Rob and Bessie
Welded Wildlife Foundation
2021
Research
Education
Conservation
Although our work and world have changed over the last two years, Welder Wildlife Foundation Fellows have carried on with their research and are producing some interesting results you will read about in this report. Several students have completed their degrees and have moved into new positions or other academic degree programs. We are proud of each of them and hope you enjoy learning about their research.

We have resumed most of our education programming with some modifications and will continue on this path as long as it is deemed safe. Angie Arredondo, Education Program Coordinator, and Sarah Melendez, Conservation Educator, have worked diligently throughout the pandemic to ensure all of our programs and events provide safe environments. In some cases that includes limiting the number of individuals in groups that visit, but Angie and Sarah have gone over and above to accommodate our visitors.

We have continued to focus on controlling invasive huisache on the refuge through herbicide use and managed livestock grazing. Our hope is that our research and partnerships will lead to better techniques in managing this invasive species. You can read more about these efforts in this publication.

Some needed infrastructure projects will be taking place in 2022 at the Foundation Headquarters. After 67 years it is time to upgrade our public drinking water system and replace our backup generator that runs the Headquarters compound during outages such as hurricanes. We are grateful to several major donors that have contributed to these projects.

Lastly, we are excited to announce that we will be completing the final phase of the Foundation’s visitor’s museum, which will include new displays of the remaining raptors and owls from the Don Bowman bird collection. These are unbelievably beautiful specimens and we are deeply thankful to Don Bowman for his donation. We also thank several donors who helped make this final phase possible, and we look forward once again to working with Chase Studios, Inc. in the design and construction of this phase.

It is our hope 2022 brings health and happiness to each of you.

Terry Blankenship, Director
&
Selma Glasscock, Assistant Director
Prairies across North America are experiencing continent-wide declines due to the disruption of historic disturbance regimes and other anthropomorphic effects. This situation has led to the conservation and restoration of prairies becoming a contemporary management issue. However, little is known about the effectiveness of restoration tools on the coastal prairie, and the impacts it could have on grassland guild birds that are also experiencing declines range-wide. In addition, it is also important to consider how restoration might impact a species like the Greater Roadrunner (*Geococcyx californianus*) that is reliant on woody vegetation for its life history.

We found that through the use of a combination treatment of herbicide and prescribed fire it was possible to reduce woody vegetation cover significantly while shifting the avian community from a wooded and scrub guild community to one more in line with the historic grassland bird community. The results from our radio-tracking study on greater roadrunners showed that the removal of woody vegetation may benefit them in certain situations.

### Resilience to Shifting Weather Patterns in Gulf Coast Songbirds

Understanding how birds respond to shifting weather patterns and acute weather events is critical for effective conservation planning and understanding broader ecosystem dynamics. This research investigates the avian response following natural disturbances at multiple spatial scales by pairing local avian population and productivity data with larger regional datasets. We use a species- and guild-level approach that utilizes morphometric data collected at the Welder Wildlife Refuge to analyze the effects of weather on avian body condition. We are also currently using these data in conjunction with occupancy and distributional data to investigate similar questions at a regional and landscape scale. Preliminary results indicate that annual precipitation totals influence the body condition of several passerine species during the following breeding season. Our results also suggest that annual precipitation patterns may have implications for overall population health. Since changing weather patterns are already widely known to affect birds at the population and community levels, it is significant to note that effects are also apparent at the level of the individual.
Copper, iron, and zinc are trace minerals that arise from soils and are essential for reproduction, growth, and disease resistance in wildlife. We compared minerals across 19 study sites in Texas to assess the relationships of weather, soils, plants, sex, and population density with the transfer of minerals from soils to hispid cotton rats (*Sigmodon hispidus*) and white-tailed deer (*Odocoileus virginanus*). Available minerals in soils were positively related to liver copper and zinc in rats, which was consistent with the short lives and high productivity of small granivores that rely on grasses. Interactions between soil minerals and plant growing conditions were correlated with liver copper and iron in deer, which reflected the complexity of trophic transfers in large, long-lived, browsing herbivores. Population density was correlated with liver copper, iron, and zinc in rats, and copper and iron in deer. Both rats and deer exhibited regional limitations for copper. Our data suggest that trace minerals may contribute to density dependence of wild herbivore populations. Local population density may therefore influence the prevalence of deficiencies and disease outbreak that exacerbate population cycles in wild herbivore populations.

**Determining the Effect of Invasive Vegetation on Small Vertebrate Communities**

Invasive vegetation such as non-native grasses and woody brush species have altered many native mixed-grass and tallgrass prairie ecosystems in South Texas. The objectives of this study are to determine how nonnative and invasive dominated habitats differ from intermediately invaded and native habitats in composition and habitat structure and determine how small vertebrate species differ in abundance, diversity, and composition across this habitat gradient. We sampled sites at the Welder Wildlife Refuge to identify community and habitat differences along this gradient of ecosystem change (i.e., native, moderately invaded, invaded). Over two years, we captured 853 unique individual small mammals and 2,192 herpetofauna representing 8 and 37 species, respectively. Small mammal diversity was lowest in native habitats but no significant differences in herpetofaunal diversity occurred. Species composition differed between habitat types. Invaded sites contained mainly generalist species and native sites hosted more habitat specialists, suggesting effects of habitat change on small vertebrates are seen at the species level.
Medium and Large-Sized Mammal Habitat Occupancy Across a Landscape Mosaic

Duston R. Duffie, Texas A&M University-Kingsville, Ph.D.
Cord Eversole, Ph.D., Scott Henke, Ph.D., Major Advisors

Nonnative and invasive plants are considered a major conservation threat to native ecosystems due to their impacts on ecosystem function. Consequences of nonnative and invasive vegetation have been exhibited across the globe, often resulting in altered ecosystem function due to decreased habitat quality and diversity. Similarly, biodiversity has been linked to ecosystem function and stability due to the positive relationship between vegetation richness and animal diversity. For this study, we are examining the conservation of native animal species across a landscape gradient of plant invasion and the potential impacts of invasive plant management on animal communities. Few studies have documented community-level impacts of invasive and nonnative plant-dominated systems, which is especially true for ecosystems in the South Texas area. In July 2021, we established 24 remote camera stations spaced approximately 1 km apart at Welder Wildlife Refuge. These cameras will be used to document medium- and large-sized mammal occurrence within various vegetation types. We will continue to assess the plant and animal communities for three years.

Modeling Adaptive Rangeland Management under Increased Climatic Variability

Miranda R. Peterson, Texas A&M University, Ph.D.
W.E. Grant, Ph.D., Hsiao-Hsuan Wang, Ph.D., Major Advisors

Although rangelands support approximately 50% of the world’s livestock, 10-20% of the world’s rangelands have been degraded and projected climatic variability poses significant management challenges. Simulation models can explore potential consequences of increased variability on rangelands under different management schemes. I will use systems modeling to simulate grass and brush dynamics on South Texas rangelands under alternative future climate scenarios and management schemes, specifically the effects of different rotational grazing and prescribed burns schemes on brush and grass dynamics under present and two future 30-year climate scenarios. Future scenarios assume worst-case and moderate CO2 emissions and are averaged projections for 2080 to 2100. Preliminary results indicate heavy stocking rates and summer burns reduce grass biomass under all climate scenarios. Heavy stocking rates and winter burns reduce grass biomass under current climate, but in future climate scenarios grass biomass is maintained. This study may be used by rangeland managers when evaluating prescriptive burning and grazing options.
Migratory shorebirds are one of the fastest declining groups of North American avifauna, suffering an estimated population decline of 40% since 1970. As an obligate grassland shorebird and long-distance migrant, the Buff-breasted Sandpiper (*Calidris subruficollis*) is a species of global conservation concern that uses the Texas Gulf Coastal Plain during north and south migrations. To evaluate stopover habitat selection of Buff-breasted Sandpipers in the region, we deployed 52 GPS tracking devices across one fall and spring migration, with 50 more planned deployments in the spring and fall of 2022. From location data, we will build a species distribution model using nested hierarchical resource selection analyses at two orders of selection. Additionally, we visited the transmitted GPS locations within a 5-day window to estimate vegetation height to describe habitat use by this short-grass specialist. Because measures targeted at preserving habitat for this species are expected to benefit many other grassland birds, an understanding of how they use habitat at this critical stopover site is imperative to designing effective conservation measures in the region.

The Laguna Madre of Texas is an important stopover site for migrating shorebirds, so understanding potential impacts to habitats by recent and proposed development is critical for making informed conservation decisions. I am developing a model that will estimate the spatial and temporal availability of foraging habitat for shorebirds during spring migration. My model will incorporate several spatial datasets delineating bathymetry, submerged substrate, and seagrasses in the lagoon. Surface water extractions from satellite imagery verified by ground-truthing will be used to identify the location of the waterline during various weather conditions to inform the model. Data from tide gauges and weather stations will be used to develop a regression that will estimate the movement of the waterline over lagoon bathymetry. The completed model will predict when and where foraging habitat is available in the Laguna Madre. This model will be a tool that will inform managers of the potential impacts of future development in and around the Laguna Madre and will identify areas that are a priority for conservation.

Modeling Foraging Habitat for Shorebirds in the Laguna Madre

Mikayla M. Killam, Texas A&M University-Kingsville, M.S.
Bart M. Ballard, Ph.D., Major-Advisor

Buff-breasted Sandpiper Habitat Selection in the Texas Gulf Coastal Plain

Tara L. Rodkey, Texas A&M University-Kingsville, M.S.
Bart Ballard, Ph.D., Major Advisor

Migratory shorebirds are one of the fastest declining groups of North American avifauna, suffering an estimated population decline of 40% since 1970. As an obligate grassland shorebird and long-distance migrant, the Buff-breasted Sandpiper (*Calidris subruficollis*) is a species of global conservation concern that uses the Texas Gulf Coastal Plain during north and south migrations. To evaluate stopover habitat selection of Buff-breasted Sandpipers in the region, we deployed 52 GPS tracking devices across one fall and spring migration, with 50 more planned deployments in the spring and fall of 2022. From location data, we will build a species distribution model using nested hierarchical resource selection analyses at two orders of selection. Additionally, we visited the transmitted GPS locations within a 5-day window to estimate vegetation height to describe habitat use by this short-grass specialist. Because measures targeted at preserving habitat for this species are expected to benefit many other grassland birds, an understanding of how they use habitat at this critical stopover site is imperative to designing effective conservation measures in the region.
The population of Texas tortoises (*Gopherus berlandieri*) has drastically declined in number and distribution. Historically found throughout southern Texas below a line from Victoria to San Antonio to Del Rio in densities of 16 tortoises/ha, their populations now exist sporadically in southern Texas with densities estimated to be 0.26 tortoises/ha which constitutes a 98% reduction in population number. Hence, today, Texas tortoises are listed as a threatened species. The Lower Rio Grande Valley is a stronghold for populations of Texas tortoises, but development of the area by liquefied natural gas (LNG) companies threatens to fragment this refuge. Translocation has been suggested as a possible management option to keep tortoises out of immediate harm from construction of the LNG infrastructure and resulting vehicular traffic; however, it is unknown if such attempts will alter tortoise movements, survival, and reproduction. Therefore, our goal is to assess the viability of translocation for Texas tortoises as a potential mitigation option before their habitat is altered.

Camera Surveys for Large Carnivores in the Davis Mountains, Texas

Jamie L. Cooper, Sul Ross State University, M.S.
Patricia M. Harveson, Ph.D., Major Advisor

The impacts of large carnivores on all trophic levels of ecosystems are beginning to be understood as critically important. However, studying these species can be difficult as they are often few in number, have very large ranges, and are elusive. Mountain lions (*Puma concolor*) and black bears (*Ursus americanus*) are two remaining large carnivores in the southwest. Researchers at Borderlands Research Institute have been monitoring these two carnivores in the Davis Mountains region of Texas for the past decade. We surveyed for mountain lions and black bears using remotely activated trail cameras on the Davis Mountain Preserve and surrounding areas. Our objectives were to evaluate the habitat characteristics of sites with positive detections and to create a partial identity matrix to help identify individual mountain lions and black bears. We used categorical covariates such as sex, age, and musculature to populate the matrix which will be used in future spatial capture-recapture analysis to evaluate the effectiveness of this technique for estimating densities of mountain lions and black bears in West Texas.

Effect of Translocation on the Threatened Texas Tortoise

Christin A. Moeller, Texas A&M University-Kingsville, M.S.
Scott E. Henke, Ph.D., Major Advisor
Education & Outreach Program

The Welder Wildlife Foundation was excited to welcome visitors to the Refuge in 2021. With our visitor numbers nearly doubling from 2020, it appears everyone was ready to return to a sense of normalcy. Some of the many programs we offered were our annual Wildflower Workshop, the Foundation’s onsite K-12 education programs and teacher workshops, and a long-overdue Wildlife Conservation camp. Here’s a glance at what our Education Program has accomplished this year.

The Foundation’s annual Wildflower Workshop has been a particular favorite since its beginning in 1976. Imagine that, 45 years of teaching about wildflowers! The event was again a great success with 20 participants attending, many of whom had been on a reserved list since 2020. We look forward to another fantastic Wildflower Workshop in 2022!

We are happy to report that we reached nearly 1,000 students through our K–12 outreach and onsite programs this year. To enhance our efforts in reaching K–12 students, we have partnered with several organizations to host teacher workshops. In addition to our widely popular Rangelands Workshop series, this year we partnered with Texas A&M AgriLife Extension Agency to host the Connected by Birds workshop, a grant-funded program for teachers of grades 8–12. Participants learned the importance of bird conservation and how to incorporate a variety of related activities into their classrooms. We also partnered with Texas A&M University-Kingsville to provide both Beyond WILD and Wildlife Education and Sustainability Training workshops. These workshops provide wildlife ecology training to pre-service and in-service Ag teachers, something often absent from their formal training. Altogether we’ve reached approximately 350 teachers over the last 3 years. We greatly value our partnerships with our donors, Texas Agri-Life Extension and Texas A&M University-Kingsville on these important teacher programs.

We hosted the Texas Chapter of the Wildlife Society’s Wildlife Conservation Camp in July. Eleven campers from Texas and one from Louisiana were immersed in learning about various aspects of wildlife conservation, management, and stewardship. Natural resource professionals including wildlife and range biologists, game wardens, and soil scientists volunteered to teach campers the importance of conserving these resources. It is a life-changing experience for many and some go on to pursue careers in these fields. For more information on the Wildlife Conservation Camp, visit www.wildlifecamptx.org.

Finally, we wish to acknowledge the many volunteers who help make all of these programs a success. For more information on future Welder Foundation programs, or on how to become a volunteer, please visit www.welderwildlife.org.
This year began with predictions that rainfall would be below average resulting in a dry year. For the first 3 months of the year those predictions were correct. At the end of October, we had 53 inches (about 17.5 inches above average) producing the 5th wettest year since 1956. Consequently, our rangelands have been very productive and the wetlands are now full and once again teaming with wetland birds and other wildlife. In the recent past, we used a low stocking rate due to yearly rainfall fluctuations but we are currently using 1 herd/8 pasture and 1 herd/4 pasture grazing systems. We have seen some interesting responses in some tall grasses species since initiating these grazing systems following the last severe drought in 2011-2012. Big bluestem, Indian grass, and switchgrass are all increasing, and we are happy to report that big bluestem in particular has increased significantly with the longer rest periods used under the current rotational grazing system.

We continue to work with Bayer on the use of Invora® for control of huisache. Many areas on our rangelands have dense overstories of huisache and our long-term plan is to spray several hundred acres per year in pastures with Victoria clay soils to reduce huisache density. Following the spraying of 300 acres this October we will monitor changes to determine the mortality of huisache and mesquite and look at impacts to other brush species including spiny hackberry, persimmon, lotebush, and brasil. We will be seeking other opportunities to conduct trials and experiments to investigate questions relating to regrowth and longer-term suppression of huisache.
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Donations to the Rob & Bessie Welder Wildlife Conservation Foundation, a 501(c)3 charitable foundation, enhances our mission by allowing us to carry out our mission of research, education and conservation of wildlife and wildlife habitats. If you are interested in supporting these programs, please contact the Rob and Bessie Welder Wildlife Foundation, 361-364-2643.

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