

SAFEGUARDING GRASSLANDS AND SHRUBLANDS



Ecosystem Adaptation to Global Warming

Global warming is already affecting America's grasslands and shrublands, degrading the value of these important ecosystems for both people and wildlife. Even with aggressive reductions in greenhouse gas emissions, climate change will place additional strain on these important ecosystems. The fate of grasslands and shrublands – and the wildlife they support – will depend on steps we take to help them survive in the face of a changing climate. **Climate change adaptation** – actions designed to safeguard these and other natural ecosystems – will largely define a new era in America's conservation.



Bison in Montana.

AMERICA'S OPEN RANGE

A vast sea of grass reverberating with the thundering hoofs of bison is among the most iconic of American landscapes. From the prairies of the Great Plains to the chaparral scrub blanketing California hillsides, grasslands and shrublands represent the most extensive class of ecosystems in the United States, covering more than a billion acres. Yet these diverse ecosystems are often taken for granted and poorly managed, or converted altogether to other uses. Grasslands and shrublands are enormously important for both wildlife and human livelihoods. They serve as the resource base for America's ranching tradition, enrich our economy and spirits through hunting, fishing, and other recreational opportunities, and provide clean water for agriculture and household use. These open spaces have often borne the brunt of human activities and exploits, however, from conversion to agriculture and urbanization, degradation from overgrazing, and fragmentation from energy development.

GLOBAL WARMING IMPACTS ON GRASSLANDS AND SHRUBLANDS

Climate change presents a set of problems for the nation's rangelands unlike any previously encountered. Shifts in temperature and precipitation not only will have direct impacts on grasslands and shrublands, but will exacerbate many of the existing stresses to these ecosystems. Impacts to these extraordinarily varied habitats—from frozen Alaskan tundra to arid Southwestern grasslands—will differ considerably by region and ecosystem type. Nonetheless, global warming already is effecting the health and vitality of these important natural systems, threatening not only their many benefits to people and wildlife, but also undermining their ability to help cleanse the air of the greenhouse gases that are the underlying cause of global warming.

Among the major changes expected due to global warming are:

Expanding Desertification ~ Warmer and drier conditions will cause the spread of desert conditions to the north and east, and likely cause a deterioration in range conditions across the Southwest and Great Plains.

Conversion to Woodland Systems ~ Dryland habitats such as sagebrush-steppe and desert grasslands increasingly will be invaded by woody vegetation, such as juniper and mesquite, significantly altering these iconic ecosystems.

Thawing Permafrost ~ Higher temperatures are already thawing permafrost and altering the composition of tundra habitats in northern latitudes. The release of carbon dioxide associated with these changes is likely to exacerbate global warming.

More Severe Wildfires ~ Drier conditions will increase the frequency and severity of wildfires, and speed the conversion of native habitats to invasive species unpalatable to both native wildlife and livestock. People and infrastructure will be at increased risk from such conflagrations and attendant erosion and mudslides.



Arctic National Wildlife Refuge.

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Prescribed burn for prairie restoration in Texas.

GRASSLAND AND SHRUBLAND ADAPTATION TO CLIMATE CHANGE

Safeguarding the nation's grasslands and shrublands in the face of climate change will require an approach that acknowledges and addresses problems of the past—such as overgrazing, fire suppression, and fragmentation—but recognizes and prepares for those of the future.

Adaptation strategies ideally should anticipate climate impacts by promoting ecosystem resilience and adopting agile management approaches. Many adaptation opportunities, however, will take place in the wake of major disturbances or other extreme events, and managers should use those restoration opportunities to facilitate the ability of species and habitats to cope with future climate change. Adaptation approaches will also need to be locally and regionally tailored, reflecting underlying differences in habitat types as well as the different options available on private and public lands.

Grassland and shrubland adaptation strategies include:

- **Address current stressors to create more climate-resilient habitats.** Threats such as habitat loss and fragmentation, unsustainable grazing practices, invasive species, and altered fire regimes render grassland and shrubland systems more vulnerable to the impacts of climate change. Nonetheless, climate change will require us to be strategic in identifying which existing problems are most important to address.
- **Plan ahead to react after extreme events and disturbances.** The best time to adjust range management can be after a major disturbance, such as wildfire. In particular, managers should consider future climate in the selection of species mixes for restoration and replanting.
- **Take a landscape approach in protecting high-value habitats.** Protect fish and wildlife strongholds and provide connectivity among core habitat areas through use of buffers and corridors to enable unimpeded range shifts in response to climate change.
- **Adaptation depends on detecting change.** Ensure that robust and long-term monitoring systems are in place that can provide rangeland managers with early warnings about ecological shifts and ecosystem disruptions.

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For additional information on ecosystem adaptation see P. Glick, A. Staudt, and B. Stein. 2009. *A New Era for Conservation: Review of Climate Change Adaptation Literature*, Washington, DC: National Wildlife Federation (available at: <http://www.nwf.org>).

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