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BIG SAGEBRUSH SUBSPECIES and Management Implications

Harmon S. Hodgkinson

Each sagebrush species and subspecies has a unique place in our plant communities. Management alternatives chosen for sagebrush sites depend on the species and the desired goals or objectives of the user. Before management is applied, the livestock, wildlife, watershed, aesthetic, and recreation values must be considered and evaluated. For land users and managers to make the proper management decisions (like whether to control brush or not) for big sagebrush plant communities, proper identification is essential. The lack of information and a need to identify the distribution of Wyoming, mountain, and basin big sagebrush subspecies in Arizona prompted this study.

Both Wyoming and mountain big sagebrush have good wildlife-livestock forage value, especially for deer, antelope, and sheep. Where the density of these species has increased in excess of the site's potential, control measures should be considered with wildlife and livestock needs in mind. Many control measures can be applied with success. Burning, chemical and mechanical methods are practical on the moderately deep to deep soils. Where grasses and forbs are lacking, seeding of adapted species following the control measures will be needed. After treatment, deferment, intensity and season of use will extend the treatment life. The shrubs should not be controlled on the shallow soils.

Basin big sagebrush has a low wildlife and livestock forage value, except for some shelter in winter months. Because of the few isolated locations of this subspecies and its relationship to drainages, no control measures should be applied. The chance of increasing erosion of the washes' sides would be great.

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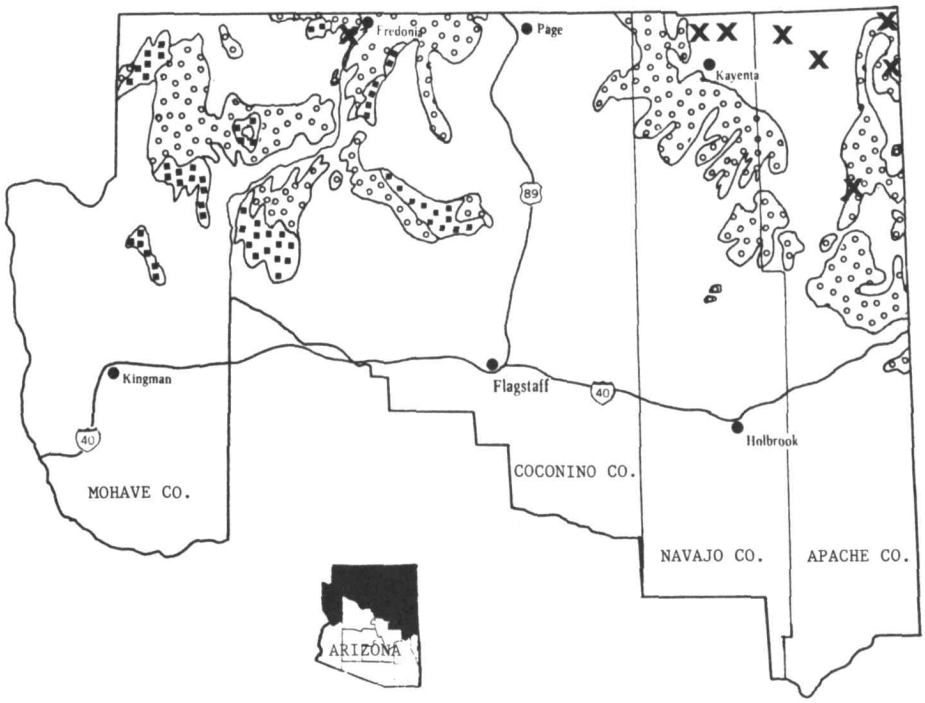
Northern Arizona, where big sagebrush species occur, has a semiarid climate and is in the Colorado Plateau physiographic province. Average annual precipitation ranges from 8 to 17 inches, with 60% occuring in the fall, winter, and spring months. Elevations range from 4,500 to 7,600 feet. The soils have a mesic soil temperature regime and a Ustic Aridic to Typic Ustic moisture regime (Hendricks 1985).

Northern Arizona was traversed by using roads to obtain the boundaries of each subspecies. Topographic maps with a scale of 1:250,000 were used. At 195 locations, plant height, leaf shape, growth form, soil surface texture, associated species, elevation, and precipitation were recorded. Although morphological characteristics were used to identify each subspecies, a sample was gathered at each location so that the chemical method as described by Winward and Tisdale (1969) could be used to confirm identification for each subspecies.

After summarizing all data, a distribution map of the three subspecies was developed.

Wyoming big sagebrush was the most abundant subspecies, occurring on mesas, undulating plateaus and high alluvial terraces. Of the 136 samples taken, 85% were on moderately deep to deep, well-drained soils with textures of sandy loam, loam, and sandy clay loam. The remaining 15% were on shallow soils with textures of very gravelly loam, loam, and clay loam. Wyoming big sagebrush was associated with pinyon pine-Utah juniper woodlands at elevations of 5,000 to 7,600 feet with an average of 6,300 feet. Annual precipitation averaged 13



Distribution of big sagebrush subspecies in Arizona.

inches. It was the dominant plant in the "sagebrush parks" and a major understory species of the pinyon-juniper woodland communities. The shrub's growth form is with uneven topped flowering stalks arising throughout the crown. Shrub height averaged 33 inches. The leaf shape is narrowly cuneate. The major associated species in order of dominance were blue grama, bottlebrush squirreltail, broom snakeweed, pinyon pine, Utah juniper, Indian ricegrass, muttongrass, and Greene rabbitbrush.

Mountain big sagebrush occurred in the zone between the upper end of the pinyon pine-Utah juniper woodlands and the low end of ponderosa pine forests at elevations of 4,500 to 7,400 feet with an average of 6,160 feet. Annual precipitation averaged 16 inches. The shrubs have a growth form where the flowering stalks are even topped and arising from the upper crown and extending above the foliage. Shrub height averaged 32 inches. The leaf shape is broadly cuneate. It preferred moderately deep to deep, well-drained soils with textures of clay loam and sandy clay loam on undulating plateaus and low stream terraces. When it occurred under pinyon-juniper or ponderosa pine, the soils were shallow with clay loam and loam textures on hillslopes, summits, and shoulders of undulating plateaus. Of the 51 samples taken, 70% were associated with the deeper soils on low stream terraces. Major associated species were blue grama, bottlebrush squirreltail, western wheatgrass, muttongrass, broom snakeweed, Stansbury cliffrose, Fremont barberry, pinyon, Utah juniper, ponderosa pine, and Gambel oak.

Basin big sagebrush was encountered in only eight small isolated locations. It occurred on deep, well-drained stratified sandy loam soils on flood plains or on low stream terraces at elevations of 4,800 to 5,800 feet. Precipitation averaged 10 inches. In northern Arizona, these soils and landscape positions are usually dominated by fourwing saltbush. In areas where soil salts are high, black greasewood or mound saltbush is the dominant shrub. Basin big sagebrush is the tallest of the three subspecies. The shrub height averaged 57 inches. The shrubs have a growth form characterized by uneven topped flowering stalks arising throughout the crown. The leaf shape is narrowly lancelolate. Associated species were cheatgrass, broom snakeweed, rubber rabbitbrush, and numerous annual herbaceous forbs.

Management alternatives for this big sagebrush subspecies should have the objectives of erosion control, improving the soil-vegetation relationships, providing a grazing resource for wildlife and livestock while maintaining positive values for watershed and recreation uses.

Land management agencies in Arizona have detailed guidelines to aid landusers plan and apply good range

management to the big sagebrush plant communities. Bringing the shrub-grass ratio closer towards the potential plant community concept will allow use of the big sagebrush sites while improving soil stability and watershed protection.

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Psy"cow"logy— an 'Art' in Range Management

Charles M. Quimby

Without question, the major challenge facing range managers today involves the conflicts and opportunities inherent in managing our riparian areas. Numerous articles, endless speeches, and interminable discussions have informed us that many of our riparian zones are in a less than desirable condition. However, there are far fewer sources of information available to assist the on-the-ground manager in analyzing and correcting or even in defining the "Problems." Relatively little research is available concerning the effects of various grazing systems, fencing schemes, other structural improvements, nonstructural improvements, or operator management on the condition and trend of riparian areas.

In addition, the manager is also faced with the problem of being unable to properly identify and measure the riparian plant community. Frequently, the riparian communities have not been studied in enough detail to allow the development of a suitable classification system. If the manager cannot define the community in terms of what currently exists in relation to what can potentially exist, it is almost impossible to determine what "condition" the area is in. The same situation makes it equally difficult to determine the trend with any degree of accuracy.

The resource manager is faced with a demand to improve a resource that he cannot define, to an "acceptable" condition that he cannot measure, using methods that have little scientific backing, while remaining cost effective and politically sensitive. But then if the job was easy, everyone would want to do it.

It is obvious that the riparian problem is highly complex and there is no simple answer (and probably not even a single complex answer). As things now stand, each land manager is operating under conditions where reliable information is scarce. He must try to devise new ideas and methods based on what little information is available, combined with whatever his imagination can dream up. The manager will need to try to devise grazing systems or management practices that meet the physiological needs of the riparian ecosystems. In order to achieve this objective, he will need to continue to be innovative in the application of existing grazing systems and management techniques. But in addition to modifying known techniques, perhaps we need to go beyond the normal bounds of the **science** of range management and into the **Art** of range management.

One possible example of an "Art" that could be explored further would be an increased application of the knowledge of inherited and learned characteristics. This would involve use of the existing knowledge in the field of animal genetics and breeding as well as the essentially undeveloped field dealing with how animals learn and pass on these learned characteristics.

While much work has been done in the area of genetic improvement of livestock for the purposes of increasing production, relatively little has been done in the way of developing traits that are useful in better matching the animal to its environment. There are some specific examples where breeding has provided livestock that are more in tune with the environment. An example is the use of Brahman breeds in the Southwest to improve the ability of the animals to withstand the hot dry conditions. A side benefit has been an improved ability of the crossbred stock to cover the rough broken country better than could purebred English or European stock. There are other examples of similar genetic improvement from other portions of the country too. Usually, these improvements have been based on improving the productive ability of the animals. Any improvement in the ability to better utilize the range has usually been simply a positive side benefit.

Very little has been done in the area of understanding and using learned traits to improve management. Although livestock operators have long understood that a calf will frequently show behavior characteristics similar to those shown by the mother, this information has not been put to use. For example, livestock operators have known that certain cattle tend to become "located" in certain areas within a given pasture. By "located", this