UNIVERSITY OF CENTRAL OKLAHOMA
Center for Wildlife Forensics and Conservation Studies

CFACS Research Spotlight | 13 December 2017
Conservation Genetics II
Michelle L. Haynie, Department of Biology

Dr. Michelle Haynie is an evolutionary biologist and mammalogist. Her work focuses mainly on rodents, although she also has worked on other mammals (including bats and skunks) and non-mammalian vertebrates. Her main interests include hybridization and speciation, as well as the effects of climate change on genetic diversity. Michelle likes to incorporate field and laboratory aspects in her projects, exposing students to multiple aspects of evolutionary biology research.

Michelle has worked on a number of projects during here 10 years at UCO. One project examined hybridization between two species of woodrats along a zone of contact that ran from Kansas, through Oklahoma, and into Texas. Using a suite of genetic markers, Michelle and her collaborators at Texas Tech University were able to identify and characterize three areas (one in each state) where hybridization occurs. Results indicated that although hybridization is common in certain populations, it is restricted to very specific habitat types and the parental species retain their genetic identity outside of the small hybrid zones. A portion of this research has been published in the Journal of Heredity and two additional manuscripts are under revision for submission to the Journal of Mammalogy.

A second project is examining genetic diversity of pocket gophers throughout the state of Oklahoma. Prior to the start of this project, two gophers were known to occur in Oklahoma and the boundaries of their distributional range in central Oklahoma was confusing. Gophers are difficult to identify based on morphological features and are considered cryptic species. Therefore, in areas where two species might overlap, it is difficult to determine what species has been collected. Based on genetic analyses, Michelle and her students have been able to identify the distributional boundaries of gophers throughout the state. Additionally, they have identified a third species that is found in the Oklahoma panhandle and two regions of hybridization in the state. Two graduate students and nine undergraduate students have participated in this project. The work has been presented at numerous local, regional, national, and international meetings.

Michelle and her students have won several UCO-based grants to investigate various aspects of this project, and the work will result in at least two graduate theses and three manuscripts. Additionally, Michelle has joined a research consortium involving three institutions in Texas that will be using a whole-genome approach to compare multiple pocket gopher hybrid zones to identify regions of the genome under selection during hybridization events. The aims of this research are to identify how hybrid zones are maintained, describe the comparative patterns of hybrid zone maintenance, and identify regions of the genome that are involved in speciation mechanisms.

Michelle presently is designing a long-term mark-recapture survey to monitor the small mammal community at the UCO Selman Living Lab. The intent of this project is to establish a dataset that can be used to monitor changes in rodent populations and communities over

multiple generations and to determine what factors (e.g., climate change) affect how the populations and communities change over time. The surveys will be conducted four times a year for a minimum of five years and will include not only collection of data on the animals themselves (e.g., age, reproductive condition, etc.), but also climate data (e.g., temperature, precipitation, etc.) and vegetation data (e.g., ground cover, species present, etc.). Additionally, samples will be taken to conduct genetic diversity studies. Michelle is collaborating with CFACS members Sean Laverty and Chad King, as well as with Gloria Caddell in the CMS Dean's Office. The project will involve a number of undergraduate and graduate students from UCO, as well as students from other institutions. The surveys will begin in March 2018.

Michelle will be collaborating with CFACS member Vicki Jackson, as well as Sue Fairbanks at Oklahoma State University, to do a genetic capture-recapture study of bobcats in Oklahoma. This project has been funded by the ODWC and will use genetic profiles generated from hairs collected in hair snares to estimate bobcat density and population size in Oklahoma. The project will begin in January 2018 and the data will be used to inform management decisions regarding bobcat populations in the state. Michelle also has collaborated in the past with CFACS members Paul Stone to examine genetic diversity in Sonoran mud turtles and Troy Baird to examine reproductive success in collared lizards.

For further information, additional research details, and opportunities for future collaboration, contact Dr. Michelle Haynie (mhaynie@uco.edu).