



Science to Solutions

# Conserving Diverse Wet Habitats Keeps Western Rangelands Resilient



## ***In Brief:***

- Mesic resource productivity, as well as mesic areas' drought-sensitivity, varies between the Great Plains, Rocky Mountains, and Great Basin regions.
- Private land contains 68% of all mesic resources in sagebrush country, though it comprises just 40% of the total land area.
- As water scarcity concerns deepen, collaborative whole-watershed conservation strategies will provide landscape resiliency for wildlife and livestock by protecting a diversity of mesic resources across private and public lands.
- Sage grouse and many other species rely on a range of mesic habitats—including riparian areas, wet meadows, alfalfa fields, and productive rangelands—to sustain their populations. Landscapes with the greatest uncertainty in mesic abundance and distribution support the fewest grouse.

## Background

**A**cross the vast sagebrush range in western North America, the climate is semi-arid, meaning that vegetation productivity is limited by periodic drought. Wet mesic habitats help sustain wildlife here by serving as the last remaining islands of productive green areas during the hot, dry summer months.

Sage grouse survival rates fluctuate up or down annually based on climate variations. The birds' populations generally boom during wet years, when more of the landscape is green with vegetation and easily-accessible food (like forbs and insects for growing chicks). But during drought years, when hens and their broods have to travel long distances in search of sparse mesic resources, many chicks die.

It's important to conserve a diversity of mesic habitats to give grouse and other wildlife options during both lean and abundant periods.



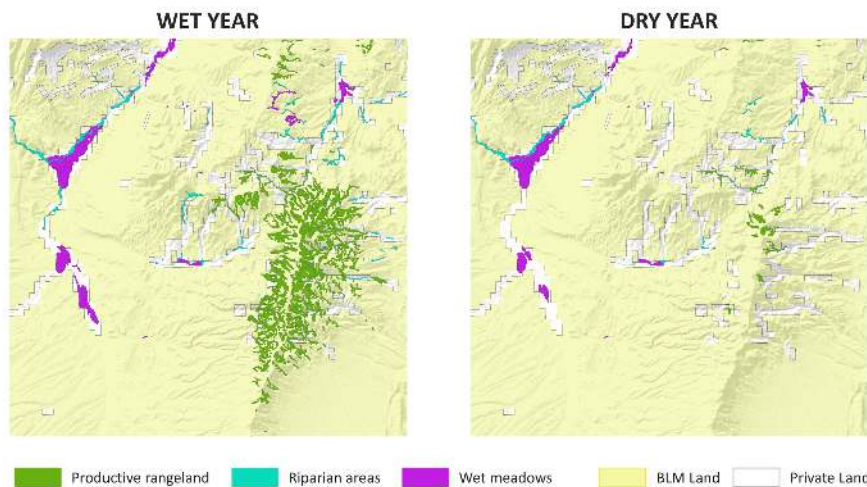
*Wildlife rely on access to different types of wet mesic habitats, such as low-elevation agricultural wetlands during dry years (photo left) and productive high-elevation rangelands during wet years (photo right). Photo credits: Patrick Donnelly, USFWS (left) and Andrew Olsen, Oregon State University (right).*

*“Drought-resilient riparian areas and wet meadows provide green refuges that keep sage grouse and other animals alive when water is scarce. But when rain and snow are plentiful, productive upper-elevation rangelands help populations grow.” ~Patrick Donnelly, IWJV/USFWS*

## Methods

Researchers used over 15,000 satellite images to examine annual vegetation productivity patterns across the sagebrush biome from 1984 to 2016. Analysis focused on late-season (mid-July to mid-September) rangeland productivity when these ecosystems are driest and sage grouse are concentrated within remaining green areas.

Next, they linked the productivity patterns to annual variations in climate. The resulting mesic resource was categorized into irrigated alfalfa, rangeland, riparian areas, or wet meadows. Lastly, data were combined with land tenure information to evaluate proportional mesic resource abundance by ownership within three distinct western regions: the Great Basin, Rocky Mountains, and Great Plains.



*Privately owned wet meadows and riparian areas in valley bottoms remain productive in late summer as opposed to high-elevation public rangelands that dry out during drought. Maps: northeast Nevada, credit: Patrick Donnelly, USFWS.*

## Results

Sage grouse populations are structured in part by drought sensitivity: the landscapes with the greatest uncertainty in mesic availability support the fewest birds. The density of mesic resources is highest in the Rocky Mountains, which is also the region with the largest number of sage grouse.

Despite similar average annual precipitation across the range, mesic resource productivity differs between the three regions. Local topography along with the timing of rain and snow are the key drivers of variation in mesic resources. Mesic

productivity in the Great Plains is up to one-third more sensitive to precipitation than similar habitats in the Rocky Mountains or Great Basin.

Privately owned parcels contain 68% of all mesic resources in sagebrush country, even though private lands comprise just 40% of the total land area. Ownership patterns vary by region and by the type of mesic habitat. For example, in the Great Basin 87% of wet meadows are found on private lands while 66% of productive mesic rangeland are on public lands.

Interestingly, nesting birds in the Great Basin position themselves in mid-elevation habitat during the spring to hedge their bets—they either move down into wetlands or migrate up-slope to find mesic resources, depending on how the summer unfolds. Sage grouse are able to minimize their risk of predation and their energy output by nesting between these two vital mesic habitat types, which researchers have coined the “Goldilocks Zone.”

## Science In Action

The USDA Natural Resources Conservation Service offers technical and financial assistance for **mesic conservation** that improves or maintains wet meadows and riparian areas. Meanwhile, on adjacent upper-elevation sagebrush rangelands, the Bureau of Land Management removes encroaching conifers to **boost water availability** and improve forage.

By partnering to conserve mesic resources across both public and private lands, we can open up more habitat for sage grouse to move between seasonal habitats and safely raise their young. This cross-boundary, landscape-scale conservation approach ensures western rangelands are resilient for wildlife and livestock long into the future.

> **FREE TOOL:** Track mesic resources through time using the **SGI Interactive Web App**. This free online tool can help plan, prioritize, and monitor mesic conservation projects across the range.

## Source

J.P. Donnelly, D.E. Naugle, et. al. 2018. **Seasonal drought in North America’s sagebrush biome structures dynamic mesic resources for sage-grouse.** Ecology & Evolution 8:12492-12505.

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The **Sage Grouse Initiative** is part of **Working Lands for Wildlife**, led by USDA’s Natural Resources Conservation Service, which is a partnership-based, science-driven effort to proactively conserve America’s working agricultural lands and wildlife.