

Ecological site R010XA009ID South Slope Gravelly 12-16 PZ

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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): 010X—Central Rocky and Blue Mountain Foothills

This MLRA is characterized by gently rolling to steep hills, plateaus, and low mountains at the foothills of the Blue Mountains in Oregon and the Central Rocky Mountains in Idaho. The geology of this area is highly varied and ranges from Holocene volcanics to Cretaceous sedimentary rocks. Mollisols are the dominant soil order and the soil climate is typified by mesic or frigid soil temperature regimes, and xeric or aridic soil moisture regimes. Elevation ranges from 1,300 to 6,600 feet (395 to 2,010 meters), increasing from west to east. The climate is characterized by dry summers and snow dominated winters with precipitation averaging 8 to 16 inches (205 to 405 millimeters) and increasing from west to east. These factors support plant communities with shrub-grass associations with considerable acreage of sagebrush grassland. Big sagebrush, bluebunch wheatgrass, and Idaho fescue are the dominant species. Stiff sagebrush, low sagebrush, and Sandberg bluegrass are often dominant on sites with shallow restrictive layers. Western juniper is one of the few common tree species and since European settlement has greatly expanded its extent in Oregon. Nearly half of the MLRA is federally owned and managed by the Bureau of Land Management. Most of the area is used for livestock grazing with areas accessible by irrigation often used for irrigated agriculture.

For further information, see "Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin (U.S. Department of Agriculture Handbook 296, 2006)" available online at: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_053624

Classification relationships

Artemisia vaseyana/ *Agropyron spicatum* HT in "Hironaka, M., M.A. Fosberg, A. H. Winward. 1983. Sagebrush-Grass Habitat Types of Southern Idaho. University of Idaho. Moscow, Idaho. Bulletin Number 35."

Ecological site concept

- Site occurs on uplands
- Slopes greater than 30% on southerly aspects
- Occurs in 12-16 inch PZ
- Soils are not volcanic cinders
- Soils greater than 20" to bedrock
- Coarse fragments >35% throughout the soil profile

Associated sites

R010XA004ID	Loamy 12-16 PZ ARTRV/FEID-PSSPS Adjacent loamy soils with less than 30% slope
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R010XA008ID	North Slope Loamy 16-22 PZ Adjacent north slopes
R010XA031ID	Bouldery Loam 12-16 PZ ARTRV/FEID Adjacent bouldery soils
R010XA037ID	Shrubby Stony North 12-16 PZ ARTRV/FEID Adjacent stony north slopes

Similar sites

R010XA014ID	Steep South Slope 16-22 PZ Occurs in the 16-22 inch PZ, slopes greater than 45%
R010XA030ID	South Slope Channery 11-13 PZ ARTRX/PSSPS Site occurs in association with rock outcrops and talus slopes
R010XA021ID	South Slope Fractured 12-16 PZ Soils less than 20" to fractured bedrock
R010XA015ID	South Slope Loamy 16-22 PZ Occurs in the 16-22 inch PZ, slopes greater than 45%
R010XA025ID	South Slope Loamy 11-13 PZ ARTRW8/PSSPS < 35% coarse fragments throughout the profile

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata</i> ssp. <i>vaseyana</i>
Herbaceous	(1) <i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>

Physiographic features

This site occurs on steep mountain sides on south, southeast, or west facing aspects. Slopes range from 20 to 60 percent or more. The elevation ranges from about 5000 to 7500 feet (1515 to 2275 meters).

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	5,000–7,500 ft
Slope	20–60%
Water table depth	80 in
Aspect	W, SE, S, SW

Climatic features

The Big and Little Wood River Footslopes and Plains, proposed as MLRA 10A, has a mean elevation of 5310 feet above sea level, and varies from 3600 to 9235 feet. In general, average annual precipitation is greatest on the western side, with the southeast area being the driest. The average annual precipitation, based on 7 long term climate stations located throughout the MLRA, is 15.39 inches, with a range of 12.5 to 18 inches. Monthly precipitation is generally greatest at the end of the year, diminishes steadily until a low in July and August, then increases rapidly in the autumn. Monthly temperatures can vary considerably. Highs of up to 102° and lows down to -52° Fahrenheit have been recorded. The average annual temperature is 42.9°. The frost-free period ranges from 75 to 98 days. The freeze-free period is a bit longer: 106 to 133 days.

Both morning and afternoon average relative humidity values peak in the winter, and reach their low in July and August. The average number of sunny, cloud-free days is above average for the summer months, but below average

for the period from November through February.

Table 3. Representative climatic features

Frost-free period (characteristic range)	75-98 days
Freeze-free period (characteristic range)	106-133 days
Precipitation total (characteristic range)	12-16 in
Frost-free period (actual range)	
Freeze-free period (actual range)	
Precipitation total (actual range)	12-18 in
Frost-free period (average)	86 days
Freeze-free period (average)	120 days
Precipitation total (average)	15 in

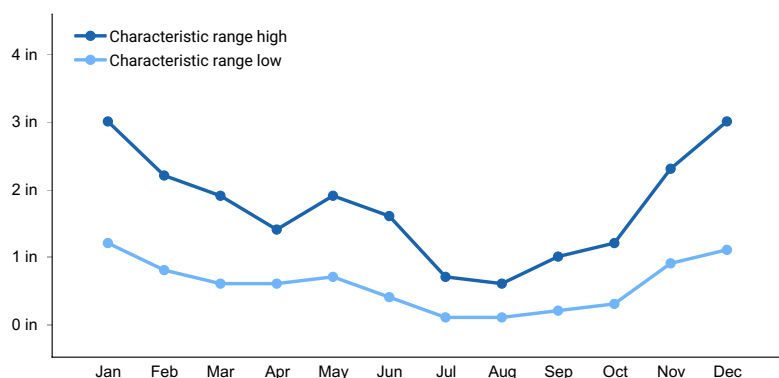


Figure 1. Monthly precipitation range

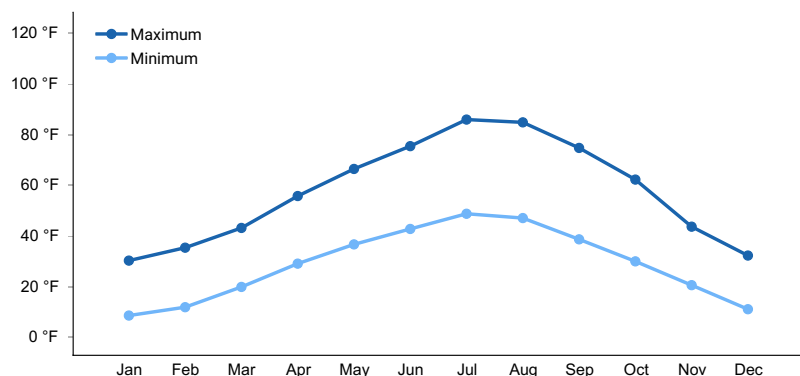


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

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

Wetland description

This site is not influenced by adjacent wetlands.

Soil features

The soils are formed in various parent material. They are gravelly, very gravelly or cobbly loams, and gravelly coarse sandy loams. The soils have over 35 percent coarse fragments throughout the profile. The subsoils are generally very gravelly or very cobbly clay loams. The water intake is moderate to rapid with well to excessive drainage. The available water holding capacity (AWC) is low to medium. Erosion hazard is moderate to high when

vegetation is scarce or removed.

Table 4. Representative soil features

Parent material	(1) Residuum–basalt (2) Colluvium–quartzite (3) Alluvium–volcanic sandstone
Surface texture	(1) Gravelly loam (2) Very gravelly sandy loam (3) Very cobbly
Family particle size	(1) Coarse-loamy (2) Loamy-skeletal (3) Sandy-skeletal
Drainage class	Well drained to excessively drained
Permeability class	Slow to very rapid
Soil depth	12–60 in
Surface fragment cover ≤3"	0–35%
Surface fragment cover >3"	0–30%
Available water capacity (0–40in)	0.6–5.9 in
Soil reaction (1:1 water) (0–40in)	5.1–7.3
Subsurface fragment volume ≤3" (4–60in)	0–50%
Subsurface fragment volume >3" (4–60in)	0–30%

Ecological dynamics

Ecological Dynamics of the Site:

The dominant visual aspect of this site is mountain big sagebrush and bluebunch wheatgrass. Composition by weight is 45 to 55 percent grasses, 10 to 15 percent forbs and 30 to 40 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, Rocky Mountain elk, and lagomorphs.

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

The Reference State, historically referred to as 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.

FUNCTION:

This site is suited for big game and livestock as late spring, summer and fall range. The site can be winter range for big game in moderate winters. It is also well suited for recreation use in the summer and fall.

Due to the rainfall, elevation, and steep topography on this site, it is susceptible to degradation from erosion. Infiltration is good where the community is in mid to late seral status. The site has low runoff potential. Runoff, when it does occur can be erosive on steeper slopes particularly 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 and antelope bitterbrush can gradually increase on the site. Grasses and forbs decrease as shrubs increase. With the continued absence of fire, mountain big sagebrush can displace most of the primary understory species.

When fires become more frequent than historic levels (20 to 50 years), mountain big sagebrush and antelope bitterbrush are reduced significantly. Rabbitbrushes can increase slightly. With continued short fire frequency, mountain big sagebrush and antelope bitterbrush can be completely eliminated along with many of the desirable understory species such as bluebunch wheatgrass. These species may be replaced by Sandberg bluegrass and bulbous bluegrass along with a variety of annual and perennial forbs including noxious and invasive plants. Cheatgrass will invade the site at lower elevations. These 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.

Continued improper grazing management influences fire frequency by increasing fine fuels. As cheatgrass increases and becomes co-dominant with Sandberg bluegrass and other annuals, 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. 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 without a suitable understory of perennial grasses, can increase cheatgrass which can lead to more frequent fire intervals.

Weather influences:

Above normal precipitation in March, April and May 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.

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 invasive species 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 and in moderate winters. Their numbers are seldom high enough to adversely affect the plant community. Herbivory can be detrimental to bitterbrush when livestock grazing and browsing by big game occurs at the same time and season. This will occur when both kinds of animal are using the plant in the late summer or fall. The adverse impact is excessive use of the current year's leader growth. The deer mouse is beneficial to this site as it is the principal vector for planting bitterbrush seed.

Watershed:

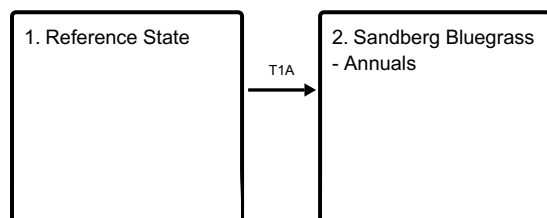
Decreased infiltration and increased runoff occur with an increase in mountain big sagebrush. Desired understory species can be reduced. This composition change can affect nutrient and water cycles. Increased runoff also causes sheet and rill erosion. Abnormally short fire frequency also gives the same results, but to a lesser degree. The long-term effect is a transition to a different state.

Practice Limitations:

Mechanical seeding or mechanical brush control is generally not feasible on the steeper slopes of this site. Brush management with aerial chemical application or prescribed burning can occur over the entire site.

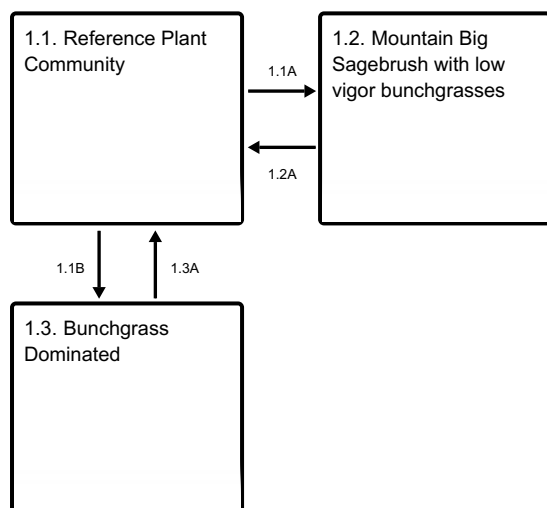
State and transition model

Ecosystem states



T1A - frequent fire and continued improper grazing management

State 1 submodel, plant communities



1.1A - improper grazing management and no fire

1.1B - fire

1.2A - prescribed grazing

1.3A - prescribed grazing and no fire

State 2 submodel, plant communities

2.1. Sandberg
Bluegrass - Annuals

State 1

Reference State

Dominant plant species

- mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), shrub
- Idaho fescue (*Festuca idahoensis*), grass
- bluebunch wheatgrass (*Pseudoroegneria spicata* ssp. *spicata*), grass

Community 1.1

Reference Plant Community



Figure 3. R010AY009ID

The Reference Plant Community (previously referred to as HCPC) has mountain big sagebrush in the overstory with bluebunch wheatgrass dominating the understory. Sandberg bluegrass, Nevada bluegrass, bottlebrush squirreltail, tapertip hawksbeard, lupine, and arrowleaf balsamroot are sub-dominant species. Antelope bitterbrush is also present in significant amounts in the overstory along with a variety of other shrubs in small amounts. Basin wildrye, Indian ricegrass, and Columbia needlegrass can occur in the understory. Natural fire frequency is 20 to 50 years.

Resilience management. The Reference Plant Community is Phase 1.1. This plant community is dominated by mountain big sagebrush and bluebunch wheatgrass. Other understory plants include Nevada bluegrass, Sandberg

bluegrass, basin wildrye, tapertip hawksbeard, lupine and arrowleaf balsamroot. Antelope bitterbrush is a subdominant in the overstory. The plant species composition of Phase 1.1 is listed later under “Reference Plant Species Composition”. Total annual production is 925 pounds per acre (1036 kilograms per hectare) in a normal year. Production in a favorable year is 1100 pounds per acre (1232 kilograms per hectare). Production in an unfavorable year is 600 pounds per acre (672 kilograms per hectare). Structurally, cool season deep rooted perennial bunchgrasses are dominant, followed by tall shrubs being more dominant than perennial forbs while shallow rooted perennial bunchgrasses are subdominant.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	300	450	550
Shrub/Vine	210	350	400
Forb	90	125	150
Total	600	925	1100

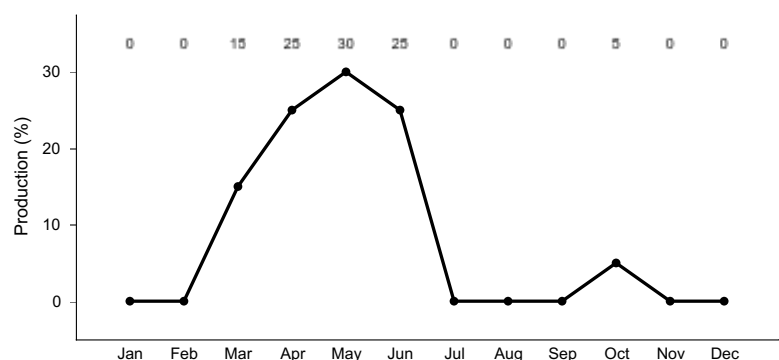


Figure 5. Plant community growth curve (percent production by month). ID0905, D25ARTRV South. State 1.

Community 1.2

Mountain Big Sagebrush with low vigor bunchgrasses

This plant community is dominated by mountain big sagebrush with reduced amounts of bluebunch wheatgrass. Sandberg bluegrass and bottlebrush squirreltail has increased in the understory. There is a reduced amount of Nevada bluegrass. All deep-rooted perennial bunchgrasses are typically in low vigor. Mountain big sagebrush has increased and antelope bitterbrush has decreased. This state has developed due to improper grazing management and no fire. Some cheatgrass may have invaded the site at lower elevations.

Community 1.3

Bunchgrass Dominated

This plant community is dominated by bluebunch wheatgrass with a variety of other bunchgrasses in small amounts. Bottlebrush squirreltail has increased. Forbs remain about in the same proportion as Plant Community 1.1. Only small amounts mountain big sagebrush and antelope bitterbrush occur in the plant community due to wildfire, but some root-sprouting rabbitbrushes are present. Mountain snowberry and chokecherry, if present, have re-sprouted from the roots or crowns. Some cheatgrass may have invaded the site at lower elevations. This plant community is the result of wildfire.

Pathway 1.1A

Community 1.1 to 1.2

Phase 1.1 to 1.2. Develops with improper grazing management and no fire.

Pathway 1.1B

Community 1.1 to 1.3

Phase 1.1 to 1.3. Develops with fire.

Pathway 1.2A
Community 1.2 to 1.1

Phase 1.2 to 1.1. Develops with prescribed grazing.

Pathway 1.3A
Community 1.3 to 1.1

Phase 1.3 to 1.1. Develops with prescribed grazing and no fire.

State 2
Sandberg Bluegrass - Annuals

Resilience management. State 2 to unknown site. Excessive soil loss and changes in the hydrologic cycle caused by continued improper grazing management and/or frequent fire cause this state to cross a threshold and retrogress to a new site with reduced potential. It is economically impractical to return this plant community to State 1 with accelerating practices.

Dominant plant species

- Sandberg bluegrass (*Poa secunda*), grass
- cheatgrass (*Bromus tectorum*), grass

Community 2.1
Sandberg Bluegrass - Annuals

This plant community is dominated by Sandberg bluegrass, cheatgrass and other annuals. Root sprouting shrubs such as rabbitbrushes can be present, dependent upon, how frequent, fire has occurred. Some soil loss has occurred. This state has developed due to frequent fires and improper grazing management. This site has crossed the threshold. It is economically impractical to return this plant community to State 1 with accelerating practices.

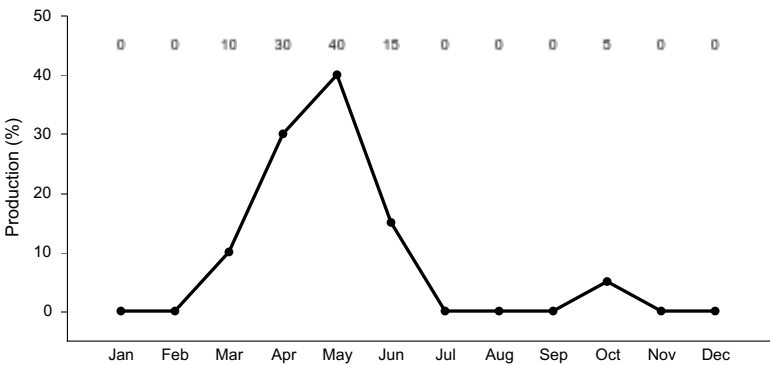


Figure 6. Plant community growth curve (percent production by month).
ID0902, D25 ARTRV Early Seral.

Transition T1A
State 1 to 2

State 1 Phase 1.3 to State 2. Develops through frequent fire and continued improper grazing management. This site has crossed the threshold. It is economically impractical to return this plant community to State 1 with accelerating practices.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				300–550	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	200–350	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	1–15	–
	Columbia needlegrass	ACNE9	<i>Achnatherum nelsonii</i>	1–15	–
	sedge	CAREX	<i>Carex</i>	1–15	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	1–15	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	1–15	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	1–5	–
Forb					
2				90–150	
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	30–60	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	30–60	–
	lupine	LUPIN	<i>Lupinus</i>	15–30	–
	phlox	PHLOX	<i>Phlox</i>	10–20	–
	buckwheat	ERIOG	<i>Eriogonum</i>	10–20	–
	Hooker's balsamroot	BAHO	<i>Balsamorhiza hookeri</i>	1–20	–
	milkvetch	ASTRA	<i>Astragalus</i>	1–15	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	1–15	–
	geranium	GERAN	<i>Geranium</i>	1–15	–
	oneflower helianthella	HEUN	<i>Helianthella uniflora</i>	1–15	–
	foothill deathcamas	ZIPA2	<i>Zigadenus paniculatus</i>	0–5	–
Shrub/Vine					
3	Shrubs			210–400	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	125–250	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	50–75	–
	mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>	1–20	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	1–15	–
	plum	PRUNU	<i>Prunus</i>	1–15	–
	currant	RIBES	<i>Ribes</i>	0–10	–
	spineless horsebrush	TECA2	<i>Tetradymia canescens</i>	1–5	–

Animal community

Wildlife Interpretations.

Animal Community – Wildlife Interpretations

This 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. Wildlife uses these areas on a seasonal basis due to the high elevation, short growing season and temperature regimes. Mule deer and elk are the large herbivores using the site. The site provides seasonal habitat for resident and migratory animals including western toad, sagebrush lizard, shrews, bats, ground squirrels, mice, coyote, red fox, badger, sage-grouse, Ferruginous hawk, prairie falcon, horned lark and western meadowlark. Sagebrush obligate avian and mammal species including sage-grouse, Brewer's sparrow, sage thrasher and pika utilize these sites on a limited basis due to the high elevation and associated cold temperatures throughout much of the year. Sage-grouse an area sensitive species, may utilize the sagebrush plant community as winter and brood-rearing

habitat. A change in the quality of the historic plant community over time can reduce the numbers and diversity of native wildlife species in the area. Encroachment of noxious and invasive plant species (cheatgrass and medusahead) in isolated areas can replace native plant species which provide critical feed, brood-rearing and nesting cover for a variety of native wildlife. The loss of herbaceous understory vegetation has a negative impact on ground nesting birds, while the loss of shrub cover negatively affects both ground and shrub nesting avians. Water features are sparse provided by seasonal streams, artificial water catchments and springs.

State 1 Phase 1.1 – Mountain Big Sagebrush/ Bluebunch Wheatgrass/ Sandberg Bluegrass/ Antelope Bitterbrush Reference Plant Community (RPC) This plant community provides a diversity of grasses, forbs and shrubs, used throughout the growing season by native insect communities that assist in pollination. The reptile and amphibian community is represented by leopard lizard, short horned lizard, sagebrush lizard, western skink, western toad, boreal chorus frog 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, sage thrasher and sage-grouse. Sage-grouse may utilize this plant community for winter and brood rearing habitat. The plant community provides forage and cover for large mammals including mule deer and elk. The site provides winter range for deer and elk in moderate winters. A diverse small mammal population including golden-mantled ground squirrels, chipmunks and yellow-bellied marmots utilize this community. Pikas may utilize the site if adjacent to rocky open areas. Habitat for the pygmy rabbit would be marginal due to gravelly soils, steepness and high elevation. The deer mouse is beneficial to this site as it is the principal vector for planting bitterbrush seed.

State 1 Phase 1.2- Mountain Big Sagebrush/ Sandberg Bluegrass / Bottlebrush Squirreiltail Plant Community: This plant community is the result of improper grazing management and no fire. An increase in the canopy cover of sagebrush contributes to a sparse herbaceous understory. Antelope bitterbrush has decreased. The reduced herbaceous understory results in reduced diversity and numbers of insects. The reptile and amphibian community is represented by leopard lizard, short horned lizard, sagebrush lizard, western skink and western toad. The reduction of grasses and forbs in the plant community would reduce the available prey species and cover for these resident reptile species. 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. This plant community supports a less diverse variety of migratory and resident avian species. Fewer prey species and sparse understory cover results in less available food, brood-rearing and nesting habitat. Key shrub-steppe avian obligates include Brewer's sparrow, sage sparrow, sage thrasher and sage-grouse. Winter cover and winter food for sage-grouse is available. Reduced understory vegetation and increased sagebrush density reduces forage value for large mammals including mule deer, and elk. A small mammal population including golden-mantled ground squirrels, chipmunks and yellow-bellied marmots utilize these areas. Pikas may be present in areas with adjacent open rocky habitat. The deer mouse is beneficial to this site as it is the principal vector for planting bitterbrush seed.

State 1 Phase 1.3 – Bluebunch Wheatgrass/ Bottlebrush Squirreiltail Plant Community: This plant community is the result of fire. The plant community, dominated by herbaceous vegetation with little or no sagebrush and antelope bitterbrush would provide less vertical structure for animals. Patches of root sprouting shrubs (snowberry, rabbitbrushes and chokecherry) may be present to provide limited vertical structure for wildlife. Insect diversity would be reduced but a diverse native forb plant community would still support select pollinators. The reptiles including short horned lizard and sagebrush lizard 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 canopy would eliminate use of these areas as nesting habitat by Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. This plant community provides limited brood-rearing habitat for sage-grouse if adjacent sagebrush cover is present. Winter cover and winter food use by sage-grouse is eliminated. The dominant herbaceous vegetation improves habitat for grassland avian species (horned lark and western meadowlark). Large mammal (mule deer, and elk) use would be seasonal and offer little thermal cover and young of year cover with the loss of the shrub component. The diversity and populations of small mammals would be dominated by open grassland species like the Columbian ground squirrel.

State 2 – Sandberg Bluegrass/ Cheatgrass / Annuals Plant Community:

This plant community is the result of continued improper grazing management and/or frequent fire. Invasive herbaceous plants and patches of root sprouting shrubs like rabbitbrushes and mountain snowberry can be present.

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-grouse, sage thrasher, Brewer's sparrow 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 the early part of the year when the invasive annuals (cheatgrass) are more palatable. At other times of the year large mammals would not regularly utilize these areas due to poor food and cover conditions. The diversity and populations of small mammals would be dominated by open grassland species like the Columbian ground squirrel.

Grazing Interpretations.

This site is suited for livestock as late spring, summer and fall range

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 60 to 70 percent of the precipitation falls as snow, and the site has snow cover during most of the winter. Productive mountain big sagebrush sites at elevations ranging from 5,000 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 to 20 percent 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 Reference, 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 but have less biomass than north-facing slopes. 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 (especially bluebunch wheatgrass) 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 contributes to the increased risk of runoff. The bulk of runoff occurs in late spring and early summer and is associated with snowmelt. Event-based runoff increases the potential for soil loss, and modeling indicates that the largest erosion losses will typically occur in early fall. A small amount of sediment is delivered off-site most years. 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, and microtopography). Some sediment may be transported off-site with higher runoff volumes. 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. Deep percolation (up to 20 percent of water budget) commonly occurs on these shallow and/or gravelly soils during late spring. Good grazing management that addresses frequency, duration, and intensity of grazing can keep fine fuels from developing on these northern slopes, 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, due to the lack of fire or improper grazing management, is associated with deteriorating hydrologic condition. Increasing water repellency and subsequently higher runoff rates are associated

with litter buildup in decadent bitterbrush and 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 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 (> 20%) of seasonal precipitation. Brush management (chemical) 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 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 often 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 as vegetation cover increases. These south aspect slopes have greater potential for severe burn conditions. Runoff and erosion on severely burned steep sagebrush landscapes may require more than 3 years to return to background levels. 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 2

Litter cover can be reduced by 50 percent or more, and bare ground can increase significantly immediately following fire. Repeated fires significantly reduce site productivity. Dominance of annual grass and forbs is typical, and is associated with unstable hydrologic conditions. Due to diffuse basal characteristics, annual grasses do not have the capacity to catch and hold sediment like bunchgrass clumps. Annual grasses will typically not provide sufficient cover to promote infiltration and reduce runoff. These sites may 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 during high intensity events. 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 plant available water, 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 rill and gully creation.

Recreational uses

The site has limited opportunities for hunting, hiking, horseback riding, photography and nature study.

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

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Contributors

Dave Franzen and Jacy Gibbs

Approval

Kirt Walstad, 12/13/2023

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, Suite C Boise, ID 83709
Date	03/29/2007
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills: can occur on this site. If rills are present they are likely to occur 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: occur on this site. When they occur, they are short and disrupted by cool season grasses and tall shrubs and are not extensive. Gravelly surface texture interrupts flows.

3. **Number and height of erosional pedestals or terracettes:** Pedestals and/or Terracettes: occur on this site but are not extensive. In areas where flow patterns and/or rills are present, a few pedestals may be expected. Terracettes occur on the site uphill from tall shrub bases and large bunchgrasses.

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 15-30 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 3 feet following a significant run-off event. Coarse litter generally does not move. Gravels on the surface help reduce fine litter movement.

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 3 to 5.

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 5 to 26 inches thick. Structure ranges weak and moderate very fine, fine or medium granular to weak thin platy. Soil organic matter (SOM) ranges from 1 to 5 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 catch blowing 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: is not present.
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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: 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 normal fire frequency and ungulate grazing. Grass and forb mortality will occur as tall shrubs increase.
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14. **Average percent litter cover (%) and depth (in):** Litter Amount: additional litter cover data is needed but is expected to be 15-20 percent to a depth of 0.1 inches. Under mature shrubs litter is >0.5 inches deep and is 90-100 percent ground cover.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual Production: is 925 pounds per acre (1036 kilograms per hectare) in a year with normal temperatures and precipitation. Perennial grasses produce 45-55 percent of the total production, forbs 10-15 percent and shrubs 30-40 percent.
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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Invasive Plants: include bulbous bluegrass, rush skeletonweed, musk and scotch thistle, and diffuse and spotted knapweed. Cheatgrass can invade the site at the lower elevations.
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17. **Perennial plant reproductive capability:** Reproductive Capability of Perennial Plants: all functional groups have the potential to reproduce in most years.
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