Caesar Kleberg Tracks

A Newsletter from the Caesar Kleberg Wildlife Research Institute

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Learn More About CKWRI

The Caesar Kleberg Wildlife Research Institute at Texas A&M University-Kingsville is a Master's amd Ph.D. Program and is the leading wildlife research organization in Texas and one of the finest in the nation. Established in 1981 by a grant from the Caesar Kleberg Foundation for Wildlife Conservation, its mission is to provide science-based information for enhancing the conservation and management of wildlife in South Texas and related environment.

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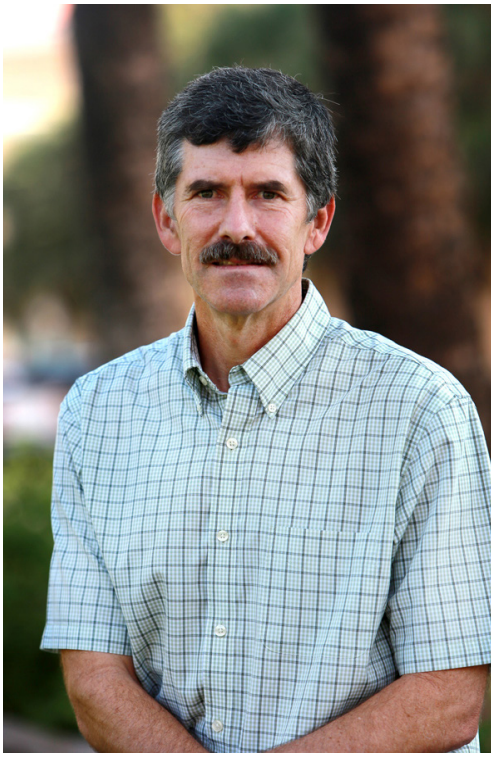
Cover Photo by Zachary Pearson

From the Director

by Dr. David Hewitt- Leroy G. Denman, Jr. Endowed Director of Wildlife Research



Dear Friends,

Every New Year brings changes, and 2017 is no different. The Caesar Kleberg Wildlife Research Institute enters the New Year under new leadership for the first time in 20 years. As most of you know by now, Fred Bryant retired as Director of the Institute in October 2016, ending a remarkable tenure during which the CKWRI grew and thrived. Although no longer serving as Director, Fred will continue to dedicate his passion and talents to the CKWRI in a half-time position directing the Institute's development activities.

I have the pleasure and honor of being selected as the fourth Director of the CKWRI. Having started work at the Institute on the same day as Fred in 1996, I have watched the Institute grow and develop under Fred's leadership. Over the course of these 20 years, I have come to appreciate and recognize what makes the CKWRI unique and why it works. I understand that landowner trust is the base on which we build research and educational programs that serve South Texas, the entire Lone Star State, and wildlife throughout North America. I understand that working closely with wildlife managers ensures our research is relevant. I appreciate the outstanding students, staff, faculty, and advisory board that are the heart of the CKWRI. I understand that being a privately funded research institute in a public university allows the CKWRI to be nimble and innovative, to bring the best science to bear on conservation concerns, and to develop unique programs to fill gaps in wildlife and habitat conservation.

As Director, my goal will be to protect and nourish these features that have made the CKWRI so successful. We will continue to serve landowners, hunters, and wildlife enthusiasts who have a passion for Texas' flora and fauna. We will continue to conduct applied research and to share these research results with ranch managers and the general public. And, we will continue to make outstanding graduate education a priority so the Institute's values can be shared widely as our graduates enter the workforce and ascend to positions of prominence across the nation.

In addition to recognizing Fred Bryant's long-time dedication to the CKWRI, I also wish to extend my utmost appreciation to Fidel Hernandez who has not only served as Deputy Director for the past 2 years but also stepped-up to serve as Interim Director since Fred's retirement. Fidel's selfless service is another example why the CKWRI is on the leading edge of wildlife conservation and is a fabulous place to work.

So, it is with great anticipation and excitement that I ask you to help me welcome 2017 and usher in a new chapter in the CKWRI's proud history.

Respectfully Yours,

David Hewitt
Leroy G Denman, Jr. Endowed Director of Wildlife Research

American Alligators: From Endangered Species to Nuisance Big Game

by Cord B. Eversole and Dr. Scott E. Henke Photos by Damon Williford

When you think of alligators, what comes to mind? Do alligators remind you of ancient throw-backs to the days of dinosaurs? Do they bring to mind fierce eating machines that are vicious predators? Or do you think of alligators as a vulnerable species that requires human protection? In reality, all of the above scenarios are true to a certain extent. Alligators first walked on earth during the Paleocene epoch about 37 million years ago and have not evolved much phenotypically since that time. Although alligators are carnivorous predators that do eat a variety of animals, they are not necessarily the killing machines that are sensationalized by Hollywood in such movies and television shows as Lake Placid and Swamp People. Lastly, the American alligator was listed as an endangered species in 1967 because of market hunting, poaching, and loss of wetlands. It only has been through the help from humans that alligator numbers have rebounded and they now have been removed from the threatened and endangered list.

However, does this mean that alligators no longer require help from humans? Not so according to two CKWRI researchers, Dr. Scott Henke and PhD candidate Cord Eversole. They have been studying alligators in south-central Texas for 6 years and have learned much about the ecology and behavior of the American alligator and have been able to dispel several myths about them.

Alligators are an iconic wetland species that can be found throughout the southeastern United States; the eastern half of Texas is the far western range distribution for the species. Today, alligators have been delisted from the threatened and endangered list and their recovery has been attributed to harvest restrictions and wetland conservation. Studies, like those of Eversole and Henke, have helped in the conservation efforts of the American alligator.

American alligators are known to be a long-lived species and reach sexual maturity at a minimum size rather than by a certain age. Statewide management strategies for alligators have been developed from harvested populations; however, a generalized population model and management plan may not be appropriate for the American alligator. Also, many of the concepts for alligator

management were based on information about alligators from other regions of the United States. Eversole and Henke hypothesized that population demographics of alligators vary by habitat type, habitat condition, geographic region, and alligator density. Eversole and Henke also saw that the newly rebounded population of alligators was resulting in an increase in nuisance alligator reports in Texas. Therefore, a study was developed by the two researchers to 1) identify trends in nuisance American alligator reports in the State of Texas; 2) determine public opinion about alligators and their management; 3) quantify alligator clutch size and hatchling production of captive and wild alligators; 4) determine the effect of drought on alligator production; 5) determine demographic differences in growth, condition, and age of alligators; 6) determine how time of night and month affect estimated density of alligators from nighttime surveys; 7) determine which environmental factors have the greatest effect on nighttime activity of alligators; and 8) develop a model to predict population size of alligators among the variables mentioned above. The assignment appeared daunting, but Eversole and Henke chipped away at each piece until the task was complete.

Eversole and Henke first studied the trends in nuisance alligator reports received by Texas Parks and Wildlife Department. They found that Texas received 5,838 nuisance alligator reports during 2000 to 2011 and reports increased with each year. The coastal counties of south-central Texas (Jefferson, Fort Bend, Matagorda, Brazoria, Harris, Jackson, Orange, Chambers, Calhoun, and Liberty counties) constituted >80% of the nuisance calls. The most common nuisance conflict was that of a medium-sized (~5 feet) alligator traveling through a residential area, of which >50% were resolved by lethal means.

Contrarily, public opinion supports non-lethal alligator removal programs, according to a survey conducted by Eversole and Henke, but also those same surveyed people were unwilling to allow alligators to be relocated near their homes. Overall, Eversole and Henke found that the general public had a very cursory knowledge concerning alligators and that an education program concerning alligator behavior would be beneficial, especially in south-central Texas where the most nuisance issues arise.

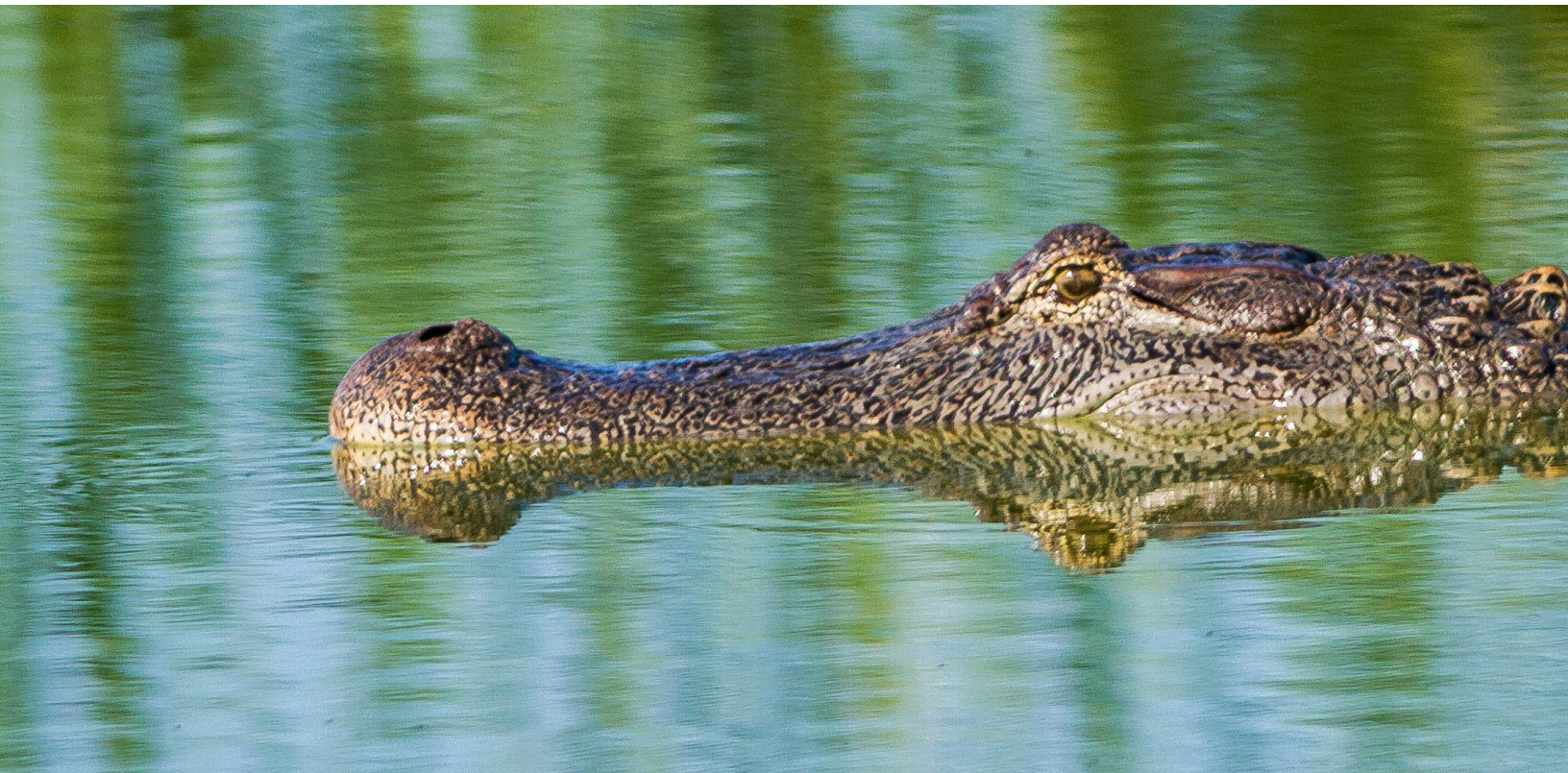
To help alleviate nuisance issues, but also to be mindful of public opinion, Eversole and Henke investigated the concept of translocation of nuisance alligators as a viable management option. However, for translocation to be successful, alligators must not return to their former range, must not create nuisance issues or ecological problems in their new home, and must survive the translocation process. They captured 5 nuisance alligators, outfitted them with GPS satellite tracking transmitters, and relocated them about 100 miles either north or south of their capture site. The researchers found that, although alligators did not return to their home, they also did not remain at their relocation site.

Instead alligators wandered for several months until they established a new area about 20 miles from their translocated release site, on average, where they became more sedentary in their behavior. It appears that translocation is a viable option for nuisance alligators in lieu of lethal control; however, a 20-mile radius of the surrounding area must be considered to determine if a translocation site is appropriate and safe to release a nuisance alligator.

Next the two CKWRI researchers focused their attention on alligator reproduction and growth. They quantified hatching success of 902 wild American alligator nests collected during 2007-2012. The average alligator nest contained 37 eggs, of which 32 eggs were viable (86%), but only 23 (61%), on average, hatched. It was determined that drought conditions played a critical role in the causation of non-hatching fertile eggs. In addition, the research duo placed 21 hatchling alligators in captive tanks in groups of 2 or 5 alligators per tank. Alligator growth was slow until they became 8 months of age, at which both genders grew substantially during June through August with males growing at a faster rate than females. During the growth spurt, a dominancy hierarchy was established, irrespective of gender and size, and hatchling survival declined to 67% and 40% for those held in groups of 2 and 5, respectively. Growth nearly ceased during autumn and winter months. It appears that despite and abundant food supply, cover sites, basking sites, and temperature and water quality conditions, available living space also may be an important factor to young alligators.

Alligators reach sexual maturity at a given size (approximately 6 feet in length) rather than at a certain age. A common belief is that alligators grow about 1 foot per year; therefore, alligators become sexually mature when they are 6 years old. The research team of Eversole and Henke captured, marked, and recaptured alligators in south-central Texas to determine that this belief does not hold true across all size classes of alligators. Hatchling alligators did grow about 12 inches in a year, but larger alligators grew only half as fast, about 5-6 inches in a year's time. Age estimates of alligators about 6 feet in length averaged 13.6 years. This means that alligators are twice as old as previously thought before they reach sexual maturity and add to the recruitment of the population. Also, female mean body condition reduced with each subsequent age class, which may be linked to sexual maturity and egg production. This new information concerning alligator growth, condition, and age needs to be incorporated into management strategies that affect alligator population dynamics in Texas, and substantiates the need to avoid a 'one-size-fits-all' approach to alligator management.

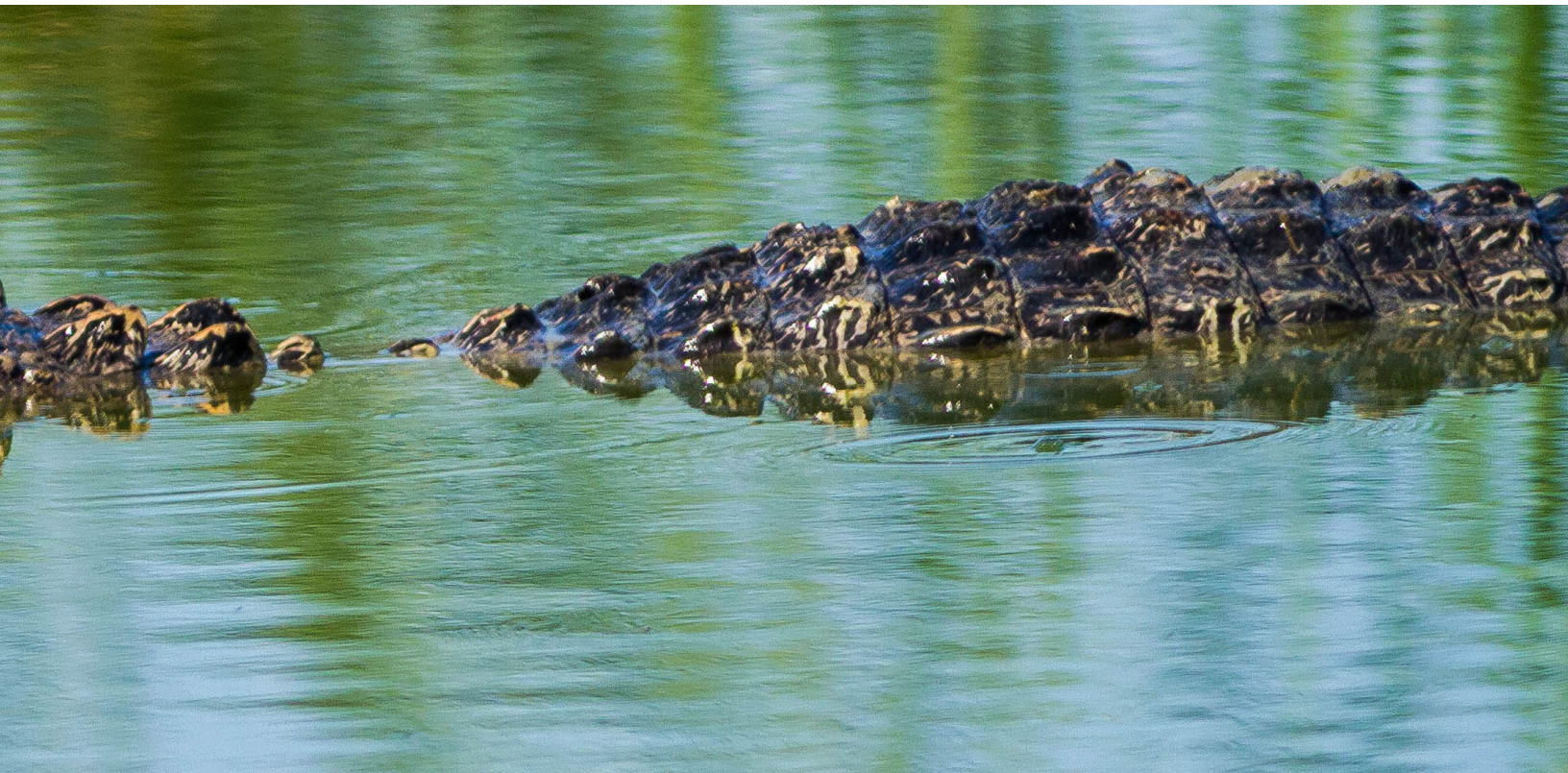
Nighttime surveys are a common method for monitoring alligator populations. Unfortunately activity pat-



terns can differ among the various size classes of alligators, which can affect population estimates. Therefore, Eversole and Henke conducted monthly surveys of several lakes in south-central Texas and during varying times throughout the night. From the 135 nighttime surveys and nearly 7,700 observations of alligators, they found that hatchlings numbers were unaffected throughout the night, but that sub-adult and adult alligators were observed more readily during survey times 3 to 6 hours after sunset. Also, they found that all size classes of alligators were most readily observed during August than other months during the year. Therefore, CKWRI researchers recommend that annual alligator surveys for Texas be conducted during August each year at least 3 hours after sunset to obtain the most accurate estimates of alligator densities.

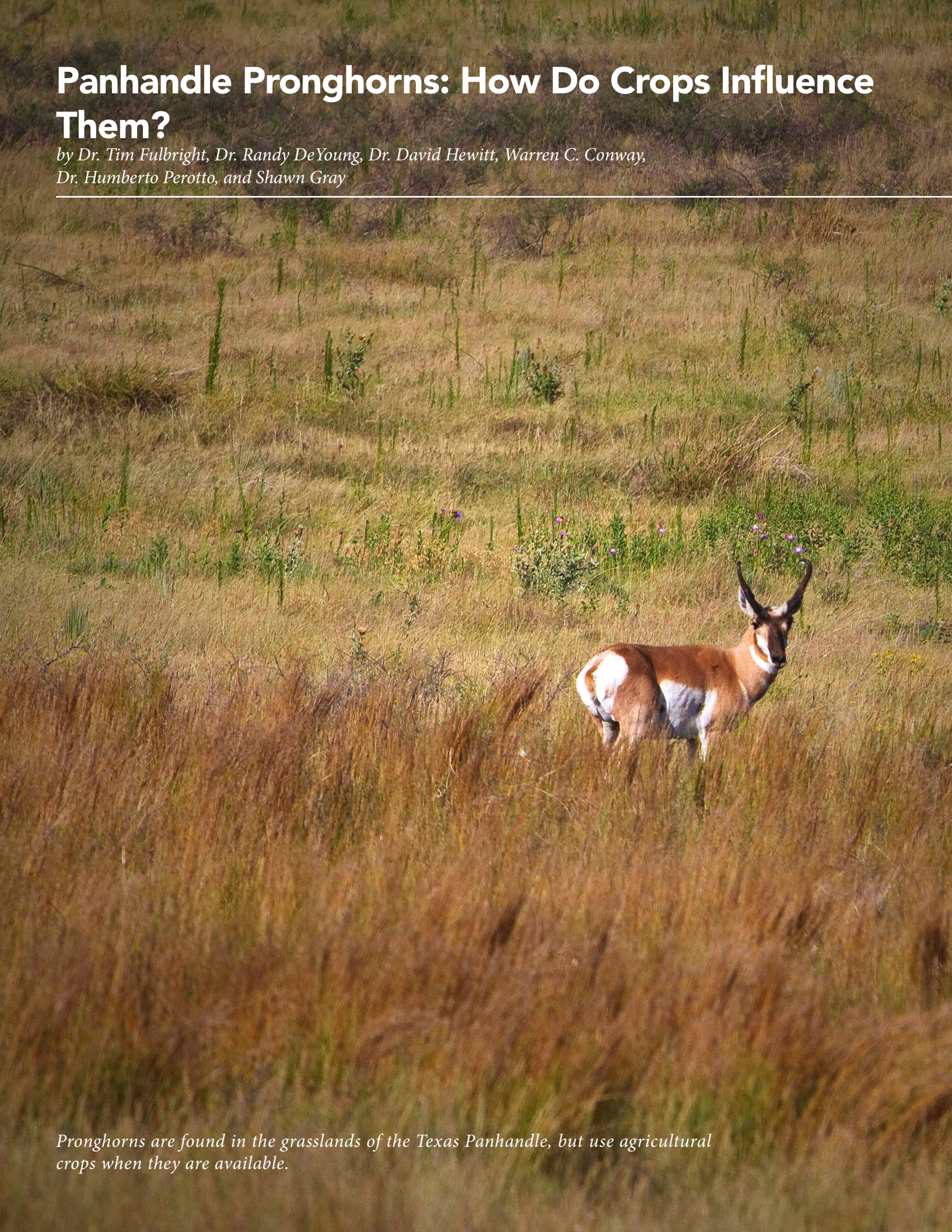
Another common belief about alligators is that they are cannibalistic. Past research suggests that as much as 65% of alligator mortality is due to cannibalism. Eversole and Henke hypothesize that if alligators were cannibalistic, they would depredate hatchlings. Therefore, the researchers collected 62 adult-sized, wild-caught alligators during September 2012, a time when the hatchling population would be at its height. They found only one instance of potential cannibalism, but it was from an equal-sized alligator (i.e., portion of a tail) that could have resulted from a dominancy fight or possibly been a scavenging event, rather than an act of cannibalism. Instead, the researchers found that food habits varied by size class and gender. Smaller-sized adult males ate more reptiles, whereas, similarly sized females consumed more fish. Large females ate more birds; whereas, large males consumed more mammals. The CKWRI researchers did suggest that perhaps the alligator density within their study was not sufficient to elicit cannibalistic behaviors.

Currently the two CKWRI researchers are developing a harvest model to better manage the Texas population of alligators. Current policy of Texas Parks and Wildlife Department is to allow 100% of alligator eggs to be collected from 50% of the alligator nests that are located. However, such a management strategy reduces the gene pool when, for example, egg harvesting is concentrated only on nests located in areas easily accessible by egg collectors. Such harvest strategies potentially can negatively impact the viability of alligator populations, hence potentially reducing populations to threatened levels once again. The researchers' hypothesis is that current harvest levels are not sustainable and that egg harvest has the greatest effect on the overall final population. This component of the alligator research is on-going. Clearly, proper harvest of wildlife species is critical in the implementation of management strategies of this iconic, and once endangered species.



Panhandle Pronghorns: How Do Crops Influence Them?

by Dr. Tim Fulbright, Dr. Randy DeYoung, Dr. David Hewitt, Warren C. Conway, Dr. Humberto Perotto, and Shawn Gray



Pronghorns are found in the grasslands of the Texas Panhandle, but use agricultural crops when they are available.

Pronghorns currently are found in about 27 counties in the Texas Panhandle. Although the fleet-footed animal called an "antelope" by many folks has long been an iconic resident of the plains, we know very little about the movements, spatial distribution, and habitat use of pronghorns in the Panhandle. Once a vast shortgrass prairie that seemed unending to travelers in the 18th century, the Panhandle landscape today is a patchwork of prairie, crops, and small towns. Much of the cropland is irrigated out of the Ogallala aquifer, an incredible and extensive underground lake that has been tapped by farmers and urbanites alike for decades.

Agricultural crops, particularly when they are irrigated, provide abundant, high-quality forage. Although one typically does not think of farmland as habitat for pronghorns, presence of high-quality forage makes crops highly attractive to them. In fact, crops are so attractive that some Panhandle farmers are concerned about just how much the critters are eating. Caroline Ward, one of our graduate students, recently completed her master's thesis on radio-collared pronghorns. Caroline found that near Pampa, Texas, more than a quarter of radio-collar relocations during April to October 2014 occurred in agricultural crops. This shows that much of the time pronghorns spent in agricultural crops.

We are initiating a new research project in January 2017 in collaboration with Texas Tech University and Texas Parks and Wildlife Department to determine how much use pronghorns make of agricultural crops in the Texas Panhandle. Texas Parks and Wildlife Department is providing funding for the project. We will use study areas near Dalhart and Pampa, Texas. We plan to place GPS collars on 32 pronghorns at each site, half of them male and half female. These collars have the capability of transmitting GPS locations to satellites. We will collect locations of each animal every couple of hours, which will give us an extensive record of where the animals are at all times of the day. We will track the animals for 2 years to determine their movement patterns with respect to agricultural crops, and to determine how much time they spend in cultivated areas. With the information we collect, we will be able to get a handle on how much use they make of different types of crops, and how dependent the pronghorn population is on availability of dryland and irrigated crops versus rangeland.

Researchers in Kansas and Colorado have found that pronghorns spend considerable time foraging in winter wheat fields. This was initially a cause of concern for farmers in the region. However, researchers found that pronghorns typically shift patterns of use from winter wheat fields to rangeland before winter wheat matures sufficiently to be damaged by them. Concerns among Texas landowners about crop damage might be partly alleviated if pronghorns use crops such as wheat and winter rye in early growth stages and then shift foraging activity to rangeland before the crops are susceptible to damage.

In addition to developing a better understanding of the use of crops by pronghorns, we will also examine how landscape features such as highways, ranch roads, fences, and water availability influence movements and behavior. Identifying landscape features that may constrain or act as barriers to pronghorn movements will aid wildlife biologists in managing landscapes to minimize the effects of habitat fragmentation on the species. Knowledge of areas where pronghorns aggregate and identification of the portions of the landscape most heavily used by pronghorns will assist in allocation of hunting permits and population monitoring since animals may be clumped in portions of their range.

Our study will help biologists develop a better idea of how future changes in the Panhandle may influence pronghorn populations. The Panhandle landscape will likely support more roads and fences in the future with development of infrastructure such as windfarms and power corridors. The Ogallala aquifer is being depleted, which may result in reduced crop production in the Texas Panhandle in the future. Our research will provide insight into how the presence of more human-imposed structures and reduced crop production may influence pronghorn populations in the future.

Montezuma Quail in the Edwards Plateau

by Dr. Eric Grahmann and Zachary Pearson

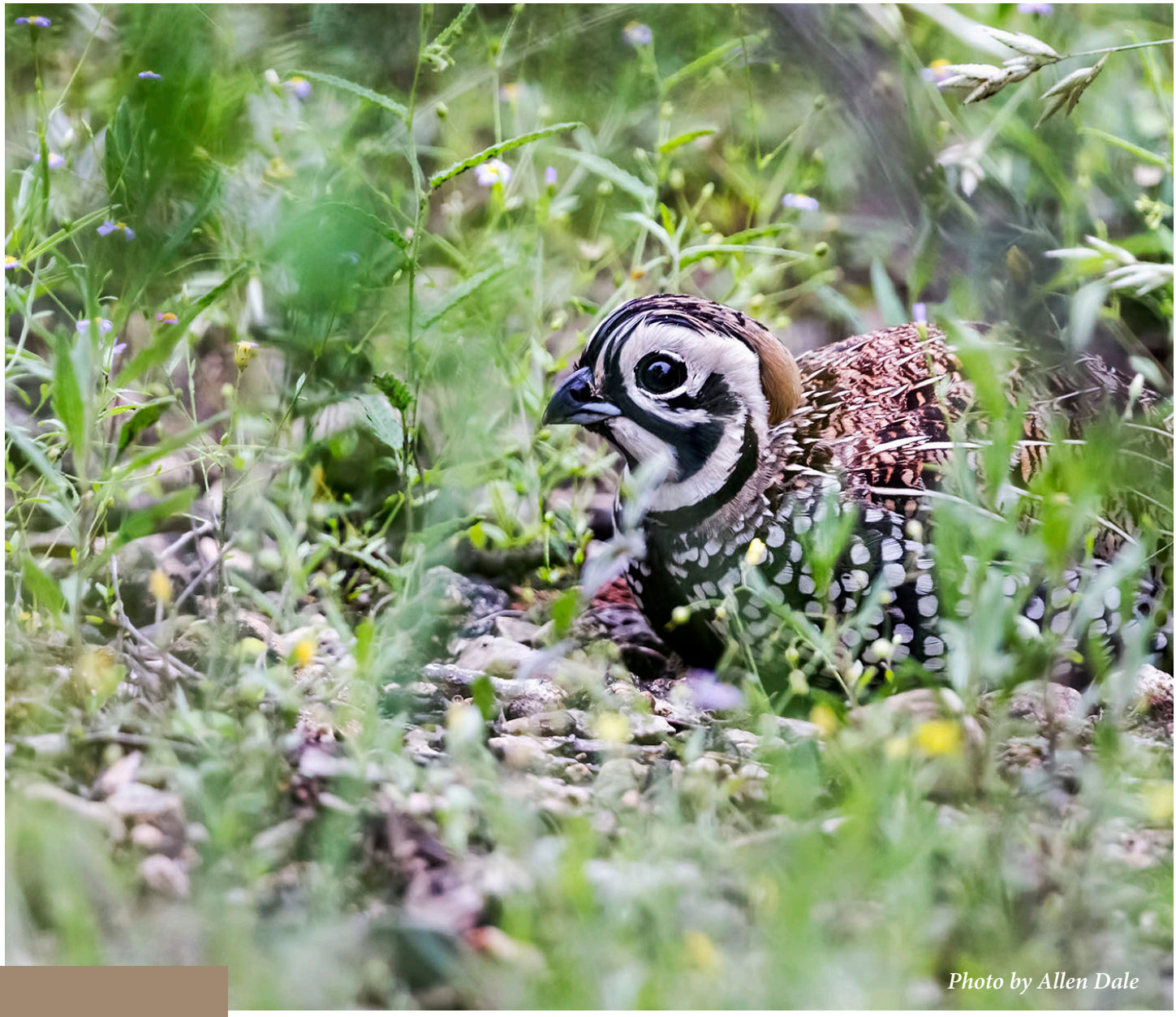
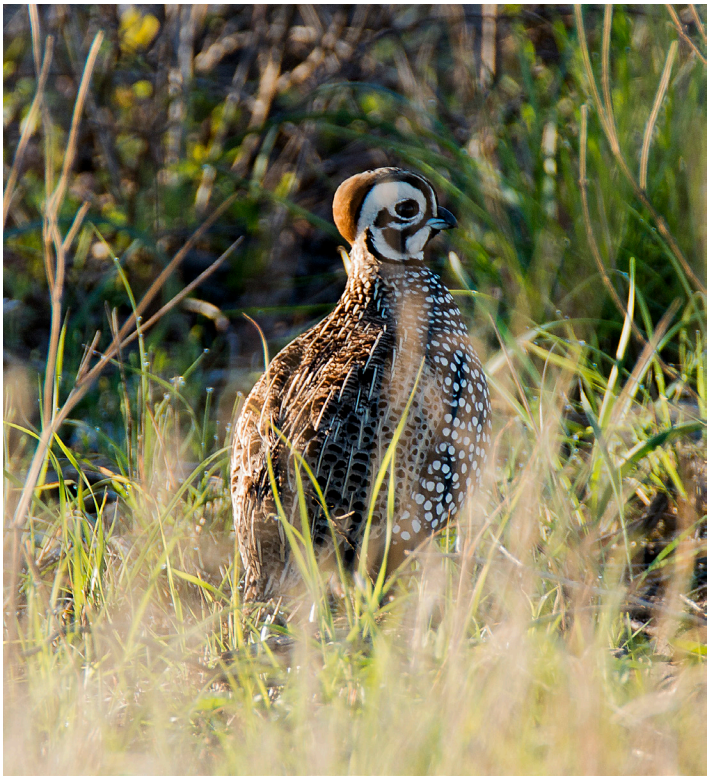


Photo by Allen Dale

THE MONTEZUMA QUAIL IS A SECRETIVE GAMEBIRD NATIVE TO THE MOUNTAINOUS REGIONS OF MEXICO AND THE SOUTHWESTERN US. IN TEXAS, THE MONTEZUMA QUAIL CAN BE FOUND IN THE MOUNTAINS AND HILLS OF WEST TEXAS (E.G. DAVIS, DEL NORTE, AND GLASS) AND THE SOUTHERN EDWARDS PLATEAU. THEY HAVE BEEN PRIMARILY STUDIED IN ARIZONA, MEXICO, AND TO A LESSER EXTENT WEST TEXAS. HOWEVER, LITTLE RESEARCH HAS BEEN CONDUCTED ON THIS SPECIES IN THE EDWARDS PLATEAU.



A male Montezuma quail in the Southern Edwards Plateau. Sightings have increased over the past few years as this bird may be increasing with more compatible land use practices and favorable weather patterns. Photo by Sandy Hurwitz

Historically, these birds were found in nearly every county within the Edwards Plateau, but due to incompatible land use practices (e.g. overgrazing by livestock and fire suppression), their populations declined sharply during the past century. By the 1970's, Montezuma quail in the Edwards Plateau were reportedly restricted to a handful of ranches centered in and around Edwards County. Later, this species was documented in several other localities by researchers (Albers and Gehlbach 1990 and Gonzalez-Sanders 2008) and now retired Texas Parks and Wildlife Biologist Sylvestre Sorola.

Although it is known that a population of Montezuma quail existed in the Edwards Plateau into the 90's, their population status to-date is unclear. Conflicting reports suggested that this species was rare and uncommon, while simultaneously, sightings by private landowners have increased over the past 10 years.

In response to this general lack of information and growing interest in the species, we initiated a study in cooperation with the Texas Parks and Wildlife Department to tackle some challenging questions. These basic questions included 1) what is the current geographic range of the Montezuma quail within the Edwards Plateau, 2) what constitutes their habitat and 3) how can we refine occupancy sampling techniques for this secretive species?

During 2014, we began a pilot study to locate Montezuma quail by conducting call back surveys along various ranches and roadways across the southern Edwards Plateau. Call back surveys were conducted by playing the buzz call of a male Montezuma quail and waiting for a response or "call back". Montezuma quail were detected on 12 separate ranches in addition to several locations along roadsides. Beginning in 2015, we quantified 1) the vegetation community to define Montezuma quail habitat and 2) weather to understand variables affecting their calling phenology.

Since 2014, over 100 surveys have been conducted across the region resulting in an approximated distribution of Montezuma quail (Fig. 2). This figure is similar to Sylvestre Sorola's (1986) distribution with the exception that the known distribution of Montezuma quail in this region has been slightly extended north and south and westward into Mexico. Unlike Sorola (1986) who predicted Montezuma quail distribution further into the northern reaches of Uvalde County, we have been unable to locate this bird east of highway 55 in Uvalde or Real Counties. Interestingly, this occupied area consists of 2.5 million acres. In comparison, the largest complex (Davis, Del Norte, and Glass mountains) of Montezuma quail habitat in the Trans Pecos region is about 2.3 million acres.

Although the Montezuma quail range in the Edwards

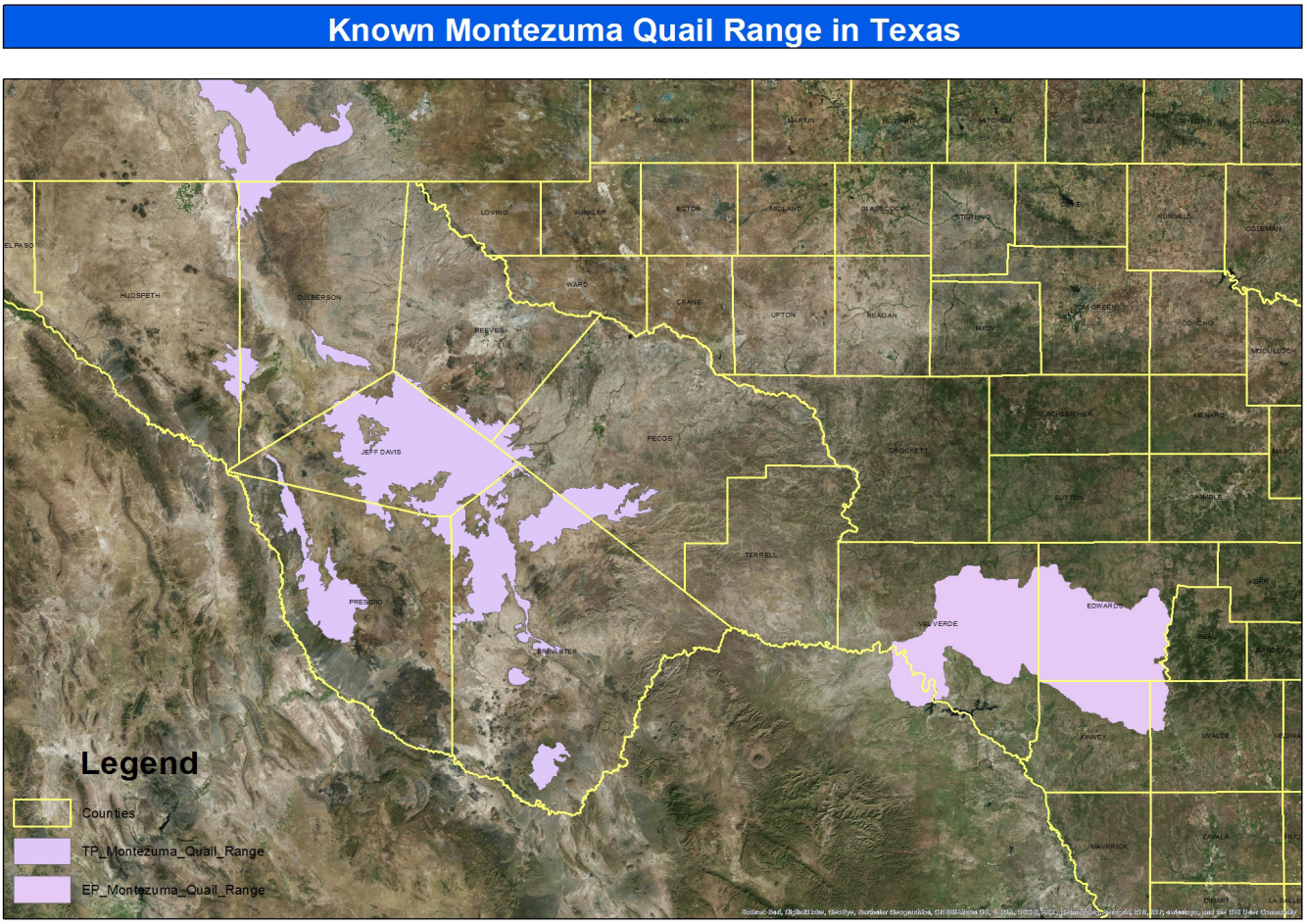


Figure 2. The known range of Montezuma quail in Texas. Montezuma quail once occupied nearly every county within the Edwards Plateau. Today, they occur mostly in Edwards, Val Verde and northern Kinney Counties.

Plateau may be larger than the Davis, Del Norte, and Glass mountain complex, population size in the Plateau is likely lower. For example, we sampled a variety of terrain for Montezuma quail across the region and found that the majority of occupied sites were located on hillsides (55%) and hilltops (35%). Only 10% of survey sites were occupied in valleys. Furthermore, occupancy rate decreased as juniper coverage increased. As a comparison to these occupancy rates in the Edwards Plateau, nearly all sites sampled in the Davis Mountains of West Texas were occupied during Gonzalez-Sanders (2008) study.

Another aspect of our study was to determine the best conditions to survey for Montezuma quail via the "call-back" method. Montezuma quail are not only secretive by preferring to stay hidden, but their response to calls (the best know method of sampling) is variable. During the 2 years of our study, Montezuma quail responded to our calls during every month sampled (March - August) and during a wide range of weather conditions. However, most call backs occurred during April when morning temperatures were relatively warm (72-77˚F), humidity was high (>86%), atmospheric pressure was moderate (948-955 hPa), and wind speeds were low (<2 mph). Call-backs were most likely to occur just before a rainstorm, regardless of the month (March - August). We will be using our data to refine our survey window in the Edwards Plateau to the months of April and May when attempting to find other occupied ranges. In addition, survey locations will now be located in proximi-

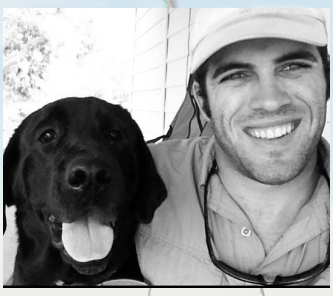
ty to hillsides and hilltops to maximize the chance of receiving a response.

From our 3 years of research, we have found Montezuma quail on most ranches outlined in Fig. 2 when habitat is available (Fig. 3). With increased sightings of this beautiful bird from landowners in addition to further detections on the periphery of their formerly known range, it is possible that Montezuma quail are occupying more area within the Edwards Plateau than 20 years prior. This is exciting information as Montezuma quail were reportedly near extinction in this area just 50 years prior. Over the next year, we will continue to analyze data and survey for these birds on the periphery of their known range. If you are aware of Montezuma quail located outside the distribution outlined in Fig. 2, or if you would like to make a contribution to Montezuma quail research, please contact Dr. Eric Grahmann at the Caesar Kleberg Wildlife Research Institute at (361) 522-9868 or eric.grahmann@tamuk.edu.

Figure 3. Montezuma quail habitat in the Edwards Plateau. Although we have documented these quail using a variety of plant community assemblages, generally, Montezuma quail habitat is described as rolling or steep upland, oak-juniper-pinon savannah with good grass cover and plentiful forbs.

Author's Note:
We would like to thank the private landowners for access to their properties to conduct this research, the Texas Parks and Wildlife Department for funding and assistance, and South Texas and San Antonio Quail Coalition for funding.

Student Highlight



Zachary Pearson

Project: *Habitat Suitability for Montezuma Quail in the Edwards Plateau*

A Texas native, Zachary Pearson grew up in the small town of La Vernia. His passion for wildlife began at a very young age, hunting and fishing with family. This passion grew throughout his high school years as he attended the Texas Brigades summer camps, where he was first introduced to mearns, or montezuma quail. He acquired his bachelors degree in Range and Wildlife Management here at Texas A&M University- Kingsville while working as a wildlife specialist on a private ranch. After short break he returned to begin a masters program studying Montezuma Quail in the Edwards Plateau. The challenge of studying this secretive bird is what attracted Zachary to this project. After graduation he plans to find a job as a biologist with Texas Parks and Wildlife or a private landowner.

Photo by Zachary Pearson

Eagle Ford Shale: Impacts and Solutions

by Forrest S. Smith, Dr. Eric D. Grahmann, and Dr. David B. Wester

The Eagle Ford Shale (EFS) is a globally significant oil and gas reserve that has enormous economic and ecological implications for South Texas. Its economic benefits—mineral wealth for landowners, infusions of capital into local economies, and positive bearing on private and public resource-bases—are inherently positive. Ecologically, however, energy exploration and production in the EFS have had a more somber impact, and one that is not universally positive from the standpoint of wildlife and their habitats. Three broad areas of impact—effects on soils, vegetation, and habitat—are pertinent to wildlife in the EFS.

Natural resource managers value soils as the fundamental resource upon which management and productivity are based. Soil degradation, erosion, or contamination bear heavily on our land's productivity and its sustainable value, not just for wildlife, but for any use. We have addressed two widespread soil concerns: reclamation on mixed soil layers, and salvage and storage of topsoil. When valuable topsoil becomes mixed with saline or alkaline subsoil during pipeline construction, restoration can be a challenge that may require costly measures such as soil amendments and mulching to ameliorate unfavorable physical or chemical properties. Therefore, we recommend conscientious double-trenching to minimize mixing topsoil and subsoil. Topsoil stockpiling is a common practice that sets aside valuable soil for future use. Stockpiling may result in soil degradation because without living plant cover the biotic portion of soil (bacteria and fungi) is diminished. The natural depth gradient that characterizes soil microbial communities in intact (undisturbed) soils is absent in stockpiles; in particular, the top 4 inches of stockpiles have lower amounts of soil microbia than surface layers of intact soils; furthermore, these disturbance-caused differences persist for many years. Thus, although salvaging soil from pads or other production sites has merit, we recommend establishing native vegetation on stockpiles. We also recommend that stockpiles be constructed to maximize benefits of plants growing on them: long, windrowed piles of moderate depth may be superior to single enormous piles of stored soil.

Vegetation concerns in the EFS focus on expansion of non-native plants including buffelgrass, Lehman lovegrass, and Old World bluestems. These plants threaten wildlife habitat because they displace native vegetation critical for wildlife travel, survival, and persistence. Unfortunately, these invasive plants also flourish following disturbance, and without control efforts they commonly dominate vegetation in and around former oil and gas production sites. In an analysis of 30-year old pad sites in the heart of the EFS, we identified more buffelgrass and Old world bluestems close to pads than at random sites in the same pasture. Whether a result of initial disturbance, subsequent traffic, or altered hydrology, the bottom line is that pad sites are reservoirs of non-native grasses in otherwise native-plant dominated areas. Invasive plants also can use disturbed sites as corridors for

Photo by Forrest Smith

expansion that leads to further habitat degradation. We encourage operators to avoid introduction of non-native plants; and we recommend that managers require operators to control undesirable plants with herbicides during early stages of invasion when chemicals are effective in minimizing plant populations as well as future seedbank formation.

In most cases following intense soil disturbance, reseeding is recommended to reduce subsequent erosion. Another vegetation concern in the EFS is use of non-native grasses for restoration. Locally-adapted native seed selections from our South Texas Natives program can restore functional and persistent native vegetation on pads, pipeline rights of ways, and along roads in the EFS more effectively than native seeds from other regions, and are preferable to non-native grasses from the standpoint of wildlife habitat.

Habitat fragmentation and loss is the most profound impact of the EFS on wildlife. Wildlife enthusiasts are rightfully concerned about direct and indirect impacts of EFS development on wildlife. Direct impacts are obvious because wildlife can be killed along roadways; indirect effects include soil and vegetation disturbance that negatively affects wildlife. The actual physical footprint of EFS development is substantial, easily exceeding hundreds of thousands of acres. For every acre converted to a caliche pad, think of one less quail on the landscape. More important, though, are indirect impacts such as habitat and meta-population fragmentation that may not be realized for decades. A recent example of indirect impacts on wildlife is the precipitous decline of scaled quail because of habitat fragmentation via root-plowing and planting non-native grasses. Our research has shown that avoidance of EFS exploration corridors by scaled quail may simply be due to increased vehicle traffic and associated noise. The result is that the very qualities that have historically made South Texas valuable for its diverse wildlife—expansive, undisturbed contiguous native habitats—are rapidly changing in EFS exploration-impacted areas.

The EFS represents an economic boom for many landowners and employees and from this perspective the boom is good. However, South Texas landowners and energy-related industries should heed examples from other regions where expansive development has resulted in irreversible impacts on natural landscapes and their wildlife. Far greater efforts are needed by landowners and industry to orient future development wisely and to minimize negative effects on wildlife habitat. One of the best ways to do so is wise selection of development corridors, thereby concentrating negative impacts in already-marginal areas for wildlife, and avoiding productive habitats altogether. For example, placing a pad string in an area historically root-plowed and seeded to buffelgrass is preferable to clearing virgin land that will require subsequent restoration. When fragmentation is unavoidable, prudent restoration using proper soil handling and locally-adapted native plants should be priorities to restore wildlife habitat and patch connectivity in the future.

The EFS could be the greatest single habitat impact of our generation. By wisely and responsibly addressing soil, vegetation, and habitat issues, future generations will be blessed twice over by our management practices that build today's economy and enhance tomorrow's sustainability. Wildlife and their enriching benefits are far too precious to let go by the wayside in an area as large, expansive, and valuable as the EFS. We can make a difference that matters.

On the Road

South Texas Natives and Texas Native Seed researchers attended the National Native Seed Conference in February in Washington D.C. STN/TNS researchers gave or co-authored 9 presentations, including a half-day session entitled "The Texas Ecotype Approach to Commercial Native Seed Provision and Ecosystem Restoration". The conference was attended by over 300 native seed and restoration professionals from throughout the nation.

The National Native Seed Conference connects Research, Industry, Land Management, and Restoration professionals, providing the premier opportunity to develop relationships and share information about the collection, research and development, production, and use of native plant materials.

Chronic Wasting Disease and Deer Population Dynamics in South Texas

by Dr. Aaron Foley

CWD increases the mortality rate of deer which would reduce hunting opportunities in areas with the disease.

Chronic wasting disease (CWD) is an aptly named transmissible disease that literally causes an infected animal to waste away. The disease is caused by prions, which are an abnormal form of proteins that promote the conversion of normal protein to abnormal protein. Prions eventually accumulate in an infected animal and causes degeneration of the brain. CWD can be directly transmitted via infected deer to uninfected deer and indirectly transmitted via prions deposited into the environment from bodily fluids, feces, and carcasses and from there to uninfected deer. CWD affects members of the Cervid family which includes white-tailed deer, mule deer, elk, moose, and most recently, reindeer. CWD is found in 24 states in the United States and in 2 Canadian provinces. In June 2015, CWD was found in captive white-tailed deer facilities in Texas and has since been detected in free-ranging deer in the Hill Country; thus, there is concern about CWD emerging in free-ranging white-tailed deer populations in South Texas.

CWD-afflicted deer populations in Colorado and Wyoming have declined, whereas no decline, to date, has been observed in Wisconsin. One key difference between South Texas and the other CWD-afflicted states is the variability in environmental conditions. Temperate environments such as Wisconsin and Wyoming generally have consistent warm-cold seasons with occasional severe winters. Thus, fawn production in these areas is typically high and consistent. South Texas, on the other hand, is a semi-arid environment with variable rainfall resulting in variable and, on average, low average fawn recruitment rates. Because fawn recruitment is an important element of deer population dynamics, there is value in modeling the possible effects of CWD on deer populations in variable environments such as South Texas.

My colleagues and I developed a mathematical model based on data from portions of King Ranch, a large ranch in South Texas. Deer harvest was light (~2% annually), no supplemental feed was provided, and deer counts were conducted annually for 20 years. We used changes in deer population size during this 20 year period to evaluate whether our model was able to forecast deer population size comparable to what was observed. Our model incorporated age-specific annual survival rates for males and females, fawn recruitment rates (fawn:doe ratios), and rates of hunter harvest. The predicted number of deer in the model was similar to the number of deer observed annually during the deer counts, suggesting that our model was able to produce realistic projections in deer population size.

We then added CWD parameters to the existing model. Because CWD does not exist in free-ranging deer in South Texas, we used data from other states where CWD exists. We assumed that if CWD was first discovered in South Texas, 1% of the deer population would be infected. The number of infected deer in the population was modeled to increase 0.26% annually which was the rate observed in West Virginia. We added age- and sex-specific CWD infection rates based on empirical data from Wisconsin. We also modeled deer to die 1 to 3 years after being infected.

We modeled changes in population size over 25 years under 4 scenarios – no CWD with no harvest, no CWD with harvest, CWD with no harvest, and CWD with har-

Mature bucks will be less common in populations with CWD because they are more susceptible to the disease than females.

Low and erratic fawn production makes deer populations in southern Texas especially vulnerable to CWD.

vest. In the model without CWD and without harvest, deer populations averaged a 1.43% increase annually. The population was able to sustain itself with a 2% annual harvest rate of both sexes. The CWD model without harvest did not have a net change in population size; however, when annual harvest was 1%, the CWD-infected population declined. Limiting harvest to males did not cause the CWD-infected population to decline; however, even with this light harvest, the proportion of mature males declined because males are more susceptible to CWD. To further validate our modeling efforts, we used fawn:doe ratios from 3 CWD-afflicted areas in Wyoming and Wisconsin. Large increases in deer populations were observed in all 3 areas even with a 0.26% annual increase in CWD prevalence. Further, these 3 areas could sustain 10%, 16% and 26% annual harvests without causing a population decline.

Our models revealed several interesting points. First, South Texas receives erratic rainfall which in turn causes variable fawn:doe ratios. Because the recruitment rates are not high and consistent, harvest needs to be conservative to ensure deer populations do not decline. The low average fawn:doe ratios in South Texas are unlike more northerly environments where deer productivity is typically high and consistent which allows higher harvest rates. Further, the higher productivity of deer in temperate regions likely allows deer populations to persist in CWD-afflicted areas.

Secondly, introduction of CWD into deer populations in South Texas would likely reduce harvest opportunities. Even though male harvest would continue to be available, there would be fewer mature males in the population because CWD infection rates increase with age. Thus, the opportunity for hunters to pursue mature bucks would be reduced. The introduction of CWD may alter economics of managing for white-tailed deer on private lands; a shift from wildlife-cattle management program to development and agriculture may negatively influence the ecosystem.

The presence of CWD would also have a large impact on the culture of deer hunting in South Texas. Many deer managers use supplemental feed to enhance deer productivity and use corn as bait to increase visibility of deer during the hunting season. Both of these practices result in congregation of deer which would likely increase infection rates. Several states have banned the practice of baiting or feeding as a response to CWD. Thus, if CWD is detected in free-ranging South Texas deer populations, there would likely be profound and dramatic changes in deer management and hunting culture. Because there is no viable management approach to avoid the effects of CWD, efforts should focus on preventing the introduction of CWD in deer populations in South Texas.

Collaborators included David Hewitt, Charles DeYoung, Randy DeYoung, and Matthew Schnupp. The manuscript can be viewed at *http://dx.doi.org/10.1371/journal.pone.0163592.* To learn more about CWD, go to *http://tpwd.texas.gov/huntwild/wild/diseases/cwd/.*

An Update on Tanglehead Research

by Dr. David Wester and Joshua Grace

CKWRI has been blessed to have on our staff some very talented and enthusiastic invasive grass specialists since 2010. Starting with Aaron Tjelmeland, who was followed by Scott Mitchell and then Josh Grace, we've made excellent progress in better understanding tanglehead invasion dynamics. Aaron started a monitoring program on 160 acres near Benavides: with a hand-held GPS unit he marked the location and the size of every tanglehead plant or patch of plants in the summer of 2011. Scott repeated the exercise in fall of 2013. During those 2 years, tanglehead more than doubled the area it occupied. More astonishing, though, is the fact that what tanglehead invaded was an existing Old World bluestem/Kleingrass stand (two plants that are not easy to "push around"), and all of this happened during some very, very dry months in 2011 and 2012. And of course this is just an example, in miniature, of what's happened across thousands of acres in south Texas over the past 20 years or so.

Given this invasive behavior, a natural thing to investigate is tanglehead's regeneration potential. Tanglehead is a prolific seed producer: it's easy to see thousands and thousands of seeds on the soil surface mixed in with plant litter. What about the seed bank that tanglehead forms? We started a study in 2010, and then repeated and extended it in 2012, that involved counting seeds, assessing their viability and germination, and then burying them in screen pouches at two different depths in the soil. We then extracted these pouches over time—some pouches were removed after just 3 months in the soil, or 6 months, or 9 months…some remained in the soil for 25 months. After we extracted these buried seeds, we again assessed their viability and germination. The good news is that, whereas our seeds had up to about 80% viability and 80% germination when they were buried, their viability and germination potential steadily decreased with burial time: seeds that had been buried for 25 months had only about 20% viability and germination potential. Although 20% viability in a seed bank is still a concern, it looks as if tanglehead lacks the potential to form what's called a "persistent seedbank," which means that whatever we can do to reduce or limit seed input into the soil, whatever we can to do to simply leave the seeds that are already in the soil alone and undisturbed, will help to reduce the potential of tanglehead to reproduce.

Another aspect of tanglehead management that we've studied involves effects of prescribed fire, and these effects can be related to seed bank dynamics. Burning in the autumn will, of course, destroy seeds on the plant—this will help to limit seed input. But we also know that, after a fire, tanglehead comes back with a fury: the landscape can be carpeted with thousands and thousands of seedlings. We've monitored these seedlings after a spring burn and after a fall burn. Conditions were dry after our spring burn, and although there was the expected flush of seedling emergence, most of these seedlings died in a couple of months, so that seedling density was not different in the burned area and in unburned areas. After the fall burn we had more rain and so although there was a flush of seedlings, and although some had died, there were still more seedlings a couple of months after the fire in the burned area than in the non-burned area. Obviously, weather patterns after a fire will have a huge influence on what happens to the seedling flush that comes up. We've started a new project that's investigating the interaction between fire and livestock grazing—and there's real hope here: if we can stock an area after a fire and use cattle to "get after" the tanglehead, this might help to control the plant. More to come from the study as it develops.

Another thing we've looked at deals with soil microbiology and tanglehead. It's important to stop and think about this: the microbial communities in the soil are the link, the bridge, between the inorganic and the organic world: all the nutrients and energy that flow through ecosystems pass through the bacteria and the fungi in soil. And we've got some evidence that the soils under tanglehead stands are different than the soils under plant communities that are dominated by native plants. This gets very complicated very fast, because microbial communities are also affected by weather patterns, and so differences between tanglehead-dominated sites and native-dominated sites shift from one season to another, from one year to another. We're still in the preliminary stages of data analysis, and so there's still a long way to go with this project, but it seems clear that soils can be different in tanglehead sites and native sites. Now, on the one hand, this may not seem terribly practical—except for this one thing: we know how hard it is to restore tanglehead sites to communities that are characterized by native species—and perhaps one factor at play here is just this: if the soils under tanglehead are different, then maybe they're different in such a way that native species just don't do well. Perhaps this helps to explain why there's "more to it" than simply killing tanglehead and reseeding with natives.

Tanglehead is a plant that was historically considered a valuable decreaser grass on our native rangelands. Since the late 1990s tanglehead's populations have exploded throughout thousands of acres in sandy-textures soils in south Texas. Because its effects on native habitats are pervasive and far-reaching, we will continue to work on tanglehead related issues with solid science-based research that has practical applications.

Major Gift to Support Caesar Kleberg Wildlife Research Institute

Courtesy of TAMUK

Texas A&M University-Kingsville announced major funding support for its Caesar Kleberg Wildlife Research Institute (CKWRI) in October.

The wildlife research organization, considered by many the leading one of its kind in Texas and among the best in the nation, will receive continued funding totaling $16.5 million through 2020 from the Caesar Kleberg Foundation for Wildlife Conservation.

The CKWRI was founded in 1981 with a $3 million endowment from the Caesar Kleberg Foundation for Wildlife Conservation.

The overall commitment of $16.5 million to the CKWRI includes gifts from 2013-2015, plus a pledge through 2020. The usage breakdown of the $16.5 million gift is as follows:

- *$7.7M is dedicated to the CKWRI Dr. Fred Bryant General Endowment*
- *$7.5M is dedicated to the general support of CKWRI*
- *$1.3M is dedicated to the support of the Tio and Janell Kleberg Research Park*

The mission of the CKWRI is to provide science-based information for enhancing the conservation and management of wildlife in South Texas and related environments. The Institute includes 17 outstanding research scientists, covering a wide range of specialties. Modern high-tech facilities, specially designed wildlife study pens, and rangeland tracts provide an ideal environment for conducting quality research by Institute faculty.

"The Caesar Kleberg Wildlife Research Institute is the gold standard for wildlife research," Steven H. Tallant, president of Texas A&M-Kingsville, said. "The support of the Caesar Kleberg Foundation for Wildlife Conservation has been vital to the Institute. It was a Foundation grant that established the Institute, and through the total commitment of the Caesar Kleberg Foundation and its relationship with Texas A&M University-Kingsville, we have the leading wildlife research organization in the state. The future of the Caesar Kleberg Wildlife Research Institute is brighter than ever, thanks in large part to this inspiring pledge of support from the Caesar Kleberg Foundation for Wildlife Conservation."

Stephen J. "Tio" Kleberg, a trustee of the Caesar Kleberg Foundation for Wildlife Conservation, said at the event he believed each of the scientists represented at the Institute, along with its director, Dr. Fred Bryant, would rank top in the world for their discipline. "Each one of these men has dedicated their life and their career to wildlife conservation, and there's no one that does it any better. I say that with a lot of pride, because it's something Caesar (Kleberg) would look at and say, 'Job well done.'"

Dr. Fred C. Bryant served as the Leroy G. Denman, Jr. Endowed Director of Wildlife Research at the CKWRI. He said of the funding, "The Caesar Kleberg Foundation for Wildlife Conservation is the founding entity that allowed this Institute to move forward back in 1981.

(L-R): Brad Walker, CEO and Chief Development Officer for the Texas A&M University-Kingsville Foundation; Dr. Steven H. Tallant, president of Texas A&M-Kingsville; Stephen J. "Tio" Kleberg, a trustee of the Caesar Kleberg Foundation for Wildlife Conservation; and Dr. Fred C. Bryant, former Leroy G. Denman, Jr. Endowed Director of Wildlife Research at the CKWRI

Since that time, the Foundation has been a tremendous supporter financially, strategically and emotionally—more than any similar entity that I can think of in my 20 years. Tio Kleberg's leadership on that Foundation board, along with his son Chris and of course Duane Leach, have all been a phenomenal source of inspiration for us for more than three decades," Bryant said.

Brad Walker, CEO and Chief Development Officer for the Texas A&M University-Kingsville Foundation, furthered those sentiments of Kleberg. "No single person has been more generous to our university than Tio Kleberg, and as a donor, Mr. Kleberg has provided tremendous leadership. This latest gift commitment from the Caesar Kleberg Foundation for Wildlife Conservation comes at an important time in the university's history. What this support has done for the Caesar Kleberg Wildlife Research Institute is an incredible example for everyone who cares about our university," Walker said.

Bryant and Kleberg to be Inducted into the 2017 Texas Conservation Hall of Fame

Courtesy of TAMUK

The Texas Parks and Wildlife Foundation has selected Stephen J. "Tio" Kleberg and Dr. Fred C. Bryant to be inducted in the 2017 Texas Conservation Hall of Fame. They are being honored for their individual achievements and their work together at the Caesar Kleberg Wildlife Research Institute (CKWRI).

Bryant is the Leroy G. Denman, Jr. Endowed Director of the CKWRI at Texas A&M University- Kingsville. The institute provides science-based information for enhancing the conservation and management of wildlife.

Stephen J. "Tio" Kleberg is a member of the King Ranch Board of Directors and a member of the legendary King Ranch family. He is a trustee of the Caesar Kleberg Foundation for Wildlife Conservation. In addition, Kleberg serves as 1st Vice Chairman of the Texas A&M University-Kingsville Foundation and is a member of the CKWRI Advisory Board.

"Tio Kleberg and Dr. Bryant are true visionaries who have committed their lives to promoting conservation across our state and beyond" President Dr. Steven Tallant said. "Their leadership has made The Caesar Kleberg Wildlife Research Institute the leading wildlife research organization in Texas and one of the best in the nation. We are excited and proud that both men are being honored for the passion they share for conservation. The state of management and wildlife in Texas is better because of their work."

Bryant received his Bachelor of Science degree in Wildlife Management from Texas Tech University, followed by his master's degree from Utah State University and a Ph.D. from Texas A&M University. His research interests are in the field of livestock-wildlife relationships and habitat management.

Kleberg graduated from Texas Tech with a Bachelor of Science degree in Animal Science. His dedication to Texas A&M-Kingsville has extended over three decades. He and his wife, Janell, co-chaired the university's first capital campaign from 2005-2008 and were instrumental in securing funds to construct a wildlife research park at Texas A&M University-Kingsville, which was subsequently named in their honor.

Bryant and Kleberg will be honored at the Texas Conservation Hall of Fame dinner and concert at Moody Theatre in Austin on April 6, 2017.

In the News

Brennan Honored as Fellow of Ornithologist's Union

Dr. Lenny Brennan was recently named a Fellow of the American Ornithologist's Union (AOU). He was elected by the board.

Brennan was also honored by the National Bobwhite Technical Committee (NBTC) with its award for Individual Achievement. This award is presented to recognize an individual's overall contributions to bobwhite research and/or management during a career.

NBTC specifically cited Brennan's positive national influence on quail management and his support of the NBTC and the National Bobwhite Conservation Initiative within the wildlife profession during his 33-year career. In addition, they recognized Brennan's research on six species of quail across nine state, his more than 170 scientific publications and more than 105 extension publications, many of which established the course for today's quail management research activities.

Dr. Brennan holds the C.C. Winn Endowed Chair in the Richard M. Kleberg Jr. Center for Quail Research at CKWRI. He is a Professor in the Department of Animal, Rangeland and Wildlife Sciences at Texas A&M University – Kingsville. Lenny graduated from The Evergreen State College in Olympia, Washington (1981) with a B.S. in Environmental Studies, Humboldt State University in Arcata, California (1984) with a M.S. in Natural Resources-Wildlife Management, and from The University of California-Berkeley (1989) with a Ph.D. in Wildland Resource Sciences - Wildlife Ecology where he was also a Regents' Fellow.

Henke Named Wildlife Society Student Chapter Advisor of the Year

Dr. Scott Henke, Regents Professor and chair of the Animal, Rangeland and Wildlife Science Department, recently received the prestigious Student Chapter Advisor of the Year in North America Award from the Wildlife Society. The Student Chapter Advisor of the Year recognizes execeptional annual mentorship by a Wildlife Society student chapter advisor.

Henke is advisor to the Student Chapter of the Wildlife Society that has won the Outstanding Student Chapter Award five times, most recently in 2015. There are 139 chapters in the United States, Canada and Mexico. Also under Henke's guidance, the university's Wildlife Society has won 12 of the last 14 state Student Chapter of the Year Awards.

Dr. Scott Henke is the Chair for the Animal, Rangeland and Wildlife Science Departmentat Texas A&M University-Kingsville. He is a research scientist and a Regents Professor. Scott received his Bachelor of Science degree in Ecology, Evolution, and Population Biology from Purdue University in West Lafayette, Indiana. Scott obtained his Master of Science degree and his Ph.D. in Wildlife Science from Texas Tech University in 1988 and 1992. Upon graduation with his Ph.D. in 1992, Scott joined the faculty of CKWRI and the Animal, Rangeland and Wildlife Sciences Department of Texas A&M University-Kingsville where he has received numerous awards.

In the News

CKWRI Researchers Awarded TPWD Grant for Pronghorn Research*

Dr. Tim Fulbright, Dr. Randy DeYoung, Dr. David Hewitt and Dr. Humberto Perotto were recently awarded a sizeable grant by Texas Parks and Wildlife for their project entitled "Influence of Agricultural Production on Pronghorns in the Panhandle". Because information regarding movements, spatial distribution, and habitat use of pronghorns in this region is lacking, they will work to determine the dynamics of pronghorn movement and habitat selection in the Texas Panhandle. Understanding the movements and habitat of proghorns in relation to areas of agricultural production will help wildlife biologists in alleviating conflicts with agricultural producers.

See Pronghorn article on page 8 for more information

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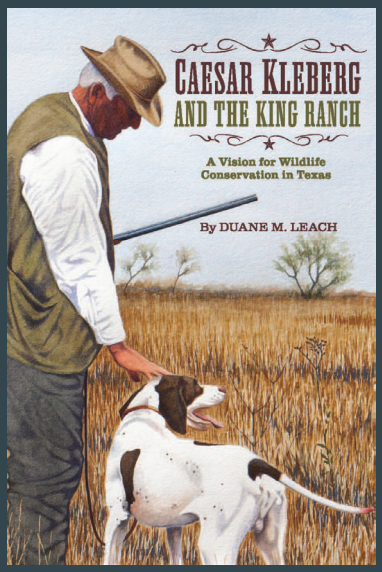

Caesar Kleberg and the King Ranch: A Vision for Wildlife Conservation in Texas

by Duane M. Leach, Ph.D.

In this tribute to a pioneer conservationist, Duane M. Leach celebrates the life of an exceptional ranch manager on a legendary Texas ranch, a visionary for wildlife and modern ranch management, and an extraordinarily dedicated and generous man.

Caesar Kleberg went to work on the King Ranch in 1900. For almost thirty years he oversaw the operations of the sprawling Norias division, a vast acreage in South Texas where he came to appreciate the importance of rangeland not only for cattle but also for wildlife.

Creating a wildlife management and conservation initiative far ahead of its time, Kleberg established strict hunting rules and a program of enlightened habitat restoration. Because of his efforts and foresight, by his death in 1946 there were more white-tailed deer, wild turkey, bobwhite quail, javelinas, and mourning dove on the King Ranch than in the rest of the state.

Kleberg's legacy lives on at the Caesar Kleberg Wildlife Research Institute in Kingsville, where a research program he helped found has gained recognition far beyond the pastures of Norias.

Texas A&M University-Kingsville Honors Endowment Donors

Texas A&M University-Kingsville President Steven Tallant Ph.D. and First Lady Karen Tallant will honor several dedicated supporters of CKWRI at the President's Legacy Ball in Kingsville on March 25, 2017. The following donors will be recognized for their establishements of endowed funds to support wildlife research at the Institute:

Allison and Bryan Wagner - *Allison and Bryan Wagner Director's Exellence Fund*
Mary and Mike Terry - *Mike and Mary Terry Family Endowed Fellowship for Habitat Research*
Frances and Peter Swenson - *Peter and Fran Swenson Fellowship in Rangeland Restoration*
Ed and Linda Whitacre - *Linda and Edward Whitacre, Jr. Endowment for Waterfowl Research*

These donors have long supported the work being done at the Institute and we are grateful for their generous contributions.

Caesar Kleberg Wildlife Research Institute
700 University Blvd.
MSC 218
Kingsville, Texas 78363

DONATE TODAY

The Texas landscape is changing. The need for wildlife and habitat research and the expansion and development of new and innovative management techniques in South Texas has never been greater. By investing in the Caesar Kleberg Wildlife Research Institute today, you will ensure the future of wildlife and their habitat in South Texas for tomorrow. Your generous contributions help us continue to make an impact like no other for our important and unique region.

To learn more about how you can make a difference for the wildlife of Texas, visit www.ckwri.tamuk.edu/giving or call (361) 593-4025.

Photo by Zachary Pearson