CURRENT RESEARCH REPORT

2023-2024

CAESAR KLEBERG
WILDLIFE RESEARCH INSTITUTE
TEXAS A&M UNIVERSITY - KINGSVILLE®

Providing the Science Behind Wildlife Conservation and Management

REPORT OF CURRENT RESEARCH

September 1, 2023 to August 31, 2024
Caesar Kleberg Wildlife Research Institute

ABOUT

The Caesar Kleberg Wildlife Research Institute at Texas A&M University - Kingsville is the leading wildlife research organization in Texas and one of the finest in the nation. Established in 1981 by a grant from the Caesar Kleberg Foundation for Wildlife Conservation, the Institute operates as a nonprofit organization and depends financially upon private contributions and faculty grantsmanship. Our mission is to provide science-based information for enhancing the conservation and management of Texas wildlife.

The Caesar Kleberg Wildlife Research Institute is located on the campus of Texas A&M University - Kingsville and functions as a unit within the Dick and Mary Lewis Kleberg College of Agriculture and Natural Resources.

SUPPORT US

Three ways to give:

1. Use this QR code.

2. Visit our giving webpage:

https://www.ckwri.tamuk.edu/giving

3. Use the envelope to send a check.

Reports in Current Research *often represent preliminary analyses, and interpretations may be modified once additional data are examined. Therefore, these reports should not be cited without approval of the appropriate investigator. Use of trade names does not infer endorsement by Texas A&M University-Kingsville.*

December 2024
Editor Sandra Rideout-Hanzak, Ph.D.

Showered with Blessings

Managing South Texas rangelands is a challenge, so it is a special pleasure when the dice come up right and everything falls into place. For most of South Texas, the summer of 2024 was one of those times. Rainfall was timely throughout the summer and temperatures, albeit hot, were much more tolerable than recent summers. As I write this in late September, wildlife surveys are just being completed and all indications are our wildlife had a productive summer.

For many wildlife populations in South Texas, these unearned, sporadic wet years are essential. Reproduction requires high-quality food and thus, many young are produced and survive during these wet summers. During dry years, there is not enough food to raise offspring, and many species in South Texas invest little in reproduction. Thus, the deer fawns and turkey poults produced in a wet year like this are what carry the populations through the dry years when reproduction is a bust.

The Caesar Kleberg Wildlife Research Institute similarly experiences blessings that have long-lasting impacts. This year the Killam family endowed the Sue and Radcliffe Killam Chair for Wildlife, Livestock, and Habitat Interactions. This blessing, because it is an endowment, will benefit CKWRI for decades. It will provide the resources necessary for a faculty scientist to work in this critical arena forever, serving the needs of Texas landowners and training students to do the same long into the future.

The Institute received more than one rain shower this year. Private donors in Houston and South Texas showered us with funding to build the CKWRI Ocelot Conservation Facility at the Tio and Janell Kleberg Wildlife Research Park. In October, we held a groundbreaking ceremony for this facility. When it is complete a year from now, CKWRI and its partners, the East Foundation, other private landowners, and the US Fish and Wildlife Service, will have a key tool to promote ocelot recovery. We will learn more about the reproductive physiology of ocelots. We will also produce ocelot kittens who will be trained for release into unoccupied habitat, thereby helping secure the species' future in the United States.

Please enjoy and learn from this year's Current Research Report. The stories and information it contains are fruits of blessing provided by our supporters, some recently, some many years ago. Because of this generosity, CKWRI will continue to work, through good years and bad, on behalf of everyone who cares about wildlife and wild lands.

David Hewitt
Leroy G. Denman, Jr. Endowed Director of Wildlife Research

Table of Contents

CKWRI ESTABLISHES THE HENRY HAMMAN PROGRAM FOR HILL COUNTRY CONSERVATION AND MANAGEMENT

CKWRI was fortunate to have Henry Hamman serve on our Advisory Board for 20 years and lead the Institute as Chairman for 8 years. CKWRI has earned a reputation as an authority on a variety of wildlife and conservation topics in South Texas, and we are excited to be expanding our research to the Hill Country. Because Henry was dedicated to habitat restoration and truly understood the importance of a healthy and balanced ecosystem, we are honored to name our newest research program *The Henry Hamman Program for Hill Country Conservation and Management*. Based in the quintessential Hill Country town of Leakey, the overall goal is to produce management guidance and best practices that will be applicable to the entire region.

INAUGURAL PROJECTS

Juniper Management in the Upper Frio River Basin: This project will summarize past research that has been done on juniper management in the Hill Country. We will use juniper management projects implemented over the last 30 years to understand the outcome of various treatments and then produce a management bulletin for Hill Country Landowners.

Large Mammal Monitoring and Management: White-tailed deer and exotics are important species in the Hill Country. Understanding their impacts and managing their populations begins with reliable population estimates and knowledge of their habitat use and interactions. We will use camera surveys to provide this information and translate what we learn into management actions.

HOW YOU CAN HELP

Our biggest need at this stage of program development is operating funds. Support for specific projects will be welcome once the program's infrastructure is in place. Operating funds can be provided through the following giving programs (complete benefits of each opportunity can be found on our website):

- Named Endowment: Opportunities starting at $100,000.
- Caesar Kleberg Patron: $5,000 or greater in a single year.
- Caesar Kleberg Friend: up to $4,999 in a single year.
- Caesar Kleberg Partner (Annual Gift): $5,000+

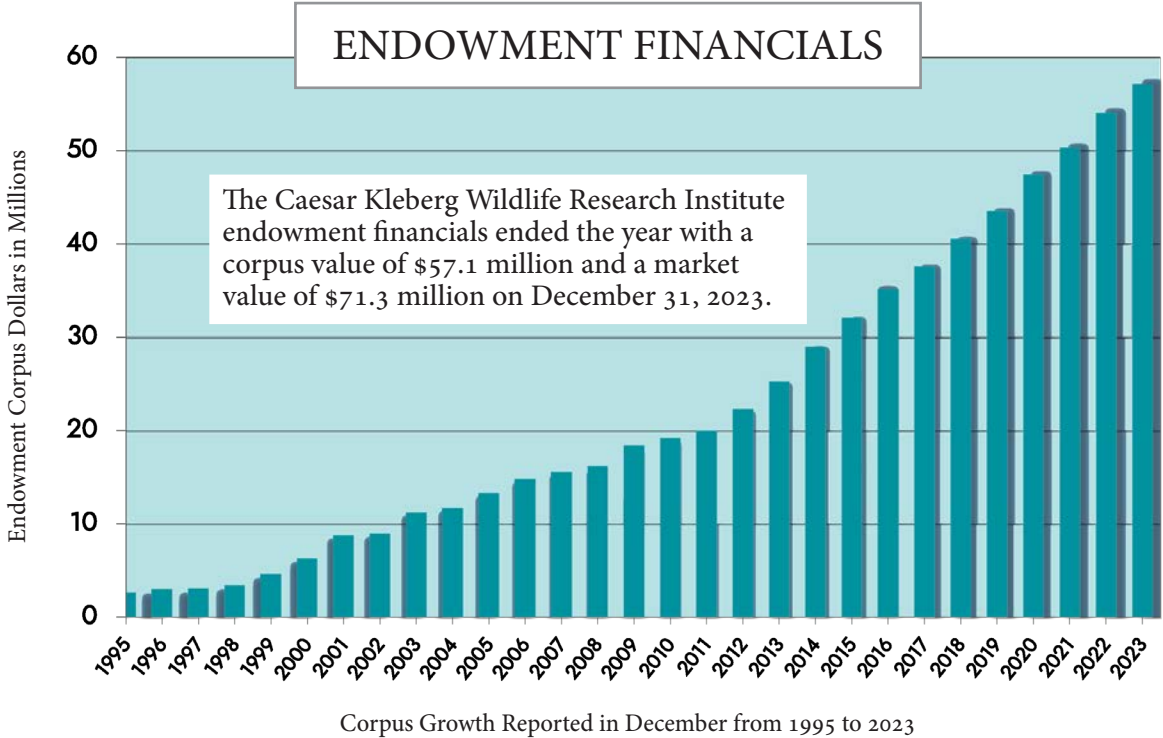*Learn more by visiting www.ckwr.tamuk.edu*

IN MEMORY AND HONOR

Many people choose to send unsolicited gifts in honor of cherished friends or family.
In FY2024, we received memorials and gifts to honor:

Russell Wayne Abel	*Celia Dupre	Joseph Claude Martin
*Chad Auler	Martha Erwin	David Miclette
Ed Auler	*Jamie Griffith	Masahiro Ohnishi
Joyce Wiedemer Bates	*John Harris	Stacy Owen
Janie Beggs	*Harold Hees	*Alec D. Ritzell
*Albert Biedenharn	*Charlie M. Herrington	*John David Terry, III
Larry Biedenharn	David Hewitt	Ben F. Vaughan, III
John Paul Budinger	Chris Kleberg	*David Villanueva
*Grady Cage	Scott Kleberg	Charlie & Patsy Winn
*Lon and Leigh Cartwright	*Tio Kleberg	Mary Yturria
William Albert Clark	Richard M. Kleberg, III	Chandler Zoch

* Also honored in previous years

NEW ENDOWMENTS

Dr. Henry Estess Endowment for Native Plant and Habitat Restoration in East Texas
Stevens and June Herbst Endowment for Wildlife Research
Sue and Radcliffe Killam Chair for Wildlife, Livestock, and Habitat Interactions

ENDOWMENT FINANCIALS

The Caesar Kleberg Wildlife Research Institute endowment financials ended the year with a corpus value of $57.1 million and a market value of $71.3 million on December 31, 2023.

Corpus Growth Reported in December from 1995 to 2023

Our Students

Graduate Students

Mr. Cole C. Anderson
Mr. Jose S. Avila-Sanchez
Ms. Kendall L. Bancroft
Mr. Michael R. Barrett
Mr. Alejandro Bazaldua
Ms. Laura C. Beck
Mr. Ethan Bennie
Ms. Tyler A. Bostwick
Mr. Marlin M. Dart II
Mr. Duston R. Duffie
Ms. Georgina R. Eccles
Mr. Calvin C. Ellis
Mr. Juan C. Elissetche
Mr. Forrest C. Fay
Mr. Raziel I. Flores
Ms. Breanna R. Green
Mrs. Ashlyn Halseth-Ellis
Dr. Joseph A. Hediger
Mr. James N. Helferich
Mr. John E. Herschberger
Ms. Alexandria N. Hiott
Ms. Ashley G. Hodge
Ms. Miranda L. Hopper
Ms. Mikayla M. House
Ms. Lindsey K. Howard
Mr. Sean A. Kiernan
Mr. Austin K. Killam
Ms. Victoria L. Locke
Mr. Jason P. Loghry
Mr. Kevin T. Lovasik
Mr. Herbert Magobwe
Mr. Joseph M. McGovern
Ms. Katherine G. McDaniel
Mr. Caleb M. McKinney
Ms. Dakota R. Moberg
Ms. Christin R.A. Moeller
Ms. Carolina M. Munoz
Mr. James N. Neugebauer
Ms. Chloe M. Nouzille
Mx. Molly E. O'Brien
Ms. Micayla E. Pearson
Mr. Daniel J. Ramirez
Ms. Maydeliz Ramos-Gonzalez
Mr. E. Drake Rangel
Mr. Harry Rakosky

Isabella Ruiz

Joseph McGovern

Ms. Celine M. J. Rickels
Ms. Tara L. Rodkey
Mr. Jack R. Rogers
Mr. Javier A. Segovia
Ms. Liza A. Soliz
Ms. Kristyn G. Stewart
Mr. Michael T. Stewart
Mr. Levi D. Sweeten
Ms. Kimberly M. Tanguma
Mr. Jack G. Towson
Ms. Katherine A. Travis
Mr. Parker C. Trifiletti
Ms. Rachel V. Walters
Mr. Zachary M. Wardle
Ms. Emma R. Weber
Mr. Thomas J. Yamashita

Student Scholarships

Caesar Kleberg Foundation for Wildlife Conservation Fund for Graduate Student Tuition

Every graduate student in our program financially benefits from this fund.

Houston Safari Club Dan L Duncan Scholarship Program

Kendall L. Bancroft, Marlin M. Dart II, Duston R. Duffie, Forrest C. Fay,
Kevin T. Lovasik, Joseph M. McGovern, Dakota R. Moberg,
Celine M.J. Rickels, Kimberly M. Tanguma

South Texas Quail Coalition Graduate and Undergraduate Scholarships in Wildlife Management

Caesar Kleberg Wildlife Research Institute graduate students
and Range and Wildlife Science undergraduate students gain
financial support from this organization.

San Antonio Livestock Exposition, Inc. (S.A.L.E.) Assistantship & Scholarship

Liza A. Soliz

Houston Livestock Show and Rodeo Graduate Scholarship

Alejandro Bazaldua

Houston Livestock Show and Rodeo Graduate Fellows in Wildlife Research

Javier A. Segovia

Dr. Charles Seidel Wildlife Photography Scholarship

Jessica Johnson, Molly O'Brien

Endowed Student Scholarships

Robert and Rebecca Palmer Scholarship Fund
Graduate Student

Lindsey Howard, Kristyn Stewart-Murphy, Michael Stewart,
Kimberly Tanguma, Thomas Yamashita

Robert and Rebecca Palmer Scholarship Fund
Undergraduate Student

Shayla Haifflich, Jessica Johnston, Carolina Munoz, Saren Perales

A. E. Leonard Undergraduate Student Scholarship
in Wildlife Conservation

Abby M. Balson, Jackson Baack, Preston Rabe, Wraith Rodriguez

Phillip M. Plant Endowment for Graduate
Scholarships in Wildlife

Alejandro Bazaldua, Duston Duffie, Miranda Hopper, Joseph McGovern,
Christin Moeller, Chloe Nouzille, Katherine Travis

Alec D. Ritzell Memorial Fund for Wildlife Research
and Education Scholarship

Marlin Dart

Breanna Green

Endowed Student Fellowships

Sam Walton Fellowship in Quail Research

Caleb M. McKinney

Alice Gertrudis King Kleberg Reynolds Endowed Fellowship in Quail Research

Kristyn G. Stewart-Murphy

Elliot B. and Adelle Bottom Fellowship in Quail Research

John E. Herschberger

Walter Fondren, III Fellowship in Shorebird and Wading Bird Research

Georgina R. Eccles

Betty and George Coates Fellowship in Habitat Enhancement Research

Search in progress

Jess Y. Womack, II Fellowship in Wetlands and Wetland Bird Research

Joseph M. McGovern

Boone and Crockett Club Fellowship in Ungulate Research

Calvin C. Ellis, Chloe M. Nouzille

Hixon Fellowships in Deer

Kendall L. Bancroft, Miranda L. Hopper

Hixon Fellowships in Quail

Lindsey K. Howard

Hixon Fellowships in Range Restoration

Katherine A. Travis

Kenneth E. Leonard Fellowship for Livestock-Wildlife Research

Jose S. Avila-Sanchez

Stuart W. Stedman-Faith Ranch Fellowships in Deer Research

Breanna R. Green, Kevin T. Lovasik

Mike and Mary Terry Endowed Fellowship for Habitat Research

Laura C. Beck

Coates-Kelso Graduate Fellowship for Conservation and Management of White-tailed Deer

Kendall L. Bancroft

The F. Peter Zoch III Fund for Research in Habitat Enhancement

Rachel Walters

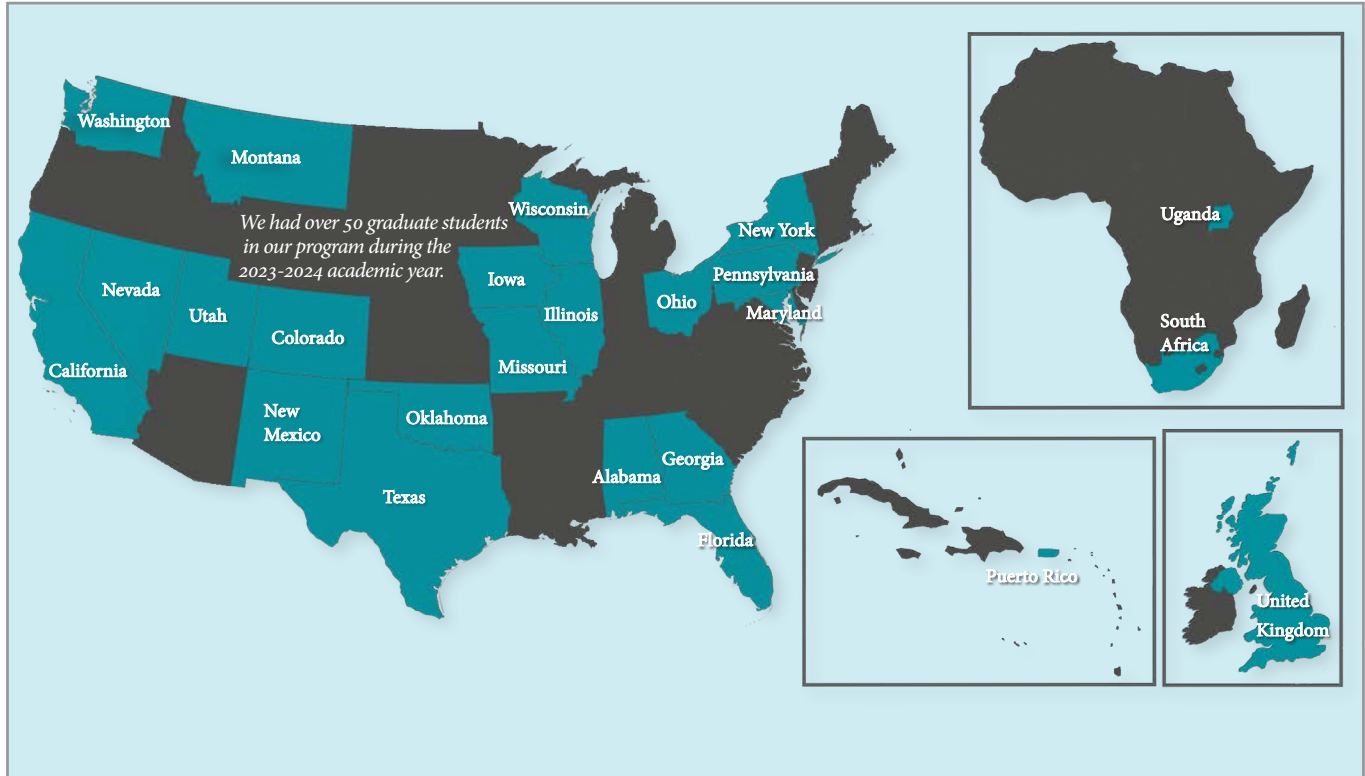*Grady Cage Memorial Fund for Quail Research*

Levi D. Sweeten

Tim & Karen Hixon Fund for Wild Cat Research

James N. Neugebauer

WHERE OUR STUDENTS COME FROM

CKWRI's world-class program attracts some of the brightest minds from all over the United States and beyond. Our program is unique in that our students have the opportunity to conduct research on private lands. Because of this, our students leave with a greater appreciation for private landowners and their stewardship values.

We had over 50 graduate students in our program during the 2023-2024 academic year.

Washington, Montana, Wisconsin, New York, Pennsylvania, Ohio, Maryland, Iowa, Illinois, Nevada, Utah, Colorado, Missouri, California, New Mexico, Oklahoma, Texas, Alabama, Georgia, Florida

Uganda, South Africa

Puerto Rico

United Kingdom

WHERE OUR STUDENTS GO

Once they graduate, our students are some of the most sought after in the field of wildlife biology and habitat management. CKWRI graduates are working for:

American Bird Conservancy
Austin Community College
CrossTimbers Consulting, Inc.
Deseret Cattle & Timber
Ducks Unlimited
East Foundation
Florida Fish and Wildlife Conservation
Georgia Department of Natural
    Resources
Idaho Fish and Game
Kansas Wildlife Service
King Ranch, Inc.
Michigan Dept. of Natural Resources
Mississippi Department of Wildlife,
    Fisheries, and Parks

Montana Fish, Wildlife, and Parks
National Parks and Wildlife
The Nature Conservancy
Pheasants Forever
Rocky Mountain Bird Observatory
Stephen F. Austin University
    in Forest Wildlife Management
Sul Ross State University
Texas A&M University-Agrilife
Texas A&M University-College Station
Texas A&M University-Kingsville
Texas Parks and Wildlife Department
USDA-NRCS
U.S. Fish and Wildlife Service
U.S. Forest Service

U.S. Geological Survey,
    Patuxent Wildlife
    Research Center
U.S. Geological Survey,
    National Wildlife
    Health Center
University of Idaho
University of San Diego
Washington Department of
    Fisheries & Wildlife
Welder Wildlife Foundation
Wisconsin Department of
    Natural Resources

CKWRI graduates also work for countless private ranches in management positions throughout the country.

Cole Anderson, M.S.
Thesis: Examining Environmental and Genetic Effects on Antler Growth in Whitetail Deer

Jose Silverio Avila-Sanchez, Ph.D.
Dissertation: Assessing Fine-scale Vegetation Structure in an Adaptive
Grazing Management System in South Texas

Juan C. Elissetche, M.S.
Thesis: Assessment of South Texas Loma Soils and Vegetation with Considerations for Texas Tortoise Habitat

Calvin C. Ellis, M.S.
Thesis: The Interaction between Mule Deer Spatial Ecology & CWD Epidemiology

John E. Herschberger, M.S.
Thesis: Drought Legacy Effects in Northern Bobwhites in Texas

Miranda Hopper, M.S.
Thesis: Reproductive Ecology of White-tailed Deer in Semi-arid Enviroment

Lindsey K. Howard, M.S.
Thesis: Influence of Rainfall and Landscape Appearance on Northern Bobwhite Quail Reproduction

Sarah Jacobson M.S.
Thesis: Population and Habitat Assessment of the California, Mountain, and
Gambel's Quail in California's Changing Landscape

Dakota R. Moberg, M.S.
Thesis: Assessing the Impact of Wildfires on the Temporal Dynamics of
Vegetation Cover using High Resolution Imagery

Christin Moeller, M.S.
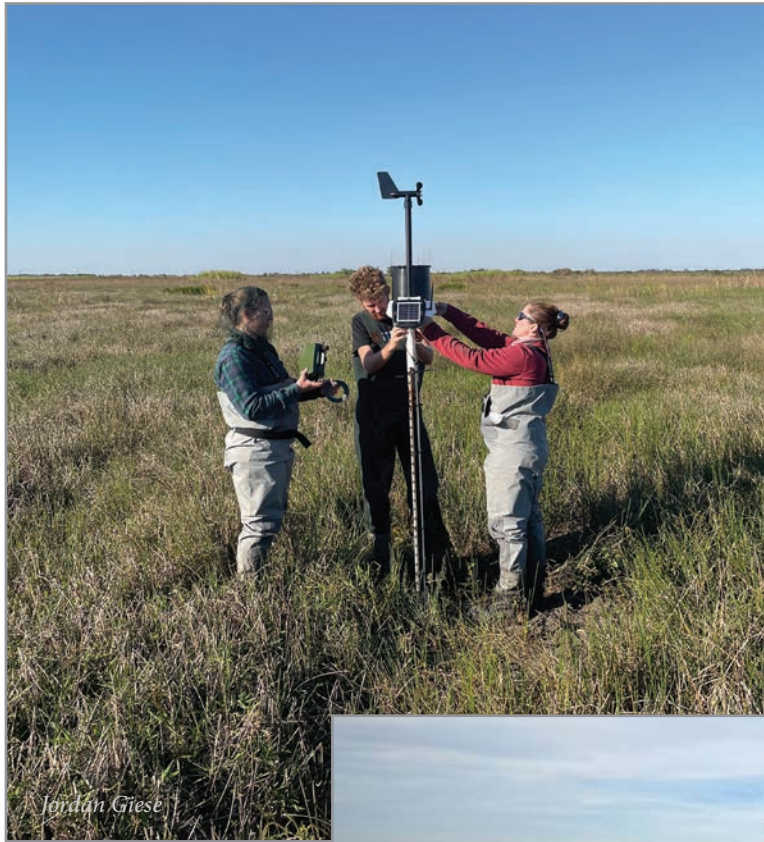Thesis: Translocation and Disease Assessment with Texas Tortoises

Evan Drake Rangel, M.S.
Thesis: Identifying Best Practices To Survey For Spot-Tailed Earless Lizards

Tara L. Rodkey, M.S.
Thesis: Insights into the Migration Ecology of Buff-breasted Sandpiper
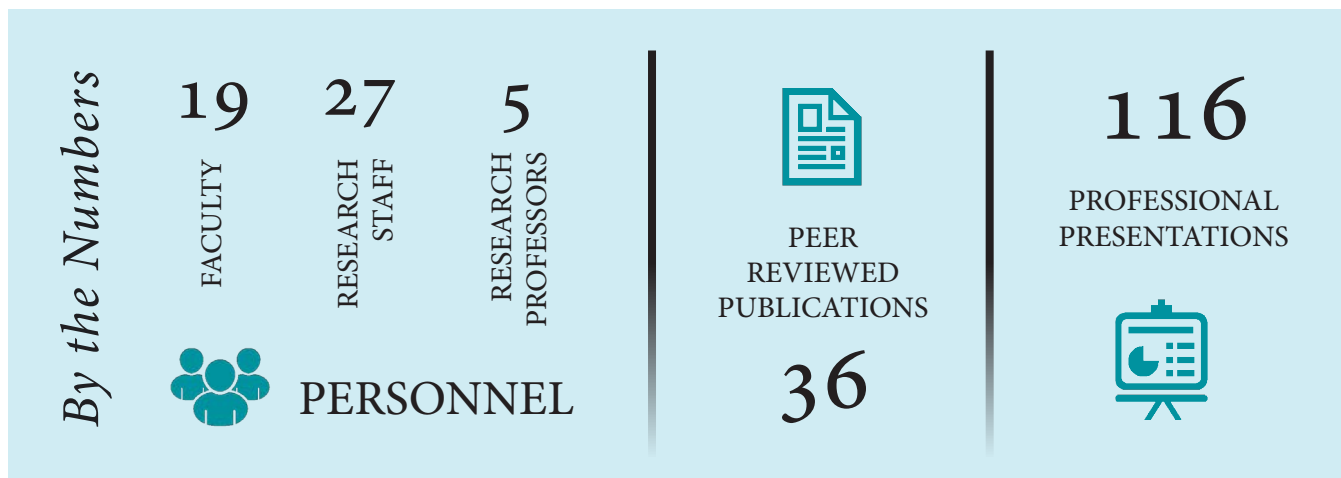in the American Mid-continent

Jordan Giese

Jordan Giese

Ethan Bennie

CKWRI students getting their hands dirty in the field.

Scientists and Staff

Mr. Robert S. Alonso, Program Manager
Mr. Nelson O. Avila, Research Associate, Texas Native Seeds-West Texas
Dr. Bart M. Ballard, Professor
Mrs. Yolanda Ballard, Director, CKWRI Administration
Mrs. Sara K. Barrera, Manager-Event Services
Mr. Michael R. Barrett, Laboratory Manager
Dr. Jamie S. Benn, Research Assistant Professor
Mr. John R. Boone, Farm Foreman II, Texas Native Seeds-Coastal Prairie
Mr. Joshua D. Breeden, Farm Foreman II, Texas Native Seeds
Dr. Emma K. Brookover, Research Assistant Professor
Dr. Fred C. Bryant, Director, CKWRI Development
Ms. Gina M. Cavazos, Administrative Coordinator I
Mrs. Cecilia A. Chapa, Business Coordinator III
Mr. John R. Chapa, Facilities Coordinator III
Ms. Kyndra N. Chastain, Research Technician I
Dr. Michael J. Cherry, Associate Professor
Mr. Jameson S. Crumpler, Assistant Director, Texas Native Seeds, Permian Basin
Mrs. Alexandra J. Dart, Program Manager
Dr. Charles A. DeYoung, Research Scientist
Dr. Randy W. DeYoung, Professor
Mr. John A. Dietz, Purchasing Specialist
Ms. Nicole R. Durtschi, Research Technician I
Mrs. Florinda G. Falcon, Administrative Associate V
Dr. Anthony D. Falk, Program Director, Texas Native Seeds
Ms. Mia Y. Farah, Research Technician I
Mrs. Sandra L. Fischer, Business Coordinator III
Dr. Aaron M. Foley, Research Assistant Professor
Dr. Timothy E. Fulbright, Research Scientist
Dr. Jordan C. Giese, Research Assistant Professor
Mrs. Elizabeth A. Grunwald, Research Associate
Dr. Lon I. Grassman, Jr., Research Scientist
Dr. Joseph A. Hediger, Research Technician I
Dr. Levi J. Heffelfinger, Assistant Professor & Director-CKWRI North
Dr. Scott E. Henke, Professor
Dr. Fidel Hernández, Professor
Mr. Mario A. Hernandez, IT Manager III
Mr. John E. Herschberger, Research Associate

Dr. David G. Hewitt, Executive Director
Mrs. Liisa L. Hewitt, Research Technician II
Dr. Clayton D. Hilton, Professor
Mr. Austin K. Ibarra, Research Technician I-Internship
Ms. Lauren M. Jackson, Research Technician I
Ms. Nancy T. Jennings, Assistant Director-CKWRI Administration
Mrs. Edna G. Kirkpatrick, Travel Specialist II
Ms. Bailey A. M. Kleeberg, Administrative Coordinator I
Dr. William P. Kuvlesky, Jr., Professor
Mr. Brian K. Loflin, Adjunct Faculty
Ms. Kendal A. Martel, Assistant Director, Texas Native Seeds-East Texas
Dr. Alynn M. Martin, Assistant Professor
Mrs. Caroline C. McAllister, Assistant Director of Development
Mr. Hagen D. Meyer, Research Associate
Dr. J. Alfonso Ortega-Santos, Professor
Mrs. Celina Y. Ortiz, Purchasing Specialist
Ms. Meghan K. Peoples, Assistant Director, Texas Native Seeds-Coastal Prairie
Mr. Marco A. Perez, Administrative Associate IV, Texas Native Seeds
Dr. Lisanne S. Petracca, Assistant Professor
Mrs. Shyla E. Rabe, Assistant Director, CKWRI Operations
Dr. Sandra Rideout-Hanzak, Professor
Ms. Tara L. Rodkey, Research Associate
Mr. Zachary W. Rodriguez, Business Coordinator II
Mr. Tristian J. Saxon, Research Technician II, Texas Native Seeds
Dr. Daniel G. Scognamillo, Research Associate Professor
Mr. Antonio Segura, Farm Foreman II
Mr. Colin S. Shackelford, Associate Director, Texas Native Seeds–West Texas
Dr. Matthew M. Smith, Research Assistant Professor
Mrs. Susan C. Smith, Administrative Coordinator I
Dr. Ashley M. Unger Tanner, Assistant Professor
Dr. Evan P. Tanner, Assistant Professor
Dr. Michael E. Tewes, Professor
Mr. Raymond K. Turner, Research Technician I

SCIENCE TEAM

By the Numbers

19 FACULTY

27 RESEARCH STAFF

5 RESEARCH PROFESSORS

PERSONNEL

PEER REVIEWED PUBLICATIONS
36

116 PROFESSIONAL PRESENTATIONS

AWARDS & ACHIEVEMENTS

Senior Faculty Research Award
Dr. Randy DeYoung was recognized with the Senior Faculty Research Award by the Dick and Mary Lewis Kleberg College of Agriculture and Natural Resources.

2024 Distinguished Seminar Speaker
Levi Heffelfinger was honored as the 2024 Distinguished Seminar Speaker by the Department of Natural Resource Ecology and Management at Oklahoma State University. He was invited to give a research seminar, tour the NREM department, and visit with faculty and graduate students.

Outstanding Electronic Media Award
Drs. Sandra Rideout-Hanzak and Alynn Martin won the Outstanding Electronic Media Award for their production of A Talk on the Wild Side podcast from the Texas Chapter of The Wildlife Society.

Junior Faculty Research Award
Dr. Lisanne Petracca was recognized with the Junior Faculty Research Award by the Dick and Mary Lewis Kleberg College of Agriculture and Natural Resources. This award is presented annually to a junior (non-tenured) faculty that exhibits exemplary work in the realm of research for the College and Department.

TAMUK Early Research Award
Dr. Evan Tanner received the TAMUK Early Research Award by the President's office at Texas A&M University-Kingsville.

Daniel Scognamillo

Breanna Green

A caracal in Botswana, and a white-tailed deer fawn and ocelot in South Texas are among the many research stubjects of CKWRI students and faculty.

Elizabeth Grunwald

Project Sponsors & Cooperators

3H Ranch
AEG Dos Ranches, LLC
American Forests
Arizona Game & Fish Department
Arnim Family Foundation
Tommy & Sue Arnim
Bamert Seed Company
Lee & Ramona Bass Foundation
Boone & Crockett Club
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      Conservation
Caesar Kleberg Partners
California Dept. of Fish & Wildlife
Center for Conservation and Research of
      Endangered Wildlife
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Colorado State University
Comanche Ranch
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East Foundation
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Faith Ranch
Alfred S. Gage Foundation
Marie M. & James H. Galloway Foundation
Fred C. Hamilton
Frederic C. Hamilton Foundation
Harris County Flood Control District
Henderson-Wessendorf Foundation
Hill Country Quail Coalition
Tim & Karen Hixon Foundation
Ms. Julianna Hawn Holt
Houston Livestock Show & Rodeo
Houston Quail Coalition
Las Huellas Association of South Texas
Willard & Ruth Johnson Foundation
The Jones Center at Ichauway

Kansas Dept. of Wildlife, Parks, & Tourism
Joan & Herb C. Kelleher Charitable Foundation
King Ranch, Inc.
Douglass W. King Seed Company
The Richard M. Kleberg, Jr. Family
Robert J. Kleberg, Jr. & Helen C. Kleberg
      Foundation
Laguna Atascosa National Wildlife Refuge
Lavaca Navidad River Authority
A. E. Leonard Family Giving Council
Travis & Bettina Mathis
Mule Deer Foundation
National Christian Foundation
National Fish & Wildlife Foundation
The Nature Conservancy, Texas City Prairie
      Preserve
Next Decade LNG
Oklahoma Dept. of Wildlife Conservation
Oklahoma State University
Orsted Energy
Park Cities Quail Coalition
Quail Ranch
Railway Ranch
RES Texas Mitigation, LLC
Rotary Club of Corpus Christi
Safari Club International Foundation
San Antonio Zoo
San Pedro Ranch
Sandbrock Ranch
Mr. Rod Sanders
Shield Ranch
Shield-Ayres Foundation
SK Foundation
Mr. Stan Smith
South Texas Quail Coalition
Stedman West Foundation
Stephen F. Austin State University
Stone Ranch
Sul Ross State University, Borderlands Research
      Institute
SUN Grant
Dr. Peter & Fran Swenson
Tarleton State University
Mrs. Ellen Temple
T.L.L. Temple Foundation's Boggy Slough
      Conservation Area

Texas A&M AgriLife Research
Texas A&M AgriLife Research Station-
        Bushland
Texas A&M AgriLife Research & Extension
        Center-Stephenville
Texas A&M University
Texas A&M University-Corpus Christi, Harte
        Research Institute
Texas A&M University-Kingsville, Dept. of
        Biological and Health Sciences
Texas Comptroller Office of Public Accounts
Texas Department of Transportation
Texas Ecological Laboratory
Texas Parks & Wildlife Department
Texas State Aquarium
Texas Tech University
The Raul Tijerina, Jr. Foundation
Toyota Motor Manufacturing
Turner Seed Company
Mr. Edward Underbrink

University of Georgia
University of Idaho
University of Texas at Rio Grande Valley
University of Texas at San Antonio
University of Wyoming
U.S. Customs & Border Protection
U.S. Department of Defense
U.S. Fish & Wildlife Service
U.S. Forest Service
USDA Agricultural Research Service
USDA Natural Resources Conservation Service
USDA NIFA Nextgen LEADING Hispanics
USDA NRCS E. "Kika" de la Garza Plant
        Materials Center
USDA NRCS East Texas Plant Materials Center
USDA NRCS James E. "Bud" Smith Plant
        Materials Center
Rob & Bessie Welder Wildlife Foundation
Wild Cat Conservation, Inc.
Winston 8 Land & Cattle
Yturria Ranch

Elizabeth Grunwald

Researchers collect a blood sample from a bobcat.

The Patton Center for Deer Research

FEATURE ARTICLE

POPULATION SURVEYS IN RANGELANDS: BLENDING SCIENCE AND MANAGEMENT

Aaron M. Foley and Randy W. DeYoung

Population surveys are used to track trends in abundance, sex ratio, fawn survival and age structure, set harvest rates, and track the effects of management actions. Many managers also use surveys for scouting, to assess general health of animals, and gain incidental sightings of other species, such as quail or turkey. The CKWRI has been at the forefront of evaluating survey methods since the early 1980's. After these many decades of refinements, what have we learned?

- Most survey methods are affected by visibility of the animals, and perform better in more open areas vs dense vegetation
- Deer populations rarely change drastically from one year to the next. Any large change is usually due to an abnormal count.
- A single survey is unlikely to be useful for management. Trends from consistent, long-term surveys are more valuable than gold. Any abnormally high or low counts will tend to even out over time. Aim for three consecutive years, at least.
- There is no single "best" method for surveys. Many methods can be useful, depending on the conditions, the species, the budget, and how the information will be used. Often, managers combine two or more methods to leverage their strengths (e.g., helicopter and camera surveys).
- There are usually more deer than you think!

Common survey methods for South Texas rangelands

Helicopter: Fly parallel survey lines, count deer up to 100 yards on either side of helicopter. Validated using known number of marked animals and repeated surveys.
Strengths:
- Quickly and efficiently cover large area, not limited by roads or terrain
- Basic survey requires little to no additional input, survey results available immediately
- Sex ratios and fawn:doe ratios variable but usually acceptable for management
- Good, quick appraisal of deer population

Weaknesses:
- Expensive, and helicopter crashes can be fatal
- Counts are highly variable due to *availability* and *visibility* bias, also *observer* bias
- See an average of 35–50% of marked animals, depending on type of helicopter and number of observers, extremes of 17 to 67%, depending on survey

Modifications:
- Place survey lines farther apart, more cost-effective for large ranches
- Incorporate perpendicular distance to sightings to correct for *visibility* bias
- Fly surveys after leaf fall to increase visibility

Spotlight: Drive ranch roads or lanes at night, sight animals using handheld spotlight. Validated using repeated surveys, compare to helicopter.
Strengths:
- Works best in open areas
- Can be effective in closed canopy tree cover if understory is more open
- Cost-effective, can do multiple surveys to increase accuracy

Weaknesses:
- Counts can be highly variable, repeat counts are advisable
- Depends on roads or other drivable areas, subject to *availability, visibility,* and *observer* bias
- Sex ratios and fawn:doe ratios are variable, inaccurate

Modifications:
- Incorporate perpendicular distance to sightings to correct for *visibility* bias

Camera: Place cameras over bait or feed sites. Identify bucks by antler characteristics, assume does and fawns are sighted at same rate. Validated using known number of marked animals, repeated surveys.
Strengths:
- Observers do not need to be present
- Permanent record of animals
- Good for scouting, identification of individual deer eligible for harvest

Weaknesses:
- Population estimates under-count true population size
- Not all deer come to bait or are photographed, bucks tend to dominate baited camera sites
- Time lag: may need to have cameras out ≥2 weeks, time-consuming to process photos
- High initial cost for many cameras
- High effort to survey large area; better for smaller ranches or enclosed areas

Modifications:
- Recent survey methods using un-baited cameras appear promising for larger ranches. The CKWRI is currently evaluating several related methods for use in South Texas.

Drone: Fly survey lines, use thermal video or photos to count animals. Validated using repeated surveys, compare to camera and spotlight.

Strengths:
- Can be cheaper than helicopter surveys for small areas, low risk of injury
- Does not rely on animal movement for sightings, minimizing *availability* bias
- More accurate and repeatable than helicopter

Weaknesses:
- Limited by wind and weather conditions, battery life
- Hard to identify bucks vs. does vs. fawns using thermal images
- Hard to distinguish deer from similar-sized exotics
- Requires some knowledge of survey design for best use of the information
- Can be time-consuming to view camera footage or photos, susceptible to *observer* bias

Modifications:
- Detections using still thermal photos can be automated using artificial intelligence
- Incorporate perpendicular distance to sightings to correct for *visibility* bias

Browse survey (stem count index): Count number of freshly-bitten stem tips on browse plants. Validated using known deer densities, repeated surveys.

Strengths:
- Tracks use of browse resource by all species present, including livestock and exotic
- Good, repeatable index of animal density
- Incorporates plant quality and diversity

Weaknesses:
- Is not an estimate of population size or composition
- Requires some basic plant ID skills
- Can be time-consuming for large ranches
- Will be affected by changes in supplemental feeding

Find links to CKWRI articles regarding deer survey methods using this QR code.

GENETICS, ANTLER SIZE, AND DMP: THE FAITH RANCH YANA STUDY

Cole C. Anderson, Randy W. DeYoung, Michael J. Cherry, David G. Hewitt, Charles A. DeYoung, Joseph A. Hediger, Matthew T. Moore, and Stuart W. Stedman

The deer management permit, better known by the acronym DMP, allows private landowners in Texas to temporarily confine wild white-tailed deer for the purpose of natural breeding. This allows a manager to select and control which individuals breed, usually focusing on large-antlered males. Although DMP has been available since the late 1990's, there have been no formal studies of its effectiveness for improving antler size.

In 2007, the Faith Ranch constructed 2 1,100-acre game-fenced sites, christened the East and West Yana pastures. The East Yana served as a control, managed using supplemental feed but no hunting or selection. The West Yana was hunted to local extinction and repopulated using 2 DMP enclosures stocked with native deer captured from the ranch. All DMP fawns were ear-tagged and released back into the West Yana pasture; this was repeated annually through 2022 with different sires and dams. Annual helicopter captures of tagged individuals and untagged fawns each autumn allowed us to create an extensive set of measurements from pedigreed individuals. Preliminary results indicate that date of birth and the influence of the dam have long-lasting influence on antler size of DMP-born bucks. Managers should attempt to minimize late births and prioritize health, age, and condition of the does. The results of this study will help landowners and wildlife managers make science-based decisions when managing populations of wild deer.

WHITE-TAILED DEER

FAWN SURVIVAL IN SOUTH TEXAS

Kevin Lovasik, Miranda Hopper, Bryan Spencer, Randy DeYoung, Aaron Foley, Alfonso Ortega-Santos, David Hewitt, Landon Schofield, Tyler Campbell, Jason Sawyer, Michael Cherry

White-tailed deer are an important species on South Texas rangelands. Understanding how deer populations fluctuate is essential for managers to make informed decisions. Deer are exposed to multiple sources of mortality throughout life, and fawns are the most susceptible to mortality. In addition, environmental conditions can impact the chance a fawn has of surviving to adulthood. Therefore, we are studying fawn survival rates, causes of mortality, and drivers of survival.

From 2020 to 2024, we have caught and collared 63 adult female white-tailed deer on The East Foundation's San Antonio Viejo Ranch in South Texas. Pregnant does were equipped with vaginal implant transmitters (VITs) that allow researchers to identify when and where does give birth. After birth, the fawns were located and equipped with expandable radio collars designed to grow with the fawn until they fall off or the fawn dies. We also captured fawns when they were about 4- and 8-months-old in the fall and spring of each year for a total of 252 fawns.

Early results indicate low annual survival (12-26%), and identify coyote predation as the leading cause of mortality. We are also finding that fawns are more at risk of mortality within the first two weeks of life if born in areas of poorer soil quality. Equipped with this knowledge, managers can make better-informed decisions regarding deer populations and management.
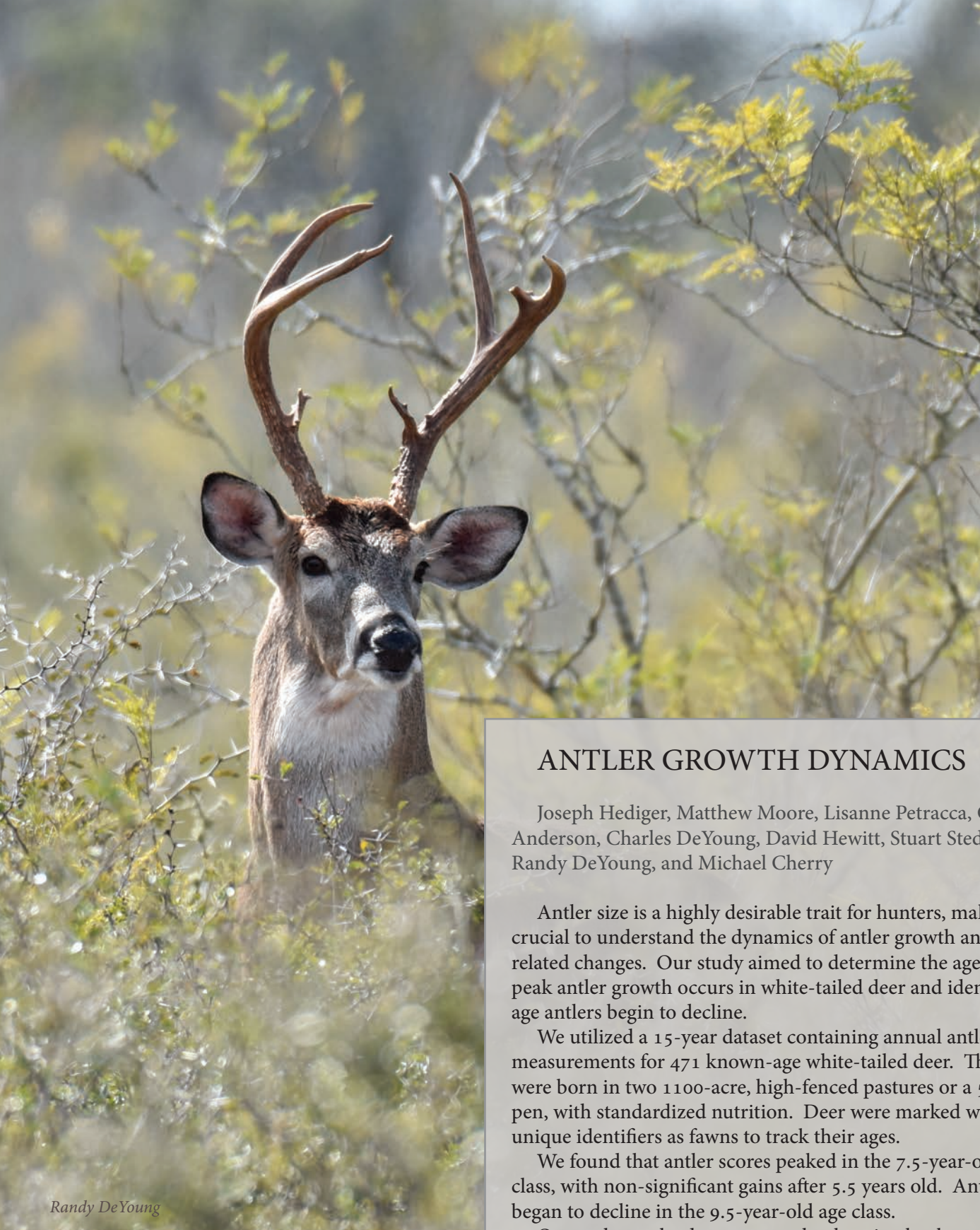
Randy DeYoung

ANTLER GROWTH DYNAMICS

Joseph Hediger, Matthew Moore, Lisanne Petracca, Cole Anderson, Charles DeYoung, David Hewitt, Stuart Stedman, Randy DeYoung, and Michael Cherry

Antler size is a highly desirable trait for hunters, making it crucial to understand the dynamics of antler growth and age-related changes. Our study aimed to determine the age at which peak antler growth occurs in white-tailed deer and identify the age antlers begin to decline.

We utilized a 15-year dataset containing annual antler measurements for 471 known-age white-tailed deer. The deer were born in two 1100-acre, high-fenced pastures or a 5-acre pen, with standardized nutrition. Deer were marked with unique identifiers as fawns to track their ages.

We found that antler scores peaked in the 7.5-year-old age class, with non-significant gains after 5.5 years old. Antlers began to decline in the 9.5-year-old age class.

Our early results demonstrate that keeping bucks past 7.5 years of age is unlikely to produce greater antler scores. This information can help managers determine the appropriate age to harvest mature bucks based on their objectives.

EFFECTS OF VARIABLE PRECIPITATION AND REPRODUCTIVE STATUS ON STRESS LEVELS

Joseph Hediger, Bryan Spencer, Michaela Rice, Miranda Hopper, Randy DeYoung, J. Alfonso Ortega-Santos, Timothy Fulbright, David Hewitt, Aaron Foley, Landon Schofield, Tyler Campbell, Michael Sheriff, and Michael Cherry

As global climate change brings extreme weather events more frequently, animals will be forced to cope with such stressors. Animals cope with changes in their environments through glucocorticoids (stress hormones). However, few studies have looked at the long-term impacts of stressors on an individual's glucocorticoid levels.

Our study is evaluating how a previous stressor can impart lasting consequences to an individual's stress levels. We tested how rainfall during fawn-rearing (summer) affected stress levels of female white-tailed deer in autumn. Our early results indicate that for every 0.4 inch decrease in summer rainfall, autumn stress levels increased by 6.9%, but only in lactating females.

A better understanding of the long-term effects that stressors have on an individual's stress levels will help to evaluate the totality of the cost of a stressor to that animal's welfare, and help predict consequences of future climate scenarios.

THERMAL ECOLOGY IN SOUTH TEXAS

Breanna Green, Evan Tanner, Bryan Spencer, Miranda Hopper, Kevin Lovasik, Randy DeYoung, J. Alfonso Ortega-Santos, David Hewitt, Aaron Foley, Landon Schofield, Tyler Campbell, and Michael Cherry

Heat can affect the behavior, health, and reproductive success of wildlife. The effect of heat is not fully understood in many species including white-tailed deer. In South Texas, stress from heat could be harmful to deer as the hottest conditions align with deer pregnancy and fawn-rearing. In heat-stressed areas, deer must balance energetic demands of reproduction with avoiding heat. We used biologgers in female deer to understand how pregnancy, hot weather, movement, and location affect deer body temperature.

At CKWRI's Alkek Ungulate Research Facility, we observed captive pregnant and non-pregnant deer using cameras to see how pregnancy and movement affected their body heat and feeding times in different temperatures. In the wild, pregnant deer at East Foundation's San Antonio Viejo Ranch were equipped with GPS collars and body temperature loggers. We are examining how heat and brush cover influenced where and when deer moved and how these choices affected their body temperature. Our early findings show that hot weather makes deer warmer, especially if they are pregnant. Pregnant deer also needed to eat more during the day to meet energy demands, while those not pregnant were able to avoid the heat by eating mostly during twilight hours. Additionally, pregnant deer also had higher body temperatures than non-pregnant deer in all micro-climates but the effect was greatest in full sun.

SARS-COV-2 TRANSMISSION IN DEER BREEDING FACILITIES

Joseph Hediger, Sarah Hamer, Gabriel Hamer, Walt Cook, and Michael Cherry

There are nearly 10,000 deer breeding operations in North America and a high concentration in Texas. Studies show white-tailed deer can carry different genetic variants of the SARS-CoV-2 virus. In fall 2021, over 94% of deer tested positive on one deer farm.

There are still many unanswered questions about how the virus spreads on deer farms. This includes spread from humans or other animals, and the risk of deer passing the virus onwards. We also don't know much about how SARS-CoV-2 infections impact the health of deer.

This project aims to understand the biosecurity threat posed by SARS-CoV-2 to the deer populations in Texas. The key objectives are to quantify:

1. How often deer get infected
2. Degree of virus spread among captive deer, livestock, wildlife, and farm workers
3. Viral genome variants and direction of transmission
4. Health consequences for infected deer

Our project will provide critical information to guide biosecurity practices and protect animal health. It utilizes the team's expertise, partnerships with deer managers, and capabilities for molecular and antibody testing.

Landen Addison
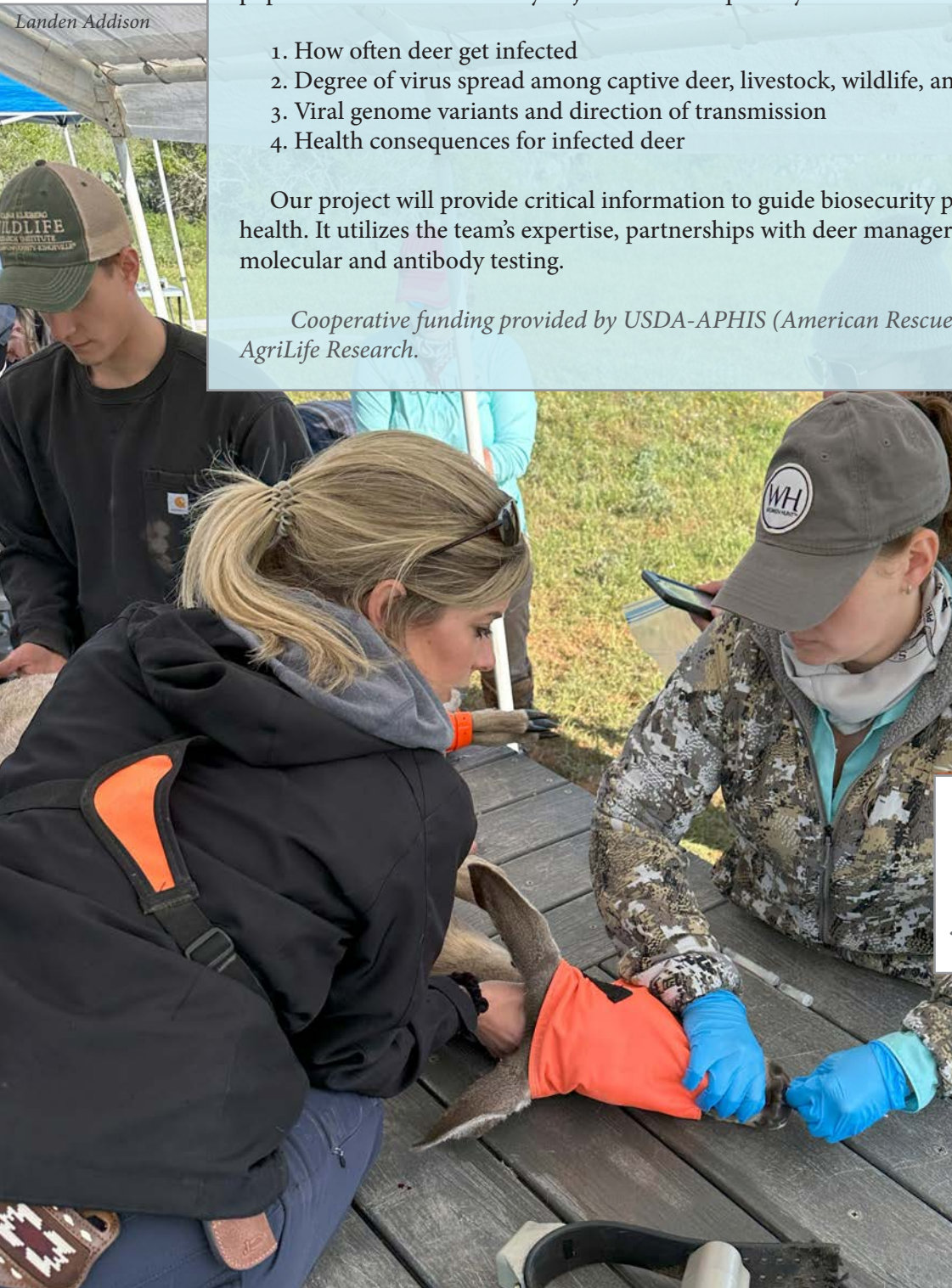
Researchers collect nasal swabs for SARS-CoV-2.

CKWRI partners with the USGS to tackle CWD research

Chronic Wasting Disease (CWD) is a highly contagious and fatal disease that is spreading throughout both farmed and free-ranging cervids. More research is needed to understand the effects, progression, and spread of CWD.

The National Wildlife Health Center (NWHC) has partnered with CKWRI to obtain white-tailed deer fawns for use in experimental CWD infection to better understand this disease.

10 fawns were hand-raised at the Alkek Ungulate Research Facility and specially trained for life at the NWHC during summer 2024.
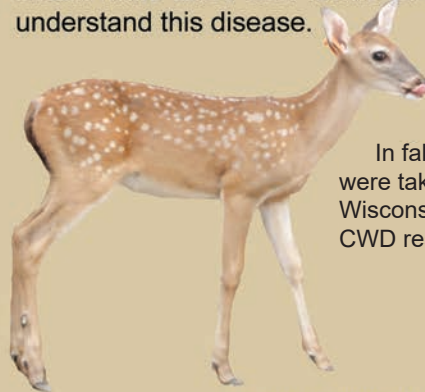
In fall 2024 these fawns were taken to the NWHC in Wisconsin to contribute to CWD research.

Michael J. Cherry, Breanna R. Green, Joseph A. Hediger, and Clayton D. Hilton

TOXOPLASMOSIS IN SOUTHERN TEXAS

Kendall L. Bancroft, Alynn M. Martin, Tyler A. Campbell, Randy W. DeYoung, Aaron M. Foley, David G. Hewitt, Clayton D. Hilton, Miranda L. Hopper, Kevin T. Lovasik, J. Alfonso Ortega-S, Jason Sawyer, Landon R. Schofield, Bryan D. Spencer, Ashley M. Tanner, and Michael J. Cherry

Toxoplasmosis is a zoonotic disease caused by the parasite *Toxoplasma gondii* that causes significant morbidity in animals and humans. Infections are observed across warm-blooded species and can be life-long with clinical signs including behavioral changes (e.g., risk-taking), which may affect survival. Human cases have been attributed to consumption of infected wildlife products; however, prevalence data are sparse for free-ranging game species. The objectives of this study are to: 1) assess the prevalence of *T. gondii* in four distinct white-tailed deer populations in southern Texas, and 2) investigate the effects of infection on deer behavior and demography.

Preliminary results from four years (2020-2023) of serology data revealed that 29 of 59 (49%) adult does from a single population were positive for *T. gondii*. From this same population, fawn 12-week survival was lower when the mother was positive for *T. gondii* (18-40% compared to 31-50%), indicating that the mother's infection status may affect offspring survival. Adult survival was high except for 2022, a year with harsh winter and drought conditions, when seropositive doe survival was lower than that of seronegative does (70% vs. 85%, respectively). These findings suggest that, while *T. gondii* on its own may not drive mortality events in does, infection may compound impacts of external stressors on white-tailed deer. We will continue to use serological and movement data to expand on these preliminary results.

NUTRITIONAL SUPPLEMENTATION TYPE AND TIMING EFFECTS ON RECRUITMENT

Joseph Hediger, Michael Cherry, Randy DeYoung, Clay Hilton, Lisanne Petracca, Michael Sheriff, David Hewitt

Fawn recruitment is crucial for white-tailed deer population growth, and environmental conditions influence recruitment. Nutritional supplementation is a common management technique used to enhance herd health and productivity. However, questions remain regarding what type to use and when to supplement deer herds.

Our research project aims to understand how the type and timing of nutritional supplementation influences reproduction and recruitment of white-tailed deer in South Texas. The study will be conducted on the Faith Ranch in four, 200-acre enclosures. The type and timing of supplementation will be varied among the enclosures.

We will determine annual fawn recruitment with camera traps. Additionally, during our annual captures we will assess nutritional condition and health parameters. The study aims to provide valuable insights into optimizing supplemental feed programs for white-tailed deer herds.

Joseph Hediger

Researchers handle a yearling buck during a deer capture.

PROTECTING WHITE-TAILED DEER WITH THE COMMERCIAL ANTHRAX VACCINE

Maeli Caudillo, Tammi L. Johnson, Chase M. Nunez, Walter E. Cook, Jamie S. Benn

Tammi L. Johnson

Anthrax outbreaks in Texas occur during the summer after cool, wet weather followed by hot, dry conditions. Anthrax can kill an animal within 1-3 days, yet the spores can survive in the environment for decades or longer. Combined with the large size of many Texas ranches, anthrax outbreaks are difficult to control.

Some ranchers have reported between 70-90% death loss in white-tailed deer from one outbreak and have poured the commercially available vaccine over feed in attempts to protect their herds. The commercial vaccine works in livestock when hand-injected under the skin, and we recently found this also works for white-tailed deer; however, we don't know if feeding animals the commercial vaccine will stimulate protection. While efforts to continue developing an oral anthrax vaccine for wildlife are in progress, our current study is testing if feeding the commercial vaccine to deer would work.

We fed deer multiple doses of the commercial vaccine mixed with animal crackers, syrup, and pecan shells. Our early data confirms that getting an animal to eat what we want them to is out of our control (as we're sure those with canine/feline companions, and even little ones, at home can agree). Although this may lead to variable responses when our lab work is complete, our results will bolster support for more wildlife vaccine research while informing landowners about managing anthrax outbreaks.

DEER HABITAT SELECTION AND CATTLE FEVER TICKS

Ashley G. Hodge, Jeremy A. Baumgardt, Randy W. DeYoung, Michael J. Cherry, Aaron M. Foley, David G. Hewitt, John A. Goolsby, and Kim H. Lohmeyer

Cattle fever ticks were introduced into the Americas in the early 1500's by the Spanish. These one-host ticks can carry a deadly *Babesia* parasite that can be fatal in up to 90% of naïve adult cattle. Cattle fever ticks were eradicated from the US in the 1940's, but remain endemic in Mexico. The tick prefers cattle, but will use several alternative wildlife hosts, including white-tailed deer, which can serve as a reservoir to re-infect cattle herds.

We are studying movements and habitat selection of white-tailed deer in a high-density population surrounding Falcon Lake near Zapata on the Texas-Mexico border. The site is located inside a permanent quarantine zone established to prevent re-emergence of cattle fever ticks in the US. We fitted 100 deer with GPS collars that collected hourly locations. We are using ecological niche models to understand how local habitat characteristics are associated with cattle fever ticks. Home ranges of infested deer give us information about the distribution of ticks, and we will compare those home ranges to landscape metrics such as vegetation cover, distance to the lake, and proximity to treated cattle herds. Preliminary results have revealed that deer had relatively small home ranges (<200 acres), and there were distinct clusters of tick-infested deer on the landscape. The results of this study will reveal environmental variables important to ticks, allowing managers to predict areas of future northward range expansions of the fever tick.

DISEASE SURVEILLANCE FOR WILDLIFE AND LIVESTOCK HEALTH

Jamie S. Benn, Alynn M. Martin, and Richard C. Laughlin

Wildlife diseases can cause problems for keeping wildlife and livestock populations healthy. Many diseases can spread among wildlife, livestock, and humans, but we still don't fully understand the patterns behind how these diseases spread. Texas, especially South Texas, is a crucial area for monitoring diseases. This region is near a busy international border, hosts several invasive species known for spreading diseases, and likely has the highest variety of both native and exotic wildlife species in the country.

Starting this year, we've begun a program to monitor infectious diseases in hoofstock species throughout Texas. We will test animals for exposure to anthrax, *Brucella*, hemorrhagic disease viruses, and other common diseases in Texas rangelands. Our sampling will cover different times of the year and various habitats to track how disease exposure changes across different regions over time. Both native and exotic wildlife species are valuable to hunters, while domestic species are important to agriculture. Understanding disease exposure and transmission risks across these species will help Texas landowners improve their management practices and ease tensions between wildlife, hunting, and agricultural interests.

Researchers collect a blood sample from a white-tailed deer.

Chase M. Nunez

J. Vail

CREATING BLOOD REFERENCE INTERVALS FOR NILGAI IN SOUTH TEXAS

Tiffany Pope, Alynn Martin, Miguel Palermo, and Ashley Reeves

A crucial component of disease management is identifying disease cases quickly, but this can be complicated by delayed onset of symptoms. The initial, pre-symptomatic stages of disease can often be detected using blood samples. The most common assessments include (1) complete blood count, which evaluates red blood cells, white blood cells, and platelets; and (2) blood chemistry profiles, which measure indicators of organ function. The results of these tests are then compared to that species' population-based normal intervals to decide if they are experiencing effects of disease.

In South Texas rangelands, wildlife and agricultural animal health can be impacted by invasive species. Nilgai are large Asian antelope that occur as invasive free-ranging populations in this region and are thought to carry pathogens that affect livestock. Detecting disease incidence in nilgai through direct observation is difficult because they avoid areas with human activity. Since nilgai are a highly sought-after game species, opportunities for blood collection from hunter-harvested animals are abundant. However, there are no published blood reference intervals for free-ranging nilgai with which to compare results. We plan to collect blood from nilgai harvested on East Foundation properties to develop the normal reference range for blood values representing healthy nilgai.

Our findings will assist wildlife and land managers in assessing the health of nilgai populations and mitigate risk of disease for native wildlife and livestock.

FEATURE ARTICLE

CULLING BUCKS FOR GENETIC IMPROVEMENT

Charles A. DeYoung

Managers see evidence that selective breeding produces results in dogs, cattle, and other animals and think culling bucks can produce similar results in antler size. That can happen in penned situations, but wild deer present many barriers to genetic improvement for antlers.

Here are barriers to genetic change revealed from research here at the CKWRI:

1. Does do not have antlers—This is of course obvious and not a result of research, but culling can only be done on one sex although both sexes contribute to antler genetics. Some advocate "turning over the does" as a way of improving doe genetics for antlers. This practice is based on the theory that young does are the product of the culling program while old does have inferior genetics from pre-culling times. CKWRI research has shown this is not a good practice because older does are the best mothers that produce the best quality fawns with the highest survival.

2. Variable rainfall—"What you see is frequently not what you get". Variable rainfall, especially in South Texas, affects bucks from before birth to old age by affecting deer nutrition for growing antlers. The breeding value of bucks for antlers can be hidden due to drought or other environmental conditions. Some call this "stunting," and young bucks with good genetics can have inferior antlers and may never catch up with their genetic potential.

3. Generation length—Genetic change in a population occurs in generations, not yearly. A generation is the average age of the breeding individuals. In well-managed populations, this can be five years or more. Even if there is some small genetic benefit of culling, it will take several generations, and many years, to produce reasonable results.

4. Dispersal—30-40% of yearling bucks disperse several miles from their mother's home range. If you are not high-fenced, yearlings are leaving your property, and your neighbor's are coming into your property. This mixing does not allow local genetic populations to develop no matter how much you cull.

5. Few offspring/buck/year—During the rut, bucks travel from doe group to doe group looking for receptive females. Bucks form a temporary tending bond with a doe nearing estrous. This can last several days, and considering the time spent looking for does, one buck cannot breed a lot of females during one breeding season. And, even in fed populations, over half of fawns do not survive to yearling age where they may not do much breeding until 3.5 years of age. Many bucks are breeding and bucks with good genetics for antlers cannot produce many recruits into the population.

6. Low heritability for young bucks—Culling young bucks is like playing a slot machine. You might win by keeping a good buck and getting rid of inferior ones, but many with good antler genetics will be culled because they have not produced good antlers because of environmental conditions. However, young bucks with inferior antlers may turn into mature bucks with inferior antlers even though they have good breeding value. Thus, there is some value in culling inferior young bucks even though it will not lead to genetic progress in antler size.

Rather than a fascination with genetics, managers can make much more progress in increasing population antler size by providing high-quality nutrition. CKWRI researchers have found that feeding programs can produce increases of 15 inches or more in the average antler size of mature bucks within a generation. And, a good native mix of food plants in the habitat provides the best nutrition and enhances a feeding program. This is much more antler progress than any culling program could produce.

Joseph Hediger

PRONGHORN

ADULT SURVIVAL IN THE OKLAHOMA PANHANDLE

Celine M.J. Rickels, Michael J. Cherry, M. Colter Chitwood, Marlin M. Dart, Randy W. DeYoung, W. Sue Fairbanks, Derek P. Hahn, Robert C. Lonsinger, Evan P. Tanner, Matthew T. Turnley, H. George Wang, and Levi J. Heffelfinger

Pronghorn are native to North America, and their population numbers are lower than they were historically. Wildlife populations living at the edge of their range are more vulnerable to changes, and evidence suggests a decline in the pronghorn population at their southeastern range limit in the Oklahoma panhandle.

To gain insight on pronghorn population metrics in Oklahoma, we are examining adult pronghorn survival rates. This 4-year project that will run 2022-2025 is halfway complete. We use a helicopter crew to capture and GPS-collar adult pronghorn in Cimarron and Texas counties of Oklahoma. Through the use of GPS-collars, we are able to monitor adult pronghorn survival and investigate cause of death. We will also be looking at external factors that may be affecting pronghorn survival such as weather variables, increased agriculture, movement, and more.

Our preliminary results from 2022 through 2023 indicate overall yearly adult pronghorn survival to be 73.1%. This result reveals lower survival rates compared to regions with robust pronghorn populations such as Wyoming and other areas in the Intermountain west. Over the next couple years, we plan to continue monitoring pronghorn populations within Oklahoma and to identify factors that are influencing survival. Through further analyses, we hope to determine the degree of the potential population decline and to generate results that are able to inform management actions.

Levi Heffelfinger

Celine M.J. Rickels, Evan P. Tanner, Michael J. Cherry, M. Colter Chitwood, Marlin M. Dart, Randy W. DeYoung, W. Sue Fairbanks, Robert C. Lonsinger, Matthew T. Turnley, H. George Wang, Levi J. Heffelfinger
Corporative funding provided by the Oklahoma Department of Wildlife Conservation

MOVEMENT AND POPULATION DYNAMICS IN OKLAHOMA

Marlin Dart, Evan Tanner, Matthew Turnley, Derek Hahn, Celine Rickels, Colter Chitwood, Randy DeYoung, Sue Fairbanks, Levi Heffelfinger, Robert Lonsinger, George Wang, and Michael Cherry

Surveys suggest pronghorn populations in Oklahoma have declined over the past decade. Estimates show a decrease from over 2,500 individuals in 2016 to approximately 800 in 2024. In Oklahoma, pronghorn only occur in the panhandle region, an area with unpredictable weather, limited resources, and increasing agriculture and energy development. We are working with Oklahoma State University and East Central University to better understand the factors causing the decline of this economically and ecologically important big game species.

Our research aims to identify the factors influencing survival and space use of adult and fawn pronghorn in the region. To do this, we captured, collared, and monitored survival of adult and fawn pronghorn from 2022 to 2024. We also collected fecal samples to assess diet quality and conducted predator surveys to assess their density and diet.

The project is ongoing, but we have observed low fawn survival rates thus far. In 2022 and 2023, only about 11.5% of fawns survived to 45 days, with coyote predation being the leading cause of mortality. Adult annual survival was around 73% in both 2022 and 2023. This research will inform pronghorn management and help us evaluate the causes of their population decline in Oklahoma.

HOW DOES BEHAVIOR AFFECT PRONGHORN RESOURCE SELECTION IN THE TEXAS PANHANDLE?

Marlin Dart, Evan Tanner, Timothy Fulbright, Anthony Opatz, Levi Heffelfinger, David Hewitt, Randy DeYoung, Shawn Gray, and Michael Cherry

Pronghorn are a grassland species that have experienced population declines and range contractions. Understanding how pronghorn select resources while in different behavioral states can highlight habitat requirements for important but infrequent behaviors. We modeled behavioral states (encamped, foraging, and transiting) of 72 pronghorn (36 males, 36 females) collared from 2017 – 2019 in the Texas Panhandle. We then analyzed resource selection during various behaviors and across multiple seasons.

Resource selection differed by behavioral state. Pronghorn spent the most time foraging (65%). While foraging, they selected areas with shallower slopes. They also selected areas farther from roads and woody vegetation while foraging. Foraging pronghorn had seasonal variation in selection for herbaceous vegetation. Specifically, they selected areas closer to herbaceous vegetation during the growing season than during the winter. Pronghorn spent the least amount of time encamped (10%). Resource selection while encamped was similar to selection while foraging. However, when transiting (25%), pronghorn selected areas closer to roads when compared to foraging behavior. Our findings provide insight into how pronghorn behavior influences their resource selection. We also highlight that accounting for behavior can identify critical habitat associations that may be used less commonly but are biologically important.
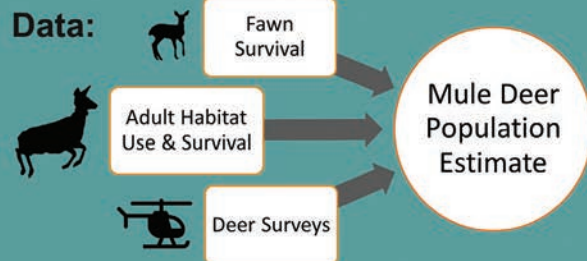
MULE DEER

Chronic Wasting Disease Dynamics within the Texas Panhandle Region

Question:

Can we better understand Chronic Wasting Disease (CWD) dynamics by analyzing historic data in new ways?

Background:

The Texas Panhandle CWD zone has free-ranging mule deer, white-tailed deer, and elk. Positive CWD cases have been detected in all 3 species.

Methods:

Using data from GPS-collared deer, we can use a new technique known as agent-based modeling (ABMs) to help understand CWD spread in the Texas Panhandle.

Data:

1. Landscape factors

2. Sex ratios and abundance

3. Harvest rates

4. Biology of species

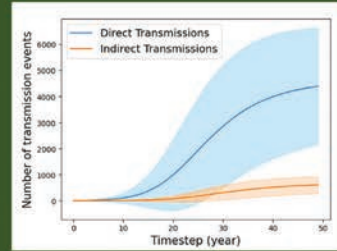5. Tri-species movement data

Goals:

After developing the model, we expect to be able to:

Predict future CWD transmissions

Identify "high risk" areas

Results will be used to inform management practices to help prevent further spread of CWD in Texas.

Ashlyn N. Halseth-Ellis, Alynn M. Martin, Levi J. Heffelfinger

Releasing a mule deer doe to collect another year of movement data.

Levi Heffelfinger

USING TIME LAPSE IN TRAIL CAMERAS TO ESTIMATE POPULATION SIZE OF WHITE-TAILED DEER

Javier Robeldo and Aaron M. Foley

Trail cameras have been used to estimate population sizes of white-tailed deer. However, trail camera surveys often use bait as an attractant, which can underestimate population sizes because male deer dominate feed sites. A relatively new approach using time lapse settings in trail cameras has been developed as a bait-free method but has yet to be evaluated in rangelands. We compared drone, baited camera, and time-lapse camera surveys during fall-winter 2023–2024 in a 200-acre enclosure in Kingsville, Texas.

• Drones, which served as our baseline population estimate, yielded an estimate of 24–27 deer. Trail cameras baited with shelled corn generated an estimate of 15 deer. Time-lapse surveys without the presence of corn feeders had an estimate of 13–39 deer. The population estimate with the presence of corn feeders generated an estimate of 15–26 deer.
• Number of cameras had a little effect on population estimate, but precision declined with fewer cameras. Population estimates were consistent after ~20 days in the field but precision increased with more days.
• Overall, time-lapse methods appear to be a viable alternative population estimator for white-tailed deer whether supplemental nutrition is present or not. Time-lapse methods offer advantages in not requiring bait and have applications for estimating population sizes of other species. More work is needed to determine whether time-lapse methods can be used to generate sex and age ratios.

FLEXIBLE ANIMALS ARE MORE SUCCESSFUL IN CHANGING ENVIRONMENTS

Miranda Hopper, Kevin Lovasik, Bryan Spencer, Randy DeYoung, Aaron Foley, J. Alfonso Ortega-Santos, Landon Schofield, Tyler Campbell, and Michael Cherry

With changing weather and human development, the environment that animals have grown used to looks different than it did in the past. Animals must find ways to live in these new environments, while still raising healthy young. We wanted to see if animals are flexible and use different strategies depending on what has worked in the past, or if they continue to use the same strategy no matter if their young previously lived or died.

• We captured 63 female white-tailed deer over 4 years to determine what strategies females use to help their fawns survive. We located birth sites of fawns and measured plant cover at each birth site. We also put collars on fawns to see if they lived or died.
• We found that most females chose birth sites with greater plant cover. We also found that if a fawn died in the previous year, females moved farther away to find a new birthing area in the next year. If their fawn lived in the previous year, they tended to stay close when choosing a birth site the next year.
• For the ones that did move far away, their fawns were more likely to live the following year. This shows that animals that were willing to be flexible were more likely to have a fawn that survives, so flexibility is good in new environments.

MULE DEER SITE FIDELITY IN THE SOUTHERN GREAT PLAINS

Calvin C. Ellis, Levi J. Heffelfinger, David G. Hewitt, Randy W. DeYoung, Timothy E. Fulbright, Louis S. Harveson, Warren C. Conway, Shawn S. Gray, and Michael J. Cherry

Site fidelity is the tendency of an individual to reuse an area for some kind of benefit. In highly mobile species, site fidelity is often high because familiarity with the landscape and resources is beneficial for survival. Though high site fidelity is often beneficial, recent data suggests it can negatively impact species in a heavily human-influenced landscape. In the Texas Panhandle, mule deer are exposed to human-influence through energy development and row-crop farming. To assess site fidelity in response to human-influence, we used a 5-year GPS dataset of 146 adult mule deer in the Texas Panhandle. We collected these data across 4 sites with varying amounts of row-crop farming and energy development. Specifically, we compared individual home range overlap.

• For males, site fidelity between years was greatest during antler growth (38 ± 17% overlap) and was lowest during the rut (31 ± 11%). For females, site fidelity between years peaked post-rut (52 ± 12%) and was lowest during pre-rut (43 ± 17%).
• Generally, deer reduced site fidelity to track greener vegetation within a given year, but not between years.
• For females, reproductive status influenced nutritional benefits of site fidelity. For reproductive females, nutritional condition increased with greater site fidelity, but decreased for non-reproductive females.
• Our results show variable effects of site fidelity that can inform population management plans as human influence accelerates environmental change.

The Richard M. Kleberg, Jr. Center for Quail Research

EFFECT OF GUINEAGRASS ON NORTHERN BOBWHITE ECOLOGY

Aaron M. Foley and David G. Hewitt

Increases in invasive non-native grasses have been identified as a factor causing the decline of northern bobwhites. Invasive non-native grasses have a negative impact on bobwhites because the vegetation can become too dense, which hinders bobwhite movement. Forb and insect diversity can also be reduced. Guineagrass is an invasive non-native grass but its impact on bobwhite ecology is under-studied. Our objective is to examine how Guineagrass impacts bobwhite ecology at both population and individual levels.

We will conduct the study on King Ranch where Guineagrass has become the dominant species in several locations. To examine the population impact, we will trap and band bobwhites on 2 sites with varying Guineagrass cover. We will capture quail during autumn and winter for 3 years to compare and contrast population metrics. To examine the individual impact, we will attach GPS transmitters to a subset of bobwhites along a gradient of Guineagrass cover. Bobwhite movements and habitat use will be monitored for 1 year. The GPS data will provide a wealth of information across important periods of the bobwhites' lifecycle including nesting, brooding, and thermoregulation.

Our results will improve knowledge regarding how bobwhites respond to Guineagrass of varying densities. Our data can also guide management projects intended to control Guineagrass.

Brian Loflin

Spatial Trends and Individual-Level Consequences of Parasitic Helminth Infections in Quail

Liza A. Soliz, Alynn M. Martin and Fidel Hernandez

- North American quail have experienced range-wide population declines with habitat loss identified as the primary cause.
- Parasites—specifically eyeworms and cecal worms—may be a compounding factor for quail declines in Texas.
- However, spatiotemporal trends and the impact of eyeworms and cecal worms on quail are poorly understood.

Question 1: Does prevalence of cecal worm and eyeworm in quail vary over a latitudinal gradient?

Current knowledge:

- Eyeworm prevalence appears to decline from north to south latitudes
- Cecal worms do not appear to exhibit a spatial pattern

Limitations: Many locations lack data

Goals: Strategic sampling of quail from Nebraska to Northern Mexico to fill in data gaps, assess trends, and assess potential drivers of observed trends.
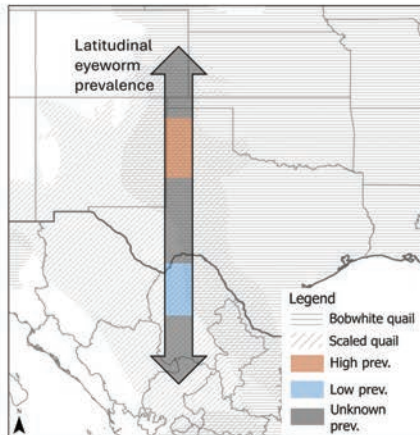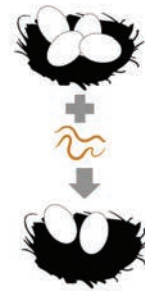
Question 2: Does eyeworm and cecal worm infection influence survival and life history traits?

Scenario 1: Parasites may cause direct mortality and limit populaitons
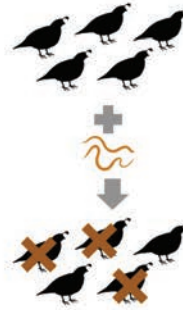
Scenario 2: Parasites may impact life history traits (e.g., egg laying) that limit populations

Goals: Utilize experimental trials to assess the impact of worm infection and burden (number of worms) on survival and other life history traits (e.g., egg laying, predator response, etc.).

What's more important for northern bobwhite in Texas: habitat or weather?

Question: How do habitat and weather influence population growth of bobwhites in *northern* and *southern* Texas?

We will collect **data** on:
- Habitat amount
- Habitat connectivity
- Weather (rainfall, soil moisture, etc.)
- Quail abundance

Results: Bobwhite population growth appears to be more influenced by habitat in southern Texas, whereas it appears to be more influenced by weather in northern Texas.

Goals: To better understand the relative importance of drivers of bobwhite population dynamics in 2 regions of Texas.
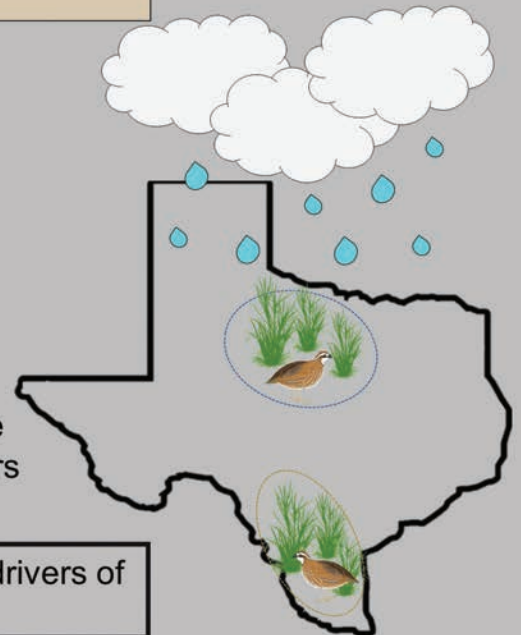
EXPLORING VARIABILITY IN SCALED QUAIL POPULATIONS

Caleb McKinney, Evan Tanner, Leonard Brennan, Ashley Tanner, Humberto Perotto-Baldivieso, Fidel Hernández, David Wester, David Hewitt, Ryan Luna, John Mclaughlin, Katherine Travis

Scaled quail populations have declined, and the range where scaled quail are found in South Texas continues to shrink. Many factors can influence scaled quail abundance locally or over short time periods. However, the long-term distribution wide declines are believed to be primarily a result of changes in land use and landscape fragmentation. Scaled quail require large areas of intact Tamaulipan Thornscrub vegetation which is being lost due to many factors. Another alarming trend is that scaled quail abundance appears to have rapidly declined around the year 2000. This may indicate that landcover change and fragmentation crossed a threshold and now have greater impact on scaled quail populations, reducing their ability to recover from short-term fluctuations in abundance.

Our goal is to examine the scale of effect, and identify potential thresholds of landcover change and fragmentation on scaled quail population in South Texas. To accomplish this, we are using over 30 years of scaled quail abundance data collected across South Texas by the Breeding Bird Survey and Texas Parks and Wildlife Department's annual quail surveys. These quail abundance data will be compared to landcover and landscape fragmentation data for every year since 1992. A better understanding of how landcover change and fragmentation impact scaled quail populations may allow us to recommend management efforts to target restoration goals at more appropriate scales or better identify areas to protect.

Movement Ecology of Scaled Quail

QUESTION:
Why are chestnut-bellied scaled quail (a subspecies of scaled quail that lives in South Texas) on the decline?

STUDY AREA:
Two sites: a stable population (Dimmit County) and a declining population (Duval County).

METHODS:
We are tracking quail movements with backpack-style GPS transmitters, which allows us to better understand how quail are navigating their environment, including vegetation structure, vegetation communities, oil & gas development, and more.

RESULTS:
From February 2022 to August 2023, we fitted 123 individuals with GPS units that took locations every four hours, which resulted in 21,052 locations collected.

500 ft

Our results suggest that scaled quail avoid mesquite-dominated shrublands, particularly if those shrublands contain high amounts of herbaceous biomass (often from invasive grass species). These degraded shrublands may arise when brush management is applied to native Tamaulipan thornscrub, as cleared areas are often recolonized by only a handful of shrub species and invasive grasses.

Katherine A. Travis, Caleb M. McKinney, Evan P. Tanner, Ashley M. Tanner, Fidel Hernández, Humberto L. Perotto-Baldivieso, Leonard A. Brennan, David G. Hewitt, David B. Wester, Ryan S. Luna, John W. McLaughlin, and R. Dwayne Elmore. Cooperative funding provided by the Texas Parks & Wildlife Department.

Brian Loflin

SURVIVAL OF SYMPATRIC QUAIL SPECIES IN SOUTH TEXAS

Question: How does survival vary between scaled quail and northern bobwhite where their ranges overlap?

Approach: Scaled quail and northern bobwhite are being captured, banded, released and recaptured across three years at two ranches in South Texas. Capture history data will be analyzed to estimate survival for both species.
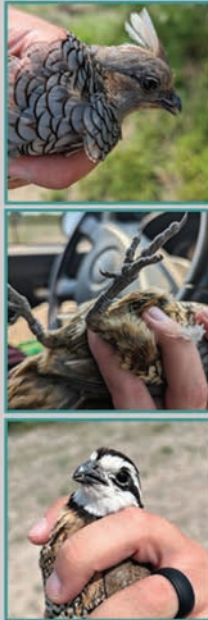
Distribution of Scaled Quail and Northern Bobwhite in Texas

Scaled Quail
Northern Bobwhite
Overlapping Range

N

Miles
0   150   300

San Pedro Ranch
Ranch in Duval County
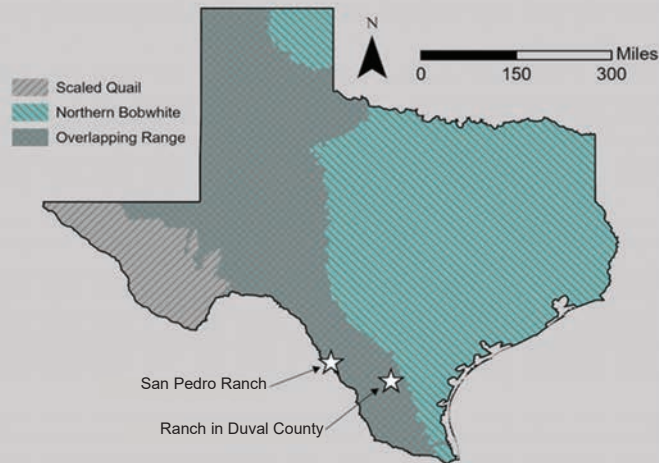
Goal: Assess common factors that influence both scaled quail and northern bobwhite survival in areas where their distributions overlap.

Levi D. Sweeten, Evan P. Tanner, Leonard A. Brennan, Fidel Hernández, David G. Hewitt, Ryan S. Luna, Caleb M. McKinney, John McLaughlin, Humberto L. Perotto-Baldivieso, Lisanne Petracca, Maydeliz Ramos-Gonzalez, Ashley M. Tanner, Katherine A. Travis, and David B. Wester

Brian Loflin

Patterns in Distribution and Occupancy of Chestnut-Bellied Scaled Quail and Associated Bird Communities in South Texas

Maydeliz Ramos-Gonzalez, Ashley M. Tanner, Leonard A. Brennan, Fidel Hernandez, David G. Hewitt, Caleb M. McKinney, John W. McLaughlin, Humberto Perotto-Baldivieso, Levi Sweeten, Evan P. Tanner, Katherine A. Travis, David B. Wester

QUESTION — Can specific signals in the bird community, such as species composition or presence, serve as an early alert for changes in chestnut-bellied scaled quail populations?

METHODS — We are conducting breeding season bird surveys across 19 counties in South Texas using:

Point Counts — Observers count every bird seen/heard in 5 minutes

Acoustic Recorders — Small devices that record all sounds starting 30 minutes before sunrise

PRELIMINARY RESULTS — Since May 2024, we have completed over 750 point counts. We have recorded 95 different species of breeding birds, including the chestnut-bellied scaled quail.

Cooperative funding provided by the Texas Parks & Wildlife Department
Photo credits: K. Chastain and M. Ramos

GENETIC ANALYSIS OF WILD TURKEYS ACROSS OKLAHOMA

Michael Barrett, Evan Tanner, Randy DeYoung, Alynn Martin, Dwayne Elmore, Colter Chitwood, Craig Davis, Samuel Fuhlendorf, Nicolle De Fillipo, Cody Griffin, and Cyrena Bedoian

The wild turkey is a conservation success story in the U.S. Recently however, wildlife agencies are seeing a decline in their populations. Oklahoma Department of Wildlife Conservation (ODWC) has seen declines across the state, raising questions about the integrity of current populations. Using genomic techniques, we aim to better understand the structure of wild turkey across Oklahoma.

We worked with ODWC, the National Wild Turkey Federation, Oklahoma Tribal Nations and private citizens. Together we have collected a total of 250 samples from turkeys harvested during Spring 2022 and 2023. Using genomic sequencing, we gathered data for 160 individuals from 52 counties. Data showed separation between eastern and Rio Grande subspecies. A hybrid zone between each subspecies was also found, although it was much wider than previously reported. Populations of eastern turkey showed possible signs of mixed ancestry that may be due to isolation and secondary contact or past restoration.

Sample collection continued during the 2024 season, focusing on counties with little data. Results of this study will inform management of wild turkeys in the region by revealing factors that affect gene flow, extent of hybridization, and identification of suitable source stocks for future restoration. This research will enable ODWC to utilize genetic information to guide management decisions and help speed the recovery of turkey populations in Oklahoma.

A researcher attaches a leg band to a chestnut-bellied scaled quail.

Evan Tanner
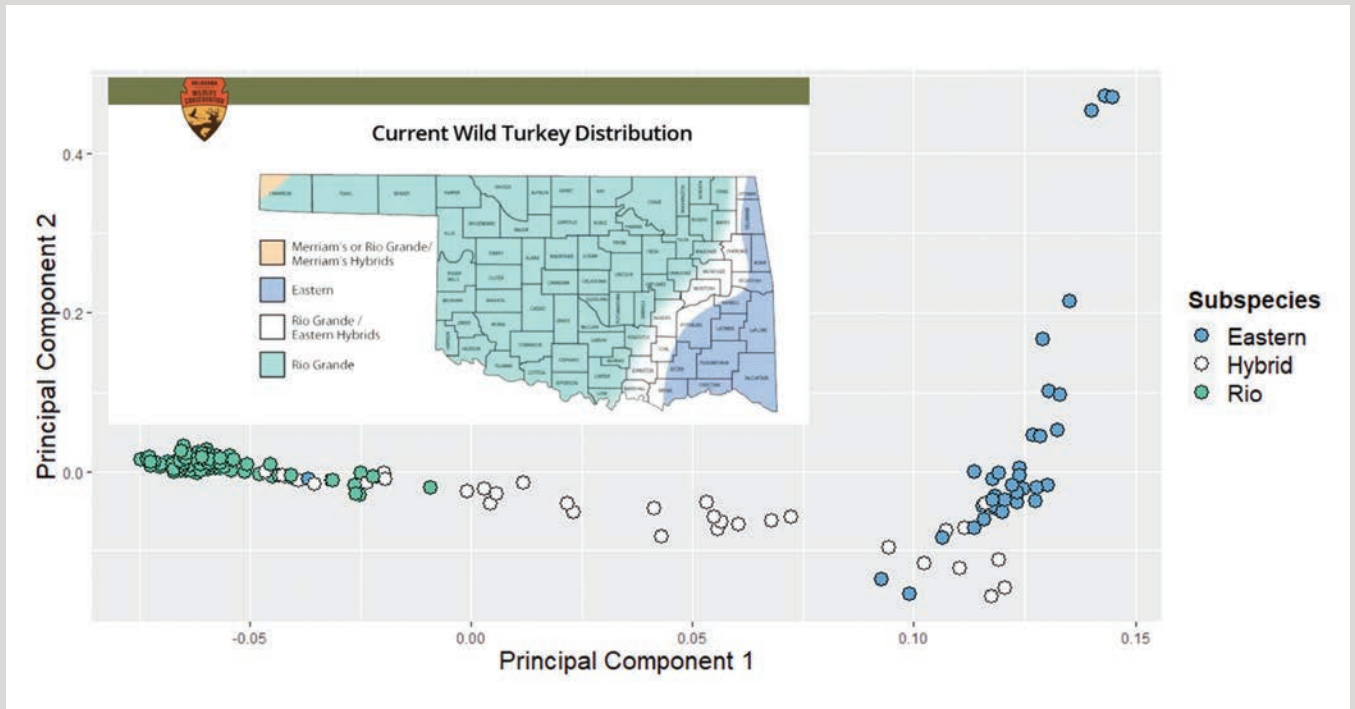
Analysis of wild turkey population structure in Oklahoma. Each point represents an individual, with colors indicating the subspecies or hybrid status.

RAINFALL AND GREEN-UP EFFECTS ON BOBWHITE REPRODUCTION

Lindsey K. Howard, Fidel Hernández, Clayton D. Hilton, David G. Hewitt, David B. Wester, and Michelle R. Garcia

There is abundant evidence that bobwhite populations are correlated with rainfall, but the reasons why remain unknown. The general opinion is that resource abundance after rainfall promotes bobwhite production and survival. In addition to this, we propose that rainfall itself, or a closely associated factor like the green-up, acts as a breeding cue for bobwhite. The first step in exploring this hypothesis is to test whether rainfall and change in vegetation color can cause increases in reproductive hormones.

- Rainfall sometimes coincided with increases in reproductive hormones levels.
- A change in vegetation color from brown to green resulted in increased reproductive hormone levels.
- This is evidence that both rainfall itself and a change in vegetation color can act as breeding cues for bobwhite.

Decreased bobwhite reproduction in drought years may be due to lack of a breeding cue. This may further limit bobwhite populations in South Texas, as conditions are expected to become drier due to climate change.

Fidel Hernández

RAINFALL LEGACY EFFECTS IN NORTHERN BOBWHITE

John E. Herschberger, Fidel Hernández, David B. Wester, John T. Edwards, Alejandro Bazaldua, and Kristyn G. Stewart-Murphy

Northern bobwhite is a species whose populations respond favorably to rainfall. Bobwhite populations often are lower than what is expected given the amount of rainfall in a year. Rainfall legacy effects may offer an explanation. These legacy effects occur when past rainfall influences the current conditions. This phenomenon is known to happen in grasslands, with current biomass influenced by both current and past rainfall. Our objectives were to evaluate whether rainfall legacy effects occurred in bobwhite populations in northern and southern Texas.

- We detected rainfall legacy effects in both regions.
- Quail abundance was influenced not only by current-year rainfall as indexed by the Palmer Modified Drought Index (PMDI), but also by the prior year's rainfall.
- The strength of rainfall legacy effects appeared to be stronger in northern Texas than southern Texas.

Our study highlights how rainfall, or lack of it, can have lasting effects on bobwhite populations into the future.

QUANTIFYING HABITAT-BOBWHITE RELATIONSHIPS WITH REMOTE SENSING

Alejandro Bazaldua, Fidel Hernández, Aaron M. Foley, and Andrea Montalvo

Northern bobwhite populations are driven mostly by rainfall and habitat. Habitat-bobwhite relationships have been documented previously with on-the-ground sampling, but this approach is time and labor intensive and limited to small areas. A better method of collecting habitat data is needed that is efficient and practical for large areas.

Satellite imagery and cloud computing allows researchers to quickly collect habitat data for wildlife. Our objective was to evaluate the use of these technologies to develop habitat-bobwhite relationships for large areas.

- We collected relative abundance data using repeated roadside surveys on 28 different routes within 13 properties in southern Texas during August and September 2022.
- Routes were buffered out about 440 yards, and data on percent perennial forb and grass cover, percent litter cover, and percent woody cover were extracted from the Rangeland Analysis Platform.
- Our analysis indicated that perennial forb and grass cover had a positive relationship with bobwhite relative abundance while litter cover had a negative relationship.
- Woody cover had no relationship with bobwhite relative abundance.

Our findings fall in line with previous bobwhite habitat studies and validate the use of remote sensing as an alternative to traditional data collection methods. Remote sensing may be a useful tool for both ranch managers and researchers to use in habitat management for bobwhite quail in southern Texas.
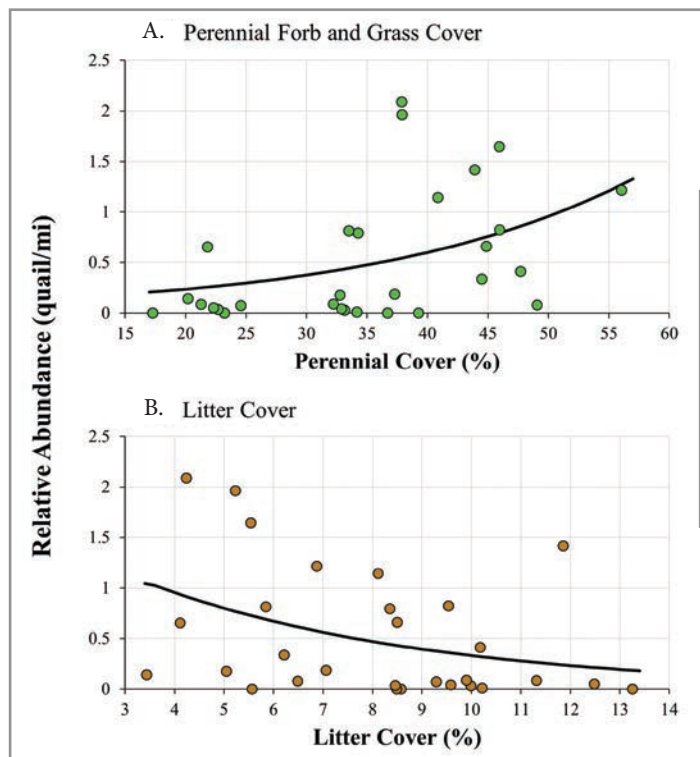
Relationship between bobwhite relative abundance and A. perennial forb and grass cover, and B. litter cover in South Texas, 2022.

Wild Cats

95°F 01/08/2024 02:40PM CAMERA122

Hunter Vasquez

OCELOTS

   With less than 100 individuals remaining in the U.S., the ocelot is a federally endangered wild cat. There are two populations of this rare, medium-sized cat in South Texas. One population occurs at Laguna Atascosa National Wildlife Refuge (LANWR) in eastern Cameron County, and the other population occurs on ranches in Willacy and Kenedy counties: the East Foundation's El Sauz Ranch, and the Yturria San Francisco Ranch.
   In Texas, this exquisite cat species relies heavily on native thornscrub, which has been fragmented by agriculture, highways, and increasing human development. Understanding the characteristics of vegetation most suitable for ocelots is essential for their conservation. Additionally, understanding differences in habitat selection of ocelots, bobcats, and coyotes can provide insight into the coexistence between these 3 carnivores. Researchers in the Feline Research Program at the CKWRI have been studying ocelots and other wild cats to aid in their conservation for over 35 years.

OCELOT MONITORING ON THE LAGUNA ATASCOSA REFUGE

Daniel G. Scognamillo, Elizabeth A. Grunwald, Andrew P. Grunwald, Sergio J. Vasquez, Brandon N. Jones, Sarah E. Lehnen, Grant M. Harris, and Michael E. Tewes

In Texas, ocelots occur on both private and public land. During the last year we have used trail camera sampling to monitor the ocelot population and estimate density on the Laguna Atascosa National Wildlife Refuge (LANWR). Photographs from these cameras are used to identify individuals based on their unique coat patterns to estimate their density. Our research also focuses on ocelot movements, reproduction, and health.

From 54 ocelot encounters recorded by our cameras, we identified 12 individual ocelots: 6 females, 3 males, and 3 undetermined. We applied a Spatially Explicit Capture-Recapture model to estimate population density, which estimated an ocelot density of D = 1 ocelot/2.58 square miles. Our model used a mask area of 58.3 square miles for the estimation of density, resulting in an estimated ocelot population of 21 ocelots in the study area. We also conducted live trapping in 2024 which resulted in the capture of 4 ocelots and 2 bobcats. All these individuals were fitted with GPS collars and released at the capture site. Monitoring with GPS collars is expected to extend until early October 2024

This research contributes to an existing, long-term study of ocelots on LANWR by the refuge staff. Our results will support ocelot conservation and restoration efforts at LANWR, and elsewhere in South Texas.

OCELOTS ON THE YTURRIA RANCH IN SOUTHERN TEXAS

Daniel G. Scognamillo, Thomas M. Langschied, Elizabeth A. Grunwald, Edward Underbrink, Laura de la Garza, Imer de la Garza, and Michael E. Tewes

Nearly all land in Texas is privately owned, so conservation easements are important agreements that benefit plants and wildlife into the future. We have been monitoring the ocelot population on the Yturria Ranch conservation easements with GPS collars. Using photographs from trail cameras, we have been identifying individuals based on their unique coat patterns.

The number of identified individual ocelots and their locations will be used in a computer model to estimate ocelot density on the easements. We were unable to collar more ocelots during winter 2024, but we collared 9 bobcats (5 female, 4 male). During bobcat captures we also took measurements and collected samples for genetic and reproductive studies. In the fall we will capture ocelots and fit them with GPS collars.

This research will help us gain knowledge on the movement patterns of both ocelots and bobcats, which potentially compete with each other. Analyzing data collected from easements is a critical step for designing and implementing dispersal corridors for this ranch population of ocelots. Results from this study will support ocelot conservation and restoration on private lands in South Texas.

HOW MANY OCELOTS ARE LEFT IN TEXAS?

Goal – Determine abundance of ocelots in South Texas while comparing **camera trap** and **scat detection dog** methods.

Methods – 750 camera traps placed across 2 populations. Surveyed **92 miles** of scat detection dog transects over one month.

Implications – Abundance is important for **conservation decision** making and predicting **future population size.**

Ranch Property
Scat Dog Transects
Camera Grid
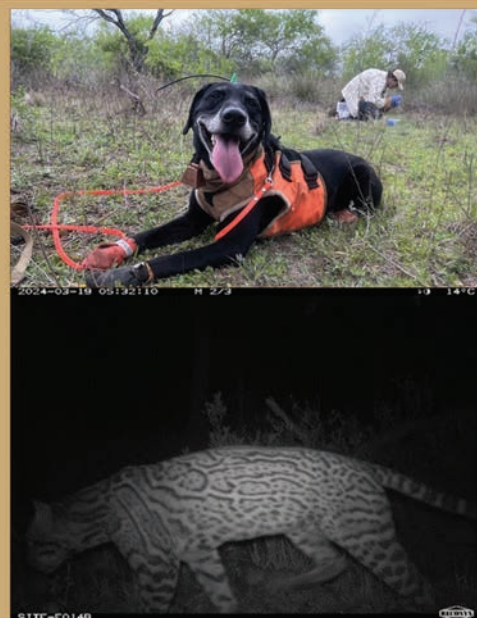
James N. Helferich, Randy W. DeYoung, Beth Gardner, Alynn Martin, Ashley Reeves, Daniel G. Scognamillo, Lisanne S. Petracca
Cooperative funding provided by U.S. Customs and Border Protection through the U.S. Fish & Wildlife Service.

Above: Benny, the scat detection dog, taking a break after alerting to a scat sample being collected by Ph.D. student James Helferich (L. Wendt and K9 Conservationists); flank of a male ocelot at East Foundation's El Sauz Ranch (J. Helferich).

CLUSTER SAMPLING AND OCELOT POPULATION DYNAMICS

Hunter G. Vasquez, Daniel G. Scognamillo, Elizabeth A. Grunwald, Andrew P. Grunwald, Sergio J. Vasquez, Brandon N. Jones, and Michael E. Tewes

Population dynamics describe the size and age composition of a population over time. Understanding the population dynamics of ocelots can inform conservation strategies for this endangered species. The main goals of our study are to examine ocelot sex ratio, behaviors, habitat use, and interactions using trail cameras.

We have deployed up to 40 trail cameras at once on Laguna Atascosa National Wildlife Refuge. Cameras are set in clusters of 10, sometimes in pairs to capture different sides of ocelots. They are checked monthly, and photos are processed using Timelapse software. We record number of individuals (based on spot patterns), sex, presence of a GPS collar, and general observations on behavior. From 6 months of sampling, we have identified 21 individuals (10 female, 9 male, 2 undetermined). This is the first comprehensive assessment of the population size of the refuge ocelot population. A database of individuals has been created based on spot patterns. Additionally, a map of sightings has been developed to inform refuge managers about potential areas of ocelot use based on our cluster sampling.

This information is vital for understanding ocelot population dynamics and guiding conservation efforts. Our research can provide data not usually available in grid sampling, inform habitat management, and enhance conservation strategies.

OCELOT USE OF ARTIFICIAL WATER SOURCES

Hunter G. Vasquez, Daniel G. Scognamillo, Elizabeth A. Grunwald, Andrew P. Grunwald, Sergio J. Vasquez, Brandon N. Jones, and Michael E. Tewes

Ocelot conservation is increasingly important due to habitat loss and fragmentation. However, high quality habitat still exists on certain private and federal lands. At Laguna Atascosa National Wildlife Refuge, ocelots regularly use man-made water sources known as guzzlers. These artificial sources could be crucial to supporting the population by providing water during drought. This project aims to understand how ocelots use guzzlers and the impact of guzzler condition on behavior and movement.

Beginning in October 2023, we placed trail cameras in pairs at 14 guzzlers. Guzzler cameras are checked monthly, and photos are processed using software called Timelapse. Data collected include the count of individuals, their identities, whether they are male or female, if they are collared, notes on behavior, and water availability. In the last 6 months we have observed 17 ocelots (9 female, 8 male) drinking from guzzlers.

This study underscores the importance of maintaining guzzlers as water sources for ocelots. Our early findings suggest that guzzlers could encourage ocelots to reside within the safe refuge boundaries, emphasizing their role in conservation and monitoring ease. We will continue studying ocelots at guzzlers, providing valuable insights into the role of water availability in ocelot conservation.

James Helferich

HOW DOES WEATHER AFFECT OCELOT MOVEMENT AND HABITAT USE?

Matthew M. Smith and Lisanne S. Petracca

The changing climate can have major effects on wildlife and their communities. Extreme weather conditions like drought and heatwaves can be challenging for wildlife by limiting resources and increasing physical stress. Resource managers are then tasked with recovering species where extreme weather has become more frequent and severe. However, few studies have assessed the effects of extreme weather on movement, habitat use, and energetic demands in the context of species recovery. Our goal is to better understand how ocelots respond to drought and heatwaves by identifying differences in movement and habitat use.

We are using locations from collared ocelots on Laguna Atascosa National Wildlife Refuge and East Foundation's El Sauz Ranch to calculate daily movement rates and differences in habitat use during periods of drought and extreme heat in South Texas. We are then calculating daily energy use and predicting the energetic cost of weather extremes. We expect to see ocelots limit their movement and activity in high temperatures because it is too costly. We will also identify important habitat features used during droughts and heatwaves.

Extreme weather conditions pose challenges for management, but understanding how species respond to these conditions is critical. This research will identify challenges in our progress towards ocelot recovery and help promote a long-term future for this cat in South Texas.

HOME RANGE SIZE AND MOVEMENTS OF OCELOTS

Amanda M. Veals Dutt, Aidan B. Branney, Jason V. Lombardi, Maksim Sergeyev, Michael E. Tewes, and Lisanne S. Petracca

Animals need space on the landscape to find the resources needed to survive and reproduce, referred to as a home range. Understanding the size and necessary resources for home ranges is vital for long-term conservation of endangered species, such as the ocelot. We are examining questions crucial to understanding what affects home range size and movement of ocelots. For example: do ocelot home ranges get larger when resources are more limited, such as in times of drought, or are home ranges determined mostly by the structure of the vegetation, with little impact of time-dependent conditions?

We will determine home range size for ocelots in South Texas using data from GPS collars. The ocelots in our study (10 females and 8 males) are from the Yturria and East Foundation's El Sauz Ranches, with data spanning from March 2011 through August 2021. Each cat had an average 3-month monitoring period. Several ocelots exhibited exploratory movements, i.e., movement outside an individual's typical home range. We used statistical analysis to identify these exploratory movements and remove them from our analysis to prevent overestimating home range size. An additional step determined that at least 60 days is required to accurately assess home range size. We are now ready to estimate home range size and examine factors that may influence its size, such as drought and vegetation greenness. Our results may help guide ocelot management and recovery.

The Road Effect Zone and Mammal Communities

Question: Are species detections and mammal communities affected by traffic volume in the road effect zone (the area surrounding a road into which road and traffic impacts extend)?
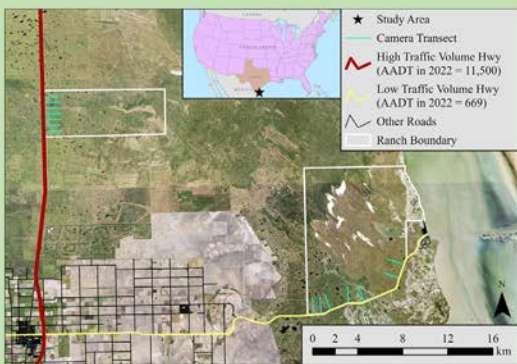
Methods
- Set cameras in transects around 2 Texas highways.
- Analyzed mammal communities and monthly detections of individual species on both roads in relation to traffic volume.

Results
- Detections: there were more coyote, raccoon, and badger detections around the high-volume road; bobcat detections did not differ.
- Communities: more species were recorded around the low-volume road than the high-volume road.

Conclusions: Examining individual species may underrepresent how roads impact mammals, so a community-level approach is likely necessary in research to evaluate traffic volume impacts in the road effect zone.
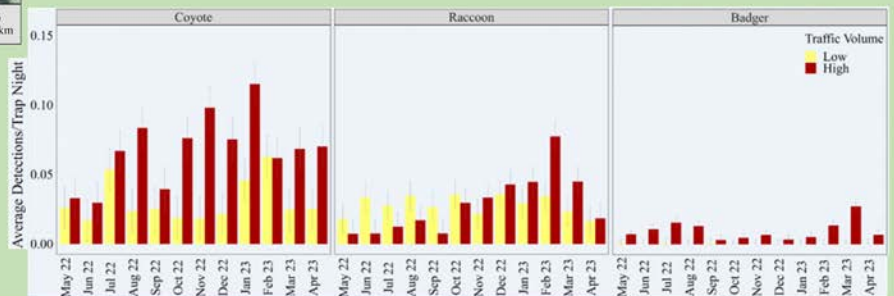
ROAD CROSSINGS FOR OCELOTS AND OTHER WILDLIFE

Thomas J. Yamashita, Daniel G. Scognamillo, Elizabeth A. Grunwald, Thomas M. Langschied, Emma K. Brookover, John H. Young Jr., and Michael E. Tewes

Roads can have large impacts on wildlife, including habitat fragmentation, vehicle collisions, and disturbance from vehicle noise. Wildlife crossings can reduce impacts by providing safe passage below the road. Determining crossing effectiveness can be done by monitoring crossings and how they reduce road effects. In South Texas, crossings are built for ocelots and used by many species, so using ocelots as the standard may not fully capture crossing value.

We are using trail cameras and road mortality surveys to determine crossing effectiveness on US 77 in Willacy County and Farm-to-Market 1847 in Cameron County. We monitored pre-construction and are now assessing how the mammal community changes over time. We are also using cameras to monitor certain areas of brush near crossings. To help determine which crossings work best, we are incorporating factors such as vehicle noise and traffic, climate, and road structure. We have documented many species at crossings, including ocelot, bobcat, coyote, raccoon, skunk, opossum, deer, nilgai, armadillo, and rabbit. We have documented these species and badger and long-tailed weasel on road mortality surveys. Wildlife crossing use has been greater at rural crossings and at night when there are fewer vehicles and greater activity by carnivores.

Our research will help the Texas Department of Transportation determine which crossing designs benefit the most species. It will also likely help ocelot survival and support ocelot conservation.

OCELOT INTERACTIONS WITH OTHER CARNIVORES

Thomas J. Yamashita, Daniel G. Scognamillo, Landon R. Schofield, Jason V. Lombardi, and Michael E. Tewes

Wildlife may interact in both positive and negative ways, with competition potentially influencing their behavior. We are examining the activity patterns of carnivores, assessing how vegetation density, climate, and roads affect their relationships. We are determining long-term patterns of habitat selection and activity overlap of ocelots, bobcats, coyotes, badgers, and other mammals on 2 ranches in South Texas.

We are using 2 years of trail camera data from a private ranch in Kenedy County and 12 years of camera data from the East Foundation's El Sauz Ranch. We have detected ocelots, bobcats, coyotes, and badgers on both ranches. Ocelots and bobcats are primarily nocturnal, but bobcats are more active during the day than ocelots. Coyotes and badgers are active during both the night and day.

This project will bring a greater understanding of factors influencing ocelot distribution and how they may be affected by other carnivores. Our research shows how vital private lands are in conserving ocelots, and how they may aid in ocelot recovery and translocation.

Thomas Yamashita

KITTEN SURVIVAL AND REPRODUCTION OF BOBCATS AND OCELOTS

Victoria Locke, Ashley Reeves, Evan P. Tanner, Julie K. Young, and Lisanne S. Petracca

Understanding reproduction rates and survival of young is important for managing wildlife populations. When two species fill a similar role ("niche"), competition for resources may affect the survival of young. South Texas has two wild cat species with similar niches that may compete for resources. Bobcats are a wide-ranging resource generalist in the United States, while federally endangered ocelots are a resource specialist. Our research aims to determine (1) first-year survival rates of ocelots and bobcats; (2) timing and frequency of ocelot and bobcat reproductive events; and (3) drivers of ocelot and bobcat den site selection.

We GPS-collared 2 female ocelots and 7 female bobcats on East Foundation's El Sauz Ranch during the 2023 - 2024 trapping season. We are monitoring GPS locations daily to determine when females are denning so that we can place expandable collars on 6-week-old kittens to monitor survival. The kitten collars communicate with the mother's GPS collar and alert us of any deaths. After the den site has been abandoned, we will visit the site to measure vegetation characteristics that influenced site selection.

Our goal is to inform ocelot reintroduction and recovery efforts by filling important data gaps in ocelot reproduction and kitten survival. For example, ocelot den site data may influence future thornscrub habitat restoration.

Researchers perform an ultrasound on a female bobcat.

Tyler Bostwick

SOUTH TEXAS MOUNTAIN LION ECOLOGY

Chloe Nouzille, Michael J. Cherry, and Lisanne S. Petracca

Carnivore management is challenging due to their low densities, tendency to have large home ranges, and the need to navigate complex viewpoints on human-carnivore coexistence. Carnivores require large, continuous habitat spaces, making them likely to interact with barriers as they move through the landscape. Structural barriers (e.g., fencing) affect wildlife worldwide, yet few studies have quantified their effects on carnivores. Understanding potential barrier impacts, particularly in light of the construction of the border barrier system between the U.S. and Mexico, is more difficult when little information exists about the target species' abundance and distribution.

As part of our South Texas Lion Project (STXLP) in collaboration with USFWS, TPWD, and private landowners, we will assess transboundary movements, genetic connectivity, and population dynamics of these cats. We will also determine the impacts, if any, of the border security activities on South Texas lions.

We have trapped and collared 2 young male lions thus far, with plans to collar more as the temperatures cool. In the meantime, we are (1) deploying remote cameras to assess lion density, and (2) investigating kill sites of collared lions, as well as collecting scat samples, to better understand diet composition. The results of this study will inform lion management in Texas. Any private landowners or ranch managers with interest in the project can contact us at: southtexaslionproject@gmail.com.

Chloe Nouzille

MOUNTAIN LION MOVEMENT AND GENETICS IN TEXAS, MEXICO, AND NEW MEXICO

Katherine G. McDaniel, Michael J. Cherry, Chloe M. Nouzille, Robert Alonso, David Hewitt, Randall W. DeYoung, Levi J. Heffelfinger, Clayton D. Hilton, Dana Karelus, Grant Harris, Lisanne S. Petracca

Large carnivores, like mountain lions, require large, continuous habitat and accessible corridors between populations. Barriers, like fencing, can reduce a species' ability to move, and can even threaten population viability. Our South Texas Lion Project is researching how the border barrier system between Texas and Mexico may impact mountain lion movements and genetics.

First, we are using a combination of GPS collars and camera traps to determine: (1) what landscape features lions are selecting for as they move through the landscape, and (2) whether the border barrier system impacts lion movements. Our research will help inform larger-scale management and determine what steps are necessary to promote connected habitats.

Second, we are interested in the genetic diversity of mountain lions. When animals move from one population to another and reproduce, this "gene flow" allows for more genetic diversity in a population. Our research goal is to identify genetic differences among lions in South Texas, West Texas, New Mexico, and Mexico. For instance, are the lions of South Texas showing signs of inbreeding? Are lion genetics in South Texas more similar to West Texas lions or Mexican lions? Our work will investigate the viability of South Texas cats in the context of other populations. It is our hope that the results of this work will promote interstate and international cooperative management of large carnivores.

FLORIDA PANTHER HABITAT SELECTION

Zachary M. Wardle, Dave P. Onorato, Michael J. Cherry, and Lisanne S. Petracca

The endangered Florida panther is the last population of mountain lions found east of the Mississippi River. Historically, unregulated hunting, bounties, and habitat loss resulted in a small, isolated panther population. While habitat loss continues, additional threats include road mortality, disease, and the effects of small population size. More information on panther habitat use is needed to inform conservation efforts and make progress towards recovery.

To better understand how panthers use the landscape, we are analyzing 20 years of location data that span the entire panther breeding range in South Florida. We are assessing how changes in habitat, human population density, and road networks have affected panther habitat selection over time. Differences in habitat use between day and night and Florida's wet and dry seasons are also being evaluated.

This research on the Florida panther is the first of its kind. Findings will advance our knowledge of panther habitat requirements and how changes to the landscape have influenced selection of habitat types over time. Our results will also provide updated ecological information to wildlife agencies and managers guiding Florida panther conservation initiatives.

Zachary Wardle

ACTIVITY OF SIX WILD CAT SPECIES IN BOTSWANA

William N. Stephens, Trevor C. Black, Daniel G. Scognamillo, Christopher E. Comer, and Michael E. Tewes

Understanding the behavior and activity patterns of co-occurring species could give researchers insight on how to develop effective actions for the conservation of wild cats. From March through June 2023, we studied the activity patterns of 6 species of wild cats in central Botswana: African wildcats, cheetahs, lions, leopards, caracals, and servals.

We sampled 2 sites with 100 cameras per site, arranged in pairs in 50 sampling stations. Photos were processed with Megadetector AI software to identify animals, people, vehicles, and empty images. The photos with animals were classified by species and number of individuals using Timelapse software. By using the time stamp in each photo and the location where species were detected, we developed daily activity patterns for each species.

- African wildcats, cheetahs, lions, and servals were most active from 6:00 p.m. to 7:00 a.m.
- Leopards and caracals showed a slightly broader time range, with activity ranging from 4:00 p.m to 9:00 a.m.
- When comparing overlap in space and time, our data suggest that caracals might avoid lions.
- All other species seem to overlap with lions and leopards, suggesting these big cats are not a major threat to them.

Our data indicate that conservation actions targeting 5 of these species do not have to be site-specific; conservation for caracals should focus on areas where lions are absent or in low densities.

Daniel Scognamillo

LEOPARD POPULATION STUDY IN BOTSWANA

Daniel G. Scognamillo, Christopher E. Comer, and Michael E. Tewes

The African leopard is among Africa's most iconic predators and represents one of the "Big Five" trophy goals for safari hunting. Consequently, leopards receive wide attention and support for their management and conservation from the countries with leopards and their hunting partners. Thus, understanding leopard distribution and population size is important for the development of accurate hunting quotas.

We are implementing a nationwide leopard survey in Botswana with trail cameras to estimate leopard densities in areas with different land uses (communal areas, private game ranches, protected areas, and wildlife management areas). Individual leopards are identified by their pelage characteristics such as unique spot pattern, scarring, or other marking. We have sampled 12 sites and analyzed data for 3 of them. Density estimates using Spatially Explicit Capture-Recapture models for these 3 sites resulted in densities of 0.15 leopards/square mile for a farm area, 0.06 leopards/square mile for a hunting lease area, and 0.69 leopards/square mile for a hunting lease with high fence area.

Results from this research will assist the Botswana Ministry of Environment, Wildlife, and Tourism in the formation of science-based recommendations for leopard management.

UNDERSTANDING DISEASE TRANSMISSION AMONG DOMESTIC AND WILD CATS

Alexandria N. Hiott, Alynn M. Martin, Mason Fidino, Clayton D. Hilton, Ashley M. Reeves, Lisanne S. Petracca

The sharing of disease-causing agents between domestic animals and wildlife can have severe impacts on wildlife populations. Wildlife species are often unfamiliar with pathogens that have evolved with domestic species, which can result in more severe forms of disease and death in wildlife. These impacts may be greater in small, fragmented populations where lower genetic diversity may limit immune response.

South Texas is home to the last remaining populations of the federally endangered ocelot. These populations are small, geographically separated, and genetically distinct from each other. Other cat species, such as bobcats and domestic cats, exist in this region and may be a source of disease for ocelots. While ocelots may be spatially separated from domestic cats due to ocelots' use of thornscrub, bobcats could potentially "bridge the gap" between ocelots and domestic cats. The aim of our research is to better understand the transmission pathways for diseases among these three species.

We will use GPS collar data from all three cat species in and around East Foundation's El Sauz Ranch to estimate contact rates among individuals and evaluate how each species uses the shared landscape. This information will be used in computer-based models to test how these contacts change when the landscape and the number of animals changes. We will also screen ocelots, bobcats, and domestic cats for diseases that are common in felines to lay the groundwork for understanding disease transmission dynamics.

Fin & Fur Films

BOBCAT AND CARNIVORE DYNAMICS ON A MANAGED RANCH

Aidan B. Branney, Michael J. Cherry, Evan P. Tanner, Humberto L. Perotto-Baldivieso, and Michael E. Tewes

Management activities on working lands can influence landscape temperatures, resources, and animal interactions. For example, brush management on ranches can change shade, cover, and water availability, affecting wildlife directly or through competition. We studied landscape feature effects on the occurrence and activity of carnivores on the Hixon Ranch in South Texas.

- We continuously recorded temperature at 53 trail camera sites from May 2021 – May 2022. We used aerial imagery to create vegetation maps.
- The best predictor of bobcat occurrence was the daily average number of coyote photographs. As coyote detection increased, bobcat occurrence increased.
- Skunk occurrence was greatest where daily average temperature varied more. Thermal variation decreased as the count of woody patches increased, so skunks may prefer contiguous habitat.
- Temperature affected the detection of carnivores, but habitat structure was a greater driver of occurrence. Our results can inform habitat clearing and are a call for more research to tease apart effects of microclimate and landscape attributes.

Thomas Yamashita

USING LIDAR TO ASSESS HABITAT PARTITIONING

Maksim Sergeyev, Daniel A. Crawford, Joseph D. Holbrook, Jason V. Lombardi, Michael E. Tewes, and Tyler A. Campbell

Understanding how ocelots, bobcats, and coyotes select habitat differently can provide insights into coexistence between these medium-sized carnivores. Light detection and ranging (LiDAR) is a method that can help measure the structure of vegetation below the tree canopy.

- Using LiDAR and GPS collar data for 8 ocelots, 13 bobcats, and 5 coyotes, we determined how these species select habitat on a South Texas ranch.
- Ocelots selected vertical canopy cover and shorter, dense understory vegetation. Vegetation management for ocelots should focus on preserving or creating vertical canopy with dense vegetation below.
- Bobcat selection was less specific. Coyotes selected areas with higher canopies.
- The different habitat selection behavior of ocelots, bobcats, and coyotes may allow these carnivores to coexist.
- By combining LiDAR data with GPS collar locations, we enhanced understanding of wild animals that can otherwise be difficult to study.

THERMAL ECOLOGY OF OCELOTS AND BOBCATS

Maksim Sergeyev, Evan P. Tanner, Michael J. Cherry, Jason V. Lombardi, Michael E. Tewes, and Tyler A. Campbell

Extreme climate conditions can change the activity and habitat selection of species and can have a greater impact on species that occur at the extremes of their geographic distribution. In South Texas, ocelots are at the northern edge of their distribution and bobcats are at the southern. Given ocelots and bobcats may face unique climactic pressure, we studied how they select thermal cover. We sought to answer if they partition cover, or if cover is a potential source of competition between these cats.

- Using 130 thermal sensors on a ranch, we described the thermal properties of the various vegetation cover types. Bare ground and herbaceous cover are significantly warmer than forest and shrub cover.
- Based on the cover selection of 8 collared ocelots and 13 collared bobcats, selection is consistent between species across ambient temperatures.
- At lower temperatures, both ocelots and bobcats chose shrub cover and vertical canopy cover. At higher temperatures, both avoided bare ground and chose higher vertical canopy cover located closer to dense brush.
- Based on our results, dense shrub cover and forested canopy cover are important thermal refuges for ocelots and bobcats.
- Abundant vegetation could reduce competition between these cats at lower temperature limits, and habitat partitioning may reduce competition at upper temperature limits.

Elizabeth Grunwald

Elizabeth Grunwald

BOBCAT HABITAT SELECTION IN MANAGED BRUSH

Aidan B. Branney, Zachary M. Wardle, Michael J. Cherry, Humberto L. Perotto-Baldivieso, and Michael E. Tewes

Rangeland management usually combines agriculture and wildlife management goals by removing woody vegetation and keeping open areas and strips of brush. This is often done for cattle or economically important game species, such as quail and deer, but it could also affect other species. We examined the ways in which bobcats respond to such management activities.

• From 2021 – 2022 we affixed GPS collars to 9 bobcats on the Hixon Ranch in La Salle County, Texas. With the collar data we examined how these bobcats responded to landscape configuration, such as woody edge length and patch density.
• Bobcats avoided herbaceous cover and high patch density, but were not influenced by oil and gas infrastructure. They selected areas closer to water, woody vegetation, and greater woody edge density.
• Brush clearing for agriculture and game species might help prey species, which could in turn benefit bobcats, as well as endangered ocelots. Bobcats are ambush predators, which likely explains their fine-scale selection of areas with greater woody edge density.

Shorebirds & Waterfowl

ROOST SITE SELECTION BY WINTERING CACKLING GEESE

Javier A. Segovia, Alynn M. Martin, Kevin J. Kraai, Kyle Shaney, and Bart M. Ballard

Animals will interact with their environment based on a number of factors, including prior knowledge of the environment, daily or seasonal resource needs, and to maximize their fitness. Migratory waterfowl are well known for using various habitat types that meet their resource needs during the non-breeding period. Cackling geese typically occur in large flocks during winter and use this flocking behavior to reduce risk of predation and stress from cold temperatures, and to maximize foraging efficiency. They roost at night in water bodies with little human disturbance, then will travel to surrounding areas during the day to feed.

In recent years, cackling geese have started roosting in wetlands inside urban areas. It is unknown whether this is a response from the birds to decrease predation risk or because natural roosting habitats in rural areas are limited. This urban roosting can cause increased disturbance to geese, as well as potential disease (e.g., avian influenza) transmission to humans. Therefore, the selection of roost sites is of great importance during the non-breeding period of cackling geese. We will use several publicly-available land-cover datasets to understand the selection of landscapes around roost sites during the non-breeding period. By determining the factors that drive roost site selection, this research will guide future management and conservation efforts for waterfowl.
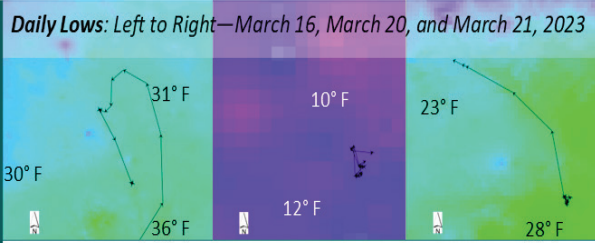
SEARCHING FOR BIRD FLU IN CACKLING GEESE

Javier A. Segovia, Alynn M. Martin, Kyle Shaney, Kevin J. Kraai, and Bart Ballard

The Great Plains Region–which spans from western Canada through central Texas–supports many species of migratory waterfowl as they move to and from winter and summer sites. This region has undergone urban and agricultural development over the last few decades, changing the landscape and available features for use by wildlife. Many waterfowl species have adapted to use these converted landscapes. Cackling geese, which are similar in appearance to, but distinct from, Canada geese, have begun to use and congregate in green spaces within city limits, causing concern for public and domestic animal health.

Cackling geese may be infected with or carriers of important diseases, such as highly pathogenic avian influenza (HPAI), also known as bird flu. The risk of contact with other urban avian species, susceptible domestic animals (e.g., backyard chicken flocks), and humans increases with their use of green space. However, little is known about HPAI prevalence (or infection rates) in cackling geese, which limits our ability to assess disease risks associated with landscape-use shifts. In this research, we plan to survey cackling geese captured in the Texas Panhandle region, in both urban and agricultural landscapes, to explore the prevalence of highly pathogenic avian influenza antibodies in this species. This information will guide future research and management efforts to limit disease transmission risks in converted landscapes.

Cooperative funding provided by the Texas Parks & Wildlife Department.

How Do Northern Pintails Respond to Thermal Conditions During Migration?

Goal
Understand how local temperatures affect northern pintail spring migration patterns

Methods
Combine tracking device locations and weather data to predict pintail movement changes across different temperatures

Study Area & Data
Spring GPS tracks of female northern pintails from 2020 - 2022.

Preliminary Results
Daily Lows: Left to Right—March 16, March 20, and March 21, 2023

31° F — 10° F — 23° F
30° F — — —
36° F — 12° F — 28° F

Panels: Movement of a pintail affected by a cold front during spring migration in NW Iowa, USA. This pintail reversed course, flying southward (left), sheltered for a few days (middle), and then continued north (right).

Management Implications
⇒ Pintails' responses to variable weather conditions during spring migration can affect breeding success
⇒ Changing climate conditions may make migration more challenging
⇒ Results of our study will inform waterfowl management with climate change in mind

Joseph M. McGovern, Evan P. Tanner, Clayton D. Hilton, and Bart M. Ballard

Cooperative Funding:

CONSERVATION OF NESTING WATERBIRDS ALONG THE TEXAS COAST

Jordan C. Giese, David J. Newstead, David Essian, Dale Gawlik, and Bart M. Ballard

The coastal bays of Texas provide nesting islands for large gatherings of waterbirds, a group that has declined by 22% since 1970. These islands, made up of cacti, shrubs, or grassy vegetation also provide isolation and protection from potential nest predators. There is a growing concern among resource managers along the Texas Gulf Coast regarding the degradation of coastal islands due to erosion from sea-level rise, storm surges, and wakes from ship traffic.

In partnership with Coastal Bend Bays and Estuaries Program and the Harte Institute for Gulf of Mexico Studies, we completed the second of a five-year study prioritizing colony islands for rehabilitation and management. While our partners collected data on waterbird productivity on islands, we captured and fitted 6 Great Egrets and 28 Tricolored Herons with tracking devices during spring 2023 and 2024. Among initial results, we found that both species prefer freshwater estuaries and avoid urban areas when foraging. In combination with data on waterbird abundance and reproduction, we identified two priority regions for island restoration – the Upper Laguna Madre, south of the mouth of Baffin Bay, and the Lower Laguna Madre between Port Mansfield and the land cut. In coming years, this project will expand to the entire Texas coast and improve the ability of resource managers to effectively sustain breeding populations of waterbirds.

Edgar De La Garza

WATERFOWL USE OF SANCTUARIES ON THE TEXAS MIDCOAST

Emma R. Weber, Jordan C. Giese, Rachel R. Fern, and Bart M. Ballard

Texas coastal wetlands provide important habitat for wintering waterfowl. In response to hunting pressure and declining waterfowl populations, Texas Parks and Wildlife Department created the Texas Coast Waterfowl Sanctuary Program. This program creates sanctuaries for waterfowl, or wetlands free of hunting, on privately-owned properties.

To understand the effects of hunting on waterfowl habitat use, we used autonomous recording units (ARUs) to collect audio recordings in 14 pairs of sanctuary and hunted wetlands during winter 2023-2024. We will use these recordings to measure diversity, richness, and density of 10 species of ducks and geese. Our study will establish a protocol for waterfowl monitoring using ARUs in wetlands. Our results will measure the effectiveness of the waterfowl sanctuary program and guide future placement of sanctuaries along the Texas coast.

EFFECTS OF WINTER WETLAND MANAGEMENT ON WATERFOWL

Georgina R. Eccles, Daniel P. Collins, Kevin J. Kraai, J. Dale James, Jay A. VonBank, Jordan C. Giese, Barry C. Wilson, Clay D. Hilton, and Bart M. Ballard

Large amounts of money are invested each year to manage areas for wildlife. Land managers need credible information to help justify investments made. Despite the importance of such information, most assessment efforts provide little useful information on their true impacts to wildlife populations. For example, the Texas Prairie Wetland Project is a wetland management program that aims to support the winter foraging needs of waterfowl to promote survival and improved body condition before spring migration. The program is evaluated based on the amount of flooded acreage of enrolled wetlands. However, this does not provide an assessment related to survival or improved body condition of waterfowl. We investigated the effects of using managed sites by northern pintails wintering along the Texas Coast.

- We used 60,587 locations from 58 female northern pintails with tracking devices to estimate the use of managed and non-managed wetlands during winter.
- Females that spent more time on managed sites during winter, also spent less time at stopovers during spring migration, suggesting they departed wintering areas in better body condition.
- Females that spent a higher proportion of their time on managed sites arrived to breeding areas earlier than others. In fact, for every 10% greater use of managed sites, females arrived on breeding areas 2.3 days earlier.
- The Texas Prairie Wetland Project appears to be successful in preparing female northern pintails for spring migration.

SPRING MIGRATION STRATEGIES OF NORTHERN PINTAILS

Georgina R. Eccles, Daniel P. Collins, Kevin J. Kraai, J. Dale James, Paul T. Link, Jay A. VonBank, Jordan C. Giese, Mitch D. Weegman, and Bart M. Ballard

Migration timing, mainly arrival to breeding areas, can have a large impact on reproductive success in birds. Earlier arrival to breeding areas has been shown to increase reproductive success in waterfowl. For example, an earlier start to nesting is related to greater ability to renest, higher nest survival, and higher brood survival. Our goal was to investigate spring migration strategies in female northern pintails to understand how individuals adjust their strategies in relation to the migratory route.

- We analyzed spring migration tracks from 283 female northern pintails marked with tracking devices from several wintering areas across much of the central and southwestern part of the U.S.
- Time of departure from wintering areas was positively related to arrival to breeding areas.
- Lower body mass, higher energy expenditure during winter, and less time spent foraging during winter all were related to later departure from wintering areas.
- Later departures from wintering areas and more stopovers used during spring migration were related to later arrival to breeding areas.
- Understanding how birds optimize their migration to arrive to breeding areas in a timely manner increases our understanding of where to invest in management to be most effective.

Texas Native Seeds (TNS)

TEXAS NATIVE SEEDS

Anthony D. Falk, Colin S. Shackelford, Rider C. Combs, Joshua D. Breeden, John Boone, Nelson O. Avila, Hagen D. Meyer, Jameson S. Crumpler, Meghan K. Peoples, Kendal A. Martel, John E. Herschberger, Antonio Segura, Tyler C. Wayland, Douglas L. Jobes, and R. John Bow

Following a number of personnel changes over the last year, Texas Native Seeds (TNS) is back up to full staff, and is making large strides towards improving the diversity and quantity of locally-adapted native seed commercially available. This year we have hired 6 new employees who have brought excellent new energy to the program in our South, Central, East, and Coastal Prairies project regions. Additionally, we continue to strengthen our partnerships which has led to increased demand, helping spur increased production.

All of the new employees have allowed us to install several new evaluation sites throughout the state. Several of these sites are TNS's first trials in unique regions. Because of this, we are trying many previously-released varieties as well as several that are still in the developmental phase. Additionally, these new sites are in highly visible locations that lend themselves to field days, so please be on the lookout for future invitations to see just why variety matters.

Along with seed production and evaluations, we are making a focused effort to assist landowners and managers with native grassland restoration. To do this, we are currently developing several field days and trainings to help educate users on important points surrounding native grassland restoration. These will include selecting ideal species and varieties, designing seed mixes, and key terms like *Pure Live Seed*.

FEATURE ARTICLE

SUCCESSFUL NATIVE GRASS RESTORATION: LESSONS LEARNED

Anthony D. Falk

Drawing truly meaningful results from projects converting non-native grass to native grassland is often very difficult. There are many aspects we cannot control including soils, site history, and most notably, the weather. This leads to frequent skepticism of results. Additionally, landowners are also frequently skeptical of the long-term sustainability of these types of conversion projects.

Thankfully, through conducting several of these conversion projects over the last 12 years, the Texas Native Seeds staff can put many of those fears to rest, and develop some best management practices. Our goal is to conduct enough conversion projects that we can find similarities in those that are successful, as well as the failure, to disprove the "*well, they got lucky*" mindset.

The most important things we have learned through all of these plantings is that you cannot skimp on site preparation. When conducting a conversion project, the site needs to be completely rid of all non-native grasses prior to re-seeding with native species. This point can not be stated emphatically enough. To date we have completed 11 highly successful projects converting non-native grass back to native grassland, and another 5 that were not successful. These projects were each completed in different years. This means they each received very different weather patterns, and they were also conducted on different soil types.

Nine out of the 11 successful projects all utilized the same site preparation. They each used varying combinations of herbicide and mechanical treatments to eliminate all non-native grass prior to re-seeding. Typically, 4 or more treatments were carried out over 12 to 24 months, depending on rainfall during the elimination process. Each time there was enough rainfall for the vegetation on the site to start to grow it was either sprayed with a broad-spectrum herbicide or disked to eliminate all of the vegetation.

The second important factor in all of these projects was matching the correct species and commercial variety of locally-adapted native species to the site. By utilizing the correct commercial variety, you are doing your best to safeguard yourself against weather disasters. This is because locally adapted commercial varieties are very well adapted to local weather conditions. This gives the seeds of these species the ability to sit in the soil until the correct conditions for germination are present. Additionally, it makes them well suited to be able to handle the wet and dry cycles that swing back and forth in South Texas.

The final thing we have learned through these projects is that if the site preparation is done and the correct species are utilized, the native communities that establish are highly stable. Recently, Texas Native Seeds staff revisited several of these projects that are nearing 10 years old, and they are all still dominated by native species. While we are still working towards developing grassland conversion techniques that are less intense, we are very pleased with what we have found so far, and now confident in recommending these techniques to anyone who would like to convert a non-native grass stand back to a native grassland community.

EXCITING YEAR FOR TXDOT AND TNS

Anthony D. Falk, Shyla E. Rabe, Colin S. Shackelford, Jameson S. Crumpler, R. John Bow, Douglas L. Jobes, Tyler C. Wayland, Meghan K. Peoples, Kendal A. Martel, and Travis J. Jez

Texas Native Seeds (TNS) is very grateful to continue our collaboration with the Texas Department of Transportation (TxDOT). Since the start of this collaboration, we have worked together to complete 33 native seed releases and, with the help of the commercial seed industry, make thousands of pounds of native seed commercially available. This year has been an especially exciting one for the collaboration.

Through our 23 years of collaborative effort between TNS, TxDOT, and the commercial seed industry it is now possible for TxDOT to release new seeding specifications for their rural areas. These new specifications that encompass the entire state contain only native species specific to each TxDOT district. This marks the first time in TxDOT's history that there are no non-native species included in their seeding specifications. In addition to the new specifications, we are working to develop new tools to help engineers select appropriate native seed mixes as they develop each project.

Just as exciting is the wonderful news that we have completed the process of extending our collaboration for an additional 3 years. Through the extension, we will focus on developing new releases to provide pollinator resources and investigate species that could slow the spread of wildfires through TxDOT rights-of-way. This new contract also demonstrates TxDOT's commitment to being good neighbors and reducing the introduction of non-native species.

PLANT MATERIAL CENTER PARTNERSHIP

Anthony Falk, Shelly Chambers, R. Alan Shadow, Brandon Carr, Colin Shackelford, Joel Douglas, Robert Ziehr, and Charles Kneuper

TNS and the 3 USDA-Natural Resources Conservation Service's Plant Material Centers (PMC) in Texas continue our partnership focused on improving the diversity and availability of native grassland species. This partnership has proven vital to Texas landowners as both programs are tasked with providing native plant material to meet their conservation and restoration needs.

Over the last year, the partnership has completed the release documents of 3 new native plants. We are also currently working through the process for an additional 4 native plants to be completed next year. The 3 new releases will make 2 locally-adapted native species available for conservation and restoration in Central Texas and 1 for South Texas. The 4 planned releases for next year will be beneficial for the entire state. In addition to these current and future native plant releases, the partnership will continue its evaluation of 10 new native species at strategic locations across the state.

The TNS and PMC partnership doesn't just focus on collection, evaluation, selection, and release of native plants. It also works to ensure there is an ample supply of high-quality seed for large-scale commercial production, allowing for these varieties to be recommended, planted, and managed on the Texas agricultural landscapes. Last year the partnership provided 125 pounds of pure live seed to 4 commercial growers in Texas and Kentucky.

STN PROJECT UPDATE

John E. Herschberger, Joshua D. Breeden,
Anthony D. Falk, and Rider C. Combs

Over the past year, the STN Project has continued our efforts expanding seed production and adding several new research and evaluation sites. With increased interest and demand for native seeds from the public and seed producers, part of this year's mission was increasing seed production to meet commercial demands. Evaluations of bushy bluestem have been established and are sampled monthly in preparation for future commercial release.

In this past year we grew over 20,750 individual plants which were transplanted in the field for seed increase and new species evaluations. To increase seed production this year, we were able to harvest 115 pounds of seed of various species from our Kingsville complex.

In an effort to expand research efforts, 1 new evaluation site and 1 new research planting were installed this year with two more research plantings planned for the future. These projects will allow us to test new seed species across South Texas in different climates and soil types. The growth that we have been able to experience this year comes through the support and collaboration of our partners. We are very grateful for the continued support and partnerships of organizations and landowners whose collaborations allow us to continue our mission.

REVISITING THE PAST

John E. Hershberger, Joshua D. Breeden, and
Anthony D. Falk

Recently STN staff revisited 2 of our previous study sites in South Texas. Both sites were restored from non-native grass back to native grass over 10 years ago. The sites are located in Hidalgo and LaSalle counties. Having 2 sites which received similar treatments in different areas of South Texas, provides results based on differences in soils, temperatures, rainfall, and climates.

Visiting and collecting data from restoration sites has allowed us to understand how rangelands change following restoration. In both sites, we are happy to report that the native plant community is still dominating the sites. In our northern site we reported a 96% native plant community, with an 88% native plant community in the southern site. Both sites are actively managed by the respective landowners, with a focus on native plant communities. Non-native species have only slightly re-invaded these sites over the last 10 years with the highest cover of 8% at our southern site. Over the years, invasive species that have become present have been found in small patches, which are easily managed, and have not spread.

These restoration sites are testimonies and inspiration to us at STN, demonstrating that native grasslands can successfully be restored and maintained. We are grateful for the long-term partnership with these landowners, allowing us to monitor these sites over the years.

Arizona cottontop and multiflower false Rhodes grass in a restored native grassland in South Texas.

Myrella Munoz

John Herschberger

ROADSIDE SAMPLING FOR MONARCH HABITAT

John E. Herschberger, Anthony D. Falk, and Samuel Glinsky

In 2020, TxDOT joined the nationwide Monarch Candidate Conservation Agreement with Assurances program. All of TxDOT's land is enrolled in the agreement, including all paved surfaces, for a total of 1.2 million acres. Of the enrolled areas only 800,000 acres are manageable, of which 450,000 acres were selected and pledged for conservation measures for monarch butterfly habitat.

TxDOT partnered with TNS to document monarch butterfly habitat along Texas rights-of-way. Each year TxDOT randomly selects roadside sampling plots from the adopted acreage, adding more plots each year. We sampled 140 plots, spanning most of Texas from March through May 2024. Of the 140 there were only 17 plots that did not meet the criteria for monarch butterfly habitat, having < 2 milkweed stems per plot or < 10% of potential flowering plants. Of the 123 plots that met the criteria, they averaged 14 stems per plot or at least 401 stems per acre of milkweed, and 36% cover of potentially flowering plants.

We will resample the 17 failed plots during fall 2024, to determine whether they failed due to rainfall or another factor. TxDOT will use these data to manage current and future vegetation to improve monarch butterfly habitat.

TEXAS NATIVE SEEDS: COASTAL PRAIRIES

John R. Boone, Anthony D Falk, and Douglas L. Jobes

The Coastal Prairies project region of TNS has undergone many changes over the last year. Despite these changes, there have been many improvements made propelling the program into the future. Changes include renewal of contracts with the Harris County Flood Control District, The Nature Conservancy, and the Lavaca Navidad River Authority. Additionally, new evaluation sites have been established at the 3H ranch and the Double D ranch.

Along with developing the new evaluation sites, we have been busy making new native seed collections from wild populations, collecting data on species currently being evaluated, and expanding our current seed production. This past fall and spring we made 105 collections of 7 different species. In addition to making new collections, we have been busy collecting data on brownseed paspalam and bushy bluestem evaluations. Seed production activities have also continued to expand with the installation of 6,000 new transplants. Because of the increased production, knotroot bristlegrass is expected for release this year. The knotroot will be the first release specifically for the Coastal Prairies region made available through the program. We have also installed new research plantings on Harris County Flood Control district property and assisted several landowners with grassland restoration activities.

COASTAL PRAIRIE GRASSLAND RESTORATION

Anthony D. Falk, Jacob R. Lampman, and Kypfer S. Cordts

TNS and Texas A&M Natural Resources Institute (NRI) have begun a new research project focused on improving coastal native grasslands on 2 of Naval Air Station Corpus Christi's airfields. This project aims to use native plant species to incorporate climate and ecosystem resilience into an active installation. This new project moved from the initial planning and data collection phases to the beginning of restoration activities late in 2024. A significant amount of data were collected on the site to create a baseline from which to work. The data focused on the vegetation community, investigating composition, distribution, and quantity. Additionally, the first soil samples were collected and are currently being evaluated for baseline stored carbon.

From these data we have been able to create areas to focus future work. This future work will include seeding of roughly 200 acres of native grassland, which will be split into 3 different categories, including shortgrass prairie adjacent to runways, mowed prairie which will be in flight paths but further from the runway, and finally tallgrass prairie. Along with native grass seeding work, a significant amount of brush removal is planned. This will involve removing individual non-native trees, and herbiciding to manage running live oak near the runways. Some of the removed brush will be used to create biochar for testing as a soil amendment also.

CENTRAL TEXAS NATIVE SEEDS PROJECT OVERVIEW

Meghan K. Peoples, Hagen D. Meyer, and Anthony D. Falk

Our Central Texas Native Seeds Project (CTNSP) strives to meet the expanding needs of grassland restoration projects in the region, through research, evaluation, selection, and release of locally adapted native seed. Partnerships with the Texas A&M AgriLife Research Center in Stephenville, the USDA NRCS James E. "Bud" Smith Plant Materials Center in Knox City, and the Sandbrock Ranch in Aubrey, have provided farm space for plant evaluation and seed increase. Ongoing evaluations include narrowleaf coneflower, sand bluestem, and big bluestem planted in 2022, bushy bluestem planted in 2023, rayless gaillardia (also called pincushion daisy), and Arizona cottontop planted in 2024.

Seed increase plantings in Stephenville are successfully producing harvests of hairy grama, Indiangrass, little bluestem, sand dropseed, seep muhly, sideoats grama, silver bluestem, tall dropseed, and Illinois bundleflower. The 2023 season saw 135 lbs of bulk seed harvested. This seed will be cleaned and distributed to commercial seed growers. Recent CTNSP releases of Taylor Germplasm sand dropseed and Burnet Germplasm hooded windmillgrass are available on the commercial market.

Our program prides itself on being a resource for grassland restoration in Texas. To accomplish this goal CTNSP staff provides site visits, custom seed blends, and restoration advice to strategic partners based on our research findings.
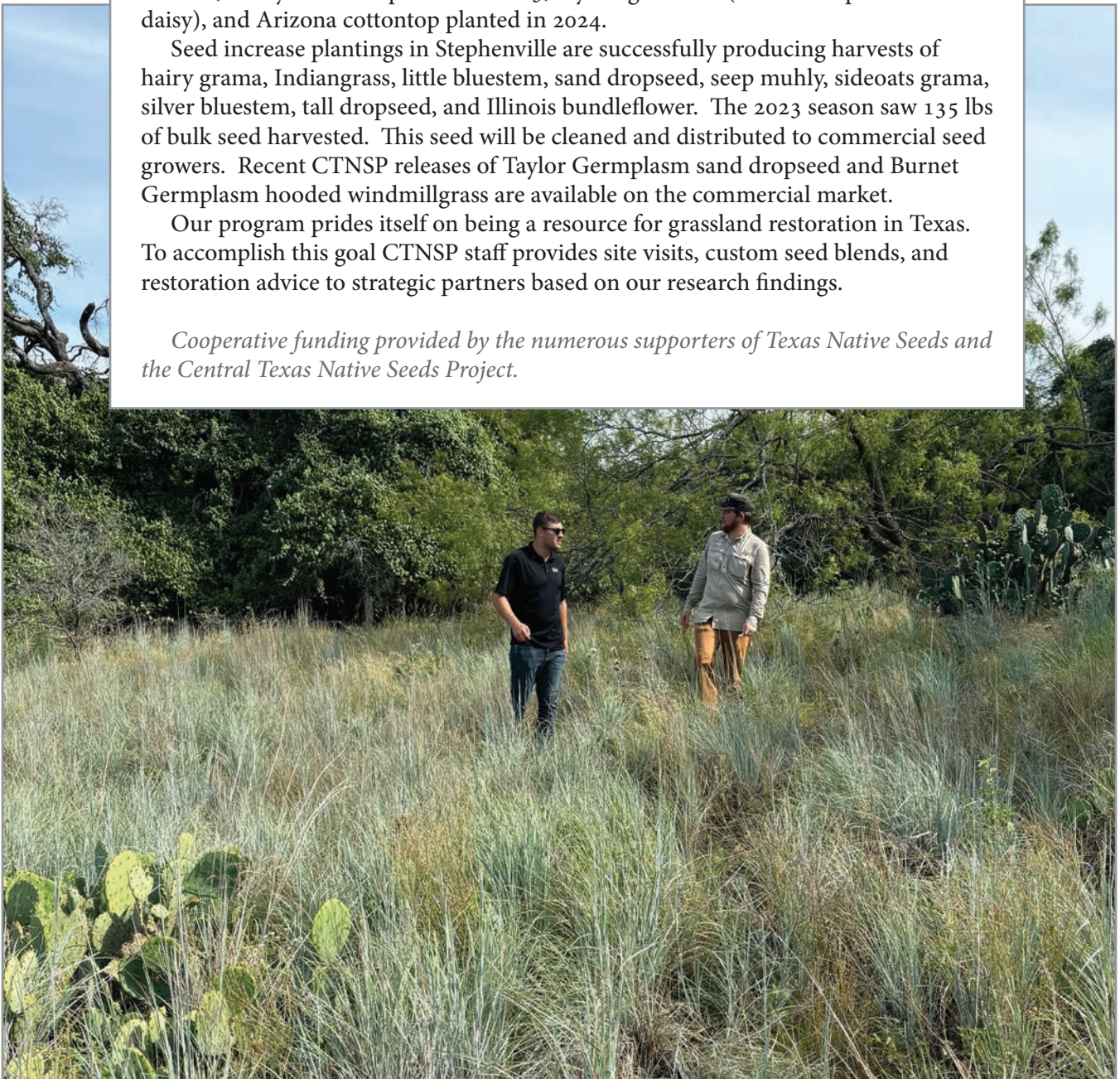
CENTRAL TEXAS NATIVE SEED PROJECT
(CTNSP)

DALLAS COLLEGES

Meghan K. Peoples and Anthony D. Falk

The CTNSP was approached in 2023 by Dallas Colleges Office of Sustainability and Urban Agriculture to aid in campus habitat restoration projects. The University currently holds around 7,000 acres between 7 campuses in the greater Dallas area. Three campuses were proposed for initial small acreage prairie plantings including Mountain View, Cedar Valley, and Brookhaven Colleges. The independent university system hopes to expose students, staff, and community members to the value of native grasslands in an urban setting. Restored grassland areas will also reduce maintenance costs for large areas currently planted in turf grass.

We will assist in the planning, preparation, and planting of two acres of pollinator habitat at Mountain View College during spring 2025. Work completed to date includes site selection and the first application of herbicide needed to remove the existing turf grass. Dallas Colleges will maintain the planting with the help of the area Texas Master Naturalists. Educational signs will be placed along walking trails to reinforce the value of native habitat restoration and the role of CKWRI in the project. We will collect data twice a year to evaluate the performance of commercially available and soon to be released seed material.

TARRANT REGIONAL WATER DISTRICT PARTNERSHIP

Meghan K. Peoples and Anthony D. Falk

Tarrant Regional Water District (TRWD) is a water authority responsible for managing water supply, flood protection, and recreational opportunities for Tarrant County. Tarrant County is the third most populous county in the state. TRWD seeks to conserve water supply through sustainability initiatives like habitat conservation. Eagle Mountain Lake is one of the District's major reservoirs, surrounded on the north side by 400 acres of park. Eagle Mountain Lake Park provides valuable stormwater management along with five miles of recreational trail access.

TRWD has become more interested in the use and benefits of native plants in flood protection. In an effort to manage for increased native plant cover, TRWD has begun to employ more frequent use of prescribed fire as a management tool. CTNSP, being the regional leader in native plants, was sought out as a research partner. We were engaged to help the Water District better understand how fire affects plant community dynamics. Our staff is conducting seasonal vegetation surveys in the year leading up to and following the burning of Eagle Mountain Lake Park to observe how fire alters species composition. If applicable, we also plan to seed areas to increase the quantity of native plants in the park. With our help, TRWD hopes to increase native species diversity, habitat health, and overall watershed function.

EAST TEXAS NATIVE SEED PROJECT (ETNSP)

ETNSP UPDATE

Kendal A. Martel, Nelson O. Avila, Robert A. Shadow, Tyler C. Wayland, and Anthony D. Falk

ETNSP was begun in response to the need for commercially-available, regionally-adapted native seed sources for use in East Texas. We currently manage plant evaluation sites for 6 target species at the Riverby Ranch in Northeast Texas, the East Texas Plant Materials Center (PMC) in Nacogdoches, and the Boggy Slough Conservation Area in Lufkin. Each of these sites is representative of a different soil and climate unique to the region. This year we were able to successfully harvest over 40 lbs of seed of silver bluestem and purpletop tridens at the PMC. We are continuing to add to our 700 collections of over 70 different species. These collections represent approximately 60 counties across East Texas.

We also continued our partnership with the US Forest Service to increase native seed development for use in pine woodlands. A specific focus of the Forest Service is to aid Native American Tribes in the region. In order to fulfill this goal, we established trial plots of rivercane, a species that has important value to local Native American tribes on the Kisatchie National Forest in Louisiana. Finally, we have continued to build strong relationships with landowners in East Texas by supporting restoration projects on private land, as well as working with local partners like the Texas Longleaf Initiative and the Texas Parks and Wildlife Department.

A longleaf pine seedling amongst native herbaceous plants.

EAST TEXAS NATIVES RESTORATION RESEARCH

Kendal A. Martel, Nelson O. Avila, and Anthony D. Falk

A goal of ETNSP is to assist landowners with native grassland restoration. To reach this goal we work with landowners to establish research plantings that can be opportunities for shared learning and increasing our understanding of native plant seed sources.

Over the last 4 years we have partnered with several landowners across East Texas to answer several key questions related to native grassland restoration. The most recent project was done in partnership with the Texas Longleaf Initiative and the Texas Parks and Wildlife Department. For this project we were interested in the idea of seeding native grassland species commonly found in pine understories at the same time that longleaf pine seedlings were planted. In another project we tested current non-native grass conversion techniques on bahiagrass near Huntsville, Texas. Finally, we have partnered with the Winston 8 Ranch to evaluate seeding techniques and the performance of several soon-to-be-released native seed varieties.

Our evaluations in controlled settings along with private landowner partnerships give opportunities to collect data and make observations on how these species perform in restoration plantings. They also help us identify and adapt to trends and barriers in the native seed market. Feedback from these projects allows us to make high quality native seeds more commercially available.

RIVERBY RANCH EVALUATION SITES

Kendal A. Martel, Nelson O. Avila, and Anthony D. Falk

ETNSP has been partnering with RES Texas Mitigation to lay the ground work for restoration in the northern Blackland Prairie in Fannin County since 2019. Work in the area began with a multi-year native seed variety adaptation trial. For this trial transplants of over 30 commercially-available seed sources were planted to evaluate performance. This was done alongside a large-scale research project where the same commercially-available native seed varieties were seeded across 300 acres.

Our team has continued evaluations on the performance of 3 additional species over 3 growing seasons. These evaluations include important native grass species such as longspike tridens and bushy bluestem. We have also evaluated 2 valuable and beautiful Texas pollinator species, rattlesnake master and blue mistflower.

These evaluations, along with the Fannin County restoration project, have provided huge returns for the program. They are excellent opportunities to increase our knowledge of the science through the training of a master's student, and the data they collected. The seed selection and seed mix development will ensure that landowners and land managers have access to the best seed sources for sustainable landscape restoration in East Texas. The partnership with RES on this project has also had far reaching implications as they now utilize locally-adapted native species whenever possible.

WEST GULF COASTAL PLAIN SEED SOURCE DEVELOPMENT

Kendal A. Martel, Nelson O. Avila, Thomas C. Philipps, Robert A. Shadow, and Anthony D. Falk

In 2022, ETNSP partnered with the U.S. Forest Service and the East Texas Plant Materials Center (PMC) to create quality native seed sources for restoration projects in East Texas forests. Through the wonderful support of the US Forest Service, we have been able to grow and evaluate species important for pine understory communities. We have also been able to help the PMC provide native seed to commercial growers. Finally, we have been able to expand seed collections of priority species. From this work we will be able to develop native plant releases for commercial growers which will increase access to regionally-adapted seed in conservation plantings and restoration.

One species of cultural importance is rivercane. We have established trials of rivercane at the Stuart Seed Orchard on the Kisatchie National Forest. We are testing large-scale production techniques on this critical species. In addition, we are currently growing 2,000 rivercane seedlings at the PMC greenhouse to expand our current production.

The goal of this project is to increase the quality and quantity of native plant materials available to meet restoration demand in the West Gulf Coastal Plain region. We are on track to expand site preparation, irrigation improvements, and plantings.

HARRIS COUNTY FLOOD CONTROL DISTRICT USES NATIVE SPECIES

Anthony D. Falk, John Boone, Tyler C. Wayland, Douglas L. Jobes, Kory J. Nickell, and Jonathan H. Holley

Working with the Harris County Flood Control District (HCFCD), we continue to refine revegetation techniques and identify new native seed varieties for use on lands managed by the HCFCD. In the past year we have installed 1 new research project and continued data collection on 2 projects.

The new research project was seeded in December 2023, focusing on winter seeding and the use of cover crops. The 2 cover crops tested were Cibolo Germplasm little barley, a native cool season grass, and oats, a traditional cool season small grain. Six months post-seeding there are some very clear results. The oats provided more above-ground cover than the little barley and did not limit the establishment of the permanent vegetation; little barley is a good cool season component in mixes, but at the rate tested did not work as a cover crop. Secondly, seeding in the middle of winter promotes the establishment of flowering species.

Data collection from the 2 previously-seeded research projects has helped to demonstrate the long-term survival of native species such as Coastal Plains little bluestem and knotroot bristlegrass. This is especially important as these plots have been subject to standard management practices, and local weather events, including flooding. Understanding how these plantings will perform under various conditions is critical to HCFCD adopting native seeding long term.

Nelson Avila

Rivercane seedlings are established in the greenhouse.

WEST TEXAS NATIVE SEED PROJECT (WTNSP)

UPDATE ON THE WTNSP

Colin Shackelford, Louis Harveson, and Anthony Falk

The West Texas Native Seeds Project continues to make progress developing locally-adapted native plant seeds. A new evaluation site in partnership with Sul Ross State University has been completed, and a drip irrigation system has made the site operational for 2024.

Two new evaluations for West Texas were installed this year. An advanced evaluation of 20 accessions of Arizona cottontop were planted at 4 sites in West, Central, and the Panhandle regions of Texas. An initial evaluation of 80 accessions of rayless gaillardia, also known as pincushion daisy, were installed at 3 sites in West and Central Texas. Data collection on existing plantings of sand bluestem and narrow-leaf coneflower are continuing. Additional data collection is needed before selections for commercial release are made.

Thirteen plant species are currently in seed increase to provide seed for commercial release. These include 9 grasses and four forb or shrub species. Evaluations for 29 native plant species have been completed in West Texas.

Six seed releases for West Texas have been completed and are currently in commercial production. Seed collections are continuing in the region to support future evaluations. Over 2,000 native seed collections have been made.

Multiple research plantings have been completed near Alpine. New restoration plantings are planned for the new site at Sul Ross State University. The location will allow for testing different seed mixes to look at seedling survival over time.

Installing an advanced evaluation planting of Arizona cottontop at the new plant evaluation site on the campus of Sul Ross State University.

Hagen Meyer

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Colin Shackleford

WTNSP RESEARCH PLANTINGS

Colin Shackelford, Louis Harveson, and Anthony Falk

   The WTNSP continues to focus on developing successful restoration techniques. To accomplish this a new collaborative research partnership with the Borderlands Research Institute at Sul Ross State University and the Apache Corporation is testing the interaction of soil organic amendments, the addition of biochar, discing, and site preparation to restore retired oil pad sites. Treatment installations were completed during spring 2024. Results from this experiment will have significant impacts on how pad site restoration is completed across the Permian Basin. Additionally, our partnership with XTO Energy and ExxonMobil is now in its second year. This project is investigating how different seed mixes combined with cover crops are affecting grassland restoration across 10 sites in the Permian Basin.
   To date, nearly 15 research and demonstration plantings have been completed in West Texas. Areas of focus include the Chihuahuan Desert grasslands in the Big Bend region and the Permian Basin oil and gas fields. Plantings have examined the role of cover crops, seed mix diversity, planting method, and the timing of planting in grassland restoration success. Positive and negative results from these plantings help guide the recommendations we make to landowners and energy partners interested in grassland restoration. These efforts further our goal to make grassland restoration a possibility for all West Texas landowners and managers.

NATIONAL FISH AND WILDLIFE FOUNDATION RESEARCH

Colin Shackelford, Louis Harveson, and Anthony Falk

The WTNSP and the Permian Basin-Panhandle Native Seeds Project are completing the second, two-year project funded by the National Fish and Wildlife Foundation (NFWF). The project is part of NFWF's Pecos Watershed Conservation Initiative. The Initiative is a partnership between NFWF, 6 major oil and gas producers in West Texas, the USDA Natural Resources Conservation Service, and the U.S. Fish and Wildlife Service.

Funding from NFWF has provided four years of support for the ongoing efforts of the WTNSP. This support has included the development of new seed sources for habitat restoration across West Texas. The installation of new grassland restoration research plantings has also been made possible through this funding. Additionally, NFWF has also helped support seed production of new plant releases. New seed source research made possible by the project include advanced evaluations of the grasses Arizona cottontop and Canada wildrye, and initial evaluations of sand bluestem and narrowleaf purple coneflower.

NFWF funding provided partial support for two assistant director positions and a full-time technician position employed through project partner Sul Ross State University in Alpine. Thirty acres of new restoration research plantings were completed in the region through the project. A new two-year funding agreement from NFWF will be submitted in 2025 to continue seed development work in West Texas.

Greenhouse production of 2024 evaluations of Arizona cottontop and experimental plantings for research in the northern Panhandle.

Colin Shackelford

Habitat Restoration & Management

THORNFOREST RESTORATION ENHANCEMENT IN THE LOWER RIO GRANDE VALLEY, TEXAS

Raziel Flores, Ashley Tanner, and Evan Tanner

Reforestation of the Lower Rio Grande Valley has been conducted annually since the early 1980s. As urban and industrial pressures continue to marginalize the once abundant native thornforests, reforestation becomes increasingly important for conservation. Research is needed to improve our efforts in thornforest restoration. Our research will compile information from the previous 40 years of restoration. We will identify strategic locations for future restoration and explore approaches that use the ecosystem's inherent regenerative capabilities.

It isn't always straightforward how the goals of restoration compare amongst different groups. We will interview people from agencies, nurseries, academia, private lands, and other groups involved in thornforest management to understand their goals and strategies. One shared interest is ensuring restored land can provide habitat for endangered species, such as the ocelot. This research will use habitat and movement characteristics of ocelots to identify critical locations for restoration. Lastly, we will document the habitat structure of areas that have been actively restored and areas that have been allowed to mature unassisted. We will compare these traits to those of old-growth thornforest reference sites to know how forests develop over time.

This research is complementary to other restoration studies coordinated by the University of Texas at Rio Grande Valley. These joint efforts can guide restoration efforts in the near and distant future.

Seedlings of native woody plants with tree protectors in the Lower Rio Grande Valley, Texas.

Raziel Flores

FEATURE ARTICLE

USING PRESCRIBED FIRE WITH CATTLE GRAZING ON WILDLIFE HABITAT AFFECTED BY INVASIVE GRASSES

J. Alfonso Ortega

High plant diversity in the habitat represents opportunities for different wildlife species to select adequate diets to optimize their potential. However, in the last two decades invasive grass species, whether introduced or native, have threatened wildlife habitat quality by dominating extensive areas of South Texas. Exotic grasses such as Guineagrass, buffelgrass, or Kleberg bluestem were introduced to produce forage for cattle, but in the absence of cattle grazing they form monocultures that eliminate native plant diversity. Some native species such as tanglehead and four flower trichloris can cause similar problems. All these grasses may produce over 5,000 lbs/acre with higher than 90% cover, which limits plant species diversity.

Cattle grazing is considered a tool to manage wildlife habitat especially in the case of introduced species; however, it is not very popular because of the fear of overgrazing valuable native plants. This fear is far from true. In general, introduced species including Kleberg bluestem are more palatable than even some of the so-called "*ice cream*" native plants such as seacoast bluestem, plains bristle grass, and sideoats grama. Therefore, the risk of overgrazing these plants is very low. Additionally, if necessary, cattle preference for plants may be increased using prescribed fire in small spots; the highly nutritious young regrowth attracts the cattle, increasing grazing pressure, and creating openings where native plants may have the opportunity to germinate and establish.

We studied burning plus grazing effects, and the number of Guineagrass plants per acre decreased to half after burning and cattle grazing with an increase in native plant species richness of over 300% as compared to before the application of the burning and grazing treatments. In this case, the increase in the number of native plant species included 6 important plants for bobwhite quail and 10 important plants for white-tailed deer. Similarly, the lack of palatability for cattle when tanglehead reaches maturity, makes it necessary to use patchy prescribed burns to attract cattle to the very dense grass. We recommend burning no more than 10% of a pasture in an area dominated by tanglehead to maximize grazing pressure, and burning can be conducted in November or February. Tanglehead grazing utilization in the burned areas was 42-52% compared to 6-7 % in the non-burned areas. Native plants species richness increased over 300% in the burn plus cattle grazing area compared to before the burns, with an increase in bare ground to more than double in the November burns. During the first 2 years of the study we counted 17 bobwhites in the non-burned areas, compared to 72 in the burned areas. The effect of the burns on the vegetation characteristics lasted for 4 years.

Fourflower trichloris can also become a problem, reaching a height of 3 feet with greater than 80% cover, which is too dense for bobwhite quail. Using cattle grazing to maintain a stubble height of about 1 foot, increased the percent bare ground, reduced the density of four flower trichloris, and increased plant species diversity. The changes in structure and composition of the vegetation in the area with cattle grazing increased the bobwhite density 38% compared to the area with no cattle grazing within a period of 3 years. Cattle grazing and prescribed fire are valuable tools to manipulate wildlife habitat and to reduce the negative effects of invasive grass species, regardless of whether these grasses are native or introduced.

CONTINUED GRASSLAND RESTORATION AT TOYOTA

John E. Herschberger, Anthony D. Falk, Joshua D. Breeden, Preston L. Rabe, Scott E. Henke, Paul O. Chroniak, and Nikki M. Tanzer

In 2020, Toyota Motor Manufacturing in San Antonio, Texas, approached the San Antonio Zoo and TNS to convert non-native Bermudagrass areas to a native grassland. The goal of this project is to restore grasslands to a native state, and provide suitable habitat for Texas horned lizards. In the time since, we have worked diligently to reach these restoration goals. In a recent visit, staff surveyed the area and found that the native species cover made up 77% of the restoration area, an increase of 17% from last year. Bare ground decreased 18% from last year, corresponding to the increase of native species. Along with vegetation monitoring we identified 92 harvester ant mounds, a critical food source for the horned lizards, once released.

In efforts to further restoration on Toyota's property, new acreage has been added and new techniques for current restoration will be tested. The new area is currently subject to soil erosion during rainfall, with low biomass and nutrients in the soil. The objectives for the new acreage are to restore native grasslands, increase water infiltration and retention, and decrease soil erosion within the given area. In current restoration areas, we are looking at food sources for the Texas horned lizards. We are happy with the progress of the current restoration, and are looking forward to more successful restoration in the newly added section.

John Herschberger

FROM FARMING TO NATIVE GRASSLANDS

John E. Herschberger, Anthony D. Falk, and Joshua D. Breeden

During fall 2023 South Texas Natives (STN) staff installed a new research planting located in the Rio Grande Valley of South Texas. Having experienced increasing water restrictions and recurring droughts, the landowners were looking to provide native grassland habitat features that are not currently present.

The objectives of this planting were twofold: 1) to convert agricultural farm land to native grasslands, and 2) to test new native seed varieties that are currently under evaluation or were recently released for commercial production. The seed mix was planted into 2 different soil types on the ranch, allowing us to test establishment of the seeded species on different soil types within the same area.

We sampled the site during spring 2024, and we can report a successful planting. The 2 sites had native seeded cover of 49% and 82%, which is comparable to other plantings we have previously completed. The main possible reason for the sizable difference in native seed cover is the difference in soil type. Additionally, very little rainfall had occurred between planting and sampling, slowing establishment of some of the native seeds. We suspect that with time and rainfall this site will continue to improve and prosper in the coming years. We are thankful for landowners who partner with us, allowing us to evaluate native seeds on their property.

Laura Beck

SOUND TRANSMISSION IN CHANGING GRASSLANDS

Laura Beck, Evan Tanner, Ashley Tanner, Darren Proppe, Samuel Fuhlendorf

Climate change is driving woody plant encroachment in the Great Plains ecosystem.   Changes in temperature and precipitation patterns allow woody plants to spread into grasslands, shifting the structure of the vegetation dramatically. These shiftchanges can alter sound transmission, as temperature and vegetation both influence how sound travels. For certain animals, these changes have serious implications. Many rely on auditory cues for navigation, communication, and detecting predators or prey. Altered sound transmission can disrupt these functions, affecting their reproduction, survival, and fitness. Additionally, the increase in human-made noises can further mask natural sounds critical for animal communication, exacerbating the challenges faced by wildlife in this changing landscape.

For this study, we will measure how changes in vegetation patterns from areas of high density woody plants to more open grasslands impact temperature and sound propagation by using a combination of temperature and sound measuring devices. We will quantify different sound types across the landscape, which include tones (2, 4, 6, 8 kHz) and 3 different calls from species that are habitat obligates for grasslands or, woodlands, and generalists. This study is being conducted at the Shield Ranch in the Austin area of central Texas.

This research aims not only to elucidate the relationship between vegetation patterns, temperature, and sound in the landscape but also to provide insights for managing urban and non-urban native vegetation communities. By understanding these dynamics, we can better conserve critical wildlife species in a changing environment.

Graduate students construct a small-mammal exclosure on a restoration site in western Texas.

Fidel Hernández,.

INFLUENCE OF SMALL-MAMMAL HERBIVORY ON RANGELAND RESTORATION IN WESTERN TEXAS

Herbert Magobwe, Fidel Hernández, Anthony D Falk, Benjamin L Turner, Alejandro Bazaldua, and John E Herschberger

Rangelands are being degraded by desertification, development, and invasive grasses. Native grass restoration is an important practice to maintain rangeland productivity and health.

Many factors can influence the success of rangeland restoration. A factor that has not been studied in western Texas is the impact that herbivory by small mammals such as jackrabbits, gophers, and rodents can have on native plant establishment. Our objective is to evaluate the influence of small mammal herbivory on the success of rangeland restoration.

We will establish 40 small mammal exclosures on 2 restoration sites located in western Texas (Ector and Gaines counties), and compare plant diversity and biomass between exclosures and adjacent unprotected areas. We will also trap small mammals on the restoration sites to estimate relative abundance of small mammals.

Herbivory by small mammals can exert great pressure on desert grasslands. Our findings will help determine if such herbivory may limit the ability of native plants to establish during rangeland restoration in western Texas.

ESTIMATING DETECTABILITY OF WILDLIFE DURING DRONE SURVEYS

Aaron M. Foley, Ernie Reyes, Dakota Moberg, Randy W. DeYoung, and Humberto L. Perotto-Baldivieso

Drones are becoming a common platform for conducting wildlife surveys. Many drone surveys use thermal sensors during nighttime to increase detectability of wildlife. Wildlife use of woody cover, which can reduce detectability, during nighttime is largely unknown and may offset the advantages of surveying at nighttime.

We will use GPS radio-collar data from white-tailed deer, nilgai, cattle, and wild pigs from a variety of landscapes in South Texas as our dataset. Aerial photographs of the study sites will be classified into open or brush categories. Percent brush will be extracted for each animal location with the idea that higher brush indicates lower detectability. We will then determine whether ambient temperatures, seasons, and time of night affect detectability among species and landscapes. Our data should provide insights into optimum times to conduct nocturnal drone surveys.
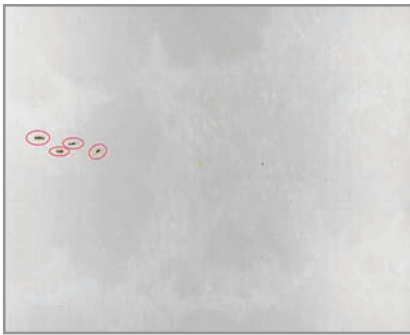
Nighttime drone image of nilgai antelope taken by a thermal camera on a drone. Species identification is confirmed by measuring length of heat signatures.

WILDLIFE COMMUNITY DYNAMICS AND FOREST MANAGEMENT IN EAST TEXAS

P. Trifiletti, L. M. Conner, Steven B. Jack, Michael J. Cherry

Understanding how wildlife are using their environment is important for conservation. Forest management practices, such as fire and timber harvest, alter vegetation and can have profound effects on wildlife communities. To examine how forest management influences wildlife communities, we established a grid of 40 remote trail cameras on the Boggy Slough Conservation area in East Texas. These cameras were deployed during summer 2023 and will operate until summer 2024 to collect a full year of wildlife detections. We will combine these detection data with forest management records to help us understand how habitat conditions are influencing species across seasons.

Preliminary analyses have provided interesting results. We found that bobcats and raccoons were less abundant near areas that had been burned in the last year. For coyotes, we found that during the summer they were more abundant near stands that had been harvested in the last 5 years. During the fall, coyotes were less abundant near areas that had been burned in the last year. These results highlight the influence of prescribed fire and timber harvest on the distribution of predator species. This information can help inform management decisions to balance a variety of wildlife and forestry objectives.

CHEMICAL CONTROL OPTIONS FOR WHITEBRUSH IN SOUTH TEXAS

Katie Pennartz, Evan Tanner, Megan Clayton, Anthony Falk, David Wester, Humberto Baldivieso-Perotto

This study evaluated chemical control options for whitebrush, a native shrub in South Texas that can form dense stands requiring intensive management. The research aimed to expand our understanding of effective herbicide treatments, including testing applications during the plant's dormant season when traditional foliar treatments are challenging. Understanding whitebrush control methods is important for maintaining productive rangelands and wildlife habitat in the region.

Key findings:
• Invora™ provided very high control of whitebrush as both individual plant (99.98% mortality) and broadcast (81.97% mortality) treatments, regardless of application season.
• Other common rangeland herbicides applied during the dormant season with high surfactant rates also achieved very high control for individual plant treatments (99.98% mortality) and high control for broadcast applications (81.97% mortality).
• There was no significant difference in whitebrush mortality between treatments using 2.5% vs. 5% surfactant rates in dormant season applications.
• Seed viability varied widely between whitebrush populations (6-49%), providing insight into potential recruitment strategies after treatment.

TESTING RESTORATION METHODS: SOUTH TEXAS SOLAR

Micayla E Pearson, Anthony D. Falk, David B. Wester, Sandra Rideout-Hanzak, Daniel Willard

Renewable energy efforts across the country have grown exponentially over the last 10 years. There has been a call for restoring ecosystems that have been damaged from these efforts. This project set out to establish if we could restore height-appropriate native grassland communities within the development. To test this, we evaluated the effects of planting date, seed mix diversity, and planting technique on the establishment of vegetation and growth during active construction of a solar development in Bee County, Texas.

• Planting date, seed mix, and the height at which the vegetation was sampled all had an effect on the percent cover and richness of native species, non-native species, and seeded species. How each of these affected each response varied greatly, indicating a complex system.
• We found that seeding native grassland species increased the percent cover of native plants compared to plots that did not receive seed. Conversely, areas that did not receive seed had higher percent cover of non-native grasses.
• Increasing the number of species in the seed mixes did not increase the percent cover or the species richness when we analyzed all vegetation, native vegetation, or just seeded species.
• As the sampling height increased species cover and richness decreased in all measured categories. Understanding how cover and richness changes with respect to height is an important aspect for solar development groups concerned with panel shading caused by vegetation.

Molly O'Brien

Applying a native seeding treatment to restoration plots in Menard County, Texas.

NATIVE GRASSLAND RESTORATION IN THE EDWARDS PLATEAU

Molly O'Brien, Evan Tanner, David Wester, Anthony Falk, Sandra Rideout-Hanzak

This study investigated the effectiveness of restoration techniques for native grasslands in the Edwards Plateau region of central Texas. The research is important because grasslands worldwide have experienced significant declines, and region-specific restoration methods are needed. By testing combinations of disking, seeding, and herbicide treatments, we aimed to develop tailored restoration approaches for this unique region.

Key findings and conclusions:
• The combination of seed mix application and herbicide treatment, without disking, produced the most desirable plant community characteristics. This included increased perennial species density as well as higher seeded, native, and grass species richness.
• Disking generally led to undesirable outcomes. It is not recommended as a restoration technique in this region due to its negative effects on perennial grass species.
• Both high and low diversity seed mixes outperformed non-seeded areas, but there were minimal differences between the two seed mix types.
• Herbicide application showed mixed results. Overall, it caused less severe undesirable effects compared to disking and increased seeded species richness in several treatment combinations.

Biology & Ecology

HABITAT USE AND POPULATION DEMOGRAPHICS OF GRAY HAWKS IN THE LOWER RIO GRANDE VALLEY OF TEXAS

Michael T. Stewart, Ashley M. Tanner, Bart M. Ballard, Jennifer A. Smith, and Brian A. Millsap

We have been tracking the movement of gray hawks, a state-listed species, in the Lower Rio Grande Valley of Texas since January 2019 with GPS transmitters. We have collected >10,000 locations the hawks have used, and we will compare physical characteristics of the landscape at these locations to randomly selected sites that were accessible, but unused. By performing this comparison, we will determine what habitat components are important for gray hawks, aiding in conservation of this species. We are also conducting quarterly surveys where color-banded birds are relocated in order to study important population parameters. By determining parameters such as survival rates and nesting success we can then assess the population growth of gray hawks, which will be used to inform management decisions for this Species of Greatest Conservation Need in Texas.

While working on these projects, we tackled two additional projects. One studied the behavioral effects of habitat loss on a female gray hawk when approximately 70% of the trees in her territory were cut down, resulting in increased exploratory movements and exposure to additional threats. The second examined the dispersal movements of five females from nestlings to breeding adults.

Michael Stewart

CAN LIGHT METER DATA BE A PROXY FOR VEGETATION COVER?

Jessica Johnston, Caleb McKinney, Katherine Travis, Evan Tanner, Ashley Tanner, Leonard Brennan, Fidel Hernández, Humberto Perotto-Baldivieso, David Hewitt, David Wester, Ryan Luna, and John Mclaughlin

Vegetation cover provides critical protection from abiotic conditions (non-living conditions, such as climate or light intensity). It can also limit predation risk for many wildlife species. Measures of overhead vegetation are typically collected with handheld methods that are limited logistically at large scales. Alternative remotely-sensed options can be cost prohibitive. Thus, determining alternative methods to estimate overhead vegetation is a critical need. Many wildlife tracking devices are solar-powered and often collect light-intensity data that are typically used to assess transmitter battery performance. As overhead vegetation cover intercepts light, light-intensity data collected from these tracking devices may also be used as an index of overhead vegetation cover. We tested the performance of GPS transmitters equipped with a light meter and compared readings to scientific-grade light meters. In August 2023, we conducted 97 paired light meter comparisons in Dimmit County, Texas. Within Tamaulipan thornscrub and mesquite grassland, paired light meters were deployed in low, medium, and high shrub cover areas. Data were collected every hour for a minimum of 24 hours at each location. In addition to categorical measurements of shrub cover, overhead leaf area index was collected using a ceptometer. Preliminary analyses show a significant relationship between light intensity and overhead vegetation cover. These data show promise as a proxy for vegetation cover at locations used by wildlife species.
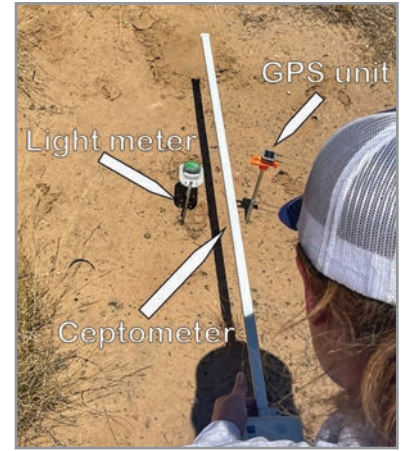
RELATIONSHIP BETWEEN HUMANS, RODENTS, AND COVID AT WASTEWATER TREATMENT FACILITIES

Matthew Chen, Scott E. Henke, Alynn M. Martin, Jamie Benn, Kyle Shaney, Clayton Hilton, and Rick C. Laughlin

Viruses are infectious agents that reproduce within the cells of their host and disrupt normal cell functions, resulting in illness. Many viruses are species-specific, meaning that they infect only one type of animal. Zoonotic viruses are capable of infecting animals and also humans (e.g., rabies virus). Some viruses are not only transmitted from animals to humans, but also from humans back to animals, such as the SARS-CoV-2 virus. This phenomenon is described as "reverse zoonosis." Covid began during 2019 (coined COVID-19) as a zoonotic disease that likely originated from either bats or pangolins, and quickly spread worldwide with fatal cases having been reported in humans, companion animals, livestock, zoo animals, and wildlife.

Because COVID-19 virus can be spread by feces, wastewater treatment facilities are focal points to monitor the virus. Also, because wastewater treatment facilities are outdoors, the possibility of wildlife, especially rodents, having contact with infected water and feces is possible, and thus these locations may enable wildlife exposure to the virus. Therefore, we will sample rodents that occur within and on the periphery of wastewater treatment facilities, and test them for previous exposure to COVID-19 and for active virus. Data from this project will provide better insight into the pandemic and hopefully provide sentinel species to monitor to reduce the likelihood of future pandemics.

EFFICACY OF NALMED-A IN DENNED BLACK BEAR SOWS IN ARKANSAS

Clayton D. Hilton, Jennifer R. Ballard, Myron L. Means, Amanda J. Riggs, Julie A. Balko, Carrie E. Ullmer, and Morgan A. Rosenbaum

Effective management of black bears requires knowledge regarding numbers of cubs produced, sex of the cubs, and cub weights. These data are collected by natural resource agencies every year in late winter while mothers are still in dens with cubs. The sows (adult females) are given drugs via dart or a hand injection so that the cubs can safely be retrieved, but these sows can be tricky to sedate because they are in torpor—not fully awake and not fully asleep (black bears are not true hibernators). This is further complicated because the degree of torpor can vary from bear to bear and from day to day, depending upon the weather. A relatively new "cocktail" of drugs called NalMed-A (nalbuphine-medetomidine-azaperone) has proven effective in non-torpid bears, but has not been fully evaluated in torpid bears. After two pilot studies we immobilized 23 denned sows in the Ouachita and Ozark mountains of Arkansas in late winter of 2024 and we are currently analyzing the data. Results from this project will provide wildlife agencies with information about how best to keep both bears and humans safe while working with sows in dens.

Kristen Booth

Kristen Booth

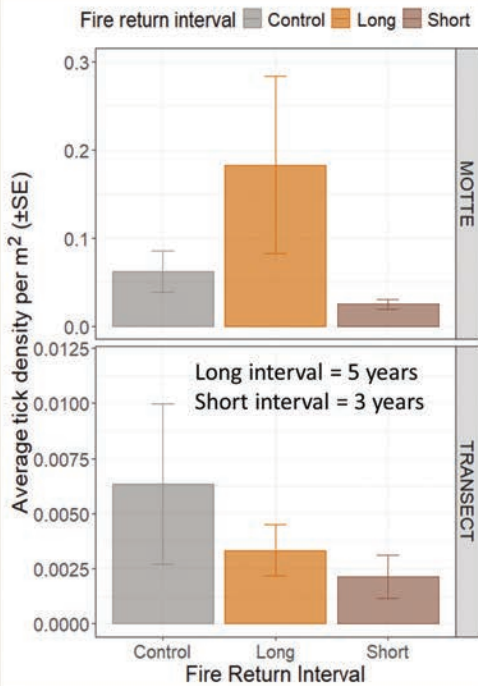*Researchers work with a denned black bear sow in Arkansas.*

Can Prescribed Fire Reduce Tick Density and Disease Risk?

- South Texas rangelands are important ecosystems for wildlife and livestock.
- Both wildlife and livestock are threatened by the **risk of tick-borne disease**, fueled by climate change and woody encroachment.
- **Prescribed fire** may serve as a control method for ticks and the diseases they carry.

Questions:

1. Does prescribed fire reduce tick density in grasslands and tree stands (mottes)?
2. Does prescribed fire return interval impact tick densities?

How: We utilize 2 years of data from an 8-year prescribed fire project at East Foundation's El Sauz Ranch in southern Texas.

Fire return interval ▇ Control ▇ Long ▇ Short

Average tick density per m² (±SE)

MOTTE

Long interval = 5 years
Short interval = 3 years

TRANSECT

Control   Long   Short
Fire Return Interval

Preliminary results:

Three-year fire return intervals during winter may effectively reduce ticks in both grasslands and mottes.

Dynamics of prescribed fire:

Mottes do not burn under prescribed fire conditions, providing refugia during fire.

Potential effects on system:

1. Animals leave burn areas during fire (tick removal from area)
2. Ticks and animals use mottes within burn area as refugia (ticks remain in mottes)
3. Animals return to burned areas to graze new growth (tick re-establishment)
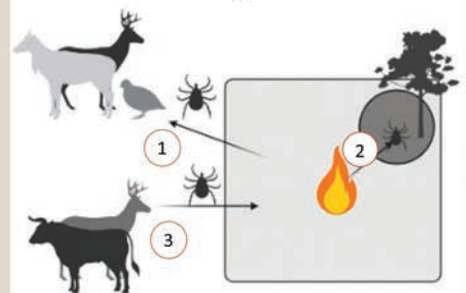
Figure created using BioRender

Rachel Walters, Sandra Rideout-Hanzak, Alynn Martin
Cooperative funding provided by the East Foundation.

Alynn Martin

ARE NATIVE GRASSES IMPORTANT RESOURCES FOR POLLINATORS?

Ethan Bennie, Joshua Allison, Summer Aguilar, Leah Ramos, Adam Mitchell, Sandra Rideout-Hanzak, and Anthony Falk

Pollinators play an important role in all terrestrial ecosystems. We know from prior research that they save the US economy an estimated $39.2 billion a year by pollinating agricultural crops and reducing the need for mechanical pollination. They also help sustain ecosystems by pollinating the vegetation, aiding in reproduction, which cannot be given a dollar value. However, we do not yet know the extent of all the plant species they affect.

This study is aimed at investigating the interaction that pollinators might have with our native grass species. More specifically, we will be investigating the relationships that insect pollinators might have with native grass species found in southern Texas. Our research is conducted at the Texas Native Seeds facility in Kingsville, Texas, with ten native grasses that have been selected for observations. We randomly select five individuals for study from each target species. We are monitoring the inflorescence structure and the seasonal changes that they undergo, and tracking when pollen resources are available for insects. Additionally, we are collecting insects found on our target grasses to determine if insects may be pollinating native grasses. This information may be helpful to determine which native grasses provide food resources for pollinators during late summer and fall when other flowers may not be present.

GENETICS OF THE FERRUGINOUS PYGMY-OWL IN ARIZONA AND MEXICO

Stephanie M. Cobbold, Randy W. DeYoung, Glenn A. Proudfoot, Rodney L. Honeycutt, Ryan P. O'Donnell, Nora D. Clark, and Michael F. Ingraldi

The ferruginous pygmy-owl is a small, feisty, owl that often hunts during the day. Widely distributed throughout Mexico and Central America, the edge of the pygmy-owl range extends into portions of southern Texas and Arizona. Pygmy-owls nest in cavities in trees or large cacti, and are limited by availability of nest sites. Fragmentation of this critical habitat combined with climate-induced changes in rainfall patterns have led to the decline of pygmy-owls in northern Mexico and Arizona. As a result, the pygmy-owl was listed as threatened in 2023 by the US Fish & Wildlife Service. We used genetic markers to characterize diversity and differentiation in pygmy-owls from core populations in the Mexican states of Nayarit, Jalisco, and Colima compared to samples from the edge of the range in Arizona, Sonora, and Sinaloa.

• Genetic differentiation of pygmy-owls in Arizona and western Mexico was largely a function of geographic distance among sampling sites.
• We found no evidence that landscape features, such as the rugged and mountainous Mexican Transvolcanic belt, are barriers to movement of pygmy-owls.
• Although gene flow occurred throughout our sampling area, pygmy-owls in Arizona had the lowest genetic diversity. Enhancing connectivity of existing populations in Arizona and Sonora should be prioritized to maintain genetic connectivity.
• Managers should consider habitat management and strategic placement of nest boxes to help maintain dispersal and gene flow into isolated parts of the range.

SMALL MAMMAL DYNAMICS ACROSS A GRADIENT OF PLANT INVASION

Duston R. Duffie, Andrew J. Mullaney, Cord B. Eversole, and Scott E. Henke

During the past several decades, South Texas rangelands have been invaded by non-native grasses and native, woody shrubs. Little is known about small mammal responses to this habit change. We surveyed small mammals at the Welder Wildlife Refuge in San Patricio County, Texas. From 2019 to 2023, we sampled across six plots: two with native vegetation, two with invasive vegetation, and two intermediate plots. We recorded 3,206 captures of 9 small mammal species. To determine influence of invasive vegetation, we compared relative abundance for four species: hispid cotton rats, northern pygmy mice, fulvous harvest mice, and deer mice.

• Cotton rats and harvest mice abundances differed across survey years.
• We found no statistical difference in abundance between plot types for cotton rats, pygmy mice, or deer mice. However, deer mice were not captured in native plots indicating a preference for woody cover found in intermediate and invaded plots.
• During drought years, harvest mice were more abundant in intermediate plots, so intermediate levels of invasion may mitigate drought effects for this species.

South Texas rangelands experience frequent droughts that are known to alter vegetation structure. Drought cycling may play a more significant role in regulating small mammal populations than vegetation structure alone.

Northern pygmy mice captured in a live trap at the Welder Wildlife Foundation.

Duston Duffie

HOW SOIL MOISTURE IMPACTS REFLECTANCE VALUES ON REMOTE SENSING IMAGES

Kimberly M. Tanguma, Humberto L. Perotto-Baldivieso, Anthony D. Falk, Maria C. Donato-Molina, Doug R. Tolleson, Shad D. Nelson, Bart M. Ballard, and Jose Espiritu.

Water is essential for the growth and health of native rangeland species. Drought can create water stress, causing plants to close their stomata (pores that move gases in and out of the leaf or stem). This reduces photosynthesis which affects the plants' abilities to grow and reproduce.

To test whether plant stress can be observed through remote sensing platforms, we flew a drone equipped with a multispectral sensor at a height of 150 ft above ground level. We focused our research on 3 different species: slender grama, pink pappusgrass, and seacoast bluestem. Flights were conducted at the Texas Native Seeds fields in Kingsville, Texas, during the 2024 growing season. Soil moisture data were collected with sensors, and plant tissue samples were collected to compare field data with aerial imagery and determine the relationship between nutrient analysis and reflectance values.

• We observed variations in soil infiltration rates that did not consistently correspond with the patterns of above-ground plant growth, suggesting other factors may influence soil hydrology.
• Pink pappusgrass exhibited higher above-ground biomass to root structure compared to standard expectations, highlighting the importance of studying both visible and underground plant components.
• This research is critical for understanding how water availability affects the spectral reflectance and nutritional quality of individual native plant species, and how various management practices may influence rangeland health.

NICHE EVOLUTION IN A DROUGHT DECIDUOUS SHRUB

Katie Pennartz and Evan Tanner

This study focused on how different climate conditions can lead to a change in climatic requirements within two populations of whitebrush. Understanding these patterns is important for predicting how species may respond to climate change.

• We found evidence that the North and South American populations of whitebrush have evolved to have unique climatic requirements. This is because they have experienced different climate conditions over time.
• Species distribution models built for one population did a poor job predicting the other population's range. This suggests significant differences in climatic requirements across populations.
• The population in North America showed greater ability to adapt to novel conditions like extreme cold compared to the population in South America.
• Under future climate conditions, the northern population is expected to expand its range. However, the southern population may shrink due to its limited ability to adapt.
• The study highlights the need to consider population-level variation in abilities to adapt when predicting species' responses to climate change and planning conservation efforts.

GUIDING SHINNERY OAK RESTORATION UNDER CHANGING CLIMATES

Katie Pennartz, Evan Tanner, Matthew Carroll, Dwayne Elmore, Craig Davis, and Samuel Fuhlendorf

Shinnery oak is an important plant species in the southern Great Plains that has lost much of its historic habitat. Our research looked for areas to protect and restore shinnery oak in Arizona, Colorado, Kansas, New Mexico, Oklahoma, Texas, and Utah. Shinnery oak plays a key role in maintaining biodiversity in certain ecosystems. We wanted to understand how climate change might affect where the species can be restored to help plan future management strategies.

- Models showed that shinnery oak's current distribution is mainly determined by soil type, amount of precipitation as snow, and the direction a slope is facing, or aspect.
- Future climate models predicted that the species' suitable habitat will shift northward. Potential gains are predicted in the northern region of its range with predicted losses in the southern region when projecting through 2100.
- The study identified target areas for conservation where the climate will remain suitable and soil types are appropriate, mainly in southwestern Oklahoma and northern Texas.
- Restoration target areas, where the climate will become suitable after 2071 and soil types are appropriate, were identified mostly in the western part of the study area, including the separate population in Utah and Arizona.
- Land ownership and crop cultivation status varied between the eastern and western populations, affecting the potential management strategies and stakeholder involvement needed for conservation and restoration efforts.
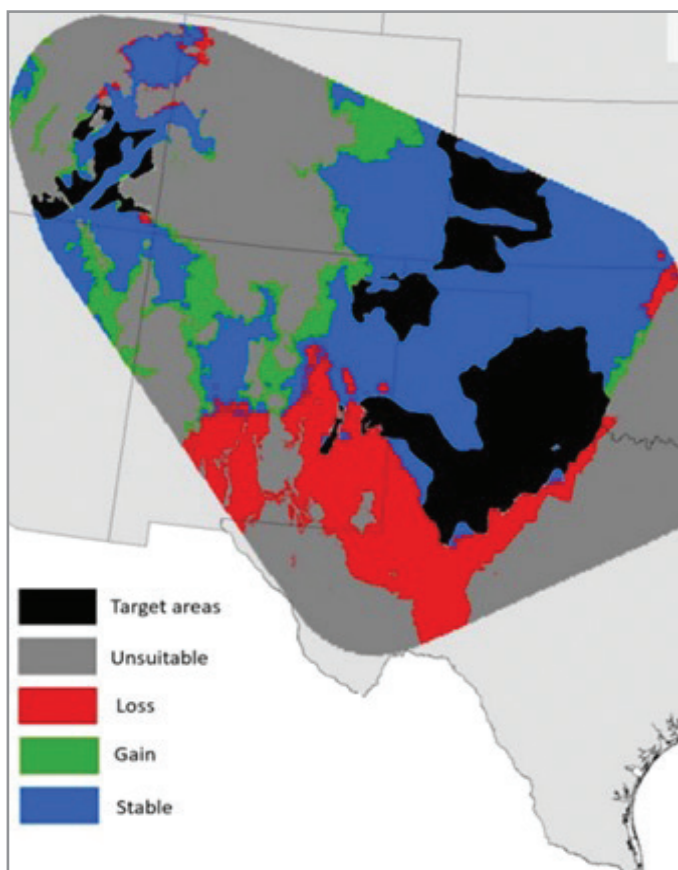
Target areas (black) identified for shinnery oak restoration under future climate change scenarios. Changes in future climate patterns will also cause areas of loss (red) and gains (green) for habitat suitability of shinnery oak.

SOFT-RELEASE EFFECTS ON MOVEMENTS OF TEXAS TORTOISES POST TRANSLOCATION

Christin Moeller, Saren Perales, Wraith Rodriguez, Scott E. Henke, Sandra Rideout-Hanzak, David B. Wester, Cord B. Eversole, and Paul Crump

Texas tortoises are a Species of Greatest Conservation Need and a Texas state threatened species. Threats to their populations only increase as Texas continues to urbanize. Translocation of populations may represent a viable option; however, much remains unknown about moving Texas tortoises. A challenge of tortoise relocation is their instinctual homing behavior that drives tortoises to return to where they were captured, negating efforts involved in moving them and possibly placing tortoises at greater risk of death. We captured 80 Texas tortoises, placed GPS transmitters on them, divided tortoises amongst 3 soft-release enclosures (4-, 8-, and 12-month enclosures), and then removed enclosures walls at the end of the enclosure period.

- Tortoises did not display a homing instinct after any soft-release time period.
- Tortoises did not display directional movement, but appeared to scatter fairly evenly in most directions.
- Tortoises within the 4-month soft-release enclosure moved greater distances from their enclosure 90-days after release than tortoises from the 12-month soft-release enclosure.
- The majority (94%) of Texas tortoises placed within the 12-month soft-release enclosure remained within the enclosure area for at least 90 days after the walls were removed.

A 4-month soft-release period is sufficient for tortoises to lose their instinctual homing behavior, but tortoises become nomadic and travel distances from their release site. A 12-month soft-release period is needed if the desire is to have tortoises become sedentary and remain at their release site.

HOW DO TIME OF DAY AND TEMPERATURE EFFECT DETECTABILITY OF TEXAS TORTOISES?

Christin A. Moeller, Saren Perales, Wraith Rodriguez, Scott E. Henke, Cord B. Eversole, David B. Wester, and Sandra Rideout-Hanzak

Because of decline in Texas tortoise populations, conservation agencies need to count remaining populations; however, low abundance and unknown detectability make this difficult. We built a 6-acre enclosure, translocated 56 Texas tortoises into it, and conducted weekly line surveys during morning, afternoon, and evening from July – September 2023. We recorded air temperature and all tortoises observed, and calculated the percent observed and detectability from the known number of tortoises within the enclosure.

- No differences were observed in number or percent observed, or detectability between the 3 time periods.
- Average detectability for Texas tortoises was 0.17, meaning 17% were detected.
- More tortoises were found when temperatures were lower.

Therefore, Texas tortoises could be surveyed anytime during the day in March – October in southern Texas. We recommend surveying when temperatures range between 70 and 85 F, the temperatures when Texas tortoises are most active.

90187 - Male

Movements of a translocated male Texas tortoise following 8 months in an enclosure (green rectangle) and a soft release. Purple dots represent the first 7 days of movement after enclosure walls were removed, yellow dots are days 8 through 30, and red dots are days 31 through 90.
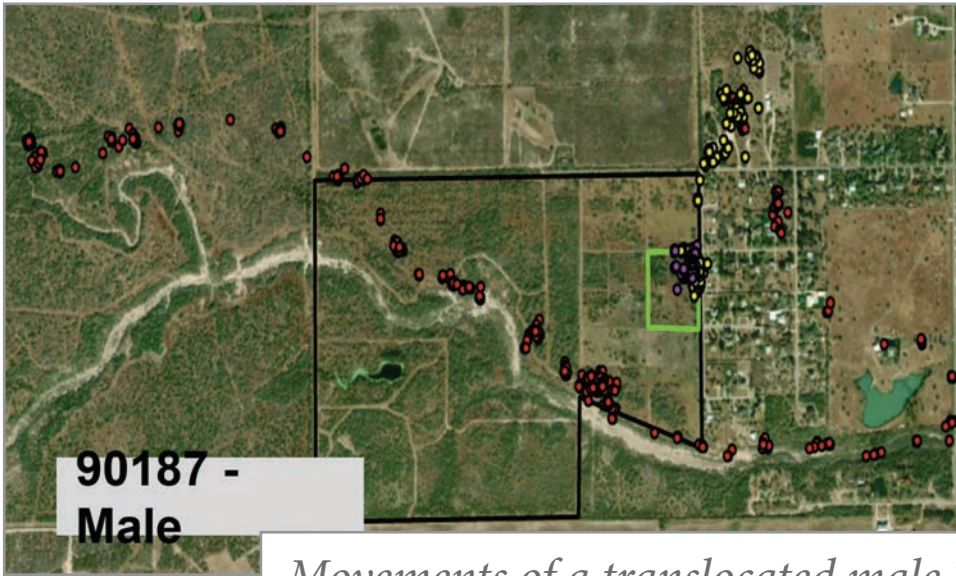
SURVIVAL OF TEXAS TORTOISES POST TRANSLOCATION AND HELD DURING 3 SOFT RELEASE PERIODS

Christin A. Moeller, Saren Perales, Wraith Rodriguez, Scott E. Henke, Cord B. Eversole, Sandra Rideout-Hanzak, and Paul Crump

Translocation, moving animals from one location to another, has been theorized as a potential mitigation tool to offset habitat loss of Texas tortoises due to development. However, data to verify if Texas tortoises can be successfully translocated are lacking. Therefore, our goal was to translocate Texas tortoises and to assess tortoise survival and reproduction post translocation. In total, 148 tortoises were captured, translocated, and placed within 4-, 8-, and 12-months soft-release enclosures. Eighty tortoises received GPS transmitters and were divided amongst the 3 soft-release enclosures. Walls were removed at the end of the respective soft-release period, and tortoises were allowed free choice of movement.

- Fourteen confirmed deaths and 10 additional potential deaths or transmitter failures occurred amongst all enclosures.
- Deaths were attributed to raccoons, feral cats, fencing, and vehicles strikes.
- Survival rates did not differ among the 3 soft-release enclosures; mortality rates ranged from 10 – 23%.

Translocation did not appear to affect survival of Texas tortoises.

CLAY LOMA ECOLOGY AND THEIR USE BY TEXAS TORTOISES

Juan C. Elissetche, Sydney E. Pate, David B. Wester, Scott E. Henke, Cord B. Eversole, Jason Singhurst, and Sandra Rideout-Hanzak

Clay lomas are a result of wind-blown clay sediment from the surrounding lagoons when they are dry, that accumulated over thousands of years on existing vegetation and eventually formed elevated dunes. In the Americas, they are found only along the southern Texas and northern Mexico gulf coast. We studied the soils, vegetation communities, and Texas tortoise density on 15 clay lomas across both public and private land in southern coastal Texas. Our objective was to characterize the soils and vegetation communities, and determine the importance of clay lomas for Texas tortoises.

- We found no statistical differences between the soils at the center of a loma and along the edge.
- However, soils at the center of lomas were classified as clays whereas soils at windward and leeward edges of lomas were sandy clays and sandy clay loams, respectively; and windward and leeward locations 50 m away from loma edges had soils classified as silty clay and sandy clay loams, respectively.
- Vegetation differed greatly between the lomas and the surrounding tidal flats.
- We also discovered that Texas tortoises are associated with lomas with Texan goatbush present.
- Lastly, Texas tortoise populations are denser on lomas than what has been reported in the literature for other areas in southern Texas.

Conservation of the few remaining undeveloped lomas is crucial to maintain these unique assemblages of plants, and to provide critical habitat for Texas tortoises.

NEED FOR A NEW TREATMENT FOR MYCOPLASMA INFECTION IN TEXAS TORTOISES

Christin A. Moeller, Saren Perales, Wraith Rodriguez, Scott E. Henke, Cord B. Eversole, Clay Hilton, and Sandra Rideout-Hanzak

Upper respiratory tract infection is bacterial and highly contagious. It is also debilitating and sometimes lethal for Texas tortoises. Recommended treatment for tortoises displaying signs of Mycoplasma infection is danofloxacin, a drug used successfully to treat Mycoplasma infections in otherspecies, including reptiles. We had 20 tortoises that showed signs of infection, and we began a regimen of danofloxacin, but stopped after the first dose because of adverse reactions. Tortoises displayed excessive salivation and lethargy, which only began to subside after 72 hours. We designed a drug trial to test tulathromycin and oxytetracycline, two different types of antibiotics for tortoise with symptoms. Because tulathromycin and oxytetracycline have different dosages and handling regimes, we divided symptomatic and non-symptomatic tortoises into equal groups as treatment and control animals. Control tortoises were handled as though they were given the drug, to determine effects of handling stress on drug therapy.

- Danofloxacin appeared to be too aggressive for Texas tortoises, which are smaller than other tortoises it has been used on.
- Neither new drug caused the clinical symptoms to subside after a 50-day treatment period.
- Handling Texas tortoises created apparent stress, which caused non-symptomatic tortoises to display clinical signs.

Mycoplasma clinical signs appear to be cyclic and can abate without treatment once the stressor subsides or the tortoise sufficiently copes with stress.

PREVALENCE OF MYCOPLASMA INFECTION IN TRANSLOCATED TEXAS TORTOISES

Christin A. Moeller, Saren Perales, Wraith Rodriguez, Scott E. Henke, Cord B. Eversole, and Sandra Rideout-Hanzak

Texas tortoises are a Texas-state threatened species due to perceived population declines. One factor in their decline is upper respiratory tract disease (URTD). URTD is caused by Mycoplasma bacteria and creates a range of symptoms including nasal discharge, swollen eyelids, lethargy, and a general failure to thrive. Translocation, the moving of animals from one location to another, is often suggested as a mitigation option for tortoises found on sites with planned development; however, disease spread must be considered before relocation efforts begin. We assessed the prevalence of Mycoplasma from both a donor and recipient site in southern Texas before translocation.

- We collected 171 and 23 Texas tortoises from a donor site and recipient site, respectively.
- Within the donor and recipient sites, 56 (32.7%) and 8 (34.8%), respectively, had titers suggesting past exposure to URTD.
- Eighteen tortoises from the donor site (10.5%) and 2 from the recipient site (8.7%) displayed clinical symptoms (i.e., nasal discharge) of URTD, even though all polymerase chain reaction (PCR) results were negative for the bacteria.

Mycoplasma bacteria have a commensal relationship with their tortoise hosts, where the bacteria benefits from the tortoise and the tortoise is not harmed by it. However, the additional stress on tortoises could alter their immune system, which can lead to infection. Stressors, such as translocation, can cause tortoises with the bacteria to display clinical symptoms of URTD, which can be cyclic and can abate without treatment, once the stressor subsides.

TEXANS' ATTITUDES PERTAINING TO DANGEROUS ANIMAL OWNERSHIP

Harry Rakosky and Scott E. Henke

The novelty of an exotic animal often spurs people to own one. Texas law states that exotic animals, including those considered dangerous, can be privately owned with a certificate of registration issued by an animal registration agency. However, some Texans believe that certain dangerous wild animals (DWA) should not be allowed as pets. Our objectives with this project included determining what species of DWA are currently kept as pets in Texas, and how comfortable Texans are regarding DWA being kept as pets, including within various distances from their homes.

- To date, we received 365 responses across all regions that correspond closely with the demographic breakdown of Texas citizens.
- Texans were equally split on the legality of DWA ownership; however, of those who felt it should be legal, 75% believed a permit should be required.
- Texans were split about who should provide permits for DWAS: Animal Control, Health Department, sheriff's office, or Texas Parks and Wildlife Department.
- Of those who would want a DWA, small cats (e.g., bobcats, ocelots, servals, etc.) were favored over canids (e.g., wolves), non-venomous snakes, large cats, bears, venomous snakes, alligators, and finally primates.
- 71% of Texans were in favor of mandatory training for people who keep DWAs, while 80% stated they had no desire to keep DWAs, and were also unwilling to allow their neighbors keep them.

Current laws concerning DWAs in Texas are confusing, and most Texans do not have adequate knowledge about what is allowable.

PRELIMINARY COMPARISON OF TEXAS COUNTY LAWS PERTAINING TO DANGEROUS ANIMALS

Harry Rakosky and Scott E. Henke

Members of the public often desire dangerous wild animals (DWA), such as lions, tigers, bears, or wolves, as pets. However, the possibility of such ownership depends upon the state where the potential owner resides. There are 19 states that ban private ownership of exotic animals, 26 states that require the owner of an exotic animal to obtain a license first, and 5 states with no statutes or regulations governing the ownership of dangerous wild animals. In Texas, each individual county via its commissioners' court can choose how it will regulate the ownership of dangerous wild animals within its jurisdiction. We surveyed county commissioners and sheriff departments to determine counties that allow ownership of DWAs.

- We have received responses from 136 of the 254 Texas counties (54%).
- 16 (12%) counties stated that they have an outright ban on DWA ownership.
- 95 (70%) counties stated that they allow DWA ownership with no required licenses or regulations.
- 25 (18%) counties mandate that licenses are required to maintain a DWA
- 3 (2%) counties displayed a discrepancy of information between the commissioner and sheriff office

Our goal is to provide a comprehensive source of information that will assist Texans in identifying regulations that govern the private possession of dangerous wild animals within each county.

Collared peccary captured on camera at Welder Wildlife Refuge in Sinton, Texas.

INTERACTIONS BETWEEN COLLARED PECCARIES AND FERAL HOGS ON A SOUTH TEXAS RANGELAND

Laken Mize, Duston R. Duffie, Cord B. Eversole, and Scott E. Henke

Invasive species can negatively impact native species through species interactions and competition for resources. For example, native collared peccaries, also called javelinas, utilize similar habitats and forage as invasive feral hogs, which researchers have speculated may be one cause of declines in peccary populations. In addition, peccaries are known to alter their activity patterns when feral hogs are present. Our goal was to evaluate interactions between peccaries and feral hogs. We established 24 remote camera stations across the Welder Wildlife Refuge in San Patricio County, Texas. For this project, we used data collected from July to October during 2021 and 2022. We compared activity levels of peccaries and hogs.

- In 2021, hogs were detected at all camera sites, and both species were detected at 10 sites. In 2022, hogs were detected at 21 sites, both species were detected at 12 sites, and peccaries were detected at 3 sites without hogs.
- We observed differences in daily activity levels between peccaries and hogs with peccary activity peaking after sunset and before daybreak. Hogs were active throughout the night.

These results indicate that peccaries and hogs have different activity patterns, so peccaries may be avoiding feral hogs. Species interactions are an important parameter to consider in wildlife management, especially when invasive species alter the behavior and conservation of native wildlife populations.

MONTHLY ACTIVITY BY AGE CLASS OF TAMAULIPAN SPOT-TAILED EARLESS LIZARDS IN SOUTHERN TEXAS

E. Drake Rangel, Christin A. Moeller, Scott E. Henke, David B. Wester, and Cord B. Eversole

Tamaulipan spot-tailed earless lizards (STEL) are an elusive species whose populations are declining. The species is being considered for threatened status by the U.S. Fish and Wildlife Service. Therefore, it is imperative to understand the activity patterns displayed by various age STEL to improve survey protocols used to assess populations. We conducted monthly surveys during 2022 along a road within crop fields where Tamaulipan STEL are known to occur.

- Tamaulipan STEL emerged in March and could be found through December; their brumation occurs in January and February. Brumation is similar to hibernation, but is the term used for cold-blooded animals.
- The activity of STEL peaked during June, July, and August.
- Adults were found from March – November and in greatest numbers during June – September.
- Hatchlings occurred as early as late May and were found each month through October with peaks in June and August.
- Juvenile STEL were observed from June – December. Their abundance peak lagged a month behind hatchling peak abundance, which suggests STEL grow fast and transition from hatchling to juvenile size in approximately 30 days.

Juvenile STEL enter brumation later than adults. Remaining aboveground extends their growth period before brumation, increases their weight and survivability, and decreases time to sexual maturity. However, it also exposes juveniles to greater chance of predation.

Drake Rangel

Drake Rangel

Drake Rangel

Drake Rangel

Spot-tailed earless lizards are visual predators that may be impacted by pesticide use.

EXPERIMENTAL ASSESSMENT OF SPOT-TAILED EARLESS LIZARDS AS VISUAL PREDATORS

E. Drake Rangel, Scott E. Henke, and Cord B. Eversole

Plateau and Tamaulipan spot-tailed earless lizards (STEL) are considered opportunistic dietary generalists. Their diets consist of beetles, ants, wasps, termites, caterpillars, spiders, true bugs, centipedes, crickets, and grasshoppers. We noticed that prey must move for STEL to consume them, and that STEL were visual predators. However, empirical data are lacking to fully support this conclusion. Therefore, our goal was to confirm our observation. Five STEL of each species were individually housed in aquaria and randomly assigned to one of three treatments; 1) placing one live cricket in aquarium, 2) gluing a freshly dead cricket onto monofilament line and pulling it across the aquarium in a cricket-like movement, or 3) placing 10 dead crickets evenly distributed onto the soil surface. STEL were then observed for 1 hour.

- Both species of STEL reacted similarly and consumed the prey, on average, in ~30 seconds upon gaining access if the prey moved.
- STEL did not distinguish between live cricket movement or crickets pulled by monofilament.
- Neither species consumed any dead crickets within the hour time limit.

We demonstrated that STEL are indeed visual predators and react to prey movement, even if the movement is forced by mechanical means. This is important because STEL are commonly found near agriculture fields where various pesticides are used to reduce insect damage; however, this may decrease prey availability for STEL, especially when pesticides are fast-acting and insects die quickly.

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Parting Shots

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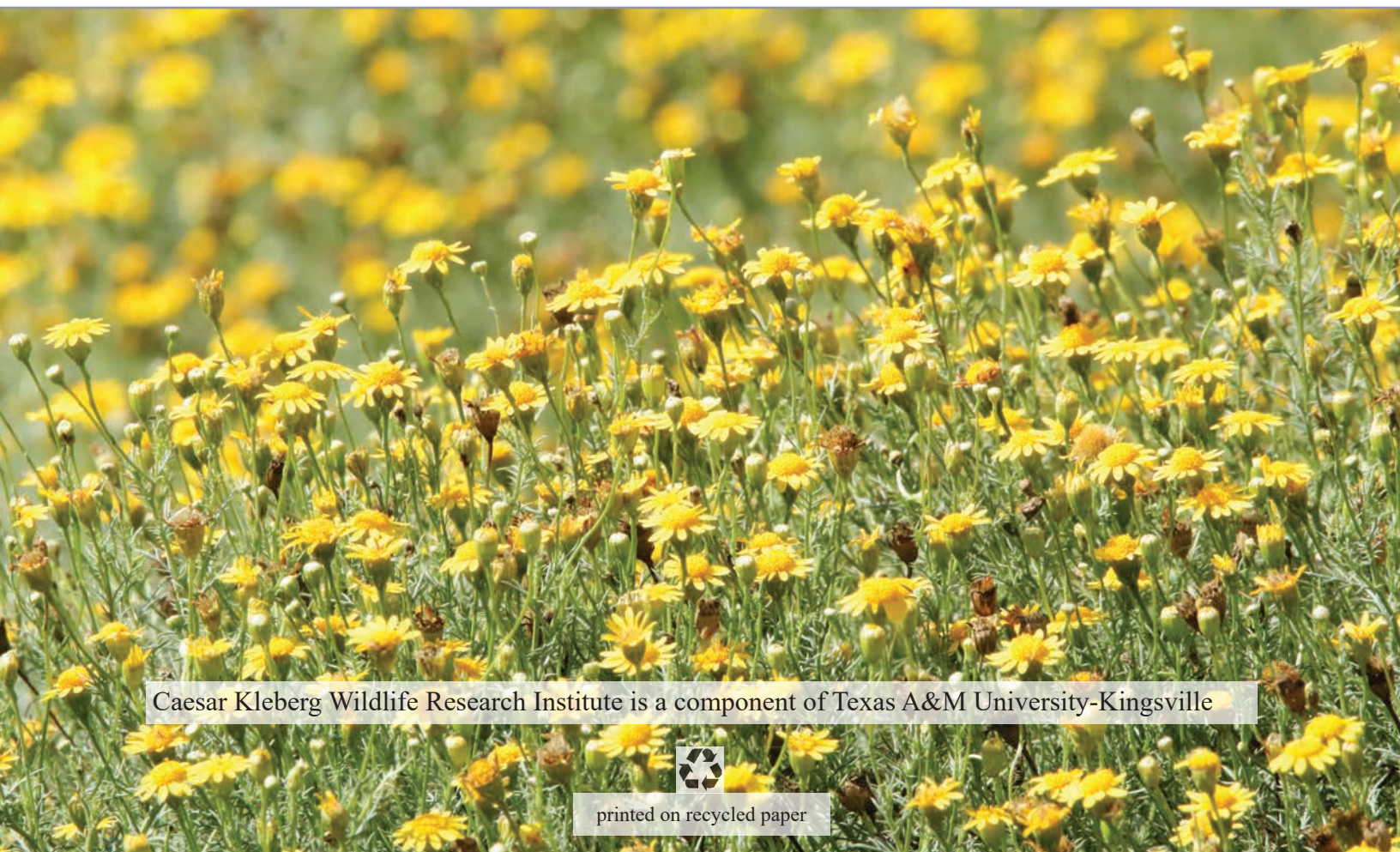Breanna Green

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