

53rd Annual Meeting

of the

Texas Chapter of The Wildlife Society



A wary jackrabbit on East Foundation land. Photo by Wyman Meinzer.

Wildlife Conservation and Management on Private Lands

16–18 February 2017

San Antonio, Texas

2016–2017 EXECUTIVE BOARD

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PROGRAM

TYLER CAMPBELL

LOCAL ARRANGEMENTS

ERIC GRAHMANN

POSTERS

HEATHER MATHEWSON

MEETING SCHEDULE

Wednesday, 15 February

6:00 PM–9:00 PM Plant ID Set-up Executive Salon 4

Thursday, 16 February

8:00 AM–8:00 PM	Registration	Second Floor Foyer
8:00 AM–12:00 PM	Exhibitor Set-up	Third Floor
8:00 AM–12:00 PM	Landscape Ecology Workshop	San Antonio Ballroom
8:00 AM–12:00 PM	AgriLife Extension Unit Meeting	Directors Room 2
8:00 AM–3:00 PM	Poster Session Set-up Period	Fiesta Pavilion
8:00 AM–4:00 PM	Distance Sampling/Modeling Workshop	Lone Star
8:00 AM–12:00 PM	Habitat Mgt. Incentives Workshop	Boardroom
10:00 AM–12:00 PM	TWS Certification Workshop	Executive Salon 5
10:00 AM–12:00 PM	TCTWS Executive Meeting	Executive Salon 3
12:00 PM–9:00 PM	TCTWS Office Work Space	Directors Room 2
1:00 PM–3:00 PM	Plant ID Competition	Executive Salon 4
1:00 PM–5:00 PM	Speaker Prep	Second Floor Foyer
1:00 PM–6:00 PM	Submit for Art & Photo Contest	Executive Salon 1
1:00 PM–7:00 PM	Raffle & Silent Auction	Fiesta Pavilion
2:00 PM–4:00 PM	TCTWS Business Meeting	Executive Salon 3
3:00 PM–5:00 PM	TWA Conservation Affairs Committee	Boardroom
3:15 PM–5:00 PM	Texas Quiz Bowl Competition	San Antonio Ballroom
4:00 PM–5:00 PM	Southwest Section of TWS meeting	Executive Salon 3
4:00 PM–6:00 PM	Poster Session Judging	Fiesta Pavilion
5:30 PM–6:30 PM	Student Mentor Mixer	Fiesta Pavilion
6:30 PM–10:00 PM	President’s Reception	Fiesta Pavilion

Friday, 17 February

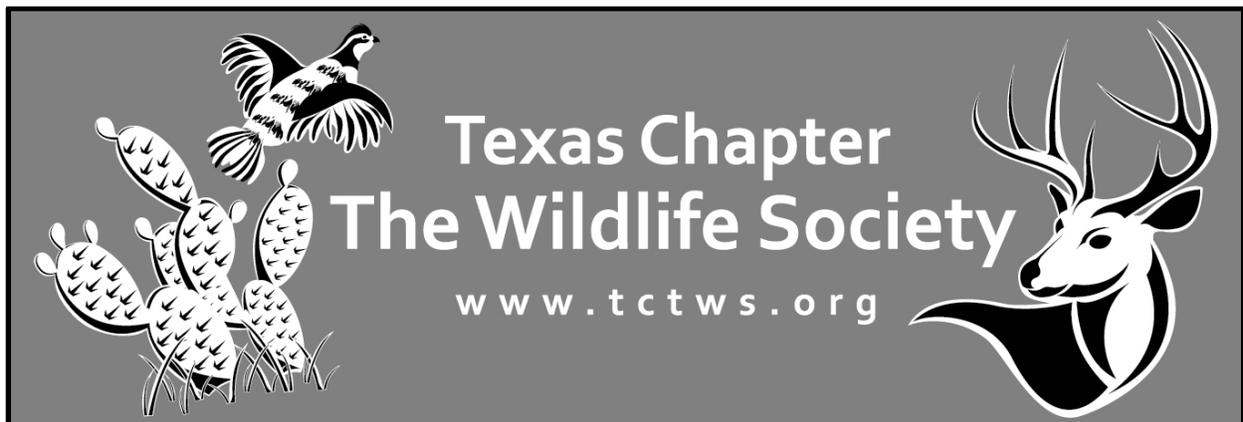
7:00 AM–8:00 AM	Student Breakfast	Executive Salon 2
7:30 AM–5:00 PM	Raffle & Silent Auction	Executive Salon 1
7:30 AM–5:00 PM	Registration	Second Floor Foyer
7:30 AM–10:00 PM	Exhibits – Breaks	Second & Third Floors
8:00 AM–10:00 AM	Submit for Art & Photo Contest	Executive Salon 1
8:00 AM–9:00 PM	TCTWS Office Work Space	Directors Room 2
8:00 AM–5:00 PM	Speaker Prep	Second Floor Foyer
8:00 AM–10:30 AM	Plenary Session	Texas Ballroom A, B & C
10:00 AM–12:00 PM	TWA Women of Wildlife Reception	Executive Salon 2
10:30 AM–11:00 AM	Break	Third Floor Foyer
10:30 AM–4:00 PM	Voting for Art & Photo Contest	Executive Salon 1
11:00 AM–12:30 PM	Cottam Award Papers	Texas Ballroom A, B & C
12:30 PM–1:30 PM	Past President’s Luncheon	Executive Salon 3
12:30 PM–1:30 PM	Lunch – On Your Own	

Friday, 17 February (Continued)

1:30 PM–3:00 PM	Concurrent Technical Sessions	Texas Ballroom A, B, C, San Antonio Ballroom, & Executive Salon 4
3:00 PM–3:30 PM	Break	Third Floor Foyer
3:00 PM–4:45 PM	Wildlife Conservation Camp Meeting	Executive Salon 3
3:30 PM–4:45 PM	Concurrent Technical Sessions	Texas Ballroom A, B, C, San Antonio Ballroom, & Executive Salon 4
5:30 PM–6:30 PM	Awards Ceremony	Texas Ballroom A, B & C
6:30 PM–10:00 PM	Awards Reception	Fiesta Pavilion

Saturday, 18 February

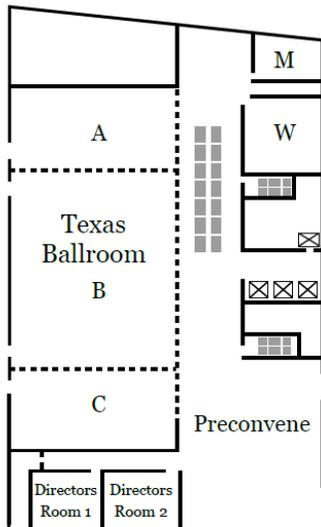
7:00 AM–7:45 AM	Followship of Christian Conservationists	Executive Salon 4
7:30 AM–11:00 AM	Registration	Second Floor Foyer
8:00 AM–11:30 AM	Exhibits – Breaks	Second & Third Floors
8:00 AM–10:00 AM	Posters Taken Down	Fiesta Pavilion
8:00 AM–10:00 AM	Art & Photo Contest Pickup	Executive Salon 1
8:00 AM–12:00 PM	TCTWS Office Work Space	Directors Room 2
8:00 AM–9:30 AM	Concurrent Technical Sessions	Texas Ballroom A, B, C, San Antonio Ballroom, & Executive Salon 4
9:00 AM–11:00 AM	TCTWS Executive Meeting	Directors Room 1
9:30 AM–10:00 AM	Break	Third Floor Foyer
10:00 AM–11:30 AM	Concurrent Technical Sessions	Texas Ballroom A, B, C, & Executive Salon 4
12:00 PM	Adjourn 53rd Annual Meeting	



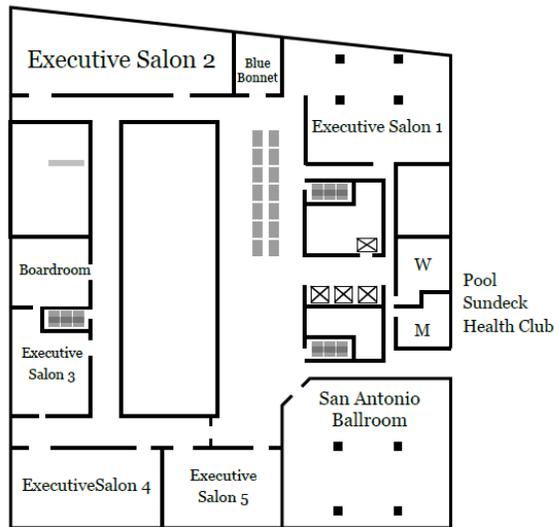
WYNDHAM – SAN ANTONIO RIVERWALK

111 EAST PECAN STREET
SAN ANTONIO, TEXAS 78205

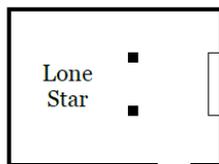
Second Floor



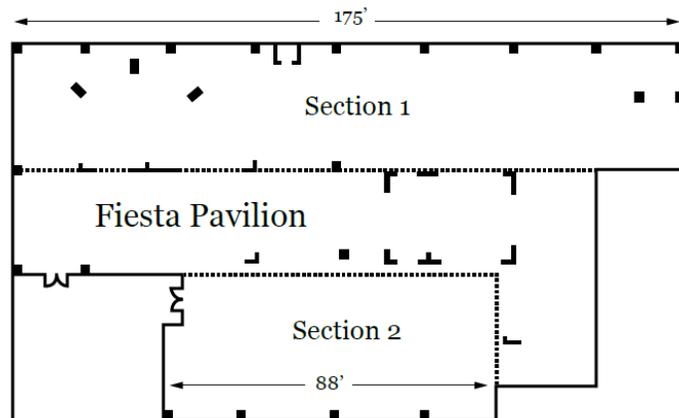
Third Floor



Lobby Level



Lower Level



SOUTH TEXAS CHAPTER
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Friday, 17 February 2017

PLENARY SESSION TEXAS BALLROOM A, B & C MODERATOR: TYLER CAMPBELL

- 8:00 Presentation of Colors**
8:05 Welcome & Introduction – Randy DeYoung, President, Texas Chapter of The Wildlife Society
8:15 Terry Anderson, “It’s Time to Rethink the North American Model for Wildlife Conservation”
8:45 Reed Noss, “Values of Conservation and their Fulfillment on Public and Private Lands”
9:15 James Oliver, “Relevancy”
9:45 Jonathan Ogren, “The Texas Landscape Project: Texas Models for Conservation”
10:15 Panel Discussion & Questions/Answers – All the Above
10:30 Break – 30 minutes

CLARENCE COTTAM AWARD COMPETITION TEXAS BALLROOM A, B & C MODERATOR: ALFONSO ORTEGA-SANCHEZ, JR.

- 11:00 Impacts of disturbance from Eagle Ford Shale exploration on quail site use and demographics.** Kelsey R. Davis, Eric D. Grahmann, Fidel Hernández, Timothy E. Fulbright, Chase R. Currie, David B. Wester, Humberto L. Perotto-Baldivieso, and Fred C. Bryant
11:15 Desert bighorn sheep habitat: a probability occurrence distribution model at a landscape level. Carlos E. Gonzalez, Louis A. Harveson, Roel Lopez, Brian Pierce, Thomas S. Janke, Joshua G. Cross, and Froylan Hernández
11:30 Evaluation of the Conservation Reserve Program as a conservation practice for lesser prairie-chickens in the Southern High Plains of Texas. Samuel W. Harryman, Blake A. Grisham, Clint W. Boal, Samantha S. Kahl, and Christian A. Hagen
11:45 Habitat selection of wintering waterfowl communities on the upper Texas coast. Tiffany C. Lane, Blake A. Grisham, Jena A. Moon, Doug M. Head, David A. Haukos, and Warren C. Conway
12:00 Evaluation of vomit characteristics in microencapsulated sodium nitrite bait formulations on captive feral pigs. Grant S. Lawrence, Justin A. Foster, John C. Kinsey, and Ryan S. Luna
12:15 Does time change everything? Northern bobwhite response to post-grazing vegetation recovery in South Texas. Rachel A. Smith, Leonard A. Brennan, Fidel Hernández, and Humberto L. Perotto-Baldivieso
12:30 Lunch Break – 1 hour

SESSION 1A: WHITE-TAILED DEER ECOLOGY AND MANAGEMENT
TEXAS BALLROOM A
MODERATOR: CLAY HILTON

- 1:30** **Effects of thermal environment on the growth and health of white-tailed deer fawns during summer.** Nicole A. Alonso, David G. Hewitt, Randy W. DeYoung, and Clayton D. Hilton
- 1:45** **Effects of age, sex, and feeder density on pelleted feed use by white-tailed deer in South Texas.** Emily H. Belser, David G. Hewitt, Timothy E. Fulbright, Charles A. DeYoung, Thomas W. Boutton, and Don A. Draeger
- 2:00** **Modeled impacts of chronic wasting disease on white-tailed deer populations in a semi-arid environment.** Aaron M. Foley, David G. Hewitt, Charles A. DeYoung, Randy W. DeYoung, and Matthew J. Schnupp
- 2:15** **Evaluation of culling intensity and criteria for antler traits in white-tailed deer.** Masahiro Ohnishi, Randy W. DeYoung, Charles A. DeYoung, Bronson Strickland, Steven Lukefahr, Donnie A. Draeger, and David G. Hewitt
- 2:30** **Does white-tailed deer browsing result in browse lines on three preferred South Texas woody plants?** Lindsey M. Phillips, Timothy E. Fulbright, David G. Hewitt, Charles A. DeYoung, and Don A. Draeger
- 2:45** **Recruitment patterns of white-tailed deer in a variable environment: waiting for rain.** Michaela F. Rice, Kory R. Gann, Randy W. DeYoung, David G. Hewitt, Aaron M. Foley, Alfonso Ortega-S. Jr., and Tyler A. Campbell
- 3:00** **Break – 30 Minutes**

SESSION 1B: NORTHERN BOBWHITE ECOLOGY AND MANAGEMENT
TEXAS BALLROOM B
MODERATOR: JEFF BREEDEN

- 1:30** **Evaluation of land restoration practices on northern bobwhite survival and productivity in north-central Texas.** Danielle Belleny, Heather Mathewson, Jeff Breeden, John Tomeček, T. Wayne Schwertner, and Jim Giocomo
- 1:45** **An evaluation of factors influencing detectability of northern bobwhites during distance-sampling based helicopter surveys.** Andrea Bruno, John T. Edwards, Fidel Hernández, Leonard A. Brennan, Fred C. Bryant, Tyler A. Campbell, and Michael L. Morrison
- 2:00** **Evaluation of a solar powered micro-GPS transmitter for northern bobwhite.** Byron R. Buckley, Rowdy A. White, and Brad Dabbert
- 2:15** **Home range and density of northern bobwhite on irrigated rangeland in South Texas.** Ross O. Couvillon, Leonard A. Brennan, Fidel Hernández, Bart M. Ballard, and Thomas V. Dailey
- 2:30** **Density surface modeling as a method to estimate spatial distribution of northern bobwhite.** John T. Edwards, Fidel Hernández, David B. Wester, Leonard A. Brennan, Fred C. Bryant, and Chad J. Parent
- 2:45** **Influence of tanglehead on spatial distribution of northern bobwhite.** John T. Edwards, Fidel Hernández, Jose Mata, Humberto L. Perotto-Baldivieso, David B. Wester, Leonard A. Brennan, Fred C. Bryant, and Chad J. Parent

3:00 Break – 30 Minutes

SESSION 1C: NATURAL RESOURCE EDUCATION, HUMAN DIMENSIONS, AND NEW OPPORTUNITIES

TEXAS BALLROOM C

MODERATOR: JUSTIN WEID

- 1:30 Full STEAM ahead: using art to assess students' knowledge of trophic levels at the 4th & 5th grade level.** April A. Conkey and Marybeth E. Green
- 1:45 Broadening perspectives of diversity and inclusion in natural resource professions: a demographic snapshot of the Texas Chapter of The Wildlife Society in 2016.** Stephanie D. George, Penny D. Wilkerson, and Michelle Wood-Ramirez
- 2:00 Motivations of professionals and students to pursue a career in natural resources in Texas.** Maria F. Mejia, and Kerry Griffis-Kyle
- 2:15 “This could change everything!” – A new opportunity to obtain alternative funding for wildlife conservation.** Mary Pearl Meuth, Christopher Farrell, James Hall, Andy James, and Thomas S. Janke
- 2:30 “This could change everything!” – A tipping point for the future of wildlife conservation.** Mary Pearl Meuth, Christopher Farrell, James Hall, Andy James, and Thomas S. Janke
- 2:45 Incorporating research into the undergraduate wildlife curriculum.** Janel L. Ortiz, April A. Conkey, Leonard A. Brennan, La Vonne Fedynich, and Marybeth Green
- 3:00 Break – 30 Minutes**

SESSION 1D: CANDIDATE SPECIES IN TEXAS: WHAT’S ON THE HORIZON AND THE ROLE OF PRIVATE LANDS

SAN ANTONIO BALLROOM

MODERATOR: ROEL LOPEZ

- 1:25 Candidate species in Texas: what’s on the horizon and the role of private lands.** Roel Lopez
- 1:30 Species status assessments: a new framework for assessing species viability under the Endangered Species Act.** Mike E. Marshall
- 1:45 Informing species status assessments when data are limited: a case study with Sprague's pipits.** Ashley M. Long, Brian L. Pierce, Kevin Skow, Amanda Dube, and Addie Engeling
- 2:00 Assessing viability of the spot-tailed earless lizard in Texas.** Wade A. Ryberg, Toby J. Hibbitts, Travis J. LaDuc, Brad D. Wolaver, Jon Paul Pierre, Ben J. Labay, Ian Wright, Michael Duran, and Roel Lopez
- 2:15 Freshwater mussel research in central and west Texas: highlights, conservation implications and future directions.** Charles R. Randklev, Michael Hart, Eric T. Tsakiris, Kentaro Inoue, and Roel Lopez
- 2:30 Status of the Louisiana pine snake (*Pituophis ruthveni*) in Texas.** Toby J. Hibbitts, Wade A. Ryberg, Josh Pierce, and Craig Rudolph
- 2:45 Panel Discussion.**
- 3:00 Break – 30 Minutes**

SESSION 1E: AVIAN ECOLOGY AND MANAGEMENT
EXECUTIVE SALON 4

MODERATOR: JEREMY BAUMGARDT

- 1:30** **Are whooping cranes destined for extinction? Climate change imperils their recruitment and population growth.** Matthew J. Butler, Kristine L. Metzger, and Grant M. Harris
- 1:45** **Influence of vegetative characteristics on predation and predator assemblage of bird nests.** Helen T. Davis, Michael L. Morrison, and Tyler A. Campbell
- 2:00** **Improving avian species distribution models by incorporating biotic interactions.** Rachel R. Fern, Michael L. Morrison, Jeremy Baumgardt, and Tyler A. Campbell
- 2:15** **Brood survival of lesser prairie chickens in the Sand Shinnery Oak Ecoregion of Texas and New Mexico.** Daniel U. Greene, Blake A. Grisham, Clint W. Boal, David A. Haukos, and Robert D. Cox
- 2:30** **Citizen science data indicates managed housing is a critical component to long-term population persistence of the eastern purple martin (*Progne subis subis*).** Blake A. Grisham, Daniel Raleigh, James D. Ray, Joe Siegrist, and Daniel U. Greene
- 2:45** **Three decades of golden-cheeked warbler habitat change: effects of development, drought, and conservation.** Nancy A. Heger and Tom Hayes
- 3:00** **Break – 30 Minutes**

SESSION 2A: DEER ECOLOGY AND MANAGEMENT
TEXAS BALLROOM A

MODERATOR: TIM FULBRIGHT

- 3:30** **Site fidelity and survival of captive-reared white-tailed deer following liberation.** Daniel J. Tidwell, Louis A. Harveson, Ryan S. Luna, and Ryan O'Shaughnessy
- 3:45** **Autumn and winter body mass dynamics of female white-tailed deer and reproduction at Kerr WMA.** William T. Wunderlich, Floyd W. Weckerly, and Ryan L. Reitz
- 4:00** **Survival and movements of translocated mule deer in southeastern Brewster County, Texas.** John Clayton K. Campbell, Louis A. Harveson, Ryan S. Luna, Ryan O'Shaughnessy, Shawn S. Gray, and Thomas S. Janke
- 4:15** **Antler characteristics and age structure of mule deer in Texas.** Carolina Medina-Nava, Thomas S. Janke, and Shawn S. Gray
- 4:30** **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 S. Gray
- 4:45** **Break – 45 Minutes, Just Prior to Awards Ceremony in Texas Ballroom at 5:30**

SESSION 2B: NORTHERN BOBWHITE ECOLOGY AND MANAGEMENT
TEXAS BALLROOM B

MODERATOR: ANDREA BRUNO

- 3:30** **Acute toxicity of gossypol on northern bobwhites.** Amy L. Okichich, T. Wayne Schwertner, Kimberly Guay, and Heather A. Mathewson

- 3:45 Gossypol toxicity and reproduction of northern bobwhite.** Jordan M. Fisher, Amy L. Okichich, Heather A. Mathewson, Thomas W. Schwertner, and Kimberly Guay
- 4:00 Brood range variation of northern bobwhite females in the Gulf Prairies and Marshes of Texas.** William M. Keenan, Nova J. Silvy, Roel R. Lopez, and James R. Connor
- 4:15 Woody cover metrics associated with northern bobwhite abundance and productivity in the Rolling Plains.** Bradley W. Kubečka, Dale Rollins, Fidel Hernández, Humberto Perotto-Baldivieso, David B. Wester, and Lloyd M. LaCoste
- 4:30 Habitat factors influencing northern bobwhite abundance in Texas.** Brian L. Pierce, Israel D. Parker, Kevin Skow, Addie Smith, Amanda Anderson, Ross Anderson, Roel R. Lopez, and Nova J. Silvy
- 4:45 Break – 45 Minutes, Just Prior to Awards Ceremony in Texas Ballroom at 5:30**

SESSION 2C: FELID ECOLOGY AND MANAGEMENT

TEXAS BALLROOM C

MODERATOR: DANIEL TAYLOR

- 3:30 Abundance, activity patterns, and interactions among ocelots, cattle, nilgai, feral hogs, and javelinas.** Shelby B. Carter, Michael E. Tewes, Jason V. Lombardi, Justin P. Wied, John P. Leonard, Alfonso Ortega-Sanchez, Jr., and Tyler A. Campbell
- 3:45 Macro- and micro-habitat effects on occupancy of ocelots.** Jason V. Lombardi, Michael E. Tewes, Humberto L. Perotto, Justin P. Wied, John P. Leonard, Daniel Kunz, Jose Mata, and Tyler A. Campbell
- 4:00 Microhabitat analysis of sympatric ocelot and bobcat in South Texas using cameras.** Justin P. Wied, Michael E. Tewes, Jason V. Lombardi, John P. Leonard, Arturo Caso, Alfonso Ortega-Sanchez, Jr., and Tyler A. Campbell
- 4:15 Evaluation of non-invasive fecal sampling for monitoring bobcats and ocelots in South Texas.** Daniel R. Taylor, Randy W. DeYoung, Michael E. Tewes, Terry L. Blankenship, Alfonso Ortega-Sanchez, Jr., and Tyler A. Campbell
- 4:30 Open**
- 4:45 Break – 45 Minutes, Just Prior to Awards Ceremony in Texas Ballroom at 5:30**

SESSION 2D: HABITAT AND VEGETATION MANAGEMENT

SAN ANTONIO BALLROOM

MODERATOR: RACHEL FERN

- 3:30 Invasive grass species distributions at well pad sites in South Texas.** Forrest H. Cobb, Forrest S. Smith, Brian L. Pierce, and Susan Stuver
- 3:45 Using LANSAT to assess vegetation response to grazing.** Elliott A. Foxley, Rachel R. Fern, Carl Green, Andrea Bruno, and Michael L. Morrison
- 4:00 Overcoming herbivory pressure: two year results of oak and hickory seedling establishment in the Western Gulf Coastal Plain.** Ryan J. Jacques, Christopher E. Comer, Jeremy P. Stovall, Hans M. Williams, and Matthew E. Symmank
- 4:15 Factors influencing the spatial and temporal distribution of tanglehead on South Texas rangelands.** Jose M. Mata, Humberto Perotto, Fidel Hernández, Eric D.

- Grahmann, Sandra Rideout-Hanzak, John T. Edwards, Jaclyn Robles, and Michael T. Page
- 4:30 Effects of fire on soft-mast production in restored pine woodlands.** Tamara B. Wood, Christopher E. Comer, Roger W. Perry, Brian P. Oswald, Rebecca Kidd, and Phillip N. Jordan
- 4:45 Break – 45 Minutes, Just Prior to Awards Ceremony in Texas Ballroom at 5:30**

SESSION 2E: AVIAN ECOLOGY AND MANAGEMENT
EXECUTIVE SALON 4
MODERATOR: APRIL CONKEY

- 3:30 Avian community response to prairie restoration efforts on the Welder Wildlife Foundation.** Olivia A. Kost, Clint W. Boal, Terry L. Blankenship, and Robert D. Cox
- 3:45 Winter ecology of a declining grassland bird, the Sprague's pipit (*Anthus spragueii*).** Richard Kostecke, Joseph Veech, Jacqueline Ferrato, John Muller, and Charlotte Reemts
- 4:00 Response of grassland birds to varying agricultural types at different spatial scales in 20 Texas counties from 2013 to 2016.** Anna Matthews, M. Clay Green, and James J. Giocomo
- 4:15 Dispersal patterns of juvenile golden eagles during their first two years.** Natasia R. Mitchell, Ben Skipper, and Clint W. Boal
- 4:30 Breeding bird abundance and landscape productivity on South Texas rangelands.** Janel L. Ortiz, April A. Conkey, Leonard A. Brennan, Humberto L. Perotto-Baldivieso, David B. Wester, and Tyler A. Campbell
- 4:45 Break – 45 Minutes, Just Prior to Awards Ceremony in Texas Ballroom at 5:30**

Saturday, 18 February 2017

SESSION 3A: ECOLOGY OF MAMMALS
TEXAS BALLROOM A
MODERATOR: RAMON SAENZ

- 8:00 Optimization of sodium nitrite as an oral toxicant for feral swine.** John C. Kinsey, Nathan P. Snow, Kurt C. VerCauteren, Justin A. Foster, Linton Staples, and Simon Humphrys
- 8:15 Modeling translocation strategies for pronghorn populations in the Trans-Pecos, Texas.** Philip J. Boyd, Patricia Moody-Harveson, Louis A. Harveson, Whitney J. Gann, and Shawn S. Gray
- 8:30 A dietary preference study for the Texas state bison herd in Caprock Canyon State Park.** a'Lisa M. McAnally, Heather A. Mathewson, Thomas W. Schwertner, Jeff B. Breeden, and Donald Beard
- 8:45 Roosevelt elk use of a new forage patch in Redwoods National and State Parks.** Aaron S. McGuire and Floyd W. Weckerly
- 9:00 Identification of corridors for the natural recolonization of black bears to east Texas using spatially explicit models.** Caitlin M. Glymph, Christopher E. Comer, Daniel G. Scognamillo, Tanh Nguyen, and Dave Holdermann

9:15 Depredation of simulated wild turkey nests by feral swine. Heather N. Sanders, Nathan P. Snow, David G. Hewitt, Kurt C. VerCauteren, and Humberto L. Perotto-Baldivieso

9:30 Break – 30 Minutes

SESSION 3B: QUAIL ECOLOGY AND MANAGEMENT
TEXAS BALLROOM B
MODERATOR: MARIA MEJIA

8:00 Artificial nest accuracy and factors influencing nest success for northern bobwhite. Christine L. Palmer, Bradley W. Kubecka, Dale Rollins, and Becky Ruzicka

8:15 Evaluating maximum home range of Montezuma quail. Karlee D. Cork, Elizabeth Oaster, and Ryan Luna

8:30 Results of Sendero[®] treatment on western honey mesquite for scaled quail habitat restoration. James D. Eddy, Ryan S. Luna, Bonnie J. Warnock, and Charles R. Hart

8:45 Influence of artificial resources on scaled quail survival and nest success. Ernesto García-Ortega, Ryan S. Luna, Louis A. Harveson, and Fidel Hernández

9:00 Quantifying habitat-suitability bounds for Montezuma quail in the Edwards Plateau. Zachary Pearson, Eric D. Grahmann, Fidel Hernandez, Robert Perez, Leonard A. Brennan, Humberto L. Perotto-Baldivieso, and David B. Wester

9:15 Summer loafing habitat selection of Montezuma quail in the Capitan Mountains, New Mexico. Kaitlyn M. Williams, Elizabeth A. Oaster, and Ryan S. Luna

9:30 Break – 30 Minutes

SESSION 3C: REPTILE AND AMPHIBIAN ECOLOGY
TEXAS BALLROOM C
MODERATOR: CONNOR ADAMS

8:00 Assessing habitat preferences and population trends of herpetofaunal communities in the Rolling Plains of Texas. James S. Cash, Matthew Poole, Donald C. Ruthven, and Lee A. Fitzgerald

8:15 Microhabitat characteristics and thermal biology of Texas tortoises from an inland population. Ross O. Couvillon, Leonard A. Brennan, Bart M. Ballard, Fidel Hernández, and Thomas V. Dailey

8:30 Analysis of dispersal, survival, and fine-scale habitat selection of reintroduced Texas horned lizards. Alyssa A. Fink and Joseph A. Veech

8:45 The effects of moon phase on diurnal activity of snakes. Timothy E. Johnson, Connor S. Adams, Dalton B. Neuharth, Shelby L. Frizzell, Wade A. Ryberg, Toby J. Hibbitts, Josh B. Pierce, and D.C. Rudolph

9:00 Exploring variation in survival of yellow mud turtles in Texas. Trevor J. McVay, Richard T. Kazmaier, and Donald C. Ruthven, III

9:15 Evaluation of the feasibility of translocating wild Texas horned lizards to formerly occupied habitat in the Texas Cross Timbers. Kelly J. Mitchell, Devin Erxleben, Nathan Rains, and Jesse M. Meik

9:30 Break – 30 Minutes

SESSION 3D: DOVE ECOLOGY AND MANAGEMENT
SAN ANTONIO BALLROOM
MODERATOR: JANEL ORTIZ

- 8:00** **Factors influencing survival of white-winged doves in Texas.** Jared D. Hall, Heather A. Mathewson, Thomas W. Schwertner, Shaun L. Oldenburger, and Mike Frisbie
- 8:15** **Fine scale population trends of white-winged dove 2008-2016.** Conor J. McInnerney, Heather A. Mathewson, T. Wayne Schwertner, Shaun L. Oldenburger, and Mike Frisbie
- 8:30** **Factors influencing nest survival of mourning doves in the Lower Rio Grande Valley, Texas.** Kelton W. Mote, Jordan C. Giese, Heather A. Mathewson, Thomas W. Schwertner, and Jeff B. Breeden
- 8:45** **Abundance of mourning doves in the United States using distance sampling.** Shaun L. Oldenburger, Mike Frisbie, John Brunjes, Bill Harvey, Johnathan O'Dell, Richard Schultheis, Michael Small, Nathan Stricker, John Schulz, and Russell Woolstenhulme
- 9:00** **A comparison of lead and steel shot loads for harvesting mourning doves.** Brian L. Pierce, Thomas A. Roster, Michael C. Frisbie, Corey D. Mason, and Jay A. Roberson
- 9:15** **Annual survival of mourning doves from banding data.** Joseph M. Wilson, Heather A. Mathewson, Shaun L. Oldenburger, Thomas W. Schwertner, and Mike Frisbie
- 9:30** **Break – 30 Minutes**

SESSION 3E: AVIAN ECOLOGY
EXECUTIVE SALON 4
MODERATOR: HELEN DAVIS

- 8:00** **Spatial relationships between fledge success and habitat of American oystercatchers on Fisherman Island National Wildlife Refuge, Virginia, USA.** Amanda D. Hackney and Pamela Denmon
- 8:15** **Breeding bird response to post oak savanna restoration in eastern Texas.** Courtney K. Williams, Roger J. Masse, Christopher E. Comer, and Jeff Gunnels
- 8:30** **Winter survival of American kestrels in South Texas.** Carter G. Crouch, Leonard A. Brennan, Robert H. Benson, Eric D. Grahmann, Fidel Hernández, and Jeffrey F. Kelly
- 8:45** **Habitat characteristics of areas used by brooding eastern wild turkey hens in eastern Texas.** Bryce J. Gerlach, Christopher E. Comer, Kyle T. Hand, and Jason B. Hardin
- 9:00** **Rio Grande wild turkey movements relative to riparian corridors.** Jacob White, Doug Jobs, and Bret Collier
- 9:15** **Lead concentrations and source discrimination in American woodcock.** Amanda D. French, Warren C. Conway, and David M. Klein
- 9:30** **Break – 30 Minutes**

SESSION 4A: ECOLOGY OF MAMMALS
TEXAS BALLROOM A
MODERATOR: VICTORIA HAYNES

- 10:00 Soil and vegetative association of heteromyid rodents in central and South Texas.** Michelle E. Adcock, Thomas R. Simpson, Joseph A. Veech, M. Clay Green, and Richard W. Manning
- 10:15 Development of a long-term monitoring program for small mammals on the East Foundation.** Jeremy A. Baumgardt, Michael L. Morrison, Leonard A. Brennan, and Tyler A. Campbell
- 10:30 Comparison of fine scale vegetative parameters at active and inactive Gulf Coast kangaroo rat burrow sites.** Meagan M. Bell, Thomas R. Simpson, Joseph Veech, and Todd Swannack
- 10:45 Meso-mammal cave use in the central Texas.** Andrea E. Montalvo and Roel R. Lopez
- 11:00 Using soil associations to model potential habitat of the Texas kangaroo rat.** Silas L. Ott, Ivan Castro-Arellano, M. Clay Green, Thomas R. Simpson, and Joseph A. Veech
- 11:15 Grassland conservation through plague management for prairie dogs.** David R. Pipkin, Michael J. Bodenchuk, Terry B. Johnson, William E. Van Pelt, and David L. Bergman

SESSION 4B: GENERAL SESSION
TEXAS BALLROOM B
MODERATOR: ASHLEY LONG

- 10:00 Molecular analysis of the diet of the American parastrelle.** Krysta D. Demere and Loren K. Ammerman
- 10:15 Changes in rural private land ownership in the southeastern United States.** Lauren A. Engeling, Roel R. Lopez, James C. Cathey, Charles E. Gilliland, and Ashley M. Long
- 10:30 Baseline data on wintering bats and roosts in Texas.** Melissa B. Meierhofer, Michael L. Morrison, Brian L. Pierce, Joe M. Szewczak, and Jonah Evans
- 10:45 Track display and cluster analysis using MATLAB for dama gazelle GPS collar data.** Christian Mungall, Elizabeth Cary Mungall, and Susan M. Cooper
- 11:00 Modeling wildlife data – what you’re missing.** Donnie Draeger and Shawn Vickers
- 11:15 Open**

SESSION 4C: REPTILE AND AMPHIBIAN ECOLOGY
TEXAS BALLROOM C
MODERATOR: CONNOR ADAMS

- 10:00 A novel method of snake detection using time-lapse triggered camera traps.** Dalton B. Neuharth, Connor S. Adams, Wade A. Ryberg, Toby J. Hibbitts, Josh B. Pierce, and Craig Rudolph
- 10:15 Returning the Louisiana pine snake to restored habitat.** Josh B. Pierce, Craig Rudolph, Steve Reichling, and Emlyn Smith
- 10:30 A herpetofaunal survey of two sites in the Texas Cross Timbers Ecoregion with an evaluation of survey method effectiveness.** Thomas E. Barnes

10:45 Open
11:00 Open
11:15 Open

SESSION 4D: AVIAN ECOLOGY
EXECUTIVE SALON 4
MODERATOR: BLAKE GRISHAM

- 10:00 Using home ranges and site fidelity to identify areas of importance for overwintering sandhill crane on the Southern High Plains.** Kathryn J. Brautigam, Blake A. Grisham, William Johnson, Nicole Athearn, Daniel P. Collins, Shaun Oldenburger, Jude Smith, and Warren Conway
- 10:15 Viability and persistence of North America's rarest heron: a population viability analysis of reddish egret (*Egretta rufescens*) in Texas.** Sarah E. Durham and M. Clay Green
- 10:30 Determining precise migratory stopover and overwintering sites for a Texas population of purple martin by using new G.P.S. dataloggers.** James D. Ray, Amanda Shave, and Kevin C. Fraser
- 10:45 Waterfowl use and comparison of unmanned aerial vehicle surveys and visual ground surveys of waterfowl on stock ponds in the Oaks and Prairies Region of Texas.** James R. Morel, Samantha S. Kahl, Blake A. Grisham, Kevin J. Kraai, Daniel P. Collins, and Warren C. Conway
- 11:00 Habitat associations of black rails with occupancy.** James D. M. Tolliver, Floyd W. Weckerly, M. Clay Green, and Amanda A. Moore
- 11:15 Open**

POSTER SESSION
THURSDAY, 16 FEBRUARY 2017: 4:00–6:00 PM
FIESTA PAVILION
CONTACT: HEATHER MATHEWSON

- *Quantifying urban sprawl and habitat loss for northern bobwhite in Texas.** Heather J. Hannusch, Humberto L. Perotto-Baldivieso, Katherine Miller, and Leonard Brennan
- *Conservation of Mexican longnosed bats along the migration route and surrounding maternity caves.** Brittany F. Stamps
- *Estimating wildlife species richness, diversity, and habitat connectivity using non-invasive sampling technologies.** Harun Khan and Melissa Karlin
- *Migratory connectivity of American kestrels in Texas.** Austin K. Killam, Carter G. Crouch, Leonard A. Brennan, Robert H. Benson, and Jared Clarke
- *Changes in species biodiversity due to Open House Events at Robber Baron Cave.** Genne Liu and Evelyn Mitchell
- *A top predator returns: effects of the eastern indigo snake on herpetological communities in southern Alabama.** Hannah C. Gerke, David Steen, Hsiao-Hsuan (Rose) Wang, and William E. Grant

7. ***Long-term vegetation monitoring of mixed-grass rangelands in South Texas.** Luis R. Bartolo, Joshua L. Grace, J. Alfonso Ortega-S., David B. Wester, and Aaron Tjelmeland
8. ***Evaluating the effect of pharmaceuticals and polychlorinated biphenyl contamination upon fountain darter population.** Andrew W. Richardson, Hsiao-Hsuan Wang, and William Grant
9. ***Prevalence of infectious and noninfectious diseases in Rio Grande wild turkeys located in southern Texas.** Julia K. Burchsted, Clayton D. Hilton, Brandon S. Mitchell, William P. Kuvlesky, Jr., Alfonso Ortega-Santos, Leonard A. Brennan, and Humberto Perotto
10. ***GPS collar performance on ocelot and bobcat in South Texas.** Taylor R. Shirley, Michael E. Tewes, Jason V. Lombardi, John P. Leonard, Alfonso Ortega-Sanchez, Jr., Justin P. Wied, and Tyler A. Campbell
11. ***The isolation and propagation of reticuloendotheliosis virus from Attwater's prairie chickens.** Brittany Stewart and Dustin Edwards
12. ***Serological survey of reticuloendotheliosis virus from wild turkeys.** Heidi Spann, Brittany Stewart, Camille Trautman, Jason Hardin, Thomas Schwertner, and Dustin Edwards
13. ***Sites of integration of reticuloendotheliosis virus.** Camille Trautman, Brittany Stewart, Heidi Spann, and Dustin Edwards
14. ***Population trends and reproductive success of mottled ducks on the upper Texas coast.** Trey McClinton, Heather A. Mathewson, and Stephen K. McDowell
15. ***Simulated effects of indo-pacific lionfish (*Pterois volitans* and *P. miles*) invasions on parrotfish (scaridae family) populations on coral reefs in the Caribbean.** Maria P. Camposeco, Jasmin Diaz, Marissa Ortega, Hsiao-Hsuan (Rose) Wang, and William Grant
16. ***Diet composition of bobcats amid guarded livestock and the dogs who love them in the Edwards Plateau of central Texas.** Jessica L. Sannwaldt, Nick A. Broman, John Tomeček, and Nova Silvy
17. ***Validation of environmental flow standards.** Anne M. Beckmann, Cody A. Craig, David S. Ruppel, and Timothy H. Bonner
18. ***Status of horned lizards in the United States.** Taylor M. Shedd, Scott E. Henke, and Humberto L. Perotto-Baldivieso
19. ***Efficacy of mint-scented spray to repel rodents.** Travis Dillard, Zachary Naegelin, and Scott E. Henke
20. ***Efficacy of sound-emitting devices to repel nuisance wildlife species.** Zachary Naegelin, Travis Dillard, and Scott E. Henke
21. ***Effect of density, gender, and age on captive hatchling alligator growth and survival.** David M. Campbell, Scott E. Henke, and Cord B. Eversole
22. ***Effects of rainfall and coyote abundance on spatial distribution of bobcat, ocelot and gray fox.** Matthew O. Hewitt, Michael E. Tewes, Jason V. Lombardi, Justin P. Wied, John P. Leonard, Alfonso Ortega-Sanchez, Jr., and Tyler A. Campbell
23. ***Assessing fine-scale microclimate conditions in an intensively managed landscape.** Manuel Silva, Daniel U. Greene, Sarah R. Fritts, Blake A. Grisham, Clint W. Boal, David A. Haukos, Jonathan Lautenbach, Christian A. Hagen, and Willard R. Heck
24. ***Demographics and timing of mule deer utilizing feeders in the Cienega Mountains, Texas.** Fabiola T. Baeza, Thomas S. Janke, and Louis A. Harveson

25. ***Determining competition of desert bighorn sheep and aoudad at water sources in the Sierra Vieja Mountains, Texas.** Destinee D. Love, Jose L. Etchart, and Ryan O'Shaughnessy
26. ***Comparison of shorebird and waterfowl utilization of the Sandia Wetland Project Site, Texas.** Charles H. Musick, Ryan S. Anthony, and Ryan O'Shaughnessy
27. ***The effects of precipitation and percent sand on forage standing crop in South Texas.** Jose G. Cortez, Jr., Ramon Saenz III, J. Alfonso Ortega-S, Timothy E. Fulbright, David G. Hewitt, Tyler A. Campbell, and Alfonso Ortega-S, Jr.
28. ***Factors affecting waterfowl abundance and distribution in Texas during winter.** Derek C. Ballard and Kevin J. Kraai
29. ***Impact of human disturbance on the relative abundance and diversity of native and exotic avian species.** Alexandra M. Sigg, Oscar F. Mariscal, Janel L. Ortiz, and April A. Conkey
30. ***Tracking its roots: Expansion by Japanese stiltgrass in the forestlands of Tennessee.** Lela Z. Culpepper, William E. Grant, William E. Rogers, and Hsiao-Hsuan Wang
31. ***Evaluating home range estimators in captive-reared white-tailed deer males following liberation.** Cody A. Putman, Daniel J. Tidwell, Thomas S. Janke, and Louis A. Harveson
32. ***Estimating wildlife species richness, diversity, and habitat connectivity using non-invasive sampling technology.** Alexandra Salinas and Melissa Karlin
33. ***Effects of road development on decreasing population of the endangered Florida panther.** Anna Cole, Hsiao-Hsuan Wang, and William Grant
34. ***Evaluating potential effects of Antarctic ice-shelf retreat on blue whale populations: a simulation model of interactions among sea ice, Antarctic krill, and blue whales.** Jennifer M. Borski, Hsiao-Hsuan (Rose) Wang, and William E. Grant
35. ***Marking turtles using nail polish to determine population size.** Mitchell M. Green, Matt Hewitt, Christina Richey, and April A. Conkey
36. ***A comparison of barber pole worm loads between Marfa Plateau and Marathon Basin pronghorn.** Mark J. Black, Whitney J. Gann, Louis A. Harveson, and Shawn S. Gray
37. ***The recovery of rangeland production in the Wild Horse Desert of South Texas: the importance of residual forage.** Dillan Drabek, Andrea Bruno, Alfonso Ortega-S. Jr., and Tyler A. Campbell
38. ***Wildlife frequency and plant cover associations recorded with remote camera traps at Elephant Mountain Wildlife Management Area, Texas.** Alec Ritzell, James Eddy, Thomas S. Janke, and Ryan Luna
39. ***Restoration effects on vegetation at northern bobwhite nests.** Myca R. Reed, Danelle Belleny, and Heather A. Mathewson
40. ***Spring survivorship on monarch butterfly eggs and larvae in North Texas.** Misty Nixon, Kaylynn Hudman, and Emily Casper
41. ***Use of trail cameras to determine big game utilization of supplemental protein feeders in the Santiago Mountains, Texas.** Benjamin Q. Benavidez, John C. Campbell, Thomas S. Janke, and Louis A. Harveson
42. ***Visitation of quail feeders by quail and non-target species.** Catherin C. Longest, Reece C. Wells, Jason Davis, and Joshua M. Brokaw

43. ****Wintering Sandhill crane habitat selection along Texas gulf coast.** Emily D. Wells, Bart M. Ballard, Shaun M. Oldenburger, Daniel P. Collins, David A. Brandt, Aaron T. Pearse, and Humberto L. Perotto-Baldivieso
44. ****Assessing risk of wind turbines to migrating Swainson's hawks.** Katheryn Watson, Clint W. Boal, Laurie Groen, and James D. Ray
45. ****Reproductive success of barn swallows nesting on buildings along the SH 24 corridor in northeast Texas.** Katelyn M. Miller and Jeffrey G. Kopachena
46. ****Northern bobwhite habitat restoration in a landscape dominated by non-native grasses.** Brandon J. Palmer, Eric D. Grahmann, Timothy E. Fulbright, Fidel Hernandez, Michael W. Hehman, David B. Wester, Forrest S. Smith, and Benjamin R. Olsen
47. ****Assessment of precipitation on the northern bobwhite cecal nematode.** Nicole J. Traub, Stephanie A. Shea, Andrew Olsen, Leonard A. Brennan, and Alan M. Fedynich
48. ****Nesting ecology of bell's vireo in northeast Texas.** Natasha R. Lehr and Dean Ransom, Jr.
49. ****Insects, red imported fire ants, and northern bobwhite abundances.** Oscar Perez, Nova J. Silvy, Roel R. Lopez, and Fred E. Smeins
50. ****Change and fragmentation of woody cover in the Lower Rio Grande Valley from 1984-2016.** Jason V. Lombardi, Michael E. Tewes, Humberto L. Perotto, and Tyler A. Campbell
51. ****Influences on black rail detection and implications for survey techniques.** James D. M. Tolliver, Floyd W. Weckerly, M. Clay Green, and Amanda A. Moore
52. ****Environmental factors affecting mesopredator occurrence in an urban landscape.** Christopher R. Carter, Warren C. Conway, Mark C. Wallace, and Robert D. Bradley
53. ****Development of a habitat suitability model for Montezuma quail in the Edwards Plateau.** Zachary Pearson, Eric D. Grahmann, Fidel Hernandez, Humberto L. Perotto-Baldivieso, Robert Perez, Leonard A. Brennan, and David B. Wester
54. ****Effects of summer and winter patch burning in coastal cordgrass communities on ungulate distribution.** Victoria Haynes, Sandra Rideout-Hanzak, J. Alfonso Ortega-S., David B. Wester, Timothy E. Fulbright, Humberto Perotto-Baldivieso, Tyler A. Campbell, and Alfonso Ortega-S, Jr.
55. ****Grazing utilization integrated with various abiotic variables impact on forb production in South Texas.** Ramon Saenz III, J. Alfonso Ortega-S., Timothy E. Fulbright, David G. Hewitt, Tyler A. Campbell, and Alfonso Ortega-S. Jr.
56. ****Experiments in DNA amplification from carnivore feces.** Daniel R. Taylor, Randy W. DeYoung, Michael E. Tewes, Terry L. Blankenship, Alfonso Ortega-Sanchez Jr., and Tyler A. Campbell
57. ****Waterfowl identification success by waterfowl hunters on the upper Texas coast.** Michael D. Whitson, Thomas V. Riecke, Warren C. Conway, David A. Haukos, Jena A. Moon, and Patrick Walther
58. ****Stage-structured matrix analyses evaluating the post-2010 population trend of Kemp's ridley sea turtles in the Gulf of Mexico: four processes of investigation.** Amanda R. Kocmoud, William E. Grant, Hsiao-Hsuan (Rose) Wang, and Benny J. Gallaway
59. ****Movement, resource use, and reproductive success of elk in response to competition, predation risk, and landscape restoration.** Sharon E. Smythe, James W. Cain, III, Warren C. Conway, Mark A. Peyton, and Robert R. Parmenter

60. ****Effects of agriculture on mule deer movement in the Texas Panhandle.** Laura S. Warner, Jacob R. Lampman, David G. Hewitt, Shawn S. Gray, Dana J. Wright, Warren C. Conway, Tim E. Fulbright, Randy W. DeYoung, and Louis A. Harveson
61. ****Habitat associations of flycatchers migrating along the lower Texas coast.** Samantha J. Wolfe, Arlene J. Arnold, Matthew J. Schnupp, and Bart M. Ballard
62. ****Effects of thermal environment on food consumption and rumen temperature of white-tailed deer bucks during summer.** Nicole A. Alonso, David G. Hewitt, Randy W. DeYoung, and Clayton D. Hilton
63. ****INTENTIONALLY LEFT BLANK****
64. ****Population dynamics modeling: translocation alternatives for desert bighorn restoration.** Carlos E. Gonzalez, and Louis A. Harveson
65. ****Analysis of activity patterns of sympatric ocelot and bobcat in South Texas using cameras.** Justin P. Wied, Michael E. Tewes, Jason V. Lombardi, John P. Leonard, Arturo Caso, Alfonso Ortega-Sanchez, Jr., and Tyler A. Campbell
66. ****Environmental and capture stress: white-tailed deer in a stochastic environment.** Michaela F. Rice, Randy W. DeYoung, David G. Hewitt, Michael J. Sheriff, Aaron M. Foley, Alfonso Ortega-S. Jr., and Tyler A. Campbell
67. ****INTENTIONALLY LEFT BLANK****
68. ****Do social classes of white-tailed deer influence use of supplemental feeders?** Onalise R. Hill, Justin P. Young, Timothy E. Fulbright, David G. Hewitt, Charles A. DeYoung, and Don A. Draeger
69. ****Habitat characteristics associated with wild turkey use of constructed roosts in South Texas.** Brandon S. Mitchell, William P. Kuvlesky, Jr., J. Alfonso Ortega-S., and Leonard A. Brennan
70. ****Simulated effects of juvenile survival on adult population dynamics of the Houston toad.** Rebecca E. Aden, Hsiao-Hsuan Wang, Ivana Mali, William E. Grant, and Michael R. Forster
71. ****Are ocelots using wildlife road crossing structures in south Texas?** Tiffany C. Cogan, John Young, Jr., and Richard J. Kline
72. ****Preliminary risk assessment of turkey vultures exposed to sodium nitrite through consumption of feral swine carcasses.** Jorge Bustamante, Louis A. Harveson, Ryan S. Luna, Justin A. Foster, and John C. Kinsey
73. ****Response of native Texas milkweeds to soil nutrients, light, and drought.** Ursula Alvarado-Miller, Janis K. Bush, Terri J. Matiella, and Oscar Van Auken
74. ****Assessing the effectiveness of wildlife crossings to reduce wildlife vehicle mortalities.** Trinity D. Livingston, John Young, Jr., and Richard J. Kline
75. ****Pronghorn fawn survival and recruitment in a localized pronghorn population in southeast New Mexico.** Courtney L. Threadgill, Warren C. Conway, Robert D. Cox, Robert D. Bradley, and James W. Cain III
76. ****Biomass estimation before and after of prescribed fires using unmanned aerial system (UAS) technology.** Karelys N. Labrador-Rodriguez, Humberto L. Perotto-Baldivieso, and Alfonso Ortega-Santos, and Jinha Jung
77. **Responses of scaled and Gambel's quails to past and future climate change.** Damon L. Williford, Randy W. DeYoung, and Leonard A. Brennan

78. **Impacts of Quaternary climate change on the phylogeography and demography of the wild turkey.** Damon L. Williford, Randy W. DeYoung, Leonard A. Brennan, and William P. Kuvlesky, Jr.
79. **Sixteen years of golden-cheeked warbler (*Setophaga chrysoparia*) monitoring at Barton Creek Habitat Preserve, Travis Co.** Jacqueline Ferrato
80. **Association levels of dama gazelles in different social combinations.** Elizabeth Cary Mungall and Susan M. Cooper
81. **Addressing cross-boundary conservation challenges through partnerships: the Oaks and Prairies Joint Venture.** James Giocomo, Jonathan Hayes, Kenneth Gee, Jeff Raasch, Robert Perez, Anna Matthews, M. Clay Greene, Danielle Belleny, Heather Mathewson, Nicolas Jaffe, and Timothy O'Connell
82. **Movement and apparent survival of color-banded reddish egrets.** Rebekah J. Rylander, Michael C. Green, Adam Duarte, and Eduardo Palacios
83. **Sandhill crane abundance and energy requirements at Muleshoe NWR.** William P. Johnson, Alex Daniels, Jude R. Smith, Melanie Hartman, Daniel P. Collins, Kathryn Brautigam, Blake A. Grisham, Shaun L. Oldenburger, Nicole D. Athearn, and Warren C. Conway
84. **Comparative analysis of photo identification for mark-recapture data in the spot tailed earless lizard (*Holbrookia lacerate*).** Shelby L. Frizzell, Dalton Neuharth, Connor Adams, Timothy Johnson, Wade A. Ryberg, and Toby J. Hibbitts
85. **Resolving questionable museum records of the Louisiana pinesnake.** Connor S. Adams, Wade A. Ryberg, Toby J. Hibbitts, Josh B. Pierce, and Craig Rudolph
86. **Skinks of the South Texas Sand Sheet: do we have a new species?** Connor S. Adams, Toby J. Hibbitts, Timothy B. Garrett, Johanna Harvey, Heather L. Prestridge, and Gary A. Voelker
87. ****INTENTIONALLY LEFT BLANK****
88. **Foraging habitat partitioning by three kingfisher species (family Cerylidae) along the South Llano River, Texas.** Griffin D. Chodacki and Ben R. Skipper
89. **Recovery time of juniper-oak woodlands following prescribed fires.** James M. Mueller, Steven E. Sesnie, and Carl Schwoppe
90. **Impacts of disturbance from Eagle Ford Shale exploration on avian abundance and nesting.** Kelsey R. Davis, William C. Lutz, Eric D. Grahmann, Fidel Hernández, Timothy E. Fulbright, Chase R. Currie, David B. Wester, and Fred C. Bryant
91. **Anuran use of the coastal prairie in Texas.** Cory K. Adams, Daniel Saenz, Toby J. Hibbitts, James D. Childress, and Rebecca E. Chester
92. **Influence of prairie dog colonies on vegetation and cattle movement in the Marathon Basin.** Cullom S. Simpson, Whitney J. Gann, Louis A. Harveson, Bonnie J. Warnock, and Ryan O'Shaughnessy
93. **Groundwater use and drought influence stream discharge in the Roswell Basin, New Mexico: implication for endangered aquatic invertebrates.** Matthew J. Butler and Paul Tashjian
94. **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
95. **Northern bobwhite survival during raptor migration in the Rolling Plains Ecoregion of Texas.** Drew A. White, Rebekah E. Ruzicka, and Dale Rollins

96. **Synthesis of two long-term studies examining the potential impacts of road construction noise and activity on an endangered songbird in Texas.** Ashley M. Long, J. Cal Newnam, and Michael L. Morrison
97. **Golden-cheeked warbler behavior in relation to vegetation characteristics across their breeding range.** Kathryn N. Smith-Hicks, John C. Newnam, Melanie R. Colon, Ashley M. Long, and Michael L. Morrison

*Undergraduate student poster to be judged.

**Graduate student poster to be judged.

ABSTRACTS

COTTAM ABSTRACTS – IN ORDER PRESENTED (ALPHABETICAL)

IMPACTS OF DISTURBANCE FROM EAGLE FORD SHALE EXPLORATION ON QUAIL SITE USE AND DEMOGRAPHICS

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Abstract: South Texas, which contains some of the few remaining areas of unfragmented habitat for quail, is also home to the intensely developed Eagle Ford Shale (EFS) formation. Although much is known about northern bobwhites (*Colinus virginianus*) and scaled quail (*Callipepla squamata*) in general, relatively little is understood regarding the impacts of disturbance on their site use and demographics. Our objective was to determine how these 2 species respond to noise and traffic from localized oil-and-gas production. Our study took place during 2015–2016 and was located on 2 private ranches in Dimmit County, Texas. The study area encompassed sites along an oil-and-gas exploration corridor (disturbed) and sites where no exploration activities occurred (undisturbed). Sound levels were recorded with a sound level meter and traffic rates were recorded with road tube accumulators. Radio-telemetry was used to collect metrics of quail site use and demographics. Mean maximum sound levels (dBA/sec) were higher ($P = 0.013$) in disturbed sites (70.7 ± 2.9) than in undisturbed sites (61.2 ± 2.4). Mean traffic rates (vehicle passes/wk) were 603.5 ± 134.9 in disturbed sites and 34.2 ± 9.4 in undisturbed sites. Scaled quail

appeared to avoid areas 0–360 m of the exploration corridor, whereas bobwhites appeared to select for areas within 0–120 m of the corridor. In addition to direct habitat loss as a result of development, anthropogenic noise from the EFS has the potential to cause indirect habitat loss by influencing scaled quail site use.

DESERT BIGHORN SHEEP HABITAT: A PROBABILITY OCCURRENCE DISTRIBUTION MODEL AT A LANDSCAPE LEVEL

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Froylan Hernández, Texas Parks and Wildlife Department, Alpine, TX 79830, USA

Abstract: By mid-1940s a population of desert bighorn in Texas was estimated to be 35 individuals and by the early 1960s the last native desert bighorn was lost. Reasons that influenced the populations of desert bighorn to decline resulted from a combination of environmental conditions, habitat fragmentation, diseases from domestic animals, and unrestricted hunting. Understanding habitat use and distribution of the species across large scale habitat is vital for restoration efforts. However, knowledge on how habitat components affect desert bighorn spatial distribution is not well understood. From 2010 to 2016 a total of 341 desert bighorn were captured and 172 were allocated with global positioning system collars which acquired 234,947 locations. Principal component analysis was used to reduce strongly correlated data groups and only utilize environmental variables that explained the most variance allowing reduction of data by projecting data into a two-dimensional presentation. To assess habitat occupancy a presence-only maximum likelihood approach was used. The model explained over 95% of variability by using 4 variables (terrain ruggedness index, elevation, percent slope, and canopy cover). Files were loaded into ArcGIS® 10.1 for better visualization and then imported into ArcScene for creation of 3D models. This study is one of the largest and most exhaustive studies for desert bighorn utilizing GPS collar technology for the construction of habitat models. In Texas, it represents the only habitat assessment done at a landscape level assessing the whole Trans-Pecos region and the first to use probability occurrence distribution for desert bighorn.

EVALUATION OF THE CONSERVATION RESERVE PROGRAM AS A CONSERVATION PRACTICE FOR LESSER PRAIRIE-CHICKENS IN THE SOUTHERN HIGH PLAINS OF TEXAS

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Clint W. Boal, U.S. Geological Survey, Texas Cooperative Fish and Wildlife Research Unit, Texas Tech University, Lubbock, TX 79409, USA

Samantha S. Kahl, Department of Natural Resources Management, Texas Tech University, Lubbock, TX 79409, USA

Christian A. Hagen, Department of Fisheries and Wildlife, Oregon State University, Bend, OR 97702, USA

Abstract: Lesser prairie-chickens (*Tympanuchus pallidicinctus*, LEPC) historically occurred in mixed-grass prairies in the Southern Great Plains of North America. Conversion of native prairie to agriculture, energy development, unmanaged grazing, and recurrent drought substantively reduced the LEPC's geographic range, and the species has become a significant conservation priority. The Conservation Reserve Program (CRP) was initiated under the Federal Food Security Act of 1985, and 14 million ha of marginal croplands were seeded with grasses and other permanent vegetation as a result. The mass conversion of croplands to grasslands benefited many wildlife species, including LEPCs in the Northern portions of their range. However, the efficacy of CRP as a LEPC conservation practice within the Sand Shinnery Oak Prairie (SSOP) in Texas is still largely unknown. We examined home range size, breeding and non-breeding season survival, and nest success of LEPCs (N = 9 males and 5 females) captured and marked in CRP fields in Bailey and Cochran Counties in 2015 and 2016. Our space use, survival, and nest success estimates fell within the range of estimates from other studies in the SSOP and other LEPC ecoregions. Single or grouped CRP fields >400 ha in area with native grasses and forbs constituted LEPC habitat in our study area. However, LEPC populations in CRP were part of a larger population of LEPCs on the Southern High Plains of Texas. Maintaining large fields in grasses upon contract expiration and including forbs in newly seeded fields will benefit LEPCs in the distant future.

HABITAT SELECTION OF WINTERING WATERFOWL COMMUNITIES ON THE UPPER TEXAS COAST

Tiffany C. Lane, Department of Natural Resources Management, Texas Tech University, Lubbock, TX 79409, USA

Blake A. Grisham, Department of Natural Resources Management, Texas Tech University, Lubbock, TX 79409, USA

Jena A. Moon, U.S. Fish and Wildlife Service- Region 2 Inventory and Monitoring Program, Winnie, TX 77665, USA

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David A. Haukos, U.S. Geological Survey -Kansas Cooperative Fish and Wildlife Research Unit, Manhattan, KS 66502, USA

Warren C. Conway, Department of Natural Resources Management, Texas Tech University, Lubbock, TX 79409, USA

Abstract: Waterfowl management focuses on conserving habitat across their range. To understand habitat selection, studies typically describe resource selection by single species. Management efforts that target single waterfowl species can affect multiple species, especially when waterfowl communities aggregate around shared resources. Our goal was to assess habitat selection by waterfowl communities that overwinter on Anahuac National Wildlife Refuge to develop effective conservation plans targeting multiple species of dabbling ducks. We observed mixed-flocks of 6 *Anas* species defined as a guild of migratory, shallow-water dabblers overwintering on the upper Texas Coast. We conducted aerial surveys on Anahuac NWR to track monthly waterfowl habitat use from October–February, 2014–2016. We visited sites with >500 birds in an aggregated flock (used) and randomly selected locations (available) and recorded water salinity, temperature, depth, submerged aquatic vegetation (SAV), and invertebrate biomass. We developed a resource selection function using used/available data in a generalized linear model to assess community habitat selection at multiple spatial and temporal scales. Habitat selection at the intermediate scale was best predicted by salinity, depth, and food resources whereas fine-scale habitat selection was best predicted by SAV. We extrapolated our data to the entire NWR using habitat metrics best supported by our model set to produce predictive habitat use maps for large flocks of dabbling ducks on the refuge and predicted use on ~65% of Anahuac NWR. Overlap in resource use among similar species of dabbling ducks occurred during the winter, and therefore, using the guild concept in lieu of single species is likely a more efficient strategy for waterfowl habitat management.

EVALUATION OF VOMIT CHARACTERISTICS IN MICROENCAPSULATED SODIUM NITRITE BAIT FORMULATIONS ON CAPTIVE FERAL PIGS

Grant S. Lawrence, Borderlands Research Institute, Natural Resource Management Department, Sul Ross State University, Alpine, TX 79830, USA

Justin A. Foster, Texas Parks and Wildlife Department, Kerr Wildlife Management Area, Hunt, TX 78024, USA

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Abstract: Feral pigs are one of the most ecologically destructive species in North America and populations are expanding across the U.S. Current harvest methods fall vastly short of the required removal rate (>70%), therefore, the U.S. requires additional feral pig control methods (i.e., toxicants). Due to feral pigs' susceptibility to nitrite poisoning, microencapsulated sodium nitrite (MESN) was selected as the active toxicant agent. Vomiting is a documented side-effect of nitrite poisoning in pigs but the frequency of vomit and concentrations of residual MESN in vomit remain unknown. We compared 5 unique MESN formulations (2 gastric, 3 enteric) on captive feral pigs ($n = 45$) to identify the best performing candidate based on the occurrence of

vomit, time from dosage to initial vomit occurrence, and residual MESN levels in vomit. We recorded a 97.78% mortality rate ($n = 44$) and 80.00% vomit rate ($n = 36$). Vomit was a strong indicator of lethal dosage delivery as all vomiting pigs (100.00%) resulted in a mortality. Gastric formulation 13 recorded significantly fewer vomit attempts compared to formulations 20, 23, 24 ($p \leq 0.05$). Time to first vomit was significantly reduced in formulations 13 ($p = 0.008$) and 20 ($p = 0.044$), but overall there was no correlation between time to first vomit and concentrations of residual SN in vomitus ($p = 0.328$). Ion chromatography tests identified a 90% reduction of available nitrite in vomitus compared to the initial dosage amount, highlighting MESN's efficiency in producing lethality in feral pigs while minimizing environmental risk.

DOES TIME CHANGE EVERYTHING? NORTHERN BOBWHITE RESPONSE TO POST-GRAZING VEGETATION RECOVERY IN SOUTH TEXAS

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Abstract: Northern bobwhite (*Colinus virginianus*) require habitat structure with substantial grass cover for nesting, predator avoidance, and thermal refuge. During the past 2 decades, many land managers have reduced or completely eliminated livestock across South Texas rangelands with the goal of improving bobwhite habitat. Our objective was to investigate how bobwhites respond to the vegetative changes following removal of grazing. Our study was conducted on a private ranch in Jim Hogg County, Texas and involved 3 different areas of post-grazing habitat recovery: a 1,246 ha area rested from grazing for 15 years; a 1,133 ha area rested 3 years from high grazing (7 ha/AU); and a 1,254 ha area rested 3 years from moderate grazing (14 ha/AU). We estimated bobwhite density and breeding season survival and hypothesized these parameters would be highest on the recovered site and lowest on the heavily grazed site. 2015 estimated breeding season survival was $58\% \pm 0.10$ (SE) on the recovered site ($n = 26$) and $44\% \pm 0.11$ on the highly grazed site ($n = 24$). 2016 estimated breeding season survival was $57\% \pm 0.09$ on the recovered site ($n = 26$), $40\% \pm 0.09$ on the moderately grazed site ($n = 27$), and $37\% \pm 0.09$ on the highly grazed site ($n = 24$). Estimated 2015 winter bobwhite density was 2.35 ± 0.29 bird/ha on the recovered site, 1.85 ± 0.29 bird/ha on the moderately grazed, and 0.99 ± 0.24 bird/ha on the highly grazed site. Our sites are confounded with treatment; however, results support our hypotheses that post-grazing habitat recovery is a relatively long-term process that takes more than several years. These data may suggest that the removal of cattle can be a useful tool for improving habitat for bobwhites especially after many years of continuous grazing. We expect to see increases in bobwhite density and productivity on the two recently-grazed sites over time as the vegetation continues to recover.

**CONCURRENT SESSION ABSTRACTS – IN ALPHABETICAL ORDER OF AUTHOR’S
LAST NAMES**

**SOIL AND VEGETATIVE ASSOCIATIONS OF HETEROMYID RODENTS IN
CENTRAL AND SOUTH TEXAS**

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Abstract: Heteromyid rodents often form granivorous foraging guilds in habitats with sandy soils and vegetation that offers both open areas and dense shrub cover. Detailed information on habitat requirements and community assemblage data for heteromyids is limited within central and southern Texas. We investigated soil and vegetative associations for heteromyid communities at the landscape and microhabitat scales. We established treatments as the unique combination of each land cover and soil type on two study sites in Guadalupe and Jim Hogg counties. We trapped small mammals in each treatment on consecutive nights for three seasons. We assessed microhabitat parameters, including grass and forb cover, bare ground, leaf litter, and shrub and canopy cover within each treatment for all seasons. For landscape level analyses, we conducted a chi-square goodness of fit test to determine if captures of *Chaetodipus hispidus*, *Dipodomys compactus*, and *Perognathus merriami* differed per treatment. We used simple linear regression models to determine which microhabitat parameters were important predictors of occurrence for each species at each site. For landscape level analyses, capture was significantly different per treatment for all species on both sites. For microhabitat analyses (Jim Hogg County), herbaceous cover ($\beta = 0.1259$, $R^2 = 0.1516$, $P = 0.0276$) and bare ground ($\beta = -0.2156$, $R^2 = 0.2477$, $P = 0.0038$) were significant predictors of occurrence of *C. hispidus*. This information may be beneficial in assessing distribution and abundance of these rodent species, especially for *D. compactus*, a heteromyid deemed vulnerable by the Texas Conservation Action Plan.

**EFFECTS OF THERMAL ENVIRONMENT ON THE GROWTH AND HEALTH OF
WHITE-TAILED DEER FAWNS DURING SUMMER**

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Abstract: White-tailed deer (*Odocoileus virginianus*) maintain body temperature by balancing the generation and dissipation of body heat. Summer temperatures in South Texas may result in heat stress, which negatively affects deer growth, but the magnitude of the effect is unknown. We studied the effect of summer temperatures on growth, food consumption, and cortisol production of captive white-tailed deer fawns during summer 2015. We assigned 8 fawns as ambient temperature controls and 9 fawns to a cool-air treatment. We recorded food intake,

growth rate, and behavior, and collected feces and saliva for cortisol assays. We hypothesized that fawns with access to the cooled area would be able to dissipate digestive and metabolic heat more readily, and therefore maintain higher intake rates, activity levels, and lower cortisol levels. Treatment fawns weighed 1.1 kg more at 12 weeks with a standard error of 1.05 (age*treatment interaction, $P = 0.064$). They also consumed more milk at weeks 1, 2, and 4 (age*treatment interaction, $P = 0.077$). Treatment fawns ate 15% more solid feed than control animals with a standard error of 2.36, however high variation precluded significance ($P = 0.20$). Treatment fawns had a 0.1 ug/dL lower salivary cortisol concentration (treatment effect, $P = 0.040$). Activity levels were similar between groups. Results of this study help managers understand an important environmental constraint for deer in South Texas, providing insight into habitat and water management projects that could help deer contend with summer heat.

A HERPETOFAUNAL SURVEY OF TWO SITES IN THE TEXAS CROSS TIMBERS ECOREGION WITH AN EVALUATION OF SURVEY METHOD EFFECTIVENESS

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Abstract: As global reptile and amphibian populations decline, determining effective survey methods and applying them in the field is key to monitoring populations long-term. We examined herpetofaunal communities across two large sites in the western Cross Timbers ecoregion to compare amphibian and reptile assemblages, habitat associations, and determine relative abundances. In addition, we evaluated differences in observations made from various standardized detection methodologies, such as visual encounter surveys, cover board arrays, nocturnal road searches, hoop trapping, and audio surveys. In total, 41 species were documented, but with only a 63.4% overlap in species richness between sites despite similar topography and vegetation. Frogs dominated the actual counts of individuals across taxa, whereas snakes showed the highest species richness. Visual detection methods seem to be the most effective way of detecting squamates, the turtles were detected more efficiently by hoop trapping, and frogs were detected most efficiently via nocturnal road surveys.

DEVELOPMENT OF A LONG-TERM MONITORING PROGRAM FOR SMALL MAMMALS ON THE EAST FOUNDATION

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Abstract: Long-term monitoring of biological populations is critical for recognizing and understanding relationships between species and management decisions. The East Foundation has deemed it a priority to develop and implement a long-term monitoring program to evaluate trends in the distribution and abundance of flora and fauna across the foundation's properties. Proper planning in the beginning stages of a monitoring program are critical to ensure the

program meets objectives in an efficient manner. This includes decisions such as determining which species to monitor, which metrics to measure, and the level of effort necessary to produce a desired level of power for detecting biologically meaningful changes. We initiated a 3-year study to evaluate and identify efficient methods for monitoring small mammal abundance and occupancy rates on the East Foundation ranches. We trapped small mammals for 6 consecutive nights on an average of 40 grids each year, using both a square grid design, and an elongated transect design. We conducted power analyses with these data to explore the tradeoffs among duration of trapping, configuration of traps, number of sites sampled, power, and effect size for 9 species of small mammals. With these results, we developed multiple options for monitoring small mammals with varying power and associated costs. With the presentation, we will explain various monitoring scenarios for quantifying changes in small mammal occupancy and abundance over different time frames.

COMPARISON OF FINE SCALE VEGETATIVE PARAMETERS AT ACTIVE AND INACTIVE GULF COAST KANGAROO RAT BURROW SITES

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Abstract: The Texas endemic Gulf Coast kangaroo rat (*Dipodomys compactus*, GCKR) is listed as vulnerable on Texas Parks and Wildlife Conservation Action Plan; however, few ecological studies have focused on GCKR. Since April 2016, we have monitored changes in vegetation and GCKR burrowing activity seasonally at 63 randomly selected sites and monthly at sites with burrowing activity on a working ranch located in Guadalupe County. Using the Daubenmire frame cover estimate technique, we recorded percent cover of woody canopy, bare ground, litter, standing dead and live herbaceous vegetation, and height of live and dead herbaceous vegetation. We also identified dominant species of forbs and grasses. We found active burrows for at least one month at 19 of 63 sites. Comparing sites (ANOVA) with active burrows to sites with no burrows, we found significantly greater cover of woody canopy ($p < 0.001$) and litter ($p < 0.001$) at sites with no burrows, while percent cover of forbs was significantly greater ($p < 0.001$) at sites with active burrows. Also, there was significantly taller standing dead material ($p < 0.001$) and grass ($p < 0.001$) at sites with no burrows. Comparing the top 5 dominant plants, we found significantly greater percentage of rosette grass (*Dichanthelium* spp., $p < 0.001$), lazy daisy (*Aphanostephus* spp., $p < 0.001$), plantain (*Plantago* spp., $p < 0.001$), thin paspalum (*Paspalum setaceum*, $p < 0.001$), and woolly croton (*Croton capitatus*, $p < 0.001$) at sites with active burrows. These large seeded species are known colonizers of disturbed habitats which may offer richer food sources. Together, these results indicate GCKR select for disturbed habitats.

EVALUATION OF LAND RESTORATION PRACTICES ON NORTHERN BOBWHITE SURVIVAL AND PRODUCTIVITY IN NORTH-CENTRAL TEXAS

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Abstract: The decades long declines in grassland avian populations is ultimately attributed to changing land use throughout the United States. Land restoration practices offer opportunities to mitigate these declines. Due to their economic importance and reliance on healthy grasslands, attention focused on land management for northern bobwhite (*Colinus virginianus*) also benefits other grassland species. This study addressed the effectiveness of land restoration practices that attempt to alleviate the impacts of land-use change on northern bobwhite survival and reproductive productivity. We radio-marked and located female northern bobwhite to obtain information on survival, reproduction, and diurnal locations. We monitored nests and placed infrared video cameras near nesting sites to identify nest predators. We measured vegetation characteristics including visual obstruction, herbaceous, grass, litter, woody material, and canopy ground cover at each nest site and diurnal location. We built adult survival and nest survival models to determine the influence of vegetation characteristics on nest, brood, and adult survival. Twenty collared birds entered the nesting season, 12 initiated a nest, resulting in 4 successful nests. We calculated nests to have a 95% daily survival rate and a 32% chance of success. Our models failed to detect relationships among nest success and vegetation characteristics. We interpret these results as a need to further evaluate breeding success and adult survival.

EFFECTS OF AGE, SEX, AND FEEDER DENSITY ON PELLETTED FEED USE 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. However, dominance hierarchies among deer may limit accessibility to supplemental feed for some groups, particularly does and fawns. Social exclusion may become exacerbated with increasing deer density. Increasing feeder density may provide

more opportunities for subordinate deer to access feed. To test these hypotheses, pelleted feed was provided year round, ad libitum within four, 81-ha enclosures on two ranches in South Texas with the following numbers of deer and feeders, respectively: 20/1, 60/1, 60/3, and 80/4. We used ratios of carbon stable isotopes in deer tissues to estimate supplemental feed in deer diets during February, March, September, October, and December. We used a mixed model to determine the effect of treatment and deer age and sex on supplement consumption. For all months, feed use increased with age ($P = 0.001$), and males utilized more feed than females ($P = 0.001$). Females consumed more feed in the 80/4 enclosures compared to the 20/1 enclosures during February ($P = 0.031$), March ($P = 0.044$), and September ($P = 0.029$). Yearlings consumed more feed in the 80/4 treatment compared to the 20/1 treatment in February ($P = 0.034$) and September ($P = 0.017$). In December, fawns consumed more feed in the 80/4 treatment compared to the 20/1 ($P = 0.035$) and 60/1 ($P = 0.014$) treatments. These results suggest young and female deer have less access to supplement and that increasing feeder density can alleviate some of the social exclusion.

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 focused on translocating groups of pronghorn from the Texas Panhandle. Pronghorn are endemic to North America. Archaeological records, Native American paintings, and testimony of European settlers place large herds of pronghorn in the Trans-Pecos for millennia. The influx of human settlement to the Trans-Pecos, beginning in the late 1800s, saw fluctuations in the regional pronghorn populations due to habitat fragmentation, overhunting, change in land-use practices, and drought. Since 1978, TPWD has collected population estimate data using aerial line transect 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. Ecological modeling is a tool that has been utilized in population viability analysis to evaluate the potential impacts of various management scenarios. Habitat fragmentation in the Trans-Pecos has caused multiple metapopulation arrangements which TPWD manage as unique herd units. We sought to evaluate potential for each herd unit to serve as a source or sink population. We used 30 years of aerial population estimates, fawn production, and survival data from recent studies on pronghorn in the Trans-Pecos to develop a simulation model. We also used various demographic and translocation timing combinations to determine projected long-term success of translocation on population viability.

USING HOME RANGES AND SITE FIDELITY TO IDENTIFY AREAS OF IMPORTANCE FOR OVERWINTERING SANDHILL CRANE ON THE SOUTHERN HIGH PLAINS

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Abstract: Approximately 82% of the Mid-Continent Population (MCP) of Sandhill crane (*Antigone canadensis*, SACR) overwinter on the Southern High Plains of Texas and New Mexico. We identified wintering areas of importance, estimated home ranges (HR), and assessed site fidelity of Sandhill cranes to wintering sites in the Southern High Plains (SHP), 2014–2016. We captured and equipped a platform transmitter terminal (PTT) to 17 and 10 cranes during winter 2014-15 and 2015-16, respectively. We used winter locations (from capture to exit from winter range or within approximately 32-36N and 100-104W in subsequent winters) to estimate home ranges (95% contours) using the Brownian Bridge Movement Model in Program R. Of the 17 cranes captured in 2014-15, 88% ($n = 15$) returned to overwinter in the SHP the following year. We identified several areas of importance, each containing ≥ 1 saline lake or playa wetland used by >1 crane for $>50\%$ of a complete winter. Saline lakes remain an important component to SACR ecology on the SHP, and the large-scale loss of saline lakes due to land use practices over the past 50 years are disconcerting. This study is part of a larger, ongoing assessment of the sustainability of the Southern High Plains landscape for this growing population. These spatial parameters, along with population parameters, landscape composition, and climate parameters, will be used to inform models to estimate future population and spatial demographics under several land cover and climate scenarios.

AN EVALUATION OF FACTORS INFLUENCING DETECTABILITY OF NORTHERN BOBWHITES DURING DISTANCE-SAMPLING BASED HELICOPTER SURVEYS

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Abstract: Distance sampling has become a widely used technique for obtaining density estimates of wildlife populations. However, its practicality and efficiency is dependent upon the focal species and survey environment. Methodologies have been developed for the application of distance sampling during helicopter surveys of northern bobwhites (*Colinus virginianus*), notably within southern Texas. These methods are highly dependent upon eliciting a covey-flush for detection. Anecdotal evidence has suggested that detection of bobwhite coveys is influenced by weather conditions and time of day. Detection also may vary depending on the vegetation structure (i.e., the openness of the surveyed habitat) and observer experience. Our objective was to evaluate the effects of biotic and abiotic factors on the detectability of bobwhites during helicopter surveys in southern Texas. We flew 2,391 km of helicopter surveys in December 2014, 2015, and 2016 across 64,755 ha of rangeland in Jim Hogg and Duval Counties, Texas. For each covey location we determined the perpendicular distance to the transect line and recorded observation-level covariates such as covey size, time of day, cloud cover, temperature, wind speed, vegetation cover, and observer experience. We used a continuous variable (National Difference Vegetation Index; NDVI) as a relative measure of vegetation cover. We used multiple covariate distance sampling within Program DISTANCE to determine the significance of observation-level covariates on bobwhite detectability. Determining the individual effects of biotic and abiotic factors on bobwhite detectability will result in an improved survey protocol and allow for more precise estimates of bobwhite density on rangelands of southern Texas.

EVALUATION OF A SOLAR POWERED MICRO-GPS TRANSMITTER FOR NORTHERN BOBWHITE

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Abstract: For the past 50 + years, quail biologists have used very high frequency (VHF) transmitters to monitor the survival, habitat use, and movements of northern bobwhite. However, it is unclear of the impacts that human researchers represent when monitoring bobwhites while using VHF transmitters. We conducted a controlled and field experiment to determine accuracy and survival of bobwhite fitted with Micro-GPS units. We are using 8 micro-GPS units that are 6.5g (which include a built-in short range VHF transmitter for easy relocation) with remote download capability. We assessed the accuracy of the GPS units under 0%, 25%, 50%, 75%, and 100% vegetation cover as well as the power longevity under each vegetation condition. We trapped male and female northern bobwhite quail using Stoddard walk-in-funnel traps and selected a single individual that weighed >180g. We replace VHF transmitters on the GPS units after 45 days. Currently, the average accuracy of our control locations is 27.6m and 11m with GPS fixes gathered every 5 mins and 1 hour, respectively. To date, we have monitored 15 bobwhites with the GPS units. Survival for bobwhites equipped with solar powered GPS backpack is 74%. We have been able to collect up to 500 locations over a week-long period with 5 min locations then reduce the number of locations after a week to a location every hour for 8 hours. We have replaced transmitters on several birds multiple times to a monitoring period of

3.5 months. Currently, we are not seeing a negative impact in survival when solar powered GPS units are used on bobwhite quail however, accuracy may be an issue of concern when examining fine scale movements of birds when locations are collected at 5 minute intervals.

ARE WHOOPING CRANES DESTINED FOR EXTINCTION? CLIMATE CHANGE IMPERILS THEIR RECRUITMENT AND POPULATION GROWTH

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Abstract: Identifying drivers of an animal population's vital rates and locating where they operate steers conservation efforts to optimize species recovery. We identify climatic drivers (solar activity [sunspots] and weather) of whooping crane (*Grus americana*) recruitment throughout the species' life cycle (breeding, migration, wintering). Our method uses a repeated cross-validated absolute shrinkage and selection operator approach to identify drivers of recruitment. We model effects of climate change on those drivers, to predict whooping crane population growth given alternative scenarios of climate change and solar activity. Sunspots form the primary driver, with fewer sunspots enhancing recruitment. Increased precipitation during autumn migration signified less recruitment. On the breeding grounds, fewer days below freezing during winter and more precipitation during breeding suggested less recruitment. We predict whooping crane recruitment and population growth falling below long-term averages during all solar cycles when atmospheric CO₂ concentration increases, as anticipated, to 500 ppm by 2050. Species recovery will require 8-times longer during a typical solar cycle with 500 ppm CO₂ and the chance of population decline increases to 31%. Although the whooping crane population is growing and may appear secure in Canada, long-term threats imposed by climate change and increased solar activity jeopardize its persistence. Weather on the breeding grounds likely affects recruitment through hydrological processes (i.e., nesting pond depth) and predation risk, whereas precipitation during autumn migration may influence juvenile mortality. Mitigating threats or abating climate change must occur within ≈ 30 years or this wild population of whooping cranes will begin declining to extinction.

SURVIVAL AND MOVEMENTS OF TRANSLOCATED MULE DEER IN SOUTHEASTERN BREWSTER COUNTY, TEXAS

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Abstract: Mule deer (*Odocoileus hemionus*) populations have dwindled in parts of southeastern Brewster County since the late 1990s. In February 2015, Texas Parks and Wildlife Department, Borderlands Research Institute, and CEMEX-USA initiated the first part of a restoration effort by translocating 41 mule deer does to the Black Gap Wildlife Management Area (BGWMA) and El Carmen Land and Conservation Company (ECLCC) properties (collectively called the Black Gap Complex) from Elephant Mountain Wildlife Management Area. Of the 41 does translocated, 34 were fitted with radio collars (16 GPS and 18 VHF) to help monitor and compare survival, movements, and habitat selection of the translocated mule deer between two release methods (Soft-release: BGWMA, Hard-release: ECLCC). We conducted these different release methods in the thought that soft-release will yield a higher survival rate and higher site fidelity than that of deer that have been hard-released. For comparison of movements and home ranges between release method, we only ran GPS collars from 2015 release ($n = 11$) we used T-LoCoH from Program R for the analysis. To compare survival we used all collars from year 1 ($n = 34$) in a known-fate analyses using Program Mark. With this information hopefully we can improve our future restoration effort down at the Black Gap complex and improve how we translocate mule deer in the future.

ABUNDANCE, ACTIVITY PATTERNS AND INTERACTIONS AMONG OCELOTS, CATTLE, NILGAI, FERAL HOGS AND JAVELINAS

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Abstract: In southern Texas, ocelots (*Leopardus pardalis albescens*) are located in two small sub-populations on private and public lands in Willacy and Cameron counties. The East Foundation's El Sauz Ranch (EESR) 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 (*Bos taurus*) and other large game species on private lands has not been examined. Since 2011, we have conducted a remote camera survey on the EESR. The objective of this study is to analyze camera data to examine differences in abundance, activity patterns and determine interactions among ocelots, cattle, nilgai (*Boselaphus tragocamelus*), feral hogs (*Sus scrofa*), and

javelina (*Pecari tajacu*) on trails and within dense thornshrub. We hypothesize that there will be more interactions on trails compared to dense thornshrub, and ocelots will have more interactions with cattle and nilgai than smaller game species. The information derived from this study will assist management of cattle, large game and ocelots. Furthermore, this will also benefit future ocelot recovery and conservation on private lands in southern Texas.

ASSESSING HABITAT PREFERENCES AND POPULATION TRENDS OF HERPETOFAUNAL COMMUNITIES IN THE ROLLING PLAINS OF TEXAS

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Abstract: Herpetofauna communities have been monitored intermittently on the Matador Wildlife Management Area for the past 12 years in an attempt to understand and track their response to habitat changes. This study analyzed data from all available years (2004, 2013, 2014, and 2016) with the goal of assessing habitat preference, species presence, and population trends. Herp sampling was conducted using standard Y-array drift fences with pitfall traps. The number of drift fences used each sampling year ranged from 10-17 and were opened for varying periods of time (8 to 61 days). Vegetation data for habitat preference analysis was based on infrared satellite imagery and the LANDFIRE geospatial database. A total of 23 species were found over all years combined, compared to 43 species known from Cottle County. However, species accumulation curves for each year indicated trapping effort was insufficient to sample presence of most species. Jaccard's dissimilarity values between trapping arrays were high, indicating little overlap in species assemblages between sites (mean dissimilarity value: 0.71). Trapping data revealed coarse habitat affinities for common species, but sample sizes limited our ability to infer habitat preferences or assess population trends for any species. If the goal is to obtain long-term trends for herp communities and species, more intensive and consistent sampling would be required. To achieve this goal, we recommend implementation of a standardized program that involves biennial sampling, 5 week sampling periods during Spring, and replicated trapping arrays within major habitat types.

INVASIVE GRASS SPECIES DISTRIBUTIONS AT WELL PAD SITES IN SOUTH TEXAS

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Abstract: The association of well pads with non-native grasses is of growing concern to South Texas landowners. Over 19,000 new pad sites have been established in the Eagle Ford Shale since 2008, adding to thousands of historic pad sites already present in the region. Statewide, over 435,000 pad sites exist. Canopy cover of non-native grasses was measured along transects radiating from 18 well pads, and 18 control points on the same soil series in Dimmit County, Texas. Average time since construction of these pads was 34 years. Non-native grass canopy cover was higher (33%) within 63 m of well pads than at control points (26%) ($P = 0.04$). Variation in cover between well pad and control sites was species specific. Canopy cover of Lehman lovegrass (*Eragrostis lehmanniana*) was similar, whereas buffelgrass (*Pennisetum ciliare*) canopy cover was 13-fold higher within 63 m of well pads (11%) than control sites (<1%) ($P < 0.001$), and 46-fold higher (37%) ($P < 0.001$) within 3 m of pads in comparison to control sites. Kleberg bluestem (*Dichanthium annulatum*) did not occur at control sites, whereas it was found within 33 m of 3 of the 18 well pads sampled. These results indicate that well pads have significant and long-lasting effects on non-native grass distributions in South Texas, and showed well pads promulgate some non-native grasses in areas where they are otherwise scarce. Efforts to monitor and eliminate this unintended function of well pads would be judicious for conservation of native plant communities in rangelands impacted by oil and gas exploration.

FULL STEAM AHEAD: USING ART TO ASSESS STUDENTS' KNOWLEDGE OF TROPHIC LEVELS AT THE 4TH & 5TH GRADE LEVEL

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Abstract: The latest education standards encourage incorporating the arts within science, technology, engineering and math (STEM) to help foster innovation and creativity in design; however, effective integration is often lacking. To meet this need, we conducted an art, science, and augmented reality project with 4th and 5th grade students at a small rural school district. The objective of this project was to assess students' knowledge of trophic levels using artwork as the assessment tool. Prior to instructional activities, we asked students to draw a rattlesnake in its environment. Students, then, took a field trip to the university to see live rattlesnakes and learn about their local ecosystem, followed by art sessions to create a painting including producers and consumers (snake). Finally, we videoed the students describing the trophic levels in their painting and their art techniques, and linked the video to an augmented reality app for an interactive art exhibit. Ecological components of pre- and post-activity drawings were scored with a rubric, and significant differences were found using a paired samples t-test. In addition, several themes emerged from qualitative analysis of student artwork descriptions and feedback from a parent and teacher focus group including increased curiosity about rattlesnakes, connections to real-world applications and careers, application of art and science vocabulary, and student focus on art and science details. Joining art, science, and communication generated students that were highly engaged, able to transfer their knowledge to new environments, and able to communicate what they learned.

EVALUATING MAXIMUM HOME RANGE OF MONTEZUMA QUAIL

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Abstract: Montezuma quail (*Cyrtonyx montezumae*) are the most understudied quail in the south western United States, leaving large gaps in information about their ecology. To date, only two studies have tackled questions about Montezuma quail movements, and had starkly differing results, possibly due to monitoring effort, rather than differences in populations. Montezuma quail are difficult to capture, requiring a lot of effort and specialized equipment, and have a high mortality rate. This creates problems when trying to answer questions about home range sizes, especially when using a VHF unit. GPS units can lessen these problems, but have short battery lives at small sizes. Using GPS and VHF units we attempted to determine if there was an optimal number of recorded locations or time period of monitoring for determining the maximum size of quail home ranges. Quail were captured in Lincoln County, New Mexico with the aid of pointing bird dogs during the winter and monitored from early spring to mid-summer.

MICROHABITAT CHARACTERISTICS AND THERMAL BIOLOGY OF TEXAS TORTOISES FROM AN INLAND POPULATION

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Abstract: Texas tortoises (*Gopherus berlandieri*), the smallest North American tortoise species, are chiefly associated with the Tamaulipan Biotic Province of southern Texas and northern Mexico, and its distribution appears limited to thorn-scrub communities. The biology of this species remains poorly understood. Texas tortoises are distributed in a region characterized by short, mild winters and long, hot summers. They do not dig extensive burrows like other North American tortoises and instead seek refuge from extreme temperatures under vegetation or by scraping away a cavity or depression called a pallet. We studied vegetation composition and temperature of microhabitats used by 17 adult Texas tortoises over 2 years to determine habitat components important to inactive tortoises during the hottest time of their active season. Tortoise body temperature was highly correlated with soil temperature at the microhabitat site. Ground and operative temperatures were higher at random sites than tortoise microhabitats. Woody and screening cover were higher at tortoise microhabitats than random sites. Tortoises often sheltered under litter under or near brush. Habitat management for game species can be intensive over the

distribution of Texas tortoises. These results should be considered in management decisions so that the landscape remains suitable for this iconic tortoise.

HOME RANGE AND DENSITY OF NORTHERN BOBWHITE ON IRRIGATED RANGELAND IN SOUTH TEXAS

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Abstract: Within the distribution of northern bobwhite (*Colinus virginianus*), the goal of many land managers is to promote production and survival of this game bird. Habitat management is sometimes accompanied with supplemental feed and water. Studies on these cultural practices do not suggest benefits to bobwhite populations. The strong link between precipitation and bobwhite population dynamics has led some land managers to supplement habitat, not bobwhite, with water. Unlike other cultural practices which intend to provide resources that are directly consumed by bobwhite, irrigation could be a way to maintain habitat features important to quail during drought. We studied bobwhite in irrigated and control pastures for 3 years. Bobwhite hens were monitored with radio-telemetry during the breeding season. Distance sampling was conducted from a helicopter in December of the last 2 years of the study. There were no differences in home range size between irrigated and control pastures. Density estimates from distance sampling will be presented. These data will help determine the efficacy in sustaining and possibly improving bobwhite production and survival during drought conditions.

WINTER SURVIVAL OF AMERICAN KESTRELS IN SOUTH TEXAS

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Abstract: American kestrels (*Falco sparverius*) are North America's most abundant falcon, but they are declining in many parts of their range. Research is common in the breeding range, but far less is known about them during migration and on the wintering territories. Understanding the cause of their decline requires demographic information throughout the annual cycle. We conducted this study along county roadways in Bee, Nueces and San Patricio counties, Texas to estimate winter survival. We trapped kestrels with a bal chatri baited with wild caught mice during October–December in 2014 and 2015. We color marked kestrels with celluloid flat bands (Avinet[®]) and non-toxic fabric dye (Tulip[®]). We searched for kestrels once per week using a spotting scope (Leopold[®]) until birds departed winter grounds in March. In 2015, we searched for returning birds starting in mid-September. We used Cormack-Jolly-Seber models in program Mark to estimate apparent survival. In a preliminary analysis, the top model used different survival for newly banded kestrels and returning kestrels. In this model, weekly survival from early October–early March was $97.97 \pm 0.52\%$ during the season they were banded and $99.62 \pm 0.38\%$ for the kestrels that returned to their territory the following year. The probability of resighting a kestrel in this model was constant, and the probability of resighting a kestrel in a given week was $86.73 \pm 1.14\%$. The probability of surviving the 23 week period was 62.44% for kestrels in the season they were banded but 91.58% for returning kestrels.

INFLUENCE OF VEGETATIVE CHARACTERISTICS ON PREDATION AND PREDATOR ASSEMBLAGE OF BIRD NESTS

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Abstract: Predation is the primary cause of nesting failure in birds. Thus, understanding this process is paramount to conserving birds and mitigating population declines. Our goal was to investigate predator/nest relationships and how these relationships were influenced by nest site specific vegetative characteristics. Between March and August of 2015 and 2016, we collected nest success data for 17 species of birds on the 60,000 ha San Antonio Viejo ranch of the East Foundation in south Texas. During this period, we visually monitored 258 nests to estimate nest success and deployed 90 infrared digital video recorders to identify nest predators. Shrub cover was included in the top model for one nesting functional group ($w_i = 0.59$), suggesting increasing shrub cover could have negative effects on nest success. Snakes were the primary predator of camera monitored nests ($n = 30$). Shrub cover was also included in the top model for predicting snake predation ($w_i = 0.74$). As shrubs continue to encroach upon semi-arid savannas in south Texas, results of our study help predict how vegetation management could influence predator dynamics and breeding bird nest success in this region.

MOLECULAR ANALYSIS OF THE DIET OF THE AMERICAN PARASTRELLE

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Abstract: The documented diet of *Parastrellus hesperus* is largely based on a single conventional identification effort that identifies eight orders and twenty-three families of prey items including caddis flies, stoneflies, moths, small beetles and flies. Our objectives were to use a molecular approach to analyze the diet of *Parastrellus hesperus*, the American parastrelle, and to determine if the diet varied across sex and age-classes. We collected guano pellets from a total 147 *P. hesperus* from May-July 2015 over nine nights in Big Bend National Park. We then sequenced a fragment of the cytochrome c oxidase gene from the fecal pellets of 79 individuals and inferred the identity of prey items from voucher sequences in DNA reference databases. Using conservative molecular identification criteria, we assigned molecular operational taxonomic units to eight orders, 28 families, 36 genera and 27 species of arthropods of which two orders and 20 families contain new prey items for *P. hesperus*. We observed no dietary differences between the age-classes or across female reproductive condition. However, we found significant variation in the diet between males and females.

MODELING WILDLIFE DATA – WHAT YOU’RE MISSING

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Abstract: Our presentation will demonstrate the process of collecting, modeling and applying common wildlife geospatial data. Using readily available mobile wildlife software during helicopter surveys we will explain how to create spatial maps of animal species, quantities and locations. We will then show a step-by-step process of how to use the resulting data in constructing a representative model. Finally we will explore how the models can be used to offer insights into your data beyond the numbers. Example models will include animal density maps and even some unexpected applications of modeling.

VIABILITY AND PERSISTENCE OF NORTH AMERICA’S RAREST HERON: A POPULATION VIABILITY ANALYSIS OF REDDISH EGRET (*EGRETTA RUFESCENS*) IN TEXAS

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Abstract: Reddish egrets are a threatened waterbird species that inhabit the Gulf Coast of the U.S. and Mexico, as well as, the Bahamas, Cuba, the Mexican Pacific Coast, and the Yucatan peninsula. The plume trade of the late 1800s drastically reduced global population numbers of reddish egrets. By the 20th century, the species was decimated and possibly extirpated in many parts of its range. While much of the historical range has been recolonized, the reddish egret remains North America’s least abundant heron species. An estimated one-third to one-half of the global reddish egret population occurs in the United States, with Texas having approximately 75% of the breeding pairs. While egret population numbers may be increasing throughout portions of the range, many factors continue to threaten the persistence of the species. Population viability analyses (PVAs) are a common method of predicting a species’ persistence into some future time. The purpose of developing a population viability analysis for *E. rufescens* is to

identify possible factors impeding the growth of Texas populations. By assessing the relative threat of each contributing factor and identifying vulnerable life stages, a robust PVA can estimate how different management actions will affect population demographics. The outcome of this analysis will help guide the management of Texas populations of *E. rufescens*. Using population and demographic data from the Texas population of *E. rufescens*, our model will serve as the backbone for the creation of a range-wide PVA.

RESULTS OF SENDERO[®] TREATMENT ON WESTERN HONEY MESQUITE FOR SCALED QUAIL HABITAT RESTORATION

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Abstract: Woody plant encroachment outcompeting native grass populations is a problem in many parts of the Western United States and the Trans-Pecos region of West Texas is no exception. This woody plant encroachment is in large part due to factors such as overgrazing, fire suppression, and livestock affecting seed distribution. Unfortunately, once woody plant encroachment has taken place, it is quite difficult to reverse. In fact, left alone the process will continue to degrade these grasslands. The focus of this project was to evaluate the effectiveness of Sendero[®], an herbicide found effective at controlling honey mesquite (*Prosopis glandulosa* var. *glandulosa*), on western honey mesquite (*Prosopis glandulosa* var. *torreyana*). Additionally, we have evaluated the use of Sendero[®] as a means to promote forb and grass populations, thereby restoring scaled quail (*Callipepla squamata*) habitat at Elephant Mountain Wildlife Management Area (EMWMA). The effectiveness of the Sendero treatments have been assessed by utilizing line transects, a nested Daubenmire vegetation sampling method, and aerial photography on multiple sites using 2 different treatments (Sendero and a Sendero-Remedy mix). A comparison of individual plant treatment (IPT) versus aerial broadcast was also evaluated to determine which method of application yields the most economic results. Wildlife habitat use was assessed in the treatment and control areas pre- and post-treatment by deploying game cameras placed in a stratified random sampling pattern. The information garnered from this research is of interest to many parties including: ranchers, land managers, state and federal agencies, and wildlife management institutions.

INFLUENCE OF TANGLEHEAD ON SPATIAL DISTRIBUTION OF NORTHERN BOBWHITE

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Abstract: Tanglehead (*Heteropogon contortus*) is a native grass that has expanded rapidly in the western Sand Sheet region of South Texas within the last 15 years. Prior research indicates that increased tanglehead cover reduces herbaceous species diversity and bare ground, and that bobwhite avoid areas with >20% canopy cover of tanglehead. However, there has been no research into the effects of tanglehead cover on bobwhite density and their spatial distribution. The objective of our research was to determine the spatial effects of tanglehead cover on bobwhite density. We used a helicopter-based, distance sampling approach to survey bobwhite populations in 2014 across 20,560 ha in Jim Hogg and Duval counties. We utilized an unsupervised classification approach, using 1-m National Agricultural Imagery Program aerial images, to remotely sense tanglehead cover across our study area. Within FRAGSTATS, we determined the percent cover, mean patch area, patch density and largest patch index of tanglehead within a 100-m moving window. We used a generalized additive model to individually model bobwhite density as a function of tanglehead cover metrics using data from our helicopter surveys to determine detection probability. This methodology allowed for a dynamic evaluation of the relationship between bobwhite density and tanglehead cover across a large study area at a fine resolution (<1 ha). Herein we present on the spatial relationships between tanglehead cover and bobwhite density and distribution.

DENSITY SURFACE MODELING AS A METHOD TO ESTIMATE SPATIAL DISTRIBUTION OF NORTHERN BOBWHITE

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Abstract: Density surface models (DSM) are a refinement of concepts and theory underpinning conventional distance sampling (CDS) that allow for a spatial representation and evaluation of animal density. Density estimates of northern bobwhite (*Colinus virginianus*) historically have been derived using CDS methods, but this approach is limited because it provides a single density estimate for an entire area and therefore lacks a spatial component of density (i.e., how density varies across space). Density surface models address this limitation. Our objective was to evaluate DSM as a method for estimating both bobwhite density and its spatial variation across a landscape. We used a helicopter-based, line-transect, distance sampling approach to survey bobwhite populations in 2015 across 5 ranches (20,560 ha) in Jim Hogg and Duval counties, TX. This information was used in a CDS analysis to determine density per ranch, and subsequently to determine a detection probability utilized for the DSM. Detections were then spatially assigned to survey transects along with values of relevant environmental covariates. For the DSM, density was estimated using a generalized additive model, based on covey detections, environmental covariate data, and geographic information, while correcting for probability of detection. Ranch-level density estimates ranged from 2.01 to 3.88 bobwhites/ha, and were similar between CDS and DSM methods, although DSM estimates had generally lower coefficients of variation. Both methods were efficient estimators of bobwhite density; however, the DSM method had the additional benefit of yielding the spatial distribution of quail density across the areas.

CHANGES IN RURAL PRIVATE LAND OWNERSHIP IN THE SOUTHEASTERN UNITED STATES

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Abstract: Changes in the demand for rural land in combination with rapid population growth and rising land market values threatens privately owned farms, ranches and forests (i.e., “working lands”), and the ecosystem services they provide across the United States. These factors collectively facilitate the sub-division and conversion of working lands (i.e., ownership fragmentation). As such, ownership fragmentation can have serious implications for how landscapes are managed, given varying management objectives among landowners and the external pressures they exert on each other. While most land fragmentation studies are conducted within small spatial scales, focusing on the spatial discontinuity of land or habitat, ownership fragmentation focuses instead on the human aspect of landscapes. I used data reported by the United States Department of Agriculture’s Census of Agriculture and the United States Census Bureau to evaluate ownership fragmentation metrics and social drivers of land ownership change

across a large geographic region. I used these data to quantify ownership fragmentation and explanatory variables that are hypothesized to explain variation in ownership fragmentation (e.g., total population, asset value per acre), and to analyze the systematic forces that influence ownership fragmentation of working lands across the southeastern United States. I identified important trends and relationships between ownership fragmentation, population, and land value across the southeastern United States that can be used to inform public and private decision makers, and to evaluate land use policies in light of conservation and natural resource policy efforts to maintain critical resources and ecosystem services delivered from privately owned land.

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 the assemblage distribution across time can increase our understanding of the community 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 a baseline SDM across relevant environmental variables and then improved the model by quantifying and incorporating interactions between species and seasonal timing. Composite maps of single-species distributions showed moderate correlation with vegetation type and woody vegetation cover. However, distributional models that included Julian date revealed a temporal influence on songbird detectability and a seasonally dynamic vegetation-avian distribution relationship previously unacknowledged. Layered maps, multi-variate analysis, cluster analysis, and spatial autocorrelation are utilized to better understand the relationships between the distributions of selected species and how those relationships may change throughout the breeding season. Resulting simulations and the development of new modeling techniques are valuable to wildlife management as the use of spatial statistics and landscape scale approaches evolve and become more heavily emphasized.

ANALYSIS OF DISPERSAL, SURVIVAL, AND FINE-SCALE HABITAT SELECTION OF REINTRODUCED TEXAS HORNED LIZARDS

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Abstract: The historical range of the Texas Horned Lizard (THL, *Phrynosoma cornutum*) spans across most of Texas, but the species has experienced range contraction and population declines. There is no substantial evidence to indicate any one cause, so it is likely the decline has been triggered by multiple factors. Possible threats include Red Imported Fire Ants (*Solenopsis invicta*), herbicides and pesticides, habitat destruction and disturbance, and collection. In addition, the habitat description given by many is vague, such as that from Burrow et al. (2001): “a mosaic of bare ground, herbaceous vegetation, and woody vegetation in close proximity.” The purpose of this study is to investigate the factors influencing THL dispersal, survival, and fine-scale habitat selection following reintroduction. As part of an ongoing project at Mason Mountain Wildlife Management Area, a total of 1,378 points were collected from 22 lizards using radiotelemetry from May to August 2016. Habitat characteristics were measured at these points and randomly selected points to determine fine-scale habitat selection. Harvester Ant (*Pogonomyrmex* or *Ephebomyrmex*) colony locations were also mapped. Of 23 lizards released in 2016, 9 died before the third day of data collection, and 9 survived at least 54 days after release. Predation was a major cause of death, initial dispersal for each lizard took approximately 9 days, and overall area used by each lizard ranged from 1,250 to 76,509 m². Further analysis will provide stronger conclusions about fine-scale habitat use and better insight on proper techniques to successfully reestablish extirpated populations of THL across Texas.

GOSSYPOL TOXICITY AND REPRODUCTION OF NORTHERN BOBWHITE

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Abstract: Gossypol is a toxic secondary plant compound found in cotton (*Gossypium* spp.). Because of gossypol’s toxicity to many animals, cottonseed-based feeds are currently under investigation as a possible control agent for feral swine. The effects of gossypol ingestion on non-target wild animals such as northern bobwhite (*Colinus virginianus*; NOBO), however, are unknown. Our objectives were to examine the effects of gossypol on reproduction in adult NOBO and effects of gossypol on second generation young produced from adults that had ingested gossypol. 30 male/female pairs were randomly assigned to 1 of 3 groups: control, 20 mg/kg of body weight [BW] refined gossypol dose, and 200 mg/kg dose. In each treatment

group, 5 males and 5 females were dosed and paired with an untreated bird of the opposite sex. We measured egg production, egg size, embryo development, percentage of chicks hatched, and survival and health of chicks. The 200 mg/kg group produced 15.2 eggs/pair and hatching success was 84% ($n = 152$ eggs). The 20 mg/kg group produced 14.6 eggs/pair and hatching success was 83.7% ($n = 146$). The control group produced 16.1 eggs/pair and hatching success was 79.9% ($n = 161$). There was no difference in the survival and health of chicks across all 3 groups. We are currently analyzing the data on egg size and embryo development. Should gossypol be distributed in the environment to control feral pig populations, our study indicates that ingestion up to 200 mg/kg of gossypol will not influence reproduction in bobwhites.

MODELED IMPACTS OF CHRONIC WASTING DISEASE ON WHITE-TAILED DEER POPULATIONS IN A SEMI-ARID ENVIRONMENT

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Abstract: Chronic wasting disease (CWD) is a transmissible disease that affects members of the Cervid family. Recently, multiple cases of CWD have been discovered in captive white-tailed deer facilities in Texas. There is concern about how CWD would impact free-ranging deer populations especially in South Texas where the variable rainfall results in variable and, on average, low fawn recruitment rates. We developed a model based on data from 55,505 ha of rangelands where deer harvests were light (~2%), no supplemental feed was provided, and deer counts were conducted annually for 20 years. Our models with survival rates, fawn:doe ratios, and rates of hunter harvest produced projections that were comparable with observed trends. CWD parameters were inputted into the model based on data from CWD-afflicted states. Initial prevalence was set at 1% of the population with a 0.26% increase in prevalence per year and mortalities occurred 1-3 years after being infected. With no CWD and no harvest, populations increased 1.43% annually and the population was able to sustain a 2% annual rate of harvest. Incorporation of CWD did not result in a decline in population size if there was no harvest; however, populations declined when 1% harvest of both sexes occurred. Limiting harvest to males did not cause populations to decline but proportion of mature males declined because males are more susceptible to CWD. Our results indicated that if CWD emerged in free-ranging deer populations in South Texas, the economics and culture of deer management and recreational hunting would be altered.

USING LANDSAT TO ASSESS VEGATATION RESPONSE TO GRAZING

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Abstract: Advancements in information technology have revolutionized the way that ecologists are using and distributing biodiversity data. Landsat imagery in particular has substantial potential for use in rangeland management because it is generally free, widely accessible, updated every 16 days, and with moderate effort can yield very usable measurements. Livestock grazing is a heavily studied practice because it can cause substantial impacts on vegetation type and cover. The San Antonio Viejo (SAV) Ranch, located in south Texas, is a property of the East Foundation and is primarily managed as a working cattle operation with wildlife management and research a growing priority. With this study, we assessed the utility of Landsat to measure the impacts of grazing on vegetative cover. All experimental pastures were rested for two years prior to the start of grazing in last week of December 2015. Four pastures were constantly grazed and two groups of three pastures were independently rotated, amounting to a total grazing area of 7,502 ha. We determined the accuracy of 4 (2 supervised, 2 unsupervised) classification methods of both, 2015 and 2016 LANDSAT 8 imagery and compared vegetative cover (woody, herbaceous, bare ground) estimates of each method to observer-collected ground cover estimates. For 2015, K-Means unsupervised classification resulted in the highest overall accuracy. For 2016, Maximum Likelihood supervised classification resulted in the highest overall accuracy. All classifications displayed the highest accuracy when classifying woody vegetation and unsupervised classifications had the highest overall accuracy, with the exception of Maximum Likelihood in 2016. We concluded that Landsat 8 imagery classification was reasonably accurate in estimating vegetation cover and should be increasingly considered for use in rangeland management.

LEAD CONCENTRATIONS AND SOURCE DISCRIMINATION IN AMERICAN WOODCOCK

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Abstract: Lead (Pb) concentrations have been estimated to exceed biological thresholds in American woodcock (*Scolopax minor*) and may be contributing to population declines. Woodcock are susceptible to Pb accumulation through ingesting earthworms, contaminated soil, and Pb shot. Although Pb shot was banned for use for waterfowl hunting, it remains legal for webless migratory bird hunting, and may be a significant source of elevated Pb in woodcock. We used inductively coupled plasma mass spectrometry (ICP-MS) to quantify Pb concentrations and Pb isotope ratios in primary feathers (P2), secondary feathers (S14) and wing bones from 392 hatch year woodcock retrieved from the nationwide Parts Collection Survey in 2011 and 2012. The three sample types provide information on natal origins, migration routes, and lifetime Pb accumulation, respectively. We quantified total Pb concentrations and calculated isotope ratios for $^{206}/^{207}\text{Pb}$ and $^{208}/^{207}\text{Pb}$ to compare Pb sources. Elevated feather Pb concentrations (>4 ppm) were found in 19% of the feathers, with 24% having concentrations ≥ 20 ppm. Elevated bone concentrations (>20 ppm) were found in 35% of the bones analyzed. Approximately 60%

of feathers with elevated Pb were P2 feathers, indicating Pb accumulation is slightly greater at natal origins. Isotope ratios in both the P2 and S14 feathers overlap with ratios from multiple environmental sources including coal emissions, gasoline, zinc smelting, and various types of Pb shot. While Pb shot is a possible source of Pb in woodcock, further research is needed to accurately determine the source of Pb in birds with elevated Pb concentrations.

INFLUENCE OF ARTIFICIAL RESOURCES ON SCALED QUAIL SURVIVAL AND NEST SUCCESS

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Abstract: Scaled quail experienced a noteworthy decline throughout its range in the early 1960s. Among the suggested factors of this decline, anthropogenic events have been identified as the primary influence in the Trans-Pecos region. Radiotelemetry has been used to gain more and finer scale information about scaled quail home ranges, movements, and basic ecology. Eighty radio collars were deployed on scaled quail females to investigate the influence of artificial resources on their survival and nesting success. To accomplish these objectives, the females were monitored via homing during their breeding season (1st May–12th September) 2014–2015. Upon the completion of data collection, monitoring information from 66 female scaled quail was considered for the analysis, only. The information-theoretic approach designed in program MARK did not show any influence of artificial resources on scaled quail survival. Survival for scaled quail was obtained using program STAGKAM and performing a Kaplan-Meier analysis with a staggered-entry design. Scaled quail females presented high and similar survivorship among years (73.76% in 2014, 74.01% in 2015). Nest success and nest site selection were not significantly influenced by artificial resources, accordingly with a logistic regression performed in program SAS. Sixty nests were found during this study, which averaged a hatching success rate of 55.00%. More research is needed to explore all the potential benefits of supplemental feed and water in the Chihuahuan Desert. Scaled quail management is complex, and must be only considered as a tool within a dynamic system where habitat improvement needs to be the fundamental priority.

BROADENING PERSPECTIVES OF DIVERSITY AND INCLUSION IN NATURAL RESOURCE PROFESSIONS: A DEMOGRAPHIC SNAPSHOT OF THE TEXAS CHAPTER OF THE WILDLIFE SOCIETY IN 2016

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Abstract: The goal of natural resource professionals in Texas is to conserve public trust resources and maintain them for future generations. The public to which these resources belong is changing. How can resource professionals stay relevant to changing stakeholders and an increasingly urbanized, culturally diverse population? Historically the wildlife and fisheries management profession has struggled to increase minority and female representation. Our team within the 2016 cohort of the James G. Teer Conservation Leadership Institute has been tasked with quantifying the demographics of the Texas Chapter of the Wildlife Society (TCTWS) membership via an online survey. Preliminary survey results demonstrate that female biologists represent 34% of TCTWS survey respondents. While 90% of biologists surveyed in the Texas Chapter, identify themselves as Caucasian. Specific actions suggested to increase recruitment and retention of diverse biologists include: the adoption of a workforce diversity position statement by the chapter, creating a TCTWS workforce diversity committee or subcommittee, developing recruitment strategies for target populations, increasing TCTWS marketing and outreach through established partnerships, and lastly increase training and financial support specifically for underrepresented students. The cohort will also discuss concepts of diversity and how it is much broader than skin color and gender.

HABITAT CHARACTERISTICS OF AREAS USED BY BROODING EASTERN WILD TURKEY HENS IN EASTERN TEXAS

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Abstract: After extensive restoration efforts for the eastern wild turkey (*Meleagris gallopavo silvestris*) in east Texas, populations still remain small and disjointed. Brood survival and specifically a lack of high quality brood-rearing habitat have been found to be a potential limiting factor for establishment. A new phase of reintroduction is currently being conducted using the super-stocking method. This involves translocating approximately 80 birds (60 hens and 40 gobblers) to a large parcel (e.g., $\geq 4,046.9$ ha) of suitable habitat identified by a regional Habitat Suitability Index (HSI). To better understand brood habitat use, we marked 52 hens on 5 study sites with GPS transmitters between 2015 and 2016. Once a hen was identified as brooding (e.g., one or more poults were hatched), we randomly chose 2 GPS locations for each day of the brooding period (up to 30 days post-hatch) for sampling. Only 3 hens were successful in raising poults past 30 days. Therefore, we sampled 180 brood use locations and 180 paired random points. Various vegetation structural variables (e.g., vegetation type, visual obstruction, basal area, canopy cover, and fine-scale vegetation components) and invertebrate availability were

sampled at each brooding location and random point. We quantified biomass of invertebrate groups that have been found to be important food sources for wild turkey poults (e.g., aranea, coleoptera, hemiptera, and orthoptera). Vegetation variables and insect availability will be compared between used and random points using simple, paired T-tests to determine if wild turkey hens are selecting brood habitat based on food availability and structural characteristics.

IDENTIFICATION OF CORRIDORS FOR THE NATURAL RECOLONIZATION OF BLACK BEARS TO EAST TEXAS USING SPATIALLY EXPLICIT MODELS

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Abstract: Recent research has identified suitable, yet unoccupied, black bear habitat in east Texas available for recolonization of their historic range. Protected habitat corridors between source populations and available habitat in east Texas are necessary for the process of natural recolonization to take place. We are implementing a spatial modeling study to identify potential dispersal corridors between the east Texas target areas and the extant populations in Louisiana, Arkansas and Oklahoma. As the first phase of this effort, we have classified habitats in terms of suitability for bears between extant populations and target areas using Ecological Niche Factor Analysis (ENFA) and Generalized Linear Models (GLM's). These models use known bear occurrences ($n = 348$) from all four states to define characteristics of suitable locations. ENFA identified locations for pseudo-absence generation (e.g. locations where bear occurrence is unlikely) and provided absences to weight the GLM's. These models are based on several predictor variables at 100m resolution: elevation, distance to land-cover types, distance to roads and rivers, and protected properties. The final model provides a tool to categorize the habitat within the study area, and identify habitat patches that represent potential corridors. Preliminary results suggest potential corridors exist and that the landscape scale variables (e.g. elevation and protected status) are more important in predicting bear occurrence than more local variables (e.g. distance to rivers). The results of this study will be used as part of a more extensive path analysis effort to determine likely colonization paths for black bears in the region.

BROOD SURVIVAL OF LESSER PRAIRIE CHICKENS IN THE SAND SHINNERY OAK ECOREGION OF TEXAS AND NEW MEXICO

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Abstract: There is currently little information on brood ecology and survival of Lesser Prairie-Chickens (LEPC) in the sand shinnery oak prairie (SSOP) ecoregion. Therefore, we radio-tagged LEPC hens and located their nests and broods during 7 breeding seasons (2006–2012). We evaluated brood site selection and survival regarding vegetation structure, invertebrate abundance and richness, and management practices at control sites (TX, NM) and grazing (short-duration, rotational) and herbicide (shrub control) treatments (NM). In TX, all broods were in monotypic stands of sand shinnery oak (SSO) and treated or grazed areas in NM. Brood survival was lower in NM (avg. = 11 days; TX = 18 days), positively influenced by the number of hot days (≥ 90 th percentile of maximum temperatures encountered by a brood [≥ 37 °C]) in both states, and overhead cover in NM. In total, 16% percent of all nests produced broods, 62% of broods failed within 14 days, and 75% failed by 30 days. Our study demonstrates the complexity of LEPC brood ecology in SSOP: hens were flexible in selecting brood-rearing habitat, including herbicide treatments that were likely detrimental 1-3 years post-treatment via loss of thermal cover. Brooding hens selected restored sites over post-climax communities in NM, despite lower survival in treatments. Brood survival was greatest when temperatures and winter and brood-rearing precipitation were high, but not extreme (e.g., >54 °C). Brood survival is a dynamic process in SSOP that is mostly regulated by extrinsic factors, and land management practices that completely remove SSO are likely detrimental to productivity via loss of thermal refugia.

CITIZEN SCIENCE DATA INDICATES MANAGED HOUSING IS A CRITICAL COMPONENT TO LONG-TERM POPULATION PERSISTENCE OF THE EASTERN PURPLE MARTIN (*PROGNE SUBIS SUBIS*)

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Abstract: The continental population of the Purple Martin (*Progne subis*) is entrenched in a consistent, long-term decline. This is especially true for the subspecies east of the Rocky Mountains (*P. s. subis*) in the United States and most Canadian provinces which today nests almost exclusively in provisioned housing (e.g., birdhouses and hollow gourds) provided citizen scientists. One indirect benefit of provisioned housing is reduced nest site competition with nonnative European Starlings and House Sparrows. Increased competition for nest sites and subsequent lower productivity is speculated to be a primary factor of their long-term declines. To assess if poor nest survival is contributing to the long-term declines of the eastern Purple Martin, we analyzed nest-check records from an 18-year (1995–2013) database provided by Project MartinWatch, a citizen science program of the Purple Martin Conservation Association. We

compared nest ecology metrics and nest survival among housing and entrance hole type from 72,627 nests across 8 regions to evaluate if specific provisioned housing or entrance hole type increased clutch sizes or number of chicks successfully fledged. Our major findings were: 1) nest survival was >85% in the Eastern United States and Canada; 2) clutch sizes and number of fledglings produced were slightly larger in natural and artificial gourds with entrances designed to exclude European Starlings, but; 3) housing and entrance hole types were not important predictors of nest survival and clutch size had a small, inverse relationship with daily nest survival ($\beta_{\text{Clutch}} = -0.002$, 95% CIs: -0.0003 – -0.009). Our results suggest poor nest survival is not the cause of declines for the eastern Purple Martin. Additionally, our findings encourage the use of artificial and natural gourds with European Starling-resistant entrance holes, but promotion of managed artificial housing of any type in North America will benefit the eastern Purple Martin.

SPATIAL RELATIONSHIPS BETWEEN FLEDGE SUCCESS AND HABITAT OF AMERICAN OYSTERCATCHERS ON FISHERMAN ISLAND NATIONAL WILDLIFE REFUGE, VIRGINIA, USA

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Abstract: The American Oystercatcher (*Haematopus palliatus*) is a species of high conservation concern that has experienced population declines due to low fecundity. High-tide washouts and predation are primary causes of low productivity. We examined field data from 2005, 2008, 2010, 2012 and 2014 (N = 286 nest events) to determine habitat influences on nest outcomes and to locate hotspots of high nest predation. Nest sites were plotted and categorized into six fate classes: abandoned, fledged, not fertile, predation as chick, predation as egg, unknown and washouts. Iso-cluster Unsupervised Classifications were run on orthophotos in ArcMap 10.1 to classify habitat types. Upland and marsh habitats were identified and distance from each nest to these “edges” was calculated using Euclidean Distance. ANOVA tests were run on distance to edge for each nest, followed by Tukey-Kramer tests for pairwise comparisons. The Optimized Hot Spot Analysis tool located statistically significant areas of nest predation. When known predated nests and fledged nests were compared, predated egg locations were significantly different from fledged nests (Adjusted *P* Value = 0.020). The Tukey Method paired fledged nests with predated chick nests and predated chick nests with predated egg nests (*P* Value = 0.019). Optimized Hot Spot Analysis identified four major predation zones on the island. Nests that fledged chicks were typically located farther from edge habitat than nests predated as eggs. This method can be replicated on other sites to prioritize areas for mammalian trapping or for predator exclusion electric fencing to increase oystercatcher productivity. Future work will examine chick predation habitat associations.

FACTORS INFLUENCING SURVIVAL 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. Texas Parks and Wildlife Department has banded 89,297 white-winged doves (*Zenaida asiatica*) across Texas since 2003. The objectives of this study are to: 1) investigate annual survival and recovery rates of white-winged doves, 2) examine extrinsic and intrinsic factors influencing survival, and 3) determine peak breeding season. We predict hatch-year doves will have higher annual mortality than adults. Upon review of recent literature, we hypothesize that doves breed later in the summer than originally speculated by state agencies. We will analyze banding data in Program MARK. We will use molt scores of hatch-year doves recorded during annual banding operations to assess the length of the breeding season and update knowledge of breeding chronology. Furthermore, we will examine weather covariates, banding location, molt score and other factors which may influence survival on an annual basis. This information will help determine breeding season length for this species. A further understanding of dove population dynamics will assist state agencies in managing for this species more effectively in the future.

THREE DECADES OF GOLDEN-CHEEKED WARBLER HABITAT CHANGE: EFFECTS OF DEVELOPMENT, DROUGHT, AND CONSERVATION

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Abstract: Single point-in-time assessments of the habitat of the endangered golden-cheeked warbler (GCWA; *Setophaga chrysoparia*) are inadequate to determine if available GCWA habitat is declining, remaining stable, or increasing, a primary consideration for determining whether further protection is required or whether delisting is warranted. Studies that use consistent methodology to assess habitat change over several decades would be most informative. We used remote sensing (ERDAS IMAGINE 2015) and ESRI ArcGIS ModelBuilder to identify and document change in GCWA habitat in Travis County, TX, and the surrounding area over three decades (1986 to 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. We validated our model by comparing model predictions of habitat quality to that of actual GCWA sightings in Balcones Canyonlands National Wildlife Refuge (BCNWR). Our previous research (1986-2004) had shown that 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 BCNWR. Even so, habitat loss exceeded habitat gains. This phase of the study (2004-2016) indicates this trend is continuing. In addition, habitat loss seems to be accelerating in certain areas that were previously stable in 2004. Both development and the 2011 drought are contributing to this loss. A story map

created in ArcGIS Online will demonstrate habitat change results and causes for these recent changes will be discussed.

STATUS OF THE LOUISIANA PINE SNAKE (*PITUOPHIS RUTHVENI*) IN TEXAS

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Abstract: The Louisiana Pine Snake (*Pituophis ruthveni*) is one of the rarest snakes in North America. Trends in captures at sites in both Texas and Louisiana indicate that the species is in serious decline. The U.S. Fish and Wildlife Service has proposed that the species be listed as threatened under the U.S. Endangered Species Act. Past research in Texas has focused on populations of Louisiana Pine Snakes on USDA Forest Service lands. Here, we present research designed to focus on potential populations on private lands which are a gap in our knowledge of this species in Texas. First, we used all known records of Louisiana Pine Snake to generate a model of historical habitat based on soil and forest data. Then, we generated a model of current habitat by using Change Detection Analysis to identify pine forests that have not been harvested in 30 years. The remaining habitat fragments were sorted by size to guide trapping efforts on private lands and to identify future reintroduction sites in Texas. We found no additional populations of Louisiana Pine Snakes in Texas using either camera trapping or traditional box trapping methods. Intensive habitat and population management is likely needed to maintain this species in Texas.

OVERCOMING HERBIVORY PRESSURE: TWO YEAR RESULTS OF OAK AND HICKORY SEEDLING ESTABLISHMENT IN THE WESTERN GULF COASTAL PLAIN

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Abstract: Bottomland hardwood forest restoration attempts in the post oak savannah and blackland prairie regions of Texas have seen limited success, primarily due to very low survival of planted oak and hickory seedlings. This study examined the influence feral swine and white-tailed deer on the survival and growth of 1-0 bare-root seedlings of Shumard oak, bur oak, and

pecan. The objective was to quantify the impacts of wildlife on seedling growth and survival and to test the effectiveness of three mitigation techniques (portable electric fence, 8-ft. woven-wire fence, and 2-ft individual tree shelters) in both forested and open field conditions. We recorded survival, height, and diameter on four study sites in the Post Oak Savannah and Blackland Prairie ecoregions 2, 14, and 26 months after planting. Overall survival and the impact wildlife had on survival varied by study site, field condition, and species of seedling planted. Study sites were located on three watersheds that differed in inundation over the study period. Substantial herbivory was not observed on open field treatments. Feral swine significantly impacted seedling survival on two partially forested sites, even though feral swine densities were similar across all study sites, showing selective herbivory towards pecan seedlings (95% mortality due to feral swine). Even at moderate to high white-tail deer densities, we noted minimal browse damage that resulted in seedling mortality. At one study site, we observed increased deer browsing activity throughout the partially forested area that appeared to impact growth. Although feral swine and white-tailed deer can affect seedling survival and growth, other factors besides herbivory, such as multiple prolonged flooding events and short-term severe droughts observed throughout 2015-2016, were likely causes of mortality exceeding 90% on several sites for all three species.

THE EFFECTS OF MOON PHASE ON DIURNAL ACTIVITY OF SNAKES

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Abstract: Varying light levels caused by different moon phases has been shown to affect the activity levels across a wide range of taxa in the animal kingdom. Research has shown the amount of moonlight affects the nocturnal behavior of snakes, which is highly variable depending on the species, but almost no research has been done investigating how varying moon phase affects diurnal activity the following day. In this study, we correlated the diurnal activity levels of 8 species of east Texas snakes (*Coluber constrictor*, *Micrurus tener*, *Pantherophis obsoletus*, *Masticophis flagellum*, *Thamnophis proximus*, *Heterodon platirhinos*, *Agkistrodon contortrix*, and *Lampropeltis calligaster*) with moon phase over the course of 6 months. Each species was classified into one of the following daily activity categories: diurnal, nocturnal, and facultative. We hypothesized that diurnal and facultative snakes will exhibit species-specific activity patterns relative to moon phase, and the nocturnal snake will increase active during the

full moon phase. To test these hypotheses, we analyzed a herpetological survey database of 8.6 million images to characterize correlations between 470 observations of the previously listed snake species and moon phase. Database images were collected from camera arrays consisting of a plus design drift fence with a central camera trap instead of a pitfall or funnel trap. These cameras took an image every 30 seconds in order to capture photographic evidence of large snake species. Preliminary analyses suggest moon phase is important in determining snake activity; however, snakes from the same activity category do not necessarily exhibit the same activity patterns.

BROOD RANGE VARIATION OF NORTHERN BOBWHITE FEMALES IN THE GULF PRAIRIES AND MARSHES OF TEXAS

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Abstract: A moderate number of northern bobwhites (*Colinus virginianus*) can be found in the Gulf Coast Prairies and Marshes Ecoregion of Texas. Much is known about adult northern bobwhite home ranges, but information about hen-brood home ranges is lacking because they are, by nature, more challenging to track. The goal of our study was to determine if there was a difference in mean home range size among females with and without broods in this region. Northern bobwhite females were trapped with baited funnel traps on the Attwater Prairie Chicken National Wildlife Refuge (Colorado County) and marked with leg bands and radio-transmitter collars then released back at the site of capture. We attempted to locate females via radio telemetry 4 or more times per week. The minimum convex polygon (MCP) method was used to determine home ranges of the females, with and without a brood. Females with a brood had a mean range of 11.9 ha (SD = 5.3 ha), while females without a brood had a mean range of 38.7 ha (SD = 21.7 ha). Females without broods had a significant ($P = 0.0038$) larger mean range size than females with a brood. One possible explanation for the smaller brood range size of females with broods is they localize their movements in an area with good cover and concentrated food rather than traveling between feeding areas and thus exposing the brood to predators.

OPTIMIZATION OF SODIUM NITRITE AS AN ORAL TOXICANT FOR FERAL SWINE

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Abstract: Research and management experience have shown that when attempting to control invasive and adaptive species of vertebrate pests it is most efficacious to take an integrated pest management approach that incorporates the timely use of a variety of cost-effective methods to minimize damage. Several methods can be employed to manage feral swine, but they have not proven efficient or cost effective in reducing damage or limiting populations on broad scales. Methods such as shooting or trapping with humane destruction are currently used to reduce densities of feral swine but neither option reliably achieves the desired control range-wide. Additional lethal methods that can be more broadly applied are needed to address this issue and development of a toxicant for feral swine is warranted. We describe how an interdisciplinary team from state, federal, and private entities in three countries has developed, evaluated, and will register a toxicant to target feral swine in the USA. Our team has progressed quickly in recent years to make advancements in bait stability and palatability which has resulted in mortality rates >90%. We have continued to focus on eliminating non-target risks through the development of species-specific feeders as well as evaluating the sensitivity of secondary consumers. Our science-based efforts began in controlled captive settings and will be expanded to free-range settings in representative habitats across the US. By aiding efforts to eliminate populations of feral swine, our toxicant will serve to reduce associated damages to our natural resources and thus benefit native wildlife and fish.

AVIAN COMMUNITY RESPONSE TO PRAIRIE RESTORATION EFFORTS ON THE WELDER WILDLIFE FOUNDATION

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Abstract: Grassland obligate birds are experiencing population declines across North America. Habitat loss due to brush encroachment is a primary driver of these declines. We are assessing avian community response to a brush-targeted herbicide treatment on the Welder Wildlife Refuge. We established 58 variable circle survey points in a 355-acre treatment plot and a 533-acre control plot. We conducted point count and vegetation surveys during the breeding season prior to the Aminocyclopyrachlor (DPX-MAT28) herbicide application in October 2014, and continued post-treatment surveys for breeding and wintering seasons of 2015 and 2016. We

compared various avian community and vegetation composition estimates in each study plot to determine effects following herbicide application. The herbicide treatment was successful in significantly reducing overall brush cover during the study ($P < 0.05$). Our breeding season survey results indicate high avian diversity prior to treatment, but this was ultimately dominated by 5 species: northern cardinal (*Cardinalis cardinalis*), painted bunting (*Passerina ciris*), white-eyed vireo (*Vireo griseus*), northern bobwhite (*Colinus virginianus*), and yellow-billed cuckoo (*Coccyzus americanus*). Brushland bird species density decreased in the treated plot between 2014 and 2015, and a grassland bird species density increased in the treated plot in 2016. Morisita's index of similarity showed low overlap between 2014 and 2016 avian communities in the treated plot compared to the control. These results point to a lag in breeding avian community response to herbicide effects until two years post-treatment. We are currently conducting density estimates for wintering bird community in program DISTANCE for the study period.

WINTER ECOLOGY OF A DECLINING GRASSLAND BIRD, THE SPRAGUE'S PIPIT (*ANTHUS SPRAGUEII*)

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Abstract: Sprague's pipit (*Anthus spragueii*) is a small, migratory songbird endemic to the North American grasslands. Data from long term monitoring programs reveal a population decline across the breeding and wintering range from 1966 through 2011. Research on Sprague's pipit has focused to a greater extent on the breeding grounds than on the wintering grounds and conservation of wintering habitat is limited by this lack of information. Our goal was to collect data on the wintering distribution and abundance of this species in Texas and to analyze pipit-habitat relationships at local (individual) levels. Distance-based estimates of density were between 0.07-0.1 pipit/acre, but sample size (i.e., number of detections) was relatively low. An information-theoretic approach to habitat selection models indicated the most significant variables for predicting pipit occurrence were vertical cover (14.8%), site, and exposed soil (21.8%). Percent forb, grass, exposed soil, vertical cover, and number of woody stems differed significantly ($P < 0.05$) between pipit flush points and transect points.

WOODY COVER METRICS ASSOCIATED WITH NORTHERN BOBWHITE ABUNDANCE AND PRODUCTIVITY IN THE ROLLING PLAINS

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Abstract: Landscapes that support Northern bobwhite (*Colinus virginianus*) on Texas rangeland consist of an interspersed mixture of woody and herbaceous cover. Recent research suggests that landscapes with greater amounts of brush cover express less variation in bobwhite relative abundance among wet and dry years, but the mechanisms for why variation is minimized are unknown. Our objective was to examine associations between bobwhite population performance (abundance and productivity) and landscape metrics (woody cover and precipitation) in the Rolling Plains of Texas. Using fall trapping data from the Rolling Plains Quail Research Ranch, we estimated relative abundance (no. of individuals/trap) and productivity (juvenile:adult) at each trap for the month of November during 2009–2016. We classified National Agriculture Imagery Program (NAIP) satellite imagery using ERDAS IMAGINE and calculated 9 woody-patch metrics (percent cover, edge density, patch density, mean patch area, mean shape index, largest patch index, cohesion index, clumpiness index, and aggregation index) within a 100- and 300-m buffer of each trap site using program FRAGSTATS. We will use multiple linear regression to analyze significant predictors of bobwhite relative abundance and productivity across years and configurations of woody cover.

MACRO- AND MICRO-HABITAT EFFECTS ON OCCUPANCY OF OCELOTS

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Abstract: The ocelot is a small endangered subtropical felid found in two 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. Previous research in ocelot habitat use has found that ocelots select for dense closed canopy thornshrub (>75%) and will occasionally use more open cover types. However, research need to examine if these or other habitat variables affect occupancy of ocelots. From 2011-2016, we conducted remote camera surveys on 28 sites on the East Foundation's El Sauz Ranch, Willacy County, TX. From 2011-2015, ocelots were more likely to occur in thornshrub habitat. Preliminary results for 2016 indicates thermal cover may be a factor that influences ocelot occupancy (e.g., less intense light, lower temperatures, low

wind speed, and higher relative humidity). This research provides information into habitat components most likely to influence where ocelots occur which is essential for future ocelot recovery and habitat restoration in the Lower Rio Grande Valley.

INFORMING SPECIES STATUS ASSESSMENTS WHEN DATA ARE LIMITED: A CASE STUDY WITH SPRAGUE'S PIPITS

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Abstract: The Sprague's pipit (*Anthus spragueii*; pipit hereafter) is a small, migratory passerine that breeds in northern mixed-grass prairies and winters in grasslands across the southwestern U.S. and northern Mexico. Over the last 50 years, pipit populations have experienced steep declines associated with loss, fragmentation, and degradation of grasslands in the Great Plains. Given downward population trends and suspected future threats to pipit habitat, the USFWS was petitioned to list the species as Threatened or Endangered in 2008. The Service determined that the listing was 'warranted, but precluded' due to higher conservation priorities. From 2014–2015, the USFWS solicited expert opinion and analyses to identify the conservation status of pipits under their newly adopted Species Status Assessment (SSA) Framework. To address data gaps on the wintering grounds in Texas, we answered the following questions: (1) Where is potential pipit habitat located? (2) To what degree, and where, is pipit habitat at risk of conversion? (3) How do grassland conservation efforts align with potential pipit habitat and areas at risk of conversion? Because there were no range-wide survey data available at the time of our study, we developed an innovative approach to habitat and conversion risk mapping using citizen science records and remotely-sensed imagery. We will summarize our results, describe how our methodology aligned with the goals of the SSA process, and discuss how our approach could be applied to other species during time-sensitive listing decisions.

SPECIES STATUS ASSESSMENTS: A NEW FRAMEWORK FOR ASSESSING SPECIES VIABILITY UNDER THE ENDANGERED SPECIES ACT

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Abstract: The U.S. Fish and Wildlife Service recently adopted an integrated and conservation-focused analytical approach, the Species Status Assessment (SSA) Framework, to assess a species' biological status for the purpose of informing decisions and activities under the Endangered Species Act. The SSA process is focused exclusively on a scientific analysis of a given species' viability using empirical data, expert opinion, and forecasting (using conceptual

and/or mathematical models) that incorporates best available biological and threats-based information. SSAs use the conservation biology principles of resiliency, redundancy, and representation (collectively known as the “3Rs”) as a lens to evaluate the current and future condition of the species. SSAs provide for consistent and improved assessments because they are focused, repeatable, and rigorous scientific assessments evolved from a collaborative and integrative process. SSAs streamline implementation of the ESA by providing a single source for all ESA decisions (listing, consultation, grant allocations, permitting, HCPs, and recovery planning). Finally, the SSA framework results in improved and more transparent and defensible decision making, as the SSA does not result in a decision directly, rather it provides the best available science for comparison to policy standards to guide ESA decisions.

FACTORS INFLUENCING THE SPATIAL AND TEMPORAL DISTRIBUTION OF TANGLEHEAD ON SOUTH TEXAS RANGELANDS

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Abstract: Tanglehead (*Heteropogon contortus*) is a perennial grass native to Southwestern US rangelands; however, large monotypic stands of tanglehead have emerged over the last decade in Jim Hogg and Kleberg Counties, simplifying native vegetative communities. Unfortunately, little is known regarding the spatial extent of this invasion. The goal of this project is to determine the extent and spatial distribution of tanglehead in Jim Hogg and Duval Counties. The specific objectives are: (1) to determine the feasibility of classifying tanglehead from other vegetation types using National Agriculture Imagery Program (NAIP) aerial imagery and (2) to quantify the spatial and temporal distribution of tanglehead in relation to soil type and the distance from roads. To achieve this goal, 22 color-infrared 1-meter resolution NAIP imagery (2014) were classified by combining the NAIP bands (red, green, blue, near infrared) with the normalized difference vegetation index (NDVI) to identify tanglehead from other land cover types. The overall accuracy exceeded the minimum national standard of 85% and was assessed using a confusion matrix. This process was repeated for imagery available in 2008, 2010, and 2012. We found that the presence of tanglehead increased in Jim Hogg County from 8% (2008) to over 30% (2014) on site 1 and from 8% (2008) to 20% (2014) on site 2, with the greatest increases occurring in areas with higher sand content. The distance from roads analysis indicated that most of the tanglehead present in the landscape (>50%) occurred within the first 250 meters from the road.

RESPONSE OF GRASSLAND BIRDS TO VARYING AGRICULTURAL TYPES AT DIFFERENT SPATIAL SCALES IN 20 TEXAS COUNTIES FROM 2013 TO 2016

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Abstract: Grassland bird decline is associated with habitat loss due to conversion to agricultural lands and alterations of natural disturbances. Therefore, it is expected that different agriculture types would have varying impacts on grassland bird abundances. We sought to identify agricultural effects on grassland birds at the county and point scale. 150,423 roadside point count surveys following the Breeding Bird Survey protocol were performed from 2013 to 2016 in 20 Texas counties during the months of May and June. To estimate the coarse effects of agriculture at a county level, cattle head and amount of area per crop type were used for analyses (NASS, 2012). The ability of each variable to predict the average number of birds per point was estimated via linear models and stepwise selection. An analysis at the scale of the point count was also performed for northern bobwhite (*Colinus virginianus*) using annual agricultural data from the NASS' Cropscape database. Generalized linear models and stepwise selection were used to estimate predictive ability of variables on this scale. For county level analyses, models including agricultural data were identified for 4 species. For rufous-crowned sparrows (*Aimophila ruficeps*) and field sparrows (*Spizella pusilla*), top models included the number of cattle per county ($R^2 = 0.10$; $R^2 = 0.29$), while for yellow-billed cuckoos (*Coccyzus americanus*) it included cattle per county and year ($R^2 = 0.23$). For dickcissels (*Spiza americana*), top model predictors included year and the proportions of woodland agriculture and pasture ($R^2 = 0.33$). Additionally, preliminary results indicate that several agricultural factors may impact bobwhite abundance at finer scales.

A DIETARY PREFERENCE STUDY FOR THE TEXAS STATE BISON HERD IN CAPROCK CANYON STATE PARK

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Abstract: Saved by Charles Goodnight and his wife during the 1800s, the Texas State bison herd in Caprock Canyon State Park, Briscoe County TX, is the only remaining herd of southern plains bison (*Bison bison bison*). Research has found that the bison in this herd have three unique genetic markers not found in the DNA of other bison in North America. Texas Parks and Wildlife (TPWD) has been working on the stability and success of the herd; their work includes restoration of habitat for the bison and slowly increasing their semi-free range area. Further research is needed on dietary preference of the southern plains bison to ensure restoration is headed in the right direction as TPWD attempts to restore the entire 6,070 hectares of Caprock Canyon State Park. Currently, TPWD is collecting fecal samples and tracking the bison using

Global Positioning System collars. Our research will analyze available and fresh fecal samples for seasonal diets, annual diets, and forage preferences. We will also use movement data to assess patterns in movement that coincide with dietary preferences. In addition, we will conduct vegetation sampling using Daubenmire frames to study availability of herbaceous plant species. Our results will fill a major void in the dietary requirements and behavior of southern plains bison, aid TPWD as they continue to restore Capock Canyon state park, and provide a model for future research on dietary preference for mammals as a whole.

ROOSEVELT ELK USE OF A NEW FORAGE PATCH IN REDWOODS NATIONAL AND STATE PARKS

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Abstract: Redwood National and State Park, California, is home to an irruptive herd of Roosevelt elk (*Cervus elaphus roosevelti*) known as the Davison herd. In the last two decades the Davison herd has experienced a four stage irruption as described by Professor Aldo Leopold in 1943. This herd recently gained access to a new meadow called the cattle pasture, which is near the meadows already used by the herd. Cattle and predators, both of which can affect elk activity, have access to the cattle pasture. My focus is assessing monthly variation in elk, cattle, and black bear (*Ursus americanus*) presence and absents activity within the cattle pasture. Data were collected by seven infrared cameras placed around the cattle pasture. Diurnal and nocturnal activity of the three species was measured. Activity was when one or more individuals used the cattle pasture in a day. Camera data has been collected between June and September, 2016. Analysis of Variance results showed there was no variation across months in elk activity, however, cattle and black bears displayed monthly variation in activities. By understanding the Davison herd's activity in the cattle pasture along with the activity of cattle and predators, managers can better understand how this new forage opportunity will affect the herds' population dynamics.

FINE SCALE POPULATION TRENDS OF WHITE-WINGED DOVE 2008-2016

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Abstract: White-winged dove (*Zenaidia asiatica*, WWDO) populations have expanded over the last few decades and are associated with urban environments more than rural ones (81.2% and 19.8%, respectively; TPWD). 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 assess the population trends of WWDO at the city level as well as to provide an

updated urban dove population estimate for 2016. To accomplish this, we used the Conventional Distance Sampling Engine (CDS) in Program DISTANCE 6.2 to quantify densities at the city level. We truncated data by the largest 10% of observation distances to reduce the effects of outliers and selected models using Akaike Information Criteria corrected for small sample size (AICc). Preliminary analyses indicate that, predictably, the greatest increases in WWDO populations by city occurred in the ecoregions that had the most population growth over the survey period: Post Oak Savannah, Cross Timbers, and South Texas. Additionally, larger cities and those undergoing rapid urban development over the survey period (i.e. San Marcos, Denton) also experienced larger WWDO density increases (0.217 birds/ha 2008, 4.387 birds/ha 2015; 0.327 birds/ha 2008, 2.087 birds/ha 2015, respectively) as opposed to more rural towns. Knowledge of fine scale population trends of WWDO will allow us to address survey effort issues going forward. Routes within the UDS will likely need to be altered to make the survey as efficient as possible by allocating resources towards WWDO population centers.

EXPLORING VARIATION IN SURVIVAL OF YELLOW MUD TURTLES IN TEXAS

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Abstract: Turtles are declining globally, but a general paucity of information on variation in demographic rates hampers management. Yellow mud turtles (*Kinosternon flavescens*) are a highly adaptable species occupying a diversity of habitats throughout their range. Mud turtles also produce growth lines that have been used for aging. These lines theoretically allow for age-structured analyses, although this is considered controversial by some researchers. Collectively, these qualities make these turtles desirable models to study demography. Our goals were to explore variation in yellow mud turtle survival through a 760-km north-south gradient, and to compare age-structured regression to capture-mark-recapture (CMR) as techniques for estimating survival. We estimated ages from impressions of 2,428 captures of 1,634 individuals from 8 different study sites over periods ranging from 1-10 yrs/site. Using age-structured regression, we estimated annual survival rates of 65.2% to 85.6% across the sites. Capture-mark-recapture survival using a Jolly-Seber model from 3 sites with many years of data produced estimates of 75.1% to 86.7%. The differences between the 2 methods were all <1.1%, suggesting that age-structured regression can be as robust as CMR for survival estimation. The survival rates varied greatly across the sites, however this variation did not follow the spatial gradient. We expected to see a clinal climate effect along the gradient corresponding to length of the active season, but our results suggest that local factors have a stronger influence. Further exploration is needed to address what site-specific mechanisms are driving this variation, but hydroperiod and mesocarnivore density are likely factors.

ANTLER CHARACTERISTICS AND AGE STRUCTURE OF MULE DEER IN TEXAS

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Abstract: In cervid management, antlers can be used as a selective harvest tool to reduce harvest of young animals. Since 2002, with the implementation of antler restrictions by Texas Parks and Wildlife Department (TPWD) on white-tailed deer (*Odocoileus virginianus*) in eastern Texas counties, the average age class and antler size of harvested bucks have increased. With regards to mule deer (*O. hemionus*), harvest and population data show that a high percentage of bucks are being harvested at ≤ 3 years of age in the southeastern Panhandle, resulting in a young buck age structure. TPWD data also indicates that mule deer bucks reach their greatest antler size at ≥ 6 years of age; suggesting that mule deer antler quality and hunter satisfaction are currently not reaching their potential. The idea of increasing age structure, and hence antler size, of mule deer bucks in the southeastern Panhandle through an antler restriction has arisen. If an effective antler restriction is possible for mule deer, as it is in white-tails, ear tip-to-tip and inside/outside antler spread measurements must be understood for each age class of bucks. Data was collected from various on-going mule deer studies and TPWD harvest data. This study will add to the information we have on antler and ear spread characteristics for mule deer in Texas, thus allowing TPWD to further explore an antler restriction for mule deer in certain areas of the state.

BASELINE DATA ON WINTERING BATS AND ROOSTS IN TEXAS

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Abstract: White-nose syndrome (WNS), caused by a fungus (*Pseudogymnoascus destructans*), has led to substantial declines in population size of some bat species in eastern United States. Of the 33 species in Texas, three are known to be susceptible to the fungus. Based on current rates of expansion, WNS could possibly arrive in Texas within the next few years. 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, abundance, distribution, and environmental characteristics at 19 sites from January-March 2016, and visited an additional 67 sites in the late spring-summer and assessed for a potential occupancy by bats. We recorded four bat species over the course of our winter surveys. Of the 120 bats swabbed for WNS, 117 were tested for *P. destructans* using real-time PCR. All swabs were negative for *P. destructans*. Baseline data on winter roosts and bats in Texas will play a critical role in developing management plans prior to the arrival of WNS, and how to proceed should it arrive.

MOTIVATIONS OF PROFESSIONALS AND STUDENTS TO PURSUE A CAREER IN NATURAL RESOURCES IN TEXAS

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Abstract: The Wildlife Society is interested in recruiting diverse individuals into the profession. Our goal was to understand why Texas students and professionals chose to enter a career in natural resources. We developed an online survey with questions regarding recruitment, motivation, and supports and barriers to entering the field. The survey was e-mailed to students and professionals Texas. Overall individuals knew they would enter this field during pre-k–12th grade. We found that intrinsic motivation (internal to the individual) was more important than extrinsic motivation (external rewards), with females having higher in intrinsic motivation than males ($p < 0.005$). All individuals indicated media and organized science/natural resource activities were important to attracting them to the field. However, older groups also attributed their interest in the profession in part to family and outdoor activities; whereas, younger groups did not include these experiences as important in their attraction to the field. An individual's passion and personal interests provided the greatest intrinsic supports; while job activities and mentoring provided the greatest extrinsic support. Low pay, lack of educator/administrative support, and job security were identified as the biggest barriers. Generally, everyone was attracted to the profession through the same sorts of activities, experiences, and motivation. This indicates the profession must do better at providing more experiences for youth that target nontraditional gender and ethnicities to diversify the field. Hiring managers, natural resource managers, professional societies and human resource departments can use these results as they recruit individuals to the field and retain individuals in this field.

“THIS COULD CHANGE EVERYTHING!” - A NEW OPPORTUNITY TO OBTAIN ALTERNATIVE FUNDING FOR WILDLIFE CONSERVATION

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Abstract: Funding for wildlife conservation is not guaranteed and fluctuates annually. Historically, funds have been more stable for game species which we hunt or fish with the issuance of Pittman-Robertson and Dingell-Johnson Act funds. However, for nongame species, those not regulated with hunting/fishing seasons, funding can fluctuate or even disappear from year to year. The Texas Conservation Action Plan (TCAP), originally completed in 2005 and revised in 2013, includes 1,310 plants and animals on the Species of Greatest Conservation Need list. While the number of at-risk species on this list is on the rise, funding allocated to study, conserve, and reverse these declines is not. Efforts are being made at the national level by the Blue Ribbon Panel, a group affiliated with the Association of Fish and Wildlife Agencies, to garner support for the new legislation entitled “Recovering America’s Wildlife Act (H.R.

5650)". This new legislation would dedicate up to \$1.3 billion dollars of existing revenue from the development of energy and mineral resources on federal lands and waters, potentially providing Texas itself with \$65 million in alternative conservation funding. In this presentation, we present the challenges of our profession's funding models and provide an introduction to the Blue Ribbon Panel and its goals.

"THIS COULD CHANGE EVERYTHING!" - A TIPPING POINT FOR THE FUTURE OF WILDLIFE CONSERVATION

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Abstract: As conservationists, we find ourselves constantly wanting to do more; often times with fewer resources available than are needed to complete the job. A lack of steady and sufficient funding for wildlife conservation has historically led to boom and bust phases for wildlife professionals and for the ecosystems that we protect. Federal and state agencies, University faculty, graduate students, landowners, and consultants rely on funding tied to legislation passed decades ago (Pittman-Robertson and Dingell-Johnson Act funds). While wildly successful, these funds have their limitations and do not cover conservation work needed for the almost 12,000 nongame species of concern at the national level, including the 1,310 plants, animals, and their associated habitats on the Species of Greatest Conservation Need list here in Texas. There is a need now more than ever to align our conservation need with the conservation action required. That tipping point is NOW, and a new opportunity is here to bridge that gap and secure reliable natural resource funding. At the national and state level, organizations are gathering to secure up to \$1.3 billion from existing revenue from the development of energy and mineral resources on federal lands and waters, potentially providing Texas itself with \$65 million in alternative conservation funding. Now is the time for members of the Texas Chapter of the Wildlife Society to learn about and support this effort, which will significantly and positively impact the state's finite natural resources and our future jobs.

EVALUATION OF THE FEASIBILITY OF TRANSLOCATING WILD TEXAS HORNED LIZARDS TO FORMERLY OCCUPIED HABITAT IN THE TEXAS CROSS TIMBERS

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Abstract: We conducted a three-year study to evaluate the feasibility of reintroduction of Texas horned lizards (*Phrynosoma cornutum*), a state threatened species in Texas that appears to be declining throughout its distribution. Lizards were translocated from natural populations in

western Texas to Muse Wildlife Management Area in the Cross Timbers of central Texas, an ecoregion that has experienced apparent local extirpations of horned lizards. After soft enclosure releases, we tracked horned lizards daily to evaluate movements, spatial use, sources of mortality, and reproduction. Although we observed reproduction each year, and body condition of lizards remained mostly stable, mortality from predation was particularly high, and may ultimately hinder success of the project.

DISPERSAL PATTERNS OF JUVENILE GOLDEN EAGLES DURING THEIR FIRST TWO YEARS

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Abstract: Golden eagles (*Aquila chrysaetos*) are reclusive in nature, occur at low densities, and can travel great distances, making it a difficult species to study. To date, there have not been any studies focusing on dispersal patterns, habitat use, survival rates, and home range of golden eagles in the Southern Great Plains and Trans Pecos regions. Platform terminal transmitters (PTTs) and other satellite telemetry devices make such studies possible by providing highly specific global positioning data from anywhere around the world. We attached PTTs to 20 golden eagle nestlings in the Southern Great Plains and Trans Pecos regions in 2015 and 2016. Each PTT was programmed to retrieve multiple location data each day. Our goal is to determine survival rates, dispersal and movement patterns within the first two years post-fledging, as well as seasonal and annual home range size and habitat use. We are using Program MARK to analyze daily survival rates and ArcGIS 10.3.1 to analyze dispersal, home range, and habitat use. As this is an ongoing study with data added daily, we will present up-to-date survival, movement, and habitat assessments for our study population.

MESO-MAMMAL CAVE USE IN CENTRAL TEXAS

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Abstract: Few wildlife studies examine the role of caves in the ecology of meso-mammals including what constitutes typical timing or frequency of meso-mammal cave visitation nor typical behaviors or resource use. This knowledge is important not only for management of meso-mammals, but also for management of cave resources. This is especially important on Joint Base San Antonio – Camp Bullis, where many of the caves are actively managed for federally endangered arthropods. Meso-mammal scat serves an important function in a cave’s ecosystem by bringing nutrients that support cave-obligate species. The added nutrients of newly naturalized North American porcupine scat could lead to extirpation of the endangered arthropods and other cave-adapted species by invasion and settlement of more competitive or predatory terrestrial species. In this study, we aimed to both quantify and describe meso-mammal cave use on Camp Bullis using trail cameras placed in the passages and at the entrances of multiple caves for a full year. Our results show North American porcupines, raccoons, and

Virginia opossums were the three most commonly photographed meso-mammals (>87%). All meso-mammals groups showed significantly different cave use according to season, weather, and cave characteristics. Our data supports previous studies that suggest herbivorous North American porcupines largely use caves for denning and grooming, while omnivorous Virginia opossums and raccoons used caves to feed on arthropods. We suggest land managers begin monitoring meso-mammal cave use including changes in the rate of consumption of arthropods and scat deposition to better understand long-term impacts to cave system dynamics.

WATERFOWL USE AND COMPARISON OF UNMANNED AERIAL VEHICLE SURVEYS AND VISUAL GROUND SURVEYS OF WATERFOWL ON STOCK PONDS IN THE OAKS AND PRAIRIES REGION OF TEXAS

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Abstract: The Oaks and Prairies ecoregion of east-central Texas harbor numerous man-made 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. To understand temporal trends of species specific waterfowl-use of ponds, we conducted 1,186 visual ground surveys during two migration and wintering seasons on 94 ponds between October 1, 2014 and February 20, 2015 ($n = 503$), and between September 24, 2015 and March 7, 2016 ($n = 683$). Unmanned aerial vehicle (UAV) surveys were also conducted to explore the efficacy of identification and potential to limit flushing behavior, often caused by visual ground surveys. During the 2015/2016 season, 40 UAV flights were conducted during corresponding visual pond surveys to examine waterfowl behavior, collecting high resolution video data. A double-blind test, utilizing three professional waterfowl biologists, was conducted to examine observer concordance and species identification while also examining the occurrence of waterfowl flushing behavior relative to visual ground surveys. Overall waterfowl occurrence on stock ponds declined between the 2014/2015 season and 2015/2016 season, despite an increase in survey effort and length of survey season. Initial results of survey methods indicate visual ground surveys are more precise relative to UAV surveys, in terms of identification, but the potential for flushing is greater during ground surveys.

FACTORS INFLUENCING NEST SURVIVAL OF MOURNING DOVES IN THE LOWER RIO GRANDE VALLEY, TEXAS

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Abstract: In the United States, mourning doves (*Zenaida macroura*) are harvested more than all other gamebirds combined. In the Lower Rio Grande Valley (LRGV) of south Texas, mourning doves nest in both citrus and remnant woodland habitats, two land cover types that are decreasing in the LRGV. The objectives of this study were to compare nest survival between the two land cover types and to model the influence of habitat characteristics on nest survival. In 2016, we located 100 nests in 4 citrus groves ($n = 21$) and 2 woodlots ($n = 79$) in Hidalgo and Cameron Counties, Texas. We monitored nests every three days and collected nest site vegetation measurements. We used logistic-exposure and AIC model selection to determine which environmental and temporal variables predicted nest survival. Candidate models included temporal variables and nest concealment variables such as overhead cover, side cover, distance to foliage edge, and density of vegetation below the nest. Daily survival rate was higher in citrus sites (0.972) than woodland sites (0.946). We determined that predation was the primary reason for nest failure. The interaction of nesting stage and land cover type was the best predictor of survival (AICcWt = 0.30). Density of vegetation below the nest (AICcWt = 0.13) was the next supported model. Due to relatively high nest survival of mourning doves in citrus groves and the loss of native vegetation in the LRGV, it might be necessary to consider management for doves nesting in citrus groves.

TRACK DISPLAY AND CLUSTER ANALYSIS USING MATLAB FOR DAMA GAZELLE GPS COLLAR DATA

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Abstract: Some 26,000 valid geospatial data points were taken at 3 hr intervals in a pasture of 202 ha on Morani River Ranch, near Uvalde, Texas. Over a period of 18 months, various combinations of dama gazelles (*Nanger dama ruficollis*) were studied. Use of GPA collars was the method of choice because dense brush covered much of the pasture. Goal of the work using MATLAB was to learn about the movements of female groups, adult males, and 'loners,' with a view to optimizing population growth for this endangered species. The work complements previously undertaken analyses using Excel and ArcView. Concentration has been on providing

computer visualization of movements along with products that summarize the data in such a way that periods of both regular and out-of-the-ordinary activities can be identified. Wherever possible, the data are presented in a manner which simulates 'perfect' visual observations. The resulting plots are supplemented by relevant analysis results. The approach has taken advantage of the numerical, graphical, and cluster analysis capabilities of MATLAB along with its ability easily to handle large data sets. Results to date indicate that when one adult male was present, he stayed with the single group of females. With no adult male, the female group split. When three adult males were then added, there were two female groups, each with an attendant male. The third male stayed apart. These sorts of insights into social structure should help managers working with animals such as dama gazelles.

A NOVEL METHOD OF SNAKE DETECTION USING TIME-LAPSE TRIGGERED CAMERA TRAPS

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Abstract: Advancements in game camera technology have allowed researchers to explore new methodologies for studying the distributions and ecologies of vertebrate species, particularly mammals. Passive infrared (PIR) and active infrared (AIR) triggered cameras are now widely used in wildlife research; however, these studies are often species specific and are unreliable for studying poikilothermic species such as snakes. Many modern camera traps include a programmable time-lapse trigger feature, which could resolve these problems. To evaluate this method, we conducted surveys for snakes throughout east Texas remnant longleaf pine forests using time-lapse triggered cameras and a traditional drift fence design. These camera trap arrays consisted of a Reconyx PC800 mounted on a pole positioned in the center of the array, with the camera lens parallel to the ground. Twenty-six of these camera arrays were distributed across 7 sites and programmed to take a picture of the trap area every 30 seconds from 0545 to 2200. Here we present the results of our survey effort from March to October of 2016. 8,388,078 images resulted in 505 observations of 18 snake species. Our findings suggest that time-lapse triggered cameras, in conjunction with a traditional drift fence design can be an effective method for surveying across snake taxa.

EVALUATION OF CULLING INTENSITY AND CRITERIA FOR ANTLER TRAITS IN WHITE-TAILED DEER

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Abstract: Culling, or selective harvest, is a widely practiced strategy aimed at increasing antler size in managed populations of cervids. Microevolution of phenotypic traits through selection has long been practiced in laboratory or domestic populations, but the effect of culling on wild populations is poorly documented. If culling is effective at changing population antler size, the offspring sired by desirable males should display improved antler traits. However, physically immature individuals may not be able to express their phenotypic potential in variable environments. The aim of this study was to evaluate the effects of culling intensity and culling criteria based on a 7-year experiment in populations of white-tailed deer from southern Texas, USA. Three treatment areas were established; one subject to intensive culling (14 km²), one to moderate culling (72 km²), and one as a control (20 km²). Each autumn during 2006–2015, we captured male deer using the helicopter net-gun method. We estimated age and measured antler characteristics. Deer that did not meet culling criteria for their age class were sacrificed during 2006–2012. We recorded 4,264 captures of 2,503 individual deer. Culling intensity in the yearling age class in the intensive treatment ranged annually from 50 to 100%. The proportion of males that changed from acceptable to culls as they aged, based on the criteria was high in young deer. In stochastic environments, culling of physically immature males may be inefficient because young males may not display their potential for antler growth. These results will have important management implications.

ACUTE TOXICITY OF GOSSYPOL ON NORTHERN BOBWHITES

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Abstract: Cottonseed products have been used a protein feed supplement for ruminant livestock and white-tail deer (*Odocoileus virginianus*) for many years. Although cottonseed products offer a high protein supplement, they also present possible risks due to the presence of gossypol. Gossypol, a secondary plant compound found in cotton (*Gossypium* spp.), is known to be toxic to a variety of animals, particularly monogastric mammals and birds. However, there are no published data regarding the effects of gossypol on northern bobwhites (*Colinus virginianus*), which may encounter cottonseed products in the environment and subsequently ingest gossypol. We determined the oral LD50 of gossypol in northern bobwhites following the EPA's OCSPP

850.2100 Guideline: Avian Acute Toxicity Test. Through a range-finding test, we estimated that the LD50 was between 200 mg/kg and 1,000 mg/kg body weight (BW). Following the range-finding test, we administered a single oral dose of refined gossypol to quail at 262, 342, 447, 585, and 765 mg/kg BW. We observed quail daily for mortality or any signs of intoxication throughout a 31-day observation period. We measured feed consumption daily and body weight intermittently. We monitored sublethal effects, including: behavior, gross appearance, and physiological changes. Using probit analysis, we determined that the oral LD50 of gossypol in northern bobwhites is 651 mg/kg BW (95% CI, 579–731). Our results suggest that gossypol can have deleterious effects on northern bobwhites at sufficient doses. When dosed with <200mg/kg BW, birds experienced significant weight loss and decreased feed consumption.

ABUNDANCE OF MOURNING DOVES IN THE UNITED STATES USING DISTANCE SAMPLING

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Abstract: Estimating abundance of any species at large spatial scales in wildlife management still represents unique challenges due to logistics, monetary costs, and varying habitat types. For mourning doves, abundance is estimated at a management unit scale (Eastern, Central, and Western) by the use of Lincoln estimators that utilize harvest estimates, age-ratios, and harvest rates. However, in the case of a closed hunting season, there would be limited options to monitor this species' abundance at a large-scale since current monitoring is primarily hunter aided. We used distance sampling combined with standard sampling methods to design a survey to estimate the breeding population of mourning doves at a management unit scale with an annual CV = 15% over a three-year period. We utilized the previous Call-count Surveys (conducted from 1966–2013) with 20 fixed point counts per roadside route in each of the Bird Conservation Regions (BCR) in the conterminous 48 states. We used previous Breeding Bird Survey data from 2010–2012 to index populations and population variance by BCR. Per standard sampling

techniques, more routes were conducted in BCRs with higher populations and variance compared to BCRs with lower populations and variance. For the Central Management Unit, where Texas resides, we estimated the breeding population of mourning doves to be 103,617,580 (CV = 11%) and 109,077,750 (CV = 12%) in 2014 and 2015, respectively. Based on preliminary results, these methods appear to have promise to monitor mourning doves on a large-scale.

INCORPORATING RESEARCH INTO THE UNDERGRADUATE WILDLIFE CURRICULUM

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Abstract: An undergraduate research project was incorporated into a course to improve bird identification, study design, and writing skills. The course “Wildlife Management Techniques” aims to provide hands-on experiences to students and give them exposure to a variety of field methods used in wildlife science. A bird observation study in combination with data contribution to a citizen science project was proposed as an addition to the existing curriculum. Students formed a research question, designed a 4-week bird observation study to address the question, and wrote a report in scientific journal format. Students (N = 38) were given a written pre-survey, prior to starting the project, and a post-survey following project completion. These surveys assessed their knowledge and attitudes towards scientific writing, study design, bird identification, and citizen science. Positive changes were expected in student awareness of citizen science, confidence in conducting a research project, improved bird identification skills, and increased interest towards bird conservation. Students significantly improved their ability to identify birds by full common name, increasing their scores by an average of 17 points. Ninety-two percent of students correctly defined citizen science. Eighty-nine and 97% of students agreed that the course helped them improve their bird identification and research/survey skills, respectively. This research project allowed students to gain experience in an area generally not taught in the undergraduate program, exposed them to new research areas, provided a collaborative working environment, and initiated their role as researchers. With these newly developed skills, students become more marketable for future employment or graduate school opportunities.

BREEDING BIRD ABUNDANCE AND LANDSCAPE PRODUCTIVITY ON SOUTH TEXAS RANGELANDS

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Abstract: The use of Normalized Difference Vegetation Index (NDVI), a measure of landscape “greenness,” has moved to the forefront in identifying wildlife-habitat relationships. The breeding season is a critical component of the avian life cycle with higher nutritional requirements to feed young, maintaining protection from predators, and attracting mates. Our objective is to determine relationships between avian abundance and NDVI during the breeding season on South Texas rangeland vegetation. Breeding bird point counts were conducted in May and June on the East Foundation’s El Sauz Ranch from 2014-2016. NDVI values were extracted from MODIS imagery. We predicted that total bird counts would have a positive relationship as spring progresses into June and thus more green vegetation is available (i.e., higher NDVI levels). Bird counts in each month were analyzed with a generalized linear mixed model assuming a negative binomial distribution and accounting for repeated measures at N = 37 point count stations. The relationship among bird counts and NDVI levels depends on the year (i.e., drier versus wetter) and NDVI levels in months prior to and during bird counts. In a drier year, NDVI had very little effect on May counts, yet June numbers were related to previous levels of NDVI. In a wetter year, bird numbers were positively related to previous NDVI levels in both survey months. NDVI can help determine ideal conditions for breeding bird surveys and appears to be an important factor that influences bird numbers.

USING SOIL ASSOCIATIONS TO MODEL POTENTIAL HABITAT OF THE TEXAS KANGAROO RAT

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Abstract: The Texas Kangaroo Rat (TKR, *Dipodomys elator*) is a species of concern in Texas with sightings in only 5 counties in the past 30 years. The decline of TKR has been attributed to habitat loss. Habitat studies have focused on microhabitat and burrow associations but have failed to create an accurate landscape level habitat model. Multiple species within the genus

Dipodomys have demonstrated strong associations with certain soil types. Our goal was to determine which soil features are associated with TKR, and then use these associations to model potential TKR habitat across their historic 11 county range. During the summer of 2016, we surveyed with spotlights at night for TKR over 1,473 miles of public roads throughout its historic range. We found TKR at 75 locations among 5 counties. For analysis, random points were generated along the surveyed roads to create a dataset of points representing TKR absence. A two-group randomization test was used to determine if percent composition of soil types (within 50 meter buffers surrounding the points) were significantly different between presence and absence points. Presence points had a greater proportion of clay loam as the topmost soil layer ($P < 0.05$) and friable clay as the underlying soil ($P < 0.05$) than did absence points. A potential habitat model based on clay loam overlaying friable clay was created using GIS software and the USDA-NRCS Soil Database. This model portrays a more confined range than that shown by previous modeling efforts.

ARTIFICIAL NEST ACCURACY AND FACTORS INFLUENCING NEST SUCCESS FOR NORTHERN BOBWHITE

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Abstract: Nest success of northern bobwhites (*Colinus virginianus*) is a key variable in quail production. Anthropogenic factors such as roads and quail feeders are speculated to reduce nesting success by increasing nest depredation. Artificial nests have been used to evaluate the influence of roads and feeders on nesting success, however, using artificial nests to depict actual nest success has been questioned, and empirical results are equivocal. Our objectives were to 1) compare nest success between artificial nests ($n = 705$) and actual nests ($n = 135$), and 2) analyze the influence of age, year, gender, and nest proximity (meters) to quail feeders and roads on bobwhite nest success using data from the Rolling Plains Quail Research Ranch, 2012–2016. We found no correlation between success of artificial and bobwhite nests ($P = 0.87$). We used a backward stepwise selection to determine the candidate variables included in the final model. Age and nest proximity to road were both significant predictors of bobwhite nesting success. Juveniles (i.e., first year breeders) exhibited higher nest success (74.4%, $n = 82$) than adults (50.9%, $n = 53$, $P = 0.005$). Likelihood of bobwhite nests hatching increased as their distance to roads declined ($P = 0.008$, $\beta = -0.013 \pm 0.005$ [SE]). Our results suggest researchers should heed caution when making inferences using artificial nest data. Anthropogenic factors did not negatively influence nest success within the context of our study area.

QUANTIFYING HABITAT-SUITABILITY BOUNDS FOR MONTEZUMA QUAIL IN THE EDWARDS PLATEAU

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Abstract: Very little is known about the Montezuma Quail (*Cyrtonyx montezumae*) in the Edwards Plateau. This population has declined over the past 150 years due to incompatible land use practices, where these birds became mostly restricted to pockets of habitat in and around Edwards County. More recently, interest in this species has been renewed with a shifting focus towards wildlife management instead of livestock production in the region. Unfortunately, little information exists regarding habitat-suitability bounds and best management practices for this population remaining in the Edwards Plateau. The objective of our study was to quantify habitat-suitability bounds for Montezuma quail in the Edwards Plateau. During 2015 and 2016, we sampled for Montezuma quail, twice per month, at 60 points on 9 ranches using call-back surveys. Points were stratified between areas of high, medium and low juniper (*Juniperus* spp.) densities, slope and elevation, and between hill tops, hillsides and valleys to account for the greatest amount of variation possible. Macro-habitat variables (e.g. plant community, topographical location, elevation, and total woody plant coverage) were determined and micro-habitat variables (e.g. juniper coverage, herbaceous cover, herbaceous height, and food plant density) were quantified at each sampling location. Responses by Montezuma quail were recorded at 40% of our call-back locations. Fifty-six percent of these occupied points were documented at survey locations on hillsides or in areas with low juniper density. Information from this study will provide landowners with tangible information to manage for this beautiful and secretive quail species in the Edwards Plateau.

DOES WHITE-TAILED DEER BROWSING RESULT IN BROWSE LINES ON THREE PREFERRED SOUTH TEXAS WOODY PLANTS?

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Abstract: Intense white-tailed deer (*Odocoileus virginianus*) browsing typically results in a reduced canopy volume of woody plants. In semiarid environments, the effects of intense deer browsing may be less pronounced because woody plants are capable of compensatory growth. Supplemental feed may reduce the effects of increasing deer density. Our objectives were to determine if (1) woody plant canopy volume decreases with increasing deer density and (2) if maintaining a ratio of 20 deer/feeder reduces the effect of increasing deer density on canopy volume of spiny hackberry (*Celtis pallida*), blackbrush acacia (*Acacia rigidula*), and guayacan (*Guajacum angustifolium*). Pairs of each plant species were selected within research enclosures

in June 2013 and one plant/pair was randomly chosen for an enclosure to eliminate deer browsing. During July 2013-2016, canopy volume was estimated by measuring plant height and diameter at 0.25-m height increments. There was no effect on guayacan or blackbrush acacia <1.5 m tall ($P > 0.05$). Year altered spiny hackberry <1.5 m tall ($P = 0.03$). Irrespective of density, deer browsing caused a decline in the canopy volume of blackbrush acacia >1.5 m tall ($P < 0.02$). Canopy volume of spiny hackberry >1.5 m tall increased with increasing deer density with one feeder and with increasing deer and feeder densities together ($P < 0.05$), except at the highest density ($P = 0.04$). There is minimal evidence of 'browse lines.' Spiny hackberry >1.5 m tall follows the grazing optimization hypothesis by overcompensating for tissue removed at all densities except our highest density.

HABITAT FACTORS INFLUENCING NORTHERN BOBWHITE ABUNDANCE IN TEXAS

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Abstract: Grassland birds are declining at an alarming rate, commensurate with losses of grassland habitat. An icon of grassland birds, the Bobwhite quail (*Colinus virginianus*), is one of the most intensively studied bird species, with over 3,500 publications dedicated to its natural history, autecology, and management. Yet, despite this enormous amount of research, the species has undergone a substantial long-term decline. While previous research has identified several biotic factors which influence abundance in a stochastic manner (i.e., short and long term weather fluctuations, disease), researchers have speculated that habitat loss due to anthropogenic land use change is the most likely cause for the long-term decline. We used multivariate constrained ordination analyses to compare economic, agricultural, and anthropogenic metrics among ecoregions in Texas over a 20 year period (1993–2012). Landscape variables explained 88.60% of the variance among ecoregions (canonical discriminant analysis; $P < 0.0002$, $nperm = 4,999$), and 74.47% of the variance in bobwhite relative abundance (redundancy analysis; $P < 0.0018$, $nperm = 4,999$), as measured by the Breeding Bird Survey and Texas Parks and Wildlife Department Annual Quail Survey during this period. Most metrics of anthropogenic land use were negatively correlated with quail relative abundance. Our results indicate that increases in

land values (market value and production value per acre) and human population density may signal the onset of anthropogenic land conversion, and might be used to predict future changes that will impact grassland bird species and other natural resources.

A COMPARISON OF LEAD AND STEEL SHOT LOADS FOR HARVESTING MOURNING DOVES

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Abstract: With approximately 100 million shots fired at mourning doves (*Zenaida macroura*) annually, it is incumbent on managers to determine whether changes in ammunition will substantially alter harvest metrics or hunter satisfaction. We compared mourning dove harvest metrics for 1 lead (Pb 7 1/2, 32 g) and 2 steel (Fe 7 and Fe 6, 28 g) 12-gauge ammunition types using a double-blind field test in central Texas, USA. There were no differences in the number of attempts, or number of shots fired among ammunition types. Hunters were unable to distinguish the ammunition type being used in the field, and we detected no relationship between ammunition type and level of hunter satisfaction. Field analyses detected no difference in doves bagged per shot, wounded per shot, bagged per hit, or wounded per hit among the 3 ammunition types. Necropsy analyses detected no difference in the proportion of birds with through-body strikes, mean penetration depth of through-body strikes, or mean embedded pellet depth among ammunition types. Ammunition and choke combinations that produced higher pattern densities yielded more hits per shot and produced more total strikes per bird, resulting in a higher percentage of birds with embedded pellets, more embedded pellets per bird, and a higher proportion of birds with broken legs. All 3 ammunition types retained sufficient lethality to harvest mourning doves under typical hunting conditions. Our results demonstrate that when the ammunition type used provides sufficient lethality for pellets to penetrate vital organs, pattern density becomes the primary factor influencing ammunition performance.

RETURNING THE LOUISIANA PINE SNAKE TO RESTORED HABITAT

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Abstract: Ongoing surveys suggest that the Louisiana Pine Snake (*Pituophis ruthveni*) is rapidly declining, and currently occupied habitat is limited to a few small blocks of degraded and highly fragmented habitat. 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 of ~100 individuals was previously established from wild-caught snakes from Bienville Parish, LA. A reintroduction site was chosen on the

Catahoula District of the Kisatchie National Forest. Eighty-three individuals have been released to date, and 5 snakes are currently being head-started and are planned for release in April 2017. The current protocol is to continue to breed captive snakes and 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 (APTR) and trapping are the primary monitoring techniques, however canine detection and radiotelemetry, may be used in the future. For the next few years, we will release fewer snakes while we consolidate 109 snakes located across 24 zoos, into four dedicated facilities. 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.

GRASSLAND CONSERVATION THROUGH PLAGUE MANAGEMENT FOR PRAIRIE DOGS

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Abstract: Five species of prairie dogs (*Cynomys* spp.) are essential to shortgrass prairie conservation in western North America. In turn, literally hundreds of species depend on the shortgrass prairie ecosystem. Unfortunately, sylvatic plague, an exotic disease, has wreaked havoc on prairie dogs since arriving on the continent in the late 1800s. Plague affects prairie dogs by both enzootic mortality and periodic epizootic outbreaks. To address plague management, 25 State, Federal and Tribal agencies and nongovernmental organizations tested a new Sylvatic Plague Vaccine (SPV) over the entire range of the prairie dog between 2014 and 2016. Personnel from Texas Wildlife Services program applied treated and placebo baits to 2 sites on the Rita Blanca National Grasslands to test the efficacy of SPV in controlling plague mortality in prairie dogs. The project is a component of the Western Association of Fish and Wildlife Agencies (WAFWA) Grasslands Conservation Initiative and the Black-footed Ferret Recovery Implementation Team. If proven efficacious, the vaccine could enable agencies and stakeholder cooperators to maintain specific populations of prairie dogs at robust levels, thus enhancing rangewide conservation of grassland species. The results of clinical and field testing in the early stages of developing this vaccine are preliminary but promising. A plan for broad-scale application is being developed and if warranted, the vaccine would be registered for governmental use.

FRESHWATER MUSSEL RESEARCH IN CENTRAL AND WEST TEXAS: HIGHLIGHTS, CONSERVATION IMPLICATIONS AND FUTURE DIRECTIONS

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Abstract: Freshwater mussels (Bivalvia: Unionoida; hereafter mussels) are one of the most imperiled wildlife taxa in the world, with rates of extinction exceeding levels of imperilment in all other groups of freshwater organisms. In Texas, there are 15 species listed as state threatened, of which five are candidates for protection and one has been proposed as endangered under the U.S. Endangered Species Act. Over the past five years, researchers at Texas A&M Institute of Renewable Natural Resources (IRNR) have made significant contributions toward mussel conservation efforts for several of these species in central and west Texas. Much of this research has focused on improving knowledge of their conservation status, systematics and life history. As a result, our research has been used to inform listing decisions and to develop strategies to protect threatened species and mussel diversity. This presentation provides a retrospective look at past and present research performed by our group through several cases studies for threatened mussel species from central and west Texas. Implications of this research and future research needs also will be highlighted.

DETERMINING PRECISE MIGRATORY STOPOVER AND OVERWINTERING SITES FOR A TEXAS POPULATION OF PURPLE MARTIN BY USING NEW G.P.S. DATALOGGERS

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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 new archival GPS loggers and as part of a larger range-wide study on Purple Martins (*Progne subis subis*; fine-scale migratory connectivity and habitat use), we tracked individuals from a colony in the Texas Panhandle during two non-breeding seasons (2014/2015 [$n = 4$] and 2015/2016 [$n = 4$]) to determine precise (<10m) locations of migratory stopovers and overwintering roost locations in Central and South America. Individuals originating from this Texas-breeding population, exhibited extensive, fine-scale mixing with birds from distant (>2,000 km) breeding sites at stopover sites in Central and South America and at wintering sites in the Amazon, where on some occasions they shared the same roost sites. Stopover regions in the Yucatan and Nicaragua appear important for Purple Martins from across the breeding range. Despite vast tracts of contiguous forest in the Amazon region, birds from Texas and across the eastern range occupied a much more limited habitat, with most (63%) roosts occurring on small habitat islands

that were strongly associated with water. Wintering Purple Martins often relocated (intratropical migration) as the wintering season advanced, thus indicating the importance of identifying areas important to the species throughout the wintering period. These data reflect a critical advance in our ability to remotely determine precise migratory connectivity and habitat selection across vast spatial scales, enhancing our understanding of population dynamics and enabling more effective conservation of species at risk.

RECRUITMENT PATTERNS OF WHITE-TAILED DEER IN A VARIABLE ENVIRONMENT: WAITING FOR RAIN

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Abstract: The hall-mark of density dependence is that recruitment and survival rates are dependent on animal density such that overall production is greatest at moderate densities. In the semi-arid system of South Texas, white-tailed deer (*Odocoileus virginianus*) production and survival appear to be influenced much more strongly by environmental conditions than deer density. We investigated the influence of precipitation, age class, and site on the probability of lactation for white-tailed deer. We captured 1,862 females during October–November in 2011–2015 on 4 sites that range from the Gulf coast to 145 km inland across a precipitation gradient, where rainfall decreases east to west. We compared the probability of lactation and distribution of body condition scores for females 2.5 years-old and females ≥ 3.5 years-old. We used the Palmer Modified Drought Index (PMDI) to model soil moisture for all analyses. Probability of lactation increased with decreasing drought conditions ($P = <0.001$), and tended to differ ($P = 0.06$) between age classes. Adult females were 27 times more likely to be lactating than young females ($P < 0.001$). Lactating females had lower body condition scores than non-lactating females ($P < 0.001$). Nutrition was a limiting factor for lactation during dry years. However, adult females were more likely able to allocate more metabolic energy to lactation because they were not longer growing. Land managers should consider the effects of drought on recruitment and lactation on female body condition when making management decisions.

ASSESSING VIABILITY OF THE SPOT-TAILED EARLESS LIZARD IN TEXAS

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Abstract: Historically the Spot-tailed Earless Lizard (*Holbrookia lacerata*) occupied open grassland habitats across central and southern Texas and northern Mexico. Distribution surveys in 2008-09 detected this species at only 5% of historic localities, motivating a petition to list *H. lacerata* in 2010. In 2011, U.S. Fish and Wildlife Service (FWS) declared listing may be warranted and requested information on current and future threats to *H. lacerata* populations and habitat. To inform the 2020 listing decision, we developed a collaborative research program designed to characterize *H. lacerata* viability within the FWS's Species Status Assessment (SSA) framework. Specifically, we proposed to identify the species' resource and habitat needs, estimate abundance within habitat, model current habitat and population size, and then forecast changes in the amount of habitat and *H. lacerata* population size under different scenarios of future landscape change. Research to date (2015-16) identifies *H. lacerata* as an early-successional grassland species that thrives in heavily disturbed, but not urban, areas with bare ground and sparse vegetation. State-wide surveys demonstrate that *H. lacerata* is patchily distributed with some populations exhibiting extreme fluctuations in abundance consistent with boom-bust cycles. Genetic analyses suggest a strong division between populations of the two recognized subspecies north and south of the Balcones escarpment, and a weaker division between eastern and western populations of the southern subspecies. Although preliminary, these results help frame the structure of the upcoming SSA by defining genetically distinct units with independent population dynamics, different habitat availabilities, and therefore potentially unique viabilities across the state.

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 1981 and has become a major management concern in recent decades. Survival rates within herds of wild and captive cervids have been reduced up to 30% by the disease. The presence of CWD has influenced the economic and ecological well-being of many rural areas due to reduced hunter participation. It is believed this disease entered Texas mule deer (*Odocoileus hemionus*) from New Mexico via natural movements in the Hueco Mountain range in 2012. Chronic Wasting Disease is always fatal, and 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 gene (PrnP) affect susceptibility to CWD, incubation time, and the ability to detect the disease in infected deer. We amplified and sequenced the Prnp 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 nonsynonymous mutations in the PrnP gene, including several not previously detected in cervids. Three deer phenotypically identified as mule deer had PrnP mutations found in white-tailed (*Odocoileus virginianus*), probably due to past hybridization and backcrossing. The number and type of Prnp alleles has implications for detection and future management decisions throughout the state aimed at CWD.

DEPREDAATION OF SIMULATED WILD TURKEY NESTS BY FERAL SWINE

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Abstract: Feral swine (*Sus scrofa*) are a prolific invasive species whose continuing range expansion throughout North America has severe economic and ecological implications. Surprisingly little is known about the foraging strategies and extent of feral swine damage relative to ground-nesting birds despite reports of nest depredation for species such as the wild turkey (*Meleagris gallopavo*). The objectives of this study were to identify whether feral swine seek seasonal food sources like wild turkey nests, and to quantify the extent of nest depredation relative to other predators. Thirty-five feral swine were equipped with GPS satellite collars in south Texas and monitored at 15 minute intervals between March and July. We deployed artificial wild turkey nests within the available nesting habitat in the home ranges of feral swine using 3 treatment levels: control (i.e., no nests), low nest density, and high nest density. Movements of feral swine were monitored relative to the artificial nests and wild turkey nesting habitat. We observed an increasing trend in the use of nesting habitat by feral swine throughout the nesting season. Feral swine depredated the highest proportion of nests, followed by native nest predators such as raccoons (*Procyon lotor*) and gray foxes (*Urocyon cinereoargenteus*). These results indicate that feral swine seasonally exploit available food sources like the eggs of ground-nesting birds. This study provides further evidence that feral swine are a detrimental invasive species to an important game species and sensitive ground-nesting bird in the United States.

EVALUATION OF NON-INVASIVE FECAL SAMPLING FOR MONITORING BOBCATS AND OCELOTS IN SOUTH TEXAS

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Abstract: Current field research methods to monitor the endangered ocelots (*Leopardus pardalis*) in South Texas include live-trapping and camera detection stations. However, months of trapping efforts often result in the capture of only a few individuals; camera detection stations lack the ability to gather valuable genetic information for population monitoring. Because bobcats (*Lynx rufus*) and other carnivores are known to defecate along roads and trails within their home ranges, it may be possible to incorporate non-invasive scat sampling as an additional monitoring tool for ocelots, with added benefits such as the acquisition of DNA. This research evaluates the feasibility and sampling effort needed to determine abundance of ocelots and bobcats in areas where the two species co-occur. Our 2 study areas are on East Foundation's El Sauz Ranch, Willacy County, TX, where we collected carnivore scats along ranch roads within and adjacent to known ocelot habitat. We extracted DNA from each sample, and genetically confirmed species of origin through mitochondrial DNA sequencing. We had an 89.13% amplification success rate for identifying species of the 92 samples collected (33 bobcat, 0 ocelots) in the first replication of this study. Abundance estimates from identifying individuals with microsatellite genotyping will be compared to data from a grid of 26 camera stations within the same study areas during the collection periods. Identification of individual bobcats and ocelots with our non-invasive methods for monitoring could greatly benefit conservation efforts for these elusive felids.

SITE FIDELITY AND SURVIVAL OF CAPTIVE-REARED WHITE-TAILED DEER FOLLOWING LIBERATION

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Abstract: Texas white-tailed deer (*Odocoileus virginianus*) breeding operations frequently release captive-reared deer in anticipation of increasing the genetic quality of their deer herd. There is little understanding of how well captive-reared deer acclimate following release. Our goal was to determine site fidelity and survival of does and bucks in spring versus fall releases. Thus, 223 (103 M, 120 F) deer were released in spring and fall liberations from fall 2013–spring 2015 into a 2,630.46 ha high-fenced pasture. Additionally, deer were also released by age cohorts ranging from 1.5–3.5 years of age for bucks and 1.5–4.5+ years of age for does. Survival was measured for 118 (53 M, 65 F) radio-collared deer for 1-year following liberation. Does' survival across all releases were 97%, while bucks' were 87%. Site fidelity was measured from the release point of both bucks and does. A total of 28 (14 M, 14 F) GPS radio-collared deer from releases fall 2013–spring 2014 releases. Does kept a close proximity to the release point, which

were the doe pens, while bucks of all age cohorts covered a larger expanse of area when compared to does. In conclusion captive-reared white-tailed deer are capable of surviving liberation from pens, but accommodations such as maintaining a high density of water and supplemental feed will aid in survival. Does' philopatric nature was evident in the lack of dispersal following release. Releasing does away from pens could provide a better distribution of does across the property.

HABITAT ASSOCIATIONS OF BLACK RAILS WITH OCCUPANCY

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Abstract: Eastern black rails (*Laterallus jamaicensis jamaicensis*) are being considered for listing under the Endangered Species Act, yet they have received little attention in Texas. This subspecies is difficult to study because, like most rail species, they are reluctant to vocalize and inhabit dense vegetation. We conducted the first large scale study of black rail habitat associations with occupancy along the Texas coast. We executed repeated point count surveys of 308 points across six study sites in 2015 and 2016. We used repeated surveys within survey years to account for imperfect detection. At each point we conducted call broadcast surveys for a duration of six minutes. Our study sites were Anahuac, Brazoria, and San Bernard National Wildlife Refuges, Mad Island Wildlife Management Area, Clive Runnel's Mad Island Marsh Preserve, and Powderhorn Ranch Preserve. We examined 19 occupancy models where occupancy varied by six covariates at two spatial scales and by year. Detection varied with a constant set of three covariates. Points colonized between survey years were allowed to vary with points burned between years. Points black rails abandoned between survey years were held constant. Detection increased with warmer temperatures, brighter moon phases, and low wind speeds. Occupancy increased with high vegetative cover and intermediate marsh cover. Black rails insignificantly colonized burned points at a higher rate than unburned points. Total points that black rails occupied insignificantly dropped from 2015 to 2016. Our results suggest, black rail managers should conserve sites with high intermediate marsh cover and habitat with high vegetative cover.

RIO GRANDE WILD TURKEY MOVEMENTS RELATIVE TO RIPARIAN CORRIDORS

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Abstract: Across much of the Rio Grande turkey's range, roosting habitats are largely isolated to riparian corridors where large trees suitable for roosting persist. Limited roost availability presumably has a significant impacts on range dynamics and habitat selection, as Rio Grande's have high roost fidelity. Range dynamics driven by roosting limitations may limit usable space to areas around riparian corridors. We evaluated the average maximum daily distance turkeys move from roosting habitats and evaluated movement distances relative to roost site selection, riparian corridor availability, and range dynamics. We captured 30 Rio Grande wild turkeys in the Oaks and Prairies Region of Texas in 2016 and equipped each with a GPS unit collecting hourly locations daily and one roost location nightly. Daily movements for each individual were between 1,000 and 4,500m and were primarily driven by roost site selection. Roost site fidelity was variable, ranging between 10 and 80% during the non-breeding season, and most hen nest locations were located within 1,500m of roosting locations. Overall, our results indicate that in regions where roosting habitats are tied to riparian corridors, habitat selection indices may be less driven by selection processes turkeys use during daily movements, and more driven by availability and fidelity to roost locations. Future work on demographic impacts of roost site selection is warranted.

MICROHABITAT ANALYSIS OF SYMPATRIC OCELOT AND BOBCAT IN SOUTH TEXAS USING CAMERAS

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Abstract: The ocelot (*Leopardus pardalis*) and bobcat (*Lynx rufus*) comprise the felid portion of the carnivore guild in South Texas. These two species share similar diet and activity patterns. Bobcats are a habitat generalist whereas ocelots are a habitat specialist. We established 28 camera-trap sites on the East Foundation's El Sauz Ranch, Port Mansfield, Texas. These cameras have been continuously monitored since autumn 2011. We measured vertical and horizontal cover, canopy height, and species composition at each camera trap site in summer 2016. These variables were compared with the Keetch-Byram drought index and the number of unique photographs of ocelots and bobcats in a negative binomial regression. A stepwise model selection will be used to determine which variables best explain the distribution of the two species. We will use these analyses to infer which habitat parameters best suit the preferences of ocelots for future management practices.

BREEDING BIRD RESPONSE TO POST OAK SAVANNA RESTORATION IN EASTERN TEXAS

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Abstract: Abstract Oak savannas were once an abundant vegetation type in the Midwest United States, but have now declined to <1% of their original extent. Historically, natural disturbances such as periodic fire and grazing maintained oak savannas, but these have been reduced or eliminated resulting in woody encroachment and subsequent habitat loss and degradation. In 2007, a 1,000 ha post oak savanna restoration project was initiated at Gus Engeling Wildlife Management Area in Anderson County, Texas. A baseline, pre-restoration study (Phase I) was completed to determine breeding bird abundances, nest success, and nest site selection of target species. The results of Phase I generally showed a lack of savanna vegetation structure on degraded sites and few savanna or grassland obligate bird species. Now, 8 years after initial restoration, a post-restoration study (Phase II) is underway to document breeding bird responses to post oak savanna restoration. Phase II first year data generally show an increase in species richness (Phase I = 44; Phase II = 55) and abundance of target grassland and savanna birds. During Phase II, we also confirmed breeding for 2 species of savanna birds that were not present during the Phase I study: dickcissel and lark sparrow. The presence of savanna species can be linked to the herbaceous vegetation that was restored to more closely resemble historic oak savanna structure. However, low nesting success observed during Phase II could be a result of habitat isolation and fragmentation, and a lack of nearby source populations.

SUMMER LOAFING HABITAT SELECTION OF MONTEZUMA QUAIL IN THE CAPITAN MOUNTAINS, NEW MEXICO

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Abstract: Montezuma quail (*Cyrtonyx montezumae*) occur in low densities in pine-oak vegetation zones in Texas, New Mexico, and Arizona. Due to their cryptic nature, limited information is known regarding selection for habitat, especially loafing sites. Loafing sites are important for Montezuma quail to escape thermal pressure and predation. From May–August 2016, this study was conducted on a Bureau of Land Management (BLM) property in Lincoln County on the Fort Stanton-Snowy River Cave National Conservation area outside of Capitan, New Mexico. The objective was to identify loafing site characteristics of Montezuma quail in order to better manage the local habitat for them. For this study, quail were captured and fitted

with radio-telemetry backpacks. The backpacked Montezuma quail ($n = 6$) were located between the hours of 1000–1500 to determine loafing sites. Vegetation measurements taken at each loafing site included: Visual Obstruction Index (VOI), basal cover, 10 heights of vegetation, species present, percentage of each species, canopy cover, species of cover, and distance to closest canopy cover. The same vegetation data was collected at random sites to compare to the loafing sites' vegetation data. Random sites were identified by spinning a random azimuth and walking 50 m in that direction from the loafing site. A total of 40 loafing sites and 80 random sites were analyzed. Information obtained from this study will assist the BLM in making sound management decisions regarding thinning and fire regimes to help construct and maintain quality Montezuma quail habitat.

ANNUAL SURVIVAL OF MOURNING DOVES FROM BANDING DATA

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Abstract: Dove hunting is one of the most economically important hunting activities in Texas and more doves are harvested in Texas than any other state. Accumulated bird banding data has been subject to rigorous statistical approaches over the last 50 years and has been used to obtain vital rate estimates, essential for proper management of the species. The objective of our study is to analyze 13 years (2003–2015) of data collected by Texas Parks & Wildlife Department on banding and recovery of mourning doves (*Zenaida macroura*) in Texas. As expected, the probability of a dove to be banded, recovered, and reported is low, yet this probability is vital to our primary survival model. We used the dead-recovery Brownie (et. al 1985) model to analyze various covariates that may influence annual survival. We selected covariates by studying the biology and ethology of the mourning dove and selecting variables known to influence the annual survival of an individual. Covariates include drought intensity, latitude, hunter density, urban density, and others. We used a model selection process (Akaike information criterion) to select the model of best fit for annual dove survival. Identifying the variables that have the greatest effect on dove survival will help TPWD with the active management of the species. As environmental and anthropogenic conditions change year to year, the survival estimates of mourning doves can be predicted based on those annual variations.

EFFECTS OF FIRE ON SOFT-MAST PRODUCTION IN RESTORED PINE WOODLANDS

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Abstract: The use of prescribed fire is integral to restoration of open habitats in the southeast, including shortleaf pine woodlands in the Ouachita Mountains. Fire has many potential benefits for wildlife; however, long-term implications for soft-mast production are not fully understood. This study determined how fire affected soft-mast producing plants and the influence of fire on various habitat resources for multiple wildlife species. Sixteen stands were inventoried representing four temporal periods after dormant season prescribed fires: within 1 growing season of burn, 2 growing seasons after burn, 3 growing seasons after burn and 5 growing seasons after burn. Stands were sampled by establishing 40 0.045 ha plots along 6 to 8 transects per stand and measuring number and biomass of all soft-mast. Data collection occurred three times per growing season (June through August) to capture a range of soft-mast producing species. Soft-mast specimens were collected each month while percent cover of soft-mast species was recorded in July during the peak growing season. Data collection took place in 2015 and 2016. Soft-mast production was highest 2 and 3 growing seasons after prescribed fire, with American beautyberry (*Callicarpa americana*), blackberries (*Rubus* spp.) and grapes (*Vitis* spp.) being most productive in these stands. Percent cover and diversity of soft mast plants correlated positively with years post burn, with more species producing soft-mast in stands 5 growing seasons post-burn. Species such as poison ivy (*Toxicodendron radicans*), winged sumac (*Rhus copallinum*), and greenbrier (*Smilax* spp.) had the greatest percent cover across the landscape, but had low soft-mast production. Our results suggest that burning on a 3-5 year rotation may maximize soft-mast production for wildlife species such as eastern wild turkeys and black bears.

AUTUMN AND WINTER BODY MASS DYNAMICS OF FEMALE WHITE-TAILED DEER AND REPRODUCTION AT KERR WMA

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Abstract: In many large mammals reproduction and survival of young depend on body size and condition of the dam. White-tailed deer (*Odocoileus virginianus*) residing in central Texas inhabit an environment with stochastic changes in seasonal precipitation that affect food supplies differently from seasonal patterns at higher latitudes. An ongoing study addresses two hypotheses on how seasonal changes in female mass influence reproduction. The brushy slope hypothesis is focused on body mass in the autumn. Females with large protein and fat stores will be heavier and invest more energy into reproduction. The prior-present state hypothesis considers mass during the autumn mating season but also the present conditions. Beginning in

autumn, 2009, females were collected during autumn hunts and culls conducted by Texas Parks and Wildlife personnel in the first week of March. Data collected included day the female was dispatched and lactation status in autumn and litter size, length and mass of fetus in March. In both periods dressed mass, back fat thickness and age was collected. In two years dressed mass adjusted for age, lactation status and day of collection was heavier in autumn than March but no change was detected in remaining years. Twinning rates ranged from 25–85 percent. Fetal mass was not influenced by litter size, but differed across years. Findings so far indicate support for the prior-present state hypothesis. In a year when autumn dressed mass was low, twinning rate was also low but fetal and female masses tended to be heavier the following March.

POSTER ABSTRACTS – IN NUMERICAL ORDER

(Number at beginning of title is number on poster board)

(At end of title: *Judged undergraduate poster; **Judged graduate poster)

1. QUANTIFYING URBAN SPRAWL AND HABITAT LOSS FOR NORTHERN BOBWHITE IN TEXAS*

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Leonard Brennan, Caesar Kleberg Wildlife Research Institute, Texas A&M University–Kingsville, Kingsville, Kingsville, TX 78363, USA

Abstract: As the human population continues to grow, urban and agricultural development also expand. Such development has catalyzed wildlife habitat degradation and population declines. In Texas, the decline of Northern Bobwhite, (*Colinus virginianus*) has been especially concerning. The purpose of this study was to spatially assess the current relationship between Bobwhite populations and impervious cover and then to predict the potential amount of habitat lost in coming years. The Texas Ecological Mapping System was used with Breeding Bird Survey Bobwhite estimates to examine the correlation between the percentage of impervious cover and relative Bobwhite abundance in 2010. Twenty random points were selected for each county in Texas. It was found that Bobwhite relative abundance diversity decreased sharply above .77% impervious cover. Integrated Climate and Land Use Scenarios were then used to predict the growth of high density urbanization (>.77% impervious cover) every ten years under four different models of development. The amount of rural land being lost to urbanization was identified and quantified. We found that range experienced the most losses to urbanization of any rural land type. Furthermore, the models of growth which were motivated by economic profit rather than environmental health resulted in the development of almost twice as much land. These findings have implications not only for Bobwhite, but also for other grassland wildlife species. Therefore, the future conservation of wildlife must become integrated with urban development policies. In order to effectively conserve populations of wildlife, development must become more concentrated and less sprawled onto rural lands.

2. CONSERVATION OF MEXICAN LONGNOSED BATS ALONG THE MIGRATION ROUTE AND SURROUNDING MATERNITY CAVES*

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Abstract: The nectar-feeding Mexican long-nosed bat (*Leptonycteris nivalis*) population has been experiencing a steep decline over the past ten years. Conservation of this species is vital for the mutualistic relationship between the plant genus *Agave* and the bat species *Leptonycteris nivalis*. Bat pollination promotes genetic diversity of the agave plant and ensures maintenance of the plant community structure. To gain an understanding of critical habitat locations for conservation, species distribution models will be developed with data on current and historic sites and observations.

3. ESTIMATING WILDLIFE SPECIES RICHNESS, DIVERSITY, AND HABITAT CONNECTIVITY USING NON-INVASIVE SAMPLING TECHNOLOGIES*

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Abstract: Government Canyon State Natural Area (GCSNA) represents the largest nature preserve in Bexar County, TX at 12,086 acres. Infrastructure development in Bexar and Bandera counties on undeveloped properties close to GCSNA are increasingly fragmenting the landscape and disrupting spatial ecology of local wildlife populations. These properties may represent crucial wildlife passageways between private ecologically valuable land and GCSNA. This project used non-invasive microsatellite technologies (camera traps and hair snares) to determine an inclusive assessment of richness and evenness of cataloged species at 13 properties in closest proximity to GCSNA through 20 motion sensor cameras deployed over the 13 properties, for 30-60 day intervals. In addition, hair samples collected from hair snares at sites were used in PCR assay, in order to determine potential genetic relatedness of species between sites. Species-specific markers of known hair samples collected from dog (*Canis familiaris*), feral pig (*Sus scrofa*), and raccoon (*Procyon lotor*) were used to identify unknown species and determine family relatedness among collected samples using mitochondrial and genomic DNA extracts. In order to yield high-quality extracts from inadequate hair samples, protocol changes were required. Increased amounts of the digestive enzyme, extended incubation periods, and changes in PCR cycling were required for successful extraction. Results showed successful DNA yields in only raccoon species samples despite lower nucleic acid concentrations and 260/280 ratios (DNA purity factors) than the same corresponding values in dog and feral pig extracts. Camera trap analysis showed a diverse species presence, with a total species richness of 19 distinct species.

4. MIGRATORY CONNECTIVITY OF AMERICAN KESTRELS IN TEXAS*

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Abstract: American kestrels (*Falco sparverius*) are a small falcon common throughout North America. They are a partially migratory species with northern breeding kestrels highly migratory and southern breeding kestrels more sedentary. Few studies on migratory connectivity of American kestrels have been undertaken, with the exception of one in the Pacific Northwest and a mention of connectivity between Florida and Pennsylvania. To investigate migratory connectivity of Texas American kestrels, we requested Bird Banding Laboratory (USGS) data for kestrels that were encountered twice, at least one time in Texas. There were 108 kestrels that fit this criterion. These 108 kestrels were encountered in 14 states and 4 Canadian Provinces. To focus on breeding and wintering connectivity only, we censored out kestrels that did not have an encounter during both the breeding season (May–July) and the wintering season (November–February). There were 13 females, 9 males and 6 kestrels of unknown sex that met this criteria ($n = 28$). The average distance between breeding and wintering territories was similar for both males (1,637.38 km) and females (1,715.51 km). We also tested to see if these data support the notion that kestrels exhibit “leap frog” migration. Plotting the latitude of breeding and wintering kestrels using linear regression showed a minor negative relationship between breeding latitude and wintering latitude ($y = -0.2951x + 43.21$, $R^2 = 0.3008$). Texas data show some support for the notion of “leap frog” migration in American kestrels.

5. CHANGES IN SPECIES BIODIVERSITY DUE TO OPEN HOUSE EVENTS AT ROBBER BARON CAVE*

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Abstract: According to the studies relating to protecting cave ecosystems, Robber Baron located in San Antonio, TX, is generally a healthy habitat for local fauna and the natural ecological processes. Although there are numerous protective measures implemented, two arachnids unique to the cave, the *Texella cokendolpheri*, also known as the Robber Baron cave harvestman, and the *Cicurina baronia*, the Robber Baron Cave spider, have been listed as endangered by the US Fish and Wildlife Service. The purpose of our study is to investigate how the official Open House Events, held every 18 months in which 450-500 people are able to tour the cave, affect the

species richness of the cave. To accomplish this, we took a biological survey of the cave once a month for the past 22 months to find fluctuations in biodiversity. Our results indicate no correlation between the months revolving around the Open House Events and the species richness, throwing out these events as a chief factor. Given our limitations of the study involving data from two Open House Events, further investigation regarding natural species interactions is recommended.

6. A TOP PREDATOR RETURNS: EFFECTS OF THE EASTERN INDIGO SNAKE ON HERPETOLOGICAL COMMUNITIES IN SOUTHERN ALABAMA*

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Abstract: Increasing focus has been placed on snakes and their role in the ecosystem. As a key predator of longleaf pine ecosystems, the eastern indigo snake (*Drymarchon couperi*) feeds on a variety of taxa, but recent studies have shown an innate preference for snakes. Once found throughout the southeastern United States, its decreasing range and numbers resulted in its extirpation from many areas. In 2008, reintroduction efforts for the eastern indigo were initiated in the Conecuh National Forest (CNF) in southern Alabama. Six years after its reintroduction, drift fences were constructed in control sites as well as sites where the eastern indigo was released to survey the herpetofauna. The objective of this study is to assess the effects of the eastern indigo snake on herpetological communities in Southern Alabama. I will analyze field data collected from reintroduction and non-reintroduction sites within CNF to test the hypotheses that at reintroduction sites, (1) abundance of venomous snakes has been reduced, (2) species diversity is greater, and (3) average sizes of snakes are larger.

7. LONG-TERM VEGETATION MONITORING OF MIXED-GRASS RANGELANDS IN SOUTH TEXAS*

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Abstract: Non-native grasses are a concern to south Texas land managers and researchers alike. Their increasing abundance threatens wildlife habitat by decreasing plant diversity in wildlife-livestock operations. Tanglehead (*Heteropogon contortus*), old world bluestems (OWB;

Bothriochloa spp. and *Dicanthium* spp.), are among several invasive grass species in south Texas. The short-term detrimental effects of grass invasion to plant communities are well known; however, long-term data sets are a rarity and are of great value in present-day ecological research. Twenty two permanent transects were placed in a private ranch in south Texas in 1999. The step-point method was used at each transect to determine, percent composition of tanglehead, OWB, and native grasses. Sampling was repeated at each transect 2002, 2004, 2009, and 2016. Preliminary results after the 2016 sampling showed Exotic grasses increased from 7.5 to 37.7%, Tanglehead increased from 3.1 to 10%, OWB increased from 4.7 to 12.7%, Native grasses decreased from 58.1 to 34.3% from 1999 to 2009, respectively. However, 2016 data has shown that these groups have stabilized. Tanglehead decreased from 10 to 7.7%, OWB decreased from 12.6 to 10.3%, Native grasses increased from 34.3 to 37.3%, and Exotic grasses decreased from 37.7 to 30.2%. The increase/decrease of these invasive grasses, individually and as a group, provides an interesting look at the long-term changes undergone by these plant communities. These areas represent critical wildlife habitat and valuable grazing lands for livestock, thus, an understanding of the long-term trends of invasive and native species will prove valuable in future management.

8. EVALUATING THE EFFECT OF PHARMACEUTICALS AND POLYCHLORINATED BIPHENYL CONTAMINATION UPON FOUNTAIN DARTER POPULATION*

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Abstract: Found in the headwaters of the Comal and San Marcos River, the fountain darter (*Etheostoma fonticola*) is on average three-centimeter length fish that feeds upon small invertebrates. 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 poor competitor and is the first species affected by habitat disruption, the endangered fountain darter has been a focal point for controversies involving the endangered species act, state of Texas groundwater law, and private property rights. An age and sex-structured population model for the fountain darter will be created using Pharmaceutical and Polychlorinated Biphenyl data and initial darter population dynamics. The model will also extend to include population dynamics under scenarios of increased contamination that could occur as a result of an environmental spill or increased urban construction.

9. PREVALENCE OF INFECTIOUS AND NONINFECTIOUS DISEASES IN RIO GRANDE WILD TURKEYS LOCATED IN SOUTHERN TEXAS*

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Abstract: Wild turkeys (*Meleagris gallopavo*) are susceptible to a variety of viral and bacterial diseases. However, most of the wild turkey disease research published has been conducted on the eastern wild turkey (*M. g. sylvestris*). Only three studies have been conducted on Rio Grande wild turkeys (*M. g. intermedia*) in south Texas and these studies were conducted more than 30 years ago and were restricted to 2 counties. The results of these research projects indicated that mycoplasmosis, and salmonellosis commonly occur in south Texas wild turkeys, however other disease organisms may also occur in south Texas turkey populations that were never isolated because they were not thought to occur in wild turkeys 35 years ago. Therefore, the objective of this study was to conduct disease reconnaissance on wild turkeys in at least 4 south Texas counties. We screened for *Mycoplasma gallisepticum* & *Mycoplasma synoviae* (bacteria), *Salmonella pullorum* & *Salmonella typhi* (bacteria), Newcastle disease virus, and Reovirus in ascending order according to significance. Specific results of our disease surveillance will be provided in the poster. We anticipate that our results will not only provide updated information on diseases prevalent in south Texas wild turkey populations but will also help Texas Parks & Wildlife officials make decisions about wild turkey translocations.

10. GPS COLLAR PERFORMANCE ON OCELOT AND BOBCAT IN SOUTH TEXAS*

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Abstract: Global positioning system (GPS) telemetry is a widely used research technique to understand the spatial, behavioral, and population ecology of carnivores. Reliability of GPS collars in a variety of cover types is key to conducting statistical analyses and making informed conclusions regarding an animal's behavior. The ocelot (*Leopardus pardalis*) is a medium-sized neotropical felid that is a habitat specialist using dense woody cover in Texas. The bobcat (*Lynx rufus*) is a medium-sized felid and habitat generalist that co-occurs with ocelots in extreme

southern Texas. From 2013-2016, we collared 6 ocelots and 3 bobcats on the East Foundation's El Sauz Ranch in Willacy County, TX with Lotek Minitrack GPS collars to track daily movements and fine scale activity patterns. The purpose of this study is to determine the percentage of successful GPS fixes for each species and explore if extrinsic factors (e.g., vegetation, animal behavior, gender, time of day, number of satellites) influence GPS collar performance. Preliminary data for ocelots ($n = 1$) and bobcat ($n = 1$) indicated the female ocelot had a 79.4% success rate, whereas the male bobcat had a 94.6% success rate. Data from this research is essential for understanding ocelot and bobcat ecology and making informed decisions about study designs involving ocelots recovery in South Texas.

11. THE ISOLATION AND PROPAGATION OF RETICULOENDOTHELIOSIS VIRUS FROM ATTWATER'S PRAIRIE CHICKENS*

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Abstract: Reticuloendotheliosis virus (REV) is an immunosuppressive avian retrovirus which infects Galliformes, which include many ground dwelling birds. The virus infects B-cells, a component of blood, and has been identified in turkeys, chickens, and the highly endangered Attwater's prairie chicken. Infected individuals may exhibit symptoms such as anemia, neoplasia, non-neoplastic runting, lymphomas, and feathering abnormalities. Little is known on the pathogenesis, transmission, prevalence, and genetic variability of the virus in Texas. In order to study the virus in a laboratory setting, isolation and propagation methods have previously been used. Isolation of the virus has been achieved by euthanizing infected birds and harvesting the liver and the spleen. Other less invasive methods include isolating virus from blood of infected birds. I am interested in studying a currently circulating variant of the virus that infects galliform birds in Texas by propagating virus variants from blood of REV-infected Attwater's prairie chickens (*Tympanuchus cupido attwateri*) from conservation centers from around the state. To do this, we first isolated B-cells from the donated whole blood by centrifugation in a density gradient. We then used the isolated B-cells to infect chicken embryonic fibroblast cells in vitro. After propagation, we released and separated the virus from the cells. We quantified the virus using an antibody-based assay, and the supernatant containing the virus has been stored in cryogenic tubes at -80°C . This virus will be used in further studies involving viral pathogenesis and transmission.

12. SEROLOGICAL SURVEY OF RETICULOENDOTHELIOSIS VIRUS FROM WILD TURKEYS*

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Abstract: Reticuloendotheliosis Virus (REV) is a lethal avian retrovirus that infects Galliformes. The virus infects B-cells, a blood component of the immune system. Little is known on the prevalence of the virus in wild birds in Texas. We hypothesize that a significant number of wild turkeys are infected with REV, which could permit them to serve as a reservoir for transmission to other related species. To determine the prevalence rate of REV-infected wild turkeys in Texas, serological test kits were developed by our lab and distributed to wildlife workers. In the first study, blood samples from 155 individual wild Rio Grande turkeys from 15 counties in Texas were collected between 15 January 2016 and 10 March 2016. In the second study, blood samples were collected from wild Eastern turkeys imported to Texas. The imported turkeys had been previously tested for avian influenza and pullorum-typhoid. DNA was extracted from the blood samples and viral DNA amplified using polymerase chain reaction (PCR) with REV-specific primers. PCR products were resolved by gel electrophoresis and presence of amplified viral DNA indicated that an individual was infected by REV. We detected REV in 1 out of 30 individual Rio Grande turkeys from Mason County. Individuals from all other counties tested were negative for the virus. In addition, we detected REV in 1 out of 50 Eastern turkeys imported into the state. By better understanding the prevalence rate of existing infections and sources of new virus infections, additional measures could be implemented to protect at-risk bird populations.

13. SITES OF INTEGRATION OF RETICULOENDOTHELIOSIS VIRUS*

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Abstract: Reticuloendotheliosis virus (REV) is a lethal retrovirus that infects various game birds such as turkeys, chickens, and endangered Attwater's prairie chickens. By dysregulating B-cells, REV causes immunosuppression, resulting in symptoms that include neoplasia, anemia, lymphomas, and runting. There have been limited studies to determine integration and genetic variability of REV in wild Galliformes. Previously, REV has been shown to integrate into the genome of a mosquito-borne virus, fowlpox virus, or near a proto-oncogene, c-myc, causing dysregulation of cell growth and proliferation. The purpose of this study is to determine the site of integration among currently circulating REV variants in Texas. DNA samples collected from REV-positive individuals will be amplified at the virus-host junctions, the amplified PCR products will be sequenced, and mapped to reference genomes of fowlpox, wild turkeys, and Attwater's prairie chickens. We then plan to quantify occurrences of integration within fowlpox, c-myc, or at other sites. Determining the location and frequency of REV integration could provide a biomarker to predict virus route of transmission and disease outcome in infected individuals.

14. POPULATION TRENDS AND REPRODUCTIVE SUCCESS OF MOTTLED DUCKS ON THE UPPER TEXAS COAST*

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Abstract: Mottled ducks (*Anas fulvigula*) are non-migratory waterfowl dependent upon coastal marshes, such as those along the Texas Gulf Coast. Populations on the upper Texas coast have experienced long-term declines. Our objectives were (1) to examine if rainfall influenced annual nest success and (2) evaluate population trends of mottled ducks on the J. D. Murphree WMA, Texas. We used banding and harvest data from 2000–2016, from the WMA, as an index of population trends. To analyze rainfall as an influencing factor, we used the proportion of hatch year (HY) birds banded as an index of reproductive success. We calculated the Pearson's correlation between the proportion of HY birds banded and rainfall during the peak nesting period (March–May). We used the number of birds banded per banding day (BPBD) and the number of birds harvested each year as an index of population trends. There was a weak negative correlation between rainfall during peak nesting and the proportion of HY birds ($r = -0.3$). The mean BPBD was 15.8 (SD = 6.84, $n = 16$ years), and has shown a positive trend. The mean number of birds harvested per year was 160.3 (SD = 57.35, $n = 16$), and also has shown a positive trend. The negative correlation coefficient between rainfall and the proportion of HY birds indicates the presence of other influencing factors on reproductive success. The positive trends of BPBD and annual harvest might indicate increasing populations; however, high standard deviations indicate considerable annual fluctuations.

15. SIMULATED EFFECTS OF INDO-PACIFIC LIONFISH (*PTEROIS VOLITANS* AND *P. MILES*) INVASIONS ON PARROTFISH (SCARIDAE FAMILY) POPULATIONS ON CORAL REEFS IN THE CARIBBEAN*

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Abstract: The introduction of invasive species in marine environments is rare but detrimental to the existence of native species. The Indo-Pacific lionfish species (*Pterois volitans* and *P. miles*) recently has invaded coral reefs across the Atlantic and Caribbean at an alarming rate. One keystone species currently being affected by the lionfish invasion is the parrotfish (Family Scaridae). The parrotfish plays a vital role in the stabilization of coral reef ecosystems by preventing a phase shift from coral to macro-algal dominated reefs. We propose to study the dynamics of parrotfish populations in response to the lionfish invasion in the Caribbean. We will review the literature to obtain recent demographic parameters for both the lionfish and parrotfish, develop an age-/stage-structured population dynamics model for each species, integrate the two

models to form a prey- predator model, and use the integrated model to quantify the potential effects of lionfish invasions on parrotfish population dynamics on coral reefs in the Caribbean.

16. DIET COMPOSITION OF BOBCATS AMID GUARDED LIVESTOCK AND THE DOGS WHO LOVE THEM IN THE EDWARDS PLATEAU OF CENTRAL TEXAS*

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Abstract: Bobcats (*Lynx rufus*) are found throughout Texas. Given that nearly all of Texas is privately owned land, balanced management for both livestock and wildlife can be difficult when wildlife may predate upon livestock animals. Native predators, including bobcats, are considered a factor in livestock and economically-important wildlife losses, though more information on the magnitude of their effect is needed to substantiate these inferences. The objective of this study is to analyze bobcat diets through scat analysis on a central Texas ranch home to sheep and goats actively protected by livestock protection dogs (hereafter LPDs). Over a 6-month period, including the peak of lambing and kidding seasons, scat samples were collected along 22 transects. Hairs from each of 30 scat samples were examined to identify prey species by the microstructure of hair shafts. Hairs were designated into 5 categories: small rodents, lagomorphs, deer, livestock and “other”. The study site, Martin Ranch, located in Menard County, is comprised of ~300 sheep, ~200 goats and 5 guard dogs. At approximately 1,902 hectares, it supports a myriad of native species indicative of the region and has not been subject to predator control in several years. We found that bobcat diet consisted primarily of lagomorphs and rodents and little to no sheep or goat, a result perhaps influenced by the activity and presence of LPDs on site. Future studies should compare diets of bobcats on Martin Ranch to diets of bobcats on similar ranches with unguarded livestock.

17. VALIDATION OF ENVIRONMENTAL FLOW STANDARDS*

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Abstract: Validation of environmental flow standards by quantifying predicted biotic responses is necessary for refining flow standards and the theory of natural flow paradigm. Currently, most Texas rivers are managed under established environmental flow standards. The purpose of our study is to validate instream flow standards implemented on the Lower Brazos, Guadalupe, and San Antonio rivers. Study objectives were to investigate macroinvertebrate and fish assemblages and to assess ecological responses to instream flow tiers (e.g., subsistence, base, 1 per season, 1 per year). Fourteen sites associated with USGS gaging stations were visited over a period of sixteen months with visits classified into flow tiers based on the preceding fifteen days. Riffle and run habitats were sampled for swift water specialists and diet (gut fullness) and condition factor (HSI) was investigated. Fish and macroinvertebrate indices were tested among basin, season and flow tier. Relative abundance of slack water fish and occurrence of fluvial fish differed among flow tiers, whereas relative abundance of fluvial fishes differed in run habitats among flow tiers. This insight will contribute to understanding ecological responses to the current implemented flow recommendations to maintain a sound ecological environment. However, biotic responses of environmental flow tiers for other aquatic vertebrates (i.e., reptiles and amphibians), birds, and riparian mammals are lacking and would provide a more holistic view for environmental flow management.

18. STATUS OF HORNED LIZARDS IN THE UNITED STATES*

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Abstract: Horned lizards are an iconic reptile family native to the western United States. We surveyed the state wildlife agencies of the western states to determine the legal status, current relative abundance, population trends, and distribution of the 8 endemic species of horned lizards found within their borders. No state agency actively conducted surveys for their populations of horned lizards. Either surveys were not conducted within a state, or state agencies relied on external organizations and citizen science groups to determine the distribution and relative abundance of horned lizards. The range of distributions was as small as for the flat-tailed horned lizard (*Phrynosoma mcallii*), which is only found in a small region of southeastern California and southwestern Arizona, to as large as that for the short horned lizard (*P. hernandezii*), which can be found in 12 states. Legal status of horned lizard varies greatly by species and by state. For example, the Texas horned lizard (*P. cornutum*) is listed as state threatened in Texas, protected in Colorado and Oklahoma, but has non-game status in New Mexico, Kansas, and Missouri. The majority of horned lizard species have unknown or declining populations, yet >50% of the western states allow commercial or hobby collection of horned lizards by their citizens. We argue for a moratorium on collection of horned lizard species until a national survey can be conducted to establish a baseline abundance and distribution for each horned lizard species. After which, proper management can be instituted for this precarious family.

19. EFFICACY OF MINT-SCENTED SPRAY TO REPEL RODENTS*

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Abstract: Rodents, as a wildlife group, are typically considered a nuisance. They are competitors within crop fields, and uninvited guests in barns and homes. To reduce unwanted interactions with rodents, various deterrent products have been developed to repel rodents from commensal areas. One such product is a mint-scented spray that advertises to repel rodents; therefore, we tested the efficacy of the product as a rodent repellent. We sprayed 25 Sherman live traps daily with 4 sprays of mint-scented repellent (2 sprays inside each trap and one spray on each outer side) for 14 days. In addition we used 25 non-sprayed Sherman live traps as a control group. Treatment for individual traps were constant throughout our study but trap order between treatment and control traps was random each night as well as trap line location. Captured rodents were identified to species and gender. Analysis of variance was used to evaluate main and interactive effects of treatment, species, and gender. We caught 120 rodents, which represented 6 species. No differences occurred in the number of captured rodents between treatments ($P = 0.68$), genders ($P = 0.38$), or interactions of main effects ($P = 0.48$; $P > 0.17$; $P = 0.20$). More cotton rats (*Sigmodon hispidus*; $P < 0.0001$) were caught than other species, which most likely was a function of relative abundance and available habitat. However, mint-scented spray had no effect on repelling rodents. On the positive side, mint spray did not attract rodents to traps either. Therefore, mint-scented products do not perform as advertised (i.e., do not repel rodents); however, the products do not appear to exacerbate the nuisance situation.

20. EFFICACY OF SOUND-EMITTING DEVICES TO REPEL NUISANCE WILDLIFE SPECIES*

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Abstract: White-tailed deer (*Odocoileus virginianus*) play the role of Dr. Jekyll and Mr. Hyde in Texas. Some people love deer because they constitute a billion dollar hunting industry, while others fear deer because the species represents economic loss due to vehicle collisions and consumption of gardens and landscaping. To reduce economic losses, products to repel deer from commensal areas have been developed. We tested the efficacy of a sound-emitting product that advertises to repel deer and other wildlife species for a 15 m radius. We set up four feeder sites that dispersed corn 4X/day and photographed animals that visited the feeders. We used a cross-over, repeated measures design, in which 2-week intervals were divided into 4 periods where periods 1 and 3 were control periods where sound-emitting devices were not used. During period 2, sound-emitting devices were used on 2 sites while the remaining sites were control sites, then during period 4 the treatment and control sites were switched. Four species consistently came to our feeder sites (i.e., white-tailed deer, raccoons (*Procyon lotor*), javelina (*Tayassu tajacu*), and feral hogs (*Sus scrofa*)). We did not find main effects of treatment, species, or period; however, we did find an interaction between treatment and period ($P = 0.001$). The overall general trend was that the number of animals that came to the feeders and the number of visits per day by each species did not alter between treatments, but time spent by each species at feeders with sound-emitting devices was greater than time spent at feeders without such devices. It was noted that sound-emitting devices appeared to deter animals initially for 1-2 days, but

animals quickly habituated to the effects of the device. Also, species use of feeders, in general, increased with successive periods. This suggests that wildlife species became habituated to the accessibility of corn and perhaps remained near feeders. Therefore, sound-emitting devices as a single deterrent method are not effective to repel nuisance wildlife species.

21. EFFECT OF DENSITY, GENDER, AND AGE ON CAPTIVE HATCHLING ALLIGATOR GROWTH AND SURVIVAL*

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Abstract: American alligators (*Alligator mississippiensis*) are an iconic wetland and keystone species that has rebounded from its endangered status within the past 30 years. Strict harvest regulations have been cited as the most important factor in the restoration of alligator populations. However, potentially liberal harvest of alligator eggs from wild-located nests could return alligators back on Threatened and Endangered lists. Knowledge of the ecology of hatchling alligators is sparse but critical to make informed decisions about alligator management. Our objectives were to determine the effects of density, dominance, sex, and age on hatchling growth and survival. Of 21 hatchling alligators, 48% survived their first year with a density of <2 alligators/4.7 m² of surface area. Dominance was not related to gender or size, but individual temperament. Males grew at a faster rate than females; however, the majority of growth for both sexes occurred between June through August. Because alligators become sexually mature at a certain size than age, knowing gender-based growth rates and annual survival is important to determine alligator recruitment, and thus, harvest rates of alligator nests.

22. EFFECTS OF RAINFALL AND COYOTE ABUNDANCE ON SPATIAL DISTRIBUTION OF BOBCAT, OCELOT AND GRAY FOX*

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Abstract: The large mesocarnivore guild in southern Texas includes bobcats (*Lynx rufus*), coyotes (*Canis latrans*), gray foxes (*Urocyon cinereoargenteus*), and ocelots (*Leopardus pardalis*) in certain areas of Willacy and Cameron counties. These four species live in close proximity together and have been reported to share similar resources in other parts of their

geographic range. Furthermore, coyotes kill and prey upon bobcat and gray fox, however their effect on ocelot populations is unknown. Frequent droughts in South Texas can affect rodent and mesocarnivore populations. Since 2011, we have conducted long-term remote camera monitoring on the East Foundation's El Sauz Ranch in Willacy County, TX. The objective is to determine the impact of rainfall of coyote abundance and the spatial distribution of bobcats, ocelots and gray foxes. We will use occupancy analyses to examine remote camera data collected between August and November 2012 (drought year) and 2015 (non-drought year). We hypothesize that coyotes will have a greater effect on other mesocarnivore species during drought years than during non-drought years. This research is valuable for ocelot recovery in southern Texas and will evaluate the impacts of coyotes on other mesocarnivores in relation to drought.

23. ASSESSING FINE-SCALE MICROCLIMATE CONDITIONS IN AN INTENSIVELY MANAGED LANDSCAPE*

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Abstract: The extent of sand shinnery oak (*Quercus harvardii*) prairies (SSOP) in the southwestern United States have declined precipitously in the past century. Land-use change through the conversion of native prairies to agriculture, unmanaged grazing, and energy development are the primary drivers. Management efforts to restore SSOP include managed cattle grazing (a major land use) and herbicide applications (tebuthiuron) to control shrubs and promote grass production for cattle. However, short- and long-term implications for native wildlife from these restoration practices are poorly understood. For example, effects on ground nesting birds include, but are not limited to: declines of nesting and brood-rearing habitat, shifts in food availability, and reduced amount of thermal refugia on the landscape. SSOP are already marked by an extreme climate; temperatures range from -33–44°C, average annual precipitation is approximately 46 cm, and droughts are frequent. Moreover, climate change forecasts predict the Southern Great Plains will become drier with more frequent extreme heat events. Therefore, to understand how management efforts alter fine-scale thermal profiles, and how these changes may influence ground nesting birds, we are evaluating the influences of vegetation structure, topography, and land management practices (control sites, grazing and herbicide treatments) on

thermal profiles (temperature and relative humidity) across seasons within the Southern Great Plains. Understanding how these predictors influence thermal profiles at local spatial scales will provide critical information for long-term conservation and management of wildlife unique to these prairies.

24. DEMOGRAPHICS AND TIMING OF MULE DEER UTILIZING FEEDERS IN THE CIENEGA MOUNTAINS, TEXAS*

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Abstract: Supplemental feeding is a popular management practice for deer (*Odocoileus* spp.) in Texas. It can provide deer with additional nutrients when forage is scarce, increase antler quality, and improve harvest opportunity. To aid in their deer management program, a private ranch distributed free-choice protein feeders ($n = 14$) across the property. From September 2015–March 2016, 11 Moultrie (M-880) trail cameras were rotated throughout the feeder sites to capture images of animals utilizing the feeders. After trail camera photos were collected, photos were re-named by their respective date/time stamp using the program SpecialRenamer (smallcats.org), organized into feeder locations, and sorted by species. Mule deer (*O. hemionus*) photos were later sub-sorted by group demographics (i.e., bucks, does, fawns, solitary, or groups). After all data was sorted, programs DataOrganize and DataAnalyze (smallcats.org) were used for analyses. Occurrences of: 1) mule deer at feeder sites, 2) mule deer group demographics at feeder sites, 3) peak times of day when mule deer utilize the feeders, and 4) seasons when mule deer are more likely to form groups at feeders will be discussed. Knowledge gained from this study will aid in the understanding of mule deer feeder utilization.

25. DETERMINING COMPETITION OF DESERT BIGHORN SHEEP AND AOUDAD AT WATER SOURCES IN THE SIERRA VIEJA MOUNTAINS, TEXAS*

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Abstract: As desert bighorn sheep (*Ovis canadensis*) restoration efforts continue in Texas, Texas Parks and Wildlife Department biologists, hunters, and landowners suggest that desert bighorn sheep are potentially threatened by the distribution and population increase of aoudad (or barbary sheep; *Ammotragus lervia*). In order to assess some of these speculations, we wanted to determine competition between these two species (if any) at artificial water sources in the Sierra Vieja Mountains, Presidio County, Texas. Trail cameras ($n = 9$) were set from June 2014–June 2016 at 9 artificial water sources on our study site to: (1) observe seasonal water use; (2) assess time of day and duration of use; (3) record group sizes; and (4) evaluate lambing periods

of both species. In our findings we analyzed a total of 2,307 photos of bighorn and aoudad (including their lambs). Bighorn (180 photos) were observed at the waters in 8% of the photos, whereas aoudad (2,127 photos) were documented in 92% of the photos. The average group sizes of both bighorn and aoudad to visit the waters was 2 and 3, respectively. Information regarding duration length of visits for varying group sizes will be addressed. This information will add to our understanding of bighorn and aoudad interactions at water sources and hopefully better dictate future management decisions on both bighorn sheep and aoudad, in and outside of Texas.

26. COMPARISON OF SHOREBIRD AND WATERFOWL UTILIZATION OF THE SANDIA WETLAND PROJECT SITE, TEXAS*

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Abstract: Wetlands are a crucial habitat type for the conservation of many migratory birds because they act as resting and feeding stops on migration routes. Limited management information exists on wetlands in the Trans-Pecos region of Texas. The Sandia Shorebird Wetland Project site is located near Balmorhea, Texas in the Trans-Pecos region. The objective of this study was to document the seasonal presence and species of shorebirds and waterfowl at the Sandia Shorebird Wetland Project site as well as to compare use by waterfowl and shorebirds. Scan surveys were performed once per week from 1 November 2015 to 31 April 2016. Starting at sunrise, one scan was done of each unit ($n = 3$) every 15 minutes (i.e., 06:15, 06:30, 06:45, etc.) for 2 hours (i.e., 06:15–08:15). The number of each species observed were recorded. The data were analyzed using an independent T-test analyses between shorebirds and waterfowl, which showed that there was a significant difference in the number of waterfowl and number of shorebirds ($P < 0.001$), concluding that during this project, the Sandia Wetland was utilized significantly more by waterfowl than by shorebirds. Further research is necessary to determine why there are such limited numbers of shorebirds at the Sandia Wetland Project Site. Knowledge gained from this study will provide management recommendations to arid wetland biologists in New Mexico and west Texas, particularly those practicing moist soil management.

27. THE EFFECTS OF PRECIPITATION AND PERCENT SAND ON FORAGE STANDING CROP IN SOUTH TEXAS*

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Abstract: Available plant moisture and soil texture is crucial for forage production in semiarid rangelands. Inverse Soil Texture Hypothesis (ISTH) describes how certain soil textures infiltrate and hold on to moisture more efficiently than others. This hypothesis states that course textured soils have a higher forage production than fine textured soils in semiarid rangelands. The amount of forage determines possible stocking rates of wildlife and cattle. Amounts of daily perception were gathered using weather stations located throughout various ranches on the East Foundation. Standing crop biomass and soil samples were collected at 300 randomly allocated 1.5m² grazing enclosures on the East Foundation. Biomass and soil samples will be analyzed for annual forage production and percent sand within each enclosure. Our objective is to determine how the effects of precipitation in the two months prior of autumn biomass clipping in the years of 2015-2016 coupled with soil texture have on the total amount of above-ground forage production in south Texas. The data will then be compared to the NRCS's proposed potential forage production data for the various soil textures to determine the reliability of the data. This data may then be used to help determine a relationship between rainfall and the amount of forage standing crop.

28. FACTORS AFFECTING WATERFOWL ABUNDANCE AND DISTRIBUTION IN TEXAS DURING WINTER*

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Abstract: Texas serves as the most important wintering area for waterfowl in the Central flyway. Hunter expectations for the upcoming hunting season are often determined based on an incomplete knowledge of factors regulating wintering waterfowl abundance and hunter success. Our objective was to investigate factors that influence waterfowl distribution and abundance in Texas. We acquired data on breeding population abundance and age ratios from the breeding survey to estimate the available fall population for the 10 most abundant species of waterfowl. We also obtained daily high and low temperatures from 1 October to 15 January each year from 1996–2016 for Estevan, Saskatchewan; Sioux Falls, South Dakota; Hastings, Nebraska; Wichita, Kansas; and Corpus Christi, Texas. These towns represent changes of approximately 10° latitude and will be used to calculate the number of freezing days, cumulative low temperature, and changes in temperature. The Palmer Drought Severity Index (PDSI) is a measure of soil moisture and is often highly correlated with wetland habitat conditions. We calculated average PDSI values for each ecoregion in Texas as well as those on major fall migration staging areas to provide an index of habitat conditions during migration and winter. This array of variables represents our explanatory variables used in our backwards stepwise regression analyses to identify those variables that explain a significant amount of variation in our response variables (Mid-winter Survey estimates for each ecoregion in Texas, Harvest estimates for Texas). We predict that a complex interaction of variables explain waterfowl abundance and the waterfowl harvest in Texas.

29. IMPACT OF HUMAN DISTURBANCE ON THE RELATIVE ABUNDANCE AND DIVERSITY OF NATIVE AND EXOTIC AVIAN SPECIES*

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Abstract: The ‘intermediate disturbance theory’ suggests that mildly disturbed areas yield higher overall species richness than locations with low or high disturbance. Research on the effects of urbanization on avian species has been widely conducted; however, studies within areas transitioning from rural to urban are lacking. This study, as part of a Wildlife Management Techniques course at Texas A&M University–Kingsville, was conducted in such a transitional location in order to understand the alteration of a South Texas avian community’s composition when immersed in different levels of human disturbance and to determine if diversity levels supported the intermediate disturbance theory. To do so, our study compared the species richness and relative abundance between low, mildly, and highly disturbed areas within a transitional rural-to-urban environment, in order to gauge how community composition changes in terms of diversity, relative abundance, and non-native species presence. Results showed increases in great-tailed grackles (*Quiscalus mexicanus*), white-winged doves (*Zenaida asiatica*), golden-fronted woodpeckers (*Melanerpes aurifrons*), and black-crested titmice (*Baeolophus atricristatus*) but declines in raptors and scavengers when long-term human disturbance increases in an area. A positive correlation was observed between exotics and urbanization; European starlings (*Sturnus vulgaris*) and Eurasian collared-doves (*Streptopelia decaocto*) comprised a comparatively larger relative abundance in the high disturbance site than in areas of lower disturbance. Lastly, it reinforced the intermediate disturbance theory yielding higher biodiversity. Management implications of this study include evaluation of conservation efforts of adaptive native species such as the black-crested titmouse and the golden-fronted woodpecker that seem suited to higher disturbance areas.

30. TRACKING ITS ROOTS: EXPANSION BY JAPANESE STILTGRASS IN THE FORESTLANDS OF TENNESSEE*

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Abstract: The impact from non-native plant invasions on forests is far reaching and responsible for ecological and economic losses. Within the southeastern USA invasive grasses in particular have led to drastic changes in forest understory structure and composition. Japanese stiltgrass (*Microstegium vimineum* (Trin.) A. Camus) is one of the most successful grass invaders in Tennessee. Being a prolific seeder and tolerant of low-light environments has aided in its persistence in natural areas and displaces most native understory plants. Here we aim to quantify the range expansion of Japanese stiltgrass within forestlands of Tennessee. We analyzed an extensive dataset collected as part of the Forest Inventory and Analysis Program of the United States Department of Agriculture (USDA) Forest Service to quantify the range expansion of Japanese stiltgrass in the forestlands of Tennessee from 2000 to 2011. Japanese stiltgrass generally expanded its range, with the number of sample plots in which Japanese stiltgrass was detected increasing 50%. The mean percent coverage of Japanese stiltgrass in sample plots increasing significantly ($P < 0.05$) during this period. Our empirical results indicate the trend of expansion, and hence, likely paths of invasion, forest managers can develop long term monitoring and control strategies for effectively slowing range expansion and mitigating its effects.

31. EVALUATING HOME RANGE ESTIMATORS IN CAPTIVE-REARED WHITE-TAILED DEER MALES FOLLOWING LIBERATION*

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Abstract: This project utilizes camera trap MCPs, GPS collar MCPs, and GPS collar KDEs for captive-reared white-tailed (*Odocoileus virginianus*) bucks following liberation. Camera MCPs were created in ArcMap[®] 10.1 (Environmental Systems Resource Institute, Redlands, CA) by identifying bucks from 29 trail cameras (Moultrie M-880, Alabaster, AL) on marked water troughs from September 2013–February 2014. A total of 15,466 pictures were collected and renamed using ReNamer (smallcats.org). Pictures were then sorted into folders by camera trap location. Inside each camera trap folder pictures were then sorted by individual bucks. After sorting, we analyzed folders through DataOrganize and DataAnalyze (smallcats.org). Eight GPS radio-collars were used in ArcMap[®] 10.1 to create MCPs and 95% KDE home range estimations. KDE rasters were made allowing us to delineate the 95% home range values. Then the values were converted into polygons giving us a representation of home ranges. We found that the average camera trap MCP was 1,034 acres. Average GPS radio-collar MCP was 3,078 acres. Home ranges for GPS radio-collar KDEs averaged out to 953 acres. Correlations of $r^2 = .738$ were found between camera MPC and both collar methods.

32. ESTIMATING WILDLIFE SPECIES RICHNESS, DIVERSITY, AND HABITAT CONNECTIVITY USING NON-INVASIVE SAMPLING TECHNOLOGY*

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Abstract: Texas is composed of about 170 million acres of mostly rural country-side, about 97% of which is privately owned and managed. While only a small percentage of land within the state is protected and managed by the government, private landowners are still encouraged and have mild incentive to follow good wildlife management practices. Landowners of course all follow different management practices which end at their property lines, but ecosystems do not stop at human-made borders. If habitat connectivity is lost between private properties, then species diversity could diminish. Great species diversity is generally indicative of a healthy and well-functioning ecosystem, so it could potentially be used to measure the success or failure of different management techniques. Thus, our goal was to determine species diversity and habitat connectivity of private properties within the Texas Hill Country using non-invasive, camera trap technology. Through the Texas EcoLab Program, we gained access to do research on 13 different properties from San Antonio to Leakey, thus spanning over Bexar, Bandera, and Real Counties. At each property, we placed DLC Covert White Illuminator trail cameras to collect data for a year from April 2015 to April 2016. Photos were then analyzed to determine and compare species diversity among the 13 properties and to track activity patterns of the species identified. Based on trap events, species diversity was fairly low across most of the properties, potentially indicating that management practices need to be improved.

33. EFFECTS OF ROAD DEVELOPMENT ON DECREASING POPULATION OF THE ENDANGERED FLORIDA PANTHER*

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Abstract: The Florida panther, *Puma concolor coryi*, historically roamed throughout the Southeastern United States from Louisiana to Southwestern Florida. Due to habitat degradation from increased development, the subspecies experienced a drastic population decline that led to an influx in negative inbreeding effects that lowered the survival rates. Such inbreeding effects include a kinked caudal vertebrae, a cowlick in the caudal fur, and reproductive problems including cryptorchidism. The introduction of 8 Texas cougars, *Puma concolor*, into the population of Florida panthers increased the genetic diversity and population. Despite this population increase, the subspecies continues to experience threats from continued development of expanding roadways through vital habitat, specifically that of Big Cypress National Preserve and the Florida Panther National Wildlife Refuge. Our objective is to determine the extent of population loss of the Florida panther due to roadway development and automobile traffic. Data compiled on Google Earth by the Florida Fish and Wildlife Conservation Commission was used

to create a spreadsheet in Excel documenting the time and location of roadkills and presences in Florida from 1972 to 2015. We then used boosted regression trees to identify potential factors influencing the likelihood of roadkills, and quantify the relative importance of each factors.

34. EVALUATING POTENTIAL EFFECTS OF ANTARCTIC ICE-SHELF RETREAT ON BLUE WHALE POPULATIONS: A SIMULATION MODEL OF INTERACTIONS AMONG SEA ICE, ANTARCTIC KRILL, AND BLUE WHALES*

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Abstract: In the Antarctic, blue whales (*Balaenoptera musculus*) feed primarily on Antarctic krill (*Euphausia superba*), which feed primarily on under-ice algae. The retreat of the Antarctic ice shelf may pose potentially serious problems for blue whale populations by causing shifts in the abundance and distribution of sea ice and, hence, under-ice algae and Antarctic krill. Hence, the objective of this study is to evaluate the potential effects of Antarctic ice-shelf retreat on blue whale populations. We collected a comprehensive literature review to obtain data on the Antarctic ice-shelf retreat, abundance and distribution of Antarctic krill, and vital rates and population dynamics of blue whales. We then developed a stochastic simulation model representing the interactions among sea ice, Antarctic krill, under-ice algae, and blue whales, and used the model to explore the potential effects of Antarctic ice-shelf retreat on blue whale populations under various assumptions regarding the rate of retreat of the Antarctic ice shelf. Our preliminary results suggested that a decrease in ice-shelf extent would cause a decrease in blue whale populations due to a decrease in abundance of Antarctic krill.

35. MARKING TURTLES USING NAIL POLISH TO DETERMINE POPULATION SIZE*

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Abstract: Monitoring population trends of indicator species can be useful to wildlife managers to form or adjust management plans. The population size of turtles, for example, can give an indication of pond health. Thus, we estimated the turtle population size of a small pond in an urban park using a mark-recapture method. In addition to estimating the turtle population size,

we also wanted to test a new marking method that would be noninvasive. The project looked at two marking methods using a brightly colored nail polish on the turtles' fore claws and carapaces. We used hoop nets baited with sardines to capture the turtles at six sites along the pond. We caught a total of 21 turtles during the study; eighteen of which were Red Eared Sliders and the other 3 being Spiny Softshell turtles. By using the Schnabel method, the turtle population was calculated to be 81 turtles. For the marking technique, only Red Eared Sliders were tested since none of the Spiny Softshell turtles were recaptured. The polish was found to wear off easily on the fore claws, but the polish on the carapace lasted the length of the study period. Therefore, nail polish could be used to mark Red Eared Sliders for a short-term study, but is not permanent enough for a long-term study.

36. A COMPARISON OF BARBER POLE WORM LOADS BETWEEN MARFA PLATEAU AND MARATHON BASIN PRONGHORN*

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Abstract: Recent decline in pronghorn (*Antilocapra americana*) in the Trans-Pecos region of west Texas prompted the Borderlands Research Institute and Texas Parks and Wildlife Department to implement the Pronghorn Restoration Project. Since 2011, 538 pronghorn have been translocated from the Texas Panhandle to the Marfa Plateau and Marathon Basin. Barber pole worm (*Haemonchus* sp.) are a helminth parasite that can be transmitted among and between both domesticated livestock and wild ruminants. *Haemonchus* is believed to be one of several contributing factors in recent decline of pronghorn populations. Objectives of this study were to (1) summarize *Haemonchus* abundance in pronghorn prior to and following translocation in 2016, (2) make comparisons of *Haemonchus* abundance in current fecal samples between Marfa and Marathon pronghorn, (3) and make comparisons between *Haemonchus* abundance in current fecal samples between resident and translocated pronghorn in Marfa. Forty-four random fecal samples from pronghorn in the Marathon Basin were collected and processed. Eighty random fecal samples were collected and processed from the Marfa Plateau, including 43 from resident population and 29 from the 2016 translocatees. Fecal collection time period was divided into 2 seasons: the warm-dry season (1 April–30 June 2016) and the warm-wet season (1 July–31 October 2016). Average *Haemonchus* eggs per gram (EPG) found in 100 pronghorn sampled prior to translocation was 54. Post-translocation samples ($n = 29$) yielded an average of 85 EPG. Currently, Marfa and Marathon pronghorn have an average of 64 and 900 EPG, respectively. Specifically, resident Marfa pronghorn have an average of 53 EPG.

37. THE RECOVERY OF RANGELAND PRODUCTION IN THE WILD HORSE DESERT OF SOUTH TEXAS: THE IMPORTANCE OF RESIDUAL FORAGE*

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Abstract: Las Coloraditas Research and Demonstration Area was initiated with the objective of documenting the long-term results of different grazing practices in the Wild Horse Desert of South Texas. This study takes place on 7,681 hectares of the East Foundation in Jim Hogg County, Texas. The record-breaking drought years of 2011, 2012, and 2013, resulted in forage standing crop values to average as low as 5 kg/ha. Knowing this, the initial objective was to recover the forage production levels throughout the Las Coloraditas pasture. The pasture was grazed at a stocking rate of 1 animal unit per 18 hectares until destocked in April 2014 and rested until reaching a forage standing crop value that could maintain a predetermined number of animal units for one year (December 2015). Forage standing crop was estimated using the double sampling technique. Forage standing crop was estimated twice per year (Summer and Fall of 2014–2015) to capture the culmination of the two peak growing seasons characteristic of South Texas. A total of 17.88 cm of rain were received during 1 March–15 June 2014 and forage standing crop increased to 2,729 kg/ha, with a growth rate of 2.6 kg/ha/day. From 1 March–15 June 2015 a total of 41.75 cm of rain were received, which helped the Fall 2015 season to reach 4,032 kg/ha. This allowed a crop growth rate to average 7.7 kg/ha/day. Crop growth rate increased substantially as the forage base in the area increased. Future evaluations in this project will help to determine the optimal amounts of residual forage for recovery in the South Texas region.

38. WILDLIFE FREQUENCY AND PLANT COVER ASSOCIATIONS RECORDED WITH REMOTE CAMERA TRAPS AT ELEPHANT MOUNTAIN WILDLIFE MANAGEMENT AREA, TEXAS*

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Abstract: In the Trans-Pecos region of Texas, wildlife is diverse and often wide ranging. Various factors influence wildlife movements, including water sources, food availability, cover, and seasonal changes. At Elephant Mountain Wildlife Management Area (EMWMA), remote game cameras were used to assess the spatial distribution of wildlife in areas to be treated with Sendero[®] herbicides. This study is part of a larger project assessing the response of wildlife to Sendero herbicide application at EMWMA. Vegetation types at the camera sites include honey

mesquite shrublands and creosote-tarbrush flats. Soil types are mostly Straddlebug series but also include the Stovall and Butcherknife soils. Sixty game cameras were setup in the treatment areas 24 hrs/day with motion sensors on 1-minute intervals. Pre-treatment data was collected from April 2nd until August 3rd 2015. Camera sites were assigned in a stratified random sample using ArcGIS. Plant cover at camera sites was assessed to determine associations with wildlife frequencies recorded on remote cameras. This project will benefit future research by helping to determine camera trap placement for observing target wildlife.

39. RESTORATION EFFECTS ON VEGETATION AT NORTHERN BOBWHITE NESTS*

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Abstract: Northern bobwhite (*Colinus virginianus*) populations have exhibited a steady decline over the past several decades. Many believe this decline is due to loss of habitat and loss of plant diversity in their environment. This study evaluates effects of land restoration practices on structural and compositional differences of vegetation at nest sites between treated and non-treated areas. We evaluated two private ranches in Shackelford County and Stephens County in the Rolling Plains ecoregion of Texas during the summer of 2016. We collared and tracked female northern bobwhites through nesting and evaluated ground cover following termination of the nests. We used Daubenmire frames to catalogue the percent ground cover at and around nest sites along with visual obstruction at the nest using a Robel pole. We paired each nest site with a randomly selected site within a 100-m radius of the nest site. We compared eight nests in the non-treated site and three nests in the treated sites, ($n = 11$). Visual obstruction ($P = 0.75$), and bare ground ($P = 0.36$) did not differ between sites. Percent cover of forbs ($P = 0.001$), litter ($P = 0.047$), and grass ($P = 0.01$) differed between sites. One of three nests was successful in the restored sites and two of eight nests were successful in the non-restored sites. Restoration might be creating a more diverse landscape; however, more research is needed to determine so.

40. SPRING SURVIVORSHIP OF MONARCH BUTTERFLY EGGS AND LARVAE IN NORTH TEXAS*

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Abstract: In 2014 the Monarch Butterfly (*Danaus plexippus*) was petitioned for listing under the Endangered Species act in response to dramatic population declines of monarchs that migrate east of the Rocky Mountains. Texas is an important area for the population biology of this species, as much of north Texas and Oklahoma is where monarchs migrating north in spring lay their eggs to produce the generation of monarchs that ultimately populate most of the eastern

U.S. However, there is little information on reproductive success in this region. During the spring of 2016 we studied spring generation survival at the Cooper Lake WMA in Hopkins Co., Texas. Milkweed plants with eggs were monitored daily until the eggs or larvae disappeared or until the larvae reached the fifth instar. Since Red Imported Fire Ants (*Solenopsis invicta*) (RIFA) might affect survival, we collected data on the presence of RIFA adjacent to each of the plants. Our survivorship was higher than any other study using the same methodology (all in other regions). Additionally, contrary to expectations, monarch survivorship was higher on plants that were closer to RIFA mounds and on plants associated with higher capture rates of RIFA in glue traps adjacent to the plants. These results are discussed in relation to existing literature on tritrophic interactions potentially occurring within arthropod communities associates with milkweed.

41. USE OF TRAIL CAMERAS TO DETERMINE BIG GAME UTILIZATION OF SUPPLEMENTAL PROTEIN FEEDERS IN THE SANTIAGO MOUNTAINS, TEXAS*

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Abstract: Supplemental feed has become a popular management technique among landowners and managers in Texas. Evidence has been found that supplemental feeding can enhance reproduction and population growth under certain conditions, as well as allow animals to utilize marginal habitat, thereby improving their distribution in an area. On a ranch in the Santiago Mountains, free-choice supplemental feed is provided year-round. Big game animals on the ranch include: mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), bison (*Bison bison*), desert bighorn sheep (*Ovis canadensis*), javelina (*Pecari tajacu*), and others. To better assess timing, location, and species specific supplemental feed utilization on the ranch, we rotated game cameras ($n = 11$) between different feeder locations ($n = 26$) around the study area from September 2015–April 2016. Photos were collected and renamed by their associated date/time stamps and organized by feeder location. All photos were then sorted by species and later sub-sorted by the number of individuals captured in each photo. A total of 179,071 photos were collected of the aforementioned 5 big game species. Analyses of the photos shows that the elk and mule deer exhibited typical crepuscular habits with peak usage of the feeders taking place at dawn and dusk hours, desert big horn sheep utilization peaked during the heat of the day in the afternoon, while bison and javelina utilization was common throughout all hours of the day with peaks during the dusk hours.

42. VISITATION OF QUAIL FEEDERS BY QUAIL AND NON-TARGET SPECIES*

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Abstract: The purpose of this project is to determine the percentage of use of quail feeders by northern bobwhite quail (*Colinus virginicus*) and scaled quail (*Callipepla squapata*) in comparison to other species in different seasons during a period of high quail populations. Our area of focus lies in the Rolling Plains ecoregion of Texas on the Rolling Plains Quail Research Ranch off of Highway 180 in Fisher County (32.7708391° N, 100.599247° W). Above average rainfall during 2015 and 2016 has resulted in large increases in quail populations at this site, and here we revisit patterns of visitation observed in previous studies in order to determine whether altered population dynamics in quail and non-target species result in modified patterns of feeder utilization. The project involves the monitoring of 26 stationary quail feeders and 10 game cameras. Each feeder is monitored and kept full throughout the study and the amount of feed used is measured. Game cameras were used to track the percentage of use of the feeders by different species and the presence of predators at the feeders. Our findings indicate that quail feeders continue to experience significant use by non-target species during increased quail abundance.

43. WINTERING SANDHILL CRANE HABITAT SELECTION ALONG TEXAS GULF COAST**

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Abstract: The Gulf Coast subpopulation of the Midcontinent sandhill crane (*Antigone canadensis*) population winters along the Texas coast where considerable land use changes have occurred over the last few decades. In order to understand how continuing landscape changes

from expanding energy industries, changing agricultural practices, and urban growth will impact sandhill crane distributions in this region, more information is needed on their wintering ecology including habitat requirements. From November 2015 through January 2017, satellite transmitters ($n = 31$ with $\pm 18\text{m}$ accuracy) programmed to take four locations daily will be attached to adult sandhill cranes wintering along the Texas coast and will be programmed to take four locations daily. Using locations from the 2015-2016 and 2016-2017 wintering periods and habitat data layers (National Land Cover, surface water maps, and National Agricultural Statistics Service Cropland Data Layer), we will estimate diurnal habitat use along the Texas coast. We will use resource selection functions to estimate selection of habitat types and specific landscape configurations. For winter 2015-2016 our analysis includes 18 adult sandhill cranes encompassing 3,249 diurnal locations. Habitat classes most often used included grassland/shrubland (native grassland, shrubland and pastures), wetlands (woody and herbaceous), fallow agricultural fields and grain crops (sorghum and corn). We will incorporate data until 15 December 2017 to determine resource selection along the Texas coast. This information will help inform land management decisions and conservation planning needed to ensure the sustainability of the Gulf Coast subpopulation.

44. ASSESSING RISK OF WIND TURBINES TO MIGRATING SWAINSON'S HAWKS**

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Abstract: Swainson's Hawks (*Buteo swainsoni*) breed in western North America and migrate over 10,000 km to Argentina. Wind energy is expanding globally, and little research has been conducted on the potential threat wind turbines pose to Swainson's Hawks. To explore this question, we attached backpack harnesses carrying solar-powered GPS transmitters to 24 adult Swainson's Hawks near Amarillo, TX. We collected location data from May 2011 to November 2016, with 0.11 to 4.37 years of total data on each bird. Using average wind speed data, we classified the migration pathway by the potential for wind energy development as high (winds greater than 6 m/s), moderate (4.2-6 m/s), and low (less than 4.2 m/s). Previous assessments suggested Swainson's Hawks spent the majority of their migration time in low-wind-potential regions; our goal was to explore why that pattern occurred. We hypothesized that the observed pattern may not reflect Swainson's Hawks selecting for areas with low wind, but rather their movement rates may be faster when transiting high-wind regions, resulting in less time spent in those areas. We tested this hypothesis with a GLM in SPSS and found that travel rate varied with wind potential category ($p < 0.001$), with higher average migration speeds in areas of greater potential for wind energy construction. These results suggest that while 18% of GPS locations fell within areas that are prime for wind energy, the birds traveled through these areas at a fast rate, which may reduce their exposure, and therefore risk, to wind turbines.

45. REPRODUCTIVE SUCCESS OF BARN SWALLOWS NESTING ON BUILDINGS ALONG THE SH 24 CORRIDOR IN NORTHEAST TEXAS**

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Abstract: Barn swallows (*Hirundo rustica*) are known for using manmade structures such as buildings, bridges and culverts as nesting sites. The reproductive success under bridges and culverts has shown a decline in northeastern Texas apparently in response to the expansion of cave swallows (*Petrochelidon fulva*) into the area. This is believed to be caused by eviction from nesting sites and an increase in brood loss due to increasing density in mixed species colonies. Despite the marked decline in barn swallows nesting under bridges and in culverts, barn swallows are still common in the area and may be relying more on nesting on buildings than occurred previously. This study investigated the reproductive success of barn swallows nesting on buildings to determine how well these birds are doing. Ultimately the results will be used to determine whether local populations of swallows are showing a stratification of nesting habitat that results in equal reproductive success or whether this stratification is occurring at the detriment to barn swallows by virtue of forcing them to nest in locations where they experience decreased reproductive success.

46. NORTHERN BOBWHITE HABITAT RESTORATION IN A LANDSCAPE DOMINATED BY NON-NATIVE GRASSES**

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Abstract: The northern bobwhite (*Colinus virginianus*) has declined across the majority of its geographic range. Habitat loss and fragmentation are widely accepted as the primary culprits. In southern Texas, where bobwhite populations have remained relatively stable to-date, non-native grasses such as buffelgrass (*Pennisetum ciliare*) and Kleberg bluestem (*Dicanthium annulatum*) are threatening this stronghold by invading and displacing native plant communities, and thus bobwhites. Given this concern, we are attempting to restore native vegetation on a 109-ha area dominated by these grasses. Specifically, our objectives are to 1) document bobwhite site use before, during, and two years post-restoration treatment and 2) to evaluate bobwhite site selection in relation to thermal and vegetation structural attributes. In 2014, we began our restoration treatment by repeatedly discing and applying glyphosate herbicide to non-native grasses, taking care not to allow the grass to reseed in the process. After removal of non-native grasses, a diverse mix of ecotypic native plants was drill-seeded across the entire site in October 2015. During this process, bobwhite site use will be monitored via radio-telemetry and analyzed using a compositional home range analysis. Characteristics of the thermal environment will be

sampled by collecting ambient, black globe and ground surface temperatures surrounding bobwhite locations on both restoration and control sites. Attributes of the vegetation community providing for a suitable thermal environment, including overhead canopy density and species cover will also be measured. The knowledge attained in this study will be insightful to future restoration efforts as non-native grasses continue to expand their range.

47. ASSESSMENT OF PRECIPITATION ON THE NORTHERN BOBWHITE CECAL NEMATODE**

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Abstract: The northern bobwhite (*Colinus virginianus*) has been experiencing a long-term decline throughout Texas, and it is unclear what role parasitism plays, if any. Bobwhite populations have been shown to naturally follow a boom and bust cycle that corresponds with annual precipitation. Thus, it is likely that parasite population dynamics also are influenced by precipitation. Presently, it is unclear which precipitation metric (Palmer Drought Severity Index, Standardized Precipitation Index, or NOAA monthly summaries) is suitable for assessing parasite population dynamics. Our objectives were to (1) determine the best measure for assessing the potential effect of precipitation on the population dynamics of the cecal nematode, *Aulonocephalus pennula* and (2) determine if *A. pennula* population dynamics follow the same boom and bust cycle of their host. *Aulonocephalus pennula* prevalence and intensity from 4 hunting seasons (2012-2016) in South Texas were compared to the above precipitation metrics (representing coarse to fine scale measures). We discuss how our findings relate to assessing the role of precipitation on the common cecal nematode of northern bobwhites in South Texas.

48. NESTING ECOLOGY OF BELL'S VIREO IN NORTHEAST TEXAS**

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Abstract: Bell's vireo (*Vireo belli*) is a small migratory passerine bird that breeds throughout the central and southwest United States to northern Mexico. The species is considered a species of concern due to population declines. The subspecies of Bell's vireo (*Vireo belli belli*) whose breeding range encompasses parts of northeast Texas is listed among the species. Little is known about the Bell's vireo population in this region. Our goal is to quantify nest fate, quantify nest site characteristics, and develop a resource selection function model using logistic regression and AIC. We located 43 nests across 2 sites from late May to late July. The nests were compared to

43 randomly generated points. Predictor variables were found to be lateral concealment ($P = 0.0068$), canopy cover ($P = 0.0273$), and concealment below the nest ($P = 0.0429$). Daily survival rates of nests were related to the distance of the nest to the edge of the nest substrate, woody density, and visual obstruction. We compared vegetative variables between the sites and found significance in concealment below the nest ($P = 0.0404$), distance from the nest to the trunk of the nest substrate ($P = 0.0185$), distance from the ground to the rim of the nest ($P = 0.0178$), visual concealment ($P = 0.0338$), and woody density ($P = 0.0377$). The information gathered from this study will set a baseline for future studies and land management practices concerning Bell's vireo in the region.

49. INSECTS, RED IMPORTED FIRE ANTS, AND NORTHERN BOBWHITE ABUNDANCES**

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Abstract: Insects are an important food source for northern bobwhites (*Colinus virginianus*), more importantly for female reproduction and growing chicks. The red imported fire ant (RIFA, *Solenopsis invicta*), which was introduced into Mobile, Alabama in the 1920's, has since expanded its range to include much of Texas. This RIFA introduction has brought to question what effects RIFA are having on bobwhites, directly or indirectly. To determine if RIFA are having an effect on bobwhite abundances, we looked at the abundance of RIFA at 3 different sites. One site was treated with Extinguish[®] Plus (a highly attractive ant control substance) with predator control, another site was non-treated with predator control, and the third was non-treated with no predator control. We also measured the biomass and number of invertebrates on the same sites to determine if RIFA were influencing their abundance. We used ANOVA to test for differences in the mean numbers of RIFA and mean numbers invertebrate biomass and numbers between the 3 sites. The non-treated with no predator control site had significantly ($P = 0.0001$) higher RIFA numbers than the other 2 sites. Invertebrate biomass was significantly ($P < 0.0001$) higher on the non-treated site with predator control than the other 2 sites. For invertebrate numbers, there was no significant ($P = 0.0896$) difference between the 3 sites. Treatment with Extinguish[®] Plus did not reduce RIFA abundance on the treated site in 2016, probably due to the heavy rainfall. RIFA and invertebrate abundance did not appear to have influenced bobwhite abundances.

50. CHANGE AND FRAGMENTATION OF WOODY COVER IN THE LOWER RIO GRANDE VALLEY FROM 1984-2016**

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Abstract: The Lower Rio Grande Valley is one of the fastest urbanizing areas in the United States. In addition, cropland and rangeland conversion has led to loss and degradation of woody cover types across the region. The endangered ocelot which is native to southern Texas has seen its geographic range diminished due to loss of dense thornshrub and other woody cover. In the mid-1980's, researchers suggested only 5% of the woody cover in the region remained based on the current data available at the time. However, the advent of advanced satellite imagery allows quantification of wood cover over the past 32 years. We classified LANDSAT imagery data every 8 years from 1984-2016 to quantify different rates of land cover change and other land cover class metrics. Over the past 32 years, the amount of woody cover increased from, 13.7 to 15.9%, however mean patch area, edge density, patch density and Euclidean distance to nearest patch increased indicating severe fragmentation. Rangeland and intensive cropland conversion were the leading causes of change in woody cover, which can be attributed to rapidly expanding urban areas. These data provide important information for predicting future woody cover fragmentation, focus restoration efforts for ocelot recovery, and development of effective conservation strategies.

51. INFLUENCES ON BLACK RAIL DETECTION AND IMPLICATIONS FOR SURVEY TECHNIQUES**

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Abstract: Eastern black rails (*Laterallus jamaicensis jamaicensis*) are secretive and generally difficult to observe. Understanding what influences species detection can be a useful tool in developing a survey protocol. To determine what factors drive black rail vocalizations and observers' ability to hear them, we conducted repeated point count surveys across the Texas coast. We conducted six minute call broadcast surveys at each point. There were 308 survey points distributed throughout six study sites: Anahuac, Brazoria, and San Bernard National Wildlife Refuges, Mad Island Wildlife Management Area, Clive Runnel's Mad Island Marsh Preserve, and Powderhorn Ranch Preserve. At each survey we recorded the detection or non-

detection of black rails. We evaluated 10 possible protocol and climatic variables that could influence black rail detection. This was done in a multistep process including a goodness-of-fit test, single-season occupancy models, and multi-seasonal occupancy models. We then estimated the number of surveys needed, under good conditions, to have a 95 percent chance of detecting a rail when present in a single season. We found that temperature, lunar phase, and wind speed, primarily influenced detection. We estimated that it would require at least 16 surveys at a site to have a 95 percent chance of detecting a black rail when present in a single season. We conclude it is impractical to survey sites this many times. Occupancy models accounting for imperfect detection seem to be the logical alternative to intensive and expensive survey methods.

52. ENVIRONMENTAL FACTORS AFFECTING MESOPREDATOR OCCURRENCE IN AN URBAN LANDSCAPE**

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Abstract: Urban landscapes provide habitat to several mesomammals, and increased attention and interest in wildlife-human coexistence in these systems has fostered dramatic advances in urban wildlife ecology and management science. In urban settings, wildlife coexistence with humans may create elevated conflicts, persecution, and concerns regarding potential disease transmission to humans and pets. However, relevant anthropogenic and environmental factors influencing wildlife presence in urban systems remain poorly known, which are key for developing mitigation plans for potential conflicts. To date, few data have been collected on presence and composition of mesomammals in urban settings of the Southern Great Plains. This research is focused upon relating habitat and anthropogenic features with presence, occupancy, and distribution of coyote (*Canis latrans*), domestic dog (*C. lupus familiaris*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), domestic/feral cat (*Felis silvestris catus*), raccoon (*Procyon lotor*), and Virginia opossum (*Didelphis virginiana*) within the city limits of Lubbock, Texas. To date, >600,000 images have been collected from camera-trap surveys conducted during spring, summer, and fall 2016 within 15 randomly selected 1 km² cells overlaid on the boundaries of Lubbock city limits. Cats have been most common, with detections in all but one sampled cell, opossums and gray foxes were detected in 12 cells, whereas coyotes, wild dogs, and raccoons, were detected in 3, 2, and 4 cells respectively. Subsequent camera surveys will continue using an adaptive sampling approach to further expand the spatial extent and potential features associated with these mammals in Lubbock, Texas.

53. DEVELOPMENT OF A HABITAT SUITABILITY MODEL FOR MONTEZUMA QUAIL IN THE EDWARDS PLATEAU**

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Abstract: Montezuma Quail (*Cyrtonyx montezumae*) once inhabited nearly every county in the Edwards Plateau ecoregion of Texas. However, over the past 150 years, the Edwards Plateau population of Montezuma quail has been reduced to 5 counties centered on Edwards County due to incompatible land-use practices. Because of a lack in general information regarding the distribution and potential restoration of this species, we initiated a study to model suitable Montezuma Quail habitat in the Edwards Plateau. Specifically, our objectives were to identify important macro-habitat factors explaining Montezuma quail occupancy and then use these characteristics to model suitable habitat within the region. During March–September 2016 and 2017, we sampled 60 locations, twice per month, on 9 ranches using the call-back method to determine occupied and un-occupied habitat by Montezuma quail. We then determined macro-habitat variables around all sampling locations including the plant community, ecological site, topographical location, elevation, soil series, and total woody-plant coverage. We will use logistic regression and backwards elimination to determine variables of importance in predicting occupancy for Montezuma quail. Variables significant in our regression model will be used to model suitable habitat for Montezuma quail across the Edwards Plateau in the programs ArcMap 10 and Max ENT. This model will allow researchers and natural resource practitioners to identify areas with suitable habitat for the sampling of unknown meta-populations and to determine areas best suited for restoration attempts.

54. EFFECTS OF SUMMER AND WINTER PATCH BURNING IN COASTAL CORDGRASS COMMUNITIES ON UNGULATE DISTRIBUTION**

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Abstract: Gulf cordgrass (*Spartina spartinae* [Trin.] Merr. ex Hitchc.) and seacoast bluestem (*Schizachyrium scoparium* [Michx.] Nash var. *littorale* [Nash] Gould) are two native grass species along the Texas Gulf Coastal Prairies. In our study, prescribed fire is being applied to determine season of burning's influence on (1) grazing distribution patterns of ungulates; and (2) the nutritional value of gulf cordgrass and seacoast bluestem. Our study is on the East Foundation's El Sauz property in Willacy County. The site consists of 10 patches (>200 ha each) with two patches being burned each treatment season, plus two non-burned control patches. Our first year of burning has been completed with 2016 summer and winter treatments. Within each patch we established two 60 m transects that traverse both a cordgrass and a seacoast bluestem community. After burning, we clipped forage within the burned patches every third day for 7 weeks, then every seventh day for 8 weeks. We clipped forage within non-burned patches roughly every 45 days. We are analyzing forage samples for variation in crude fiber, protein, and fat levels. We are monitoring movement of thirty cattle (*Bos* sp.) using Lotek's LifeCycle® GPS collars, which record locations every 13 hours, and we are conducting ground-based visual counts every sampling day for white-tailed deer (*Odocoileus virginianus*), nilgai (*Boselaphus tragocamelus*), and cattle. Our goal is to develop prescribed burning recommendations to optimize utilization of cordgrass rangelands for both cattle and wildlife along the Gulf Coast Prairies on a sustainable basis.

55. GRAZING UTILIZATION INTEGRATED WITH VARIOUS ABIOTIC VARIABLES IMPACT ON FORB PRODUCTION IN SOUTH TEXAS**

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Abstract: With the growing interest of wildlife, landowners have developed an understanding of the significance of land management. In south Texas, cattle have contributed to a long history of shaping rangelands. There are different clarifications in vegetation response in the use of herbivory as a habitat management tool and also with a combination of various abiotic factors. Our goal is to formulate a model that assists with the understanding of the ecological processes of forb production that are utilized by white-tailed deer. Fifty randomly placed 1.5 m² vegetation enclosures with a paired grazed plot on six 2,500 ha study sites were positioned on four East Foundation ranches occurring in south Texas. Each autumn from 2012–2015, plant species composition and standing crop within each enclosure were compared to its paired grazed plot to determine grazing utilization. Vegetation was separated into grasses, forbs preferred by white-tailed deer, and non-preferred forbs. Data were also analyzed from local weather stations at study sites for daily annual precipitation, total autumn precipitation, and daily maximum temperature. The sand percentage was collected in the proximity of the enclosures by means of the USDA -

Ecological Site Description. Fifteen distinctive models were analyzed on Statistical Analysis Software (SAS) and selected using the Akaike Information Criterion (AIC). The best fit model biomass of forbs preferred by white-tailed deer included percent sand, autumn rain and grazing utilization.

56. EXPERIMENTS IN DNA AMPLIFICATION FROM CARNIVORE FECES**

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Abstract: Non-invasive genetic sampling has become an increasingly popular tool for wildlife management, aided by advancements in laboratory methods and DNA sequencing technology. However, the use of non-invasive samples presents challenges in sample identification and sample viability in the environment. We conducted a series of experiments to determine the accuracy of visual species identification, whether visual indications of sample exposure reflect DNA quality, and effects of insect predation on sample quality. Seven wildlife professionals with scat identification experience correctly identified 64% of scats (individuals range 50-90%) when given 10 images and the choices of bobcat or coyote. Bleached-white scats are typically avoided in non-invasive sampling because of concerns about age and exposure on DNA quality. We collected white scats and determined the amplification success for mitochondrial and nuclear DNA. Preliminary results suggest that color is not a good indicator of DNA amplification success. In our South Texas study location, dung beetles were observed scavenging all carnivore scats within 24 hours, leaving a loose cluster of undigested prey remains. Nine scats were partially collected before and 5 days after insect foraging. Mitochondrial DNA amplification for species identification was successful for 8 of 9 samples regardless of the impact of dung beetles. Overall, molecular identification of species was more accurate than visual identification, but scavenging by dung beetles and exposure did not correlate with DNA quality. Results of these experiments will guide the development of research and monitoring protocols for carnivores that rely on non-invasive sampling in the south Texas region.

57. WATERFOWL IDENTIFICATION SUCCESS BY WATERFOWL HUNTERS ON THE UPPER TEXAS COAST**

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Abstract: The Texas coast attracts hunters with a variety of skill, experience, and familiarity with local waterfowl. Regionally, mottled ducks (*Anas fulvigula*) are of conservation and management concern. For example, 2015-2016 regulations allowed a single “dusky duck” (i.e., mottled duck, Mexican-like duck, black duck and their hybrids) in a daily bag, but only after the first five days of the regular season. During the 2012-2013 hunting season we administered a post-hunt, voluntary survey at check stations in Anahuac and McFaddin National Wildlife Refuges, on the upper Texas coast. Successful hunters were asked to identify bagged birds to common name and sex; both successful and unsuccessful hunters were asked to participate in a photographed-based identification quiz. There were 442 successful hunters (89% of total participants), whom correctly identified 89% of their harvested birds to common name. Gadwalls (*A. strepera*) were most frequently incorrectly identified (29% of all incorrect identifications), whereas 10% of all incorrect species identifications were of mottled ducks. However, this is tempered, as >500 gadwalls harvested, only 8% were misidentified. Conversely, 25% (13/51) of harvested mottled ducks were misidentified as either female mallards (*A. platyrhynchos*) or American black ducks (*A. rubripes*; of which no individuals were ever observed at check stations). Photo-quiz identification success for successful and unsuccessful hunters dropped to ~70%, and 50% respectively; mirroring identification success of gadwall and mottled ducks for both hunter groups. These preliminary results indicate hunter duck identification skills are good for birds in-hand, but may be related to familiarity with commonly harvested species.

58. STAGE-STRUCTURED MATRIX ANALYSES EVALUATING THE POST-2010 POPULATION TREND OF KEMP’S RIDLEY SEA TURTLES IN THE GULF OF MEXICO: FOUR PROCESSES OF INVESTIGATION**

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Abstract: The Kemp’s ridley sea turtle (*Lepidochelys kempii*) is a critically endangered sea turtle that breeds and spends the majority of its life cycle in the Gulf of Mexico. Prior to 2010, the population appeared to be recovering; however, coincidental with the deep water horizon oil spill, there was an unprecedented increase in turtle strandings in the northern Gulf of Mexico and also a 35% decline in nesting success on the principal nesting area in Mexico. Reduced per capita availability of blue crabs and shrimp trawl by-catch in the northern Gulf of Mexico may have also contributed to the Kemp’s ridley decline. Currently, I am conducting a stage-structured

matrix model and thorough elasticity and sensitivity analyses to simulate and quantitatively evaluate various versions of four general processes that have been hypothesized to be driving the post-2010 population trend in the Gulf of Mexico. The four general processes I investigate here include: (1) single-year (“pulse”) reductions in survivorship, (2) multi-year (“press”) reductions in survivorship, (3) stock-recruitment relationships, and (4) density-dependent effects on the remigration interval. I expect to have the findings to demonstrate the different magnitudes of effects of the four hypotheses before the Texas Chapter of the Wildlife Society’s annual meeting.

59. MOVEMENT, RESOURCE USE, AND REPRODUCTIVE SUCCESS OF ELK IN RESPONSE TO COMPETITION, PREDATION RISK, AND LANDSCAPE 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 (2010-2019) and DOI Resilient Landscapes Program (2015-2024) 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, responses of all large, wild mammals present on the landscape are being evaluated and modeled, including Rocky Mountain elk (*Cervus canadensis*). Since 2012, >100 cow elk have been collared with VHF, store-on-board, or iridium GPS collars and their movements measured relative to their dominant natural competitors (mule deer, *Odocoileus hemionus*), predators (black bears, *Ursus americanus*, and cougars, *Puma concolor*), available forage, and landscape characteristics (topography, water sources, etc). Mule deer, black bear, and cougar movements are determined by store-on-board or iridium GPS collars. Elk forage availability and quality have been quantified across the landscape using 200 vegetation plots sampled annually and seasonally since 2013, while landscape features have been geospatially referenced via satellite and GIS layers. Starting in 2016, elk calves were captured and tagged to estimate elk reproductive success. This research will provide the basis for conservation and management of elk through this substantial landscape-scale restoration effort, and provide a holistic model for future ungulate research.

60. EFFECTS OF AGRICULTURE ON MULE DEER MOVEMENT IN THE TEXAS PANHANDLE**

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Abstract: Mule deer (*Odocoileus hemionus*) occur in most counties of the Texas Panhandle Wildlife District, which consists of rangeland habitat fragmented by row-crop agricultural fields. Deer often use crops to supplement natural forage, especially when natural forage is scarce or nutritional quality is low. Seasonal movements of mule deer in the Texas Panhandle have not been documented, and the effect of agriculture on deer movements is not known. Anecdotal observations suggest that deer in the region make large seasonal movements during fall and spring, which may be tied to agriculture. The goal of this study is to determine how agriculture affects deer movements, including type of crop and stage of maturation. We captured and marked 43 adult mule deer with GPS collars during October 2015, and fixes were taken every two hours for one year. Data from these fixes will be used to quantify movement distances and position on the landscape. Any seasonal movement characterized as long-distance or as a deviation from the home range will be paired with the season during which that movement occurred, the proportion of time the movements were directed to crop fields, and the crop that was most often used by the deer. Our findings will quantify the influence of crop resources on deer movements and habitat use and define the scale that should be considered in management of mule deer, especially in agricultural areas.

61. HABITAT ASSOCIATIONS OF FLYCATCHERS MIGRATING ALONG THE LOWER TEXAS COAST**

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Abstract: Although our knowledge of passerine habitat requirements during the breeding season is vast, less research has been done on habitat associations during the transient period. The lower Texas coast provides important stopover habitat for many birds, and its position adjacent to the Gulf of Mexico makes it the first landing spot for many trans-Gulf migrants. Thus, it is important to understand characteristics of stopover habitat in this region to aid future migratory bird conservation efforts. At least 29 out of the 34 species of flycatchers (family Tyrannidae) that reside in North America can be found in Texas at some point during their annual cycle. The majority of these species are migratory, making them an ideal group to investigate. En-route migrants are believed to assess the quality of an unfamiliar landscape through physiognomic traits. Thus, we are using bird abundance and physiognomy data collected along the lower Texas coast to assess habitat associations of migrant flycatchers. Flycatchers were surveyed during spring and autumn migration from 1991 to 1993, and again from 2006 to 2008. These surveys were conducted along 10, 500m transects within 5 physiognomic classes common along the lower Texas coast. DISTANCE 7.0 was used to evaluate densities of flycatcher species in habitats where sample sizes were large enough. The best fitting model was determined using Δ AIC; models with the lowest Δ AIC value were chosen for density estimates. Results from this study will help us understand what type of habitat is valuable to flycatchers during migration.

62. EFFECTS OF THERMAL ENVIRONMENT ON FOOD CONSUMPTION AND RUMEN TEMPERATURE OF WHITE-TAILED DEER BUCKS DURING SUMMER**

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Abstract: The effects of extreme temperatures on production have been studied in livestock, but less is known about the effects of the thermal environment on wildlife. White-tailed deer (*Odocoileus virginianus*) in the south Texas region must contend with extreme heat during summer. Because the rumen generates heat during microbial fermentation, one way to manage heat loads is to vary the time of day feed is consumed. We studied the effect the time of day has on feed consumption and rumen temperature during June 2016. Eight mature white-tailed deer males were fitted with a rumen temperature monitor and assigned to an ambient temperature or a cool-air (air-conditioned) treatment. We fed half the deer during the heat of the day and the other half at night. We recorded food and water intake and changes in rumen temperature. We hypothesized that animals with access to cooler environments would have a lower rumen temperature, consume more, and drink less. Preliminary data suggests intake was greater for deer fed at night vs. daytime. In addition, variation in consumption was greater for deer in the air-conditioned treatment. Results of this study will help managers understand an important environmental constraint for deer in South Texas and provide insight into habitat and water management projects that could help deer contend with summer heat.

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64. POPULATION DYNAMICS MODELING: TRANSLOCATION ALTERNATIVES FOR DESERT BIGHORN RESTORATION**

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Abstract: It is believed there was 1,000–1,500 desert bighorn (*O. c. mexicana*) living in 16 mountain ranges in Texas in the late 1800s. However, by 1960s, Texas lost the last of its native desert bighorn. Reasons for decline were believed to be associated with a combination of unregulated hunting, competition and disease transmission from domestic sheep and goats, habitat fragmentation, and potentially other unknown causes. An approach that has been used for restoration has been the translocation of individuals into former habitats. However, there is a lack of understanding how population dynamics function for these animals. In a decision-making setting, population models are critical for calculating the influences of different management activities on populations of interest, such as population size and population growth rate. To help understand basic population dynamics for future translocation efforts, we used a system dynamics model to assess different strategies to conduct translocations of desert bighorn. System dynamics modeling tools such as Stella allows to experiment with complex systems and develop better intuitions about the mechanisms that govern dynamic interactions. Preliminary projections show desert bighorn populations are mostly sensitive to alterations in adult female survival and reproduction or survival of lambs. This model could contribute in decision making for conservation and management assisting on alternative efforts for restoration that could have the greatest positive effect on the population growth of translocated populations.

65. ANALYSIS OF ACTIVITY PATTERNS OF SYMPATRIC OCELOT AND BOBCAT IN SOUTH TEXAS USING CAMERAS**

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Abstract: Ocelots (*Leopardus pardalis*) and bobcats (*Lynx rufus*) are two felids with a geographic range in the United States that overlaps in South Texas. Ocelots and bobcats have

similar dietary requirements. Ocelots occur in areas with dense vegetation and bobcats are also known to occur in these areas. The two felids are nocturnal with crepuscular peaks of activity. We established a camera-trap array on the East Foundation's El Sauz Ranch, Port Mansfield, Texas in autumn 2011. We monitored the remote cameras continuously and selected the photographs of ocelots and bobcats to capture times of activity. Circular statistics are useful to analyze cyclical data. We fit kernel density functions to these observed times to estimate the coefficient of overlap (Δ) between the two species. Confidence intervals were estimated with a smoothed bootstrap. The overlap in the time niche is useful to understand along which niche axes the two species are most competitive. This can lead to management practices best suited to protect the endangered ocelot.

66. ENVIRONMENTAL AND CAPTURE STRESS: WHITE-TAILED DEER IN A STOCHASTIC ENVIRONMENT**

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Abstract: Variable environments present ecological and physiological challenges for herbivores, which must adapt and cope with both predictable and unpredictable perturbations. The stress response plays a critical role in mammals' ability to respond to changes in the environment. South Texas is a semi-arid region and experiences drastic fluctuations in precipitation, a stressor white-tailed deer (*Odocoileus virginianus*) encounters often. We captured ≥ 500 deer during October–November of 2015 and 2016 throughout 4 sites that ranged from the Gulf coast to 145 km inland, spanning a precipitation gradient where rainfall decreases east to west. The objectives of this study were to 1) assess the ability of deer to respond to changes in rainfall using fecal glucocorticoid metabolites (FGMs) and 2) assess stress of capture using saliva and plasma cortisol. We quantified cortisol, the primary hormone involved in the mammalian stress response and fecal glucocorticoid metabolites (FGMs) via radioimmunoassays. We compared individuals between the 4 capture sites and used Palmer Modified Drought Indices (PMDI), an index of soil moisture, to model drought conditions prior to capture. We hypothesized that deer captured on ranches with higher PMDI values will have higher FGM concentrations. We also hypothesized that individuals with high FGM concentrations will have higher plasma and saliva cortisol, in addition to females who are lactating. We also used correlations to test whether there was a relationship between cortisol levels and lactate, a measure of glucose metabolism in the bloodstream, capture time and restraint time. This study will help determine if FGMs are an appropriate and feasible way for managers to identify periods of enhanced environmental stress and if plasma and salivary cortisol can be useful for monitoring individual health and response to capture and handling.

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68. DO SOCIAL CLASSES OF WHITE-TAILED DEER INFLUENCE USE OF SUPPLEMENTAL FEEDERS?*

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Abstract: Supplemental feed is a management tool that has been used in many regions of North America to increase white-tailed deer (*Odocoileus virginiana*) herd health and productivity, but the effect of supplemental feed on social behavior of deer is not well understood. Hierarchical competition within a white-tailed deer herd may compromise effectiveness of supplemental feeding. I hypothesized that peak feeding times of bucks and fawns will be correlated in the enclosures with only one feed site, but not correlated in the enclosure with several available feeding sites. We placed game cameras in 3, 81-ha enclosures with 40 deer/1 feeder, 60 deer/1 feeder, and 60 deer/3 feeders on both the Comanche and Faith ranches in Dimmit County, TX. The cameras actively recorded photos from November 2014 to mid-April 2015, and November 2015 until early April 2016. I analyzed a subset of these photos to determine the probability of observing a mature buck, immature buck, mature doe, immature doe, and fawn at specified time intervals in a 24-hour period. Peak feeding times among social classes were compared. Presence of mature bucks at a single available feeding site may cause less dominant deer to feed at a different time or rely on natural vegetation. Contrary to my hypothesis, preliminary results suggest no difference in the peak feeding times among the social classes in the high density enclosure with one feeder (60 deer/1feeder).

69. HABITAT CHARACTERISTICS ASSOCIATED WITH WILD TURKEY USE OF CONSTRUCTED ROOSTS IN SOUTH TEXAS**

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Abstract: Roosting habitat is an essential requirement of Rio Grande wild turkeys (*Meleagris gallopavo intermedia*, RGWT). Typically large trees such as live oak (*Quercus virginianus*) and hackberry (*Celtis occidentalis*) provide important roosting habitat in south Texas. RGWT also use structures constructed by humans, such as transmission towers, telephone poles and constructed roosts, where natural roosts are limited. However, not all constructed roosts are used

by wild turkeys. Our goals were to determine which habitat features, landscape features, and design features are important for turkeys selecting roost sites. Specific attributes of 71 existing used and unused constructed roosts, as well as active natural roost, were measured during summers of 2014–2016. Natural roost locations will be collected during winter of 2016. Natural roost data will be analyzed to isolate important attributes preferred by wild turkeys, and then these attributes will be used to select sites for erection of constructed roosts on study areas. Preliminary Results indicate distance to water is significant in selection of roost sites ($p < 0.01$). No other habitat features measured were found to differ among used and unused constructed roost. The results of this research will enable landowners to provide constructed roosts where natural roosts are declining, limited or absent, thereby providing a critical habitat component that would improve wild turkey populations in South Texas.

70. SIMULATED EFFECTS OF JUVENILE SURVIVAL ON ADULT POPULATION DYNAMICS OF THE HOUSTON TOAD**

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Abstract: Amphibian populations have been documented to be declining worldwide for the last three decades. Determining the risk of extinction is a major goal of amphibian conservation. Low juvenile survivorship is a common issue among amphibians and the effects of juvenile survivorship on Houston toad (*Bufo houstonensis*) populations have not been studied extensively. The sex ratio of reproductively mature individuals within a population is an important determinant of population dynamics, particularly for the Houston toad, a species endemic to east central Texas. The species demonstrates differences in the age at sexual maturity for both sexes thus causing an intrinsic sex ratio disparity. The objective of our research was to determine how juvenile survivorship affects this disparity along with population growth rates. We conducted a literature review to obtain the best demographic data available and developed a stage- and sex-structured population dynamics model for the Houston toad using STELLA[®]7.0.1. The model was applied to simulate variations in mortality rates, the resulting sex ratio of reproductively mature individuals within the population, and growth rates. Finally, we evaluated the performance of the model based on published literature. Our results showed that the sex ratio was influenced the most by changes in juvenile and adult female mortality rates. As the juvenile survivorship increased, the sex ratio disparity and growth rates increased. As adult female survivorship increased, the sex ratio disparity decreased and growth rates increased. The Houston toad population may not be affected by sex ratio disparity if enough juvenile females survive to reproductive age.

71. ARE OCELOTS USING WILDLIFE ROAD CROSSING STRUCTURES IN SOUTH TEXAS?***

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Abstract: It is estimated that there are fewer than 50 endangered ocelots (*Leopardus pardalis*) left in the United States. The two populations in Cameron County and Willacy County, TX are declining due to habitat loss and fragmentation; increasing road collisions account for more than 40% of ocelot mortality in south Texas. In an effort to maintain habitat connectivity and reduce vehicle collisions, the Texas Department of Transportation (TxDOT) is building wildlife road crossing structures under several high-use highways that pass through current and historic ocelot habitat. Ongoing construction on state highway 100 (SH100) in Cameron County is modifying existing wildlife road crossings and adding new crossings, cattle guards, and exclusion fencing in an effort to reduce ocelot mortalities. Arrays of camera traps have been placed around these crossing structure locations to document animal approach, entry, and passage through the crossings. The wildlife community will be assessed before, during, and after construction and to document animal presence and use. The primary focus of this research is road crossing structure use by ocelots and bobcats. Animals that have been documented using the road crossing structures so far are: bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), Virginia opossum (*Opossum virginicus*), and nine-banded armadillo (*Dasybus novemcinctus*). Presently, there is little information regarding ocelot use of road crossing structures. Maintaining habitat connectivity and reducing road mortalities are essential components to the recovery of the ocelot in Texas.

72. PRELIMINARY RISK ASSESSMENT OF TURKEY VULTURES EXPOSED TO SODIUM NITRITE THROUGH CONSUMPTION OF FERAL SWINE CARCASSES***

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Abstract: Feral swine (*Sus scrofa*) are the most abundant invasive mammal in the United States today. In Texas, feral swine cause extensive damage to wildlife, wildlife habitat, and agriculture. Damage mitigation campaigns are costly and current methods have not been effective at

reducing populations statewide. A target-specific and cost-effective feral swine toxicant has the potential to reduce feral swine damages in our state. An international collaboration to develop and register such a product with the EPA has determined HOGGONE[®], a sodium nitrite (NaNO₂) based toxicant, to currently be the best candidate for registration. There is little information on the effects of sodium nitrite in native Texas wildlife, whether ingested through primary or secondary consumption. Turkey vultures (*Cathartes aura*) are important to Texas ecology and will likely be exposed to sodium nitrite through secondary consumption of feral swine carcasses. This study was conducted in effort to refute the hazards of mortality to turkey vultures by assessing their sensitivity to sodium nitrite and evaluating risk of consumption of feral swine treated with HOGGONE[®]. A total of 10 turkey vultures of known age and sex were treated with NaNO₂ via oral gavage at of 600 mg/kg (N = 5) and 75 mg/kg (N = 5) and monitored for clinical signs of intoxication. Preliminary results indicate that sensitivity to sodium nitrite varies between dosages and suggest that risk of acute mortality to turkey vultures through consumption of feral pigs killed by sodium nitrite is not high. Work is ongoing to further assess risk to turkey vultures that consume feral swine killed by HOGGONE[®].

73. RESPONSE OF NATIVE TEXAS MILKWEEDS TO SOIL NUTRIENTS, LIGHT, AND DROUGHT**

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Abstract: Milkweeds (*Asclepias* spp.) are herbaceous perennials that play an important role in the monarch butterfly (*Danaus plexippus* Linnaeus) lifecycle, serving as the host plant for eggs and the sole food source for developing larvae. During monarch butterfly's annual migration adults seek out and lay their eggs almost exclusively on milkweeds. The decline of monarch populations has been attributed to the loss of milkweeds within their breeding range. This study will evaluate growth response of 9 milkweed species commonly found in Texas to basic habitat requirements (soil nutrients, light, and water). In a series of experiments, milkweed seedlings of each species will be grown at increasing nitrogen, phosphorous, and potassium levels for a 12 week period, after which above and below dry plant mass per treatment will be compared. In a separate outdoor experiment, milkweed seedlings will be grown in shade chambers with varying light levels for 12 weeks. Growth rates, photosynthetic rates, stomatal conductance rates, and transpiration rates of each plant will be measured and compared. Lastly, after milkweeds reach field capacity for a set time, and weighed after drainage has ceased. Plants will then be dehydrated for 23-46 days to reach pre-determined, wilting stages. Water content and water potential will be measured using leaf punches to gauge relative drought-tolerance. Results of this study will improve our understanding of basic habitat requirements for milkweeds in Texas, allowing natural resource professionals to better manage for the species, thus improving monarch habitat along their migration route.

74. ASSESSING THE EFFECTIVENESS OF WILDLIFE CROSSINGS TO REDUCE WILDLIFE VEHICLE MORTALITIES**

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Abstract: Ocelots (*Leopardus pardalis*) are endangered in the USA where an estimated 50 individuals remain, mostly in south Texas. Moreover, 40% of known ocelot deaths are caused by vehicle collisions. The Texas Department of Transportation (TxDOT) is upgrading and constructing wildlife crossing structures on state highway 100 (SH100) to increase habitat connectivity and reduce wildlife-vehicle collisions. TxDOT has also placed cattle guards and fencing along SH100 to prevent animals from crossing the road where wildlife crossings are lacking. The objective of this study is to assess the effectiveness of the wildlife crossing structures, fences, and cattle guards on SH100 in reducing wildlife mortalities. Road surveys are being conducted along a 7-mile stretch of SH100 and three additional highways within ocelot habitat once per week. All identifiable roadkill is photo-documented and GPS location taken to compare high mortality locations to crossing structures, fencing and cattle guard placements. Felids, ocelot and bobcat are the focal species of this study. Other species that have been documented as vehicle mortalities include Texas tortoise (*Gopherus berlandieri*), Virginia opossum (*Didelphis virginiana*), Coyote (*Canis latrans*), and Raccoon (*Procyon lotor*). Species identified as road mortalities will be compared to species identified in a parallel study using camera traps. This study will provide much needed information concerning the effectiveness of the wildlife crossing structures, cattle guards, and fences in reducing road mortalities in South Texas.

75. PRONGHORN FAWN SURVIVAL AND RECRUITMENT IN A LOCALIZED PRONGHORN POPULATION IN SOUTHEAST NEW MEXICO**

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Abstract: Pronghorn (*Antilocapra americana*) fawn survival is often considered a significant limiting factor for native or translocated pronghorn population growth and persistence. However,

pronghorn fawn survival can be highly variable due to predation, habitat quality (potential forage) issues, and weather stochasticity during the fawning period. In attempt to estimate fawn survival in a localized pronghorn population near the Fort Stanton Snowy River Cave National Conservation Area, New Mexico that was recently augmented by translocations of 75 (50 females: 25 males), 69 (33 females:36 males), and 15 female pronghorn in 2013, 2014, and 2015, respectively, we captured 116 pronghorn fawns aged ≤ 5 days, and marked them with ear tag radio transmitters to monitor survival from 2014 to 2016. Fawns were checked twice daily until the youngest surviving fawn was 40 days-old, and thereafter checked periodically. A total of 96 mortalities were documented; 42 attributed to definite predation by bobcat (*Lynx rufus*), coyote (*Canis latrans*) or “unknown” predator, 25 attributed to “probable” predation, 26 attributed to unknown cause of death, and 3 attributed to injury/infection. Naïve survival results for 2014, 2015 and 2016 were 0% (0/29 survived), 19.35% (6/31 survived), and 23.21% (13/56 survived), respectively. Surviving fawns from 2015 and 2016 were between 2.60 to 5.45 kg at capture (average 3.79 kg) and were approximately 6 hours to 5 days old (average 2.37 days). Based on preliminary data, future efforts aimed at experimental sterilization of adult coyotes and juvenile removal may improve pronghorn fawn survival in this localized pronghorn population.

76. BIOMASS ESTIMATION BEFORE AND AFTER OF PRESCRIBED FIRES USING UNMANNED AERIAL SYSTEM (UAS) TECHNOLOGY**

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Abstract: The application of unmanned aerial systems (UAS) in the management and monitoring of rangelands has been increasing significantly in recent years with new low altitude platforms, the miniaturization of sensors, the development of high spatial resolution pictures, and the flexibility to fly an unmanned aerial vehicle (UAV) in remote environments. The application of UAS could be used to estimate the biomass of vegetation including invasive plants. These plants have the ability to decrease plant diversity and alter vegetative composition and structure. Tanglehead (*Heteropogon contortus*) is a native perennial grass found on rangelands across Texas. Although tanglehead has been classified as native, its behavior has been more representative of an invasive. Tanglehead’s growing abundance is a cause for concern for many landowners in South Texas. The aim of this research is to understand the temporal dynamics of biomass production in South Texas Pastures with emphasis in tanglehead. The specific objectives are (1) to evaluate the feasibility of quantifying biomass in rangelands with very high-resolution imagery and (2) to compare aboveground tanglehead biomass development before and after prescribed fires. Imagery at 2 cm resolution is acquired flying UAV in Jim Hogg County, Texas. Imagery was acquired 15 days prior to prescribe burning in 3 areas of 400m x 200m each one, and then it will be acquired 1 week after the burn. Imagery is used to produce 3D models of

pasture before and after the burn, and we will use field biomass data to calibrate and validate a biomass production model derived from high resolution imagery.

77. RESPONSES OF SCALED AND GAMBEL'S QUAILS TO PAST AND FUTURE CLIMATE CHANGE

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Abstract: The scaled (*Callipepla squamata*) and Gambel's quails (*C. gambelii*) are species of New World quails found in semi-arid regions of southwestern North America. Recent phylogeographic studies have found evidence of rapid post-Pleistocene demographic growth and range expansion for both taxa. To evaluate conclusions based on genetic data, we used ecological niche modeling to examine how the geographic distributions of the scaled and Gambel's quails have changed over the past 130,000 years and predict how these 2 species may respond to a warmer climate in 2070. Our models support conclusions of that scaled and Gambel's quails underwent post-Pleistocene expansion. Ecological niche modeling indicated the geographic ranges of both species contracted severely during the Last Glacial Maximum (21,000 years ago), but expanded to their current distribution after the last glaciation ended. It also appears that the scaled quail was negatively affected by the warm conditions of the Last Interglacial (130,000 years ago), whereas the Gambel's quail expanded its range. Gambel's and scaled quails are predicted to expand their ranges under the future climate scenarios for 2070; however, caution should be used in the interpretation of these forecasts because the ecological niche models presented here do not account for human activity that negatively affects quality of desert quail habitat. The differing responses of the 2 species to past climate may be due to physiological differences, traits that warrant additional study.

78. IMPACTS OF QUATERNARY CLIMATE CHANGE ON THE PHYLOGEOGRAPHY AND DEMOGRAPHY OF THE WILD TURKEY

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Abstract: The wild turkey (*Meleagris gallopavo*) is a large gallinaceous New World gamebird that was historically distributed throughout much of the eastern and southwestern United States and Mexico. Although the wild turkey has been subject to numerous ecological and genetic studies, research focused on its historical phylogeography and demography is lacking. We used ecological niche modeling based on temperature- and precipitation-related bioclimatic variables and mitochondrial DNA sequences from previous studies to investigate how the wild turkey has responded to climate changes during the past 130,000 years. We also used ecological niche modeling to evaluate how the wild turkey might respond to a warmer climate in the future (2070). Our results suggested that the wild turkey was largely restricted to the Gulf Coast and

Mexico during the Last Interglacial (130,000 years ago) and the Last Glacial Maximum (21,000 years ago), but expanded its range during the Holocene (11,000–0 years ago). This was supported by the analysis of mitochondrial DNA, which suggests that the wild turkey underwent rapid population expansion. Our ecological niche model also suggests that the wild turkey will be relatively unaffected by future warmer climate, which conflicts with the species' restricted range during the previous interglacial. This conflict is probably due to the fact that Last Interglacial and future climate models do not represent identical temperature and precipitation gradients. Despite the lack of predicted range contraction in response to a warmer climate in the future, caution should be exercised in the interpretation of the models because they do not account for responses of the wild turkey's habitat to future warming or human-induced landscape change.

79. SIXTEEN YEARS OF GOLDEN-CHEEKED WARBLER (*SETOPHAGA CHRYSOPARIA*) MONITORING AT BARTON CREEK HABITAT PRESERVE, TRAVIS CO.

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Abstract: The golden-cheeked warbler (*Setophaga chrysoparia*) is an endangered neotropical migratory songbird with narrow nesting habitat requirements confined to Texas. A significant portion of their nesting habitat is found in the greater Austin area, where urban expansion and habitat destruction are critical issues. The Nature Conservancy's Barton Creek Habitat preserve, located in southwest Travis County along the western edge of Austin, was acquired as part of the Balcones Canyonlands Conservation Plan and provides nesting habitat for the golden-cheeked warbler. For the last sixteen years volunteers have been conducting point count surveys on the preserve as part of monitoring efforts for the warbler. On average, the golden-cheeked warbler was the fourth most detected species with relative abundances ranging between 3.7-8.6%. Relative abundances did not significantly differ across years indicating the golden-cheeked warbler population on the preserve is stable.

80. ASSOCIATION LEVELS OF DAMA GAZELLES IN DIFFERENT SOCIAL COMBINATIONS

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Abstract: Conservation of wildlife on private lands requires knowledge of animal social organization. GPS collars programmed on a 3 hr schedule, were fitted on dama gazelles (*Nanger dama ruficollis*) released into a 202 ha pasture on the Edwards Plateau near Uvalde, Texas. The study was comprised of 3 phases and ran from December 2014 until June 2016. For each treatment, an association matrix was calculated based on frequency of animals being within 50 m of each other. A score of ≥ 0.50 indicates consistent grouping. In treatment 1, the females had with them one adolescent male (Rm) and one young adult male. All these animals formed a cohesive group (association score 0.58). In treatment 2 when no adult males were present, mean association score fell to 0.42 due to 3 females forming a spatially separate subgroup. For treatment 3, three adult males were introduced. They separated; 2 localized in opposite ends of

the pasture, one by each of the female groups although not as a cohesive group member (0.31 and 0.35 association scores). The third adult male overlapped in area but avoided the other two adults. He loosely associated with the maturing male Rm (0.28 association score). Managers will note that this pasture accommodated multiple adult males during treatment 3. This appeared possible because of dense brush areas and slopes which allowed animals to remain out of view of each other. However, maturing males like Rm might well come into conflict with older males when eventually vying for access to females.

81. ADDRESSING CROSS-BOUNDARY CONSERVATION CHALLENGES THROUGH PARTNERSHIPS: THE OAKS AND PRAIRIES JOINT VENTURE

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Abstract: The Oaks and Prairies Joint Venture (OPJV) is a partnership of state and federal agencies, non-government organizations, universities, and individuals working together to address priority bird conservation in central Texas and Oklahoma established in 2008. To strategically deliver partner identified grassland bird conservation objectives, partners selected a set of focus counties using ecological, social, political, and economic datasets to identify where grassland conservation practices could meet the needs of priority grassland birds in an agricultural landscape. In 2013 the OPJV partners began a Grassland Restoration Incentive Program (GRIP) to provide financial incentives to private landowners to conduct habitat improvement practices resulting in over 60,000 acres of grassland habitat improvement. This conservation delivery is supported by several monitoring and research projects in an adaptive management framework. The OPJV Grassland Bird Monitoring Program started in 2012 and involves over 4,000 point counts per year in 24 counties in Texas and 10 counties in Oklahoma. This large-scale monitoring effort is planned for 10 years, but results from this monitoring effort have provided data for analysis to test short-term fragmentation effects. Additionally, targeted

research on northern bobwhite (*Colinus virginianus*) productivity and survival are ongoing to examine the ranch-level impacts of habitat management practices on bird populations. By concentrating efforts from multiple partners within a series of focus areas, the OPJV partners are working together to have a measurable impact on grassland bird populations and have the systems in place to be able to document impacts and tell our shared story.

82. MOVEMENT AND APPARENT SURVIVAL OF COLOR-BANDED REDDISH EGRETS

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Abstract: The Reddish Egret (*Egretta rufescens*) is a rare heron species of North America that continues to decline in abundance throughout most of its range. Thus gathering information about its spatial and temporal movements, detectability, and apparent survival are crucial for creating a conservation plan for this species. We used ten years (2006-2016) of banding and resight data to assess survivorship and movement patterns of juvenile reddish egrets in Mexico and Texas. Over 1,200 individuals were banded, and only 62 were resighted. Using Program MARK, our results suggest that hatch year reddish egrets have a lower apparent survival rate (0.25 in Texas, 0.51 in Baja) than older birds (0.86 in Texas, 0.91 in Baja), which leads us to believe that this life stage is possibly a limiting factor on the growth of the population across its range. Therefore our research targets the importance of long-term color banding, yielding to considerable insight on this species that could lead to management actions in the future.

83. SANDHILL CRANE ABUNDANCE AND ENERGY REQUIREMENTS AT MULESHOE NWR

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Abstract: As part of the initial stage of developing a landscape design focused on Sandhill Cranes (*Antigone canadensis*, SACR), we compiled weekly survey data from Muleshoe National Wildlife Refuge, Texas, from 2002-2014. We estimated seasonal SACR abundance, seasonal SACR energetic needs, and cropland scenarios needed to maintain 2002-2014 numbers. SACR consistently occurred on refuge from late October through early March; abundance peaked in early February at 51,727. Average annual SACR abundance totaled slightly more than 4.9 million occurrence days, with 20% occurring in fall (Sep-Nov), 52% in winter (Dec-Jan), and 28% in spring (Feb-Mar). We assumed an individual SACR requires 1,017.88 kcal per day. Kilocalories needed within the daily foraging flight distance (estimated <20 km) of cranes from the refuge are 984,794,828 in fall, 2,614,712,840 in winter, and 1,376,594,144 in spring. Winter wheat (2,588 SACR use-days/ha), corn (1,034 use-days/ha), and grain sorghum (497 use-days/ha) are the primary forage crops available. In 2016, roughly 492 ha of corn, 3,921 ha of sorghum, and 4,218 ha of winter wheat were available within 20 km of the refuge. These crops were estimated to provide 13,371,688 SACR use-days, or 2.7 times the amount needed. Future iterations will prioritize cropland at multiple distance scales (e.g., 91% of foraging likely occurs within 10 km of the refuge) and consider depletion of waste grains during winter. As the landscape design is developed, it will aim to maintain the energetic needs of SACR while balancing the needs of grassland dependent species and ground water conservation.

84. COMPARITIVE ANALYSIS OF PHOTO IDENTIFICATION FOR MARK-RECAPTURE DATA IN THE SPOT TAILED EARLESS LIZARD (*HOLBROOKIA LACERATA*)

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Abstract: The Spot-tailed Earless Lizard (*Holbrookia lacerata*) was historically found in open grassland habitats across central and southern Texas and northern Mexico. Distribution surveys conducted in 2008-2009 found that this species was in only 5% of historic localities, motivating a petition to list *H. lacerata* in 2010. U.S. Fish and Wildlife Service (FWS) declared listing may be warranted in 2010 and requested data on current and future threats to *H. lacerata* populations and habitat. A collaborative research program was developed, designed to characterize *H. lacerata* viability within the FWS's Species Status Assessment (SSA) framework. Surveys were conducted in different areas of historical and known habitat for estimation of population size using mark-recapture techniques. *Holbrookia lacerata* have unique blotches on their backs in

different shapes and sizes that provide identifiers for individuals. Encounter histories were constructed from side-by-side comparisons of photos taken of individual lizards for each site. Upon review of the photos, no similarities were found between blotching patterns of specimens indicating that each specimen was a unique individual. These results indicate that, while no recaptures were found, this method can still be used for mark-recapture studies on this species.

85. RESOLVING QUESTIONABLE MUSEUM RECORDS OF THE LOUISIANA PINESNAKE

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Abstract: The Louisiana Pinesnake (*Pituophis ruthveni*) is considered one of the rarest snakes in North America. This species is currently under review by the U.S. Fish & Wildlife Service (FWS) for threatened or endangered species listing. Specimens of *P. ruthveni* are not well represented in scientific collections, and many museum records are questionable or unverified. In past studies, these records have been used to create distribution and habitat models for this species. Some of these records have been resolved, but uncertain records still exist. The purpose of this study is to resolve questions surrounding unverified museum records of *P. ruthveni*. We measured 13 morphological characters of 28 museum specimens of *P. ruthveni*, and 15 museum specimens of *P. catenifer*. Multivariate statistics were used to distinguish among the two groups. Questionable records of *P. ruthveni* have been identified, and represent *P. catenifer*.

86. SKINKS OF THE SOUTH TEXAS SAND SHEET: DO WE HAVE A NEW SPECIES?

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Abstract: Two skink species from the genus *Plestiodon* are known to occur throughout southern Texas. We have discovered populations of skinks in the South Texas sand sheet that are morphologically distinguishable from both sympatric *Plestiodon* species (*obsoletus* and *tetragrammus*). They most closely resemble *P. obsoletus*; however, they mature at a smaller size, are more elongate, and have shorter legs. Also, if they were *P. obsoletus* most specimens encountered would be small enough to either be black or transitioning from black as is typical for

juvenile *P. obsoletus*. Here we use mtDNA (ND1) to compare these skink populations to other sympatric skink species as well as other *Plestiodon* species from the USA and Mexico.

87. **INTENTIONALLY LEFT BLANK**

88. FORAGING HABITAT PARTITIONING BY THREE KINGFISHER SPECIES (FAMILY CERYLIDAE) ALONG THE SOUTH LLANO RIVER, TEXAS

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Abstract: Currently, many neotropical and subtropical bird species are expanding northward in the United States. Included among these are ringed kingfishers (*Megaceryle torquata*) and green kingfishers (*Chloroceryle americana*). This northward expansion of *M. torquata* and *C. americana* now places these tropical kingfishers into aquatic systems with the familiar belted kingfisher (*Megaceryle alcyon*). We surveyed a 23.5km stretch of the South Llano River near Junction, TX to determine seasonal abundance among species and to compare foraging perch characteristics among species. We collected data on 5 characteristics of foraging perches for 136 kingfishers over 12 surveys. Mean encounter rate for *C. americana*, *M. alcyon*, and *M. torquata* per kilometer of river was 0.38, 0.17, and 0.08, respectively. Seasonal presence varied among the species: *C. americana* was present year-round, while *M. alcyon* were absent from mid-April to late-August, and *M. torquata* were absent from late-May to mid-July. Foraging perch characteristics were analyzed (permutational MANOVA); foraging perch characteristics of *C. americana* were significantly different from those of *M. alcyon* and *M. torquata*, while there was no difference in foraging perch characteristics between *M. alcyon* and *M. torquata*. 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.

89. RECOVERY TIME OF JUNIPER-OAK WOODLANDS FOLLOWING PRESCRIBED FIRES

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Abstract: We evaluated post-fire recovery of Ashe juniper (*Juniperus ashei*) - oak (*Quercus* spp.) woodlands using Landsat 7 imagery from growing seasons before and after three 100-acre prescribed fires at Balcones Canyonlands National Wildlife Refuge. The Normalized Difference Vegetation Index (NDVI) visually corresponded better with field measurements of fire severity than the Normalized Burn Ratio (NBR) or Normalized Burn Ratio 2 (NBR2). Thus, we evaluated changes in NDVI in a Before-After Control-Impact design. By the fourth growing season following the burns, mean NDVI values had returned to within 40% of pre-burn levels. If

recovery continues at a constant rate, full recovery of NDVI values will occur after 6 growing seasons. In Ashe juniper -oak woodlands, low-severity fire may reduce the probability of crown fire by raising canopy base height and reducing canopy bulk density; it may enhance breeding habitat for endangered golden-cheeked warblers (*Setophaga chrysoparia*) by increasing woodland diversity via promotion of oak regeneration and reductions of fire-intolerant Ashe juniper in near monotypic juniper stands. However, high-severity fire can negatively impact warblers due to reductions in woodland cover. Initial treatment effects due to the fires were a 10% decrease in canopy cover and 40% decrease in warbler density. Results from this remote sensing analysis will be used to plan the timing of future field measurements of vegetation and warbler density to determine if remote sensing measurements of NDVI correspond to vegetative characteristics useful for measuring warbler habitat recovery.

90. IMPACTS OF DISTURBANCE FROM EAGLE FORD SHALE EXPLORATION ON AVIAN ABUNDANCE AND NESTING

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Abstract: South Texas contains some of the last relatively unfragmented habitat for avian populations in the U.S. However, over the past few years, development has become a concern in this region due to the rapid expansion of Eagle Ford Shale (EFS) hydrocarbon production. Our objective was to determine how noise and traffic from localized oil-and-gas production affect avian abundance and nest success. Our study took place during 2015–2016 on 2 private ranches in Dimmit County, Texas. The study area consisted of sites along an oil-and-gas exploration corridor (disturbed) and sites where no exploration activities occurred (undisturbed). Sound levels were recorded with a sound level meter, and traffic rates were recorded with road tube accumulators. We conducted point counts at 8 points along roads and we conducted nest searches in 32, 100 × 400-m belt transects. Mean maximum sound levels (dBA/sec) were greater ($P = 0.013$) in disturbed sites (70.7 ± 2.9) than in undisturbed sites (61.2 ± 2.4). Mean traffic rates (vehicle passes/wk) were 603.5 ± 134.9 in disturbed sites and 34.2 ± 9.4 in undisturbed sites. In 2015, birds in undisturbed areas selected nest sites >80 m from roads while birds in disturbed areas selected for nests sites <30 m and >140 m from exploration roads. Noise

propagation will be modeled across the study area and its importance to avian abundance and nest success will be assessed. The EFS exploration has the potential to cause indirect habitat loss by influencing avian abundance and reproduction.

91. ANURAN USE OF THE COASTAL PRAIRIE IN TEXAS

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Abstract: Prairies are among the most rapidly disappearing landscape types in North America. Between 1830 and 1994, the extant area of tallgrass prairie declined by as much as 99% in parts of its historic range. The prairies of Texas have suffered a decline of 90%, with most of this loss occurring on the coastal prairie. This decline is primarily attributed to habitat loss and fragmentation which are considered major threats to biodiversity. The Attwater Prairie Chicken National Wildlife Refuge (APCNWR) is one of the largest remnants of native coastal prairie habitat in southeast Texas, thus making it an ideal place to examine prairie inhabiting anurans. We used Song Meters to record calling frogs at twelve sites (9 ephemeral and 3 permanent). Overall, 12 species of anurans were detected at the APCNWR, representing four families. Some anuran species were common on the APCNWR; crawfish frogs (*Lithobates areolatus*; a species of conservation concern), southern leopard frogs (*L. sphenoccephalus*), eastern narrowmouth toads (*Gastrophryne carolinesis*), and cajun chorus frogs (*Pseudacris fouquettei*) were detected at all ponds during our study. In contrast, Fowler's toad (*Anaxyrus fowleri*) and the bronze frog (*L. clamitans*) were only detected at two and four ponds, respectively. Our results suggest that numerous anuran species utilize the coastal prairie of Texas for breeding, including the crawfish frog, which has suffered declines across much of its range, primarily due to a loss of habitat.

92. INFLUENCE OF PRAIRIE DOG COLONIES ON VEGETATION AND CATTLE MOVEMENT IN THE MARATHON BASIN

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Abstract: The Black-tailed prairie dog (*Cynomys ludovicianus*) plays an important role in maintaining biological stability in western grasslands, unfortunately, current range has decreased from in the Trans-Pecos. Public opinion on potential competition for forage resources between prairie dogs and cattle influences conservation and management strategies for these native

herbivores. Understanding the ecological benefits that prairie dogs provide cattle and rangelands is important to sound species management being achieved. Objectives for this study include evaluating movement and grazing patterns of cattle in prairie dog colonies, assessing spatial variation and trade-offs between forage quality and quantity in and out of prairie dog colonies, and documentation of seasonal variation in forage quality and quantity. Biomass and vegetation characteristics will be collected April-June, July-October, and November-March over two years. Cattle ($n = 50$; 10 with GPS collars) will be rotated through an 1,100 ha pasture with approximately 300 ha consisting of prairie dog colony. A cow-calf operation with a rotational grazing system of three months on and two months off will be used for two years to represent a normal grazing routine common to the Marathon Basin. A selection model using a logistic mixed model analyses will be used to determine the probability of cattle using prairie dog colony or non-colony on an annual and/or seasonal basis. This data will allow us to obtain a better understanding of how prairie dog colonies influence cattle movement, alter nutritional content of vegetation, and educate the public about the role of prairie dogs in grassland systems.

93. GROUNDWATER USE AND DROUGHT INFLUENCE STREAM DISCHARGE IN THE ROSWELL BASIN, NEW MEXICO: IMPLICATIONS FOR ENDANGERED AQUATIC INVERTEBRATES

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Abstract: Spring features (sinkholes, isolated springs and spring creeks) on Bitter Lake National Wildlife Refuge, derived from an artesian aquifer, provide habitat for a suite of rare and endemic species. These species include three endangered snails (*Pyrgulopsis roswellensis*, *Juturnia kosteri* and *Assiminea pecos*) and one endangered amphipod (*Gammarus desperatus*). Aquifer recharge has been impeded by extended drought, prompting concern about long-term persistence of spring features and invertebrate persistence. We modeled stream discharge as a function of groundwater elevation, drought and season. This model indicated that as groundwater elevation deepened and drought worsened, stream discharge decreased. We used this model to predict groundwater elevations needed to maintain discharge conditions favorable to long-term persistence of the endemic invertebrates. For example, during the growing season a groundwater elevation below the well casing of ≈ 45 ft could maintain stream discharge at 0.25 cfs during normal drought conditions but ≈ 40 ft would be needed during extreme drought conditions. We also used an ARIMA model to forecast future groundwater elevations under varying drought scenarios. This model indicated that increased drought will likely deepen groundwater elevation assuming groundwater extraction continues at levels commensurate with current rates. Even assuming wetter conditions in the short-term, forecasts from this model suggested groundwater is unlikely to increase to necessary levels over the next 5 years. Given that climate change scenarios for the Southwestern United States predict increased drought duration and intensity, recovery of stream discharge may require changes in groundwater extraction rates.

94. 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. The purpose of these images is to capture the beauty of nature through a digital medium which few will ever physically see in the wild while also appealing to the viewer to be a participant for the cause of conservation. 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, concentrate on regional locations and offer monetary prizes to photographers of all skill sets with the purpose of drawing attention to conservation issues. These contests are conducted generally on an annual or semi-annual basis and attempt to unite photographers with landowners. Photographers may range in skill from novice to professional while landowners may include small ranches/farms, larger ranches, and conservation areas. We have developed an online survey utilizing Qualtrics software; this survey is currently gathering information from both photographers and landowners to gain an understanding of why they participate in these contests and more importantly what inspires them to photograph nature. Once the survey has ended, we will analyze the different socio-economic factors of conservation photographers as well as the landowners who offer the use of their property. Furthermore, we hope to discover if photographers and landowners participate in other conservation causes besides conservation photography such as hunting/fishing or conservation/restoration events.

95. NORTHERN BOBWHITE SURVIVAL DURING RAPTOR MIGRATION IN THE ROLLING PLAINS ECOREGION OF TEXAS

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Abstract: Raptors are major predators of northern bobwhite (*Colinus virginianus*) in the Rolling Plains Ecoregion and may impact populations during annual raptor migration when raptor

numbers are elevated. Combinations of brush and prickly pear (*Opuntia* spp.) provide escape cover for bobwhites. Years with greater precipitation bolster herbaceous production (e.g., common broomweed [*Amphiachyris dracunculoides*]), providing forage and canopy cover, possibly improving bobwhite survival. The relationship between raptor-caused mortality and herbaceous cover is not well understood. Our objectives are to (a) determine if bobwhite survival varies as a function of relative raptor abundance in the Rolling Plains Ecoregion and (b) whether shrub density or herbaceous cover can mitigate that effect. We used precipitation as a proxy for herbaceous cover, and will correlate changes in raptor-caused mortality over time with relative raptor abundance and precipitation. We monitored survival of radio-marked bobwhites (N = 406) from December 2009–December 2015 on the Rolling Plains Quail Research Ranch in Fisher County, Texas. Raptor-caused mortality (N = 302) was determined by evidence found at each mortality site. Relative raptor abundance by genus (*Accipiter*, *Circus*, and *Buteo*) was recorded during weekly roadside counts. We classified percent shrub cover in each pasture and recorded precipitation with an onsite weather station. Survival models in Program MARK will be used to assess adult bobwhite survival as a function of raptor abundance, shrub density, precipitation, age, and sex. This study will provide information on the relationship between bobwhite survival, raptor predation, shrub density, and herbaceous cover in the Rolling Plains Ecoregion.

96. SYNTHESIS OF TWO LONG-TERM STUDIES EXAMINING THE POTENTIAL IMPACTS OF ROAD CONSTRUCTION NOISE AND ACTIVITY ON AN ENDANGERED SONGBIRD IN TEXAS

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Abstract: We studied the potential impacts of road construction noise and activity on golden-cheeked warblers (*Setophaga chrysoparia*; hereafter warbler) at rural Highway 83 (2007–2013) and urban Highway 71 (2009–2014) in Texas. In both study areas, we established treatment sites within construction zones, control sites exposed to traffic noise, and control sites with no construction or traffic noise. We confirmed that noise decreased with increasing distance from both highways, but mean and maximum noise did not vary in relation to construction noise across the treatment phases. We mapped and monitored 370 warbler territories at the Highway 83 sites and 450 warbler territories at the Highway 71 sites. Territory densities remained the same or increased over time at all sites. We found no evidence that construction noise or activity influenced warbler territory size, mean territory distance from the roadways, pairing success, or fledging success at Highway 83 or Highway 71. We also conducted playback experiments to examine acute response of warblers to construction noise, and found that warblers elicited few responses, regardless of site, phase, or distance to the roadway. We did find some differences in song characteristics across sites. However, the differences were unrelated to phase and likely reflected individual variation in warbler songs. While some bird species exhibit negative responses to noise along roadways, we found no evidence to suggest that warblers responded negatively to road construction noise and activity in our rural and urban study areas.

**97. GOLDEN-CHEEKED WARBLER BEHAVIOR IN RELATION TO
VEGETATION CHARACTERISTICS ACROSS THEIR BREEDING RANGE**

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Abstract: We examined golden-cheeked warbler (*Setophaga chrysoparia*; hereafter warbler) behavior by age, sex, and habitat characteristics across their breeding range in central Texas (1995–1997). This federally endangered songbird foraged more on oak (*Quercus* spp.) substrates early in the breeding season and more on Ashe juniper (*Juniperus ashei*) late in the breeding season. We observed no overall difference in tree species use by warbler sex or age; however, we detected female and juvenile warblers in the low and middle canopy more often than males for all behaviors. Also, female warblers rested less and foraged twice as much as male warblers, who instead vocalized more than females and juveniles. In the southernmost study location, male warblers foraged more and vocalized less. More specifically, they foraged more on oaks when compared to other tree species, suggesting vegetation may influence warbler behavior in some locations. As the breeding season progressed, warblers increased their use of lower tree height classes for foraging and non-foraging behaviors. Site-specific vegetation management practices incorporating structural and compositional heterogeneity may better address the habitat needs of both warbler sex and age groups.

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