

THE ROB & BESSIE
WELDER WILDLIFE
FOUNDATION

2009-2011



DR. JAMES G. TEER

(1926 – 2012)

Dr. James G. Teer served as the third director of the Rob and Bessie Welder Wildlife Foundation from 1978-1989. He brought to the Foundation a singular dedication to the field of wildlife management that focused on the Foundation's mission of research and education.

Recognized and sought after globally as an authority in wildlife conservation, Dr. Teer served on many boards in North America and abroad. He consulted for organizations, industries, agencies, private individuals, and governments in the U.S. and tropical world.



Dr. Teer's research and conservation efforts extended to Africa, India, Europe, and Central and South America. During his professional career, he published numerous scientific papers, book chapters, monographs, and a book of his memoirs, *It's a Long Way from Llano: The Journey of a Wildlife Biologist*.

Dr. Teer won many awards including the Aldo Leopold Memorial Award, the highest honor bestowed by The Wildlife Society. He was inducted into Texas Parks and Wildlife Foundation's Hall of Fame in 2001.

Dr. Teer's presence, leadership, and friendship will be missed by all that knew and worked with him.



FOUNDERS & LEADERS

Robert H. and Bessie Welder Founders

It is my desire and my purpose to further the education of the people of Texas and elsewhere in wildlife conservation and in the knowledge of the breeding and living habits of our wild creatures, and in the relationship of wildlife to domestic livestock on our ranches and farms; to afford students and others interested in wildlife along with domestic animals, a place for research and an opportunity for the study thereof; and to develop scientifically methods of increasing the wildlife populations of the state and nation for the benefit of future generations of our people who may not have the opportunity to know and appreciate our wildlife, as I have, unless methods of increasing and conserving our wildlife are scientifically developed.

For these purposes I here create a foundation to be known as the Rob and Bessie Welder Wildlife Foundation.

Excerpt from Rob Welder's will, 1954.

TRUSTEES

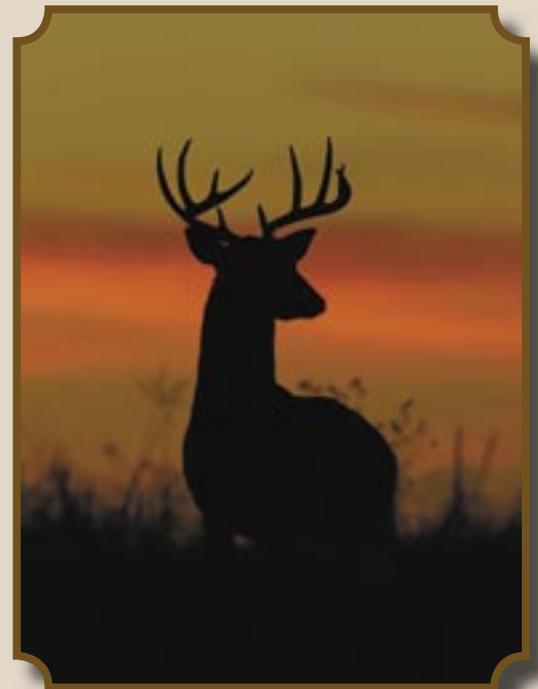
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DIRECTORS

Dr. Terry L. Blankenship, Director
Dr. Selma N. Glasscock, Assistant Director



MISSION & OBJECTIVES



Welder Wildlife Foundation Headquarters

The Rob and Bessie Welder Wildlife Foundation is a private, non-profit, tax-exempt, operating foundation funded by an endowment, oil royalties, and cattle income. Established in 1954, the Welder Wildlife Foundation has gained national and international recognition through its graduate student research and education programs. The mission of the Foundation is to conduct research and education in the field of wildlife management and conservation and closely related fields.



In 2009 the Welder Wildlife Foundation Trustees established the Rob & Bessie Welder Wildlife Conservation Foundation, a private, non-profit, charitable foundation. The purpose of this second foundation is to raise funds to support the Rob and Bessie Welder Wildlife Foundation's research and education programs.

The Foundation's headquarters and 7,800-acre wildlife refuge are located 35 miles north of Corpus Christi, Texas in the Tamaulipan Biotic Province of Texas. It is located in a transitional area between the Gulf Coast Prairies and Marshes and the Rio Grande Plains vegetation areas. Permanent facilities include offices, library, dormitory, bunkhouse, study, lecture hall, laboratories, museum, collections, and rotunda.

The Foundation annually funds an average of five to ten carefully selected graduate students from universities across the United States and Canada. Our fellowships support their research and advanced degrees in wildlife conservation and management. It is our strong conviction that graduate students bring to their work a unique dedication and drive. Welder students work side by side with our staff and their peers from a variety of backgrounds, thus their projects are under constant review and discussion. Students and projects are selected so that our research is on the leading edge of the field of wildlife conservation and management.

As a private foundation, our purpose and operation remain unhindered by outside political or institutional pressures. Many other organizations conducting land management research exist across the state and nation, but no other organization has dedicated itself solely to conducting wildlife research in conjunction with a ranching operation and other traditional land uses.



DIRECTOR'S LETTER



The Welder Wildlife Foundation continues to focus its efforts on educating youth and adults and using the Refuge to demonstrate the importance of habitat and wildlife conservation. We have accomplished this through providing education programs for school and university students, teacher courses, and workshops for landowners and biologists since we believe these activities are important to the mission of the Foundation. Several years ago we began a campaign to construct a new education and museum building, but these plans have been modified because of the availability of an existing building on the Refuge. Our plans now are to renovate this building for our education program and remodel our existing museum. This change will allow us to complete the project sooner, reduce operational costs, and provide much needed space for our education programs and updated museum displays.

We continue to seek research projects that will provide practical applications to management questions facing landowners in Texas and the U.S. We also look for outstanding students who will have an impact on the management of our natural resources. In fall 2011 we held our 12th student symposium with 16 students and professors attending. We look forward to these students being active in the wildlife field for years to come. Currently the Foundation is providing fellowships for 5-6 graduate students. Because of the Foundation's reputation and research facilities we have been able to provide research sites and housing for graduate students not funded by the Foundation during the year. As long as we have space, we will continue to accommodate researchers and graduate students interested in conducting research on the Foundation property.

We can all look back at individuals who have mentored, helped, or assisted us in our careers and have received the respect of many of their professional peers for their efforts in teaching and conservation. For me, my dad, Dr. Lytle Blankenship, would be up at the top. Others who have been important along the way include Drs. Sam Beasom, Wendel Swank, Doug Slack, Lynn Drawe, and Nova Silvy. I also am particularly grateful to Dr. Jim Teer for the educational and job opportunities he provided. He had a huge impact on a number of students, and I am one of those who will never forget those opportunities. We dedicate this report to the late Dr. James Garth Teer for his support of students, conservation efforts, and leadership of the Rob and Bessie Welder Wildlife Foundation.

Dr. Terry Blankenship

WELDER STAFF



The Welder Wildlife Foundation staff and graduate assistants play an integral part in achieving our mission. These talented individuals assist with projects and programs throughout the year and are an important part of our Foundation. The Foundation is fortunate to have such an enthusiastic and dedicated group of individuals. We thank them for their contributions.



STAFF

Dr. Liz Bates, Education and Volunteer Program Coordinator

Elizabeth Burke, Executive Assistant

B. C. Glasscock, Operations Technician

Baldemar Martinez, Ranch Hand

Irma Tamez, Custodian

Jan Walker, Bookkeeper

Agnes White, Finance Operations

GRADUATE ASSISTANTS

Ashley Exendine, Southwest Missouri State University

Sarah Kahlich, Sul Ross State University

Amy Potts, Tarleton State University



FELLOWSHIPS & RESEARCH PROGRAMS

The Welder Wildlife Foundation's graduate fellowship program began in the 1950's with our first Welder Fellow, Dr. Thadis Box, graduating in 1957. The fellowship program is designed to train students in wildlife ecology and management. Financial support is normally provided the entire time the student is enrolled in graduate school at an accredited university in the United States. The student is supported



while in the field or laboratory doing thesis or dissertation work, while on campus taking coursework, and while analyzing and writing results of field and laboratory work. Financial awards include a stipend and health insurance. In some instances there is an allowance for field and laboratory research. Those who work on or near the Welder Wildlife Refuge are provided housing, laboratory and office space, and other amenities.

Students are first selected by the university in which they are enrolled, and the first year's stipend is granted following proof of registration. The Welder Wildlife Foundation participates in student selection through review of their applications and approval of funding. Requirements include a grade-point average of 3.0 or higher and combined scores of not less than 300 on the verbal and quantitative portions of the Graduate Record Examination. The Welder Wildlife Foundation may contact universities specializing in particular research to solicit proposals. Proposal letters may be submitted to Foundation Directors to explore possibilities of interest in a project the student and the major advisor wish to undertake.

Student awards are made directly to the university which subsequently administers the project budget. A memorandum of understanding detailing the amount and terms of the award is signed by officers of both the university and the Foundation. Information for proposals may be found on the Foundation's website. Awards may be made at any time of the year, however, our proposal deadline is October 1st of each year. A student may begin at any semester or summer term in the academic year. Proposals should be directed to:

Rob and Bessie Welder Wildlife Foundation Research Program

P. O. Box 1400, Sinton, Texas 78387 Phone: 361-364-2643 Fax: 361-364-2650

Email: welderfoundation@welderwildlife.org Website: www.welderwildlife.org

Staff research is minor in scope and funding compared to student research and is conducted primarily as umbrella projects under which a number of students can work to monitor long-term changes in plant and animal communities. The following project summaries include student and staff research conducted from 2009-2011.



STUDENT RESEARCH

INFLUENCE OF HABITAT HETEROGENEITY AND FORAGING PREFERENCES ON DISTRIBUTION OF UNGULATES



M. SOFIA AGUDELO

Texas A&M University, Ph.D.

William E. Grant, Ph.D., Major Advisor

Studies of resource selection are basic to understanding animal habitat requirements; however, studies of interaction of landscape structure and foraging preferences are limited. The objective of this study is to integrate optimal foraging theory within an individually-based, spatially explicit simulation model to determine the relationship between habitat heterogeneity and distribution and dispersion of ungulates. The dynamics of forage resources and animal dispersion through time were simulated

on hypothetical landscapes under different cattle stocking rates. Simulations were performed to project animal distribution and resource abundance over the course of a single year. Maps of landscape structure and animal distribution were analyzed using density-based analysis and class and landscape metrics. Under light stocking rates, habitat fragmentation and landscape heterogeneity increased over time, but animal patterns did not seem to change accordingly, indicating that a significant change in patterns of animal distribution occurs at higher thresholds of habitat heterogeneity than those considered. Under heavy stocking rates, after a short period of time the landscape became highly heterogeneous and habitat fragmentation increased dramatically, suggesting a system in which the rate of biomass production was inferior to the rate of consumption. The relationship between patterns and processes is crucial for developing management plans. Spatially explicit simulation models that project changes in animal distribution across the landscape based on resource availability and distribution are extremely valuable to understanding the complex dynamics of grazing land ecosystems.

EVALUATION OF BEST MANAGEMENT PRACTICES FOR REDUCING BACTERIAL LOADING IN GRAZING-LAND STREAMS

CALVIN R. CLARY

Texas A&M University, M.S.

Larry A. Redmon, Ph.D., Major Advisor

Bacterial and sediment non-point source pollution is a common concern in agricultural lands, but many best management practices (BMPs) attempt to reduce such pollution from agricultural grazing lands. Exclusion fences prove effective at providing these water quality benefits. Relatively few studies have evaluated the individual effectiveness of prescribed grazing, alternative shade, alternative water, and rip-rap BMPs at reducing bacterial loading in overland runoff or protecting riparian zones. These BMPs are believed to provide water quality benefits without the drawbacks of total exclusion; however, some study results on this topic are conflicting. This study evaluates 1 non-structural BMP to assess its effectiveness at reducing bacteria loading in overland runoff. Three structural BMPs will be evaluated to assess their effectiveness at reducing the amount of time cattle spend along a riparian area. This study evaluates the effectiveness of each BMP by determining how well the BMP reduces bacterial loading in overland runoff or how well the BMP deters cattle away from the stream and riparian zone. The prescribed grazing BMP compared bacteria concentrations between 3 grazing-management strategies. Structural BMPs were evaluated using Global Positioning System collars on cattle. For the 3 structural BMPs, cattle distribution before BMP implementation was compared against cattle distribution after BMP implementation. The alternative shade BMP showed an 11–30% reduction in the amount of time cattle spent within 25 feet of the stream. The rip-rap BMP was observed to work very effectively when rock diameter exceeded 12 inches at greater than 80% ground cover. Severe drought conditions at all project sites impeded results for the alternative water and prescribed grazing BMPs.





STUDENT RESEARCH

EVALUATING THE EFFECTIVENESS OF AN ISSUE-BASED CURRICULUM ON STUDENT KNOWLEDGE, UNDERSTANDING, AND ATTITUDE TOWARD TEXAS RANGELANDS

ASHLEY N. EXENDINE

Missouri State University, M.S.

Janice S. Greene, Ph.D., Major Advisor

As populations move away from rural areas into urban settings, our youth are experiencing a loss of a personal connection with the natural world and our native landscapes. Texas has recorded a loss of over 4.8 million acres of native rangelands since 1997 alone. This project was initiated to affect the knowledge and attitudes of students toward native rangelands and the services they provide, with the understanding that these students will become the landowners, conservation leaders, and decision-makers of the future. The Welder Wildlife Foundation's Rangeland Conservation Education Guide is a curriculum which includes 27 student-centered lessons focused on activities investigating soil, water, wildlife, ecology, and stewardship. The objectives of this study are to evaluate changes in (1) student knowledge of rangelands and management of wildlife, (2) student appreciation and awareness of rangelands and management of wildlife, (3) student performance on the Texas Science TAKS test, and (4) student understanding of the North American Conservation Education Strategy Core Concepts. The study entails surveying all students and instructors who agreed to participate in testing the curriculum. For accurate evaluation, the survey results of the rangeland (i.e., experimental) students will be compared to those of students who have not participated in curriculum lessons (i.e., control group). Participating teachers instructed students using at least four specific lessons from the curriculum and administered 20-minute pre- and post-tests; teachers also completed three 5-minute lesson surveys. Testing was administered during spring semester 2011 with continued testing in fall semester 2011.



LONG-TERM VEGETATION DYNAMICS OF WELDER WILDLIFE REFUGE

STEVEN J. GOERTZ

Texas A&M University-Kingsville, M.S.

Timothy E. Fulbright, Ph.D., Major Advisor



Invasive exotic grasses are becoming a major concern among land managers and ecologists alike, and there are many factors affecting establishment and spread of these species. Old World bluestems are of particular concern throughout much of south Texas because invasion by these species reduces habitat quality and biodiversity for wildlife. Our primary objective is to use data from long-term permanent vegetation transects to determine spatial and temporal patterns of Old World bluestem invasion in relation to disturbance, roads, and soils. Canopy cover of woody and herbaceous vegetation has been estimated using about 150 vegetation transects annually since 1976, except for a 1-, 3-, and 6-year period when data were not collected. These transects were randomly placed throughout 7,800 acres on the Welder Wildlife Refuge in northern San Patricio County, Texas. We will evaluate these results in conjunction with proximity to roadways and pipelines, drought conditions through time, soil chemical and physical properties, and disturbance to determine mechanisms underlying spread of invasive Old World bluestems. An

understanding of conditions conducive to exotic invasion may help land managers and ecologists better predict where these invasions will occur. Understanding ecological variables that drive invasion may help managers develop ways to reduce the potential for invasion and better maintain native species diversity.



STUDENT RESEARCH

THE WELDER WILDLIFE FOUNDATION FELLOWSHIP MODEL: AN ANALYSIS OF EFFECTIVENESS

SARAH N. KAHLICH

Sul Ross State University, M.S.

Patricia Moody-Harveson, Ph.D., Major Advisor



The Welder Wildlife Foundation (WWF) was established in 1954. Since that time, approximately 330 students have received support from the WWF Fellowship Program to attain advanced degrees in wildlife science and related fields. The primary objective of our study is to assess the effectiveness of the WWF Fellowship Program through a survey of current and former WWF Fellows. Based on our survey responses, we will be able to identify what parts of the fellowship program are most effective and where improvements can be made. The surveys will also inquire about each Fellow's interest in the formation of a society of WWF Fellows. If our survey indicates interest in such an association is high, our second objective is to establish a WWF Fellows Association to enhance networking and collaborative opportunities among Fellows. We believe such an association will not only help Fellows to enhance their research efforts and further their

careers, but that the Fellows Association would be an investment in the future of the Welder Fellowship Program. Members of the Association will be asked to support the WWF by providing valuable insight and guidance that will enrich the WWF Fellowship Program for future students.

SOIL MODIFICATION AS A RESEARCH TOOL TO REDUCE OLD WORLD BLUESTEMS

ADAM B. MITCHELL

Montana State University, M.S.

Andrea R. Litt, Ph.D., Major Advisor

Old World bluestem (OWB) grasses (e.g., *Bothriochloa*, *Dichanthium* spp) have become dominant throughout the southern and central Great Plains, altering the composition and structure of native plant communities and chemistry of the soil with concomitant effects for native fauna. Although conventional management tools have not reduced dominance of these grasses, modifying the soil may favor establishment of native plants and provide an alternative to restore grasslands invaded by OWBs. Modifications of soil pH, nitrogen, and other characteristics have resulted in reduced dominance of some nonnative plants, but these tools have not been tested on OWBs. We are examining the efficacy of 10 soil modification treatments (pH increase, pH reduction, carbon amendment, inoculation of soil mycorrhizae, soil disturbance alone, and each of the previous combined with seeding of native vegetation) as restoration tools in grasslands dominated by OWBs. We will compare treated areas to undisturbed areas dominated by OWBs, as well as undisturbed areas dominated by native plants to assess restoration success. We established 60 research plots (6 m x 9 m, 5 replicates of each treatment) at the Welder Wildlife Foundation Refuge and applied soil treatments in June 2011. We will sample soil chemistry, vegetation density, cover, and height as well as soil, terrestrial, and flying arthropods for 2 years to assess changes. Mean species richness of OWB and native control plots are 2 (SE = 0.447), and 5 (SE = 0.632), respectively. We hope to identify an effective solution to restore native vegetation in grasslands and promote colonization of native fauna.





STUDENT RESEARCH

PARENTAL RECOGNITION OF FAMILIAR YOUNG IN A COLONIALY NESTING SONGBIRD SPECIES

STEPHANIE A. STRICKLER

University of Oklahoma, Ph.D.

Douglas W. Mock, Ph.D., Major Advisor

In many animal species, parents care for offspring by providing food or protection from predators. Parental care may be costly in terms of predation risk and energy spent finding food. Natural selection favors the habit of directing costly parental care to genetic relatives over giving such aid indiscriminately. When parent birds reliably feed offspring in their own nests, the potential costs of misdirecting parental care, and thus the benefits of recognizing one's own offspring, are highest in species where unrelated young are commonly mixed with true (genetic) offspring. Cave swallows (*Petrochelidon fulva*), colonialy nesting songbirds in which parents frequently encounter unrelated young, provide a unique opportunity to study the evolution of parent-offspring recognition. My field experiments indicate that cave swallows recognize their own young when nestlings are near fledging, but not when they are younger. I used a cross-fostering experiment to examine how parents learn to identify their offspring. Two weeks after cross-fostering, I tested whether parents would favor their own offspring over unrelated nestlings when all had been reared in a different nest (i.e., all nestlings were unfamiliar). They did not. When parents encountered 2 of their genetic offspring, 1 of which was reared by foster parents before the test ('unfamiliar'), they biased food allocation to the familiar nestlings. Together, these results suggest parents learn to recognize familiar offspring. My ongoing work examines whether recognition is facilitated by the variable visual (facial feather patterns) cues, vocal (begging calls) cues, or both possessed by older nestlings.



REPRODUCTIVE ECOLOGY AND HABITAT QUALITY OF RED-SHOULDERED HAWKS

BRADLEY N. STROBEL

Texas Tech University, Ph.D.

Clint W. Boal, Ph.D., Major Advisor



Habitat quality is often evaluated based on relative resource preferences, usually by examining disproportionate use of available resources. Alternatively, the ideal despotic distribution hypothesis predicts that given a suite of territories from which to select, an individual will select the highest quality territory with regard to its perceived fitness benefit. Presumably, long-term occupancy rates of specific territories are positively correlated with habitat quality. This prediction hinges upon the individual bird's ability to accurately assess territory quality (perfect knowledge) despite temporal and spatial

variation. Using a 5-year data set on a resident population of red-shouldered hawks (*Buteo lineatus*) in southern Texas, I examined the predictions of the ideal despotic distribution hypothesis. My results were consistent with the prediction of the ideal despotic distribution hypothesis that the proportion of years a territory supported a nesting attempt was negatively related to relative nest initiation dates. However, in contrast to predictions of the ideal despotic distribution hypothesis, my data show that the proportion of years a territory supported a nesting attempt was unrelated to the average number of eggs laid and negatively related to the average number of young fledged annually; whereas, the proportion of years a territory supported a nesting attempt varied across territories, the annual reproductive success of breeding red-shouldered hawks varied markedly from year to year and was positively associated with the number of breeding pairs observed. My results suggest red-shouldered hawk reproductive success is influenced heavily by stochastic characteristics that violate the ideal despotic distribution hypothesis' assumption of perfect knowledge by individuals.



STUDENT RESEARCH

CHARACTERIZING TEMPORAL PHENOLOGY AND PHYSIOLOGY FOR CHEMICAL MANAGEMENT OF HUISACHE

PABLO C. TEVENI

Texas Tech University, Ph.D.

Robert D. Cox, Ph.D., Major Advisor



Huisache (*Acacia farnesiana*) is a thorny, leguminous shrub or small tree that has become a severe pest on many rangelands throughout the southern third of Texas. Contemporary control methods for huisache have proven unsatisfactory, expensive, or time-consuming. The objective of this study is to demonstrate a successful method of controlling huisache while increasing favorable conditions for wildlife and livestock and reducing the rate of chemical application. The project will consist of 3 parts that will be carried out on a monthly basis. First, the average phenological stage of 25 randomly selected huisache plants at each study site will be determined. The study sites will include 3 areas of south Texas with different soil

types. Second, 10 plants in the same phenological stage at each site will be sampled using destructive root harvest to analyze total non-structural carbohydrates. Finally, 2 different herbicide formulations will be applied to additional plants in the same phenological stage, and root mortality will be evaluated after the second subsequent growing season. Phenological data, root total nonstructural carbohydrate content, and monthly soil temperature and soil moisture data will be correlated with the mortality of treated huisache to determine conditions under which managers can most effectively control huisache.

PRAIRIE AND SAVANNA RESTORATION WITH CONTROLLED WILDFIRE

DIRAC L. TWIDWELL

Texas A&M University, Ph.D.

William E. Rogers, Ph.D., Major Advisor

Widespread conversion of grasslands and savannas to shrublands has caused many landowners and resource managers to search for novel solutions to the woody plant problem. In some areas of Texas, landowners and agency personnel are beginning to implement controlled wildfires (i.e. high-intensity fires conducted in periods of severe drought, typically with permission during county government-mandated burn bans) for restoration purposes in post-grassland woodland ecosystems. However, many managers are reluctant to use controlled wildfires in restoration activities because they are perceived to be more dangerous and harder to control, and although there is no scientific evidence to suggest prescribed fire can cause high levels of mortality on resprouting woody plants, individuals are concerned such fires will lead to undesirable effects. To this end, we established an experiment in 2 mesquite-invaded ecosystems to (1) demonstrate how to control prescribed fires in wildfire conditions, (2) determine if fire can kill mature, resprouting invasive woody plants, and (3) determine whether controlled wildfires lead to reductions in native species richness or to undesirable invasions by exotic plants and animals. We tracked woody plants for 3 years following fire and found high levels of mortality of honey mesquite (*Prosopis glandulosa*) and other woody plants can be achieved with controlled wildfires. Moreover, native herbaceous species richness was greater 1 year after fire, while abundance of King Ranch bluestem (*Bothriochloa ischaemum*) and fire ants (*Solenopsis* sp.) did not differ between burned and unburned plots. Our findings suggest controlled wildfires have the potential to be a successful restoration strategy in woody plant dominated grasslands and savannas.





STUDENT RESEARCH

EVALUATION OF METHODS TO REDUCE BACTERIAL CONTAMINATION OF SURFACE WATER FROM GRAZING LANDS

KEVIN L. WAGNER

Texas A&M University, Ph.D.

Terry J. Gentry, Ph.D. and Larry A. Redmon, Ph.D., Major Advisor Co-Chairs

Runoff of *Escherichia coli* from grazing lands has been identified as a significant source of bacterial contamination needing reductions to improve water quality. Proven best management practices are needed to address these bacterial issues and ensure success of watershed restoration efforts. Two best management practices, grazing management and off-stream watering facilities, were evaluated to assess their effectiveness for reducing *E. coli* loading. *E. coli* levels in runoff from grazed and ungrazed rangeland, improved pasture, and native prairie sites were monitored from November 2007 through October 2010. Results show rotational grazing, if timed appropriately, is a very effective practice for reducing *E. coli* runoff. Further, the impact of grazing timing was more significant than the impact of grazing management and stocking rate. As a result of these findings, it is recommended that creek pastures and other hydrologically connected pastures be grazed during periods when runoff is less likely and upland sites be grazed during rainy seasons when runoff is more likely to occur. To assess the effect of providing off-stream watering facilities, an upstream-downstream, pre- and post-treatment monitoring design was used to evaluate *E. coli* levels in Clear Fork of Plum Creek, near Maxwell, Texas, from July 2007 to July 2009. Further, Global Positioning System collars were used to track cattle movement. Findings indicated that when alternative off-stream water was provided, the amount of time cattle spent in the creek was reduced 43%. However, this study could not conclusively attribute *E. coli* loading reductions to providing alternative water.



PREY-MEDIATED AVOIDANCE OF AN INTRAGUILD PREDATOR BY ITS INTRAGUILD PREY

RYAN R. WILSON

Utah State University, Ph.D.

John A. Shivik, Ph.D., Major Advisor

Intraguild (IG) predation is an important factor influencing community structure, yet factors allowing coexistence of IG predator and IG prey are not well understood. The existence of spatial refuges for IG prey has recently been noted for their importance in allowing coexistence. However, reduction in basal prey availability might lead IG prey to leave spatial refuges for greater access to prey, leading to increased IG predation and fewer opportunities for coexistence. We determined how the prey availability affected space-use patterns of bobcats (*Lynx rufus*, IG prey) in relation to coyote space-use patterns (*Canis latrans*, IG predators). We located animals from fall 2007 to spring 2009 and estimated bobcat home ranges and core areas seasonally. For each bobcat relocation, we determined intensity of coyote use, distance to water, small mammal biomass, and mean small mammal biomass of the home range during the season the location was collected. We built generalized, linear mixed models to determine which factors best predicted bobcat space use. Coyote intensity was a primary determinant of bobcat core area location. In bobcat home ranges with abundant prey, core areas occurred where coyote use was low, but shifted to areas intensively used by coyotes when prey declined. High spatial variability in basal prey abundance allowed some bobcats to avoid coyotes while at the same time others were forced into more risky areas. Our results suggest multiple behavioral strategies associated with spatial variation in basal prey abundance likely allow IG prey and IG predators to coexist.



REFUGE VEGETATION, WILDLIFE, & LIVESTOCK



Over the last 5-year period we have witnessed highly variable rainfall going from the second wettest year on record in 2007 with 57.7 inches to the driest year on record in 2011 with 13.3 inches. The last several years of rainfall have shown wide fluctuations around our long-term average of 36 inches. Wetlands and lakes have been dry for almost a year, which is longer than usual.

Welder Wildlife Foundation Fellow Steven Goertz recently assisted Terry Blankenship with sampling 150 permanent Refuge vegetation transects. They performed a summary of brush data for comparisons with data collected in 1975. This summary indicates honey mesquite (*Prosopis glandulosa*), blackbrush acacia (*Acacia rigidula*), agarito (*Berberis trifoliolata*), and lime pricklyash (*Zanthoxylum fagara*) had the highest canopy cover in 1975. Mesquite, huisache (*Acacia farnesiana*), and lime pricklyash had the highest canopy cover in 2012. Huisache is a species of particular concern for most landowners, and it increased from 0.7% to 8.4% cover on the Refuge during this period. Steven is analyzing the WWF long-term vegetation data set, and he will be quantifying and providing more detail on changes that have occurred over this 37-year period. The most concerning change is the difference in brush cover from 25% to 51% between 1975 and 2012. Future analyses of herbaceous species will address long-term compositional changes. Much to our concern, we have seen a steady increase in old world bluestems and a concomitant decrease in native herbaceous species on these transects over time.



Wildlife populations have been impacted during the recent drought and in 2012 the Headquarters compound javelina (*Tayassu tajacu*) herd has declined from 14 animals to 4. Long-term rodent sampling also indicates rodent numbers being at a low for 2 to 3 years. Past data would indicate it is time for rodent numbers to increase, but numbers will likely remain low because of weather patterns. Deer density remains in the 1 deer per 12 acre range, and long-term fawn survival is 29%. Christmas Bird Counts have indicated range shifts in 3 bird species, white-tipped doves (*Leptotila verreauxi*), green jays (*Cyanocorax yncas*), and great kiskadees (*Pitangus sulphuratus*).

We are currently leasing cattle grazing rights on the property. This is a change from our previous cow-calf program to a stocker operation. With the extremes we have seen in rainfall over the last several years, we hope this strategy will provide more consistent income and flexibility to manage livestock numbers. We will continue to use livestock as a tool to manage vegetation, and this may become more important as we deal with increasing densities of old world bluestems.



CONSERVATION & OUTREACH PROGRAMS

We proudly report that more than 18,000 people either visited the Welder Wildlife Refuge or directly participated in the Foundation's Conservation Education and Outreach Programs during 2009–2011. This is approximately 5,000 more people than we reported for the prior 3 years. Over this time, the Foundation provided 82 youth (K-12) and 20 university group programs, 66 workshops, field days and courses, and 71 outreach events.

Over the past 18 years, the Foundation has reached an average of 3,800 people annually. Amazingly, over the past 3 years we have been able to reach nearly 5 times the annual average. How did we accomplish this? We did so because of the extraordinary efforts of our outstanding staff of educators and volunteers.



Education Specialists

We are fortunate to have had an excellent cadre of educators working with us over the past 3 years. The position of Education and Volunteer Program Coordinator was first established at the Foundation in 2010 with a grant from the Ed Rachal Foundation. Mandy Corso was the first person to fill this position, and she did an excellent job of getting the position off the ground. Having this new position freed up time for other WWF staff to fulfill additional duties or work with more groups. When Mandy moved on to a new position in 2011, she was replaced by Dr. Liz Bates. Liz has a Ph.D. in wildlife science, as well as Masters degrees in both wildlife science and education. Consequently, her background is particularly well-suited for this position and she has done a stellar job of continuing to expand and refine the Foundation's Conservation Education and Volunteer programs.



The role of Conservation Educator has been filled by 3 Masters students from 2009-2011, Amy Potts (Tarleton State University), Ashley Whaley Exendine (Southeast Missouri State University), and Sarah Kahlich (Sul Ross State University). They each have brought their own style and ideas to the Education Program, and have reached out to engage many K-12 students over the past several years. We thank them for all that they have done to make the program a standard of excellence.



CONSERVATION & OUTREACH PROGRAMS

Public Tours

Public tours are conducted Thursdays from 3:00 to 5:00 p.m. and on selected Saturdays during the year, excluding holidays. Tours begin with a visit to the Foundation's headquarters and museum where visitors are introduced to the Foundation's origin, mission, goals, and programs. The museum houses an array of south Texas wildlife and art. This introduction is followed by a 10-mile tour of the Welder Wildlife Refuge conducted by Foundation personnel or volunteers. The tour takes visitors through a variety of habitats ranging from upland mesquite-mixed-grass communities to freshwater lakes and wetlands.



Special Programs and Tours

Ecology, nature, and special-interest groups often arrange organized Refuge tours designed and led by our staff. Groups of 10 or more people are welcome to make arrangements with us for these programs.

K-12 School and University Programs

WWF educational programs, specifically designed for K-12 and college students, consist of 1 to 2 days of conservation and field activities focusing on south Texas ecology. Our newest components are field-based rangelands and wetland education curricula developed and initiated with aquatic science and biology classes from regional schools. Foundation staff and volunteer educators often visit classrooms to assist with program-associated activities. The Wildlife Conservation Leadership Club was formed at Sinton High School to provide in-depth participation with students interested in conservation. Club meetings are organized and facilitated by Foundation personnel.



Teacher, Naturalist, and Landowner Education Programs and Field Days

Adult programs, workshops, and field days of interest to the public - particularly teachers, youth leaders, and landowners - include workshops on birding, wildflowers, wildlife management, and range ecology. Staff members are available and eager to participate in outreach programs throughout the year. We occasionally host Project WILD, Aquatic WILD, Project Learning



CONSERVATION & OUTREACH PROGRAMS

Tree, Leopold Education Project, Adopt-a-Wetland, and National Archery in the Schools Program workshops. We believe we can indirectly reach many young people with conservation concepts through our field-based adult and teacher education programs. Our teacher programs provide training designed to aid teachers in taking their students into the field to stimulate interest in learning about the natural world. We predict this field-based, hands-on approach and enthusiasm for learning will be passed on to their students.



We also provide 1 or 2 landowner and manager workshops per year. Topics for these workshops range from management of individual wildlife species to management of wildlife habitat.

Conservation Across Boundaries®

Conservation Across Boundaries® is an innovative, graduate-level, college course for teachers. Its purpose is to enhance wildlife conservation by educating teachers about biology, ecology, and conservation issues unique in diverse ecosystems of Texas and Montana. Regional history, culture, and land-use practices are incorporated to demonstrate how these factors have shaped the landscapes of the regions. Computer technology, including systems modeling and geographic mapping, is integrated into the course. These skills, when taken into the classroom, will help students conceptualize wildlife, natural habitats, and conservation issues in a systems context. Our ultimate goal is to produce citizens who understand solutions to wildlife and natural resources issues must be made based on developing an understanding of the causes and wide-ranging implications underlying such problems. The course

originated as a partnership between the Rob and Bessie Welder Wildlife Foundation and the Boone and Crockett Club. In 2010–2011 we initiated an additional partnership with the Chihuahuan Desert Research Institute to host 2 Texas-based Conservation Across Boundaries® courses. These courses focus on differences in south and west Texas ecoregions and their associated conservation issues. In 2009–2011 we hosted 4 Conservation Across Boundaries® courses and reached 73 teachers from 9 U.S. states.





CONSERVATION & OUTREACH PROGRAMS

Rangelands: A Conservation Education Guide

The Rangelands project, which includes the ***Rangelands: A Conservation Education Guide*** curriculum and professional development for teachers, began in 2006 when Dr. Selma Glasscock and Jaime Winans, a Welder Wildlife Foundation Fellow, developed the core concepts addressed by the curriculum. Jaime developed the lesson format, outline of activities, and initial lessons.



The mission of the Rangelands project is to develop student awareness and appreciation of the importance of rangelands and natural resources in K-6 grade students through investigations of rangeland attributes including landscapes, plants, wildlife and livestock, rangeland ecology, and land stewardship; and to provide a teacher-friendly instructional program that will be inexpensive.

In 2008, the project took off when we received a Coastal Impact Assistance Grant of \$51,000 enabling us to hire Dr. Sandra Johnson, a well-respected Texas science education specialist, to continue curriculum development and alignment of activities to the state curriculum standards, the Texas Essential Knowledge and Skills (TEKS).

The 27 student-centered Rangelands lessons, which include 3-8 activities each, provide appropriate learning activities for students of different ages and abilities, and use hands-on, real world science and social studies investigations. The curriculum focuses on science, integrates social studies, utilizes language arts, math and technology skills, and documents core TEKS with each activity.



Classroom implementation began with small teacher workshops for school districts near the Welder Wildlife Foundation. Ashley Whaley Exendine, a Welder Fellow, is using feedback from these teachers to evaluate the curriculum for her master's research. In 2011-2012 workshops were expanded to other parts of Texas. Professional development for teachers is being planned and conducted by Dr. Johnson. Sixty teachers attended a Rangeland mini-workshops at the 2011 Conference for the Advancement of Science Teaching. In spring and summer 2011, 5 Education Service Center Regions in Corpus Christi, San Angelo, Austin, Ft. Worth, and Victoria hosted workshops for 150 teachers. We anticipate this year these teachers will use these activities with at least 3,300 students. Future plans are to reach additional Education Service Centers to expand our education of the students of Texas in the importance of rangelands and their stewardship for the well-being of our state.



CONSERVATION & OUTREACH PROGRAMS

Conservation Leaders for Tomorrow

Conservation Leaders for Tomorrow (CLFT) (<http://clft.org/>) is a nationally-recognized professional development program designed for student and professional leaders in natural resource sciences. CLFT focuses on raising conservation education and hunting awareness among students in academic programs and staff at government agencies. Currently CLFT involves participation from more than 40 universities and 20 government agencies. The program operates 12 workshops annually at 7 facilities nationwide. The Welder Wildlife Foundation is the site for training in Texas. An instructor training was held at the Foundation in spring 2011, and a student training in 2012. Thirteen wildlife biology university students participated in the 2012 training. These students were identified by their college professors as future leaders in the field of wildlife science. Funds awarded to the Foundation by the Harvey Weil Sportsman Conservationist Trust were used to support participation of the students and 14 instructors in the first Conservation Leaders for Tomorrow Student Training in Texas.



Welder Wildlife Foundation Annual Youth Hunt



The Welder Foundation is committed to ensuring the continuation of our hunting heritage. One weekend each year, WWF sponsors 6 or 7 young hunters who participate in a youth hunt organized through the Texas Youth Hunting Program and led by trained Huntmasters. Accompanied by their parent or guardian, 20 young people participated in hunts on the Welder Wildlife Refuge during years 2009 – 2011.

Any child interested in participating in these hunts may sign up through the Texas Youth Hunting Program website www.tyhp.org.

Contact Information:

For more information on our WWF education programs or tours contact our Conservation Education Program Coordinator at 361-364-2643 or conservationeducator@welderwildlife.org.



VOLUNTEER PROGRAM



The Welder Wildlife Foundation is fortunate to have an active Volunteer Program. Our volunteers have definitely been productive over the past 3 years. The Foundation has over 50 volunteers who together have reported more than 7,300 hours from 2009 – 2011, with an estimated value of \$149,868 calculated according to The Independent Sector. Our volunteers help with a variety of projects ranging from maintenance tasks to working with our education program and continue to make vital contributions to the Foundation.

Projects assisted with or led by WWF volunteers from 2009 – 2011 include:

- Writing and implementation of a Birding Classic grant for invasive species control
- Planning, construction, and maintenance of the Welder Grass Garden/Water Catchment System and CONE Native Plant/Butterfly Garden
- Maintenance of nature trails and updating trail guides
- Writing and editing the Rangelands Curriculum and conducting associated teacher training workshops
- Conducting WWF education and outreach programs
- Scanning and archiving documents in WWF scrapbooks
- Development of newspaper articles and press releases
- Publication of WWF newsletters
- Leading public tours
- Running the Monitoring Avian Productivity and Survival (bird banding) station
- Repairing mist nets
- Maintenance of our collections
- Building and running traps for cowbirds
- Construction of specimen trays for our natural history collection
- Running the WWF Youth Hunt
- Photography of WWF events
- WWF workdays

The WWF staff is greatly appreciative of the time and hard work the volunteers have put forth over the years. We honor our volunteers each year with an annual Volunteer Appreciation Dinner. The dinner takes place in December and recognizes the volunteers for their hard work throughout the year. In 2009 the “Golden Duck Award” was established. This award is given to a single volunteer each year in recognition of that volunteer’s outstanding contribution to the Foundation. Past recipients include Dr. Sandra Johnson (2009), Kris Kirkwood (2010) and Ray Kirkwood (2011). Special recognition also goes to Bill and Sharon Draker who donated the wonderful wildlife photos in this report and to Neal Johnson for his great people and event photos.

Thank you to all our volunteers for making the last 3 years a great success!



DISSERTATIONS, THESES & PUBLICATIONS

Dissertations & Theses

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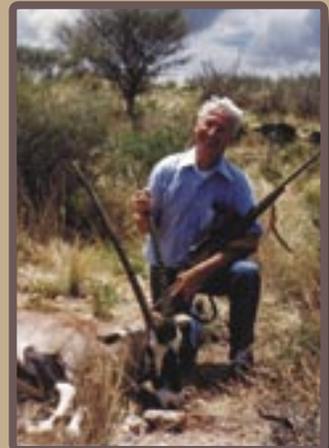
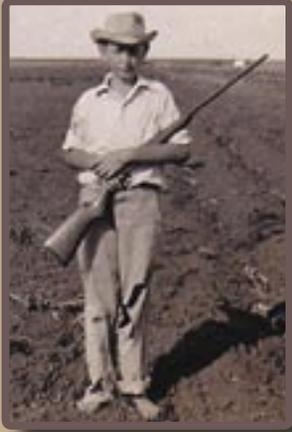
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