USDA Natural Resources
Conservation Service

Ecological site R028AF214UT
Semidesert Gravelly Loam (Wyoming Big Sagebrush) South

Accessed: 05/19/2024

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.

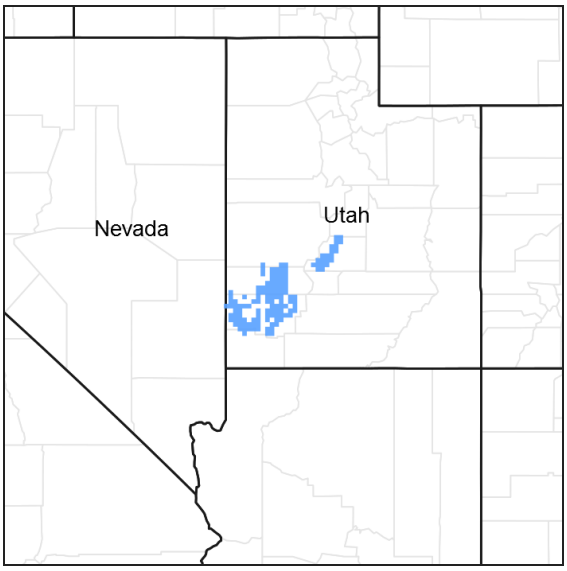

Figure 1. Mapped extent

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.

Ecological site concept

This site occurs the toe-slopes of foothills adjacent to and on lower reaches of lake terraces; alluvial fans and valley floors.

Associated sites

R028AY224UT	**Semidesert Sandy Loam (Winterfat)** This site is often found adjacent
R028AY230UT	**Semidesert Shallow Hardpan (Black Sagebrush)** This site is often found adjacent
R028AY232UT	**Semidesert Shallow Hardpan (Utah Juniper)** This site is often found adjacent

Similar sites

R028AY220UT	**Semidesert Loam (Wyoming Big Sagebrush)** This site has fewer rock fragments in the soil profile and slightly higher production

Table 1. Dominant plant species

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

Physiographic features

This site occurs on gently and strongly sloping fan remnants, stream terraces, and mountain slopes. Located on the valley floors. These are mainly Pleistocene Lake formed.

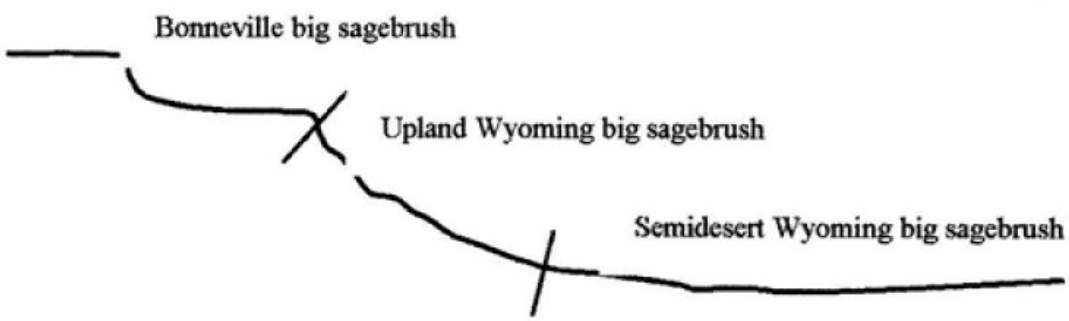

Figure 2. Landform & Position

Table 2. Representative physiographic features

Landforms	(1) Fan remnant (2) Mountain slope (3) Stream terrace
Flooding frequency	None
Ponding frequency	None
Elevation	1,512–1,890 m
Slope	2–15%
Aspect	Aspect is not a significant factor

Climatic features

The climate is semi-aria and characterized by cold snowy winters and warm dry summers. The average annual precipitation is 9 to 12 inches. Approximately 70 percent comes as rain from March through October. On the average, June through September are the driest months and March through May are the wettest months.

Table 3. Representative climatic features

Frost-free period (average)	120 days
Freeze-free period (average)	110 days
Precipitation total (average)	279 mm

Influencing water features

Soil features

The characteristic soils in this site are deep and well drained.

The soils are characterized by 19 to 68 percent rock fragments in the upper part of the root zone (0 to 24 inches). Surface textures are typically gravelly loam to gravelly sandy loam. The fine earth texture can be sandy loam, loam, or clay loam. Some soils will have clay loam subsoils. Others will have carbonate accumulations in the substratum and be calcareous throughout the profile. Available water holding capacity is 1.8 to 4.9 inches.

The water supplying capacity is 2.0 to 3.8 inches.

Table 4. Representative soil features

Parent material	(1) Alluvium–quartzite (2) Colluvium–limestone and sandstone
Surface texture	(1) Gravelly loam (2) Gravelly 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"	14–20%
Surface fragment cover >3"	0–11%
Available water capacity (0-101.6cm)	4.57–12.45 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	19–52%
Subsurface fragment volume >3" (Depth not specified)	0–16%

Ecological dynamics

The interpretive plant community for this site is the Reference State plant community 1.1. Dominant vegetative aspect is Wyoming big sagebrush and Indian ricegrass with other grasses and forbs in the interspaces. This site is usually associated with Pleistocene Lake formation terraces. Plants begin growth around May 1 and end growth around September 15. The RPC has been determined by the study of rangeland in good condition areas, the evaluation of collected data, trend data, and historic information. The assumptions in developing this site were that the historic data and the sites visited were accurately represented.

When the RPC is burned, Wyoming big sagebrush, fourwing saltbush, and winterfat decrease while low rabbitbrush, snakeweed, blue grama, galleta, threeawn, and undesirable forbs increase.

State and transition model

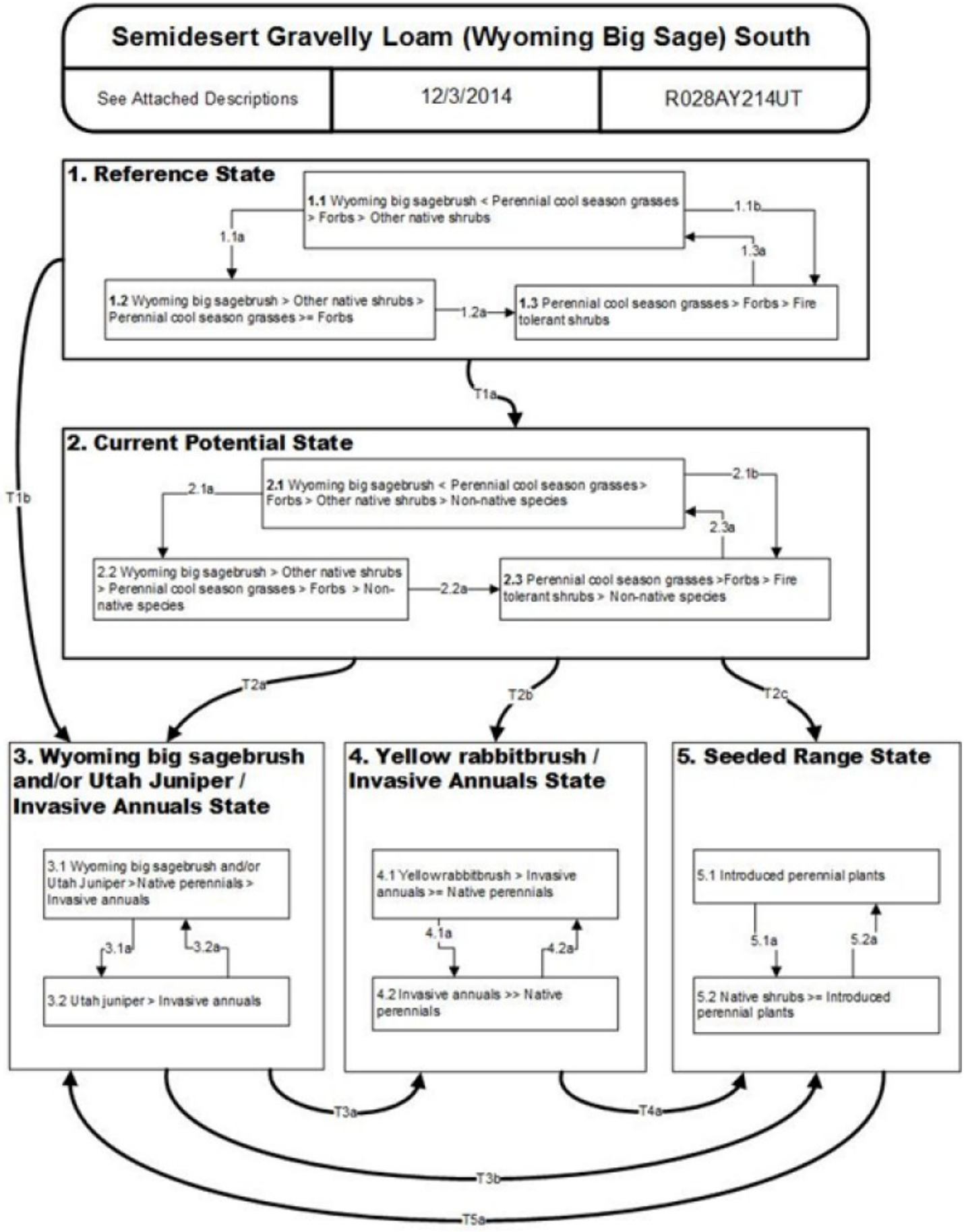

Figure 7. State & Transition Model

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. The dominant aspect of the plant community is Wyoming big sagebrush and Indian ricegrass. 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 45 to 75 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 into another state.

Community 1.1
Wyoming big sagebrush, Perennial cool season grasses, forbs, Other native shrubs

Wyoming big sagebrush, perennial cool season grasses, forbs and other native shrubs: This is the community that is described in the plant list. This community is represented with 55% grasses, 10% forbs and 35% shrubs. The dominant shrub is wyoming big sagebrush. The dominant grass is indian ricegrass and the dominant forb is scarlet globemallow.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	252	336	370
Shrub/Vine	123	224	336
Forb	34	56	112
Total	**409**	**616**	**818**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	15-30%
Grass/grasslike foliar cover	12-25%
Forb foliar cover	4-10%
Non-vascular plants	0%
Biological crusts	0-2%
Litter	1-3%
Surface fragments >0.25" and <=3"	8-15%
Surface fragments >3"	0-6%
Bedrock	0%
Water	0%
Bare ground	20-40%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	0-1%	2-8%	5-10%
>0.15 <= 0.3	–	2-9%	10-15%	2-5%
>0.3 <= 0.6	–	5-10%	5-10%	1-5%
>0.6 <= 1.4	–	15-25%	0-10%	0-1%
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Community 1.2
Wyoming big sagebrush, Other native shrubs, Perennial cool season grasses, forbs

Wyoming big sagebrush, other native shrubs, perennial cool season grasses, and forbs: This community shows up when there is a period of time when the Wyoming big sagebrush increases to where it is suppressing the understory. Other shrubs (notably) Nevada ephedra, Yellow rabbitbrush and Broom snakeweed also increase which helps in the suppression of the herbaceous understory. Percent composition air-dry weight = 30% grass, 10% forbs and 60% shrubs.

Community 1.3
Perennial cool season grasses, Forbs, Fire tolerant shrubs

Perennial cool season grasses, Forbs and Fire tolerant shrubs: This community happens when the non-sprouting shrubs are destroyed and the fire tolerant (sprouting) shrubs are left. These types of shrubs will typically persist as the shrub community for around 30 years depending on environmental factors acting upon the community. Percent composition air-dry weight = 60% grass, 10% forbs and 30% shrubs.

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

Pathway 1.2a
Community 1.2 to 1.3

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

Pathway 1.3a
Community 1.3 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. This state will 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 45 to 75 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
Wyoming big sagebrush, Perennial cool season grasses, Forbs, Other native shrubs, Non-native species

Wyoming big sagebrush, perennial cool season grasses, forbs and other native shrubs: This is the community that is described in the plant list. This community is represented with 55% grasses, 10% forbs and 35% shrubs. The dominant shrub is Wyoming big sagebrush. The dominant grass is Indian ricegrass and the dominant forb is Scarlet globemallow. This community will have notable amounts of non-native species shown above and possibly others that were not mentioned.

Community 2.2
Wyoming big sagebrush, Other native shrubs, Perennial cool season grasses, Forbs, Non-native species

Wyoming big sagebrush, other native shrubs, perennial cool season grasses, and forbs: This community shows up when there is a period of time when the Wyoming big sagebrush increases to where it is suppressing the understory. Other shrubs (notably) Nevada ephedra, Yellow rabbitbrush and Broom snakeweed also increase which helps in the suppression of the herbaceous understory. Percent composition air-dry weight = 30% grass, 10% forbs and 60% shrubs. This community will have notable amounts of non-native species shown above as well as others not mentioned.

Community 2.3
Perennial cool season grasses, Forbs, Fire tolerant shrubs, Non-native species

Perennial cool season grasses, Forbs and Fire tolerant shrubs: This community happens when the non-sprouting shrubs are destroyed and the fire tolerant (sprouting) shrubs are left. These types of shrubs will typically persist as the shrub community for around 30 years depending on environmental factors acting upon the community. Percent composition air-dry weight = 60% grass, 10% forbs and 30% shrubs.

Pathway 2.1a
Community 2.1 to 2.2

Time without catastrophic event. This was probably dependent on a specific chain of climatic events as well as the use of proper grazing practices.

Pathway 2.1b
Community 2.1 to 2.3

Fire; insects; prolonged drought; pathogens that kills and/or reduces the 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 2.2a
Community 2.2 to 2.3

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 2.3a
Community 2.3 to 2.1

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

State 3
Wyoming big sagebrush and/or Utah Juniper / Invasive Annuals 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. It will go to Wyoming big sagebrush and then if there is a source of Utah Juniper and maybe a source of Pinyon seed it will often move to a Utah Juniper state. Movement from community faze to community faze can and often is accelerated by overgrazing. The dominate aspect of the plant community will either be Wyoming big sagebrush or Utah Juniper/Wyoming big sagebrush along with 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
Wyoming big sagebrush and/or Utah juniper, Native perennials, Invasive Annuals

Figure 9. 28A214 Early & Later Invasion

Figure 10. 28A214 Junier Invasion

This community has a strong overstory of Wyoming big sagebrush or Utah Juniper and two-needle pinyon (Rarely the Pinyon may be One-Needle Pinyon on the West side of the State) but still has an understory similar to community 2.1. This community will have around 30 – 45% bare ground and surface rock fragments.

Community 3.2
Utah juniper, Invasive Annuals

This community is present when most of the native plants have been removed from the plant community and only Utah Juniper and Pinyon with a sparse understory of invasive annuals and very few Sandberg bluegrass plants are left on the site. This community will have around 40 – 85% bare ground and surface rock fragments.

Pathway 3.1a
Community 3.1 to 3.2

Introduction of utah juniper coupled with overgrazing with or without drought and no fire over a prolonged period of time.

Pathway 3.2a
Community 3.2 to 3.1

Fire; insects; prolonged drought; pathogens that kill or greatly reduce the dominant overstory. Fire is the most effective of these disturbances.

State 4
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 and/or the seeding fails. The dominant aspect of the plant community is Cheatgrass brome, Yellow rabbitbrush with a very small amount of Wyoming 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. This state depends on a short fire frequency (3 – 10 years) and/or continued over grazing.

Community 4.1
Yellow rabbitbrush, Invasive Annuals, Native perennials

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 25 – 45% bare ground and surface rock fragments.

Community 4.2
Invasive annuals, Native perennials

Figure 11. 28A214 state 4 phase 4.2 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 Annual Native species. This community will have around 25 – 45% bare ground and surface rock fragments.

Pathway 4.1a
Community 4.1 to 4.2

Increased fire frequency (from 10 - 15 years to 3 - 5 years) and fire intensity without follow-up management. Overgrazing can move this change along faster. In the state (4) the yellow rabbitbrush / invasive annuals state in box 4.2 the fire frequency can remain at a 3 – 5 year interval. This condition is self sustaining and the site will keep deteriorating.

Pathway 4.2a
Community 4.2 to 4.1

Lessening of the fire frequency (from 3 – 5 years to 8 – 15 years) and/or the management of the grazing of the area. These situations along with human caused disturbances and/or natural causes that introduce native perennial plants back into the system. With this short of a fire cycle the shrubs coming back in will be fire tolerant species.

State 5
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 5.1
Introduced perennial plants

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

Community 5.2
Native shrubs, Introduced perennial plants

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

Pathway 5.1a
Community 5.1 to 5.2

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

Pathway 5.2a
Community 5.2 to 5.1

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 3

Introduction of non-native species into the ecosystem. Along with 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 45- to 75 years to 70 – 90 years and the introduction of utah juniper and often pinyon.

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 75 years and the introduction of Utah juniper and often Pinyon.

Transition T2b
State 2 to 4

Continuing of over grazing and/or an increase of fire frequency over a very prolonged period of time. (The fire frequency interval for this to happen is 10 – 15 years.)

Transition T2c
State 2 to 5

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

Transition T3a
State 3 to 4

Continuing of over grazing and increase of fire frequency over a very prolonged period of time. (The fire frequency interval for this to happen is 10 – 15 years to go to community phase 4.1 and 3 – 5 years to move to community phase 4.2.)

Transition T3b
State 3 to 5

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

Transition T4a
State 4 to 5

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

Transition T5a
State 5 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 75 years and/or maintenance practices are stopped along with the introduction of utah juniper and sometimes pinyon.

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	**Primary Shrubs**			101–235	
	fourwing saltbush	ATCA2	*Atriplex canescens*	20–34	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	20–34	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	20–34	–
3	**Secondary Shrubs**			20–101	
	Shrub, other	2S	*Shrub, other*	34–67	–

	~~Shrub, other~~	~~2S~~	~~*Shrub, other*~~	~~31–67~~	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	7–20	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	7–20	–
	pricklypear	OPUNT	*Opuntia*	7–20	–
	Nuttall's horsebrush	TENU2	*Tetradymia nuttallii*	7–20	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–7	–
Grass/Grasslike					
0	**Primary Grasses**			202–269	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	101–168	–
1	**Secondary Grasses**			67–101	
	Grass, perennial	2GP	*Grass, perennial*	67–101	–
	Grass, annual	2GA	*Grass, annual*	20–67	–
	Sandberg bluegrass	POSE	*Poa secunda*	20–34	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	20–34	–
	purple threeawn	ARPU9	*Aristida purpurea*	20–34	–
	blue grama	BOGR2	*Bouteloua gracilis*	20–34	–
	squirreltail	ELEL5	*Elymus elymoides*	20–34	–
	needle and thread	HECO26	*Hesperostipa comata*	20–34	–
	western wheatgrass	PASM	*Pascopyrum smithii*	20–34	–
	muttongrass	POFE	*Poa fendleriana*	0–20	–
Forb					
0	**Primary Forbs**			34–67	
	carpet phlox	PHHOC	*Phlox hoodii ssp. canescens*	20–34	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	20–34	–
2	**Secondary Forbs**			34–54	
	Forb, annual	2FA	*Forb, annual*	34–54	–
	Forb, perennial	2FP	*Forb, perennial*	34–54	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	7–20	–
	Utah milkvetch	ASUT	*Astragalus utahensis*	7–20	–
	northwestern Indian paintbrush	CAAN7	*Castilleja angustifolia*	7–20	–
	sego lily	CANU3	*Calochortus nuttallii*	7–20	–
	roundspike cryptantha	CRHU2	*Cryptantha humilis*	7–20	–
	longstalk springparsley	CYLO	*Cymopterus longipes*	7–20	–
	western tansymustard	DEPIH	*Descurainia pinnata ssp. halictorum*	7–20	–
	cushion buckwheat	EROV	*Eriogonum ovalifolium*	7–20	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	7–20	–
	common sunflower	HEAN3	*Helianthus annuus*	7–20	–

Animal community

This site is suited for grazing by cattle or sheep during fall, winter, and spring.

Wildlife using this site include rabbit, coyote, fox, badger, pronghorn antelope, mule deer, and dove.

This is a short list of the more common species found. Many other species are present as well and migratory birds are present at times.

Hydrological functions

Soils are in hydrologic group B and C with runoff curves ranging from 60 to 70 and 75 to 82 respectively, depending on hydrologic conditions.

Recreational uses

Resources that have special aesthetic and landscape values are wildflowers. Some recreation uses of this site are hiking, hunting, and motorcycling.

Wood products

Site may have some value for fire wood when the site is invaded by Utah juniper and pinyon.

Other information

Threatened and endangered species include plants and animals.

Type locality

Location 1: Iron County, UT	
General legal description	SWA'S-D454, S153 SO81 SO-82, FOO3, GO47. These site areas are located in Cedar City BLM District, New Castle, Utah, near dump.

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.

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Date	02/08/2010
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 may increase when run inflow enters site from adjacent sites that produce large amounts of runoff (i.e. steeper sites, slickrock, rock outcrop). Site is essentially level and rills do not form.

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2. **Presence of water flow patterns:** Water flow patterns will be short (2-5'), narrow (<1'), and meandering; interrupted by plants and exposed rocks. Slight to no evidence of erosion or deposition associated with flow patterns.

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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.

   Well-developed biological crusts may appear pedestalled, but are actually a characteristic of the crust formation. 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):** 20 – 40% bare ground (soil with no protection from raindrop impact). Herbaceous communities are most likely to have lower values. As species composition by shrubs increases, bare ground is likely to increase. Poorly developed biological soil crust that is susceptible to raindrop splash erosion should be recorded as bare ground. 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:** No gullies present.

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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.

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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 is moderately stable (average soil stability score of 3.5 -5).

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** This description is based on the modal soil (Hiko Peak GR-SL, soil survey area: 634, Iron-Washington). This site has 14 correlated soils, resulting in variation of each of these attributes. Unless working on a location with the modal soil, it is

critical to supplement this description with the soil-specific information from the published soil survey.

Soil surface horizon is typically 2 to 6 inches deep. Structure is typically weak thin platy. Color is typically brownish gray (10YR 6/2), dark brown (10YR 3/3) moist. An ochric horizon extends to a depth of 6 inches. An ochric horizon typically extends to a depth of 2 to 10 inches. The ochric horizon is a surface horizon lacking fine stratification and which is either light colored, or thin, or has an low organic carbon content, or is massive and (very) hard when dry. The A horizon would be expected to be more strongly developed under plant canopies. It is important if you are sampling to observe the A horizon under plant canopies as well as the interspaces.

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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):** None. Naturally occurring soil horizons may be harder than the surface because of an accumulation of calcium carbonate and should not be considered as compaction layers.

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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: Indian ricegrass & Wyoming big sagebrush

    Sub-dominant: James galleta

    Other: The perennial grass/non-sprouting shrub functioning group is expected on this site.

    Additional: In the northern portion of the MLRA cool-season perennial grasses (Indian ricegrass, needle and thread) dominate. In the southernmost portion of the MLRA warm-season perennial grasses (galleta, sand dropseed) dominate. The two groups share dominance in the middle portion of the MLRA. Functional /structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference state (e.g. crested wheatgrass and Russian wildrye may substitute for mid stature cool season perennial native bunchgrasses.). Biological soil crust is variable in its expression on this site and is measured as a component of ground cover. Forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions.

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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 bunchgrass and shrub mortality may occur during severe droughts, particularly on the shallower and coarser soils associated with this site.

14. **Average percent litter cover (%) and depth (in):** Litter cover includes litter under plants. Most litter will be fine litter. Depth should be 1-2 leaf thickness in the interspaces and up to 1/2” under canopies. Litter cover may increase to 15-25% following years with favorable growing conditions. Excess litter may accumulate in absence of disturbance. Vegetative production may be reduced if litter cover exceeds 40%.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 550 #/acre.
    Even the most stable communities exhibit a range of production values. Production will vary between communities and across the MRLA. Refer to the community descriptions in the ESD. Production will differ across the MLRA due to the naturally occurring variability in weather, soils, and aspect. The biological processes on this site are complex; therefore, representative values are presented in a land management context.

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, Russian thistle, and Utah juniper

17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce sexually 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.