

# *Regional Science Consortium*

## *13<sup>th</sup> Annual Research Symposium*

*Tom Ridge Environmental  
Center at Presque Isle, Erie,  
Pennsylvania*



NOVEMBER 8 – 10, 2017

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**PROCEEDINGS**

# WELCOME

*Regional Science Consortium  
13<sup>th</sup> Annual Research Symposium  
November 8-10, 2017  
Tom Ridge Environmental Center  
At Presque Isle State Park*

*Welcome* to the celebration of our 13<sup>th</sup> 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 35 Oral Presentations and 36 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. We encourage everyone to attend our Poster Session on Wednesday evening, providing the opportunity to discuss the projects with the poster presenters (*refreshments provided*). Also, there is still time to purchase your ticket for the Dinner on Thursday evening, which includes great food, drinks, silent auction, and the Salmon Frank band. Visit our Registration Table for more details.

I would like to thank all of the participants of the Symposium this year. I would like to thank the researchers, professors, and especially the students for their hard work in preparing their PowerPoint and Poster presentations. I would also like to thank the PA DCNR staff of the TREC and the Sunset Café for the preparations. I would especially like to thank Amber Stilwell, Holly Best, and Jennifer Salem for their support with this event. **Thank you!**

I hope you all enjoy Symposium 2017!  
Please mark your calendar for next year's Regional Science Consortium Research Symposium on November 7 – 9, 2018.

Cheers!

*Jeanette*

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

## FACILITIES

*Regional Science Consortium  
13<sup>th</sup> Annual Research Symposium  
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At Presque Isle State Park*

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

- TREC Lobby – Registration Table
  - Room 112 – Oral Presentations
  - Room 110 – Social Area
  - Room 108 – Presentation Practice Area
  - First Floor – Exhibitor Tables (throughout visitor's area)
  - First Floor – Poster Presentations (near Big Green Screen Theatre)
  - First Floor – Thursday evening Dinner
  - Sunset Café – Lunch
-

## EXHIBITORS

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

- Cleveland Museum of Natural History
  - Coastal Zone Management Program
  - Creek Connections, Allegheny College
  - CRANE – Community Resiliency Action Network of Erie
  - Environment Erie
  - Erie County Department of Health
  - Erie County Department of Planning
  - Flagship Niagara League
  - Fondriest Environmental
  - Gannon University – Environmental Science & Engineering Graduate School
  - Go Native Erie!
  - Natural History Museum at the Tom Ridge Environmental Center
  - PA Department of Conservation and Natural Resources
  - PA Sea Grant
  - PASST – Pennsylvania Archaeological Shipwreck and Survey Team
  - Purple Martin Conservation Association
  - SONS of Lake Erie
  - Weed Warriors
-

# SCHEDULE OF TALKS

*Regional Science Consortium*  
*13<sup>th</sup> Annual Research Symposium*  
*November 8 - 10, 2017*  
*Tom Ridge Environmental Center*  
*at Presque Isle State Park*

**WEDNESDAY, NOVEMBER 8, 2017**

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9:00 – 9:55            **REGISTRATION OPENS**  
                                 Register, upload presentations

9:55 – 10:00        **Welcome**  
                                 Jeanette Schnars, Ph.D., Executive Director, RSC

## **Presentations**

***Session Chair: Jeanette Schnars, RSC Executive Director***

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10:00 – 10:20        **Lepidoptera of Presque Isle State Park, Moth and Butterfly Sampling  
Showing a Decline in Butterflies**  
                                 Jerry McWilliams, Insect Curator, Tom Ridge Environmental Center  
                                 Natural History Museum

10:20 – 10:40        **Growth of young-of-year yellow perch (*Perca flavescens*) and white perch  
(*Morone americana*) in Presque Isle Bay**  
                                 Chloe Parise\*, Jacob Kisiel\*, Christopher Dempsey, and Greg Andraso;  
                                 Department of Biology, Gannon University

10:40 – 11:00        **The development of the pharyngeal bone, ceratobranchial 5 in *Lepomis*  
hatchlings**  
                                 Meaghan Danaher\*, Greg Andraso, and Kelly Grant Gannon University,  
                                 Department of Biology

11:00 – 11:20        **Distribution and abundances of French Creek Mussels**  
                                 Kyle Clark\*, Jay R. Stauffer, Jr., The Pennsylvania State University

11:20 – 11:40        **Comparison of Aquatic Macroinvertebrates Among Major Pennsylvania  
Drainages**  
                                 Sara Mueller, The Pennsylvania State University

11:40 – 12:40        **LUNCH – THE SUNSET CAFÉ**

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

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- 12:40 – 1:00            **Reducing Cigarette Litter at Beach 10, Presque Isle State Park**  
Sarah Bennett\*, Mark Mullinger, Mercyhurst University
- 1:00 – 1:20            **Teens and environmental awareness**  
Daniel T. Kaufmann, Pennsylvania Outdoor Corp, Student Conservation Association
- 1:20 – 1:40            **Stable isotope analysis of individuals from the Fort Bridger and Platte Bridge Station (Fort Caspar) burial communities: An exploration of frontier-era military burials**  
Leslie Fitzpatrick, Department of Applied Forensic Sciences, Mercyhurst University
- 1:40 – 2:00            **The Remains of Perry’s Victory: A Geophysical Survey of Misery Bay, Presque Isle, PA**  
Zaakiyah Cua\*, Student Researcher, Anthropology Department, Indiana University of PA  
Dr. William Chadwick, Faculty Researcher, Anthropology Department, Indiana University of PA  
Dr. Ben Ford, Faculty Researcher, Anthropology Department, Indiana University of PA
- 2:00 – 2:20            **BREAK**

***Session Chair: Sara Turner, RSC Vice-President***

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- 2:20 – 2:30            **Design of wastewater treatment for Erie Water Works, Sommerheim Plant**  
Evan Wujcik\*, David Bovkun, Jeb Bortz, Dr. Varun Kasaraneni, Department of Environmental Science and Engineering, Gannon University, Erie, PA  
*(Speed Talk)*
- 2:30 – 2:40            **Sustainable waste management: Application of yard clippings based on Biochar for water treatment**  
Blake Dantio\*, Billy Morris, and Steven Houser, Dr. Varun Kasaraneni, Department of Environmental Science and Engineering, Gannon University  
*(Speed Talk)*
- 2:40 – 2:50            **Waste management: Development of a leachate collection system and cover materials for Ranadi Landfill, Solomon Islands**  
Courtney Platt\*, Madeline Schwerinski, Matthew Hackathorn, Hwidong Kim, Ph.D., PE., Department of Environmental Science and Engineering, Gannon University  
*(Speed Talk)*



10:00 – 10:20      **Assessing the Economic Impact and Value of Recreational Fishing on Lake Erie Waters**  
                                 <sup>1</sup>Michael D. Ferguson, Ph.D.\*, <sup>2</sup>Alan R. Graefe, Ph.D.  
                                 <sup>1</sup>Department of Recreation Management and Policy; University of New Hampshire  
                                 <sup>2</sup>Department of Recreation, Park, and Tourism Management; The Pennsylvania State University

10:20 – 10:40      **BREAK**

***Session Chair: Fred Brenner, RSC Board Member***

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10:40 – 11:00      **Water Quality and Phytoplankton Communities of Bear Lake, NY**  
                                 Simona Lukasik\*, Courtney R. Wigdahl-Perry, State University of New York at Fredonia

11:00 – 11:20      **The Effects of Micro-Plastic Pollution on Zooplankton**  
                                 Heather Barrett\*, Courtney R. Wigdahl-Perry, Sherri A. Mason, State University of New York at Fredonia

11:20 – 11:40      **The response of brine shrimp (*Artemia salina*) to light in turbulence**  
                                 Fedele, C.M.\*, Schwab, E.M., Kato, K. D., Wolfe, T., and Anderson, E.J., Grove City College, Grove City, PA

11:40 – 12:00      **The balance of fluid forces in fish-like propulsion during deceleration, acceleration and constant speed swimming**  
                                 Noll<sup>1</sup>, A. R., Garborg<sup>1</sup>, C. S., Lauder<sup>2</sup>, G. V., and Anderson<sup>1</sup>, E. J.  
                                 <sup>1</sup>Grove City College, Grove City, PA; <sup>2</sup>Harvard University, Cambridge, MA

12:00 – 12:20      **Review of flume speed ramping as a method for collecting tailbeat kinematics during fish swimming**  
                                 Gridley<sup>1</sup>, T. I., Noll<sup>1</sup>, A. R., Daningburg<sup>1</sup>, K. M., and Anderson<sup>1,2</sup>, E. J.  
                                 <sup>1</sup>Grove City College, Grove City, PA; <sup>2</sup>Woods Hole Oceanographic Institution, Woods Hole, MA

12:20 – 1:40      **LUNCH – THE SUNSET CAFÉ**

***Session Chair: Tammy Zimmerman, RSC Board Member***  
***Harmful Algal Bloom Session***

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1:40 – 2:00      **Summer 2017 survey of cyanobacteria blooms in lakes of the PA-NY Lake Erie region**  
                                 J. Michael Campbell\*, John Otto Campbell and Angelea Belfiore,  
                                 Biology Department, Mercyhurst University  
                                 Rick Diz, Department of Environmental Science & Engineering, Gannon University



- 2:00 – 2:20            **Estimation of Nutrient Loadings to Presque Isle Bay**  
Harry R. (Rick) Diz\*, Mostafa Tahmasebi, Yashaswini Raviillu  
Department of Environmental Science and Engineering, Gannon  
University
- 2:20 – 2:40            **Responses of Zooplankton Rotifer *Polyarthra* to Increased Severity of  
Cyanobacteria Blooms**  
Angelea Belfiore, Biology Department, Mercyhurst University
- 2:40 – 3:00            **Comparison of cyanotoxin concentrations to cyanobacterial cell counts using  
flow cytometry**  
Amber Stilwell\*, Jeanette Schnars, Ph.D., Regional Science Consortium
- 3:00 – 3:20            **An Overview of USGS Studies of Cyanobacterial Harmful Algal Blooms  
(cHABs) in the Great Lakes Basin**  
Joseph Duris, Water Quality Specialist, USGS Pennsylvania Water  
Science Center, New Cumberland, PA
- 3:20 – 3:40            **NOAA’s Focus on Harmful Algal Blooms**  
Sarah Jamison, Service Hydrologist and HAB Focal Point at National  
Weather Service – Cleveland
- 3:40 – 6:00            **BREAK**
- 6:00 – 9:00            **DINNER RECEPTION**  
*Food and drinks by the Sunset Café*  
*Entertainment by the Salmon Frank Band*
- Need a ticket? It’s not too late! Please see Registration Table*

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**FRIDAY, NOVEMBER 10, 2017**

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- 9:00 – 9:55            **REGISTRATION OPENS**  
*Register, Upload presentations*  
*Continental Breakfast*
- 9:55 – 10:00            **Welcome**  
Jeanette Schnars, Ph.D., Executive Director, RSC

**Presentations**

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

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- 10:00 – 10:20            **Genetic Analysis of Brook Trout from Isolated Populations in the Western  
Branch of the Susquehanna Watershed**  
Benjamin T. Rittenhouse\*, Daniel G. Rittenhouse\*, and Fred Brenner,  
Grove City College

- 10:20 – 10:40      **An Analysis of Diet and Habitat-related Variation in Body Size in Ringed Sawbacks (*Graptemys oculifera*)**  
Chelsea L. Gale\*, Ashley Gibson, and Peter V. Lindeman  
Edinboro University of Pennsylvania
- 10:40 – 11:00      **Evaluation of Range and Population Estimates for Two Endangered Species Candidate Map Turtles (*Graptemys* spp.)**  
Ashley G. Gibson\*, Chelsea L. Gale, and Peter V. Lindeman  
Edinboro University of Pennsylvania
- 11:00 – 11:20      **Chasing Purple: Uncovering the mysteries of Purple Martin (*Progne subis*) migration**  
Joe Siegrist, Purple Martin Conservation Association
- 11:20 – 11:40      **A Census of the Bat Population of Gannon University, Erie, PA**  
Maria Colt, Akmed Kulyev\*, and Dr. Steve Ropski, Biology Department, Gannon University
- 11:40 – 12:00      **Repeated prenatal VPA exposure results in marked deficits in development of sensory systems and the Superior Olivary Complex**  
Ryan S. Zimmerman M.Sc.\*, Dr. Randy Kulesza Ph.D., Auditory Research Center, The Lake Erie College of Osteopathic Medicine
- 12:00 – 1:00      **LUNCH – THE SUNSET CAFÉ**
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- 1:00 – 1:30      **STUDENT AWARDS AND CLOSING REMARKS**  
Jeanette Schnars, Ph.D., Executive Director, RSC  
*Student Award Presentations*  
*Closing Remarks*

# ABSTRACTS

*Regional Science Consortium*  
*13<sup>th</sup> Annual Research Symposium*  
*November 8–10, 2017*  
*Tom Ridge Environmental Center*  
*at Presque Isle State Park*

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## **ORAL PRESENTATIONS**

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**Wednesday, November 8, 2017**

### **Lepidoptera of Presque Isle State Park, Moth and Butterfly Sampling Showing a Decline in Butterflies**

Jerry McWilliams, Insect Curator, Tom Ridge Environmental Center Natural History Museum  
About half as many species of butterflies have been recorded on Presque Isle S.P. in recent decades since John Prescott published his paper on the [Butterflies of Presque Isle State Park, Erie County, Pennsylvania](#) in 1981. Not only has butterfly species diversity fallen, but number of individuals has fallen as well. It is not certain as to why this is happening. However, habitat loss through plant succession and invasive species introductions may be a contributing factor to the decline. Comparative lists of butterflies will be shown in order to demonstrate the changes that have occurred in the past 60 or more years. It is unknown as to whether the moths on the park are on the decline as well, since little sampling has occurred until recently. Beginning in the summer of 2012, moth sampling began by means of bait trapping, sweeping, and black lighting. These sampling methods will be discussed. Annual moth sampling has continued since then. We hope to use the material collected as a data base to determine the status of moth abundance and species diversity. So far we have made some interesting finds. One example is the discovery of 'dark underwing' moths in the genus *Catocala*. Their larvae typically feed on trees in the family Juglandaceae. However, this family of trees, which include Walnut, Butternut, and Hickory, are not found on the park. Despite the absence of their known larval host plants on the park, at least six species have been collected in bait traps. Some species of butterflies and moths are known to be migratory or wander north of their normal range. Because of the shape and position of the peninsula on the south shore of Lake Erie, there is some indication of a butterfly and moth funneling effect, which is well known with bird migration. This might explain why some moths and butterflies that have no host plant on the park are being found there. Some samples of known Lepidoptera transients will be shown.

### **Growth of young-of-year yellow perch (*Perca flavescens*) and white perch (*Morone americana*) in Presque Isle Bay**

Chloe Parise\*, Jacob Kisiel\*, Christopher Dempsey, and Greg Andraso

Department of Biology, Gannon University

Gannon University has begun a long-term, monthly sampling program to monitor the waters of Presque Isle Bay (PIB). That monitoring effort includes bottom trawling to assess several fish species of interest. Two of those species are yellow perch (YP, Percidae: *Perca flavescens*), an important commercial and game fish; and white perch (WP, Moronidae: *Morone americana*), a non-native temperate bass that has received considerable attention. The goal of this project was to assess relative abundance and growth rates of young-of-year (YOY) of both species in PIB. Sampling was conducted with a 4.9 m semi-balloon bottom trawl with a bag lined with 6.4 mm knotless netting. Trawls were 10 minutes in duration and

covered approximately 0.70 km. YP and WP were counted and total length (TL) of all individuals was recorded. Relative abundance of both species was calculated for each sampling date and TL data were used to construct size-frequency distributions and estimate YOY growth rates across the season. A total of 1325 YP and 1408 WP was collected on five dates between 16 June and 15 September, 2017. Of those, 43% of YP and 97% of WP were YOY. Across collection dates, YP and WP were the two most abundant species collected. Regression analyses of TL and collection date revealed linear growth rates of approximately 0.31mm/day for YP and 0.58mm/day for WP. These results suggest that PIB is an important spawning area for both species and that WP have an early advantage over YP in terms of growth rate.

### **The development of the pharyngeal bone, ceratobranchial 5 in *Lepomis* hatchlings**

Meaghan Danaher\*, Greg Andraso, and Kelly Grant

Gannon University, Department of Biology

Since Darwin, scientists have tried to explain how bones develop into varying shapes in different species. Environmental and genetic differences help to sculpt bones, but previous evolutionary-developmental studies have demonstrated that changes in gene expression, rather than changes in the coding sequence of the gene drive a lot of the morphological difference between species. We hypothesize that differential gene expression is key to shaping ceratobranchial 5 (cb5) in bluegills (*Lepomis macrochirus*) and pumpkinseed (*Lepomis gibbosus*). Bluegills have a narrow, petite cb5 compared to the large, broad cb5 of pumpkinseeds. cb5 is a pharyngeal bone with teeth that fish use to process prey. Before, investigation of differential gene expression can commence, the earliest stage at which cb5 becomes different between the species must be determined. We generated bluegill, pumpkinseed, and hybrid embryos and measured cb5 at different stages of development to pinpoint the stage when size differences are first observable. Simultaneously, embryos and hatchlings were preserved for future gene expression studies via RT-PCR and RNA sequencing. Several candidate genes have already been cloned for RT-PCR studies, including a few members of the Bone Morphogenetic Protein family and other signaling molecules.

### **Distribution and abundances of French Creek Mussels**

\*Kyle Clark, Dr. Jay R. Stauffer, Jr.

French Creek is arguably one of the most biodiverse systems on the East coast. It is home to 25 different species of mussels, of which, 4 are federally endangered. Mussels are vital to an aquatic system as they act like natural filters that extract copious amounts of toxins and metals from our waterways. In recent years, people have taken notice of their filtering behavior and have started using mussels as indicators of water quality. Although there has been a recent surge in the number of people studying mussels, not much is known about their distributions or abundances in our waterways. During the spring and summer of 2017 researchers from Penn State conducted mussel inventories and mark recapture studies at 8 different sites on French Creek. This presentation will focus on the results of these studies.

### **Comparison of Aquatic Macroinvertebrates Among Major Pennsylvania Drainages**

Sara Mueller, The Pennsylvania State University

Since the turn of the 20<sup>th</sup> century, aquatic macroinvertebrates have become ubiquitous and important indicators of water quality. This group of organisms is widespread in its diversity across a range of habitat types. Most studies concerning the distribution of aquatic macroinvertebrates are regional in scale or are based on a single taxonomic group. There is a distinct lack of inter-drainage comparison with aquatic macroinvertebrates as is common with fishes. In the summers of 2015 and 2016, nine Pennsylvania State Parks were surveyed for aquatic macroinvertebrates. Fifty-two waterways were sampled, yielding over 20,000 individuals located in three of the major drainages in Pennsylvania. This presentation will

highlight the differences among drainages and notable occurrences of macroinvertebrates in Pennsylvania.

### **Reducing Cigarette Litter at Beach 10, Presque Isle State Park**

Sarah Bennett\*, Lecturer of Biology, Mercyhurst University and Mark Mullinger, Student, Mercyhurst University

Cigarette litter is the most common types of litter found during beach cleanups worldwide (Ocean Conservancy, 2017), and Presque Isle State Park is no exception. They have consistently been one of the two most abundant items picked up during Adopt-a-Beach cleanups since 2013 (Alliance for the Great Lakes, 2017). The purpose of this project is to compare historical beach cleanup data beginning in 2012 to beach cleanup data after cigarette collection canisters were placed at Beach 10. Canisters were installed at Beach 10 on August 2, 2017. The average number of cigarette butts picked up during August cleanups prior to installation was 426. The average number of cigarette butts picked up during September prior to installation was 603. In August 2017 and September 2017, only 129 and 163 butts, respectively, were picked up during cleanups. Additionally, at least 919 cigarette butts have been placed in canisters since they were installed. These initial data indicate that the canisters are effective at reducing cigarette litter on the beach; however, further analysis is needed. Summer 2017 was a mild one, which most likely reduced the number of visitors to the beach. Additionally, the number of cigarette butts retrieved is often related to the number of volunteers picking up a beach. Data collection will continue through October 2017 and again May 2018-October 2018 to seek stronger evidence for canister effectiveness.

### **Teens and environmental awareness**

Daniel T. Kaufmann, Pennsylvania Outdoor Corp, Student Conservation Association  
As the effects of climate change present themselves, we look for more avenues to proactively combat it. Through programs like the Pennsylvania Outdoor Corps (PAOC) and the Student Conservation Association (SCA) we can turn to an often-overlooked and misrepresented resource. That resource is our children, more specifically urban teenagers approaching the next step in their journey to adulthood. The PAOC and SCA endeavor to foster conservation awareness in teenagers and, through strong leadership and extracurricular education, show them more options for careers related to the environment. After compiling data from a nationwide six-week summer program, we begin to see how gender and race play a factor in educating the next line of defense in care for our natural environment. We can also see the efficacy of the program from before and after surveys of the time they spent caring for their environment and the education they received that encompassed how they impact the environment both positively and negatively. They also benefitted from education relating to critical thinking and becoming aware of confirmation bias and how to avoid its trap. Through this data we hope to identify more ways to incorporate urban teenagers who do not have the knowledge of programs like the PAOC and SCA and expand their options for careers in fields that can lead to better environmental care.

### **Stable isotope analysis of individuals from the Fort Bridger and Platte Bridge Station (Fort Caspar) burial communities: An exploration of frontier-era military burials**

Leslie Fitzpatrick, Department of Applied Forensic Sciences, Mercyhurst University  
Increased tensions between Native American and non-indigenous immigrant groups within the Wyoming Territory during the mid-19th century led to the garrisoning of United States soldiers at Fort Bridger and Platte Bridge Station (Fort Caspar) for the protection of the non-indigenous parties. Towards the end of the Civil War, the troops at these sites were generally assigned from a mixture of Galvanized Yankee (former Confederate troops that were active Union-based prisoners-of-war) and former Union units. The scant historic records pertaining to these sites suggest the probable origin of many of the troops assigned to the American west during this period; however, for the majority of these troops, individual

identification remains undetermined. This study employs stable isotope methodologies in an effort to reconstruct the geographically-bound residential mobility ( $\delta^{18}\text{O}$ ) and diet ( $\delta^{13}\text{C}$ ,  $\delta^{15}\text{N}$ ) patterns across the life histories of individuals interred at the sites of Fort Bridger (N=3) and Platte Bridge Station (Fort Caspar) (N=3). Although the firm identification of individuals within archaeological settings is relatively uncommon, the identification of two military-associated individuals from the aforementioned burial communities is proposed based on historic records and distinctive osteological trauma markers. A comparison of the stable  $\delta^{18}\text{O}$  isotope values obtained from this study with the modern oxygen isoscape values for regions of suspected origin will be discussed, as well as the implications of correlating archaeologically-based isotopic values to those of modern origin.

### **The Remains of Perry's Victory: A Geophysical Survey of Misery Bay, Presque Isle, PA**

Zaakiyah Cua\*, Student Researcher, Anthropology Department, Indiana University of PA

Dr. William Chadwick, Faculty Researcher, Anthropology Department, Indiana University of PA

Dr. Ben Ford, Faculty Researcher, Anthropology Department, Indiana University of PA

During the War of 1812, Misery Bay was important in the battle preparation and ship repairs for Oliver Hazard Perry and the American Lake Erie squadron. During and following the war, several vessels were left to decay and sink into the bay. American warships *Niagara*, *Lawrence*, and *Caledonia*, British vessels *Queen Charlotte*, and the converted commercial vessel *Amelia* were deposited in the bay. Over time, several vessels have been located, recorded, and raised for repairs; either to memorialize the American victory or for routine use. However, historic records suggest the *Amelia* is possibly still laying in Misery Bay, along with other 1812 era resources. This research utilizes a geophysical survey over approximately two acres of the frozen bay, incorporating ground-penetrating radar and gradiometer deployed on the ice surface to map cultural resources. Survey data may be used to guide subsequent cultural resource diver surveys to more easily locate the shipwreck in the low visibility waters of the bay. Although the purpose of the survey is to locate the *Amelia*, other submerged cultural resources will likely be encountered as many fishing and canal vessels have been deposited in the bay since the war. Since there is little physical evidence of the Battle of Lake Erie, locating the War of 1812 shipwreck *Amelia* will contribute significantly to knowledge of the U.S. victory. Furthermore, the findings of this survey will aid Presque Isle State Park in its mission of interpreting the region's cultural resources.

### **Design of Wastewater treatment for Erie Water Works, Sommerheim Plant**

Evan Wujcik<sup>1</sup>\*, David Bovkun<sup>1</sup>, Jeb Bortz<sup>1</sup>, Dr. Varun Kasaraneni<sup>1</sup>

<sup>1</sup>Department of Environmental Science and Engineering, Gannon University, Erie PA

Erie Water Works is the primary water treatment and distribution plant for the city of Erie with an average demand of 27MGD in summer and 20MGD in winter. The plant produces an average of 1.5MGD of wastewater which is sent directly to the wastewater treatment plant without being treated on site. The wastewater treatment plant charges Erie Water Works monthly based on turbidity and flow of the raw waste water output. In addition, it is suspected that solid are accumulated in various stages of the treatment. The objectives of this project are to determine if there is accumulation of solid at any stage during the treatment, and to design the most effective and economic on site treatment method for wastewater generated at Erie Water Works. In order to determine where solid accumulation occurs most a mass balance of TSS of entering and leaving each stage of the treatment will be required. To accomplish the task of treating wastewater the following tasks will be completed in chronological order: TSS screening, grain size analysis, mass balance, evaluate the available solutions, determine the best treatment based on preset criteria, design and build prototype, bench scale testing and cost-benefit analysis. Currently, the plant produces wastewater with TSS between 30 and 300 ppm. The goal is to get the TSS below 5 ppm or less so that the water can be discharged in to the bay. To achieve this, different technologies will be researched such as a series of screenings, filter press, or separators.

## **Sustainable Waste Management: Application of yard clippings based Biochar for water treatment**

Blake Dantio<sup>1\*</sup>, Billy Morris<sup>1</sup>, and Steven Houser<sup>1</sup>, Dr. Varun Kasaraneni<sup>1</sup>

<sup>1</sup>Department of Environmental Science and Engineering, Gannon University

The disposal of yard waste is costly and, in many states, illegal and takes up valuable space in landfills. A particular application of yard waste is to use grass clippings as a feed stock to produce biochar. Pyrolysis is a method of decomposition at high temperatures in the absence of oxygen. Pyrolysis of biomass between 250°C and 500°C, have proven to produce biochar. A main objective of the project is to optimize the pyrolysis parameters in order to produce high char yields with low ash content. Once produced, the biochar will be activated using chemical or physical activation methods to convert the biochar into a form of activated carbon. Batch isotherms experiments will be conducted to evaluate the contaminant removal capabilities of the biochar for contaminants such as organic compounds and heavy metals. The results of batch tests will determine how the activated biochar will be applied to a designed and fabricated filter to test its contaminant removal abilities under dynamic conditions. Filter uses will then be explored for residential, industrial, or commercial purposes depending on biochar capabilities. Potential issues that may arise include pretreatment of the grass clippings due to residual fertilizer and pesticide concentrations, soil composition affecting grass quality, and technology limitations for complete biochar composition analysis. Ultimately, this project will reduce amounts of yard waste disposed of in landfills as well as create a sustainable product for water treatment.

## **Waste Management: Development of a Leachate Collection System and Cover Materials for Ranadi Landfill, Solomon Islands**

Courtney Platt\*, Madeline Schwerinski, Matthew Hackathorn, Hwidong Kim, Ph.D., PE.

Department of Environmental Science and Engineering, Gannon University

Honiara capital city of the Solomon islands is situated northeast of Australia. Along the shores of the Pacific Ocean rest an unmanaged dumpsite where residents are able to leave their domestic, commercial and industrial waste. This dumpsite known as the Ranadi landfill contains numerous piles of scattered waste alongside with several stagnant water ponds. Contaminated swamp-like areas are primary breeding grounds for disease carrying mosquitos, bacteria, and parasites. According to a study done by the World Health Association, 89.8% of mosquito related cases in the Solomon Islands were detected in Honiara. The ultimate goal is to reduce the amount of mosquito related diseases and improve overall health in Honiara by introducing a leachate collection system and cover materials to their current dumpsite. Through extensive research for this project, regional waste composition data and current status of waste management will be explored. Leachate production of the Renadi landfill will be estimated using Hydrologic Evaluation Landfill Performance (HELP) model. Various types of cover materials that reduce odor and vermin will be evaluated by simulating their dumpsite based on their waste composition and weather data.

## **Spatial Distribution of Heavy Metals in Surface Sediment at Presque Isle Bay and Peninsula.**

Colleen Trabold\* and Hwidong Kim, Ph.D., PE.

Department of Environmental Science and Engineering, Gannon University

Although Presque Isle Bay was determined to be in recovery by the EPA in 2002, heavy metals continue to be an environmental concern for this area. The objective of this study is 1) to determine spatial distribution of heavy metals in sediments in both Presque Isle Bay as well as along the beaches of Presque Isle State Park, 2) to observe the effects of water quality parameters such as pH, conductivity, dissolved oxygen, temperature, and phosphate on the distribution of heavy metals in the sediment, and 3) to determine if any geological or biological processes are involved in the heavy metal deposits in the sediment. Water and sediment samples were collected at three locations along the beaches of Presque Isle and five locations in Presque Isle bay. Quagga mussels were also collected at all five locations in the bay to determine heavy metal concentrations that have bioaccumulated into the tissue of the mussels. All

water quality parameters were measured at the time of sampling excluding phosphate. Phosphate levels were determined in the lab using Ion Exchange Chromatography (Dionex, USA). Sediment samples were laid out and air dried before being sieved using U.S. Standard sieves. All analysis of heavy metals and pH will be conducted on grain sizes finer than 710  $\mu\text{m}$ . Sampling and analysis will continue through December of 2017.

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**Thursday, November 9, 2017**

### **Prospects for active biological restoration of Erie's Garrison Run.**

Anne Helms, Departments of Public Health and Biology, Mercyhurst University

Maintaining a healthy watershed in densely populated urban areas is a challenge, and restoring biological integrity to historically degraded urban streams can be overwhelmingly difficult. The goal of this project is to determine whether low cost urban stream restoration options such as strategic biological reintroductions are viable for improving benthic macroinvertebrate community structure in one of the streams draining directly into Presque Isle Bay. We used Garrison Run in South East Erie as a test stream since it has consistently scored low on water quality testing on all metrics for the last 15 years. We chose to test the survivability of transplanted net-spinning Trichoptera from Walnut Creek in Garrison Run with a simple in-situ bioassay experiment. A preliminary in-situ trial using fathead minnows (*Pimephales promelas*) in the summer of 2017 indicated that proposed bioassay testing the survivability of aquatic macroinvertebrates in the stream was feasible. Successful results with the Trichoptera survivability experiment conducted in early October 2017 suggests that reintroduction of selected aquatic insects into Garrison Run might be worth advancing.

### **Unexpected diversity of diatoms in the periphyton community of Garrison Run, a polluted urban stream in Erie, PA.**

J. Michael Campbell, Biology Department, Mercyhurst University

The periphyton community of Garrison Run, a historically degraded urban stream in southeast Erie, was sampled during low-flow conditions in July 2017 to provide preliminary data on the stream's ability to provide food resources necessary to support macroinvertebrate organisms. Despite evidence of ongoing pollution discharges to the stream from the extensive upstream storm sewer system, the periphyton community presented a diverse community of diatoms on submerged surfaces of rocks and other substrates on the stream bottom. Besides diatoms, the periphyton film contained abundant particulate organic matter (POM), indicating that there are appropriate food resources for grazing and filter-feeding types of aquatic insects.

### **Monitoring Long Term Forest Change due to Invasive Insects and Disease, Deer Over Grazing, and Climate Change**

Kurt Moeller\*, Jonathan Titus, Biology Dept., SUNY Fredonia, Fredonia, NY

This study is a continuation of a long term study of the changes occurring in Western New York forests due especially to invasive forest pests, such as emerald ash borer (EAB), and the effects of intense deer pressure. The continued monitoring of twenty-nine 900 m<sup>2</sup> plots in various upland and wetland forests throughout the area was conducted. In these plots DBH for all trees was measured and recorded, along with the general health and condition of the individual trees. In these plots an assessment of down woody debris (DWB) was also recorded. Further analysis of the plots was accomplished via smaller understory plots (16m<sup>2</sup>) in which light penetration was recorded, and all of the smaller shrub, sapling, and forb species were recorded. Dramatic change was especially apparent in the wetland sites, where the forest is mostly comprised of ash trees. These trees are experiencing very high mortality rates, and far more



sunlight is penetrating to the forest floor. This data will serve as a baseline for future work in these plots, as new species move in and fill the gap left behind.

### **Avifaunal biodiversity and land use on Nusa Penida, Indonesia**

Ashlee A. Abrantes, SUNY at Fredonia, Fredonia, NY 14063

Establishment of wildlife reserves, be it an acre or an island, dedicated to the protection of species have become an essential conservation management tool due to the need to combat the inherent gamut of environmental issues stemming from anthropogenic expansion. Changes in land use affect land cover and biodiversity, making conservation management of regions home to critically endangered species a challenge. This preliminary study of the small Indonesian island, Nusa Penida, begins to fill the gap previous studies have neglected; examining the presence of endemic species in historically deforested tropical regions home to critically endangered animals facing the challenges of improved infrastructure and increased tourism. Over surveys of 28 transects across the island, 46 exotic and 14 endemic species, including the Bali Starling *Leucopsar rothschildi*, were observed. All endemic species, excluding two *Lonchura* species due to large flock size, accounted for 4.63% of total birds surveyed. Distinctions between surveys at dawn versus at dusk yielded near significance when Shannon-Weiner diversity and endemic avifaunal richness were analyzed via mixed linear modeling. More matutinal activity was witnessed across surveys by more individual birds, though fewer species. Greater richness was observed at transects below 50 meters, where development of the island is also increasing most rapidly. As exotic species adapt to changes in Nusa Penida's land use, the fate of many endemic species could potentially be imperiled. Further study of the avian populations on this island is likely to provide a model for human interference and the fate of Indonesia's terrestrial biodiversity.

### **Assessing the Economic Impact and Value of Recreational Fishing on Lake Erie Waters**

<sup>1</sup>Michael D. Ferguson, Ph.D.\*, <sup>2</sup>Alan R. Graefe, Ph.D.

<sup>1</sup>Department of Recreation Management and Policy; University of New Hampshire

<sup>2</sup>Department of Recreation, Park, and Tourism Management; The Pennsylvania State University

The well-established Lake Erie recreational angling industry is a cornerstone of the economy and lifeblood for many residents. With such a valuable water resource, natural resource managers and stakeholders alike within the Lake Erie basin recognize the importance of providing credible economic data to policy makers in order to sustain this abundant fishing resource for generations to come. Yet, there is little existing information on the economic impact and value of recreational fisheries on Lake Erie. Previous assessments are dated or considered only specific components of the Lake Erie fishery. For example, annual surveys of angler effort and catch are limited to the open water fishery only and are typically conducted only seasonally. No previous study has focused on all aspects of recreational fishing on Lake Erie waters. This research examined recreational anglers' ( $n= 1,050$ ) economic contributions to the local and Pennsylvania state economy. Preliminary study findings and their implications for natural resource management will be discussed.

### **Water Quality and Phytoplankton Communities of Bear Lake, NY**

Simona Lukasik\*, Courtney R. Wigdahl-Perry

Bear Lake is a small headwater lake located in Chautauqua County, New York. A management plan is needed at this site to protect and conserve this relatively undeveloped lake in western New York, but very little information is available about the ecology of this system. To better understand water quality concerns at Bear Lake, we performed monthly sampling from May-August during the summer of 2017. We collected vertical profile data using a Hydrolab sonde as well as whole water samples from the epilimnion, metalimnion, and hypolimnion. In the lab, chlorophyll was filtered and analyzed on the spectrophotometer. Each sample was also analyzed for phytoplankton on an inverted microscope. In

addition to water quality analysis, the watershed of Bear Lake was also mapped using ArcGIS. The maps made include land cover, macrophyte dispersal, and others. Results indicate that Bear Lake is a meso-eutrophic lake, with diverse phytoplankton dominated by *Cryptophyceae*, *Rhodomonas*, and *Anabaena*. Dissolved oxygen concentrations decrease in the hypolimnion throughout the summer, leading to concerns about anoxia at this site. These data will be used in the development of an effective and adaptive management plan for Bear Lake.

### **The Effects of Micro-Plastic Pollution on Zooplankton.**

Heather Barrett<sup>1</sup>, Courtney R. Wigdahl-Perry<sup>1</sup>, Sherri A. Mason<sup>1</sup>, State University of New York at Fredonia

Concern over plastic pollution has been growing over the last ten years, particularly with respect to microplastics. Although the consumption of microplastics has been well documented in larger organisms, little is known on how their presence might affect the behavior of zooplankton. Zooplankton are microscopic organisms that feed on algae, common in lakes around the world, and are a major food source for fish. As filter feeders, they sift through the water column for algal cells where they are also ingesting micro-plastics. Grazing zooplankton are a main source of food for fish making ingestion at this level a potential vector for plastics to enter the food chain and reduce the amount of transferred energy through trophic levels. This presentation will discuss an on-going feeding study aimed at understanding the potential impact of microplastics on Great Lakes zooplankton communities.

### **The response of brine shrimp (*Artemia salina*) to light in turbulence**

Fedele, C.M.\*, Schwab, E.M., Kato, K. D., Wolfe, T., and Anderson, E.J.  
Grove City College, Grove City, PA

In order to manage aquatic systems and resources appropriately, we need to understand the components of these systems, and how they impact the health of the biosphere. In this work we analyze the behavior of brine shrimp, *Artemia salina*, which behave similarly to marine plankton--organisms vital to the biosphere. Here we explore how turbulence and light affect swimming behavior, which might contribute to understanding the impact of turbulence on diurnal migrations of these organisms. We are using brine shrimp as a comparison organism to oyster larvae. Brine shrimp are both easy and inexpensive to culture, and thus are ideal in this study. We subjected the brine shrimp to five different levels of turbulence in light and dark conditions. The light was mounted above the tank. Using a high speed and high-resolution digital video camera and an infrared laser, we acquired image sequences to track the movement of the brine shrimp and visualize the flow around them. Our preliminary analysis of the data suggests that brine shrimp tend to swim upward when the light is on at low turbulence levels, but then begin to lose control of their movement at higher turbulence levels.

### **The balance of fluid forces in fish-like propulsion during deceleration, acceleration and constant speed swimming**

Noll<sup>1</sup>, A. R., Garborg<sup>1</sup>, C. S., Lauder<sup>2</sup>, G. V., and Anderson<sup>1</sup>, E. J.

<sup>1</sup>Grove City College, Grove City, PA; <sup>2</sup>Harvard University, Cambridge, MA

In previous work, we showed that fluid friction measured on a stationary plastic panel by boundary layer flow visualization agreed with force transducer measurements. This suggests that the visualization technique can be used to calculate friction on an undulatory—"swimming"—flexible plastic panel. A force transducer, which measures net force, cannot be used to measure friction in this case since undulation results in pressure forces. We can, however, predict the pressure forces in undulatory swimming by subtracting the friction determined from flow visualization from the transducer measurements, which has until now not been achieved. We "swam" an undulating plastic panel at three different flow speeds, simulating acceleration, deceleration, and constant speed swimming, and took flow

visualization data to measure the friction at different phases in the undulation cycle. It was found that there is an average 87% increase in friction due to undulatory motion compared with a still foil. This is in agreement with theoretical and experimental work on swimming fish, where an approximate 94% increase was found on swimming vs. still dogfish. The friction changed with the different swimming cases of acceleration, deceleration, or constant speed, and showed variation over the undulation cycle. Regular patterns in the variation of local friction over the undulation cycle were also observed. In the future, we plan to validate the pressure forces using recently developed tools. Our work furthers the understanding of the interaction of fluids with undulating propulsors, providing useful information to the fields of fish biology and marine vehicle design.

### **Review of flume speed ramping as a method for collecting tailbeat kinematics during fish swimming**

Gridley<sup>1</sup>, T. I., Noll<sup>1\*</sup>, A. R., Daningburg<sup>1</sup>, K. M., and Anderson<sup>1,2</sup>, E. J.

<sup>1</sup>Grove City College, Grove City, PA; <sup>2</sup>Woods Hole Oceanographic Institution, Woods Hole, MA  
In studies looking at resonance exhibited by fish swimming at different speeds, there is a strong linear relationship between tailbeat frequency and swimming speed. In this study, tailbeat and position information about the fish was obtained by a stereoscopic camera setup that tracks the trailing edge of the fish's tail while it swims in a flume. In this work we analyze a method for decreasing the time required for taking a data set by swimming fish for a short amount of time at each flume speed and running flume speeds in consecutive order. This method, which we call ramping, results in over three times as many speeds being tested in a set amount of time compared with non-ramped testing. The 95% confidence intervals for the slope of tail beat frequency vs. flume speed for a striped bass (33 cm in length) was 3.75-3.90 hz/(cm/s) for the non-ramped case and 3.41-3.49 hz/(cm/s) for the ramped data. Although this preliminary study shows a significant difference between the two methods, ramped data gives a similar but tighter linear fit than the data from the non-ramped cases. More work is needed to decide which method is best applied to the study of fish swimming kinematics.

### **Summer 2017 survey of cyanobacteria blooms in lakes of the PA-NY Lake Erie region**

J. Michael Campbell\*, John Otto Campbell and Angelea Belfiore, Biology Department, Mercyhurst University  
Rick Diz, Department of Environmental Science & Engineering, Gannon University  
Project funded in part by Pennsylvania Sea Grant

A regional survey was conducted of cyanobacteria blooms occurring during late July 2017 in ten different lakes in the PA-NY Lake Erie region. Publicly accessible locations along the shore of nine of the lakes were sampled with a 5-m long horizontal tow of a 65-micron mesh Wisconsin-style plankton net. Lake Erie's Presque Isle Bay was sampled using 5-m long vertical tows from a boat at mid-bay. The highest total cyanobacteria colony densities, exceeding 200,000/L, were found in Findley Lake, with Chautauqua Lake at Long Point ranking second (189,127/L) and Edinboro Lake ranking third (113,365/L). The lowest late-July cyanobacteria colony densities were found in Canadohta Lake (219/L) and Conneaut Lake (3,751/L). Cyanobacteria densities in Presque Isle Bay in late July 2017 (7,331/L) ranked sixth among the region's lakes, between Pymatuning Lake (8,827/L) and Lake LeBoeuf (6,079/L) sampled the same week. At least one or two cyanobacteria species in the genus *Anabaena* were found in each of the ten lakes. *Aphanizomenon* was detected in all of the lakes in late July except LeBoeuf and Canadohta. *Microcystis*, the genus known for producing microcystin toxin, was found in all of the lakes except Lake LeBoeuf. Highest densities of this taxon were found in Presque Isle Bay (6,740/L), Chautauqua Lake at Long Point (5,313/L) and Eaton Reservoir (3,678/L). Ranking regional lakes' cyanobacteria blooms based upon single-date sampling is not entirely reliable, since we observed a remarkable bloom of *Aphanizomenon* develop in Lake Pleasant between July 27 (3,978/L) and August 10 (101,538/L).

### **Estimation of Nutrient Loadings to Presque Isle Bay**

Harry R. (Rick) Diz\*, Mostafa Tahmasebi, Yashaswini Raviillu

Department of Environmental Science and Engineering, Gannon University

In support of a project to better understand the factors leading to blooms of cyanobacteria, so-called 'harmful algae', in Presque Isle Bay, PA, a study was conducted of the transport of nutrients (nitrogen and phosphorus) into the Bay from its watershed, and of the ambient concentrations of those substances in the waters of the Bay during the summer seasons 2016 and 2017. In order to estimate loadings from the watershed, monitoring stations were installed on the two largest tributaries to the Bay (Mill Creek and Cascade Creek). Continuous water level monitoring of the tributaries provided data for the hydrologic modeling of those streams. Nutrient concentrations in water samples collected during storm events and base flow were combined with estimates of the corresponding flow to calculate the nutrient mass being discharged from those individual watersheds into the Bay. Assuming that the monitored watersheds were representative of the unmonitored balance of the Bay's watershed, estimates were made of the daily and annual mass of nutrients transported from the watershed into the Bay. Additionally, water samples were collected in the Bay every two weeks during the summer seasons (June to September) of both 2016 and 2017. Loadings are important driving factors for the aquatic ecosystem of the Bay, and in-Bay samples provide a calibration data set for an aquatic ecosystem computer model, still under refinement. Results of the loading study and preliminary results from the aquatic ecosystem modeling will be presented.

### **Responses of Zooplankton Rotifer *Polyarthra* to Increased Severity of Cyanobacteria Blooms**

Angelea Belfiore, Biology Department, Mercyhurst University

In freshwater pelagic algal communities, responses to nutrient intakes can be seen through changes in population densities, and what organisms are detected in those circumstances. As a continuation of research conducted on Presque Isle Bay from May to October 2016, this study looked at the algal communities in Presque Isle Bay from May to September 2017, enumerating all phytoplankton and zooplankton within vertical triplicate samples collected by a Wisconsin style 65-micron plankton net. These samples were collected every two weeks from three locations along the midline of the Bay. As part of the two-year study, I examined parallels to environmental conditions and aquatic biota responses between the same months in 2016 and then of 2017. Over the course of the two-year study, the numbers and presence of the rotifer *Polyarthra* appeared to correlate with cyanobacteria blooms. In this analysis, I focused in from the broad perspective of the whole planktonic community in Presque Isle Bay to try to discern the nature of the relationship between cyanobacteria blooms and *Polyarthra*, with the intent to better understand how these animals manage to maintain large populations in the presence of potentially high levels of cyanobacteria toxins.

### **Comparison of cyanotoxin concentrations to cyanobacterial cell counts using flow cytometry**

Amber Stilwell\*, Jeanette Schnars, Ph.D., Regional Science Consortium

The Regional Science Consortium collected and analyzed harmful algal blooms samples once per week at 22 sites around Presque Isle Bay, beaches, and the Lake Erie coastline of Pennsylvania from late May to late October of 2017. Cell counts of cyanobacteria were obtained by using a BD Accuri C6 Plus Flow Cytometer and through funding from Pennsylvania Sea Grant. This data will be compared to the cyanotoxin concentrations of Microcystins which were determined using the ELISA method from Abraxis through funding from CZM and GLRI grants. Preliminary results from several sampling locations will be presented the Regional Science Consortium Symposium during the Harmful Algal Bloom session.

## **An Overview of USGS Studies of Cyanobacterial Harmful Algal Blooms (cHABs) in the Great Lakes Basin**

Joseph W. Duris<sup>1</sup>, Mary Anne Evans<sup>2</sup>, Carrie E. Givens<sup>3</sup>, Lisa R. Fogarty<sup>3</sup>, Peter Lenaker<sup>3</sup>, Erin A. Stelzer<sup>4</sup>, James H. Larson<sup>5</sup>, Keith A. Loftin<sup>6</sup>

<sup>1</sup> USGS Pennsylvania Water Science Center, <sup>2</sup> USGS Great Lakes Science Center, <sup>3</sup> USGS Upper Midwest Water Science Center; <sup>4</sup> USGS Ohio-Indiana-Kentucky Water Science Center; <sup>5</sup> USGS Upper Midwest Environmental Sciences Center; <sup>6</sup> USGS Kansas Water Science Center

Cyanobacterial Harmful Algal Blooms (cHABs) are an annual occurrence in several locations around the Great Lakes Basin. The USGS has been conducting research around the Basin, as part of the Great Lakes Restoration Initiative, since 2014. The focus of this research is to evaluate five major objectives: (1) determine the influence of biotic controls, such as invasive mussels and microbial interactions, on the formation, duration, and intensity of cHABs; (2) assess the influence of micro- and macronutrients on the formation, duration, and intensity of cHABs; (3) evaluate microbial communities for functional feedback during bloom formation through which cHABs change the microbial community or microbial-mediated processes, or in turn, bloom-associated microbes induce algal-toxin production; (4) evaluate the effects of HABs on benthic invertebrate production and communities; (5) determine the effect of landscape factors on the formation of HABs. An overview of study design, scope, and progress will be provided in the context of the core objectives.

## **NOAA's Focus on Harmful Algal Blooms**

Sarah Jamison, Service Hydrologist and HAB Focal Point at National Weather Service - Cleveland

NOAA's role in the research and prediction of harmful algal blooms has expanded notably over the last few years. In August of 2014 a harmful algal bloom in Lake Erie contaminated the drinking water used by Toledo and many of its suburbs. It prompted a "do not drink" advisory for parts of three days and fueled public discussions about what created the problem and how to prevent it from happening again. NOAA's role in HAB monitoring and predicting has grown rapidly since this event. NOAA is on the forefront of HAB research to better understand how and why these blooms form, and to improve detection and forecasting of these seasonal events. One of our top goals is to provide communities with advance warning so they can adequately plan for and deal with the adverse environmental, economic and health effects associated with HABs.

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**Friday, November 10, 2017**

## **Genetic Analysis of Brook Trout from Isolated Populations in the Western Branch of the Susquehanna Watershed**

Benjamin T. Rittenhouse\* and Daniel G. Rittenhouse\*, Grove City College

The purpose of the study is to assess the degree to which acidic discharge from abandoned mine drainage is impacting the isolation of Eastern Brook Trout (*Salvelinus fontinalis*). Acid mine drainage (AMD) has limited the movement of *Salvelinus* in West Branch Susquehanna tributaries. Consequently, the isolation has decreased gene flow resulting in a genetic bottleneck. The Trout Unlimited Unassessed Waters Initiative is assisting the Pennsylvania Fish and Boat Commission (PFBC) in identifying wild trout producing streams for protection through Department of Environmental Protection permitting. Methods for collecting samples are completed by following sampling protocols determined by the PFBC. Sampling is carried out during low flow summer conditions in order to reduce sampling bias. Sites for sample collection are approximately 100 meters of stream habitat. The end point of each site contains a natural barrier to prevent upstream movement of the trout. Collection of *Salvelinus fontinalis* utilized a Smith-Root Model LR-24 backpack Electrofisher. Caudal fin clips greater than 100mm are preserved in 70%

ethyl alcohol to be used in genetic analysis. The nucleic DNA was later isolated using Qiagen DNeasy® Blood and Tissue Kit. Research involves the use of polymerase chain reaction for rapid amplification of target gene. The primers were developed from previously published research. PCR products were then confirmed 2% agarose gel electrophoresis Images of the gel were recorded using a BioRad ChemiDoc unit under UV light to analyze the fragment sizes. Analyzation of microsatellite markers in the brook trout gene provides the ability to determine the degree of isolation.

### **An Analysis of Diet and Habitat-related Variation in Body Size in Ringed Sawbacks (*Graptemys oculifera*)**

Chelsea L. Gale\*, Ashley Gibson, and Peter V. Lindeman, Edinboro University of Pennsylvania  
There are 14 species of *Graptemys* turtles, differentiated by female head sizes into three categories: narrow-headed microcephalics, moderately broad-headed mesocephalics, and broad-headed megacephalics. Among the microcephalic species are *G. nigrinoda*, *G. flavimaculata*, and *G. oculifera*, better known as the sawback clade. Published data has shown that *G. nigrinoda* and *G. flavimaculata* are both sponge specialists; however, a previous study of the federally threatened *G. oculifera* has no mention of sponges and also lacks comparison of diets between males and females. Because of this oversight, we examined the diet of *G. oculifera* using fecal samples. Ringed sawbacks fed primarily on sponge and caddisfly larvae, although females also ate algae, Asian clams, and, in a coastal population, dark falsemussels. Similar results have been reported in both other sawback clade members. In low-gradient river reaches near the coast and at the inflow to a large reservoir, body sizes of *G. oculifera* were larger than they were in populations inhabiting sandbar-dominated reaches. This trend has also been reported in other *Graptemys* species, including *G. nigrinoda* and *G. flavimaculata*.

### **Evaluation of Range and Population Estimates for Two Endangered Species Candidate Map Turtles (*Graptemys* spp.)**

Ashley G. Gibson\*, Chelsea L. Gale, and Peter V. Lindeman, Edinboro University of Pennsylvania

*Graptemys pearlensis* and *Graptemys gibbonsi*, known as the Pearl map turtle and the Pascagoula map turtle, respectively, are two species being considered for the U.S. endangered species list. These species are each restricted to single Gulf Coast river drainages, the Pearl and Pascagoula rivers of southern Mississippi and the southeastern corner of Louisiana. These two species are similar in appearance and habitat and each coexists with a congener that is already listed. Our understanding of their ranges has expanded over the years, hence in order to determine their total ranges, surveys were conducted along the entire length of the Pearl and Pascagoula Rivers, including all of their major tributaries. The Pearl map turtle has a total range length of 1295 river km, with tributaries making up 39% of that length, while the Pascagoula map turtle occupies 1728 river km, 64% of which is in tributaries. Basking traps and fykenets used in select localities along with surveys provided data for relative abundance. On average, Pascagoula map turtles had a higher trapping success rate than Pearl map turtles: one *G. gibbonsi* was caught for every 5.8 trap-days and one *G. pearlensis* for every 7.7 trap-days. Basking densities will be used to extrapolate population estimates over the entire range of each species.

### **Chasing Purple: Uncovering the mysteries of Purple Martin (*Progne subis*) migration**

Joe Siegrist, Purple Martin Conservation Association, Tom Ridge Environmental Center, Erie, PA

The Purple Martin is an aerial insectivore that is experiencing a significant long-term population decline. Much is known about its unique ecology during the breeding season in North America and its complete reliance on human provided nesting cavities for successful nesting. However, the remainder of the life cycle covering migration and overwintering in the Amazon Rainforest has remained a mystery.

Researchers at the Purple Martin Conservation Association in collaboration with international partners have characterized migration and habitat usage from 2007 to 2017 using light level geolocators and GPS dataloggers. Improvements in biologging technology over that timeframe have allowed a focus from broad to fine scale habitat resolution. Discovery of unexpected fine scale overlap in habitat usage during overwintering from birds tagged in widely separated breeding ranges culminated in an Amazonian expedition to explore the characteristics of and conservation risks to this important habitat. This presentation will summarize some of the major findings from the course of this migration tracking research as well as the findings from work on the ground in Brazil.

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

Maria Colt, Akmed Kuliyevev \* and Dr. Steve Ropski, Biology Department, Gannon University, Erie, PA. 16541

For the past eight 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 5 years indicates a dramatic decline. White Nose Syndrome was first reported in 2006 in a cave in New York. The disease has killed an estimated 6 million bats in the eastern United States since then and has spread throughout Pennsylvania and into northeastern Ohio. This fungal infection has killed 95% of bats in some caves and may result in the listing of three bat species as endangered in Pennsylvania, including the Little Brown Bat (*Myotis lucifugus*), the predominant bat on the Gannon campus. This study will compare yearly data by building, time of year, building side and species composition to determine how White Nose Syndrome has affected the Gannon campus bats. A decrease in numbers may be partially responsible for an increase in West Nile Virus in the area. The results will also be used to place bat houses at appropriate locations to encourage bat presence on campus.

### **Repeated prenatal VPA exposure results in marked deficits in development of sensory systems and the Superior Olivary Complex**

Ryan S. Zimmerman M.Sc.\*, Dr. Randy Kulesza Ph.D., Auditory Research Center, The Lake Erie College of Osteopathic Medicine

Autism Spectrum Disorder is a group of developmental disorders characterized by deficits in behavior and socialization. While a majority of cases are idiopathic, there is a minority of cases related to genetic factors and isolated teratogen exposure, such as to valproic acid (VPA). Historically, VPA has been used to treat epilepsy, bipolar disorder, and migraines. Despite the therapeutic value of VPA, there is a significant relationship between VPA exposure and elevated risk for ASD. Pathological hallmarks of ASD in humans include decreased neuron number, size, and shape in a region of the ascending auditory pathway known as the Superior Olivary Complex. The SOC is the first site of auditory convergence in comparing sounds between each ear; in humans with ASD, this region has both fewer and misshapen neurons. Furthermore, the use of VPA in rodents has created a reproducible and reliable model of ASD as observed in humans. This investigation utilized rats prenatally exposed to VPA in an attempt to elucidate the delay of development in auditory and visual systems, characterize changes in calcium binding proteins in the SOC. Additionally, we used immunoreactive Calretinin to measure axon diameter in VPA exposed rats, and reconstructed the Calyx of Held terminal to gain a more clear understanding of the auditory dysfunction experienced by humans with ASD.

# ABSTRACTS

*Regional Science Consortium  
13<sup>th</sup> Annual Research Symposium  
November 8–10, 2017  
Tom Ridge Environmental Center  
at Presque Isle State Park*

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## **POSTER PRESENTATIONS**

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### **1. Waste Management: Development of a Leachate Collection System and Cover Materials for Ranadi Landfill, Solomon Islands**

Courtney Platt\*, Madeline Schwerinski, Matthew Hackathorn, Hwidong Kim, Ph.D., PE.

Department of Environmental Science and Engineering, Gannon University

Honiara capital city of the Solomon islands is situated northeast of Australia. Along the shores of the Pacific Ocean rest an unmanaged dumpsite where residents are able to leave their domestic, commercial and industrial waste. This dumpsite known as the Ranadi landfill contains numerous piles of scattered waste alongside with several stagnant water ponds. Contaminated swamp-like areas are primary breeding grounds for disease carrying mosquitos, bacteria, and parasites. According to a study done by the World Health Association, 89.8% of mosquito related cases in the Solomon Islands were detected in Honiara. The ultimate goal is to reduce the amount of mosquito related diseases and improve overall health in Honiara by introducing a leachate collection system and cover materials to their current dumpsite. Through extensive research for this project, regional waste composition data and current status of waste management will be explored. Leachate production of the Renadi landfill will be estimated using Hydrologic Evaluation Landfill Performance (HELP) model. Various types of cover materials that reduce odor and vermin will be evaluated by simulating their dumpsite based on their waste composition and weather data.

### **2. Sustainable Waste Management: Application of yard clippings based Biochar for water treatment**

Blake Dantio<sup>1\*</sup>, Billy Morris<sup>1</sup>, and Steven Houser<sup>1</sup>, Dr. Varun Kasaraneni<sup>1</sup>

<sup>1</sup>Department of Environmental Science and Engineering, Gannon University

The disposal of yard waste is costly and, in many states, illegal and takes up valuable space in landfills. A particular application of yard waste is to use grass clippings as a feed stock to produce biochar. Pyrolysis is a method of decomposition at high temperatures in the absence of oxygen. Pyrolysis of biomass between 250°C and 500°C, have proven to produce biochar. A main objective of the project is to optimize the pyrolysis parameters in order to produce high char yields with low ash content. Once produced, the biochar will be activated using chemical or physical activation methods to convert the biochar into a form of activated carbon. Batch isotherms experiments will be conducted to evaluate the contaminant removal capabilities of the biochar for contaminants such as organic compounds and heavy metals. The results of batch tests will determine how the activated biochar will be applied to a designed and fabricated filter to test its contaminant removal abilities under dynamic conditions. Filter uses will then be explored for residential, industrial, or commercial purposes depending on biochar capabilities. Potential issues that may arise include pretreatment of the grass clippings due to residual fertilizer and pesticide concentrations, soil composition affecting grass quality, and technology limitations for complete biochar



composition analysis. Ultimately, this project will reduce amounts of yard waste disposed of in landfills as well as create a sustainable product for water treatment.

### 3. Design of Wastewater treatment for Erie Water Works, Sommerheim Plant

Evan Wujcik<sup>1\*</sup>, David Bovkun<sup>1</sup>, Jeb Bortz<sup>1</sup>, Dr. Varun Kasaraneni<sup>1</sup>

<sup>1</sup>Department of Environmental Science and Engineering, Gannon University, Erie PA

Erie Water Works is the primary water treatment and distribution plant for the city of Erie with an average demand of 27MGD in summer and 20MGD in winter. The plant produces an average of 1.5MGD of wastewater which is sent directly to the wastewater treatment plant without being treated on site. The wastewater treatment plant charges Erie Water Works monthly based on turbidity and flow of the raw waste water output. In addition, it is suspected that solid are accumulated in various stages of the treatment. The objectives of this project are to determine if there is accumulation of solid at any stage during the treatment, and to design the most effective and economic on site treatment method for wastewater generated at Erie Water Works. In order to determine where solid accumulation occurs most a mass balance of TSS of entering and leaving each stage of the treatment will be required. To accomplish the task of treating wastewater the following tasks will be completed in chronological order: TSS screening, grain size analysis, mass balance, evaluate the available solutions, determine the best treatment based on preset criteria, design and build prototype, bench scale testing and cost-benefit analysis. Currently, the plant produces wastewater with TSS between 30 and 300 ppm. The goal is to get the TSS below 5 ppm or less so that the water can be discharged in to the bay. To achieve this, different technologies will be researched such as a series of screenings, filter press, or separators.

### 4. The Effect of Essential Plant Oils and Antibiotics on Growth Inhibition of *Streptococcus mutans*

Tarun Ahuja\*, Robert Waters, MS, Nancy Carty, Ph.D., Christopher C. Keller, Ph.D., FNAOME  
Laboratory of Human Pathogens, Lake Erie College of Osteopathic Medicine, Erie, PA

**Introduction:** *Streptococcus mutans* is a gram positive bacteria that causes dental caries and subacute endocarditis. Previous studies have shown that essential oils, such as oregano and cinnamon oil, inhibit the growth of *S. mutans*. The goal of this study was to determine the effects of a large panel of essential plant oils on inhibiting *S. mutans* growth in comparison to antibiotics that are commonly used to treat *S. mutans* infections.

**Methods:** The zone of inhibition (ZOI) of 38 essential plant oils and 8 antibiotics was determined for *S. mutans* ATCC 25175 using disk diffusion assays on brain-heart infusion (BHI) agar. The average ZOI of each oil was compared to each other, as well as to the antibiotics. ANOVA followed by Dunnett's multiple comparisons test was used to determine significance.

**Results:** Oregano and red thyme oils were the most effective at inhibiting the growth of *S. mutans*, with 100% oil clearing the plate of bacteria. Dilutions of oregano and red thyme oil were investigated, and oregano at a 25% dilution was found to have the largest ZOI (43.0 mm), compared to that of 25% red thyme (37.0 mm). No significance was observed between these two oils, but 25% oregano oil had a significantly larger ZOI than 29 of the essential oils tested. Of the antibiotics, ticarcillin and penicillin G were the most effective, with ticarcillin showing the largest ZOI of 44.9 mm, which showed no significance compared to 25% oregano oil.

**Conclusion:** Since dilutions of oregano oil had similar ZOIs compared to the antibiotics used to treat *S. mutans* infections, oregano oil in mouthwash or toothpaste could be investigated as a potential therapy or preventative maintenance against *S. mutans* infections.

## 5. The Effect of Essential Cinnamon Oils and Cinnamaldehyde on Growth Inhibition of *Pseudomonas aeruginosa* and *Staphylococcus aureus*

Scott Schmalzried\*, Nancy Carty, PhD., Christopher C. Keller, PhD., FNAOME, Robert Waters, MS, Laboratory of Human Pathogens, Lake Erie College of Osteopathic Medicine, Erie, PA

**Introduction:** *Staphylococcus aureus* and *Pseudomonas aeruginosa* are gram-positive and gram-negative pathogens, respectively, that cause a variety of infections in humans, including skin infections. Many strains are resistant to standard antibacterial therapy and due to increasing resistance new treatment options are needed. In a previous study of 37 essential plant oils, cinnamon bark oil (CBO) and cinnamon cassia oil (CCO) were found to have the largest inhibitory effects on both bacteria. The major constitutive compound of both oils is cinnamaldehyde. The goal of this study was to determine if cinnamaldehyde can inhibit growth of *S. aureus* and *P. aeruginosa*, compared to CBO and CCO.

**Methods:** The zone of inhibition (ZOI) of CBO, CCO, cinnamon leaf oil, and varying concentrations of cinnamaldehyde was determined for *S. aureus* and *P. aeruginosa* using disk diffusion assays on Mueller-Hinton agar. Statistical significance was determined by Kruskal-Wallis test followed by Dunn's multiple comparison post-hoc test.

**Results:** There were similar ZOIs for CCO, CBO, and 100% and 80% cinnamaldehyde solutions for all strains of both *S. aureus* and *P. aeruginosa* tested, and these ZOIs all had significantly larger ZOIs than cinnamon leaf oil. Cinnamaldehyde dilutions down to and including 10% and 25% inhibited the growth of *S. aureus* and *P. aeruginosa*, respectively, and these concentrations did not show a significant difference in ZOI when compared to CBO.

**Conclusion:** Cinnamaldehyde itself inhibits the growth of pathogenic bacteria. Future studies should be conducted to determine concentrations of cinnamaldehyde that are safe for topical use in order to treat antibiotic-resistant bacterial skin infections.

## 6. *Enterobacter aerogenes*: Resistance Responses to Antibiotics

Matthew C Dilts<sup>1\*</sup> & Narveen Jandu<sup>2</sup>

<sup>1</sup>Biology Major; Undergraduate Student; Gannon University, Erie, PA

<sup>2</sup>Assistant Professor; Biology Department; Gannon University, Erie, PA

Antibiotic resistance is a growing problem around the world, with no sign of stopping. Antibiotic resistance is a major concern with *Enterobacter aerogenes* (*E. aerogenes*); a gram negative, rod shaped, species which belongs to the family Enterobacteriaceae. *E. aerogenes* is an incredibly versatile and adaptable specimen, which is often multidrug resistant, and in some cases pandrug resistant. The organism is naturally found in the gastrointestinal tracts of animals, including humans. The species includes both pathogenic, and non-pathogenic strains, however the major problem caused by this organism is nosocomial infections, as it is an extremely opportunistic organism. Nosocomial infections are infections brought on in the hospital environment, as opposed to the community environment. Most commonly *E. aerogenes* causes urinary tract infections, respiratory tract infections, and bacteremia. In 2017 *E. aerogenes* was identified by WHO as a top priority for global research and drug development. Similarly, infections with carbapenem resistant Enterobacter species have a mortality rate of 40-50% in the United States. The main objective of this study is to determine the viability and growth response of a laboratory strain of *E. aerogenes* to common antibiotics tetracycline, ampicillin and streptomycin, in the laboratory setting. We hypothesize that *E. aerogenes* will exhibit greater antibiotic resistance relative to non-pathogenic *Escherichia coli*. Preliminary results reveal a dose-dependent inhibition of *E. aerogenes* growth when exposed to increasing concentrations of ampicillin (0.01ug/mL to 0.133ug/mL). Further studies will explore the growth of *E. aerogenes* with other antibiotics, and with combinations of antibiotics, in reference to *Escherichia coli*.

## 7. Impact of neonatal toxicity on vestibulocochlear afferents

Weam Altaher, Lake Erie College of Osteopathic Medicine, Erie, PA

Glutamate is the most abundant excitatory neurotransmitter in the central nervous system, and is stored and released by both neurons and astrocytes. However, neurons in the neonatal central and peripheral nervous systems are extremely sensitive to the excitotoxic effects of excessive glutamate. Indeed, excitotoxic events during the early neonatal period have been shown to result in near complete loss of retinal ganglion cells and concomitant loss of axons in the optic nerve. Results from our own investigation of excitotoxicity have revealed significant loss of neurons and abnormal expression of calbindin in brainstem auditory neurons. These results lead us to hypothesize that the impact of neonatal excitotoxicity on the auditory system originates from injury to neurons in the spiral ganglion. Herein, we examined the impact of neonatal exposure to monosodium glutamate (MSG) on spiral and vestibular ganglia. Specifically, we exposed male rat pups to MSG from postnatal day 4 to postnatal day 10. At P28, temporal bones were harvested, processed for histology and the structure and density of neurons in both the spiral and vestibular ganglia were studied. Preliminary results suggest decreased density of neurons in both the spiral and vestibular ganglia in animals exposed to MSG. Further, there was a reduction in the cross sectional area of the vestibular ganglion in MSG-exposed animals. These preliminary results suggest that an early excitotoxic environment significantly impacts neurons in the spiral ganglion and that the alterations of central auditory neurons may stem from loss of spiral ganglion neurons.

## 8. The Effect of Blueberry Fruit Extract on Growth Inhibition of *Staphylococcus aureus*

Kaylin Strauser\*, Robert Waters, MS., Christopher Keller, Ph.D., Nancy Carty, Ph.D., Kyle Scully Ph.D., Erika Allen Ph.D., Laboratory of Human Pathogens, Lake Erie College of Osteopathic Medicine, Erie, PA

**Introduction:** *Staphylococcus aureus* is a gram-positive pathogen that causes dermatological infections such as impetigo, cellulitis, and abscesses. Over-prescription of antibiotics has contributed to a rise in resistant strains of *S. aureus*, which has led to a need for new treatment approaches. Previous research has shown that blueberry extract has antimicrobial properties. The goal of this study was to determine the growth inhibition of *S. aureus* in the presence of blueberry extract.

**Methods:** Three laboratory strains of *S. aureus* were grown in the presence of whole blueberry extract, or fractionated partitions of the blueberry extract, and the zone of inhibition (ZOI) was measured after 24 hours of incubation at 37°C. Three partitioned blueberry fractions were obtained through a series of liquid extractions: hexane to isolate the non-polar compounds, followed by chloroform, and then ethyl acetate to isolate the polar compounds. The three partitions were suspended in DMSO. The remaining depleted aqueous extract was also tested.

**Results:** For the three strains of *S. aureus* tested, chloroform and ethyl acetate fractions showed the greatest ZOI followed by the hexane fraction although there was no significant difference in ZOIs between the fractions. The depleted aqueous extract showed no zones of inhibition.

**Conclusion:** Taken together, data presented here suggests that blueberry fruit extract should be investigated further for potential use as a topical antibacterial for *S. aureus*.

## 9. Exploring the role of translational quality control using CRISPR

Molly Mills\*, Department of Biology, Mercyhurst University

Paul Kelly- Molecular, Cellular, and Developmental Biology Program, The Ohio State University

Michael Ibba- Department of Microbiology, The Ohio State University

Accuracy in translation is vital to ensure the synthesis of functional proteins. Among the mechanisms that contribute to quality control of translation are the editing activities of aminoacyl-tRNA synthetases (aaRS), as they protect against incorrect amino acid incorporation. Although found in all organisms, it is not known if aaRS editing activities are required for cellular life. To date, only single editing-deficient aaRS mutants have been studied in *E. coli*. We sought to generate single, double, and triple editing-

deficient mutant strains of *E. coli* to determine if there is a threshold for quality control in translation to maintain cell viability. We successfully used the no-SCAR system to create lacZ mutants and design the aaRS mutant strains. Upon completion, these strains will be utilized to study amino acid misincorporation and the role of editing in quality control for translation.

#### **10. The Role of SCAMP3 in CXCR4 trafficking**

Dr. Quyen Aoh, Assistant Professor at Gannon University

Kasie Inserra\* Sophomore Biology Major at Gannon University

The CXC-Chemokine Receptor Type 4, CXCR4 is a G-protein coupled receptor that regulates cell growth and division, differentiation, and migration. Overexpression of CXCR4 has been linked to metastasis in cancer and promotes HIV infection. Decreased trafficking of CXCR4 to the lysosome can promote its overexpression. Upon binding to its ligand, CXCL12, CXCR4 is endocytosed. At the early endosomes, CXCR4 is ubiquitinated by the ubiquitin ligase Itch and then sorted into multivesicular bodies by the ubiquitin adaptor proteins Hrs and Tsg101. It is then targeted for degradation in the lysosomes. We are interested in whether Secretory Carrier Membrane Protein (SCAMP) 3, which is known to interact with Hrs and Tsg101, also regulates CXCR4 trafficking. To test whether SCAMP3 regulates CXCR4 trafficking to the lysosome, we will use RNA interference to knockdown SCAMP3 and we will then monitor CXCR4's localization relative to markers of the early endosome and lysosomes. We have optimized the immunofluorescence assay to examine CXCR4 localization. We have found that staining for the lysosomes and early endosomes independently of CXCR4 reduces non-specific cross-reactivity between the antibodies and increases labeling specificity. Also, permeabilizing the cells before fixing them increases specific labeling of CXCR4. Our next step will now be to perform the immunofluorescence assay in the presence or absence of SCAMP3 to determine the role of SCAMP3 in CXCR4 trafficking.

#### **11. The Role of Ent Proteins in Nitrogen Regulated Growth of *Saccharomyces cerevisiae***

\*Olivia Haile, Allyson Owens, Dr. Quyen Aoh, Ph. D., Gannon University

Cell membrane trafficking is the movement of important cellular cargo between the plasma membrane and organelles. In eukaryotic cells, trafficking plays a key role in proper nutrient uptake, which is essential to cell growth. We are examining the role of trafficking in regulating the localization of nitrogen permeases in the yeast *Saccharomyces cerevisiae*. More specifically how two clathrin adaptors, Ent3 and Ent5 regulate cell growth and affect trafficking of nitrogen permeases under preferred nitrogen sources ammonium and glutamine, and the non-preferred source proline. Ents are adaptor molecules that facilitate the trafficking of many proteins at the *trans*-Golgi network (TGN) and endosomes. We performed a growth curve assay in mutant cells with single or double deletion of Ent3 and Ent5 to examine cell fitness. Our preliminary data shows that deletion of Ent3 or Ent5 has no significant effect on growth in any of the nitrogen sources, but simultaneous deletion of both Ent3 and Ent5 causes a significant growth defect in the preferred nitrogen sources, suggesting that both Ent3 and Ent5 are required for robust growth in preferred nitrogen sources, but not in the non-preferred source. To assess the role of Ent3 and Ent5 on trafficking of nitrogen permeases, we monitored localization of the reporter permease Gap1 tagged with Green Fluorescent Protein (GFP) in *ent3ΔΔ* and *ent5ΔΔ* mutants in proline and ammonia, and no significant effect on Gap1 localization. The results from our study will give us a better understanding of the regulatory mechanisms that control nitrogen metabolism and cell survival.

## **12. Population Genetic Analysis of *Micropterus dolomieu***

Kallie Hinspeter\* and Sara Turner Ph. D., Mercyhurst University, Zurn School of Natural and Health Sciences Biology Department, 501 East 38<sup>th</sup> St. Erie, PA 16546

Microsatellites, also known as short tandem repeat (STR) variants and simple sequence length polymorphisms (SSLP's), are repeating short sequences that exist at a specific chromosomal location. Variation exists among a population in the number of repeat copies present at these loci. Therefore, these microsatellites offer distinguishable alleles that can be utilized to reveal genetic variation within a population through PCR-based assays. Within this study, ten previously identified microsatellites for *Micropterus dolomieu* will be used to examine the genetic variation within and genetic isolation between three populations in surrounding Lake Erie watersheds including Elk Creek, Presque Isle Bay, and Twenty Mile Creek. DNA extraction will be completed using the Qiagen DNeasy Tissue kit from the fin clips of each sample followed by the amplification of each allelic length variant using polymerase chain reaction and fluorescently labelled primers. Allelic size variation will be determined using the Applied Biosystem 3730XL GeneMapper through the Genomics Core Facility at Penn State University. Data will be analyzed for conformance to Hardy-Weinberg equilibrium, allelic richness for each locus and population, population size estimation, and population differentiation. This experiment, as part of the larger project "Assessing background rates of intersex, expression of vitellogenin, teste transcriptome, and population genetics of *Micropterus dolomieu*," will also estimate the effects of intersex male frequency on effective population size.

## **13. Seasonal and Biological Variation of Urinary Dopamine Levels**

Ashley Crilley\* and He Liu, Department of Biology, Morosky College of Health Professions and Sciences, Gannon University, Erie, PA, USA

Dopamine is a neurotransmitter, the chemical signal molecule between nerve cells. Dopamine is produced in many different areas of the brain, such as the substantia nigra and the ventral tegmental area. It is essential for numerous functions, including pleasure, mood, motivation, movement, and attention. Diminished production of dopamine plays a critical role in Parkinson's disease. In this study, 63 urine samples (23 in early February and 40 in early September) from Gannon University students and members of the Erie community were collected. We were interested in finding out how the levels of dopamine in the body differ under certain conditions, for example, gender, diet, exercise level, and seasons. We tested for the change in dopamine concentration with an ELISA kit. Our results showed that the average dopamine level in the samples collected in the winter is more than twofold the average dopamine level in the samples collected in the summer. Further data analysis will be conducted to examine correlations between the variation of dopamine levels and other factors.

## **14. An investigation of the role of Peroxisome Proliferator-activated Receptor $\gamma$ (PPARG) Agonists in human adipocyte differentiation**

Calvin Wong, State University of New York at Fredonia

The initial goal/purpose of this exploratory research was to examine what treatments lead to preadipocyte differentiation; of particular interest is the differentiation of preadipocytes to brown adipose tissue (BAT). The targeted mechanism, is if the activation of peroxisome proliferator-activated receptor  $\gamma$  (PPARG) induces differentiation to BAT. In an attempt to accomplish this, there were three proposed methodologies at our disposal, cell culturing technique, cell differentiation, and treatment mechanism. The original aliquot of SGBS cells were graciously donated to us from researchers at the University of Ulm, Germany, courtesy of Martin Wabitsch, PhD. However, as the project proceeded on, there was a shift in focus to the former of the three, cell culturing technique. The importance of this shift towards solely cell culturing became evident when our sample of SGBS cells had arrived in media, rather than frozen. We began growing a vast quantity of SGBS for "stock cells" from which future projects could utilize. This was accomplished through numerous attempts at cell feeding and splitting until an adequate

quality and quantity was achieved. From there, the cells were frozen down and stored in liquid nitrogen as stock cells. The initial purpose remained but were put on hold until an adequate stock of cells were produced. Following the summer, in this Fall 2017 semester, we look forward to carrying on the initial goal of the project.

### **15. Investigation of benign arrhythmia and caffeine consumption**

Samantha Meyer\*, Johnelle Dirsha\*, Keith Marble\*, Marissa Okerland\*, and Caitlin Hackett\*  
State University of New York at Fredonia

The purpose of this project is to see if gender, caffeine, and daily activity can be causal factors that lead to Premature ventricular contractions (PVCs) and Premature atrial contractions (PACs). Premature atrial contractions are premature heart beats that originate in the atria of the heart. Premature ventricular contractions are abnormal heart beats that occur in the ventricles of the heart. Both types of premature arrhythmias are thought to be relatively benign and are not typically thought to indicate underlying s. 24 (12 men and 12 women) of college age will be recruited to participate in this study. Potential subjects with pre-existing or diagnosed cardiac pathology or arrhythmias will be excluded from participating. Additional exclusionary criteria will be the use of over the counter and/or prescription medication that can affect the electrical system of the heart. Prior to the EKG recording visit, subjects will have to answer a caffeine intake questionnaire and record food intake over a period of three days. Additionally subjects will keep track of daily activity, through the use of a pedometer. Once these factors are recorded, the subjects will have their resting heart rate and blood pressure measured and recorded. Subjects will then visit the lab on two separate occasions to have their resting EKG recorded while lying in a supine position on a padded table. We predict that subjects who lack in daily activity and consume more caffeine are at a higher risk for incidence of PACs and PVCs.

### **16. Perspectives on Attention Deficit Hyperactive Disorder**

Mary Vagula\*, Armaghan Raeouf, and Austin Grist, Biology Department, Morosky College of Health Professions and Sciences, Gannon University, Erie, PA 16541

Attention Deficit Hyperactive Disorder (ADHD) is the most common neurodevelopmental disorders of childhood which could last into adulthood. The signs and symptoms of this disorder start to manifest in children, as early as the age of 3, in the form of trouble paying attention, controlling impulsive behaviors, or overly active behaviors. Such symptoms can hinder their learning process, social skills, and overall maintenance of health. In case of adults with ADHD the disease may manifest in the form of trouble managing time, being organized, setting goals, holding down a job, or having stable relationships. There are three types of ADHD and are categorized based on the severity of a particular symptom. The first type is 'Predominantly Inattentive Presentation' where the patient finds it difficult to construct and complete a task, is inattentive to details, and cannot comprehend instructions. The second type is 'Predominantly Hyperactive-Impulsive Presentation' where the patient is restless, is constantly on the move, and interrupts others often. The third type is 'Combined Presentation' where both first and second types are displayed equally in the patient. In this presentation authors discuss the increasing incidence of this condition and the possible causes in the light of research available.

### **17. Surveying the Gut Microbiome of the Pacific Coast Dampwood Termite, *Zootermopsis angusticollis***

Michael Anthony\* and Tyce Scheider\* (Matthew J. Foradori), Department of Biology and Health Services, Edinboro University

A gut microbiome describes all the genes found in the entire collection of microorganisms that live within the intestinal tract of a host organism. The hindgut of *Zootermopsis angusticollis* - the Pacific Coast Dampwood Termite - harbors single-celled protozoans such as members of the *Trichonympha* genus,

along with bacterial members of the *Treponema* genus that aid in the digestion of cellulose found in the wood that termites thrive on. Therefore, these microbes are crucial for the termite's survival. *Trichonympha* and *Treponema* are only a small subset of microorganisms found in the termite's gut. The intestinal tract is teeming with microbial species. This project aims to survey the constituents of this expansive microbial ecosystem using Next Generation Sequencing and Metagenomic Analyses technology (Metagenomic-Rapid Annotations using Subsystems Technology [MG-RAST], Argonne National Labs). We have extracted and sequenced microbial DNA from the termite's intestinal tract and are currently performing analysis to generate the termite's gut microbiome. From the microbiome, a microbial profile will be generated. The profile will be made public to the MG-RAST database in order to bolster the increasing knowledge base of the termite's complex microbiome.

Keywords: gut microbiome, symbiosis, microbial species profile

### **18. Surveillance of Actively Questing Ticks throughout Erie County**

Adriani Cherico\*, Michael Khoury\*, Robert Waters, MS, Nancy Carty, PhD., Christopher C. Keller, PhD., FNAOME, Laboratory of Human Pathogens, Lake Erie College of Osteopathic Medicine, Erie, PA

**Introduction:** Black-legged ticks (*Ixodes scapularis*) are commonly found in the Northeastern United States. Our previous results have shown a high carriage-rate of *Borrelia burgdorferi*, the pathogen responsible for Lyme disease, in *I. scapularis* ticks collected from Presque Isle State Park (PISP). This study examined the distribution of ticks on PISP compared to those collected in Erie County.

**Methods:** Adult and nymph *I. scapularis* ticks were collected throughout Erie County between June and July 2017. Ticks were obtained by flagging low-lying brush and grasses. Parameters recorded during collection included time spent collecting (ticks/hour), time of day, temperature, humidity, GPS coordinates of flagging locations.

**Results:** A total of 144 ticks were collected during the study period: 102 were *I. scapularis* nymphs, 28 were *I. scapularis* adults, and 14 were adult *D. variabilis*. Ticks were significantly more prevalent on the trails on PISP compared to the rest of Erie County that was flagged. Specific locations where ticks were prevalent included Sidewalk, Dead Pond and Pine Tree trails on PISP, and Erie Bluffs State Park, south and west of the city of Erie. Most of the ticks were captured during the late morning (10AM-12PM) and early afternoon (1PM – 3PM) periods.

**Conclusions:** Ticks are present in the highest numbers at PISP and the northern areas of Erie County, with the largest number of ticks collected during the late morning and early afternoon hours.

### **19. Detection of *Borellia burgdorferi* from *Ixodes scapularis* in Erie County, PA.**

Mark Mullinger, Mercyhurst University

The passing of *Borellia burgdorferi* from *Ixodes* ticks to a vertebrate host is central to the life cycle of the bacteria. When this host is human, *B. burgdorferi* becomes the causative agent for Lyme borreliosis, a disease of medical significance that affects over 30,000 people in the U.S. annually. In the public health response to Lyme disease, data on the prevalence of *B. burgdorferi* in *Ixodes* tick populations are invaluable to assessing the risk of exposure to human populations. This study seeks to identify the prevalence of *B. burgdorferi* for *Ixodes scapularis*, which is the primary Lyme vector, in Erie, PA over a 3-year period. Using PCR, our data showed close to a third of ticks tested positive for the presence of *B. burgdorferi* (n>100). Cytochrome oxidase PCR was used to ensure the presence of tick DNA, with around 80% successful (n>100).

## **20. Monthly water quality changes in Presque Isle Bay**

Luchansky, K.\*, Ross, C.\*, Andraso, G., and Dempsey, C., Gannon University

Monitoring water quality in aquatic ecosystems is critical to our understanding of how they change over time. Here in Erie, PA, Presque Isle Bay (PIB) is a unique body of water that provides ecological, economic, and recreational benefits. Faculty and students at Gannon University have implemented a monthly sampling program in an effort to monitor environmental and biological changes in Presque Isle Bay. Our part of this multidisciplinary project is to focus on changes in water quality, nutrients, light, and dissolved organic carbon. Each month we collect water quality data (temperature, conductivity, pH, and dissolved oxygen) using a YSI profiling instrument. We take light readings using a LICOR PAR (photosynthetically active radiation) meter and conduct a Secchi disc reading. Lastly, we collect water samples from 0, 2, 4, and 5 meter depths. These samples are analyzed in the laboratory for ammonia, phosphate, and dissolved organic carbon concentrations/quality. Our goal is to piece together a long term data-set of change in Presque Isle Bay. Information presented here focuses on data from fall 2016 to fall 2017.

## **21. Spatial Distribution of Heavy Metals in Surface Sediment at Presque Isle Bay and Peninsula.**

Colleen Trabold\* and Hwidong Kim, PhD., PE.

Department of Environmental Science and Engineering, Gannon University

Although Presque Isle Bay was determined to be in recovery by the EPA in 2002, heavy metals continue to be an environmental concern for this area. The objective of this study is 1) to determine spatial distribution of heavy metals in sediments in both Presque Isle Bay as well as along the beaches of Presque Isle State Park, 2) to observe the effects of water quality parameters such as pH, conductivity, dissolved oxygen, temperature, and phosphate on the distribution of heavy metals in the sediment, and 3) to determine if any geological or biological processes are involved in the heavy metal deposits in the sediment. Water and sediment samples were collected at three locations along the beaches of Presque Isle and five locations in Presque Isle bay. Quagga mussels were also collected at all five locations in the bay to determine heavy metal concentrations that have bioaccumulated into the tissue of the mussels. All water quality parameters were measured at the time of sampling excluding phosphate. Phosphate levels were determined in the lab using Ion Exchange Chromatography (Dionex, USA). Sediment samples were laid out and air dried before being sieved using U.S. Standard sieves. All analysis of heavy metals and pH will be conducted on grain sizes finer than 710  $\mu\text{m}$ . Sampling and analysis will continue through December of 2017.

## **22. Impacts of Urban Environments on Marsh Run: Insights from the 2017 Floods**

Jillian Mathews\* and Dr. Katherine Farnsworth, Indiana University of Pennsylvania, Geoscience Department

This study attempts to determine the amount of stormwater runoff from residential areas entering Marsh Run in Indiana, Pennsylvania. First, an approximate volume of water within the river system must be calculated by multiplying the width of the stream and the depth of the water across the stream in a cross-sectional manner. This volume will be multiplied with the velocity to get the approximate discharge of the stream. A series of sensors have been placed into the stream that collect water level changes. These sensors were placed along the bottom of the stream and measure the pressure and how it changes over time. The precipitation rates will be analyzed over time, and compared to the water level changes over time. The amount of stormwater from residential regions entering the river system is also being calculated. A fellow classmate is estimating how many gallons of stormwater enter the stream per hour. Once the stormwater flux is determined, the most detrimental source of water will hopefully be identified. If the stormwater is the major factor affecting the floods, then this information can help to determine possible remediation plans. These plans may include removal of traditional drainage systems and replacing them with French drains or some sort of time-release system of the stormwater to reduce the



rate at which the water flows into Marsh Run. Should stormwater not be the cause of flooding, more testing would need done in order to uncover the true source of the flooding.

### **23. Invasive Plant Species Eradication**

Darlene Galiszewski, Grace Schoeniger\*, Shannon Steves, Penn State Erie – The Behrend College

The Weed Warrior Project implemented at Penn State Behrend, including part of the Wintergreen Gorge, is a continuous effort to minimize the population of invasive plant species while allowing native plant populations to recover throughout the campus.

Beginning in June of 2015, a group of undergraduate students began to eradicate invasive plants on the Penn State Behrend campus. The project has already afforded many opportunities for research and the advancement of the Cooperative Weed Management's mission to find successful methods to eradicate invasive plant species. Using ArcGIS, students have located the exact locations of six major invasive plant species and have plotted these on a grid system of Penn State Behrend's campus. This map is now consulted as a starting point to remove invasive plants from the area. The Weed Warriors also work to educate the campus and greater Erie communities about this important environmental issue, hosting many volunteer and outreach days.

In 2017, a partnership formed with the John E. Horan Garden Apartments in which a small wetland area is being eradicated of invasive plant species, while introducing native plants and offering educational opportunities.

### **24. Giant Yellow Hyssop Ecology**

Samantha Fleming\*, Jonathan Titus, Biology Dept., SUNY Fredonia, Fredonia, NY  
*Agastache nepetoides* (giant yellow hyssop, family Lamiaceae) is a perennial, flowering plant with an herbaceous growth habit and is a native endangered (S1) species in New York State. Plants were grown from seed in the greenhouse in Spring 2017 before being planted in the SUNY Fredonia Campus Woodlot in plots in June 2017.

Plants were placed in six different habitats in the woodlot: hemlock understory, deciduous understory, moist site in light with deciduous tree shade, No Mow Zone grassland, forest edge with sparse surrounding vegetation, and forest edge with dense surrounding vegetation. All plants were contained within 3x3m plots. Each habitat contained four plots for a total of 24 plants in each habitat, totaling 144. Plant height and number of leaves and inflorescences were recorded. The objective for these established plots were to determine which types of habitats *A. nepetoides* grow best in.

In order to gain insight into the pollination requirements of *A. nepetoides*, 40 plants were placed in individual pots and monitored in a sunny backyard. A set of 30 plants had mesh bags placed over their flowering heads to prevent potential pollinators from landing on them. Ten plants were left uncovered, ten were self-pollinated by hand, ten were cross-pollinated by hand, and ten plants were not pollinated, but had bags. This experiment aimed to discern whether or not *Agastache nepetoides* are able to self-pollinate.

### **25. Monitoring of a Small Population of Snow trillium (*Trillium nivale*): Assessing the Health and Identifying Threats**

Kristin Grohol\*, Josephine Harsh, Delaney Martin (and Robert Whyte, faculty advisor)

[whyte@calu.edu](mailto:whyte@calu.edu)

250 University Avenue, California PA 15419

724-938-4200

Department of Biological and Environmental Sciences, California University of Pennsylvania

A small population of Snow Trillium (*Trillium nivale*) was monitored and mapped at the request of Becketts Run Woodlands (a small private tract) from 2015-2017. Prior to this effort, the Western Pennsylvania Conservancy had completed the most recent survey in March 2012. The objective of this ongoing survey is to better determine the *T. nivale* population size and assess what future steps may be taken to protect this threatened population. Although *T. nivale* is found in fifteen states, populations are largely sporadic and considered scattered to rare. Pennsylvania DCNR classifies *T. nivale* as rare because this species exhibits restricted geographic range and is found in low numbers throughout the state. The area monitored for this study is protected through a unique land-lease giving surface rights to the Becketts Run property owners. The population is located on a small northwest-facing hillside that is severely eroded with large areas of exposed soil. The area was visited six times each spring between March and April from 2015-2017. All observed plants were counted (flowering, non-flowering, mature, and immature) and marked. A total of 77, 83, and 68 plants were recorded, respectively, for each year's survey period, in contrast to the 14 plants observed in 2012. Based on the limited information of past surveys, the *T. nivale* population appears to be stable. While our observations in comparison to older accounts may indicate an expanding population of *T. nivale* and perhaps infer a healthier one, threats to the population exist. The current erosion and habitat destruction by means of foot and motor traffic through the area threaten the population's viability. Invasive plants such as Garlic Mustard (*Allaria petiolata*) are found nearby and management efforts should address their control.

## **26. The Benefit of Trees: An Environmental and Economic Study of Connellsville City Trees**

Kristin Bomboy\* and Laken Ganoe (Robert Whyte, faculty advisor)

[whyte@calu.edu](mailto:whyte@calu.edu)

250 University Avenue, California PA 15419

724-938-4200

Department of Biological and Environmental Sciences, California University of Pennsylvania  
Recognizing the contribution of trees to society, both environmentally and economically, the City of Connellsville requested the assistance of California University of Pennsylvania through its Interdisciplinary Center for Environmental Studies to conduct a comprehensive inventory of the city trees. From June through early August of 2016 three CalU students collected relevant information for each tree to include: species name, size by measuring the diameter at breast height (dbh), location, and information regarding the health of the tree and maintenance needs and concerns. All information was collected and recorded on an iPad using a software system i-Tree™ Streets. Location data was recorded by using a Trimble global positioning system unit (GPS). Almost 1,000 trees were inventoried comprised of 43 different species. From this information the City of Connellsville may determine several economic and environmental benefits that the trees provide to the city. For example, the Callery Pear which comprised ~11% of all public trees provides a total aesthetic value of ~\$2,300. This same tree provides energy cost savings to the city and its residents of ~\$15/tree. Stormwater and air quality benefits were also calculated based on the total number and species of trees present. A full report will be provided to the City of Connellsville and additional work is anticipated being done in the near future.

## **27. Functional Wetland Assessment of Three Mitigated Wetlands in Southwest, PA – Year One, Plant Productivity**

Elizabeth Miller (Robert Whyte, faculty advisor)

[whyte@calu.edu](mailto:whyte@calu.edu)

250 University Avenue, California PA 15419

724-938-4200

Department of Biological and Environmental Sciences, California University of Pennsylvania  
To compensate for impacts to project area wetlands resulting from State Route 70 highway construction activities, three constructed wetlands were built on Game Commission property at State Gameland 297 in

North Bethlehem Township, Washington County. Wetland mitigation for these constructed wetlands includes the design, construction and subsequent monitoring. Partners for Fish and Wildlife, a unit of California University of Pennsylvania, was responsible for the design and construction phase. The monitoring which will extend over a 5 year period is being done by the Interdisciplinary Center for Environmental Studies of California University of PA. Year one monitoring was done in the summer and fall of 2016 examining the physical and biological components of these wetlands. The primary objective of this five year study will be to assess the level of function of these mitigated wetlands. Results presented here include plant productivity (biomass) as one component to aid in the evaluation of the success of the initial wetland mitigation efforts. Dominant plants in year one included the native broad-leaf cattail (*Typha latifolia*) and the herbaceous water plantain (*Alisma plantago-aquatica*), neither of which were planted but were a component of the present seedbank. Overall herbaceous wetland plants comprised the bulk of the plant biomass measured.

## **28. Functional Wetland Assessment of Three Mitigated Wetlands in Southwest, PA – Years One and Two: Wetland Plant Development and Species Composition**

Jerry Koza (Robert Whyte, faculty advisor)

[whyte@calu.edu](mailto:whyte@calu.edu)

250 University Avenue, California PA 15419

724-938-4200

Department of Biological and Environmental Sciences, California University of Pennsylvania  
To compensate for impacts to project area wetlands resulting from State Route 70 highway construction activities, constructed wetlands were built on Game Commission property on State Gamelands 297 and 302 in southwest PA. Wetland mitigation for these constructed wetlands includes the design, construction and subsequent monitoring. Partners for Fish and Wildlife, a unit of California University of Pennsylvania, was responsible for the design and construction phase. The monitoring which will extend over a 5 year period is being done by the Interdisciplinary Center for Environmental Studies of California University of PA. Year one monitoring was done in the summer and fall of 2016 examining the physical and biological components of these wetlands. The primary objective of this five year study will be to assess the level of function of these mitigated wetlands. Results presented here include wetland plant species composition and abundance to aid in the overall evaluation of the success of the initial wetland mitigation efforts. Dominant plants in year one included the native broad-leaf cattail (*Typha latifolia*) and the herbaceous water plantain (*Alisma plantago-aquatica*), neither of which were planted but were a component of the present seedbank. *Typha* spp. continued to expand in all SGL 297 wetlands in year 2, and overall wetland plant diversity was down slightly.

## **29. Monitoring Wetland Development in Recently Mitigated Wetlands in Southwest PA: Water Quality and Soils**

Cassadi Stainbrook<sup>1\*</sup> and Addison Seman<sup>2</sup> (Robert Whyte, faculty advisor)

[whyte@calu.edu](mailto:whyte@calu.edu)

250 University Avenue, California PA 15419

724-938-4200

Department of Biological and Environmental Sciences, California University of Pennsylvania

Department of Earth Sciences, California University of Pennsylvania

To compensate for impacts to project area wetlands resulting from State Route 70 highway construction activities, three constructed wetlands were built on Game Commission property at State Gamelands 297 and 302 in southwestern PA. Wetland mitigation for these constructed wetlands includes the design, construction and subsequent monitoring. Partners for Fish and Wildlife, a unit of California University of Pennsylvania, was responsible for the design and construction phase. The monitoring which will extend over a 5 year period is being done by the Interdisciplinary Center for Environmental Studies of California

University of PA. Several water quality and soil parameters were monitored and evaluated at both mitigated sites. Each State Game Land site consists of three wetlands receiving water from a combination of intermittent streams, surface runoff and precipitation. Water samples were collected from areas of permanent standing water. Recorded water quality parameters included temperature, water depth, dissolved oxygen, pH, salinity, total dissolved solids, and turbidity. Hydric soil development was assessed in each wetland from soil samples collected in the immediate upland, mid-levee, nearshore, and wetland center. Soil pH, bulk density, organic content, and color (Munsell Soil Color) were recorded for all samples.

### **30. Functional Wetland Assessment of Mitigated Wetlands in Southwest, PA: Benthic Macroinvertebrate Development and Community Composition**

Matthew Carter (Robert Whyte, faculty advisor) whyte@calu.edu  
250 University Avenue, California PA 15419  
724-938-4200

Department of Biological and Environmental Sciences, California University of Pennsylvania  
To compensate for impacts to project area wetlands resulting from State Route 70 highway construction activities, constructed wetlands were built on Pennsylvania Game Commission property - State Gamelands 297 and 302 in southwest PA. Wetland mitigation for these constructed wetlands includes the design, construction and subsequent monitoring. Partners for Fish and Wildlife, a unit of California University of Pennsylvania, was responsible for the design and construction phase. The monitoring which will extend over a 5 year period is being facilitated by the Interdisciplinary Center for Environmental Studies of California University of PA. The primary objective of this five year study will be to assess the level of function of these mitigated wetlands. Results presented here include wetland an assessment of benthic macroinvertebrate populations in these created wetlands. Benthic macroinvertebrates were sampled in June, July, August, and September of 2017. The wetlands were sampled using Hester-Dendy plate samplers, and D-frame dipnets. Hester-Dendy plates were deployed in September, with dip-netting taking place every month at each wetland starting in June. Collected specimens were identified down to the species level when possible, and all were identified to the order level. Results will be analyzed using both the Shannon-Weiner diversity index, and the non-parametric Mann-Whitney test to determine if there are significant differences in abundance and diversity between both study sites. The study of both of these sites investigates will provide a better understanding of benthic macroinvertebrate communities development in created wetlands.

### **31. Fish community composition in open waters of Presque Isle Bay, 2017**

Nathan Reckner\*, Christopher Dempsey, and Greg Andraso  
Department of Biology, Gannon University

Gannon University has begun a long-term, monthly sampling program to monitor the waters of Presque Isle Bay (PIB). Part of that monitoring effort includes bottom trawling to assess fish community composition of the bay. Sampling was conducted with a 4.9 m semi-balloon bottom trawl with a mesh bag lined with 6.4 mm knotless netting. Trawls were 10 minutes in duration and covered approximately 0.70 km. All fish collected were identified to species level, and most were released. Catch data were used to calculate absolute numbers and relative abundance of each species across the season. Species richness, species diversity [Shannon ( $H'$ ) and Simpson ( $D$ ) Indices], and evenness ( $J'$ ) were also calculated for each sampling date. Sorenson's Coefficient ( $CC$ ) was used to make community comparisons between dates. A total of 3091 individuals belonging to 17 species was collected on five dates between 16 June and 15 September. Species richness ranged from 4 to 14 species. Across dates, white perch, yellow perch, round goby, and pumpkinseed were the most abundant species, and together comprised over 95% of the total catch. Values for  $H'$  and  $D$  were 0.72-2.07 and 1.58-3.30, respectively. Calculations of evenness ( $J'=H'/H_{max}$ ) ranged between 0.44 and 0.78, suggesting relatively low species diversity over the study

period. Except for 16 June, comparisons of the fish community using CC suggest a high degree of community similarity throughout the season. Continued long-term monitoring of the fish community within PIB may serve as a valuable tool for detecting ecological changes within this body of water.

### **32. Preliminary morphometrics, growth, and natural history observations of the short-headed garter snake, *Thamnophis brachystoma* at two urban sites in Erie County, Pennsylvania, USA**

Brian S. Gray\* & Mark Lethaby\*, Natural History Museum at the Tom Ridge Environmental Center 301 Peninsula Drive, Erie, Pennsylvania 16505

We used mark-recapture techniques to study the short-headed garter snake, *Thamnophis brachystoma* at two urban sites (Shannon Road and McClelland Park) in Erie County, Pennsylvania, USA. Mean snout-vent length (SVL) and weight was greater in females than males regardless of age class; whereas relative to total length, tail length was consistently greater in males than in females. Sex ratios did not differ significantly from 1:1 regardless of age-class. At Shannon Road, adults significantly outnumbered juveniles 3.3 to 1. While at McClelland Park, juveniles (N = 63) were nearly twice as numerous as adults (N = 31). Data regarding estimated growth are also reported. The results of the present study conform to previously published data from populations in Pennsylvania and a population near Olean, New York.

### **33. Differences in Nematode Infections of Ruffed Grouse (*Bonasa umbellus*) by Year, Age, and Sex in Pennsylvania.**

\*Matthew Inscore<sup>1</sup>, \*Joshua Stearns<sup>1</sup>, Edward Phillips<sup>1</sup>, Denver Greenawalt<sup>2</sup>, and Justin Brown<sup>3</sup>,  
<sup>1</sup>Gannon University, Biology Department, Erie, PA 16501, <sup>2</sup>Department of Veterinary and Biomedical Sciences, Penn State University, University Park, PA 16802, <sup>3</sup>Pennsylvania Game Commission, Animal Diagnostic Laboratory, University Park, PA 16802

Ruffed grouse (*Bonasa umbellus*) were collected from 21 counties in Pennsylvania during the last three hunting seasons. Necropsies were performed on the intestines and ceca of the grouse to remove parasitic nematodes. Two species of nematodes were identified (not all specimens were identified to species), *Ascarida bonasae* from the intestines and *Heterakis isolonche* from the cecum. The prevalence (% of birds infected) and intensity (mean infection per infected bird) of both species of nematode were analyzed in all birds combined, by year, and by age and sex of the bird. Overall prevalence infection rates with *Ascarida* dropped each season from 64.7% to 53.7% to 30.9%. Individual mean intensity of infection with *Ascarida* also dropped each season from 4.6 to 3.1 to 0.8 worms per bird. The drop to 0.8 during the 2016-17 season was significantly different from the two previous seasons. The prevalence of *Heterakis* remained relatively constant between seasons, and the individual mean intensity of infection dropped during the 2016-2017 season but not significantly so. During the 2016-17 season juvenile grouse had significantly greater mean infections of *Ascarida* than did adult grouse. There were no significant differences between the sexes.

### **34. Forest Management for Avian Conservation**

Carl Pohlman, Allegheny College, Environmental Science

With bird populations declining around the world it is more important than ever to ensure that suitable habitats are available for avian species. Habitat loss and degradation are the greatest threats to biodiversity worldwide (Wilcove et al. 1998). In particular, deforestation is a big threat to forest dwelling species, as deforestation results in the loss of suitable habitat for these birds to nest and breed (Mortelliti et al. 2010). Many such birds rely on the forests of the Eastern United States as areas to breed during summer months. With the expansion of human development and the harvest of timber, healthy forests in this region are becoming scarce. This study examined the differences in bird communities at three different forest sites that vary in management history. A different forest management technique was utilized at each site, the three techniques studied are: small group selection, high grading, and shelterwood

cutting. Healthy forests feature a greater degree of diversity of species and forest structure (Buchanan et al. 2016; Mitchell et al. 2005). In order to assess forest quality, a four part assessment designed to compare the quality of different forest layers was created. The results of the quality score assessment were compared to the management technique utilized at each site in order to determine the quality of habitat created by each technique. Point counts are a popular method for taking inventory of the species of birds present in an area. A point count involves an observer standing at a predetermined location for a fixed period of time, the observer records all species seen or heard during the allotted amount of time, as well as several temporal variables. To sample the avian community at each site, point counts were conducted at four randomly selected points within each site. The results of these point counts were compared with the forest quality score of each point in order to determine whether a relationship between forest quality and bird abundance and diversity exists. A statistically significant correlation was found to exist between quality score and species recorded ( $P=0.000553$ ), as well as between quality score and the number of individuals recorded ( $P=0.002085$ ). These results show that quality habitat was more likely to be created by small group selection than either high grading or shelterwood cutting. In turn, this quality habitat is more likely to be used by a wider variety and high number of birds. This information can be used by forest management groups, landowners, and others, to help these groups in their efforts to create the most bird-friendly habitats on their land.

### **35. School property as a safe haven for small mammal species**

Samantha Horodyski\*, Student, Mercyhurst University, Nora Wagner, Student, Mercyhurst University, Zarah Pratz, Student, Mercyhurst University, Sarah Bennett, Lecturer, Mercyhurst University

Mercyhurst University is located on the southern edge of the City of Erie, Pennsylvania and is just north of Mercyhurst Preparatory High School. Between the two schools are field, wetland, and wooded areas that provide potential habitats for a variety of organisms. The purpose of the current study is to determine what small mammals inhabit these areas. It is possible that this plot of land provides a safe haven for a variety of taxa, unable to survive in other locations in the city. At each trapped location, traps were baited with a mixture of oats, peanut butter, and sunflower seeds and placed 5 meters apart in transects. Some parts of transects may have been left out due to natural barriers like water. Each location was trapped 2-3 nights in a row with traps being set near sunset and checked the next morning at sunrise. Any mammals found in the traps were identified, measured for comparison statistics, and weighed. To date there were 21 white footed mice, 1 meadow vole, and 5 short tail shrews that were trapped in both locations combined. Trapping will continue until November 2017 and will resume in April 2013. Additional trapping will take place in more heavily traversed parts of campus to provide comparative data.

### **36. Constituents of Electronic Cigarette Oils**

Karla Salnoris\*, Naod Kebede, Edinboro University

The media has been strongly pushing electronic cigarettes as a much better, healthier alternative to smoking traditional tobacco products. Almost all of the companies are claiming there are only three or four ingredients in the oils depending upon the product. These products are glycerin, propylene glycol, flavorings, and nicotine. The electronic cigarette was invented in 2003, globally sold in 2004, and was not FDA regulated until August of 2016. Three electronic cigarette oils purchased before the regulation of oils were researched. These samples consisted of one strawberry flavored oil containing nicotine, and two different flavored oils, Fruit Punch and Kiwi Strawberry, containing no nicotine. These samples were investigated using Gas Chromatography-Flame Ionization Detector (GC-FID) and Gas Chromatography Mass Spectrometry (GC-MS).