

VIEWPoints

Society for Range Management Issue Paper: Ecology and Management of Sage-Grouse and Sage-Grouse Habitat—A Reply

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Introduction

Sage-grouse (*Centrocercus* spp.) depend entirely on sagebrush (*Artemisia* spp.) ecosystems that dominate much of western North America. Historically, sage-grouse occurred in at least 12 western states and 3 Canadian provinces but have declined throughout much of their former range and have been extirpated from Nebraska and British Columbia.¹ Concerns for long-term conservation of the species and potential threats to sage-grouse and the sagebrush habitats upon which they depend² have resulted in at least 9 petitions requesting the US Fish and Wildlife Service list greater sage-grouse (*Centrocercus urophasianus*) and Gunnison sage-grouse (*Centrocercus minimus*) under the Endangered Species Act.

The Society for Range Management (SRM) recently developed an issue paper on sage-grouse and their habitats.³ We applaud the Society's recognition of these species and their habitats, as well as SRM's efforts to stress the importance of improved management of western rangelands to aid in the conservation of sage-grouse. However, we are concerned the issue paper presents information in an ambiguous fashion that is open to numerous interpretations. Moreover, the issue paper identifies potential constraints on sage-grouse populations or habitats for which there is little or no empirical evidence while ignoring other well-documented factors affecting the species and its habitat. Here, we provide a critique of that issue paper and attempt to correct any erroneous beliefs that may have been fostered by the information it presents.

Background

In 2005, SRM distributed a stand-alone publication, titled "Ecology and Management of Sage-Grouse and Sage-

Grouse Habitat" (both greater and Gunnison sage-grouse), with the December issue of *Rangelands*.³ Although there were no specific authors listed for the publication, it was subtitled "An Issue Paper Created by the Society for Range Management."

SRM³ stated (p. 7) that the publication was "based on an invited synthesis paper by Crawford et al.,"⁴ a published compilation of the symposium on sage-grouse presented at the annual SRM meeting in 2001. Crawford et al.⁴ stated, "this paper synthesizes current knowledge regarding pertinent topics in sage-grouse ecology and management and suggests direction for future research and management" (p. 3). The only other published reference listed by SRM³ is a publication dealing with the distribution of sage-grouse.¹

We are concerned about the length of time between the original symposium in February 2001 and the SRM³ distribution in December 2005. "Current knowledge," as referenced in Crawford et al.⁴ (p. 3), tends to be a moving target. This is a pertinent consideration for sage-grouse because of the vibrancy of ongoing research efforts on sage-grouse throughout the West. A great deal of research has been conducted on sage-grouse in the time since the original synthesis⁴ was published and in the 5 years since the SRM conference was held, upon which it was based. In addition, Crawford et al.⁴ stated: "Our effort is not comprehensive to all factors affecting sage-grouse but is meant to provide expanded coverage of topical management concerns with an emphasis on habitat ecology" (p. 3). For instance, energy development and anthropogenic changes to the landscape were not addressed by the synthesis, but both have been identified as threats to conservation of sage-grouse.⁵ Thus, we question the utility of publishing a synthesis³ of a synthesis.⁴ By only focusing on 1 paper, the author or authors may provide an inaccurate and/or incomplete assessment of sage-grouse populations and habitat.

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Sage-Grouse Distribution

The descriptions of sage-grouse distribution, habitat relationships, and population ecology within the issue paper³ are general by design and, for the most part, correct. However, in the description of sage-grouse distribution SRM³ stated that “if sage-grouse were ever present in [Kansas and Oklahoma], they probably would have been Gunnison sage-grouse” (p. 1). Although the range map is from Schroeder et al.,¹ the correct reference to this statement is Young et al.⁶ In fact, Schroeder et al.¹ stated that because of contradictions in observations of behavior and habitat, they “did not attempt to define a presettlement distribution for potential sage-grouse habitat in regions dominated by sand sagebrush” (*Artemisia filifolia*; ie, Kansas and Oklahoma) (p. 371).

The issue paper³ also stated that much of the decline of sage-grouse populations was due to direct conversion of 11.1 million acres of sagebrush habitat to other habitats, such as cities and cropland. Most of this land, and especially that associated with urban expansion, was converted in the late 1800s and early 1900s. Although we do not disagree with this general assertion, substantial evidence⁵ indicates many of the current problems are associated with habitat degradation and fragmentation. Declines in habitat quality provide the most defensible explanations for sage-grouse population declines occurring during the past 50 years. For instance, sage-grouse populations in North Dakota declined at an annual rate of 2.8% from 1965 to 2003, long after cities and most farms in that state were established.⁵

Habitat Relationships

In the description of winter habitat, SRM³ stated that “severe winter conditions have little effect on sage-grouse populations unless snow completely covers sagebrush, and winter habitat does not usually limit sage-grouse populations” (p. 2). This statement is almost identical to one in Crawford et al.,⁴ except that instead of stating that winter habitat is usually not limiting, Crawford et al. stated that “adequate cover is typically available on a landscape scale . . . unless snow completely covers sagebrush” (p. 5). The difference in these statements is not trivial. If winter habitat does not limit sage-grouse populations, then grazing, herbicides, and mechanical treatments could be used to treat habitat by purposely reducing sagebrush canopy cover with little concern for affecting sage-grouse winter habitat. However, care needs to be taken with this statement because there is little evidence to support the observation that sagebrush is not limiting (Fig. 1). This is a particularly difficult problem to address because sagebrush can be extremely important during the nesting season (cover for nests) as well as during winter (primary source of food and protective cover). There are annual, habitat, regional, and landscape considerations to this issue. For example, research in Colorado⁷ showed that sagebrush cover was limited during a winter of above-average precipitation. It may be impossible in winters with average or below-average snow conditions to know exactly which areas of sagebrush are critical.



Figure 1. Big sagebrush is rarely distributed evenly across the landscape, as this wintering area in north-central Washington illustrates. Because sage-grouse depend on sagebrush for both food and cover, climatic conditions, such as the depth and distribution of snow, can influence which areas of a landscape are used by sage-grouse.

SRM³ also stated: “sagebrush canopy cover should not exceed 15% on lower-elevation sites or 25% on mountainous sites” (p. 5). This declaration of maximum or threshold values for sagebrush is not supported in Crawford et al.⁴ nor in the numerous studies described in detail in Connelly et al.⁸ In fact, the range of average sagebrush cover values provided in previously published literature is 15%–38% around nest sites and 12%–43% at winter sites (usually above the snowpack). The difference between the maximum cover values provided in SRM³ and the averages provided by Crawford et al.⁴ is substantial. Compounding the danger inherent in the SRM statement is the fact that sagebrush-cover determination by agencies for management objectives, based on previous research, is often unreliable (Fig. 2).⁹

The issue paper's³ section on nesting habitat describes sage-grouse nests as “generally located within 2 miles of a lek, but in some areas hens may nest much farther from leks” (p. 3). Based on other research,¹⁰ Crawford et al.⁴ stated that “55% of nests were within 3 km of the lek” (p. 6). The significance of these respective statements is that by using a pre-defined distance, such as 2 miles,¹¹ the management of habitats may be easier, but a substantial portion of the breeding population may not be considered. For example, recent research in Wyoming showed that 36% of nests were > 3 miles from a lek,¹² and work in Idaho demonstrated that nests were randomly located relative to lek locations.¹⁰ Hence, protection of nesting habitat cannot be achieved by considering only the habitat within an arbitrary distance of known lek locations.

Habitat Management Practices

SRM³ stated: “Prescribed burning, as well as prescribed live-stock grazing, herbicides, and mechanical treatments, can be used to enhance sage-grouse habitat by purposely reducing sagebrush canopy cover where dense sagebrush canopy cover

limits understory forbs and grasses. However, sagebrush thinning should be avoided where sage-grouse winter habitat is limited . . ." (p. 4).

The previous statement in the section on "Habitat Relationships," that "winter habitat does not usually limit sage-grouse populations," suggests this would rarely be an issue. The basic problem with these recommended practices for reducing sagebrush canopy cover is that there appears to be no peer-reviewed research showing that burning, spraying, or mechanically removing sagebrush has substantial positive impacts on sage-grouse. However, there are many papers indicating that sagebrush removal can adversely impact sage-grouse (eg, Connelly et al^{8,13} and Klebenow¹⁴). Wambolt et al² concluded that fires typically destroy the more important portions of sage-grouse habitat, specifically by removing the larger and more productive sagebrush plants that provide cover and food, including important insect populations vital to sage-grouse diets. Prescribed fires, in fact, usually target habitats with the highest amounts of sagebrush cover, thereby often maximizing detrimental effects to sagebrush-dependant species like sage-grouse. Additionally, SRM³ earlier made the statement that "few research studies have examined the effects of these practices on sage-grouse populations and habitat use patterns" (p. 4). That statement is scientifically inconsistent with a recommendation for management action.

Encroachment by conifers is a significant issue in limited portions of the sage-grouse range. In addition, the range-wide conservation assessment of greater sage-grouse⁵ showed that the increase of wildfires has been dramatic across the range, but particularly in areas where conifer encroachment is not an issue. Consequently, vast portions of the range have been, and are being, influenced by fire without the need for prescribed burning. Moreover, Crawford et al⁴ stated: "In Wyoming big sagebrush-dominated communities, there is little evidence that fire will enhance sage-grouse habitat where there is already a balance of native shrubs, perennial grasses, and forbs" (p. 10). By recommending the consideration of prescribed fire, herbicides, and/or mechanical treatment, SRM appears to be pushing for a reduction of sagebrush cover when the potential for this cover to become a limiting factor is increasing. It is also possible that the fire return intervals given in the issue paper³ are incorrect.¹⁵

Livestock grazing tends to be controversial, and the paragraph referring to grazing in the issue paper³ does little to alleviate the controversy. The statement³ that "light-to-moderate grazing in sagebrush rangeland is ecologically sustainable and can benefit sage-grouse" (p. 4) is not only a broad generalization for sage-grouse but also for the relationship between livestock and western rangelands. Light-to-moderate grazing may be sustainable but can be influenced by many factors, including weather, soil, habitat type, the species being grazed, and the timing of use, just to name a few. This is particularly true in sagebrush-dominated habitats where livestock management must be well managed to be sustainable,¹⁶ and even then, there are differing opinions

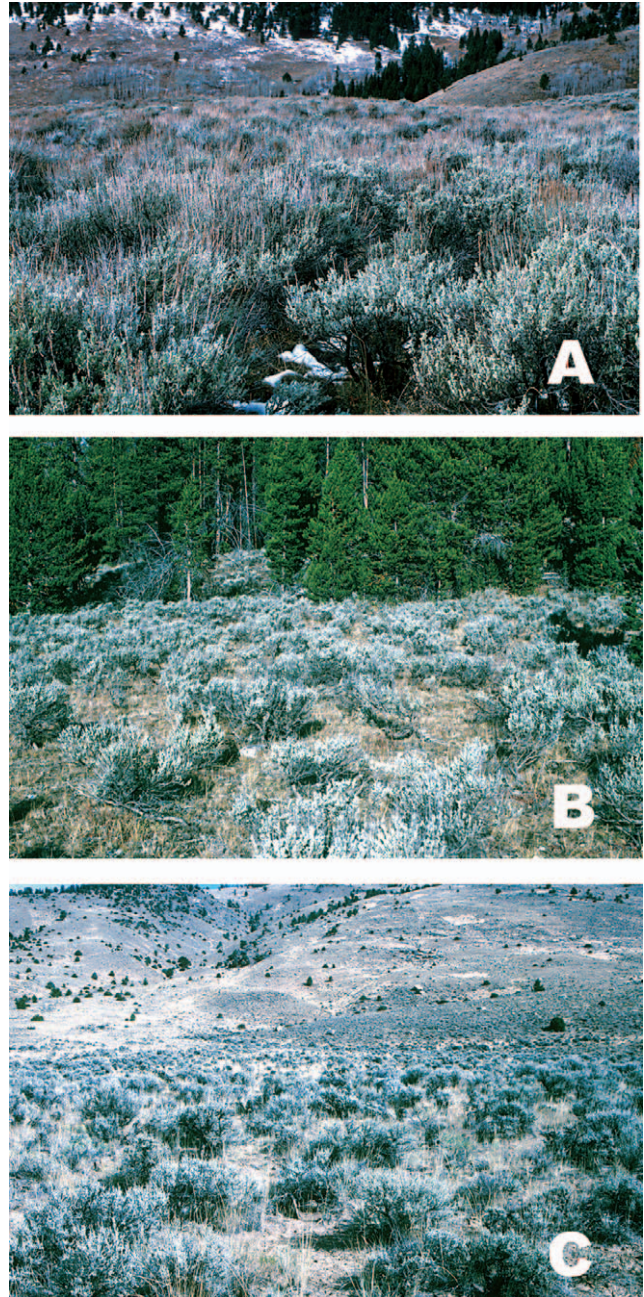


Figure 2. Although these photographs were not taken on range currently occupied by sage-grouse, they illustrate a concern with the SRM issue paper,³ which contained photographs of mountain big sagebrush stands and which stated that cover was 15% and 34% and that canopy cover should not exceed 15% (discussed in text). **A**, Mountain big sagebrush cover of 23% and **B**, cover of 13% for the same taxon. **C**, Wyoming big sagebrush with a cover of 11%. The method of cover determination at our sites followed a method commonly used in research from which management recommendations have been based.²⁰ This demonstrates the need to be precise with such critical parameters. The plant community in **A** had significantly more herbaceous production than the other sites despite the highest sagebrush cover.

about sustainability.¹⁷ Similarly, Crawford et al⁴ stated that "generalizing a specific level of utilization that represents 'proper use' can be difficult" (p. 10).



Figure 3. Successful nests often depend on the cover of both sagebrush and herbaceous vegetation, as is illustrated with this nest in north-central Washington. The most efficient strategy to manage predators is with vegetation.⁴

SRM³ also stated that prescribed livestock grazing can be used to control invasive weeds and reduce wildfire risks. Although this statement is discussed in Crawford et al,⁴ the authors stated that: “the logistics of applying such grazing treatments at large spatial scales remain difficult” (p. 12). In addition, if livestock remove enough cover to significantly reduce the risk of fire, they may also damage the potential of the habitat to support sage-grouse.¹⁸ Virtually all of the wildfires occurring in sage-grouse habitat during the past 15 years have been in areas grazed by domestic livestock.⁵

Factors Other Than Habitat That Affect Sage-Grouse Populations

The issue paper³ implies that a lack of predator control is an important negative factor for sage-grouse, but there is little published information to support this view. Crawford et al⁴ briefly discussed predator control but primarily in relation to its complicated nature and the difficulty of interpreting the effects from multiple simultaneous manipulations. In fact, Crawford et al⁴ do not recommend predator control as was done in SRM.³ Rather, Crawford et al⁴ stated that “adequate vegetation structure at the nest site provides visual, scent, and physical barriers between ground-nesting birds and predators and may ultimately determine susceptibility to predation” (p. 6) (Fig. 3). Predation is a normal environmental variable, and the fact that it occurs does not automatically indicate that it is a problem. Thus far, there are only a few isolated areas where sage-grouse vital rates (adult survival, nest success, chick survival) appear to have been affected by predation, but often these have been related to both habitat fragmentation and the introduction of nonnative predators.

The issue paper³ introduces the topic of potential competition between nonnative species of game birds, such as the gray partridge (*Perdix perdix*), the chukar (*Alectoris chukar*), and the ring-necked pheasant (*Phasianus colchicus*). This topic was not mentioned by Crawford et al⁴ and is not sup-

ported by peer-reviewed literature. This does not mean this issue should not be considered in future research. However, a thorough examination of potential competition from non-native species would also consider the competitive effects of other sympatric nonnative species, including cattle, horses, and sheep.

Landscape Issues

SRM³ stated: “Sage-grouse do not thrive where large homogenous stands of any single plant species occupy the bulk of the landscape” (p. 6). The actual quote from Crawford et al⁴ is “Sage-grouse is not a species that can thrive only where large homogeneous stands of any single plant species occupy the bulk of the landscape” (p. 13). In the latter quote, sage-grouse can thrive in a homogenous landscape, and, in the former quote, they cannot. Nevertheless, both Crawford et al⁴ and SRM³ stated that the proportion of optimal seasonal habitats in a landscape is unknown, thus illustrating the complicated nature of the relationship between sage-grouse and their landscape. The reason why this relationship is poorly understood is that it likely varies by region, season, weather, population, suitability, and configuration of habitats within the landscape and by the landscape scale that is being examined.⁴ For example, in winter, a relatively large homogeneous stand of crested wheatgrass (*Agropyron cristatum*) or cheatgrass (*Bromus tectorum*) would undoubtedly be negative, whereas a large area of sagebrush-dominated rangeland would be positive.

Final Thoughts

SRM³ used this section to relate sage-grouse numbers in the past with hunting regulations, implying that increases in populations followed closures or restrictions of hunting seasons in several western states. Crawford et al⁴ did not discuss this issue, and the issue has not been examined by any other authors, primarily because there are few published population data sets for the region before 1965.⁵ Moreover, if one were to make the assumption that SRM³ was correct in its assessment of range-wide populations of sage-grouse from the 1930s through the 1960s, equally plausible explanations would be that the establishment of grazing districts, through the Taylor Grazing Act of 1934, led to sage-grouse population increases, and long-term efforts to remove sagebrush and/or to establish crested wheatgrass contributed to declines.

Conclusions

We believe it is important for science-based professional societies to produce nontechnical information to reach a broader public so that the public understands the results and implications of research. We commend SRM for pursuing this form of outreach with sage-grouse, as it has with other issue papers (eg, rangelands and global change¹⁹). However, in doing so, a Society also has the obligation to use the best-available information and to present that information in an

unbiased and unambiguous fashion. The preponderance of unreferenced material and unsupported interpretations undermines the intention of the SRM issue paper.³ Although distributing a nontechnical informational brochure on sage-grouse could be useful, the information contained in this issue paper³ confuses and contradicts the body of knowledge surrounding management of these species and their habitat. Therefore, we suggest that SRM consider revising and redistributing this issue paper,³ using recent information, presented in a clear and concise fashion. Doing so will enhance the stature of SRM as a science-driven organization that is a leader in the proper stewardship of our nation's rangeland resources.

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