WELCOME

Regional Science Consortium
18th Annual Research Symposium
November 2-4, 2022
Tom Ridge Environmental Center
at Presque Isle State Park

Welcome… to the celebration of our 18th Annual Regional Science Consortium Research Symposium!

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 46 Oral Presentations and 49 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 TREC Visitor's Area, featuring information on some of our 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*). 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 Holly Best and the PA DCNR staff of the TREC for the preparations. I would especially like to thank Jennifer Salem, Sean Dalton, Sarah Magyan, and Jeremiah Covert for their support of this event and the RSC. ***Thank you all***!

I hope you all enjoy Symposium 2022!
Please mark your calendar for next year's Regional Science Consortium Research Symposium on November 8 – 10, 2023.

Cheers!
Jeanette

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

SCHEDULE OF TALKS

Regional Science Consortium
18th Annual Research Symposium
November 2-4, 2022
Tom Ridge Environmental Center
at Presque Isle State Park

WEDNESDAY, NOVEMBER 2, 2022

8:30 – 8:50 **REGISTRATION OPENS**
Register, upload presentations
Continental breakfast

8:50 – 9:00 **Welcome**
Jeanette Schnars, Ph.D., Executive Director, RSC

Presentations

Session Chair: *Jeanette Schnars, RSC Executive Director*

9:00 – 9:20 **Identification of Human Remains: The Value of Forensic Anthropology and Forensic Odontology**
Joe Adserias-Garriga[1]*
[1]Assistant Professor, Department of Applied Forensic Sciences, Mercyhurst University

9:20 – 9:40 **The role of hypothesis construction and testing in the new forensic anthropology**
Dennis Dirkmaat[1]*
[1]Chair of the Department of Applied Forensic Sciences, Mercyhurst University

9:40 – 9:50 **An experimental design for the analysis of the evolution of microbial communities linked to decomposition processes under controlled laboratory conditions**
Colleen Krall[1]*+, Sheana Ramcharan[1], Dr. Michael Foulk[2], Dr. Joe Adserias-Garriga[1], Luis Cabo-Perez[1].
Department of Applied Forensic Sciences[1] and Depart of Biology[2], Mercyhurst University
Speed Talk

9:50 – 10:10 **Signature of microRNAs correlates with differential target gene expression in tissue samples**

Anastasia Grytsay*+, Godwin E. Young, Nadiya D. Andrews, Kasia B. Bauer and Olanrewaju B. Morenikeji
Division of Biological and Health Sciences, University of Pittsburgh-Bradford, PA 16701

10:10 – 10:30 **BREAK**

Session Chair: *Sean Rafferty, RSC Executive Board President*

10:30 – 10:40 **Flat Physics: Observations of Fluid Flow Behavior and Analogs to natural Systems in a 2-Dimensional 2-D Soap Film**

David Horne*
Gannon University
Speed Talk

10:40 – 11:00 **Ice-rich flow features and mantling on north-facing slopes in Alba Patera, Mars**

Nicholas L.G. Schiff*, Tracy K.P. Gregg
Department of Geology, University at Buffalo

11:00 – 11:20 **Determining the Influence of Surface Winds on the Behavior of Aquatic Invertebrates**

Haley Altadonna[1]*+ and Lynne Beaty[1]
[1]School of Science, Penn State Erie - The Behrend College, Erie, PA

11:20 – 11:40 **Innovative Manufacturing Concepts to Tackle Emergency Demand**

Junayed Pasha*, Rahul Singh
Gannon University

11:40 – 12:40 **LUNCH**

Session Chair: *Sean Dalton, RSC Lab and Field Manager*

12:40 – 1:00 **Chiropteran Chatter in Chautauqua, NY (USA): Using Acoustic Sampling and Geographic Information Systems to Create a Baseline Bat Habitat Dataset**

Jonathan P. Townsend[1,2]*+, Chris S. Renschler[1,2] Jared Aldstadt[1]
1Department of Geography, University at Buffalo, Buffalo, USA;
2 Landscape-based Environmental System Analysis & Modeling Laboratory (LESAM), University at Buffalo, Buffalo, USA

1:00 – 1:20 **A Census of the Bat Population of Gannon University, Erie, PA**

Till, Sarah E.* +; Ropski, Steven J.
Gannon University, 109 University Square, Erie, PA 16541

1:20 – 1:40 **When a duck nests on your green roof... AGAIN**
Cassandra Froehlich*+ and Dr. Steven Ropski
Biology Department, Gannon University, Erie, PA 16541

1:40 – 2:00 **BREAK**

Session Chair: *Jennifer Salem, RSC Plant Lab Manager*

2:00 – 2:20 **Preliminary comparative analysis of soil microarthropod communities of Tamarack Swamp and bog, Warren County, PA**
J. Michael Campbell*
Department of Biology, Mercyhurst University

2:20 – 2:30 **Fossil Brachyurans from the Upper Kimmeridgian Sponge Reefs of Geisingen Germany**
Haylee Ludington* – *University of Pittsburgh at Bradford*
Ovidiu Frantescu – *Allegheny Institute of Natural History*
Speed Talk

2:30 – 2:40 **Impact of Human Activity Levels on Coyote Temporal Behaviors on Presque Isle State Park**
Magdaline A. Baham*+ – *Undergraduate Student, Allegheny College Department of Environmental Science and Sustainability*
Kelly J. Pearce – *Assistant Professor, Allegheny College Department of Environmental Science and Sustainability*
Chris Shaffer – *GIS Manager and Instructor, Allegheny College Department of Environmental Science and Sustainability*
Speed Talk

2:40 – 3:00 **Changes in forest structure from 2016-2022 of an ash stand since the arrival of the invasive emerald ash borer in 2017**
Christopher R. Dolanc*+
Associate Professor, Mercyhurst University Department of Biology

3:00 – 3:20 **Vegetation of Bay Point Island -- a barrier island in South Carolina**
Jonathan Titus*, *Professor Emeritus, Biology Dept., SUNY-Fredonia, Fredonia, NY*
Priscilla Titus, *Free-Lance Ecologist, Fredonia, NY*
Jeanette Schnars, *Executive Director, Bay Point Island Foundation, Hilton Head, SC*

3:20 – 4:30 **BREAK**

4:30 – 6:00 **RSC BOARD MEETING** – RSC Board Members – *Room 112*

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

THURSDAY, NOVEMBER 3, 2022

8:30 – 8:50 **REGISTRATION OPENS**
Register, upload presentations
Continental Breakfast

8:50 – 9:00 **Welcome**
Jeanette Schnars, Ph.D., Executive Director, RSC

Presentations

Session Chair: *Casey Bradshaw-Wilson, RSC Past-President*

9:00 – 9:10 **Modern changes in the freshwater mussel community of Conneaut Creek, Erie County, PA**
Andrew Shaw* and J. Michael Campbell
Department of Biology, Mercyhurst University
Speed Talk

9:10 – 9:30 **Unsolved mysterysnails: The mystery continues**
Lynne Beaty[1]*, Adam Simpson[1], and Sam Nutile[1]
[1]School of Science, Penn State Erie – The Behrend College

9:30 – 9:50 **Genetic survey of invasive mysterysnails in western Pennsylvania**
Aaron Seymour[1], Phoebe Will[1], Lynne Beaty[1], Samuel Nutile[1], and Adam Simpson[1]*
[1] School of Science, Penn State Erie - The Behrend College, Erie, PA 16563

9:50 – 10:10 **Are you sure you want to eat that? Investigating Polychlorinated Biphenyl Concentrations in Lake Erie Fishes**
Olivia Hodgson[1]*+, Adam Simpson[1], Samuel Nutile[1]
School of Science, Penn State Erie – The Behrend College, Erie, PA 16563

10:10 – 10:30 **Tributary and mainstem habitat use of brook trout (*Salvelinus fontinalis*) and brown trout (*Salmo trutta*) in the East Branch Sugar Creek watershed**
Jake Folaron*+, Mark A. Kirk, Kelly Pearce, Casey Bradshaw-Wilson
Allegheny College, Meadville, PA 16335

10:30 – 10:50 **BREAK**

Session Chair: *Jerry Covert, RSC Past-Executive Director*

10:50 – 11:10 **Long term monitoring update: water quality changes in Presque Isle Bay 2016-2022**
Chris Dempsey*, Michelle Kuns, and Greg Andraso
Gannon University, Biology Department

11:10 – 11:30 **A five year (2016-2021) summary of the open-water fish community of Presque Isle Bay**
Andraso, G.M.*, Dempsey, C.M., and Kuns, M.M.
Gannon University, Biology Department

11:30 – 11:50 **Understanding Thermal Stratification patterns in the South Basin of Chautauqua Lake, NY**
Kasey Crandall[1]*+, Dr. Courtney Wigdahl-Perry[1]
1. State University of New York at Fredonia

11:50 – 12:10 **Instream habitat improvement, monitoring, and future plans in the French Creek watershed**
Briana Sebastian*, Mark Kirk, Casey Bradshaw-Wilson, Kelly Pearce
Watershed Conservation Research Center, Allegheny College

12:10 – 12:20 **The Environment Impacts of Acid Mine Drainage**
Jacob Lister* – *University of Pittsburgh at Bradford*
Ovidiu Frantescu – *Allegheny Institute of Natural History*
Speed Talk

12:20 – 12:40 **Evaluation of Efficiency of Erie County, Pennsylvania, Small Flow Treatment Facilities and their Impact on Public Health and the Environment**
Colton Hyatt, *Kent State University*
Dr. Nicholas Bonini, *Erie County Department of Health*
Dr. Joseph Ortiz, *Kent State University*

12:40 – 1:40 **LUNCH**

Session Chair: *Holly Best, RSC Executive Board Member*

1:40 – 2:00 **Plastic and Water: Environmental Ethics Research Project**
Brianna Coluzzi*+, Garrett McClelland, Jeanne Swanson, Nour Masri* supervised by Aaron K. Kerr, Ph.D.
Gannon University

2:00 – 2:20 **Environmental Issues in Freshman Composition**
Derek F. DiMatteo*
Gannon University, Erie, PA

2:20 – 2:40 **What to do with the Gifted Few:** How to use immersive experiential learning to support student engagement, career and college preparation and involvement in the community
Sarah Skelton*
Gifted Coordinator, Iroquois School District

2:40 – 3:00 **Behind the lens – bringing nature to your living room**
Ray Bierbower* and Brian Gula*

Environmental Education Specialists - Department of Conservation and Natural Resources

3:00 – 3:20 **BREAK**

Session Chair: *Jeanette Schnars, RSC Executive Director*

3:20 – 3:40 **Genomic surveillance of Sars-CoV-2 variants enhances mitigation strategies and reveals viral evolution in a university campus context**

Hertel, Austin, Heeter, Madison*, Bestram, Mara, Gibson, Ross, Ciletti-Dougherty, Gwendolyn*, and Steven Mauro

Gannon University

3:40 – 4:00 **Tobacco (nicotine) consumption and COVID-19**

Scott P. Zanella*+, Grace E. Foster*+, Mughiara Qadeer, Julia Del Ponte, Prasad S. Dalvi

Biology Department, Morosky College of Health Professions and Sciences, Gannon University

4:00 – 4:10 **The effects of cortisol exposure on placental trophoblast extracellular vesicles and iron transport proteins**

Ashley E. Russell[1,2]

[1]Department of Biology, School of Science, Penn State Erie, The Behrend College, Erie, PA 16563, USA

[2]Magee Womens Research Institute - Allied Member, Pittsburgh, PA 15213, USA

4:10 – 4:30 **Repeated Prenatal Valproic Acid Exposure on Spinal Cord Lower Motor Neuron Morphology in Autism Spectrum Disorder Rat Models**

Alhelo H[1]*+, Kulesza RJ[1]

1 – Lake Erie College of Osteopathic Medicine

FRIDAY, NOVEMBER 4, 2022

8:30 – 8:50 **REGISTRATION OPENS**
Register, upload presentations
Continental Breakfast

8:50 – 9:00 **Welcome**
Jeanette Schnars, Ph.D., Executive Director, RSC

Presentations

Session Chair: *Jeanette Schnars, RSC Executive Director*

9:00 – 9:20 **Presque Isle State Park vs. Invasive Plants – 2022 Update**
Holly Best*
PA Department of Conservation and Natural Resources

9:20 – 9:40 **Wetland Restoration and Propagation Updates on Presque Isle State Park**
Jen Salem*, Jeremiah Covert*
Regional Science Consortium

9:40 – 10:00 **Biological Surveys in Restored Primary Wetland Habitats on Presque Isle State Park Erie, PA**
Sarah Magyan*, Sean Dalton*
Regional Science Consortium

10:00 – 10:20 **Marsh Bird Monitoring at Presque Isle State Park: 2022 Update**
Sarah Sargent*
Erie Bird Observatory

10:20 – 10:40 **Overview of Wetland Vegetation Monitoring on Presque Isle from 2012 through 2022 (Update)**
Robert S. Whyte*
Pennwest University, California, Biology Department, California, PA 15419

10:40 – 11:00 **Aerial Drone Surveys of Shoreline Change and Primary Wetland Habitats on Presque Isle State Park, Erie, PA**
Sean Dalton*
Regional Science Consortium

11:00 – 12:00 **LUNCH**

Session Chair: *Jerry Covert, RSC Past-Executive Director*

12:00 – 12:20	**Surveys of Basking Turtles in the Corn Wilderness of Southeastern and East-Central Illinois, With Emphasis on Three Map Turtle Species (Genus Graptemys)** Peter V. Lindeman* *Pennsylvania Western University at Edinboro*
12:20 – 12:40	**Allometry and Isometry in the Scaling of Body Mass to Linear Shell Measurements in Turtles** Danielle M. Beck*+, D. Kyle Breault, & Peter V. Lindeman *Pennsylvania Western University at Edinboro*
12:40 – 1:00	**Determination of terrestrial salamander diversity relative to edge habitats and sampling type on conserved properties in Northwestern Pennsylvania** Eva Kerr*+, Kelly Pearce, Casey Bradshaw-Wilson *Allegheny College*
1:00 – 1:20	**Do diseased tadpoles affect aquatic community structure and ecosystem processes?** Matthew D. Venesky*, *Allegheny College, Department of Biology, Meadville PA* Karolina Fučíková, *Assumption University, Department of Biological and Physical Sciences, Worcester MA* P.J. Torres, *College of the Holy Cross, Biology Department, Worcester MA*
1:20 – 1:40	**Exploring factors associated with an amphibian die-off at Bousson Environmental Research Reserve** Emma Yesko*+ *Allegheny College, Meadville, PA*
1:40 – 2:00	**BREAK**

2:00 – 2:30	**PRESENTATION OF THE JERRY COVERT STUDENT RESEARCH AWARDS** Jeanette Schnars, Ph.D., Executive Director, RSC Jerry Covert, Ph.D., Past Executive Director, RSC *Student Award Presentations* *Closing Remarks*

ABSTRACTS

Regional Science Consortium
18th Annual Research Symposium
November 2-4, 2022
Tom Ridge Environmental Center
at Presque Isle State Park

ORAL PRESENTATIONS

Wednesday, November 2, 2022

Identification of Human Remains: The Value of Forensic Anthropology and Forensic Odontology

Joe Adserias-Garriga[1]

1: Assistant Professor, Department of Applied Forensic Sciences, Mercyhurst University

When human remains are found, there are three basic questions the forensic professionals are asked: What´s the identity of the remains?, What caused the death? and When did the death occur? The identification process starts with the reconstruction of the biological profile (that is an assessment of the remains´ ancestry, sex, age and stature) which provides a broad description of the individual. This information is used by the authorities to find candidates for the identity among the missing persons lists. The next step is the comparison between the data derived from the unidentified individual (or postmortem data) and the missing person (or antemortem) data. The results of this comparison can lead to a positive identification. This presentation will discuss the value and contribution of Forensic Anthropology and Forensic Odontology in the process of human identification. The different identification methods and techniques will be illustrated by forensic cases conducted by the Department of Applied Forensic Sciences at Mercyhurst University.

The role of hypothesis construction and testing in the new forensic anthropology

Dennis Dirkmaat[1]

1: Chair of the Department of Applied Forensic Sciences, Mercyhurst University

In a recent reassessment of the field of forensic anthropology, Dirkmaat has suggested that there are in fact two different sub-disciplines: Forensic Osteology (FO) and Outdoor Crime Scene Reconstruction (OCSR). This distinction will be discussed briefly. OCSR, recently defined and practiced by Dirkmaat, focuses on an approach to the processing of an outdoor crime scene that includes not only the recovery of the biological tissues of the recently deceased (often exclusively, the bones), but also the placement (location, orientation, spatial distribution) of the body/body parts, as well as, the associated evidence within the surrounding ecosystem (i.e., the floral, faunal, geological, climatological components), in an effort to produce a comprehensive reconstruction of past events (sequence and timing) at the scene. This forensic taphonomic approach to scene processing now requires an investigative and analytic skill set (beyond just osteology), incorporating many different scientific disciplines and a significant reliance on hypothesis creation and testing creation to paint the clearest and most detailed picture of what happened in the past at this crime scene. This new perspective to the field of forensic anthropology will be richly illustrated via an interesting actual forensic case.

An experimental design for the analysis of the evolution of microbial communities linked to decomposition processes under controlled laboratory conditions.

Colleen Krall*[1], Sheana Ramcharan[1], Dr. Michael Foulk[2], Dr. Joe Adserias-Garriga[1], Luis Cabo-Perez[1]. Department of Applied Forensic Sciences[1] and Depart of Biology[2], Mercyhurst University

The term postmortem interval (PMI) refers to the length of time elapsed between the death of an individual and the time of discovery and examination. Currently, most forensic methods for the estimation of PMI from the overall degree of body decomposition break that process into five generic categories: fresh, bloat, active, advanced, and skeletonized. These methods suffer from both accuracy and precision issues. Interdisciplinary research has begun to leverage knowledge from microbiology, geochemistry, and biochemistry to explore the correlation between microbial and macroscopic changes along decomposition, and its potential to improve PMI estimation. Most of this research has been conducted on full bodies at body farm facilities, which examine macroscopic changes along the decomposition process at outdoor sites. While highly valuable, these experimental designs fail to control most relevant variables, are highly dependent on local conditions and require costly and unique resources only available at a handful of research facilities across the country. The present study utilizes an experimental design based on the analysis of isolated tissue samples in a controlled, hypoxic laboratory environment. This design seeks to compare the evolution of the microbial community composition both with time, and with the evolution of the volatile organic compounds (VOC) released as byproducts of the decomposition process. Aside from additional insight into both the microbial communities and molecular pathways involved in the decomposition process, relevant to PMI estimation, this more nuanced approach may also help to identify promising venues of research in relation to other relevant issues including buried body detection.

Signature of microRNAs correlates with differential target gene expression in tissue samples

Anastasia Grytsay*, Godwin E. Young, Nadiya D. Andrews, Kasia B. Bauer and Olanrewaju B. Morenikeji

Division of Biological and Health Sciences, University of Pittsburgh-Bradford, PA 16701

While different tissues express genes differentially based on their functions, tissue specific gene expression is highly coordinated by several molecular regulators. Non-coding RNAs such as micro-RNAs (miRNAs) are small molecules capable of modulating cellular response by regulating gene expression at pre- and post-transcriptional levels through complementary base pairing with their target messenger RNAs. Till date, the mechanism by which miRNAs coordinate differential gene expression across tissues has not been fully elucidated. Thus, there is a great need to identify the small molecules that could be used to screen differential cellular response to confounding stressors. We hypothesize that miRNAs involved in this process are distinctly regulated between different tissues and are important diagnostic or drug targets. Previously, through computational analysis, we identified important miRNAs that target Interleukin 6 (IL-6), CCAAT/ enhancer-binding protein beta (CEBPB) and Interferon regulatory factor 1 (IRF-1). In this study, we used a quantitative approach to identify microRNA signatures that correlate with the expression of IL-6, CEBPB and IRF-1 in bovine tissue samples. Importantly, we found a significant correlation of two miRNAs being bta-mir-22-3 and bta-mir-2325 with target genes, IL-6 and CEBPB in the skin and liver but not in the kidney tissue. Pathway analysis further linked these genes and miRNAs to key biological processes including immune response, activation of T-cells, antibodies production and transcriptional activities. This expression correlation of miRNAs may represent a mechanism of dysregulated target gene expression across tissues, requiring further validation and may be useful for diagnosis or therapeutic target.

Flat Physics: Observations of Fluid Flow Behavior and Analogs to natural Systems in a 2-Dimensional 2-D Soap Film

David Horne*
Gannon University

The behavior of vortices and turbulent flow is a subject of much theoretical and practical study in fluid dynamics, comparable with the behavior of fluids in a number of natural settings such as rivers, lakes, oceans and the atmosphere. By observing vortex formation and flow patterns in a 2 dimensional fluid we can create theoretical models of these effects. We present new results from our innovative, reconfigurable laboratory apparatus capable of generating highly stable and resilient soap films many hours in duration. We have captured imagery of vortex-vortex interactions in 2-D films along with their interactions with obstructions placed in the film using high resolution, high frame rate images and video recorded simultaneously at both visual and 546.1nm wavelengths. We also detail our efforts to create detailed physical computational models of these effects based on analysis of slow motion imagery now possible due to advances in affordable slow motion imaging devices and our efforts to reproduce the effects of natural phenomena such as wake patterns, waves and shock fronts.

Ice-rich flow features and mantling on north-facing slopes in Alba Patera, Mars

Nicholas L.G. Schiff*, Tracy K.P. Gregg
Department of Geology, 126 Cooke Hall, University at Buffalo, Buffalo, NY 14260-3050, USA

Alba Patera (40°N, 250°E), the summit caldera complex of Alba Mons, contains a collection of unconformable lobate deposits on north-facing slopes. Based on data from the Mars Reconnaissance Orbiter Context Camera, High-Resolution Imaging Science Experiment, and Mars Orbiter Laser Altimeter, we believe these north-facing slope deposits (NFSDs) deposits to be small glacier-like formations called lobate debris aprons (LDAs). NFSDs bear two textures: a hummocky texture of 20-50 m-wide hills and a smooth texture. The latter is associated with convex-up slopes and lobate distal margins. Reduced insolation on north-facing slopes likely resulted in the accumulation or preservation of water ice, allowing these deposits to form. At ~6 km above mean planetary radius, Alba Patera is the highest elevation at which LDAs have been documented, which may explain the small size of NFSDs compared to typical LDAs and their restriction to north-facing slopes; less moisture was likely available to form ice-rich deposits than at lower elevations. We interpret the hummocky texture as a partially-eroded ice-rich dust mantle, which post-dates NFSDs and has been almost completely eroded in smooth-textured areas. The difference in degradation rates may have been due to reduced insolation on steep slopes, where the hummocky texture is generally found, slowing sublimation, or due to movement of the thicker lobate parts of NFSDs densely fracturing the mantle, increasing sublimation rates.

Determining the Influence of Surface Winds on the Behavior of Aquatic Invertebrates

Haley Altadonna[1]* and Lynne Beaty[1]
[1]School of Science, Penn State Erie - The Behrend College, Erie, PA 16563

Climate change is expected to alter meteorological patterns across the world, with many areas projected to have increased temperatures and precipitation. Along with altered global atmospheric patterns, it is also expected that average surface wind speeds will change. However, unlike other meteorological phenomena, few studies have investigated how changes in surface winds may impact aquatic ecosystems. Here, we tested how surface wind speeds influenced the behavior of aquatic invertebrates and interactions between predator and prey species. Notonectids, Corixids, and Anisopteran nymphs were collected from ponds across Penn State Behrend's campus. For individual behavioral assessment, one subject was placed into a 10-gallon tank and exposed to surface winds generated by a fan. Wind speed was randomly adjusted in five-minute intervals, for a total of 30 minutes. To assess predator-prey interactions, an

Anisopteran nymph and a Notonectid or Corixid were placed into the 10-gallon tank together, and the same treatments were applied. We used Noldus EthoVision XT software to record each trial and quantify individual space use, movement frequency, and velocity. We found that as surface wind speed increased, Notonectids and Corixids spent more time close to the wind source and attempted to move down more frequently. These species also swam faster and moved greater distances as wind speed increased, but this response was lost in the presence of a predator. While we found no evidence that wind speed influences predator-prey interactions tested here, our study suggests that increasing wind speeds can alter the space use of aquatic invertebrates.

Innovative Manufacturing Concepts to Tackle Emergency Demand

Junayed Pasha*, Rahul Singh
Gannon University
*Presenting Author, Assistant Professor, Industrial and Robotics Engineering Program, Biomedical, Industrial and Systems Engineering Department, Gannon University

The COVID-19 pandemic has reminded that there is a serious need for emergency supply chains, as emergencies require urgent production and distribution of goods under disrupted supply chain conditions. In order to meet the urgent demand, emergency supply chains can be facilitated with innovative logistics solutions, such as the factory-in-a-box manufacturing concept. Under the factory-in-a-box manufacturing concept, vehicles are deployed to transport containers, which are used to install production modules (i.e., factories). In order to perform on-site production, the vehicles travel to customer locations. This study focuses on the selection of vehicles for factory-in-a-box manufacturing. Decisions are made regarding the optimal routes within the supply chain, which includes a depot, suppliers, manufacturers, and customers. Furthermore, in order to compare the options of factory-in-a-box manufacturing with that of conventional manufacturing, the final production location is determined for each customer (i.e., factory-in-a-box manufacturing with production at the customer location or conventional manufacturing with production at the manufacturer locations). An optimization model is formulated for the vehicle routing problem with a factory-in-a-box, which aims to minimize the total cost associated with traversing the edges of the network and the total cost associated with serving the nodes of the network. The model is solved with a customized multi-objective hybrid metaheuristic solution algorithm. A case study is performed for a vaccination project involving factory-in-a-box manufacturing along with conventional manufacturing, which demonstrates the potential of the proposed methodology.

Chiropteran Chatter in Chautauqua, NY (USA): Using Acoustic Sampling and Geographic Information Systems to Create a Baseline Bat Habitat Dataset

Jonathan P. Townsend[1,2],(presenting), Chris S. Renschler[1,2] Jared Aldstadt[1]
1Department of Geography, University at Buffalo, Buffalo, USA;
2 Landscape-based Environmental System Analysis & Modeling Laboratory (LESAM), University at Buffalo, Buffalo, USA

Understanding bat habitat use and how bat activity changes in response to differing habitats across time and space is critical in developing and implementing effective bat conservation actions. To investigate the utility of geographic information systems (GIS) in studying bat habitat interactions, habitat delineations and bioacoustic sampling were conducted along two transects in Chautauqua County, NY (USA) from mid-May until the end of August, 2013. Surveys were vehicular, and driven between 29 - 32 kmph in order to match bats' flying speed. They were conducted starting 30 min after sunset on nights where the temperature was greater than 13 oC. In total, twenty surveys were completed, and 1248 bat calls were identified to species. Mixed models regression analysis revealed significant interactions among all of the species of bat analyzed in the model. The model was supported with a secondary analysis comparing bat

call density with land cover. This study supports the hypothesis that bats forage in different habitats at the species level and indicates the importance of forested areas to bats. Additionally, the methodology for this study has the potential to gather large data sets in a short period of time, while collecting data on several species of bat at once and has been shown to be useful in identifying important habitat features for bats using bioacoustics and geospatial analysis. Since the data has been collected following state guidelines, the dataset and its analysis establish a baseline for future biogeographical projects in New York State.
Townsend JP, Renschler CS, Aldstadt J. Chiropteran chatter in Chautauqua, NY (USA): Using acoustic sampling and geographic information systems to create a baseline bat habitat dataset. Sci Total Environ. 2022 Mar 1;810:152410. doi: 10.1016/j.scitotenv.2021.152410. Epub 2021 Dec 13. PMID: 34915009.

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

Till, Sarah E.*; Ropski, Steven J.
Gannon University, 109 University Square, Erie, PA 16541

For the past twelve 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 eight 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 7 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 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. A compilation of ongoing results of the study reveals a rapid decline of the bat population in Erie Pennsylvania between the summer of 2012 and the summer of 2013, which has yet to bounce back. The conclusion of our study at this time is that bat presence, including, but not limited to that of *Myotis lucifugus*, have been negatively affected by the presence of White Nose Syndrome.

When a duck nests on your green roof... AGAIN

Cassandra Froehlich* and Dr. Steven Ropski, Biology Department, Gannon University, Erie, PA 16541

When curious waterfowl discover a green roof, the possibilities are endless and allows ongoing research. Located atop Gannon University's Nash Library and Student Learning Commons is a now 5-year-old green roof. As many know, on May 23rd, 2021, a nesting mallard was discovered during a routine clean out of the plant beds. This mallard was a successful anomaly and would soon be a mother to 6 ducklings and safely removed by researchers and W.I.N. on June 21st. Through video equipment and close observations from the library staff and researchers there was an ability to closely monitor the behaviors of the mallard. While the mallard's subtle but various behaviors were a primary focus, the idea that animals would make use of a green roof as habitat is significant and not well documented. While at the time we had never seen this before, it occurred again on April 20th, 2022. During the first nesting we were unable to tag the mallard but from gathered photos of the waterfowl's markings, we were able to determine that it was the same mallard as before. This nesting cycle had varying instances including less vocalization, nonresearching individuals walking over the nest, and a different capture method the day after hatching. Even with these different variables, the mallard managed to hatch every egg while during the last cycle only half hatched. This pushes us to research the impact of green rooves even farther and what they mean for the future of waterfowl, animal, plant and human generations.

Preliminary comparative analysis of soil microarthropod communities of Tamarack Swamp and bog, Warren County, PA

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On October 1, 2022, soil microarthropod communities were sampled in six different plant communities associated with Tamarack Swamp and bog. The investigated plant communities included the Eastern hemlock forest ecotone of the alder-dominated upper swamp, and five distinct vegetative zones occurring in concentric rings around the open water of the bog -- from the Sphagnum-dominated floating bog mat to the Eastern hemlock-dominated edge of the bog and Red maple/Black cherry upland slope forest. Plant litter materials collected from single 1000-cm2 plots sampled to a depth of 2.5-cm from each habitat were suspended in a Berlese funnel apparatus beneath a 40-W light for five days, and escaping microarthropods were collected in 70% ethanol. Oribatid mites were the dominant microarthropods in all six plant communities, and were most abundant in litter collected from the leatherleaf/Sphagnum bog mat and Eastern hemlock-dominated ecotone around the perimeter of the bog. Densities of predatory microarthropods (pseudoscorpions and merostigmatid mites) varied widely among habitats, along with low numbers of eight different orders of insects, dominated by Diptera and Coleoptera.

Fossil Brachyurans from the Upper Kimmeridgian Sponge Reefs of Geisingen Germany

Haylee Ludington* – University of Pittsburgh at Bradford
Ovidiu Frantescu – Allegheny Institute of Natural History

This project will investigate the fossil decapod brachyurans from a limestone quarry in Germany to identify the fauna and to assign it to the appropriate taxonomical groups. To study these fossils, first they will be cleaned using an air abrasive tool (MicroJack©) to reveal as much of the specimen as possible from the rock. Upon an initial examination, the 44 specimens are separated in four categories. These categories are based upon the shape of the carapace, and they include: carapace is semi round, carapace is rectangular (longer than wide), lobster- or shrimp-like, and a category for unknown specimens that need extra preparation time. The fossil specimens are used for this project are preserved in limestone and are of Upper Kimmeridgian age (157-152 Ma) and were collected from the Geisingen Limestone Quarry in Geisingen Germany during the summer of 2010. During Kimmeridgian this area in Germany was an epicontinental marine environment and the fossils were found on the top of a sponge-dominated reef. This project is part of the capstone class GEOL 1452 as a requirement for the Environmental Science program at Pitt Bradford.

Impact of Human Activity Levels on Coyote Temporal Behaviors on Presque Isle State Park

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Humans and wildlife must adapt to coexist in increasingly overlapping environments. The coyotes (Canis latrans) are one species that shares urban, suburban, and natural recreation areas with humans and are already known to spatially distance themselves from humans. However, few studies have been conducted to determine if coyotes will change what time they are active to avoid interactions. This study will examine Presque Isle State Park in Pennsylvania, an area used by both humans and coyotes, to assess if coyotes change when they are active based on the level of human activity. Between October 24, 2022 and February 3, 2023 I will place camera traps in three locations with high, low, and no human activity. Photos and videos will be collected from the cameras every two weeks, and then will be analyzed for when coyotes, and other wildlife, are active and what behaviors they are exhibiting. It is expected that

coyotes on Presque Isle State Park will be temporally avoiding humans - thus becoming more nocturnal - especially on trails with high human activity. These results can be used to create future management plans for coyotes on Presque Isle and educate the public on the wildlife they may interact with while visiting.

Changes in forest structure from 2016-2022 of an ash stand since the arrival of the invasive emerald ash borer in 2017

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Emerald ash borer (EAB; Agrilus planipennis) was introduced to North America about 20 years ago and has been devastating ash forests ever since, with a mortality rate of mature ash trees reaching nearly 100 percent. This major impact on the economically-important ash tree species has been compared to the devastation caused by the chestnut blight of the early 1900s. However, without data on mortality rates of different-sized ash trees, and the long-term impact on ash regeneration, it's unclear whether EAB will lead to a lasting community shift in eastern forests, or simply cause a temporary blip in ash abundance. In 2016, we established long-term forest monitoring plots in the James Preserve of Mercyhurst University in the Asbury Woods Green Belt (Erie, PA) in two stands dominated by pumpkin ash (Fraxinus profunda). Two plots of 20 X 20 meters each were censused every year from 2016 to 2022, monitoring the mortality rates of 104 individual ash trees over this period. By 2021, 65% of all ash trees were classified as having dead canopies. However, mortality rates were not even across size classes. The mortality rate of overstory trees was 78% but only 26% in "overtopped" trees. In addition, a clear positive correlation exists between tree diameter size and declining health. These findings suggest small ash trees may be able to persist in EAB impacted stands for some time, offering some hope for the future of ash species, but it's unclear why this persistence exists and whether it will outlast the invasion.

Vegetation of Bay Point Island -- a barrier island in South Carolina

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Bay Point Island is a 570 ha South Carolina barrier island near Hilton Head. At present the island is uninhabited. Initial surveys are underway in order to develop baseline characterizations that will allow monitoring of changes in habitats and species assemblages over time. This study focused on characterization of the vegetation and inventory of species presence on the island. Existing habitats include extensive salt marsh, upland slash pine forest, mesic maritime forest with live oak and cabbage palm, scattered freshwater wetlands, two ponds, and both vegetated and unvegetated beach habitats. The character of the dune vegetation varies annually depending on erosional forces and deposition and damage related to storms. Dune vegetation comprises grasslands, interswale marshes and areas of sparse salt tolerant vegetation. Two distinct shrub communities, one of which borders salt marshes, and the other of which borders the dunes, are present on the island. To date,128 plant taxa have been detected comprising 43 families, but others are expected as the study continues. The most species rich family is Poaceae with 32 species followed by Asteraceae with 17 species. Eight of the species are non-native with Chinese Tallow being the only aggressively invasive species. This study will support plans to develop a field station on the island to foster research and nature education by the Bay Point Island Foundation.

Modern changes in the freshwater mussel community of Conneaut Creek, Erie County, PA

Andrew Shaw* and J. Michael Campbell, Department of Biology, Mercyhurst University

Since 2016, the freshwater mussel populations of Conneaut Creek have been intermittently assessed to monitor changes in the community compared to prior similar studies conducted in 2004. In the summer and fall of 2021 and 2022, two different locations on the creek between Albion, PA and the Ohio line were visited to collect shells of deceased mussels, which we assume represent the current community composition. We report here on progress made in identifying, measuring, and enumerating over 200 collected specimens and a dozen different species. The recent death assemblage of mussels in Conneaut Creek indicates a potential shift in the dominant species since 2004, from *Lampsilis siliquoidea* (fatmucket) to *Eurynia dilatata* (spike). Age-frequency analysis of recently collected specimens and observations made during field collection suggest two possible explanations for the high numbers of spike in our samples, both linked to differential capacity of *E. dilatata* to survive environmental stressors.

Unsolved mysterysnails: The mystery continues

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Invasive, nonindigenous species can influence native communities directly via consumption and indirectly through trophic cascades and accidental stowaways (e.g., parasites). Freshwater snails—because of their diet variety and obligatory role in trematode life cycles—can significantly affect the communities they invade. Western Pennsylvania is currently home to several invasive, nonindigenous freshwater snail species: New Zealand mud snails (*Potamopyrgus antipodarum*), faucet snails (*Bithynia tentaculata*), mysterysnails (*Cipangopaludina/Margarya* spp.), all of which have the potential to negatively impact the coastal ecosystems of Lake Erie and other freshwater ecosystems in Western PA. Since 2019, we have been surveying waterbodies in Western PA to gather basic information about these populations. Here we present updates from our 2022 field season for invasive freshwater snails in Western PA, including population estimates for invasive mysterysnails in Presque Isle State Park, and discuss additional future and on-going projects involving these species.

Genetic survey of invasive mysterysnails in western Pennsylvania

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The Chinese mysterysnail (*Cipangopaludina chinensis*) and the Japanese mysterysnail (C. japonica) are large-bodied gastropods native to eastern Asia. Following their introduction to the United States in the 19th century, these species have spread throughout the Great Lakes, including much of the Lake Erie watershed. Although their impact on native species is not well-documented, the ecology of mysterysnails suggests that they might be a sink for parasites and toxicants. Management efforts are particularly challenging, given the morphological similarities between mysterysnail species. To assist these efforts, we performed a genetic survey of mysterysnails collected from Presque Isle State Park and multiple inland waterbodies across western Pennsylvania (Lake Pleasant, Lake Canadohta, Lake Arthur, and Pymatuning Reservoir). DNA was isolated from preserved foot tissue, followed by the amplification and sequencing of a universal cytochrome c oxidase 1 (CO1) barcode. These barcodes were aligned with existing mitochondrial genomes (NCBI BLAST) to determine the species identification of each snail. *Cipangopaludina chinensis* and *C. japonica* were detected in multiple waterbodies; however, two additional mysterysnail species were also identified (*C. cathayensis and Margarya melanioides*), both of which have not been reported in this region. The morphological similarity between these four species is

concerning, considering that some sites harbor multiple species (e.g., Lake Pleasant, Pymatuning Reservoir). The limited genetic tools, coupled with the potential for hybridization, make it challenging to resolve the taxonomy of mysterysnails. More genomic information must be pursued to determine if management plans need to be updated for this cryptic species complex.

Are you sure you want to eat that? Investigating Polychlorinated Biphenyl Concentrations in Lake Erie Fishes

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Lake Erie serves as an important commercial and recreational fishery for residents of Pennsylvania, yet consumption advisories for polychlorinated biphenyls (PCBs) exist for many commonly caught and consumed game species. With consumption limits set at one meal per month due to excessive PCB contamination, there exists large potential for dietary exposure of Pennsylvania anglers to PCBs; however, accumulation of individual congeners into human tissues is poorly documented. This study evaluated PCB tissue concentrations in five Lake Erie fish species and used physiologically-based pharmacokinetic (PBPK) modeling to predict PCB accumulation in the tissues of men and women, assuming adherence to Pennsylvania consumption advisories over the course of 10 years. Toxic equivalency (TEQ) values were calculated for dioxin-like congeners and were compared to cancer incidence rates to understand human-health implications of PCB exposure. Twenty-one congeners were detected between filets of walleye, freshwater drum, yellow perch, bluegill, and steelhead species at concentrations ranging from 56.0-411.7 ng/g. Accumulation in human tissues varied based on tissue type, the species consumed, and biological sex. Accumulation in men ranged from 1.15-8.96 ng/g (blood) to 68.8-540.3 ng/g (fat), while accumulation in women ranged from 1.61-12.5 ng/g (blood) to 96.2-754.9 ng/g (fat). Based on TEQs of eight dioxin-like congeners, cancer risk is not expected to be higher for humans consuming fish according to consumption advisories. Additional PCB exposure routes and noncompliance with consumption advisories, however, complicates risk estimates and compels the development of more nuanced approaches to model the efficacy of PCB consumption advisories.

Tributary and mainstem habitat use of brook trout (*Salvelinus fontinalis*) and brown trout (*Salmo trutta*) in the East Branch Sugar Creek watershed

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Native brook trout (*S. fontinalis*) and non-native brown trout (*S. trutta*) are two species of naturally reproducing trout that reside in the East Branch Sugar Creek watershed of northwestern Pennsylvania. Research suggests that brook trout occupy smaller stream habitats than brown trout, perhaps because brook trout are negatively impacted by the presence of non-native brown trout. Our research explores how population characteristics of the two species differs between tributary and mainstem habitats. Several additional environmental variables will be evaluated between tributary and mainstem habitats that could explain the occurrence of each trout species, including local land use, water temperature, dissolved oxygen, and the impact of different stream crossings on the mobility of these two species. The data that will be collected for this project will come from the East Branch Sugar Creek watershed during the summer and fall of 2022. By examining these factors, we hope to develop a conservation plan that could be used to preserve and protect brook and brown trout populations in the watershed.

Long term monitoring update: water quality changes in Presque Isle Bay 2016-2022

Chris Dempsey*, Michelle Kuns, and Greg Andraso
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Monitoring water quality in aquatic ecosystems is critical to understanding 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 implemented a long-term monitoring project in 2016 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 and analyze them in the laboratory for concentration and quality of dissolved organic carbon. Results indicate seasonal changes in the bay that appear to be biologically driven. Water temperature has increased, while oxygen and pH have decreased since 2016. Specific conductivity readings have stayed consistent over time. Light transparency has decreased over time, likely as a result of increasing dissolved organic carbon concentrations. Recent data indicate a shift in the water quality compared to 2016.

A five year (2016-2021) summary of the open-water fish community of Presque Isle Bay

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Monitoring water quality in aquatic ecosystems is critical to understanding how they change over time. Presque Isle Bay (PIB) is a unique body of water that provides ecological, economic, and recreational benefits to the region. Since October 2016, we have collected monthly fish community data in the open waters of PIB. Sampling in most years extends from May through November and occurs near the middle of each month. Fish are sampled for 10 minutes (approximately 0.70 km) using a semi-balloon bottom trawl towed along the same path each month. All fish are identified to species level, and body length of several species is recorded. Although we have collected 20 species belonging to 11 families, the catch has been dominated by four species: yellow perch (63%), white perch (18%), round goby (7%), and mimic shiner (6%). Across sample dates, species richness has ranged from 3 to 14. Shannon diversity index is generally low (<1.50) due to low richness and the catch being dominated by a few species. Our data suggests a seasonal, but stable aquatic environment with predictable changes in fish community structure on an annual basis over the five year study period.

Understanding Thermal Stratification patterns in the South Basin of Chautauqua Lake, NY

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Thermal stratification (separation of the water column into a warm surface layer and a cooler deep layer in lakes) affects numerous processes and conditions, including nutrient cycling and algae growth patterns.The focus of this study was Chautauqua Lake, a dual basin lake in Chautauqua County, NY. Though stratification has been observed in the deeper North Basin, monitoring data suggest that the shallower South Basin does not stratify. However, the monitoring program only collects surface samples at this site (due to depth), and vertical profile data are needed to better track temperature patterns and any stratification events. In order to determine the stratification patterns of the shallower South Basin at Chautauqua Lake, chains of high frequency temperature sensors (Onset HOBO Pendant loggers) were deployed at six different locations throughout the lake. Each chain had sensors spaced approximately 1m apart from the bottom of the lake up to 1.5m below the surface. These sensors recorded data every five minutes from June to September of 2021. We found that the South Basin is primarily mixed but does experience intermittent, brief periods of stratification (timescale of hours to days). Additionally, large fluctuations in temperature of the entire water column occur. These results indicate that the temperature

patterns in the South Basin are more complex than previously thought. Further work is being done to identify relationships between the thermal activity in the North and South Basins as well as the effects of environmental and human factors on thermal stratification.

Instream habitat improvement, monitoring, and future plans in the French Creek watershed

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Watershed Conservation Research Center, Allegheny College

Streambank and instream habitat restoration is an important practice to reduce erosion and sediment loading and mitigate property damage. The Watershed Conservation Research Center (WCRC) and community partners are working to improve streambanks and instream habitat and monitor two sites on Woodcock Creek, a main tributary to French Creek, in Crawford County, PA. Two sites (Craig Road and Telliho) were identified and assessed for instream habitat improvement during the spring of 2022. Two pre-restoration surveys were conducted at each site on fish assemblages, macroinvertebrates, substrate, water velocity, basic water quality parameters, and riparian habitat in summer 2022. Water samples were collected bi-weekly from June to October 2022 at eleven locations in the French Creek watershed to document changes in bacteria and nutrient levels upstream and downstream of the sites. Craig Road was restored in August 2022, where habitat improvement structures were implemented along the streambanks, and two surveys were completed post-restoration (August and October 2022). Thirty one species were collected in pre-instream habitat improvement, and twenty eight species were found after restoration. Pre-restoration surveys will continue for the Telliho site until habitat improvement occurs, which is planned for summer of 2023. Long-term post-restoration monitoring will continue into the future. This is a key component in determining the effectiveness of these habitat improvement projects and usefulness of them as a tool for both conservation and restoration in lotic systems.

The Environment Impacts of Acid Mine Drainage

Jacob Lister* - University of Pittsburgh at Bradford
Ovidiu Frantescu – Allegheny Institute of Natural History

This project examines the influence of Acid Mine Drainage on the ecosystem that is near property named Cameron Five owned by the Lyme Allegheny Land Company in Benezette, PA. Acid mine drainage is the outflow of acidic water from metal mines or coal mines. This acidic water will alter the soil and the streams around as well as the organisms that live there. The testing for this project will take place on Cameron Five owned by Lyme Allegheny Land Company in Benezette, PA. This project will closely examine what particulates are present in the acid mine drainage on the property and can be found in the soil at different distances from the site. Different species of plants will be recorded and tested to see how well they tolerate the acid mine drainage. A nearby source of water will also be tested to investigate the influence of acid mine drainage on its ecosystem. This testing will be done to see how the acid mine drainage affects the environment in various directions, and how far away from the site does the drainage alter the ecosystems. This project is part of the capstone class GEOL 1452 as a requirement for the Environmental Science program at Pitt Bradford.

Evaluation of Efficiency of Erie County, Pennsylvania, Small Flow Treatment Facilities and their Impact on Public Health and the Environment

Colton Hyatt, Kent State University
Dr. Nicholas Bonini, Erie County Department of Health
Dr. Joseph Ortiz, Kent State University

Small Flow Treatment Facilities (SFTFs) are waste management systems used to treat wastewater in small and rural communities without access to city wastewater management or sewage. The treated wastewater, or effluent, is then released back into the environment via streams or drainage ditches that may be active or intermittent in flow. Effluent runoff can pose potential environmental and health hazards. It can contain nutrients and pathogens that are found in wastewater, such as phosphorous and fecal coliform bacteria. Strict guidelines based on the Environmental Protection Agency (EPA) 1972 Clean Water Act limit the permissible levels of nutrients in effluent runoff. Despite these limitations, attainment levels are not always reached, and wastewater effluent runoff can be a source of nutrient loading into natural water systems. This runoff poses potential health hazards, such as contamination of drinking water, and environmental hazards, such as eutrophication in bodies of water and increased occurrence of harmful algae blooms. This study compares SFTF effluent levels in Erie County, PA, to national water standards and evaluates the effectiveness of various types of systems at meeting those standards.

Plastic and Water: Environmental Ethics Research Project

Brianna Coluzzi*, Garrett McClelland, Jeanne Swanson, Nour Masri* supervised by Aaron K. Kerr, Ph.D.
Gannon University

The use of plastic in every facet of life has proven to be damaging to human and animal habitats. When storm drains cannot handle run-off due to too much concrete in built environments, all chemicals and plastic end up in the water system. A lesson was developed for elementary school children, providing alternative behaviors their families, schools, and communities could implement to reduce plastic poisoning the water and earth. However, the topic was simplified to meet the educational needs of the elementary school audience, focusing on delivering a simple genre. Through the critical connection between social and physical sciences, environmental ethics research was conducted to address numerous problems that plastic can cause to our environment and how it affects our health. In addition, the project underlines the importance of nature and culture, summarizing the monoculture and other losses of food biodiversity in the Anthropocene.

Environmental Issues in Freshman Composition

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Gannon University, Erie, PA

This presentation explains how I organized a first-year college composition course that creates opportunities for students to engage with environmental issues while helping students develop college-level writing, rhetoric, language, and literacy skills. Rather than being organized around random writing assignments, my course is coherently organized and themed around environmental issues. Students tackle four major writing projects: a memoir essay, a rhetorical analysis, a research report, and a policy proposal. Each project expands how students see themselves in relation to the environment and their roles as writers, scholars, and citizens. In the memoir essay, students examine their own attitudes toward nature by reflecting on an event in their past that sparked a realization about their relationship to the natural world. Next, students examine the attitudes of others as encountered in opinion essays written by experts, scholars, and activists, choosing one to rhetorically analyze its strategies and effectiveness. Students then engage in two linked projects in which they first become knowledgeable on a topic and then make a persuasive argument. In the first, students collaboratively conduct academic research and write a report

about an environmental issue, such as algae blooms in Lake Erie, connecting large environmental issues to their local context. In the second, students individually write policy proposals recommending solutions to the environmental problem their group researched. Here students act as citizens using research and writing skills to change the world. Thus the course's journey begins with introspection, travels through analysis and research, and ends in a form of public action.

What to do with the Gifted Few: ***How to use immersive experiential learning to support student engagement, career and college preparation and involvement in the community***

Sarah Skelton*
Gifted Coordinator, Iroquois School District

Interested in hearing how immersive learning experiences can help support student engagement, career and college preparation? Hear how the Regional Science Consortium (RSC), in collaboration with local school districts, is providing learning opportunities for gifted students. Learn how this authentic experiential learning provides a framework for gifted students to self-direct further investigation into a topic of their interest, develop problem solving and critical thinking skills, and implement their solution through a stewardship action project benefiting their community. The skills accumulated through the RSC programs provide students unique and competitive experiences to highlight on their college essays, applications, and resumes. This presentation will describe the importance of immersive learning in gifted education as well as laying out the plan, tools, and collaborative elements needed for success.

Behind the lens – bringing nature to your living room

Ray Bierbower* and Brian Gula*
Environmental Education Specialists - PA Department of Conservation and Natural Resources

There were many challenges to offering programming in a safe and effective format over the past couple of years. Learn how DCNR rose to the challenge to think "outside the box" and develop virtual programming by collecting video and still images of nature to be able to share them with program participants in a virtual format.

Genomic surveillance of Sars-CoV-2 variants enhances mitigation strategies and reveals viral evolution in a university campus context

Hertel, Austin, Heeter, Madison*, Bestram, Mara, Gibson, Ross, Ciletti-Dougherty, Gwendolyn, and Steven Mauro

Genomic surveillance of Sars-CoV-2 variants enhances mitigation strategies and reveals viral evolution in a university campus context. Upon its discovery in December 2019, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has been responsible for millions of deaths globally having since been declared a worldwide pandemic by the World Health Organization (WHO). Similar to other RNA viruses, SARS-CoV-2 has an enhanced ability to consistently mutate, resulting in the proliferation of several variants of concern (VOCs) as classified by the WHO. The increased transmissibility, virulence, and decreased effectiveness of public health measures attributed to VOCs highlight the importance of genomic surveillance of SARSCoV-2 in tracing the spread of mutants and elucidating the emergence of novel variants. Gannon University, located in Erie, PA. has undertaken surveillance for SARS-CoV-2 VOCs utilizing RT-qPCR and Next Generation Sequencing (NGS) to continually monitor their prevalence in those infected within the campus population. Like many industries, higher education has been negatively impacted by the COVID-19 pandemic. The results of this study provide insights into the impact of SARS-CoV-2 VOCs in a university campus environment and viral evolution in a distinct population. These findings have led to enhanced risk-aversion strategies at Gannon University to mitigate the impact of emerging SARS-CoV-2 VOCs. Furthermore, our results illustrate the potential for localized

genomic surveillance to reduce the burden of a public health crisis in similar industries and in the general population.

Tobacco (nicotine) consumption and COVID-19

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Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) caused the COVID-19 pandemic. As of October 2022, over 625 million individuals were infected with this virus with more than 6.6 million deaths. COVID-19 significantly affects respiratory and cardiovascular systems. Additionally, prior or concurrent nicotine consumption through cigarette smoking, tobacco use, and other nicotine products increases severity of pathology of these vital systems. COVID-19 and tobacco use have a combined effect that results in cytokine storms, severe inflammation, and ARDS. Use of nicotine-containing tobacco products is prevalent in at least every 13 out of 100 Americans and poses a significant public health risk. In the respiratory system, smoking impacts function through bronchial and epithelial cell remodeling resulting in the upregulation of ACE2 receptors, oxidative stress from reactive oxygen species, and inflammatory chemotactic responses. COVID-19 exacerbates respiratory dysfunction through airway hyperresponsiveness, improper gas exchange due to endothelial dysfunction, and in severe cases acute respiratory distress syndrome (ARDS). In the cardiovascular system, smoking largely disrupts cardiovascular function through inflammation and oxidative stress, modification of lipid profiles, and vasomotor dysfunction through lack of nitric oxide availability. COVID-19 impacts the cardiovascular system due to presence of ACE2 receptors on the heart that increases susceptibility of COVID-19 infection and can lead to cardiac injuries, cardiac arrest, arrhythmias, and thromboembolic disorder. Analysis of the combined pathophysiological effects of tobacco (nicotine) consumption and COVID-19 on the respiratory and cardiovascular systems is crucial in understanding acute and chronic impacts of the disease as well as the treatments and outcomes of COVID-19.

The effects of cortisol exposure on placental trophoblast extracellular vesicles and iron transport proteins

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During pregnancy, the placenta serves as the main form of communication between the mother and growing fetus. This unique organ is responsible for transferring nutrients, including iron, from the maternal to the fetal bloodstream. Prolonged chronic stress during pregnancy has been linked with negative fetal outcomes including preterm birth, low birthweight, and other more long-lasting effects including impaired immune system functioning and cognitive impairments. The mechanism by which this occurs has yet to be elucidated, however impaired iron trafficking and aberrant intercellular communication may play a role. Extracellular vesicles (EVs) are small (50-200 nm) vesicles that function as intercellular communicators. They contain bioactive cargo and are released from all cell types under both normal and pathological conditions. Previous work has shown placental-derived EVs are found in maternal circulation and are involved in maternal-to-fetal trafficking of important proteins, which may include three iron transport proteins TFR1, ferroportin-1, and DMT-1. In the current study we are investigating the effects of hydrocortisone on the expression of these iron transport proteins in placental trophoblast cells and their released EVs via western blot. Further, we are assessing how hydrocortisone exposure alters vesicle quantity and size with particle tracking analysis. Our results will demonstrate the effects of hydrocortisone exposure on iron transport proteins, which may influence how iron is delivered during fetal development.

Repeated Prenatal Valproic Acid Exposure on Spinal Cord Lower Motor Neuron Morphology in Autism Spectrum Disorder Rat Models

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Autism spectrum disorder (ASD) is a developmental disorder associated with prenatal exposure to valproic acid (VPA) in humans. As such, prenatal exposure to VPA is a validated animal model of ASD, where animals exposed to VPA in utero have significant behavioral impairments, auditory dysfunction, ataxia, and impaired oropharyngeal function. We hypothesize the ataxia observed in VPA-exposed animals is associated with dysmorphology in spinal cord motor neurons. Specifically, we hypothesize that in utero VPA exposure will result in hypoplasia of limb musculature, fewer spinal cord lower motor neurons (LMN), and surviving neurons will be smaller and abnormally arranged. We believe that such alterations would be consistent with deficiencies in innervation and control of limb musculature. Herein, we used repeated prenatal VPA exposure on embryonic days 10 and 12 to examine structural features of spinal cord LMNs. Examination of cervical and lumbar spinal cord sections on postnatal day 28 revealed significant morphological changes in the LMNs. Spinal cords from P28 rats showed neuronal cell bodies associated with motor control of the forelimbs in the cervical expansion to be significantly smaller in the VPA groups compared to the control animals. LMNs associated with hindlimbs in the lumbar expansion are significantly larger in the VPA groups compared to the control animals. The cell body shape was also significantly different in the cervical region. These results provide evidence that prenatal exposure to VPA impacts the fore and hind limb innervation differently, which leads to possible limb muscular weakness and disruption in movement and balance.

Presque Isle State Park vs. Invasive Plants – 2022 Update

Holly Best* (PA Department of Conservation and Natural Resources)

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 were able to collaborate with Ducks Unlimited to receive a large amount of Great Lakes Restoration Initiative and Sustain our Great Lakes funding to be able to arm ourselves and win some of the battles on the Park to turn things around. This presentation will provide an overview of the work being done at the Park and why Presque Isle State Park is such an important place to preserve. 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, and Erie Bird Observatory. This presentation will be about invasive plants, partnerships, and will provide an update on what we were able to accomplish during the 2022 treatment season.

Wetland Restoration and Propagation Updates on Presque Isle State Park

Jen Salem* and Jeremiah Covert*
Regional Science Consortium

Since 2016, the Regional Science Consortium has been growing native plant species to be used in our priority wetland restoration project. In 2022, we adopted several new propagation methods and incorporated new research and storage equipment into our program to increase seed viability, increase plant production, capitalize on greenhouse space and better develop a plan for additional priority wetland sites.

Biological Surveys in Restored Primary Wetland Habitats on Presque Isle State Park Erie, PA

Sarah Magyan* & Sean Dalton*
Regional Science Consortium

Invasive plant species can have numerous negative effects if left unopposed in priority wetland habitats for many biological species, ultimately leading to their displacement. The RSC monitors species of native amphibians, fish, mussels, and macroinvertebrates using various methods at 7 priority wetland habitat restoration areas distributed across Presque Isle State Park in Erie County, PA where treatment for invasive plants has been applied since 2009. Surveys were conducted both before and after native replanting efforts by Go Native! Erie. These surveys seek to catalog the change in native biodiversity in these restored habitats.

Marsh Bird Monitoring at Presque Isle State Park: 2022 Update

Sarah Sargent* and Chris Lundberg
Erie Bird Observatory, 301 Peninsula Dr, Ste 14, Erie, PA 16505

Starting in 2017, we surveyed for secretive marsh breeding birds using a standardized protocol at approximately 50 points within open marsh habitats at Presque Isle SP. Six of the eight target species have been detected in at least one year. Least Bitterns are the most abundant, with Common Gallinules second most abundant, Virginia Rails have become more abundant over the study period. Soras, Pied-billed Grebes and American Coots remain irregular breeders here. King Rails and American Bitterns have not been detected. Habitat surveys have been conducted in 2020 and 2022 within the marsh bird survey areas to quantify characteristics of the habitat that are important to the birds.

Overview of Wetland Vegetation Monitoring on Presque Isle from 2012 through 2022 (Update)

Robert S. Whyte*
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The Presque Isle Priority Wetland Restoration project was initiated in 2011 and recently completed phase III (2019-2022). This comprehensive multi-agency effort seeks to treat and restore >1250 acres of coastal wetland habitat at Presque Isle State Park. The Park, located in northwestern Pennsylvania, is 3,200 acres, which contains several unique ecological communities including numerous emergent wetlands and an open-water lagoon system. The native wetland plant communities have been overrun by invasive species including Phragmites (Phragmites australis), Narrow-leaved cattail (Typha angustifolia), and Purple loosestrife (Lythrum salicaria). In this talk, I provide a general update and overview of the program's monitoring status. I will review the areas monitored, our approach to monitoring, the overall state of the vegetation, and next steps. While significant areas of Phragmites have been removed and controlled, the focus going forward is to monitor the remaining small isolated stands that could rapidly spread under the right environmental conditions. In 2020 we also monitored the inner lagoon to evaluate the submerged plant community. This area has been under recent threat from invasive species to include Eurasian watermilfoil (Myriophyllum spicatum) and Starry stonewort (Nitellopsis obtusa). We are currently preparing a comprehensive 10 year report of the Presque Isle wetland vegetation, which should be ready in 2023. In 2022 we began a new monitoring phase that will run through 2024 and will focus on an assessment of the planted and restored areas.

Aerial Drone Surveys of Shoreline Change and Primary Wetland Habitats on Presque Isle State Park, Erie, PA

Sean Dalton*
Regional Science Consortium

Presque Isle's shoreline and wetlands are dynamic environments subject to rapid change as a result of underlying geologic and biological conditions. These changes have direct impacts on the local economy and ecosystems of Erie, PA and Presque Isle State Park. In response, the RSC has integrated drone surveys into two of its already existing monitoring projects including tracking erosional changes to Presque Isle's lakeside shoreline over time and indexing the health of primary wetland habitat vegetation.

Surveys of Basking Turtles in the Corn Wilderness of Southeastern and East-Central Illinois, With Emphasis on Three Map Turtle Species (Genus Graptemys)

Peter V. Lindeman*
Pennsylvania Western University at Edinboro

The concept of a "Wallacean deficit" refers to the incomplete nature of our knowledge of the geographic distributions of animal and plant species globally. This deficit hampers studies of limiting factors that determine geographic ranges as well as effective conservation. I conducted basking surveys of freshwater turtles in four severely under-sampled tributary systems of the Wabash River drainage in southeastern and east-central Illinois during late September 2022: the Little Wabash River, Bonpas Creek, the Embarras River, and the Vermillion River. Using a long-lens camera, I obtained photo vouchers for 21 new county records of six turtle species (7 for Graptemys pseudogeographica, 5 for G. ouachitensis, 2 for G. geographica, 4 for Trachemys scripta, 2 for Apalone mutica, and 1 for A. spinifera), as well as 10 additional photos that are the first vouchers for species in various Illinois counties in over 40 years (1, 1, 3, 4, 0, and 0, respectively, plus 1 for Chrysemys picta). I found the map turtles G. ouachitensis and G. pseudogeographica to be syntopic and broadly sympatric in the lower Embarras and Little Wabash rivers, where their similar head markings make them a challenge to distinguish in visual surveys. I did not record G. geographica at any of the sites where I saw the other two Graptemys, but it was moderately common in smaller streams, including Bonpas Creek, the upper Embarras, and the Vermilion River. I recorded the softshells A. mutica and A. spinifera only in the lower Embarras River.

Allometry and Isometry in the Scaling of Body Mass to Linear Shell Measurements in Turtles

Danielle M. Beck*, D. Kyle Breault, & Peter V. Lindeman
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A log-log regression of a 3-D measurement such as body mass on a 1-D measurement such as length or width results in a slope of 3.00 if the relationship is isometric or a slope that skews from 3.00 if it is allometric. In turtles, body mass scales hypoallometrically to shell length, with slopes less than 3.00. We examined whether turtle body mass would scale 3:1 with the geometric mean of shell length, width, and height, using data collected from four species (a total of 473 individuals): the snapping turtle Chelydra serpentina and the map turtles Graptemys versa, Graptemys geographica, and Graptemys sabinensis. Use of the geometric mean of shell length, width, and height generally improved regression model fit. The three Graptemys largely followed the predicted pattern when regressing body mass on the geometric mean, with slopes closer to 3.00. Using the geometric mean, male G. geographica had a slope of 3.05 and females had a slope of 3.01, male G. sabinensis had a slope of 3.04 and females with a slope of 3.00, male G. versa had a slope of 3.34 and females had a slope of 3.07, and male C. serpentina had a slope of 2.94 and females had a slope of 3.31. Reasons for departure from expectations in C. serpentina may include the smaller sample size and unmeasured body parts (i.e., head, tail, or limb musculature), which may grow allometrically.

Determination of terrestrial salamander diversity relative to edge habitats and sampling type on conserved properties in Northwestern Pennsylvania

Eva Kerr*, Kelly Pearce, Casey Bradshaw-Wilson

Amphibians are going through global species declines because of human impacts such as forest fragmentation and other habitat disruptions. Monitoring species declines is important to gather information and conserve species. Salamanders, a group of amphibians, are easy to monitor and are essential to habitats because of their role as an indicator species. As an indicator species, salamanders are sensitive to microhabitat changes in edge habitat areas, which can be created by human interference. The objective of this study is to monitor salamander diversity in the edge habitat and core habitat and to determine the best location and sampling method for salamander monitoring on conservered properties in the future. Between April and October, I set-up and monitored five transects on a property owned by the French Creek Valley Conservancy (FCVC), a local land trust in Northwestern Pennsylvania (PA). Each transect started at an edge (i.e., a road) and transitioned into fully forested, and each transect also contained both a natural cover section and a tiled section, and during each visit the number of salamanders in each habitat and sampling type was counted. The results I collected from monitoring five transects will be very important for advising FCVC as to where the best and most accurate sampling location. With this information, I hope FCVC will be able to conduct more efficient, accurate, and inexpensive studies on local salamander populations.

Do diseased tadpoles affect aquatic community structure and ecosystem processes?

Matthew D. Venesky*, Allegheny College, Department of Biology, Meadville PA
Karolina Fučíková, Assumption University, Department of Biological and Physical Sciences, Worcester MA
P.J. Torres, College of the Holy Cross, Biology Department, Worcester MA

Parasites can affect the physiology and behavior of hosts and, in many instances, parasites can reduce host population sizes. Disease ecologists have discovered that parasites can also affect the structure of ecological communities and even ecosystem processes. However, few studies mechanistically link parasite-induced changes in host traits to the changes at the level of the community or ecosystem. We explored this topic using replicated, semi-natural, ponds in which we manipulated the infection status of tadpoles and quantified host traits, measures of community structure, and ecosystem function. In ponds, tadpoles graze algae from substrates or

consume phytoplankton in the water column and thus exert a top-down control on algal communities. Since algae serve as the basal food resource in ponds, changes in the algal community can affect the entire structure of a pond community. Tadpoles infected with *Batrachochytrium dendrobatidis* (hereafter "Bd") had significantly more tooth deformities compared to the tadpoles in the non-exposed tanks. Because of this, we predicted that Bd-infected tadpoles would consume less algae than non-infected tadpoles and thus algal density and community structure would differ between treatments. However, despite the strong effect of Bd on tadpole mouthpart deformities, the experimental treatments did not differ in periphyton or phytoplankton biomass, algal community dynamics (richness or Shannon Index), zooplankton community dynamics (richness or Shannon Index), leaf decomposition, or water chemistry. Our findings are surprising and could indicate that parasite-infected changes to transient members of a pond community (e.g., tadpoles) might not exert strong effects on community or ecosystem processes.

Exploring factors associated with an amphibian die-off at Bousson Environmental Research Reserve

Emma Yesko*, Allegheny College, Meadville, PA

The declines of local populations have detrimental effects on biodiversity and can change community interactions. During the summer of 2022, we observed a die-off of wood frog (Lithobates sylvaticus) tadpoles at Bousson Environmental Research Reserve, a property owned by Allegheny College. We opportunistically observed hundreds of dead and moribund tadpoles in a pond. We investigated this mass mortality event over the next couple of weeks and tried to determine the cause of this mortality event. Amphibian die-offs events, similar to what occurred at Bousson, are typically attributed to one of three different factors: population density, parasites, and/or some abiotic factor in the pond. To test for the factor(s) associated with this mortality event, we sampled the pond on a weekly basis and collected dead and moribund tadpoles and conducted necropsies on them, searched for aquatic parasites in the pond, and collected abiotic data. All tadpoles had relatively full intestines upon death, indicating that they had not surpassed their carrying capacity in the pond. Although numerous snail species were found in the pond, none of the screened snails were found to contain echinostome parasites (a parasite of tadpoles) and less than 5% of the tadpoles tested positive for Batrachochytrium dendrobatidis, a fungal pathogen that infects amphibians and can lead to chytridiomycosis. Dissolved oxygen and pH levels in the pond were within typical range and thus were also unlikely to cause the die-off. Ongoing research will determine if the mortality event was due to Ranavirus, another amphibian pathogen linked to population crashes.

ABSTRACTS

Regional Science Consortium
18th Annual Research Symposium
November 2-4, 2022
Tom Ridge Environmental Center
at Presque Isle State Park

POSTER PRESENTATIONS

POSTER SESSION: Wednesday, November 2, 2022, 6pm—8pm

1. **Collection, Identification, and Probe Development Using the matK Gene for the Aquatic Invasive Species *Nitellopsis obtusa***

Amanda Welsbacher*, Ivor Knight, Abigail Melendez, Hannah Phillips, Ryan Sheehan, and Matthew E. Gruwell
Penn State University, The Behrend College

Nitellopsis obtusa, commonly known as Starry Stonewort, is a macro-algae native to Eurasia. N. obtusa was brought to the Great Lakes region through the uptake and release of ballast water from commercial ships. Through development of probes for this species, environmental DNA (eDNA) can be tested as a tool for identification and monitoring the Great Lakes and ballast water. The objective of this experiment was to collect and identify *N. obtusa* in the PA Lake Erie region and develop oligonucleotide probes which only amplify *N. obtusa*. The collection of the species utilized physical characteristics consisting of white star-shaped bulbils, orange antheridia, and branchlets, and identification by Sanger Sequencing using primers rbcl BF and rbcl 724R of Rubisco. Probe development compared the matK gene of N. obtusa to its closest relative, *Lychnothamnus barbatus*, and compared both matK gene sequences in Geneious. Probes were developed 18-25 base pairs in size, with at least three nucleotide differences. The probes were tested using a qPCR gradient protocol to identify optimal annealing temperatures. Two primer combinations were tested, matK 695R and 299F, and matK 695R and 458F. The qPCR protocol for 299F gradient ranged from 45.0-51.9°C with CQ values between 13.55 and 16.29 and melt temperatures consistently between 74.50-75.50°C. The qPCR protocol for 458F gradient ranged from 46.0-53.5°C with CQ values between 15.41 and 16.72 and melt temperatures consistently between 71.00-71.50°C. The probe matK 695R and 458F had more consistency in CQ values and melt temperatures, along with a symmetric melt curve. The consistency of the matK 695R and 458F probe is optimal for future eDNA testing with *Nitellopsis obtusa* and monitoring the Great Lakes and ballast water for the species.

2. **Environmental DNA Signal Extinction Rates of Two Planktonic Invasive Species: Implications for Real Time Monitoring in the Great Lakes**

Ryan Sheehan*, Ivor T. Knight, Amanda Welsbacher, Abigail Melendez, Hannah Philips, Matthew E. Gruwell

Aquatic invasive species (AIS) have negative impacts on ecosystems and economies across the globe necessitating reliable and timely organism detection methods. *Hemimysis anomala* and *Daphnia lumholtzi* are AIS established in the lower Great Lakes and present a risk of invasion to Lake Superior. To prevent the transport of these species to the upper Great Lake region, environmental DNA (eDNA) has been proposed as a tool to monitor harbor and ballast water. Since eDNA methods detect only the genetic

material of an organism, regardless of whether the organism is alive or dead, the question of how long eDNA persists in the environment is relevant to its use as a tool in monitoring studies. The objective of this study was to determine the rate of degradation of target AIS eDNA under conditions found in Great Lake harbors. Aerated exposure chambers constructed from 40 L glass aquaria were filled with 20 L of water collected from Lake Erie. For each experiment, dead organisms were added to three chambers with another chamber acting as a control. The chambers were sampled in triplicate by pumping water through 0.45 µm membrane filters over the course of several weeks with total DNA extracted from each filter. Using custom qPCR assays, the presence and quantity of *H. anomala* and *D. lumholtzi* eDNA was determined for each of the samples. For both species there was a rapid (3-4 log) decrease in target eDNA signal over several days. These results indicate that, for these two planktonic, invasive species, their DNA is rapidly metabolized by the microflora in the water implying that a persistent eDNA signal is likely the result of a live population in the water.

3. eDNA Probe development for Amphipods that qualify as Aquatic Invasive Species (AIS) in the Great Lakes

Abigail Melendez*, Amanda Welsbacher, Ivor Knight, and Matthew E. Gruwell
Penn State University, The Behrend College

Class Malacostraca is a diverse group of over 25,000 species and includes the major Crustacean groups of lobsters (Decapoda), woodlice (Isopoda), mysids (Mysida) and side swimmers (Amphipoda). Within any group of organisms, some play valuable roles, and some act as AIS in their environment. AIS are are non-native in their environment and their presence potentially causes economic/ecological harm. To better understand the distribution of invasive species in the Great lakes, species presence can be detected with eDNA in filtered water, once discriminating oligonucleotide probes have been developed. In Lake Erie, we have targeted three species of Amphipods for investigation; *Echinogammarus ischnus*, *Gammarus fasicatus*, and *Gammarus tigrinus*. When sampling around Presque Isle, an overwhelming percentage of species were found to be *E. ischnus*, while the others were rare or non-existent. Due to the prevalence of *E. ischnus*, they are of most interest for probe development. *G. fasciatus* is still important because of its classification as a non-native species, that has also been collected locally. No matter the amount collected, developing primers for each species is required because of their close phylogenetic relationships. Natural history research, collection, and probe creation information was collected for these target scuds over the summer and fall of 2022. This record and data will aid in the detection of these species throughout the Great Lakes.

4. Identifying Neoantigens Resulting from Frameshift, Somatic Mutations in the Tumor Suppressor Gene, APC for Colorectal Cancer Vaccine Design

Timothy Edwards*, Jenna Sins, John Vieira, Abigail Palotas, Rabab Alamairy, Savannah Battleson, Sherin Puthenpurayil, Nicholas Farrell, Jack Kloecker, Malachi Harris, Matthew Gacura, Ph.D., and Gary Vanderlaan, Ph.D.[1]
[1]Gannon University, Erie, PA, USA

Colorectal cancer is a debilitating disease driven by many unique mutations. One frequently mutated gene is Adenomatous Polyposis Coli (APC). The APC gene encodes a protein that is essential for the destruction of beta-catenin, the effector protein of the WNT signaling pathway that regulates cell proliferation. Loss-of-function (LOF) alleles in APC result in the inability to degrade beta-catenin, permitting beta-catenin entry into the nucleus to complex with TCF/LEF transcription factors, which upregulates mitotic genes. There are numerous ways in which APC LOF alleles might arise, including point mutations that result in missense or nonsense consequences as well insertion or deletion mutations that yield frameshifts. In the latter case, a premature stop codon is typically encountered. Truncation can yield a neoantigen peptide sequence (>11 amino acids) that may be sufficient to activate the host immune system. Utilizing a Catalogue of Somatic Mutations in Cancer (COSMIC) filter to yield high-confidence

oncogenic driver alleles, we carefully mapped all 178 known frameshift lesions of APC obtained from colorectal cancer biopsies, as documented in The Cancer Genome Atlas (TCGA). Each frameshift allele is first mapped to its genomic coordinates using Ensembl Archive, followed by a predicted neoantigen frameshift consequence using NCBI CCDS (Consensus Coding Sequence). Most frameshift alleles prematurely truncate APC to roughly half its original peptide size. Neoantigens greater than 11 amino acids can be presented natively via host MHC-I alleles. We identify roughly four consensus regions amenable to cancer vaccine design due to shared immunogen sequences in resulting neoantigens.

5. The role of micro RNAs during cellular response to heat stress

Nadiya D. Andrews*, Anastasia Grytsay, Godwin E. Young, Kasia B. Bauer and Olanrewaju B. Morenikeji

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Global warming is a defining challenge of our time causing heat stress in human, animal and plant. Heat shock is a response that cells undergo when temperature conditions get too high. During heat stress, chaperone genes like heat shock proteins (HSP) are selectively activated. In humans, ambient high temperature affects many biological processes, such as inflammation, raise the body's natural temperature, thus subjecting cells to heat shock. MicroRNAs are short nucleotide sequences of about 20-22 base pair long capable of regulating cellular response to heat stress and HSP production. So far, little is known about the role of miRNA that modulate HSP expression during heat stress. Our hypothesis is that miRNAs play a significant role in the regulation of heat shock proteins across a variety of human cells and can be used as a biomarker for heat stress detection or target for therapy. This study plans to profile the expression of HSPs by targeting them with miRNAs in human cells when subjected to varying high temperatures. The method will include cell transfection, cell imaging, RNA isolation, reverse transcription for cDNA synthesis, quantitative analysis via qPCR and gel electrophoresis. Research is still in progress, but the goal is to observe any notable upregulation or downregulation of genes in response to miRNA during heat shock. The results from this research, we believe would clarify the role of miRNAs in heat stress response and could lead to discovering potential biomarker or treatment for heat stress, mitigating the effect of global warming on humans.

6. Spinal Cord Lower Motor Neuron Morphology in GRIN2B Rat Models

Alhelo H[1]*, Kulesza RJ[1]

1 – Lake Erie College of Osteopathic Medicine

GRIN2B gene mutations can cause a spectrum of neurodevelopmental disorders characterized by developmental delays, cognitive impairment, early-onset childhood epilepsy, movement disorders, and features of autism spectrum disorder. GRIN2B-related disorders are not common, but can manifest with motor signs and symptoms, including dystonic, dyskinetic, or choreiform movement disorders. Further, a small number of children have significant cortical malformations. Based on these observations, we hypothesize the movement symptoms observed in GRIN2B-related disorders are associated with spinal cord dysmorphology. Specifically, we hypothesize that GRIN2B-knockout rats will exhibit neuronal dysmorphology in the spinal cord lower motor neurons (LMN), and surviving neurons will be smaller and abnormally arranged. We believe that such alterations would be consistent with the motor dysfunction in GRIN2B syndromes. We investigated this hypothesis using GRIN2B-mutant rats to examine structural features of spinal cord LMNs. Examination of cervical and lumbar spinal cord sections on postnatal day 28 revealed significant morphological changes in the LMNs. Spinal cords from P28 rats showed neuronal cell bodies in the cervical expansion were significantly larger in the GRIN2B-knockout group compared to the wild type. The LMNS in the lumbar expansion on the other hand were significantly smaller in the knockout group. The cell body shape distribution was also significantly different in the cervical and lumber regions between the two groups. These results provide evidence that pathologic GRIN2B-gene

mutations affect the development of LMNs in the spinal cord, which can be associated with the movement disorders characteristic of GRIN2B-related syndromes.

7. The role of dietary sugars, saturated fats, and turmeric on the accumulation of amyloid beta proteins and the incidence of Alzheimer's disease

Sarah Dean* and Mary Vagula
Gannon University

Alzheimer's disease (AD) is a slowly progressing neurodegenerative disease where the brain of the patient with AD undergoes changes with accumulation of amyloid beta peptide and enlargement of brain ventricles. At present there are more than 6 million people in the US and 50 million worldwide afflicted with this disease and costing about 1 trillion dollars globally. AD is a multifactorial disease and exact causes of AD are still eluding the scientific community. Among various AD risk factors such as diabetes, cardiovascular diseases, age, gender, genetic makeup, the lifestyle including dietary habits seems to be the most alterable risk factor. In this research we are planning to study the effects of excess of dietary components such as refined sugars, fats, and turmeric on cultured SH-SY5Y cells (neural cells) ability to uptake/synthesis of amyloid beta proteins. We also hypothesize that turmeric will be the best therapeutic supplement to help minimize the degeneration of these neural cells and prevention of AD as expressed in the form of less deposition of amyloid beta protein in these cells. This presentation also elaborates on the risk factors, neuropathophysiology, and demographics of AD.

8. Identifying Cysteine-Dependent Neoantigens Resulting from Missense Substitutions for Cancer Immunotherapy by BiTE Treatment

Jack Kloecker*, Jenna Sins, John Vieira, Abigail Palotas, Rabab Alamairy, Savannah Battleson, Sherin Puthenpurayil, Nicholas Farrell, Timothy Edwards, Malachi Harris, Matthew Gacura, Ph.D., and Gary Vanderlaan, Ph.D.[1]
[1]Gannon University, Erie, PA, USA

The KRAS oncogene encodes a GTPase that mediates cell proliferation. The KRAS G12C allele is a missense substitution detected in 19% of human cancer cells (Cekani, 2022). Clinically, KRAS G12C blockers have been recently approved for the treatment of non-small cell lung cancers (NSCLCs) (Nakajima, 2022). G12C drugs like ARS1620 act by covalently bonding to the sulfhydryl group found in cysteine residues. Covalent chelation prevents reactivation of the mutant KRAS G12C peptide. Although effective as a chemotherapeutical, evolution of resistance to KRAS G12C inhibitors has inevitably arisen (Zhang, 2022). Resistance to KRAS G12C inhibitors involves several distinct mechanisms, yet many recalcitrant tumors still possess covalent adduct signatures. Cancer immunotherapy can exploit MHC-I display of ARS1620-haptenated KRAS G12C antigens using bispecific T-cell engager (BiTE) therapy (Zhang, 2022). A BiTE contains two different Fab regions, one specific to CD3ε and the other binds ARS1620-haptenated antigens presented on MHC-I. BiTEs activate bound T cells to drive apoptosis on nearby haptenated cancer cells (Stieglmaier, 2015). The Cancer Genome Atlas (TCGA) is a growing database of somatic mutations obtained from cancer patient biopsies (Tomczak, 2015). The Catalogue of Somatic Mutations in Cancer (COSMIC) is a curation effort to identify driver mutations of cancer states (Tate, 2019). By blending TCGA with COSMIC, we datamined over 100K point mutations to identify ~4K alleles arrayed across ~500 genes that yield a cysteine residue due to a missense substitution. Our work identifies candidate BiTE targets for a cancer immunotherapy approach involving haptenation by ARS1620.

9. The effects of endoplasmic reticulum stress on oligodendrocyte derived EVs

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Oligodendrocytes are glial cells found in the central nervous system that serve to assemble myelin sheaths. Myelin sheaths possess various proteins and lipids, which are synthesized, folded, and transported in the cell's endoplasmic reticulum (ER), which are necessary for their formation. Disrupting the ER's protein synthesis mechanisms can lead to ER stress due to misfolded and denatured proteins. Protein production is important for these cells, making them susceptible to the adverse effects of ER stress. Previous studies have shown that ER stress induces the release of extracellular vesicles (EVs) in some cell types. EVs are nano-sized lipid-membrane bound structures that are released from all cells and are present in all biofluids. They contain all the genetic material and components of the parent cell from which they are derived. The focus of this study is to determine how ER stress in oligodendrocyte cells affects EV release and protein composition. To study this, human oligodendroglioma (HOG) cells are cultured and exposed to tunicamycin to induce ER-stress. To verify successful ER-stress, the expression of activation transcription factor 6 (ATF6) becomes activated in response to ER stress. To determine how ER stress affects EV release and composition, EVs are separated from the conditioned cell culture media of control and tunicamycin treated cells by size exclusion chromatography and examining changes in their protein composition via western blot. The results of this study can provide insight for pathophysiology of neurodegenerative diseases associated with demyelination such as multiple sclerosis (MS).

10. Determining the Effect of Essential Plant Oil Combinations on Growth Inhibition of Methicillin-Sensitive and Methicillin-Resistant Staphylococcus aureus

Ananya Koka*, Robert Waters PhD, Noelle Thielman PhD, Nancy Carty PhD, Christopher C. Keller PhD, FNAOME

Lake Erie College of Osteopathic Medicine, Erie, PA.

Increasing antibiotic resistance in pathogenic strains of *Staphylococcus aureus* has prompted a need to develop alternative therapeutic approaches to treatment. Methicillin Resistant Staphylococcus aureus (MRSA) perpetuates this issue by displaying resistance to most first-line antibiotics. Our previous research showed that essential plant oils, including red thyme oil (RTO) and cinnamon cassia oil (CCO), inhibit the growth of MSSA and MRSA strains in vitro when used individually. This study further examines the effect of these essential oils in combination on growth inhibition of MSSA and MRSA strains. Two strains of S. aureus (one MSSA and one MRSA strain) were cultured on Mueller-Hilton agar in the presence of differing amounts (5 µL and 10 µL) of RTO and CCO individually, and in combination (5 µl RTO + 5 µL CCO). After 24 hours in culture, the Zone of Inhibition (ZOI) produced by these oils was measured. Statistical significance was determined using a Kruskal Wallis test followed by Dunn's multiple comparisons test. The ZOI was significantly larger at 10 µL of RTO and CCO individually compared to the ZOI from 5 uL of RTO and CCO combined. Additionally, 10 µL of RTO and CCO were each individually larger than 5 µL of the oils. Lastly, RTO had a larger ZOI compared to CCO. These results were consistent for both the MSSA and MRSA strains. While both RTO and CCO displayed growth inhibition against both the MSSA and MRSA strains when used individually, combination of the oils was surprisingly antagonistic suggesting that the mechanisms by which these oils inhibit *S. aureus* growth are disparate and opposing. These studies also show that RTO and CCO inhibit *S. aureus* growth independent of antibiotic-resistant status suggesting that these oils individually might prove appropriate alternatives to antibiotics in treating *S. aureus* infections.

11. The Inhibitory Effects of Essential Oils on Candida albicans Growth

Karan Desai* LECOM OMS-II

Candidiasis is a fungal infection caused by Candida, commonly *C. albicans*. Cutaneous Candidiasis often seen in diabetics; may present as napkin dermatitis in infants, folliculitis, intertrigo. *Candida spp*. can develop resistance, specifically *C. auris* an emerging multidrug-resistant species that presents a serious global health threat in hospitalized patients. Thus, the increase in antifungal resistance of *Candida spp*. poses a significant risk to medical treatments available for candidiasis. The purpose of this study was to determine if essential plant oils (EPOs) can inhibit the growth of *C. albicans* and be an effective alternative treatment. Overnight culture of *C. albicans* were diluted to 0.030-0.040 OD at 600 nm in YM broth and plated on YM agar. Utilizing disc diffusion assays, sterile discs containing 10 µL of an individual EPO were placed on an inoculated YM plate. The zone of inhibition (ZOI) was measured at three different timepoints including: 24, 48 and 72 hours. The ZOI were statistically analyzed using a Kruskal-Wallis & Post-Hoc test with a $p \leq 0.05$ deemed to be significant. A total of 31 different EPOs were tested with varying ZOIs after 24, 48, and 72 hours. After 24 hours, Lemongrass, Lemon Eucalyptus & Coriander Seed had a statistically significant ZOI when compared to the other EPOs. However, after 48 & 72 hours, Lemongrass and Cinnamon Cassia had a statistically significant ZOI when compared to the other EPOs. As a fungi, *C. albicans* requires more time to grow when compared to most bacteria. Of the 31 EPOs tested, both Lemongrass & Cinnamon Cassia have shown strong growth inhibition of *C. albicans*. This is a significant finding, because Lemongrass was shown to be the third most effective EPO against *Staphylococcus aureus* & had no effect on *Pseudomonas aeruginosa* but the most effective for C. albicans. Future studies can be done to determine if these same EPOs can inhibit growth of multidrug resistant strains of Candida such as *C. auris.*

12. SURYA: Efficacy of Speedy, Ultraviolet Radiation Yielding Antimicrobial Effects

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The concept of ultraviolet (UV) irradiation as a disease control method is nearly a century old. As early as 1937, UV lamps were installed in a K-12 elementary school (Swarthmore Public Schools, PA) and the effect of UV irradiation on various childhood disease metrics including measles was tracked in a longitudinal study (6-year duration). Although the viral agent would not be isolated until 1954 by Dr. Thomas Peebles, measles as a disease was extensively tracked by the CDC in the USA starting as early as 1912. Thus decades prior to viral identification, the 1937 study revealed a most remarkable finding: UV irradiation was effective at reducing the weekly measles incidence in attending Swarthmore elementary school students. Today, commercial UV-sterilization chambers are abundant.

Here we examine the antibacterial efficacy of the commercially available PRIMACE design that utilizes 12 high-intensity UV-light emitting diodes (UV-LEDs) in a portable form factor. We also test our own portable design (SURYA, or Speedy Ultraviolet Radiation Yielding Antimicrobial effects) that harnesses a single UV-emitting CF-bulb. In our chamber comparisons, we employ the well-studied *Escherichia coli,* a gram-negative coccobacillus commonly found in the human colon. In each sterilization chamber (PRIMACE vs. SURYA), we tested three different durations of UV-exposure: 5, 10 and 30 minutes. To prevent contamination, we employed ampicillin as selective pressure, as our strain of *E. coli* is naturally ampicillin-resistant (at 100 ug / mL ampicillin). Each plate for each timepoint was performed in triplicate to provide statistical robustness to our bacterial enumeration.

13. Isolation & Characterization of Gram Negative Bacteria Colonizing A Clavarioid Coral Mushroom

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Fungi and bacteria are exceptionally diverse groups of microbes but virtually nothing is known about the microbes colonizing the fairly common clavarioid coral fungi. We retrieved a coral mushroom from the Allegheny National Forest in Pennsylvania and isolated three strains of culturable bacteria from inside the fungus using serial dilution plating. Using 16S ribosomal RNA sequencing, we identified these bacteria as two distinct *Pseudomonas* species, belonging to the phylum Proteobacteria, as well as *Chryseobacterium*, belonging to Bacteroidetes. Gram staining ascertained the identity of the three bacteria as gram negative rods. Biochemical tests revealed that all the three strains contained proteolytic enzymes (geletinase, caseinase) and were able to utilize citric acid as an organic nutrient and all preferred lower temperatures for growth. Both the *Pseudomonas* species were genetically distinct, but biochemically identical in all aspects tested. Both *Pseudomonas* strains were fluorescent and were capable of solubilizing complex phosphate. The *Chrysobacterium* could not utilize any of the nine sugars tested and the Pseudomonas strains had very limited sugar preference, surprisingly only oxidizing glucose. Intriguingly, only the *Chryseobacterium* was able to digest starch, and only the *Pseudomonas* species were able to digest the glucose, the breakdown product of starch, suggesting a possible mutualistic interaction between the bacteria. These results lead to interesting hypotheses regarding the possible nature of the interaction between the Coral fungus and these specific bacteria. We speculate that the bacteria colonizing the fungus may be commensal in nature with the capacity to becoming opportunistic pathogens towards the end of the mushroom life cycle.

14. Detecting Microbial Contamination in Ground Beef Products at Various Locations in Erie, PA.

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With the advent of modern sanitation methods, ground beef is seen as a largely safe food source, however sporadic outbreaks still occur. *Clostridium perfringens* bacteria is one of the most common causes of foodborne illness, with an estimated 1 in 6 Americans getting sick from foodborne diseases each year resulting in 3,000 deaths (CDC). Food safety is also a socioeconomic issue. The pattern of poverty and disease incidence, including foodborne botulism has been well documented. We hypothesize that ground beef of lower quality (i.e., lower % lean and lower cost) will have a higher occurrence of microbial contamination, consistently throughout different time intervals. Additionally, we hypothesize that varying socioeconomic conditions in regions will yield differences in the incidence of microorganisms.
For analysis, ground beef samples, of two different qualities, were sampled from several stores in multiple locations around the Erie, PA area. Locations were selected based upon the overall socioeconomics of the surrounding area. Both aerobic and anaerobic bacteria from each sample will be quantified with serial dilution and spread plate inoculation. For aerobic bacteria, LB (Luria-Bretani) agar and EMB (Esosin Methylene Blue) agar will be used for culturing under aerobic conditions. While anaerobic bacteria will be cultured using TPGYE (Tryptone, Peptone, Glucose, Yeast Extract) agar plates incubated in anerobic growth chambers. Afterwards colonies will be counted, and cfu/g of sample will be calculated. Statistical analyses will be used to determine if quality, location, and store impact the overall concentration of aerobic/anaerobic bacteria per sample.

15. The Microbiome of Erie, PA Sour Dough Bread Starter Cultures.

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Microbial communities are complex dynamic systems that can be influenced by a variety of environmental conditions and other mechanisms. One such community can be found within sourdough starters. Sourdough starters are cultures used in the production of sour dough bread, originating from the local environment, containing primarily yeasts, pollens, and native bacteria. However, these communities may be highly dynamic and influenced by not only the surrounding environment, but the substrate they are grown in (i.e., the dough itself). The purpose of this study is to quantify/identify this microbial community. It is hypothesized that substrate and surrounding community will influence the microbial community found within starters. Sourdough bread starters were produced during the Summer of 2021. Starters were created using flour from two grains types, wheat or barley. These two were selected due to differences in grain structure, endosperm, bran percentage, and protein synthesis. After sourdough starters were created, triplicates of each starter were incubated in one of two environments. An indoor environment, a kitchen, or an outdoor environment, the green roof found on the Nash Library in the Gannon Campus. DNA was extracted from all 12 samples and quantified. Starter cultures were incubated and maintained in each environment for 14 days. DNA was sent to be analyzed through Illimuna sequencing of the 16s rRNA gene for bacteria and ITS (Internal Transcribed Spacer) region for fungi. As expected, unique microbial communities were found in each sample, with higher diversity being detected within samples incubated in outdoor environments.

16. NIMBUS: Near-Earth, Investigative Mycological & Bacteriological Ubiquity Surveyor

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Traditional biosignature gases, such as oxygen, ozone, nitrous oxide, & methane are gases that accumulate in Earth's atmosphere in a fashion primarily driven by living entities. Biosignature gases are particularly important to astrobiologists in their search for evidence of life on other planets. On Earth, phosphine (PH3) gas is produced primarily by either human activity or anaerobic microbial action. Recently, astrobiologists detected high levels (parts per billion, ppb) of PH3 in the atmosphere of Venus. Such PH3 concentrations suggest the possibility of microbial life on our sister planet. On Earth, microbes are masterfully ubiquitous. They broadly occupy numerous ecological niches, via their impressive metabolic diversities. If microbes truly do occupy the Venusian clouds, can we say the same of our very own skyline? Here we describe our efforts to construct an aerial drone (NIMBUS, or Near-Earth, Investigative Mycological & Bacteriological Ubiquity Surveyor) that is capable of hauling payload canisters axenically laden with a customized collection of nutrient media. Canisters are extensively sterilized via an ethanol wash followed by overnight ultraviolet bombardment. Our canister lids utilize magnetic seals to prevent in-transit contamination, and upon arriving at altitudinal destinations, a servo-motor breaches magnetic seals to permit ambient exposure to payload media. Our current experimental design will collect aerial samples in 100-foot altitudinal increments, up to a 400-foot ceiling per FAA regulations. Retrieved payload media will be incubated in aerobic and anaerobic conditions, followed by DNA extractions of cultured microbes for species identification via 16S rDNA (bacterial) or ITS (fungal) profiling.

17. Phosphate Removal Using Porous Glass

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The goal of the project is to efficiently remove phosphate from surface waterusing porous glass. Porous glass is made by mixing pulverized glass with calcium and other additives and heating at high temperatures (>600oC). The additives currently tested are lime (CaO) and silicon dioxide (SiO2). SiO2 is added to make air bubbles in the glass while melting so the glass will be porous and have a higher surface area. The calcium present will enable the removal of Phosphate. Porous glass will be made with various ratios of the materials and will be tested for phosphate removal. Testing of porous glass will be done using batch experiments. The most efficient porous glass will be used to grow biomass that could utilize the phosphate absorbed. The combination of porous glass and biomass could provide a long lasting and efficient removal of phosphate from water.

18. Pilot study: ICP-MS Analysis of sediments and round goby (*Neogobius melanostomus*) tissues from Presque Isle Bay

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The round goby (*Neogobius melanostomus*) is a non-native fish that has received much attention in the Great Lakes region. Recently, our laboratory has become interested in how toxic metals such as barium (Ba), cadmium (Cd), lead (Pb), nickel (Ni), and arsenic (As) accumulate in the round goby and cycle through local aquatic food webs. Due to its benthic nature, predation on dreissenid mussels, and its role as prey to many larger fishes, the round goby likely plays an important role in the transfer of metals to higher trophic levels. This pilot project was designed to quantify metal concentrations in the livers, muscle tissue, and otoliths of 11 round gobies (89-104 mm TL) as well as the sediments of Presque Isle Bay using ICP-MS methodology. We have successfully developed methods for analyzing samples that minimize contamination and yield ICP-MS detection limits of less than 0.01 ppm for tissues and 0.50 ppm for sediments. The five elements of interest were generally found above detection limits in the three tissue types and sediments. Among the tissues analyzed, metal concentrations were generally highest in livers and lowest in otoliths. Current work is focused on quantifying metals in round gobies, sediments, and water from additional sites in Erie County using the same methodology so across-site comparisons can be made.

19. Using micro-CT imaging to document morphological plasticity of fall armyworm head capsule size associated with diet hardness.

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The fall armyworm (FAW), Spodoptera frugiperda, is polyphagous and has morphological plasticity when feeding on leaves with varying hardness, which influences head size. It is unknown if the enlargement of mandibular muscles also occurs when feeding on different herbaceous materials. Micro-CT imaging techniques are used to analyze small internal structures of samples without internally damaging specimens. This technique has recently been used to study delicate species such as insects. This project utilizes micro-CT image scans of FAW heads to investigate the effect of diet hardness on mandibular muscle mass. FAW caterpillars were fed three different plant types with varying hardness, including rice, bermuda grass, and maize. They were fixed in a 0.1M buffer phosphate pH 8.0 and 3% glutaraldehyde solution and micro-CT scanned. Dragonfly, a 3-D imaging software used image segmentation to highlight the cranial adductor muscle. The area of the highlighted region was calculated and compared among samples. Preliminary results indicate that caterpillars feeding on softer leaves have a smaller muscle area (A= 402.7977m2), than those fed on bermuda grass with intermediate hardness (A= 700.0694m2). The results of the toughest material, rice, are still in process but are expected to have the

greatest area of all of the materials, suggesting that along with head size, FAW mandibular muscles also increase when feeding on more hardy materials.

20. Increasing Prevalence of *Amblyomma americanum* Ticks on Presque Isle State Park: Potential Implications on Local Tick-borne Diseases

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There are many tick species throughout the United States, with a small number responsible for the majority of pathogen transmission to humans. On Presque Isle State Park (PISP) in Erie County, most ticks have been identified as *Ixodes scapularis*, which transmit pathogens such as *Borrelia burgdorferi* and *Babesia microti*. Another less commonly collected tick on PISP, *Dermacentor variabilis*, transmits *Rickettsia rickettsii* and *Ehrlichia chaffeensis*. In recent years an increasing number of *Amblyomma americanum* ticks have been collected on PISP. The introduction of this tick to the PISP ecosystem has the potential to change the types of tick-borne pathogens that can infect humans. Like *D. variabilis* ticks, *A. americanum* ticks can transmit *R. rickettsii* and *E. chaffeensis*, which are rare diseases in Erie County. The purpose of this study was to characterize the current tick population on PISP. Ticks were collected by flagging trails on PISP in June to July 2022 and were stored in ethanol prior to identification by PCR amplification. DNA was extracted from individual ticks by manually crushing ticks in lysis buffer followed by ethanol/chloroform precipitation. A PCR was then run with Lonestar tick specific DNA primers and resulting fragments were separated by gel electrophoresis visualized with UV light. The same procedure was repeated with *Ixodes Scapularis* ticks. A total of 70 ticks were collected, with 43 (61.4%) *I. scapularis*, 25 (35.7%) *A. americanum*, and 2 (2.9%) *D. variabilis* ticks. The corresponding tick/hr rate was calculated and was 1.5 for *I. scapularis*, 0.87 for *A. americanum*, and 0.07 for *D. variabilis* ticks. Current findings show that over 35% of ticks collected from PISP in 2022 were *A. americanum* ticks. Considering that these ticks were absent from PISP just a few years ago, these findings show a drastic increase in prevalence of these ticks and a potential for introduction of new tick-borne pathogens to Erie County.

21. Brood pouch and juvenile microbiome structure in the Japanese Mysterysnail, Heterogen japonica

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The importance of microbial interactions across all aspects of an organism's life history is well documented. While snail microbiomes have been shown to vary within and between species and across environments, diets, and reproductive modes, little is known about possible parental transfer to offspring. One anatomical compartment that has not been studied in a microbiomic context is the brood pouch of ovoviviparous snails. Female ovoviviparous snails possess modified oviducts that have evolved into a brooding pouch, and hatched juveniles are released through the gonopore at the edge of the maternal mantle. It is therefore possible that females may transfer microbes to their brooding young. Using the Japanese Mysterysnail, *Heterogen japonica*, as our model organism, we compared microbiomes taken from maternal brood pouches and the juveniles therein, determined if juvenile microbiomes differed with position in the brood pouch, and determined a core microbiome for both females and juveniles. Our data showed that maternal brood pouch microbiomes differed significantly from those of the brooded young. Proteobacteria was the most abundant phylum in all samples, and juveniles' microbiomes significantly differed relative to an individual's distance from the gonopore. Maternal microbiomes were more than juveniles'; juveniles harbored near monocultures of a single bacterial taxon likely to be a *Pseudomonas* species. Our data represent the first microbiome comparison between maternal brood pouches and the juveniles they contain. Elucidating the mechanisms responsible for maternal and juvenile microbiome establishment and structuring would not only improve understanding of snail-bacteria associations.

22. Biofluorescence in Larval Salamanders

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Biofluorescence has been widely documented in marine life, but very few studies have looked for this trait in terrestrial vertebrates. In fact, it was only recently that biofluorescence was found to be a widespread trait among many adult amphibians. In particular, many adult salamanders were documented to biofluoresce green in response to blue light. How this biofluorescence in response to blue light changes throughout development in salamanders, however, is unknown. For our study, we observed how patterns of biofluorescence in response to blue light changed throughout development in spotted salamanders (*Ambystoma maculatum*) and red spotted newts *(Notophthalmus viridescens viridescens*). To do this, we captured larval and recently metamorphosed spotted salamanders and red spotted newts at different stages of development around Behrend's campus and brought them to the lab to photograph. Salamanders were photographed under normal lighting and in the presence of a blue excitation light with longpass filter (500 nm) to document which tissues biofluoresced in response to blue light at each stage. We found that larvae of both species have several biofluorescent regions on their bodies, and the amount of biofluorescence decreases later in development. After metamorphosis, the entire body of the red eft stage of *N. v. viridescens* is biofluorescent, including the spots. Research on biofluorescence in terrestrial vertebrates is limited, so our study is a novel contribution that uses ontogeny to provide insight into the function of amphibian biofluorescence.

23. Metal Accumulation in the Shell vs, Soft Tissues of Invasive Mysterysnails

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Invasive species threaten non-native habitats by outcompeting native species, disrupting food chains, and reducing biodiversity. Invasive mysterysnail (*Cipangopaludina/Margarya spp*.), were introduced to the Great Lakes region in the 1930s, are now considered invasive species. In addition to the classic adverse effects of invasive species, mysterysnails also accumulate toxic metals that can negatively affect native ecosystems. As a self-preservation mechanism, snails can transfer most acquired metals into their shells and away from important organs, but the relative allocation of metals to shells versus various soft tissues is unknown. This study aimed to determine how metal concentrations differ between the shell and soft tissues of mysterysnail. To determine the distribution of metals within snails, we collected snails, water, and sediment samples at Presque Isle, Pymatuning, Lake Canadohta, Edinboro Lake, and Lake Pleasant in summer 2022. Lab-work consisted dissecting snails to separate the shell and internal organs (i.e., gonad, mantle, foot, gut) and quantifying metal concentrations in water, sediment, and tissue samples. Invasive mysterysnails accumulate significant metal concentrations, with the distribution of metals between tissue types varying between metal ions. Comparisons to metal concentrations in sediment and water suggest that accumulation in snails is occurring via water, likely by crossing cellular membranes in the gills. Understanding how metals accumulate in the different tissues of mysterysnails will provide insight into what additional threats they pose to native species and provide information to aid in the management of these invasive species.

24. Maternal Transfer of Metals in Invasive Mysterysnails

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Aquatic snails are known to accumulate metals into their tissues and shells based on environmental exposure. Due to the presence of a calciferous shell, snails are capable of offloading metal contaminants into their shells during development, reducing concentrations in more sensitive tissues. This process may be exacerbated in snail species, such as invasive mysterysnails (*Cipangopaludina/Margarya spp*.), that

are ovoviviparous. The formation of juvenile shells within the brood pouch of the mother may allow for extensive maternal transfer of metal contaminants to offspring, but little is known about this process in mysterysnails. The objective of the current study was to quantify maternal transfer of metal contaminants in invasive mysterysnails collected from Pennsylvania waters. Invasive snails were collected from five locations around Pennsylvania, including Presque Isle State Park, Lake Arthur, Pymatuning Reservoir, Lake Canadohta, and Lake Pleasant. After a 24 h depuration period, adult snails were dissected, and gravid females were isolated for analysis. Maternal tissues and offspring within the brood pouch were digested and metal concentrations were quantified via an inductively coupled mass spectrometer. We found that mothers are capable of offloading metals to their offspring, but the relative accumulation in offspring varies with the metal ion considered. Maternal transfer of metals may influence shell integrity, altering offspring survival and population dynamics. Similarly, female snails may reduce their overall metal body burden, and potential toxic effects, by offloading contaminants to offspring. Better understanding of maternal transfer in invasive mysterysnails is required for effective management of these invasive species.

25. Fitness effects of metal accumulation in invasive mysterysnails

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Originally from Asia, invasive mysterysnails (*Cipangopaludina/Margarya spp*.) have spread to United States waters and negatively impacted native aquatic species. As snails, these species can also readily accumulate metals from aquatic environments. The effect of metal accumulation on mysterysnail fitness and ecosystems they invade, however, is poorly understood. Centered in Presque Isle State Park (PISP), our objective was twofold: 1) to quantify metal accumulation within the tissues and shells of mysterysnails and 2) determine the impact of metal accumulation on mysterysnail fitness. During the summer of 2022, 638 snails were collected from PISP along with water and sediment samples. We then quantified metal concentrations in snail tissues and compared them to environmental concentrations to determine the amount of metal accumulated by the invasive snails. We quantified snail fitness using snail activity levels, shell thickness, shell morphology, and shell/tissue weight. Increased concentrations of certain metal ions, especially in the foot and operculum, correlated to reduced snail activity. Currently, additional data collected from the summer of 2022, such as morphometric characteristics, is being analyzed to expand upon fitness observations and will be presented at the 18th Annual Regional Science Consortium Research Symposium. With these data, we will better understand accumulation of metals by mysterysnails and the influence of metal accumulation on their fitness. As a result, this research will provide insight into factors that influence fitness of mysterysnails in Pennsylvania waters, supplying information for mysterysnail management.

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

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The round goby (*Neogobius melanostomus*) is an invasive species that was first discovered in Lake Erie in the 1990s. The overwhelming increase in this invasive species has negatively impacted other aquatic life and has caused great concern for the fate of biodiversity in the region. One trait that might be augmenting round goby success in its invasive range is its eyespot, a color pattern that mimics the eye of a vertebrate to intimidate predators. To determine how the eyespot is contributing to the round goby invasion, we first must document variation in round goby eyespot size and color and determine if this variation differs between local populations of round goby in the Pennsylvania waters of Lake Erie. Round gobies were collected from select areas in Erie County and the size and color of their eyespots were analyzed from photos. From our results, it is apparent that eyespots are abundant in all the sampled

locations, but the eyespots vary in size and color depending on the Lake Erie environment. Collectively, eyespots occur less frequently and are smaller in tributary goby populations compared to Lake Erie pier populations. With this information, we can clearly see variation in eyespot size and color between local round goby populations. This study helps us to determine the impact of invasive round goby on native species, to distinguish round gobies from native look-alikes, and to learn about the importance of an eyespot as an anti-predator defense.

27. Site effects in round goby (*Neogobius melanostomus*) gut microbiomes: A precautionary tale

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Gut microbes are important contributors to host life history traits. While multiple factors likely affect the development of the fish gut microbiome, host habitat is likely the primary driver. Diet and developmental stage also affect the fish gut microbiome, since both correlate significantly with habitat. The round goby, *Neogobius melanostomus*, is an invasive fish to the United States first reported in the Great Lakes whose diet is comprised heavily of dreissenid mussels. However, it has also moved from the Great Lakes to adjacent inland lakes and tributaries where dreissenids are less available. The diet of the round goby has been shown to vary with habitat and undergoes size-related shifts over time. Little is known regarding the round goby gut microbiome, though it has been previously shown to vary with habitat. Three hypotheses were tested during the project. First, round goby gut microbiomes would differ significantly between the two sites. Second and third, differences in fish size and diet would correlate with differences in gut microbiomes within each site. Size-matched round gobies from two sites in Presque Isle Bay were examined and their sizes, stomach contents, and gut microbiomes determined. Fish gut microbiomes differed significantly between sites. Within each site dietary shifts were observed between small and large fish. However, microbiome shifts were correlated with dietary and size shifts at one site but not the other. These results suggest that site effects on round goby gut microbiomes are important and may mask effects of diet and size in certain populations.

28. Identifying Native Pennsylvania Aquatic Plants for use in Bioremediation of Metals

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Phytoremediation of metal contaminants is an apt approach to reducing bioavailable metal concentrations in terrestrial and aquatic habitats. Many plant species, specifically those found in wetland habitats, can accumulate high concentrations of metals with little toxicological effect. Identifying more widespread native plant species capable of accumulating significant metal concentrations may expand use of phytoremediation to ameliorate metal contamination in additional sites. The objective of the current study was to document metal accumulation in native aquatic plant species around Presque Isle State Park (PISP) for potential use in phytoremediation. Within PISP haphazardly placed 1 m2 quadrats were used to determine metal accumulation by native plants. Plants within each quadrat were identified and tissue samples and water and sediment samples were collected for metal analysis. Metal concentrations (e.g., cadmium, copper, lead, nickel, zinc) in plant tissue, water, and sediment samples were determined through acid digestion and analysis via inductively coupled mass spectrometry. Accumulation of metals varied between sites and across species, with Whitestem Pondweed (*Potamogeton praelopngus*) accumulating the highest average metal concentrations; this suggests that plant metal accumulation may depend upon environmental metal concentrations. Identifying a range of native plants that could function as phytoremediators would help extend the applicability of this methodology in different habitats and locations. Using native plant species for phytoremediation instead of introducing potentially invasive non-

native species could result in ecologically safe and effective metal removal. This project represents an initial step towards this goal within Pennsylvania.

29. Electric Kitchen Composter

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In light of the excessive food waste in landfills today, this project goal is to create an electric, table-top kitchen composter that is low in cost, odors, energy usage, and noise levels. Additionally, this device will not require the addition of microbes, reducing maintenance costs over time. Waste reduction by volume aims for 80% and the output will be a beneficial and nutrient-rich fertilizer additive for plants. This is to be achieved through the work of environmental, electrical, and mechanical engineering students. Low product costs will be met by using materials like plastic and aluminum. Layered carbon filters will handle odor elimination and energy efficiency will be made possible by using the lowest possible temperature gradients and rpm values. This well-insulated machine will be free of noise or heat leakage in the home, making it highly convenient for any small household with passions for waste reduction or gardening.

30. Creating Biodegradable Fungi Based Material for Sustainable Multiuse Purposes

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The growing environmental crisis demonstrate the need for development in green industry and renewable materials. Fungal-based biomaterials have been a topic of interest, serving as both a cost-effective industrial material and as a continuous food surplus for low-income communities. This project aims to repurpose waste, like paper and spent barley, from local businesses in the Erie community into growing substrates for edible fungi such as *Pleurotus ostreatus* (oyster mushroom) and *Lentinula edodes* (shiitake mushroom). These fungi are widely accessible white-rot mushrooms which can decay wood and other high in cellulose substrates. The fungal biomass cultivated are a resilient and versatile composite brick-like material which can be sold for construction or insulation purposes. In the Fall semester of 2022, various substrates were tested for fungal growth quality and quantity by inoculating them with *P. ostreatus* in a small-scale treatment test. Substrates examined include potato starch, spent barley, recycled paper, and recycled sawdust. Treatments were observed daily for 2 weeks, noting any change in growth. Rate of growth data was analyzed and compared to determine which substrate treatment yielded desirable fungal biomass appropriate for brick growth. Once the ideal substrate is chosen, fungal bricks will be produced from it. They will then be deactivated (fungi will be killed) using various methods including heating/drying and UV light. After deactivation the material will be preserved using several strategies including the use of plant extracts and edible waxes. Afterwards the mechanical properties of the materials will be tested at various temperature using an MTI-10k.

31. Hyperostosis Frontalis Interna and its Presentation in Two Female Skulls

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Hyperostosis Frontalis Interna (HFI) is a bone growth that affects the diploe and the inner table of the frontal bone. According to the scientific literature, it is found in 5-10% of the current population, being a rare finding in the archaeological remains. This injury is more frequent in aged females, and in both sexes, it is usually associated with hormonal imbalances. In the past, HFI has been linked to Morgagni-Steward-Morel Syndrome and to Paget's disease, among other bone disorders. Currently, HFI is considered as an entity of its own and not as sign of a syndrome. The advances in image diagnostic techniques allow proper diagnosis and specific classification of the HFI lesions. Due to this, accurate evaluation of the bone alterations in HFI is possible nowadays. However, despite several studies on that subject being found in the scientific literature, there is still controversy about its etiology, pathogenesis, and epidemiology. This poster presents the findings of HFI in two females from the Mercyhurst donated skeletal collection: a 71-year-old white female and a 59-year-old white female.

32. The Accuracy and Bias of Transition Analysis Age Estimation Priors in Historical and Modern Populations

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Age-at-death estimates are a crucial component of the biological profile, essential for victim identification in forensic anthropology, and for demographic, taxonomic and evolutionary interpretations in biological anthropology. In this study, we examined the differences in accuracy of the alternative statistical priors (archaeological and forensic) used in ADBOU, an age estimation software based on Transition Analysis (TA). TA is a multifactorial method that relies on Bayesian statistics to estimate confidence intervals of age that are less dependent of sample age distribution than the age ranges of traditional methods. The study sample consisted of 75 individuals from the Hamann-Todd Osteological Collection (HTOC), as a historical sample reference, and 18 individuals from the Mercyhurst University Donated and Case Collection (MUC), as a modern forensic sample. The differences in age estimation error between the archaeological and forensic priors was found non-significant for both the HTOC ($t=0.238$, $p=0.406$) and the MUC ($t=0.138$, $p=0.445$). However, we found significant differences in the direction of age estimation bias between the archaeological and forensic priors for both the HTOC ($t=1.919$, $p=0.028$) and the MUC ($t=2.625$, $p=0.006$). The results indicate that the forensic prior is more biased toward underestimating age than the archaeological prior, both in historical and modern forensic samples. Future studies using a larger modern sample would be useful to confirm this observation.

33. Stewardess Injury Prevention

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About 13% of flight attendants are injured each year, which doesn't seem large but comes to about 13,500 per year. Out of those injuries, 58% were musculoskeletal involving the neck, back, and shoulders. Training simulations have been used in other areas, such as medicine, sports, and warehouses, so the application can be reasonably applied to stewardesses for the same effect. The training environment was designed with Unity 3D, following three main objectives for the trainee to complete, pushing the food cart, lifting luggage into the overhead compartments, and closing the cabin door. To verify the that the motion completed in virtual reality by the subject can be reasonably applied to real life, a 10kg box was lifted in real life, in the virtual setting, and then the motion can be compared. An Oculus Rift S then put them inside the environment, and Xsens sensors recorded motion data. The data can then be analyzed to see if the trainee is at risk of injury based on the form used during each task. This method of training will result in a lower risk of musculoskeletal injuries in stewardesses.

34. Skeletal Evidence of Physiological Stress in a Low Socio-Economic Status Population

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Physiological stress reflects the consequences of biological and environmental stressors on the individual and greater population. This study highlights sociocultural structures in the Hamann-Todd Osteological Collection (HTOC) through an analysis of sex-based differences in skeletal physiological stress markers. The HTOC is predominantly made up of individuals from low socioeconomic backgrounds that would have been employed in labor-intensive occupations and had restricted access to resources. These conditions would have induced moderate to severe physiological stress throughout their lifetimes, which is expected to manifest in their skeletal remains. Here, we analyzed the presence of linear enamel hypoplasia (LEH) and stature for 195 individuals in the HTOC. LEH and stature are used as non-specific indicators of physiological stress experienced during growth and development. We found that LEH are prevalent in this population, affecting 44.1% of individuals. There is no significant difference in stature for males with at least one LEH, compared to those without LEH. However, females with at least one LEH displayed significantly shorter statures compared to those without LEH, which suggests females may have experienced prolonged or more severe stressors during key developmental stages relative to males. This constitutes structural violence, a form of identity-based violence that is normalized by the society or community in which it occurs including health disparities and differential treatment within a society. Overall, the results presented here show high levels of physiological stress in the population and are indicative of structural violence against the individuals that compose the HTOC.

35. Evaluating Injury Risk Through Controlled Tests In Jack Siemens Task Simulation Builder and Xsens Motion Capture System for Injury Prevention

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There are many implications of digital human model (DHM) technology into different applications, including aviation, automotive industry, military industry, energy industry, and industrial plants. This evaluation is necessary as many workers, in various industries, have been reported to have musculoskeletal injuries due to poor posture in everyday activities they perform on a daily basis. Specifically in the brewery industry, currently there are studies that assess the prevalence of these injuries based upon discomfort in workers and how they respond to a survey, however, there are very few studies that analyze the amount of force being placed on certain parts of the body. Through a study consisting of two real life human movements in the brewery industry, lifting a bag of grain, as well as lifting 24 full cans of beer from a raised surface to the ground, this discomfort and pain in the workers is measurable. The forces on the body can be compared to standard, healthy, force values to determine the likelihood of injury. This technique can then therefore be used to help prevent these injuries in the future.

36. Rain Garden for Gannon's Campus

Kate Halapin and Sydney Hanratty*
Advisor: Varun Kasaraneni, Ph.D.

A rain garden, or a bioretention area, is a depressed area in the landscape that is utilized to collect rainwater and increase the reabsorption into the soil. They are a best management practice for stormwater management and use native vegetation to reduce runoff. As part of Gannon's Senior Engineering Design, a rain garden will be designed for a location on Gannon's campus. The rain garden will be placed in a location on Gannon's campus that fits the regulations and guidelines for building rain gardens. The location will be determined based on soil characteristics, current usage, ease of construction etc. Soil testing will take place in order to determine the soil characteristics of each of the areas to in turn help with the determination of the final location for the rain garden. Once the final location for the garden is determined, the design process will begin within the AutoCAD software. Native species and perennials

will be preferred plants and shrubs. The design will continue to be reviewed and reworked if needed based on feedback provided by the advisor. The final design will be given to Gannon University so it can be implemented on campus.

37. How can my photographs make people appreciate Allegheny College's environment?

Ariana Clark*; Undergraduate Student, Allegheny College Department of Environmental Science and Sustainability
Eric Pallant; Professor, Allegheny College Department of Environmental Science and Sustainability
Heather Brand; Eila V. Bush Endowed Professor of Art, Allegheny College Department of Art

People have seen the classic picture of the lone, malnourished polar bear on a small, drifting piece of ice, and that's just one of many pictures out there that portray that the world is doomed because of climate change currently taking place. But what if there was a way to show positive reinforcement through pictures that portray the world in a more delightful, hopeful way? A way to rewrite the negative narrative of people's perspective on the environment through photography. The environment is everything and everyone around us; everything is connected. There's a powerful relationship between photography and the field of environmental science. Photography has been around for many, many years. It gives people the ability to capture the details that the naked eye doesn't always see. One of the many capabilities of photography is to alter a person's perception. There are many photographers whose goal is to change people's perceptions of the environment and to encourage people to appreciate the world. National Geographic is an example of connecting people to the environment all over the world. On a smaller scale, Allegheny College is a small liberal arts college located in Meadville, Pennsylvania. The campus is full of life and "hidden treasures" that are passed by on a day to day life without being seen. The end goal is to see how my photographs that are taken with a Canon EOS T3 can influence people to "stop and smell the roses" in order to rewrite the narrative.

38. Growing a Resilient Campus Forest: Opportunities, Barriers, Solutions

Olivia C. Ave, Kinsley R. Greenlaw, Hana B. Kneiser, Jenna R. Lutz, Sebastian McRae, , Molly A. Miller, Katherine Mowry, Kevin T. Murphy, Nicholas Waddington, Daniel Torrance, Jesse Swann-Quinn, Eric Pallant, Kelly Boulton, Joe Michael, Richard D. Bowden

Campus forests are highly managed landscapes that provide ecological services and social benefits to actively enhance our spaces of higher education. Managing these forests, however, is challenging due to multiple and at times conflicting perspectives, including aesthetics, maintenance, ecological consideration, recreation, function, and institutional continuity. Ongoing efforts to study and shape Allegheny College's campus forest through student research, campus initiatives, and institutional efforts demonstrate how campus landscapes offer opportunities to provide educational activities and work toward more sustainable communities. Current efforts include courses developing policy and management directions for a climate resilient forest that includes agroforestry. This paper presents recent efforts by Allegheny's Environmental Science and Sustainability department to consider the past, present, and future of its campus forest through lenses of resiliency, productivity, and history. The paper explores challenges to maintaining a sustainable campus forest, including the need to undertake a full inventory of campus forests, centralizing decision-making while remaining inclusive of varied stakeholders, and developing community relationships through those forest activities. We also outline possible solutions to these challenges, leveraging the many assets of a campus community to pursue the goal of more resilient campus forests.

39. From Vine to Table: Penn State Summer Experience in Viticulture and Enology

Keegan Rupp* and Dr. Campbell

The Lake Erie Regional Grape Research and Extension Center (LERGREC) has partnered with the United States Department of Agriculture to educate and introduce undergraduates from across the nation to the wine and grape industry. The LERGREC is a 40-acre facility located in North East, Pennsylvania serving the grape-processing industry. Students participate in an eight-week summer internship program diving into the operations and workings of viticulture and enology. Throughout the program, students work at the LERGREC vineyards obtaining hands-on training in the fields. This includes insect and disease scouting, trellis system implementation, crop estimates, pruning, and many other tasks pertinent to the operation of a vineyard. Students also work with local wineries including Mazza Vineyards and Presque Isle Wine Cellars. Students take on all levels of duties at the wineries from wine chemistry to racking to bottling. Students are tasked with maintaining a 2021 variety trial that was planted by the inaugural year interns. During the program, students participate in various research projects that relate to their field of study and interests such as plant pathology, entomology, enology, and viticulture. Previous projects have looked at photosynthetic data from various varieties, Brettanomyces contamination, and foliar endophyte presence. Additionally, students have the opportunity to work with industry professionals on issues that the wine and grape industry are facing. The students leave the program with a deep understanding of the grape and wine industry as well as an appreciation for agricultural practices.

40. Seasonal water quality trends in Lake Pleasant

Abigail Palotas[1]*, Matt Gacura[1], Gary Vanderlaan[1] and Chris Dempsey[1],
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Lake Pleasant is a 64acre glacial lake located in Erie County, Pennsylvania. It has a maximum depth of 13.7 meters and is considered dimictic regarding its mixing frequency. Groundwater and precipitation are the dominant inputs of water into the lake. Based on the literature, many years have passed since regular monitoring of water quality changes in Lake Pleasant has occurred. We have been visiting Lake Pleasant quarterly since September 2021 to collect water quality, light, and nutrient data over the deepest location in the lake. A YSI Pro DSS was used to collect temperature, dissolved oxygen, pH, and specific conductivity readings from the surface down to 12 meters. Light readings are collected using a secchi disk. In addition, we use paired Licor PAR sensors to collect upward and downward welling irradiance. These PAR readings are converted into Z1% values. Triplicate water samples are collected from 0, 1, 5, 9, and 12 m depths. Upon return to the lab, the samples are filtered and analyzed for soluble reactive phosphorus, ammonia, and dissolved organic carbon concentration and quality. The lake follows a typical season pattern in that it is stratified during the summer and mixes during the spring and fall. During these periods of stratification, oxygen is quickly consumed in the hypolimnion, and nutrient concentrations are minimal in the surface waters. We plan to continue monitoring Lake Pleasant to assess long-term changes in the lake.

41. An assessment of the invertebrate richness of a mitigated wetland in southwestern Pennsylvania during the summer growing season

Kerry Katz*, Jesse Eiben, and Robert Whyte
Pennwest University, California, Biology Department

Wetlands are vitally important ecosystems that have been historically threatened by human-induced change. Increasingly, wetlands are recognized for their many benefits including maintaining water quality and providing habitat for wildlife. Wetland mitigation and restoration programs are on the rise, including the Pennsylvania Department of Environmental Protection's Net Gain Strategy for managing wetland resources. Invertebrates are a key part of wetland ecosystems, facilitating the cycling of nutrients, decomposing dead plant and animal material, and connecting primary producers with consumers across trophic levels. Due to their ecological importance and sensitivity to disturbance, invertebrates provide a

direct mechanism to evaluate the quality and development of mitigated wetlands. This case study examines the taxonomic richness and assemblages of invertebrates across a mitigated depressional wetland in southwestern Pennsylvania in the summer of 2022. Sampling was completed at four different microhabitats across the wetland complex. Sites were selected based on accessibility, connection with other wetland monitoring efforts, and representativeness of the habitat matrix. Invertebrates were collected using dip nets, sweep nets, foliage beats, and pitfall activity traps during June and July. Specimens were sorted and identified to the lowest practical taxonomic level in the lab and results analyzed to determine species richness and assemblages. Biodiversity and sample completeness metrics of wetland aquatic and aquatic edge vegetation gained from this study may be used to inform wetland mitigation success in a more holistic manner than more traditional IBI survey metrics.

42. Biological Surveys in Restored Primary Wetland Habitats on Presque Isle State Park Erie, PA

Sarah Magyan* & Sean Dalton*
Regional Science Consortium

Invasive plant species can have numerous negative effects if left unopposed in priority wetland habitats for many biological species, ultimately leading to their displacement. The RSC monitors species of native amphibians, fish, mussels, and macroinvertebrates using various methods at 7 priority wetland habitat restoration areas distributed across Presque Isle State Park in Erie County, PA where treatment for invasive plants has been applied since 2009. Surveys were conducted both before and after native replanting efforts by Go Native! Erie. These surveys seek to catalog the change in native biodiversity in these restored habitats.

43. Wetland Restoration and Propagation Updates on Presque Isle State Park

Jen Salem* and Jeremiah Covert*
Regional Science Consortium

Since 2016, the Regional Science Consortium has been growing native plant species to be used in our priority wetland restoration project. In 2022, we adopted several new propagation methods and incorporated new research and storage equipment into our program to increase seed viability, increase plant production, capitalize on greenhouse space and better develop a plan for additional priority wetland sites.

44. Aerial Drone Surveys of Shoreline Change and Primary Wetland Habitats on Presque Isle State Park, Erie, PA

Sean Dalton*
Regional Science Consortium

Presque Isle's shoreline and wetlands are dynamic environments subject to rapid change as a result of underlying geologic and biological conditions. These changes have direct impacts on the local economy and ecosystems of Erie, PA and Presque Isle State Park. In response, the RSC has integrated drone surveys into two of its already existing monitoring projects including tracking erosional changes to Presque Isle's lakeside shoreline over time and indexing the health of primary wetland habitat vegetation.

45. Examining Sediment Distribution Along Presque Isle State Park Beaches to Inform Beach Nourishment Activities

Anna Alberti*, Joshua Ernst*, Kelsey Evans*, and Eric Straffin

Erosion of Presque Isle beaches continues to be a problem, despite the installation of offshore breakwaters in 1992. Artificial beach replenishment is still required, as the amount of sand entering the system naturally does not keep pace with the rate of sediment erosion. Beach nourishment activities have cost millions of dollars and moved millions of cubic yards of sediment.

This study aims to provide a better understanding of the distribution of sediments on Presque Isle, with the goal of better informing beach nourishment activities. We hypothesized that beach grain size should decrease down current (northeast) with the prevailing long-shore current, and that grain size of the beach berm would be controlled by wave height. Active berms from six beaches were sampled during periods of variable but relatively low wind and wave conditions. Grain size was analyzed via dry sieving and found to be generally finer in the down current direction, however wind direction with respect to orientation of the shoreline plays a large role in localized sediment transport and resulting grain size. Sampling during storms would help to further quantify modern wave and sediment grain size relationships, and samples from prehistoric landforms would permit a better understanding of natural, pre-breakwater conditions.

46. Bluff Erosion Monitoring Along Shades Beach

Kennedy Beasley-Watson* (Mercyhurst Geology Department), Katie Goodnow (Mercyhurst Geology Department), Nick Lang (Mercyhurst Geology Department), Nicole Schwab (Mercyhurst Biology Department), Albert Jackson(Mercyhurst Biology Department), Chris Dolanc (Mercyhurst Biology Department)

Bluff erosion rates along the southern Lake Erie shoreline are imperative for land use planners. To help constrain those rates, we have undertaken a combined geospatial and field- based approach at two sites in Erie County, PA. Here we focus on Shades Beach in Harborcreek Township, PA. The process of mapping involved sketching the area, collecting GPS points along the edge of the bluff line, and then imported LiDAR images as well as air photos in order to trace out historical bluff lines to compare those to current bluff lines. We utilized trail camera footage to monitor the bluff edge as well as dendrochronology to age and cross-date specific events to better understand past erosional events. Total erosion of the bluff edge varied from 0- 5 meters (avg 0 - 0.33m/yr), which is consistent with reported field-survey derived values by the PA DCNR. In the absence of field-based surveys, air photos and LiDAR will also help constrain erosion rates. However, the amount of time between when air photos and LiDAR are collected is large making it difficult to keep on top of erosion rates. In addition, most erosion is happening on the bluff face and not so much at the top of the bluff edge. Erosion at Shades Beach is ongoing but will likely continue to be slower than other coastal sections in this region.

47. Energy Audits of the West Erie Bayfront

Kalob Sperling and Legend Perry*
Advisor: Michelle Homan Ph.D.
Gannon University Environmental Science and Engineering Department

The overall goal of this project is to conduct energy audits of homes and businesses in the West Bayfront area, Erie PA to evaluate their energy efficiency and make recommendations on how to improve efficiency. An energy efficiency workshop will be held for the residents of West Bayfront area and volunteered homes will be enlisted for energy audit. During the workshop, the concept of energy audits will be introduced and kits that can help homes and businesses cut back on energy losses will be distributed. A preliminary energy audit will be conducted prior to beginning of winter starts followed by a final audit during the winter. The data collected from these audits will be used to design plans and propose solutions for the home or business to be more energy efficient.

48. The Yellowstone Earthquake of 1959

Kendall McGarity*
Steven Ropski (Biology Dept. Gannon University)

On August 17th, 1959, an earthquake hit near Hebgen Lake in southwest Montana. It is one of the largest earthquakes observed in the United States, and the area surrounding it is still experiencing the effects to this day. The initial earthquake lasted less than 1 minute and triggered a massive landslide that was traveling 100 mph, caused many fault scarps, and damaged roadways. The landslide moved than 80 million tons of rock down into the canyon below, which formed Earthquake Lake. The rocks and debris also covered the popular camping site, Rock Creek campground. The surrounding areas of Hebgen Lake were affected by the earthquake by the lake rising nearly 8 feet (2.4 meters) and caused roads and highways along the shoreline to collapse into the water. In addition to the landslide, a few more effects were cracks and geysers that developed as a result of the earthquake. Although earthquakes can cause extensive damage in the environment, they can also be very important to the hydrothermal systems by helping to remove blockage of minerals in geysers.

49. Occurrence of beech leaf disease in American beech (*Fagus grandifolia*) across tree size class in northwestern Pennsylvania

Adams, T., R. Amsdell, K. Brozell*, T. Cade, N. Claudio, A. Corso, M.R. Dosch, A. Ferguson, J. Folaron, H. Hersh, A. Hunt, S. Jones, E. Kerr, E. Manning, B. Michael, K. Mowry, S. Olsen, A. Peachey, R. Walters, R.D. Bowden. 2022. Allegheny College Department of Environmental Science and Sustainability.

Beech leaf disease (BLD) has severely impacted American beech *(Fagus grandifolia*) throughout the northeastern United States by inhibiting leaf growth and potentially increasing tree mortality through repeated defoliation events. As an ecologically and economically valuable species in northern hardwood forests, it is crucial to monitor the spread of the invasive nematode *(Litylenchus crenatae*) that causes BLD. We assessed 74 American beech trees in two forests in Crawford County, PA, examining the fullness or health of the canopy, the rate of banded or shrunken leaves, the presence suspended buds, and signs of damage from mites or aphids. We categorized each tree by size class to compare the effects of BLD on tree size class. Banded leaves were found in 96% of the trees, and 88% showed shrunken leaves. Overall, shrunken leaves appeared in <10% of banded leaves that were banded, however 96% of banded beech saplings also had shrunken leaves. Larger trees had more canopy cover and more healthy leaves, whereas small trees had higher rates of banded or shrunken leaves. Mite damage increased with the increase in banding, suggesting a relationship between the two sources of pathology. Banded and shrunken leaves will likely lead to a decrease in the overall health of a tree, suggesting that tree mortality will be highest in trees with the smallest diameter. Regeneration and growth of American beech may be affected to the degree in which they diminish in hardwood stands in the Northeast, potentially altering forest composition, structure, and ecological processes.