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SCHOOL OF NATURAL RESOURCES

Introduction

Beef production is viewed as the most sustainable use of rangelands across the northern Great Plains, and is generally compatible with wildlife habitat needs. With growing interest from society about how food is produced and how food production impacts the environment, there is a huge opportunity for ranchers to show that raising beef cattle on rangelands is one of the least intrusive methods of food production. Ranchers understand that production potential on rangelands is relatively low and returns in beef production per unit input is low; therefore, arid and semi-arid rangelands commonly receive few inputs. Furthermore, allowing rangeland degradation is poor management because restoring degraded rangeland is expensive and the cost cannot be recovered through beef production. It only makes sense for ranchers to be excellent stewards of rangelands as they look towards sustained productivity at minimum levels of costly inputs. Ranchers are one of the major reasons that rangeland remains productive in the Great Plains, and they are important stewards of this invaluable natural resource. In the northern Great Plains, 60-

80% of the once-extensive mixed-grass and short-grass prairies has been converted to other uses, such as row crop agriculture. Thus, rangeland and the wildlife that depend on it are limited resources that with thoughtful management can bring benefits to ranch families. One key management consideration is “habitat heterogeneity.”

What is Habitat Heterogeneity?

Habitat heterogeneity is the existence of two or more different types of habitat in an area. For example, if a pasture has one area that is grazed hard and has shorter grass and less litter, while another area is avoided and has taller grass and more litter, it has high heterogeneity. If a pasture has approximately the same grass height and litter layer across the whole area, it has low heterogeneity. Having many different types of habitat is important because there are many types of wildlife in the Great Plains, and the different species of wildlife have different habitat requirements (Figure 1). When there is habitat heterogeneity on a landscape, there are a variety of habitat types, from bare ground (preferred by

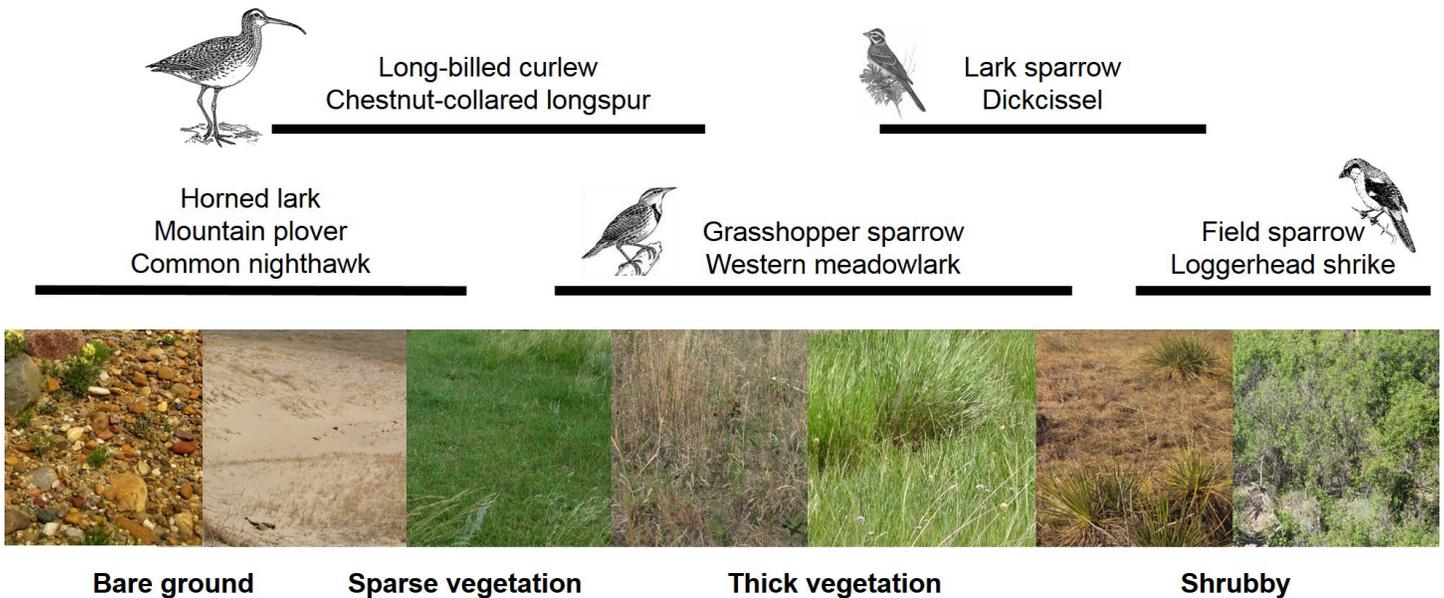


Figure 1. Diverse bird communities in the Northern Great Plains require a variety of habitats, from bare ground to shrubby areas. For example, common nighthawks (*Chordeiles minor*) nest on rocky and bare ground surfaces, grasshopper sparrows (*Ammodramus savannarum*) nest in moderately thick grassy habitats, and loggerhead shrikes (*Lanius ludovicianus*) require shrubby habitats.

common nighthawks and mountain plovers, for example) to tall, dense vegetation with a thick layer of litter (preferred by grasshopper sparrows and Sprague's pipits, for example). Some areas may also have shrubs in varying densities, creating additional habitat for those wildlife species that like shrubs, such as loggerhead shrikes and lark sparrows. The opposite of habitat heterogeneity is when there is a relatively even layer of vegetation across a given area.

What Creates Habitat Heterogeneity?

Historically, three main factors contributed to the creation of habitat heterogeneity in the Great Plains: grazing, fire, and burrowing mammals (Figure 2). These factors are used now as management tools or practices for creating a variety of habitat types. Grazing is considered the practice with the greatest potential in managing for heterogeneity because grazing is the most common use of rangelands in the Great Plains, although fire and burrowing mammals have different effects from grazing on vegetation and wildlife. Fire removes most of the above-ground vegetation but roots and belowground, re-sprouting buds are left intact, which allows regrowth of perennial grasses, forbs, and sedges following fire (Arterburn 2016). Besides helping to increase habitat heterogeneity, prescribed fires can be used to prevent the spread of wildfires. Prairie dogs keep vegetation in their towns clipped short, thus creating a sharp contrast in vegetation structure on and off the town, which can be an important contribution to habitat heterogeneity and a diversity of wildlife. Some animals that prefer or require prairie dog towns include mountain plovers and black-footed ferrets. Prairie dogs also help with soil aeration and water infiltration.

Ranching and Habitat Heterogeneity

Keeping a ranch in business requires efficient and sustainable use of perennial forage resources. During interviews, ranchers reported managing against bare ground and shrubby cover. Bare ground

Photograph courtesy of Maggi Sliwinski



Photograph courtesy of Maggi Sliwinski



Photograph courtesy of Maggi Sliwinski



Figure 2. Grazing animals, fire, and burrowing mammals are three major drivers of heterogeneity that can be used to manage rangelands in the Great Plains.

can lead to erosion and reduced forage production, and shrubs generally are not palatable to cattle and lead to reduced forage production. However, this means that meeting the goals of efficient beef production can lead to a reduction in habitat heterogeneity for wildlife. In many instances, the grassland birds of concern are those that require more bare ground or short vegetation for nesting, such as long-billed curlews and chestnut-collared longspurs. From a production and land steward's perspective, such management is difficult to justify even though it potentially increases heterogeneity and improves wildlife habitat. Besides being good for diverse wildlife communities, habitat heterogeneity can stabilize beef production by minimizing changes in forage availability in response to precipitation variability over time by including drought-tolerant grass species (Allred et al. 2014).

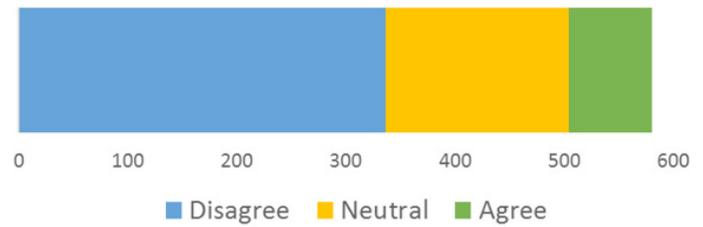
It's clear that many ranchers are excellent stewards and are working in an increasingly challenging industry. With increasing pressure from consumers for products that are environmentally friendly, and growing societal interest in the way their food is produced, it should benefit ranchers to be at the forefront of incorporating wildlife needs into their ranch management plans. Also, our landscapes will be pressed for more food production in the future, so the rangelands that ranchers manage are critical refuges for many species, like long-billed curlews, chestnut-collared longspurs, swift fox, black-footed ferret, short-horned lizards, and more.

Results of 2016 Rancher Survey

Nearly 600 ranchers in western Nebraska, South Dakota, and North Dakota contributed responses that provide a better understanding of ranchers' opinions related to ecosystem factors that increase habitat heterogeneity, including grazing, fire, and burrowing mammals. Some survey highlights are summarized here.

Less than 15% of surveyed ranchers viewed fire as a vital tool in managing rangeland vegetation, with most ranchers responding that fire does not provide any outcomes that cannot be achieved by livestock

“Periodic fire is vital in managing rangeland vegetation.”



“Fire provides outcomes that cannot be reached with livestock.”

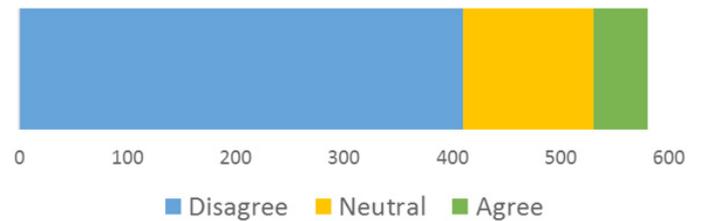


Figure 3. Ranchers' views of fire as a management tool in rangelands.

grazing (Figure 3). Surveyed ranchers reported that fire is too risky because they cannot control fire, and many were concerned about smoke affecting neighbors and nearby communities. Interestingly, fire is used in many rangeland ecosystems to control herbaceous and woody invasive species, including grasses, forbs, shrubs, and trees. Fire also is a useful tool for manipulating distribution of grazing, improving wildlife habitat, and revitalizing underused pastures by removing accumulated dead vegetation.

For those ranchers who are interested in using fire as a tool, there is a growing number of resources available. For instance, there is the Fire Learning Network (Resource 1-The list of resource links is shown on the last page), which brings together private landowners and those with fire resources (e.g., state and federal agencies) to develop strategies for the use of fire in solving local problems (e.g., reducing the risk of catastrophic wildfire). There is also the Great Plains Fire Science Exchange (Resource 2) that has numerous resources related to fire management and learning opportunities.

About 85% of ranchers agreed that eliminating prairie dogs would be in the best interests of a ranch (Figure 4). From a livestock production standpoint, this makes sense because prairie dog foraging can compete with livestock grazing. When nearly all ranchers agree that prairie dog presence leads to degraded rangeland and reduced livestock production, the result is that the Great Plains has less prairie dogs, which might be good for ranchers, but it also leads to severe losses of certain wildlife species. Prairie dogs are considered a “keystone” species (Davidson, Detling, and Brown 2012), meaning that their presence on the landscape supports numerous other species, including mountain plovers, burrowing owls, swift foxes, and black-footed ferrets. Current estimates suggest that prairie dogs occupy only 2.5% of the area they occupied prior to settlement of the Great Plains in the late 1800s (Forrest 2005), and efforts to eliminate them continue.

“Eliminating prairie dogs would be in the best interests of a ranch.”

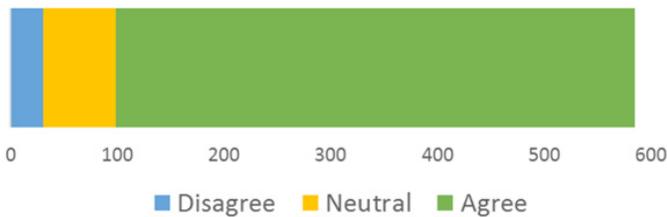


Figure 4. Ranchers’ views of prairie dogs in rangelands.

The science concerning the competition between livestock and prairie dogs for forage is beginning to challenge our long-held beliefs. Research has shown that there can be a positive feedback between prairie dogs and livestock (Augustine and Springer 2013). Because prairie dogs keep vegetation clipped short, it is more easily accessible and more nutritious than vegetation that grows tall, goes to seed, and loses its forage quality. When there is competition between livestock and prairie dogs, such as during droughts, the cost of prairie dog control may actually exceed the lost revenue from beef production (Freese, Fuhlendorf, and Kunkel 2014).

Allowing prairie dogs to exist on a ranch is a difficult decision and can require consultation with neighbors, community groups, and state wildlife agencies. Managing a prairie dog colony on private land is a challenge that needs planning

and foresight to accomplish, but state agencies and conservation groups are available to provide support, and possibly incentives, for people who wish to manage a local prairie dog colony. Like any other wildlife population, a prairie dog colony needs to be managed.

About 85% of ranchers had positive attitudes about planting trees in rangelands (Figure 5), which may reflect the use of trees for livestock shelter and yard sites throughout history. Although trees can encourage some wildlife such as turkeys and deer, adding trees to rangeland ecosystems is a negative

“Planting trees (e.g., for wind breaks or shelter belts) is bad for rangeland wildlife.”

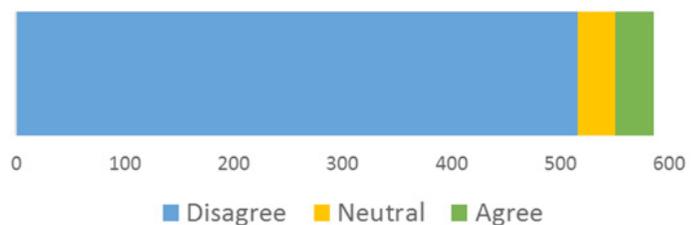


Figure 5. Ranchers’ views of tree plantings in rangelands.

for most wildlife species native to rangelands (Figure 6). Trees serve as shelter for mammalian predators and perches for raptors and reduce nesting and food cover required by rangeland fauna. Most native rangeland species, like long-billed curlews and swift foxes, actually avoid trees (Dugger and Dugger 2002; Kamler et al. 2003). Therefore, trees may reduce productivity of many avian and mammalian species native to rangelands because trees can increase predator abundance and fragment their habitat.



Photograph courtesy of Aaron Shropshire

Figure 6. A shelterbelt planted in native rangeland can be detrimental to rangeland wildlife.

Most ranchers agreed that their land should provide for the needs of future plant and wildlife populations (Figure 7). Diverse plant and wildlife communities on rangelands require a wide variety of habitat types, including bare ground, short vegetation, and patches of high forb density. Different combinations

“My land should provide for the needs of future plant and wildlife populations.”

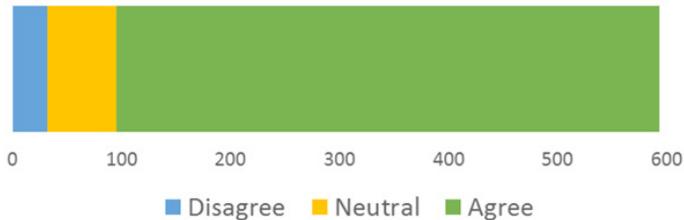
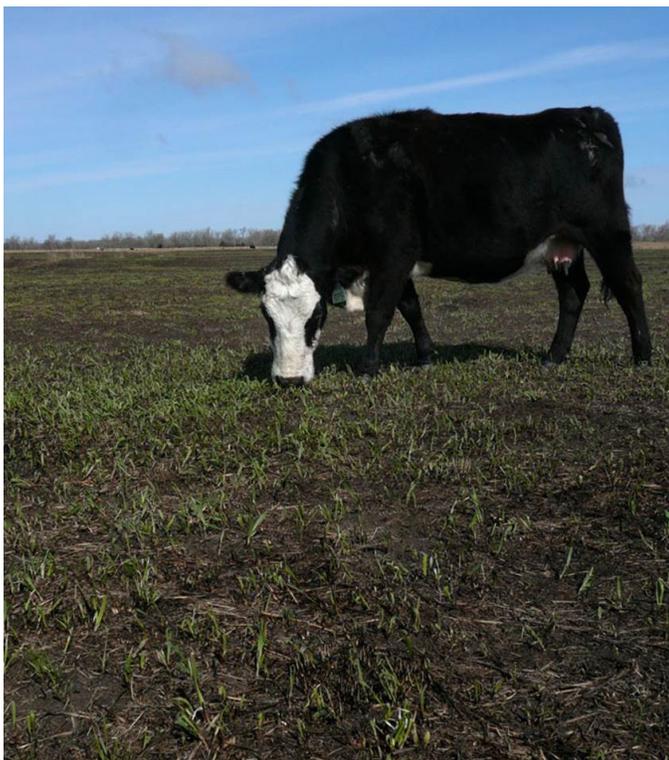


Figure 7. Ranchers’ views of the role of their land for wildlife habitat.

of grazing practices, fire, and/or burrowing animals are the principal factors that can be manipulated to create this mosaic of habitat types (Figure 8). Managing for even plant cover is thought to result in the most efficient forage production and highest carrying capacity (stocking rate) for cattle. However, research has shown that cattle production is not necessarily compromised when managing for



Photograph courtesy of Chris Helzer

Figure 8. Different grazing practices, along with fire, can create a mosaic of habitat types.

heterogeneity and diverse wildlife habitats (Allred et al. 2014; Limb et al. 2011). Some programs available to help ranchers learn about the habitat needs of different wildlife species and to implement management that is beneficial, include the Natural Resource Conservation Service’s conservation programs through the Farm Bill (e.g., Conservation Stewardship Program (Resource 3), Conservation of Private Grazing Land Initiative (Resource 3), Pheasants Forever habitat programs (Resource 4), and World Wildlife Fund’s Sustainable Ranching Initiative (Resource 5)).

One ongoing concern for many ranchers, especially with increasing societal interest in food production, is what effect having a rare or threatened species on their land will have. Most of the surveyed ranchers would not be pleased if a rare or threatened species was found on their land because the associated government regulations could result in government intervention and reduced control of their land (Figure 9). Ranchers can help prevent the future listing of species as threatened or endangered by managing for a diversity of wildlife species. One federal program, intended to lessen the burden of private landowners, is the Safe Harbor Program (Resources 6 and 7). Landowners work with the US Fish and Wildlife Service to establish agreements that prevent future regulation in exchange for actions that contribute to the recovery of the species. This program was used in Texas to successfully reestablish aplomado falcons, where reintroductions had to take place on private land for the recovery of the species (Jenny et al. 2004). State wildlife biologists and conservation groups can help connect producers with the appropriate partner for exploring options for management of threatened and endangered species on their land.

“I would be pleased if a rare or threatened species was found on my land.”

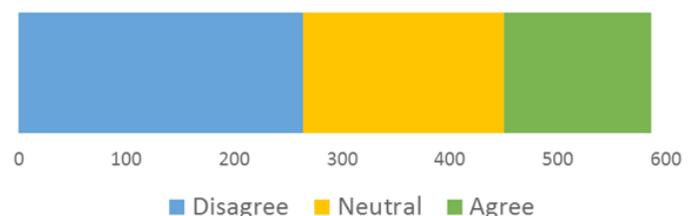


Figure 9. Ranchers’ views of threatened and endangered species.

Conclusions

Our research clarifies the perceived conflicts between the needs of wildlife and the needs of ranchers. However, many rangeland ecologists and conservationists are confident that beef production and wildlife habitat, including for those species that prefer bare ground, can be mutually beneficial when managed carefully. There is a growing number of resources available to producers who would like to do more to promote wildlife conservation on their land, some of which are listed in the resources section below. With growing interest from society in the food production system, it will be important for ranchers to demonstrate how their production systems contribute to the well-being of wildlife and other environmental factors.

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Resources

1. The Nature Conservancy
<https://www.conservationgateway.org>
2. Great Plains Fire Science Exchange
<http://www.gpfirescience.org/>
3. Natural Resource Conservation Service, USDA
<https://www.nrcs.usda.gov>
4. Pheasants Forever
<https://www.pheasantsforever.org>
5. World Wildlife Fund
<https://www.worldwildlife.org>
6. U.S. Fish and Wildlife Service
<https://www.fws.gov>
7. Examples of the Safe Harbor Program being used to protect private landowners from further regulations while contributing to endangered species conservation
<http://www.conservationmagazine.org/2001/07/safe-harbor-agreements/>



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