

Science to Solutions



Predicting the Outcome of Wyoming's Sage Grouse Conservation Strategy

In Brief: Wyoming supports nearly 40% of the world's sage-grouse population, yet much of the state's sagebrush habitat is undergoing rapid transformation for energy and residential development. In 2008, the state enacted a proactive "core area" strategy to balance conservation with development. Will this strategy protect grouse? A recent study by The Nature Conservancy (TNC), University of Wyoming and the Sage Grouse Initiative (SGI) analyzed potential levels of residential and energy development to measure how well the policy can sustain sage grouse over the long term. The findings suggest that Wyoming's strategy, combined with targeted conservation easements on private lands, could cut anticipated sage grouse losses by half statewide, and by nearly two thirds within core habitat areas.

Wyoming's sage grouse conservation strategy seeks to balance future development with protecting core habitat.



Wyoming's sagebrush sea is undergoing brisk development for energy resources and residential communities.

"This study suggests important implications for the conservation of sage grouse if the core area policy is implemented as intended."
 ~ Holly Copeland, TNC
 Landscape Ecologist.

Photo credits: oil field/Mark Gocke, Wyoming Game & Fish Department; residential subdivision/Jeremy Roberts, Conservation Media; wind mills/Paula Hunker, TNC.

Mapping the Future to Gauge the Benefits of Wyoming's Sage Grouse Policy

W Wyoming hosts the largest sage grouse population of any state in the species' range: 37% of the entire greater sage-grouse population (Doherty et al. 2010). The species inhabits sagebrush habitats from the western mountains across the Cowboy State's vast basins. Wyoming also has a dynamic economy powered by agriculture and the production of oil, gas and renewable energy, and many regions are seeing residential growth as people are attracted to energy jobs or the outdoor amenities of western towns. All of these activities fragment the once-unbroken sagebrush sea so crucial for sage grouse.

In 2008, Wyoming enacted a policy to conserve sage grouse and balance economic development with conservation. The Greater Sage-Grouse Core Area Protection Policy was enacted by executive order and updated most recently in 2011 (Wyoming Executive Order 2011-5). The heart of the policy is protection of core sage grouse population areas (the regions with the largest numbers of leks and grouse) and restricting habitat alterations for a minimum of five years, while allowing existing land uses to continue.

The Bureau of Land Management (BLM) followed with a statewide Instructional Memorandum to "manage Greater Sage-Grouse seasonal habitats and maintain connectivity in identified areas in support of the population management objectives set by the State of Wyoming." The BLM policy calls for a reduction of management activity changes on public lands administered by the agency, including the federal mineral estate (BLM 2012).

On private lands, NRCS and land trusts statewide have invested more than \$100 million on voluntary conservation easements to permanently restrict development in exchange for direct payments and/or tax incentives (Copeland et al. 2013).

But will Wyoming's strategy protect sage grouse populations in the state?

Holly Copeland, Landscape Ecologist with TNC, and her co-authors at The Nature Conservancy, University of Wyoming and SGI, tackled the question by analyzing how these conservation efforts would affect sage grouse populations under different "build-out" scenarios over short and long-term time frames.

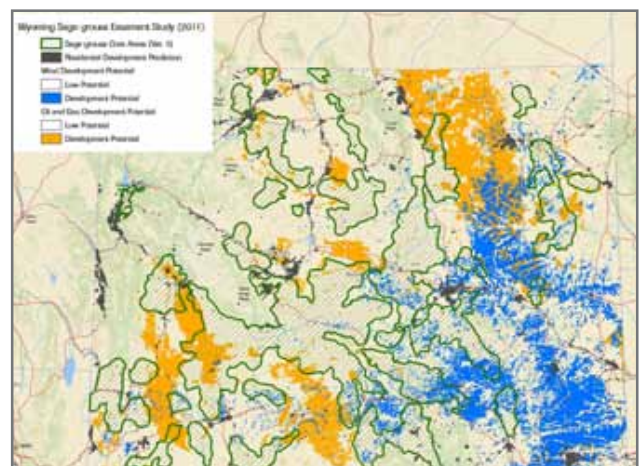
"We sense that the combined effort of conservation policy and easements in Wyoming, has important implications. Our study tackles the question of what, if any, benefit can we measure of these actions for sage grouse?" says Copeland.

Using Build-out Scenarios to Forecast the Future

The science team first considered the biggest threats to sage grouse and chose to study those that are currently the most important drivers to landscape change in Wyoming: energy development (wind, oil and gas) and residential development. With a Geographic Information Systems (GIS) platform, they used geospatial modeling to forecast potential development, analyze the cumulative threats on sage grouse, and measure how conservation could abate those threats.

By integrating independent data on predicted wind, oil and gas, and residential development, the team created "build-out" scenarios—first for the next 20 years, and then a long-term forecast based on a doubling of wind and residential development and a maximum build-out of oil and gas. With these scenarios in place, they measured the cumulative potential landscape change for grouse across Wyoming.

The team linked these changes in the human footprint to sage grouse lek locations, buffering the leks by 5 miles (8.5 km; the typical zone for hens to nest around leks), and then calculated how grouse populations could change with and without the conservation measures of Wyoming's core area policy and conservation easements in place.



An example of mapping predicted residential (dark gray), wind (blue), and oil and gas (yellow) development across Wyoming, overlaid with the sage grouse core population areas (green hatching), to predict the impact of development on grouse populations. Map courtesy of The Nature Conservancy.

A Map of Conservation Outcomes

The scientists' findings were clear. Without conservation measures, the models predicted that cumulative, long-term development could threaten nearly 30% of Wyoming's sage grouse population—an enormous blow to the future of the bird. Statewide, grouse could decline by 14% in the short term, and 29% long term. Within core population areas, declines were 11% in the short term, and 24% under maximum development (Copeland et al 2013).

Conservation measures under Wyoming's core area policy could significantly mitigate these losses. With the policy in place, the models predicted that no leks would be extirpated within core areas, and that population losses would be reduced to 9–15% statewide, and 6–9% within core areas (Copeland et al. 2013). These findings give support to Wyoming's conservation policy: if implemented as intended and sustained over time, the policy's measures could stem a dramatic sage grouse decline.

The addition of targeted conservation easements could play a significant role in protecting summer range for grouse. As the core area policy does not restrict residential



Photo: Jeremy Roberts, Conservation Media

Map of sage grouse leks that may be extirpated under the model's long-term development scenarios with conservation in place. The only leks predicted to be lost within core areas are in the Powder River Basin of northeast Wyoming, where existing development contributed to the depletion of populations before the Wyoming strategy was enacted. Map courtesy of The Nature Conservancy.

development, conservation easements can protect habitat on private lands that are vulnerable to development. These are voluntary legal agreements between a landowner and a land trust or government agency that provide the landowner compensation in return for giving up certain development rights. Conservation easements protect land values, such as wildlife habitat and open space, in perpetuity.

The models predicted that the addition of \$250 million in targeted easements would avert another 9% to 11% of potential declines (Copeland et al. 2013). Focusing easement purchases within core habitat areas further protects the core areas from potential subdivision on private lands, and ensures the highest return on conservation investment.

“Easements play an important role where the core policy can’t be effective. Easements are protecting the private lands where residential development is a threat. They also protect important summer range, which is important for grouse to rear their chicks—those areas are typically on private lands. All the science isn’t in yet, but there’s evidence that private lands may play a disproportionately important role for summer range,” explains Copeland.

Under the model scenarios, the most effective conservation strategy combined the core area policy with targeted conservation easements—long-term population loss could be reduced to only 9–15%, cutting predicted losses in half statewide, and by two-thirds within core areas (Copeland et al. 2013).

“In the large core areas, the expected declines are really different with and without conservation. Just the core area policy itself is highly significant. Easements are an additional piece of conservation, but the base of the conservation is from the core policy,” concludes Copeland.

Learn More

To learn more about this Wyoming’s Core Area Strategy and this analysis, see SGI’s Youtube video, “Saving Sage Grouse: the Wyoming Example”:

<https://www.youtube.com/playlist?list=PLbQnrJD6rX92519iSGPQnJaO1QiKNGS3W>.

For more information about sage grouse conservation strategies and the Sage Grouse Initiative, visit:

<http://www.sagegrouseinitiative.com/>.



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Holly Copeland, Landscape Ecologist with TNC in Lander, Wyoming, lead a research team (including investigators from TNC, the University of Wyoming and SGI) to examine the effectiveness of Wyoming’s sage grouse conservation strategy using geospatial modeling.

Sources

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