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# Cranberry Lake Biological Station Research Symposium, Session D

SUNY College of Environmental Science and Forestry

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SUNY – ESF Dept. of Environmental and Forest Biology  
Cranberry Lake Biological Station  
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Amphibians

**Kaur, Balpreet, Alyssa Kess, Laura Pickering.** Study of toad presence on trails, near natal sources, at different times of day. While walking about in the field classes at CLBS, we noticed an abundance of American Toads (*Axarylius americanus*) in the trail paths we traveled. Human foot traffic is a danger to toads due to their small size. Determining what times these toads are most active would be beneficial to preventing accidental death due to humans. Our hypothesis was that toads are most active during a specific time frame. Three trails leading to known frog and toad natal sources were sampled with a 50 meter transect, starting from where the water becomes visible. These transects were sampled during four distinct time frames: Morning 9AM, Midday 1PM, Dusk 7PM, and Night 9PM. Sampling consisted of visually surveying the transect 2-3 times and marking with flags were frogs were found. This process takes about 10 minutes. Data were processed in an ANOVA test to determine if there was a difference in frogs given the time frame. Statistical results show there is no difference in frog presence on trails near natal sources with regards to time (P-value = .916). Frogs don't appear to prefer a specific time frame.

Invertebrates

**Gabriel Sanchez, Jacob Wojcik, Conor Darcy.** Comparative Analysis of Invertebrates within Differing Bryophyte Life Forms. Bryophytes create microenvironments that can provide invertebrates with shelter, moisture, camouflage, and a place to oviposit eggs. Important factors determining the composition of invertebrates within bryophytes include the size, shape, and texture of the leaves. As bryophytes are categorized into life forms based on these morphological differences, it is hypothesized that different moss life forms will vary significantly in terms of relative abundance of invertebrates as well as trophic level composition of nematodes. The experimental units were the five separate boulders (n=5) that were sampled on a 50m transect along skid trail. The sampling units were the thirteen samples of moss which represented four different moss life forms: The subsampling units were the five types of bryofauna observed (Nematoda, Tardigrada, Rotifera, Collembola, Acari) and the nematode trophic levels. The samples were placed into Tullgren funnels for 24 hours and were then examined under a dissecting microscope. To extract macroinvertebrates, the moss samples were then placed into separate Baermann funnels for a 20 hour period. The samples were concentrated into 2ml each, allowed to settle, and the sediments were pipetted out and observed under scanning power to quantify organismal abundance. The nematodes were also examined under high power to determine their trophic level via mouthpart morphology. A Shannon-Weiner diversity index was performed in order to quantify diversity and evenness of the bryofauna. An ANOVA and Tukey's test was also performed to identify the significant variation between the invertebrate communities of separate moss life forms. This observational study was important because the invertebrate trophic structure within bryophytes is an extremely understudied subject.

**Ashkar, Shaheemah A., Danielle L. Browne, and Victoria G. Knowlton.** Ground Beetle Populations in Response to Trail Edge Effects. Foot trails alter forest structure and dynamic, creating ecotones between adjacent forest fragments. These trail edges impact forest cover, habitat, and biodiversity. We used Coleoptera, the most numerous animal order, as bioindicators of the ecological diversity of trail edges. We hypothesized that abundance, species richness, and diversity would be lower at trail edges than interior forest fragments. Three trails of similar forest composition, Tower, Skid, and Chair Rock Trails consisted of four alternating transects 25 m apart and at least 50 m from wetlands and other forest edges. Two sampling units were placed along each transect at 0 and 50 m. At each sampling unit we constructed a pitfall trap (48 h), conducted a timed visual leaf litter search (1 x 1 m, 3 min), and measured forest cover density; beetles were counted and identified by species. A paired t-test was used to determine significant difference in beetle abundance and a Shannon-Weiner index of species diversity to determine diversity between both increments. Results will be presented and discussed. This study will provide insight to the importance of trail edge effects on biodiversity.

Plants

**McDaniel, Louis, Nicole McCoy, Joe Benz, Sam Greulich.** Predicting Microhabitat Conditions Using Morphological Characteristics of *Drosera rotundifolia*. *Drosera rotundifolia* is a common zoophagous plant in the Adirondack region. Morphological differences were noticed at different locations which prompted the question of which environmental factors caused these differences. It was expected that microhabitat conditions could be predicted based on morphological characteristics (mm) of *Drosera rotundifolia*. Samples were analyzed in four different substrate types (peatlands, soil, sphagnum and log) with three replicates of each site resulting in our experimental unit (n=12). Each *Drosera* was considered a sampling unit (n=100). Light, stem length and petiole length were taken in situ and soil samples were collected to be later analyzed for pH and nitrogen in the lab. The data was compared by nine regressions and six one-way ANOVAs and the results will be discussed and presented upon. This data gives others the flexibility to better delineate Adirondack wetlands and applying noninvasive survey techniques.

**Baker, Adellia, Taylor Moskal, Gabrielle Dalton.** Study of Species Richness and Diversity of Vascular Plants on Peatland Hummocks. Hummocks are found throughout a variety of peatlands and are characterized as being a mound above the water level formed by various mosses and vascular plants. Because hummocks vary in shape and size, we hypothesize that the diversity and richness of vascular plants are more strongly correlated with height as opposed to with base perimeter. Within the area of Cranberry Lake Biological Station we sampled three separate peatlands; Forsaith's Bog, Duck Pond, and Del's Pond. Using two 20m transect lines in each peatland, we observed the microtopography of each hummock within the transect. We did this by laying three line intersects across each hummock and calculating percent cover and species richness for each vascular plant along the intersects. The experimental units for our study are the hummocks and the sampling units are the vascular plants found on the hummocks. After analyzing our data we found no significant correlation between diversity and richness with height, concluding that we failed to reject our null hypothesis. Although, if a larger amount of data were to be collected in the future, a stronger correlation could be found. Understanding the diversity and richness of vascular plants on hummocks is important when attempting to study or restore wetlands and improve biodiversity.

**Dami, Katherine A., Jennifer S. Ferlenda and Annarose Y. Quinn.** The Influence of Abiotic Factors on the Growth Pattern of *Monotropa uniflora*. *Monotropa uniflora* is a parasitic plant found in the Adirondacks that can be found growing individually or in clusters. We could not find many scientific studies that examined relationships between abiotic factors and growth patterns of *M. uniflora*, so we decided to test it ourselves. Our hypothesis states that as canopy cover increases, soil moisture increases, and pH decreases *M. uniflora* will grow in larger clusters. Other abiotic factors (soil temperature and leaf litter thickness) that could affect *M. uniflora* growth patterns were also sampled. Ten different *M. uniflora* populations (experimental units) were chosen. In each population, we sampled ten different individuals (sample units). We selected certain individuals of the population that would result in a broad diversity of stem numbers. Regression analyses will be conducted on every variable tested within each population. Relationships between all measured variables and growth patterns of *M. uniflora* in our ten populations will be discussed. The data will be pooled in order to analyze overall trends. We hope to find other factors that influence *M. uniflora* growth other than the type of mycorrhizae it is parasitizing.

**DeRosa, James M., Maximilian H. Gordon, Catherine E. Obidienzo and Katherine A. Rupp.** Antibacterial properties of *Prunella vulgaris* and *Thuja occidentalis*. Native American groups have and continue to use *Prunella vulgaris* and *Thuja occidentalis* for antibacterial medicinal purposes. Active ingredients in *P. vulgaris* include the flavonoids quercetin and rutin (Arima et. al., 2002). *T. occidentalis* contains many phytochemicals, including thujone (Cushnie et. al., 2005). Both flavonoids and thujone have been confirmed to retain antibacterial properties. We hypothesized that *P. vulgaris* and *T. occidentalis* would have measurable antibacterial effects in an agar diffusion test, if administered through an aqueous solution. Secondly, we hypothesized that local flora will have a statistically greater zone of inhibition than the drug Neosporin. Our experimental units are plant species and our sampling units are individual plant treatments. Four separate individuals of *P. vulgaris* and *T. occidentalis* were harvested. There were also four diffusion-disc treatments of both Neosporin and distilled water (control). The dependent variable was the zone of inhibition, and the independent variable was the disc treatment. An ANOVA test was used to find statistical significance. Results will be presented and discussed- we anticipated a statistical difference between the local flora and the control group- to show that indigenous use of medicine holds scientific credibility.

**Lomery, Elaina. Alexa Pedneault, and Michelle Fonda.** Edaphic Factors Influencing Understory Herb Communities on Pits and Mounds. We observed understory plant growth in pits and mounds around Cranberry Lake, with respect to height difference, plant richness and diversity, as well as soil pH and moisture. We measured fourteen 30m transects off station trails, with each starting point decided by rolling a 10-sided die. We included each pit/mound complex within 2m on either side, and with a 87.5cm wide hula-hoop as our sampling region, we observed the aforementioned factors within it. We hypothesized community composition between pits and mounds would be different, and that pits would have greater species diversity ( $H'$ ), lower pH, and a deeper litter layer (cm) when compared with mounds. The weighted Sorensen's index value was 57.87, and so we fail to reject our null hypothesis of difference in community composition.  $H'$  values for pits and mounds were 0.51 and 0.58, respectively. Using paired t-tests, we found that between pits and mounds, leaf litter depths were significantly different, ( $p < 0.001$ ) and we failed to reject our null hypothesis regarding soil moisture ( $p = 0.595$ ). We also failed to reject our null hypothesis for soil pH ( $p = 0.353$ ).

#### Aquatic Systems

**Castiglia, Dominic. Ryan Goodman, Devan Wade.** Spatial partitioning, and territory between and within Odonata families. Members of the Odonata order are predators that influence the fundamental structure of the food web. As nymphs, they are found in slow moving water, and are often used as an indicator species. We created an experimental study to test how nymphs respond to territory partitioning of nymphs of different sizes and families. We hypothesized that young Libellulidae will avoid territories of different Odonata families, but move freely into territories of the same family. We also hypothesized that young Libellulidae will avoid territories with larger nymphs, but move freely into territories with smaller nymphs. Nymphs were collected from Barber Island, Sucker Brook, and Catherine's Bay, then separated into tanks by size and family. Four tanks were created with a sediment bottom, air bubbler and screen used to separate the nymphs for two hours to acclimate to the new environment. After screens were removed each tank was observed for fifteen minutes, and was observed every two hours for twelve hours, and was then reset to repeat the experiment three times. A chi square test was calculated and found that the movements that were expected did occur. This illustrates that Libellulidae nymphs will avoid territories based on size and family.

**Meashaw, Andrew, Matthew McBride, Lorenzo Natalie.** The Effects of Sunscreen on Photosynthetic Filamentous Algae. Algae are photosynthetic, often single celled aquatic organisms which serve as one of the most basic prey organisms in a given ecosystem. They are susceptible to changes in the aquatic ecosystem, and when chemicals found in sunscreen are introduced, they may be affected. Based upon a previous study we hypothesize that filamentous algae will have a greater rate of photosynthesis in water where sunscreen is present as compared to water where sunscreen is not present due to the lack of UV light penetration. For this experiment, we collected algae from South Bay, and placed 4 mL samples into 118mL jars, with one control group and three experimental groups of varying sunscreen concentrate. The change in dissolved oxygen was recorded. We ran this test in outside conditions, and once under a UV and sun lamp. We then repeated the set of tests with less sunscreen to account for a potential error in light penetration, as well as a trial without UV to make sure it was in fact UV that impacted photosynthesis. Using ANOVA and Tukey statistical tests our results showed that our hypothesis was not supported, but there were other trends that were noticeable. This shows that sunscreen has a negative effect on algae photosynthesis.

**Inchausti, Max W., Jeffrey D. Browne, and Connor A. Groff.** Study of Water Strider Survivorship in the Presence of Predatory Fish. Gerridae and Veliidae, the two common species of water striders at Cranberry Lake, coexist in the lake and surrounding streams with various predatory fish. Each species occupied similar niches but with different morphologies. We hypothesized that Gerridae would be more heavily preyed upon than Veliidae, measured in the number of water striders consumed, in the presence of various predatory fish due to their larger size. The experimental unit for our study was predatory fish as a whole, while our sampling unit was the individual fish species used. For our test, we placed 5 fish species, each in their own tank, and placed 5 Gerridae and 5 Veliidae in the tank for 4-hour intervals. We ran the intervals 6 times over a 24-hour period for a total of 6 experimental units and 5 sampling units. A t-test was used to compare the number of water striders preyed upon by all fish species per interval. An ANOVA test was then used to compare differences of water striders preyed upon between fish species. The results will be presented and discussed. This study is significant as not much is known about the predator-prey relationship between water striders and predatory fish species.

**Blanchard, Jill, Catherine McLaughlin, Erik Erbes, Oliver Knox.** Macroinvertebrate Drift in Cranberry Lake Stream Systems.

Macroinvertebrates play an important role in nutrient cycles, decomposition, providing food sources for many fish and are valuable as indicators of water quality. We examined macroinvertebrate drift in Sucker Brook during the day and night. Drift nets were checked every six hours and contents were collected and sorted for family groups. We hypothesize there will be more drift of family richness and diversity during the night rather than during the day. Additionally, as a case study we examined Chair Rock Flow and Six Mile every 24 hours to see what macroinvertebrate family groups drift in both richness and diversity for the various streams. Experimental units are the three different streams, and the sampling units include the average of the communities in the three drift nets at the times in which they were collected. We will use a weighted Sorreson analysis to compare the three streams for average of family groups that drift. Data for Sucker Brook will be analyzed using an ANOVA test. Results will be presented and discussed as well as the various family groups we have recorded drifting in Chair Rock Flow and Six Mile.

**Reilly, Breanna, Savannah Bartlett, and Abigail Flaitz.** Zooplankton population changes in the presence of personal care product pollution.

Rotifers, Cladocerans, and Copepods, three of the most common freshwater zooplankton groups, have a crucial role in the aquatic food web in Cranberry Lake. Any pollutants they consume could impact their predators and, eventually, the rest of the environment. It is for this reason we became intrigued as to how pollutants, specifically DEET and sunscreen, can decimate populations of such vital organisms. We hypothesized that Rotifers will be the most abundant group (number of living individuals per 8 mL of water) present after each treatment. Zooplankton were collected from six different sites in Cranberry Lake, half swim areas and half open water. These locations stood as our replicated experimental units. These samples were homogenized, measured out (15 mL), and put into treatments (n=7). With the exception of the control, all of the jars received different concentrations (1 mL solution) of solutions containing DEET, sunscreen or both. This was replicated five times, for six hours each. To test our hypothesis, we will use ANOVA and Tukey's test. We expect our results to show a significant difference. We anticipate that our findings will provide a better understanding on the impact of man-made products such as DEET and sunscreen on freshwater habitats.

### Birds

**Jessica VanGronigen, Kayla Lenway & Kelly Sieman.** Mobbing behavior in wetland and stream edge habitats.

Mobbing is aggressive behavior exhibited in prey species, where individuals will form a group to drive away predators. This commonly contagious reaction will drive many different species to attack together. We described differences in mobbing in stream and wetland edge habitats. We expected to find greatest mobbing behavior in response to barred owls in wetland edge habitats due to edge-effect theory and greater length of intermediate habitat. Mob behavior was quantified with five different response variables, speed (min), intensity (call/min), range (m), species richness, and species diversity, to account for variability in species' behaviors, condensed in one overarching hypothesis for clarity. The study was performed in 5 wetland edges, and 5 stream edges, totaling 10 experimental units, with 3 sample units in each. Sample units are defined as different sounds played, control House Finch (*Haemorrhous mexicanus*) song, Black-Capped Chickadee (*Parus atricapillus*) scold call, and Barred Owl (*Strix varia*) call, spaced at least 50 m apart. T-tests were performed for species richness and diversity in wetland vs streams. Chi-squared tests were performed for range, speed and intensity in both the wetland vs. stream and chickadee vs owl tests. Results will indicate further discussion on ecological interspecies relationships and behaviors.

### Fungi

**Jared Fearby, Christa Dock, Tristin Houck, Shelby Woyciesjes.** Correlations Between Fungi Species Richness and Microorganism Abundance in Nurse Logs at Cranberry Lake Biological Station.

Nurse logs with high moisture levels, neutral pH and larger abundance of microorganisms will have greater fungal species richness. A secondary and tertiary objective is to identify relationships between fungal species richness, moisture content, and pH of nurse logs. We sampled thirty different nurse logs ranging in size from 20 to 40 cm in diameter from beginning and end points of North Shore Trail, South Side Trail and Chair Rock Trail using a stratified random sample with line transects. We identified all fungi with fruiting bodies present on the nurse log, and collected wood samples to determine pervasiveness of microorganisms, pH level, and moisture content. The nurse logs act as both the experimental and sampling unit. A correlation test was used for determining if there is a positive correlation between fungi species richness and microorganism abundance, and for testing the secondary and tertiary hypotheses. We failed to reject the null hypothesis, and no significant correlations were discovered. Understanding the determinants of fungal richness can be used as an identifier of the quality of nurse logs and the surrounding forest.

**Hermanson, Max, Silus Weckel, Alex Kozisky, and Kyle Kozlowski.** Under the sphagnum: An observational analysis of the relationship between distance and ectomycorrhizal morphotype diversity in wetland ecosystems.

Ectomycorrhizal fungi (EMF) form a mutualistic symbiosis with host plants by increasing plants' uptake of nutrients and water. Many tree seedlings are dependent on EMF for successful establishment in nutrient poor areas, such as wetlands. It was hypothesized that EMF morphotype diversity should decrease as the larch saplings get closer to the center of the bog. *Larix laricina* was chosen as the EMF host of choice due to its abundance in wetlands around Cranberry Lake. Three sample sites were used and a total of nine trees were sampled from three transect lines at each site. The sites were Forsaith's Bog, Lost Pond Bog, and an unnamed fen. The distances used consisted of trees from the upland-wetland boundary, trees from the wetland interior, and an intermediate zone. These sites were selected because they possessed abundant stands of *Larix laricina* and met the DBH requirement of our transects. Twenty root tips were taken from each host sapling. EMFs were classified based on morphological features. EMF diversity was calculated for each tree. A regression analysis on the relationship between distance and diversity of morphotypes showed no significant difference (p=0.051). ANOVA analysis revealed no significant difference between the three sites (p=0.060).