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**Professional Review of:**

**Connelly, J. W., S. T. Knick, M. A. Schroeder, and S. J. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming.**

**GENERAL COMMENTS**

Overall, this is a relatively thorough review of what is known about greater sage-grouse and their habitats. There are some deficiencies (noted below). The literature reviewed is relevant and current through 2003. The Assessment covers most important issues and summarizes the material in one document.

**DETAILED COMMENTS**

**Executive Summary**

The material presented covers a few of the important “findings” which are reported in more detail in the Chapter where first discussed. Overall, the long-term trends in habitats occupied and numbers of sage-grouse are markedly down (ES-5) and the authors “are not optimistic about the future of sage-grouse.” I concur with their conclusion.

**Chapter 1. Introduction**

The authors clearly state (1 – 2) that reported sage-grouse habitats in Kansas and Oklahoma were disregarded as were those in the Provinces of Alberta, British Columbia, and Saskatchewan. While this may be convenient, if these “outlying” or possibly disconnected habitats (Schroeder et al. 2004 [Condor 106:363-376]) were included in the Assessment, the change in distribution of sage-grouse and their habitats would be much larger than that reported.

**Chapter 2. Conservation Status of Greater Sage-grouse Populations**

The authors report (2 – 11) the U. S. Fish and Wildlife Service made a positive 90-day and 12-month finding (7 May 2001) on the petition to list the Washington population of “Western” (now Greater) sage-grouse. This finding was that “listing was warranted but precluded because of higher priority listing actions.” With an estimated population of ~ 700 birds in spring 2003 in only 2

disjointed areas, it is difficult to believe this population has only a “species priority number 9”. What will it take to correctly list this distinct population segment of greater sage-grouse as endangered?

It is also reported (2 – 13 & 14) that the U. S. Bureau of Land Management (BLM) has issued a memorandum on sage-grouse habitat conservation strategy and “interim program guidance” (# 2003-003) as well as a draft “National Sage-grouse Habitat Conservation Strategy” which has been postponed being finalized awaiting the release of the “Greater Sage-grouse Conservation Assessment.” The BLM, more than any other single agency, has the responsibility for managing sage-grouse habitats. That sage-grouse numbers have markedly declined and local populations have been extirpated, is striking testimony as to how little importance the agency has placed on managing habitats to maintain or benefit greater sage-grouse. This agency (BLM) has been derelict in their responsibility in managing public rangelands for all resources even in light of scientific studies that indicate the importance of sagebrush habitats for sage-grouse. The BLM could effectively increase sage-grouse numbers by following and applying the currently available knowledge. Any delay in implementing positive actions designed to improve habitats for sage-grouse must be avoided.

The Assessment focuses on individual State efforts in developing local and statewide conservation plans to benefit greater sage-grouse (2 – 15 through 25). All of these plans are voluntary, poorly funded, with essentially no evaluation or monitoring of any progress. It is not likely these plans will significantly improve habitats or increase sage-grouse populations. While local plans can be important in securing attention and support of the affected publics, they have become a distraction resulting in “finger pointing” instead of building strong coalitions that increase implementation of positive actions to benefit sage-grouse. It is important to note that Washington State has prepared the first “Recovery Plan” for sage-grouse (2 – 22 & 23).

### Chapter 3. Population Ecology and Characteristics

This Chapter describes the basic knowledge about greater sage-grouse and their use of habitats. Some “data,” while seemingly intuitive, are weak (relation of forbs to egg laying and apparent hen success). Of importance are the apparent low rates of nest success. These rates could be affected by observer behavior or, if real, most likely reflect the lack of quality nesting and early brood-rearing habitats.

### Chapter 4. Sage-grouse Habitat Characteristics

This Chapter basically describes what is known about the habitats used by sage-grouse. An important point (4 – 15) is the need for “large, interconnected expanses of sagebrush.” Presently occupied habitats are rarely large or interconnected and management of public lands dominated by sagebrush steppe is increasingly fragmenting useful habitats for sage-grouse on an unprecedented scale (e.g., Campbell and Sublette counties, Wyoming).

## **Chapter 5. Sagebrush Ecosystems: Delineation and Dynamics of Primary Sagebrush Habitats**

The authors of this Chapter suggest (5 – 1) that “all regions of the sagebrush biome” were included in their assessment. That appears to be an overstatement as large areas historically dominated by *Artemisia filifolia* in Colorado, Kansas, and Oklahoma (Schroeder et al. 2004 [Condor 106: 363-376]) are not included. Sage-grouse historically were reported from these habitats in Kansas and Oklahoma (reviewed by Schroeder et al. 2004). I note that small populations of sage-grouse still use *A. filifolia* habitats in eastern Wyoming. Thus, the extent of habitat lost is underestimated in the Assessment.

## **Chapter 6. Greater Sage-grouse Populations**

This Chapter presents some of the existing population data (Appendix A4) by State and range wide for greater sage-grouse. It correctly identifies most of the problems with the data sets caused by agencies not following any standard protocols within and among states. These problems occurred even though a WAFWA 1982 publication (Autenrieth et al.) and a 1995 Memorandum of Understanding encouraged state agencies to work together to produce standardized data across the range of sage-grouse. Unfortunately, much of the available population information has great variation, low precision, and dubious accuracy. Despite these huge problems, the general trend is obviously downward, frequently significantly so. However, the Assessment suggests that sage-grouse populations are stable or only slightly declining in two states. Close examination of what is known in these states (California and Colorado) demonstrates that sage-grouse populations in both states have markedly decreased since the 1960’s (and later in at least Colorado). Sage-grouse have been extirpated from local areas and even counties in both states (Siskiyou in California [electronic mail of 19 July 2004 from California Fish and Game], Lake and Summit in Colorado [Braun 1995, *Prairie Naturalist* 27: 1-9]) and other local populations are barely persisting. Obvious examples of incorrect data are those presented for Eagle-South Routt, Colorado (Appendix A4.5) (Draft Conservation Plan 2004 and CEB files) and Middle Park, Colorado (Appendix A4.14) (K. M. Potter and C. E. Braun [1999] Unpublished Report, Colorado Division of Wildlife, Fort Collins). If close examination can reveal these obvious discrepancies in the database (for Colorado), similar problems may exist for other databases used in the Assessment. It is clear the Assessment most likely underestimates the decline that has occurred.

It should be noted that the Assessment Team could only analyze the data provided by the states and had little opportunity to check the accuracy of individual data sets. It is distressing that more effort was not made by some states to provide verified information. This problem could occur if databases were not current or verified by those involved with data collection over time. However, this problem casts some doubt on the veracity of certain data sets and conclusions inferred from those data.

The numbers of leks reported “censused” differs between the Executive Summary and Chapter 6 (page 6 – 2) (but see page 6 – 64). These may be small problems but not all leks known to be active are “censused” each year and some

projection (Synthesis) (13 – 5) is made for leks not counted but active in previous years and unfound leks. Since leks with larger number of males are more likely to be found and counted, systematic error could result from not locating and counting all leks or samples representing all active leks. This would inflate population estimates. Further, the data presented are misleading as few inactive leks are actually counted each year. A more representative picture of trends in populations would be provided by males per active lek as the only really important statistics are number of active leks and total males counted

The range wide assessment indicates that populations in many areas of California, Colorado Nevada, Utah, and Washington are very small and isolated (pages 6 - 59 through – 62). Sage-grouse hunting is not allowed in Washington but continues in some states (above and others) where populations are clearly isolated and small. It would appear these isolated populations have the greatest risk for low gene flow, catastrophic events, and extirpation.

Harvest data are mentioned in Chapter 6 but no real data are presented on trends in harvest. This is most likely the result of very poor estimates of harvests for any state. It would have been useful to overlay harvest trends for some leading sage-grouse hunting states with population trends developed from counts of males on leks. States also routinely collect wings from hunter-harvested sage-grouse. This is mentioned in Chapter 6 (page 6 – 7), as are production data. However, no attempt was made to use harvest data, especially chicks per hen in the harvest, to support the obvious conclusion that production has been less than adequate to maintain stable populations. If harvest data are not useful for management purposes, why is it collected or, why does hunting of some obviously small populations continue (see Connelly et al. [2000:936])?

#### Chapter 7. Sagebrush Ecosystems: Current Status and Trends

This is an important chapter as it illustrates what has happened and is happening to the sagebrush steppe. The figures are especially useful. It would have been desirable to prepare a figure overlaid with all of the various factors affecting the sagebrush steppe. While this figure might appear too complex, it would be shocking if one could visualize the amount of disturbance that has occurred and is still occurring. Unfortunately, some of the material presented only pertains to the Great Basin ecoregion, as similar data apparently were not available for the other ecoregions that encompass historic and present sage-grouse habitats. It is likely the Assessment understates the problems with fire, juniper/pinon invasion, expansion of cheatgrass, fences, agriculture, invasive species, power lines, livestock grazing and associated developments to benefit livestock, etc., that have negatively affected sage-grouse populations. Also of importance is the information that rangeland health has not been assessed on 57% of the public lands managed by the BLM (page 7 – 34). Clearly, a substantial proportion of the public lands do not meet established standards for rangeland health, which may explain part of the reduced ability of public lands to sustain healthy sage-grouse populations. These lands are now under further stress from oil and gas development without any reduction in domestic livestock grazing. While stipulations have been placed on some oil and gas developments, most stipulations can be waived or exempted by local BLM officials.

Restoration and revegetation of disturbed sites within the sagebrush steppe are now underway in localized areas on a small scale. However, there is little evidence these practices will be successful in the short- or long-term and that sage-grouse will positively respond in less than 20-30 years, if at all.

#### **Chapter 8. Greater Sage-grouse Genetics**

The genetics of sage-grouse populations have taken center stage with discovery of the Gunnison sage-grouse, no support for distinction of Western and Eastern subspecies, and discovery of a genetically identifiable population in eastern California and western Nevada. This chapter adequately covers the published literature on the genetics of sage-grouse. What is lacking is a discussion of the related nature, if any, of sage-grouse populations across the expanse of the distribution. This is especially true when one considers the small, isolated populations in California, Colorado, Utah, North and South Dakota, and other states/provinces, and the fragmentation of larger populations caused by oil and gas development in Wyoming and Montana. Many of the smaller populations can be considered functionally extirpated. Thus, there is a need to look at relatedness of all populations if population management is to be effective.

#### **Chapter 9. Effect of Harvest on Greater Sage-grouse**

This chapter is related to Chapter 6 and some of the same comments are pertinent. The harvest totals presented for Idaho (7,576) and range wide (~24,000) are either too precise to be accurate (Idaho) or represent an educated guess. Unfortunately, the reader is not provided information on how these totals were derived. An analysis of the long-term trends in harvest for some of the leading harvest states and their relationships to actual hunting regulations could be illustrative of some of the problems in collection of these data and impacts on sage-grouse populations. There should be an analysis of the effects of hunting on small populations. At one time, many states initiated hunting of sage-grouse in August, a practice that unknowingly directed harvest to successful hens and chicks. No mention is made of the use of these regulations and their effect on populations even though there now seems to be recognition that harvest in early September before brood breakup and fall dispersal can be negative for survival of successful hens. This chapter could benefit by reporting of harvest regulations dating to the 1950's and the apparent goal of the regulations in population management. There is a general discussion of compensatory and additive mortality possibly caused by hunting without any closure as to what effect hunting can have on populations. However, population modeling strongly suggests two important factors affecting sage-grouse populations are habitat treatments and harvest (Johnson and Braun 1999 [Conservation Biology 13: 77-84]).

#### **Chapter 10. Predation, Parasites and Pathogens**

This chapter is superficial as it fails to focus on possible negative effects on sage-grouse populations caused by predators in fragmented habitats, the impacts of transmissible diseases such as coccidiosis on populations when concentrated, the potential of parasite transmission from exotic game birds such as ring-necked

pheasants which could lead to spread of diseases such as blackhead, and thorough review of the existing literature. Concern (and rightly so) is expressed about the newest disease threat, West Nile Virus, which has the potential to markedly affect local sage-grouse populations provided certain environmental conditions are met. The topics in this chapter should have been more thoroughly developed as they have the potential to markedly affect local populations.

### **Chapter 11. Monitoring Sage-grouse Habitats and Populations**

This chapter is superficial and briefly describes what is presently being done. However, the monitoring techniques described are not being uniformly applied and the data collected are not accurate or sufficiently precise for detailed analysis. Databases among states are not compatible or easily assessed and some appear to not have been verified. No thought was given to developing production indices based on chicks per hen or the importance of measuring trends in winter use. Similarly, monitoring of habitats is poorly developed. This suggests that changes in habitats as a result of treatments could not be easily measured unless the changes are catastrophic.

### **Chapter 12. The Human Footprint Across the Sage-grouse Conservation Assessment Area: A Large-scale Analysis of Anthropogenic Impacts**

This chapter may be a valuable contribution but was truncated to allow publication elsewhere. Thus, the reader is only offered a glimpse of what might be important such as the impact of Interstate 80 across Wyoming and Nevada, regional fragmentation of habitats, human-induced fires, etc. It would have been useful for this chapter to provide a better understanding of the effect of the “human footprint” on sage-grouse habitat. One can imagine that the impacts are extremely negative for sage-grouse and their persistence as viable species.

### **Chapter 13. Synthesis**

This chapter is not well focused and contains material that should have been included in the Executive Summary. New information is presented that should have been reported in earlier chapters. For example, we learn that “five populations are now extirpated or have numbers too small to monitor”. “An additional 14 populations face a high risk of extirpation, due largely to their small population [size].” These are important findings and suggest it will be difficult for sage-grouse to persist over large areas for a significant period of years. While I want to believe the numbers presented on page 13 – 5, there are problems with use of the Walsh et al. (2004) estimator. This publication is based on observations of small samples of radio-marked males and females in one small area in about 30-45 days during one year. The study has not been replicated. Further, male sage-grouse are known to display in late evening and at night (near the full moon phase) with hens present, which may lead to their (both genders) non-attendance on leks in the morning and, thus, would not be available to be observed. Also, some sage-grouse display and may mate away from leks. All of these factors would bias the Walsh estimator leading to higher population estimates. The statement (page 13 – 5) that “the number of greater sage-grouse in western North America is probably much higher than the

previous estimate” is not likely true. I also note that if sage-grouse populations are increasing at present as suggested (page 13 – 5), there is no evidence that former range is being reoccupied. What is apparent is that there has been a large increase in effort to locate leks and count male sage-grouse since the late 1990’s. Thus, any increase in apparent numbers of sage-grouse most likely reflects increased effort resulting in location [and counting of males] of larger leks, and not sustained expansion of sage-grouse populations.

The available data and knowledge do not support the contention that 2 of 10 states had populations of sage-grouse that are “stable or slightly increasing.” The available knowledge suggests that sage-grouse populations have markedly and significantly decreased in all states when 50, 25, and 10-year series of data or information are carefully reviewed. The data are not convincing that extirpation can be avoided when the entire original distribution and apparent number of sage-grouse are considered. Further, there is little evidence that sage-grouse have reoccupied areas from which they have been extirpated even with “relatively stable or slightly declining populations during the last 15-20 years” or in regions where “in many areas numbers increased between 1995 and 2003.”

### Appendices

Several of these are important as some provide the basis for material covered in the text. There are problems as reported in the review of Chapter 6. The general trend in all states/provinces except California and Colorado (but see earlier comments), according to the Assessment, is down, and markedly down in most analyses. Unfortunately, it is difficult to tease the individual data sets apart as some are grouped across state boundaries. Two data sets (Tables A4.5, A4.14) for Colorado are clearly erroneous and do not match the available data. These may be anomalies and do not overly distract from the apparent trend. However, neither lends support to the suggestion that sage-grouse populations in Colorado are stable or have increased. Only one population in Colorado has demonstrably increased in the last 5-year interval (but see Braun 1998 [Proceedings of the Western Association of Fish and Wildlife Agencies 78: 139-156] for the trend from 1959 through 1998 for this population) and one other has increased slightly from lows in 1996-98 (82% decline from 1978-80) (Braun 1998). This population is still less than half of what it was in the late 1970’s.

### Conclusions

I generally agree with the overall findings of the Assessment. However, habitat fragmentation and degradation would appear to be understated and implied current population levels would appear to be inflated. The significant downward trend in population trajectory for many, if not most populations, indicates that local extirpations will continue and likely increase as some populations should logically be considered as functionally extirpated with little hope for meaningful recovery.

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