Ecological site EX043B23B123
Loamy Calcareous (LyCa)
Absaroka
Upper Foothills

Last updated: 3/06/2025
Accessed: 09/11/2026

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 043B–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 does not receive any additional water. • Slope is less than 30 percent. • Soils are: o Not saline or saline-sodic. o Moderately deep, deep, or very deep o With less than 3 percent stone and boulder cover and less than 20 percent cobble and gravel cover. o Not skeletal (less than 35 percent rock fragments) within 20 inches (51 cm) of mineral soil surface. o Site begins or increases in reaction (strongly or violently effervescent) below 4 inches (10 cm) of the mineral soil surface. o Textures usually range from very fine sandy loam to clay loam in the top 4 inches (10 cm) of the mineral soil surface. o Site has a distinctive layer of calcium carbonate accumulation between 10-20

inches (25 to 51 cm), of the mineral soil surface (layer appearing whiter in color) with a Calcium Carbonate Equivalent (CCE) of greater than 15 percent. o Clay content is less than or equal to 32 percent in top 4” (10 cm) of the mineral soil surface. Each of the following subsurface horizons has a clay content of less than 35 percent. The concept of this site is based on having a diagnostic calcic horizon or a pronounced accumulation of calcium carbonates usually identified as a white soil appearance with strong to violent effervescent starting or increasing 4 inches (10 cm) below the mineral soil surface. This site was correlated previously as a Loamy range site and the site concept absorbed the variances. But with further review, it is seen that Loamy calcareous predominately has a bluebunch wheatgrass dominated plant community which responds in a different manner and holds a different potential with similar management than the Loamy range site. The identified breakpoint for calcium carbonate equivalent (CCE’s) for this site is 15 percent or greater CCE’s at a depth of 7-20 inches.

Associated sites

EX043B23B122	**Loamy (Ly) Absaroka Upper Foothills** Loamy sites will existing in concave pockets or in areas where the calcic layer formed lower in the profile or did not form at all.
EX043B23B121	**Limy Skeletal (LiSk) Absaroka Upper Foothills** Limy Skeletal will occur in the back slope of landslides where Loamy Calcareous will be ion the concave or more gently sloping segments with more soil deposition occurred or is occurring.

Similar sites

EX043B23B121	**Limy Skeletal (LiSk) Absaroka Upper Foothills** See Above
EX043B23B120	**Limy Upland (LiU) Absaroka Upper Foothills** Limy Upland is similar in traits, with the added limitation of the calcareous characteristics existing throughout the entire soil profile, not just within the lower extent of the profile. Limy upland is lower in production, higher in black sagebrush, and more erosive.
EX043B23B162	**Shallow Loamy (SwLy) Absaroka Upper Foothills** Shallow loamy will appear very similar to the Loamy calcareous because of the limiting factor of the calcic layer restricting plants much in the same way the shallow depth to rock is for Shallow Loamy.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. vaseyana* (2) *Artemisia nova*
Herbaceous	(1) *Pseudoroegneria spicata* (2) *Elymus albicans*

Legacy ID

R043BX623WY

Physiographic features

This site occurs on nearly level to gently rolling land and on slopes generally less than 30 percent. Within the Upper Foothills this site is found to exist predominately on the gently sloping summits of erosional remnants or fan remnants that flow from the upper foothills into the lower foothills, but are found on several landforms. Many of these landforms cross several climatic zones and are influenced by multiple geomorphic processes, for example: alluvial fans crossed/eroded by streams/stream terraces, covered by landslides, or breached by uplifts/escarpments. On a smaller scale, this site occurs in a patch-work dynamic at the base or across the basin floor (remnants) as wind and water move and shift sediments, derived from carbonate rich parent material, across the landscape (alluvium).

Table 2. Representative physiographic features

Landforms	(1) Foothills > Fan remnant (2) Foothills > Stream terrace (3) Foothills > Erosion remnant
Runoff class	Negligible to high
Elevation	1,830 – 2,740 m
Slope	0 – 30 %
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, Tower Falls, and Yellowstone Pk Mammoth are the only available weather stations 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)	20-60 days
Freeze-free period (characteristic range)	40-100 days

Precipitation total (characteristic range)	360-410 mm
Frost-free period (actual range)	10-70 days
Freeze-free period (actual range)	20-110 days
Precipitation total (actual range)	360-410 mm
Frost-free period (average)	40 days
Freeze-free period (average)	70 days
Precipitation total (average)	380 mm

- (1) SUNSHINE 3NE [USC00488758], Meeteetse, WY
- (2) YELLOWSTONE PK MAMMOTH [USC00489905], Yellowstone National Park, WY
- (3) TOWER FALLS [USC00489025], Yellowstone National Park, 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 moderately deep to very deep (greater than 20 inches to bedrock), moderately well to well drained, and moderately slow to moderate permeability. The soil characteristic having the most influence on the plant community is available moisture and the potential to develop soluble salt near the surface. More data is needed to quantify these characteristics specifically for this site.

Major Soil Series correlated to this site include: Coyoteflats-like, Pachel-like.

Table 4. Representative soil features

Parent material	(1) Slope alluvium – igneous, metamorphic and sedimentary rock (2) Colluvium – limestone and dolomite (3) Slide deposits – interbedded sedimentary rock
Surface texture	(1) Gravelly sandy clay loam (2) Fine sandy loam (3) Loam

Family particle size	(1) Fine-loamy
Drainage class	Somewhat poorly drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	50 cm
Surface fragment cover <=3"	0 – 20 %
Surface fragment cover >3"	0 – 10 %
Calcium carbonate equivalent (20.3-101.6cm)	20 – 30 %
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	0 – 10
Soil reaction (1:1 water) (Depth not specified)	6.8 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 20 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

Ecological dynamics

The Loamy Calcareous ecological site was originally correlated as either a Loamy or Shallow Loamy range site. Review of the Loamy range site throughout the Big Horn Basin found that commonly the communities visited had calcareous characteristics. Historically, classification of the soils in the area did not recognize the calcareous tendencies. The calcareous communities are very similar to the Loamy and Shallow Loamy range sites, the community potential and system resilience are altered by the chemistry within the soil.

Historic correlations of these soils were made on production and plant cover. High productivity sites were correlated to Loamy, and to Shallow loamy when bluebunch wheatgrass was prominent with reduced production expressing a “shallow” acting characteristics.

Mountain big sagebrush, although present on this site, is generally restricted in vigor and production compared to a true Loamy ecological site.

Potential vegetation on this site, as with the Loamy site, is dominated by mid cool-season perennial grasses. Other significant vegetation includes Winterfat and mountain big sagebrush, and a variety of forbs. The expected potential composition for this site is 75 percent grasses, 10 percent forbs, and 15 percent woody plants. The composition and production will vary due to historic use, fluctuating precipitation and fire frequency.

As this site deteriorates species such as mountain big sagebrush, rubber rabbitbrush, and bluegrasses will increase. Cool season grasses such as bluebunch wheatgrass, Columbia needlegrass, spike fescue, and Idaho fescue will decrease in frequency and production. As conditions deteriorate further, annuals such as cheatgrass will invade.

Mountain big sagebrush may become dominant in areas with absence of fire. Wildfires have been actively controlled, resulting in persistent, aged and decadent stands of sagebrush. Chemical control was used in place of fire throughout the 1960s, resulting in large areas where sagebrush has not recovered. Recently, prescribed burning has regained some popularity, but another popular treatment method is mowing or mulching of the sagebrush.

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 are established. This situation is more likely to develop in areas where fires have occurred in a relatively short cycle. Fringed sagewort 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 reference plant community (description follows the plant community diagram) has been determined by study of relic rangeland sites, 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 (STM) Diagram for this ecological site. An STM has five fundamental components: states, transitions, restoration pathways, community phases and community pathways. The state, designated by the bold box, is a single community phase or suite of community phases. The reference state is recognized as State 1. It describes the ecological potential and natural range of variability resulting from the natural disturbance regime of the site. The designation of alternative states (State 2, etc) in STMs denotes changes in ecosystem properties that cross a certain threshold.

Transitions are represented by the arrows between states moving from a higher state to a lower state (State 1 - State 2) and are denoted in the legend as a “T” (T1-2). They describe the variables or events that contribute directly to loss of state resilience and result in shifts between states. Restoration pathways are represented by the arrows between states returning back from a lower state to a higher state (State 2 - State1 or better illustrated by State 1.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Tall-stature Cool-season Grasses**			224-504	
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	56-280	5-25
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0-112	0-10
	mountain brome	BRMA4	*Bromus marginatus*	0-56	0-5
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0-56	0-5
2	**Mid-stature Cool-season Bunchgrasses**			112-392	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	56-336	5-30
	spike fescue	LEKI2	*Leucopoa kingii*	0-112	0-10
	Idaho fescue	FEID	*Festuca idahoensis*	0-84	0-5
3	**Rhizomatous Cool-Season Grasses**			56-112	
	Montana wheatgrass	ELAL7	*Elymus albicans*	17-56	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	17-56	–

4	**Short-stature Cool-season Grasses**			0-112	
	Sandberg bluegrass	POSE	*Poa secunda*	0-56	0-5
	Cusick's bluegrass	POCU3	*Poa cusickii*	0-56	0-5
	prairie Junegrass	KOMA	*Koeleria macrantha*	0-56	0-5
	spike trisetum	TRSP2	*Trisetum spicatum*	0-56	0-5
5	**Miscellaneous Grasses/Grass-Likes**			0-56	
	threadleaf sedge	CAFI	*Carex filifolia*	0-56	0-5
	needleleaf sedge	CADU6	*Carex duriuscula*	0-56	0-5
	onespike danthonia	DAUN	*Danthonia unispicata*	0-56	0-5
	Grass, perennial	2GP	*Grass, perennial*	0-56	0-5
Forb					
6	**Perennial Forbs**			28-84	
	Indian paintbrush	CASTI2	*Castilleja*	0-56	0-5
	silvery lupine	LUAR3	*Lupinus argenteus*	0-56	0-5
	Forb, perennial	2FP	*Forb, perennial*	0-56	0-5
	agoseris	AGOSE	*Agoseris*	0-56	0-5
	pussytoes	ANTEN	*Antennaria*	0-56	0-5
	milkvetch	ASTRA	*Astragalus*	0-56	0-5
	balsamroot	BALSA	*Balsamorhiza*	0-56	0-5
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	0-56	0-5
	phlox	PHLOX	*Phlox*	0-56	0-5
	lousewort	PEDIC	*Pedicularis*	0-56	0-5
	beardtongue	PENST	*Penstemon*	0-56	0-5
	American vetch	VIAM	*Vicia americana*	0-56	0-5
Shrub/Vine					
7	**Dominant Shrubs**			56-168	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	56-168	5-10
	black sagebrush	ARNO4	*Artemisia nova*	0-56	0-5
8	**Miscellaneous Shrubs**			0-56	
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0-56	0-5
	prairie sagewort	ARFR4	*Artemisia frigida*	0-56	0-5
	Shrub, other	2S	*Shrub, other*	0-56	0-5

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Tall-stature Cool-season Grasses**			56-336	
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	56-224	5-20
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0-112	0-10
	mountain brome	BRMA4	*Bromus marginatus*	0-112	0-10
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	0-56	0-5
2	**Mid-Stature Cool-Season Bunchgrasses**			56-280	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	56-224	5-20
	Idaho fescue	FEID	*Festuca idahoensis*	0-112	0-10
	spike fescue	LEKI2	*Leucopoa kingii*	0-56	0-10
3	**Rhizomatous Cool-Season Grasses**			112-336	

	Montana wheatgrass	ELAL7	*Elymus albicans*	56-224	5-20
	western wheatgrass	PASM	*Pascopyrum smithii*	56-112	5-10
4	**Short-Stature Cool-Season Grasses**			84-224	
	Cusick's bluegrass	POCU3	*Poa cusickii*	0-112	0-10
	prairie Junegrass	KOMA	*Koeleria macrantha*	0-56	0-5
	spike trisetum	TRSP2	*Trisetum spicatum*	0-56	0-5
	Sandberg bluegrass	POSE	*Poa secunda*	0-56	0-5
5	**Miscellaneous Grasses/Grass-Likes**			22-112	
	Grass, perennial	2GP	*Grass, perennial*	0-56	0-5
	threadleaf sedge	CAFI	*Carex filifolia*	0-56	0-5
	needleleaf sedge	CADU6	*Carex duriuscula*	0-56	0-5
	onespike danthonia	DAUN	*Danthonia unispicata*	0-56	0-5
Forb					
6	**Perennial Forbs**			0-112	
	Indian paintbrush	CASTI2	*Castilleja*	0-56	0-5
	silvery lupine	LUAR3	*Lupinus argenteus*	0-56	0-5
	Forb, perennial	2FP	*Forb, perennial*	0-56	0-5
	common yarrow	ACMI2	*Achillea millefolium*	0-56	0-5
	agoseris	AGOSE	*Agoseris*	0-56	0-5
	pussytoes	ANTEN	*Antennaria*	0-56	0-5
	milkvetch	ASTRA	*Astragalus*	0-56	0-5
	balsamroot	BALSA	*Balsamorhiza*	0-56	0-5
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	0-56	0-5
	phlox	PHLOX	*Phlox*	0-56	0-5
	beardtongue	PENST	*Penstemon*	0-56	0-5
	American vetch	VIAM	*Vicia americana*	0-56	0-5
	field chickweed	CEAR4	*Cerastium arvense*	0-56	0-5
7	**Annual Forbs**			0-56	
	woolly plantain	PLPA2	*Plantago patagonica*	0-28	0-5
	tansymustard	DESCU	*Descurainia*	0-28	0-5
	Forb, annual	2FA	*Forb, annual*	0-28	0-5
Shrub/Vine					
8	**Dominant Shrubs**			56-280	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	56-224	5-20
	black sagebrush	ARNO4	*Artemisia nova*	0-56	0-5
9	**Miscellaneous Shrubs**			0-112	
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0-56	0-5
	prairie sagewort	ARFR4	*Artemisia frigida*	0-56	0-5
	Shrub, other	2S	*Shrub, other*	0-56	0-5

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

1.1 - Bluebunch Wheatgrass/Sagebrush (Reference Community): The predominance of grasses in this plant community favors grazers and mixed-feeders, such as 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. 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 meadowlarks, horned larks, and golden eagles. Many grassland obligate small mammals would occur here. 1.2 - Perennial Grasses/Sagebrush: 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 to 30 percent 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. 1.3 - Bluebunch Wheatgrass/Perennial Grasses Plant Community: The loss of the thermal and escape cover limit use, but is favored for grazers and mixed feeders such as bison, elk, and antelope. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for sage grouse, as well as lek sites. Many grassland obligate small mammals would occur here. 2.1 - Idaho Fescue/Sagebrush Plant Community: The combination of an overstory of 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 to 30 percent 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. 3._ - Invaded State: The combination of sagebrush and the added diversity of invasive grasses and/or forbs provide an extended plant community for wildlife. But as the invasive species increase, decreasing the desirable species, the wildlife species benefits are decreased as well. Early spring and fall green up of cheatgrass provides foraging opportunities for many of our grazers and mixed feeders. 4._-Disturbed State: The variability of this site prevents a detailed review of wildlife benefits. However, many of the introduced grasses, forbs and shrubs can provide adequate cover, feed and nesting sites for those wildlife species that would have selected the site prior to disturbance. Limitations and enhancements need to be considered by specific locations. 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. The Carrying capacity is calculated as the production for a normal year X .25 efficiency factor / 912.5 #/AUM to calculate the AUM's/Acre. Plant Community Production Carrying Capacity* Plant Community Description/Title: Lbs./Acre AUM/Acre 1.1 Bluebunch Wheatgrass/Sagebrush 600-1000 0.22 1.2 Perennial Grasses/Sagebrush 550-1100 0.21 2.1 Idaho Fescue/Sagebrush ** ** 3.1 Invaded Plant Community ** ** 4.1 Disturbed Plant Community ** ** * - Carry Capacity is figured for continuous, season-long grazing by cattle under average growing conditions. ** - Sufficient data for invaded and reclaimed communities has not be collected or evaluated, at this time, so no projection of a stocking rate recommendation or production range will be established at this time. Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong 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. Distance to water, shrub density, and slope can affect carrying capacity (grazing capacity) within a management unit. Adjustments should be made for the area that is considered necessary for reduction of animal numbers. For example, 30 percent of a management unit may have 25 percent slopes and distances of greater than one mile from water; therefore, the adjustment is only calculated for 30 percent of the unit (i.e. 50 percent reduction on 30 percent of the management unit). Fencing, slope length, management, access, terrain, kind and class of livestock, and breeds are all factors that can increase or decrease the percent of graze-able acres within a management unit. Adjustments should be made that incorporate these factors when calculating stocking rates.

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 moderately slow to moderate. Runoff potential for this site varies from low to moderate 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. 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 which bloom from spring until fall have an aesthetic value that appeals to visitors. Outside of plants, the extent offers a variety of culture resources to view on the landscape based on the location of many of these sites on higher ground on the benches and fans which also provides a rich source of geology for exploration. This ecological site, however, can prove to have limitations when associated with roadways and trails in relation to erosion potential and functionality. The soils will be sticky or slick when wet and are more erosive than the Loamy range sites and so consideration needs to be given when crossing these areas with trails and roadways

Wood products

No appreciable wood products are present on the site.

Other products

Herbs: Several of the forb species within the communities of the Loamy Calcareous Ecological site have medicinal characteristics and have been used by the Native Americans in this area and more recently by the naturopathic profession. Ornamental Species: The forbs commonly found as well as the shrub component of these communities have been used in landscaping and xeriscaping.

Inventory data references

Information presented was derived, in part, from NRCS inventory data. Field observations from range-trained personnel also were used. Those involved in the development of the new concept for the Loamy Calcerous ecological site include Tricia Hatle, Range Management Specialist, US Department of the Interior-Bureau of Land Management (USDI-BLM); Karen Hepp, Range Management Specialist, USDI-BLM; and Marji Patz, Ecological Site Specialist, NRCS.. 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 IV, and USDA NRCS Soil Surveys from various counties. Quality control and quality assurance completed by NRCS: Dan Mattke, Area Resource Soil Scientist; Daniel Wood, MLRA Soil Survey Leader; John Hartung, Wyoming State Rangeland Management Specialist; James Bauchert, Wyoming State Soil Scientist; and Scott Woodall, Regional Quality Assurance Ecological Site Specialist. For specific data inquiries, contact the Powell, Wyoming Soil Survey Office (USDA-NRCS). Inventory Data References: Ocular field estimations observed by trained personnel were completed at each site. Then sites were selected where a 100-feet 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 three of these estimated points, with two 21-foot X 21-foot square extended shrub plots). • Line Point Intercept (overstory 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 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 (Ten 1-meter square point photographs taken at set distances on transect. Read 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.)

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Approval

Kirt Walstad, 3/06/2025

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	03/25/2020
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** **Rills are normally not present. Some very minor rill development may occur in sparsely vegetated areas. Any rills present should be less than 1/2 inch deep, widely spaced (15 to 20 feet), and not connected. They should average less than 4 feet in length. A slight increase in rill development may also be observed following large storm events or spring runoff periods, but should heal within the next year. Rill development may also increase where the site is adjacent to other sites that produce large amounts of runoff (i.e. steeper sites).**

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2. **Presence of water flow patterns:** **Barely observable but may be occurring on steeper slopes (10-25 percent). Any flow patterns present should be sinuous and wind around perennial plant bases. Generally short (less than 5 feet), less than 1 foot wide, and spaced from 10 to 20 feet apart if present on steeper slopes. They should be stable with only minor evidence of deposition.**

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3. **Number and height of erosional pedestals or terracettes:** **Essentially non-existent, or rare if occurring. In that rare occurrence, plants may show very minor pedestalling where they are adjacent to water flow patterns, but there should be no exposed roots. A few minor terracettes may be present in similar situations on steeper slopes, however they should be stable and occur behind litter blocking water flow patterns.**

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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 is 25 to 35 percent occurring in small patch-like areas throughout site. Bare ground openings should not be greater that 1 foot in size and should not be connected.**

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

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6. **Extent of wind scoured, blowouts and/or depositional areas:** **Rare to non-existent. No evidence of wind generated soil movement. Wind scoured (blowouts) and depositional areas are not present.**

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7. **Amount of litter movement (describe size and distance expected to travel):** **The majority of litter accumulates in place at the base of plant canopies. Slight movement of the finest material (less than 1/8 inch) may move 1 to 2 feet in the direction of prevailing winds or down slope if being transported by water. Little accumulation is observed behind obstructions. Large woody debris from sagebrush will show no movement except for minimal debris damming after large rain or snow melt events on slopes greater than 9 percent.**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Plant cover and litter is at 60 percent or greater of soil surface and maintains soil surface integrity. Soil stability class is anticipated to be 3.0 or greater on average. Ranging from 1.0 in interspaces and up to 6.0 under plant canopy.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil data is limited for this site. A-horizons vary in depth from 1 to 12 inches with OM of 1-2 percent.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community consists of, on average, 75% grasses, 10% forbs, and 15% shrubs. This, with an evenly distributed canopy and litter, with deep healthy rooted native grasses enhancing infiltration, limits the runoff potential to little or no effect on this site.

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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):** No compaction layer or soil surface crusting should be present. A dry subsurface will often refuse a probe, causing misidentification of a compaction layer. Soil profiles must be described by hand dug holes.

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Mid-stature cool season bunchgrasses

    Sub-dominant: perennial shrubs > cool season rhizomatous grasses

    Other: short stature bunchgrass and grass-likes > perennial forbs

    Additional: Community 1.1 = Perennial Cool-Season bunchgrasses > Shrubs > Rhizomatous Wheatgrasses>Perennial Forbs Community 1.2 = Rhizomatous Wheatgrasses> Perennial Cool-Season bunchgrasses > Shrubs > Perennial Forbs 12b. F/S Groups not expected for the site: Annual Grass 12c. Number of F/S Groups: 6 groups 12d. Species number in Dominate and Sub-dominate F/S Groups: 7 species

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimal decadence can be observed and is typically associated with shrub component. It is common to find dead matter accumulated in bunchgrasses, but live plant matter quantity should exceed standing dead except for in times of severe drought. Sagebrush canopy will often have occasional dead branches, but it should not exceed 30 percent and shouldn’t be found on most plants.

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14. **Average percent litter cover (%) and depth (in):** Litter ranges from 5 to 25 percent of total canopy with total litter including beneath the plant canopy can reach up to 70 percent. Herbaceous litter depth typically ranges from 3-10 mm, with woody littler varying between 4-6 cm. Woody litter can be up to a couple inches in diameter (4-6 cm), but is sporadically distributed.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Community 1.1 =Total normal or average production is estimated at 800 lbs. with a low of 600 lbs. and ranging to 1000 lbs. Community

1.2 =Total normal or average production is estimated at 750 lbs. with a low of 550 lbs. and ranging to 1100 lbs.

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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: Sandberg bluegrass, threadleaf sedge, fringed sagewort, pricklypear cactus, broom snakeweed and rubber rabbitbrush; mustards as well as other annuals, and then exotics and species found on the noxious weed list including but not limited to: cheatgrass, spotted knapweed, and bull thistle.**

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17. **Perennial plant reproductive capability: All species are capable of reproducing except in severe drought years. Thickspike and Montana wheatgrass will commonly reproduce by underground rhizomes and not by seed production.**
