# 57<sup>th</sup> Annual Meeting of the Texas Chapter of the Wildlife Society



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### Managing Human-Wildlife Conflict

24–26 February 2021

Virtual Meeting Via Attendify

### 2020 - 2021 Executive Board

Executive Director	Don Steinbach
President	John Tomeček
President-elect	Romey Swanson
Vice President	John Kinsey
Past President	Tyler Campbell
Secretary	Blake Grisham
Treasurer	Jon Purvis
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# Program

Cristy Burch, Blake Grisham, Andrea Montalvo, and Landon Schofield

### Local Arrangements

Mary Pearl Meuth and Tiffany Lane

### **Posters and Student Affairs**

Heather Mathewson

### Meeting Schedule - 2021

#### Wednesday, 24 February 2021

8:00 AM - 12:00 PM 8:00 AM - 10:00 AM 8:00 AM - 12:00 PM 11:00 AM – 4:00 PM 12:00 PM - 4:00 PM1:00 PM - 3:00 PM 10:00 AM - 12:00 PM 12:00 PM - 1:30 PM 12:30 PM - 1:00 PM 1:00 PM - 1:30PM 1:30 PM - 3:30 PM 3:30 PM – 4:00 PM 4:00 PM - 4:30 PM 6:00 PM - 10:00 PM 6:00 PM - 10:00 PM 6:00 PM - 10:00 PM

#### Thursday, 25 February 2021

7:00 AM - 8:00 AM 8:00 AM - 8:40 AM 8:45AM - 9:00 AM 9:00 AM - 12:00 PM 12:00 PM - 2:00 PM 2:00 PM - 4:00 PM 2:00 PM - 5:00 PM 6:00 PM - 7:00 PM 7:00 PM - 8:00 PM

#### Friday, 26 February 2021

8:00 AM - 8:30 AM

Workshop - Dispersed Does Not Mean Dysfunctional: Working on Remote Teams Workshop - TWS Certification Workshop - R and R Studio for Beginners Workshop – AWB and CWB Application Review Workshop – There is a Leader in Every Seat Workshop - Understanding Land Trusts and the Importance of and Opportunities for Conservation Easements in Texas **Executive Board Meeting** Student Leaders Luncheon Olivia Schmidt's Video Presentation Bayou City Virtual Coffee HALF Hour, Tech Check General Session **TCTWS Business Meeting** Poster Session I Poster Session II Texas Tech NRM Reception Borderlands Research Institute Reception Wildlife Conservation Camp Reception

> Past Presidents Breakfast/Coffee Virtual Coffee Hour Tech Check Cottam Award Introduction Session Cottam Award Presentations Plenary and Lunch Ecology and Management of Quail Conservation and Ecology of Mammals 1 General Session New Technologies and Applications Amphibians and Reptiles Exotic and Invasive Species Judge's Art and Photo Critique Wildlife Trivia Social Awards Ceremony

> > Virtual Coffee HALF Hour Tech Check

8:30 AM – 10:30 AM 10:30 AM – 10:30 AM 11:00 AM – 11:00 PM 11:00 AM – 1:00 PM 12:00PM – 1:00 PM 1:00 PM – 3:00 PM 3:00 PM Avian Ecology and Management 1 Wildlife and Highways TCTWS Special Session for Students Wildlife Diseases Poster Session III Avian Ecology and Management 2 Ecology and Management of Ocelots Lunch Break Executive Board Meeting Adjourn

Photo and Art Contest Voting Closes at 5:00PM on 25 February 2021

Photo and Art Contest, Exhibitors, Raffle, and Job Board Content Links Open Continuously Throughout Meeting

#### Thursday, 25 February 2021 Clarence Cottam Award Competition Moderators: Justin French and Masahiro Ohnishi

- 9:00 Long-term Multi-Scale Habitat Selection of an Endangered Carnivore: Ocelots in South Texas (1982-2017), Amanda M. Veals; Joseph D. Holbrook; Michael E. Tewes; Tyler A. Campbell; John H. Young Jr.
- 9:20 **The Effects of Livestock Grazing on Forb Quality and Quantity: Implications for Pronghorn Habitat Management,** Jacob C. Locke; Justin T. French; Carlos E. Gonzalez; Louis A. Harveson; Bonnie J. Warnock; Shawn S. Gray
- 9:40 Nutritionally Mediated Size Differences in White-tailed Deer Morphology in the Coastal Sand Sheet Ecoregion of Texas, Seth T. Rankins; Randy W. DeYoung; Aaron M. Foley; J. Alfonso Ortega-S.; Timothy E. Fulbright; David G. Hewitt; Landon R. Schofield; Tyler A. Campbell
- 10:00 Break
- 10:10 Differences in Vital Rates Between Two Subspecies of Translocated Northern
   Bobwhite in Northcentral Texas, John Palarski; Heather Mathewson; Brad W. Kubecka;
   Thomas W. Schwertner; Dale Rollins
- 10:30 Evidence of Rare Pigment Loss and Genetic Population Divergence in Townsend's Big-eared Bats, Natalie Hamilton; Michael L. Morrison
- 10:50 Influence of Juniper on Montezuma Quail Habitat Use in Texas, Kristyn G. Stewart; Fidel Hernández; Eric D. Grahmann; Humberto L. Perotto-Baldivieso; Leonard A. Brennan; David B. Wester; Robert M. Perez
- 11:10 Break
- 11:20 Mule Deer and Anthropogenic Change: Effects of Agricultural Encroachment on Movement, Morphology, and Population Performance, Levi J. Heffelfinger; David G. Hewitt; Shawn S. Gray; Timothy E. Fulbright; Randy W. Deyoung; Aaron M. Foley; Louis A. Harveson; Warren C. Conway
- 11:40 Characterization of the Prion Protein Gene in Axis Deer and Implications for Susceptibility to Chronic Wasting Disease, Matthew J. Buchholz; Emily A. Wright; Blake A. Grisham; Robert D. Bradley; Thomas L. Arsuffi; Warren C. Conway

#### Plenary Session – Lunch and Learn Managing Human-Wildlife Conflict Moderator: John Tomeček

- 12:00 **The Role of Human-Wildlife Conflict Management in Conservation**, Michael J. Bodenchuk
- 12:45 Break
- 1:00 The Role of Human-Wildlife Conflict Management in Conservation, an International Dilemma, David Bergman

#### Session A1: Ecology and Management of Quail Moderator: Andrea Montalvo

- 2:00 A Practical and Efficient Helicopter Survey Technique to Estimate Bobwhite Abundance on Texas Rangelands-10 Years Later, John T. Edwards; Andrea Montalvo; Alec D. Ritzell; Zachary J. Pearson; Abraham Woodard; Leonard A. Brennan; Fidel Hernández
- 2:15 **Implementing and Evaluating a Sustainable Bobwhite Harvest Prescription,** D. Abraham Woodard; Leonard A. Brennan; Fidel Hernández; Humberto L. Perotto-Baldivieso; Neal Wilkins
- 2:30 Influence of Woody Vegetation Patterns on Overwinter Spatial Ecology and Demographics of Scaled Quail, Manuel Silva; Charlotte Wilson; Sarah Fritts; Rowdy A. White; Brad C. Dabbert; John W. McLaughlin; Blake A. Grisham
- 2:45 Break
- 3:00 Assessing Temperature Impacts on Nest Site Selection by Scaled Quail (*Callipepla squamata*) Hens in the Southern High Plains of Texas, Charlotte D. Wilson
- 3:15 Scaling Habitat Management for Northern Bobwhites and Grassland Birds: The First 5 Years of the Oaks and Prairies Joint Venture's Grassland Restoration Incentive Program (GRIP), Derek Wiley; Jim Giocomo; Kenneth Gee; Ty Higginbotham; Anna Matthews; Amanda Haverland; Thomas S. Janke; Ryan Piltz; Amber Brown

#### Session B1: Conservation and Ecology of Mammals Moderator: Michelle Haggerty

- 2:00 Vacant
- 2:15 Habitat Selection of Aoudad, Desert Bighorn Sheep, and Mule Deer in A Cooccupied Landscape, Daniel C. Wilcox; Carlos E. Gonzalez; Justin T. French; Louis A. Harveson; Froylan Hernandez; Shawn S. Gray
- 2:30 Static Scaling Between Body Mass and Antler Length in Black-tailed Deer, Willis Sontheimer; Floyd Weckerly

#### 2:45 Break

- 3:00 Notes of the Natural Recolonization and Dispersal of American Black Bears in Northeast Texas, Penny D. Wilkerson
- 3:15 Occupancy of Black Bears in the Davis Mountains: Documenting the Natural Recolonization of an Iconic Texas Species, Jamie L. Cooper; Dana L. Karelus; Bert Geary; Louis A. Harveson; Patricia Moody Harveson

3:30

#### Session C1: General Session Moderator: Blake Grisham

- 2:00 Are All Coyotes Equal? Kelly Simon
- 2:15 **Determining the Effect of Invasive Vegetation on Small Vertebrate Communities,** Andrew Mullaney; Cord B. Eversole
- 2:30 **Piecing Together the Prescribed Fire Puzzle in Texas,** Thomas S. Janke; William 'Andy' McCrady; Heath Starns; Jim Giocomo; Derek Wiley; Chris McLeland
- 2:45 Break
- 3:00 **Recovering America's Wildlife Act: Help Us, Help You Get More Wildlife Funding,** Rachel Rommel-Crump
- 3:15 **Predation Management for Wildlife Protection, Michael Bodenchuk**

#### Session D1: New Technologies and Applications Moderator: Kevin Moczygemba

- 2:00 An Operational Approach to Forage Mass Estimation Using Drones, Michael T. Page; Rider C. Combs; Bradley K. Johnston; Melaine Ramirez; Annalysa M. Camacho; Alexandria M. DiMaggio; J. Alfonso Ortega-S; Dwain Daniels; Tony Kimmet; Evan P. Tanner; Jay P. Angerer; Humberto L. Perotto-Baldivieso
- 2:15 Quantifying Spatio-Temporal Variability in Thermal Landscapes Through A Fiberoptic Distributed Temperature Sensing System: Implications for Thermal Ecology Research, Evan P. Tanner; John Polo; Skylar Wolf; Samuel D. Fuhlendorf; Shannon Brewer
- 2:30 Estimating White-Tailed Deer Population Sizes Using Unmanned Aerial Vehicles (UAVS), Jesse Exum; Aaron M. Foley; Randy W. DeYoung; David G. Hewitt; Jeremy Baumgardt; Mickey W. Hellickson
- 2:45 Break
- 3:00 Vacant
- 3:15 Using UAVs for Wildllife Aerial Surveys. What Is the Big Picture? Annalysa Marie Camacho; Walter Gless; Thomas Yamashita; Jesse Exum; Aaron Foley; Randy DeYoung; Evan Tanner; Shad Nelson; Humberto Perotto

3:30

#### Session E1: Amphibian and Reptiles Moderator: Romey Swanson

- 2:00 Should I Stay or Should I Go? Spatial Ecology of Western Chicken Turtles, Brandon Bowers; Danielle K. Walkup; Toby J. Hibbitts; Paul S. Crump; Wade A. Ryberg; Roel R. Lopez
- 2:15 **Texas Horned Lizard Scat Predicts Lizard Size and Age Class,** Javier O. Huerta; Stephen L. Webb; Scott E. Henke; David B. Wester; Fidel Hernandez; Randy L. Powell
- 2:30 Fine Resolution Mapping of Houston Toad Breeding Pond Habitat, Amie Treuer-Kuehn
- 2:45 Break
- 3:00 **Research Through the Lens of Camera Traps: Insights Gained from Three Secretive Snake Species,** Wade A. Ryberg; Danielle Walkup; Emlyn Smith; Josh Pierce; James Childress; Forrest East; Corey Fielder; Price Brown; Brandon Bowers; Brian Pierce; Toby Hibbitts; Paul Crump; Russell Martin; Krysta Demere
- 3:15 Development of an Environmental DNA Assay to Detect the State Threatened Black-spotted Newt, Padraic S. Robinson; Drew R. Davis; Richard J. Kline

#### Session F1: Exotic and Invasive Species Moderator: Samantha Leivers

- 2:00 Assessment of Genetic Variation in Aoudad: Implications for Disease Transmission, Emily A. Wright; Rachael C. Wiedmeier; Caleb D. Phillips; Robert D. Bradley; Warren C. Conway
- 2:15 Conquering A Prolific Invader- Optimal Herbicide Rates for Controlling Chinese Tallow, Colt Sanspree
- 2:30 **Movement Strategies and Behavior of Nilgai Antelope,** Kathryn M. Sliwa; Jeremy A. Baumgardt; Randy W. DeYoung; J. Alfonso Ortega-S.; David G. Hewitt; John A. Goolsby; Adalberto A. Pérez de León
- 2:45 Break
- 3:00 **Habitat Utilization of Nilgai During the Winter in South Texas,** Megan Granger; Humberto Perotto-Baldivieso; Clay Hilton; Scott Henke; Tyler Campbell
- 3:15 Movement Responses and Resource Selection of Wild Pigs in Relation to Corn Growth Stages, Bethany Friesenhahn; Randy W. DeYoung; Michael J. Cherry; Humberto L. Perotto-Baldivieso; Kurt C. VerCauteren; Nathan P. Snow; Justin W. Fischer

#### Session A2: Avian Ecology and Management 1 Moderator: Kathryn Burton

- 8:30 **Grassland-Obligate Birds Early Response to A Chemical Shrub Removal Treatment,** Alejandro Chávez Treviño; Mieke Titulaer; Carlos E. González-González; Maureen Correl; Louis A. Harveson
- 8:45 Avian Community Response to Coastal Prairie Restoration using Herbicide and Prescribed Fire on the Welder Wildlife Refuge, Derek R. Malone; Clint W. Boal; Terry L. Blankenship
- 9:00 Changes in Avian Community Composition and Structure Following Prescribed Thinning of Pinyon-Juniper Woodlands, Lucas Schilder; Corrie Borgman; Carlos Portillo-Quintero; Robert Cox; Clint Boal
- 9:15 Break
- 9:30 The Effects of Urbanization on A Kin-Structured Passerine, the Black-crested Titmouse, Rebekah J. Rylander; Sarah R. Fritts
- 9:45 Where and by how Much do Golden-Cheeked Warbler Models Differ? James M. Mueller; Steven E. Sesnie; Sarah E. Lehnen
- 10:00 Seasonal Weather Effects on Avian Productivity in South Texas, Camryn Kiel

#### Session B2: Wildlife and Highways Moderator: Kaitlyn Cargol

- 8:30 **Temporal Partitioning as A Means for Wildlife to Persist Around A Road in South Texas,** Thomas John Yamashita; T. Miles Hopkins; Anna D. Rivera Roy; Kevin Ryer; John H. Young Jr.; Richard J. Kline
- 8:45 **Wildlife Behavior at Culverts in East Texas,** Samantha J. Leivers; Michael L. Morrison; Brian L. Pierce; Melissa B. Meierhofer
- 9:00 When Can Cropping Rate Compensate for Increased Vigilance? Elizabeth M. Kurpiers; Floyd Weckerly
- 9:15 Break
- 9:30 Determining the Effectiveness of Wildlife Exits Along A South Texas Highway, Zarina Sheikh; Richard Kline; Kevin Ryer; John Young
- 9:45 Estimating the Performance and Permeability of a South Texas Road Ecology Project, T. Miles Hopkins; Kevin Ryer; John Young Jr.; Richard Kline

#### Session C2: Special Session for Students Moderator: Heather Mathewson

- 8:30 What Every Undergrad Needs to Know about Going to Graduate School, John Tomeček
- 8:45 Texas Parks & Wildlife, Whitney Gann
- 9:00 USDA-Natural Resources Conservation Service, Bertha Venegas
- 9:15 Break
- 9:30 United States Fish and Wildlife Service Working for the Man, Tiffany Lane
- 9:45 **Consulting Agencies, Plateau Land & Wildlife Management,** David Riley
- 10:00 Private Lands, MT7 Ranch Perspective, Ty Bartoskewitz
- 10:15 Non-Profit Organizations, Audubon Texas, Yvette Stewart
- 10:30 **Zookeeper, Outreach, and Education,** Amanda Hackney

#### Session D2: Wildlife Diseases Moderator: Annaliese Scoggin

- 8:30 Small Mammal Community Ecology and Ectoparasite Dynamics in Tamaulipan Thornscrub Habitat, Brandi Giles; Cord B. Eversole
- 8:45 A Comprehensive Study of Parasites of the Texas State Bison Herd: Part I, Sara B. Boggan
- 9:00 Characterization of Desert Bighorn Sheep Microbiomes in Texas, Rachael C. Wiedmeier; Emily A. Wright; Bob Dittmar; Robert D. Bradley; Warren C. Conway; Caleb D. Phillips
- 9:15 Break
- 9:30 Monitoring Movements Relative to Management Efforts Along the US-Mexico Border, Ashley G. Hodge; Jeremy A. Baumgardt; Randy W. DeYoung; Michael J. Cherry; David G. Hewitt; John A. Goolsby; Kim H. Lohmeyer; Adalberto Pérez de León
- 9:45 Exploring A Plant-Diversity Hypothesis to Explain A Latitudinal Gradient in
   Eyeworm Prevalence in Northern Bobwhite in Texas, John E. Herschberger; Shaelyn Rainey; Fidel Hernández; Kristyn G. Stewart; Andrea Montalvo

#### Session A3: Avian Ecology and Management 2 Moderator: Amanda Hackney

- 11:00 An Assessment of Prescribed Grazing for Lesser Prairie-chickens on Beef Herd Health and Productivity, Lily Evans; Michael Whitson; Carlos Villalobos; Darren Hudson; Christian Hagen; Blake A. Grisham
- 11:15 A Resident Raptor: A Review and Empirical Study of the White-Tailed Hawk in Texas, Madeleine A. Thornley
- 11:30 **Mapping Texas Landscapes on the Go: Teamgo and Ground Truther,** Wendy Anderson – Moved from General Session to accommodate Technical Difficulties Thursday Afternoon
- 11:45 Break
- 12:00 Comparative Productivity of American Kestrels in A Nest Box Program and Natural Nests in Lubbock County, Texas, Jenny R. Harris; Clint W. Boal
- 12:15 A Perfect Home 2.0: Creating A Reasonable and Reliable Artificial Burrowing System for Western Burrowing Owls, Audrey L. Holstead; Sarah J. Turner; Frank A. Cartaya; David L. Rizzuto; Brian L. Pierce

#### Session B3: Ecology and Management of Ocelots Moderator: Liz Tidwell

- 11:00 Effects of Water Salinity on Intake of Food and Water by White-tailed Deer, Austin K. Killam; Clayton D. Hilton; David G. Hewitt; Aaron M. Foley; Natasha L. Bell Moved from Conservation and Ecology of Mammals to accommodate Technical Difficulties Thursday Afternoon
- 11:15 Assisted Reproductive Techniques in Free-ranging Ocelot and Bobcat Populations of South Texas, Ashley Reeves; Debra L. Miller; William F. Swanson; Clayton D. Hilton; Jason V. Lombardi; Michael E. Tewes; Tyler A. Campbell; Landon Schofield
- 11:30 **Habitat Selection of Ocelots Using Lidar Derived Canopy Metrics,** Maksim Sergeyev; Michael E. Tewes; Jason V. Lombardi; Tyler A. Campbell
- 11:45 Break
- 12:00 Are All Large Patches Created Equally? Landscape Structure of Woody Communities to Inform Ocelot Recovery and Road Mitigation in Texas, Jason V. Lombardi; Humberto L. Perotto-Baldivieso; Michael E. Tewes; Maksim Sergeyev; John P. Leonard; Amanda M. Veals; Landon Schofield; John H. Young Jr.
- 12:15 Ocelot Density and Habitat Use in Tropical Deciduous Forests in the Sierra Tamaulipas of Mexico, Jason V. Lombardi; Michael E. Tewes; W. Chad Stasey; Arturo Caso; Sasha Carjaval-Villareal

#### Poster Competition - Session A 3:30 PM – 4:00 PM Wednesday, 24 February

- Comparison of Native Grass Establishment in Monocultures and Mixtures in Northeast Texas, Emily R. Bishop; Tyler C. Wayland; Sandra Rideout-Hanzak; Forrest S. Smith; Keith A. Pawelek; David B. Wester
- 2. Distribution and Abundance of Cormorants in Texas, Sophie A. Morris; Clint W. Boal; Reynaldo Patino
- 3. Indexing Fall Abundance Through Spring Call Count Surveys for Landowners, Hailey Wright; Becky Ruzicka; Dale Rollins; Daniel King; Lloyd LaCoste
- 4. **Burrowing Owl Movements in Relation to Wind Energy Development,** Meghan Renee Mahurin; Clint W. Boal; Courtney J. Conway; Warren C. Conway; James D. Ray
- An Assessment of Fine Scale Microclimate Conditions in Purple Martin Housing and Its Influence on Nest Survival, Ariana Rivera; James D. Ray; James Price; Blake A. Grisham
- 6. Analysis of Survey Methodologies for Wintering Rio Grande Wild Turkey in Cross Timbers and Post Oak Savannah Ecoregions, Chloe Bates; Humberto L. Perotto-Baldiveiso; William P. Kuvlesky; Alfonso Ortega Santos; Leonard A. Brennan; Jason V. Lombardi; Michael T. Page; Nicholas R. Kolbe
- Population Trends of Land Birds on East Foundation Ranches: An Analysis of Ten Years of Data, Delanie Slifka; Leonard A. Brennan; April A. Conkey; Fidel Hernández; Humberto L. Perotto-Baldivieso; Tyler A. Campbell; Javier O. Huerta; Tenley N. Housler
- 8. Verdin Nesting Ecology in South Texas, Delanie Slifka; Leonard A. Brennan; April A. Conkey; Tyler A. Campbell; Javier O. Huerta; Tenley N. Housler

- Wildlife Use of Future Wildlife Mitigation Structures on A Highway in South Texas, Thomas John Yamashita; Zachary M. Wardle; Jason V. Lombardi; Michael E. Tewes; John H. Young Jr.
- Heat Induced Behavioral Adaptations in A Wild Ruminant and the Potential for Competition with Cattle, Jacob L. Dykes; Randy W. DeYoung; Timothy E. Fulbright; David G. Hewitt; Charles A. DeYoung; J. Alfonso Ortega-S; Aaron M. Foley; Tyler A. Campbell
- 11. **Reproductive Capabilities of Nilgai in South Texas,** Megan Granger; Clay Hilton; Scott Henke; Humberto Perotto-Baldivieso; Tyler Campbell
- 12. Monitoring Dispersal and Habitat Associations of Two Threatened Primates Along A Conservation Corridor in Western Ecuador, Jacquelyn M. Tleimat; Sarah R. Fritts; Shawn F. McCracken
- 13. Wildlife Avoidance Behavior at Wildlife Crossing Structures in South Texas, Victoria A. Hanley; T. Miles Hopkins; John H. Young; Richard Kline
- 14. Species Richness at Wildlife Crossing Structures Compared to Right-Of-Way Cameras Along Fm106 in Cameron County, Texas, Anna Rose Mehner; T. Miles Hopkins; John Young Jr; Richard Kline
- 15. Influence of Agriculture on the Spatial Genetic Structure of Mule Deer in the Texas Panhandle, Lindsey Howard; Levi Heffelfinger; Randy DeYoung; David G. Hewitt; Shawn S. Gray; Warren C. Conway; Timothy E. Fulbright; Louis A. Harveson

- 16. **Spatiotemporal Patterns of Pronghorn in the Texas Panhandle,** Dakota R. Moberg; Humberto L. Perotto-Baldivieso; Victoria M. Cavazos; Timothy E. Fulbright; Randy W. DeYoung; David G. Hewitt; Warren C. Conway; Shawn Gray
- 17. Influence of Wildlife Crossing Structure Characteristics on South Texas Wildlife, Caitlin K. Brett; T. Miles Hopkins; John Young Jr; Richard J. Kline
- The Effect of Road Mortality Mitigation Structures on Rodent Abundance and Community Composition in South Texas, Adam Sanjar; Kevin Ryer; John Young; Richard Kline
- An Evaluation of Social Media in A Wildlife Organization: What Messages People Engage with Most, Janette Martinez; Stacey S. Dewald; Julie Rumbelow; Louis A. Harveson

#### Poster Competition - Session B 4:00 PM – 4:30 PM Wednesday, 24 February

20. Vacant

- 21. Fine-Scale Genetic Structure in A High-Density Population of White-Tailed Deer: Implications for Management of Cattle Fever Ticks, Ashley G. Hodge; Jeremy A. Baumgardt; Masahiro Ohnishi; Randy W. DeYoung; Michael J. Cherry; David G. Hewitt; John A. Goolsby; Kim H. Lohmeyer; Adalberto Pérez de León
- 22. Ocelot and Bobcat Occurrence in A Hunted Exotic Game Ranch, Zachary M. Wardle; Jason V. Lombardi; Michael E. Tewes
- 23. A Comparative Study of Plant and Arthropod Communities Pre and Post Grazing by Bison, Molly Marita Koeck; Adam B. Mitchell; Heather A. Mathewson; Donald K. Beard
- 24. Cover Crop Considerations for Rangeland Restoration, Brianna M. Slothower; Anthony Falk; Sandra Rideout-Hanzak; Terry Blankenship; David B. Wester
- 25. Examining the Effects of Topsoil Stockpiling and Seeding Amendments on Plant Community Species Richness Over Time, Dustin A. Golembiewski; Sandra Rideout-Hanzak; David B. Wester
- 26. Ecological Niche and Species Distribution of the Banded Tree Anole (*Anolis transversalis*) With New Record from Bolivia, Umberto J. Fasci; Cord B. Eversole; Randy L. Powell; Dennis Lizarro; Gonzalo Calderón Vaca; Elizabeth Surovic
- 27. Application of Environmental DNA (eDNA) Metabarcoding in South Texas, Sean M. Collins; Drew R. Davis; Richard J. Kline

- 28. Incorporating Microclimate into A Species Distribution Model for the Black-spotted Newt, Shelby M. Bauer; Drew R. Davis; Richard J. Kline
- 29. Effects of Prescribed Burning on Butterfly Populations in Coastal South Texas, Rebecca Zerlin; Juan Elissetche; David B. Wester; Sandra Rideout-Hanzak
- 30. Vacant
- 31. Ecological Monitoring on Military Installations: Balancing Mission and Conservation, Andrew E. Hanna; Sarah J. Turner; Audrey L. Holstead; Francisco A. Cartaya; David L. Rizzuto; Brian L. Pierce
- 32. Tracking Eastern Red Bat Movement Response to an Ultrasonic Acoustic Deterrent in Flight Cage Trials, Brittany F. Stamps; Emma Guest; Sara Weaver; Amanda Hale; Brogan Morton; Janine Crane; Mark Chaffee; John Ugland; Cris Hein; Sarah Fritts
- 33. Identifying Spectral Signatures for Bunch Grasses Using UAV Mounted Multispectral Sensors, Walter A. Gless IV; Annalysa M. Camacho; Michael T. Page; Melaine A. Ramirez; J. Alfonso Ortega S; Humberto Perotto; Evan Tanner; Forrest S. Smith; Anthony D. Falk; Dwain Daniels; Tonny Kimmet; Shad D. Nelson
- 34. Pasture Biomass Estimation Using UAV Lowest Point Analysis, Melaine A. Ramirez; Michael T. Page; Rider C. Combs; Bradley K. Johnston; Annalysa M. Camacho; Alexandria DiMaggio; Evan P. Tanner; J. Alfonso Ortega-S; Dwain Daniels; Tony Kimmet; Jay Angerer; Humberto L. Perotto-Baldivieso
- 35. Improving Wildlife Road Mortality Video Survey Methodology, Bradley E. Beer; Kevin Ryer; John H. Young Jr.; Richard J. Kline

- 36. Convolutional Neural Network Land Cover Classification for Wildlife Habitat in South Texas, Taylor Trafford; Justin P. Wied; Michael T. Page; Dakota R. Moberg; Victoria Cavazos; Jeremy Baumgardt; Humberto L. Perotto-Baldivieso
- 37. Quantifying Wild Pig Damage at Different Crop Growth Stages with Remote Sensing Techniques, Lori D. Massey; Bethany Friesenhahn; Randy W. DeYoung; Humberto L. Perotto-Baldivieso; Justin Fischer; Nathan P. Snow; Kurt C. VerCauteren
- 38. Immune System Variation in Nilgai Antelope, Kathryn M. Sliwa; David Navarro; Randy W. DeYoung; Jeremy A. Baumgardt; Masahiro Ohnishi; J. Alfonso Ortega-S.; David G. Hewitt; John A. Goolsby; Adalberto A. Pérez de León
- 39. Validation of A Novel Technique to Detect Chronic Wasting Disease in White-tailed Deer and Mule Deer Utilizing Muscle Tissue, Angela M. Grogan; Warren C. Conway; Robert D. Bradley; Richard D. Stevens; Daniel M. Hardy

#### Poster Session: Non- Competitive 10:30 AM – 11:00 AM Friday, 26 February

- 1. Estimating Economic Potential of the Hunting Industry Based on Four Ungulate Species in the Trans-Pecos, Texas, Kelley Wood; Stacey S. Dewald; Louis A. Harveson; Patricia Moody Harveson; Billy Tarrant
- 2. **Comparing Nest Materials for Black-crested Titmouse in an Urban Gradient,** Madison Vasquez; Sarah Fritts; Jacquelyn Tleimat; Rebekah Rylander
- 3. Habitat Selection and Nest Success Response of Lesser Prairie-Chicken to Prescribed Burning and Grazing Treatments, Michael D. Whitson; Blake A. Grisham; Christian A. Hagen; Warren C. Conway; David A. Haukos; Carlos Villalobos
- 4. **Determining Mammal Diversity on Fragmented Game Reserves in South Africa,** Ian A. Mack II; T. Wayne Schwertner; Jeff Breeden; Hemanta Kafley; Heather Mathewson
- 5. Analysis of Eastern Red Bat Echolocation Behavior in the Presence of an Ultrasonic Acoustic Deterrent, Emma Guest; Brittany F. Stamps; Sara P. Weaver; Amanda Hale; Brogan Morton; Janine Crane; Mark Chaffee; John O. Ugland; Cris Hein; Sarah R. Fritts
- 6. Helicopter Surveys for White-tailed Deer: Number of Detections Matter, Aaron Foley; Randy DeYoung; Landon Schofield; Tyler Campbell
- Evaluation of Net-gunning and Deployment of Collars on Movement and Survival of Nilgai Antelope, Jeremy A. Baumgardt; Aaron M. Foley; Kathryn M. Sliwa; Randy W. DeYoung; J. Alfonso Ortega-S; David G. Hewitt; John A. Goolsby; Kim Lohmeyer
- Morphological Variation of Cranial Elements in the Western Massasauga, John J. Jacisin III; Corey M. Fielder; Danielle K. Walkup; Toby J. Hibbitts; Wade A. Ryberg; Jesse M. Meik; A. Michelle Lawing
- 9. **Turkey Vulture and Black Vulture Roosting Habits in Kingsville, TX,** Tristan H. Lozano; Ashley M. Tanner; Evan P. Tanner; Ken A. Wells; Sarah J. Corbett
- 10. Frequency of Use of Irrigation Canal Bridges by Ocelots, Bobcats and Coyotes, Eve Schrader; Zachary M. Wardle; Jason V. Lombardi; Michael E. Tewes; Landon Schofield

### **Program Abstracts:**

#### Mapping Texas Landscapes on the Go: Teamgo and Ground Truther

Wendy Anderson, TPWD, Austin, Texas, USA

**Abstract:** Texas Parks and Wildlife Department's Landscape Ecology Program has developed a mobile version of TEAM (Texas Ecosystem Analytical Mapper) called TEAMgo to allow Texas citizens to utilize and contribute to the Ecological Mapping Systems of Texas (EMS) data on handheld devices. The TEAMgo application is a free, easy to use, interactive mapping tool accessible on a mobile phone that assists users in understanding Texas habitats and integrates vegetation data with land management and resource planning of all types. Within TEAM and TEAMgo, the Ground Truther tool allows Texans to contribute to the mapping effort via a citizen-science data entry module on both a computer browser and on a mobile device. Crowdsourcing ecological information will allow TPWD experts to identify areas of landscape change and systemic errors in the vegetation data. Application users will also be able to document habitat change due to land management or climatic events, and share information with other users regarding specific habitat types. Wildlife biologists, land managers, naturalists, planners, and conservationists can use TEAMgo to view the EMS data in relationship to their current location or property. All crowdsourced data will be used to assist with land management, conservation, and map updates. Users can use TEAM to view and print the EMS data in relationship to other natural feature layers such as soils, geology, hydrology, and ecoregion.

# Gulf Cordgrass Community Vegetation Response to a 3-year Fire Return Interval of Winter and Summer Prescribed Burning

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Abstract: Prescribed burning is a tool used for habitat management that eliminates old growth and sets back vegetative succession, promoting flora that benefits both livestock and wildlife species. However, inappropriate timing of a burn can be detrimental to your range health. Vegetation response depends on several factors, such as phenological stage, soil moisture content and the plant's natural response to severe defoliation. This is the second phase of a patch-burn grazing study comparing two seasons of prescribed burning (winter and summer), that was focused on plant community dynamics and forage production of Gulf cordgrass (Spartina spartinae [Trin.] Merr. ex Hitchc.). Results of the first phase showed no differences between winter and summer burning in forage production and plant functional group composition for the first three months following burning. For the second phase, we returned fire to the previously-burned patches while keeping season constant. Short and long-term fire return intervals (3 and 5 years, respectively) were randomly assigned and applied to winter and summer treatments. We monitored vegetation growth and plant composition in burn and control patches. Sampling occurred before burning and at approximately three months following each burn, and at every late spring and fall. Our objective is to compare fire return intervals to analyze the dynamics of community ecology in the Gulf Prairies and Marshes Ecoregion. We will include preliminary results that compare short- and long-term winter and summer prescribed burning by analyzing plant functional group and forage standing crop.

#### Analysis of Survey Methodologies for Wintering Rio Grande Wild Turkey in Cross Timbers and Post Oak Savannah Ecoregions

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**Abstract:** Rio Grande wild turkey (*Meleagris gallopavo*) are a species of significance in Texas ecosystems. The aim of this study is to assess the precision of survey methodologies for estimating wild turkey abundance. The specific objective of this study is to determine the precision of survey methods in estimating Rio Grande wild turkey density on two ecoregions: Cross Timbers and Post Oak Savannah. Our study sites are on Camp Swift in Bastrop, TX and Camp Bowie in Brownwood, TX. We will conduct the following surveys: road, roost, and camera. These surveys will take place January-March of 2021 and 2022; We will survey each site for a week until the end of March. Road survey routes will be selected randomly and will be proportional to each habitat type on each site. Our goal is to complete at least 100 16-km survey routes per installation per survey season. Road and roost surveys will be conducted based on the consensus of existing literature. Camera-traps will be placed at each site so that there are four traps (each composed of two cameras) per average Rio Grande wild turkey home range (12 km<sup>2</sup>). Turkey trapping will occur on each site in December 2020; each turkey captured will be marked and returned. We hypothesize that road-based surveys and camera-traps will provide significant information to estimate abundance. This research will help determine the precision of survey techniques for wild turkey; and in doing so, aid wildlife managers and biologists in conserving and managing Rio Grande wild turkey.

#### Incorporating Microclimate into a Species Distribution Model for the Black-spotted Newt

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**Abstract:** We have recently begun to refine a Black-spotted Newt (*Notophthalmus meridionalis*) distribution model. Earlier models identified habitat characteristics, environmental conditions, and land management practices correlated with this species' presence, but the coarse resolution of the soil, vegetation, and climate data may not reflect the environmental conditions experienced by Black-spotted Newts (BSNs). BSNs likely experience their environment at a scale equivalent to microclimate: within subterranean refugia, over the soil surface, and beneath cover objects where a temporally narrow, cool, and moist environment exists. To determine if microclimate is a relevant measure of environmental conditions for the BSN distribution model, we are conducting a study to determine if a distinct microclimate exists in the ephemeral wetlands of Rio Grande Valley associated with the presence of BSNs. Representative temperature and moisture measures will be collected using data loggers placed within and adjacent to ephemeral wetlands. If a distinct microclimate is detected, these data can be incorporated into the refined BSN distribution model. By refining the resolution of the Black-spotted Newt distribution model, we may better understand what defines suitable habitat for this cryptic amphibian.

Evaluation of Net-gunning and Deployment of Collars on Movement and Survival of Nilgai Antelope

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**Abstract:** Nilgai antelope (*Boselaphus tragocamelus*) are native to India and were introduced to Texas in the early 20<sup>th</sup> century. Current populations in Texas are estimated over 30,000 and continue to grow. This, coupled with human conflicts will likely result in increasing interest in studies involving nilgai. Since few studies have been published involving capture of nilgai, our objectives were to estimate the impacts of capturing via helicopter net-gunning and collaring on survival and movement patters. We used data from 3 studies to calculate daily survival rates over a 28 day period for 125 nilgai. Additionally, we calculated daily movement rates (DMR) and net squared displacement (NSD) for 21 individuals that had GPS collars prior to a subsequent capture. Our analysis suggested that survival rates increased linearly with time, with the lowest estimated daily survival rate of 0.988 (0.960-0.997) for the first day following capture, and an estimated survival rate over the 28 days following capture of 0.968 (0.918-.0988). The mean DMR over the 30 days prior to capture was 134 m/hr. We observed an increase of ~65% in the mean DMR on the day of and the day following capture. Our NSD analysis suggested that most nilgai returned to movement patterns similar to that observed prior to capture within a few days of capture. However, 3 individuals did not appear to return to pre-capture movement patterns within the month following capture. Our results should aid in design considerations and analysis of movement data for future studies involving nilgai.

#### Improving Wildlife Road Mortality Video Survey Methodology

**Bradley E. Beer**, University of Texas Rio Grande Valley, Brownsville, Texas, USA **Kevin Ryer**, University of Texas Rio Grande Valley, Brownsville, Texas, USA **John H. Young**, Texas Department of Transportation, Austin, Texas, USA **Richard J. Kline**, University of Texas Rio Grande Valley, Brownsville, Texas, USA

**Abstract:** An understanding of wildlife road mortality is essential to evaluating the impacts of roads and wildlife crossing structures. A common mortality surveying method involves driving road transects and recording mortality observations. This method presents challenges for safety and is time consuming when stopping and exiting the vehicle to identify road mortalities. An alternative method, video surveying, can decrease the risk of the observer from entering the roadway and reduce labor time by allowing one person to safely survey instead of two. However, it presents challenges in identification of some road mortalities to species and in taking longer to complete than standard driving surveys. In this study we aimed to build on our pre-existing video survey methodology to minimize required time and maximize mortality detection and identification rates. We performed survey trials with differing camera positions and settings to determine optimal camera placement and settings for our goals. Paired video surveys with standard driving surveys were conducted to review survey videos. We brought time required for video surveys below that required for driving surveys, increased the specificity of video survey mortality identifications, and accomplished these goals without lowering relative detection rate. The reduction in labor time will allow video surveys to be

conducted more frequently to examine temporal differences in observed animal communities and allow for further improvement of wildlife road mortality video survey methodology.

#### Comparison of Native Grass Establishment in Monocultures and Mixtures in Northeast Texas

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**Abstract:** Native tallgrass prairies are a threatened ecosystem. The rich diversity of tallgrass prairies provides important ecosystem services that should be preserved through enhanced restoration. The first step in ecosystem restoration is the selection of locally-adapted seed sources—and this information is lacking in northeast Texas. We planted 30 varieties of native grasses using 13 common native tallgrass prairie species on 630 plots on approximately one square kilometer on a Red River floodplain in Fannin County, Texas. Sixteen grass varieties were seeded in monocultures and in mixtures with other grasses and forbs. We compared the density of seedlings of each variety in a monoculture and in mixtures to assess intra-*vs* inter-specific interactions. First-year establishment results show that varieties seeded in mixtures performed as well as their counterparts seeded in monocultures. Further monitoring will document establishment dynamics and inform the development of suitable restoration recommendations.

#### Predation Management for Wildlife Protection

#### Michael Bodenchuk, USDA-Wildlife Services, San Antonio, Texas, USA

**Abstract:** Predation management for livestock protection is socially controversial but necessary for some livestock producers. Predation management for wildlife protection is practiced less often but may be necessary for meeting human objectives. This presentation will discuss factors which affect predation rates and provide an example of decision-making criteria for when to initiate, and when to discontinue predation management. Non-lethal and lethal methods of management will be discussed.

#### A Comprehensive Study of Parasites of the Texas State Bison Herd: Part I

#### Sara B. Boggan, Tarleton State University, Stephenville, Texas, USA

**Abstract:** Parasites can have a significant effect on the typical growth and weight gain of any species, in our case we are evaluating Bison. Texas Parks & Wildlife Department (TPWD) biologists are charged with the management of the Texas State Bison herd at Caprock Canyons State Park, Briscoe County, Texas, and base their management plans on restoring native prairies to preserve the historic herd. To improve their management plan, we have started a comprehensive study of the micro and macro parasites of the herd. The objectives of this study are to 1) determine the presence and prevalence of micro and macro parasites, 2) identify the species of micro and macro parasites present, and 3) determine if treatment of the herd for parasites is necessary in the Texas State Bison herd. We collect fecal samples from a treatment and control group of cows and juveniles. For this study, TPWD biologists did not provide treatment to 50% of tagged females during the winter and summer treatment months, thus allowing them to serve as controls. We then test all samples using the Modified McMaster test. Thus far, preliminary results have suggested the presence of Coccidia, *Trichostrongylus* spp., and *Moniezia* spp. Findings from this study will provide TPWD with data concerning the presence of micro and macro parasites of micro and macro parasites found in the herd.

#### Should I Stay or Should I Go? Spatial Ecology of Western Chicken Turtles

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Abstract: Though its distribution within Texas is widespread, the spatial resource requirements of *Deirochelys* reticularia miaria are poorly understood. Formal protection is lacking for the subspecies and its habitat, and past research suggests that its remaining habitat in Texas is under threat from increasing urbanization. For these reasons, the U.S. Fish and Wildlife Service issued a 90-day finding that states listing the subspecies as threatened or endangered may be warranted. Here, we present analyses of telemetry data using a variety of methods to understand annual home range, core activity area, and movements. We evaluate the applicability of minimum convex polygons, kernel density estimators, and autocorrelated kernel density estimators to a species that migrates between isolated wetlands, spending most of the year aestivating underground. To improve model fit, we applied each method to datasets with all positions included, repeated consecutive coordinates excluded, and with only aquatic positions included. The 95% kernel density estimators provided the most consistent estimates of annual home range. Traditional 50% core activity area estimators had questionable utility, and we observed better geographic fit for core areas in 95% kernel density estimates using the least-squares cross validation on the aquatic dataset. When making habitat conservation decisions, managers should consider how extensive periods at rest affect home range estimates, how periods of drought affect movement, and how the longevity of the species, the potential to make long migrations over land, and the landscape characteristics of the site could affect spatial resource requirements.

#### Influence of Wildlife Crossing Structure Characteristics on South Texas Wildlife

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**Abstract:** Wildlife Crossing Structures (WCS) are a common method for mitigating the direct and indirect negative effects of roadway networks on wildlife. Wildlife may benefit from WCS and localized fencing due to increased habitat connectivity and reduced road mortalities, though understanding wildlife responses to these treatments requires long-term study. Nine WCS were installed below grade on Farm-to-Market (FM) 106 in Cameron County, Texas to mitigate road mortality and facilitate movement of the endangered ocelot (*Leopardus pardalis*). These WCS are likely utilized by wildlife at different rates because they vary in their structural, temporal, and landscape characteristics. We measured structural (i.e. dimensions, fencing, cat walks), temporal (i.e. time since construction, water levels), and landscape characteristics (soil accumulation, grade change, local vegetation cover) to investigate their potential influence on wildlife use. Species behaviors at each WCS were classified as crossings or refusals and compared to WCS characteristics to determine differences among WCS and which characteristics may influence successful crossings. The findings of this research will inform our working hypotheses for how WCS characteristics may affect wildlife use to fully understand the influence of WCS design on South Texas wildlife.

# Characterization of the Prion Protein Gene in Axis and Implications for Susceptibility to Chronic Wasting Disease

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Abstract: Chronic wasting disease (CWD) is a fatal, transmissible spongiform encephalopathy of Cervids that effects both native and non-native North American species. The expanding geographic distribution of CWD and list of affected species is concerning, especially for stakeholders who manage wildlife populations or harvest wild animals. In areas where native and non-native species overlap, the potential for interspecific transmission of CWD is of concern when the CWD susceptibility of the non-native species is unknown. Axis deer (Axis axis) occur both in captivity and free-ranging populations in portions of North America but to date, no data exist pertaining to their susceptibility to CWD. We obtained DNA sequences of the prion protein gene (PRNP) exon 3, the coding region of the prion protein (PrPC), from 133 axis deer to assess their potential susceptibility to CWD. We identified and compared amino acid substitutions in axis deer PrP<sup>c</sup> to reported substitutions that confer varying levels of susceptibility in Cervid species and compared the axis deer sequence to those of CWD susceptible species. A single PRNP allele with no individual variation was recovered from axis deer, that indicates axis deer PRNP is most similar to North American elk (Cerrus canadensis) PRNP in both nucleic and translated amino acid sequence. The sequence similarity to elk suggests that axis deer may have a similar level of CWD susceptibility and prevalence. We recommend increased CWD surveillance for axis deer focused on areas where CWD has been detected and axis deer coexist with native North American CWD susceptible species.

#### Using UAVs for Wildlife Aerial Surveys. What is the Big Picture?

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**Abstract:** Unmanned aerial vehicles (UAVs) can be used with thermal infrared cameras to detect, identify and monitor wildlife. However, the use of these sensors is dependent on daily and seasonal weather conditions. While we have a good understanding of local conditions, we do not have a cross-scale assessment of temperature conditions that could help plan UAV surveys with thermal cameras. Moreover, it is important to consider how long-term climate change may affect our ability to conduct such studies in the future. The objective of our research was to determine optimal times of year and day to conduct UAV surveys using thermal cameras. We acquired 30 years (1990-2019) of average monthly temperature data for all Texas counties and 10 years (2010-2019) of hourly temperature data for 10 counties in the 10 Texas ecoregions. We calculated and compared monthly temperature averages for 1990-2019 and 2010-2019 to delineate areas where thermal flights would detect white-tailed deer on a cloudy day (threshold 27°C) and on a sunny day (threshold 20°C). We based temperature thresholds on preliminary data gathered during drone surveys of white-tailed deer (Odocoileus virginianus). Monthly average temperatures increased in Texas from 1990-2019 to 2010-2019. Average hourly temperatures showed flights could be conducted on cloudy and clear days from November-March, only on cloudy days in April, May, September, October and from seven p.m. to seven a.m.

on cloudy days only in June and August. This research will help determine the best times of year to conduct UAV surveys for wildlife.

#### Grassland-obligate Birds Early Response to a Chemical Shrub Removal Treatment

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**Abstract:** Grassland-obligate bird species (GOBs) are a group of specialized birds that live in grasslands. These GOBS species are declining dramatically in North America, especially on their wintering grounds throughout the Chihuahuan desert grasslands. Habitat changes such as shrub encroachment are the main cause of these population declines. We used a paired treatment-control design to conduct bird surveys in the winters of 2019 and 2020 in open grassland and shrub invaded areas within the same sites before and after a chemical shrub removal treatment in the Marfa grasslands, Texas. This work aims to compare grassland bird population density and diversity among the two habitat types in the early stages of a shrub removal treatment. We performed 78 (800m) line transects and estimated bird density using distance sampling for species with more than 45 detections, and effective diversity using Hill's numbers. Our results show a greater abundance of GOBs in the control (open grassland) strata with little change after the restoration (before: 366 bird/km<sup>2</sup>, 95% CI: 345-412 birds/km<sup>2</sup>; after: 415 birds/km<sup>2</sup>, 95% CI: 364-498 birds/km<sup>2</sup>), and a significant difference in the treatment strata (before: 143 birds/km<sup>2</sup>, 95% CI: 113-200 birds/km<sup>2</sup>, after: 35 birds/km<sup>2</sup>, 95% CI: 14-56 birds/km<sup>2</sup>). In contrast, shrub dependent species such as Black-throated sparrow (*Amphispiza bilinieata*) decreased significantly after the treatment in the treatment strata (p < 0.05). Observed species decreased from 44 to 37 in the treatment site. In the control site observed species increased from 41 to 43.

#### Application of Environmental DNA (eDNA) Metabarcoding in South Texas

Sean M. Collins, University of Texas at Rio Grande Valley, Brownsville, Texas, USA Drew R. Davis, University of Texas at Rio Grande Valley, Brownsville, Texas, USA Richard J. Kline, University of Texas at Rio Grande Valley, Brownsville, Texas, USA Abstract: Environmental DNA (eDNA) is organismal DNA that is left behind when individuals slough their skin, release gametes, and deposit waste. eDNA surveys traditionally focus on one particular species but can also be used to describe communities of related species, often referred to as metabarcoding. Though many traditional methods for surveying amphibians exist, they often fail to detect all species equally, often favoring abundant species. Complementing traditional survey methods with metabarcoding assays may result in a more complete understanding of the amphibian community present at a site and can be used to examine how community structure changes over time. Here, we use a metabarcoding assay to characterize amphibian communities at select wetland sites in south Texas. We compared a previously published universal primer set to recently developed primer sets from conserved regions of amphibian species found in south Texas, as this may improve species detection. eDNA samples were collected from ephemeral ponds, amplified with universal primer sets and sent for next-generation sequencing (NGS). NGS reads were aligned to a reference database to determine the species identified. Metabarcoding assays may aid in examining populations of cryptic and rare species in south Texas as well as identifying priority conservation areas.

# Occupancy of Black Bears in the Davis Mountains: Documenting the Natural Recolonization of an Iconic Texas Species

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Abstract: American black bears (Ursus americanus) are one of two remaining large carnivores in Texas. Once widely distributed throughout Texas, this species was extirpated by the 1950s due to intense hunting pressure, federal predator control programs, and habitat loss and degradation. Due to state protection from exploitation, black bears have since been recolonizing the Big Bend Region in West Texas from Mexico. Previous research has documented growth and dispersal of a resident population in Big Bend National Park, yet there is limited documentation of other regional populations. Our objective is to provide evidence of the recolonization and occupancy of black bears in the Davis Mountains. As part of our carnivore monitoring activities, we have conducted camera surveys in the Davis Mountains over the past decade and have documented the changes in black bear presence. Our surveys covered a 342-km<sup>2</sup> grid in the Davis Mountains, encompassing 36 trail cameras. We estimated black bear occupancy using data from 12-week surveys in 2018 and 2019. We sorted and labeled photos using Microsoft's MegaDetector and Timelapse2 and captured black bears in 85 photos at 8X sites in Summer 2018 and 79 photos at 9 sites in Spring 2019. Combining presenceabsence data from these photos with environmental covariates, we modeled occupancy using the R package, Unmarked. As expected, tree canopy cover was an important predictor of occupancy. These results serve as a record of initial occupancy and will help biologists monitor future changes in this naturally recolonizing population of black bears in the Davis Mountains.

# Heat Induced Behavioral Adaptations in a Wild Ruminant and the Potential for Competition with Cattle

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**Abstract:** Heat stress is common in wildlife. Thus, it is important they avoid excess heat during warmer months. Adaptive behaviors such as seeking shade or wind, and/or altering activity patterns are often less costly than physiological adaptations. However, changing behavior could result in competition with other species. Understanding wildlife behavior and competition is important when designing management plans. We deployed 40 GPS collars (30 deer, 10 cattle) at the East Foundation's El Sauz Ranch in South Texas during spring 2019. Collars recorded GPS locations at 30-minute intervals. In addition, we deployed 100 black-globe thermometers across the landscape to measure operative temperature. We developed a predictive temperature map and investigated how deer movement correlated with temperature. Also, we measured deer preference of woody cover and open grassland areas as temperature fluctuated. We compared spatial and temporal overlap between deer and cattle during the hottest periods of the day. Preliminary results indicate deer prefer the coolest areas across the landscape as temperatures increased. Similarly, preference for woody cover increased and decreased as daily temperature fluctuated. Deer and cattle were observed using the same shade resources, but never within the same hour, maintaining a minimum distance of at least 1,000 yards. Knowledge of how deer movement, resource preference, and competition are effected by heat will further our understanding of deer and cattle and what landscape features are important in alleviating heat stress.

Management implications include improvements in brush and habitat management regimes, and a better understanding of deer-livestock competition.

#### A Practical and Efficient Helicopter Survey Technique to Estimate Bobwhite Abundance on Texas Rangelands-10 Years Later

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#### Abstract:

The 2010 Caesar Kleberg Wildlife Research Institute Technical Publication No. 2 by DeMaso et al. provided quail managers an important tool for estimating northern bobwhite (*Colinus virginianus*) density via helicopter surveys. Utilizing data from helicopter surveys within a distance-sampling framework, they developed a relationship to convert raw counts (i.e., coveys seen per mile) to bobwhite density (no. bobwhites/acres). Since this publication, bobwhite managers have commonly relied on its proposed methodology for conducting surveys and used this conversion factor to obtain estimates of bobwhite density across Texas. Here we examine the impact of this publication over the last 10 years. We look at how it has been used and mis-used by managers, and investigate additional concerns presented by managers over the years. We further expound upon issues inherent in the original relationship and seek to overcome them with additional data collected during the past decade, specifically through graduate research projects at Caesar Kleberg Wildlife Research Institute. This enhanced dataset included data from over 70 helicopter surveys for bobwhite, which documented >12,000 covey detections, collected from 2014-2019 within South Texas and the Rolling Plains regions of Texas. Lastly, we provide an updated relationship and information for managers to use to convert raw count data to estimate bobwhite density.

#### An Assessment of Prescribed Grazing for Lesser Prairie-chickens on Beef Herd Health and Productivity

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**Abstract:** Anthropogenic activities have led to severe declines in lesser prairie-chicken (*Tympanuchus pallidicinctus*; hereafter LEPC) populations and habitat, and New Mexico has designed land as an Area of Critical Environmental Concern where there is a focus on habitat management for the species while also continuing to provide activities such as hunting for public use. Grazing is a main socio-economic driver in the region, and my research will focus on the grazing management techniques being implemented on the ranch and the effect on LEPC habitat. We will assess overall beef herd health and productivity when grazing is used as a management tool for lesser prairie-chicken habitat. I will deploy Global Position System (GPS) collars on cows in order to monitor daily movements, quantify biomass reduction in relation to water sources and topography, quantify available plant nutrient composition, and assess overall beef herd health with fecal sampling in conjunction with pregnancy, calving, and mortality rates, and disease information. I will also compare cow movements to lesser prairie-chicken movements to assess habitat overlap. This study will progress our understanding of using beef herd grazing as a tool to manage LEPC habitat, and provide more detailed management implications for LEPC and cattle. The majority of remaining LEPC habitat is on private land, and my study will provide information pertaining to beef herd health with the goal of providing habitat for lesser prairie-chickens that incentivizes grazing techniques for this species.

#### Estimating White-Tailed Deer Population Sizes using Unmanned Aerial Vehicles (UAVS)

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Abstract: Helicopters are commonly used to survey wildlife in South Texas; however, they are expensive, risky, and sometimes impractical for small ranches. Unmanned aerial vehicles (UAVs) are an emerging technology that has not been fully evaluated for white-tailed deer (Odocoileus virginianus) surveys. We conducted UAV surveys at 5 sites with varying deer densities from February - April 2020. One site contained 8 deer fitted with satellite radio-collars programmed to record locations every 5 minutes. We repeated surveys  $\geq 2$ times at each site to evaluate consistency across counts. The UAV, equipped with a dual thermal-optical video camera, was flown at 36.6 m above ground level, 6.7 m/s, and downward camera angle of 20°. Heat signatures were detected on thermal imagery, then species identification was confirmed via optical imagery. Mark-resight and distance sampling analyses were used to estimate population sizes. We compared our UAV survey results with an estimate derived from a 100% coverage helicopter survey conducted during September 2019; the raw deer count was multiplied by 2 to account for missed deer. Our pooled thermal estimates from 5 repeated surveys at 1 site from mark-resight (5.22 ha/deer, 95% CI = 5.46 - 5.01) and distance sampling (4.09 ha/deer, 95% CI = 6.72 - 2.48) were comparable with the helicopter survey estimate (5.39 ha/deer). However, optical mark-resight and distance sampling estimates were 33% (8.02 ha/deer, 95% CI= 8.55 -7.55) and 26% (7.30 ha/deer, 95% CI = 13.01 - 4.10) lower, respectively. Remaining analysis is in progress and additional results will be discussed.

# Ecological Niche and Species Distribution of the Banded Tree Anole (*Anolis transversalis*) with New Record from Bolivia

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Abstract: Anolis transversalis is a Neotropical species that is thought to occur across the northern countries of South America, which includes Brazil, Colombia, Ecuador, Peru, and Venezuela. However, this species' occurrence remains unclear and poorly documented. The objective of our study was to delineate the fundamental niche and species distribution of A. transversalis and report a new record from Bolivia. We collected presence data via field surveys, and databased museum records and coupled these with maximum entropy modeling to address and achieve our study objectives. Our model indicates that A. tranversalis may have a more southerly distribution than what has been previously discussed in the literature. Results indicate that 7 of the 19 bioclimatic variables (bio2: mean diurnal range; bio3: isothermality; bio11: mean temperature of the coldest quarter; bio15: precipitation seasonality; bio17: precipitation of driest quarter; bio18: precipitation of warmest quarter; and, bio19: precipitation of coldest quarter) and land cover fall below our defined correlation threshold (i.e., r < 0.7). Our model predicts areas with a high suitability of habitat and those areas with suitability above the predetermined threshold. We predict the fundamental niche of A. transversalis to primarily include the tropical lowlands of northern and central South America. Our results provide information as to the species' full distribution across the entirety of its range as well as the environmental factors that synergistically shape its distribution. Areas identified via these models can be utilized, should precise conservation or management strategies be needed for this species.

#### Helicopter Surveys for White-tailed Deer: Number of Detections Matter

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**Abstract:** Helicopters are commonly used to collect population data on white-tailed deer (*Odocoileus virginianus*) in South Texas. Relative to other areas in the USA, South Texas habitat is homogenous. Therefore, it is plausible that demographic data collected during surveys will eventually become constant. To test this hypothesis, we obtained running encounter rates (n deer seen/km transect), doe:buck ratios, and fawn:doe ratios and calculated the differences between these 3 demographic values at each nth doe observed during a survey versus the end of the survey. We also calculated the running coefficient of variation (CV) to determine how precise the aforementioned differences were. Surveys took place on King Ranch during September 2011-2015 and on East Foundation lands during January-February 2018-2020. Of a maximum of ~660 does observed during a survey, doe:buck ratio was the only demographic that attained high precision (<20% CV); this occurred when >210 does were observed. However, when  $\geq$ 20 does were observed, average encounter rates (<0.50 deer/km), doe:buck ratios (<1.0), and fawn:doe ratios (<0.10) were comparable with the final estimates. Our results indicate that a large number of deer observations were needed to achieve high precision or that high precision may not be possible. However, when  $\geq$ 20 does were observed, demographic data became stable. Our results also provide information for designing survey protocols to reduce redundancy in data collection but further research is needed to examine the effect of habitat types during deer surveys.

#### Movement Responses and Resource Selection of Wild Pigs in Relation to Corn Growth Stages

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**Abstract:** Wild pigs (*Sus scrofa*) are an invasive species introduced to North America in the 1500s. Due to their high reproductive rate and omnivorous diet, populations of wild pigs are expanding in many parts of North America. Wild pigs annually cause billions of dollars in damage to agriculture in the USA, with the most severe damage reported in corn. Our objective was to quantify space use and resource selection of wild pigs in an agricultural landscape to determine periods of greatest crop use and damage in relation to corn growth stages. We monitored hourly movements of adult wild pig using GPS collars (n=30 in 2019 and n=34 in 2020) during the growing season (Feb-Sept) in Delta County, Texas, USA. We generated home ranges using the Brownian Bridge movement model and integrated step selection functions to estimate spatial use of wild pigs in response to each corn growth stage: pre-planting, germination/emergence, vegetative, milk and dent/mature. We obtained crop information from farmers to define crop availability. The data from 2019 show that use of corn fields varied substantially across growth stages ranging from an averaged 1% in March during the corn growth establishment stages to a peak average of 29.5% in June during the milk stage. This study provides a better understanding of wild pig spatial ecology in an agricultural landscape, determines when crops are most vulnerable to pig damage, and suggests that preventative efforts before the milk stage would be best to protect agricultural resources.

# Small Mammal Community Ecology and Ectoparasite Dynamics in Tamaulipan Thornscrub Habitat

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Abstract: Small mammals play an important role in the ecosystem ecology at local, regional, and global scales. These organisms are known to be indicators of overall ecosystem function and health; however, they are also known to be highly competent hosts for ticks and tick-borne diseases of both humans and wildlife. In this study, we collected data on small mammal community ecology to determine species diversity, abundance, and overall ectoparasite (i.e., ticks) dynamics. We assessed these characteristics in both edge and interior habitats best described as Tamaulipan thornscrub. We hypothesized that small mammal species diversity would be lower along habitat edges and that abundance and diversity of ectoparasites would increase in edge habitats. Additionally, we hypothesized abundance and diversity of small mammals and ectoparasites would persist at increased levels compared to other habitat types in south Texas. Overall, data from this study demonstrates similar small mammal species richness in edge and interior habitats. The most abundant small mammal species were Sigmodon hispidus and Peromyscus leucopus. On-host tick abundance was highest for Peromyscus leucopus, as compared to other small mammal species. Additionally, the most abundant tick species observed was Dermacentor variabilis. Vector ecology is highly understudied despite the major implications for controlling many zoonotic diseases. Although some research has been done on ectoparasite ecology within Tamaulipan thorn scrub habitat, small mammal ecology and how it relates to vectors has not been well studied. These data provide insight into overall small mammal diversity of this area, and potential disease risks across South Texas.

Identifying Spectral Signatures for Bunch Grasses Using UAV Mounted Multispectral Sensors

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Abstract: Unmanned Ariel Vehicles (UAVs) are capable of collecting aerial imagery with high spatial and temporal resolution compared to other methods of aerial imagery collection. Multispectral cameras can be mounted on UAVs and are capable of capturing high spatial resolution (<2.54cm) images. Multispectral cameras can capture multiple reflectance bands which can be analyzed individually to identify unique spectral signatures of rangeland vegetation. The objective for this project is to develop spectral signatures of four bunch grass species that are native to Texas rangelands; Silver bluestem (Bothriochloa saccharoides), Switchgrass (Panicum virgatum), Knotroot bristlegrass (Setaria geniculata), and Halls panicum (Panicum hallii). We are collecting multispectral imagery with a DJI Phantom IV Pro UAV mounted with a MicaSense Red Edge MX multispectral camera. We are conducting flights at an altitude of 50m above ground level to acquire imagery from monoculture plots located at the South Texas Natives Project Farm in Kingsville, Texas. The collected imagery will be processed in Pix4D and reflectance maps and an orthomosaic will be generated for each band. We are delineating boundaries around each species plot, and generating buffers to minimize edge effect. We are using 200 random points for each species to extract reflectance values. Mean reflectance values and standard errors are being calculated to generate spectral signatures for each species. This research will provide a digital library for further image classification of these species at different times of the year. We hope this will help efforts in mapping vegetation communities in rangelands across South Texas.

# Examining the Effects of Topsoil Stockpiling and Seeding Amendments on Plant Community Species Richness Over Time

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**Abstract:** Prior to oil and gas extraction, it is commonly recommended that topsoil be stock-piled for future site restoration. Our goal is to quantitatively assess the use of stock-piled topsoil following soil disturbance in a semiarid region. Our study area, a retired fracking pond, was restored in 2017 with 5-yr old stock-piled topsoil collected prior to construction. We segregated the stock-pile into 3 layers (each 1-1.5 m thick) and distributed these layers in separate strips over the pond; an area not re-surfaced acted as a control. Each surface layer was split into 15 subplots, each receiving one of three seeding treatments: (1) 13 native grasses, (2) 13 native grasses plus an annual warm-season grass cover crop, or (3) non-seeded. We monitored species richness and diversity for each surface-seeding subplot combination yearly, for 3 years. Seeded plots had higher richness than non-seeded plots, but addition of the cover crop did not enhance richness; in addition, richness did not change over time. Diversity was lowest in the non-seeded plots and increased over time, and higher but stable in seeded plots. The non-amended surface had highest richness and diversity, a pattern that remained consistent over time. These results will help determine the efficacy of the common recommendation of stock-piling topsoil, and examine different seeding techniques, for grassland restoration at our site in South Texas.

### Habitat Utilization of Nilgai During the Winter in South Texas

Megan Granger, Texas A&M University- Kingsville, Kingsville, Texas, USA Humberto Perotto-Baldivieso, Texas A&M University- Kingsville, Kingsville, Texas, USA Clay Hilton, Texas A&M University- Kingsville, Kingsville, Texas, USA Scott Henke, Texas A&M University- Kingsville, Kingsville, Texas, USA Tyler Campbell, East Foundation, San Antonio, Texas, USA Abstract: Nilgai antelope (Boselaphus tragocamelus) are bovids endemic to India and portions of Pakistan and Nepal. Nilgai were introduced into South Texas in the 1920's and currently have a free-roaming population of approximately 33,000 individuals. Past studies suggest that nilgai in Texas utilize sparse forest and coastal prairie habitats. However, further studies of nilgai habitat utilization is needed to effectively manage populations in South Texas. Nilgai location data was collected from annual aerial surveys in 2017-2020 on East Foundation's El Sauz Ranch. Vegetation community maps and classified imagery were used to assess utilization-availability at multiple scales. We performed a habitat utilization-availability with vegetation communities analysis using a Bonferroni z statistic to estimate whether observations of nilgai occurred more or less frequently than expected in different vegetation communities. We then looked at landscape structures around observed nilgai locations using multiple buffers (10-80 m) to assess the scale of effect of landscape structure on observed nilgai locations during the winter season. A one-way ANOVA showed that cows were observed using landscapes consisting of denser woody cover, higher edge densities, and higher patch densities than bulls. Bulls were observed in open landscapes with a lower patch density. Overall, nilgai were observed utilizing shrublands more than expected and grasslands much less than would be expected given the available area of each vegetation community. Nilgai populations in South Texas continues to increase, therefore, knowledge of nilgai habitat utilization at different spatial scales is essential in effectively controlling the species.

# Reproductive Capabilities of Nilgai in South Texas

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Abstract: Nilgai antelope (Boselaphus tragocamelus) are bovids that are endemic to India and portions of Pakistan and Nepal. They were introduced into South Texas in the 1920's and now have a free-roaming population of approximately 33,000 individuals. Previous studies in both native and introduced ranges indicate that nilgai have high reproductive rates, commonly have twins, and reach sexual maturity at approximately 2-3 years of age. However, these studies do not provide reliable quantitative data to prove these claims. Further research is needed to better understand the reproductive capabilities of nilgai in southern Texas. Commercial nilgai harvests were conducted during the summers of 2018-2020 on three ranches in southern Texas resulting in 571 harvested nilgai. Pregnancies and fetal sex and crown-rump lengths were recorded. Of 412 adult cows harvested, 320 (77.7%) individuals were pregnant, and of those cows, 200 (62.5%) produced twins. Feti occurred in an even sex ratio (291 males:295 females). The fetus crown-rump lengths varied by month, and on average, increased with each successive month, except during August where the average fetal size was smaller than the previous month. The large variability each month in fetal size suggests that nilgai do not have a set breeding season, although a peak in breeding may occur during December. Our results confirm previous assumptions of nilgai having high reproductive rates in southern Texas. Considering their reproductive rate and that natural predators to nilgai appear lacking in Texas, nilgai populations have the potential to drastically increase.

# A Paradigm Shifting Without a Clutch: A Six Year Evaluation of Student Engagement and Degree Pride in the Department of Natural Resources Management

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Abstract: Undergraduate enrollment in the Department of Natural Resources Management (hereafter NRM) at Texas Tech University (TTU) has nearly tripled between 2008 and 2020, reaching a high in Fall 2020 of 350 students. While it took 55 years for TTU undergraduate enrollment to double, NRM growth is far outpacing both college and university growth rates End-of-degree evaluations suggest NRM's above average growth may be attributed to the following criteria:1) engaged, active faculty, 2) hands-on experience inside and outside the classroom, 3) development of degree pride, 4) and active professional organizations. The Wildlife Society at Texas Tech is an official student chapter of both the Texas and National Chapters of The Wildlife Society, and the goal of the organization is to "provide educational and experiential wildlife-research and management opportunities to students to promote professional development and develop skills that will be used for science-based wildlife management." Evidence suggests the early reestablishment of TTU-TWS in 2014 and the development of NRM 1401 and 3407, both field-based, hands-on courses, have contributed to NRM's growth and the active undergraduate membership in TTU-TWS. Here-in we discuss the advantages and minor inconveniences associated with exponential student growth, rebuilding a student professional organization, and maintaining student engagement inside and outside of the classroom using the NRM classes and TTU-TWS as examples. We learned the development and maintenance of student engagement and degree pride are like a paradigm shifting without a clutch: the process is slow, tedious, and a labor of love, but becomes positively unstoppable after third gear.

# Validation of a Novel Technique to Detect Chronic Wasting Disease in White-tailed Deer and Mule Deer Utilizing Muscle Tissue

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**Abstract:** Chronic wasting disease (CWD) is a transmissible spongiform encephalopathy primarily affecting Cervid species and raises concerns for wildlife managers nationwide. Current testing measures in Texas examine the retropharyngeal lymph nodes and obex through immunohistochemistry and ELIZA testing. However, these are post-mortem tests and require high levels of prion protein (PRNP) in these tissues to be present for CWD to be detected. Our goal is to validate a new technique to detect CWD in muscle and blood samples and can be used for both ante mortem and postmortem testing. This technique operates similarly to protein-misfolding cyclic amplification (PMCA) and should provide detection of low levels of PRNPs and eventually. We are currently coordinating with Texas Parks and Wildlife Department biologists, processors, and private landowners to acquire tissue and blood samples from white-tailed deer (*Odocoileus virginianus*) and mule deer (*O. hemionus*) during the 2020 hunting season in the Texas Panhandle and Southern High Plains. Laboratory analyses are planned to start during 2021 to validate and refine the laboratory testing protocols. If successful, this new approach could be used for more widely available testing protocols for CWD in Texas and include non-scientists in sample acquisition in the future.

# Analysis of Eastern Red Bat Echolocation Behavior in the Presence of an Ultrasonic Acoustic Deterrent

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Abstract: Wind energy provides potential to combat global climate change. However, an unintended consequence of wind energy development is bat fatalities caused by turbine blade strikes. Ultrasonic acoustic deterrents (UADs), produced to "jam" echolocation and cause airspace surrounding turbines to be undesirable, have resulted in lower overall bat fatalities in some studies. However, effectiveness at the species level is variable, potentially due to some species being able to alter echolocation frequency and resist UAD jamming. Our broad objective was to maximize effectiveness of an UAD (NRG Systems) by filling knowledge gaps regarding bat behavior during UAD emissions. Herein we will examine the influence of varying UAD emissions on bat echolocation using a 61 m- x 9.8 m- x 4.3 m (l x w x h) flight cage located in San Marcos, Texas, USA. We released wild-captured bats into the flight cage from July-October 2020 and monitored echolocation frequencies using six ultrasonic microphones dispersed within the flight cage. Each trial consisted of three randomly ordered treatment periods in which a UAD broadcasted frequency ranges of 20-50 kHz, 20-32 kHz, or 38-50 kHz interspersed with no UAD emission control periods. All treatments and controls were four minutes. Preliminary results of 20 eastern red bats (Lasiurus borealis) comparing shifts in maximum, minimum, and characteristic frequencies suggest bats are shifting their maximum frequency during the 20-50 kHz and 20-32 kHz treatments, potentially to broaden their frequency range. Results will guide improvement of UAD effectiveness to reduce turbine related fatalities.

# Evidence of Rare Pigment Loss and Genetic Population Divergence in Townsend'S Big-eared Bats

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Abstract: Populations of Townsend's big-eared bats (Corynorhinus townsendii townsendii) in the Invo and White Mountains and the adjacent Sierra Nevada have been monitored as part of a long-term study. This study includes monitoring summer maternity colonies, tagging individuals with Passive Integrated Transponder tags and taking tissue punches from wing and tail membranes for genetic analyses. In the summer of 2020, individuals from maternity roost "Section 14N" presented with notable hypopigmentation patterns - variable patches of white spots on the body and wings (piebaldism). This pattern may be due to environmental causes (i.e. age, injury, chemical interaction) or genetic origin (as a result of inbreeding, low genetic diversity, or genetic drift after an isolation event). It is important to conservation efforts to understand if there are environmental stressors that need to be mitigated or if this population is an independent conservation unit. To explore underlying causes of pigment loss in this colony, we used 9 polymorphic microsatellite markers to compare genetic diversity of this population to other populations of C. t. townsendii in our study area. We tested for a recent population bottleneck and genetic population structure between roosts at nuclear and mitochondrial levels. Our analyses reveal that 14N roosts exhibit signs of inbreeding and this roost is isolated from nearby colonies. The genetic isolation of 14N is an unexpected result as other roosts within the area appear to be panmictic. Future work examining hibernating colonies and breeding areas can give insight into how Section 14N has become isolated from nearby roosts.

#### Wildlife Avoidance Behavior at Wildlife Crossing Structures in South Texas

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**Abstract:** Highways in the Texas Lower Rio Grande Valley fragment the landscape resulting in high wildlife road mortality rates, including for the federally endangered US ocelot (*Leopardus pardalis*). In response to ocelot-vehicle collisions, the Texas Department of Transportation constructed nine wildlife crossing structures (WCS) on Farm-to-Market (FM)106 which adjoins Laguna Atascosa National Wildlife Refuge in Cameron County, Texas. Wildlife crossing structures are combined with extensive fencing to funnel wildlife toward WCS and limit road access. Fencing length is not uniform among WCS, with gaps between fenced sections enabling animals to enter the road. This study examines the rate of wildlife then cross onto the roadway. Camera traps located at WCS monitor wildlife refusals, while camera traps at fence ends capture wildlife that cross onto the roadway. The rate at which wildlife avoid WCS, bypass fencing and risk crossing onto the road was calculated by combining WCS refusal and fence end datasets. Refusals at WCSs were cross referenced with individuals of the same species that crossed onto the road at fence ends. Instances where individuals crossed the road shortly after refusing to cross WCS were considered "risky" crossings. Analysis of these data will determine whether the length of adjacent fencing influences the rate of risky crossings. These results may have future implications on road mortality mitigation projects in South Texas.

### Ecological Monitoring on Military Installations: Balancing Mission and Conservation

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Abstract: The Department of Defense manages over 12 million acres of relatively undisturbed lands worldwide. A caveat for the use of this public resource is the requirement to monitor and maintain the ecological integrity of these training lands. Due to their location and relatively low rate of human activity, military installations tend to harbor a higher number of rare and/or threatened species than other government landholding entities. Multiple environmental regulations help guide installation managers in the creation of Integrated Natural Resources Management Plans; an installation-specific, multi-year strategy for the management of natural resources contained within their jurisdictional limits. These plans serve the dual purpose of conservation and military preparedness, while minimizing potential wildlife/human conflicts. At Texas A&M Natural Resources Institute we have implemented a holistic management approach that not only meets monitoring mandates, but also pioneers effective and replicable research methods to address management requirements across a variety of ecosystems. Methodologies include traditional techniques such as avian point counts, point-intercept/belt transect vegetation surveys, and mark-resight mammal surveys, but also incorporate automated systems such as acoustic recording and camera trapping surveys for the rapid assessment of rare or cryptic species. This multi-facet approach allows for the efficient collection of data in a low impact manner, under adverse conditions, or in areas with access limitations, while contributing to the long-term monitoring essential for assessing management actions. Natural resource professionals and land managers will need to combine, and tactically employ, traditional and alternative monitoring methods to solve the complex ecological issues of the future.

# Comparative Productivity of American Kestrels in a Nest Box Program and Natural Nests in Lubbock County, Texas

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Abstract: The American kestrel (Falco sparverius) is the smallest falcon in North America. They are secondary cavity nesters, normally nesting in woodpecker holes and naturally occurring cavities in trees and cliffs. Kestrel populations have been enhanced in many areas by establishment of nest box programs. However, the productivity of American kestrels using nest boxes compared to natural sites has seldom been evaluated. This has important implications for assessment of kestrel populations and conservation needs. We monitored 29 kestrel nest boxes in Lubbock County, Texas, during the breeding season of 2019 and 2020. We also conducted county-wide road surveys to locate breeding pairs, and then monitored their natural nests. Although we refer to these as 'natural' nests, some were in man-made structures, such as barn lofts and abandoned buildings. Seventeen and eighteen pairs of kestrels used nest boxes in 2019 and 2020, respectively, with three nesting attempts failing each year. Nine and twelve pairs of kestrels used natural nest structures, respectively, with only one failure occurring in 2019. Nest success was 82.8% for the kestrels in the nest box program, and 95.2% for the kestrels using the natural nests. We only compared fledging counts as many properties and cavities were inaccessible and initial nestling number could not be determined. Average number of fledglings among the nest boxes was 3.6/successful nest, whereas the average among natural nests was 2.9/successful nest. During our period of study, it appears kestrels using nest boxes had higher productivity but lower success than those using natural nests.

# Mule Deer and Anthropogenic Change: Effects of Agricultural Encroachment on Movement, Morphology, and Population Performance

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Abstract: Native rangeland conversion to row-crop farming is a large form of habitat fragmentation in the USA. Mule deer (Odocoileus hemionus) populations have been stable, but have increased in the Texas Panhandle, an area of extensive row-crop production. Our objectives were to evaluate how presence of agriculture influenced mule deer resource selection and link habitat use to population parameters. We collected multiyear movement (via GPS collars) and morphometric measurements from 122 males and 185 females. We assessed mule deer resource selection at different spatio-temporal scales and tested functional responses of agriculture availability towards mule deer use. We evaluated how individual habitat use influenced body condition, lactation status, and antler size. Cropland only accounted for 3-14% use and we observed greater selection for cropland during winter than summer months. Mule deer exhibited a quadratic functional response where agriculture use increased proportionally with availability then decreased when >20% land cover was cropland. Males that utilized cropland in summer months had greater body condition. Winter agriculture use increased the probability of lactation the following autumn for adult females. Cropland use by males enhances the ability to build up endogenous reserves before reproduction. Further, female cropland use during gestation increases the probability of successfully recruiting young. Functional responses indicate there may be threshold to which cropland is no longer beneficial to mule deer. Understanding the influence of anthropogenic changes on the landscape will further enhance knowledge towards human-wildlife interactions and aid in adaptive management plans for mule deer in the Great Plains.

# Exploring a Plant-diversity Hypothesis to Explain A Latitudinal Gradient in Eyeworm Prevalence in Northern Bobwhite in Texas

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**Abstract:** Eyeworms (*Oxyspirura petroni*) are a potential factor influencing northern bobwhite (*Colinus virginianus*) populations in Texas. Eyeworm prevalence appears to be greater in the Rolling Plains ( $\approx 63.09\%$ ) than the Rio Grande Plains ( $\approx 9\%$ ), a pattern generally attributed to possible differences in occurrence of insects (i.e., intermediate hosts). We explored an alternative hypothesis. Many plants possess phytochemicals with anthelmintic properties. Because wildlife suffering from parasitic infestations are capable of self-medicating via diet selection, animals foraging in diverse communities should possess lower parasite levels. We predicted that plant diversity would be greater and bobwhite diet more diverse in the Rio Grande Plains than the Rolling Plains. We conducted literature reviews of anthelmintic plants and bobwhite diet in Texas. Our results indicate that the number of anthelmintic plants is 30 percent greater, and bobwhite diet more diverse, in the Rio Grande Plains compared to the Rolling Plains. Our study only provides circumstantial evidence for the plant-diversity hypothesis and warrants experimental testing.

Fine-Scale Genetic Structure in a High-Density Population of White-Tailed Deer: Implications for Management of Cattle Fever Ticks

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Abstract: Female white-tailed deer (Odocoileus virginianus) form small matriarchal groups composed mainly of close relatives, which may contain several generations of offspring. Yearling males disperse from their natal areas and form new home ranges, a behavior that avoids close inbreeding. Outside of the rut, males form loose social groups, termed "bachelor groups" thought to be composed of unrelated individuals. These social structures and dispersal events are influenced by population density and sex and age structure. The spatial scale of population structure and dispersal movements can inform management for issues such as wildlife disease. We are studying fine-scale population structure of a high-density population of white-tailed deer near Falcon Lake Reservoir, in South Texas, USA using genetic markers. The site is located in a permanent quarantine zone for cattle fever ticks, a 1-host tick which can transmit bovine babesiosis. The disease is economically important for the livestock industry; white-tailed deer are alternative hosts for the ticks, which complicates tick eradication efforts. We collected tissue samples from 400 deer, 100 of which were fitted with GPS radio collars, and extracted DNA. We will use a panel of genetic markers and spatial locations of captured deer to estimate the fine-scale spatial genetic similarity of male and female deer. We will also compute home range overlap for males and females as a function of genetic similarity and tick loads. Information collected can be used expand our knowledge on male and female social structures and provide more in-depth knowledge on host population dynamics in this area.

#### Monitoring Movements Relative to Management Efforts Along the US-Mexico Border

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**Abstract:** Cattle fever ticks (CFTs) are a growing concern in South Texas. These 1-host ticks can carry a *Babesia* parasite that causes babesiosis in cattle, a disease which is fatal in up to 90% of naïve individuals. Wildlife, such as white-tailed deer (*Odocoileus virginianus*), can act as alternative hosts for CFTs. The ticks were eradicated from the U.S. in the 1940's, and a permanent quarantine zone was established along the Texas-Mexico border to prevent re-invasion. In Mexico, treatment for CFTs is less regulated, creating concern for transient livestock and wildlife that can cross the border freely. Deer can also move outside the quarantine zone and seed new outbreaks, as their movements are not restricted like livestock. There are few CFT treatment options available for wildlife. We are evaluating the effects of population reduction on CFT in a high-density population of white-tailed deer near Falcon Lake Reservoir, Texas. The site is within the permanent quarantine zone and has experienced persistent re-infestations of CFT. We captured 100 deer and fitted them with GPS collars and later removed 298 un-collared deer from the area. We will compare pre-and post-removal movements, home range, and tick burdens. Deer movements, especially border crossings, will be quantified and associated with landcover. We will evaluate landcover variables and deer movements to

understand how these factors influence the spatial distribution of ticks. Understanding the influence of landcover and efficacy of culling will provide new tools for ranch managers and associated government agencies along with focal areas for CFT management.

# A Perfect Home 2.0: Creating a Reasonable and Reliable Artificial Burrowing System for Western Burrowing Owls

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**Abstract:** Western burrowing owls (*Athene cunicularia hypugaea*) are small specialist owls that reside in prairies and other arid environments across the western USA. These owls depend on fossorial mammals to create natural cavities for shelter and brood rearing. Anthropogenic influences have resulted in declines of fossorial mammal and burrowing owl populations, and the burrowing owl is now considered a New Mexico Species of Greatest Conservation Need. On Holloman Air Force Base in Otero County, New Mexico, the historical extirpation of prairie dogs and low species density has resulted in a lack of natural burrows, leading burrowing owls to utilize anthropogenically created cavities. The base has implemented artificial burrow systems in order to compensate for the lack of natural burrows and to relocate owls nesting in locations presenting a wildlife/human conflict. In 2019, 5 artificial burrows were installed with 2 of the 5 units being occupied, albeit at a high cost per unit and moderate installation difficulty. In 2020, 10 new units were installed utilizing a different design created to increase structural rigidity and reduce input costs. In 2020 4 artificial burrows were utilized by burrowing owls, with the remaining 11 having no visible evidence of discovery. Average cost per unit decreased from \$150 to \$130 and installation time was reduced approximately 30 minutes, with no evident design preference by owls. Future efforts should concentrate on facilitating translocations from high risk areas to both types of artificial burrows, and determining utility of each burrow type by owls.

# Estimating the Performance and Permeability of a South Texas Road Ecology Project

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**Abstract:** The endangered ocelot (*Leopardus pardalis*) is estimated to have fewer than 80 individuals remaining in the USA, with the entire population constrained to South Texas. Within this population, 40% of known ocelot mortalities are due to vehicle collisions. To prevent additional road mortalities on state highway 100 (SH100) in Cameron County, Texas Department of Transportation (TxDOT) constructed 11.5 km of wildlife exclusion fencing and eighteen wildlife guards (WG). To maintain landscape connectivity, TxDOT also constructed five wildlife crossing structures (WCS). Camera trap arrays at each road mitigation structure monitor actual wildlife use through WCS and across WG. Though important, this baseline data collection does not study the structure's performance. Performance determines the effectiveness of the structure for each species and is influenced by two factors: location and design. Location includes biotic and abiotic factors surrounding the structure, such as vegetation cover, an important factor for ocelot occupancy. The influence of location may be isolated by comparing wildlife use at the structure to wildlife occupancy surrounding the structure. This comparative analysis was conducted for 13 south Texas species; however, a specific focus was applied to bobcats (*Lynx rufus*) as they are a common surrogate for potential ocelot use. Bobcat presence and usage at structures increased with increased canopy cover. Additionally, WCS have a positive bobcat performance, indicating the SH100 road ecology project is

performing as intended for felids. Finally, permeability of the project may be calculated for all species, potentially indicating its success.

# Verdin Nesting Ecology in South Texas

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**Abstract:** The verdin (*Auriparus flaviceps*) is a desert-adapted bird that is considered a common resident of the arid southwestern USA and northern Mexico, yet the 2014 State of the Birds report listed this species as being in steep decline. Although concern about its status has been raised, data on potential causes of the decline of this species are lacking. In their ranges in California and Arizona, verdins create structurally different nests than found in their south Texas range. Verdin nests in south Texas were typically spherical, made of twigs, and have a small hole, approximately 3cm, at the bottom for an entrance. Nests were found on East Foundation ranches in Hebbronville and Port Mansfield Texas. Additionally, the nests were located almost exclusively on granjeno (*Celtis pallida*) branches (n = 30). Verdin nests in California were larger, loosely cone shaped, made of twigs, and have the entrance on the top. Verdin nests in Arizona and south Texas nests was size and organization. By studying the structural differences in the nest of this species, we may be able to provide critical information about the life history of this species and potential factors responsible for its population declines.

# Influence of Agriculture on the Spatial Genetic Structure of Mule Deer in the Texas Panhandle

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**Abstract:** Habitat loss and fragmentation pose a threat to ecosystems and wildlife conservation worldwide. In the Great Plains region of the USA, including portions of the Texas Panhandle, conversion of land for agricultural use is one of the main drivers of habitat fragmentation. Although fragmentation can be detrimental to native wildlife, Panhandle mule deer (*Odocoileus hemionus*) have steadily increased over the past 30 years. There is, however, little information relating to the spatial use of farmland by Panhandle mule deer. Our goal was to use genetic analyses to study fine-scale spatial response of mule deer in fragmented landscapes in the Texas Panhandle. Tissue samples were collected from 314 individuals across 3 study sites

with varying degrees of habitat fragmentation. We extracted DNA and are using 11 microsatellite DNA loci to conduct analyses of spatial genetic autocorrelation within each study site. Preliminary results indicate that females in the unfragmented study site show no relationship between genetic similarity and spatial proximity, while those in the most fragmented site show a weak spatial autocorrelation. This unexpected result may be due to the traversability within each site or the attraction of agricultural land to surrounding deer. Current work is focused on genetic analysis of additional tissue samples, as well as incorporation of the third study site, which has an intermediate land cover proportion. Knowledge of spatial genetic structure can be used to make inferences about animal movement and dispersal patterns, with implications for management decisions as well as conservation of these charismatic large mammals.

# Texas Horned Lizard Scat Predicts Lizard Size and Age Class

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**Abstract:** Texas horned lizards (THL; *Phrynosoma cornutum*) have declined throughout most of its historic distribution. THL can be difficult to locate so scat is used to indicate their presence. We propose that scat be used to estimate lizard size and provide an estimate of lizard age class. We collected 70 scats from known-size THL during 2005 and 2018-2019 and were able to predict lizard size (SVL, mm) from scat length (mm;  $r^2 = 0.89$ , n = 70) using the equation: *loge(SVL,mm)=1.91+ 0.7201× loge(Scat length,mm)*. Additionally, 20 female THL produced 178 hatchlings that were marked and monitored for growth during 2001-2008. Growth rates were greatest during their first 2 years (0.101 ± 0.003 mm/day, 1<sup>st</sup> year class; 0.099 ± 0.007 mm/day, 2<sup>nd</sup> year class) and their 4<sup>th</sup> year class (0.092 ± 0.017), whereas, growth rates were reduced in year 3 lizards (0.076 ± 0.009 mm/day). On average, THL emerged at a SVL of 16.6 ± 0.003 mm and obtained a SVL up to 31.0 mm, 54.5 mm, 77.5 mm, and 100.5 mm by the end of their 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> year, respectively. No differences ( $\chi 2 d/2 = 0.82$ , P = 0.66) were noted in the relative proportions of the lizards placed into the 3 age classes (i.e., hatchlings, juveniles, and adults) using the size classifications based on past literature and our classification based on known year class. Scats of THL can be used to estimate age distribution and can aid in the management of this protected and threatened species.

# Piecing Together the Prescribed Fire Puzzle in Texas

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**Abstract:** Throughout Texas, there is considerable effort among private landowners and conservation professionals to manage our natural resources, on both private and public lands, effectively and efficiently. Of Aldo Leopold's 5 habitat management tools - ax, cow, plow, fire, and gun - fire is arguably the most debated tool due to its complexities in understanding, implementation, and ecological value. Furthermore, various levels of prescribed fire acceptance, financial support, and utilization occur across Texas throughout individual properties, landowner cooperatives, local governments, state agencies/organizations, and federal

agencies/organizations (e.g., in 2019 alone, more than a dozen different categories of conservation entities accounted for >325,000 acres of Texas forests and rangelands being treated with prescribed fire). So, when it comes to being a private landowner or conservation professional interested in implementing prescribed fire as a habitat management tool, it can become very daunting to try and figure out what avenue/organization is most suited for the goals at hand. This presentation will showcase the best available information on whom is involved within the professional prescribed fire community here in Texas, and how they are involved - whether that be at the research, planning, implementation, or legislative levels. We will also discuss various opportunities of financial and/or resource support from companies, organizations, or agencies available to landowners and/or other organizations interested in utilizing prescribed fire. Ultimately, by being able to piece together this prescribed fire puzzle, we will most effectively and efficiently be able to manage our state's resources!

### Seasonal Weather Effects on Avian Productivity in South Texas

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Abstract: There is concern over how wildlife will respond to changes in climate and local weather patterns. Changes in environmental conditions can have marked impacts on local wildlife communities, such as their distributions, abundance, species richness, and reproductive ecology. Due to the ease of observing avian species, birds make a good model taxa to study the effects of weather patterns on wildlife communities. Rainfall affects resource availability, which affects abundance, diversity, and the onset of nesting. Extreme temperatures can impact the length of breeding season, and thus reproductive output. My project aims to determine the effects of rainfall and temperature on wildlife communities in a coastal, south Texas rangeland by analyzing avian productivity on a seasonal scale. Beginning in 2018, observational monitoring of multiple species of breeding birds was completed in 15 1600 m<sup>2</sup> plots during May and June at the East Foundation's El Sauz ranch. Average temperatures remained steady throughout the 2018-2020 breeding seasons, although 2018 total rainfall over the breeding season was about 53% greater than in either 2019 or 2020. Species richness does not appear to vary with seasonal weather data; however, the 2018 breeding season reported 35%-40% more individuals exhibiting breeding behavior than either 2019 or 2020. These findings indicate a direct relationship between seasonal rainfall and reproductive activity of birds, which in turn may allow us to predict trends in productivity of wildlife communities based on expected weather conditions. Ranch managers can use this information to alter their grazing regimen accordingly during productive seasons for wildlife.

#### Effects of Water Salinity on Intake of Food and Water by White-tailed Deer

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**Abstract:** Surface water in the southwestern USA is often limited due to frequent droughts. Large mammals in this environment are forced to rely on pumped ground water or rapidly evaporating pools of poor-quality water that may contain high (>7000 ppm) levels of salt and dissolved solids. Our objectives were to identify for white-tailed deer (*Odocoileus virginianus*) 1) the upper threshold of salinity that deer will drink, 2) if water salinity affects daily water intake across seasons, and 3) if increasing salinity causes a decrease in dry matter intake (DMI). We offered captive deer water *ad libitum* at varying (1000-control, 2500-low, 4000-moderate, 6000-high, and 7500ppm-extra high) salinity in autumn 2019, spring 2020, and summer 2020. Water intake increased with water salinity in the spring and summer seasons (*P* &dt; 0.0001) and had a weak interaction in the fall season (*P* = 0.06). Daily water consumption was between 6.5-12.5% of body mass (4-12 liters) across seasons and treatments. No difference in DMI we observed across treatments or seasons

throughout the study. Toxic levels of salts in water occur at >7000 and 10000 ppm for livestock. We observed no negative health impacts by treatments on any deer. Our study indicates that white-tailed deer can tolerate salinity up to 7500 ppm without a decline in dry matter consumption. This water data information will be valuable to wildlife managers giving them a range specific to wildlife instead of livestock as they evaluate water sources to improve habitat for white-tailed deer.

### A Comparative Study of Plant and Arthropod Communities Pre and Post Grazing by Bison

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**Abstract:** Texas Parks & Wildlife (TPWD) manages a remnant herd of Southern Plains Bison (*Bison bison*) at Caprock Canyons State Park (CCSP) in Briscoe County, Texas. Today the bison population in Caprock Canyons State Park is approximately 250 individuals. Caprock Canyons State Park bases their management plans on preserving native Texas prairies for their bison herd. Our goal is to identify the effects of bison grazing at CCSP on native plant and arthropod communities. In summer 2018, CCSP officials established 20 3x3-m<sup>2</sup> grazing enclosures at random locations but with consideration of accessibility of the bison to the area. We will use a paired design by selecting a 3x3-m<sup>2</sup> grazed area proximate to the enclosure that represents similar soil and topography. At both grazed and ungrazed areas, we will survey vegetation using Daubenmire quadrat frames to determine plant diversity, litter depth, and ground cover, and to collect samples for analysis of nutritive quality. We will use a Robel pole to measure grazing restraint, which is represented by plant height. We will survey for arthropods within grazed and ungrazed areas using pitfall traps and bee bowls to target pollinators and beetles. The data collected from this research will be used to produce a TPWD management plan for CCSP.

# When Can Cropping Rate Compensate for Increased Vigilance?

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**Abstract:** Vigilance is an antipredator behavior employed by prey animals to reduce predation risk, yet it imposes a forging efficiency cost. The more time an individual spends with its head up in a state of vigilance, the less efficient its foraging bout will be as time lost to vigilance directly detracts from time used to search for, find, and ingest food. It is still unclear if certain behavioral modifications can be used to offset the costs of vigilance. We attempt to answer the question: can ungulates compensate for vigilance costs by increasing cropping rate? To assess this question, we compared the proportion of time elk spend with their head up to their cropping rate using data collected from 271 focal observations of Roosevelt elk (*Cervus canadensis roosevelt*) in Redwood National and State Parks from 2008 to 2012. We fit a linear mixed-effect model to the data to assess how head up time effects cropping rate. If increased head up time does result in increased cropping rate, we would expect the regression to have an absolute value of the slope greater than the absolute value of the y-intercept. The y-intercept of the regression was 40.79 bites/minute, and the slope was -40.59 bites/minute. Using a parametric bootstrap, the 95% confidence interval of the slope was -46.78 bites/minute to -34.36 bites/minute, demonstrating that the estimate of the slope calculated by the regression is similar to the y-intercept. This indicates that elk cropping rate was constant and no vigilance compensation occurred via increased cropping rate.

# Wildlife Behavior at Culverts in East Texas

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**Abstract:** Culverts play a critical role in drainage under road structures but have also been recorded to support movement of a diverse range of wildlife. Although a primary focus on wildlife and culverts is on the passage of animals, culverts can provide refuge to wildlife where a variety behaviors can be performed. Using trail camera data, we describe bird and mammal species diversity and activity within and around the entrance of drainage culverts and the behaviors performed by these species at six culverts under a main highway in east Texas. We identified nine mammal species and seven bird species using areas in and around the entrance of culverts. In 45% of visitations, animals entered the culvert, with mammals entering the culverts more than birds. Travel in or around culverts was the most frequently recorded behavior for birds and mammals, but other recorded behaviors included foraging, drinking, perching, roosting, grooming and copulation. Our observations show that culverts in east Texas are not utilized only for passage by wildlife, but also provide refuge and resources to both birds and mammals. We discuss how these findings may provide insight in wildlife-vehicle collisions and suggest that future research expand data collection both temporally and spatially.

# The Effects of Livestock Grazing on Forb Quality and Quantity: Implications for Pronghorn Habitat Management

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**Abstract:** Pronghorn (*Antilocapra americana*) evolved in grasslands with a diet composed of highly nutritious forbs. However, pronghorn habitat throughout North America has been lost to fragmentation and degradation. Additionally, the effects different cattle grazing regimes have on forb biomass, protein, and energy production for pronghorn are not well known in West Texas. We sampled vegetation during the growing season in the months of September 2018 and 2019 to assess the effects of different cattle grazing regimes on forbs. We hypothesized rotational grazing would increase the nutritional quality of the forb community and overall forb production, compared to continuous grazing and no grazing. We randomly sampled pastures subject to continuous and rotational grazing, as well as deferred grazing exclosures using 100, 96, and 64 1 m<sup>2</sup> plots, respectively. We collected all forbs in each plot and analyzed differences in nutritional composition and biomass production using redundancy analysis. We found that the effects of grazing varied by year. In wetter conditions, rotational grazing exhibited higher forb quality and biomass, while deferment from grazing exhibited these results under drier conditions. The knowledge gained from this study helps resource professionals and landowners understand how cattle grazing affects forbs for pronghorn. This knowledge may be used to improve the suitability of pronghorn habitat through cattle grazing regimes.

Ocelot Density and Habitat Use in Tropical Deciduous Forests in the Sierra Tamaulipas of Mexico

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Abstract: The Sierra Tamaulipas is on the northern periphery of the geographic range of ocelots (Leopardus pardalis) in Mexico. Ocelots are considered threatened in Mexico due to illegal hunting, habitat loss, and fragmentation. Distribution and population size are also poorly known in remote mountainous areas of the region. These populations are genetically similar to isolated populations in Texas and may serve as a source population for future ocelot translocation in the USA. From May to December 2009, we conducted two camera-trap surveys on Rancho Caracol and Catamol in the Sierra Tamaulipas to assess population density, population size, and habitat use patterns of ocelots. During the study, increasing the percentage and total core area of tropical deciduous forest was the best predictor of ocelot habitat use. We estimate a density of 11.14 ocelots /  $100 \text{ km}^2$  (95% CI = 5.85-22.18 ocelots /  $100 \text{ km}^2$ ), where encounter probabilities and movement parameters varied by behavioral and sex-specific responses, respectively. We estimated 507 ocelots occupied the tropical deciduous forests and thornshrub communities in the Sierra Tamaulipas. Additional ocelots likely occur in other vegetation communities within this mountain range. This study indicates a robust population density and size, among the highest reported in Mexico using spatially explicit capture-recapture methods. Although ocelots were detected in thornshrub cover, the tropical deciduous forest interspersed within thornshrub had the greatest probability of use. Given the robust estimates, this population is likely large enough to as a source population for genetic rescue using translocation into the USA population.

# Are All Large Patches Created Equally? Landscape Structure of Woody Communities to Inform Ocelot Recovery and Road Mitigation in Texas

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**Abstract:** Understanding wildlife-habitat relationships is critical to making informed decisions for recovery of endangered species and mitigating potential road mortality. Our ability to quantitatively evaluate habitat suitability provides indices of potential presence and population metrics by assessing the complexity, configuration, and spatial structure of different habitats. Ocelots in South Texas are considered habitat

specialists and forest-interior species favouring dense stands of woody cover, but the potential distribution of patches favorable to ocelots is unknown. We used the gradient concept of landscape ecology and the concept of slack combined with high-frequency GPS data from 11 ocelots caught from 2016 to 2020 to identify the range of the spatial structure of woody cover in South Texas. Optimal landscape-level patch structure occurs in only 10% of woody cover present in the eight southernmost counties. Spatial distribution of optimal woody cover is comprised of large patches, with low shape-indices (1.07-2.25), and low patch (27.2-72.5 patches/100 ha), and edge densities (0-191.5). Model verification compared to previous years (2012-2015) indicated that frequency of GPS locations were not statistically significant among time periods ( $\chi^2 = 6.74$ ,  $\alpha = 0.05$ , df = 4). Our results show that a model based on the gradient concept of landscape structure can reliably identify ocelot habitat. This study suggests that there are potentially more large patches of woody cover that contain the spatial structure preferred by ocelots than previously known. These results will aid in further fine-scale evaluation of potential recovery areas for translocation and identification of locations for wildlife crossing structures.

#### Turkey Vulture and Black Vulture Roosting Habits in Kingsville, TX

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**Abstract:** Large urban roosts of turkey vultures (*Cathartes aura*) and black vultures (*Coragyps atratus*) can create conflict between humans and wildlife. In Kingsville, Texas, a primary roost site for vultures is a U.S. Customs and Border Protection (USCBP) tower. Due to the human-wildlife conflict associated with this roost, the USCBP plan to establish a permanent deterrent that would prevent vultures from roosting. This decision could result in an increase of vulture activity at nearby towers. Our objective was to determine how vulture roosting patterns would change if the main roost became unavailable. We implemented a before-after-control-impact (BACI) study design in which double-observer roost surveys were conducted over a two-week period in October (control) and November (treatment), 2020. During the treatment week, USCBP staff used an active deterrent an hour before and 30 minutes after sunset in a random manner to deter all vultures from settling on the primary roost. Results indicate the main roosting site had an average of 342 vultures during the control week and 138 during the treatment week. During the treatment week, We estimated an increase of 248 vultures on a secondary tower from the control to the treatment week. Five towers had little to no activity during the control period, while four out of five towers had an increase in vulture activity during the treatment week. With the main tower not available for roosting in the future, we anticipate that the remaining seven towers will see an increase in vulture activity leading to new future potential conflicts.

#### Determining Mammal Diversity on Fragmented Game Reserves in South Africa

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Abstract: Nature Reserves in South Africa are severely fragmented, resulting in isolated local populations of animals. Our study was conducted on Hans Merensky and Vygeboom Nature Reserves in Limpopo Province, South Africa. The Balepye community manages these nature reserves and are reliant on the reserves' ecological diversity to attract prospective big game hunters and tourists. Activities on and around the reserves result in increased wages and sustainable livelihood opportunities for local community members. Accurate and current wildlife data is lacking on many reserves in South Africa, including Hans Merensky and Vygeboom Nature Reserves. Understanding current mammal diversity on these reserves is crucial for furthering conservation and successful management of wildlife species, including leopard and mesocarnivore populations. To further our understanding of mammal diversity on these reserves, we deployed paired game cameras in 4-km<sup>2</sup> grids covering the entirety of our study sites. Vegetation surveys were conducted using transects 50 m from a specific camera location in each grid to classify vegetation type and structure. We are currently analyzing game camera photographs and vegetation data to determine current mammal diversity on these properties. We anticipate overall mammal diversity will differ between the two properties and vegetation types. Understanding local scale mammal diversity is a crucial component that will further our understanding of leopard and mesocarnivore populations on the reserves. This will allow future researchers to study the impact of various management practices on these reserves, including reintroducing lions and other historically present species that are locally extirpated.

#### Burrowing Owl Movements in Relation to Wind Energy Development

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**Abstract:** Burrowing owls (*Athene cunicularia*) occupy open landscapes throughout western North America, often in association with black-tailed prairie dogs (*Cynomys ludovicianus*), whose vacant burrows they will use for nesting. Burrowing owl populations have declined in many portions of their range, and it is suspected that wind energy development may be partially responsible for these declines, either by displacement or direct mortality. This has prompted a need to investigate the effects of wind energy facilities on burrowing owls. We affixed 5-gram solar satellite transmitters to 4 burrowing owls occupying a 10-turbine wind farm in Lubbock county, TX in summer 2020. The location data from these owls will provide detailed information regarding movement and habitat use and allow us to test whether wind turbines influence migration and wintering movements of owls. Data from the Southern High Plains will be merged with movement and habitat association data for 9 burrowing owl captured in Wyoming from 2016-2019. Together these data will allow us to better determine whether burrowing owl movements and habitat use are influenced by wind energy at large spatiotemporal scales. Our findings will help inform renewable energy development across the burrowing owls distribution.

# Avian Community Response to Coastal Prairie Restoration Using Herbicide and Prescribed Fire on The Welder Wildlife Refuge

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Abstract: Grassland-obligate birds are experiencing declines across North America, including the coastal prairies. We have been monitoring avian and vegetation communities in control (216-ha) and treatment (144ha) plots from 2018-2020 to evaluate their responses to prairie restoration efforts. We assessed how brush management by application of herbicide to a 144-ha treatment plot in 2014, and a follow-up summer burn in 2019, have influenced avian communities by conducting point counts within the control and treatment plots during the summer months of May-July each year. Our goal is to understand how prairie restoration efforts can contribute toward grassland bird community recovery. We used non-metric multidimensional scaling (NMDS) to represent our avian community consisting of 12 species with sufficient detections. We ran a mantel's test on environmental factors to determine which ones were significantly correlated with our avian community matrix and plotted them on our NMDS. To test the differences between avian communities in control and treatment plots we used an analysis of similarity and found a significant difference (R=0.5, p <0.001) between communities. To determine which species were driving this difference we ran an indicator species analysis. The analysis showed that the Northern Cardinal (Cardinalis cardinalis), Verdin (Auriparus flaviceps), Olive Sparrow (Arremonops rufivirgatus), White-eyed Vireo (Vireo griseus), and Yellow-billed Cuckoo (Coccyzus americanus) were detected significantly more often in the control. Within the treatment plot, the Northern Bobwhite (Colinus virginianus), Scissor-tailed flycatcher (Tyrannus forficatus), Dickcissel (Spiza americana), Mourning Dove (Zenaida macroura), and Northern Mockingbird (Mimus polyglottos) were detected significantly more often.

#### An Evaluation of Social Media in a Wildlife Organization: What Messages People Engage with Most

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Abstract: Social media is an important tool for wildlife organizations to educate, communicate, and engage with the public. The Borderlands Research Institute (BRI) uses social media platforms, like Facebook, to educate the public about wildlife and natural resources. However, little time has been spent to understand the effectiveness of using social media to engage with the public. Our project aimed to examine what types of messages people engage with most. We used the Facebook Insights feature to summarize posts between January to November 2020, reviewing the number of users reached and their engagement (i.e., reactions, comments, and shares) among organic and paid posts. We found BRI had an increase of 156 page likes and 165 page followers during this period. Based on the organic posts, users showed the highest engagement with an image of a BRI graduate student defending their thesis (reach = 2,637; engagement = 652). Of the paid posts, users showed the highest engagement with a post on facts about quail not being good at social distancing (reach = 14,447; engagement = 2,135). These results suggest that we have increased our brand awareness through engaging messages. Although paid posts assist in reaching more users, the type of message has a larger impact on engagement. We recommend other wildlife organizations consider posting more about students/employees or wildlife associated with humans, as this type of messaging appears to be highly relatable to users. Future social media summaries should identify the time of day when messages are posted to determine user engagement.

### Quantifying Wild Pig Damage at Different Crop Growth Stages with Remote Sensing Techniques

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**Abstract:** Wild pigs (*Sus scrofa*) were first introduced into Texas as livestock over 300 years ago by Spanish explorers. Over time, pigs were released or escaped fenced properties and became feral, leading to a rapid spread and population growth. Wild pigs are presently classified as an exotic, invasive species because they cause major damage to properties, cropland, livestock, and native species and ecosystems. All told, wild pigs cost the U.S. an estimated \$1.5 billion each year in damage and control costs. In this study, we compared different methods for monitoring wild pig damage to corn fields near Delta County, Texas. From April 1-August 28, 2019, we flew 5 drone missions at an altitude of 100 m, and captured imagery during different stages of corn growth: planting/seed stage, vegetative stage, blister stage, milk stage, and harvest. To verify damage detected through drone flights, we ground-truthed sites by walking transects and recorded damage using a sub-meter GPS unit. Finally, we evaluated the Digital Terrain Model (DTM) and the Digital Surface Model (DSM) of the remotely sensed imagery. We will compare damage detected via drone imagery and ground transects to the outputs of the DTM and DSM. Our objective is to find a practical means for the detection and monitoring of crop damage at a larger scale, with the ultimate goal of patterning damage temporally to assist in more efficient control efforts to protect crops.

# Species Richness at Wildlife Crossing Structures Compared to Right-of-way Cameras Along Fm106 in Cameron County, Texas

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**Abstract:** Farm-to-market (FM) 106 was recently upgraded to a two-lane road with shoulders and a 60 mph speed limit. To mitigate the expected increase in traffic and wildlife-vehicle collisions, especially of the endangered ocelot (*Leopardus pardalis*), Texas Department of Transportation modified or constructed nine wildlife crossing structures (WCS) with short sections of wildlife exclusion fencing to funnel wildlife towards the entrances. Construction concluded at the beginning of 2020. Wildlife communities are monitored with camera trap arrays on both sides of each WCS to record all wildlife approaching or using the crossings. In addition to the mitigation structure array, five right-of-way (ROW) sites were chosen between the wildlife exclusion fencing flanking each WCS. These ROW sites record species occurrence and complete crossings that occur outside the mitigation structures using cameras placed on either side of the roadway. The wildlife communities at WCS and ROW sites were analyzed to determine if differences exist at each site and crossing type with PERMANOVA. Distance to nearest vegetation cover was included as a factor. To further characterize potential differences between sites, nMDS plots and PERMDISP analysis were also conducted.

Results from this study will be used as a baseline to determine if ROW use decreases as WCS use increases, which is expected to occur over time as more individuals become acclimated to mitigation structures on the landscape.

### Spatiotemporal Patterns of Pronghorn in the Texas Panhandle

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Abstract: Pronghorn (Antilocapra americana) are found in 27 counties of the Texas Panhandle. Their behavior is heavily influenced by forage availability and disturbances in the landscape. However, there is very little information on the spatial and temporal distribution of pronghorn in the panhandle. The goal of this project is to compare the spatiotemporal distribution of pronghorn in two contrasting landscapes in the Texas Panhandle: Pampa, an agriculture dominated landscape, and Dalhart, a rangeland dominated landscape. We used GPS data collected from 64 pronghorn (32 males and 32 females) from 2016 to 2019 evenly distributed across Pampa and Dalhart. We created space-time cubes for each individual pronghorn using a monthly step time. The space-time cube is a representation that helps assess spatiotemporal patterns across the landscape. This cube can provide information on whether wildlife movement has distinctive patterns across the landscape through time. Combined with land cover data, the space-time cubes can provide new insights into how species use the landscape throughout the year. We classified the resulting patterns as emerging hot spots, emerging cold spots, or no-patterns areas. We are currently classifying these patterns according to land cover information in relation to agriculture and rangeland landscapes. Once we have identified specific times and areas of patterns within agricultural crops, we will identify the specific crop and growth stage within these areas using remote sensing imagery. The results of this study will help us understand the temporal dynamics of pronghorn spatial distribution.

# Distribution and Abundance of Cormorants in Texas

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**Abstract:** Double crested cormorants (*Phalacrocorax auratus*; DCCO) and neotropic cormorants (*Phalacrocorax brasilanus*; NECO) are thought to be expanding their populations across Texas. This expansion is cause for concern for both fish stocking and fisheries management in public waters. The objective of this study is to determine the historic and current distributions of cormorants in Texas. We compiled Christmas Bird Count (CBC) and Breeding Bird Survey (BBS) data over a period of fifty years (1970 to 2019). We compared total CBCs conducted each year to those CBC's reporting detections of DCCO and NECO as a proxy for changes in detection rate and in distance from the Gulf Coast during winter. We are using the same approach to analyze the BBS data to assess changes from baseline abundance and distribution during the summer. We are also conducting field surveys from December through February to assess cormorant abundance at a set of stocked and unstocked lakes in the Dallas-Fort Worth area; these counts will assess the seasonality of presence and association with fish stocking to better inform decisions regarding fish stocking and

management. Preliminary results suggest wintering DCCO increased from 1970 through 1990, then exhibited a slow decrease over the last 30 years. Further, DCCO did not expand their range so much as they infilled areas. In contrast, NECO appeared to be both expanding their range and increasing in number.

# Determining the Effect of Invasive Vegetation on Small Mammal Communities

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**ABSTRACT** Invasive vegetation, such as Old World Bluestems (*Dichanthium annulatum* and *Bothriochloa ischaemum*) and Huisache (*Vachellia farnesiana*), has taken over much of the South Texas rangeland that was once native mixed and tallgrass prairie habitat. The proliferation of these plants is a considerable threat to conservation and native wildlife. Therefore, it is important to monitor how these invasions are affecting biodiversity. Our study aims to determine how the diversity and dynamics of herpetofaunal and small mammal communities are affected by invasive vegetation. We are sampling these communities at six sites on the Welder Wildlife Refuge, two sites per habitat type (i.e., invaded, moderate, native), to identify community and habitat differences along a gradient of ecosystem change (i.e., invasion). We hypothesize that communities in invaded stands will host the least amount of diversity among sites and will be dominated by generalist species. This project will have a significant impact on understanding the implications of invasive vegetation on wildlife communities and will provide better insight into the management of natural resources at both local and landscape scales.

### Where and by How Much do Golden-cheeked Warbler Models Differ?

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**Abstract:** Two breeding range surveys of golden-cheeked warblers (*Setophaga chrysoparia*, hereafter warbler) have been conducted. The first, conducted in 2008-2009 and published in 2012, predicted warbler abundance using data from 1,057 point count surveys conducted across the breeding range; patch-specific densities were estimated as a function of predicted patch occupancy and woodland patch characteristics. The second, conducted in 2018 and in prep, predicted densities using distance sampling from surveys at 1,804 points across the breeding range. Predictors included canopy cover derived from 1-m leaf-off and leaf-on 4-band digital aerial photographs and canopy height from lidar collected from airborne sensors. Differences between predicted abundances of the two models will be presented at various scales across the range.

# An Operational Approach to Forage Mass Estimation Using Drones

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Abstract: The use of Unmanned Aerial Vehicles (hereafter: "drones") has exponentially increased in recent years for monitoring and managing rangelands. High-resolution cameras and improved sensors provide an opportunity to investigate pasture-scale sampling methodology as an operational approach to estimate forage mass on rangelands using 3D models derived from drones. Our objectives were to 1) develop a protocol for sampling forage standing crop at the pasture-scale and (2) to compare field-based and drone-based forage estimation methods. To accomplish this, we used a DJI phantom IV pro RTK to acquire imagery which was processed to create orthoimagery, digital terrain models, and digital surface models. We conducted 2 flights at altitudes of 50 and 100 meters above ground level within the South Texas Plains ecoregion. We performed three biomass sampling techniques: double sampling with the UAV, traditional double sampling method, and a traditional quadrat clipping method. Linear regression analysis was used to evaluate relationships between UAV derived vegetation volume for each flight altitude and the forage biomass derived from each biomass sampling method. The results of this research will provide guidance on the operational approaches to use drones for forage estimation. This type of information can be used for the collection of a large number of samples using a non-destructive method to estimate forage standing crop for grazing animals. We expect that this approach will allow for efficient large-scale rangeland analysis to assist with stocking rate and rangeland monitoring.

# Differences in Vital Rates Between Two Subspecies of Translocated Northern Bobwhite in Northcentral Texas

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**Abstract:** Translocation of northern bobwhite (*Colinus virginianus*) is a conservation tool to reintroduce and re-stock existing populations. Despite numerous translocation efforts, the effects of source population, particularly subspecies, on demographic parameters in bobwhite is not well understood. Texas has three primary subspecies of wild bobwhite—*C. v. taylori* (northwest Texas) and *C. v. texanus* (south Texas) are the most common. In northcentral Texas, where the study site is located, *C. v. taylori* is considered the native subspecies. Our objectives were to compare survival, dispersal, and reproduction of these two translocated subspecies. We translocated 167 (n = 64 northwest Texas; n = 103 south Texas) and 237 bobwhites (n = 46 northwest Texas; n = 55 south Texas) and 110 bobwhites (n = 46 west Texas; n = 64 south Texas) during 2019 and 2020, respectively. Our top model for survival included the additive effects of year and time-since-release. The majority, 85% and 79%, of radio-marked individuals dispersed < 1 km from the release in 2019 and 2020, respectively. We located 9 nests in 2019 and 52 nests in 2020. On average, northwest Texas hens initiated 48% more nests than south Texas hens. Pooled across

years, nest success was similar for nests incubated by bobwhite sourced from northwest Texas (0.47  $\pm$  0.09 [SE]) and south Texas (0.42  $\pm$  0.09 [SE]).

#### Pasture Biomass Estimation Using UAV Lowest Point Analysis

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**Abstract:** The use of Unmanned Aerial Vehicles (UAV) has exponentially increased in recent years for monitoring and managing rangelands. High-resolution cameras and improved sensors provide an opportunity to investigate pasture-scale sampling methodologies as an operational approach to estimate forage mass on rangelands using 3D models derived from drones. Our objectives were to 1) assess the feasibility of a protocol for sampling forage standing crop at the pasture-scale and (2) evaluate the efficiency of using two altitudes on forage mass estimation. Our study was conducted in an 830-ha pasture. We selected seven sampling sites (12-ha each) where we collected field data using the traditional quadrat clipping method. For each sampling site, we collected biomass from 10 quadrats. For each quadrat, we dried and obtained the dry mass weight. We acquired aerial imagery using a DJI phantom IV pro-RTK with two flight altitudes at 50m and 100m above ground level. Imagery was processed to create orthoimages at a resolution of 1.5cm and 3cm respectively and digital surface models using the lowest point analysis. Simple regression analysis was used to compare data derived from the UAV and field data for each altitude. The results of this research will provide guidance on the operational approaches to use drones for forage estimation. This type of information can be used as a non-destructive method to estimate forage standing crop for grazing animals to aid in efficient large-scale rangeland analysis for assessing stocking rate and conducting rangeland monitoring.

Nutritionally Mediated Size Differences in White-tailed Deer Morphology in the Coastal Sand Sheet Ecoregion of Texas

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**Abstract:** There is increasing evidence that regional size differences in ungulate morphology are nutritionally, rather than genetically, driven. However, it is unclear if these size differences are caused by the quantity of high-quality forage or differences in nutritional quality of the same plant species between regions. We quantified differences in white-tailed deer (*Odocoileus virginianus*) body mass and antler size at 4 sites in South Texas. We sampled forage quantity, quality, and diversity to determine if deer size differences were best explained by forage quantity or quality. We collected blood serum from a sub-set of deer (n = 28) to test for sub-clinical mineral imbalances. Data from deer captured during 2011-2019 showed antler size and body mass of female and male deer were 8%, 9% and 20% smaller, respectively, on the eastern edge of the Coastal Sand Plain ecoregion compared to the western border. Digestible energy in browse and mast species was ~0.06 kcal/g lower at sites with smaller deer ( $\chi_3^2 = 7.40$ , P = 0.06). Additionally, the proportion of deer with deficient levels of serum copper was greater at the site with smaller deer sizes (100% versus 21%, P < 0.001). Our results support our nutrient- and diversity-mediated hypotheses, but not our quantity-mediated hypothesis. Heterogeneity in abiotic resources, drives productivity of living organisms at local and regional spatial scales. We recommend wildlife managers interested in increasing body mass and antler size of deer in South Texas focus on increasing the quality and diversity, rather than the quantity, of forage.

#### Assisted Reproductive Techniques in Free-ranging Ocelot and Bobcat Populations of South Texas

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**Abstract:** Recent studies concerning genetic variation in wild felid populations have shown that despite captive management, these small populations tend to lose genetic variation over time. Assisted reproductive techniques (ART) have been used in many other species and have the advantage of addressing behavioral or physical incompatibilities between genetically suitable pairs, connecting regional populations by transporting frozen semen and embryos, preserving genetic diversity, and linking wild and human-managed populations without bringing more cats into captivity. The goals of this study are to 1. compare the effectiveness of urethral catheterization using ultra rapid freezing (Cath-URF) with the traditional straw freezing method in wild ocelots (*Leopardus pardalis*) and bobcats (*Lynx rufus*) in South Texas, which are genetically similar populations, and 2. compare the effectiveness of ART in wild felids to human-managed felids, which are genetically variable populations. Currently, 4 attempts have been made to collect semen on 3 bobcats and 1

ocelot. Although 3 samples were successfully collected, the ocelot sample was the only viable sample after freezing and produced embryos in-vitro using domestic feline oocytes. The next steps are to compare these results with males captured in the present season and produce pregnancies in human-managed ocelots using wild ocelot sperm. Historically, successful pregnancies have resulted from laparoscopic artificial insemination in 4 ocelots, among other species of felids using this technique. Using the Cath-URF approach, field veterinarians could opportunistically collect felids in other areas of the world for broader application of ART for felid population management.

# An Assessment of Fine Scale Microclimate Conditions in Purple Martin Housing and Its Influence on Nest Survival

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Abstract: The eastern subspecies of Purple Martin (Progne subis subis) are almost entirely dependent on provisioned nesting cavities. Raleigh et al. (2019) found no variation in nest survival across 7 styles of housing, but with projected climate change forecasts, an evaluation of the microclimate conditions within artificial housing is an important component for the declining species. The goal of this study was to assess microclimate conditions of artificial housing types and if microclimate conditions (i.e., temperature and vapor pressure deficit; hereafter VPD) influenced nest survival of eastern Purple Martins. We deployed ibuttons among 4 types of artificial houses, in an active Purple Martin colony, Canyon TX, 20 Feb-15 Jul 2020. We monitored nest status 3-5 times per week. We used a one-way Kuiper statistic to assess if temperature and VPD empirical distribution functions (EMD) were different and if they influenced nest survival. We collected 180,626 temperature and VPD measurements among 20 purple martin nests, and our major findings were 1) EMDs varied by all factors, 2) Chirpy<sup>TM</sup> houses and artificial gourds had more favorable microclimates, 3) EMDs in metal boxes had the highest standard errors whereas wood boxes had the lowest standard errors, 4) microclimate was a marginal predictor of nest survival and 5) nest survival was >88%. Our preliminary data suggested Chirpy<sup>™</sup> houses and artificial gourds may be beneficial for the species in 1) areas in hot, dry climates found on the periphery of their distribution 2) extreme weather events and 3) the future, given climate change forecasts.

#### Development of an Environmental DNA Assay to Detect the State Threatened Black-spotted Newt

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**Abstract:** The Black-spotted Newt (*Notophthalmus meridionalis*) is a chronically understudied species, with much information on the natural history, ecology, and distribution of this species poorly known, especially at the proposed northern boundary of their range in Texas, USA. Historic records of *N. meridionalis* exist from 13 Texas counties, however since 2000, confirmed observations of *N. meridionalis* have been limited to just three counties (Cameron, Hidalgo, and Willacy). *Notophthalmus meridionalis* is a cryptic species, spending the majority of the time beneath the surface, only emerging after heavy rains. Previous studies using traditional methodologies have had limited success, finding *N. meridionalis* at 6% (7 of 114) and 1% (2 of 221) of sites surveyed. Our goals were to improve detection efforts of this species on the landscape through designing and implementing a novel eDNA assay specific to *N. meridionalis*. We designed two primer sets (initial and nested) and validated their specificity through testing against DNA extracts from sympatric amphibians. We developed a modified DNA extraction procedure, which was optimized through testing with tissue samples, a dilution series from newt aquarium water, and from sites where populations of *N. meridionalis* are known to occur. Positive detection of *N. meridionalis* eDNA from highly dilute samples and a preliminary set of field

sites suggests the utility of eDNA assays in understanding the distribution of *N. meridionalis* in Texas. This assay lays the groundwork for future monitoring of sites used by *N. meridionalis* and the potential discovery of new populations.

### Recovering America's Wildlife Act: Help Us, Help You Get More Wildlife Funding

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**Abstract:** Wouldn't it be nice to have more funds for your project? What ideas have been jettisoned for lack of funding? Research and recovery of many at-risk fish and wildlife is significantly underfunded and has little long-term certainty. Meanwhile, the number of species across the country facing population declines—like many pollinators, grassland birds, amphibians, and freshwater species—continues to grow. The Recovering America's Wildlife Act (RAWA) is gaining momentum in Congress and supported by a large coalition of organizations nationwide and in Texas. We may soon need to activate the entire Texas wildlife community to show their support. RAWA is federal, bipartisan legislation that would dedicate \$1.4 billion each year to help states, territories, and tribal lands conserve Species of Greatest Conservation Need and their habitats. Texas stands to receive over \$50 million per year for activities such as research, land acquisition, conservation easements, habitat restoration and management, reintroductions, cost-share programs for private landowners, community engagement, and more. Thanks to national and local partnerships, RAWA made significant headway in the previous legislative session—including a 5-year authorization of the Act passing the U.S. House, and over one-third of our delegation from Texas cosponsoring the House bill. We will briefly highlight the need for, and potential benefits of RAWA, the latest legislative updates, and how you can work with our Texas Alliance to effectively advocate for RAWA and help acquire congressional support in Texas.

### Research Through the Lens of Camera Traps: Insights Gained from Three Secretive Snake Species

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**Abstract:** Rare and secretive snake species with low occupancy and detection rates are expensive to monitor and study using traditional box traps. Advancements in camera trap technology have provided wildlife researchers with a more efficient technique to monitor such species, like the federally listed Louisiana Pinesnake (*Pituophis ruthveni*) and Eastern Indigo Snake (*Drymarchon comperi*), as well as the Western Massasauga (*Sistrurus tergeminus*), for which a subspecies listing petition was recently withdrawn. Here, we report the results of camera trapping studies on each of these species and summarize insights gained from all studies within the context of estimating occupancy and detection parameters of rare and secretive species. Camera trapping was effective at detecting many snake species, including two of the target species with obvious implications for long-term monitoring of those populations. However, the Eastern Indigo Snake was not detected in 6,788,710 images that included 745 snake observations of 14 different snake species. This extensive survey

effort provides evidence that Eastern Indigo Snakes were not in the study area, but how many camera nondetections provide enough evidence to say that they are extirpated from that area? While camera trapping has increased our ability to detect target species, its greatest advantage might actually be increasing our ability to record non-detections and identify local extirpations. We conclude by discussing this apparent advantage and the potential for hidden biases that could emerge with automated object detection algorithms involving machine learning or deep learning approaches.

### The Effects of Urbanization on a Kin-structured Passerine, the Black-crested Titmouse

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**Abstract:** Urbanization is altering avian behavior and survival. Depending on the life-history and behavioral plasticity of the species, populations may adapt or suffer declines. To assess the influence of anthropogenic landscapes on avian home range, dispersal patterns, and body condition, we studied a kin-structured passerine, the black-crested titmouse (*Baeolophus atricristatus*, hereafter BCTI) in urban areas of San Marcos, Texas. We color-banded and monitored n = 35 urban BCTI families between 2017 - 2019. Urban BCTI home range size was (mean  $\pm$  SD) 9.11  $\pm$  5.06 ha and was positively correlated with the proportion of high urbanization (areas dominated by impervious cover) within the home range (P < 0.01). Limited dispersal (when juveniles eventually establish a territory adjacent to their father's) was negatively influenced by the proportion of low urbanization habitat (areas of non-industrial infrastructure and some impervious cover) (P = 0.02), as well as by sex (P = 0.02) and mass-rank (95% CI = [0.21 - 1.28]), indicating heavier male-biased philopatry. We conducted a similar study on a rural population of BCTI in San Marcos in 2013 - 2015. BCTI nestling and adult body condition did not differ between urban and rural populations, year, or fledge date, but adult males had a higher body condition (higher standardized mass to tarsus length ratio) (P < 0.01) in both populations. Similar to rural populations, urban BCTI construct kin-structured neighborhoods, though urban landscapes are influencing home range and the proportion of juveniles able to establish territories near family.

# The Effect of Road Mortality Mitigation Structures on Rodent Abundance and Community Composition in South Texas

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**Abstract:** Wildlife crossing structures (WCS), wildlife guards (WG), and exclusionary/guide fences are constructed to mitigate wildlife road mortalities and maintain connectivity between populations around roads. Knowledge of the effects of these structures on rodent abundance and community structures is limited and in need of further research. A primary reason for this lack of knowledge is the difficulty of non-invasively monitoring rodent populations along with a focus being placed on monitoring larger animals and species of concern. However, due to the significant interactions that rodents have with other wildlife, finding a better understanding of rodent road ecology is warranted. We evaluate whether the relative abundance of rodents increased at structures and/or if the rodent community shifted in any significant ways. Data was gathered utilizing photo booths designed specifically for rodents being deployed at WCS, WG, exclusionary/guide fencing, and control sites along a monitored section of state highway 100 in south Texas. The collected data was analyzed utilizing a PERMANOVA test to determine if significant differences in rodent species abundance exist between site categories. If differences exist between rodent populations at mitigation structure use that should be accounted for in future studies.

### Conquering A Prolific Invader- Optimal Herbicide Rates for Controlling Chinese Tallow

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Abstract: Invasive species in the U.S. cost around \$120 billion in economic damages each year, with a large portion of these costs going to control measures. One of the most difficult to control and widespread invasive plants in the southeastern U.S. is the Chinese tallow (*Triadica sebifera*) tree. Chinese tallow is hard to control due to its ability to readily resprout from stem and lateral root buds after chemical treatment with several commonly used herbicides. Additionally, peer reviewed research on the effectiveness of newer herbicide and rate that maximizes Chinese tallow mortality to reduce control costs associated with repeat chemical treatments. We randomly applied herbicide treatments using aminocyclopyrachlor, imazamox, and triclopyr ester to individual Chinese tallow trees at three study sites using basal bark and foliar applications. Here, we describe the methods used to evaluate the effectiveness of the herbicides, results, and management implications.

# Changes in Avian Community Composition and Structure Following Prescribed Thinning of Pinyon-Juniper Woodlands

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**Abstract:** Pinyon-juniper woodlands are an extensive vegetation community found throughout the western United States, where climate and land use practices have significantly increased woodland range and density. This expansion has created federal and state agency interest in tree removal and thinning with the goals of reducing fuel loads and restoring historic stand structure. Conversely, the high proportion of avian pinyon-juniper specialists included on national and state lists of concern has created a need to balance thinning targets with conservation of these woodland-obligate bird species. The objective of this study was to document avian community changes and estimate species densities following thinning prescriptions at two geographically distinct pinyon-juniper woodlands in central New Mexico (NM). We stratified our random sampling into thinned and unthinned plots and conducted point count surveys during the breeding seasons of 2018, 2019, and 2020 at a site in Lincoln County, NM and a site in Socorro County, NM. We observed 90 species across both sites, with over half determined as moderate or high conservation concern in the State of North America's Birds 2016. We will determine detection probabilities and estimate densities for species with sufficient detections (> 60), and analyze differences in richness, diversity, and community structure between strata. Our results will provide resource managers with quantified avian community response to thinning and inform conservation efforts for the benefit multiple species.

#### Frequency of Use of Irrigation Canal Bridges by Ocelots, Bobcats and Coyotes

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**Abstract:** Irrigation canals serve an important role in the distribution of water resources on cattle-managed rangelands and croplands in South Texas. However, because of the linear features of these canals, they likely restrict the movement and space use of carnivores. Often, single land concrete bridges are built in important rangeland areas to facilitate cattle pasture rotation and vehicle access. Further, these bridges likely serve as movement corridors or latrine sites to mark territorial boundaries. From June to October 2020, we use motion-activated cameras to monitor two such bridges on the East Foundation's El Sauz Ranch to determine the frequency of use by ocelots (*Leopardus pardalis*), bobcats (*Lynx rufus*), and coyotes (*Canis latrans*). We observed 189 crossing events (bobcat: 84; coyote: 65; ocelot: 40). Bobcats and coyotes had the highest frequencies of use per five survey nights and ocelots had the lowest. We documented bobcats using the bridge ends as a latrine site, but not for ocelots. All predators were captured utilizing the center-uncovered as a path. The frequent use of these irrigation canal bridges demonstrates the dual importance of important movement corridors and landmarks for latrine placements. This study can be used as a baseline for future studies examining the use of irrigation canal bridges by carnivores on working rangelands and allow for new insights on rangeland connectivity, and distribution of wildlife.

# Habitat Selection of Ocelots Using Lidar Derived Canopy Metrics

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Abstract: Many species depend on specific features on the landscape to persist and as such, characterizing the vegetation available in an area can be essential for managing these specialist species. One such habitat specialist is the ocelot (Leopardus pardalis), a medium-sized wild felid keenly adapted to dense thornshrub vegetation. Availability of this habitat type in its native South Texas has plummeted due to agriculture and urbanization, leading to population declines of ocelots and an eventual listing as federally endangered. As such, quantifying the characteristics of vegetation most suitable for ocelots has become an essential aspect to conservation of the species. Light detection and ranging (LiDAR) differs from other remote sensing techniques in its ability to penetrate through the canopy surface and describe the inner structure of the vegetation. Using LiDAR, we quantified the overall canopy height (m) and the percentage cover at 1 m increments. We captured 8 ocelots on the East Foundation's El Sauz Ranch in Southern Texas from 2017 -2020 and fitted individuals with global positioning system (GPS) collars that recorded locations every 30 minutes. We used a step selection function to determine selection of canopy height and cover by ocelots. By combining accurate, fine-scale measurements derived from LiDAR data with high-frequency GPS locations, a more detailed understanding of habitat selection can be obtained. With a greater understanding of habitat use patterns, conservation strategies can be tailored to target the specific characteristics of vegetation that ocelots require by preserving existing patches and reforesting previous habitat.

# Determining the Effectiveness of Wildlife Exits Along a South Texas Highway

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**Abstract:** Movement is a key component of survival for many species. Animals move to find resources, mates, and defend territory. This need for movement often causes wildlife to cross heavily trafficked highways, resulting in road mortalities. In Cameron County, Texas, wildlife crossings, gates, guards, and continuous fencing along State Highway (SH) 100 are being used to mitigate these wildlife road mortalities. In February 2019, the Texas Department of Transportation installed ten wildlife exits along an 11.9 km stretch of SH 100 between Los Fresnos, TX and Laguna Vista, TX in an effort to reduce wildlife road mortalities for species that cross onto the highway and need an option to exit the right-of-way. In order to measure the effectiveness of these exits, we installed two cameras at each of the ten exits, one on the roadside and one on the habitat side, to capture animal activity. One of the primary goals of this study is to determine which mitigation structures animals are using to enter the right-of-way, as well as the percentage that are crossing back into the habitat using a wildlife exit. Results of this study will provide information on the effectiveness of these novel structures. This will be useful in the development of future mitigation throughout highly trafficked areas to optimize wildlife exit design and placement and ensure maximum usage of each structure.

# Influence of Woody Vegetation Patterns on Overwinter Spatial Ecology and Demographics of Scaled Quail

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Abstract: Scaled quail (hereafter SCQU, Callipepla squamata) populations have declined precipitously over the past four decades, with several factors including habitat loss and fragmentation, and increased predation, contributing to their decline. However, the underlying mechanisms driving population trends are still poorly understood. Increases in woody vegetation [e.g., Mesquite (Prosopis glandulosa) and Juniper (Juniperus spp.)] are speculated to be the primary driver of population declines across most of their geographic range. Arid land management issues concerning the rate of change and geographical extent of woody vegetation encroachment are, although globally recognized, yet to be systematically quantified. Importantly, with the advent of GIS and UAV (Unmanned Aerial Vehicle) technology, a landscape analysis approach can be used to determine changes in landscape patterns and how these changes influence SCQU demographics between populations, as well as analyze how these landscape patterns contribute to habitat use and selection. We monitored SCQU on four study sites (i.e., ranches), two with stable populations and two with intermittent populations throughout the Texas Plains ecoregions using VHF telemetry and GPS backpack data loggers. We combined these data with real-time, high resolution UAV imagery to establish Land Use Land Cover (LULC) classes and assess core area, home range and overwinter habitat selection at multiple spatial scales. Our objectives were to: 1) assess and compare grassland and woody cover; 2) assess and compare home range size; and 3) assess and compare habitat selection at 4 Orders (ranch, home range, core area, fine scale) between intermittent and stable populations.

# Are All Coyotes Equal?

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**Abstract:** In urban and suburban areas, management of coyotes is usually reactionary: complaints that come through our portals are recorded in different systems, evaluated, and an appropriate response is determined. We know that coyotes can utilize all available habitat in urban and suburban areas. If complaints are distributed differently from known populations throughout a city, we may conclude that not all coyote populations are being managed equally. Additionally, it could indicate that not all human communities are receiving the same services. We investigate and compare patterns of coyote sightings through community science portals, motion-activated cameras along an urban to rural gradient, and public sightings and complaints to city staff in Austin, Texas, to determine how human communities may influence coyote management.

#### Population Trends of Land Birds on East Foundation Ranches: An Analysis of Ten Years of Data

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**Abstract:** Bird surveys have been conducted on East Foundation properties in South Texas since 2010 to document species occurrence, richness, and abundance. Both breeding and non-breeding bird surveys have been conducted on San Antonio Viejo, El Sauz, and Santa Rosa ranches located in Jim Hogg, Willacy, and Kennedy counties respectively. Non-breeding bird surveys were conducted from August-April using transect surveys. During May and June, breeding bird point count surveys were conducted. Typically, El Sauz had the highest species richness (68 species) despite not being the largest of the three ranches. This is likely due to its proximity to the coast. However, Santa Rosa has surpassed El Sauz in bird abundance (4405 individuals vs 2151 individuals). The East Foundation properties have a unique mix of avian species and vast diversity of landscape types due to their varying locations. Both Santa Rosa and El Sauz ranches are a part of the Gulf Coast Prairies and Marshes ecoregion, and San Antonio Viejo Ranch lies in the South Texas Plains ecoregion. Of these three ranches, Santa Rosa contains the most diversity as far as avian habitat. Vegetation strongly influenced bird abundance, distributions, and dynamics, which is why it is important to assess how vegetation structure and environmental changes are impacting species in long-term data sets. Large relatively undisturbed land holdings, like the East Foundation properties, provide scientists with a unique opportunity to study population trends on a scale that is not available elsewhere.

#### Movement Strategies and Behavior of Nilgai Antelope

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Adalberto A. Pérez de León, USDA Agricultural Research Service, Knipling-Bushland U.S. Livestock Insects Research Laboratory and Veterinary Pest Genomics Center, Kerrville, Texas, USA Abstract: Wildlife play an important role in the emergence of livestock diseases and can complicate disease management efforts. One of the most significant tick-borne diseases of livestock worldwide is bovine babesiosis, which is at risk of spreading from wildlife hosts to cattle. The Southern cattle fever tick (CFT), Rhipicephalus (Boophilus) microplus, is a vector of the pathogens that cause bovine babesiosis in cattle. Nilgai antelope (Boselaphus tragocamelus) are an exotic ungulate with over 30,000 free-ranging individuals in South Texas. Nilgai are a competent host for CFT. Nilgai infested with CFT can complicate eradication efforts because their ecology involves long-distance movements. The goals of this study were to 1) assess movement strategies of individual nilgai, 2) estimate home range sizes at different temporal scales (monthly, seasonally, and overall), and 3) calculate average movement metrics of nilgai to assess activity patterns and space use. We used hourly locations from 30 GPS-collared individuals to help understand nilgai movement behaviors. Movement strategies included dispersal (6.7%), use of seasonal ranges (23.3%), nomadic movements (13.3%), and resident (56.7%). Two young females made long-distance movements, traveling ~40 km from their initial capture location. Overall, nilgai had large and highly variable home ranges: annual median home range estimate for females was 593 ha (105-1,545) and for males 937 ha (221-1,602). Peak nilgai activity occurred during the crepuscular hours, and average movement for females was 126 m/hr and for males 152 m/hr. Large home ranges and long-distance movements by nilgai challenge the sustainability of CFT eradication efforts in the U.S.

# Immune System Variation in Nilgai Antelope

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**Abstract:** Nilgai antelope (*Boselaphus tragocamelus*), an exotic species from India, has flourished in South Texas since their introduction in the 1930's. Nilgai, a large bovid species, are a suitable host for the Southern cattle fever tick (CFT), *Rhipicephalus (Boophilus) microplus*. The presence of CFT in Texas threatens cattle herds with the transmission of bovine babesiosis, a disease which can be devastating to livestock. Nilgai have the potential to spread ticks during long-distance movements and have been implicated in recent outbreaks of CFT in South Texas. Genetic diversity can determine how well a population responds to pathogens and disease. Populations founded by few individuals, such as nilgai in Texas, often have low genetic diversity, possibly making them more susceptible to pathogens. The major histocompatibility complex (MHC) is responsible for the recognition of pathogens and is one of the body's first immune defenses. We

characterized genetic diversity of the nilgai MHC to index immune system diversity. We then compared tick loads to the immune system diversity of nilgai captured in Cameron County, Texas. Nilgai have low genetic diversity compared to other bovid species, with only 7 unique alleles in the population and a heterozygosity of 61.5%. Tick loads between individual nilgai varied independent of their genetic diversity at the MHC. Our results suggest that there is no relationship between MHC diversity and tick burdens in South Texas nilgai. Continued research on the genetic diversity and immune response of nilgai will provide information on nilgai-tick interactions to aid in future management decisions.

# Cover Crop Considerations for Rangeland Restoration

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**Abstract:** Worldwide, healthy rangelands provide a host of ecosystem services such as nutrient cycling, carbon sequestration, and aquifer recharge. This land and the services it provides are invaluable to Texas. Over half of Texas's land area is considered rangeland and is managed for water resources, food production, recreational activities, energy extraction, and habitat for wildlife. Unfortunately, rangelands are susceptible to damage when disturbed. We are studying restoration strategies on a recently-installed pipeline in south Texas. Consideration was given to maintain the soil layers by double ditching. Although double-ditching conserved the topsoil, the surface was left bare and vulnerable to undesirable plant species such as old world bluestems (*Dichanthium spp.*) and Bermuda grass (*Cynodon dactylon*). In agricultural settings, farmers combat this issue by planting an annual cover crop between cash crops. Cover crops not only reduce weed encroachment, but also protect soil integrity and can sometimes add nutrients to the soil. In this experiment, we are evaluating the use of a cover crop with or before seeding our "cash crop" of native grasses. Our research questions are: (1) should native grasses be planted simultaneously or separately with a cover crop, and (2) is a grass or legume cover crop enhances early grass emergence, an effect that is stronger where soils may have experienced more compaction during pipeline construction.

# Static Scaling Between Body Mass and Antler Length in Black-tailed Deer

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Abstract: Static scaling relationships are useful for estimating relationships between antler size and body size in deer of a particular age or a range of ages (usually as adults). We tested the effect of female removals on the scaling relationship between male antler length and body mass in black-tailed deer (*Odocoileus hemionus columbianus*) from data collected during a 19-year study at Hopland Research and Extension Center, California. The lower density group represents cohorts in which female black-tailed deer were culled. The higher density group represents cohorts when there was no cull of female deer. We used a simple linear regression to determine the scalar between body mass and antler length. Often single predictor models of static scaling relationships are depicted by the power function equation: , where Y is our response variable, *a* is our intercept, X is our predictor, and *b* is our scalar. Considering the different dimensions of body mass and antler length *b* should be 0.33. We found that antler length of pre-culled deer did not scale differently with body mass than culled deer. Hence, a single scaling relationship between body mass and antler length was sufficient. Our findings indicate that body mass and antler length scale isometrically (b = 0.92, 95% CI = 0.71-1.13). The scalar (slope) was nearly three times higher than expected. This study revealed the significant energy investment that black-tailed deer direct towards antler growth.

# Tracking Eastern Red Bat Movement Response to an Ultrasonic Acoustic Deterrent in Flight Cage Trials

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Abstract: Wind energy is an essential part of combating climate change, but it is not without risks. Bat fatalities at wind turbines due to blade strikes are an unintended consequence of this renewable energy source. Wider implementation of minimization strategies to reduce bat fatalities is likely if effectiveness is consistently proven across species. Ultrasonic acoustic deterrents (UAD), designed to create unattractive air-space by jamming echolocation, permit normal operation of wind turbines, but have had variable success among species. Variability may be due to higher frequency sounds attenuating faster or due to bats not encountering their characteristic frequency range at greater distances from the UAD. Our broad objective was to maximize species effectiveness of a commercially available UAD manufactured by NRG Systems. We released bats into a 60-m-long outdoor flight cage located in San Marcos, Texas, USA and tracked flight during three, fourminute trials of various sound emission frequencies: 20-32 kHz (low), 38-50 kHz (high), and 20-50 kHz (default), interspersed by four-minute control periods with UADs powered off. We quantified time bats flew within demarcated distances using thermal cameras and compared differences among treatments. We conducted trials in July-October 2020. Preliminary results for a subset of Lasiurus borealis (n =20) trials indicate bats are predominately flying in areas furthest from the UAD during the high frequency treatment. However, the low frequency treatment displayed similar results. We are analyzing trials for other species from the fall season and continuing trials in spring 2021 to assess whether seasonal differences exist.

Influence of Juniper on Montezuma Quail Habitat Use in Texas

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Abstract: Montezuma quail (Cyrtonyx montezumae) inhabit oak-juniper (Quercus-Juniperus spp.) woodlands throughout Mexico and the southwestern US. In Texas, Montezuma quail occur in the Edwards Plateau and Trans-Pecos, 2 ecoregions with contrasting juniper patterns. Ashe juniper (Juniperus ashei) dominates in the Edwards Plateau and has been increasing, whereas alligator juniper (Juniperus deppeana) is a co-dominant in the Trans-Pecos and appears stable. Interestingly, Montezuma quail are rare in the former but common in the latter. Our objectives were to 1) compare Montezuma quail habitat use at a micro- (16-m) and macro- (350m) scale between ecoregions, and 2) quantify the influence of juniper on key features of Montezuma-quail habitat (grass height, grass cover, forb cover, and forb species richness). We collected vegetation data at used (n = 32) and random (n = 72) locations at the micro-scale in the Edwards Plateau and Trans-Pecos (n = 30)and n = 60, respectively). We also collected macro-scale data (juniper cover and mean patch size) at these points in the Edwards Plateau. Montezuma quail avoided areas of Ashe juniper with >23% cover in the Edwards Plateau but selected areas of alligator juniper with >18% cover in the Trans-Pecos. Additionally, Ashe juniper cover had a significant, negative influence on herbaceous features, whereas alligator juniper exerted little to no influence. Creating habitat for Montezuma quail in the Edwards Plateau involves creation of small patches of Ashe juniper  $(1-9 \text{ m}^2)$  that possess low amounts of cover (<23%), while management in the Trans-Pecos requires a site-specific assessment.

# Quantifying Spatio-temporal Variability in Thermal Landscapes Through a Fiber-optic Distributed Temperature Sensing System: Implications for Thermal Ecology Research

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**Abstract:** Environmental conditions have long been understood to be fundamental in structuring ecological patterns and processes across multiple spatial and temporal scales. More specifically, thermal conditions (i.e., temperature) can dictate how organisms perceive and use their environment, and thus can influence patterns of habitat use, population dynamics, and biotic interactions. However, thermal conditions are highly variable across spatio-temporal scales, and an understanding of fine scale variability in thermal conditions has only recently received attention as an important element of biological conservation. Fiber-optic distributed temperature sensing (FO-DTS) systems offer a unique opportunity to quantify thermal landscapes at fine spatio-temporal scales across a continuous fiber-optic cable, thus providing temperature measurements along a continuum rather than at discrete points in space or time. We provide examples of both terrestrial and aquatic applications of this system to elucidate its use across multiple ecological disciplines. For the terrestrial application, we highlight the changes in thermal patterns that can occur in relation to woody encroachment within temperate grasslands in the southern Great Plains. With regard to the aquatic application, we provide
an example of using FO-DTS to collect fine-scale thermal data within a stream to characterize patterns of temperature-driven selection by stream fishes. Our results will illustrate how FO-DTS systems may be implemented in ecological research to better understand spatio-temporal variability of thermal conditions and we will provide insight into the future use of such systems in ecological studies while highlighting potential drawbacks and limitations.

## A Resident Raptor: A Review and Empirical Study of the White-Tailed Hawk in Texas

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**Abstract:** The white-tailed hawk (Geranoaetus albicaudatus) is a common raptor in Central and South America and the southern tip of the USA. Only one of the three subspecies, G. a. hypospodius, resides in the northernmost extent of its range in coastal Texas. The white-tailed hawk is one of North America's least known bird of prey, and their life history and population demographics have received little empirical attention. Historically, the northern distribution of white-tailed hawks in America was described as including the American Southwest and that the lack of fire on the landscape in the end of the 19th century is thought to have resulted in range contraction while an increase in pesticide use in the mid-20th century is believed to have resulted in a species decline. Despite insufficient data and lack of reliable estimates, current beliefs are that population numbers are stable or increasing in south Texas. Previous studies indicate that the whitetailed hawk is profoundly sensitive to nesting disturbance and will quickly flee when approached. This discussion will cover a review of current literature, gaps in the knowledge, and an introduction to an ongoing field study aimed at quantifying the nesting sensitivity of the white-tailed hawk subspecies during the breeding season in south Texas.

# Monitoring Dispersal and Habitat Associations of Two Threatened Primates Along a Conservation Corridor in Western Ecuador

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Abstract: The Chocó rainforest in coastal Ecuador is an internationally recognized biodiversity hotspot but has been more than 95% deforested, 50% of which has occurred in the past 25 years. Converting forests into agriculture not only reduces habitat density for several wildlife species, but also isolates remaining habitat patches. Promoting habitat connectivity among patches has proven to be a successful conservation strategy. Recently, the Jama-Coaque Reserve in Ecuador has established the Three Forest Conservation Corridor (TFCC) in collaboration with local towns, Reserva Bosque Seco Lalo Loor, and the International Union for Conservation of Nature Netherlands. To inform management decisions, a better understanding of threatened species' habitat associations throughout the corridor is required, such as the two threatened primates (Cebus aequatorialis [Ecuadorian capuchin] and Alouatta palliata aequatorialis [Ecuadorian mantled howler]). We will assess distribution of these two primate species across the TFCC and the influence of habitat type (agriculture and 3 forest types [cloud, dry, and wet]) and characteristics (vegetation structure and landscape composition) on activity. To monitor the activity and distribution of these primates, we are using twenty acoustic monitoring devices and trail cameras that have been systematically placed in the canopy of the TFCC. Thus far, the presence of C. aequatorialis has been documented in all 3 forests, whereas A. p. aequatorialis has been documented in forest and agriculture habitats. We currently are conducting dynamic occupancy models to examine the influence of habitat characteristics on activity. Results will be used to prioritize future land acquisition and restoration of the TFCC.

## Convolutional Neural Network Land Cover Classification for Wildlife Habitat in South Texas

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**Abstract:** Recent advances in remote sensing have paved the way to improve classification approaches for land cover through artificial intelligence algorithms. New approaches include deep learning, machine learning, and artificial intelligence. Deep learning is a subset of machine learning, which uses artificial intelligence to predict land cover types. Deep Learning is a methodology that relies on multiple layers of nonlinear processing for feature identification and patterns. By using deep learning approaches, we can potentially improve classification processing time and develop a higher land cover classification accuracy. The goal of our research is to develop deep learning workflows that can be used to classify NAIP imagery, sentinel imagery, UAV imagery in South Texas. Our specific objectives are to 1) create classification models for South Texas and 2) Evaluate the accuracy of our image classification algorithm. We are using ArcPro for creating training sets (image chips) these training sets are then imported into ERDAS Imagine to incorporate them into a spatial model. This spatial model will use a random forest to delineate training samples to a class and create an output classified image. By achieving these goals, we hope to be able to perform faster image processing and highly accurate classified imagery for study areas in South Texas rangelands. This will provide an important baseline for range and wildlife habitat studies and improve models such as habitat suitability models, habitat use and preference models as well as land cover change analysis.

### Fine Resolution Mapping of Houston Toad Breeding Pond Habitat

### Amie Treuer-Kuehn, TPWD, Austin, Texas, USA

**Abstract:** The federally endangered Houston Toad (*Bufo (Anazyrus) houstonensis*) is declining due to climatic changes, habitat loss or destruction, and anthropogenic habitat alteration. This species requires a specific breeding habitat of pine and oak woodlands and savannas, specific soil geology, and shallow or ephemeral ponds. The Landscape Ecology Program at Texas Parks and Wildlife (TPWD) developed a high-resolution map of ephemeral and permanent wetlands aimed at supporting the conservation and restoration of *B. houstonensis* breeding habitat. To map potential breeding habitat, available LiDAR and high-resolution digital elevation models within *B. houstonensis*' geographic range were acquired and analyzed to identify sinks, using ERDAS Imagine and ArcGIS Hydrology Toolset. Also, an object-based image analysis was performed in eCognition to extract bodies of water over 200 m<sup>2</sup> from satellite imagery to determine which landscape sinks contained water during wet years. Ecological Mapping Systems, soil types, hydrological features, as well as pond edge slope were used to produce a map of potential breeding habitat, using randomForest in R 4.0.2. Both information gaps and conservation actions identified in the Texas Conservation Action Plan are addressed by this mapping project including gaining information regarding ponds within this species historic range and locating potential areas where landowner incentives would enhance connectivity among sites.

#### Comparing Nest Materials for Black-crested Titmouse in an Urban Gradient

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**Abstract:** ABSTRACT: Anthropogenic debris, such as plastic strings and cloth materials that are persistent in environments, occur in the nests of many birds, especially in more urbanized areas. This can be problematic because birds often ingest and become entangled in plastics and other fabricated materials thus, our objective was to assess the proportion of anthropogenic materials in nests of the Black-crested Titmouse (Baeolophus atricristatus) along an urban gradient in San Marcos, TX. We collected 45 Black-crested Titmouse nests from nest boxes previously installed across the city in areas of varying degrees of urbanization. In order from rural to urban, we collected nests from four main locations: 21 nests on an operating ranch, 5 in local parks, 12 in residential areas, and 7 on the main campus of Texas State University. We separated and weighed artificial and natural materials, allowing us to compare and estimate the proportion of the total weight versus the weight of anthropogenic material for each nest. We compared proportions among nests in each of the four locations using regression analyses. Results indicate that there is a greater proportion of plastic in urban areas compared to rural (P = 0.03). Nests on campus, the most urban area, were 1.6-1.9 times lighter than other nests (P = 0.01). Though Black-crested Titmouse populations appear stable in urban areas, we suggest further research to understand the influence of anthropogenic materials within nests on reproductive success.

## Long-term Multi-scale Habitat Selection of an Endangered Carnivore: Ocelots in South Texas (1982-2017)

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Abstract: Evaluating temporal trends in habitat and behavioral responses is critical for conservation. However, long-term habitat selection studies are rare. We used a 35-year dataset (1982-2017) to assess resource selection and functional responses by an endangered carnivore and habitat specialist, the ocelot (Leopardus pardalis), and examined the importance of private lands for conservation. We used satellite imagery of South Texas to map change in availability of woody cover, which is critical to ocelots but decreased in availability due to anthropogenic development. We applied resource selection functions at the landscape scale and functional response models at the home range scale for 78 ocelots. Ocelots used areas with a higher proportion of woody cover ( $\geq 0.48$ ), and areas farther from high-traffic roads (0.14-14.82 km) compared to average availability (0.42 and 4.20 km, respectively) at broader scales. Private lands contained 89% of the landscape predicted to contain high-quality habitat over time, indicating their importance for ocelot conservation. We did not find evidence that ocelots demonstrated strong functional responses to habitat cover or road variables at finer scales, but demonstrated behavioral patterns expected for a habitat specialist. Our assessment of functional responses demonstrated that higher order selection processes likely truncate resource gradients within home ranges such that ocelots generally exhibited proportional habitat use. Multiscale habitat use is essential for assessing animal-habitat relationships and developing conservation recommendations. We described long-term ocelot habitat selection with respect to land cover and roads across multiple scales for the first time, which can serve as an example for future studies.

### Morphological Variation of Cranial Elements in the Western Massasauga

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Abstract: Understanding the correspondence between ecological and morphological variation across populations provides insight into both taxonomic distinctions and the functionality and performance of traits in different environments. To examine morphological variation of cranial and soft tissue elements across the geographic distribution of Western Massasauga (Sistrurus tergeminus) populations, and to examine the differences between its two subspecies, we performed microcomputed tomography (micro-CT) scans of 129 museum. We developed landmark schemes of dorsal and left lateral skull orientations, then used Procrustes superimposed landmarks to translate, rotate, and scale the schemes. We ordinated the landmarks with a principal component analysis and used linear discriminant functions to test the reliability of taxonomic assignments. We also scored eight aspects of squamation for all individuals and made 15 additional soft-tissue morphology measurements. Preliminary analyses of the skull in the dorsal view showed that PC1 (42.9% explained variance) represents an axis of nasal and premaxilla elongation and braincase, orbital, and occipital region compression, potentially associated with among-population dietary differences. In the skull lateral view, PC1 (21.4% explained variance) represents the relative height of the skull as well as the relative length of the quadrate. These changes directly affect both the possible angles and the proportions of the lever system in the jaw and should therefore have a direct effect on the prey sizes available to an individual. Preliminary results for soft-tissue morphology show most variables differ between individuals based on the different subspecies designations, where discriminant functions identified subspecies with 85.2% and 91.2% accuracy, respectively.

## Ocelot and Bobcat Occurrence in a Hunted Exotic Game Ranch

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**Abstract:** The endangered ocelot (*Leopardus pardalis*) is found in two isolated populations of <80 individuals in South Texas. The Refuge Population is located in eastern Cameron County, and the much larger Ranch Population is located on private rangelands in Willacy and Kenedy counties. The size and distribution of the Ranch Population is being evaluated, and working with landowners to conduct camera monitoring can provide needed information on the status of the population. From 2020 to 2021, we used camera traps on a confidential ranch in southern Kenedy County to assess ocelot presence and bobcat (*Lynx rufus*) coexistence within a hunted exotic game ranch. We determined the number of photographic events, camera trap success rates, and diel activity patterns for large and medium-sized mammal species. Species richness was also calculated for each camera station. Ocelots were detected during the survey, and their number and distribution on the study site were estimated. The previously undocumented presence of ocelots on the ranch contributes to a growing understanding of the status and distribution of the Ranch Population and refinement of its range and abundance estimates. These findings also demonstrate the importance of private lands where

extensive habitat tracts are largely shielded from development, thus benefitting ocelot and wildlife conservation in South Texas.

# Habitat Selection and Nest Success Response of Lesser Prairie-Chicken to Prescribed Burning and Grazing Treatments

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Abstract: The lesser prairie-chicken (Tympanuchus pallidicinctus) is an iconic endemic species of the North American Great Plains. Historically, interaction of wildfire and grazing by free-ranging herbivores directed plant community composition and created heterogeneous mosaics of habitats that met the annual lifecycle needs of lesser prairie-chickens (LEPC). Alteration of these natural disturbances through anthropogenic causes, including row-crop agricultural expansion, continuous domestic livestock grazing regimes, fire suppression, wind-energy development, hydrocarbon exploration, urban expansion, coupled with natural influences, such as invasive species encroachment and severe droughts, have contributed to fragment and degrade historic LEPC habitats. Severe declines of LEPC occupied range and population abundance have increased the importance of improving habitat management efficacy and efficiency to optimize remaining available habitats and sustain existing populations. In eastern New Mexico, LEPC populations occupy the Sand Shinnery Oak (Ouercus havardii) Prairie Ecoregion; dominant vegetation consists of sand shinnery oak, sand sagebrush (Artemisia filifola), and mixed- and shortgrass assemblages. While habitat selection and nesting success of LEPC in eastern New Mexico have been documented; vegetation community composition and LEPC response to variation in prescribed-fire and grazing regimes have not been quantified. We used GPS satellite telemetry transmitters to monitor nesting success and habitat selection response by female lesser prairie-chickens to prescribed fire and grazing treatments. Additionally, quantification of plant community composition, invertebrate assemblage and biomass, and standing herbaceous biomass, response to 5 spring prescribed-fire treatments, performed 2016-2020, and post-fire grazing treatments are being conducted to further analyze lesser prairie-chicken habitat selection and nest success response.

#### Characterization of Desert Bighorn Sheep Microbiomes in Texas

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**Abstract:** Bighorn sheep (*Ovis canadensis*) inhabit the western USA, northwestern Mexico, and some of southwestern British Columbia and Alberta. Many herds have encountered die-off events thought to be caused by a group of bacterial species referred to as the pneumonia complex, which are transmissible to bighorn sheep from domestic sheep (*Ovis aries*) and goats (*Capra hircus*). Transmission may also occur from aoudad (*Ammotragus lervia*), a non-native invasive species in Texas that are sympatric with desert bighorn sheep (*O. c. nelsoni*) in the Trans Pecos Ecoregion. Microbiome dispersal occurs among other species through social behavior and shared resource and may be a mechanism by which pathogens and other diseases are transmitted between aoudad and bighorn sheep. However respiratory microbiomes are unknown for bighorn sheep and aoudad in Texas. Characterizing healthy microbiome composition is important to understanding transmission risks as well as the baseline from which diseased state microbiomes depart. While studies have shown some members of the pneumonia complex are often found in healthy bighorn sheep, it is unknown how their presence influences overall microbial community structure. Here, nasal and throat microbiomes of bighorn sheep and aoudad are being characterized for populations across Texas to help inform baseline information for disease surveillance and response for bighorn sheep in Texas.

### Habitat Selection of Aoudad, Desert Bighorn Sheep, and Mule Deer in a Co-occupied Landscape

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**Abstract:** Desert bighorn sheep (*Ovis canadensis*) and mule deer (*Odocoileus hemionus*) have experienced widespread declines in distribution and abundance in the Texas Trans-Pecos. While translocation efforts have successfully revived these species, the ongoing expansion of aoudad (*Ammotragus lervia*) populations across the region has raised concern for native species restoration. However, little is known regarding the implications of aoudad invasions on recipient ecological communities. We initiated this study to fill gaps in the knowledge of aoudad's role in desert bighorn sheep, and mule deer occupied landscapes. Specifically, the objectives of this study are to investigate overlap in habitat use and selection between the three species and how these dynamics change spatiotemporally. We used satellite collars and integrated step selection analyses to examine movement and habitat associations of 39 desert bighorn sheep, 48 mule deer, and 40 aoudad in the Van Horn Mountains, Texas. Results reveal similarities in habitat associations between the three species across broad spatial and temporal scales. This data suggests aoudad may present competitive pressure to desert bighorn sheep and mule deer in the Texas Trans-Pecos.

Scaling Habitat Management for Northern Bobwhites and Grassland Birds: The First 5 Years of the Oaks and Prairies Joint Venture's Grassland Restoration Incentive Program (GRIP)

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Abstract: Fine scale, individual property, habitat management has been the primary focus of northern bobwhite (Colinus virginianus), hereafter bobwhite, management for years, and continues to be touted to this day. Research has indicated that large, quality, native grasslands result in increased bobwhite survival versus "traditional" weedy fencerow management. The Oaks and Prairies Joint Venture (OPJV) was formed in 2008 as a public-private partnership of agencies and organizations working across traditional boundaries that focuses on reversing declines of bird populations. The OPIV's major focus is on grassland-obligate species and their respective habitats. OPJV is one of 18 bird habitat JVs in North America and one of five within Texas. To improve grassland bird habitat at regional scales, OPJV designed the Grassland Restoration Incentive Program (GRIP) to assist landowners with habitat improvements. Since inception in 2013 GRIP has treated 106,000 acres on private lands in Texas and Oklahoma, with the goal of providing quality grassland bird habitat on treated acres for a minimum of 5 years. All acres are contained within OPJV partner-selected focal counties to limit the "shotgun" conservation approach and concentrate efforts as well as resources within targeted areas where conservation practices are most likely to improve grassland bird populations. Point count surveys are conducted every year to monitor grassland bird populations. To date, over 4,500 surveys have been performed in Oklahoma and over 20,000 in Texas. We are currently soliciting assistance in analyzing this data to evaluate our focal area effectiveness.

### Notes of the Natural Recolonization and Dispersal of American Black Bears in Northeast Texas

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**Abstract:** In the four years between 2016 and 2020, American black bears (*Ursus americanus americanus*) have increased their movements into and through northeastern Texas. The uptick in bear activity has centered in counties along the Red River and the eastern border. During the last four years, in Bowie and Cass County, alone eighteen transient bears sighting locations have been verified by Texas Parks and Wildlife Department (TPWD) personnel, almost half of those in the spring of 2020. Recent observations of black bear movements through northeast Texas seem to coincide with increases in bear populations in Arkansas and Oklahoma. Herein, increases of and general locations for the most recent north Texas bear observations are discussed. A review of general spatial statistics of confirmed bear locations in East Texas and analysis of data for clustering and emerging hot spots is also included. Finally, future research to identify possible corridors for future bear movement and recolonization in East Texas is suggested.

# Assessing Temperature Impacts on Nest Site Selection by Scaled Quail (*Callipepla squamata*) Hens in the Southern High Plains of Texas

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Abstract: Scaled Quail (Callipepla squamata) in the Rolling and High Plains have been steadily decreasing since the mid-1980's. Several factors are responsible for population declines, with habitat composition and fragmentation likely being the most influential. Insufficient or inadequate vegetation and cover at nests contribute to greater than normal temperatures and can result in nest failures at sustained temperatures (>4 hr) over 37.5° C, which are lethal to incubating embryos. We captured Scaled Quail hens on a ranch in Potter County, Texas and monitored nests via radio-telemetry. We placed Ibutton dataloggers at each nest and at a paired random site. Temperature was recorded in 30-minute increments during 2-week time intervals. We assessed differences in several temperature covariates (minimum, mean, and maximum temperature, as well as the number increments where temperature exceeded 37.5° C between nests and random sites) using a binomial mixed effects model with nests versus random sites as the response variable and hen identification as the random effect. Minimum temperatures did not differ between nests and random sites whereas mean, maximum, and lethal temperatures differed (P < 0.01). On average, mean and maximum temperatures were 3° C and 8.6 °C cooler at nests versus random sites, respectively. Additionally, on average, there were 64 fewer 30-minute increments of lethal temperatures at nests versus random sites during the 2-week interval. Management objectives should focus on the reduction of mesquite and other habitat practices that increase herbaceous-shrub cover and support cooler temperatures at nest sites.

## Estimating Economic Potential of the Hunting Industry Based on Four Ungulate Species in the Trans-Pecos, Texas

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**Abstract:** With the rise in urbanization, it has become important to realize the economic value of industries involving the outdoors to help us determine areas of conservation need. Hunting can be critical to a region's economy, particularly in rural locations. The purpose of this study was to determine the economic impact hunting has on the Trans-Pecos region of Texas. Focusing on four native big game species, including pronghorn (*Antilocapra americana*), white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), and desert bighorn sheep (*Ovis canadensis mexicana*), we created a spatially- explicit model representing the economic potential of hunting on privately owned land. We gathered population estimate data of each species from Texas Parks and Wildlife Department (TPWD) wildlife surveys, and expert TPWD biologists were consulted to determine the potential economic hunting potential across species management units. Landowner privacy was considered by associating the values with an entire county, wildlife management unit, or grid of 1 km<sup>2</sup>. These maps display a spatially- explicit model demonstrating the economic potential of hunting for the Trans-Pecos region. By identifying which regions have higher economic potential, we determine areas of higher conservation concern based on economic potential from hunting which can be used as a tool when considering the impacts of future development.

### Implementing and Evaluating a Sustainable Bobwhite Harvest Prescription

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**Abstract:** The current harvest rate recommendation for northern bobwhites (*Colinus virginianus*) in South Texas is 20% of the autumn population inclusive of crippling loss. This recommendation is based on population simulations of demographic data and still requires empirical testing. The goal of this project is to implement a 20% harvest and compare temporal trends between a hunted and non-hunted population. The study is taking place on East Foundation property in Jim Hogg County, TX. We have designated a hunted area (6,118 hectares) and a non-hunted area (4,376 hectares). Periodic bobwhite density estimates (i.e., November, mid-December, late-January, and March) are obtained using line-transect distance sampling from a helicopter platform. According to our November density estimates, the 20% harvest quota was 422 bobwhites in 2018-2019 and 852 bobwhites in 2019-2020. Hunting cooperators achieved the desired quotas in both the 2018-2019 (N = 59 hunts) and 2019-2020 (N = 74 hunts) hunting seasons. Spring densities were similar on hunted and non-hunted area and 0.39 quail per hectare (95% CI = 0.29-0.53) on the non-hunted area and 0.32 quail per hectare (95% CI = 0.25-0.41) on the non-hunted area. Preliminary results indicate that quail harvest may be a sustainable element of quail management in South Texas.

### Assessment of Genetic Variation in Aoudad: Implications for Disease Transmission

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Abstract: With documented reports of intentional human-mediated translocations of aoudad (Ammotragus lervia) into various regions of Texas, it appears the African exotic was introduced multiple times. Two mitochondrial markers (cytochrome-b, cytb; displacement loop, D-loop) and one nuclear gene (prion protein exon 3 gene, PRNP) were used to assess genetic variation to provide disease risk surveillance among populations in Texas as well as California and New Mexico. We developed genetic profiles of mitochondrial markers (cylb and D-loop) in 90 individuals of aoudad in the southwestern U.S. and identified two disparate populations of aoudad with genetic divergences of 5.13% and 12.8%, potentially indicating the importation of two different subspecies exclusively within Texas. A comparative study focused on two subspecies of aoudad naturally occurring in Algeria may allow identification of the two subspecies in Texas as A. l. lervia and A. l. sahariensis, supported phylogenetically with Bayesian and Maximum Likelihood methodologies. Interestingly, no variation in PRNP (0% genetic divergence) in individuals of both putative subspecies indicated aoudad have the genotype of A136, R154, and Q171, the most common genotype among domestic sheep and goats. Further, the PRNP genotype displayed by both potential subspecies shows moderate resistance to scrapie and sequence similarity to Texas desert bighorn sheep (Ovis canadensis). To date, it is unknown if the two mitochondrial genetic profiles of aoudad have a greater disease-risk potential. However, given the similar habitat requirements and sympatry of both species in the Trans-Pecos Region of Texas, acudad may serve as a disease vector to bighorn sheep.

#### Indexing Fall Abundance Through Spring Call Count Surveys for Landowners

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**Abstract:** Spring call counts are an index of quail population abundance commonly used by landowners because they are easy to implement. Indices must be reliable predictors of true population abundance to be valuable. Landowners have limited resources, so it is important to use time efficiently, yet accurately gauge abundance. We wanted to determine how many call count markers and counts per marker per year are needed to accurately predict true fall abundance. We conducted 8 spring call count surveys per year during May and June at 25 listening points spaced approximately 1.5 km apart on the 1900-ha Rolling Plains Quail Research Ranch in Fisher County, Texas from 2011-2018. We estimated true abundance from band-recapture data collected during annual fall trapping sessions. We correlated full effort spring call counts with fall abundance and found a high level of correlation (r = 0.83). We randomly sampled from the full spring call count dataset varying the number of listening points (4 - 25) and counts per year (2-8). We then correlated each sample dataset with true fall abundance. We found that even at the lowest effort (i.e., 4 listening points and 2 counts) there was no difference in correlation compared to full effort (r = 0.82). The lowest effort requires just over 5 hours of surveying time. Our recommendation to landowners is to conduct surveys at 4 listening points and twice per years on 1900 ha to most efficiently use resources.

## Temporal Partitioning as a Means for Wildlife to Persist Around a Road in South Texas

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Abstract: Human disturbance can greatly affect wildlife behavior and can be concentrated around transport corridors such as roads. To cope with human disturbance, wildlife living near roads may alter their behavior through spatial and temporal partitioning. Temporal partitioning has been shown to be an important adaptation in places where spatial partitioning is difficult. In this study, time stamped photos from camera trap sites located in Texas, USA were used to assess how wildlife activity varies at different distances from the highway and with different levels of human activity. Diel activity was compared at camera trap sites at mitigation structures along the highway and in the habitat around the highway for 11 species (black-tailed jackrabbit, bobcat, coyote, eastern cottontail, javelina, nilgai, nine-banded armadillo, northern bobwhite, striped skunk, Virginia opossum, and white-tailed deer) and examined how distance to highway and human visitation affect wildlife presence. Jackrabbits, bobcats, coyotes, cottontails, nilgai, armadillos, opossum, and deer showed greater nighttime activity and lower daytime activity along the highway than sites around the highway. Peak activity for all species occurred during the time of lowest human activity. Additionally, cottontail, armadillo, opossum, and bobwhite were found more often along the highway while jackrabbit, nilgai, and white-tailed deer were found more often around the highway. Therefore, it is likely that wildlife living near highways may employ temporal partitioning to coexist with humans. These findings demonstrate the importance of examining how animal behavior varies around a road when assessing the impact of roads on wildlife.

## Wildlife Use of Future Wildlife Mitigation Structures on a Highway in South Texas

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Abstract: Roads can have major impacts on wildlife, causing habitat fragmentation and direct mortality from wildlife-vehicle collisions. Therefore, wildlife crossing structures (WCSs) are often constructed on roads to help promote connectivity and reduce wildlife road mortality. In order to assess the effectiveness of these structures over long time periods, it is important to establish baseline rates of use along the highway before WCSs are constructed. In South Texas, WCSs are being built to mitigate for threats of roads to the endangered ocelot (Leopardus pardalis). However, WCSs benefit a wide variety of species in addition to ocelots. In this study, we assessed baseline usage of five future WCSs on Farm-to-Market (FM) 1847 in eastern Cameron County, Texas. We used camera traps set at the locations where the WCSs will be built to monitor wildlife use of those sites from July 2019 through January 2020, when preparation for WCS construction began. We determined the number of individual photographic events, camera trap success rates, and diel activity for all large and medium-sized mammal species. We identified between six and 12 unique species at each of the five WCS locations. Bobcats were detected at four of the WCSs and were most prominent at an underpass along a resaca. Most wild species showed nocturnal activity patterns, while domestic cats and domestic dogs showed diurnal and nocturnal activity. These results will help establish baseline usage of future WCS locations on FM 1847 and allow us to assess their effectiveness in reducing road mortality and increasing landscape connectivity.

### Effects of Prescribed Burning on Butterfly Populations in Coastal South Texas

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Abstract: Plants are essential parts of an ecosystem providing uses such as food and habitat for animals. Virtually all seed plants need to be pollinated and this can be done via pollinators. Approximately sixty-seven percent of flowering plants rely on insects for pollination, making insect pollinators such as butterflies vital in any ecosystem. With this knowledge, land managers should look to improve pollinator health in their management areas. One way to manage for pollinators is to manage the vegetation in an area. A method for managing rangeland plants is the use of prescribed fire. Fire can act as a useful tool to reduce fuel, remove certain invasive species, and promote new plant growth. The objective of this study is to determine effects of different prescribed burn intervals and seasons on butterfly populations. The field site is a private ranch in Willacy and Kenedy Counties, Texas, in the Coastal Marsh and Prairies ecoregion. Plots ranging from 500 to 1200 acres are being burned with different season and return intervals: summer and winter long return intervals, summer and winter short intervals, and no-burn control plots. Beginning March 2020 monthly butterfly and vegetation surveys were completed to determine effects of season of burn, return interval, and time since burning on butterfly communities. These results will help land managers determine the proper burn season and return interval for maximizing butterfly populations. This is particularly crucial for threatened butterfly species, such as monarch butterflies (Danaus plexippus), which travel through south Texas during their annual migrations.