

## The Cofrin Grant Student Research Symposium

Wednesday, February 27, 2008

2:00 - 5:15 pm

Christie Theatre: University Union

The symposium is free and open to the public. Refreshments will be served.

### Schedule of Presentations

2:00--Introduction and Welcome by Cofrin Biodiversity Center Director Dr. Robert Howe

2:05--Hannah Aplin: Plant species associated with dense stands of *Phragmites australis* at the Pt. au Sauble Nature Preserve in Brown County, Wisconsin. (Faculty advisor: Bob Howe)

2:25--Lana Athorp: Bird species associated with *Phragmites australis* at the Pt. au Sauble Nature Preserve in Brown County, Wisconsin. (Faculty advisors: Amy Wolf and Bob Howe)

2:45--Christina Brady: Effects of garlic mustard, deer browsing, and ecological restoration on deciduous forest leaf litter invertebrates. (Faculty advisor: Mike Draney)

3:05--Lori Caelwaerts: Variation in seed rain along a gradient of forest quality. (Faculty advisor: Matt Dornbush)

3:25--Megan Harvey: Florivory in populations of *Gentianopsis procera* in Door County, Wisconsin (Faculty advisor: Amy Wolf)

3:45--Megan Jacobi: Competition and Predation among Great Lakes Invasives: A study of the relationships between Round Gobies, Zebra Mussels, and Quagga Mussels at three UWGB Natural Areas. (Faculty advisors: Amy Wolf and Tara Reed)

4:05--Susan Haen: Archeological Cultures at Toft Point. (Faculty advisor: Janet Speth)

4:25--Sarah Rauen: Assessment of Endocrine Disruption in Amphibians in Northwest Wisconsin **CANCELLED**

4:45--Ryan Wachtl: Effects of Brassicaceae dominance on fungal biomass and soil phosphorous - A family based mechanism for competitive superiority. (Faculty advisor: Matt Dornbush)

### Presentation Abstracts

Hannah Aplin: Plant species associated with dense stands of *Phragmites australis* at the Pt. au Sauble Nature Preserve in Brown County, Wisconsin.

UW-Green Bay's Point au Sauble Natural Area has experienced dramatic changes in water levels and vegetation since it was acquired by The Nature Conservancy in 1997. One of the most important yet dynamic features of the area is an open lagoon of approximately 10 ha. In the mid-1990's the lagoon was filled almost entirely with open water, supporting feeding flocks of American White Pelicans, Sandhill Cranes, and large flocks of waterfowl during spring and fall migration periods. During the low water period of the past decade, however, cattails been replaced by the widespread invasive grass, *Phragmites australis*. This research project monitored changes in plant communities in the lagoon following last year's spraying of *Phragmites* by the WI DNR. This research at Point au Sauble is important in order to document the extent of *Phragmites* invasion at this site. Results will serve as a benchmark for research after the U.S. Fish and Wildlife has treated the *Phragmites* stand and will enable a spatially explicit description of the plant recolonization process.

Lana Athorp: Bird species associated with *Phragmites australis* at the Pt. au Sauble Nature Preserve in Brown County, Wisconsin.

The invasive plant species, *Phragmites australis*, has become the dominant vegetation along the Green Bay shoreline and in a 10 ha coastal lagoon at UW-Green Bay's Point au Sauble Natural Area in Brown County, Wisconsin. The U.S. Fish and Wildlife Service, Wisconsin Department of Natural Resources, and others have attempted to remove *Phragmites* from affected wetlands, and currently research is underway on the west shore of Green Bay to assess different treatment methods. My proposed project will sample the birds in the lagoon and along the shoreline during summer 2007, prior to experimental control measures to eradicate *Phragmites* to provide baseline data to determine whether birds are impacted by the removal of this invasive plant.

Christina Brady: Effects of three mustard (Brassicaceae) species on ground-dwelling macroinvertebrate communities in Cofrin Arboretum.

Our study looked at the effects of three mustard (Brassicaceae) species on ground-dwelling macroarthropod communities. We studied three sites, each with areas of dense growth of a mustard species: Native toothwort in Mahon Woods, non-native dame's rocket in the escarpment woods, and non-native wintercress in old field west of Laboratory Sciences building. At each site, three 3 x 3 m "in" treatments were placed where the mustard grew densely, and an adjacent 3 x 3 m "out" plot had no mustard growth. One covered pitfall trap placed in the center of each plot ran for two weeks in June-July and two weeks in September-October, 2007. We collected nearly 10,000 macroinvertebrates belonging to 19 Orders. 65% were Isopod crustaceans; all these are non-native. Two-way ANOVAS looked for site and treatment (In versus Out) effects and site/treatment interactions of diversity (macroinvertebrate orders and spider species) and abundance (of all taxa with N > 100) response variables. Many groups showed no treatment effects. There were more Invertebrate Orders, Isopods and Hemipterans among wintercress "In" than "Out" treatments, and possibly more macroinvertebrates among "Out" than "In" treatments in dame's rocket. Wintercress may provide a moister, cooler, shadier microclimate in the hot sunny Old Field habitat, whereas in the dame's rocket habitat, the dense mustard growth may impede invertebrate movement and hence lower trap efficiency.

Lori Caelwaerts: Variation in seed rain along a gradient of forest quality. (Faculty advisor: Matt Dornbush)

Small-scale community composition results from a balance between species additions resulting from colonization events, and species losses resulting from local extinctions. Few studies have directly addressed the importance of seed rain (colonization) in maintaining local diversity. The paucity of information on seed rain in Midwestern deciduous forests highlights a major gap in our understanding of the factors affecting forest composition and richness. My project measured the differences in annual seed rain among three distinct forests, including an intact, high diversity, mesic forest (Mahon Woods), a lower diversity, lakeshore forest (Bayshore Woodland), and a low diversity, highly invaded woodland (Bay Beach Wildlife Sanctuary).

Megan Harvey: Florivory in populations of *Gentianopsis procera* in Door County, Wisconsin  
*Gentianopsis procera*, or Great Plains fringed gentian, is a plant of special concern in Wisconsin and several other states because it is restricted to habitats with unique characteristics such as limestone substrate. Last flowering season (2006) I found a significantly higher rate of florivory of *Gentianopsis procera* at a shoreline site (Toft Point, Light House Point), compared to an inland site owned and managed by The Nature Conservancy. Presence of florivorous insects (insects that eat flowers) has been shown to significantly reduce lifetime fitness by limiting seed production, seedling recruitment, plant density, and maternal fitness of plants under natural conditions. My study compared morphological characteristics, reproductive success and level of flower and seed predation among several populations of *Gentianopsis procera* in Door County, Wisconsin, including the Toft Point Natural Area. Relationships between these factors and population density, population size, isolation, and degree of disturbance (inland vs. shoreline) were examined. I also identified factors related to high florivory rates of *Gentianopsis procera* and to identify the primary florivores in Door County populations.

Megan Jacobi: Competition and Predation among Great Lakes Invasives: A study of the relationships between Round Gobies, Zebra Mussels, and Quagga Mussels at three UWGB Natural Areas.

Zebra mussels, quagga mussels, and round gobies are all invasive species brought to the Great Lakes region from ballast water in transoceanic vessels. Zebra mussels constitute a major part of the diet of round gobies. This might have benefits for Great Lakes ecosystems because few other resident species eat the exotic mussels. My study investigated the competitive relationships between zebra mussels (*Dreissena polymorpha*) and quagga mussels (*Dreissena bugensis*) and the influence of round goby (*Neogobius melanostomus*) predation on relative abundance of these two mussel species in Green Bay and Lake Michigan. Experimental structures at two sites along Green Bay (Cofrin Arboretum and Point Au Sauble) and one site in Door County, Wisconsin (Toft Point Natural Area) were followed over the growing season. The objective was to test whether 1) quagga mussels out-compete zebra mussels on a local scale and 2) round gobies have an effect on the mussel populations.

Susan Haen: Archeological Cultures at Toft Point.

The University of Wisconsin-Green Bay Natural Area at Toft Point is in the same location as a site recorded in the State of Wisconsin Archeological Site Inventory. The site 47DR3, known as the Mud Bay site, was recorded early in the twentieth century by John P. Schumacher, who reported artifacts from the site in the presence of T. Toft. The status of the site at Toft Point and a more exact identification of the types of artifacts will be investigated in the light of more recent excavations, which have established a chronological framework for archeological cultures on the Door Peninsula. I inventoried artifacts from this site in area museums. Identification of the artifacts from the site will give a clearer picture of when the site was occupied, and perhaps of the range of activities which took place there. Awareness of the potential of this archeological site may help plan for future activities for this natural area, and enhance appreciation for past human interactions with the natural world.

Sarah Rauen: Assessment of Endocrine Disruption in Amphibians in Northwest Wisconsin

Recently, it has been discovered that certain frog populations on UW-Green Bay land exhibit elevated rates of morphological abnormalities. Manmade chemicals that interfere with hormone signaling are often referred to as endocrine disruptors or hormone mimics. Amphibians are thought to be particularly susceptible to the effects of environmental endocrine disruptors due to their highly permeable skin, and due to the fact that they spend a significant portion of their life history in an aquatic environment. A preliminary study conducted by Dr. Dan Meinhardt at the University of Wisconsin – Green Bay provided evidence that newly metamorphosed frogs existing in an area of UW-Green Bay land that is likely to contain significant levels of herbicides (the UW-Green Bay golf course) exhibit a significantly higher rate of abnormalities in skeletal development than frogs living in other areas less likely to be contaminated (16% vs. 8% of the population, respectively, exhibiting abnormalities). The goal of the present study is to build upon these preliminary findings in order to 1) gather more extensive data regarding the rates of morphological abnormalities in amphibian populations at a variety of sites on UW-Green Bay land, and 2) to examine whether these morphological abnormalities are correlated with disrupted reproductive processes (another sign of endocrine disruption), such as the ability of the gonads to synthesize sex hormones and the ability of the brain to make the reproductive factor GnRH.

Ryan Wachtl: Effects of Brassicaceae dominance on fungal biomass and soil phosphorous - A family based mechanism for competitive superiority.

Since 2000, *Alliaria petiolata* (garlic mustard), a member of the Brassicaceae family, has been on the Nature Conservancy's Red Alert list because of its rapid colonization of mesic North America forests. Roughly 80% of terrestrial plants have mycorrhizal fungal associations that increase the effective surface area of roots and aid in the absorption and acquisition of immobile nutrients like phosphorus. To understand *A. petiolata*'s competitive advantage, I propose that a broader examination at the family level (Brassicaceae) is needed. I investigated differences in soil fungal biomass, acid phosphatase activity, and soil available phosphorous under two native Brassicaceae, *Cardamine diphylla* (Michx.) A.W. Wood and *Cardamine concatenata* (Michx.) O. Schwarz, growing on the University of Wisconsin-Green Bay Arboretum, and under *A. petiolata*, growing in replicated research plots in the Bay Beach Wildlife Sanctuary. Examining fungal biomass, soil acid phosphatase levels, and plant available phosphorous under *A. petiolata*, *C. concatenata*, and *C. diphylla* will add to our understanding of the success of the Brassicaceae family.