Oklahoma State
WILDLIFE
Division of Agricultural Sciences and Natural Resources
Department of Natural Resource Ecology and Management

INSIDE THIS ISSUE

Scaled Quail Roost Site Selection

By: Madison Washburn, MS Graduate Student

Roosting scaled quail form a tight circle to conserve heat during the winter months. *Photo by Asch McDonnell*

Wildlife research often focuses on resources required by a species to survive. These requirements can change across time and influence how an animal uses their habitat. Specifically, behavior observed during the day may differ from that observed at night. As wildlife are still affected by factors such as predation and hypothermia, nocturnal habitat use can have important implications for survival.

Little is known about how scaled quail use their environment, particularly during the night. As scaled quail are diurnal birds, their nocturnal habitat use focuses on where they choose to roost. A covey of scaled quail will form a tight circle, tail-to-tail, to sleep on the ground. The behavior of roosting in a circle with other quail can help minimize heat loss during low nocturnal temperatures.

Additionally, having little visual obstruction is thought to help birds detect predators and enable them to flush freely from the roost site when disturbed without colliding with vegetation.

As part of our research project investigating scaled quail during the nonbreeding season, we attached radio-transmitters to scaled quail on the Cimarron National Grassland (CNG) in southwestern Kansas during the fall of 2020 and 2021. We monitored their survival and collected daily locations to understand habitat selection, movement, and survival. Twice a week, we also collected roost site locations. After determining roost site locations, we measured vegetation and temperature at these points. To collect the temperature data, we deployed thermal sensors on metal stakes at the height of a scaled quail. The temperature sensors, and nearby random sensors, were left to collect data for at least 24 hours.

Our initial findings from the temperature sensors show that temperatures experienced by scaled quail at roost sites may not be different from the surrounding area. This suggests that scaled quail select roost sites based on factors beyond the need for temperature regulation. Factors such as vegetation type, density of vegetation, and topographic position may be more important for site selection. Our next step will be to determine if vegetation, temperature, and topographic position influence overnight survival.

A temperature sensor collects data at a scaled quail roost site.

Donor support of research and outreach is welcomed. We are eager to hear from land owners, land managers, and donors regarding research ideas, concerns, and management questions.

To make a donation to the Wildlife Chairs at OSU:

- Go to http://secure.osugiving.com, click on the search box.
- Type "wildlife chairs" in the search box.
- When the results appear, choose either "Bollenbach Chair in Wildlife Management" or "Wildlife Conservation Chair" (Groendyke).

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Converting Tall Fescue to Wildlife Friendly Pasture

By: Dwayne Elmore, Bollenbach Endowed Chair in Wildlife Management

Tall fescue (hereafter, fescue) is a commonly planted cool season grass in much of the eastern US. If properly managed with fertility and with adequate moisture, fescue forms a dense stand inhibiting other plants from growing. Fescue can produce large amounts of palatable forage for grazing or hay production, particularly during the spring and fall. During hot dry summers, fescue forage production is limited and many fields are infected with an endophyte which is problematic for cattle when consumed in large amounts. Additionally, as it tends to form monocultures inhibiting other plants from growing, fescue is a poor plant for wildlife. For these reasons, many landowners are interested in converting fescue fields to native warm season grasses and forbs (broad-leaved flowering plants). Fortunately, fescue is one of the easier grasses to eradicate when conversion is desired.

Fall is an excellent time to convert fescue fields using herbicide. Before herbicide is applied, the field needs to be prepped so that the herbicide is able to contact actively growing fescue rather than being intercepted by standing dead plant material. The fescue field should be mowed, grazed, or burned several weeks prior to spraying. Once the fescue is actively growing (i.e., not drought or cold stressed) and reaches >6", the field is ready for the herbicide application. Glyphosate is effective at fescue control and should be applied at a rate of 2 qt per acre to in October. An additional treatment is recommended for the following spring (April or May) to kill any fescue seedlings that germinated and any established plants missed by the first spray. Failure to completely eliminate fescue will only cause future problems and increased maintenance treatments.

If managing for wildlife, it is likely that native grass planting is unnecessary once the fescue is eliminated. Typically, the native seed bank is diverse and responds quickly following elimination of fescue. While not all plants that respond from the seed bank are desirable, many will be. Spot spraying unwanted plants will be required regardless of whether you choose to plant or allow the native seedbank to germinate. If you choose to plant native warm season grasses and wildlife is an objective, use a lower grass seed rate with an abundance of native forbs mixed in. Many of these forbs are not only good for wildlife, but they are also good cattle forage. You may want to establish shrub thickets if quail is an objective. While some shrubs usually become established without planting (e.g., sumac and blackberry), others such as plum are slow to establish. For additional information about converting fescue to native warm season grasses and forbs, contact your county USDA NRCS office.

Tall fescue is an exotic grass that is not beneficial for most wildlife due to its dense structure.

Shorebirds, Wetlands, and Climate Change Project

By: Dr. Craig Davis, Bollenbach Endowed Chair in Wildlife Management

Wetlands provide buffers against drought, flooding, pollution, and other threats to humans and nature. Climate change threatens wetlands, including the connections among wetlands that facilitate wildlife movement. Managers and policymakers need to understand how climate change will affect wetlands and wetland-dependent wildlife.

Drs. Craig Davis, Scott Loss, Dave Londe, and Ellen Robertson are collaborating with colleagues from North Dakota State University, Texas Tech University, and Kansas State University to address this need. Specifically, we will model climate change effects on future wetland availability and the potential impacts of losing wetland connections throughout the south-central U.S. for multiple wetland wildlife. One wildlife group of considerable conservation concern and vulnerability to climate-induced wetland change is migratory shorebirds (a diverse group that includes sandpipers and plovers). Many shorebirds undertake long-distance migrations and have experienced sharp population declines, partly from loss of migratory stopover sites. During stopovers, shorebirds are thought to need a regional network of wetlands, with connections among local wetlands and large-scale connections among wetland clusters.

Our research seeks to determine how regional variation in particular climate factors (e.g., precipitation, temperature) will affect wetland extent and connectedness and where and when shorebirds and other wildlife (e.g., waterfowl) will most likely be impeded by gaps in wetland connections. A unique aspect of this study is that we will be using GPS transmitters on migrating shorebirds (e.g., willets, avocets, godwits) to determine how the birds respond to the variability of wetlands throughout their annual migration. The goal of this project is to provide predictive tools that help managers and policymakers identify critical wetlands and regions contributing most to connectivity for shorebirds and other wildlife. Results will inform conservation actions, such as water level management and prioritization of regions for conservation.

A captured willet is ready to receive a GPS transmitter that will help monitor its habitat selection and migratory behavior.

Movement Ecology of Northern Bobwhite

By: Landon Neumann, PhD Graduate Student

During 2019–2021, my research focused on understanding how changes in time of day, season, weather, and vegetation alter the movement of Northern Bobwhite (*Colinus virginianus*; hereafter, bobwhite) in western Oklahoma. Because movement connects various aspects of an animal's life, it is important to understand their movement ecology to aide conservation efforts. GPS transmitters allowed us to collect hourly location data on bobwhite throughout the year. Bobwhite were trapped at four wildlife management areas in Oklahoma: Beaver River, Packsaddle, Sandy Sanders, and Cross Timbers. We used weather and vegetation data from the Mesonet and the Rangeland Analysis Platform, respectfully.

We determined that bobwhite are most sedentary during the winter. Bobwhite moved the farthest during the morning and evening and became more sedentary as air temperature and solar radiation increased. Additionally, our findings suggest that changes in weather altered how bobwhite use habitat and move across the landscape. For example, bobwhite used denser tree cover during hotter conditions. Also, bobwhite moved farthest when in highly variable landscapes during days with extreme heat. These findings indicate that the movement of bobwhite is influenced by many factors and varies a great deal throughout the day and year. Managing for this species in the future will require managing for a multitude of habitat conditions that allows this species to survive weather extremes and maintain population connectivity.

Landscapes that contain different vegetation cover and composition provide quail with options as environmental conditions change throughout the day and seasons.

Wildlife Chairs' 2021 Research and Extension Highlights

2021 Research Publications

-Allred, BW, BT Bestelmeyer, CS Boyd, C Brown, KW Davies, MC Duniway, LM Ellsworth, TA Erickson, SD Fuhlendorf, TV Griffiths, V Jansen, MO Jones, J Karl, A Knight, JD Maestas, JJ Maynard, SE McCord, DE Naugle, HD Starns, D Twidwell, DR Uden. 2021. Improving Landsat predictions of rangeland fractional cover with multitask learning and uncertainty. Methods in Ecology and Evolution 12:841-849.

-Anthony, CR, CA Hagen, KM Dugger, RD Elmore. 2021. Greater Sage-Grouse nest bowls buffer microclimate in a post-megafire landscape although effects on nest survival are marginal. Ornithological Applications 123:1-13.

-Butler, A, CA Davis, SD Fuhlendorf, SM Wilder. 2021. Effects of fire on ground-dwelling arthropods in a shrub-dominated grassland. Ecology and Evolution 11:427-442

-Cady, SM, CA Davis, SD Fuhlendorf, R Scholtz, DR Uden, D Twidwell. 2021. A generalist bird exhibits site-dependent resource selection. Ecology and Evolution 11:12714–12727.

-Dahlgren, DK, EJ Blomberg, CA Hagen, RD Elmore. 2021. Upland game bird harvest management. Chapter 21 in KL Pope and LA Powell, eds. Harvest of Fish and Wildlife: New Paradigms for Sustainable Management. CRC Press, Taylor and Francis Group, LLC, Boca Raton, FL, USA.

-Kauffman, KL, RD Elmore, CA Davis, SD Fuhlendorf, LE Goodman, CA Hagen, and EP Tanner. 2021. Role of the thermal environment in scaled quail (*Callipepla squamata*) nest site selection and survival. Journal of Thermal Biology doi.org/10.1016/j.jtherbio.2020.102791.

-Londe, DW, JM Carroll, RD Elmore, CA Davis, SD Fuhlendorf. 2021. Avifauna assemblages in sand shinnery oak shrublands managed with prescribed fire. Rangeland Ecology and Management 79:164-174.

-Londe, DW, RD Elmore, CA Davis, SD Fuhlendorf, TJ Hovick, B Luttbeg, J Rutledge. 2021. Fine-scale habitat selection limits trade-offs between foraging and temperature in a grassland bird. Behavioral Ecology doi:10.1093/beheco/arab012.

-McMillan, NA, SD Fuhlendorf, B Luttbeg, LE Goodman, CA Davis, BW Allred, RG Hamilton. 2021. Are bison movements dependent on season and time of day. Investigating movement across two complex grasslands. Ecosphere 12(1):e03317.10.1002/ecs2.3317.

-Noden, BH, EP Tanner, JA Polo, SD Fuhlendorf. 2021. Invasive woody plants as foci of tick-borne pathogens: Eastern redcedar in the Southern Great Plains. Journal of Vector Ecology 46:12-18.

-Reeves, JT, SD Fuhlendorf, CA Davis, SM Wilder. 2021. Arthropod prey vary among orders in their nutrient and exoskeleton content. Ecology and Evolution DOI: 10.22541/au.162444077.75600728/v1.

-Roberts, CP, DR Uden, SM Cady, B Allred, SD Fuhlendorf, MO Jones, JD Maestas, D Naugle, AC Olsen, J Smith, J Tack, D Twidwell. 2021. Tracking spatial regimes as an early warning for a species of conservation concern. Ecological Applications 32:e02480

-Robertson, EP, EP Tanner, RD Elmore, SD Fuhlendorf, JD Mays, J Knutson, JR Weir, SR Loss. 2021. Fire management alters the thermal landscape and provides multi-scale thermal options for a terrestrial turtle facing a changing climate. Global Change Biology DOI: 10.1111/gcb.15977.

-Scholtz, R, SD Fuhlendorf, DR Uden, BW Allred, MO Jones, DE Naugle, D Twidwell. 2021. Challenges of brush management treatment effectiveness in Southern Great Plains, United States. Rangeland Ecology and Management 77:57-65.

-Sherrill, CW, SD Fuhlendorf, LE Goodman, RD Elmore, RG Hamilton. 2021. Managing an invasive species while simultaneously conserving native plant diversity. Rangeland Ecology and Management 80:87-95.

-Tanner, EP, AM Tanner, SD Fuhlendorf, RD Elmore, CA Davis, JA Polo. 2021. Land enrolled in the Conservation Reserve Program supports roosting ecology of the lesser prairie-chicken. Global Ecology and Conservation doi.org/10.1016/j.gecco.2021.e01916.

-Tanner, EP, SD Fuhlendorf, JA Polo, JM Peterson. 2021. Woody encroachment of grasslands: Near-surface thermal implications assessed through the lens of an astronomical event. Ecology and Evolution 11 12886-12901.

-Twidwell, D., CH Bielski, R Scholtz, SD Fuhlendorf. 2021. Advancing fire ecology in 21st century rangelands. Rangeland Ecology Management 78:201-212.

2021 Extension Publications

-Andersson, K, ET Thacker, MJ Carroll, EP Tanner, JP Orange, R Carroll, C Duquette, CA Davis, SD Fuhlendorf, and RD Elmore. 2021. Research Summary: Quail Population and Nesting Characteristics in Western Oklahoma. Oklahoma Cooperative Extension Service P-1063.

-Dale, LL, TJ O Connell, and RD Elmore. 2021. Aflatoxins in wildlife feed: know how to protect wildlife. NREM-9021.

-Elmore, RD, M Beem, and J Weir. 2021. Calendar for land and pond management practices. NREM-9032.

-Elmore, RD, SL Ferrell, and T Hovick. 2021. What you need to know about the Endangered Species Act. NREM 9018.

-Elmore, RD. 2021. Harvest management for northern bobwhite. Quail Forever Magazine.

-Geest, E, E Rebek, RD Elmore, D Hillock, M Schnelle, and T Royer. 2021. Landscaping to attract butterflies and moths. HLA-6430.

-Janke, A, RD Elmore, J Nack, and S Craven. 2021. The other university educators: extension educators take wildlife education beyond the university's walls. The Wildlife Professional 15:26-30.

2021 Extension Activity Highlights

15 presentations at professional and landowner meetings

7 field days and workshops

5 TV segments and 13 interviews on wildlife and land management

Oklahoma State University Wildlife Chairs

Craig Davis holds the Bollenbach Endowed Chair in Wildlife Management with both research and teaching responsibilities. He can be contacted at craig.a.davis@okstate.edu or 405-744-6859.

Dwayne Elmore holds the Bollenbach Endowed Chair in Wildlife Management with a focus on extension and research. He can be contacted at dwayne.elmore@okstate.edu or 405-744-9636.

Samuel Fuhlendorf is a Regents Professor and holds the Groendyke Endowed Chair in Wildlife Conservation. He can be contacted at sam.fuhlendorf@okstate.edu or 405-744-9646.