

Tick talk: Unveiling the Potential of Prescribed Fire in South Texas Tick Control

*Rachel Walters, Sandra Rideout-Hanzak, and
Alynn Martin*

South Texas rangelands are at the intersection where wildlife, agriculture, and humans meet. The diverse plant communities found here support cattle ranching, as well as game wildlife populations: both of which are important contributors to the local economy. Sustainable management of these rangelands has ensured productivity and health of these systems. However, an often-undetected threat to humans, wildlife, and livestock is lurking in these vibrant and prosperous rangeland systems – ticks.

Ticks have long been a part of terrestrial ecosystems around the world. Having originated 65-146 million years ago, they evolved and dispersed to parasitize different host species. Through this process, they also co-evolved with different pathogens (viruses, bacteria, and parasites) that utilize ticks to spread from host to host. Some of the most common tick-borne diseases in Texas include Lyme disease, anaplasmosis, ehrlichiosis, babesiosis, and spotted fever (rickettsiosis), among others.

But, if ticks have long been part of Texas ecosystems, why are they an emerging health problem now? Hard ticks—the type of tick we envision when we hear the word—spend some portion of their life off-host in some, or all, of the four life stages: egg, larva, nymph, and adult. Survival off host is highest in warmer and wetter environments, such as in the pineywoods of Texas. But several tick species thrive in South Texas rangelands also, and there are two factors that may increase tick survival off-hosts in that part of the state: climate change and woody plant encroachment.



A male American dog tick (*Dermacentor variabilis*) is questing for a host.

Texas temperatures are rising, with projected increases of 0.06°F per year across the state, and average annual rainfall is increasing in the eastern 2/3 of the state. Further, woody plant encroachment is an ongoing issue plaguing Texas rangelands. The Great Plains Grassland Extension Partnership reported nearly 15 million tons of rangeland production lost to woody encroachment in Texas in 2019 alone. These two factors combined are creating a perfect microclimate for off-host tick survival. In woody mottes, temperatures are warm and moisture is retained. Woody mottes are favored by rangeland animals and ticks alike as a welcome escape from the South Texas sun, increasing contact between hosts and ticks, facilitating parasitism, and escalating risk of disease transmission.

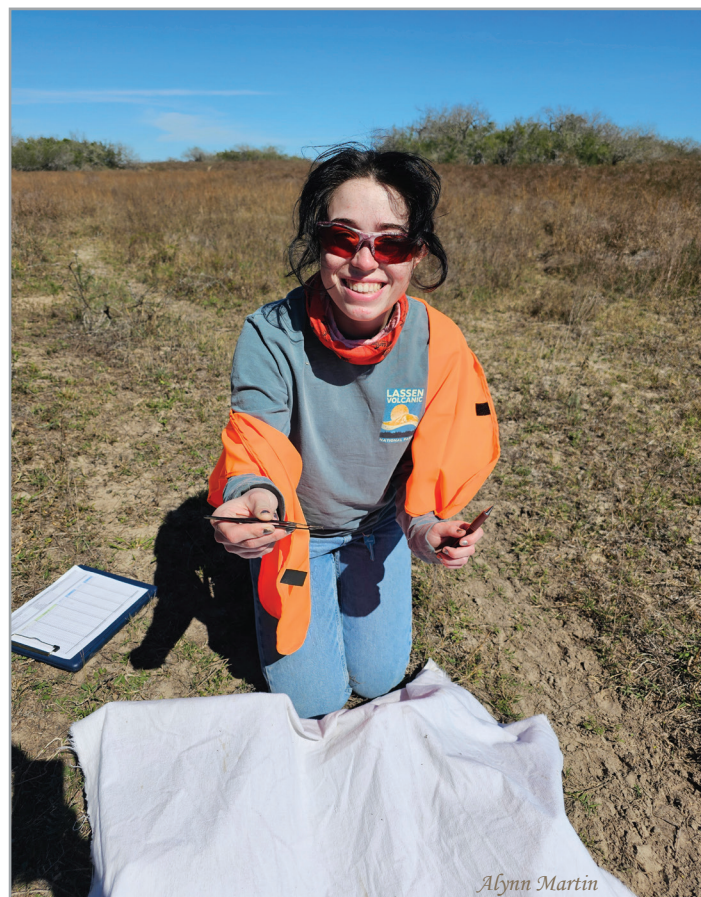


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Prescribed fire is a potential tool for addressing both tick densities and woody encroachment. The use of fire dates back many centuries, with Native Americans using it, in part, to control for ticks, mosquitoes, and other biting insects. Recent assessments of prescribed fire efficacy on tick control vary based on ecosystem and vegetation types. But in many places, prescribed fire creates a less hospitable environment for ticks, limiting their off-host survival, reproductive opportunities, and overall numbers.

However, the historic fire return interval of 2 to 5 years has been suppressed in South Texas, and the effectiveness of prescribed fires in the region remains uncertain. The effect of factors such as fire return interval on tick populations has not been examined, and we know nothing about the impact of prescribed fire on tick-borne diseases in this region. Our team is currently assessing the efficacy of winter burning occurring every three years or every five years in reducing tick densities. We are conducting intensive tick surveillance across burn and control sites. By analyzing abundance of ticks and their pathogen loads, we will better understand the potential of prescribed burns as a tool for tick control in South Texas rangelands. ~

Ms. Walters is a graduate Research Assistant, Drs. Rideout-Hanzak and Martin are Research Scientists at the CKWRI. ~



Rachel Walters is collecting ticks off the drag cloth.

CKWRI News

Board Member, Carter Smith

The CKWRI is delighted to report that Carter Smith (former Executive Director of Texas Parks & Wildlife Department) is our newest Advisory Board member. We are thrilled to have Carter's unique expertise and perspective through his board involvement.



Dr. Henry Estess Endowment

Our East Texas Natives project will soon be benefiting from the new Dr. Henry Estess Endowment for Native Plant and Habitat Restoration in East Texas. A special thanks to Sandra Estess for establishing this meaningful gift in memory of her husband who had a deep love of the pineywoods region of the state.

By The Numbers

- 2 Texas counties, Nueces and Kleberg, make up the known range of the endangered herbaceous plant slender rush-pea (*Hoffmannseggia tenella*). (U.S. Fish & Wildlife Service, <https://ecos.fws.gov/ecp/species/5298>)

Rabbit Fever: Assessing Hemorrhagic Disease in Davis Mountain Cottontails

Scott Henke, Sandra Rideout-Hanzak, and
Alynn Martin

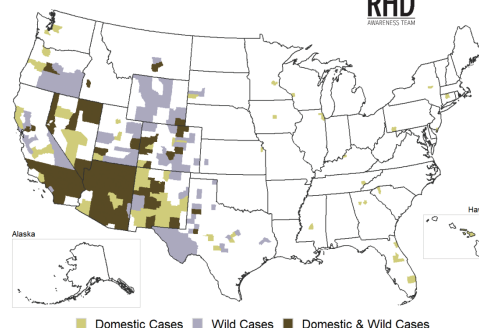
As you prepare the nightly dinner, you see your daughter out the kitchen window taking care of Fluffy, Pinky, and Bugs – her 4-H rabbits. You also see a wild cottontail nearby. As you call her in for dinner, you remind your daughter to secure the rabbit hutch door well because you’ve heard coyotes howling nearby in the evenings, and lately you’ve seen a red-tailed hawk perching in the trees. But what is the greatest risk to your daughter’s domestic rabbits in this scenario? Is it the coyotes? The hawk? Surprisingly, the wild cottontail may pose the real danger.

Rabbit hemorrhagic disease virus (RHDV) emerged during the 1970s or 1980s in Europe. Since then, it has spread globally, killing over 250 million domestic and wild rabbits. A second strain, RHDV2, was identified in France in 2010 and in Canada in 2016. RHDV2 is now considered endemic—meaning consistently present—in the western U.S. There have been outbreaks in wild rabbits in 14 states, including Texas. RHDV2 threatens multiple species of wild rabbits, including the Davis Mountain cottontail (*Silvilagus robustus*), which is a Species of Greatest Conservation Need.

Davis Mountains cottontails are typically found at elevations higher than 4,500 feet. In Texas, they inhabit the dry and rocky piñon-oak-juniper woodlands and pine-fir forests in the Chisos, Chinati, Davis, and Guadalupe mountains of Brewster, Presidio, Jeff Davis, and Culberson counties. They are listed as Vulnerable because of their small population size that is restricted to a small geographical area.

Both RHDV and RHDV2, present many challenges for wildlife managers. They both have high mortality rates, killing 80 to 100% of infected rabbits. However, outbreaks are difficult to identify in remote, wild rabbit populations. Most past research has focused on RHDV with the assumption that RHDV2 behaves similarly, even though differences between the two viruses have already been documented. Most notably, RHDV2 has a broader host range, affecting most North American rabbit species, while RHDV has primarily impacted cottontails in Europe. Additionally, young rabbits of only 2 to 3 weeks old are susceptible to RHDV2, while young rabbits less than 6 or 8 weeks old appear to be resistant to RHDV.

RHDV2
January 2024



Domestic Cases Wild Cases Domestic & Wild Cases
Data provided by USDA APHIS. Supplemental data reports (e.g., Press Releases) have been collated by Rabbits Rescue Society and WildRescue Inc. since the last USDA reporting period (every 3 months).
See RHDV2.org/resources for USDA data disclaimer.
Domestic cases include both domestic and feral rabbit cases.
Map Credit: Dr. Michel Kohl, RHD Awareness Team, University of Georgia.
Data last updated January 1 2024

Distribution within the U.S. of RHDV2 as of January 2024 (USDA APHIS).

Although their susceptibility is unknown, RHDV2 may be a problem for Davis Mountain cottontails if it has the same characteristics of RHDV. It can remain infectious in the environment for up to 3 months in carcasses of dead rabbits and has a greater impact on rabbits in arid areas than wetter areas. If these traits also hold true for RHDV2, Davis Mountain cottontails may be living in the “perfect storm.”

We recently initiated a project, funded by the Texas Parks & Wildlife Department, to study the impacts of RHDV2 on this vulnerable species. We will start with an assessment of the Davis Mountain cottontail population and habitat needs, allowing us to create a habitat suitability model. We will then determine potential impacts of a disease outbreak. Our final tasks will be to quantify antibody production and duration in Davis Mountain cottontails after receiving the only currently-approved vaccine, and to determine if immunity is transmitted from mother rabbits to their kits.

What we learn will enable Texas Parks & Wildlife Department to create a plan for protecting the rare Davis Mountain cottontail species. Our results may also be applicable to other rabbit species elsewhere. Hopefully, we will figure out how to save both Davis Mountain cottontails and 4-H rabbits alike. ~

Did You Know?

Grasshopper mice (*Onychomys torridus*) have an adaptation that not only negates the typically painful venom of its main prey, the Arizona bark scorpion (*Centruroides sculpturatus*), but converts the venom into a painkiller. (Thompson, B. 2018. The grasshopper mouse and bark scorpion: Evolutionary biology meets pain modulation and selective receptor inactivation)



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More CKWRI News

Henry Hamman Program for Hill Country Conservation and Management

Recently, several scientists and graduate students who will be conducting research within the Henry Hamman Program for Hill Country Conservation and Management gathered in Leakey to discuss the upcoming research projects that will be deployed in the area later this year. CKWRI Advisory Board Member, Tim Leach, and his wife, Amy, graciously hosted a dinner for several landowners who are going to be involved in the inaugural research projects. Currently, the program has about 30,000 acres committed to the projects. To learn more about how you can help support this project, visit our website.

Celia and Cornelius Dupré Program

The Celia and Cornelius Dupré Program in Wildlife Education was established in 2020. This endowment has provided nearly 100 youth the opportunity to learn about CKWRI research and practices through South Texas Ranch Brigade. Before Celia passed away in late 2023, she requested that memorial gifts be made to their endowment. Through the generosity of their family and friends, the Dupré Program endowment has nearly doubled. The impact this will have on wildlife education will be tremendous.

What Do They Eat?

Barton Springs salamanders (*Eurycea sosorum*) eat amphipods, which are tiny aquatic crustaceans, and other small aquatic animals. (TPWD. 2024. Wildlife Fact Sheets, Barton Springs salamander, tpwd.texas.gov)

Advisory Board

The Advisory Board of the Caesar Kleberg Wildlife Research Institute (CKWRI) provides leadership in all aspects of our work. We are indebted to them for their commitment to the CKWRI and its mission.

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