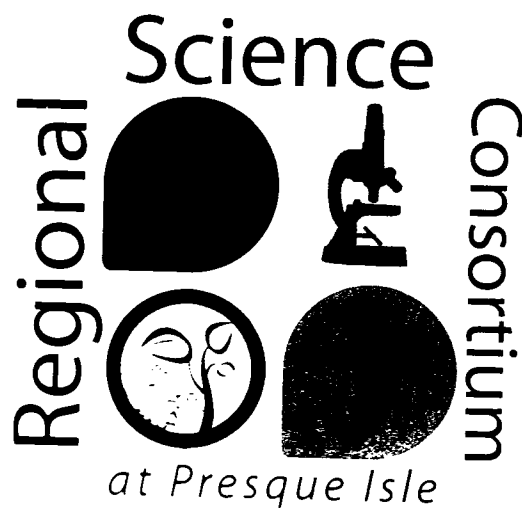


*Regional Science Consortium*

*8<sup>th</sup> Annual Research  
Symposium*

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



NOVEMBER 1 - 2, 2012

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PROCEEDINGS

## WELCOME

*Regional Science Consortium  
8<sup>th</sup> Annual Research Symposium  
November 1-2, 2012  
Tom Ridge Environmental Center  
At Presque Isle State Park*

Welcome to the 8<sup>th</sup> Annual Regional Science Consortium Research Symposium! Every year I look forward to the Symposium, and this year was no different. I am excited to report that the Symposium continues to grow each year. This year we have a total of 42 Oral Presentations and 30 Poster Presentations, of which 75 students will be presenting. The purpose of the Symposium is to provide a venue to present all types of scientific research. The Symposium is the one time each year that the scientists in this region can inform others of their research and also listen to their colleagues' research, thereby creating a great opportunity for collaboration among scientists... which I believe to be the essence of the Consortium.

I believe we have a great variety of presentations that will interest everyone. Please take the time to visit the 18 exhibitor tables featuring information on scientific equipment, services, and educational programs found throughout the TREC lobby. Also, the Natural History Collections of TREC has displayed some of their best specimens in Room 110.

I would like to thank all of the participants of the Symposium this year. I would like to thank the researchers, professors, and especially the students for their hard work in preparing their presentations. I would also like to thank the PA DCNR staff of the TREC, PA Sea Grant, the Sunset Café, and especially Casey Bradshaw and Ashley Wimer for all of their hard work to prepare for this event.

I hope you all enjoy Symposium 2012!  
Please mark your calendar for next year's Symposium on November 7-8, 2013.

Cheers!

*Jeanette*

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



## FACILITIES

*Regional Science Consortium  
8<sup>th</sup> Annual Research Symposium  
November 1-2, 2012  
Tom Ridge Environmental Center  
At Presque Isle State Park*

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Welcome to the Tom Ridge Environmental Center. This year's Research Symposium has expanded and we will be using a larger area of the facilities than previous years. If you have any questions, please do not hesitate to ask at the Registration Table in the lobby.

- TREC Lobby – Registration Table, Poster Presentations
  - Room 112 – Oral Presentations
  - Room 110 – Natural History Collections – Open House
  - Room 108 – Social Area
  - Research Wing – Open
  - First Floor – Exhibitor Tables (throughout visitor's area)
  - Second Floor – Mercyhurst University Fossil Exhibit
-

## EXHIBITORS

*Regional Science Consortium  
8<sup>th</sup> Annual Research Symposium  
November 1-2, 2012  
Tom Ridge Environmental Center  
At Presque Isle State Park*

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Please take the time to visit the many Exhibitor Tables throughout the first floor of the TREC providing you with information on employment/internship/volunteer opportunities, graduate programs, school programs, analytical services, and product information.

- AT&T
  - Cleveland Museum of Natural History
  - Edinboro University of Pennsylvania
  - Environment Erie
  - Fondriest Environmental, Inc.
  - French Creek Valley Conservancy
  - Mercyhurst University Farm
  - Natural History Collections at the Tom Ridge Environmental Center (Room 110)
  - Northwest Tri-county Intermediate Unit #5
  - Nuhsbaum Inc. – Microscopy and Imaging
  - PA Department of Conservation and Natural Resources
  - PA Sea Grant
  - Purple Martin Conservation Association
  - Renewergy, Inc.
  - Roswell Park Cancer Institute
  - Shimadzu Corporation
  - Wadsworth Controls – Greenhouse Systems
  - Weed Warriors
-

*A Special Thanks to Kal Darres, chef of the Sunset Café and Petra Restaurant...*

## PETRA RESTAURANT



Chef kal Darres

### APPETIZERS

Raspberry Almond  
Brie en Filo  
Cretan Shrimp  
Three Cheese Fatayer  
Mussels Petra  
Artichokes & Cream  
Eggplant Napoleon

### ENTREES

Crab Cakes Cypress  
Veal Chop Neffertiti  
Chicken  
Mediterranean  
Couscous Marrakech  
Lobster Shrimp Ravioli  
Pistachio Encrusted  
Salmon  
Artichokes & Shrimp  
Penne

### DESSERTS

Baklava  
Coconut Rice Pudding  
Bananas Foster Crepe  
Peanut Butter Pie

Serving Dinner  
Monday thru Saturday  
from 4 pm.

### Ancient Bounty

Named for an ancient city in a distant, remote Jordan, the Eastern Mediterranean region is as famous for hospitality as it is for pliant and delightful food. Bites are available in abundance at Petra. Nothing in the upscale yet understated dining room can prepare you for the explosion of flavor in Petra's cuisine. The secret to the restaurant's success is in the spices. Most of the spices come right from Jordan at the original spice shop - which explains why each dish served at Petra is fresh and authentic. Petra's recently acquired three liquor licenses and new fully-stocked bar provides the perfect accompaniment to your meal. Start with fatayer, puff pastry dough, started with either three cheeses or tied with fresh fragrant onions & vegetables. Try the Mediterranean Chicken, strips of boneless chicken pan sautéed finished with cream served atop penne pasta. And for the more adventurous - The Middle Eastern Mutton has a little bit of everything - hummus, Baba ghanoush, fatoush, tabbouleh, ouzo and cheese fatayer - a perfect introduction to this exotic cuisine. The Kachouche is marvelous - a whatevel from softias butter, beef tenderloin, fragrant onion, shrimp & scallops, vegetables. The entire menu is low-fat and built on fresh ingredients. So that means you can go ahead and indulge - have dessert!

3602 West Lake Road  
Erie, Pennsylvania 16505  
814.838.7197 [petrarestaurant.com](http://petrarestaurant.com)



at The Tow Ridge Environmental Center  
301 Pentastyle Drive  
814-833-5833

## SCHEDULE OF TALKS

*Regional Science Consortium  
8<sup>th</sup> Annual Research Symposium  
November 1-2, 2012  
Tom Ridge Environmental Center  
At Presque Isle State Park*

**THURSDAY, NOVEMBER 1, 2012**

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8:00                   **REGISTRATION OPENS**  
                              TREC Lobby

8:30 – 9:30           **RSC BOARD MEETING**  
                              Continental Breakfast at 8:00  
                              Board Members  
                              Room 112

**PRESENTATIONS** – ROOM 112

**Session Chair: Greg Andraso, Gannon University, RSC President**

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10:30 – 10:45       **WELCOME**  
                              Greg Andraso, Ph.D., Gannon University; RSC President  
                              Holly Best, Presque Isle State Park Manager, PA DCNR  
                              Jeanette Schnars, Ph.D., Executive Director, RSC

10:45 – 11:00       **Predicting *E. coli* Levels Using Local Weather Data: Results from  
2012 at Presque Isle State Park**  
                              Michael Rutter, Ph.D., Penn State Erie – The Behrend College

11:00 – 11:15       **Developing and Implementing the Use of Predictive Models at  
Presque Isle State Park Beaches**  
                              Tammy Zimmerman, U.S. Geological Survey

11:15 – 11:30       **Microbial Influence on the Persistence of Shiga Toxin Producing *E.*  
*coli* in Presque Isle Recreational Water**  
                              Hannah Opalko\*, Kyle Lindsay, and Steve Mauro, Ph.D.,  
                              Mercyhurst University  
                              (*Student Presentation - Undergraduate*)

11:30 – 11:45      **The Active Ingredient in Anti-depressants Acts Synergistically with Other Chemicals to Influence Levels of the Fecal Indicator Bacteria *E. coli* in Recreational Freshwaters**  
Eric Clark, Surafel Mulugeta, Christina Vojtek\*, and Steve Mauro,  
Ph.D.  
Mercyhurst University  
(*Student Presentation - Undergraduate*)

11:45 – 12:00      **Biochemistry in the Environment: *An Elusive Quest for Sucralose and More in Lake Erie***  
Amy Diegelman-Parente, Ph.D., Mercyhurst University

12:00 – 1:15      **LUNCH – *THE SUNSET CAFÉ***

***Session Chair: Frederic Brenner, Grove City College, RSC Vice-President***

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1:15 – 1:30      **Pilot Study to Assess the Microbiological Quality and Safety of Fruits and Vegetables from a Summer Farmers' Markets compared to those from Two Anonymous Grocery Chain Stores in Erie**  
Adam G. Ryzinsk\*, Lismari Reyes-Munoz, Megan Kelly, and  
Davison T. Sangweme, Ph.D., Penn State Erie - The Behrend  
College  
(*Student Presentation - Undergraduate*)

1:30 – 1:45      **Monitoring Presque Isle Bay: *Design and Construction of a Sediment Collection Device***  
Erika Schmidt\*, Sheldon Addis, Stephen Cox, Benjamin  
Thompson, Nichole McGuire, Sean Herron, Barry Brinkman,  
Ph.D., and Karinna M. Vernaza, Ph.D.  
Gannon University  
(*Student Presentation - Undergraduate*)

1:45 – 2:00      **Understanding Recent, Rapid Landscape Evolution in the White River Badlands, South Dakota**  
James J. Stevens\* and Patrick Burkhart, Ph.D.  
(*Student Presentation - Undergraduate*)

2:00 – 2:15      **Marsh Bird Nesting Response to Predation in Lake Erie Coastal Wetlands**  
Mark Lazaran\* and Joseph R. Holomuzki, Ph.D.  
Ohio State University  
(*Student Presentation - Graduate*)

2:15 – 2:30      **Examining Speciation Within *Phragmites australis* Using DNA Microsatellites**  
Bryanna Learn, Tabitha Mauer, and Sara L. Meiss, Ph.D.\*  
California University of Pennsylvania

- 2:30 – 2:45      **Suppression of the Invasive Oriental Bittersweet (*Celastrus orbiculatus*) to Preserve Native Plant Communities**  
Jessica Wooten\* and Jonathan Titus, Ph.D.  
State University of New York – Fredonia  
(Student Presentation - Graduate)
- 2:45 – 3:00      **Analysis of Biofilm and Community Diversity Associated with Invasive Diatom *Didymosphenia geminate* in the Gunpowder River, Baltimore County, Maryland**  
Thomas Croushore-Kysor\* and J. Michael Campbell, Ph.D.  
Mercyhurst University  
(Student Presentation - Undergraduate)
- 3:00 – 4:00      **BREAK AND POSTER SESSION**  
***Sponsored by Nuhsbaum Inc. – Microscopy and Imaging***  
**([www.nuhsbaum.com](http://www.nuhsbaum.com))**

***Session Chair: Robert Whyte, California University of Pennsylvania, RSC Treasurer***

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- 4:00 – 4:15      **Plasticity in Reproductive Investment of the Invasive Cladoceran *Bythotrephes longimanus***  
Sarah Glancy\*, Greg Andraso, Ph.D., and Mike Ganger, Ph.D.  
Gannon University  
(Student Presentation - Undergraduate)
- 4:15 – 4:30      **Assessing Changes in the Presque Isle Bay Watershed Fish Community Using a Modified Fish Index of Biotic Integrity (IBI): 2001 – 2011**  
Sean Rafferty<sup>1\*</sup>, Jake Lybrook<sup>1</sup>, Karla Kaczmarek<sup>1</sup>, Mark Lethaby<sup>2</sup>, and Robert Wellington<sup>2</sup>  
<sup>1</sup>Pennsylvania Sea Grant, <sup>2</sup>Regional Science Consortium
- 4:30 – 4:45      **Acid Precipitation Treatment for Brook Trout Using Passive Stormwater Systems Along Dirt and Gravel Roads**  
Ken Anderson  
Pennsylvania Fish and Boat Commission
- 4:45 – 5:00      **Four Mile Creek Steelhead Fish Passage Projects**  
Chris Frese\*<sup>1</sup> and Ken Anderson<sup>2</sup>  
<sup>1</sup>Kleinschmidt Energy and Water Resource Consultants  
<sup>2</sup>Pennsylvania Fish and Boat Commission



- 5:00 – 5:15      **A General Model for Causation of Skin Tumors in Brown Bullhead (*Ameiurus nebulosus*) in Presque Isle Bay and Strategy for Collaborative Investigation**  
 J. Michael Campbell, Ph.D.  
 Mercyhurst University
- 5:15 – 5:30      **Genetic Stock Identification of McDonald Lake Sockeye Salmon in Selected Southeast Alaska Fisheries**  
 Sara Turner, Ph.D.  
 Mercyhurst University
- 5:30 – 5:45      **A Comparison of the Microfloras Found on House Wren and American Kestrel Eggs**  
 Emily Hyde\*, Holly Pier\*, Beth Potter, Ph.D., and Margaret Voss, Ph.D.  
 Penn State Erie – The Behrend College  
*(Student Presentation - Undergraduate)*
- 5:45 – 6:00      **A Census of the Bat Population on the Campus of Gannon University**  
 Jenny Hess\*, Liz Rula\*, Hannah Smerker\*, and Steve Ropski, Ph.D.  
 Gannon University  
*(Student Presentation - Undergraduate)*
- 6:00 – 6:15      **Using Mitochondrion DNA Sequencing to Study White Tailed Deer Movement and Dispersal Patterns**  
 Jedediah Seltzer\*, Alex Rankin, Daniel Ackerman, Bethany Lashbrook, Erin Eperthener, and Fred Brenner, Ph.D.  
 Grove City College  
*(Student Presentation - Undergraduate)*
- 6:30 – 9:00      ***POSTER SESSION***
- EXHIBITOR TABLES***  
*Includes Organizations with information on Graduate Programs, Employment/Internship Opportunities, Analytical Services and Products*
- DINNER RECEPTION***  
*Food by the Sunset Café, drinks, silent auction, and the Salmon Frank Band*
- (Need to purchase a ticket? It's not too late! Please see the Registration Table)*

FRIDAY, NOVEMBER 2, 2012

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7:30 – 8:00           **REGISTRATION OPENS**  
*CONTINENTAL BREAKFAST*

**PRESENTATIONS** – ROOM 112

*Session Chair: Eric Obert, PA Sea Grant, RSC Past-President*

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8:00 – 8:15           **WELCOME**  
Jeanette Schnars, Ph.D., Executive Director, RSC

8:15 – 8:30           **A Dietary Study of the Spiny Softshell (*Apalone spinifera*) at Presque Isle**  
Shannon Mahoney\* and Peter V. Lindeman, Ph.D.  
Edinboro University  
*(Student Presentation - Undergraduate)*

8:30 – 8:45           **Habitat-related Variation in Body Size of the Sabine Map Turtle (*Graptemys sabinensis*) Among the Mermentau, Calcasieu, and Sabine River Drainages of Southwestern Louisiana and East Texas**  
Stacy McFadden\*, Amy K. Fehrenbach, and Peter V. Lindeman, Ph.D.  
Edinboro University  
*(Student Presentation - Undergraduate)*

8:45 – 9:00           **Reproduction Allometry of the Sabine Map Turtle (*Graptemys sabinensis*) in Southwestern Louisiana**  
Amy K. Fehrenbach\*, Stacy McFadden, and Peter V. Lindeman, Ph.D.  
Edinboro University  
*(Student Presentation - Undergraduate)*

9:00 – 9:15           **A Review of the Biotic Pre-Monitoring Efforts in Preparation for Control of Invasive Wetland Plants in Presque Isle State Park**  
Kelsey Powers\*<sup>1</sup>, Kyle Mulligan\*<sup>2,3</sup>, Robert S. Whyte, Ph.D.<sup>1</sup>, Jeanette L. Schnars, Ph.D.<sup>2</sup>  
<sup>1</sup>California University of Pennsylvania, <sup>2</sup>Regional Science Consortium, <sup>3</sup>Edinboro University  
*(Student Presentation - Undergraduate)*

9:15 – 9:30           **Substrate and Diet Preference of Two Benthic Fishes in Elk Creek, Pennsylvania**  
Casey Bradshaw-Wilson\* and Jay R. Stauffer, Ph.D.  
Penn State University  
*(Student Presentation - Graduate)*

\* Presenter

www.RegSciConsort.com

9:30 – 9:45      **A Comparison of Drift and Substrate Macroinvertebrate Communities in Elk Creek**  
Sara Mueller  
Penn State University  
(Student Presentation - Undergraduate)

9:45 – 10:15      **BREAK AND POSTER SESSION**  
***Sponsored by Fondriest Environmental Inc.***  
**(www.Fondriest.com)**

***Session Chair: Greg Andraso, Gannon University, RSC President***

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10:15 – 10:30      **The Use of Next-Generation Sequencing Technologies and Bioinformatics to Detect Invasive Asian Carp**  
John J. Miller, Ph.D.\*<sup>1,2</sup>, Robin Johnson<sup>1</sup>, Michael S. Eackles<sup>1</sup>,  
Timothy L. King, Ph.D.<sup>1</sup>, and Jay R. Stauffer, Ph.D.<sup>2</sup>  
<sup>1</sup>U.S. Geological Survey, Leetown Science Center, WV  
<sup>2</sup>Penn State University

10:30 – 10:45      **Development of a Field Diagnostic Test Kit Utilizing Isothermal HDA in Order to Detect the Presence of the Round Goby (*Neogobius melanostomus*) and the Tubenose Goby (*Proterorhinus semilunaris*)**  
Brent Smith  
Penn State University  
(Student Presentation - Graduate)

10:45 – 11:00      **Distribution of Young of Year Darters in the Ohio River Basin, Pennsylvania**  
Richard B. Taylor  
Penn State University  
(Student Presentation - Graduate)

11:00 – 11:15      **Spawning Habits of *Notropis bifrenatus* and *Notropis chalybaeus***  
Jacqueline Matzke  
Penn State University  
(Student Presentation - Undergraduate)

11:15 – 11:30      **An Examination of Petromyzontidae in Pennsylvania: Current Distribution of Native Lamprey Species and Their Habitat Preference**  
Shan Li  
Penn State University  
(Student Presentation - Graduate)

11:30 – 11:45      **Three New *Metriaclima* spp. of Lake Malawi, East Africa**  
David F. Ryan  
Penn State University  
(Student Presentation - Graduate)

11:45 – 12:00      **Fish Diet Analysis Used to Determine the Macroinvertebrate Diversity of Freshwater Streams**  
Shelly C. Pickett  
Penn State University  
(*Student Presentation - Graduate*)

12:00 – 1:00      **LUNCH – THE SUNSET CAFÉ**

*Session Chair: Holly Best, PA DCNR, RSC Executive Board*

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1:00 – 1:15      **Dissolved Organic Carbon Dynamics in Precipitation of Central Pennsylvania as Influenced by Climate Variability**  
Lidiia Iavorivska  
Penn State University  
(*Student Presentation - Graduate*)

1:15 – 1:30      **Quantifying Dynamic Soil Properties Across Northern Pennsylvania Ecological Sites**  
Michael Marsicano  
Penn State University  
(*Student Presentation - Graduate*)

1:30 – 1:45      **Comparison of Carbon Exchange Mechanisms for Carbon Benefits of Afforestation Projects**  
Chieh-Chung Yang  
Penn State University  
(*Student Presentation - Graduate*)

1:45 – 2:00      **How to Sample Vernal Pools for the Accumulation of Mercury**  
Dan Lawler  
Penn State University  
(*Student Presentation - Graduate*)

2:00 – 2:15      **Mode of Parasitism of a Lung Nematode, *Rhabdias pseudosphaerocephala*, in the Cane Toad in Australia**  
Nick Forman\* and Sigrid Heise-Pavlov, Ph.D.  
Penn State University  
(*Student Presentation - Graduate*)

2:15 – 2:45      **BREAK AND POSTER SESSION**  
*Sponsored by Shimadzu Corporation*  
([www.Shimadzu.com](http://www.Shimadzu.com))

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

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- 2:45 – 3:00      **The History of Chronic Wasting Disease (CWD) Surveillance in the Northeastern United States and Implications for the State of Pennsylvania**  
Tyler S. Evans  
Penn State University  
(*Student Presentation - Graduate*)
- 3:00 – 3:15      **Atlas and Key to the Hair of Terrestrial Pennsylvania Mammals**  
Andrea L. Nickoloff  
Penn State University  
(*Student Presentation - Graduate*)
- 3:15 – 3:30      **Spacial Analysis of Black Bear (*Ursus americanus*) to Assess Harvest Vulnerability in Relation to Anthropogenic Activity**  
Charles S. Crawford  
Penn State University  
(*Student Presentation - Graduate*)
- 3:30 – 3:45      **Variability in Brook Trout Populations in Great Smokey Mountains National Park**  
Casey Weathers  
Penn State University  
(*Student Presentation - Graduate*)
- 3:45 – 4:00      **STUDENT AWARDS**

## ABSTRACTS

*Regional Science Consortium  
8<sup>th</sup> Annual Research Symposium  
November 1-2, 2012  
Tom Ridge Environmental Center  
At Presque Isle State Park*

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### PRESENTATIONS

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**Thursday, November 1, 2012**

**Title: Predicting *E. coli* Levels Using Local Weather Data: Results from 2012 at Presque Isle State Park**

**Author:** Michael A. Rutter, Penn State Erie, The Behrend College

**Abstract:** During the 2012 summer swimming season at Presque Isle State Park (PISP), a new set of tools was implemented for monitoring PISP beaches for high levels of bacteria. In addition to the traditional monitoring program, a computer model analyzed weather conditions in real time in order to predict *E. coli* levels for five regions of PISP beaches each morning at 7:00 AM. These model results were used by beach managers as an additional piece of information when making decisions about protecting human health via the issuing of swim advisories at PISP beaches. In addition, model results indicating a high level of *E. coli* triggered additional sampling events in order to better estimate *E. coli* levels before swimmers arrived. In this talk, I will present the results of the model predictions for the 2012 swimming season as well as discuss additional data sources that will be used for the 2013 swimming season predictions.

**Title: Developing and Implementing the Use of Predictive Models at Presque Isle State Park Beaches**

**Author:** Tammy M. Zimmerman, Hydrologist, U.S. Geological Survey

**Abstract:** To improve the timeliness and accuracy of recreational water-quality assessments, nowcast systems that use predictive models are used at a few locations around the Great Lakes. Predictive models use environmental and water-quality variables that are measured and statistically analyzed to yield the probability that the state standard for bacteria will be exceeded, such as *Escherichia coli* (*E. coli*). Nowcasts are able to predict public health risk better than the use of the previous day's *E. coli* concentrations, especially in regard to sensitivity (the proportion of actual exceedances--concentrations greater than 235 CFU/100 mL--that are predicted correctly). The USGS, in cooperation with local and state agencies, worked to test the use of nowcasts at 6 Presque Isle State Park beaches. Software routines, spreadsheets, and modeling programs were used to expedite the compilation of environmental and water-quality data from external sources and to automate modeling steps. Examples of 2010-11 models that were validated using 2012 data will be presented. Variables used to predict *E. coli* include rainfall, turbidity, wind speed and direction, lake level, water temperature, barometric pressure, and wave height.

- Title:** **Microbial Influence on the Persistence of Shiga Toxin Producing *E. coli* in Presque Isle Recreational Water**
- Author:** Hannah Opalko\*, Kyle Lindsay, and Steven Mauro, Mercyhurst University
- Abstract:** Shiga toxin producing *E. coli* (STEC) infects over 60,000 people in the United States annually, with symptoms ranging from mild diarrhea to death. Water has been identified as a major reservoir for the transmission of this bacterial pathogen. STEC has been detected in a number of aquatic ecosystems, including the beach waters of Presque Isle State Park. The presence of STEC in Presque Isle and other water sources is sporadic, and examination of factors that govern the emergence and persistence of STEC in water are lacking. In this study, we examined the role that microbes have in mediating STEC persistence in Presque Isle beach water. Our results demonstrate that bacteria and protists, but not viruses, play an important role in removing STEC from an aquatic environment. Our results highlight the importance of the microcosm in modulating the persistence of bacterial pathogens in aquatic environments.
- 
- Title:** **The Active Ingredient in Anti-depressants Acts Synergistically with Other Chemicals to Influence Levels of the Fecal Indicator Bacteria *E. coli* in Recreational Freshwaters**
- Author:** Eric Clark, Surafel Mulugeta, Christina Vojtek\*, and Steven Mauro, Mercyhurst University
- Abstract:** Fluoxetine is the active ingredient in anti-depressant drugs and has been shown to accumulate in recreational waters at levels that have the potential to negatively impact aquatic organisms including fish, algae, and crustaceans. However, the impact of fluoxetine on aquatic microbes remain poorly understand. In this study, we examined how fluoxetine influences *E. coli* levels in the recreational waters of Presque Isle State Park in Erie, Pennsylvania. Our results demonstrate that fluoxetine is present in these waters and can decrease *E. coli* levels. Moreover, we found that fluoxetine can act synergistically with triclosan, a personal care product chemical also found in Presque Isle beach waters, to reduce *E. coli* concentration. Since *E. coli* is used as an indicator of freshwater quality, the presence of fluoxetine in aquatic ecosystems can influence how water management decisions are made.

Title: **Biochemistry in the Environment: an Elusive Quest for Sucralose and More in Lake Erie**

Author: Amy Diegelman-Parente, Mercyhurst University

Abstract: The ability to quantitatively and qualitatively assess the health of our environment is becoming increasingly important in today's world. Research in the Parente lab attempts to use oligonucleotide and protein biopolymers with modern day biochemistry instrumentation to answer many of these important questions. Past work has involved the rational design of an aptamer-based biosensor for potassium ions. More recent work has used liquid chromatography with mass spectrometry (LC-MS) to quantitatively identify sucralose in Lake Erie. Polyclonal antibodies have also been generated against sucralose for use in an ELISA-based detection system. New directions of research include the use of SELEX (systematic evolution of ligands by exponential enrichment) and magnetic bead technologies to develop new aptamers for interesting ligands, including sucralose, as well as the comet assay to investigate DNA damage in lesions from brown bullhead fish found in Lake Erie.

Title: **Pilot Study to Assess the Microbiological Quality and Safety of Fruits and Vegetables from a Summer Farmers' Markets compared to those from Two Anonymous Grocery Chain Stores in Erie**

Author: Adam G. Ryzinski\*, Lismari Reyes-Munoz, Megan Kelly, and Davison T. Sangweme, Ph.D., Penn State Erie - The Behrend College

Abstract: The Center for Disease Control and Prevention (CDC) estimates that food poisoning causes 76 million illnesses, over 300,000 hospitalizations, and 5,000 deaths in the USA. Worldwide it affects 60-80 million people and results in 8 million deaths annually. All major grocery store chains obtain fresh produce from large commercial farms, which are under FDA regulations in shipping, contact, and display of all materials, including produce. On the other hand, very little oversight and supervision if any is given to small scale local farmers. The Pennsylvania Department of Agriculture is in the process of enforcing new rules statewide, but Erie (and others) are still at risk. Farmer's markets on street corners and parking lots sell potentially unsafe goods with little protocol for handling. In this study fruit samples were purchased from a farmer's markets and two popular grocery chain stores in Erie. Microbial cultures were grown swabbing comparable local fresh fruits and vegetables (grapes, peaches, cucumbers, cherry tomatoes and vine tomatoes) to distinguish and determine the different types of bacteria found on these products. These products are normally consumed raw by themselves or as constituents of salad dishes with little or perfunctory washing. This study raised awareness of the risk of the potential risk of food poisoning specifically in situations where the public assumes cleanliness. In order to reduce the burden of food poisoning from agricultural produce. A surprisingly large microbial burden was noted on all products examined. Even prewashed and prepackaged cherry tomatoes were not an exception. Peaches, cucumbers, grapes and cherry tomatoes had a wide array of microbial contaminants, particularly coliforms and even Methicillin Resistant *Staphylococcus aureus* (MRSA).



Title: **Monitoring Presque Isle Bay: *Design and Construction of a Sediment Collection Device***

Author: Erika Schmidt\*, Sheldon Addis, Stephen Cox, Benjamin Thompson, Nichole McGuire, Sean Herron, Barry Brinkman, Ph.D., and Karinna M. Vernaza, Ph.D., Gannon University

Abstract: Polluted runoff is one of the main water quality problems in the United States and typically consists of bacteria, nutrients, sediment, toxin, and debris. Pennsylvania (PA) Sea Grant is interested in capturing suspended sediment from streams, during storm events, to assess for nutrients and toxins. Engineering students at Gannon University, recipients of a scholarship funded by a National Science Foundation S-STEM award, partnered with PA Sea Grant to design and build a sediment collection device. Students underwent a two-year design sequence (2010-2012) which consisted of the review of environmental studies on sediment collection, study of sediment collection techniques, prototyping and testing of two separate design concepts, and the selection, optimization and construction of the device.

The device consists of a galvanized steel frame with a lockable, hinged lid, and two removable Lexan boxes located inside of the frame. The boxes have screens on the entry and exit ways to collect sediment, and internal galvanized steel baffles to slow the flow. The boxes are also equipped with hinged, lockable lids, allowing access to the sediment which will settle at the bottoms of the boxes. Pennsylvania Sea Grant will use the sediment collection device to monitor the water quality of the streams and creeks that flow into Presque Isle Bay. The device was placed in Cascade Creek on Friday, September, 28 2012. At this point, the results of the sediment and findings of the device are in-progress. This presentation will provide details of the design, characteristics, and construction of the sediment collection device.

Title: **Understanding Recent, Rapid Landscape Evolution in the White River Badlands, South Dakota**

Author: James J. Stevens\* and Patrick Burkhart, Ph.D., Slippery Rock University

Abstract: The White River Badlands are an intensely sculpted landscape on the Northern Great Plains. Detritus from the eroding highlands has formed a sloping apron along the base of the cliffs within the last 4,000 years. Within the last 1,000 years, the pediments have been dissected by streams into sod tables.

The radiocarbon dated paleosols within the sod tables hold clues to environmental conditions that constrain the timing of soil formation and reveal rapid recent landscape evolution. Our original hypothesis suggested that pediments formed along the “castles” became subsequently incised by streams into sod tables, and that this sequence repeated itself several times. We now recognize a single incision event by streams between 900 and 570 RCYBP, forming the sod tables. Radiocarbon dates reveal that intervals of soil formation occurred ca. 3600, 2400, 1800, 1200, and 900 RCYBP. Other investigators working with eolian sediments found intervals of soil formation around 3600, 2600, and 1400 RCYBP, giving strong confidence to these intervals of landscape stability and climate favorable to soil formation.

By measuring the depth of incision between sod tables, we calculated erosion rates. Vertical incision of the pediments has been progressing at 2-4 cm annually, while lateral retreat of the stream channels banks ranges between 1-2 cm/year. The question of what could be capable of causing the abrupt incision into the pediments points towards climate change. We are now examining literature for evidence reported in other settings to shed light on what triggered this event.

Title: **Marsh Bird Nesting Response to Predation in Lake Erie Coastal Wetlands**

Author: Mark Lazaran\* and Joseph R. Holomuzki, Ph.D., Ohio State University

Abstract: Perhaps the two most important selective influences on migratory passerine nesting are predation risk and breeding habitat structure. The impacts of invasive *Phragmites australis* on breeding marsh birds are complex and unclear, as are the interactions of nesting habitat and nest predators. Emergent vegetation provides important breeding habitat for marsh birds, and *Phragmites* invasion is often viewed as detrimental for all but the most generalist bird species. We compared marsh bird breeding success between two Lake Erie coastal wetlands with different predator communities in 2009 and 2012 in 50m circular plots of *Phragmites*, *Typha* spp., and mixed native emergent vegetation. Nest success did not differ between wetlands in 2009, but differed in 2012, with a higher overall number of nests constructed in *Phragmites* experiencing a ~9x lower predation rate. We conclude that the structural differences between *Phragmites* and native vegetation may be effective in protecting some avian species from trophic cascades induced by mesopredator release in coastal wetlands

Title: **Examining Speciation Within *Phragmites australis* Using DNA Microsatellites**

Author: Bryanna Learn, Tabitha Mauer, and Sara L. Meiss, Ph.D.\*, California University of Pennsylvania

Abstract: Invasive species have been problematic within natural ecosystems for many years. Due to unbalanced resource competition caused by introduced species, native organisms are often disrupted and sometimes forced into extinction. *Phragmites australis* (Common Reed) is an invasive plant currently inundating wetlands throughout the northern United States. Although native to the U.S., invasive strains of *Phragmites* were introduced from Europe in the late 1800's. Since then the reed has run rampant, taking over entire wetlands in only a few years. In the search for a solution, it is important to determine if these plants are the same species that initially started the wetland invasion or if they are adapting, thus making themselves more "fit" and able to continue their rampage. In this research, four DNA microsatellites located on the *Phragmites* chloroplast chromosome (cpDNA) were used to identify the haplotype of invasive *Phragmites* and compare their relationship to each other. Plant samples were taken from two different locations within Presque Isle State Park in Erie, PA and their chloroplast DNA was isolated and amplified. cpDNA microsatellites and gel electrophoresis were used to compare the microsatellite presence and size. The resulting data suggests no genetic drift within the population at Presque Isle even suggesting identical clones in all samples (possible founder effect). To assess the future potential for *Phragmites* to spread through its seedbank we additionally assessed whether seed germination is a viable re-population mechanism post-herbicide exposure. Preliminary results indicate of the four sampled *Phragmites* stands, three had germination rates greater than 50%.

Title: **Suppression of the Invasive Oriental Bittersweet (*Celastrus orbiculatus*) to Preserve Native Plant Communities**

Author: Jessica Wooten\* and Jonathan Titus, Ph.D., State University of New York – Fredonia

Abstract: Oriental bittersweet (*Celastrus orbiculatus*) is a deciduous, woody vine native to Southeast Asia. Currently this invasive is considered a major threat to native forests in the eastern United States. This invasive has the potential to outcompete native plants in a diverse range of conditions. Some characteristics associated with this species competitive ability include shade tolerance, wide range of suitable environmental conditions, and prolific seed viability and germination. These factors contribute to difficulties related to the suppression and containment of this species. In order to preserve the delicate native plant communities at Presque Isle State Park in Erie, PA, 20 plots were established to test various procedures to suppress this invasive species and restore native plant communities.

Title: **Analysis of Biofilm and Community Diversity Associated with Invasive Diatom *Didymosphenia geminata* in the Gunpowder River, Baltimore County, Maryland**

Author: Thomas Croushore-Kysor\* and J. Michael Campbell, Ph.D., Mercyhurst University

Abstract: Samples of 'rock snot' produced by the oligotrophic, invasive, bloom-forming colonial diatom *Didymosphenia geminata* were collected in June 2012 from the Gunpowder River below Prettyboy Reservoir in Baltimore County, Maryland. Sample contents analyzed to determine what kinds of algae and invertebrates lived within the colonial masses revealed a diverse collection of tychoplanktonic creatures and periphyton. Polysaccharide biofilm development in different parts of colonial masses of *Didymosphenia geminata* was assessed using alcian blue stain, to determine how biofilm formation correlates with the age of diatom stalks. Older stalks in deeper locations within rock snot clumps contained well developed biofilms supporting a diverse community of single-celled diatoms and associated organisms.

Title: **Plasticity in Reproductive Investment of the Invasive Cladoceran *Bythotrephes longimanus***

Author: Sarah Glancy\*, Greg Andraso, Ph.D., and Mike Ganger, Ph.D., Gannon University

Abstract: The spiny water flea (*Bythotrephes longimanus*) is a non-native, predatory cladoceran identified by its long caudal spine with 1-4 pairs of lateral barbs. A new pair of barbs is added with each molt, allowing for determination of relative age. Reproductive investment can also be quantified by counting the number of parthenogenically produced young within a brood sac located on the female's dorsum. The objectives of this study were to investigate relationships among age, body size, and reproductive investment in *B. longimanus* and to determine if these relationships differ between sites. In 2011, *B. longimanus* were collected from an offshore site in Lake Erie near the town of Northeast, Pennsylvania. A stepwise regression was used to determine whether age class or any of seven size metrics predicted female reproductive success. Females with three barbs produced significantly more offspring than individuals with either one or two barbs. In females with three pairs of barbs, the length of the caudal spine between the first and second pair of barbs predicted offspring number, suggesting that somatic investment early in life may play an important role in later reproductive success. Current work involves comparing age, body size, and reproduction in *B. longimanus* from Lake Erie and Presque Isle Bay to investigate plasticity in these characters between sites.

Title: **Assessing Changes in the Presque Isle Bay Watershed Fish Community Using a Modified Fish Index of Biotic Integrity (IBI): 2001 – 2011**

Author: Sean Rafferty<sup>1\*</sup>, Jake Lybrook<sup>1</sup>, Karla Kaczmarek<sup>1</sup>, Mark Lethaby<sup>2</sup>, and Robert Wellington<sup>2</sup>

<sup>1</sup>Pennsylvania Sea Grant, <sup>2</sup>Regional Science Consortium

Abstract: The Presque Isle Bay watershed, located in Erie County, Pennsylvania, drains a highly urbanized area (62.6% imperviousness) of 26.2 square miles. Tributaries of the bay include Scott Run, Cascade Creek, Mill Creek, and Garrison Run. It has been well documented that urbanization can alter biotic communities and cause declines in the diversity of fishes. Declines in fish diversity and index of biotic integrity (IBI) scores have been observed in urban streams throughout the United States. The IBI uses the characteristics of fish assemblages to evaluate the biological integrity of a stream and includes scoring 12 metrics related to species composition, trophic composition, and fish abundance and condition. The sum of the 12 metrics yields an overall site score that characterizes the biotic integrity of the site. The purpose of this study was to investigate changes to the Presque Isle Bay watershed fishery, between 2001 and 2011, using fish species richness, diversity, and a multi-metric IBI. Species richness was significantly higher among the 12 sites assessed in 2011 (mean = 4.9) compared to 2001 (mean = 3.8). The number of sensitive species was higher in 2011 (n = 5) compared to 2001 (n = 2); however, tolerant species dominated the catch in both years. The diversity of fish, calculated using the Shannon-Wiener Diversity Index ( $H'$ ), was low in 2001 ( $H' = 1.41$ ) and 2011 ( $H' = 1.35$ ). Comparison of IBI scores from 2011 and 2001 suggests that the Presque Isle Bay watershed as a whole still remains poor; however, the average IBI score significantly improved from 25 in 2001 to 32 in 2011, and the IBI scores improved at nine of the 12 sites. The assessment of fish communities in this study, along with future assessments, will enable the determination of the impact of stream improvement projects.

Title: **Acid Precipitation Treatment for Brook Trout Using Passive Stormwater Systems Along Dirt and Gravel Roads**

Author: Ken Anderson, Pennsylvania Fish and Boat Commission

Abstract: The Pennsylvania Fish and Boat Commission (PFBC) and Partners have worked closely on the design and installation of Passive Acid Precipitation Stormwater Treatment systems on two watersheds, one at the South Branch of Kinzua Creek in McKean County, and one at the unnamed tributary of Gifford Run in Clearfield County, PA. Both projects were designed primarily to improve water quality by increasing pH and alkalinity, and in turn benefit receiving brook trout *Salvelinus fontinalis* fisheries. The treatment systems were retrofitted into existing dirt and gravel road stormwater facilities. The Kinzua Creek Study consisted of placing three approximately 1000 foot long treatment efforts using limestone and crab shell treatment media types to two untreated controls sites. A second study on Gifford Run consisted of placement of two miles of treatment system using limestone as a treatment media. The South Branch of Kinzua Creek treatment system went into place in July of 2009 and was expanded in 2011. The unnamed tributary of Gifford Run treatment system went into operation in summer of 2011. In both studies pre/post water quality and biological response data were collected. The treatment systems at both project sites were successful at increasing pH and alkalinity of receiving waters. The limestone treatment system at the South Branch of Knizua Creek was successful at re-establishing brook trout recruitment and the treatment system at unnamed tributary of Gifford Run provided a robust brook trout population response.

Title: **Four Mile Creek Steelhead Fish Passage Projects**

Author: Chris Frese\*<sup>1</sup> and Ken Anderson<sup>2</sup>  
<sup>1</sup>Kleinschmidt Energy and Water Resource Consultants, <sup>2</sup>Pennsylvania Fish and Boat Commission

Abstract: The Pennsylvania Fish and Boat Commission (PFBC) and Kleinschmidt have worked closely on the design and installation of two fish passage projects on Fourmile Creek in Erie County, PA. Both facilities are designed primarily for the passage of steelhead trout *Oncorhynchus mykiss*, but will also allow passage of resident fishes, and provide management options for the invasive sea lamprey *Petromyzon marianus*. One project included the design and installation of an Alaskan steepass fishway on an existing low-head dam near the mouth of Fourmile Creek, a small tributary to Lake Erie that runs through a private golf club, the Lawrence Park Golf Club. The fishway went into operation in fall of 2010 and has passed an undetermined number of steelhead upstream. The second fish passage project involves the design and installation of a waterfall bypass channel at a natural obstruction located some 750 feet upstream of the low-head dam. The construction of the second fish passage facility was opened allowing passage during the fall 2011 steelhead run.

Kleinschmidt's scope of work for the steepass fishway included final design, acquisition of all necessary permits/waivers, preparation of contractor bid package, and construction observation. Final design of the bypass channel at the waterfall included a site survey, hydraulic analysis, a site meeting to review and adjust the conceptual layout of the bypass channel, final design of the bypass channel, preparation and submittal of a PA DEP GP-4 permit, and an erosion and sedimentation control plan. The PFBC's involvement included easement acquisition, grant funding management, ordering pre-fabricated sections of fishways and site construction activities. Both projects involved multiple agencies and partners and were accomplished through cooperation with the landowner and interested private parties such as fishermen's groups.

Title: **A General Model for Causation of Skin Tumors in Brown Bullhead (*Ameiurus nebulosus*) in Presque Isle Bay and Strategy for Collaborative Investigation**

Author: J. Michael Campbell, Ph.D., Mercyhurst University

Abstract: Decades of fish sampling to monitor tumors in brown bullheads of Presque Isle Bay and other locations have not included any investigations to successfully pin-point the cause of external tumors in this sentinel species. The relative importance of the main types of external tumors detected in brown bullhead populations varies in space and time, suggesting the possibility that multiple etiologies are involved. A general explanatory model for external tumor formation in *Ameiurus nebulosus* will be presented, followed by a proposed strategy to approach unraveling this mystery in a collaborative, systematic and step-wise manner. The proposed strategy would utilize the research facilities of the Regional Science Consortium and diverse collective research expertise of its member institutions, and will focus on the Presque Isle Bay ecosystem as an ideally situated field setting for this work.

**Title: Genetic Stock Identification of McDonald Lake Sockeye Salmon in Selected Southeast Alaska Fisheries**

**Author:** Sara Turner, Ph.D., Mercyhurst University

**Abstract:** McDonald Lake has been considered the largest sockeye salmon producing system in Southern Southeast Alaska, although returns have declined in recent years. This study uses genetic stock identification (GSI) analysis on sockeye salmon tissue samples collected from commercial net fisheries in Southern Southeast Alaska. The analysis focused on assessing commercial harvest of a depressed McDonald Lake stock in four fishing areas: Clarence Strait, Sumner Strait, Gravina Island, and 107-10 (Ernest Sound). In Clarence Strait the highest proportions of McDonald Lake fish were harvested after statistical week 30 and comprised up to 57% of the harvest. In Sumner Strait the highest proportions of McDonald Lake fish were harvested during statistical week 30 and comprised up to 32% of the harvest. In Gravina Island the highest proportions of McDonald Lake fish were harvested after statistical week 30 and comprised up to 30% of the harvest. In Ernest Sound McDonald Lake fish comprised 30-60% of the commercial harvest. The determination of the contribution of McDonald Lake sockeye salmon in the commercial harvest fishery by statistical week provides information on the return timing and harvest patterns of McDonald Lake sockeye salmon in these fisheries and will provide alternatives for additional management actions to reduce the exploitation on the stock should it be necessary.

**Title: A Comparison of the Microfloras Found on House Wren and American Kestrel Eggs**

**Author:** Jenny Hess\*, Liz Rula\*, Hannah Smerker\*, and Steve Ropski, Ph.D., Gannon University

**Abstract:** For the past three summers a census of the bat population has occurred on the campus of Gannon University in Erie, Pa. The numbers for the first two years have held relatively steady while this year's data is being analyzed at this point and will be compared to the previous two years during the presentation. The disease White Nose Syndrome was first reported in 2006 in a cave in New York. The disease has killed an estimated 5.7 million bats in 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 in Pennsylvania and may result in the listing of three bat species as endangered by the state, including the Little Brown Bat (*Myotis lucifugus*) which is the predominate bat on the Gannon campus. This study will compare yearly data by building, time of year, building side and species composition to determine trends and whether 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 the most appropriate locations to encourage bat presence on the campus.



Title: **Using Mitochondrion DNA Sequencing to Study White Tailed Deer Movement and Dispersal Patterns**

Author: Jedediah Seltzer\*, Alex Rankin, Daniel Ackerman, Bethany Lashbrook, Erin Eperthener, and Fred Brenner, Ph.D., Grove City College

Abstract: The white tailed deer (*Odocoileus virginianus*) is the most abundant ungulate in the Eastern United States and has a large impact on ecosystems. Understanding deer dispersal patterns is important for managing a healthy ecosystem. A limited number of radiometric studies suggest that female deer are philopatric, ranging little from their place of birth. Previous studies suggest that male deer are responsible for the genetic variation in the species. This study seeks to determine deer movement patterns through DNA sequencing. By sequencing the mitochondrion displacement loop, a non-coding regulatory region in the mitochondria genome, haplotypes are assembled from the sequences and the nucleotide diversity of the sequences is calculated. Using Haplotypes and nucleotide diversity measurements phylogenetic trees are constructed of maternal lines and local deer dispersal patterns are determined. Eleven samples from Presque Isle State have been sequenced and compared to five sequenced samples from the surrounding Erie County. The sequence results suggest active deer movement between Presque Isle and the surrounding County of Erie. The close homology among deer herds in Presque Isle and Erie imply that female deer dispersal takes place in this sampling location at a rate higher than previous studies have shown. This dispersion pattern may be a result of environmental influences such as overpopulation and hunting pressure. The deer may migrate through the city of Erie in small herds during times of stressful conditions and thus resulting in the genetic diversity that DNA sequencing has revealed.  
**KEY WORDS** D-loop, haplotypes, mtDNA variation, white-tailed deer, population genetics, nucleotide diversity

## PRESENTATIONS

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Friday, November 2, 2012

Title:           **A Dietary Study of the Spiny Softshell (*Apalone spinifera*) at Presque Isle**

Author:          Shannon Mahoney\* and Peter V. Lindeman, Ph.D., Edinboro University

Abstract:        Spiny softshells (*Apalone spinifera*) are distributed throughout the Mississippi -Ohio-Missouri drainage, smaller Gulf Coastal drainages, and the lower Great Lakes. Populations in the Great Lakes are of conservation concern as numbers have declined due to habitat degradation. Previous studies have shown the diet to be mostly crayfish, aquatic insects, and fish, while vegetation seems to be only a small part of their diet. No research has been done on whether or not this turtle species feeds on invasive zebra and quagga mussels. At Presque Isle, we trapped spiny softshells to determine to what extent they feed on invasive mussels and also what the difference in diet is between males and females. The turtles were captured in fykenets in Misery Bay and Graveyard Pond, with most data collected in August and September of 2006–2012. Turtles were confined for up to 48 hours and fecal samples were sorted under a dissecting microscope. Each prey taxon was quantified by volumetric displacement and ranked using an Index of Relative Importance (IRI) based on average volume of feces for the taxon and its frequency of occurrence in feces. Males (N = 23) ate primarily insect fragments (IRI = 60), algal stalks (IRI = 33), and caddisfly larvae (IRI = 5). Females (N = 4) ate primarily algal stalks (IRI= 43), crayfish (IRI = 34), and fish (IRI= 16). Only one turtle, a male, had eaten zebra and quagga mussels, which is surprising as stinkpots (*Sternotherus odoratus*) and common map turtles (*Graptemys geographica*) had previously been reported to eat significant quantities of invasive mussels. It was also unusual for algae to be of such high importance as softshells have generally been reported to be strict carnivores.

\* Presenter

Title: **Habitat-related Variation in Body Size of the Sabine Map Turtle (*Graptemys sabinensis*) Among the Mermentau, Calcasieu, and Sabine River Drainages of Southwestern Louisiana and East Texas**

Author: Stacy McFadden\*, Amy K. Fehrenbach, and Peter V. Lindeman, Ph.D., Edinboro University

Abstract: The Sabine map turtle (*Graptemys sabinensis*) is restricted to the Sabine, Calcasieu, and Mermentau river drainages of southwestern Louisiana and east Texas. Data on body size suggest that it is the smallest of the 14 species of the genus *Graptemys*, although inter- and intradrainage variation in its body size have not been examined. The entire Sabine drainage and the upper Calcasieu drainage have a fast current and contain numerous sandbars. The entire Mermentau drainage and the lower Calcasieu drainage have lower gradients with little perceptible current and no sandbars. We captured *G. sabinensis* from the Mermentau and two of its major tributaries, bayous Plaquemine Brule and Nezpique, as well as the upper and lower portions of the Calcasieu drainage, using fykenets, basking traps, and baited hoop nets. Data were supplemented by museum specimens and literature records from the Sabine and upper Calcasieu. Body size of *G. sabinensis* found in the lower Calcasieu and Mermentau were similar (males up to 99 mm in plastron length and females up to 189 mm), but specimens from the upper Calcasieu were considerably smaller for both sexes (77 and 125 mm for males and females, respectively). *Graptemys sabinensis* from the Sabine showed a range of body sizes similar to those in the upper Calcasieu (males up to 91 mm and females up to 176 mm, but most <130 mm). Literature reports of clutch size (2–4 eggs) are from the small-bodied populations in the Sabine and upper Calcasieu; we found clutch sizes up to 7 eggs in both the lower Calcasieu and Mermentau, where females were considerably larger. Other species of *Graptemys* such as *G. flavmaculata*, *G. versa*, and *G. nigrinoda* show a similar pattern of body size in relation to the habitat in which they are found, being smaller in river reaches that have faster current and sandbars. This consistent pattern may indicate reduced prey base and productivity in these habitats.

Title: **Reproduction Allometry of the Sabine Map Turtle (*Graptemys sabinensis*) in Southwestern Louisiana**

Author: Amy K. Fehrenbach\*, Stacy McFadden, and Peter V. Lindeman, Ph.D., Edinboro University

Abstract: Optimal offspring size theory states that as females grow larger, they produce more eggs at optimum size rather than developing larger eggs. However, many turtle species show a correlation between egg size and female body size. This phenomenon can be explained by the anatomical-constraints hypothesis, under which smaller females are physically unable to lay eggs of the optimum size because of the restricted size of the caudal gap of the shell and the pelvic aperture. We collected data on female body size, clutch size, and egg width for populations of Sabine map turtles (*Graptemys sabinensis*) in the Mermentau and Calcasieu river drainages in southwestern Louisiana. The data were logarithmically transformed to perform correlation analyses addressing isometry and allometry. A nonsignificant positive, hypoallometric correlation was found between body size and clutch size. Significant positive correlations found between mean and maximum egg width and female plastron length also showed a hypoallometric relationship (i.e., egg size increased at a slower rate than body size), which is consistent with the concept of the anatomical-constraints hypothesis. Our results are consistent with studies of other species of *Graptemys* in showing that as females grow larger, they partition the extra reproductive effort they achieve between increased egg size and increased clutch size, such that neither can increase isometrically. There was a significant difference between the two drainages in egg width, with Calcasieu females laying wider eggs after statistical correction for the influence of female body size, but whether anatomical differences that facilitate this difference exist between the drainage populations is unknown.

Title: **A Review of the Biotic Pre-Monitoring Efforts in Preparation for Control of Invasive Wetland Plants in Presque Isle State Park**

Author: Kelsey Powers<sup>1\*</sup>, Kyle Mulligan<sup>2,3\*</sup>, Robert S. Whyte, Ph.D.<sup>1</sup>, Jeanette L. Schnars, Ph.D.<sup>2</sup>  
<sup>1</sup>California University of Pennsylvania, <sup>2</sup>Regional Science Consortium, <sup>3</sup>Edinboro University

Abstract: Controlling invasives such as *Phragmites* has become a priority of coastal wetland managers because decreases in plant diversity and habitat homogenization resulting from their expansion can potentially adversely affect wildlife (e.g., waterfowl) habitat quality and food web structure. As part of a broader invasives control program in Presque Isle, a pre- and post-monitoring of invasive and native plant communities will be implemented beginning in the summer of 2012. We will (1) identify and quantify macroinvertebrates in, and emerging from, the stated emergent stands, and similarly identify and quantify macrophytes from select plant communities; (2) conduct greenhouse *Phragmites* germination assays to assess whether seed germination is a viable re-population mechanism post-herbicide exposure, and (3) evaluate the genetic variability within *Phragmites* stands of varying age and size to assess the future potential for *Phragmites* to spread through its seedbank. In the summer of 2012 we began pre-monitoring of these select macrophyte communities and will provide an overview of our early efforts and a description of the stands.

Title: **Substrate and Diet Preference of Two Benthic Fishes in Elk Creek, Pennsylvania**

Author: Casey Bradshaw-Wilson\* and Jay R. Stauffer, Ph.D., Penn State University

Abstract: *Neogobius melanostomus*, the Round Goby, was introduced into the Great Lakes through ballast waters of freighters. They were discovered in 1990 and since have become among the most abundant benthic fish in all five Great Lakes and compete with native fishes. We examined diet overlap as well as habitat preference using three different types of artificial substrate between *N. melanostomus* and *Etheostoma caeruleum*, the Rainbow Darter, in Elk Creek, a tributary to Lake Erie. Four, 24-hour studies were conducted from June, July, August and September 2012, where macroinvertebrates were collected via drift and kick nets, and fish were electroshocked from each of 9 habitat plots. Data analysis will consist of a principle-component analysis to compare substrate preference between fish species collected. In addition to that, macro invertebrates collected in the environment will be compared to stomach contents of each fish, and electivity indices will be calculated.

Title: **A Comparison of Drift and Substrate Macroinvertebrate Communities in Elk Creek**

Author: Sara Mueller, Penn State University

Abstract: Insect drift is a phenomenon that occurs when freshwater macroinvertebrates release themselves from the substrate and float downstream. This movement is concentrated during morning and evening hours when it is difficult for predators to see the insects move. Drift and substrate samples were collected on Elk Creek in Erie, Pennsylvania to examine the diel and seasonal changes in species composition found in drift and substrate samples over three different substrate types. Samples were collected using drift nets and D-frame kick nets. A better understanding of species composition of a stream's drift and substrate communities, combined with fish feeding preference, avoidance, and position, can provide for more informed management decisions to be made.

Title: **The Use of Next-Generation Sequencing Technologies and Bioinformatics to Detect Invasive Asian Carp**

Author: John J. Miller, Ph.D.<sup>1,2</sup>, Robin Johnson<sup>1</sup>, Michael S. Eackles<sup>1</sup>, Timothy L. King, Ph.D.<sup>1</sup>, and Jay R. Stauffer, Ph.D.<sup>2</sup>  
<sup>1</sup>U.S. Geological Survey, Leetown Science Center, WV, <sup>2</sup>Penn State University

Abstract: Invasive species are an increasing nuisance around the world, making early detection a priority to prevent their spread and minimize their impact. The Great Lakes of North America have a long history of invasions. Two species of Asian carp currently of particular concern are the bighead carp, (*Hypophthalmichthys nobilis*) and the silver carp (*Hypophthalmichthys molitrix*), which as planktivores feeding at the base of the food chain, could potentially impact entire ecosystems. PCR, using species-specific primers, has been a valuable tool in the detection and management of these carp, but takes advantage of a relatively small amount of information from the environment for detection and provides little if any information about how invasives impact their environment. Next-generation sequencing technologies generate vast amounts of DNA sequence information from the environment. This provides the opportunity not only to detect invasive species but also to learn about the organisms with which they share the environment (including other invasives) and how the invasive species alter the communities in which they live. We have been developing a bioinformatic pipeline to analyze next generation data for the presence of invasive carp and understand their impact on the environment. The pipeline will be described using current data as examples and discuss future directions for this research.

Title: **Development of a Field Diagnostic Test Kit Utilizing Isothermal HDA in Order to Detect the Presence of the Round Goby (*Neogobius melanostomus*) and the Tubenose Goby (*Proterorhinus semilunaris*)**

Author: Brent Smith, Penn State University

Abstract: Monitoring the expansion and presence of invasive species is critical in determining the most effective measures in minimizing their impacts to the native species and environment. The Round Goby (*Neogobius melanostomus*) and the Tubenose Goby (*Proterorhinus semilunaris*), are two invasive species present in the Great Lakes. The degree of their impact on native fishes varies, but both outcompete for food and breeding habitat. The focus of this project is to develop a field diagnostic test kit utilizing isothermic reactions in order to identify the presence of these two species in the streams and tributaries of Lake Erie. The kit will be based on detecting the presence of environmental DNA (eDNA), which enters the water through mucous, excretions, or other bodily fluids from the specific fish species. Current methods to monitor their presence in streams and tributaries have included using Polymerase Chain Reaction (PCR) which requires varying temperatures throughout the reaction process, or other amplification methods which requires a series of complex reactions or an initial heat source. These methods have involved long and intensive procedures in the laboratory in order to amplify the DNA for analysis. In the test kit, Helicase-dependent isothermal DNA amplification, a one step process that does not require a heat source to carry out amplification of the eDNA will be utilized. The benefits of such a kit include: analysis of a water sample for the presence of a species while in the field and minimally intrusive equipment compared with conventional methods. Overall, this test kit will provide a more immediate analysis of the presence of a species, the range of an expanding invasive species or the presence of threatened or endangered species, all while requiring significantly less man power compared with current methods of testing.

Title: **Distribution of Young of Year Darters in the Ohio River Basin, Pennsylvania**

Author: Richard B. Taylor, Penn State University

Abstract: The U.S. Army Corps of Engineers, Pittsburgh District, conducted a feasibility-level study examining modernization of the three locks and dams on the Ohio River in Pennsylvania (Emsworth, Dashiields, and Montgomery locks & dams). To support both compliance and ecosystem restoration planning, the Pittsburgh District is compiling known information on the status and condition of biological and physical resources in the study area. A minimum of 10 species of darters (*Etheostoma*, *Percina*) spawn throughout the study area (*E. blenniodes*, *E. caeruleum*, *E. camurum*, *E. flabellare*, *E. nigrum*, *E. tippecanoe*, *E. zonale*, *P. caprodes*, *P. copelandi*, and *P. evides*). *E. camurum*, *E. tippecanoe*, and *P. evides* are listed as threatened species of concern in PA. Also present in the study area is *P. shumardi*, a welcome new colonial. These species reproduce in the main channel of the Ohio River. Additionally these darters seek out and use suitable habitats for reproduction associated with historic navigation improvements (bases of dams and island back channels). Upstream migration of adults begins in the late winter. Spawning commences in the spring and continues into the summer.

Title: **Spawning Habits of *Notropis bifrenatus* and *Notropis chalybaeus***

Author: Jacqueline Matzke, Penn State University

Abstract: This project is focused on the spawning habits of *N. chalybaeus* and *N. bifrenatus*. The objectives were to see if either species demonstrated parental behavior and to record the interaction between males and females during spawning. Cyprinids in general do not display parental behavior and are broadcast spawners. These two species of minnows are an important study subjects because they are endangered in Pennsylvania and they are thought to display different behavior than the typical minnow. The two species are limited to certain habitats and have been greatly affected by anthropological activities. The study communities took place in Marshalls Creek, PA. One month of video took place, recording the different behaviors of the two minnow species and also the habitat that was used during spawning. Water chemistry and other qualities were also recorded to compare with the times of spawning behavior. After the data was collected it videos were reviewed and broken into six categories: threaten heterospecific, threaten conspecific, attack heterospecific, attack conspecific, court, and court successful. This data was then compared through number of occurrences each behavior was displaying by either *N. bifrenatus* or *N. chalybaeus*. The results, for both species, showed that parental behavior is not present or is only a result of territoriality displayed by the males and that male competition influences spawning where the most aggressive males are the individuals likely to have a successful court.



Title: **An Examination of Petromyzontidae in Pennsylvania: Current Distribution of Native Lamprey Species and Their Habitat Preference**

Author: Shan Li, Penn State University

Abstract: Lampreys (superclass-Agatha) have a larval form termed ammocoete and either a parasitic or non-parasitic adult form. In those species that are non-parasitic, the larval stage is longer than the adult stage. The objectives I achieved in this study included: 1) Compiled all existing PA historical data (prior to 1990s) of lampreys and created database and distribution maps for each species; 2) sampled historical sites for native lampreys in 2011 by using backpack designed for ammocoetes, documented changes in lamprey communities at the watershed scale; 3) conducted substrate sampling at sites where ammocoetes were present, and analyzed substrate size preferred by ammocoetes; 4) identified lampreys to species, compared the current data and historical data to see the presence and absence of native lamprey species and document changes of distributions.

In Pennsylvania, 7 species were found historically and included: *Lampetra aepyptera*, *Lampetra appendix*, *Ichthyomyzon bdellium*, *Ichthyomyzon fossor*, *Ichthyomyzon greeleyi*, *Ichthyomyzon unicuspis*, *Petromyzon marinus*, among which *I. fossor* and *I. unicuspis* are endangered. In 2011, 4 species- *Lampetra aepyptera*, *Lampetra appendix*, *Ichthyomyzon greeleyi* and *Petromyzon marinus* were found in 14 creeks statewide. Lampreys were extinct at some sites because of flow regulation, channelization, poor water quality, and chemical treatments. In tributaries of Lake Erie, Sea Lamprey treatment might be a major reason to the population decline of native species. Substrate size and water velocity are the most important factors associated with the presence and absence of larval lampreys, so substrate samples were collected at 5 sites where ammocoetes were present. Differences on size of the sediments were found between lamprey presence and absence. Ammocoetes preferred smaller sized substrate with particle diameter less than 0.25mm in shallow, warm waters with dissolved organic matter. Distributional of Lamprey is shrinking.

Title: **Three New *Metriaclima* spp. of Lake Malawi, East Africa**

Author: David F. Ryan, Penn State University

Abstract: Three new species of *Metriaclima* are described. The three populations collected at Chitande Island, Chewere, and Chilumba in Lake Malawi were initially recognized by the brilliant coloration of the males. *Metriaclima* is currently comprised of 31 described species, with some 44 additional forms recognized by the aquarium industry. The new species were distinguished based on color patterns and morphological character states.

**Title:** **Fish Diet Analysis Used to Determine the Macroinvertebrate Diversity of Freshwater Streams**

**Author:** Shelly C. Pickett, Penn State University

**Abstract:** When aquatic entomologists are conducting research they tend to collect only the group of insects they are studying. Ichthyologists, on the other hand, collect all species present within a particular survey area. As a result, historical data is lacking for the aquatic macro-invertebrate community.

A backpack electrofishing unit was used to collect fish in Marshall's Creek, PA, and Bald Eagle Creek, PA. Marshall's Creek is a tributary of the Delaware River. Bald Eagle Creek, a part of the Susquehanna River Drainage, flows over the Allegheny Plateau, giving it reduced species diversity compared to Marshall's Creek. At Marshall's Creek, 3 sites were sampled in 3 different habitats: riffles, runs, and pools. At Bald Eagle Creek, 2 sites were sampled in 2 different habitats: pools and runs. Sites were sampled in March, August, and December in order to gain a representative list of all macro-invertebrate and fish taxa contained within each reach of stream. When fish were collected, a macro-invertebrate sample was also collected via kick sampling. Digestive tracts of all fish, according to species, will be examined in order to determine macro-invertebrates consumed. From this, I will determine a specific fish sample wherein the macro-invertebrate community can be estimated via those fish's gut analysis (ie: 3 centrarchids, 2 percids, and 2 cyprinids should be dissected and their gut content can be used to estimate what the macro-invertebrate community was like at time of capture).

**Title:** **Dissolved Organic Carbon Dynamics in Precipitation of Central Pennsylvania as Influenced by Climate Variability**

**Author:** Lidiia Iavorivska, Penn State University

**Abstract:** Dissolved organic carbon (DOC) is ubiquitous in atmospheric water, plays an important role in cloud formation processes, and contributes to organic acidity of precipitation. Rain deposited to the landscape is a source of acidity and nutrient enrichment to aquatic ecosystems. Despite the significance of DOC to a plethora of ecosystem processes, knowledge about its contributions via precipitation remains limited. In this research project, we are quantifying temporal variations in the sources and concentrations of organic carbon in precipitation in the central Pennsylvania. The study focuses on the dynamic variability of DOC in rainwater, at multiple time scales, at two sites located in the Appalachian Plateau Region. Sequential sampling during stormflow events at the first site, the Shale Hills Critical Zone Observatory, is conducted to address event-scale variability in rainfall DOC concentrations and is explored in the context of the types and the origins of the storms. Weekly sampling over many years at the second site, the Leading Ridge Experimental watershed, was conducted to address relationships among emissions sources, seasonal variability in storm tracks, antecedent atmospheric moisture conditions, and the temporal variability in DOC responses. Chemical analyses conducted on the samples include DOC, dissolved inorganic carbon, forms of nitrogen, major cations and anions, pH and conductivity. These ancillary data, along with meteorological back trajectory analyses, help to identify sources and origins of DOC in the rainwater of central Pennsylvania over different time scales.

Title: **Quantifying Dynamic Soil Properties Across Northern Pennsylvania Ecological Sites**

Author: Michael Marsicano, Penn State University

Abstract: Ecological Sites (ES) were identified in Major Land Resource Areas (MLRAs) 127 and 140 using GIS datasets and field sampling of ecological communities. A template was developed for the region that best constrained ESs using a combination of soil characteristics identified from SSURGO2 data and regional climate models. A common ES was then selected from each MLRA, and was used in the quantification of dynamic soil properties (DSP). States of the selected ESs were identified through field reconnaissance and speaking with employees of the Pennsylvania Department of Conservation and Natural Resources (DCNR) about past land use history. In MLRA 127, five states were identified including a reference state, a deer enclosure state, areas with a high degree of deer browsing, logging states, and anthropogenic states. The DSPs that were quantified across these states included O horizon thickness, A horizon thickness, truncated profiles, bulk density, penetration resistance, and C/N. A soil pit was dug at each sampling location to accurately describe the soil and measurements of penetration resistance were taken across transects, while bulk density was measured using the soil core method and the nuclear density gauge method. Grab samples of each master horizon were taken to measure C/N. Comparisons of each disturbed state were then made against the reference state which acts as an experimental control.

Title: **Comparison of Carbon Exchange Mechanisms for Carbon Benefits of Afforestation Projects**

Author: Chieh-Chung Yang, Penn State University

Abstract: Although success and failure to date of carbon trading mechanisms, such as EU ETS and flexible mechanisms under Kyoto Protocol, have always been controversial, Climate policies are still demanded for the U.S. to mitigate the warming climate. Some voluntary programs and mandatory state-level programs are multiplying to allow users to register emission-offset activities. This study will focus on how forest landowners and public agencies can participate in these mechanisms and how can they earn carbon credits. We examined a hypothetical afforestation project in Pennsylvania. I applied four sets of protocols from the following registries: the California Climate Action Registry, the Chicago Climate Exchange (CCX), the Regional Greenhouse Gas initiative, USDOE 1605. I compared the results to the net sequestration and briefly compared them to international protocols, such as the EU ETS and Clean Development Mechanism methodology. The consequence of applying different protocols for reportable carbon offset was significant. The choice of the measurement of baseline and the issue of uncertainty varied the results of sequestered carbon significantly. Choices of accounting protocol are a critical decision when landowners and agencies consider their forest offset projects. We concluded that participating in the carbon trading mechanism could benefit forest landowners and agencies in PA, but the financial profits might be variable because of market uncertainty. We also found the calculation of leakage needed to be improved in this study in order to examine accurate carbon offsets.

Keywords: carbon, carbon prices, flexible mechanisms, Kyoto Protocol, carbon offsets

Title: **How to Sample Vernal Pools for the Accumulation of Mercury**

Author: Dan Lawler, Penn State University

Abstract: The accumulation of mercury in environmental systems throughout the nation has been a cause for concern from a soil and water perspective. Mercury's ability to harm fish, reptiles, amphibians and other organisms it comes into contact with has a major focus of many environmental scientists. Its movement from these animals into humans has been well documented and can cause several health issues in humans. Pennsylvania has some of the highest depositional levels of Hg found in the northeastern United States. The goal of this study is to determine the extent to which vernal pools accumulate mercury vs. their upland counterparts, and find causal links to these high mercury levels. This presentation will be a subset of the overarching project dealing with mercury accumulation and will focus only on how to sample these ecosystems appropriately for analysis of total mercury accumulation. The material sampled will be the organic and mineral soil layers underlying these pools. In addition mercury in precipitation falling on these sites will be estimated from data collected at a mercury deposition network located within 15 miles of the furthest site. This presentation will attempt to show the advantages and flaws to several sampling approaches. Ultimately these pro's and con's will be taken into consideration to build an ideal hybrid sampling scheme that will limit contamination while maximizing time and efficiency of sampling. This scheme will then be used to assess the ability of these vernal pools to accumulate Hg over time.

Title: **Mode of Parasitism of a Lung Nematode, *Rhabdias pseudosphaerocephala*, in the Cane Toad in Australia**

Author: Nick Forman\* and Sigrid Heise-Pavlov, Ph.D., Penn State University

Abstract: Host-parasite dynamics are characterized by a physiological demand on the host's metabolism. The rapid spread of the cane toad (*Rhinella marina*) and its documented impact on native wildlife in Australia necessitate a strategy for population control, and one potential means for biological control is the lung nematode, *Rhabdias pseudosphaerocephala*. Studies have shown that *R. pseudosphaerocephala* impacts movement, growth and survivorship in juvenile Cane Toads (Kelehear *et al* 2009, Kelehear *et al* 2011, Pizzatto and Shine 2011), but it is not understood along what pathways these impacts manifest. This study looked at fat bodies in Cane Toads as one pathway that the impacts of parasitism manifest. The expected impact of parasitism by *R. pseudosphaerocephala* on the Cane Toad was that as infection intensity increased, fat bodies would be reduced. Cane toads were collected by hand at night from each season from 2010 to 2012. at two sites on the Atherton Tablelands in far north Queensland, Australia. Toads were dissected to ascertain fat body weight and count lung nematodes in the lung. Preliminary analysis of data using regression analysis did not demonstrate a strong relationship between lung nematode infection and fat body weight. Additional analysis will further describe the impact of the lung nematode on the cane toad, and illuminate the mode of impact of *R. pseudosphaerocephala*.

Title: **The History of Chronic Wasting Disease (CWD) Surveillance in the Northeastern United States and Implications for the State of Pennsylvania**

Author: Tyler S. Evans, Penn State University

Abstract: Chronic wasting disease (CWD) is a prion disease that faces both free-ranging and captive cervid populations. In the past 45 years, CWD has spread from a single region in Colorado to all bordering states, as well as Canada, the Midwest and the northeastern United States. Many states have developed surveillance plans to monitor the spread of CWD, in addition to placing bans on the importation of farmed cervids from infected regions. Because CWD is a relatively new issue for wildlife management agencies in the northeastern United States, I surveyed one representative (deer biologist, project leader, etc.) from each state to gain a better understanding of state-specific surveillance measures. After compiling all information returned via electronic mail, I determined that since 2005, when CWD was first detected in the northeast, New York (32,976) and Pennsylvania (28,062) have collected the greatest numbers of hunter-harvested white-tailed deer, and New York also had the largest single-year sampling effort (8,164 in 2005) of any state in the region. Conversely, the state of Rhode Island has tested the fewest hunter-harvested white-tailed deer (1,290) of any state in the region since 2005. I also found that the most common CWD-sensitive tissues used for testing were the retropharyngeal lymph nodes (RLN's), but some states also submitted the obex of the brain stem and tonsillar tissues. Understanding CWD surveillance efforts at a regional scale can help to provide guidance for the development of new surveillance plans or the improvement of existing ones. By collaborating with other state agencies in the northeast, the efficiency of other wildlife programs can also be improved with the aid of regional expertise.

Title: **Atlas and Key to the Hair of Terrestrial Pennsylvania Mammals**

Author: Andrea L. Nickoloff, Penn State University

Abstract: Hair is considered one of the synapomorphies (shared derived characters) of extant mammals. Keys and atlases of mammal hairs can be useful for many purposes. Although rare, such can be used for studies of food habits of predators, species identification of material recovered in the illegal trade of wildlife parts and products, determining diet changes, taxonomic and phylogenetic studies, archaeology, research on the contamination of mercury and other metals in mammals, and behavioral studies. These keys and atlases can also be used as a non-invasive method for censusing. In Pennsylvania, there are approximately 70 extant or extinct species of mammals. I want to test whether 1) the families of Pennsylvania mammals can be diagnosed based on hair 2) whether species within the families Sciuridae (squirrels) and Soricidae (shrews) can be diagnosed by their hair. I will obtain the following coarse scale information for 10 dorsal hairs in telogen phase (resting phase during which the hair does not grow further) from at least three specimens of each species: surface area of one side of each hair, length (mm) of each hair, width (mm) of each hair, width/length ratio of each hair, mean hue (degrees), and mean darkness (degrees), using the computer program ImageJ. Next, I will examine the dorsal guard hairs for their microscopic features. Finally, I will examine medullary patterns. The microscopic images will be photographed, and catalogued. The third part will be cross sectional patterns. I will note any noticeable features of each species hair, and calculate values for scale index (SI), scale count index (SCI), and medullary index (MI) for every hair from every species. With my data, I will construct a quantitative key to the hair of Pennsylvania mammals.

Title: **Spatial Analysis of Black Bear (*Ursus americanus*) to Assess Harvest Vulnerability in Relation to Anthropogenic Activity**

Author: Charles S. Crawford, Penn State University

Abstract: Successful management of large mammals is dependent upon availability of population to harvest in defined management units or season structures and by extension dependent on landowner distribution and hunter characteristics within management units that species occupy. Although harvest of *Ursus americanus* in Pennsylvania is regulated by the Pennsylvania Game Commission (PGC), individuals occupying suburban/urban environments results in a lower risk of harvest vulnerability due to landowner attitudes, hunting ordinances, and seasonal use of habitat by black bear. An ongoing study of 3 populations of radiocollared black bear in Cambria, Centre, and Lackawana counties of Pennsylvania can assist in understanding use of suburban environments by *U. americanus*. I will be compiling and analyzing radiocollar data collected by the PGC from the areas in and around State College, Johnstown, and Scranton PA to assess movement, homerange, and resource selection of black bears. A mail survey of landowner activities and attitudes will be incorporated with this data in order to assess harvest vulnerability on a landscape with varying distribution of landowners. This study is designed to have direct application in setting hunting regulations for black bear in Pennsylvania.

Title: **Variability in Brook Trout Populations in Great Smokey Mountains National Park**

Author: Casey Weathers, Penn State University

Abstract: Recent genetic (i.e. DNA microsatellites) and anecdotal evidence (i.e., stream observation) suggest that Brook Trout, *Salvelinus fontinalis*, taken from several streams and transplanted into two restored streams of Great Smoky Mountains National Park (GRSM), TN are assortative mating or demonstrate outgroup depression, which has resulted in reduced spawning and reproduction. In order to determine to what extent self-segregating is affecting restoration efforts, a study of lifecycle events affected by seasonal spawning activity is being undertaken by university researchers from Penn State and the staff of the Fisheries Department of the GRSM, with support by members of the Little River Chapter of Trout Unlimited. This work is being performed in order to ascertain the extent of self-segregation, to learn how to mitigate this natural predisposition of the trout, and to thus optimize efforts to sustain and restore wild Brook Trout populations.

## POSTER PRESENTATIONS

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**Title:** **Comparison of Ancient and Modern Dune and Beach Stratigraphy Utilizing Ground Penetrating Radar of Presque Isle Peninsula: Erie, Pennsylvania**

**Author:** Keith Hayes, Steve Mattern, Jeremy Menzer, Crystal Shafer\*, Eric Straffin, Ph.D., Edinboro University of Pennsylvania

**Abstract:** This study uses Ground Penetrating Radar (GPR) to compare the geometry and stratigraphy of prehistoric beach/dune sand deposits located on Presque Isle, to those emplaced since the construction of breakwaters in 1978. This includes modern dunes and beaches protected by breakwaters, and those developing naturally, without erosion control structures.

Presque Isle peninsula, located in Erie, Pennsylvania, rests atop a moraine deposited approximately 14 kya during a late, minor advance of the last major ice sheet to cover northwestern Pennsylvania. The peninsula originated as a small sand spit, which has been migrating and growing the past 3.5 kya as a result of long-shore (beach) and eolian (wind blown) sedimentation.

GPR transects using Mala® 250MHz and 500 MHz antennae were taken both parallel and perpendicular to an ancient dune ridge/beach system along Sidewalk Trail. Dune topography was surveyed using a laser transit. Similar transects and surveys were then conducted on an active, modern dune/beach system near Gull Point. A comparison of subsurface stratigraphy between modern and ancient systems will be presented, with the goal of examining the impact of erosion control structures on resulting patterns of erosion and deposition.

**Title:** **Duck Run Trail and Culvert Design**

**Author:** Colin Teed\*, Brendan Murray\*, and Theron Bisko\*, Gannon University

**Abstract:** Due to the current state of the landscape in the vicinity of Duck Run, we will be exploring the possibility of designing a trail system and culvert crossing within the Erie Bluffs State Park. Our research will help to make the area more safe and appealing to visitors who use the park for outdoor recreation. The project includes initial land surveying, culvert and trail design, and environmental permitting. Several potential crossing sites in the vicinity of Duck Run will be located and evaluated based on ease of access, environmental impact, and desired characteristics outlined by park officials. Wetland delineation will be performed at the perspective sites in order to eliminate crossings that will directly affect large areas of wetland. Once a site is chosen, the culvert will be designed to safely pass storm events without restricting the stream channel and causing further erosion downstream, while at the same time, not detracting from the natural aesthetic quality of the park. As per the wishes of park officials, the new trail system will direct park goers across the Duck Run ravine in order to minimize future erosion caused by pedestrian traffic along Duck Run.



Title: **Stream Quality: Assessment of a Rural Stream Compared to an Urban Stream**

Author: Cody Breon\*, Ian Jeffers\*, and Ryan Grode\*, Gannon University

Abstract: The goal of this project is to compare the stream quality of a rural stream, Duck Run, to an urban stream, Cascade Creek. The two creeks will be studied by selecting 100m sections that best represent each of the selected streams. There will be three testing locations per 100m section to assure quality control. These samples will be collected multiple times during November and December of 2012, including directly after a rain event. The parameters to be studied will include those outlined by the Environmental Protection Agency's (EPA) Rapid Bioassessment Protocol for Stream Quality. The specific tests to be completed include: Biochemical Oxygen Demand - 5 (BOD5); nitrogen and phosphorus concentrations; a benthic macro-invertebrate study, fecal coliform testing, and additional water quality parameters. These tests will be completed following standardized methods using quality assurance/quality control procedures at Gannon University.

Title: **Developing and Implementing the Use of Predictive Models at Presque Isle State Park Beaches**

Author: Tammy M. Zimmerman (Hydrologist) and Michael A. Benczkowski\* (Student Trainee-Hydrologic Technician), U.S. Geological Survey

Abstract: The use of *Escherichia coli* (*E. coli*) as an indicator of recreational water quality has been largely effective in determining when fecal contamination is present; however, there are drawbacks with using it as the *only* indicator. The most significant drawback is that reported results are not available until 18-24 hours after samples are collected; *E. coli* concentrations where the samples were collected may have changed significantly during this time period. Therefore, a more time-sensitive method that some managers of recreational waters have adopted is the use of predictive modeling to obtain near real-time estimates of water-quality conditions in about an hour. Predictive models utilize easily-measured water-quality and environmental variables such as precipitation, wind speed and direction, streamflow, wave height, and turbidity to estimate, or predict, when recreational water-quality standards for fecal-indicator bacteria will be exceeded. Predictions from the statistical models may supplement the use of *E. coli* as an indicator of fecal contamination at Presque Isle State Park beaches and can be used to "nowcast" water-quality conditions to the public during the recreational season (May to September). A nowcast of recreational water quality is much like a weather forecast except it estimates current conditions rather than future conditions. USGS scientists and their partners are testing and refining statistical models developed for six Presque Isle beaches using data collected since 2010. If modeling efforts are successful, a web-based nowcast system can be implemented.

**Title: The Contribution of Bacterial Pollution by Algal Mats in Recreational Freshwater**

**Author:** Prabhat Kc, Drew Spacht, Drew Sturm\*, and Steven Mauro, Ph.D., Mercyhurst University

**Abstract:** Fecal indicator bacteria (FIB) are commonly used indicators of recreational freshwater quality. There are many potential sources of freshwater contamination by FIB. One such candidate is algal mats, which have the potential to harbor high concentrations of these, and other, microbes. To better understand the extent to which algal mats contribute to bacterial pollution in recreational freshwater, we utilized plating, quantitative PCR, and a metagenomics approach to measure specific and total bacterial populations on algal mats and the recreational freshwater in which it resides. While we found high levels of FIB in algal mats, we found no correlation between the concentration of these microbes in the algae and nearby water. Moreover, population based approaches indicated a different composition of bacteria compared to the water it was obtained from. Taken together, these results indicate that it is unlikely that algal mats are serving as a direct source of bacterial pollution to the recreational water analyzed in this study.

**Title: Summer Water Quality Monitoring in 3 Allegheny County, Pennsylvanian Streams**

**Author:** Heather Jenkins\*, Anthony Foyle, Ph.D., and Ann Quinn

**Abstract:** The objective of this project was to better understand the difference between urban and mining settings; and to produce baseline water tests of streams within the Marcellus Shale deposit area. The streams that were assessed were Little Plum Creek, Aber's Creek, and Turtle Creek in Allegheny County (southwestern PA). The parameters that were tested were the total dissolved solids, conductivity, velocity, acidity, and temperature. By testing the water and conducting baseline monitoring; detection of water quality problems was made possible. These problems could be caused by urban runoff, construction, mine restoration and Marcellus gas drilling within the watershed.

Data shows that there is a direct correlation between rain events and the pH of Little Plum Creek site F, which is located at the base of a strip mine. Turtle Creek is directly affected where it meets with Aber's Creek, especially when noting temperature, total dissolved solids, and conductivity above and below the confluence. There is also a positive correlation between total dissolve solids and conductivity in all streams. Depth and flow of Aber's Creek did not have a meaningful correlation; Little Plum Creek had a positive correlation. The water quality of a creek is directly affected by the environmental factors in the watershed, and is different for each creek.

**Title: Roswell Park Cancer Institute Pharmacokinetics/Pharmacodynamics Core Resource Capabilities and Services for Your Research Needs**

**Author:** Joshua Prey\*, Kimberly Clark\*, and Gerald Fetterly, Roswell Park Cancer Institute

**Abstract:** The mission of the Pharmacokinetic/Pharmacodynamic (PK/PD) Resource is to support clinical research and clinical/pre-clinical drug development at Roswell Park Cancer Institute (RPCI) as well as providing bioanalytical and consultation services to industry and academia. The PK/PD resource provides state of the art analytical scientific data and PK/PD modeling and simulation services for PK/PD studies of cancer therapeutic and preventive agents. In addition our group advises investigators on PK/PD study design, sample collection and handling and dose selection to optimize the therapeutic window of oncology drug products. Complete services are also provided to investigators, ranging from study design consultation and methodology development, to storage, preparation and assay of samples, and data analysis. The Resource offers a wide variety of analytical assays along with the capabilities to develop and validate new methods. Using state-of-the-art techniques with LC/MS/MS, UPLC, HPLC, Real Time QRT-pcr, ELISA and Atomic Absorption spectrophotometry, the PK/PD facility provides highly sensitive measurements for a wide array of small molecule compounds including chemotherapeutic agents and their metabolites. With emphasis on mass spectrometry the facility is equipped with three triple quad mass spectrometers capable of highly sensitive high throughput quantification of small molecule compounds. In addition to our analytical capabilities we participate in an education program giving students a chance to work within the facility as visiting scientists both in the analytical and modeling sections of the facility.

**Title: Determining the Antimicrobial Effectiveness of Agion Silver Technology on Door Handles within the Penn State Erie Campus**

**Author:** Vishall Kaistha\*, Marcelo Lob\*, Emily Schmitt\*, Aubrey Hetzler and Beth Potter, Ph.D., Penn State Erie, The Behrend College

**Abstract:** Agion antimicrobial solutions are relatively new, effective, and natural ways to control microbial growth. Through recent technological developments, scientists have been able to incorporate silver ions in a zeolite carrier. Unique to this material is the ability to provide a three dimensional mechanism to release silver ions. These ions are generally activated by sodium ions and moisture present on skin cells, allowing the silver ions to only be released upon contact. The antimicrobial effectiveness has been studied in a controlled laboratory setting, but the novelty of our study is that effectiveness will be viewed from a 'real life' perspective. In the study, 50 door handles (25 silver-coated/25 control) within four different buildings located on the Penn State Erie campus were processed over a six week period in both the fall and spring semesters. Bacterial samples were taken to determine the total bacterial counts and handles were also analyzed to determine the amount of silver released. Initial analysis of the data suggests that the silver-coated doors consistently had lower counts than controls but bacterial amounts varied considerably from week to week in the experimental and control groups. Overall, it is the anticipation that this study will provide a deeper insight into the broad-scale use of Agion silver technology for bacterial control.

Title: **Growth Inhibition of Methicillin-Resistant *Staphylococcus aureus* by Essential Plant Oils**

Author: Christopher Haydanek\*, John Gallagher, Nancy Carty Ph.D., Christopher Keller Ph.D. C.P.H., Lake Erie College of Osteopathic Medicine

Abstract: Introduction: The emergence of community-acquired methicillin resistant *Staphylococcus aureus* (MRSA) coupled with the increase in multiple-drug resistant *S. aureus* strains makes treatment of infections difficult. Our previous studies showed that cinnamon cassia oil overcame erythromycin resistance in *S. aureus* clinical isolates. The goal of the present study is to determine if essential plant oils have an inhibitory effect on MRSA growth.

Methods: Antibiotic resistance profiles, consisting of ten common antibiotics, were used to select MRSA and methicillin sensitive *S. aureus* (MSSA) strains from *S. aureus* isolates collected previously from the anterior nares of pre-clinical medical students (n=102). A disk diffusion assay was used to screen a panel of 32 essential oils against lab strains of MSSA and MRSA, and the four most effective oils were tested against MSSA (n=4) and MRSA isolates (n=4).

Results: MRSA isolates displayed cross-resistance for erythromycin (75%), amoxicillin/clavulanic acid (50%), ciprofloxacin (50%), and chloramphenicol (25%). The effect of oregano, cinnamon cassia, tea tree, and lemongrass oils on growth inhibition of MSSA and MRSA isolates was determined. There was no significant difference in growth inhibition for all oils between the MSSA and MRSA isolates. In addition, these oils showed no significant difference on growth inhibition of MSSA isolates, however, oregano oil significantly inhibited growth of the MRSA isolates compared to lemongrass oil ( $p < 0.01$ ).

Conclusions: Results presented here demonstrate that essential oils can inhibit growth of both MSSA and MRSA isolates, and further studies should be conducted to determine synergistic effects of essential oils and antibiotics.

Title: **Cinnamon Oil and Erythromycin Act Synergistically to Overcome Erythromycin Resistance in *Staphylococcus aureus* Clinical Isolates**

Author: Gregory R. Delost\*, Niallah Ochai, Joanna Aiken, Christopher Keller, Ph.D., and Nancy Carty, Ph.D., Lake Erie College of Osteopathic Medicine

Abstract: **Introduction:** Increasing rates of antibiotic resistance in *Staphylococcus aureus* has necessitated new and alternative treatment methods. A potential strategy for treating antibiotic-resistant infections involves the concept of synergism, which uses sub-inhibitory doses of two antimicrobial agents. The antimicrobial activity of essential oils, such as cinnamon, has been recognized for a long time, but only recently have they been used synergistically with an antibiotic. Therefore, the goal of this study was to assess the effectiveness in treating erythromycin-resistant strains of *S. aureus* with combinations of cinnamon oil and erythromycin.

**Methods:** Nasal swab samples were taken from first and second year medical students (n=354) and tested for the presence of *S. aureus* by growth on mannitol salts agar. Confirmed *S. aureus* isolates (n=102, 28.8%), were subcultured into Trypticase Soy broth (TSB) and subsequently grown on Mueller-Hinton agar. Susceptibility to selected antibiotics was determined in duplicate using disk diffusion methods. Erythromycin-resistant samples (n=35) were selected for subsequent experiments. A panel of essential oils was tested for inhibition of *S. aureus* growth, and cinnamon oil was selected for testing potential synergism with erythromycin in checkerboard assays using 96-well microtiter plates.

**Results:** Of the 35 samples, 31 (88.6%) demonstrated synergism with cinnamon oil and erythromycin, while 4 (11.4%) showed indifference. None of the samples showed an antagonistic effect.

**Conclusion:** These results demonstrate that cinnamon oil increased the susceptibility of erythromycin-resistant strains of *S. aureus* to erythromycin. This study carries the much broader implication that synergism with essential oils can render previously obsolete antibiotics effective again.

**Title:** **Characterization of Herpes Simplex Virus Mutations in the Conserved DNA Polymerase Exonuclease Sites**

**Author:** Darnell Lewis\* and Sara Turner, Ph.D., Mercyhurst University

**Abstract:** In multicellular organisms, poor DNA replication fidelity can lead to the accumulation of mutations, resulting in death or unregulated growth. An important component to the fidelity of DNA polymerases is the associated 3' to 5' exonuclease (exo) activity, which is controlled by a dynamic switching mechanism. This exo activity not only serves to repair mismatched DNA, it also facilitates a cyclic transfer of the elongating DNA strand between the exo site and polymerizing site when the polymerase runs into "road blocks" such as misincorporated nucleotides, a basic sites, or DNA cross-links. Wild type polymerases deal with these "road blocks" by activating the switch behavior to prevent DNA extension until the barrier is removed. The Parris laboratory studies the herpes simplex virus (HSV) DNA polymerase (pol) as a model enzyme. It has been shown in some HSV pols that a lack of exo activity is lethal. We hypothesize that switching behavior that occurs in exo-nuclease domain is vital for sustaining the fidelity of DNA as well as the ability of the virus to replicate. We have constructed a variety of mutation within the exo domain. Mutant forms of the polymerase will be tested for functionality in viral DNA synthesis and the production of viable viruses through various assays.

**Title:** **Aptamer Development for Sucralose Detection using FLU-MAG SELEX**

**Author:** Amy Diegelman-Parente, Michael J. Gigliotti\*, and Gregg A. Robbins-Welty\*, Mercyhurst University

**Abstract:** Sucralose and many other non-metabolizable food additives, drugs, and consumer personal care products are accumulating to detectable levels in our environment. Traditional analytical instrumentation or antibody-based ELISA assays can quantitatively assess their presence and have been used to report detectable levels of sucralose in Lake Erie. Aptamers are DNA or RNA based molecules that adopt specific structures that allow for characteristic functions – often the binding of a small molecule. While aptamers have been developed for many target ligands, none exist for sucralose. SELEX (systematic evolution of ligands by exponential enrichment) is a methodology useful for selecting "winning" sequences – the ability to adopt a shape that binds a target molecule – from a library of possible sequences. The process involves several steps that ultimately separate and enrich the population of DNAs with sequences having a high affinity for sucralose. FLU-MAG SELEX uses two specific modifications to traditional SELEX. Magnetic bead technology ("MAG") will facilitate separation of mixtures of solutions while fluorescently labeled primers ("FLU") will allow for the quantitative monitoring of DNAs as SELEX proceeds. Winning sequences can then be modified into structure-switching biosensors capable of selective and sensitive detection of sucralose from environmental samples.

**Title: GC-MS Analysis of Polybrominated Diphenyl Ethers in the Lake Erie**

**Author:** Mary C. Vagula, Ph.D.\* Marissa Vartak, and Weslene Tallmadge, Ph.D., Gannon University

**Abstract:** Lake Erie is one of the five great lakes of North America. It is the shallowest, the warmest, and the most biologically productive of the Great Lakes producing more fish than all of the other four lakes combined. It is also a source of drinking water for 11 million people and a recreational asset. On the flipside, it is also very vulnerable and troubled with environmental challenges because it has the smallest water volume, but the greatest pressures from the human settlement. One of the many issues faced by the Lake is pollution. It receives larger loads of many pollutants than any other Great Lake. Even with the best pollution controls many pesticides and organohalogen continue to enter the lake.

Polybrominated diphenyl ethers (PBDEs) are a class of flame-retardants that have been used in a variety of consumer products since the 1970s. They are added to many commercial and household products such as computers, foam mattresses, carpets, etc. Being largely non-polar and chemically stable, these chemicals are extremely lipophilic and resist degradation in the environment, thus giving them a high affinity for their bioaccumulation. Due to these properties PBDEs have become ubiquitous environmental contaminants. These compounds are reported to be endocrine disruptors and could cause oxidative damage. This report presents the sample preparation protocol, the GC-MS analysis of PBDEs in Lake Erie sediment samples.

**Title: Impact of Year of Building Construction on Lead Concentration of Drinking Water in an Urban Setting**

**Author:** Walter Aksent\* and Rebecca Deeter\*, Gannon University

**Abstract:** The goal of this research project is to determine the impact of year of building construction on lead concentrations of drinking water in an urban setting of downtown Erie, PA. Lead (Chemical symbol: Pb) is a major concern for public health as it affects the nervous system, including the brain, where it can cause developmental problems in children. It was commonly used as piping in home construction during the early 1900s. Lead solder was used to join different types of metal pipes such as copper and brass until it was banned in 1986. Because of these uses of lead in drinking water systems, lead concentrations will be tested by taking first-draw and late-draw samples from a total of approximately thirty commercial buildings and residential houses within the Erie-GAINS (Gannon Alliances to Improve Neighborhood Sustainability) focus area. Samples will be collected from sites within these time periods: before 1930, between 1931 and 1986, and after 1986 to distinguish between the effects of lead piping, lead solder, and absence of lead usage, respectively. Conclusions elicited from data can help minimize the effects of lead on human health and provide a means for informing the public to decrease their exposure to this toxic metal.

Title: **Atmospheric Mercury Deposition in the Great Lakes Region of Pennsylvania**

Author: Brianne Campbell\*<sup>1</sup>, Alexis Rowley<sup>1</sup>, Jason Bennett<sup>1</sup>, Michael Naber<sup>1</sup>, Elizabeth Boyer<sup>2</sup>, Kevin Horner<sup>2</sup>, and Matt Borden<sup>2</sup>

<sup>1</sup>Pennsylvania State University, Behrend College, at Erie, PA;

<sup>2</sup>Pennsylvania State University at University Park, PA

Abstract: Mercury occurs naturally in the environment in air, soil, and water. Mercury pollution is widespread, and is a well-known neurotoxin that can enter the food chain and bio-accumulate in fish and other biological systems. A primary mechanism of dispersal of mercury in the environment is by *emissions* to the atmosphere followed by *deposition* to the earth's surface. Much of the mercury emitted to the atmosphere eventually deposits onto land or water bodies. Biological transformations can produce methylmercury, which is the primary form of mercury implicated with regard to negative effects. Our research group has been quantifying atmospheric mercury deposition in the Erie region, in both *wet deposition* (via precipitation) and in *dry deposition* (via dry fallout). We measure wet mercury deposition weekly at a long-term monitoring site in Erie on Presque Isle using an active sampling technique. We also have initiated a pilot study to measure dry mercury deposition every two weeks using a new passive sampling technique at eight sites in Erie County. Our work helps to understanding status of atmospheric deposition in the Great Lakes region and will be useful to researchers aiming to understand the effects of mercury pollution.

Title: **Monitoring Acetyl-CoA Carboxylase and Thiolase in Lipid Metabolism of Microalga *Chlamydomonas Reinhardtii* for biodiesel production**

Author: Michelle Sudyn\*, Frederick Harrington, Ph.D., State University of New York – Fredonia

Abstract: Developing an alternative means of obtaining biodiesel that is clean, sustainable, and efficient is an issue demanding attention. Microalgae are a competitive source of oil that can ultimately substitute our current means of oil extraction. In order to integrate this new alternative energy source the process in which the oil is extracted and anabolized within the cell must be practical and efficient. Understanding the metabolic pathway in which lipids are synthesized within algae can provide a model in which we can manipulate to maximize this process. Acetyl-CoA Carboxylase (ACCase) and Thiolase are enzymes involved in lipid synthesis and degradation. We have observed via mRNA quantification a relationship between ACCase and Thiolase during nitrogen starvation induced lipid storage, indicating their importance in lipid metabolism. Observing these enzymatic activities now serve as a molecular indicator of internal cellular functioning, setting the groundwork for further investigation of other molecular interactions within the lipid production and storage pathways.



Title: **Auxin Effects on Root Exudation**

Author: Colleen Friel\* and Catharina Coenen, Ph.D., Allegheny College

Abstract: Plant roots exude a wide range of chemicals into the rhizosphere. These exudates are important for mediating interactions between plants and soil microorganisms and constitute a significant fraction of global carbon transfer into soils. Despite this importance, the regulation of root exudation is currently poorly understood. To test the hypothesis that the plant hormone auxin, which regulates sugar flow between different plant tissues, also regulates root exudation, we are characterizing root exudates in tomato. Exudates from wild-type tomato root organ cultures were compared to those of the auxin-resistant tomato mutant *diageotropica* (*dgt*), and the auxin-hypersensitive/hypertransporting tomato mutant *polycotyledon* (*pct*). Sugars in root exudates were identified and quantified by HPLC with refractive index detection. Sugar profiles suggest that auxin stimulates the exudation of fructose and glucose, whereas it does not affect sucrose exudation. In the presence of exogenously supplied sucrose, root colonization by a strain of plant-protective bacteria did not differ between WT and *dgt* roots. We are currently assessing bacterial colonization patterns in greenhouse-grown plants absence of supplemental sugar. In addition, we will be characterizing the secretion of organic acids in root organ cultures and in greenhouse-grown plants. Auxin effects on root exudation are of major importance for carbon transfer to agricultural soils, because many green revolution crops carry mutations in auxin transport proteins, suggesting that use of these crops on large land areas may affect soil microbial communities and patterns of carbon flow.

Title: **Implemented Invasive Plant Species Management Plan at Presque Isle State Park**

Author: Jessica Wooten, Penn State University

Abstract: During this past summer, Presque Isle State Park hired fourteen interns to work in the park on invasive plant removal. Mechanical and chemical field operations were performed to suppress invasive species and preserve delicate native plant communities. An invasive plant species management plan for Presque Isle State Park was implemented to ensure adequate procedures followed to contain the spread of these noxious species. Throughout the summer, 1,759 gallons of herbicide were sprayed by either a motorized or backpack sprayer. Mechanical efforts resulted in the removal of 161 bags of Garlic Mustard, 20 truckloads of Japanese Knotweed, 9 truckloads of Yucca, 10 truckloads of Japanese Honeysuckle, 25 bags of Spotted Knapweed, and 22 bags of Purple Loosestrife. Furthermore, the interns facilitated the protection of over 470 acres in accordance with the restoration of a more natural environment for the park and its inhabitants.

Title: **Water levels, *Phragmites* and the Biotic Response: 20 Years Post-Water Level Decline**

Author: Robert S. Whyte, California University of Pennsylvania  
David Klarer, Research Coordinator, Old Woman Creek National Estuarine Research Reserve

Abstract: *Phragmites australis* (Cav.) Trin. ex Steud, the common reed, is a tall perennial grass that has historically been a minor component of the wetland plant communities of the Laurentian Great Lakes. In the last decade a more aggressive genotype has displaced native populations of *Phragmites* populations and has threatened native floral diversity in these systems. This dramatic increase in *Phragmites* was facilitated by the decline in Lake Erie water levels and its ability to readily establish and spread on disturbed areas. Since 1993 we have monitored the invasion and spread of *Phragmites* in the Old Woman Creek National Estuarine Research Reserve (Huron, Ohio). *Phragmites* appears to have a widespread impact on the diversity of native plants, mammal populations, and bird communities indicating a potential loss of ecosystem function and health.

Title: **Herbiciding Invasive Reed: Indirect Effects on Habitat Conditions and Snail–Algal Assemblages One-Year Post-Application**

Author: Joseph R. Holomuzki, Ohio State University; Christina L. Back, the McGraw-Hill Company; David M. Klarer, Ohio Department of Natural Resources; Robert S. Whyte, California University of Pennsylvania

Abstract: Invasive common reed (*Phragmites australis*) can rapidly form near monotypic stands, and lower plant diversity and change marsh habitat structure. Consequently, North American wetland managers often use herbicides, such as glyphosate-based AquaNeat® and imazypr-based Habitat®, to control its establishment. However, herbiciding might indirectly affect benthic community structure by directly altering habitat structure, and habitat alterations may vary with herbicide and concentration. To assess how herbicide-caused alterations in habitat affect key trophic linkages, we compared snail and epiphytic algal assemblages, and habitat conditions, among replicated plots of reed treated with either AquaNeat® (30% solution), Habitat® (5% solution), or left herbicide-free (i.e. controls) in an eutrophic Lake Erie marsh 1-year post-herbiciding. Both herbicides equally reduced reed cover by >90% relative to controls. *Fossaria* spp. and *Gyraulus parvus* snails were more abundant in herbicide-treated plots than in controls, but Shannon-Wiener diversity was similar ( $H' \approx 1.0$ ) across treatments. All snails collected were pulmonates, suggesting habitat drying might be driving assemblage structure. Snails were denser in plots with metaphyton (mostly *Spirogyra*) than without, and metaphyton was more abundant in herbicide-treated plots with higher incident light levels and warmer water temperatures than in controls. Diatoms dominated algal communities in all treatments. In June, *Navicula* spp. was dominant in controls, whereas *Nitzschia palea* and *Aulacoseira italic*, and *Nitzschia* spp., were dominant in AquaNeat® and Habitat® treatments, respectively. However algal assemblages were similar in treatments by early-July when marsh water levels significantly decreased and nitrate levels were <1.0 µg L<sup>-1</sup>. Marsh hydrologic patterns may mediate herbiciding's indirect effects on trophic structure.

Title: **Effect of Trophic Status on Unionid Mussels in the Outlets of the 11 Finger Lakes**

Author: Maggie M. Hanafin, Allegheny College

Abstract: North America is home to the richest fauna of freshwater mussels (Mollusca: Unionidae), with about 300 species and subspecies recorded throughout history. However, unionid mussels are sensitive organisms and have declined rapidly due to pollution, habitat destruction, and exotic mussel invasion. As a result of their reliance on suspended particulate matter as food, unionid mussel growth should be correlated with lake productivity. To date, there have been no studies that demonstrate a relationship between unionid populations and trophic state. The objective of this project was to compare the mussel populations in the outlet streams to the trophic state of the 11 Finger Lakes in western New York. I predicted that lakes with mid-level trophic states would have the highest density and diversity of outlet stream mussels. These mid-level trophic lakes should export high amounts of seston, but not so much as to overwhelm the mussels. Lakes were classified using Carlson's Trophic State Index based on Secchi depth, total phosphorus, and chlorophyll *a* levels. Mussel surveys in the lakes' outlets were conducted, and live or recently dead unionids were found in six lakes. Live mussels were found in Otisco and Honeoye Lakes' outlets (one and 11 live specimens, respectively). None of the trophic state data explained variation in the total number of mussels ( $p \gg 0.05$ ), even when the outlier (Honeoye) was excluded. Additional mussel surveys in the lakes should be completed to draw conclusions regarding trophic status effects on unionid mussel populations.

Title: **The Impacts of Climate Change on the Overwintering Energetics and Microenvironmental Conditions of the Goldenrod Gall Fly, *Eurosta solidaginis***

Author: Drew Spacht\*, Seth Pezar\*, and Michael A. Elnitsky

Abstract: Larvae of the goldenrod gall fly (*Eurosta solidaginis*) have long served as model organisms for studying the strategies used by freeze-tolerant animals for winter survival. The larvae of this insect undergo a marked transition from freeze intolerant to freeze tolerant during fall and, at our field site in Pennsylvania, enter diapause during mid- to late-October. These larvae then remain dormant throughout winter relying on accumulated lipids and glycogen as metabolic substrates. The winter temperatures experienced by the larvae directly influence the potential fecundity of the adults, as the energy reserves remaining at the end of winter determine body size and are used for gamete production in the flies. Therefore, the purpose of the present study was to assess the current and future impacts of climate change on the overwintering energetics and microenvironmental conditions experienced by *E. solidaginis* larvae. We used historical temperature data to estimate the overwintering (November through March) energy used by larval gall flies. Based upon the relationship between metabolic rate and temperature, the estimated energy utilization during winter has increased by nearly 30% over the last 50 years. Each additional 1°C rise in temperature is predicted to increase overwintering energy consumption by ~13%. Continued climate change will also have significant impacts on the winter thermal microenvironment of *E. solidaginis*. Elevated winter temperatures are predicted to significantly decrease the number of freeze-thaw cycles, the average time spent frozen per cycle, the total time spent frozen during winter, and the minimum winter temperature experienced by the larvae.

Title: **A Descriptive Beetle Study at Presque Isle State Park**

Author: Jerry McWilliams, Ph.D., Natural History Museum-Tom Ridge Environmental Center; Ashley Wimer\*, Regional Science Consortium

Abstract: Presque Isle State Park is located in Pennsylvania's only palustrine sand plain habitat, a habitat largely comprised of low sand dunes. This region of Pennsylvania is also located in the Central Lowlands Province as well as the Lake Erie watershed (sub basin 15). This project is the first descriptive beetle study in this area, specifically targeting Family: *Carabidae* and *Scarabaeidae*. Specimens were collected using pitfall traps with drift fences set along paths with minimal human traffic to limit interruption due to human/animal disturbances. Drift fence lengths ranged from approximately 0.9 to 1.5 meters. The pitfalls consisted of plastic containers holding about three to five centimeters of water with two to three drops of dish detergent mixed in. Six fences were used to ensure proper sampling size and replication. One was placed at the west end of Beach 9 access road, one on the east end of the Beach 9 access road, and four traps along the east end of Dead Pond Trail. The pitfalls were open for 87 days between April 18, 2012 and October 5, 2012. A total of 42 beetles were collected including 20 from the *Carabidae* family and 22 from the *Scarabaeidae* family. Of these, three are confirmed county records and one is a possible state record pending verification.

Title: **Amphibian Monitoring on Presque Isle State Park Before and After the Removal of *Phragmites***

Author: Casey Bradshaw-Wilson\*, Jeremiah Covert, Ashley Wimer\*, and Jeanette L. Schnars, Ph.D., Regional Science Consortium

Abstract: Presque Isle State Park, in Erie County Pennsylvania, has been heavily affected by the invasive plant *Phragmites australis*. This Common reed inhabits wetlands and has become the dominant plant in many habitats throughout Presque Isle. The purpose of this two-year study is to determine the population diversity and abundance of amphibians before and after the removal of *Phragmites*. We constructed three drift fences with pitfall traps. Two sites were located on the edge of ponds with *Phragmites* stands, and the third site was located in a wooded area between *Phragmites* stands. A song meter, SM2 model, was used to record frog vocalizations from 2100 - 2300 each night and rotated between four ponds from June through August 2012. Frog vocalizations were also monitored from June through September at 10 sites throughout the park using standard North American Amphibian Monitoring Protocol. Pitfalls were opened 21 days from June to August and collected 263 amphibians with 4 recaptures. Amphibians were marked for recapture purposes using visual implant elastomer (VIE) tags which can be identified under a UV light. This study will continue through 2013, allowing for data collection post-*Phragmites* removal.

Title: **Detection of DNA Damage in Brown Bullhead Fish From Lake Erie Using Comet Assay**

Author: Amy Diegelman-Parente and Juliane E. Harmon\*, Mercyhurst University

Abstract: In 1991, Presque Isle Bay was listed as an area of concern primarily based on observations of external fish tumors on brown bullhead (*Ameiurus nebulosus*) collected from the Bay area. Limited findings on the causative agents for these lesions as well as no evidence that these tumors adversely affects survival, growth, or reproduction of this species of fish have left many questions unanswered two decades later. In this research project, we will be using a comet assay to assess the level of DNA damage within skin lesions of brown bullhead. The comet assay determines a qualitative level of DNA damage from cells obtained from blood or tissue samples. This is accomplished by electrophoresis of whole cells fixed to a microscope slide with subsequent analysis using fluorescence microscopy. Undamaged DNA will remain condensed in the "head" region of the resulting comet, while damaged DNA (generally resulting from strand breakage) electrophoreses away, generating the comet "tail." The extent of DNA damage is directly proportional to the amount of "tail" seen in this dye-stained DNA comet. While this will not identify the causative agent of DNA damage, it might be able to provide additional information regarding the nature of the skin tumors observed on these fish. The project will involve the examination of blood and tissue samples from brown bullhead collected this November and will also involve a detailed water analysis from samples collected at the same time and from the collection site and surrounding locations.

Title: **Feasibility of Converting a Waste Water Treatment Plant into an Aquaculture System**

Author: John Hoover and Jacob Anastasia, Gannon University

Abstract: A private owner of a forsaken tannery waste water treatment plant along Brandy Run in Girard Pennsylvania has contacted Gannon University to conduct a feasibility design project converting the storage tanks on site into a commercial fish farm. Fish farm aquaculture systems alleviate the current overfishing in our lakes and oceans. This project will look at the design requirements, in regards to aeration and flow, needed to fully convert the out of commission waste water treatment tanks into a suitable environment for the growing of fish. It will look into the proper aquaculture layout for the site, making adjustments to the current equipment on site. It will investigate the local, state and federal permitting requirements for both fish farming, and waste water discharging. It will look at the proposed process water to see if it contains any chemicals that pose a threat to the fish community. It will investigate and generate a retrofitting design for the tanks, as well as designate a wastewater disposal technique for fish waste. It will also include a basic economic feasibility assessment to determine if the farm may be profitable. The project will also look at alternatives for each step, and overall, to the aquaculture process in general.

**Title: Addressing the Decline of Purple Martins in Pennsylvania**

**Author:** John Tautin, Robert Aeppli\* and Tara Dodge, Purple Martin Conservation Association

**Abstract:** Pennsylvania's population of the once very familiar and popular Purple Martin (*Progne subis*) has declined substantially in recent years, according to data from the 2nd Pennsylvania Breeding Bird Atlas and the Breeding Bird Survey. The data are consistent with anecdotal observations and community based knowledge. The decline is most likely due to fewer people providing housing for martins to nest in. Listing the Purple Martin as Pennsylvania Vulnerable and forming a state-level working group will help address the decline. Best management practices for Purple Martins are well-defined, and martins respond well to them.

**Title: Tracking the Bacterial Diversity on Individual House Wren Eggs**

**Author:** Dan Hoang\*, Mary Sperry\*, Adam Mobley\*, Beth Potter, Ph.D., and Margaret Voss, Ph.D., Penn State Erie, The Behrend College

**Abstract:** While avian incubation has been shown to be integral for embryonic development by regulating temperature, humidity and gas exchange, recent studies suggest that it is also important for the maintenance of a microflora on eggs that provides protection against pathogenic microorganisms. To begin to understand the bacteria that comprise this microflora, our lab has previously identified culturable bacteria on the surface of House Wren eggs. While this previous study identified a variety of 46 different species within 21 genera and 3 phyla, individual eggs were not tracked. The current study aims to track individual eggs within multiple nests throughout the incubation period and by doing so reveal specific bacterial species that are important for hatching success and those that are detrimental to hatching. This is a novel experiment and is the first attempt at deciphering the impact of the egg microflora on embryonic development.

Title: **Eggshell Microstructure and Temperature Fluctuation Facilitate Microbial Invasion during Intermittent Incubation**

Author: Kaitlin Pander\*, Brian Carlson, Beth Potter, Ph.D., and Margaret A. Voss, Ph.D., Penn State Erie, The Behrend College

Abstract: The mineralized shells of avian eggs protect developing embryos from physical damage and desiccation while permitting exchange of respiratory gases and water with the external environment. Microscopic pores that pass through eggshells facilitate embryonic metabolism; this, however, provides a route for potential bacterial contamination. Bacterial infections reduce hatch success and increase neonate mortality. We examined the role of eggshell pores in microbial contamination of quail eggs under artificial incubation conditions. The external surfaces of 240 eggs were sterilized and inoculated with *Pseudomonas fluorescens*. The eggs were artificially incubated at 75±5% relative humidity. Three incubators were held at constant temperatures (23±1.5°C, 28±0.5°C, 33±0.5°C), while three temperature treatments simulated intermittent incubation (23±3°C, 28±3°C, 33±3°C). The intermittent temperature treatments fluctuated through cooling cycles every 15 minutes during 12 hours of daylight. Eggs were sampled on day 4, 8, and 14 to quantify external and internal *P. fluorescens* concentrations. The microstructures of sampled eggshells were examined using scanning electron microscopy. Pore size and density were compared with the density of bacterial colonies found on the internal surface of the eggs. Increases in eggshell pore size and density, coupled with lower average egg temperatures and intermittent cooling facilitated bacterial passage through the eggshell and internal contamination of incubated eggs.

Title: **The Cause of Body Mass Increase in the Eastern Coyote**

Author: Stephanie Wood\*, Claire Haines, James Kintzing, Frederic Brenner, Ph.D., Grove City College

Abstract: The eastern coyote (*Canis latrans*) continues to expand in eastern North America. The purpose of this research is to explore the potential genetic factors in different populations of this species. Liver specimens were collected from various regions of Pennsylvania. Using primers designed from published genomic sequences of the western coyote, a 350 base pair mtDNA D-Loop segment of the D-loop region of an eastern coyote was compared to the published GenBank sequences from a western coyote. This 350 base pair sequence matched the published region of the western coyote, but other primers designed from the western coyote genome did not yield successful results suggesting that the genome of the eastern coyote differs in these regions. Additional primers were designed from mitochondrial D-Loop regions of Spanish grey wolf (*Canis lupus*) and Canada Grey Wolf (*Canis lycaon*) (check this scientific name, I thought that *Canis lupus* was the grey wolf in NA). There was a 96% homology between the Spanish grey wolf and a 99% homology between the Canada grey wolf and the western coyote, respectively. It has been speculated that both the Canada grey wolf and the red wolf (*Canis rufus*) both may have contributed genetic material to the eastern coyote. Using these primers another 400 base pair mtDNA segment of the eastern coyote's mtD-Loop was sequenced resulting 750 base pair segment or approximately 50% of the mtD-Loop for this species. The remaining primers are being tested and results are not yet known.

Title: **Use of DNA Fingerprinting to Determine the Breeding Patterns of Urban and Rural White-tailed deer Herds**

Author: Luke Laterio\*, Maire Casey, Michelle Peck, Richard Toth, Frederic Brenner, Ph.D., E. C. Vroegindewey, Megan Osborne, Stacey Senter, Kaitlyn Bailey, Grove City College

Abstract: DNA fingerprinting of short tandem repeats in nuclear DNA from white-tailed deer (*Odocoileus virginianus*) was used as a means of tracing breeding behavior within urban and rural deer herds in Ohio and Pennsylvania. Liver tissue samples were obtained from three metroparks in Dayton, Ohio and Presque Isle State Park in Pennsylvania. Nuclear DNA was isolated from the liver tissue and nine fluorescently labeled primers for DNA were selected and confirmed as effective for use in polymerase chain reactions to amplify the short tandem repeats of nuclear deer DNA. Products of PCR reactions were then confirmed using gel electrophoresis in 2% agarose gel and photographed under UV light using a Bio-Rad imaging unit. Successful PCR products were then analyzed using an Applied Bio Systems 310 single capillary automatic DNA sequencer with GeneScan software to accurately measure STR length. This process was used to create a unique DNA "fingerprint" of each deer based on the STR size and frequency, a procedure analogous to forensic identification of human DNA. These results will be used to determine paternal history and genetic variability as a means to infer the breeding behavior and patterns among urban and rural white-tailed deer herds.