esa Mid-Atlantic Chapter

19 April 2008

WILKES UNIVERSITY

# Meeting Abstracts

## *Meeting at a Glance*

Morning activities

| | | |
|---|---|---|
| 8:00 | Breakfast / Registration / Poster Set-up | BREIS foyer |
| 8:45 | Welcome (K. Klemow / M. Steele / R. Verret) | BREIS 106 |
| 9:00 | Plenary Presentation (Katriona Shea) | BREIS 106 |
| 9:45 | Break | BREIS foyer |
| 10:00 | Oral Session I – Invasive Species | BREIS 106 |

Mid-day activities

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| 11:45 | Lunch | HSC Ballroom |
| 12:45 | Business meeting / Informal poster viewing | BREIS 108 / foyer |

Afternoon activities

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| 1:30 | Oral Session II – Animal Ecology | BREIS 106 |
| 1:30 | Oral Session III – Plant Ecology | BREIS 108 |
| 3:00 | Break | |
| 3:15 | Oral Session IV – Applied Ecology | BREIS 106 |
| 3:15 | Oral Session V – Aquatic Ecology | BREIS 108 |
| 4:45 | Poster Pub Session | BREIS foyer |

Evening activities

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| 6:15 | Dinner | HSC Ballroom |
| 7:00 | After dinner speaker (Dale Bruns) | HSC Ballroom |
| 7:45 | Concluding comments / adjourn | HSC Ballroom |

Co-hosted by:

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Wilkes Institute for Environmental Science and Sustainability

BEARER, S.*, D. JENKINS (1), E. JUST. The Nature Conservancy in Pennsylvania, 220 West 4th Street, Williamsport PA 17701. **The FoRest Decision Tool: A habitat decision tool for restoring ecological values to working forests.** (Oral Session IV, 4:00 P.M.)

Extensive yet disjoint research now exists on numerous wildlife species' preferences for forest community type, seral stage, and habitat structure. Further, land owners and resource managers lack clear planning and management guidance on how silvicultural practices might be applied at the stand/landscape level to benefit non-game species and/or species of conservation concern. The Nature Conservancy in Pennsylvania has developed three products that will assist landowners and land managers to better manage their working forestlands for biodiversity conservation by explicitly correlating forest attributes to economic and biodiversity values. The three products include: 1) the Vegetation Prediction Index (VPI), a spatial dataset to analyze, predict and map potential of occurrence of upland forest community types in two ecoregions, the High Allegheny Plateau and the Central Appalachian Forests, 2) the Multi-species Habitat Profiles for bird and mammal species of conservation concern. The profiles indicate the habitat preference for 200 bird and mammal species in six matrix forest community types and four successional stage combinations. Profiles were further detailed by conducting small mammal trapping. 3) Silvicultural Modeling: We completed original research to develop forest community definitions by successional stage (emphasis on structural attributes for mid-, late- successional and old growth stages). We then modeled this data in the US Forest Service's Forest Vegetation Simulator (FVS) to identify appropriate silvicultural treatments to assist landowners/managers to better balance biodiversity and economic goals. These three products are being integrated to develop the Forest Restoration (FoRest) Decision Tool, which will soon be available to the public.

BELT, K. (1), WATTS, T.* (2), JONES, D.* (3), SWAN, C. (4), KAUSHAL, S. (5) AND POUYAT, R. (1). (1) US Forest Service, UMBC, Baltimore, MD. 21227. (2) US Forest Service/UMBC CUERE/BCCC, Baltimore, MD. 21227. (3) US Forest Service/UMBC GES, Baltimore, MD. 21227. (4) UMBC GES, Baltimore MD, 21250. (5) UMCES CBL, Solomons, MD, 20688. **Organic Matter Concentrations in Urban Streams.** (Poster 19)

Dissolved (DOC), fine (FPOM) and coarse (CPOM) organic carbon in streams is important for stream food webs and other stream processes. Sampling for DOC and FPOM at 3 weekly (INT) and 13 biweekly (EXT) sites was done over ~ 2 years. Dry weather INT site CPOM samples were taken ~monthly in the summer of 2007. FPOM samples were separated into size fractions (0.7, 54, 50, 250 and 1000 um); CPOM samples were sorted into leaves, flowers/seeds and misc. EXT dry weather urban FPOM concentrations resembled those found in "natural" catchments, and were mostly in the 0.7 and 53 um fractions. Means for urban, suburban and "natural" reference (forested, agriculture) groupings were 1.32, 0.93, and 1.97 mg/l, respectively. At INT sites, means were 1.23, 0.62, and 0.81 mg/l at DR (urb), GB (suburb), and BR (forest) sites. DOC concentrations, however, were much higher at the DR site (2.49 mg/l) than at GB and BR sites (1.32, 1.22 mg/l.) Dry weather CPOM concentrations were much smaller than FPOM or DOC (DR, GB and BR had concentrations of 0.055, 0.014, and 0.018 mg/l) and were ~50% wood. These OM concentrations generally followed the pattern of higher values at both the urban and "natural" sites. This may suggest that urban catchments, with their altered drainage pathways and strong terrestrial-aquatic linkages, can still transport appreciable quantities of DOC and FPOM during dry weather, with greater urbanization giving rise to higher concentrations.

BERARDI, R.* and N. TODD. Department of Biology, Manhattanville College, 2900 Purchase St., Purchase, N.Y. 10577. **Nest distribution and population estimates of Monk Parakeets (*Myiopsitta monachus*) in the towns of West Haven, Stratford and Milford, CT.** (Oral Session I, 11:15 A.M.)

*Myiopsitta monachus,* commonly known as the Monk or Quaker parakeet, are a recent invasive avian species. Thousands of Monk parakeets were imported into the United States from South America to be sold as pets in recent years, but either escaped from transport containers or were released, and are now established in FL, MI, NY and CT. In the US, they commonly build their nests on telephone and electric transformer poles, which has the potential to start fires in electrical transformer boxes. Utility companies have come under public scrutiny for removing the nests and euthanizing the birds, but not much is known about the parakeets inhabiting the towns of West Haven, Stratford, and Milford in Connecticut. In this study, parakeets were observed in these towns for approximately 12 months. Each nest that housed Monk

parakeets was recorded with a nest number and GPS coordinates to establish distribution of the birds in these towns. Nests were monitored on a weekly basis. Pictures of nests were taken throughout the study to measure growth in size of the nest. Numbers of birds associated with each nest were recorded to get an estimate of flock size in each town. Monk parakeets are the only species of parrots that build their nests from sticks, and we also had the opportunity to examine a large piece of nest, approximately 25% of an entire nest, for stick size, twig species and overall nest construction. Preliminary data suggests that the parakeets are not inferring with local, native bird populations.

BERG, J. (1) & K. UNDERWOOD (2). [1] Biohabitats, 2081 Clipper Park Road, Baltimore, MD 21211. [2] Underwood & Associates, 1753 Ebling Trail, Annapolis, MD 21401. **Replacing Incised Headwater Channels and Failing Stormwater Infrastructure with Regenerative Stormwater Conveyance.** (Oral Session IV, 4:30 P.M.)

Stormwater conveyance practices magnify and transfer water energy to the receiving stream, causing alternating temporal and spatial patterns of erosion and deposition. Other localized effects include lowering of local groundwater shifting headwater streams towards an ephemeral rather than perennial discharge regime. The impacts of this include degradation of floodplain and riparian wetlands, increased opportunity for establishment of non-native invasive plants, and reduced sediment and nutrient processing. These adverse effects extend downstream, adversely effecting the ecosystem through an increasing spiral of negative feedback. Alternatively, the approach of using stream restoration techniques to create a dependable open channel conveyance with pools and riffle-weir grade controls is a regenerative design since the use of these elements result in a system of physical features, chemical processes, and biological mechanisms that can have dramatic positive spiraling effects on the ecology of a drainage area. This approach results in the delivery of low energy storm water discharge, potential volume loss through infiltration and seepage, increased temporary water storage, restoration of lowered groundwater, increases in vernal pool wetland area, improved water quality treatment, improvements in local micro-habitat diversity, and provides a significant aesthetic value. These projects are generally a win-win-win arrangement, as conventional construction practices and materials are more expensive, conventional conveyance provides no environmental benefits and are more difficult to permit, and people generally enjoy the aesthetics associated with a well vegetated channel form when compared to the conventional conveyance alternative.

BISHOP, E. J.* R.B. SPIGLER, and T.-L. ASHMAN. Department of Biological Sciences, University of Pittsburgh, Pittsburgh, PA 15213. **Sex-allocation plasticity in hermaphrodites of *Fragaria virginiana* (Rosaceae).** (Poster 2)

Several studies have revealed a relationship between habitat quality and the degree of sexual dimorphism in plant species. One proposed explanation for this pattern is sex-allocation plasticity. In gynodioecious systems, hermaphrodites typically show low fruit-setting ability in poor habitats because they are unable to maintain both sex functions. Sex-allocation plasticity may enable hermaphrodites to gain fitness advantages in high resource environments by increasing investment in female function. While a promising hypothesis, it rests on assumptions that plasticity exists for reproductive traits, that there is genetic variation for plasticity, and that selection can act on plasticity directly. We tested these assumptions for hermaphrodites of gynodioecious *Fragaria virginiana*. We grew clones of 11 genotypes in four resource environments and measured plasticity for a suite of reproductive traits (e.g. fruit set, pollen and ovule production) and vegetative traits. We examined whether genotypes were similarly plastic and whether plasticity for reproductive traits was independent of trait means and changes in plant size. Results showed significant plasticity for most traits examined and that these were not passive consequences of changes in plant size. Genetic variation in plasticity was present for the majority of traits showing plasticity; genotypes were differentially plastic and no genotype was the most plastic for all traits. Correlations between plasticity and mean trait values suggest that although traits associated with male and female function are plastic, plasticity for female function may be less constrained. Thus, sex-allocation plasticity may influence the degree of sexual dimorphism in populations of *F. virginiana.*

BOJDANI, E.*, B. GRAF, E. NOWICKI, AND J. MORRISON. Department of Biology, The College of New Jersey, P.O. Box 7718, Ewing, NJ, 08628. **Have invasive *Andropogon virginicus* plants from Hawaii evolved to be more competitive than their native counterparts from eastern North America?** (Oral Session I: 11:00 A.M.).

Plant invasion may occur due to evolved increased competitive ability (EICA) because of a reduced need for defense against enemies who were left behind in the native range. *Andropogon virginicus* (broomsedge) is a $C_4$ perennial grass native to the eastern US, and has been introduced into various places including Hawaii, where it is identified as a widespread invasive species. The EICA hypothesis was tested by analyzing the effect of broomsedge from different regions (East, Hawaii, California, Australia) on the growth characteristics of a phytometer, Bermuda grass, in a common-greenhouse competition experiment. Dry mass of shoots and roots of Bermuda grass were greatly reduced by competition from *A. virginicus*, while the root:shoot ratio increased, but this effect did not differ between *A. virginicus* from the East (native) or Hawaii (invasive). Hawaiian *A. virginicus* grew larger than eastern plants, and Bermuda grass reduced the size of *A. virginicus* plants in competition. This effect was different among *A. virginicus* from the different ranges, with the Hawaiian plants experiencing a greater negative effect. Even though plants from the invaded range were more vigorous than natives, this did not translate into stronger competitive ability. This suggests that *A. virginicus* plants in Hawaii have not evolved increased competitive ability per se, but nevertheless have higher inherent growth rates that promote their ability to thrive.

BOTHAM, R* and T.-L. ASHMAN. Department of Biological Sciences, University of Pittsburgh; Pittsburgh, PA 15213. **Mycorrhizal interactions affect inbreeding depression in wild strawberry** (Poster 3).

Although hermaphroditism is the standard for flowering plants, the evolution to two separate sexes, diocey, has occurred numerous times and a main route includes a transitory stage of females and hermaphrodites, gynodioecy. In a gynodioecious species females are only able to produce offspring via out-crossing, while hermaphrodites can self-fertilize or out-cross. Plants produced via self-fertilization have displayed inbreeding depression, a reduced fitness due to decreased genetic diversity. A possible factor encouraging transition to dioecy may be a differential interaction between cross-type and mycorrhizal fungi. Mycorrhizas are mutualistic intracellular relationships in the roots; the fungi aiding nutrient acquisition in exchange for photosynthates. If mycorrhizal fungi colonize specific to the inbreeding history, they have the potential to either aid or oppose the transition towards dioecy. This project examined whether mycorrhizal fungi affected the fitness of selfed and out-crossed plants differently and studied inbreeding depression. The results show that mycorrhizal fungi do not effect the vegetative growth of selfed versus out-crossed plants based upon their inoculation. However, inbreeding depression is seen. Sexual reproduction shows an interaction between mating system and mycorrhizal treatment when the mycorrhizal treatment did not affect the number of flowers produced by selfed plants, but decreases the number of flowers of the out-crossed plants. The asexual reproduction is affected by mycorrhizae: inoculated plants have an increased number of plantlets. Colonization varies based upon the cross-type of the individual, with out-crossed plants seeing significantly higher colonization levels for both hyphae and vesicles.

BREW, I*(1), S. DI LONARDO (2) and D. J. WEHR (3). (1) SUNY at Albany, 1400 Washington Drive, Box 1508. Albany, NY 12222 USA. (2) NYC Department of Environmental Protection. 465 Columbus Avenue. Suite 190. Valhalla, NY 10595 USA. (3) Louis Calder Center - Biological Field Station, Fordham University, PO Box 887, 53 Whippoorwill Road, Armonk, NY 10504 USA. **Stream flow, nutrient, and bacterial concentration in Kensico Reservoir tributaries during storm events.** (Oral Session V: 3:35 P.M.)

The relationship between nutrient and bacterial concentrations in three perennial Kensico Reservoir tributaries was investigated over four summer storm events. Depending on stream, storm size, and antecedent conditions, storm events may elicit elevated bacterial concentrations via nutrient enrichment as a result of watershed runoff, or decrease cell concentrations as a result of dilution as a result of increased stream discharge. Storm sampling was performed using Teledyne ISCO auto-samplers fitted with 24, 1-L polypropylene bottles; discharge was monitored and recorded using a Bruck pressure transducer which relayed information to a Campbell Scientific data-logger. Water samples were analyzed for dissolved organic carbon (DOC), $NH_4^+$, $NO_3^-$, soluble-reactive phosphorus (SRP) and total bacterial concentration (DAPI direct counts). Bacterial concentration and nutrients differed significantly among storms (based on rainfall amounts) and streams (likely based on watershed size and characteristics), and there were clear trends between bacterial and DOC concentrations (but $P > 0.05$). Both nutrients and bacterial concentrations seemed to show evidence of a non-linear relationship with stream discharge. In addition some sites, especially during larger storm events, seemed to show evidence of dilution (i.e. N5-1). Future research topics

include monitoring the influents and effluents of BMP to determine if they are performing according to their design.

BROTHERSON, T. *(1), K. ALIAGA (1), AND G. RUSSELL (1, 2) 1. Department of Biological Sciences, New Jersey Institute of Technology, Newark, NJ 07102. 2. Department of Biological Sciences, Rutgers University, Newark, NJ 07102. **Island biogeography with active dispersal** (Oral Session II: 1:45 P.M.)

Macarthur and Wilson's theory of island biogeography models the effect of distance and area of an island on the immigration and extinction rates of species, and therefore on equilibrium species richness. Like many classic spatial models in ecology, it assumes 'passive' dispersal and population dynamics. Here, we introduce the concept of emigration as a choice-based disappearance mechanism whereby species play an active role in deciding whether to leave, or remain on, an island. We link the emigration rate to both the area and distance of an island, using a variety of functional forms, and demonstrate how this function alters traditional species-area and species-distance relationships. We show how our modified model explains some otherwise puzzling patterns found in real data.

BRUNS, D.A.. College of Science and Engineering, Wilkes University, Wilkes-Barre, PA 18766. **Geospatial watershed analyses for an American Heritage River**. (Oral Session IV. 3:15 P.M.)

Since 1998, when the Upper Susquehanna-Lackawanna Watershed was designated as an American Heritage River (AHR), the GIS team at Wilkes University has attempted to evaluate regional impacts from mining, urban storm sewers, and suburban sprawl. For the entire AHR watershed (2000 sq.mi.), the strongest association was an inverse relationship between forest and agricultural lands ($r = -0.82$, $P < 0.0005$, $n = 42$) while similar riparian patterns were weaker ($r = -0.59$, $P < 0.001$, $n = 42$). At the scale of selected mining and urban vs. reference sub-watersheds, mining impacts significantly reduced stream biodiversity more than urban affects based on multivariate analysis (PCA-2 vs. biodiversity: $r = -0.93$, $P < 0.001$, $n = 17$; biodiversity relative to mining lands: $r = -0.83$, $P < 0.001$, $n = 17$, step-wise regression). Preliminary GIS modeling on a local watershed with the Soil Watershed Assessment Tool (USDA) indicated that change of forests to suburban development would significantly accelerate runoff (suburban lands vs. surface runoff: $r = 0.82$, $P < 0.001$, $n = 11$). This finding is consistent with the Sierra Club's listing of our area as the third worst site in the nation for sub-urban sprawl (http://www.sierraclub.org/sierra/200205/lol13.asp).

BRUNS, D.A.. College of Science and Engineering, Wilkes University, Wilkes-Barre, PA 18766. **"Lessoned learned" on ecological monitoring and assessment: from Patagonia to Noatak to an American Heritage River**. (After dinner presentation)

This presentation will review an evolving (personal) perspective on an "ecosystems" approach to environmental monitoring and assessment based on research experiences at sites ranging from remote areas in China (Biosphere Cloud Forest at Fan Jing Shan), Chile (Patagonia's Torres del Paine Biosphere Reserve), Alaska (Noatak in the Arctic Circle), and the Rockies (Wind River Mountains, WY) to an American Heritage River Watershed in northeastern PA. Earlier research on integrated monitoring at remote wilderness sites was based on an initial set of key monitoring design elements: a simple "heuristic model" of the ecosystem, delineating sources and pathways of pollutants, multi-media measurements (air, water, soils, biota), and characterization of key ecological endpoints. In contrast to wilderness ecosystems, the Upper Susquehanna-Lackawanna American Heritage River (AHR) has sustained over $2.5 billion of environmental "clean-up" impacts due regional coal mining, urban storm sewers, and suburban sprawl. For this 2000 sq.mi. AHR watershed, we have expanded the scope of this "ecosystems" approach to monitoring design and have employed geospatial data and tools for analysis at various spatial scales. "Lessons learned" from over 30 years of related research in ecological monitoring will be highlighted.

BUGDAL, M*. (1), A. YUAN (1), R. SWIHART (2), N. LICHTI (2), AND M. STEELE (1). (1) Dept. of Biology, Wilkes University, Wilkes-Barre, PA 18766. (2) Dept. of Forestry and Natural Resources, Purdue University, 715 W State Street, West Lafayette IN 47907-2061. **Cache recovery, pilfering and spatial memory in a scatter-hoarding rodent: Do hoarders have a recovery advantage?** (Poster 11).

Scatter-hoarding mammals are thought to rely on spatial memory to relocate food caches. Yet, we know little about how long these granivores (primarily rodents) recall specific cache locations and whether individual

hoarders have an advantage at recovering their own caches. Indeed, a few recent studies suggest that high rates of pilfering are common and that individual hoarders may not have a retriever's advantage. Here we tested this hypothesis in a high-density (>7 animals/ha) population of Eastern gray squirrels (*Sciurus carolinesis*) by presenting individually marked animals (> 20) with tagged acorns, mapping cache sites, and following the fate of seed caches. PITT tags allowed us to monitor individual seeds without disturbing cache sites. Cached acorns only remained in the cache site for 12-119 hrs. (0.5-5d). However, when we live-trapped and removed some animals from the site immediately after they stored seeds (thus simulating predation), their seed caches remained intact for significantly longer periods (16-27d). Cache duration corresponded roughly to the time at which squirrels were returned to the study area. These results suggest that these rodents may have a retriever's advantage and that they may remember specific cache sites longer than previously thought.

BURKE, K.*, R. KELLS*, E. KOHLER* and T. LIGHT. Department of Biology, Shippensburg University, Shippensburg PA 17257. **An investigation into hybridization between two related species of crayfish of the same genus in Central Pennsylvania.** (Poster 25).

Hybridization between crayfish species has only been slightly researched. An invasive species of crayfish, *Orconectes rusticus,* has been introduced into some of Pennsylvania's aquatic ecosystems where it is displacing resident crayfish species. In Central Pennsylvania, we have suspected hybridization in sympatric populations containing *O. rusticus* and the native species *O. obscurus*. Our study compared morphological and molecular characteristics of *O. obscurus, O. rusticus,* and suspected hybrids. The ratios used to separate the two species are the chela width/length and the gonopod ratio (central - mesial projection)/total length. Our data indicates hybridization in some of the *O. obscurus* in sympatric populations. The results are applicable to conservation efforts for *O. obscurus* and may add urgency to efforts to prevent further introductions of *O. rusticus* in Pennsylvania and elsewhere.

BUTT, J.S. (1, 2) and T. LIGHT* (1). Department of Biology, Shippensburg University, Shippensburg PA 17257. (2) 8725 Manderston Court, Fort Myers, FL 33912. **Effects of stream liming on the biota and water chemistry of a Pennsylvania Appalachian Mountain headwater stream.** (Poster 23).

Determining the effectiveness of in-stream limestone application to mitigate atmospheric acidification in Appalachian headwater streams can be problematic. For the technician, these problems include determining readily available, yet reliable, chemical and biological measures of mitigation effectiveness. We intensively studied a limed and unlimed branch of Laurel Run, an acidified low order Appalachian Mountain stream located in the Tuscarora State Forest, Perry County, PA. Our results suggest that readily obtainable water chemical parameters including pH (spot and continuous), specific conductivity, and acid neutralizing capacity (ANC), as well as measures of macroinvertebrate and fish richness and abundance are viable tools for gauging the success of the liming effort. Our study indicates that the long-term in-stream application of crushed limestone in the limed branch of Laurel Run has increased pH from approximately 4.5 to circumneutral (6.9 to 7.3), even during periods of peak flows; increased specific conductance values from lows of 32 ms/cm to highs of 61 ms/cm; and increased ANC values from lows of -200 meq/l to highs of 180 meq/l. Liming was also associated with increased richness of acid sensitive EPT taxa, while apparently detrimentally influencing an acid tolerant aquatic community. Overall fish density in the limed branch (~740/ha) was more than double that in the unlimed branch (~310/ha), and fish richness increased to three species from one, although brook trout (*Salvelinus fontinalis)* remained exceedingly dominant. However, year-to-year weather variations may confound the ability to rely on short term data, necessitating long term monitoring.

CAREY, M. Dept. of Biology, University of Scranton, Scranton, Pennsylvania 18510 USA. **Effects of old field succession on a population of field sparrows breeding in northeastern Pennsylvania.** (Poster 8).

Many bird breeding in open shrub/scrub type habitat in the eastern United States are experiencing population declines partially due to the habitat loss that occurs when such areas continue their successional changes from once-used agricultural fields toward forests. Field sparrows (*Spizella pusilla*) are one such species. I have been following the mating and reproductive biology of a population of field sparrows in northeastern Pennsylvania since 1986. Over this time interval, the breeding habitat has changed from a state of relatively open fields with small, scattered woody vegetation to areas that are heavily overgrown with shrubs and trees.

As this old field succession has occurred, the number of field sparrow breeding territories has declined steadily. However, the successional change and decline in population size are not significantly correlated with any change in individual sparrow breeding parameters, such as adult settlement dates, territory fidelity, adult survivorship, nestling growth rates, or reproductive success. Thus, as old field succession makes much of the habitat suboptimal for the sparrows, the few field sparrows that remain are able to find patches of suitable habitat sufficient for breeding. On those patches the smaller remaining population of sparrows is able to reproduce just as successfully as individuals that bred earlier in the successional sequence. As a result of this patchy nature of succession and of the birds' responses to it, it is likely that reduced populations of shrub/scrub breeding bird species may persist on those successional areas for much longer periods of time than would otherwise seem probable.

CHARLES, S. *(1), C. AGARD*(1), M. GOODE (2), and G. MIDDENDORF (1). (1) Department of Biology, Howard University, Washington DC 20059. (2) School of Natural Resources, University of Arizona, Tucson, AZ 85721. **Demographics of two *Sceloporus* spp. (Spiny Lizards) in three adjacent micro-canyons in the Chiricahua National Monument of southeastern Arizona and the relationship to floral and insect prey composition.** (Oral Session II, 2:00 P.M.).

We surveyed the populations of *Sceloporus jarrovii* and *S. virgatus* in three adjacent micro-canyons in the Chiricahua National Monument in southeastern Arizona during July 2003 and 2004. For each lizard captured, we recorded snout-vent and tail length, mass and sex as well as microhabitat (canopy cover) where collected. Vegetation and insect transect surveys were also conducted in each canyon. We measured and marked 77 *S. jarrovii* for 2003 and 81 for 2004, while 6 and 24 *S. virgatus* were measured and marked respectively. No significant differences within species in sex ratio, fitness (mass to snout-vent length ratio), or population age composition were seen among micro-canyons or between years. Differences between years were noted in distribution of *S. jarrovii* males among the sites [$X^2$=7.45, p=0.024, d.f.=2] and numbers of *S. virgatus* [$X^2$=10.8, p=0.001, d.f.=1]. Although we did not find significant differences in canopy cover use within or between species, we did note the absence of *S. viragtus* in two of the micro-canyons as well as significant differences in insect densities [$X^2$=46.9, p=0.000, d.f.=2] and oak versus pine tree distribution [$X^2$=10.407, p=0.005, d.f.=2] among the three study sites. While the explanations for our observations remain unclear, we propose that they may include both predator control of population size and territorial constraints on habitat use.

CORBETT, B.* and J.A. MORRISON. Department of Biology, The College of New Jersey, P.O. Box 7718, Ewing, NJ 08628. **The allelopathic potential of an invasive species, *Microstegium vimineum*, and a native species, *Eupatorium rugosum* and the role of soil microbes in allelopathic studies.** (Poster 7).

The success of invasive species can have profound effects on ecosystems. One crucial factor which may be involved in this success is the allelopathic potential of an invasive species. Our study focused on the allelopathic potential of *Microstegium vimineum*, an invasive annual grass in forests of eastern North America, and a native herb layer species, *Eupatorium rugosum*. In one experiment we assessed the allelopathic effect of each species on germination of two common test species, radish and lettuce, by applying aqueous extracts from the roots and shoots of *M. vimineum* and *E. rugosum* to test seeds in Petri dishes. All extracts inhibited seed germination, relative to water controls. In a second experiment, we planted seeds from lettuce and radish in a factorial pot experiment with 1) non-sterile forest soil or heat-sterilized forest soil; 2) activated carbon added or not added; and 3) watered with *M. vimineum* extract, *E. rugosum* extract or water. Neither species' extracts reduced the biomass of test seedlings, but they both either inhibited seed germination or increased seedling mortality. Allelopathic effects against seeds and seedlings of competitors may therefore be one mechanism of *M. vimineum* invasiveness, but this strategy is also available to a native species. Biomass of plants grown with carbon in non-sterile soil decreased relative to controls, while it increased with carbon in sterile soil. A model is provided which offers an explanation for complex microbiological effects in allelopathic studies and plant growth in both sterilized and non-sterilized soil.

CROMARTIE, J.*, COSTA, C. AND A. TRIPLER. NAMS, Richard Stockton College, PO Box 195, POMONA NJ 08240 USA. **Stream ecology in Pine Barrens landscapes: does monitoring improve with taxonomic refinement?** (Poster 20).

Macroinvertebrate fauna of woody debris (submerged sticks 3-35 mm in diameter) provides a readily sampled assemblage for biological monitoring in

New Jersey Pine Barrens streams. Work from 2003 to 2006 has shown that these assemblages change as encroaching agriculture and urban development raise pH and specific conductance above their typically low values and alter the physical characteristics of the stream and flood plain. Previously, we used order and family level classifications in our multivariate analyses. This presentation reports on whether classifying the Trichoptera in the samples to the generic level enables us to detect more subtle changes in conditions. Trichoptera form a useful group for analysis because the various genera display a wide range of ecological tolerance, and at least 15 genera occur on submerged sticks in our samples. Results on our samples through 2006 fail to support the hypothesis that greater taxonomic refinement allows better discrimination among sites. Determining the genera present in every sample is probably not cost-effective in a large-scale, community based monitoring program.

CUNNINGHAM, K.* and N. WATERS. Department of Biology, Lafayette College, Easton, PA 18042 USA. **Impacts of the pesticide atrazine on crayfish motility and behavior**. (Oral Session V: 4:15 P.M.)

Atrazine is considered lethal to crustaceans (Pumley et al 1980), but behavioral responses to sub-lethal levels are unknown. We examined sub-lethal atrazine concentrations for crayfish motility and defense posture at 3 concentrations (0, 3, 30 ppb) across 4 durations (0, 24, 48, 96 hr). Behavior was assayed for 10 minutes every 24 hours by recording movement time across quadrants in 4L tanks. Results showed that motion was hindered by 18-20% after 24 hr exposure, but did not vary thereafter regardless of atrazine concentration. Net reduction in motility followed the equation $y = -2.55x^2 + 16.22x - 28.09$ ($R^2 = 0.83$). Feeding behavior was uncorrelated to atrazine concentration or duration. In another study, crayfish were assayed immediately following a toxicity test and again 1 week later for 'time to right' after inversion, and defense display fatigue in both standing and flowing water. Results indicated no correlation between time to right and exposure or concentration. In standing water, control individuals displayed tail-flip defenses 85% more frequently than atrazine-exposed individuals immediately after toxicity testing, and 40% more frequently 1 week later. Flowing water tests are underway. These data suggest exposure to minimal atrazine concentrations may elicit subtle reductions in crayfish activity, motility, and defense posture.

EBERHARDT, S and M.S. PEEK.* Department of Biology, William Paterson University, 300 Pompton Road, Wayne, NJ 07470 USA. **Effects of sand burial on the coastal dune grass *Ammophila breviligulata*.** (Poster 1).

Shoreline erosion represents a major problem for many coastal systems. American Beachgrass (*Ammophila breviligulata* Fern.) acts as a natural stabilizer in this successional system. As a result, this dune vegetation is prone to severe disturbance and stress, most commonly burial by shifting sand. We monitored plant performance above and belowground throughout the summers of 2006 and 2007 in response to an experimental addition of 10 cm/yr sand accretion rate. We measured above and below ground growth to determine if *A. breviligulata* shows a compensatory response to burial. In both years we saw a significant increase in culm numbers and plant height as the season progressed. The response to burial was similar in both years, sand accretion increased culm numbers and plant height at greater rates than ambient controls. Belowground, we saw now affects of sand burial to root length or root diameter depth distribution, however, we did measure a uniform root distribution of both mass and root length to a depth of 70 cm. Tentatively, the compensatory growth response was restricted to above ground activity with no change in belowground allocation. Future studies will confirm this pattern under different environmental conditions and explore the nutrient requirements necessary to sustain the change in root:shoot ratio.

EICHELBERGER, B.*, PODNIESINSKI, G. and A. DAVIS. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, 208 Airport Drive, Middletown, PA 17057 USA. **Assessment of high conservation priority floodplain plant communities along the Delaware River.** (Poster 6).

Floodplain plant communities along the Delaware River were assessed to target sites for conservation and restoration value. Floodplain sites were delineated based on aerial imagery interpretation and placed into three classes: deltas, islands and riverside. Vegetation maps developed for the National Park Service were used to delineate plant communities located within sites. Field surveys were conducted in 2007 to document species composition for plant communities and survey information was used to update community boundaries within sites. Communities were prioritized based on condition, size and context in order to identify sites of high conservation priority. Additionally, sites with low prioritization scores were examined to identify sites of

restoration value. The equation used to calculate the prioritization scores is heavily influenced by site complexity (number of communities present at site). As a result, delta sites tended to have higher prioritization scores than islands or riverside sites. Therefore it is important to look at various other factors, such as the number of rare communities present at a site, in order to make an informed decision of a site's conservation value. In general, it appears that the floodplain communities along the Delaware River are threatened by exotic invasive plant species. General management recommendations are discussed.

FALCONER, A*. and N. TODD. Department of Biology, Manhattanville College, 2900 Purchase St., Purchase, N.Y. 10577. **Rate of zinc uptake and accumulation in tissues of freshwater mussels under controlled laboratory conditions.** (Oral Session V: 4:00 P.M.)

The ability of freshwater mussels to remove metals from aquatic environments has been a topic of recent research into bioremediation and biomonitoring of toxic metals. In this study, the freshwater mussel *Anodontoides sp.* was exposed to an aqueous zinc concentration of 5 ppt, dissolved in 10 gallon aquarium tanks over a 14 day period. Mussels were removed every 2 days from the test and control tanks, dissected, separated into gills/mantle, stomach and adductor muscle tissue and dried. Zinc concentrations in the tissue were measured using Chemetrics zinc vacuvials and a V-2000 Chemetrics photometer. Levels of zinc in water were also monitored as was daily temperature and water pH. Over the 14 day period, the concentration of zinc decreased in the tank water, but increased in mussel tissue, differentially in different tissues. This study represents one of the few controlled laboratory experiments examining metal uptake in mussels, and will provide information about the rate of uptake and accumulation of zinc in mussel tissue. In addition, the results are relevant to evaluating the relative metal pollution of various aquatic environments as well as the level of metal contaminants mussels are able to remove from the water as bioremediators.

FERRIS, G.[1*], J. MORGAN[1], C. WILLIAMS[1], and V. D'AMICO[1,2]. [1]University of Delaware - Department of Entomology & Wildlife Ecology, Newark, DE 19717. [2]USDA Forest Service, NRS. **Riparian corridors as potential biodiversity refugia.** (Oral Session II, 3:30 P.M.)

Forested corridors are used to protect streams from agricultural runoff and may also encourage terrestrial and aquatic biodiversity by providing habitat in suburban and agricultural landscapes, increasing connectivity of fragmented patches, and excluding invasive plants. The goal of this study is to determine if and how forested buffers can be effectively used to preserve native biodiversity. In spring 2006 we examined soil chemistry across forested stream corridors in and near Newark DE in agricultural and suburban environments. Additionally in summer 2007, we collected soil chemistry, aquatic macroinvertebrate samples, stream morphology, and invasive plant densities at 36 study sites located on 1$^{st}$ and 2$^{nd}$ order streams throughout the White Clay Creek watershed. Invasive plant density was strongly influenced by distance from buffer edge ($P = 0.031$) and soil tests suggest that nutrients such as Phosphorus and Potassium might be filtered effectively by forested riparian corridors. No correlation between buffer width and aquatic macroinvertebrate community integrity is immediately apparent. Preliminary results suggest that riparian corridors act as refugia for native biota by excluding invasive plants from the riparian zone.

FETCHER, N.* (1) and T. J. IACOVONI (2). (1) Institute for Environmental Science and Sustainability, Wilkes University, Wilkes-Barre, PA 18766. (2) Dept. of Biology, University of Scranton, Scranton, PA 18510. **Carbon gain in the understory of eastern deciduous forest.** (Oral Session III, 2:15 P.M.)

Although positive carbon gain is necessary for plant survival in the understory, few studies have compared carbon gain for different functional groups growing in the same habitat. We hypothesized that there would be no detectable difference between carbon gain of seedlings of woody species that remain in the understory and seedlings of canopy trees. We used dynamic measurements of photosynthesis to parameterize a model of carbon gain for seedlings of canopy trees and understory shrubs. Measurements of photosynthetic photon flux density were used to drive the model to provide estimates of daily carbon gain in the understory of the Lacawac Sanctuary in Northeastern Pennsylvania. Daily carbon gain was simulated for different days during the 2003 growing season. Nested analysis of variance using species as a random effect was used to test whether there was a significant difference between the canopy species and understory species. There was no significant difference between functional groups in daily carbon gain on the days sampled.

FUREDI, M.*. Pennsylvania Natural Heritage Program, Middletown, PA 17057 USA. **Restoration and management of the Goat Hill Serpentine Barrens.** (Oral Session IV, 4:15 P.M.)

Serpentine barrens are globally rare communities composed of grasslands and oak savannas underlain by serpentine bedrock. In the eastern United States, this community type is concentrated over a small region in Pennsylvania and Maryland, the State Line Barrens. The Goat Hill serpentine barrens, in southwestern Pennsylvania, is one area of ecological importance within the State Line complex. Goat Hill provides habitat for 15 animal species and 20 plant species of special conservation concern in Pennsylvania, including several species classified as threatened and endangered. Nearly all of the rare species live mainly or exclusively in the serpentine grassland and savanna. Disturbance once played an important role in maintaining these habitats. However, several factors including fire exclusion, soil development, forest succession, and native and exotic species invasion have severely reduced the historical extent of grassland and savanna, thus necessitating restoration. Plans are underway to restore and maintain a healthy serpentine barrens ecosystem at Goat Hill and will be discussed in this presentation.

GIUSTI, D. and N. TODD.* Department of Biology, Manhattanville College, 2900 Purchase St., Purchase, N.Y. 10577. **Experimental removal of Japanese knotweed (*Fallopia japonica*) in the Manhattanville College Environmental Park.** (Oral Session I, 10:45 A.M.)

The invasive Japanese Knotweed (*Fallopia japonica)* is rapidly becoming a problem for wetland ecosystems in the United States, particularly in New York. It invades wet areas near streams and ponds, and is very difficult to eradicate. Injecting the stems directly with the herbicide glyphosate is a new technique that is proving very useful at killing the plant, but the plants need to be mature and have a stem diameter large enough to accommodate the injection gun. Manhattanville College, a small liberal arts college in Purchase, N.Y. recently completed an environmental classroom associated with an Ecomachine that filters water from an adjacent stream and wetland. The clearing of the area for construction, combined with a massive tree clearing project by the college, has resulted in new growth of knotweed, too immature for the injection procedure. We employed different experimental eradication methods to determine which might work best in this situation, including injection of glyphosate into mature plants, but also coating leaves with humic acid, a new procedure. In addition, we monitored growth in untouched plots, plot in which all plants were cut repeatedly, and plots in which plants were pulled out. The mature plants injected with glyphosate died, and plants growing underground from their rhizomes also died. The humic acid experiment on the immature plants was also successful, which provides a solution to plants that are not suitable for herbicide injection. Further monitoring during this coming growing season will determine the extent of success of the 2007-2008 eradication methods.

GRESE, M.*(1,2), YESILONIS, I. (2,3), POUYAT, R. (2,3). (1) Center for Urban Environmental Research and Education, University of Maryland Baltimore County, Baltimore, Maryland 21250 USA. (2) Baltimore Ecosystem Study, University of Maryland Baltimore County, Baltimore, Maryland 21250 USA. (3) United States Forest Service. **Landuse effects on surface soil metal and nutrient concentration in Washington, D.C.** (Poster 18).

Soils located in metropolitan areas are known to be contaminated by metals. In this poster, we evaluate soil metal and nutrient concentrations in Washington, D.C. as part of a study involving Urban Forest Effects Model, a computer model that analyzes the structure and environmental effects and values of urban forests. We investigated the spatial distribution of the metals Al, P, S, Ti, Mn, Fe, Co, Ni, Cu, Mo, Pb, Cd, Na, Mg, K, Ca, As, V, B, Cr, Zn, Sr, Li, Be, Sb, and Ba in surface soils of 129 plots randomly stratified by landuse. Each plot was categorized as one of nine land-uses: federal/institutional, park/recreation/open space, local public, industrial, commercial, mixed, residential low-density, residential medium-density, and residential high-density. The Piedmont region contained 54 plots, and 75 plots fell within the Coastal Plain region. Soils were collected in the summer of 2004 and digested with a strong acid, which provides an indication of the environmentally available fraction. We found that average concentrations of Al, Fe, Ni, Pb, and As differed significantly among land-uses. The highest concentrations of Fe, Ni, Pb, and As were associated with industrial plots, whereas Al was shown in the highest concentrations for both high- and medium-density residential plots. Furthermore, Washington, D.C. results were compared to Baltimore city soil metal and nutrient concentrations from past studies. Our results showed that the median concentrations of Pb, Ni, Ca, and K were higher in Washington, D.C.

HECKMAN, R.W. *(1) and D.E. CARR (2). (1) Department of Environmental Sciences, University of Virginia, 291 McCormick Rd, Charlottesville, VA 22904 USA. (2) Blandy Experimental Farm, University of Virginia, 400 Blandy Farm Lane, Boyce, VA 22620 USA. **The effects of disturbance and community diversity on the success of an exotic forb in a Virginia grassland.** (Oral Session I, 10:30 A.M.)

Community biodiversity and disturbances have been suggested to contribute to species invasions. In many systems the availability of excess nutrients allows exotic species to establish and thrive. The tall-grass prairie ecosystem is dominated by warm-season grasses, which have high nutrient-use efficiency. We studied a restored meadow in Virginia's Shenandoah Valley that has been invaded by *Galium verum*, an exotic herbaceous plant with lower nutrient-use efficiency. We hypothesized that physiological differences would allow *Galium* to dominate at high nutrient levels, while native grasses would thrive at lower concentrations. This meadow comprises replicate 0.6 hectare assemblages of one, three or six species of native warm-season grasses. Within each species assemblage, we performed four nutrient manipulations: 1) depleted nitrogen (excess carbon introduction), 2) ambient nitrogen, 3) elevated nitrogen (fertilizer addition) and 4) fire (early-season burn). We found no effect of native grass diversity on the abundance of exotic *Galium,* nor did grass diversity significantly alter soil $NO_3^-$ or $NH_4^+$. Elevated nitrogen treatments produced significantly higher *Galium* biomass and stem density than depleted or ambient nitrogen treatments. The fire treatment significantly reduced *Galium* biomass relative to all other treatments. Nutrient treatments did not significantly alter warm-season grass biomass. As predicted, soil plant-available nitrogen drove the pattern of *Galium* abundance, but early season fire inhibited *Galium* despite the nutrient release afterwards. These results suggest that tallgrass prairies may become more susceptible to invasion by forbs with increased nitrogen deposition but fire may retard *Galium* invasion.

HOFER C.* (1) and C. HOLZAPFEL (2). (1) Rutgers University New Brunswick, 14 College Farm Rd, New Brunswick, NJ 08901. (2) Rutgers University, Newark, 95 University Ave, Newark, NJ 07102. **Using passerine nestlings as bioindicators of heavy metal accumulation at a former brownfield site.** (Poster 17).

Soils of former brownfield sites are notoriously laden with heavy metal pollutants that may have adverse effects on resident wildlife. Previous studies at our study site – Liberty States Park in Jersey City, NJ – have shown high levels of lead (Pb) and zinc (Zn) translocating from soil to plant tissue where they become available to the greater food web. We tested breast feathers of nestling house wrens (*Troglodytes aedon*) and American robins (*Turdus migratorius*) for heavy metal accumulation using a plasma-atomic emission spectrophotometer (ICP-AES). Our results indicate that concentrations of Pb, chromium (Cr), and arsenic (As) at the study site were significantly higher than those found at our control site. While these levels were high at the study site, they were still well below clinical levels known to have adverse physiological or neurological effects on birds, suggesting the site is in fact providing viable habitat for breeding avifauna. We also found little intra-clutch variability within our samples, but significant inter-clutch variability, suggesting that metal levels found in an entire brood of nestlings have a positive relationship to their proximity to areas of higher soil concentrations. Our results also indicate that there was no temporal change in metal concentrations comparing nestlings from first clutches to those of second clutches, indicating that metal concentrations remain relatively constant during the course of the breeding season. Overall, our study indicates that nestling passerines could effectively be used as bioindicators of heavy metal accumulation to help evaluate the future viability of brownfield habitat.

HOQUE, T.* and A. GRIFFITH. Dept. of Biology, 1301 College Ave., University of Mary Washington, Fredericksburg, VA 22401. **Effects of the population density on seed predation and seed loss of *Aeschynomene virginica*, a rare, tidal, wetland annual.** (Oral Session III, 2:30 P.M.)

*Aeschynomene virginica* or sensitive joint-vetch is a federally threatened annual legume that is found in populations from southern New Jersey to central North Carolina. Potentially severe seed loss from herbivory has been observed in *A. virginica* populations, but not measured. We studied the effect of population density on seed predation of *A. virginica* at the Vandell Preserve at Cumberland Marsh Preserve in New Kent County, Virginia. In September 2007, all known populations of *A. virginica* were sampled. We censused all plants in each population and measured the area covered by each population. We counted number of seeds produced and number of seeds eaten on ten randomly selected plants in each population. Seed predation rates were defined as

either percent of seeds eaten per plant or average percent of seeds eaten in a population. Seed predation per plant increased as seed production per plant increased. Also seed predation rate increased with increased seed density in a population. Seed predation rate decreased as plant density in a population decreased. So there is a positive correlation between seed predation and plant density in *A. virginica* populations. Insect herbivory study is limited for freshwater wetland rare annuals, so this study of *A. virginica* acts as a role model to understand the ecology of rare plants. These data also suggest a potential density dependent impact on population dynamics of this plant. Herbivory density dependence has seldom been seen in rare plants.

JOHNSON, S.E.* and M.D. ABRAMS. School of Forest Resources, Pennsylvania State University, University Park, PA 16802 USA. **Age class, longevity and growth rate relationships: Evidence for increasing growth in both young and old trees.** (Oral Session III, 1:30 P.M.)

Tree growth rates are a function of many factors, and a dynamic resource that allows us to study past forest changes, as well as predict future impacts of a changing environment. Growth rates have been correlated with species and individual longevity in the past, but this has not been documented over a wide range of species of varying life histories. We hypothesize that individual trees are able to approach the maximum species longevity by growing very slowly throughout most or all of their life. Within that framework, species longevity, and thus growth rate, will vary by shade tolerance and site quality. This study utilizes data from the International Tree Ring Data Bank website and tree cores collected in the field to explore the relationship between growth rate (basal area increment; BAI) and age class (from young to old) for eight contrasting tree species in the eastern U.S.; bigtooth aspen (*Populus grandidentata*), black oak (*Quercus velutina*), red oak (*Q. rubra*), chestnut oak (*Q. montana*), white oak (*Q. alba*), pitch pine (*Pinus rigida*), hemlock (*Tsuga canadensis*), and blackgum (*Nyssa sylvatica*). Our results support the hypothesis that the oldest trees within each species have very slow growth, and that growth rate and longevity vary inversely with shade tolerance and site inferiority. In addition, we found that younger trees (<60 years of age) within each species are consistently growing faster than the older trees, but that both young and old trees exhibit increasing BAI throughout their lives (i.e., expected sigmoidal growth plateau not observed).

JUNE-WELLS, M. & C. HOLZAPFEL, Rutgers University, Newark NJ. USA. **Niche divergence: Root-level competition, scale, and implications for invaded plant communities.** (Poster 5).

Niche divergence is a phenomenon associated with reduced interspecific competition, increased community stability, and productivity. While a considerable amount of evidence has been presented to show minimization of competitive effects and niche separation between neighboring plants, a true evaluation of the scale has not been conducted. We performed greenhouse experiments that examined the spatial aspect of neighborhood effects in plant communities. In the spring of 2007 genets of two species pairs were collected from two different non-woody plant communities in Northern New Jersey. The species pairs were of two different classes: native/native and native/non-native from two separate plant communities. One species, *Solidago canadensis,* was present in both communities and was collected from the immediate border of the species-pair populations while genets of the other test species were collected from three locations of increasing distance from the border. The ramets of the target species (*Solidago*) were planted pair wise with ramets of the two test species (*Monarda* - native and *Artemisia* - non-native) from different distance classes. The individuals were grown in the greenhouse for three months; directional and mass root-data were collected then analyzed using MANOVA. The results suggest that native/native species pairs minimize their root level competition within the local community up to the distance of 100 m but not beyond. Additionally, that native plants could potentially have a sufficiently long evolutionary history together where community building has became a selective trait within individuals and that the relative scale of this phenomenon is at that of the community.

LANGKILDE, T. Dept. of Biology, Penn State University, University Park, PA, 16827, USA. **Invasive fire ants provide insight into the evolution of antipredator strategies.** (Oral Session I, 11:30 P.M.)

Predator-prey interactions are virtually ubiquitous across life, and play an important role in structuring communities. Introduced non-native predators provide an opportunity to examine the evolution of antipredator strategies within a natural context. My research took advantage of the well-documented spread of fire ants to examine how antipredator responses of native fence

lizards to these invasive predators change across invasion time. Native lizards that have been in contact with fire ants for longer are more likely to behaviorally respond to their attack, and have altered morphologies that increase the effectiveness of this behavior. The observed changes are not correlated with habitat or latitude, and cannot be acquired with repeated exposure, arguing against phenotypic plasticity and learning as causal mechanisms, and museum specimens show that morphological differences were not evident prior to fire ant invasion. These data contribute to our growing awareness that changes in community structure via the introduction of novel predators can prompt adaptive responses, altering the nature of interactions between invaders and the natives they contact.

LIGOCKI, A.*, E. NOWICKI*, B. CORBETT, E. BOJDANI, A. ROMANCHUK, and J.A. MORRISON. Department of Biology, The College of New Jersey, P.O. Box 7718, Ewing, NJ 08628. **Three years of change in a natural plant-pathogen interaction.** (Poster 4).

Plant diseases can be important in ecological and evolutionary processes of their host plants. We have studied the interaction between the grass *Andropogon virginicus* (broomsedge) and its specialist pathogen, the smut fungus *Sporisorium ellisii*. Infected plants experience reduced or complete loss of reproduction because the fungus uses the inflorescence for its sporulation. We are interested in the changing pattern of disease and how it may influence the population dynamics of *A. virginicus*. We established 480 1 $m^2$ plots arrayed in a clustered, regular pattern across a 50 m x 150 m section of old-field. Annually in each plot we counted the number of infected and uninfected plants. Infection across the site increased from 2005 (9% plants/plot on average) to 2006 (11%), due to an increase of plots with infected plants (80 to 150). A much greater disease increase occurred in 2007 (19%) because more plots showed disease (194) and because infection became more severe in many plots. In plots with disease present, higher infection rate was correlated with lower plant density within years (e.g. in 2006, correlation with CRH procedure to account for spatial autocorrelation: -0.45, $P<0.01$). However, infection rate in the previous year either had no correlation with the change in plant density the next year (2005-2006) or was positively correlated with density change (2006-2007, CRH correlation: 0.23, $P=0.05$). Rather, decreased plant density was strongly correlated with higher plant density the previous year. These results illustrate a complex interplay between the two populations.

LOWERY, D.*(1) and A. GRIFFITH (2). (1) Dept. of Biological Sciences, Box 1928, University of Mary Washington, Fredericksburg, Virginia, 22401 USA.. (2) Dept. of Biological Sciences, 1301 College Ave., University of Mary Washington, Fredericksburg, Virginia, 22401 USA. **Ecological and vegetation responses from two dam removals in a tidal wetland system.** (Oral Session III, 2:00 P.M.)

As dam removals have increased in frequency due to dam deterioration and interest in ecosystem restoration, there is a growing need to determine the ecological effects of dam removal. Few studies have been conducted on dam removals and pre-dam removal data is particularly limited. Our interdisciplinary study aims to measure impacts of dam removal on stream physical characteristics, vegetation, aquatic invertebrates, and fish along Holts Creek, a tributary to the Pamunkey River in New Kent County, VA. This research reports pre-dam removal plant distribution and abundances. To assess distribution and abundance of vegetation, ten transects were constructed along the entire drainage between the two dams. The presence of tree, sapling, vine, and herbaceous species were systematically sampled at each transect. Among all transects there were 18 tree species, 23 sapling species, 5 vine species, and 71 herbaceous species. Out of the 71 herbaceous species, the most abundant was *Murdannia keisak*, which is an invasive species. *M. keisak* was present at 6 of the 8 transects sampled, and had an average percent cover of 20%. Several other invasive herbaceous species were also present in high abundances. High relative abundance of *M. keisak* and other invasive species pose a potential problem when dam removal occurs, due to their ability to effectively disperse and quickly colonize newly barren sediments. As dam removal proceeds, it will be essential to monitor the establishment of these species and to determine their effects on other plant species.

MAJETIC, C.J.*(1,2), R.A. RAGUSO (3), and T.-L. ASHMAN (1,2). (1) Dept. of Biological Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania 15260 USA. (2) Pymatuning Laboratory of Ecology, University of Pittsburgh, Linesville, Pennsylvania 16424 USA. (3) Dept. of Neurobiology and Behavior, Cornell University, Ithaca, New York 14853 USA. **Evaluating the relationships between pollinator behavior, floral scent, and female fitness in a flower-color polymorphic plant, *Hesperis matronalis*.** (Oral Session III – 1:30 P.M.).

Floral scent is thought to evolve through pollinator-mediated natural selection. However, while many studies document significant behavioral responses of pollinators to floral scent, few assess the specific relationship between floral scent traits and estimates of plant fitness. We explored the effect of floral scent variation in color polymorphic *Hesperis matronalis* on both pollinator behavior and female fitness. In an array experiment using target inflorescences augmented with color-specific floral scent extracts, we found that diurnal floral visitors significantly preferred larger quantities of scent. Such a result suggests that if pollinator visitation is an important factor determining plant fitness, then plants with greater scent emission should have higher fitness. We then assessed the relationship between floral scent and seed production for plants in small arrays exposed to either day time or night time pollinators. Here, greater scent emission led to higher seed fitness, but only for plants exposed to day-flying pollinators. This result is aligned with pollinator behavior responses to enhanced scent seen in arrays. In contrast, the relationship between floral scent and female fitness across four wild populations did not match expectations. Rather, we found a significant quadratic relationship between day-emitted floral scent and seed production, i.e., increased scent emission increased fitness at low emission levels, but at high levels, fitness declined with increased emission. A quadratic relationship between floral scent and fitness may be explained by effects of density on scent cues, costs of producing floral scent, minimal pollen limitation, and/or selective forces that oppose pollinator-mediated ones in large populations.

MANGAN, B., A. CILIBERTO*, and M. HOMEWOOD*. Environmental Program, King's College, Wilkes-Barre, PA 18711. **A versatile and economical trap for the capture of wild crayfish.** (Poster 24).

A growing number of crayfishes are threatened or endangered in North America. Therefore, reliable methods are needed to assess crayfish populations. We designed, built and tested a trap for the capture of wild crayfish. Unlike many commercial crayfish traps, including minnow traps often used for this purpose, our trap has smaller mesh that allows for the capture of a larger size range of crayfish. The rectangular shape of our design makes more contact with the substrate than a cylindrical trap, and the double-ended feature allows crayfish to enter from either side. This trap is also better at retaining trapped crayfish. It is further superior to the minnow trap it that it is not as likely to trap non-target organisms such as finfishes, amphibians, and water snakes. This trap can be built for one-third to one-eighth the cost of most commercial traps allowing for multiplication of traps and an overall increase in sampling effort.

MANGAN, B.*(1), J. KOHLERT(2), AND L. MANGAN*(1). (1) Environmental Program, King's College, Wilkes-Barre, PA 18711, (2) Psychology Department, King's College, Wilkes-Barre, PA 18711. **PPCPs in the waterways: The effects of three antidepressants on the locomotion and aggression of the Siamese fighting fish, *Beta splendens.*** (Poster 21).

Pharmaceuticals and personal care products are increasingly reported to be present in our waterways. Research suggests that some of these may be affecting the ecology of these systems through sublethal ecotoxicological effects. We examined the individual sublethal effects of three commonly prescribed selective serotonin reuptake inhibitor antidepressants on the locomotion and aggression of the Siamese fighting fish, *Beta splendens*. While two of these compounds significantly reduced locomotion and aggression in this fish species at our test concentrations, their dose-response relationships varied considerably. All three compounds required relatively long exposure periods and high concentrations before these effects were observed. Given the small probability of fish in the wild encountering these high concentrations for extended exposure periods, we think it unlikely that these compounds will affect most fish populations. However, synergist reactions between these compounds have yet to be investigated.

MANGAN, B. and L. MANGAN.* Environmental Program, King's College, Wilkes-Barre, PA 18711. **Profile of an invasion: Density and size-range of the Asian clam (*Corbicula fluminea*) in the Susquehanna River**. (Poster 22).

The Asian clam, *Corbicula fluminea*, invaded the main stem of the Susquehanna River as early as the 1960s. It was first reported in the north branch of the river in 2002. We examined the current profile of this invasion by measuring clam density and size range at three locations on the main stem of the river and three locations on the north branch. Our results indicate a significant decrease in clam density and size moving from south to north along the river. However, the larger average size of the clams collected at one of the sites in the north branch suggests that this PA Fish and Boat Commission boat launch site

was invaded earlier by the clams and was perhaps the introduction point of the clams to the north branch.

MEYER, EUGENE R.*. Natural History Society of Maryland, Baltimore, MD 21206. **How extensive is trophic cascade in the Mid-Atlantic region? How an amphibian study reflects trophic cascade conditions.** (Oral Session II, 1:30 P.M.)

Trophic cascade linked to suburbanization is widespread, and has large impacts on one of my study sites and their amphibians. I present the results, describe how trophic cascade shapes results, and ask if others have similar experiences. For amphibians at a Maryland vernal pool complex, I show results from 26 searches over 12 years. (1) A simultaneous search by several experienced people of differing backgrounds produced a more realistic understanding of a community than any one-person search. (2) Where communities are remnants, searches include uncommon or cryptic life stages, an interesting focus. (3) The NCP measures of realism are especially useful when communities include uncommon or cryptic life stages. Background: new graphics show the breadth of trophic cascade. Reducing top predation impacts a remarkable range of taxa. The graphics include Ripple and Beschta's recent finds at Zion NP: reduced top predation lead to sustained deer irruptions, reducing cottonwoods and hydrophytic plants, reducing butterfly and lizard numbers by a factor of three, and reducing two conspicuous wildflower species and two amphibians by a factor of one hundred! Williams and Ward found abundant deer also disperse seeds of exotic invasive plants. Soule and Terborgh show that both browsers, and mid-size carnivores such as raccoons are part of trophic cascade. This presentation is intended to further recognition of extent of trophic cascade, and ask if some areas are little affected. Will increasing realism of study results help to find solutions and predict outcomes where trophic cascade is stopped, and historic diversity is restored?

McFARLANE, W.J.* Department of Biology, Manhattanville College, 2900 Purchase, NY 10577 USA. **Intertidal crabs may influence periwinkle shell morphology and population size in Western Long Island Sound. (**Oral Session I: 10:00 A.M.).

The invasive Asian shore crab (*Hemigrapsus sanguineus*) has been observed in Long Island Sound for nearly 20 years, and is thought to have a significant impact on populations of other intertidal crabs such as green and mud crabs (*Carcinus maenas* and *Panopeus herbstii,* respectively). There has also been a link made between occurrence of Asian shore crabs and declining populations of the common periwinkle (*Littorina littorea*). This study sought to examine relative population sizes and distributions of these four intertidal species at three western Long Island Sound sites: Edith Read Sanctuary and Marshlands Conservancy (Rye, NY), and Glen Island Park (New Rochelle, NY). Over the past few years, there has been a decline in the common periwinkle population at the Marshlands Conservancy. Quadrat analysis was completed at High, Medium, and Low intertidal areas of each site, and all crabs and periwinkles were identified and measured. Results illustrated that the Asian shore crab was the most abundance species of intertidal crab at both the Edith Read and Marshlands sites, however the mud crab was the most abundant species at Glen Island Park. Surprisingly, there were absolutely no periwinkles found at the Marshlands site. Periwinkles were found in greatest abundance at Edith Read, but in lower numbers at Glen Island Park. Furthermore, shell densities were significantly different for the two populations of periwinkle. This study suggests that predation pressure may have shaped morphological features in the periwinkle, and that the Asian shore crab may not be *solely* responsible for dramatic declines in periwinkle populations.

MONTELLO, M. and N. TODD.* Department of Biology, Manhattanville College, 2900 Purchase St., Purchase, N.Y. 10577. **The potential for disruption of aggressive behavior in female *Betta splendens* by environmental estrogens.** (Oral Session II, 2:30 P.M.)

The Siamese Fighting Fish, *Betta splendens* is a popular aquarium fish, and is known for its aggressive behavior. Males cannot be kept more than one to a tank, but many hobbyists and pet stores keep multiple females together, not thinking they are very aggressive. Recent research at Manhattanville suggests otherwise, that females are just as aggressive as the males of the species. In the wild, these fish live in flooded rice paddies and other stagnant bodies of water in Asia, environments that are potentially susceptible to contamination with chemicals containing estrogenic compounds such as pesticides, waste chemicals from factories, and other non-point sources. The effects of these estrogens on aggressive behavior is studied here. Female *Betta splendens* were exposed to 2.5ul of 17-B estradiol for 28 days to evaluate the effect on their aggressive behavior. Females were visually exposed to male and female controls for behavioral observation pre-treatment, 28 days after treatment, and 28 days after treatment was ended. The

control females showed no difference in behavior before and after treatment, but females treated with 17B estradiol exhibited a statistically significant difference before and after treatment and 28 days after treatment ceased. All observed behaviors differed in frequency, not just a few. This indicates that environmental estrogens can decrease aggression in females, and can ultimately affect their dominance hierarchy and reproductive success.

NEFF, N*. and N. TODD. Department of Biology, Manhattanville College, 2900 Purchase St., Purchase, N.Y. 10577. **Reduction of bubble nest frequency and size by male *Betta splendens* after exposure to 17ß Estradiol.** (Oral Session V, 4:30 P.M.)

*Betta splendens*, known as the Siamese Fighting Fish, are notorious for their highly aggressive behavior toward each other. Males in particular have been selectively bred to enhance these epigamic traits, such as bright colors and long, flowing fins. In addition to their aggression as an attractant for females, males build elaborate bubble nests to house fertilized eggs. Many environmental estrogens are now present in aquatic ecosystems, resulting from pesticides, waste chemicals from factories, and other non-point sources. In the wild, these fish live in flooded rice paddies and other stagnant bodies of water in Asia, environments that are potentially susceptible to contamination by estrogenic compounds. The effects of these estrogens is beginning to emerge in studies of other species of fish that have reduced fertility, or undergo sex changes and transitions. In this study, male *Betta splendens* were exposed to 5ul of 17-B estradiol for 28 days to evaluate the effect on their aggressive behavior and bubble nest construction. Behavior was examined pre-treatment, and 28 days after treatment, and the presence/absence of a bubble nest and its size was recorded. While the males were highly variable compared to each other and between behaviors, males that were exposed to 17ß estradiol made significantly smaller bubble nests, or none at all, after treatment. More aggressive males made smaller bubble nests, while the less aggressive males made larger nests on average, but few made nests after treatment. These results highlight the potential effects of environmental estrogens on reproductive behavior in *Betta splendens*.

POTAPOV, E.*, and E.A. ROHTLA. Science Division, Bryn Athyn College, PA 19009 USA. **Can randomly spaced trail cameras alone return density of White-Tailed Deer directly?** (Poster 14).

We have generated correlated random walks based on the daily movement parameters measured for two individual deer, monitored on the grounds of a natural preserve, using GPS/GSM radio collars. We set the number of segments in the trajectory to 288 (5 min fixes per 24 hr), and set parameters for segment length and turning angle based on field-measured trajectories to Gaussian distributions of 0-500 m for segment length and 0 +/− 360 degrees for turning angle. We used a Bayesian approach to calculate average probabilities (WinBUGs) of a deer to be recorded by trail cameras set in sampling areas ranging from 0.1 to 100 $km^2$, which enabled us to assess the probability of deer detection in a given area size. In order to test the model, we placed five trail cameras at five random locations within the home range of the radio-collared deer and measured the average time needed to photograph the marked individual. Predictions based on the model were in accord with the density of the collared deer calculated from the number of pictures taken per 24 hour period and the home range size of the marked individuals.

POTAPOV, E.* (1), A. BEDFORD (1), F. BRYNTESSON, (1), S. COOPER (1), D. ROBERTSON (2), B. NYHOLM (2) E.A. ROHTLA (1) and B. BROWN (1). (1) Science Division, Bryn Athyn College, PA 19009 USA. (2) Pennypack Ecological Restoration Trust, Huntingdon Valley, PA 19006 USA. **Fine-scale daily movement patterns and territory se by white-tailed deer in suburban Philadelphia.** (Poster 15).

We have monitored the movement of three individual white-tailed deer (*Odocoileus virginiana*) fitted with high-tech GPS/GSM radio-collars, collecting location fixes every five minutes for two of the deer. The deer were captured in a suburban natural area preserve owned by the Pennypack Ecological Restoration Trust (PERT). The preserve is open to the public from dawn to dusk, and is also hunted during the state hunting season. The preserve contains a mixture of mature forests, regenerating woodlands, riparian forest, and fields of native, warm season grasses. The preserved lands are surrounded by suburban and commercial areas and transected by several busy public roads. The monitored deer spent most of the daylight hours outside the preserve on private lands, although the deer also did use the preserve's warm season grass stands during the day. The daily movement patterns of the deer demonstrated several periods of peak activity alternating with periods of quiescence. Some of the movements were clearly attributable to avoiding human visitors in the preserve.

There was a dramatic difference between territory use between the collared male and female deer. The two females used their territories more or less uniformly, whereas the male used brushy patches more heavily, traveling between these patches in predictable routes. We will present data on movement trajectories, Minimum Distance Moved for 24-hour periods, density of territory use by day vs. night, sizes of home ranges, and weekly movement patterns.

REGAN, A.* and W.J. McFARLANE. Department of Biology, Manhattanville College. Purchase, NY 10577 USA. **Assessing the coincidence of water turbidity and distribution of immature Asian shore crabs (*Hemigrapsus sanguineus*) at four sites along the northern coast of Long Island Sound.** (Oral Session I, 10:15 A.M.)

The Asian shore crab is an invasive hemigrapsid crab that has been found in abundance for the past twenty years throughout intertidal zones of Long Island Sound. Despite their common occurrence as adults, there is still much to be learned about recruitment of immature crabs. This study aimed to assess distribution of settled Asian Shore crabs, and whether recruitment patterns differ depending on location within the estuary, and the degree of turbidity of nearshore waters. It was hypothesized that immature crabs would be found in greater abundance in turbid waters due to greater nutrient availability for planktonic stages. The second hypothesis was that the western areas of Long Island Sound would have greater numbers of immature crabs due to the topography of the basin, and the lack of "flushing out" of the planktonic stages. Four sites along Long Island Sound were chosen for monitoring from June to November of 2007, covering a distance of about 90 miles along the coastline. At each site temperature, turbidity and salinity were monitored, and biological data was collected through the use of 0.25 $m^2$ quadrats. Results revealed the greatest abundance of crabs were found at the most western site. Differences in the turbidity of water between Eastern and Western sites were also correlated to the number of immature crabs found, with a greater number of young crabs found in the western part of the estuary basin. These findings may aid in understanding the dispersal of larval stages along estuaries, as well as allow for further study of ecological impacts on other intertidal species.

RICHARDS, A.* and W.J. MCFARLANE. Department of Biology, Manhattanville College, 2900 Purchase, NY 10577 USA. **Assessment of bioenergetic response to salinity transfer and exercise stress in wild mummichogs (*Fundulus heteroclitus*) acclimated to brackish and fresh water.** (Poster 26).

Mummichogs are euryhaline fish commonly found in estuarine environments. Their tolerance to changing salinity allows fish to migrate up or down estuaries, depending on ecological factors such as food availability, water quality, or predation. When they enter water of different salinities, complete acclimation can occur in a matter of days. This study compared the metabolic response to exercise and salinity transfer in two distinct populations of mummichog from the Hackensack River near the town of Little Ferry, NJ - a part of the estuary experiencing a salinity range of 5 ‰ to 30 ‰. One population of fish was taken from 15‰ salinity water, and the other from a physically isolated area of constant 5‰ salinity (similar to fresh water). The "freshwater" population is thought to have been isolated from the rest of the estuary for many generations. The goal was to assess whether fish originating from an environment of changing salinity would be superior at handling an ecologically relevant type of induced stress, such as exhaustive exercise. Predation stress was simulated through use of an 8 min chasing protocol resulting in exhaustion. Fish were manually chased in 5‰, 15‰, and 25‰ water, and controls were unexercised. All fish were anaesthetized in MS-222, muscle samples frozen in liquid nitrogen and held at -80ºC until analysis. Levels of glycogen and lactate were assayed, serving as indicators of bioenergetic stress. Differences in the inherent ability of this euryhaline species to withstand the stress of both salinity transfer and exercise will be related to the ecology of each population.

ROBINSON, G.*, P. DOMBROSKI, M. FUESNER AND M. STEELE. Dept. of Biology Wilkes University, Wilkes-Barre, PA 18766. **Cache management by small mammals: The importance of secondary dispersal.** (Poster 10).

Scatter-hoarding mammals and birds store seeds for later use, and in the process often impact plant establishment and regeneration. Although it is hypothesized these granivores may recover and move individual seeds several times in the process of managing food stores, little is known about this process of secondary, animal-mediated dispersal. Here, we report on a field experiment designed to test for secondary dispersal of acorns of red oak (*Quercus rubra*) by small mammals (primarily mice, chipmunks and gray squirrels). We selectively provisioned small mammals with 32 radio-

tagged acorns at six independent locations in a mature oak-hickory forest in NE Pennsylvania. We then followed the movement patterns and final fates of these seeds from mid-November 2007 to February 2008. Small mammals moved 25 acorns on 53 occasions allowing us to document 7 instances of secondary movement, 5 instances of tertiary movement, and a single instance of quaternary movement. Distances that seeds were dispersed were not directly related to the number of times they were moved. Although sample sizes in this preliminary study were small, they clearly allowed us to document the occurrence of secondary dispersal in this system.

ROYO, A.A.* AND S. STOUT. USDA Forest Service, Northern Research Station, Forestry Sciences Laboratory, Irvine, PA 16329, USA. **Landscape level impacts of deer browsing on understory vegetation: indicator species and legacy effects.** (Oral Session III, 2:45 P.M.)

In eastern North America, overbrowsing by white-tailed deer (*Odocoileus virginianus*) over the last century has drastically alter plant diversity patterns by shifting species composition towards a few highly browse-tolerant or unpalatable species. To date, the vast majority research on deer impacts to plant communities has relied on comparisons between fenced areas (exclosures) and areas open to browsing. While highly informative, this binary approach does not accurately reflect the spatial and temporal variability in herbivory across a landscape. Here, we report on the understory plant community response following reductions in regional deer densities in the ~30,000 ha Kinzua Quality Deer Cooperative management area. We monitored woody and herbaceous richness, abundance, and size in 76 permanent plots randomly located across the region in 2003 and again in 2007, following four years of herd reductions utilizing the Pennsylvania Game Commission's Deer Management Assistance Program (DMAP). This program consists of issuing additional antlerless deer harvest permits. Several herbaceous indicators responded positively over time as deer densities declined. Sizes of *Medeola virginiana, Maianthemum canadense,* and *Trillium* spp. have increased and *Trillium* population structure has shifted towards a greater proportion of reproductive individuals. In contrast, overall species richness has not changed and seedling heights have not increased. These results demonstrate that while some species are sensitive short-term indicators of deer impacts, the understory plant community is less responsive. We suggest chronic overbrowsing has altered the plant community so extensively that recovery may be slow as species overcome establishment barriers including dispersal limitations, slow growth, and competition from higher vegetation strata.

SCHNELL, J.* and C. HOLZAPFEL. Federated Department of Biological Sciences, Rutgers University, Newark, NJ 07029 USA. **Studying the effects of *Passer domesticus* on native sparrows in Newark, NJ: resource competition and migratory costs.** (Poster 9).

Since the introduction of the house sparrow (*Passer domesticus*) to the US in the 1850s, the spread of this cosmopolitan species has been generally assumed as responsible for the correlated decline in native passerines. We attempted to test the impact of house sparrows on a native migratory sparrow, *Zonotrichia albicollis*, whose over-wintering range and mixed-species flock foraging overlaps with that of the invasive along the eastern United States, including here in Newark, NJ. Our analysis shows that there is a negative correlation between the species, such that white-throats are in lower abundance with increasing abundance of house sparrows present on the feeder. We interpret this as evidence of possible competition ongoing between the native and invasives. In addition, we performed routine collections of birds killed by window impacts, and found a number of white-throats (migratory birds) to be window kill victims, but no such casualties in the resident house sparrows. This could potentially reveal an additional factor responsible for the invasives' success.

SIMMONS, J. A.* Science Department, Mount St. Mary's University, Emmitsburg, MD 21727 USA. **Phosphorus-metal interactions in streams contaminated with acid mine drainage.** (Oral Session V, 3:15 P.M.)

Acid mine drainage (AMD) contains high concentrations of Fe, Al and Mn, all of which are known to bind to phosphate in soils and sediments. Although the precipitation and adsorption reactions of phosphate with each of these metals individually are well known, the interaction of phosphate with combinations of these metals (as is common in AMD) is not well documented. The main objectives of this study were to determine the interactive effects of these metals on soluble phosphate concentrations at varying pH levels and to determine if the presence of sulfate and calcium altered these effects. Lab studies demonstrated that soluble phosphate was reduced by approximately 98% and 97% in the presence of Fe and Al, respectively, due to precipitation and adsorption

reactions. Maximum phosphate removal occurred between pH 4 and 9 for Fe and between pH 5 and 8 for Al. Manganese only precipitated with phosphate at pH 10 and above. A kinetic study demonstrated that at pH 6, adsorption of phosphate to Fe- and Al-oxides was rapid, occurring within just 10 minutes, and did not change appreciably over 7 days. The presence of sulfate ions, which are present in high concentrations in AMD, led to less precipitation of phosphate with Fe and Al and less adsorption of phosphate to Fe- and Al-oxides. Precipitation and adsorption studies using field-collected AMD yielded results similar to the lab study. The presence of AMD in streams is likely causing major reductions in soluble phosphate in streams.

STRATFORD, J. A.*(1) and W.D. ROBINSON(2). (1) Department of Biology and Health Sciences, Wilkes University, Wilkes-Barre, PA 18766. (2) Department of Fisheries and Wildlife, Oregon State University, Corvallis, OR 97331. **Increased urbanization decreases fitness of Eastern Bluebirds (*Sialia sialis*)** (Oral Session II, 2:45 P.M.)

Urbanization decreases avian species and native birds are particularly at risk. One likely reason is that urbanization decreases the amount of forested habitat. This does not explain, however, why meadow and grassland species are absent from urban sites because these habitats are often present in urban sites. Along an urban-rural gradient in the southeastern US, I monitored 200 nest boxes throughout the 2005 breeding season for Eastern Bluebirds. Around each box, I quantified the amount of urbanization and grassland for use as explanatory variables in regression models. The frequency of box use was negatively associated with increasing urbanization and not affected by the amount of grassland. Box fitness, defined as the number of fledged bluebirds produced per box in a season, also decreased with increasing urbanization and was unaffected by the amount of grassland. These results suggest that the context of a nest box is one of the important drivers of nest success and partially explains the absence of bluebirds from seemingly appropriate habitat.

TILDEN, V.*(1), M. SWATZ (1), J. HOVIS (2), D. McNAUGHTON (1), and NICK HOFFMAN (1). (1) The Pennsylvania State University, Fort Indiantown Gap, Building 11-19, Annville, PA 17003, (2) Department of Military and Veterans Affairs, Fort Indiantown Gap, Building 11-19, Annville, PA 17003. **Habitat identification, restoration, and repatriation plan for the regal fritillary butterfly, *Speyeria idalia* (Drury) to landholdings historically occupied within the northeastern United States.** (Oral Session IV, 3:45 P.M.)

Fort Indiantown Gap (FIG), a National Guard Training Center in Pennsylvania, is home to one of only two known populations of regal fritillary butterflies (*Speyeria idalia)* remaining east of Indiana. This species was once common throughout the northeast but has declined drastically over the past 20 years, most likely because of the loss of native, open grassy habitats due to development and changes in agricultural practices. Regals survive at FIG while being extirpated elsewhere because of a large mosaic of grasslands maintained by soil disturbances and low intensity fires caused by military activity and land stewardship. These habitats provide the regal with three essential components: larval host plants (*Viola spp*.), nectar plants for adults (*Asclepias spp., Circisum spp*.), and warm season grass tussocks.In an effort to preserve this rare species a repatriation effort is being proposed to return regal fritillaries to landholdings having a historic or probable occurrence. A tiered approach over 5-7 years is planned for this effort and will consist of three phases:

Phase 1- landholding identification and interagency and cooperative partnerships

Phase 2- habitat enhancement and restoration

Phase 3- multiple releases of wild and captive-reared regals, monitoring for success, and adaptive management.

FIG employees are currently identifying partnerships with agencies and conservation organizations that manage grasslands with historical regal presence or county record and are interested in taking part in this project. Restoration will begin at several sites (i.e. Gettysburg National Military Park, PA) in the 2008 field season.

VARELA, J. *(1,2), POTOSKY R. (1,3), RIDALL H. (1), and BARR G. (1,2). (1) Department of Biology, King's College, Wilkes-Barre, PA 18643 USA. (2) Environmental Program, King's College, Wilkes-Barre, PA 18643 USA. (3) The Chimpanzee and Human Communication Institute, Central Washington University, 400 E. University Way, Ellensburg, WA 98926 USA. **Effects of paroxetine on the predatory behavior of smallmouth bass (*Micropterus dolomieu*)** (Poster 27).

Pharmaceuticals and personal care products (PPCPs) have been found in ground, surface, and drinking water. Limited research suggests these products can have measurable effects on aquatic organisms. Paroxetine, a widely used selective serotonin reuptake inhibitor, can be

an environmental contaminant and can alter fish aggression and locomotion. This study examined the effects of paroxetine dissolved in water (700 mg/l) on the predatory behavior and feeding of smallmouth bass (*Micropterus dolomieu*). Bass exposed to paroxetine showed increased handling time and reduced prey consumption. Results also suggested an increase in time to first attack and first capture. Behavioral differences between experimental and control groups decreased following the first week, likely due to decreases in the concentration of paroxetine. Such behavioral impacts of PPCPs may have relevant implications for fish growth and development and food web structure.

WALSH, B.*(1), K.M. DOUGHERTY(2) and G.R. PLAGUE(2). (1) Box 3502, Fairfield University, 1073 North Benson Rd., Fairfield, CT 06824. (2) Louis Calder Center, Fordham University, P.O. Box 887, Armonk, NY 10504. **Movin' on up: negative geotaxis in rice and maize weevils.** (Oral Session II, 2:15 P.M.)

*Sitophilus oryzae* and *Sitophilus zeamais,* rice and maize weevils, infest stored grain. We observed that rice weevils seem to have a much greater propensity than maize weevils to climb upwards following physical disturbance of the grain store. Therefore, our goal was to quantify this climbing behavior in both species under a variety of environmental conditions. We confirmed that, following disturbance, rice weevil individuals do climb significantly more often than maize weevil individuals ($P \leq 0.05$) when reared on both wheat and corn, and on both fresh and exhausted grain. We speculate that these divergent behaviors may have evolved in response to ecological differences between these sister species. Interestingly, maize weevil climbers are significantly more likely to fly than rice weevil climbers, indicating additional divergent behaviors.

WASHENKO, H*, A. VELOPOLCAK, R. KOSIK, R. CURTIS, R. STETZ, Z. WILSON and K. KLEMOW. Biology Department, Wilkes University, Wilkes-Barre, PA 18766 **Developing a podcast trail guide for an urban natural area, Wilkes-Barre.** (Poster 16).

Visitors to hiking trails and other natural areas often have access to paper-based trail guides that provide information about the history and natural features found along the trail. While such paper-based guides are handy and informative, they can become outdated, need to be restocked when the supply is exhausted, and may become litter when discarded. The emergence of new technologies, especially associated with podcasting, provides an opportunity to replace paper trail guides with electronic versions that can be downloaded to an mp3 player. Over the past year, we developed a podcast guide to a hiking trail in the Kirby Park Natural Area, which is an 80-acre riparian urban forest in Wilkes-Barre, PA. That guide currently consists of twenty image-enhanced podcast episodes – each focusing on a single station along the trail or on a species of note. The podcasts cover a variety of ecological topics, including various habitat types found in the Kirby Natural Area, key ecological processes, and representative species of vascular plants and megafauna. The podcasts, created using GarageBand software on the Macintosh OS, have been uploaded to Wilkes University's iTuneU website (http://itunes.wilkes.edu) and are publicly available. Representative podcast episodes will be presented. The results of a user survey concerning the podcasts' effectiveness will also be presented and discussed.

WHITE, A.*(1), C. GRAVENER (1), S. MARINO (1), A. OTTIS (1), A. JULIAN (1), R. SWIHART (2), N. LICHTI (2), and M. STEELE (1). (1) Dept. of Biology, Wilkes University, Wilkes-Barre PA 18766. (2) Dept. Forestry and Natural Resources, Purdue University, 715 W State Street, West Lafayette IN 47907-2061. **Dispersal and predation of American chestnut by small mammals.** (Poster 12).

The American chestnut (*Castanea dentata*) dominated eastern hardwood forests until ca 1940 when the chestnut fungus (*Cryphonectria parasitica*) virtually eliminated the species. Although chestnuts were known to be critical food for numerous wildlife species, there has been no attempt, to date, to understand how birds and mammals may have dispersed these nuts. Recent studies on oak (*Quercus*) dispersal indicate how acorn characteristics (e.g., tannin, fat, germination schedules) influence oak dispersal by small mammals and further suggest that white oak species are dispersal limited in the presence of red oak species. Because chestnut shares characteristics common to acorns of both oaks (e.g., high palatability, delayed germination), it is interesting to know how chestnuts and oaks likely influenced each other's dispersal. To test this, we selectively provisioned small mammals at several study areas over two years with > 29,000 tagged nuts of northern red oak (NRO), white oak (WO), American chestnut (ACP) and American chestnut hybrids (ACH). We then determined removal rates, consumption and caching frequencies, and dispersal distances. Dispersal of all seed types was influenced differently depending on the other seed types present. Preliminary results suggest, however, that chestnuts are

dispersal limited in the presence of NRO but may enhance dispersal of WO.

YEUNG-CHEUNG, A., and J. DEGA*. Dept. of Biology, Manhattanville College, 2900 Purchase St., Purchase, NY 10577. **The study of the densities of *E. coli* and Enterococci bacteria recovered from sediment between areas of Upper and Lower Guion Creek, Mamaroneck, NY.** (Oral Session V, 3:30 P.M.)

The beach closings at Harbor Island Park have been a result of exceeding levels of Enterococci bacteria, especially after heavy rainfall. A filter system Gunderboom® BPS™(Beach Protection System) was installed in 2002 in the beach in order to lower bacterial levels in swimming areas. Our previous studies in 2006 showed that the densities of *E. coli* and coliform bacteria recovered from water and sediment were significantly lower inside than outside the Gunderboom® and other areas in Mamaroneck Harbor. However, a very high density of bacteria was found in water and sediments collected from Guion Creek. The water from the creek drains into the Mamaroneck Harbor. In the current study, sediment samples were collected from 3 areas of Upper Guion Creek and and compared with the lower Guion Creek along with the outside and inside the Gunderboom. Sediment samples were collected bi-weekly in these 6 areas from May to November of 2007, especially after rainfall to evaluate the densities of *E. coli* and Enterococci. In addition, the texture of sediment samples from all sites was analyzed and compared. Results showed the densities of *E. coli* and Enterococci were found significantly higher in sediment samples collected from Upper Guion Creek areas than the other 3 lower regions. Our study suggests that some non-point source bacterial contamination located in the upper areas of the Guion Creek may contribute to the increased densities of *E. coli* and Enterococci found in Mamaroneck Harbor.