

Ecological site EX043B23B176 Very Shallow (VS) Absaroka Upper Foothills

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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.

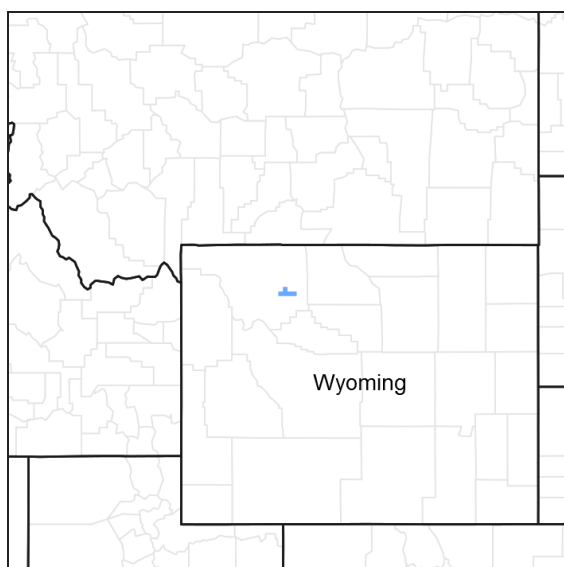


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 043B–Central Rocky Mountains

Major Land Resource Unit (MLRU) 43B: Central Rocky Mountains

43B – Central Rocky Mountains – The Central Rocky Mountains extends from northern Montana to southern extent of Wyoming and from Idaho to central Wyoming. The southern extent of 43B is comprised of a combination of metamorphic, igneous, and sedimentary mountains and foothills. Climatic changes across this extent are broad and create several unique breaks in the landscape.

Further information regarding MLRAs, refer to: United States Department of Agriculture, Natural Resources Conservation Service. 2006. 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.

Available electronically at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook.

LRU notes

Land Resource Unit (LRU) 43B23B: Absaroka Upper Foothills

Based on the shifts in geology, precipitation patterns and other climatic factors, as well as elevations and vegetation, the Absaroka Range was divided into LRU 23. Further division of this LRU is necessary due to the gradient moving from the foothills to the summit, as well as aspect shifts (north/east face versus south/west face). Subset B is set for the higher elevations within the foothills, with 15 to 19 inches of precipitation. To verify or identify Subset B (the referenced subset for this ecological site), refer to the Wyoming LRU matrix key contained within the Ecological Site Key.

This particular LRU/Subset occurs along the eastern foothills of the Absaroka Range. This LRU starts north of Clark, WY and runs to the Thermopolis, WY area. Once the foothills cross into the Northern Beartooth Range, the climatic patterns and elevational changes shifts the plant community and allows for a break in LRU's near the Montana state line. As the LRU follows to the south and then tracks east to the intersection of the Absaroka Range and the Owl Creek Range, the face changes aspect and geology creating a shift in plant dynamics and a break in the LRU.

The extent of soils currently correlated to this ecological site does not fit within the digitized boundary. Many of the noted soils are provisional and will be reviewed and corrected in mapping update projects. Other map units are correlated as small inclusions within other MLRA's/LRU's based on elevation, landform, and biological references.

Moisture Regime: Typic Ustic

Temperature Regime: Frigid

Dominant Cover: Rangeland – Sagebrush Steppe (major species is Mountain Big Sagebrush)

Representative Value (RV) Effective Precipitation: 15-19 inches (381 – 483 mm)

RV Frost-Free Days: 37 - 80 days

Classification relationships

Relationship to Other Established Classification Systems:

National Vegetation Classification System (NVC):

2 Shrub & Herb Vegetation Class

2.B Temperate & Boreal Grassland & Shrubland Subclass

2.B.2 Temperate Grassland & Shrubland Formation

2.B.2.Na Western North American Grassland & Shrubland Division Division

M048 Central Rocky Mountain Montane-Foothill Grassland & Shrubland Macrogroup

G273 Central Rocky Mountain Lower Montane, Foothill & Valley Grassland Group

Ecoregions (EPA):

Level I: 10 North American Deserts

Level II: 10.1 Cold Deserts

Level III: 10.1.18 Wyoming Basin

Level IV: 10.1.18.d Foothills and Low Mountains

Ecological site concept

- Site receives no additional water.
- Slope is < 60%
- Soils are:
 - o Textures range from loamy sand to clay loam in top 4" (10 cm) of mineral soil surface
 - o Clay content is \leq 35% in top 4" (10 cm) of mineral soil surface
 - o All subsurface horizons have a weighted average of < 35% clay.
 - o very shallow (< 10 in. (25 cm))
 - o <3% stone and boulder cover and < 15% cobble and gravel cover
 - o Generally not skeletal (< 35% rock fragments) but occasionally will have up to 75% gravels and cobbles.

Associated sites

R043BY322WY	Loamy (Ly) 15-19" Foothills and Mountains East Precipitation Zone Loamy
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R043BY350WY	Sandy (Sy) 15-19" Foothills and Mountains East Precipitation Zone Sandy
R043BY358WY	Shallow Clayey (SwCy) 15-19" Foothills and Mountains East Precipitation Zone Shallow Clayey
R043BY362WY	Shallow Loamy (SwLy) 15-19" Foothills and Mountains East Precipitation Zone Shallow Loamy
R043BY366WY	Shallow Sandy (SwSy) 15-19" Foothills and Mountains East Precipitation Zone Shallow Sandy

Similar sites

R032XY376WY	Very Shallow (VS) 10-14" East Precipitation Zone Very Shallow 10-14" Foothills & Basins East P.Z., 032XY376WY has lower production.
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Table 1. Dominant plant species

Tree	(1) <i>Pinus flexilis</i> (2) <i>Juniperus scopulorum</i>
Shrub	(1) <i>Artemisia tridentata ssp. vaseyana</i>
Herbaceous	(1) <i>Achnatherum nelsonii</i> (2) <i>Pseudoroegneria spicata</i>

Legacy ID

R043BX676WY

Physiographic features

This site occurs on steep slopes and ridge tops, but may occur on all slopes.

Table 2. Representative physiographic features

Landforms	(1) Foothills > Hillslope (2) Foothills > Ridge (3) Foothills > Erosion remnant
Runoff class	Negligible to high
Elevation	1,829–2,743 m
Slope	20–60%
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation and modeled relative effective annual precipitation ranges from 15 to 19 inches (381 – 483 mm). The normal precipitation pattern shows peaks in June tapering into September. This amounts to about 50% of the mean annual precipitation. Average snowfall is about 150 inches annually. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation.

Because of the varied topography, the wind will vary considerably for different parts of the area. The wind is usually much lighter at the lower elevations and in the valleys as compared with the higher terrain. The average winter wind velocity is 8.5 mph while the summer wind velocity averages 7.5 mph. Winds during storms and on ridges may exceed 45 mph.

Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures.

Chinook winds may occur in winter and bring rapid rises in temperature. High winds are generally blocked by high mountains but occur in conjunction with thunderstorms, which are common in late summer. Growth of native cool-season plants begins about May 1 to May 15 and continues until about October 15.

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/>. Historically, "Crandall Creek" was the representative weather stations within this subset. However, "Sunshine 3NE" is the only available weather station within a close proximity in location and characteristics for this subset. The following graphs and charts are a collective sample representing the averaged normals and 30-year annual rainfall data for the selected weather stations from 1981 to 2010.

Table 3. Representative climatic features

Frost-free period (characteristic range)	40 days
Freeze-free period (characteristic range)	84 days
Precipitation total (characteristic range)	356 mm
Frost-free period (actual range)	40 days
Freeze-free period (actual range)	84 days
Precipitation total (actual range)	356 mm
Frost-free period (average)	40 days
Freeze-free period (average)	84 days
Precipitation total (average)	356 mm

Climate stations used

- (1) SUNSHINE 3NE [USC00488758], Meeteetse, WY

Influencing water features

The characteristics of these upland soils have no influence from ground water (water table below 60 inches (150 cm)) and have minimal influence from surface water/overland flow. There may be isolated features that are affected by snow pack that persists longer than surrounding areas due to position on the landform (shaded/protected pockets).

Soil features

The soils of this site are very shallow (less than 10" to bedrock) well-drained soils formed in residuum. These soils have rapid to slow permeability and can be of any texture. This site usually occurs on steep slopes, but may be on any slope. The bedrock will include all kinds except soft clay shale's, igneous and some volcanic. The soil characteristic having the most influence on the plant community is the very shallow depth to bedrock, which drastically limits the available moisture.

Table 4. Representative soil features

Surface texture	(1) Channery loam (2) Clay loam (3) Clay (4) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Slow to very rapid
Depth to restrictive layer	3–25 cm
Soil depth	3–25 cm

Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0–29%
Available water capacity (0-101.6cm)	3.56–4.06 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0–25%

Ecological dynamics

Ecological Dynamics of the Site:

Potential vegetation on this site is dominated by a variety of mid cool-season perennial grasses. Other significant vegetation includes antelope bitterbrush, black sagebrush, and a variety of forbs. On areas along the west slope of the Big Horn Mountains, mountain mahogany is the significant shrub. The expected potential composition for this site is about 70% grasses, 15% forbs and 15% woody plants. The composition and production will vary naturally due to historical use, fluctuating precipitation and fire frequency.

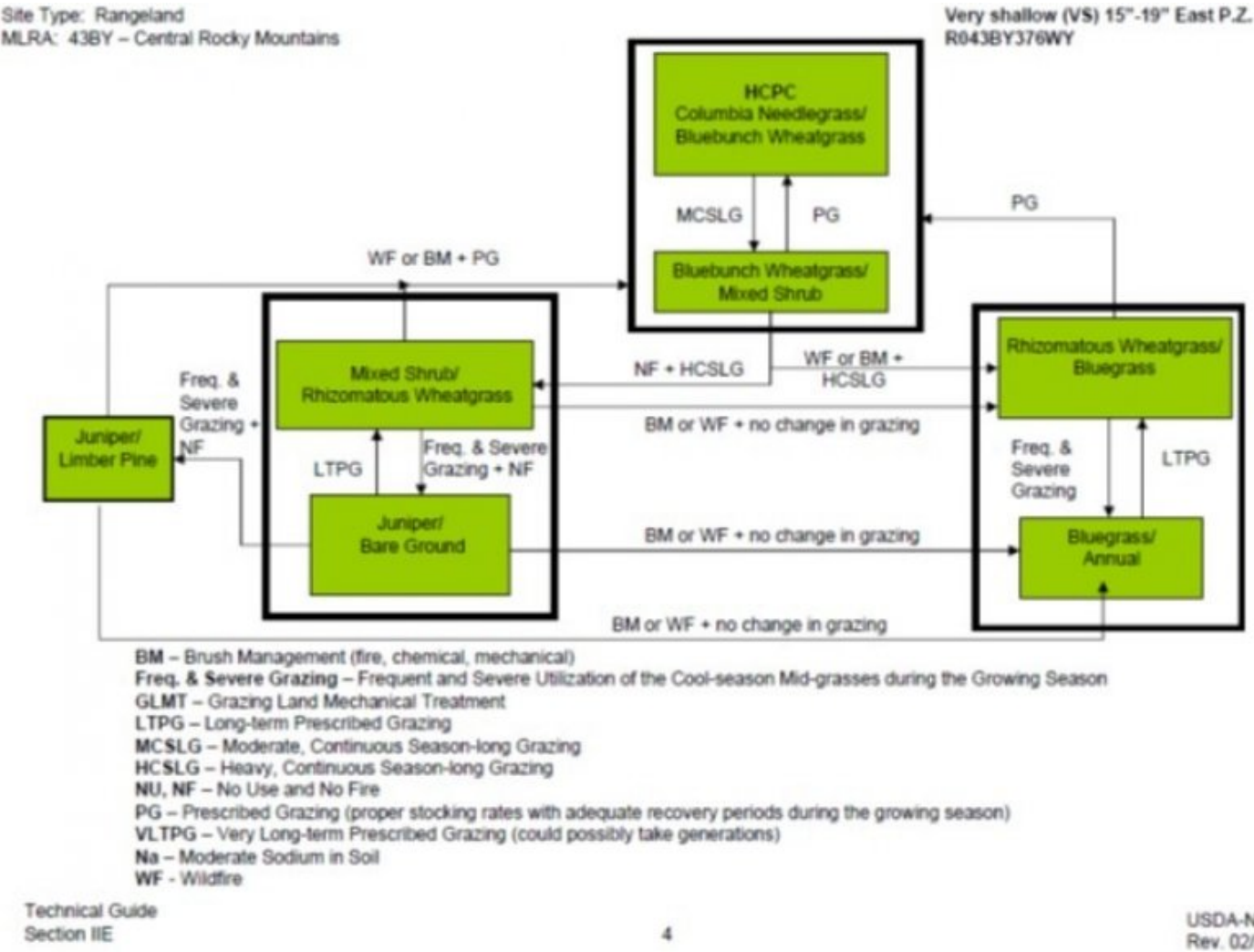
As this site deteriorates, bluegrasses, antelope bitterbrush, and big and black sagebrushes will increase. On areas along the west slope of the Big Horn Mountains, mountain mahogany, which is a strong resprouter, will usually dominate the site. Cool season grasses such as Columbia needlegrass, bluebunch wheatgrass, spikefescue, Idaho fescue, mountain muhly, and rhizomatous wheatgrasses will decrease in frequency and production. As conditions continue to deteriorate, annual forbs and grasses such as cheatgrass will invade.

Limber pine does occur on this site as scattered individual trees. Typically, tree cover is relatively sparse due to the available precipitation, droughtiness of the soil, and the natural fire cycle. Consequently, the site is considered rangeland and not an open forestland. On sites more conducive to tree production and with the current fire suppression policies, this situation has resulted in more trees and a plant community with an open forestland appearance. This plant community should not be confused with a forestland site, as the site does not historically comprise a significant total production of limber pine and the atypical cover of limber pine is the result of the removal of fire as a natural plant interaction in the plant community succession. Recently, prescribed burning has regained some popularity.

The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

State and transition model



State 1
Columbia Needlegrass/Bluebunch Wheatgrass Plant Community

Community 1.1
Columbia Needlegrass/Bluebunch Wheatgrass Plant Community

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores, very shallow soils, and periodic fires. Potential vegetation is about 70% grasses or grass-like plants, 15% forbs, and 15% woody plants. The cyclical nature of the fire regime in this community prevents shrubs from being the dominant landscape. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and on areas receiving periods of rest. Cool season midgrasses dominate the state. The major grasses include Columbia needlegrass, spikefescue, Idaho fescue, and bluebunch wheatgrass. Antelope bitterbrush is a major element of this state, occurring in mosaic patterns, and makes up to 15% of the annual production. On areas along the west slope of the Big Horn Mountains, mountain mahogany is the dominant shrub. A variety of shrubs and forbs also occur in this state and plant diversity is high (see Plant Composition Table). Annual production on this state ranges from 400 to 800 pounds depending on climatic conditions. This plant community is extremely stable and well adapted to the Central Rocky Mountains climatic conditions. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity). Transitions or pathways leading to other plant communities are as follows: Moderate, continuous season-long grazing will convert the plant community to the Bluebunch Wheatgrass/Mixed Shrub Plant Community.

Figure 9. Plant community growth curve (percent production by month).
WY0601, 15-19E all upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	15	40	20	10	10			

State 2
Bluebunch Wheatgrass/Mixed Shrub Plant Community

Community 2.1
Bluebunch Wheatgrass/Mixed Shrub Plant Community

Historically, this plant community evolved under grazing by large ungulates and a low fire frequency. Currently, this site is normally found under a moderate, season-long grazing regime and will be exacerbated by prolonged drought conditions. In addition, the fire regime for this site has been modified and extended periods without fire is now common. Shrubs are important components of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of miscellaneous forbs. Dominant grasses include bluebunch wheatgrass, Idaho fescue, rhizomatous wheatgrass, prairie junegrass, and of less frequency Columbia needlegrass and spikefescue. Grasses of secondary importance include slender wheatgrass, bluegrasses, one-spike oatgrass, and spike trisetum. Forbs commonly found in this plant community include stonecrop, asters, biscuitroot, balsamroot, phlox, buckwheat, pussytoes, lupine, paintbrush, agoseris, and larkspurs. Sagebrushes and antelope bitterbrush make up from 15% to 25% of the total annual production. On areas along the west slope of the Big Horn Mountains, mountain mahogany is the dominant shrub on this site and comprises 15% to 25% of the total annual production. When compared to the Historical Climax Plant Community, big and black sagebrushes or mountain mahogany, juniper, limber pine, rhizomatous wheatgrasses, and bluegrasses have increased. Columbia needlegrass and spikefescue have decreased, often occurring only where protected from grazing by the sagebrush canopy. Some weedy species such as cheatgrass may have invaded the site but are in small patches. This state produces between 350 and 700 pounds annually, depending on the growing conditions. This plant community is resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. The herbaceous component is mostly intact and plant vigor and replacement capabilities are sufficient. Water flow patterns and litter movement may be occurring but only on steeper slopes. Incidence of pedestalling is minimal. Soils are mostly stable and the surface shows minimum soil loss. The watershed is functioning and the biotic community is intact. Transitions or pathways leading to other plant communities are as follows: • Prescribed grazing will convert this plant community to the HCPC. The probability of this occurring is high especially if rotational grazing along with short deferred grazing is implemented as part of the prescribed method of use. In addition, the removal of fire suppression will allow a somewhat natural fire regime to reoccur to more easily transition between this plant community and the HCPC. A prescribed fire treatment can be useful to hasten this transition if desired. • Heavy, continuous, season-long grazing plus no fires will convert the plant community to the Mixed Shrub/Rhizomatous Wheatgrass Plant Community. The probability of this occurring is high. This is especially evident on areas where drought or heavy browsing does not adversely impact the shrub stand. • Heavy, continuous, season-long grazing plus wildfire or brush management will convert the plant community to a Rhizomatous Wheatgrass/Bluegrass Plant Community. The probability for this is high, especially on areas where the shrubs have been heavily browsed or removed by natural or human causes. Drought can also exacerbate this transition.

Figure 10. Plant community growth curve (percent production by month).
WY0601, 15-19E all upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	15	40	20	10	10			

State 3
Mixed Shrub/Rhizomatous Wheatgrass Plant Community

Community 3.1
Mixed Shrub/Rhizomatous Wheatgrass Plant Community

This plant community currently is found under heavy continuous season-long grazing by livestock and protection from fire. Shrubs are a significant component of this plant community. Cool-season grasses make up the majority of the understory, but some of the preferred grasses have been reduced or are absent. Dominant grasses include rhizomatous wheatgrass, mountain muhly, prairie junegrass, bluegrasses and of less frequency Columbia needlegrass, spikefescue, Idaho fescue and bluebunch wheatgrass. Grasses of secondary importance include

slender wheatgrass, spike trisetum, Indian ricegrass, needleandthread, one-spike oatgrass, and upland sedges. Forbs commonly found in this plant community include biscuitroot, balsamroot, groundsel, buckwheat, phlox, lupine, larkspur, stonecrop, pussytoes, and American vetch. Black and big sagebrushes and antelope bitterbrush can make up to 30% of the total annual production. On areas along the west slope of the Big Horn Mountains, mountain mahogany is the dominant shrub. When compared to the Historic Climax Plant Community, black sagebrush or mountain mahogany, big sagebrush, juniper, limber pine, bluegrasses, prairie junegrass, and rhizomatous wheatgrasses have increased. Most of the preferred grasses and antelope bitterbrush have been reduced and some are absent. Some annuals, such as cheatgrass, have invaded the site, but are not yet abundant. Annual production ranges from 300 to 650 pounds. This plant community is resistant to change as the shrubs become more abundant. These areas may actually be more resistant to fire as less fine fuels are available and the bare ground between the shrubs is increased. The herbaceous component is not as diverse and plant vigor and species regeneration capabilities of some cool-season perennials are deficient. The removal of grazing does not seem to affect the plant composition or structure of the plant community. Soil erosion is accelerated because of increased bare ground. Water flow patterns and pedestalling is more noticeable. Infiltration is reduced and runoff is increased. Rill channels may be noticeable in the interspaces on steeper areas and gullies may be establishing where rills have concentrated down slope. Transitions or pathways leading to other plant communities are as follows: • Prescribed grazing plus brush management will convert this plant community to near HCPC. If prescribed fire is used as a means to reduce or remove the shrubs, sufficient fine fuels will need to be present. This may require deferment from grazing prior to treatment. Post management is critical to ensure success. This can range from two or more years of rest to partial growing season deferment, depending on the condition of the understory at the time of treatment and the growing conditions following treatment. Seeding may be required regardless of the brush treatment to reestablish the major cool-season grasses. • Frequent and Severe Grazing plus no fires will convert the plant community to the Juniper/*Bare Ground* Plant Community. The probability of this occurring is high and is especially evident on areas where drought or heavy browsing does not adversely impact the shrub stand. • Brush management or Wildfire with no change in grazing management will convert this plant community to the Rhizomatous Wheatgrass/Bluegrass Plant Community.

Figure 11. Plant community growth curve (percent production by month).
WY0601, 15-19E all upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	15	40	20	10	10			

State 4

Juniper/Bare Ground Plant Community

Community 4.1

Juniper/Bare Ground Plant Community

This plant community is the result of frequent and severe grazing and protection from fire. Juniper is the dominant shrub of this plant community, but other shrubs and limber pine will occur and the total production will exceed 30%. The under story has been significantly altered and the preferred cool season grasses have been eliminated or greatly reduced. Bareground is expansive. The dominant grasses are the bluegrasses such as Sandberg, mutton, big, and Canby. Weedy annual species such as cheatgrass, povertyweed, gumweed, and stickseed occupy the site. When compared with the HCPC the annual production is less, as the major cool-season grasses are significantly reduced or absent, but the shrub production has increased significantly and compensates for some of the decline in the herbaceous production. The interspaces between plants have expanded leaving the amount of bare ground more prevalent and more soil surface exposed to erosive elements. Annual production ranges from 200 to 500 pounds. This plant community is resistant to change as the stand becomes more decadent. These areas may actually be more resistant to fire as less fine fuels are available and the bare ground between the shrubs is increased. The herbaceous component is not as diverse and plant vigor and species regeneration capabilities of cool-season perennials are deficient. The removal of grazing does not seem to affect the plant composition or structure of the plant community. Soil erosion is accelerated because of increased bare ground. Water flow patterns and pedestalling are obvious. Infiltration is reduced and runoff is increased. Rill channels may be noticeable in the interspaces and gullies may be establishing where rills have concentrated down slope. Transitions or pathways leading to other plant communities are as follows: • Long-term prescribed grazing will eventually convert this plant community to the Mixed Shrub/Rhizomatous Wheatgrass Plant Community but this may take many years. • Brush management or Wildfire with no change in grazing management will convert this plant community to the

Bluegrass/Annual Plant Community. • No fire plus Frequent and Severe Grazing will convert the plant community to the Juniper/Limber Pine Plant Community. This will occur where growing conditions are favorable and a seed source is available for limber pine.

Figure 12. Plant community growth curve (percent production by month).
WY0601, 15-19E all upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	15	40	20	10	10			

State 5

Juniper/Limber Pine Plant Community

Community 5.1

Juniper/Limber Pine Plant Community

This plant community is the result of frequent and severe grazing and protection from fire of the Juniper/*Bare Ground* plant community. This is likely only where conditions are more conducive and a seed source is available for limber pine. Juniper is the dominant shrub of this plant community, but limber pine can occur in sufficient numbers to give the site an open forestland appearance. The under story has been significantly altered and the preferred cool season grasses have been eliminated or greatly reduced. The dominant grasses are the bluegrass such as Sandberg, mutton, big, and Canby. Weedy annual species such as cheatgrass, povertyweed, gumweed, and stickseed occupy the site. Noxious weeds such as Canada thistle may invade the site if a seed source is available. When compared with the HCPC the annual production is less, as the major cool-season grasses are reduced, but the shrub and tree production has increased significantly and compensates for some of the decline in the herbaceous production. The interspaces between plants have expanded leaving the amount of bare ground more prevalent and more soil surface exposed to erosive elements. Annual production ranges from 200 to 500 pounds. This plant community is resistant to change as the stand becomes more decadent. These areas may actually be more resistant to fire as less fine fuels are available and the bare ground between the shrubs is increased. The herbaceous component is not as diverse and plant vigor and species regeneration capabilities of cool-season perennials are deficient. The removal of grazing does not seem to affect the plant composition or structure of the plant community. Soil erosion is accelerated because of increased bare ground. Water flow patterns and pedestalling are obvious. Infiltration is reduced and runoff is increased. Rill channels are noticeable in the interspaces and gullies may be establishing where rills have concentrated down slope. Transitions or pathways leading to other plant communities are as follows: • Prescribed grazing plus brush management will eventually convert this plant community to near HCPC. If prescribed fire is used as a means to reduce or remove the shrubs, sufficient fine fuels will need to be present. This may require deferment from grazing prior to treatment. Post management is critical to ensure success. This can range from two or more years of rest to partial growing season deferment, depending on the condition of the understory at the time of treatment and the growing conditions following treatment. Seeding may be required regardless of the brush treatment to reestablish the major cool-season grasses. • Brush management or Wildfire with no change in grazing management will convert this plant community to the Bluegrass/Annual Plant Community.

Figure 13. Plant community growth curve (percent production by month).
WY0601, 15-19E all upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	15	40	20	10	10			

State 6

Rhizomatous Wheatgrass/Bluegrass Plant Community

Community 6.1

Rhizomatous Wheatgrass/Bluegrass Plant Community

This plant community currently is found under heavy continuous season-long grazing by livestock and is perpetuated by either brush management or a wildfire, which removes shrubs from the plant community. Some of the major cool-season bunchgrasses associated with the site have been reduced and some may have been

removed. Dominant grasses include rhizomatous wheatgrasses, mountain muhly, bluegrasses, prairie junegrass, spike trisetum, and Montana wheatgrass, and of less frequency Columbia needlegrass, Idaho fescue, bluebunch wheatgrass, and spikefescue. Forbs commonly found in this plant community include biscuitroot, balsamroot, groundsel, buckwheat, phlox, lupine, larkspur, stonecrop, pussytoes, and American vetch. When compared to the Historical Climax Plant Community, rhizomatous wheatgrass, prairie junegrass, and bluegrasses have increased. Columbia needlegrass, bluebunch wheatgrass, Idaho fescue, and big sagebrush have decreased or been removed. Production of the preferred cool-season grasses has been reduced. Cheatgrass can be common and in large patches, but most invaded areas are relatively small. Annual production ranges from 300 to 650 pounds. This plant community is resistant to change as the herbaceous species present are well adapted to grazing. However, species composition can be altered through long-term overgrazing. The herbaceous component is mostly intact, but some cool-season bunchgrasses associated with the site have been reduced or removed. Plant vigor and replacement capabilities are sufficient for some species but not all. Water flow patterns and litter movement is occurring but only on steeper slopes. Incidence of pedestalling is moderate to slight. Soils are mostly stable and the surface shows minimum soil loss. The watershed is functioning and the biotic community is partially intact. Transitions or pathways leading to other plant communities are as follows: • Prescribed grazing will convert this plant community to near HCPC. Reestablishing the black sagebrush and antelope bitterbrush or mountain mahogany stands may be difficult and may take many years. Seeding may be required to reestablish any of the lost major bunchgrasses. • Frequent and severe grazing will convert this plant community to a Bluegrass/Annual Plant Community.

Figure 14. Plant community growth curve (percent production by month).
WY0601, 15-19E all upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	15	40	20	10	10			

State 7

Bluegrass/Annual Plant Community

Community 7.1

Bluegrass/Annual Plant Community

This plant community evolved under frequent and severe heavy grazing and the shrub component has been removed by heavy browsing, wildfire or human means. Weedy annuals and bluegrasses are the most dominant plants and occupy any open bare ground areas. The interspaces between plants have expanded leaving the amount of bare ground more prevalent and more soil surface exposed to erosive elements. Compared to the HCPC, weedy annual species and bluegrasses are widespread and virtually all of the major cool-season mid-grasses are absent or severely decreased. Big sagebrush has also been removed. The dominant grasses are the bluegrass such as Sandberg, mutton, big, and Canby. Weedy annual species such as cheatgrass, povertyweed, gumweed, and stickseed occupy the site. Noxious weeds have usually invaded the site if a seed source is available. Annual production ranges from 150 to 350 pounds. This plant community is resistant to overgrazing. Annuals and bluegrasses are effectively competing against the establishment of perennial cool-season grasses. Plant diversity is greatly altered and the herbaceous component is not intact. Recruitment of the major perennial grasses is not occurring and the replacement potential is absent. The biotic integrity is missing. The state is unstable and is not protected from excessive erosion. Rill channels and maybe even gullies may be present on site and adjacent areas are impacted by excessive runoff. Water flow patterns and pedestalling are obvious. The watershed is not functioning. Transitions or pathways leading to other plant communities are as follows: • Long Term Prescribed grazing will convert this plant community to the Rhizomatous Wheatgrass/Bluegrass Plant community.

Figure 15. Plant community growth curve (percent production by month).
WY0601, 15-19E all upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	15	40	20	10	10			

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
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Grass/Grasslike					
1				67–168	
	Columbia needlegrass	ACNE9	<i>Achnatherum nelsonii</i>	67–168	–
2				67–168	
	Montana wheatgrass	ELAL7	<i>Elymus albicans</i>	67–168	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	67–168	–
3				34–67	
	spike fescue	LEK12	<i>Leucopoa kingii</i>	34–67	–
4				0–67	
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	0–67	–
5				0–67	
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	0–67	–
6				0–67	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0–67	–
7				0–67	
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–67	–
8				0–67	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–34	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0–34	–
	sedge	CAREX	<i>Carex</i>	0–34	–
	onespike danthonia	DAUN	<i>Danthonia unispicata</i>	0–34	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	0–34	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	0–34	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–34	–
	spike trisetum	TRSP2	<i>Trisetum spicatum</i>	0–34	–
Forb					
9				34–101	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–34	–
	yarrow	ACHIL	<i>Achillea</i>	0–34	–
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	0–34	–
	sandwort	ARENA	<i>Arenaria</i>	0–34	–
	balsamroot	BALSA	<i>Balsamorhiza</i>	0–34	–
	field chickweed	CEAR4	<i>Cerastium arvense</i>	0–34	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	0–34	–
	larkspur	DELPH	<i>Delphinium</i>	0–34	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–34	–
	aster	EUCEP2	<i>Eucephalus</i>	0–34	–
	desertparsley	LOMAT	<i>Lomatium</i>	0–34	–
	phlox	PHLOX	<i>Phlox</i>	0–34	–
	stonecrop	SEDUM	<i>Sedum</i>	0–34	–
	groundsel	TEPHR3	<i>Tephrosieris</i>	0–34	–
	American vetch	VIAM	<i>Vicia americana</i>	0–34	–
Shrub/Vine					
10				67–168	

	black sagebrush	ARNO4	<i>Artemisia nova</i>	67–168	–
	mountain mahogany	CERCO	<i>Cercocarpus</i>	67–168	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	67–168	–
11				0–34	
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0–34	–
12				0–34	
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	0–34	–
13				0–34	
	limber pine	PIFL2	<i>Pinus flexilis</i>	0–34	–
14				0–34	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0–34	–

Animal community

Animal Community – Wildlife Interpretations

Columbia Needlegrass/Bluebunch Wheatgrass Plant Community (HCPC): The predominance of grasses in this plant community favors grazers and mixed-feeders, such as deer, bison, elk, and antelope. Suitable thermal and escape cover for deer may be limited due to the low quantities of woody plants. However, topographical variations could provide some escape cover. Due to the location of these sites on the foot slopes of mountains they are valuable for elk and deer winter ranges. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for sage grouse, as well as lek sites. Other birds that would frequent this plant community include western meadowlark, lark bunting, sage thrasher, horned larks, red-tail and ferruginous hawks, and golden eagles. Many grassland obligate small mammals would occur here.

Bluebunch Wheatgrass/Mixed Shrub Plant Community: The combination of an overstory of big sagebrush and an understory of grasses and forbs provides a very diverse plant community for wildlife. The crowns of sagebrush tend to break up hard crusted snow on winter ranges, so mule deer, elk, and antelope may use this state for foraging and cover year-round, as would cottontail and jack rabbits. It provides important winter, nesting, brood-rearing, and foraging habitat for sage grouse. Brewer's sparrows' nest in big sagebrush plants and hosts of other nesting birds utilize stands in the 20-30% cover range. Other birds that would frequent this plant community include western meadowlark, lark bunting, sage thrasher, horned larks, red-tail and ferruginous hawks, and golden eagles.

Mixed Shrub/Rhizomatous Wheatgrass Plant Community: The combination of an overstory of big sagebrush and an understory of grasses and forbs provides a very diverse plant community for wildlife. The crowns of sagebrush tend to break up hard crusted snow on winter ranges, so mule deer, elk, and antelope may use this state for foraging and cover year-round, as would cottontail and jack rabbits. It provides important winter, nesting, brood-rearing, and foraging habitat for sage grouse. Brewer's sparrows' nest in big sagebrush plants and hosts of other nesting birds utilize stands in the 20-30% cover range. Other birds that would frequent this plant community include western meadowlark, lark bunting, sage thrasher, horned larks, red-tail and ferruginous hawks, and golden eagles.

Juniper/*Bare Ground* Plant Community: This plant community can provide important winter and escape cover for elk, mule deer and antelope, as the juniper and limber pine can approach 70% cover. However, due to the lack of quality browsing and herbaceous species, this site provides only a minimal source of forage for most wildlife species. Specific bird species such as the nuthatches, western tanager, western kingbird, mountain bluebird, wood-warblers, and northern flicker frequent this site.

Juniper/Limber Pine Plant Community: This plant community can provide important winter and escape cover for elk, mule deer and antelope, as the juniper and limber pine can approach 70% cover. However, due to the lack of quality browsing and herbaceous species, this site provides only a minimal source of forage for most wildlife species. Specific bird species such as the nuthatches, western tanager, western kingbird, mountain bluebird, wood-warblers, and northern flicker frequent this site.

Rhizomatous Wheatgrass/Bluegrass Plant Community: The production of herbaceous species provided for good

foraging for grazers. However, the lack of tall or mid growing shrubs does not benefit browsers nor provides cover for many species. As these site greens-up sooner in the spring, this site tends to provide early new growth for foraging large and small mammals. If located adjacent to shrub dominated sites, It provides good foraging habitat for sage grouse.

Bluegrass/Annual Plant Community: This community provides limited foraging for elk and other grazers. They may be used as a foraging site by sage grouse if proximal to woody cover. Generally, these are not target plant communities for wildlife habitat management.

Animal Community – Grazing Interpretations

The following table lists suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor.

Plant Community Production Carrying Capacity*

(Lb./ac) (AUM/ac)

Columbia Needlegrass/ Bluebunch WG 400-800 .2

Bluebunch WG/Mixed Shrub 350-700 .17

Mixed Shrub/Rhizomatous WG 300-650 .15

Juniper/*Bare Ground* 200-500 .05

Juniper/Limber Pine 200-500 .05

Rhizomatous WG/Bluegrass 300-650 .17

Bluegrass/Annual 150-350 .07

* - Continuous, season-long grazing by cattle under average growing conditions.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use needs to be supplemented with protein because the quality does not meet minimum livestock requirements.

Hydrological functions

Climate is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group D due to its shallow feature. Infiltration and runoff potential for this site varies from moderate to high depending on soil hydrologic group and water table. Runoff will be high on this site since the soil saturate easy and due to its shallow characteristic and water holding capacity. (Refer to Part 630, NRCS National Engineering Handbook for detailed hydraulic information.

Rills and gullies may be present, but should be small. Water flow patterns should be barely distinguishable. Pedestals are only slightly present in association with bunchgrasses such as bluebunch wheatgrass. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game species. The wide varieties of plants that bloom from spring until fall have an esthetic value that appeals to visitors. Other recreational uses may include hiking, and mountain biking.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used. Those involved in developing this site include: Chris Krassin, Range Management Specialist, James Haverkamp, Range Management Specialist, Steven Gullion, Range Management Specialist, James Mischke, District Conservationist, and Everet Bainter, State Range Management Specialist. Other sources used as references include USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

Contributors

J. Haverkamp

Approval

Scott Woodall, 10/04/2019

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.

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Date	05/01/2008
Approved by	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Some rills to be expected on this site. Depending on slope, rills range from .5-2 inches (1-5 cm) wide and are found every 3-6 feet (1-2 m).

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2. **Presence of water flow patterns:** Barely observable.

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3. **Number and height of erosional pedestals or terracettes:** Slight pedestalling evident.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground can range from 20-50%.

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5. **Number of gullies and erosion associated with gullies:** Active gullies, where present, should be rare.
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6. **Extent of wind scoured, blowouts and/or depositional areas:** Rare to nonexistent.
-
7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter expected to move in moderate amounts. Large woody debris will show only slight movement down slope.
-
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Index ratings range from 1 (interspaces) to 6 (under plant canopy), but average values should be 3.0 or greater.
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Currently no soil series are correlated to this ecological site. Soil Organic Matter of less than 3% is expected.
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community consists of 65-85% grasses, 15% forbs, and 0-20% shrubs/trees. Sparse plant canopy (40-60%) and litter plus slow to moderate infiltration rates result in slight to moderate runoff. Basal cover is typically less than 10% and marginally affects runoff on this site. Surface rock outcrop of 10-30% provide stability to the site, but reduce infiltration. Runoff can be rapid on this site with a moderate to high erosion hazard associated with steep slopes.
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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None
-
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: Mid-size, cool season bunchgrasses
- Sub-dominant: perennial shrubs/trees perennial forbs
- Other: cool season rhizomatous grasses short cool season bunchgrasses
- Additional:
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimal decadence, typically associated with shrub component.
-
14. **Average percent litter cover (%) and depth (in):** Litter ranges from 10-30% of total canopy measurement with total

litter (including beneath the plant canopy) from 30-50% expected. Herbaceous litter depth typically ranges from 3-10mm. Woody litter can be up to several inches (>6 cm).

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 400-800 lb/ac (600 lb/ac average); Metric 448-896 kg/ha (672 kg/ha average).
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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:** Bare ground greater than 75% is the most common indicator of a threshold being crossed. Bluegrasses, antelope bitterbrush, big sagebrush, and black sagebrush are common increasers. Annual weeds such as cheatgrass and mustards are common invasive species in disturbed sites.
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17. **Perennial plant reproductive capability:** All species are capable of reproducing, except in extreme drought years.
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