

# SCHEDULE OF TALKS

*Regional Science Consortium  
11<sup>th</sup> Annual Research Symposium  
November 4-6, 2015  
Tom Ridge Environmental Center  
At Presque Isle State Park*

**WEDNESDAY, NOVEMBER 4, 2015**

---

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

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

## **Presentations**

*Session Chair: Fred Brenner, RSC President*

---

10:00 – 10:20        **A long term study examining the antibacterial effectiveness of Agion silver zeolite technology on door handles within a college campus**  
Celina Joco\*, Michael Rutter, and Beth Potter, School of Science, Penn State Erie, The Behrend College

10:20 – 10:40        **Effects of Polybrominated Diphenyl Ethers on the Heat Shock Protein Profile of Human Umbilical Vein Endothelial Cells**  
Armaghan T. Raeouf\*, Dr. Mary C. Vagula, Gannon University

10:40 – 11:00        **Patterns of *ANI1* expression in gametophytes of the fern *Ceratopteris richardii* and its role in sexual development**  
Michael Ganger\*, Randy Toth, Kara Norman, Julia Girouard, and Sarah Ewing, Department of Biology, Gannon University

11:00 – 11:20        **Mapping plant changes in Presque Isle State Park**  
Jeanette Girosky\*, Natural History Museum of the Tom Ridge Center, Dr. James Bissell, Cleveland Museum of Natural History

11:20 – 11:40        **Using DNA technology to identify invasive cattail (*Typha angustifolia*), native cattail (*Typha latifolia*), and their hybrid (*Typha x glauca*) to better manage and control the spread of the invasive in Presque Isle State Park**  
Sarah L. Meiss\*, Robert Whyte, Kelsey Kuznicki

11:40 – 12:55        **LUNCH – THE SUNSET CAFÉ**

- 12:55 – 1:00      **Abundance and Distribution of Dreissenid Mussels in Presque Isle Bay**  
Ryan D. Carter, Department of Environmental Science and Engineering,  
Gannon University  
(*Speed Talk*)
- 1:00 – 1:20      **Survey of a mussel community in the Allegheny River at a pipeline crossing site**  
Dale Snyder \*<sup>1,2</sup>; Dr. Martin Huehner Ph.D.<sup>2</sup>; Greg Zimmerman<sup>2</sup>;  
Gregory Andraso Ph.D.<sup>4</sup>  
<sup>1</sup>Gannon University, Freshwater and Marine Biology Program,  
<sup>2</sup>EnviroScience, Inc. (Stowe, Ohio)
- 1:20 – 1:40      **Development of molecular methods to detect genomic sequence variants in skin tumors/lesions on brown bullhead, *Ameiurus nebulosus*, from Presque Isle Bay**  
Sarah J. Ewing, Natalie Spaeder\*, Steven Mauro  
Morosky College of Health Professions and Sciences, Department of  
Biology, Gannon University
- 1:40 – 2:00      **Tracking Aquatic Invasive Species Using DNA in the Feces of Piscivorous Fish**  
Jared Wilczynski\*, Samantha Czerniak, Brian Fuller, Greg Andraso, and  
Kelly Grant  
Department of Biology, Gannon University
- 2:00 – 2:20      **Using Artificial Streams to Determine the Potential Impact of Round (*Neogobius melanostomus*) and Tubenose (*Proterorhinus Semilunaris*) Gobies in Two Lotic Systems of Northwestern Pennsylvania.**  
Benjamin Plohr<sup>1\*</sup>, Casey Bradshaw-Wilson<sup>1</sup>, Sara Mueller<sup>2</sup>, Jay Stauffer Jr.<sup>2</sup>  
<sup>1</sup>Allegheny College, Biology Department, 520 North Main Street,  
Meadville PA 16433  
<sup>2</sup>Penn State University, School of Ecosystem and Science Management,  
University Park, PA 16802

2:20 – 2:40      **BREAK**

- 2:40 – 3:00      **A Reptile Species Inventory in Presque Isle State Park**  
Alexandra Jones\*, Casey Wilson, Allegheny College
- 3:00 – 3:20      **The Lake Erie Bluffs – 30 years of Lake Bluff Recession Rate Monitoring**  
Jake Moore, Environmental Planner, Pennsylvania Department of  
Environmental Protection, Coastal Resources Management Program
- 3:20 – 3:40      **Sedimentation and Nutrient Loading in Pennsylvania Lake Erie Tributaries**  
Devin Beggs, Penn State Erie – The Behrend College

3:40 – 4:00            **Characterization of Longshore Current Velocity to Estimate the Potential for Nearshore Contaminant Transport from Walnut Creek to Presque Isle State Park Beaches, Erie, Pennsylvania**  
Elizabeth Hittle\*, Hydrologist, U.S. Geological Survey,  
Tammy Zimmerman, Supervisory Hydrologist, U.S. Geological Survey

4:00 – 6:00            **RSC BOARD MEETING – RSC Board Members**

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

---

**THURSDAY, NOVEMBER 5, 2015**

---

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

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

**Presentations**

*Session Chair: Bob Whyte, RSC Executive Committee*

---

9:00 – 9:20            **The role of carotenoids in integumentary color of Painted Turtles**  
John Steffen<sup>1</sup>\*, Jessica Hultberg, Stephen Drozda, Penn State Erie – The Behrend College

9:20 – 9:40            **A Census of the Bat Population of Gannon University, Erie, PA**  
Erin Debelak\* and Nick Bengal and Dr. Steve Ropski, Biology Department, Gannon University, Erie, PA

9:40 – 10:00            **Pharyngeal morphology of field-caught and lab-reared bluegills (*Lepomis macrochirus*), pumpkinseeds (*Lepomis gibbosus*), and their hybrids**  
Kelly Grant and Greg Andraso\*, Department of Biology, Gannon University

10:00 – 10:05            **Evolution & Development of the Pharyngeal Apparatus of Bluegill and Pumpkinseed Sunfish**  
Greg Andraso, Corrie Olson, Sofia Bychkova, Sourabh Goyal, Brad Nowosielski, and Kelly Grant\*, Department of Biology, Gannon University  
(*Speed Talk*)

10:05 – 10:40            **BREAK**

**Session Chair: Jon Titus, RSC Board Member**

---

- 10:40 – 11:00      **Forest Structure at the College Lodge and four Chautauqua County Swamps**  
Tera Douglas\* and Jonathan Titus, Biology Department, State University of New York at Fredonia
- 11:00 – 11:20      **Chautauqua Lake Algae Blooms**  
Jennifer Phillips Russo\* and Dr. Courtney Wigdahl-Perry, State University of New York at Fredonia
- 11:20 – 11:40      **Development of a Real-time PCR Method for the Detection of the Aquatic Invasive Plant, *Trapa natans*, in Pennsylvania Watersheds**  
Benoit Van Aken<sup>1,\*</sup>, Sasha Eisenman<sup>2</sup>, Asad Khan<sup>1</sup>, Rouzbeh Tehrani<sup>1</sup>  
<sup>1</sup> Civil and Environmental Engineering, <sup>2</sup> Landscape Architecture and Horticulture, Temple University, Ambler, PA
- 11:40 – 12:00      **Behavioral responses of host, *Formica subsericea*, to raiding activity of the parasitic slave-maker, *Formica subintegra***  
Schmidt, R. M.\*, Lueers, H. I., Schlabach, K. J., Anderson, E. J., Mohr, T. A., and Jenkins, S. P., Grove City College, Grove City, PA
- 12:00 – 1:00      **LUNCH – THE SUNSET CAFÉ**

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

---

- 1:00 – 1:20      **Vertical swimming behavior of Eastern Oyster larvae (*Crassostrea virginica*) in a jet-stirred turbulence tank**  
Parry<sup>1</sup>, S. D.\*, Wheeler<sup>2</sup>, J. D., Mullineaux<sup>2</sup>, L. S., Helfrich<sup>2</sup>, K. R., 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
- 1:20 – 1:40      **Investigation of resonance in fish swimming from tailbeat frequency and amplitude in bluefish (*Pomatomus saltatrix*) and striped bass (*Morone saxatilis*)**  
Turner<sup>1</sup>, E. L.\*, Garborg<sup>1</sup>, C. S., Lauder<sup>3</sup>, G. V., Mott<sup>1</sup>, R. D. 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; <sup>3</sup>Harvard University, Cambridge, MA
- 1:40 – 2:00      **Investigation of swimming performance in bluefish (*Pomatomus saltatrix*) by boundary layer flow visualization**  
Graybill<sup>1</sup> P. M.\*, Grosenbaugh<sup>2</sup>, M. A. (posth.), 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
- 2:00 – 2:20      **Uncovering the mechanics of remora fish (*Echeneis naucrates*) adhesion by image motion enhancement**

Voris<sup>1</sup>, A.R.\*, Flammang<sup>2</sup>, B. E., Garborg<sup>1</sup>, C. S. and Anderson<sup>1,3</sup>, E.J.  
<sup>1</sup>Grove City College, Grove City PA; <sup>2</sup>New Jersey Institute of  
Technology, Newark, NJ; <sup>3</sup>Woods Hole Oceanographic Institution,  
Woods Hole, MA

2:20 – 2:40                    **BREAK**

*Session Chair: Fred Brenner, RSC President*

---

2:40 – 3:00                    **An evaluation of sediment quality conditions in Presque Isle Bay: assessing compliance with ecosystem health and delisting targets (2005 – 2015)**  
Sean D. Rafferty, Pennsylvania Sea Grant, The Pennsylvania State University, Tom Ridge Environmental Center; [sdr138@psu.edu](mailto:sdr138@psu.edu)

3:00 – 3:20                    **Monitoring of Round Gobies in Lebouef and French Creek**  
Joshua Wisor\*, Sara Mueller, Jay R. Stauffer, Casey Bradshaw-Wilson, The Pennsylvania State University

3:20 – 3:40                    **Long-term Monitoring of Macroinvertebrates in Elk Creek**  
Kyle Clark\*, Jay R. Stauffer, The Pennsylvania State University

3:40 – 4:00                    **Foraging habits of *Etheostoma caeruleum* to determine dietary variability**  
Sara Mueller\*, Jay R. Stauffer, The Pennsylvania State University

4:00 – 6:00                    **BREAK**

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

**FRIDAY, NOVEMBER 6, 2015**

---

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

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

### **Presentations**

*Session Chair: Holly Best, RSC Executive Committee*

---

9:00 – 9:20                    **Impacts of road salts on leaching behavior of lead contaminated soil**  
Jingjing Wu, Timothy Cheney and Hwidong Kim\*, Ph.D., PE.  
Department of Environmental Science and Engineering  
Gannon University

- 9:20 – 9:40                    **Compost Conundrum: Evaluating Food Waste and the Effectiveness of Composting on College Campuses**  
Jonah Raether\* and Daela Munoz\*, Allegheny College
- 9:40 – 10:00                **Evaluation of Biochar Made from Invasive Plants for Phosphorus Removal from Urban Storm Water Runoff**  
Amber Stilwell, Department of Environmental Science and Engineering, Gannon University
- 10:00 – 10:20              **Effects of Low Aeration on Waste Decomposition and Methane Production in Simulated Landfill Bioreactors**  
Adrienne Liberati, Gannon University, Environmental Health and Engineering
- 10:20 – 10:40              **BREAK**

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

---

- 10:40 – 10:45              **Analysis of bio-filter media in a recirculating sand filter**  
Adam Olesnanik and Mingjun (Gabe) Shao, Department of Environmental Science and Engineering, Gannon University  
(*Speed Talk*)
- 10:45 – 10:50              **Urban Storm Water Filter Design for the Removal of Phosphorus Using Biochar Made From Invasive Plants**  
Robert Duran, Department of Environmental Science and Engineering, Gannon University  
(*Speed Talk*)
- 10:50 – 10:55              **Measuring and Mapping the Antibacterial Substance, Triclosan, in the Presque Isle Bay Watershed**  
Jillian Kaleal, Department of Environmental Science and Engineering, Gannon University  
(*Speed Talk*)
- 10:55 – 11:00              **Computer Modeling of Harmful Algal Blooms in Presque Isle Bay**  
Daniel Hart\* and Andrea Swagler, Environmental Science, Gannon University  
(*Speed Talk*)
- 11:00 – 11:20              **Hydrologic Modeling of Walnut Creek Using EPA Computer Software**  
Dr. Rick Diz, PE, Department of Environmental Science and Engineering, Gannon University
- 11:20 – 11:40              **Lake Erie Water-Based Outdoor Recreation Users Opinions Towards Environmental Conditions**  
Michael D. Ferguson, M.S.\*, Andrew J. Mowen, Ph.D., Alan R. Graefe, Ph.D., Department of Recreation, Park and Tourism Management, The Pennsylvania State University

11:45 – 12:45

**LUNCH – THE SUNSET CAFÉ**

12:45 – 1:00

**STUDENT AWARDS AND CLOSING REMARKS**  
Jeanette Schnars, RSC Executive Director

# ABSTRACTS

*Regional Science Consortium  
11<sup>th</sup> Annual Research Symposium  
November 4-6, 2015  
Tom Ridge Environmental Center  
At Presque Isle State Park*

---

## **ORAL PRESENTATIONS**

---

**Wednesday, November 4, 2015**

### **A long term study examining the antibacterial effectiveness of Agion silver zeolite technology on door handles within a college campus**

Celina Joco, Michael Rutter, and Beth Potter, School of Science, Penn State Erie, The Behrend College, Erie, PA, 16563

Laboratory studies have shown that small concentrations of silver are effective at inhibiting the growth of microorganisms through the disruption of important cell structures and processes. The additional ability to incorporate silver into surfaces has increased the usage of silver in the medical field and expanded its use into the consumer market. To understand the impacts of increased silver-containing antimicrobials, it is important to determine whether silver-based consumer goods are effective at reducing bacterial populations. Our study examined the antibacterial effectiveness of Agion silver zeolite technology applied to twenty-five silver- and control-coated door handles across a college campus. Door handles were sampled for six week periods in both the fall and spring semester and bacteria were cultured and enumerated on tryptic soy agar (TSA), MacConkey agar (MAC) and mannitol salt agar (MSA). A significant difference was observed between the bacterial populations isolated from silver- and control-coated door handles after four years. However, bacteria were consistently isolated from silver-coated door handles suggesting that the silver zeolite was only effective against a portion of the bacterial populations.

### **Effects of Polybrominated Diphenyl Ethers on the Heat Shock Protein Profile of Human Umbilical Vein Endothelial Cells**

Armaghan T. Raeouf, Gannon University, Student Presenter

Dr. Mary C. Vagula, Gannon University, Faculty Sponsor

Heat shock proteins (HSPs) are critical to cellular survival in stressful conditions such as altered pH, temperature, or oxygen levels. Their role is to correct denatured proteins and aid in reformation of their structure. HSPs' maintenance capabilities prevent the formation of cellular protein aggregates that would, if unattended, promote cellular necrosis. Exposure to toxicants has been found to alter the levels of these proteins. Recently, HSPs are also found to possess anti-cancer properties in cells. Polybrominated diphenyl ethers (PBDEs) are a category of halogenated compounds that serve as flame retardants in consumer goods ranging from electronics to textiles. Recently labeled as 'probable carcinogens' by the Environmental Protection Agency, this study proposes to investigate the HSP's cellular response to PBDEs in exposed human umbilical vein endothelial cells (HUVECs). Specifically, the experimentation of two congeners, BDE-209 and BDE-85, will allow for a comparison of HSPs' activity in regards to levels of toxicity and also could shed light on the role of HSP proteins in the event of PBDE exposure. An increased concentration of HSPs indicates increased cellular stress; therefore, the results are expected to signal a direct relationship between PBDE toxicity and quantity of HSPs present in the cell and can be used as a diagnostic tool to monitor cellular PBDE levels.



## **Patterns of *ANII* expression in gametophytes of the fern *Ceratopteris richardii* and its role in sexual development**

Michael Ganger, Randy Toth, Kara Norman, Julia Girouard, and Sarah Ewing

Department of Biology, Gannon University

Gametophytes of the fern *Ceratopteris richardii* may be either male or hermaphrodite. Induction, the development of males, occurs in the presence of hermaphrodite-secreted antheridiogen, while hermaphrodites develop in its absence. Antheridiogen is thought to only influence sex determination during a narrow three-day period during early development, called the induction window. The gene *ANII* is expressed at high levels by gametophytes in the presence of antheridiogen during the induction window. Thus it has been implicated as a gene important for male development. Here we show that *ANII* expression is high in mature hermaphrodites, particularly in tissue associated with rhizoids and antheridia. Hermaphrodites exhibiting greater rhizoid growth express *ANII* at comparable levels to control hermaphrodites suggesting a role for *ANII* in antheridia. Hermaphrodite explants (severed lateral wing pieces) showed greater expression of *ANII* than lateral wings that remained connected to the rest of the hermaphrodite. Explants also showed higher expression of *ANII* in the presence of antheridiogen. Together these results suggest that *ANII* expression is spatially regulated in the hermaphrodite. Its expression is likely not related to sex determination, but rather to the production of secondary sex characters, namely antheridia.

## **Mapping plant changes in Presque Isle State Park**

Jeanette Girosky, Dr. James Bissell- Natural History Museum of the Tom Ridge

Center, Cleveland Museum of Natural History

Presque Isle State Park is a 3200 acre recurved barrier sand spit, located on the south shore of Lake Erie across from Erie, PA. It is part of the Lake Erie Coastal Wetland system. A botanical field survey was conducted on Presque Isle State Park over the summer of 2015. The objective of the survey was to determine the status of, and map the locations of, Plants of Special Concern in Pennsylvania (POSCIP) where the populations had fallen to a few individuals. Historical records were consulted to determine the probable location of these species and those sites revisited. Overall plant communities were noted, along with any restoration areas so a cohesive map could be generated for use by state agencies.

Invasive plants continue to be a problem on Presque Isle, with *Typha angustifolia* (narrow-leaf cattail) having the ability to quickly take over areas that have been treated for reed grass (*Phragmites australis*). A Vegetative Index of Biological Integrity (VIBI) was conducted in Dead Pond, to gauge restoration efforts under-taken from 2004-2006 when the pond was almost a solid stand of *Phragmites*. Forty-three plant species were found in Dead Pond, including *Cladium mariscoides*, which had disappeared from the site.

## **Using DNA technology to identify invasive cattail (*Typha angustifolia*), native cattail (*Typha latifolia*), and their hybrid (*Typha x glauca*) to better manage and control the spread of the invasive in Presque Isle State Park**

Sarah L. Meiss, Robert Whyte, Kelsey Kuznicki

Native Cattail (*Typha latifolia*) is a well-known important plant in the wetland environment. Its survival is essential for a healthy wetland. But an invasive cattail (*Typha angustifolia*) has made its way from Europe into the native cattail environment. This invasive cattail quickly spreads into open wet mineral soil habitats (as found on Presque Isle State Park). It very quickly out-competes the native cattail as well as other wetland plants. Also, it has been found that the invasive cattail can hybridize with the native creating *Typha x glauca*, which can also cause problems in the native habitat. The hybrid is very difficult to identify as it often has characteristics of both the native and invasive cattail. Treatment of the invasive cattail and the hybrid is difficulty for many reasons; The best way to remedy this problem is by treating and removing the invasive and the hybrid while encouraging the native to grow, survive, and reproduce.

All three plants are considered look a likes and this can sometimes prove difficult. The overall purpose of this research is to find a way to better manage the invasive cattail in Presque Isle State Park. To do this DNA methods will be employed to quickly identify native cattail, invasive cattail, and their hybrid. Correct and quick identification of the invasive plant will allow management to specifically target the problem plant.

### **Abundance and Distribution of Dreissenid Mussels in Presque Isle Bay**

Ryan D. Carter

Department of Environmental Science and Engineering, Gannon University

This project will examine the distribution and abundance of the dreissenid mussels (zebra mussel *Dreissena polymorpha* and quagga mussels *Dreissena rostriformis*) in Presque Isle Bay, Pennsylvania. These freshwater mussels have been some of the most harmful biological invasive species to enter the Great Lakes of North America since 1990. Originating from the seas of Eastern Europe, they have made their way into the Great Lakes through ballast water of cargo vessels. Filter feeding by the mussels can increase water clarity, but the mussels tend to prefer 'true' algae to cyanobacteria (the so-called blue-green algae), some of which produce harmful toxins. This filter feeding behavior is believed to result in a greater opportunity for the cyanobacteria to 'bloom'. This project will review the mussels' environmental requirements such as temperature, calcium, pH, DO and estimate the mussels' potential distribution and abundance in Presque Isle Bay. Since the bottom sediments of Presque Isle Bay are soft and not suitable for colonization by the mussels, most of the mussels most likely are attached to sea walls and other hard submerged structures. Samples will be collected from vertical hard surfaces in order to estimate the abundance of the mussels. The results of this study will be helpful in better understanding the aquatic ecosystem of Presque Isle Bay, and the likelihood of occurrence of "harmful algal blooms".

### **Survey of a mussel community in the Allegheny River at a pipeline crossing site**

Dale Snyder <sup>\*1,2</sup>; Dr. Martin Huehner Ph.D.<sup>2</sup>; Greg Zimmerman<sup>2</sup>; Gregory Andraso Ph.D.<sup>4</sup>

<sup>1</sup>Gannon University, Freshwater and Marine Biology Program, <sup>2</sup>EnviroScience, Inc. (Stowe, Ohio)

The client has two existing pipelines crossing the Allegheny River at a site in western Pennsylvania. Intense scouring has exposed these lines. They now pose potential scour, navigation, and environmental hazards. The proposed construction and rehabilitation activities proposed by the client include cutting out the old pipes, replacing them with new pipes and covering the completed project. Such in-water construction could affect freshwater mussels (Family: Unionidae) inhabiting the riverbed at the site. The Pennsylvania Natural Heritage Program describes the Allegheny River as having a number of federally and state listed Threatened and Endangered (T&E) mussel species. Because of the potential for harm to the T&E mussel species that could arise during and after the implementation of the proposed pipeline project, the U.S Fish and Wildlife Service (USFWS) and the Pennsylvania Fish & Boat Commission (PFBC) required Phase 1 (quantitative) and Phase 2 (qualitative) freshwater mussel surveys be conducted on behalf of the client to comply with the Endangered Species Act of 1973 and the Pennsylvania Fish and Boat Code. EnviroScience, Inc. (ES) was contracted by the client to conduct mussel surveys for the project and on May 11-13, 2015 a field team from (ES) completed the necessary survey work. Here, we report the methods and findings of this project.

### **Development of molecular methods to detect genomic sequence variants in skin tumors/lesions on brown bullhead, *Ameiurus nebulosus*, from Presque Isle Bay**

Sarah J. Ewing, Natalie Spaeder, Steven Mauro

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

Brown bullheads, *Ameiurus nebulosus*, are used as an indicator species to assess environmental health and water quality within the Great Lakes watershed. Current reports estimate skin tumor incidences are high for brown bullheads found in areas of concern within Lake Erie compared to reference sites. Although Presque Isle Bay was delisted, brown bullhead skin tumor incidence is still higher at this site relative to reference sites, and the cause of these skin tumors remains unknown. We seek to develop a molecular method to identify skin tumors on brown bullheads for assessment purposes and investigate the cause(s) of skin tumor formation in brown bullheads found in the Lake Erie watershed. Genomic sequences of tumor/lesion skin tissue and non-tumor/non-lesion skin tissue collected from two brown bullheads in Presque Isle Bay and two brown bullheads from Long Point Bay, a reference site with low skin tumor incidences, were used for preliminary studies. Contigs were compared between the two genome assemblies to identify any variance between aligned sequences, and used to conduct a BLAST search to look for putative homology to known gene sequences. A subset of variant sequences that aligned to genes known to function in cell survival or immune responses was used to design PCR primers for amplification. Eight primers amplified DNA isolated from tumor/lesion and non-tumor/non-lesion skin tissues of brown bullhead isolated from Presque Isle Bay. On-going studies will determine whether the variant sequences are reliable as a target for the molecular method to identify skin tumors/lesions in brown bullheads.

### **Tracking Aquatic Invasive Species Using DNA in the Feces of Piscivorous Fish**

Jared Wilczynski, Samantha Czerniak, Brian Fuller, Greg Andraso, and Kelly Grant

Department of Biology, Gannon University

Lake Erie's ecology is disrupted by aquatic invasive species (AIS), such as the round goby (*Neogobius melanostomus*) and the tubenose goby (*Proterorhinus semilunaris*). The impact of the tubenose goby on the Great Lakes ecosystem is relatively unstudied. Our current studies focus on discovering which species of fish prey upon these invasive gobies. We use polymerase chain reaction (PCR) to detect specific DNA samples of this aquatic invasive species in the feces of piscivorous fish of Lake Erie.

Identification of DNA for the gobies must be specific and accurate for our method to be successful. We optimized primers to be species-specific to segments of cytochrome oxidase I (COI) from the fish. We have demonstrated the specificity of our primer sets. Our assay is also sensitive; we can detect DNA samples at a concentration below 10ng/mL. The Qiagen Tissue Kit is the most effective method we use to extract DNA. This molecular approach offers advantages compared to traditional gut content analyses because collection of feces does not harm the fish and it allows for community partners such as anglers to participate in our assessment by collecting fecal samples. Involvement of community partners would allow us to map where and when piscivorous fish recently consumed round and tubenose gobies.

### **Using Artificial Streams to Determine the Potential Impact of Round (*Neogobius melanostomus*) and Tubenose (*Proterorhinus Semilunaris*) Gobies in Two Lotic Systems of Northwestern Pennsylvania.**

Benjamin Plohr<sup>1</sup>, Casey Bradshaw-Wilson<sup>1</sup>, Sara Mueller<sup>2</sup>, Jay Stauffer Jr.<sup>2</sup>

1. Allegheny College, Biology Department, 520 North Main Street, Meadville PA 16433
2. Penn State University, School of Ecosystem and Science Management, University Park, PA 16802

Round Gobies *Neogobius melanostomus* and Tubenose Gobies *Proterorhinus Semilunaris* are native species of the Ponto-Caspian region of Eastern Europe, and have become an inherent invasive species in the North American Laurentian Great Lakes region. Round Gobies, specifically, are an opportunistic species that are able to adapt to a wide variety of aquatic habitats including new feeding habits, nesting conditions, and competition behaviors. The purpose of this study is to assess the ability of Round and Tubenose gobies to spread into the tributaries of Lake Erie and into the French Creek watershed based on

their physical condition pre and post introduction of artificial streams. Artificial stream research used Gobies which were collected using a seine from Lake Erie and Elk Creek with consistent abiotic factors and a constant food source in the tanks. The further spread of Gobies in the French Creek watershed has a large potential for disrupting the ecosystem and further endangering the biodiversity of this lotic waterway. Round Gobies are expected to be seen as a highly adaptive species that can withstand diverse habitats and can adapt more efficiently than the tubenose goby that has shown a slower spread throughout the great lakes and its tributaries. Gobies are a highly adaptive species that are spreading through our waterways, we need to understand their abilities so that we can predict their further spread and mitigate possible negative impact.

### **A Reptile Species Inventory in Presque Isle State Park**

Alexandra Jones and Casey Wilson, Allegheny College

Reptiles are a very diverse group of organisms that are unfortunately currently in global decline. The main causes of reptile decline are habitat loss and degradation, invasive species, environmental pollution, disease, commercial overexploitation and climate change. Since reptiles are in decline, protected land is very important to maintain biodiversity and limit threats to organisms. The objectives of this study were to perform a reptile species inventory in Presque Isle State Park in Erie, Pennsylvania and to compare these results to the last species inventory that was conducted in the 1980's. In this study, reptiles were captured by using cover objects, hoop net traps, visual encounters, basking traps, funnel traps, and pitfalls. Reptiles were photographed, marked, and processed when captured. The snake species that were found in the park were eastern garter snakes (*Thamnophis sirtalis sirtalis*), and northern brown snakes (*Storeria dekayi*). The turtle species that were found were painted turtles (*Chrysemys picta*), map turtles (*Graptemys geographica*), stinkpot turtles (*Sternotherus odoratus*), and common snapping turtles (*Chelydra serpentina*). A Simpson's Diversity Index was calculated to be 0.7375 for this study. From comparing the results from this study to the study in the 1980's, shorthead garter snakes (*Thamnophis brachystoma*) seem to be extirpated from the park, and some species of special concern are the blanding's turtle (*Emydoidea blandingii*) and the ribbon snake (*Thamnophis sauritus*). In conclusion, continued monitoring and protection against invasive species are needed to protect the reptiles of Presque Isle State Park.

### **The Lake Erie Bluffs – 30 years of Lake Bluff Recession Rate Monitoring**

Jake Moore, Environmental Planner, Pennsylvania Department of Environmental Protection,  
Coastal Resources Management Program

Lake Erie's bluffs are dynamic environments that provide sediment for littoral drift, contain ecologically significant areas, abound with recreational opportunities, and are prime real-estate. As such they provide a unique problem in the form of bluff erosion. Through observation and monitoring efforts, the Pennsylvania Coastal Resources Management Program (CRMP) has characterized erosional factors and documented lake bluff recession rates along Pennsylvania's Lake Erie shoreline. This talk will provide an overview of lake bluff erosional factors and CRMP's Control Point Monitoring Program.

### **Sedimentation and nutrient loading in Pennsylvania Lake Erie tributaries**

Devin Beggs, Penn State Erie – The Behrend College

Sedimentation and nutrient loading in Pennsylvania Lake Erie tributaries are leading to decreases in near shore water quality and instream impairments related to storm water runoff. This study examined agricultural land uses in the Eightmile Creek watershed, specifically agricultural lands devoted to viticulture and grape growing. Land parcels identified as hosting viticulture operations were analyzed using GIS software to determine each parcel's potential for soil erosion and the resultant contributions of sediment to hydrologically-connected tributaries to Eightmile Creek. This study considered factors of soil

type, slope, potential soil loss and distance to the nearest waterway in an effort to develop a graduated color intensity map. Utilizing a developed priority equation specifically created for this study, the intensity map highlighted the relative differences in the potential for non-point source pollution for each of the land parcels, and developed a priority ranking system to identify the degree of impact of each operation within the watershed. This study concluded that the operations identified in the priority lists had the highest potential for soil loss were also those with highly erodible soils and were within 50ft of a waterway.

### **Characterization of Longshore Current Velocity to Estimate the Potential for Nearshore Contaminant Transport from Walnut Creek to Presque Isle State Park Beaches, Erie, Pennsylvania**

Elizabeth Hittle, Hydrologist, U.S. Geological Survey - presenter

Tammy Zimmerman, Supervisory Hydrologist, U.S. Geological Survey

Bacteria-driven beach restrictions/advisories on Presque Isle State Park (PISP) beaches can occur during the summer months. A terrestrial source of sediment and bacteria to Lake Erie is Walnut Creek. Walnut Creek discharges to Lake Erie about 8.5 kilometers southwest of PISP beaches. Exploratory work is currently underway by the U.S. Geological Survey (USGS), to determine the suspended-sediment and bacteria loads discharging from Walnut Creek into Lake Erie. However, little is known about the movement of sediment and the associated bacteria, once it enters the lake. Characterization of longshore current velocity (magnitude and direction) in Lake Erie from Walnut Creek to PISP beaches could provide valuable information to understanding what factors influence bacteria levels on Lake Erie and PISP beaches. If nearshore transport of sediment/bacteria contributions from Walnut Creek to PISP beaches occurs, the magnitude and direction of longshore currents would be important variables to add to bacteria regression models currently being used by the USGS to assess beach health. These regression models predict when the recreational water-quality standard for *Escherichia coli* (*E. coli*) bacteria will be exceeded at PISP beaches. Information gained from this study could also help determine the best location for a nearshore buoy between Walnut Creek and PISP beaches equipped with instrumentation to record continuous (near real time) current magnitude and direction.

---

**Thursday, November 5, 2015**

### **The role of carotenoids in integumentary color of Painted Turtles**

John Steffen<sup>1</sup>, Jessica Hultberg, Stephen Drozda

Animals use a variety of pigments to color their integument, including pigments known as carotenoids. Carotenoids are photosynthetic pigments in plants that animals must acquire from their diet and are thought to be costly to obtain and transport. Carotenoids play diverse and important roles in photoprotection, free-radical scavenging, immunomodulation, visual tuning, and visual signal coloration in animals that ingest carotenoids. As a result, carotenoid-based skin colors are hypothesized to function as honesty-reinforcing mechanisms that underlie the use of colorful ornamental traits in sexual selection. The Painted Turtle, *Chrysemys picta* has red and yellow patches and stripes on the skin and carapace which are colored by two carotenoids: an apocarotenoid (which generates yellow colors) and astaxanthin (which generates red colors). Here we present data from our latest research efforts that investigate whether or not a) male and female turtles differ in carotenoid-based colors in the wild, b) adult male turtles can use dietary carotenoids to color their integument in real time, and c) adult male turtles use circulating carotenoids as free radical scavengers in the blood.

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

Erin Debelak and Nick Bengal and Dr. Steve Ropski, Biology Department, Gannon University, Erie, PA. 16541

For the past six summers a census of the bat population has occurred on the Gannon University campus in Erie, PA. The numbers for the first three years have held relatively steady, while the data for the past 3 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.

### **Pharyngeal morphology of field-caught and lab-reared bluegills (*Lepomis macrochirus*), pumpkinseeds (*Lepomis gibbosus*), and their hybrids**

Kelly Grant and Greg Andraso

Department of Biology, Gannon University

The pharyngeal apparatus of fish consists of modified gill arches that are used to process food. In Presque Isle Bay and elsewhere, adult bluegills (*Lepomis macrochirus*) prefer soft-bodied prey, whereas adult pumpkinseeds (*Lepomis gibbosus*) prey heavily on mollusks, including dreissenid mussels. Pharyngeal morphology of adults reflects these dietary differences, with pumpkinseeds possessing robust pharyngeal bones with molar-like teeth, and bluegills possessing relatively small pharyngeal bones with narrow, sharp teeth. Work in our lab has revealed that hybrids of the two species appear to possess a pharyngeal apparatus with intermediate robustness and dentition. Although the diets and pharyngeal morphology of adults differ, it is not known when during development this divergence occurs. Comparisons of the pharyngeal apparatus of small, field-caught *Lepomis* suggest that pharyngeals begin to diverge by the time bluegills and pumpkinseeds reach 30 mm TL. To better understand development of the pharyngeal apparatus of *Lepomis*, we lab-reared bluegills, pumpkinseeds, and both hybrids at Gannon University and a flow-through system on Presque Isle during the summer of 2015. We now have the ability to compare pharyngeals among crosses from the time these structures first appear during development. Ongoing work is focused on elucidating molecular mechanisms responsible for differences in pharyngeal morphology in *Lepomis*.

### **Evolution & Development of the Pharyngeal Apparatus of Bluegill and Pumpkinseed Sunfish**

Greg Andraso, Corrie Olson, Sofia Bychkova, Sourabh Goyal, Brad Nowosielski, and Kelly Grant

Department of Biology, Gannon University

In “Evolution-Development” studies, we are interested in how changes in the developmental program (e.g., patterns of gene expression, cell migration and cell proliferation) of a species result in the modification of structures. Specifically, we are interested in the “evo-devo” of the pharyngeal apparatus in two species of sunfish: bluegills (*Lepomis macrochirus*) and pumpkinseeds (*Lepomis gibbosus*). The pharyngeal apparatus consists of modified gill arches and functions as a second set of jaws to process prey. The morphology of the pharyngeal apparatus is quite different between the adults of the two species. Bluegills have delicate pharyngeal bones with sharp, cardiform teeth; pumpkinseeds have larger, stronger bones with molariform teeth used to crush prey. We are investigating the early development of the pharyngeal bones and teeth, comparing their initial size, ossification pattern, and dentition. We have begun to examine patterns of cell proliferation, osteoblast activity, and the role of Wnt signaling in creating these two distinct morphologies. We are continuing to clone and study the expression of genes that may be responsible for the species-specific variation in the pharyngeal apparatus. The ability of

bluegills and pumpkinseeds to hybridize provides us with an additional genetic tool to study the variations between these skeletal structures.

### **Forest Structure at the College Lodge and four Chautauqua County Swamps**

Tera Douglas (speaking -- presenter) and Jonathan Titus, Biology Dept., Fredonia, Fredonia, NY 14063

Trees in 26 900m<sup>2</sup> plots at four wetland sites (Elm Flats, Bonita Swamp, Frog Valley and Bentley) and at the College Lodge have been identified and measured for a number of years. At Elm Flats trees exhibited a hump-shaped basal area distribution with a high proportion of shade tolerant trees in the larger size classes. This is indicative of a forest that has been subjected to limited anthropomorphic disturbance and possibly retains some old growth characteristics. Trees at the other three wetland sites exhibited characteristics indicative of a successional forest. The College Lodge sites range from having old growth characteristics to successional. This tree census data, in conjunction with the understory species cover data, will be used to assess the impact of emerald ash borer, beech bark disease, hemlock woolly adelgid, non-native species invasions and climate change on our forests.

### **Chautauqua Lake algal blooms**

Jennifer Phillips Russo - State University of New York at Fredonia, Graduate Student  
Dr. Courtney Wigdahl-Perry - State University of New York at Fredonia - Professor of Biology and Environmental Science

Chautauqua Lake (Chautauqua County, NY) has been experiencing increased algae blooms in recent years, but the exact cause(s) have not been clearly identified for this site. The objective was to determine whether phytoplankton growth was controlled by nitrate (NO<sub>3</sub>), phosphorus (P), ammonia (NH<sub>4</sub>), NO<sub>3</sub>+P, and/or NH<sub>4</sub>+P availability. Lake water was collected from both the deeper north basin (NB) and shallower south basin (SB), and amended for the following treatments: control (no nutrient addition), P, NH<sub>4</sub>, NO<sub>3</sub>, P+ NO<sub>3</sub>, and P+NH<sub>4</sub>. Using small experimental bags, four replicates of each treatment were deployed in floating PVC racks, placed in Chautauqua Lake, and incubated under natural conditions for a period of seven days. Bioassays were conducted in June, July, and August 2015. After completion of each bioassay, phytoplankton samples from each bag were collected, preserved, and water was also filtered for chlorophyll a analysis via acetone extraction. Initial chlorophyll results indicate that P nutrient addition depressed biomass compared to controls in both basins until August, when results were similar to the control. All three bioassays for the NB and June and August in the SB showed no response to NO<sub>3</sub> alone. All three NB and June SB results for P+NH<sub>4</sub> produced an additive effect with P+NO<sub>3</sub> enrichments producing a synergist effect as compared to the controls. These results indicate complex patterns of co-limitation by nitrogen and phosphorus at Chautauqua Lake, and continued analysis of phytoplankton community structure will be important in interpreting these results for application in management decisions.

### **Development of a Real-time PCR Method for the Detection of the Aquatic Invasive Plant, *Trapa natans*, in Pennsylvania Watersheds**

Benoit Van Aken<sup>1,\*</sup>, Sasha Eisenman<sup>2</sup>, Asad Khan<sup>1</sup>, Rouzbeh Tehrani<sup>1</sup>

<sup>1</sup> Civil and Environmental Engineering, Temple University, Philadelphia, PA 19122

<sup>2</sup> Landscape Architecture and Horticulture, Temple University, Ambler, PA 19002

Conventional methods for the identification of aquatic invasive species (AIS) are laborious and time-consuming, frequently preventing the timely application of eradication measures. Recently, PCR-based molecular methods have raised increasing interest for the detection of AIS, as they are rapid, sensitive, and specific. In this study, a real-time (quantitative) PCR method was developed for the early detection of the invasive aquatic plant, *Trapa natans*, in Pennsylvania watersheds. A suite of primers were designed in

*T. natans* hypervariable region, internal transcribed spacer (ITS) 1 - 5.8S rRNA - ITS 2. Universal 16S rDNA prokaryotic primers were used as baseline markers. The primer specificity was verified *in silico* by comparison with other Tracheophyta sequences in the NCBI database. The primers were successfully tested *in vitro* by performing qPCR using DNA extracted from *T. natans* specimens. Standard curves were established for the quantitative detection of the biomarker. The method was validated in the field by collecting water samples from the Little Neshaminy Creek (Bucks County, Pennsylvania) at increasing distances from a reservoir (Bradford) contaminated by *T. natans*. Water samples were filtered (0.2  $\mu\text{m}$ ) and total DNA was extracted from the filters. Extracted DNA was used for the qPCR amplification of the biomarker. The biomarker was positively detected in all samples to a distance of approx. 9.2 miles downstream the contaminated reservoir (maximum distance tested). Further validation of the method is currently conducted to determine the detection limit and selectivity of the biomarker, as well as the sensitivity to physical and chemical water quality

### **Behavioral responses of host, *Formica subsericea*, to raiding activity of the parasitic slave-maker, *Formica subintegra***

Schmidt, R. M., Lueers, H. I., Schlabach, K. J., Anderson, E. J., Mohr, T. A., and Jenkins, S. P.  
Grove City College, Grove City, PA

Parasitic slave-maker ants, *Formica subintegra*, are known to conduct raids on host ants, *Formica subsericea*, and steal larvae and pupae. Once the host adults emerge in the parasite nest, they serve as the parasite colony workers. Activity profiles of these species are speculated to change over the raiding season. We conducted manual observations of and recorded multiple types of behaviors of ants on slave-maker, host, and non-host nests for two months in 2014. *F. subintegra* slave-maker ants increased their level of activity during the study period, especially after July 15. In contrast, *F. subsericea* slaves on the slave-maker nest gradually decreased their activity level over time. Like *F. subsericea* slaves, 'free' host *F. subsericea* ants also decreased activity over the study period, but showed a dramatic decline in activity after July 15, at the time the slave-maker activity increased. These data suggest that as slave-makers begin scouting and raiding, host ants decrease their activity to go undetected by slave-maker scouts. We also found species-specific differences in the proportions of activities observed by ants on the nests. Both free and slave host ants were most often observed foraging, followed by patrolling. The slave-makers were most often observed patrolling; no foraging was observed. Non-host *F. pallidefulva* ants exhibited different proportions of foraging, patrolling, and excavating activities than either slave-maker *F. subintegra* or host *F. subsericea* ants.

### **Vertical swimming behavior of Eastern Oyster larvae (*Crassostrea virginica*) in a jet-stirred turbulence tank**

Parry<sup>1</sup>, S. D., Wheeler<sup>2</sup>, J. D., Mullineaux<sup>2</sup>, L. S., Helfrich<sup>2</sup>, K. R., 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

Understanding settlement behaviors of mollusk larvae is important for modeling larval dispersion and supply. Recent work suggests that turbulent conditions may cue settlement behavior. In a previous work, we reported the swimming velocities of oyster larvae relative to a fixed reference frame in a jet-stirred turbulence tank at dissipation rates,  $\epsilon$ , ranging from 0 to 17  $\text{cm}^2 \text{s}^{-3}$ . We used automatic particle identification and tracking algorithms to determine these swimming velocities from video sequences (1024 x 1024 pixels, 60 frames per second). In the current work, we determined the velocity of the flow surrounding the oyster larvae using particle image velocimetry (PIV) - a method of flow visualization. We used this information to determine the actual behavioral velocity of the larvae with respect to the fluid to determine their response to turbulence. At our lowest levels of turbulence,  $\epsilon = 0 - 10^{-2} \text{ cm}^2 \text{ s}^{-3}$ , the mean vertical velocity of larvae was close to 0, similar to our previous work in a grid stirred turbulence tank. At dissipation rates from  $10^{-2}$  to  $10^{-1} \text{ cm}^2 \text{ s}^{-3}$ , mean vertical swimming velocities ranged from -0.5 to 0  $\text{mm s}^{-1}$  (i.e., slightly downward) while in our grid-stirred tank experiments they ranged from 0.5 to 1  $\text{mm s}^{-1}$



(upward). For comparison, maximum behavioral velocities observed in oyster larvae are about  $10 \text{ mm s}^{-1}$ . At high turbulence levels,  $\varepsilon = 1 - 17 \text{ cm}^2 \text{ s}^{-3}$ , mean vertical velocity was about  $-1 \text{ mm s}^{-1}$ , with one trial at  $-6 \text{ mm s}^{-1}$ . Dissipation rates above  $1 \text{ cm}^2 \text{ s}^{-3}$  were not tested in our previous grid-stirred turbulence experiments. This work represents an important evaluation of the repeatability of larval swimming experiments in different turbulence tanks. More work is necessary to determine if differences in larval behavior observed in the two different turbulence tanks are due to differences in the turbulence or inter-brood variability.

### **Investigation of resonance in fish swimming from tailbeat frequency and amplitude in bluefish (*Pomatomus saltatrix*) and striped bass (*Morone saxatilis*)**

Turner<sup>1</sup>, E. L., Garborg<sup>1</sup>, C. S., Lauder<sup>3</sup>, G. V., Mott<sup>1</sup>, R. D. 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; <sup>3</sup>Harvard University, Cambridge, MA

Previous research reports evidence of resonance in swimming in striped bass based on highly resolved measurements of tailbeat frequency vs. swimming speed. The work suggested that at some speeds and body lengths, striped bass exhibit “sweet spots” and “sour spots” in swimming performance similar to resonant behavior observed in flapping plastic panels. We conducted similar experiments with a bluefish (length = 53 cm)—a faster and more adept swimmer than striped bass. We tracked the trailing edge of the tail of the bluefish in real-time with two cameras while it swam in a high-speed flume. The fish was swum at 149 different speeds ranging from the slowest speeds yielding a regular tailbeat to a speed where the fish was no longer swimming aerobically (i.e., 0.19 -1.7 m/s, or 0.37 - 3.3 body lengths/second). The tail position data from the two cameras was used to determine the 3D position of the tail, and the tailbeat frequency and amplitude. Our results reveal that tailbeat frequency vs. swimming speed in the bluefish, as for striped bass, is not linear as suggested by previous investigators; however, the data from the bluefish exhibits less deviation from a smooth curve than observed in striped bass. This may be the result of differences in stiffness between these species. Stiffness resulted in similar differences in the performance of swimming plastic panels. Alternatively, the effects of sweet and sour spots may not be seen in tailbeat frequency of certain species due to adjustments of other swimming parameters.

### **Investigation of swimming performance in bluefish (*Pomatomus saltatrix*) by boundary layer flow visualization**

Graybill<sup>1</sup> P. M., Grosenbaugh<sup>2</sup>, M. A. (posth.), 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

Only recently have investigators achieved measurements of the drag on a swimming fish and the time varying behavior of the flow near the body of the fish—the “boundary layer.” As a result, we have a limited understanding of the hydrodynamic performance and energy budgets of swimming fish. We used particle tracking velocimetry (PTV) to visualize the flow in the boundary layer around bluefish swimming in a flume. Data was collected on a bluefish 45 cm in length, and at a swimming speed,  $U$ , of 24cm/s (0.55 body lengths/second). We found wall shear stress on the fish to oscillate by as much as 70% with body phase; thus the local friction coefficient on the fish body surface oscillates by as much as 35%. Boundary layer thickness also oscillates, and the degree of oscillation varies with lengthwise position on the fish—2.5 times greater at the posterior end than at the anterior. In general, the boundary layer profiles exhibited acceleration, which could delay separation of flow and enhance propulsive efficiency. This work is part of a comparative study of fish with different swimming strategies that will provide information significant not only to biologists but also to engineers looking to biology for inspiration for the design of marine vehicles and propulsion systems.

## **Uncovering the mechanics of remora fish (*Echeneis naucrates*) adhesion by image motion enhancement**

Voris<sup>1</sup>, A.R., Flammang<sup>2</sup>, B. E., Garborg<sup>1</sup>, C. S. and Anderson<sup>1,3</sup>, E.J.

<sup>1</sup>Grove City College, Grove City PA; <sup>2</sup>New Jersey Institute of Technology, Newark, NJ; <sup>3</sup>Woods Hole Oceanographic Institution, Woods Hole, MA

Remora fishes have a natural suction cup on their heads that allows them to attach to whales or other large sea life and ride along with that animal. In addition to being a unique adaptation, this natural suction cup is the inspiration for the development of safe and effective sensor tags for tracking whales and other marine life. We acquired videos of remoras (n=2, length = ~ 60 cm) interacting with glass walls of a large commercial aquarium (Discovery Cove, Orlando, FL). A total of 32 useful video sequences of the suction disks were captured and analyzed using the motion enhancement program Eulerian Video Magnification (EVM). EVM uses an algorithm that tracks pixel color values and magnifies small color changes and small movements. On attachment, the remora disk tended to attach from anterior to posterior, expel water laterally, and sometimes stretch the contact area of the suction disk. On detachment, the disk tended to detach beginning on the side opposite of the direction of lateral motion of the head. We also found that lamellae are pressed against the wall individually and can create a compartmentalized seal for partial attachment and detachment. These findings complement our understanding of the disk functional morphology and will guide our development of a biomimetic underwater adhesive device.

## **An evaluation of sediment quality conditions in Presque Isle Bay: assessing compliance with ecosystem health and delisting targets (2005 – 2015)**

Sean D. Rafferty<sup>1</sup>

<sup>1</sup> Pennsylvania Sea Grant (The Pennsylvania State University); Tom Ridge Environmental Center; 301 Peninsula Dr., Suite 3; Erie, PA 16505; sdr138@psu.edu

Presque Isle Bay is a 3,655-acre embayment located in northwestern Pennsylvania on the southern shore of Lake Erie. In 1991, due to a legacy of industrial and wastewater problems the bay was listed as an Area of Concern. In 2005, in an effort to move towards delisting the restrictions on dredging impairment, a comprehensive sediment evaluation was implemented. Results of the study indicated that additional requirements did not need to be placed on dredging or disposal activities due to contaminants in the sediment, and the contaminants in the sediment did not appear to be toxic to benthic organisms or negatively impacting fish or aquatic-dependent wildlife. In July 2007, EPA approved the petition to delist the restrictions on dredging BUI in the bay. As a result of the delisting, a long-term sediment monitoring plan was developed to evaluate sediment quality as it relates to the delisting targets and ecosystem health of Presque Isle Bay. In 2009, surficial sediment samples were collected from nine sites in accordance with the long-term monitoring plan to determine if delisting and ecosystem health targets were being met in the bay. The results of the 2009 study indicated that the delisting targets were being met and sediment quality in Presque Isle Bay was improving

In August 2015, 12 sites were assessed in accordance with the long-term monitoring plan for the bay. The primary objective of the study was to assess compliance with the delisting target for the restrictions on dredging BUI in Presque Isle Bay. The delisting target is met if material from at least 90% of samples can be placed in the combined disposal facility (CDF). A secondary objective of the study was to evaluate changes in the health of the ecosystem. Based on the longterm monitoring plan, the ecosystem health targets are met if at least 90% of the sediment samples from Presque Isle Bay have the conditions necessary to support healthy benthic invertebrate, fish, and aquatic-dependent wildlife. This presentation will provide an overview of the results of the 2015 Presque Isle Bay sediment quality evaluation, compares the results to those observed in 2005 and 2009, and assess compliance with the ecosystem health and delisting targets for the bay.

### **Monitoring of Round Gobies in Leboeuf and French Creek**

Joshua Wisor\*, Sara Mueller, Jay R. Stauffer, Casey Bradshaw-Wilson, The Pennsylvania State University

The introduction of round gobies, *Neogobius melanostomus*, to Lake Leboeuf was confirmed by the Pennsylvania Fish and Boat Commission in August 2014. Collections of *N. melanostomus* in both Lake Leboeuf and Leboeuf Creek yielded young of year (YOY) class individuals, suggesting that the population is established and breeding. In order to track the spread of this invasive species, sampling was conducted at several sites in Leboeuf Creek and at one site in French Creek. Specimens of *N. melanostomus* were collected at every sampling site including French Creek. The spread of *N. melanostomus* further downstream is alarming due to French Creek's high natural diversity of darters and freshwater mussels. The findings of this study should be used as preliminary information to guide research and management decisions in the near future.

### **Long-term Monitoring of Macroinvertebrates in Elk Creek**

Kyle Clark\*, Jay R. Stauffer, The Pennsylvania State University

Macroinvertebrates serve as indicators of health in a stream ecosystem. A balanced and functioning biological community is one of the best indicators of a healthy stream capable of providing ecosystem services. The goal of this study is to evaluate the macroinvertebrate community at two sites on Elk Creek near Erie, Pennsylvania. Macroinvertebrates were collected from above the boat launch on Elk Creek and at the bridge along Elk Creek Park Rd. Macroinvertebrate substrate samples were collected using a D-frame kicknet and the standard nine 30-second sampling technique. Stream health will be determined by identifying each macroinvertebrate to the genus level. Statistical analysis will be done using the statistical software R 3.2.2 and a Brillouin diversity index package.

### **Foraging habits of *Etheostoma caeruleum* to determine dietary variability**

Sara Mueller\*, Jay R. Stauffer, The Pennsylvania State University

The objective of this study is to gain insight into the foraging habits of *E. caeruleum* in communities where there are varying degrees of competition with other benthic species including exotic round gobies. Fishes were collected from Woodcock Creek in Saegertown, Pennsylvania and Elk Creek in Erie, Pennsylvania. Macroinvertebrate substrate samples were collected using a D-frame kicknet and the standard nine 30-second sampling technique. Fishes were collected with a 3-m seine. Fish electivity was determined by examining the stomach contents of each fish and compared among three populations. Principal component analyses and MANOVA tests were used to determine groups of similar prey selections among populations. Results showed that diet shifted in the presence of invasive species and other darter species.

---

**Friday, November 6, 2015**

### **Impacts of road salts on leaching behavior of lead contaminated soil**

Jingjing Wu, Timothy Cheney and \*Hwidong Kim, PhD., PE.

Department of Environmental Science and Engineering

Gannon University, PA., USA

Research was conducted to explore the effects of road salts on lead leaching from lead contaminated soil samples that were collected in an old residence area in Erie, PA. The synthetic precipitate leaching procedure (SPLP) test was employed to evaluate the lead leaching from lead contaminated soil in the presence of various levels of road salts (5%, 10%, 20%, 30% and 40%). The results of the leaching test showed that lead leaching was dramatically increased as road salts were added. Different lead leaching

patterns were also observed by types of the road salts added. With 30% of road salts, lead concentration leached from one of the soil samples was as high as 50 mg/L, which is 3000 times higher than the US drinking water standard action level of lead (0.015 mg/L). The MINTEQ simulation results showed that the lead leachability was highly dictated by lead mineral species contained in different lead-based paint pigments.

### **Compost Conundrum: Evaluating Food Waste and the Effectiveness of Composting on College Campuses**

Jonah Raether and Daela Munoz, Allegheny College

Globally, food waste results in approximately 3.3 billion tons of CO<sub>2</sub> emissions every year. Allegheny College, an institution that is committed to sustainability, participates actively in composting as a means to reduce those emissions. While food scraps and most paper and plastic products on campus are compostable, improper disposal remains an issue. Through the use of measurements, observations, and interviews, this research revealed that 94% of the items in the trash and 36% of the items in the recycling in campus dining halls could have been composted. Results suggest that waste disposal processes could be improved at Allegheny

### **Evaluation of Biochar Made from Invasive Plants for Phosphorus Removal from Urban Storm Water Runoff**

Amber Stilwell, Department of Environmental Science and Engineering, Gannon University  
A positive correlation has been found between elevated phosphorus levels and the occurrence of harmful algal blooms. Therefore the goal of this research is to decrease phosphorus loading to Presque Isle Bay from urban storm water runoff. One way to remove phosphorus from urban runoff is to employ a filtration device with filter media capable of adsorbing phosphorus. It has been observed that biochar has such properties. Biochar is made by heating fibrous plant material to temperatures above 250°C. The remaining material consists mostly of carbon, and is now known as “biochar.” Each type of raw material heated to a various temperatures may produce a final product with differing abilities to adsorb phosphorus. Phragmites, purple loosestrife, and narrow-leaved cattail, all nuisance invasive plants, were used as raw materials. Each starting material was heated in a sealed reaction chamber in the absence of oxygen to three different temperatures (250°, 300°, and 350°C). A series of batch tests were used to determine the phosphorus adsorption affinity of each material. The biochar with the highest capacity for phosphorus adsorption will be used in a second series of flow-through column tests using synthetic stormwater. The biochar with the highest capacity for phosphorus removal could be used in a filter deployed in the field to intercept runoff prior to entering Presque Isle Bay or Lake Erie.

### **Effects of Low Aeration on Waste Decomposition and Methane Production in Simulated Landfill Bioreactors**

Adrienne Liberati, Gannon University, Environmental Health and Engineering

This research has been conducted to determine the effects of aeration on waste decomposition and methane production in simulated landfill bioreactors. Substantially lower aeration rates than those required for maintaining aerobic condition were considered providing more favorable conditions for both aerobic and anaerobic bacteria to reduce COD and ammonia levels in landfill leachate and to produce usable methane gas (> 35%). The experiment consisted of six different columns filled with synthetic municipal solid wastes. One column was a control column and operated anaerobically. The other column was an aerobic column with air continuously being run through it at a rate of 70 mL/min. Two columns were operated as microaeration (extremely low aeration) at rates of 0.3 L<sub>air</sub>/L<sub>column</sub>/day and 0.6 L<sub>air</sub>/L<sub>column</sub>/day. The last two columns were operated as limited aeration (aeration rates lower than oxygen

requirements). In one, the air was injected intermittently for thirty minutes every four hours during a 24 hour period, at a rate of  $2.1 \text{ L}_{\text{air}}/\text{kg}_{\text{waste}}/\text{day}$ . While the other operated under a continuous air injection with the same aeration rate. The columns have been operating for approximately two months. So far, the anaerobic, microaerated and limited aerated columns produced methane within the first month. As of now, the anaerobic and microaeratic columns are producing methane at usable quality.

### **Analysis of bio-filter media in a recirculating sand filter**

Adam Olesnanik and Mingjun (Gabe) Shao, Department of Environmental Science and Engineering, Gannon University

As an alternative to traditional septic systems, an in-ground recirculating sand filter is used to remove BOD and other contaminants from waste water before it is released back to the environment. A sand filter works by having the wastewater percolate through the filter media; a portion of the flow is re-circulated through the filter, while another portion is discharged to the environment. One of the issues that can arise with this system is clogging of the void spaces between the media particles by biological debris or from compaction; both lead to the water not being able to percolate through the filter. This results in failure of the system and considerable expense. This project will evaluate the performance of filter media of different size distributions. The extremes of the approved particle size ranges will be used. A lab apparatus will be constructed to simulate a full scale system. A feed tank will periodically add simulated wastewater to the dosing tank. A float switch will activate a pump to transfer wastewater to the filter unit. The waste water will run through the filter and a portion of it will be returned to the dosing tank, while an amount equal to the inflow will be discharged. Samples of effluent will be analyzed for BOD and TSS. At the end of the study, the media will be removed and the collected debris/biomass will be weighed. Performance will be judged by a combination of BOD reduction, effluent TSS, and minimal clogging due to biomass build-up.

### **Urban Storm Water Filter Design for the Removal of Phosphorus Using Biochar Made From Invasive Plants**

Robert Duran, Department of Environmental Science and Engineering, Gannon University  
Urban storm water is known to contain various pollutants, such as nitrogen and phosphorous. Given the impermeability of concrete or asphalt covering the vast percentage of urban areas, there is little opportunity for the water to be filtered by the soil before it ends up in lakes or streams. These pollutants play a direct role in eutrophication and encouraging the growth of harmful algal blooms. The goal of this engineering project will be to develop a biochar water filter from invasive species common on the Presque Isle State Park, Erie, PA. The aim of the filter will be to remove phosphorus from runoff from a large shopping center or paved area, thus reducing nutrient loading to Presque Isle Bay and Lake Erie. The chemistry of phosphate removal by biochar derived from the plants is the subject of a sister project. The specific hydrology of the chosen location will be studied to determine the quantity and the direction of water runoff. The volumetric flow rate during strong storm events and the degree of water contamination will be paramount in determining the appropriate filter design. Three filter designs will be proposed. A complimentary goal is to find a beneficial use for the residues of invasive plant species such as Phragmites, Purple Loosestrife, and Hybrid Cattails that have been harvested from sensitive areas.

### **Measuring and Mapping the Antibacterial Substance, Triclosan, in the Presque Isle Bay Watershed**

Jillian Kaleal, Department of Environmental Science and Engineering, Gannon University  
Triclosan is a widely used antibacterial substance found in many consumer and personal care products. It has been identified as a probable endocrine disruptor due to its structural similarity to estrogen. Studies have suggested that triclosan may adversely impact aquatic organisms and human health. Triclosan and its metabolites are lipophilic, bioaccumulative, and persist in the environment for long periods of

time. Researchers have also shown that when triclosan is exposed to direct UV light, it can be converted to dioxin, a harmful chemical by-product. Bacterial resistance to triclosan has become more common, causing the chemical to slowly lose effect. The goal of this research project is to determine the concentration and geographical distribution of triclosan within the Presque Isle Bay watershed and the nearshore waters of Lake Erie. Water samples will be collected in Cascade Creek and Mill Creek, both tributaries to Presque Isle Bay, and in the so-called 'outer harbor' in the vicinity of the discharge location of the Erie wastewater treatment plant. The concentration of triclosan will be measured using the Enzyme Linked Immunosorbent Assay (ELISA) test. Maps will be generated to show the peak and average levels of triclosan within the study area.

### **Computer Modeling of Harmful Algal Blooms in Presque Isle Bay**

Daniel Hart and Andrea Swagler, Environmental Science Majors, Gannon University  
Presque Isle Bay is located on the southern shore of Lake Erie, enclosed by the Presque Isle peninsula to the north and west, and by the City of Erie to the south. A narrow channel connects the bay to Lake Erie. It is approximately 7.9 kilometers long, and at most 2.9 kilometers wide with an average depth of 4.0 meters. Recently, Presque Isle Bay has become more eutrophic, and "harmful algal blooms" have been observed. These blooms consist of cyanobacteria (blue-green algae) which pose a health risk to the ecosystem. Due to the value of the Bay, this aquatic ecosystem needs to be protected, not only to help preserve the diverse bionetwork of plants and animals that live there, but also to insure the safety of people who use the bay in any way. AQUATOX is a simulation model for aquatic systems, which makes educated predictions in order to determine the fate of various pollutants and their effects on the environment as a whole, including aquatic plants, fish, and invertebrates. Through a thorough search of literature measurements for water quality and biological samples from the bay and tributaries, a model can be developed to predict harmful algal blooms, assess the impact of different nutrients and organic compounds on the watershed, and utilized for environmental analysis.

### **Hydrologic Modeling of Walnut Creek Using EPA Computer Software**

Dr. Rick Diz, PE, Department of Environmental Science and Engineering, Gannon University  
Walnut Creek located in Erie County, PA, has been designated as an impaired stream by the Pennsylvania Department of Environmental Protection. The watershed consists of 23,663 acres, of which about 30% is forest and 55% is cropland, pasture, or otherwise undeveloped. Only about 15 to 20% of the watershed is developed, but that human activity has apparently caused impairment to the stream. This project has used freely available GIS software developed by and for the USEPA to study the hydrology of the stream. Data such as land use, soil type, elevation, and other data can be quickly and easily downloaded from EPA servers, and then used to analyze the watershed and model the hydrology of the stream. The simulated stream flow is driven by actual weather records for precipitation, temperature, etc. Model output is compared to actual flow measurements obtained from the USGS for the gauging station at the mouth of Walnut Creek. The presentation will explain how this software was employed and will provide statistical analysis of the model calibration for the years 2008 to 2014. A well-calibrated model can then be used to simulate water quality. The model could be used by watershed managers to develop and evaluate management practices that have or could be employed within the watershed to improve environmental quality.

### **Lake Erie Water-Based Outdoor Recreation Users Opinions Towards Environmental Conditions**

Michael D. Ferguson, M.S., Andrew J. Mowen, Ph.D., Alan R. Graefe, Ph.D.

Department of Recreation, Park and Tourism Management, The Pennsylvania State University  
A multitude of unique year-to-year ecological variations within the Lake Erie watershed have been attributed to global climate change such as the number and intensity of storms, the volume of water

flowing within the watershed, the quality of that water, the average height of lake levels, and the intensity of waves that strike coastal regions (IJC, 2012). However, the impact of these changing environmental conditions upon Lake Erie water-based outdoor recreation users remains unclear. While climate-change induced environmental changes are becoming progressively evident to both users and resource managers (NPCA, 2009), few studies have sought to assess the extent to which changing conditions alter outdoor recreation coping behaviors and attitudes. Further, no study has explored whether there are differences in these behaviors across different recreation user groups. Having such information would assist managers in developing appropriate and adaptive outdoor management strategies. The purpose of this study was to assess the role of these changing environmental conditions upon the behaviors and attitudes of three specific water-based recreation user groups; 1) beach users, 2) anglers, and 3) boaters. In summer 2015, The Pennsylvania State University and The Pennsylvania Sea-Grant conducted on-site surveys of water-based outdoor recreation users (i.e. beach users, anglers and boaters) along the Pennsylvania section of Lake Erie (n=800). Early results from this study indicate that while many users simultaneously recreate amongst one another, they report differential effects based on the type of environmental change. Preliminary study findings and their implications for natural resource management within the Great Lakes Region will be discussed.

# ABSTRACTS

*Regional Science Consortium  
11<sup>th</sup> Annual Research Symposium  
November 4-6, 2015  
Tom Ridge Environmental Center  
At Presque Isle State Park*

---

## **POSTER PRESENTATIONS**

---

### **1. How does the use of Agion Silver Technology change the bacterial flora found on door handles?**

Nesve Ozsoy and Beth Potter, School of Science, Penn State Erie, The Behrend College, Erie, PA 16563

Silver has been used as an antimicrobial agent throughout history. Agion technology is one of the newest strategies in using silver. This technology encases silver ions within a zeolite carrier that can be incorporated into a variety of materials. In this study, the zeolite carriers have been incorporated into a clear coating that has been used on door handles across the Penn State Erie campus. Upon contact, the sodium ions from the moisture in our hands will exchange with the silver ions, allowing them to interact with bacteria that were also left behind. In our study we have a total of fifty doors within four building on campus; 25 doors are silver-coated and the other 25 are non-coated. These doors have been sampled for the past three years for a six-week period in both the fall and spring semesters. Quantitative analysis has shown that bacteria still grow on the silver-coated door handles and we are using culture-dependent techniques and sequencing of the 16S rRNA gene to determine the bacterial populations that are growing on the door handles.

### **2. The Role of Ent3p in the Nitrogen-Regulated Growth of *Saccharomyces cerevisiae***

Robert Ramirez, Alexander MacFarlane, Quyen Aoh, Gannon University

Nitrogen plays a key role in metabolism, DNA and protein synthesis. In *Saccharomyces cerevisiae*, cellular uptake of nitrogen is mediated by nutrient transporters such as Gap1. Gap1 is synthesized and transported from the trans-Golgi network (TGN) and endosomes to the cell membrane through a regulated process that involves many proteins. We are investigating whether the clathrin adaptors Ent3 regulate trafficking of Gap1. Using fluorescence microscopy, we have found that deleting ENT3 prevents transport of Gap1 to the cell surface and redirects it to the vacuole. To assess the effect of ENT3 on cell fitness we examined growth rates using a 96-well growth assay. We found the deletion of ENT3 severely impaired growth under conditions that utilize Gap1. Our results suggest that Ent3 plays a critical role in nitrogen uptake and metabolism. In the future we will perform rescue experiments with Ent3 and investigate how Ent3 interacts with other known regulators of Gap1 trafficking.



### **3. The role of Ent3 in Put4 trafficking from the trans-Golgi Network to the Plasma Membrane**

Gabrielle Acosta, Robert Ramirez, Quyen Aoh, Ph.D., Gannon University

In cells, nitrogen is necessary for the production of many essential cellular products, such as proteins and nucleic acids. Often, nitrogen sources such as amino acids are imported from the extracellular media through transporters. For the brewer's yeast, *Saccharomyces cerevisiae*, a major source of nitrogen is the amino acid proline. Several studies suggest that the expression and transport of Put4p to the cell surface is regulated, much like the general amino acid permease Gap1p. Our preliminary data suggest that the deletion of clathrin adaptor ENT3 reduces the growth rate of yeast grown in proline, suggesting that it regulates Put4p trafficking. In this study, we will tag Put4 with Green Fluorescent Protein (GFP) and determine if Ent3 is required for its trafficking to the cell surface.

### **4. Non-Reciprocal Interaction between TRPA and TRPV Channels in *C. elegans***

Jennie Thies and He Liu, Department of Biology, Morosky College of Health Professions and Sciences, Gannon University, Erie, PA

TRPA and TRPV are two ion channels among the TRP (transient receptor potential) cation channel super family that is responsible for various sensory transductions. TRPV channel is known to affect chemosensation, while TRPA channel is associated with thermosensation and mechanosensation. TRPA and TRPV are co-expressed in human airway sensory neurons and have recently become targets for pharmaceutical intervention. They are also co-expressed in some neurons in *C. elegans*, therefore we used *C. elegans* as a model system to study the interaction between the two channels. Prior research showed that TRPV knockout worms exhibited learning/memory deficits associated with temperature, in a similar manner as the TRPA knockout. In this study, we investigated whether TRPA and TRPV knockout worms demonstrate deficits in chemical avoidance. We found three chemical repellents, Ethanol, 1-Octanol and 2-Octanone, induced quick avoidance responses in wild-type worms, but the responses were about 4-5 fold slower in TRPV-knockout worms. Similarly to the wild-type, TRPA-knockout worms exhibit fairly quick avoidance responses, which are significantly quicker than the TRPV-knockout. Our results suggest although TRPV appears necessary for TRPA to function in thermosensation, TRPA is not required for the TRPV to function normally in the chemosensory avoidance response.

### **5. Neonatal exposure to monosodium glutamate results in dysmorphology in oropharyngeal motor neurons**

Foran L<sup>1</sup> (presenting author), Kupelian C<sup>1</sup>, Laroia S<sup>2</sup>, Esper J<sup>2</sup>, Kulesza R<sup>1</sup>

<sup>1</sup>LECOM, Auditory Research Center

<sup>2</sup>UPMC Hamot, Dept of Neurology

Monosodium Glutamate (MSG) is a naturally occurring sodium salt of glutamic acid that is used as a flavor enhancer in many processed foods. Glutamate is stored and released by both neurons and astrocytes in the central nervous system. Excessive extracellular glutamate results in excitotoxicity and apoptosis; such excitotoxic events may have catastrophic effects in neonates. Previous studies have shown that MSG administration during the early postnatal period results in neurodegeneration in several forebrain regions, characterized by neuronal loss and neuroendocrine abnormalities. We hypothesized that MSG exposure during the early postnatal period would similarly impact brainstem lower motor neurons involved in feeding behavior. We therefore investigated the effects of neonatal MSG exposure on neurons in the nucleus ambiguus, the trigeminal, facial, and hypoglossal nuclei. We found that exposure to MSG from postnatal days 4 through 10 resulted in significantly lower body weights, nose-to-tail length and brain weight by postnatal day 28. Neonatal MSG exposure had no impact on the total number of neurons in the nuclei examined. MSG-exposure was associated with a significant increase in the

number of round somata in both the trigeminal and facial nuclei. Furthermore, MSG-exposure resulted in significantly smaller neurons in the trigeminal, facial and hypoglossal nuclei and the nucleus ambiguus. These results suggest that neonatal exposure to MSG may impact development of brainstem lower motor neurons and may impact feeding and swallowing behaviors.

## **6. Cerebellar structure and function after repeated prenatal exposure to valproic acid**

Main S (presenting author), Kulesza R

LECOM, Auditory Research Center

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by difficulties with communication and social interactions, restricted, repetitive behaviors and sensory abnormalities. Additionally, cerebellar hypoplasia with a reduced number of Purkinje cells has long been considered a hallmark of ASD. Valproic acid (VPA) is an anti-seizure medication and is indicated in the treatment of epilepsy, manic episodes and migraines. Prenatal exposure to VPA significantly increases the risk of an ASD diagnosis in humans and prenatal VPA-exposure is used as an animal model of ASD. Notably, exposure to VPA on embryonic (E) day 12.5 is known to impact cerebellar circuits and function in rodents. Purkinje cells are one of the main neuronal cell types in the cerebellar cortex and these neurons are born as early as E12, with a peak on E15. These neurons then migrate into the cerebellar cortex until E22. We hypothesized that repeated VPA exposure on E10 and E12, would impact Purkinje cell morphology, neurochemistry and motor coordination. To test this hypothesis, we exposed pregnant female rats to VPA on E10 and E12. We tested motor coordination in a behavioral cohort of animals on postnatal (P) days 26 – 30 and we examined Purkinje cell morphology and neurochemistry in an anatomical cohort on P28. Our preliminary results suggest that repeated exposure to VPA results in Purkinje cell dysmorphology and difficulty with motor tasks requiring coordination.

## **7. Prenatal valproic acid exposure disrupts morphology and neurochemistry of the medial nucleus of the trapezoid body**

Konda S (presenting author), Kulesza R

LECOM, Auditory Research Center

Valproic acid (VPA) is an anti-epileptic and mood-stabilizing drug and has been observed to increase the risk of autism in human populations. In this study, we examine the impact of prenatal exposure to VPA on the rat auditory brainstem. Previous studies have indicated that VPA exposure to animals significantly reduces the number of neurons in the auditory brainstem and also changes their morphology. We attempt to extend this VPA-induced dysmorphology and specifically focus on the neurons of the medial nucleus of the trapezoid body (MNTB), the major afferent axonal projections to this nucleus and the major efferent glycinergic projections of this nucleus within the superior olivary complex (SOC). We hypothesize that prenatal VPA exposure on embryonic day 15 will impact afferent innervation, neuronal morphology, and axonal projections of MNTB neurons. Using 16 control and 16 VPA-exposed rats, we characterize the afferent projections of the MNTB using calretinin and confocal microscopy. Morphology of MNTB neurons is observed by their cell body size and shape and the distribution of the calcium-binding protein calbindin (normally expressed in MNTB neurons). Finally, we quantify the density and distribution of glycinergic terminals arising from the MNTB within the auditory brainstem with immunofluorescence for glycine receptors. This study should provide insight into

the developmental changes that occur in autism—specifically with the auditory system— from a prenatal etiology.

#### **8. Synergistic Effects of Resveratrol and Quercetin on Cancerous Mouse Cell Line**

Katie Baldwin, Lauren Gillespie, Amanda Lisby, Fred J. Brenner Ph.D., and Durwood Ray, Ph.D., Grove City College, Grove City, PA 16127.

The purpose of this study was to determine synergism between quercetin and resveratrol compounds in a cancerous cell line. The compounds tested were resveratrol (3, 4', 5-trihydroxy-trans-stilbene), a phenolic phytoalexin, and quercetin (2-(3, 4-dihydroxyphenyl)-3, 5, 7-trihydroxy-4H-chromen-4-one), a flavonoid. The cell line used in these experiments was Grove City College's T2A mouse cancer cell line. (Ray et al. in Press). The T2A cells were plated 3 days prior to the start of the experiment so that the average confluency of the cells on day 1 was approximately 1-10%. Quercetin and resveratrol were dissolved in DMSO and then prepared in media such that all solutions had a final DMSO concentration of 0.1%. T2A cells were treated with either resveratrol or quercetin in a range of concentrations from 0-300 $\mu$ M. The concentration of quercetin was held constant at 12 $\mu$ M while the resveratrol was in range from 0-300 $\mu$ M. Photomicrographs were taken of six randomly preselected 2mm<sup>2</sup> regions on days 1-4. Based on the LD50's established in prior research, the framework of initial concentrations was determined. For further study, the synergism between the compounds on the T2A cell line was compared to the results of the compounds on other cell lines (NIH Swiss, T1A immortal, T3HA hepatic, and T4PA pulmonary metastatic cancer cells) and the opposite study was performed switching the compound held constant and the compound in varied concentrations. Upon completion of the T2A cell line, the T3HA cell line will be further examined using the same methodology.

#### **9. Lower Limb Electromyographic Evaluation and Oxygen Consumption of Motorized and Non-Motorized Treadmill Running**

Charlene Takacs- student at SUNY Fredonia (presenter of the poster)

Todd Backes PhD- Asst Prof of Biology at SUNY Fredonia

The purpose of this project is to measure electrical activity of lower limb muscles and oxygen consumption in both motorized and non-motorized treadmill running. Recently non-motorized treadmills have provided an alternative to traditional motorized treadmills. Non-motorized treadmill running is advertised as superior to motorized treadmill running because of more realistic pacing capabilities, increased muscle activity, and increased oxygen consumption. The benefit of non-motorized treadmill running therefore would be increased calories burned for an identical bout of exercise completed on a motorized treadmill. Subjects will run for 3km on the Woodway Curve<sup>Tm</sup> non-motorized treadmill at a self-selected pace and a CosMed Trackmaster Tx428 motorized treadmill. Oxygen consumption data will be collected via breath by breath analysis with the CosMed CPET metabolic cart. Electromyographic (EMG) data will be collected with Noraxon Myomuscle wireless EMG telemetry system with 5cm x 10cm electrodes placed on muscle activation points of 7 dominant side muscles. EMG data will be collected from the following muscles: tibialis anterior, biceps femoris, medial gastrocnemius, vastus lateralis, vastus medialis, rectus femoris, and erector spinae. We predict the non-motorized treadmill EMG data to exhibit spatial muscle activation patterns similar to motorized treadmill running patterns. Additionally, we predict increased temporal patterns in the stance and propulsion phase in the non-motorized treadmill running condition. The increased muscle activation in these phases will correspond to an increase in oxygen consumption in the non-motorized condition compared to the motorized condition.

## 10. CytochromeB Mitochondrial DNA in *Formica* Ants

Steven Muti\*, Victoria Thee\*, Dr. Heather D. Barton\*, Dr. Stephen P. Jenkins\*

\*Grove City College Department of Biology, Grove City PA

Colony queen number (monogyny or polygyny) is one criterion used for determining phylogenetic relationships among ant species groups within the genus *Formica*. Within some Nearctic *Formica* species groups, however, colony queen number remains unknown. For example, *F. exsectoides* is known to be polygynous, while *F. subintegra* is suspected to be monogynous. We sequenced a 314 bp region of the cytochrome B gene for two *Formica* species: *F. subintegra* and *F. exsectoides*. Using this sequence data, we determined genetic relatedness between the two species as well as expected heterozygosity (He) within each species. We found that the two species differ at 8 of 314 loci (2.55% genetic difference). He within *F. exsectoides* was found to be  $0.37 \pm 0.19$ , and He within *F. subintegra* was found to be  $0.42 \pm 0.076$ . These preliminary results suggest that, contrary to expectations, *F. subintegra* is likely polygynous rather than monogynous.

## 11. The occurrence of the parasite *Toxoplasma gondii* in Erie County

Jacqueline Raymond, Margaret Matthews, Tom Cook Ph.D. and Sara M Turner Ph.D.,  
Mercyhurst University

*Toxoplasma gondii* is a unicellular parasite that can be found throughout the globe that is approximated to have infected 25% - 30% of the human population. This parasite poses a serious problem for pregnant women and immunocompromised individuals. Humans can be infected in many ways including contact with infected cat feces, drinking contaminated water, contact with contaminated soil, and vertical transmission from mother to fetus among other routes. This study examines the prevalence of *T. gondii* in rural and urban areas around Erie County, PA. It is predicted that urban areas would have higher rates of *T. gondii* than the peripheral areas because outdoor/stray/feral cats would be concentrated in the city with greater access to food, dumping of cats at shelters, and rodent populations serving as intermediate host.

Soil samples were collected by placing in a sealed plastic bag until the DNA could be extracted using the E.Z.N.A. soil DNA kit. PCR was used to amplify the B1 gene, which is present in six strains of *T. gondii*. The samples were then run against a positive sample of *Toxoplasma gondii* using gel electrophoresis. Thus far, 20 samples have been analyzed and half of the samples were positive for *T. gondii*. This indicates that *T. gondii* is prevalent throughout Erie, Pennsylvania. In the United States, no testing has been done in the environment for *T. gondii* so these findings are significant.

## 12. The Prevalence of *Borrelia burgdorferi* in *Ixodes scapularis* on Presque Isle

Samantha De Salle\*, Thomas Kelly, Sara Turner, PhD.

Mercyhurst University Biology Department, 501 East 38th Street, Erie, PA 16546

Deer ticks, *Ixodes scapularis*, can often be pathogen carriers for the bacteria *Borrelia burgdorferi*. When *I. scapularis* transmit the bacterium to humans through bite, it leads to Lyme disease. It has been documented that *I. scapularis* have spread throughout the Northeast United States over the past few decades. Surveys have shown that *I. scapularis* are present on Presque Isle State Park. More than four and a half million visitors come to Presque Isle annually, making it one of

the most popular state parks in the United States. Due to the high traffic, it is crucial to monitor the *I. scapularis* population as it is often a vector for pathogens that may be fatal to humans and animals. While Lyme disease is often nonfatal, other pathogens carried by ticks such as the bacteria genus *Ehrlichia* can lead to Erlichiosis which has a fatality rate reaching 5%. DNA analysis of ticks collected by flagging to determine if they were vectors for *B. burgdorferi* was then conducted through the use of a polymerase chain reaction and gel electrophoresis. All samples were tested to determine if DNA was present before being tested for Lyme disease.

### **13. Comparing tick abundance on small mammals treated with permethrin to untreated small mammals**

Samantha Horodyski, Zarah Pratz, and Sarah Bennett, Mercyhurst University Pennsylvania consistently has one of the highest incidences of Lyme disease in the United States (CDC, 2015). Additionally, a recent survey by the Department of Environmental Protection found that blacklegged ticks (*Ixodes scapularis*) infested with the bacterium that causes Lyme disease, *Borrelia burgdorferi*, are now found in all 67 counties in Pennsylvania (Hutchinson et al., 2015). Dr. Sara Turner, in conjunction with the Pennsylvania DCNR, introduced the pesticide permethrin to small mammals at Presque Isle State Park in 2014 and 2015. Damminix tubes were placed every 10 meters along Sidewalk and Deadpond Trails. The current study seeks to determine the effectiveness of this product by comparing tick loads on small mammals in treatment areas to those in a control area located 1 km from the treatment site. During Summer 2015 small mammals were trapped using H.B. Sherman live traps. In 192 trap nights, five white-footed mice (*Peromyscus leucopus*) were captured in the permethrin treatment area. In 257 trap nights 27 white-footed mice and one meadow vole (*Microtus pennsylvanicus*) were captured in the control area. No ticks were found on the ventral sides of the animals or on the ears of any of the animals that were captured. Investigators are currently exploring the use of anesthetic to immobilize the animals so they can better explore the region behind the their ears.

### **14. Survey of Human Pathogen Carrying Ticks and Possible Pathogens from Presque Isle State Park (Erie, PA)**

Nicole Lee, M.S., Kaya Smith\*, Nancy Carty, Ph.D., Christopher Keller, Ph.D.  
FNAOME, Laboratory of Human Pathogens, Lake Erie College of Osteopathic Medicine,  
Erie, PA

Objectives: Black-legged ticks (*Ixodes scapularis*) and dog ticks (*Dermacentor variabilis*) transmit disease-causing pathogens to humans, including *Borrelia burgdorferi*, *Babesia microti*, and *Rickettsia rickettsii*. Our previous studies have shown both *I. scapularis* and *D. variabilis* ticks to be present throughout Erie County with the highest prevalence in Presque Isle State Park. Therefore, the current study was undertaken to determine the tick distribution and pathogen carriage rate of ticks found on Presque Isle.

Methods: Adult *I. scapularis* (n=660) and adult *D. variabilis* ticks (n=64) were collected in 2013-2015 by flagging multiple trails on Presque Isle. After collection, tick DNA was extracted and the presence of PCR-quality DNA was determined by a tick mitochondrial 16S PCR. Samples were then tested for the presence of pathogen DNA via PCR, including *B. burgdorferi* flagellin and *B. microti* 16S ribosomal genes. Positive samples were verified using gene sequencing.

Results: From 2013-2015, 660 deer, 64 dog, and 3 Lonestar ticks were found. Black-legged ticks were evenly distributed among trail areas, while dog and Lonestar ticks were mainly found in the central Sidewalk, Fox, Marsh, and Dead Pond Trails. All ticks were positive for the tick 16S PCR. Of the deer ticks found on Presque Isle in 2013-2014, 33.8% (223/660) were positive for *B. burgdorferi*, 3.0% (20/660) were positive for *B. microti*, and 1.36% (9/660) were positive for both *B. burgdorferi* and *B. microti*. None of the dog ticks were positive for *B. burgdorferi*, and further testing is being done on the carriage rate of *R. rickettsii*.

## **15. Measurements of Glyphosate Levels in Local Water and Common Foods**

Rachel Stauffer and He Liu, Department of Biology, Morosky College of Health Professions and Sciences, Gannon University, Erie, PA

Glyphosate is used as an herbicide by farmers to kill weeds and grasses while genetically engineered crops are tolerant. Glyphosate has been used since 1974 in over 160 countries around the world. The Maximum Contaminant Level Goal (MCLG) for glyphosate by EPA is 700 ppb but the long-term effect of glyphosate under the MCLG still remains controversial. We took samples of common foods, beverages, and water and measured the concentrations of glyphosate in them using ELISA method. Overall, our results show glyphosate is present at very low levels in water samples from Lake Erie and in local tap water. The concentrations in foods and beverages are higher, but still well below the MCLG.

## **16. Growth inhibition of gram-positive and gram-negative bacteria by essential plant oils: Implications for novel therapeutic interventions**

Sudha K. Ayala OMSII\*, Christopher Haydanek M.S, Nancy Carty Ph.D., Christopher C. Keller Ph.D., Laboratory of Human Pathogens, Lake Erie College of Osteopathic Medicine, Erie, PA

*Pseudomonas aeruginosa* is a Gram-negative pathogen implicated in nosocomial and opportunistic infections. Recent emergence of antibiotic resistance in *P. aeruginosa* isolates has necessitated the search for alternative therapeutic interventions. Our previous studies have shown that oils inhibit the growth of *Staphylococcus aureus* a Gram-positive organism. The current study was performed to determine if essential oils inhibit *P. aeruginosa* growth and whether there is a commonality in the oils that inhibit both *P. aeruginosa* and *S. aureus*. Disk diffusion assays were used to screen 16 essential oils against *P. aeruginosa* reference strains (n=3). The four most effective oils for *P. aeruginosa* and for *S. aureus* were compared respectively. Of the 16 essential oils tested, cinnamon cassia oil was the most effective against *P. aeruginosa*, followed by tea tree, clove, and rosemary oils. The remaining oils tested had little to no effect on *P. aeruginosa* growth. Our previous studies showed that the four most effective oils against *S. aureus* were oregano, cinnamon cassia, tea tree, and lemongrass oils. In this study, cinnamon cassia oil was found to be the most effective oil tested in inhibiting growth of both *P. aeruginosa* and *S. aureus*, followed by tea tree oil, indicating that these oils are effective in inhibiting growth of both Gram-positive and Gram-negative organisms, and this may lead to the development of novel therapeutic interventions against antibiotic resistant bacterial infections.

### **17. User friendly map tools for managing the Lake Erie Arboretum at Frontier Park**

Michael Curtis, Penn State Erie - The Behrend College

The goal of this research project is to migrate a database from Microsoft Access to SQL and integrate it with a web based map service, like Google or Bing maps. This project will also update the database with new GPS data taken with survey grade geospatial tools due to new biological developments at the Lake Erie Arboretum at Frontier Park (LEAF). The integration of this tool will update the database in real-time and will provide user friendly tools for managing the Arboretum and directing workflow. However, the use of web based services and maps will also allow for an educational tool for the patrons of the park.

### **18. Seismic Investigation of the Lake Erie Bluffs**

Curtis Kerns (csk5798@sru.edu) and Brian Miller (brian.miller@sru.edu), Department of Geology, Geography, and the Environment, Slippery Rock University, PA 16057

It is of interest to understand the impacts of Lake Erie bluff erosion. Bluff erosion may give rise to structural damage and the loss of property as shorelines are reclaimed by Lake Erie. Erosional rates are variable and may be influenced by several processes including wave action, meteoric water activity, human activity, and local geology. Of particular interest to this study are the bedrock geometry and pathways for subsurface water transport.

This study uses seismic geophysical methods to explore the near surface of the Erie Bluffs. One method employed is the Multichannel Analysis of Surface Waves (MASW), which produces a 2D shear-wave velocity profile of the subsurface. A low shear-wave velocity anomaly can be a result of water saturation of unconsolidated sediment and gravel. Thicker gravel units are also interpreted to be both more porous and permeable, further aiding the transport of water. Another method employed is seismic reflection, which can be used to map geologic structures and geometry of strata. Both methods are noninvasive and, when used together, provide a comprehensive picture of the near surface. These exploratory surveys will be used to examine the bedrock geometry and lateral variation of gravel layers which may play a role in the transport of ground water. Examining these components of erosion may help provide a better understanding of erosional rates and mechanisms of the Lake Erie bluffs.

### **19. Effects of acid mine drainage on stream fish and macroinvertebrates**

Benjamin C. Wadsworth\* and David J. Janetski

Department of Biology, Indiana University of Pennsylvania, 975 Oakland Avenue, Indiana, PA 15705, USA

This study aims to determine the impacts of acid mine drainage on stream ecosystems in Indiana County, PA. The central question guiding our study is: do changes in conductivity and pH associated with acid mine drainage negatively impact the abundance and diversity of stream biota? To answer this question, we measured physical conditions and biological diversity above and below mine drainage entry points in three streams in Western Pennsylvania. Results showed reduced abundance of fish and macroinvertebrates in Dixon Run, the site where impacts from acid mine drainage were most evident downstream of mine drainage sites. Downstream of mine inputs into Dixon Run, fish biomass was ~30% lower and macroinvertebrate abundance was ~90% reduced compared to the upstream site. These findings contribute to our broader understanding of how energy extraction impacts surrounding environments.

## **20. Pharmaceutical Assessment in Surface Waters Surrounding Presque Isle State Park**

Eli R. Beal\* and David J. Janetski

Department of Biology, Indiana University of Pennsylvania, 975 Oakland Avenue, Indiana, PA 15705, USA

Pharmaceuticals, although beneficial for human health, can have negative effects on aquatic ecosystems. These pharmaceuticals enter water systems through a variety of ways, such as direct pollution runoff, but the main mode of contamination is through waste water treatment facilities. Areas with large human populations generate more waste water, and in turn, discharge more pharmaceuticals into aquatic environments. This study is designed to survey concentrations of pharmaceuticals in surface waters surrounding Presque Isle State Park. Water collection and testing will occur at 16 sites around Presque Isle, including sites located at various distances from the wastewater discharge and three nearby streams that may also contribute pharmaceuticals. The results of our study will be used to assess potential impacts on wildlife and inform more targeted pharmaceutical research in Presque Isle State Park.

## **21. A comparison of the plant community and soil characteristics of two established prairies and two post-industrial sites**

Melissa Mattwig, Allegheny College, Presenter

Lauren Umek, Chicago Botanic Garden, Chicago Park District

Byron Tsang, Chicago Park District

The Chicago Park District's Natural Areas Program employs traditional management techniques similar to other regional land managers. In southern Chicago, some new parks have been built upon post-industrial brownfields with imported soils. We compared the plant community and soil characteristics of two established prairies and two post-industrial sites with imported sediment soil along Chicago's lakefront. Sites were characterized by vegetation quality and soils were characterized by physical (moisture and texture), chemical ( $\text{NO}_3$ ,  $\text{NH}_4$ , K,  $\text{PO}_4$ , pH), and biological (decomposition rate, and enzymatic activity) properties. Nutrient content, decomposition, and enzymatic activity were dramatically elevated at one post-industrial site (Steelworkers), but comparable among reference sites and the other post-industrial site (USX). At Steelworkers, soil chemical properties varied widely between sampling locations. At reference sites, soil pH generally reflected plant diversity, but this trend was not observed with the post-industrial sites. The altered soil quality and biodiversity of the post-industrial sites with imported sediments suggests that these sites require a modified management approach that anticipates high invasive species growth and accounts for elevated nutrients and altered soil biodiversity.

## **22. Implementing the Weed Warrior project at Penn State Erie, The Behrend College**

Catherine Hensley, David Hersh, Kyle Lambing, Madison Schaefer, Riley Waugaman, Penn State Erie – The Behrend College

Invasive vegetation control is necessary in areas where invasive plants have become predominant. Their removal helps to preserve species diversity. The Weed Warrior program has been in place at Presque Isle State Park in Erie, Pennsylvania and was initially funded through a National Fish and Wildlife Foundation Grant. Adding a site at Wintergreen Gorge on the Penn State Behrend campus will add many opportunities for research for years to come and advance the Cooperative Weed Managements mission to find successful ways to eradicate invasive plant species.

The Weed Warrior project at Penn State Erie, The Behrend College will strive to eradicate several populations of non-native invasive plant species. Working with Sea Grant, a team of Penn State Behrend undergraduates have learned how to identify, mark, and properly remove the invasive species from the Wintergreen Gorge.

The Weed warrior Program will minimize the population of invasive plants on campus. This will allow the native plant species a better chance of spreading, gradually becoming a larger part of the ecosystem



here on campus again. Due to this work the Weed Warrior program at Behrend will be ongoing and sustainable.

### **23. Protein Assemblages of Crustacean Muscle Fibers in Different Sized Ghost Crabs and their Effect on Locomotive Ability**

JJ Martin (presenter), Scott Medler, Biology Department, SUNY Fredonia

Ghost crabs are a type of terrestrial decapod crustacean and are the fastest running land crabs. These animals provide an excellent model organism for studying basic principles of locomotion including muscle physiology and running velocity. The running velocity and stride frequency of these crabs varies greatly with changes in overall size. The smaller crabs have a stride frequency that is almost 2 times that of the larger crabs. Also, with regards to contractile speed, the smaller crabs also prove to about twice as fast. What parameters might be responsible for these differences? The cellular make-up of the muscle fibers within the different sized crabs plays a large role in muscle physiology. Within these different sized crabs, a variety of the myosin motor protein exists. There are also several other proteins that are involved in muscle contraction that may account for the difference in muscle motion. Some of these proteins include isoforms of troponin and tropomyosin. My hypothesis is that the running ability of the crabs is determined by the organization of the proteins found within the muscle fibers. We believe that there are significant differences in the protein assemblages between small and large crabs that will have substantial effects on the locomotive ability of the animal. Several two-dimensional difference electrophoresis gels were produced which revealed several protein changes from small to large crabs in the various locations within the whole muscle as well as among different sized crabs. Further studies will reveal the identities of proteins responsible for these changes.

### **24. Assessing the utility of eDNA to track lake sturgeon and invasive gobies**

Jared Wilczynski, Samantha Czerniak, Rebecca Ford, and Kelly Grant

Biology Department. Gannon University, 109 University Square, Erie, PA 16505

Environmental DNA (eDNA) is DNA that is shed into an aquatic habitat from sloughed cells, feces, spawning events, as well as other sources. It has emerged as a powerful tool to track organisms of interest, including those that are elusive, rare, or invasive. However, a tremendous amount of background research is required to understand and accurately use eDNA to track specific organisms. Here, we relay the results of proof-of-principle studies to investigate whether we can use eDNA as a tool to track round goby (*Neogobius melanostomus*), tubenose goby (*Proterorhinus semilunaris*), and lake sturgeon (*Acipenser fulvescens*). Round and tubenose gobies are not native to Lake Erie; whereas the lake sturgeon used to be quite plentiful in Lake Erie, but its numbers have diminished due to overfishing and other population stressors. We tested a variety of parameters including water volume, filter types, and types of DNA extraction kit. In addition, we will compare the efficacy of endpoint and quantitative PCR for detection of these species.

### **25. Comparison of Brown Bullhead Catfish Tumor and Non-tumor Tissue using mtDNA**

Garrett Hitzel, Brandon Schamberg, Brittany Peachey, Tiina Negron, Micaela Carter, Thane Feldeisen, Lydia Keiper and Fred J. Brenner, Biology Department, Grove City College, Grove City, PA 16127

Brown Bullheads (*Ameiurus nebulosus*) are opportunistic bottom feeders inhabiting lakes and ponds across the United States. In the brown bullhead populations inhabiting Presque Isle Bay in Erie, Pennsylvania, external tumors have been detected around mouth of specimens captured in the bay. Brown Bullhead tumors exhibited a three-fold increase in the amount of mitochondrial DNA compared to non-tumor tissue from the same specimens. The non-coding displacement (mtD-loop) region of the mitochondria of 12 tumor tissues and 9 non-tumor tissues are being prepared for sequencing to determine

if there are any differences (SNPs) between tumor and non-tumor tissues. DNA is currently being isolated from tumor and non-tumor tissue from other specimens and being prepared for analyses.

**KEY WORDS** Brown bullhead Mitochondrial DNA, D-loop, tumor and non-tumor tissues.

## **26. Genetic Diversity of Brook Trout Populations in the West Branch Susquehanna River Watershed**

Fred J. Brenner, Lydia Rittenhouse, and Katelyn Hess, Biology Department, Grove City College, Grove City, PA 16127

The West Branch Susquehanna River watershed is located in northcentral Pennsylvania. Some of the most pristine brook trout (*Salvelinus fontinalis*) habitat in Pennsylvania occurs in this watershed. Over the years however, abandoned mine drainage (AMD) has contributed to the decline of brook trout, impairing over 20% of the watershed, or an equivalent 1,200 stream miles. Consequently, brook trout populations have been isolated from one another, leading to a decline in genetic diversity. The purpose of this study is to evaluate the genetic diversity of brook trout populations in the West Branch Susquehanna Watershed. Caudal fin samples were collected from brook trout inhabiting these ADM impacted streams throughout the watershed and preserved in 70% ethanol for the genetic analysis of these isolated populations. Results thus far indicate that populations are strikingly homozygous at tested loci. The results of this study will aid management decisions for re-establishing genetic diversity of wild brook trout throughout the West Branch Susquehanna River watershed. Increasing genetic diversity will promote survival of these populations as they undergo changing environments.

## **27. Prevalence of Chytridiomycosis in Amphibian Populations on Presque Isle**

Natalie Popielski and Dr. Sara Turner, Mercyhurst University

*Batrachochytridium dendrobatidis* is a widespread fungal pathogen that causes the cutaneous infection chytridiomycosis in amphibian populations. Presque Isle is home to approximately 13 species of amphibians. This fungus has been documented in areas surrounding Erie, Pennsylvania and in close proximity to Presque Isle. The population decline and increased mortality of infected individuals could endanger any or all of the populations on Presque Isle. The prevalence of the chytrid fungus on Presque is currently unknown. By using qPCR to test for the presence of chytrid zoospores on collected skin swabs, we propose to determine the presence and extent of chytridiomycosis on Presque Isle. This information can be used in future studies to determine methods to protect the amphibian population on the peninsula from future infection and possibly to devise methods to increase survival in infected populations.

## **28. Identification of the microflora found on the feathers of Purple Martins compared to the microflora found on eggs**

MaryAnn Mason<sup>1</sup>, Kristen Webster<sup>1</sup>, Gabriel Imler<sup>1</sup>, Luke Patten<sup>1</sup>, Eric Brown<sup>2</sup>, Joe Siegrist<sup>2</sup>, and Beth Potter<sup>2</sup>

<sup>1</sup>School of Science, The Behrend College, Pennsylvania State University, Erie, PA, 16563, USA;

<sup>2</sup>Purple Martin Conservation Association, Tom Ridge Environmental Center, Erie, PA, 16505

Previous work in our lab has focused on determining the composition of the microflora found on the surface of Purple Martins (*Progne subis*) eggs. Interestingly, the bacteria identified from the egg surface were more similar to those found on the surface of House Wrens and Pied-Flycatchers rather than members within the same family including Tree and Violet-Green Swallows. Since Purple Martins and Tree and Violet-Green Swallows tend to share similar breeding habits and diets, we believe the differences in bacterial composition are due to differences within the uropygial gland secretions of these birds. We are beginning to look at this possibility by first identifying bacteria found on the feathers of mothers and babies and have preliminary data revealing the composition of the microbial flora.

### **29. A Small Mammal Population Census of the Habitat Islands at the Tom Ridge Environmental Center at Presque Isle State Park, Erie Pennsylvania**

David Shearer\* and Dr. Steve Ropski, Biology Department, Gannon University, Erie, PA 16541  
The principal objective of this research was to obtain a diverse sample of the mammal population using the habitats created in the parking lot of the Tom Ridge Environmental Center. There are ten islands throughout the parking lot containing native plant species. Sixty-five small and large Sherman box traps were evenly distributed throughout the ten islands and baited using peanut butter and oatmeal. The traps were checked and re-baited every morning. Animals were marked using non-toxic paint and then released. This process spanned the time period of 22 August 2014 to 3 October 2015. The majority of animals found were mostly male *Peromyscus leucopus* (white footed mice). This project is the beginning of an ongoing study that will collect data from the spring, and summer of future years for comparison. This research will provide valuable information regarding whether these habitat islands can successfully be used as natural mammal habitats.

### **30. Small mammal diversity in habitats dominated by invasive *Phragmites australis* compared to habitats dominated by native plants**

Zarah Pratz, Samantha Horodyski, and Sarah Bennett, Mercyhurst University

A rigorous program aimed at restoring wetland habitats at Presque Isle State Park by removing the invasive common reed, *Phragmites australis*, has been underway for the past several years. The effects of *Phragmites* removal on amphibians and birds have been monitored (Regional Science Consortium, 2014); however, effects on small mammals have not. A study conducted at the park in 2005 by an Edinboro University graduate student assessed small mammal diversity in several different habitats and found that it was highest in locations dominated by *Phragmites australis*.

The purpose of the current study is to compare small mammal diversity in habitats dominated by *Phragmites* to diversity in field habitats dominated by native species. *Phragmites*-dominated locations at Presque Isle State Park could not be trapped during Summer 2015 due to high water levels; however, a *Phragmites*-dominated site at the James Preserve at Asbury Woods was trapped as a control in the study. H.B. Sherman live traps were used for 46 trap nights. Eleven small mammal specimens were captured including 8 *Peromyscus leucopus*, 2 *Blarina brevicauda*, and 1 *Microtus pennsylvanicus*. Additionally, one location at Presque Isle State Park dominated by native weeds was trapped in September 2015. In 60 trap nights, 3 *Microtus pennsylvanicus* were captured. Researchers plan to continue trapping efforts at all locations during Fall 2015 and throughout 2016. Park locations include *Phragmites*-dominated sites along Sidewalk and Gull Point Trails and native-dominated sites near the Ranger Station and the Coast Guard. The James Preserve site will also continue to be trapped.

### **31. Assessing red fox (*Vulpes vulpes*) and coyote (*Canis latrans*) populations on Presque Isle State Park using remote cameras**

Tyler Chrispen, Branden Auen, Amy Burniston (Faculty advisor), Mercyhurst University  
Concurrent with the surrounding Northwestern region, Erie County is seeing an increase in ticks and Lyme disease. Lyme disease results from infection with *Borrelia burgdorferi*, a spirochete that is carried by the black-legged tick, *Ixodes scapularis*, and transmitted to humans by bite. The bacterium is transmitted to the tick through a small mammal reservoir such as the white-footed mouse (*Peromyscus leucopus*). Studies have suggested that when small mammal predators, such as the red fox (*Vulpes vulpes*) actively prey upon the reservoir species the tick population remains low. However, across the northeast United States, the expansion of the coyote (*Canis latrans*) has led to the displacement of red fox populations; potentially leading to an increase in bacteria-harboring tick populations due to magnitude of predator populations and differences in eating habits. Thus, the purpose of this study was to gather baseline data on the red fox and coyote populations on Presque Isle State Park through the use of remote

cameras. A total of 10 remote cameras were displaced throughout the park at approximate 1km intervals and ran continuously for a total of 138 days. This resulted in 2 camera captures of red foxes and 66 camera-captures of coyotes, with the identification of 8 unique individuals; 3 adults and 5 pups. Additional animals caught on camera included deer, turkey, raccoons, and opossum. This project will continue for the next three years to assess annual and seasonal changes in the populations. Future projects include trapping and radio collaring red fox and coyotes, as well as collaboration with other researchers currently exploring different aspects of the black-legged tick life cycle.