# 54th Annual Meeting
## of the
# Texas Chapter
# of The Wildlife Society


*The Relevance of Conservation to a Diverse Society….How to Make It a Reality*

**9–11 February 2018** **Dallas, Texas**

# 2017-2018 Executive Board

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|---|---|
| Executive Director | Don Steinbach |
| President | Corey Mason |
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| Board Member-at-Large | Justin Dreibelbis |
| Archivist | Alan Fedynich |

# Program

John Silovsky and T. Wayne Schwertner

# Local Arrangements

Bill Adams

# Posters

Heather Mathewson and Penny Wilkerson

# Meeting Schedule

## Friday, 9 February 2018

| | | |
|---|---|---|
| 8:00 AM – 5:00 PM | Registration | The Grand Hall |
| 8:00 AM – 3:00 PM | Poster Set-up | The Grand Hall |
| 8:00 AM – 4:00 PM | James G. Teer Leadership Institute | Cityview 7* |
| 7:30 AM | Prescribed Fire Workshop Participants Meet | Dallas Ballroom A1 |
| 8:00 AM – 5:00 PM | Prescribed Fire Workshop | Offsite |
| 8:00 AM – 10:00 AM | TWS Certification Workshop | Dallas Ballroom A2 |
| 8:00 AM – 12:00 PM | Program R Workshop | Dallas Ballroom A3 |
| 10:00 AM – 12:00 PM | Mobile Application Symposium | Dallas Ballroom D1 |
| 10:00 AM – 12:00 PM | TCTWS Executive Board Meeting | Chaparral Boardroom* |
| 1:00 PM – 3:00 PM | Student Plant ID Contest | Houston Ballroom C |
| 1:00 PM – 5:00 PM | Presentation Submission | The Grand Hall |
| 1:00 PM – 5:00 PM | Art and Photo Contest Submission | The Grand Hall |
| 2:00 PM – 4:00 PM | TCTWS Business Meeting | Dallas Ballroom A1 |
| 3:15 PM – 5:15 PM | Student Quiz Bowl Competition | Dallas Ballroom D2 & D3 |
| 4:00 PM – 5:00 PM | East Foundation Reception | State Room 4 |
| 4:00 PM – 5:00 PM | Southwest Section TWS | State Room 1 |
| 5:00 PM – 6:00 PM | SRSU Alumni and Borderlands Reception | State Room 2 |
| 5:00 PM – 6:00 PM | Women of Wildlife and Women of the Land | Majestic 1* |
| 5:15 PM – 6:30 PM | Student Poster Judging | The Grand Hall |
| 6:30 PM – 10:00 PM | President's Reception and Student-Mentor Mixer | The Grand Hall |

## Saturday, 10 February 2018

| | | |
|---|---|---|
| 6:30 AM – 7:30 AM | Student Breakfast | Chaparral Main Room* |
| 7:30 AM – 5:00 PM | Presentation Submission | The Grand Hall |
| 7:30 AM – 5:00 PM | Raffle and Silent Auction | The Grand Hall |
| 7:30 AM – 5:00 PM | Registration | The Grand Hall |
| 7:30 AM – 1:45 PM | Professional Plant ID Contest | The Grand Hall |
| 8:00 AM – 10:15 AM | Plenary Session | Dallas Ballroom BC |
| 8:00 AM – 10:00 AM | Art and Photo Contest Submission | The Grand Hall |
| 10:15 AM – 10:45 AM | Break | The Grand Hall |
| 10:45 AM – 12:15 PM | Cottam Award Presentations | Dallas Ballroom BC |
| 10:30 AM – 4:00 PM | Voting for Photo and Art Contest | The Grand Hall |
| 12:15 PM – 1:45 PM | Lunch (On Your Own) | |
| 12:30 PM – 1:45 PM | Past-Presidents Luncheon (Invitation Only) | San Antonio Ballroom A |
| 1:45 PM – 3:15 PM | Technical Session A1 | Dallas Ballroom A3 |
| 1:45 PM – 3:15 PM | Technical Session B1 | Dallas Ballroom D3 |
| 1:45 PM – 3:00 PM | Technical Session C1 | Dallas Ballroom A1 |
| 1:45 PM – 3:00 PM | Technical Session D1 | Dallas Ballroom D1 |
| 1:45 PM – 3:45 PM | Conservation Affairs Committee | San Antonio Ballroom B |
| 3:15 PM – 3:45 PM | Break | The Grand Hall |

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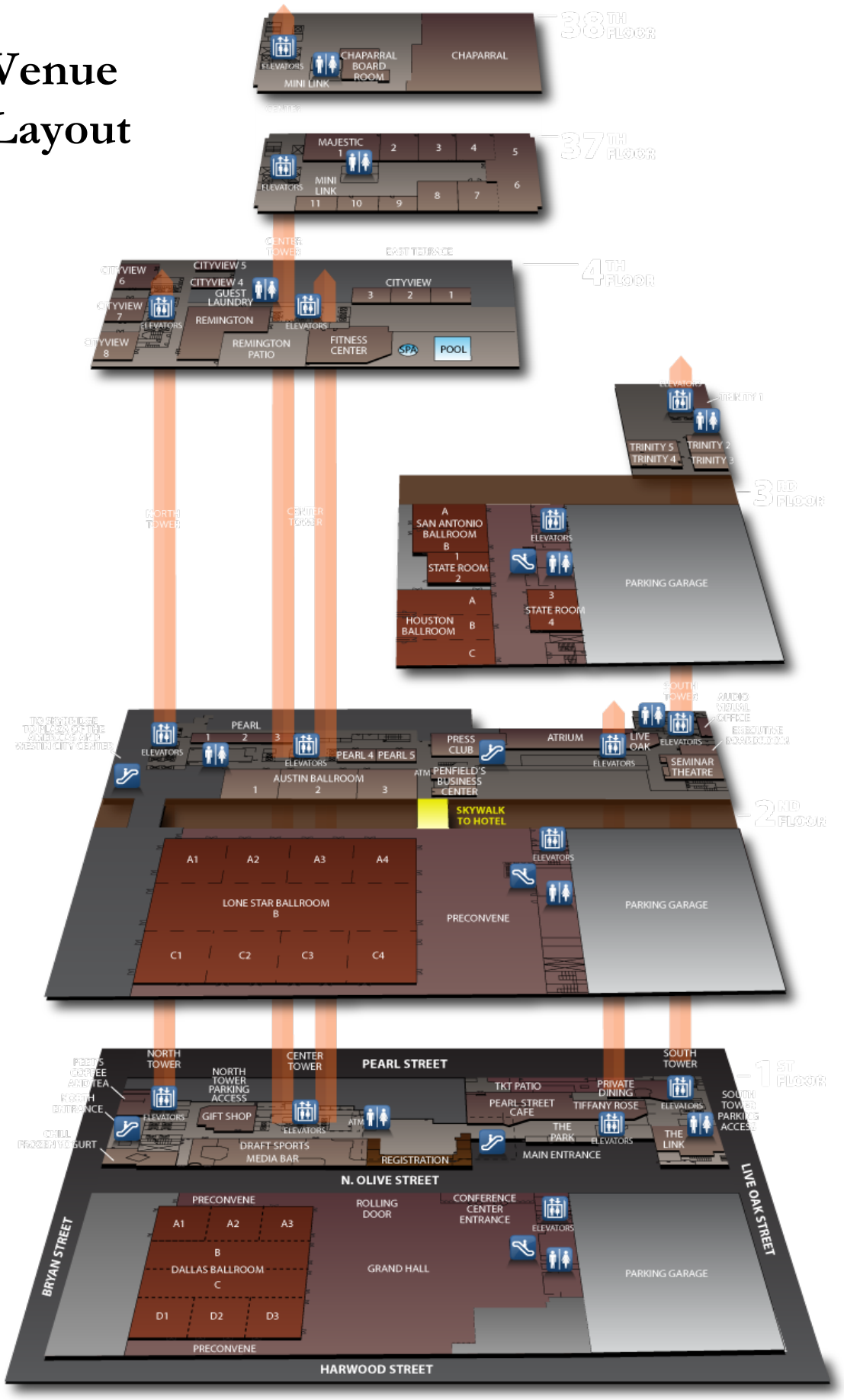
|---|---|---|
| 3:45 PM – 5:00 PM | Technical Session A2 | Dallas Ballroom A3 |
| 3:45 PM – 5:00 PM | Technical Session B2 | Dallas Ballroom D3 |
| 3:45 PM – 4:45 PM | Technical Session C2 | Dallas Ballroom A1 |
| 3:45 PM – 5:00 PM | Technical Session D2 | Dallas Ballroom D1 |
| 4:00 PM – 5:30 PM | Art and Photo Contest Pick-up | The Grand Hall |
| 5:30 PM – 7:00 PM | Awards Ceremony | Dallas Ballroom BC |
| 7:00 PM – 10:00 PM | Awards Reception | The Grand Hall |

## Sunday, 11 February 2018

| | | |
|---|---|---|
| 7:00 AM – 7:30 AM | Fellowship of Christian Conservationists | Pearl 1* |
| 7:30 AM – 10:00 AM | Registration | The Grand Hall |
| 8:00 AM – 9:30 AM | Technical Session A3 | Dallas Ballroom A3 |
| 8:00 AM – 9:30 AM | Technical Session B3 | Dallas Ballroom D3 |
| 8:00 AM – 9:30 AM | Technical Session C3 | Dallas Ballroom A1 |
| 8:00 AM – 9:30 AM | Technical Session D3 | Dallas Ballroom D1 |
| 9:30 AM – 10:00 AM | Break | The Grand Hall |
| 10:00 AM – 11:30 AM | Technical Session A4 | Dallas Ballroom A3 |
| 10:00 AM – 11:30 AM | Technical Session B4 | Dallas Ballroom D3 |
| 10:00 AM – 11:00 AM | Technical Session C4 | Dallas Ballroom A1 |
| 8:00 AM – 2:00 PM | James G. Teer Leadership Institute | Cityview 7* |
| 8:00 AM – 10:00 AM | Poster Removal | The Grand Hall |
| 9:00 AM – 11:00 AM | TCTWS Executive Board Meeting | Chaparral Boardroom* |
| 11:30 AM | Adjourn | |

*Rooms marked with an asterisk are located in the Sheraton Hotel. All others are in the convention space.

# Venue Layout



# Saturday, 10 February 2018

## PLENARY SESSION
## DALLAS BALLROOM BC
## MODERATOR: JOHN SILOVSKY

**8:00** **Welcome and Introduction** – Corey Mason, President, Texas Chapter of the Wildlife Society

**8:10** **Steve Williams** – President, Wildlife Management Institute

**8:35** **Greg Simons** – Owner, Wildlife Systems, Inc.

**9:00** **John McDonald** – President, The Wildlife Society

**9:25** **Tina Yturria Buford** – Director of Education, East Foundation

**9:50** **Panel Discussion and Q&A**

**10:15** **Break**

## CLARENCE COTTAM AWARD COMPETITION
## DALLAS BALLROOM BC
## MODERATOR: JOHN KINSEY

**10:45** **Breeding Bird Response to Post Oak Savanna Restoration in Eastern Texas 8 Year Post-management,** Courtney K. McInnerney, Christopher Comer, and Jeffery Gunnels

**11:00** **The Importance of Unbiased Sampling for Informing Conservation Policy: A Case Study with Jollyville Plateau Salamanders,** Zachary C. Adcock and Michael R. J. Forstner

**11:15** **Analysis of Allelic Variation in Prion Protein Gene of Texas Mule Deer,** Gael A. Sanchez, Randall W. DeYoung , Damon L. Williford, David G. Hewitt, Timothy E. Fulbright, Humberto Perotto-Baldiviseo, Louis A. Harveson, and Shawn Gray

**11:30** **Taking Them Under My Wing: Integrating Wild Bird Conservation Curriculum into the Sixth and Seventh Grade Classroom,** Janel L. Ortiz, April A. Torres Conkey, Leonard A. Brennan, La Vonne Fedynich, Marybeth Green

**11:45** **Factors Affecting Detection Probability and Abundance of White-winged Doves in Texas,** Conor J. McInnerney, Heather A. Mathewson, Thomas W. Schwertner, Shaun L. Oldenburger, Mike Frisbie, Jared D. Hall

**12:00** **Modeling Translocation Strategies for Pronghorn Populations in the Trans-Pecos, Texas,** Philip J. Boyd, Patricia Moody Harveson, Louis A. Harveson, Whitney J. Gann, Shawn S. Gray

**12:15** **Lunch**

## SESSION A1: CONSERVATION AND MANAGEMENT OF QUAIL
## DALLAS BALLROOM A3
## MODERATOR: JIM RAY

**1:45** **Evaluation of Land-Restoration Practices on Northern Bobwhite Survival and Productivity in North-central Texas,** Danielle E. Belleny, Heather A. Mathewson, Jeff B. Breeden, John Tomecek, Thomas W. Schwertner, and Jim Giocomo

**2:00** **Influences of Temperature on Resource Selection by Northern Bobwhites,** Brandon J. Palmer, Benjamin R. Olsen, Ellart J. Vreugdenhil, Geron G. Gowdy, Timothy E. Fulbright, Eric D. Grahmann, Fidel Hernandez, Michael W. Hehman, and David B. Wester

**2:15** **Monitoring Changes in Northern Bobwhite Density and Vegetation Structure Within a Large-scale Experimental Grazing Study in South Texas,** Andrea Bruno, Leonard A. Brennan, Michael L. Morrison, Eric D. Grahmann, and Andrew N. Tri

**2:30** **Impacts of Red Imported Fire Ants on Northern Bobwhites,** Kelly M. Redmond, Nicole A. Hansen, William L. Lutz, Taylor R. Shirley, Andrew P. Nicholson, Eric D. Grahmann, Fidel Hernandez, Leonard A. Brennan, Timothy Anderson, Kirk Feuerbacher, and Michael E. Morrow

**2:45** **Foraging Site Selection of Montezuma Quail in the Capitan Mountain of New Mexico,** Karlee D. Cork and Ryan S. Luna

**3:00** **Canopy Cover Selection of Montezuma Quail in the Capitan Mountains of New Mexico,** Elizabeth Oaster, Karlee Cork, Ryan S. Luna, Ryan O'Shaughnessy, and Dan Foley

## SESSION B1: CONSERVATION AND MANAGEMENT OF NONGAME AND NON-NATIVE MAMMALS
## DALLAS BALLROOM D3
## MODERATOR: WHITNEY GANN

**1:45** **Exploring Detailed GPS Collar Data Analysis of Movements to Approximate Visual Observation Results Using Dama Gazelle as the Subject,** Elizabeth Cary Mungall and Christian Mungall

**2:00** **MATLAB-based Analysis Techniques for Detailed Investigations of Group Constitution and Daily Movements of Gazelles,** Christian Mungall and Elizabeth Cary Mungall

**2:15** **Determining the Seasonal Diets of Waterbuck Located in Central Texas Using Microhistological Analysis,** Kaitlin N. Lopez, James Gallagher, Dittmar Hahn, David Rodriguez, and Thomas R. Simpson

**2:30** **Baseline Activity of Cave Myotis Colonies Prior to the Arrival of White-nose Syndrome, Lilianna K. Wolf,** Melissa B. Meierhofer, Brian L. Pierce, Joseph M. Szewczak, Jonah W. Evans, and Michael L. Morrison

**2:45** **Baseline Data on Overwintering Bats and Roosts in Texas,** Melissa B. Meierhofer, Krysta D. Demere, Brian L. Pierce, Joseph M. Szewczak, Jonah W. Evans, Michael L. Morrison

**3:00** **Naturalization of North American Porcupines in Texas, Effects of Rangeland, and Management Techniques,** Andrea E. Montalvo and Roel R. Lopez

## SESSION C1: HUMAN DIMENSIONS AND HUMAN-WILDLIFE CONFLICTS I
## DALLAS BALLROOM A1
## MODERATOR: RICHARD HEILBRUN

**1:45** **When Worlds Collide: Bird–Window Collision Mortality on a Continental Scale,** April A. Conkey, Stephen B. Hager, Bradley J. Cosentino, et al.

**2:00** **An Analysis of Factors Associated with Wildlife Road Mortalities in South Texas,** Trinity D. Livingston, Kevin Ryer, Richard J. Kline, and John Young, Jr.

**2:15** **Analytical Comparison of Carnivore-Human Conflict Management,** Elliott A. Foxley

**2:30** **Wildlife and Habitat Management Program at Dallas/Fort Worth International Airport, Texas: Mitigation Efforts to Minimize Wildlife Strikes with Aircraft,** Hannah M. Ashbaugh, and Catherine A. Boyles

**2:45** **Nuisance American Alligators and Evaluation of Translocation as a Management Strategy,** Cord B. Eversole, Scott E. Henke, Selma N. Glasscock, Randy L. Powell, David B. Wester, and Bart M. Ballard

**3:00** **Vacant**

## SESSION D1: HABITAT AND VEGETATION MANAGEMENT
## DALLAS BALLROOM D1
## MODERATOR: DEVIN ERXLEBEN

**1:45** **Comparison of Season of Burning Effects on Mortality and Recruitment of Gulf Cordgrass,** Jose S. Avila-Sanchez, Victoria L. Haynes, Sandra Rideout-Hanzak, David B. Wester, Jose A. Ortega-S, and Tyler A. Campbell

**2:00** **Regrowth of Angleton Bluestem Following Warm Season Prescribed Burning,** Jose S. Avila-Sanchez, Zachary Pearson, Heather N. Sanders, Chase H. Walther, Sandra Rideout-Hanzak, David B. Wester, and Terry Blankenship

**2:15** **Transforming Mesquite-Texas Wintergrass-Dominated Plant Communities into Native Grassland Bird Habitat,** Michael F. Machart, Darrel B. Murray, and James P. Muir

**2:30** **Analysis of Unmanned Aerial System Imagery to Map Emergent Aquatic Vegetation in a Constructed Wetland,** Kristy A. Kollaus, Thomas C. Heard, Rachel Williams, Lucas Chavez, Matthew Symmank, and Thomas B. Hardy

**2:45** **Use of Ground Juniper in Wildlife and Livestock Feeds,** Jessica L. Glasscock , David G. Hewitt, Travis R. Whitney, Susan M. Cooper, Fred C. Bryant, and Christina M. Toenjes

**3:00** **Vacant**

## SESSION A2: CONSERVATION AND MANAGEMENT OF MIGRATORY GAMEBIRDS
## DALLAS BALLROOM A3
## MODERATOR: BRIAN PIERCE

**3:45** **Annual Survival, Recover, and Molt Chronology of White-winged Doves in Texas,** Jared D. Hall, Heather A. Mathewson, Shaun L. Oldenburger, Thomas W. Schwertner, and Mike Frisbie

**4:00** **An Examination of Long-distance Flights of Sandhill Cranes During Winter on the Southern High Plains of Texas and New Mexico,** Kathryn J. Brautigam, Blake A. Grisham, William P. Johnson, Dan P. Collins, Shaun Oldenburger, Jude Smith, and Warren C. Conway

**4:15** **Autumn and Wintering Movement Ecology of Gulf Coast Subpopulation Sandhill Cranes,** Emily D. Wells, Bart M. Ballard, Shaun L. Oldenburger, Daniel P. Collins, David A. Brandt, Aaron T. Pearse, Humberto L. Perotto-Baldivieso, and David Wolfson

**4:30** **Characterization of Waterfowl Forage and Carrying Capacity Estimates for Stock Ponds of the MT7 Ranch, Stevens County, Texas,** James R. Morel, Samantha S. Kahl, Blake A. Grisham , Kevin J. Kraai, Daniel P. Collins, and Warren C. Conway

**4:45** **Winter Movements and Habitat Use by Greater White-fronted Geese,** Jay A. VonBank, Bart M. Ballard, Kevin J. Kraai, Mitch D. Weegman, Daniel P. Collins, and Humberto L. Perotto-Baldivieso

## SESSION B2: CARNIVORE ECOLOGY AND MANAGEMENT
## DALLAS BALLROOM D3
## MODERATOR: JOHN TOMECEK

**3:45** **Status of Swift Foxes in Northwestern Texas,** Gregory C. Pavur, Philip S. Gipson, Souparno Ghosh, Colton D. Laws, John T. Baccus, Perna Gamage, and Manuel De Leon

**4:00** **Assessment of the Condition of Artificial Escape Dens and Use by Swift Foxes 10 Years Post-establishment,** Colton D. Laws, Greg Pavur, Philip S. Gipson, John T. Baccus, Souparno Ghosh, and Kevin Mulligan

**4:15** **Spatial Ecology and Landscape-Scale Behavior of Coyotes in South Texas,** Justin T. French and John M. Tomecek

**4:30** **Environmental Factors Affecting Mesopredator Occupancy in an Urban Area on the Southern High Plains of Texas,** Christopher R. Carter, Warren C. Conway, Mark C. Wallace, and Robert D. Bradley

**4:45** **Simulation of Black Bear Dispersal from Populations in Louisiana, Arkansas, and Oklahoma to Areas of Suitable Habitat in East Texas,** Tanh T. Nguyen, Caitlin Glymph, Christopher E. Comer, and Daniel G. Scognamillo

## SESSION C2: HUMAN DIMENSIONS AND HUMAN-WILDLIFE CONFLICTS II
## DALLAS BALLROOM A1
## MODERATOR: APRIL CONKEY

**3:45** **The Influence of Livestock Protection Dogs on Mesocarnivore Activity in the Edwards Plateau of Texas,** Nick Bromen, John M. Tomeček, and Justin French

**4:00** **Public Duck Hunter Demographics at Richland Creek Wildlife Management Area, Texas,** Matthew E. Symmank

**4:15** **Human Dimensions of Conservation Photographers in Wildlife Management,** William C. Colson, April A. Torres Conkey, Scott E. Henke, Richard L. Miller, Glenn Perrigo, and La Vonne Fedynich

**4:30** **Recovering America's Wildlife Act: A Game-Changing Opportunity to Expand Wildlife Management in Texas,** John Shepperd

**4:45** **Vacant**

## SESSION D2: INNOVATIONS IN WILDLIFE MANAGEMENT I
## DALLAS BALLROOM D1
## MODERATOR: DARREL MURRAY

**3:45** **Invisible Larval Zebra Mussels: What Dogs' Noses Can Tell Us About What We Can't See,** Laura J. Speight and Aimee Hurt

**4:00** **Using Morphological Measurements to Distinguish Between Sexes of Grassland Birds in the Chihuahuan Desert, Texas,** Jacob C. Locke, Kaitlyn M. Williams, and Ryan S. Luna

**4:15** **Reducing Cowbird Control Costs at Fort Hood: Implications for Black Capped Vireo Recovery,** Scott G. Summers and David A. Cimprich

**4:30** **Improving Avian Species Distribution Models by Incorporating Biotic Interactions,** Rachel R. Fern, Michael L. Morrison, Jeremy Baumgardt, and Tyler A. Campbell

**4:45** **Modeling Audible Detection of Prairie Grouse Booming Informs Survey Design,** Matthew J. Butler and R. Douglas Holt

## Sunday, 11 February 2018

### SESSION A3: CONSERVATION AND MANAGEMENT OF NONGAME BIRDS I
### DALLAS BALLROOM A3
### MODERATOR: JIM MUELLER

**8:00** **Wintering Plover Use of a Public Beach After Hurricane Harvey: Preliminary Observations on Changes in Habitat and Human Disturbance,** Amanda D. Hackney, Susan Heath, Kacy Ray, and Kristen Vale

**8:15** **Interactive Effects of Severe Drought and Grazing on the Life History Cycle of a Bioindicator Species,** Sarah Fritts, Blake Grisham, Robert D. Cox, Clint W. Boal, David A. Haukos, Patricia McDaniel, Christian A. Hagen, and Daniel U. Greene

**8:30** **The Influence of Age Structure on Pairing and Territory Success of an Endangered Songbird,** Drew S. Finn

**8:45** **Conservation and Mitigation Effects on Rates of Golden-cheeked Warbler Habitat Loss,** Nancy A. Heger and Tom Hayes

**9:00** **Influences of Catastrophic Weather Events on the Endangered Attwater's Prairie Chicken,** Jennifer M. Romero, Michael L. Morrison, and Michael E. Morrow

**9:15** **American Kestrel Nest Survival and Productivity in the Llano Estacado of Texas,** Shea D. Mullican, Clint W. Boal, Warren C. Conway, and Richard D. Stevens

### SESSION B3: CONSERVATION AND MANAGEMENT OF BIG GAME I
### DALLAS BALLROOM D3
### MODERATOR: DONALD BEARD

**8:00** **Status Update: The Collaborative Trans-Pecos Pronghorn Restoration Effort,** Whitney J. Gann, Louis A. Harveson, and Shawn S. Gray

**8:15** **Available Forage and Vegetative Structure in the Northern Sacramento Mountains, and the Potential Impact on Neonatal Pronghorn Survival,** Courtney L. Ramsey, Warren C. Conway, Robert D. Cox, James W. Cain, III, and Robert D. Bradley

**8:30** **Rangeland Suitability Model for the Texas State Bison Herd in Caprock Canyons State Park,** a'Lisa M. McAnally, Heather A. Mathewson, Thomas W. Schwertner, Jeff B. Breeden, Hemanta Kafley, and Donald Beard

**8:45** **Panhandle Mule Deer: A Survey of Body Condition, Size, Reproductive Output, and Antler Growth,** Levi J. Heffelfinger, Laura S. Warner, David G. Hewitt, Shawn S. Gray, Warren C. Conway, Timothy E. Fulbright, Randy W. DeYoung, and Louis A. Harveson

**9:00** **Influence of Agriculture on Mule Deer Diets and Nutrition in the Texas Panhandle,** Jacob R. Lampman, Laura S. Warner, Louis A. Harveson, Whitney J. Gann, David G. Hewitt, Warren C. Conway, and Shawn S. Gray

**9:15** **The Other Supplemental Feed: How Crop Use Affects Mule Deer Movements in the Texas Panhandle,** Laura S. Warner, Levi J. Heffelfinger, Jacob R. Lampman, Dave G. Hewitt, Shawn S. Gray, Dana J. Wright, Warren C. Conway, Tim E. Fulbright, Randy W. DeYoung, and Louis A. Harveson

## SESSION C3: CONSERVATION AND MANAGEMENT OF REPTILES AND AMPHIBIANS I
## DALLAS BALLROOM A1
## MODERATOR: MIKE MILLER

**8:00** **Population Structure, Distribution, and Habitat Use of American Alligators at an Urban Coastal Site,** Cord B. Eversole, Scott E. Henke, Selma N. Glasscock, Randy L. Powell, David B. Wester, and Bart M. Ballard

**8:15** **A Theoretical Population and Harvest Model for American Alligators,** Cord B. Eversole, Scott E. Henke, Benjamin L. Turner, Selma N. Glasscock, Randy L. Powell, David B. Wester, and Bart M. Ballard

**8:30** **Exploring Trade-offs Between Survival and Reproduction in Yellow Mud Turtles in Texas,** Jonathan A. Zenor, Richard T. Kazmaier, Mark J. Lange, and Trevor J. McVay

**8:45** **Neonate Cottonmouth Spatial Ecology and Habitat Selection: From Parturition to Hibernation,** Zackary J. Delisle, Dean Ransom, Lani Lyman-Henley, and Johanna Delgado-Acevedo

**9:00** **Niche Overlap in a Coastal Texas Aquatic Snake Community,** Logan D. Ediger, Richard T. Kazmaier, and Daniel P. Walker

**9:15** **Functional Distance and Establishment of Non-native Species with Complex Life Cycles,** Christopher M. Schalk, Carmen G. Montana, Kelsey Kralman, and Daniel J. Leavitt

## SESSION D3: INNOVATIONS IN WILDLIFE MANAGEMENT II
## DALLAS BALLROOM D1
## MODERATOR: BLAKE MURDEN

**8:00** **Demonstration of a Multi-species, Multi-response State-and-transition Model Approach to Help Inform Wildlife Management,** Ashley M. Long, Melanie R. Colón, Tiffany M. McFarland, Helen T. Davis, Sean M. Laverty, Joseph A. Grzybowski, Heather A. Mathewson, and Michael L. Morrison

**8:15** **Potential Strike Hazard Posed by White-winged Doves to Military Aircraft in Central Texas,** Melanie R. Colon, Clay Thompson, and Ashley M. Long

**8:30** **Evaluations of Distance Sampling and Occupancy Modeling as Targets for a Long-term Monitoring Program for Bird Populations,** Jeremy A. Baumgardt, Michael L. Morrison, Leanord A. Brennan, and Tyler A. Campbell

**8:45** **Using Acoustic Monitors to Assess At-risk Species in Survey Locations with Limited Access,** Sarah J. Turner, Brian L. Pierce, Charles E. Dixon, Francisco A. Cartaya, and Krysta D. Demere

**9:00** **Environmental Influences on Age Differences Between Cementum Annuli and Tooth Replacement and Wear in White-tailed Deer,** Oscar Cortez, Aaron Foley, Charlie DeYoung, David G. Hewitt, and Randy DeYoung

**9:15** **Tooth Wear of White-tailed Deer Consuming Pelleted Ration and Browse Diet,** Sterling G. Spilinek and Floyd W. Weckerly

## SESSION A4: CONSERVATION AND MANAGEMENT OF NONGAME BIRDS II
## DALLAS BALLROOM A3
## MODERATOR: WARREN CONWAY

**10:00** **Partitioning of Foraging Habitat Amongst Kingfishers Along the South Llano River, Texas,** Griffin D. Chodacki and Ben R. Skipper

**10:15** **Effects of Cover Type on Presence and Distribution of Grassland Birds in the Oaks and Prairies Region of Texas,** Helen Davis, Meta Griffin, James Giocomo, Kenneth Gee, Steven Riley, Anna Matthews, M. Clay Green, Jeff Raasch, and Robert Perez

**10:30** **Scaled Quail and Grassland Birds as Indicators of Grassland Health in the Chihuahuan Desert,** Kaitlyn M. Williams, Katherine J. Sauer, Ryan S. Luna, Ryan O'Shaughnessy, and Warren C. Conway

**10:45** **Habitat Associations of Migratory Birds in South Texas,** Samantha J. Wolfe, Arlene J. Arnold, Bart M. Ballard, Matthew J. Schnupp, and John T. Edwards

**11:00** **Selection of Island Habitat by a Texas Population of Purple Martin During the Non-breeding Season,** James D. Ray, Kevin C. Fraser, Auriel Fournier, and Amanda Shave

**11:15** **Vacant**

## SESSION B4: CONSERVATION AND MANAGEMENT OF BIG GAME II
## DALLAS BALLROOM D3
## MODERATOR: JEFF BREEDEN

**10:00** **Roosevelt Elk Use and Selection of a New Meadow in Redwood National and State Parks,** Aaron S. McGuire and Floyd W. Weckerly

**10:15** **Social Dominance Affects Pelleted Feed Consumption by White-tailed Deer in South Texas,** Emily H. Belser, David G. Hewitt, Timothy E. Fulbright, Charles A. DeYoung, Thomas W. Boutton, David B. Wester, and Don A. Draeger

**10:30** **Effects of White-tailed Deer Density and Deer:Feeder Ratio on Population Growth Rates,** Daniel B. Brown, Charles A. DeYoung, Timothy E. Fulbright, David G. Hewitt, Lindsey M. Phillips, and Don A. Draeger

**10:45** **Effects of White-tailed Deer Density and Feeder Density on Antler Growth,** Ryan M. Rothstein, Charles A. DeYoung, David G. Hewitt, Timothy E. Fulbright, Lindsey M. Phillips, and Donnie A. Draeger

**11:00** **Effects of White-tailed Deer and Supplemental Feeder Density on Wood Species Composition,** Onalise R. Hill, Lindsey M. Phillips, Timothy E. Fulbright, David G. Hewitt, Charles A. DeYoung, David B. Wester, and Don A. Draeger

**11:15** **Does White-tailed Deer Browsing Result in Browse Lines and Changes in Mast Production of 3 Preferred South Texas Woody Plants?** Lindsey M. Phillips, Onalise R. Hill, Timothy E. Fulbright, David G. Hewitt, Charles A. DeYoung, and Don A. Draeger

## SESSION C4: CONSERVATION AND MANAGEMENT OF REPTILES AND AMPHIBIANS II
## DALLAS BALLROOM A1
## MODERATOR: CONOR MCINNERNEY

**10:00** **Relationships Between Canopy Cover and Herpetofauna in an Eastern Texas Woodland,** Erin E. Stiede and Richard T. Kazmaier

**10:15** **Phylogeographic Structure of Spot-tailed Earless Lizards: 1 Species or 2?** Toby J. Hibbitts, Wade A. Ryberg, Johanna Harvey, Gary Voelker, Michelle Lawing, Connor S. Adams, Dalton B. Neuharth, Drew E. Dittmer, C. Michael Duran, Brad D. Wolaver, Jon Paul Pierre, Benjamin J. Labay, and Travis J. LaDuc

**10:30** **Home Range and Habitat Associations of the Spot-tailed Earless Lizard,** Danielle K. Walkup, Shelby Frizzell, Dalton Neuharth, Connor S. Adams, Timothy Johnson, Wade A. Ryberg, and Toby J. Hibbitts

**10:45** **Life in the Thornscrub: Movement, Home Range, and Territoriality of the Reticulate Collared Lizard,** Wade A. Ryberg, Timothy B. Garrett, Connor S. Adams, Tyler A. Campbell, Danielle K. Walkup, Timothy E. Johnson, and Toby J. Hibbitts

**11:00** **Peeping Herpetology: How to Spy on Black-spotted Newts and Other Herpetofauna,** Evan Bare and Richard Kline

**11:15** **Vacant**

## POSTER SESSION
## 5:00 PM – 6:30 PM FRIDAY, 9 FEBRUARY (JUDGING)
## 8:00 AM – 5:30 PM SATURDAY, 10 FEBRUARY (DISPLAY ONLY)
## GRAND HALL
## ORGANIZERS: HEATHER MATHEWSON AND PENNY WILKERSON

01. **Calling Phenology of the Common Pauraque in the Northernmost Part of Its Range,** Cory K. Adams, Daniel Saenz, Clifford E. Shackelford, and James D. Childress
02. **Evaluating Effectiveness of Wildlife Crossings Using Camera Traps in South Texas,** Michelle E. Adcock, Joshua D. Renner, M. Clay Green, and Thomas R. Simpson
03. **Behavioral Effects of Environmental Enrichment on Captive Northern Bobwhites,** Stefanie G. Aguallo, Kari D. Waddle, Heather A. Mathewson, and Kimberly Guay
04. **Effects of Prescribed Fire on Texas Horned Lizard Habitat and Food Supply,** Wyatt L. Bagwell, Darrel Murray, David Kattes, and Heather Mathewson
05. **Range Distribution Modeling for the Black-Spotted Newt,** Evan Bare, Richard Kline, Andrew Gluesenkamp, and Luis J. Peña
06. **Effects of the Synthetic Estrogen, 17α-ethinylestradiol, on Fountain Darter Populations,** Jennifer M. Borski, Andrew Richardson, Hsiao-Hsuan "Rose" Wang, and William E. Grant
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# ABSTRACTS

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## Calling Phenology of the Common Pauraque in the Northernmost Part of Its Range

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**ABSTRACT:** The common pauraque (*Nyctidromus albicollis*) is a large, long-tailed, nightjar that has a vast geographic range extending from southern Texas south to Brazil and northern Argentina. They are common across their extensive range; however, very little is known about their basic biology. This nocturnal species typically roosts in brushy undergrowth during the day and can be found foraging and vocalizing in more open areas after dark. The pauraque is a non-migratory species; however, decreased sightings during certain periods of the year, in parts of their range, suggest seasonal shifts in activity. Like most birds, pauraques vocalize during the breeding season but are also known to vocalize after breeding has concluded in some areas. We examined the calling phenology of this species in the northernmost part of its range using automated recording units on Powderhorn Ranch, Calhoun County, along the central coast of Texas. We recorded calling pauraques at all of our sites, but calls were given only between sunset and sunrise. Seasonal shifts in calling activity was evident with more calling detections observed during spring and summer months; however, calling was detected every month of the year except January. We concluded that common pauraque concentrate their calling during certain times of the year, associated with breeding. However, vocalizations outside of the breeding season suggest a more complex communication system in this species that we do not fully understand.

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## The Importance of Unbiased Sampling for Informing Conservation Policy: A Case Study with Jollyville Plateau Salamanders

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**ABSTRACT:** Properly identifying habitat is critical for conservation and management of wildlife and biased habitat descriptions can influence subsequent studies, conservation efforts, and management policy. The U.S. Fish and Wildlife Service (USFWS) listed Jollyville Plateau salamanders (JPS; *Eurycea tonkawae*) as threatened in 2013, designated critical habitat units (CHUs), and defined preferred refugia habitat in the listing documents. The USFWS predominately described these habitat parameters based on traditional surveys of searching for JPS under cobble near spring discharges. We sought to evaluate the listing decision habitat designations with unbiased sampling that spanned the full spring run and all potential refugia types. We conducted monthly surveys at 6 spring sites in Williamson and Travis Counties, Texas. We used dynamic occupancy models to estimate occupancy within and outside of the federal CHU. We used generalized linear models to evaluate salamander observation rate and density at increasing distances from spring discharges and among 4 refugia types commonly found in these springs. JPS observation rate and density decreased as distance downstream increased but JPS were found to occur outside of the CHU more than 50% of the time. We also conclude that JPS use all available refugia but may prefer vegetation, which was previously considered suboptimal habitat. We demonstrate that an unbiased approach to sampling yields contradictory results to previous habitat descriptions and current conservation policy for JPS. We encourage wildlife practitioners to consider the evolutionary ecology of their target taxa and if current and historic sampling techniques may lead to inadequate habitat descriptions.

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## Evaluating Effectiveness of Wildlife Crossings Using Camera Traps in South Texas

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**ABSTRACT:** Evaluating the effectiveness of road crossings for vertebrate wildlife is warranted to 1) reduce wildlife mortality by vehicular collisions, 2) determine habitat connectivity and wildlife movement within and among landscape corridors, and 3) draw inferences of community ecology dynamics in regard to wildlife usage. Camera traps serve as a noninvasive sampling method to not only detect common species, but also detect species difficult to capture (e.g., rare or elusive) using other methods. We deployed 52 camera traps at twelve wildlife crossings within 3 counties (Live Oak, Cameron, and Webb) in south Texas over the summer and fall of 2017. The purpose of our study is to 1) evaluate the effectiveness of established wildlife crossings for vertebrate populations,

and 2) provide recommendations for the placement of future wildlife crossings to facilitate movement. Here we include preliminary results from our early trapping efforts. Notable detections to date include bobcat (*Lynx rufus*) at every crossing location, and some rare species, such as the long-tailed weasel (*Mustela frenata*) and the Texas indigo snake (*Drymarchon melanurus erebennus*), each observed once at one crossing location. The study area is an important region for wildlife conservation within Texas, as it includes numerous state and federally listed species that are at the northern extent of their subtropical range and/or are restricted to the Tamaulipan biotic province. Habitat fragmentation and wildlife/vehicle interactions from roads are a leading conservation threat stemming from rapid human population growth in this unique ecoregion.

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## Behavioral Effects of Environmental Enrichment on Captive Northern Bobwhites

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**ABSTRACT:** High quality of life standards are important for populations of captive animals. Physical and behavioral benefits of environmental enrichment and stimulation has been documented for captive animals. The purpose of this study was to determine how alterations to the environment of captive northern bobwhite (*Colinus virginianus*) influenced behavior. We predicted that enrichment would reduce behaviors associated with stress and vigilance. We also predicted that birds exposed to enrichment would gain weight because of increased feeding allowed by a reduction in vigilance behaviors. We divided a population of quail from the Tarleton State University aviary into 4 enclosures with equivalent gender ratios consisting of 27 males and 19 females. We rotated 3 categories of enrichment (novelty items, vertical structure, and food-based supplemental enrichment) through 3 of the 4 enclosures on 36-hr rotations, allowing the fourth enclosure to serve as the control with no enrichment application. We recorded pretreatment behavior via video recordings from 2 camera angles in each enclosure. We developed an ethogram to identify behaviors associated with stress and normal activity. We set each video camera to record continuously for 36 h. We collected behavior data using Noldus Observer XT behavior software. We weighed 10 banded-birds from each enclosure at 4 intervals through the duration of the study to monitor body condition changes in the population. Preliminary results suggest that aggressive behavior was likely reduced and eating and drinking increased in the enclosures with enrichment. Our results will assist in the health and well-being of captive quail populations.

## Wildlife and Habitat Management Program at Dallas/Fort Worth International Airport, Texas: Mitigation Efforts to Minimize Wildlife Strikes with Aircraft

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**ABSTRACT:** CFR Part 139 Certificated airports are required by the Federal Aviation Administration (FAA) to conduct a formal yearlong Wildlife Hazard Assessment, and mitigate wildlife hazards on and near airport property through subsequent Wildlife Hazard Management Plans. While all airports are different and deal with a wide variety of wildlife challenges due to geographic location, surrounding habitat, and environmental concerns, all rely on both pro-active and reactive tools to address these challenges. However, potential for aircraft and wildlife to occupy the same space at the same time continues to challenge airport wildlife biologists to ensure safe air operations. Understanding the wildlife hazards and attractants specific to each airport is imperative to establishing and implementing an effective management program. This is accomplished by C3 (Communicate, Collaborate, and Coordinate) at Dallas/Fort Worth International Airport (DFW). DFW is approximately 9,026 ha with multiple habitat types ranging from grasslands to watersheds, resulting in significant wildlife diversity. By partnering with multiple internal departments, governmental agencies, outside professionals, and the community, DFW takes a holistic approach to aviation safety. Using both tactical and strategic methods that include deterrents, repellents, dispersal, preventive habitat management, and even botany and falconry, DFW exceeds the FAA's minimum standards to address airport wildlife challenges.

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## Comparison of Season of Burning Effects on Mortality and Recruitment of Gulf Cordgrass

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**ABSTRACT:** Gulf cordgrass (*Spartina spartinae* [Trin.] Merr. ex Hitchc.) is a productive, warm season, perennial bunchgrass. It is an evergreen plant, and can provide valuable forage for livestock

and wildlife when green, particularly during drought when other forage grasses may be sparse. However, a problem arises when gulf cordgrass becomes mature; leaves and stems are very coarse, low in palatability and nutritive value. Removing mature growth encourages greater production of tender, palatable shoots. One way of rejuvenating aging stands of gulf cordgrass is prescribed burning. Effects of prescribed burning on a plant depend upon the amount of heat the plant receives, and the timing of the fire in the plant's seasonal life cycle. Bunchgrass meristems, or growing points, are susceptible to exposure to high temperatures depending on their placement above or below the soil surface. In my study we have applied prescribed burning at the pasture scale in coastal grasslands dominated by either gulf cordgrass or seacoast bluestem (*Schizachyrium scoparium* var. *littorale* [Nash] Gould). We burned 2 200-hectare pastures in both winter and summer 2016 and 2017 for a total of 8 pastures, and we have 2 control (no burn) plots. Plant mortality preliminary results indicate higher mortality of gulf cordgrass in summer 2016 burn plots than in control plots. Summer burn plots had 15 dead plants per our 8-$m^2$ sampling unit, representing 29% of total cordgrass individuals. Additionally, odds of mortality increase 36% for each 37.8$^{0}$ C increase. Early results show no differences in recruitment among treatments.

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## Regrowth of Angleton Bluestem Following Warm Season Prescribed Burning

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**ABSTRACT:** Historically, fire was present on the Gulf Coast Prairie of Texas recurring more frequently than every 10 years. With the removal of fire and intensified cattle grazing, invasive, non-native grasses became established in monotypic stands. In 2014, we initiated a season of burn study on the Welder Wildlife Refuge in San Patricio County, Texas, in an area dominated by Angleton bluestem (*Dichanthium aristatum* [Poir.] C.E. Hubbard). We established 10 0.01-ha grazing exclosures, and randomly assigned a treatment of either winter burn, summer burn, or control (no burn).

Summer burn plots were burned in August 2014 and again in August 2017. After summer 2017 burn treatments, we sampled vegetative cover and ground cover in the summer burn plots (4) and control plots (2). We used a 10-point frame every 2 weeks for 6 sampling periods. We hypothesized that burning would result in increased growth of vegetative cover because of increased light and available space. We will present a comparison of cover in the summer burned plots and control plots following summer burning, as well as a discussion of burn temperature and precipitation just prior to and following treatment.

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## Effects of Prescribed Fire on Texas Horned Lizard Habitat and Food Supply

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**ABSTRACT:** The Texas horned lizard (*Phrynosoma cornutum*) was once abundant across Texas, but it is now a threatened species. Little is known about how land management practices might influence these lizard's habitat and food resources. We conducted a study at the Muse Wildlife Management Area in Brown County to determine effects of prescribed fire on reintroduced lizards while hibernating and to evaluate changes in habitat structure and food supply. Texas horned lizards typically overwinter under small trees, shrubs, or bunch grasses. At each site, we installed belowground temperature sensors to monitor temperature during a fire and aboveground datalogging temperature probes to monitor changing ambient temperature related to post-fire vegetation changes. We used a Robel pole to measure visual obstruction readings pre- and post-fire to observe changes in vegetative structure. We also surveyed red imported fire ants (*Solenopsis invicta*) and harvester ants (*Pogonyrmex* spp.) following a prescribed burn in an unburned and a burned site to examine potential effects of the prescribed fire on lizard food supply. We observed that changes in the vegetation structure did not affect aboveground ambient temperature below the vegetation. The belowground temperature sensors did not record detectable changes in temperature as the fire burned, suggesting fire would not influence the temperature for hibernating lizards. We are currently analyzing ant data. This study's results on the temperature imply that prescribed burning in the cross-timbers and prairies ecoregion is potentially safe for overwintering Texas horned lizards.

## Peeping Herpetology: How to Spy on Black-spotted Newts and Other Herpetofauna

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**ABSTRACT:** Black-spotted newts (*Notophthalmus meridionalis*) are a poorly studied amphibian species of Southern Texas. A dearth in research has resulted in minimal knowledge regarding their habitat use and behavior, leaving only subjective hypotheses. Coastal thornscrub habitat, common for black-spotted newts, experiences prolonged dry periods during which black-spotted newts are rarely seen and ephemeral ponds, where they can be found, dry out. Prior work with destructive digging strategies found black-spotted newts taking refuge underground but risks to the animal are severe and the procedure may be frowned upon by private landowners. Using a novel, non-invasive survey technique a borescope was used to capture pictures and video of black-spotted newts using fissures and burrows near dry pond beds. Extending on this concept, artificial burrows constructed as passive traps intended for borescope observation have also been used to find newts successfully. Thus far, six newts have been discovered residing in these microhabitats and additional newts have been observed crawling into fissures shortly after discovery. Regular use of these microhabitats by black-spotted newts, a behavior rarely observed in other *Notophthalmus* species, has been found in multiple populations suggesting it is a regular behavior and unique to the species. Borescope technology and artificial burrows offer cheap new avenues for surveying this cryptic species and also offer greater potential for herpetofauna monitoring.

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## Range Distribution Modeling for the Black-Spotted Newt

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**ABSTRACT:** Global amphibian declines have been a major concern in recent years. Habitat loss due to increased urbanization and agriculture have been linked to declines across the world, including in south Texas. Black-spotted newts (*Notophthlamus meridionalis*) have likewise been impacted by human intervention across their range. We investigated ecological variables associated with black-spotted newt habitation and depicted an updated range distribution model to the original range map (Mecham 1968). In addition, we identified variables that distinguish the 2 subspecies and the closely related eastern newt (*N. viridescens*). We identified 4 independent climate variables with significant impact ($R^2 > 0.05$) distinguishing the 3 newt groups studied: annual mean temperature ($R^2 = 0.315$, $P < 0.001$), temperature seasonality ($R^2 = 0.241$, $P < 0.001$), mean temperature of coldest quarter ($R^2 = 0.178$, $P < 0.001$), and precipitation of warmest quarter ($R^2 = 0.083$, $P < 0.001$). A set of 4 environmental variables (temperature seasonality, mean temperature of coldest quarter, soil organic carbon content, and soil pH) were found to correlate with subspecies division. Multidimensional scaling of environmental variables shows minimal overlap between black-spotted newt subspecies. The Texas black-spotted newt (*N. m. meridionalis*) shows a greater affinity for the Lower Rio Grande Valley, extending slightly into Tamaulipas, Mexico, tending towards the coastal shrublands. The Mexico black-spotted newt subspecies (*N. m. kallerti*) shows an affinity for the gulf coast and foothills of the Sierra Madres in central Mexico. Range overlap of the 2 subspecies most identifies with the southern subspecies. These new models are predictive in nature and provide a guide for future surveys.

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## Evaluations of Distance Sampling and Occupancy Modeling as Targets for a Long-term Monitoring Program for Bird Populations

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**ABSTRACT:** Long-term wildlife monitoring programs are useful for identifying impacts of management decisions and critical for recognizing effects of long-term weather patterns and climate change. Establishing a monitoring program requires key decisions including species and metrics. These decisions affect the sensitivity of the program, as well as cost to implement. Our objectives for this study were to evaluate the targets of occupancy and density for monitoring bird populations and provide recommendations for establishing a long-term monitoring program for the East Foundation in south Texas. We collected data by conducting 10-min point counts along 30 transects, each with 12 observation points. We used double observers and conducted 4–6

observations at each location from mid-April through June. We conducted 7,200 point counts in 2015 and 2016, resulting in >96,000 observations of >150 species of birds. We generated estimates of occupancy and density for 54 of the most common species and conducted power analyses to determine the effort required to reach sensitivities to detect a 50% decline in 25 years, a 30% decline in 10 years, and a 15% decline in 5 years with a power of 90%. We used these results to develop 3 alternative monitoring scenarios representing a range of sensitivities and implementation costs, and estimated the resulting power for each scenario for all 54 species. Our monitoring scenarios include conducting 6 counts at each point using double sampling, conducting 4 counts at each point with double sampling, and conducting 4 counts with only a single observer each year.

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## Evaluation of Land-Restoration Practices on Northern Bobwhite Survival and Productivity in North-central Texas

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**ABSTRACT:** Land restoration practices offer opportunities to mitigate population declines of important grassland species like northern bobwhite (*Colinus virginianus*). Our study addresses the effectiveness of restoration practices focused on improving bobwhite populations and the habitat structure upon which they rely. We examined breeding season survival, nest success, and vegetation characteristics of diurnal locations between treated and non-restored landscapes. Treated landscapes underwent restoration practices including native grass reseeding, prescribed grazing, and brush removal within the past 3 years; non-restored landscape did not. We radio-collared 182 bobwhites from 2016 ($n$ = 29) to 2017 ($n$ = 153) and located individuals 3 times/week via triangulation to collect metrics on land use and demographics. Survival estimates were obtained using Kaplan-Meier analysis with staggered entry design. Radio-marked individuals showed similar survivorship between years (43% in 2016, 41% in 2017). Breeding season survival in 2017 was higher for bobwhites in treated landscapes (51%, $n$ = 85) than non-restored landscapes (44%, $n$ = 68). We monitored 32 nests and evaluated the effects surrounding vegetation may have on nest success using logistic regression and AIC model selection. In 2016, nests in non-restored landscapes had a higher chance of success, 36% ($n$ = 10), compared to those in treated landscapes, 26% ($n$ = 4). In 2017 nests in

treated landscapes had a higher chance of success, 32% (n=14), compared to those in non-restored landscapes, 19% (n= 9). Top AIC models indicated that increased herbaceous ground cover, visual obscurity, and decreased litter ground cover predicted nest success.

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## Social Dominance Affects Pelleted Feed Consumption by White-tailed Deer in South Texas

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**ABSTRACT:** Providing pelleted feed for white-tailed deer (*Odocoileus virginianus*) is a common management practice in Texas. Previous research has shown that not all deer consume the same amount of supplemental feed, suggesting that social interactions at the feed sites may restrict access to the feeder for subordinate deer, such as young and female deer. Social dominance at feed sites may benefit dominant deer by reducing competition. Changing deer density and supplemental feeder density may change the accessibility of supplemental feeders. To test these hypotheses, pelleted feed was provided year round, ad libitum within 3 81-ha enclosures on 2 ranches in south Texas with the following numbers of deer and feeders, respectively: 20 and 1, 60 and 1, and 60 and 3. We used stable carbon isotope ratios (d13C) in deer serum to estimate supplemental feed in deer diets during March 2015. Social interactions at the feed sites were analyzed using trail cameras that recorded 30-sec videos with no delay in March 2015. Elo Rating in Program R was used to recreate the social hierarchy within each enclosure. We used a mixed model to determine the effect of a deer's Elo rating (dominance) on supplement consumption within the different treatments. As a deer's dominance increased, feed consumption increased ($P < 0.01$), but the importance of dominance was greatest in the 20 and 1 treatment ($P << 0.01$). These results suggest that during spring, dominance at feed sites allow those deer to consume more supplemental feed but that the effect of dominance on feed access diminishes at high deer densities.

## Effects of the Synthetic Estrogen, 17α-ethinylestradiol, on Fountain Darter Populations

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**ABSTRACT:** Found in the headwaters of the Comal and San Marcos River, the fountain darter (*Etheostoma fonticola*) is on average 3-cm length fish that feeds upon small invertebrates. It is considered endangered by the United States and the International Union for Conservation of Nature (IUCN). The darter has been controversial due to its location in the Edwards Aquifer in south-central Texas, which is recognized worldwide for its aquatic species of flora and fauna, many of which are endangered or threatened like the fountain darter. The Edwards Aquifer is also the sole water source supporting the industrial, agricultural, municipal, and recreational needs of nearly 2 million people. Because the darter generally is a poor competitor and is the first species affected by habitat disruption, it has been a focal point for controversies involving the Endangered Species Act, Texas groundwater law, and private property rights. We developed an age-structured population matrix model for the fountain darter, calibrated the model within the constraints of published parameter estimates. We then integrated the available synthetic estrogen contamination data of fathead minnow (*Pimephales promelas*) into the model. We finally used the model to project population dynamics under scenarios of increased synthetic estrogen contaminations. Population projections indicated that a decrease in population growth due to increased synthetic estrogen concentrations were seen and a decreasing population was found at 4.0 ng/L. At higher concentrations, the darter did not survive through its full life cycle.

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## Modeling Translocation Strategies for Pronghorn Populations in the Trans-Pecos, Texas

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**ABSTRACT:** In 2011, the Borderlands Research Institute and Texas Park and Wildlife Department (TPWD) began an effort to boost populations of pronghorn (*Antilocapra americana*) in the Trans-Pecos region of Texas. Restoration efforts involve translocating groups of pronghorn from the Texas Panhandle. Since 1978, TPWD has collected population estimate data using aerial surveys in the Trans-Pecos. A decrease from >17,000 pronghorn in the 1980s to a low of <4,000 in 2011 led to the initiation of translocation efforts. Habitat fragmentation in the Trans-Pecos has led to metapopulation arrangements which TPWD manages as 11 unique units. We sought to evaluate the effectiveness of various strategies in restoring regional pronghorn populations to a targeted population of 10,000 and estimated the probability of meta unit population quasi-extinction, and meta unit population extinction over a 20-year period. We used TPWD survey data and survival data from recent studies to develop a stochastic, stage-based simulation model. The models show that certain sustained translocation strategies can aid in increasing pronghorn populations in the Trans-Pecos beyond the additive increases contributed by each translocation, though the goal of 10,000 pronghorn is unlikely to be attained in the next 20 years. The most successful translocation strategy modeled involved translocating 1,000 pronghorn over 10 years to Trans-Pecos meta units that historically showed the most sustained success and were closest to their targeted goal.

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## An Examination of Long-distance Flights of Sandhill Cranes During Winter on the Southern High Plains of Texas and New Mexico

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**ABSTRACT:** The Southern High Plains of Texas and New Mexico makes up a significant portion in both size and selection of the winter range for the Mid-Continent Population (MCP) of lesser sandhill cranes (*Antigone canadensis canadensis*). Little information regarding sandhill crane movements during winter has been published to date, despite the fact that this region supports ±80% of the MCP. We observed short-duration, long-distance flights via data collected from Platform Terminal

Transmitters (*P*ITs) attached to 22 sandhill cranes, 2015–2017. We defined short-duration, long-distance flights as those which the individual arrived at entirely different region within the winter range in one day, regardless of duration at new region. We tested the hypotheses that these flights are outside the normal migratory trajectories and therefore 1) had purposeful ecological trajectory (e.g., toward newly replenished playas or a recently harvested grain field) or 2) were an escape strategy due to a disturbance. We performed trajectory analyses on 34 crane-winters and compared the dates of flights to dates of harvest of sorghum and corn crops, changes in surface water (both estimated through remote sensing), dates of various hunting season(s), and major stochastic weather events. Within-winter flights were not largely explained by any one covariate, and our sample exhibited high variation in timing and length of large movements. However, identified flights were non-random overall and could not be explained by migration alone ($P < 0.001$). Therefore, this suggests these within-winter flights are purposeful, but their contribution to survival remains unclear.

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## Cost Analysis of Coyote Removal to Aid Cattle Production in Texas

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**ABSTRACT:** Coyotes (*Canis latrans*) are native canids that range across North America and continue to be reported as a top livestock predator for multiple species of livestock. Ranchers throughout Texas contribute considerable time, money, and effort to remove coyotes through various lethal and non-lethal methods. Our objective was to determine the cost effectiveness of the various methods and combinations of methods of coyote control. We used Vensim systems modeling software to conduct multiple scenario simulations based on coyote population, ecological limitations, various common coyote control methods, timing of control application, cattle price, and percent of calf crop depredated. Eighty-eight total scenarios were tested for individual and multiple coyote management methods and number of applications of those methods per year. Use of snares (applied one month prior to calving) combined with the year-round use of livestock guard animals was the most cost effective method of coyote predation control for cattle. Scenarios of continuous coyote management throughout the year suggest that a dedicated call and shoot approach and/or the use of livestock guard animals provide the greatest overall benefit to cattle producers. The ecological value of coyotes to ecosystems (i.e., predator of rabbits, which are grazing competitors with cattle; mitigation of mesopredator release) would likely negate the negative effects of cattle

predation. The ecological value of coyotes should be considered by ranchers before lethal coyote management methods are employed.

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## Survey of Rancher Perceptions of Livestock-predator Conflicts in Texas

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**ABSTRACT:** Predator conflicts largely occur when predators interfere with human economic interests in livestock and wildlife. The goal of this research project was to quantify the perceived threat of livestock depredation in Texas. A survey was developed to measure rancher beliefs toward predators, severity of predator damage, predator management efforts, coyote biology, and demographics of survey respondents. We received 460 responses from ranchers throughout Texas. Preliminary results suggest that 1) the majority of responses came from ranchers who were >50 years old, 2nd generation+ cattle ranchers that derived >50% of their annual income from ranching, and owned properties in central and eastern Texas; 2) most ranchers (74%) considered predators to be a problem on their ranch, of which 62% ($n$ = 208) deemed coyotes (*Canis latrans*) to be the greatest threat to their livestock; 3) the majority of respondents (60%) believed livestock losses from predation occurred during the first 2 weeks after parturition, while 50% believed that those losses accounted for <1% of their livestock herd and 23% ($n$ = 100) felt that predator losses accounted for 1–3% of their herd; 4) shooting was the most commonly used (89%, $n$ = 351) control method; however, it was unclear whether these were planned or opportunistic approaches to coyote removal; and 5) perceptions of coyote biology overestimated coyote size, abundance, and the carnivorous nature of coyotes, but were accurate with coyote litter size, even if coyote removal efforts were in place. It is important to understand that experience, heritage, and knowledge vary greatly among Texas ranchers and that there are wide-ranging levels of tolerance towards predators and the perceived need for predator management.

## The Influence of Livestock Protection Dogs on Mesocarnivore Activity in the Edwards Plateau of Texas

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**ABSTRACT:** The use of livestock protection dogs (LPDs; *Canis lupus familiaris*) to deter predators from preying upon sheep and goat herds continues to increase across the United States. Most research regarding the efficacy of LPDs has been based on queries of rancher satisfaction with their performance, yet little is known regarding whether LPDs actually displace the predators they are commissioned to protect livestock from. Here, we examined whether the presence of LPDs amid livestock resulted in fewer observable detections of carnivores in pastures they occupied throughout one year on a ranch in central Texas. To detect and quantify the presence of carnivores across the ranch, a remote camera grid and scat transects were simultaneously surveyed to compare results produced between each method. Four LPDs were fitted with GPS collars to collect their positions and evaluate their occupancy across the ranch over time. Remote cameras and scat surveys detected the same mesocarnivore species, though in different proportions. No large carnivores were detected and no significant difference was observed between the results of the 2 methods across sampling units ($U = 164.5$; $P = 0.37$, Mann-Whitney U-test) or over time ($U = 68$; $P = 0.84$, Mann-Whitney U-test). Both methods detected a rise in mesocarnivore activity during the fall and early winter. Detections of known depredators to livestock (bobcat and coyote) were 31.2% lower in pastures occupied by LPDs amid livestock ($\chi^2 = 5.91$, $df = 1$, $P < 0.05$ and $\chi^2 = 0.45$, $df = 1$, $P > 0.05$, respectively) and lower for raccoon ($\chi^2 = 6.84$, $df = 1$, $P < 0.01$), while detections of less ominous gray foxes were significantly higher in LPD occupied pastures ($\chi^2 = 13.21$, $df = 1$, $P < 0.01$). These results provide support for LPDs as a predator management tool which can displace known depredators of livestock from the pastures and herds they protect.

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## Effects of White-tailed Deer Density and Deer:Feeder Ratio on Population Growth Rates

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**ABSTRACT:** In south Texas, many landowners provide supplemental feed to maintain high white-tailed deer (*Odocoileus virginianus*) populations for hunting. However, it is not well-known how this affects the fitness of their populations. This experiment was carried out on 2 ranches in Dimmit County, Texas. Our goal was to determine the effects of different population densities and deer to feeder ratios on population growth rates ($\lambda_t=N_{t+\Delta t}/N$). The experimental design was randomized, complete block with 2 blocks and 5 treatments. The treatments on each ranch consisted of 5 81-ha enclosures with deer and feeders in ratios of 20:1, 40:1, 60:1, 60:3, and 80:4. We counted individual deer births and deaths from 2013 to 2017 using remote camera surveys, annual helicopter capture data, and found dead deer. Birth and death records were used to reconstruct the population and thereby estimate the number of deer in each enclosure during May each year. We used these population estimates to calculate λ-apparent population growth rates for each enclosure, which were then compared among treatments. Preliminary results (2013–2015) suggest significantly higher growth rates in the 60:3 and 80:4 vs. the 60:1 treatments ($P<0.05$). If this holds true for the full dataset, it will indicate that with higher population densities, competition at limited feed sources can cause lower population growth rates. With the cost of feed and the time required for feeding considered, maintaining healthy, high deer populations could be impractical for many managers.

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## Monitoring Changes in Northern Bobwhite Density and Vegetation Structure Within a Large-scale Experimental Grazing Study in South Texas

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**ABSTRACT:** In south Texas, northern bobwhites (*Colinus virginianus*) occur on lands where grazing and hunting are integral parts of the ranch's viability and longevity. Identifying the cause and effect relationship between cattle grazing and bobwhites requires consideration of precipitation, range productivity, management type, and historical land use, among many other variables. In 2014, a

large-scale monitoring project was developed to observe the patterns and fluctuations of vegetation and bobwhite density over 4 treatment pastures (7,505 ha; continuous and rotational each at 14 ha/AU and 20 ha/AU stocking densities) and 3 reference sites (4,365 ha; variable stocking densities) on the East Foundation in Jim Hogg County, Texas for 10 years. We estimated bobwhite density using line-transect distance sampling each December 2014–2017 via helicopter. This time period included 2 years of cattle deferment from 2014–2015 and 2 years of ongoing grazing treatments from 2016–2017. We measured vegetation structure, composition, standing forage, and utilization by cattle. Sampling began at the end of a drought period and transitioned into above normal precipitation. Seasonal changes in vegetation and annual changes in bobwhite density at this point reflect the high variability in seasonal precipitation and land use history. During grazing deferment from 2014 and 2015, standing forage and bobwhite density increased by over 100% from the previous year, demonstrating the range's propensity for recovery and the necessity of monitoring at an appropriate time scale. We will further discuss patterns in vegetation and bobwhite density over the first 4 years of this long-term project.

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## Pig Diets: Pig Tails Tell the Tale

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**ABSTRACT:** Stable isotope analyses of mammal hair can provide a relatively long-term integrated dietary history, and can often identify the trophic position of an animal. Stable carbon isotope ratios ($\delta^{13}C$) differ between C3 and C4 plants, and because many human foods are derived from C4 plants (e.g., corn, sugarcane, sorghum), carbon isotopes can be used to assess animal reliance on human-based foods. Nitrogen isotope ratios ($\delta^{15}N$) increase from lower to higher trophic levels, and can provide a measure of the proportion of animal matter in diets. Therefore, isotope ratios of animal hair samples can be compared to isotope ratios of plants growing in their habitat to determine diet and trophic position. Our objective was to use $\delta^{13}C$ and $\delta^{15}N$ values of hair samples to explore trophic relationships of invasive wild pigs. Domestic pig hair takes about 1 year to grow, so we were able to determine diet for approximately 1 year before harvest. We collected tail tips from over 400

harvested invasive wild pigs from Camp Bullis, Texas. We selected 68 pigs for analysis based on sex, body mass (>35 kg), and location relative to the property boundary where pigs could access human food crops. We processed these samples, analyzed them at the Stable Isotopes for Biosphere Science lab at Texas A&M University for δ13C and δ15N, and will report the results.

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## Modeling Audible Detection of Prairie Grouse Booming Informs Survey Design

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**ABSTRACT:** Many wildlife surveys, especially avian, are reliant upon audible detection of individuals. Many factors can impact call frequency and sound attenuation which influence audible detection. Prairie grouse surveys are conducted during lekking and courtship (i.e., booming) to take advantage of frequent vocalization resulting in greater detectability. It is often assumed booming can be detected more than 1.6 km away. To test this assumption and determine factors effecting attenuation and detectability of booming, we established artificial lesser prairie chicken (LEPC; *Tympanuchus pallidicinctus*) leks. We conducted sound detection trails at these leks using playback of recordings of male LEPCs calibrated to appropriate sound intensity. Observers traversed 3.2-km transects oriented in the cardinal directions and listened for booming for 3 min at 100-m increments along each transect. At each 100-m increment, they recorded wind speed and direction, temperature, humidity, and if booming was detected. We modeled detectability using generalized linear mixed-effects models with distance from lek and weather conditions as covariates. We assumed a binomial distribution and treated trail lek as a random effect to account for dependencies among observers and subsamples within each trail. Our model suggested detectability decreased 96.8% with each 1-km increase in distance. Detectability decreased with increased wind speed and temperature, increased with humidity, and was influenced by wind direction. We use this model to predict probability of missing leks. For example, a survey of 3.2-km wide transects during average weather would have 18.7–57.2% chance, depending on wind direction, of detecting booming LEPCs within the surveyed strip.

## Multiple Scale Spatial Analysis of Rio Grande Wild Turkey Habitat in the Edwards Plateau of Texas

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**ABSTRACT:** Rio Grande wild turkey (*Meleagris gallopavo intermedia*) populations have declined in the Edwards Plateau ecoregion of Texas due to woody vegetation encroachment and anthropogenic disturbances. Digital aerial photography combined with geographic information systems (GIS) databases from the late 1990s were used to quantify the amount of woody cover and disturbance in stable and declining population sites across the Edwards Plateau. However, there have not been studies conducted within the last 20 years to assess if further landscape changes have occurred. The goal of this project is to assess if the woody cover and disturbance from 1995 in stable and declining population sites across the Edwards Plateau identified have changed. The specific objective of this research were to quantify and compare the spatial structure of Rio Grande wild turkey habitat among 1995, 2004, and 2014 in stable and declining Rio Grande Wild Turkey populations areas. Color-infrared aerial photography from 2004 and 2014 was used to map and quantify the spatial structure of vegetation and human infrastructure in the study areas. We are currently comparing the changes occurred among 1995, 2004, and 2014. To compare these changes, we are using landscape metrics that describe landscape structure: percent woody cover, woody cover mean patch area, patch density, road density and human disturbance (infrastructure). We will compare these metrics using an analysis of variance with a significance of 0.05

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## Estimation of Anthropogenic and Catastrophic Effects on Florida Manatee

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**ABSTRACT:** One of the most endangered marine mammals in the coastal areas of the United States is Florida manatee (*Trichechus manatus latirostris*). The Florida manatee population has been increasing and decreasing since 1991 along the east and west coast of Florida, respectively, and has a present population of about 6,250. However, the populations had been dramatically fluctuated due to various anthropogenic factors. Causes of manatee deaths can be broken down into 5 categories: watercrafts, crushed/drown by floodgate or canal lock, entanglement, perinatal, and other natural factors (such as disease and natural catastrophe). Unfortunately, 3 of these 5 categories are associated with human. Hence, we aimed to estimate and compare anthropogenic and natural catastrophic effects on the manatee population dynamics. We conducted a literature review to obtain the basic demographic data and then developed a stage-structure population dynamics model of Florida manatee during this summer. We then used the data from Florida Fish and Wildlife Conservation Commission synoptic surveys to calculate average mortality rates and 95% confidence interval of those for 4 scenarios including baseline, anthropogenic threats, cold stress, and perinatal effects. We simulated each scenario with the worst, average, and better effects from each of their average mortality rates for 20 years. When comparing all 4 scenarios based on our preliminary results, the leading factors affecting the manatee population are natural causes followed by the cold stress, and then human related deaths.

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## Breeding Bird Diversity and Density at Muleshoe National Wildlife Refuge

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**ABSTRACT:** Muleshoe National Wildlife Refuge (NWR), located on the Southern High Plains, is the oldest national wildlife refuge in Texas and is one of the last remaining tracts of true short-grass prairie habitat in the ecoregion. Muleshoe NWR is also important habitat for migratory birds and is recognized for its wintering grounds for sandhill cranes (*Antigone canadensis*) and waterfowl due to 3

publicly owned saline lakes. The goal of this study was to quantify diversity and density of avian fauna in May–June 2012–2016 to assess the role of Muleshoe in protection of non-targeted species during the breeding season. We quantified species diversity and density (#birds/ha) of breeding birds using radial, distance-based point counts. Each point counts was conducted for 6 minutes, and there were 150 randomly selected points. The radial, distance-based point counts were developed by U. S. Fish and Wildlife Service and Bird Conservancy of the Rockies and include covariates such as date, time, temperature, wind speed and numerous vegetation metrics. We calculated species richness and evenness among years and used a combination of key functions and series adjustments in Program Distance to determine probability of detection and density for birds with 60 observations. Preliminary results indicated Muleshoe NWR protects numerous breeding grassland birds across the gamut of seral stages in shortgrass prairies, including grasshopper Sparrow (*Ammodramus savannarum*), meadowlark species (*Sturnella neglecta*, *S. magna*), and Scaled Quail (*Callipepla squamata*).

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## Environmental Factors Affecting Mesopredator Occupancy in an Urban Area on the Southern High Plains of Texas

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**ABSTRACT:** Urban landscapes provide valuable habitat to several mesocarnivores; however, few studies have identified which environmental features in these environments influence mesocarnivores presence and occupancy within urban areas. We used game cameras dispersed throughout the city limits of Lubbock, Texas to characterize occupancy of coyote (*Canis latrans*), domestic cat (*Felis catus*), domestic dog (*Canis familiaris*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), and Virginia opossum (*Didelphis virginiana*). We delineated 16 1-$km^2$ cells throughout the study area and used program PRESENCE to estimate occupancy and evaluate the influence of environmental covariates (grasslands, croplands, and densities of development) using coverages from the National Land Cover Data (NLCD) on focal species occupancy. We detected too few observations (<10) of raccoons and red foxes for formal analyses. However, preliminary analyses suggest that cat (the most frequently observed species) occupancy increased as grassland decreased (ß = -156.5), gray fox occupancy increased as both grasslands (ß = -37.2) and crops (ß = -19.1) decreased, whereas coyotes occupancy increased as grasslands increased (ß = 12). Virginia opossum occupancy increased with both low (impervious surfaces occupy <20% of the area; ß = 68.4) and medium development (impervious surfaces occupy 20–49% of the area; ß = 119.3), whereas dogs were not correlated with any land cover characteristics despite a 47% naïve

occupancy. For all analyses, elevated AIC values (>6), suggested that the selected environmental characteristics defined by NLCD did not provide strong model weights, and other factors may be more important drivers for these species occurrence. Further analysis will include other local scale habitat features and socioeconomic factors to improve model performance.

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## Abundance, Activity Patterns, and Interactions Among Felids, Cattle, Nilgai, Feral Hog, and Javelina

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**ABSTRACT:** In southern Texas, ocelots (*Leopardus pardalis albescens*) occur in 2 small breeding populations on private and public lands in Willacy and Cameron counties. East El Sauz Ranch of the East Foundation in Willacy County has the largest known population of ocelots in the United States. Research on ocelot interactions with other carnivores and prey species have been previously studied across their geographic range; however, interactions with cattle and game species on private lands has not been examined. This study analyzes photographic data from 2011–2017 to examine differences in abundance, activity patterns and interactions among ocelot, bobcat (*Lynx rufus*), cattle, and 3 game species, nilgai (*Boselaphus tragocamelus*), feral hogs (*Sus scrofa*), and javelina (*Pecari tajacu*). We will focus on use of trails and occurrence within dense thornshrub by the target species. Patterns have shown that the 2 smaller game species, feral hog and javelina, have greater overlap of activity. These species used areas that were secluded and isolated, similar to behavior observed by ocelots. Nilgai occurrence was not related to ocelot movement or activity. Information derived from this study will assist management of cattle, game species, bobcat, and ocelot coexistence. Furthermore, these results will benefit future ocelot recovery and conservation on private lands in southern Texas.

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## Partitioning of Foraging Habitat Amongst Kingfishers Along the South Llano River, Texas

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Abstract: Currently, many neotropical and subtropical bird species are expanding northward into the United States. Included among these are ringed kingfishers (*Megaceryle torquata*) and green kingfishers (*Chloroceryle americana*). This northward expansion of ringed kingfishers and green kingfishers now places these tropical kingfishers in aquatic systems with the temperate belted kingfisher (*M. alcyon*). A 23.5-km stretch of the South Llano River near Junction, TX was surveyed to determine seasonal abundance and compare foraging perch characteristics among the species. Data were collected on 7 foraging perch characteristics for 380 kingfisher samples over 25 surveys. Mean encounter rate for green kingfishers, belted kingfisher, and ringed kingfishers per kilometer of river was 0.48, 0.22, and 0.09, respectively. Seasonal presence varied among the species; green kingfishers were present year-round, while belted kingfisher were absent from mid-spring to mid-summer, and ringed kingfishers were absent from late-spring to mid-summer. Foraging perch characteristics were analyzed via permutational MANOVA; characteristics of green kingfishers foraging perches were significantly different from those of belted kingfisher and ringed kingfishers, while there was no difference in foraging perch characteristics between belted kingfisher and ringed kingfishers. Analyzing how sympatric kingfishers partition their foraging-habitat as ranges shift could be used as a model for anticipating how stable bird communities might react to the introduction of a new member or a shift in species abundance.

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## Using Goals and Profitability to Determine What to Plant in Pastures

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**ABSTRACT:** The economics behind replanting a pasture on a hypothetical ranch in Live Oak County were recently evaluated. The model included 3 different enterprises: 1) owner grazing the land with their cattle, 2) leasing the grazing rights to another producer, or 3) haying the field. Three different plant covers were considered: 1) a mix of native grasses and forbs, 2) buffelgrass, or 3) Tifton 85 bermudagrass. In the end, no grazing scenario paid for the planting and maintenance cost after 10 years. Careful evaluation of your goals and the motives behind replanting will help you decide which practice is best. Deferred grazing, chemical, mechanical, or prescribed fire techniques may help to improve the productivity of a pasture without the cost and risk of replanting.

## Potential Strike Hazard Posed by White-winged Doves to Military Aircraft in Central Texas

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**ABSTRACT:** Bird–aircraft strikes cost more than $900M a year in damage to aircraft in the United States and sometimes cause loss of human life. Large-bodied birds (e.g., raptors) are often the focus of management aimed at reducing strike risk, but smaller-bodied species, like doves, may also present a hazard to military aircraft engaged in high speed, low altitude maneuvers. We used strike records and avian radar data to identify strike trends and develop a management strategy aimed to reduce such hazards at an Air Force base in central Texas, where white-winged doves (*Zenaida asiatica*) have been increasing in number since the 1990s. We also conducted avian point counts and white-winged dove movement surveys on base and characterized fine- and landscape-scale habitat features. White-winged doves were both the most commonly detected and most frequently struck species on the base. Strikes with white-winged and other dove species were especially prevalent in summer months and cost more than $1M over a 7-year period. Mature live oaks, which provide nesting and roosting habitat for doves, were the most common tree species on base and similar vegetation covered 30% of the surrounding landscape. The majority of the landscape was comprised of agricultural fields, which provide foraging sites for doves and other birds, and avian radar data identified consistent daily movement patterns across runways in the direction to and from these fields in the mornings and afternoons. Given our findings, we recommended an integrated management approach including habitat and population management techniques, bird repellents, and flight operations management.

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## Human Dimensions of Conservation Photographers in Wildlife Management

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**ABSTRACT:** Conservation photography is a powerful tool that utilizes images of wildlife (often threatened or endangered) and/or critical habitat to raise conservation awareness. Many organizations use conservation photography in an attempt to champion different environmental causes or at best educate the public about conservation issues they feel are important. A few of these organizations, such as Wildlife in Focus, unite landowners with photographers with the purpose of drawing attention to conservation issues. Because there are few data on demographics and viewpoints of participants of conservation photography contests, a 102-question survey was designed and uploaded to Qualtrics.com; these questions asked for information concerning demographics, personal opinions, and change in habits since participating in photography contests. Additional questions were also tailored for those that had not participated in any contests. The survey consisted of photographer questions (n=39), landowner questions (n=25), and questions for all participants (n=38). Forty-two people completed the online survey comprised of photographers (n=22), landowners (n=14), and those claiming to be both photographers and landowners (n=6). Additionally, the survey (in written form) was administered to a photography club in Austin, Texas. Eighteen people completed the written survey composed of photographers (n=14) and landowner/photographers (n=4). Results appear to suggest that participation in conservation photography contests leads to an increased desire to spend more time outdoors; there was also an increase in bird-watching among participants. Results of this study also offer a unique insight into photographer and landowner viewpoints on issues such as fishing, hunting, and environmental issues.

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## When Worlds Collide: Bird–Window Collision Mortality on a Continental Scale

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**ET AL**.

**ABSTRACT:** The number of bird-window collisions in an area is influenced by building characteristics and the surrounding land cover; however, little is known about collisions at large spatial scales. In fall 2014, researchers at 40 college campuses across North America used standardized protocols to conduct a continent-wide study to document bird-window collision mortality, building characteristics, and local land cover and regional urbanization. We surveyed 281

buildings of various sizes with varying degrees of urbanization. Buildings were categorized as small, medium, and large based on window area, number of floors, and floor space area. Landscaping surrounding the building was categorized by percent vegetation cover within 50 m. Carcass surveys were completed from late August to late October for a median of 21 consecutive days. We documented 324 bird mortalities (range = 0–34 per site, mean = 8.1 per site) representing 71 species (84.9% of carcasses identified to species). Nearly all carcasses were passerines, with migratory species having a higher mortality (91%) compared to residents (9%). Principal component analysis was used to identify latent variables that summarized covariation among building size, local land cover, and regional urbanization. Building size had a strong positive effect on bird mortality. Large buildings in areas of low urbanization, large lawn size, and low-density structures had greater bird mortality, while small buildings had consistently low mortality. While past collision prevention measures have been stressed for large buildings in urban areas, we recommend collision prevention measures be implemented at large buildings in regions of low urbanization as well.

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## Foraging Site Selection of Montezuma Quail in the Capitan Mountains of New Mexico

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**ABSTRACT:** Montezuma quail (*Cyrtonyx montezumae*) are distinct from other quail species in several ways, notably, foraging strategy. Unlike other quail, who forage on the surface for seeds and insects, they use their large feet and claws to dig for subterraneous tubers and insects. As a result, foraging areas can be easily identified by the assembly of digs. Montezuma quail foraging habitat was studied on the Fort Stanton Snowy River Cave National Conservation Area in Lincoln county, NM. The focus of the study is a 140-ha polygon that was approved by the Bureau of Land Management to improve Montezuma quail habitat by reducing tree density. Nineteen north-south transects were walked throughout the polygon to search for digs. Once a dig site was found, vegetation in the area was assessed and compared to random sites. A logistic regression analysis was used to determine that distance to closest trees and height of closest trees has the most significant effect on Montezuma quail foraging site selection. Our results indicate that the decrease of tree density and height improves Montezuma quail foraging areas.

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## Environmental Influences on Age Differences Between Cementum Annuli and Tooth Replacement and Wear in White-tailed Deer

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**ABSTRACT:** White-tailed deer (*Odocoileus virginianus*) are often aged by tooth replacement and wear (TRW). It is unknown whether environmental factors or visual bias influence estimated TRW age. For instance, sand in the soil may accelerate tooth wear whereas supplemental feeding may have the opposite effect. Further, visual bias such as body size and antler size may influence estimated TRW age. Cementum annuli (CA), another ageing technique is unbiased; thus, the differentials between TRW and CA may provide information about external influences on TRW ages. We obtained CA and TRW ages from 7,389 male deer harvested on King Ranch and performed a mixed effects model with the differences between CA and TRW ages as the dependent variable, antler size, feeder site density, body mass, soil characteristics, and harvest date as exploratory variables, and TRW as random effect. Results indicated that fixed effects explained little of the variation in age differences between TRW and CA ($R^2 = 0.01$). The largest influence came from body mass; the greater the body mass, the higher the TRW age than the CA age. This indicates that visual bias may influence TRW age; however, the influence was small ($ß = 0.01$). Furthermore, we found that sand and supplemental feed had very small influences on age differentials. Thus, our results agree with previous studies that differences between true ages and estimated ages are likely a function of variability in teeth among individual deer. Despite the variability among individual deer, we found CA and TRW were ±1 year 70% of the time indicating that TRW has value for management purposes.

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## Effects of Grazing Utilization, Precipitation, and Soil Texture on Forb Production in South Texas

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**ABSTRACT:** South Texas is a semi-arid environment with dynamic plant communities. Ranching and livestock production are significant revenue generators within this region and proper management of the land is essential. Forbs serve as an important food source for a variety of

ungulates including white-tailed deer (*Odocoileus virginianus*), nilgai (*Boselaphus tragocamelus*), and cattle. Soil texture also plays an important role when it comes to overall forage production. The Inverse Soil Texture Hypothesis states that sandier soils in arid and semi-arid environments will produce more forage compared to mesic environments, which are more productive in areas with clay-heavy soils. Here, we evaluated the effects of grazing utilization, soil texture, and other ecological factors on forb production from autumn 2015 to autumn 2016 on East Foundation ranches. We have sampled 6 different study sites and a total of 600 vegetation exclosures every autumn and spring for 2 years to assess the relationship between residual forage in autumn 2015 and forb production in the spring of 2016. Additionally, we are also evaluating effects of seasonal precipitation and soil texture within the sites and their effects on forage production.

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## Fourteen Years of Monitoring Birdlife at the Gus Engeling Wildlife Management Area, Anderson County, Texas

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**ABSTRACT:** Birds at the Gus Engeling Wildlife Management Area (WMA), a 4435 hectare WMA managed by the Texas Parks and Wildlife Department, were monitored for 14 consecutive years (2004–2017). Forty, 5-minute point-count stations were established and visited twice each year during the breeding season by the same observer over the 14-y period. Detections of birds by sight and sound were placed into 1 of 3 distance categories. Each station had a radius of 200 m and the maximum total surveyed was >500 hectares or roughly 11% of the WMA. The more abundant year-round species encountered included tufted titmouse (*Baeolophus bicolor*), Carolina wren (*Thryothorus ludovicianus*), and northern cardinal (*Cardinalis cardinalis*), while some of the more abundant migratory species included yellow-billed cuckoo (*Coccyzus americanus*), white-eyed vireo (*Vireo griseus*), and indigo bunting (*Passerina cyanea*). Several species of high conservation concern (e.g., northern bobwhite [*Colinus virginianus*], wild turkey [*Meleagris gallopavo*], Bachman's sparrow [*Peucaea aestivalis*]) were in such low densities that no trends were determined for these. Individuals detected as "flyovers" (e.g., cattle egret [*Bubulcus ibis*], turkey vulture [*Cathartes aura*]) that were not utilizing the WMA at the time of detection were excluded from the analyses. To improve conditions for species of conservation concern, management in the dry uplands of this mostly forested WMA should include a low basal area of hardwoods with a lush herbaceous layer maintained by growing-season fire. Likewise, in the

bottomlands, periodic disturbance in the form of frequent flooding would improve conditions for a variety of priority birds.

## Developing Eastern and Rio Grande Wild Turkey Wintering Habitat Suitability Models in Northeast Texas

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**ABSTRACT:** Developing habitat suitability models can be useful for estimating population abundance of Rio Grande (*Meleagris gallopavo intermedia*) and eastern (*M. g. silvestris*) wild turkeys as well as highlighting optimal habitat for their wintering sites. Our study sites reside on Fort Wolters in Mineral Wells, TX (where we will study Rio Grande wild turkeys) and Camp Maxey in Paris, TX (where we will study eastern wild turkeys). To develop these models, we focused on 3 main factors: food, water, and cover. For the food aspect, we directed our attention to places that had hard mast during winter (oak trees), available corn (wildlife feeders), and favorable seed types (grasses). For the water aspect, we identified water sources and created buffers around them. Studies show that wild turkeys tend to stay within a 0.8-km radius of any viable water sources. Finally, for cover we emphasized areas dominated by woody cover because studies show that woody habitat use increases during winter so turkeys can use the trees height to escape predators as well as the possibly inclement weather. With these 3 factors we will be able to create models depicting the most favorable habitat for turkeys. This can be used to show areas that need to be focused on for wild turkey surveying in order to obtain the most precise population abundance estimates. This will also optimize surveying techniques by reducing time and money allotted for any surveys.

## Nutritional Quality of Native and Winter Wheat Forage for Mule Deer in the Texas Panhandle

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**ABSTRACT:** Mule deer (*Odocoileus hemionus*) exist throughout the western United States, including portions of Texas. Although mule deer population declines have been reported throughout the western United States, the Texas Panhandle is an exception; maintaining healthy populations of mule deer among a diversity of habitats. Agricultural cultivation in the Panhandle provides mule deer with food resources that do not naturally occur, and may provide additional nutrition for regional mule deer. This study was conducted on private lands throughout Hall and Motley counties within the western Rolling Plains of Texas to document nutritional values of native rangeland and winter wheat forage; and evaluate if winter wheat is aiding mule deer in reaching or exceeding winter and spring nutritional requirements. We collected composite samples of winter wheat, browse, and forb forage monthly from December 2016—May 2017. Fiber content was measured through Neutral Detergent Fiber (NDF), Acid Detergent Fiber (ADF), and Acid Detergent Lignin (ADL) to estimate forage sample digestibility. Percent nitrogen was determined through gas chromatography to estimate crude protein concentration of forage samples. Crude protein levels tended to be greater ($P > 0.05$) for wheat (19–22%) than native forage (9–13%) throughout winter, while fiber levels were greater for winter wheat during spring (34–43%) when maturing, as compared to native forage (22–28%) during annual green-up. Winter wheat appears to be a potentially valuable forage for mule deer in the Rolling Plains ecoregion, particularly during winter when native forage tends to be less nutritious, and less palatable.

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## Effects of Cover Type on Presence and Distribution of Grassland Birds in the Oaks and Prairies Region of Texas

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**ABSTRACT:** Habitat loss is the primary driver of population declines in many grassland-dependent bird species. Thus, understanding how vegetation structure and composition drives presence and distribution of grassland birds is of paramount importance when developing management plans and directing delivery of conservation programs. During May and June of 2013–2017, we utilized a modified Breeding Bird Survey protocol to survey 13,420 roadside point-count locations within the Oaks and Prairies Bird Conservation Regions of Texas. We then paired presence/absence data for northern bobwhite (*Colinus virginianus*), eastern meadowlark (*Sturnella magna*), and painted bunting (*Passerina ciris*) with spatial variables (e.g. shrub cover, grass cover, crop cover) extracted from Texas Ecological Mapping Systems data at 250-m buffers around each point count location. We detected northern bobwhite at sites with 3 times more shrub cover ($W = 5161800$, $P < 0.01$) and half the proportion of grass cover ($W = 18023000$, $P < 0.01$) than sites with no detections. Additionally, we detected eastern meadowlark at sites with 1.5 times less shrub cover ($W = 5467200$, $P < 0.01$) and 1.5 times more grass cover ($W = 8591900$, $P < 0.01$) than sites with no detections. Lastly, we detected painted buntings at sites with 1.5 times more shrub cover ($W = 5999100$, $P < 0.01$) and 1.5 times less crop cover ($W = 3642200$, $P < 0.01$) than those without. We did find significant differences ($a = 0.05$) in crop cover between sites with northern bobwhite and eastern meadowlark detections versus those without; however, these differences were not biologically significant. Additionally, we found significant differences in grass cover between sites with painted bunting detections versus those without; however, these differences were also not biologically significant. Results of our study will help inform future delivery of conservation efforts and represent the first 5 y of a 10-y monitoring program to examine the effectiveness of enhanced partner conservation efforts within the Oaks and Prairies Joint Venture.

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## Neonate Cottonmouth Spatial Ecology and Habitat Selection: From Parturition to Hibernation

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**ABSTRACT:** Telemetric studies of North American neonate pit vipers have been confined to a single species, timber rattlesnakes (*Crotalus horridus*). These studies have revealed that neonate timber rattlesnakes use conspecific scent trailing for locating hibernacula, select thickly covered areas, and even exhibit arboreal behavior. No telemetric studies have been conducted on neonate cottonmouths (*Agkistrodon piscivorus*). Given their semi-aquatic nature and preference of mesic environments, it is possible that neonate cottonmouths exhibit far different spatial movements and habitat preferences. We telemetered 12 postpartum neonate cottonmouths from August 2017 to November 2017 and continuously measured their habitat and spatial use. We found neonate cottonmouths to disperse an average of 162.4 m from their parturition site, and have a mean fall home range size of 0.71 ha. At both the home range and macrohabitat scale, we found neonate cottonmouths to prefer edge and mesic forest habitats. At the microhabitat scale, we found neonate cottonmouths to prefer areas with greater canopy cover and crypsis potential. Our results stress the importance of neighboring habitats and wetland buffer zones, as dominant species such as the cottonmouth depend on ecotones for parturition and upbringing.

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## An Evaluation of Dummy Nests for Northern Bobwhite Management

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**ABSTRACT:** Dummy nests are simulated nests that mimic the size and nest substrate of an actual avian nest. In bobwhite (*Colinus virginianus*) management, dummy nests are used to estimate nest success during a given nesting season or across different habitats. Our objectives were to 1) determine if nest success is similar between dummy nests and bobwhite nests monitored via radio-telemetry, 2) compare the assemblage of nest predators between the nest types, and 3) evaluate the percent of dummy nests correctly classified by diagnostic sign. We hypothesized paired dummy nests might be autocorrelated with actual nests, so we monitored 3 nest groups with game cameras: 1) actual nests ($n$ = 21), 2) dummy nests paired with actual nests ($n$ = 21), and 3) independent dummy nests ($n$ = 39). Nest success was (± SE) 0.50 (± 0.12), 0.80 (± 0.09), 0.63 (± 0.08), respectively. We used remote infrared cameras concealed with natural vegetation for nest surveillance. Only 4 of 13 bobwhite nest depredations were captured on camera – 2 by American badgers (*Taxidea taxus*) and 2 by Mexican ground squirrels (*Spermophilus mexicanus*). Striped skunks (*Mephitis mephitis*; 44%), badgers (44%), and ground squirrels (13%) accounted for known dummy nest depredations. Diagnostic sign was evaluated by both "open" and "blind" observers who were (or weren't) allowed to see video footage of depredations during the study, respectively. Only 33% percent of all observations ($n$ = 60) were classified correctly by diagnostic sign. Of blind observations ($n$ = 35), observers correctly classified 17% of depredations whereas open observers correctly classified 56% of observations ($n$ = 25). Our results, though numerically limited, suggest dummy nests are not reliable for estimating nest success or predator assemblage from diagnostic sign.

## Potential Effects of Hantavirus Infections on Activity Patterns of Cotton Rats

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**ABSTRACT:** Hantaviruses are zoonotic pathogens maintained in rodent reservoir hosts, including cotton rats (*Sigmodon hispidus*). While rodent hosts show no clinical signs of the disease, studies have suggested that hantaviruses may increase host aggression. This behavioral change may facilitate horizontal transmission of the virus, thought to occur via agonistic interactions during territorial defense. Our goal was to quantify the behavior of cotton rats within a closed environment to determine if hantavirus infection corresponded to a change in diel use patterns or overall activity. Cotton rats of known infection status were uniquely marked to allow for identification, then released into outdoor enclosures constructed on Texas State University property at Freeman Ranch. Each outdoor enclosure was equipped with 12 motion sensing cameras, strategically positioned to record all activity in the enclosure. We conducted 4 trials, 5 nights each, with 2 adult male rodents per enclosure: one Hantavirus-positive and one naïve. Upon trial completion, we reviewed camera video data and recorded the time of each camera trigger and appearance of a cotton rat, as well as the individual's unique mark and ID. Our evidence suggests that all individuals were active during the same hours of the day, despite Hantavirus infection status ($P > 2$). When comparing overall activity, we found no evidence to suggest that activity was affected by Hantavirus infection ($P = 0.0939$). Our results indicate that epidemiology models can confidently assume that Hantavirus infection has no effect on the activity levels or patterns of rodent hosts.

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## Niche Overlap in a Coastal Texas Aquatic Snake Community

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**ABSTRACT:** Snakes are interesting models to study community interactions because of their intermediate trophic position where they act as both predator and prey within ecosystems. Additionally, the overall similarity in body plan across snakes would suggest the need for niche diversification along non-morphological niche axes, such as habitat partitioning. In Texas, the coastal aquatic snake community is an excellent candidate for studying such partitioning because of the regions high snake species richness and its greater range in aquatic habitat types compared to other systems. Our objective was to investigate habitat associations within this community at

Guadalupe Delta Wildlife Management Area, in Calhoun and Refugio counties, Texas. We used pyramid-style aquatic traps to sample vertebrates during 10–14 day sampling periods in June, July, and August, 2016–2017. Habitat variables (water quality, depth, habitat type, etc.) were measured at each trap. We trapped 152 snakes, 47,809 fish, and 979 amphibians across the 2 years. A combination of analysis of variance and canonical correspondence analyses revealed few associations and a high degree of niche overlap across various freshwater habitats, but the saltmarsh snake (*Nerodia clarkii*) was highly associated with saltmarsh habitat and water quality variables (i.e., salinity) that correlate with this habitat. In general, aquatic snakes appeared to be more associated with vegetative structure than open water habitats. Individualistic species parameters and permanence of water could explain many of the observed relationships, but habitat resulting from the practices used to manage waterfowl appeared to be generally favorable to most of the snake species we sampled.

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## Genetic Evaluation of White-tailed Deer Associated with Chronic Wasting Disease in Medina County, Texas

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**ABSTRACT:** Chronic Wasting Disease (CWD) is a transmissible spongiform encephalopathy found in cervids. It is caused by a malformed version of the prion protein. Prions are not bacterial or viral, but are abnormal proteins that convert normal proteins into a form resistant to breakdown in the body and the environment. The prions accumulate in brain and nervous tissue, resulting in death within 1–3 years after exposure. The disease is transmitted via body fluids or nervous tissue among animals or through contact with prions in the environment. Currently, CWD has been found in free-ranging mule deer in west Texas, several herds of captive white-tailed deer, and a single positive free-ranging white-tailed deer in Medina County. The free-ranging positive in Medina County was found in close proximity to captive white-tailed herds that have tested positive for CWD. The goal of this study is to use genetic markers to determine whether the free-ranging positive buck was a wild deer or escaped from a captive facility. We collected samples of hunter-harvested deer from hunter check stations within Medina county during 2016, and sampled captive herds during CWD monitoring activities. We extracted DNA and amplified 15 microsatellite DNA markers. We are working to genotype and analyze approximately 300 samples. We will compare the positive buck to these samples and determine which population he is genetically closest to. These results should have important implications for the management of CWD in the region.

## Prey Preferences of Western Cottonmouths in a Constructed Wetland in Northeast Texas

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**ABSTRACT:** Cottonmouths (*Agkistrodon piscivorus*) are generally cited as opportunistic omni-carnivores with a wide-ranging diet. However, studies conducted in different habitat types have concluded that cottonmouths can be somewhat particular with what they consume. For instance, some populations have been found to be predominantly piscivorous, while other populations only consumed carrion. This evidence prompted us to question whether cottonmouths truly do have prey preferences. Using a use-availability approach, we examined prey preferences of cottonmouths within a constructed wetland. To calculate prey availability, we surveyed the study site using drift fence arrays containing pitfall and funnel traps. To identify cottonmouth prey selection, we used a forced regurgitation technique on captured cottonmouths during the same time period as our trapping. We found that cottonmouths selected prey non-randomly. Comparisons between the proportion of available prey species and used prey species revealed that cottonmouths strongly favored eating various snake species, including other cottonmouths. Despite small mammals, birds, and fish being very abundant at our study site, no cottonmouths were found preying on these species. Our research adds further evidence that cottonmouth prey preferences could be habitat dependent.

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## Nuisance American Alligators and Evaluation of Translocation as a Management Strategy

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**ABSTRACT:** Alligator populations and number of nuisance alligator complaints are on the rise across states where alligators occur. Human interactions with American alligators pose a multifaceted wildlife management challenge that involves both human psychology and alligator ecology. Many alligator management strategies involve some sort of translocation program; however, translocation of alligators is thought to be largely ineffective due to their homing ability. However, the efficacy of translocation, especially long–distance translocation, has not been thoroughly investigated. We conducted an alligator translocation study to address the aforementioned concerns at 2 sites in Texas. We captured 5 male alligators from Brazos Bend State Park, Texas, outfitted them with GPS satellite transmitters, and translocated 3 alligators to the Welder Wildlife Refuge (i.e., 227 km to the south) and 2 alligators to Gus Engeling Wildlife Management Area (i.e., 282 km to the north). We tracked their movements for 6 months. All individuals remained within 32 km of their respective translocation sites. Translocated alligators exhibited larger home range sizes and greater daily movements than what has been reported for non-translocated alligators in past studies. Alligators translocated to the Welder Wildlife Refuge had larger movement patterns than those translocated to Gus Engeling Wildlife Management Area. Based on our study results, long distance translocation appears to be a management option for nuisance American alligators in Texas. We also suggest that future research determine the effectiveness of this strategy for all size classes and both sexes of alligators in all portions of their range.

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## Population Structure, Distribution, and Habitat Use of American Alligators at an Urban Coastal Site

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**ABSTRACT:** We studied an alligator population that occurred at an urban coastal site in Texas, which is one of the least studied areas of the species' range. Our objectives were to determine population abundance, structure, spatial distribution, and microhabitat use of alligators. We hypothesized that these parameters occurred in relation to alligator size-class and that abundance of alligators at this site was low compared to estimates of past studies. We recorded 653 observations of individual alligators and their locations during 19 alligator surveys at an encounter rate of 0.6

alligators per km. Results of Ripley's K function indicated that alligators exhibited clustering patterns of distribution and areas of high-density point locations, which ranged from 1–47 points per hectare. Thirteen different wetland types occurred within the survey area, but alligators were only observed in 10 of the 13 types. Irrespective of size, alligators along our survey transect used 3 of the 13 habitats in greater proportion relative to their availability. We observed little segregation between adult size classes. However, there was spatial segregation between hatchlings and all other size classes, presumably due to female nest site selection and predator avoidance. Alligators of all size classes seemingly avoided areas of high human activity. Our results demonstrate that many factors contribute to the spatial ecology of alligator populations in urban wetland ecosystems of Texas. Biologists can identify potential target areas for implementing management strategies (e.g., harvest, nuisance control, size-specific surveys), identify habitat and nesting areas, or improve survey methods.

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## A Theoretical Population and Harvest Model for American Alligators

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**ABSTRACT:** The American alligator (*Alligator mississippiensis*) is a crocodilian species that was once listed as endangered in the United States but is now harvested both recreationally and commercially throughout its range in the southeastern United States. Harvest of alligators typically includes egg collecting and hunting. However, review of scientific literature reveals that the effects of harvest on alligator populations have received little scientific scrutiny. A theoretical simulation model was built to evaluate the impact of several harvest strategies on long-term (i.e., 100 years) alligator population trends. System dynamics software was used to develop the model and data for the model was acquired through literature and field studies on alligator ecology. Results of model simulations showed that current harvest (50% egg harvest, 2% subadult harvest, 2% adult harvest) in Texas is sustainable, but alligator populations will stabilize at levels below population potential. The best harvest scenario for a sustainable harvest that maintains alligator populations at a relatively unchanging level is a 38% egg harvest, 2% subadult harvest, and 2% adult harvest. An elevated egg harvest (80%) can be sustained if no hunting harvest occurs. Contrarily, an increased hunting harvest

(4% subadult, 4% adult) can be sustained with no egg harvest. This model identifies the function of current alligator harvest within populations and provides a tool for future use in determining the effect of changes in harvest or life-history characteristics on alligator population dynamics.

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## Effect of Red Imported Fire Ant Presence on Success and Depredation of American Alligator Nests: Evidence of a Possible Predator Deterrent

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**ABSTRACT:** Red imported fire ants (*Solenopsis invicta*) are an ant species endemic to South America that has become an invasive exotic species in the United States. Since their establishment, their impact on wildlife species has been the focal point of many studies. The objectives of this study were to 1) determine if the presence of fire ants in alligator nests has an effect on nest success, 2) determine if the presence of fire ants has an effect on the occurrence of depredation by known alligator nest predators, and 3) determine if the presence of fire ants in alligator nests serves as a deterrent to nest predators. From 2013–2016 we monitored 65 nests at Brazos Bend State Park, Texas (i.e., 40 in 2013, 18 in 2014, 7 in 2015, and 0 in 2016) and 14 nests, all in 2016, in Kleberg County. The nests at Brazos Bend State Park had a 70% success rate, while Kleberg County nests had a 50% success rate. Greater proportion of alligator nests without fire ants were depredated more than expected (38% of the $c^2$-value) compared to nests with fire ants. Alligator nests were less likely to be depredated (43% of the 5.3 $c^2_1$-value, $P = 0.02$) by raccoons (*Procyon lotor*) if fire ants were present. This study indicates that although fire ants are known to be detrimental to many wildlife species, their presence may actually be of benefit to American alligators at the population level by increasing nest success by decreasing nest depredation.

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## Improving Avian Species Distribution Models by Incorporating Biotic Interactions

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**ABSTRACT:** Species distribution models (SDMs) attempt to predict or statistically associate geographic record of a species with biospatial variables of interest over large spatial extents and are

being increasingly utilized in wildlife management as remote sensing technology and our understanding of ecological distributional patterns advances. Most models use variables such as soil type, climatic patterns, topography, hydrology, vegetative communities, and other abiotic conditions to identify the predicted range of a species. However, species interactions and temporal influence have yet to be successfully quantified and included in SDMs. Expanding the focus from a single species to multiple species distribution across time can increase our understanding of the assemblage and improve our predictions for how changes in the environment might impact the ecosystem. Using avian occupancy data collected from 2014 through 2016 on the East Foundation's San Antonio Viejo Ranch, we built baseline SDMs across relevant environmental variables and then improved the models by generating and incorporating biotic layers into the model. Consideration of biotic interactions significantly improved all models (Boosted Regression Tree, Random Forest, and Maxent). We created new coding language using ArcGIS, R, and ENVI and applied novel modeling techniques to traditional distributional data. With these new methods, we have built a more comprehensive approach to niche modeling for avian species. Conclusions drawn from these more robust models enable a more informed approach to management since they incorporate and predict a multi-species response to varying management regimes. This is valuable to wildlife managers as the use of spatial statistics and landscape scale approaches become more heavily utilized to simulate changes in wildlife abundance or distribution in response to environmental variability and manipulation (e.g., cattle grazing, vegetation control, and drought conditions).

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## The Influence of Age Structure on Pairing and Territory Success of an Endangered Songbird

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**ABSTRACT:** Many taxa exhibit differential reproductive success across age classes, which can influence a species' population dynamics. As such, understanding age structure and the influence of age structure on wildlife demographics can help inform management and conservation of prioritized species. The golden-cheeked warbler (*Setophaga chrysoparia*; hereafter warbler) is an endangered neotropical songbird that nests exclusively in central Texas. I examined male warbler age structure and quantified the effects of male warbler age on pairing and territory success at a study site in the south-central portion of the warbler's breeding range. From 2015–2017, after-second-year (ASY) males outnumbered second-year (SY) males each year and across all years at my study site. Preliminary analyses indicated that age had no effect on pairing success; however, ASY males exhibited greater territory success than SY males. My results may assist with management efforts for warblers at my study site and will contribute to conservation efforts for this endangered species.

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## Analytical Comparison of Carnivore-Human Conflict Management

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**ABSTRACT:** As the human population expands and urbanizes there has been a significant rise in human-wildlife conflict. Because some carnivore species can inflict substantial injury and even death to humans, government agencies, at multiple levels, are attempting to reduce the conflict and mitigate the threat. As carnivore populations are declining and facing endangerment, it is vital to compare the various methods being applied to conflict management in order to preserve human and carnivore life alike. I will present a comparison of successful versus unsuccessful carnivore-human conflict management strategies and make recommendations based on my findings. In classifying the successful versus unsuccessful methods, I will equally consider the carnivore population and the human threat. A successful method of managing human-carnivore conflict will display an increase in the respective carnivore population and a decrease in human threat. Though, from a global context, there are many different practices and approaches in both successful and unsuccessful conflict management, the most successful conflict management strategies include high local involvement and education of the effected people, specifically children under the age of 13. The various methods change across region and country, but the degree of local involvement and education ultimately determines the success of the human-carnivore conflict management practice. By incorporating the methods used to involve locals and educate children, more management strategies can be successful and aid in the conservation of carnivore species and preservation of human safety.

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## Structural Characteristics of the Urban Environment as Predictors of Bird Species Richness

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**ABSTRACT:** Urbanization is rapidly modifying Earth in extensive and long-lasting ways, making urban ecology an increasingly important field. Because birds are highly associated with vegetation cover, and a significant portion of the urban landscape is comprised of residential yards, managing them for birds and other wildlife could alleviate some of the detrimental effects of the urbanization process. Bird diversity varies along the urban-rural gradient in response to development and anthropogenic factors, and so examining traditional urban-rural gradients can enhance our understanding of the dynamics of urban ecosystems. We collected neighborhood age, distance to the city center, human population density, canopy cover, and bird species-richness data in 14 neighborhoods in Lubbock, Texas. We report how traditional urban-rural gradient variables and vegetation cover correlate with breeding bird species across the cityscape. Because traditional urban-rural gradient measures can act as surrogates for the quantity and quality of vegetation provided in urban wildlife habitats, and since vegetation is considered the most important driver of fluctuations in bird communities, we assessed each variable's predictive strength of different categories of bird species with and without the inclusion of canopy cover into multiple regression analyses. We found that exploiters were associated with age; adapters with age, distance, density, and canopy cover; and uncommon birds with density and age. As long as humans continue to dominate the Earth, habitat

loss, species endangerment, and biotic homogenization will persist, making wildlife conservation in fragmented landscapes an important topic for researchers and managers alike.

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## Spatial Ecology and Landscape-Scale Behavior of Coyotes in South Texas

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**ABSTRACT:** Impacts of coyote (*Canis latrans*) predation are a serious management concern to livestock producers and wildlife managers. Despite repeated calls in the management literature for further research into basic coyote behavior and space use, our understanding of these topics remains limited. Our goals were to quantify activity patterns and landscape-scale behaviors of coyotes, as well as correlates of these behaviors that may be of management significance. We captured a total of 16 coyotes between 2 capture events in December 2016 and April 2017 and fitted them with satellite GPS collars set to record locations every 2 h. To analyze activity patterns we evaluated the autocorrelation structure in coyote movement speed and turning angles using autocorrelation functions. We used a novel application of spatial residency indices at multiple temporal scales gain insight into the temporal dynamics of coyote space use. We found that coyote movements exhibit strong diel periodicity. Our residency indices produced detailed information on the dynamics of space use in both resident and transient coyotes. We were able to observe switches between transience and territoriality, and identify when these changes occurred. We were also able to observe repeated vicariance from a territory to a dumpsite that anecdotally suggests that coyote perceptual range could be as large as 8.4 km. These results will be used to inform ongoing research into the implications of management activities for coyote space use and behavior and the development of effective predation management practices.

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## Interactive Effects of Severe Drought and Grazing on the Life History Cycle of a Bioindicator Species

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**ABSTRACT:** Recurring drought and grazing are ecological drivers of semi-arid grasslands on the Southern High Plains, USA; however, ecological drivers are currently undergoing human-induced alterations, which likely have implications for wildlife. We used the lesser prairie chicken (*Tympanuchus pallidicinctus*), an iconic grouse species that exhibits a boom-bust life history strategy, on the Southern High Plains, USA, as a bioindicator of main and interactive effects of severe drought and grazing. This region experienced the worst drought on record in 2011. We surveyed lesser prairie-chicken leks (i.e., communal breeding grounds) across 12 y that represented 7 y before the 2011 drought ("pre-drought") and 4 years during and following the 2011 drought ("post-drought"). Grazing was annually managed to achieve ≥50% utilization of above-ground vegetation biomass. We used lek ($n$ = 49) count data and covariates of weather and managed grazing to 1) estimate long-term lesser prairie-chicken abundance, 2) examine the influence of drought and precipitation on long-term lesser prairie-chicken populations, and 3) assess and compare the influence of grazing on lesser prairie-chicken populations pre-drought and post-drought. Drought led to decreases in survival and recruitment. Annual abundance pre-drought was, on average, >4 times greater than post-drought. Although the species was declining immediately prior to the 2011 drought, the population exhibited a substantial bust during in 2011 and 2012 without a boom to recover in 4 post-drought years. Adaptive grazing positively influenced the population pre-drought, but had no effects post-drought. Results suggest that the severe drought in 2011 may have been beyond the range of environmental conditions to which lesser prairie chickens, and likely other species, have adapted. Land management practices such as grazing should remain adaptive to ensure potential negative influences to all species are avoided. Increasing habitat quantity and quality by reducing habitat loss and fragmentation likely will increase resiliency of the ecosystem and individual species.

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## Status Update: The Collaborative Trans-Pecos Pronghorn Restoration Effort

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**ABSTRACT:** In 2009, the Texas Parks and Wildlife Department aerial pronghorn (*Antilocapra americana*) surveys indicated that prolonged drought conditions were contributing to rapid declines in the Trans-Pecos region. By 2012, populations in the Trans-Pecos fell to a 40-year low of 2,751. Rapid population declines and poor understanding of the cause of the decline prompted a collaborative restoration program. In 2011, 202 pronghorn were captured from surplus populations in the northwest Texas Panhandle and released in the Marfa Plateau, Trans-Pecos. In 2011 ($n$ = 202), 2013 ($n$ = 133), 2014 ($n$ = 103), 2016 ($n$ = 116), and 2017 ($n$ = 114) 668 individuals were translocated from the Texas Panhandle to 5 Restoration Areas in the Marfa Plateau and Marathon Basin. Thirty-five to 65% of all animals were equipped with either lightweight expandable breakaway VHF, GPS, or satellite radio-collars. At the beginning of the effort, limited precipitation in 2010 and

no precipitation in 2011 resulted in little to no forage availability for the translocated pronghorn. As a result, survival of translocated pronghorn was estimated at 21% at 43-weeks post-release. Examination of capture methods and modification of capture and transport protocol has led to an increase in survival of translocated individuals (87% in 2016) and an 18% decline in capture myopathy events throughout the study. Pronghorn populations in the restoration areas have doubled since initiation of the restoration effort, but location data from collared individuals has raised new concerns that grassland loss through encroachment of woody vegetation may become a barrier to restoration success.

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## Use of Ground Juniper in Wildlife and Livestock Feeds

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**ABSTRACT:** Woody plant encroachment has negatively impacted rangelands in North America. Reduction of juniper cover in dense areas can improve rangelands for use by livestock and wildlife. When harvested, ground, and utilized as an alternative to traditional roughage ingredients in animal feeds, juniper may reduce feeding cost and non-target species consumption. White-tailed deer supplemental pellets are often consumed by non-target species such as feral hogs. To determine if pellets containing a roughage source of ground blueberry juniper (JUN) or cottonseed hulls (CSH) would reduce feral hog intake, and at what percent of roughage this was achievable, a 2 × 2 factorial design study was used with 3 feeding periods to evaluate effects on dry matter intake, growth performance, and blood serum chemistry. Hogs were assigned to 1 of 4 diets ($n$ = 5 animals/treatment) containing 20% CSH, 40% CSH, 20% JUN, or 40% JUN. During period 1, hogs received 5% of body weight (BW) of treatment diet and 5% of BW of commercial hog chow (basal) diet from d 0 to 17; Period 2 = 5% of BW treatment diet and 2% of BW basal diet from d 18 to 26; Period 3 = 5% of BW treatment diet and 5% of BW basal diet d 27 to 34. Weigh backs conducted daily determined consumption of treatment and basal diets. No interactions were observed for percentage of roughage × day, although reduced intake of treatment diets (<0.5% BW) observed in multiple animals during each period, warrants further investigation.

## Predator and Mesocarnivore Occurrence at Protein Feeders in the Trans-Pecos, Texas

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**ABSTRACT:** The desire to observe wildlife without disturbing it can be dated back to hunter-gatherers. Coupled with the enticement that protein feeders can provide, trail cameras can offer a wide range of data about observed wildlife without ever being physically present. This study focused specifically on the occurrence of predators and mesocarnivores at protein feeders in the Trans-Pecos region of Texas. Multiple protein feeders ($n$ = 20) were monitored throughout a private ranch in the Santiago Mountains. Additionally, 8–12 Moultrie (M-880) trail cameras were rotated multiple times throughout each season (September–March) at the various feeders across the ranch for 3 seasons (September 2014–March 2017). Once all trail camera photos were collected, they were sorted (down to species level), renamed, organized, and analyzed using software from smallcats.org. Of the 100,000+ photos collected and sorted, 1,490 were found to have >1 target species in them, and 822 were considered independent and used in analyses. Eight different predator and mesocarnivores species were documented at the protein feeders during the study. Feeder location and timing of occurrence were recorded. Inter-species interactions of predators, mesocarnivores, and other mammals, or with other predators or mesocarnivores were noted. Data from this study will aid biologists and managers in understanding what species (specifically predators and mesocarnivores) are attracted to areas with protein feeders, and how they interact with other species at this resource site as well.

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## Wintering Plover Use of a Public Beach After Hurricane Harvey: Preliminary Observations on Changes in Habitat and Human Disturbance

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**ABSTRACT:** We surveyed wintering Piping Plover (*Charadrius melodus*; PIPL), Wilson's Plover (*C. wilsonia*; WIPL), Snowy Plover (*C. nivosus*; SNPL) and Red Knot (*Calidris canutus*; REKN) on Bryan Beach, TX in the fall of 2016 and 2017. Surveys were conducted along linear Gulf beaches and back-beach habitats. The beach survey route was divided into 6 1-km transects to capture bird density and recreational use in each transect. We conducted area surveys in back-beach habitats (5 locations), recording total count of birds and recreational use in that area. Beach conditions in 2017 were very different from 2016 due to large amounts of storm generated woody debris littering the area. Similar numbers of PIPL and WIPL were found on beach transects during both years. There was, however,

a 71.4% reduction in number of SNPL observed. Area surveys were impacted by flooding from Hurricane Harvey; most areas were flooded for nearly the entire survey period. In 2016, 129 individuals representing 3 species were recorded on area surveys. In 2017 only 18 individuals representing 2 species were recorded. Compared to 2016 totals, disturbance events were fewer in 2017 due to beach inaccessibility from Hurricane Harvey woody debris. Transects 1–3 held more birds in 2017 than 2016. People observed in these transects decreased 73% and vehicles decreased by 56.2% in 2017. Birds may have benefited from excess woody debris washed up on the beach impairing the general public's access and causing vehicles to drive more slowly and carefully. However, excessive hurricane related flooding of back beach habitat resulted in less utilization by wintering shorebirds.

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## Annual Survival, Recovery, and Molt Chronology of White-winged Doves in Texas

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**ABSTRACT:** Understanding survival and breeding season length of game birds is important for effective management and conservation. The objectives of this study were to 1) determine subpopulations of white-winged doves (*Zenaida asiatica*) in Texas, 2) investigate annual survival and recovery rates of white-winged doves, 3) determine intrinsic and extrinsic factors influencing survival and recovery rates, 4) determine adult molt chronology, and 5) examine hatch chronology and survival based on hatch date. We used a Multi-Response Permutation Procedure (MRPP) analysis in R with banding data to determine subpopulations of white-winged doves in Texas. We used MARK to analyze bandings and recoveries, to produce estimates and include covariates to explore the most predictive variables. We will use a least-squares regression in R to analyze molt chronology of adult doves. We will assess molt scores of hatch-year doves recorded during annual banding operations to understand the chronology of the breeding season and generate survival estimates based on hatch date. Texas Parks and Wildlife Department has banded 89,297 white-winged doves across Texas since 2003, of which 3,267 have been recovered. MRPP analysis delineated 4 subpopulations of white-winged doves in Texas. Preliminary results suggested that survival rates varied by age class (HY, AHY), while recovery rates varied by age class and MRPP subpopulation designation, although we are currently examining models with additional covariates. We will report results from our molt chronology study. A further understanding of dove population dynamics will assist state agencies in managing more effectively in the future.

# Direct Impact from Hurricane Harvey on Gamebirds in the Coastal Prairie of Texas

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**ABSTRACT:** Major weather disturbances are known to have occasional devastating acute impacts on gallinaceous gamebirds. On 25 August 2017, Hurricane Harvey made landfall in the proximity of Rockport, TX, where its eye passed directly over 2 of 3 inland study sites in Goliad and Refugio Counties. Maximum sustained winds reached between 177 and 209 kph and rainfall exceed 40 cm on both study sites. On these sites, 25 northern bobwhites (*Colinus virginianus*; hereafter, bobwhites) and 82 recently liberated Attwater's prairie chickens (*Tympanuchus cupido attwateri*; hereafter, prairie chickens) were being monitored via radio-telemetry, giving us an opportunity to measure the effects of this disturbance on their survival. We calculated 2-wk bobwhite survival on these 2 study sites and compared the estimates of monitored bobwhites located on an additional site in Goliad County (48 km from the hurricane eye wall) and another site in LaSalle County where there were no direct effects experienced from the hurricane. Overall, the hurricane resulted in roughly 25% mortality of adult bobwhites during a 2-wk period, and 93% of the liberated prairie chickens died or moved off

site. Many of the direct mortality impacts remain unknown; however, we documented at least 14 drowning events of bobwhites and prairie chickens. Most surviving bobwhites apparently weathered the storm on areas of greater topological relief. This study provides insight on impacts of gamebirds by major acute disturbances. Such studies are important in understanding how major weather events could affect populations in an increasingly fragmented landscape.

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## Population Declines of Breeding Snowy Plovers on the Southern Great Plains of Texas, New Mexico, and Oklahoma

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**ABSTRACT:** Snowy plover (*Charadriius nivosus*) population declines are generally considered to be perpetuated by habitat degradation throughout their North American range. Because of this, snowy plovers along the Pacific coast are listed as federally threatened, and state endangered in Washington and Mississippi. Although less studied, interior populations of snowy plovers have also declined due to human disturbance, high predation rates, declining groundwater, stochastic weather events, and potential heavy metal contamination. According to surveys conducted in 2007–2009, breeding snowy plover populations at saline lakes on the Southern High Plains of Texas experienced a ±75% population decline in the preceding decade. To reassess the long-term trends of these potentially vulnerable populations, we conducted weekly surveys of the same private saline lakes (designated A, B and C) during summer 2017, following Saalfeld et al. 2013. Preliminary analyses suggest that plovers have declined significantly in the last decade at Lake B ($P > 0.05$), and remained steady at Lakes A and C ($P > 0.05$). Surveys at Bitter Lake National Wildlife Refuge (NWR) in New Mexico indicate long-term declines across the Southern Great Plains region ($P < 0.05$). However, annual surveys at Salt Plains NWR in Oklahoma suggest that plover numbers on the refuge have remained steady over the last decade ($P > 0.05$), ranging between 3000 and 5200 individuals during May surveys. Long-term declines of breeding snowy plovers in the Texas and New Mexico portions of the Southern High Plains indicate that regional persistence may only be maintained by plovers occurring at Salt Plains NWR.

## Panhandle Mule Deer: A Survey of Body Condition, Size, Reproductive Output, and Antler Growth

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**ABSTRACT:** Historically, Texas mule deer (*Odocoileus hemionus*) were most common in the Trans-Pecos, but population numbers have dramatically increased in the Panhandle. Little is known about mule deer population structure in the Panhandle and how the agriculture-rangeland habitat structure affects population performance. Here, we evaluate body condition and mass, antler size, and lactation status of mule deer in 3 regions throughout the Texas Panhandle. We captured 74 adult male, 81 adult female, and 123 juvenile mule deer during autumn of 2015–2017. Though age structure was consistent across sites, morphometric measurements varied greatly. On average, adult (>3-y old) males in the southwest Panhandle had greater body mass (114 kg *SD*=11 vs. 90 kg *SD*=29), had more rump fat (28 mm *SD*=10 vs. 22 mm *SD*=7), and larger antlers (142 in. *SD*=20 vs. 103 in. *SD*=26; B&C score) than deer in the southeast Rolling Plains and northern Canadian River breaks. Adult females were larger in the southwest Panhandle (70 kg *SD*=11 vs. 62 kg *SD*=13) and lactated at a higher rate (0.50 vs 0.25); however, there was no difference in rump fat measurements. Juvenile size and body mass did not vary between years and sites and overall observed antler growth was 30 B&C inches per year averaged across all age classes. Our data show high heterogeneity in population health indices across the Texas Panhandle. Creating baseline population measures will aid in establishing an adaptive management plan as mule deer population levels in the Panhandle continue to increase.

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## Conservation and Mitigation Effects on Rates of Golden-cheeked Warbler Habitat Loss

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**ABSTRACT:** Remote sensing and ESRI ArcGIS ModelBuilder were used to identify and document changes in golden-cheeked warbler (GCWA; *Setophaga chrysoparia*) habitat in Travis County, TX, and

the surrounding area over 3 decades (1986–2016). Supervised classification of Landsat imagery was conducted and a mixed and evergreen habitat-based model was used to rank Central Texas GCWA habitat quality from low to high. The greatest loss of GCWA habitat occurred along the San Antonio–Austin corridor just west of I-35, while the greatest gains were northwest of Austin and included the Balcones Canyonlands National Wildlife Refuge. Habitat losses exceeded habitat gains and losses appear to be accelerating in certain areas that were previously stable in 2004. We will demonstrate that patterns of loss are consistent across counties, although the rate of loss differs among them. We look at the roles mitigation and conservation played by county in explaining some of the rate differences. The effects of development and drought on habitat loss are enumerated.

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## Rapidly Increasing Invasion by Chinese Tallow in Southeast United States

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**ABSTRACT:** Invasions by non-natives contribute to the loss of ecosystem biodiversity and productivity, modification of biogeochemical cycles, and inhibit natural regeneration of native species. Chinese tallow, *Triadica sebifera* (L.) Small, is one of the most prevalent invasive species in southeastern United States. Hence, we aimed to understand the historical trend in range expansion of Chinese tallow, which could provide valuable information upon which to base effective control strategies and mitigation plans. We first documented the recent range expansion of Chinese Tallow in southeast U.S. based on analyses of an extensive set of field data collected by the US Forest Service on fixed plots during the period from 2001 to 2015. We then compared the empirical results with predictions of existing models, which were based on less-recent data. Chinese Tallow generally spread northward, with the number of sample plots in which Chinese Tallow was detected approximately doubling and mean percent coverage of Chinese Tallow in sample plots increasing

significantly ($P < 0.05$) during this period. Our empirical results supported the general trend of northward expansion predicted by existing models, which were based on less-recent data.

## Influence of Green-flowered Milkweed Health and Quality on Monarch Butterfly Larval Survivorship

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**ABSTRACT:** Monarch butterflies (*Danaus plexippus*) have experienced population declines of up to 90% in the past few decades. Each spring, overwintering monarchs make their journey north from montane forest refuges in Mexico to stop in Texas and Oklahoma to breed. Many of these spring generation monarchs are reared on green-flowered milkweed (*Asclepias viridis*). While there have been numerous studies on the arthropod predators present on monarch host plants and on host plant defense mechanisms, there is no information about how the health and quality of green-flowered milkweed affects monarch larval survivorship. The purpose of this study is to describe host plant characteristics of green-flowered milkweed and to determine what affects these traits have on monarch larval survivorship. This information may prove to be important for making informed decisions on best management practices for successful monarch reproduction in spring.

## Invertebrate Diversity and Community Composition of Stock Ponds in the Oaks and Prairies Ecoregion

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**ABSTRACT:** The Oaks and Prairies Ecoregion of east-central Texas contain high densities of man-made stock ponds, which are the dominant water feature in the region and have been identified as important wintering habitat for waterfowl. As part of a larger project examining stock pond forage relationships to non-breeding waterfowl, we examined the aquatic invertebrate community from stock ponds at the MT7 Ranch, in Stephens County, Texas. We collected aquatic invertebrate samples within the water column from 10 stock ponds between 1 October 2016 and 15 March 2017

($n$ = 980) to examine species richness and diversity. Invertebrates were collected using an open cylinder method in water ≤1-m deep and zooplankton nets in water >1-m deep. We identified 27 individual aquatic invertebrate species within 19 families collectively across all ponds, while individual ponds were variable in both richness and diversity. Water fleas (*Daphniidae* spp.) were the most dominant and abundant within the study area. Preliminary analysis suggest stock pond invertebrate communities vary widely, and are comprised of communities of aquatic invertebrates that are highly variable in density, abundance, and diversity. Invertebrate presence-absence and abundances appear to be closely associated with water depth and season, along with vegetative characteristics of the aquatic plant community.

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## Determining a Sustainable Harvest Rate for Collared Peccary

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**ABSTRACT:** The collared peccary (*Pecari tajacu*) is a native game animal in south Texas. Compared to other south Texas wildlife, peccaries have received little attention from the scientific community resulting in a lack of understanding about population dynamics, including their population response to harvest. This project describes a method of determining a sustainable harvest rate for collared peccary using age-class distributions derived from harvest records. We used 11 y of harvest data from the Chaparral Wildlife Management Area (WMA) to identify age structures consistent with a population under sustainable harvest pressures. Ages of harvested peccaries was estimated using a gradient of tooth replacement wear and were placed into 5 categories. We compared those indices to data derived from harvest records collected on a private ranch in La Salle County, TX. The age structures derived from the Chaparral WMA suggested that a harvest rate of 1.45 animals/km$^2$ will result in maintaining 10% of the population in the oldest age class. The La Salle County ranch was harvesting at a rate of 1.85 animals/km$^2$ and had 0% of the population in age class 4; therefore, we concluded that the La Salle county ranch might not have been harvesting sustainably. This technique will be beneficial to landowners who do not have the resources to conduct property-wide census or determine annual recruitment rates. We encourage further investigation of age class criteria and harvest rates per unit area to refine guidelines for collared peccary harvest.

# Phylogeographic Structure of Spot-tailed Earless Lizards: 1 Species or 2?

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**ABSTRACT:** Species delimitation attempts to match species-level taxonomy with actual evolutionary lineages. Such taxonomic conclusions are typically, but not always, based on patterns of congruence across multiple data sources and methods of analyses. Here, we use this pluralistic approach to species delimitation to help resolve uncertainty in species boundaries of phrynosomatid sand lizards of the genus *Holbrookia*. Specifically, the spot-tailed earless lizard (*H. lacerata*) was historically divided into a northern (*H. l. lacerata*) and southern (*H. l. subcaudalis*) subspecies based on differences in morphology and allopatry, but no research has been conducted evaluating genetic differences between these taxa. In this study, patterns in sequence data derived from 2 genes, one nuclear and one mitochondrial, for 66 individuals sampled across 18 counties in Texas revealed 3 strongly supported, reciprocally monophyletic lineages each comprised of individuals from a single geographic region. Distinct genetic variation evident across 2 of these regions corresponds with both the historical subspecies boundaries based on morphological variation and the presumed geographic barrier between them, the Balcones Escarpment. The combined evidence from genetics, morphology and distribution is sufficient to consider these subspecies as distinct species with the lizards north of the Balcones Escarpment retaining the name *Holbrookia lacerata*, and those south of the Balcones Escarpment being designated as *Holbrookia subcaudalis*.

# Effects of White-tailed Deer and Supplemental Feeder Density on Wood Species Composition

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**ABSTRACT:** Researchers in North America have observed a shift in woody plant species composition as white-tailed deer (*Odocoileus virginianus*) densities increase, but this shift has not been documented in highly variable environments like south Texas. Our research was conducted on 2 ranches in Dimmit County, TX. Each ranch contains 6 81-ha enclosures, and each enclosure was assigned one of the following treatment combinations: 0 deer/1 feeder, 20 deer/1 feeder, 40 deer/1 feeder, 60 deer/1 feeder, 60 deer/3 feeders, and 80 deer/4 feeders. In 2004, we established 20 50-m transects in each enclosure. During June 2012–2017, we estimated woody plant canopy cover by species using the line intercept method. We used non-metric multidimensional scaling to detect and display patterns over time in woody species composition. We used an index of multivariate dispersion to compare average similarities in composition among treatments, and then regressed the index on year to detect changes in variation in species composition over time. Preliminary results suggest that patterns in community composition vary between ranches and among enclosures. Transect trajectories were not directional and were difficult to associate with particular treatments. The index of multivariate dispersion indicated that variation in community composition was reduced in the 80/4 treatment relative to the 0/1 and 20/1 treatments on one ranch. Woody plant community changes over time are the result of a complex interplay of initial species composition and treatment. When deer/feeder density had an effect, this effect was to reduce variation in community composition and thus potentially limit habitat stability.

## Infectivity and Transmission of Reticuloendotheliosis Virus in Northern Bobwhite

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**ABSTRACT:** Northern bobwhite populations have recently been declining across their range, due in large part to habitat loss and fragmentation. The role of disease in this decline, however, has been little-studied. Our objectives include determining if northern bobwhites can be infected with reticuloendotheliosis virus (REV) and the transmission method of the virus. REV has been detected in other gallinaceous birds, but not yet observed in northern bobwhites. The purpose of this study is to determine if REV may be a contributing factor to the decline of northern bobwhites. Thirty quail, anesthetized using isofluorane, were inoculated with varying doses (0%, 25%, 50%, 100%) of 103.4 $TCID_{50}$ of virus intramuscularly into the breast muscle. Virus detection by PCR was performed at 6 wk to determine infection. After determining infection, mosquitoes were starved overnight in a feeding jar and then allowed to feed for 15 min on REV-infected or uninfected quail. At 15 min, fully engorged mosquitoes were collected, observed under a binocular microscope for blood content, and frozen at –80°C. Based on previous research involving Japanese quail (*Coturnix japonica*), we expect to find that northern bobwhites are susceptible to REV infection. We also expect to find that mosquitoes are viable vectors for REV.

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## Modeling Foraging Habitat for Shorebirds in the Laguna Madre

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**ABSTRACT:** Continued development and urbanization along the Texas coast make understanding habitat use by native species more important for successful management and conservation. We plan to develop a model that will delineate foraging habitat for migratory shorebirds in the Laguna Madre located on the lower Texas coast. We plan to use satellite imagery, LIDAR data, and geospatial datasets of bathymetry, seagrass distribution, and benthic habitat. We will also measure several habitat attributes along transects established in 7 key study sites. Tidal variations within the Laguna are primarily wind-driven so we plan to use a combination of tide gauge readings, and wind direction, speed, and duration from 4 weather stations strategically placed along the Laguna Madre. We will also manually verify the location of the water's edge at different times throughout spring as a way to assess performance of the model. By combining these layers we will be able to identify the spatial and temporal locations of shorebird foraging habitat created by varying water levels in the Laguna Madre. An independent data set provided by satellite-GPS equipped shorebirds from an associated study will be used as an additional measure of performance of the model. The final product will allow managers to be fully informed of the potential environmental impacts of development in and around the Laguna Madre on shorebird foraging habitat.

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## Effects of Red Imported Fire Ants on the Arthropod Community Associated with Green-flowered Milkweed Plants Occupied by Monarch Butterfly Eggs and Larvae

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**ABSTRACT:** Declines in monarch butterfly (*Danaus plexippus*) populations have resulted in an interest in the potential effects of red imported fire ants (*Solenopsis invicta*; RIFA) on the survival of monarch larvae in Texas. A pilot study conducted in 2016 suggested that RIFA may facilitate monarch survival through indirect effects. Such indirect effects would depend strongly on the inter- and intra-guild interactions among arthropods on and surrounding the host plants. This study addresses the hypothesis that RIFA might cause a density-dependent trophic cascade in the milkweed arthropod community that effects monarch survival. The study will identify major components in the system and look at the relationship between RIFA and these components. These relationships will assist in making management decisions regarding the ecological communities that host monarch larvae in Texas.

## Growth Patterns of Captive Hatchling Alligators

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**ABSTRACT:** The American alligator (*Alligator mississippiensis*) is an iconic keystone species of wetlands in the southeastern United States. During their prior status as endangered, alligator research became bountiful. However, knowledge of hatchling alligator growth is sparse. Our objective was to determine growth patterns and rates of both alligator sexes from hatchling to 2-y of age. We measured lengths of the head, eye-to-nare, total body, snout-to-vent, tail girth, and live weight every 2 wk for the first year, and every month thereafter. Sex*time interactions occurred ($F_{24,249} > 1.73$, $P < 0.024$) for all alligator measurements. Size differences in time were obvious due to growth with age, and sex differences were sporadic in time, but generally females grew faster during their first year post hatching while males grew faster during the second year, and eventually surpassed the size of female alligators by the end of their second growing season. May–October constituted the growing season for young alligators. Although alligators grew throughout the year, growth was nominal outside the growing season. Male alligator growth rates were 1.5 and 4.4 cm/month during their first and second growing season, respectively, for snout-to-vent length, while female growth rates were 1.7 and 3.5 cm/month, respectively, during the same time periods and measurement. Growth rates for alligator total length were twice that of snout-to-vent length. The belief that alligators grow 1-foot-per-year was not observed in our study.

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## Raccoon Roundworm: An Occupational Hazard to Captive Wildlife Caregivers

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**ABSTRACT:** Raccoon roundworm (*Baylisascaris procyonis*) is a large nematode found in the small intestine of raccoons (*Procyon lotor*). Adult parasites are not pathogenic to raccoons; however, larvae in intermediate hosts can cause blindness, paralysis, and death. Humans can serve as intermediate hosts. Infected raccoons expose intermediate hosts through their feces, which can contain millions of eggs. Recently, we demonstrated a single raccoon roundworm-infected raccoon could contaminate 0.25-ha/year with raccoon roundworm eggs, which is conservative because this calculation assumes every $cm^2$ of ground would become contaminated. Therefore, raccoon roundworm represents a risk to potential intermediate hosts, especially caregivers and wildlife rehabilitation personnel, in areas where infected raccoons and intermediate hosts co-occur. Our objectives were to determine the prevalence of raccoon roundworm -positive scats within the Tio and Janell Kleberg Wildlife Research Park, the potential exposure to captive wildlife and human caregivers, and the most effective methods to neutralize potential transmission to humans and captive animals. To date, 28 fecal samples from raccoons have been collected and analyzed via centrifugal flotation for parasite ova. Of these, 5 specimens (18%) have been positive for raccoon roundworm ova; 2 locations within the captive deer pasture, one location within the hay storage facility, and one location within the aviary. Raccoon trapping, coupled with burning contaminated soil, has been the only successful method to reduce the prevalence of raccoon roundworm eggs within the facility. Personnel should always wear gloves within the facility and thoroughly wash their hands upon leaving to reduce their transmission risk to this zoonotic parasite.

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## Long-term Snowy Plover Surveys at Bitter Lake National Wildlife Refuge

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**ABSTRACT:** The interior population of snowy plovers (*Charadrius nivosus*) is believed to number <26,000. The ability to discern range-wide trends is hampered by survey coverage and inconsistency; however, sharp declines in local abundance of breeding snowy plovers have been noted on Texas saline lakes. We monitored breeding snowy plovers at Bitter Lake National Wildlife Refuge, Roswell, New Mexico between 1999 and 2016. Snowy plovers nest on a large saline lake and salt flat areas of the refuge. These habitats are "discharge wetlands," as surface water is tied to groundwater through springflows and seeps. Peak April and peak May counts of snowy plovers declined at a rate of about 9 individuals/y. Likewise, post-breeding numbers (June surveys of adults plus young) declined at a rate of about 12 birds/y. Abundance of both breeding and post-breeding snowy plovers declined by over 60% during the 17 y of the survey. Abundance of breeding Snowy Plovers is correlated ($r^2$ = -0.73, $P < 0.001$) with annual ground water levels. The link between groundwater and habitat availability at Bitter Lake needs to be further explored, and can likely be accomplished using historic imagery. Declines in snowy plovers at Bitter Lake mirror results from Texas saline lakes, which also may be correlated with declining aquifer levels.

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## Estimation of Deepwater Horizon Oil Spill Effects on Population Dynamics of the Loggerhead Sea Turtle

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**ABSTRACT:** Deepwater Horizon (DWH) was the largest offshore oil spill in US history. The result was 87 d of constant oil and natural gas flow, which resulted in approximately 3.19 million barrels of oil being released into the ocean. DWH significantly affected the Gulf of Mexico and surrounding beaches, including threatened and endangered marine life such as the loggerhead sea turtle (*Caretta caretta*). Both federal and state agencies charged with overseeing U.S. natural resources conducted numerous assessment activities to quantify the adverse effects of oil and its consequences on wildlife resulting in a DWH Natural Resource Damage Assessment. Short- and long-term effects to juvenile and adult loggerheads result from catastrophic oil spills, including oil adhesion, over-heating, and oil ingestion which can lead to egg mortality, developmental defects, and impacts to the skin, blood, salt glands, and digestive and immune systems. Hence, we aimed to determine how the event affected the population dynamics of loggerhead sea turtles. We conducted a thorough literature review to obtain the demographic data and developed a stage-structured population dynamics model for loggerhead sea turtles. We then used the model to quantify the potential effects of oil spills on the population of loggerhead sea turtles for the next decade. Our results showed that the event of oil spills could negatively influence the conservation efforts of loggerhead sea turtles even though the

population was under the light oil exposure. Long term monitoring program for the effects of oil spills on loggerhead sea turtles is urgently needed.

## Social Hierarchy Position of Lactating White-tailed Does in an Enclosed Population at Pelleted Feed Stations

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**ABSTRACT:** Pelleted feed stations are a common management tool in south Texas for white-tailed deer (*Odocoileus virginianus*) to improve the deer's nutritional plane. However, the social hierarchy may influence which deer can access the supplemental feed. Lactating does need access to these feed stations because lactation is nutritionally demanding. Lactating does would benefit being higher on the social hierarchy because they are able to get a more nutritionally rich diet that they may not be able to get from foraging. To test this hypothesis we used 2 81-ha research enclosures on the Comanche and Faith ranches, with a target density of 60 deer and a single feed site. We analyzed social interactions between marked deer in videos from a 7-day survey in August 2015, when peak lactation occurs. Social hierarchy interactions were analyzed in Program R using Elo Rating. Logistic regression showed that as a does standing in the social hierarchy increased, her probability of lactating increased ($P = 0.02$): the odds of lactation increased 165% for a 100-unit increase in Elo rating. This is important because lactating does have a higher nutritional need and being higher in the social hierarchy allows them to access higher quality food and produce more milk for her offspring.

## Influence of Forest Structural Characteristics on Hardwood Growth in Open Pine Woodlands

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**ABSTRACT:** The restoration of open pine woodlands is critical for the management of many southeastern wildlife species. In these woodlands, the application of prescribed fire can suppress the growth and diversity of many hardwood species; however, hardwoods provide important habitat features for wildlife including browse, mast, and cover. We measured the percent cover of various groups of hardwoods (hickory, oak, elm, and other) on 640 plots in 16 short-leaf pine stands in the Ouachita National Forest in Arkansas. Using linear mixed models, we examined the influence of forest structural characteristics (e.g. basal area, aspect, canopy cover, number of previous burns, and time since most recent burn) on the coverage by hardwood species. Preliminary analysis showed that time since previous burn was the most influential characteristic for the species being examined. This information will be helpful for wildlife professionals who are managing these pine woodlands for wildlife that will benefit from the increased hardwood diversity that will result.

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## Preference by White-tailed Deer among Acorns from 6 Common Oaks

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**ABSTRACT:** Acorns are an important component of the diet for many wildlife species, including white-tailed deer. Although acorns from various species of oak are often considered similar in terms

of use and benefit for wildlife, there are several characteristics that vary among acorns such as tannin content and palatability. We will use paired preferential trials with captive white-tailed deer to examine palatability of 6 common east Texas oak species – Shumard (*Quercus shumardii*), southern red (*Q. falcate*), live (*Q. virginiana*), overcup (*Q. lyrata*), swamp chestnut (*Q. michauxii*), and white oak (*Q. alba*). The pairs will be compared by recording initial consumption and then by measuring total consumption after the food is removed. This will be replicated with 5 deer, and will result in a ranking of the species in order of preference. This information will help wildlife professionals manage oak forests that will provide maximum benefits for white-tailed deer.

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## Analysis of Unmanned Aerial System Imagery to Map Emergent Aquatic Vegetation in a Constructed Wetland

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**ABSTRACT:** Richland Creek Wildlife Management Area (Fairfield, Texas) contains a large constructed wetland (approximately 899 ha) with several vegetation species that provide ideal habitat for many species of waterfowl. While annual vegetation coverage estimates are necessary to monitor the health, productivity, and biodiversity of this dynamic system, they are very labor intensive. Unmanned aerial systems (UAS) in conjunction with image analysis tools could provide an efficient alternative or compliment the more traditional survey techniques. For 3 years (2014–2016) an UAS was used each fall to obtain high resolution true color (RGB) and near-infrared imagery of the Richland Creek WMA wetland cells. Ground-control points and ground-truthing vegetation data were obtained at the time of each flight. Unsupervised classification using the ISO cluster option was performed in ERDAS 2016 and areal coverage estimates were calculated for the classified vegetation groups within ArcGIS. The UAS imagery collected in suboptimal weather conditions showed degraded spectral properties that hampered image classification; therefore, the best-performing classification had a kappa value of 45%. Results from this study provide insight on the application of UAS in aquatic vegetation monitoring and what improvements could be made to improve overall accuracy, especially in terms of deployment under degraded field conditions.

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## New Host Record of *Mesocestoides* in North American Birds: Northern Bobwhite and Scaled Quail

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**ABSTRACT:** Northern bobwhite (*Colinus virginianus*, hereafter bobwhite) and scaled quail (*Callipepla squamata*) are popular game birds in Texas. During the 2016–2017 hunting season, hunter-harvested bobwhite and scaled quail from northwest and southern Texas, respectively, were examined for helminth parasites. One bobwhite and one scaled quail were found to host *Mesocestoides* sp. tetrathyridia under the pericardial sac, on the surface of the crop, and in the peritoneal cavity. *Mesocestoides* spp. are cestodes with a cosmopolitan distribution with zoonotic potential. Identification to species within this genus is inadvisable. Thus, we obtained partial sequences of mitochondrial 12S, cox1, and nad1 genes. Molecular analysis demonstrated that the tetrathyridia from the birds likely belong to an undescribed species and are identical to pre-tetrathyridium stages recently found in *Scincella lateralis* skinks in Oklahoma. Although prevalence of *Mesocestoides* in quails is rare, and pathogenicity low, hunters should assure their harvest is cooked thoroughly and internal organs disposed in a place not accessible to pets or other wildlife. This is the first report of *Mesocestoides* from North American birds.

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## Influence of Agriculture on Mule Deer Diets and Nutrition in the Texas Panhandle

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**ABSTRACT:** Mule deer (*Odocoileus hemionus*) occur in the Panhandle region of Texas and are commonly found in environments characterized by large amounts of agriculture interspersed across the landscape. The use of agriculture can act as a supplemental forage and may put mule deer on a greater nutritional plane resulting in greater body mass and body condition, antler growth, and fawn survival. This research has 3 main objectives: 1) document a seasonal diet including both native rangeland and agricultural crops; 2) document monthly nutritive values of forages in native rangeland and agricultural crops used by mule deer; and 3) determine if deer taking advantage of the agricultural crops are on a greater nutritional plane, and if these foraging behaviors are correlated with body mass, body condition, antler size, and fawn recruitment. The study was conducted on private lands throughout Hall and Motley counties within the western Rolling Plains ecoregion. Forty-five fecal samples were collected opportunistically across the study area from individual mule deer from April 2016 to October 2017 to document annual and seasonal diets. Fecal material will be analyzed for plant DNA via high-throughput sequencing of a chloroplast intron (trnL), allowing for quantitative reconstruction of the taxonomic composition of diets. Samples of native forage and crop species were collected monthly from July 2016 – October 2017 across the study area to estimate crude protein, detergent fiber, digestible dry matter, and digestible energy. Diet and nutrition data will be compared to morphological and observational data recorded during deer captures to determine if foraging behaviors are correlated with body mass, body condition, antler size, and fawn recruitment. This information will allow biologists to determine which crops and forages are most beneficial to mule deer for future management decisions, including harvest regulations and habitat management.

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## Assessment of the Condition of Artificial Escape Dens and Use by Swift Foxes 10 Years Post-establishment

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**ABSTRACT:** Swift foxes (*Vulpes velox*) occurred in 79 counties in Texas during the early 1900s; they currently only inhabit the 2 northwestern counties, Dallam and Sherman. The major cause of swift fox mortality is coyote (*Canis latrans*) depredation. During 2002–004, 191 artificial escape dens, made of PVC pipe, were established on the Rita Blanca National Grassland (RBNG), the Kiowa National Grassland (KNG), and a private ranch to aid swift foxes in escaping coyotes. Swift foxes used escape dens through 2004 and survival increased. We initiated a study in 2012 to determine physical condition and use of these artificial dens. We found 72.8% had become unusable by swift foxes because of obstructions within dens and/or complete burial by soil. Ten artificial dens sustained physical damage, 7 had cracks along the pipe, 2 had crushed entrances, and teeth marks were on one den entrance. We found evidence of swift fox use at only one artificial den in RBNG. The percentage of bare ground, mean vegetation height, and visual obstruction at 10 m and at artificial den entrances had changed compared to the values for these variables when the artificial dens were installed. The changes in vegetation may be due to an increased capacity of artificial dens to hold water after precipitation compared to the drainage at natural dens. Long-term use of escape dens will probably require periodic maintenance to clear obstructions that interfere with access by swift foxes.

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## Understanding Human and Livestock Use of Space in Tiger Habitat in Chitwan National Park, Nepal: An Occupancy Modeling Approach

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**ABSTRACT:** Domestic animals and human disturbance can impact large carnivores in several ways, including increased predation or decreased occupancy in otherwise suitable habitat. Chitwan National Park, located in a human-dominated landscape in Nepal, supports one of the few remaining wild tiger (*Panthera tigris*) populations while simultaneously withstanding human and livestock use of the park. Local people rely on the park's resources for food, fuel, and fodder, and also exercise their traditional rights of using the park in many other ways. Chitwan National Park is also one of the most visited sites in Nepal by domestic and foreign tourists. Appropriate management of endangered species like tiger requires proper understanding of human and livestock use of the space in its habitat. Our goal is to understand the effect of human and livestock occupancy of the park on habitat use tigers. We will use camera-trapping data in an occupancy modeling framework and GIS to understand distribution and occupancy of human and livestock in the park in relation to the tiger habitat use. This study will provide insight into the occurrence patterns of humans and livestock in the tiger habitat, thereby aiding in identifying appropriate habitat management strategies in the park.

## An Analysis of Factors Associated with Wildlife Road Mortalities in South Texas

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**ABSTRACT:** The continued development of land and roadways impacts wildlife populations by increasing the risk of wildlife road mortalities. In south Texas, the endangered ocelot is the focus of several road-mortality mitigation projects. In order to determine the effects of this mitigation, a better understanding of the factors associated with ongoing mortalities and baseline trends present in these locations are necessary. Road mortality surveys were conducted on 4 major thoroughfares in south Texas at least twice a month in 2016 and 2017, focusing on mammals and reptiles. Species composition as well as seasonal trends were examined in relation to environmental variables, barriers to animal movements, and presence of planned road crossing structures. We found areas of greater mortality were associated with presence of water bodies and roads with increased vehicular traffic. The installation of mitigation fencing caused a decrease in observed mortalities. This information is useful for planning future mitigation techniques and can serve as a baseline for future wildlife road mortality studies in south Texas.

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## Using Morphological Measurements to Distinguish Between Sexes of Grassland Birds in the Chihuahuan Desert, Texas

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**ABSTRACT:** A recent decline in numbers of grassland birds has provided a need to learn more about these birds in order to use them to assess grassland ecosystem health. An understudied skill is the ability to sex certain monomorphic and monochromatic species of grassland birds. Being able to distinguish the sexes is important when determining the abundance of females and nests in a grassland because more nests equate to a healthier ecosystem. This study was conducted on the Dixon Water Foundation's Mimms Ranch in Presidio County, Texas, from June to August 2017.

The objective was to determine if any morphological differences exist between the sexes of the Cassin's sparrow (*Peucaea cassinii*), lark sparrow (*Chondestes grammacus*), grasshopper sparrow (*Ammodramus savannarum*), and eastern meadowlark (*Sturnella magna*) in the Chihuahuan Desert region of Texas. For this study, birds were captured using 12 m × 2.5 m, 30 mm mesh size mist nets. Five morphological measurements and specific plumage characteristics for each species were recorded for comparison. A total of 50 birds were caught and analyzed using a t-test comparison. For the Cassin's sparrow, wing chord was found to be statistically different ($P = 0.001$). For the eastern meadowlark, wing chord was almost statistically different with $P = 0.061$. Information obtained from this study will benefit avian ecologists in the future when trying to sex these monomorphic and monochromatic species in the Chihuahuan Desert region of Texas. Ultimately, results from this study will aid in using grassland birds as indicators of grassland ecosystem health.

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## Macro- and Micro-habitat Effects of Ocelot Occupancy

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**ABSTRACT:** The ocelot (*Leopardus pardalis*) is an endangered subtropical felid found in 2 small populations in the Lower Rio Grande Valley of Texas. Degradation and loss of habitat is one of the principal drivers of a loss of ocelot genetic diversity in the region. From 2011–2017, we conducted remote camera surveys on 28 sites within the East Foundation's El Sauz Ranch, Willacy County, TX. Preliminary results indicated a seasonal trend in detection between hot and cool months and initial occupancy was positively influenced by increasing linear distance to roads and woody patch density. Localized colonization was negatively influenced by sandy clay loam soils, but positively influenced by increasing woody patch density. Local extinction was influenced by decreasing woody patch density and negatively impacted by fine sandy soils. These data indicate that probability of initial occupancy of ocelots was greatest at least 1 km from roads, which has impacts on mitigating road crossings for ocelots. As woody patch density decreases, there will be less preferred dense vegetation for ocelots to colonize and differences in soil types should be factored into future habitat preservation and restoration efforts. This research provides information into habitat components

most likely to influence ocelot occupancy, which is essential for future ocelot recovery and habitat restoration in the Lower Rio Grande Valley.

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## Demonstration of a Multi-species, Multi-response State-and-transition Model Approach to Help Inform Wildlife Management

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**ABSTRACT:** We used previously collected data and expert opinion to hypothesize how the types, levels, intensities, and locations of fire disturbance could create habitat conditions outlined in region-specific, conceptualized state-and-transition models (STMs) for 2 endangered bird species, the golden-cheeked warbler (*Setophaga chrysoparia*; hereafter warbler) and the black-capped vireo (*Vireo atricapilla*; hereafter vireo). We then collected data to quantify habitat-specific warbler and vireo demographic responses to vegetation conditions across ecological sites per study area and we conducted analyses to identify thresholds at which avian responses changed as a function of vegetation structure and composition. We used an extensive vegetation data set to quantify region-specific, vegetation-based STMs in relation to time since burn. Finally, we linked warbler and vireo demographic information to models that depict plant community transformations in each of our study areas. Through this process, we demonstrate a multi-species, multi-response STM approach that could allow land managers to determine the types, levels, intensities, and locations of management activities to minimize the negative effects or enhance the positive effects of disturbance on wildlife.

## Determining the Seasonal Diets of Waterbuck Located in Central Texas Using Microhistological Analysis

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**ABSTRACT:** Waterbuck (*Kobus ellipsiprymnus*) are antelope native to sub-Saharan Africa. In Texas, they are one of several species of non-native ungulates stocked on private ranches primarily for the exotic game hunting industry. To date, no food habit studies have been conducted for waterbuck residing in Texas. Our goal was to determine the seasonal diets of waterbuck on the Mason Mountain Wildlife Management Area located in Mason, Texas using microhistological analysis. During each meteorological season, twenty fecal samples were taken for microhistological analysis. In addition, 10 vegetation surveys were conducted to determine the composition of available food sources each season. To determine diet, plant fragments observed in the fecal material were examined under a microscope at 200X and identified to species. A total of 2,000 plant fragments (500 per season) were examined and 1,947 were identified to species. Grasses made up 93.8% of the annual diet and forbs contributed 6.2% to the annual diet. No browse species were detected. The dominant species were Texas wintergrass (*Nassella leucotricha*), green sprangletop (*Leptochloa dubia*), eastern gamagrass (*Tripsacum dactyloides*), Canada wildrye (*Elymus canadensis*), American barnyardgrass (*Echinochloa muricata*), yellow indiangrass (*Sorghastrum nutans*), and vine mesquite (*Hopia obtuse*). In all seasons, food resources were not used proportional to their availability ($P < 0.05$), suggesting that waterbuck are grazers that forage selectively.

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## Transforming Mesquite-Texas Wintergrass-Dominated Plant Communities into Native Grassland Bird Habitat

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**ABSTRACT:** Intensive overgrazing by cattle, climatic variation, fire suppression, and an overuse of poorly timed prescribed burns have converted many of Texas's native grasslands into low-diversity plant communities not supportive of native grassland bird species, including bobwhite quail (*Colinus virginianus*). Annual grasses during the warm season, Texas wintergrass (*Nassella leucotricha* [Trin. & Rupr.] Barkworth) during the cool season, and invasive mesquite (*Prosopis glandulosa* Torr.) now dominate much of the original plant community throughout Texas's Rolling Plains and Cross Timbers Ecoregions. Using commonly recommended management practices, our study aims to determine the best technique, or combination of techniques to restore native grassland bird habitat to mesquite-Texas wintergrass dominated plant communities. Towards this end, plot-level mesquite removal followed by subplot-level treatment variations including seeding, grazing, herbicide application, burning, and controls were seasonally measured across 3 years for species composition, percent cover, bare ground, and litter. An initial single 2-L/ha application of glyphosate herbicide during the boot stage of Texas wintergrass, quickly followed by a controlled burn of dead plant material, with or without cattle grazing at 1.5 AUMs/ac stocking rates were the simplest and most effective treatment combinations ($P < 0.05$) decreasing Texas wintergrass cover, decreasing litter, and increasing bare ground. These same subplots, pre-treated with a seed mixture of native warm-season grasses and forbs, have quickly transformed ($P < 0.05$) into more diverse plant communities reflective of the native plant species composition and structure required for native grassland bird guilds. Texas land stewards throughout the Rolling Plains and Cross Timbers Ecoregions can use these treatment methods to begin the successful conversion of mesquite-Texas wintergrass dominated plant communities into rich and diverse grassland bird habitat.

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## Grain Sorghum Residual Availability for a Migrating Population of Sandhill Cranes Wintering on the Southern High Plains

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**ABSTRACT:** The Southern High Plains is one of the most agriculturally impacted regions in the world. Irrigation advances during the last century have facilitated large-scale transition of native grasslands to grains, wheat, and cotton. Migratory Sandhill cranes (*Antigone canadensis*) forage on harvested grain fields for easy-access, high-energy foods, and recent literature suggests the Southern High Plains may be important for fat reserves prior to migration. To quantify available overwinter forage for the species, we sampled both irrigated and non-irrigated fields of grain sorghum residuals on the Southern High Plains. We randomly sampled sorghum fields (irrigated = 405 ha, non-irrigated = 395 ha) immediately following harvest and again 3 additional times at 3-wk intervals. Seeding rates (*P*lanting densities) were standardized after we dried and weighed seeds to assess residual densities across all study sites. Preliminary results from the first sampling period suggest seed densities were sufficient for wintering sandhill cranes as long as residuals remain on the landscape and are not plowed under, making them unavailable. Irrigation will likely become less common as aquifer depletion limits profitability for producers; thus, dryland sorghum may be important for the future of wintering sandhill cranes. Carrying capacities of major stopover migration sites have declined in recent years, thus making the Southern High Plains food resources potentially more vital for the population. We will use the updated seed residual densities to model carrying capacity of areas of high importance on the Southern High Plains for sandhill cranes.

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## Biological Invasion and Coexistence in the Southeast United States

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**ABSTRACT:** Invasive species have had enormous, sometimes irreversible, impacts on biodiversity, human property, and economic activities. Theoretically, plant communities with high species diversity should be most resistant to invasion. While many empirical studies support this hypothesis, other empirical studies suggest that communities with higher biodiversity tend to be invaded more easily. Hence, we aimed to understand the relationship between abiotic/biotic factors and the coexistence of invasive species. We analyzed an extensive dataset collected as part of the Forest Inventory and Analysis Program of the United States Forest Service. We associated the data on coexistence of Chinese tallow (*Triadica sebifera*), Chinese/European privet (*Ligustrum* sp.), and

Japanese honeysuckle (*Lonicera japonica*) (SNIPET) with the data on landscape conditions, forest features, disturbance factors, and forest management activities (FIA Data and Tools) using the FIA plot identification numbers. We then checked the relationships. Our results indicated that some abiotic/biotic factors showed significant effects on the coexistence of invasive species. Among 42,637 forested plots, 147 plots were invaded by all 3 invaders: Chinese tallow (tree), Chinese and European privets (shrubs), and Japanese honeysuckle (vine). The plots with coexisting invasive species were mainly private lands (93%). They were either loblolly pine (*Pinus taeda* ) (34%), oak (*Quercus*)/hickory (*Carya*) (24%), or oak/gum (*Liquidambar styraciflua*)/cypress (*Taxodium distichum*) (14%) forests. Moreover, those stands were relatively young, with average age of 26.6 years (± 18.4), and highly productive (≥50 $ft^3$/acre/year). The average biodiversity measure, Shannon index, was lower in the plots with coexisting invasive species (1.39) than in the non-invaded ones (1.44). Our preliminary results supported the Elton's hypotheses that higher biodiversity resists plant invasion.

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## Rangeland Suitability Model for the Texas State Bison Herd in Caprock Canyons State Park

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**ABSTRACT:** The Texas State Bison herd in Caprock Canyons State Park, Briscoe County, TX, is the only remaining herd of southern plains bison (*Bison bison bison*). Research has found that this herd has 3 unique genetic markers not found in the DNA of other bison herds in North America. Texas Parks and Wildlife has been working on the stability and success of the herd; their work includes restoration of the native vegetation using prescribed fire and chemical treatments. In February 2017, we placed 4 GPS collars on bred females around 3 y of age. We set the collars to take fixes every 2 hours and upload twice daily. We are using remote sensing data and field data to assess for resource selection. Our covariates include slope, distance to permanent water, woody coverage, rangeland productivity and plant composition, and human disturbances. We will use an information-theoretic approach and Akaike's Information Criterion adjusted for small sample sizes (AICc) to identify models that best fit the data. In addition, we will create a Rangeland Suitability Model to help

understand habitat use. Our study will aid Texas Parks and Wildlife as they continue to restore the state park, and provide a model for future conservation herds in semi-free range areas.

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## Roosevelt Elk Use and Selection of a New Meadow in Redwood National and State Parks

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**ABSTRACT:** According to optimal foraging theory, herbivores will use a new foraging patch intensely to become familiar with the new resource. Recently, a Roosevelt elk (*Cervus elaphus roosevelti*) herd in the Redwood National and State Park, California, was given access to a new forage patch, the cattle pasture. Cattle and predators, both of which can negatively affect elk, also used the cattle pasture. Our focus was to assess if cattle and black bear (*Ursus americanus*) presence in the cattle pasture negatively affected the herd and determine if the herd used the cattle pasture intensely to become familiar with a new forage patch. Camera data was collected continuously from August 2016, to November 2017, by 6 infrared cameras strategically placed around the cattle pasture. We measured herd activity and forage biomass in January and herd movement in July. Avoidance between elk and cattle or bears at small scales was apparent because days with pictures of both elk and cattle or bears were fewer than randomly generated data. Analyses of movement data indicated that the herd was becoming familiar with the cattle pasture. In January, elk foraged in meadows in proportion to available forage biomass except in the cattle pasture, where elk foraging exceeded available forage biomass. In spite of cattle and black bear in the cattle pasture, elk appeared to use the pasture intensely to become familiar with the new resource.

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## Breeding Bird Response to Post Oak Savanna Restoration in Eastern Texas 8 Years Post-Management

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**ABSTRACT:** Oak savannas were once an abundant vegetation type in the midwestern United States that have now declined to <1% of their original distribution. Historically, natural disturbances such as periodic fire maintained oak savannas, but these have been reduced or eliminated resulting in woody encroachment and subsequent habitat loss and degradation. In 2007, a baseline, pre-restoration study (*P*hase I) was completed to determine breeding bird abundances, nest success, and nest site selection. The results of Phase I showed a lack of savanna vegetation structure on degraded

sites and few savanna or grassland obligate bird species. The goal of this study is to determine how breeding birds of oak savanna vegetation types in eastern Texas respond to restoration effects 8 years after initial management. Finishing up, the post-restoration study (*P*hase II) was conducted to document breeding bird responses to post oak savanna restoration using line-transects and nest searching during 2016 and 2017 breeding seasons. While Phase II data did not show a significant change in species richness (*P*hase I = 39; Phase II = 51), the abundance of target grassland and savanna birds did change. A shift in bird communities has been observed from a more woodland dominated community to grassland/savanna community. During Phase II, we also confirmed breeding for 2 species of savanna birds that were not present during the Phase I study: dickcissel (*Spiza americana*) and lark sparrow (*Chondestes grammacus*). The presence of savanna species can be linked to the herbaceous vegetation that was restored to more closely resemble historic oak savanna structure and can quantify the success of restoration efforts.

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## Factors Affecting Detection Probability and Abundance of White-winged Doves in Texas

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**ABSTRACT:** White-winged dove (*Zenaidia asiatica*, WWDO) populations have expanded since approximately 1980 and are now associated with urban environments more than rural ones (81.2% and 18.8%, respectively; TPWD 2015). Given their importance as a game species, TPWD expanded monitoring efforts in 2008 to provide a statewide Urban Dove Survey (UDS). Objectives of this study are to update the monitoring program for urban dove by assessing the population trends of WWDO at the city level, so we can adjust the sample size for individual cities. To accomplish this, we used hierarchical modeling in the R package 'unmarked' and a stepwise information theoretic approach to assess our a priori predictions about covariate influence on detection probability and abundance of WWDO. We determined support for a model using Akaike's Information Criterion (AIC). Based on our preliminary AIC results, detection probability was influenced by percentage of low-medium intensity urbanization within 200m of a survey point, human population density, latitude, time of day, year, and ecoregion. Abundance processes were influenced by human population density, year, and ecoregion. Statewide abundance estimates of WWDO increased over

the 2008–2016 survey period from 8,849,778 dove (95% CI = 8,054,434–9,743,509) to 13,831,433 dove (95% CI = 12,779,307– 4,983,158). This study will eventually provide TPWD with a more efficient sampling protocol and a more precise estimate of WWDO at the city, subpopulation, and state levels to inform harvest management decisions and monitor the species' population.

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## Baseline Data on Overwintering Bats and Roosts in Texas

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**ABSTRACT:** White-nose syndrome (WNS), a fungal disease caused by *Pseudogymnoascus destructans* has led to declines in population size of cave-dwelling bat species in eastern Unites States. Of the 33 species documented in Texas, 6 species have known susceptibility to the fungus. Based on current rates of expansion, we expect that WNS could be documented in Texas within the 2016–2019 period. To understand the potential threat of WNS to bats in Texas, we monitored for signs of WNS, as well as collected data on bat species distribution, abundance, and environmental characteristics at 20 sites from January–March 2016, and 207 sites from October–March 2017. We submitted 142 swabs from bats for testing of *P. destructans* using real-time PCR in 2016. All swabs were negative for the fungus. Additionally, we submitted 163 samples for testing between January and March 2017. Of the 10 sites swabbed, 5 cave sites located in the Texas panhandle produced positive results for *P. destructans* DNA. After the initial documentation of *P. destructans*, WNS is commonly found within 2 years at sites positive for the fungus. Throughout our surveys, we documented baseline data for winter roost sites of 7 bat species and additionally obtained winter distribution information for one species (evening bat [*Nycticeius humeralis*]) from Bat World Sanctuary. These baseline data will play a critical role in developing management plans prior to the arrival of WNS, and provide guidance on how to proceed should it arrive.

## Utilization of Anthropogenic Guzzlers by Wildlife in the Black Gap Complex, Texas

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Abstract: Water is one of the most limiting resources for wildlife in an arid environment. Since the 1940s, the Black Gap Wildlife Management Area and El Carmen Land and Conservation Company's ranch (collectively the Black Gap Complex) of the Big Bend region of Texas have constructed numerous anthropogenic water catchments (i.e., guzzlers) of various designs for the native fauna of the area. In July 2017, we selected and monitored 7 different styles of water sources (6 different guzzler types and one dirt tank) for wildlife utilization. Over the course of the month, 4,495 photos of wildlife were captured at these water sources. Once collected, photos were sorted into groups (mammals, birds, and herps), and later sub-sorted (species level for mammals, classification [i.e., game bird, scavenger, predator, or grassland/songbird] for birds, and family for herps) for each water source. All information gained will add to our understanding of when and why certain species, or groups of animals, select for various water sources. This study will help managers and biologists select the guzzler type/design best suited for their management goals.

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## Pronghorn Diet Composition Using Metabarcoding Analysis

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**ABSTRACT:** Pronghorn (*Antilocapra americana*) occur in 27 of the 56 counties in the Texas Panhandle Wildlife District. Pronghorn are known to primarily feed on forbs, but little is known about how crops may be incorporated into their diet. Pronghorn may make seasonal tradeoffs when selecting between agricultural and rangeland environments. We are studying movements, home range, and response(s) to the rangeland-agricultural landscape using satellite collars deployed on 64

pronghorn in 2 study areas. We are also examining dietary components of these study animals, to more closely identify how they are using these habitats from a nutritional perspective. We are initiating a dietary component to the collaborative research project on pronghorn movements and resource selection, using DNA metabarcoding of pronghorn fecal samples. To date, we have collected 41 fecal samples, 26 from native rangeland and 15 from croplands, and at 6 different sampling periods. Samples are collected fresh from individuals after observed defecations, with site characteristics and GPS location noted. Three preliminary samples from rangeland were sent to Northern Arizona University for analyses, where forbs comprised 85.7% of identified genera. We will analyze the differences between diet and food habits between male and females, spatiotemporally to more clearly identify how pronghorn utilize food resources in both landscapes. These data will be useful to identify plant species or genera that appear most frequently in pronghorn fecal samples that may help guide land managers in making regional pronghorn management decisions.

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## Naturalization of North American Porcupines in Texas, Effects of Rangeland, and Management Techniques

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**ABSTRACT:** The North American porcupine (*Erethizon dorsatum*) has now naturalized in much of Texas. Land managers are looking to control damage to their local landscapes, but are often unfamiliar with techniques used farther north within the porcupine's historic range. Therefore, our goal is to synthesize current literature to address their range expansion, possible affects, and control methods within Texas. The first recorded sightings of porcupine in Texas occurred around the turn of the 20th century in the Trans-Pecos region. Today porcupine are found in approximately 70% of Texas counties. Studies have speculated porcupines were able to expand their range through the loss of large predators and changes in land use that led to the encroachment of woody vegetation. Porcupines can cause extensive damage including the killing or girdling of trees and their establishment in Texas decreases the quantity of resources available to native species. Porcupine populations have been successfully managed with the re-introduction of large predators, like mountain lions, though this is inappropriate for most areas. Porcupine may also be hunted or trapped, deterred with repellants, or excluded with mechanical barriers. A more enduring solution will incorporate rangeland remediation including replacement of woody cover with grasslands. Grasslands offer fewer food resources, den sites, and less protection from predators. Future research should examine the likelihood of further range expansion, potential range limits, regional diet and density.

## Evaluations of Morbillivirus Exposure to Bottlenose Dolphins Following the Deepwater Horizon Oil Spill

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**ABSTRACT:** Deepwater Horizon (DWH) blowout is the largest offshore oil spill in history. The presence of a continuous plume of oil, more than 35 km in length, at approximately 1,100 m depth persisted for months without substantial biodegradation. DWH significantly altered the ecology and biology of the Gulf of Mexico and its surrounding areas, including many species of threatened and endangered marine life and habitat quality. Following the oil spill in April 2010, an unusual mortality event occurred in the Gulf of Mexico in cetaceans, primarily bottlenose dolphins (*Tursiops truncatus*). Dolphin morbillivirus (DMV) was investigated to be the cause of this event. DMV is a well-recognized paramyxovirus that causes dolphin deaths in the United States from acute viral pneumonia, viral encephalitis, or from fungal or bacterial infections from immunosuppression. Therefore, we aimed to determine how the event of oil spills affects the exposure of bottlenose dolphins to morbillivirus. We conducted thorough literature reviews to obtain the polymerase chain reaction (*P*CR) and serological analysis data for different age categories in order to develop a model to determine morbillivirus exposure in bottlenose dolphins. We then used the model to quantify the effects of DWH on the morbillivirus exposure to bottlenose dolphins' population dynamics for the future 20 years. Our results indicated that dolphins living in areas affected by the DWH spill were more likely to be ill and hence decreased the population.

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## Characterization of Waterfowl Forage and Carrying Capacity Estimates for Stock Ponds of the MT7 Ranch, Stevens County, Texas

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**ABSTRACT:** The Oaks and Prairies Ecoregion of east-central Texas harbors numerous manmade stock ponds, which regionally are the dominant landscape water feature and collectively provide abundant habitat for wintering waterfowl. In recent years, Texas Parks and Wildlife Department Mid-Winter Waterfowl Surveys indicate that the Oaks and Prairies ecoregion may harbor >1/3 of all wintering waterfowl in Texas, with nearly half observed occurring on stock ponds. We qualified and quantified waterfowl forage on 10 stock ponds within the MT7 Ranch, Stephens County, Texas. Aquatic invertebrate samples ($n$ = 980), seeding plant samples ($n$ = 89), and submerged aquatic

samples ($n$ = 21) were collected to quantify total waterfowl forage biomass between 1 September and 15 March (waterfowl migration and wintering periods) for 2 seasons, 2015–2016 and 2016–2017. Invertebrate and vegetation communities were characterized and waterfowl carrying capacity estimates were developed for each of the ponds, approximately once each month over the 2 study periods. Initial results suggest high diversity and variability of forage characteristics, both temporally and spatially occurred among all study ponds. Waterfowl carrying capacity estimates were also highly variable and appear to be influenced by pond size and depth, which presumably limits available space for forage production, as well as cyclical differences throughout migration and winter.

## Migratory Connectivity of Golden-cheeked Warblers

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**ABSTRACT:** Golden-cheeked warblers (*Setophaga chrysoparia*; hereafter warbler) breed only in the Edwards Plateau and Cross Timbers ecoregions of central Texas. Many areas in these regions harbor breeding warblers, but the migratory pathways and specific wintering sites for individuals from these areas remain unknown. We hypothesize that individuals from specific breeding populations migrate to population-specific regions. An alternative hypothesis is that individuals from breeding populations mix freely across the warbler's known wintering range. To evaluate these hypotheses, we attached small (0.38 g) geolocators to 100 male golden-cheeked warblers from 5 breeding locations distributed across the species' breeding range (Dinosaur Valley State Park, Fort Hood, Balcones Canyonlands National Wildlife Refuge, Camp Bullis, and Kerr Wildlife Management Area). The geolocators log light levels throughout the day; upon retrieval and download of these data, daily locations of the device can be estimated to within 75-100 km. We attached geolocators to warblers in the spring of 2017. Because the expected battery life of our geolocators is only 6–8 months, we programmed units to begin collecting data on 1 May (25%) and 1 July (75%). We will recapture these birds in spring 2018 to remove the geolocators and analyze our data. We will attach geotags to an additional 100 males in 2018, 2019, and 2020 to evaluate variability in the annual migration patterns. Our results will help guide more effective conservation actions on the wintering grounds to ensure full life-cycle conservation of breeding populations.

## American Kestrel Nest Survival and Productivity in the Llano Estacado of Texas

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**ABSTRACT:** American kestrel (*Falco sparverius*) populations are declining across the nation, except for 2 regions in Texas: the shortgrass prairie and the Tamaulipan Brushlands. We initiated a kestrel nest box program across Lubbock County TX in January–March 2012, and have monitored occupancy and reproduction from 2013–2017. Among 30–32 nest boxes, we observed box occupancy rate increase from 12% in 2013 to 28% in 2014, which leveled off at 65–73% in subsequent years. We monitored 73 known fate nest attempts of which 55 were first nest attempts and 18 are suspected second nest attempts. Nest success was 89% for first attempts and 83% for second attempts; all suspected second nest attempts followed the successful fledging of first attempts. Across 5 years, average clutch size was 4.8 eggs (±0.9), with 4.1 (±1.3) nestlings per hatched nest, and 3.2 (±1.4) fledglings per successful nest. Clutch size slightly decreased from first nest attempts (4.9 ± 0.9) to second nest attempts (3.9 ± 1.1). Observed hatching success across all 5 years was 76%, resulting in 210 fledglings. Across all nesting attempts, observed nest success was 88%. The daily survival rate was 0.99 (±0.03) which modelled nest survival to be 92.7%. Kestrel populations across the nation that use artificial cavities are experiencing nest success rates of 49–73%. Our population has high nest success which might be due to suspected site- and pair-fidelity and the nesting experience of the pair, favorable climate, and extended breeding season.

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## Exploring Detailed GPS Collar Data Analysis of Movements to Approximate Visual Observation Results Using Dama Gazelle as the Subject

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**ABSTRACT:** This presentation has 2 objectives: to look at 4 different patterns of 24-h female movement, and to determine grouping modes useful for quantifying frequencies of different forms of group-related movement. Movement is analyzed in terms of degree of continuity between 2 successive time steps. Using a Texas pasture population of the critically endangered dama gazelle (*Nanger dama ruficollis*), each wearing a GPS collar, 4 kinds of social organization were distinguished. A timed 1-d span was analyzed for each. Each span had the same 7 adult females plus one young male, but the adult male component varied: 1) one adult herd male, 2) no adult males, 3) 3 unrelated adult males added, 4) same as case 3 except with only 2 of the unrelated adult males. Next, groups are identified using cluster analysis at each time step in conjunction with the requirement that the animals be within a specified distance (typically 50 m) of each other. Three kinds of behavior information are presented with 1) detailed printout for each time step (groups, centroids, and movements), 2) information on changes (remained in group, remained single, left group or joined group), and 3) track plots (2D, 3D) for groups or for animals alone along with tracks combined with 50 percent core areas. Changes, as detailed in (2) will permit tabulation of statistics for each kind of

social organization. This could be applied to different species in order to compare grouping and movement strategies.

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## MATLAB-based Analysis Techniques for Detailed Investigations of Group Constitution and Daily Movements of Gazelles

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**ABSTRACT:** MATLAB-based group analysis code was developed that helps biologists view GPS collar data in ways similar to those used when viewing the animals directly. The code is designed to facilitate obtaining answers to 2 basic questions: 1)What are the pasture circulation patterns for female groups and singles? And 2), how do males position themselves in relation to female groups? A 1-d base case of a single female group accompanied by an adult male is used when describing the group analysis code. The subject animals were exotic dama gazelles (*Nanger dama ruficollis*) in a 202-ha pasture on the Edwards Plateau near Uvalde, Texas. Approximately 24,000 3-hourly GPS data were obtained for 7 females and 4 males. The first analysis phase used traditional 1-month association matrices, 3D "spaghetti" plots of tracks versus time, and 1-month 50 percent core areas to select representative single days for detailed study. The second analysis phase produced combined plots of 2-wk 50 percent core areas with tracks, the determination of groups based on cluster analysis for each time step, detailed printout of group constitutions with data on centroids and relevant movement, and simultaneous step-by-step track and group plots. Information on group changes during each time step was presented on-screen as the tracks were drawn. In the final phase, plots were drawn of tracks over 3D terrain with contours along with a table of group or lone status for each animal at each time step during the day. Subsequent work consisted of analyzing 3 more cases.

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## Simulation of Black Bear Dispersal from Populations in Louisiana, Arkansas, and Oklahoma to Areas of Suitable Habitat in East Texas

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**ABSTRACT:** We developed a model for identifying corridors for black bear movement and dispersal from current breeding populations in Louisiana, Arkansas, and Oklahoma to target areas in

east Texas. Black bear's habitat preferences, home range size, known moving distances, and agonistic behaviors described in previous studies were considered when simulating black bear movement and the effects on movement decisions. We considered black bear movement as a scan-assess-select strategy (SAS strategy), where bears scanned surrounding habitats in the landscape with variable perceptual ranges and located possible habitats for occupancy. We introduced a new approach in modeling movement by considering 4 movement states of black bears over time: a bear maintains the current position in a cell, the bear moves to a new location within the current cell, it moves to a new location in another cell, and the bear returns to the current cell. We operated 28 simulation runs for 1,094 time steps (3 years) each. During each simulation, 1,000 black bears moved following the rules described for the SAS strategy. The ratio of black bears reaching east Texas was 566/28,000 = 2.02%. The simulation revealed several pathways for black bears dispersal and indicated that there is a small chance for black bears from the neighboring states to move to east Texas.

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## Influence of Arthropod Community Structure on the Survival of Monarch Butterfly Eggs and Larvae in Northeast Texas

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Abstract: Monarch butterfly populations have exhibited significant declines over the past decade, leading to a petition for listing under the Endangered Species Act (ESA) in 2014. Understanding spring-generation survivorship in Texas is important to the overall study of monarch population dynamics. Data collected on monarch survivorship during a pilot study conducted in spring of 2016 on a wildlife management area in northeast Texas indicated that there is not a simple relationship between predators and prey within the arthropod community, suggesting that community dynamics on and around plants may be an important aspect affecting monarch survivorship rates. Data from the spring 2017 season has been collected and analyzed to document the arthropod community and look for intra- and inter-trophic interactions that might be important for monarch survival. Arthropod community structure was measured along with the influence of particular species or functional groups on the survivorship of monarch eggs and larvae using green milkweed (*Asclepias viridis*) as a host plant.

## Canopy Cover Selection of Montezuma Quail in the Capitan Mountains of New Mexico

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**ABSTRACT:** Montezuma quail (*Cyrtonyx montezumae*) are largely found in pinyon-juniper woodlands. The associated canopy cover is thought to be an important aspect of habitat selection. However, there is limited knowledge about canopy cover selection of Montezuma quail. This study was initiated to evaluate the canopy cover selection of Montezuma quail, continuously and seasonally. Montezuma quail were captured with either trained pointing dogs, mist net, or the "Judas" bird method. Captured individuals ($n$ = 41) were fitted with a Very High Frequency (VHF; $n$ = 31) or GPS (Global Positioning System; $n$ = 10) backpack. VHF-backpacked Montezuma quail were located 2–5 times biweekly, while GPS backpacks were programmed to take points every 4–5 hrs. Canopy cover was assessed by running 3 Landsat 8 images (USGS EarthExplorer) through the ArcGIS ISO Cluster Unsupervised Classification analysis tool. Raster values were extracted from each point and uploaded to SPSS for a chi-square analysis. Results showed that quail selected 30%–69% canopy cover and avoided areas with canopy cover ≤29%. Seasonal canopy cover selection was 30–39% for the covey season, 40–59% during the paired/breeding season, and 40–69% during the nesting/brooding season. The differences in canopy cover utilization through biological seasons could be explained by microclimates created by the pinyon-juniper woodlands. Further research is required to quantify the thermal relationship between canopy cover utilization and Montezuma quail. The results of this study indicate that creating quality Montezuma habitat requires a variety of canopy cover throughout the landscape with canopy cover being ≤30%.

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## Evaluation of Home-Range Estimators for the Analysis of Resource Selection by Pronghorns in the Texas Panhandle

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**ABSTRACT:** Advances in GPS collar technology and methods of estimating home ranges have made it possible to more accurately describe animal movements, habitat use, and resource selection. However, different approaches to the estimation of home ranges may produce different conclusions for the same data set. Furthermore, it is hard to compare among studies that use different analytical methods. We are studying locations used by pronghorn (*Antilocapra americana*) during important life history activities, including fawning, lactation, and the rut. Our goal is to analyze the advantages and disadvantages of home range models specifically pertaining to the description of pronghorn movements. We have collared 64 adult pronghorn in the Panhandle of Texas, 32 near the town of Dalhart, and 32 near the town of Pampa; equal sex ratios were maintained during collaring. The collars are set to record a fix every 2 h and upload fixes to a web service daily. We are currently creating home ranges using 4 methods: kernel density estimation, minimum convex polygon, Time local convex hull models, and Brownian bridge movement models. Comparison among analysis methods will help to link the results of newer estimation methods with previous research conducted on pronghorn in Texas. The findings of this study will help researchers to better understand pronghorn movement and habitat use estimations during crucial biological periods of the year.

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## Taking Them Under My Wing: Integrating Wild Bird Conservation Curriculum into the Sixth and Seventh Grade Classroom

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**ABSTRACT:** Getting kids outdoors is a challenge! Few positive outdoor experiences may lead a child to grow up perceiving that the natural world has little importance in our modern technology-based society; thus, they might not appreciate local wildlife or be interested in natural resource careers. To address this issue, we created a Student-Teacher-Scientist-Partnership (STSP) program to enhance the knowledge and attitudes of students (and their teachers) towards birdlife in south Texas. We developed a wild bird conservation curriculum aligned with state standards for use in K–12 classrooms. We assessed sixth (n=39) and seventh grade (n=52) students' affinity, appreciation, and knowledge of wildlife, birds, and science prior to and after the program using a mixed methods design of open-ended questions and Likert-type statements. Likert-type statement responses were analyzed using an upper-tailed sign test. Students had a positive attitude towards wildlife ($P > 0.05$) and working with a scientist ($P > 0.05$). Their attitude towards habitat fragmentation and its effect on wildlife improved (sixth: $P = 0.004$, seventh: $P = 0.003$) as well as their attitudes towards their knowledge of birds (sixth: $P = 0.004$, seventh: $P = 0.009$). Seventh grader attitudes improved towards their ability to identify birds ($P = 0.003$), yet sixth grader attitudes remained similar ($P > 0.05$). Lessons provided local educators with additional tools to incorporate wildlife techniques and research into their instruction and an opportunity for students to be outdoors while being introduced to the STEM (Science, Technology, Engineering, & Math) career of wildlife biology.

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## Spatial Ecology of Wild Turkey Habitat in South Texas

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**ABSTRACT:** There is little landscape-level research conducted on Rio Grande wild turkey (*Meleagris gallopavo intermedia*) in south Texas. Research conducted in south Texas has focused on site information related to roost characteristics and distance to land features (e.g. water). We aim to look at Rio Grande wild turkey habitat with landscape-level approach to understand the amount and spatial distribution of landscape features around roosting sites in south Texas. Aerial photography from 2008 and 2014 were used to quantify and compare land cover and anthropogenic disturbances that may affect wild turkey habitat. Telemetry data collected in 2007 and 2008 will be used to assess the areas turkeys were located. We will combine aerial photography and telemetry data to assess

landscape characteristics. To compare these changes, we are using landscape metrics that describe landscape structure: percent woody cover, woody cover mean patch area, patch density, edge density, largest patch index, road density and percent cover human infrastructure. We will compare these metrics using an analysis of variance with a significance of 0.05. The results of this project will inform future development of spatially explicit habitat suitability models to quantify amount and spatial distribution of roosting habitat in south Texas rangelands.

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## Influences of Temperature on Resource Selection by Northern Bobwhites

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**ABSTRACT:** Northern bobwhites (*Colinus virginianus*) are sensitive to extreme thermal conditions, particularly along the southern and western peripheries of their range. In south Texas, bobwhites are exposed to temperatures that frequently exceed 39°C. As mean and maximum temperatures during summer are expected to increase, thermal fragmentation of suitable microclimates could have a deleterious effect on bobwhite populations. Therefore, it is critical to understand site selection by bobwhites in response to temperature extremes. From 2014–2016, we monitored bobwhite site use on 2 areas (a 118-ha restoration area and a 108-ha experimental control) using radio telemetry. Each bird was tracked 2–3 times per week from April–August. We recorded temperature, time of day, and vegetation community type upon locating each bird. We compared quail locations to paired random points generated 4–200 m from each location within both areas. A resource selection function was calculated utilizing a mixed effects, case-controlled logistic regression to determine if there was an

effect of sampled variables (community type, time of day, temperature, etc.) on site selection. We found that quail selected for mesquite regrowth mottes and riparian areas during the hottest times of the day. These community types can provide suitable microclimates due to their dense canopy in comparison to the surrounding landscape. Our results emphasize the need for managers to maintain dense woody cover that will provide cooler microclimates for bobwhites when faced with thermal extremes.

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## Vegetation Attributes Providing Thermal Refugia for Bobwhites

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**ABSTRACT:** Northern bobwhites (*Colinus virginianus*) are sensitive to extreme thermal conditions, particularly along the western peripheries of their geographic range. These regions are characterized by high summer temperatures and variable precipitation patterns. Southern Texas is a region noted for hot, dry conditions and emphasizes the need for managers to provide suitable thermal cover for bobwhites. Unfortunately, the structural components of vegetation that provide cooler temperatures are unknown. This information is critical for making on-the-ground brush management decisions for bobwhites. The objective of our study is to quantify what vegetation structural attributes contribute to suitable thermal refugia for bobwhites during the summer. In 2017, we radio-marked 49 bobwhites and located them 2–3 times/week from April–August. Upon locating birds, we collected temperature readings including ambient, black globe, and ground surface temperatures. We then measured vegetation attributes at each bird's location including herbaceous and woody cover, canopy density, and plant height. We also characterized other structural attributes using a plant

composition checklist to provide relevant descriptions to managers of what these sites looked like. Preliminary data shows that during the middle of the day, black globe temperatures, canopy density, and shrub height averaged 37 ± 6°C (mean ± SE), 97 ± 0.1%, and 3.9 ± 2 m at bobwhite locations, respectively, compared to 42 ± 6, 91 ± 0.2, and 3.5 ± 2 m at random locations, respectively. The results of this study will be informative to managers to create and maintain adequate thermal cover for bobwhites in semi-arid regions.

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## Status of Swift Foxes in Northwestern Texas

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**ABSTRACT:** Swift fox (*Vulpes velox*), one of the smallest North American foxes, were abundant throughout the Great Plains in the early 1900s. Their historical range included short grass regions of southern Canadian prairies south to Texas in 79 west Texas counties. Surveys during 2005–2007 detected swift foxes only in Dallam and Sherman counties. We conducted surveys with sifted soil tracking stations, infrared camera traps, and scent dogs on the Rita Blanca National Grasslands and private ranches in Dallam and Sherman counties. Our goals were to find habitats used by swift foxes and other mesocarnivores and document the presence of swift foxes. We surveyed 3 vegetative types: native grasslands, croplands, and exotic pastures. We found swift foxes presence only on sites dominated by native short grasses in Dallam County. Frequency of detection for swift foxes in native grasses was 38 during 819 camera trap nights, 24 during 540 scent station nights, and 29 with scent dogs. We detected coyote (*Canis latrans*), badger (*Taxidea taxus*), striped skunk (*Mephitis mephitis*), bobcat (*Lynx rufus*), and raccoon (*Procyon lotor*) on croplands. Striped skunk, coyote, and bobcat occupied exotic pastures. Native grassland had the greatest richness of mesocarnivores. Swift foxes inhabited moderate to heavily grazed grasslands. Predator avoidance by swift foxes may restrict use of mid to tall grass sites, crop fields, and standing stubble. Vegetation over 25 cm in height may obstruct vision of swift foxes and increase their risk of depredation by coyotes.

## Overwinter Survival and Habitat Use of Baird's and Grasshopper Sparrows in the Marfa Grasslands, Texas

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**ABSTRACT:** Baird's sparrow (*Ammodramus bairdii*) and grasshopper sparrow (*A. savannarum*) are 2 grassland bird species that overwinter in the Chihuahuan Desert and have lost approximately 70–80% of their population since 1966. Both species are identified as birds of conservation concern by the U.S. Fish and Wildlife Service, species of greatest conservation need by the Texas Parks and Wildlife Department's Texas Conservation Action Plan, and Chihuahuan Desert priority birds by the Rio Grande Joint Venture. Habitat loss and degradation, as a result of climate change, over-grazing, fire suppression, shrub encroachment, and absence of native herbivores, are thought to be the main causes of the population declines. The aim of this project is to understand causes of these population declines and to develop management guidelines for the conservation of both bird species. Specifically, our objectives are to 1) map Chihuahuan Desert grasslands, 2) monitor winter survival rates of Baird's and grasshopper sparrows in the Marfa Grasslands, 3) determine home ranges for the 2 species, and 4) evaluate bird-habitat relationships relative to habitat conditions. We therefore track birds for 2 winters using radio-telemetry and collect data on vegetation, ground cover, and seed availability in the soil seed bank. To determine the threat of shrub encroachment we create a time series of new and historic GIS coverages of desert grasslands in the study region. We present preliminary results on home range and habitat preferences for the first year. The results of this project will allow us to better understand the relationship between grassland birds and their habitat in order to inform land managers and researchers about the ecological conditions needed to support thriving grassland bird populations within the region.

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## Prevalence of Avian Trichomoniasis in 3 Species of Dove in and around the City of San Angelo, Texas, USA

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**ABSTRACT:** Avian trichomoniasis is caused by an infection of the protozoan *Trichomonas gallinae*, a cosmopolitan parasite of columbiform birds. This flagellated protozoan is characterized by the necrotic ulceration of the mouth, esophagus, crop and proventriculus it causes in birds. These lesions prevent feeding and inhibit breathing through the obstruction of the upper respiratory and digestive tracts, frequently resulting in death. The objective of this study is to determine the prevalence of avian trichomoniasis (through detection of the protozoan *T. gallinae*) in 3 species of dove (*Columbina inca*, *Zenaida asiatica*, and *Z. macroura*) in and around the city of San Angelo, Texas. Preliminary results indicate that 62.5% of samples collected in urban San Angelo were positive for avian trichomoniasis, while 80% of samples collected in a rural outlying area were positive for avian trichomoniasis. Samples were analyzed using InPouch TF diagnostic pouches. Occasional trophic spillover of *T. gallinae* has been documented in ornithophagous raptors that utilize infected prey, such as doves, as primary food sources in predominantly suburban and urban environments. Further, nestlings may become infected indirectly when fed the infected prey, or directly from infected parents. Determining the prevalence of avian trichomoniasis among these columbiform species will aid in determining the risk of trophic spillover to Cooper's Hawks and other ornithophagous raptors in the urban and suburban environments of San Angelo, Texas.

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## Does White-tailed Deer Browsing Result in Browse Lines and Changes in Mast Production of 3 Preferred South Texas Woody Plants?

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**ABSTRACT:** Intense browsing by white-tailed deer (*Odocoileus virginianus*) typically results in a reduced canopy volume and mast production of woody plants. Adaptations to herbivory, such as compensatory growth, and the presence of supplemental feed may reduce the effects of intense deer browsing. Our objectives were to determine if 1) woody plant canopy volume and mast production of spiny hackberry (*Celtis ehrenbergiana*), blackbrush acacia (*Acacia rigidula*), and guayacan (*Guajacum angustifolium*) decreases with increasing deer density and 2) if maintaining a ratio of 20 deer/feeder reduces the effect of increasing deer density. Matching pairs of each plant species were located in

June 2013, and one plant/pair was randomly selected to be caged to eliminate deer browsing. During July 2013–2017, canopy volume of each plant was estimated by measuring total plant height and diameter at 0.25-m height increments, and mast production was estimated by counting the number of fruits present in a 20 cm X 20 cm X 20 cm, 30 cm, or 50 cm frame. Preliminary results show there was no effect on canopy volume or mast production of guayacan, spiny hackberry <1.5 m tall, blackbrush acacia <1.5 m tall, or blackbrush acacia >1.5 m tall ($P > 0.05$). Spiny hackberry canopy volume >1.5 m tall increased with increasing deer density with one feeder ($P < 0.05$). This plant appears to follow the grazing optimization hypothesis by compensating for tissue removed by deer. However, there is no obvious evidence of 'browse lines' or reductions in mast production.

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## Returning the Louisiana Pine Snake to Restored Habitat

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**ABSTRACT:** Ongoing surveys suggest that populations of the Louisiana pine snake (*Pituophis ruthveni*) are limited to a few small blocks of degraded and highly fragmented habitat. Research indicates that the species requires frequently burned sites with a well-developed herbaceous understory capable of supporting populations of its primary prey, Baird's pocket gopher (*Geomys breviceps*). Recent changes in management practices on U. S. Forest Service lands have resulted in restoration of substantial blocks of suitable habitat, which are now available for reintroduction. A captive population consisting has been established from wild-caught snakes from Bienville Parish, LA. The reintroduction site is located on the Catahoula District of the Kisatchie National Forest. Ninety-one individuals have been released to date, and 3 snakes are currently being head-started to be released in April 2018. The current protocol is to release 50% of available animals as neonates immediately following post-natal shed, while the remaining snakes will be head-started and released the following April. Currently, automated pit tag readers and trapping are the primary monitoring techniques. To date, 20 snakes have been detected the year following release, or later. Five of those snakes have been detected 4 years following release. Louisiana pine snakes across >20 zoos have been consolidated into 4 dedicated and successful facilities, which should increase the production of hatchlings in the future. Production of neonates and release of young will be repeated annually until a viable population is established or it is concluded that further releases are not likely to result in establishment of a population.

## Home Range of Translocated Pronghorns in the Trans-Pecos Region of Texas

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**ABSTRACT:** Pronghorn (*Antilocapra americana*) in the Trans-Pecos region of west Texas were once as numerous as 17,000 individuals. A population decline began in the 1980s with their numbers falling below 3,000 in 2012. In 2011, a translocation program was initiated to use pronghorn from healthy populations in the Texas Panhandle to supplement declining populations in the Trans-Pecos. During translocation events, we fitted 30–60% of adult pronghorn with Global Positioning System (GPS) collars to assess movement post release. In 2014, GPS collar data was used to assess the home range of translocated pronghorn in the Trans-Pecos using the Time Local Convex Hull (T-LoCoH) program. Due to the use of differing estimators of home range, these results are not comparable to research on pronghorn home ranges from other areas within their greater geographic range. Our goal is to determine the home range of adult translocated pronghorn in the Trans-Pecos using an estimating program that is similar to those used to estimate home ranges of pronghorn from other regions of North America. We will be using the data collected from GPS collars on adult pronghorn from translocation events in 2011, 2013, 2014, 2016, and 2017. We will use a kernel density (KDE) estimator program to estimate the home range of translocated pronghorn. These results will allow us to compare local home ranges to those of pronghorn in other regions of North America allowing state agencies to make future decisions on translocations and stocking densities.

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## Available Forage and Vegetative Structure in the Northern Sacramento Mountains, and the Potential Impact on Neonatal Pronghorn Survival

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**ABSTRACT:** Fawn survival often limits population growth and persistence for native and translocated pronghorn (*Antilocapra americana*) populations. However, pronghorn fawn survival can be highly variable due to predation, habitat quality (*P*otential forage) issues, and weather stochasticity during the fawning period. To estimate effects of available forage and vegetative structure on pronghorn fawn survival in the Fort Stanton Snowy River Cave National Conservation Area, New Mexico, we compared habitat data from pronghorn fawn capture or bed site locations and randomly located plots in 2016 and 2017. Also, using plant production and composition data from 24 and 20 exclosures in 2016 and 2017, respectively, we estimated biomass production of different vegetative communities across the study area. During May and early June (2016 and 2017), we captured 101 pronghorn fawns aged ≤5 days, and marked them with ear tag radio transmitters to monitor survival. Naïve estimates of summer fawn survival for 2016 and 2017 were 23% (13/56 survived) and 20% (9/45) respectively, which is greater than previously estimated 0% and 19% survival in 2014 and 2015. Preliminary analyses indicate that average vegetation height within exclosures was greater than average vegetation height of random locations near exclosures, but clear patterns of bed site and capture site selection have not emerged during initial analyses. Fawn survival is likely most strongly influenced by predation pressures in the area, but further analyses will inform potential management strategies to improve fawn cover and habitat structure for long-term persistence.

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## Selection of Island Habitat by a Texas Population of Purple Martin During the Non-breeding Season

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**ABSTRACT:** Migratory aerial insectivores are among the fastest declining of avian groups, but our understanding of these trends has been limited by poor knowledge of migratory connectivity and the identification of critical habitat across the vast distances they travel annually. By using archival GPS loggers and as part of a larger range-wide study on purple martins (*Progne subis subis*), we tracked individuals from a colony in the Texas Panhandle through 2 non-breeding seasons (2014–2015 [$n$=3] and 2015–2016 [$n$=4]). Remote sensing data in concert with the data-loggers allowed us to identify precise (<10 m) habitat selection during spring and fall migration as well as through the winter period. We tested the hypothesis that individuals select vegetated habitats that are isolated from the surrounding habitat matrix because these may improve survival during migration by reducing

predation. We found support for the island-habitat selection hypothesis, where individuals selected isolated, island-like habitats near water for stopover during spring and fall migration and winter, as compared to random locations. Many of these stopover sites occurred on islands in deltas, in lakes or rivers, or in isolated forest patches. These patterns of habitat selection were consistent across the full non-breeding season and among purple martins from across the range (2014–2015 [*n*=19] and 2015–2016 [*n*=16]). Future investigation of fine-scale habitat selection during migration will greatly advance the conservation of critical migratory and wintering habitat for long-distance migrant songbirds.

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## Impacts of Red Imported Fire Ants on Northern Bobwhites

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**ABSTRACT:** Northern bobwhite (*Colinus virginianus*) populations have declined throughout their geographic range. Declines can be attributed mostly to habitat loss; however, invasion by the red imported fire ant (*Solenopsis invicta*) remains a concern among wildlife managers. Similar to the influence of predation, fire ants can impact individual bobwhites and their nests; however, biologists have yet to document a conclusive link between fire ant abundance and population effects. Our objective was to determine if the impact of fire ants on bobwhites is scale dependent, differing

between impacts at the individual and population level. We predicted that fire ants would decrease demographic performance of individual birds, but that the population as a whole would be unaffected, thereby reflecting no correlation to bobwhite density. Our study was located on 3 private ranches in Goliad and Refugio counties where 2 500-ha paired experimental units were designated on each. One of each paired unit was treated with an aerially applied fire ant bait (Extinguish Plus), while the other remained untreated. Pasture-wide fire ant abundance and mound density were determined using baited cup traps and by counting fire ant mounds via distance sampling along random 100m transects. Adult bobwhite survival, brood survival, and nest success were determined using radio-telemetry. At each nest and radio-location, fire ant occurrence was documented within a 0.25-$m^2$ frame and mound density and proximity was measured using the point-center quarter method. Bobwhite densities were estimated using distance sampling via helicopter at 100% survey coverage. These data will be analyzed fall 2017 and presented at the conference.

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## Evaluation of Red Imported Fire Ant Treatment for Gamebirds

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**ABSTRACT:** Non-native red imported fire ants (*Solenopsis invicta*) have been implicated as a potential cause for upland gamebird population declines since arriving in the southern United States during the 1930's. Recently, a treatment to combat fire ants (aerial application of 0.25% s-methoprene and 0.36% hydramethylnon) was developed and this treatment has shown promise in reducing fire ants, with a resulting increase in native arthropods. It has been hypothesized that increases in native arthropods may result in greater survival and densities of northern bobwhites (*Colinus virginianus*) and Attwater's prairie chickens (*Tympanuchus cupido attwateri*) in the Gulf Coast Prairie; however, this benefit remains unclear. The objective of this research is to determine the effectiveness of this insecticide in 1) reducing fire ant numbers and 2) increasing gamebird demographic performance and density. Our study is located on 3 private ranches in Goliad and Refugio Counties. Each ranch contains a 500-ha pasture that will be treated with the fire ant bait during the spring of 2018. Paired similarly sized untreated units were designated for comparison. Pasture-wide fire ant density and relative abundance estimates will be determined using baited cup traps and by estimating fire ant mound density along random transects via distance sampling. Adult survival, brood survival, and nest success of both gamebird species will be determined using radio-telemetry. Bobwhite density will be estimated using distance sampling via helicopter. This study is ongoing and data will be analyzed fall 2018.

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## Assessing Wildlife Permeability of a South Texas Highway

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**ABSTRACT:** Texas' landscape contain a length of over 500,000 km of roads. The ecological effects of roads have become a large area of study. Road Ecologists study a variety of road effects such as erosion, hydrological effects, soil chemistry alterations, direct road mortality, and consequences to wildlife at the local and population level. Direct impacts to wildlife include fragmentation of habitat as well as road mortality. One of the mitigation strategies designed to reduce both habitat fragmentation and road collision is the engineering of a permeable road. This study aims to assess biodiversity within the road-effect zone and analyze the permeability of a south Texas highway. We are attempting to model factors that increase the usage and success of road underpasses. Eight road underpasses are being monitored on a 24-km stretch of a bifurcated highway. Three types of previously existing underpasses are being monitored: bridge ($n$ = 3), culvert ($n$ = 3), and bridge-class culvert ($n$ = 2). Camera arrays are currently deployed at each underpass to maximize the detection of wildlife utilizing the underpass as well as the surrounding road-effect zone habitat. Sixty-four Reconyx Hyperfire PC900 Professional camera traps will be placed; 32 cameras are currently in the

area. We are measuring canopy cover, vegetation:concrete ratio, and visible horizon (through the crossing) at the entrance of each underpass. We are analyzing the potential effects of these factors on the success of the underpass as a conduit for wildlife. We suspect that underpasses with higher proportions of vegetation, canopy cover, and visible horizon will increase the wildlife usage of these underpasses.

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## Wildlife Use of Road Mitigation Structures Pre- and Post-construction Along a South Texas Highway

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**ABSTRACT:** Roads have long been known as an influence on wildlife movements and survival. Large numbers of vertebrates are killed by vehicles on roads in the United States daily, and road mortalities of endangered species have had significant negative impacts on their populations. Road mitigation measures have taken several forms, and wildlife crossing structures have been among some of the most widely used solutions. The federally endangered ocelot (*Leopardus pardalis*), whose range in the United States includes a small area of south Texas, is a species that is negatively affected by roads but may benefit from the presence of crossing structures. State Highway 100 in Cameron County, Texas has seen 3 ocelot mortalities since 2010; thus, Texas Department of Transportation has taken measures to construct and improve road mitigation features, including 5 wildlife crossings, fencing, and 18 cattle guards. To monitor activity and use of these structures, camera traps were placed at each structure and in peripheral areas. The objectives of this study are to analyze wildlife use of crossings prior to and post construction, and compare wildlife species composition of surrounding areas to that of species using the crossings. The results of this study will allow us to determine which crossing designs are most beneficial to wildlife in the area.

## Roost Use by Rafinesque's Big-eared Bats in an Upland Forest of South Carolina

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**ABSTRACT:** Although roosting ecology of Rafinesque's big-eared bats (*Corynorhinus rafinesquii*) is well documented in the Coastal Plains Regions, few studies have examined roost use in upland habitats. Rafinesque's big-eared bats are known to roost in live trees of bottomland hardwood forests within and adjacent to river floodplains. In the northern part of their range, Rafinesque's big-eared bats often roost in caves, mines, or artificial structures, as well as tree cavities. Our objective was to determine roost use of Rafinesque's big-eared bats in the Andrew Pickens Ranger District, Sumter National Forest, in upstate South Carolina. We mist-netted and radio-tracked 2 Rafinesque's big-eared bats in June and July 2017 and conducted emergence counts to determine colony size. On 8 June 2017 we tracked a pregnant female to a large, live, tulip poplar (*Liriodendron tulipifera*) with a basal cavity. The roost was 30.7 m tall, 89 cm diameter at breast height (DBH), with an interior cavity height of 9.4 m and contained approximately 44 total bats. On 17 July 2017 we tracked a juvenile male Rafinesque's big-eared bats to another large, live tulip poplar with a chimney cavity opening. This roost was 23.2 m tall, 81 cm DBH, and had an estimated interior cavity height of 11.5 m. Approximately 33 bats were utilizing this roost. Although our sample size was small, our data suggest that in upland areas where Rafinesque's big-eared bats exist, conservation of large hollow tree species that commonly form hollow trunks with basal or chimney openings could aid in the conservation of this species.

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## Influences of Catastrophic Weather Events on the Endangered Attwater's Prairie Chicken

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**ABSTRACT:** The Attwater's prairie-chicken (*Tympanuchus cupido attwateri*), which once inhabited prairies along the Gulf Coast of Texas and Louisiana, was listed as endangered by the U.S. Fish and Wildlife Service in 1967. The decline of the species is largely attributed to habitat loss, and a majority of the 2.4 million ha of habitat have been converted to urban and agricultural uses. Today, approximately 80,000 ha of fragmented coastal prairie remains, and an estimated 42 Attwater's prairie chickens exist in 2 wild populations. Studies have shown that breeding success is the

dominant demographic factor impacting future population growth in prairie-chickens, and a majority of management efforts for wild Attwater's prairie-chickens is focused on increasing nest success and chick survival. While different studies have debated the significance of the effect precipitation has on Attwater's prairie-chicken breeding success, large flooding events and hurricanes have historically resulted in high initial mortality rates and subsequently fewer breeding pairs for the following year. Heavy rainfall events and/or flooding have occurred during the past 5 breeding seasons, and Hurricane Harvey resulted in a large loss of prairie-chickens during August 2017. We analyzed National Weather Service data of the Houston area from 1930–2017 to determine the frequency of these catastrophic weather events over time. Population estimates for the Attwater's prairie chicken were collected from historical survey data, and fluctuations were correlated to weather data. If the frequency of these catastrophic weather events increases, different management strategies will need to be pursued if the species is to be delisted.

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## Effects of White-tailed Deer Density and Feeder Density on Antler Growth

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**ABSTRACT:** With rising popularity of intensive white-tailed deer (*Odocoileus virginianus*) management, it is important to understand whether deer density affects antler growth, especially considering the expenses managers incur to maximize antler potential. Our objective was to determine whether deer density and feeder density influences antler growth among age classes. Photo files of known-age, ear-tagged bucks were created from trail camera images in 5 81-ha enclosures on Comanche and Faith ranches in Dimmit County, TX. Treatments were 20 deer and one feeder; 40 deer with one feeder; 60 deer with one feeder; 60 deer with 3 feeders; and 80 deer with 4 feeders. Software BuckScore® was used to calculate gross Boone & Crockett (GBC) scores for bucks aged 1.5–8.5 years old during 2015–2016. Data were analyzed using a PROC MIXED model in SAS. In 2015, mean GBC score decreased 34.18 cm for 1.5-year-olds ($P < 0.01$; $n = 21$) and 23.06 cm for 2.5-year-olds ($P = 0.0575$; $n = 18$) from low- to high-density. However, when the deer/feeder ratio was constant, there was no effect on GBC score for yearlings ($P = 0.54$; $n = 18$) or

2.5-year-olds ($P = 0.48$; $n = 26$). There was no difference in mean GBC score in 2016. Social exclusion from food sources may have contributed to differences in younger bucks, while older, more dominant bucks have priority access and are not limited by nutrition. When provided with adequate nutrition year-round, it appears bucks can overcome a density effect on antler growth upon reaching maturity.

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## Sifting Through the Soup: Developing an Environmental DNA Assay for Threatened Amphibians

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**ABSTRACT:** Environmental DNA (eDNA) assays have become a major aspect of amphibian surveys in the past decade. These methods are highly sensitive making them well-suited for monitoring rare and elusive species. Current efforts to study the Rio Grande siren (*Siren intermedia texana*) and black-spotted newt (*Notophthalmus meridionalis*) in the Lower Rio Grande Valley (LRGV) have been hampered due to the cryptic nature of these salamanders. Arid conditions in the LRGV making sampling efforts difficult as both species are known to reside underground when breeding ponds are dry. Due to the ephemerality of these water sources, sampling efforts are constrained to a short window after heavy deluges and require extensive man-hours for effective conventional sampling. We here discuss the development of a novel eDNA assay technique for these 2 elusive species and the first successful PCR amplification of eDNA for each. In addition, our study has found a small, handheld, store-bought coffee filtration apparatus to be a viable replacement for bulky battery-powered vacuum pumps as an effective part of the eDNA processing. This apparatus gives great promise for filtration of the highly turbid waters present in resacas of the LRGV.

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## Life in the Thornscrub: Movement, Home Range, and Territoriality of the Reticulate Collared Lizard

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**ABSTRACT:** Over an animal's lifetime, several habitats may be required for persistence, and the collection of movements within and among these habitats make up that animal's home range. For lizards, variation in home range size is best explained by either sit-and-wait or active foraging styles. Entire lizard families typically share characteristic foraging styles; however, within the subfamily Crotaphytinae, foraging style characteristics do not appear to be shared. In this study, we explore movements, home range size, and territoriality of the reticulate collared lizard (*Crotaphytus reticulatus*), a basal taxon in the genus that could help characterize the ancestral foraging style for all *Crotaphytus*. Using GPS telemetry data from 10 adult males and 4 adult females tracked during the breeding season over 3 years, we found male reticulate collared lizard moved significantly longer distances and maintained significantly larger home ranges and core areas than females. We observed no home range overlap in females and one case of overlap in males, although all females maintained home ranges overlapped by a single male home range. The one-to-one pattern of a male home range overlapping just a single female home range is consistent with male mate guarding or tracking observed in active foragers. Moreover, compared to the common collared lizard (*C. collaris*), a classic sit-and-wait forager, reticulate collared lizard moves more frequently, maintains a larger home range, is less territorial, and exhibits less sexual dimorphism. In an evolutionary context, this active foraging style and the associated movement, home range, and territoriality traits of reticulate collared lizard are considered a derived rather than ancestral condition within the Crotaphytinae. From a conservation perspective, this study confirms that private land stewardship across the reticulate collared lizard distribution in Texas has benefitted the species, and it suggests that regional conservation planning for the species will be most successful with continued engagement with private landowners.

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## Analysis of Allelic Variation in Prion Protein Gene of Texas Mule Deer

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**ABSTRACT:** Chronic wasting disease (CWD) was discovered in North American cervids in 1980 and has become a major management concern in recent decades. Chronic wasting disease was detected in Texas mule deer (*Odocoileus hemionus*) in 2012, most likely spread to Texas from New Mexico via natural movements of mule deer in the Hueco Mountains. Management has focused on containment of the disease as the most realistic and economically viable option. There is no cure or evidence of resistance to CWD, but mutations in the prion protein (PrP) gene affect susceptibility, incubation time, and the ability to detect the disease. We amplified and sequenced the PrP gene from tissue samples collected at CWD check stations in the Trans-Pecos and Panhandle regions of Texas during 2012–2015. We observed both synonymous and non-synonymous mutations in the PrP gene, including 6 not previously reported in cervids. Twenty deer phenotypically identified as mule deer had nucleotide substitutions at codon 96, mutations originally identified in the white-tailed deer (*O. virginianus*) PrP gene. Seven mule deer had mutations at codon 225, resulting in an amino acid substitution associated with CWD prevalence and progression in Colorado and Wyoming populations. Our preliminary results reveal a diverse set of PrP alleles in Texas mule deer, due to past hybridization and backcrossing with white-tailed deer, as well as novel non-synonymous mutations, with unknown significance. Genetic variation in the PrP gene has implications for detection of CWD and future management decisions throughout the state aimed at controlling the spread of the disease.

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## Landscape Genetic Analysis of Mule Deer to Guide Management for Chronic Wasting Disease

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**ABSTRACT:** Chronic wasting disease (CWD) was discovered in North American cervids in 1980 and has become a major management concern in the following decades. This disease has spread throughout the country and entered Texas through the Hueco Mountain Range in 2012. The disease has reduced survival rates within herds of wild and captive cervids up to 30%, which has influenced the economic and ecological well-being of many areas. Management has focused on containment of CWD as the most viable and economically efficient option. Landscape genetics is an emerging field that could play a large role in understanding the potential spread of diseases. The influence of landscape features on movements and dispersal of mule deer (*Odocoileus hemionus*) can inform managers how this disease may spread across the landscape in coming years. Tissue samples have been collected from 2,100 deer at Texas Parks and Wildlife Department CWD check stations across the Trans-Pecos and Panhandle regions of Texas to analyze genetic relationships. We will create resistance surfaces to predict potential corridors and barriers to dispersal. Results so far show statistically significant but low levels of population structuring, suggesting high dispersal rates. The combination of genetic and landscape data provides a powerful tool in predict the movement of CWD within Texas. Understanding dispersal routes and the possibility of environmental barriers will inform future management decisions throughout the state.

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## Effects of Livestock Grazing on Grassland Abundance and Ecosystem Health

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**ABSTRACT:** The encroachment of woody plant species into grasslands of the Chihuahuan Desert is negatively affecting the health of the ecosystem. Persistent, high intensity grazing from domestic cattle appears to be a primary cause of brush encroachment. One consequence of grassland deterioration is the loss of critical habitat for many North American grassland birds. Determining

abundance, distribution, and habitat preferences for these grassland birds is essential for making informed management decisions. We conducted flush counts on 2 sites in west Texas using 500-m line transects and distance sampling methods. Our study sites include desert grasslands under varying degrees of grazing intensity: continuous, rotational, and seasonal. We conducted flush counts from January–March 2017 and July–September 2017 to examine abundance and habitat use for both winter and summer bird species. To determine if grassland bird abundance is a reliable indicator of grassland health, we conducted vegetation surveys along each line transect and compared our vegetation data across grazing regimes. We expect to find a greater abundance and diversity of grassland birds at our sites with lower grazing intensities. Results from this study can be used to educate landowners about sustainable grazing practices that will promote conservation of grassland ecosystems.

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## Wintering Birds at Restored and Unrestored Isolated Blackland Prairies on the Sam Houston National Forest in Texas

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**ABSTRACT:** Isolated Blackland Prairie patches exist east of the western edge of the larger prairie ecosystem. Many of these small prairies have been lost or drastically altered by agriculture, fire suppression, grazing, soil erosion, invasive plants, and off-road vehicle use. Intensive restoration and management of small prairies on the Sam Houston National Forest began in 2004. Some prairies required little restoration effort in terms of tree and shrub removal while others remain unrestored. The removal of woody plant encroachment followed by prescribed fire has been effective in restoring and expanding prairie plant communities at a number of sites. Mean prairie size is 2.3 ha (range = 0.4–10.3 ha). To quantify winter avian use, we began bird surveys at restored and unrestored prairies in 2009. Here we present 9 years of survey data (2009–2017). We calculated the percent of years each bird species was present in restored versus unrestored prairies. Six species were detected at restored prairies during all 9 years including Henslow's sparrow (*Ammodramus henslowii*), LeConte's sparrow (*A. leconteii*), and savannah sparrow (*Passerculus sandwichensis*) which have benefitted from prairie restoration efforts. Other grassland species were detected only in restored prairies, though not every year due to low or changing population densities. These include sedge

wren (*Cistothorus stellaris*), vesper sparrow (*Pooecetes gramineus*), grasshopper sparrow (*A. savannarum*), and eastern meadowlark (*Sturnella magna*). Several species typically associated with wooded habitats were found only at unrestored prairies including American woodcock (*Scolopax minor*), winter wren (*Troglodytes hiemalis*), brown thrasher (*Toxostoma rufum*), and spotted towhee (*Pipilo maculatus*).

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## Functional Distance and Establishment of Non-native Species with Complex Life Cycles

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**ABSTRACT:** More than 80% of animals have complex life cycles (CLCs) and undergo distinct changes in ecology and morphology during development. The strength and type of factors regulating each life-stage may differ as an organism may occupy different niches during ontogeny. We examined the functional distance at larval and adult life-stages of 2 non-native anurans (green tree frog [*Hyla cinerea*] and bullfrog [*Lithobates catesbeianus*]) that have established in a Chihuahuan Desert anuran assemblage in Big Bend National Park. Both life stages of both non-native species occupied niche space outside the recipient assemblage. At the larval stage, the ability of the tadpoles to utilize permanent aquatic habitats and coexist with predatory fishes differentiated it from the majority of the native species that are restricted to temporary pools. At the post-metamorphic life stage, each species appears to have established by exploiting unoccupied niches in the recipient community. The arboreal habits of H. cinerea may enable it to utilize resources in microhabitats that are otherwise not used by native species as arboreal frogs are absent in this assemblage. The large body size of post-metamorphic bullfrog may enable it to utilize larger food resources that are otherwise unavailable to the smaller-bodied natives. Separate examination of the position each life stage of the non-natives relative to the native community functional trait can provide may help predict their potential establishment or invasion as well as aid in the development of stage-specific control or eradication efforts.

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## Landscape Connectivity for Lesser Prairie Chickens on the Southern High Plains of Texas and New Mexico

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**ABSTRACT:** The lesser prairie chicken (*Tympanuchus pallidicinctus*) is a species of conservation concern on the Southern High Plains, where its habitat is currently a juxtaposition of grassland patches interspersed within large sections of agriculture and energy development. Fragmentation has isolated formerly contiguous habitat, suggesting that dispersal through a heterogeneous landscape may be constrained within a patch network. The objective of this study was to understand how connectivity for lesser prairie chicken on the Southern High Plains was potentially altered by landscape conversion that created a patch network. We used graph theory (network modeling) to quantify structural landscape connectivity for lesser prairie chicken on the Southern High Plains. Our results suggest that there was a 31.5-km coalescence distance of the network (farthest nearest-neighbor distance), as well as a suite of other connectivity metrics that indicated a high degree of clustering among leks ($n$ = 115 leks). Two leks were identified as cutpoints within the network, meaning if these leks and associated habitat were fragmented or abandoned, birds and associated habitat near the remaining leks may become isolated. Other preliminary results identified several leks that were also important for maintaining overall population connectivity for lesser prairie chicken on the Southern High Plains. Future plans include modeling potential movement through the landscape using circuit theory to aid long-term conservation planning via identification of important existing patches.

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## Influence of Black-tailed Prairie Dogs on the Abundance of Small Mammals in the Marathon Basin, Texas

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**ABSTRACT:** Black-tailed prairie dogs (*Cynomys ludovicianus*) play a vital role in grassland ecosystems. They alter the landscape through soil aeration, seed dispersal, and grazing vegetation. In May 2017,

Sherman live traps ($n$ = 108) were used to trap small mammals in the Marathon Basin Grassland Preserve located 16 km northeast of Marathon, Texas. The traps were divided evenly between the local prairie dog colony and the adjacent grasslands, with 2 transect lines of traps on the colony and 2 were set on the colony. Each transect line included 26 traps set 12 m apart becoming a transect with a total length of 312 m. Traps were set each night ($n$ = 108) with bird seed and checked the following morning. If a small mammal had been captured the location and species was noted and the animal was photographed. During this study, 8 small mammals of 4 species were captured on the prairie dog colony and 12 individuals of 4 species were captured off-colony.

## Recovering America's Wildlife Act: A Game-Changing Opportunity to Expand Wildlife Management in Texas

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**ABSTRACT:** Natural systems in Texas face dramatic challenges. Habitat is lost to urbanization and fragmentation. Invasive species are changing ecosystem form and function. Systemic diseases threaten to forever alter the landscape of aquatic and terrestrial conservation. Our increasingly disconnected public doesn't understand the importance, the need, or the tools of natural resource management, and lack access to even the most basic natural resource education and outdoor recreation opportunities such as bird watching and hiking. Conservation intervention is urgently needed. The Recovering America's Wildlife Act, under consideration by US Congress, has the potential to provide a substantial and unprecedented level of financial investment to restore, recover, and conserve wildlife communities and their habitats. This presentation will offer an overview and status of this proposed legislation, and discuss opportunities for the wildlife community to engage in the conversation at hand to invest in this new potential and transformative funding initiative.

## Survey of Helminth Parasites in Scaled Quail from Southern Texas

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**ABSTRACT:** Little is known about the occurrence of helminth parasites in scaled quail (*Callipepla squamata*) from south Texas. To learn more, 54 scaled quail were collected during the 2016–2017 quail hunting season from La Mesa II Ranch in Jim Hogg County, Texas and La Mesa I Ranch in Zapata County, Texas and examined for helminth parasites. Seven species were found, of which the cecal nematode *Aulonocephalus pennula* had the highest prevalence (83%) and abundance (735 individuals; 16.0 ± 2.7). The remaining species rarely occurred (each species <33% prevalence and <125 individuals) and included the eyeworm (*Oxyspirura petrowi*), which is known to cause damage to the surface of the eye and a cestode in the genus *Mesocestoides*, which can infect humans and hunting

dogs. This study presents insight on a host-helminth system that is species-poor and numerically dominated by a single nematode species.

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## Habitat-suitability Bounds for Northern Bobwhites in the Coastal Prairie of Texas

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**ABSTRACT:** Northern bobwhites (*Colinus virginianus*) are a species of concern in Texas because populations have declined since at least 1950 and the species possesses ecological and economic value. Northern bobwhite populations in the Gulf Coast Prairies and Marshes ecoregion have declined but, unfortunately, little information exists regarding their habitat and best management practices in this ecoregion. Anecdotally, wildlife managers and rangeland practitioners have suggested that bobwhites in the region use less woody cover and bare ground but greater amounts of herbaceous cover than in other ecoregions of the state. The objective of our research was to quantify the bounds of habitat-suitability for bobwhites in the Gulf Coast Prairies and Marshes Ecoregion. Our study took place in Goliad and Refugio Counties, TX on 3 spatially independent ranches. On each ranch, 20 bobwhites were maintained and monitored via radio-telemetry during March–September 2017. Bobwhites were tracked 2–3 days per week and 6 habitat metrics (woody,

grass, and forb cover, traversable space, herbaceous plant species richness, and microtopography) were measured at bobwhite locations and paired random locations within 20–50 m. Herein we report habitat-suitability bounds that were developed for these metrics using continuous selection functions. This study will aid managers in better identifying bobwhite habitat in this ecoregion and permit more targeted management practices.

## New Research Partnerships to Increase Relevance to Urban Audiences and Widen Potential Employment Choices of Current Students

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**ABSTRACT:** Texas Parks and Wildlife Department (TPWD) has strong relationships with well-established traditional wildlife programs. These relationships have increased scientific knowledge relevant to our traditional wildlife management priorities. Texas is a private property state, and we recognize the vital importance of using the knowledge gained through these investigations to assist landowners in managing their land for the benefit of wildlife. We also recognize that only 1% of Texans own land that qualifies as agricultural land under Tax Code Chapter 23, Subchapters C and D (Tax Code Section 23.52(d). However, we must also address the concerns of the 85% of Texans who live in urban areas and the 99% who do not own land under agricultural valuation. Huston-Tillotson University (HTU) is a private, historically black University in Austin, Texas. HTU recently began the Environmental Studies course of study, guiding students through coursework in ecology, environmental law, conservation biology, descriptive writing, environmental history, environmental literature, environmental sociology, chemistry, climate science and economics. TPWD is currently fostering a relationship with HTU in a pilot project that investigates subjects of interest to urban residents ("Investigating Urban Wildlife as Environmental Sentinels"). We anticipate this partnership will provide benefits to TPWD, HTU, and urban wildlife and habitat managers throughout Texas, including 1) increased awareness of environmental issues relevant to urban residents, and increased funding of activities addressing those priorities, 2) increasing the diversity of the pool of emerging wildlife professionals, and 3) providing HTU students with relevant, marketable skills and relationships that will strengthen their career potential.

## Factors Influencing Elk Calf Bed Site Selection in a Landscape Changed by Wildfire and Restoration

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**ABSTRACT:** Due to historical land use and fire suppression, forests in northern New Mexico are at abnormally high risk for catastrophic wildfires. In response, a coalition of agencies under a USDA Collaborative Forest Landscape Restoration Project began restoring 210,000 ha in the Jemez Mountains to the historical fire regime via thinning and prescribed fire. As part of these restoration efforts, we are monitoring the responses of radio-collared Rocky Mountain elk (*Cervus canadensis*) and their calves to changes in vegetation resources. In 2017, 20 elk calves born to cows were captured or confirmed dead within 48 hours of parturition. If captured ($n$ = 11), their survival was monitored and bed site characteristics were assessed (e.g., visibility, ground cover, obstructions). These habitat data were compared to bed site data collected on elk calves captured and monitored in 2011 to evaluate the effects of post-restoration vegetation growth on calf survival and bed site selection. Calf captures will continue in 2018, but initial results suggest predator-specific calf vulnerability (35% survival 2–3 months following parturition) may have changed, along with vegetation characteristics associated with calf bed site selection. This may be due to vegetation succession and overall differences in sites chosen by cows following wildfire and restoration. This research will assist state and federal managers in evaluating the influence of large-scale restoration activities on elk calf survival and habitat use.

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## Invisible Larval Zebra Mussels: What Dogs' Noses Can Tell Us About What We Can't See

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**ABSTRACT:** Working Dogs for Conservation and colleagues investigated the ability of dogs to assess whether lake water is harboring invisible larval mussels ("veligers"). In May 2017, 7 dogs trained to adult zebra and quagga mussels were exposed to water samples from 8 reservoirs in the Dallas-Fort Worth area. Samples ranged from zero to 68 veligers per liter of water, and dogs were asked to select the infested samples in a bucket among a line-up of similar buckets. Water samples were then poured on watercraft to see if comparable results were achieved. Finally, the dogs conducted inspections on watercraft leaving an infested reservoir, and searched shorelines for juvenile mussels attached to substrate. This is the first time that dogs have been asked to assess water from multiple waterbodies—thus "sort through" various background plankton odor—and

then proceed beyond line-ups to ascertain real-world applications. This presentation will include the possible implications for watercraft inspections and screening of water samples in mussel monitoring efforts.

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## Tooth Wear of White-tailed Deer Consuming Pelleted Ration and Browse Diet

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Abstract: Tooth wear in white-tailed deer influences diet, digestion, and demography. When the cheek teeth have greater wear it can take animals longer to chew forage particles to small sizes and thus digestion efficiency might be less. We compared the amount of tooth wear in 2 deer populations that consumed different diets that should influence the rate of tooth wear. One population at the Kerr Wildlife Management Area captive facility consumed primarily a pelleted diet that should require less chewing to breakdown particles than the other, free-ranging population in south Texas that consumed a browse diet. At the captive facility, we measured the height of the first molar on the mandible (M1) of 57 females and at the south Texas site we measured the M1 height of another 44 females. All females were at least 2.5 years of age and M1 height was measured with a digital caliper. We also recorded dressed body mass and mandible length of all deer. Mandible length was our index of skeletal size. Bootstrapped regression analyses were conducted to assess potential differences in M1 height between sites. We detected no difference between sites in M1 heights of females. The lack of differences still persisted when we controlled for dressed body mass and mandible length. Reasons for not detecting site differences might be due to not having access to the actual age of deer from south Texas or diets required similar amounts of mastication.

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## Could a Texas-driven National Security Effort Benefit Conservation of Ocelot?

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**ABSTRACT:** The U.S. Fish and Wildlife Service is interested in opportunities to partner with agencies or institutions that are willing to leverage resources for the benefit of wildlife management. The use of remote cameras for documenting wildlife has become a standard for species that are secretive and difficult to document and ocelots (*Leopardus pardalis*) are no exception. In 2015, USFWS was granted access to photos from the Drawbridge Program, a national security effort in Texas to reduce illegal activities along the Texas-Mexico border, including surveillance on National Wildlife Refuge lands. While reviewing incoming images from remote security cameras, Texas

Department of Public Safety officers selected photos of any possible wild felines and emailed photos to USFWS (MAS). Species will be identified, and location data will be extracted and then generalized to protect the integrity of the national security effort while still providing insights into wild felid occurrence across the range. Final results will be presented from the thousands of photographs of felids and omnivores collected including bobcats, unknown felids, mountain lions, coyotes, a ring-tailed cat, and a bear. The study demonstrates the benefits that can come from people that are willing to work together even when their agencies may have different missions. The USFWS is interested in genuine collaborations, particularly those that could benefit ocelot conservation.

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## Relationships Between Canopy Cover and Herpetofauna in an Eastern Texas Woodland

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**ABSTRACT:** Reptile and amphibian populations are declining because of many factors, but habitat loss and change have been especially causal. In eastern forests, canopy cover can change by either selective management or neglect. Understanding how herpetofaunal communities are influenced by canopy cover can lead to more informed management decisions about manipulating canopy cover. We used time-constrained searches to assess herpetofauna at 54 sites on Gus Engeling Wildlife Management Area in Anderson County, Texas, in 2017. At each site, the canopy cover was determined with a spherical densiometer. We then regressed total herpetofauna, total reptiles, total amphibians, abundance of dominant species, and species richness against canopy cover. Herpetofauna were only detected at 27 of the study sites. Collectively, searches detected 58 individuals of 7 species. Total herpetofauna abundance increased with canopy cover, but our data had too much variation to detect other relationships at the community level. At species level, six-lined racerunners increase as canopy cover decreased, whereas ground skinks decreased with decreasing canopy cover. Thus, species responses varied more than the community with regard to canopy cover. This suggests a mosaic management strategy would be best to account for variation in canopy cover responses from herpetofauna, because actions that select for a more open canopy may negatively affect some species, but benefit others. Such a management strategy would maximize benefits across the most species.

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## Effects of Food Enrichment on Aggressive Behavior of Captive Northern Bobwhite

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**ABSTRACT:** High quality of life standards are important for captive animals. Physical and behavioral benefits can be observed with the presence of environmental enrichment and stimulation. This study investigated how alterations in the environment of captive northern bobwhites (*Colinus virginianus*) influenced behavior. A population of quail from Tarleton State University's aviary was divided into 4 enclosures with equal gender ratios of 27 males and 19 females. Three categories of enrichment (novelty items, vertical structure, and food-based supplemental enrichment) were employed across the populations, rotated through 3 of the 4 enclosures on 36-h rotations, the fourth being used as a control. Pretreatment observations were made via video recordings from 2 camera angles in each enclosure. This was used to develop a baseline for the behavioral ethogram utilized during the treatment period using Noldus Observer XT behavior study software. The ethogram's behavioral list consisted of eating, drinking, dusting, chasing, biting/pecking, roosting, and a scale for avoidance. The video camera was set to record continuously for 3 h. Food enrichment showed to be effective at reducing aggressive pecking behavior. Activity levels also increased, likely due to increased feeding opportunities, suggesting that aggressive pecking may be related to boredom. Like previous studies, food enrichment increased feeding behavior and decreased resting behavior. Insufficient evidence was present to conclude whether drinking and chasing were affected. Food enrichment could be important for reducing pecking behavior and improving welfare of pen-raised birds. More research is needed to determine if food enrichment has an effect on other behaviors.

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## Reducing Cowbird Control Costs at Fort Hood: Implications for Black Capped Vireo Recovery

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**ABSTRACT:** Cowbird control began in 1989 to help recover endangered black-capped vireos on a large (87,890 ha) military installation in central Texas. Eckrich et al. (1999) reported significant reductions in parasitism of vireo nests by implementing a rigorous control program that used trapping in cow pastures year-round within this relatively un-fragmented landscape. Kostecke et al. (2005) reported increasing numbers of vireos resulting from this landscape-level trapping that averaged over 8,000 trapping days/year from 1997 to 2003. We ended year-round trapping in 2004, and further reduced trapping days from an average of 3,100 per season (2004–2011) to 1,500 during 2012–2017. Reduced trapping effort did not compromise the high number of nesting vireos (5,000-7,000 males) or their historically low parasitism rates averaging 7% during 1998–2017. We demonstrate that trapping in March–April is the key period to remove locally breeding cowbirds

despite both species (cowbirds and vireos) breeding into July annually. Our results have implications for managers seeking to reduce costs in their time budgets that will lead to reduced financial costs without compromising continued recovery of an endangered species.

## The Use of Prescribed Fire, Herbicide Application, and Native Plants to Restore Bottomland Blackland Prairie in a Constructed Wetland Matrix

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**ABSTRACT:** The Blackland Prairie of Texas, once covering approximately 4.2 million ha, now exists mainly in fragments <10 ha encompassing less than 1% of its original total area. Increasing awareness of the importance of the Blackland Prairie region and the ecosystem services provided therein has promoted restoration of prairie remnants and establishment of prairie assemblages in constructed systems with mixed-land use histories. We will build on these principles through reestablishment of native vegetation and a comparative study on differing treatments testing the effectiveness of prescribed fire, herbicide application, and a combination of both methods. We will use a randomized block design to measure levels of short-term phenological success and biomass gain of native vegetation reestablishment in a 9.72-ha constructed wetland/prairie matrix containing encroaching woody and invasive competitor species. We will establish 3 treatments: 1) herbicide, 2) prescribed burn and 3) herbicide and prescribed burn. Each treatment will contain plots with species 1, plots with species 2, and plots with both species 1 and 2 to compare isolated and co-occurrence growth success. Following the application of herbicide, prescribed burn, or herbicide/prescribed burn plot treatments, randomly selected pre-grown tillers will be assigned to plots and establishment success will be measured. We hypothesize that a combination method of herbicide/prescribed burn will have the greatest negative effect on invasive re-emergence and the greatest positive effect on native plant growth. Results from this study will provide baseline data for native plant success and future management strategies in a constructed wetland prairie, and may be integrated into future bottomland prairie restoration designs.

## Public Duck Hunter Demographics at Richland Creek Wildlife Management Area, Texas

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**ABSTRACT:** In recent years, waterfowl hunting in Texas has increased in popularity. Small Game Program estimates for the 2005–2006 season were 62,901 duck hunters statewide. This increased to an estimated 94,469 hunters for the 2016–2017 season. The overall increase in duck hunters has also

been seen on public hunting lands. As duck hunting was increasing in popularity, Texas Parks & Wildlife Department partnered with Tarrant Regional Water District on the construction of approximately 2,000 acres of wetlands for waterfowl habitat on Richland Creek Wildlife Management Area (RCWMA). These wetlands were completed in 2013. Duck hunting is often a difficult and expensive pursuit with specialized gear and boats often needed. These constructed wetlands open to the general public were built for ease of hunter access making them popular with inexperienced, youth, elderly and budget hunters. The combination of 1) significantly increased hunting acreage, 2) ease of hunting access and 3) overall popularity increase of duck hunting became a perfect storm of public duck hunter management for RCWMA staff. Public duck hunting averaged 847 man-days/year each year before construction (2001–2010) then increased to an average of 2,290 man-days/year after construction (2013–2016). During the 2016–2017 duck hunting season, staff of the RCWMA conducted an optional survey of public duck hunters to obtain general demographic information and better understand the increased popularity of duck hunting. A total of 184 hunters completed the survey. We also analyzed registration card information for all 1,230 individual duck hunters that visited RCWMA.

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## American Kestrel Food Habits in the Llano Estacado of Texas

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**ABSTRACT:** American kestrels (*Falco sparverius*) are a secondary cavity nesting species of falcon with a wide distribution across North America. In 2011, we initiated a program to study kestrel ecology in the region with 30 nest boxes placed in short/mixed grass prairies in Lubbock County. Due to the lack of studies on prey use by the species, one line of research is to assess how population dynamics could be influenced by regional dietary habits. We placed cameras at 5 nest boxes each year in 2016 and 2017 to study kestrel prey use and delivery rates during the breeding season. Preliminary results suggest a prey delivery rate of 20.1 deliveries per day, with a breeding season diet dominated by reptiles (77.9%); mammals (6.2%), invertebrates (6.2%), birds (5.0%), and unidentified prey (1.2%) accounting for smaller proportions of the diet. Among reptile prey, prairie racerunners (*Aspidoscelis sexlineata viridis*) accounted for 74.4% of deliveries, and unidentifiable lizards were the second most common deliveries (14.4%); common spotted whiptails (*A. gularis*) and Texas horned lizards (*Phrynosoma cornutum*) accounted for 3.6 and 2.8% or reptilian prey, respectively. Mammalian, avian, and invertebrate prey were difficult to identify beyond class or order, but prey as large as juvenile cottontail (*Sylvilagus floridanus*), cotton rat (*Sigmodon hispidus*), and great-tailed grackle (*Quiscalus mexicanus*) were identified. Analysis is ongoing, and we will provide a completed analysis for breeding season prey use of kestrels in Lubbock County, with comparison to data from other regions.

## Using Acoustic Monitors to Assess At-risk Species in Survey Locations with Limited Access

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**ABSTRACT:** When monitoring for threatened or rare species, survey methods that maximize effort in terms of coverage, reliability, and economical expenditure are frequently pursued. Melrose Air Force Range in Roosevelt and Curry counties, New Mexico has historically supported populations of lesser prairie chickens (*Tympanuchus pallidicinctus*), a formerly Endangered Species Act-listed bird whose declining population is attributed to habitat alteration and volatile weather patterns. Monitoring efforts for lesser prairie chickens on Melrose Air Force Range are limited by coverage area and military training, facilitating the need for innovative survey techniques that can be conducted regardless of accessibility. Acoustic monitoring has the ability to achieve the spatial-temporal sampling requirements, and was implemented on Melrose Range from 27 April 2017 until 13 September 2017. Monitor locations were selected to provide adequate spatial coverage of suitable vegetative associations, in addition to sampling of historical lekking sites. Eight acoustic monitors were deployed at Melrose Air Force Range, and a separate experimental control unit was placed near a verified lek at the Claudel Prairie Chicken Area in Roosevelt County, New Mexico. Upon collection and analysis of audio data collected during deployment, 2 separate instances of verified lesser prairie chicken occurrence were documented outside of the mating season, and in areas not deemed "suitable habitat." Our efforts support the use of acoustic monitoring as a viable avian sampling technique, particularly when resources and access are limited. Wildlife managers of today must complete comprehensive species monitoring in the face of declining budgets and land access restrictions, and acoustic monitoring is one burgeoning tool that can facilitate this mission.

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## Investigating Factors that Influence Northern Bobwhite Chick Survival

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**ABSTRACT:** Research on northern bobwhite brood ecology is extremely limited, especially for neonate chicks. Furthermore, basic life-history information such as cause-specific mortality for the

first 6 weeks of life, post-hatch is deficient in the literature. What little survival information exists on bobwhite chicks is often based on flush counts which are subject to detection issues resulting in biased estimates and untenable inference. Data concerning bobwhite brood resource use are also very limited. Given these shortcomings in the literature, our objective is to estimate bobwhite chick survival and resource use in the Rolling Plains of west Texas. We are using a combination of GPS-equipped radio-transmitters fitted to hen parents and VHF radio-transmitters sutured to backs of chicks. Tracking parent hens using GPS tags provide fine-scale movement information while suture-tags of chicks provides individual vital rate information and more accurate estimation of individual and group-specific survival. Additional factors potentially influencing survival and resource use such as predator abundance, weather conditions, insect availability, and vegetation composition and structure will be incorporated as covariates in future analyses. During 2017, we monitored 13 broods and 70 chicks using a combination of patagial tags and radio-tags, 2–4 times a day to determine movements, survival, and cause of mortality based on evidence at the mortality site. Apparent chick survival was measured at 3 intervals: 7–10 days (37.29%), 12–15 days (21.19%), and 17–21 days (2.54%). However, since apparent survival does not account for brood amalgamation, brood dumping, and emigration these estimates are likely biased low. As such, we will attempt to account for these sources of bias in future analyses when sample sizes improve. Anecdotally, we observed that broods used mesquite, western ragweed, and vine mesquite vegetative cover types. In 2018, we aim to increase our sample size and continue monitoring brood movement and chick survival. These data will provide much needed insight to management practices that will help maintain or increase bobwhite populations in the Rolling Plains of Texas as well as help to fill a gap in the literature on bobwhite ecology.

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## Weather Patterns and Vegetation Structure Affect the Spatial Distribution of Small Mammals in a Lubbock, Texas Rangeland Site

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**ABSTRACT:** Population modeling allows us to anticipate the ability of small mammal communities to adapt to environments experiencing an increasingly variable climate. Small mammal capture-recapture data were systematically collected annually from 2010 to 2017 across 35 trapping locations throughout the isolated Texas Tech University native rangeland site. We assessed capture success with abiotic and biotic variables to get a better understanding of the population dynamics seen across time. We evaluated ambient temperature, aspects of rainfall, nighttime illumination, and percent cover of vegetation functional groups. Weather, and in particular rainfall of the previous season, exhibits the strongest relationship with capture success likely because rain stimulates growth and reproduction in plants which provide food for small mammals. We will also apply information theory, using Akaike's Information Criterion, to evaluate biologically determined models and use model averaging to determine the relative importance of these variables to small mammal population

dynamics. The results will better inform us of how changes in the environment through time affect the structure and interaction of the community as a whole.

## Winter Movements and Habitat Use by Greater White-fronted Geese

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**ABSTRACT:** Historically, Texas wintered a large portion of the midcontinent population of greater white-fronted geese (*Anser albifrons frontalis*; hereafter, white-fronts). Recently winter population surveys have shown changes in the winter distribution and abundance of white-fronts in Texas and the overall winter distribution has shifted northeastward. Changes in land use, climate, and resource availability are likely drivers of the perceived distribution shift, yet the degree to which these drivers effect the change in distribution is unknown. We captured 63 adult white-fronts during winters 2015–2017 and attached GSM/GPS tracking devices. We used GPS information to determine movement patterns and decipher specific habitat use and selection made by white-fronts throughout winter. Tracking devices collected 60,615 GPS locations during the winter period on white-fronts that wintered in Texas, Louisiana, Arkansas, Mississippi, USA, and Nuevo Leon, Tamaulipas, Durango, and Jalisco, Mexico. Mean daily movement distance decreased as winter progressed ($P < 0.001$) and was not influenced by average daily minimum ($P = 0.929$) or maximum ($P = 0.719$) temperatures. During winter 2016–2017, 30.6% of tagged white-fronts ($n = 37$) made movements among wintering regions, and 16.7% made movements between the Central and Mississippi flyways. White-fronts marked before 1 December 2016, however, moved among regions (50.0%) and between flyways (83.3%) more frequently. Habitat use of geese changed monthly and agricultural crops including sorghum, rice, peanuts, and winter wheat, and wetland types including palustrine emergent and scrub-shrub wetlands, were used most frequently. Understanding the drivers of movements in relation to habitat selection will aid in determining factors influencing the winter distribution shift by white-fronts.

## Quail Habitat Restoration in Areas Dominated by Non-native Grass

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**ABSTRACT:** Non-native grasses, particularly buffelgrass (*Pennisetum ciliare*) and Old World bluestem (*Dichanthium annulatum*), have been planted in Texas since the 1940's for cattle forage and erosion control. In southern Texas and Mexico, their expansion is a leading cause of quail habitat loss and fragmentation. These non-natives grasses tend to form dense, monotypic stands, thereby eliminating travel corridors, decreasing structural heterogeneity, and reducing critical habitat components including bare ground and food. In 2008, we initiated a study to determine potential techniques for restoring native vegetation in areas dominated by non-native grasses. Repeated disking and/or glyphosate application and subsequent planting of ecotypic natives far surpassed other methods. Northern bobwhite (*Colinus virginianus*) habitat components were restored and densities increased from nearly 0 to 1 bobwhite/1.2ha. In 2014 we began a study to replicate this success on a large scale (±121 ha). Our study is composed of 2 sites, a restoration treatment area and a non-treated control area. For 2 years (2014–2016), our restoration site has been repeatedly disked and sprayed (5 events each) to remove non-native grasses and to deplete the soil seed bank of their progeny. Since 2013, non-native grass, native herbaceous cover, and woody cover have been sampled along 80 transects using Daubenmire frames and the line-intercept method. Data analyses are currently ongoing. This sampling will continue until at least 2019 to determine our effectiveness in creating native quail habitat. If this restoration proves to be beneficial to quail, it represents an important step in learning how to effectively restore habitat on larger scales.

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## Home Range and Habitat Associations of the Spot-tailed Earless Lizard

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**ABSTRACT:** The spot-tailed earless lizard (*Holbrookia lacerata*) is thought to be declining throughout its range and was petitioned for federal listing in 2010. Currently, a listing decision is scheduled for 2020 and there is a need for basic biological data on movements, home ranges, and habitat preferences for the spot-tailed earless lizard. From May to July 2017, driving and time-constrained walking surveys were conducted for the 2 subspecies of this lizard, the northern spot-tailed earless Lizard (*H. l. lacerata*) in Crockett County and southern spot-tailed earless lizard (*H. l. subcaudalis*) in Val Verde County, Texas. Thirty-three adult spot-tailed earless lizards were fitted with a radio transmitter. Radioed lizards were relocated 3 times daily at 2-hr intervals. On average, males of both the southern and northern spot-tailed earless lizards moved longer distances than females, both between fixes (i.e. step lengths) and overall (i.e. total step length). Nineteen lizards had at least 25 fixes, which provided enough data to estimate the home range of those individuals using minimum convex polygon (MCP) and kernel density estimation (KDE). There were no significant sex differences for MCP, 50% KDE, or 95% KDE. These baseline data will help us to better understand the movements and home ranges of the spot-tailed earless lizard, allowing us to make better recommendations on conservation and management strategies for the 2 subspecies.

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## The Other Supplemental Feed: How Crop Use Affects Mule Deer Movements in the Texas Panhandle

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**ABSTRACT:** Agricultural crops provide an important source of nutrition to mule deer (*Odocoileus hemionus*) in the Texas Panhandle. However, we know little about the influence of crops on movements and nutrition of mule deer. Anecdotal observations suggest that deer make large seasonal movements to access specific crop types, and that these movements are driven by crop phenology. We captured and marked 94 adult mule deer with GPS collars at 2 study sites in the Texas Panhandle. Fixes were taken every 2 hrs from October 2015 through October 2017. We identified core areas of use within the home range of each deer using adaptive kernel home range analysis with 50% isopleths. Crops were an important resource for mule deer, as 78% of marked deer had crops in their core areas of use. However, mule deer exhibited relatively small home ranges ($\bar{x}$ = 2,200 ha), and the average distance between core areas of use was 3.7 km. Winter wheat (*Triticum* spp.) received the greatest use overall, especially during the tillering and stem-elongation growth stages, which mainly occur during winter. These results suggest that crops were used seasonally, but distribution throughout the study areas was such that deer did not have to travel long distances to access them. This knowledge will help us understand trends in deer density in agricultural areas and ensure that deer herds are being managed on the proper spatial and temporal scales.

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## Migration, Wintering Movements, and the First Return to the Breeding Range of Fledgling Swainson's Hawks

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**ABSTRACT:** Swainson's hawks (*Buteo swainsoni*) are long-distance migratory raptors that are common in western North America. Adult Swainson's hawks are relatively well studied, but little research has been conducted on survival, dispersal, and behaviors of fledgling and juvenile Swainson's hawks. In 2016 and 2017, we attached satellite transmitters to 14 fledgling Swainson's hawks from nests near Amarillo, TX to explore questions about the survival and dispersal of young

birds. Four of the 5 birds tagged the first year died before returning to the breeding range. The one surviving juvenile spent its first summer exploring west Texas and eastern New Mexico until migration began in fall 2017. Out of 10 birds tagged in 2017, 8 are on track to successfully complete migration. We've seen exploratory movements during the migration pathway, suggesting that the migration route may be more variable than once thought, and young birds may not hold as direct a path and may complete migration more slowly than adult birds. We hope to gather enough data to estimate a survival analysis that we can compare with adult transmitter data and previous banding records. There is evidence that Swainson's hawk population genetics are not well structured, suggesting a high degree of population mixing. Because adult hawks show high site and mate fidelity, we suggest that juvenile dispersal prior to breeding may explain those results. We hope to observe one or more birds dispersing from their natal territory to support this hypothesis, but currently data collection is ongoing.

## Testing Efficacy of Acoustic Deterrents for Reducing Bat Fatalities in Southern Texas

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**ABSTRACT:** Acoustic deterrent technology as an impact-reduction strategy for bats at wind energy facilities is in early phases of research and development. Although initial research has been promising, few field studies testing the influence of broadcasting ultrasound at wind turbines to reduce bat fatalities have been published. Our objective was to assess effectiveness of a newly developed acoustic deterrent for reducing bat fatalities at a 3-phase wind energy facility in Starr County, Texas. We randomly selected 16 wind turbines and equipped each with 6 acoustic deterrent devices mounted on the nacelle. Each deterrent emitted a continuous high frequency signal ranging from 20–50 kHz. We randomly assigned 8 wind turbines to a control group (deterrents off), and 8 wind turbines to a treatment group (deterrents on) each night from July 31 through October 30, 2017. When possible, we searched all 16 turbines daily for bat carcasses within established search plots and included in analyses only fatalities determined to have occurred the night before. Here we present preliminary results. We found 305 bat carcasses comprised of 7 species. Of these, Brazilian free-tailed bats (*Tadarida brasiliensis*) accounted for 77% of the fatalities, followed by northern yellow (*Lasiurus intermedius*) bats at 10%. In total, we found 199 bat fatalities at control turbines and 106 at treatment turbines. Preliminary results indicate species-specific responses to this novel technology. We are continuing to conduct analyses, in addition to future study development.

## Chorioptic Mange in White-tailed Deer

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**ABSTRACT:** Chorioptic mange is a common, contagious skin disease of herbivorous mammals that is most commonly caused by the common cattle itch mite (*Chorioptes bovis*) or the Texas itch mite (*C. texanus*). Mite species in the genus *Chorioptes* are not host specific and can be found on domestic ruminants, wild ruminants, and horses. *Chorioptes* spp. mites are surface-dwelling mites that cause an oozing dermatitis usually on the lower limbs, but also has been reported on testicles resulting in changes to fertility in ruminants. The goal of this study was to provide evidence of mite activity on the skin of white-tailed deer (*Odocoileus virginianus*) in southern Texas. We surveyed free-range white-tailed deer on 4 ranches in southern Texas for indicators of mite infestation. Individuals with areas of hair loss were assessed for secondary indicators of mites. Lesions with reddish-colored, oily, or thickened skin were marked for specimen collection via skin scraping. Of the 439 deer surveyed, skin scrapings were performed on 29 individuals, of which 2 deer were positive for *Chorioptes* spp. mites. This was the first account of free-ranging white-tailed deer infected with this mite. More research is needed to identify the extent of their impact, but there is potential for white-tailed deer to serve as a reservoir host, which could make them responsible for introducing or increasing the spread of the disease throughout livestock herds that inhabit a similar area.

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## Autumn and Wintering Movement Ecology of Gulf Coast Subpopulation Sandhill Cranes

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**ABSTRACT:** As climate and land use change continues, current information on the Gulf Coast subpopulation sandhill crane (*Antigone canadensis*) migratory behavior, wintering space use, and habitat selection are needed to help properly manage this hunted subpopulation. To address these information needs we attached tracking devices to 39 sandhill cranes between April 2015 and February 2017 on their breeding grounds in Minnesota ($n = 8$) and on wintering areas along the Texas coast ($n = 31$). During winter, we found cranes were highly variable in their space use with an average home range size of 1,374.6 km$^2$ and ranging between 28.7 and 11058.1 km$^2$. Fidelity to home ranges was also highly variable among individuals, ranging from 0 to 95%. At the habitat patch scale we found selection for rice, seasonal surface water, and freshwater emergent wetlands during the day, and selection for estuarine unconsolidated shore as nocturnal roosting habitat. At the landscape scale, we found roost use to be positively correlated with the amount of grain ($P < 0.033$) and freshwater ($P < 0.024$) habitats and negatively correlated with the amount of development ($P < 0.041$) and estuarine habitat ($P < 0.001$) within 6.8 km of roosts. We will also investigate several aspects of autumn migration including timing of departure from breeding areas, arrival on wintering areas, identify important stopover areas, and quantify relative exposure to harvest. This information can aid biologist in the planning of fall and winter population surveys, development of harvest recommendations, and habitat conservation on wintering areas.

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## Factors Influencing Nesting Success of Songbirds in a Bison-grazed Landscape

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**ABSTRACT:** Founded on the basis of its ecological benefits, bison restoration is known to considerably influence prairie communities. In an environment that contrasts highly with the historic American plains however, one must question how bison restoration will affect dynamics of today's ecosystems. This study investigates how bison-influenced environmental factors affect nesting success of prairie songbirds in a restored grassland. Our objectives were to 1) determine how vegetation structure differs with grazing pressure, 2) examine the impact of nest site vegetation structure and grazing pressure on nesting success, 3) investigate the prevalence of cowbird parasitism on prairie songbird nests, and 4) examine the relationship between nesting success relative to distance from bison activity. We conducted this study during the summer of 2017 at the 6,197-hectare Caprock Canyons State Park located in the high plains of the Texas Panhandle. We conducted nest searches following a plot design in 10 randomly generated 100-m$^2$ plots representing

a mixed-grass prairie landcover type. To discover nests within each plot, we used behavioral cues (e.g. nest building, copulatory, auditory), flushing, and systematic searches. Once located, we monitored nest contents until nesting failure or fledging. We measured vegetation structure at and around nest sites immediately upon nest success or failure. We determined nest proximity to bison activity using daily data acquired from GPS collars fixed to 4 individuals in the bison herd. The information obtained from this study will help influence management decisions at Caprock Canyons State Park.

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## Scaled Quail and Grassland Birds as Indicators of Grassland Health in the Chihuahuan Desert

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**ABSTRACT:** The Chihuahuan Desert spans northeastern Mexico and the Trans-Pecos region of Texas. Recently, grassland deterioration has become a threat to Chihuahuan Desert ecosystem health. Grassland deterioration in the form of brush encroachment is caused by many factors, including livestock overgrazing. We used scaled quail (*Callipepla squamata*), Baird's sparrows (*Ammodramus bairdii*), McCown's longspurs (*Calcarius mccownii*), chestnut-collared longspurs (*C. ornatus*), Sprague's pipits (*Anthus spragueii*), lark sparrows (*Chondestes grammacus*), Cassin's sparrows (*Peucaea cassinii*), Eastern meadowlarks (*Sturnella magna*), and black-throated sparrows (*Amphispiza bilineata*) to assess grassland health relative to cattle operations in the Chihuahuan Desert. Grassland bird abundance and diversity were used as indicators of grassland health. Study sites included grasslands experiencing different grazing pressure: continuous, rotational, and seasonal. Grassland bird surveys were conducted January–March 2017 and July–September 2017 to survey both summering and wintering species. Nineteen species were observed during winter, and 47 species observed during summer. Simpson's Diversity Indices were calculated to compare diversity among the 3 grazing regimes. Quail abundance was determined using call-count surveys conducted mid-April–June 2017. The number of quail heard during call counts was analyzed using linear regression. The number of quail heard in the continuously grazed pasture was lower than the number of quail heard in both the rotationally ($P = 0.007$) and seasonally ($P = 0.001$) grazed pastures. These results can be used to create management plans for these species, as well as to educate ranch managers on ideal grazing approaches to promote a healthy ecosystem in this region.

## Accumulation of Radiocesium in Bullfrog Tadpoles in a Contaminated Effluent Canal on the Savannah River Site

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**ABSTRACT:** As a result of nuclear energy production and weapons testing, environmental contamination of radionuclides is a concern for wildlife worldwide. Radiocesium (137Cs) is a long-lived radionuclide that bioaccumulates in the tissues of exposed organisms over time. Although research has examined 137Cs uptake in various species of wildlife, little is known about bioaccumulation patterns in amphibians, despite their widespread distribution and their ability to transport contaminants between ecosystems. Anurans, such as bullfrogs (*Lithobates catesbeianus*), serve as useful indicators of environmental contamination given their propensity to accumulate contaminants throughout their complex life histories in both aquatic and terrestrial habitats. Therefore, the objective of our study was to determine the accumulation rate of 137Cs in bullfrog tadpoles inhabiting a contaminated effluent canal on the U.S. Department of Energy's Savannah River Site. Uncontaminated tadpoles were released into 3 enclosures located in R-Canal on the SRS and were allowed to naturally accumulate 137Cs present within the system. Three tadpoles were collected from each enclosure at 2-d intervals for 12 days and then again at 20 and 32 days to assess 137Cs accumulation. Using the Richards model for 137Cs bioaccumulation, our data indicated that bullfrog tadpoles achieved steady-state 137Cs concentrations averaging 3.9 Bq/g whole-body weight after 14 days exposure among sampling sites. Radiocesium accumulation in bullfrog tadpoles was found to be more rapid than rates reported for other biota, likely due to their closer association with contaminated sediments, demonstrating the importance of quantifying 137Cs uptake across different wildlife species in contaminated ecosystems.

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## Baseline Activity of Cave Myotis Colonies Prior to the Arrival of White-nose Syndrome

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**ABSTRACT:** Changes in bat roost activity may be an effective indicator of disease presence. However, roosting behavior of bat species in the southern United States differs from behavior of bat species in the northern US. To date, there have been no studies documenting the activity of healthy colonies of cave-roosting bats in western Texas ecoregions. As white nose syndrome (WNS) extends its range into Texas, proper baseline data will be essential in developing well-informed and effective management plans. To determine baseline activity patterns in WNS-free caves in Texas, we selected caves with known colonies of cave myotis in the Texas Panhandle and Edwards Plateau regions for our study. Cave myotis is a species of concern when considering potential effects of WNS in Texas, as *Myotis* species in the northern USA have been the most adversely effected by WNS. Using Anabat Acoustic detectors, we collected baseline information on bat activity within the roosts during 2016 to understand pre-WNS behavior. We found similar daily patterns of activity in all sampled caves regardless of latitudinal and regional differences. We also found key environmental predictors that correlate strongly with daily activity. Our results show that there are strong similarities in daily activity patterns of healthy cave bat populations in different ecoregions. This work therefore provides a solid baseline from which deviations could be interpreted as symptomatic of disease.

## Habitat Associations of Migratory Birds in South Texas

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**ABSTRACT:** It is estimated that 80% of North American avian migrants travel along the southern coast of Texas where wind energy development is increasing; thus, quality of stopover habitat in this region is of concern. Since little research has been conducted on stopover habitat use in south Texas, we investigated habitat associations of migratory birds to identify important migratory areas in this region. We surveyed birds during spring and autumn migration from 1991–1993, and from 2006–2008. We conducted bird surveys along 500-m transects placed within 6 habitats common in south Texas. Using multiple-covariate distance sampling in DISTANCE 7.0, we estimated densities of 11 foraging guilds in each habitat during spring and autumn. We also calculated species and guild richness, guild diversity, community similarity indices and habitat conservation values. We found wooded habitats (oak island and woodland) were consistently higher in guild density, species and guild richness, and guild diversity than habitats dominated by herbaceous growth (grassland and shrub-grassland). Only 36% of guilds were present in grasslands, whereas oak island was the highest density habitat for 64% of guilds. Species richness for each habitat increased from autumn to spring;

in grassland, park and brush richness nearly doubled, whereas oak island increased nearly fivefold. Although grassland was lowest in avian habitat use, habitat conservation scores indicate it is the most important habitat for species of conservation concern. These results suggest that land managers in south Texas should aim to preserve large expanses of woodlands and grasslands, especially near coastal areas.

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## Effects of Several Flavors on Feed Selection Behavior in Feral Hogs

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**ABSTRACT:** Since their introduction to Northern America, feral hogs (*Sus scrofa*) have proven to be incredibly prolific, as well as destructive. Feral hogs cost the United States several billion dollars each year in population control and agricultural losses. These numbers do not include the growing negative ecological effect feral hogs have on the environment. The most common form of control is hunting; however, this method has not been able to mediate growing population sizes of hogs in many states. Some forms of chemical control have been investigated, but baits are often unpalatable. Because of this, flavor preferences of feral hogs may benefit efforts in developing various baits. In addition, the identification of unappealing scents or flavors may be used to develop avoidants that may potentially discourage hogs from inhabiting certain areas. The objective of our study was to investigate preferences of flavors of feral hogs for potential baits as well as avoidants. In this study, 6 different flavors (banana, vanilla, peanut butter, baking soda, beer extract, and nutmeg) were randomly offered via a sectional feeder in pastures with known hog populations in Erath County. Flavors were mixed with cottonseed meal, weighed, and offered to pigs every 3 days. Game cameras were placed by feeders to record preference as defined by time with nose in the trough. Refusals were also weighed and recorded as an indicator of preference. Preliminary results indicate a preference for baking soda. Results of this study may help in the development of baiting systems for population control.

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## A Carrying Capacity Estimate for Pronghorn Populations in the Trans-Pecos Region of West Texas

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**ABSTRACT:** The Trans-Pecos ecological region of west Texas experienced a decline in pronghorn antelope (*Antilocapra americana*) populations starting in 2008. This decline climaxed with a historical low of ±3,000 adult individuals in 2012. To mitigate this decline, Texas Parks and Wildlife Department and Borderlands Research Institute began translocating pronghorn from the Texas Panhandle to the Marfa Plateau and Marathon Basin in 2011. To estimate pronghorn carrying capacity for the restoration areas, we will evaluate biomass and nutritional quality of forbs, grasses, browse, cacti, and mast on 2 TPWD restoration areas. We will conduct 6 sampling seasons over the course of 2 years. Seasons will be defined as warm-dry, warm-wet, and cool-dry. Each season, 65 1-$m^2$ Daubenmire plots will be randomly placed within the 3 herd units making up the Marfa northwest restoration area, and 35 plots will be placed within the Marathon restoration area. Sample areas will be limited to suitable grasslands as defined by the TPWD Chihuahuan Desert habitat layer. Biomass of the 5 forage classes will be estimated. The vegetation will be dried, ground, and analyzed for neutral detergent fiber, acid detergent fiber, acid detergent lignin, and protein content. A carrying capacity estimate for these areas will assist with management of Trans-Pecos pronghorn on a regional scale. If results indicate that a restoration area is below carrying capacity, then management actions will continue to bolster populations. However, if estimates indicate a healthy carrying capacity, those populations could serve as sources for future translocations.

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## Exploring Trade-offs Between Survival and Reproduction in Yellow Mud Turtles in Texas

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**ABSTRACT:** Turtles have the highest conservation need of any vertebrate group, yet we have a nearly universal lack of understanding of variation in patterns of survival and reproduction across the group. Such demographic data are essential for proper management. Yellow mud turtles (*Kinosternon flavescens*) are semi-aquatic and found throughout most of the western half of Texas. Our intent was to explore possible trade-offs in survival and reproduction for this wide-ranging species. We began assessing yellow mud turtle demography in 2007, and have made 3,132 captures of 1,973 individuals across 9 sites. Impressions of each turtle's plastron were taken to produce a survival estimate via age-structured regression analysis. When possible, reproductive output was determined by performing x-rays on adult females and calculating an average clutch size for each site. Annual survival varied from 63.4% to 85.6% across 8 populations, and clutch size varied from 3.3 to 5.0 across 5 sites. We detected a weak positive correlation between clutch size and annual survival. For both variables, within-site differences in habitat might be more significant drivers of survival and reproduction than among-site differences. Although this species is currently abundant in Texas, it is considered threatened in Iowa, Illinois, and Missouri, and changes in climate, particularly with regard to rainfall patterns in western Texas, may impact populations in the near future. Therefore, a better

understanding of the factors influencing survival will help us better manage yellow mud turtles and other similar species.

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## Spatial Distributions of Nilgai Antelope Latrines: Implications for Control of Cattle Fever Ticks

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**ABSTRACT:** Nilgai antelope (*Boselaphus tragocamelus*), are an exotic species of ungulate in Texas. Native to India, Nepal, and Pakistan, nilgai have expanded into northeast Mexico and much of coastal southern Texas since their introduction in 1924–1949. The presence of nilgai in Mexico and south Texas has complicated the eradication of cattle fever ticks (CFT; *Rhipicephalus annulatus* and *R. microplus*). Cattle fever ticks can transmit bovine babesiosis to cattle, a serious economic threat to the U.S. cattle industry. With CFT quarantine zones established in southern Texas, ranches with infested cattle are burdened with expensive and time-consuming eradication requirements. Wildlife can hinder eradication efforts because white-tailed deer (*Odocoileus virginianus*) and nilgai are alternative hosts for CFT. Control methods, such as treated baits, are available for deer. Nilgai do not respond to bait, which is a major challenge for controlling the spread of CFT. One unique aspect of nilgai ecology is their use of communal latrines, or repeated defecation at a localized site. The existence of communal areas which nilgai re-visit presents an opportunity for CFT treatment through an application of acaricides via remotely activated sprayers. We are characterizing the distribution and usage of latrines on ranches in south Texas. We will analyze the density, size, and location of latrines in relation to roads, habitat types, and abundance of nilgai. The results of this study will have important implications for the development of treatment methods for eradication of CFT in the U.S.

# Identifying and Estimating Sorting Bias in Aquatic Invertebrate Samples

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**ABSTRACT:** Aquatic invertebrates are identified to be a major forage resource for waterfowl during both the breeding and non-breeding season. To make accurate inferences of waterfowl forage dynamics of aquatic invertebrates, it is imperative to identify processing and sorting bias(es) of invertebrate samples among observers. As part of a larger project examining stock pond forage resources, we examined sorting bias and efficiency utilizing samples of aquatic invertebrates collected from stock ponds within the MT7 Ranch, Stephens County, Texas during fall and winter of 2016–2017. Samples ($n$ = 97) were initially sorted by an observer, removing all invertebrates and retaining the sample for a second sorting effort by another observer, utilizing 3 separate observers. Sorting efficiency was calculated as the proportion of invertebrates found in the second sorting effort relative to all invertebrates found in the sample. A randomized experiment was also developed where samples ($n$ = 50) were artificially constructed using vegetative and benthic material from the study ponds, then placing known numbers of invertebrates within the sample. Observers with no prior knowledge of the number or species of invertebrates were asked to locate all invertebrates. Initial results suggests relatively high efficiency (92%) in locating and enumerating aquatic invertebrates in samples. Bias appears to be closely related to size and number of invertebrates, and though variability between observers was identified, it appears to be minimal. For this particular study, bias in sorting efforts would not appreciably affect inference toward quantifying and qualifying the aquatic invertebrate communities of the study ponds.

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