ENVIRONMENTAL AND EARTH SCIENCE PAPER ABSTRACTS

BENTHIC FORAMINIFERAL SPECIES DISTRIBUTIONS IN EASTERN LAKE, WALTON CO., FL. *KAYLYN BELLAIS*, MURLENE CLARK AND STEVEN SCHULTZE, UNIVERSITY OF SOUTH ALABAMA.

The coastal dune lakes of Walton Co., Florida represent a rare environment only found in a few other areas of the world, such as New Zealand and Madagascar. The lakes originally formed as estuaries in the geologic past, when sea level was much lower than today. At the end of the last ice age, these estuaries became drowned and separated from the Gulf of Mexico by migrating sand as rising waters moved into the area. Today, the coastal dune lakes are largely controlled by streams that drain into them, although they are periodically invaded by saltwater from the Gulf during storm surges. The ecology and overall health of these lakes has become an important environmental concern as the area has developed as a tourist center. An investigation of benthic foraminiferal populations has revealed information about the salinity, pH, and bottom substrate of this understudied environment. Ten samples were collected from a north-south transect of Eastern Lake using a box core sampler. Samples were washed through a 63 micron sieve, and air dried. benthic foraminiferal were then picked, mounted on a slide, and identified using a binocular microscope. The population in the lake is a zoned microcosm of foraminiferal populations described elsewhere along the Gulf Coast. Agglutinated forms are predominant in the less saline areas of the lake, while carbonate forms dominate areas under the influence of invading saltwater.

EXAMINATION OF EXTREME COLD AND FROST IN ALABAMA CITRUS. *SAMANTHA DARRING* AND STEVEN SCHULTZE, UNIVERSITY OF SOUTH ALABAMA.

Frost and extreme cold has been a limiting factor in the production of citrus in the central Gulf Coast region. Extreme cold events (<-6°C) can bring heavy damage to citrus crops, particularly if they are long lasting. While these are rare in the region, they can completely wipe out entire groves, as seen in the late 1980s. Frost events (<1°C), which are far more common, can be particularly damaging if the trees have gone in to their bloom stage. Such temperatures can kill of the flower blooms, which will decrease the amount of fruit set on each tree. This study has looked at these events within a Satsuma Orange (*Citrus unshiu*) grove in Fairhope, Alabama throughout the winter of 2017-2018. 22 micrologger weather sensors have been deployed within the grove across 11 trees. Each of the selected trees have two sensors in a vertical column on the west face of each tree at a height of 1 and 2 meters above the ground. Temperature, relative humidity, and dewpoint have recorded every minute, on the minute, since early November 2017. Multiple frost events and at least two extreme cold events have occurred in the region while the grove was monitored. Temperature inversions, deep freezes, major cold fronts, and even frozen precipitation events all are clearly on display in the . The results and implications will be discussed.

PRECISION AGRICULTURE AND THE EFFECT OF MICROCLIMATES ON CROP DEVELOPMENT. *STEVEN SCHULTZE*, UNIVERSITY OF SOUTH ALABAMA.

The field of precision agriculture has brought the concept of "Big Data" and data analytics to the world of agriculture. Growers view sub-field agricultural variables in order to make management decisions across their crops rather than applying a one-size-fits-all technique. However, precision agriculture has mostly focused on the effects of soil changes on a sub-field basis as the primary determinant for yield and quality variability within the same plot of land, while microclimate influences have largely been ignored. The goal of this study was to analyze the differences in these weather variables at the highest spatio-temporal resolution possible over the course of a growing season. Using properly calibrated weather microloggers placed in aerated PVC housings, we placed several "micronet" stations in a satsuma orange (*Citrus unshiu*) grove and measured temperature, relative humidity and dewpoint for every minute for 66 days. These variables were compared to the yields of each individual tree. Our "micronet" found extreme temperature variability, as high as 10˚C in some instances, in the grove. Differences in GDD accumulation for each tree were found to be as much ±10% the mean. As such, each tree faced different micrometeorological conditions, and we discuss the implications. Ultimately, the study of microclimates on a sub-field level has similar, if not greater, utility than soil variability on a sub-field level within the context of precision agriculture.

FEASIBILITY OF GROWING BEER HOPS IN THE SOUTHERN ALABAMA REGION. *WAYNE WILLIAMS* AND STEVEN SCHULTZE, UNIVERSITY OF SOUTH ALABAMA.

Hops (*Humulus lupulus*) are grown on a vine that produce flowers that which are used in the production of beverages. Production of hops is mostly confined to the areas found between 35 and 55 degrees north latitude. This is mostly due to the length of the day, and the angle of the sun in sky during the growing season. Being located south of the 35˚N line, there is very little to no hop production in the state of Alabama. However, hop production has begun in the surrounding states, most notably in Florida. While there are certain obstacles to growing hops, these can be counteracted by using certain farming practices and through close observation of issues that can arise as the hops reach maturity. Working in conjunction with Auburn University at their Research and Extension Center in Fairhope, AL, a "variety trial" was composed of 5 vines of three varieties of hops (Cascade, Chinook, and Neomexicanus). This paper will discuss the results of the variety trial, focusing on the positive and negative experiences found during the inaugural growing season of 2017. Further expansion of the trial is planned for 2018.

ENVIRONMENTAL AND EARTH SCIENCE POSTER ABSTRACTS

IMPACT OF INVASIVE ANTS (HYMENOPTERA: FORMICIDAE) ON CARRION BEETLE ABUNDANCE ACROSS AN URBAN-RURAL GRADIENT. *GRANT GENTRY* AND HOPE REAMER, SAMFORD UNIVERSITY. ISAAC HEINKEL, UNIVERSITY OF NORTH ALABAMA.

As urbanization increases, the abundance of invasive ants that thrive in disturbed habitats increases. Invasive ants, such as *Solenopsis invicta*, can reduce the abundance of native ants and disrupt arthropod communities. Using the abundance of carrion beetles in the Silphidae as our measure, we sought to determine the impact of invasive ants across an urban-rural gradient. We chose a total of twelve sites along this gradient and used pitfall traps baited with chicken to capture both the silphid beetles and ants. We found that as the proportion of native ants at a site increased the abundance of silphids increased, however as the proportion of invasive ants captured as a site increased, the abundance of silphids decreased. As with native ants, invasive ants may have a particularly negative effect on silphid abundance because of their superior competitive abilities.

A NOVEL TESTING METHOD FOR MANGANESE CONCENTRATION IN DRINKING WATER. *ANNA HOLMES*, EMANUEL WADDELL AND BERNHARD VOGLER, UNIVERSITY OF ALABAMA IN HUNTSVILLE.

Manganese (Mn) is a trace metallomic requirement in biological systems that can wreak havoc when hyperaccumulated, manifesting in neurologically degenerative pathologies. One mode of biological entry is through water contaminated by natural and industrial sources. Removal of manganese oxides are achievable in water treatment facilities, however Mn(II) ion in solution eludes conventional entrapment. Approved Environmental Protection Agency (EPA) testing methods for the detection of manganese in water are toxic and difficult to perform outside of advanced analytical laboratories, requiring water processing facilities to outsource costly tests. The colorimetric method for quantifying manganese concentration in water, the persulfate method, has a "low detection limit" of 0.210 mg/L, - an order of magnitude out of range of the "maximum allowable limit" set for pharmaceutical or bottled drinking water (0.01 mg/L and 0.05 mg/L respectively) established as a global standard. As yet no limit has been established for tap water. To address the need for a safer and compliant testing method, a multistep synthesis was conducted with the reagents characterized by proton nuclear magnetic resonance (Hydrogen-1 NMR) and confirmed as an oxime producing a colorimetric response within the compliance range. The reagent has been stabilized in ammoniacal buffer solution that can easily be used by local water processing facilities to detect manganese by simple spectrophotometric methods. Current efforts are being conducted to determine any possible metal contaminants that may cross react with the testing method and to determine what processes need to be included in a protocol to eliminate interference.

RADIAL GROWTH RESPONSE OF CONIFEROUS AND DECIDUOUS TREES TO LATE GROWING-SEASON FROSTS IN MICHIGAN.

ABIGAIL COLEY **AND DR. KETIA SHUMAKER, UNIVERSITY OF WEST ALABAMA. DR. CAROLYN COPENHEAVER, VIRGINIA TECH.**

Extreme climatic events, such as late frost, may have a greater impact on long-term tree growth than previously realized. We tested whether late frost reduced tree-ring growth in coniferous and deciduous trees. To observe differences in tree-ring width during frost and non-frost years, we used superposed epoch analysis and a t-test to analyze tree-ring data from three coniferous (eastern hemlock, white pine, and red pine) and three deciduous (red maple, red oak, and bigtooth aspen) trees. The frost years had significantly narrower ring widths than non-frost years ($t = -4.261$, $P = 0.004$). There was no evidence that deciduous trees had a greater reduction in tree-ring width than coniferous trees during frost years. Therefore, late frosts reduce growth in both coniferous and deciduous trees.