USDA Natural Resources
Conservation Service

Ecological site R034AA220UT
Semi-desert Loam (Wyoming big sagebrush/ Bluebunch wheatgrass)

Last updated: 2/21/2025
Accessed: 05/10/2025

General information

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.

MLRA notes

Major Land Resource Area (MLRA): 034A–Cool Central Desertic Basins and Plateaus

Major Land Resource Area (MLRA) 34A, Cool Central Desertic Basins and Plateaus, consists of approximately 21 million acres in Wyoming, Colorado and Utah, it consists of 11 Land Resource Units (LRU). These units are divisions of the MLRA based on geology, landscape, common soils, water resources and plant community potentials. The elevation spans from approximately 5600 feet (1700 m) along the Green River in UT and CO to approximately 9500 feet (2900m) near Jeffrey City, WY. Annual precipitation ranges from 7 to 16 inches (177 to 406 mm), with the driest areas in the Green River and Great Divide Basins and the wettest areas in northern Carbon County, Southeast Fremont County and Albany County. There is a seasonal weather pattern that trends west to east, with more winter precipitation in the west and more spring/summer in the east, illustrated by diminishing amounts of Big Sagebrush in the eastern part of the MLRA.

LRU notes

The Bear River Valley LRU is located on the far western side of MLRA 34A between the Bear River Divide and the Monte Cristo Range, from Woodruff, Utah at the southern end to Cokeville, Wyoming at the northern end. The total area of the LRU is approximately 340,000 acres. It shares a boundary with MLRA 47, 43B and 46 (proposed).
This LRU differs from the others in its geology, which is comprised mostly of alluvium and colluvium from the Stump Formation. Its weather patterns are such that the soil moisture is xeric, there is a slight peak in winter precipitation in this LRU, with typical yearly precipitation between 9 to 15 inches (230 to 380 mm). The soil temperature regime of this LRU is frigid with mean annual soil temperatures ranging from 44 to 48 degrees Fahrenheit (6.7 to 8.8°C). The elevation range is from 5700 to 7000 feet (1730 to 2130 m). The soils in the Bear River Valley are dominated by young aged very deep soils developed from sandstone and shale parent material re-worked with recent alluvium. Soils are dominated by Alfisols with young argillic horizons and by Fluvents in more recent alluvium.
The Bear River runs through this LRU, allowing for ample amounts of irrigation water used in the lowland areas to produce hay. Smaller tributaries originating from the neighboring mountains.

Ecological site concept

• This site does not receive any additional water.
• These soils:
o are not saline or saline-sodic
o are moderately deep to deep
o are not skeletal within 20” of the soil surface; and have less than 35 percent rock fragments in the soil subsurface
o are not strongly or violently effervescent in the surface mineral layer (within top 10”)
o have surface textures that usually range from sandy loam to loam in surface mineral layer (4”)
• have slopes less than 30 percent
• clay content is not greater than 35% in mineral soil surface layer (1-2”)

Associated sites

R034AA235UT	**Semi-desert Shallow Loam (Wyoming big sagebrush)**

Similar sites

R034AY150WY	**Sandy Green River and Great Divide Basins (Sy)**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata var. wyomingensis*
Herbaceous	(1) *Pseudoroegneria spicata*

Physiographic features

This site occurs on toe slopes, alluvial fans, and gentle slopes at elevations between 5,700 and 7,000 feet. Runoff is medium and flooding and ponding do not occur on this site.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan
Flooding frequency	None
Ponding frequency	None
Elevation	5,700–7,000 ft
Slope	2–8%
Water table depth	60 in
Aspect	Aspect is not a significant factor

Climatic features

The climate is characterized by warm, dry summers and cold, snowy winters. This climate is modified by local topographic conditions. The mountains appreciably modify both the precipitation and temperature patterns. April, May, September and October are the wettest months; December, January, February, and July are the driest.

Table 3. Representative climatic features

Frost-free period (average)	79 days
Freeze-free period (average)	112 days
Precipitation total (average)	13 in

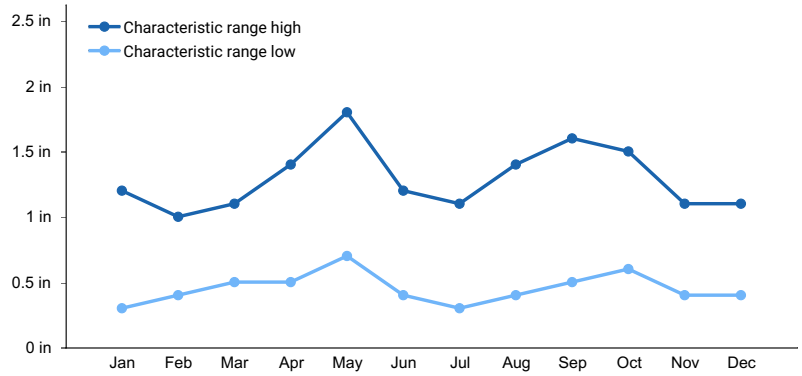

Figure 1. Monthly precipitation range

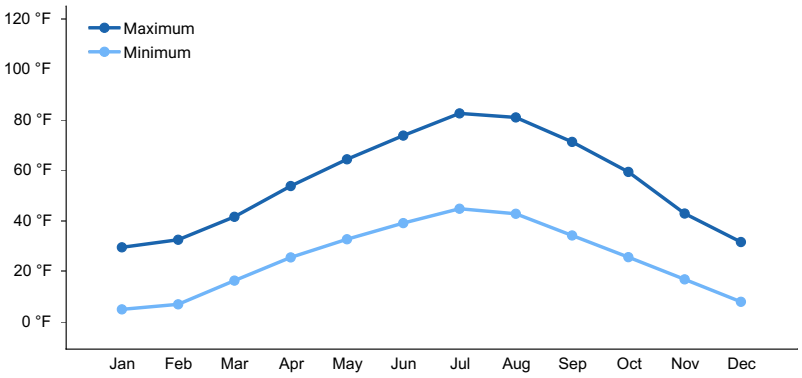

Figure 2. Monthly average minimum and maximum temperature

Influencing water features

This site is not typically influenced by streams or wetlands.

Wetland description

N/A

Soil features

The soils of this site are moderately deep to deep and formed in alluvium derived from sandstone, limestone, shale, and conglomerate.
Surface and subsurface textures are loams, silt loams or sandy loams. Rock fragments may be found on the soil surface or in the profile and make up less than 15 percent of the soil volume. These soils are well-drained, have moderately slow to moderate permeability, and water-holding capacity ranges from 9 to 10 inches of water in the upper 40 inches of soil. The soil moisture regime is xeric and the soil temperature regime is frigid.

Table 4. Representative soil features

Parent material	(1) Alluvium–metamorphic and sedimentary rock
Surface texture	(1) Loam (2) Silt loam (3) Sandy loam
Family particle size	(1) Sandy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	40–60 in
Surface fragment cover <=3"	0–15%

Surface fragment cover >3"	0–15%
Available water capacity (0-40in)	9–10 in
Soil reaction (1:1 water) (0-40in)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0–15%

Ecological dynamics

It is impossible to determine in any quantitative detail the Reference Plant Community for this ecological site because of the lack of direct historical documentation preceding all human influence. In some areas, the earliest reports of dominant plants include the cadastral survey conducted by the General Land Office, which began in the late 19th century for this area (Galatowitsch 1990). However, up to the 1870s the Shoshone Indians, prevalent in northern Utah and neighboring states, grazed horses and set fires to alter the vegetation for their needs (Parson 1996). In the 1860s, Europeans brought cattle and horses to the area, grazing large numbers of them on unfenced parcels year-long (Parson 1996). Itinerant and local sheep flocks followed, largely replacing cattle as the browse component increased.

Below is a State and Transition Model diagram to illustrate the “phases” (common plant communities), and “states” (aggregations of those plant communities) that can occur on the site. Differences between phases and states depend primarily upon observations of a range of disturbance histories in areas where this ESD is represented. These situations include grazing gradients to water sources, fence-line contrasts, patches with differing dates of fire, herbicide treatment, tillage, etc. Reference State 1 illustrates the common plant communities that probably existed just prior to European settlement.

The major successional pathways within states, (“community pathways”) are indicated by arrows between phases. “Transitions” are indicated by arrows between states. The drivers of these changes are indicated in codes decipherable by referring to the legend at the bottom of the page and by reading the detailed narratives that follow the diagram. The transition between Reference State 1 and State 2 is considered irreversible because of the naturalization of exotic species of both flora and fauna, possible extinction of native species, and climate change. There may have also been accelerated soil erosion.

When available, monitoring data (of various types) were employed to validate more subjective inferences made in this diagram. See the complete files in the office of the State Range Conservationist for more details.

The plant communities shown in this State and Transition Model may not represent every possibility, but are probably the most prevalent and recurring plant communities. As more monitoring data are collected, some phases or states may be revised, removed, and/or new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities.” According to the USDA NRCS National Range & Pasture Handbook (USDA-NRCS 2003), Desired Plant Communities (DPC’s) will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including descriptions of a plant community is to capture the current knowledge at the time of this revision.

State and transition model

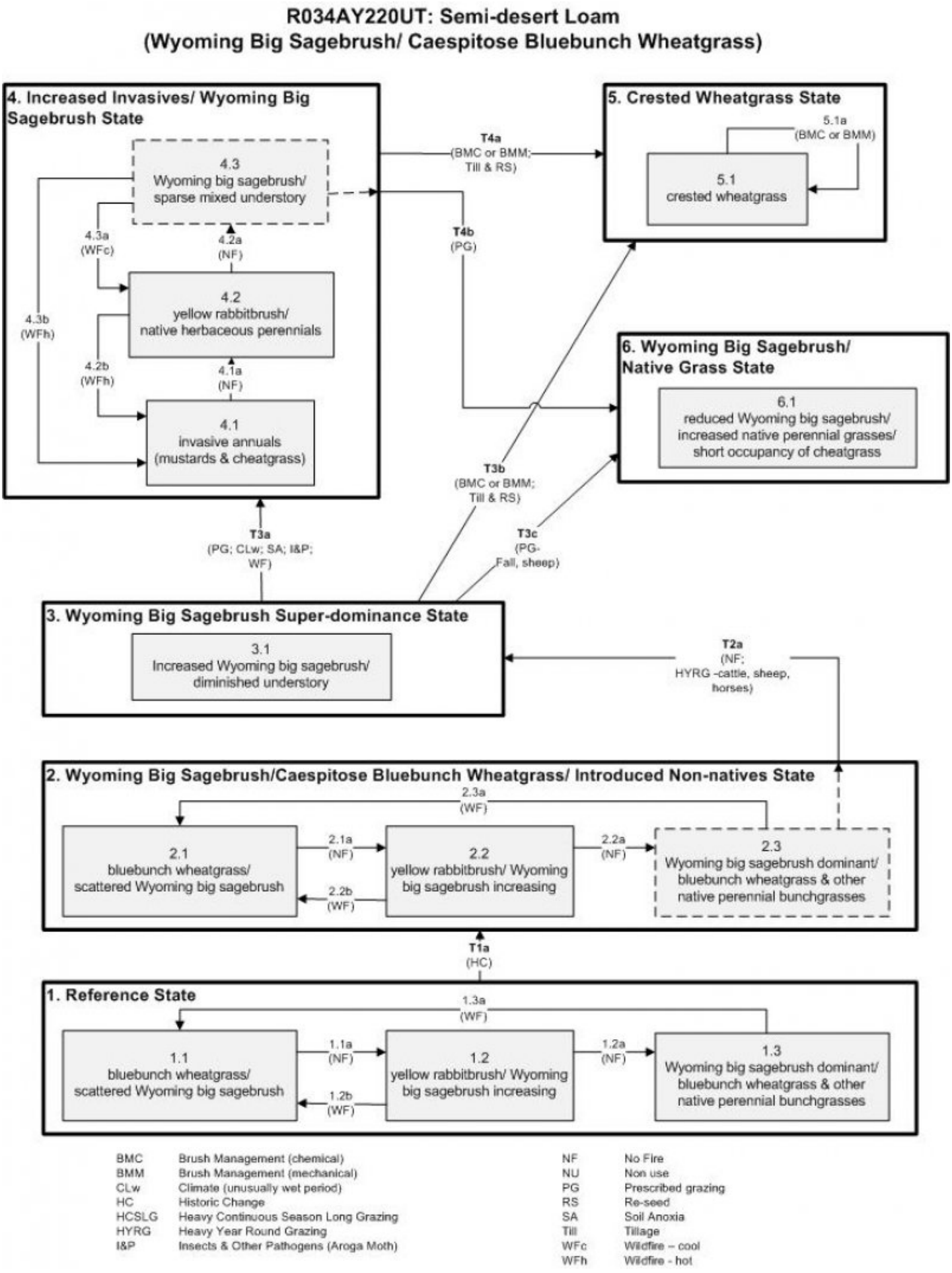

Figure 3. State and Transition Model

State 1

Reference

The Reference State is a description of this ecological site just prior to Euro-American settlement but long after the arrival of Native Americans. The description of the Reference State was determined by NRCS Soil Survey Type Site Location information and familiarity with rangeland relict areas where they exist. Before Euro-American settlement, this would have been a sparsely vegetated variant of semi-desert sagebrush with about 40 percent of the forage production from grasses, 10 percent from forbs, and 50 percent from woody plants, primarily from Wyoming big sagebrush (*Artemisia tridentata* spp. wyomingensis). The productivity would have been relatively lower than nearby sites (e.g. R034AY2llUT Semi-desert Gravel Ecological Site) because of the Inverse Texture Principle (Noy-Meir, 1973). The major grasses would have included the caespitose form of bluebunch wheatgrass (*Pseudoroegneria spicata*), Western wheatgrass (*Pascopyrum smithii*), needle-and-thread (*Hesperostipa comata*), Indian ricegrass (*Achnatherum hymenoides*), prairie junegrass (*Koeleria macrantha*), and bottlebrush squirreltail (*Elymus elymoides*). Other associated woody species may have included yellow rabbitbrush (*Chrysothamnus viscidiflorus*), and winterfat (*Krascheninnikovia lanata*). A more complete list of species by lifeform for the Reference State is available in the accompanying tables in the “Plant Community Composition by Weight and Percentage” section of this document. Total annual forage production would have been about 350 to 400 pounds per acre on flat to moderately sloping uplands. The fire return interval would have been on average approximately 40-50 years. The phases of this State would have depended on the time since last fire, starting with a bluebunch wheatgrass-dominated site (1.1) immediately following fire (1.3a, 1.2b), with yellow rabbitbrush becoming temporarily dominant 30 to 40 years post fire (1.2), followed by return to Wyoming Big sagebrush dominance with bunchgrass understory (1.3) 40 to 50 years post fire (1.2a).

Community 1.1
Bluebunch wheatgrass/ Scattered Wyoming big sagebrush

Community Phase 1.1: Bluebunch wheatgrass/ Scattered Wyoming big sagebrush This plant community would have been characterized by the temporary dominance of assorted native perennial bunchgrasses, primarily the caespitose form of bluebunch wheatgrass, with scattered Wyoming big sagebrush. Dominant grasses would have included Western wheatgrass, needle-and-thread, Indian ricegrass, prairie junegrass, and bottlebrush squirreltail. This community would have existed for approximately the first decade following fire.

Community 1.2
Yellow rabbitbrush/ Wyoming big sagebrush increasing

Community Phase 1.2: Yellow rabbitbrush/ Wyoming big sagebrush increasing This plant community would have existed approximately 30 to 40 years post wildfire, and would have had yellow rabbitbrush as the dominant species, with a slight increase in Wyoming big sagebrush.

Community 1.3
Wyoming big sagebrush dominant/ bluebunch wheatgrass & other native perennial bunchgrasses

Community Phase 1.3: Wyoming big sagebrush dominant/ bluebunch wheatgrass & other native perennial bunchgrasses The balance between Wyoming big sagebrush and bluebunch wheatgrass would have returned following at least a 40 year period since the last wildfire. Other native perennial bunchgrasses such as Western wheatgrass, needle-and-thread, Indian ricegrass, prairie junegrass, and bottlebrush squirreltail would have also been present.

Pathway 1.1A
Community 1.1 to 1.2

Community Pathway 1.1a: As time increased since the last wildfire, yellow rabbitbrush and Wyoming big sagebrush would have increased.

Pathway 1.2B
Community 1.2 to 1.1

Community Pathway 1.2b: Wildfire would have reset the successional clock back to a graminoid dominated site,

temporarily removing most of shrubs.

Pathway 1.2A
Community 1.2 to 1.3

Community Pathway 1.2a: As length of time increased since the last wildfire, (i.e. greater than 40 years) the balance between Wyoming big sagebrush and bluebunch wheatgrass would have slowly returned.

Pathway 1.3A
Community 1.3 to 1.1

Community Pathway 1.3a Wildfire would have reset the successional clock back to a graminoid dominated site, removing the majority of the sagebrush and allowing the native perennial bunchgrasses, mainly bluebunch wheatgrass, to increase and be temporarily dominant.

State 2
Wyoming Big Sagebrush/ Caespitose Bluebunch Wheatgrass/ Introduced Non-natives

State 2 is very similar to State 1 in form and function, with the exception of the presence of non-native plants and animals, possible extinctions of native species, and a different climate. State 2 is a description of the ecological site immediately following Euro-American settlement, and can be regarded as the current potential for this site. The phases of this State vary between a bluebunch wheatgrass dominated phase (2.1), to a yellow rabbitbrush/ Wyoming big sagebrush invaded phase (2.2), to a Wyoming big sagebrush with bluebunch wheatgrass understory phase (2.3), which develop according to the time since last wildfire (2.3a or 2.2b, 2.1a, 2.2a, respectively). This State is maintained by periodic wildfire, which reduces the sagebrush component, and a productive understory capable of providing a seed source for native herbaceous species. The resiliency of this state is reduced by lack of occasional wildfire and loss of native seed source. Moderate levels of growing-season livestock utilization will allow this State to maintain its resiliency, but excessive levels of growing-season livestock utilization will reduce its resiliency.

Community 2.1
Bluebunch wheatgrass/ Scattered Wyoming big sagebrush

Community Phase 2.1: Bluebunch wheatgrass/ Scattered Wyoming big sagebrush This plant community is characterized by the temporary dominance of assorted native perennial bunchgrasses, primarily the caespitose form of bluebunch wheatgrass, and scattered Wyoming big sagebrush. Dominant grasses include Western wheatgrass, needle-and-thread, Indian ricegrass, prairie junegrass, and bottlebrush squirreltail. This community is typically found to occur within the first 10 years following wildfire.

Community 2.2
Yellow rabbitbrush/ Wyoming big sagebrush increasing

Community Phase 2.2: Yellow rabbitbrush/ Wyoming big sagebrush increasing This plant community is typical approximately 30 to 40 years post wildfire, where yellow rabbitbrush is the current dominant species, and with a slight increase in Wyoming big sagebrush.

Community 2.3
Wyoming big sagebrush dominant/ Bluebunch wheatgrass & other native perennial bunchgrasses

Community Phase 2.3: Wyoming big sagebrush dominant/ Bluebunch wheatgrass & other native perennial bunchgrasses The balance between Wyoming big sagebrush and bluebunch wheatgrass will return following at least a 40 year period since the last wildfire. Other native perennial bunchgrasses such as Western wheatgrass, needle-and-thread, Indian ricegrass, prairie junegrass, and bottlebrush squirreltail will also be present.

Pathway 2.1A

Community 2.1 to 2.2

Community Pathway 2.1a: As time increases since the last wildfire, yellow rabbitbrush and Wyoming big sagebrush will increase.

Pathway 2.2B
Community 2.2 to 2.1

Community Pathway 2.2b: Wildfire will reset the successional clock back to a graminoid dominated site, temporarily removing most of shrubs.

Pathway 2.2A
Community 2.2 to 2.3

Community Pathway 2.2a: After approximately 40-50 years since the last wildfire, a balance between Wyoming big sagebrush and bluebunch wheatgrass will return.

Pathway 2.3A
Community 2.3 to 2.1

Community Pathway 2.3a Wildfire will reset the successional clock back to a graminoid dominated site, removing the majority of the sagebrush and allowing the native perennial bunchgrass, mainly bluebunch wheatgrass, to increase and be temporarily dominant.

State 3
Wyoming Big Sagebrush Super-dominance

The plant community that characterizes this state is a tall, dense stand of Wyoming big sagebrush with a diminished understory. The Wyoming big sagebrush will remain super-dominant as wildfire continues to be suppressed, and with heavy unrestricted grazing of livestock. The chance of wildfire has diminished due to lack of fine fuels. This State is maintained by the continuation of fire suppression and heavy livestock grazing.

Community 3.1
Wyoming big sagebrush super-dominance

Community Phase 3.1: Wyoming big sagebrush super-dominance This plant community is dominated by tall, dense Wyoming big sagebrush that have increased at the expense of associated understory species.

State 4
Increased Invasives/ Wyoming Big Sagebrush

Where livestock grazing has been reduced, there may be a build up of introduced annuals during years of heavy spring precipitation. The unusually wet climate can have a two-fold effect, where in some cases, soils can became anoxic; if this is followed by subsequent Aroga moth outbreak, much of the sagebrush can be killed. In other cases, an increased fine fuel loads can increase the chance of wildfire, which has the same effect of removing the sagebrush. The phases of this State pass through a period of short-term dominance by annuals (4.1), followed by a yellow rabbitbrush and native herb phase (4.2), and the eventual return of Wyoming big sagebrush with a sparser understory (4.3). Some introduced grasses that may be present in this state are Kentucky bluegrass (*Poa pratensis*), Bulbous bluegrass (*Poa bulbosa*), and smooth brome (*Bromus inermis*). Resiliency of this state is maintained by fire and reduced livestock grazing. As root-sprouters, yellow rabbitbrush, rhizomatous wheatgrasses, and invasive species are effective following disturbance, particularly fire. These species can out-compete fire and grazing-intolerant species. Heavy growing-season grazing will reduce site resiliency.

Community 4.1
Increased Invasives/ Wyoming Big Sagebrush State

Community Phase 4.1: Invasive annuals (mustards & cheatgrass) Mustards and cheatgrass tend to invade after a

hot, complete burn through a sagebrush community having a diminished understory component.

Community 4.2
Yellow rabbitbrush/ Native herbaceous perennials

Community Phase 4.2: Yellow rabbitbrush/ Native herbaceous perennials This community is dominated by yellow rabbitbrush and native herbaceous perennials.

Community 4.3
Wyoming big sagebrush/ Sparse mixed understory

Community Phase 4.3: Wyoming big sagebrush/ Sparse mixed understory This community is dominated by Wyoming big sagebrush and has a sparse mix of understory species.

Pathway 4.1A
Community 4.1 to 4.2

Community Pathway 4.1a: Community Phase 4.1 will move towards Community Phase 4.2 after 10-15 years as invasive annuals are replaced by (re-sprouting) rabbitbrush and herbaceous perennials if fire does not return to the site, and with light livestock grazing.

Pathway 4.2B
Community 4.2 to 4.1

Community Pathway 4.2b: A hot fire will convert Community Phase 4.2 into an invasive annuals-dominated site (4.1). Community Phase 4.1 can be effectively maintained if fire re-occurs every 2-3 years.

Pathway 4.2A
Community 4.2 to 4.3

Community Pathway 4.2a: Community Phase 4.2 will move towards Community Phase 4.3 as Wyoming big sagebrush re-invades the site and a more diverse understory develops in the absence of fire, and with light livestock grazing.

Pathway 4.3A
Community 4.3 to 4.1

Community Pathway 4.3a: A cool wildfire will reduce the sagebrush component (or set back its re-invasion of the site), allow for (re-sprouting) yellow rabbitbrush to dominate, and reduce understory (herbaceous) species diversity.

Pathway 4.3B
Community 4.3 to 4.2

Community Pathway 4.3b: A hot wildfire will remove sagebrush and allow invasive annuals to dominate the site.

State 5
Crested Wheatgrass

Crested wheatgrass (5.1) will be found on sites where it has been planted to provide a higher level of productivity. To keep the shrubs from re-invading, it may be necessary to follow up with additional chemical or mechanical treatment (5.1a). This resiliency of this State can be maintained by moderate livestock grazing, but excessive livestock grazing will reduce its resiliency.

Community 5.1
Crested wheatgrass

Community Phase 5.1: crested wheatgrass This plant community is characterized by a crested wheatgrass

monoculture. Community Pathway 5.1a: Maintenance of this state requires retreatment of the brush using chemicals or plowing to maintain grass dominance and remove re-invaded shrubs.

State 6
Wyoming Big Sagebrush/ Native Grass

The state is achieved following a prescribed grazing regime where sheep are used during fall months (with nutrient supplementation) with the intention of reducing the shrub component to allow re-growth of native grasses (Woodland, 2008). This state can be maintained by continuing fall sheep grazing only over several years. A return to growing-season grazing too soon (before establishment of a productive native perennial grass understory) will reduce the resiliency of this State.

Community 6.1
Reduced Wyoming big sagebrush/ increased native perennial grasses/ short occupancy of cheatgrass

Community Phase 6.1: Reduced Wyoming big sagebrush/ increased native perennial grasses/ short occupancy of cheatgrass This plant community is characterized by Wyoming big sagebrush with native perennial grass understory.

Transition T1A
State 1 to 2

Transition T1a: from State 1 to State 2 (Reference State to Wyoming Big Sagebrush/ Caespitose Bluebunch Wheatgrass/ Introduced Non-natives State) The simultaneous introduction of exotic species, both plants and animals, and possible extinctions of native flora and fauna, along with climate change, has caused State 1 to transition to State 2. Reversal of such historic changes (i.e. a return pathway) back to State 1 is not practical.

Transition T2A
State 2 to 3

Transition T2a: from State 2 to State 3 (Wyoming Big Sagebrush/ Caespitose Bluebunch Wheatgrass/ Introduced Non-natives State to Wyoming Big Sagebrush Super-dominance State) The major driving factors behind this transition include a period of fire suppression following Euro-American settlement, allowing the sagebrush component to increase in age, height, and density. This, combined with heavy, near year-around grazing by cattle and horses, results in a diminishment of the graminoids. Subsequent use by sheep results in further loss of the native forb component. The approach to this transition is indicated by an increase in sagebrush dominance, a decrease in graminoids and/or forbs, and a reduction in microphytic soil crust. This transition is triggered by heavy season-long livestock grazing. A return to State 2 is unlikely if the seed sources of desirable understory species are depleted and/or accelerated soil erosion has ensued.

Transition T3A
State 3 to 4

Transition T3a: from State 3 to State 4 (Wyoming Big Sagebrush Super-dominance State to Increased Invasives/ Wyoming Big Sagebrush State) The combined effect of reduced grazing followed by an unusually wet climate can create an environment where sagebrush is temporarily killed off by either: 1) the presence of anoxic soils followed by an Aroga moth outbreak (or other pathogen), or 2) wildfire carried by a buildup of fine fuels developed in response to the increased moisture. The approach to this transition is indicated by an increase in the abundance of invasive species. A return from State 4 to State 3 may be possible with long-term protection of the site from both grazing and wildfire.

Transition T3B
State 3 to 5

Transition T3b: from State 3 to State 5 (Wyoming Big Sagebrush Super-dominance State to Crested Wheatgrass State) Land managers unhappy with diminished herbage production in State 3 can opt for mechanical or chemical

removal of shrubs and seeding with crested wheatgrass. This requires, however, occasional reduction of re-invading brush by chemical or mechanical means.

Transition T3C
State 3 to 6

Transition T3c: from State 3 to State 6 (Wyoming Big Sagebrush Super-dominance State to Wyoming Big Sagebrush/ Native Grass State) A cheaper alternative to improved forage production from State 3 is possible with supplemental fall sheep grazing to reduce sagebrush dominance and release of understory species (Woodland, 2007). Cheatgrass has a short period of temporary importance under Rich County conditions (Woodland 2007).

Transition T4A
State 4 to 5

Transition T4a: from State 4 to State 5 (Increased Invasives/ Wyoming Big Sagebrush State to Crested Wheatgrass State) The Increased Invasives/ Wyoming Big Sagebrush State will transition to the Crested Wheatgrass State following brush management through chemical or mechanical means, and later plow and cropping into a crested wheatgrass monoculture.

Transition T4B
State 4 to 6

Transition T4b: from State 4 to State 6 (Increased Invasives/ Wyoming Big Sagebrush State to Wyoming Big Sagebrush/ Native Grass State) The Increased Invasives/ Wyoming Big Sagebrush State can transition to the Wyoming Big Sagebrush/ Native Grass State if soils are mostly intact and seeds of desirable species are trampled into the soil during fall sheep use of the site. This strategy is risky; the desired outcome may not be achieved.

Transition T5A
State 5 to 6

Brush control and plowing of crested wheatgrass stand

Additional community tables

Animal community

The suitability for livestock grazing is fair to good. This site provides grazing for cattle and sheep during all seasons, however prolonged spring grazing will result in loss of perennial grasses and increase unpalatable shrubs and exotics.

Inventory data references

Data gathered by qualified range professionals within NRCS and cooperating partners.

Other references

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pasture management]

Woodland, R.D., 2007. Influence of fall grazing by sheep on plant productivity, shrub age class structure, and herbaceous species diversity in sagebrush steppe. Master's Thesis, Utah State University, Utah, USA.

Contributors

USU

Approval

Kirt Walstad, 2/21/2025

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	02/21/2025
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**