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## SOME CONSIDERATIONS IN ESTIMATING CARRYING CAPACITY ON RANGELANDS

by J. Alfonso Ortega-S., Dillan J. Drabek, and Bradley K. Johnston

Estimating carrying capacity for livestock and wildlife on rangelands is a difficult task in habitat management. Balancing the forage needs of all the herbivores grazing and browsing on the range seems simple.

Editor's Note: Dr. J. Alfonso Ortega-S. is a research scientist at the Caesar Kleberg Wildlife Research Institute and professor at Texas A&M University-Kingsville; Dillan Drabek and Bradley Johnston are graduate students at the Caesar Kleberg Wildlife Research Institute/Texas A&M University-Kingsville.

However, the complexity of estimating carrying capacity or correct stocking rate becomes evident when we see many overgrazed areas.

The difficulty is that carrying capacity is a moving target that changes over both time and space. Thoroughly monitoring the vegetation to evaluate the response by grazers and browsers is the most important activity needed to keep a ranch at the target carrying capacity. This monitoring is used to maintain the integrity of plant communities by avoiding overgrazing and help maintain proper animal performance.

Estimating carrying capacity requires adjusting for topography, presence of rocks or thick brush,

and distance to water to determine grazeable area. However, other factors like preference of herbivores for particular range sites may also affect grazeable acreage.

In a study conducted over eight years at six locations on the East Foundation properties in South Texas, we compared 300 grazing exclosures with outside paired points to measure utilization. Our goal was to determine effects of grazing on forbs and plant species richness for white-tailed deer. During the dry years of 2012 and 2013 less than 28% of grazing exclosures had higher forage standing crop than the outside paired point. This indicates that animals avoided 72% of sites with low productivity, and grazed 28% of the sites, which were more productive. During the wet years of 2014 to 2019, herbivores did not use 41 to 59% of the sites.

In our study, herbivores did not graze sites with less than 410 pounds per acre. This indicates that they prefer sites of high productivity and

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avoid sites with low productivity. This avoidance pattern is typically not considered when estimating grazeable area. Therefore, this may result in overestimating carrying capacity of the rangeland, which may lead to overgrazing.

The carrying capacity formula allows 25% of forage standing crop to be removed by herbivores. Another 25% is set aside for losses from weathering, insects, fouling, and trampling. The remaining 50% of vegetation is left intact for proper recovery of the rangeland.

We are conducting a study on 2,718 acres at the Sweden Ranch using cattle grazing to manipulate habitat for northern bobwhites. The area is dominated by four flower trichloris and buffelgrass. Our goal is to maintain between 1 and 1.5 feet of stubble height to benefit bobwhites. In March 2020, we estimated forage standing crop at 2,725 pounds per acre using a grazeable area of 1,841 acres of open grassland. We stocked it with 228 mature cows, and they grazed the pasture for 109 days. Allowing forage consumption of 26 pounds per animal per day based on their average weight, the cows consumed only 13% of the initial forage standing crop.

In October 2020, the herd was removed from the pasture and forage

standing crop was estimated at 1,742 pounds per acre. Thus, about 36% of the initial forage standing crop was removed to maintain the stubble height goal. If we estimate that forage consumption per animal unit was no more than 26 pounds per day, it was 13% of the initial forage standing crop. That means losses to insects, weathering, fouling, and trampling during that time equaled 64% of the total forage removed—much higher than what we typically account for. This does not consider



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Cattle grazing can be used to open grasslands that may be too dense for bobwhites; however, losses of forage from other factors need to be considered when calculating stocking rate.

forage growth that occurred during the grazing period. Therefore, loss of forage from factors other than grazing may be much higher than the 25% that we usually consider, and this may vary seasonally.

Our findings from these studies indicate that to avoid overgrazing we may need to consider the avoidance by cattle of sites that are low in productivity when estimating grazeable area in addition to taking into account the higher losses of forage from other sources. Monitoring range responses to grazing and the ability to recognize forage availability are crucial. They allow rangeland managers to make timely adjustments in stocking rates to better manage habitats, thereby ensuring the integrity of the plant communities and avoiding overgrazing. ~

## CKWRI NEWS

### Randy DeYoung and Fidel Hernández Awarded

We are pleased to announce that CKWRI research scientists **Drs. Randy DeYoung and Fidel Hernández** have been selected by The Wildlife Society (TWS) as Fellows for 2020. “This award recognizes current TWS members who have distinguished themselves through exceptional service to the wildlife profession and have been members for at least 10 years. TWS Fellows serve as ambassadors of the TWS and are encouraged to engage in outreach and other activities that will benefit and promote both TWS and



**Drs. Randy DeYoung (left) and Fidel Hernández (right) with their award plaque from The Wildlife Society recognizing them as Fellows for 2020.**

the wildlife profession. Fellows are appointed for life” (<https://wildlife.org/tws-fellows-program/>). Please congratulate both researchers for this outstanding achievement!

### Timothy Fulbright Recognized for His Research

The dean’s office in the Dick and Mary Lewis Kleberg College of Agriculture and Natural Resources has announced **Dr. Timothy Fulbright** as the recipient of the 2019–2020 Sr. Research Award. This award recognizes college faculty for their outstanding efforts in research.

## By The Numbers

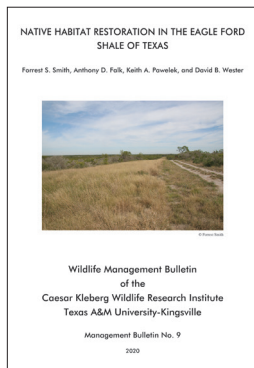
- 3 number of years before a juvenile osprey becomes a sexually mature adult (Handbook of the Birds of the World, Vol. 2, del Hoyo et al. editors, 1996, Lynx Edicions)
- 20 record length measured in inches of an adult black-striped snake, although most are 12 to 18 inches long (Texas Snakes: A Field Guide, J.R. Dixon and J.E. Werler, 2000, University of Texas Press)

Visit our web page at  
<http://www.ckwri.tamuk.edu>

## CKWRI Management Bulletin 9 Published

We are pleased to announce that CKWRI Management Bulletin 9 “Native Habitat Restoration in the Eagle Ford Shale of Texas” written by **Forrest S. Smith, Anthony D. Falk, Keith A. Pawelek, and Dr. David B. Wester** has been published. The bulletin includes 24 pages dealing with legal considerations, types of wildlife habitats, disturbance in the Eagle Ford Shale (EFS), restoration best practices, native plant seeding, and lists of seed sources and vendors.

The many color photographs show examples of disturbances in the EFS, habitat types impacted,



exotic grasses of concern, and successful habitat restoration. This publication is available in hard copy and posted in digital format on the CKWRI (<https://www.ckwri.tamuk.edu/publications>) and the Texas Native Seeds Program (<https://www.ckwri.tamuk.edu/research-programs/texas-native-seeds-programs-tns>) websites. Be sure to get your copy today!

article provides a historical account for each species and ideas on how to use remote sensing to monitor changes caused by these species. The article was published as open access and a PDF can be obtained online at <https://doi.org/10.1017/inp.2020.11>. ~

## Invasive Plant Article Published

Graduate student **Justin Wied** and coauthors **Drs. Humberto L. Perotto-Baldivieso, April A. T. Conkey, Leonard A. Brennan,** and former graduate student **José M. Mata** published a review article entitled “Invasive Grasses in South Texas Rangelands: Historical Perspectives and Future Directions,” which appeared in Issue 2 Volume 13 of the journal *Invasive Plant Science and Management*. The

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## Did You Know?

The giant reed (*Arundo donax*) is a non-native wetland species that uses about three times as much water as native plant species. (Grasses of South Texas, J.H. Everitt, D.L. Drawe, C.R. Little, and R.I. Lonard, 2011, Texas Tech University Press)

Purple martins migrate from North America to South America each fall, overwintering in Bolivia, Brazil, and Peru. (Handbook of the Birds of the World, Vol. 9, del Hoyo et al. editors, 1996, Lynx Edicions)

Wyoming in the 1990s. He also gave me my first German Shorthair Pointer—the best bird dog I have ever had.

An entomologist by training and trade, Killian is the most avid game bird hunter I have ever known. He has literally hunted grouse, quail, turkeys, and waterfowl all over the world. About 15 years ago, Killian called me to tell me he wanted to give his collection of bird mounts to an organization that would appreciate it and also use it for educational purposes. I told him we would take it in a heartbeat!

About six months later, he showed up in Kingsville with two rented vans that contained numerous bird mounts secured by their little feet to plywood panels. We had no place to put them initially, but thank goodness for the Conner Museum on the TAMUK campus. They let me store them there until we could get the glass cases built to display them. The carpenters on the Kingsville campus did a phenomenal job building the terrific cases you see in the photo below. We installed the displays in our teaching laboratory/auditorium so our students could see

## KILLIAN ROEVER — GIFT OF HIS BIRD COLLECTION

by Fred Bryant

Way back in 1972, when I was studying the Merriam’s turkey for my MS degree in the Virgin River country north of Zion National Park, Utah, I had the good fortune to cross paths with an avid turkey hunter from Phoenix by the name of Killian Roever. We struck up a great friendship as he knew way more about turkeys than I did.

That friendship included hunting for sage grouse in Utah in the 1970s and elk in the Red Desert of

Editor’s Note: Dr. Fred Bryant is the former director of the Caesar Kleberg Wildlife Research Institute and currently serves as the director of development.



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Killian Roever’s collection is housed in the lecture hall that serves as a teaching laboratory and auditorium in the Kleberg Agriculture Building at Texas A&M University-Kingsville.

them every day they walk into class. The collection contains 51 mounts of waterfowl representing 34 species and races, nine North American upland gamebirds of eight species, and nine European and Asian upland gamebirds, representing five species.

I still talk to Killian every three to four months after almost 50 years

**Advisory Board**

The Advisory Board of the Caesar Kleberg Wildlife Research Institute (CKWRI) provides leadership in all aspects of our work. We are indebted to them for their commitment to the CKWRI and its mission.

Chad Auler Gus T. Canales T. Dan Friedkin Henry R. Hamman Jeff Hildebrand Karen Hunke	David W. Killam ( <i>Chair</i> ) Mason D. King Chris C. Kleberg Tio Kleberg C. Berdon Lawrence Tim Leach Kenneth E. Leonard	Ellen B. Randall Barry Coates Roberts Stuart W. Stedman Ben F. Vaughan, III Bryan Wagner Charles A. Williams
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*Emeriti:* A.C. "Dick" Jones, IV and James A. McAllen



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The collection has a wide range of waterfowl and upland game birds featuring the excellent work of the specimens that were donated to the CKWRI at Texas A&M University-Kingsville by Killian Roever.

of friendship. I was blessed that day in 1972 when he showed up in Stout Canyon, Utah, where I was camped with no running water, heat, or electricity, and politely knocked on my trailer door. One never knows who you might run into who will become a lifelong friend! ~

**What Do They Eat?**

Black swallowtail caterpillars feed on “dill, parsley, celery, caraway, and carrots.” ([https://animaldiversity.org/accounts/Papilio\\_polyxenes/](https://animaldiversity.org/accounts/Papilio_polyxenes/), K. Eby, 2001, ADW, Regents of the University of Michigan)

Coues’ rice rats are omnivores, foraging on birds, fish, eggs, insects, mollusks, leaves, seeds, grains, and nuts. ([https://animaldiversity.org/accounts/Oryzomys\\_couesi/](https://animaldiversity.org/accounts/Oryzomys_couesi/), N. Nguyen, 2013, ADW, Regents of the University of Michigan)



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