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Natural Resources Conservation Service

CEAP Conservation Insight
Conservation Effects Assessment Project

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Wetlands Provide Vital Sage-Grouse Summer Habitats on Private Lands

Summary Findings

Riparian areas, wet meadows and wetlands provide important summer habitats for sage-grouse broods.

Through a CEAP partnership assessment within the sage-grouse range in Oregon, California and Nevada, investigators examined how the occurrence of wetland resources influences where sage-grouse choose to breed and nest.

The study revealed a strong link between wet sites and the distribution of sage-grouse breeding areas (or leks). The authors found 85% of leks were clustered within 6 miles of these wet summer habitats. Moreover, although wet habitats cover less than 2% of the western landscape, more than 80% are located on private lands.

The assessment makes it clear that successful sage-grouse conservation greatly depends on cooperative ventures with private landowners, ranchers, and farmers to help sustain vital summer habitats.

Range-wide expansion of a decision support tool developed for the 3-state region to help target conservation of important sage-grouse summer habitat wetlands is expected to be completed by 2016.

Background

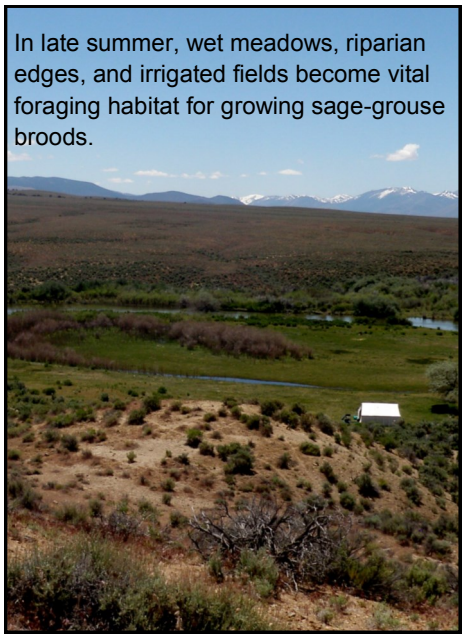
Water scarcity shaped western settlement and remains a driver of human economic growth and urbanization in semiarid ecosystems. Intensive agriculture and ranching traditionally accounted for more than 85% of water use in the West. Recent growth in exurban and rural populations now places unprecedented pressure on scarce water resources (Hansen et al. 2002). Sustainability of irrigated rangeland is at risk as water demand shifts from agricultural to domestic and industrial uses. Predicted climate change is expected to reduce water supply in already stressed systems.

Sage-grouse inhabit semiarid sagebrush communities. Climate-driven variation in herbaceous ground cover, important for chick survival and recruitment, has influenced how sage-grouse have evolved their life history strategy (Blomberg et al. 2012). Seasonal drying and senescence of herbaceous vegetation (July-August) cause female sage-grouse to move their broods from breeding areas to more productive summer habitats; wet meadows, riparian systems, and irrigated alfalfa; hereafter referred to as wetlands (Connelly et al. 2011).

Annual climatic variation influences seasonal sage-grouse movements and habitat use. Females moving greater distances to summer habitats experience higher predation risk and greater nutritional stress.

Assessment Partnership

As part of the science support provided by the Conservation Effects Assessment Project (CEAP) to the NRCS Sage Grouse Initiative (SGI), a partnership was formed among NRCS and researchers at the U.S. Fish and Wildlife Service/ Intermountain West Joint Venture (IWJV), the University of Montana and Oregon State University to assess how the occurrence of wetland resources influences where sage-grouse choose to breed and nest (Donnelly et al. In Review).



In late summer, wet meadows, riparian edges, and irrigated fields become vital foraging habitat for growing sage-grouse broods.

Photo: Dan Taylor

Assessment Approach

The assessment team mapped sage-grouse breeding sites in relation to wet habitats across a large landscape, and analyzed the land ownership of wet habitat sites. The team then studied patterns in the distribution of sage-grouse breeding sites (leks) and summer habitats over a 28-year period (1984-2011) using annual lek survey data collected by state wildlife agencies and Landsat satellite imagery. The study area covered more than 32 million acres of current sage-grouse range, encompassing populations in California, Oregon, and northwestern Nevada (Fig. 1). The team examined location and count data for 1,277 active lek sites in relation to habitat cover interpreted from Landsat satellite imagery. Based on lek survey data, breeding areas were categorized as supporting sparse, moderate, or dense grouse populations.

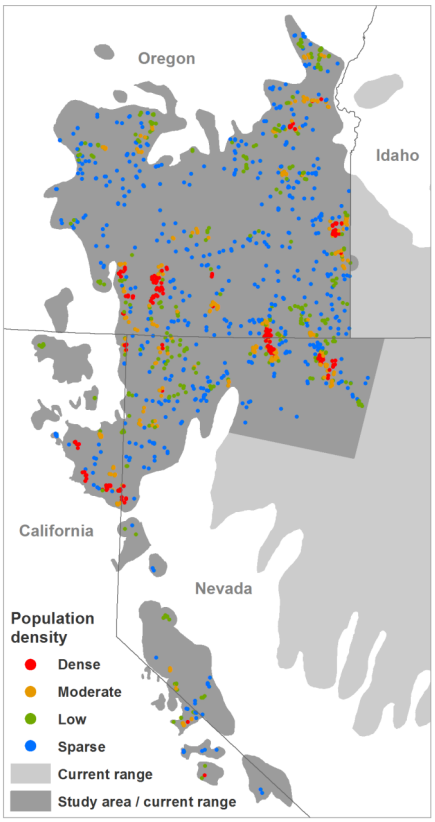


Figure 1. The study area included sage-grouse range in Oregon, California, and northwest Nevada. Colored dots represent lek sites. Grouse leks and populations tend to cluster in the landscape: red and yellow indicate higher breeding densities; blue and green are more sparse.

Late summer (August and September) is when sage-grouse rely heavily on wetland sites for food. For each year, late summer Landsat images were acquired to map wet habitats. This allowed the authors to account for annual variations in climate and determine how changes altered summer habitat distribution during wet and dry periods. Summer habitats were classified as natural or agricultural areas. Natural sites included riparian areas, seasonal and temporary wetlands, as well as reservoirs, lakes, and playas with moist soil vegetation. Agricultural sites included wet meadows and alfalfa fields. Although wet meadows form naturally in basins, more than 92% of wet meadows in the study area were irrigated.

Once mapping was complete, the team examined spatial relationships among summer habitat locations, the likelihood of a habitat site being wet from year to year, and the distribution and abundance of sage-grouse based on lek surveys. In addition, the researchers overlaid land ownership maps with wet habitat locations to establish whether late summer sage-grouse habitat is more likely to be on public or private land.

Findings

Leks are near wetlands

Several patterns quickly emerged. Not only were leks clumped in the landscape (Fig. 1), but the distribution of those clusters was strongly linked to the location of wet habitats: 85% of leks were within 6.2 miles of wet sites (Fig. 2). The breeding areas with the highest densities of birds were even closer—within only 1.8 miles of wet habitats. In other words, the scarcity of wet habitats in sagebrush ecosystems appears to drive the location of grouse breeding sites on uplands. Hens choose to mate and nest within a reasonable walk of where they can find late summer foraging for their broods.

While sagebrush uplands are characteristically more stable environments, the study found the extent of wet summer habitats varied greatly from year to year with shifting climate patterns. In dry years, grouse broods must walk up to twice as far to find adequate summer foraging sites (Fig. 3). Traveling greater distances to brood habitat increases nutritional stress and makes hens and chicks more vulnerable to predation.

Populations are clumped near wetlands

Grouse breeding sites with larger populations were also linked to the best natural summer habitats, and in wet years these sites may drive population recruitment because more chicks survive. On the other hand, sparsely populated breeding areas were farther from summer habitats and were often associated with irrigated agriculture. During drought, grouse find fewer options for late summer foraging and may rely more on irrigated fields and wet meadows, when natural sites dry out.

Wetland sites are tied to private land ownership

European settlers of the Great Basin well understood the best sites for farms and pastures, and settled stream bottoms and basins that collect snowmelt and remain productive late into summer. When current land ownership maps were overlain on topographic basin maps from 1887 and with Landsat imagery of current wet habitat condition, it became obvious that the natural basins that support both temporary and persistent

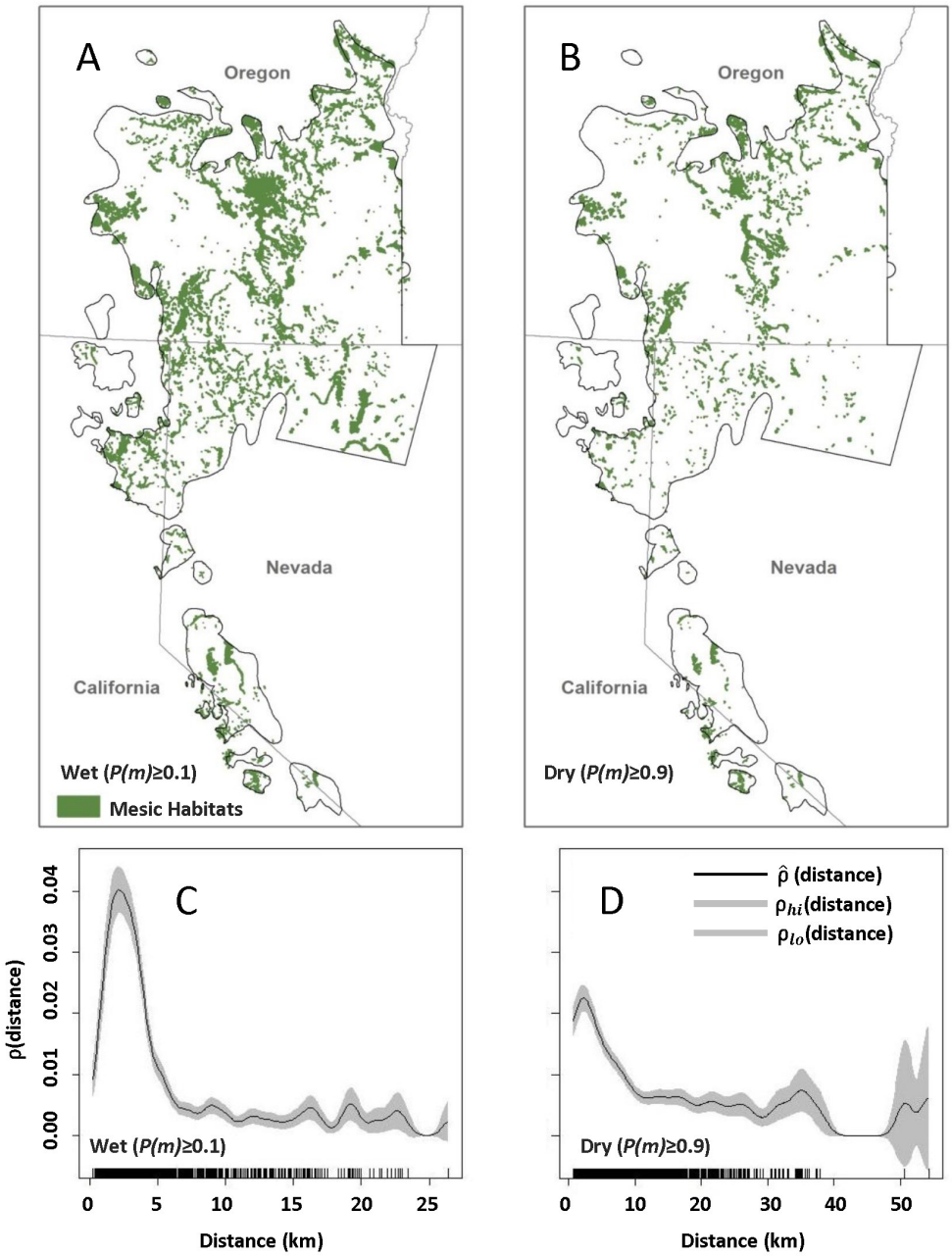


Figure 2 Spatial distribution of wetland habitats occurring during wet (521,871 acres, left) and dry (328,981 acres, right) conditions. Plots estimate dependence of lek density as a function of wetland distance *p(distance)* indicating high lek to wetland proximity.

wet habitats today were magnets for settlers, and virtually all are in private ownership today. The assessment team found that while wet habitats make up only 1 to 2% of the land area, 81% are in private hands (Fig. 3).

Conventionally, sage-grouse conservation has focused on managing sagebrush uplands, yet this study reveals that wet summer habitats and private land partnerships are vital for sustaining sage-grouse populations. Since sage-grouse split their time in the study area between public and private lands—public lands for breeding and nesting and private lands for brood-rearing—successful sage-grouse conservation is inextricably linked to ranching and farming in the West.

Approximately half of all wetland resources in the Western U.S. have been lost (Dahl 1990) and future impacts are expected as water supplies are diverted to support exurban demand. Despite covering only a small fraction of the landscape, wetland habitats act as keystone features that limit sage-grouse distributions. High private ownership of these resources inextricably links sage-grouse conservation to ranching in the West. To complement existing public land management, a focus on private lands voluntary and incentive based conservation measures can reduce continued conversion of wetlands to non-compatible land uses and maintain important summer habitats.

Putting Findings into Practice

The Intermountain West Joint Venture and Sage Grouse Initiative have created a map-based "Decision Support Tool" for land managers. The tool can be used to target summer habitat areas for conservation, and to evaluate the outcomes of conservation efforts.

The tool can help practitioners:

- Target protection, enhancement and restoration of summer habitats in priority landscapes
- Maintain or expand available summer habitat to sustain grouse distribution and abundance; and
- Coordinate conservation efforts across public and private lands.

The tool is available on the SGI website as an ArcGIS data package and must be downloaded to an ArcGIS platform. Private landowners interested in using this decision tool, as well as those without ArcGIS capability, can contact their NRCS field office for assistance.

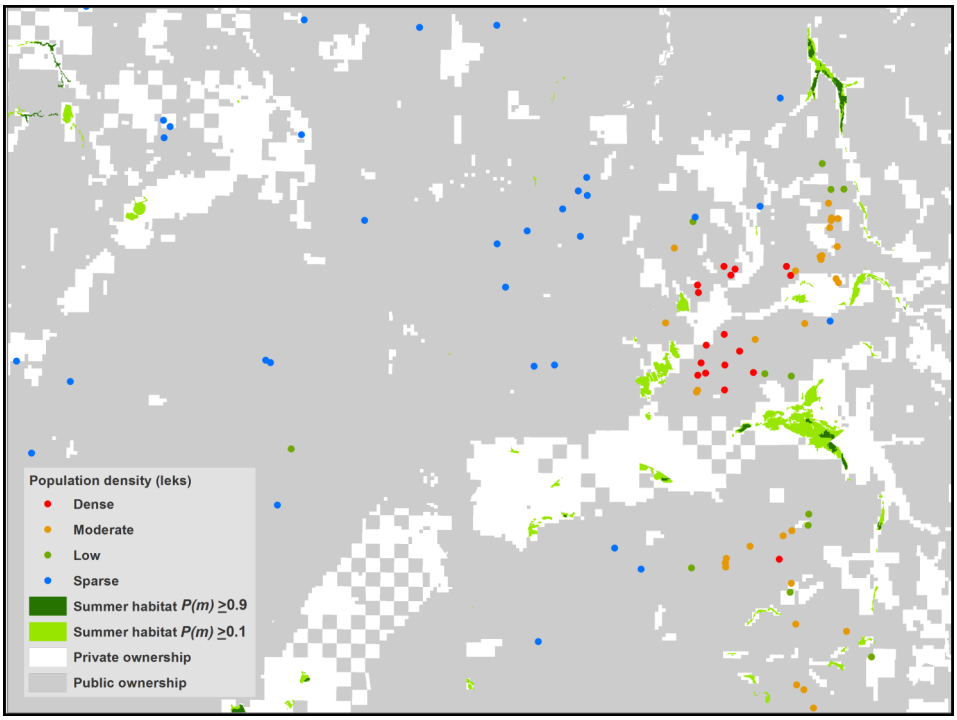


Figure 3. Example of wetland ownership characteristics, where public lands provide sage-grouse breeding and nesting habitats and private lands account for the majority (81%) of summer habitats. Population density and lek proximity to wetlands illustrate typical structure of spatial and density dependence that cluster high density populations on public lands in close proximity to summer habitats.

Currently, the decision tool only covers sage-grouse range in Oregon, California, and northwest Nevada. Work is underway through a CEAP cooperative agreement to expand the assessment and provide the tool for the entire 145 million-acre sage-grouse range. The range-wide tool is expected to be completed and made available for use in 2016.

To learn more about sage-grouse conservation and the Sage Grouse Initiative, visit the SGI website at www.sagegrouseinitiative.com.

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The Conservation Effects Assessment Project: Translating Science into Practice

The Conservation Effects Assessment Project (CEAP) is a multi-agency effort to build the science base for conservation. Project findings will help to guide USDA conservation policy and program development and help farmers and ranchers make informed conservation choices.

One of CEAP's objectives is to quantify the environmental benefits of conservation practices for reporting at the national and regional levels. Because wildlife is affected by conservation actions taken on a variety of landscapes, the wildlife national assessment complements the national assessments for cropland, wetlands, and grazing lands. The wildlife national assessment works through numerous partnerships to support relevant assessments and focuses on regional scientific priorities.

This assessment was conducted through a partnership among NRCS, The U.S. Fish and Wildlife Service, the Intermountain West Joint Venture (IWJV) and the University of Montana (UM). Primary investigators on this project were Patrick Donnelly (IWJV) and David Naugle (UM).

For more information: www.nrcs.usda.gov/technical/NRI/ceap/, or contact Charlie Rewa at charles.rewa@wdc.usda.gov.

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