



College of

Agriculture and Natural Resources

TARLETON STATE UNIVERSITY™

Newsletter

Undergraduate Research Edition

Happy Retirement Dr. Steve Damron!

September 2021



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On August 20th, we celebrated Dr. Steve Damron's Retirement from his role as Dean of the College of Agriculture and Natural Resources at Tarleton State University. Dr. Damron made a significant and lasting impact on the college. During his 5 years as Dean, we've experienced the grand opening of state of the art Animal and Plant Science Center, a retail mechanizing lab known as The Purple Tractor, significant upgrades and repairs to the waste management system at the Southwest Regional Dairy Center, new fencing throughout the Agriculture Center as well as many Agriculture Center facilities upgrades.

Dr. Damron championed many significant college and university investments in specialized equipment and technologies to provide faculty and students with the tools needed to perform world class teaching and research. Examples include complex simulators, drones with advanced capabilities, robots, advanced-capability video equipment, feed analysis equipment, DNA, RNA, and protein imaging equipment, game cameras, tracking collars, and countless others.

During his time at Tarleton, he led the college through continued enrollment growth to our current enrollment of more than 2,300 students! That represents almost a 20% growth in enrollment under Dr. Damron's leadership.

One of the areas of focus for Dr. Damron was to increase undergraduate students involved in research. Under his leadership, the college successfully launched a healthy and growing undergraduate research program which allows students to participate in meaningful faculty-led research projects where they build skills, network with students and faculty and discover new knowledge to advance their field of study. This special edition of the college newsletter provides a brief summary/abstract of some of the projects supported by the college during the past academic year.

Dr. Damron, from the college, we thank you for everything you have done. We wish you health and prosperity in your retirement and enjoy those beautiful grandbabies!

Bison Grazing at Caprock Canyon State Park

By: Ty Cosper, UG Wildlife and Natural Resources student

Summary: The objective of this research is to evaluate the effect that bison have on plant and arthropod communities in areas that they graze. We are comparing metrics between areas where grazing is excluded, using fencing, versus areas where bison freely graze at Caprock Canyons State Park in Quitaque, Texas. At Caprock Canyons State Park, Texas Parks & Wildlife established 18 - 3x3m² grazing exclosures across the state park, which we paired with random locations 20m away that are available for bison to graze.

Once a month, we surveyed these areas, starting in Spring 2020 and will continue through December 2021. In the exclosures and the grazing points, we use Daubenmire frames to evaluate the cover class and height of vegetation, litter, and bare ground. We survey the arthropod community using pit falls and bee-bowl traps. Preliminary results suggest grass height, especially on bunch grasses, is greater in the grazing exclosures compared to the grazed locations. Forbs are shorter in grazed areas but the difference is not as strong as that for the grasses. We continue to work with our arthropod data. With the continuation of the project, we will see the impact of grazing the bison have on vegetation and how that interacts with the arthropod community.



Photo courtesy Texas Parks & Wildlife

Students Involved, Presentations and Publications:

Molly Koeck, undergraduate, initiated this project in early 2020 but the pandemic delayed the launch of the research. Molly graduated in May 2021. Ty Cosper, undergraduate, took over to collect the data. This provides us with data across all seasons.

Cosper*, T., M. Koeck*, H. Mathewson, A. Mitchell, and D. Beard. 2021. Grazing pressure of bison on arthropods and vegetation communities at Caprock Canyons State Park, Texas. Poster presentation. The Wildlife Society Virtual Conference, November 1-5.

Erath County Pollinator Collection

By: Avery Smith, UG Wildlife and Natural Resources student

Summary: Pollinator insect assemblages were sampled along roadsides in Erath County, March-June 2021, at one-half mile intervals every two weeks. A total of 520 samples were collected from US State Highway 377, and 480 samples from US State Highway 67. Some samples were discarded due to lack of vegetation (recently mowed, burnt, or similar disturbance).

Over 1,000 photos of plant communities were taken to help associate plant hosts with pollinator insects. Sorting and identification is ongoing to determine the overall insect diversity associated with both highways in Erath County.



Students Involved, Presentations and Publications:

Avery Smith was the primary recipient of the project and received funding for sampling, sorting, and identification of pollinators associated with roadside plants.

Avery plans to complete identification of samples and present their findings at the Texas State Chapter of The Wildlife Society meeting in February, in addition to past research on biological diversity of insects on Tarleton's Agricultural Center. Avery Smith was assisted by undergraduates David Johnston, Daniel Andrews, and Nathan Wood in the collection of insects on roadsides and laboratory sorting. All specimens will be contributed to the Tarleton Insect Collection.

Photo courtesy: Tarleton Insect Collection

Tarleton Campus Pollinator Survey

By: Jennifer Tellez, UG Wildlife and Natural Resources students

Summary: This project involved conducting a pollinator survey across the campus of Tarleton State University to identify the diversity of pollinators and landscape plants that provide early-spring resources to pollinators. This survey was also part of a nationwide citizen science project as per the 2019 Oklahoma-Texas Pollinator survey.

Results indicated that 1. Most plants froze and were removed after winter storm, which lowered overall pollinator resources. 2. There are not many floral resources for pollinators on campus (especially herbaceous plants) and that trees and shrubs are the main early-blooming plant species. Spring-blooming trees and shrubs included Eastern redbud, plums, and holly species. These species bloomed for relatively short periods within the same time period. 3. Further research on the campus landscape should focus on the nutritional quality of nectar and pollen for adults and immature individuals. Tarleton landscapers can plant thousands of new plants and trees without consideration of pollinators. This research is related to an ongoing USDA-NIFA (#2000471) grant on grassland restoration that Dr. Murray & Dr. Mitchell are co-PI's on.

Students Involved, Presentations and Publications:

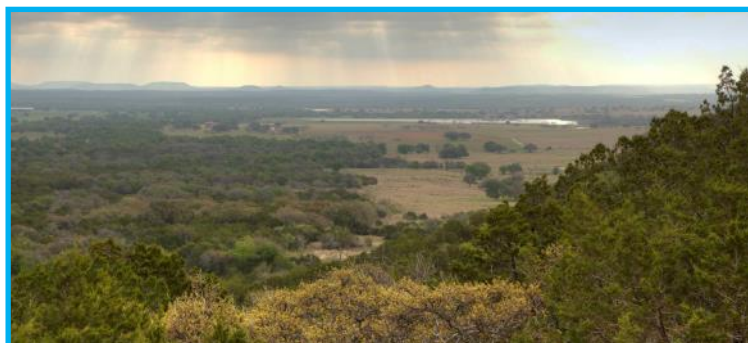
Jennifer Tellez, WSES undergraduate student. Jennifer produced & presented a poster during Educational Excellence Week 2021 in April at Tarleton. The poster served as an artifact for ALE credit, along with a reflective paper discussing the relevance of the research to society.

Reptile and Amphibian Microhabitats in Palo Pinto

By: Marshall Mills, UG Wildlife and Natural Resources student

Summary: The objective of this research is to describe microhabitats used by reptiles and amphibians in Palo Pinto Mountains State Park in Palo Pinto, TX. Surveys have been conducted at 15 study sites across the property. Taking place in rocky outcrops in the area and measuring microhabitat variables, such as substrate type and temperature, soil moisture, and distance to water source.

During a round of surveys, 17 species of reptiles and amphibians were observed. A flat-headed snake and an unidentified frog under a log, were both located in moist, soft soil substrates. Several opportunistic sightings have been within 50 m of a water source. As expected, many frogs utilizing rock microhabitats in or near ponds and streams were observed. The species include southern leopard frogs, Rio Grande leopard frogs, Blanchard's cricket frogs, gulf coast toads, and a red-spotted toad. The survey period will continue through 2021 and into Spring 2022.



[Photo Courtesy of Texas Parks and Wildlife](#)

Students Involved, Presentations, and Publications:

Marshall Mills, undergraduate. Kathryn Burton and Josef Leachman, both graduate students, provided supervision.

Mills*, M., K. Burton, and H. A. Mathewson. 2021. Herptile microhabitat usage within the Palo Pinto Mountains, Texas. Poster presentation. The Wildlife Society Virtual Conference, November 1-5.

Mealworm Colony Development

By: Avery Smith, UG Wildlife and Natural Resources student



Summary: A total of 20,000 mealworms (*Tenebrio molitor*) were purchased with the intent of developing a colony capable of breaking down polystyrene material and utilizing mealworm waste as a potential substrate for greenhouse plants. Initial feeding trials and observations demonstrated that mealworms could complete larval development (~40 days) with polystyrene as the sole feeding material, albeit at lower developmental rates than with supplemental vegetable feed. Expanded polystyrene foam materials were more readily accepted by mealworms than extruded polystyrene foam, possibly due to the behavior of mealworm larvae seeking to burrow and feed in less densely packaged material. A separate study of 100 super worms (*Zophobas morio*) was conducted and initial observations suggest that superworms may breakdown polystyrene at higher rates than mealworms.

Due to a power failure at the APSC facilities, both superworm and mealworm colonies exhibited significant mortality or infestation of parasites. Additional funds will be sought for the development of a new colony to assist in future studies.

Students Involved, Presentations, and Publications:

Olivia Waggoner was the initial recipient of the scholarship to develop, design, and conduct the experiment. Olivia left the project in Spring 2021 and colonies were managed and maintained by Avery Smith until Summer 2021 when colonies were lost.

Seeded Native Perennial Grass Establishment

By: David Johnston, UG Wildlife and Natural Resources

Summary: The goal of the project was to determine if soil carbon amendments can increase seeded native perennial grass establishment & vigor, on the premise that grass establishment & vigor would be an indication of rapid soil carbon availability by amendments. Following site preparation (mowing and roto-tilling), amendments (ground alfalfa hay, straw hay, peanut shells, cotton seed & green mulch), were added prior to seeding of native grasses and forbs. Amendments were chosen because they could be locally sourced & used on a larger scale (larger areas) for restoration. Plots were 2m x 2m and each amendment had 3 replicates. No other treatments have been applied.

As a result, weedy species have become dominant or co-dominant with seeded species. Preliminary results will be gathered early fall, when planted species are easier to identify with reproductive structures (seed heads) present. It was determined that this will be a long-term, ongoing experiment. Weedy species are often early colonizers, with native grasses and forbs becoming prominent later. This research has two benefits. First, it is located at the Tarleton Agriculture Center, and will be performed in an area designated as a wildland research & demonstration site for the Wildlife and Natural Resources Department. Second, it is related to an ongoing USDA-NIFA (#2000471) grant on grassland restoration

Students Involved, Presentations, and Publications:

David Johnston, WNR undergraduate student. David produced & presented a poster during Educational Excellence Week 2021 in April at Tarleton. The poster served as an artifact for ALE credit, along with a reflective paper discussing the relevance of the research to society.

Impact of Mexican Scud on Lettuce Rooting in Hydroponics Systems

By: Neesa Johnson, UG Wildlife and Natural Resources student

Summary: Quality of lettuce grown in 100, 50, 25, and 10% strength hydroponics nutrient solution. Determining the impact of Mexican scud on lettuce rooting was conducted using 8 mini-hydroponics systems in 70 qt heated and aerated containers with Styrofoam rafts containing 4 plants each. The systems grew quality lettuce. However, the Mexican scud could not survive the 100 percent hydroponic nutrient solution. Thus, a new study was needed to determine what percent concentration of nutrient solution scud could survive (50%, 25%, 10%, 0% [control] strength) and then determine if quality of the lettuce would be acceptable in the lesser strength hydroponic nutrient solutions. Mexican scud survived in the 0, 10, 25, and 50% nutrient solutions in 7 gal aerated and heated wastebaskets; however, not all scud survived possible due to self predation/death. Cucumber slices were added as a food source.



Lettuce quality was determined using 25%, 50%, and 100% (control) nutrient strength replicated twice in 17.5 gal tubs where each tub had a raft with 4 lettuce plants. Lettuce quality in 50% nutrient solution was acceptable. Significant differences for lettuce in nutrient concentrations were determined in only lettuce width ($p < 0.0320$). For curiosity sake Neesa, lettuce was also cultured in identical tubs with 25% and 50% nutrient strength but also included 200 scud with 1 replicate each. Although the scud treatment was not replicated properly, lettuce grown in the scud treatment reported significantly less lettuce height ($p < 0.0121$), lettuce width ($p < 0.0001$), root fresh weight ($p < 0.0004$), root dry weight ($p < 0.0001$), lettuce head fresh weight ($p < 0.0001$), and lettuce head dry weight ($p < 0.0001$). Root length was not significantly impacted by scud ($p < 0.0616$). These data suggest that Mexican scud can negatively impact lettuce.

Students Involved, Presentations, and Publications:

Neesa Johnson plans to present a PowerPoint in the Fall 2021.

Monitoring Restoration Areas with Drone Footage

By: Maximiliano Flores, UG Wildlife and Natural Resources student

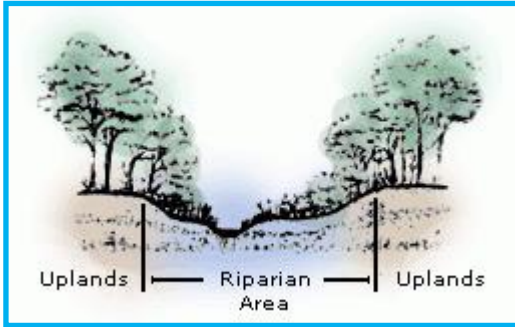


Photo courtesy Texas Riparian Association

Summary: This research project used UAV (drone) images to monitor restoration activities of a riparian area in Palo Pinto County, Texas. Part of the goal of this project was to determine the utility of using drone images for monitoring restoration by using before and after images of areas where brush were being removed.

Methodology developed included determining drone flight height, utilizing software (Drone2map) to "mosaic" individual images together into a single cohesive image, developing methods in ArcGIS software to detect change in percent cover of juniper from before & after images, and relate these to ground-based measurements.

Results indicated that the images recorded juniper removal with a high resolution (even small junipers were detected). Soil disturbance was also noted, which may be useful to document for restoration. Comparison of drone images and ground-based measurements indicated that drone images will provide an appropriate monitoring methodology for brush clearing and ecological restoration at a broad scale. This will

provide a good supplement for (and may take the place of) ground-based measurements. This research is related to an ongoing USDA-NIFA (#2000471) grant on grassland restoration.

Students Involved, Presentations, and Publications:

Maximiliano Flores, WSES undergraduate student, produced & presented a poster during Educational Excellence Week 2021 in April at Tarleton. The poster served as an artifact for ALE credit, along with a reflective paper discussing the relevance of the

Short Video Usage in Undergraduate Education

By: Tesa Morris, UG Wildlife and Natural Resources

Summary: Background research and experience from the project indicated that short videos can be important for undergraduate education in several ways. 1. They provide "experience" to students during times of remote learning (COVID-19 pandemic restrictions). 2. They can provide a means of conveying important ideas to students that are more visual learners. 3. They stimulate student interest (engage) when mixed with other student learning activities. 4. They provide benefit to the student making the videos in the form of creativity and mastery of subject matter ideas and concepts.

The best format for videos was determined to be approximated 2-5 minutes long. The student was able to formulate an evaluation of videos based on video interest, learning objectives, and asking viewers "What would you have done different to convey the video message?". This project was able to relate to two classes the student had taken, Conservation Outreach & Interpretation (WSES 3387) and Public Land Stewardship (WSES 4090). This project reinforced student learning outside of the classroom. Also, the students discovered the broad range of research going on within the Wildlife and Natural Resources Department. This project was also part of an ongoing USDA NIFA grant by bringing grassland restoration research into the classroom.

Students Involved, Presentations and Publications:

Tesa Morris, WSES undergraduate student. Tesa produced & presented a poster during Educational Excellence Week 2021 in April at Tarleton. The poster served as an artifact for ALE credit, along with a reflective paper discussing the relevance of the research to society.