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From Nurse Plants to Gatekeepers: How Cover Crops Promote Restoration Success

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They're called "nurse plants." Once we realize what they are, we see them everywhere. They do what their name suggests: nurse plants facilitate the growth of other plants. Throughout Texas, mesquite plays the role of nurse plant by providing shade for many other plants. Nurse plants offer more than a favorable environment for other plants—they can enhance nutrient transfer to their associates. Additionally, nurse plants can benefit from plants they shelter through a variety of mechanisms including soil microbial interactions.

Throughout the Rolling Plains, we see redberry juniper under mesquite trees, and it seems that mesquite is nursing the juniper. But sometimes there's an added twist: eventually, the juniper can engulf its host, something that might be called "ecological ingratitude."

These relationships are complicated. If a plant's growth is enhanced by another plant, we call it facilitative interaction. If its growth is reduced, it's called competitive interaction. Both positive and negative effects can act simultaneously or alternately: it's the net outcome that matters. Ecologists have studied this for decades, often using woody species. But plants like mare's-tail and Johnsongrass can foster

Editor's note: Dustin Golembiewski, Brianna Slothower, and Emily Bishop are graduate students. Dr. David Wester is the Frances and Peter Swenson Endowed Chair in Rangeland and Restoration Research Professor & Research Scientist. All are with the CKWRI. Authors are indebted to Frances and Peter Swenson and Alston and Holly Beinhorn for their support of this project. ~



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A redberry juniper, initially established under the canopy of a live mesquite, has engulfed its nurse plant, whose dead branches are seen extending above the juniper.

certain native grasses in their canopy, too, as we've found in tallgrass prairies in northeast Texas. It's clear that plant to plant interactions are major drivers in plant community structure and function.

We are taking cues from nature's nurses to improve restoration success. If our goal is establishment of native grasses, can we develop prescriptions for restoration that include the use of other plants to promote the success of our target species? To limit the growth of undesirable plants? Selection of a nurse plant is all-important.

Suppose you are restoring a pipeline right-of-way. The soil is severely compacted bare ground with high surface temperatures—a forbidding environment for plants. We have used an annual grass as a nurse plant: browntop millet. We call it our 'cover crop.' In Dimmit County, we planted millet with a suite of native grasses. The millet emerged quickly,



© Emily Bishop

Coastal plains little bluestem is growing in a seeded row under the canopy of several mare's-tail plants.

grew for several weeks, and died. Two years later we harvested grasses along the pipeline. We found that although millet had no effect on native grass biomass, it reduced invasive grass biomass. On a nearby retired frac pond, we are studying cover crop effects on restoration surfaces made of either the subsoil that lined the frac pond or re-constructed from stock-piled topsoil. The effect of millet on invasive grass density depended on restoration surface: millet had no effect on stockpiled soils but reduced invasive grass density on the subsoil surfaces. In both examples, the cover crop's influence was neutral with respect to native grasses but competitive with respect to invasive grasses.

It might be expected that a nurse plant's influence depends on timing of association—whether native grasses are seeded simultaneously with the cover crop or later into it. Weather likely plays a role in this as well. Along a pipeline in San Patricio County, we are seeding plots in summer or in winter and comparing two kinds of annual cover crops, legumes and grasses. And we are assessing timing of association. Preliminary results suggest that all three factors influence native grass density. In the summer, for example, native grass density is higher when grasses are seeded simultaneously with the cover crop; and cowpeas, a legume, is better than millet.

We are learning that cover crops have a place in restoration. Matching an appropriate cover crop—the most helpful nurse plant—to desired native grasses is a complicated process. And it will be site-specific in its application. The principles guiding this approach, though, are clear: Nature is the best teacher. ~

Did You Know?

Flamingo chicks aren't born pink. Flamingoes turn pink or orange as they mature because of the carotenoids in the shrimp and other foods they eat. (BBC Science Focus Magazine, www.sciencefocus.com)

CKWRI News

Exciting New Endowments

We are honored to announce the creation of the following new endowments!

Frances and Peter Swenson Endowed Chair in Rangeland and Restoration Research. Congratulations to David Wester, Ph.D. for receiving this honor.

Alfred C. Glassell, Jr. Endowed Chair for Quail Research. Congratulations to Fidel Hernandez, Ph.D. for receiving this honor.

Isabel B. and Wallace S. Wilson Endowment for Quail Research

This endowment was established by her family to honor the memory of Isabel Wilson and their shared dedication to quail conservation.

Laurie and Duane Leach Avian Research Endowment

This endowment was established in memory of Laurie, who was an avid bird enthusiast. The endowment also honors both Laurie and Duane for their shared passion for conservation.

David G. Hewitt Endowment for Deer Research

This endowment was established as a lasting tribute to the meaningful work Dr. Dave Hewitt has contributed to the understanding of deer and deer management over his 20+ years as a research scientist at CKWRI. Dr. Hewitt was a professor and research scientist until 2006 when he became the Stuart Stedman Chair in White-tailed Deer Research. He held the Stedman Chair until 2017 when he became the 4th Executive Director of the Caesar Kleberg Wildlife Research Institute. ~

By The Numbers

8-11 the typical number of days before young prairie warblers leave the nest, although they will continue to be cared for and fed by their parents until they are independent.

(<https://www.audubon.org/field-guide/bird/prairie-warbler>)

Visit our web page at
<http://www.ckwri.tamuk.edu>

The Past, Present, and Future of Chronic Wasting Disease in Texas

by Calvin C. Ellis, Levi J. Heffelfinger, and Michael J. Cherry

Chronic Wasting Disease (CWD) is a neurological disease found in the cervid family, which includes deer, moose, caribou, and elk. Identified in 1967 at a captive deer facility in Colorado, CWD has expanded throughout the United States and Canada. Transmission occurs when a healthy animal encounters prions (that cause misfolded proteins) that were shed in an infected animal's saliva, urine, blood, feces, or carcass after death. Prions accumulate in the brain and other tissues leading to neurological distress, emaciation, and ultimately death. These prions can persist in the environment for years, making effective management plans crucial for mitigating the effects of the disease.

In 2012, the first case of CWD in a free-range mule deer population in Texas was discovered in the Trans-Pecos in the Hueco Mountains. The disease was first detected in white-tailed deer in Texas at a deer breeding facility in Medina County in 2015. The resulting investigation and increased testing in Medina County led to positive detections in four additional breeding facilities and two adjacent deer release sites. Two years later, CWD was detected in free-ranging white-tailed deer in Medina County. To date, CWD has since been detected in 260 captive or free-range cervids including white-tailed deer, mule deer, and elk in 14 Texas counties. In 2021, Texas experienced an expansion of CWD into multiple counties. In February, a free-range mule deer tested positive in Lubbock County. White-tailed deer from captive facilities in Hunt, Mason, and Matagorda Counties also tested positive for CWD. Most recently, CWD was detected at a captive breeding facility in Duval County in late August 2021.

Texas Parks and Wildlife Department (TPWD) and Texas Animal Health Commission (TAHC) are working together to continually develop and adapt CWD Management Plans that mitigate risks, develop management strategies, and protect big game resources. One example is the development of CWD containment and surveillance zones where special regulations apply, such as mandatory CWD testing and carcass movement restrictions for all harvested deer. The current

containment or surveillance zones are the Trans-Pecos, Panhandle, Lubbock County, Hunt County, Val Verde County, Kimble County, and South-Central CWD Zones. These surveillance zones are established by setting a buffer around areas with known positives. CWD has yet to be detected in these zones but that is not proof the disease is absent; therefore, mandatory testing and other management practices are implemented. Recent surveillance zone expansions include areas of Hunt, Rockwall, Kaufman, and Van Zandt Counties.



© Levi Heffelfinger

Beyond the CWD threats of moving cervids between captive facilities, landscape attributes can also serve as sources of congregation increasing possible transmission rates.

Wildlife managers throughout Texas have always placed a strong emphasis on adaptive management through research, which is vital in managing CWD. Recently, researchers at Texas A&M's College of Veterinary Medicine and Biomedical Sciences developed a genomic tool which can predict susceptibility to CWD in white-tailed deer. Currently, Caesar Kleberg Wildlife Research Institute along with TPWD are researching dispersal of juvenile mule deer and white-tailed deer in the Texas panhandle to determine potential movement corridors where the risk for spread of CWD may increase.

While research is being conducted, there are multiple recommendations landowners can act upon to be proactive in managing against CWD on their properties. With CWD prions being spread by bodily fluids (e.g., saliva), supplemental feeding and bait sites where deer congregate (feeders, food plots, mineral blocks, etc.) increase the risk for transmission. Reducing or removing these locations on your property can reduce risk and prevent spread. Proper disposal of carcasses from CWD-threatened areas include incineration, disposing in a permitted landfill (if from a CWD negative region), burying carcasses 6 feet deep, or leaving carcasses on site. Further, proper decontamination of tools and work surfaces are other safe practices you can follow.

Editor's Note: Calvin Ellis is a graduate student. Dr. Levi Heffelfinger is a Senior Research Instructor, and Dr. Michael Cherry is the Stuart W. Stedman Chair for White-tailed Deer Research Professor and Research Scientist. All are with the CKWRI. ~

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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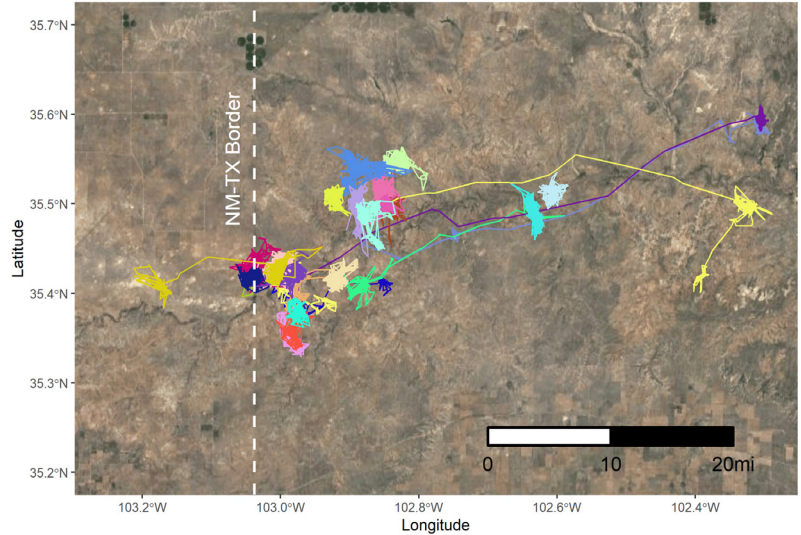
With a disease like CWD where we still have much to learn, our most effective tool is education and cooperation. Texas is approximately 97% private land, and landowners play an enormous role in combating CWD by taking proactive measures to reduce risks on their properties. Hunters can help by reporting any animals they suspect have CWD, by submitting voluntary samples from harvested animals outside CWD management zones, and by properly disposing of unused carcass parts. The more we know and work together, the more quickly we can effectively manage against and mitigate the effects of CWD so we can continue enjoying the unique and robust wildlife Texas has to offer.

For more information on CWD in Texas, please look at the resources listed below:

Texas CWD News: <http://cwd-info.org/category/texas/>

What Do They Eat?

The Texas Blind snake feeds on ants and termites. They have been observed being carried by Screech Owls to their nests to act as a natural form of pest control. (https://tpwmagazine.com/archive/2018/nov/scout5_wildthing_snake/)



Movements of yearling mule deer in the Panhandle CWD Management Zone. Fourteen percent of yearlings have dispersed along the Canadian River up to 43 miles. Several deer have crossed the New Mexico state line, an area of unknown CWD prevalence.

CWD Management Guide <https://www.ckwri.tamuk.edu/publications/technical-publication/management-bulletin-no-10>

CWD in Texas: <https://tpwd.texas.gov/huntwild/wild/diseases/cwd/>

CWD Case Tracking: <https://tpwd.texas.gov/huntwild/wild/diseases/cwd/tracking/> ~



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