USDA Natural Resources
Conservation Service

Ecological site EX043B23B109
Cobbly Upland (CoU) Absaroka Upper Foothills

Last updated: 10/04/2019
Accessed: 05/21/2025

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.

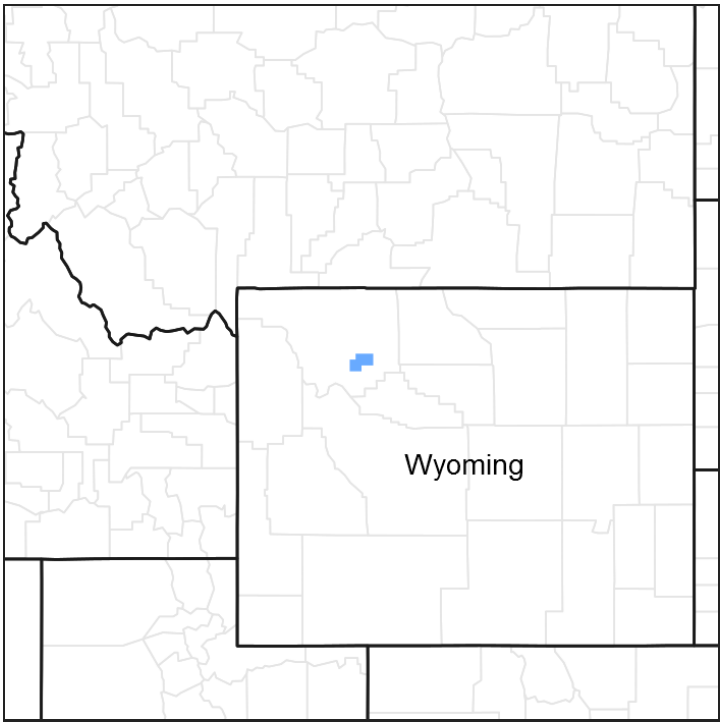


Figure 1. Mapped extent

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 (MLRA) 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.b Big Horn Basin and
10.1.18.d Foothills and Low Mountains

Ecological site concept

• Site receives no additional water.
• Slope is <50%
• Soils are:
o Textures range from fine sandy loam to clay loam in top 4” (10 cm) of mineral soil surface
o Clay content is ≥18% in top 4” (10 cm) of mineral soil surface
o All subsurface horizons in the particle size control section have a weighted average of ≥18% but < 35% clay. (The particle size control section is the segment of the profile from either the start of an argillic horizon for 50 cm’s or from 25-100 cm’s).
o Moderately deep to very deep (20-80+ in. (50-200+ cm)
o <3% stone and boulder cover and >35% cobble and gravel cover
o Skeletal (≥35% rock fragments) starting within 8-20” (20-50 cm) of mineral soil surface (may have up to but not exceeding 35% rock fragments above 8")
o Non-saline, sodic, or saline-sodic

Associated sites

R043BY362WY	**Shallow Loamy (SwLy) 15-19” Foothills and Mountains East Precipitation Zone** Shallow Loamy
R043BY376WY	**Very Shallow (VS) 15-19” Foothills and Mountains East Precipitation Zone** Very Shallow

Similar sites

R032XY308WY	**Coarse Upland (CU) 10-14" East Precipitation Zone** Coarse Upland 10-14” Foothills and Basins East P.Z., 032XY308WY has lower production.

Table 1. Dominant plant species

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

Legacy ID

R043BX609WY

Physiographic features

This site occurs in most positions and may be found on all degrees of slope.

Table 2. Representative physiographic features

Landforms	(1) Foothills > Hill (2) Foothills > Outwash fan (3) Foothills > Ridge
Runoff class	Negligible to high
Elevation	1,829–2,743 m
Slope	0–50%
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 deep to moderately deep (greater than 20" to bedrock),

moderately well to somewhat excessively well-drained & moderately slow to moderately rapidly permeable. This site consists of bouldery to cobbly coarse fragment soils. The soil surface can be covered extensively with these coarse fragments and as such, plant density can be reduced. The soil characteristics most influential to the plant community are volume of coarse fragments in the profile that reduces the available moisture and the extensive cover of these coarse fragments, which can reduce the plant density.

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and shale (2) Residuum–igneous, metamorphic and sedimentary rock
Surface texture	(1) Cobbly loam (2) Silt loam (3) Very fine sandy loam
Family particle size	(1) Fine-loamy (2) Loamy-skeletal (3) Fine-loamy over sandy or sandy-skeletal
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	4.57–13.72 cm
Calcium carbonate equivalent (0-101.6cm)	0–10%
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)	0–25%
Subsurface fragment volume >3" (Depth not specified)	0–35%

Ecological dynamics

Potential vegetation on this site is dominated by mid cool-season perennial grasses. Other significant vegetation includes antelope bitterbrush, big sagebrush and a variety of forbs.

The expected potential composition for this site is about 75% grasses, 10% 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 from improper grazing management, species such as rhizomatous wheatgrasses, Sandberg bluegrass, spike trisetum, and big sagebrush will increase. Cool season grasses such as bluebunch wheatgrass, spikefescue, Idaho fescue and Columbia needlegrass will decrease in frequency and production.

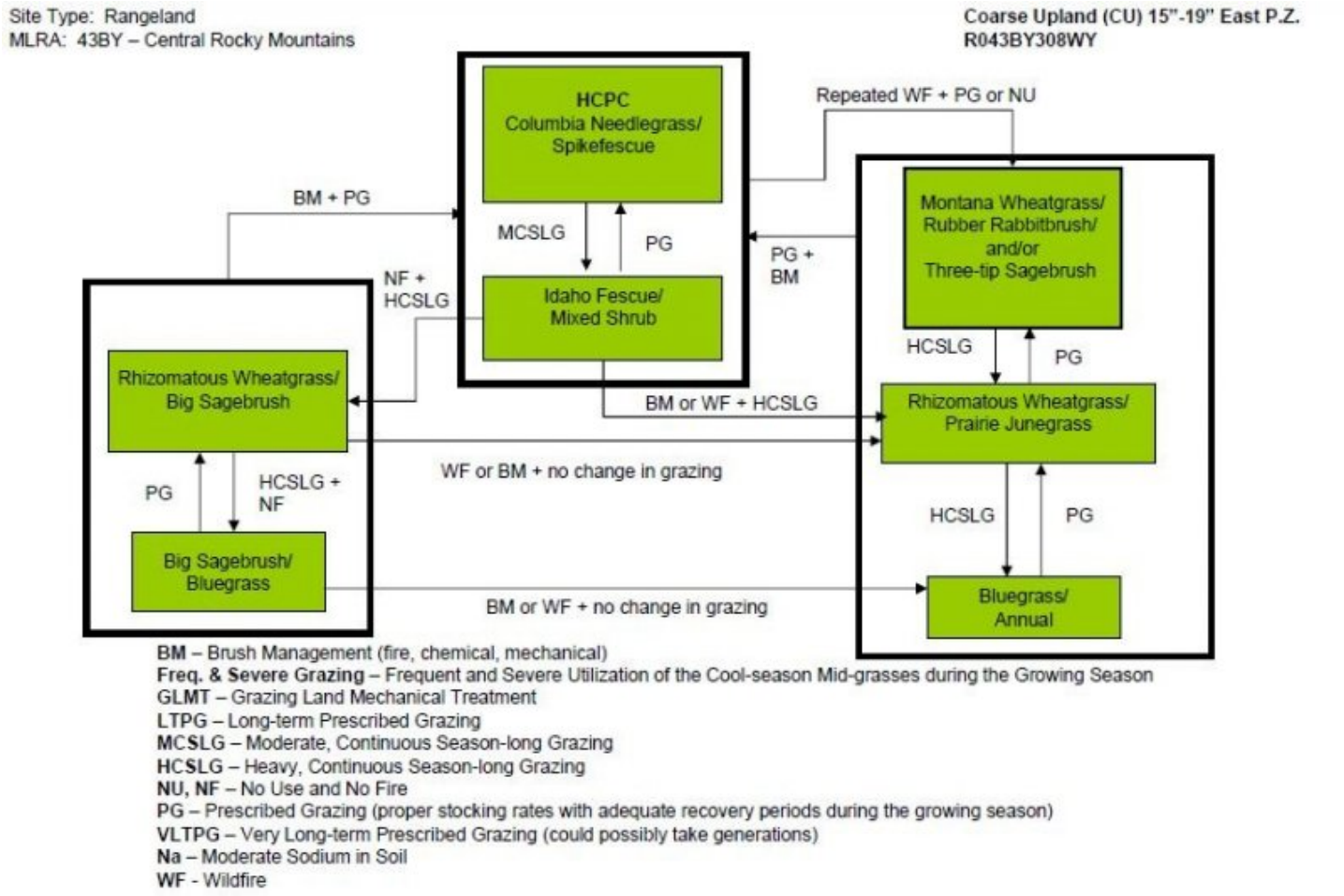
Big sagebrush and juniper may become dominant on areas with an absence of fire and sufficient amount of precipitation. Wildfires are actively controlled in recent times and as a result old decadent stands of big sagebrush persist. Chemical and mechanical controls have replaced the historic role of fire on this site. Recently, prescribed burning has regained some popularity.

The big sagebrush component may not be as resilient once it has been removed or severely reduced, if a vigorous stand of grass exists and is maintained. The exception to this is where the herbaceous component is severely degraded at the time of treatment, growing conditions are unfavorable after treatment, and/or recovery of herbaceous species are inadequate due to poor grazing management. Regeneration of big sagebrush may also be suppressed if three-tip sagebrush and rubber rabbitbrush is established. This situation is more likely to develop in areas where fires have occurred in a relatively short cycle. Three-tip sagebrush and rubber rabbitbrush are strong resprouters and will out compete other shrubs where a site is disturbed. Any thinning project should be designed in a way to maintain the viability of the stand and to consider wildlife requirements.

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/Spikefescue Plant Community

Community 1.1
Columbia Needlegrass/Spikefescue Plant Community

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores, soils with at least 35% coarse fragments, and periodic fires. 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. The cyclical nature of the fire regime in this community prevents big sagebrush from being the dominant landscape. Cool-season midgrasses dominate the state. The major grasses include Columbia needlegrass, spikefescue, Idaho fescue, bluebunch wheatgrass, and rhizomatous wheatgrasses. Big sagebrush, antelope bitterbrush, and juniper are conspicuous elements of this state, occurring in a mosaic pattern, and making up 15% of the annual production. A variety of forbs also occurs in this state and plant diversity is high (see Plant Composition Table). Annual production on this state ranges from 600 to 1100 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 HCPC to the Idaho Fescue/Mixed Shrub Plant Community. Prolonged drought will exacerbate this transition. • Repeated Wildfire + Prescribed Grazing or Non-Use will convert the HCPC to the Montana Wheatgrass/Rubber Rabbitbrush and/or Three-tip Sagebrush 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
Idaho Fescue/Mixed Shrub Plant Community

Community 2.1
Idaho Fescue/Mixed Shrub Plant Community

Historically, this plant community evolved under grazing by large ungulates and a low fire frequency. Currently, it occurs under moderate, season-long grazing by livestock and is exacerbated by prolonged drought conditions. In addition, the fire regime for this site has been modified and extended periods without fire is now common. Big sagebrush and/or antelope bitterbrush are significant 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 Idaho fescue, bluebunch wheatgrass, prairie junegrass, western wheatgrass and of less frequency Columbia needlegrass and spikefescue. Grasses of secondary importance include spike trisetum, bluegrasses, and mountain muhly. Forbs commonly found in this plant community include hawksbeard, groundsel, buckwheat, phlox, and penstemons. Shrubs can make up to 20% of the total annual production and include mainly big sagebrush, antelope bitterbrush, juniper, and black sagebrush. When compared to the Historic Climax Plant Community, big and black sagebrushes, rubber rabbitbrush, juniper, bluegrasses, and rhizomatous wheatgrasses have increased. Production of specific species such as Columbia needlegrass and spikefescue has been reduced. Some weedy species such as cheatgrass may have invaded the site but are in small patches. Annual production ranges from 500 to 1000 pounds. 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 or 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. • Repeated Wildfire + Prescribed Grazing or Non-Use will convert the HCPC to the Montana Wheatgrass/Rubber Rabbitbrush and/or Three-tip Sagebrush Plant Community. • Heavy, continuous season-long grazing plus no fires will convert the plant community to the Rhizomatous Wheatgrass/ Big Sagebrush 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/Prairie Junegrass Plant Community. The probability for this is high especially on areas were 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
Rhizomatous Wheatgrass/Big Sagebrush Plant Community

Community 3.1
Rhizomatous Wheatgrass/Big Sagebrush Plant Community

This plant community currently is found under heavy continuous season-long grazing by livestock and protection from fire. Big sagebrush is a significant component of this plant community although other shrubs may be as abundant. 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 wheatgrasses, prairie junegrass, bluegrasses and of less frequency Columbia needlegrass, spikefescue, Idaho fescue and bluebunch wheatgrass. Grasses of secondary importance include spike trisetum and mountain muhly. Forbs commonly found in this plant community include hawksbeard, groundsel, buckwheat, phlox, lupine, larkspur, and penstemons. Shrubs can make up to 30% of the total annual production and include mainly big sagebrush, antelope bitterbrush, juniper, and black sagebrush. When compared to the Historic Climax Plant Community, big sagebrush, rubber rabbitbrush, juniper, bluegrasses, and rhizomatous wheatgrasses have increased. Most of the preferred grasses 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 500 to 1000 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 will be required regardless of the brush treatment to reestablish the major cool-season grasses. • Heavy, continuous season-long grazing plus no fires will convert the plant community to the Big Sagebrush/Bluegrass 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. • Brush management or Wildfire with no change in grazing management will convert this plant community to the Rhizomatous Wheatgrass/Prairie Junegrass 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
Big Sagebrush/Bluegrass Plant Community

Community 4.1
Big Sagebrush/Bluegrass Plant Community

This plant community is the result of frequent and severe grazing and protection from fire. Big sagebrush is the dominant shrub of this plant community as the annual production of shrubs exceeds 30%. Shrubs comprise the significant component of the plant community 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, kochia, Russian thistle, and a variety of mustards may occupy the site. Big sagebrush is the dominant shrub, but other shrubs may include juniper, black sagebrush, rubber rabbitbrush and antelope bitterbrush. Noxious weeds such as Canada thistle may invade the site if a seed source is available. The interspaces between plants have expanded leaving the amount of bare ground more prevalent. When compared with the HCPC the annual production is less, as the major cool-season grasses are reduced, but the shrub production has increased significantly and compensates for the decline in some of the herbaceous production. Annual production ranges from 350 to 650 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: • 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 will be required regardless of the brush treatment to reestablish the major cool-season grasses. • Prescribed grazing will convert this plant community to the Rhizomatous Wheatgrass/Big Sagebrush Plant Community. • Brush management or Wildfire with no change in grazing management will convert this plant community to the Bluegrass/Annual Plant Community.

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
Montana Wheatgrass/Rubber Rabbitbrush and/or Three-tip Sagebrush Plant Community

Community 5.1
Montana Wheatgrass/Rubber Rabbitbrush and/or Three-tip Sagebrush Plant Community

This plant community currently is found under prescribed grazing or possibly no use by livestock and is perpetuated by a fire cycle, which maintains the removal of big sagebrush and antelope bitterbrush. Three-tip sagebrush and rubber rabbitbrush are significant components of this plant community. Cool-season grasses remain an important component, but some bunchgrasses are not as abundant. Dominant grasses include Montana wheatgrass, prairie junegrass, and rhizomatous wheatgrasses, and of less frequency Columbia needlegrass, Idaho fescue, bluebunch wheatgrass, and spikefescue. Grasses of secondary importance include one-spike oatgrass, slender wheatgrass, spike trisetum, and bluegrasses. Forbs commonly found in this plant community include phlox, groundsel, penstemons, larkspurs, lupines, pussytoes, miner’s candle, hawksbeard, and milkvetch. Three-tip sagebrush and rubber rabbitbrush can comprise as much as 25% of

the total production. When compared to the Historical Climax Plant Community, Montana wheatgrass, rhizomatous wheatgrass, three-tip sagebrush and rubber rabbitbrush have increased. Columbia needlegrass, bluebunch wheatgrass, and Idaho fescue have decreased. Production of cool-season grasses has remained about the same. Cheatgrass can be common and in large patches, but most of the invaded areas are relatively small. Annual production ranges from 500 to 1000 pounds. This plant community is resistant to change as once three-tip sagebrush and rubber rabbitbrush become the dominant shrubs it is difficult for other shrubs to become established. 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 and brush management will convert this plant community to the HCPC. Controlling three-tip sagebrush and rubber rabbitbrush is difficult as these are strong resprouters. Reestablishing the big sagebrush and antelope bitterbrush may be difficult and may take many years. • Heavy, continuous, season-long grazing will convert this plant community to a Rhizomatous Wheatgrass/Prairie Junegrass Plant community. More than likely, either the three-tip sage or the rubber rabbitbrush will persist in varying degrees due to the difficulty of controlling both species and their strong resprouting capabilities.

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/Prairie Junegrass Plant Community

Community 6.1
Rhizomatous Wheatgrass/Prairie Junegrass 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 big sagebrush and antelope bitterbrush from this plant community. Three-tip sagebrush and rubber rabbitbrush can be significant components of this plant community but may also be lacking. Some of the major cool-season bunchgrasses associated with this ecological site have been reduced and some may have been removed. Dominant grasses include rhizomatous wheatgrasses, prairie junegrass, bluegrasses, 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 phlox, groundsel, penstemon, larkspur, lupine, pussytoes, miner’s candle, hawksbeard,

and milkvetch. Three-tip sagebrush and rubber rabbitbrush can comprise as much as 25% of the total production. When compared to the Historical Climax Plant Community, rhizomatous wheatgrasses, prairie junegrass, Montana wheatgrass, three-tip sagebrush and rubber rabbitbrush have increased. Columbia needlegrass, bluebunch wheatgrass, Idaho fescue, big sagebrush and antelope bitterbrush have decreased or been removed. Production of the preferred cool-season grasses has been reduced. Cheatgrass can be common and in large patches, but mostly invaded areas are relatively small. Annual production ranges from 400 to 800 pounds. This plant community is resistant to change as the herbaceous species present are well adapted to grazing and if three-tip sagebrush and rubber rabbitbrush become the dominant shrubs it is difficult for other shrubs to become established. 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 plus brush management will convert this plant community to near HCPC. Controlling three-tip sagebrush and rubber rabbitbrush, if present, is difficult as these are strong resprouters. Reestablishing the big sagebrush and antelope bitterbrush may be difficult and may take many years. Seeding may be required to reestablish any of the lost major bunchgrasses. • Prescribed grazing will convert this plant community to the Montana Wheatgrass/Rubber Rabbitbrush and/or Three-tip Sagebrush Plant community. • Heavy, continuous season-long grazing will convert this plant community to a Bluegrass/Annual Plant Community. If three-tip sage or rubber rabbitbrush is present more than likely either or both will persist in varying degrees due to the difficulty of controlling these species.

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 big sagebrush and antelope bitterbrush shrub components have 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 between the exposed boulders or cobbles. Rubber rabbitbrush and three-tip sagebrush may or may not be present on the

site. However, it is common for these shrubs to occur as these species are strong resprouters and may quickly re-establish after a disturbance. On wildlife winter ranges, rubber rabbitbrush can significantly be reducee or removee from the site due to heavy browsing by large ungulates leaving the three-tip sagebrush as the only shrub. 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 and antelope bitterbrush have also been removed. Weedy annuals may include cheatgrass, kochia, Russian thistle, and a variety of mustards. Bluegrass species will include Sandberg, mutton, Canby, and big. Noxious weeds such as Canada thistle may invade the site if a seed source is available. Annual production ranges from 250 to 500 pounds. This plant community is relatively stable and 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 soils are unstable and not protected from excessive erosion. Rill channels and maybe even gullies may be present on the 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: • Prescribed grazing plus brush management may convert this plant community to near HCPC, although it will require major investment and time. Controlling three-tip sagebrush, if present, is difficult as it is a strong resprouter. Reestablishing the big sagebrush stand may be difficult and may take many years. Seeding will be required to reestablish any of the lost major bunchgrasses. • Prescribed grazing will convert this plant community to the Rhizomatous Wheatgrass/Prairie Junegrass 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 (%)
Grass/Grasslike					
1				106–267	
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	106–267	–
2				106–267	
	Idaho fescue	FEID	*Festuca idahoensis*	106–267	–

3				106–213	
	spike fescue	LEKI2	*Leucopoa kingii*	106–213	–
4				0–106	
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–106	–
5				0–106	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	0–106	–
6				0–106	
	western wheatgrass	PASM	*Pascopyrum smithii*	0–106	–
7				0–106	
	Montana wheatgrass	ELAL7	*Elymus albicans*	0–106	–
8				106–213	
	Grass, perennial	2GP	*Grass, perennial*	0–54	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–54	–
	nodding brome	BRAN	*Bromus anomalus*	0–54	–
	Pumpelly's brome	BRINP5	*Bromus inermis ssp. pumpellianus var. pumpellianus*	0–54	–
	mountain brome	BRMA4	*Bromus marginatus*	0–54	–
	onespike danthonia	DAUN	*Danthonia unispicata*	0–54	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–54	–
	mountain muhly	MUMO	*Muhlenbergia montana*	0–54	–
	muttongrass	POFE	*Poa fendleriana*	0–54	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–54	–
	spike trisetum	TRSP2	*Trisetum spicatum*	0–54	–
Forb					
9				0–106	
	Forb, perennial	2FP	*Forb, perennial*	0–54	–
	yarrow	ACHIL	*Achillea*	0–54	–

	rosy pussytoes	ANRO2	*Antennaria rosea*	0–54	–
	sandwort	ARENA	*Arenaria*	0–54	–
	milkvetch	ASTRA	*Astragalus*	0–54	–
	balsamroot	BALSA	*Balsamorhiza*	0–54	–
	field chickweed	CEAR4	*Cerastium arvense*	0–54	–
	bastard toadflax	COUM	*Comandra umbellata*	0–54	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	0–54	–
	miner's candle	CRVI4	*Cryptantha virgata*	0–54	–
	larkspur	DELPH	*Delphinium*	0–54	–
	buckwheat	ERIOG	*Eriogonum*	0–54	–
	aster	EUCEP2	*Eucephalus*	0–54	–
	sunflower	HELIA3	*Helianthus*	0–54	–
	desertparsley	LOMAT	*Lomatium*	0–54	–
	lupine	LUPIN	*Lupinus*	0–54	–
	beardtongue	PENST	*Penstemon*	0–54	–
	phlox	PHLOX	*Phlox*	0–54	–
	groundsel	TEPHR3	*Tephroseris*	0–54	–
Shrub/Vine					
10				0–106	
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–106	–
11				11–106	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–54	–
	black sagebrush	ARNO4	*Artemisia nova*	0–54	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0–54	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–54	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	0–54	–

Animal community

Animal Community – Wildlife Interpretations

Columbia Needlegrass/Spikefescue 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.

Idaho Fescue/Mixed Shrub Plant Community:
The combination of an overstory of antelope bitterbrush and 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.

Rhizomatous Wheatgrass/Big Sagebrush 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.

Big Sagebrush/Bluegrass Plant Community:
This plant community can provide important winter foraging for elk, mule deer and antelope, as sagebrush can approach 15% protein and 40-60% digestibility during that time. This community provides escape and thermal cover for large ungulates, as well as nesting and brood rearing habitat for sage grouse. Due to the lack of herbaceous production and diversity of mid cool season grasses on this site, it is not as beneficial to grazers. 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.

Montana Wheatgrass/Rubber Rabbitbrush and/or Three-tip Sagebrush Plant Community:
The production of herbaceous species provided for good foraging to grazers. However, the lack of tall or mid growing shrubs does not benefit browsers nor provides cover for many wildlife 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.

Rhizomatous Wheatgrass/Prairie Junegrass 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 wildlife 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/Spikefescue 600-1100 .5
Idaho Fescue/Mixed Sagebrush 500-1000 .4
Rhizomatous WG/Big Sagebrush 500-1000 .4
Big Sagebrush/Bluegrass 350-650 .3
Montana WG/R. Rabbitbrush/Three-tip Sagebrush 500-1000 .4
Rhizomatous WG/Prairie Junegrass 400-800 .3
Bluegrass/Annual 250-500 .15

* - 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 seasonal 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

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B and C, with localized areas in hydrologic group D. Infiltration ranges from moderate to moderately rapid. Runoff potential for this site varies from moderate to high depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where; short-grasses form a strong sod and dominate the site. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information).

Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. 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 included hiking, camping, mountain biking, and in the winter snowshoeing and cross-country skiing.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Inventory data references

Information presented in the original site description was derived from NRCS inventory data. Field observations from range trained personnel were also used. Those involved in developing the original site include: Chris Krassin, Range Management Specialist, NRCS and Everet Bainter, Range Management Specialist. Other sources used as references

include USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, USDI and USDA Interpreting Indicators of Rangeland Health Version 3, and USDA NRCS Soil Surveys from various counties.

Information presented here has been derived from NRCS inventory data, Field observations from range trained personnel, and the existing range site descriptions. Those involved in developing the Loamy range site include: Chris Krassin, Range Management Specialist, NRCS and Everet Bainter, Range Management Specialist.

Those involved in the development of the new concept for Loamy and Loamy Calcareous Ecological site include: Ray Gullion, Area Range Management Specialist, NRCS; Jim Wolf, Resource Manager, USDI-BLM; Jack Mononi, Range Management Specialist, USDI-BLM; Daniel Wood, MLRA Soil Survey Leader, NRCS; Jane Karinen, Soil Data Quality Specialist, NRCS; and Marji Patz, Ecological Site Specialist, NRCS.

Inventory Data References:
Ocular field estimations observed by trained personnel were completed at each site. Then sites were selected where a 100 foot tape was stretched and the following sample procedures were completed by inventory staff. For full sampling protocol and guidelines with forms please refer to the Wyoming ESI Operating Procedures, compiled in 2012 for the Powell and Rock Springs Soil Survey Office, USDA-NRCS.
• Double Sampling Production Data (9.6 hoop used to estimate 10 points, clipped a minimum of 3 of these estimated points, with two 21 foot X 21 foot square extended shrub plots).
• Line Point Intercept (over story and understory captured with soil cover). Height of herbaceous and woody cover is collected every three feet along established transect.)
• Continuous Line Intercept (Woody Canopy Cover, with minimum gap of 0.2 of a foot for all woody species and succulents. Intercept height collected at each measurement.),
• Gap Intercept (Basal Gap measured with a minimum gap requirement of 0.7 foot.),
• Sample Point (10 – 1 meter square point photographs taken at set distances on transect. Red using the sample point computer program established by the High Plains Agricultural Research Center, WY).
• Soil Stability (Slake Test – surface and subsurface samples collected and processed according to the soil stability guidelines provided by the Jornada Research Center, NM.)

Other references

Baker, William L. 2006. Fire and Restoration of Sagebrush Ecosystems. Wildlife Society Bulletin 34(1): 177-185.

Bestelmeyer, B., and J. R. Brown. 2005. State-and-transition models 101: a fresh look at vegetation change. The Quivira Coalition Newsletter, Vol. 7, No. 3.

Bestelmeyer, B., J. R. Brown, K. M. Havstad, B. Alexander, G. Chavez, J. E. Herrick. 2003. Development and use of state and transition models for rangelands. Journal of

Range Management 56(2):114-126.

Bestelmeyer, B., J. E. Herrick, J. R. Brown, D. A. Trujillo, and K. M. Havstad. 2004. Land management in the American Southwest: a state-and-transition approach to ecosystem complexity. Environmental Management 34(1):38-51.

Herrick, J. E., J. W. Van Zee, K. M. Havstad, L. M. Burkett, and W. G. Whitford. 2005. Monitoring manual for grassland, shrubland and savanna Ecosystems. Volume I Quick Start. USDA - ARS Jornada Experimental Range, Las Cruces, New Mexico.

Herrick, J. E., J. W. Van Zee, K. M. Havstad, L. M. Burkett, and W. G. Whitford. 2005. Monitoring manual for grassland, shrubland and savanna Ecosystems. Volume II: Design, supplementary methods and interpretation. USDA - ARS Jornada Experimental Range, Las Cruces, New Mexico.

NRCS. 2014. (electronic) National Water and Climate Center. Available online at http://www.wcc.nrcs.usda.gov/

NRCS. 2014. (electronic) Field Office Technical Guide. Available online at http://efotg.nrcs.usda.gov/efotg_locator.aspx?map=WY NRCS. 2009. Plant Guide: Cheatgrass. Prepared by Skinner et al., National Plant Data Center.

Pellant, M., P. Shaver, D. A. Pyke, and J. E. Herrick. 2005. Interpreting indicators of rangeland health. Version 4. Technical Reference 1734-6. USDI-BLM. Ricketts, M. J., R. S. Noggles, and B. Landgraf-Gibbons. 2004. Pryor Mountain Wild Horse Range Survey and Assessment. USDA-Natural Resources Conservation Service.

Schoeneberger, P. J., D. A. Wysocki, E. C. Benham, and Soil Survey Staff. 2012. Field book for describing and sampling soils, Version 3.0. Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (http://soils.usda.gov/technical/fieldbook/)

Stringham, T. K. and W. C. Krueger. 2001. States, transitions, and thresholds: Further refinement for rangeland applications. Agricultural Experiment Station, Oregon State University. Special Report 1024.

Stringham, T. K., W. C. Kreuger, and P. L Shaver. 2003. State and transition modeling: an ecological process approach. Journal of Range Management 56(2):106-113.

United States Department of Agriculture. Soil Survey Division Staff. 1993. Soil Survey Manual, United States Department of Agriculture Handbook No. 18, Chapter 3: Examination and Description of Soils. Pg.192-196.

USDA, NRCS. 1997. National Range and Pasture Handbook. (http://www.glti.nrcs.usda.gov/technical/publications/nrph.html)

Trlica, M. J. 1999. Grass growth and response to grazing. Colorado State University. Cooperative Extension. Range. Natural Resource Series. No. 6.108.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA/NRCS). 2007. The PLANTS Database (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA/NRCS), Soil Survey Staff. 2010. Keys to Soil Taxonomy, Eleventh Edition, 2010.

USDA/NRCS Soil survey manuals for appropriate counties within MLRA 32X.

Western Regional Climate Center. (2014) (electronic) Station Metadata. Available online at: http://www.wrcc.dri.edu/summary/climsmwy.html.

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.

Author(s)/participant(s)	Ray Gullion, E. Bainter
Contact for lead author	ray.gullion@wy.usda.gov 307-347-2456
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:** Rare to nonexistent. Where present, short and widely spaced.

---

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

---

3. **Number and height of erosional pedestals or terracettes:** Rare to nonexistent.

---

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 0-20%.

---

5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present.

---

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 and large woody litter not expected to move.

---

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 3 (interspaces) to 6 (under plant canopy), but average values should be 4.0 or greater.

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil data is limited for this site. Soil OM of 2 to 5% 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 50-80% grasses, 15% forbs, and 5-35% shrubs. Evenly distributed plant canopy (60-95%) and litter plus moderate infiltration rates result in minimal runoff. Basal cover is typically 5-

15% for this site and does affect runoff on this site. Surface rock fragments of 5-20% provide stability to the site, but reduce infiltration.

---

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>>

    Other: perennial forbs>>tall, cool season bunchgrasses=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 5-40% of total canopy measurement with total litter (including beneath the plant canopy) from 50-90% expected. Herbaceous litter depth typically ranges from 5-15mm. Woody litter can be up to a couple inches (4-6 cm).

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 600-1100 lb/ac (850 lb/ac average); Metric 672 -1232 kg/ha (952 kg/ha average).

---

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 30% is the most common indicator of a threshold being crossed. Rhizomatous wheatgrasses, Sandberg bluegrass, spike trisetum, juniper and big sagebrush are common increasers. Kentucky bluegrass, common dandelion, thistles, and annual weeds such as cheatgrass and mustards are common invasive species in disturbed sites.

---

17. **Perennial plant reproductive capability:** All species are capable of reproducing, except in extreme drought years.
