

TRACING THE NUTRIENTS ON THE LANDSCAPE FOR WILDLIFE HEALTH



Sickness during the hunting season can be a hunter's worst nightmare. During cold and flu season, people will often increase vitamin and mineral supplements in order to boost their immune systems. We know that vitamins and minerals are an important part of a well-balanced diet, and they play a role in fighting infections. However, unlike humans that have the ability to take a pill to obtain these additional nutrients, wild herbivores, such as whitetail deer, get all their nutrients from the plants they eat. So, if deer can't eat the nutrients they need to maintain a fully functioning immune system, chances are, they are more likely to get sick. So, it's not just the hunter's health that matters; it's also the deer's health.

Deer counted by a distance sampling method on 11 sites across Texas.

PLANT BUFFET

Although deer have a diverse diet, the available food varies widely based on where that deer is located. It's like being at a buffet—some areas have great quality food at low quantities; other areas have poor quality food at high quantities and vice versa. The quality and quantity of the buffet depends on many factors, including how rich the soil is in nutrients, how hot and cold it gets, how much rain there is during summer and winter, and even how many other deer share that buffet.

BUFFETS ACROSS TEXAS

Texas is a diverse state with 10 distinct ecoregions—each with different soils, weather, plants, and animals—and the state's more than 4 million whitetail deer are found in every one of these ecoregions. Whitetail deer encounter and eat different plants all over the state from the dry Trans-Pecos all the way to the moist Pineywoods. That leads us to the question, are some areas better for deer? How do we determine a good quality location from a poor-quality location?

WHY CAN'T WE JUST MEASURE THE SOILS?

Wouldn't it be convenient if we could measure nutrients in the soils and be able to predict how the plants and wildlife in that area were doing? However, it's not that simple. First, most plants do not passively uptake minerals. It is an active process, which involves soil pH and moisture, plant roots and microbes. Secondly, whitetail deer are large-bodied, long-lived animals that build up nutrients in their bodies from the plants they eat over the growing season. They also likely carry over nutrient stores from the previous fall and winter, or even the previous growing season.

We studied what was driving these nutrient stores in whitetail deer across Texas—specifically, copper, iron and zinc—that are stored in the liver. We investigated if soils, weather, diet, sex, or population density of deer were affecting whitetail deer liver stores. We also checked for mineral deficiencies in deer across sites, in order to identify locations where deer might be more at risk of a disease outbreak.



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SOILS, WEATHER, AND DENSITY

We found that nutrient stores in whitetail deer were driven by a combination of soils and their interactions with weather during the growing season. Simply put, soil nutrients do affect what is getting into deer, but that depends on the weather. We also found that population density affected copper, iron and zinc stores in deer. With increased deer densities, there was increased competition for food. With increased densities, deer shifted their diets away from preferred plants (woody plants) toward less-preferred plants (grasses). Additionally, copper was the only mineral that fell to levels that would have been considered deficient for livestock. Of all the deer sampled, one-fifth had copper levels below the threshold for deficiency; that is, deer in more than half of our sites were at risk of copper deficiency. A high risk of nutrient deficiency in a population at high density is the “perfect” condition for a disease outbreak. So, how do we prevent this situation from occurring?

Kaylee worked with hunters to sample 305 deer over the 3 year study.

WHAT MAKES A GOOD PROPERTY FOR WILDLIFE?

Since mineral stores are partially driven by soils through their interactions with weather, well-managed soils are essential for healthy plants and healthy deer. The weather cannot be controlled; however, soil management may be beneficial. We do not know how the use of fire, grazing, and restoration of native forages affect the trace nutrient stores and the health of deer populations. Additionally, regular monitoring of mineral stores in deer populations would be useful in order to identify nutrient-limited—and therefore, vulnerable—segments of the population. Land managers and wildlife biologists would be able to alter harvest to decrease population densities where liver copper stores are low, and high densities predispose the population to competition for resources and transfer of disease. This proactive approach to whitetail deer population management has the potential to promote healthier, more resilient populations of whitetail deer that also have the potential for growing larger body sizes and larger antlers. ■

B&C FELLOW PROFILE

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TELL US ABOUT YOURSELF:

I am originally from Guthrie, Oklahoma, where I was raised on a small working ranch outside of town. I grew up working and playing outside and had an interest in science from an early age. I've always been self-motivated with full support from my parents to pursue my passions. I earned my bachelor's degree in biological sciences at Oklahoma State University with a focus in Zoology. I took a two-year detour to veterinary school, which allowed me to rediscover my forgotten passion for ecological science and teaching. With my background in physiology and animal production, I transitioned into the masters program in Wildlife and Fisheries Sciences with a focus in nutrition at Texas A&M University in 2016. With the inspiration from some of my colleagues, I have also recently taken up hunting, in which I have a newly found passion.

THESIS TITLE:

Little and large: mammals as monitors of ecological resilience

