Ecological site EX043B23A121
Limy Skeletal (LiSk)
Absaroka
Lower Foothills

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General information

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

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) 43B23A: Absaroka Lower 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 A is set for the lower elevations within the foothills with 10 to 14 inches of precipitation. To verify or identify the LRU A (the referenced LRU for this ecological site), refer to the Wyoming LRU matrix key contained within the Ecological Site Key. This particular LRU occurs along the eastern lower 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 tracks east with the intersection of the Absaroka and Owl Creek Ranges, 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: Aridic Ustic or Ustic Aridic – Progressive Initial mapping has shown that soil correlations completed prior to 2014 were identified as ustic aridic, after further evaluation of climatic and soil taxonomy information the proper moisture regime is aridic ustic. Both are recorded here until an update project is completed to correct the previous correlations. Temperature Regime: Frigid Dominant Cover: Rangeland – Sagebrush Steppe (major species is Wyoming Big Sagebrush) Representative Value (RV) Effective Precipitation: 10-14 inches (254 – 355 mm) RV Frost-Free Days: 80-110 days

Classification relationships

Relationship to Other Established Classification Systems: National Vegetation Classification System (NVC): 3 Xeromorphic Woodland, Scrub & Herb Vegetation Class 3.B Cool Semi-Desert Scrub & Grassland Subclass 3.B.1 Cool Semi-Desert Scrub & Grassland formation 3.B.1.NE Western North American Cool Semi-Desert Scrub & Grassland Division M169 Great Basin & Intermountain Tall Sagebrush Shrubland & Steppe Macrogroup G302 Artemisia Tridentata - Artemisia tripartita - Purshia tridentata Big Sagebrush Steppe Group CEGL001535 - Artemisia tridentata ssp. wyomingensis/Pseudoroegneria spicata Herbaceous Vegetation or CEGL001009 - Artemisia tridentata ssp. wyomingensis/Pseudoroegneria spicata Shrubland 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 less than 30 percent • Soils are: o Moderately deep to very deep (20-78 plus inches (50-200+ cm) o less than 5 percent stone and boulder cover and greater than 35 percent cobble and gravel cover o Skeletal (greater than or

equal to 35 percent rock fragments) within 20 inches (50 cm) of mineral soil surface o Violently effervescent starting within 4 inches (10 cm) of the mineral soil surface; calcium carbonates increases with depth o Clay content is less than 35 percent in top 4 inches (10 cm) of mineral soil surface; Textures range from fine sandy loam to clay loam in top 4 inches (10 cm) of mineral soil surface o All subsurface horizons in the particle size control section have a weighted average of greater than 18 percent but less than or equal to 35 percent 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). o Non-saline, sodic, or saline-sodic

Associated sites

EX043B23A122	**Loamy (Ly) Absaroka Lower Foothills** Loamy ecological site will occur in similar locations as the skeletal site, in areas were fewer rocks were deposited and may be associated with Limy Upland ecological site.
EX043B23B175	**Skeletal (Sk) Absaroka Upper Foothills** Skeletal ecological site will occur in concave areas or areas with a deeper deposit of non-carbonitic alluvial materials. Where limy skeletal will occur on more convex or areas with a greater deposit of calcic materials.

Similar sites

EX043B23A120	**Limy Upland (LiU) Absaroka Lower Foothills** Site has fewer rock fragments throughout the soil profile, a shift in grasses species, and greater management responses.
EX043B23A123	**Loamy Calcareous (LyCa) Absaroka Lower Foothills** Site has fewer rock fragments throughout the soil profile, carbonates starting lower in the profile, greater production, and a shift in plant species between the two sites.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia nova* (2) *Krascheninnikovia lanata*
Herbaceous	(1) *Pseudoroegneria spicata* (2) *Elymus albicans*

Legacy ID

R043BX521WY

Physiographic features

This site occurs on nearly level to gently rolling land and on slopes generally less than 30 percent. Within the lower foothills of the Absaroka Range and associated mountains, this site is found to exist predominately on the gently sloping summits of erosional remnants or fan remnants that flow from the foothills into the basin proper. These landforms cross several climatic zones and are influenced by multiple geomorphic processes, for example: fan remnants covered by landslides, or breached by uplifts/escarpments. On a smaller scale, this site occurs in a patch-work dynamic as water moves and shifts sediments, derived from carbonate rich parent material, across the landscape (alluvium).

Table 2. Representative physiographic features

Landforms	(1) Foothills > Colluvial apron (2) Foothills > Fan remnant (3) Foothills > Escarpment (4) Foothills > Dip slope
Runoff class	Low to high
Elevation	1,770 – 2,200 m
Slope	0 – 30 %
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation and modeled relative effective annual precipitation ranges from 10 to 14 inches (254 – 355 mm). The normal precipitation pattern shows peaks in May and June and a secondary peak in September. This amounts to about 50% of the mean annual precipitation. Much of the moisture that falls in the latter part of the summer is lost by evaporation and much of the moisture that falls during the winter is lost by sublimation. Average snowfall is about 20 inches annually. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation.

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. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring. High winds are generally blocked from the basin by high mountains, but can occur in conjunction with an occasional thunderstorm. Growth of native cool-season plants begins about April 15th and continues until about July 1st. Cool weather and moisture in September may produce some green up of cool season plants that will continue through late October.

Review of a 30 year trend of data for Average Temperature as well as Average Precipitation, there has been a warming trend, but as the last 12 years graphed, the temperatures have swayed high and low, but overall it has maintained a steady trajectory, neither increasing nor decreasing. Where on the moisture side, the trajectory in trend has been a slow decline. The swings of when spring warm up and first frost hit with the decline in average precipitation have produced a drought effect where the moisture is not being received when the plants and ground is able to utilize the moisture. And in some cases, the late precipitation has encouraged the warm season or mat forming species over the cool season bunchgrasses that are the drivers of the natural system. Early frosts, with dry open winters has created a more arid or desert effect on plants resulting in high rates of winter kill, loss of vigor or overall damage to the plant.

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at http://www.wcc.nrcs.usda.gov/. “Buffalo Bill Dam", "Cody 21SW", "Thermopolis", "Thermopolis 9NE", "Thermopolis 25WNW" and "Wapiti 1NE" are the representative weather stations within LRU D. 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)	70-110 days
Freeze-free period (characteristic range)	110-150 days

Precipitation total (characteristic range)	280-330 mm
Frost-free period (actual range)	70-120 days
Freeze-free period (actual range)	100-150 days
Precipitation total (actual range)	250-330 mm
Frost-free period (average)	90 days
Freeze-free period (average)	120 days
Precipitation total (average)	310 mm

- (1) THERMOPOLIS 25WNW [USC00488888], Thermopolis, WY
- (2) THERMOPOLIS [USC00488875], Thermopolis, WY
- (3) THERMOPOLIS 9NE [USC00488884], Thermopolis, WY
- (4) BUFFALO BILL DAM [USC00481175], Cody, WY
- (5) WAPITI 1NE [USC00489467], Cody, WY
- (6) CODY 21 SW [USC00481855], Cody, WY

Influencing water features

The characteristics of these upland soils have no influence from ground water (water table below 60 inches or 150 cm) and have minimal influence from surface water and overland flow. There may be isolated features that are affected by snowpack that persists longer than surrounding areas due to position on the landform (shaded or protected pockets), but overflow is not a suitable fit. No streams are classified within this ecological site.

Soil features

The soils of this site are moderately deep to very deep (greater than 20” 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 (affected by the calcium carbonates throughout the soil profile) 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: Amalia, Broback, Bronec, Cragnot-like, Crago-like, Foy-like, Trimad, Twinadams

Figure 7. Soils pit excavated by hand on an eroded fan remnant.

Table 4. Representative soil features

Parent material	(1) Slope alluvium – limestone and dolomite (2) Colluvium – igneous, metamorphic and sedimentary rock (3) Residuum – calcareous conglomerate

Surface texture	(1) Very gravelly, very cobbly, very stony sandy clay loam (2) Very bouldery clay loam (3) Loam
Family particle size	(1) Loamy-skeletal (2) Clayey-skeletal
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	50 cm
Surface fragment cover <=3"	20 – 60 %
Surface fragment cover >3"	10 – 40 %
Available water capacity (Depth not specified)	7.87 – 15.75 cm
Calcium carbonate equivalent (Depth not specified)	20 – 40 %
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	0 – 10
Soil reaction (1:1 water) (Depth not specified)	7.4 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	20 – 70 %

Subsurface fragment volume >3" (Depth not specified)	10 – 80 %

Ecological dynamics

The Limy Skeletal ecological site within the Absaroka Lower Foothills was originally correlated as a coarse upland range site. During the review of the coarse upland range site, several communities presented with more rock fragments throughout the profile than expected and there were areas that were found to have calcareous characteristics throughout the profile. Historically, classification of the soils in the Big Horn Basin did not recognize the calcareous tendencies. Although this site is similar to the Coarse Upland range site, the community potential and system resilience are altered by the chemistry within the soil. The dominance of black sagebrush, bluebunch wheatgrass, increased bare ground or lichen cover and reduced production express the “shallow” acting characteristic of the site. Wyoming big sagebrush has been replaced by black sagebrush but is present in scattered areas of this site, and is generally restricted in vigor and production compared to the Coarse Upland range site. Minimal research can be found for this particular ecological site.

Potential vegetation on the Limy Skeletal ecological site, as with the Loamy ecological site, is dominated by mid-stature cool-season perennial grasses. Other significant vegetation includes black sagebrush, winterfat and a variety of forbs. The expected potential composition is 75 percent grasses, 10 percent forbs, and 15 percent woody plants. The composition and production will vary due to historic use and fluctuating precipitation.

As the Limy Skeletal ecological site deteriorates species such as threadleaf sedge, Sandberg bluegrass, and broom snakeweed will increase. Plains pricklypear and weedy annuals will invade. Cool-season grasses such as bluebunch wheatgrass, needle and thread, and Indian ricegrass will decrease in frequency and production.

Due to the amount and pattern of the precipitation, in combination with soil limitations, the black sagebrush component has a lower structure than similar ecological sites within the same area. Sagebrush may not be resilient once it has been removed or severely reduced if a vigorous stand of grass exists and is maintained. Threadleaf sedge may become the dominant vegetation if the area is subjected to frequent and severe (continuous season-long) periods of grazing, especially year-long grazing; resulting in a dense sod cover of threadleaf sedge.

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	**Mid-stature Cool-season Bunchgrasses**			56-224	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	56-168	10-25
	needle and thread	HECO26	*Hesperostipa comata*	0-56	0-10
	spike fescue	LEKI2	*Leucopoa kingii*	0-56	0-10
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0-28	0-5
2	**Rhizomatous Cool-season Grasses**			0-56	
	Montana wheatgrass	ELAL7	*Elymus albicans*	6-56	2-10

	western wheatgrass	PASM	*Pascopyrum smithii*	0-56	0-10
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0-28	0-5
3	**Short-stature Cool-season Bunchgrasses**			0-56	
	squirreltail	ELEL5	*Elymus elymoides*	0-28	0-5
	Sandberg bluegrass	POSE	*Poa secunda*	0-28	0-5
	muttongrass	POFE	*Poa fendleriana*	0-28	0-5
	prairie Junegrass	KOMA	*Koeleria macrantha*	0-28	0-5
4	**Miscellaneous Grasses**			0-28	
	threadleaf sedge	CAFI	*Carex filifolia*	0-28	0-5
	needleleaf sedge	CADU6	*Carex duriuscula*	0-28	0-5
	Grass, perennial	2GP	*Grass, perennial*	0-28	0-5
Forb					
5	**Perennial Forbs**			28-112	
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	0-28	0-5
	milkvetch	ASTRA	*Astragalus*	0-28	0-5
	spiny phlox	PHHO	*Phlox hoodii*	0-28	0-5
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0-28	0-5
	prairie sagewort	ARFR4	*Artemisia frigida*	0-28	0-5
	Forb, perennial	2FP	*Forb, perennial*	0-28	0-5
Shrub/Vine					
6	**Dominant Shrubs**			28-168	
	black sagebrush	ARNO4	*Artemisia nova*	0-168	0-15
	winterfat	KRLA2	*Krascheninnikovia lanata*	0-56	0-10
7	**Miscellaneous Shrubs**			0-112	
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0-56	0-5
	curl-leaf mountain mahogany	CELE3	*Cercocarpus ledifolius*	0-56	0-5
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0-28	0-5
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0-28	0-5

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Mid-stature Cool-season Bunchgrasses**			28-84	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	28-84	5-25
	needle and thread	HECO26	*Hesperostipa comata*	0-28	0-5
	spike fescue	LEKI2	*Leucopoa kingii*	0-28	0-5
2	**Rhizomatous Cool-season Grasses**			0-84	
	western wheatgrass	PASM	*Pascopyrum smithii*	0-56	0-10
	Montana wheatgrass	ELAL7	*Elymus albicans*	0-56	0-10
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0-28	0-5
3	**Short-stature Cool-season Grasses**			28-84	
	squirreltail	ELEL5	*Elymus elymoides*	6-56	2-10
	Sandberg bluegrass	POSE	*Poa secunda*	6-56	2-10
	muttongrass	POFE	*Poa fendleriana*	0-28	0-5
	prairie Junegrass	KOMA	*Koeleria macrantha*	0-28	0-5
4	**Miscellanous Grasses**			0-28	

	threadleaf sedge	CAFI	*Carex filifolia*	0-28	0-5
	needleleaf sedge	CADU6	*Carex duriuscula*	0-28	0-5
	Grass, perennial	2GP	*Grass, perennial*	0-28	0-5
Forb					
5	**Perennial Forbs**			6-84	
	milkvetch	ASTRA	*Astragalus*	0-28	0-5
	spiny phlox	PHHO	*Phlox hoodii*	0-28	0-5
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0-28	0-5
	prairie sagewort	ARFR4	*Artemisia frigida*	0-28	0-5
	plains pricklypear	OPPO	*Opuntia polyacantha*	6-28	2-5
	Forb, perennial	2FP	*Forb, perennial*	0-28	0-5
6	**Annual Forbs**			0-17	
	woolly plantain	PLPA2	*Plantago patagonica*	0-6	0-2
	flatspine stickseed	LAOC3	*Lappula occidentalis*	0-6	0-2
	western tansymustard	DEPI	*Descurainia pinnata*	0-6	0-2
	Forb, annual	2FA	*Forb, annual*	0-6	0-2
Shrub/Vine					
7	**Dominant Shrubs**			56-280	
	black sagebrush	ARNO4	*Artemisia nova*	56-224	10-25
	winterfat	KRLA2	*Krascheninnikovia lanata*	0-56	0-5
8	**Miscellaneous Shrubs**			0-112	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0-56	0-5
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0-56	0-5
	shadscale saltbush	ATCO	*Atriplex confertifolia*	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 4.1 plant community composition

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

Table 10. Community 5.1 plant community composition

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

Animal community

Animal Community – Wildlife Interpretations: 1.1 - Bluebunch Wheatgrass/Black 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/Black Sagebrush Plant Community: The combination of an overstory of sagebrush and an understory of grasses and forbs provide a very diverse plant community for wildlife. The crowns of sagebrush tend to break up hard crusted snow on winter ranges, so mule deer 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. 2.1 - Threadleaf Sedge/Black Sagebrush Plant Community: This community provides limited foraging for antelope and other grazers. They may be used as a foraging site by sage grouse where reference state community phases are limited. Generally, these are not target

plant communities for wildlife habitat management. 3.1 - Black Sagebrush/Bare Ground 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 excellent escape and thermal cover for large ungulates, as well as nesting habitat for sage grouse. 4.1 - Perennial Grasses/Invasive Species/Black Sagebrush Plant Community: The retained combination of sagebrush and the added diversity with the invasive grasses and/or forbs provide an extended plant community for wildlife. The similarities to Community Phase 1.2 are to some extent enhanced for some species with the added forage provided by the invasive species. But as the invasive species increase, decreasing the desirable species, the wildlife species benefits are decreased as well. 5.1 - Disturbed Lands Plant Community: 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 Acres/AUM 1.1 Bluebunch Wheatgrass/Black Sagebrush 250-400-650 0.11 9.13 1.2 Perennial Grasses/Black Sagebrush 200-375-600 0.10 9.73 2.1 Threadleaf Sedge/Black Sagebrush ** ** 3.1 Black Sagebrush/Bare Ground ** ** 4.1 Perennial Grasses/Invasive Species/Black Sagebrush ** ** 5.1 Disturbed Lands ** ** * - 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% of a management unit may have 25% slopes and distances of greater than one mile from water; therefore, the adjustment is only calculated for 30% of the unit (i.e. 50% reduction on 30% 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. The extent of this ecological site is found within wild horse use areas; Pryor Mountain and McCullough Peaks. Wild horse/Wildlife Excursions are found as recreational venues for BLM lands and State lands within the Big Horn Basin. 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 erosive.

Wood products

No appreciable wood products are present on the site. Utah juniper, Rocky Mountain juniper, limber pine, and mountain mahogany may be present in scattered patches, but no logging or timber harvest for commercial use is occurring.

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 from NRCS inventory data. Field observations from range-trained personnel also were used. Those involved in the development of the new concept for the Limy Skeletal 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; Blaise Allen, Multi-county Rangeland Management Specialist, NRCS; 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 3, 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; Jeff Goats, 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, 3/05/2025

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.

Author(s)/participant(s)	Marji Patz
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Date	04/29/2020
Approved by	
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.

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

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground can range from 5-40%.

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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 nonexistent.

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7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous and large woody litter not expected to move.

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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):** Soil Stability Index ratings range from 1 (interspaces) to 5 (under plant canopy), but average values should be 3.0 or greater.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil Organic Matter of less than 2% is expected.

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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 45-75% grasses, 10% forbs, and 15-35% shrubs. Evenly distributed plant canopy (50-75%) and litter plus moderate infiltration rates result in minimal runoff. Basal cover is typically less than 10% and marginally affects runoff on this site. Surface rock fragments of 5-30% provide stability to the site, but reduce infiltration.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None.

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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 < Rhizomatous, Cool-season Bunchgrasses

    Other: Perennial Forbs < Short-stature, Cool-season Bunchgrasses

Additional:

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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.**

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14. **Average percent litter cover (%) and depth (in):** **Litter ranges from 10-25% of total canopy measurement with total litter (including beneath the plant canopy) from 50-80% expected. Herbaceous litter depth typically ranges from 3-10 mm. Woody litter can be up to a couple inches (4-6 cm).**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** **Annual production ranges from 250 -650 lb/ac (280-729 kg/ha); with an average of 400 lbs/ac (448 kg/ha).**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** **Bare ground greater than 40% is the most common indicator of a threshold being crossed. Bluegrasses, sagebrush, and fringed sagewort are common increasers. Annual weeds such as cheatgrass and mustards are common invasive species in disturbed sites.**

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