USDA Natural Resources
Conservation Service

Ecological site R028AY307UT
Upland Gravelly Loam (Wyoming Big Sagebrush)

Accessed: 05/18/2024

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.

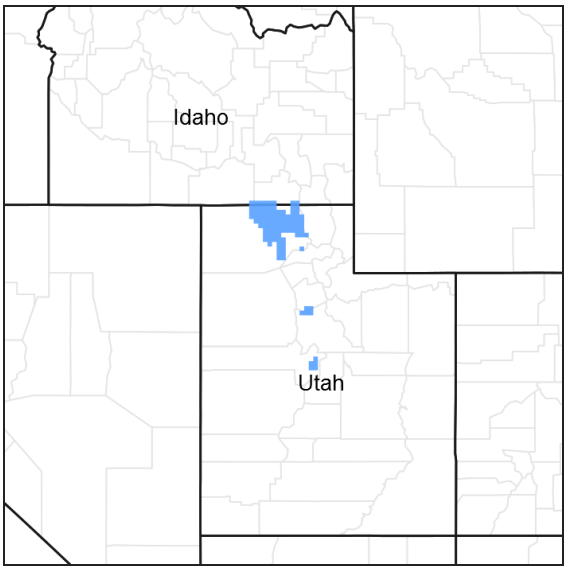

Figure 1. Mapped extent

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.

Classification relationships

Western Intermountain Sagebrush Steppe (West 1983)

Ecological site concept

This is a Wyoming big sagebrush site that is normally found on lake terraces and benches, but can be found on mountain slopes going up to 7000 feet in areas where there are specific environmental conditions that allow this to take place. The site is a Bluebunch and Wyoming big sagebrush dominated site in a high similarity index condition. Also this site will contain a number of other grasses, forbs and shrubs. The site is one that is quite resilient as long as it is allowed to burn at intervals of 40 to 70 years and does not get over-utilized for any extended period of time. (More than 2 years in a 20 year period)

Associated sites

R028AY306UT	**Upland Gravelly Loam (Bonneville Big Sagebrush)** The main difference between these two sites is the species of the sagebrush. 306 is Bonneville big sagebrush and on 307 it is Wyoming big sagebrush. There will also be differences in the species and amounts of forbs and in the amount of production. The 306 site will have 300 to 450 pounds per acre greater production than the 307 site.

R028AY309UT	**Upland Loam (Wyoming Big Sagebrush)** The difference between these two sites is first the soils. The soil on the 309 site will typically have 0 to less than 15% gravels on the surface and through the profile where the 307 site will have typically 35% or more second the production on the 309 site will be 250 to 300 pounds per acre greater than on the 307 site. Also the amount of forb species diversity will be greater on the 309 site over the 307 site.
R028AY325UT	**Upland Shallow Loam (Black Sagebrush)** The difference between these two sites is the debth of the soil, 325 soils are typically less than 20 inches deep and on the 307 soil they are 40 inches or greater. Also shrub component on 325 is black sagebrush instead of Wyoming big sagebrush.
R028AY334UT	**Upland Stony Loam (Wyoming Big Sagebrush)** The 334 site and the 307 site differ mainly in the amount of production. The production on the 307 site will be 300 to 450 pounds per acre greater than on the 334 site. Also the size of the rocks will help tell these two sites apart. 307 will have material around 1 to 3 inches in size and the 334 site will have rocks around 4 to 10 inches or greater in size.

Similar sites

R028AY334UT	**Upland Stony Loam (Wyoming Big Sagebrush)** The 334 site and the 307 site differ mainly in the amount of production. The production on the 307 site will be 300 to 450 pounds per acre greater than on the 334 site. Also the size of the rocks will help tell these two sites apart. 307 will have material around 1 to 3 inches in size and the 334 site will have rocks around 4 to 10 inches or greater in size.
R028AY306UT	**Upland Gravelly Loam (Bonneville Big Sagebrush)** The main difference between these two sites is the species of the sagebrush. 306 is Bonneville big sagebrush and on 307 it is Wyoming big sagebrush. There will also be differences in the species and amounts of forbs and in the amount of production. The 306 site will have 300 to 450 pounds per acre greater production than the 307 site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. wyomingensis* (2) *Purshia tridentata*
Herbaceous	(1) *Pseudoroegneria spicata* (2) *Elymus trachycaulus*

Physiographic features

This site occurs on lake terraces, alluvial fans and lower foot hills at elevations between 4,400 and 5,400 feet. Runoff class is medium for the site and flooding and ponding do not occur.

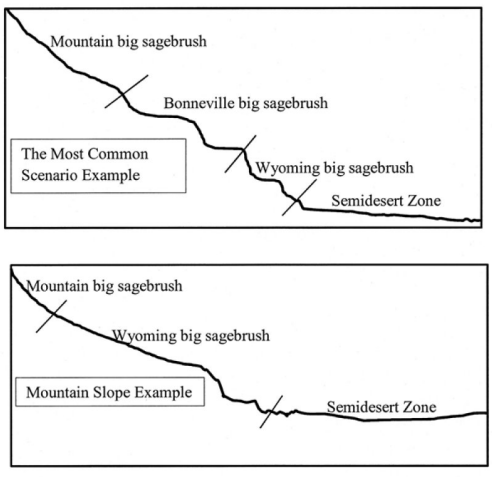

Figure 2. Catena drawings for both existing scenarios

Table 2. Representative physiographic features

Landforms	(1) Fan remnant (2) Lake terrace (3) Alluvial fan
Flooding frequency	None
Ponding frequency	None
Elevation	1,341–1,646 m
Slope	1–30%
Aspect	Aspect is not a significant factor

Climatic features

The climate is characterized by warm, dry summers, cold, moist winters and fairly moist springs. This climate is modified by local topographic conditions. The mountains appreciably modify both the precipitation and temperature patterns. October to May is the wettest part of the year with July to September being the driest.

Table 3. Representative climatic features

Frost-free period (average)	92 days
Freeze-free period (average)	115 days
Precipitation total (average)	356 mm

Influencing water features

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

Soil features

The soils are deep to very deep and well drained Typically the surface layer is dark grayish brown loam and the subsurface layer is brown gravelly loam with gravels extending to 60 inches or to bedrock. These soils are Moderately Alkaline and Moderately Calcareous.

Soils that represent this site include:

West Box Elder Survey (601), Collard (19), Hupp (19,22), Donnardo (28,29,43); Box Elder East Survey (602), Abella (ABE), Blue Star (BgE; BLG), Hupp (HpB; HpD), Sandall (SHE); Tooele Survey (611), Abela (1); Golden Spike National Monument East Box Elder Survey, Abela (ABE;PSR), Sterling (ABE,SRP,SsB,SsD), Hupp (ABE,KeC,SsB,SsD), Sanpete (KgD,PAB, PwE,PwG2), Windmill (SvB)

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone and sandstone (2) Lacustrine deposits–quartzite
Surface texture	(1) Gravelly loam (2) Gravelly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	152 cm
Surface fragment cover <=3"	0–28%
Surface fragment cover >3"	0–3%

Available water capacity (0-101.6cm)	8.64–11.68 cm
Calcium carbonate equivalent (0-101.6cm)	5–10%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0–42%
Subsurface fragment volume >3" (Depth not specified)	0–20%

Ecological dynamics

The state and transition model diagram is more completely described in the following narratives for each of the plant communities. These plant communities may not represent every possibility, but they probably are the most prevalent and repeatable plant communities. As more monitoring data are collected, some of these plant communities may be revised or removed, and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities.” The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

As vegetation communities respond to changes in management or natural occurrences, thresholds can be crossed (transitions), which usually means that a reversal of direction is probably not possible without major energy input. The amount of energy input needed to effect vegetative shifts depends on what the present vegetation is and the desired results.

State and transition model

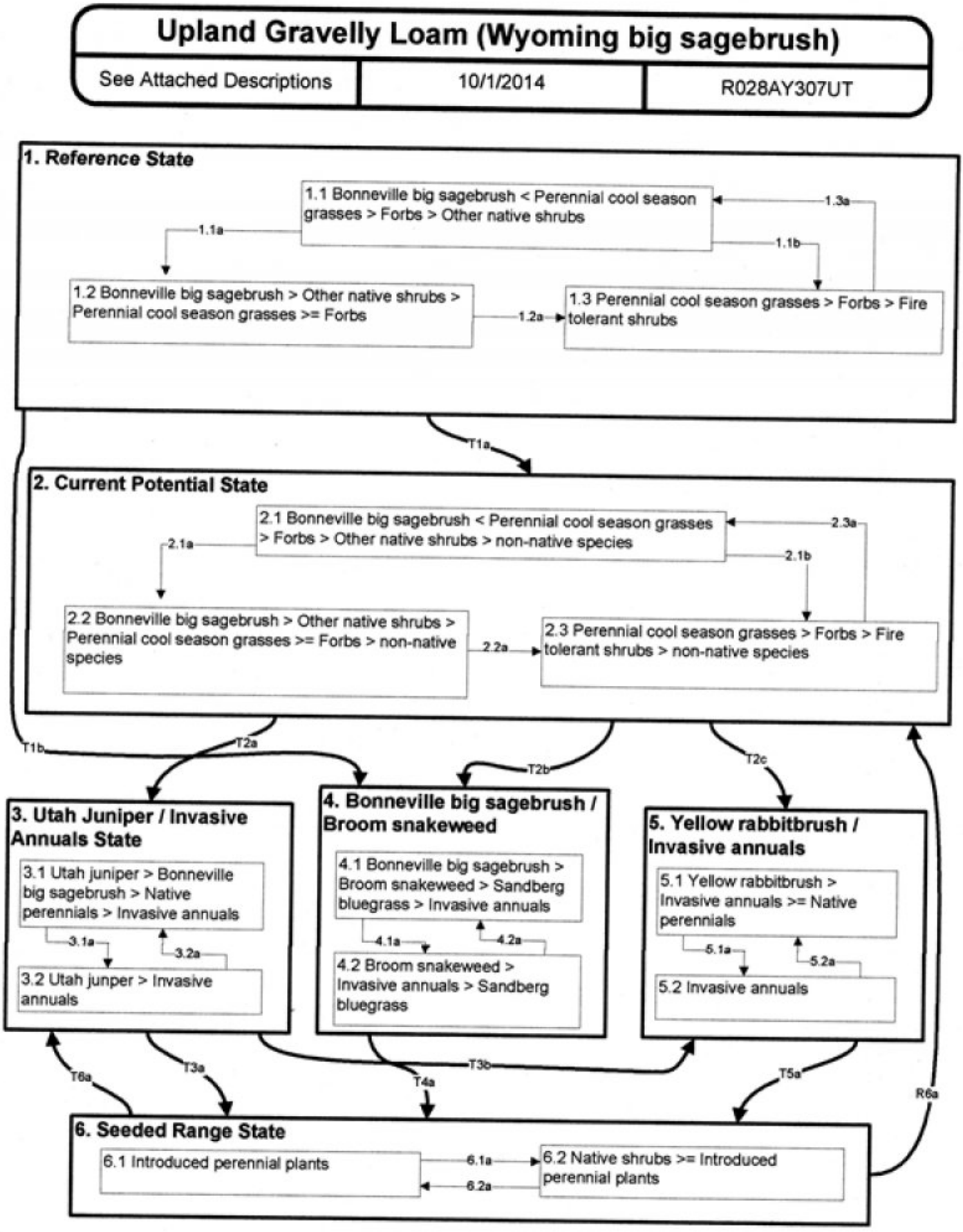

Figure 7. 028AY307 State & Transition Model

State 1
Reference State

The interpretive plant community for this site is the Reference State (RS). Dominant vegetative aspect is Wyoming

big sagebrush and Bluebunch wheatgrass with other grasses and forbs in the interspaces. This site is usually associated with Salt Lake formation terraces. The air-dry composition weight is 50% perennial grasses, 15% forbs and 35% shrubs. Plants begin growth around April 20 and end growth around September 15. The RS has been determined by the study of rangeland relic areas, the evaluation of collected data, and trend data. The assumptions in developing this site were that the historic data and the sites visited were accurately represented.

Community 1.1
Bonneville big sagebrush < Perennial cool season grasses > forbs > Other native shrubs

The dominant aspect of the plant community is Wyoming big sagebrush and Bluebunch wheatgrass. The community is made up of 40-60 % Grass, 7-20 % forbs, and 33-45 % shrubs on an annual production dry weight basis.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	263	572	874
Shrub/Vine	224	493	751
Forb	73	168	280
Total	**560**	**1233**	**1905**

Table 6. Ground cover

Tree foliar cover	0.0-0.5%
Shrub/vine/liana foliar cover	15-25%
Grass/grasslike foliar cover	20-30%
Forb foliar cover	7-12%
Non-vascular plants	0%
Biological crusts	1-3%
Litter	10-20%
Surface fragments >0.25" and <=3"	10-15%
Surface fragments >3"	0-3%
Bedrock	0%
Water	0%
Bare ground	15-25%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	0%	0-1%	5-8%	1-2%
>0.15 <= 0.3	0%	1-5%	3-7%	2-4%
>0.3 <= 0.6	0%	3-5%	10-14%	2-3%
>0.6 <= 1.4	0%	15-24%	1-3%	0-1%
>1.4 <= 4	0%	0%	5-8%	0%
>4 <= 12	0%	0%	0%	0%
>12 <= 24	0%	0%	0%	0%
>24 <= 37	0%	0%	0%	0%
>37	0%	0%	0%	0%

Community 1.2
Bonneville big sagebrush > Other native shrubs > Perennial cool season grasses > = forbs

The dominant aspect of the plant community is Wyoming big sagebrush with a suppressed understory. Utah juniper may be sparsely scattered if a seed source is available. The community is made up of 15-25 % Grass, 20-35% forbs, and 45-70 % shrubs on an annual production dry weight basis.

Community 1.3
Perennial cool season grasses > Forbs > fire tolerant shrubs

The dominant aspect of the plant community is Perennial grasses and forbs. Some fire tolerant shrubs may be present. The community is made up of 60-90 % Grass, 15-25% forbs, and 5-20 % shrubs on an annual production dry weight basis.

Pathway 1.1a
Community 1.1 to 1.2

Time without a disturbance event. (i.e. Fire, insect damage, prolonged drought, etc.) This was probably dependent on a specific chain of climatic events.

Pathway 1.1b
Community 1.1 to 1.3

Disturbance: Fire; Insects; Prolonged Drought; Pathogens. This can be anything that kills and/or reduces the sagebrush over story and releases the perennial grass and forb under story community. Fire is the most effective of these disturbances.

Pathway 1.2a
Community 1.2 to 1.3

Disturbance: Fire; Insects; Prolonged Drought; Pathogens. This can be anything that kills and/or reduces the sagebrush over story and releases the perennial grass and forb under story community. Fire is the most effective of these disturbances.

Pathway 1.3a
Community 1.3 to 1.1

Time without a disturbance event. (i.e. Fire, insect damage, prolonged drought, etc.) This was probably dependent on a specific chain of climatic events.

State 2
Current Potential State

This state includes the biotic communities that would become established on the ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in its development. The Current Potential state may include acclimatized, naturalized or invasive nonnative species. Plant communities within the CPS state may be managed and used for various purposes by man without significant alteration in plant community composition or production. It includes all of the plant communities that exist in the reference state with the inclusion of nonnative species.

Community 2.1
Bonneville big sagebrush < perennial cool season grasses > forbs > other native shrubs > non-native

Disturbances such as fire, insects, prolonged drought, or pathogens that kills and/or reduces the sagebrush and releases the perennial grass and forb understory community. Fire is the most effective of these disturbances. Chemical or mechanical vegetation manipulation may also be used.

Community 2.2
Bonneville sage > other native shrubs > perennial cool season grasses >= forbs > non-native species

The dominant aspect of the plant community is Wyoming big sagebrush with a suppressed understory. The community is made up of 15-25 % Grass, 20-35% forbs, and 45-70 % shrubs on an annual production dry weight basis. Non-native species are present but do not dominate.

Community 2.3
Perennial cool season grasses > forbs > fire tolerant shrubs > non-native species

The dominant aspect of the plant community is Perennial grasses and forbs. Some fire tolerant shrubs may be present. The community is made up of 60-90 % Grass, 15-25% forbs, and 5-20 % shrubs on an annual production dry weight basis. Non-native species are present but do not dominate.

Pathway 2.1a
Community 2.1 to 2.2

Time without a disturbance event. (i.e. Fire, insect damage, prolonged drought, etc.) This was probably dependent on a specific chain of climatic events.

Pathway 2.1b
Community 2.1 to 2.3

Disturbance: Fire; Insects; Prolonged Drought; Pathogens. This can be anything that kills and/or reduces the sagebrush over story and releases the perennial grass and forb under story community. Fire is the most effective of these disturbances.

Pathway 2.2a
Community 2.2 to 2.3

Disturbance: Fire; Insects; Prolonged Drought; Pathogens. This can be anything that kills and/or reduces the sagebrush over story and releases the perennial grass and forb under story community. Fire is the most effective of these disturbances.

Pathway 2.3a
Community 2.3 to 2.1

Time without a disturbance event. (i.e. Fire, insect damage, prolonged drought, etc.) This was probably dependent on a specific chain of climatic events.

State 3
Utah Juniper Invasion State

This is the state that this plant community will move to when there is a lack of fire with a source of juniper seeds. Movement into this state can be accelerated by overgrazing. The dominant aspect of the plant community is Utah juniper with or without One needle pinyon and Cheatgrass brome. This state can persist for a long time until extreme conditions needed for a wildfire occur or some other management treatment is implemented.

Community 3.1
Utah juniper > bonneville big sagebrush > native perennials > invasive annuals

The dominant aspect of the plant community is Utah Juniper. The community is made up of 5-15 % Grass, 15-25% forbs, 5-25 % shrubs, and 15-35% juniper trees on an annual production dry weight basis. Non-native species are present, and may or may not dominate.

Community 3.2
Utah juniper > invasive annuals

The dominant aspect of the plant community is Utah Juniper with a sparse understory. The community is made up of 0-5 % Grass, 5-10% forbs, 0-5 % shrubs, and 45-95% juniper trees on an annual production dry weight basis. Non-native species are present, and may or may not dominate.

Pathway 3.1a
Community 3.1 to 3.2

Overgrazing or drought over a prolonged period of time with no fire or other disturbance occurring. This site when it gets to this condition will keep deteriorating until the site potential is lost.

Pathway 3.2a
Community 3.2 to 3.1

Fire, insect damage, prolonged drought, or pathogens that cause trees to die off in large enough areas to open the canopy so that understory plants can reestablish.

State 4
Broom Snakeweed / Wyoming big sagebrush State

This is the state that this site will move to when there is long term improper grazing (continuous season long, high intensity). The perennial grasses are removed and brome snakeweed will increase in the understory until it dominates the site. (Ralphs and Thacker 2007 - Poison Plants Lab and ARS Logan, Utah)

Community 4.1
Broom Snakeweed / Wyoming big sagebrush state

The dominant aspect of the plant community is Wyoming big sagebrush with significant portions of Broom snakeweed in the understory or Broom snakeweed with Wyoming big sagebrush as the secondary shrub. The community is made up of 5-15 % Grass, 20-35% forbs, and 40-60% shrubs of which 25 to 80% is broom snakeweed on an annual production dry weight basis. Non-native species are present but do not dominate.

Community 4.2
Broom snakeweed > invasive annuals > sandberg bluegrass

The dominant aspect of the plant community is Broom snakeweed. The community is made up of 5-15% Grass, 15-20% forbs, and 40-75 % shrubs of which Broom snakeweed is 60 to 90% of the shrub production on an annual production dry weight basis. Non-native species are present, but do not dominate.

Pathway 4.1a
Community 4.1 to 4.2

Increase in disturbances like fire, overgrazing, prolonged drought, etc. that destroy the Wyoming big sagebrush and allow the snakeweed to dominate the site.

Pathway 4.2a
Community 4.2 to 4.1

Time without disturbance that allows the Wyoming big sagebrush to reestablish.

State 5
Yellow rabbitbrush / Invasive annuals state

This is the state that this site will move to when it is in an overgrazed situation. Drought conditions will enhance and/or accelerate the move to this state. Fire (wild or controlled)and not seeded will often end up in this state. The

dominant aspect of this state is fire tolerant shrubs like yellow rabbitbrush and fire tolerant annual grasses like Cheatgrass brome.

Community 5.1
Yellow rabbitbrush > Invasive annuals >= native perennials

The dominant aspect of the plant community is rabbitbrush and other fire tolerant shrubs. The community will usually be made up of 20 - 35% cheatgrass brome and other grasses, 10-15 % forbs, and 20 - 45 % shrubs.

Community 5.2
Invasive annuals

The dominant aspect of the plant community is typically invasive annual grasses, but may include significant components of forbs such as halogeton, annual kochia and/or Russian thistle. These plants dominate with only a scattering of native plants.

Pathway 5.1a
Community 5.1 to 5.2

This is caused by increased fire frequency (from 10 to 20 years to 3 to 5 years) and intensity without follow-up management. Overgrazing can move this situation along faster. This pathway is somewhat self-sustaining and the site will keep deteriorating until the site potential is lost.

Pathway 5.2a
Community 5.2 to 5.1

Time without disturbance that allows native plant diversity to get reestablished.

State 6
Seeded Range State

This state results from a significant vegetation manipulation that may include prescribed burning, chaining, cabling, disking, mowing, plowing or other techniques with the intent of introducing non-native and/or native grasses and forbs on to the site. These may be plants like crested wheatgrasses, Russian wildrye, bluebunch wheatgrass, slender wheatgrass, Alfalfa etc. Typically Wyoming big sagebrush will start reestablishing back into the site within 15 to 20 years.

Community 6.1
Introduced perennial plants

The dominant aspect of the plant community is the intentionally introduced perennial grasses and/or forbs and/or shrubs. The community will usually be made up of 60 - 95% grasses, 1 - 30% forbs, and 0-10% shrubs. Some invasive plants may be present depending on the success of the planting.

Community 6.2
Native shrubs >= introduced perennial plants

The dominant aspect of the plant community is can be either intentionally introduced perennial grasses and/or forbs and/or shrubs with Wyoming big sagebrush or Wyoming big sagebrush with either intentionally introduced perennial grasses and/or forbs and/or shrubs. The community will usually be made up of 25 - 75% grasses, 1 - 20% forbs, and 15 - 35% shrubs. Some invasive plants may be present depending on the success of the planting.

Pathway 6.1a
Community 6.1 to 6.2

Time without disturbance that allows native plant diversity to get reestablished.

Pathway 6.2a
Community 6.2 to 6.1

Human caused disturbance i.e. mechanical treatment, chemical treatment and/or Fire. In each case with or without seeding depending on the condition of the plant community.

Restoration pathway R6a
State 6 to 2

Time with proper management that favors the native plants as they move back onto the site. This process can take from 30 to over 80 years to start taking place.

Conservation practices

Prescribed Grazing
Grazing Management Plan - Applied

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			202–404	
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	202–404	–
3	**Subdominant Shrubs**			135–202	
	Shrub, other	2S	*Shrub, other*	67–135	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	67–135	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	13–67	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	13–40	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	13–40	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–25	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–13	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–13	–
Grass/Grasslike					
0	**Dominant Grasses**			538–807	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	269–404	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	135–202	–
	western wheatgrass	PASM	*Pascopyrum smithii*	135–202	–
1	**Subdominant Grasses**			135–269	
	Grass, perennial	2GP	*Grass, perennial*	67–202	–
	Grass, annual	2GA	*Grass, annual*	40–67	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	13–54	–
	muttongrass	POFE	*Poa fendleriana*	13–54	–
	needle and thread	HECO26	*Hesperostipa comata*	13–54	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	13–40	–
	basin wildrye	LECI4	*Leymus cinereus*	13–40	–
	Sandberg bluegrass	POSE	*Poa secunda*	13–40	–

	purple threeawn	ARPU9	*Aristida purpurea*	0–40	–
	squirreltail	ELEL5	*Elymus elymoides*	13–40	–
Forb					
0	**Dominant Forbs**			135–269	
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	54–135	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	40–67	–
	white sagebrush	ARLUC8	*Artemisia ludoviciana ssp. candicans*	40–67	–
2	**Subdominant Forbs**			67–135	
	Forb, perennial	2FP	*Forb, perennial*	108–202	–
	Forb, annual	2FA	*Forb, annual*	67–108	–
	common yarrow	ACMI2	*Achillea millefolium*	27–54	–
	tailcup lupine	LUCAC3	*Lupinus caudatus ssp. caudatus*	27–54	–
	matted buckwheat	ERCA8	*Eriogonum caespitosum*	13–40	–
	shaggy fleabane	ERPU2	*Erigeron pumilus*	13–40	–
	common sunflower	HEAN3	*Helianthus annuus*	13–40	–
	western stoneseed	LIRU4	*Lithospermum ruderale*	13–40	–
	Gray's biscuitroot	LOGR	*Lomatium grayi*	13–40	–
	lobeleaf groundsel	PAMU11	*Packera multilobata*	13–40	–
	low beardtongue	PEHU	*Penstemon humilis*	13–40	–
	longleaf phlox	PHLO2	*Phlox longifolia*	13–40	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	13–40	–
	Torrey's milkvetch	ASCA9	*Astragalus calycosus*	13–40	–
	painted milkvetch	ASCE	*Astragalus ceramicus*	13–40	–
	woollypod milkvetch	ASPU9	*Astragalus purshii*	13–40	–
	Utah milkvetch	ASUT	*Astragalus utahensis*	13–40	–
	yellow spiderflower	CLLUL	*Cleome lutea var. lutea*	0–40	–
	roundspike cryptantha	CRHU2	*Cryptantha humilis*	13–40	–
	longstalk springparsley	CYLO	*Cymopterus longipes*	13–40	–
	tall annual willowherb	EPBR3	*Epilobium brachycarpum*	0–27	–
	cushion cryptantha	CRCI2	*Cryptantha circumscissa*	13–27	–
	wavyleaf thistle	CIUNU	*Cirsium undulatum var. undulatum*	13–27	–
	sego lily	CANU3	*Calochortus nuttallii*	13–27	–
	Nevada onion	ALNE	*Allium nevadense*	13–27	–
	rosy pussytoes	ANRO2	*Antennaria rosea*	13–27	–
	foothill deathcamas	ZIPA2	*Zigadenus paniculatus*	13–27	–
	Utah buttercup	RAJO	*Ranunculus jovis*	13–27	–
	carpet phlox	PHHOC	*Phlox hoodii ssp. canescens*	13–27	–
	scarlet gilia	IPAGA3	*Ipomopsis aggregata ssp. aggregata*	13–27	–
	smoothstem blazingstar	MELA2	*Mentzelia laevicaulis*	0–27	–
	yellow owl's-clover	ORLU2	*Orthocarpus luteus*	13–27	–

Animal community

Sagebrush ecological sites support a wide diversity of wildlife. More than 300 species of invertebrates, 45 reptiles, 91 birds, and 88 mammals have been documented to use sagebrush communities. Sagebrush obligates require sagebrush to complete their life cycles. The sagebrush defoliator moth, sage-grouse, sage thrasher, sage sparrow, Brewer's sparrow, pygmy rabbit, and sagebrush vole are known sagebrush obligate species. Many other species are closely associated with sagebrush sites, and occur in them more frequently than adjacent sites lacking sagebrush. These include Mormon cricket, western rattlesnake, gopher snake, short-horned lizard, sagebrush lizard, Great Basin pocket mouse, least chipmunk, and pronghorn. Other common wildlife species using this site include red-tailed hawk, common raven, black-tail jackrabbit, and coyote. Mule deer use the site primarily as winter range.

Reference and Current Potential States
The highest diversity and densities of wildlife on this site are found where mosaics of community phases are present. Phases dominated by shrubs will be used more by sagebrush obligates, including greater sage-grouse for nesting and wintering habitat. Phases dominated by grasses and forbs will be used more by grassland-nesting birds, such as Columbian sharp-tailed grouse, vesper sparrow, lark sparrow, western meadowlark, and as greater sage-grouse brood-rearing habitat.

Utah Juniper Invasion State
Sagebrush obligate and grassland species will no longer use this site, or be greatly reduced. Woodland species will increase their use of the site. These include ferruginous hawk, gray flycatcher, juniper titmouse, bushy-tailed woodrat, and porcupine. Juniper berries provide winter food for Townsend's solitaire, bluebirds, waxwings, and American robin. Mule deer and elk will use the site as winter range and for thermal cover.

Wyoming Big Sagebrush / Broom Snakeweed and Invasive Plant States
Sagebrush obligate and associated wildlife will persist on this site as long as sufficient cover of Wyoming big sagebrush is present. Sagebrush-killing fire on this site will eliminate use by sagebrush obligates, and greatly reduce use by other shrubland species. Typical wildlife will consist of generalist species such as western fence lizard, black-billed magpie, common raven, cottontails, deer mouse, and coyote.

Seeded Range State
Sagebrush obligate and associated species will be lost from this site until Wyoming big sagebrush is established through intentional planting or natural recolonization. Typical wildlife using the site will be generalist grassland species such as northern harrier, western meadowlark, deer mouse, and coyote. Wildlife species diversity and densities will increase as the community becomes more complex and includes more native grasses, forbs, and shrubs. Seeded monocultures will be depauperate of wildlife.

Hydrological functions

The Hydrologic group is B

Recreational uses

Recreation activities include aesthetic value; and fair opportunities for hiking and hunting.

Wood products

There are no wood products from this site unless there is Utah Juniper invasion onto the site. With this event you will be able to harvest Cedar posts and firewood.

Other information

This site is most often found on the Salt Lake Benches and slopes between them. The site is located just below the Bonneville big sagebrush zone. But there are occasions where due to climatic anomalies the Bonneville big sagebrush sites are absent from the catena and the Wyoming big sagebrush site will run all the way up to the Mountain big sagebrush sites. In these rare situations Antelope bitterbrush will be present in the upper parts of the site where the site is located above 14 inches of precipitation.

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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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Date	02/09/2010
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None to few. Any rills present should be short in length (less than 1.5 feet long) and follow the surface micro-features. If rills are present they should be widely spaced and not connected. Old rills will weather quickly because of loamy surface textures. Frost heaving will accelerate recovery. A slight increase in rill formation may be caused by major disturbance events such as severe thunderstorms.

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2. **Presence of water flow patterns:** Flow patterns around perennial plants bases will show minor evidence of erosion. They will be short (1 to 3 feet long) and look stable. There will be slight evidence of deposition. Where slopes exceed 10 % water flow patterns may increase to lengths of 5 to 10 feet.

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3. **Number and height of erosional pedestals or terracettes:** Plants should show slight (1/8 – ½ in.) pedestalling. Pedestalling on the down slope side of plants may appear to be greater than this and will be more visible as slopes increase. Terracettes should be small (1 to 3 inches) until slopes are greater than 20 % where they will be visible at a distance. At this point the terracettes should look stable and have little to no evidence of soil being re-deposited.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 15 to 40 % (15 – 25 % on slopes up to 25 % and 25 – 40 % on slopes from 25 % up). Very few if any bare spaces will be greater than 1.5 square feet.

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5. **Number of gullies and erosion associated with gullies:** None to very few. Any gullies present should show little sign of active erosion and should appear stable having perennial plants growing in the bottom and on the sides.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Slight wind generated soil movement is normal. Wind caused blowouts are very rare and are mostly stable and have healed over or started to do so. Increased wind generated soil movement can occur after severe wind events but will normally not be visually apparent.

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7. **Amount of litter movement (describe size and distance expected to travel):** A little redistribution can be caused by both wind and water. Very fine to fine litter movement may occur in water flow patterns with deposition occurring at points of obstruction. Fine litter may be removed from the site by wind action. On slopes greater than 25 % litter may be moved down hill to the next point of obstruction.

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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):** 80 to 90% of this site should have soil surfaces that are stabilized by organic matter both de-compositional and incorporated (Stability Class 3.5 - 5). This should be observable in that water flow patterns are not scoured to where the surface is visibly smoother than soil surfaces in non flow pattern areas.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The A horizon is varies from 5 to 16 inches thick. Color is a grayish brown gravelly loam (typical mollic colors). Structure should be granular.

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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 plant community is intact it will maintain the organic granular structure, soil porosity, and sinuous water flow paths that allow water to infiltrate at a rate that will not lend itself to water leaving the site except in the case of severe thunder storms. If the plant community has been degraded then the site will show longer and/or smoother than expected water flow patterns, with increased numbers of and/or longer rills, with a more platy structure making it likely that more water will leave the site.

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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):** There should be no compaction layer. The amount of gravel can make it hard to use a probe to determine this.

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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: bluebunch wheatgrass, Wyoming big sagebrush

    Sub-dominant: slender wheatgrass, Western wheatgrass

    Other: other grasses, forbs, other shrubs

    Additional: Assumed fire cycle of 50-60 years. Perennial bunchgrasses > non-sprouting shrubs > rhizomatous grasses > sprouting shrubs » annuals > invaders such as Cheatgrass brome For example, Dominants: Wyoming big sagebrush,

Bluebunch wheatgrass; Sub-dominants: Slender Wheatgrass, Western wheatgrass. The perennial bunchgrass about 40 to 55 %; forbs 10 to 20 %; shrub 20 to 40 % (composition by biomass) functional 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):** During years with average to above average precipitation, there should be very little recent mortality or decadence apparent in either the shrubs or grasses. Some mortality of bunchgrass and other shrubs may occur during very severe (long-term) droughts. There may be partial mortality of individual bunchgrasses and shrubs during less severe drought. Long-lived species dominate site. Open spaces from disturbance are quickly filled by new plants through seedlings and reproductive reproduction (tillering).

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14. **Average percent litter cover (%) and depth (in):** 15 to 35 % of the ground surface should have a litter covering that is within 1 inch or less of the soil surface. Excess litter may accumulate in the absence of grazing and/or disturbance which if it becomes greater than 45% it will often reduce live vegetative cover and reproduction.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 650 – 950 lb./acre on slopes 20 to 30 % and 800 to 1100 lb./acre on slopes less than 20 % under normal growing conditions.

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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:** As ecological condition deteriorates due to outside disturbances, perennial bunch grasses decrease while less desirable plants like Low rabbitbrush, and Prickly pear increase along with invasive plants like Cheatgrass brome and Utah juniper. When the historic climax plant community is burned, Wyoming big sagebrush will decrease while perennial grasses, forbs and Low rabbitbrush increase markedly. Broom snakeweed and Purple threeawn increase to a much lesser extent. If the site is burned too frequently Cheatgrass brome, Halogeton, Broom snakeweed and Russian thistle are most likely to invade this site and eventually dominate it.

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17. **Perennial plant reproductive capability:** All plants should have the ability to reproduce either by seed and/or vegetative tillers in all years, except after prolonged extreme drought years. Within capability of site there are no restrictions on seed or vegetative reproductive capacity.
