Ecological site EX043B23C106
Clayey Overflow (CyO)
Absaroka Subalpine Zone

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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) 43B23C: Absaroka Subalpine Zone Based on the shifts in geology, precipitation patterns and other climatic factors, as well as elevation 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 C is the high elevation zone noted for dense timber interspersed with open parks and longer persisting snowpack (within timberline). Precipitation can range from 18 to 20 plus inches and is more noted for the duration of snow cover and shorter growing season. To verify or identify Subset C (the referenced subset for this ecological site), refer to the Wyoming LRU matrix key contained within the Ecological Site Key. This LRU/Subset occurs on the eastern divide of the Absaroka Range. This LRU starts north of Clark, WY and runs to the Thermopolis, WY area. Once the Absaroka Range merges with the Owl Creek and Wind River Ranges, the climatic patterns and elevational changes shifts the plant community and creates a break in the LRU/Subset. 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: Cryic Dominant Cover: Rangeland – Sagebrush Steppe (major species is Mountain Big Sagebrush) Representative Value (RV) Effective Precipitation: 20+ inches (508 mm) RV Frost-Free Days: 31-65 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 M048 Central Rocky Mountain Montane-Foothill Grassland & Shrubland Macro-group G273 Central Rocky Mountain Lower Montane, Foothill & Valley Grassland Group Ecoregions (EPA): Level I: 6 North Western Forested Mountains Level II: 6.2 Western Cordillera Level III: 6.2.10 Middle Rockies Level IV: 6.2.17ao – Absaroka Volcanic Subalpine Zone 6.2.17i – Absaroka – Gallatin Volcanic Mountains

Ecological site concept

• Site receives significant additional effective moisture as overland flow. • Slope is 30% • Soils are: o Textures range from fine sandy loam to clay 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 > 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 occasionally up to 10% cobble and gravel cover o Not skeletal (35% rock fragments) within 20" (50 cm) of mineral soil surface o None to Slightly effervescent throughout top 20" (50 cm) of mineral soil surface o Non-saline, sodic, or saline-sodic

Associated sites

R043BY130WY	**Overflow High Mountains** Overflow
EX043B23D104	**Clayey (Cy) Absaroka Alpine Zone** Clayey

Similar sites

R043BY130WY	**Overflow High Mountains** Overflow (Ov), 20+ has coarser soil textures.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. vaseyana*
Herbaceous	(1) *Leymus cinereus* (2) *Elymus trachycaulus*

Legacy ID

R043BX706WY

Physiographic features

This site occurs on gently sloping to moderately sloping flood plains, canyons, and small valley bottoms along intermittent streams.

Table 2. Representative physiographic features

Landforms	(1) Mountain range > Alluvial fan (2) Mountain range > Stream terrace
Runoff class	Negligible to medium
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Frequent
Elevation	1,710 – 2,530 m

Slope	0 – 10 %

Climatic features

Annual precipitation and modeled relative effective annual precipitation range from 18 to 35 inches (457 – 889 mm). The normal precipitation pattern is evenly distributed through the year and averages over 20 inches. Annual snowfall averages 150 to 200 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. Prevailing winds are from the southwest, and strong winds are less frequent than over other areas of
Wyoming. Occasional storms, however, can bring brief periods of high winds with gusts exceeding 50
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 June 1, but can be as late as July 15, and continues until the beginning of September.

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at http://www.wcc.nrcs.usda.gov/. Climate station representative of this precipitation zone include: “Cooke City 2W” and “Tower Falls”. 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)	0-0 days
Freeze-free period (characteristic range)	20-50 days
Precipitation total (characteristic range)	460-580 mm
Frost-free period (actual range)	0-0 days
Freeze-free period (actual range)	20-50 days
Precipitation total (actual range)	430-610 mm
Frost-free period (average)	0 days
Freeze-free period (average)	40 days
Precipitation total (average)	530 mm

- (1) COOKE CITY 2 W [USC00241995], Gardiner, MT
- (2) 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)). This site is characterized by the influence from surface water/overland flow from adjacent slopes, that has created a long-term shift in vegetation. The hydrology reflects more of a lowland position, lacking the ground water influence. These soils are prone to drought effects due to the hydrologic relationship to precipitation rather than to ground water. Isolated features that are affected by snow pack may connect and will persists longer than surrounding areas due to position on the landform (shaded/protected pockets).

Soil features

The soils of this site are moderately deep (greater than 20" to bedrock) to very deep, well-drained soils with textures that vary from the finer portions of silty clay loams to sandy clay loams and clay loams. These soils occur in playa areas or along stream courses which receive periodic overflow from adjacent slopes. Erosion is slight except for some stream bank cutting. Infiltration and water movement is good. Root penetration is deep.

Table 4. Representative soil features

Parent material	(1) Alluvium – igneous, metamorphic and sedimentary rock
Surface texture	(1) Clay loam (2) Clay (3) Sandy clay loam
Family particle size	(1) Fine
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to slow
Soil depth	50 – 150 cm
Available water capacity (0-101.6cm)	7.11 – 14.48 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	0 – 10 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0 – 10

Soil reaction (1:1 water) (0-101.6cm)	6.6 – 8.4

Ecological dynamics

As this site deteriorates, woody species such as snowberry, silver and mountain big sagebrush, and green rabbitbrush will increase. Rhizomatous wheatgrass and Letterman needlegrass will also increase. Kentucky bluegrass and introduced forbs such as dandelion often invade. Cool season grasses such as basin wildrye, western needlegrass, Canby bluegrass, and slender wheatgrass will decrease in frequency and production.

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

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1				140-280	
	basin wildrye	LECI4	*Leymus cinereus*	140-280	–
2				140-420	
	Idaho fescue	FEID	*Festuca idahoensis*	140-420	–
3				280-560	
	western wheatgrass	PASM	*Pascopyrum smithii*	280-560	–
4				140-280	
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	140-280	–
5				280-701	
	Grass, perennial	2GP	*Grass, perennial*	0-140	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0-140	–
	western needlegrass	ACOC3	*Achnatherum occidentale*	0-140	–
	mountain brome	BRMA4	*Bromus marginatus*	0-140	–
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	0-140	–
	timber oatgrass	DAIN	*Danthonia intermedia*	0-140	–
	squirreltail	ELEL5	*Elymus elymoides*	0-140	–
	blue wildrye	ELGL	*Elymus glaucus*	0-140	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0-140	–
	spike fescue	LEKI2	*Leucopoa kingii*	0-140	–
	oniongrass	MEBU	*Melica bulbosa*	0-140	–
	muttongrass	POFE	*Poa fendleriana*	0-140	–
	Sandberg bluegrass	POSE	*Poa secunda*	0-140	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	0-140	–

Forb					
6				140-420	
	Forb, perennial	2FP	*Forb, perennial*	0-140	–
	common yarrow	ACMI2	*Achillea millefolium*	0-140	–
	agoseris	AGOSE	*Agoseris*	0-140	–
	rosy pussytoes	ANRO2	*Antennaria rosea*	0-140	–
	sandwort	ARENA	*Arenaria*	0-140	–
	milkvetch	ASTRA	*Astragalus*	0-140	–
	Indian paintbrush	CASTI2	*Castilleja*	0-140	–
	fireweed	CHAN9	*Chamerion angustifolium*	0-140	–
	springbeauty	CLAYT	*Claytonia*	0-140	–
	larkspur	DELPH	*Delphinium*	0-140	–
	fleabane	ERIGE2	*Erigeron*	0-140	–
	buckwheat	ERIOG	*Eriogonum*	0-140	–
	aster	EUCEP2	*Eucephalus*	0-140	–
	bedstraw	GALIU	*Galium*	0-140	–
	geranium	GERAN	*Geranium*	0-140	–
	avens	GEUM	*Geum*	0-140	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0-140	–
	pea	LATHY	*Lathyrus*	0-140	–
	stoneseed	LITHO3	*Lithospermum*	0-140	–
	lupine	LUPIN	*Lupinus*	0-140	–
	creeping barberry	MARE11	*Mahonia repens*	0-140	–
	bluebells	MERTE	*Mertensia*	0-140	–
	monkeyflower	MIMUL	*Mimulus*	0-140	–
	ragwort	PACKE	*Packera*	0-140	–
	beardtongue	PENST	*Penstemon*	0-140	–
	phacelia	PHACE	*Phacelia*	0-140	–
	phlox	PHLOX	*Phlox*	0-140	–
	cinquefoil	POTEN	*Potentilla*	0-140	–
	buttercup	RANUN	*Ranunculus*	0-140	–
	stonecrop	SEDUM	*Sedum*	0-140	–
	starwort	STELL	*Stellaria*	0-140	–
	goldenbanner	THERM	*Thermopsis*	0-140	–
	western meadow-rue	THOC	*Thalictrum occidentale*	0-140	–
	clover	TRIFO	*Trifolium*	0-140	–
	American vetch	VIAM	*Vicia americana*	0-140	–
Shrub/Vine					
7				140-420	
	Shrub, deciduous	2SD	*Shrub, deciduous*	0-140	–
	Tree, deciduous	2TD	*Tree, deciduous*	0-140	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	0-140	–
	silver sagebrush	ARCA13	*Artemisia cana*	0-140	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0-140	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0-140	–
	quaking aspen	POTR5	*Populus tremuloides*	0-140	–

	chokecherry	PRVIV	*Prunus virginiana var. virginiana*	0-140	–
	Woods' rose	ROWOW	*Rosa woodsii var. woodsii*	0-140	–
	elderberry	SAMBU	*Sambucus*	0-140	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0-140	–

Table 6. Community 2.1 plant community composition

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

Table 7. Community 3.1 plant community composition

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

Table 8. Community 4.1 plant community composition

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

Animal community

Animal Community – Wildlife Interpretations Rhizomatous Wheatgrass/Basin Wildrye Plant Community (HCPC): The high degree of plant species and structural diversity, additional moisture, and woody plants in this community favors a large variety of wildlife. Woody plants provide suitable thermal and escape cover for mule deer, elk, and antelope. This community provides habitat for a wide array of small mammals such as jackrabbits, cottontail rabbits, mice, and voles so diverse prey populations are available for badgers, fox, coyotes, and raptors such as red-tail and Swainson's hawks. Birds such as sage sparrow, Brewer's sparrow, and the sage thrasher will utilize this community for nesting and foraging. Mountain Big Sage/Idaho Fescue Plant Community: This plant community may be useful for the same wildlife that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals. Silver Sage/Kentucky Bluegrass Plant Community: The plant community composition is much less diverse, and thus, less apt to meet the seasonal needs of many wildlife dependent on big sagebrush. Kentucky Bluegrass/Forb Plant Community: The plant community composition is much less diverse, and thus, less apt to meet the seasonal needs of many wildlife dependent on big sagebrush. Lack of woody plants may provide opportunities for sage grouse leks. 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) Rhizomatous Wheatgrass/Basin Wildrye (HCPC) 1500-3000 .7 Mountain Big Sage/Idaho Fescue 800-2300 .6 Silver Sage/Kentucky Bluegrass 500-1900 .3 Kentucky Bluegrass/Forb 300-800 .16 * - 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 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.

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 rate is moderately slow to slow. 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. 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 variety of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Inventory data references

Inventory Data References (narrative) Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used. Those involved in developing this site include: Bill Christensen, Range Management Specialist, NRCS; Karen Clause, Range Management Specialist, NRCS; and Everet Bainter, Range Management Specialist, NRCS. Other sources used as references include: USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties. Inventory Data References Data Source Number of Records Sample Period State County SCS-RANGE-417 58 1966-1986 WY Lincoln & others

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Contributors

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Approval

Scott Woodall, 10/04/2019

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

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Date	03/16/2007
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** **Rare to nonexistent.**

2. **Presence of water flow patterns:** **Water flow patterns sometimes evident in ephemeral floodplain zone where this site occurs.**

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 5-10%.**

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:** Minimal to nonexistent.

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7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter expected to move in water flow patterns.

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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 3 (interspaces) to 6 (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):** Described A-horizons are up to 30 inches (76 cm) with a dark gray color (10YR 4/1) and weak to moderate granular or platy structure. Organic matter is typically 3 to 6%.

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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 70-85% grasses, 15% forbs, and 0-15% shrubs. Dense plant canopy (75-95%) and litter, despite slow infiltration rates, results in minimal runoff. Basal cover is typically greater than 5% for this site and effectively reduces runoff 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 exists.

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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-size, cool season bunchgrasses> cool season rhizomatous grasses

    Sub-dominant: perennial forbs=perennial shrubs>

    Other: tall, cool season bunchgrasses>short, 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 1-20% of total canopy measurement with total litter (including beneath the plant canopy) from 80-95% expected. Herbaceous litter depth typically ranges from 15-30 mm. Woody litter can be up to

several inches (>8 cm).

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** **English: 1500-3000 lb/ac (2500 lb/ac average); Metric: 1680-3360 kg/ha (2800 kg/ha average).**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** **Bare ground greater than 20%, noxious weed invasion, and/or presence of Kentucky bluegrass are the most common indicators of a threshold being crossed. Rabbitbrush, mountain silver sagebrush, and Sandberg bluegrass are common increasers. Common dandelion, thistles, and Kentucky bluegrass are common invasive species on disturbed sites.**

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