

Regional Science Consortium

4th Annual Research Symposium

Tom Ridge Environmental Center at
Presque Isle, Erie, Pennsylvania

November 6-7, 2008

PROCEEDINGS

Tom Ridge 
Environmental Center
PRESQUE ISLE

**REGIONAL SCIENCE
CONSORTIUM**
at The Tom Ridge Center at Presque Isle

REGIONAL SCIENCE CONSORTIUM

4th Annual Research Symposium

November 6 – 7, 2008

Tom Ridge Environmental Center

Room 112

AGENDA

THURSDAY, NOVEMBER 6, 2008

12:00 – 1:00 Lunch for Board Members and Presenters (Room 110)

1:00 – 1:20 **Registration**

Presentation Times, Presentation Titles, Presenters and Institutions Represented

1:30 – 1:50 **Viral Hemorrhagic Septicemia (VHS) in the Great Lakes**

Eric Obert, Pennsylvania Sea Grant

1:50 – 2:10 **West Branch of Cascade Creek Restoration Project**

Karla Kaczmarek*, PA Sea Grant; David Skellie, PA Sea Grant; Amy Jo Smith, Erie County Conservation District; Kathy Dahlkemper, LEAF; Ed Kissel, S.O.N.S.; Sarah Galloway, City of Erie

2:10 – 2:30 **The Statistical Analysis of Brown Bullhead Tumor Incidence Data**

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

2:30 – 2:50 **Break**

2:50 – 3:10 **Geographic Movements of the Common Snapping Turtle (*Chelydra s. serpentina*) on Presque Isle State Park, Erie, Pennsylvania**

Jennifer R. Hughes*, Penn State-Erie, The Behrend College; Jeanette L. Schnars, The Regional Science Consortium

3:10 – 3:30 **Bird Banding at Presque Isle State Park: Evaluating Stopover Site Quality on the Lake Erie Shore**

Dr. Sarah Sargent (NW PA Important Bird Area Coordinator, Audubon Pennsylvania, 301 Chestnut St., Meadville, PA 16335) Desiree Narango* (Bander, Audubon Pennsylvania, 301 Peninsula Drive, Erie, PA 16505-2042) Erika Dittmar (Banding Assistant, Audubon Pennsylvania, 301 Peninsula Drive, Erie, PA 16505-2042)

- 3:30 – 3:50 **Avian Activity in Phragmites Dominated Wetlands Along the South Shore of Lake Erie**
¹Robert S. Whyte*, ¹Carol Bocetti, ²Lindsey Maust, and ²Jonathan Shogan
¹California University of Pennsylvania, Department of Biological & Environmental Sciences
²Graduated 2007/2008, California University of Pennsylvania, Department of Biological & Environmental Sciences
- 4:00 – 4:30 **Natural Histories Collection Tour**
Bob Harris
Meet in Room 112

FRIDAY, NOVEMBER 7, 2008

- 8:00 – 9:00 **Registration**
Continental Breakfast
- 9:00 – 9:20 ***Bacteroides* Contamination Identified in Erie's Tributaries and Presque Isle's Beach Sand and Waters by Real Time PCR Detection**
K. Hoover*, R. Hindman, A. Olszewski, C. VanTassel, A. Zewe, A. McDonald, A. Passetti, S. Mauro – Mercyhurst College
- 9:20 – 9:40 **Comparison of the Abundance of the Shiga Toxin Gene to Commonly Used Microbial Indicators in Lake Erie**
Adam Olszewski*, Cody Smith, and Steve Mauro. Biological Sciences, Mercyhurst College, Erie, Pa, USA, 16546
- 9:40 – 10:00 **2008 Bacterial Water Quality Assessment of Presque Isle Bay, Erie, Pennsylvania**
Jerry Covert, Ph. D.*; Nicole Phinney; Jeremiah Covert
- 10:00 – 10:20 **Effect of Storm-Associated Discharges from Local Streams on the *E. coli* levels in Beach Waters of Presque Isle State Park**
Stacy Knapp*, MS candidate; Rick Diz, PhD, PE, Dept of Environmental Science & Engineering, Gannon University
- 10:20 - 10:40 **Break**
- 10:40 - 11:00 **Watershed-Scale Modeling to Predict Release and Discharge of Coliform Bacteria to the Lake Erie Shoreline West of Presque Isle State Park**
Rick Diz* and Kevin Caffrey, Department of Environmental Science & Engineering, Gannon University

- 11:00 – 11:20 **Parental Testing in Wild Herds of *Odocoileus virginianus* (White-Tailed Deer) With PCR DNA Fingerprinting**
Richard Toth, Durwood B. Ray, Fred J. Brenner*, Biology Department, Grove City College, Grove City, PA 16127
- 11:20 – 11:40 **Size-Selective Predation on Dreissenid Mussels by Round Gobies (*Apollonia melanostomus*) in the Field**
G.M. Andraso* and M.T. Ganger, Gannon University Department of Biology
- 11:40 – 12:00 **Assessment of Shorthead Garter Snake (*Thamnophis brachystoma*) Abundance in an Urban Area.**
Dicks, Margaret J. *, Mr. Joseph Hummer, The Pennsylvania State University
- 12:00 – 1:00 **Lunch for Presenters**
- 1:00 – 1:20 **POSTER PRESENTATION**
Cancer Risk Assessment of Airborne PAHs and PCBs in Erie, PA
Emily Venesky*, Student, Environmental Science, Gannon University;
Michelle Homan, Ph.D., Associate Professor, Environmental Science & Engineering
- 1:20 – 1:40 **Intelligent Hydrogel Nanoparticles for the Extraction of Environmentally Relevant Molecules from Aqueous Solutions**
Clinton D. Jones, Ph.D., Mercyhurst College, Department of Chemistry and Biochemistry
- 1:40 – 2:00 **Aquatic Invasive Species Monitoring in Pennsylvania**
Sara Grise`, PA Sea Grant
- 2:00 – 2:20 **Analysis of Ambient Air Quality Records for Erie's Lower East Side, with Emphasis on Ground-Level Ozone and Suggestions for Continued Improvement**
Allyson LaCovey, Michalle Nedley, Whitney Paul, Brittany Prischak, and J. Michael Campbell*, Mercyhurst College, Department of Biology
- 2:30 – 3:00 **Natural Histories Collection Tour**
Edwin Masteller
Meet in Room 112

* Presenters

The 4th Annual Regional Science Consortium Research Symposium
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PROCEEDINGS

PRESENTATIONS

Thursday, November 6, 2008

Title: Viral Hemorrhagic Septicemia (VHS) in the Great Lakes

Author: Eric Obert, Pennsylvania Sea Grant

Abstract: Viral hemorrhagic septicemia (VHS) virus is a fish pathogen that is causing a great impact in the Great Lakes region of the United States and Canada. Recent outbreaks in the Great Lakes appear to be a new, mutated strain of the marine virus that has become pathogenic for freshwater fish. Although its method of transfer to the Great Lakes and how long it has been in the ecosystem are unknown; scientists think it was introduced into this region as early as 2003, and related fish mortality has been reported since 2005. The virus could have arrived into the Great Lakes in the ballast water of ocean going ships, through aquarium and live fish releases, or carried from the ocean by migrating fish. In North America, VHS is present in the waters of Lakes Huron, St. Clair, Erie, Ontario, and Michigan, as well as the St. Lawrence, Niagara, and Detroit rivers.

Title: West Branch of Cascade Creek Restoration Project

Authors: Karla Kaczmarek*, PA Sea Grant; David Skellie, PA Sea Grant; Amy Jo Smith, Erie County Conservation District; Kathy Dahlkemper, LEAF; Ed Kissel, S.O.N.S.; Sarah Galloway, City of Erie

Abstract: The west branch of Cascade Creek was targeted for a series of restoration efforts that took place between 2006 and 2007 in Erie County, Pennsylvania. Approximately 500 feet of stream was restored at Frontier Park, a highly utilized recreational area in the City of Erie. The main goal of the project was to restore good water quality and stream flow to Cascade Creek. This was accomplished by performing several methods of channel stabilization, habitat and recreation restoration, education, and monitoring. A biomass survey was completed both before and after the restoration project in order to determine the impact of the project. Before restoration, three species of fish were found. After restoration, four species of fish were found including two brown trout. Brown trout are a stocked species that need cool water and deep pools to survive during summer months. More restoration needs to be completed to make an even greater impact on Cascade Creek.

Title: **The Statistical Analysis of Brown Bullhead Tumor Incidence Data**

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

Abstract: Presque Isle Bay (Erie, PA) was declared an Area of Concern in 1991. In order to examine the beneficial use impairment “fish tumors or other deformities”, brown bullhead have been collected from Presque Isle Bay and other sites around Lake Erie, and examined for liver and skin tumors. The goal of the data collection is to compare tumor incidence in Presque Isle Bay to unimpacted sites in Lake Erie and look for differences. It is therefore necessary to determine what is an “unimpacted site” and this presentation attempts to answer that question using a statistical approach. Of particular interest is the ability to identify sites with low tumor incidence as well as examining the possibility of combining sites with low tumor incidence in order to increase statistical power. The creation of an online brown bullhead tumor database whose purpose is to aggregate data from around the Great Lakes will also be discussed.

Title: **Geographic Movements of the Common Snapping Turtle (*Chelydra s. serpentina*) on Presque Isle State Park, Erie, Pennsylvania**

Authors: Jennifer R. Hughes, Penn State-Erie, The Behrend College
Jeanette L. Schnars, The Regional Science Consortium

Abstract: Presque Isle State Park has a number of unique ecological zones including a lagoon system, which opens to both Presque Isle Bay and Lake Erie. Common snapping turtles are normally localized in a home pond with the seasonal movements of gravid females to lay eggs. Our study identified the movements of three snapping turtles to determine if they moved into the bay or the lake due to seasonality. Aquatic turtle trapping was employed to catch three male snapping turtles. A single-stage radio transmitter was attached to the carapace of each turtle. Each turtle was released at the capture site and monitored 2 to 4 times a week during the spring and summer months. The turtles have been found in centralized locations near the point of release. Thus showing that they mainly remain localized in the lagoon system. There were also times where the turtles were not found. This information suggests that the turtles moved out of range of our equipment and further investigation would be necessary to fully understand the movements of the common snapping turtle at Presque Isle State Park.

Title: **Bird Banding at Presque Isle State Park: Evaluating Stopover Site Quality on the Lake Erie Shore**

Authors: Dr. Sarah Sargent (NW PA Important Bird Area Coordinator, Audubon Pennsylvania, 301 Chestnut St., Meadville, PA 16335) Desiree Narango* (Bander, Audubon Pennsylvania, 301 Peninsula Drive, Erie, PA 16505-2042) Erika Dittmar (Banding Assistant, Audubon Pennsylvania, 301 Peninsula Drive, Erie, PA 16505-2042)

Abstract: In the spring and fall, Presque Isle State Park functions as an important stopover site for nearctic-neotropical birds to refuel energy supplies before continuing migration. The quality of a stopover site can be affected by changes in habitat, like the presence of invasive plant species, and these characteristics should be evaluated for conservation purposes. Invasive plants found at Presque Isle are used as a food source by passerine migrants but there is a dearth of information on how this may influence refueling rate. We will use mist-netting and vegetation sampling at Presque Isle State Park to 1) continue a long-term dataset started by Ron Leberman in 1960, 2) determine species abundance and migration timing, and 3) compare migrant fat acquisition relative to invasive plant abundance.

Title: **Avian activity in Phragmites dominated wetlands along the south shore of Lake Erie**

Authors: ¹Robert S. Whyte*, ¹Carol Bocetti, ²Lindsey Maust, and ²Jonathan Shogan
¹California University of Pennsylvania, Department of Biological & Environmental Sciences
²Graduated 2007/2008, California University of Pennsylvania, Department of Biological & Environmental Sciences

Abstract: Dense stands of *Phragmites australis* are spreading rapidly in the coastal wetlands of the Great Lakes. Resultant loss of native plants and wetland function will reduce suitable habitat for waterfowl and other wetland birds. To examine the impacts of *Phragmites* on avian activity we conducted preliminary bird surveys (June-August, 2007) in two coastal wetlands in the western basin of Lake Erie. Bird diversity was low for all sampled vegetation types. Surprisingly, the *Phragmites* dominated stands had avian diversity similar to densities of other sampled vegetation types and abundance significantly greater than all sites. Of the 37 bird species observed across all vegetation types, 4 species were unique to *Phragmites* sites and 6 observed only in *Typha* stands, perhaps reflective of the greater plant structure provided by the vegetation.

Friday, November 7, 2008

Title: ***Bacteroides* Contamination Identified in Erie's tributaries and Presque Isle's beach sand and waters by real time PCR detection.**

Authors: Kaityln Hoover*, Ryan Hindman, Adam Olszewski, Craig VanTassel, Amy Zewe, Abigail McDonald, Audry Passetti, Steve Mauro. Biological Sciences, Mercyhurst College, Erie, Pa, USA, 16546

Abstract: Since fecal bacterial contamination in recreational waters can pose a serious health concern for humans, bacterial analysis of tributary and beach waters used for recreational purposes is an important measure of water quality. The bacteria in the genus, *Bacteroides*, are typically mutualistic, but some are opportunist pathogens, which can cause acute diarrhea and peritoneal infections. *Bacteroides* species are a good indicator for fecal pollution, as they constitute for a significant portion of bacteria present in the gastrointestinal tract. Moreover, the bacterial species in *Bacteroides* are host specific; therefore, we can identify the sources responsible for water contamination in the tributaries, beach sand and beach waters.

From June to August 2008, we collected water and/or sand three times per week in duplicate from Presque Isle State Park and surrounding tributaries. Each sample of isolated DNA was analyzed for the content of *Bacteroides* in the polluted water by using quantitative real time PCR. Host specific primers and fluorescent probes were used to differentiate the *Bacteroides* specific to humans to the total *Bacteroides* present in a sample. The amplified bacterial DNA from human sources was represented as a percent to amplified *Bacteroides DNA* originating from all possible sources. Our results indicate a large component of human contribution to bacterial pollution in several of the waters tested. Implications of the study and remediation strategies will be discussed.

Title: **Comparison of the abundance of the Shiga Toxin gene to commonly used microbial indicators in Lake Erie**

Authors: Adam Olszewski*, Cody Smith, and Steve Mauro. Biological Sciences, Mercyhurst College, Erie, Pa, USA, 16546

Abstract: The shiga toxin gene produces a protein that is pathogenic to humans and its presence can lead to severe gastrointestinal illness. This gene is most commonly associated with bacteriophage DNA that resides in enterohemorrhagic *E. coli*, which upon lysogenic induction produces the toxin. This work focuses on the relationship between the abundance of the shiga toxin gene to common microbial indicators of water quality. Using real time PCR to identify and determine the relative abundance of shiga toxin DNA in over 700 samples, we find that the distribution and relative concentration of the shiga toxin gene is variable and shows no correlation to the concentration of *E. coli*, enterococcus, or viral abundance. These results illustrate the need for standardized water quality protocols that focus specifically on pathogen detection.

Title: **2008 Bacterial Water Quality Assessment of Presque Isle Bay, Erie, Pennsylvania**

Authors: Jerry Covert, Ph. D.*; Nicole Phinney; Jeremiah Covert

Abstract: Presque Isle State Park is a seven-mile long migrating peninsula, located on Lake Erie, that curves to the east forming a 3,718 acre Bay for the city of Erie, Pennsylvania. Presque Isle Bay was designated the 43rd Great Lakes Area of Concern by the U.S. Department of State in January of 1991. In 2002, the Bay was announced as in the Recovery Stage. Although vast improvements have been seen in the health of the Bay, the state of the bacterial water quality has yet to be assessed in depth. Presque Isle State Park, using the U.S. EPA standards, posts swimming advisories when *E. coli* levels are greater than or equal to 235 Colony Forming Units/100ml, but less than 999 CFU/100ml and posts a swimming restriction when the levels are greater than or equal to 1000CFU/100ml). This study aimed to investigate the bacterial water quality of Presque Isle Bay, Erie, Pennsylvania. This investigation found that the bacterial levels within the Bay are within a swimmable range regardless of weather conditions.

Title: **Effect of Storm-Associated Discharges from Local Streams on the *E. coli* levels in Beach Waters of Presque Isle State Park**

Authors: Stacy Knapp*, MS candidate; Rick Diz, PhD, PE, Dept of Environmental Science & Engineering, Gannon University

Abstract: *Escherichia coli* (*E. coli*) is a commonly used indicator of bacterial contamination in recreational waters. To protect the health of bathing visitors to Presque Isle State Park (Erie, PA), swimming advisories are posted when levels are ≥ 235 CFU/100mL and beaches are closed when *E. coli* concentrations are equal $\geq 1,000$ CFU/100mL. In order to predict and mitigate high bacterial levels in beach water, it is desirable to determine the source of the bacterial contamination. This research was conducted to gain a better understanding of the role of storm water discharged from a small stream located just to the west (upstream) of the Park.

Water samples were collected in Marshall Run located 1.1 km to the west of the Park, as well as at six other sampling locations before, during, and after two storm events. A total of 11 sampling rounds were completed. Counts as high as 2,575 CFU/100 mL were observed in Marshall Run, but there was no simple relationship between high counts in the Marshall Run water and those observed simultaneously or subsequently along the shoreline. For example:

- While *E. coli* concentrations were found to be higher at all sampling locations during rain events, Marshall Run increases did not correspond with higher concentrations at other locations. For example, during the first rain event sampled, the *E. coli* concentration in Marshall Run was 1161 CFU/100ml and the count at Beach 1 was 661 CFU/100ml. However, during the second rain event studied, the *E. coli* concentration was twice as high in Marshall Run (2330) while the count at Beach 1 was lower than during the first storm (147) but still elevated above dry conditions.
- About half the time during dry periods prior to storm events, *E. coli* counts at Beach 1 were higher than Marshall Run samples. On one occasion, the *E. coli* count at Beach 1 was 896 while Marshall Run was 107 and all other sampled locations along the shoreline had counts below 25.
- During rain events, *E. coli* concentrations along the shoreline both west and east of the Marshall Run discharge were higher than up in the stream during rain events.

Based on these findings, it was concluded that Marshall Run is a source of bacteria discharged to the Lake, but is unlikely to be a major contributing cause of elevated bacterial levels in the bathing waters of Presque Isle State Park.

In addition to data from the two storms studied, data compiled during 2007 and 2008 by others was also evaluated. Comparisons will be made to the findings of this current project.

Title: **Watershed-Scale Modeling to Predict Release and Discharge of Coliform Bacteria to the Lake Erie Shoreline West of Presque Isle State Park**

Authors: Rick Diz* and Kevin Caffrey, Department of Environmental Science & Engineering, Gannon University

Abstract: There has been an increase in beach closures due to high bacterial counts in the Lake Erie bathing waters of Presque Isle State Park, Erie, Pennsylvania. Possible sources of bacteria are the streams discharging to Lake Erie west of the Presque Isle beaches, such as Trout Run, Walnut Creek, and Elk Creek. Using BASINS 4.0 along with HSPF, a hydrodynamic model and its Bacteria Modeling Tool, estimations of flow and fecal bacteria loadings were made for each of the streams of interest. The model is uncalibrated at this point, and the results presented are based on reasonable estimates for a number of parameters. The USGS, as of this writing, is in the process of producing a stage-discharge curve for Walnut Creek. Once that process is complete, the calibration of the model's flow predictions to actual measurements will be possible.

As the model stands now, precipitation and flow exhibit a classic increasing curvilinear relationship as would be expected. Output has been generated on a daily basis only, over long periods of time (decades). Since reliable hourly precipitation records are not available, hourly flow output has not been generated. Therefore, it is difficult to model changes on less than a daily basis for bacterial concentrations. This is a limitation of the modeling effort, since it would be reasonable to think that bacterial concentrations would vary during the course of a storm event. Instead, we are left with daily average output for flow and bacteria load, and thus daily average bacterial concentration.

Daily bacteria production was found to increase as a function of daily precipitation and flow. An interesting result concerned bacteria *concentrations*. If flow increases disproportionately compared to bacterial loading increase, concentrations would decrease due to dilution. This appeared to be the case for the Elk Creek and Trout Run watersheds. There was a high degree of variability for Walnut Creek, such that there was no clear relationship between precipitation and bacteria concentration.

Since the stream mouths of interest in this study are located 10, 12, and 22 km to the west of Presque Isle, a time lag would occur before any material discharged by each stream would reach the Presque Isle peninsula. Estimates were made of the transport of bacteria along the Lake shoreline using a laboratory measured rate of survival, a typical current velocity along the shoreline in the eastward direction. The mouths of the three streams were treated as point sources. A dispersion rate was estimated, and the resulting pattern of bacterial concentrations appearing at the first beach on the Presque Isle peninsula was presented. It was found that for a 0.5 inch or greater rain event, bacterial concentration at Presque Isle would exceed the 235 cfu/100mL action level for about 24 hours beginning about 2.5 days after the rain event, with a smaller peak being observed about 5 days after the event. Thus, it was concluded that the export of bacteria from these watersheds to Lake Erie could contribute to the unacceptably high levels of bacteria in the bathing waters of Presque Isle.

Title: **Parental Testing in Wild Herds of *Odocoileus virginianus* (White-Tailed Deer) With PCR DNA Fingerprinting**

Authors: Richard Toth, Durwood B. Ray, Fred J. Brenner*, Biology Department, Grove City College, Grove City, PA 16127

Abstract: We are developing the capability for paternity testing of deer within wild herds of white – deer (*Odocoileus virginianus*) To identify individuals, PCR methods have been developed to amplify 11 different DNA short tandem repeats (STRs) of deer nuclear DNA thereby creating a DNA profile for individual deer. To date, the PCR primers pairs that have been useful with whitetail deer were adapted from methods published by other researchers: two from *Odocoileus virginianus*, three from mule deer (*Odocoileus hemionus*), two from domestic cattle (*Bos Taurus*); and four from caribou (*Rangifer tarandus*). The sizes of the alleles amplified by these PCR primer pairs was determined using the Gene Scan method of Grove City College's Applied Biosystems 310 single capillary automatic DNA sequencer. Each primer set was prepared with one of three (blue, green or yellow) fluorescently labeled deoxynucleotides at the 5 prime end of one primer of each pair. The labeled PCR products were run as mixtures with red fluorescently labeled base pair molecular size standards purchased from Applied Biosystems. Based on these initial studies, the sizes of the PCR products produced by this collection of primer pairs in one white tailed deer ranged from 163 to 300 bp. Future studies will involve the use of these primer sets to identify allelic size profiles of individual members of white-tailed deer herds within geographically isolated parks in the Dayton, Ohio Metro Park system so that we can determine the major fraternal contributor to each herd. These results will be compared with samples obtained from free ranging white-tailed deer herds in Western Pennsylvania.

Title: **Size-selective predation on dreissenid mussels by round gobies (*Apollonia melanostomus*) in the field**

Authors: G.M. Andraso* and M.T. Ganger, Gannon University Department of Biology

Abstract: Dreissenid mussels (*Dreissena polymorpha* and *D. bugensis*) and round gobies (*Apollonia melanostomus*) are Ponto-Caspian invaders that have altered the ecosystems of the North American Great Lakes. Round gobies have been shown to prey upon a diversity of invertebrates and small fish, but their well-developed pharyngeal molars make them efficient predators of mollusks. A number of studies have shown that round gobies prey on dreissenid mussels, but there is an apparent shortage of detailed field studies on the subject. The objectives of this study were to 1) quantify the number and size of dreissenids consumed by different size classes of gobies, 2) compare the size of whole and crushed dreissenids that were consumed and 3) compare size distributions of consumed and available mussels over a five-month period during the summer of 2007. A total of 3839 dreissenid valves were recovered from 153 round gobies (TL=53-125 mm) and composed nearly 100% of the goby diet. For all gobies combined and for each of the three goby size classes (53-81, 82-98, and 99-125mm TL), crushed valves were larger than whole valves. To some extent, the size distribution of consumed dreissenids reflected the size of available dreissenids throughout the season. Specifically, gobies ate large numbers of small (1-2mm) mussels when they were available. Although large gobies are able to ingest large dreissenids, 7-10mm mussels appear to be most important to all three size classes of gobies, especially late in the season. The apparent preference of round gobies for dreissenids approaching reproductive size suggests that they may play an important role in regulating dreissenid populations.

Title: **Assessment of Shorthead Garter Snake (*Thamnophis brachystoma*)
Abundance in an Urban Area**

Author: Dicks, Margaret J.*, Mr. Joseph Hummer, The Pennsylvania State University

Abstract: The shorthead garter snake, *Thamnophis brachystoma*, is a member of the genus *Thamnophis* which includes 32 species of garter snakes worldwide. However, *Thamnophis brachystoma* has the most limited known range of any snake species in the United States. *T. brachystoma* populations naturally occur in western Pennsylvania and southern New York (Hulse et al. 2001) however a small group was introduced in Ohio (Novotny 1990). To determine the presence or absence of shorthead garter snakes, cover board arrays were placed in two distinct locations near the Penn State DuBois campus in Clearfield County, Pennsylvania. One site is an overgrown hilltop; the other is a wet meadow. The 48 cover boards combined provided 60m² of cover for the snakes as well as a reliable place for us to find them. Data were collected between the months of April and September of 2006 by a team of student volunteers and our advisor Mr. Joseph Hummer. With the information gathered, we discovered the wet meadow site is more densely populated with *Thamnophis brachystoma* than the hilltop site.

Title: **Cancer Risk Assessment of Airborne PAHs and PCBs in Erie, PA**
POSTER PRESENTATION

Authors: Emily Venesky*, Student, Environmental Science, Gannon University; Michelle Homan, Ph.D., Associate Professor, Environmental Science & Engineering

Abstract: The purpose of this study was to determine the excess cancer risk from the inhalation of airborne polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) in both the urban and rural areas of Erie, PA. Air samples were collected using a high-volume sampler at three sites in the Erie region during a one-year period in 2004 and 2005. The concentrations of 14 separate PCBs were not significant at the detection limit for an accurate risk assessment evaluation. The concentration of 16 separate PAHs were collected and analyzed using both deterministic and probabilistic methods. The deterministic method incorporated population assumptions given by the Environmental Protection Agency. Using this method, a point value was arrived at which indicated the estimated excess cancer risk in a population of 1 million. A point estimate was determined for children and adults in both the urban and rural areas of Erie. The probabilistic method was used to calculate a probability distribution of the estimated cancer risk based on a one-dimensional and two-dimensional Monte Carlo analysis. The results from both deterministic and probabilistic methods of analysis indicate that the estimated risk for both children and adults in the rural and urban areas of Erie are equal to or less than 1 in a million. On average, there was a higher concentration of PAHs in the urban site of Erie compared to the rural sites. Of the possible scenarios, the estimated cancer risk was highest for adults who inhale airborne PAHs in the urban environment of Erie with an estimated excess cancer risk of 1.2 in a population of 1 million.

Title: **Intelligent Hydrogel Nanoparticles for the Extraction of Environmentally Relevant Molecules from Aqueous Solutions**

Author: Clinton D. Jones, Ph.D. Mercyhurst College, Department of Chemistry and Biochemistry,

Abstract: Environmentally relevant organic molecules such as polycyclic aromatic hydrocarbons (PAHs), caffeine, estrogens and pharmaceutical drugs when present in water samples are at or below the parts-per-million concentration level. Prior to chemical analysis, the extraction and pre-concentration of these organic molecules from aqueous solution is routinely performed by using an organically modified substrate to trap analyte molecules or *via* liquid-liquid extraction. Both methods require the use of organic solvents, which themselves must then be safely discarded. Intelligent hydrogel polymers composed of *N*-isopropylacrylamide are crosslinked polymer networks with the ability to shrink and swell in aqueous solutions. The polymer can exist as a swollen gel at normal room temperature (23 °C) or as a collapsed semi-solid material above 31 °C. During this reversible phase transition, the polymer network changes from a hydrophilic swollen state to a collapsed hydrophobic state. The use of intelligent hydrogel polymers in the form of spherical nanoparticles is presented as a new method for the extraction of environmentally relevant organic molecules. The need for organic solvents is eliminated in this new approach, as temperature control serves to modify the nanoparticle's affinity toward hydrophobic organic molecules in aqueous solution. We are exploring the proper conditions in which to trap and release analytes such as PAHs and caffeine for subsequent analysis *via* high performance liquid chromatography (HPLC) and gas chromatography/mass spectrometry (GCMS). Preliminary results of PAH analysis from Elk Creek and Walnut Creek are also presented; these analyses were performed during 2008 using traditional extraction methods.

Title: **Aquatic Invasive Species Monitoring in Pennsylvania**

Author: Sara Grise`, Pennsylvania Sea Grant

Abstract: Aquatic Invasive species (AIS) like round gobies, zebra mussels, and Eurasian watermilfoil are changing the health and natural diversity of watersheds across Pennsylvania. They may also cause severe economic harm to water-based industries, tourism, and recreational fishing. Once established in a body of water, AIS are very difficult to eradicate, and are easily spread to uninfested waters through recreational boating, bait introductions, and aquaculture. Prevention and early detection of new invaders are the least expensive and most effective means to ensure the health of Pennsylvania's aquatic ecosystems. Statewide monitoring efforts are comprised of volunteers, field biologists, and scientific experts coming together to achieve the goal of early detection through annual monitoring for invasive species. The data gathered through these monitoring networks will be used to help advise future management and education efforts to minimize the spread and harmful impacts of aquatic invasive species.

Title: **Analysis of ambient air quality records for Erie's lower East side, with emphasis on ground-level ozone**

Author: J. Michael Campbell and Brittany Prischak,, Biology Department, Mercyhurst College, 501 East 38th Street, Erie, PA 16546
jcampbell@mercyhurst.edu

Abstract: Ambient air quality data for the air monitoring station in Erie, PA was obtained from the on-line database maintained by the PA-DEP, to analyze long-term trends in NO_x (nitrogen oxides – 1-hour), SO₂ (sulfur dioxide – 1-hour), and ozone (8-hour). The top 10 ranked highest daily averages of these pollutants for each year from 1999 through 2007 were combined into three-year groups for computing descriptive statistics, which indicated a general decline in levels of all three parameters. Statistical analysis of the averages indicated that pollutant levels in 2005-2007 were significantly lower than in 1999-2001.

Despite improvement in air quality over the nine-year period, ground level ozone concentrations (4th highest maximum daily 8-hour average) on Erie's lower East side are still above the 75 ppm health standard recently established by the US EPA, and may pose a human health risk, especially during the late summer when ragweed pollen is also problematic in the City. It appears that pollutants contributing to bad ozone days in Erie may be originating from local and regional emission sources, and suggestions are offered to advance continued reduction of this pollutant.