

SCHEDULE OF TALKS

*Regional Science Consortium
9th Annual Research Symposium
November 6-8, 2013
Tom Ridge Environmental Center
At Presque Isle State Park*

WEDNESDAY, NOVEMBER 6, 2013

8:00 – 9:00 **REGISTRATION OPENS**

9:00 – 9:15 **Welcome**

Greg Andraso, Ph.D., Gannon University; RSC President
Harry Leslie, Presque Isle State Park Manager, PA DCNR
Jeanette Schnars, Ph.D., Executive Director, RSC

Presentations

Session Chair: Greg Andraso, RSC President

9:15 – 9:30 **Laboratory Evaluation of the Modified Ludzak Ettinger Method for the Removal of Nitrogen from Simulated Septic Tank Effluent**

Raad Jabbr Alkhafaja*, Harry R. Diz, Ph.D., PE Department of Environmental Science and Engineering, Gannon University
(*Student Presentation*)

9:30 – 9:45 **Denitrification of Septic Tank Effluent: a pilot-scale study**

Cory Seese, PE Department of Environmental Science and Engineering, Gannon University
(*Student Presentation*)

9:45 – 10:00 **Permeable Reactive Barrier for the Denitrification of Groundwater Contaminated by Septic Tank Wastewater**

Doaa Almaliki*, Rick Diz, Ph.D., PE Department of Environmental Science and Engineering, Gannon University
(*Student Presentation*)

10:00 – 10:15 **Design to reduce arsenic and organic contamination in Bangladeshi water**

Shannon M. Gross* and Andrew Bartoe*, Environmental Science and Engineering Department, Gannon University
(*Student Presentation*)

* Presenter

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

Session Chair: Holly Best, RSC Executive Committee

- 10:45 – 11:00 **PPCP's and the Effects on Aquatic Life**
Amy Diegelman-Parente, Mercyhurst University
- 11:00 – 11:15 **Fresh Face Forward Campaign: Preliminary Report on Consumers' Personal Care Products Use, Knowledge and Attitudes**
Dr. Anne Zaphiris, Mercyhurst University
- 11:15 – 11:30 **The Synergistic Effect of Essential Plant Oils and β -Lactam Antibiotics Against Methicillin-Resistant *Staphylococcus aureus* (MRSA)**
Christopher Haydanek M.S.*, John Gallagher, Christopher Keller Ph.D. C.P.H, Nancy Carty Ph.D., Laboratory of Human Pathogens Lake Erie College of Osteopathic Medicine, Erie, PA
(Student Presentation)
- 11:30 – 11:45 **Examining effects of Lake Erie sediment on stem cells of the lateral line**
Tyler Conley* and Kelly Grant , Gannon University, Biology Department
(Student Presentation)
- 11:45 – 12:00 **The effects of excess fructose, glucose, and xylose on lipogenic gene expression and fat accumulation of HuH-7 hepatoma cells in long-term culture**
Peterson HL*, Hudder A, & Bradbury MW, Lake Erie College of Osteopathic Medicine
(Student Presentation)
- 12:00 – 1:00 **LUNCH – THE SUNSET CAFÉ**

Session Chair: Jerry Covert, Past RSC Executive Director

- 1:00 – 1:15 **Prevalence of *Babesia microti* in *Ixodes scapularis* ticks collected from Presque Isle State Park**
Christopher Haydanek M.S.*, John Gallagher, Nancy Carty Ph.D., Christopher Keller Ph.D., Laboratory of Human Pathogens, Lake Erie College of Osteopathic Medicine, Erie, PA
(Student Presentation)

- 1:15 – 1:30 **Weaning and adaptation of SH-SY5Y cells to low-glucose containing media for manganese exposure studies**
 Hannah Smerker^{1*}, Thomas Corso², and Sarah Ewing¹
¹Department of Biology, Gannon University; ²Lake Erie College of Osteopathic Medicine
(Student Presentation)
- 1:30 – 1:45 **Isolation of a diverse group of soil bacteria for future use in studying their effect on gender determination in *Ceratopteris richardii***
 Nicole McAllister*, Jasmine Shinko, Michael Ganger, and Sarah Ewing, Department of Biology, Gannon University
(Student Presentation)
- 1:45 – 2:00 **Determining the Antimicrobial Effectiveness of Agion Silver Technology on Door Handles within the Penn State Erie Campus**
 Rachel Mercaldo*, Katelyn Melvin, Hasan Kahn, and Beth Potter. School of Science, Penn State Erie, The Behrend College, Erie, PA
(Student Presentation)
- 2:00 – 2:15 **Predicting *E. coli* Levels with Roboharry: Can the Real Harry Ever Retire?**
 Michael A. Rutter, Penn State Erie, The Behrend College
- 2:15 – 2:45 **BREAK AND POSTER SESSION**
Sponsored by Shimadzu Corporation (www.Shimadzu.com)

Session Chair: Bob Whyte, RSC Executive Committee

- 2:45 – 3:00 **Phytoremediation: Plant Based Removal of Lead in Surface Soil**
 Timothy Chaney* and Chad Francis*, Department of science and engineering, Gannon University
(Student Presentation)
- 3:00 – 3:15 **Testing the effect of pharmaceuticals on lipid accumulation in microalgae using a 96-well microplate-based system**
 Sibia Ranjbar^{1*}, Heidi Keller², Benoit Van Aken¹, ¹Civil and Environmental Engineering, Temple University, Philadelphia, PA 19122; ²Environmental Science, Barnard College, Columbia University, New York, NY 10027
(Student Presentation)
- 3:15 – 3:30 **Updates on the Most Recent Harmful Algal Bloom (HAB) in Presque Isle Bay**
 Nate Irwin, PA DEP

- 3:30 – 3:45 **Aquatic Remediation-Enzyme Treatment Assessment**
 Boughton D.(dbb11@psu.edu), PA Sea Grant, Tom Ridge
 Environmental Center, Erie, PA
- 3:45 – 4:00 **Establishment of an algal historical record for Presque Isle Bay, Lake
Erie**
 Jeanette Girosky, Natural History Museum at the Tom Ridge
 Environmental Center

THURSDAY, NOVEMBER 7, 2013

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

Presentations

Session Chair: Fred Brenner, RSC Incoming President

- 9:00 – 9:15 **Global change and parasitism: effects of ultraviolet radiation on infection
prevalence in *Daphnia***
 Rebecca L. Healy,^{1,2*} Catherine L. Searle,² Meghan A. Duffy²
 1. Biology Department, Mercyhurst University, Erie, PA 16546, USA;
 2. Department of Ecology and Evolutionary Biology, University of
 Michigan, Ann Arbor, MI 48109, USA; Email:
 rhealy94@lakers.mercyhurst.edu, searlec@umich.edu,
 duffymeg@umich.edu
 (*Student Presentation*)
- 9:15 – 9:30 **The threat of the invasive rusty crayfish (*Orconectes rusticus*) in
Presque Isle Bay**
 Sara N. Stahlman*, Pennsylvania Sea Grant; Mark Lethaby,
 Natural History Museum at TREC
- 9:30 – 9:45 **Management of Salmonid Fisheries of Lake Erie and Lake Erie
Tributaries**
 Michael Hosack, Fisheries Biologist, Pennsylvania Fish and Boat
 Commission - Lake Erie Research Unit
- 9:45 – 10:00 **Management of Walleye and Yellow Perch on Lake Erie and the
incorporation of a stakeholder group into the process of conducting a
Walleye and Yellow Perch Management Strategy Evaluation**
 Chuck Murray, Fisheries Biologist, Pennsylvania Fish and Boat
 Commission - Lake Erie Research Unit

* Presenter

10:00 – 10:15 **Status of the Round Goby, *Neogobius melanostomus* in the Lake Erie Drainage System in Pennsylvania**
Stauffer, Jay, Penn State University, Ecosystem Science and Management; Schnars, Jeanette, Regional Science Consortium; Wilson, Casey*, Penn State University, Ecosystem Science and Management; Taylor, Richard, Penn State University, Ecosystem Science and Management
(*Student Presentation*)

10:15 – 10:45 **BREAK AND POSTER SESSION**
Sponsored by Baseline a Mocon Company. (www.Baseline-Mocon.com)

Session Chair: Jay Stauffer, RSC Board Member

10:45 – 11:00 **Applying fish removal techniques to Round Goby invaded tributaries of Erie County, Pennsylvania. A genetic approach to provide management solutions**
Caleb Abramson, Penn State University, Ecosystem Science and Management
(*Student Presentation*)

11:00 – 11:15 **Foraging habits of *Etheostoma caeruleum* to determine dietary niche breadth**
Sara Mueller, Penn State University, Ecosystem Science and Management
(*Student Presentation*)

11:15 – 11:30 **Assessing the ecological integrity of Presque Isle Bay through the comparison of hepatic, orcocutaneous, gonadal tumor rates, and intersex within fishes**
Sean D. Rafferty^{1*} and Jay Stauffer, Ph.D²
¹ The Pennsylvania State University; Tom Ridge Environmental Center; 301 Peninsula Dr., Suite 3; Erie, PA 16505; sdr138@psu.edu ; ² The Pennsylvania State University; Ecosystem Science and Management; 432 Forest Resources Building; University Park, PA; vc5@psu.edu
(*Student Presentation*)

11:30 – 11:45 **Post Restoration Brook Trout Phenotypic Variance in Winding Stair Great Smoky Mountains National Park: A Snap-shot of Differentiation**
Casey Weathers^{1*}, Dr. Jay Stauffer¹, Dr. Tim King², Stephen E. Moore³ and Mathew A. Kulp³
¹The Department of Ecosystem Science & Management, Wildlife and Fisheries, The Pennsylvania State University, State College, PA

²USGS, Leetown Science Center, Kearneysville, WV ³National Park Service, Great Smoky Mountains National Park, Gatlinburg, TN
(*Student Presentation*)

11:45 – 12:00 **Aquatic Habitat Characters that Support Both the Bridle Shiner (*Notropis bifrenatus*) and the Ironcolor Shiner (*Notropis chalybaeus*)**
Bill Hanson, The Pennsylvania State University; Ecosystem Science and Management
(*Student Presentation*)

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

Session Chair: Bob Whyte, RSC Executive Committee

1:00 – 1:15 **Fish Culture Environments for Hatchery Fish**
Bryan Ferguson, The Department of Ecosystem Science & Management, Wildlife and Fisheries, The Pennsylvania State University
(*Student Presentation*)

1:15 – 1:30 **Predation on the Snowshoe Hare**
Laura Gigliotti, The Department of Ecosystem Science & Management, Wildlife and Fisheries, The Pennsylvania State University
(*Student Presentation*)

1:30 – 1:45 **Cervid Crop Damage Prevention and Reduction in Southwest Colorado**
Emily Carrollo, The Pennsylvania State University; Ecosystem Science and Management
(*Student Presentation*)

1:45 – 2:00 **Geographic variation in tree ring responses to climate change**
Christopher Bouma, The Pennsylvania State University; Ecosystem Science and Management
(*Student Presentation*)

2:00 – 2:15 **Effects of Marcellus shale-gas development on forest fragmentation in north-central Pennsylvania**
Lillie A. Langlois* and Margaret C. Brittingham, Pennsylvania State University, Dept. of Ecosystem Science and Management, University Park, PA 16802
(*Student Presentation*)

2:15 – 2:45 **BREAK AND POSTER SESSION**
Nuhsbaum Inc.- Leica Microscopes and Digital Imaging
www.Nuhsbaum.com

Session Chair: Pat Burkhart, RSC Board Member

- 2:45 – 3:00 **The utilization of LiDAR to detect the breeding habitat characteristics of the cerulean warbler (*Dendroica cerulea*) and identify potential habitat at the landscape level**
Alissa Carlton, M.S. Student, Department of Ecosystem Science and Management, The Pennsylvania State University
(*Student Presentation*)
- 3:00 – 3:15 **A Census of the Bat Population on the Campus of Gannon University, Erie, Pennsylvania**
Szelwach, Malgorzata*, Lee, Kyrsten* and Dr. Steve Ropski, Biology Department, Gannon University, Erie, PA. 16541
(*Student Presentation*)
- 3:15 – 3:30 **Exploring White-tailed Deer Dispersal Patterns using mtDNA**
Erin Eperthener*, Daniel Ackerman, Kelly Cowher, Bethany Lashbrook, Jedediah Seltzer, and Fred J. Brenner, Biology Department, Grove City College, Grove City, PA 16127
(*Student Presentation*)
- 3:30 – 3:45 **DNA fingerprinting of Urban White-Tailed Deer**
Amy Getz*, Kaitlyn Bailey, Arleigh McRae, Luke Latario, Stacey Senter, Fred J. Brenner, Heather Barton and Durwood Ray; Biology Department, Grove City College, Grove City, PA 16127
(*Student Presentation*)
- 3:45 – 4:00 **Conducting a Community Health Needs Assessment to Determine the Needs of the Population Served by the Meadville Medical Center**
Erica D. Bryson¹, Kevin Crooks², Hana Falein¹, Cailyn Lingwall¹, Mary E. Nagel¹, Kim Seymoor², Paul D Vojtek², Alejandro Weil², and Rebecca Dawson^{1,2}
¹ Allegheny College, Global Health Studies Program (Meadville, PA); ² Allegheny College, Department of Biology (Meadville, PA)
(*Student Presentation*)
- 4:00 – 4:15 **The Power of Proteomics: A Study of Viral Mediated Post Translational Modification**
Max DeNies^{1,2*}, Erik Verschuere³, Jeff Johnson³, Nevan Krogan³
¹Department of Biology, State University of New York College at Fredonia, Fredonia, New York 14063; ²Amgen Scholars Program 2013, ³Department of Cellular and Molecular Pharmacology, University of California San Francisco, San Francisco, California 94143
(*Student Presentation*)

4:15 – 4:30

Evolution of Pediments Adjacent to the White River Group in Nebraska and South Dakota, Including Potential Influence of the Medieval Climate Anomaly

STEVENS, James J.*¹, BURKHART, Patrick², MICKLE, Katherine³, BIRES, Benjamin³, FIEDLER, Derick¹, and CROOKS, Jason¹,

(1) Geography, Geology, Slippery Rock University, Slippery Rock, PA 16057, jjs8369@sru.edu (2)Geography, Geology, and Environment, Slippery Rock University, 335 ATS, Slippery Rock, PA 16057,(3) Art Department, Slippery Rock University, Slippery Rock, PA 16057

(Student Presentation)

4:30 – 4:45

Living along the Lake Erie Shoreline: What you need to know...

Don Benczkowski, Coastal Resources Program Manager, PA Department of Environmental Protection

4:45 – 5:00

PA CRM Lake Erie Resource Mapping

Matt Walderon, Coastal Resource Specialist, PA Department of Environmental Protection

5:00 – 6:00

BREAK

- **TOUR OF THE NATURAL HISTORY MUSEUM (SIGN UP AT THEIR TABLE)**
- **TOUR OF THE TREC (SELF-GUIDED)**
- **TOUR OF THE RESEARCH WING (SELF-GUIDED)**

6:00 – 9:00

DINNER RECEPTION

Food by the Sunset Café, drinks, Silent Auction, and the Salmon Frank Band

(Need a Ticket? It's not too late! Please see the Registration Table)

EXHIBITOR TABLES

Includes Organizations with information on internship/volunteer opportunities, graduate school programs, educational and service learning programs, environmental organizations, analytical services, and product information. As you visit these Exhibitors, have them initial your card (received at the Registration Table) to enter for the raffle item.

FRIDAY, NOVEMBER 8, 2013

8:00 – 9:00 **REGISTRATION OPENS**

8:55 – 9:00 **Welcome**

Jeanette Schnars, Ph.D., Executive Director, RSC

Presentations

Session Chair: Jeanette Schnars, RSC Executive Director

9:00 – 9:15 **Assessment of Nearshore Substrates and Potential Spawning Habitat -
Northeast Pennsylvania**

Scudder D. Mackey, Ph.D., Habitat Solutions NA, Norwalk, Ohio

9:15 – 9:30 **Hydrological Modeling and Water Quality of Trout Run Watershed,
PA**

Andrew Clark, Department of science and engineering, Gannon
University
(*Student Presentation*)

9:30 – 9:45 **The Missing Link: A Buoy for the Pennsylvania Waters of Lake Erie**

Jeanette Schnars, Regional Science Consortium

9:45 – 10:00 **An exploration of *ANII* expression in the hermaphrodite
gametophytes of the fern *Ceratopteris richardii***

Kara Norman*, Julia Girouard, Mike Ganger, and Sarah Ewing
Department of Biology, Gannon University
(*Student Presentation*)

10:00 – 10:15 **Inner City Farming: Designing an Aquaponics Garden**

Ben Thompson* and Stephen Cox*, Gannon University
Department of Environmental Science and Engineering
(*Student Presentation*)

10:15 – 10:45 **BREAK AND POSTER SESSION**

Session Chair: Bob Whyte, RSC Executive Committee

10:45 – 11:00 **Potential For Seed Dispersal by Resident and Migratory Canada
Geese Populations**

Justin Peel*, Kelley Flaherty, and David Argent, Department of
Biological and Environmental Science, California University of
Pennsylvania, California, PA 15419
(*Student Presentation*)

- 11:00 – 11:15 **Tracking Invasive Species with iMap Invasives**
Kierstin Carlson, Amy Stauffer*, Mary Walsh, PA Natural Heritage Program, Western Pennsylvania Conservancy, 800 Waterfront Dr., Pittsburgh, PA 15222, Ph: (412) 586-2305, astauffer@paconserve.org
- 11:15 – 11:30 **Comparitive community ecology of dusky salamander assemblages (Plethodontidae: *Desmognathus*) in the northern Appalachian Mountains and Glaciated Plateau of Pennsylvania**
Alex Hess* and Josiah Townsend, Department of Biology, Indiana University of Pennsylvania, Indiana PA 15705, ajhess44@gmail.com
(Student Presentation)
- 11:30 – 11:45 **Assessing the distribution and conservation status of the mountain chorus frog (Hylidae: *Pseudacris brachyphona*) in Pennsylvania**
Ellen Teygart* and Josiah Townsend, Department of Biology, Indiana University of Pennsylvania, Indiana, PA 15705, eteyga056@gmail.com
(Student Presentation)
- 11:45 – 12:00 **A Study of an Isolated Population of Shorthead Garter Snakes in Erie County, Pennsylvania**
McDuff, Jessica*; Lethaby, Mark and Dr. Steve Ropski. Biology Department, Gannon University, Erie, Pa
(Student Presentation)

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

Session Chair: Greg Andraso, RSC President

- 1:00 – 1:15 **Carotenoid colors and the Painted Turtle: a health-enhancing, sexually selected trait?**
JOHN E. STEFFEN^{1,4*}, KYLE M. LEARN¹, JONATHAN S. DRUMHELLER¹, SCOTT M. BOBACK², KEVIN J. MCGRAW³
¹School of Science, Penn State Behrend, Erie, PA, USA;
²Department of Biology, Dickinson College, Carlisle, PA, USA;
³School of Life Sciences, Arizona State University, Tempe, AZ, USA
- 1:15 – 1:30 **Pennsylvania Amphibian and Reptile Survey**
Marlin Corn, Pennsylvania Amphibian and Reptile Survey (PARS) Coordinator, Mid-Atlantic Center for Herpetology and Conservation

1:30 – 1:45

Assessing Golden-winged Warbler Response to NRCS Working Lands for Wildlife Effort in the Appalachian Mountains.

Darin J. McNeil*, Marja Bakermans, and Jeffery L. Larkin, Department of Biology, Indiana University of Pennsylvania, Indiana, PA 15705

Petra Wood, US Geological Survey West Virginia Cooperative Fish and Wildlife Research Unit, West Virginia University, Morgantown, West Virginia.

David Buehler, and Justin Lehman, Department of Forestry, Wildlife, and Fisheries, University of Tennessee, Knoxville, TN 37996

Curtis Smalling, Important Bird Areas Coordinator and Mountain Program Manager, Audubon North Carolina. Boone, NC 28607

Anna Tisdale, John A. Jones, Department of Biology, Appalachian State University, Boone, NC 28608

Kyle Aldinger, West Virginia Cooperative Fish and Wildlife Research Unit, West Virginia University, Morgantown, West Virginia.

(Student Presentation)

1:45 – 2:15

BREAK AND POSTER SESSION

Session Chair: Holly Best, RSC Executive Committee

2:15 – 2:30

A Comparison of the Bacterial Microfloras Found on Avian Eggs

Beth Potter*, School of Science, Penn State Erie, The Behrend College, Erie, PA

2:30 – 2:45

White tail spots and tail-flicking behavior enhance foraging performance in the Hooded Warbler

Ronald L. Mumme, Department of Biology, Allegheny College, Meadville, PA 16335

2:45 – 3:00

Research and education opportunities with the Purple Martin Conservation Association

John Tautin*, Robert Aeppli, Emily Hauser, and Ellen Brockwell, Purple Martin Conservation Association, 301 Peninsula Drive, Ste 6, Erie, PA 16505

3:00 – 3:30

STUDENT AWARDS AND CLOSING REMARKS

Jeanette Schnars, RSC Executive Director

ABSTRACTS

*Regional Science Consortium
9th Annual Research Symposium
November 6-8, 2013
Tom Ridge Environmental Center
At Presque Isle State Park*

ORAL PRESENTATIONS

Wednesday, November 6, 2013

Laboratory Evaluation of the Modified Ludzak Ettinger Method for the Removal of Nitrogen from Simulated Septic Tank Effluent

Raad Jabbr Alkhafaja*, Harry R. Diz, Ph.D., PE Department of Environmental Science and Engineering, Gannon University

(Student Presentation)

An important problem in Pennsylvania is nitrate-contaminated groundwater due to poorly performing septic systems. For systems large enough such as for manufactured home communities, a nitrogen removal treatment system is endorsed by the Pennsylvania DEP. The purpose of this project is evaluate such a system that employs recirculation of wastewater through a sequence of anoxic and aerobic environments. Ammonia in the wastewater is aerobically converted to nitrate by microorganisms, and then to N₂ gas in the anoxic tank by denitrifying bacteria.

The modified Ludzak Ettinger method employs the incoming BOD to feed the denitrifying bacteria which use nitrate as their electron acceptor. Nitrification occurs in the second stage and thus the nitrate-containing water must be re-circulated to mix with the incoming septic tank effluent. In the laboratory, a simulated feed solution was used which contained the typical concentrations of nitrogen and BOD found in septic effluent (45 mg/L nitrogen and 122 mg/L BOD).

After about four months of operation, during which time numerous technical difficulties were resolved, the system has achieved about 95% nitrification but just 20% denitrification. The effluent nitrogen concentration at the time of this writing was about 35 mg/L, which is still well above the PA DEP requirement of 10 mg/L. Work is continuing to improve the denitrification performance. Possibilities include increasing the microbial concentration in the anoxic tank, increasing the BOD concentration in the feed, and/or extending the residence times in the system.

* Presenter

Denitrification of Septic Tank Effluent: a pilot-scale study

Cory Seese, PE Department of Environmental Science and Engineering, Gannon University

(Student Presentation)

Located within Girard Township near Lake City, a mobile home park serving approximately 90 housing units is under scrutiny by the Pennsylvania DEP for its failing leach field. The outdated leach field should theoretically allow the effluent wastewater from the homes to pass through and percolate safely into the surrounding grounds. However, total nitrogen tests in the surrounding areas have revealed a concentration (~70ppm) far above the regulated standard of 10ppm. In an effort to denitrify the wastewater prior to entering the leach field, a pilot scale model of a Modified Ludzack-Ettinger Process has been built and operated since late-Spring. In theory, microorganisms would convert the ammonia and other nitrogen containing species into nitrate which in turn would be consumed by denitrifying microorganisms. With the nitrate being consumed, the total nitrogen concentration within the wastewater would steadily diminish. Chemical and physical parameters such as COD, DO, pH, and $[\text{NO}_3^-]$ have been monitored in order to create an ideal environment for such a synergistic effect. Essentially, a system maintaining a water chemistry reflecting above 2ppm DO in the aerobic tanks, lower than 2ppm in the anoxic tank, and a neutral pH of around 7 will be able to produce such a chain of events to occur. Currently the project is on-going, yet it was only recently that nitrate started being produced in significant concentrations within the aerobic areas of the MLE system. The water will be monitored and tested quite enthusiastically in the days to come.

Permeable Reactive Barrier for the Denitrification of Groundwater Contaminated by Septic Tank Wastewater

Doaa Almaliki*, Rick Diz, Ph.D., PE Department of Environmental Science and Engineering, Gannon University

(Student Presentation)

Nitrate (NO_3^-) is a groundwater contaminant of concern due to its adverse impact on infants. It can occur in groundwater due to poorly performing septic systems. In the United States more than 20% of wells had a concentration of $\text{NO}_3\text{-N}$ above the drinking water limit of 10 mg/l. One way to eliminate nitrate from groundwater is denitrification, a biological process by which nitrate is converted to nitrogen gas (N_2) by facultative heterotrophic bacteria.

One technique endorsed by the Pennsylvania DEP, is to employ a permeable reactive barrier (PRB) to facilitate denitrification (PA DEP, 2013). A PRB is a zone of reactive material placed underground.

This study investigated the use of woodchips in anoxic laboratory columns to simulate the function of a PRB. Water containing nitrate was passed through the columns to discover the nitrate removal capacity of the woodchips. Preliminary results suggest that nitrate removal initially is due to sorption onto the surface of the woodchips. Concentration reductions during the first month of the study ranged from 0.027 to 0.053 mg/L-N per gram of woodchips when the columns were operated at a hydraulic residence time of about 5 days as recommended by the DEP. Effluent nitrate concentrations remained below the DEP water quality target of 10 mg/L for only the first 17 days of operation. It is not yet clear whether true denitrification has occurred or whether the removals are due to sorption alone. The study will investigate many additional factors to enhance and sustain the nitrate removal performance.

Design to reduce arsenic and organic contamination in Bangladeshi water

Shannon M. Gross* and Andrew Bartoe*, Environmental Science and Engineering
Department, Gannon University
(*Student Presentation*)

Dangerous concentrations of arsenic in groundwater have threatened the safety of millions of people living in southern Bangladesh, causing what has been called 'the largest mass poisoning in history'. The impoverished community members of this region receive their drinking water from millions of tube wells formerly installed by aid agencies who promoted groundwater as a safer alternative to surface water. Though avoiding surface water mitigated incidences of enteric diseases, the population is now in extreme health danger from drinking arsenic-contaminated groundwater. This project aims to design a simple water treatment system capable of removing organics and arsenic contamination from drinking water. This unit is to be designed to administer clean water to a family unit with a flow rate of 25-35 gallons per day and lower arsenic concentrations below $10 \mu\text{g/L}$ as well as reducing organic impurities to safe levels. The materials used in the design of the system are to be locally available resources in rural Bangladesh. Research into available resources in rural areas of Bangladesh will be collected from literature reviews and contact with project workers located in target location. Different types of filtration media are to be tested for their ability to remove either organic or inorganic contaminants including activated carbon, iron oxide, limonitic clay, bone char, and silicate sands. Standardized arsenic methods are to be used in detection of arsenic in the filtrate of the system. Potential filter media will be tested in isolation with test water containing known amounts of arsenic and organic contamination.

PPCP's and the Effects on Aquatic Life

Amy Diegelman-Parente, Mercyhurst University

Chemicals used extensively and intensively in our technological society are currently predicted to have surpassed the 100,000 mark in numbers and depending on their properties, modes, and quantity of use, a large number of these chemicals can reach the environment and have unpredictable but potentially harmful environmental and health impacts. Accurate methods of monitoring the levels of these chemicals, an understanding of their potential to damage natural inhabitants to these waters, and the ability to properly develop a risk assessment strategy are all critical pieces to the maintenance of a healthy aquatic ecosystem that does not pose a threat to human safety. Current research has identified several emerging contaminants in Lake Erie beach waters of Presque Isle State Park, including fluoxetine, triclosan, estradiol, and diuron, as well as the artificial sweetener sucralose. All of these chemicals have been shown to have negative health consequences in organisms from bacteria to humans. For most of these, the levels in the Park approach or exceed levels known to cause harm to aquatic species. We have also demonstrated the ability of these chemicals of concern to have genotoxic (and often synergistic) effects on sentinel species, including *E. coli*.

Fresh Face Forward Campaign: Preliminary Report on Consumers' Personal Care Products Use, Knowledge and Attitudes

Dr. Anne Zaphiris, Mercyhurst University

Fresh Face Forward is a communication campaign to create public awareness of toxic chemicals found in personal care products and the effects of these chemicals on health and environment. Efforts of the social change campaign, a partnership between Mercyhurst University and Pennsylvania Sea Grant, focus on increasing awareness of the issue among college students, as well as influencing students to change their current personal care products to safer alternatives. During the 2013-2014 academic year at Mercyhurst University, *Fresh Face Forward* will work to increase awareness of the issue and to persuade students to change their products to safer alternatives or decrease the number of personal care products they use on a daily basis. Researchers will conduct qualitative and quantitative research to guide creative and strategic development of the campaign and evaluate effectiveness of campaign. Campaign impact will be evaluated through measures including online pre- and post-surveys designed to measure awareness, attitude and behavior change; audience response to events and workshops; media exposure; web analytics; and interviews and focus groups of campus constituents. Results of campaign evaluation will be used to refine strategies and tactics to develop an expanded reach to additional Sea Grant universities in 2014 and 2015 academic years. Results of an online campus survey to establish baseline data (use, knowledge, and perceptions of PCPs) and determine best media outlets to reach audience are presented.

The Synergistic Effect of Essential Plant Oils and β -Lactam Antibiotics Against Methicillin-Resistant *Staphylococcus aureus* (MRSA)

Christopher Haydanek M.S,* John Gallagher, Christopher Keller Ph.D. C.P.H, Nancy Carty Ph.D., Laboratory of Human Pathogens, Lake Erie College of Osteopathic Medicine, Erie, PA
(*Student Presentation*)

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 and erythromycin worked synergistically to overcome erythromycin resistance in *S. aureus* clinical isolates. Therefore, the goal of this study was to determine if essential plant oils in combination with β -lactam antibiotics overcome β -lactam resistance in MRSA clinical isolates.

Methods: Antibiotic resistance profiles, consisting of ten antibiotics, were used to select MRSA (n=4) and methicillin sensitive *S. aureus* (MSSA) strains (n=4) from *S. aureus* isolates collected previously from the anterior nares of pre-clinical medical students. A disk diffusion assay was used to screen a panel of 32 essential oils against MRSA and MSSA strains. Essential oil/antibiotic combinations were prepared using the 2 most effective oils and the β -lactam antibiotic, oxacillin. Checkerboard assays were used to classify the interaction of the essential oil/antibiotic combinations against MRSA and MSSA isolates.

Results: Red thyme and oregano were identified as the most effective oils against both MRSA and MSSA strains. Checkerboard assay results indicated a synergistic effect when combinations of red thyme oil/oxacillin or oregano oil/oxacillin were used against MRSA strains. Results from checkerboard assays testing the combinations against MSSA strains indicated no antagonistic effect was present.

Conclusions: Results presented here demonstrate that when used in combination essential oils and β -lactam antibiotics have a synergistic effect against MRSA. In some cases the effect was sufficient to decrease the antibiotic MIC for MRSA strains to a level consistent with MSSA

strains. Further studies should be conducted to examine the effect of active oil components in combination with oxacillin.

Examining effects of Lake Erie sediment on stem cells of the lateral line

Tyler Conley* and Kelly Grant , Gannon University, Biology Department

(Student Presentation)

The effects of chemicals on stem cells are poorly characterized, yet the capacity of stem cells is critical to maintain health. Diminished capacity halts regeneration, (i.e., aging); inappropriate activation may result in neoplasia. We will evaluate the regenerative ability stem cells within the lateral line of zebrafish (*Danio rerio*) after exposure to Presque Isle Bay sediment.

The Lateral Line (LL) is a mechansensory organ that allows fish to sense the movement of water. The LL is comprised of rosettes of mechanosensory hair cells, support cells, the nerve, and oligopotent stem cells that give rise to these structures during growth or after damage. These clusters of cells, known as neuromasts, are directly exposed to the environment; thus, at greater risk from toxicants. The aim of our ongoing research is to examine what effect exposure to Bay sediment has on the regenerative properties of these neuromasts.

At 4-days post-fertilization zebrafish embryos are treated with neomycin, an antibiotic that kills the hair cells in the neuromast. Embryos are then exposed to sediment from three different sites in Lake Erie and a control site from Canadohta Lake for 24-hours while their hair cells would typically regenerate. Afterwards, the embryos are examined using DASPEI, a fluorescent-mitochondrial stain. Results are based on size, number, and location of the regenerated neuromasts. These results are then compared to controls to determine if the behavior of the stem cell, e.g., regeneration, was altered.

The effects of excess fructose, glucose, and xylose on lipogenic gene expression and fat accumulation of HuH-7 hepatoma cells in long-term culture

Peterson HL*, Hudder A, & Bradbury MW, Lake Erie College of Osteopathic Medicine
(Student Presentation)

High fructose corn syrup (HFCS) is a popular sweetener that has replaced cane sugar in most food products (Bray *et al*, 2004). It has been indicated in the development of multiple metabolic disorders due to the way fructose sidesteps the regulatory mechanisms of sugar metabolism (Basciano *et al*, 2005; Elliot *et al*, 2002). Fructose is absorbed from the lumen of the intestine by the GLUT5 transporter, which operates by facilitated diffusion, and bypasses PFK-1, the rate-limiting enzyme of glycolysis. This results in excessive amounts of acetyl-coA, the main substrate for *de novo* fatty acid synthesis which is consequently shunted into fatty acid and triglyceride synthesis. These can then either accumulate within the hepatocytes or be exported into the blood stream to be deposited in adipose and other tissues. While some tissues are able to use these fatty acids for fuel, excess quantities being synthesized by the liver may eventually lead to elevated blood triglycerides, atherosclerosis, and other symptoms associated with obesity and the development of the metabolic syndrome. To further understand the impact of a constant high-sugar diet, this project first demonstrated the viability of the HuH-7 hepatoma cell line in long-term culture, then investigated the effects of fructose on key enzymes in the fat-synthesis pathway and differences in fat accumulation. Results showed that the HuH-7 cell line was viable in long-term cell culture and can be used to further investigate metabolomic studies. Triglyceride assays and lipid droplet analysis showed the fructose produced significantly higher amounts of triglycerides at 6 weeks and lipid droplets throughout the course of the study, respectively. Real-time PCR and western blot analyses revealed significantly large increases in both the gene and protein expression of FAS, leading to the conclusion that the increased lipid droplets may contain more free fatty acids than triglycerides. This, in turn, may contribute significantly to the development of fatty liver diseases.

Prevalence of *Babesia microti* in *Ixodes scapularis* ticks collected from Presque Isle State Park

Christopher Haydanek M.S.*, John Gallagher, Nancy Carty Ph.D, Christopher Keller Ph.D., Laboratory of Human Pathogens, Lake Erie College of Osteopathic Medicine, Erie, PA
(Student Presentation)

Babesia microti is a parasite that infects red blood cells of mammals, including humans. In severe cases, *B. microti* can cause anemia and even fatality in humans. In animals, *B. microti* can also cause severe anemia as it infects and destroys red blood cells. *I. scapularis* ticks are known to harbor and transmit various pathogens, including *Borrelia burgdorferi* and *B. microti*, to human and animals. Our previous studies have shown that there are a high number of *I. scapularis* ticks on Presque Isle State Park (PI), and that >50% of these ticks carry *B. burgdorferi*, the causative agent of Lyme disease. However, no study to date has found evidence of *B. microti* in ticks from PI. Therefore, the purpose of this study will be to determine the prevalence of *B. microti* carriage in black-legged ticks collected from PI.

To complete these studies, *I. scapularis* ticks (n=500) will be examined individually for the presence of *B. microti* DNA. From our previous studies we have collected well over 1,000 ticks

and have examined them individually for the presence or absence of *B. burgdorferi* DNA. Therefore, we will randomly select 400 of these *I. scapularis* DNA samples to examine them for the presence of *B. microti* DNA. In addition, adult *I. scapularis* ticks (n=100) will be collected in Fall of 2013 to Spring of 2014 on PI by flagging for questing ticks. DNA will be isolated from individual ticks by manual crushing with a sterile mortar and pestle in the presence of a 5% Chelex solution. The presence of *B. microti* DNA will be determined by conventional PCR reactions using specific primer sequences obtained from the literature, followed by visualization of bands on agarose gels. The proposed studies are planned to be completed by June 1st, 2014.

Completion of these studies will help to elucidate the potential for transmission of *B. microti* within the animal population on PI, and if there is a potential risk of *B. microti* transmission to humans.

Weaning and adaptation of SH-SY5Y cells to low-glucose containing media for manganese exposure studies

Hannah Smerker^{1*}, Thomas Corso², and Sarah Ewing¹

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(*Student Presentation*)

Manganism is an idiopathic Parkinsonism-like disease caused by the accumulation of manganese in cells of the basal ganglia. This is a health and environmental concern, as exposure to this trace metal can arise through mining, welding, ground or well water use or the use of pesticides. Manganism and Parkinson's disease are characterized by the loss of dopaminergic cells and dopamine signaling. Previous studies in our lab demonstrated that SH-SY5Y dopaminergic cells exposed to 200 uM of manganese led to a near abrogation of extracellular dopamine. However, growth of SH-SY5Y cells in DMEM high-glucose media prevented us from discerning the levels of dopamine metabolites using high performance liquid chromatography with electrochemical detection. The objective of this experiment was to determine if SH-SY5Y cells could be weaned off of DMEM high-glucose media and adapted to DMEM low-glucose or EMEM/Ham's F12 media, without altering cell viability. A sequential method was developed to adapt cells. Prior to each cell passage, the trypan blue exclusion assay was conducted to determine cell viability. SH-SY5Y cells were successfully adapted to EMEM/Ham's F12 media, whereas SH-SY5Y cell proliferation was hindered when grown in DMEM low-glucose media. Qualitatively, SH-SY5Y cells grown in EMEM/Ham's F12 media appeared larger in size compared to cells grown in DMEM high-glucose media. Ongoing studies will quantitate differences in SH-SY5Y cell size and examine the HPLC profile for EMEM/Ham's F12 media. EMEM/Ham's F12 media may allow further analysis of dopamine metabolism in dopaminergic cells following manganese exposure for use as a model of Parkinson's disease.

Isolation of a diverse group of soil bacteria for future use in studying their effect on gender determination in *Ceratopteris richardii*

Nicole McAllister*, Jasmine Shinko, Michael Ganger, and Sarah Ewing, Department of Biology, Gannon University

(*Student Presentation*)

Ceratopteris richardii develop as either hermaphrodite or male; spores initially develop as hermaphrodites that produce a pheromone, antheridiogen. Antheridiogen signals nearby spores to develop as males through a process called induction. Previous studies showed that when *C. richardii* was grown with a K12 strain of *Escherichia coli* induction was blocked, resulting in a bias toward hermaphrodite development (unpublished data). To demonstrate the broader ability of bacteria to elicit this effect on gender determination, a diverse, relevant population of bacteria must be identified for further study. Thus, bacteria were collected and isolated from the soil surrounding ferns from the local environment in an attempt to identify this group of diverse bacteria. Nine bacterial isolates were cultured overnight and used to isolate DNA for amplification of the 16S rRNA gene using gene specific primers and polymerase chain reaction (PCR). The PCR products were verified using agarose gel electrophoresis and purified for sequencing analysis. Sequence data were collected and analyzed using EZTaxon. The following bacteria families were identified: *Enterobacteriaceae*, *Bacillaceae*, *Pseudomonadaceae*, *Planococcaceae*, *Aeromonadaceae*. For some isolates we were also able to identify the genus. Future studies will use these diverse isolates to determine whether or not each affects gender determination in *C. richardii*.

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

Rachel Mercaldo*, Katelyn Melvin, Hasan Kahn, and Beth Potter. School of Science, Penn State Erie, The Behrend College, Erie, PA
(*Student Presentation*)

There are numerous antimicrobial products currently on the market and many of them involve the use of silver ions, which have been shown to have a multifactorial approach to killing bacteria. Agion technology incorporates silver ions into a zeolite carrier. With this technology, sodium ions from the moisture on our hands can cause the release the silver ions allowing them to target bacteria that were left behind from a simple touch. The antimicrobial effectiveness of this technology has been tested in the laboratory, but our study looks at the effectiveness in a real-world setting. Twenty-five door handles on the Penn State Erie campus were coated with Agion silver and were sampled along with twenty-five uncoated door handles. The doors were in four different buildings on campus and samples were taken over a six week period during the fall and spring semesters of the 2010-2011 and 2011-2012 academic years. Bacterial counts were obtained from tryptic soy agar, mannitol salt agar and MacConkey agar plates. Initial analysis of the data suggests that silver-coated doors consistently had lower microbial counts than controls. Quantitative analysis is continuing and we are now examining the microflora present on the door handles to see if the microbial populations change due to the presence of the silver coating.

Predicting *E. coli* Levels with Roboharry: Can the Real Harry Ever Retire?

Michael A. Rutter, Penn State Erie, The Behrend College

During the 2013 summer swimming season at Presque Isle State Park (PISP), an updated version of the statistical model for monitoring PISP beaches for high levels of bacteria was implemented. This model, based on creating a forest of decision trees using weather and Lake Erie data, is called Roboharry. Roboharry uses these data sources in real time in order to predict *E. coli* levels for five regions of PISP beaches each morning at 7:00 AM and 10:00 AM. In this talk, I

will present the results of the model predictions for the 2013 swimming season and see if the time the prediction has had any effect on accuracy. I will also discuss some additional data sources that have been added to the model during the past year.

Phytoremediation: Plant Based Removal of Lead in Surface Soil

Timothy Chaney* and Chad Francis*, Department of science and engineering, Gannon University

(Student Presentation)

In older cities across the United States, there are higher concentrations of lead in soil due to lead based paints, gasoline, piping, and so on from past decades. These materials have made their way into the soil around many older homes over time, leading to a higher risk of lead exposure among residents, especially younger children. Ideally these lead levels can be reduced by economical and non-invasive methods, such as phytoremediation. Our research goal is to compare plant species found in Northwest Pennsylvania to a species known to effectively remove lead from surface soil in order to identify a suitable species for phytoremediation in residential areas. In order to achieve this goal, plant species will be chosen based on growth rate and local availability and planted in soil with known lead contamination. Once the plants have begun to grow, both soil and plant matter will be collected and analyzed for lead concentrations at various stages of the plants' life cycles. The data collected from the plants and soil at the various stages will then be compiled and compared using statistical testing.

Testing the effect of pharmaceuticals on lipid accumulation in microalgae using a 96-well microplate-based system

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(Student Presentation)

Using microalgae to treat municipal wastewater has raised increasing interest because of their potential benefits for contaminant removal and biofuel production. Beside conventional contaminants, municipal wastewater has been shown to contain detectable concentrations of pharmaceuticals originating from human excretion or domestic disposal. These biologically active compounds may affect living organisms at low doses. In this study, a 96-well microplate-based cultivation system was used to determine changes in biomass and lipid production in the model freshwater alga, *Chlorella vulgaris*, exposed to nine pharmaceuticals: acetaminophen, atenolol, carbamazepine, erythromycin, estrone, gemfibrozil, ibuprofen, sulfamethoxazole, and tetracycline. *C. vulgaris* was grown for 14 days in Bristol medium dosed with pharmaceuticals at concentrations of 0.0, 0.40, 1.56, 6.25, 25, and 100 μM . The biomass and neutral lipid accumulation were measured by optical density (680 nm) and Nile red fluorescence (530/580 nm), respectively. Pharmaceuticals did not show observable effects on algal growth at concentrations below 25 μM , except sulfamethoxazole and tetracycline, which inhibited the growth at concentration of 0.4 and 6.25 μM , respectively. A significant increase in neutral lipid was detected in cultures dosed with acetaminophen, atenolol, gemfibrozil, estrone, and carbamazepine at all concentrations as compared with non-exposed controls. On the other hand, exposure to erythromycin, tetracycline, and ibuprofen increased cellular lipids only at low

concentrations. Contrary to other tested pharmaceuticals, sulfamethoxazole caused a decrease in neutral lipid at all concentrations. These results show that exposure to most common pharmaceuticals at low levels, as likely observed in municipal wastewater, may enhance lipid accumulation in microalgae.

Updates on the Most Recent Harmful Algal Bloom (HAB) in Presque Isle Bay

Nate Irwin, PA DEP

This past season a Harmful Algal Bloom (HAB) of *Microcystis* was detected in Presque Isle Bay. Monitoring for the Microcystin toxin occurred throughout the season, including prior to and during the bloom event. This monitoring provided the necessary information to Presque Isle State Park officials to post precautionary signs for visitors. Following the bloom, a task force was established to deal with localized HAB events. Introduction to blue-green algae, identifying a bloom, and the need for more HAB's research will be discussed.

Aquatic Remediation-Enzyme Treatment Assessment

Boughton D.(dbb11@psu.edu), PA Sea Grant, Tom Ridge Environmental Center, Erie, PA

Background: This proposed project is intended to assess alternative solutions to chemical treatments of impaired water bodies. The use of enzymes and diffusers to minimize harmful elements is currently used in select environments to stabilize and maintain healthy water quality. Enzymes are biological catalysts that regulate the multitude of chemical reactions that occur in a living cell. It is currently used as a supplement in municipal swimming pools and waste water treatment plants to minimize the introduction of more costly treatments. Enzymatic processes are currently being developed to target specific compounds that are detrimental to the environment. Traditional stabilization of municipal wastewater and pools, which is monitored by the state department of health, endorses the use of muriatic acid and chlorinators which break down common waste. The introduction of commercially produced enzymes has been shown to be effective in naturally breaking down targeted bacteria and is used to balance and maintain safe Ph values. Other promising areas of research include mitigation of Hazardous Algae Blooms (HAB) and synthetic estrogens and pharmaceuticals that have been found in our water systems.

Proposal/Projects: Research associates are sought to conduct various bench studies:

- a). Establish and monitor a controlled and variable aquatic environment with native fish and macro-invertebrates to determine any adverse effects of enzyme treatment. Record water quality parameters and monitor health of fish species.
- b). Treat (5) samples of blue/green algae with enzymes and monitor remediation values. Quantify data results and correlate with treatment levels.
- c). Document the effect of enzyme treatments on Pharmaceutical and Personal Care (PPCP) product contaminants.

Establishment of an algal historical record for Presque Isle Bay, Lake Erie

Jeanette Girosky, Natural History Museum at the Tom Ridge Environmental Center
Lake Erie has experienced a resurgence in harmful algal blooms (HABs) on a level that has not been seen since the 1970s. While the worst of these HABs have been mostly confined to the Western Basin of Lake Erie, HABs were reported in Presque Isle Bay in 2009 and again in 2011.

A large HAB occurred in 2013. The epilimnion of the pelagic waters of Presque Isle Bay was sampled horizontally with a 10 µm phytoplankton trawl net approximately every week starting in July 2013. The phytoplankton obtained was identified to genus, and sometimes to species. A qualitative representation of the populations was estimated by direct count using wet mount slide preparations. Simple water quality observations such as color and clarity, and the presence or absence of visible colonies in the water were used in conjunction with abiotic factors of observed surface water movement and water temperature to characterize the HAB. General weather conditions and Presque Isle Bay morphology were also taken into account. The combination of these methods and observations were found to be of use when public alerts needed to be issued, and are being developed into a citizen science protocol.

This project is ongoing, as its original aim was to establish and preserve a historical record of algal species in Presque Isle Bay. There are very limited historical records of the algal populations of Presque Isle Bay. Algal populations have been used successfully as bioindicators in assessing natural and human influences on aquatic systems. Surface sampling will continue throughout next year. However, I propose that from May to October of 2014, standard limnological vertical and nutrient profiles be obtained once a month. The use of a Secchi disk and whole water sampling (for quantification) would be incorporated with weekly surface sampling. These additions to the current sampling procedure would allow a record to be built over time and space through which an algal species or group of species could be chosen as a bioindicator(s). This would allow for simple and inexpensive monitoring of Presque Isle Bay in the future, and ultimately a more effective management strategy.

Thursday, November 7, 2013

Global change and parasitism: effects of ultraviolet radiation on infection prevalence in *Daphnia*

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(Student Presentation)

Global climate change has far reaching effects on ecosystems throughout the world. The effects on ultraviolet radiation (UVR) in freshwater ecosystems are a source of concern for the study of disease dynamics. Climate change is expected to increase levels of dissolved organic carbon in lakes and may cause UVR penetration to decrease. Since both hosts and their parasites are susceptible to these decreasing UVR levels, it is unknown how these changes will affect disease dynamics. We investigated a system of a zooplankton (*Daphnia dentifera*) and its parasitic bacteria (*Pasteuria ramosa*) in order to better understand the effect of increased UVR levels on the infectivity of the bacteria. Bacterial samples were subjected to increasing levels of UVR and then used to infect the zooplankton. We observed through controlled laboratory testing that the bacteria's infectivity was extremely susceptible to increased UVR. This suggests that current UVR levels are a limiting factor in epidemics of this disease. Further research on the how UVR levels in the field affect the infectivity of the bacterium and how UVR levels affect other parasites of these zooplankton still needs to be done.

The threat of the invasive rusty crayfish (*Orconectes rusticus*) in Presque Isle Bay

Sara N. Stahlman*, Pennsylvania Sea Grant; Mark Lethaby, Natural History Museum at TREC

The rusty crayfish is an invasive species native to the Ohio River Basin that was introduced into Pennsylvania through its use as bait. It is large, aggressive, and until recently has only been known to be established in the Susquehanna River Basin in the central and eastern regions of the state. In 2013, three rusty crayfish individuals were collected by seine at Vista 3 boat launch on Presque Isle Bay. If established in the Bay, the rusty crayfish could damage spawning sites for native species and alter the food web. Regular monitoring and sampling will be needed to determine the full extent of the rusty crayfish infestation in Presque Isle Bay. Once established, it is very difficult to control and eradicate aquatic invasive species; therefore, prevention is the first line of defense. Because it can be transferred in bait buckets, it is imperative to raise angler awareness about the problems of using rusty crayfish as bait, and the steps they can take to help prevent additional introductions and spread of the rusty crayfish to additional water bodies and tributaries throughout the Lake Erie watershed. It is illegal to possess, sell, barter, or transport rusty crayfish in Pennsylvania.

Management of Salmonid Fisheries of Lake Erie and Lake Erie Tributaries

Michael Hosack, Fisheries Biologist, Pennsylvania Fish and Boat Commission - Lake Erie Research Unit

Fisheries for Steelhead Trout, Brown Trout, and Lake Trout constitute the salmonid fisheries of Lake Erie and its tributaries. Presently, all salmonid fisheries on Lake Erie are primarily sustained by means of annual stocking, with negligible natural reproduction supplementing high annual stocking rates. Four US states and the Canadian Province of Ontario annually stock salmonids into Lake Erie and its tributaries. In 2012, over 1.9 million yearling trout were stocked into Lake Erie by all agencies combined, of which 91% (1,788,839) were Steelhead Trout. Lake Erie continues to undergo ecological changes that have ended once popular fisheries and have created new opportunities.

Lake Erie had historically sustained a native population of Lake Trout consisting of genetically distinct strains. Overfishing and the detrimental effects of non-native species led to the extirpation of all strains of Lake Trout native to Lake Erie. An intensive decades-long lake trout restoration and assessment effort led by the Cold Water Task Group (CWTG) of the Great Lakes Fishery Commission (GLFC) has stocked various non-native strains of Lake Trout into Lake Erie. To date, natural reproduction of stocked Lake Trout has not been confirmed in Lake Erie. This has been attributed to various impediments including insufficient spawner biomass, stocking limitations, invasive species, and degraded habitat (Markham et al. 2008). Progress towards Lake Trout restoration is measured annually by means of an Eastern Basin deep-water gill net assessment performed by PA, NY and ON.

Assessments for Steelhead Trout and Brown Trout are performed annually by CWTG member agencies for agency-specific management purposes. The PFBC, for example, has begun a weir assessment of spawning adult steelhead returning to Godfrey Run, a nursery water. Beginning in 2009, PFBC staff have fin-clipped all Brown Trout stocked by PFBC and cooperative hatcheries to quantify stocking success. Tributary anglers are interviewed on-site annually to provide

tributary effort and harvest data and a voluntary tributary angler logbook program has been reimplemented. Based on findings from assessments, scientific literature, and expert opinion significant changes have been made to steelhead management in PA including changing to a larger size at stocking, and a refinement of stocking locations to increase imprinting and reduce straying. Anticipated findings from a proposed Mass Marking Initiative on Lake Erie may substantially change how Steelhead Trout fisheries are managed on Lake Erie.

Management of Walleye and Yellow Perch on Lake Erie and the incorporation of a stakeholder group into the process of conducting a Walleye and Yellow Perch Management Strategy Evaluation

Chuck Murray, Fisheries Biologist, Pennsylvania Fish and Boat Commission - Lake Erie Research Unit

Lake Erie's Walleye and Yellow Perch are shared resources among four US states and the Canadian Province of Ontario. Within these jurisdictions are the varied interests of sport and commercial fishers. Walleye and Yellow Perch are the only two commodity species that are managed by a compulsory harvest quota system on Lake Erie. Jurisdictional share of the harvest quota is allocated based on the open lake surface area for each State/Province in a given management unit. Virtual population catch-at-age analysis is utilized, incorporating data supplied by fisheries independent and dependent surveys, which produce an annual population estimate for these species. Quotas are derived by applying applicable fishing rates to the population estimates for the respective management unit of the lake.

The Walleye and Yellow Perch populations in Lake Erie are sustained solely through natural reproduction. Responsible management of these stocks includes equitable yet judicious harvest of these limited resources. In an effort to facilitate the process, a stakeholder group was formed on Lake Erie, the Lake Erie Percid Management Group (LEPMAG), to provide input on the management of Walleye and Yellow Perch. Stakeholders include both recreational and commercial fishing interests. This presentation will provide a contemporary history of Walleye and Yellow Perch management on Lake Erie and a look at the impacts of LEPMAG in the decision making process of setting annual harvest quotas for Walleye and Yellow Perch.

Status of the Round Goby, *Neogobius melanostomus* in the Lake Erie Drainage System in Pennsylvania

Stauffer, Jay, Penn State University, Ecosystem Science and Management; Schnars, Jeanette, Regional Science Consortium; Wilson, Casey*, Penn State University, Ecosystem Science and Management; Taylor, Richard, Penn State University, Ecosystem Science and Management
(Student Presentation)

The relative abundance of the round goby, *Neogobius melanostomus*, in Lake Erie has increased dramatically since 1996. With the exception of the trout perch, *Percopsis omiscomaycus*, all benthic species decreased in abundance or were extirpated. Male round gobies live longer and grow larger than females. The tubenose goby, *Proterorhinus semilunaris*, has established a reproducing population in Presque Isle Bay, Lake Erie, Pennsylvania. Neither the round goby nor the tubenose goby appear to compete directly with the Iowa darter, *Etheostoma exile*, for prey species. In the tributaries, the round goby directly competes and causes dietary

shifts of the rainbow darter, *Etheostoma caeruleum*, although the rainbow darter can co-exist with the round goby.

Applying fish removal techniques to Round Goby invaded tributaries of Erie County, Pennsylvania. A genetic approach to provide management solutions

Caleb Abramson, Penn State University, Ecosystem Science and Management
(Student Presentation)

The Round Goby *Neogobius melanostomus*, a benthic fish native to the Ponto-Caspian region of the Black and Caspian seas, was first reported in the St. Clair River, Michigan, in 1990 and Eastern Lake Erie in 1995. Subsequently, it has spread to all five Great Lakes and many of their tributaries. In Elk Creek (PA), length frequency data have indicated that young of year fish are present earlier in spring and later in the summer than indicated by previous samples. Thus, suggesting Round Goby populations may be spending their complete life cycle within the tributaries. A comparison of microsatellite loci from DNA extracted from Round Goby samples from tributary populations and Lake Erie populations will aid in delineating whether Round Goby metapopulations exist within the lake and its tributaries. If data support the above-listed scenario, management measures could be implemented to mitigate or eliminate populations within tributaries (e.g., Fintrol© Antimycin-A).

The required LD to use on Round Goby can be tested in living streams housed at the Tom Ridge Environmental Center in Erie, PA. Temperature and dissolved oxygen content can be made to mimic the natural conditions found in Erie tributaries in early and late spring.

Foraging habits of *Etheostoma caeruleum* to determine dietary niche breadth

Sara Mueller, Penn State University, Ecosystem Science and Management
(Student Presentation)

The fundamental niche is the full range of resources that can be used by an organism when there are no pressures on a system, where as the realized niche is the actual resources used by an organism due to pressures present in an ecosystem. Niche determination will be based on foraging habits of *Etheostoma caeruleum*. My goal is to gain insight into the foraging habits of *E. caeruleum* in communities where there are varying degrees of competition other benthic species including exotic round gobies. Fishes were collected from French Creek and Woodcock Creek in Saegertown, Pennsylvania and Elk Creek in Erie, Pennsylvania. Macroinvertebrate substrate samples were collected using a D-frame kicknet and the standard nine 30-second sampling technique. Fishes were collected with a 3-m seine. Fish electivity will be determined by examining the stomach contents of each fish and compared among four populations. Further analysis may be done to compare gut contents to macroinvertebrates in substrate samples to see if the darters are feeding opportunistically or if they are selective.

Assessing the ecological integrity of Presque Isle Bay through the comparison of hepatic, orcocutaneous, gonadal tumor rates, and intersex within fishes

Sean D. Rafferty¹* and Jay Stauffer, Ph.D²

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(*Student Presentation*)

In 2013, the Presque Isle Bay Area of Concern was delisted partially in response to research indicating that liver tumor rates in Presque Isle Bay and the reference site Long Point Inner Bay (Port Dover, Ontario) were similar. Since the delisting, the use of tumors in brown bullhead as indicators of ecosystem health has been debated. Specifically, the following questions have been raised: 1) does the occurrence of tumors in brown bullhead indicate a greater impact to the bay's fish community; and 2) are there other indicators that could be used to evaluate the ecological integrity of the bay's fish community. To address these questions, we are assessing the ecological integrity of Presque Isle Bay by comparing hepatic, orocutaneous, and gonadal tumor rates and intersex within smallmouth bass, bowfin, yellow and brown bullheads, and logperch. Fishes will be collected from Presque Isle Bay and Long Point Inner Bay. Fishes will be euthanized, dissected, and liver and gonads removed. Samples of presumptive orocutaneous tumors will also be collected for microscopic evaluation. All tumor and intersex histology will be performed at the U.S. Geological Survey National Fish Health Research Laboratory. Fish ages will be determined by reading annual rings of otoliths. The probability that a fish has a tumor and comparison of tumor rates and intersex among species and sites will be assessed using logistic regression. Additionally, benthic fishes will be collected at 10 sites in spring 2014 at both locations using the Penn State electric benthic trawl. Brillouin's diversity index will be calculated for each collection at both sites. Index scores between the two sets will be compared using a t-test.

Post Restoration Brook Trout Phenotypic Variance in Winding Stair Great Smoky Mountains National Park: A Snap-shot of Differentiation

Casey Weathers^{1*}, Dr. Jay Stauffer¹, Dr. Tim King², Stephen E. Moore³ and Mathew A. Kulp³

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(*Student Presentation*)

Great Smoky Mountains National Park biologists have restored eleven Brook Trout Streams to date. Winding Stair Branch was stocked from two geographically isolated headwater populations (Caldwell Fork & Straight Creek). Consequentially, each geographically isolated population could possess unique genotypes and phenotypes polymorphisms, resulting in separate biological species. During the summer of 2013, we examined ten Brook Trout from each population (n=30) and examined the probability of Winding Stair Branch phenotypically differentiating from its parent stock. We measured 23 morphometric and 10 meristic characters from these Brook Trout to delineate if unique polymorphisms have arisen within Winding Stair Branch. Brook Trout restoration which obtains multiple source stockings from geographically isolated headwater populations is a common management practice. Given the results of this investigation we will make some restoration management suggestions to biologists seeking to retain unique phenotypic polymorphisms exhibited by geographically isolated headwater populations of Brook Trout.

Aquatic Habitat Characters that Support Both the Bridle Shiner (*Notropis bifrenatus*) and the Ironcolor Shiner (*Notropis chalybaeus*)

Bill Hanson, The Pennsylvania State University; Ecosystem Science and Management
(*Student Presentation*)

The endangered Bridle Shiner, *Notropis bifrenatus*, and endangered Ironcolor Shiner, *Notropis chalybaeus*, co-exist in Marshalls Creek (Delaware River drainage), Monroe County, Pennsylvania. Although both species were historically widespread, the only known extant populations where these two species occur syntopically is in Marshalls Creek. The primary research goal was to determine the unique aquatic habitat characters of Marshalls Creek that support the syntopic populations of Bridle and Ironcolor shiners. To achieve this goal, research objectives were (1) to examine and discern the aquatic habitat characters (i.e., the combination and interaction of biological, chemical, and physical habitat characters) that are coincident with these two endangered species in Marshalls Creek; (2) to determine if these aquatic habitat characters are commonly found at other historical sites for these two endangered shiners; and (3) to speculate as to why these two endangered shiners currently exist together in Marshalls Creek. A NetWeaver model was developed to examine aquatic habitat characters of Marshalls Creek research sites and other historical sites on the Atlantic seaboard. NetWeaver model network components were utilized to produce strength of evidence scores (i.e., trueness levels) to compare, contrast, and evaluate aquatic habitat characters to the reference (i.e., benchmark) aquatic habitat characters in Marshalls Creek. This study provided important data and methodology for scientists and resource managers to assess biodiversity and determine favorable habitat for these two endangered shiners, and documented important aquatic habitat character data for fisheries management personnel to manage Bridle and Ironcolor shiner populations.

Fish Culture Environments for Hatchery Fish

Bryan Ferguson, The Department of Ecosystem Science & Management, Wildlife and Fisheries, The Pennsylvania State University
(*Student Presentation*)

I propose that fish culture environments may play an important role in the survival of stocked hatchery fish. Fish raised in plain hatchery environments have little exposure to complex environments that more closely resemble stocked streams and lakes. By creating environmental complexity and variability during a fish's residence in a hatchery environment, fish may have the ability to learn and alter behavior in ways that increase post-stocking survival. We are investigating the addition of variability in the environment of hatchery-reared brook trout (*Salvelinus fontinalis*), and Atlantic salmon (*Salmo salar*), by assessing behavioral changes and post-stocking survival in several Adirondack lakes. Preliminary data have shown a change in adaptive behavior prior to stocking, as well as a survival advantage in a controlled laboratory setting. It did not result, however in increased survival rates when the brook trout and Atlantic salmon were stocked into Adirondack lakes.

Predation on the Snowshoe Hare

Laura Gigliotti, The Department of Ecosystem Science & Management, Wildlife and Fisheries, The Pennsylvania State University

(Student Presentation)

Little is known about the populations of snowshoe hares (*Lepus americanus*) in Pennsylvania, which are on the southern edge of the species' range. The snowshoe hare is considered to be a species of concern in the state due to its sensitive habitat requirements and its role in providing a genetic link between hares on either side of the Allegheny Mountains. If temperatures continue to rise as expected, the snowshoe hares' available habitat in Pennsylvania will be reduced extensively. In addition, an increase in temperature will likely shorten winters in the state and reduce snow cover. Snowshoe hares change their coat color as a response to photoperiod, independent from temperature or weather conditions. With a later onset of the first snow, a shorter winter, and decreased snow cover, there will likely be periods of time in which the hares experience a mismatch with the color of their fur and the surrounding habitat. Coat mismatch periods are potentially problematic for the maintenance of snowshoe hare populations because during these times, the hares' camouflage ability is reduced. I intend to investigate if this coat mismatch leads to a higher predation rate and if the habitat usage of snowshoe hares in Pennsylvania is impacted by coat mismatch.

Cervid Crop Damage Prevention and Reduction in Southwest Colorado

Emily Carrollo, The Pennsylvania State University; Ecosystem Science and Management
(Student Presentation)

Mule deer and Elk populations in the western United States provide many benefits (e.g., recreational, ecological and economical) to the local areas. Unfortunately, they also cause a significant amount of damage to agriculture, which can cost local farmers $\$10^6 - 10^7$ in crop damage and loss. Methods to prevent deer and elk damage to the crops can be costly, and the other choice of permanently getting rid of the animals via depredation or other hunting means is not very popular among the public and wildlife management.

This study will use GPS collars to follow 20 mule deer and 8 elk, and assess their movement patterns. GIS and R modeling systems will be used to analyze these individual's movements, and whether or not they have a preference in resource selection. The location is in the vicinity of agricultural fields in Dove Creek, Colorado. The capturing and collar placement of the deer and elk began September 2011, and will continue through October 2013. Some data has been collected already because of collars that have fallen off or the individual is deceased.

Geographic variation in tree ring responses to climate change

Christopher Bouma, The Pennsylvania State University; Ecosystem Science and Management
(Student Presentation)

Global temperatures have risen dramatically in the last century, much of which has been in the last four decades. One result of these increases in global temperatures has been a change in the physiological response of biota. While some organisms can simply adjust to this variation in temperature by shifting their range, established trees must endure the new conditions imposed upon them. Recent findings indicate that this rise in temperature has caused an increase in radial growth throughout the eastern United States. This increase may not be ubiquitous in all locations or site types. For example, south facing slopes tend to be warmer and have drier soils than those facing northward. With a changing climate, the growth patterns of trees on these different site

types may vary. We intend to look at the response in annual growth based on mesic, xeric, southeast, and northwest slope conditions of trees found in central Pennsylvania. We will proceed to evaluate the basal area increment (BAI) trends, ring width index correlation with climate (temperature and PDSI), and percent growth change. Most notably the comparison will be made between the growth of trees from trees in the 30-40 years preceding 1970, and 1970 to present, when the most significant warming has occurred.

Effects of Marcellus shale-gas development on forest fragmentation in north-central Pennsylvania

Lillie A. Langlois* and Margaret C. Brittingham, Pennsylvania State University, Dept. of Ecosystem Science and Management, University Park, PA 16802
(*Student Presentation*)

The rapid expansion of Marcellus shale-gas development and its impact upon the natural resources of Pennsylvania is largely unknown. Recent development in the north-central region of Pennsylvania is of interest because it encompasses the state's largest block of contiguous forest and is one of the most important areas for wildlife. Natural gas development will result in direct loss of habitat at well sites, pipelines, and service roads; however the resulting habitat fragmentation surrounding these areas may be of greater importance. We selected Lycoming County to measure changes in forest fragmentation and core forest (forest greater than 100 m from edges) across the north-central region of Pennsylvania. Shale-gas development in Lycoming County began in 2007 and is greatest on private land with 707 well permits issued (292 on public land). As of 2012, shale-gas development resulted in the conversion of 372 ha (918 acres) for well pads, 80 ha (197 acres) for related infrastructure (water impoundments, compressor stations, etc.), and 360 km (224 mi) of pipeline, thereby decreasing core forest by 59.9 km² (23.1 mi²) or 1.9 percent. Lycoming County is in the early stage of development with only 66 percent of permitted wells drilled and 33 percent of wells producing gas, thereby indicating further loss of core forest. Our results suggest major changes in landscape composition have already occurred within several years as a result of shale-gas development and highlight the importance of maintaining the remaining areas of core forest habitat.

The utilization of LiDAR to detect the breeding habitat characteristics of the cerulean warbler (*Dendroica cerulea*) and identify potential habitat at the landscape level

Alissa Carlton, M.S. Student, Department of Ecosystem Science and Management, The Pennsylvania State University
(*Student Presentation*)

Habitat loss and degradation play a major role in the population declines of many Neotropical migrant birds. One such Neotropical migrant, the cerulean warbler (*Dendroica cerulea*), is a species of high conservation concern due to its significant and steady decline. Cerulean warblers have specific breeding habitat needs and as an area sensitive species, management of large tracts of mature forest is essential to any conservation plan set forth; however, field survey for suitable breeding habitat at the landscape level is unrealistic in terms of labor and cost. Light Detection and Ranging (LiDAR) is a more efficient method of describing the topography and vegetation structure at a greater scale. These metrics combined with bird survey data could be utilized to create a predictive habitat model and subsequently identify

potential habitat. The additional information gained from LiDAR could prove critical to the conservation of cerulean warblers and other species that rely on similar habitat. My research objectives are 1) to use leaf-off aerial LiDAR to quantify the topography and vegetation structure of selected areas in Pennsylvania, 2) to use determined LiDAR metrics and presence bird data to identify the breeding habitat characteristics of the cerulean warbler, and 3) to use statistically significant ($p < 0.05$) habitat metrics to create a model for the mapping of suitable cerulean breeding habitat at the landscape level. I propose that leaf-off aerial LiDAR can be used to identify habitat requirements of cerulean warblers and that these statistically significant LiDAR metrics can be applied to the landscape level to identify potential cerulean breeding habitat.

A Census of the Bat Population on the Campus of Gannon University, Erie, Pennsylvania

Szelwach, Malgorzata*, Lee, Kyrsten* and Dr. Steve Ropski, Biology Department,
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(Student Presentation)

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

Exploring White-tailed Deer Dispersal Patterns using mtDNA

Erin Eperthener*, Daniel Ackerman, Kelly Cowher, Bethany Lashbrook, Jedediah Seltzer, and Fred J. Brenner, Biology Department, Grove City College, Grove City, PA 16127

(Student Presentation)

White-tailed deer (*Odocoileus virginianus*) is the most abundant ungulate in the Eastern United States and has a drastic influence on ecosystems. As such, understanding their dispersal patterns is important for managing a healthy ecosystem. A limited number of radiometric studies suggest that females are philopatric, remaining close to their birth place. However, males move further distances and therefore are primarily responsible for genetic variation in deer populations. The object of this study was to determine deer movement patterns using DNA sequencing. By sequencing the mitochondrion displacement loop (mtD-loop), a non-coding regulatory region in the mitochondria genome, haplotypes were assembled and the nucleotide diversity was calculated. Phylogenetic trees were constructed based on maternal lineages to determine deer dispersal patterns within Presque Isle State Park. Fifteen samples from Presque Isle State have been sequenced and compared to seven samples sequenced from Erie County. Results to date suggest that deer movement occurs between Presque Isle and the County of Erie, as indicated by

the close homology between these herds indicate that female dispersal may be occurring at a rate higher than previously thought. This dispersion may be due to a variety of environmental influences including overpopulation and hunting pressure. The movement of deer between the adjacent communities and Presque Isle State Park may be the reason for the genetic diversity revealed by mtD-Loop sequences.

KEY WORDS D-loop, haplotypes, mtDNA variation, white-tailed deer, population genetics, nucleotide diversity, deer dispersal patterns

DNA fingerprinting of Urban White-Tailed Deer

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(Student Presentation)

DNA fingerprinting of short tandem repeats (STRs) in nuclear DNA from white-tailed deer (*Odocoileus virginianus*) was investigated as a means of determining breeding patterns within deer herds in Presque Isle State Park in Pennsylvania as well as in two metroparks in Dayton, Ohio. Previously obtained liver tissue samples from a total of 38 deer were selected for study beginning in June, 2013. Isolated nuclear DNA from liver tissue and nine fluorescently labeled primers for DNA were used in polymerase chain reactions to amplify the STRs 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 begin 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. Three analysis programs known as GenePop, FSTAT, and Arlequin were used to determine potential gene flow within the sample population, which yielded results consistent with Hardy-Weinberg equilibrium. It is suspected that a more exhaustive study will produce results displaying increased heterozygosity, which would suggest a lack of inbreeding and that bucks move in and out of the different herds. This information will contribute to determining more clearly paternal genetic history and infer the breeding behavior among white-tailed deer herds in Presque Isle and Dayton, OH.

Conducting a Community Health Needs Assessment to Determine the Needs of the Population Served by the Meadville Medical Center

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(Student Presentation)

The Meadville Medical Center (MMC) is an independent community hospital located in Meadville, PA. In accordance with its mission statement, the MMC has conducted a community health needs assessment (CHNA) every five to ten years since the early 1980s. However, the most recent assessments have not gathered data from a representative sample of the population served by the hospital.

The purpose of our research is twofold: 1) create a questionnaire to gather reliable and valid information about the health needs of the community served by the MMC; and 2) gather this information from a random sample that is representative of the population served by the MMC.

To create such a questionnaire, we propose making revisions to the past assessment. Our aim is to create an instrument that will identify the health needs of community using both quantitative and qualitative measures. We must prioritize and validate the questions to be asked as well as ensure that the questionnaire is written at an appropriate reading level.

In order to obtain responses from a representative sample of the population served by the MMC, we propose administering a mail survey to a random sample of individuals in the population served by the MMC. Following the completion of the mail survey, key informant interviews will be conducted to solicit responses from non-responders and under-represented populations (the homeless and illiterate).

The results of the CHNA will be used by the MMC to create policies and programs to meet the health needs of the community.

The Power of Proteomics: A Study of Viral Mediated Post Translational Modification

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(Student Presentation)

Systems approaches to study biological complexity are rapidly revolutionizing research. A global proteomics approach was used to explore differential enterovirus infection stimulated post-translational modifications (PTMs) of host proteins. Since posttranslationally modified proteins innately regulate cellular activities and viral replication is dependent on host cell machinery, we hypothesized that viral infection evokes specific host proteome PTMs that favor viral proliferation. The aspiration of this study is to identify proteins that are universally targeted during viral infection. Stable Isotope Labeling by Amino Acids in Cell Culture, affinity chromatography, and Mass Spectrometry were used to identify ubiquitinated and phosphorylated host proteins in control and infected cells. The host proteome was characterized at multiple postinfection time points. Data cleaning was essential and a scoring algorithm (based on sample reproducibility and viral impact) was developed to validate and rank proteins with biologically relevant PTMs. We found that infection time was positively correlated with dataset validity. The greatest protein overlap was observed between 4-hour samples and the Poliovirus 4-hour dataset was most valid and therefore was used for further preliminary analysis. DAVID (a functional genomics tool) was implemented to expose common themes among highly ranked proteins and indicated that the most biologically relevant proteins were involved with protein transport and localization. Our preliminary results are promising and suggest the validity of the new scoring algorithm as it is well

document that Poliovirus attacks the Golgi apparatus during infection. Future analyses will include complete phosphorylation data integration, additional algorithm development, and increased protein coverage.

Evolution of Pediments Adjacent to the White River Group in Nebraska and South Dakota, Including Potential Influence of the Medieval Climate Anomaly

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(*Student Presentation*)

Late Holocene pediment development in outcrop areas of the White River Group on the northern Great Plains demonstrates several stages of development that relate a story with linkages between geomorphology and paleoclimate. Aggradation of the alluvial-colluvial fans capping the pediments has been punctuated by intervals of landscape stability, favoring pedogenesis. Subsequent deposition upon pediments has left a record of paleosol ages in Holocene alluvium, several of which are synchronous with paleosol ages reported for regional wind-blown deposits. We take the age of the uppermost paleosol as the constraint for the maximum age for the onset of the incision that subsequently dissected the pediments into the sod tables. This incision occurred sometime early in the last millennium, suggesting that the Medieval Climate Anomaly (MCA) may have provided the forcing that substantially altered pediment geomorphology. Dune field migration reported for the period of 1,000-1,300 AD on the Great Plains suggests a dominant wind blowing from the Great Basin to the northeast, across the Rocky Mountain front and adjacent plains. Perhaps, the resulting desiccation of the plains led to a loss of vegetation or an increased flashiness of rainfall. Either, or both, of these linkages appear to have enabled mega droughts associated with the MCA to dissect pediments into sod tables through fluvial incision. Our recent geomorphic transect across Nebraska and South Dakota yielded additional observations to support these postulated linkages and pending radiocarbon dates on paleosols should help further constrain the timing of the terminal incision that formed sod tables.

Living along the Lake Erie Shoreline: What you need to know...

Don Benczkowski, Coastal Resources Program Manager, PA Department of The Coastal Resources Management (CRM) Program of the Pennsylvania Department of Environmental Protection has been instrumental in monitoring and assessing the Lake Erie bluffs and shoreline since the Coastal Program was approved in 1980. CRM staff provides technical assistance to municipalities, and especially to landowners that occupy bluff properties bordering Lake Erie. Several factors affect bluff recession and coastal erosion, from the local geology on a reach of beach, to groundwater and stormwater issues, to human activities taking place on that property. The CRM Program monitors bluffs at 130 different locations along Pennsylvania's shoreline, with precise measurements to determine annual losses. Through aerial and oblique angle photographs, the CRM Program will bring the Lake Erie bluff to you in this photographic presentation! No need for boots, gloves and coveralls for this one. Just have a seat. You will see active bluffs eroding, and stable bluffs thinking about eroding. You will see bluff features

that are very diverse along our relatively short stretch of lakefront property, and methods to arrest, control, or slow down bluff recession. Some work, some don't. Lake Erie and its forces are very unforgiving to many, and living along its coast is not for everyone. We'll give you some basic facts about Lake Erie, and clue you in to the 'real' story of enjoying the coastal life, and the amount of work that it takes to maintain stability in this harsh environment.

Environmental Protection

PA CRM Lake Erie Resource Mapping

Matt Waldron, Coastal Resource Specialist, PA Department of Environmental Protection
The Pennsylvania Coastal Resources Management Program (CRM) is undertaking a multi-year project to map vital resources within the Pennsylvania waters of Lake Erie. CRM staff are using available technologies such as single-beam hydroacoustic substrate mapping, sidescan sonar, and a remotely operated vehicle (ROV) to investigate benthic habitats and known shipwreck locations. The data collected will ultimately be used as a tool for balancing use conflicts within the lake and will be made available to applicants for in-lake development projects as well as to permit writers/reviewers and other decision makers. For this session, CRM will present some preliminary results after one season of data collection, including a discussion on the challenges faced in deploying technologies that are new to program staff.

Friday, November 8, 2013

Assessment of Nearshore Substrates and Potential Spawning Habitat - Northeast Pennsylvania

Scudder D. Mackey, Ph.D., Habitat Solutions NA, Norwalk, Ohio
In June 2011, 37.45 line miles of sidescan sonar data were acquired in nearshore waters near Northeast, Pennsylvania. The sidescan sonar data were collected to map the distribution of nearshore lakebed substrates and identify areas suitable for use as potential spawning or nursery habitat by lake sturgeon, walleye, and lake trout. Spawning habitat characteristics are generally similar for these species. A total of twelve substrates were identified based on the data collected during the survey. Ten of these substrates are bedrock variants and two of the substrates are not bedrock-related (sand and cohesive clay). Approximately 90% of the lakebed consists of exposed bedrock and/or a relatively thin layer of geologic materials resting on bedrock. The observed lakebed materials are complex and heterogeneous. Within the area surveyed, sites with potential coarse-grained spawning habitat with deep interstitial spaces are rare and may be impacted by invasive species such as dreissenids and cladophora. Linear sand deposits in the eastern portion of the survey area may be more suitable for use as nursery habitat for juvenile and/or adult fish species rather than larval or young-of-the-year fish. The data collected are fundamental and can be used to address multiple resource management and research questions dealing with coastal and shoreline management, sand resources, fisheries, and historic Lake Erie water levels. Moreover, this study provides a high-quality baseline GIS dataset that can be used for future comparative studies.

Hydrological Modeling and Water Quality of Trout Run Watershed, PA

Andrew Clark, Department of science and engineering, Gannon University
(*Student Presentation*)

State and local authorities have placed a large amount of effort in understanding the sediment and pollutant loads to the Lake Erie watershed. The entire stream length of Trout Run is listed as non-attaining on the 303(d) list by the DEP. The source of impairment is listed as crop related agriculture activities resulting in excessive nutrients and siltation.

The goal of this study is to extensively monitor the hydrology and water quality of the Trout Run watershed to support or oppose the non-attainment status. Hydrologic modeling will be conducted using GIS and BASINS watershed models. Modeling results will potentially indicate the sources of nutrients and siltation, as well as areas of possible improvement. Water quality will be analyzed from June to October 2013 by measuring for phosphate, nitrate, TSS, bacteria levels, BOD₅, temperature, pH, and dissolved oxygen. In addition to manual sampling at six areas in the watershed, an ISCO automatic water sampler was placed above and below the Fairview Fish Hatchery.

Results for low flow conditions show acceptable levels of most parameters; however phosphate concentrations are high and bacterial counts are high in the headwaters. Further sampling and watershed modeling is currently ongoing.

The Missing Link: A Buoy for the Pennsylvania Waters of Lake Erie

Jeanette Schnars, Regional Science Consortium

Currently there are two weather stations and two water quality buoys operated by the Regional Science Consortium (RSC) at the Tom Ridge Environmental Center in the Pennsylvania waters of Erie, Pennsylvania; however there are no weather buoys reporting the nearshore forecast located on Lake Erie between those at Cleveland, Ohio and Buffalo, New York. Since weather and wave conditions in the Lake Erie waters adjacent to Erie, Pennsylvania vary from those reported by the National Weather Service in Cleveland and Buffalo, the absence of data in this area poses a threat to recreational water users, recreational boaters and commercial boaters. Recently the RSC has been awarded a grant from the Great Lakes Observing Systems (GLOS) to purchase a nearshore buoy reporting weather and water conditions providing the missing data to the NOAA-National Weather Service, GLOS, and the RSC; such real-time meteorological and physical data will be used to make visitors, residents, and communities safer from the negative impacts of storm events. In addition, this real-time data is easily accessible with potential to be used in a variety of research. This presentation will review the buoy system parameters and accessibility.

An exploration of *ANII* expression in the hermaphrodite gametophytes of the fern *Ceratopteris richardii*

Kara Norman*, Julia Girouard, Mike Ganger, and Sarah Ewing
Department of Biology, Gannon University
(*Student Presentation*)

Gametophytes of the fern *Ceratopteris richardii* may be either male or hermaphrodite. The pheromone, antheridiogen, produced by hermaphrodites, induces spores to develop into

ameristematic males containing antheridia. Hermaphrodites develop in the absence of antheridiogen and contain a notch meristem, peripheral antheridia and centrally located archegonia. Expression of the gene *ANII* has been shown to be induced by antheridiogen and is therefore implicated in male determination and maintenance. However, our lab has shown *ANII* expression in three-week old hermaphrodites at higher levels than similarly aged males. An experiment was undertaken to determine the spatial pattern of *ANII* expression in hermaphrodites and whether antheridiogen is sufficient for *ANII* expression. Three-week old hermaphrodites were cut to separate the more central archegonia and notch meristem from the edges containing antheridia. Edge pieces were maintained in the same media with hermaphrodites, and thus, antheridiogen for four days. After four days, a parallel set of hermaphrodites were cut to separate the central portion of hermaphrodites from the edges. RNA was extracted from each group of treated gametophytes, exposed to DNase and converted to cDNA. *ANII* expression in each treatment was determined using qRT-PCR. The center portions of hermaphrodites exhibited 93x higher *ANII* expression than edge pieces. Edge pieces separated from center portions for four days exhibited 240x higher *ANII* expression than edge pieces separated from center portions just prior to RNA isolation. *ANII* expression varies spatially within hermaphrodites. Antheridiogen is not sufficient for *ANII* expression and a second hormone, auxin, is implicated in its expression.

Inner City Farming: Designing an Aquaponics Garden

Ben Thompson* and Stephen Cox*, Gannon University Department of Environmental Science and Engineering

(Student Presentation)

Many organizations are creating community gardens in order to increase access and availability of fresh produce for urban residents. Gardening in urban areas can be problematic, however, since many areas contain soil with high levels of contaminants such as lead, which pose risks to human health. One approach to avoid contamination is to build an aquaponic garden.

Aquaponics is a form of farming that combines hydroponics and aquaculture and does not require soil in order to grow crops. It works by using the waste produced by fish as fertilizer for the plants. Water from the fish tank is pumped through beds suspended above the water. The plants absorb the nutrients from the fish waste and help filter the water as it passes through. Aquaponic gardens allow for more crops to be grown on smaller plots of land.

The overall goal of this project is to design an aquaponics system for a non-profit organization, located in Erie, that provides educational programming to children. The system will be housed in a greenhouse on a small strip of land on the organization's property. The greenhouse will be large enough to allow people and classes inside. The preliminary design is to sink the fish tank into the ground to reduce heating costs in the winter. The tank will house perch, a native fish that can handle cold temperatures. Around the sides of the green house will be the plant beds, which will double as tables for classes. This presentation will provide details of the preliminary design, characteristics, and calculations needed to build a successful aquaponics system for the nonprofit client. A scale model of the designed system will be built later and another group will scale the project to size and install it.

Potential For Seed Dispersal by Resident and Migratory Canada Geese Populations

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(*Student Presentation*)

Resident Canada geese (*Branta canadensis*) are abundant around the Great Lakes region. They differ from migratory Canada geese because they nest in northern latitudes, whereas resident geese do so locally. Both variants have the potential to facilitate seed dispersal through endozoochory, transport of seeds through ingestion. However, because of the shorter distance travelled by resident geese and the variation in timing of seed production between species, resident and migratory geese may affect plant populations differently. To test this hypothesis, we collected fecal samples every two weeks, beginning 3 June 2013, from different locations across Presque Isle State Park, Erie, Pennsylvania. One-third of samples collected from each site were cold-stratified for three months. The remaining samples were planted immediately after collection. We planted samples by spreading fecal matter onto potting soil in small pots that are then kept in a greenhouse. If germination does not occur, samples are subjected to a moist soil treatment and finally a submerged treatment to allow seeds from wetland species to germinate. Thus far, 312 fecal samples have been planted and an additional 85 samples remain in cold-stratification. A total of 35 plants have germinated with a diversity of 11 different species. Of those that have germinated 23% are graminoid species while 77% are forb species. Our results at this time indicate that resident geese do, in fact, facilitate seed dispersal by means of endozoochory but do not contribute to the spread of invasive plant species.

Tracking Invasive Species with *iMap Invasives*

Kierstin Carlson, Amy Stauffer*, Mary Walsh, PA Natural Heritage Program, Western Pennsylvania Conservancy, 800 Waterfront Dr., Pittsburgh, PA 15222, Ph: (412) 586-2305, astauffer@paconserve.org

Invasive species can be a threat to developed and natural systems, cause human diseases, reduce water quality, degrade recreational experiences, and cause loss of biodiversity. Having a tool to track the introduction and spread of invasive species is one critical step to curbing their damage. *iMapInvasives*, a database for Pennsylvania invasive species, stores spatially-referenced information on invasive plants and animals in an on-line system for the public and for natural resource managers. Tracking invasive species locations in this way can assist managers with decision making and prioritizing resources for management. Several types of information, such as general observations, targeted-survey efforts, and treatments, may be entered through the on-line system. Queries and interactive mapping tools enable users to retrieve data and map species distributions. The presentation will walk participants through the use of *iMapInvasives* database and applications.

Comparitive community ecology of dusky salamander assemblages (Plethodontidae:*Desmognathus*) in the northern Appalachian Mountains and Glaciated Plateau of Pennsylvania

Alex Hess* and Josiah Townsend, Department of Biology, Indiana University of Pennsylvania, Indiana PA 15705, ajhess44@gmail.com
(*Student Presentation*)

Dusky salamanders (Plethodontidae: *Desmognathus*) are a species rich adaptive radiation of aquatic and semi-aquatic salamanders typical of seeps and streams throughout eastern North America. *Desmognathus* predominantly have biphasic life histories with aquatic larvae, but are phylogenetically nested within a group of direct developing salamanders, having secondarily re-evolved an aquatic larval stage. Adaptive radiation in *Desmognathus* primarily features increases in body size, length of larval period, and use of aquatic habitat. These salamanders often occur in sympatric assemblages with adults distributed along a terrestrial to aquatic gradient, with smaller species becoming more terrestrial in the presence of larger congeners. Shifts to terrestrial environments may lessen escape opportunities and increase risk of predation, necessitating more inconspicuous behavior. Shifts in microhabitat utilization and narrowing of niche breadth among “small” species have been observed in the presence of larger congeners. Stream assemblages of *Desmognathus* provide an opportunity to study linkages between habitat selection, intraspecific interaction, and evolution of adult body size. Interspecific competition will be measured by comparisons between niche and diet utilization in assemblages of *D. fuscus*, *D. ochrophaeus*, and *D. monticola* across two different biogeographic regions: the northern Appalachians and the Glaciated Plateau of south-central and northwestern Pennsylvania, respectively. Niche utilization will be studied by measuring distance of capture from open water and observations of diet collected by stomach flushing. Lastly, the selective pressure of predation on size across the habitat gradient will be evaluated using measurements of flight distance before rest as well as species’ individual reliance on escape or camouflage.

Assessing the distribution and conservation status of the mountain chorus frog (Hylidae: *Pseudacris brachyphona*) in Pennsylvania

Ellen Teygart* and Josiah Townsend, Department of Biology, Indiana University of Pennsylvania, Indiana, PA 15705, eteyga056@gmail.com
(Student Presentation)

The mountain chorus frog (Hylidae: *Pseudacris brachyphona*) is an understudied species in the Family Hylidae that is endemic to the Appalachian Plateau of the northeastern United States. The status of *P. brachyphona* in Pennsylvania is currently unknown, with few confirmed records in the past 25 years leading to the species being considered of “Immediate Concern” by the state. A predictive geospatial model will be created using historical records from museum collections and published accounts, in an effort to identify critical potential habitat for the species. The distributional model will be used to guide surveys of potential habitat in Spring 2014, in an attempt to identify one or more breeding populations of *P. brachyphona* in Pennsylvania. At each site where *P. brachyphona* is confirmed, we will estimate, or directly count, the number of calling males and attending females, mark as many individuals as can be captured using established capture-mark-release techniques, and set up automated acoustic-monitoring and climatic data collection devices. Following the initial breeding surveys, we will attempt to collect data concerning non-breeding habitat in southwestern Pennsylvania through August 2014. Using the evidence gathered during breeding and non-breeding activity, the conservation status of *P. brachyphona* within the state will be reevaluated. Results of this project will be used to develop a long-term monitoring program for *P. brachyphona* at select reproductive sites and a state-wide management plan.

A Study of an Isolated Population of Shorthead Garter Snakes in Erie County, Pennsylvania

McDuff, Jessica*; Lethaby, Mark and Dr. Steve Ropski. Biology Department, Gannon University, Erie, Pa
(*Student Presentation*)

From May 2013 to July 2013, a mark recapture study was carried out on the shorthead garter snake, *Thamnophis brachystoma*, at the Shannon Road site in Erie, Pennsylvania. Sixty two individual snakes were captured, four of which were recaptured individuals from a previous study by Mark Lethaby. Each adult snake was marked using a cauterizing tool and processed to obtain weight, snout to vent length, tail length, pre-ocular and post-ocular scale counts, molt status, and anomalies. Cover boards from the previous study were the method of capture. Chi-square analysis was used to determine cover board preference within the study area, ratio of males to females, weights between males and females, and molt status synchronization.

Carotenoid colors and the Painted Turtle: a health-enhancing, sexually selected trait?

JOHN E. STEFFEN^{1,4*}, KYLE M. LEARN¹, JONATHAN S. DRUMHELLER¹, SCOTT M. BOBACK², KEVIN J. MCGRAW³

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Animals use a variety of colors as sexually selected visual signals, and these colors can be generated by pigments known as carotenoids. Carotenoids are photosynthetic pigments in plants that animals must acquire from their diet and are thought to be costly to obtain and transport. Carotenoids play diverse and important roles in photoprotection, free-radical scavenging, immunomodulation, visual tuning, and visual signal coloration in animals that ingest carotenoids. As a result carotenoid-based skin colors are hypothesized to function as honesty-reinforcing mechanisms that underlie the use of colorful ornamental traits. Carotenoids are commonly found in bird integument, but are found in some species of reptiles. Many species of Emydid turtle (including the Painted Turtle, *Chrysemys picta*) have red or yellow carapaces, throat patches, and stripes along the head, neck, or legs. Courtship behavior of this Emydid turtle has been described and includes females facing males' colorful heads while males use tactile stimulation to attempt to encourage females to copulate. Integumentary colors that are viewed by prospective mates or rivals may function in intra- and intersexual contests in the Painted Turtle, which is common throughout the Great Lakes region. The objectives of this presentation are to a) present evidence documenting the carotenoid basis to red and yellow colors in Painted Turtles and b) discuss these findings in light of the role carotenoids play in communicating health information during courtship interactions, and c) describe new areas of health-related research using turtles which might be especially suitable due to their small size and relative longevity.

Pennsylvania Amphibian and Reptile Survey

Marlin Corn, Pennsylvania Amphibian and Reptile Survey (PARS) Coordinator, Mid-Atlantic Center for Herpetology and Conservation

The Pennsylvania Amphibian and Reptile Survey (PARS) is a joint project between the Mid-Atlantic Center for Herpetology and Conservation and the Pennsylvania Fish & Boat

Commission (PFBC), with additional funding from the Department of Conservation and Natural Resources, Wild Resource Conservation Fund. This project, which launched in June of 2013, is largely a citizen science project which will attempt to determine the current status of Pennsylvania's reptile and amphibian populations. Although PARS is the third state-wide herpetological atlas to be conducted in Pennsylvania, relatively little information has been collected on the commonwealth's herpetofauna compared to other vertebrates. Because these environmentally sensitive animals are suffering global declines at rates unprecedented in human history, current and comprehensive distribution knowledge is critical to effective conservation measures. To create the most effective herpetological atlas to date, the PARS project will build on previous atlas efforts through three primary objectives:

- Develop a comprehensive, quality checked herpetological database through the compilation of all existing Pennsylvania reptile and amphibian data.
- Develop a systematic volunteer/citizen science driven PA amphibian and reptile atlas, including a user friendly and interactive website.
- Develop focal species teams that target high priority species of concern.

The PARS project will collect and compile data for ten years, and culminate in a publication of the results.

Assessing Golden-winged Warbler Response to NRCS Working Lands for Wildlife Effort in the Appalachian Mountains.

Darin J. McNeil*, Marja Bakermans, and Jeffery L. Larkin, Department of Biology, Indiana University of Pennsylvania, Indiana, PA 15705

Petra Wood, US Geological Survey West Virginia Cooperative Fish and Wildlife Research Unit, West Virginia University, Morgantown, West Virginia.

David Buehler, and Justin Lehman, Department of Forestry, Wildlife, and Fisheries, University of Tennessee, Knoxville, TN 37996

Curtis Smalling, Important Bird Areas Coordinator and Mountain Program Manager, Audubon North Carolina. Boone, NC 28607

Anna Tisdale, John A. Jones, Department of Biology, Appalachian State University, Boone, NC 28608

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(Student Presentation)

The Golden-winged Warbler (*Vermivora chrysoptera*; GWWA) is a migratory songbird that breeds in early successional habitats in forest-dominated landscapes. Populations of this species have experienced significant declines over the past 50 years. Recent development of a species-specific conservation plan, habitat management guidelines, and the identification of conservation focal areas were critical first steps toward the recovery of GWWA breeding populations. We are now faced with the challenges of implementing range-wide efforts to increase the quantity and quality of breeding habitat. The GWWA is one of 7 focal species targeted for habitat management on private lands through the Natural Resource Conservation Service's (NRCS) *Working Lands for Wildlife* effort (WLFW). Beginning in 2012, we initiated a monitoring project to evaluate GWWA response to habitat created via conservation practices associated with NRCS-WLFW in NC, PA, TN, and WV. During the 2012 and 2013 field seasons, we conducted 114 and 169 point-counts, territory-mapped 196 and 213 males and

monitored 72 and 129 nests, respectively. We banded 326 GWWA, 13 Blue-winged Warblers, and 51 hybrids over this same time period. GWWA nest success varied across study areas and ranged from 33.33%-90.91% with an average study-wide nest success rate of 51.52%. Our monitoring efforts are planned to continue through at least 2016. Ultimately we hope to reliably evaluate the merit of the WLFW effort to contribute to achieving regional GWWA breeding habitat and population goals.

A Comparison of the Bacterial Microfloras Found on Avian Eggs

Beth Potter*, School of Science, Penn State Erie, The Behrend College, Erie, PA
Several recent studies involving Pearly-Eyed Thrashers, Pied Flycatchers, Western bluebirds, as well as Tree and Violet-green Swallows suggest that a bacterial microflora exists on the surface of avian eggs. It is believed that this microflora could be influential in preventing the growth of pathogenic species and/or allowing shell modifications, such as an increase in water vapor permeability, that are necessary for embryonic development. To determine the exact role of the microflora it is necessary to first determine the exact composition of the microflora. Since only a few descriptive studies of the microbial diversity of eggs in natural nests exist, we began examining the eggshell microflora of House Wrens and American Kestrels using culture-based techniques. While the bacteria identified in both studies were from the same phyla: Actinobacteria, Firmicutes, and Proteobacteria, the proportions identified in each were very different. While bacteria isolated from House Wren eggs were almost equally distributed throughout the Proteobacteria and Firmicutes phyla, the majority of bacteria isolated from American Kestrels were from the Actinobacteria phylum. Together these studies suggest that bacterial composition is likely regulated by nesting behaviors and environments and requires further research. Thus, we have expanded our research to include another local, temperate species, the Purple Martin.

White tail spots and tail-flicking behavior enhance foraging performance in the Hooded Warbler

Ronald L. Mumme, Department of Biology, Allegheny College, Meadville, PA 16335
Many species of insectivorous birds have contrasting plumage patches that are often displayed during foraging. Although such displays are widely hypothesized to flush potential prey and enhance foraging performance, experimental evidence that they function in this way is limited. Here I provide additional evidence from an experimental study of the Hooded Warbler (*Setophaga citrina*). Hooded Warblers regularly flick their tails while foraging, revealing large white spots on the outer tail feathers. I tested the function of the white tail spots by temporarily darkening the tails of nesting adults. Experimental birds with darkened tails showed significantly reduced foraging performance relative to sham-darkened controls, and the decline in foraging performance was driven almost entirely by a decreased frequency of aerial prey attack. High-definition video recording at nests showed that plumage manipulation also altered the types of prey females delivered to nestlings; females with darkened tails delivered significantly fewer winged insects, and proportionally more insect larvae, than did controls. However, the types of prey delivered by males were unaffected by plumage manipulation. Tail-flicking behavior co-develops with independent foraging in juveniles and is a significant positive predictor of juvenile foraging performance, even when the effects of juvenile age and activity are controlled

statistically. Collectively, these results provide strong support for the hypothesis that white tail spots and tail-flicking behavior of Hooded Warblers function to flush visually oriented winged prey and enhance foraging performance. They also raise questions about sexual dimorphism in the tail pattern and its relationship to possible sex differences in foraging strategies.

Research and education opportunities with the Purple Martin Conservation Association

John Tautin*, Robert Aeppli, Emily Hauser, and Ellen Brockwell, Purple Martin Conservation Association, 301 Peninsula Drive, Ste 6, Erie, PA 16505

Institutional partnerships in research and education help the Purple Martin Conservation Association (PMCA) achieve its mission. These partnerships are founded on making mutually beneficial use of data collected through PMCA's three citizen science projects, through its large research colonies that contain scores of marked individuals of known age and sex, and through its extensive network of members and affiliate organizations. These resources are described, and results from recent partnerships utilizing them in research and education are highlighted. New opportunities ranging from class projects and internships to PhD level research are discussed, and inquiries about potential partnerships in Purple Martin based research and education are invited.

ABSTRACTS

*Regional Science Consortium
9th Annual Research Symposium
November 6-8, 2013
Tom Ridge Environmental Center
At Presque Isle State Park*

POSTER PRESENTATIONS

1. Geologic History of Presque Isle; current and proposed work

Sarah Steadman*, Luz Ydania A.*, Alex Bear, Michael Eckstrom, Sean Swick, Kyle Shugerts, and Eric Straffin, Edinboro University

Presque Isle is a popular local tourist attraction, bringing in millions of visitors annually who enjoy its beaches and trails. However, the general public is usually unaware of the dynamic processes and underlying geologic features that have shaped the peninsula into what is seen today. This study examines the unique formations of Presque Isle, including the progressive development of ancient beach ridges, dunes, and ponds that formed episodically over the last 5000 years. To better understand these processes, we sampled sediments with vibracores and from artificial exposures. We also conducted remote sensing/mapping of landforms using LIDAR and Ground Penetrating Radar (GPR). Laboratory analyses included dry sieving, magnetic susceptibility and facies analyses of the collected sediments.

GPR data suggests that the modern geologic processes forming the migrating sand-spit, dune and beach ridges were similar in the past. However, the timing of episodic spit migration is unknown, as is the cause of those changes. Current and future work is focused on continuing to document the stratigraphy of Presque Isle, and to collect samples for Optically Stimulated Luminescence dating that will permit age determination of landforms and rates of pre-historic spit migration. Better age control and understanding of stratigraphic relationships between landforms will allow us to better interpret the formation of the ancient parts of the peninsula, and the causative mechanisms driving episodic spit migration.

2. Conodont Coloration to Determine Thermal Maturation of Late Pennsylvanian Limestone Formations of Western Pennsylvania

Christy L. Miller and Tamra A. Schiappa, Department of Geography, Geology and the Environment, Slippery Rock University, Slippery Rock, PA 16057 clm4669@sru.edu

The thermal maturity of the Late Pennsylvanian limestone formations in western Pennsylvania were determined by applying the conodont alteration index (CAI). The Pennsylvanian period ranges from 320-290 mya and during this time sea level fluctuation resulted in the deposition of extensive carbonate units; Vanport, Brush Creek, Pine Creek and Ames Limestones. These formations are important proxies for not only past climate change but the location of potential oil and gas resources. One method used to determine thermal cutoffs for oil, condensate, and dry gas generation in sedimentary rock units is the conodont coloration. The CAI bases color changes on the organic matter present in fossil teeth of these small chordates, commonly

preserved in Paleozoic limestones. The CAI is time and temperature dependent, therefore making it a good correlation tool for determining maximum burial temperatures. Further, the CAI is determined by comparing collected samples against a set of laboratory produced conodont color standards with colors ranging from pale yellow to black, identified with numbers from 1-5 to estimate burial temperature ranges. The results of this study indicate that the Brush Creek and Vanport limestones have a CAI of one, indicating a burial temperature range 50°-80°C. The Pine Creek and Ames limestones have a slightly higher index number of 1.5 indicating a temperature range of 50°-90°C. This data indicates that the Brush Creek and Vanport limestones do not reach the thermal cutoff and the Pine Creek and Ames limestones are at the minimum thermal cutoff for possible oil and condensate production.

3. Diagenesis of fossil brachiopods: Is that really original, 350-million-year-old shell material?

Brittney A. Oleniacz, Edinboro University of PA Geosciences
<bo090272@scots.edinboro.edu>

I investigated the diagenetic fates of local, Devonian aged brachiopods to address a long standing question of area geologists and paleontologists: “are the 350 million year old ‘shells’ in local bedrock made of original shell material?”. I sampled brachiopod fossils from Late Devonian sedimentary rocks (siltstones and sandstones of the Chadakoin Formation) of southern Erie Country, PA. Four possible diagenetic outcomes were tested via thin section microscopy and X-ray diffraction. Results indicate that the original biogenic mineral, calcite (a common crystal form of CaCO_3), remains, albeit recrystallized in parts. The degree of recrystallization varies among specimens, from none to nearly complete. I speculate that this variation can be attributed to taxonomic differences and, also, variations in the physical characteristics (permeability, etc.) of the surrounding matrix. No evidence of chemical change, i.e. replacement, was observed.

4. Artistic Renditions of the Badlands: Multi-Media Explorations of a Rugged Desert Landscape

Ben Bires¹, Maria Camera¹, Hannah Scrima¹, Katherine Mickle¹ and Patrick Burkhardt²

¹Department of Art, Slippery Rock University

²Department of Geography, Geology, and Environment, Slippery Rock University

We participated in a two week intercollegiate expedition to interrogate a harsh, but compelling landscape on the American Great Plains. While our art has assisted our science colleagues with visually conveying their description of landscape evolution, we also created materials that convey a different approach to understanding Earth. Our presentation includes two- and three-dimensional manipulations of various media in an attempt to convey our impressions of a foreign place. As Slippery Rock receded in the rear view mirror, anticipation for discovery grew. Upon arrival, our concerns for the harsh conditions became more apparent, and it was coupled to the excitement of the blank palette offered by this expedition. In the desert, we experienced wind, dryness, obstacles, heat and cold, and a profound remoteness, which allowed us to step out of our comfort zones and gain new perspectives. Our efforts were placed into creating pieces that would convey these experiences. Amongst our collection, you will find works in ceramics, metalsmithing, drawing, painting and photography.

5. Reflections upon Our First Scientific Field Research Investigation

Kaitlyn Bouch, Derrick Fiedler, and Kaitlyn Walters, Department of Geography, Geology, and the Environment, Slippery Rock University

This past summer, we travelled to the White River Badlands of Nebraska and South Dakota. It was a very unique and thrilling experience and we learned a lot about what it takes to be a geologist. Each day we went out and explored the land looking for various geologic structures, like sod tables, castles, and pseudokarst. We learned a lot about the ways geologists study the earth and how they get to share their experience with others. For example, keeping a field notebook is a critical skill. It was a great tool to record every observation I had. We also learned about safety in the field, appropriate gear, and how to read the skies to know what weather we would have when we got to camp. Also, water is life. If we did not have our canteens filled at the start of everyday, and multiples of them, we would run out of water and that is a bad place to be when you are in the Badlands. Teamwork was an important component, but not always easy achieve. Along with learning about the landscape of the Badlands, we also learned a lot about the people who live there. The Lakota shared many of their stories and experiences there. It was an amazing place to spend our first expedition. With all the experience we accumulated, we all want to go back and apply our new skills to further our research.

6. Rapid Analysis of Aerobic/Facultative Bacteria Utilizing Oxygen Uptake Rate

Edward F. Askew PhD, Askew Scientific Consulting and Baseline Industries

Oxygen uptake rate or oxygen demand has been utilized in wastewater analysis, “Standard Methods for the Examination of Water and Wastewater”, to measure the activity of aerobic and facultative anaerobic bacteria found in wastewater plants. In many cases wastewater plant bacteria is suspected to be responsible for beach impairment and the rapid detection of live bacteria loading in less than 6 hours is desirable for beach managers. The Greenlight® 900 series are instruments that measure the oxygen demand of aerobic and facultative anaerobic bacteria in real time, from one to six hours, for surface fresh water sources. Calibration of the Greenlight demand rate to bacteria populations determined by classical regulatory bacteria tests has shown an acceptable linear relationship ($R^2 > 0.82$). Experimental results from freshwater river and lake beaches in Iowa support the use of this type of analysis for risk control of human exposure to excessive bacteria loads at beaches.

7. Determination of Frac Water Toxicity by Wastewater Methods: Oxygen Uptake Rate and Biochemical Oxygen Demand

Edward F. Askew PhD, Askew Scientific Consulting and Baseline Industries

The toxicity of raw frac process water is a major problem and concern to regulators and the general public as it applies to wastewater treatment plants receiving this wastewater, the drinking water plants downstream from the wastewater plant discharge, ground water injection sites and surface water discharge sites. The current test for wastewater plant toxicity under the Clean Water Act is called the Whole Effluent Toxicity (WET) test. It is performed on the wastewater plant effluent utilizing live indicating macro-invertebrate and fish organisms. This test only measures the toxicity that passes through the wastewater plant, not the raw process frac water toxicity.

The use of a rapid and traditional bacteria screening test to determine toxicity of the process frac water before it is discharged at the headworks of the wastewater plant or at any time during the treatment process will be presented. Calibration of a rapid oxygen demand instrument, GreenLight®, with traditional toxicity tests such as Biochemical Oxygen Demand (BOD) will be performed with a frac water challenge matrix. Toxicity impacts will then be measured on representative wastewater samples from municipal treatment plants and the results presented.

8. Bioethanol derived from Algal Carbohydrates

Ramses Rodriguez* and Dr. Fredrick Harrington, SUNY Fredonia

Carbohydrates derived from algae can be converted to bioethanol through the process of fermentation. The efficient induction of carbohydrate synthesis and storage in algae can thus be used to supplement energy demands in our global economy. *Chlamydomonas reinhardtii* is a photosynthetic alga in which the mechanisms of carbohydrate synthesis and storage can be studied using variable pH conditions.

C. reinhardtii consumes atmospheric carbon dioxide. It uses a CO₂ concentrating mechanism (CCM) associated with its pyrenoid complex that is responsible for the internal mobilization of inorganic carbon (Ci) that will be used for carbon fixation. The CCM requires the function of carbonic anhydrases to facilitate this internal mobilization of Ci and to facilitate its conversion to a form usable by RuBisCo in the pyrenoid complex. Carbonic anhydrases (CAs) are a group of enzymes responsible for the rapid interconversion of carbon dioxide and carbonic acid.

Because *C. reinhardtii*'s genome has been sequenced, RT-PCR was employed to analyze the mRNA of the carbonic anhydrases CA3 and CA6, which reside in the chloroplast of the alga. Our data shows that the mRNA expression of these two CA's decreased over the period of 48 hours when grown in media of pH 5.5 and pH7.5. Confocal microscopy imaging has revealed that the overall size of the pyrenoid complex increases by an average of 1 µm in algae grown in these two pH conditions suggesting that pH variation can induce carbohydrate synthesis and storage in *C. reinhardtii*.

9. Photomorphogenic Effects of UV-B Radiation and α -Tocopherol Treatment on *Brassica rapa*

Tiffany M. Wong Department of Biology, SUNY Fredonia, NY; wong2088@fredonia.edu

UV-B radiation may cause morphological, physiological, and genetic damage to living organisms and prolonged exposure to UV-B radiation results in photooxidative damage to DNA and proteins. Sessile organisms, such as plants, are unable to escape relentless UV-B exposure. However, plants can protect themselves from UV-B by the production of antioxidants. Plants also respond to UV-B irradiance by inhibiting hypocotyl elongation, and reducing leaf surface area. In this study, *Brassica rapa* is being subjected to varying degrees of UV-B radiation and treated with an antioxidant, α -tocopherol. Harmful reactive oxygen species, formed by UV-B radiation, may be stabilized by the α -tocopherol scavenger. The hypothesis is: *B. rapa* will recover more efficiently when treated with an external application of α -tocopherol. In the experiment, plants are grown in an environmental chamber consisting of 3 racks. Each rack contains two UV-B (280-315 nm) fluorescent lights and four photosynthetically active radiation (PAR, 400-700 nm) lights. Plant treatments are no UV, ambient UV-B, and high exposure UV-B. Plants either receive daily applications of α -tocopherol (in addition to water) or only water.

Measurements are being taken to determine chlorophyll content, stem height, leaf surface area, and total biomass. *B. rapa* may be susceptible to photooxidative damage which will result in an alteration of morphology or perhaps premature senescence. The external application of α -tocopherol on plants may promote repair mechanisms in the presence of UV-B radiation.

10. Atmospheric Mercury Deposition in the Great Lakes Region of Pennsylvania.

Peter Schuster¹, Alexis Rowley¹, Jason Bennett¹, Michael Naber¹, Elizabeth Boyer², Kevin Horner², and Matt Borden².

¹Pennsylvania State University, Behrend College, at Erie, PA

²Pennsylvania State University at University Park, PA

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, including one on Presque Isle. The results of this study will be presented with the aim of understanding the status of atmospheric deposition in the Great Lakes region in order to help researchers understand the effects of mercury pollution.

11. Genotoxic effects of flame retardants

Ali Al-Dhumani, Sajaad Al-Dhumani, Alexandra Mastro and Mary Vagula*, Biology Department, Gannon University, Erie, PA 16541

Polybrominated Diphenyl Ethers (PBDEs) are flame retardants widely used in many commercial products, including building materials, electronics, furnishings, motor vehicles, airplanes, plastics, polyurethane foams, and textiles. Although the specific toxic action of these chemicals is not clear, it is reported that they can cause serious damage to the nervous, reproductive, and endocrine systems. These chemicals are branded as "probable carcinogens" by Environmental Protection Agency (EPA). Therefore, this study is taken up to investigate the expression of genes namely, TP-53, RAD1, CRADD, and ATM, which are involved in apoptosis, DNA repair and cell cycle regulation. For this study human umbilical vein endothelial cells (HUVEC) are exposed to 5 μ M of BDE-85 (a penta-BDE) and BDE-209 (deca-BDE). The results of this report reveal significant alteration in all the genes under investigation in BDE-85 and BDE-209 exposed cells. The BDE-85 induced responses are significantly more than BDE-209. These results emphasize the congener specific action of PBDEs on the expression of genes relevant to DNA repair and cell division of HUVEC cells.

12. A Report on the Incidence Pattern of Some Ailments and Autoimmune Diseases among Young Adults from Erie, PA

Alexandra D. Mastro, Ali Al-Dhumani, Sajaad Al-Dhumani, Jessica L. Hartnett and Mary Vagula*, Department of Biology and Department of Psychology and Counseling, Gannon University

This report presents the incidence pattern of six conditions, namely, myopia, asthma, hyperopia, depression, acid reflux disease and eczema in young adults who are currently living in Erie, PA. The objective of this study is to track the incidence of these conditions among young adults and compare with state and nation's average values. Many conditions which were once very rare have become more prevalent, particularly some types of autoimmune diseases such as asthma, eczema, etc. The research method employed was a survey administered to 582 young adults hailing from 21 states and 3 international territories, whose responses to a 2-page questionnaire formed the raw data. A chi-square was performed using the Statistical Package for the Social Sciences (SPSS) to compare number of disease reported (0-6) by gender. 22 females and 5 males reported having two diseases while the expected count should have been 16.1 and 10.9, respectively ($X^2(5, N= 149) = 12.06, p=.034$). Finally, it is noted that 47% population had myopia, 14.6% asthma, 11.3% hyperopia, 8.6% depression, 6.7% acid reflux and 5.1% eczema. The results will be discussed in the light of national and PA state averages.

13. Fresh Face Forward: Infographic of the Toxic 15 Chemicals to Avoid in Personal Care Products

Javi Cubillos*, Alyssa Littin*, Leann Krysiak, Amanda Martin, Brittany Prischak, Elissa Reitz, Dr. Anne Zaphiris, Mercyhurst University

The organizational leadership/sustainability studies graduate program at Mercyhurst University has partnered with Pennsylvania Sea Grant to launch *Fresh Face Forward*, a yearlong social change campaign to raise awareness on campus about toxic chemicals that can be found in many cosmetics and personal care products (PCPs).

This poster features the toxic 15 chemicals to avoid that were selected based on their toxicity and prevalence in personal care products, according to various health and environmental organizations. In addition, this poster highlights the harmful effects of these chemicals on people and the environment.

Fresh Face Forward's goal is to improve the health of individuals on campus by inspiring them to either reduce the number of PCPs they use or replace their products with safer alternatives. A reduction in PCP use will also aid in decreasing the amount of chemicals that end up in our waterways.

14. Fresh Face Forward: Social Change Campaign Overview of Strategies and Tactics

Elissa Reitz*, Alyssa Littin*, Javi Cubillos, Leann Krysiak, Amanda Martin, Courtney Olevnik, Brittany Prischak, Dr. Anne Zaphiris, Mercyhurst University

The organizational leadership/sustainability studies graduate program at Mercyhurst University has partnered with Pennsylvania Sea Grant to launch *Fresh Face Forward*, a yearlong social

change campaign to raise awareness on campus about toxic chemicals that can be found in many personal care products (PCPs).

The *Fresh Face Forward* team aims to increase awareness of this issue among college students by 40 percent during the 2013-14 academic year through several initiatives. These initiatives include *No Make-up Mondays*, *Beauty Secrets* workshops and *Natural Beauty Club*. In addition, the team will host lectures and guest speakers, display educational posters and contribute a weekly column to the *Merciad*, campus newspaper, called "Beauty Talks." The team has also compiled a regional shopping guide, which helps consumers find products with less chemicals, and a recipe book of homemade beauty treatments.

With these efforts in place, *Fresh Face Forward* aims to improve the health of individuals on campus by inspiring them to either reduce the number of PCPs they use or swap out their products with safer alternatives. Reducing the amount chemicals a person puts on their body will reduce the amount of chemicals that end up in our waterways.

15. Water Quality Analysis of Formile and Eightmile Creeks; Erie, PA

Heather Jenkins*, and Kathryn Sauka: Penn State Erie: The Behrend College
The objective of this ongoing research project is to collect baseline data for the total dissolved solids, salinity, conductivity, pH, temperature, velocity, depth, discharge, and organic compounds found in Formile Creek and Eightmile Creek. Formile Creek is located in a more developed, urban setting than Eightmile Creek, which runs through a rural area. The main focus will be on the amount of total dissolved solids and organic compounds in the water. Each of these factors could be affected by road or farm runoff, especially in times of heavy precipitation. By collecting baseline data, conclusions and generalizations can be made about the quality of the creeks and some possible pollution sources. Data collected in the fall of 2012 will be compared with data collected in the fall of 2013 to see how the creeks have changed over the course of a year or if they have remained stable. Last year, the average total dissolved solids at Formile Creek was 383 ppm and 280 ppm at Eightmile Creek. This fall, the averages are 385 ppm at Formile and 323 ppm at Eightmile Creek. Last fall, six different organic compounds were discovered in Formile Creek, and five different organic compounds were discovered in Eightmile Creek. Because this project is ongoing, we are expecting to find more organic compounds in addition to the compounds found last fall.

16. Study of Effects of Radio-Wave Frequency Radiation Emitted from Cellular Telephones on Embryonic Development of *Danio rerio*

Ryan Harkless (presenting) and Dr. Mary Vagula, both Gannon University Biology Department.

Radio wave frequency (RF) radiation emitted from cellular telephones has become increasingly ubiquitous as a result of the popularity of these phones. With the increasing and unavoidable exposure to RF radiation a reality, it is imperative that the effects of such radiation on living tissue be well understood. In particular, it is critical to understand any effects that RF radiation may have as a carcinogen and on embryonic development, as pregnant women are not exempt from such exposure. As a model organism, zebra fish (*Danio rerio*) have been studied

extensively, and their value in studies of gene expression cannot be overstated. This study continues observe the effects of RF radiation on the embryonic development of zebra fish. The expression of two genes that are key to the early development of the fish are being examined, and both genes have homologs in humans as well as in other model organisms. The goal of this study is twofold: firstly, to provide data on the effects of RF radiation on zebra fish development, very little of which exists; and secondly, to elucidate the effects of RF radiation on zebra fish genes which have homologs in humans and other model organisms.

17. Diet Induced Obesity Alters Skeletal Muscle Fiber Types of Male But Not Female Mice

Maxwell DeNies*, Jordan Johnson*, Michael Bruno, Annabelle Kim, Maria Green, and Scott Medler

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Skeletal muscles are highly plastic tissues that are dramatically remodeled in response to use, disuse, disease, and other factors. Growing evidence suggests that adipose tissues exert significant effects on basic fiber type composition. We investigated the long-term effects of a high fat diet and subsequent obesity on C57 BLK mouse muscle fiber types. Litters of mice were randomly assigned to either a high fat diet or a control group at the time of weaning, and were maintained on this diet for 6 months to 1 year. Single fibers were harvested from soleus and plantaris muscles, and fiber types were determined using SDS-PAGE. The high fat diet mice were significantly heavier than the control mice (39.17 +/- 2.7 g v. 56.87 +/- 3.4 g; $p < 0.0003$), however muscle masses were not significantly different. In male mice, the high fat diet was associated with a significantly lower proportion of male soleus type I fibers (40.42 v. 29.33; $p < 0.016$). Moreover, this proportion was inversely proportional to their relative fatness ($p < 0.003$; $r^2 = 0.65$). No association was observed in female mice. In male mice, the decline in type I fibers was correlated with an increase in type I/IIA hybrid fibers, suggesting a possible transformation to these hybrid fibers. Our results suggest that factor(s) secreted by the adipose tissues directly affect skeletal muscle phenotype in a dose-dependent fashion. Additionally, the reported trends indicate that type I fibers are most susceptible to these effects, and that these effects can be sex-specific.

18. Aptamer Development for Sucralose Detection using FLU-MAG SELEX

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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 a specific structure that allows for a characteristic function, often the binding of a small molecule. Biosensors based on aptamer sequences thus provide a unique platform for detection of small molecules, generating a response to analyte through a binding-specific conformational change. 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.

19. Overexpression and FPLC-purification of the DNA polymerase from *T. aquaticus*

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Systematic evolution of ligands by exponential enrichment (SELEX) is a methodology in biochemistry for identifying nucleic acid sequences capable of adopting a shape that binds a target molecule. The process involves several rounds of the polymerase chain reaction (PCR) to amplify DNA sequences followed by steps that ultimately separate and enrich the population of DNAs with sequences having a high affinity for the target molecule. Four main reagents required for any PCR reaction include: 1 – DNA template, 2 – DNA primers, 3 – dNTPs, and 4 – DNA polymerase. PCR optimization is frequently performed to identify experimental conditions that are optimal for the chosen template and primers. This can be a costly step of the experimental procedures, as commercially available DNA polymerases can range from a few hundred to thousands of dollars. In the proposed research project, we have undertaken the process of overexpressing and purifying the heat-stable DNA polymerase from *Thermus aquaticus*. A plasmid containing the gene for Taq DNA polymerase was transformed to BL21(DE3) *E. coli* cells. Cell cultures of these transformed cells can then be grown to saturation at 37°C and overexpression initiated with the addition of IPTG. The desired Taq polymerase will be purified from a portion of the cleared lysate using ion-exchange chromatography. PCR activity using a standard template and primers can then be evaluated using samples of purified and unpurified Taq polymerase with comparison to three commercial samples.

20. Penn State Behrend Energy Efficiency Measures

Paul Lukasik* and Ann Quinn, Penn State Erie, The Behrend College
Behrend is continuing to decrease our carbon footprint. This year the PSB Energy Management Team would like to monitor Dobbins Dining hall **October 14th- October 28th** to see how much energy can be conserved. By using last year’s meter readings, we will be able to see how this October compares to last October’s Energy and Water statistics. Our plan is to create advertisements that will describe how students can make a difference in eliminating waste and conserving energy/water. Additionally we would like to implement minor changes during this two week period to see if it would affect overall energy/water consumption. We will conduct a pre survey and then a post survey two weeks later to see if awareness of energy conservation increases as a result of our media campaign.

21. Rain Gardens as Storm water BMPs

Taylor Minkus* and Ann Quinn

Two Rain Gardens were planted on the Behrend campus this summer as part of a Growing greener grant. One garden is in the open while the other is between buildings. The gardens are also pollinator gardens and butterfly gardens. They are best management practices (BMPs) for storm water. Future research can be to assess water quality after a storm event from water that percolated through the rain garden.

22. The Decline of Pollinators

Stephanie Snyder* and Mark Lethaby

A pollinator is an animal that moves pollen from the male anthers of a flower to the female stigma of a flower to accomplish fertilization of the female gamete in the ovule of the flower by the male gamete from the pollen grain. Plants fall into pollination syndromes that reflect the type of pollinator being attracted, showing characteristics such as overall flower size, the depth and width of the corolla, the color, the scent, amount of nectar, composition of nectar, etc. that attract different pollinators. Bees are the most recognized pollinators, but hoverflies (Syrphidae), butterflies and moths (Lepidoptera), beetles (Coleoptera), and a variety of other insects also serve as pollinators. Even some vertebrates, such as hummingbirds, serve as pollinators. Pollinators play a key role in ecosystems, but are in decline.

23. Forest Structure in Chautauqua County Swamps -- the Collection of per-Emerald Ash Borer Invasion Data

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Trees in 12 900m² plots at four wetland sites (Elm Flats, Bonita Swamp, Frog Valley and Bentley) were identified and have had their diameter measured annually since 2009. Three 25m² quadrats are sampled in each plot for understory species cover. At Elm Flats trees exhibited a hump-shaped basal area distribution with a high proportion of shade tolerant trees in the larger size classes. This is indicative of a forest that has been subjected to limited anthropomorphic disturbance and possibly retains some old growth characteristics. Trees at the other three sites exhibited characteristics indicative of a successional forest. Overall, trees are increasing in diameter at an average rate of 0.8cm per year. This tree census data, in conjunction with understory species cover data, will be used to assess the impact of the emerald ash borer on our swamp forests.

24. The soil bacterium, *Lysinibacillus xylanilyticus*, increases the proportion of hermaphrodites and improves germination rates in the fern *Ceratopteris richardii*

Haley Hallowell, Mike Ganger, and Sarah Ewing, Department of Biology, Gannon University

Gender determination in *Ceratopteris richardii*, a homosporous fern, is strongly influenced by a pheromone, antheridiogen, secreted by hermaphrodites. Antheridiogen biases individuals to develop as males, while its absence leads to hermaphrodite development. Our unpublished research shows that *C. richardii* grown in the presence of the K12 strain of *Escherichia coli* are

more likely to develop into hermaphrodites, despite the presence of antheridiogen. Soil bacteria were isolated from fern roots, and one of these, *Lysinibacillus xylanilyticus*, was selected to characterize the broader impact of these findings. A protocol was developed to introduce live *L. xylanilyticus* into fern agar plates. *L. xylanilyticus* was incubated for 48 hours at 35 degrees Celsius in tryptic soy broth. This highly concentrated bacterial culture was serially diluted to establish fern agar plates containing three concentrations of *L. xylanilyticus*, 1×10^{-6} , 1×10^{-7} and 1×10^{-8} . Approximately 300 spores were sown onto the bacteria-containing plates or onto a control plate without bacteria. After three weeks, *C. richardii* individuals were characterized as male, hermaphrodite, ungerminated or newly germinated. Growth and development of *C. richardii* spores in all three concentrations of *L. xylanilyticus* resulted in a higher percentage of hermaphrodites compared to spores in control plates. Additionally, spores grown on agar containing *L. xylanilyticus* germinated at a higher rate than on control plates.

25. Comparison Between 2012 and 2013 Summer Herbicide Applications on Presque Isle

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The Presque Isle peninsula is a unique land structure that is home to a multitude of rare and native plants. Unfortunately, due to the wave patterns of Lake Erie as well as human intervention, the peninsula is continuously exposed to new plant species that will oftentimes outcompete the native species for resources. This results in a changing ecosystem that will ultimately affect all plant and animal life on the peninsula. The summers of 2012 and 2013 served as time periods for heavy herbicide applications to combat encroaching invasive plants. "Acres treated" is the application rate at which herbicides are applied found by dividing the total gallons applied at each site by the proper application rate. By finding gallons/acres treated for each year, 2012 is found to have applied herbicide at a rate of 46.04 gallons/acre as opposed to 30.61 gallons/acre in 2013. Due to this large decrease in gallons/acre in just one year, the prediction can be made that the gallons/acre will continue to decrease in the following years. Not only has the application rate decreased, but retreatment sites only encompassed 38% of all treatment sites in 2013 while the remaining 68% of sites were new treatment areas. This implies that a large amount of sites from 2012 did not need to be revisited because the applications were successful. The declining use of herbicides/acre on the Presque Isle peninsula as well as in increased number of new treatment sites shows that success in decimating the invasive species populations is increasing, allowing for the reemergence of rare and native plants.

26. Historical vs. Present Populations of Listed Darters in French Creek

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Garcia, Kristy; Glen, Jennifer; Hickox, Emilie; Hill, Mason; Pierce, Meghan; Rudge,
Leah; Snively, Katie; Vasquez, Kirby; Worthington, Gary; Zavala, Sharon; Allegheny
College

French Creek is the most biologically diverse stream in Pennsylvania and is home to a number of threatened and endangered organisms, including five species of darter. Darters are the smallest member of the Perch family and are among the most abundant fishes found in French Creek. Due

to their sensitivity to poor water conditions, darters are critical indicators of biotic integrity. The purpose of this study was to compare the presence of five listed species of darter at four sites along French Creek with historic collections by Penn State University. Sites were chosen based on known historic locations shared by several threatened and endangered species of darter. Through a 100 meter section of stream, fishes were collected using a seine, identified and immediately released and abiotic factors such as turbidity, water temperature, surrounding land use and vegetation, cloud cover, weather, water velocity, substrate, and water depth were collected. Maps were created using GIS on land use changes since the 1960s around each site. Results show *Percina evides* and *Ammocrypta pellucida* were not found at any historic sites, while *Etheostoma camurum*, *Percina maculata* and *Etheostoma tippecanoe* were found in at least one historic location. If species of darters are not found in their historic habitats, other species may follow suit in a cascade effect of the food web, thus altering French Creek's biological diversity and stream health. This may also have implications for gauging water quality and present land use factors.

27. Early growth of the round goby (*Neogobius melanostomus*) in Presque Isle Bay

Zachary Taylor*, Kelly Grant, and Greg Andraso, Gannon University, Department of Biology

We conducted a small-scale fish community assessment of Marina Lake, a 40 ha embayment of Presque Isle Bay, during the summer of 2013 in an effort to better understand species associations of the round goby (*Neogobius melanostomus*). Sampling was conducted weekly from 14 May to 20 August using a 9 m beach seine with 6 mm mesh. Except for one date (23 May), round gobies were present throughout the sample period. On 27 June, 92 round gobies were collected, 44 of which were 12-27 mm total length (TL). That cohort of small fish, which was not apparent during the preceding month, was assumed to be young of the year (yoy) individuals. Continued weekly sampling through 26 July revealed the apparent yoy cohort with a length structure discrete from other round gobies that were collected. A regression analysis on 244 apparent yoy collected between 21 June and 26 July revealed a strong relationship ($F_{1,242} = 928.6$, $p < 0.000001$) between TL and collection day in which individuals grew an average of 0.8 mm per day over the 36 day period. We are not familiar with any studies that have estimated growth rates of round gobies in the field at such an early age. We are currently attempting to verify the age, in days, of suspected yoy individuals by counting daily growth rings on the utricular otoliths (lapilli).

28. Age and growth of the round goby (*Neogobius melanostomus*) from Lake Erie and a small invaded pond

Rebecah Ford*, Ashley Wimer, Mike Ganger, and Greg Andraso, Gannon University, Department of Biology

The ability of the round goby (*Neogobius melanostomus*) to invade North American waters has received considerable attention. The primary objective of this study was to compare age and growth of round gobies from Presque Isle Bay and a nearby invaded pond (Fairview Gravel Pit). Recent work in our lab has shown that dreissenid mussels comprise nearly 100% of food items consumed by round gobies at the Presque Isle site, whereas crustaceans and insects dominate their diet at the Gravel Pit site. Although food habits of round gobies from the two sites differ,

there appeared to be no differences between the two sites in terms of weight per unit body length. Age was determined through otolith analyses of ground lapilli. No individuals older than 2+ years were collected from either site, and size distributions of 0+, 1+, and 2+ individuals revealed no clear differences in growth rates between the two sites. Back calculation of length based on otolith size revealed that 1+ gobies from both sites grew an average of approximately 35 mm in their first year and that growth in their first year did not predict length at capture in their second year. Together, these results show that round gobies from the Gravel Pit site compare favorably to those from the Presque Isle site and suggest that the species may effectively colonize habitats in which its preferred prey of dreissenid mussels is not available.

29. Detection of Invasive Species in the Feces of Predatory Fish

Ellen Butts*, Emily Davis, Brian Fuller*, Greg Andraso, and Kelly Grant, Gannon University, Department of Biology

The ecology of Lake Erie is disrupted by non-native species, such as the tubenose goby (*Proterorhinus semilunaris*), recently discovered in Presque Isle Bay. Its impacts on the food web are relatively unstudied; we are interested in discovering what fish prey upon the tubenose goby; to extend the utility of our study, we included another invasive species, the round goby (*Neogobius melanostomus*), even though predation on it is better studied. Our goal is to specifically detect the DNA of these invasive species in the feces of predatory fish. This approach offers advantages compared to traditional gut content analysis; it allows us to examine many more samples without sacrificing the fish.

In order for this assay to be successful, we must be able to specifically identify DNA from tubenose and round gobies. During the initial phase of this project, we optimized primers to specifically amplify segments of cytochrome oxidase I (COI) from tubenose and round gobies. We tested the specificity of our primers against a panel of DNA purified from different fish species. Currently, we are testing the effectiveness of our primers when used with DNA extracted from fecal samples. These results will allow us to determine whether the predator recently consumed either tubenose goby or round goby.

30. A Genetic Assay to Identify Bluegill and Pumpkinseed Sunfish

Nikki McGaughey*, Greg Andraso, and Kelly Grant, Gannon University, Department of Biology

Our goal was to develop a rapid genetic test to distinguish between two species of sunfish, bluegills (*Lepomis macrochirus*) and pumpkinseeds (*Lepomis gibbosus*). As adults, physical characteristics make it easy to discriminate between the two species; however, with juveniles this is nearly impossible. This is part of a larger study on species-specific differences between the bones and teeth of the pharyngeal apparatus, modified gill arches that function as a second set of jaws to process prey. One key to the overarching project is that we need to accurately identify the young of each species to be able to study the differences in the pharyngeal apparatus, so we developed a genetic assay.

We use polymerase chain reaction (PCR) to amplify regions of specific genes. By evaluating the length of the DNA that is amplified we can identify the species of fish. Initially, we optimized primers that amplify the mitochondrial gene Cytochrome Oxidase I (COI) from either the

bluegill or the pumpkinseed, but not both. This allows us to identify the maternal lineage of a fish. To be sure that we can identify both parental lineages, we also developed a genetic test that relies on genomic DNA, specifically, the rhodopsin gene. We rely on a restriction fragment length polymorphism (RFLP) between the bluegill and pumpkinseed genes. We have used these assays to identify young fish and to measure their pharyngeal bones and teeth.

31. Genetic Analysis of Brook Trout from Isolated Populations in the Western Branch of the Susquehanna Watershed

Dr. Brenner, Dr. Barton, Garrett Herald, Lauren McGarvey, and Lydia Rittenhouse,
Grove City College

The brook trout (*Salvelinus fontinalis*) is the only trout species native to the streams of Pennsylvania. Abandoned mine drainage (AMD) has been discharged into streams throughout the West Branch of Susquehanna for at least a 100 years that has resulted in the isolation of brook trout populations due to these acidic discharges that prohibited fish movement within these streams. As a result of this limited movement brook trout population became isolated resulting a lack of gene flow among these populations. In order to determine the extent of genetic diversity in these isolated populations, fin samples were collected from brook trout populations in headwater streams receiving AMD throughout the West branch of the Susquehanna watershed. Nucleic DNA was then isolated from these samples and primers were designed to amplify microsatellites in the DNA sequence. Using gene scans, the amount of heterozygosity and homozygosity was determined for each fish within each population. The amount of homozygosity within each the population would indicate that there was limited or no migration of trout within the stream system and the extent of isolation of these population. The amount of genetic diversity may also reflect the length of time that these populations were isolated and or the amount of genetic diversity within these populations prior to their isolation. If it is confirmed that there is a lack of genetic diversity in these populations then plans may be developed to mitigate the AMD discharges and restore the stream system. This is a joint study between Trout and Unlimited and Grove City College.

32. The Diet of Dekay's Brownsnake, *Storeria dekayi* at a Site in Erie County, Pennsylvania

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The diet of Dekay's Brownsnake, *Storeria dekayi* was studied by examining 84 fecal samples from 74 snakes. Remains of slugs (i. e., shells, jaws, and radulae) were present in 47 (56%) of the samples; while earthworm setae were found in 6 (7%) of the samples. Seven (8%) samples contained both slug and earthworm remains. Fourteen samples lacked any identifiable slug or earthworm remains. Proportions of prey were similar between sexes and between age classes. Incidental non-prey items included mites, millipedes, an insect, snail shell fragments, glass, and gastropod eggs. Parasitic nematodes were observed in four samples.

33. Determining the bacterial diversity on the surface of Purple Martin eggs

Kaitlin Pander*,¹ Sean Weaver*,¹ Dan Hoang,¹ Mary Sperry,¹ Robert Aeppli,² and Beth Potter¹

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During ovipositioning, avian eggshells become susceptible to bacterial and fungal growth and studies have shown that a community of these microorganisms, or microflora, is maintained on eggshells throughout the incubation process. To determine the possible role of these microorganisms on embryonic development, it is first important to understand the composition of the microbial community present on the surface of the egg. A limited amount of studies have been published in this area, all of which suggest that the relationship between natural incubation behavior and the microflora of avian eggs does not conform to a single representative trend. Having already studied the microflora of House Wren and American Kestrel eggs, the objective of this study was to broaden this area of study by including research on another local and temperate species, the Purple Martin. This species was an alluring choice because Purple Martins exhibit colonial nesting, which could allow for a more variable microflora. Bacterial swabs are currently being processed; this analysis includes inoculating nutrient agar plates. Growth on plates are counted and classified based on colony morphology. The DNA from each unique colony is isolated and the 16S rRNA gene is amplified using polymerase chain reaction (PCR) techniques. The PCR products are then sequenced at the Genomic Core Facility at Penn State University Park and finally identified via comparison against BLAST and EzTaxon databases. Overall, the results can help discern the complexity of the relationship between incubation behavior and the microflora of avian eggs.

34. Exploration of incubation temperature and behaviors that can regulate bacterial growth on Purple Martin eggs

Dan Hoang*,¹ Mary Sperry*, Kaitlin Pander,¹ Robert Aeppli,² and Beth Potter.¹ School of Science, Penn State Erie, The Behrend College¹; Purple Martin Conservation Association²

On the surface of avian eggshells there exist communities of microorganisms that are believed to be maintained to protect against pathogens. A previous study examining the microbes found on House Wren eggs suggested that the composition is regulated by incubation behavior and egg temperature. Given the limited studies on avian egg microflora and egg temperature during incubation, the purpose of this study was to extend our research using another local species, the Purple Martin. These birds depend on humans for housing and multiple types can be employed (pine, plastic, metal, cedar, foam and nature-lined or plastic gourds) and were monitored in this study. Data loggers were mounted within the nest and within decoy eggs, and collected every thirty seconds throughout incubation and the nesting stage. The average daily egg and nest temperature were calculated and these values were used to determine the incubation behavior of the parents. This analysis will provide a more detailed understanding of the microflora regulations that controls growth on eggshells.

35. Identifying Important Habitat Features for Bat Conservation Using Acoustical Sampling and GIS

Jonathan Townsend. Biology Dept., SUNY-Fredonia, Fredonia, NY

Bat species worldwide have been under extreme pressure for decades due to habitat loss through fragmentation, pollution, and disease. Recently that pressure was exacerbated by the introduction of White Nose Syndrome, a fungal infection from the species, *Geomyces destructans*. In New York State, entire colonies of hibernating bats have been lost, and nationwide more than 6 million bats have died. In order to monitor species that hibernate in NYS cave systems as well as migrating species of bats the NYSDEC began a yearly bat survey in 2007. Based on the DEC's survey protocol we conducted bat surveys during the summer of 2013, with the goal of ascertaining the differing levels of habitat usage by bat species in Chautauqua County. It has been well documented that forested areas are vital for roosting bats, but the role of a forest, as well as other habitat types, in foraging and other behaviors needs further study. By conducting vehicular bat surveys a total of 1,275 bats were recorded, representing all nine species of bat present in New York State. Geo-spatial analysis will be conducted using ArcMap's Geographic Information System.

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

Hess, Jenny*, Alexander Dave*, and Dr. Steve Ropski Biology Department, Gannon University, Erie Pennsylvania

The principal objective of this research was to obtain a diverse sample of the mammal population using the habitats created in the parking lot of the Tom Ridge Environmental Center. There are ten islands throughout the parking lot containing native plant species. Sixty-five small and large Sherman box traps were evenly distributed throughout the ten islands and baited using peanut butter and oatmeal. The traps were checked and re-baited every morning. Animals were marked using non-toxic paint and then released. This process spanned the time period of three weeks from August 22nd to September 12th. The majority of animals found were mostly male *Peromyscus leucopus* (white footed mice). This project is the beginning of an ongoing study that will collect data from the winter, spring, and summer for comparison. This research will provide valuable information regarding whether these habitat islands can successfully be used as natural mammal habitats.