USDA Natural Resources
Conservation Service

Ecological site R047XA320UT
Upland Shallow Loam (Wyoming big sagebrush)

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Accessed: 05/11/2025

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.

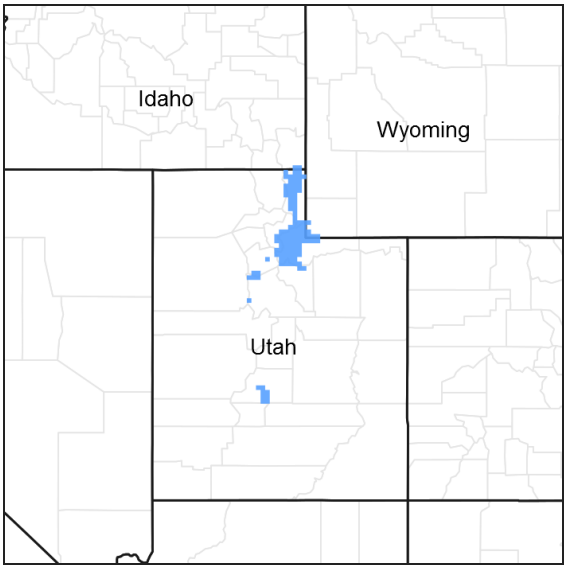


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 047X–Wasatch and Uinta Mountains

MLRA 47 occurs in Utah (86 percent), Wyoming (8 percent), Colorado (4 percent), and Idaho (2 percent). It encompasses approximately 23,825 square miles (61,740 square kilometers). The northern half of this area is in the Middle Rocky Mountains Province of the Rocky Mountain System. Parts of the western edge of this MLRA are in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. The MLRA includes the Wasatch Mountains, which trend north and south. The steeply sloping, precipitous Wasatch Mountains have narrow crests and deep valleys. Active faulting and erosion are a dominant force in controlling the geomorphology of the area.
The mountains in this area are primarily fault blocks that have been tilted up. Alluvial fans at the base of the mountains are recharge zones for the basin fill aquifers. An ancient shoreline of historic Bonneville Lake is evident on the footslopes along the western edge of the area. Rocks exposed in the mountains are mostly Mesozoic and Paleozoic sediments.
The average precipitation is from 12 to 16 inches in the valleys and can range up to 73 inches in the mountains. Peak precipitation occurs in the winter months. The average annual temperature is 30 to 50 degrees Fahrenheit (-1 to 15 C). The freeze-free period averages 140 days and ranges from 60 to 220 days, generally decreasing in length with elevation.
The dominant soil orders in this MLRA are Entisols, Inceptisols, and Mollisols. The lower elevations are dominated by a frigid temperature regime, while the higher elevations experience cryic temperature regimes. The soil moisture

regime is typically xeric. The minerology is generally mixed and the soils are very shallow to very deep, generally well drained, and loamy or loamy-skeletal.

LRU notes

This LRU includes the Wasatch Mountains which tend to run north and south. These steeply sloping, precipitous mountains have narrow crests and deep valleys. They are primarily fault blocks that have been tilted up. The alluvial fans located at the base of these mountains are important recharge zones for valley aquifers.

Classification relationships

Modal Soil: loamy, mixed (calcareous), frigid Lithic Xerorthents

Ecological site concept

The soils that support this site are shallow and very gravelly. They formed in colluvium and residuum derived from sandtone, conglomerate and shale parent materials. The surface layers are typically dark brown gravelly or stony loams and are subtended by sandstone gravels or conglomerate rock. Water holding capacity is low, ranging from 1.1 to 2.4 inches. The soil moisture regime is xeric and the soil temperature regime is frigid and sometimes mesic.

Associated sites

R047XA308UT	**Upland Loam (basin big sagebrush)**

Similar sites

R047XA338UT	**Upland Stony Loam (Wyoming big sagebrush)**

Table 1. Dominant plant species

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

Physiographic features

This site occurs on mountain slopes, ridges, foothills and valley sides at elevations between 5,400 and 8,000 feet. It is common on southern exposures but can occur on all aspects. This site occurs on virtually all slopes, as long as the soil is shallow. Runoff ranges from medium to very high.

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Mountain slope (3) Foothills
Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None
Elevation	5,400–8,000 ft
Slope	5–50%
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified

Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	4,710–8,730 ft
Slope	1–70%

Climatic features

The climate for this site is characterized by cold, snowy winters and warm, dry summers. The average annual precipitation is 14 to 16 inches with most of the moisture coming in the spring and fall. Winter snowpack provides additional moisture to the soil as it melts in the spring. However, much of the spring moisture is unavailable to plants by mid-June, and reduced precipitation causes many herbaceous species to go dormant by July 1. July and August are typically the driest months of the year for this site.

Table 4. Representative climatic features

Frost-free period (characteristic range)	56-78 days
Freeze-free period (characteristic range)	105-117 days
Precipitation total (characteristic range)	14-16 in
Frost-free period (actual range)	47-80 days
Freeze-free period (actual range)	105-122 days
Precipitation total (actual range)	14-17 in
Frost-free period (average)	66 days
Freeze-free period (average)	112 days
Precipitation total (average)	15 in

Climate stations used

- (1) COALVILLE [USW00024120], Coalville, UT
- (2) ECHO DAM [USC00422385], Coalville, UT
- (3) LAKETOWN [USC00424856], Laketown, UT

Influencing water features

Due to its landscape position, this site is not typically influenced by streams or wetlands.

Wetland description

N/A

Soil features

The soils that support this site are shallow and very gravelly. They formed in colluvium and slope alluvium derived from sandstone, conglomerate and shale parent materials. The surface layers are typically dark brown gravelly or stony loams and are subtended by sandstone gravels or conglomerate rock. Water holding capacity is low, ranging from 1.1 to 2.4 inches. The soil moisture regime is aridic xeric and the soil temperature regime is frigid.

Table 5. Representative soil features

Parent material	(1) Colluvium–sedimentary rock (2) Slope alluvium–sedimentary rock

Surface texture	(1) Gravelly loam (2) Very gravelly loam (3) Stony loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Depth to restrictive layer	10–20 in
Soil depth	10–20 in
Surface fragment cover <=3"	10–30%
Surface fragment cover >3"	0–15%
Available water capacity (0-40in)	1.1–2.4 in
Calcium carbonate equivalent (0-40in)	5–20%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (0-40in)	25–40%
Subsurface fragment volume >3" (0-40in)	0–20%

Table 6. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Not specified
Depth to restrictive layer	Not specified
Soil depth	Not specified
Surface fragment cover <=3"	5–45%
Surface fragment cover >3"	0–30%
Available water capacity (0-40in)	0.4–2.8 in
Calcium carbonate equivalent (0-40in)	0–30%
Electrical conductivity (0-40in)	Not specified
Sodium adsorption ratio (0-40in)	Not specified
Soil reaction (1:1 water) (0-40in)	6.6–9
Subsurface fragment volume <=3" (0-40in)	8–69%
Subsurface fragment volume >3" (0-40in)	0–30%

Ecological dynamics

The plant community dynamics of this site are presumed to have been driven by fire historically. The Reference Plant Community consists of very diverse shrubs, forbs and grasses. Wyoming big sagebrush would have co-dominated with bluebuch wheatgrass and other perennial bunchgrasses in the Reference State, with grasses increasing in dominance immediately following fire (or possibly other shrub-removing disturbance i.e. aroga moth, snow mold, etc.) and big sagebrush increasing in dominance over time without fire. When sprouting shrubs are abundant in the community, they tend to co-dominate with grasses on this site following fire.

The introduction of non-native plants and domestic livestock since the time of European settlement has altered the plant community dynamics of this site, as diagrammed in the State-and-Transition Model. Although this site is resilient to properly managed livestock grazing, it is susceptible to grass loss and sagebrush dominance under excessive grazing pressures. When grazing pressures repeatedly remove the growing points (apical meristems) of perennial grasses, they will tend to lose vigor and decrease on the site.

This site has been documented to support introduced perennial grass species when these species are seeded under the proper conditions for germination and establishment.

Although cheatgrass and other non-native species can occur on this site, there is currently no documentation of non-native annual species dominance. However, the conditions of this site are similar to many sagebrush sites where cheatgrass has become dominant, so care should be taken to decrease the likelihood of cheatgrass invasion. Soil surface disturbance, removal of existing perennial plants, and introduction of cheatgrass seeds via hay, livestock, or vehicles will increase the likelihood of cheatgrass dominance on this site.

State and transition model

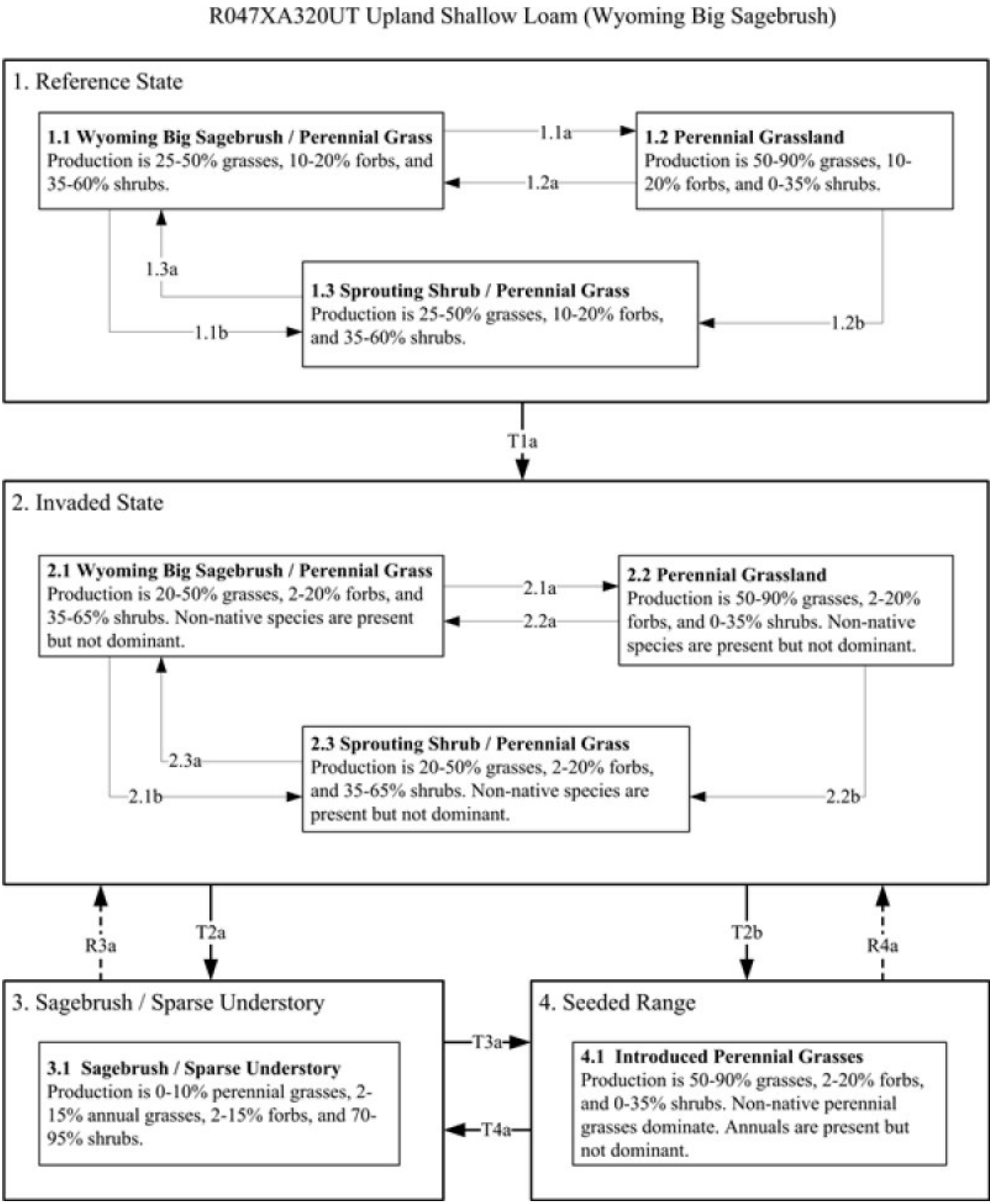


Figure 8. State-and-Transition Model

State 1
Reference State

The plant community dynamics of this site are presumed to have been driven by fire historically. The Reference Plant Community consists of very diverse shrubs, forbs and grasses. Wyoming big sagebrush would have co-dominated with bluebunch wheatgrass and other perennial bunchgrasses in the Reference State, with grasses

increasing in dominance immediately following fire (or possibly other shrub-removing disturbance i.e. aroga moth, snow mold, etc.) and big sagebrush increasing in dominance over time without fire. When sprouting shrubs are abundant in the community, they tend to co-dominate with grasses on this site following fire.

Community 1.1
Wyoming Big Sagebrush / Perennial Grass

Figure 9. Phase 1.1

The Reference Plant community is dominated by Wyoming big sagebrush and diverse shrubs in the overstory, and by perennial bunchgrasses in the understory. Dominant perennial grasses are bluebunch wheatgrass, muttongrass, and Idaho fescue. Diverse perennial grasses and forbs are also abundant in the understory. Composition by air-dry weight is 25 to 50 percent grasses, 10 to 20 percent forbs, and 35 to 60 percent shrubs.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	300	425	550
Grass/Grasslike	225	350	450
Forb	75	125	200
Total	**600**	**900**	**1200**

Table 8. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-20%
Grass/grasslike foliar cover	8-15%
Forb foliar cover	2-5%
Non-vascular plants	0-2%
Biological crusts	0%
Litter	10-20%
Surface fragments >0.25" and <=3"	20-33%
Surface fragments >3"	0-12%
Bedrock	0-20%
Water	0%
Bare ground	10-20%

Table 9. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	0%	0%	0-10%	0-5%
>0.5 <= 1	0%	0-5%	5-10%	2-10%
>1 <= 2	0%	5-10%	5-10%	0-5%
>2 <= 4.5	0%	10-20%	0-5%	0-5%
>4.5 <= 13	0%	0-5%	0-1%	0%
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 1.2
Perennial Grassland

The Perennial Grassland Community is dominated by bluebunch wheatgrass and Idaho fescue. Diverse perennial grasses and forbs are also abundant in the plant community. Sprouting shrubs may be present in small numbers, but are not abundant in this community phase. Wyoming big sagebrush has been removed from the plant community, but may also be present (not dominant) due to natural succession as it slowly increases in the community following removal. Composition by air-dry weight is 50 to 90 percent grasses, 10 to 20 percent forbs, and 0 to 35 percent shrubs.

Table 10. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	450	625	800
Shrub/Vine	0	150	300
Forb	75	125	200
Total	**525**	**900**	**1300**

Table 11. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0-10%
Grass/grasslike foliar cover	20-35%
Forb foliar cover	2-5%
Non-vascular plants	0-2%
Biological crusts	0%
Litter	10-20%
Surface fragments >0.25" and <=3"	20-33%
Surface fragments >3"	0-12%
Bedrock	0-20%
Water	0%
Bare ground	10-20%

Table 12. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	0%	0%	0-10%	0-5%
>0.5 <= 1	0%	0-5%	10-20%	2-10%
>1 <= 2	0%	0-5%	15-25%	0-5%
>2 <= 4.5	0%	0-10%	0-10%	0-5%
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 1.3
Rabbitbrush / Perennial Grass

This plant community is dominated by sprouting shrubs in the overstory (usually yellow rabbitbrush) and by perennial bunchgrasses in the understory. In moist areas, such as northern exposures or higher elevations, other sprouting shrubs, such as bitterbrush, may co-dominate with grasses. Dominant perennial grasses are typically bluebunch wheatgrass and Idaho fescue. Diverse perennial grasses and forbs are also abundant. Wyoming big sagebrush does not co-dominate the site, but it may be present due to natural succession as it slowly increases in the community. Composition by air-dry weight is 25 to 50 percent grasses, 10 to 20 percent forbs, and 35 to 60 percent shrubs.

Table 13. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	300	425	550
Grass/Grasslike	225	350	450
Forb	75	125	200
Total	**600**	**900**	**1200**

Table 14. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-20%
Grass/grasslike foliar cover	8-15%
Forb foliar cover	2-5%
Non-vascular plants	0-2%
Biological crusts	0%
Litter	10-20%
Surface fragments >0.25" and <=3"	20-33%
Surface fragments >3"	0-12%
Bedrock	0-20%
Water	0%
Bare ground	10-20%

Table 15. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	0%	0%	0-10%	0-5%
>0.5 <= 1	0%	0-5%	5-10%	2-10%
>1 <= 2	0%	5-10%	5-10%	0-5%
>2 <= 4.5	0%	10-20%	0-5%	0-5%
>4.5 <= 13	0%	0-5%	0-1%	0%
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Pathway 1.1a
Community 1.1 to 1.2

This pathway occurs as fire or other shrub-removal disturbance (drought, herbivory, etc.) removes Wyoming big sagebrush from the plant community. Historic fire regime is expected to be mostly patchy, mixed-severity fires that occurred ever 10 to 70 years (Howard 1999). This pathway occurs when phase 1.1 does not have a significant amount of sprouting shrubs in the community, and results in a community dominated by perennial bunchgrasses.

Pathway 1.1b
Community 1.1 to 1.3

This pathway occurs as fire or other shrub-removal disturbance (drought, herbivory, etc.) removes Wyoming big sagebrush from the plant community. Historic fire regime is expected to have been patchy, mixed-severity fires that occurred ever 10 to 70 years (Howard 1999). This pathway occurs when phase 1.1 has a significant amount of sprouting shrubs in the community, and results in a community co-dominated by perennial bunchgrasses and sprouting shrubs, most commonly yellow rabbitbrush.

Pathway 1.2a
Community 1.2 to 1.1

This pathway occurs as Wyoming big sagebrush slowly increases in the plant community following fire or other shrub-removal events. It may take 10 to 40 years for sagebrush to regain dominance in the community, depending on subsequent weather events and distance to sagebrush seed source. The resulting community is co-dominated by sagebrush and perennial bunchgrasses.

Pathway 1.2b
Community 1.2 to 1.3

This pathway is expected to occur when perennial grasslands experience an increase in sprouting shrubs, possibly due to repeated fires over a short time period.

Pathway 1.3a
Community 1.3 to 1.1

This pathway occurs as Wyoming big sagebrush slowly increases in the plant community, while sprouting shrubs decrease. It may take 10 to 40 years for sagebrush to regain dominance in the community following fire or other sagebrush-removal event, depending on subsequent weather and distance to sagebrush seed source. The resulting community is co-dominated by sagebrush and perennial bunchgrasses, with abundant sprouting shrubs remaining in the community.

State 2

Invaded State

Community 2.1
Wyoming Big Sagebrush / Perennial Grass

Figure 13. Phase 2.1

This plant community is dominated by Wyoming big sagebrush and diverse shrubs in the overstory, and by perennial bunchgrasses in the understory. Dominant perennial grasses are bluebunch wheatgrass, muttongrass, and/or Idaho fescue. Diverse perennial grasses and forbs are also abundant in the understory. Non-native species are present but not dominant. Composition by air-dry weight is 25 to 50 percent grasses, 10 to 20 percent forbs, and 35 to 60 percent shrubs.

Table 16. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	300	425	550
Grass/Grasslike	175	350	450
Forb	25	100	200
Total	**500**	**875**	**1200**

Table 17. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-20%
Grass/grasslike foliar cover	8-15%
Forb foliar cover	2-5%
Non-vascular plants	0-2%
Biological crusts	0%
Litter	10-20%
Surface fragments >0.25" and <=3"	20-33%
Surface fragments >3"	0-12%
Bedrock	0-20%
Water	0%
Bare ground	10-20%

Table 18. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	0%	0%	0-10%	0-5%
>0.5 <= 1	0%	0-5%	5-10%	2-10%
>1 <= 2	0%	5-10%	5-10%	0-5%
>2 <= 4.5	0%	10-20%	0-5%	0-5%
>4.5 <= 13	0%	0-5%	0-1%	0%
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 2.2
Perennial Grassland

Figure 15. Phase 2.2

The perennial grassland community is dominated by bluebunch wheatgrass and Idaho fescue. Diverse perennial grasses and forbs are also abundant in the plant community. Sprouting shrubs may be present in small numbers, but are not abundant in this community phase. Wyoming big sagebrush has been removed from the plant community, but may also be present (not dominant) due to natural succession as it slowly increases in the community following removal. Non-native species are present but not dominant. Composition by air-dry weight is 50 to 90 percent grasses, 10 to 20 percent forbs, and 0 to 35 percent shrubs.

Table 19. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	450	625	800
Shrub/Vine	0	150	300
Forb	25	100	200
Total	**475**	**875**	**1300**

Table 20. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0-10%
Grass/grasslike foliar cover	20-35%
Forb foliar cover	2-5%

Non-vascular plants	0-2%
Biological crusts	0%
Litter	10-20%
Surface fragments >0.25" and <=3"	20-33%
Surface fragments >3"	0-12%
Bedrock	0-20%
Water	0%
Bare ground	10-20%

Table 21. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	0%	0%	0-10%	0-5%
>0.5 <= 1	0%	0-5%	10-20%	2-10%
>1 <= 2	0%	0-5%	15-25%	0-5%
>2 <= 4.5	0%	0-10%	0-10%	0-5%
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 2.3
Rabbitbrush / Perennial Grass

R047XA320UT Upland Shallow Loam (Wyoming Big Sagebrush) Phase 2.3 Sprouting Shrub / Perennial grass. Yellow

Figure 17. Phase 2.3

This plant community is dominated by sprouting shrubs in the overstory (usually yellow rabbitbrush) and by perennial bunchgrasses in the understory. In moist areas, such as northern exposures or higher elevations, other sprouting shrubs, such as bitterbrush, may co-dominate with grasses. Dominant perennial grasses are typically bluebunch wheatgrass and/or Idaho fescue. Diverse perennial grasses and forbs are also abundant. Wyoming big sagebrush does not co-dominate the site, but it may be present due to natural succession as it slowly increases in the community. Non-native species are present but not dominant. Composition by air-dry weight is 25 to 50 percent grasses, 10 to 20 percent forbs, and 35 to 60 percent shrubs.

Table 22. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	300	425	550
Grass/Grasslike	175	350	450
Forb	25	100	200
Total	**500**	**875**	**1200**

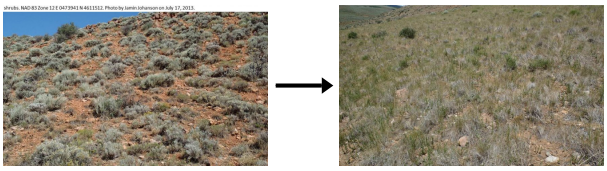
Table 23. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-20%
Grass/grasslike foliar cover	8-15%
Forb foliar cover	2-5%
Non-vascular plants	0-2%
Biological crusts	0%
Litter	10-20%
Surface fragments >0.25" and <=3"	20-33%
Surface fragments >3"	0-12%
Bedrock	0-20%
Water	0%
Bare ground	10-20%

Table 24. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	0%	0%	0-10%	0-5%
>0.5 <= 1	0%	0-5%	5-10%	2-10%
>1 <= 2	0%	5-10%	5-10%	0-5%
>2 <= 4.5	0%	10-20%	0-5%	0-5%
>4.5 <= 13	0%	0-5%	0-1%	0%
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Pathway 2.1a
Community 2.1 to 2.2



Wyoming Big Sagebrush / Perennial Grass

Perennial Grassland

This pathway occurs as fire or other shrub-removal disturbance (drought, herbivory, etc.) removes Wyoming big sagebrush from the plant community. Historic fire regime is expected to have been patchy, mixed-severity fires that occurred ever 10 to 70 years (Howard 1999). This pathway occurs when phase 2.1 does not have a significant

amount of sprouting shrubs in the community, and results in a community dominated by perennial bunchgrasses. This pathway may result in an increase in annual non-native species.

Pathway 2.1b
Community 2.1 to 2.3

Wyoming Big Sagebrush / Perennial Grass

Rabbitbrush / Perennial Grass

This pathway occurs as fire or other shrub-removal disturbance (drought, herbivory, etc.) removes Wyoming big sagebrush from the plant community. Historic fire regime is expected to have been patchy, mixed-severity fires that occurred ever 10 to 70 years (Howard 1999). This pathway occurs when phase 2.1 has a significant amount of sprouting shrubs in the community, and results in a community co-dominated by perennial bunchgrasses and sprouting shrubs, most commonly yellow rabbitbrush. This pathway may result in an increase in annual non-native species.

Pathway 2.2a
Community 2.2 to 2.1

Perennial Grassland

Wyoming Big Sagebrush / Perennial Grass

This pathway occurs as Wyoming big sagebrush slowly increases in the plant community following fire or other shrub-removal events. It may take 10 to 40 years for sagebrush to regain dominance in the community, depending on subsequent weather events and distance to sagebrush seed source. The resulting community is co-dominated by sagebrush and perennial bunchgrasses.

Pathway 2.2b
Community 2.2 to 2.3

Perennial Grassland

Rabbitbrush / Perennial Grass

This pathway is expected to occur when perennial grasslands experience an increase in sprouting shrubs, possibly due to repeated fires over a short time period. This pathway may also result in an increase in non-native annual plants.

Pathway 2.3a
Community 2.3 to 2.1

Rabbitbrush / Perennial Grass

Wyoming Big Sagebrush / Perennial Grass

This pathway occurs as Wyoming big sagebrush slowly increases in the plant community, while sprouting shrubs decrease. It may take 10 to 40 years for sagebrush to regain dominance in the community following fire or other sagebrush-removal event, depending on subsequent weather and distance to sagebrush seed source. The resulting community is co-dominated by sagebrush and perennial bunchgrasses, with abundant sprouting shrubs remaining in the community.

State 3
Sagebrush / Sparse Understory State

Community 3.1
Wyoming Big Sagebrush / Sparse Understory

Figure 19. Phase 3.1

This plant community is dominated by Wyoming big sagebrush and diverse shrubs, with few perennial forbs and bunchgrasses in the understory. Herbaceous species are unable to increase in the community due to shrub dominance. Non-native species are present but not dominant. Composition by air-dry weight is 0 to 10 percent grasses, 2 to 15 percent forbs, and 70 to 95 percent shrubs.

Table 25. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	500	650	800
Grass/Grasslike	25	100	175
Forb	25	50	100
Total	**550**	**800**	**1075**

Table 26. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	30-45%
Grass/grasslike foliar cover	0-2%
Forb foliar cover	0-3%
Non-vascular plants	0-2%
Biological crusts	0%
Litter	2-10%
Surface fragments >0.25" and <=3"	20-33%
Surface fragments >3"	0-12%
Bedrock	0-20%

Water	0%
Bare ground	10-20%

Table 27. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	0%	0%	0-2%	0-3%
>0.5 <= 1	0%	0-5%	0-2%	0-3%
>1 <= 2	0%	5-10%	0-2%	0-3%
>2 <= 4.5	0%	25-35%	0-1%	0-1%
>4.5 <= 13	0%	0-5%	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

State 4
Seeded Range State

The Seeded Range State occurs following a successful rangeland seeding, in which sufficient soil moisture was available for seed germination and growth at critical times in the spring. This site is suitable for rangeland seedings, but even when properly applied, these seedings run the risk of failure due to incertain soil moisture conditions. Transitions out of this state are likely possible, but have not yet been documented.

Community 4.1
Introduced Perennial Grass

Figure 21. Phase 4.1

This plant community is dominated by introduced perennial bunchgrasses. It is possible to have some sprouting shrubs assuming they were present in the community before seeding.

Table 28. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	450	625	800
Shrub/Vine	0	150	300
Forb	25	75	150
Total	**475**	**850**	**1250**

Table 29. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0-10%
Grass/grasslike foliar cover	20-35%
Forb foliar cover	2-5%
Non-vascular plants	0-2%
Biological crusts	0%
Litter	10-20%
Surface fragments >0.25" and <=3"	20-33%
Surface fragments >3"	0-12%
Bedrock	0-20%
Water	0%
Bare ground	10-20%

Table 30. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	0%	0%	0-10%	0-5%
>0.5 <= 1	0%	0-5%	10-20%	2-10%
>1 <= 2	0%	0-5%	15-25%	0-5%
>2 <= 4.5	0%	0-10%	0-10%	0-5%
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Transition T1a
State 1 to 2

This transition occurs as non-native plants and domestic livestock are introduced to the site. This state is similar to the Reference State in plant community structure and ecological process, but the presence of domestic livestock and exotic plants decreases the resilience of the site.

Transition T2a
State 2 to 3

This transition occurs when perennial grasses are reduced on the site to the point that they can no longer perpetuate themselves. Wyoming big sagebrush increases on the site, as perennial grasses lose vigor and reproductive capability due to excessive livestock grazing. Extended drought in combination with excessive grazing

may accelerate this transition.

Transition T2b
State 2 to 4

This transition occurs when non-native perennial grass seed is established on the site following tillage, wildfire, or other removal of the existing vegetation. Crested wheatgrass is a common seeded species on this site.

Transition T3a
State 3 to 4

This transition occurs when non-native perennial grass seed is established on the site following tillage, wildfire, or other removal of the existing vegetation. Crested wheatgrass is a common seeded species on this site.

Transition T4a
State 4 to 3

This transition occurs when perennial grasses are reduced on the site to the point that they can no longer perpetuate themselves. Wyoming big sagebrush increases on the site, as perennial grasses lose vigor and reproductive capability due to excessive livestock grazing. Extended drought in combination with excessive grazing may accelerate this transition.

Additional community tables

Table 31. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			250–500	
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	100–300	8–20
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–200	0–12
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–150	0–10
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	0–100	0–8
3	**Sub-Dominant Shrubs**			50–150	
	spineless horsebrush	TECA2	*Tetradymia canescens*	0–65	0–4
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–50	0–4
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	0–50	0–3
	Woods' rose	ROWO	*Rosa woodsii*	0–30	0–2
	little sagebrush	ARARA	*Artemisia arbuscula ssp. arbuscula*	0–30	0–2
	black sagebrush	ARNO4	*Artemisia nova*	0–30	0–2
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–30	0–2
	Utah juniper	JUOS	*Juniperus osteosperma*	0–30	0–2
	creeping barberry	MARE11	*Mahonia repens*	0–30	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–25	0–2
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–20	0–2
	spiny phlox	PHHO	*Phlox hoodii*	0–20	0–1
	slender buckwheat	ERMI4	*Eriogonum microthecum*	0–20	0–1
Grass/Grasslike					
0	**Dominant Grasses**			175–400	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	50–300	4–22

	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	50–300	4–22
	Idaho fescue	FEID	*Festuca idahoensis*	0–125	0–10
	muttongrass	POFE	*Poa fendleriana*	25–125	1–10
1	**Sub-Dominant Grasses**			50–150	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–75	0–5
	oniongrass	MEBU	*Melica bulbosa*	0–65	0–4
	western wheatgrass	PASM	*Pascopyrum smithii*	0–50	0–3
	Sandberg bluegrass	POSE	*Poa secunda*	0–50	0–3
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–50	0–3
	Geyer's sedge	CAGE2	*Carex geyeri*	0–50	0–3
	Grass, perennial	2GP	*Grass, perennial*	0–50	0–3
	needle and thread	HECO26	*Hesperostipa comata*	0–50	0–3
	squirreltail	ELEL5	*Elymus elymoides*	0–40	0–3
	basin wildrye	LECI4	*Leymus cinereus*	0–40	0–3
	Grass, annual	2GA	*Grass, annual*	0–35	0–2
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–25	0–2
Forb					
2	**Forbs**			75–200	
	Forb, perennial	2FP	*Forb, perennial*	25–75	2–5
	Forb, annual	2FA	*Forb, annual*	10–50	1–4
	low beardtongue	PEHU	*Penstemon humilis*	10–50	1–4
	rock goldenrod	PEPU7	*Petradoria pumila*	10–50	1–4
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	10–50	1–3
	povertyweed	IVAX	*Iva axillaris*	0–40	0–3
	western stoneseed	LIRU4	*Lithospermum ruderale*	0–40	0–3
	desertparsley	LOMAT	*Lomatium*	0–25	0–2
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	5–25	1–2
	shortstem buckwheat	ERBR5	*Eriogonum brevicaule*	0–25	0–2
	fleabane	ERIGE2	*Erigeron*	0–25	0–2
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	0–25	0–2
	scarlet gilia	IPAG	*Ipomopsis aggregata*	0–25	0–2
	borage	BORAG	*Borago*	0–25	0–2
	Indian paintbrush	CASTI2	*Castilleja*	0–25	0–2
	common yarrow	ACMI2	*Achillea millefolium*	0–25	0–2
	onion	ALLIU	*Allium*	0–25	0–2
	pussytoes	ANTEN	*Antennaria*	0–25	0–2
	longleaf phlox	PHLO2	*Phlox longifolia*	5–25	1–2
	vetch	VICIA	*Vicia*	0–25	0–2
	primrose	PRIMU	*Primula*	0–15	0–1
	Douglas' dustymaiden	CHDO	*Chaenactis douglasii*	0–15	0–1

Table 32. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)

Group	Common Name	Symbol	Scientific Name	(Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
0	**Dominant Grasses**			400–700	
1	**Sub-Dominant Grasses**			50–250	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–75	0–5
	oniongrass	MEBU	*Melica bulbosa*	0–65	0–4
	western wheatgrass	PASM	*Pascopyrum smithii*	0–50	0–3
	muttongrass	POFE	*Poa fendleriana*	10–50	1–3
	Sandberg bluegrass	POSE	*Poa secunda*	0–50	0–3
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–50	0–3
	Geyer's sedge	CAGE2	*Carex geyeri*	0–50	0–3
	needle and thread	HECO26	*Hesperostipa comata*	0–50	0–3
	Grass, perennial	2GP	*Grass, perennial*	0–50	0–3
	basin wildrye	LECI4	*Leymus cinereus*	0–40	0–3
	squirreltail	ELEL5	*Elymus elymoides*	0–40	0–3
	Grass, annual	2GA	*Grass, annual*	0–35	0–2
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–25	0–2
Forb					
2	**Forbs**			75–200	
	Forb, perennial	2FP	*Forb, perennial*	25–75	2–5
	Forb, annual	2FA	*Forb, annual*	10–50	1–4
	low beardtongue	PEHU	*Penstemon humilis*	10–50	1–4
	rock goldenrod	PEPU7	*Petradoria pumila*	10–50	1–4
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	10–50	1–3
	povertyweed	IVAX	*Iva axillaris*	0–40	0–3
	western stoneseed	LIRU4	*Lithospermum ruderale*	0–40	0–3
	desertparsley	LOMAT	*Lomatium*	0–25	0–2
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	5–25	1–2
	shortstem buckwheat	ERBR5	*Eriogonum brevicaule*	0–25	0–2
	fleabane	ERIGE2	*Erigeron*	0–25	0–2
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	0–25	0–2
	scarlet gilia	IPAG	*Ipomopsis aggregata*	0–25	0–2
	borage	BORAG	*Borago*	0–25	0–2
	Indian paintbrush	CASTI2	*Castilleja*	0–25	0–2
	common yarrow	ACMI2	*Achillea millefolium*	0–25	0–2
	onion	ALLIU	*Allium*	0–25	0–2
	pussytoes	ANTEN	*Antennaria*	0–25	0–2
	longleaf phlox	PHLO2	*Phlox longifolia*	5–25	1–2
	vetch	VICIA	*Vicia*	0–25	0–2
	primrose	PRIMU	*Primula*	0–15	0–1
	Douglas' dustymaiden	CHDO	*Chaenactis douglasii*	0–15	0–1
Shrub/Vine					
3	**Shrubs**			0–300	
	spineless horsebrush	TECA2	*Tetradymia canescens*	0–65	0–4

	spineless horsebrush	TECA2	*Tetradymia canescens*	0–65	0–4
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–50	0–4
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–50	0–4
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	0–50	0–4
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	0–50	0–3
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–40	0–3
	little sagebrush	ARARA	*Artemisia arbuscula ssp. arbuscula*	0–30	0–2
	black sagebrush	ARNO4	*Artemisia nova*	0–30	0–2
	Woods' rose	ROWO	*Rosa woodsii*	0–30	0–2
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–30	0–2
	creeping barberry	MARE11	*Mahonia repens*	0–30	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–25	0–2
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–20	0–2
	spiny phlox	PHHO	*Phlox hoodii*	0–20	0–1
	slender buckwheat	ERMI4	*Eriogonum microthecum*	0–20	0–1

Table 33. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			250–400	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	150–350	10–20
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–300	0–15
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	0–150	0–10
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	0–150	0–10
3	**Sub-dominant Shrubs**			50–150	
	spineless horsebrush	TECA2	*Tetradymia canescens*	0–65	0–4
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–50	0–4
	little sagebrush	ARARA	*Artemisia arbuscula ssp. arbuscula*	0–30	0–2
	black sagebrush	ARNO4	*Artemisia nova*	0–30	0–2
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–30	0–2
	Utah juniper	JUOS	*Juniperus osteosperma*	0–30	0–2
	creeping barberry	MARE11	*Mahonia repens*	0–30	0–2
	Woods' rose	ROWO	*Rosa woodsii*	0–30	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–25	0–2
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–20	0–2
	spiny phlox	PHHO	*Phlox hoodii*	0–20	0–1
	slender buckwheat	ERMI4	*Eriogonum microthecum*	0–20	0–1
Grass/Grasslike					
0	**Dominant Grasses**			200–400	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	100–400	4–22
	Idaho fescue	FEID	*Festuca idahoensis*	0–200	0–15
1	**Sub-Dominant Grasses**			50–200	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–75	0–5

	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–15	0–3
	oniongrass	MEBU	*Melica bulbosa*	0–65	0–4
	muttongrass	POFE	*Poa fendleriana*	10–50	1–4
	Sandberg bluegrass	POSE	*Poa secunda*	0–50	0–3
	western wheatgrass	PASM	*Pascopyrum smithii*	0–50	0–3
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–50	0–3
	Geyer's sedge	CAGE2	*Carex geyeri*	0–50	0–3
	needle and thread	HECO26	*Hesperostipa comata*	0–50	0–3
	Grass, perennial	2GP	*Grass, perennial*	0–50	0–3
	basin wildrye	LECI4	*Leymus cinereus*	0–40	0–3
	squirreltail	ELEL5	*Elymus elymoides*	0–40	0–3
	Grass, annual	2GA	*Grass, annual*	0–35	0–2
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–25	0–2
Forb					
2	**Forbs**			75–200	
	Forb, perennial	2FP	*Forb, perennial*	25–75	2–5
	Forb, annual	2FA	*Forb, annual*	10–50	1–4
	low beardtongue	PEHU	*Penstemon humilis*	10–50	1–4
	rock goldenrod	PEPU7	*Petradoria pumila*	10–50	1–4
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	10–50	1–3
	povertyweed	IVAX	*Iva axillaris*	0–40	0–3
	western stoneseed	LIRU4	*Lithospermum ruderale*	0–40	0–3
	desertparsley	LOMAT	*Lomatium*	0–25	0–2
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	5–25	1–2
	shortstem buckwheat	ERBR5	*Eriogonum brevicaule*	0–25	0–2
	fleabane	ERIGE2	*Erigeron*	0–25	0–2
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	0–25	0–2
	scarlet gilia	IPAG	*Ipomopsis aggregata*	0–25	0–2
	borage	BORAG	*Borago*	0–25	0–2
	Indian paintbrush	CASTI2	*Castilleja*	0–25	0–2
	common yarrow	ACMI2	*Achillea millefolium*	0–25	0–2
	onion	ALLIU	*Allium*	0–25	0–2
	pussytoes	ANTEN	*Antennaria*	0–25	0–2
	longleaf phlox	PHLO2	*Phlox longifolia*	5–25	1–2
	vetch	VICIA	*Vicia*	0–25	0–2
	primrose	PRIMU	*Primula*	0–15	0–1
	Douglas' dustymaiden	CHDO	*Chaenactis douglasii*	0–15	0–1

Table 34. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			250–500	
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	100–300	8–20

	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–200	0–12
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–150	0–10
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	0–100	0–8
3	**Sub-Dominant Shrubs**			50–150	
	spineless horsebrush	TECA2	*Tetradymia canescens*	0–65	0–4
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–50	0–4
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	0–50	0–3
	Woods' rose	ROWO	*Rosa woodsii*	0–30	0–2
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–30	0–2
	little sagebrush	ARARA	*Artemisia arbuscula ssp. arbuscula*	0–30	0–2
	black sagebrush	ARNO4	*Artemisia nova*	0–30	0–2
	Utah juniper	JUOS	*Juniperus osteosperma*	0–30	0–2
	creeping barberry	MARE11	*Mahonia repens*	0–30	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–25	0–2
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–20	0–2
	spiny phlox	PHHO	*Phlox hoodii*	0–20	0–1
	slender buckwheat	ERMI4	*Eriogonum microthecum*	0–20	0–1
Grass/Grasslike					
0	**Dominant Grasses**			175–400	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	50–300	4–22
	Idaho fescue	FEID	*Festuca idahoensis*	0–125	0–10
	muttongrass	POFE	*Poa fendleriana*	25–125	1–10
1	**Sub-Dominant Grasses**			50–150	
	cheatgrass	BRTE	*Bromus tectorum*	1–100	1–7
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–75	0–5
	oniongrass	MEBU	*Melica bulbosa*	0–65	0–4
	crested wheatgrass	AGCR	*Agropyron cristatum*	0–50	0–4
	Grass, perennial	2GP	*Grass, perennial*	0–50	0–3
	Geyer's sedge	CAGE2	*Carex geyeri*	0–50	0–3
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–50	0–3
	western wheatgrass	PASM	*Pascopyrum smithii*	0–50	0–3
	Sandberg bluegrass	POSE	*Poa secunda*	0–50	0–3
	needle and thread	HECO26	*Hesperostipa comata*	0–50	0–3
	basin wildrye	LECI4	*Leymus cinereus*	0–40	0–3
	squirreltail	ELEL5	*Elymus elymoides*	0–40	0–3
	Grass, annual	2GA	*Grass, annual*	0–35	0–2
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–25	0–2
Forb					
2	**Forbs**			25–200	
	Forb, annual	2FA	*Forb, annual*	10–100	1–7
	Forb, perennial	2FP	*Forb, perennial*	25–75	2–5
	thistle	CIRSI	*Cirsium*	0–50	0–4
	low beardtongue	PEHU	*Penstemon humilis*	10–50	1–4

	rock goldenrod	PEPU7	*Petradoria pumila*	10–50	1–4
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	10–50	1–3
	povertyweed	IVAX	*Iva axillaris*	0–40	0–3
	prickly lettuce	LASE	*Lactuca serriola*	0–40	0–3
	western stoneseed	LIRU4	*Lithospermum ruderale*	0–40	0–3
	vetch	VICIA	*Vicia*	0–25	0–2
	longleaf phlox	PHLO2	*Phlox longifolia*	5–25	1–2
	desertparsley	LOMAT	*Lomatium*	0–25	0–2
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	5–25	1–2
	shortstem buckwheat	ERBR5	*Eriogonum brevicaule*	0–25	0–2
	fleabane	ERIGE2	*Erigeron*	0–25	0–2
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	0–25	0–2
	scarlet gilia	IPAG	*Ipomopsis aggregata*	0–25	0–2
	borage	BORAG	*Borago*	0–25	0–2
	Indian paintbrush	CASTI2	*Castilleja*	0–25	0–2
	common yarrow	ACMI2	*Achillea millefolium*	0–25	0–2
	onion	ALLIU	*Allium*	0–25	0–2
	pussytoes	ANTEN	*Antennaria*	0–25	0–2
	Douglas' dustymaiden	CHDO	*Chaenactis douglasii*	0–15	0–1
	primrose	PRIMU	*Primula*	0–15	0–1

Table 35. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
0	**Dominant Grasses**			400–700	
1	**Sub-Dominant Grasses**			50–250	
	crested wheatgrass	AGCR	*Agropyron cristatum*	0–150	0–10
	cheatgrass	BRTE	*Bromus tectorum*	1–100	1–7
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–75	0–5
	oniongrass	MEBU	*Melica bulbosa*	0–65	0–4
	western wheatgrass	PASM	*Pascopyrum smithii*	0–50	0–3
	muttongrass	POFE	*Poa fendleriana*	10–50	1–3
	Sandberg bluegrass	POSE	*Poa secunda*	0–50	0–3
	needle and thread	HECO26	*Hesperostipa comata*	0–50	0–3
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–50	0–3
	Grass, perennial	2GP	*Grass, perennial*	0–50	0–3
	Geyer's sedge	CAGE2	*Carex geyeri*	0–50	0–3
	squirreltail	ELEL5	*Elymus elymoides*	0–40	0–3
	basin wildrye	LECI4	*Leymus cinereus*	0–40	0–3
	Grass, annual	2GA	*Grass, annual*	0–35	0–2
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–25	0–2
Forb					

2	**Forbs**			25–200	
	Forb, annual	2FA	*Forb, annual*	10–100	1–7
	Forb, perennial	2FP	*Forb, perennial*	25–75	2–5
	thistle	CIRSI	*Cirsium*	0–50	0–4
	low beardtongue	PEHU	*Penstemon humilis*	10–50	1–4
	rock goldenrod	PEPU7	*Petradoria pumila*	10–50	1–4
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	10–50	1–3
	povertyweed	IVAX	*Iva axillaris*	0–40	0–3
	prickly lettuce	LASE	*Lactuca serriola*	0–40	0–3
	western stoneseed	LIRU4	*Lithospermum ruderale*	0–40	0–3
	vetch	VICIA	*Vicia*	0–25	0–2
	longleaf phlox	PHLO2	*Phlox longifolia*	5–25	1–2
	desertparsley	LOMAT	*Lomatium*	0–25	0–2
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	5–25	1–2
	shortstem buckwheat	ERBR5	*Eriogonum brevicaule*	0–25	0–2
	fleabane	ERIGE2	*Erigeron*	0–25	0–2
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	0–25	0–2
	scarlet gilia	IPAG	*Ipomopsis aggregata*	0–25	0–2
	borage	BORAG	*Borago*	0–25	0–2
	Indian paintbrush	CASTI2	*Castilleja*	0–25	0–2
	common yarrow	ACMI2	*Achillea millefolium*	0–25	0–2
	onion	ALLIU	*Allium*	0–25	0–2
	pussytoes	ANTEN	*Antennaria*	0–25	0–2
	Douglas' dustymaiden	CHDO	*Chaenactis douglasii*	0–15	0–1
	primrose	PRIMU	*Primula*	0–15	0–1
Shrub/Vine					
3	**Shrubs**			0–300	
	spineless horsebrush	TECA2	*Tetradymia canescens*	0–65	0–4
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–50	0–4
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–50	0–4
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	0–50	0–4
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	0–50	0–3
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–40	0–3
	little sagebrush	ARARA	*Artemisia arbuscula ssp. arbuscula*	0–30	0–2
	black sagebrush	ARNO4	*Artemisia nova*	0–30	0–2
	Woods' rose	ROWO	*Rosa woodsii*	0–30	0–2
	creeping barberry	MARE11	*Mahonia repens*	0–30	0–2
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–30	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–25	0–2
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–20	0–2
	spiny phlox	PHHO	*Phlox hoodii*	0–20	0–1
	slender buckwheat	ERMI4	*Eriogonum microthecum*	0–20	0–1

Table 36. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			250–400	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	150–350	10–20
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–300	0–15
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	0–150	0–10
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	0–150	0–10
3	**Sub-dominant Shrubs**			50–150	
	spineless horsebrush	TECA2	*Tetradymia canescens*	0–65	0–4
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–50	0–4
	little sagebrush	ARARA	*Artemisia arbuscula ssp. arbuscula*	0–30	0–2
	black sagebrush	ARNO4	*Artemisia nova*	0–30	0–2
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–30	0–2
	Woods' rose	ROWO	*Rosa woodsii*	0–30	0–2
	Utah juniper	JUOS	*Juniperus osteosperma*	0–30	0–2
	creeping barberry	MARE11	*Mahonia repens*	0–30	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–25	0–2
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–20	0–2
	spiny phlox	PHHO	*Phlox hoodii*	0–20	0–1
	slender buckwheat	ERMI4	*Eriogonum microthecum*	0–20	0–1
Grass/Grasslike					
0	**Dominant Grasses**			150–400	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	100–400	4–22
	Idaho fescue	FEID	*Festuca idahoensis*	0–200	0–15
1	**Sub-Dominant Grasses**			50–200	
	cheatgrass	BRTE	*Bromus tectorum*	1–100	1–7
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–75	0–5
	oniongrass	MEBU	*Melica bulbosa*	0–65	0–4
	muttongrass	POFE	*Poa fendleriana*	10–50	1–4
	Sandberg bluegrass	POSE	*Poa secunda*	0–50	0–3
	western wheatgrass	PASM	*Pascopyrum smithii*	0–50	0–3
	needle and thread	HECO26	*Hesperostipa comata*	0–50	0–3
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–50	0–3
	Geyer's sedge	CAGE2	*Carex geyeri*	0–50	0–3
	Grass, perennial	2GP	*Grass, perennial*	0–50	0–3
	squirreltail	ELEL5	*Elymus elymoides*	0–40	0–3
	crested wheatgrass	AGCR	*Agropyron cristatum*	0–40	0–3
	smooth brome	BRIN2	*Bromus inermis*	0–40	0–3
	basin wildrye	LECI4	*Leymus cinereus*	0–40	0–3
	Grass, annual	2GA	*Grass, annual*	0–35	0–2
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–25	0–2
Forb					

Forb					
2	**Forbs**			25–200	
	Forb, perennial	2FP	*Forb, perennial*	25–75	2–5
	thistle	CIRSI	*Cirsium*	0–50	0–4
	Forb, annual	2FA	*Forb, annual*	10–50	1–4
	prickly lettuce	LASE	*Lactuca serriola*	0–50	0–4
	low beardtongue	PEHU	*Penstemon humilis*	10–50	1–4
	rock goldenrod	PEPU7	*Petradoria pumila*	10–50	1–4
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	10–50	1–3
	western stoneseed	LIRU4	*Lithospermum ruderale*	0–40	0–3
	povertyweed	IVAX	*Iva axillaris*	0–40	0–3
	vetch	VICIA	*Vicia*	0–25	0–2
	longleaf phlox	PHLO2	*Phlox longifolia*	5–25	1–2
	desertparsley	LOMAT	*Lomatium*	0–25	0–2
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	5–25	1–2
	shortstem buckwheat	ERBR5	*Eriogonum brevicaule*	0–25	0–2
	fleabane	ERIGE2	*Erigeron*	0–25	0–2
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	0–25	0–2
	scarlet gilia	IPAG	*Ipomopsis aggregata*	0–25	0–2
	borage	BORAG	*Borago*	0–25	0–2
	Indian paintbrush	CASTI2	*Castilleja*	0–25	0–2
	common yarrow	ACMI2	*Achillea millefolium*	0–25	0–2
	onion	ALLIU	*Allium*	0–25	0–2
	pussytoes	ANTEN	*Antennaria*	0–25	0–2
	Douglas' dustymaiden	CHDO	*Chaenactis douglasii*	0–15	0–1
	primrose	PRIMU	*Primula*	0–15	0–1

Table 37. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			400–700	
3	**Sub-Dominant Shrubs**			100–200	
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	0–100	0–7
	spineless horsebrush	TECA2	*Tetradymia canescens*	0–100	0–7
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–50	0–4
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–50	0–3
	Utah juniper	JUOS	*Juniperus osteosperma*	0–50	0–3
	creeping barberry	MARE11	*Mahonia repens*	0–30	0–2
	little sagebrush	ARARA	*Artemisia arbuscula ssp. arbuscula*	0–30	0–2
	black sagebrush	ARNO4	*Artemisia nova*	0–30	0–2
	Woods' rose	ROWO	*Rosa woodsii*	0–30	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–25	0–2
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–20	0–2

	plains prickly pear	OPPO	*Opuntia polyacantha*	0–20	0–2
	spiny phlox	PHHO	*Phlox hoodii*	0–20	0–1
	slender buckwheat	ERMI4	*Eriogonum microthecum*	0–20	0–1
Grass/Grasslike					
1	**Grasses**			25–175	
	cheatgrass	BRTE	*Bromus tectorum*	15–100	1–7
	Idaho fescue	FEID	*Festuca idahoensis*	0–50	0–4
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	0–50	0–4
	muttongrass	POFE	*Poa fendleriana*	0–50	0–4
	Sandberg bluegrass	POSE	*Poa secunda*	0–50	0–3
	Grass, perennial	2GP	*Grass, perennial*	0–50	0–3
	Grass, annual	2GA	*Grass, annual*	0–35	0–2
	western wheatgrass	PASM	*Pascopyrum smithii*	0–30	0–2
	squirreltail	ELEL5	*Elymus elymoides*	0–30	0–1
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–25	0–2
	basin wildrye	LECI4	*Leymus cinereus*	0–20	0–1
	oniongrass	MEBU	*Melica bulbosa*	0–20	0–1
	needle and thread	HECO26	*Hesperostipa comata*	0–20	0–1
	Geyer's sedge	CAGE2	*Carex geyeri*	0–20	0–1
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–20	0–1
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–20	0–1
	crested wheatgrass	AGCR	*Agropyron cristatum*	0–20	0–1
Forb					
2	**Forbs**			25–100	
	Forb, annual	2FA	*Forb, annual*	10–50	1–4
	povertyweed	IVAX	*Iva axillaris*	0–40	0–3
	desertparsley	LOMAT	*Lomatium*	0–25	0–2
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	5–25	1–2
	shortstem buckwheat	ERBR5	*Eriogonum brevicaule*	0–25	0–2
	fleabane	ERIGE2	*Erigeron*	0–25	0–2
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	0–25	0–2
	scarlet gilia	IPAG	*Ipomopsis aggregata*	0–25	0–2
	Forb, perennial	2FP	*Forb, perennial*	0–25	0–2
	common yarrow	ACMI2	*Achillea millefolium*	0–25	0–2
	onion	ALLIU	*Allium*	0–25	0–2
	pussytoes	ANTEN	*Antennaria*	0–25	0–2
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	0–25	0–2
	borage	BORAG	*Borago*	0–25	0–2
	Indian paintbrush	CASTI2	*Castilleja*	0–25	0–2
	vetch	VICIA	*Vicia*	0–25	0–2
	longleaf phlox	PHLO2	*Phlox longifolia*	5–25	1–2
	low beardtongue	PEHU	*Penstemon humilis*	0–20	0–1
	rock goldenrod	PEPU7	*Petradoria pumila*	0–20	0–1
	western stoneseed	LIRU4	*Lithospermum ruderale*	0–20	0–1

	western stoneseed	LIRU4	*Lithospermum ruderale*	0–20	0–1
	Douglas' dustymaiden	CHDO	*Chaenactis douglasii*	0–15	0–1
	primrose	PRIMU	*Primula*	0–15	0–1

Table 38. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
0	**Dominant Grasses**			400–700	
1	**Sub-dominant Grasses**			50–250	
	cheatgrass	BRTE	*Bromus tectorum*	0–100	0–7
	Idaho fescue	FEID	*Festuca idahoensis*	0–75	0–5
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	0–75	0–5
	oniongrass	MEBU	*Melica bulbosa*	0–65	0–4
	western wheatgrass	PASM	*Pascopyrum smithii*	0–50	0–3
	muttongrass	POFE	*Poa fendleriana*	10–50	1–3
	Sandberg bluegrass	POSE	*Poa secunda*	0–50	0–3
	needle and thread	HECO26	*Hesperostipa comata*	0–50	0–3
	Geyer's sedge	CAGE2	*Carex geyeri*	0–50	0–3
	Grass, perennial	2GP	*Grass, perennial*	0–50	0–3
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–50	0–3
	basin wildrye	LECI4	*Leymus cinereus*	0–40	0–3
	squirreltail	ELEL5	*Elymus elymoides*	0–40	0–3
	Grass, annual	2GA	*Grass, annual*	0–35	0–2
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–25	0–2
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–25	0–2
Forb					
2	**Forbs**			25–150	
	Forb, perennial	2FP	*Forb, perennial*	0–50	0–3
	povertyweed	IVAX	*Iva axillaris*	0–40	0–3
	Forb, annual	2FA	*Forb, annual*	0–30	0–2
	vetch	VICIA	*Vicia*	0–25	0–2
	longleaf phlox	PHLO2	*Phlox longifolia*	5–25	1–2
	desertparsley	LOMAT	*Lomatium*	0–25	0–2
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	5–25	1–2
	shortstem buckwheat	ERBR5	*Eriogonum brevicaule*	0–25	0–2
	fleabane	ERIGE2	*Erigeron*	0–25	0–2
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	0–25	0–2
	scarlet gilia	IPAG	*Ipomopsis aggregata*	0–25	0–2
	common yarrow	ACMI2	*Achillea millefolium*	0–25	0–2
	onion	ALLIU	*Allium*	0–25	0–2
	pussytoes	ANTEN	*Antennaria*	0–25	0–2
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	0–25	0–2
	borage	BORAG	*Borago*	0–25	0–2

	Indian paintbrush	CASTI2	*Castilleja*	0–25	0–2
	western stoneseed	LIRU4	*Lithospermum ruderale*	0–20	0–2
	low beardtongue	PEHU	*Penstemon humilis*	0–20	0–1
	rock goldenrod	PEPU7	*Petradoria pumila*	0–20	0–1
	Douglas' dustymaiden	CHDO	*Chaenactis douglasii*	0–15	0–1
	primrose	PRIMU	*Primula*	0–15	0–1
Shrub/Vine					
3	**Shrubs**			0–300	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–200	0–15
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–75	0–5
	spineless horsebrush	TECA2	*Tetradymia canescens*	0–65	0–4
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–50	0–4
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	0–50	0–4
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	0–50	0–3
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–40	0–3
	little sagebrush	ARARA	*Artemisia arbuscula ssp. arbuscula*	0–30	0–2
	black sagebrush	ARNO4	*Artemisia nova*	0–30	0–2
	Woods' rose	ROWO	*Rosa woodsii*	0–30	0–2
	creeping barberry	MARE11	*Mahonia repens*	0–30	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–25	0–2
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–20	0–2
	spiny phlox	PHHO	*Phlox hoodii*	0–20	0–1
	slender buckwheat	ERMI4	*Eriogonum microthecum*	0–20	0–1

Animal community

Livestock use:
This site provides good grazing for cattle, sheep and horses for spring, summer, and fall use.
Wildlife use:
This site is fair habitat for hawks, upland game birds and other small birds as well as jack rabbits, cottontails, coyotes and other small mammals. It frequently provides food for mule deer and pronghorn antelope during the winter.

Hydrological functions

This site has high runoff potential. Soils are in hydrologic group d.

Recreational uses

This site has fair to good aesthetic appeal and is valued for open space. In good condition it has a relatively large number of forbs and a few shrubs which bloom in the spring and early summer. It has very little value for screening because of the low growing nature of the plants and is therefore not good for camping and picnicking. Hunting is good for upland game birds, particularly sage grouse, chukars, and for jack rabbits and cottontails. This site has value for snowmobiling as a recreational use in winter, but this type of use may conflict with large populations of wintering mule deer or pronghorn antelope.

Wood products

none

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used.

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Contributors

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Approval

Kendra Moseley, 2/05/2025

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.

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Contact for lead author	shane.green@ut.usda.gov
Date	06/24/2004
Approved by	Kendra Moseley

Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Minor rill development in exposed areas. Rills present should be short on flatter slopes but may become longer (4 to 12 feet) as slope steepens. They should be somewhat widely spaced (4 to 6 feet), and follow the surface micro-features. Old rills should be weathered and muted in appearance. The presence of surface coarse fragments may reduce rill formation.

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2. **Presence of water flow patterns:** Flow patterns wind around surface rock & perennial plant bases and show minor evidence of erosion. They are somewhat short and stable and there is only minor evidence of deposition. Evidence of flow will increase somewhat with slope.

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3. **Number and height of erosional pedestals or terracettes:** Plants may show very minor pedestialing on their down slope side. There should be no exposed roots. Terracettes should be few and stable.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 20 – 30%. (Soil surface is typically covered with 30% rock).

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5. **Number of gullies and erosion associated with gullies:** Very few. Gullies should show only minor signs of active erosion and should be mostly stabilized with vegetation. Gullies may show slightly more indication of erosion as slope steepens. The presence of surface rock may mask erosion indicators.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Little evidence of wind generated soil movement. Wind caused blowouts and deposition are not present.

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7. **Amount of litter movement (describe size and distance expected to travel):** Some down slope redistribution caused by water. Some litter removal may occur in flow channels with deposition occurring at points of obstruction. Litter movement will increase with slope.

---

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** 70 to 80% of this site should have an erosion rating of 4 or 5. 20 to 30% may have a rating of 3 to 4. The average should be a 4. Litter accumulation and cryptogamic crusts reduce erosion. The presence of surface rock also reduces site erosion.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface varies from 0 to 6 inches. Structure is subangular blocky. Color is red (2.5YR4/6). An orhric epipedon goes to a depth of 6 inches.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** When perennial grasses decrease, reducing ground cover and increasing bare ground, runoff will increase and infiltration will be reduced.

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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):** None. Bedrock occurs at approximately 17 inches.

---

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: Cool Season Perennial bunchgrasses > Non-sprouting shrubs

    Sub-dominant: Sprouting shrubs = forbs

    Other:

    Additional: Assumed fire cycle of 40-60 years. Perennial bunchgrasses, non-sprouting shrubs > sprouting shrubs, perennial & annual forbs > invaders such as Cheatgrass, Peppergrass & Annual mustards. The perennial bunchgrass/non-sprouting shrub functioning groups are expected on this site.

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** All age classes of perennial bunchgrasses should be present. Slight decadence in the principle shrubs could occur near the end of the fire cycle.

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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):** 850 - 950 #/acre on an average year.

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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:** Cheatgrass, Green rabbitbrush, Snakeweed, Sandberg bluegrass & Annual forbs.

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17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce in all years, except in extreme drought years.
