Ecological site group R021XG905CA
Dry Sandy

Last updated: 08/26/2024
Accessed: 05/10/2025

Key Characteristics

- Upland sites
- < 12" ppt
- > 20" depth
- Sandy texture

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Physiography

This ESG is predominantly on lake terraces, stream terraces, fan remnants, terraces, and alluvial plains with slopes of 0 to 2 percent.

Climate

The average annual precipitation in this MLRA is typically 9 to 25 inches (241 to 635 millimeters). It is highest, up to 57 inches (1,450 millimeters), in small areas at high elevations on the western and southwestern edges of this MLRA. Other high precipitation zones are in the scattered mountain ranges throughout the rest of this area. Most of the rainfall occurs as low- or moderate-intensity Pacific frontal storms during the winter. At the higher elevations, rain generally turns to snow. Snow may fall at the lower elevations in winter but does not last. Summers are dry. The average annual temperature is 37 to 53 degrees F (3 to 12 degrees C). The frost-free period is 70 to 185 days and averages 130 days.

Soil features

Typical soils for this concept range from loamy fine sands to loamy sands and can be divided into two categories: moderately deep, somewhat poorly drained soils formed in sediments weathered from tuff, basalt, diatomite, and ash; and very deep, somewhat excessively drained to excessively drained soils formed in alluvium or lacustrine deposits derived either from volcanic rocks with an influence of volcanic ash, or from extrusive igneous rock.

Representative soils include the Fordney (mixed, mesic Torripsammentic Haploxerolls), Poman (sandy, mixed, mesic Xeric Haplodurids), and Poe (sandy, mixed, mesic Typic Durixerepts) series.

Vegetation dynamics

Basin big sagebrush grows on relatively more mesic habitats than other subspecies of big sagebrush. It commonly grows on plains, valley bottoms, lower foothill areas, or areas adjacent to drainages. Basin big sagebrush is associated with deep, seasonally dry, well drained soils. It commonly grows on sites with high water tables or deep moisture accumulations. Basin big sagebrush also grows on stratified sandy loam soils on floodplains or on low stream terraces [53]. In southeastern Idaho, basin big sagebrush is most abundant on sandy soils or on soils with relatively high sand content.

Basin big sagebrush is an indicator of productive sites because it tends to grow on deep, fertile soils. Many sites historically dominated by basin big sagebrush are now farmland. On farmlands basin big sagebrush is now restricted primarily to field edges, swales, and along drainageways.

Big sagebrush is the climax species on most of its present-day range. Research suggests that invasion into other vegetation types was uncommon. Humphrey describes big sagebrush as a "late successional" species in southeastern Idaho. Basin big sagebrush may increase on disturbed pastures that have been seeded to grasses such as crested wheatgrass (*Agropyron cristatum*).

In many instances, basin big sagebrush shows only a moderate increase in density on disturbed sites but may exhibit large increases in crown density. Seedling establishment may begin immediately following a disturbance, but it usually takes a decade or more before big sagebrush dominates the site. Many basin big sagebrush sites are now depleted of "normal" perennial grasses and instead are now dominated by cheatgrass (*Bromus tectorum*).

Big sagebrush is killed by most fires. Prolific seed production from nearby unburned plants coupled with high germination rates enables seedlings to establish rapidly following fire. Wind-, water-, and animal-carried seed contribute to regeneration on a site. Few if any fire history studies have been conducted on basin big sagebrush. Research suggests that fire return intervals in basin big sagebrush are intermediate between mountain big sagebrush (5 to 15 years) and Wyoming big sagebrush (10 to 70 years). Note that "given the wide range of fuel situations and our understanding of yearly climatic variation in the sagebrush ecosystem, a naturally wide variation in fire frequency in this system should be expected".

In many basin big sagebrush communities, changes in fire patterns have occurred due to fire suppression and livestock grazing. Before the introduction of annuals, insufficient fuels may have limited fire spread in big sagebrush communities. Introduction of annuals has increased fuel loads so that fire can easily carry. Burning in some big sagebrush communities can set the stage for repeated fires. Fire frequency can be as little as five years, which is not sufficient time for the establishment and reproduction of big sagebrush. Repeated fires have removed big sagebrush from extensive areas in the Great Basin and Columbia River drainages.

Fire severity in big sagebrush communities is "variable" depending on weather, fuels, and topography. However, fire in basin big sagebrush communities is typically stand replacing.

Major Land Resource Area

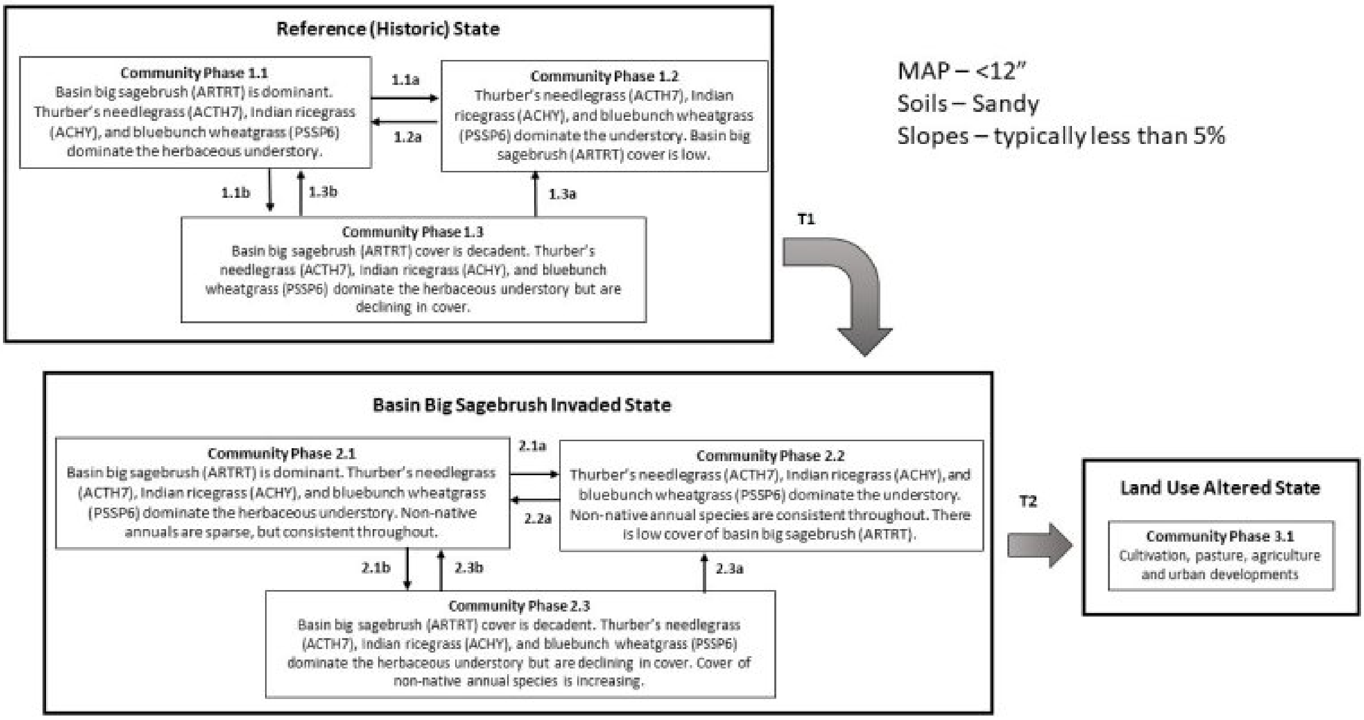
MLRA 021X
Klamath and Shasta Valleys and Basins

Stage

Provisional

State and transition model

Basin Big Sagebrush General Ecological Model (Sandy Valleys and Basins)



Basin Big Sagebrush Reference (Historic) State –

This state represents the reference state that existed prior to the introduction of non-native annuals that now dominate much of the western United States. The resistance of this state to non-native annuals is/was relatively low, but sites on more north-facing soils are more resilient to disturbance than similar sites on south-facing soils. The dynamics and species composition would be like those described in the Basin Big Sagebrush Invaded State, without the presence of non-native annuals.

T1: This transition occurs when non-native annuals are introduced to the site. Droughts, fires, wildlife grazing, and human settlement and recreation on the site all play a role in the introduction of non-native annuals. Once the non-native annuals become a consistent part of the herbaceous layer, the site crosses an ecological threshold where non-native annuals begin to capitalize on some of the resources of the site. This alters the overall ecological integrity in ways that facilitate the consistent presence of non-native annuals.

Basin Big Sagebrush Invaded State –

This state is based on limited information gathered regarding basin big sagebrush plant communities on fine sandy valley bottoms throughout MLRA 21. This information suggests fire is the dominant driver of change in this state. With the presence of non-native annuals, resistance to disturbance pressures is moderate and resilience is relatively low due to its existence on excessively drained, droughty soils. All community phases are at-risk of crossing a threshold; if the fire frequency becomes too frequent or if there are additional pressures on the site such as livestock grazing, long-term drought or pests/disease, then the additional stress to the site's ecological integrity increases the risk of crossing a threshold.

Community Phase 2.1: This community's species composition is similar to the historic reference state conditions prior to invasion by non-natives. However, while the dominant structural components remain, there is a sparse, but consistent component of non-native species in the understory. Ecological processes (infiltration, nutrient cycling, energy capture) are not significantly compromised at this time, but ecological resilience is significantly reduced by the presence of non-natives. Basin big sagebrush remains a consistent part of the canopy composition and structure through re-establishment by seed and relatively rapid growth and productivity. Bluebunch wheatgrass, Indian ricegrass, and Thurber's needlegrass dominate the herbaceous layer, comprising the bulk of the canopy cover and biomass. Non-native annual grasses contribute to fine fuel loads. This increases the risk of reoccurring wildfire. Repeated fires—more than one fire within 15 to 20 years—cause this community to transition to Community Phase 2.2 and potentially maintain the CP in 2.2 for an extended period of time, while also reducing the amount of acreage of this community phase and altering the natural fire regime and increasing the extent of Community Phase 2.2.

Community Pathway 2.1a: This pathway occurs after a wildfire hot enough to burn out most of the woody species.

Community Pathway 2.1b: This pathway occurs when fire intervals are long enough for basin big sagebrush to dominate a greater amount of the site's resources and begin to shade out the herbaceous understory.

Community Phase 2.2: This community is characteristic of an early-seral plant community post-fire. It is dominated by native perennial bunchgrasses and forbs. Early successional, post-fire plant communities in the invaded state have significant amounts of native bunchgrasses that dominate the composition. However, non-native annual grasses are also a significant component. After fire, native perennial bunchgrasses respond favorably, increasing in cover and vigor. Non-native annual grasses increase fine fuel loads. Thus, the risk of reoccurring wildfire increases. Repeated fires extend the length of time and acreage of this community phase by removing more basin big sagebrush seedlings and seeds from the site, limiting the ability of basin big sagebrush to naturally re-establish.

Community Pathway 2.2a: This community pathway occurs in the absence of natural disturbances such as fire, insect attacks, and diseases, and natural regeneration continues over time. Recovery time for sagebrush communities is dependent on ecological variables such as snowpack, spring precipitation, seed source proximity, etc.

Community Phase 2.3: This community is characterized by a decadent basin big sagebrush overstory and a reduced perennial herbaceous understory. In the absence of fire disturbance, this sagebrush community turns into a more monotypic stand of late-successional shrubs and native bunchgrasses. This results in reduced quantity and diversity of plants species, and in reduced sagebrush vigor and seed production. Over-mature sagebrush plants are competitive for light, water, and nutrients, preventing recruitment and establishment of other vegetation and increasing the amount of bare ground. Non-native annuals persist in the understory and may increase following decrease or loss of other functional and structural groups. Loss of deep-rooted perennial bunchgrasses causes reduced infiltration, water holding capacity, nutrient cycling, and energy capture, all of which contribute to the overall reduced resilience of this community phase.

Community Pathway 2.3a: This pathway occurs after a wildfire hot enough to remove most or all of the woody species.

Community Pathway 2.3b: This pathway occurs after a patchy, low-intensity fire does not remove most or all of the woody species and re-opens the canopy.

T2: This transition is caused by significant human-made alterations that remove essential topsoil horizons, alter hydrologic functions, and/or add significant inputs that change soil chemistry and soil properties. Examples of such alterations include housing developments, urban infrastructures, and intensive cropping systems. These alterations force a site over a threshold and extensively change a site's function and structure.

Land Use Altered State —

Community Phase 3.1: This community phase represents the various land uses—such as pastureland, hayland, cropland, urban developments, etc.—that significantly alter this ecological site group. This extremely varied community phase includes all types of alterations that so significantly alter the ecological site that it is permanently changed and no longer has typical or even representative ecological dynamics. Land use models are an appropriate option to develop these types of variations in altered landscapes. At this scale of grouping, specific drivers, triggers, and expressions of communities are too varied and broad to be more specific. More data collection and field verification are necessary.

Citations

Tirmenstein, D. 1999. Artemisia tridentata subsp. tridentata. Fire Effect Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer).