

Science to Solutions

Sage Grouse Conservation Benefits Migratory Mule Deer



In Brief: Habitat conservation for sage grouse, considered an umbrella species, may benefit more than 350 other native species. A new study quantifies how sage grouse conservation can protect critical habitat for mule deer. Scientists examined the overlap between two migratory populations of mule deer in Wyoming and lands with some level of protection for grouse. They found that sage grouse conservation efforts doubled the protection of deer migration habitat and winter range. Since 77% of remaining high-priority private lands important for mule deer are priorities in sage grouse core areas, SGI investments also will benefit deer. For these protections to be effective, the entire deer migration route must remain connected, including critical deer habitat located outside sage grouse core areas.



Mule Deer



Sage Grouse



Energy Development



Subdivision

Photo credits: Scott Copeland (mule deer) and Jeremy Roberts.

“We were able to show that conservation measures for sage grouse in the Green River Basin doubled existing habitat conservation for migrating mule deer.”

~Holly Copeland, The Nature Conservancy

In western Wyoming, mule deer make lengthy migrations from high-elevation summer ranges in the mountains to low-elevation winter ranges in the sagebrush basins. Throughout these seasonal movements, they encounter landscapes increasingly dominated by residential homes, oil and gas development, roads and fences. As a species in decline in much of the West, mule deer are of special management concern to state wildlife agencies. Could mule deer, which use sagebrush communities during migration and winter, also benefit from conservation measures set in place for greater sage-grouse?

To investigate the potential overlap in conservation benefits between the two species, a recent study examined spatial data for deer migrations and existing grouse conservation measures in the Green River Basin of western Wyoming—an area that contains two of the largest natural gas fields in the U.S., and has been a focus for conservation concern in the face of a development boom.

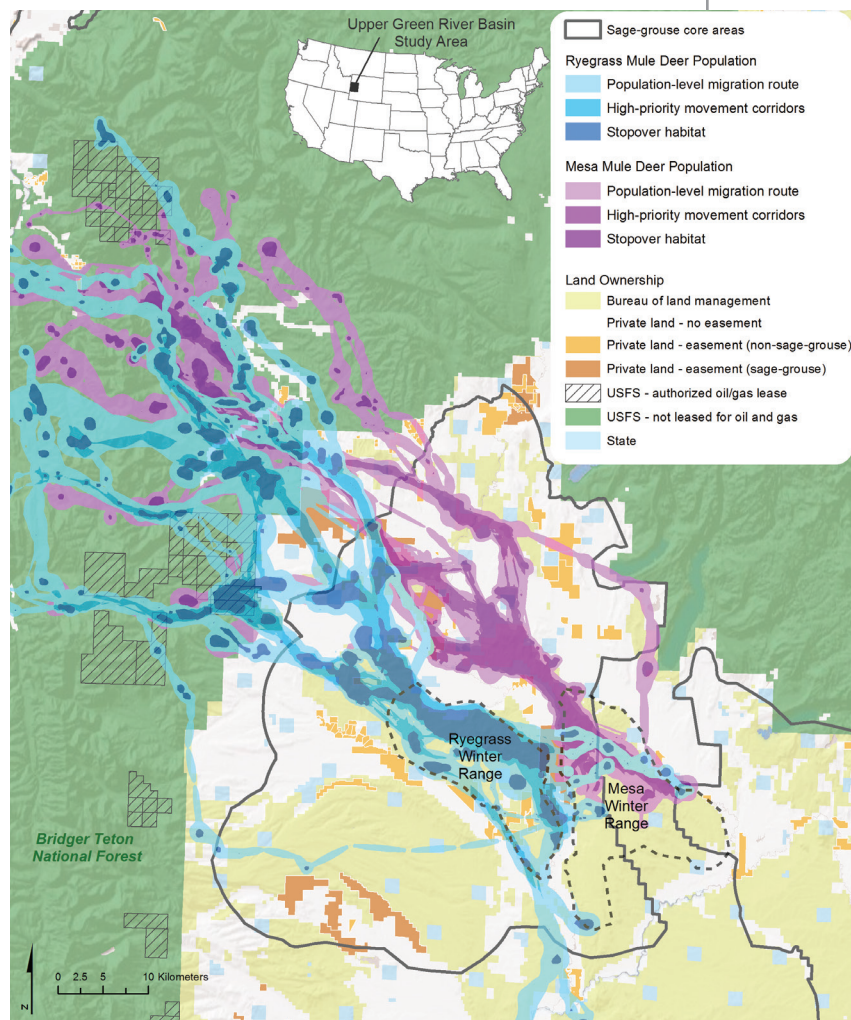
Led by Holly Copeland, Landscape Ecologist with The Nature Conservancy, and Hall Sawyer, Research Biologist with Western Ecosystems Technology, Inc., the

research team also included scientists from the University of Wyoming, U.S. Geological Survey (USGS), Natural Resources Conservation Service (NRCS) and Sage Grouse Initiative (SGI).

Mule deer consistently use the same migration corridors between winter and summer ranges, and track seasonal changes in vegetation as they move. Development of various kinds reduces habitat and can pose barriers to passage. The study examined how much overlap occurred between mule deer migration corridors and winter ranges with sage grouse habitat conservation on the ground; where gaps occurred for mule deer conservation; and whether the existing prescriptions for minimizing the impact of energy development on grouse were also sufficient for mule deer.

Assessing the Overlaps

The scientists combined location data on migrating mule deer with spatial data on lands protected for sage grouse under different conservation measures. Mule deer data were obtained from 66 radio-collared adult female mule deer in two populations, “Mesa” and “Ryegrass”, that migrate through and winter in the Green River Basin. In general, these deer move from high elevation summer range on US Forest Service (USFS) land to winter in lower basins that are a patchwork of private, state and Bureau of Land Management (BLM) land. The mule deer data were collected over several years (2003–2012 for the Mesa population; 2005–2011 for the Ryegrass population) and included a total of 101 migrations.



Migration routes of two mule deer populations in the Upper Green River Basin of western Wyoming. Deeper colors show high-priority corridors and stopover sites. The deer migration corridors and winter range overlap extensively with delineated sage grouse core area. Map courtesy of Holly Copeland, The Nature Conservancy.

The team mapped the deer location data to show both individual and population-level migration routes. By combining the data at a population level, they could determine intensity of use, whereas data for individuals indicated the number of deer using a particular route. The spatial analysis revealed high-use corridors as well as key stopover sites—areas where deer pause for a time in their migration, in sync with availability of forage plants.

The next step of analysis overlaid deer migration data with three categories of protected lands: conservation easements on private lands, U.S. Forest Service land (not leased for oil and gas), and designated sage grouse core areas (these encompass BLM, state, and private lands).

More than 36,000 acres of private lands have been placed under perpetual conservation easements in the Green River Basin. On USFS lands within the study area, many oil & gas leases were bought out or withdrawn from areas of high conservation value, essentially delivering habitat protection for wildlife. Sage grouse core areas have been designated throughout the species’ range and, in 2008, Wyoming instituted a pro-active sage grouse conservation strategy, known as the Wyoming Core Area Policy or WCAP, to limit energy development within core areas—protections that essentially apply to surface development on federal lands within core areas.

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Lastly, within these three categories, the team split out those lands that were under protections directly related to sage grouse conservation to measure the effect of grouse conservation on mule deer.

Double the Benefit

The team found a high degree of overlap between conserved lands and deer migration routes. Routes traveled by individual deer crossed conserved lands for 65% of the route length for the Mesa population and 69% for the Ryegrass population. In both cases, at least half of the lands in conservation status were directly due to sage grouse protections.

High-priority mule deer movement corridors and stopover sites showed an even stronger overlap with conserved lands, and again approximately half were protected due to sage grouse. For winter ranges, 52% of the Mesa and 91% of the Ryegrass areas overlapped with conserved lands, the majority of which are under WCAP protections for grouse.

Overall, the spatial overlap from all conservation measures that could benefit mule deer was 66–70% for migration corridors, 74–75% for stopovers, and 52–91% on winter ranges. Lands under some measure of conservation for sage

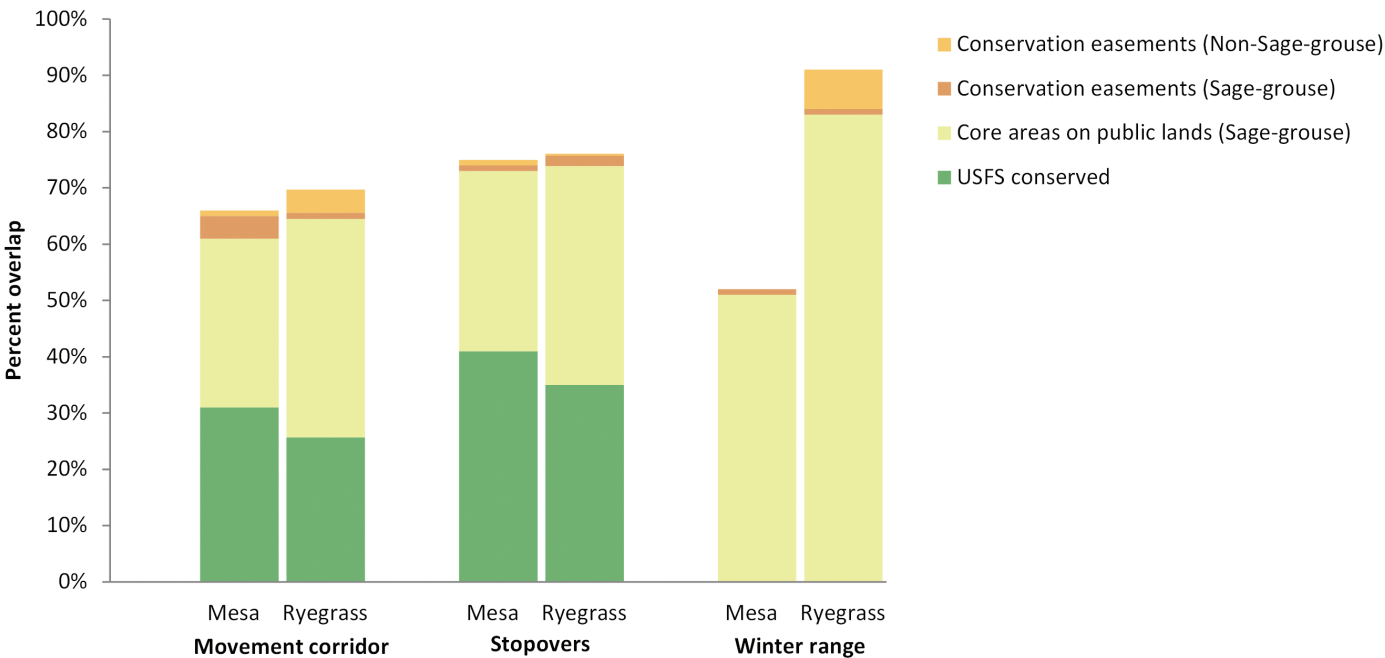
grouse accounted for at least half of protected lands along deer migration corridors and stopover areas, and nearly all winter range.

Since some level of development is allowed under the core area policy, the team also analyzed whether that level would be tolerable for mule deer, and found that 95% of random sample plots within core areas fell below disturbance levels known to effect mule deer. Most of the plots that exceeded disturbance levels existed before WCAP protections were in place.

In short, sage grouse land protections in the Green River Basin nearly double the conservation of lands used by migrating mule deer, clearly demonstrating an “umbrella” effect of sage grouse conservation for another species of concern.

Critical Connectivity

While this spatial analysis revealed good news about the high degree of land protections afforded mule deer in the Green River Basin on migration routes and wintering range, the very nature of migratory species makes them vulnerable to habitat loss and obstacles anywhere along their annual journey. The authors



Mule deer movement corridors, stopover sites and winter habitat overlap to a large extent with areas conserved for sage grouse under a combination of measures, including conservation easements, the Wyoming Core Area Policy and U.S. Forest Service lands removed from energy leases. Chart courtesy of Holly Copeland, The Nature Conservancy.

caution that the connectivity along the entire route must be maintained: any disturbance or physical barrier can make a route unusable.

Where protections in core areas focus on the needs of sage grouse and limit surface development on public lands, they benefit mule deer as well, but only as long as allowed developments don't intersect with high-priority mule deer corridors or stopover sites. Mule deer may lose out if intensive development is allowed in critical deer habitat outside of the core areas. As an example, the Mesa deer population's winter range falls outside WCAP protection and has undergone heavy natural gas development. Since development began, the Mesa population has declined by 42%.

Within sage grouse core areas, WCAP protections do not address the risk of residential development on private lands. The authors determined that more than 66,000 acres of private lands in the study area could potentially be developed for residences, yet 77% fell within core areas where voluntary conservation easements could benefit both sage grouse and mule deer. Conservation easements currently protect 13–18% of private lands along high-priority deer migration corridors. Thus, easements are an effective tool to fill important conservation gaps, especially when targeted in critical habitats.

While this study shows the strength of using sage grouse as an umbrella species, the benefits to both grouse and deer rely on the core area strategy being implemented as intended, and other habitat protections being applied and sustained over the long term. By identifying gaps in land protections for mule deer, the analysis provides a planning tool to target additional conservation in the Green River Basin. The research team plans to expand this study to examine overlaps between mule deer and grouse conservation elsewhere in Wyoming.

To learn more about the Sage Grouse Initiative and the multiple benefits of sage grouse conservation, visit the SGI website at <http://www.sagegrouseinitiative.com/>.

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Holly Copeland, Landscape Ecologist with The Nature Conservancy, and Hall Sawyer, Research Biologist with Western Ecosystems Technology, Inc., led this study to examine the potential for Wyoming's sage grouse conservation policy to also conserve mule deer migration habitat.

Source

Copeland, H.E., H. Sawyer, K.L. Montieth, D.E. Naugle, A. Pocewicz, N. Graf and M.J. Kauffman. 2014. Conserving migratory mule deer through the umbrella of sage-grouse. *Ecosphere* 5:117. <http://dx.doi.org/10.1890/ES14-00186.1>.

Additional Resources

Copeland H.E., A. Pocewicz, D.E. Naugle., T. Griffiths, D. Keinath, J. Evans and J. Platt. 2013. Measuring the Effectiveness of Conservation: A Novel Framework to Quantify the Benefits of Sage-Grouse Conservation Policy and Easements in Wyoming. *PLoS ONE* 8:e67261. doi:10.1371/journal.pone.0067261

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