

# A RENEWED COMMITMENT TO MANAGEMENT OF SAGEBRUSH GRASSLANDS

Al H. Winward

## INTRODUCTION

If we were to get into a car at Horse Ridge, just east of Bend, Oregon and begin traveling eastward, we could drive hundreds of miles - across the Oregon High Desert, through the Snake River Plains of Idaho, into the northern edge of the Great Basin of Utah, and through much of the Red Desert of Wyoming - and always be within sight of sagebrush. This is the area that some of the early travelers such as Fremont (1845) referred to as the "Sagebrush Desert." Early rangeland managers calculated that over 94 million acres of the western U.S. are dominated by woody species of sagebrush (USDA Forest Service 1936). Tisdale and others (1969) felt that this estimate is too low. Although some of this acreage is now under cultivated agriculture, many millions of acres of sagebrush dominated rangelands remain.

Over 50 years of effort have been spent in trying to improve management of these areas yet, the sagebrush region still is producing far below its potential. Stands that once produced over 800 pounds of air-dry grasses and forbs per acre now produce less than 100 pounds per acre of these understory species. Loss of much of the understory herbaceous species has been accompanied by an increase in size and vigor of the sagebrush and other woody species. Additionally, numerous poison or noxious weedy species, or dense stands of less desirable annuals have manifest themselves and altered the original character and value of these once productive rangelands.

The time has come to reevaluate our past management efforts. Based on current needs, new technology, and especially, updated information, we need to recommit ourselves again to improving the health and productivity of this vast sagebrush-grass ecosystem.

### Values of Sagebrush

What are some of the things we've learned about sagebrush-grass rangelands in the past thirty years? Perhaps one of the important things is that sagebrush does have some values. We spent so many years working to "eradicate" sagebrushes because they competed with livestock forage species that we failed to look at some of the good things about this unique group.

There has been considerable effort spent trying to understand more about their value as forage--which ones are preferred and what is their nutritional value, seasonally. Since sagebrush is considered "evergreen" it tends to provide a higher source of protein in the dormant season than most other plant species that occur in these ecosystems.

Additionally, it often is available to foraging animals during the snowy season due to its upright-shrubby growth form. Several native wildlife species have adapted foraging habits centered around this genus.

There have been some interesting studies on the native insects tied to sagebrush. Not only are some insects tied to certain kinds of sagebrush, but also to certain types of leaves (ephemeral vs persistent) of sagebrush (Jones and others 1983). Presence of certain insects, in turn, influences the types of animals and birds associated with them (Medin 1990). It is of interest to find that the black grass bug (Labops spp.), which is a native insect that can build to high numbers and damage the native and introduced wheatgrasses, often is held in check if some sagebrush plants are interspersed with the wheatgrasses. Certain insects associated with the sagebrush are parasitic on the black grass bugs. This inter-relationship has been going on for thousands of years and we can upset this balance if we get too involved in our sagebrush eradication projects.

Another value of having a balanced amount of sagebrush in the community ties to total per acre biomass. Sagebrush has both a deep penetrating tap root as well as lateral surface roots. It is able to make better use of the water and nutrients in the soil profile than, for instance, grasses alone--which extract their water and nutrients from the upper 12-18 inches of the soil. In fact, it has been recently discovered, that understory herbaceous production is enhanced if a few sagebrush plants are included in the community composition. This increased production is tied to at least two factors: (1) the sagebrush roots extract nutrients from deep in the soil profile and recycle them to the surface through leaf/litter drop (Mack 1977). The understory species are able to make use of these "extra" nutrients and (2) Sagebrush crowns assist in keeping the winter snows-on-site where the moisture can be more evenly utilized (Sturges 1977). A few scattered sagebrush crowns provide microsites that ameliorate the surface temperatures both in winter and summer. If sagebrush is not too dense, the shade from their crowns is believed to benefit establishment of certain understory plant species such as Idaho fescue (Festuca idahoensis). These crowns also provide food and protective cover for many wildlife species and are especially critical for nesting and wintering sage grouse. Additionally, the crowns provide protection for many understory plant species by providing a barrier to total utilization by grazing animals. Some of our understory species would not have survived the critical grazing pressure at the turn of the century, had it not been for the mechanical protection offered by these shrub crowns.

As we gain a greater understanding of sagebrushes, in general, we also gain a greater appreciation for their presence on our western lands. Future efforts will be geared less to eradication of this plant group and more to keeping it in a balanced supply with its understory.

## Ecological Status:

Let me make a bold statement about the current ecological status of sagebrush grasslands. A statement that I perhaps could not back-up if I were asked for specific figures. But, one that has become readily observable as I have traveled throughout the sagebrush region with my eyes to the ground and my thoughts on sagebrush-grass ecology. Here it is.

"There are more acres of sagebrush-grass lands in the western United States being held in a low ecological status the past decade due to abnormally high sagebrush cover and density than currently is occurring due to livestock grazing."

Now let me explain. One of the remarkable developments we have made in our western grazing lands the past quarter century has been improved rangeland management. Many of us may not have a full appreciation for this since we were not around at the early part of this century to see the western grazing lands during this period of highest rangeland abuse. Much improvement has occurred since the 1930's-1950's. This we can be proud of! Unfortunately, on many acres of rangelands that continue to support an overstory of shrubby species, such as sagebrush, an equal magnitude of improvement has not occurred. During the period of extremely heavy grazing much of the understory species were decimated. This loss of the understory, fine-fuel component, along with fire suppression efforts essentially removed natural fire from the sagebrush-grass setting. These ecosystems, which have developed with an historical 10-40 year fire interval, were dependent on this periodic removal or thinning of sagebrush crowns to maintain their balanced understories. Now, with the understories depleted through grazing, and with the densely established sagebrush crowns competing in an excessive way with new herbaceous seedlings, we are in an almost stagnated setting. A setting with high sagebrush cover and a low cover of the understory species. There essentially is no way we can reestablish a native--or introduced--herbaceous cover without first removing some of the dense sagebrush canopy.

There are a number of instances where exclosures have been erected to allow us to measure vegetation recovery without the grazing impact. In settings where sagebrush densities and cover were high when the exclosures were constructed there has been essentially no increase in understory herbaceous cover--even after over 40 years of protection from grazing. Once sagebrush has become established in dense stands it can be an extremely strong competitor against reestablishment of grass and forb seedlings. Where crowns are dense sagebrush roots occupy all upper soil horizons and compete fiercely with the new herbaceous seedlings. Only when sagebrush crowns are spaced far enough between to allow "open" microsites, do we get successful recovery of the understory.

When are crowns of sagebrush considered dense? In order to answer this question one must consider the particular subspecies involved. Based on numerous observations and studies it appears Wyoming big sagebrush sites have cover values that normally range between 8 to at least 23 percent (Table 1). In my studies those areas with the least disturbance had cover values between 8-11 percent, while those with the highest grazing impacts exceeded 20 percent. Observations indicate there is very little competition between Wyoming big sagebrush and herbaceous species where crown cover is less than 12 percent. Production of understory species remains about the same, or shows a slight increase, where cover values are less than 12 percent. However, somewhere between 12-15 percent cover (depending on specific site features) understory production decreases as canopy cover increases. Many millions of acres of Wyoming big sagebrush presently have canopies above 20 percent and have depleted understories. These are the acres that will require some type of thinning or removal process in order to reestablish a balanced herbaceous component.

Table 1. Density and cover values for three subspecies of big sagebrush

|   | Subspecies                          |                                   |                                 |
|---|-------------------------------------|-----------------------------------|---------------------------------|
|   | <u>ARTRW</u><br><u>wyomingensis</u> | <u>ARTRT</u><br><u>tridentata</u> | <u>ARTRV</u><br><u>vaseyana</u> |
| Density <sup>1</sup><br>(plts/Ac)<br>mean range               | 4,700<br>2,600-12,000               | 5,700<br>3,000-8,300              | 17,000<br>5,100-67,000          |
| Cover <sup>1</sup><br>(line intercept-<br>%)<br>mean<br>range | 18<br>8-23                          | 24<br>19-30                       | 23<br>14-41                     |

<sup>1</sup> Density and cover of sagebrush are functions of subspecies, habitat type, and ecological condition. Data from A.H. Winward. 1970.

Mountain and basin big sagebrush sites in best condition have cover values between 15-20 percent. Those numerous sites that support cover values in the 30-40 percent category have a much restricted herbaceous production and are essentially closed to recruitment of new herbaceous seedlings. Some type of shrub removal process will be needed before understory forbs and grasses can regain their natural prominence in these communities.

If we are to reestablish a more natural ecological balance in the overstory/understory in most of our sagebrush ecosystems, we must begin a much greater effort at restoring some of the natural mosaic of sagebrush canopies that existed prior to European settlement of the west. Historical fires naturally burned spotty leaving islands and stringers unburned during any one fire. Those areas which did burn received various intensities of fire. The overall result was an ever-changing mosaic of different densities and ages of sagebrush crowns. In any specific geographic area, a mosaic of ecological settings existed ranging from open temporary prairie types where fires were most recent, to mature, relatively dense sagebrush stands where considerable time had elapsed since the last fire.

Recovery from a burn to a 20 percent canopy can range from 12 years in a mountain big sagebrush type to over 40 years in the drier Wyoming big sagebrush types. Most sagebrush stands now approach 60+ years in age indicating fire intervals have been lengthened to more than twice their natural occurrence.

## DISCUSSION

We currently are not beginning to keep pace with the natural increases in sagebrush cover and density. Our prescribed fire programs influence, at most, a few thousand acres each year and almost no mechanical nor chemical programs are being conducted. Natural disease out-breaks, frosts and flooding, along with wildfires remove sagebrush from a few more thousand acres each year. Yet, the acreages influenced yearly is only a minor component of the 96+ million acres classified as sagebrush grasslands. As a result many millions of acres are being maintained in a low ecological status due to presence of excessive sagebrush canopies.

An intensive prescribed fire program could help in the recovery of more natural sagebrush canopies. However, not all acres are suited to burning. Some sites are inherently dry and have such low fuels that fire was probably never very important in maintaining their herbaceous understories. Also on sites where fire tolerant shrubs, especially rabbitbrush, become excessively dominant after burning, prescribed fire may not be appropriate. Other approaches to thinning the sagebrush should be considered.

We must also recognize there are some settings where high sagebrush cover provides special, needed habitat for wildlife such as mule deer and sage grouse. These needs should be considered in any sagebrush management program. However, even in settings such as these it is desirable to have a high enough component of understory species that the overall watershed needs are served. To do this we will need to instigate a long-term program that will allow periodic, patterned removal or thinning of sagebrush. This apparently is the way it was before we became such a dominant modifier of the sagebrush-grass ecosystems. And, it is the way we will have to manage

these areas if we want to maintain all the uses and values that can be associated with sagebrush-grass rangelands.

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