

# Assessing Big Sagebrush at Multiple Spatial Scales:

An Example in Southeast Oregon

Technical Note 417  
August 2005



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BLM

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**August 2005**

ASSESSING BIG SAGEBRUSH AT MULTIPLE SPATIAL SCALES: AN EXAMPLE IN SOUTHEAST OREGON





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# Abstract

This technical note describes how big sagebrush habitats (*Artemisia tridentata*, including Wyoming, basin, and mountain subspecies) are being assessed and managed at multiple spatial scales within a Bureau of Land Management resource area in southeast Oregon. It shows how the assessment results can be used to make determinations pertaining to standards and guidelines for greater sage-grouse and other animals that use sagebrush habitats. In this example, the assessment included information at the broad-scale (Interior Columbia Basin Ecosystem Management Project; 145 million acres), mid-scale (Southeast Oregon Resource Management Plan-Final Environmental Impact Statement; 4.6 million acres, and Louse Canyon Geographic Management Area; 0.52 million acres), fine-scale (pasture; less than 2,000 to 88,000 acres), and site- or local-scale (ecological site; variable in size but typically smaller than

pasture) levels. The scales are interrelated and played equally important roles in building management objectives. Big sagebrush canopy cover structural classes were created, which were the basic building blocks of the sagebrush objectives and which addressed spatial patterning of habitat structure, connectivity, and fragmentation, as well as the cumulative effects of disturbance from fires and land treatments. Findings from the Interior Columbia Basin Ecosystem Management Project and more local information from the Jordan Resource Area of BLM's Vale District were used to guide development of mid-scale big sagebrush habitat objectives. This example provides other BLM field offices in the sagebrush biome with ideas for how they might develop their own multiple-scale big sagebrush assessment to achieve land use plan objectives and rangeland health standards.





# Introduction

Big sagebrush and associated understory herbaceous species are relatively intact in some portions of their range on public lands administered by the Bureau of Land Management (BLM), yet at the broad spatial scale across the entire range of big sagebrush, there has been a notable decline in their spatial extent. The Interior Columbia Basin Ecosystem Management Project (ICBEMP) found that the spatial extent of big sagebrush had declined substantially from the mid-1800s to the 1990s within the Columbia Basin and north-west portion of the Great Basin. The decline is attributable primarily to the conversion of areas with sagebrush to agricultural lands and the transition to woodlands and forests (Hann et al. 1997). At a finer spatial scale, in the Great Basin portion of the ICBEMP in southeast Oregon, the decline in big sagebrush is attributable primarily to wildfires, seedings of introduced perennial grasses, and brush control treatments.

Sagebrush-obligate species such as sage-grouse are being adversely affected by the decline in acreage of sagebrush, by fragmentation in some areas of existing sagebrush, and by the decline in structural complexity (increasing homogeneity of structure) of existing sagebrush. As a result of these and other factors, seven petitions (as of early December 2003; K. Kritz pers. comm. 2003) have been submitted to the U.S. Fish and Wildlife Service to include the sage-grouse on the Federal endangered species list.

The BLM manages more acreage with big sagebrush than any other agency (Knick et al. 2003) and is increasingly considered the foremost land management agency in regard to conservation and restoration of big sagebrush communities. The BLM faces a challenge in assessing sagebrush habitat because the risk factors for sagebrush-obligate species operate across different spatial scales and the habitat needs of some species such as sage-grouse encompass multiple spatial scales, so an assessment at any single spatial scale does not fully characterize habitat conditions. Consequently, the BLM is looking for innovative ways to assess big sagebrush that will provide the best habitat characterization and result in the most effective management decisions.

The BLM has developed and continues to develop broad-scale assessments, such as in the Interior Columbia Basin (Wisdom et al. 2000) and the Great Basin (Wisdom et al. 2003). Broad-scale information provides a valuable context for planning and managing the public land. However, because land use plans are the mechanism by which BLM makes legally binding decisions about natural resource management, and such decisions in turn require National Environmental Policy Act (NEPA) processes that involve the public at the local level, broad-scale findings cannot and do not replace local BLM decisions. A bridge between natural resource assessments and decisions regarding public land must first be established.

The BLM has also developed Standards for Rangeland Health (originating with 43 CFR subpart 4180, published in 1995). The degree of achievement toward these Standards is typically evaluated using fine-scale (for example, pasture) to site-scale (local, for example, range site or ecological site) assessments, yet it is reported at the allotment level. Although each BLM state has at least one Standard that addresses native plants or native plant communities, which would encompass sagebrush, BLM has struggled to develop ways to assess sagebrush for these Standards. Some of the struggle is related to the lack of measurable indicators associated with these Standards that are focused on spatial patterns of sagebrush across the landscape and the structural complexity of sagebrush.

To build the bridge between assessments and management decisions and to address spatial patterns and structural complexity, the BLM developed a multiple-scale approach to assessment and management for the Proposed Southeastern Oregon Resource Management Plan (SEORMP) and Final Environmental Impact Statement (EIS) (USDI, BLM 2001). The multiple-scale assessment approach is relatively new in the BLM, but in its Strategic Plan for fiscal years 2000-2005 (USDI, BLM 2000) the agency states its commitment to a comprehensive resource assessment strategy that integrates assessment needs over multiple scales. While past assessments



were focused on the local level and provided information needed to take local actions on specific land areas, BLM's experiences with the Northwest Forest Plan and ICBEMP emphasize that not all issues are local only—there are issues that transcend specific local land areas and demand a broader spatial assessment.

This Technical Note describes an example of a multiple spatial scale assessment process that is applicable to rangelands having the potential to support big sagebrush (*Artemisia tridentata*; which includes Wyoming, basin, and mountain subspecies). The sagebrush assessment process integrates broad-, mid-, and fine-scale management objectives for sagebrush communities to achieve conservation of wildlife species that rely wholly or partially on sagebrush and associated understory plant species for their habitat needs. The sagebrush assessment process is appropriate for public land within Malheur County, Oregon, in the BLM's Vale District. Rangeland health assessments, which evaluate achievement of BLM's Standards for Rangeland Health, are the backdrop within which this sagebrush assessment process operates. The rangeland health assessment

findings tie directly to habitat criteria and prescriptions disclosed and analyzed in the SEORMP and EIS. The SEORMP habitat criteria discussed herein are a refinement and interpretation of the Oregon and Washington Standards for Rangeland Health and Guidelines for Grazing Management. The most important dimension this process offers is the introduction of desired spatial patterns and proportions of grasslands and shrublands for meeting the intent of Standard 5 for Oregon and Washington.

The long-term intent of this sagebrush assessment process is to attain patterns of plant species composition and structure across the landscape that: 1) substantially achieve the Western Association of Fish and Wildlife Agency (WAFWA) guidelines for sage-grouse (Connelly et al. 2000), and 2) support multiple species of wildlife that rely on sagebrush and associated understory plant species as habitat, consistent with the direction provided in BLM's Strategic Plan for fiscal years 2000-2005 (USDI, BLM 2000) and BLM's Standards for Rangeland Health, which both focus on restoration and conservation of multiple species of plants and animals.



# Assessment Process

## Define Assessment Scales

The multiple spatial scales included in this sagebrush assessment are shown in Table 1. Going from top to bottom, each scale level provides a greater degree of detail on sagebrush characteristics and sagebrush objectives. The assessment is organized sequentially, showing how each level relates to the levels above and below it.

The mid-scale assessment units used in BLM’s Vale District are combinations of grazing allotments—referred to as geographic management areas (GMAs). It has been argued compellingly that assessment units should have boundaries on the ground that are biologically and physically based, such as ecoregions (Bailey 2002). However, ecoregions have limited correlation with BLM grazing unit boundaries, which at the pasture level are where livestock grazing adjustments and project-level treatments occur. As such, pastures and GMAs are incorporated into BLM wildlife management objectives for purely practical and administrative reasons. These administrative boundaries and the existing vegetation conditions within them can be considered randomly sized and shaped puzzle pieces that join to complete a landscape.

## Create Canopy Cover Classes

The sagebrush assessment hinges primarily on the spatial extent and patterning of five canopy cover classes, each having either a grassland

aspect or a shrubland aspect. Classes are determined solely on the basis of shrub canopy closure, which represents structural complexity not found in traditional range surveys. Minimum allowable levels of shrubland spatial extent are described at the pasture, GMA, and Resource Area/SEORMP scales, illustrating how linkages are formed among the differing scales and how they eventually relate to one another across the landscape. Understory herbaceous vegetation is eventually incorporated into an evaluation through the use of range survey data. Descriptions and representative photographs of the canopy cover classes are introduced later in this section.

Even though more detailed groupings of habitat have been developed, these general groupings were used for this assessment because simple representations of how rangelands can appear helped facilitate discussions with stakeholders and interested publics about basic wildlife needs. In this case, there was value in simply explaining that as BLM endeavors to manage for wildlife communities over a large area, the proportion and arrangement of grassland and shrubland have an influence on wildlife community diversity.

When applied at the pasture level, these canopy cover classes can be summarized and subsequently aggregated to the GMA level and higher for broad characterization of the degree of habitat connectivity, fragmentation, and quality. Pasture-level evaluations in the SEORMP use the proportion of grasslands and shrublands as part

**Table 1. Spatial scales included in the sagebrush assessment and the approximate area covered at each scale.**

General Spatial Scale Levels	Scale Definitions Used in Example	Approximate Area Covered (Acres)
Broad-Scale	ICBEMP	145 million
Mid-Scale	SEORMP-FEIS Louse Canyon GMA	4.6 million 0.52 million
Fine-Scale	Pasture	Less than 2,000 to 88,000
Site- or Local-Scale	Ecological Site	Variable, yet typically smaller than pasture



of the resource criteria for determining conformance with BLM Rangeland Health Standards. This example does not include woodlands because woodlands were not present in the evaluated areas. However, examples are provided at the site (local) scale of western juniper woodlands, which can be present on lands in southeast Oregon that have the potential to support big sagebrush. If they are present, their spatial extent and patterning would need to be considered as well.

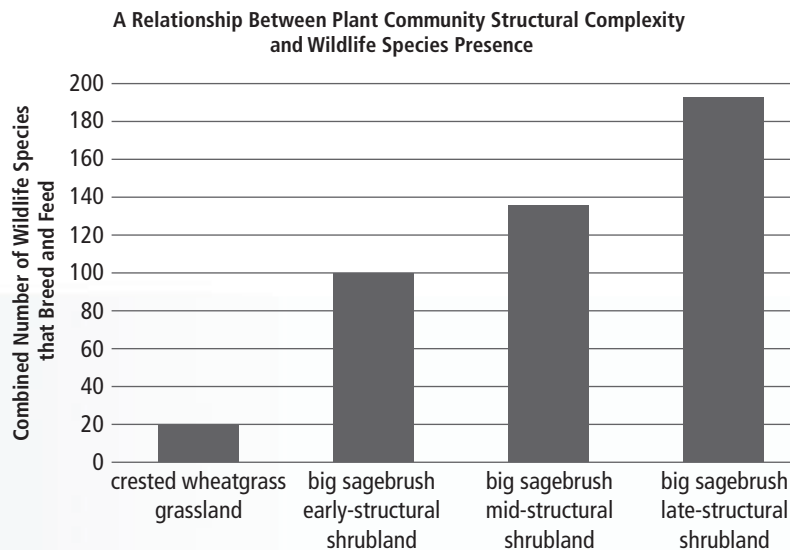
The fundamental basis for the multispecies objectives, expected management outcomes, and environmental analyses in the SEORMP originates with Maser et al. (1984), who indicate that as structural complexity of habitat increases, the number of wildlife species that breed and feed increases. Figure 1 shows two important wildlife habitat structural relationships that are fundamental drivers of SEORMP management: 1) grasslands support fewer species of wildlife than shrublands, and 2) early-structural status sagebrush communities support fewer species of wildlife than mid- and late-structural status sagebrush communities. Maser et al. (1984) did not apply metrics to define early-, mid-, and late-structural shrub characteristics (Ralph Anderson 2002, pers. comm.), meaning they did not specify exactly how tall a shrub should be or how much volume a shrub should occupy in order for it to be considered mature. However, their intent was to distinguish between young

shrubs observed shortly after shrub recolonization occurred (early) with old shrub communities (mature) that have been undisturbed by fire or other biological impacts.

In this example, sagebrush canopy cover was estimated with the line intercept method (USD, BLM 1996). A 2-inch gap was used for sagebrush canopy cover, meaning that gaps had to be 2 inches wide or greater and given no value for canopy cover to be considered a gap. Canopy cover is greater than foliar cover and foliar cover was not measured.

### Class 1: No Sagebrush Canopy Cover (Grassland)

Rangelands that exhibit a grassland aspect are characteristic of this class. Species that tend to occupy habitats with low vegetative structure, such as pronghorn and horned lark, use these rangelands. Forage and invertebrate food sources can be abundant, even for species that rely primarily on sagebrush cover for nesting and hiding. Several different vegetation types can comprise class 1 rangelands (Figures 2-4), and these various vegetation types can actually meet a portion of the habitat requirements of wildlife species that rely primarily on sagebrush. Native or nonnative class 1 rangelands can be a wildlife issue of concern if they occupy extensive tracts of land within a GMA. Depending on ecological site potential and past and present use, grass and forb cover can be highly variable. Locations where



**Figure 1.** Increasing structural complexity of big sagebrush shrublands compared with crested wheatgrass grassland shows an increase in the number of wildlife species that breed and feed for selected vegetation types in southeast Oregon. Some species were counted twice (once for breeding and once for feeding). Adapted from Maser et al. (1984).



**Figure 2.** An example of class 1, early-seral vegetation dominated by introduced annual grasses and forbs such as cheatgrass, medusahead, and tumbled mustard.

Photo taken by Jon Sadowski.



**Figure 3.** An example of class 1, vegetation dominated by Fairway crested wheatgrass.

Photo taken by Jon Sadowski.



**Figure 4.** An example of class 1, late-seral vegetation dominated by native grasses and forbs. Photo was taken where wildfire occurred prior to the 1980s.

Photo taken by Jon Sadowski.



fire and, in some cases, other disturbances have occurred recently are indicative of class 1 rangelands in eastern Oregon. It is common to observe class 1 rangelands that support a heterogeneous mix of annual and perennial species.

### **Class 2: Trace to 5 Percent Sagebrush Canopy Cover (Grassland)**

Rangelands that exhibit a predominantly grassland aspect are characteristic of this class (Figure 5). Relatively recent fire or other treatments, with ongoing sagebrush recolonization, are normally indicative of class 2 rangelands. Wildlife species often associated with low vegetative structure, such as pronghorn and

horned lark, use these rangelands. Class 2 rangelands do not meet most of the complex shrub cover needs of sage-grouse and other wildlife species that rely primarily on sagebrush. Klebenow (1970) reported that sage-grouse nesting was nearly nonexistent where sagebrush canopy cover on chemically treated areas was 5 percent or less. However, the vegetation of class 2 rangelands can still meet a portion of the habitat needs of these wildlife species. Native or nonnative class 2 rangelands can be a wildlife issue of concern if they dominate extensive tracts of land within a GMA. Depending on ecological site potential and past and present use, grass and forb cover and composition can be highly variable.



**Figure 5.** An example of class 2, dominated by Wyoming big sagebrush, crested wheatgrass, and Sandberg bluegrass.

Photo taken by Jon Sadowski.

### **Class 3: Greater than 5 Percent to 15 Percent Sagebrush Canopy Cover (Shrubland)**

Rangelands that exhibit a predominantly shrubland aspect are characteristic of this class (Figure 6). The 10 to 15 percent sagebrush canopy cover range is capable of supporting many of the habitat needs of wildlife species that rely primarily on sagebrush and associated understory herbaceous species. Connelly et al. (2000) reported that sage-grouse in Oregon and Idaho select winter habitat with sagebrush canopy cover as low as 12 to 15 percent, generally measured above snow level. Hanf et al. (1994) reported that winter habitat selected by female sage-grouse in central Oregon was dominated by mountain big sagebrush and low

sagebrush, with canopy cover ranging from 12 to 16 percent. In addition, unpublished surveys from BLM's Vale District suggested that sagebrush-obligate songbirds began to reoccupy crested wheatgrass seedings when the sagebrush canopy cover exceeded 5 percent. In Nevada, crested wheatgrass seedings with sagebrush canopy cover of about 10 percent provided structural complexity sufficient to sustain a greater diversity of grassland-nesting and shrubland-nesting nongame birds than unconverted sagebrush, monocultural crested wheatgrass, or crested wheatgrass in poor condition (McAdoo et al. 1989). Depending on ecological site potential and past and present use, grass and forb cover can be highly variable.





**Figure 6.** An example of class 3, potential natural community vegetation dominated by sagebrush and native grasses and forbs. Photo was taken on a north slope and depicts a mature sagebrush canopy, which offers abundant cover and structure important to wildlife that occupy sagebrush habitat.

Photo taken by Jon Sadowski.

**Class 4: Greater than 15 Percent to 25 Percent Sagebrush Canopy Cover (Shrubland)**

Rangelands that exhibit a shrubland aspect are characteristic of this class (Figure 7). This class is capable of supporting the habitat needs of a variety of wildlife species that rely primarily on sagebrush and associated understory herbaceous

species. Hanf et al. (1994) and Connelly et al. (2000) reported that sage-grouse nesting habitat needs and winter habitat needs can be served by sagebrush canopy cover within the 15 to 25 percent range. Depending on ecological site potential and past and present use, grass and forb cover can be highly variable.



**Figure 7.** An example of class 4, mid-seral vegetation dominated by Wyoming big sagebrush. Photo depicts relatively low-stature Wyoming big sagebrush on a xeric site (8- to 10-inch precipitation zone).

Photo taken by Jon Sadowski.

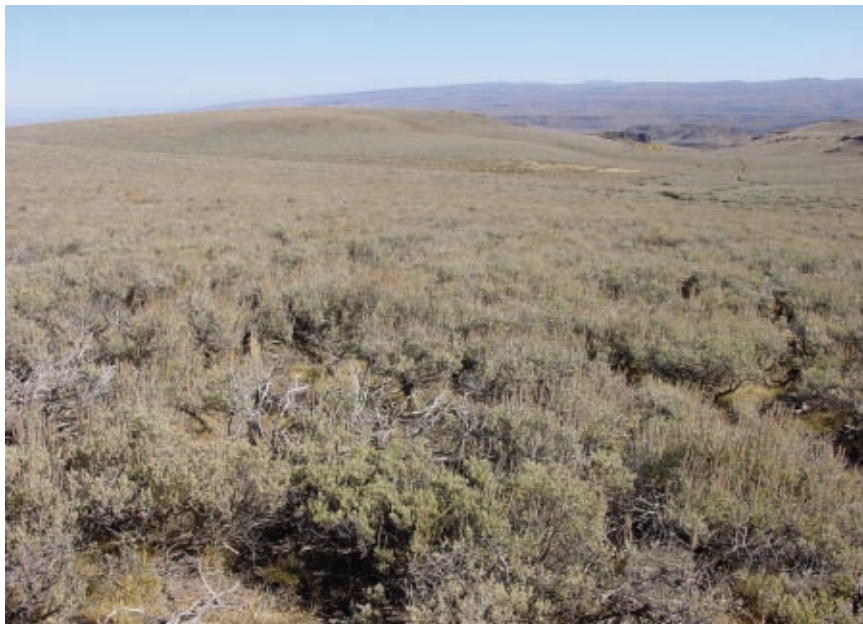


### Class 5: Greater than 25 Percent Sagebrush Canopy Cover (Shrubland)

Rangelands that exhibit a shrubland aspect are characteristic of this class (Figure 8). Sagebrush canopy cover greater than 25 percent can provide security, cover, and food for wildlife species. Research conducted on Steens Mountain in eastern Oregon by Sheehy (1978) demonstrated the value of this class of cover for fawning mule deer. Pygmy rabbits are often associated with canopy cover of 25 percent or more. This level of canopy cover hides the rabbits and provides them with their primary source of food (Weiss and Verts 1984). Connelly et al. (2000) reported nesting use by sage-grouse

in class 5 habitats. Depending on ecological site potential and past and present use, grass and forb cover can be highly variable.

Use of these canopy cover classes is integral to the sagebrush assessment process and will be discussed frequently in this example. The geographic extent of these canopy cover classes at the pasture level forms the basis for: 1) characterizing habitat conditions at the pasture level and at the GMA level, and 2) ascertaining achievement or nonachievement of Oregon's Standard 5 for Rangeland Health, when combined with understory herbaceous species composition data from range surveys.



**Figure 8.** An example of class 5, mid-seral vegetation with shrub cover dominated by mountain big sagebrush and with perennial forbs and grasses present in the understory.

Photo taken by Jon Sadowski.

## Make Mid-Scale Assessments

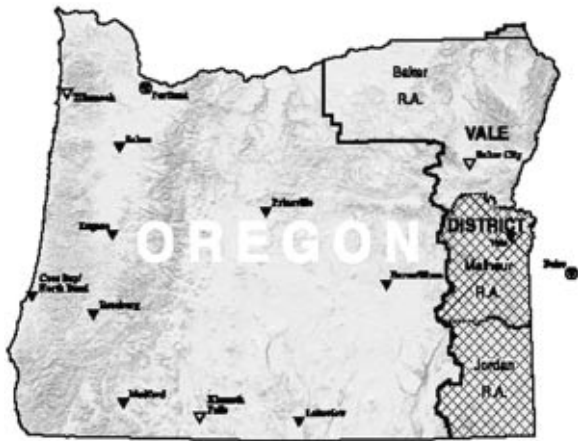
### Place Mid-Scale Conditions in the Context of Broad-Scale Findings

How should BLM manage sagebrush—particularly the Wyoming, basin, and mountain subspecies of big sagebrush—to best achieve the habitat needs of a diverse assemblage of wildlife species, including sage grouse, and forage demands for livestock? This planning issue surfaced during the scoping phase of the SEORMP for the combined Jordan and Malheur Resource Areas of the Vale District (Figure 9). The Oregon Department of Fish and Wildlife

(ODFW) submitted a formal letter to BLM, dated October 30, 1995, expressing concern about management of sagebrush habitats. Specifically, ODFW was seeking clarity in the SEORMP about how BLM would address sagebrush habitat fragmentation, prescribed fire, and monitoring methods used to determine accomplishment of the goals and prescriptions in the SEORMP.

The concerns of ODFW and a wide variety of other members of the public regarding sagebrush habitats were prompted by the following circumstances:

1. A substantial amount of habitat disturbance had already occurred within the planning area. According to Heady and Bartolome's (1977)



**Figure 9.** The Jordan and Malheur Resource Areas (hatched areas) in BLM's Vale District in southeast Oregon, which constitute the area covered by the SEORMP.

synopsis of the Vale Rangeland Rehabilitation Program: "Congress appropriated approximately \$10 million over an 11 year period beginning in 1963 to halt erosion, stabilize the livestock industry, and benefit other land uses. The money was used to control brush on 506,000 acres (205,000 ha), to seed 267,000 acres (108,000 ha) to desirable forage species, and to build over 2,000 miles (3,300 km) of fence, 1,600 water developments, and 463 miles (741 km) of pipeline."

2. Subsequent to the Vale Rangeland Rehabilitation Program, there have been nearly 30 years of additional impacts to rangelands from disturbances such as wild-fires, prescribed fires, chemical treatments, and seedings. In the SEORMP area, an increase in wildfire incidence attributable to cheatgrass prevalence was not a notable issue in the past but now is of great concern.
3. National Fire Plan objectives to reduce fuel loading could potentially exacerbate fragmentation and further diminish habitats for populations of wildlife at risk in the West. Most professional resource managers and interested publics will agree that fire plays an important role in ecosystem function, but the amount of fire disturbance that would be desirable can be a source of intense debate.
4. Re-treatment of seedings to restore forage production where it has declined has been a standard operating procedure.

5. Many of the greater sage-grouse in eastern Oregon are found in Malheur County, much of which falls within the boundaries of the Malheur and Jordan Resource Areas of the Vale District. Therefore, impacts occurring within the SEORMP area would be expected to substantially influence the overall health of the Oregon sage-grouse population.

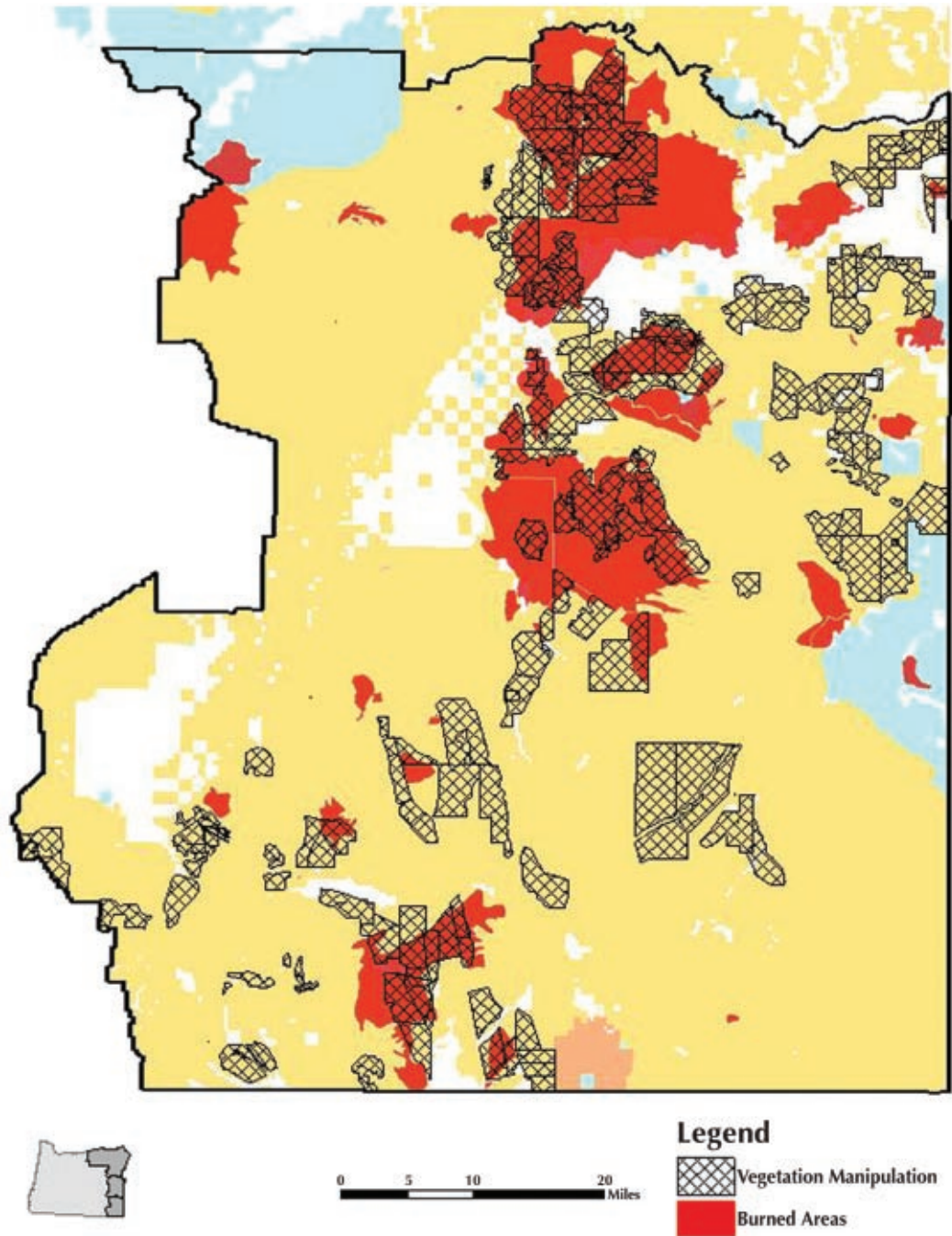
The Vale Rangeland Rehabilitation Program and postprogram activities have had the greatest impact on Wyoming big sagebrush and basin big sagebrush vegetation types and have impacted the mountain big sagebrush vegetation type at higher elevations to a lesser extent. These cumulative impacts in the Jordan Resource Area are spatially portrayed in Figure 10. As of 2002, seedings and brush control treatments covered about 347,000 and 171,000 acres, respectively, for a total of 518,000 acres of land treatments; between 1980 and 2002, 411,500 acres burned and, in some cases, the same acres burned multiple times.

Range surveys from the Vale District, which included data on percent composition by weight of vegetation, were summarized to show that of the approximately 4.6 million acres within the SEORMP area, 3.49 million acres, or nearly 76 percent, either support or have the potential to support big sagebrush vegetation. Table 2 lists all the vegetation types found within the entire SEORMP area as well as those found in the Jordan Resource Area, which constitutes 1.92 million acres of the SEORMP. It also highlights those vegetation types that support or have the potential to support big sagebrush.

Not only were big sagebrush vegetation types a concern at the SEORMP level, they were also a concern at the broader scale of the Interior Columbia Basin (Hann et al. 1997; USDA, FS and USDI, BLM 2000; Wisdom et al. 2000). The following broad-scale findings regarding sagebrush vegetation helped set the context for development of mid-scale sagebrush objectives for the SEORMP area:

1. The big sagebrush cover type (including Wyoming and basin subspecies) could be found in 24.54 percent of the ICBEMP area historically (mid-1800s) and is found in 16.43 percent currently, which represents a





**Figure 10.** Spatial portrayal of areas burned between 1980 and 2002 and vegetation manipulation treatments applied (for example, seedings and chemical brush control) between 1957 and 2002 in the Jordan Resource Area of BLM's Vale District.



- 33.05 percent decline. Conversion of rangeland to agricultural uses was the primary reason for this decline, with transition of rangeland to exotic annual grasses and forbs being secondary (Hann et al. 1997). For the Owyhee Uplands Ecological Reporting Unit, which is a smaller reporting unit within ICBEMP and contains much of the SEORMP area, the big sagebrush cover type declined from 52.03 percent historically to 41.20 percent currently, which represents a 20.81 percent decline. Again, conversion of rangeland to agricultural uses was the primary reason for the decline, with transition to exotic annual grasses and forbs being secondary (Hann et al. 1997).
2. The mountain big sagebrush cover type declined from 7.72 percent of the ICBEMP area historically to 5.12 percent currently, which represents a 33.68 percent decline. The transitions of mountain big sagebrush to western juniper, to agricultural use, and to exotic grasses and forbs were the three primary reasons, in that order, for the decline (Hann et al. 1997). For the Owyhee Uplands Ecological Reporting Unit, the mountain big sagebrush cover type declined from 21.98 percent historically to 20.86 percent currently, which represents a 5.10 percent decline (Hann et al. 1997).
  3. In summary, big sagebrush and mountain big sagebrush cover types combined declined from 32.26 percent of the ICBEMP area historically to 21.55 percent currently, which is a 33.20 percent decline. At the Owyhee Uplands Ecological Reporting Unit level, they declined from 74.01 percent historically to 62.06 percent currently, which is a 16.15 percent decline. Because these declining trends were ecologically significant at the ICBEMP scale, the Wyoming, basin, and mountain big sagebrush vegetation types were highlighted for conservation and restoration (USDA, FS and USDI, BLM 2000).
  4. Largely because of these declines in sagebrush, species such as the sage-grouse, sage thrasher, Brewer's sparrow, sage sparrow, lark bunting, pygmy rabbit, and sagebrush vole experienced a 28.21 percent decline in source habitats from historical to current levels in the ICBEMP area. Source habitats are vegetation communities that support long-term species persistence; that is, they have characteristics that contribute to stable or positive population growth for a species in a specified area and time (Wisdom et al. 2000).

**Table 2.** Vegetation types and plant species found in the Jordan Resource Area and the entire SEORMP. Acreages for the highlighted vegetation types are those that support big sagebrush (Wyoming, basin, or mountain) at the present time or have the potential to support big sagebrush at some time along successional trajectories for the ecological sites. Vegetation types are listed in order from greatest extent of the SEORMP area to least extent.

Vegetation Type	List of Associated Plant Species	Acres in Jordan Resource Area (%)	Acres in SEORMP Area (%)
<b>Big Sagebrush/Perennial Grassland</b>	western juniper, Wyoming big sagebrush, basin big sagebrush, mountain big sagebrush, antelope bitterbrush, bluebunch wheatgrass, Idaho fescue, Thurber's needlegrass, Indian ricegrass, needle and thread grass, Sandberg bluegrass, basin wildrye, bottlebrush squirreltail, arrowleaf balsamroot, phlox	1,160,363 (44.9)	2,044,240 (44.5)
Low Sagebrush/Grassland	western juniper, low sagebrush, bluebunch wheatgrass, Thurber needlegrass, Idaho fescue, cheatgrass, biscuitroot, Sandberg bluegrass	333,927 (12.9)	458,787 (10.0)
<b>Big Sagebrush/Annual Grassland</b>	western juniper, big sagebrush, cheatgrass, tumbled mustard, clasping pepperweed, foxtail barley, Sandberg bluegrass	197,643 (7.6)	440,117 (9.6)



Native Perennial Grassland	bluebunch wheatgrass, Idaho fescue, bottlebrush squirreltail, Thurber's needlegrass, Sandberg bluegrass, basin wildrye, western wheatgrass, arrowleaf balsamroot, phlox	153,876 (6.0)	368,701 (8.0)
Salt Desert Shrub/ Grassland	greasewood, shadscale saltbush, bud sagebrush, fourwing saltbush, spiny hopsage, horsebrush, winterfat, bottlebrush squirreltail, saltgrass, basin wildrye	125,747 (4.9)	218,641 (4.8)
Unknown	unknown	117,251 (4.5)	217,983 (4.7)
Annual Grassland <sup>1</sup>	cheatgrass, foxtail barley, sixweeks fescue, Sandberg bluegrass, tumbledustard, clasping pepperweed	112,630 (4.4)	178,648 (3.9)
Rabbitbrush/Grassland	western juniper, rabbitbrush, horsebrush, bluebunch wheatgrass, Idaho fescue, Sandberg bluegrass, cheatgrass, foxtail barley, sixweeks fescue, tumbledustard, clasping pepperweed, bottlebrush squirreltail	98,561 (3.8)	177,442 (3.9)
Big Sagebrush/ Crested Wheatgrass	western juniper, big sagebrush, rabbitbrush, crested wheatgrass, fourwing saltbush	142,698 (5.5)	174,376 (3.8)
Crested Wheatgrass	crested wheatgrass, sweetclover, fourwing saltbush	57,924 (2.2)	101,447 (2.2)
Stiff Sagebrush/Grassland	western juniper, stiff sagebrush, Idaho fescue, smooth brome, Sandberg bluegrass, cheatgrass, biscuitroot, largehead clover, bluebunch wheatgrass	4,217 (0.2)	75,243 (1.6)
Rock/Lacustrine Breaks	Sandberg bluegrass, biscuitroot, largehead clover, phlox	0	34,077 (0.7)
Quaking Aspen	quaking aspen, western juniper, big sagebrush, antelope bitterbrush, common snowberry, western chokecherry, bitter cherry, bluebunch wheatgrass, Idaho fescue, needlegrass, mountain brome	32,742 (1.3)	32,742 (0.7)
Black Sagebrush/Grassland	black sagebrush, shadscale saltbush, bottlebrush squirreltail, Sandberg bluegrass, cheatgrass	32,062 (1.2)	32,062 (0.7)
Mountain Shrub/Grassland	mountain mahogany, antelope bitterbrush, common snowberry, western chokecherry, bitter cherry, bluebunch wheatgrass, Idaho fescue, needlegrass, mountain brome	11,729 (0.5)	21,586 (0.5)
Forested	ponderosa pine, Douglas-fir, white fir, western juniper, quaking aspen, big sagebrush, antelope bitterbrush, common snowberry, rabbitbrush, bluebunch wheatgrass, Idaho fescue	0	7,121 (0.2)
Western Juniper/ Big Sagebrush	western juniper, big sagebrush, antelope bitterbrush, rabbitbrush, bluebunch wheatgrass, Thurber's needlegrass, Idaho fescue, cheatgrass	0	6,343 (0.1)
Western Juniper/ Low Sagebrush	western juniper, low sagebrush, bluebunch wheatgrass, Idaho fescue, Thurber's needlegrass, Sandberg bluegrass, cheatgrass	3,684 (0.1)	5,194 (0.1)
Silver Sagebrush/ Grassland	silver sagebrush, creeping wildrye, Sandberg bluegrass, bluebunch wheatgrass, cheatgrass	593 (trace)	2,968 (0.1)
<b>Vegetation Types that Support or Have the Potential to Support Big Sagebrush</b>		<b>1,923,695 (74.4)</b>	<b>3,491,314 (76.0)</b>
<b>TOTAL</b>		<b>2,585,647</b>	<b>4,597,718</b>

<sup>1</sup> Most of the annual grassland acreage has the potential to support big sagebrush; however, some unknown amount of acreage probably has the potential to support salt desert shrub/grassland.

## Determine Mid-Scale Objectives

The long-term objective of the SEORMP-FEIS preferred alternative is that 70 percent or more of the 3.49 million acres that either currently support or could support big sagebrush vegetation would provide big sagebrush canopy cover in classes 3, 4, or 5. This comes out to be 2.44 million acres or more, 1.35 million acres of which would be in the Jordan Resource Area.

Why 70 percent rather than 100 percent? Seventy percent was an administratively determined, reasonable minimum threshold. It was based on the fact that disturbances, such as wildfire, exotic plant species invasion (for example, cheatgrass and medusahead), and vegetation treatments (for example, seedings of crested wheatgrass and sagebrush control), effectively have taken out hundreds of thousands of acres of sagebrush for varying periods of time (see Figure 10). This means that not every acre capable of supporting big sagebrush does so at any given time, nor can we expect it to. In addition, the 70 percent attempts to strike a reasonable balance regarding land uses by providing a stable forage supply for the livestock industry. Other management outcomes, from 90 percent or more shrubland down to 50 percent or less shrubland, were analyzed in the EIS for comparative purposes.

The 70-percent level represents a conservative minimum target of acres supporting class 3, 4, or 5 sagebrush at any given time. Not going below the 70-percent level represents a conservation focus for sagebrush vegetation, so that at least that much sagebrush is retained at any given time across the Jordan Resource Area and the SEORMP area. If grassland increases and approaches the 30-percent maximum, there is no longer a legal basis in the SEORMP for additional land treatments that would decrease shrubland further. The cumulative effects analysis in the EIS would no longer be valid and a plan amendment or new EIS would be required. This fact underscores the need for frequent updating of land treatment and wildfire impact area information.

In essence then, staying right at the 70-percent level is not the interpretation that should be

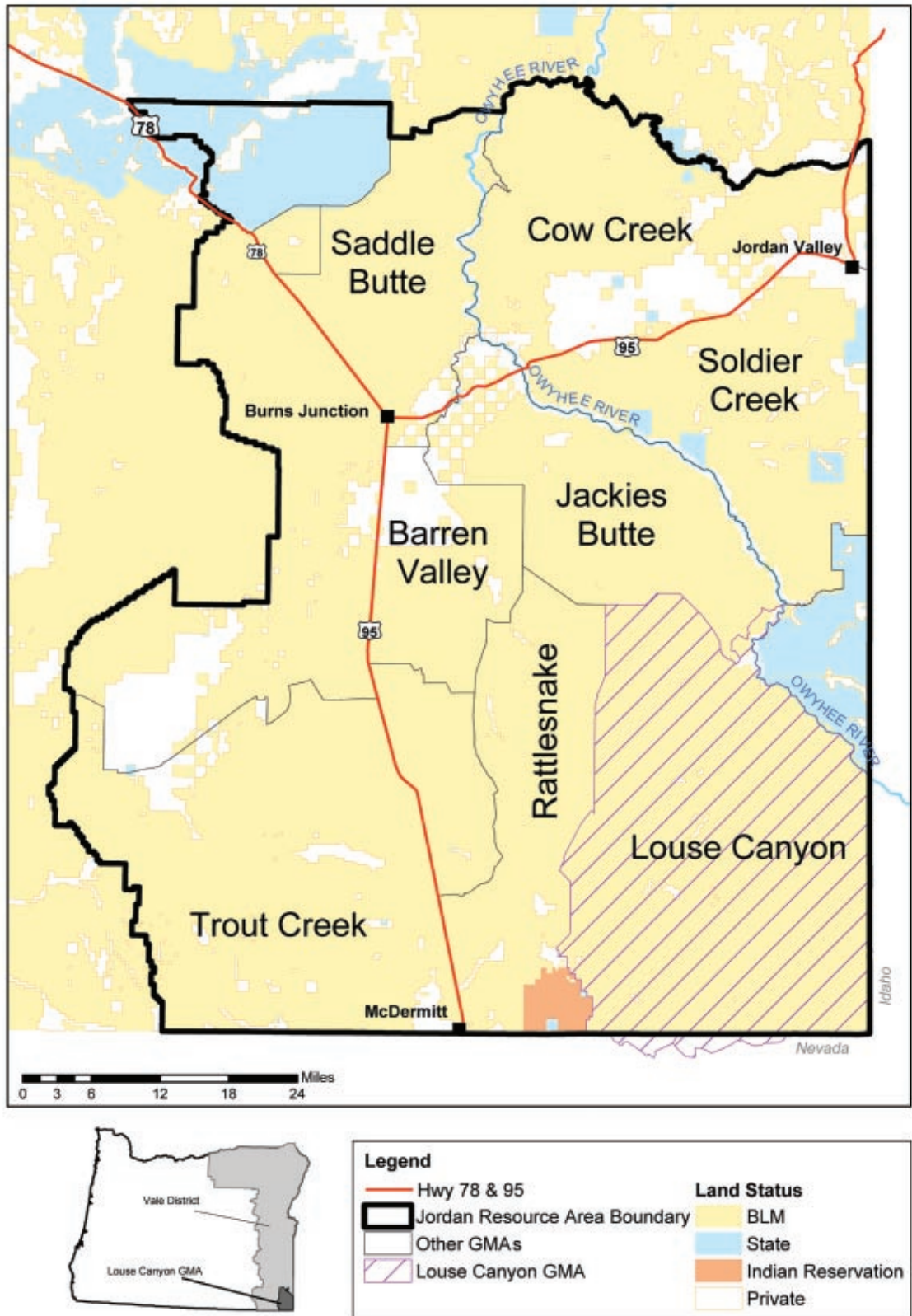
made. Actions can be taken to facilitate big sagebrush recruitment and increase its occupancy into currently unoccupied but suitable acreage (for example, active restoration treatments such as seeding of sagebrush or short-term increases in livestock grazing pressure in seedings, which can facilitate more rapid sagebrush recruitment into the seedings). Conversely, prescribed burning or other shrub-reducing treatments can still be implemented, but the timing and locations should be considered and such treatments should be delayed until sufficient sagebrush recolonization occurs so that there is no long-term decline below 70 percent.

At the mid-scale of the SEORMP, classes 3, 4, and 5 of sagebrush canopy cover and structure are considered desirable to conserve and restore sagebrush vegetation and would comprise the 2.44 million acres. The remaining 1.05 million acres or less (577,000 acres of which would be in the Jordan Resource Area), would appear on the landscape as herbaceous-dominated vegetation with little to no sagebrush occupancy. These acres would be characterized as class 1 or class 2 areas.

## Identify Mid-Scale Geographic Management Areas

The Jordan Resource Area portion of the SEORMP area was divided into eight GMAs (Figure 11). The GMAs were artificial constructs, each containing from one to several allotments, that served as expedient administrative units within which to assess progress towards Standards for Rangeland Health. Additionally, GMAs conformed to the recommendation in BLM's Rangeland Health Standards Handbook (USDI, BLM 2001) to conduct rangeland health standard assessments at a watershed level, which is the fifth unit of the Hydrologic Unit Hierarchy, ranging in size between 40,000 and 250,000 acres, (Federal Geographic Data Committee, Subcommittee on Spatial Water Data 2004), or for groups of contiguous watersheds (USDI, BLM 2001). GMAs range in size from about 175,000 acres to 530,000 acres (Table 3).





**Figure 11.** Boundaries of eight Geographic Management Areas within the Jordan Resource Area of BLM's Vale District in southeast Oregon.



**Table 3. Grazing allotments, acreages, and management issues for each of the eight GMAs within the Jordan Resource Area of BLM’s Vale District in southeast Oregon. Note: W&S = Wild and Scenic River; WSAs = Wilderness Study Areas; ACEC = Area of Critical Environmental Concern.**

Geographic Management Area	Grazing Allotments	Approximate Acres and Management Issues
LOUSE CANYON	Anderson, Campbell, Louse Canyon Community, Star Valley Community	<b>522,923</b> Upland Watershed, W&S, WSAs, Weeds, Riparian, Sensitive Species
TROUT CREEK	15 Mile, McCormick, Whitehorse Butte, Zimmerman	<b>531,318</b> Upland Watershed, Riparian, T&E Species (fish), WSAs, Archaeology, Wildlife, Weeds, Recreation, Wild Horses, ACEC
SADDLE BUTTE	Saddle Butte	<b>184,186</b> Upland Watershed, WSAs, Weeds, Wild Horses, W&S
JACKIES BUTTE	Ambrose Maher, Jackies Butte Summer	<b>218,270</b> Upland Watershed, WSAs, Weeds, Riparian, Wild Horses, W&S, ACEC
SOLDIER CREEK	Antelope, Arock, Bighorn, Cherry Creek, Little Antelope, Parsnip Peak, Rattlesnake Cave, Whitehorse, Willow Creek, Wroten	<b>251,602</b> Upland Watershed, W&S, WSAs, Weeds, Riparian, Recreation, Wild Horses, ACEC
RATTLESNAKE	Albisu-Alcorta, Echave, Eiguren, Gilbert, Sherburn, Ten Mile	<b>211,224</b> Upland Watershed, Riparian, Wildlife
COW CREEK	Antelope Individual, Bogus Creek, Danner Individual, East Cow Creek, Eiguren Individual, Miller Individual, Morcum, Oliver, Rome Individual, Skinner Individual, West Cow Creek	<b>251,674</b> Upland Watershed, W&S, WSAs, ACEC, Riparian, Recreation, Weeds, Wildlife
BARREN VALLEY	Bowden Hills, Coyote Lake, Barren Valley, Black Hill, Jackies Butte West, Crooked Creek, Sheepheads	<b>440,613</b> Upland Watershed, WSAs, Recreation, Weeds, Riparian, Wild Horses, Wildlife, Sensitive Species

### Determine Mid-Scale Geographic Management Area Objectives

Sagebrush canopy cover in classes 3, 4, and 5 should be present in a variety of spatial arrangements (for example, at a landscape level and with connectivity present) to support the life history requirements of sage-grouse and other wildlife species that use sagebrush habitats. There should be a nearly contiguous core of sagebrush and associated understory herbaceous species that is composed of several large blocks, as well as some other patch arrangements such as islands,

corridors, and mosaic patterns. Each of these patterns has significance to wildlife within geographic areas. The sagebrush canopy cover should show some mix of height and age classes but the overall emphasis should be on the presence of sagebrush in a late structural status as shown in Figure 1 (Maser et al. 1984).

Big sagebrush objectives were determined for each GMA (Table 4) on the basis of factors such as: 1) presence of sage-grouse and their various life history needs; 2) existing native sagebrush



canopy cover within each GMA; 3) existing locations of past wildfires and prescribed fires and the reasonably foreseeable recurrence of wildfires; and 4) locations of seedings of introduced grasses.

Big sagebrush objectives for each of the 8 GMAs contribute to the 70-percent minimum allowable level of acres supporting class 3, 4, or 5 sagebrush at the SEORMP level.

**Table 4. Big sagebrush objectives for each GMA in the Jordan Resource Area of BLM’s Vale District in southeast Oregon.**

Geographic Management Area	Minimum Allowable Percentage of Big Sagebrush in Classes 3, 4, and 5
Louse Canyon	85
Trout Creek	85
Saddle Butte <sup>1</sup>	45
Jackies Butte <sup>1</sup>	35
Soldier Creek	75
Rattlesnake	85
Cow Creek <sup>1</sup>	30
Barren Valley	80

<sup>1</sup>Areas highly fragmented by wildfire disturbance or seedings (see Figures 10 and 11). Saddle Butte experienced a wildfire before 1980 and therefore the full extent of wildfire does not show up in Figure 10.

## Make Fine-Scale Determinations

### Determine Fine-Scale, Pasture-Level Objectives

Pasture-level objectives are designed to achieve the minimum allowable percentages of big sagebrush in classes 3, 4, or 5 within each GMA (see Table 4). The spatial extent of big sagebrush in canopy classes 3, 4, or 5 and the ecological status (plant composition data, including herbaceous understory, compiled from range surveys) were used as the basis for pasture-level objectives:

**Sagebrush Canopy Cover on Native Rangeland:** Big sagebrush canopy cover capable of supporting wildlife (classes 3, 4, and 5) should be present on at least 50 to 75 percent of the surface acreage capable of supporting big

sagebrush within a pasture. For example, if 1,000 acres in a native rangeland pasture are capable of supporting big sagebrush, then at least 500 to 750 acres of big sagebrush canopy cover should be provided.

**Sagebrush Canopy Cover on Seeded Rangeland:** Big sagebrush canopy cover capable of supporting wildlife (classes 3, 4, and 5) should be present on at least 25 to 50 percent of the surface acreage capable of supporting big sagebrush within a pasture. For example, in a 1,000-acre pasture seeded with introduced grasses, in which every acre has the potential to support big sagebrush, at least 250 to 500 acres of big sagebrush canopy cover should be provided.

**Herbaceous Understory on Native Rangeland:** Herbaceous understory species should include multiple species of native forbs and grasses consistent with mid-seral, late-seral, or potential natural community conditions (if ecological site inventory data or range survey data on plant species composition are available). These conditions would likely be associated with vegetation states—and their inclusive plant communities—that have not crossed a threshold to a degraded state (this way of stating things comes from state-and-transition models available within ecological site descriptions; see Habich 2001).

**Herbaceous Understory on Seeded Rangeland:** Herbaceous understory species should include one or more adapted forb species.

### Evaluate Achievement of Oregon’s Rangeland Health Standard 5

Oregon BLM’s Standards for Rangeland Health and Guidelines for Livestock Grazing Management were approved for immediate implementation in August 1997 by Secretary of the Interior Bruce Babbitt. There are five standards. Standard 5 pertains to native, threatened and endangered, and locally important species, and it states:

“Habitats support healthy, productive and diverse populations and communities of native plants and animals (including special status species and species of local importance) appropriate to soil, climate and landform.”

The rationale and intent of this standard are that Federal agencies are mandated to protect

threatened and endangered species and take appropriate action to avoid the listing of any species. This standard focuses on retaining and restoring native plant and animal species (including fish), populations, and communities (including threatened, endangered, and other special status species and species of local importance). To meet the standard, native plant communities and animal habitats would be spatially distributed across the landscape with a density and frequency of species suitable to ensure reproductive capability and sustainability. Plant populations and communities would exhibit a range of age classes necessary to sustain recruitment and mortality fluctuations.

Potential indicators to measure the achievement of Standard 5 include:

- Plant community composition, age class distribution, and productivity
- Animal community composition and productivity
- Habitat elements
- Spatial distribution of habitat
- Habitat connectivity
- Population stability and resilience

### *Louse Canyon GMA Findings*

The pasture-level objectives were used as the basis for evaluating the achievement of Oregon's Rangeland Health Standard 5 for terrestrial uplands in pastures within the Louse Canyon GMA. The Louse Canyon GMA is approximately 523,000 acres and contains 4 allotments, the Campbell, Anderson, Star Valley Community, and Louse Canyon Community allotments. There are 20 pastures within these 4 allotments, the majority of which are composed of shrub-steppe vegetation types, primarily big sagebrush vegetation types. Table 5 summarizes the determinations made for each pasture regarding achievement of Oregon's Rangeland Health Standard 5 on terrestrial uplands.

Fifteen of the 20 pastures did achieve the sagebrush canopy cover structural conditions and herbaceous understory conditions necessary to achieve Standard 5. Starvation Seeding pasture did not achieve Standard 5 because only 10 percent of its acreage could be classified as class 3, 4, or 5. The remaining four pastures that did not achieve Standard 5 were deficient in herbaceous understory conditions.

Upland rangeland in the Louse Canyon GMA shows attributes that can be expected to result in long-term persistence of wildlife that rely on sagebrush and associated understory herbaceous species. Important sagebrush habitat features, including forage, cover, and structure, are spatially well-distributed. With certain isolated exceptions, the structural complexity and spatial extent of sagebrush canopy cover is excellent for wildlife. The potentially negative consequences of habitat fragmentation from fires and cultural treatments (that is, seedings and chemical brush control applications) that have occurred since the mid-1960s are localized and proportionally small in relation to the entire Louse Canyon GMA area. Of the treated rangelands, the Starvation Seeding pasture is the only area that has yet to experience substantial sagebrush recolonization.

Louse Canyon GMA has 394,000 acres capable of supporting big sagebrush, including areas of native rangeland, chemical brush control treatment areas, and seeded rangeland. Nearly 96 percent of these acres supports big sagebrush in classes 3, 4, or 5. The remaining 4 percent is composed of native or seeded rangeland that currently exhibits a grassland aspect and is in classes 1 or 2.

About 92 percent of the native rangeland in Louse Canyon GMA has no history of seeding or chemical brush control. It is a nearly complete block of sagebrush vegetation types with relatively minor, fine-scale inclusions of grassland vegetation types. Habitat patterns that appear as corridors, mosaics, and islands are detectible only at the site (local) scale and are consistent with soil, climate, or landform differences rather than recent disturbance. The herbaceous understory composition in most of the native rangeland is diverse, composed of predominantly native species, and is consistent with mid-seral, late-seral, or potential natural community ecological status (Figure 12).

Even where herbaceous understory diversity and density of individuals is somewhat weakly expressed, the vegetation is not at high risk to wildfire because cheatgrass is either totally absent or only weakly expressed. Invasive plants with the potential for direct or indirect adverse effects on wildlife habitat have only minor and localized influences.



**Table 5.** Pasture-by-pasture evaluation of Oregon’s Rangeland Health Standard 5 on terrestrial uplands of the Louse Canyon GMA.

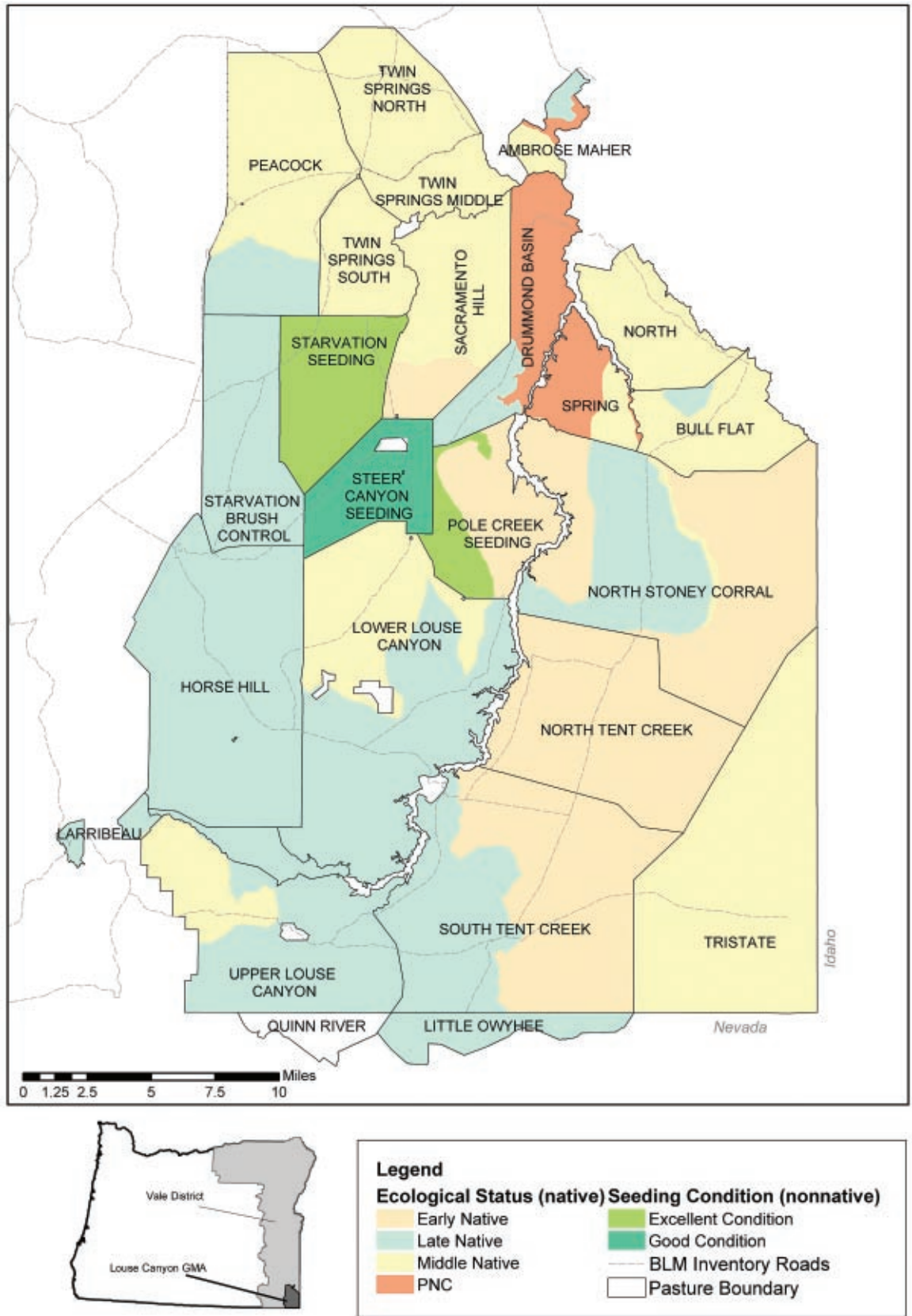
Pastures	Acres per Pasture	Vegetation Types Present <sup>1</sup>	Percent of Pasture Capable of		Achieves Sagebrush Canopy Cover Pasture Objective?	Achieves Herbaceous Understory Pasture Objective?	Achieves Standard 5 for Terrestrial Uplands?
			Supporting Big Sagebrush, Estimated to be Occupied by Classes 1 or 2	Percent of Pasture Capable of Supporting Big Sagebrush, Estimated to be Occupied by Classes 3, 4, or 5			
Campbell Allotment							
Horse Hill	49,987	Arar, Artrwyo, Artrva, Artrtr	0	100	Yes	Yes <sup>2</sup>	Yes
Starvation Brush Control	19,024	Artrwyo	0	100	Yes	No <sup>3</sup>	No
Starvation Seeding	15,472	Agcr, Artrwyo/Agcr	90	10	No	No <sup>4</sup>	No
Sacramento Hill	19,355	Artrwyo	0	100	Yes	Yes <sup>2</sup>	Yes
Twin Springs South	9,824	Artrwyo	0	100	Yes	Yes <sup>2</sup>	Yes
Twin Springs North	14,793	Artrwyo	0	100	Yes	Yes <sup>2</sup>	Yes
Twin Springs Middle	7,166	Artrwyo	0	100	Yes	Yes <sup>2</sup>	Yes
Peacock	28,583	Artrwyo	0	100	Yes	Yes <sup>2</sup>	Yes
Larribeau Holding	1,748	Arar, Artrwyo, Artrva	0	100	Yes	Yes <sup>2</sup>	Yes

Anderson Allotment						
Spring	12,959	Artrwyo	0	100	Yes	Yes <sup>2</sup>
Bull Flat	8,728	Artrwyo	10	90	Yes	Yes <sup>2</sup>
North	12,991	Artrwyo, Arar	5	95	Yes	Yes <sup>2</sup>
Star Valley Community Allotment						
North Stoney Corral	57,248	Artrwyo	0	100	Yes	Yes <sup>2</sup>
Tristate	45,782	Artrwyo	0	100	Yes	Yes <sup>2</sup>
South Tent Creek	50,660	Artrwyo, Artrtr, Arar	0	100	Yes	Yes <sup>2</sup>
North Tent Creek	35,343	Artrwyo	0	100	Yes	Yes <sup>2</sup>
Louse Canyon Community Allotment						
Drummond Basin	15,050	Artrwyo	0	100	Yes	No <sup>5</sup>
Steer Canyon Seeding	11,272	Artrwyo/Agcr	0	100	Yes	No <sup>6</sup>
Pole Creek Seeding	15,586	Artrwyo/Agcr, Artrtr	0	100	Yes	No <sup>7</sup>
Louse Canyon (Upper and Lower)	87,737	Artrwyo, Arar	<1	99	Yes	Yes <sup>2</sup>

<sup>1</sup> Artrwyo=Wyoming big sagebrush, Artrtr=basin big sagebrush, Artrva=mountain big sagebrush, Arar=low sagebrush, Agcr=crested wheatgrass.  
<sup>2</sup> Most habitats observed meet the desired herbaceous understory conditions for native rangeland (e.g., multiple species of native forbs and grasses consistent with mid-seral, late-seral, or potential natural community ecological conditions).  
<sup>3</sup> The southern third of the pasture near Lucky Seven Cow Camp is more consistent with early ecological conditions and does not meet the desired herbaceous understory conditions for native rangeland.  
<sup>4</sup> Habitats observed do not meet the minimum desired herbaceous understory conditions for seeded rangeland (e.g., some native or introduced forb species not present).  
<sup>5</sup> Herbaceous composition in the southern third of the pasture is more consistent with early ecological conditions and does not meet the desired herbaceous understory conditions for native rangeland.  
<sup>6</sup> For the 56 percent of this pasture that was seeded to crested wheatgrass, habitats observed do not meet the minimum desired herbaceous understory conditions for seeded rangeland (e.g., some native or introduced forb species not present).  
<sup>7</sup> For the 26 percent of this pasture that was seeded to crested wheatgrass, habitats observed do not meet the minimum desired herbaceous understory conditions for seeded rangeland (e.g., some native or introduced forb species not present).



ASSESSING BIG SAGEBRUSH AT MULTIPLE SPATIAL SCALES: AN EXAMPLE IN SOUTHEAST OREGON



**Figure 12.** Seral status (ecological condition) of native vegetation and range condition of seeded vegetation in pastures in Louse Canyon GMA. Quinn River and Little Owyhee allotments at the south end lie in Nevada, yet are administered by the Vale District as part of the Upper Louse Canyon and South Tent Creeks pastures, respectively.

## Future Management of Louse Canyon GMA

Based on the terrestrial upland habitat findings for Oregon's Rangeland Health Standard 5 for the Louse Canyon GMA, a terrestrial wildlife objective pertaining to sagebrush was developed for the SEORMP:

### "Terrestrial Wildlife Objective

- Terrestrial species of management importance in the Louse Canyon GMA are identified as **Brewer's sparrow, horned lark, western meadowlark, black-throated sparrow, sage sparrow, loggerhead shrike, greater sage-grouse, sage thrasher, northern bald eagle, California bighorn sheep, pygmy rabbit, pronghorn, northern sagebrush lizard, and short-horned lizard.**
- Maintain a high level of sagebrush canopy cover connectivity among the pastures and grazing allotments over the next 20 years as described below. Provide herbaceous plant cover in sagebrush upland communities that will supply the necessary forage, cover, and structure needed to sustain terrestrial wildlife communities.
- Adaptive management involving BLM land treatments and wildfire suppression will incorporate wildlife habitat needs at the fine and site scales in order to limit sagebrush community fragmentation.
- Maintain 85 percent or more of Wyoming, mountain, and basin big sagebrush communities (see Table 4) as canopy cover classes 3, 4, or 5, with shrubs in a predominantly mid to late structural condition (as per Fig. 1). This objective includes both native and modified rangelands.
- BLM-initiated land treatments which result in grassland conditions (canopy cover classes 1 and 2), will not exceed 5 percent of Louse Canyon GMA, or about 26,000 acres, at any given time. This includes future actions such as fire fuel treatments, enhancement of existing seedings for livestock forage production, watershed treatments, and wildlife habitat improvement manipulations.
- Where necessary, allow land treatments in native rangeland as long as the combined amount of disturbance resulting in grassland

conditions does not exceed 30 to 40 percent of any pasture.

- Minimize the geographic extent of grassland habitats that exist in large blocks (320 acres or more).
- In seeded areas, maintain 40 percent or more shrubland cover conditions favorable for sagebrush dependent terrestrial wildlife. This means canopy cover in classes 3, 4, or 5, with shrubs in a predominantly mid to late structural condition (as per Fig. 1).
- Appropriate fire management response planning will promote and complement the attainment of big sagebrush habitat management objectives. To the extent possible, manage wildfire so that disturbance to rangeland does not exceed 10 percent of Louse Canyon GMA over the next 20 years. Appropriate management responses to wildfire should be planned on an annual basis.
- Maintain herbaceous plant cover consistent with mid, late, and Potential Natural Community ecological status in big sagebrush, low sagebrush, and salt desert habitats. Desirable herbaceous plant communities for wildlife are comprised of native perennial grasses and multiple species of native forbs consistent with site potential as determined by Natural Resources Conservation Service (NRCS) site guides.
- Manage livestock grazing use impacts on native rangeland so that utilization levels are predominantly slight (6-20 percent) or light (21-40 percent) at reasonable distances from livestock water sources and salting areas."

These management objectives for Louse Canyon GMA demonstrate how the structural complexity, ecological status, and landscape-level features discussed in the SEORMP were incorporated into the management of the four grazing allotments. Native and modified rangeland desired conditions were addressed, links to prescribed fire and wildfire suppression activities were indicated, and desired canopy cover types that can be monitored over time were identified. Because the Louse Canyon GMA currently contains such a large geographic area of big sagebrush habitat,

much of which is in mid-seral, late-seral, or potential natural community ecological status, the 20-year management objectives are conservative in the amount of treatment proposed. Preventing further conversion of shrubland to grassland, as much as possible, will be necessary to achieve the Resource Area objective for big sagebrush habitats.

## Determine Site (Local, Within Pasture) Subclasses

Habitat needs occur at multiple scales. For the Rangeland Health Standard 5 evaluations, the five canopy cover classes of big sagebrush are useful “big picture” descriptors for assessing habitat structural conditions important to wildlife. The canopy cover classes are also useful for setting management objectives that use ranges of habitat values and combinations of habitats. However the relationships between overstory big sagebrush canopy cover, associated understory herbaceous species, and biological soil crust communities can be better assessed and described at a finer scale with more detailed data. These more discrete measures are often difficult to attain, difficult to measure and monitor over the long term, and difficult to integrate into activity plans that extend over large areas of land.

At present within the BLM, because there are hundreds of thousands, even millions, of acres within each field office’s jurisdiction, it is not possible to conduct an on-the-ground detailed assessment to discern all of the possible combinations of overstory and understory conditions present at finer scales within pastures. Alternatively, for the SEORMP, the five classes of big sagebrush canopy cover were further divided into subclasses, which serve as the basis for a site- (local-) scale, more detailed way of mapping big sagebrush habitat conditions with pastures. Although these subclasses were not mapped in the evaluation of Standard 5 conducted in the Louse Canyon GMA, they are offered as placeholders that can be identified, mapped, and spatially analyzed with remote sensing technology and geostatistics in future evaluations or identified through the use of

plant species composition data collected during ecological site inventory (Habich 2001).

These subclasses are not exhaustive by any means; they do not encompass all possible combinations of overstory and understory conditions present at the site (local) scale within pastures. However, they represent what is thought to be the most prevalent combinations of overstory and understory likely to be encountered in the SEORMP area. These subclasses and their descriptions might not fit all sagebrush habitat conditions found outside the SEORMP area, yet they could easily be modified if necessary to accommodate other sagebrush habitat conditions.

### Subclasses for Class 1

**Subclass 1(A):** This vegetation is dominated by native grasses and forbs, which generally meet a portion of the habitat needs of wildlife species that rely primarily on sagebrush and associated understory herbaceous species (Figure 13). On lands capable of supporting sagebrush, this vegetation is typically observed after fire occurs and before sagebrush species recolonize. This vegetation is desirable as patches, intermingled with subclasses 2(A), 2(C), 3(A), 3(B), 3(C), 4(B), and 5(A).

**Subclass 1(B):** This vegetation is dominated by introduced annual grasses and forbs, such as cheatgrass, medusahead, and tumbled mustard, which do not meet the habitat needs of wildlife species that rely primarily on sagebrush and associated understory herbaceous species (Figure 14). It is in a degraded vegetation state (Habich 2001) and is not desirable to sustain in its present condition if the site has potential to support sagebrush. Before converting to annual grasses and forbs, subclass 1(B) vegetation was more likely to have been dominated by Wyoming big sagebrush or basin big sagebrush than either low sagebrush or mountain big sagebrush (Miller and Eddleman 2001). Subclass 1(B) vegetation is prone to disturbance by wildfire at short-interval frequencies (Billings 1948; Pellant 1990). High plant density of these annual plants, along with great amounts of litter and frequent wildfire, effectively eliminate biological soil crusts. The combination of these factors inhibits recovery of native plants and biological soil crusts (Kaltenecker et al. 1999; Hilty et al. 2004).





**Figure 13.** An example of subclass 1(A), late-seral vegetation dominated by native grasses and forbs, on the Anderson allotment in the Louse Canyon GMA. This example occurs at an elevation of 5,180 feet, where wildfire had occurred sometime previous to the 1980s.

Photo taken by Jon Sadowski.



**Figure 14.** An example of subclass 1(B), early seral vegetation dominated by introduced annual grasses and forbs such as cheatgrass, medusahead, and tumblemustard. This example is in the Jackies Butte Summer allotment in the Jackies Butte GMA, at an elevation of about 3,400 feet.

Photo taken by Jon Sadowski.

*Subclass 1(C):* This vegetation is dominated by seedlings of crested wheatgrass or other introduced perennial grasses, which generally do not meet the habitat needs of wildlife species that rely primarily on sagebrush and associated understory herbaceous species (Figure 15). It is lacking in sagebrush canopy cover because a sagebrush seed source is lacking nearby, sufficient time has not elapsed for sagebrush species to recolonize the seeding, or the site does not have the potential to support sagebrush. This vegetation is not desirable to sustain in its present state if the site has the potential to support sagebrush.

*Subclass 1(D):* This subclass is a woodland dominated by species such as western juniper (Figure 16). Western juniper encroachment and increasing density, particularly in the mountain big sagebrush and low sagebrush dominated vegetation, can result in the near total loss of sagebrush canopy cover (Miller and Eddleman 2001). Subclass 1(D) vegetation does not meet the habitat needs of sage-grouse and other wildlife that rely primarily on sagebrush and associated understory herbaceous species. Sage-grouse did not select western juniper dominated vegetation in central Oregon for nesting or





**Figure 15.** An example of subclass 1(C), a Fairway crested wheatgrass seeding in the Jackies Butte Summer allotment in the Jackies Butte GMA.

Photo taken by Jon Sadowski.



**Figure 16.** An example of subclass 1(D), a woodland dominated by western juniper. Although the vegetation was dominated in the past by sagebrush and Thurber's needlegrass, sagebrush canopy cover now is basically nonexistent.

Photo taken by Jon Bates.

winter habitat (Hanf et al. 1994). Excessive livestock grazing pressure and fire suppression since Euro-American settlement have been the main contributors to the formation of many of these woodlands (Eddleman et al. 1994). These vegetation types have depleted understory herbaceous vegetation in addition to depleted (or sometimes nonexistent) shrub canopy cover, and they may have depleted biological soil crusts if the sites are capable of supporting biological soil crusts. The depletion of the shrub, herbaceous, and biological soil crust cover may result in accelerated erosion in these vegetation types, as well as in documented declines in vegetation productivity, floral and faunal diversity,

and wildlife habitat (Wilcox 2002). This vegetation is not desirable to sustain in its present state if the site has the potential to support sagebrush.

### Subclasses for Class 2

**Subclass 2(A):** This vegetation is dominated by native grasses and forbs, with some recruitment of sagebrush, which generally meets a portion of the habitat needs of wildlife species that rely primarily on sagebrush and associated understory herbaceous species (Figure 17). This vegetation is typically observed after fire occurs, when sagebrush species are reestablishing. It is desirable as patches, intermingled with subclasses 1(A), 2(C), 3(A), 3(B), 3(C), 4(B), and 5(A).



**Figure 17.** An example of subclass 2(A), late-seral vegetation dominated by native grasses and forbs, with sagebrush reestablishing after a recent fire. This example is on the east slope of Blue Mountain in the Trout Creek GMA at an elevation of 5,430 feet.

Photo taken by Jon Sadowski.

*Subclass 2(B):* This vegetation is dominated by introduced annual grasses and forbs, such as cheatgrass, medusahead, and tumbled mustard, where sagebrush species remain part of the vegetation in scattered patches or as individual plants that have escaped fire (photo not available.). Sagebrush canopy cover is declining because of frequent fire through time. Subclass 2(B) areas do not meet the habitat needs of wildlife species that rely primarily on sagebrush and associated understory herbaceous species. This vegetation is in a degraded vegetation state (Habich 2001) and is not desirable to sustain in its present condition if the site has the potential to support sagebrush. Before converting to annual grasses and annual forbs, subclass 2(B) vegetation is more likely to have been dominated by Wyoming big sagebrush or basin big sagebrush than either low sagebrush or mountain big sagebrush (Miller and Eddleman 2001). Subclass 2(B) vegetation is prone to disturbance by wildfire at short-interval frequencies (Billings 1948; Pellant 1990). High plant density of these annual plants, along with great amounts

of litter and frequent wildfire, effectively eliminate biological soil crusts. The combination of these factors inhibits the recovery of native plants and biological soil crusts (Kaltenecker et al. 1999; Hilty et al. 2004).

*Subclass 2(C):* This vegetation is dominated by seedings of crested wheatgrass or other introduced perennial grasses, where sagebrush species are in the early stages of recolonization (Figure 18). This vegetation might not be meeting the complex structure (shrub, grass, and forb) and food needs of wildlife species that rely primarily on sagebrush and associated understory herbaceous species, but if sagebrush canopy cover is increasing due to sagebrush colonization and growth of existing sagebrush, there is high likelihood that it will meet habitat needs in the future. This vegetation is desirable to sustain if it is moving successional to greater abundance of sagebrush species and the site has the potential to support sagebrush.





**Figure 18.** An example of subclass 2(C), a crested wheatgrass seeding with a trace to 5 percent of sagebrush canopy cover in the Dry Creek Seeding of the Jackies Butte allotment in the Jackies Butte GMA at an elevation of 3,760 feet.

Photo taken by Jon Sadowski.



**Figure 19.** An example of subclass 2(D), a woodland dominated by western juniper. Western juniper is continuing to increase in density and canopy cover, and mountain big sagebrush and blue-bunch wheatgrass are declining in canopy cover.

Photo taken by Jon Bates.

*Subclass 2(D):* This subclass is a woodland dominated by species such as western juniper (Figure 19). Western juniper encroachment and increasing density can result in near total loss of sagebrush canopy cover, particularly in the mountain big sagebrush and low sagebrush dominated vegetation (Miller and Eddleman 2001). Subclass 2(D) vegetation is where western juniper is continuing to increase in density and canopy coverage and sagebrush species are on their way out. The vegetation does not provide habitat needs for sage-grouse and other wildlife that rely primarily on sagebrush and associated understory herbaceous species. Sage-grouse did not select western juniper dominated vegetation in central Oregon for nesting or winter habitat (Hanf et al. 1994).

Excessive livestock grazing pressure and fire suppression since Euro-American settlement have been the main contributors to the formation of many of these woodlands (Eddleman et al. 1994). These vegetation types have depleted understory herbaceous vegetation in addition to depleted shrub canopy cover and may have depleted biological soil crusts if the sites are capable of supporting biological soil crusts. The depletion of the shrub, herbaceous, and biological soil crust cover may result in accelerated erosion in these vegetation types, as well as in documented declines in vegetation productivity, floral and faunal diversity, and wildlife habitat (Wilcox 2002). This vegetation is not desirable to sustain in its present state if the site has the potential to support sagebrush.

### Subclasses for Class 3

**Subclass 3(A):** This vegetation has a shrub component dominated by Wyoming big sagebrush, with an understory of native grasses (about 10 percent canopy cover) and forbs (less than 10 percent canopy cover) and intact biological soil crusts in interplant spaces, representing the potential natural community (Miller and Eddleman 2001) (Figure 20). Subclass 3(A) Wyoming big sagebrush vegetation types can meet some habitat needs of sage-grouse—for example, by providing winter habitat (Miller and Eddleman 2001)—and those of other wildlife that rely primarily on sagebrush and associated understory herbaceous species. This vegetation is desirable to sustain as patches, intermingled with subclasses 1(A), 2(A), 2(C), 3(B), 3(C), 4(B), and 5(A).

**Subclass 3(B):** This vegetation has a shrub component dominated by basin big sagebrush or mountain big sagebrush, with an understory of native grasses and forbs (photo not available.). Subclass 3(B) vegetation is typically moving successional to greater abundance of sagebrush species and is not yet at the potential natural community for basin big sagebrush and mountain big sagebrush. Despite this, subclass 3(B) basin big sagebrush or mountain big sagebrush vegetation types meet

some habitat needs of wildlife that rely primarily on sagebrush and associated understory herbaceous species. For example, they provide sage-grouse winter habitat in central Oregon (Hanf et al. 1994). This vegetation is desirable to sustain as patches, intermingled with subclasses 1(A), 2(A), 2(C), 3(A), 3(C), 4(B), and 5(A). It should be recognized, however, that subclass 3(B) vegetation is probably transitory and should be permitted to move successional to class 4.

**Subclass 3(C):** This vegetation has a shrub component dominated by sagebrush, yet is seedings of introduced perennial grasses such as crested wheatgrass (Figure 21). Sagebrush canopy cover typically is increasing in this vegetation, attributable to sagebrush establishment and growth of existing sagebrush. While not providing the structural complexity of habitat that subclasses 3(A) or 3(B) do, typically because there is yet to be a diverse grass or forb component in these seedings, this vegetation does possess a shrub structural component that serves to meet some habitat needs of wildlife species that rely primarily on sagebrush and associated understory herbaceous species. Subclass 3(C) vegetation is desirable to sustain if the site has the potential to support sagebrush, but the addition of grasses and forbs to the understory is recommended.



**Figure 20.** An example of subclass 3(A), potential natural community vegetation dominated by Wyoming big sagebrush and native grasses and forbs, on the Anderson allotment in the Jordan Resource Area on a north slope at an elevation of 5,300 feet. A mature sagebrush canopy offers abundant cover and structural character important to wildlife communities that occupy sagebrush habitat.

Photo taken by Jon Sadowski.





**Figure 21.** An example of subclass 3(C), a Nordan crested wheatgrass seeding with sagebrush canopy cover on the 15 Mile allotment in the Trout Creek GMA at an elevation of 4,940 feet.

Photo taken by Jon Sadowski.



**Figure 22.** An example of subclass 4(A), mid-seral vegetation dominated by Wyoming big sagebrush, with a sagebrush canopy cover near the higher end of the 15 to 25 percent range, on the Star Valley Community allotment in the Louse Canyon GMA.

Photo taken by Jon Sadowski.

#### Subclasses for Class 4

**Subclass 4(A):** This vegetation has a shrub component dominated by Wyoming big sagebrush, in which native grass and forb canopy cover typically begin to decline where sagebrush canopy cover exceeds 20 percent (Miller and Eddleman 2001) (Figure 22). Biological soil crust development may decline as well, compared with subclass 3(A) Wyoming big sagebrush vegetation. Disturbances such as excessive livestock grazing pressure can contribute to the development of the greater than 20 percent of this vegetation (Miller and Eddleman 2001). Subclass 4(A) vegetation that is greater than 20 percent might not be the potential natural community or a desirable outcome for Wyoming big sagebrush when the inherent capabilities of

soil, landform, and climate are factored in. However, subclass 4(A) vegetation can meet some habitat needs of sage-grouse—for example, by providing winter habitat (Miller and Eddleman 2001)—and those of other wildlife species that rely primarily on sagebrush and associated understory herbaceous species.

**Subclass 4(B):** This vegetation has a shrub component dominated by basin big sagebrush or mountain big sagebrush, with an understory of native grasses and forbs (Figure 23). Subclass 4(B) vegetation typically represents the potential natural community for basin big sagebrush or mountain big sagebrush vegetation types. It meets the habitat needs of sage-grouse—for example, by providing nesting habitat (Hanf et al.



**Figure 23.** An example of subclass 4(B) in the swale, with late-seral vegetation having a shrub canopy cover dominated by basin big sagebrush, on the 15 Mile allotment in the Trout Creek GMA at an elevation of 6,200 feet.

Photo taken by Jon Sadowski.

1994; Connelly et al. 2000; Miller and Eddleman 2001), brood-rearing habitat (Miller and Eddleman 2001), and winter habitat (Connelly et al. 2000)—and those of other wildlife species that rely primarily on sagebrush and associated understory herbaceous species. This vegetation is desirable to sustain as patches, intermingled with subclasses 1(A), 2(A), 2(C), 3(A), 3(B), 3(C), and 5(A).

**Subclass 4(C):** This vegetation has shrub canopy cover dominated by mountain big sagebrush, with tree seedlings (particularly western juniper) in the understory or in the intershrub spaces (photo not available.). Western juniper encroachment and increasing density can result in the near total loss of sagebrush canopy cover, particularly in the mountain big sagebrush and low sagebrush dominated vegetation types (Miller and Eddleman 2001). Subclass 4(C) vegetation currently meets the habitat needs of wildlife species that rely primarily on sagebrush and associated understory herbaceous species. However, with continued growth and increasing density of western juniper, sagebrush will decline, and subclass 4(C) vegetation will likely transition to subclass 2(D) and, subsequently, subclass 1(D) vegetation. During this transition, fewer habitat needs will be met for wildlife species that rely primarily on sagebrush and associated understory herbaceous species. Excessive livestock grazing pressure and fire suppression since Euro-American settlement have been the main contributors to the formation of many of these subclass 4(C) vegetation types (Eddleman et al. 1994). Subclass 4(C) vegetation is not desirable to sustain in its

present condition if the site has the potential to support sagebrush; action taken to reduce the encroachment and increasing density of western juniper is warranted.

### Subclasses for Class 5

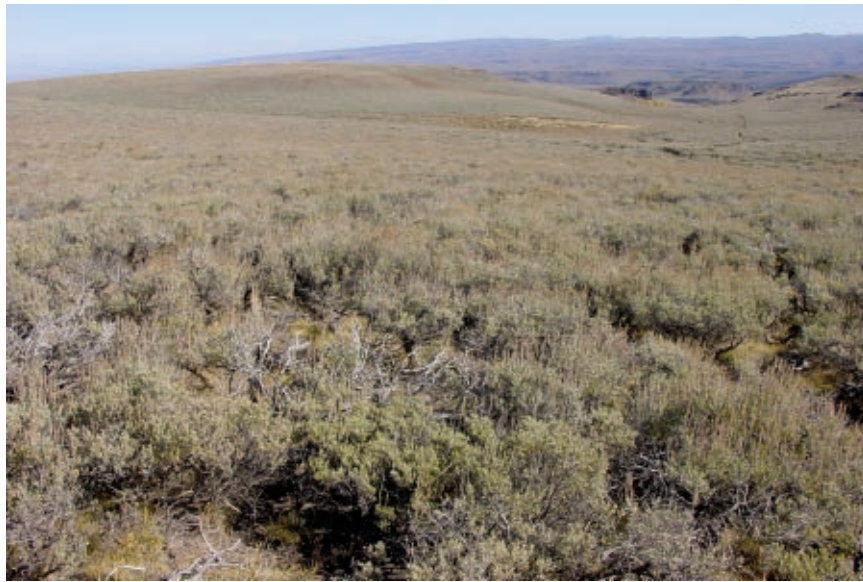
**Subclass 5(A):** This vegetation has a shrub component dominated by basin big sagebrush, or mountain big sagebrush, or infrequently, Wyoming big sagebrush, with an understory of native grasses and forbs (Figures 24 and 25). Particularly on sites where sagebrush canopy cover does not exceed 35 percent, subclass 5(A) vegetation represents the potential natural community for basin big sagebrush or mountain big sagebrush dominated vegetation types (Miller and Eddleman 2001). As sagebrush canopy cover approaches and exceeds 35 percent, the understory of native grasses and forbs declines. Subclass 5(A) vegetation can meet the habitat needs of sage-grouse—for example, by providing nesting habitat (Connelly et al. 2000; Miller and Eddleman 2001), brood-rearing habitat (Miller and Eddleman 2001), and winter habitat (Connelly et al. 2000)—and those of other wildlife that rely primarily on sagebrush and associated understory herbaceous species. Subclass 5(A) vegetation with sagebrush canopy cover in the range of greater than 25 percent to 35 percent is probably within the range of what the soils, landform, and climate would sustain for basin big sagebrush or mountain big sagebrush dominated vegetation types. However, subclass 5(A) vegetation with sagebrush canopy cover that exceeds 35 percent is less desirable



and can be a result of excessive livestock grazing pressure or fire suppression.

*Subclass 5(B):* This vegetation has a shrub component dominated by Wyoming big sagebrush, which typically is lacking in understory grasses and forbs (Miller and Eddleman 2001) and often has an understory composed of introduced annual grasses and forbs such as cheatgrass and mustards (photo not available.). Understory native grasses, forbs, and biological soil crusts

would be primarily restricted to microsites beneath shrub canopies and would rarely be found in intershrub microsites. Disturbances such as excessive livestock grazing pressure often contribute to development of subclass 5(B) vegetation (Miller and Eddleman 2001). Subclass 5(B) Wyoming big sagebrush dominated vegetation types can meet some of the habitat needs of sage-grouse—for example, by providing winter habitat (Connelly et al. 2000; Miller and Eddleman 2001)—and those of other wildlife



**Figure 24.** An example of subclass 5(A), mid-seral vegetation with shrub canopy cover dominated by mountain big sagebrush and perennial forbs and grasses present in the understory in the Whitehorse Butte allotment in the Trout Creek GMA at an elevation of 7,500 feet.

Photo taken by Jon Sadowski.



**Figure 25.** An example of subclass 5(A), vegetation dominated by Wyoming big sagebrush, with a sagebrush canopy cover averaging 25.6 percent but ranging between 20 percent and 30 percent (based on 3, 100-foot line intercept samples). It has an understory dominated by grasses, such as bluebunch wheatgrass and Thurber's needlegrass, and forbs, represented by *Lupinus* sp., *Crepis*

*acuminata*, *Erigeron* sp., *Allium* sp., *Phlox hoodii*, and *Eriogonum* sp. This example is in the North Jackson Creek pasture of the 15 Mile allotment in Trout Creek GMA, in the upland study enclosure at an elevation of 5,600 feet and in a 12- to 14-inch precipitation zone.

Photo taken by Jon Sadowski.



species that rely primarily on sagebrush and associated understory herbaceous species. However, Wyoming big sagebrush dominated vegetation types with shrub canopy cover that exceeds

25 percent generally are not the potential natural community, nor a desirable outcome, when the inherent capabilities of soils, landform, and climate are factored in.



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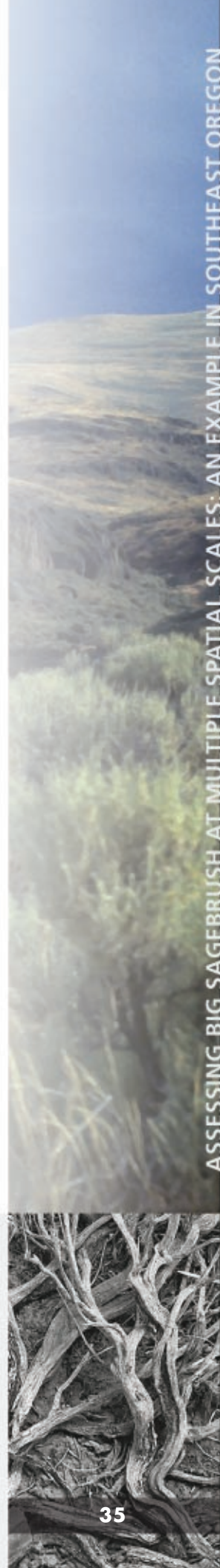
# Summary of Assessment Steps and Results

Table 6 summarizes the steps followed and the results of the assessment in southeastern Oregon. Some of the ideas in this assessment, or variations of them, may be of use to biologists working elsewhere in sagebrush habitats. However, it is well understood that there is no single management strategy that will meet all of the peculiar local

conditions and needs BLM biologists face across the sagebrush biome. As with any assessment approach, the approach presented here has its strengths and weaknesses, yet it still provides a foundation from which to build an assessment process that addresses site-specific issues.

**Table 6. Summary of major assessment steps and results, sequentially presented in this sagebrush assessment.**

Assessment Steps	Major Results
<p><b>Define Assessment Scales:</b> Define broad, mid, fine, and site (local) spatial scales.</p>	<p>The mid scale is the area covered by a resource management plan and its constituent GMAs. The fine scale is a pasture within allotments. The site or local scale is an ecological site within a pasture. The broad-scale sagebrush assessment from ICBEMP covers many BLM Districts and serves as the context for developing objectives at the finer scales. Sagebrush objectives were developed at the mid and fine scales.</p>
<p><b>Create Canopy Cover Classes:</b> Divide big sagebrush canopy cover into habitat classes that represent grasslands and shrublands. Use big sagebrush classes to complement existing rangeland ecology metrics and provide a simple way to portray sagebrush structural conditions important to wildlife.</p>	<p>These big sagebrush canopy cover classes were created: Class 1: no sagebrush canopy cover (grassland); Class 2: trace to 5 percent sagebrush canopy cover (grassland); Class 3: greater than 5 percent to 15 percent sagebrush canopy cover (shrubland); Class 4: greater than 15 percent to 25 percent sagebrush canopy cover (shrubland); Class 5: greater than 25 percent sagebrush canopy cover (shrubland).</p>
<p><b>Make Mid-Scale Assessments: Place Mid-Scale Conditions in the Context of Broad-Scale Findings:</b> Compile data about and portray mid-scale resource conditions, including the extent of vegetation types that either support or have the potential to support big sagebrush and the spatial location and extent of past disturbances such as wildfire and chemical control treatments. Mid-scale resource conditions were placed in the context of big sagebrush vegetation trends over time and space at a broader scale reported in the sagebrush assessment of the ICBEMP.</p>	<p>Of the 4.6 million acres in the SEORMP area, about 3.49 million acres either support or are capable of supporting big sagebrush and about 1.92 million of those acres lie within the Jordan Resource Area. In the Jordan Resource Area, as of 2002, seedings and brush control treatments covered about 347,000 and 171,000 acres, respectively, for a total of 518,000 acres of land treatments; between 1980 and 2002, 411,500 acres burned and, in some cases, the same acres burned multiple times.</p> <p>Big sagebrush vegetation types were highlighted for conservation and restoration in the ICBEMP. The big sagebrush cover type, which includes the Wyoming and basin subspecies, declined 33 percent in area in the Interior Columbia Basin from the mid-1800s to the present. The mountain big sagebrush cover type declined 34 percent in area in the Interior Columbia Basin from the mid-1800s to the present. Largely because of these declines, species such as the sage-grouse, sage thrasher, Brewer’s sparrow, sage sparrow, lark bunting, pygmy rabbit, and sagebrush vole experienced a 28 percent decline in source habitat from the mid-1800s to the present.</p>



**Make Mid-Scale Assessments:**  
**Determine Mid-Scale Objectives:**  
 The big sagebrush objective includes a minimum allowable percent of big sagebrush spatial extent.

Of the 3.49 million acres in the SEORMP area and 1.92 million acres in Jordan Resource Area that either support big sagebrush or have the potential to, 70 percent should be the minimum allowable maintained in classes 3, 4, or 5; this amounts to 1.347 million acres in the Jordan Resource Area.

**Make Mid-Scale Assessments:**  
**Identify Mid-Scale Geographic Management Areas:**  
 Identify GMAs containing from one to several allotments to serve as expedient administrative units within which to assess achievement of Standards for Rangeland Health.

Eight GMAs were identified in the Jordan Resource Area for the SEORMP. Louse Canyon was the first GMA assessed for Standards for Rangeland Health and is the GMA highlighted in this example.

**Make Mid-Scale Assessments:**  
**Determine Mid-Scale Geographic Management Area Objectives:**  
 For each GMA, the big sagebrush objective includes a focus on late structural status and a minimum allowable percent of big sagebrush spatial extent. Each GMA's big sagebrush objective contributes to the achievement of the mid-scale SEORMP big sagebrush objective of 70 percent minimum allowable in classes 3, 4, or 5.

Based on existing information and familiarity with the overall habitat patterns of the Jordan Resource Area, Louse Canyon GMA was generally known to have a high level of sagebrush habitat connectivity and few impacts from fires or land treatments. The minimum allowable percent goal for classes 3, 4, and 5 sagebrush habitat was set at 85 percent. For the remaining GMAs, the minimum allowable percent varies from 30 percent to 85 percent depending on existing fire impact areas or existing seedings currently in class 1 or 2 status.

**Make Fine-Scale Determinations:**  
**Determine Fine-Scale, Pasture-Level Objectives:**  
 The big sagebrush objectives include a minimum allowable range of big sagebrush spatial extent in classes 3, 4, or 5. Associated herbaceous understory objectives focus on plant composition. Each pasture's big sagebrush and herbaceous understory objectives contribute to the achievement of the mid-scale GMA objectives.

On native rangeland, 50 to 75 percent of the pasture's area is in the minimum allowable range of sagebrush to maintain in classes 3, 4, or 5. The associated herbaceous understory should be representative of mid-seral, late-seral, or potential natural community ecological status. On seeded rangeland, 25 to 50 percent of the pasture's area is in the minimum allowable range of sagebrush to maintain in classes 3, 4, or 5. The associated herbaceous understory should include one or more adapted forb species.

**Make Fine-Scale Determinations:**  
**Evaluate Achievement of Oregon's Rangeland Health Standard 5:**  
 Describe existing vegetation in terms of big sagebrush canopy cover classes and associated herbaceous understory so that determinations for Oregon's Standard 5 can be made for each pasture. Then, based on all the pasture determinations, describe composite GMA plant community patterns in an evaluation that addresses the achievement of the GMA objective.

Out of 20 pastures evaluated in the Louse Canyon GMA, 15 fully achieved the pasture-level objectives for big sagebrush canopy class and herbaceous understory conditions. Four pastures achieved the big sagebrush objective but did not achieve the herbaceous understory objective. One pasture failed to achieve the big sagebrush and the herbaceous understory objectives because it was a crested wheatgrass grassland with no native or introduced forbs.

Based on all the pasture determinations, the mid-scale GMA big sagebrush objective of 85 percent as the minimum allowable was achieved. Nearly 96 percent of the 394,000 acres in Louse Canyon GMA that are capable of supporting big sagebrush support big sagebrush in classes 3, 4, or 5. These acres appeared on the landscape as well-connected shrubland communities, predominantly in mid- to late- to potential natural community ecological status. The GMA objective permits some land treatment that specifies no more than 5 percent of the big sagebrush vegetation (26,000 acres total) could appear as grassland attributable to BLM-initiated actions. A conservation emphasis was warranted over the long term (at least 20 years) for wildlife that rely on sagebrush and associated understory herbaceous species.

**Determine Site (Local, Within Pasture)**

**Subclasses:**

Divide the five big sagebrush canopy cover classes into more detailed subclasses, which are based on different patterns of overstory and understory relationships.

Sixteen subclasses were created: four for class 1 [no sagebrush canopy cover (grassland)], four for class 2 [trace to 5 percent sagebrush canopy cover (grassland)], three for class 3 [greater than 5 percent to 15 percent sagebrush canopy cover (shrubland)], three for class 4 [greater than 15 percent to 25 percent sagebrush canopy cover (shrubland)], and two for class 5 [greater than 25 percent sagebrush canopy cover (shrubland)]. These subclasses were not used in this sagebrush assessment, yet they are provided as placeholders that can be identified, mapped, and spatially analyzed in future evaluations. They can be incorporated as attributes in ecological site inventory data collection currently being planned for the Jordan Resource Area.



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