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## Strategy Habitat: Sagebrush Steppe and Shrublands

### **Ecoregions:**

Sagebrush steppe and shrublands are a Strategy Habitat in the Blue Mountains, Columbia Plateau, and Northern Basin and Range ecoregions. Sagebrush habitats also occur in the East Cascades ecoregion. Due to the diversity of sagebrush community types and localized patterns of historic habitat loss, this Conservation Strategy focuses on different sage communities for each ecoregion.

### **General Characteristics:**

Sagebrush-dominated communities differ greatly in structure and species composition depending on ecoregion, elevation, soils, moisture regimes, and fire history. In general, sagebrush habitats occur on dry flats and plains, rolling hills, rocky hill slopes, saddles and ridges where precipitation is low. Sagebrush steppe is dominated by grasses and forbs (more than 25 percent of the area) with an open shrub layer. In sagebrush steppe, natural fire regimes historically maintained a patchy distribution of shrubs and predominance of grasses. In shrub-steppe habitats of the Columbia Plateau and Blue Mountains, a soil crust (called a microbiotic or cryptogammic crust) composed of lichens, mosses, fungi, and bacteria reduces soil erosion and moisture loss. Sagebrush shrublands are dominated by shrubs, with less area covered by grasses and forbs than in steppe habitats. In many, but not all, sagebrush shrublands, natural fire regimes created a mosaic of stand ages and structures.

### **Ecoregional Characteristics:**

**Columbia Plateau:** Shrub-steppe habitats are open grass-dominated communities and are usually found on loamy, wind-deposited (loess) soils. In this ecoregion, shrub-steppe communities can be broadly divided into two elevational types. Within ten miles of the Columbia River, sandy shrub-steppe communities occur on unstable, well-drained soils. These include grasslands dominated by needle-and-thread; shrub-steppe habitats dominated by bitterbrush and needle-and-thread grass or Indian rice grass; and sand dune communities characterized by sage-

brush, bitterbrush, and western juniper. There is usually a component of bare ground or open sand present. Further from the Columbia River, big sagebrush steppe communities include basin big sagebrush/needle-and-thread grass; basin wildrye and bluebunch wheatgrass steppe; and Wyoming sagebrush/bluebunch wheatgrass, which formerly occupied the low-elevation, loess uplands in the Columbia Plateau.

**Blue Mountains:** Big sagebrush steppe communities are similar to those of the Columbia Plateau. Sagebrush shrubland species vary by elevation and soils but include low sagebrush, silver sagebrush, rigid sagebrush, basin big sagebrush, Wyoming big sagebrush, mountain big sagebrush, threetip sagebrush, bitterbrush, and rabbitbrush. Soils vary in depth and texture but are non-saline.

**Northern Basin and Range:** Big sagebrush habitats include mountain, basin and Wyoming big sagebrush shrublands and shrub steppe. Structurally, these habitats are composed of medium-tall to tall (1.5 – six feet) shrubs that are widely-spaced with an understory of perennial bunchgrasses. Basin big sagebrush communities occur on deep silty or sandy soils along stream channels, in valley bottoms and flats, or on deeper soil inclusions in low sage or Wyoming big sage stands. Wyoming big sagebrush communities occur on shallower, drier soils. Mountain big sagebrush communities occur at montane and subalpine elevations on deep soiled to stony flats, ridges, nearly flat ridge tops, and mountain slopes. The fire frequency in big sagebrush habitats ranges from 10-25 years for mountain big sagebrush and 50-100 years for Wyoming big sagebrush.

Although these particular sagebrush communities are considered the priorities for this Conservation Strategy, other sagebrush types also provide important habitat for wildlife and may need to be considered at the local and watershed scale or for the conservation of particular species. For example, low sagebrush is important for greater sage-grouse, a Strategy Species.

Low sagebrush habitats cover large areas of the Northern Basin and Range ecoregion. They are characterized by very shallow, poorly developed soils and dominated by low sagebrush, perennial forbs and Sandberg's bluegrass. Low sagebrush provides critical wildlife habitat for many sagebrush-obligate species. Because of the poor shallow soils low sagebrush communities are slow (150-300 years) to recover from significant soil disturbance or fire. Soil disturbance in these sites often result in establishment of invasive annual grasses.

### **Conservation Overview:**

Sagebrush habitats in eastern Oregon are both extensive and diverse, ranging from low elevation valleys to high mountain areas and from grassland-like shrub-steppe to relatively dense shrublands. In addition, there are many species and subspecies of sagebrush, which are associated with different grasses and herbaceous plants, depending on site conditions. General ecology and conservation issues vary by sagebrush community type, so conservation actions must be tailored to local conditions and conservation goals. Detailed descriptions of the different sagebrush plant communities are available from sources included in the references. Also, additional information on sagebrush habitats is in Oregon Department of Fish and Wildlife's *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon: A Plan to Maintain and Enhance Populations and Habitat*.

Although sagebrush habitats are still common and widespread in eastern Oregon, some sagebrush habitat types have high levels of habitat loss and are of conservation concern. These types vary by ecoregion. In the Blue Mountains, valley-bottom sagebrush types, including threetip or basin big sagebrush, that occur on deep soils are particularly at risk. Also important are the valley margin steppe types with Wyoming sagebrush, squawapple and bitterbrush. In the lower elevations of the Columbia Plateau, shrub-steppe communities have been almost entirely replaced by irrigated agriculture. Remnant habitats occur on public lands such as the Boardman Bombing Range and in scattered patches along roadsides and fields.

In the Northern Basin and Range, several types of big sagebrush are combined into a single priority habitat for this Conservation Strategy, including mountain, basin and Wyoming big sagebrush shrublands and shrub steppe. This part of Oregon has some of the largest blocks of high-quality sagebrush habitat left in the United States, but some types have been impacted by several factors. Basin big sagebrush communities have had the greatest loss as compared to historic distribution. These communities historically occurred on deep soils, and they have been converted to agricultural development in some areas. The deep soils of basin big sagebrush are important for pygmy rabbits to create burrows.

Although Wyoming big sagebrush habitats are still common and widespread in this ecoregion, they have been altered to some degree by unmanaged grazing, invasive species, and altered fire regimes. With overgrazing and fire suppression, shrub (mostly sagebrush) density increases, bunchgrass and forb density decreases and invasive annual grasses increase. In many areas, these habitats have shifted from mosaics of native perennial grasses, forbs, and shrubs to landscapes heavily dominated by shrubs and invasive annual forbs and grasses. Juniper encroachment is an important issue in mountain big sagebrush communities between 4,500 and 7,000 feet.

Big sagebrush habitats have high structural diversity, thus more places to forage, hide, and build nests. As a result, the number of bird species generally increases with sagebrush height. Habitat values are also dependent on a diverse understory of bunchgrasses and flowering plants.

Throughout eastern Oregon, loss of grassland-shrub mosaics across landscapes and the degradation of understories have contributed to the decline of species dependent on high-quality sagebrush habitats. Strategy Species associated with sagebrush include greater sage-grouse, ferruginous hawk, loggerhead shrike, sage sparrow, Brewer's sparrow, sagebrush lizard, Washington ground squirrel, and pygmy rabbits (which often burrow along the interface where low sagebrush mixes with mountain big sagebrush). Other wildlife closely associated with sagebrush include black-throated sparrow, sage thrasher, sagebrush vole, and pronghorn.

### **Limiting factors to Sagebrush Steppe and Shrubland habitats:**

#### **Factor: Altered fire regimes and localized issues with prescribed**

**fire:** Fire suppression has resulted in undesirable changes in vegetation and contributes to increases in the intensity of wildfires. Western junipers encroach into and degrade sagebrush habitats with fire suppression in some areas. Dense juniper stands are not suitable for species that require open sagebrush habitats.

While a useful tool when tailored to local conditions, prescribed fire is not necessarily suitable for all sagebrush habitat types. Some sagebrush habitats, such as low sagebrush, are extremely slow to recover from disturbance such as prescribed fire. Inappropriately managed fire, both prescribed fire and wildfire, can increase dominance by invasive plants.

**Approach:** Carefully evaluate sites to determine if prescribed fire is appropriate, and be particularly cautious in low productivity needle-grass sites where recovery times are prolonged or in sites with invasive annual grasses. If determined to be ecologically beneficial, reintroduce natural fire regimes using site-appropriate prescrip-

tions. Use prescribed fire to create a mosaic of successional stages and avoid large prescribed fires. In areas where prescribed fire is undesirable or difficult to implement, use mechanical treatment methods (e.g., chipping, cutting for firewood) to control encroaching junipers. Develop markets for small juniper trees as a special forest product to reduce restoration costs.

Maintain juniper trees with old-age characteristics, which are important nesting habitat for songbirds and raptors. Use mechanical treatments such as mowing to maintain shrub cover at desired levels. Consider landscape context and landscape diversity when planning conservation actions.

**Factor: Invasive species:** Depending on the area, invasive plants such as yellow-star thistle, knapweeds (diffuse, spotted and purple), rush skeleton weed, spikeweed, leafy spurge and perennial pepperweed invade and degrade sagebrush habitats. The introduction

and spread of the invasive annuals cheatgrass and medusahead, can increase the frequency, intensity, and extent of fires. Sagebrush and native bunchgrasses are adapted to infrequent, patchy fires, so are eliminated by hot fires. The dominance of invasives thus increases, further increasing wildfire risk.

**Approach:** Emphasize prevention, risk assessment, early detection and quick control to prevent new invasives from becoming fully established. Prioritize control efforts and use site-appropriate methods to control newly-established species for which management can be most effective (e.g., leafy spurge and perennial pepperweed). Cooperate with partners through habitat programs and County Weed Boards to address invasive species problems. Reintroduce shrubs, grasses and forbs at control sites through seeding and/or planting. In some cases, it may be desirable to use “assisted succession” strategies, using low seed rates of non-invasive non-native plants in conjunction with native plant seeds as an intermediate step in rehabilitating disturbances to sagebrush habitat.

## Medusahead Challenge

In 2004, a group of concerned people from five western states convened to develop a strategic plan for managing medusahead. The mission of the Medusahead Challenge is to enhance and coordinate education, research, and management of medusahead infested rangeland throughout Oregon, Washington, Idaho, California, and Nevada. The USDA-Agricultural Research Service-Burns has been providing over all leadership to the program, and there are an additional 144 partners involved. The Medusahead Challenge is an outcome-based program organized around three interrelated focus areas; management, research, and education. In eastern Oregon, four working teams have developed community level management plans for medusahead. Each plan has identified a prevention and con-

tainment border, control strategies, and a restoration program where necessary. These plans are currently being implemented to the extent current resources allow. In addition, the Circle-Bar Ranch located near

Mitchell, Oregon is being used a demonstration and case study for effective and state-of the art medusahead management. Substantial research is also underway. The goals are to 1) improve the ability to prevent invasion of rangeland by medusahead, 2) determine the most ecologically sound and cost effective methods for managing medusahead using herbicides, 3) develop landscape scale restoration strategies for medusahead-infested rangeland using successional management. For more information about the Medusahead Challenge contact: Dr. Roger Sheley at 541.573.8938; email: roger.sheley@oregonstate.edu.



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Prevent and control wildfires in areas where cheatgrass dominates in the understory. Conduct research to determine methods to manage established species such as cheatgrass and medusahead. Minimize soil disturbance in high priority areas to prevent establishment of invasive species.

**Factor: Damage to microbiotic soil crusts:** In the Columbia Plateau and Blue Mountains, unmanaged grazing can damage soil crusts, which leads to soil erosion, changes in plant species composition and structure, and degradation by invasive plants.

**Approach:** Because most of the Columbia Plateau ecoregion is privately-owned, voluntary cooperative approaches are the key to long-term conservation in this ecoregion. Use tools such as financial incentives, technical assistance, regulatory assurance agreements, and conservation easements to achieve conservation goals. Continue to work with public land managers to ensure grazing is carefully managed. Conduct research and develop incentives to determine grazing regimes that are compatible with a variety of conservation goals.

**Factor: Conversion to other land uses:** In the Columbia Plateau, remnant shrub-steppe habitats are subject to conversion to

agriculture. In the Blue Mountains and East Cascades ecoregions, rapidly growing human populations near Bend, Redmond and Madras, and slowly but steadily growing populations near Baker City and La Grande are resulting in land use conversion, habitat loss, and habitat fragmentation.

**Approach:** Use tools such as financial incentives and conservation easements to conserve priority sagebrush habitats. For example, re-establishing shrub component of lands enrolled in the Conservation Reserve Program has helped restore habitat structure. Work with community leaders and agency partners to ensure that development is planned and consistent with local conservation priorities. Support and implement existing land use regulations to preserve farm and range land, open spaces, recreation areas, and natural habitats from incompatible development.

**Factor: Loss of habitat connectivity:** In the Columbia Plateau, shrub-steppe habitats often occur in small patches such as roadsides and field edges. These patches are valuable habitat for some species, especially some plants. However, small size and poor connectivity of remnant patches limits dispersal for some species.

**Approach:** Maintain high priority patches and improve connectivity when possible.



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