USDA Natural Resources
Conservation Service

Ecological site R013XY001ID
Loamy 12-16 PZ

Last updated: 12/11/2019
Accessed: 05/06/2024

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.

MLRA notes

Major Land Resource Area (MLRA): 013X–Eastern Idaho Plateaus

013X-Eastern Idaho Plateaus

Precipitation or Climate Zone: 12-16” P.Z.
https://soils.usda.gov/survey/geography/mlra/index.html

Classification relationships

Land Resource Unit: B (Northwestern Wheat and Range)
MLRA: 13 (Eastern Idaho Plateaus)

EPA EcoRegion: Level III (Middle Rockies)

Ecological site concept

Site does not receive any additional water.
Soils are:
not saline or saline-sodic.
moderately deep, deep, with < 3% stone (10-25”) and boulder (>25”) cover. not skeletal within 20” of soil surface.
not strongly or violently effervescent in surface mineral 10”.
textures usually range from very fine sandy loam to clay loam in surface mineral 4”.
Slope is < 30%.
Clay content is = <32% in surface mineral 4”.
Site does not have an argillic horizon with > 35% clay.

Associated sites

R013XY002ID	**Stony Loam 13-16 PZ ARTRV/PSSPS**
R013XY004ID	**Shallow Gravelly 12-16 PZ ARTRV/PSSPS**
R013XY005ID	**Loamy 16-22 PZ ARTRV/FEID-PSSPS**
R013XY012ID	**Gravelly South Slope 12-16 PZ ARTRV/PSSPS**
R013XY028ID	**Shallow Sand 12-16 PZ ARTRV/PSSPS**

Similar sites

R013XY005ID	**Loamy 16-22 PZ ARTRV/FEID-PSSPS**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. vaseyana*
Herbaceous	(1) *Pseudoroegneria spicata* (2) *Festuca idahoensis*

Physiographic features

This site occurs on gently undulating to somewhat rolling and broken foothills. Slopes predominantly range from 8-20 percent, occasionally to 35 percent. Elevation ranges from 4800-7000 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	1,463–2,134 m
Slope	8–35%
Ponding depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 13, the Eastern Idaho Plateaus, is part of the Northwestern Wheat and Range Region. Its elevation ranges from 4209 to 9331 feet above sea level, with an average elevation of 5787 feet. The average annual precipitation is 16.41 inches, with a range of 13.56 to 18.75 inches, based on ten long term climate stations located throughout the MLRA. A spike in precipitation amount often occurs in late spring, usually in May.

Temperatures vary widely in the MLRA throughout the year. A maximum temperature of 103° Fahrenheit occurred at the McCammon climate station (# 105716; elevation 4770 feet), while a minimum of -41° was recorded at the Kilgore station (#104908). At all stations temperatures throughout the year are usually below the national average. Kilgore also recorded the greatest annual snowfall amount of 217 inches. The average temperature is 41.4 degrees F. with an average high of 55.3 degrees and an average low of 27.5 degrees.

The frost-free period ranges from 64 to 90 days, while the freeze-free period can be 98 to 123 days.

Table 3. Representative climatic features

Frost-free period (average)	90 days
Freeze-free period (average)	123 days
Precipitation total (average)	483 mm

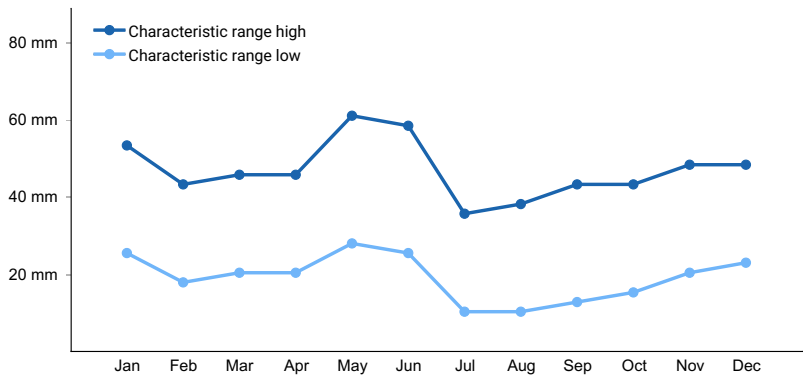


Figure 1. Monthly precipitation range

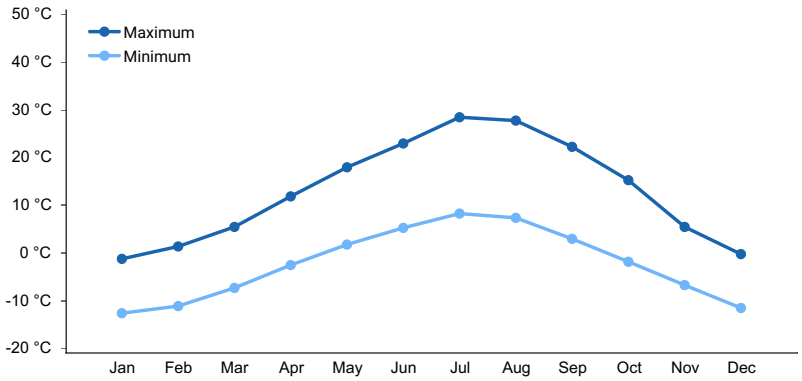


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

This site is not influenced by adjacent wetlands, streams or run on.

Soil features

Soils are dark colored, medium textured, moderately deep to deep silt loams, silty clay loams, and clay loams that are moderately high in organic matter with medium to high permeability. These soils have good available water holding capacity (AWC). Coarse fragments may be present but do not significantly affect vegetation. Erosion hazard ranges from slight to severe, depending upon slope and ground cover.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone and sandstone
Surface texture	(1) Silt loam (2) Gravelly silt loam (3) Very cobbly loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to somewhat excessively drained
Permeability class	Slow to moderately rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	0–30%
Surface fragment cover >3"	0–55%
Available water capacity (0-101.6cm)	4.57–21.08 cm
Calcium carbonate equivalent (0-101.6cm)	0–20%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–48
Soil reaction (1:1 water) (0-101.6cm)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–35%
Subsurface fragment volume >3" (Depth not specified)	0–20%

Ecological dynamics

Ecological Dynamics of the Site:

The dominant visual aspect of this site is mountain big sagebrush in the overstory with bluebunch wheatgrass and Idaho fescue in the understory. Composition by weight is approximately 60 to 80 percent grasses, 10 to 20 percent forbs and 10 to 20 percent shrubs.

During the last few thousand years, this site has evolved in an arid climate characterized by dry summers and cold, wet winters. Herbivory has historically occurred on this site at low levels of utilization. Herbivores include mule deer, pronghorn antelope, rocky mountain elk, and lagomorphs.

Fire has historically occurred on the site at intervals of 20-50 years.

The Historic Climax Plant Community (HCPC) moves through many phases depending on the natural and man-made forces that impact the community over time. State 1, described later, indicates some of these phases. The HCPC is Phase 1.1. This plant community is dominated by mountain big sagebrush with bluebunch wheatgrass and Idaho fescue in the understory. Subdominant species include streambank wheatgrass, Letterman's needlegrass, Sandberg bluegrass, and arrowleaf balsamroot. There is a wide variety of other grasses, forbs, and shrubs in the plant community that occur in minor amounts. The plant species composition of Phase 1.1 is listed later under "HCPC Plant Species Composition".

Total annual production is 1800 pounds per acre (2016 kilograms per hectare) in a normal year. Production in a favorable year is 1200 pounds per acre (1344 kilograms per hectare). Production in an unfavorable year is 800 pounds per acre (896 kilograms per hectare). Structurally, cool season deep rooted perennial bunchgrasses are very dominant, followed by perennial forbs being about equal to tall shrubs while shallow rooted bunchgrasses are subdominant.

FUNCTION:

This site is well suited for big game in the late spring and fall.

It is also well suited for livestock use in the late spring, summer, and fall. This site often is the key grazing area within a pasture due to easy accessibility and good forage.

Recreation opportunities include hunting, hiking, off-road vehicles, horseback riding, and photography.

This site can be degraded easily with improper grazing management due to easy access and palatable forage species.

Due to the gentle topography, infiltration is normally high and runoff low. Runoff, when it does occur is non-erosive except during high intensity convection storms. Snow accumulates on the site due to high elevation and presence of tall shrubs

Impacts on the Plant Community.

Influence of fire:

In the absence of normal fire frequency, mountain big sagebrush can gradually increase on the site. Utah juniper can invade the site if a seed source is in the proximity. Grasses and forbs decrease as shrubs increase. With the continued absence of fire, mountain big sagebrush and/or juniper can displace most of the primary understory species. See "Influence of juniper invasion" below.

When fires become more frequent than historic levels (20-50 years), mountain big sagebrush is reduced significantly. Rabbitbrush can increase slightly. With continued short fire frequency, mountain big sagebrush, antelope bitterbrush, and many of the other shrubs can be completely eliminated along with many of the desirable understory species such as Idaho fescue. These species may be replaced by Sandberg bluegrass along with a

variety of annual and perennial forbs including noxious and invasive plants. Some root sprouting shrubs such as rabbitbrush and horsebrush may increase. Kentucky bluegrass will invade the site. Fine fuels will increase the fire frequency.

Influence of improper grazing management:

Season-long grazing and/or excessive utilization can be very detrimental to this site. This type of management leads to reduced vigor of the bunchgrasses. With reduced vigor, recruitment of these species declines. As these species decline, an increase in mountain big sagebrush and noxious and invasive plants will occur. The plant community also becomes susceptible to Utah juniper invasion.

Continued improper grazing management influences fire frequency by increasing fine fuels. As Sandberg bluegrass and annuals increase, fires become more frequent, particularly at lower elevations.

Proper grazing management that addresses frequency, duration, and intensity of grazing can also keep fine fuels from developing, thereby reducing fire frequency. This can lead to gradual increases in mountain big sagebrush and juniper. A planned grazing system can be developed to intentionally accumulate fine fuels in preparation for a prescribed burn. Any brush management should be carefully planned, as a reduction in shrubs or junipers without a suitable understory of desirable perennial bunchgrasses can result in an increase in cheatgrass and other annuals which will lead to more frequent fire intervals.

Weather influences:

Above normal precipitation in April, May, and June can dramatically increase total annual production of the plant community. These weather patterns can also increase viable seed production of desirable species to provide for recruitment. Likewise, below normal precipitation during these spring months can significantly reduce total annual production and be detrimental to viable seed production. Overall plant composition is normally not affected when perennials have good vigor.

Below normal temperatures in the spring can have an adverse impact on total production regardless of precipitation. An early, hard freeze can occasionally kill some plants.

Prolonged drought adversely affects this plant community in several ways. Vigor, recruitment, and production are usually reduced. Mortality can occur. Prolonged drought can lead to a reduction in fire frequency.

Influence of Insects and disease:

Outbreaks can affect vegetation health. Bitterbrush can be severely affected by the western tent caterpillar (Malacosoma fragilis). Two consecutive years of defoliation by the tent caterpillar can cause mortality in bitterbrush. Mormon cricket and grasshopper outbreaks occur periodically. Outbreaks seldom cause plant mortality since defoliation of the plant occurs only once during the year of the outbreak. Snow mold can reduce the vigor of mountain big sagebrush.

Influence of noxious and invasive plants:

Many of these species add to the fine-fuel component and lead to increased fire frequency.
Perennial and annual weeds compete with desirable plants for moisture and nutrients. The result is reduced production and change in composition of the understory.

Influence of wildlife:

Big game animals use this site in the spring, summer, and fall. Their numbers are seldom high enough to adversely affect the plant community.

Watershed:

Decreased infiltration and increased runoff occur with an increase in mountain big sagebrush. Desired understory species can be reduced. This composition change can affect nutrient and water cycles. Increased runoff also

causes sheet and rill erosion. Abnormally short fire frequency also gives the same results, but to a lesser degree. The long-term effect is a transition to a different state.

Influence of Utah juniper invasion:

In plant communities that are invaded by juniper, the species has a competitive advantage for the following reasons:
• Juniper is very drought tolerant.
• It has the ability to extract soil moisture from a wide range of soil depths.
• Juniper has high evapo-transpiration rates.
• The species intercepts rain and snow before it reaches the soil surface.
• It has the ability to grow as long as there is soil moisture and the temperature is above freezing.
• Juniper has a relatively rapid growth rate and is long-lived. It can readily over-top shade intolerant species which leads to mortality.
• Nutrient cycling is reduced.
• As the canopy closes, juniper gains control of energy capture.

As juniper extracts water, other plants are unable to acquire sufficient water and nutrients to sustain growth and reproduction, thus reducing cover and biomass in the interspaces. After the canopy closes, there is sufficient soil moisture available for shallow-rooted, shade tolerant species to persist directly under the tree.

The following hydrological impacts occur on sites invaded by juniper:
• Infiltration in the interspaces is reduced.
• Run-off increases resulting in increased sheet and rill erosion with elevated sediment loads.
• Soil temperatures increase in the interspaces which results in accelerated drying of the soil surface.
• Increased bare ground in the interspaces.
• Soil moisture storage is reduced.

As bare ground and interconnectiveness of bare ground increases, flow rates are accelerated (reduction of flow sinuosity) and run-off out of the area increases.

Degradation of these systems can result in the formation of a feedback cycle in which greater juniper cover and density results in greater plant and soil disturbance between the canopies.

In summary, a closed juniper community takes control of the following ecological processes: (1) hydrology, (2) energy capture, and (3) nutrient cycling. The changes are primarily driven by the hydrological processes. The development of a closed juniper canopy always results in a transition across the threshold to a different state. Generally, when juniper canopy cover nears 20%, the plant community is approaching the threshold.

Plant Community and Sequence:

Transition pathways between common vegetation states and phases:

State 1.
Phase 1.1 to 1.2. Develops with improper grazing management and in the absence of fire. There is a Utah juniper seed source present in the vicinity near the site.
Phase 1.1 to 1.3. Results from a fire or prescribed burning.
Phase 1.1 to 1.4. Results from improper grazing management and no fire. There is no Utah juniper seed source present in the vicinity.
Phase 1.2 to 1.3. Results from a wildfire or brush management.
Phase 1.2 to 1.1. Occurs with prescribed grazing and brush management or prescribed burning.
Phase 1.3 to 1.1. Results from prescribed grazing and no fire.
Phase 1.4 to 1.1. Occurs with prescribed grazing.
Phase 1.4 to 1.3. Occurs with fire or prescribed burning and prescribed grazing.
Phase 1.3 to 1.4. Occurs with no fire and improper grazing management.

State 1 T1A and T1B to State 2. Develops through frequent fire and improper grazing management. This site has crossed the threshold. It is economically impractical to return this state to State 1 with accelerated practices.

State 1, T1C to State 3. Develops with no fire and improper grazing management from a juniper invaded phase of State 1. This site has crossed the threshold. It is economically impractical to return this state to State 1 with accelerated practices.

T2A and T3A to State 4. This results from rangeland seeding.

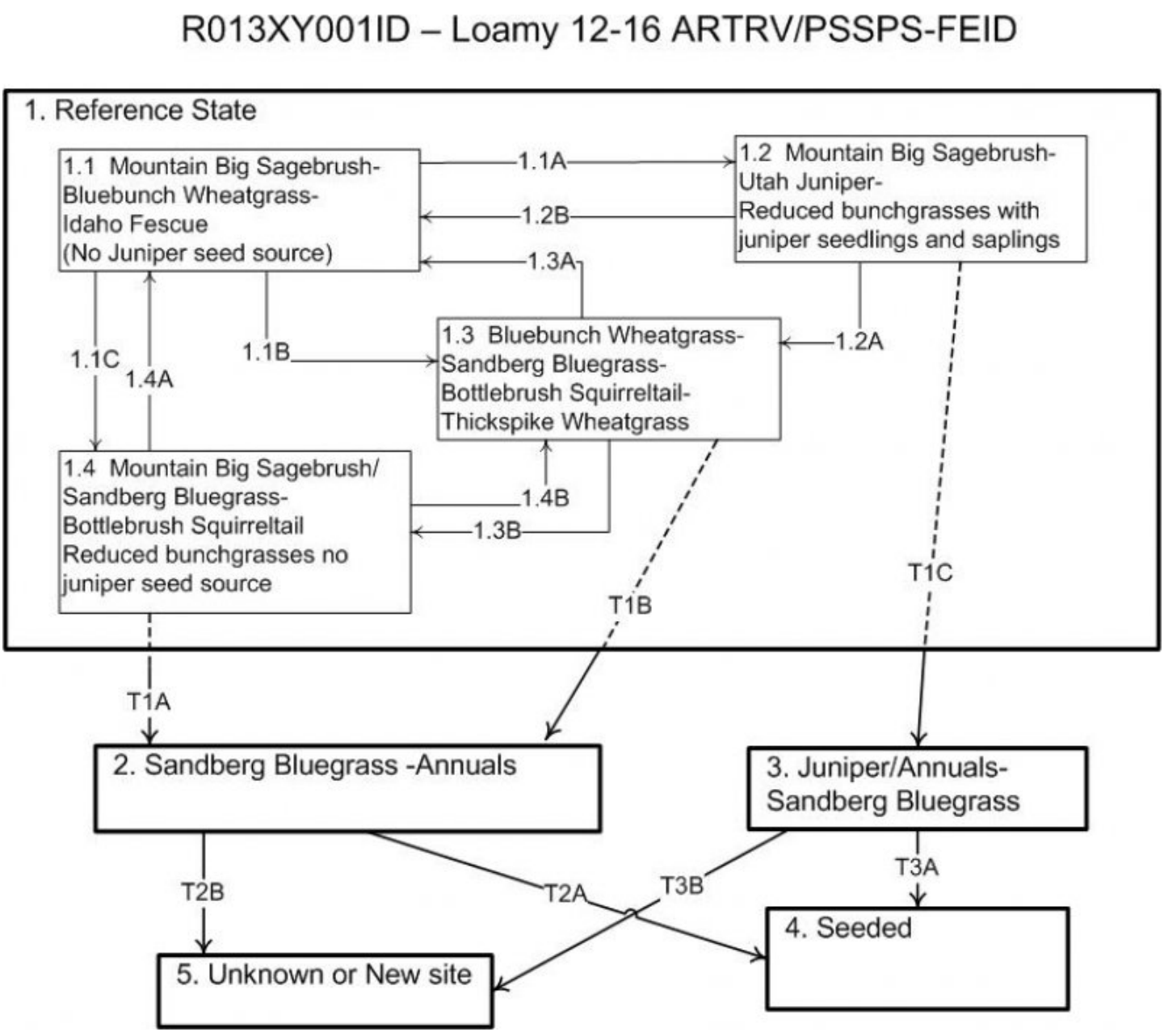
T2B to unknown site. Excessive soil loss and changes in the hydrologic cycle caused by improper grazing management and no fire or frequent fire cause this state to cross the threshold and retrogress to a new site with reduced potential. It is economically impractical to return this state to State 1 with accelerated practices.

T3B to unknown site. Continued lack of fire or improper grazing management cause this state to cross the threshold and retrogress to a new site with reduced potential due to significant soil loss and changes in hydrology. It is economically impractical to return this state to State 1 with accelerated practices.

Practice Limitations:

The site has few limitations for implementing vegetative management, facilitating, and accelerating practices.

State and transition model



State 1
Reference State

State 1, Phase A, Reference Plant Community Phase. This plant community is dominated by mountain big sagebrush with bluebunch wheatgrass and Idaho fescue in the understory. Subdominant species include streambank wheatgrass, Letterman's needlegrass, Sandberg bluegrass, and arrowleaf balsamroot. There is a wide variety of other grasses, forbs and shrubs in the plant community that occur in minor amounts. Natural fire frequency is 20-50 years. State 1, Phase B. This plant community is dominated in the overstory by mountain big sagebrush with some Utah juniper seedlings and saplings invading. Sandberg bluegrass, streambank wheatgrass, slender wheatgrass, and bottlebrush squirreltail have increased. Bluebunch wheatgrass and Idaho fescue are still significant in the plant community but with reduced amounts and in low vigor. A wide variety of other grasses, forbs and shrubs still may occur but in very small amounts and may be in low vigor. A Utah juniper seed source is present in nearby sites. Some annuals have invaded the community. This state has developed due to fire frequency being much longer than normal and improper grazing management. State 1, Phase C. This plant community is dominated by bluebunch wheatgrass. Sandberg bluegrass, bottlebrush squirreltail, and streambank wheatgrass with other perennial grasses and forbs are subdominant. Idaho fescue, Letterman's and Columbia needlegrasses have decreased and may have died out due to fire. Most shrubs are absent from the site due to recent fire, except some rabbitbrush, horsebrush, and mountain snowberry may be present due to root sprouting. Some annuals may have invaded the site. The community is a result of recent wildfire or prescribed burning. State 1, Phase D. This plant community is dominated by mountain big sagebrush in the overstory with significantly reduced amounts of Idaho fescue and bluebunch wheatgrass and in reduced vigor. Sandberg bluegrass, bottlebrush squirreltail, slender wheatgrass, and streambank wheatgrass have increased. Other bunchgrasses have been reduced and are in low vigor. There is no Utah juniper seed source in the proximity. Some annuals may have invaded the site. This plant community has developed due to improper grazing management and no fire.

Community 1.1
Reference Plant Community (HCPC)

The HCPC is dominated by mountain big sagebrush with bluebunch wheatgrass and Idaho fescue in the understory. Subdominant species include streambank wheatgrass, Letterman's needlegrass, Sandberg bluegrass, and arrowleaf balsamroot. There is a wide variety of other grasses, forbs and shrubs in the plant community that occur in minor amounts. Natural fire frequency is 20-50 years.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	628	942	1412
Forb	135	202	303
Shrub/Vine	135	202	303
Total	**898**	**1346**	**2018**

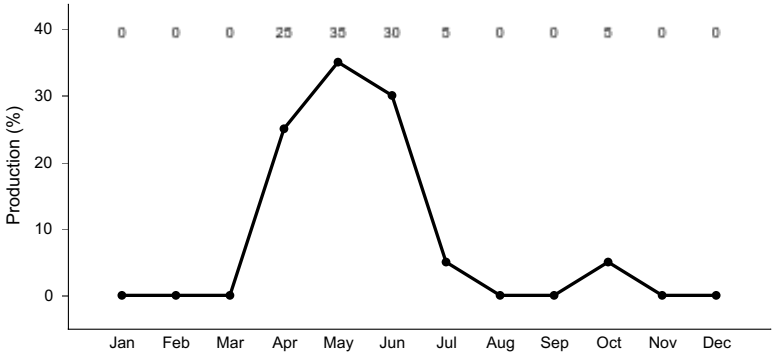


Figure 4. Plant community growth curve (percent production by month). ID0805, B13 ARTRV . State 1.

Community 1.2
Mountain Big Sagebrush - Utah Juniper

This plant community is dominated in the overstory by mountain big sagebrush with some Utah juniper seedlings and saplings invading. Sandberg bluegrass, streambank wheatgrass, slender wheatgrass, and bottlebrush squirreltail have increased. Bluebunch wheatgrass and Idaho fescue are still significant in the plant community but with reduced amounts and in low vigor. A wide variety of other grasses, forbs and shrubs still may occur but in very small amounts and may be in low vigor. A Utah juniper seed source is present in nearby sites. Some annuals have invaded the community. This state has developed due to fire frequency being much longer than normal and improper grazing management.

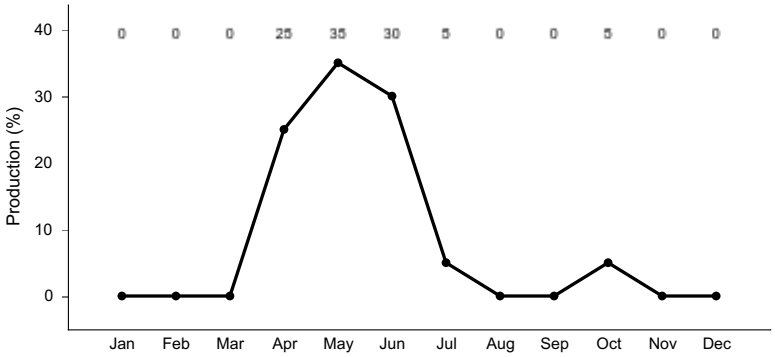


Figure 5. Plant community growth curve (percent production by month). ID0805, B13 ARTRV . State 1.

Community 1.3
Bluebunch Wheatgrass - Sandberg Bluegrass

This plant community is dominated by bluebunch wheatgrass. Sandberg bluegrass, bottlebrush squirreltail, and streambank wheatgrass with other perennial grasses and forbs are subdominant. Idaho fescue, Letterman's and Columbia needlegrasses have decreased and may have died out due to fire. Most shrubs are absent from the site due to recent fire, except some rabbitbrush, horsebrush, and mountain snowberry may be present due to root sprouting. Some annuals may have invaded the site. The community is a result of recent wildfire or prescribed burning.

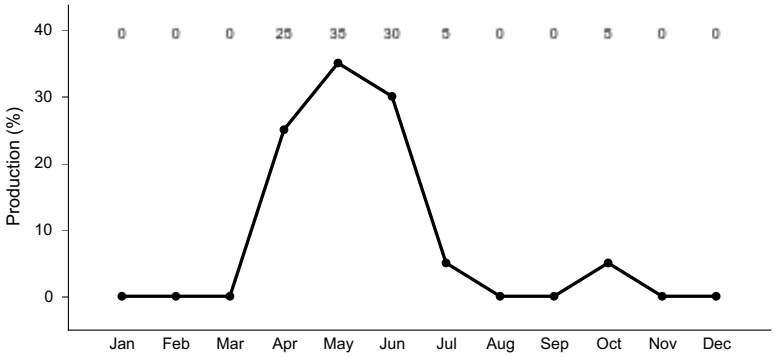
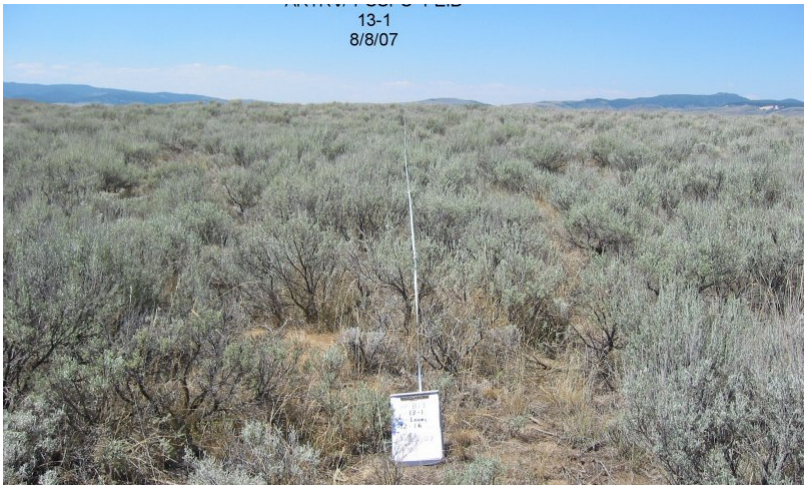


Figure 6. Plant community growth curve (percent production by month). ID0805, B13 ARTRV . State 1.

Community 1.4
Mountain Big Sagebrush with reduced bunchgrass (no juniper seed source)



This plant community is dominated by mountain big sagebrush in the overstory with significantly reduced amounts of Idaho fescue and bluebunch wheatgrass and in reduced vigor. Sandberg bluegrass, bottlebrush squirreltail, slender wheatgrass, and streambank wheatgrass have increased. Other bunchgrasses have been reduced and are in low vigor. There is no Utah juniper seed source in the proximity. Some annuals may have invaded the site. This plant community has developed due to improper grazing management and no fire.

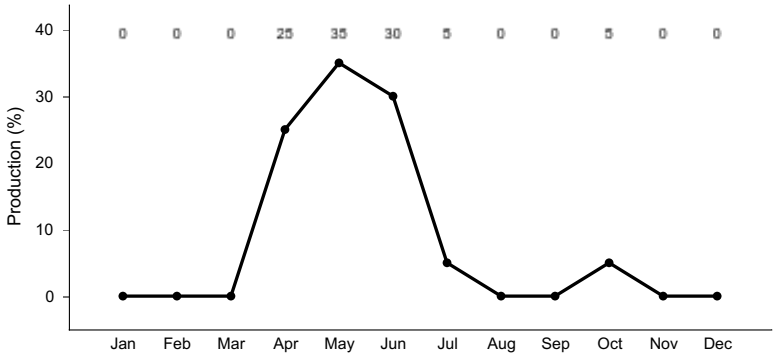


Figure 7. Plant community growth curve (percent production by month). ID0805, B13 ARTRV . State 1.

State 2
Sandberg Bluegrass - Annuals

State 2. This plant community is dominated by Sandberg bluegrass and annuals in the understory. There may be a variety of invasive forbs and some noxious species may have invaded the site. Some soil loss has occurred. The community has developed due to frequent fire and continued improper grazing management. This site has crossed the threshold. It is economically impractical to return this state to State 1 with accelerated practices.

Community 2.1
Sandberg Bluegrass - Annuals

This plant community is dominated by Sandberg bluegrass and annuals in the understory. There may be a variety of invasive forbs and some noxious species may have invaded the site. Some soil loss has occurred. The community has developed due to frequent fire and continued improper grazing management. This site has crossed the threshold. It is economically impractical to return this state to State 1 with accelerated practices.

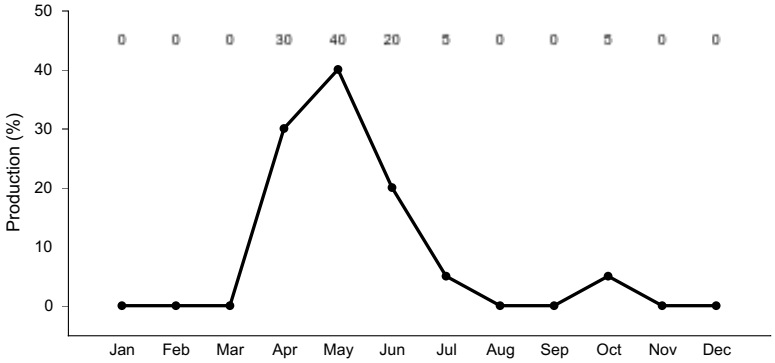


Figure 8. Plant community growth curve (percent production by month). ID0802, B13 ARTRV Early Seral. State 2.

State 3
Utah Juniper - Annuals

State 3. This plant community is dominated by Utah juniper with Sandberg bluegrass and annuals in the understory. There are few shrubs present due to competition from junipers. Some deep-rooted perennials may be present under the junipers. Generally, shrub cover is below 12-13%, bare ground is above 27-28%, juniper cover is greater than 20%, and infiltration is less than 6 cm/hr when the plant community crosses the threshold. Some soil loss has occurred. This plant community has developed due to continued improper grazing management and lack of fire. This site has crossed the threshold. It is economically impractical to return this community to State 1 with accelerated practices.

Community 3.1
Utah Juniper - Annuals- Sandberg Bluegrass

This plant community is dominated by Utah juniper with Sandberg bluegrass and annuals in the understory. There are few shrubs present due to competition from junipers. Some deep-rooted perennials may be present under the junipers. Generally, shrub cover is below 12-13%, bare ground is above 27-28%, juniper cover is greater than 20%, and infiltration is less than 6 cm/hr when the plant community crosses the threshold. Some soil loss has occurred. This plant community has developed due to continued improper grazing management and lack of fire. This site has crossed the threshold. It is economically impractical to return this community to State 1 with accelerated practices.

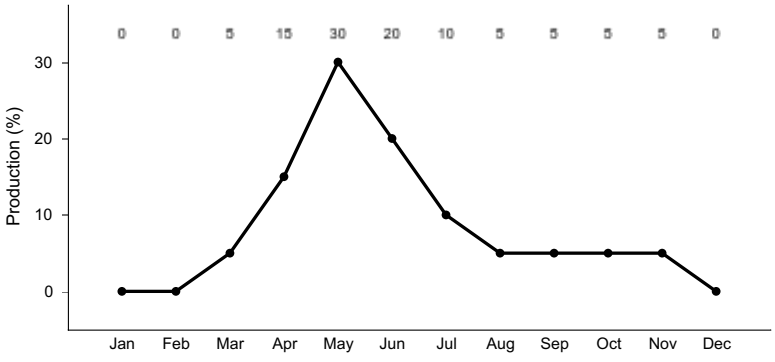


Figure 9. Plant community growth curve (percent production by month). ID0803, B13 Early Seral, JUOS. State 3.

State 4
Seeded

State 4. This plant community may be seeded to introduced species or a mixture of native species to mimic State 1

Community 4.1
Seeded

This plant community may be seeded to introduced species or a mixture of native species to mimic the HCPC.

State 5
Unknown or new site

Unknown new site. This plant community has gone over the threshold to a new site. Site potential has been reduced. Significant soil loss has occurred. Infiltration has been reduced and run-off has become more rapid. This state has developed due to continued improper grazing management and no fire or frequent fires from State 2 or the continued absence of fire from State 3 where a juniper seed source is present. This unknown new site can also be reached from State 3 with further dominance of the site by juniper. It is economically impractical to return this community to State 1 with accelerated practices.

Community 5.1
Unknown or new site

This plant community has gone over the threshold to a new site. Site potential has been reduced. Significant soil loss has occurred. Infiltration has been reduced and run-off has become more rapid. This state has developed due to continued improper grazing management and no fire or frequent fires from State 2 or the continued absence of fire from State 3 where a juniper seed source is present. This unknown new site can also be reached from State 3 with further dominance of the site by juniper. It is economically impractical to return this community to State 1 with accelerated practices.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				628–1412	
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	280–616	–
	Idaho fescue	FEID	*Festuca idahoensis*	90–202	–
	thickspike wheatgrass	ELLA3	*Elymus lanceolatus*	1–112	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	1–112	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	1–67	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	1–67	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	1–56	–
	Sandberg bluegrass	POSE	*Poa secunda*	1–45	–
	sedge	CAREX	*Carex*	1–45	–
	basin wildrye	LECI4	*Leymus cinereus*	1–34	–
	oniongrass	MEBU	*Melica bulbosa*	1–34	–
	mountain brome	BRMA4	*Bromus marginatus*	1–34	–
	squirreltail	ELEL5	*Elymus elymoides*	1–22	–
Forb					
2				135–303	
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	67–157	–
	sticky purple geranium	GEVI2	*Geranium viscosissimum*	1–45	–
	helianthella	HELIA	*Helianthella*	1–45	–
	velvet lupine	LULE3	*Lupinus leucophyllus*	1–45	–
	royal penstemon	PESP	*Penstemon speciosus*	1–34	–
	phlox	PHLOX	*Phlox*	1–22	–

	bluebells	MERTE	*Mertensia*	1–22	–
	Lewis flax	LILE3	*Linum lewisii*	1–22	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	1–22	–
	buckwheat	ERIOG	*Eriogonum*	0–22	–
	pale agoseris	AGGL	*Agoseris glauca*	1–22	–
	common yarrow	ACMI2	*Achillea millefolium*	1–22	–
	tapertip onion	ALAC4	*Allium acuminatum*	1–22	–
	aster	ASTER	*Aster*	1–22	–
	sneezeweed	HELEN	*Helenium*	0–11	–
Shrub/Vine					
3	**Shrub**			135–303	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	90–202	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	1–56	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	1–56	–
	threetip sagebrush	ARTR4	*Artemisia tripartita*	1–45	–
	chokecherry	PRVI	*Prunus virginiana*	1–45	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	1–34	–
	creeping barberry	MARE11	*Mahonia repens*	1–22	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	1–22	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	1–22	–
	Woods' rose	ROWO	*Rosa woodsii*	1–22	–

Animal community

Wildlife Interpretations.
Animal Community – Wildlife Interpretations

The rangeland ecological site provides diverse habitat for many native wildlife species. The plant community exhibits a diverse mixture of forbs throughout the growing season offering excellent habitat for invertebrates. Mule deer, pronghorn antelope and elk may utilize the site at different times of the year. The rangeland habitat provides seasonal habitat for resident and migratory animals including western toad, shrews, bats, ground squirrels, mice, coyote, red fox, badger, Ferruginous hawk, prairie falcon. Area sensitive bird species include Brewer’s sparrow, sage thrasher, sage sparrow and sage-grouse. Water features are sparse provided by seasonal runoff, artificial water catchments and springs.

State 1 Phase 1.1 – Mountain Big Sagebrush/ Idaho Fescue/ Bluebunch Wheatgrass Reference Plant Community (RPC): This plant community provides a diversity of grasses, forbs and shrubs, used by native insect communities that assist in pollination. An extensive array of forbs is represented throughout the growing season leading to a diverse insect community. Many avian and mammal species utilize this habitat based on the availability of invertebrate prey species. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, Great Basin spadefoot, western toad and northern leopard frog. Amphibians are associated with springs and isolated water bodies adjacent to this plant community. Development of spring sites that collect all available water would exclude amphibian use on these sites. Native shrub-steppe obligate avian species utilizing the habitat include the Brewer’s sparrow, sage sparrow and sage thrasher. Sage-grouse habitats (leks, nesting, brood-rearing and winter) are provided by this plant community. The plant community provides seasonal food and cover for large mammals including mule deer, pronghorn antelope and elk. A diverse small mammal population including golden-mantled ground squirrels, jackrabbits, deer mice and Great Basin pocket mice utilize this plant community.

State 1 Phase 1.2- Mountain Big Sagebrush/ Utah Juniper/ Sandberg Bluegrass Plant Community: This plant

community is the result of improper grazing management and no fire. An increase in canopy of sagebrush and junipers contributes to a sparse herbaceous understory. A reduced herbaceous understory results in less diversity and numbers of insects. The reptile and amphibian community will be similar to State 1 Phase 1.1 community represented by common sagebrush lizard, western rattlesnake, Great Basin spadefoot and western toad. The reduced diversity of insects and loss of understory cover may reduce quality of food and cover for reptile populations. As juniper increases, habitat cover for Brewer's sparrow, sage thrasher and sage sparrow may increase. Remaining sagebrush provides brood-rearing, winter cover and winter food for sage-grouse but as juniper encroaches the quality of this habitat is severely reduced or eliminated. The plant community supports limited seasonal habitat for mule deer, elk and pronghorn antelope. As juniper encroaches the site will provide additional thermal cover for large mammals. A small mammal population would be similar to State 1, Phase 1.1 animal community.

State 1 Phase 1.3 – Bluebunch Wheatgrass/ Sandberg Bluegrass/ Bottlebrush Squirreltail/ Streambank Wheatgrass Plant Community: The plant community is a result of recent wildfire, prescribed burning or brush management. The plant community, dominated by herbaceous vegetation with little or no sagebrush would provide less vertical structure for animals. Patches of root sprouting shrubs (snowberry and rabbitbrushes) may be present and provide limited vertical structure for wildlife over time. Insect diversity would be reduced but a native forbs plant community similar to State 1 Phase 1.1 would still support select pollinators. Habitat for sagebrush lizard, Great Basin spadefoot and western toad would be limited or excluded due to the loss of sagebrush. Amphibian habitat would be tied to permanent spring sites in the area. Development of spring sites that collected all available water would exclude the use of amphibians on these sites. The dominance of herbaceous vegetation with little sagebrush would limit use of these areas as nesting habitat by Brewer's sparrow, sage sparrow and sage thrasher. The dominant herbaceous vegetation improves habitat for grassland avian species (horned lark, savannah sparrow, vesper sparrow and western meadowlark). Mule deer and elk use would be seasonal and offer little thermal cover and young of year cover with the loss of shrub cover. The diversity and populations of small mammals would be dominated by open grassland species. Large blocks of this plant community would fragment historic plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

State 1 Phase 1.4 – Mountain Big Sagebrush/ Sandberg Bluegrass/ Bottlebrush Squirreltail Plant Community: This plant community is the result of improper grazing management and no fire. An increase in canopy of sagebrush contributes to a sparse herbaceous understory. Grasses, forbs and shrubs, are used by native insects that assist in pollination but the reduced herbaceous understory results in less diversity of insects. The reptile and amphibian community will be similar to State 1 Phase 1.1 and 1.2 community represented by common sagebrush lizard, western rattlesnake, Great Basin spadefoot and western toad. The reduced diversity of insects may reduce reptile diversity and populations. Reduced herbaceous understory is a key factor in limiting the use of this plant community by avian species. Key shrub-steppe obligate birds include Brewer's sparrow, sage sparrow, sage thrasher and sage-grouse. Critical habitats (brood-rearing and nesting cover) for sage-grouse are limited due to a less diverse herbaceous plant community. Winter habitat (cover and food) for sage-grouse is provided. The reduced vigor of understory vegetation provides for a shorter forage season for mule deer, elk and pronghorn antelope. Young of year cover would be provided for deer and antelope. Small mammal diversity and populations would be similar to State 1 Phase 1.1.

State 2 – Sandberg/ Annuals Plant Community:
The community has developed due to continued improper grazing management and frequent fire. The plant community does not support a diverse insect community. The reduced forb and shrub component in the plant community would support a very limited population of pollinators. Most reptilian species are not supported with food, water or cover. This plant community does not support the life requisites for sage thrasher, Brewer's sparrow, sage-grouse or sage sparrow. Diversity of grassland avian species is reduced due to poor cover and available food. Birds of prey including hawks and falcons may range throughout these areas looking for prey species. Large mammals may utilize the herbaceous vegetation in spring and summer when herbaceous vegetation is more palatable. The diversity and populations of small mammals would be dominated by open grassland species. Large blocks of this plant community would fragment historical plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

State 3 - Utah Juniper/ Sandberg Bluegrass/ Annuals Plant Community: This site has developed due to improper grazing management and no fire. The loss of native forbs and understory vegetation will reduce insect diversity on the site. Habitat for sagebrush lizard, Great Basin spadefoot and western toad would be limited due to the loss of brush cover. This plant community does not support life requisites for sage-grouse. Birds using this site as resident

or migratory habitat include Juniper titmouse, western bluebird and Virginia's warbler. The Juniper titmouse relies heavily on juniper seeds for winter food. Hunting success by raptors may decrease due to heavy overstory of juniper. The plant community supports limited seasonal habitat for mule deer and elk in spring and fall. As juniper encroaches the site will provide additional thermal cover for large mammals.

State 4 – Rangeland Seeding Plant Community: The seeding mixture (native or non-native) determines the animal species that utilize this site. A diverse seed mixture of grasses and forbs would provide similar habitat conditions as in the herbaceous plant community described in State 1 phase 1.3. A diverse seed mixture of grasses, forbs and shrubs would provide similar habitat conditions as described in State 1 phase 1.1, 1.2 or 1.4. A monoculture of non-native grass species would not support diverse populations of insects, reptiles, birds, mammals or sagebrush obligate animal species. Grassland animal species including western meadowlark, horned lark, savannah sparrow, deer mouse, kangaroo rat, mule deer and elk would utilize this site for nesting and/or foraging. Birds of prey including hawks and falcons may range throughout this community looking for prey species. Large areas of State 4 with no shrubs in the plant community would fragment the historical plant community and would severely reduce the quality of habitat for shrub obligate animal species.

Grazing Interpretations.

This site is most suitable for livestock grazing in the spring, early summer, and fall. It is often the key grazing area in a pasture.
Estimated initial stocking rate will be determined with the landowner or decision-maker. They will be based on the inventory which includes species, composition, similarity index, production, past use history, season of use, and seasonal preference.

Hydrological functions

The hydrologic condition of rangelands is the result of complex interrelationships of soil, vegetation, topography and climate. The hydrology of this site is characterized by low intensity frontal storms from October through April, and occasional high intensity thunderstorms during summer and early fall. About 50 percent of the precipitation falls as snow, and the site has snow cover during much of the winter. Productive mountain big sagebrush sites at elevations ranging from 4,800 to 7,000 feet generate most runoff from snowmelt. The site is typically protected by vegetation when snowmelt and runoff occur, from mid spring through summer. Shallow subsurface flow to drainages, especially on steeper slopes, is common. Runoff averages about 15% of the annual water budget, but this is quite variable from year to year. Ponding and flooding generally do not occur on this site. Run-on from adjacent sites normally does not occur.

State 1, Phase 1.1.
In HCPC, especially on less steep slopes, the majority of rainfall and snowmelt infiltrates into the soil profile and the erosion potential is low. Shrub canopy zones (coppices) generally have higher rates of infiltration than shrub interspaces because of differences in soil morphology, organic matter and surface litter cover. Moss and lichens dominate most coppices as ground cover. Interspaces between shrubs have sufficient aerial and ground cover in HCPC to protect the site from runoff and erosion. Moss in the sagebrush understory is a good indicator of proper hydrologic function. Dominance of bunchgrasses (bluebunch wheatgrass and Idaho fescue) in the stand is also an indicator of good hydrologic condition. When soil surface condition is dry, and undecomposed litter biomass is great, water repellency can develop on lighter textured soils. Modeling indicates that greatest runoff under undisturbed conditions typically occurs during high intensity summer storms, or during late spring or fall from frozen soil or rain-on-snow conditions on lower elevation sites. Erosion rarely exceeds 0.5 ton/acre, and very little sediment is delivered off-site. Higher runoff volumes are positively correlated with increasing bare ground and steepness of slope, but some studies have also shown reduced runoff on steeper slopes due to increased component of subsurface flow. Differences in runoff potential will be dependent on the interaction of site characteristics (soils, slopes, vegetation, aspect, and microtopography). Rill erosion is the dominant process on steeper slopes where erosion is more likely, but sediment is usually deposited on lower slopes and does not reach area streams. Little deep percolation occurs on these deeper soils (5% of water budget), unless there is greater than average winter snow cover. Good grazing management that addresses frequency, duration, and intensity of grazing can keep fine fuels from developing, maintain normal levels of litter, and promote the production and vigor of existing native

bunchgrasses. Trampling and overgrazing can result in rapid and possibly permanent loss of the cryptogam cover, which can increase the potential for wind erosion, and open crusts are a microenvironment for the establishment of winter annual aliens.

State 1, Phase 1.2.
Increasing sagebrush density and cover, along with the establishment of juniper seedlings, is a result of lack of fire or improper grazing management, with proximate seed source of juniper. Increasing water repellency and subsequently higher runoff rates are associated with litter buildup in decadent Mountain big sagebrush coppice microsites. Repellency typically increases during dry conditions, so that runoff and erosion are more likely to occur from smaller and/or less intense storm events. Studies show increasing cover of sagebrush is typically correlated with greater sediment/runoff ratios when runoff does occur. The loss of vigorous deep-rooted bunchgrasses in conjunction with invading annual grasses will typically increase the seasonal variability of infiltration and runoff as compared to HCPC. Increasing shrub cover, including taller shrubs, may impact snow hydrology. Greater shrub cover increases the chance of interception loss, but may also increase potential snow accumulation and reduce snowmelt rate. The preponderance of small, low intensity events coupled with greater shrub cover reduces the effective precipitation during the growing season, since the interception loss can be a significant proportion (> 30%) of seasonal precipitation. Changes in the hydrology of the site will occur as juniper continues to encroach. Brush management (chemical or prescribed burn) should have minimal impact on sagebrush hydrology if other factors remain undisturbed (coppice characteristics remain intact, with little impact on litter cover), and will invigorate native bunchgrasses if managed properly. Prescribed fire treatments can produce desirable results when there is an abundance of natives in the understory.

State 1, Phase 1.3.
Fire can reduce infiltration, subsurface water recharge and increase runoff and erosion causing reduced site productivity and contributing to water quality impacts in the short term. Runoff can be generated more quickly and in greater volume after fire, leading to erosion and flooding concerns. Fire reduces random roughness and significantly reduces plant cover, litter biomass, and organic matter in the soil surface. The effects of fire on the risk of runoff and erosion will be significant on steeper sites until ground and canopy cover recover. Amount of runoff and erosion will depend on the weather pattern during the recovery period. After fire, water repellency occurs on the soil surface, with burned coppices being most impacted. Mosaic burn patterns on a pre-fire HCPC site will somewhat mitigate erosion and runoff effects. Repellency is typically gone after two seasons following fire, and hydrologic function improves significantly as vegetation cover increases. Recovered sites with bluebunch wheatgrass dominating the understory have good hydrologic function. Gradual increases in sagebrush and bitterbrush, along with fine fuels management, will reduce fire frequency over time.

State 1, Phase 1.4
Increasing sagebrush density and cover is a result of lack of fire or improper grazing management. This state is usually associated with deteriorating hydrologic condition. Increasing water repellency and subsequently higher runoff rates are associated with litter buildup in decadent Mountain big sagebrush coppice microsites. Repellency typically increases during dry conditions, so that runoff and erosion are more likely to occur from smaller and/or less intense storm events. Studies show increasing cover of sagebrush is typically correlated with greater sediment/runoff ratios when runoff does occur. The loss of vigorous deep-rooted bunchgrasses in conjunction with invading annual grasses will typically increase the seasonal variability of infiltration and runoff as compared to HCPC. Increases in Sandberg bluegrass is correlated with higher runoff rates. Increasing shrub cover, including taller shrubs, may impact snow hydrology. Greater shrub cover increases the chance of interception loss, but may also increase potential snow accumulation and reduce snowmelt rate. The preponderance of small, low intensity events coupled with greater shrub cover reduces the effective precipitation during the growing season, since the interception loss can be a significant proportion (> 30%) of seasonal precipitation. Brush management (chemical or prescribed burn) should have minimal impact on sagebrush hydrology if other factors remain undisturbed (coppice characteristics remain intact, with little impact on litter cover), and will invigorate native bunchgrasses if managed properly.

State 2
Litter cover can be reduced by 50% or more, and bare ground can increase significantly immediately following fire. Repeated fires significantly reduce site productivity. Dominance of annual grass and forbs are associated with unstable hydrologic conditions Annual grass dominated sites will not have sufficient cover when runoff typically occurs. Due to diffuse basal characteristics, annual grasses generally do not have the capacity to catch and hold

sediment like bunchgrass clumps. Heavy stands of annual grasses may contribute to increased infiltration in spring and early summer, but will not have sufficient cover during other times to protect the site. These sites will demonstrate significant variability in infiltration and runoff due to seasonal changes in cover. Snow accumulation may be reduced since there are insufficient shrubs to prevent drifting, and earlier melt off is probable without shrub cover. Likewise, there is no shrub cover to mitigate the impact of rainfall on soil, which leads to increased soil detachment and availability for transport. Fire risk can be high, especially when conditions are dry. More frequent fires result in increased bare ground conditions which are highly susceptible to water and wind erosion. Repeated cycles of annual grass regeneration and repeated fire can result in severe depletion of the surface soil horizon and organic matter. Reductions in organic matter lead to reduced aggregate stability, reducing infiltration, and increasing the risks of runoff and soil loss. Reduced cover and reduced random roughness due to repeated burns provide interconnected flow paths for runoff and associated erosion. Sediment yields increase as rill erosion processes become dominant, even on lower slopes. With improper grazing management, trail areas become compacted, leading to further rilling and gully creation.

State 3
The site is transitioning from shrub-steppe to woodland, with significant changes to hydrology as a result of altered community composition and decreased structural diversity. As juniper invades and trees become large in stature, understory plants may be out-competed for water and decrease significantly on sites where water is a limiting factor (shallow soils, south slopes, coarse textured soils/increased rock content, etc.). Deep-rooted perennials remaining are primarily within the juniper canopy zone. Interspaces are largely bare ground, with increased evaporative loss. Soils in bare interspaces are more susceptible to raindrop impact, which can lead to reduction in aggregate stability and infiltration capacity. Effective precipitation is reduced with high interception losses as the site approaches stand closure. Increased bare ground and the water repellent nature of juniper litter in coppice zones increase overland flow connectivity and hence runoff. Erosion can be significant from high intensity storms as rilling becomes the dominant process for sediment loss. This increases the risk of gully formation, especially on steeper slopes. Potential for restoration decreases as stand ages and desirable species are lost. If juniper removal is utilized, leaving juniper debris on the ground after mechanical treatment can reduce runoff and evaporative soil water loss.

State 4
Seeding is not likely to reduce runoff or erosion in the year following a burn. Seeding of native or desired species, if successful, will help stabilize the erosion process and improve hydrologic conditions over time. As sagebrush and other shrubs establish, hydrologic function of this state

Recreational uses

Recreation opportunities include hunting, hiking, off-road vehicles, horseback riding and photography.

Wood products

None

Other products

None

Inventory data references

Information presented here has been derived from NRCS clipping and other inventory data. Also, field knowledge of range-trained personnel was used. Those involved in developing this site description include:
Dave Franzen, co-owner, Intermountain Rangeland Consultants, LLC
Jacy Gibbs, co-owner, Intermountain Rangeland Consultants, LLC
Jim Cornwell, Range Management Specialist, IASCD
Brendan Brazee, State Rangeland Management Specialist, NRCS, Idaho
Lee Brooks, Range Management Specialist, IASCD

Type locality

Location 1: Power County, ID	
Township/Range/Section	T11 R34 S32
General legal description	11 S 34 E Sec. 32
Location 2: Power County, ID	
Township/Range/Section	T13 R34 S4
General legal description	13 S 34 E NE ¼, NW ¼, Sec. 4 Field Offices American Falls Blackfoot Burley Driggs Idaho Falls Malad Pocatello Rexburg Soda Springs St. Anthony

Other references

Hironaka, M., M.A. Fosberg, A. H. Winward. 1983. Sagebrush- Grass Habitat Types of Southern Idaho. University of Idaho. Moscow, Idaho. Bulletin Number 35.

Petersen, S.L., 2004. A Landscape-Scale Assessment of Plant Communities, Hydrologic Processes, and State-and-Transition Theory in a Western Juniper Dominated Ecosystem. PhD Dissertation. Oregon State University, Corvallis, Oregon.

USDA Forest Service, Rocky Mountain Research Station. 2004. Restoring Western Ranges and Wildlands. General Technical Report RMRS-GTR-136-vols. 1-3.

USDA, NRCS.2001. The PLANTS Database, Version 3.1 (http://plants.usda.gov.). National Plant Data Center, Baton Rouge, LA 70874-4490 USA
USDA, Forest Service, Fire Effects Information Database. 2004. www.fs.fed.us/database/feis

USDI Bureau of Land Management, US Geological Survey; USDA Natural Resources Conservation Service, Agricultural Research Service; Interpreting Indicators of Rangeland Health. Technical Reference 1734-6; version 4-2005.

Contributors

D. Edgerton
Dave Franzen And Jacy Gibbs

Approval

Kendra Moseley, 12/11/2019

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)	Dave Franzen and Jacy Gibbs.
Contact for lead author	Brendan Brazee, State Range Conservationist USDA-NRCS 9173 W. Barnes Drive, Suite C Boise, ID 83709
Date	03/28/2007
Approved by	Kendra Moseley
Approval date	

Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills: rarely occur on this site. If rills are present they are likely to occur on slopes greater than 15 percent and immediately following wildfire. Rills are most likely to occur on soils with surface textures of silt loam and clay loam.

2. **Presence of water flow patterns:** Water-Flow Patterns: rarely occur on this site. When they occur they are short and disrupted by cool season grasses and tall shrubs and are not extensive.

3. **Number and height of erosional pedestals or terracettes:** Pedestals and/or Terracettes: are rare on this site. In areas where slopes approach 15 percent and where flow patterns and/or rills are present, a few pedestals may be expected.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground: On sites in mid-seral status bare ground may range from 30-50 percent.

5. **Number of gullies and erosion associated with gullies:** Gullies: none

6. **Extent of wind scoured, blowouts and/or depositional areas:** Wind-Scoured, Blowouts, and/or Deposition Areas: usually not present. Immediately following wildfire some soil movement may occur on lighter textured soils.

7. **Amount of litter movement (describe size and distance expected to travel):** Litter Movement: fine litter in the interspaces may move up to 2 feet following a significant run-off event. Coarse litter generally does not move.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Surface Resistance to Erosion: Values should range from 4 to 6

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil Surface Loss or Degradation: the A or A1 horizon is typically 2 to 16 inches thick. Structure ranges from weak, moderate, and strong very fine, fine, moderate medium, or weak coarse granular to weak very thin, thin, medium, thick, very thick, or moderate thick platy to weak, moderate and strong fine or medium subangular blocky. Soil organic matter (SOM) ranges from 0.2 to 6 percent.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant Community Composition and Distribution Relative to Infiltration: bunchgrasses, especially deep-rooted perennials, slow run-off and increase infiltration. Tall shrubs accumulate snow in

the interspaces.

---

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Compaction Layer: not present.

---

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: Functional/ Structural Groups: cool season deep-rooted perennial bunchgrasses >> tall shrubs = perennial forbs > shallow rooted bunchgrasses.

    Sub-dominant:

    Other:

    Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Plant Mortality/ Decadence: mountain big sagebrush will become decadent in the absence of fire and ungulate grazing. Grass and forb mortality will occur as tall shrubs increase.

---

14. **Average percent litter cover (%) and depth (in):** Litter Amount: additional litter cover data is needed but is expected to be 20-25 percent to a depth of 0.1 inches. Under mature shrubs litter is >0.5 inches deep and is 90-100 percent ground cover.

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual Production: is 1200 pounds per acre (1344 kilograms per hectare) in a year with normal temperatures and precipitation. Perennial grasses produce 60-80 percent of the total production, forbs 10-20 percent and shrubs 10-20 percent.

---

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:** Invasive Plants: includes Kentucky bluegrass, whitetop, rush skeletonweed, musk thistle, Canada thistle, scotch thistle, leafy spurge, and diffuse and spotted knapweed.

---

17. **Perennial plant reproductive capability:** Reproductive Capability of Perennial plants: all functional groups have the potential to reproduce in most years.
