USDA Natural Resources
Conservation Service

Ecological site R028AY306UT
Upland Gravelly Loam (Bonneville Big Sagebrush)

Accessed: 09/20/2024

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.

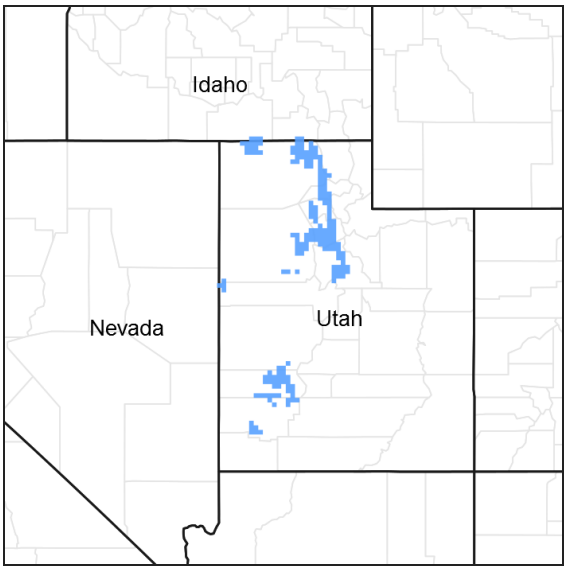

Figure 1. Mapped extent

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

Type Location: SW ¼, SW ¼, Section 19, Township 2S, Range 3W

Ecological site concept

This site is located on foothill lake terraces and benches as well as areas of fans that are located above 14 inches of effective precipitation. (14 to 16 inches of effective precipitation is the normal range Bonneville big sagebrush). The site is visualy a Bonneville big sagebrush site.

Associated sites

R028AY307UT	**Upland Gravelly Loam (Wyoming Big Sagebrush)** Dominant sagebrush is wyomingensis rather than bonnevillensis
R028AY309UT	**Upland Loam (Wyoming Big Sagebrush)** Soil is a loam and the sagebrush is wyomingensis instead of bonnevillensis.
R028AY325UT	**Upland Shallow Loam (Black Sagebrush)** This is a black sagebrush site. also the soils are shallow not deep and the production is much lower than 28A306.
R028AY334UT	**Upland Stony Loam (Wyoming Big Sagebrush)** Soil is a stony loam, dominant sagebrush is wyomingensis rather than bonnevillensis.

Similar sites

R028AY334UT	**Upland Stony Loam (Wyoming Big Sagebrush)** Soil is a stony loam, dominant sagebrush is wyomingensis rather than bonnevillensis.
R028AY307UT	**Upland Gravelly Loam (Wyoming Big Sagebrush)** Dominant sagebrush is wyomingensis rather than bonnevillensis.

Table 1. Dominant plant species

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

Physiographic features

This site occurs on upper reaches of lake terraces, alluvial fans and upper foot hills. These are mainly Bonneville Lake formation terraces. This site is found on all aspects at elevations between 4,350 and 6,800 feet. Slopes are gentle to moderately steep (1 to 45 percent). Runoff is low to medium and flooding is very rare on this site.

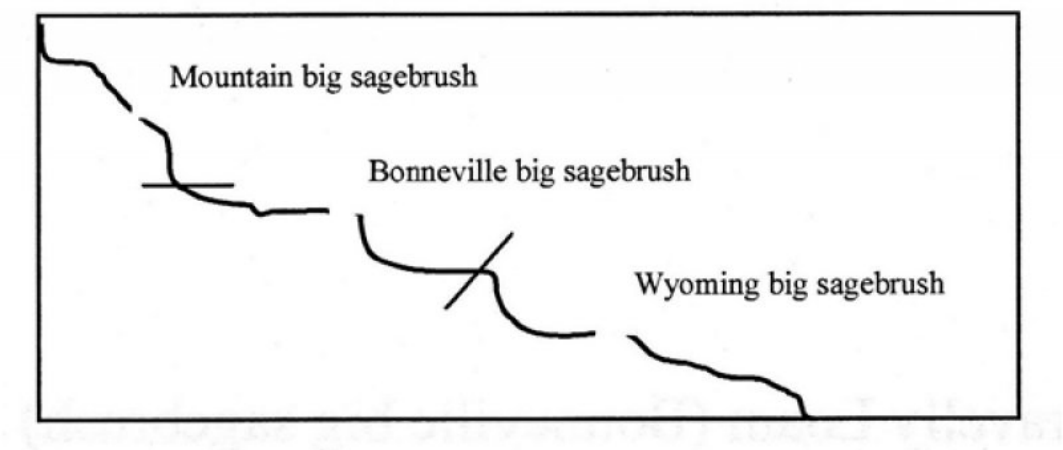

Figure 2. Catena Showing Site Position

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Lake terrace (3) Hill
Flooding duration	Extremely brief (0.1 to 4 hours)
Flooding frequency	None to very rare
Ponding frequency	None
Elevation	4,350–6,800 ft
Slope	1–45%
Aspect	Aspect is not a significant factor

Climatic features

The climate is characterized by warm, dry summers, cold, snowy winters and moist springs. October through May is

the wettest part of the year and July to September is the driest. The effective moisture for plant growth is the 60 percent that falls during the plant dormant period, which wets the soil deeply in the spring and early summer. Warm season moisture is less effective for plant growth on this site because summer storms are short and undependable.

Table 3. Representative climatic features

Frost-free period (average)	177 days
Freeze-free period (average)	146 days
Precipitation total (average)	16 in

Influencing water features

Due to its landscape position, this site is not typically influenced by streams or wetlands. It can sometimes be influenced by overland flow during heavy thunder storms and/or during wetter Spring runoff periods.

Soil features

The soils of this site are deep and well to somewhat excessively drained. They formed in alluvium and colluvium derived from mixed parent materials. The surface layer is moderately coarse to medium textured with 12 to 35 percent rock fragments. The subsoil is moderately coarse to moderately fine textured with 22 to 60 percent rock fragments. Available water capacity ranges from 2.4 to 4.9 inches in the upper 40 inches of soil. The soil moisture regime is xeric and the soil temperature regime is mesic.

Soil Map Units that may contain this site:

Soil Survey Area; Soil Components (Map units in parentheses)
Box Elder County, Western Part (UT601) Collard (19); Donnardo (28, 29, 43); Hupp (19)
Box Elder County, Eastern Part (UT602) Bingham (BdB, BeB, BeD); Dejarnet (DgB, DgD); Kilburn (KnC, KnD, KnE, KnF, KnG, KoB)
Davis-Weber Area (UT607) Kilburn (KbA, KbB, KbC, KcA, KFE2, KFF2, KFG2, KgB, KbC, KgD, KgE2, KIC, KIE2, KmA, KmC); Marriott (HMG2, McE2, MgD, MgE2); Steed (SbA, ScA, SdA, SeA)
Tooele Area (UT611) Abela (1); Holmes (26); Kapod (33, 34); Kilburn (36); Lakewin (37); Springmeyer (63)
Salt Lake Area (UT612) Bingham (BgA, BhA, BhB, BhC); Copperton (DPD, DPE, HDF); Knutsen (KBG, KnA, KoB, KoC, KrA, KsF2); Lakewin (LaA, LaC, LbC); Pharo (BfC); Pleasant Grove (PgB, PhB)
Utah County (UT621) Bingham (BhB, BkB, BmC, BmD); Cleverly (CrD, CsB, CsC, CsD); Dry Creek Variant (DEF); Kilburn (KNG2, KOD, KRE2); Lakewin (LaC, LaD, LcE); Pleasant Grove (PIC, PID, PmE2, PNG2)
Iron-Washington Area (UT634) Bamos (318); Manderfield (409); WYE (517)
Beaver-Cove Fort Area (UT640) Phage (PkD2); Pharo (PtD); Snake Hollow (SLD)

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone and siltstone (2) Colluvium–conglomerate (3) Slope alluvium–quartzite
Surface texture	(1) Gravelly loam (2) Stony sandy loam (3) Very stony coarse sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	60 in
Surface fragment cover <=3"	12–30%
Surface fragment cover >3"	0–5%

Available water capacity (0-40in)	2.4–3.8 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	22–35%
Subsurface fragment volume >3" (Depth not specified)	0–25%

Ecological dynamics

These plant communities may not represent every possibility, but they probably are the most prevalent and repeatable plant communities. As more data is 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 the “desired plant community”. According to the USDA NRCS National Range and Pasture Handbook, the desired plant community will be determined by the decision makers and will meet minimum quality criteria established by the NRCS. 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 ecological condition deteriorates due to overgrazing, bluebunch wheatgrass, needleandthread, and bitterbrush decrease, while big sagebrush, rabbitbrush and broom snakeweed increase.

Fire kills big sagebrush: If the fire is fast moving then Antelope bitterbrush will replace Bonneville big sagebrush for often an extended period of time. If the fire is hot and slower moving then Snowberry and rabbitbrush will take the dominant shrub role.

State and transition model

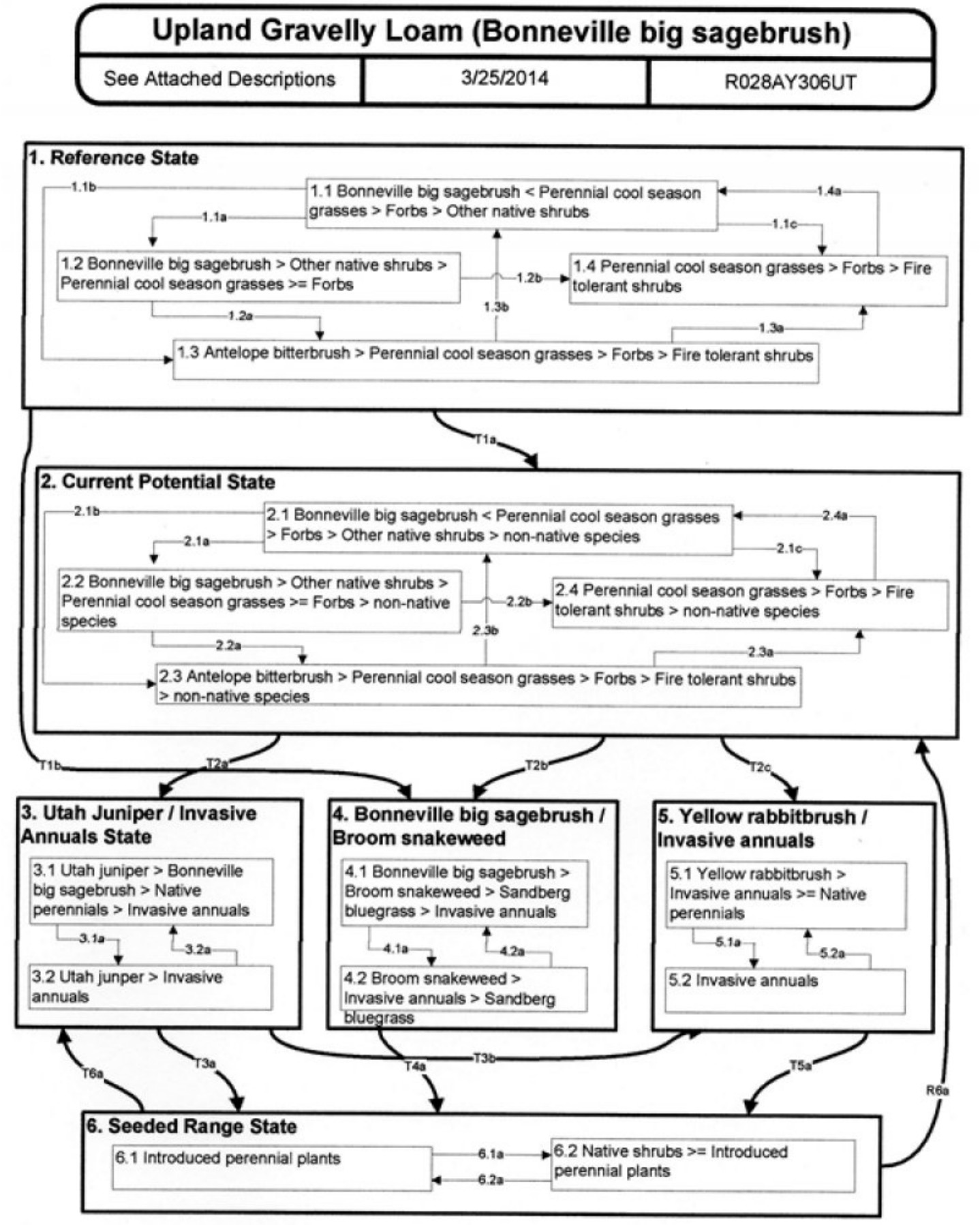

Figure 7. 28A306 State and Transition Model

State 1
Reference State

This state includes the plant communities that were best adapted to the unique combination of factors associated with this ecological site prior to European settlement. It was in a natural dynamic equilibrium with the historic biotic, abiotic, climatic factors on its ecological site in North America at the time of European immigration and settlement. This dominant aspect of the plant community is Bonneville big sagebrush and Bluebunch wheatgrass. The community is made up of 55 % Grass 25 % forbs and 20 % shrubs on a dry weight base.

Community 1.1
Bonneville big sagebrush . Perennial Cool Season Grasses > Forbs > Other Native Shrubs

1.1 – Bonneville big sagebrush, perennial cool season grasses, forbs and other shrubs: This is the community that is described in the initial plant list. This community is represented with 55% grasses, 25% forbs and 20% shrubs. The dominant shrub visually and in production is bonneville big sagebrush. The dominant grass is bluebunch wheatgrass and the dominant forb visually is arrowleaf balsamroot. This community is strong enough to only have around 10 – 15% bare ground and surface rock fragments.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	200	950	1300
Shrub/Vine	150	500	810
Forb	95	350	630
Total	**445**	**1800**	**2740**

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	10-25%
Grass/grasslike foliar cover	25-45%
Forb foliar cover	15-25%
Non-vascular plants	0-1%
Biological crusts	0-4%
Litter	10-20%
Surface fragments >0.25" and <=3"	0-31%
Surface fragments >3"	0-35%
Bedrock	0%
Water	0%
Bare ground	10-20%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	1-1%	8-10%	5-8%
>0.5 <= 1	–	1-4%	12-15%	8-20%
>1 <= 2	–	5-10%	20-25%	2-5%
>2 <= 4.5	–	8-30%	0-20%	0-2%
>4.5 <= 13	0-1%	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Figure 9. Plant community growth curve (percent production by month). UT3061, PNC. Excellent Condition.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	1	9	30	45	5	5	5	0	0	0

Community 1.2
Bonneville big sagebrush > Other Native Shrubs > Perennial Cool Season Grasses >= Forbs

Bonneville big sagebrush, other native shrubs, perennial cool season grasses, and forbs: This community is shows up when there is a period of time when the bonneville big sagebrush increases to where it is suppressing the understory and other shrubs (notably) mountain snowberry, antelope bitterbrush and utah serviceberry increase which also helps to suppress the herbaceous understory. This community is strong enough to only have around 10 – 20% bare ground and surface rock fragments.

Community 1.3
Antelope bitterbrush > Perennial Cool Season Grasses > Forbs > Fire Tolerant Shrubs

Antelope bitterbrush, perennial cool season grasses, forbs and fire tolerant shrubs: With this community the initial plant list fits except that due to fire (usually mid temperature fast moving fire, of the kind that would be associated with summer convection thunder storms) the bonneville big sagebrush has been removed and replaced with antelope bitterbrush. It takes about five to ten years and a proper episodic weather event year to get the sagebrush to move back into the site.

Community 1.4
Perennial Cool Season Grasses > Forbs > Fire Tolerant Shrubs

Perennial cool season grasses, forbs and fire tolerant shrubs: This community usually occurs when there is a hot erratically moving fire that heats the ground to the point where it damages the antelope bitterbrush so that it cannot take the dominant community position. The plant community is represented with 65% grasses, 25% forbs and 10% shrubs. The initial plant list of grasses and forbs will be quite accurate in this community also. This community will likely have around 15 – 20% bare ground and surface rock fragments.

Pathway 1.1a
Community 1.1 to 1.2

Time without catastrophic event. This was probably dependent on a specific chain of climatic events.

Pathway 1.1b
Community 1.1 to 1.3

Fire: Normally mid-Summer. A fire that is hot enough and fast enough moving to kill the sagebrush and stimulate the

antelope bitterbrush.

Pathway 1.1c
Community 1.1 to 1.4

Fire; insects; prolonged drought; pathogens that kills and/or reduces the Dominant shrub overstory. Fire is the most effective of these disturbances

Pathway 1.2a
Community 1.2 to 1.3

Fire: Normally mid-Summer. A fire that is hot enough and fast enough moving to kill the sagebrush and stimulate the antelope bitterbrush.

Pathway 1.2b
Community 1.2 to 1.4

Fire; insects; prolonged drought; pathogens that kills and/or reduces the Dominant shrub overstory. Fire is the most effective of these disturbances

Pathway 1.3b
Community 1.3 to 1.1

Time without catastrophic event. This was probably dependent on a specific chain of climatic events.

Pathway 1.3a
Community 1.3 to 1.4

Fire; insects; prolonged drought; pathogens that kills and/or reduces the Dominant shrub overstory. Fire is the most effective of these disturbances

Pathway 1.4a
Community 1.4 to 1.1

Time without catastrophic event. 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 CPS state may include acclimatized, naturalized or invasive nonnative species. There is no known way to effectively remove these plants from the site once they have become established. The level of occurrence of these plants in the CPS is such that careful management can prevent their domination of the site. This site is irreversibly changed. 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 RPC state with the inclusion of species that are non-native to this ESD. All of these scenarios are very interrelated and dependent on weather patterns and events as well as fire frequency and intensity. The fire frequency should be around 30 to 55 years. Any set of events that are strong enough to force the plant community out of this pattern can push it over a threshold and push it into another state.

Community 2.1
Bonneville big sage > Perennial Cool Season Grass > Forbs > Other Native Shrubs > Non-Native Species

Bonneville big sagebrush, perennial cool season grasses, forbs and other shrubs: This is the community that is described in the initial plant list. This community is represented with 55% grasses, 25% Forbs and 20% Shrubs.

The dominant shrub visually and in production is Bonneville big sagebrush. The dominant grass is bluebunch wheatgrass and the dominant forb visually is arrowleaf balsamroot. This community is strong enough to only have around 10 – 15% bare ground and surface rock fragments. This community will have notable amounts of non-native species shown above as well as others not mentioned.

Community 2.2
Boneville big sage > Other Native Shrubs > Perennial Cool Season Grass > Forbs > N0n-Native Species

Bonneville big sagebrush, other native shrubs, perennial cool season grasses, and forbs: This community is shows up when there is a period of time when the bonneville big sagebrush increases to where it is suppressing the understory and other shrubs (notably) mountain snowberry, antelope bitterbrush and utah serviceberry increase which also helps to suppress the herbaceous understory. This community is strong enough to only have around 10 – 20% bare ground and surface rock fragments. This community will have notable amounts of non-native species shown above as well as others not mentioned.

Community 2.3
Antelope bitterbrush > Perennial Cool Season Grass > Forb > Fire Tolerant Shrub > Non-Native Species

Antelope bitterbrush, perennial cool season grasses, forbs and fire tolerant shrubs: With this community the initial plant list fits except that due to fire (usually mid temperature fast moving fire, of the kind that would be associated with summer convection thunder storms) the bonneville big sagebrush has been removed and replaced with antelope bitterbrush. It takes about five to ten years and a proper episodic weather event year to get the sagebrush to move back into the site. This community will have notable amounts of non-native species shown above as well as others not mentioned.

Community 2.4
Perennial Cool Season Grass > Forbs > Fire Tolerant Shrubs > Non-Native Species

Perennial cool season grasses, forbs and fire tolerant shrubs: This community usually occurs when there is a hot erratically moving fire that heats the ground to the point where it damages the antelope bitterbrush so that it cannot take the dominant community position. The plant community is represented with 65% grasses, 25% forbs and 10% shrubs. This community will have notable amounts of non-native species shown above as well as others not mentioned.

Pathway 2.1a
Community 2.1 to 2.2

Time without catastrophic event. This was probably dependent on a specific chain of climatic events

Pathway 2.1b
Community 2.1 to 2.3

Fire: Normally mid-Summer. A fire that is hot enough and fast enough moving to kill the sagebrush and stimulate the Antelope bitterbrush.

Pathway 2.1c
Community 2.1 to 2.4

Fire; insects; prolonged drought; pathogens that kills and/or reduces the dominant shrub overstory. Also overgrazing with or without drought over a prolonged period of time Fire and/or overgrazing are the most common of these disturb

Pathway 2.2a
Community 2.2 to 2.3

Fire: Normally mid-Summer. A fire that is hot enough and fast enough moving to kill the sagebrush and stimulate the antelope bitterbrush.

Pathway 2.2b
Community 2.2 to 2.4

Fire; insects; prolonged drought; pathogens that kills and/or reduces the dominant shrub overstory. Also overgrazing with or without drought over a prolonged period of time Fire and/or overgrazing are the most common of these disturbances

Pathway 2.3b
Community 2.3 to 2.1

Time without catastrophic event. This was probably dependent on a specific chain of climatic events

Pathway 2.3a
Community 2.3 to 2.4

Fire; insects; prolonged drought; pathogens that kills and/or reduces the dominant shrub overstory. Also overgrazing with or without drought over a prolonged period of time Fire and/or overgrazing are the most common of these disturbances

Pathway 2.4a
Community 2.4 to 2.1

Time without catastrophic event. This was probably dependent on a specific chain of climatic events

State 3
Utah Juniper / Invasive Annual State

This state has only two described plant communities but many variations of the represented ones are present. This is the state that this plant community will move to when there is a lack of fire with a source of utah juniper and maybe a source of pinyon seed. Movement from community faze to community faze can and often is accelerated by overgrazing. The dominate aspect of the plant community is utah juniper 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 sage > Native Perennials > Invasive Annuals

This community has a strong overstory of utah juniper and singleleaf pinyon but still has an understory similar to community 2.1. This community will have around 20 – 35% bare ground and surface rock fragments. Fire is the surest means to bring this community back toward the current potential State.

Community 3.2
Utah Juniper > Invasive Annuals

This community is present when 99% of the native plants have been removed from the plant community and only pinyon and juniper with a sparse understory of invasive annuals are left on the site. This community will have around 35 – 85% bare ground and surface rock fragments. If any native plants are found in the community it will be very few sandberg bluegrass.

Pathway 3.1a
Community 3.1 to 3.2

Overgrazing with or without drought over a prolonged period of time

Pathway 3.2a
Community 3.2 to 3.1

Fire; insects; prolonged drought; pathogens that kills and/or reduces the Dominant shrub overstory. Fire is the most effective of these disturbances

State 4
Bonneville big sagebrush / Broom snakeweed State

This plant community happens when the site is overgrazed for a very prolonged period of time. Drought, fire, mechanical disturbance, and other like disturbances will speed up the process.

Community 4.1
Bonneville big sage > Broom snakeweed > sandberg bluegrass > Invasive Annuals

Bonneville big sagebrush, broom snakeweed, sandberg bluegrass, invasive annuals: At this point there will be about a 35% bonneville big sagebrush and a 35% broom snakeweed canapé with a 15% grass and forb canapé. When the air dry production is considered it would approximate 35% bonneville big sagebrush; 55% broom snakeweed; 10% grasses and forbs. Most of the grasses and forbs will be non-native annuals. This community will have around 20 – 35% bare ground and surface rock fragments.

Community 4.2
Broom snakeweed > Invasive Annuals > Sandberg bluegrass

Broom snakeweed, invasive annuals, sandberg bluegrass: This plant community has lost the bonneville big sagebrush and the invasive annuals have taken space away from the sandberg bluegrass. The broom snakeweed now controls about 75% of the annual production. This community will have around 35 – 40% bare ground and surface rock fragments.

Pathway 4.1a
Community 4.1 to 4.2

Fire; insects; prolonged drought; pathogens that kills and/or reduces the Dominant shrub overstory. Fire is the most effective of these disturbances

Pathway 4.2a
Community 4.2 to 4.1

Time and management of grazing alone or along with other disturbances where human and/or naturalized introduction of native and/or introduced perennial plant species takes place

State 5
Yellow rabbitbrush / Invasive Annuals State

This is the state that this plant community will move to when it is in an over grazed condition and/or drought condition and then burned (wild or controlled) and not seeded. The dominant aspect of the plant community is Cheatgrass brome, Yellow rabbitbrush with a very small amount of Bonneville big sagebrush. The community will usually be made up of 70 % Cheatgrass brome and 10 % Forbs and 20 % Yellow rabbitbrush with minor components of other shrubs.

Community 5.1
Yellow rabbitbrush > Invasive Annuals

Yellow rabbitbrush, Invasive annuals, Native perennials: This plant community consists of approximately 40% Yellow rabbitbrush, 45% invasive annuals, and 10% Native perennials with a small component of other species. This community will have around 20 – 35% bare ground and surface rock fragments.

Community 5.2
Invasive Annuals

Invasive annuals: This plant community consists of approximately 85% invasive annuals (Mostly Cheatgrass brome and Japanese (Field) brome), and 10% Native perennials with a small component of other species. This community will have around 20 – 40% bare ground and surface rock fragments.

Pathway 5.1a
Community 5.1 to 5.2

Increased fire frequency (from 10 - 15 years to 3-5 years) and intensity without follow-up management. Overgrazing can move this change along faster. In the State (5) the Yellow rabbitbrush / Invasive annuals State in box 5.5 the fire frequency will remain at a 3 – 5 year interval. This condition is self sustaining and the site will keep deteriorating until the site potential is lost. This will continue unless a large amount of energy is injected into the system to cause a change to take place.

Pathway 5.2a
Community 5.2 to 5.1

Time and management of grazing alone or along with other disturbances where human and/or naturalized introduction of native and/or introduced perennial plant species takes place.

State 6
Seeded Range State

This state exists when the site is cultivated and/or burned and planted to Introduced and in some situations Native grasses and forbs.

Community 6.1
Introduced Perennial Plants

The plant community here consists of Introduced and in some situations Native grasses and forbs. It is often as productive as the site is in the Current Potential State.

Community 6.2
Native Shrubs >= Introduced Perennial Plants

This site comes into existence when weather conditions create the kind of episodic situation that allows Bonneville big sagebrush to move back onto the site.

Pathway 6.1a
Community 6.1 to 6.2

Time without catastrophic event. This was probably dependent on a specific chain of climatic events

Pathway 6.2a
Community 6.2 to 6.1

Time and management of grazing alone or along with other disturbances where human intervention takes place to move the community back.

Transition T1a
State 1 to 2

Introduction of non-native species into the ecosystem.

Transition T1b
State 1 to 4

Fire; insects; prolonged drought; pathogens that kills and/or reduces the dominant shrub overstory. Also overgrazing with or without drought over a prolonged period of time Fire and/or overgrazing are the most common of these disturbances .

Transition T2a
State 2 to 3

Prolonged Drought, Overgrazing, Extreme lengthening of the fire interval frequency. This takes place when the sagebrush canopy gets so heavy that it destroys the perennial grass and forb under story and the fire frequency is increased from 20- to 40 years to 60 – 90 years and the introduction of Utah juniper.

Transition T2b
State 2 to 4

Prolonged Drought and/or Prolonged overgrazing. Most often it is a combination of the two conditions that brings this condition into existence.

Transition T2c
State 2 to 5

Continued overgrazing and increase of fire frequency over a very prolonged period of time. (8 – 12 year fire frequency interval)

Transition T3b
State 3 to 5

Continued overgrazing and increase of fire frequency over a very prolonged period of time. (8 – 12 year fire frequency interval)

Transition T3a
State 3 to 6

Human caused disturbance (mechanical treatment and seeding; chemical treatment and seeding. etc.)

Transition T4a
State 4 to 6

Human caused disturbance (mechanical treatment and seeding; chemical treatment and seeding. etc.)

Transition T5a
State 5 to 6

Human caused disturbance (mechanical treatment and seeding; chemical treatment and seeding. etc.)

Restoration pathway R6a
State 6 to 2

Time with proper management that favors the Native Plants as they move back into the site.This takes 25 to 50 years to start happening. The time frame depends on management and on the precipitation amounts. If the site is at the 15 to 16 inch zone it will respond quicker than at the 14 inch level. The site also has to receive proper grazing use along with the proper rest periods.

Conservation practices

Prescribed Grazing
Grazing Management Plan - Applied

Transition T6a
State 6 to 3

Prolonged Drought, Overgrazing, Extreme lengthening of the fire interval frequency. This takes place when the sagebrush canopy gets so heavy that it destroys the perennial grass and forb under story and the fire frequency is increased from 20- to 40 years to 60 – 90 years and the introduction of Utah juniper.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	**Primary Shrubs**			200–700	
	Bonneville big sagebrush	ARTRB3	*Artemisia tridentata ssp. ×bonnevillensis*	145–330	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	95–260	–
	Utah serviceberry	AMUT	*Amelanchier utahensis*	95–260	–
3	**Secondary Shrubs**			60–260	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	33–110	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	10–39	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	10–39	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	10–39	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	10–39	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–26	–
	granite prickly phlox	LIPU11	*Linanthus pungens*	5–26	–
	creeping barberry	MARE11	*Mahonia repens*	5–20	–
	pricklypear	OPUNT	*Opuntia*	5–20	–
	Woods' rose	ROWO	*Rosa woodsii*	5–20	–
Grass/Grasslike					
0	**Primary Grasses**			700–1100	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	250–400	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	100–300	–
	western wheatgrass	PASM	*Pascopyrum smithii*	100–200	–
1	**Secondary Grasses**			95–195	
	Grass, perennial	2GP	*Grass, perennial*	20–130	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	9–65	–
	squirreltail	ELEL5	*Elymus elymoides*	9–65	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	9–65	–
	Idaho fescue	FEID	*Festuca idahoensis*	9–65	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	9–65	–
	Grass, annual	2GA	*Grass, annual*	15–65	–
	basin wildrye	LECI4	*Leymus cinereus*	28–65	–
	muttongrass	POFE	*Poa fendleriana*	28–65	–

	[illegible]	[illegible]	[illegible]	[illegible]	
	oniongrass	MEBU	*Melica bulbosa*	9–39	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	9–39	–
	Douglas' sedge	CADO2	*Carex douglasii*	9–39	–
	Geyer's sedge	CAGE2	*Carex geyeri*	9–39	–
Forb					
0	**Primary Forbs**			95–195	
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	28–65	–
	white sagebrush	ARLUC8	*Artemisia ludoviciana ssp. candicans*	28–65	–
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	28–65	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	28–65	–
2	**secondary forbs**			50–300	
	Forb, annual	2FA	*Forb, annual*	50–130	–
	Forb, perennial	2FP	*Forb, perennial*	50–130	–
	purple milkvetch	ASAG2	*Astragalus agrestis*	10–39	–
	silverleaf milkvetch	ASAR4	*Astragalus argophyllus*	10–39	–
	Beckwith's milkvetch	ASBE3	*Astragalus beckwithii*	10–39	–
	Torrey's milkvetch	ASCA9	*Astragalus calycosus*	10–39	–
	painted milkvetch	ASCE	*Astragalus ceramicus*	10–39	–
	Geyer's milkvetch	ASGE	*Astragalus geyeri*	10–39	–
	woollypod milkvetch	ASPU9	*Astragalus purshii*	10–39	–
	Utah milkvetch	ASUT	*Astragalus utahensis*	10–39	–
	Indian paintbrush	CASTI2	*Castilleja*	10–39	–
	Anderson's larkspur	DEAN	*Delphinium andersonii*	10–39	–
	twolobe larkspur	DENU2	*Delphinium nuttallianum*	10–39	–
	sanddune wallflower	ERCAC	*Erysimum capitatum var. capitatum*	5–39	–
	shaggy fleabane	ERPU2	*Erigeron pumilus*	10–39	–
	Engelmann's aster	EUEN	*Eucephalus engelmannii*	10–39	–
	sticky purple geranium	GEVI2	*Geranium viscosissimum*	10–39	–
	common sunflower	HEAN3	*Helianthus annuus*	5–39	–
	showy goldeneye	HEMU3	*Heliomeris multiflora*	10–39	–
	lambstongue ragwort	SEIN2	*Senecio integerrimus*	10–39	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	10–39	–
	narrowleaf stoneseed	LIIN2	*Lithospermum incisum*	5–39	–
	prairie flax	LILEL2	*Linum lewisii var. lewisii*	10–39	–
	granite prickly phlox	LIPU11	*Linanthus pungens*	10–39	–
	western stoneseed	LIRU4	*Lithospermum ruderale*	5–39	–
	fernleaf biscuitroot	LODI	*Lomatium dissectum*	10–39	–
	Gray's biscuitroot	LOGR	*Lomatium grayi*	10–39	–
	tailcup lupine	LUCAC3	*Lupinus caudatus ssp. caudatus*	10–39	–
	smoothstem blazingstar	MELAL3	*Mentzelia laevicaulis var. laevicaulis*	0–39	–
	lobeleaf groundsel	PAMU11	*Packera multilobata*	10–39	–
	low beardtongue	PEHU	*Penstemon humilis*	10–39	–
	carpet phlox	PHHOC	*Phlox hoodii ssp. canescens*	10–39	–

	carpet phlox	PHHUC	*Phlox hoodii ssp. canescens*	10–39	–
	longleaf phlox	PHLO2	*Phlox longifolia*	10–39	–
	foothill deathcamas	ZIPA2	*Zigadenus paniculatus*	10–39	–
	Utah buttercup	RAJO	*Ranunculus jovis*	10–26	–
	longstalk springparsley	CYLO	*Cymopterus longipes*	10–26	–
	yellow owl's-clover	ORLU2	*Orthocarpus luteus*	0–26	–
	Nevada biscuitroot	LONE	*Lomatium nevadense*	10–26	–
	Great Basin desertparsley	LOSIS	*Lomatium simplex var. simplex*	10–26	–
	Macdougal's biscuitroot	LOFOM	*Lomatium foeniculaceum ssp. macdougalii*	10–26	–
	manyflower stickseed	HAFL2	*Hackelia floribunda*	10–26	–
	yellow fritillary	FRPU2	*Fritillaria pudica*	10–26	–
	yellow avalanche-lily	ERGR9	*Erythronium grandiflorum*	10–26	–
	fireweed	CHANA2	*Chamerion angustifolium ssp. angustifolium*	0–26	–
	yellow spiderflower	CLLUL	*Cleome lutea var. lutea*	5–26	–
	miner's lettuce	CLPEP	*Claytonia perfoliata ssp. perfoliata*	10–26	–
	Rocky Mountain beeplant	CLSE	*Cleome serrulata*	5–26	–
	sego lily	CANU3	*Calochortus nuttallii*	10–26	–
	nettleleaf giant hyssop	AGUR	*Agastache urticifolia*	10–26	–
	tapertip onion	ALAC4	*Allium acuminatum*	10–26	–
	Nevada onion	ALNE	*Allium nevadense*	10–26	–
	flatbud pricklypoppy	ARMUR	*Argemone munita ssp. rotundata*	0–20	–
	roundspike cryptantha	CRHU2	*Cryptantha humilis*	5–20	–
	western tansymustard	DEPIH	*Descurainia pinnata ssp. halictorum*	5–20	–
	scarlet gilia	IPAGA3	*Ipomopsis aggregata ssp. aggregata*	5–20	–
	flatspine stickseed	LAOC3	*Lappula occidentalis*	5–20	–
	mountain tarweed	MAGL2	*Madia glomerata*	0–20	–
	tufted evening primrose	OECAM4	*Oenothera caespitosa ssp. marginata*	5–20	–
	pale evening primrose	OEPA	*Oenothera pallida*	5–20	–
	orpine stonecrop	SEDE	*Sedum debile*	0–10	–
	hookedspur violet	VIADA	*Viola adunca var. adunca*	1–10	–
	Nuttall's violet	VINU2	*Viola nuttallii*	1–10	–
	goosefoot violet	VIPUV2	*Viola purpurea ssp. venosa*	1–10	–

Animal community

Livestock Interpretation

There is a wide diversity of plant species on this site, but the greatest production is grasses. This is a valuable site for grazing during spring to early fall for all kinds and classes of livestock.

Wildlife Interpretation

This site is a part of the sagebrush steppe supporting populations of Greater Sage-grouse (Centrocercus urophasianus), Columbian Sharp-tailed Grouse (Tympanuchus phasianellus columbianus), neotropical migratory bird species, pygmy rabbit (Brachylagus idahoensis) may be found on deep stone free inclusions. Other wildlife

using this site include Black-tail Jackrabbit; Coyote; Gold Eagle; Ravens and Mule Deer. This is a short list of the more common species found. Many other species are present as well and migratory birds are present at certain times of the year.

Hydrological functions

The soil series in this site are in hydrologic group B and the hydrologic curve number is 61 when the vegetation is in good condition.

Recreational uses

This site has fair to good values for aesthetic and natural beauty. The floristic component is quite varied with a fairly large number of species of grasses, forbs, and shrubs. Hunting is fair for deer and a limited number of species of upland game birds. Potential is fair to poor for camping and picnicking due to lack of overstory shade. Birding is very popular in this site.

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 firewood and possibly some cedar posts.

Other products

None

Inventory data references

Alma Winward, USFS Ecologis, Northern Region (retired), personal communication

Sagebrush of Colorado by Alma H. Winward, 2004

Type locality

Location 1: Tooele County, UT	
Township/Range/Section	T2S R3W SSW 19
General legal description	Type Location: SW ¼, SW ¼, Section 19, Township 2S, Range 3W

Other references

Type Location: SW ¼, SW ¼, Section 19, Township 2S, Range 3W

Contributors

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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.

Author(s)/participant(s)	Jack Alexander, Range Specialist, Synergy Resource Solutions, Inc. Julia Kluck, Soil Scientist, Synergy Resource Solutions, Inc. Shane Green, State Range Specialist, Utah NRCS
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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:** No rills present. Very minor rill development may occur in sparsely vegetated areas. If rills are present, they should be widely spaced and not connected. Rill development may increase following large storm events, but should begin to heal during the following growing season. Frost heaving will accelerate recovery. Rill development will increase as site becomes steeper.

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2. **Presence of water flow patterns:** Water flow patterns will be short (2-5') and meandering; interrupted by plants and exposed rocks. Some evidence of erosion or deposition associated with flow patterns. Where slopes exceed 10%, water flow patterns may be longer (5–10').

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3. **Number and height of erosional pedestals or terracettes:** Plants may have small pedestals (1-3") where they are adjacent to water flow patterns, but without exposed roots. Terracettes should be few and stable. Terracettes should be small (1-3") and show little sign of active erosion. Some plants may appear to have a pedestal but rather than be formed by erosion, the only place litter accumulates and soil collects is at plant bases forming the appearance of a pedestal.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground): 10 to 30 % (10 – 15 % on slopes up to 25 % and 15 – 30 % on slopes from 25 % up) Very few if any bare spaces of greater than 1 square foot.

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5. **Number of gullies and erosion associated with gullies:** 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:** Very minor evidence of active wind-generated soil movement. Wind scoured (blowouts) and depositional areas are rarely present. If present they have muted features and are mostly stabilized with vegetation and/or biological crust. Gravel or desert pavement protects the site from wind scour.

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7. **Amount of litter movement (describe size and distance expected to travel):** Most litter resides in place with some redistribution caused by water and wind movement. Very minor litter removal may occur in flow patterns and rills with deposition occurring at points of obstruction. The majority of litter accumulates at the base of plants. Some leaves, stems, and small twigs may accumulate in soil depressions adjacent to plants. Woody stems are not likely to move. On

steep slopes (>30%), litter will move downhill to next 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):** . Soil surface (top few mm) resistance to erosion (stability values are averages – most sites will show a range of values for both plant canopy and interspaces, if different): 80 to 90% of this site should have soil surfaces that are stabilized by organic matter both de-compositional and incorporated (Stability Class 4). 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):** Soil surface structure and SOM content (include type and strength of structure, and A- horizon color and thickness for both plant canopy and interspaces, if different): The A horizon is varies from 5 to 18 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:** Bunchgrasses and shrubs equally important for increasing infiltration and reducing runoff. Litter plays a role in increasing infiltration and decreasing runoff. Plants provide microhabitat for seedlings, catch litter and soil, and slow raindrops and runoff. Vascular plants and/or well-developed biological soil crusts (where present) will break raindrop impact and splash erosion. Spatial distribution of vascular plants and interspaces between well-developed biological soil crusts (where present) provide detention storage and surface roughness that slows runoff allowing time for infiltration. Interspaces between plants and any well-developed biological soil crusts (where present) may serve as water flow patterns during episodic runoff events, with natural erosion expected in severe storms. When perennial grasses decrease, reducing ground cover and increasing bare ground, runoff is expected to increase and any associated infiltration reduced. Shrubs catch snow, slow wind evaporation, and provide microhabitat for seedling establishment.

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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):** 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, Slender wheatgrass, bonneville big sagebrush

    Sub-dominant: Saskatoon serviceberry, antelope bitterbrush, Western wheatgrass, nevada bluegrass

    Other: other grasses > other shrubs, forbs

    Additional: Functional/Structural Groups (list in order of descending dominance by above-ground weight using symbols: », >, = to indicate much greater than, greater than, and equal to): Assumed fire cycle of 20-40 years. Perennial bunchgrasses > non-sprouting shrubs > rhizomatous grasses > sprouting shrubs » annuals > invaders such as Cheatgrass brome For example, Dominants: Bonneville big sagebrush, Bluebunch wheatgrass; Sub-dominants: Slender Wheatgrass, Western wheatgrass, Antelope bitterbrush. The perennial bunchgrass about 30 to 60 %; non-sprouting shrub 10 to 20 % (composition by biomass) functional groups are expected on this site.

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).

14. **Average percent litter cover (%) and depth (in):** Litter cover includes litter under plants. Most litter will be fine litter. Depth should be scattered in the interspaces and up to 1/2" under canopies. Litter cover may increase to 35-45% following years with favorable growing conditions. Excess litter may accumulate in absence of disturbance. Vegetative production may be reduced if litter cover exceeds 45%.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Expected annual production (this is TOTAL above-ground production, not just forage production): 950 – 1100 lb./acre on slopes 20 to 45 % and 1000 to 2000 lb./acre on slopes less than 20 % under normal growing conditions.

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, halogeton, green rabbitbrush, annual forbs, broom snakeweed, Utah juniper, purple threeawn, medusahead rye.

17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce sexually and/or asexually, except in drought years. Density of plants indicates that plants reproduce at level sufficient to fill available resource. Within capability of site there are no restrictions on seed or vegetative reproductive capacity.