

Regional Science Consortium

6th Annual Research Symposium

Tom Ridge Environmental Center at
Presque Isle, Erie, Pennsylvania

November 4-5, 2010

PROCEEDINGS



PRESQUE ISLE

**REGIONAL SCIENCE
CONSORTIUM**

at The Tom Ridge Center at Presque Isle

REGIONAL SCIENCE CONSORTIUM
6th Annual Research Symposium
November 4 – 5, 2010
Tom Ridge Environmental Center
At Presque Isle State Park
AGENDA

THURSDAY, NOVEMBER 4, 2010

- 10:00 - 11:30 **RSC Board Meeting**
Board Members only
- 11:30 - 12:30 **Lunch in the Café for Board Members and Presenters (Thursday)**
- 11:30 - 12:45 **Registration**

Presentation Times, Presentation Titles, Authors, and Institutions Represented

- 12:45 - 1:00 **Welcome**
Jeanette Schnars, RSC Executive Director RSC

Session Chair: Robert Whyte, RSC President, California University of Pennsylvania

- 1:00 - 1:20 ***Phragmites* growth in response to selected application of herbicides in a Lake Erie coastal marsh**
Joseph R. Holomuzki*, The Ohio State University; Robert S. Whyte, California University of Pennsylvania; David M. Klarer, Ohio Department of Natural Resources/Wildlife Division
- 1:20 - 1:40 **Preliminary results of muskrat impact in a *Phragmites*-dominated Lake Erie coastal wetland**
Mark A. Lazaran*, Robert S. Whyte, California University of Pennsylvania
(*Student Presentation*)
- 1:40 - 2:00 **Small mammal diversity and abundance in three habitat types on Presque Isle State Park, Erie, Pennsylvania**
Heather Markel*, Cynthia Rebar, Edinboro University of Pennsylvania
(*Student Presentation*)
- 2:00 - 2:20 **A census of the bat community on the campus of Gannon University, Erie, PA**
Matt Sturdivant*, Morgan Pratt*, and Steven J. Ropski, Gannon University, Erie, PA
(*Student Presentation*)

* Presenter

- 2:20 – 2:40 **Dietary analysis of coyotes on Presque Isle State Park, Erie, PA**
Carrie Ann Duafala*, Andrea Sposito, and Cynthia Rebar,
Edinboro University of Pennsylvania
(*Student Presentation*)
- 2:40 – 3:00 **Maternal Genetic Variance Determined by Sequencing *Odocoileus virginianus* (white tailed deer) mtDNA D-Loop**
Jacqueline McCullough, Lara Linden*, Mark Gooss, Andrew Berglund, Durwood B. Ray, Frederic J. Brenner, Grove City College
(*Student Presentation*)
- 3:00 – 4:00 **Break (Room 110)**
Poster Session (Room 110)
- WORKSHOP, Sponsored by Shimadzu Scientific Instruments (Room 133 Research Wing)**
Please sign up at Registration Table (*if not signed up already*)
- Natural History Collections Open House Display (Room 108)**
Get a glimpse of this collection and herbarium that is housed in the lower level of the Tom Ridge Environmental Center; Tours of the Collection Rooms will be available.
- Session Chair: Jerry Covert, RSC Past Executive Director*
- 4:00 – 4:20 **BDE-209 induced alterations in the oxidative status of mice tissues**
Nathan Kubeldis*, Mary Vagula, Gannon University
(*Student Presentation*)
- 4:20 – 4:40 **Preparation of polymer foam that contains membrane protein**
Ashleigh Hanner*, Wayne Yunghans, State University of New York, Fredonia
(*Student Presentation*)
- 4:40 – 5:00 **Computer Models for predicting bacteria levels at Presque Isle Beaches**
Michael Rutter, Rutter Statistical Consulting
- 5:00 – 5:20 **Preliminary evaluation of some sustainable algae-for-energy production systems in Erie**
Michael Campbell, Mercyhurst College

* Presenter

- 5:20 – 5:40 **Effects of temperature on algae production in mixed cultures with varied fertility**
Danielle Long, Mercyhurst College
(Student Presentation)
- 5:40 – 6:00 **Design of an aeroponic algal growth apparatus for CO₂ enrichment and nutrient limitation experiments**
Robert Crowe, Mercyhurst College
(Student Presentation)
- 6:00 – 9:00 **Poster Viewing (Room 110)**
Natural History Collections Open House Display (Room 108)
Get a glimpse of this collection and herbarium that is housed in the lower level of the Tom Ridge Environmental Center
- Vendor Tables (Lobby)**
BioMost Inc./Clean Creek Products
Fondriest Environmental, Inc.
Precision Laser & Instruments, Inc.
Shimadzu Scientific Products
- 6:30 – 9:00 **Dinner (Lobby)**
Food, Drinks, Entertainment (\$25.00 per person at the door)
- Silent Auction**
Entertainment (7:00)
Salmon Frank Band

FRIDAY, NOVEMBER 5, 2010

8:00 – 8:40 **Registration**
 Continental Breakfast
Poster Viewing (Room 110)

8:30 – 8:40 **Welcome**
 Jeanette Schnars, Executive Director of the RSC

Session Chair: Jeanette Schnars, RSC Executive Director

8:40 – 9:00 **Abundance, Distribution and Taxonomic Composition of Winter Plankton in Ice Covered Lake Erie**
 Hunter J. Carrick*, The Pennsylvania State University; Richard A. Bourbonniere, Environment Canada; Benjamin Beall, George S. Bullerjahn, R. Michael L. McKay, Bowling Green State University; Ralph E.H. Smith, University of Waterloo; Michael R. Twiss, Clarkston University; Steven W. Wilhelm, University of Tennessee

9:00 – 9:20 **Biofilm nutrient metabolism in PA streams: Changes in biomass, N:P ratio, and enzyme activity across experimental and natural nutrient gradients**
 Melissa May*, Hunter Carrick, The Pennsylvania State University
(Student Presentation)

9:20 – 9:40 **Impact of the anti-depressant drug fluoxetine on the microbial ecosystem of Presque Isle State Park**
 Surafel Mulugeta*, Steven Mauro, Mercyhurst College
(Student Presentation)

9:40 – 10:00 **Size determinants of *Ceratopteris richardii* and their potential influence on gender**
 Tiffany Sturey*, Mike Ganger, Gannon University
(Student Presentation)

10:00 – 10:20 **Break**
Poster Session
Natural History Collections Open House Display (Room 108)
 Get a glimpse of this collection and herbarium that is housed in the lower level of the Tom Ridge Environmental Center. Tours of the Collection Rooms will be available.

* Presenter

Session Chair: Eric Obert, RSC Past President, Pennsylvania Sea Grant

- 10:20 – 10:40 **The vascular plant species of the fringing habitat ecotone in the Erie Bluffs State Park**
Lindsey Bocian*, James McGivern, Nathalie-Ann C. Brown,
Joseph Perenic, Mike Ganger, Gannon University
(Student Presentation)
- 10:40 – 11:00 **Vegetation characterization of the fringing habitat ecotone in the Erie Bluffs State Park using ordination and association analysis**
James McGivern*, Lindsey Bocian, Nathalie-Ann Brown, Joseph Perenic, Mike Ganger, Gannon University
(Student Presentation)
- 11:00 – 11:20 **Whole-sediment exposure of brown bullhead (*Ameiurus nebulosus*) to industrially contaminated sediment – Preliminary results**
Jim Grazio, PA Department of Environmental Protection, Office of the Great Lakes
- 11:20 – 11:40 **An examination of Petromyzontidae in Pennsylvania: Current distributions of native lamprey species**
Shan Li*, Jay R. Stauffer, Jr., The Pennsylvania State University
(Student Presentation)
- 11:40 – 12:00 ***Neogobius melanostomus* impact on native fish distributions in Lake Erie tributaries**
Rachel Cleaver Yoder*, Jay R. Stauffer, Jr., The Pennsylvania State University
(Student Presentation)
- 12:00 – 1:00 **Lunch – Buffet in the Café**

Session Chair: Greg Andraso, RSC Vice-President, Gannon University

- 1:00 – 1:20 **Results from the initial “ELF” inter-mine pool transfer tests**
Bryan J. Page*, Bruce Leavitt, Timothy Danchy, Greg Leavitt,
Cliff Denholm, Shaun Busler, Margaret Dunn, BioMost Inc.
- 1:20 – 1:40 **Characterizing phenotypic and molecular virulence factors in antibiotic resistant *Aeromonas* from Presque Isle Bay**
Jasmine Shinko, Alexander Augustinyak, Greg Andraso, Gannon University; Troy Skwor*, Gannon University and Children’s Hospital Oakland Research Institute, California; Christopher Gee, Penn State Erie
- 1:40 – 2:00 **Evaluation of antibiotic resistance and species-level characterization of bacterial genus *Aeromonas* from Presque Isle Bay**

* Presenter

Jasmine Shinko*, Alexander Augustinyak, Greg Andraso, Gannon University; Troy Skwor, Gannon University and Children's Hospital Oakland Research Institute, California; Christopher Gee, Penn State Erie
(Student Presentation)

2:00 - 2:20

Effect of photobiomodulation (NIR and NUV) on the inflammatory response from cervical epithelial cells infected with *Chlamydia trachomatis*

Cassandra Wasson*, Jessica Zourelis, Gannon University; Janis Eells, University of Wisconsin; Troy Skwor, Gannon University and Children's Hospital Oakland Research Institute, California
(Student Presentation)

2:20 - 2:40

Characterization of *Aeromonad* and *Pseudomonad* population in a white perch, *Morone americana*, skin lesion from Presque Isle Bay

Jillian Rhoads*, Gregory Delost, Greg Andraso, Gannon University; Troy Skwor, Gannon University and Children's Hospital Oakland Research Institute, California
(Student Presentation)

2:40 - 3:00

Break (Room 110)

Poster Session (Room 110)

Natural History Collections Open House Display (Room 108)

Get a glimpse of this collection and herbarium that is housed in the lower level of the Tom Ridge Environmental Center; Tours of the Collection Rooms will be available.

Session Chair: Jeanette Schnars, RSC Executive Director

3:00 - 3:20

Quantifying parasitic infection and its effect on reproductive success in Purple Martins?

Cassandra A. Silverio*, Bridget Stutchbury, York University
(Student Presentation)

3:20 - 3:40

Current Research on Purple Martins (*Pronges subis*) conducted by the Purple Martin Conservation Association (P.M.C.A.)

Robert A. Aepli, Purple Martin Conservation Association

3:40 - 4:00

Stopover habitat for migrant land birds at Presque Isle: fire escape or full service hotel?

Sarah Sargent, Audubon Pennsylvania

4:00

Announcement of Student Awards

Closing Remarks

Jeanette Schnars, RSC Executive Director

REGIONAL SCIENCE CONSORTIUM
6th Annual Research Symposium
November 4 – 5, 2010
Tom Ridge Environmental Center
At Presque Isle State Park

PROCEEDINGS

PRESENTATIONS

Thursday, November 4, 2010

Title: ***Phragmites* growth in response to selected application of herbicides in a Lake Erie coastal marsh**

Author: Joseph R. Holomuzki, Robert S. Whyte and David M. Klarer

Abstract: Controlling invasive *Phragmites australis*, the common reed, is a priority of many North American wetland managers because it can rapidly spread to adversely affect plant diversity and wildlife habitat. Glyphosate and imazapyr herbicides (e.g., AquaNeat® and Habitat®, respectively) are commonly used to control reed, but it is unclear which is most cost-effective. We compared herbicide effectiveness and examined benthic community structure post-application in 20 x 20 m plots of reed that were either: hand-sprayed with AquaNeat® (30% solution), sprayed with Habitat® (5% solution), or left unsprayed (controls) ($n = 5$ plots/treatment). Emergent plant diversity (Shannon-Weaver H') was significantly higher in both sprayed treatments than in controls 1-year post-spraying. However, plant H' , emergent plant density, and % *Phragmites* cover were similar between both herbicide treatments. Macroinvertebrate H' and assemblage, and juvenile fish captures, were similar among all treatments. Even after 2 years post-spraying, both herbicides had similar effects on plant community recovery and reed control. We estimate AquaNeat® provides 2X more product/dollar than Habitat® at these commonly used dilutions

Title: **Preliminary results of muskrat impact in a *Phragmites*-dominated Lake Erie coastal wetland**

Author: Mark A. Lazaran and Robert S. Whyte

Abstract: The main purpose of this study was to investigate muskrat (*Ondatra zibethicus*) use of invasive *Phragmites australis*. Muskrats serve as wetland engineers by constructing lodges, grazing, and burrowing; creating open areas for seed and nutrient accumulation, which results in a change in plant communities. Our objectives were to determine if muskrats utilized *Phragmites* to construct lodges, and determine whether *Phragmites* is palatable to muskrats. During summer 2010, the entire embayment marsh at Old Woman Creek National Estuarine Research Reserve was searched for muskrat lodges. Lodge dimensions, vegetative composition, and active or inactive status were recorded for all lodges, which were spot mapped via GPS. Our results indicate that lodges were constructed of native vegetation (n=24) twice as often as *Phragmites* (n=10), and more often than *Typha* sp. (n=16). For active lodges, mean lodge width and clearing size were similar regardless of lodge construction material, however lodges constructed of native vegetation were significantly taller than those constructed of *Phragmites* (p=0.5) or *Typha* sp. (p=0.3). Field observations provided evidence that *Phragmites* was not consumed by muskrats. Our results indicate that the muskrat's use of *Phragmites* for lodge construction coupled with a distaste for *Phragmites* may influence seed and nutrient accumulation as well as plant diversity in wetlands where *Phragmites* is a major component of the vegetation community.

Title: **Small mammal diversity and abundance in three habitat types on Presque Isle State Park, Erie, Pennsylvania**

Author: Heather A. Markel, Cynthia E. Rebar

Abstract: The small mammal populations on Presque Isle State Park are an important part of the Parks ecology, a prey base for predators on the park and a known disease vector. By conducting a one year study on small mammal populations, diversity, abundance and population cycles information can be collected that will help understand the Parks small mammal ecosystem as well as contribute to various other studies on the Park. Small mammals were trapped in three habitat types; meadow, scrub and forest. Trap sessions were conducted approximately every two weeks over one year to analyze seasonal variation in small mammal populations. An additional aspect of the study was to determine trap efficacy between Large and Small Sherman Folding Traps.

Title: **A census of the bat community on the campus of Gannon University, Erie, PA**

Author: Matt Sturdivant, Morgan Pratt, and Steven J. Ropski

Abstract: The bat population in the United States is diminishing because of the White-Nose Syndrome. Finding out where bats at Gannon University roost during the day and why is very important to the study of these animals. Bats were monitored between four to five days a week from April to November 2010 by walking a set path of the campus to obtain where specifically they prefer to roost during the day. Building surfaces, building temperature, the building itself, and concentrations of insects nearby are a few of the criteria that played a role when examining the bat population. When accessible, bats were marked with non-toxic paint to see if any used sites repeatedly. Total number of bats recorded were 1224, of which 1193 were little brown bats (*Myotis lucifugus*), 32 were possibly Eastern pipistrelles (*Pipistrellus subflavus*), and one big brown bat (*Eptesicus fuscus*). Of the 150 marked bats, 75 were observed one or two subsequent times on campus. These data suggest that the Gannon campus is not a permanent roosting site but merely a stopover/temporary site. These data compare very favorably with previous censuses conducted in 1995 and 2003.

Title: **Dietary analysis of coyotes on Presque Isle State Park, Erie, PA**

Author: Carrie Ann Duafala, Andrea Sposito, and Cynthia E. Rebar

Abstract: The coyote (*Canis latrans*) is the largest mammalian predator on Presque Isle State Park. Numerous studies done throughout the United States have shown that coyotes prefer small prey as a main dietary resource, and that they scavenge large prey when available. Yet, the diet of the eastern coyote in western Pennsylvania has not been thoroughly studied. In addition, because Presque Isle State Park receives over three million visitors a year, the opportunity exists for coyotes to include discarded human refuse as a food resource may be possible. Given the paucity of data on diets of coyotes in northwestern Pennsylvania, we designed a scat analysis study to determine the food resources being used by coyotes on Presque Isle State Park. Collection of coyote scat consisted of samples taken from designated trails in: spring (March-May); summer (June-August); fall (September-November); and winter (December-February). Thirty nine samples were collected throughout the year. Mass, length, and diameter were recorded for each scat sample collected. Scat were washed in nylon stocking bags to removed digested material and the remaining material was manually separated. Microscopy was used in the examination of hair found in each sample for determination of species. In analyses of scat samples, arthropods, plant material, fish, and small mammals were found, with rabbits as the most commonly encountered hair type. Discarded human refuse does not appear to be a significant component of coyotes' diets on the Park.

Title: **Maternal genetic variance determined by sequencing *Odocoileus virginianus* (white tailed deer) mtDNA D-loop**

Author: Jacqueline McCullough, Linden, Lara, Mark Gooss and Andrew Berglund

Abstract: A limited number of studies involving electronic monitoring suggest that female white-tailed deer (*Odocoileus virginianus*) exhibit philopatric behavior, ranging only a few square kilometers within their lifetime, whereas male deer are known to range in areas of 80 square km. Studies of mitochondrial DNA genetic variation to independently determine this movement pattern are limited. Mapping variations within the 1,041 basepair long D-loop control region enables haplotype identification and comparison. We hypothesize that deer within herds from three municipal parks in Dayton, Ohio are more closely maternally related to each other than they are to herds located in Mercer County, Pennsylvania or Presque Isle, Pennsylvania. To date, studies at Grove City College have discovered 18 novel haplotypes and published 12 mitochondrial D-loop sequences on the NCBI GenBank. These studies show higher percent homology of haplotypes within parks, but less homology between the parks, and dissimilarity between Dayton and Mercer County, Pennsylvania haplotypes. Although the sequences indicated a number of different haplotypes within whitetail deer populations in Ohio and Pennsylvania, the sequences completed to date tend to support the existence of philopatry in female deer in separate urban populations.

Title: **BDE-209 induced alterations in the oxidative status of mice tissues**

Author: Nathan Kubeldis and Mary C. Vagula

Abstract: Polybrominated diphenyl ethers (PBDEs) are flame retardants that come in three commercial mixture forms *viz.*, penta, octa and deca BDEs. By the end of 2008, except for deca BDEs, all other congeners and commercial mixtures are banned or voluntarily phased out in the US. These compounds are lipophilic and persistent and thus became widespread environmental contaminants. Although some reports on the toxicity of PBDEs on reproductive, nervous, and endocrine system are available, very little is known about the specific toxicity of BDE-209, an abundantly used congener in deca BDE mixture. This study reports the impact of BDE-209 on the oxidative status and antioxidative protective mechanism in the mice tissues *viz.*, kidney, liver, brain, and intestine. Adult male mice were injected intraperitoneally with 0.25mg/kg body weight of BDE-209 for four consecutive days (a total of 1mg/kg body weight). On the fifth day mice tissues were separated for the determination of lipid hydroperoxides, superoxide dismutase (SOD) and glutathione peroxidase (GPx). The results show an overall shift in the oxidative/antioxidative equilibrium in exposed mice. Lipid hydroperoxide levels are found to be elevated significantly indicating an increased lipid peroxidation and oxidative damage. GPx and SOD have shown tissue specific alterations in exposed animals. SOD activity was found to increase in the brain tissue after exposure but was found to decrease in kidney, liver and intestine. The oxidative stress is clearly evident and the disruption in antioxidant enzymes indicates that BDE-209 is quite toxic at the above concentration and duration of exposure.

Title: **Preparation of polymer foam that contains membrane protein**

Author: Ashleigh Hanner and W. Yunghans

Abstract: We prepared plasma membranes from bovine kidney by differential and sucrose gradient centrifugation. Membrane material collected at the 53.4 % sucrose layer based on 5' nucleotidase and succinate-INT-reductase marker enzyme activity. We mixed detergent, Sarcosine, extracted membrane protein or bovine serum albumin with precursors for polymer foam production and allowed foam to polymerize. Samples showed, by light microscope, foam bubble layers to have morphology consistent with proteins being incorporated into the polymer. We expect that such foam layers may be useful for water filtration techniques.

Title: **Computer models for predicting bacteria levels at Presque Isle beaches**

Author: Michael A. Rutter

Abstract: The Regional Science Consortium at the Tom Ridge Environmental Center at Presque Isle recently received a grant from the Environmental Protection Agency as part of their Great Lakes Restoration Initiative to develop computer models to help predict bacteria levels at Presque Isle State Park Beaches. In this talk, I will explore some of the preliminary results of the modeling project. Using weather data collected in and around Presque Isle Bay as predictor variables, I will discuss how multiple linear regression and decision tree models can be used to predict *E. coli* levels at Presque Isle beaches. I will also discuss what other possible measurements could be taken by Presque Isle State Park officials early in the morning that may help determine if warnings or beach closings need to be issued, given the weather conditions.

Title: **Preliminary evaluation of some sustainable algae-for-energy production systems in Erie.**

Author: Michael Campbell

Abstract: With partial funding support from the Erie Keystone Innovation Zone (KIZ) and Pennsylvania Infrastructure Technology Alliance (PITA), biologists at Mercyhurst College have initiated a variety of experimental studies investigating the functionality of naturally occurring freshwater algal communities as potential “work-horses” for sustainable biomass production, using nutrient-rich waste-streams as fertility sources. Preliminary tests using trout feces supernatant water as a fertility source have shown positive results in laboratory experiments. Non-axenic cultures of mixed “natural” algae assemblages from a variety of Erie County sites have also been prepared for growth experiments in Erie municipal wastewater. Planned future studies will evaluate relationships among environmental stressors (nutrients and temperature), algae type, microbial biofilm development, and algal oil production in experiments simulating the variable biotic and physical conditions likely to be encountered in low-input, large-scale algal production systems.

Title: **Effects of temperature on algae production in mixed cultures with varied fertility.**

Author: Danielle Long

Abstract: Algae have become a candidate for a renewable fuel source, due to their unique ability to store lipids that can be converted into biofuel. The question that has been raised is whether algae can be grown cost effectively in less favorable climates such as our Northern Temperate Zone. In this experiment, mixed cultures of algae were exposed to varying temperatures and fertility levels to assess their production. Algae were collected from a local spring-fed stream and fertilized with fish feces supernatant from an adjoining trout nursery. The completely randomized design had three different temperatures (8, 16, and 22°C) and three different fertility levels, including a control with no fertilizer added. Production was measured by mass increase and instantaneous measurements of percent saturation with oxygen. The results showed that the production of filamentous algal mass peaked at intermediate temperature and intermediate fertility levels. Photosynthesis rates (as indicated by oxygen saturation) peaked in the intermediate fertility/high temperature setting. There was no significant effect of temperature on the non-filamentous algal mass production, but higher fertility yielded more algal mass. Photosynthetic rates of non-filamentous algae peaked in the highest fertility treatments at the coldest temperature. These results demonstrate the possibility of sustainable algal production with mixed-species communities at a wide range of temperatures.

Title: **Design of an aeroponic algal growth apparatus from CO₂ enrichment and nutrient limitation experiments**

Author: Robert Crowe

Abstract: Aeroponically generated algal biomass from wastewater is being tested by Erie's Renewergy Inc. as a means of advancing profitable organic byproducts and nutrient removal. Exactly how this system processes target compounds is unknown due to the temporal variability of the microbial communities that inhabit this system. With support of a grant from Pennsylvania Infrastructure Technology Alliance (PITA), an experimental apparatus has been constructed to allow controlled addition of CO₂ and phosphorus to mixed algal inocula on wastewater-saturated aeroponic substrates. The apparatus will allow measurement of biomass production and bacterial biofilm development with varying nutritional regimes and algal inocula sources. Data on final nutrient levels in "algal-treated" wastewater will be used to support computational modeling of Renewergy Inc.'s system performance.

PRESENTATIONS

Friday, November 5, 2010

Title: **Abundance and distribution of phytoplankton in Lake Superior**

Author: Hunter J. Carrick, Richard A. Bourbonniere, Benjamin Beall, George S. Bullerjahn, R. Michael L. McKay, Ralph E.H. Smith, Michael R. Twiss, Steven W. Wilhelm

Abstract: Pico and nano-sized phytoplankton play an important role in the trophic dynamics in many aquatic environments. These microorganisms are particularly important in oligotrophic lakes, such as Lake Superior, where past reports suggest that plankton biomass is dominated by small phytoplankton. That said, few seasonal estimates of plankton abundance and distribution have been made in Lake Superior. Therefore, this study measured the depth-specific distribution (between 7-10 depths at 2 offshore stations) of phototrophic pico and nano-plankton during three early, mid and later stratification periods (June, August, and October of 2010). The two sampling stations were located in the western arm of the lake (maximum depth at CDI and WM 250 m and 155 m, respectively). Water samples were preserved and analyzed using a combination of fractionated chlorophyll analysis, epifluorescence microscopy and flow cytometry. Pico and nanoplankton were abundant in the lake (range 10^2 to 10^5 cells/ml), and exhibited considerable variation with depth. The distribution of prokaryotic picoplankton varied with depth, exhibiting unimodal subsurface peaks during all three sampling periods. Larger, nano-sized prokaryotes such as *Limnothrix redekii* were abundant in the subsurface chlorophyll maximum (range 10^2 - 10^3 cells/ml), which was present during all sampling periods. Eukaryotic picoplankton were more uniformly distributed with depth (range 10^2 to 10^3 cells/ml), but constituted a greater proportion of algal biomass in the hypolimnion (depths > 80 m). The distribution of plankton within the lake will be discussed relative to variation in the lake's geochemistry.

Title: **Influence of nutrients, fish density, and abiotic factors on periphyton biomass along a temperate stream productivity gradient**

Author: Rebecca Eckert and Hunter Carrick

Abstract: The major influences on stream food web structure can be divided into three categories: predators, resources, and abiotic factors. While these factors have been examined separately, simultaneous effects are less often studied, especially in temperate streams. An *in situ* study using nutrient diffusing substrata with control, nitrogen (N; 0.5M), phosphorus (P; 0.05M), and N+P (0.5M and 0.05M, respectively) treatments was carried out in three temperate, limestone streams in Pennsylvania (Spring Creek, Penns Creek, and Cooks Creek). These experiments were carried out during summer low flow for five weeks to assess the impact of nutrients and lower trophic level fish density on periphyton growth. Total nutrient concentrations (total nitrogen: 0.895-4.760 mg/L; total phosphorus: 0.021-0.061 mg/L.) varied by about an order of magnitude among streams as did the density of *Salmo trutta* (1.00-35.27 per 25 m) and *Rhynchithys altratus* (30.81-307.58 per 25 m). Because the three streams are limestone influenced and have similar base chemistry, we were able to evaluate variation in nutrient concentrations and fisheries among streams. Periphyton chlorophyll was correlated with fish density, suggesting that basal nutrients probably augment the productivity of fisheries in these streams. In our experiment, while nutrients affected algal biomass differently in each stream ($F = 5.16$; $p < 0.05$), all three streams showed the strongest growth response to N+P enrichment, though it was not statistically significant for reasons to be discussed. The way in which these factors correlate to algal biomass and fish density is important to understanding the mechanisms driving food web structure in these streams.

Title: **Biofilm nutrient metabolism in PA streams: Changes in biomass, N: P ratio, and enzyme activity across experimental and natural nutrient gradients**

Author: Melissa May and Hunter Carrick

Abstract: Stream biofilms can provide important information on stream nutrient cycling due to their stationary nature and exposure to nutrients during both base flow and storm events -- information that cannot be gained from ambient nutrient concentrations alone. This study analyzed primary producer biomass (chlorophyll-a), biofilm N:P ratio, alkaline phosphatase activity (APA), and nitrate reductase (NR) as measures of biofilm community nutrient status across two types of nutrient gradients. Nutrient status indicators were first studied with an in-situ enrichment experiment at a low nutrient limestone spring (Big Spring, Bellefonte, PA) in order to calibrate them against known nutrient loads. Nutrient diffusing substrata leached nitrate and phosphate in a factorial design of nine $P \times N$ treatments (zero, 0.045M, and 0.50M nitrate and phosphate). Increasing P treatment led to significantly higher biomass and suppression of APA response, indicating P limitation at the site. High N:P ratios (>20) in the P_0 treatments also indicate P limitation, and significant response to both N and P indicate that leached nutrients were incorporated into the biomass. NR activity increased with highest N treatment, and showed significant interaction with highest P treatment, indicating increased N-demand and a shift to nitrate as an N source. Chl-a, N:P, and APA were also measured seasonally on biofilms grown on natural substrates in four subwatersheds of Spring Creek, Centre County, PA. Significant spatial and temporal differences were found between subwatersheds, and were compared with ambient nutrient and land use data in order to link the physiological indicators of nutrient status back to commonly measured watershed characteristics.

Title: **Impact of the anti-depressant drug fluoxetine on the microbial ecosystem of Presque Isle State Park**

Author: Surafel Mulugeta, Eric Clark, Kendal Greene, and Steven Mauro

Abstract: Fluoxetine is the active ingredient in anti-depressant drugs. Studies in the past decade have detected fluoxetine accumulation and persistence in several aquatic ecosystems, including the Great Lakes. The levels detected have the potential to negatively impact mussels. In this two year study, we tested for the presence of fluoxetine in the beach waters of Presque Isle State Park. Our results indicate that fluoxetine is present and persists in these recreational waters. Moreover, we find that fluoxetine can retard growth of some fecal bacteria, while not affecting other bacterial types significantly. Further, the presence of fluoxetine has the ability to induce bacteriophage production in certain strains of *E.coli*. These results provide evidence that fluoxetine has the ability to dramatically alter the microbial landscape of Presque Isle beach waters in a manner that undermines efforts to gauge water quality based on current water testing protocols.

Title: **Size determinants of *Ceratopteris richardii* and their potential influence on gender**

Author: Tiffany Sturey and Mike Ganger

Abstract: In many organisms females invest more into reproduction than males due to greater resources required to mature and support offspring. *Ceratopteris richardii*, a homosporous fern, can develop into either male or hermaphrodite gametophytes and it is hypothesized that this differentiation should be related to the developmental stage of individuals. The more advanced spores are predicted to become hermaphrodites, while the less advanced spores would become male. Antheridiogen (A_{CE}), a hormone produced by hermaphrodites, induces undifferentiated spores to develop as males. A_{CE} has been thought to act directly by altering gene expression to determine male sex. An alternative explanation is that A_{CE} affects gametophytes by delaying growth and development. If individuals make gender decisions based on developmental stage, then A_{CE} may be indirectly inducing the spores to develop as male by influencing size instead of directly dictating gender. An experiment explored the determinants of size and their role in gender decisions. Four concentrations of A_{CE} (0x, 0.5x, 1x, and 2x) were used to determine if A_{CE} affects gametophyte size. A mutant, *him1*, which always develops as male, was used as a negative control, while spore sized served as a covariate. Overall, *him1* mutants grew larger than wild type individuals. Spore size was positively related to the size of the gametophyte but was not predictive of its ultimate gender. Gametophyte size was not significantly related to A_{CE} concentration, but results were highly suggestive that it affects growth.

Title: **The vascular plant species of the fringing habitat ecotone in the Erie Bluffs State Park**

Author: Lindsey Bocian, James McGivern, Nathalie-Ann C. Brown, Joseph Perenic, and Mike Ganger

Abstract: The Erie Bluffs State Park is a 450-acre property located in northwestern Pennsylvania along Lake Erie. Approximately 441 vascular plant species occur within various habitats including old growth forest, oak savannah sand ridges, bluffs, slump ravines, old fields, agricultural fields, and a fringing habitat ecotone, hereafter referred to as the fringing habitat. The fringing habitat is formed where forest and field intergrade with one another. The management plan for the park includes converting the agricultural fields to native habitat. Given that the fringing habitat surrounds these fields, this habitat is likely to play a disproportionately large role in determining the plant species that successfully colonize and persist post conversion. The characterization of the fringing habitat is therefore crucial to successfully predicting the fate of the fields as they are allowed to go fallow. In the summer of 2010, 146 quadrats, one meter wide and 50 meters apart, were established within the fringing habitat. The vascular plant species present in each quadrat as well as the tree species that the quadrat abutted were recorded. The fringing habitat was found to contain 158 of the 441 species present in the park overall. These species include forest and field species along with some unique to the habitat. Data are currently being analyzed to further characterize the fringing habitat: the life histories, native/non-native status, and patterns of species richness are being explored.

Title: **Vegetation characterization of the fringing habitat ecotone in the Erie Bluffs State Park using ordination and association analysis**

Author: James McGivern, Lindsey Bocian, Nathalie-Ann Brown, Joseph Perenic, and Mike Ganger

Abstract: The Erie Bluffs State Park is a 450-acre park located in northwestern Pennsylvania. The park includes many plant communities including forest, old field, slump ravine, and bluff face. Approximately 441 vascular plant species occur within these communities, including species rare to Pennsylvania. One ubiquitous plant community found within the park is an ecotone formed where forest and field habitats converge, hereafter referred to as the fringing habitat. This fringing habitat is composed of species typical to forests and fields, along with a few species unique to this ecotone. Within the fringing habitat are 158 species of the total 441 found within the park itself (approximately 36%). The long-term development of the park includes converting currently farmed areas into old fields. The fringing habitat may serve as a source of colonists for these old fields and therefore an accurate understanding of the composition of the species within the fringing habitat is crucial for predicting the long-term development of these fields. To characterize the vegetation, 146 quadrats were established within the fringing habitat. Quadrats were 1m wide and were located 50m apart. The presence of vascular plant species within quadrats was determined. Two methods of vegetation analysis were used to characterize the fringing habitat. Association analysis involves determining indicator species that identify specific vegetation types, while ordination involves identifying groups of species that cluster together to form specific vegetation types. Data are currently being analyzed to determine if the fringing habitat is uniform and whether both analyses lead to similar conclusions.

Title: **Whole-sediment exposure of brown bullhead (*Ameiurus nebulosus*) to industrially contaminated sediment- Preliminary results.**

Author: Jim Grazio

Abstract: Brown bullhead catfish (*Ameiurus nebulosus*) are an important biological indicator of exposure to carcinogens in the environment. Tumors and other deformities in this species are most often attributed to exposure to polycyclic aromatic hydrocarbon (PAH) contaminants in the sediment. However, the putative relationship between sediment PAH exposure and elevated incidence rates of tumors in brown bullhead is based largely on correlative research and these correlations do not always hold. In an effort to examine the causal relationship between exposure to environmental contaminants and the development of tumors and other deformities, 66 brown bullhead from a known research stock were placed in one of 16 aquaria containing either PAH-contaminated sediment from Presque Isle Bay (Erie County, PA), control sediment from Canadohta Lake (Crawford County, PA), or aquaria containing water only. All fish were examined for the presence of grossly visible lesions, weighed and measured at the inception of the experiment and at 6 month intervals. The largest specimen from each tank was also necropsied at 6 month intervals. The liver of necropsied specimens was excised, weighed, and tissue sections removed and preserved for future histopathological analysis and analysis of DNA adduct formation. The experiment was terminated after 18 months and all remaining specimens were necropsied. There were no differences among bullhead in the three experimental conditions in terms of grossly visible lesions, condition factor (K), or hepatosomatic index (HSI). However, these results must be considered preliminary pending analysis of liver tissue for biomarkers of early-stage cancer.

Title: **An examination of Petromyzontidae in Pennsylvania: Current distributions of native lamprey species**

Author: Shan Li and Jay Stauffer, Jr.

Abstract: The survey of the native lamprey (Petromyzontiformes) populations is very important to assess their status. It could significantly improve the conservation and management of lamprey species. In the last one hundred years, their populations have been decreasing because of the effects brought by the invasive species and the control programs of the introduced Sea Lamprey (*Petromyzon marinus*). In addition to the Sea Lamprey, *Ichthyomyzon unicuspis* (Silver Lamprey), *Ichthyomyzon fossor* (Northern Brook Lamprey), *Ichthyomyzon bdellium* (Ohio Lamprey), *Ichthyomyzon greeleyi* (Mountain Brook Lamprey), *Lampetra appendix* (American Brook Lamprey), and *Lampetra aepyptera* (Least Brook Lamprey) have been documented. I compiled these records from Penn State University Fish Database, PA Fish and Boat Commission, PA Natural Diversity Inventory database, and databases of other universities such as Cornell University. This study briefly describes the characteristics and distributions of each species of lamprey in Pennsylvania. I used ArcGIS as the mapping tool and Microsoft ACCESS for database storage. The historical records and the current records of the native lampreys will be compared to update distribution records. During the next year, I will randomly sample of native species by electrofishing, dip netting and seining.

Title: ***Neogobius melanostomus* impact on native fish distributions in Lake Erie tributaries**

Author: Rachel Cleaver Yoder and Jay Stauffer, Jr.

Abstract: The Round Goby, *Neogobius melanostomus*, was first reported in Lake Erie in 1996, and has since spread throughout the Lake and its tributaries. This study aims to determine the distribution of native fishes in the presence and absence of Round Gobies. The information obtained will be an important addition to the understanding the interaction of Round Gobies and native fishes in Lake Erie tributaries. Six tributaries within Pennsylvania were selected for study. Each stream had two 50 meter sites that were sampled by snorkeling and placing a numbered flag at each location were a Round Goby, Mottled Sculpin, or darter were observed. A series of data was collected at each flag, including species name, position, orientation, water depth, bottom flow, median flow, distance from right bank, distance from starting point, and substrate composition. Habitat availability was also calculated. A general linear model was used to determine relationships among the habitat selection of Round Goby and native fishes.

Title: **Results from the initial “ELF” inter-mine pool transfer tests**

Author: Bryan J. Page, Bruce Leavitt, Timothy Danehy, Greg Leavitt, Cliff Denholm, Shaun Busler, Margaret Dunn

Abstract: Abandoned underground mines in the Pittsburgh coalbed continue to be a source of degradation to over 30 miles of streams in the Raccoon Creek Watershed. In 2006, an evaluation of selected discharges with conceptual treatment approaches was developed that included the “ELF” System which had the potential for substantially eliminating AMD impacts to Burgetts Fork for 3.3 miles to the confluence with Raccoon Creek. For simplicity, the acronym, “ELF”, is used to identify the discharge that would be created by consolidation of discharges from Erie Mine, Langeloth Mine, and Francis-Patterson Mine. This project addresses the initial physical feasibility of the “ELF” System” by identifying if the opportunity exists to combine and to relocate AMD from various locations in the Burgetts Fork Subwatershed by “inter-mine pool transfer” to a single discharge point for future reuse or treatment. To evaluate the degree of hydrologic interconnectedness of the mine workings, two injection and withdrawal tests were conducted. The tests indicate that there is no apparent impediment to flow within the Erie Mine and that the Erie Mine discharge can be successfully relocated by implementation of the “ELF” system. The Tests also indicate that withdrawal from the Langeloth Mine Shaft with injection into the Erie Mine may substantially decrease the discharge from the Francis mine that flows through and out of the Patterson Mine. The physical feasibility of the “ELF” system to decrease or eliminate the flow from the Patterson Mine requires additional confirmation prior to implementation.

Title: **Characterizing phenotypic and molecular virulence factors in antibiotic resistant *Aeromonads* from Presque Isle Bay**

Author: Jasmine Shinko, Alexander Augustyniak, Christopher Gee, Greg Andraso and Troy Skwor

Abstract: Beach closings are typically associated with high *E. coli* numbers suggesting agricultural and/or human waste contamination in the water. However, most *E. coli* are not associated with human diseases. The bacterial genus *Aeromonas* is ubiquitous in nature but has also been associated with numerous human diseases including cellulitis, skin and wound infections, necrotizing fasciitis and gastroenteritis. We recently identified multiple antibiotic resistant strains of *Aeromonas hydrophila* and *A. veronii* biotype *sobria*, both species associated with human diseases, in Presque Isle Bay. Our objective was to determine if these isolates had the potential to cause human disease as demonstrated by their cytotoxicity against human epithelial cells and their ability to lyse red blood cells. We found the majority of antibiotic resistant isolates from Presque Isle Bay demonstrated potential pathogenic phenotypes. Additionally, we wanted to create a molecular fingerprint of virulence factors to understand which genes were responsible to the above phenotype. Multiplex polymerase chain reactions (PCR) were used to characterize eight different virulence genes from each isolate. Results of the PCR analysis provided unique molecular patterns associated with each *Aeromonas spp.* and their pathogenicity phenotype. Together, we have classified antibiotic resistant *Aeromonas* species from Presque Isle Bay and demonstrated their potential to be human pathogens on a molecular and phenotypic level.

Title: **Evaluation of antibiotic resistance and species-level characterization of the bacterial genus *Aeromonas* from Presque Isle Bay**

Author: Jasmine Shinko, Alexander Augustyniak, Christopher Gee, Greg Andraso and Troy Skwor

Abstract: The genus *Aeromonas* consists of gram negative bacteria that are ubiquitous in water. They have been implicated in numerous human diseases including gastroenteritis, skin and wound infections, necrotizing fasciitis, and septicemia. Additionally, they are responsible for causing ulcerating diseases such as furunculosis in salmonids and other fish. Recently, there has been a worldwide increase amongst *Aeromonas species (spp.)* in their resistance to antibiotics such as ciprofloxacin and tetracycline. However, the prevalence of antibiotic resistance associated with *Aeromonas spp.* has not been evaluated in Lake Erie. The objective of our study was to determine the prevalence of ciprofloxacin and tetracycline resistance among *Aeromonas spp.* Antibiotic resistance was assessed by culturing bacteria on *Aeromonas* selective agar with or without tetracycline (16µg/ml) or ciprofloxacin (0.01 µg/ml). Species identification was performed by restriction fragment length polymorphism (RFLP) analysis. Results were used to characterize *Aeromonas* species composition within the Lake and to identify the species associated with antibiotic resistance. We identified six different *Aeromonas spp.* within Lake Erie, though only two species, *A. hydrophila* and *A. veronii* biotype sobria, comprised the antibiotic resistant populations. The latter species have been implicated with *Aeromonas*-induced human diseases. The detection of antibiotic resistance in *Aeromonas spp.* could limit the efficiency of antibiotics in the future treatment of human and fish infections. On-going studies in our lab will focus on assessing the potential of *Aeromonas* isolated from the Pennsylvania Lake Erie Watershed to cause human disease and identifying sources of antibiotic resistant strains.

Title: **Effect of photobiomodulation (NIR and NUV) on the inflammatory response from cervical epithelial cells infected with *Chlamydia trachomatis***

Author: Cassandra Wasson, Jessica Zourelis, Janis Eells, and Troy Skwor

Abstract: *Chlamydia trachomatis*, an obligate intracellular bacterium, is the leading cause of bacterial sexually transmitted diseases nationwide and worldwide. With the majority of infections asymptomatic, failure to identify and properly treat could lead to sequelae, including pelvic inflammatory disease, salpingitis, and ectopic pregnancy in females and epididymitis and infertility in males. Near infrared light (NIR) has been associated with tissue healing, inflammation reduction, and pain reduction. Additionally, near-ultraviolet light (NUV) can restrict the growth of various gram-positive and gram-negative bacterial pathogens. Because recent studies indicate antibiotics may increase the recurrence of these chlamydial infections, particularly those of the eye, alternative treatments are necessary. Our objective was to assess the use of NIR and NUV as possible alternatives for *C. trachomatis* infections. Human cervical epithelial cells, HeLa, were infected with *C. trachomatis* serovar E and were further treated with suboptimal concentrations of penicillin at 24h post-infection to mimic a chronic/persistent infection. Infected HeLa cells were then treated with NIR or NUV. Supernatants were collected and assessed for IL-6 production. Our results demonstrated elevated levels of IL-6 from *C. trachomatis* serovar E infected HeLa cells, with persistent states further supporting the presence of IL-6 as a possible risk factor for reproductive tract diseases. Moreover, IL-6 levels decreased upon treatment with either NIR or NUV, with NUV having a greater effect, suggesting further medicinal applications of NIR and NUV as possible alternative treatment options for *C. trachomatis* infections.

Title: **Characterization of the Aeromonad and Pseudomonad populations in a white perch, *Morone americana*, skin lesion from Presque Isle Bay**

Author: Jillian P. Rhoads, Gregory Delost, Greg Andraso and Troy Skwor

Abstract: According to a 2009 EPA statistic, Great Lakes commercial and sport fishing generates over four billion dollars in revenue annually. Fishing provides thousands of jobs in the Great Lakes states and is a main contributor to the success of the economy. Diseases affecting Great Lakes fish populations are therefore of great concern because of their possible impact. A critical component of limiting the spread of any disease is determining its etiologic agent. In this case study, we investigated bacteria found in skin lesions and healthy skin of a white perch, *Morone americana*, collected from Presque Isle Bay. To identify the etiologic agent, samples from skin lesions were first plated on tryptic soy agar (TSA). The majority of colonies presented as gram negative, oxidase positive coccobacilli, all of which are characteristic of pseudomonads and aeromonads. This corresponds with previous research associating both genera with fish diseases. Prevalence of *Aeromonas* and *Pseudomonas* on wounded and healthy skin was determined using selective agars, and results suggested a high prevalence of aeromonads colonizing the wounded skin. Sugar fermentation assays were performed to further differentiate between *Aeromonas* species and DNA sequencing of the 16S rRNA gene further confirmed genus and species identity. All results suggest *Aeromonas sobria* as the etiologic agent.

Title: **Quantifying parasitic infection and its effect on reproductive success in purple martins?**

Author: Cassandra A. Silverio and Bridget J. Stutchbury

Abstract: Parasite resistance is an important mechanism for sexual selection. Parasites may affect the expression of traits used in sexual selection, providing an *honest* indicator of quality. Individuals in poor condition due to parasitic infection will be unable to fully express these traits and therefore be less attractive during mate selection (Hamilton and Zuk 1982). Therefore parasitic infection is expected to negatively impact reproductive success as an indication of poor quality and thus influence mate choice. However the fitness costs of infection are not well established. This study quantified *Haemoproteus* infection in purple martins (*Progne subis*) and tested the prediction that birds exhibiting higher loads of *Haemoproteus* have a lower reproductive success. This study used mark-recapture, nest monitoring and blood sampling of hundreds of adult purple martins from two colonies in north western Pennsylvania over a four-year period (2006-2009). Infection loads of *Haemoproteus* were determined using real-time polymerase chain reactions (qPCR) a highly accurate method for quantifying infection. As part of a collaborative research effort we will use parasite loads as a measure of individual quality to determine if females improve their offspring fitness through extra-pair mating, as well as the role of parasites in migratory behaviour using data collected from geolocators.

Title: **Current research on Purple Martins (*Progne subis*) conducted by the Purple Martin Conservation Association (P.M.C.A.)**

Author: Robert A. Aeppli

Abstract: East of the Rocky Mountains, Purple Martins (*Progne subis*) depend almost entirely on housing provided by humans for their nesting. This dependency makes the Purple Martin a great research subject, because it eliminates time spent searching for birds, and it increases the ease of capturing them, allowing for large numbers to be banded. The P.M.C.A. and its partners at York University in Toronto, Ontario have been conducting joint research on Purple Martins for nearly 10 years studying topics such as paternity, dispersal and disease. Current research reported on includes studies of long-term survival and breeding success, and ground-breaking research using geo-locators to track the migration of Purple Martins to Brazil and back.

Title: **Stopover habitat for migrant land birds at Presque Isle: fire escape or full service hotel?**

Author: Sarah Sargent

Abstract: Most species of migratory land birds in eastern North America have experienced long- term population declines over the last half century, but developing conservation strategies for them is complicated by their reliance on multiple habitats during their annual cycle. During spring and fall, stopover habitat is essential for successful migration, but some locations provide more resources than others. Peninsulas like Presque Isle are well known as “migrant traps”, places where birds accumulate in high numbers because of the surrounding water where birds cannot land. But does Presque Isle provide sufficient resources for birds to refuel and resume their migration? I will report on estimates of rates of weight gain by different species of migrants at Presque Isle and compare them to published results from Long Point, Ontario.

POSTERS

Title: **Resilience of invasive species at the Senate Hall wetland site**

Author: Matthew Pluta

Abstract: Wetlands are significant in supplying habitats to native species, as well as for filtering nutrients and creating a passage for seed dispersal. It is very common for invasive species to disrupt natural wetland habitats. In Pennsylvania, *Phragmites australis* (Common Reed) is a major wetland invasive species. The wetland plot by Senat Hall, Penn State Erie, is the area of interest for this research. A GPS mapping technique was used to determine the boundaries of the wetland site, while a soil analysis test was conducted at five different locations to help more readily identify the wetland. The soil tests were within the wetland soil range with a pH of 7.3 and a hydration test showed a moisture content of 53.5%, which is an acceptable level for wetland habitats. A Species Dominance Index indicated that *Phragmites australis* was the most prevalent species in the Senat Hall wetland. The *Phragmites australis* were manually removed with the plot divided in half to compare growth between the natural seedbed and a wetland seed mix. The objective was to determine which method would restore the most biodiversity while eliminating the *Phragmites australis*. After analyzing the data, a Species Dominance Index showed that Common Reed was still the most prevalent species in the wetland. It was found that different techniques were needed to completely remove the Common Reed, as *Phragmites australis* showed a classic example of environmental resilience.

Title: **Evaluation of Lake Erie coastal marshes dominated by *Phragmites* as habitat for marsh wrens**

Author: Mark A. Lazaran, Carol I. Bocetti, Robert S. Whyte

Abstract: Marsh Wrens (*Cistothorus palustris*) are a species of concern in Ohio. During our 2009 assessment of the impact of invasive *Phragmites australis* on marsh birds at Old Woman Creek National Estuarine Research Reserve (OWC), our data suggested Lake Erie coastal marshes dominated by *Phragmites* serve as habitat sinks for Marsh Wrens. In an effort to control *Phragmites* in late July 2009, land managers at OWC aerially applied herbicide to the entire emergent marsh. At Sheldon Marsh State Nature Preserve (Sheldon), land managers applied herbicide spot treatments to *Phragmites* patches only throughout summer 2009. We returned to OWC and Sheldon in 2010 to monitor Marsh Wren nesting success. Our 2010 results suggest a similar abundance of singing males and active nests, however, the arrival date was significantly delayed in 2010 compared to 2009. The mean date of nest initiation was twice as late in 2010 (67.0 days past safe date) as in 2009 (31.2 days past safe date), 2-tailed t-test, $p=0.0065$. The mean height of nests were similar in 2010 (79.57 cm) and 2009 (86.36 cm), but the vegetation took longer to reach these heights in 2010 due to the herbicide treatments, particularly at OWC (nest initiation 72.5 days past safe date in 2010 vs 29.3 days in 2009, 2-tailed t-test, $p=0.106$). Our 2010 results suggest broad-scale treatment of the entire emergent marsh may have degraded habitat quality and amplified the population loss to the habitat sinks in these coastal marshes.

Title: ***Phragmites australis* versus *Typha latifolia*: testing the competitive abilities of *Typha* against *Phragmites* to assess whether *Typha* would be a good reintroduction species in areas of *Phragmites* invasion.**

Author: Michael A. Cross

Abstract: *Phragmites* has become a problematic invasive species recently in wetlands of North America. Once *Phragmites* has invaded and becomes established it can cause detrimental effects on the native flora and fauna. Although there are many treatments for the control of *Phragmites*, the majority must be reapplied to have any long term effects. The reintroduction of a native species could help affected wetlands by revegetating and improving wetland functions. One example of a species that would be well suited for reintroduction is *Typha latifolia*. Since both species are rhizomatous one could test the competitive abilities of planted rhizomes, the effects of hydrology and salinity changes, and whether planting *Typha* rhizomes into *Phragmites* stands is a way to curb *Phragmites* spread. With data from this research one could determine if *Typha* is a good replacement species once *Phragmites* is removed or controlled.

Title: **Land use/cover, landforms, and their relationships on Presque Isle, Pennsylvania.**

Author: Andrew Obringer, Nicholas Fiesler, Justina Santiago, Eric Straffin and Richard Deal

Abstract: The objectives of this study were to develop a Geographical Information System (GIS) data base for Presque Isle, and to derive landform/landcover maps from that data. The database includes digital elevation from state lidar data, color aerial photography, and anthropogenic features such as roads and trails. The construction of digital elevation models (DEMs) permits the delineation of major landforms and geologic environments, while aerial photography permits the construction of land cover and land use maps. These derived products will be useful in a variety of geologic, biologic and land management studies. Presque Isle formed as a sand spit from north-eastly long-shore transport of sand. Wind-blown sand accumulated as a series of high dune ridges that parallel exposed beaches from which the dune sand was derived. Wetlands and inland water bodies occupy the lowest spaces between beach and dune environments. High resolution DEMs, when color classified, clearly delineate modern and ancient beach, dune, and wetland systems. The resulting images illustrate the geologic evolution of Presque Isle, with younger beach and dune ridges cross-cutting older landforms. Aerial photography was used to classify land cover/use. Several categories were created, including forest cover, managed lands, wetlands/inland waters, and active beach. Land use and landform categories were verified in the field. Anthropocentric and biotic associations were observed between land cover/use and landforms. Human infrastructure tends to occur along ancient beach and dune ridges of Presque Isle. Forests exist along dune ridges. Remnants of past beaches now comprise inland water bodies and surrounding wetlands.

Title: **A preliminary ground penetrating radar survey examining the geologic history of Presque Isle, Pennsylvania.**

Author: Zachary Robertson, Susan Price, Adam Baldwin, and Eric Straffin

Abstract: The purpose of this study is to develop a better understanding of the pre-historic geologic history of Presque Isle, a migrating sand spit. To date, no study has systematically examined the subsurface stratigraphy of the prehistoric beach and dune ridges on the peninsula. Digital elevation models clearly distinguish those major landforms, which were used to define sites to study the subsurface stratigraphy utilizing ground penetrating radar (GPR) and coring techniques. A MALA[®] ground penetrating radar unit with a 500 Mhz antenna was employed to study four dune/beach ridge landforms, including one modern and three prehistoric systems. The GPR profiles illustrate differences in beach and dune sand deposits (facies). Beach facies show strong lake-ward dipping reflectors, likely due to the presence of alternating, laminated quartzose and heavy mineral sands. Dune facies are characterized by more complex reflectors that have a weaker signal than beach facies. Dunes are composed of fine, predominantly quartzose sands, that overly coarser beach sand. Eolian (wind) processes blew fine sand off the beach, which then accumulated in vegetation downwind (generally southeast) to form dune ridges. Episodic spit migration and dune development resulted in several prominent dune ridges separated by low beach and wetland environments. Vibra-coring and hand-augering of prehistoric dune and beach environments permit detailed examination of sediments, calibration of GPR profiles, and interpretations of the geologic evolution of Presque Isle. Organic materials taken from cores will be carbon-dated to constrain the timing and rate of spit migration and dune formation in the prehistoric period.

Title: **Influence of nutrients, fish density, and abiotic factors on periphyton biomass along a temperate stream productivity gradient**

Author: Rebecca A. Eckert and Hunter J. Carrick

Abstract: The major influences on stream food web structure can be divided into three categories: predators, resources, and abiotic factors. While these factors have been examined separately, simultaneous effects are less often studied, especially in temperate streams. An *in situ* study using nutrient diffusing substrata with control, nitrogen (N; 0.5M), phosphorus (P; 0.05M), and N+P (0.5M and 0.05M, respectively) treatments was carried out in three temperate, limestone streams in Pennsylvania (Spring Creek, Penns Creek, and Cooks Creek). These experiments were carried out during summer low flow for five weeks to assess the impact of nutrients and lower trophic level fish density on periphyton growth. Total nutrient concentrations (total nitrogen: 0.895-4.760 mg/L; total phosphorus: 0.021-0.061 mg/L) varied by about an order of magnitude among streams as did the density of *Salmo trutta* (1.00-35.27 per 25 m) and *Rhynchithys altratus* (30.81-307.58 per 25 m). Because the three streams are limestone influenced and have similar base chemistry, we were able to evaluate variation in nutrient concentrations and fisheries among streams. Periphyton chlorophyll was correlated with fish density, suggesting that basal nutrients probably augment the productivity of fisheries in these streams. In our experiment, while nutrients affected algal biomass differently in each stream ($F=5.16$; $p<0.05$), all three streams showed the strongest growth response to N+P enrichment, though it was not statistically significant for reasons to be discussed. The way in which these factors correlate to algal biomass and fish density is important to understanding the mechanisms driving food web structure in these streams.

Title: **Annual prevalence of *Ixodes scapularis* ticks infected with *Borrelia burgdorferi* from Presque Isle**

Author: Richard Lorenzo and Christopher Keller

Abstract: Lyme disease, caused by *Borrelia burgdorferi*, is the most common arthropod borne disease in the United States, with more than 25,000 confirmed cases reported each year. Erie County Pennsylvania is considered to be at "high risk" for disease transmission, although a relatively low number of cases are reported each year. Our goal is to determine the risk of possible exposure to Lyme disease in Erie County by examining the prevalence of *B. burgdorferi*-infected *Ixodes scapularis* ticks throughout Erie County, Pennsylvania. In addition, the annual variability of *Borrelia burgdorferi*-infected ticks from Presque Isle will be examined. Adult *Ixodes scapularis* ticks were collected using the flagging method and stored in a solution of 70% alcohol. Ticks were air dried and then manually crushed in a 5% Chelex solution. Samples were centrifuged at 12,000G for 7 min and the supernatant, containing DNA, was transferred to a new tube. The presence of *B. burgdorferi* DNA was determined using a species-specific PCR followed by gel electrophoresis. Previous results from 2006 showed a ~55% prevalence of *B. burgdorferi* in the ticks from Presque Isle. Present results from ticks collected between 2007-present show that <5% of the ticks tested positive for *B. burgdorferi*. Although previous studies revealed a prevalence of >50% infected ticks from Presque Isle, present results show a <5% infection rate. Taken together, these results indicate there may be an annual variation in the prevalence of *B. burgdorferi*-infected *I. scapularis* ticks from Presque Isle.

Title: **2010 bacterial water quality assessment of Presque Isle Bay, Erie, Pennsylvania**

Author: Jeremiah Covert, Regional Science Consortium and Penn State Erie, The Behrend College

Abstract: Presque Isle State Park is a seven-mile long migrating peninsula, located on Lake Erie, which 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/100/ml, but less than 999 CFU/100ml and posts a swimming restriction when the levels are greater than or equal to 1000CFU/100ml. This study is intended 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: **A comprehensive evaluation of variance in phosphorus uptake kinetics among aquatic microbes**

Author: Keith Price and Hunter J. Carrick

Abstract: Microbial uptake represents an important sink for nutrients in aquatic environs, and therefore, estimates of these rates are needed to infer dynamics. Rates are typically derived from experiments that measure uptake as a function of varying nutrient concentrations. We performed a comprehensive assessment of the published, peer-reviewed literature to retrieve papers that reported experimentally derived phosphorus (P) uptake rates by aquatic microbes from various environs. We performed a meta-analysis to compare P uptake rates among microbial groups (planktonic bacteria, planktonic algae, and benthic biofilms). Because meta-analyses combine results of several studies, there is inherent heterogeneity of variance and sample size. Therefore, we further examined the reference parameter for experimental variables (geographic region, assemblage origin, and a series of experimental artifacts). Mixed model analyses indicated that microbial group was significant in explaining variation in P uptake. Results further showed that planktonic bacteria had the greatest affinity for P: uptake values were very high, averaging 187.0 $\mu\text{gP}/\mu\text{gChl}/\text{d}$. Planktonic algae had over 5-fold lower uptake rates compared to bacteria, likely owing to smaller surface area-to-volume ratios and limited ability to store P as polyphosphates. Benthic biofilms exhibited the lowest P-uptake (15.58 $\mu\text{gP}/\mu\text{gChl}/\text{d}$). Their relatively low affinity for P could be attributed to their dense, adnate growth form on submerged surfaces which creates a boundary layer between cells and ambient P, acting to insulate from external nutrient sources and promoting internal P cycling. The reference parameter was strengthened when experimental artifacts were incorporated into the model, suggesting these have influence on reported uptake rates.

Title: **Predicting *Escherichia coli* at Presque Isle Beaches in Erie, Pennsylvania**

Author: Tammy M Zimmerman and David A. Stull

Abstract: The use of *Escherichia coli* (*E. coli*) as an indicator of recreational water quality has been largely effective in determining when fecal contamination is present; however, there are drawbacks with using it as the *only* indicator. Concentrations of *E. coli* may change significantly between the time of sample collection and the reporting of results (anywhere from 18-24 hours). A more time-sensitive method that some managers of recreational waters have adopted is the use of predictive modeling to obtain near real-time estimates of water-quality conditions in about an hour. Predictive models utilize easily-measured water-quality and environmental variables such as precipitation, wind speed and direction, streamflow, wave height, and turbidity to estimate, or predict, when concentrations of fecal-indicator bacteria will exceed recreational standards. Predictions from the statistical models may supplement the use of *E. coli* as an indicator of fecal contamination at Presque Isle State Park beaches and can be used to “nowcast” water-quality conditions to the public during the recreational season (May to September). A nowcast of recreational water quality is much like a weather forecast except it estimates current conditions rather than future conditions. USGS scientists and their partners plan to develop a web-based nowcast system that will estimate current bacteria levels in the water of the Park's beaches to determine if recreational water-quality standards are being exceeded. If successful, beach managers will use the nowcast system to determine if beach advisories or closings need to be posted to alert the public.

Title: ***Escherichia coli* increases the number of hermaphrodites in the gender labile fern, *Ceratopteris richardii***

Author: Jeremy Alfieri, Mike Ganger and Troy Skwor

Abstract: In *Ceratopteris richardii* (C-Fern) gender is determined by a gibberellin-like hormone called antheridiogen. Antheridiogen is produced by hermaphrodites and causes undifferentiated spores to develop as males. The percentage of hermaphrodites in a culture is negatively related to the overall density of spores. It has been noticed that populations of C-Fern grown in the presence of bacteria appeared to be highly hermaphroditic. A preliminary experiment was undertaken to determine if 1) *Escherichia coli* could affect gender determination in C-Fern and 2) whether this effect could be initiated using filtrate from *E. coli* cultures. To test these hypotheses, approximately 150 C-Fern spores were sown onto nutrient agar plates containing no *E. coli*, unfiltered *E. coli*, or filtered *E. coli* (100%, 50%, and 10%). After three weeks, the C-Fern spores had developed into gametophytes whose genders could be determined and the percent of the culture that was hermaphrodite was noted. The percentage of hermaphrodites grown in filtrate from *E. coli* was not different from the control. The percentage of hermaphrodites was significantly higher in C-Fern cultures grown in the presence of *E. coli* compared to the control. It appears that *E. coli* can alter the gender-determining mechanism in C-Fern.

Title: **Determining the role of nitrogen and phosphorus levels in relation to the abundance of *Cladophora* in bacteria**

Authors: Jeanette Schnars, Casey Bradshaw-Wilson, Michelle Wunderley and David Stull

Abstract: The objectives of this study were to determine the nutrient loads, specifically nitrogen and phosphorus, on the occurrence of *Cladophora*. *Cladophora* is a filamentous green alga common in the Great Lakes, grows on submerged rocks and is thought to harbor *E.coli*. Water was collected from 14 sites over a total of 12 days from August 31st to October 1st 2010. Duplicates were collected at each site, with a total of 24 samples per sampling day. With these samples, water chemistry was performed testing soluble reactive phosphorus, total phosphorus, nitrate, nitrite and ammonia. After preparing each sample, a spectrophotometer (UV Spec 1800) was used to read an absorbance and therefore calculate a concentration of nitrogen derivatives and phosphorus in the water. Preliminary results for this study show no statistical significance between sites and the concentration of soluble reactive and total phosphorus in the water. On average, nitrites were significantly higher in Elk Creek. Nitrate and ammonia are still being processed; therefore no results are shown for those tests. Elevated nitrogen and phosphorus in the water may be a cause for increased *Cladophora* levels. In collaboration with this study, we will correlate environmental factors, nutrient loads of nitrogen and phosphorus and abundance of *Cladophora* and *E.coli* at each site.

Title: **Lipid peroxidation and antioxidative enzyme activities in BDE-85 treated mice**

Author: Nathan Kubeldis and Mary Vagula

Abstract: Polybrominated diphenyl ethers (PBDEs) are brominated flame retardants which are added to many commercial products such as computers, television sets, foam mattresses, carpets etc. These compounds come in three commercial mixture forms, *viz.*, penta, octa and deca BDEs. Due to their lipophilic and persistent nature they have become widespread environmental contaminants and are found in humans, wildlife, and biota worldwide. About 97% of American adult population has detectable levels of PBDEs. These compounds are shown to affect the nervous, reproductive and endocrine systems upon entering the body. Although some research findings report on the toxicity of various PBDEs, BDE-85, a penta congener has been overlooked in the existing literature. This study investigates the impact of BDE-85 *per se*, on the oxidative status and antioxidative protective mechanism in the mice tissues *viz.*, kidney, liver, brain, and intestine. Adult male mice were intraperitoneally administered with 0.25mg of BDE-85 /kg body weight for four consecutive days (a total of 1mg/kg body weight). On the fifth day their tissue samples were separated to analyze the levels of lipid hydroperoxides, and the activities of superoxide dismutase and glutathione peroxidase. The oxidant/antioxidant equilibrium of the exposed mice suffered a noticeable change. The levels of lipid hydroperoxides in the mice tissues were found elevated indicating lipid peroxidation. Consequently the activity levels of antioxidative enzymes, glutathione peroxidase and superoxide dismutase should have increased; but did not appear so in our study indicating that the animals lost the ability to quench lipid hydroperoxides, and restore the oxidant/antioxidant equilibrium.