Prairie Grasslands

Photo courtesy of WGFD

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Habitat Description

In Wyoming, prairie grasslands are typically below 7,000 feet in elevation and are predominantly located in the eastern portions of the state, although they are also common in basins of south central and southwestern portions of Wyoming. In eastern Wyoming, prairie grasslands have among the warmest and longest growing seasons of Wyoming's habitat types, as well as relatively deep and well developed soils. Their location in eastern Wyoming allows them to receive relatively high summer precipitation, ultimately derived from weather systems originating in the Gulf of Mexico which are blocked by the mountains from the basins of western Wyoming. These factors result in grasslands having high primary productivity when compared to other Wyoming habitat types.

Most of Wyoming's grasslands are classified as either shortgrass prairie or mixed-grass prairie. Shortgrass prairie occurs mainly in the southeast corner of the state and extends south into Colorado. Buffalo grass and blue grama are the two predominant grass species in shortgrass prairie. Mixed-grass prairie is common across much of eastern Wyoming. It typically receives more moisture and has greater plant species diversity than shortgrass prairie. Common mixed-grass prairie plant species include needle-and-thread, western wheatgrass, blue grama, Sandberg's bluegrass, prairie Junegrass, upland sedges, and Indian ricegrass (Knight 1994).

Grasslands are characterized by frequent and occasionally intense natural disturbances including drought, fire, grazing, and occasionally short growing seasons (Nicholoff 2003). These factors have encouraged the predominance of perennial grasses with a substantial number of sedges and herbaceous forbs. These types of plants have their buds at or just below the surface, making them less susceptible to damage by surface fire and grazing (Knight 1994). Historically, regular disturbances created patches of vegetation in various stages of recovery. The size and location of patches often shifted across the landscape through time resulting in a mosaic of habitat diversity (see Wyoming Leading Wildlife Conservation Challenges – Disruption of Historic Disturbance Regimes). In addition to disturbances, water availability, often related to the location of snow drifts, influenced the local composition of prairie plant communities.

Prior to European settlement, fires on the Great Plains occurred at intervals of approximately 2–25 years (Wright and Bailey 1980). Wyoming grasslands likely burned less frequently because they are more arid than the mesic grasslands of the Great Plains and thus did not accumulate fine fuels as quickly (Knight 1994).

Much of Wyoming's prairie grasslands are unsuitable for farming; however, the abundant grazing resource led to the establishment of cattle and sheep ranches. Today, the majority of Wyoming's prairie grasslands are incorporated within privately owned ranches. The predominance of large ranches and Wyoming's relatively low population density have allowed grasslands to persist in a relatively intact state when compared to other regions of the country. Properly managed, livestock grazing can duplicate the natural influences of native species like bison. The future of this habitat type in Wyoming will be closely tied to the ability of organizations to engage private landowners in conservation efforts and the persistence of ranching as an economically viable land use within the state. In addition to ranching, wildlife habitat, oil and gas extraction, wind power, recreation, and housing development are important land uses in the grasslands habitat type.

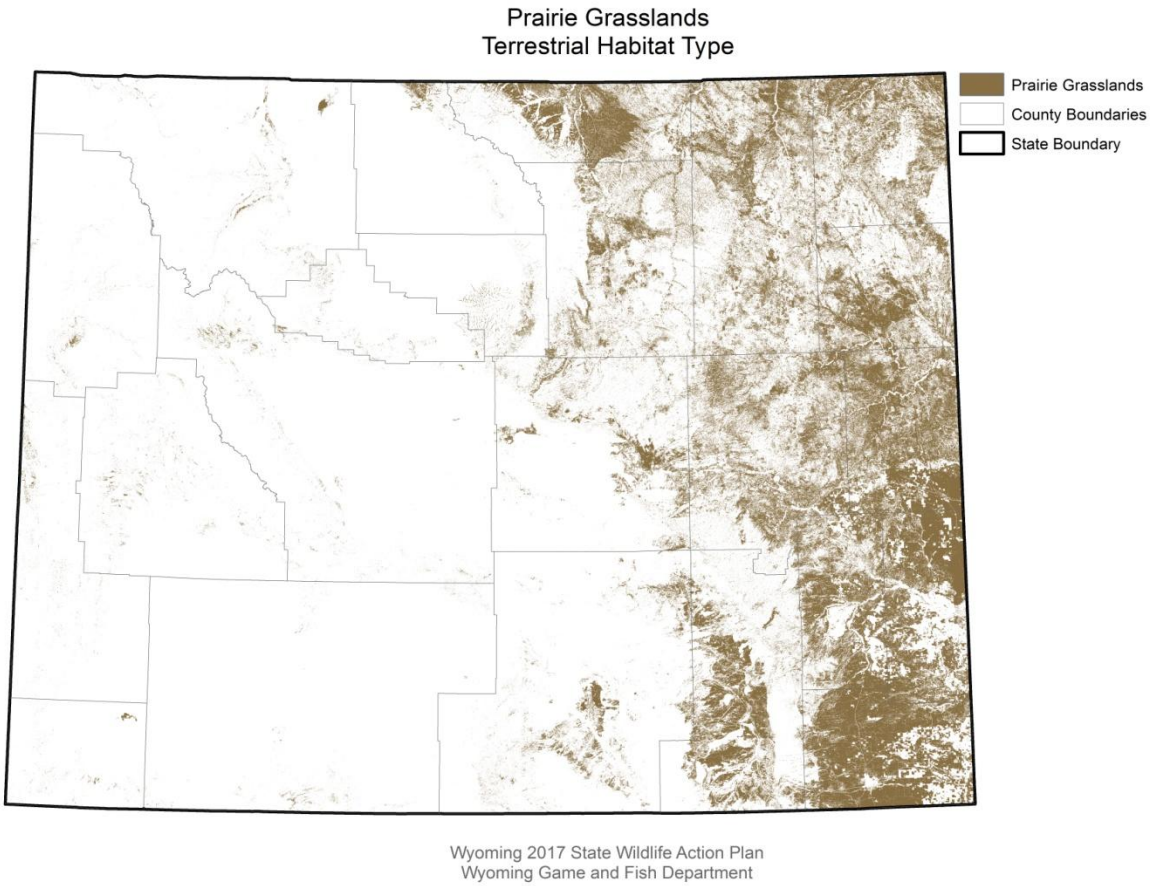


FIGURE 13. Wyoming Prairie Grasslands

TABLE 13. Wyoming Prairie Grasslands NatureServe Ecological Systems[1]

1. Inter-Mountain Basins Semi-Desert Grassland
2. Northern Rocky Mountain Lower Montane, Foothill and Valley Grassland
3. Northwestern Great Plains Mixed-grass Prairie
4. Western Great Plains Foothill and Piedmont Grassland
5. Western Great Plains Sand Prairie
6. Western Great Plains Shortgrass Prairie
7. Introduced Upland Vegetation – Forbland
8. Introduced Upland Vegetation – Annual Grassland
9. Introduced Upland Vegetation – Perennial Grassland
10. Recently burned grassland

[1] Descriptions of NatureServe Ecological Systems which make up this habitat type can be found at: NatureServe Explorer: an online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, VA. http://www.natureserve.org/explorer.

TABLE 14. Wyoming Prairie Grasslands Species of Greatest Conservation Need

Mammals
Black-footed Ferret
Black-tailed Prairie Dog
Hispid Pocket Mouse
Olive-backed Pocket Mouse
Plains Harvest Mouse
Plains Pocket Mouse
Sand Hills Pocket Gopher
Silky Pocket Mouse
Spotted Ground Squirrel
Swift Fox
White-tailed Prairie Dog

Birds
Baird's Sparrow
Bobolink
Burrowing Owl
Chestnut-collared Longspur
Dickcissel
Ferruginous Hawk
Grasshopper Sparrow
Long-billed Curlew
McCown's Longspur
Mountain Plover
Short-eared Owl
Swainson's Hawk
Upland Sandpiper

Reptiles
Great Plains Earless Lizard
Greater Short-horned Lizard
Northern Many-lined Skink
Ornate Box Turtle
Plains Black-headed Snake
Plains Hog-nosed Snake
Prairie Lizard
Prairie Racerunner

Amphibians
Great Plains Spadefoot
Great Plains Toad
Plains Spadefoot

Prairie Grasslands Wildlife

Grasslands are known to support large numbers of wildlife. They are sometimes described as grazer systems, because photosynthesis entrains solar energy into grass, which is digestible by a wide range of animals. In contrast, forests are sometimes described as decomposer systems, where solar energy is directed towards wood production, which is digestible only by specialized fungi, microbes, and insects.

Historically, a number of animal species had a significant influence on shaping the plant and animal composition of prairie grassland habitats. Estimated bison numbers prior to European settlement vary considerably, from 15–20 million (Cushman and Jones 1988, Shaw 1995) to 30–60 million (Samson et. al 1996). Certainly, large numbers of bison altered grasslands by grazing some areas intensively, which contributed to patches of open habitat and reduced encroachment by trees.

Prairie dogs, often thriving in areas recently grazed by bison, lived in large colonies, digging burrows and cropping vegetation. These burrows and the open patches of ground resulting from the colonies create habitat for other wildlife species, including the black-footed ferret, burrowing owls, long-tailed weasel, mountain plover, and swift fox (Kotliar et al. 1999, Kotliar 2000). Prairie dogs also provide a prey base for carnivores including black-footed ferrets, ferruginous hawks, and golden eagles.

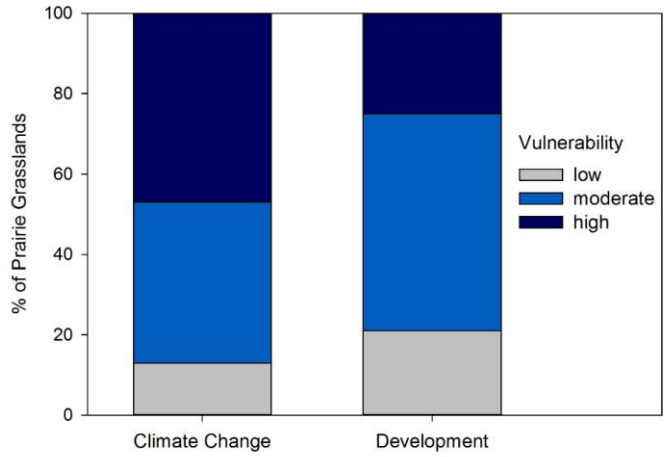
Burrowing mammals, such as prairie dogs, increase the structural diversity of grassland habitats by providing subterranean cover from the elements. Soil burrows are warmer in winter, cooler in summer, more humid year-round, and essentially windless compared to the ground surface. This burrowing activity is parallel to the function that primary cavity excavators such as woodpeckers provide in forest habitats. Most Wyoming prairie grasslands have a strong shrub component in addition to grasses. Shrubs also contribute to the structural diversity of prairie grasslands habitat by providing sites for perches, snow-capture structures, wind breaks, nest cover, and an additional forage base for ungulates. Key habitat components, such as high structural diversity of grasslands, high diversity of invertebrates, and diversity of seed crops, will increase the value of these habitats for these mammals, especially pocket mice.

Prairie grasslands are home to some of Wyoming's best known wildlife species including the pronghorn and the western meadowlark, Wyoming's state bird. Prairie sharp-tailed grouse are a popular game species found in grasslands. Many birds such as rough-legged hawk, hoary redpoll, Lapland longspur, snow bunting, and even the occasional snowy owls and gyrfalcons, which breed in the Arctic or boreal Canada, winter on Wyoming grasslands. Prior to European settlement, elk were commonly found in prairie grasslands, but then retreated to more mountainous habitats with human encroachment. In some areas of Wyoming this trend is now reversing.

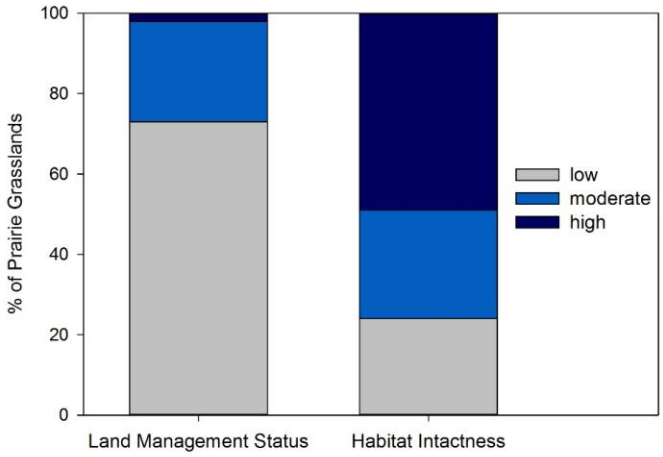
Wyoming once represented the western periphery of many species' continental ranges (e.g., mountain plover, swift fox, ferruginous hawk, and pronghorn). Intensive conversion of grassland in the Great Plains resulted in the loss of these habitats outside of Wyoming. Consequently, populations in Wyoming have remained largely intact, and the core of these species' distributions is now considered to be in Wyoming.

Prairie Grasslands Habitat Threats

Figure 14. Prairie Grasslands Vulnerability Analysis



The colored bars show the proportion of the habitat type that was identified as having low, moderate, or high vulnerability to climate change or development, based on classification of scores ranging from 0 to 1 into the following categories: low (<0.34), moderate (0.34-0.66), and high (>0.66). Rankings for climate change or development vulnerability were based on the land area of the habitat type classified as having high vulnerability: low (<10%), moderate (10-33%), or high (>33%). Vulnerability was calculated as exposure minus resilience. Development vulnerability includes existing and projected residential, oil and gas, and wind energy development. Further details are provided in the Leading Challenges section of this report and in Pocewicz et al. (2014).



The colored bars show the proportion of the habitat type that was identified as having low, moderate, or high land management status or habitat intactness. For land management status, high corresponds to the percent of the habitat occurring in GAP status 1 or 2, moderate to the percent occurring in GAP status 2b or 3, and low to the percent occurring in GAP status 4. Rankings for land management status were based on the land area of the habitat type classified as having high status or legal protection: low (<10%), moderate (10-33%), or high (>33%). For habitat intactness, scores ranging from 0 to 1 were assigned to categories as follows: low (<0.34), moderate (0.34-0.66), and high (>0.66). Rankings for intactness were based on the land area of the habitat type classified as having high intactness: low (<25%), moderate (25-75%), or high (>75%).

Energy development – High
Coal mining, oil, natural gas, and wind are common forms of energy development in Wyoming grasslands (see Wyoming Leading Wildlife Conservation Challenges – Energy Development). Wyoming is the nation's leading producer of coal (National Mining Association 2008). About 96% of Wyoming's coal originates in northeastern Wyoming[2] where grasslands predominate (Lyman and Jones 2005). Wyoming is also ranked fifth in natural gas production, eighth in crude oil production (Lawrence 2007), and, after factoring in land status and environmental constraints, seventh in wind-power generating potential (Elliott et al. 1991).

Based on a recent compendium of public land statistics, 175,980 acres of public lands are currently leased for coal extraction, and oil and gas leases total more than 8.8 million acres in Wyoming (BLM 2008).

Energy development in grasslands results in direct removal of native vegetation and habitat fragmentation through road building, well pad drilling, power line construction, buried pipelines, booster stations, and facility buildings. In addition to habitat loss and fragmentation, wildlife is impacted by increased traffic, human activity, and noise. Broken or bare ground and greater vehicle traffic associated with the construction and production phases of energy development can also contribute to the spread of invasive plant species.

Wind-energy development is a growing industry in Wyoming and will likely affect significant acreage in the near future. Wind development, individually and cumulatively, can impact food, cover, and special habitat needs for native grassland species. The location of sage-grouse core areas (see Terrestrial Habitat Types – Sagebrush Shrublands – Current Sagebrush Shrublands Conservation Initiatives) and the state strategy to place wind development east and north of I-25 have increased wind development pressures on portions of the state occupied by grasslands.

Little research has been conducted to quantify wind-energy development impacts on grasslands wildlife species. Bird and bat strikes are commonly known to occur in wind-energy facilities, but the behavioral responses and resulting population performance are largely unknown for species such as pronghorn and sage-grouse that preferentially inhabit open landscapes, area-sensitive species such as the grasshopper sparrow, dickcissel, and bobolink, and species that perform aerial displays during courtship such as the long-billed curlew, upland sandpiper, chestnut-collared longspur, and McCown's longspur. Some researchers have proposed similar impacts on wildlife from wind-energy infrastructure and associated human activity as those documented for oil and gas development (Becker et al. 2009).

Invasive plant species – High
Noxious and invasive plants can spread aggressively and dominate plant communities (see Wyoming Leading Wildlife Conservation Challenges – Invasive Species). This can reduce native plant diversity, which in turn decreases food and cover for wildlife.

Cheatgrass, the most prevalent invasive plant species in Wyoming's prairie grasslands, is an annual brome from Eurasia whose abundance has dramatically increased in the Intermountain West over the last several decades. Cheatgrass rapidly expands in areas with bare ground and soil disturbance (Mack 1981, Bradford and Lauenroth 2006). These conditions can be facilitated by drought, overgrazing, and road development. Cheatgrass dominance eventually creates uniform annual grasslands perpetuated by large, frequent fires and void of patches of native plant communities (Paige and Ritter 1999).

Notable invasive forb species include Dalmatian toadflax, Canada thistle, leafy spurge, Russian knapweed, spotted knapweed, kochia, and Russian thistle. Canada thistle, which is typically found in riparian areas, is the most widespread

[2] Campbell, Converse, and Sheridan Counties.

weed in Wyoming grasslands. Leafy spurge is an important weed because it is easily spread and difficult to eliminate. It is found on tens of thousands of acres statewide, covering the most acreage in Weston, Johnson, Crook, Sheridan, Lincoln, and Fremont counties (Wyoming Pest Detection Program 2009). Although leafy spurge has generally proliferated across the state in recent years and continues to increase in some counties, it is starting to decline in some counties, namely Lincoln, Park, Sheridan, Johnson, Converse, Crook, and Weston counties. Russian knapweed is present throughout Wyoming, covering the most acreage in Fremont, Park, Big Horn, Hot Springs, Washakie, and Weston counties (Wyoming Pest Detection Program 2009). The occurrence of Russian knapweed has generally been increasing across the state, but in recent years has remained static or even declined in some counties. Spotted knapweed is not as concentrated in Wyoming as leafy spurge or Russian knapweed, but has been steadily increasing in some counties and is now found throughout the state. This weed is reportedly declining, or has been eradicated, or nearly eradicated in a few places (Wyoming Pest Detection Program 2009). Spotted knapweed currently covers the most acres in Teton and Park counties.

Continued construction from energy and rural development, increased interstate travel, and potentially shifting weather conditions associated with climate change are likely to intensify the spread of invasive plants species. Additionally, while there are some effective treatment methods, particularly in grasslands with a predominance of alkaline and sodic soils, the re-establishment of native plant species can be difficult.

Off-road vehicle use – Moderate/Locally High

Off-road vehicle use, primarily by all-terrain vehicles (ATVs), is increasing in grassland habitats. Vehicle use off established roads can enhance the spread of invasive species including halogeton, alyssum, pepperweed, and cheatgrass. Tires can damage biological soil crusts leading to decreased organism diversity, soil nutrients, stability, and organic matter. This can result in greater erosion and reduced water quality. Wildlife often avoid areas of increased noise and disturbance from outdoor recreational vehicles, and riding off-road can destroy the nests, eggs, and young of ground-nesting birds. These impacts can also lead to conflicts with hunting, wildlife viewing, and other forms of nature-based recreation. Managing off-road vehicle use can be difficult and controversial in grassland habitats where new trails are relatively easy to create and where some off-road vehicle users place less importance on what appears to be an endless, open landscape.

Reduced vegetation structure and species diversity due to altered disturbance regimes – Moderate

Prior to European settlement, frequent fires, shifting grazing patterns by bison and other large ungulates, and extensive prairie dog colonies created grasslands with more diversity in plant structure and composition than exists today (see Wyoming Leading Wildlife Conservation Challenges – Disruption of Historic Disturbance Regimes). Most current livestock management practices emphasize the even distribution of livestock across the landscape. This strategy leads to uniform grazing intensities, which has pros and cons to habitat management, and may further contribute to grasslands with reduced habitat diversity. Reduced diversity diminishes habitat for some grassland wildlife species, particularly those which require either early or late successional stages following habitat disturbances. Other grassland habitats are negatively impacted by continuous heavy grazing, commonly associated with excessive livestock numbers, which can reduce residual plant cover needed by many wildlife species for nesting and avoiding predators.

Drought and climate change – Moderate

Drought can reduce plant vigor, decrease the abundance of cool and warm season grasses, and increase non-native plants, especially cheatgrass (Smith and Enloe 2006). Drought can also lead to outbreaks of grasshoppers and

Mormon crickets, which can further diminish the amount of available forage for wildlife and livestock.

During drought times, livestock producers are often faced with either reducing stocking rates by selling livestock or continuing to graze at the current levels, hoping that moisture will improve. Postponing decreasing stocking rates for one season often results in little damage; however, repeated use of this option can significantly reduce the health of grasslands.

While the development of livestock drought management plans will not eliminate all issues associated with drought, well developed plans can diminish negative ecological impacts for the habitat and financial impacts for the producer. At least several months' lead time is needed for land managers to respond in making preparations for drought.

Wyoming's climate is naturally semi-arid, and drought is a natural and historical feature of the state's climate. However, some climate models that project future climate conditions suggest that Wyoming's climate will become even drier as a result of warming seasonal temperatures leading to increased evaporation of surface waters and increased water loss from plants during transpiration. Warming trends have been documented in the Northern Great Plains region, while annual precipitation has been documented as decreasing in eastern Wyoming (Joyce et al. 2000). Climate patterns in the West are naturally variable, but continued warming of seasonal temperatures will likely lead to decreased soil moisture regardless of changes in precipitation (Joyce et al. 2000). For grasslands, decreasing soil moisture might mean the loss of some native species whose current growth is limited by annual precipitation and the establishment of new vegetative communities that may favor more tolerant invasive species. Changes in the structural diversity of Wyoming's grasslands may impact grazing practices and also impact disturbance regimes, such as the frequency and severity of wildfire. The alteration of prairie grasslands will also have direct implications for grassland obligate species (see Wyoming Leading Wildlife Conservation Challenges – Climate Change).

Rural subdivision and development – Moderate

Rural subdivision and development can reduce, degrade, and fragment grassland habitat (see Wyoming Leading Wildlife Conservation Challenges – Rural Subdivision and Development). Houses, outbuildings, and lawns directly replace native wildlife habitat. Wildlife commonly abandons or alters use of habitats with greater human and pet activity. Increased energy expenditures in avoiding people or greater use of lower quality habitats can decrease animal health and reproductive capacity. Greater road densities and traffic volume can increase wildlife–vehicle collisions. Predation on wildlife can increase with greater numbers of domestic dogs and cats, as well as increases in generalist predatory species such as ravens and human-commensal species such as raccoons (U.S. Department of Agriculture 2007). Soil disturbance from construction, year-round grazing of horses and other hobby livestock, and the use of non-native plants as ornamentals can facilitate the establishment of invasive species (Maestas et al. 2002). Subdivision and housing development is a greater problem for grasslands habitats near Wyoming's larger towns and cities such as Cheyenne, Glenrock, Douglas, Gillette, and Sheridan.

Conversion to agriculture – Low

Approximately 5% of Wyoming's land area is in agricultural production (Census of Agriculture 2007). Dryland agriculture accounts for just under half of all agricultural activities, while irrigated farming constitutes the remainder. In addition to lands currently being farmed, there have been numerous unsuccessful attempts over the years to bring grasslands into agricultural production. Very few of these failed attempts have returned to native conditions. Reduced plant diversity associated with farmland, as well as previously cultivated fields, supports a lower variety of wildlife than is found in native habitats (Knopf 1994). In addition to reductions in habitat and habitat

quality, some farming and haying practices, especially during the nesting season, can lower the reproductive success of grassland birds (Dale et al. 1997, Dechant et al. 2002).

Conversely, some wildlife species have adapted to use agricultural fields during various phases of their life cycle. Sub-irrigated native hay fields provide valuable nesting habitat for many wetland birds such as Wilson's phalarope, or grassland birds such as the long-billed curlew. This is especially true for fields that have not been leveled and are not under intensive management with machinery and chemical treatments. Pronghorn and mule deer use these areas during certain times of the year too. Dryland cultivated fields with low vegetation and little topographical variation can provide nesting habitat for the mountain plover in parts of its range (Knopf 1994).

United States Department of Agriculture (USDA) Farm Bill programs, such as the Conservation Reserve Program (CRP)[3], has provided incentives for planting farmland back into permanent cover. Wyoming has approximately 190,000 acres enrolled in CRP, with the vast majority occurring in the southeast Wyoming counties of Goshen, Laramie and Platte. In addition to the acreage enrolled under the general CRP sign-ups, there are several hundred acres that have been enrolled under the Continuous CRP, which targets smaller, environmentally sensitive areas, such as those found along Wyoming's riparian zones Natural Resources Conservation Service - Wyoming While this has benefited many grasslands species of wildlife, the heavy use of non-native grasses, including bromes and tame wheatgrasses, along with the lack of forb species in reseeding mixes, have reduced the wildlife value of some CRP lands. Additionally, the fate of many CRP lands whose contracts are set to expire is uncertain.

Improper use of pesticides and herbicides – Low

The over-application of herbicides, such as Tordon for cactus control and 2, 4-D for sagebrush control, can result in a loss of perennial forbs, which reduces plant and associated wildlife diversity. Pesticide used to control prairie dogs, grasshoppers, and Mormon crickets can reduce prey availability for grassland birds such as the mountain plover and small mammals such as the swift fox and black-footed ferret as well as diminish important habitat created by prairie dogs that is used by numerous wildlife species.

[3] CRP was authorized by the 1985 Farm Bill as a voluntary, long-term cropland retirement program with a soil conservation orientation. The USDA pays producers an annual rental payment plus half the cost of establishing a conserving land cover in exchange for retiring highly erodible or other environmentally sensitive lands from crop production. Ninety-three percent of CRP land is planted to grass or trees under 10-year contracts.

Current Prairie Grasslands Conservation Initiatives

The Wyoming Game and Fish Department (WGFD) published *A Plan for Bird and Mammal Species of Greatest Conservation Need in Eastern Wyoming* in 2006. The overarching goal of this plan is to formalize proactive strategies that will help the WGFD work cooperatively with landowners, other agencies, and the public to address conservation needs of Wyoming's grassland and associated wildlife. The plan reviews the ecology, land uses, and threats to Wyoming's grasslands. Recommendations are presented to conserve Wyoming grasslands including information on the life histories, threats, conservation actions, and monitoring strategies for 22 grassland species designated as Species of Greatest Conservation Need (SGCN) in Wyoming's 2005 Comprehensive Wildlife Conservation Strategy (the previous name of Wyoming's SWAP).

A number of USDA Farm Bill Programs have targeted, or secondarily provide benefit to, grasslands habitats and wildlife species. The most notable programs include the Conservation Reserve Program (CRP), the Environmental Quality Incentive Program (EQIP), and Agricultural Conservation Easement Program. Grasslands were identified as one of six priority habitats to enhance or maintain within the WGFD's Strategic Habitat Plan (SHP). First created in 2001 and revised in 2009 and 2015, the purpose of the SHP is to strategically guide WGFD habitat improvement and protection activities. Regional priority areas for conservation work are identified, including crucial areas, necessary for maintaining terrestrial and aquatic wildlife populations, and enhancement areas, where there is the potential to enhance or improve important wildlife habitats that have been degraded. Narratives for both crucial and enhancement areas describing the location, boundaries, values, issues, species, and solutions/actions were prepared (https://wgfd.wyo.gov/Habitat/Habitat-Priority-Areas/Statewide-Maps).

A number of wildlife agency programs focus on implementing projects and management plans with private landowners to benefit wildlife. These include technical and financial assistance from WGFD's Terrestrial and Aquatic personnel, Public Lands/Private Wildlife Program, as well as the U.S. Fish and Wildlife Service Partners for Fish and Wildlife Program. These programs often form partnerships with local communities and other conservation organizations in accomplishing their mission. Grasslands habitat enhancements commonly include the development of grazing systems that benefit wildlife and livestock. Payments to offset management costs, invasive plant treatments, water developments, fencing, and cattle guards are among incentives used to encourage participation from landowners.

Landscape Conservation Cooperatives (LCCs) have been established by the U.S. Fish and Wildlife Service to provide science support to enhance conservation actions in the face of climate change and other regionally shared conservation priorities. Wyoming includes portions of five LCCs. The Plains and Prairie Potholes and Northern Great Plains Landscape Conservation Cooperative encompass significant amounts of Wyoming's grasslands and have the conservation of grasslands and grassland species among their principal focuses.

Among the most notable partnerships between landowners, natural resource agencies, and non-profit organizations is the Thunder Basin Grasslands Prairie Ecosystem Association. The Association was established in 1999 as a landowner-driven effort to develop an ecosystem management plan for species of concern while balancing these needs with sustainable economic and social activities. Members in the association include private property owners within a designated 931,192-acre landscape in eastern Wyoming. Areas of interest include management activities related to ranching, coal, coal-bed methane, oil, and gas production.

The Shirley Basin-Laramie Rivers Conservation Action Plan (CAP) was completed in 2008 by The Nature Conservancy in cooperation with

the Medicine Bow and Laramie Rivers Conservation Districts. The plan describes important species and habitats in the area, threats to their persistence, and strategies and actions to abate those threats. Participants included local ranchers and individuals representing the WGFD, U.S. Fish and Wildlife Service, Albany and Carbon County Weed and Pest, County Commissioners, Audubon Wyoming, Trout Unlimited, Wyoming Natural Diversity Database, Sonoran Institute, Natural Resources Conservation Service (NRCS), BLM Rawlins Field Office, University of Wyoming Cooperative Extension Service, and the Shirley Basin-Bates Hole Sage-Grouse Working Group.

A number of land trusts in Wyoming including the Jackson Hole Land Trust, The Nature Conservancy, and the Wyoming Stock Growers Agricultural Land Trusts are actively involved in negotiating conservation easements on grassland habitats.

Recommended Prairie Grasslands Conservation Actions

Improve planning and mitigation design for wind and other types of energy development.
Coal, oil, natural gas, and wind development are likely to intensify on Wyoming grasslands. Landscape level planning and mitigation is needed to offset the potential cumulative negative impacts from these activities. Mitigation plans should stress avoiding biologically sensitive areas within project sites and directing off-site mitigation funds to nearby high value wildlife locations. Energy development planning and mitigation efforts could specifically benefit from:

- Continued research on the effects of energy development on prairie grasslands wildlife species and ecosystems. In 2014, the Wyoming Natural Diversity Database and Wyoming Cooperative Research Unit completed research evaluating the vulnerability of Wyoming terrestrial SGCN to oil, gas, and wind development. Vulnerability was investigated by evaluating each species' potential exposure and sensitivity to energy development. Exposure was evaluated through a GIS analysis that overlays distribution maps of SGCN with areas of known and projected energy development. Sensitivity was determined by examining habitat and behavioral attributes of SGCN as well as reviewing existing impact studies. Research results give an indication of which species and taxonomic groups are potentially vulnerable to development, as well as helps to direct future research to address information gaps. The project was jointly funded by the U. S. Geological Survey, Wyoming Landscape Conservation Initiative (WLCI), and WGFD, and can be found at:: http://www.nature.org/media/wyoming/wyoming-wildlife-vulnerability-assessment-June-2014.pdf.
- Use spatially-explicit grassland habitat priority areas such as those found within the SHP to help guide energy planning and mitigation activities. This work should include continued inventory of grassland habitats for SGCN.
- Where appropriate, encourage the implementation of mitigation measures and/or best management practices detailed within the Wyoming Game and Fish Commission documents *Recommendations for Development of Oil and Gas Resources Within Important Wildlife Habitats* (WGFD 2010a) and *Wildlife Protection Recommendations for Wind Energy Development in Wyoming* (WGFD 2010b).
- Reviewing management actions proposed by state and federal agencies involving grassland systems, and working closely with the Wyoming Governor's Office, industry, private land owners, and agency staff during the early stages of energy development project plans.

Support efforts to reduce the spread and establishment of invasive plant species.
The spread of invasive plant species can be reduced by improving mitigation and restoration of disturbed sites associated with construction including roads, well pads, pipelines, and windmill towers. The establishment of livestock grazing and drought contingency plans also helps to reduce the spread of invasive species. Weed management programs, including those targeting rural acreage owners, can be promoted through local County Weed and Pest Control Districts. Some counties already have local spray days where the public can obtain chemicals and equipment for treating weeds at little to no cost. In areas of recent invasion, cooperative efforts to control cheatgrass through herbicide application, re-seeding, and livestock grazing management should continue.

Create new and more incentives for landowners to incorporate multiple natural disturbances into grasslands management plans.
Most of Wyoming's grasslands have traditionally been managed for sustainable livestock production. Today, increasing interest is being placed on coordinating livestock production with other services provided by grasslands including wildlife diversity, carbon sequestration, water quality and quantity, and aesthetics. Meeting these goals requires a diverse suite of grassland habitats with a range of vegetation structure and composition (heterogeneity). This can be achieved by incorporating multiple disturbances into land management plans such as grazing with fire, grazing with prairie dogs, and grazing and selective brush management. This approach uses livestock grazing as a tool to create desired habitat conditions in addition to a method of food production. Increasing vegetation heterogeneity provides the needed habitat complexity for a diverse array of wildlife species as well as land uses. Voluntary financial incentives may also be required to encourage retaining more residual plant cover for wildlife or supporting sufficient acres of prairie dogs to facilitate sensitive species recovery efforts.

Provide incentives, planning, and technological improvements to increase flexibility in grazing plans, including stocking rates.
Range conditions can be improved by developing and increasing awareness about forage reserve options. Options include, but are not limited to, assisting livestock operators with moving grazing to other areas during times when habitat improvement projects are being implemented or when areas are affected by wildfires, droughts, or other natural events. These measures can reduce habitat damage through overuse and speed the recovery of grasslands after natural or human disturbances. Grassbanks, where access to grazing land is provided in exchange for conservation actions on another property, are an example of a forage reserve strategy that has been used successfully.

Included in this recommendation is the development of proactive, adaptive drought management plans. This will require improvements in the accuracy of drought forecasts and greater technical assistance to support the implementation of drought management plans. More incentives should be placed on rewarding land managers for effective drought management as opposed to solely relying on drought disaster declarations.

On a landscape scale, grazing should be used as a tool to achieve a variety of grassland cover and height conditions to benefit wildlife species with different needs. For example, mountain plovers, burrowing owls, and McCown's longspurs require short vegetation and open ground, while upland sandpipers, grasshopper sparrows, and chestnut-collared longspurs require grasslands in a climax successional stage.

Encourage grasslands conservation partnerships among natural resource agencies and non-profit conservation organizations.
The vast majority of Wyoming grasslands are under private ownership. This necessitates the ability to work effectively with private landowners as an essential element of any effective grassland conservation strategy. There

are numerous USDA Farm Bill programs that can be applied to grassland conservation efforts (see Current Grasslands Conservation Initiatives in Wyoming). Partnerships with the USDA, NRCS, Farm Service Agency, and conservation districts help to ensure the benefits of these programs are maximized for grasslands wildlife.

Additionally, Farm Bill grassland conservation projects are often established and administered by non-profit conservation organizations such as Ducks Unlimited, The Nature Conservancy, or Wyoming Stock Growers Agricultural Land Trust. These organizations are often very experienced in utilizing these programs and working with private landowners. Furthermore, the development of partnerships often increases the likelihood of grants being awarded and allows resources to be pooled to increase the size of projects and their chances for success.

Particular actions that have been identified to facilitate partnerships and focus grassland conservation activities include:

- Improve communications between private landowners, conservation districts, the WGFD, NRCS, and private conservation organizations to ensure all available Farm Bill programs are being utilized and that agricultural practices recommended under programs reflect the most current knowledge of those that benefit wildlife. Regular partnership meetings, and active participation in Wyoming's NRCS Technical Committee, could help to advance this goal.
- Increase active management of CRP lands including incorporating fire, grazing, disking to promote the health and diversity of plant communities. CRP reseeding mixes should include native grasses and forbs. In order to meet habitat needs of specific SGCN or where native species cannot be established, diverse mixes that include well researched nonnative species should also be considered, as well as consideration for the suitability of vegetation under future climate conditions. Contracts should be renewed and new incentives provided to prevent the conversion of CRP lands back to cropland after existing contracts expire.

A variety of entities have been successful in mediating conflicts when differences in grassland management perceptions occur. These include the Wyoming Agricultural and Natural Resource Mediation Program, University of Wyoming Cooperative Extension program, conservation districts, and local Coordinated Resource Management teams.

Pursue conservation easements on high-wildlife-value grasslands with willing landowners.
Most of Wyoming's prairie grasslands habitat type is found on private land. Conservation easements along with long-term stewardship plans are one of the most effective and long-term methods of limiting environmentally destructive development and management activities on private lands while retaining ranching, outdoor recreation, and other compatible land uses.

Enhance educational opportunities for landowners, managers, and the public relative to grassland wildlife, ecology, and management techniques.
Efforts should be made to increase educational opportunities for land managers to learn about managing grasslands for a diversity of values including but not limited to livestock productions. Educational efforts for small acreage owners should be increased through workshops, programs, and training.

Prairie Grasslands Monitoring Activities

Monitor all forms of energy development to identify and avoid potential individual and cumulative impacts and enhance future planning and mitigation.
Given a lack of existing research and the speed of wind development in Wyoming, emphasis should be placed on additional research and monitoring about its potential impacts on

wildlife (see Wyoming Leading Wildlife Conservation Challenges – Energy Development).

Continue monitoring prairie grasslands SGCN in order to detect population trends or changes in distribution that may reflect habitat problems. This information should be used to guide future monitoring and research.

Monitor the landscape distribution and habitat intactness of prairie grasslands through remote sensing.
Remote sensing is useful in tracking the size, distribution, and fragmentation level of this habitat in Wyoming. Information gathered would be helpful in determining the cumulative impacts of activities and events such as insect outbreaks, energy development, rural subdivision, and the spread of invasive species. This technique may require the further development of monitoring protocols and identification of sample sites.

In cooperation with research entities, monitor the effects of climate change, including extended periods of drought.
Research should be conducted on the potential effects of climate change on native and nonnative prairie plants and their composition. Prairie grasses, shrubs, and invasive weedy species may have different responses to changing levels of atmospheric carbon dioxide. Additionally, decreasing soil moisture resulting from increasing temperatures may also impact the current structure of prairie grasslands.

Increase monitoring of multiple ecological outcomes of habitat disturbances and treatments and how these interact with one another.
Research on natural and human-caused habitat disturbances and treatments should be enhanced and an effort made to understand how historic disturbance regimes interact with human activities, such as residential and energy development.

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