

A photograph of a wooden sign for Thunder Basin National Grassland in the foreground. The sign is dark with white text and a small number '12' in the bottom left corner. The background shows a vast grassy field under a dramatic, dark blue sky with some clouds. The overall scene is rural and natural.

# Stakeholder-driven studies in bountiful Thunder Basin flip the agriculture and natural resources research model

Derek Scasta  
*Assistant Professor*  
*Ecosystem Science and Management*



Black-tailed prairie dog (*Cynomys ludovicianus*)



Greater sage-grouse (*Centrocercus urophasianus*)

Conducting research that improves the land, and the lives of people who depend upon that land, is part of the mission of land-grant universities such as the University of Wyoming.

This has been traditionally accomplished in a researcher-driven model in which professors conduct research on university farms, ranches, and in greenhouses. Results were typically only presented to stakeholders at the end of a project – anywhere from three to five years later.

This approach is not the most effective for multiple reasons.

- First, the lack of stakeholders directing research can lead to irrelevant studies (“working on the wrong thing”).
- Second, the lack of stakeholders involved in the process can lead to a lack of trusting the results (“skepticism”).
- Third, research conducted only on university properties lacks local context that could enhance adoption (“it won’t work on my place”).

This can leave stakeholders dealing with problems for which there may not be useful information developed by a university to help guide decision-making.

The Thunder Basin region in eastern Wyoming – where ranchers face many challenges – was one such place.

### Flipping the model for Thunder Basin stakeholders

An effort started in 2014 to flip the research model specifically for the Thunder Basin region. This was facilitated by the Wyoming Agricultural Experiment Station (AES) and USDA Agricultural Research Service (ARS) leadership at the direction of local stakeholders represented by the Thunder Basin Grasslands Prairie Ecosystem Association (TBGPEA).

TBGPEA includes ranchers and energy companies in addition to other partners. Local stakeholders laid out the context for researchers and highlighted their concerns.

Federal land management and complex plant-animal relationships have posed long-term issues for stakeholders. There had been petitions to list wildlife species under the Endangered Species Act (ESA), specifically black-tailed prairie dogs (*Cynomys*

*ludovicianus*) as recently as 2009, and greater sage-grouse (*Centrocercus urophasianus*) as recently as 2015.

Stakeholders had concerns about these two species, particularly the lack of data about their distributions, impacts on ranching enterprises, difficulty of managing the two concurrently, and how associated species (such as grassland birds) might be affected.

Stakeholders wanted to be forward-looking by identifying species that might be imperiled next and then merging agriculture and natural resources in new research projects.

### Collaborative and participatory research efforts

This led to collaborative groups forming and development of initial research projects of the Thunder Basin Research Initiative. Two early projects focused on the wildlife species of concern and associated implications for ranching operations. One of these established exclosures to better understand the impacts prairie dogs were having on vegetation and agricultural production. The other sought to better quantify bird diversity and responses to disturbances in the region, particularly the disturbance of prairie dogs.

Researchers in both projects worked closely with ranchers and included research sites on private and public land.

These initial projects set the stage for strong partnerships and potential funding for future projects. For example, a new participatory research project has been funded by the USDA National Institute for Food and Agriculture titled “*Participatory research to quantify prairie dog impacts on livestock production in western rangelands.*”

In this research, we use locally owned cattle to understand cattle performance on private ranches and associated public grazing allotments. This work is measuring forage quality, animal nutrition, animal weights, and animal movements (Figures 1A-C) relative to landscape features and prairie dogs. This is a prime example of doing relevant research on private ranches with privately owned cattle to answer specific questions.

New research projects address other challenges to the region including fire and its impacts on sagebrush (*Artemisia tridentata*) and interaction with invasive species such as cheatgrass (*Bromus tectorum*).



**Fig. 1.** Participatory research with ranchers in the Thunder Basin using (A) privately owned cattle on private ranches and associated public grazing allotments to understand (B) cattle performance and (C) cattle movements relative to prairie dog colonies using new GPS tracking technology.

In this project, funded by the Joint Fire Science Program, titled “*Fire effects on herbaceous regeneration across an invasion gradient in grasslands and shrublands,*” experimental research on wildland fire and the effects on sagebrush mortality, cheatgrass invasion, and wildfire risks is being conducted with many collaborators. They include Forest Service fire staff, ranchers, and volunteer fire departments (Figures 2A-B) and study sites include Forest Service land and private ranches.

The partnerships and infrastructures developed also allow research on emerging critical issues such as drought and its impact on productivity, sylvatic plague (*Yersinia pestis*) in prairie dogs, and vegetation response before and after the 2018 plague event.

### Broader impacts

The Thunder Basin Research Initiative efforts have effectively flipped the traditional research model and produced important scientific information requested by local stakeholders:

- Important information about how drought and prairie dogs cumulatively reduce forage for livestock (Connell et al., 2019),
- How prairie dogs influence sage grouse habitat relative to well-managed livestock grazing (Connell et al., 2018), and
- How prairie dog colonies should be managed to optimize grassland bird habitat (Duchardt et al., 2019).

Through the research process, two graduate students have been closely engaged with ranchers in co-developing research and have developed a critical understanding of the challenges ranchers face in the region – in other words, training our future professionals to know the issues first-hand.

In addition, extension bulletins summarize some of the biology and ecology of the region. Results have been shared at field days in 2018 and in public meetings where researchers work alongside stakeholders at the cutting-edge of the regional issues by implementing stakeholder-driven projects in the Thunder Basin region.

Finally, the partnerships and accomplishments of the efforts in Thunder Basin are reflected in the recognition of TBGPEA with the 2019 UW College of Agriculture and Natural Resources’ Research/Outreach Partner of the Year ([bit.ly/thunderbasin](http://bit.ly/thunderbasin)) – stakeholders bringing the vision and resources together for long-term research in the Thunder Basin.

.....  
**To contact:** Scasta can be reached at (307) 766-2337 or [jscasta@uwyo.edu](mailto:jscasta@uwyo.edu).

## The multifaceted Thunder Basin

The Thunder Basin region consists of rangelands where prairies meet sagebrush, and ranching and energy are important economic drivers of local communities. The five counties in the Thunder Basin region – Campbell, Converse, Crook, Niobrara, and Weston – are home to more than 300,000 head of cattle and about 100,000 head of sheep.

This area also includes the Thunder Basin National Grassland, sprawling across more than 500,000 acres managed by the U.S. Forest Service and includes livestock grazing allotments. Drought and wildfire are persistent events.



**Fig. 2.** Research addressing fire in Thunder Basin and its impacts on sagebrush and interaction with invasive species such as cheatgrass.