



# Land Use, Land Cover, and Biodiversity in the Mississippi Embayment

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## Chris Foshee Master's Student in Biology

My research involves capturing and radio-tracking wintering Mallards in the Delta region of Arkansas. I am looking at habitat use preferences as well as vegetative characteristics that are used most by wintering Mallards. I am also learning the processes involved with wetland restoration and conservation. Teaching at Armorel a lot of the students have dealt with the different aspects of duck hunting which includes having the land to duck hunt on. I am working to show them the importance of not only agricultural fields for wintering ducks but also the extreme importance of natural habitats. I have been able to show the students how radio-tracking is done and will introduce them to some of the aspects of land restoration and conservation for agriculture.



My research focus is on the population dynamics of stored product insects at a rice mill in Northeast AR. I am specifically looking at four main species: the lesser grain borer, warehouse beetle, cigarette beetle and Indianmeal moth. I will be trapping these insects to determine when their flight activity takes place and how weather conditions affect these populations. I have incorporated my research into lesson plans several times, once with a trap simulation. The students were to count the "insects" in each trap and analyze the data they collected. They have also used weather data from my project to better understand temperature, relative humidity and weather fronts. Also, in the spring, the students will use handheld GPS units in a scavenger hunt project and map the coordinates afterwards, as I used them in my research.

## Amanda White Master's Student in Biology

## Mauricio Solis Master's Student Environmental Sciences-Biology

My research involves a description of the carrion feeding insect fauna that visit pig corpses in rural and forested areas in Northeast Arkansas, in order to increase the regional knowledge of necrophagous species used in forensic entomology. As part of my research, proper insect identification is very important and the observation of ecological aspects and relationships has helped me to present this to the students. I have been able to use this data to show the students how every living species (including little maggots and beetle larvae) play an important role in an ecosystem. I have used dichotomous keys with the students to identify several insect species and we have observed other behaviors in arthropods as well.



## Jonathan Stanley Doctorate Student Environmental Sciences-Biology

My research involves investigating the effects of prescribed fire in a unique, rocky glade habitat in the Ouachita Mountains of Arkansas. To do this, I examine the change in vegetation, mice populations, and rattlesnake populations due to the controlled burning of these habitats. I can bring this research into the classroom to teach about food chains/webs, identification of organisms, population/community studies, habitat monitoring, and abiotic influences on the ecosystem. Specific lessons may include the use of dichotomous keys, mark-recapture simulations, and various measuring devices. This provides hands-on activities for the students, and exposes them to habitats and organisms that they may be completely unfamiliar with.



## Jeremy Everitts Master's Student in Biology

My research focuses on the prescribed burns and their effects on vegetation and Swainson's Warbler spatial use in the St. Francis National Forest, Arkansas. Part of my research incorporated tracking warblers using radio-telemetry by affixing a transmitter to the birds and then homing to those radio signals using H-antennas. I integrated this part of my research into the classroom by conducting a lesson on different capture and tracking techniques used in wildlife research. Specifically, I showed the students how to use the telemetry gear to home to the radio signals given off by the transmitters by hiding the transmitters and allowing the students to attempt to find them. Another part of my research is looking at the changes in vegetation cover and structure and changes in arthropod biodiversity due to the burns. I conducted several lessons looking at population estimation techniques, Arkansas Natural Divisions, and soil texture and composition. With these lessons, I talked to students about how fire can alter habitat quality, which can change how an animal uses its habitat. Also, I talked about how fire has been used historically to alter the landscape for agricultural purposes, which included why soil texture and composition is important in knowing which crops will grow best in an area selected for agriculture.



I am a Master of Arts student in the Biology Department at Arkansas State University. My research emphasis is on the development and advancement of two field stations that have been acquired since 2008. My time in the graduate program has been spent on determining the most essential elements in establishing programs at the field stations. Specifically, I am interested in the development of Environmental Education programs at the facilities targeting both local school students as well as surrounding communities. Taking my research to the classroom is quite difficult as my focus has been primarily on planning due to the infancy of the stations. However, one of the field stations is located approximately 20 minutes from the school where I teach. As a result of the close proximity, I took the students to my research project. My mentor teachers and I took 77 fifth grade students to the Bearitage Research and Learning Center for a day-long field trip. There were three primary hands-on science activities which included benthic insect sampling, radio telemetry, and herpetological studies. Most of the activities were novel to the students which hopefully had a positive impact on their perception of STEM education and careers.

## Kevin Keen Master's Student in Biology

## Teresa Brueggen Doctorate Student Environmental Sciences-Biology

My research takes place in the upper watershed of the Strawberry River, Fulton Co, AR. Over four years I am assessing the implementation of best management practices (BMPs) that have taken place in three subwatersheds of this watershed: Little Strawberry, Greasy Creek, and Sandy Creek. These BMPs include activities such as cattle exclusion from three waterways and providing alternative water sources. The BMPs studied are attempts to control soil erosion. These practices have been shown to be effective at preserving natural water quality.

There are multiple facets to this research that are easily incorporated into a classroom setting. The destructive force of erosion is a key part of this research and has been integrated into 6-8 frameworks. Total suspended solids, nutrients, and *Escherichia coli* are directly related to this concept and easily worked into lesson plans focused on erosion and water quality. When discussing adaptations it is easy to discuss macroinvertebrates and how they are adapted to their specific environmental settings. The students have also participated in mock benthic macroinvertebrate collections to practice data analysis and answer which "collection site" had the best water quality based on the quantity of "insects" found. All three test organisms used for toxicity testing have been brought in, fully discussed, and students allowed to transfer them as is required for testing.



My Ph.D. study at ASU is to understand vitamin C metabolism in a model monocot (rice) by studying its changes throughout the development of the plant and during exposure to abiotic stresses (salt, heat, and drought). What I hope to find by enhancing vitamin C content through molecular engineering will provide rice crops with enhanced stress tolerance as well as increased biomass, all of which would lead to healthier crops and perhaps higher yield.

My research can be turned into a classroom project for any age students. I have had students design their own research project using beans or any other plant that will grow well in a classroom setting. They observe the plants under any stressful condition and test the ability of the plant to tolerate the stress by adding vitamin C to the watering regime and comparing results to control plants.



## Katie Lisko Doctorate Student in Molecular Biosciences

