Invasive Plants** Holly Best*, M.A., Park Manager 3, Presque Isle State Park
8:50 – 9:10	**Four Seasons of Growing: Plant Propagation for Wetland Restoration on Presque Isle State Park** Jen Salem*, Program Director, Go Native Erie!, Regional Science Consortium Tom Ridge Environmental Center, 301 Peninsula Drive, Suite 9, Erie, Pa 16505
9:10 – 9:30	**Fish and Amphibian Surveys in Restored Priority Wetland Habitats on Presque Isle State Park, Erie, PA** Sean Dalton,* B.S., Amber Stilwell, M.S., Jeanette Schnars, Ph.D., Regional Science Consortium
9:30 – 9:50	**Marsh Bird Monitoring at Presque Isle State Park: 2019 Update** Sarah Sargent*, Christopher H. Lundberg, and Laura Marie Koitsch Erie Bird Observatory, 301 Peninsula Dr, Ste 14, Erie, PA 16505
9:50 – 10:10	**BREAK**

Session Chair: Amber Stilwell, RSC

10:10 – 10:30	**Reconsidering Forensic Anthropology** Dennis Dirkmaat*, Ph.D., D-ABFA, Mercyhurst University, Department of Applied Forensic Sciences

10:30 – 10:50	**Stable isotopic examination (δ18O, δ15N, δ13C) of human remains from the Red Mountain site, Uinta County, Wyoming**
	Leslie Fitzpatrick*, Ph.D., R.P.A.
	Mercyhurst University, Department of Applied Forensic Sciences

10:50 – 11:10	**The effects of thermal alteration on the biological profile**
	Amelia M. Juneau, BA*+, Mercyhurst University, Department of Applied Forensic Sciences

11:10 – 11:20	**Understanding the Time Interval of Taphonomic Staining on Skeletal Elements**
	Kelly Galvin*+, Mercyhurst University, Department of Applied Forensic Sciences
	Speed Talk

11:20 – 11:30	**Utilizing interactions between soil and skin microbial communities to estimate postmortem interval (PMI) in a human model**
	Caitlin Sachsenmeier*+, MS Candidate, Mercyhurst University, Department of Applied Forensic Sciences
	Speed Talk

11:30 – 12:20	**LUNCH – THE SUNSET CAFÉ**

Session Chair: Jerry Covert, RSC Board Member

12:20 – 12:40	**Co-infection Prevalence of *Anaplasma phagocytophilum* and *Borrelia burgdorferi* in Ixodes scapularis Ticks in Erie, Pennsylvania**
	Azka Khan, MS*+, Robert Waters MS, Nancy Carty, Ph.D., and Christopher C. Keller, Ph.D., FNAOME
	Laboratory of Human Pathogens
	Lake Erie College of Osteopathic Medicine, Erie, PA

12:40 – 1:00	**Hypoplasia and reduced ascending axonal projections to the auditory thalamus after in utero exposure to valproic acid**
	Yusra Mansour*+, Naved Ahmed, Randy Kulesza PhD

1:00 – 1:20	**Finding Solutions to Address the Emerging Water Quality Issues with Per- and Poly- Fluorinated Compounds**
	Logan Miller*, Ruth Marfil-Vega, Heather Juzwa, Brahm Prakash, Jerry Byrne, Shimadzu Scientific Instruments, Inc., Columbia, MD

1:20 – 1:30	**Preliminary analysis of compounds extracted from commercially available dry dog food**
	D. Bowser*+, L. Pilewski*+, N. Kebede,
	Edinboro University of Pennsylvania, Edinboro, PA 16444
	Speed Talk

1:30 – 1:40	**New and Emerging Diseases in a 24-hour News Cycle**
	Breanna Adams*, Director of Environmental Health Services, Erie County Department of Health
	Speed Talk

| 1:40 – 2:00 | **BREAK** |

Session Chair: Holly Best, RSC Executive Board

2:00 – 2:20	**The RSC Buoy Program: Real-time data contributing to a long-term dataset**
	Jeanette Schnars, Ph.D.*
	Executive Director, Regional Science Consortium

2:20 – 2:40	**Predictive Modelling of *Escherichia coli* at Presque Isle State Park Swimming Beaches**
	Sarah Magyan, B.S.*, Sean Dalton, B.S., Amber Stilwell, M.S., Jeanette Schnars, Ph.D.
	Regional Science Consortium

2:40 – 3:00	**A Toxic Climate: Harmful Algal Blooms and Climate Change**
	Amber R. Stilwell, M.S.*
	Regional Science Consortium

3:00 – 3:20	**Climate Change Impact on our Water Balance**
	Sarah Jamison*, Senior Service Hydrologist
	National Weather Service Forecast Office, Cleveland, OH

| 3:20 – 4:00 | **BREAK** |

| 4:00 – 6:00 | **RSC BOARD MEETING** – RSC Board Members |
| | *Room 110* |

6:00 – 8:00	**POSTER SESSION**
	All are welcome to attend – *Refreshments provided*
	Upstairs Exhibitor Area

8:00 – 8:55	**REGISTRATION OPENS**
	Register, upload presentations
	Continental Breakfast
8:55 – 9:00	**Welcome**
	Jeanette Schnars, Ph.D., Executive Director, RSC

Presentations

Session Chair: Jen Salem, RSC Garden Coordinator

9:00 – 9:20   **Calculating Species Richness with Camera Traps in Northeastern Pennsylvania Forests**

Jacob LoVullo*+, Kelly Pearce, Allegheny College, 520 N. Main Street, Meadville, PA 16335

9:20 – 9:40   **Role of milkweed habitat restoration for Monarch Butterfly conservation in the Eastern United States**

Aaron J. Arden*+, Kelly Pearce, Department of Environmental Science, Allegheny College, Meadville, PA 16335, USA

9:40 – 10:00   **The Presque Isle Priority Wetland Restoration (PIPWR) Project (2012-2019): Wetland Vegetation Monitoring**

Robert S. Whyte*[1] and Amy Jewitt[2]
[1]California University of Pennsylvania, Biological and Environmental Sciences Department, 250 University Avenue, California, PA 15419, whyte@calu.edu
[2]Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy

10:00 – 10:20   **Milkweed type significantly influences the abundance of monarch chrysalis in Northwestern, PA**

Amanda Ress Liere*+, Kelly Pearce, Allegheny College, 520 N. Main Street, Meadville, PA 16335

10:20 – 10:40   **Plant species occupy different habitats on castle walls in Elbasan, Albania**

Ermelinda Gjeta[1], Priscilla Titus[2] and Jonathan Titus[3]*
[1]Biology Dept., Universiteti 'Aleksander Xhuvani', Elbasan, Albania
[2]Western New York Land Conservancy, East Aurora, NY
[3]Biology Dept., SUNY-Fredonia, Fredonia, NY

10:40 – 11:00   **BREAK**

11:00 – 11:10	**Microplastic Retention in the Digestive Tract of Lake Erie Fishes** Kasey Crandall[1]*+, Courtney R. Wigdahl-Perry[1], Sherri A. Mason[2] [1]State University of New York at Fredonia [2]Penn State Behrend *Speed Talk*
11:10 – 11:30	**The effect of surface wind on aquatic trophic interactions** Lynne Beaty*[1], Austin Brenner[1], Matt Zollars[1], and Steve Nozaki[2] [1]School of Science, Penn State Erie - The Behrend College, Erie, PA 16563 [2]School of Engineering, Penn State Erie - The Behrend College, Erie, PA 16563
11:30 – 11:50	**Summer Stratification Stability and Extent in Chautauqua Lake North Basin** MaryAnn Mason*+, Biology Dept., SUNY-Fredonia, Fredonia, NY 14063
11:50 – 12:10	**Results of Longshore Water-Current Velocity Investigation Within Select Breakwaters near Beach 6, Presque Isle State Park, Erie, Pennsylvania** Elizabeth Hittle*, Hydrologist, U.S. Geological Survey, Williamsport, PA
12:10 – 12:30	**A Culture-dependent Approach to Examine the Effects of Silver Ions on Bacterial Compositions within Local Streams** Tyler Hostetler*+, Elijah Dangrow, and Beth Potter. Penn State Behrend, School of Science
12:30 – 1:20	**LUNCH – THE SUNSET CAFÉ**

1:20 – 1:40	**Do *Ambystoma maculatum* in fragmented populations respond differently to simulated predators?** Kerry Stith*+, Samuel Nutile, Lynne Beaty School of Science, Penn State Erie – The Behrend College, Erie, PA 16563
1:40 – 2:00	**Take a Chill Pill: Fluoxetine influences the anti-predator responses of an aquatic snail (*Physa acuta*) across generations** Noah Colvin*+, Adam Simpson, Lynne Beaty School of Science, Penn State Erie - The Behrend College, Erie, PA 16563
2:00 – 2:20	**Mapping ranges and range shifts of lentic macroinvertebrates: A case study with case-making caddisflies (Limnephilidae)** Kylie Wirebach*+, Allegheny College

| 2:20 – 2:40 | **PA Fish and Boat Commission Resident Walleye Movement Study on Lake Erie** |
| | Mark Haffley*, Pennsylvania Fish and Boat Commission – Lake Erie Research Unit |

| 2:40 – 3:00 | **Long term monitoring update: water quality changes in Presque Isle Bay 2016-2019** |
| | Chris Dempsey*, Kaylee Luchansky, and Greg Andraso; Gannon University, Biology Department |

| 3:00 – 3:20 | **BREAK** |

Session Chair: Katie Farnsworth, RSC Executive Board Treasurer

| 3:20 – 3:40 | **Tick Surveillance in Erie County and Prevalence of Tick Borne Illness** |
| | Breanna Adams*, Director of Environmental Health Services, Erie County Department of Health |

| 3:40 – 4:00 | **Oh Wait...This Isn't Just a Rock: Looking Into the World of French Creek Freshwater Mussels through Art** |
| | Ivy Ryan*+, Allegheny College |

| 4:00 – 4:20 | **A multi-criteria GIS approach to prioritizing land parcels for conservation: A case study for the French Creek Valley Conservancy** |
| | Jakob Drozd*+, Samantha Easterling*+, & Kylie Wirebach*+ Allegheny College |

| 4:20 – 4:40 | **Impacts on Forest Regeneration in Northwestern Pennsylvania Timber Sites** |
| | Mitchell Carrigan*+ & Hunter Baker*+, Allegheny College |

| 4:40 – 5:00 | **BREAK** |

| 5:00 – 5:40 | **TOUR OF THE REGIONAL SCIENCE CONSORTIUM RESEARCH WING** |
| | Regional Science Consortium |

| 5:40 – 6:00 | **BREAK** |

6:00 – 9:00	**DINNER RECEPTION**
	Food and drinks by the Sunset Café
	Entertainment by the Salmon Frank Band
	Need a ticket? It's not too late! Please see Registration Table

8:00 – 8:55   **REGISTRATION OPENS**
                     Register, Upload presentations
                     Continental Breakfast

8:55 – 9:00   **Welcome**
                     Jeanette Schnars, Ph.D., Executive Director, RSC

Presentations

Session Chair: Jeanette Schnars, RSC Executive Director

9:00 – 9:20   **Population Status of the Pearl Map Turtle (*Graptemys pearlensis*)**
                     and Pascagoula Map Turtle (*Graptemys gibbonsi*) and Recommendations
                     Regarding Their Listing under the U.S. Endangered Species Act

Peter V. Lindeman[1]*, Ashley G. Gibson[1], Will Selman[2], Robert L. Jones[3], Grover J. Brown[4], Cybil C. Huntzinger[4], and Carl P. Qualls[4]
[1]Department of Biology and Health Sciences,
Edinboro University of Pennsylvania, Edinboro, PA 16444
[plindeman@edinboro.edu]
[2]Biology Department, Millsaps College, 1701 North State Street,
Jackson, MS 39210
[3]Mississippi Department of Wildlife, Fisheries, and Parks,
Mississippi Museum of Natural Science, 2148 Riverside Drive, Jackson,
MS 39202
[4]School of Biological, Environmental and Earth Sciences,
The University of Southern Mississippi,
118 College Drive, Hattiesburg, MS 39406

9:20 – 9:40   **Determining the Effects of Forest Fragmentation on Eastern Red-Backed**
                     Salamander (*P. cinereus*) Abundance

Chlöe Finger*+, Department of Environmental Sciences, Allegheny College

9:40 – 10:00   **Investigating Mortality of Gizzard Shad due to Viral Hemorrhagic**
                     Septicemia (VHS) associated with Warm Water Discharges in the Great
                     Lakes

Emma Mader*+, J. Michael Campbell, Biology Department, Mercyhurst University

10:00 – 10:10   ***Thamnophis brachystoma* (Short-headed Gartersnake) defensive behavior**

Mark Lethaby*
Natural History Museum at the Tom Ridge Environmental Center
301 Peninsula Drive, Erie, Pennsylvania, 16505, USA.
mal40@psu.edu
                     Speed Talk

10:10 – 10:30   **BREAK**

10:30 – 10:50	**How Do You Misplace Half A Million Birds?** Joe Siegrist*, Purple Martin Conservation Association
10:50 – 11:10	**A Census of the Bat Population of Gannon University, Erie, PA** Jocelyn Scott, Alasondra Tucciarelli*+, and Dr. Steve Ropski, Biology Department, Gannon University, Erie, PA. 16541
11:10 – 11:20	**Bat community composition at Presque Isle State Park** Kelly Pearce*, Allegheny College, 520 N. Main Street, Meadville, PA 16335 *Speed Talk*
11:20 – 12:10	**LUNCH – THE SUNSET CAFÉ**
12:10 – 12:40	**STUDENT AWARDS AND CLOSING REMARKS** Jeanette Schnars, Ph.D., Executive Director, RSC *Student Award Presentations* *Closing Remarks*

ABSTRACTS

Regional Science Consortium
15th Annual Research Symposium
November 6—8, 2019
Tom Ridge Environmental Center
at Presque Isle State Park

ORAL PRESENTATIONS

Wednesday, November 6, 2019

An Epic War: Presque Isle State Park vs. Invasive Plants

Holly Best, M.A., Park Manager 3, Presque Isle State Park

Since the mid 1980's, the quantity of invasive plants found at Presque Isle State Park has increased substantially. The park started battling the plants via mechanical means in the 1990's, but it wasn't enough. Fortunately, we found an ally in Ducks Unlimited, and we were able to partner with them, to receive a large amount of Sustain our Great Lakes funding to be able to arm ourselves and actually win some of the battles on the park to turn things around. Many other allies have joined in the battle and bring their own special training and skills, including the Regional Science Consortium, Go Native Erie, California University of PA, Environment Erie, and Erie Bird Observatory. This presentation will be about invasive plants, partnerships, and how the park is trying to beat the odds.

Four Seasons of Growing: Plant Propagation for Wetland Restoration on Presque Isle State Park

Jen Salem*, Program Director, Go Native Erie!, Regional Science Consortium
Tom Ridge Environmental Center, 301 Peninsula Drive, Suite 9, Erie, Pa 16505

Despite ongoing efforts to eliminate invasive plant species from Presque Isle State Park, targeted areas are not being repopulated by native plants quickly. The absence of these beneficial plants is an invitation for invasives to move back in, creating a situation where extensive treatment is necessary. The goal of this wetland restoration project is to grow and re-populate native wetland plants in three selected areas of Presque Isle. This will include propagation directly from plants found on the Park, and continual monitoring on the selected areas. The results of this project will be used by the PA DCNR and will impact future wetland restoration projects on Presque Isle State Park.

Fish and Amphibian Surveys in Restored Priority Wetland Habitats on Presque Isle State Park, Erie, PA

Sean Dalton* B.S., Amber Stilwell, M.S., Jeanette Schnars, Ph.D., Regional Science Consortium

Encroaching invasive plant species can have numerous negative effects if left unopposed in priority wetlands for both fish and amphibian species, ultimately leading to the displacement of the animals. Using field observation methods, collection transects, as well as overnight recordings, surveys were conducted at 4 priority wetland habitat restoration areas distributed across Presque Isle State Park in Erie County, PA where treatment for invasive plants has been applied. Surveys were conducted both before and after native replanting efforts by Go Native! Erie. The surveys seek to catalog the change in native biodiversity in these restored habitats.

Marsh Bird Monitoring at Presque Isle State Park: 2019 Update

Sarah Sargent*, Christopher H. Lundberg, and Laura Marie Koitsch

Erie Bird Observatory, 301 Peninsula Dr, Ste 14, Erie, PA 16505

We monitored at 50 points within wetland habitats at Presque Isle SP using a standardized protocol designed to detect secretive marsh breeding birds. Four of the eight target species were detected during surveys, with one additional species detected outside of the survey protocol. Least Bittern detections have decreased slightly over the past three years, although they are still higher than the pre-control numbers from 2011. Common Gallinule also had slightly fewer detections this year, but Virginia Rail had more. A Pied-billed Grebe was detected during the survey protocol for the first time since 2011. An American Coot was detected outside of the survey protocol, but during the breeding season and in appropriate habitat. No Soras, King Rails or American Bitterns were detected.

Stable isotopic examination ($\delta18O$, $\delta15N$, $\delta13C$) of human remains from the Red Mountain site, Uinta County, Wyoming

Leslie Fitzpatrick*, Ph.D., R.P.A.

Mercyhurst University, Department of Applied Forensic Sciences

A subset (n=5) of the human remains (N=6) recovered during the 1982 excavation season from the Red Mountain site in Uinta County, Wyoming were analyzed for stable oxygen, nitrogen, and carbon isotopes derived from bone and tooth carbonate and collagen. Standard osteological analysis results coupled with an evaluation of mortuary styles employed within this burial community suggest the probable East Asian ancestry of these individuals who were interred between 1874 and 1910. The $\delta18O$ analysis elucidates the probable geographic regions of origin for these individuals and provides information related to their long-term residential mobility. Dietary profiles ($\delta15N$, $\delta13C$) were developed for these individuals and are explored through a lens of culturally-mediated dietary source preference within a diasporic framework. This preliminary research contributes to the emerging stable isotope dataset for East Asian immigrants to the United States during the late-19th and early-20th centuries and constitutes some of the primary data related to East Asian immigrants in Wyoming during this period.

The effects of thermal alteration on the biological profile

Amelia M. Juneau, BA*+, Mercyhurst University, Department of Applied Forensic Sciences

A large component of forensic anthropological casework is the creation of the biological profile. The biological profile is an estimation of the decedent's age, sex, ancestry, and stature from skeletal remains and is used to aid in identification of the decedent. Many methods have been developed for estimation of the biological profile in unaltered skeletal remains. However, not all forensic cases are so simple, as many involve remains altered by factors such as fire. In these cases, the usual biological profile estimation methods may not be appropriate. Qualitative observation suggests that the application of heat to bone results in shrinking and warping of the bone, but this phenomenon has yet to be defined quantitatively. The goal of this research is to address this gap in the literature by quantifying changes that occur in bone as a result of burning, and, consequently, to identify the effects that those changes may have on the biological profile estimates. These theories will be tested in two phases. The first includes burning hand and foot bones from the Mercyhurst University Donated Body Collection and comparing measurements from before and after burning to examine changes in morphology, and the second will involve burning skeletal remains involved in biological profile estimation (i.e., cranium, os coxae, and long bones) to compare changes in biological profile analysis results. If differences are observed, it would cause a shift in analysis and constitute the creation of new methods for estimation of biological profile in burned remains.

Understanding the Time Interval of Taphonomic Staining on Skeletal Elements

Kelly Galvin*+, Mercyhurst University, Department of Applied Forensic Sciences
Speed Talk

Human skeletal elements recently recovered in Cascade Creek in Erie, PA during a forensic anthropology case conducted by the Applied Forensic Sciences Department at Mercyhurst University exhibited significant bone surface staining. Prior experience indicates that this type of staining typically occurs after prolonged deposition in the environment, and especially in an aqueous context. The goal of this study is to determine specifically how long this permanent staining of the bone would take. The hypothesis is that high temperature/high moisture conditions will be ideal for rapid staining of bone and will lead to higher uptake of discoloration from the surrounding environment and therefore, exhibit a greater degree of staining. To answer this question, a four-component research project will attempt to identify the variables accounting for differences in staining through time. Specifically, bones will be placed into high temp/high moisture, low temp/high moisture, high temp/low moisture and low temp/low moisture conditions. A recently completed pilot study showed that a minimal degree of staining occurred on human bone within thirty days when using nutrient-rich soil in high temp/high moisture conditions. The human remains from the recent Mercyhurst case displayed a dark, almost black staining. Literature has indicated that the presence of certain minerals, such as manganese, leads to an increased likelihood of this staining coloration. A component of this research design will be to test whether manganese in the soil does, in fact, increase the chances of dark staining of human bone. By completing this study, the aim is to clarify the factors, including time interval, leading to staining on human bones.

Utilizing interactions between soil and skin microbial communities to estimate postmortem interval (PMI) in a human model

Caitlin Sachsenmeier*+, MS Candidate, Mercyhurst University, Department of Applied Forensic Sciences
Speed Talk

Establishing the postmortem interval (PMI) is crucial part of death scene investigations. There are many methods that are currently used in the field of forensics, but none of them are accurate in extended PMI situations. New research is emerging in the field of microbiology to use soil and human microbiomes to establish PMI. The introduction of decomposition fluid to the soil changes the environment, which in turn changes the microbes present in the soil. The proposed research will utilize microbes specific to soil and human skin to potentially establish a timeline for PMI. As the skin decomposes, the microbes present on the skin may transition to the soil and vice versa. Ideally, this transition of microbes will happen at a specific time and will help establish a timeline for PMI. This proposal is looking at specific microbes of the skin and soil. If the selected microbes show that a timeline can be established, further research would involve sequencing all of the microbes present to establish a more accurate timeline. This timeline will aid members of the medicolegal community more accurately estimate PMI of human remains, specifically those remains that are scattered on the surface.

Co-infection Prevalence of *Anaplasma phagocytophilum* and *Borrelia burgdorferi* in *Ixodes scapularis* Ticks in Erie, Pennsylvania

Azka Khan, MS*+, Robert Waters MS, Nancy Carty, Ph.D., and Christopher C. Keller, Ph.D., FNAOME
Laboratory of Human Pathogens
Lake Erie College of Osteopathic Medicine, Erie, PA

Introduction: Ixodes scapularis is the primary vector responsible for transmission of tick-borne illnesses, such as Lyme disease and anaplasmosis. Our previous studies showed that *I. scapularis* ticks collected from Presque Isle State Park (PISP) carry pathogens including *Borrelia burgdorferi* and *Babesia microti*. The current study determined the prevalence and possible co-infection carriage rates of *Anaplasma phagocytophilum* and *B. burgdorferi* present in *I. scapularis* ticks collected from PISP.

Methods: *I. scapularis* ticks (n=330) were collected from PISP, DNA was extracted by individually crushing ticks, and an I. scapularis 16s rRNA PCR was used to confirm the presence of tick DNA. An *A. phagocytophilum* nested PCR and B. burgdorferi PCR targeting the 16s rDNA gene was performed on all DNA samples to determine the carriage rate of each bacterium. All *A. phagocytophilum*-positive samples, and several randomly selected B. burgdorferi-positive samples, were sequenced to confirm the PCR results. **Results:** All *I. scapularis* ticks were confirmed positive for tick DNA. The carriage rate of *A. phagocytophilum* was 15/330 (4.54%) and the carriage rate of *B. burgdorferi* was 204/330 (61.8%). All 15/15 (100%) *A. phagocytophilum*-positive ticks also tested positive for *B. burgdorferi* DNA. **Conclusion:** *I. scapularis* ticks collected from PISP carry *A. phagocytophilum* and are more likely to be co-infected with both *A. phagocytophilum* and *B. burgdorferi*, rather than carrying *A. phagocytophilum* alone, suggesting a possibility of bacterial co-infections to humans. Future studies are ongoing to detect other tick-borne pathogens to help educate area healthcare providers on risks of tick-borne co-infections.

Hypoplasia and reduced ascending axonal projections to the auditory thalamus after in utero exposure to valproic acid

Yusra Mansour*+, Naved Ahmed, Randy Kulesza PhD

Valproic acid (VPA) is an antiepileptic that causes an increase in the risk of autism spectrum disorder (ASD) in humans following prenatal exposure. Because of this, in utero exposure to VPA is an accepted and proven animal model of ASD. Individuals with ASD exhibit some level of auditory dysfunction including hypersensitivity to loud noises and an inability to filter background noises. Previous work indicates fewer neurons in the auditory brainstem following prenatal VPA exposure while surviving neurons have abnormal cell body morphology and reduced axonal projections from the cochlear nucleus, superior olive and nuclei of the lateral lemniscus to the inferior colliculus. We hypothesize these morphological changes extend into the auditory thalamus. Specifically, we believe there are reduced axonal projections from the cochlear nucleus, superior olive and central nucleus of the inferior colliculus (CNIC) to the ventral medial geniculate nucleus (vMG). Our results indicate there are fewer neurons in the vMG following in utero VPA exposure and that surviving neurons have smaller neuronal bodies. We found that in VPA-exposed animals there are fewer neurons of the cochlear nucleus, superior olivary complex and the CNIC sending axonal projections to the vMG. Our findings support our hypothesis that prenatal VPA exposure leads to hypoplasia, dysmorphology, and an imbalance of excitatory and inhibitory inputs in the auditory brainstem and thalamus.

Finding Solutions to Address the Emerging Water Quality Issues with Per- and Poly- Fluorinated Compounds

Logan Miller*, Ruth Marfil-Vega, Heather Juzwa, Brahm Prakash, Jerry Byrne, Shimadzu Scientific Instruments, Inc., Columbia, MD

Per- and Polyfluoralkyl Substances (PFAS) have been studied within the environment for years by researchers across the globe. The general public has recently become more aware and concerned regarding the presence of PFAS in consumer products and the environment because of their effects on human health and ecosystems. To respond to the increasing demands of information about PFAS, multiple Federal and State Agencies (e.g. EPA, DOD, DEQs and DEPs) in the United States as well as international organizations (e.g. ASTM) have been publishing new analytical methodologies for standardizing PFAS monitoring and establishing more stringent limits. These rapid changes in monitoring requirements pose a challenge for environmental laboratories: they need robust and easy to implement workflows that can be quickly vetted for generating accurate results. As monitoring requirements continually change and regulatory agencies proposed lower and lower limits environmental labs can be faced with a challenging analytical problem. This presentation will provide an overview of PFAS compounds as well as analytical solutions to aid environmental labs in monitoring PFAS, including "next-generation" substances, such as GenX. In this presentation, various instrument platforms and standardized methods from EPA and ASTM will be covered as well as provide guide to environmental labs about which platforms can address sensitivity limits for regulatory requirements.

Preliminary analysis of compounds extracted from commercially available dry dog food

D. Bowser*+, L. Pilewski*+, N. Kebede, (2019)
Edinboro University of Pennsylvania, Edinboro, PA 16444
Speed Talk

The presence of contaminants such as pentobarbital, melamine, cyanuric acid, and heavy metals have been the crux of many commercial dog food recalls. Ingesting these compounds can cause harm, even death, to dogs. Therefore, it is important to target and identify these contaminants. Identification can be achieved by a QuEChERS (quick, easy, cheap, effective, rugged, and safe) approach to sample extraction or Soxhlet extraction. This preliminary study utilizes both extraction techniques to determine the presence of known contaminants and reinforce the efficacy of the experiment. Prior to QuEChERS clean up, water, acetonitrile, and sodium chloride are used to separate out interfering substances from homogenized dog food samples. The supernatant is put through the QuEChERS clean up. The final extraction is run through Gas Chromatography and Mass Spectrometry (GCMS). Soxhlet extraction uses hexane as a solvent to remove lipids and other nonpolar molecules and methanol to remove polar compounds. The polar and nonpolar extractions are analyzed using Gas Chromatography and Mass Spectrometry (GCMS). Comparing the standard GCMS library data to experimental data allows for the identification of extracted compounds.

New and Emerging Diseases in a 24-hour News Cycle

Breanna Adams*, Director of Environmental Health Services, Erie County Department of Health
Speed Talk

As temperatures rise and summer season extends, more vector-borne illnesses seem to be making their way into our region. When media coverage and social media provide information to your fingertips, how important is proactive media discussion and public education? What does it take for something to "go viral" and what can the impact be on your organization.

The RSC Buoy Program: Real-time data contributing to a long-term dataset

Jeanette Schnars, Ph.D.*
Executive Director, Regional Science Consortium

The Regional Science Consortium maintains and operates 4 buoys on Lake Erie and two weather stations, providing real-time data to researchers, managers, and the public. Two of these buoys are deployed 2 miles offshore in approximately 17 meters of water, and two buoys are deployed in 3-4 meters of water along the shoreline in between the breakwaters. Three of the buoys are outfitted with a water quality sonde. The two buoys offshore are also outfitted with a weather station, wave meter, and a video camera. There are two land-based weather stations; One of the weather stations is installed at Beach 2 on Presque Isle State Park, and the other weather station is at the top of the Tom Ridge Environmental Center observation tower. All data from the buoys systems and weather stations are collected every 20 minutes and posted in real-time to the website www.PALakeErieBuoy.com . These buoys serve several purposes, including the creation of large continual data sets, real-time data, information on water quality, supporting predictive models, and monitoring lake conditions. Specifically, the buoys support on-going research projects, including the concentrations of E. coli, and the toxin concentrations from cyanobacteria. The results of this data have been integrated into predictive models for bacterial concentrations in swimming waters and will be used to further investigate the occurrence of harmful algal blooms; providing the opportunity to make better management decisions earlier compared to standard techniques. This technology allows for better management of Lake Erie on several diverse issues.

Predictive Modelling of Escherichia coli at Presque Isle State Park Swimming Beaches

Sarah Magyan, B.S.*, Sean Dalton, B.S., Amber Stilwell, M.S., Jeanette Schnars, Ph.D.
Regional Science Consortium

In order to ensure public safety at Presque Isle State Park's swimming beaches, daily bacterial sampling is performed during the peak swimming season. Since current methods require a 24-hour delay in results, predictive models have been utilized to obtain same-day exceedance potentials. The predictive models utilized include Virtual Beach developed by the United States Geological Survey (USGS) and RoboHarry developed by Penn State Erie. This study examines the accuracy of these predictive models in assessing the exceedance potential of *Escherichia coli* at Presque Isle State Park Beaches in the 2019 swimming season. Water samples and observations of water quality were obtained daily from six locations along the peninsula and analyzed for *E.coli* levels using EPA standard methods for vacuum filtration. Water quality observations were utilized to obtain exceedance potentials for each location through the Virtual Beach and RoboHarry predictive models. Exceedance potentials from both models were available within two hours of sample collection while *E.coli* levels from bacterial plating were available after 24 hours. The Virtual Beach predictive model was found to agree with the actual *E.coli* counts 85% of the time on average. The RoboHarry predictive model was found to agree with the actual *E.coli* counts 83% of the time on average. Used in combination with the previous day's *E.coli* plating counts, the Virtual Beach and RoboHarry predictive models provide park officials with the necessary resources to make accurate and timely judgments on swimming beach safety advisories.

A Toxic Climate: Harmful Algal Blooms and Climate Change

Amber R. Stilwell, M.S.*, Sean Dalton, B.S., & Jeanette Schnars, Ph.D.
Regional Science Consortium

The Regional Science Consortium (RSC) has been studying and monitoring for harmful algal blooms (HABs), also known as cyanobacteria blooms, since 2013. Monitoring efforts funded by Great Lakes Restoration Initiative through the Department of Environmental Protection (DEP) will be discussed as well as recent information from climatologists looking at rising temperatures and changing weather patterns across the United States. These climate studies and the RSC's HAB monitoring information will be brought together to hypothesis the outlook of HABs in Erie County as the local climate changes.

Climate Change Impact on our Water Balance

Sarah Jamison*, Senior Service Hydrologist
National Weather Service Forecast Office, Cleveland, OH

Are we living in a wetter world? Climate change affects not only temperature, but the atmosphere's capacity for holding and releasing water. As a result, the frequency of downpours is on the rise. According to NOAA climatologists, the Great Lakes have experienced an increase in the number of extreme precipitation events (precipitation greater than 2 inches) since the mid 1990s. The increased intensity of rainfall events is leading to an overall increase in the frequency and magnitude of flooding events. Torrential rainfall events are also resulting in overwhelming combined storm drainage systems and erosion. Water levels in the Great Lakes were at or near record levels in 2019 as a result of a wet winter, spring, and summer. NOAA Climatologist project high lake levels will be more common in the future.

Thursday, November 7, 2019

Calculating Species Richness with Camera Traps in Northeastern Pennsylvania Forests
Jacob LoVullo*+, Kelly Pearce, Allegheny College, 520 N. Main Street, Meadville, PA 16335
The Eastern Hemlock has recently faced a massive decline since an invasive species, the Woolly Adelgid, was first brought to the United States in the mid-twenties and more recently reached the Appalachians in the 1950s. These trees are a historic member of forests in western Pennsylvania and are important when considering the benefits they have to their respective ecosystems including the species richness of the region. To better understand the species richness provided by Eastern Hemlocks we placed five motion-detecting trail cameras within Bousson Experimental Forest. The Bousson Experimental forest is located in Meadville Pennsylvania, and is a mixed-forest with stands dominated by eastern hemlock. Cameras were baited with sardines in order to increase the odds of seeing the full variety of species in the area. Cameras were programmed to record an image when triggered by movement, with a 1-minute lapse between photographs. The total number of species detected and the Shannon-Wiener index will be used to calculate species diversity of the Bousson Experimental Forest.

Role of milkweed habitat restoration for Monarch Butterfly conservation in the Eastern United States
Aaron J. Arden*+, Kelly Pearce, Department of Environmental Science, Allegheny College, Meadville, PA 16335, USA
Since the mid-1990s, there have been significant declines in monarch butterfly populations. Concurrently, there has been a decline in Milkweed habitats due to agricultural practices and development. Monarch Butterflies rely on Milkweeds as a host plant for their eggs and larvae. The plant provides chemical protection through cardenolides and acts as the only food source for developing larvae. Milkweed habitat restoration is necessary to improve the monarch butterfly populations in the midwestern United States. There are multiple species of milkweed, but the three species this study will focus on are the Common (*A. syriaca*), Swamp (*A. incarnata*), and Butterfly (*A. tuberosa*). This study was conducted on September 9th, 2019 and compared CPUE (catch per unit effort) among the 3 milkweed types. We hypothesize that there will be a significant difference in CPUE among the milkweed species. There was no significant difference in CPUE among milkweed types ($p = 0.0934$) However, most monarchs were observed in the Swamp milkweed and Butterfly milkweed fields. Swamp milkweed had the highest CPUE of 1.11, with butterfly milkweed following with a CPUE of 0.22. Restoring and protecting swamp milkweed and butterfly milkweed will improve the conservation efforts for monarch populations in the Eastern United States during the late migration season.

The Presque Isle Priority Wetland Restoration (PIPWR) Project (2012-2019): Wetland Vegetation Monitoring
Robert S. Whyte*[1] and Amy Jewitt[2]
[1]California University of Pennsylvania, Biological and Environmental Sciences Department, 250 University Avenue, California, PA 15419, whyte@calu.edu
[2]Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy
The Presque Isle Priority Wetland Restoration (PIPWR) project is a comprehensive multi-agency effort coordinated by Ducks Unlimited in cooperation with the PA Department of Conservation and Natural Resources, the Regional Science Consortium and other non-profits and area universities. The project was initiated in 2012 and recently completed phase II which ran from 2016-2018. Phase III of the project will run from 2019-2021. The goal of the PIPWR project is to restore 400 acres of coastal wetland habitat at Presque Isle State Park and improve native habitat structure and complexity, hydrologic connectivity, and water quality. Presque Isle State Park is home to several unique ecological communities including numerous emergent wetlands and an open-water lagoon system. Many of these native wetland plant communities have been outcompeted and overrun by invasive species including *Phragmites australis*,

Typha angustifolia, and *Typha glauca*. For the project period, PIPWR project members monitored and measured the change in plant species composition and habitat structure by completing a comprehensive survey of the wetland vegetation in designated treatment areas (and control sites) before and after removal of *Phragmites* and other invasive and non-native species. This monitoring data was later integrated into the Pennsylvania iMapInvasives database, an on-line, GIS-based data management system available to the general public and used to assist citizen scientists and natural resource professionals working to protect our natural resources from the threat of invasive species. The integration of data into iMapInvasives allows PIPWR project members and others to view specific invasive species locations and treated areas within the designated project sites at the park, thereby increasing awareness of this important work.

Milkweed type significantly influences the abundance of monarch chrysalis in Northwestern, PA

Amanda Ress Liere*+, Kelly Pearce, Allegheny College, 520 N. Main Street, Meadville, PA 16335

In the last 20 years, the monarch butterfly (*Danaus plexippus*) population has decreased by over 95% and is on the verge of becoming eradicated. Determining effective habitat restoration techniques for monarchs is a necessity to prevent further population declines. In Northwestern Pennsylvania, we examined how different milkweed species affected chrysalis abundance in Meadville, PA with milkweed species *A. Syriaca* (common), *A. Incarnata* (swamp), and *A. Tuberosa* (butterfly weed) at three Ernst Conservation Seed Fields on 2 September 2019. Swamp milkweed had significantly greater number of chrysalises than other types of milkweed (p = 0.0232) . The results suggest that habitat restoration efforts in Northwestern, PA should focus on swamp milkweed, to have the greatest improvement in the monarch abundance.

Plant species occupy different habitats on castle walls in Elbasan, Albania

Ermelinda Gjeta[1], Priscilla Titus[2] and Jonathan Titus[3]*
[1]Biology Dept., Universiteti 'Aleksander Xhuvani', Elbasan, Albania
[2]Western New York Land Conservancy, East Aurora, NY
[3]Biology Dept., SUNY-Fredonia, Fredonia, NY

Vegetated walls are an important habitat for urban biodiversity. We conducted an analysis of the plant species that grow on the Elbasan, Albania castle walls. Walls vary in age from 4th to 21st century, and in composition. On 71 walls we assessed 2,787 plants of 41 species and recorded plant size, presence of flowers or fruits, height from the ground, crevice depth, wall aspect, wall age and composition, and distance to nearest opposing wall. Eleven species, two of which were ferns, composed 92.4% of the plants. The vast majority of plants flowered and fruited on the walls. Plant density ranged from <1-70 plants/m2. Species distributions varied significantly based on height on the wall, crevice depth and aspect. These differences may be influenced by dispersal, moisture, substrate composition, and other important environmental factors. For example *Antirrhinum majus* was generally found high on south facing walls in deep cracks whereas *Umbilicus rupestris* was found lower on north facing walls in shallower cracks. It is important that older walls colonized by plants be maintained such that the flora can persist where natural rocky features are lacking. This research was part of a Fulbright Exchange. Student researchers assisted and learned field techniques during the study.

Microplastic Retention in the Digestive Tract of Lake Erie Fishes

Kasey Crandall[1]*+, Courtney R. Wigdahl-Perry[1], Sherri A. Mason[2]
[1]State University of New York at Fredonia
[2]Penn State Behrend
Speed Talk

While the dispersion of microplastic pollutants within the environment has been well documented, limited data are available on how these particles may enter and accumulate in organisms. The goal of this study is to expand on an existing dataset which tracked microplastics in the gastro-intestinal tracts of Lake Erie fish. The previous dataset was limited in the number of individuals studied and did not assess the composition of particulates present in the fish. This project aims to increase the

number of specimens within certain species from the past study, as well as add new species in selected trophic levels in order to assess pathways for possible bioaccumulation within the food web.

Fish specimens have been provided by the New York State Department of Environmental Conservation, as by-catch from Lake Erie fish surveys. Gastro-intestinal tracts were dissected and chemically digested using potassium hydroxide and wet peroxide oxidation. After sieving through a 120 μm sieve, remaining materials were picked through to isolate plastics present in the samples. We are currently still processing the digestive tracts of fish. Once the digestive tracts are fully processed, the particles will be examined on a dissecting microscope. We will count and classify the plastic particles into one of five main morphologies (pellet, fragment, foam, film, line). Each particle will then be analyzed by Fourier-Transform Infrared Spectroscopy (FTIR) in order to identify the type of plastic. These results will help identify possible entry points for plastics into aquatic foodwebs as well as ecosystem effects from plastic pollution.

The effect of surface wind on aquatic trophic interactions

Lynne Beaty*[1], Austin Brenner[1], Matt Zollars[1], and Steve Nozaki[2]
[1]School of Science, Penn State Erie - The Behrend College, Erie, PA 16563
[2]School of Engineering, Penn State Erie - The Behrend College, Erie, PA 16563

The potential effects of climate-induced changes in temperature and precipitation on ecological interactions have been well studied. It is largely unknown, however, how predicted changes in surface wind speeds will influence wildlife. In particular, there is a gap in our understanding of how changes in surface winds, which are known to influence the abiotic conditions of aquatic habitats (e.g. dissolved oxygen, turbidity, and temperature), may affect the trophic interactions of aquatic organisms, especially those found in small waterbodies like snails and crayfish. To address this, we fitted mesocosms with equipment to either augment, reduce, or maintain surface winds and reared mud snails (*Physa* spp.) in the presence or absence of lethal crayfish (*Cambarus carinirostris*). We monitored the abiotic conditions of each mesocosm and surface wind speeds using custom-built Raspberry Pi weather stations. We recorded snail anti-predator behavior twice a week for four weeks and then assessed treatment effects on snail survival, shell shape, and size. Given snail reliance on aquatic chemical cues to detect predators, we predict that snails from treatments with increased surface winds and predator presence will exhibit greater anti-predator responses (both behaviorally and morphologically) than individuals in treatments with reduced surface wind.

Summer Stratification Stability and Extent in Chautauqua Lake North Basin

MaryAnn Mason*+, Biology Dept., SUNY-Fredonia, Fredonia, NY 14063

Lake stratification, or separation of water layers based on their temperature and density differences, is an important phenomenon that occurs in many lakes. Stratification can impact oxygen availability, nutrient concentrations, algae growth, and other ecological interactions within lake ecosystems. Despite its importance to ecological functions, information is limited on stratification patterns at Chautauqua Lake (Chautauqua County, NY). Past seasonal data from the Chautauqua Aquatic Monitoring Program (ChAMP) buoy indicated that consistent stratification does not occur at the monitoring location of 8 meters and no thermocline or separation of the surface and deeper layer, fully sets up. Therefore, if stratification occurs within Chautauqua Lake, it may be limited to isolated locations of deeper waters throughout the north basin.

In order to better understand stratification, weekly vertical profiles were performed for temperature and oxygen. In addition to the profiles, high-frequency temperature sensors were deployed to gain a spatial and temporal perspective on stratification. Stratification did occur for a period of time over the summer, however long-term temperature loggers indicated that there was vertical daily movement of the thermocline. Profile data from this site indicated that deeper water routinely reaches 0% oxygen saturation. Low oxygen levels may cause a release of phosphorus from the sediments and allow it to become freely available in the deep layer. If stratification is unstable, this could allow for rapid algae

growth. More data needs to be collected focusing on the characteristics that influence algae growth on Chautauqua Lake to further provide better management options for lake organizations.

Results of Longshore Water-Current Velocity Investigation Within Select Breakwaters near Beach 6, Presque Isle State Park, Erie, Pennsylvania

Elizabeth Hittle*, Hydrologist, U.S. Geological Survey, Williamsport, PA

On May 8 and 9, 2019, water-current velocity and direction were measured using an acoustic Doppler current profiler (ADCP) within breakwaters number 19-30 off Beach 6. The work was conducted as part of a pilot study to collect baseline data to understand the connection between wave height and angle of approach and the water currents that could be transporting sediment alongshore. Detailed bathymetry data also was collected. The two days are a snapshot in time and indicate water-current direction is generally dependent on local wind conditions. The data collected during this study could be integrated into a future breakwater hydrodynamic model of the area to help predict sediment transport along the peninsula. The bathymetry data can be used as a representation of the area before the beginning of the 2019 summer recreational period and before sand replenishment occurred in June. Results of this study can also help fine-tune field deployment methods if this study were to be repeated or expanded.

A Culture-dependent Approach to Examine the Effects of Silver Ions on Bacterial Compositions within Local Streams

Tyler Hostetler*+, Elijah Dangrow, and Beth Potter. Penn State Behrend, School of Science

Our society has become more aware of the abundance of bacteria which is evident by the increase in antimicrobial products over the past two decades. A commonly used agent in many antimicrobial products is silver ions due to its multifactorial approach to killing a wide range of microorganisms. Most of the research concerning silver ions has focused on its antimicrobial effectiveness and considerably less research has been done on any effect of the over-usage of silver in the environment. Thus, the goal of our study is to determine whether silver is affecting bacterial ecosystems within our local waterways. For the study, collections from surrounding streams were exposed to coupons either coated with silver zeolite or a non-silver coating. After 48 hours of exposure, the samples were transferred to a filter through vacuum filtration and plated onto: tryptic soy agar (TSA), modified mTec agar (mTec), m-enterococcus agar (ME), and Carbapenem-resistant Enterobacteriaceae agar (CRE). Additionally, inductively coupled plasma mass spectroscopy (ICP-MS) was used to measure silver concentrations of the individual streams during collection and during sample exposure to silver and control coupons. Preliminary culture-dependent results suggest that bacterial populations are susceptible to silver ions, including organisms that are already antibiotic resistant.

Do *Ambystoma maculatum* in fragmented populations respond differently to simulated predators?

Kerry Stith*+, Samuel Nutile, Lynne Beaty

School of Science, Penn State Erie – The Behrend College, Erie, PA 16563

Habitat fragmentation is one of the leading threats to yellow-spotted salamander (*Ambystoma maculatum*) populations. Previous research at Penn State Behrend has shown that campus *A. maculatum* populations, which have been isolated by the development of roads and highways such as the Bayfront Connector, have genetic and physical differences. Whether or not these populations also exhibit behavioral differences is unknown. The purpose of this study was to determine if there are differences in predator avoidance behavior among populations of *A. maculatum* on Penn State Behrend campus. Mature male salamanders were collected from seven ponds on campus in Spring 2019. Salamanders were then placed in an indoor arena, and their behavior before and after the appearance of a simulated bird predator was recorded. Given previously observed genetic and morphological differences, we expected that there would be behavioral differences among salamander populations. Such differences would have implications for their ability to avoid predation and respond to human disturbance (e.g. foot traffic or cars). Based on preliminary data analyses, however, we did not observe significant behavioral differences between populations. This may be due to small sample sizes for most of the experimental groups.

Take a Chill Pill: Fluoxetine influences the anti-predator responses of an aquatic snail (*Physa acuta*) across generations

Noah Colvin*+, Adam Simpson, Lynne Beaty

School of Science, Penn State Erie - The Behrend College, Erie, PA 16563

Predators can affect the phenotype of prey both within and across generations. Prey responses to predators are governed in part by the action of serotonin, which could be affected by the presence of anti-depressants (e.g., selective serotonin reuptake inhibitors; SSRIs) like fluoxetine. It is unknown, however, how the presence of SSRIs in the environment influences the anti-predator responses of organisms. To address this question, we reared mud snails (*Physa acuta*) for two generations, exposing the parent generation (F1) to the presence or absence of chemical cues from rock crayfish (*Cambarus carinirostris*) and fluoxetine. The offspring generation (F2) experienced only control conditions. For both generations, we recorded shell shape, crush resistance, and anti-predator behavior to determine the within- and transgenerational effects of predation risk and SSRIs. Parental exposure to predation risk influenced most aspects of parent and offspring phenotype. Parental exposure to fluoxetine interacted with predation risk to influence crush resistance and shape in the parent snails and the behavior of their offspring. Given that SSRIs are commonly found in aquatic environments through wastewater effluent, it is possible that the anti-predator responses of wild populations of aquatic organisms are also being affected. Future studies should aim to quantify the anti-predator phenotypes of individuals collected from areas representing a range of contamination profiles.

Mapping ranges and range shifts of lentic macroinvertebrates: A case study with case-making caddisflies (Limnephilidae)

Kylie Wirebach*+, Allegheny College

Range shifts occur when all individuals of a species or population move from a previously-habitable area to a newly-habitable area in response to changing environmental conditions. Climate-induced range shifts are well-documented for certain regions, biomes, and taxa, but large knowledge gaps exist for the Western Hemisphere and for aquatic macroinvertebrates specifically. There is a need to understand how climate-induced range shifts of aquatic macroinvertebrates are occurring, especially for taxa which have marked effects on ecosystem functioning, such as Limnephilid detritus shredders inhabiting ponds in Colorado and Pennsylvania. Thirty years of macroinvertebrate sampling at the Rocky Mountain Biological Laboratory have revealed that Trichoptera species seem to be shifting their ranges, but the details of this observation have not been quantified. My project aimed to map and describe the multidimensional ranges (and later, range shifts) of caddisflies in this region using survey data, statistical software, and GIS technology. The results have several broad-scale implications. First, quantifying which new combinations of species are emerging across the landscape provides a jumping point to researchers wanting to study population and community studies focused on the interactions among species of caddisflies. Second, it allows ecologists to ask new questions: what are the ecosystem functioning consequences of new community structuring with these taxa? What factors limit ranges and range shifts for these taxa? My methods can be applied to other regions, such as northwestern Pennsylvania, because of similarities in caddisfly diversity and abundance across mountain ranges. This project is being presented in memory of Dr. Scott Wissinger.

PA Fish and Boat Commission Resident Walleye Movement Study on Lake Erie

Mark Haffley*, Pennsylvania Fish and Boat Commission – Lake Erie Research Unit

Walleye (*Sander Vitreus*) is one of the most sought-after species, both recreationally and commercially, in Lake Erie. Millions of pounds are harvested annually between the five jurisdictions governing Lake Erie, Michigan, Ohio, Pennsylvania, New York, and the Province of Ontario. In conjunction with each of the jurisdictions and the US Geological Survey (USGS) over 2000 Walleye have been tagged in Lake Erie for multiple studies. Pennsylvania is looking at discrete spawning stocks her in Pennsylvania waters, more specifically off of Walnut Creek. Forty-one tags have been surgically implanted into these fish that have

been caught on a suspected spawning shoal. These fish are then released and tracked through stationary receivers located on the bottom of the Lake. In our first year we have seen these fish stay close to where they spawn and almost all of them have showed some sort of spawning site fidelity.   This new information about movement and spawning site usage gives us the ability to better regulate and protect this important species.

Long term monitoring update: water quality changes in Presque Isle Bay 2016-2019
> Chris Dempsey*, Kaylee Luchansky, and Greg Andraso; Gannon University, Biology Department

Monitoring water quality in aquatic ecosystems is critical to our understanding of how they change over time. Here in Erie, PA, Presque Isle Bay (PIB) is a unique body of water that provides ecological, economic, and recreational benefits. Faculty and students at Gannon University have implemented a long term monitoring project to study environmental and biological changes in Presque Isle Bay. Each month we collect water quality data (temperature, conductivity, pH, and dissolved oxygen) using a YSI profiling instrument. We take light readings using a LICOR PAR (photosynthetically active radiation) meter and conduct a secchi disc reading. Lastly, we collect water samples from 0, 2, 4, and 5 meter depths. These samples are analyzed in the laboratory for ammonia, phosphate, and dissolved organic carbon concentrations/quality. Our goal is to provide a long term data-set of change in Presque Isle Bay. Information presented here focuses on data from the fall of 2016 through the fall of 2019.

Tick Surveillance in Erie County and Prevalence of Tick Borne Illness
> Breanna Adams*, Director of Environmental Health Services, Erie County Department of Health

In 2018, Pennsylvania awarded funding for research regarding tick-borne diseases. The Erie County Department of Health worked in conjunction with PA Department of Environmental Protection to collect ticks at locations throughout the county, paying close attention to environmental conditions. This surveillance effort seeks to determine species of adult ticks, as well as rates of infection with tick-borne illnesses for further studies or education.

Oh Wait...This Isn't Just a Rock: Looking Into the World of French Creek Freshwater Mussels through Art
> Ivy Ryan*+, Allegheny College

Cultures and communities have always used art as a tool for communication. Art has varied applications and forms, which allow it to convey a multitude of ideas and concepts, and is a powerful tool for engagement. It provides a way to connect that is unattainable through other forms, which makes it a useful element in science education. With the ever-increasing threat of climate change, our society is growing in environmental awareness, meaning that we have a greater care for the environment than ever before. However, this care only goes as far as charismatic wildlife and areas that are beneficial to humans. One of the most ecologically diverse streams of its size, French Creek, located in Pennsylvania, poses a great opportunity for conservation efforts and programs, and is home to many species of native freshwater mussels. Although seemingly uninteresting and unimportant to outsiders, mussels provide valuable ecosystem services and roles that the public could benefit from understanding. Through an interactive art installation consisting of an old stylistic painting and scientific laboratory set up, participants were encouraged to learn more about French Creek's native freshwater mussels through tactile and visual experiences. I aspired to instill curiosity and wonder about French Creek's native freshwater mussels in the people of Meadville through combining installation art and science education.

A multi-criteria GIS approach to prioritizing land parcels for conservation: A case study for the French Creek Valley Conservancy

Jakob Drozd*+, Samantha Easterling*+, & Kylie Wirebach*+
Allegheny College

French Creek has been recognized as one of the most ecologically important waterways in the country, serving as habitat for 27 species of freshwater mussels and more than 80 species of fish. Just a few of the numerous environmental concerns facing the creek include agricultural runoff, erosion, sedimentation, and presence of invasive species. The French Creek Valley Conservancy (FCVC) is a non-profit land trust operating in northwest Pennsylvania aimed at protecting the ecological integrity of the French Creek watershed. As a conservation group with relatively limited funds, the FCVC must be incredibly strategic with the lands it acquires. The authors of this study approached Brenda Costa, Executive Director of the FCVC, in hopes of utilizing geographic information systems capabilities in prioritizing land parcels to acquire and land owners to partner with in Erie County, PA. Variables considered included proximity to major tributaries, roads, and other FCVC managed lands; total forested acres in the parcel; average tree canopy closure; percent forest coverage; percent hydric soil coverage; and absentee landowner status. The authors employed a ranking and weighting scheme to produce cumulative scores of suitability. The result of this study prioritizes land parcels for conservation. Future applications include utilizing ArcGIS Online for simplified exploration.

Impacts on Forest Regeneration in Northwestern Pennsylvania Timber Sites

Mitchell Carrigan*+ & Hunter Baker*+, Allegheny College

Soil conditions, light intensity, and deer browse are arguably the three of the most influential factors on regenerating forest growth after a thinning operation. Forest regeneration is essential for future economic and natural sustainability. The thinning priorities of business, most often than not, contribute to an unproductive understory, however, there are businesses and corporations who employ techniques that further the growth and value of the forest. Big business is not the only contributing factor to a depauperate understory, white-tailed deer also contribute a critical role in forest growth and reproduction. Sustainable forestry companies often employ methods of conservation such as preserving and using grounded tops(slash), as opposed to burning them, to protect saplings from browse. This study will attempt to identify whether soil temperature, soil moisture, and light intensity measured within a range of slash pile sizes will be different than open areas and if so, do these changes affect sapling growth? Additionally, does slash pile size prevent deer from browsing saplings found within these areas? We hypothesize that soil temperature, soil moisture, and light intensity measurements from slash pile areas will be different than measurements from open areas but these differences will not be great enough to hinder the growth of saplings. Furthermore, the size of slash piles will influence whether saplings have been browsed in these areas. This study's findings will justify whether or not future business should employ a more sustainable practice creating a higher value stand in conjunction with a sustainable, reproductive inventory.

Friday, November 8, 2019

Population Status of the Pearl Map Turtle (*Graptemys pearlensis*) and Pascagoula Map Turtle (*Graptemys gibbonsi*) and Recommendations Regarding Their Listing under the U.S. Endangered Species Act

Peter V. Lindeman[1]*, Ashley G. Gibson[1], Will Selman[2], Robert L. Jones[3], Grover J. Brown[4], Cybil C. Huntzinger[4], and Carl P. Qualls[4]
[1]Department of Biology and Health Sciences,
Edinboro University of Pennsylvania, Edinboro, PA 16444
[plindeman@edinboro.edu]
[2]Biology Department, Millsaps College, 1701 North State Street,
Jackson, MS 39210
[3]Mississippi Department of Wildlife, Fisheries, and Parks,
Mississippi Museum of Natural Science, 2148 Riverside Drive, Jackson, MS 39202
[4]School of Biological, Environmental and Earth Sciences,
The University of Southern Mississippi,
118 College Drive, Hattiesburg, MS 39406

The Pascagoula map turtle (*Graptemys gibbonsi*) and Pearl map turtle (*Graptemys pearlensis*) are being considered for federal listing by the U.S. Fish and Wildlife Service. From 2015⬜2018, we surveyed basking turtles in point counts and in johnboat and canoe surveys and conducted trapping at several sites to ascertain their status; data were combined with similar data collected 2006–2014. Despite their similarity morphologically and ecologically, three important differences are pertinent to whether or not they should be protected. First, their river systems are geomorphically very different. Medium to large tributary streams the two species inhabit are a considerably more prominent feature of the Pascagoula drainage than the Pearl drainage and may insulate populations from potential threats. Second, *G. gibbonsi* inhabited 35% more stream reach, had 22% higher catch-per-unit-effort, and were recorded at 44% higher numbers in point counts and 3% higher numbers in basking density surveys than Pearl map turtles. Coarse-scale estimates of each species' global populations suggest *G. gibbonsi* is ca. 1.56× as abundant as *G. pearlensis* overall. Third, the reasons for the listing of each species' sympatric congener are very different: the ringed sawback (*G. oculifera*) of the Pearl drainage was listed primarily due to existing and imminent but as-yet unrealized habitat modification, while the yellow-blotched sawback (*G. flavimaculata*) of the Pascagoula drainage was listed primarily due to perceived low populations, particularly in upper portions of the drainage, and concerns regarding water quality.

Determining the Effects of Forest Fragmentation on Eastern Red-Backed Salamander (*P. cinereus*) Abundance

Chlöe Finger*+, Department of Environmental Sciences, Allegheny College

Habitat fragmentation is one of many factors linked to declining amphibian populations around the globe. Declines in salamander populations as a result of habitat fragmentation can have profound ecosystem-scale impacts in terms of nutrient cycling and trophic equilibrium. The abundant red-backed salamanders (*P. cinereus*) has often been used as an indicator species for forest studies in eastern North America. This study focused on habitat fragmentation caused by recreational hiking trails and paved roads and their impact on red-backed salamander abundance in Crawford County, PA during the fall of 2019. Using 30 50x5 meter transects, abiotic factors and salamander abundance were determined in varying degrees of fragmentation types (near road, near trail, core forest). Salamanders found per transect were identified, measured, and counted. Abiotic factors measured included air temperature, soil temperature, and leaf litter depth. Soil moisture was also determined by collecting samples and weighing them before and after drying them in an oven. Number of days since the last rain event was also recorded. Road transects (most severe habitat fragmentation) are expected to have the most negative impact on salamander abundance followed by hiking trails. The findings of this research will be an important step in determining the

impact of forest fragmentation on red-backed salamanders and management strategies to conserve this species.

Investigating Mortality of Gizzard Shad due to Viral Hemorrhagic Septicemia (VHS) associated with Warm Water Discharges in the Great Lakes

Emma Mader*+, J. Michael Campbell, Biology Department, Mercyhurst University

Viral Hemorrhagic Septicemia (VHS) is a deadly virus to fish that was first recorded in the Great Lakes in 2005 and has affected more than 40 fish species. Gizzard shad (*Dorosoma cepedianum*) die offs due to VHS were first recorded in 2006 in Michigan and most recently, the first case of VHS Gizzard Shad die offs for Pennsylvania was recorded in Lake Erie during March 2019. The PA Lake Erie VHS Gizzard Shad die off was believed to be influenced by the permitted warm water discharge stream from the Erie Coke Corporation. This study provides evidence of the potential relationship between VHS outbreaks in the Gizzard Shad population and the locations of permitted warm water discharges in the Great Lakes. The methodology included a review of reported VHS cases in Gizzard shad in Lake Erie, Lake St. Clair, and Lake Michigan, New York, Ohio and Pennsylvania. The findings support a hypothesis for further investigation that elevated nearshore water temperature from warm water discharges during winter months increases the likelihood of cases VHS-induced Gizzard shad die-offs.

Thamnophis brachystoma (Short-headed Gartersnake) defensive behavior

Mark Lethaby*
Natural History Museum at the Tom Ridge Environmental Center
301 Peninsula Drive, Erie, Pennsylvania, 16505, USA.
mal40@psu.edu
Speed Talk

Common antipredator behaviors in snakes include those that either represent a threat (if the animal is capable of inflicting harm on an antagonist) or a bluff (if the animal is incapable of inflicting harm). Typical threat/bluff behaviors include flattening of some portion of the body, gaping, striking, and biting. The expression of antipredator behaviors may vary based on factors such as age, geography, environmental (abiotic) factors, and predator type. Small nonvenomous snakes may tend not to display these behaviors because their small size precludes the appearance of a credible threat to predators, but the expression of threat/bluff behaviors is occasionally recorded in these species. Antipredator behavior in *Thamnophis brachystoma* is typically described as consisting of thrashing movements, and release of feces and musk. It is often noted that the species does not bite. Here I report occurrences of these behaviors in this species, including contextual data, as well as the first reports of biting. I made the following observations on hand-captured snakes in Pennsylvania.

How Do You Misplace Half A Million Birds?

Joe Siegrist*, Purple Martin Conservation Association

Work by the Purple Martin Conservation Association (PMCA) conducted at Presque Isle along with our international colleagues has greatly expanded understanding of songbird migration and overwintering ecology in the last decade. From extensive leg banding studies, to light level geolocators, to GPS dataloggers, and now the incorporation of an automated telemetry network; we are truly experiencing a golden age of biologging. However, these advancements are only part of the toolkit. The power of citizen science coupled with social media makes the impossible possible. This presentation will summarize the PMCA's efforts to identify and conserve overwintering Purple Martin (*Progne subis*) habitat in the Amazon Rainforest of Brazil and our hunt for a massive roost of hundreds of thousands of Purple Martins that had unexpectedly disappeared.

A Census of the Bat Population of Gannon University, Erie, PA

Jocelyn Scott, Alasondra Tucciarelli*+, and Dr. Steve Ropski,
Biology Department, Gannon University, Erie, PA. 16541

For the past ten summers, a census of the bat population has occurred on the Gannon University campus in Erie, PA. The numbers for the first three years held relatively steady, but the data for the past 6 years indicates a dramatic decline. White Nose Syndrome was first reported in 2006 in a cave in New York. The disease has killed an estimated 6 million bats in the eastern United States since then and has spread throughout Pennsylvania and into northeastern Ohio. This fungal infection has killed 95% of bats in some caves and may result in the listing of three bat species as endangered in Pennsylvania, including the Little Brown Bat (*Myotis lucifugus*), the predominant bat on the Gannon campus. This study will compare yearly data by building, time of year, building side and species composition to determine how White Nose Syndrome has affected the Gannon campus bats. A decrease in numbers may be partially responsible for an increase in West Nile Virus in the area. The results will also be used to place bat houses at appropriate locations to encourage bat presence on campus.

Bat community composition at Presque Isle State Park

Kelly Pearce*, Allegheny College, 520 N. Main Street, Meadville, PA 16335
Speed Talk

Several species of North American bats have been documented at Presque Isle State Park (PISP). However, previous studies on PISP on bats have focused on telemetry stations or acoustic technology. As part of a larger wetland-monitoring project the goal of this study is to conduct summer mist netting between 1 June and 15 August 2020 and 2021 to monitor summer bat populations at 3 locations in PISP. Triple-high mist net surveys will be conducted over potential flight corridors associated with streams, ponds, and trails. For each captured bat, time, species, sex, age, weight, forearm length, reproductive condition, wing score, and presence of Pd spores will be recorded.

ABSTRACTS

Regional Science Consortium
15th Annual Research Symposium
November 6—9, 2019
Tom Ridge Environmental Center
at Presque Isle State Park

POSTER PRESENTATIONS

POSTER SESSION: Wednesday, November 6th, 2019, 6pm—8pm

1. **Making of a review article: Methods to Capture RNase-RNA Complexes for Structural Studies**

   Christian Goossen[1]*+, Sean Lewis[1], Seth Jones[1], Michael Gleghorn[1]
   [1]Rochester Institute of Technology, College of Science, School of Chemistry and Materials Science

Ribonucleases, or RNAses play important roles in cellular processes through nucleic acid strand cutting. RNAses can be very specific in the type of RNA they bind to and cleave. To comprehend the mechanisms of how RNAses bind to and cleave cognate RNA, X-ray crystal structures of RNAse–RNA complexes can be solved and analyzed. The structural information, especially of the active sights (where the RNAse binds and cleaves RNA) are crucial to understanding catalytic mechanisms. In order to obtain a crystal structure detailing respective active sights, a method must be used halt the RNA strand separation while continuing to allow binding. This review paper will summarize the various methods of halting RNA cleavage and provide structural figures detailing methods in the literature that have been successfully used including metal ion chelation, modeling and docking, modification of RNA, pH changes, phosphate manipulation, protein mutagenesis, RNA sequence change, and temperature snapshots.

2. **The Role of *trans*-Golgi Network and Endosomal Adaptors in Nitrogen-Regulated Growth of *Saccharomyces cerevisiae***

   Rachel Stubler*+, Student Researcher, Allyson Owens*+, Student Researcher, and Dr. Aoh-Faculty Researcher/ Advisor

For a cell to survive, it must be able to move vital cellular materials, including nutrients, waste products, and proteins, to different locations throughout the cell. This movement of cargo is known as membrane trafficking and is highly regulated. To discern the role of membrane trafficking pathways in different environmental conditions in the yeast Saccharomyces cerevisiae, we will to construct mutants with deletions in genes whose products function in cell membrane trafficking. Specifically, we will construct clathrin adaptor mutants that can be used to test for growth defects. To construct these single and double deletion mutants, we will use homologous recombination to knockout the gene sequence of specific clathrin adaptors and replace it with a selectable marker in a haploid strain of yeast. Single deletion MATα haploid cells will be mated with MATa haploid cells containing a different single deletion. The double deletion diploid cells that form will then be sporulated, and a tetrad dissection will be done to obtain our haploid double deletion cells. These cells will then be used to study the role of clathrin adaptors that function at the trans-Golgi Network (TGN) and endosome in trafficking of nitrogen from preferred and non-preferred nitrogen sources.

3. The Role of SCAMP3 in CXCR4 Trafficking

Jordyn Buchanan*+, Angelika Chiang, Kasie Inserra, Priscilla Thomas, Dr. Quyen Aoh

CXCR4, a Chemokine Receptor Type 4, is a G-protein coupled receptor. Its function is associated with the growth and division of cells. Dysfunctions in trafficking of CXCR4 may contribute to its overexpression, which can have a role in the metastases seen in cancer. In this study, we will examine the role of SCAMP3, a Secretory Carrier Membrane Protein, in regulating CXCR4 trafficking. SCAMP3 interacts with proteins that also regulate CXCR4 trafficking which include the ESCRT proteins Hrs and the ubiquitin ligase ITCH. Using RNA interference, we will examine CXCR4 trafficking in the presence and absence of SCAMP3 using a well characterized immunofluorescence assay. We predict that SCAMP3 could promote or inhibit degradation of CXCR4. If SCAMP3 promotes the degradation of CXCR4, then knocking down SCAMP3 will inhibit transport to the lysosome and increase its localization to early endosomes. If SCAMP3 inhibits the degradation of CXCR4, then knockdown of SCAMP3 will promote transport to the lysosomes and increase it localization with lysosomes. If correct, then our studies will reveal a novel regulator of CXCR expression.

4. Neurophysiology of Addiction

Ryan Thomas*+ and Mary Vagula
Biology Department
Gannon University, Erie, PA 16541

Addiction is a chronic disease that involves the habitual use of a substance or execution of some action, despite the mental, physical, and social harm to an individual. Two forms of addiction are substance addiction and behavioral addiction. There are multiple substances that contain addictive chemicals such as alcohol (ethanol), tobacco (nicotine), opioids, marijuana (THC), and different types of illicit drugs like cocaine, heroin, and methamphetamine. Behavioral addictions are repeated, non-substance behaviors that stimulate the brain's reward pathway and have the capability to become addictive; these stem from uncontrollable impulses where an individual will repeat the same behavior(s) regardless of any negative consequences they might have. Some behavioral addictions consist of social media or cell phone usage and gambling. Such addicting substances and behaviors affect the Central Nervous System (CNS) of the human brain by interfering with different neurotransmitters that generate distinct physiological responses. Although addiction is a medical disorder, there are several kinds of treatment that can assist individuals struggling with addiction that offer professional counseling, rehabilitation, prevention education, and other medical services, ultimately to provide people a chance to change their lives and build a new productive lifestyle. In this presentation a detailed mechanism of action of some addicting substances on the nervous system and various government policies and regulations to control these substances will be discussed.

5. Cardiovascular Changes in Human Diving Reflex

Britni Wike*+, Mary Vagula, and He Liu
Gannon University, Biology Department

Humans adapt to the aquatic environment through physiological changes in the cardiovascular system. We are interested in the human diving reflex and the physiological factors that contribute to the changes. We examined the data collected from a lab course where students measured changes in the heart rate and pulse amplitude over different time periods. Here we present the preliminary results in this ongoing research and future plans.

6. Repeated Prenatal Valproic Acid Exposure on Morphology in Autism Spectrum Disorder Rat Models

Alhelo H*+, Kulesza RJ

Lake Erie College of Osteopathic Medicine

Autism spectrum disorder (ASD) is a developmental disorder associated with prenatal exposure to valproic acid (VPA) in humans. As such, VPA prenatal exposure to VPA is a validated animal model of ASD. Animals exposed to VPA in utero have smaller bodies, lower body and brain weights. We hypothesize these changes result from impaired oropharyngeal function.

We hypothesize that prenatal VPA exposure results in hypoplasia of oropharyngeal components and fewer brainstem neurons. Specifically, we hypothesize that VPA-exposure will lead to smaller muscles of mastication, poorly developed hard palates and mandibles, smaller skulls, and reduced esophageal muscle thickness. We further hypothesize VPA-exposure will result in fewer brainstem neurons and surviving neurons will be smaller and abnormally arranged, leading to imbalance in number and distribution of excitatory and inhibitory inputs on brainstem LMNs.

Repeated prenatal VPA exposure on E10 and E12 results in smaller muscle fibers in tongue and masseter muscles at P0. Brainstems from P28 rats showed neuronal cell bodies in nuclei associated with motor control of the oropharynx to be significantly smaller than in control animals. Additionally, there was imbalance in the ratio of excitatory/inhibitory puncta. Finally, VPA-exposed rats had longer and narrower nasal bones, and longer basilar cranial length.

These results provide evidence that prenatal exposure to VPA impacts the orofacial innervation which leads to possible oropharyngeal muscular weakness and dysfunction. Excitatory and inhibitory imbalance may impede ability to feed through weaker neuromuscular signals, overexcitation leading to spasticity, or denervation through excitotoxicity in the LMNs.

7. Evaluating the potential angiogenesis inhibiting properties of isolated digestive secretion compounds from the Venus flytrap, *Dionaea muscipula*

R.G. Rafeew*+, M. Foradori, (2019)

Edinboro University of Pennsylvania, Edinboro, PA, 16444

Angiogenesis is the process by which vascular endothelial cells proliferate and migrate to establish new blood vessels. The process of blood vessel formation via angiogenesis is a normal physiological function, and it plays an important role in the growth of tumors. Tumor cells will secrete angiogenic factors to promote the migration of new blood vessels into the tumor. The newly recruited blood supply nourishes the tumor cells and enhances tumor growth. Inhibition of angiogenesis can be considered a strategy to limit or eliminate tumor cell proliferation. The theory of reducing tumor growth through inhibition of angiogenesis suggests that such a treatment would allow an organism to continue thriving while tumor growth is diminished. Angiogenesis inhibiting compounds impede the proliferation and migration of vascular endothelial cells. Therefore, preventing angiogenic response to tumor secreted growth factors with angiogenic inhibition would affect tumor viability. Our research evaluated the affect of digestive compounds from the Venus flytrap on bovine aortic endothelial cell (BAOEC) proliferation and migration. Samples were first extracted, concentrated, and homogenized. Samples then underwent fractionalization with a Bio-Rad EG-1 Econo Gradient pump and Bio-Scale Mini UNOsphere Q sepharose column. The resulting fractions were assessed for protein concentration using a Thermo Scientific NanoDrop Lite Spectrometer. Fractions containing the highest protein concentrations were used to challenge proliferating bovine aortic endothelial cells (BAOECs).

8. Preliminary Analysis of Active Compounds from the venom of the Honey Bee, *Apis mellifera*, as a Possible Inhibitor of Tumor Angiogenesis

S. Musa*+, L. Pilewski*+, M. Foradori, (2019)

Edinboro University of Pennsylvania, Edinboro, PA 16444

Bee venom has been found to have inhibitory impacts on the development of ovarian and lung cancer. Properties such as the ability to increase cortisol secretion, suppression of tumor proliferation, and

involvement with the cytotoxic pathway of apoptosis make the components of bee venom a promising candidate for inhibition of tumor angiogenesis. Angiogenesis, defined as the formation of new blood vessels, is a normal physiological process that occurs within organisms. However, increased angiogenesis is an identifying characteristics of cancerous tumor growth, because tumors are limited in size and growth without a blood supply. This study sought to identify angiogenic inhibitors in bee venom. Angiogenic inhibitors are a class of molecules that can disrupt the ability of tumors to grow and spread via metastasis. After extraction of venom sacs from 12 honeybees, and further homogenation in conjunction with compound extraction, the bee venom was fractioned using a Bio-Rad EG-1 Econo Gradient Pump with a Bio Scale Mini Unosphere Q sepharose column. All fractions generated were quantified for protein at OD280 using a Thermo Scientific NanoDrop Lite Spectrophotometer. Proteins from prominent peaks were then introduced to dividing bovine aortic endothelial cells (BAOECs) to assess their ability to inhibit proliferation, and indirect measure of angiogenesis.

9. **Dissection of *Ixodes scapularis* salivary glands to optimize the isolation of *Borrelia burgdorferi* DNA**

Madison Gallucci*+, Robert Waters MS, Nancy Carty, PhD., Christopher Keller, PhD.
Laboratory of Human Pathogens
Lake Erie College of Osteopathic Medicine, Erie, PA

Introduction: Annually in the U.S., over 30,000 cases of Lyme disease are caused by Borrelia burgdorferi, which is transmitted by *Ixodes scapularis* ticks. Our previous studies tracked the carriage rate of B. burgdorferi in *I. scapularis* ticks collected from Presque Isle State Park (PISP) by isolating DNA from whole tick extracts. Recent studies have shown that *Ixodes* ticks harbor *B. burgdorferi* in their midgut until the pathogen changes gene expression, allowing it to travel to salivary glands to be transmitted. This study was conducted to optimize detection of pathogen DNA from tick salivary glands.
Methods: A microscalpel was used to dissect salivary glands from *I. scapularis* ticks by making four incisions along the dorsal side of the tick followed by removal of the exoskeleton. Salivary glands were manually removed from tick bodies and DNA extracted from each sample was used to detect *I. scapularis* and *B. burgdorferi* DNA by separate PCR reactions
Results: *I. scapularis* DNA was isolated from both dissected salivary glands and from tick bodies. However, both salivary glands and the body remnants tested negative for *B. burgdorferi* DNA by PCR.
Conclusion: This study showed that tick salivary glands can be successfully isolated from the tick body and used for isolation of *I. scapularis* DNA by PCR. Future studies should be conducted to determine if isolation of tick salivary glands can optimize detection of pathogen DNA.

10. **Diversity of Night-Flying Moths at ENWR and the Relationship Between Species' Abundances and Ecosystem Types**

Lindsay Benko*+ (Allegheny College)

Pollinators are essential to the health of many ecosystems, but pollinator populations are in decline globally. Moths have not been extensively studied compared to other pollinators, though they are just as important. The goal of my study is to collect and analyze data that can be used to monitor the night-flying moth population at the Erie National Wildlife Refuge (ENWR). I seek to find out what species of moths are present at ENWR and in what abundances. In addition, I am interested in the relationship been different ecosystem types (open field, forest, wetland) and the species and abundances of moths present in them. I hypothesized that overall moth abundance would be greatest in the open fields compared to the wetlands or forested areas, due to the higher abundance of flowers in fields which could require pollinators. As an amateur moth enthusiast, I had no predictions about specific species I expected to find, but I did hypothesize that I could find a number of invasive moths. I completed my seven rounds of monthly sampling and am in the process of pinning and identifying the collected specimens. Abundance results indicate that more moths were found in the forested areas, followed by open fields and wetlands. Species results are not yet complete, though it is visually clear that a wide range of species were caught.

11. **Assessment of the fish community of Fourmile Creek (Erie County, PA) before and after habitat improvement projects**

Ileana Calderon-Martell*+, Cytalia Crosby, Christian Peterson, Danielle Samuel, Edward Phillips, Christopher Dempsey, and Greg Andraso, Gannon University, Biology Department

Fourmile Creek (Erie County, PA) is one of 22 tributary streams located along the Pennsylvania shoreline of Lake Erie. Prior to stream remediation efforts that began in 2007, which included the removal of a low-head dam, stormwater management projects, and the installation of a fish ladder near its mouth, the quality of Fourmile Creek was assessed using fish community composition. We expected that dam removal and stormwater management projects would improve habitat quality and lead to an increase in fish community diversity. The installation of a fish ladder near the mouth of the stream was also expected to increase fish diversity by permitting passage of migratory species from Lake Erie. Using standard methodology applied in the 2007 assessment and based on the EPA's Rapid Bioassessment Protocols (RBP) for fish, we evaluated Fourmile Creek to determine if stream conditions improved after remediation projects. Evaluation of data at seven sites in common between the 2007 and 2019 studies suggests that remediation efforts had little effect on fish community structure. We observed a decrease in the Index of Biotic Integrity (IBI) scores at six of the seven sites, and average IBI score was significantly lower in 2019 than 2007. The observed decline in stream quality between 2007 and 2019 appears to be due to decreases in mottled sculpin, minnow species, and catch per unit effort. Changes in other environmental factors and subtle differences in sampling methods or efficiency may account for the observed changes between 2007 and 2019 and therefore merit further investigation.

12. **The herpetology of Presque Isle State Park, Erie, Pennsylvania: A brief history and annotated checklist of species**

Brian S. Gray*
Natural History Museum at the Tom Ridge Environmental Center
301 Peninsula Drive, Suite 3, Erie, Pennsylvania, 16505 U.S.A.
brachystoma@hotmail.com

Presque Isle State Park is an approximately 1300-hectare compound recurved sand spit along the southern shore of Lake Erie in Erie County, Pennsylvania. Thirteen species of amphibians (9 frogs and 4 salamanders) and eighteen species of reptiles (9 turtles and 9 snakes) have been reported to occur on Presque Isle State Park. However, six species have not been observed on the peninsula in more than 60 years. The Northern Spring Salamander and the Wood Turtle likely never had established populations on Presque Isle, whereas the Pickerel Frog, Woodland Box Turtle, Hog-nosed Snake, and Eastern Milksnake were likely extirpated by human activities. Of the twenty-five extant species established at Presque Isle, the Red-eared Slider is an introduced invasive species. A brief history of herpetology on Presque Isle is presented and recommendations for surveying the herpetofauna are provided, especially for the rarer and possibly extirpated species (e. g., Eastern Milksnake, Hog-nosed Snake).

13. **Heterozygosity of Captive Burmese Star Tortoises, *Geochelone platynotan***

Morgan Calahan*+, Researcher and Data Analysis, Undergraduate at Edinboro University
Rachael Marczak*+, Researcher and Data Analysis, recent graduate (undergrad) at Edinboro University
Dr. Matthew Foradori, Dr. Nina Thumser, and Dr. Peter Lindeman, professors at Edinboro University

The Burmese star tortoise, *Geochelone platynota*, is a species in the family Testudinidae from the Southeast Asian country of Myanmar. The species is critically endangered, and even considered ecologically extinct in the wild primarily due to exploitation for illegal international pet trade and Asian food markets. Other threats to this species' numbers include collection by native Burmese as a food resource, and habitat loss and fragmentation. However, breeding sanctuaries in Myanmar run by the Wildlife Conservation Society and Turtle Survival Alliance have proven to be successful in reintroducing this species back into their native habitat. Our goal is to analyze the heterozygosity of captive Burmese

star tortoise populations in U.S. zoos. Tissue samples from US AZA accredited zoos have been received and are being analyzed. If funding and permit processing time allows, we have secured permission from the TSA representatives of Myanmar, Kalyar and Steve Platt, to analyze samples from their sanctuary populations. This would also enable the comparison of the population of captive Burmese star tortoises in U.S. zoos with those being bred and released at Myanmar sanctuaries. Since this species has potentially faced a severe bottleneck in the 1900's and 2000's, in addition to much of the captive population having been confiscated from pet trade, the genome of the remaining individuals has not been investigated. This analysis will give insight on the genetic diversity of the individuals in breeding and reintroduction programs, and has the potential to make global impact for the conservation of the Burmese star tortoise.

14. **Differences in Infections of Pennsylvania and West Virginia Ruffed Grouse (*Bonasa umbellus*) With *Ascarida* and *Heterakis* Nematodes, by Year, Age, and Sex**

Baleigh Klepfer*+, Kylee Schaumleffel*+, Ian Siggins*+, Edward Phillips, Gannon University, Biology Department, Erie, PA 16501

Ruffed grouse (*Bonasa umbellus*) were collected from 21 counties in Pennsylvania during the last five hunting seasons, and from two counties in West Virginia last season. Necropsies were performed and two species of nematodes were identified (not all specimens were identified to species), *Ascarida bonasae* from the intestines and *Heterakis isolonche* from the cecum. Overall infection rates with <u>Ascarida</u> have varied annually with a high of 64.7% in 2014-15 and a low of 30.9% in 2016. Individual mean infection with *Ascarida* were significantly lower during the 2016 and 2018 seasons than during the other 3 seasons. The infection rates of *Heterakis* have remained relatively similar throughout all five seasons with the greatest infections occurring during 2017 and the lowest during 2018. During 2018, and for all four seasons combined, juvenile grouse had significantly greater mean infections of both *Ascarida* and *Heterakis* than did adult grouse. There were no significant differences between the sexes.

15. **No Need to be Alarmed: Pishing and Predatory Calls as a Measure of Bird Song Volume in Western Pennsylvania Bird Species**

David Kyle Breault[1]*+, Brodie Skrochi[2]
[1]Student of Department of Biology Edinboro University of Pennsylvania, Edinboro, PA, 16444 U.S.A.
[2]Student of Department of Biology University of Pittsburgh, 4249 Fifth Ave, Pittsburgh, PA 15260

In order for wildlife managers to be able to help the habitats they are maintaining, having a strong idea of species richness and evenness is important for making informed decisions, motivating ways to increase detectability of certain species. This study seeks to survey bird species in Western Pennsylvania in order to prescribe management plans, to see if bird detectability is increased by the aid of pishing or predator calls, and how bird species respond in different habitats. Pishing and predator broadcast sounds were played in deciduous and coniferous forests in Crawford Country Pennsylvania. Bird song and call volume were recorded and differentiated for five bird species, being the northern cardinal, hooded warbler, red eyed vireo, eastern towhee, and ovenbird. The data show that there is a difference in detectability in pishing versus predator broadcasts, and that in our study areas, red eyed vireos responded the most, with deciduous forests having the highest species richness responses in our focal species. Using this data collected, wildlife managers could consider management plans that include planting of mixed stands and clear-cutting strips throughout the forest.

16. **Social Vocalizations of Big Brown Bats Vary with Behavioral Context**

Ashley Gadzo*+
Faculty Mentor Dr. Karry Kazial
Department of Biology, State University of New York at Fredonia, Fredonia, NY

In western New York there are nine bat species, six are cave dwellers and the other three species live in the trees. Before 2006, there were over 1,240 species of bats known making them the second largest

group of mammals. From 2006 to present bat species have been affected by White-Nose Syndrome (WNS). WNS was discovered in Hailes Cave in Albany, New York (NYSDEC, 2009). According to Bat Conservation International, 53 bat species are endangered, and 104 bat species are considered vulnerable (2008). WNS is caused by the fungus *Pseudogymnoascus destructans* which colonizes on the bat's skin (Greenwald, 2013). *P. destructans* impacts the amount of energy that the bat uses during its hibernation period. Due to the time of the year, food sources will be slim to none, thus resulting in the bat's death.

Bats are nocturnal, being active in foraging and mate finding at night. While they are out foraging and mingling, bats will use their echolocation. Echolocation is the use of sound waves and echoes to determine where objects are in their environment. This is done by the bat's mouth or nose emitting a high pitch sound, receivers nearby can hear it, as well as the sender.

Since bats are very cryptic in nature, it makes it hard to monitor and research their populations. There have been many methods in gathering information on bat population, each with drawbacks as well as benefits. The most common method used currently to monitor bat populations is by acoustic surveys. Before acoustic equipment was available mist netting was used. The nets are made of very fine threads which are able to capture the bat in flight.

17. **Flora Inventory of the Lake Erie Shoreline, Dunkirk, NY**

MaryAnn Mason*+, Ashton Hicks, Andrew Laurita, Chloe Petry, Olivia Conner, Cassandra Moise, Ashley Gadzo, Erik Danielsen, Jonathan Titus
Biology Dept., SUNY-Fredonia, Fredonia, NY 14063

The Lake Erie shoreline is a unique habitat for Chautauqua County, New York. The shoreline provides a very different composition compared to other in-land temperate ecosystems in the region with its increased sand content, break wall habitat, creek outlet habitat and steep shale cliffs. The shoreline has experienced much disturbance by park management and repeated human interaction. Two disturbances that have been especially impactful to the plant biodiversity of the shoreline is continuous bulldozing and mowing. These actions are harmful to sensitive species and over time can decrease the frequency of rare species that require specialized habitats. The continued human influence has also introduced many invasive species as well which can be harmful to native plant communities. In an effort to get a better understanding of the current plant species richness of the shoreline, an inventory of the present plant species was compiled. In total, 237 different species were found in 59 different families. Of these 237 species, 59 species are of a non-native status. Within this inventory, there are also three species known to belong in the S1 status in New York State due to their rarity within the state. The inventory suggests that the diverse habitats offered by the shoreline supports a diverse number of species but are also susceptible to invasive species. It is important to continue to update the species inventory of the shoreline to understand how this composition may change through time while considering land management actions and the stressors of a changing climate.

18. **Determining the Source and Prevalence of Multiple *mcr Escherichia coli* across Various Trophic Levels in Lake Erie Ecosystem**

Kristy Anthony, Kevin Regan, Jeffery T. Larkin, Dakotah Shaffer, Nicholas Christensen, Devin R. McClain, David J. Janetski, Jeffery L. Larkin, Paul M. Nealen, and Vida R. Irani

Release of slow degrading antibiotics from human and agricultural wastewaters into the aquatic ecosystem results in the emergence and promotion of antibiotic resistant (ABR) bacteria in natural environments. One such superbug gene circulating in bacteria is the plasmid-encoded *Escherichia coli* mobilized colistin resistance-1 *(mcr-1)* gene in humans and animals. Lake Erie is a complex ecosystem and its geographical location combined with high agricultural activity makes it susceptible to human and animal fecal waste being discharged into its watershed and the lake itself. We conducted a multi-trophic level study to detect and determine the baseline prevalence of fecal *(mcr-1) E. coli* in Lake Erie, PA and its major tributaries that flow through human and agricultural areas. Our goal was to determine the temporal and spatial extent of *(mcr-1) E. coli* inputs into Lake Erie south shore waters, with specific regard to the degree to which these *(mcr-1) E. coli* populations exist at baseline levels in stream outflows,

surface waters, sediment, and both bait and game fish. On microbiological and molecular biological sampling for (*mcr-1*) *E. coli* from various trophic levels in Lake Erie ecosystem, our results demonstrate that every trophic level sampled was heavily contaminated with (*mcr-1*) *E. coli.* Currently, we are in the process of identifying at least five types of *mcr* (1-5) *E. coli* circulating in the Lake Erie ecosystem. This preliminary information could aid public health officials to develop ecology-based prevention and remediation strategies to combat the aquatic spread of (*mcr*) *E. coli* within the Lake Erie ecosystem.

19. Predictive Modelling of *Escherichia coli* at Presque Isle State Park Swimming Beaches
Sarah Magyan, B.S.*, Sean Dalton, B.S., Amber Stilwell, M.S., Jeanette Schnars, Ph.D.
Regional Science Consortium
In order to ensure public safety at Presque Isle State Park's swimming beaches, daily bacterial sampling is performed during the peak swimming season. Since current methods require a 24-hour delay in results, predictive models have been utilized to obtain same-day exceedance potentials. The predictive models utilized include Virtual Beach developed by the United States Geological Survey (USGS) and RoboHarry developed by Penn State Erie. This study examines the accuracy of these predictive models in assessing the exceedance potential of *Escherichia coli* at Presque Isle State Park Beaches in the 2019 swimming season. Water samples and observations of water quality were obtained daily from six locations along the peninsula and analyzed for *E.coli* levels using EPA standard methods for vacuum filtration. Water quality observations were utilized to obtain exceedance potentials for each location through the Virtual Beach and RoboHarry predictive models. Exceedance potentials from both models were available within two hours of sample collection while *E.coli* levels from bacterial plating were available after 24 hours. The Virtual Beach predictive model was found to agree with the actual *E.coli* counts 85% of the time on average. The RoboHarry predictive model was found to agree with the actual *E.coli* counts 83% of the time on average. Used in combination with the previous day's *E.coli* plating counts, the Virtual Beach and RoboHarry predictive models provide park officials with the necessary resources to make accurate and timely judgments on swimming beach safety advisories.

20. Using chemical modeling to demonstrate a novel technique that reduces the toxicity of *Microcystis* spp. and *Planktothrix* spp.
Susan Wright*+, Dr. Sarah E Ruffell
University of Pittsburgh at Bradford Department of Biological
Harmful Algal Blooms (HABs) are a naturally occurring process that affects Lake Erie during the spring, summer, and fall. The microalgal species that produce toxic blooms in Lake Erie are *Microcystis* spp. and *Planktothrix* spp. The purpose of this study is to create a novel technique to decrease the toxicity of HABs. Chemical modeling was used to simulate the chemical reactions needed to decrease the toxicity of *Microcystis* spp. and *Planktothrix* spp. The results of the model can be applied to HABs management research and have important implications for public and environmental health.

21. The effects of the presence of *Spirulina* on Mung bean growth
Makayla Chestnut*+, Kristina Michelle Rogers*+, Cassandra Romero*+, and Sarah E. Ruffell
University of Pittsburgh at Bradford, Biology Department, 300 Campus Drive, Bradford PA 16701, United States
The purpose of this lab is to determine how *Spirulina* growth and death in soil effects mung bean growth. Prior to this lab, student groups of 2 to 4 should complete a course with content related plant metabolism and nutrient uptake. Two controls and six combinations of soil with different *Spirulina* conditions will be tested to determine which has the greatest impact on bean growth. The six combinations used during this lab will include: autoclaved soil with *Spirulina* and nutrients, *Spirulina*, or only nutrients, then soil with *Spirulina* and nutrients, *Spirulina*, or only nutrients. The non-autoclaved and autoclaved soil tests are the two controls. This lab will be split over two sessions of 40 minutes, to plant the sprouts, and 20 minutes, to measure the sprouts. This experiential learning opportunity helps students retain information by combining visual, written, and kinesthetic learning techniques and by providing them with an active role

in their education. This lab is unique as it can be used to effectively teach students about how *Spirulina* can impact the agricultural production of mung beans.

22. **Investigation of a Potential Genetic Variant of Grapevine Leafroll-Associated Virus 3 in Pennsylvania Vineyards**

Jessica Till*+, Michael Campbell

Grapevine leafroll disease (GLD) is among the most common afflictions of grape crops worldwide. Furthermore, GLD is one of the most economically impactful diseases, annually reducing both total harvest yields and overall fruit quality of vineyards. The economic significance of GLD has necessitated extensive research aimed at attaining a better understanding of this disease. GLD is caused by several known strains of single-stranded RNA viruses with grapevine leafroll-associated virus 3 (GLRaV-3) being the most common. Previous work in vineyards in the Northwestern Pennsylvania grape-growing region analyzed virus-infected vineyards using ELISA viral assays specific to GLRaV-3. Variation in positive signals from these assays has indicated the possibility of the existence of variant strains in vineyards of this region. The present study utilized RNA sequences of the heat shock protein Hsp70 gene from confirmed virus-positive samples of a single vineyard in this region and compared them with samples from vines suspected to be infected with a variant strain. Resulting RNA sequences were compared using MAFFT, an online multiple alignment program. Sequence alignments show considerable variability in the Hsp70 protein of the samples suspected of being genetically variant in comparison to positive controls. Further research is ongoing into locating other variant regions of the GLRaV-3 genome. This research holds promise for identifying a genetic variant of GLRaV-3 in the Northwestern Pennsylvania grape region. Knowledge gained through this research could aid in developing new technology which is more sensitive to emerging GLRaV-3 genetic variants and ultimately improve our ability to detect viral mutants in the field with higher acuity.

23. **Assessment of lead leaching potential at PA State Game Lands 109 and development of lead prevention system in stormwater runoff**

Nicole Dobrilovic, Isaac Merritt*+, Rachel Smith

Dr. Hwidong Kim and Dr. Michelle Homan

The overall goal of this project is to assess the lead leaching potential at the selected gun range and design a lead prevention system in stormwater runoff. We will be analyzing the soil samples using metal digestion methods to determine the lead concentration in the soil. We will be taking runoff samples and analyzing them for lead concentrations. A leaching test will be conducted, using EPA SW846 Standard Synthetic Precipitating Leaching Procedure, to assess the lead leaching potential from contaminated soil. The peak stormwater discharge will be calculated by land surveying and using NOAA weather data for this area. The total runoff volume will be determined with these values. By combining this data, we can determine the total lead released into the environment. Based on this data, we will design a structure that prevents contaminated stormwater from flowing into a nearby stream. An ImPACT identity analysis will be conducted to determine the impact of lead contamination on the individuals who use the gun range. This will determine how effective the design is to reduce lead contamination. The benefits of this prevention system should decrease the amount of contaminated stormwater runoff that enters the nearby stream which will result in less bioaccumulation of lead in aquatic life and decrease the risk of adverse human health effects. The pilot test results of the lead concentration in the soil using metal digestion shows the areas at the gun range where there are high and low concentrations of lead present.

24. **Changes in photosynthetically active radiation (PAR) in Presque Isle Bay, 2016-2019**

Kaylee Luchansky*+, Greg Andraso, and Christopher Dempsey; Gannon University, Biology Department

Photosynthetically active radiation (PAR; 400-700nm) is the wavelengths of light needed for plant growth and photosynthesis. Photosynthesis helps to dictate the overall productivity of an aquatic ecosystem. Measuring PAR in the water column of a bay or lake provides information on light transparency and

where in the water column photosynthesis can occur. Faculty and students at Gannon University have implemented a long-term monitoring project at a single study site, to assess environmental and biological changes in Presque Isle Bay (Erie, PA). We take light readings (upward and downward) using a LICOR PAR meter to collect data every half meter from 0 to 5 meters in depth. From these profiles, we calculate a Kd and Z1% value. Kd is the extinction coefficient of light in the water column. Z1% is the depth at which there is 1% light left in the water column. Here we report our PAR data from the fall 2016 through the fall of 2019.

25. **The Impact of Human Disturbances on Invasive Plant Abundance and Distribution**

Shoshana Hall*+, Dr. Lynne Beaty and Dr. Michael Naber
School of Science, Penn State Erie - The Behrend College, Erie, PA 16563

Invasive species and habitat loss are some of the leading threats to native biodiversity. Success of invasive species is often facilitated by human modifications to the landscape. Invasive species and human disturbances can also be related through the Intermediate Disturbance Hypothesis (IDH), which states that diversity flourishes when disturbances are neither too frequent nor too rare. To better understand how habitat loss influences invasive plant species, we investigated the relationships between invasive plant abundance and distribution and human disturbance at the former Gospel Hill Golf Course on Penn State Behrend's campus. To complete this project, we recorded the perimeter at the golf course with a GPS and marked the location and relative abundance of notable invasive species, such as hoary plantain (*Plantago media*), multiflora rose (*Rosa multiflora*), and honeysuckle (*Lonicera*). Using ArcMap we quantified the proximity of invasive plants to human disturbance and examined whether certain species were associated with different types of human disturbance (e.g., brush hogging vs buildings vs mowed paths). Following the Intermediate Disturbance Hypothesis, we predict that invasive plant species will thrive at a moderate amount of disturbance. For example, invasive plants will not grow on frequently mowed paths or in groves of trees where there is no notable disturbance, but they will grow in brush hogged areas that are infrequently mowed. Our results will be helpful to the Environmental Science Department for future research opportunities and possibly the maintenance crew at Penn State Behrend as a means of controlling invasive plants on campus.

26. **Long-term Nitrogen Addition Decreases Organic Matter Decomposition and Increases Forest Soil Carbon**

Richard D. Bowden[1]*, Sarah Wurzbacher[2], Susan Washko[3], Lauren Wind[4], Alexandrea Rice[5], Adrienne E. Coble[1], Nicholas Baldauf[6], Brittany Johnson[1], Jun-Jian Wang[7], Myrna Simpson[8], Kate Lajtha[9]

[1] Department of Environmental Science and Sustainability, Allegheny College, Meadville, PA, 16335; richard.bowden@allegheny.edu
[2] College of Agricultural Sciences, The Pennsylvania State University, University Park, PA 16802; sjw246@psu.edu
[3] Department of Biology, University of Arizona, Tuscon, AZ 85721; washko.susan@gmail.com
[4] Biological Systems Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061; wlauren@vt.edu
[5] College of Environmental Science and Forestry, State University of New York, Syracuse NY 13210; arice01@syr.edu
[6] Allegheny County Health Department, Pittsburgh, PA 15219; nickbaldauf@hotmail.com
[7] School of Environmental Science and Engineering, Southern University of Science and Technology, Shenzhen, Guangdong 518055, China; wangjj@sustc.edu.cn
[8] Department of Physical and Environmental Sciences, University of Toronto Scarborough, Toronto, Ontario Canada M1C 1A4; myrna.simpson@utoronto.ca
[9] Department of Crop and Soil Sciences, Oregon State University, Corvallis, OR 97331; lajthak@science.oregonstate.edu

Forests in eastern North America receive anthropogenically-elevated nitrogen (N) deposition that alters soil biogeochemistry and forest productivity. To predict N deposition effects on soil carbon (C) cycling, we applied N (100 kg·N·ha-1·y-1) since 1993 to a productive, N-rich black cherry-sugar maple second-growth PA forest, with the intention of accelerating responses to N deposition. After two decades, soil C in the upper 50cm of soil of N-Addition plots (14.2 ± 0.7 kg C·m-2) was 17% greater than Control plots. Tree growth and litterfall were not affected by fertilization, and thus did not explain increased soil C. Fine root mass (0-1mm) was 34% greater in N-Addition plots, but additional root C inputs were insufficient to explain total soil C increases. The primary driver of increased soil C is reduced decomposition of litter and soil organic matter. Decomposition rates of aboveground black cherry, sugar maple, and mixed leaf litter were 43, 67, and 36%, greater, respectively, in control than N-Addition plots. Soil in N-Addition plots also had higher proportions of less decomposed light-fraction OM as well as preservation of a range of plant-derived compounds (steroids, lignin-derived, cutin- and suberin-derived compounds) that have anti-microbial properties or are non-preferred microbial substrates. Soil biotic activity was reduced, with lower soil respiration and reduced microbial biomass in N-addition plots. N addition also reduced recalcitrant organic matter enzyme activity and available soil cations. These results suggest that chronic elevated atmospheric N inputs increase forest soil C storage by decreasing decomposition, however the long-term stability of this additional C sequestration is unknown.

27. **Four Seasons of Growing: Plant Propagation for Wetland Restoration on Presque Isle State Park**

Jen Salem*, Program Director, Go Native Erie!, Regional Science Consortium
Tom Ridge Environmental Center, 301 Peninsula Drive, Suite 9, Erie, Pa 16505

Despite ongoing efforts to eliminate invasive plant species from Presque Isle State Park, targeted areas are not being repopulated by native plants quickly. The absence of these beneficial plants is an invitation for invasives to move back in, creating a situation where extensive treatment is necessary. The goal of this wetland restoration project is to grow and re-populate native wetland plants in three selected areas of Presque Isle. This will include propagation directly from plants found on the Park, and continual monitoring on the selected areas. The results of this project will be used by the PA DCNR and will impact future wetland restoration projects on Presque Isle State Park.

28. **Monitoring Wetland Development in Recently Mitigated Wetlands in Southwest PA: Year Four (2019), Soil Development**

Josh Magyar*+ (Robert S Whyte, faculty advisor CalU), jam1052@sru.edu
Slippery Rock University, Department of Geography, Geology, and the Environment
1 Morrow Way, Slippery Rock PA 16057, 724-738-2048

To compensate for impacts to project area wetlands resulting from State Route 70 highway construction activities, three constructed wetlands were built on Game Commission property at State Gamelands 297 and 302 in southwestern PA. Wetland mitigation for these constructed wetlands includes the design, construction and subsequent monitoring. Partners for Fish and Wildlife, a unit of California University of Pennsylvania, was responsible for the design and construction phase. The monitoring will extend over a 10 year period and be done by the Interdisciplinary Center for Environmental Studies of California University of PA. In 2019 soil parameters were monitored and evaluated at both mitigated sites to assess soil development and wetland function and directly compared to previous years. Soil samples were collected and hydric soil development assessed in each wetland from samples collected in the immediate upland, mid-bank, nearshore, and wetland center; each area representing a different hydrologic regime. Soil pH, bulk density, organic content, and color (Munsell Soil Color) were recorded for all samples.

29. Monitoring Wetland Development in Recently Mitigated Wetlands: Year Four (2019), Vegetation and Water Quality

Henry D Whyte*+ (advisor Jose Taracido, Partners for Fish & Wildlife, CalU),
hwhyte21@wooster.edu
The College of Wooster, Physics, Taylor Hall
1189 Beall Avenue, Wooster, Ohio 44691, 330-263-2478

To compensate for impacts to project area wetlands resulting from State Route 70 highway construction activities, three constructed wetlands were built in 2015 and 2016 on Game Commission property at State Gamelands 297 and 302, respectively, in southwestern PA. Wetland mitigation for these constructed wetlands includes the design, construction and subsequent monitoring. Partners for Fish and Wildlife, a unit of California University of Pennsylvania, was responsible for the design and construction phase. The monitoring, which will extend over a 10 year period (through 2025) is being done by the Interdisciplinary Center for Environmental Studies of California University of PA. Wetland vegetation, water quality, and soil development are monitored and evaluated each year. Vegetation is monitored through a series of transects and observational surveys in each wetland. Water samples collected from areas of permanent standing water are analyzed for temperature, water depth, dissolved oxygen, pH, alkalinity, salinity, total dissolved solids, and turbidity.

30. The Influence of Lake Erie on the Effects of Climate Change

Kara C. Dobson [a,b,*+], Michael A. Campbell[a,b], Lynne E. Beaty[a], Michael A. Rutter[a], Bryan Hed[b]
[a]Penn State Erie, The Behrend College, School of Science, 4205 College Drive, Erie, PA 16563
[b]Lake Erie Regional Grape Research and Extension Center, Penn State College of Agriculture,
662 North Cemetery Road, North East, PA 16428

Anthropogenic climate change is affecting virtually all ecosystems across the globe. Some of the noticeable effects of the changing climate are the shifting of frost dates in the fall and spring, and how warm temperatures are distributed throughout the year. The degree to which an ecosystem is affected by these changes in climate depends upon many factors, including where the ecosystem is located and what regional variabilities in climate surround that ecosystem. One ecosystem that experiences a unique microclimate is the region surrounding Lake Erie, the southernmost Laurentian Great Lake. Using historic climate data dating from 1948-2017, we set out to determine how the effects of climate change differ between coastal and inland regions of Lake Erie, and to hypothesize as to why these effects may be occurring differently between these regions. We found that, for both coastal and inland regions, the first frost in the fall has begun later, while the last frost in the spring has begun earlier, leading to both regions experiencing longer frost-free seasons. However, although both regions have experienced these shifts, the rate at which these shifts occurred differed between the coastal and inland regions. Inland regions have been experiencing a faster rate of change in frost dates, and a faster expansion of the frost-free season. We also noted that average temperatures have been increasing for each region, primarily in coastal regions, due to increased minimum temperatures over time. The results from this study highlight the importance of regional climate variability in large-scale climatic studies.

31. A Toxic Climate: Harmful Algal Blooms and Climate Change

Amber R. Stilwell, M.S.*, Sean Dalton, B.S., & Jeanette Schnars, Ph.D.
Regional Science Consortium

The Regional Science Consortium (RSC) has been studying and monitoring for harmful algal blooms (HABs), also known as cyanobacteria blooms, since 2013. Monitoring efforts funded by Great Lakes Restoration Initiative through the Department of Environmental Protection (DEP) will be discussed as well as recent information from climatologists looking at rising temperatures and changing weather patterns across the United States. These climate studies and the RSC's HAB monitoring information will be brought together to hypothesis the outlook of HABs in Erie County as the local climate changes.

32. Comparison of fish and macroinvertebrate communities from upstream and downstream sites on Lake Erie tributary streams

Cytalia Crosby*+, Christian Peterson, Danielle Samuel, Ileana Calderon-Martell, Christopher Dempsey, and Greg Andraso, Gannon University, Biology Department

Headwater streams are relatively small tributaries in a watershed that convey water from the upper regions down to major confluences. Headwater streams are key to the dispersal and control of sediment, nutrients, and water flow to downstream sites. Within our region, there is little understanding of how species diversity of fish and macroinvertebrates varies between upstream and downstream sites. We used 10 streams in the Lake Erie watershed of Pennsylvania and included multiple sites (i.e. headwater and downstream) to assess if species diversity changed. Macroinvertebrate samples were collected using a kick net and identified to family level in the laboratory. Fish were sampled using a Smith Root LR-24 electrofishing unit, identified to species level in the field, and released. Collection data was then used to calculate the Index of Biotic Integrity (IBI) for fish, the Hilsenhoff Biotic Index (HBI) for macroinvertebrates, and the Shannon diversity index for fish and macroinvertebrates. Diversity was usually higher at downstream sites for fish and macroinvertebrates. IBI and HBI were more variable, but generally indicated higher scores at downstream sites.

33. Macroinvertebrate Indicators of Water Quality of a Second Order Stream entering into a Eutrophic Lake

Max Kelly*+ (Mercyhurst University), Dr. J. Michael Campbell (Mercyhurst University)

Analyzing aquatic macroinvertebrate communities as bioindicators is a functional method to infer water quality in streams and lakes. Different families of macroinvertebrates vary in their pollution sensitivity, thus can be diagnostic of water quality and presence of pollutants. Findley Lake, Located in Mina, New York, is a eutrophic lake due to high nutrient loading from both agriculture and septic tank leaching from surrounding homes. One of the largest streams leading into the lake was selected to analyze the effect of this stream on the nearshore benthic community of the lake. Triplicate kick samples were collected at a forested site above the mouth and at the stream-lake-interface. The organisms collected were identified to family level. Multiple metrics were used to assess how the forested site differed from the stream-lake-interface. I expect that the metrics for the stream originating from a relatively undisturbed watershed will indicate better water quality compared to the nearshore benthic community of the lake. Potential effects of microhabitat differences between the running water and lake littoral habitats will be discussed.

34. Does seasonality influence water quality and macroinvertebrate community composition in Pennsylvania tributary streams of Lake Erie?

Danielle Samuel*+, Cytalia Crosby, Ileana Calderon-Martell, Christian Peterson, Greg Andraso and Christopher Dempsey, Gannon University, Biology Department

Changing seasons can cause variation in the physical and chemical properties of stream ecosystems, which may influence water quality and macroinvertebrates. Seasonality in the emergence of aquatic insects may also lead to different conclusions about stream health if similar studies are conducted at different times of the year. Aquatic ecologists typically use water quality and macroinvertebrate communities as metrics to assess the health of stream ecosystems, but collection timeframes may vary from study to study. In the Erie, PA area, the effects of seasonality on stream health have not been documented. To test the above idea, we selected 16 study sites on 10 Pennsylvania tributary streams of Lake Erie to determine if seasonality influenced the health of these systems. Sites were sampled in the fall of 2018 and summer of 2019. At each site, we used a Surber sampling net (0.25 m2) and collected a composite sample (left, center, right) from a single riffle cross section. In addition, we used a YSI ProDSS to collect pH, temperature, dissolved oxygen, and conductivity data. By comparing the data from fall of 2018 and summer of 2019 we can provide insight into how seasonality influences stream health in the Erie, PA area.

35. **Using habitat, fish, and macroinvertebrates to assess changes to Erie, PA stream health between 2003 and 2019**

Christian Peterson*+, Danielle Samuel, Cytalia Crosby, Ileana Calderon-Martell, Greg Andraso and Christopher Dempsey, Gannon University, Biology Department

There are 22 named tributaries that drain into the Pennsylvania portion of Lake Erie. The health of these streams is important to biological life (i.e. fish and macroinvertebrates) and to residents who get their drinking water from Lake Erie. Homeowners living near these streams may deal with habitat degradation and/or stream bank erosion. Stream health in the area surrounding Erie, PA has not been assessed on a large scale since 2003. During the summer of 2019, we collected fish, macroinvertebrate, and water quality data at 21 sites on 13 streams. We compared our results to data collected in 2003 at the same sites. Fish were collected using a Smith-Root LR-24 backpack electrofishing unit, and catch data were used to calculate the Index of Biotic Integrity (IBI). Macroinvertebrates were collected using a Surber sampler, and catch data were used to calculate the Hilsenhoff Biotic Index (HBI). In addition, we assessed each site using the EPA Habitat Assessment form for low gradient streams. Our results indicate that stream health decreased at most sites, based on the metrics used in this study. Specifically, IBI scores decreased at 9 of 21 sites, HBI scores decreased at 18 of 21 sites, and Habitat quality scores decreased at 16 of 21 sites.

36. **Fish and Amphibian Surveys in Restored Priority Wetland Habitats on Presque Isle State Park, Erie, PA**

Sean Dalton*, A. Stilwell, J. Schnars, Ph.D.
Regional Science Consortium

Encroaching invasive plant species can have numerous negative effects if left unopposed in priority wetlands for both fish and amphibian species, ultimately leading to the displacement of the animals. Using field observation methods, collection transects, as well as overnight recordings, surveys were conducted at 4 priority wetland habitat restoration areas distributed across Presque Isle State Park in Erie County, PA where treatment for invasive plants has been applied. Surveys were conducted both before and after native replanting efforts by Go Native Erie!. The surveys seek to catalog the change in native biodiversity in these restored habitats.

37. **Water Quality of Marsh Run, a Small-town Urban Stream in Indiana Borough, Pennsylvania.**

Ian Darragh*+, Katherine Farnsworth, and Ryann Knowles
Indiana University of Pennsylvania, Department of Geosciences

The water quality of a stream is important because it affects the surrounding environment, and the drinking water for local population and downstream populations. Water quality is negatively impacted by any pollutants that enter our waterways. This waste finds its way into the streams through runoff from impervious surfaces or from legacy pollutants. Locally in Marsh Run, the legacy pollutants are due to tanneries, glass factories and scrap/junk yards that were previously located in the watershed.

Marsh Run is a headwater stream, located in Indiana Borough. It drains an area of 2.5 square miles, composed of mostly commercial and residential land-use. Both the first-order streams, and the main-stem, run under a multitude of paved surfaces through areas that have legacy pollutants, and are fed by storm drains.

The overall goal of this project was to characterize the water quality of Marsh Run and identify specific areas of concern. This was accomplished with monthly water samples throughout the watershed as well as in-situ instruments to monitor precipitation and streamflow.

Results show a not unexpected conclusion of higher concentrations present during low flow conditions, with dilution of dissolved material during stormflow conditions due to primarily surface runoff. As Indiana, PA receives the annual rainfall distributed quite evenly throughout the year, there is no obvious time when surface runoff contributes significant dissolved material. There was one site location with abnormally higher concentrations. This is just downstream of the daylighting of the stream after flowing through infrastructure for 600 feet under a commercial district.

38. **Determining a Water Budget for a Suburban Headwater Stream: McCarthy Run, Indiana, PA**

Ryann Knowles*+, Ian Darragh and Katherine Farnsworth

Indiana University of Pennsylvania, Department of Geosciences

Many things can impact a watershed water budget, many of these are directly related to stormwater and sewage infrastructure in urban areas. Being able to understand the hydrologic system can help remediate current issues and predict what may occur with more intense rainfall events in the future.

McCarthy Run is a small tributary (4.4 square miles) watershed of Stoney Run, White Township, PA. Stormwater is directed into McCarthy Run, often resulting in localized flooding. Current flood remediation efforts are focused on increasing retention volume in headwater stormwater ponds. Quantifying the volume of water that is supplied to the stream by direct surface runoff vs. stormwater infrastructure (piped) delivery for each of the small first order streams will allow for a better understanding of the mainstem of McCarthy Run. This can help the community prepare for the expected change in rainfall predicted in the future.

To accomplish this, we instrumented the watershed with rain gauges, barologgers and in-situ Solinst data loggers that measure water temperature, conductivity, and water pressure(depth). Rating curves have been created based on both topographic field surveys and flow -discharge measurements. The rating curves allow for the quantification of discharge, even at high flows that are unsafe to measure on these flashy streams. We see a seasonal changes in the water budget related to evaporation and infiltration on low flow (low precipitation) days. During large rainfall events, the vast majority of the water falling on the land surface is entering either the stormwater or stream system, and sometimes both.

39. **An analysis of phytoplankton in the littoral zone vs limnetic zone at Findley Lake**

Greta Taine*+, Dr. John Campbell, Max Kelly

Findley Lake is located in western New York state and is used for recreational purposes by residents in surrounding houses. Septic tank leachate and added nutrients from migratory Canada geese are factors that could increase the total abundance of phytoplankton. The littoral zone is exposed to more light and nutrients compared to the limnetic zone. From summer to late fall, a green scum forms on the surface of lake which indicates algal blooms. Over 3 years samples have been taken to examine the abundance and diversity of the phytoplankton community. Sampling was done on single dates in April and October of 2017, 2018, and 2019. During Fall of 2018, data was collected in two locations off shore at the deepest part of the lake and at the Mercyhurst Rowing dock in the shallower littoral zone of the lake. No significant difference in total phytoplankton abundance was found between the littoral zone and limnetic zone. The four most common phytoplankton taxa found in Findley Lake samples were the cyanobacteria *Aphanizomenon*, *Woronichinia*, *Microcystis* and *Anabaena*. A high abundance of Microcystis can be dangerous if toxins released by this alga is ingested by humans or pets. Potential solutions to the algal bloom problem in Findley Lake will be discussed.

40. **Urban Litter Removal from Stormwater Drains**

Leah Achille*+, Jake Weiser, Joe Westrick*+

Varun Kasaraneni Ph.D.

Department of Environmental Science and Engineering, Gannon University

Anthropogenic urban litter, in addition to tarnishing the ambiance, is one of the major contributors of pollution in surface waters including the Great Lakes. During a precipitation event or snowmelt, litter previously accumulated on the streets can enter the stormwater network and be carried to surface water. The goal of this project is to design litter removal systems for stormwater catch basins in the city of Erie. The first step would be quantifying litter entering the stormwater systems by collecting samples at several locations representing various land use (commercial, residential and industrial) and social economic conditions (low-, medium- and high- income). Samples are to be collected every week for at least six months using a 300-micron stainless steel strainer. A constraint for catch basin selection is the depth of

the basin as they must be deep enough to house the strainer without obstructing water flow. Litter samples collected will be dried at room temperature, sorted by type (plastic, glass, sediment, metal, etc.), and analyzed to determine size distribution and weight. Based on the data obtained, locations of concern within the city will be identified and current state of the art litter control measures will be explored. Furthermore, location-specific custom solutions will be designed based on information obtained and inputs from City of Erie engineers.

41.   Enhanced Sand Filtration for Developing Communities

Ezekial Morris, Eric Sapp*+, Maria Taliani*+
Varun Kasaraneni Ph.D
Department of Environmental Science and Engineering, Gannon University

Safe and readily available drinking water is key for public health. Globally over a billion people use a drinking water source contaminated with fecal matter. Although sand filters are an inexpensive way of treating water in developing communities, the reliability is low and often the effluent water still does not meet EPA MCL standards for drinking water. The goal of this project is to design and test an enhanced sand filtration system for removing pathogenic contamination from drinking water. The criteria for the new filter are that the new sand filter will be able to supply enough clean drinking water for a family of four. The enhancements include addition of copper as a disinfection agent and biochar to remove metals and other dissolved contaminants. To accomplish this, copper in various forms (mesh, copper wire pieces etc.) will be tested for disinfection capacity using batch and kinetic experiments. E. coli will be used as a model organism and concentrations in the range of 102-105 cfu/100ml will be tested. Based on the results from batch and kinetic experiments the mass of copper and contact time required to achieve a 99.9% removal will be determined. Using column experiments, various combinations of sand, copper, and biochar will be tested and the best combination, one with highest E. coli removal with low detention time, will be selected. Based on these parameters, a novel sand filter will be built and tested with water chemistry conditions meeting NSF standards.

42.   The RSC Buoy Program: Real-time data contributing to a long-term dataset

Jeanette Schnars, Ph.D.*, Executive Director, Regional Science Consortium

The Regional Science Consortium maintains and operates 4 buoys on Lake Erie and two weather stations, providing real-time data to researchers, managers, and the public. Two of these buoys are deployed 2 miles offshore in approximately 17 meters of water, and two buoys are deployed in 3-4 meters of water along the shoreline in between the breakwaters. Three of the buoys are outfitted with a water quality sonde. The two buoys offshore are also outfitted with a weather station, wave meter, and a video camera. There are two land-based weather stations; One of the weather stations is installed at Beach 2 on Presque Isle State Park, and the other weather station is at the top of the Tom Ridge Environmental Center observation tower. All data from the buoys systems and weather stations are collected every 20 minutes and posted in real-time to the website www.PALakeErieBuoy.com . These buoys serve several purposes, including the creation of large continual data sets, real-time data, information on water quality, supporting predictive models, and monitoring lake conditions. Specifically, the buoys support on-going research projects, including the concentrations of E. coli, and the toxin concentrations from cyanobacteria. The results of this data have been integrated into predictive models for bacterial concentrations in swimming waters and will be used to further investigate the occurrence of harmful algal blooms; providing the opportunity to make better management decisions earlier compared to standard techniques. This technology allows for better management of Lake Erie on several diverse issues.

43. Classification of Partial Crania in FORDISC 3.1. Using Mercyhurst University Cases

AV. Lanfranchi[1]+, EA. Dougher[2]
[1]Mercyhurst University Department of Applied Forensic Sciences
[2]Mercyhurst University Department of Education

FORDSIC 3.1 is a widely used statistical tool to estimate the sex and ancestry of human skeletal remains in forensic settings. The software utilizes discriminant function analysis (DFA) to assess the morphological distance and affinity to 13 different sex and ancestry groups, based on upwards of 20 different cranial measurements. Viscerocranium bones such as the nasals, zygomatics, maxillae, and portions of the frontal provide the most useful measurements for this classification, but they do not preserve as well as neurocranial bones (e.g., the parietals, temporals or occipital), as the histology and morphology of the facial bones makes them thinner and more fragile than those of the neurocranium. As a result, they are more frequently missing or deeply altered in forensic investigations. Thus, classification must be often attempted from neurocranial dimensions.

In this study we assessed the accuracy of sex and ancestry estimates obtained exclusively from the cranial vault, without facial measurements. Using 9 neurocranial measurements of 30 individuals from the collection housed in Mercyhurst University's Ted Rathbun Osteology Laboratory, a Principal Component Analysis was performed to assess colinearity and the main sources of variation, and the measurements were then ran in FORDISC 3.1. to assess classification accuracy. The results show that the program FORDISC 3.1. does not provide consistently accurate results when only cranial vault measurements are utilized.

44. Illustrations of Biophilia: An Artist's Yearning for Nature during the Anthropocene

René L. Benoit*+, Professor Pallant

Being an artist during the Anthropocene, the human-lead 6th mass extinction, is an existential feat. Through an environmentalist lens, art making can be heavily criticized for excessive and unreasonable use of materials. Additionally, there is a major lack of consideration in the arts for where materials come from and how they are processed from their original source to commercial art stores and retailers.

My presentation will review the historical interconnectedness between natural science and art, sustainable art making processes, as well as to create a body of sustainably made biophilic artworks. The artist will self-forage for organic objects, such as pine cones, walnuts, berries, and stones to create inks and pigments. Paper will be made by hand out of responsibly sourced plant matter. With sustainably self-made materials, the artist will illustrate biophilia through field drawings and scientific illustrations. These illustrations will depict the self-foraged organic objects, the landscapes in which the objects were found, and other visualizations of biophilia. The purpose of this work is to visually express a deep connection the artist feels to nature; invoke this connection within an audience; and to provide inspirational solutions for other artists to create responsibly during the Anthropocene.