SCHEDULE OF TALKS

Regional Science Consortium
10th Annual Research Symposium
November 5-7, 2014
Tom Ridge Environmental Center
At Presque Isle State Park

WEDNESDAY, NOVEMBER 5, 2014

9:00 – 12:00 **REGISTRATION OPENS**
Register, Upload presentations, Setup Exhibitor Table

11:40 – 1:00 **LUNCH – *THE SUNSET CAFÉ***

Presentations

Session Chair: Fred Brenner, RSC President

1:00 – 1:20 **Guest Speaker**
Harry Leslie, PA DCNR Park Operations Manager, Presque Isle State Park

1:20 – 1:40 **Guest Speaker**
Jerry Covert, Past RSC Executive Director

1:40 – 2:00 **Estimates of early growth of round goby (*Neogobius melanostomus*) using size frequency distributions and otolith analysis**
Zachary Taylor*, Kelly Grant, and Greg Andraso, Gannon University, Department of Biology
(*Student Presentation*)

2:00 – 2:20 **The Pennsylvania Amphibian and Reptile Survey (PARS)**
Mark Lethaby, The Natural History Museum at the Tom Ridge Environmental Center

2:20 – 2:40 **A Census of the Bat Population of Gannon University, Erie, PA**
Sarah Calve*, Nikki McGaughey* and Dr. Steve Ropski, Biology Department, Gannon University, Erie, PA. 16541
(*Student Presentation*)

2:40 – 3:00 **BREAK**
Sponsored by Gannon University (www.Gannon.edu)

Session Chair: Holly Best, RSC Executive Committee

3:00 – 3:20	**Effects of Polybrominated Diphenyl Ethers on the Cell Cycle Regulating Genes of Human Umbilical Vein Endothelial Cells** Connor Pletz* and Mary Vagula, Gannon University (*Student Presentation*)
3:20 – 3:40	**Microplastics in Lake Erie and Presque Isle Bay** Amy Diegelman-Parente*, Mercyhurst University Sherri A. Mason, State University of New York – Fredonia
3:40 – 4:00	**Fresh Face Forward Campaign: Update on Campaign Effectiveness and Change in Consumers' Personal Care Products Use, Knowledge and Attitudes** Anne Zaphiris, Mercyhurst University
4:00 – 6:00	**BREAK**
4:30 – 6:00	**RSC Board Meeting (*Board Members*)**
6:00 – 8:00	**POSTER SESSION** All are welcome to attend – *Refreshment Provided*

THURSDAY, NOVEMBER 6, 2014

8:00 – 9:00	**REGISTRATION OPENS** Register, Upload presentations

Presentations

Session Chair: Fred Brenner, RSC President

9:00 – 9:20	**Guest Speaker** Lori Boughton, PA DEP, RSC Executive Board Member
9:20 – 9:40	**Guest Speaker** Eric Obert, PA Sea Grant, RSC Past President
9:40 – 10:00	**The soil bacteria *Lysinibacillus xylanilyticus* affects the sex-determination mechanism of the homosporous fern *Ceratopteris richardii*** Haley Hallowell*, Nicole McAllister*, Mike Ganger, and Sarah Ewing, Gannon University (*Student Presentation*)

10:00 – 10:20 **Metagenomic Analysis of Spring and Stream Water in the Chesapeake and Ohio Canal National Historical Park**

Asad U. Khan[1]*, Hui Yu[1], Dorothy Vesper[2], and Benoit Van Aken[1]
[1] Department of Civil and Environmental Engineering, Temple University, Philadelphia, PA 19122
[2] Department of Geology and Geography, West Virginia University, Morgantown, WV 26506
(*Student Presentation*)

10:20 – 10:40 **BREAK**
Sponsored By Fondriest Environmental (http://www.fondriest.com/)

Session Chair: Jerry Covert, Past RSC Executive Director

10:40 – 11:00 **Determining the bacterial diversity on the surface of Purple Martin eggs**

Mike Knoll[1]*, Sean Weaver[1]*, Aimee Day[1], Kelly Hedderick[1], Eric Brown[1,2], Robert Aeppli[2], and Beth Potter[1]
[1]School of Science, Penn State Erie, The Behrend College, Erie, PA
[2]Purple Martin Conservation Association, Tom Ridge Environmental Center, Erie, PA
(*Student Presentation*)

11:00 – 11:20 **How does the use of Agion Silver Technology change the bacterial flora found on door handles?**

Hasan Khan*, Brenton Maloy*, Nicole Kingston, Nesve Ozsoy, Paul Ruiz-Pelet, Laura Wheeler and Beth Potter
School of Science, Penn State Erie, The Behrend College, Erie, PA
(*Student Presentation*)

11:20 – 11:40 **Characterization of Microbial Films in Canadaway Creek**

Miles DeAngelis* and Dr. Ted Lee, State University of New York – Fredonia
(*Student Presentation*)

11:40 – 12:00 **Monitoring Macroinvertebrate and Fish Populations in Marshall's Creek Through Construction**

Jacqueline Matzke, Penn State University
(*Student Presentation*)

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

Session Chair: Bob Whyte, RSC Treasurer

1:00 – 1:05	**Speed Talk – Tonotopic organization of auditory brainstem centers in an animal model of autism** Amber Dubiel* and Randy Kulesza, Lake Erie of College of Osteopathic Medicine
1:05 – 1:10	**Speed Talk - The effects of management on terrestrial salamander habitats in Crawford County PA** Leah Rudge, Allegheny College
1:10 – 1:15	**Speed Talk – Future Mating Expectations of Male Praying Mantis** Tyler Christensen*, Chris Wemmer, William Brown Department of Biology, State University of New York at Fredonia, Fredonia, NY
1:15 – 1:20	**Speed Talk - Microbial Ecology of the Rhizosphere surrounding *Phragmites australis*** Dylan Cohert, California University of Pennsylvania (*Student Presentation*)
1:20 – 1:40	**Diet Comparison between Two Species of Sympatric Darters in the French Creek Watershed** Katie Burgert, Allegheny College (*Student Presentation*)
1:40 – 2:00	**Population Genetic Structure and primer development of Round Goby *Neogobius melanostomus* in Lake Erie, Presque Isle Bay, and three Erie County tributaries** Caleb Abramson, Penn State University (*Student Presentation*)
2:00 – 2:20	**PA CRM Lake Erie Resource Mapping** Matthew Waldron, Pennsylvania DEP, Coastal Resources Program
2:20 – 3:00	**BREAK** ***Sponsored by Baseline a Mocon Company* (www.Baseline-Mocon.com)**

Session Chair: Jon Titus, RSC Board Member

3:00 – 3:20 ***Branta canadensis* phylogeography explained by genetic variation examined in mitochondrial DNA populations in Pennsylvania**

Tanner Grudda*, Miles Tonkavich, Gary Wilt, Casey Trexler, Jordan Senchak, Kate Sewell, Zachary Eschweiler and Fred J. Brenner
Grove City College, Grove City, Pennsylvania
(*Student Presentation*)

3:20 – 3:40 **Potential for the Restoration of Herbicide-treated Phragmites stands in Presque Isle State Park, Erie PA**

Dylan Cohen* and Robert Whyte, California University of Pennsylvania
(*Student Presentation*)

3:40 – 4:00 **Development of a Real-time PCR Method for the Early Detection of Aquatic Invasive Species in Pennsylvania Watersheds**

Benoit Van Aken[1]*, Sasha Eisenman[2], Asad Khan[1]
[1]Civil and Environmental Engineering, Temple University, Philadelphia, PA 19122
[2]Landscape Architecture and Horticulture, Temple University, Ambler, PA 19002

4:00 – 4:20 **"Evo-Devo" of the Pharyngeal Apparatus of Bluegill and Pumpkinseed Sunfish**

Greg Andraso, Eve Andresky, Shernelle James, Nikhil Kanthala, and Kelly Grant*
Department of Biology, Gannon University

4:20 – 4:40 **How parasites found in Yellow Perch can be linked to Lake Erie's Fishing Industry**

Emily Hesch, Allegheny College
(*Student Presentation*)

4:40 – 5:00 **DNA fingerprinting of White Tailed Deer**

Adele Bish*, Miles Tonkavich, Fred J. Brenner, Heather D. Barton
Biology Department, Grove City College, Grove City, Pennsylvania, 16127
(*Student Presentation*)

5:00 – 6:00 **BREAK**

6:00 – 9:00 **DINNER RECEPTION**

Food by the Sunset Café, drinks, silent auction, and entertainment
Need a ticket? It's not too late! Please see the Registration Table

8:00 – 9:00 **REGISTRATION OPENS**
Register, Upload presentations

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

9:00 – 9:20 **Guest Speaker**
Fred Brenner, RSC President

9:20 – 9:40 **Guest Speaker**
Jeanette Schnars, RSC Executive Director

9:40 – 10:00 **Relationships among Cyanobacteria and sediment and nutrient load in Presque Isle Bay**
Jeanette Girosky, Penn State University, The Behrend College
(*Student Presentation*)

10:00 – 10:20 **Microcystin toxin produced by Cyanobacteria is pervasive in Lake Erie water**
Natalie Spaeder* and Steve Mauro, Gannon University
(*Student Presentation*)

10:20 – 10:40 **BREAK**
Sponsored by Gannon University (www.Gannon.edu)

Session Chair: Bob Whyte, RSC Treasurer

10:40 – 11:00 **Providing the beach-going public with the best water-quality information available**
Tammy M. Zimmerman, Supervisory Hydrologist, U.S. Geological Survey

11:00 – 11:20 **Comparison of Membrane Filtration Bacteria Analysis to Oxygen Uptake Rate Analysis, A Study of the Applicability of Rapid Analyses of Active Bacteria by Oxygen Metabolism for Beach Swimming Safety**
Edward F. Askew PhD, Askew Scientific Consulting LLC
Support Provided By: Baseline Inc. A Mocon Company

11:20 – 11:40 **A Segmentation Analysis of Presque Isle State Park's Water Based Recreation Users**
Michael D. Ferguson*, Andrew Mowen, and Alan Graefe
The Pennsylvania State University
(*Student Presentation*)

11:40 – 12:00 **The Potential for Submerged Prehistoric Sites Beneath Pennsylvania's Lake Erie Waters**

Mark Durante, Indiana University of Pennsylvania
(*Student Presentation*)

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

Session Chair: Tammy Zimmerman, RSC Board Member

1:00 – 1:20 **Evidence of resonance in fish swimming from the tail beat kinematics of swimming striped bass (*Morone saxatilis*)**

C.S. Garborg[1]*, P.J.M. Thornycroft[3], G.V. Lauder[3], and E. J. Anderson[1,2]
[1]Grove City College, Grove City, PA; [2]Woods Hole Oceanographic Institution, Woods Hole, MA; [3]Harvard University, Cambridge, MA
(*Student Presentation*)

1:20 – 1:40 **Vertical swimming behavior of Eastern Oyster larvae (*Crassostrea virginica*) in a jet-stirred turbulence tank**

H.I. Lueers[1]*, A. Ritchie[1], J.D. Wheeler[2], K.R. Helfrich[2], L.S. Mullineaux[2], and E.J. Anderson[1,2]
[1]Grove City College, Grove City, PA; [2]Woods Hole Oceanographic Institution, Woods Hole, MA
(*Student Presentation*)

1:40 – 2:00 **Protecting Groundwater from Nitrate Pollution due to Septic Tank Discharge**

Rick Diz*, Doaa Almaliki, Elizabeth Rula
Department of Environmental Science and Engineering, Gannon University

2:00 – 2:20 **Living along the Lake Erie Shoreline: What you need to know…**

Donald Benczkowski, Pennsylvania DEP, Coastal Resources Program

2:20 – 3:00 **STUDENT AWARDS AND CLOSING REMARKS**

Jeanette Schnars, RSC Executive Director

ABSTRACTS

Regional Science Consortium
10th Annual Research Symposium
November 5-7, 2014
Tom Ridge Environmental Center
At Presque Isle State Park

ORAL PRESENTATIONS

Wednesday, November 5, 2014

Estimates of early growth of round goby (Neogobius melanostomus) using size frequency distributions and otolith analysis

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

The round goby (Neogobius melanostomus) is a Ponto-Caspian invader that has impacted Great Lakes ecosystems. Although numerous studies have investigated yearly growth rates of round gobies, little is known about growth of young-of-year (yoy) individuals. On 27 June, 2013, we seined 92 round gobies from Marina Lake (Presque Isle State Park), 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 yoy individuals. 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 0.78 mm per day over the 36 day period. We also investigated growth rates of apparent yoy round gobies by counting daily increments on polished otoliths. Otolith analysis confirmed that the cohort of small round gobies were yoy individuals and revealed a strong relationship between TL and age in days ($F_{1,9} = 58.3$, $p < 0.0001$) in which round gobies grew an average of 0.86 mm per day. Our two methods of estimating daily growth rates are therefore in agreement. We are unaware of previous studies that have quantified daily growth rates in yoy round gobies.

The Pennsylvania Amphibian and Reptile Survey (PARS)

Mark Lethaby, The Natural History Museum at the Tom Ridge Environmental Center

The Pennsylvania Amphibian and Reptile Survey (PARS) is an important state-sponsored atlas project launching in 2013. PARS will determine the distribution and status of all amphibians and reptiles throughout Pennsylvania, building upon previous atlas efforts and combining modern technology with an army of citizen scientists known as "herpers" (herpetology is the study of amphibians and reptiles, and herps is slang for amphibians and reptiles). The project is a joint venture between the PA Fish & Boat Commission (PFBC) and the Mid-Atlantic Center for Herpetology and Conservation (MACHAC), funded by the PFBC (via the US Fish & Wildlife Service's State Wildlife Grants Program), the PA Department of Conservation and Natural Resources (Wildlife Resources Conservation Program), and MACHAC. MACHAC is a nonprofit organization dedicated to the conservation and study of amphibians and reptiles

through advocacy, education, and execution of research by professional herpetologists and ecologists in the Mid-Atlantic and Northeastern United States. Major partners and funding sources for programs include the Pennsylvania Fish & Boat Commission, Pennsylvania Department of Conservation and Natural Resources, Natural Resources Conservation Service (US Department of Agriculture), United States Fish & Wildlife Service, and National Fish and Wildlife Foundation. Major MACHAC projects also include the study and recovery of state and federally-listed amphibians and reptiles, notably important initiatives centered on the Bog Turtle and Eastern Massasauga Rattlesnake.

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

Sarah Calve*, Nikki McGaughey* and Dr. Steve Ropski, Biology Department, Gannon University, Erie, PA. 16541

For the past five summers a census of the bat population has occurred on the Gannon University campus in Erie, PA. The numbers for the first three years have held relatively steady, while the data for the past 2 years indicates a dramatic decline. White Nose Syndrome was first reported in 2006 in a cave in New York. The disease has killed an estimated 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.

Effects of Polybrominated Diphenyl Ethers on the Cell Cycle Regulating Genes of Human Umbilical Vein Endothelial Cells

Connor Pletz* and Mary Vagula, Gannon University, 109 University Square, Erie, PA 16541

Polybrominated Diphenyl Ethers (PBDEs) are organobromine compounds widely used as flame-retardants. They are incorporated into a wide array of products including building materials, electronics, furnishings, motor vehicles, airplanes, plastics, and textiles. There are 209 congeners in this class of flame-retardants. Concern arises due to the fact that these PBDEs are mixed into the products rather than being chemically bound to them, allowing them to more easily leach out and enter into the environment. These toxic chemicals have even caught the eye of the Environmental Protection Agency (EPA) as they have added them to the Concern List as chemicals that present or may present unreasonable risk of injury to health or the environment. In this study BDE-85 and BDE-209 are used to test toxicity on healthy human umbilical vein endothelial cells (HUVEC). These are two important congeners selected for their toxicity and prevalence respectively. The genotoxic effects of these PBDEs will be analyzed specifically by assessing the expression of genes, focusing on TP-53, CRADD, ATM, RAD1, and ATR involved in apoptosis, DNA repair, and cell cycle regulation. The results of this report reveal alterations in the genes; CRADD, TP-53, and ATM in BDE-85 and BDE-209 exposed cells. Research investigation is underway for the expression of ATR and RAD1.

Key Words:

Polybrominated Diphenyl Ethers (PBDEs), Genotoxicity, Human Umbilical Vein Endothelial Cells (HUVEC)

Microplastics in Lake Erie and Presque Isle Bay

Diegelman-Parente*, Amy and Sherri A. Mason. Mercyhurst University, Mercyhurst, PA 16546; State University of New York – Fredonia

The discovery of microplastics in 2004 shed new light on the impact these post-consumer waste products can have on our aquatic ecosystems. Plastics can serve as a source of organic contaminants, either directly from the use of these materials in plastics manufacture, or through the adsorption and thus transport and uptake of hydrophobic organic pollutants and trace metal contaminants found in the watershed. While significant research has been done on the presence and persistence of microplastics in marine ecosystems, very little has been done in freshwater environments, and even less has been done to examine the effects these contaminants may have on the health of its inhabitants and the ecological integrity of their habitat. Previous hypotheses suggested that if microplastic pollution were present in freshwater bodies at all, it would contain particles larger than those found in marine environments. However, the waters of Lake Erie do contain significant levels of microplastics, which have the potential to have wide reaching implications across varying trophic levels. We have begun to examine the presence and potential effects of microplastics on various fish species from the Lake Erie and Presque Isle Bay regions using a variety of chemical and biochemical methods. Of particular interest is the examination of water samples from both the sediment as well as the water column, considering fish species that inhabit both environments.

Fresh Face Forward Campaign: Update on Campaign Effectiveness and Change in Consumers' Personal Care Products Use, Knowledge and Attitudes

Anne Zaphiris, Ph.D., Mercyhurst University, azaphiris@mercyhurst.edu

Fresh Face Forward is a communication campaign, created at Mercyhurst University and funded by Pennsylvania Sea Grant, to create public awareness of toxic ingredients found in personal care products and the effects of these chemicals on human health and the environment. During the 2013-2014 academic year, Fresh Face Forward campaigned on the Mercyhurst campus to increase awareness of the issue and to persuade individuals to change products to safer alternatives or to decrease the number of personal care products they use on a daily basis. Team members conducted qualitative and quantitative research to guide creative and strategic development of campaign messages and to evaluate the overall effectiveness of strategies and tactics used. Campaign impact was 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; interviews; and focus groups. Results of campaign evaluation have been used to refine messages as the campaign expands its reach to Penn State Erie in 2014-2015 and additional Sea Grant universities in 2015-2016.

The soil bacteria *Lysinibacillus xylanilyticus* affects the sex-determination mechanism of the homosporous *fern Ceratopteris richardii*

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

Sex determination in Ceratopteris richardii is strongly affected by a pheromone called antheridiogen. Antheridiogen is secreted by hermaphrodites and biases individuals to develop as males, while its absence leads to hermaphrodite development. Though the sex-determination system in C. richardii is well studied, such research occurs in sterile environments that lack the microbial complexity of soil. Soil bacteria are known to communicate and respond to plant roots through chemical signals leading us to ask whether soil bacteria could alter this sex-determination system. Soil bacteria were isolated from fern roots and identified using 16S rRNA sequences. One of these, identified as Lysinibacillus xylanilyticus, was selected for further study. C. richardii spores were sown onto agar plates with various concentrations of L. xylanilyticus. After three weeks, C. richardii gametophytes grown with L. xylanilyticus were characterized as male, hermaphrodite, ungerminated, or newly germinated. C. richardii gametophytes grown in the presence of L. xylanilyticus were more likely to develop as hermaphrodites. Additionally, many C. richardii gametophytes displayed aberrant morphologies in the presence of L. xylanilyticus.

Metagenomic Analysis of Spring and Stream Water in the Chesapeake and Ohio Canal National Historical Park

Asad U. Khan[1]*, Hui Yu[1], Dorothy Vesper[2], and Benoit Van Aken[1]
[1]Department of Civil and Environmental Engineering, Temple University, Philadelphia, PA 19122
[2]Department of Geology and Geography, West Virginia University, Morgantown, WV 26506

Metagenomic analysis based on high-throughput sequencing constitutes a powerful method for the characterization of microbial communities in the environment. The objective of this study was to establish relationships between the prokaryotic community profile and water quality parameters in springs and streams of the Chesapeake and Ohio Canal (CHOC) National Historical Park. Spring and stream samples were collected from selected sites along the CHOC and analyzed for a suite of physical and chemical water parameters, including pH, alkalinity, conductivity, metals, and nutrients. DNA was extracted from the samples, 16S rDNA was amplified by PCR, and sequencing was performed by 454 Roche pyrosequencing. Sequencing data, consisting in approx. 130,000 reads, were processed using the microbial ecology software, QIIME. A total of 37,940 distinct operational taxonomic units (OTUs) were assigned, suggesting a large diversity of the microbial communities. The dominant bacterial phyla in all sites were Proteobacteria (major classes, Alphaproteobacteria and Gammaproteobacteria), Bacteroidetes (major class, Bacteroidia), Actinobacteria (major class, Acidimicrobiia), and Planctomycetes (major class, Phycisphaerae). The dominant archaeal phylum was Thaumarchaeota (major class, Soil Crenarchaeotic Group). Bacterial diversity indexes (Shannon) ranged from 5.22 (Taylors

Landing stream) to 7.16 (mine pool water). The microbial profiles were tentatively related to a suite of water quality parameters by redundancy analysis (RDA) using the statistical software, CANOCO. The most significant environmental factors explaining the bacterial community structure in water were found to be the concentration of calcium and nutrients (nitrogen and phosphorous), suggesting that trophic factors were the major determinant of the prokaryotic microflora in these waters.

Determining the bacterial diversity on the surface of Purple Martin eggs

Mike Knoll[1]*, Sean Weaver[1]*, Aimee Day[1], Kelly Hedderick[1], Eric Brown[1,2], Robert Aeppli[2], and Beth Potter[1].

School of Science, Penn State Erie, The Behrend College, Erie, PA[1]; Purple Martin Conservation Association, Tom Ridge Environmental Center, Erie, PA[2]

During ovipositioning, avian eggshells become susceptible to bacterial and fungal growth and studies have shown that these microorganisms are maintained on the eggshells throughout incubation. To decipher the role of these microorganisms on embryonic development, it is important to understand the microbial composition present on the eggshell surface. The few studies that have been published in this area 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 research by studying the Purple Martin. Culture-dependent techniques were combined with sequencing of the 16S rRNA gene to identify bacteria in samples taken from Purple Martin eggs throughout incubation. The eggshell microflora of Purple Martins was dominated by bacteria of the Gamma-proteobacteria phylum within the Pseudomonas genus. In this respect, the microflora of Purple Martin eggs appears similar to that found on House Wrens and Pied-Flycatchers, but not similar to Violet-Green and Tree Swallows which are part of the same family.

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

Hasan Khan*, Brenton Maloy*, Nicole Kingston, Nesve Ozsoy, Paul Ruiz-Pelet, Laura Wheeler and Beth Potter, School of Science, Penn State Erie, The Behrend College, Erie, PA 16563

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

Characterization of Microbial Films in Canadaway Creek

Miles DeAngelis* and Dr. Ted Lee, State University of New York – Fredonia

Biofilms are naturally occurring bacterial growth formations. Canadaway Creek, located in Chautauqua County of Western New York, has dark reddish biofilms on the shoreline of the creek. The shoreline is composed of sandstone with a lower iron concentration and higher levels of manganese and barium than is typically observed. We are using a genetic approach to identify organisms in the biofilm to see if they are responsible for the unusual levels. The 16S ribosomal RNA genes were amplified using the polymerase chain reaction, using genomic DNA that was purified from the biofilm, and then inserted into plasmid vectors. Recombinant plasmids were transformed into Escherichia coli. 16S genes from selected plasmids were sequenced and analyzed to determine what organisms are present in the biofilm. Preliminary data has indicated the presence of many bacteria belonging to the proteobacteria phylum, specifically beta-proteobacteria.

Monitoring Macroinvertebrate and Fish Populations in Marshall's Creek Through Construction

Jacqueline Matzke, Penn State University

Construction in Marshalls Creek (Monroe County, PA) has been ongoing from 2004 and recently ended in 2014. Collections of macroinvertebrates began in 2001 to monitor the population fluctuations before construction could create an impact. Collections were made three times a year in different sections of Marshalls Creek. Locations were selected to either be a reference site or an experimental site. Sites located upstream of construction were considered reference sites that would model how the population would normally fluctuate. In 2004 the fish population was sampled at reference sites and experimental sites annually, until 2014. The three goals of this research are: to track stability and change in the upstream sites from 2001 to 2014; to track stability and changes in downstream sites from 2001 to 2014; and to determine if there were any changes in populations downstream of the construction that could not be explained by temporal changes recorded since 2001.

Speed Talk

Tonotopic organization of auditory brainstem centers in an animal model of autism

Amber Dubiel*, and Randy Kulesza, PhD, Lake Erie College of Osteopathic Medicine

Autism spectrum disorder is a neurological disorder characterized by developmental delays, social withdrawal, repetitive and often self-destructive behaviors, and difficulties with communication. There is also evidence that the vast majority of subjects with autism have some degree of auditory dysfunction. Our laboratory has recently discovered that the auditory brainstem exhibits significant hypoplasia and heterotopias in human subjects with autism. Valproic acid is an antiseizure medication and administration to pregnant females is associated with an increased risk of autism in their offspring. We have previously used prenatal VPA exposure to produce autism-like neuronal abnormalities in rats. We further that prenatal VPA exposure disrupts the functional organization of the auditory brainstem. We plan to examine the tonotopic arrangement (sound frequency receptiveness) of auditory brainstem nuclei in control and VPA-exposed rats. Experimental animals will be created by injecting pregnant dams with

VPA at embryonic days 12.5 or 15. Control animals will be exposed to the same volume of saline at the same time points. At postnatal day 28, animals will be exposed to either 4 kHz or 16 kHz pure tone stimuli for 1 hour and their brains processed for immunofluorescence using a primary antibody directed against c-fos, an early marked of gene expression. We will then quantify the number and distribution of c-fos labeled neurons between control and VPA-exposed animals.

Speed Talk

The effects of management on terrestrial salamander habitats in Crawford County PA

Leah Rudge, Allegheny College

Conservation is important, especially for amphibians whose populations have been globally declining for decades. Data collection on the current state of amphibian abundance in Crawford County is important, and can also shed light on how different management techniques affect local communities. Six sites in Crawford County PA were selected and deemed conservation areas or recreation areas depending on the primary use listed on each property's website. Two 50x5 meter transects, one along the forest edge and one 50 meters into the forest, were surveyed three times from September to October. Visual encounter surveys were performed to search for and identify salamanders. Other data collected includes number of cover objects flipped, soil moisture, soil temperature, percent canopy cover, and leaf litter depth. Data will be analyzed using ANOVA and Tukey statistical tests. It is expected that conservation areas will have higher average salamander abundance in both edge and deep habitats. Over all sites, it is expected that salamanders will be more abundant in deep forest habitats. Recommendations for restoration of habitats or reduction of the effects of fragmentation may be distributed to some sites.

Speed Talk

Future Mating Expectations of Male Praying Mantis

Tyler Christensen*, Chris Wemmer, William Brown, Department of Biology, State University of New York at Fredonia, Fredonia, NY

Female praying mantises are notorious for cannibalizing their sexual partners after copulation. This eliminates the possibility of future reproduction for the male. But if a male was to survive a mating event, what is the likelihood that he mates again? In this study, we aim to examine the mating opportunities and the future mating expectations of male mantises after their first mating experience. We have selected two field sites that are optimal habitat for local praying mantis species (Tenodera sinensis and Mantis religiosa). Our project will be conducted in two stages. The first will involve marking and recapture of mantises in the two study sites. This will provide us with an estimate of population size and dispersal distances. From that information we can determine the number of possible female encounters a male may have within a season. The second stage involves the collection of mantis egg-cases (oothecae) from the two field sites. We will then utilize DNA extraction, PCR methods, and analysis of microsatellites to determine the paternity of the eggs and see if any males have fertilized several oothecae. From the data we gather, we should be able to determine the possibility of males to mate multiple times within a season, thus giving an idea of whether or not there are high or low future mating expectations after the male's first mating encounter.

Examining the Microbial Ecology of the Rhizosphere surrounding Phragmites australis and determining the factors that affect the success of the Invasive plant

Dylan Cohen*, Dr. Sarah L. Meiss, Dr. Robert Whyte. California University of PA

Soil is one of the world's most valuable resources providing the terrestrial environment with nutrients, water and support for plant growth. The presence of fungal and bacterial (microbial) organisms drastically affect the health of soil and therefore plant success by playing roles in nutrient cycling, pathogen suppression, and bioremediation of pollution. To better understand the establishment and success of invasive plants, such as Phragmites australis, it is important to understand the ecosystem surrounding their roots and rhizosphere. This research aims to better understand the entire soil ecosystem surrounding and influencing the establishment of P. australis as well as examining the effects of the establishment of P. austrialis on the native soil ecosystem.

Diet Comparison between Two Species of Sympatric Darters in the French Creek Watershed

Katie Burgert, Allegheny College

Darters are small benthic fish common to the northeastern United States that feed almost entirely on aquatic macroinvertebrates. They primarily inhabit shallow riffle sections of streams, and several species of darters often inhabit the same area, increasing competition between darter species. The aim of this project was to determine whether a high level of interspecific competition in one stream could lead to diet shifts of two species of darter, Etheostoma zonale and E. blennioides, in comparison with a stream with fewer species and therefore less competition. Samples were collected over a two-year period during the summer 2013 and 2014 from two streams, French Creek and Woodcock Creek, in northwestern Pennsylvania. Stomach contents of these fish were compared with kicknet samples of macroinvertebrates in each stream, and Ivlev's Electivity Index was used to determine whether selectivity varied between streams. Chironomids, which made up most of the stomach contents of both species, were primarily selected in French Creek, which had higher number of darter species. Hydropsychids were avoided more in French Creek than in Woodcock Creek throughout the summer, possibly indicating food resource partitioning in French Creek. Results from the project suggest that interspecific competition in French Creek does affect the diets of E. zonale and E. blennioides in comparison to areas of lower competition.

Population Genetic Structure and primer development of Round Goby *Neogobius melanostomus* in Lake Erie, Presque Isle Bay, and three Erie County tributaries

Caleb Abramson, Penn State University

The Laurentian Great Lakes represent one of the World's most ecologically invaded freshwater systems (Jude et al. 1992; Corkum et al. 2004; Brown and Stepien 2009). The Round Goby, Neogobius melanostomus, a benthic fish native to the Ponto-Caspian region of the Black and Caspian seas, was first reported in Eastern Lake Erie in 1995 (Clapp et al 2001). The current North American distribution of Round Goby includes all five Great Lakes and many of their tributaries. While Round Goby have become more abundant in lake habitats, there has been an expansion of their populations into tributary streams and rivers (Krakowiak and Pennuto, 2008).

Identifying post-invasion dispersal of Round Goby has proven an important management tool for predicting range expansion capabilities (LaRue et. al, 2011). Population genetic studies and genotyping of Round Goby promotes a better understanding of evolutionary change and mechanisms of species adaptation (Salmenkova 2008). The development of genetic markers and primers for Round Goby collected from Erie County tributaries and lake habitats may display greater specificity for those localized populations versus primers developed from specimens collected from other regions. The development of molecular markers to add to the limited suite of existing primers may aid in determining source locations (founder effect) for Round Goby collected from locations such as French and LeBeouf Creeks.

PA CRM Lake Erie Resource Mapping

Matthew Waldron, Pennsylvania DEP, Coastal Resources Program

The Pennsylvania Coastal Resources Management Program (CRM) is now in its second season of 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 two seasons of data collection, including a discussion on the challenges faced in deploying technologies that are new to program staff.

***Branta canadensis* phylogeography explained by genetic variation examined in mitochondrial DNA populations in Pennsylvania**

Tanner Grudda*, Miles Tonkavich, Gary Wilt, Casey Trexler, Jordan Senchak, Kate Sewell, Zachary Eschweiler and Fred J. Brenner
Grove City College, Grove City, Pennsylvania

Mitochondrial DNA sequences of resident Canada geese (Branta canadensis) were compared to determine the maternal lineages of the eastern and western Pennsylvania resident populations. The object of the study was to determine if western populations originated from the Eastern populations, originated from the same migratory population, or if both populations independently emerged from different migratory populations. Mitochondrial DNA was isolated from Canada goose liver samples donated by hunters or US Department of Agriculture from across Pennsylvania. Primer set were confirmed for use in polymerase chain reaction (PCR) to amplify the DNA sequences and confirmed using 2% agarose gel electrophoresis and photographs using a UV light in a Bio-Rad imaging camera. Successful PCR products were purified using the AlQuick PCR purification kit and confirmed using a Nanodrop spectrophotometer. A di-deoxy terminator reaction using dye-labeled products were purified from the primers, monomers, and polymerases. Samples were vacuum concentrated to remove water and then re-dissolved. Samples were sequenced using an ABI Prism 310 Genetic Analyzer and a contig was developed for each sample. Sequenced samples were compared to the published Canada goose mitochondria genome (Snyder et al. 2013) and the eastern and western samples were compared for homogeneity. Overall homology between samples and the published Goose genome was between 83% and 98%. There was a 97% homology between Eastern and Western samples when

compared to the published genome but samples obtained from central populations had the greatest genetic variability when compared to the sequenced genome as well as between the Western and Eastern populations. These results suggest that two separate resident Canada geese populations evolved from separate migratory populations in western and eastern Pennsylvania and then merged in Central Pennsylvania resulting in the greater amount of genetic variability. These preliminary results are based on 16 samples, but additional mitochondria DNA samples will be sequenced to confirm the origin of these resident Canada geese populations.

Potential for the Restoration of Herbicide-treated Phragmites stands in Presque Isle State Park, Erie PA

Dylan Cohen* and Robert Whyte

Presque Isle State Park (Erie, PA) contains perhaps some of the the greatest biodiversity and unique plant communities in the state of Pennsylvania. The numerous wetland communities are threatened by non-native and invasive plant species such as Phragmites australis (Common reed), Typha angustifolia (narrow-leaved cattail), and Lythrum salicaria (purple loosestrife). Large-scale control efforts began in 2011 and continued through 2014. Monitoring efforts designed to assess the effectiveness of the management program and the potential for restoration of these wetland sites were initiated in 2012. This presentation primarily focuses on findings from Leo's Landing, an emergent cattail marsh located in the lower third of the peninsula. As part of the monitoring process vegetation was surveyed in the summer of 2014, and soil collected in October, 2013 to carry out a seedbank study at the Cal U greenhouse. Results of the two studies were compared. The study objectives are to 1) monitor the effectiveness of the treatment program, and 2) assess the viability of the native seed bank and its potential to facilitate site restoration. Preliminary results from the seed bank suggest that a diverse assemblage of native plants are present in soil. Standing vegetation at Leo's Landing continues to be dominated by a mix of Typha species (broadleaf, narrow, and the hybrid). The Phragmites population, however, has been greatly reduced. The seedbank study will be repeated in 2014-15 with additional wetland sites added; we will also quantitatively analyze the change in the standing wetland plant species composition from 2102-2104 from Leo's Landing.

Development of a Real-time PCR Method for the Early Detection of Aquatic Invasive Species in Pennsylvania Watersheds

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Morphological methods for the identification of aquatic invasive species are laborious and time-consuming, frequently preventing the timely application of effective eradication measures. Because of their specificity and sensitivity, molecular biology methods have raised increasing interest for monitoring invasive species. The objective of this study is to develop a real-time PCR (qPCR) method for the early detection of the invasive species, Trapa natans, in Pennsylvania watersheds. Water samples were collected from Little Neshaminy Creek (Bucks County, PA) at increasing distances from a reservoir (Bradford) contaminated by T. natans to approx. 9.2 miles downstream. Physicochemical parameters recorded at the time of sampling showed that water quality downstream was significantly impacted by the excessive growth of T. natans in the

reservoir (e.g., low DO, high turbidity). DNA was extracted from the samples for the quantitative detection of T. natans using qPCR. A suite of primers was designed in T. natans hypervariable region, internal transcribed spacer (ITS) 1 - 5.8S rRNA - ITS 2. The primer specificity was verified by comparison with all Tracheophyta sequences available in the NCBI database (Primer-BLAST). The primers were successfully tested using T. natans DNA and standard curves were established for the quantitative detection of T. natans biomarkers. The validation of the method is currently conducted by qPCR amplification of the biomarkers in Little Neshaminy Creek samples. This research is expected to provide a sensitive method for the detection of T. natans in stream water. The method will be extended to other aquatic invasive species existing in Pennsylvania watersheds.

"Evo-Devo" of the Pharyngeal Apparatus of Bluegill and Pumpkinseed Sunfish

Greg Andraso, Eve Andresky, Shernelle James, Nikhil Kanthala, and Kelly Grant*
Department of Biology, Gannon University

In "Evo-Devo" studies, we are interested in how changes in the developmental program (e.g., patterns of gene expression, cell migration and cell proliferation) of a species result in the modification of structures. Specifically, we are interested in the "evo-devo" of the pharyngeal apparatus in two species of sunfish: bluegills (*Lepomis macrochirus*) and pumpkinseeds (*Lepomis gibbosus*).

The pharyngeal apparatus consists of modified gill arches and functions as a second set of jaws to process prey. The morphology of the pharyngeal apparatus is quite different between the adults of the two species. Bluegills have delicate pharyngeal bones with sharp, cardiform teeth; pumpkinseeds have larger, stronger bones with molariform teeth used to crush prey. We have begun to investigate the early development of the pharyngeal bones and teeth, comparing their initial size and ossification pattern. Ultimately, we hope to investigate patterns of cell proliferation, osteoblast activity, and gene expression to determine developmental differences that lead to species-specific variation in the pharyngeal apparatus. The ability of bluegills and pumpkinseeds to hybridize may allow us to map the genetic variations that cause the different morphologies within these skeletal structures.

How parasites found in Yellow Perch can be linked to Lake Erie's Fishing Industry

Emily Hesch, Allegheny College

Two species of Eustrongylides parasites (E. tubifex and E. ignotus) are appearing in the western basin of Lake Erie. These parasites have been found by fishermen in yellow perch and have been linked to the collapsed fishing industry in Erie, Pennsylvania. The parasites can affect the lifespan and growth of the fish as well as the health of humans and water fowl. Studying the surface temperature of Lake Erie, number of Oligochaete worms (first intermediate host) in the sediment, and number of yellow perch infected, may yield a correlation. In this study 446 yellow perch were dissected for parasites, the surface temperature of Lake Erie was taken, and sediment samples were collected in six randomly chosen locations off the shore of Erie, PA. No Eustrongylides spp. was found but, an unknown parasitic worm was discovered in the meat or the gut of 8 yellow perch. Without a positive identification of this unknown worm, it is impossible to say whether or not a correlation is present between the three factors. Although, possible correlations can be made independent of the identification of the parasite by comparing

temperature and the size of yellow perch with the number of fish infected. Future research needs to be carried out to investigate these factors.

DNA fingerprinting of White Tailed Deer

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DNA fingerprinting of short tandem repeats (STRs) in nuclear DNA from white-tailed deer (Odocoileus virginianus) was investigated as a means to assist in determining breeding patterns of deer herds. Liver tissue samples were collected from 41 deer residing in Presque Isle State Park, PA, as well as in Erie County, PA. Isolated nuclear DNA from liver tissue along with nine fluorescently tagged DNA primers were used in polymerase chain reactions to amplify the STRs located within each DNA sample and confirmed using gel electrophoresis in 2% agarose gel and analyzed under UV light using a Bio-Rad imaging unit. Successful PCR products were analyzed using an Applied Bio Systems 310 single capillary automatic DNA sequencer using GeneScan software to accurately measure STR length. The data obtained were used to create a unique DNA fingerprint of each deer based on the STR size and frequency. 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. Although this study has been ongoing since June 2013, 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. Data and results obtained from this preliminary study will contribute to determining a clearer paternal genetic history and infer the breeding behavior among white-tailed deer herds in Presque Isle and Erie County, PA.

Friday, November 7, 2014

Relationships among Cyanobacteria and sediment and nutrient load in Presque Isle Bay Cyanobacteria can cause harmful algal blooms (HABs)

Jeanette Girosky, Penn State University, Behrend Campus

The direct causes of HABs are not known but HABs are usually indicative of eutrophication. Like many other areas in the Laurentian Great Lakes, Presque Isle Bay (Lake Erie, Pennsylvania) has begun experiencing HABs. Preliminary work in 2013 identified areas of concern that were correlated with known sources of sediment inputs that had recently been mapped. Phosphorus and nitrogen are known contributors to eutrophication, but nutrient data are scarce and not easily obtained for Presque Isle Bay. A study was conducted from May into October of 2014, to collect nutrient and cyanobacterial data. Water quality data, including phosphorus and nitrogen levels, and phytoplankton data (cyanobacterial assemblage composition and density, chlorophyll a) were collected at multiple sites in Presque Isle Bay to establish a baseline. This study will increase awareness of the eutrophication status of Presque Isle Bay, provide some of the information needed to understand the causes of HABs in Presque Isle Bay, predict blooms, and develop better management practices.

Microcystin toxin produced by Cyanobacteria is pervasive in Lake Erie water

Natalie Spaeder* and Steve Mauro, Gannon University

Cyanobacteria is a common freshwater microbe. Certain strains of this bacterial type have the ability to produce microcystin, which is pathogenic to humans. Harmful algal blooms that contain exceedingly high levels of microcystin have been found in the western basin of Lake Erie, and more recently in the Bay of Presque Isle State Park, prompting further research aimed at better understanding Cyanobacteria and microcystin presence in freshwater. Using metagenomics, we have undertaken a population based approach to understand abundance of Cyanobacteria in Presque Isle beach waters. Our results indicate that >20% of all bacteria in Presque Isle bathing waters are Cyanobacteria. Moreover, microcystin produced by this bacterial type is often present in these waters in the absence of a bloom, albeit at low levels. Similar results were found across Lake Erie in 2014. Together, our results indicate that Cyanobacteria and microcystin is pervasive in Lake Erie.

Providing the beach-going public with the best water-quality information available

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

Predictive models are used at a number of locations around the Great Lakes to improve the timeliness and accuracy of recreational water-quality assessments. Predictive models use environmental and water-quality variables that are measured and statistically analyzed to determine the probability that the state standard for bacteria, such as Escherichia coli (E. coli), will be exceeded. Models are better at predicting public health risk than the use of the previous day's E. coli concentrations, especially in regard to sensitivity (the proportion of actual exceedances--concentrations greater than 235 CFU/100 mL--that are predicted cor¬rectly). The U.S. Geological Survey, in cooperation with local and state agencies, worked to test the use of nowcasts at 6 Presque Isle State Park beaches. Software routines, spreadsheets, and modeling programs were used to expedite the compilation of environmental and water-quality data from external sources and to automate modeling steps. Examples of 2010-13 models that were validated using 2014 data will be presented. Variables used to predict E. coli include rainfall, turbidity, wind speed and direction, lake level, water temperature, barometric pressure, and wave height.

Comparison of Membrane Filtration Bacteria Analysis to Oxygen Uptake Rate Analysis, A Study of the Applicability of Rapid Analyses of Active Bacteria by Oxygen Metabolism for Beach Swimming Safety

Edward F. Askew PhD; Askew Scientific Consulting LLC, Support Provided By: Baseline Inc. A Mocon Company

The analysis of fecal indicating bacteria utilizing their oxygen respiration rate in Tryptic Soy Broth, a general growth media, is compared to regulatory analytical Membrane Filtration method. Utilizing a binary data analyses procedure in which the data from the GreenLight® 910 is statistically evaluated with the data from the standardized Membrane Filtration method as two data sets (Meets swimming bacterial level-Pass / Doesn't meet swimming bacterial level-Fail). Results will show how this Pass/Fail test applies the EPA Beach Act and a beach manager's risk or cost/benefit liability.

A Segmentation Analysis of Presque Isle State Park's Water Based Recreation Users

Michael D. Ferguson*, Andrew Mowen Ph.D., Alan Graefe Ph.D., The Pennsylvania State University

Lake Erie and its associated resource management is extremely unique as recreation and tourism have become an increasingly important component of the economy, displacing the prominence of manufacturing that once dominated the landscape. Subsequently, water-based recreation is the most prevalent form of outdoor recreation within the region, keeping intact both the local economy and the overall well-being of the area. Specifically Lake Erie provides opportunities for beach use, swimming, sunbathing, angling from shore and boats, ice fishing, and both motorized and non-motorized boat use. However, little is known about the behaviors, attitudes, and preferences of these water-based outdoor recreation stakeholders as they relate to the resource itself, as well as their economic contributions to the region's economy. To answer these questions, three specific user groups were individually segmented from the 2012-13 Presque Isle State Park Visitor Survey: 1) Beach users, 2) Anglers, and 3) Boaters. Early results from this analysis indicate that while many of these users simultaneously recreate amongst one another, variation exists in behaviors, attitudes, preferences and economic expenditures. Study findings and their implications for future research will be discussed and will act as a stepping-stone to inform future research regarding water quality concerns, lowering lake levels, and proposed energy development in the Great Lakes Region.

The Potential for Submerged Prehistoric Sites Beneath Pennsylvania's Lake Erie Waters

Mark Durante, California University of Pennsylvania

This presentation describes the ongoing work to model preserved submerged prehistoric archaeological site locations in Lake Erie. Parameters for a site location model are chosen using data derived from known terrestrial sites in the vicinity of Lake Erie in Ohio, Pennsylvania, and New York. These data include proximity to water, slope, proximity to the shoreline, and others. Once a model for site location is developed, data modeling changes in the Lake Erie shoreline, locations of channels currently under water, and deposition or removal of sediment are collected. These criteria are then used to model submerged areas with potential for preservation of an intact archaeological site. Locations correlating strongly with high likelihood for archaeological sites and site preservation in both models will be suggested for testing. The presentation includes discussion of data collection and compatibility issues, criteria choice, and further work on testing of the model.

Evidence of resonance in fish swimming from the tail beat kinematics of swimming striped bass (*Morone saxatilis*)

C.S. Garborg[1]*, P.J.M. Thornycroft[3], G.V. Lauder[3], and E. J. Anderson[1,2]
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Recent experiments on the propulsive performance of undulating plastic panels suggest that the relationship between a fish's swimming speed and tail beat frequency may depend on body length, stiffness and tail beat amplitude. There may also be resonant states where the fish would

require smaller than expected energy to swim at certain ranges of speed. That is, fish may have propulsive "sweet spots" that depend on body morphology and swimming kinematics. To investigate this, striped bass (n = 3) were swum in a flume with precise speed control and at many different speeds, ranging from the flume's lowest setting to the speed at which the fish no longer swam aerobically. The motion of the trailing edge of the tail was extracted from digital video streams from two cameras in real time. This allowed for the collection of a large amount of data. Tail beat frequency and amplitude were determined from the kinematic data. The data give strong evidence of deviations from a smooth increase in tail beat frequency with swimming speed and body length, suggesting the presence of resonant behavior like that seen in swimming plastic panels. If this phenomenon is at play in fish swimming, it could advance our understanding of the relationships between fish behavior and morphology, and, thereby, fish ecology.

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

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The cues that initiate the settlement of mollusk larvae are not fully understood. Recent work suggests that turbulence may be a settlement cue. Understanding these cues is important for modeling larval dispersal and supply. We measured the vertical swimming velocities of oyster larvae in a jet-stirred turbulence tank at six different turbulence levels. These levels covered the range of turbulence experienced by larvae in situ. Vertical velocities were determined from video sequences of swimming larvae using automatic particle finding and tracking algorithms. Our preliminary results suggest that, rather than cuing oyster larvae to settle, increasing turbulence is correlated with increasing upward movement by the larvae. Further work is needed to determine whether this is due to the nature of the flow generated by the jet-stirred tank, or if it represents active behavior on the part of the larvae.

Protecting Groundwater from Nitrate Pollution due to Septic Tank Discharge

Rick Diz*, Doaa Almaliki, Elizabeth Rula

Department of Environmental Science and Engineering, Gannon University

Pollution of groundwater by poorly performing septic systems is a pervasive problem in Pennsylvania and across the country. There are several failure modes for septic systems. The problem of interest here is nitrate pollution of the groundwater. The action level for this substance in Pennsylvania is linked to the maximum contaminant level (MCL) for nitrate-nitrogen in drinking water, which is 10 mg-N/L. The primary health risk associated with nitrate in drinking water is the development of methemoglobinemia in infants. When the density of septic systems in a given area is high, the natural dilution of the septic discharge by groundwater flow and precipitation may not be sufficient. The resultant concentration can exceed the MCL and drinking water wells downstream can be threatened. Such a condition potentially exists at a mobile home park located in Girard Township, PA, where the number of residential units per acre exceeds the recommendation by the PA DEP. This study investigates several methods of

reducing the nitrate concentration in groundwater at this community. Our research is intended to aid the landowner in protecting groundwater quality while continuing to serve the needs of his residents.

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

Donald Benczkowski, Pennsylvania DEP, Coastal Resources Program

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 by NOAA 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 it's coast is not for everyone. We'll give you some basic facts about Lake Erie, and clue you in to the 'real' story of living along the coast, and the amount of work that it takes to maintain stability in this harsh environment.

ABSTRACTS

Regional Science Consortium
10th Annual Research Symposium
November 5-7, 2014
Tom Ridge Environmental Center
At Presque Isle State Park

POSTER PRESENTATIONS

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

Paul Ruiz-Pelet*, Laura Wheeler*, Hasan Khan, Brenton Maloy, Nicole Kingston, Nesve Ozsoy, Laura Wheeler, Michael Rutter, and Beth Potter, School of Science, Penn State Erie, The Behrend College, Erie, PA, 16563

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

2. Comparative Analysis of the Constituents of Essential Plant Oils Displaying an Inhibitory Effect on *Staphylococcus aureus*

Christopher Haydanek M.S,* Nancy Carty Ph.D, Christopher Keller Ph.D, C.P.H.
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Introduction: The past decade has seen a rise in the incidence of multiple-drug resistant Staphylococcus aureus strains, making treatment of infections difficult. Recent research has examined the antimicrobial effects of essential oils and their constituents. The goal of this study was to assess the efficacy of essential oils against S. aureus clinical isolates, and to compare the composition of the most effective oils.
Methods: Disk diffusion assays were used to screen 35 essential oils against S. aureus reference strains (n=4). This data was used to select the six oils with the highest inhibitory effect. These six oils were then tested against S. aureus clinical isolates (n=8). A literature search provided data on the major constituents of each oil.

Results: Cinnamon bark, cinnamon cassia, lemongrass, oregano, red thyme, and tea tree were among those oils exhibiting the highest degree of inhibitory effect on S. aureus growth. Red thyme and oregano oils shared 77% of their constituents. There was 71% homology in constituents of tea tree, red thyme and oregano oils. The two cinnamon oils did not share any major constituents with any of the other four oils. Lemongrass shared only 22% of its components with the other five oils.
Conclusions: Results presented here support previous studies showing essential oil efficacy in inhibiting S. aureus growth. The high degree of similarity seen in oil composition indicates that synergy may factor into the whole oil's inhibitory mechanism. Additionally, this study highlights thymol and terpinen-4-ol as components in need of further investigation.

3. Prevalence of MLS Antibiotic Resistance and Inducible Clindamycin Resistance Phenotypes in *Staphylococcus aureus*

Sarah Cunningham OMSII*, Christopher Haydanek MS, Christopher C. Keller Ph.D. C.P.H, Nancy Carty Ph.D.

Laboratory of Human Pathogens, Lake Erie College of Osteopathic Medicine, Erie, PA

Introduction & Objectives: Antibiotic resistance in Staphylococcus aureus is an increasing concern. The most common mechanism of erythromycin resistance confers cross resistance to macrolides, lincosamides, and streptogramins, creating the MLS phenotype. Some isolates may also display inducible clindamycin resistance in the presence of erythromycin. The present study was conducted to determine the prevalence of MLS cross resistance and inducibility in erythromycin resistant S. aureus isolates.
Methods: S. aureus isolates collected from the anterior nares of pre-clinical medical students (n=111), were previously tested for antibiotic resistance and 25 erythromycin resistant isolates were used for the present study. Erythromycin, azithromycin, clindamycin, dalfropristin/quinupristin (D/Q) antibiotic resistance was determined using disc diffusion, and the zone of inhibition was measured. Isolates were determined to be sensitive or resistant based on CLSI guidelines. Clindamycin inducible resistance was determined by placing erythromycin discs 15mm apart from clindamycin discs and incubating for 18 hours at 37oC. The phenotype was determined visually per CLSI protocol.
Results: All isolates tested were resistant to erythromycin and azithromycin, and all isolates were susceptible to D/Q. When examined for clindamycin resistance alone, 76% of the isolates were susceptible to clindamycin, and 24% were resistant. When tested for inducibility, 12% were clindamycin sensitive, 64% displayed inducible clindamycin resistance in the presence of erythromycin, and 24% were constitutively resistant.
Conclusions: Erythromycin resistant S. aureus isolates exhibit cross resistance to azithromycin, but are susceptible to D/Q. Some clindamycin sensitive S. aureus isolates display erythromycin-dependent inducible clindamycin resistance.

4. Prenatal valproic acid disrupts neurochemistry of the medial nucleus of the trapezoid body

Shruti Konda*, and Randy Kulesza, PhD, Lake Erie College of Osteopathic Medicine

Autism (ASD) is a neurodevelopmental disorder characterized by impairments in social and communication skills. However, the vast majority of subjects with ASD also suffer some degree of auditory dysfunction. As ASD prevalence and awareness grows, the cellular neurobiology of the disorder remains unclear. Significant hypoplasias and heterotopias have been identified in the auditory brainstem of human subjects diagnosed with ASD. Similarly, children prenatally exposed to the antiepileptic drug valproic acid (VPA) have been found to have elevated risk for a diagnosis of ASD. This has also been documented in the auditory brainstem of rodents prenatally exposed to VPA. Such animals have fewer auditory brainstem neurons while the neurons that were present were smaller and abnormally oriented. Our previous studies with rodents utilized animals exposed to VPA on embryonic day 12.5, which had a significant effect on many neuronal clusters in the superior olivary complex (SOC). The medial nucleus of the trapezoid body (MNTB) is composed of a population of large, round neurons which receive a powerful excitatory input from the contralateral cochlear nucleus. Nearly all MNTB neurons are glycinergic and send inhibitory projections to the SOC nuclei. In this study, we attempt adjust our prenatal VPA-exposure model to specifically target neurons in the medial nucleus of the trapezoid body (MNTB) as well as the major afferent axonal projections to this nucleus and the major efferent glycinergic projections of this nucleus within the SOC. Our preliminary results suggest that prenatal exposure to VPA at E15 disrupts the neurochemistry of MNTB neurons.

5. Hypoplasia of the human medial superior olive in chromosome 15q duplication syndrome

Karisa I. Beebe, MS*, Lake Erie College of Osteopathic Medicine
Richard Lukose, DO, UPMC Hamot, Dept of Neurology
Randy Kulesza, PhD, Lake Erie College of Osteopathic Medicine

Autism (AUT) is a neurodevelopmental disorder characterized by social and communicative impairments, sensory abnormalities and restricted repetitive behaviors. Although the etiology of most cases of AUT is idiopathic, a small number of cases can be attributed to genetic causes, such as chromosome 15q duplications (dup15q). Recent neuropathological investigations suggest distinct patterns of heterotopias and dysplasias in subjects with dup15q. Subjects with AUT generally have some degree of auditory dysfunction and we have recently demonstrated significant hypoplasia in the superior olivary complex (SOC), a collection of auditory brainstem nuclei, of subjects with AUT. Specifically, we found the medial superior olive (MSO) to contain significantly fewer neurons in AUT. We therefore hypothesize that the MSO in subjects with dup15q will demonstrate a similar reduction in neuronal number. Herein, we describe results from a quantitative morphometric investigation of post-mortem brainstem tissue from normally developing control subjects, subjects with AUT and subjects with dup15q. Our observations in subjects with AUT support our previous reports, such that the MSO contained significantly fewer neurons. However, the remaining MSO neurons were significantly smaller, more round and abnormally oriented. In subjects with dup15q, we found the MSO to contain many fewer neurons and the remaining neurons were smaller and more round. These results suggest that in the brainstem, these neuropathological conditions (AUT and dup15q) may be associated with similar

developmental errors. However, based on the higher incidence of ectopic neurons in dup15q, additional pathfinding errors may occur in this condition.

6. Primer/Probe optimization of RTqPCR for identification of double-stranded RNA in Rhizoctonia solani

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Rhizoctonia solani is a soil-borne pathogenic fungus with several distinct isolates that have been classified based on their anastomosis groups. Many isolates of these fungi contain double-stranded viral RNA (dsRNA) that are cytoplasmic. Research in our laboratory has studied the epidemiology and molecular biology of viral RNA in R. solani, making it a useful biological model in the development of protocols for the rapid identification of biological agents. In the present study the dsRNA from the isolate EGR-4 was purified. Attempts to clone middle (M)-size dsRNA fragments from R. solani have been difficult primarily due to artifacts that co-purify including large (L)-size dsRNA in the fungus. Various MgCl2 concentrations were tested to optimize full length dsRNA PCR product. Magnesium is required for DNA polymerase and requires a specific concentration. The dsRNA was analyzed by gel electrophoresis. The gel-purified, nuclease-treated dsRNAwas reverse transcribed into cDNA and ligated into the p-jet cloning vector and transformed using E. coli. All such clones were sequenced and forward and reverse primers were generated using BLAST sequence via Biosearch Technology. The plasmids were purified from transformed cultures and amplified using real-time PCR (RTqPCR) with the primers (reverse CCACCGGAAGAGGGAAATCC, forward AGCGCTGACCTTGCTATCGAATC) and probe (5' Fam-AGTGCCGATCAGCCCTCCACCG-BHQ1 3'). The ideal primer/probe concentration was determined by comparing the lowest threshold concentration values using plasmid cDNA as a template.

7. Allelopathic Effects of Centaurea jacea On Native Plants Species

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Centaurea jacea (brown knapweed) is a successful non-native invasive species in western New York of European origin. The mechanism of how this plant establishes and dominates the ecosystem is still not understand. However, "the novel weapon" hypothesis describes the role of allopathic chemicals which are released by invasive plants species into the environment and affect the neighboring plants. My study involves one invasive species (Centaurea jacea) and two native plant species that grow in western New York State (Elymus virginicus and Erigeron karvinskianus). Conducting research on allelopathic plants is important due to the various ecological and economic impacts they have on native plants and crops. Invasive plant species are one of the main reasons behind the loss of biodiversity.

To investigate if C. jacea has an allelopathic effect on E. virginicus and E. karvinskianus, two individuals of one native species were planted into 60 plastic pots and one C.jacea was planted into half of these. Activated carbon at a concentration of 20% was added to half of the pots. Activated carbon absorbs allelochemicals from the soil and shows the effect of the invasive still

being present in a pot but without the allelochemicals. This experiment took a place in the greenhouse.

This experiment is still in progress and all the plants will be harvested within the next month. Further information about the evidence for allelopathic chemicals being released by C. jacea will be provided at that time.

8. Seed Bank of Two Oak Openings

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Oak openings are rare plant communities on sandy soils in New York and Pennsylvania with an open canopy and a diverse assemblage of understory species. Where extant, oak openings are usually heavily degraded by invasive species. In order to understand restoration potential for oak openings it is important to know if any of the rare species are still present in the soil seed bank. Soil samples were collected in degraded oak openings in Clarence, NY and Erie Bluffs State Park, PA in March 2013 and 2014. Half of each sample was heated at 100oC for 15 minutes to simulate heating by fire. Samples were spread out on flats in the greenhouse and germinants assessed. In the 2013 samples a total of 79 known species germinated. An additional 110 taxa remain unidentified, particularly graminoid and Rubus species, many of which may be the same species. Among the identified germinants 19 are non-native. An average of 70 seedlings emerged from unheated soil and 79 from heated soil from the Clarence site and 172 from unheated soil and 155 from heated soil from the Erie Bluffs site. Thirty three species emerged from unheated soil and 30 from heated soil from the Clarence site and 46 from unheated soil and 54 from heated soil from the Erie Bluffs site. No rare species were detected. Cyperus lupulina and Conyza canadensis were the most common species at the Erie Bluffs site and Agrostis perennans and Juncus tenuis at the Clarence site.

9. Permanent Plots at the College Lodge Nature Preserve

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The College Lodge Nature Preserve in Chautauqua County NY is owned by Fredonia and has a diverse range of forest communities and 16 ha of old growth. Trees in 13 900 m2 plots at the Lodge were tagged and had their DBH measured. Average tree diameter at the lodge was found to be 28.2 cm, with the most abundant diameters being between 10 and 20cm. Both living and dead trees, standing or recently fallen, were tagged. This is the start of a long term study to help understand plant community structure at the Lodge. The data will also help track how the community reacts to the death of beeches in the Lodge forests due to the effects of beech bark disease. The condition of each beech tree tagged was marked as either none, low, medium or high. The first of five deer exclosures was constructed to help understand the effect the deer population is having on plant communities. Understory vegetation plots will be established inside and outside of the deer exclosures. In addition, it is possible that hemlock woolly adelgid and Asian longhorn beetle will arrive in the near future and kill hemlocks and maples. These forests will also be changing dramatically in the future due to global change.

10. Comparison of Three DNA Extraction Methods from Ixodes scapularis Ticks

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Objectives: Black-legged ticks (Ixodes scapularis) are responsible for transmission of the disease-causing organisms Borrelia burgdorferi and Babesia microti to humans. PCR amplification is a common method used to determine the presence of B. burgdorferi and B. microti in ticks. In this study, we compared three methods of tick DNA isolation using several parameters: DNA quantity and purity, PCR amplification, and cost- and time-effectiveness.
Methods: DNA was extracted from three groups of adult ticks (n=25/group) using Chelex resin, phenol-chloroform with ethanol precipitation, or a Qiagen DNeasy Blood and Tissue kit. Following extraction, PCR amplification of the mitochondrial 16S rRNA I. scapularis gene was used to verify successful DNA isolation and functionality, and spectroscopy was performed to assess yield and purity. Each method also underwent a cost and time analysis.
Results: Chelex resin yielded the highest amount of DNA, and phenol-chloroform and Qiagen extractions yielded the highest purity of DNA. Although the tick 16S rRNA gene was successfully amplified using all three DNA extraction methods, 20% of Chelex samples had nonspecific banding. Chelex is the quickest and least expensive method. Rankings were given to each parameter in order to determine the best method of tick DNA extraction, with phenol-chloroform extraction being the best.
Discussion: We established that, in terms of DNA yield, functionality, and practicality, phenol-chloroform extraction is the best method for tick DNA isolation. This extraction method will be used for all future analyses of pathogen DNA in I. scapularis ticks.

11. Co-infection prevalence of *Borrelia burgdorferi* and *Babesia microti* in blacklegged ticks on Presque Isle

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Objectives: Blacklegged ticks (Ixodes scapularis) transmit the pathogens Borrelia burgdorferi and Babesia microti to humans, causing Lyme disease and babesiosis, respectively. Recent studies in the northeastern United States showed that these infections in humans are increasing. In this study, we aim to determine the prevalence of B. burgdorferi in ticks found on Presque Isle and assess the co-infection rate with B. microti.
Methods: Adult I. scapularis ticks (n=75) were collected in summer 2014 by flagging multiple trails on Presque Isle. After collection, tick DNA was extracted, and the presence of DNA was determined by an I. scapularis mitochondrial 16S PCR. Samples were then tested for the presence of the B. burgdorferi flagellin gene by PCR, and positive samples were examined for the presence of the B. microti 16S ribosomal DNA PCR. B. microti-infected hamster red blood cells (ATCC 30221) and B. microti genomic DNA (ATCC 30221D) were purchased as PCR positive controls.
Results: DNA isolation from B. microti-infected red blood cells was unsuccessful. All ticks were positive for the I. scapularis 16S PCR. B. burgdorferi DNA was found in 33% of ticks tested, and of these, 5% were positive for B. microti DNA. Further verification of B. microti DNA is being determined by DNA sequencing.

Conclusions: Ticks collected from Presque Isle are infected with both B. burgdorferi and B. microti, which pose possible health risks to people of Erie County.

12. The Effect of Damminix on the *Ixodes scapularis* population of Presque Isle

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Deer ticks, Ixodes scapularis, can often be pathogen carriers for the bacteria Borrelia burgdoferi. When I. scapularis transmit the bacterium to humans through bite, it leads to Lyme disease. It has been documented that I. scapularis have spread throughout the Northeast United States and are found on Presque Isle State Park. More than four and a half million visitors come to Presque Isle annually, making it one of the most popular state parks in the United States. Due to the high traffic, it is crucial to monitor the I. scapularis population because it is often a vector for pathogens that may be debilitating to humans and animals. While Lyme disease is often nonfatal, other pathogens carried by ticks such as the bacteria genus Ehrlichia can lead to Erlichiosis which has a fatality rate reaching 5%. DNA analysis of ticks collected by flagging was conducted using Polymerase Chain Reaction and gel electrophoresis to determine if ticks were vectors for B. burgdoferi. Subsequent studies will also be conducted to determine the effect of Dammix®, a product claiming to control the tick population, on the ticks of Presque Isle.

13. Allocation of male soma to females and eggs in a sexually cannibalistic praying mantis

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Models of the evolution of sexual cannibalism argue that males may offset the cost of cannibalism if materials of their soma are allocated to the eggs that they might father. We studied male reproductive investment via sexual cannibalism in the praying mantis Tenodera sinensis. Males and females were each fed differently radiolabeled crickets (Acheta domesticus) and allowed to mate. We allowed half of the pairs to progress to sexual cannibalism and prevented cannibalism in the other half. We assess the relative allocation of both male-derived somatic materials and ejaculate materials into the eggs and soma of the female. We also compare allocation to reproduction of materials consumed by females within context of sexual cannibalism (male mantids) and outside the context of sexual cannibalism (crickets).

14. Genetic Diversity of Brook Trout Populations in the West Branch Susquehanna River Watershed

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The West Branch Susquehanna River watershed is located in north central Pennsylvania. Some of the most pristine brook trout (Salvelinus fontinalis) habitat in Pennsylvania is found in this watershed. However, abandoned mine drainage (AMD) has contributed to the decline of brook trout in the watershed. Over 20% (1,200 stream miles) of the watershed is impaired by AMD. Consequentially, brook trout populations have been isolated. The isolation of the populations

has led to a decline in genetic diversity. The purpose of this study is to evaluate the genetic diversity of brook trout populations in the West Branch Susquehanna River watershed in Pennsylvania. Fin samples were collected and preserved in 70% ethanol for genetic studies of these isolated populations. Results indicate that populations are overall homozygous at tested loci. The results of this study will aid management decisions for reconnecting and re-establishing populations of wild brook trout throughout the West Branch Susquehanna River watershed.

15. Radiation Hazards of Radio Frequency Waves on the Early Embryonic Development of Zebrafish

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With the growing use of wireless devices in almost all day-to-day activities, exposure to radio-frequency radiation has become an immediate health concern. It is imperative that the effects of such radiation not only on humans, but also on other organisms be well understood. In particular, it is critical to understand if RF radiation has any bearing on the gene expression during embryonic development, as this is a crucial and delicate phase for any organism. Owing to possible effects that RF radiation may have on gene expression, it is essential to explore the carcinogenic or teratogenic properties that it may show.

This study observed the effects of RF radiation emitted from a cellular telephone on the embryonic development of zebra fish. The expression of the gene shha plays a key role in the early development of the fish. This gene has homologs in humans as well as in other model organisms. Additionally, several biomarkers indicative of cell stress were examined: including lactate dehydrogenase (LDH), superoxide dismutase (SOD), and lipid peroxidation (LPO). Results show a significant decrease in the expression of shha, a significant decrease in LDH activity. There was no significant increase in SOD and LPO activity. No morphological abnormalities were observed in the developing embryos. At present, these results indicate that exposure to cell phone radiation may have a suppressive effect on expression of shha in D. rerio, though such exposure does not appear to cause morphological detriments. More trials are underway to corroborate these results.

Keywords: Radio frequency radiation, development, shha gene, SOD, LPO, LDH, zebrafish

16. Tracking invasive species using DNA in the feces of piscivorous fish

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The ecology of Lake Erie is disrupted by non-native species, such as the tubenose goby (Proterorhinus semilunaris), discovered in Presque Isle Bay in 2011. 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 include another invasive species, the round goby (Neogobious melanostomus), even though predation on it is better studied. Our goal is to use PCR to specifically detect the DNA of these invasive species in the feces of predatory fish.

For this assay to be successful, we must specifically identify DNA from tubenose and round gobies. To do so, we optimized primers to amplify species-specific segments of cytochrome

oxidase I (COI) from tubenose and round gobies. We ensure the specificity of our primers by testing them against a panel of DNA purified from different fish species. Using the described parameters, we are able to detect DNA at concentrations below 10ng/mL. Additionally, we tested several methods to extract DNA from feces and demonstrate that the Qiagen Tissue Kit is the most effective. Our assay is now optimized to determine whether the predator recently consumed either tubenose goby or round goby. This approach offers advantages compared to traditional gut content analysis because it allows us to quickly examine many more samples without sacrificing the fish and it provides the opportunity for community partners, such as sport anglers, to participate by collecting fecal samples in the field.

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

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The principal objective of this research was to obtain a diverse sample of the mammal population using the habitats created in the parking lot of the Tom Ridge Environmental Center. There are ten islands throughout the parking lot containing native plant species. Sixty-five small and large Sherman box traps were evenly distributed throughout the ten islands and baited using peanut butter and oatmeal. The traps were checked and re-baited every morning. Animals were marked using non-toxic paint and then released. This process spanned the time period of 22 August- 12 September 2013, 14-16 June 2014, 10-12 July 2014, 14-16August, 2014, 13-14 September 2014. The majority of animals found were mostly male Peromyscus leucopus (white footed mice). This project is the beginning of an ongoing study that will collect data from the spring, and summer of future years for comparison. This research will provide valuable information regarding whether these habitat islands can successfully be used as natural mammal habitats.

18. Exploring White-tailed Deer Dispersal Patterns through the Eyes of mtDNA

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The white tailed deer (Odocoileus virginianus) is the most abundant ungulate in the Eastern United States inhabiting both rural and urban areas. Because of this, understanding their movement patterns is an important tool in managing deer herds especially in urban areas. A limited number of radiometric studies suggest that female deer are philopatric, so that they range little from the area of their birth. However, male deer are more mobile with home ranges of up to 2 square miles, and are therefore responsible for the genetic variation in the species. This study seeks to better understand deer movement patterns using DNA sequencing. By sequencing the mitochondrion displacement loop, a non-coding regulatory region in the mitochondria genome, haplotypes are assembled from the sequences and the nucleotide diversity of the sequences are calculated. Phylogenic trees are then constructed using maternal ancestry lines, which allows local deer dispersal patterns to be determined. Fifteen samples from Presque Isle State have been sequenced and compared to seven sequenced samples from the surrounding Erie County. Our sequencing results suggest active deer movement between Presque Isle and the surrounding Erie County, as illustrated by the close homology between these herds. Female deer dispersal is

occurring in Presque Isle State Park at a rate higher than previous studies have shown. These movements of deer through the city of Erie and surrounding areas may be the reason for the genetic variations within Presque Isle State Park. These studies are continuing to increase the sample size to answer the questions on genetic composition of these herds in order to assist in the management of deer within Presque Isle State Park.
KEY WORDS D-loop, haplotypes, mtDNA variation, white-tailed deer, population genetics, nucleotide diversity, deer dispersal patterns

19. Mapping the incidence pattern of some ailments and autoimmune diseases in young adults using GIS

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This report presents the incidence pattern of six prevalent conditions and autoimmune diseases, namely, myopia, asthma, hyperopia, depression, acid reflux disease, and eczema in young adults who are currently living in Erie, PA. Autoimmune diseases are associated with abnormal immune responses to innocuous agents or chemicals. Body responds by producing antibodies which attack normal healthy tissue resulting in the destruction of structure and function of the affected organs. According to a recent National Institutes of Health report, 23.5 million Americans suffer from autoimmune diseases. Many of these conditions which were once very rare have become more prevalent. In addition to autoimmune diseases, conditions such as acid reflux disease, depression, and myopia have also become more prevalent. Although the exact cause for the increase in the incidence of these conditions remains unknown, modern lifestyle appears to be the primary culprit. The objective of this study is to track the incidence of these conditions among young adults and compare with state's and nation's average values. The research method employed was a survey administered to 542 young adults whose responses to a 2-page questionnaire formed the raw data. Analysis of the data revealed that 47.42% of the population had myopia, 11.81% hyperopia, 15.13% asthma, 6.83% acid reflux, 4.98% eczema and 9.59% depression. The results will be discussed in the light of national averages and will be compared to 2013 data obtained from the same place.
Keywords: Autoimmune diseases, GIS, Eczema, Asthma, Myopia

20. Hydrogeology of a Latest-Holocene Recurved-Spit Complex, Presque Isle, PA: A Progress Update

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Climate change in the Great Lakes Basin is expected to result in a decline in Lake Erie water levels over the next century. This contrasts with the 0.5m rise in 20th Century lake levels during which Presque Isle's easternmost wetlands developed. Lake level and related climate changes

should impact the hydrologic regime of cat's eye ponds and wetlands developed on this low-lying strandplain system. Understanding the present hydrogeologic regime will allow better prediction of coastal wetland evolution in response to climate change across the Great Lakes.

Beginning in spring 2014, four geomorphic units (beach-ridge sets) at the eastern tip of Presque Isle were selected for monitoring and represent four distinct post-1950 strandplain growth phases. Groundwater parameters are being monitored using a network of 20 shallow piezometers using P-T transducers (12-min sampling) and electronic tape (bi-weekly sampling); and by field slug and permeameter tests. Lake levels along the perimeter of the strandplain are being tracked using 6-minute data from the NOAA gauge on the North Jetty; and lake and atmospheric parameters (e.g., pH, SC, T, DO, turbidity, wind) are being tracked using the RSC's Nearshore and Beach 6 buoys (20-30-min sampling interval). Lake and groundwater characteristics are being identified by geochemical analyses.

Research questions to be answered are: Is the present wetland system a groundwater discharge, flow-through, or recharge setting; and does this configuration change over time? Are wetlands connected across the strandplain or are they compartmentalized within geomorphic units? If lake levels decline as expected, how will the wetland system respond?

21. The Liquid Costs of Hydraulic Fracturing

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Hydraulic Fracturing or, fracking, has a not so long history within the United States. It was massively developed after the oil shortage crisis that became apparent towards the end of the 20th century. The process aims to extract natural gas from pockets in deep rock formations and to also increase the domestic availability of fossil fuels. The process itself relies on the accessibility of the gas and the accessibility of a large amount of water, since this is essential to the process. The use of water, and its inevitable contamination, has been a large source of contention amongst the environmental and economic communities. As fracking developed a desirable economic benefit for the United States, other countries continue to display an interest in developing their own systems of industrial extraction and management policies. Permeability of rock in different regions comes into play and has an effect on the amount of water required for the process of fracking. The shift from coal to natural gas may help reduce the amount of CO2 that is released there still is an industrial requirement to improve the detrimental environmental risk factor, especially since the process is so dependent on water. The focus of this literature review will be to assess water's role in the development of fracking in the United States, with an attempt to focus on the potential physical and economic costs of water in the currently developing international Hydraulic Fracturing market.

22. Rates of plastic accumulation on beaches along the southern shore of Lake Erie

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Plastic is prized for its versatility and its ability to withstand biodegradation, but for these same reasons it is also a potential environmental problem. Plastic debris is not only unsightly for

beachgoers and inconvenient for fishers, but can cause environmental damage if animals become entangled in it or ingest it. While the presence of plastics in the Great Lakes is a well-known problem, no studies have been conducted to determine how much plastic waste is washing up on the shoreline. For this study we had two main objectives: 1) to determine the rate of accumulation of plastics on beaches in areas of high and low human population densities; and 2) to identify the types of plastic debris found on Great Lakes beaches. We selected eight beaches along the southern shoreline of Lake Erie: Four were selected in areas with high human population density and four in areas with low population density. The beaches were sampled once a month during June, July, and August of 2014. On our first visit to each beach in June we randomly selected sections of the beaches to be cleared of plastic debris and then sampled those same sections on subsequent visits. Preliminary data suggests that plastic accumulation rates are higher near areas of high human population density. The most common items collected were small plastic fragments (1-5cm), small Styrofoam pieces (1-5cm), and plastic cigar tips. The abundance of Styrofoam and cigar tips suggests that efforts to reduce plastic debris in Lake Erie should target beachgoers that bring food containers and cigars to the beach.