

Greater Sage-Grouse, Ecology and Conservation of a Landscape Species and Its Habitats

By Steven T. Knick and John W. Connelly, editors. 2011 Studies in avian biology No. 38. A publication of the Cooper Ornithological Society. xvii. 646 pages. 122.75 CAN.

This is an impressive book and a treasure trove of information that I read with excitement and pleasure for I study grouse, population dynamics, and know several of the authors. I am greatly impressed by all that is accomplished but left with some aspects still uncovered. The book is 646 pages of packed print, maps,

diagrams, and graphs and ends with 1683 references. The material presented ranges from grouse eggs to the control of wild horses (*Equus caballus*) by the number of harems removed. My abilities, time, and space for this review compromise a more accurate, deeper, and fuller explanation of the book. There are 24 chapters

by 38 authors, many leaders in their field. They are from 20 institutions; state, federal, university, and NGOs. The aim is to provide the best information for the understanding and long-term survival of the Greater Sage-Grouse (*Centrocercus urophasianus*) and the Sagebrush (*Artemisia spp.*) Biome in as natural a state as possible so "that generations long into the future will be able to experience the sun rising on a vast open landscape, smell the pungent scent of sagebrush, and marvel at the centuries old rite of Greater Sage-Grouse displaying on a lek." Amen!

The book is a state of the art text on the biology, ecology, and population dynamics of the sage-grouse and their sagebrush habitat. But most important, it also discusses the huge effort and difficulty in making fact into value, influencing public policy, and obtaining legality for action. The sage-grouse is in trouble with generally declining numbers, shrinking distributions, and deteriorating habitats. From 1999 to 2005, 9 petitions to place Greater Sage-Grouse in protection under the Endangered Species Act were submitted to the United States Fish and Wildlife Service (USFWS). In March 2010, the USFWS warranted the listing under the Act but immediate action was prevented by higher priorities. Many people and agencies view the Act as a loss of rights to land and revenue. I just recently read that in 2010 the Governor of Wyoming issued an order outlining a new strategy to protect Sage Grouse while allowing a development in core area. The action is to prevent an adverse effect upon the economy. Clearly, science, resources, and politics are covered and the information used to construct a road map where all the many who are involved with or value Sage Grouse and their habitat may plan and act for their care.

A Preface by the editors outlines aims and broad limits. Next, a Foreword on thoughts on the role of science in making public policy. Then the editors write an introduction to the Greater Sage-Grouse and sagebrush under the heading An Introduction to the Landscape. Knick begins the chapters with Historical Development, Principal Federal legislation, and Current Management of Sagebrush Habitats. Chapter two completes the first; The Legal Status of Greater Sage-Grouse and the Organisational Structure of Planning Efforts. Key points are: most sage-grouse are on unprotected private lands, and legal status is by state law as wildlife and game birds. However, many plans of stewardship are acted upon.

Chapters three and fifteen are the heart of the matter and deal with the biology, population dynamics, and long-term trends of the populations of sage-grouse. Here, the Greater-Sage-Grouse is called one of North America's most unique species of bird. It shares the myth of the West in its sagebrush home on the range. I claim the Blue Grouse (*Dendragapus spp.*) is at least equal to the Sage Grouse in remarkable features (Zwickel, F. C. and Bendell, J. F. 2004. Blue Grouse: Their Biology and Natural History. NRC Research

Press, Ottawa, Ontario. 284 pages) and there is a great similarity between the two genera. Most striking is the migration between winter and summer ranges. Other similar attributes include: natal down, secondary sexual characteristics, behaviour, large size, long length of life as adults, and habitats and foods used by hens and chicks during the breeding season. A fundamental difference is that Sage Grouse use sagebrush in relatively flat, open landscape for winter food and cover. Blue Grouse use conifer trees, generally in the alpine zone. Most winter habitats of Blue Grouse are inaccessible to humans, but sage-grouse are exposed to human throughout the year with generally destructive consequences.

The numbers of sage-grouse throughout their entire range were measured by counting males on 9,870 leks with a total of 75,598 counts since 1965. Many leks were counted each year through 2007 yielding greater than 30 years of abundance data. A minimum estimate is 88,816 male sage-grouse on 5,042 leks over 530,000 kilometres square where sagebrush is the dominant cover. Leks with adequate data were grouped into 23 populations and analysed by several accepted mathematical models to derive annual rates of population change. A few populations are predicted to remain stable in number but most will decline. For example, 13% of the analysed populations may decline below an effective size of 50 birds within the next 30 years. Clearly, strong action must be taken to arrest the decline and increase the numbers of sage-grouse.

Overall, 20 of the 24 chapters are devoted to environmental and other factors that may be linked to the abundance and distribution of Sage Grouse. Clearly paramount, Sage Grouse need sagebrush; as goes the sagebrush, so goes the Sage Grouse and a large community of desirable plant and animal associates. Many pages are devoted to the kinds, ecology, and requirements of sagebrush. The abundance and distribution of sagebrush is declining and shrinking. The causes are complex and include: burning, conversion to crop land, grazing by domestic stock and feral horses and burros (*Equus sp.*), competition with invasive and exotic plants, mineral and gas claims and extraction, and the myriad impacts of human settlement.

An obvious need is to determine how the density of Sage Grouse is set by their environment. Some of the usual explanations for population limitations for this and other species of grouse are hunting, predation, and disease. Disease is given special attention with the recent appearance, negative impact, and rapid spread of the West Nile Virus. Gratefully, the long held belief that the grouse generally cannot be reduced in breeding density by hunting because of their high birth rate is questioned. And numbers shot should be adjusted to desired densities of breeders. Disease and predation may cause local reductions of population but neither can be blamed as a general cause of density and distribution.

Other features and factors found frequently in the vast grouse literature relevant to population are missing or treated lightly. Some may be critical in focussing research and recommending management. As examples: with the long runs of census data, are sage-grouse cyclical in numbers? What aspects of behaviour might drive density? What is the impact of the quantity and quality of foods eaten throughout the year by both sexes of all ages? What is the influence of climate, weather, and micro-climate, especially where micro-climate may determine next site selection and success?

I could find no clear answer as to how densities of Sage Grouse are limited. Perhaps the intention is to emphasize habitat as the only way to management. Other studies of grouse suggest breeding densities are determined by the spacing behaviour of hens for their requirements for nesting and the insect food needed by their young chicks. The book does note that the quality of hens may be a driving cause of the productivity and persistence of leks. Quality may influence behaviour and originate genetically and/or in an environmental factor such as food. Recent work on grouse and mammals shows levels of stress may be measured by amounts of metabolites of progesterone in blood or faecal droppings to reveal modification of behaviour and reproduction the may affect population.

The last few pages of the text are entitled A Road Map to Conservation. 1. Much additional work needs to be done to better understand the impacts of hunting,

predation, and disease. 2. Habitat protection is the best strategy to stabilize or recover many populations. 3. Habitat restoration with improve many protected areas. And 4. Accurate monitoring and assessment are necessary to provide an objective appraisal of improvements or damage to sage-grouse populations and habitats.

Without question, this book is an enormous amount of excellent information, but will it and the Road Map be followed? Certainly by professionals and naturalists dealing with wildlife, other natural resources, and the land. Politicians, captains of industry, and the general public may find it overwhelming and forbidding and too difficult to follow. Perhaps there should be a condensation of the book with the main points made in simpler language and illustrated with many coloured pictures. Pictures that show the salient fact and stunning beauty. Perhaps a CD should be included. And above all, explain why we must keep the experiences of the sun rising on vast expanses of sagebrush and the spectacular courting dances of the sage-grouse.

Many healthy populations of sage-grouse and much sagebrush habitat remain. But the alarm bells are ringing. Hopefully, the dedication and the excellent work of the authors will translate into the long-term appreciation and survival of the sage-grouse of "this icon of the West."

JIM BENDELL

RR #2 Clayton, Ontario, K0A 1P0