Connecting pattern and process in greater sage-grouse populations and sagebrush landscapes

By: Steven T. Knick and Steven E. Hanser
Edited by: Steven T. Knick and John W. Connelly

Links

- More information: **Publisher Index Page** (html)
- Download citation as: RIS | Dublin Core

Abstract

Abstract. Spatial patterns influence the processes that maintain Greater Sage-Grouse (Centrocercus urophasianus) populations and sagebrush (Artemisia spp.) landscapes on which they depend. We used connectivity analyses to: (1) delineate the dominant pattern of sagebrush landscapes; (2) identify regions of the current range-wide distribution of Greater Sage-Grouse important for conservation; (3) estimate distance thresholds that potentially isolate populations; and (4) understand how landscape pattern, environmental disturbance, or location within the spatial network influenced lek persistence during a population decline. Long-term viability of sagebrush, assessed from its dominance in relatively unfragmented landscapes, likely is greatest in south-central Oregon and northwest Nevada; the Owyhee region of southeast Oregon, southwest Idaho, and northern Nevada; southwest Wyoming; and south-central Wyoming. The most important leks (breeding locations) for maintaining connectivity, characterized by higher counts of sage-grouse and connections with other leks, were within the core regions of the sage-grouse range. Sage-grouse populations presently have the highest levels of connectivity in the Wyoming Basin and lowest in the Columbia Basin Sage-Grouse management zones (SMZs). Leks separated by distances 13-18 km could be isolated due to decreased probability of dispersals from neighboring leks. The range-wide distribution of sage-grouse was clustered into 209 separate components (units in which leks were interconnected within but not among) when dispersal was limited to distances 18 km. The most important components for maintaining connectivity were distributed across the central and eastern regions of the range-wide distribution. Connectivity among sage-grouse populations was lost during population declines from 1965-1979 to 1998-2007, most dramatically in the Columbia Basin SMZ. Leks that persisted during this period were larger in size, were more highly connected, and had lower levels of broad-scale fire and human disturbance. Protecting core regions and maintaining connectivity with more isolated sage-grouse populations may help reverse or stabilize the processes of range contraction and isolation that have resulted in long-term population declines.

Study Area

Additional publication details

Publication type	Book chapter
Publication Subtype	Book Chapter
Title	Connecting pattern and process in greater sage-grouse populations and sagebrush landscapes
Year Published	2011
Language	English
Publisher location	Reston, VA
Contributing office(s)	Forest and Rangeland Ecosystem Science Center
Description	24 p.
Larger Work Type	Book
Larger Work Subtype	Other Government Series
Larger Work Title	Greater Sage-Grouse: Ecology and Conservation of a Landscape Species and Its Habitats
First page	383
Last page	406
Country	United States

2010. Connecting pattern and process in greater sage-grouse populations and sagebrush landscapes. ST Knick, SE Hanser. 52. 2011. Greater sage-grouse as an umbrella species for shrubland passerine birds: a multiscale assessment. SE Hanser, ST Knick. 51. 2011. Ecological scale of bird community response to pinon-juniper removal. ST Knick, SE Hanser, M Leu. Rangeland Ecology & Management 67 (5), 553-562, 2014. 23. Greater sage-grouse (Centrocercus urophasianus) population response to gas field development in western Wyoming. Ph.D. dissertation, University of Wyoming, Laramie.Google Scholar. Holloran, M. J., R. C. Kaiser, and W. A. Hubert. 2007. Population response of yearling greater sage-grouse to the infrastructure of natural gas fields in southwestern Wyoming. Completion report. 2011. Connecting pattern and process in greater sage-grouse populations and sagebrush landscapes. Number 18 in S. T. Knick and J. W. Connelly, eds. Greater sage-grouse: Ecology and conservation of a landscape species and its habitats. Studies in Avian Biology. sagemap.wr.usgs.gov/monograph.aspx. Retrieved September 10, 2010.Google Scholar. Sage-grouse require large areas of contiguous sagebrush. Sagebrush species and subspecies occurrence in an area is dictated by local soil type, soil moisture, and climatic conditions. The degree of dominance by sagebrush varies with local site conditions and disturbance history. Due to the disruption of primary patterns, processes and components of sagebrush ecosystems since EuroAmerican settlement the large range of abiotic variation, the minimal short-lived seed banks, and the long generation time of sagebrush, restoration of disturbed areas is very difficult. Not all areas previously dominated by sagebrush can be restored because alteration of vegetation, nutrient cycles, topsoil, and living (cryptobiotic) soil crusts has exceeded recovery thresholds.