

Management of Sagebrush

W.A. Laycock

Sagebrush is the dominant species in one of the largest range ecosystems in the western United States. The major species, big sagebrush (*Artemisia tridentata*), ranges through North and South Dakota, Nebraska, Colorado, New Mexico, and all states to the west. When other species of sagebrush are included, the range includes Oklahoma and Texas and goes far into Canada and Mexico. Total acreage estimates of the sagebrush ecosystem vary from 87 to 270 million acres, so, it is safe to say that it covers 100 million acres or more. Sagebrush generally occurs at elevations from 5,000 to 7,000 feet, but some species and subspecies grow at elevations as low as 3,000 feet; others grow up to 10,000 feet. Sagebrush grows in areas with as little as 8 or 9 inches of annual precipitation, but in some of the higher elevations, sagebrush grows in areas with as much as 25 inches of precipitation per year.

Sometimes the question is asked, "How widespread was the sagebrush type before European man came on the scene?" A leading expert on sagebrush, Alan A. Beetle, University of Wyoming, has said, "No evidence has been found of extensive changes in recent times of the distribution of the sagebrush type." Also, Thomas R. Vale, University of Wisconsin, after examining numerous journals and diaries of early explorers and travelers throughout the western United States, concluded that, "The early writings suggest a pristine vegetation visually dominated by shrubs."

Management Strategies

Rangelands offer tremendous opportunities to increase red meat production with a saving of fossil fuel energy. Sagebrush sites with deep soils and adequate rainfall can produce abundant forage for both livestock and game animals. Early observers used vigor of big sagebrush as an indicator of sites suitable for agriculture. Because of the extremely large acreage and large increases in livestock forage that are possible on the better sites, the sagebrush type has a greater potential for increasing red meat production than any other range vegetation type in the western United States. With proper planning, this increase can be achieved without diminishing the value of the sagebrush ecosystem for other uses.

Although the sagebrush ecosystem may appear to be uniform or monotonous, there is an abundant variety in species, subspecies, and growth form of sagebrush as well as the number and abundance of associated plant species.

Some of the reasons for adopting a particular management strategy for a specific piece of sagebrush land are:

- 1—to increase the amount, availability, season of growth, and nutritional quality of forage for domestic livestock.
- 2—to improve or diversify wildlife habitat and for aesthetics.
- 3—to increase watershed value by reducing erosion and improving water quality.
- 4—to maintain "natural" conditions in areas set aside for preserving representative vegetation types. Fire, natural or prescribed, may be used to maintain the "natural" condition.

The choice of a management strategy will vary considerably with the ownership of the land. On federal lands, agency regulations, policies, and procedures required will apply. Also, on federal land, environmental analyses are required by the National Environmental Policy Act. On privately owned lands, landowners can get advice from the Soil Conservation Service, the Extension Service, and private consultants, or they can make their own decisions based on personal knowledge and experience.

The first step in deciding on a particular management strategy is to classify the site, the plant community, or the habitat type to determine the productivity potential of the land under different management systems. Various classifications include the range site concept used by the Soil Conservation Service, habitat type, soil type, or any other vegetational community classification that is applicable. The question, "Was sagebrush natural to the site?" affects management decisions, because if sagebrush were a natural part of the plant community it will eventually return. The time for return will depend on the subspecies of sagebrush, the management of the area, and also on some poorly understood climatic factors that produce "sagebrush seedling years."

An accurate species identification is important because species react differently to treatments. For example, threetip sagebrush (*Artemisia tripartita*) and silver sagebrush (*A. cana*) often sprout after fire. Silver sagebrush is also fairly resistant to most herbicides. Black sage (*A. nova*) is valuable forage for sheep and big game and probably should be left untreated. Low sagebrush (*A. arbuscula*) may indicate a site with low productive potential.

Big sage subspecies differ in volatile oil content, palatability to livestock and big game, germination requirements, rate of recovery after treatment, growth rate, and response to herbaceous competition. All differences are important in the choice of a treatment or management strategy.

If native grasses or other desirable forage plants are abundant, seeding probably will not be necessary. The effect of the proposed treatment on other valuable shrub species such as bitterbrush (*Purshia tridentata*) must be considered. Horsebrush (*Tetradymia* spp.) and rabbitbrush (*Chrysothamnus* spp.), if abundant, rule out fire because they increase in abundance after burning. Spraying usually is not recommended on sheep ranges containing abundant desirable forbs because of the possible adverse effect.

The author is range scientist with Agricultural Research, Science and Education Administration, United States Department of Agriculture, Colorado State University, Fort Collins, Colorado 80523.

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Both the kind of livestock and season of use are important. On sheep winter range, an open stand of sagebrush is desirable for protection and emergency feed, while little or no sagebrush is desirable on cattle summer range.

Species and season of use are also important on big game ranges. On deer winter range, heavier stands of shrubs are desirable for emergency winter feed and cover and a mixture of shrubs is better than a pure stand of sagebrush. On deer spring or summer range, an open stand of sagebrush with a good understory of grass and other forage species is desirable. Areas seeded to grass interspersed with shrubs are highly desirable because they will attract the deer and take the pressure off native plants. Antelope prefer sagebrush in winter and, therefore, it is important on their winter ranges.

The habitat requirements of small birds differ with species, age classes, and season of use. Sagebrush control usually is considered undesirable for sage grouse but spring burning in Nevada created openings which stimulated meadows and furnished forbs and other species necessary as food for their chicks.

Recreation and aesthetics must be considered in assessment of present and future land use. Rock hounding, bird watching, and similar pursuits have little conflict with other uses. But off-road vehicle use and other similar activities are disruptive to livestock and game and destructive to range and watersheds.

Management Alternatives

Grazing can maintain existing vegetation or it can be used to manipulate amounts of sagebrush and composition of understory vegetation. Inadvertent manipulations caused by overgrazing have resulted in dense stands of sagebrush with little herbaceous understory in many areas. In southern Idaho, frequent fires coupled with improper grazing have converted vast sagebrush areas into an annual grassland dominated by cheatgrass brome (*Bromus tectorum*).

An open stand of sagebrush with a productive understory



U.S. Forest Service photo

Effects of season of grazing on the U.S. Sheep Experiment Station, Dubois, Ida. Poor condition on the left was caused by more than 40 years of heavy spring grazing. The range on the right is in good to excellent condition with an abundance of grasses and forbs as a result of heavy fall-only grazing during the same period.

requires grazing management to maintain that condition. The best system of management cannot be determined by any one formula because of the great variation within the sagebrush ecosystem, the kind of grazing animal, time of grazing, and many other factors. Spring and early summer use requires careful selection of grazing system and intensity because grasses and forbs are damaged the most when grazed during the growing season. Fall or winter grazing generally is less critical. Even the effects of cattle and sheep grazing are quite different.

Heavy fall grazing by sheep following rest during the spring has been shown to be an effective way to reduce the amount of sagebrush on both sheep and cattle ranges if the density of brush is not too great. Goats have been used to control other species of shrubs and might be useful in the sagebrush type.

Complete protection from grazing, at least on sites where sagebrush is a natural part of the vegetation, may be relatively ineffective in reducing the amount of sagebrush because of the long life and competitive ability of sagebrush.

On critical big game winter ranges, increased sagebrush density might be desirable. Heavy spring grazing by either sheep or cattle reduces the vigor and production of herbaceous species and results in an increase in sagebrush. However, use of sagebrush as the main source of winter feed for game may be questioned because the volatile oils in its leaves can hamper rumen activity and digestion. A dense stand of sagebrush often is considered to be good deer winter range by some people but a mixed stand of several shrub species is better.

Introduction of animals that can utilize sagebrush to produce meat or fiber is a management alternative that has received little attention. Possibilities include domestic goats and the large browsing game animals of Africa, such as the eland.

Ranges with a thick stand of sagebrush and little or no perennial herbaceous production in the understory generally cannot be improved with grazing management. The management alternatives then are reduction of shrub density or complete removal.

Fire was the major ecological density-controlling factor before settlement. Unfortunately, little is known about its use as a management tool. Research is needed to determine the effects of different seasons of burning on sagebrush and on other associated species.



U.S. Forest Service photo

Prescribed burning of a heavy stand of big sagebrush on the Duchesne Ranger District, Ashely National Forest in Utah.

After World War II herbicides became the standard tool for sagebrush control. The most effective is still 2,4 -D, which is relatively nonpersistent and environmentally acceptable. In spite of this, little spraying is currently being done on federal rangelands. Important factors in determining the success of a spraying operation are: form of the chemical; season of spraying; time of day; method of application; and rate of spraying. The effects of the herbicide on associated species should be carefully considered, especially on sheep or big game ranges where forbs are important. Careful timing of herbicide application can minimize the effect on desirable forbs.

Mechanical eradication methods, including railing, chaining, rotobating, disking, and plowing, have been widely used for removing sagebrush. Time of the control operations is important. If mechanical methods are used after the seed has been set in the fall, it may insure a good crop of sagebrush seedlings the next year. On good sites with deep nonrocky soils, mechanical eradication, seedbed preparation, and drilling may be the best way to proceed.

Biological control of sagebrush occurs naturally in some instances but has not been used as a management tool. Voles (*Microtus* spp.) sometimes girdle and kill sagebrush during peaks in their population cycle. The Aroga moth (*Aroga websteri*) has destroyed fairly large stands in some areas. Whether these or other biological controls such as other insects and diseases can be used for reduction under controlled conditions is not known.

Seeding after Control

The decision to seed or not to seed after sagebrush reduction or control is a major one. If palatable grasses and other forage species are already abundant and are not damaged by the control method, seeding is probably not necessary unless the goal is spring forage growth earlier than that of the native plants. Seeding can increase forage production considerably.



U.S. Forest Service photo

Cattle on a high-elevation big sagebrush site that has been plowed and seeded to crested wheatgrass and smooth brome. Total grass production was about 400-500 pounds per acre before seeding and 1,200-1,500 pounds per acre after seeding.

Considerations for seeding are as follows:

Choice of species. Species chosen must fit the site, climate, and potential use.

- (a) Native versus introduced. This decision will depend on the availability of seed; ease of establishment; price; production potential; longevity, palatability, grazing resistance, and season of growth.
- (b) Single species or mixture. Monocultures of some wheat-grasses and other species have led to troubles with insects such as black grass bugs in some areas. However, species mixtures can also cause problems because of differential palatability. This can lead to elimination of all but one or a few species after a few years, and the extra cost and the advantages of a mixture are lost. Other things to consider are whether there should be shrubs in the mixture for livestock, wildlife, or aesthetics. Sagebrush sometimes is planted but it can cause problems later. Even on wildlife ranges, shrubs other than sagebrush may be more desirable to plant because of the potential for sagebrush to dominate the site and to cause digestive problems for ruminants. Forbs, especially legumes, may be included in the mixture for variety in species composition and in nitrogen fixation.

Methods of seeding. Seeds must be covered in order to get a good stand of seeded grass. Broadcasting in ashes or ahead of railing or chaining operation covers the seed and can be successful. However, it is generally best to prepare a seedbed and drill the seed rather than broadcast.

Other factors. Time of seeding, rate, depth, and row spacing will depend upon the species being planted and the area. **Control of pests.** Rabbits, pocket gophers, prairie dogs, insects, and other pests can destroy a seeding and sometimes must be controlled.

Follow-up control. It is sometimes necessary to reduce other undesirable plants or to prevent sagebrush from becoming too thick again. The methods used for follow-up control might be different than those used initially. For example, if a piece of land is plowed and seeded and sagebrush comes back, a light fire can rid the area of the small plants.

Fertilizer. Fertilizer can increase production but the economics must be carefully considered. One aspect of fertilizer that needs further investigation is its value in delaying sagebrush reinvasion.

Size of seeded area. The area seeded must be manageable unit but excessively large seeded areas can be detrimental to wildlife and other values. Juxtaposition of cleared and undisturbed areas can be advantageous to wildlife.

Grazing management. Nonuse immediately following control and seeding is essential to allow the seeded stand to become established. Proper management is then essential to prevent or at least slow down reinvasion of sagebrush. However, a grazing management system that works quite well before sagebrush seedlings become reestablished might not be the best system to use after they are established. With cattle, any rest rotation or similar system that puts heavy pressure on herbaceous plants, even 1 year out of 3 or 4, will tend to favor the sagebrush because cattle eat very little of it. A combination of cattle and sheep or occasional heavy grazing by sheep in the fall or winter can be used to keep density and vigor low.

Watershed Considerations

Because much of the sagebrush ecosystem occurs in a fairly low rainfall zone, the effect of management strategies on run-off and erosion usually are considered but the effects on water yield often are ignored. Snow is a major supplier of moisture in the

sagebrush type and treatment may affect snow accumulation, distribution and melt. The amount and timing of snowfall, the wind direction and speed in winter, and the drifting potential for increased water if patterns of sagebrush are left must be considered. In some locations, large areas with no shrubs may be scoured clean of snow and actually reduce the water on site for plant growth.

Economic Implications

For any sagebrush control management strategy, the major

economic implications are the length of control, and the value of the increased food production versus the cost. The amount of increased forage depends on the site, precipitation, and other factors. Up to ten-fold increases in grass production have been reported on plowed and seeded sagebrush land. Alternative methods such as grazing management must be examined against expensive mechanical or chemical treatments. Any available cost sharing practices should be taken into account by the landowner before deciding on any particular management strategy. ●

Legislative Log

The first session of the 96th U.S. Congress, reconvened Labor Day week after an August recess. They are reported to have plenty of hard work ahead for the fall months. The major problems as of September 14, include hospital costs, synfuels windfall profits, Panama, SALT, Alaska Lands, the defense budget and issues such as draft registration and new weapons systems, policy on federal funds for abortion, and the energy

issue. Many observers believe that many issues will not be fully considered due to lack of time. There are approximately 50 working days left from September convenement to an October adjournment.

Some of the more important natural resource bills and issues follow.

| Proposed Bill | Description of Bill | Status as of September 14, 1979 |
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| H.R. 2551 Jeffords (Vermont) | Bill would protect farmland from development. | The House held a lengthy hearing on May 17 by the Agriculture Sub-committee on Family Farms Rural Development and Special Studies. |
| S795 Senator Magnuson (Wash- ington) | The four titles in the proposed bill would (1) Declare federal policy, in cooperation with the states and local jurisdictions to promote farmland retention. (2) Authorize a study committee for 3 years to study factors on continued availability and quality of farmland. (3) Establish a cost sharing approach (4) Establish funding authorizations. | The Senate Sub-committee on Environment, Soil Conservation, and Forestry of the Committee on Agriculture, Nutrition, and Forestry held a hearing on July 10. Wide support was received. The major difference in H.R. 2551 and S795 is in more limited financial assistance to states and local governments under S795. Field hearings are planned. Several national farm and conservation organizations appeared in support of the bills both on the House and Senate side. The National Cattlemen's association opposes both bills. The administration at the July 10 hearing urged the committee to defer legislation until a lands study is completed. |
| Udall-Anderson substitute for HR-39 S-9 Senators Jackson (Washing- ton and Durkin, (New Hampshire) | Described as Alaska Lands Bill. This bill as amended provides protection for over 120 million acres of some of the most valuable wildlife habitat and spectacular scenic areas in the state, while allowing for considerable commodity development. | The House passed this complex bill on May 16 by a vote of 360 to 65. In a joint letter on July 25 Chairman Henry Jackson, of the Energy and Natural Resources Committee and Minority leader of the committee Senator Mark Hatfield (Oregon) informed Senators that the committee's consideration of Alaska lands legislation would be delayed until after the August recess. Considering the busy schedules of the Senate Energy and Natural Resources Committee and the full Senate, consideration of the Alaska lands legislation on the Senate floor by the end of this session is uncertain. |
| S-1680 Senator Hatch cosponsored Senators Gold- water, Ariz., Cannon Nev., | Cited as Western Lands Distribution Act of 1979. A bill to provide for the cession and conveyance of federally owned, unreserved unappropriated lands and to establish policy, methods, procedures, schedules, and criteria for such transfers. In introductory remarks, Senator Hatch said the bill is | Bill was introduced on August 3 and referred to the Senate Committee on Energy and Natural Resources. Formal hearings have not been announced as of this date. |