



# 2018 Texas Tech University Axis Deer Project Update



TEXAS TECH UNIVERSITY  
Department of Natural  
Resources Management

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Following the completion of the Upper Llano River Watershed Protection Plan in 2016, Texas Tech University's Department of Natural Resources Management and Llano River Field Station developed a research project to better understand the ecology of free-ranging axis deer along the South Llano River. The goals of this project are to assess the effects that axis deer have on native riparian habitats and vegetation, assess current and possible future population status and growth, investigate possible issues with the spread of disease between axis and white-tailed deer, and assess habitat selection by free-ranging axis deer. We are finishing the first year of the 3 ½ year field data collection portion of the research and are providing a project update to current and potential landowners and collaborators.

## Effects of axis deer on native riparian habitats and vegetation

Last summer we constructed 33 (33 ft. x 33 ft.) exclosures along the riparian corridor on the South Llano River. We have been collecting data to estimate biomass and percent ground cover of grasses, forbs (flowering plants), and woody plants from the exclosures every 3 months. Vegetation data collection will continue through January 2020. Four of the exclosures had visible differences compared to surrounding outside areas as early as 3 months post-construction, and by April 2018, ~20 of the exclosures had visible differences compared to surrounding areas. In many cases vegetation inside was taller whereas the control plots had little vegetative structure, and were grazed to the bare-ground. For example, the exclosure shown here (Figure 1) has wintergrass and buffalograss that is 6-8 inches tall and seeding out, while the outside area is dominated by frost weed. Many exclosures also have small seedlings of cedar elm, pecan, and live oak while none have been recorded outside exclosures. These preliminary data suggest that the combined effect of both species of deer on plant biomass is substantial. While identifying the effect of each deer species is difficult, differences in grass biomass may be attributed to axis deer foraging given that their diet consists of substantially more grass than white-tailed deer diets.

This summer we will continue monitoring the exclosures and conduct vegetation transects to record plant species presence and composition. We will also be estimating soil erosion associated with axis deer trails compared to random sites along the South Llano River to assess what effect they may have on erosion into the river.

## Population Surveys

Starting summer 2018, we will be conducting spotlight surveys to estimate axis deer density in the study area, within Kimble County. We have identified several routes along county and FM roads, along with routes on accessible properties that will be surveyed monthly (excluding September, December, and February). We will use distance sampling for these surveys, where we will measure how far away axis deer are from the route, which can be used to estimate axis deer density (# herds/ mi<sup>2</sup>). Herd composition (number of bucks, does, and fawns) will also be recorded to help characterize population growth and breeding chronology. We anticipate observing mixed groups of axis and white-tailed deer to assess possible interactions between the two species.



Figure 1: Example of a deer exclosure depicting abundant grasses inside and near bare ground outside the exclosure. Photo by Ivy Whitener.

## Disease and Genetics

So far we have collected approximately 50 tissue samples and 10 blood samples to test for genetic diversity and disease, respectfully. This summer and fall, sample kits will be made available and distributed to landowners to help in tissue and blood collection from any axis deer harvested. We are waiting to collect more samples before submitting any for analysis to the Texas Veterinary Medical Diagnostic Laboratory in College Station.

In March, we were made aware of a sick axis deer that was put down by a collaborator. While test results have yet to come back, we suspect that the deer may have died from a viral disease called Malignant Catarrhal Fever (MCF). The symptoms that were described to us match with previously observed symptoms of MCF in axis deer. MCF is transmitted through contact with infected individuals and via aerosolized droplets. This is the only suspected case of disease-related mortality in axis deer we have witnessed to-date, but we have observed a white-tailed deer last summer that we suspect died from a rattlesnake bite.

As a result of the suspected case of MCF, we are adding MCF to the list of diseases in our study. The list of tests also includes Epizootic Hemorrhagic Disease, Bluetongue Disease, and a white blood cell count to assess if their immune system is responding to another potential disease.

## Habitat Selection

Capturing of axis deer to affix GPS collars has been difficult and has gone very slowly. As a result of difficulties in netting axis we have shifted our focus to attempt to capture them with chemical immobilization. Our goal is to start darting axis deer in late May or early June 2018.

Preliminary observations from the individuals that have been GPS-tagged suggest home ranges are small and they remain near the river with occasional trips into the uplands by traveling via ravines. We plan to use locations of axis herds on the spotlighting routes to assess what characteristics are important for habitat selection via occupancy analysis techniques.



Figure 2: An axis doe with a GPS tracking collar and identifying ear tags attached. Photo by Robert Stubblefield.

## Tooth Replacement and Wear Guide

As part of our assessment of axis deer population structure and disease models, we needed an accurate method to estimate axis deer age. Currently, most people age axis deer using the tooth replacement and wear model available for white-tailed deer. However, given the variation between axis and white-tailed deer diets (grazers vs. browsers) we hypothesized that the tooth wear pattern in axis may be substantially different than what is seen in white-tailed deer.

We recently sent teeth from 51 axis deer collected from hunts on the South Llano River State Park, roadkill, from processors, or harvested by landowners to a lab for cementum annuli analysis to develop an accurate aging guide. Once we receive those results we will compare jaws within and between age groups and look for any consistent wear patterns to develop an aging guide. We are also asking professionals to assist with aging the actual jaws in a similar manner as they would a white-tailed deer to assess possible differences in the replacement and wear patterns between axis and white-tailed deer.



Figure 3: Axis deer jaws. The top jaw is estimated to be from a ~3 year old while the bottom jaw is estimated to be from a ~7 year old. Photo by Matthew Buchholz.

## Diet Analysis

Last summer, the Llano River Field Station conducted diet analysis of axis deer on the TTU Junction campus and the South Llano River State Park. Using a technique called metabarcoding that looks for plant DNA, along with traditional microhistological techniques, they looked for the presence of plant species in feces and rumen contents. While many different plant species were found, including several different grasses as expected, it was interesting just how much browse they were consuming. Mesquite and pecan were near the top in both fecal and rumen analysis.

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