

Written Testimony
Submitted to
U.S. House Subcommittee on Conservation and Forestry
June 25, 2019 Hearing

Managing for Soil Health: Securing the Conservation and Economic Benefits of Healthy Soils

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Board Chair, National Grazing Lands Coalition
Industry Relations and Stewardship Manager, Noble Research Institute, LLC

Chairwoman Spanberger, Ranking Member LaMalfa, Members of the Committee, thank you for this opportunity to submit a written statement on behalf of the National Grazing Lands Coalition as their Chairman and as the Industry Relations and Stewardship Manager for the Noble Research Institute.

Established in 1991, the National Grazing Lands Coalition is as a grassroots, nationwide consortium of individual agriculture producers and organizations that support voluntary, ecologically and economically sound management of all grazing lands for their adaptive uses and multiple benefits to the environment and society through science-based technical assistance, research and education.

The National Grazing Lands Coalition is led by a national steering committee dedicated to America's grazing lands resource and its sustainability. The Steering Committee is made up of individuals representing the National Association of Conservation Districts (NACD), National Cattlemen's Beef Association (NCBA), American Forage and Grassland Council (AFGC), American Sheep Industry (ASI), American Farm Bureau Federation (AFBF), Society for Range Management (SRM), the Dairy Industry, the Soil and Water Conservation Society (SWCS), the National Farmers Union (NFU), and the Noble Research Institute, LLC.

Grazing lands are one of America's greatest natural resources. They provide the nation and the world with a secure food supply, renewable energy, improved water quality and availability, productive plants that sequester carbon, robust wildlife habitat, and healthy soils and serve as the foundation for our country's farming and ranching families. Grazing lands contribute \$78 billion annually to the U.S. economy by supporting an estimated 60 million head of cattle and 8 million head of sheep. To sustain agricultural production, grazing lands must be conserved and properly managed to produce robust, resilient stands of grasses and forage. All of this starts below our feet with "soil health," the foundation of our operations.

Grazing lands are those lands not cultivated by man. As America developed westward in the 19th century, farmers began to cultivate soils by clearing timber and destroying many of the natural prairies that existed, all in an effort to grow what are now known as commodity crops. The fertile, productive prairies of the Great Plains that once teemed with diverse grasses, forages and large herds of bison were tilled and farmed. These practices depleted the soils of nutrients, organic matter, and biological life. The natural biological processes of grazing by roaming herds and

periodic fire that created the natural grazing lands, were no longer at work. Combined with a decade-long drought, these poor management practices contributed to the great Dust Bowl of the 1930s. This disaster brought about the birth of land conservation and the Conservation Act of 1935, which created the Soil Conservation Service, now the NRCS. Notwithstanding, in the 1950s the Green Revolution took hold, and great advancements were made in agricultural technology, including the development of commodity and forage crops that responded well to fertilizer, advanced farm machinery and other technological advancements that expedited crop production with less need for labor.

In the years that followed, the agricultural industry operated on cheap feed, cheap fertilizer and cheap fuel. Our industry and our research during that time focused on the chemical and physical characteristics of soils with little to no consideration of biological interactions within the soil.

In recent years, however, prices for feed, fertilizer and fuel have increased to a point that has become unsustainable for many operations. Many producers have had to make a choice: continue doing what they have always done or work *with nature* to find a new way to farm and ranch. Born out of equal parts necessity and frustration, producers began to experiment with farming and ranching techniques that limited the use of inorganic fertilizer, fuel and feed.

They began to see that limiting or eliminating tillage reduced their fuel bill, using the ageless practice of “cover crops” to keep their fields covered provided numerous benefits to the soil (i.e., preventing erosion, increasing water holding capacity and increasing biodiversity), converting marginal soils to perennial pasture land to eliminate tillage and minimize erosion, and through managed rotational grazing the pastoral lands improved in composition and production due to the recovery allowed between grazing events.

In essence, they built a foundation of principles that many producers follow today to manage healthy soils and restore deteriorated soils. These soil health management principles were set forth to achieve specific goals that are inherent to all soils. They are based on mimicking highly diverse, heterogeneous, native grazing land plant communities by harnessing the power of biologic interactions between plants, soil microbes, fungi and other of life in our soils. These principles build soil aggregation, which further builds soil structure.

These principles have proven the path forward for many innovative producers and substantiated that the conventional farming and ranching practices of the last six decades are not the only way.

The following soil health management principles were developed by producers for producers, and these apply to both croplands and grazing lands:

- 1) **Armor the soil:** Soil health cannot be built if the soil is moving. Building organic matter on the soil surface armors and protects the soil from erosive processes. Keeping the ground covered also serves as a mitigation mechanism for soil temperature. Excessive increases in soil temperature can have drastic and destructive effects on soil microbial life. Once soil temperatures reach 140° F, soil bacteria die. The soil must be covered to minimize bare ground, this is largely accomplished by forage and crop residue. In grazing lands, this means managing lands to retain forage cover year round either in the form of growing plants and plant residues.
- 2) **Optimize disturbance:** Physical soil disturbance, such as tillage, alters the structure of the soil and limits biological activity. If the goal is to build healthy, functional soil systems,

tillage should only be use in specific, limited circumstances. While tillage is a detrimental disturbance, not all disturbances harm the soil. In fact, some are quiet beneficial and should be optimized. Grazing, prescribed fire, herbicide applications, among others, are all disturbances that can, if properly managed, be beneficial. For this reason, we use the term optimize disturbance to ensure that the timing, frequency, intensity and duration of these management activities are implemented in a planned manner. In grazing lands, the act of grazing is a disturbance, but if properly managed, the grazed plants are allowed to regrow. In addition, fire is a type of disturbance that when administered periodically as a tool can have positive effects on plant composition and reduce unwanted woody plant encroachment.

- 3) **Increase diversity:** Increasing plant diversity above ground allows for a more diverse community below ground. Specific soil microbes require specific plant types. The more diverse the microbial population in the soil, the better the plant species will perform due to increased biological activity. In grazing lands, this means inter-seeding forage species into monocultures of introduced pastures and providing appropriate periods of recovery following grazing events.
- 4) **Keep living roots in the ground all year:** Soil microbes tend to utilize active carbon first. Active carbon is the exudates from living plant roots. Therefore, to keep soil biology working as long as possible, a living root in the ground is ideal. A living root provides a food source for beneficial microbes and provides opportunity for symbiotic relationships between plant roots and mycorrhizal fungi. In grazing lands, this means inter-seeding cool season forages into warm season pasture and vice versa depending on the predominate type of pasture.
- 5) **Properly integrate livestock:** Grazing lands naturally evolved under grazing pressure. Soil and plant health is improved by grazing, which recycles nutrients through improved manure distribution, reduces plant selectivity and increases plant diversity. The most important factor in grazing systems is the management of stocking rate and allowing, in some manner, adequate rest periods for plants to recover before being grazed again. This principle is critical to both native and introduced grazing lands.

Principles over Practices

The great challenges facing the U.S. agricultural industry as a whole are numerous and daunting. However, to solve those challenges, one must determine the root of the problem. For much of the past sixty years, the agriculture industry admittedly focused on treating symptoms with practices and inputs rather than addressing the problem with science-based, holistic principles. Innovative producers today understand that we do not solve ecological problems by implementing practices, rather, we implement principles. We can and are addressing ecological degradation by following principles that rebuild ecological processes and habitat from the ground up rather than focusing on specific singular species or management practices. It all begins with maintaining a solid foundation with healthy soil as the cornerstone to any agricultural enterprise. Properly applied grazing is the capstone to building soil health.

Applying the Principles Today

In properly managed grazing lands, whether in introduced pastures or native range, all five of the soil health principles can actively build more productive, more profitable and more sustainable agricultural production systems. In fact, it is often easier to apply the soil health principles to grazing lands (rather than cultivated croplands) because the soil health principle of properly integrating livestock (the grazing animals) is already in place. Healthy grazing lands begin with a management philosophy that properly manages grazing livestock and addresses the physiological needs of the forages being grazed.

Similar to the five soil health principles, there are four guiding principles, natural laws, of grazing management that, when understood and properly implemented, can help restore and rebuild the soil. These principles contribute to improved soil health and the function of both native range and introduced pastures.

- 1) **Keep down the shoot, kill the root:** In essence, if plants are grazed too short for too long of a duration, the plant will die. Roots of plants form essential functions: anchor the plant to soil, take up water and nutrients, and if healthy, the roots help the plant mitigate stresses of drought, temperature extremes, and grazing. The top growth of grass plants is directly proportional to root growth. Roots naturally die and are replaced by new roots. However, when excessive amounts of top growth are removed, roots are unable to regrow and replace themselves as they die. The plant becomes weaker and eventually dies. When actively growing leaves are left at an optimum amount, the root system is maintained and supports plant growth. Grassland managers have learned that managing plants and root systems are the keys to a healthy and productive grassland. These managers have adopted a planned grazing approach to their management, which defines a proper degree of grazing use for the key species. Planned grazing prescribes rest and recovery following grazing events to maintain or enhance grasslands.
- 2) **Nature abhors a vacuum:** Nature does not like bare ground. Bare ground is soil that is not protected by plants, plant residues, plant litter, gravel or rocks. Bare ground is subject to erosion, rain runoff instead of infiltration, intense temperatures and exposure to the sun.

When grazing lands are disturbed, overly grazed, and managed poorly for extended periods, bare soil is exposed. Grazing lands with extensive bare soil are more susceptible to droughts and are much less productive. Managing grazing lands so that the soils remain covered provides protection from erosion, allows for water infiltration, and builds organic matter, which in turns builds biological activity and soil health. Together these elements improve soil stability and productivity.

- 3) **Bare soils decrease moisture availability:** When grazing lands have significant amounts of bare soil or are in the early stages of recovery, they have little organic matter and are prone to erosion, weeds and the effects of drought mentioned above. Rains that fall on bare soil is less effective because less moisture soaks into the soil whether it can be absorbed by organic matter. More water runs off the soil making the affected area more prone to drought. With the direct exposure to the sun, soil surface temperatures of bare soil are elevated creating an environment that reduces or eliminates biological activity in the top layers of the soil. In this condition, soils are less likely to support productive grasses

and forages. As a result, less productive, less desirable plants, such as weeds, appear rapidly.

Conversely, rain that falls on grazing lands covered with productive grasses and forages readily infiltrates the soil and is absorbed by soil organic matter. This provides an environment more conducive to the continued recruitment and maintenance of the desired grasses and forages. Healthy grazing lands remain more resilient to drought over time.

- 4) **If given a chance, the best-adapted plants will dominate:** In general, nature will bring back the best-adapted vegetation on grazing lands if the producer works *with* nature by following a good grazing plan. These best-adapted vegetation species are more productive, more resilient to drought, and are more profitable than less desirable species. This concept also holds true with introduced pastures. A well-managed, properly grazed grazing land provides nature the opportunity for the grasses and forages that best fit the environment to survive and thrive.

Implementation of Principles and Natural Laws on Grazing Lands

Grazing Plans – To provide an effective mechanism for implementing the soil health principles and the natural laws of grazing management, producers must develop and follow a grazing plan. A grazing plan allows producers to intentionally manage the grazing lands to achieve desired outcomes for a livestock operation. A good grazing plan considers two essential components – the nutritional needs of the livestock and the health of the key plants being grazed and managed, which is impacted by health of the supporting soil.

Grazing plans are, in essence, conservation plans for grazing lands. They include decisions for manipulating the plant community to manage the soil, water, air, plant and animal resources. A well-designed and well-managed grazing plan results in healthy soils and grasses, proper nutrition for grazing animals, and greater livestock production at a lower cost.

There are also four keys to proper grazing management: stocking rate, livestock rotation, utilization rate and plant rest and recovery. All of these elements must be managed in unison to be effective.

Stocking Rate – Stocking rate is arguably the most critical variable in proper grazing management. Stocking rate is the number of animals on a given area of land over a certain period. If intake is not limited, livestock consume about three percent of their body weight of grass and/or forage per day. For all practical purposes, stocking rate is a measure of the grass demanded by the livestock over a period of time.

The amount of grass and forage produced on a given area is a function of many factors, including soil types, forage types (e.g., grasses, legumes), pasture condition, and previous management. However, moisture and temperatures during the growing season also drive production. Forage production is dynamic, and the entirety of the forage produced should not be grazed. As provided above, with proper grazing management, only a portion is grazed and the rest is used to maintain the health and productivity of the grazing land. The portion of the forage that is allocated for grazing is called the *available* production. It is important that the stocking rate match the available production and be used optimally. Improper stocking of grazing lands leads to over-grazing or under-grazing, neither of which provides favorable outcomes. Over-grazing for extended periods of time leads to the degradation of the grazing land and an overall reduction in pasture

productivity, soil health and livestock production. Determining a proper stocking rate is essential for proper grazing management and requires balancing the animal numbers with available grass and forage production.

Grazing Rotation – Once a proper stocking rate is established, implementing a suitable grazing rotation is the next variable in proper grazing management. A grazing rotation considers where to graze, when to graze, how long to graze, and how long to allow a grazed area to rest and recover. The purpose of a grazing rotation is to manage the impact of grazing on the grazing land while maintaining or improving livestock production.

Livestock are selective grazers, and left unmanaged they tend to disproportionately graze more-productive plants over less-productive plants. Livestock also prefer the fresh regrowth over mature leaves. In a continuously grazed pasture, plants that are grazed early in the growing season are grazed repeatedly without adequate time to recover. Since these plants are not allowed to regrow leaves and supply needed energy to the roots through the process of photosynthesis, roots do not regrow adequately to support the plant. Roots of these plants become weakened, depleted, and eventually die. Over time, the more-productive plants are grazed out leaving less desirable, less productive plants, which can lead to deterioration of the grazing land and the health of the soil.

Grazing Intensity – Grazing intensity is the amount of grass and forage removed before livestock are rotated to a new area. Stated another way, it is how short the pasture is grazed before removing the grazing animals. A good grazing management practice is “take half and leave half.” Conceptually, this means graze the top half of the leaves and leave the rest to allow for rapid recovery and regrowth. Ideally, every plant in the pasture would be grazed evenly at this level. Taking more than 50% of the leaf production stops root growth and extends the recovery time. Grazing 50% or less of the leaf area of plants has little or no effect on root growth and plant regrowth. This expedites recovery and increases the productivity of grazing lands. Other benefits of grazing less intensely include increased root production, rooting depth, and plant residue, which increases soil organic matter, water holding capacity, pasture production, and soil health. When properly stocked with a good grazing rotation, grazing intensity can be managed such that the majority of the plants in a pasture are grazed at 50% or less during each grazing rotation throughout most of the growing season allowing for optimum growth and production of the grazing land.

Rest and Recovery – The final aspect to consider in grazing management is the rest and recovery period. After being grazed, plants need an adequate recovery period. The more severe the grazing intensity, the longer it takes for the plants to fully recover. Soil moisture and seasonal temperatures also affect the rest and recovery period. In favorable moisture conditions, the recovery period is shorter than in low moisture conditions. As moisture becomes more limiting, longer rest and recovery periods are required. It is important to determine the recovery period based on the key species in the grazing land being managed. In a native grass pasture, the key species are those more productive, more palatable species that have a longer recovery period than the less desirable species. Introduced pastures usually have a shorter recovery period than the native prairies and have to be managed differently for optimum results. Well-managed rest and recovery periods increase pasture production and offer greater potential for livestock production.

Conclusion

Management of grazing lands is a dynamic process with a complex set of variables that must be taken into account. However, as the science of grazing management has evolved, innovative producers have mastered the understanding of the natural laws of grazing management. Many have seen dramatic improvements in the productivity and resilience of their grazing lands. They have also observed great improvements in soil health and ecosystem function because they have embraced and are managing for the soil health principles; many even before the soil health principles were specifically identified. It is the challenge of organizations, such as the National Grazing Lands Coalition and the Noble Research Institute, to continue to education land managers, farmers and ranchers to ensure proper management of grazing lands becomes the norm for producers focused on the long-term economic viability and ecological sustainability.

Chad Ellis
Short Narrative Biography

Chad Ellis is the industry relations and stewardship manager at the Noble Research Institute in Ardmore, Oklahoma. Through his department, he advocates and promotes the benefits of agricultural production with a focus on stewardship by highlighting the important role stewardship plays in the nation's long-term sustainability. Prior to Noble, Mr. Ellis worked for the Natural Resource Conservation Service (NRCS) and Grazing Lands Conservation Initiative (GLCI), as regional rangeland management specialist for the 15 central states. Mr. Ellis has over 20 years' of experience working directly with producers and land managers implementing stewardship-focused management. Ellis not only promotes and advocates land stewardship principles he also implements it within his own family operation in Lohn, Texas. Mr. Ellis is passionate on helping empower the producer to be better tomorrow than they are today. He provides this passion and leadership as chairman of the National Grazing Lands Coalition (NatGLC), a producer lead organization. NatGLC supports voluntary ecologically and economically sound management of all grazing lands for their adaptive uses and multiple benefits to the environment and society through science based technical assistance, research and education.

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Home:

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crellis@noble.org

EDUCATION:

Fellow, Enviropreneur Institute, Property Environment Research Center, Bozeman, MT. July 2014

M.S., Animal Science with an emphasis in Range Management; Angelo State University, San Angelo, Texas 76902. Graduated December 2001. Thesis: Persistence and Heritability of Juniper Consumption as a Biological Control by Goats.

B.S., Natural Resource Management with an emphasis in Wildlife Management; Sul Ross State University, Alpine, Texas 79832. Graduated May 1999.

Lohn High School, Valedictorian of graduating class, Lohn, Texas 76852. Graduated May 1995.

PROFESSIONAL EXPERIENCE:

May 17 – Present **Industry Relations & Stewardship, Manger**, Noble Research Institute, 2510 Sam Noble Parkway, Ardmore, OK 73401

Provide leadership in partnership development and collaboration with partners on projects that are local to national in scale. Provide technical consulting services to agricultural producers, industry and other stewards of natural resources to achieve production, financial and quality of life goals through an integrated consultation process by assessing operations, identifying opportunities and limitations, recommending solutions, monitoring client progress as requested throughout the consulting engagement, and providing supportive educational opportunities.

Technical Assistance: I work directly with producers and industry corporations to provide technical assistance, research, conservation planning and the application of conservation practices to maintain or improve production while conserving the natural resources.

Engagement: I work closely with leadership in the development and coordination of interested parties to work on common priorities for advancing agricultural. Collaborate with other like-minded groups whose goals are to promote and enhance the vision of land stewardship. Facilitate and convene workshops and symposia to bring multi-stockholders together to develop and implement solutions.

Pilot and Program Development: Develop and collaborate with industry on solutions for conservation to scale.

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-U.S. Beef Sustainability Pilot – Developed and delivered full value chain pilot with cow/calf producers, feed yards, Tyson, Golden State Foods, and McDonalds. 2017-2019

-Land Stewardship Program Pilot – Quantifying and valuing land stewardship with 14 producers in Oklahoma and Texas with over 75,000ac. 2018-Present

-Texoma Pilot of Ecosystem Service Market Consortium, Protocol development, 2019

-McDonalds Flagship Farmer – Develop and oversight of Flagship Farmer Program in the United States

-Beef Sustainability Self-Assessment Tool – Developed sustainability self- assessment tool for full beef value chain.

Research: Conduct basic research on land use changes and other drivers affecting private lands. Conduct applied research that serves to inform proper stewardship practices by quantifying and valuing land stewardship.

Education: Train future natural resource leaders and practitioners in the principles and practices of private land stewardship. Develop education materials that inform producers on concepts and practices.

July 14 – May 16

Center for Land Stewardship, Manager, The Samuel Roberts Noble Foundation, 2510 Sam Noble Parkway, Ardmore, OK 73401

Provide leadership of the Agriculture Division’s Center for Land Stewardship (CLS). Coordinate and administer the Noble Foundation efforts with the Center for Private Lands Stewardship (CPLS) to advance collaboration for purposeful outcomes. Provide input and assistance to the Centers of Excellence and Producer Relations programs and Noble Foundation Initiatives. Coordinate development efforts involving “projects” pertaining to cooperator needs and collaborative efforts (consulting, education, advocacy and research). Lead in the development and dissemination of symposia and training of future natural resource leaders.

Technical Assistance: I work directly with producers and industry corporations to provide technical assistance, research, conservation planning and the application of conservation practices to maintain or improve production while conserving the natural resources.

Research: Conduct basic research on land use changes and other drivers affecting private lands. Conduct applied research that serves to inform proper stewardship practices.

Education: Train future natural resource leaders and practitioners in the principles and practices of private land stewardship. Develop education materials that inform producers on concepts and practices.

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July 12 – July 14

Range and Pasture Consultant, The Samuel Roberts Noble Foundation, 2510 Sam Noble Parkway, Ardmore, OK 73401

I provide leadership and technical assistance with emphasis in rangeland and pastureland to land owners, managers, and professionals within the southern Great Plains. Also, provide leadership in partnership development and collaboration with partners on projects that are local to national in scale.

Technical Assistance: I work directly with producers to provide technical assistance, conservation planning and the application of conservation practices to maintain or improve production while conserving the natural resources.

Partnership Development: I work closely with leadership in the development and coordination of interested parties to work on common priorities for advancing agricultural.

March 10-July 12

Rangeland Management Specialist-GLCI, GS-13, USDA Natural Resources Conservation Service, 501 W. Felix St., Building 23, Fort Worth, TX 76115

I provided leadership, technology development, and technical assistance with emphasis in rangeland, pastureland, forestland, with wildlife and livestock planning throughout 15 States in the Central Region.

Conservation Planning – Policy: I have developed National Practice Standards, Statement of Work, Specifications and Job Sheets for (Prescribed Grazing, Prescribed Burning, Herbaceous Weed Control, Brush Management, etc.) I have also written policy for ESD and FSGD in the NRPH. Developed policy and procedures for Range and Pasture NRI.

Development of Technology: I have developed a process to quickly and accurately develop FSGD and added this into Ch.3, sect2, NRPH. Have been on numerous teams (GRAS, Inventory, Monitoring, Resource Assessment) with the development of Conservation Delivery Streamline Initiative. Helped develop ESD development and training of National Soil Ecology Group.

Training: A member of the Interpreting Indicators of Rangeland Health Quadra training BLM, USFS, USGS, ARS, NRCS, USFWS, and NGOs in Rangeland Health. A member of the National NRI training group training States in all aspects of the science study. Provide technical assistance and training to NRCS State requests within the Central Region.

Partners: Work with NGOs, Archbold Research Station, Tall Timbers Research, ARS, BLM, USFS, Universities, USGS, GLCI on range and wildlife restoration and projects.

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Programs: On numerous teams with O&E on studies of conservation planning and program delivery. Helped with Sage Grouse and Lesser Prairie Chicken Initiatives in EQIP. Helped write CSP enhancements for grazing and wildlife.

July 07-March 10

State Rangeland Management Specialist-GLCI Coordinator, GS-12, USDA
Natural Resources Conservation Service, 2416 NW 43rd St., Gainesville, FL
32606

I provided leadership in ecological sciences with emphasis in rangeland, pastureland, forest, wildlife and conservation planning throughout the state. Also, coordinate and lead partnership development within the Grazing Lands Conservation Initiative grassroots effort for private land owners.

Programs: I have developed the prescribed grazing incentive for EQIP. An addition to the incentive I have developed all support documents and policy for guidance to implement this practice for cost-share. I have developed an upfront application sheet that the customer reads and signs during the sign-up that lays out what NRCS and what the customers is responsible for the length of the contract. This new way of thinking of upfront documentation has been very appreciative from the field and customers. I also assist programs with guidance and development of cost lists, eligible practices, etc. for all programs (EQIP,CSP, GRP,WHIP,WRP,FRPP). I have helped develop CSP guidance and ranking for wildlife and grazing systems. I am also responsible for all grazing and management practices (mowing, haying, brush management, etc.) CUA's for the WRP program. I am also the lead Biologist on the WRP ranking team; which ranks eligible WRP applications. I develop all grazing plans for WRP and GRP contracts. I work with the field to develop tools to help them in CTA, WHIP, EQIP, CSP, GRP and WRP programs.

Partners: I work closely with GLCI and Florida Grazing Lands Coalition (FGLC). As GLCI coordinator for the state I have developed a contribution agreement with FGLC and Treasure Coast RC&D for outreach of grazing management. This project had been very successful with education and research in grazing management for all producers small or large. I am advisor for the Florida Cattleman Association, ARS and University of Florida Extension in technical research and development. I have helped developed numerous publication and research projects with UF. I am also very active and advise Florida A&M University in there research for small scale producers. I also have given training and advice Florida Fish and Wildlife Commission on their grazing policy. I have worked with Florida Department of Agriculture (FDACS) in the development of the cow-calf and equine Best Management Practices (BMP's). I am also an active committee member of the North Florida Fire Council and the South Florida Fire Council.

Conservation Planning/Policy: I write the ecological site descriptions (ESD) and forage suitability groups (FSG) to assist the field in conservation planning. I also develop supplements and tools for the field to use

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(pasture condition sheet, range health check sheet, grazing record books, grazing sticks, economic tools). I also provide guidance and training on GSAT for animal plant balance. Develop technical standards and specifications and provide guidance in field office technical guide.

Training: I provide all 4 areas in the state to NRCS employees and district employees in grazing and wildlife conservation planning training. I provide ProTracts training to the areas in the use of reports for time management. I provide input in Tech Guide Committee meetings. I have trained the state in GSAT and also provide NHQ on the development of the tool as representative for the southeast. I hold quarterly range and grazing specialist workshops to provide training and leadership to achieve NRCS business plan.

Dec. 05-July 07

Resource Team Leader (DC), GS-12, USDA Natural Resources Conservation Service, 300 S. Phelps, Alpine, TX 79830.

I supervise portions of 4 counties covering over 9 million acres. I work directly with team staff members to assure NRCS mission and goals are achieved. Also work closely with other partners (FSA, SWCD, TSSECB, RC&D Councils, NPS, TPWD) to obtain these goals.

Rangeland: I have assisted over 65+ ranches in planning and applying management systems. I have assisted landowners in the instillation of over 85 miles of fence, 16 water storage facilities, 80 miles of pipeline, and over 60,000ac of brush management both chemically and mechanically. I have helped the soil survey crew for MLRA 42 with ESD's and have been on the team to determine ecological region boundaries. I have also, helped the soil survey party for Presidio county as the range specialist on current details. I have contributed with RC&D in writing a Trans-Pecos Plant Book containing 250 plants to be published in the next year. I have helped RC&D and ARS with Salt Cedar Project to release beetles along the Rio Grande River and Balmorhea in July. I have been guest lecture at Sul Ross State University and Angelo State University in Range Ecology and Range Management classes including over 100 students.

Programs: I have assisted cooperators applying for conservation programs (EQIP, WHIP, CRP, CSP, GRP, and CCRP) I have assisted over 100+ EQIP applications, 60+EQIP Contracts, 8+CCRP contracts, 1 CSP and 1 GRP contracts. I have also, have assisted with Conservation Technical Assistance (CTA) with writing over 50 individual plans and assisting with over 275 individual conservation practices. I started the Pronghorn Initiative in EQIP to address the concerns of habitat and management dynamics of the pronghorn.

Supervision: I have provided individual training and mentoring to both NRCS and SWCD employees. I have effectively overseen, coordinated and guided a team of 5+ individuals in providing accurate planning and application of conservation measures. Each year we have obtained and exceeded our goals of 190,000+ac in conservation plans written, 400,000+ac conservation applied to improve water quality, 240,000+ac grazing and forest land with

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conservation applied, and 580,000+ac of Non-federal land with conservation applied to improve wildlife habitat.

Oct. 03-Dec. 05

District Conservationist, GS-11, USDA Natural Resources Conservation Service, 501 S. Ann St., Brackettville, TX 78832.

I work directly with producers to provide technical assistance, conservation planning and the application of conservation practices to maintain or improve production while conserving the natural resources. I work directly with FSA, SWCD, LWG, PDG and TSSWCB to accomplish these goals.

Rangeland: I have assisted 50+ ranches in planning and applying management systems. I have assisted ranchers in the instillation of over 100 miles of fence, 10 water storage facilities, 40+ troughs, 25 miles of livestock pipeline, and over 25000+ acres of brush control (chemical & mechanical). I was the primary Rangeland Management Specialist for the CSP (San Ambrosia watershed) stretching from Laredo to Eagle Pass. I have been the Team Leader for NRI for NRI in Maverick County. I have also, helped develop the State – Transition Models for MLRA 42. I was the Team Leader for field work on ESD for MLRA 42.

Cropland: I assisted with two center pivots and irrigation water management for both. I surveyed cropland fields using the Trimble Total Station GPS. I processed the survey data through Blowup95 and then into ArcView to generate contour maps or to design conservation practices. I have also; gained experience in CRP; planning grass mixes, brush control, and appraisals. In addition, the planning of total resource management systems on cropland has included the planning, designing, supervising installation and certification of sound conservation practices. Conservation practices planned and installed include underground irrigation pipelines, drip irrigation, center pivots, waterways, terraces, and filterstrips.

Programs: I have assisted cooperators applying for conservation programs (EQIP, WHIP, CRP, CSP, GRP and CCRP), and assisted with 100+ EQIP application, 50+ EQIP Contracts, 24 CCRP applications, and 2 CSP Contracts within 2003-2004.

July 02-Oct. 03

Rangeland Management Specialist, GS-9, USDA Natural Resources Conservation Service, 3514 Devonian Dr, San Angelo, TX 76903.

Rangeland & Cropland: I have worked directly with cooperators to develop conservation plans and to suggest practices and procedures needed to maintain and improve the natural resources affected by the operation. I have performed surveys using the Trimble Total Station GPS and Garmin Map76 on over 10,000 acres. I have worked heavily with CCRP with riparian buffers, filter strips and water ways. I have processed data through Arcview to generate maps and designs for conservation practices (livestock pipelines, mech. & aerial brush control,

CHAD R. ELLIS

center pivot irrigation systems, drip irrigation, filter strips, waterways, and riparian buffers).

Programs: I have assisted cooperators applying for conservation programs (EQIP, WHIP, CRP, 503WQ, GRP and CCRP), and assisted with 580 EQIP application, 82 CCRP applications within 2002-2003.

Jan 00-Dec 01

Research Assistant, Department of Agriculture, Angelo State University, Box 1088 ASU Station, San Angelo, TX 76902.

Research: Assisted in research of juniper, bitterweed, genetics, livestock feeding and breeding trials.

Livestock: Assisted in handling and working of livestock, research, and breeding.

Deer: Assisted in research of genetics and e-coli, guiding of hunters, maintained feeders and stands, monitoring and baseline.

Baseline Inventory: Conducted spotlight counts and helicopter surveys, vegetation transects.

Range: Conducted brush management control projects, prescribed burning, vegetation monitoring, and research.

May -Oct 99

Seasonal Wildlife Biologist, Kerr Wildlife Management Area, Texas Parks and Wildlife Department, Route 1, Box 180, Hunt, TX 78024.

Deer Research: Assisted in handling, tagging, scoring, and sexing of a pedigreed white-tail deer herd.

Black-Capped Vireo: Assisted in census counts.

Cattle: Assisted in rotating, feeding, working, and fencing.

Trapping: Trapped hogs and cow birds.

Baseline Inventory: Conducted small and large mammal counts, and vegetation transects.

Mexican Free-tailed Bats: Assisted in tagging, sexing, and research on Old Tunnel WMA.

Jan - May 99

Teacher Assistant (TA), Wildlife Techniques, Sul Ross State University, P.O. Box C-110, Alpine, TX 79832.

Demonstrated wildlife techniques and importance of their application. Assisted in research and administration for professor.

Jan- May 99

Wildlife Assistant, Black Gap Wildlife Management Area, Texas Parks and Wildlife Department, HC 65, Box 433, Alpine, TX 79830.
Supervisor: Dr. Louis Harvison & Bonnie McKinney (915)837-8600.

Baseline Inventory: Assisted in the construction of herp-arrays, monitoring of vegetation and small mammals.

Guzzler Project: Aided Bighorn Sheep Society and Texas Parks and Wildlife Department with two guzzlers and four slicks.

CHAD R. ELLIS

May – Aug. 98 **Seasonal Wildlife Biologist**, Gene Howe Wildlife Management Area, Texas Parks and Wildlife Department, Rt. 3 Box 19, Canadian, TX 79014.

Russian-olive Control: Assisted in cutting and application of herbicide to russian-olives on research project.

Baseline Inventory: Developed and maintained herp-arrays, live traps, bird surveys, and vegetation transects.

Monitored Burrowing Owl: Monitored burrowing owls for radio collaring young.

Spotlight Census: Assisted in spotlight counts of mule deer / white-tail deer.

Oct. 97 - 01 **Wildlife Assistant**, Kerr Wildlife Management Area, Texas Parks and Wildlife Department Rt. 1, Box 180, Hunt, TX 78024.

Deer Research: Assisted in handling of deer by giving vaccinations, ear tagging, sexing fawns, taking blood, weight, and sawing off antlers.

1997 – 1999 **Ranch Assistant**, (O2, Bar Light, Black Mesa Ranches), 375,000Acres, Alpine TX 79830.

Ranch Management: Assisted in cattle feeding, rotation, and vaccination, fence repair, pipeline installation, and vegetation monitoring and removal.

Predator Control: Assisted in trapping and removal of predators.

1996 - 1997 **Wildlife Assistant**, Elephant Mnt. Management Area, Texas Parks and Wildlife Department, HC 65, Box 80, Alpine, TX 79830.

Spotlight Census: Assisted in spotlight counts of mule deer, white-tail deer, javelina, and pronghorn.

Creosotebush Management: Assisted in a study of manual removal of creosotebush *Larrea tridentata*.

Guzzler Project: Aided Bighorn Sheep Society and Texas Parks and Wildlife Department in establishment of two guzzlers.

1994 - 1996 **Ranch Assistant**, Reed Ranch, Lohn Texas 76852.

Ranch Management: Assisted in cattle and sheep vaccination, fence repair, planting and harvesting of wheat and oats, and vegetation monitoring and removal.

Predator Control: Assisted in trapping and removal of predators.

1993 - 1995 **Ranch Assistant**, Walker Ranch, Lohn Texas 76852.

Ranch Management: Assisted in cattle vaccination, fence repair, transferring of irrigation system, and monitoring and feeding of white-tail deer.

Predator Control: Assisted in trapping and removal of predators.

CHAD R. ELLIS

OTHER EXPERIENCE:

- 1996 - 2010 **Texas Hunter Safety Instructor**
Teach students the importance of safety and ethics while hunting.
- 1998 - 2010 **Project Wild**
Teach students the importance of wildlife and their role in our ecosystem.
- May 93 – Aug. 95 **Sales Manager, Guide**, The Sportsman, Lake City, Colorado.
Sales Manager: Assisted in sales and purchasing of hiking, camping, and fishing supplies. Maintained rentals and equipment for the store and customers.
Guide: Guided fly fishing trips and taught fly fishing lessons.

HONORS AND AWARDS:

- Outstanding Young Professional for the Society for Range Management, 2014
Outstanding Alumni, Angelo State University, 2010-2011
Outstanding Young Professional of Texas Section Society for Range Management, 2010
Certificate of Merit, FY2008
Certificate of Merit, FY2006
Certificate of Merit, FY2005
Certificate of Merit, FY2004
Certificate of Merit, FY2003
Distinguished Graduate Student of College of Sciences, ASU, 2001.
Graduate Student of The Year, Animal Science Dept., ASU, 2001.
Texas Chapter of The Wildlife Society Scholarship, 1999.
Texas Parks and Wildlife Department Expo Scholarship, 1998.
Who's Who, 1999.
Dean's List, Sul Ross State University, 1995-1999.

PROFESSIONAL SERVICES:

Organizations:

- National Grazing Lands Coalition
- Texas Grazing Lands Coalition
- Oklahoma Grazing Lands Coalition
- Kansas Grazing Lands Coalition
- National Cattleman Beef Association
- US Roundtable for Sustainable Beef
- Oklahoma Prescribed Burn Association
- Oklahoma Wildlife Association

Societies:

- Society for Range Management
- Texas Section Society for Range Management
- Oklahoma Section for Range Management

CHAD R. ELLIS

Florida Section Society for Range Management
American Forage and Grassland Council
The Wildlife Society
Oklahoma Chapter of The Wildlife Society
Soil Water Conservation Society
Ecological Society of America

Activities:

Advisor for Conservation, National Agricultural Research, Extension, Education, and Economic for USDA, for Sec. Purdue, 2018-Present
Chairman, National Grazing Lands Coalition, 2015-Present
Executive Committee Member, Ecosystem Service Market Consortium, 2017-Present
Board Member, International Consortium for Anti-Microbial Stewardship in Agriculture (ICASA), 2019 - Present
Board Member, US Roundtable for Sustainable Beef, 2015-Present
Advisor, Soil Health, Foundation Food Ag Research (FFAR), 2016-Present
Board Member, Sustainable Rangeland Roundtable, 2015-Present
Committee Member for NCBA Environmental Stewardship Award Program, 2019-Present
Science Advisor, Gulf Coast Prairie LCC, 2015-Present
Advisor, OKA Institute, 2016-Present
Chair, Society for Range Management, GLCI Committee, 2013-2015
Steering Committee Member, National Grazing Lands Coalition, 2015-Present
Vice Chair, Society for Range Management, GLCI Committee, 2012-2013
Advisor, Texas Grazing Lands Conservation Initiative, 2010-Present
Advisor, Kansas Grazing Lands Coalition, 2010-Present
Advisor, Oklahoma Grazing Lands Coalition, 2010-Present
Director, OK Society for Range Management, 2012-Present.
Director, OK The Wildlife Society, 2013.
Annual Meeting Chair, Texas Section SRM Meeting in Ft Worth, 2013.
Committee member of the North Florida Fire Council, 2008-2010
Board of Directors, Florida Section for Range Management, 2007-2010
Annual Meeting Chair, Texas Section SRM Meeting in Del Rio, 2006.
Member, Trade Show Committee and Local Arrangements, National Meeting, Society for Range Management, Fort Worth, 2005.
Chair, Photo Contest, Texas Section SRM Meeting held in Kerrville, 2004.
Vice President, Sul Ross Chapter of the Wildlife Society and Range & Wildlife Club, 1997-1999.
Member, Student Affairs Committee, Texas Chapter of The Wildlife Society, 96/97.
Secretary, Sul Ross Chapter of the Wildlife Society and Range & Wildlife Club. 1996.
Treasure, Sul Ross Chapter of The Wildlife Society and Range & Wildlife Club, 1995.

Education Delivery:

Developed and Delivered: Natural Resources Conservation Service – National Education Development Center, Working Effectively with Livestock Producers, 5-Day Course, 2013 - Present

CHAD R. ELLIS

Developed and Delivered: Natural Resources Conservation Service – National Education Development Center, Plant Herbivore and Interaction, 5-Day Course, 2013 – Present

Developed and Delivered: Natural Resources Conservation Service – National Education Development Center, Rangeland Ecology, 5-Day Course, 2013 – Present

Developed and Delivered: Sustainability action Tour for McDonalds, 2016

Developed and Delivered: King Ranch Institute for Ranch Management, Grazing Lectureship, 4-day workshop, 2018

Presentations & Publications:

Ellis, C.R. (2017). Farmers, ranchers must share their ag stories. *Ag News and Views*, 33 (12), 3.

Ellis, C.R. (2016). Producers make important contributions to useable science. *Ag News and Views*, 34 (10), 7.

Derner, J. D., Ellis, C.R. & Stanley, C. (2016). Usable Science: Soil Health. *Rangelands*, 38 (38), 64-67 doi:10.1016/j.rala.2015.10.010.

Tanaka, J. A., Maczko, K. A., Hidinger, L. A. & Ellis, C.R. (2016). Usable Science for Sustainable Rangelands: Conclusion. *Rangelands*, 38 (2), 90–95 doi:10.1016/j.rala.2016.02.007.

Maczko, K. A., Hidinger, L. A., Tanaka, J. A. & Ellis, C.R. (2016). A Workshop on Future Directions of Usable Science for Rangeland Sustainability. *Rangelands*, 38 (2), 53-63 doi:10.1016/j.rala.2016.02.006.

Ellis, C.R. (2015). New initiative supports land stewardship. *Ag News and Views*, 33 (2), 5.

Ellis, C.R. (2015). Online tool makes grazing record-keeping more productive. *Ag News and Views*, 33 (7), 4.

Ellis, C.R. (2015). New center fosters collaborations for land stewardship. *Ag News and Views*, 33 (10), 1-2.

Funderburg, E. & Ellis, C.R. (2015). Pasture improvement considerations. *Progressive Cattleman*, 5 (3), p. 26-27.

Stevens, R. L. & Ellis, C.R. (2014). Key steps facilitate formation of associations. *Ag News and Views*, 32 (4), 2-3.

Ellis, C.R. (2014). Monitoring pastures assists sustainable management. *Ag News and Views*, 32 (5), 4.

CHAD R. ELLIS

Ellis, C.R. (2014). [Grazing management benefits cattle and deer](#). *Ag News and Views*, 32 (10), 6.

Ellis, C.R. (2013). [Five basic principles increase soil health](#). *Ag News and Views*, 31 (10), 4.

Ellis, C.R. (2013). [Grazing event provides opportunity](#). *Ag News and Views*, 31 (5), 2.

Ellis, C.R. (2012). [Phone app provides soils data in the field](#). *Ag News and Views*, 30 (12), 7.

Presented “Empowering and Amplifying the Producer Voice” Global Roundtable for Sustainable Beef- Communication Summit, 5/22/19

Presented “Ecosystem Services Market “ National Association Conservation Districts 2019 annual Conference. 2019

Presented “Sustainable Beef Panel” Sustainability Ag Summit. 2018

Presented “Building Soil Health with Grazing Management” Society for Range Management. Orlando, FL. 2014.

Presented “Understanding Pastureland’s Role in Ecological Sites with Forage Suitability Group Descriptions” Society for Range Management. Spokane, WA. 2012.

Presented “Use of Multivariate Analysis to Develop Forage Suitability Groups” The Fourth National Conference on Grazing lands, Reno, NV, Dec. 2009.

Presented “Use of Multivariate Analysis to Develop Forage Suitability Groups” American Forage and Grassland Council, Grand Rapids, June 2009.

Presented “Diversity the Key to Sustainability” Society for Range Management, Albuquerque NM, 2009.

Published “Grazing Management During Drought” The Florida Cattlemen and Livestock Journal, Jan. 2008.

Presented “Potential EQIP Priority for Pronghorn in the Trans-Pecos” Pronghorn Symposium, Alpine, Texas, Aug. 2006.

Published “Sire Influence on Juniper Consumption by Goats” Rangeland Ecology & Management, Volume 58, Number 3, May 2005.

Presented “Remedy RTU Effectiveness” Grazing Land Conservation Initiative (GLCI), Nashville TN, 2003.

Presented “Sustainable Juniper Management” Society for Range Management, Casper WY, 2003.

Published “Sustainable Juniper Control Through the Use of Goats” Homesteader’s Connection, May/June issue, 2002.

Published “Persistence and Heritability of Juniper Consumption by Goats” Angelo State University,

CHAD R. ELLIS

Progress Report, Pub. No.R-9, Sept. 2002.

Published "Efficacy and Cost of the Stem and Leaf Spray Techniques on the ASU Ranch" Angelo State University, Progress Report, Pub. No.R-9, Sept. 2002.

Published "Physiological Mechanisms to Avoid Bitterweed Toxicity by Sheep" Angelo State University, Progress Report, Pub. No.R-9, Sept. 2002.

Presented "Sustainable Juniper Management in West Central Texas" Society for Range Management, 2001.

Thesis: "Persistence and Heritability of Juniper Consumption as a Biological Control by Goats" Angelo State University, 2001.

Presented "Cut-Stump Treatment on Russian-olives on the Gene Howe Wildlife Management Area." Society for Range Management, 1998.

COMMUNITY SERVICES:

Committee Member: Pastor/Staff-Parish Relations Committee, First United Methodist Church, Ardmore, OK – 2019-2021

Volunteer – Eastman Volunteer Fire Department, Marietta, OK 2012 – Present

Volunteer/Leader – 4-H Love Co, Marietta, OK 2018-Present

Truth in Testimony Disclosure Form

In accordance with Rule XI, clause 2(g)(5)*, of the *Rules of the House of Representatives*, witnesses are asked to disclose the following information. Please complete this form electronically by filling in the provided blanks.

Committee: Agriculture

Subcommittee: Conservation and Forestry

Hearing Date: June 25, 2019

Hearing Title :

Managing for Soil Health: Securing the Conservation and Economic Benefits of Healthy Soils

Witness Name: Chad Ellis

Position/Title: Chairman National Grazing Lands Coalition

Witness Type: Governmental Non-governmental

Are you representing yourself or an organization? Self Organization

If you are representing an organization, please list what entity or entities you are representing:

National Grazing Lands Coalition

If you are a non-governmental witness, please list any federal grants or contracts (including subgrants or subcontracts) related to the hearing's subject matter that you or the organization(s) you represent at this hearing received in the current calendar year and previous two calendar years. Include the source and amount of each grant or contract. *If necessary, attach additional sheet(s) to provide more information.* House Rules do NOT require disclosure of federal payments to individuals, such as farm program payments or assistance to agricultural producers.

See Attachment A

If you are a non-governmental witness, please list any contracts or payments originating with a foreign government and related to the hearing's subject matter that you or the organization(s) you represent at this hearing received in the current year and previous two calendar years. Include the amount and country of origin of each contract or payment. *If necessary, attach additional sheet(s) to provide more information.*

N/A

Attachment A

Federal grants, cooperative agreements, or contracts (including subgrants or subcontracts) related to hearing's subject matter that you or the organization(s) you represent at this hearing received in the current calendar year and previous two calendar years. Include the source and amount of each grant, cooperative agreement, or contract.

Federal Grants made to the National Grazing Lands Coalition that relate to hearing's subject matter:

1. Contribution Agreement
 - a. Funding Agency: USDA-NRCS
 - b. Amount: \$360,000
 - c. Term: 2/27/18 – 12/31/2020
2. Outreach on Grazing Lands to Enhance Economic Analysis (Costs/Benefits) for Conservation Changes
 - a. Funding Agency: USDA-NRCS-CIG
 - b. Amount: \$787,145
 - c. Term: 11/1/17 – 9/30/19
3. Utilizing Outreach and Grazing to Improve Conservation & Soil Health
 - a. Funding Agency: USDA-NRCS-CIG
 - b. Amount: \$279,720
 - c. Term: 10/14 – 8/31/2018
4. Contribution Agreement
 - a. Funding Agency: USDA-NRCS-TX
 - b. Amount: \$135,000
 - c. Term: 10/1/18 – 9/30/21