USDA Natural Resources
Conservation Service

Ecological site EX043B23C130
Overflow (Ov) Absaroka Subalpine Zone

Last updated: 10/04/2019
Accessed: 05/12/2025

General information

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

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

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 < 6%
• Soils are:
o Textures range from loamy sand to clay in top 4” (10 cm) of mineral soil surface
o All subsurface horizons in the particle size control section have a weighted average of > 18% clay but < 35% clay. (The particle size control section is the segment of the profile from either the start of an argillic horizon for 50 cm’s or from 25-100 cm’s).
o Moderately deep to very deep (20-80+ in. (50-200+ cm)
o <3% stone and boulder cover and 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

R043BY122WY	**Loamy High Mountains** Loamy
R043BY174WY	**Subirrigated High Mountains** Subirrigated

Similar sites

R043BY230WY	**Overflow Foothills and Mountains West** Overflow (Ov) 15-19W has lower production.

Table 1. Dominant plant species

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

Legacy ID

R043BX730WY

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 (3) Mountain range > Flood plain
Runoff class	Negligible to medium
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Frequent
Ponding frequency	None
Elevation	1,981–3,658 m
Slope	1–10%
Aspect	Aspect is not a significant factor

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)	1-2 days
Freeze-free period (characteristic range)	23-47 days
Precipitation total (characteristic range)	457-584 mm
Frost-free period (actual range)	1-2 days
Freeze-free period (actual range)	17-53 days
Precipitation total (actual range)	432-610 mm

Frost-free period (average)	2 days
Freeze-free period (average)	35 days
Precipitation total (average)	533 mm

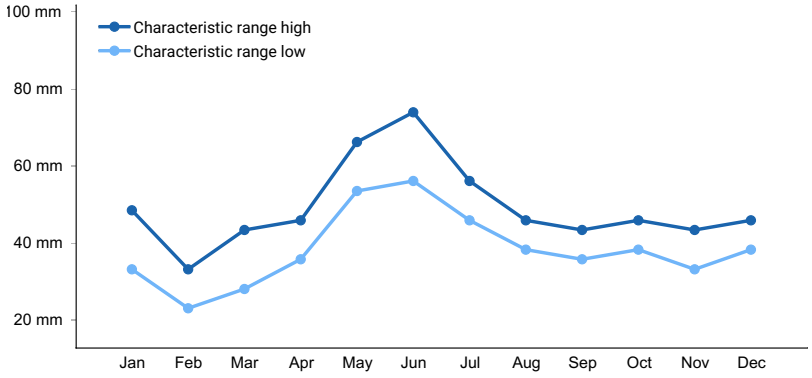


Figure 1. Monthly precipitation range

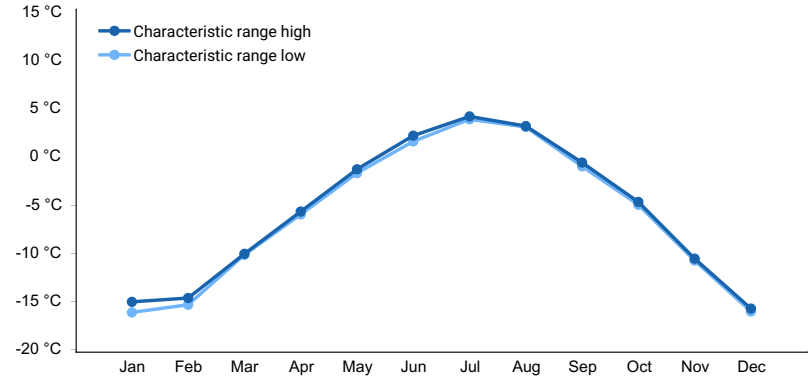


Figure 2. Monthly minimum temperature range

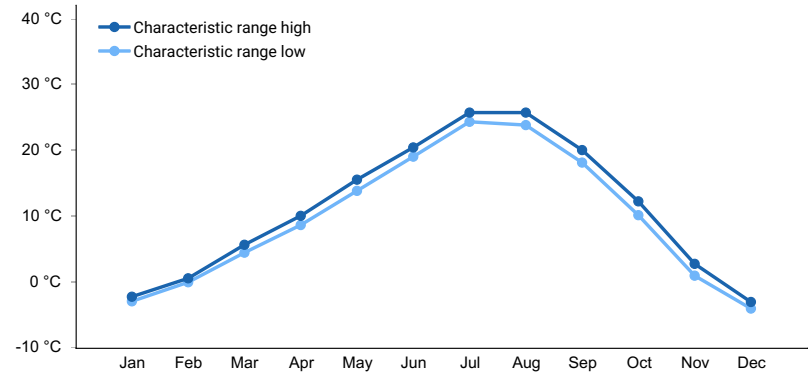


Figure 3. Monthly maximum temperature range

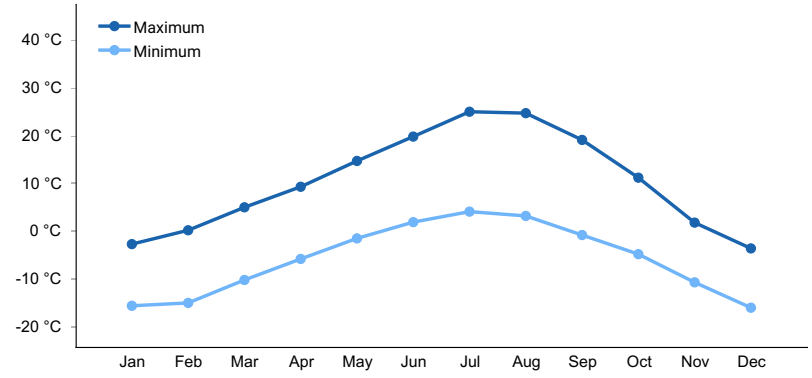


Figure 4. Monthly average minimum and maximum temperature

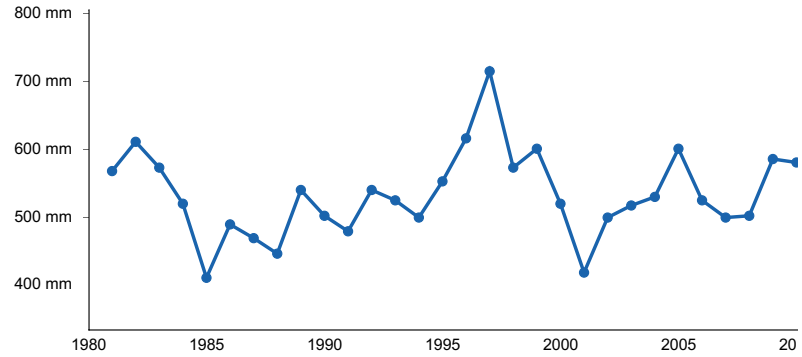


Figure 5. Annual precipitation pattern

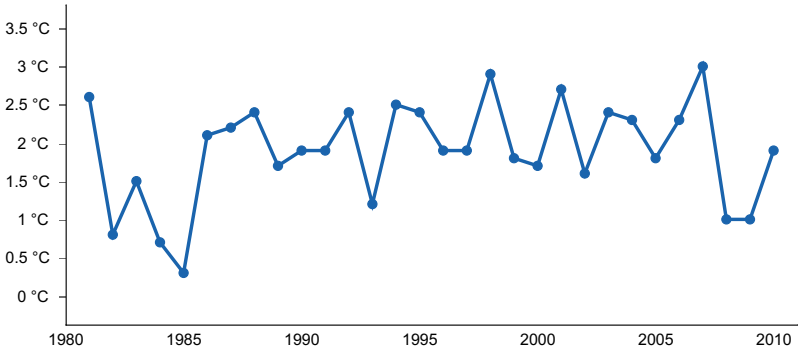


Figure 6. Annual average temperature pattern

Climate stations used

- (1) COOKE CITY 2 W [USC00241995], Gardiner, MT
- (2) TOWER FALLS [USC00489025], Yellowstone National Park, WY

Influencing water features

The characteristics of these soils have no influence from ground water (water table below 60 inches (150 cm)) but does have significant influence from surface water/overland flow. Irrigation runoff as well as isolated features that are affected by snow pack that persists longer than surrounding areas due to position on the landform (shaded/protected pockets) will create this site in non-typical locations.

Soil features

The soils of this site are deep to very deep with varying textures from sandy loam to light silty 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 streambank cutting. Landscape position is very important to this site.

Table 4. Representative soil features

Parent material	(1) Alluvium–igneous, metamorphic and sedimentary rock
Surface texture	(1) Gravelly sandy loam (2) Cobbly loam (3) Silty clay
Family particle size	(1) Fine-loamy
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderately rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	0–25%

Surface fragment cover >3"	0–15%
Available water capacity (0-101.6cm)	7.62–11.43 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	7.2–8.8
Subsurface fragment volume <=3" (Depth not specified)	0–25%
Subsurface fragment volume >3" (Depth not specified)	0–15%

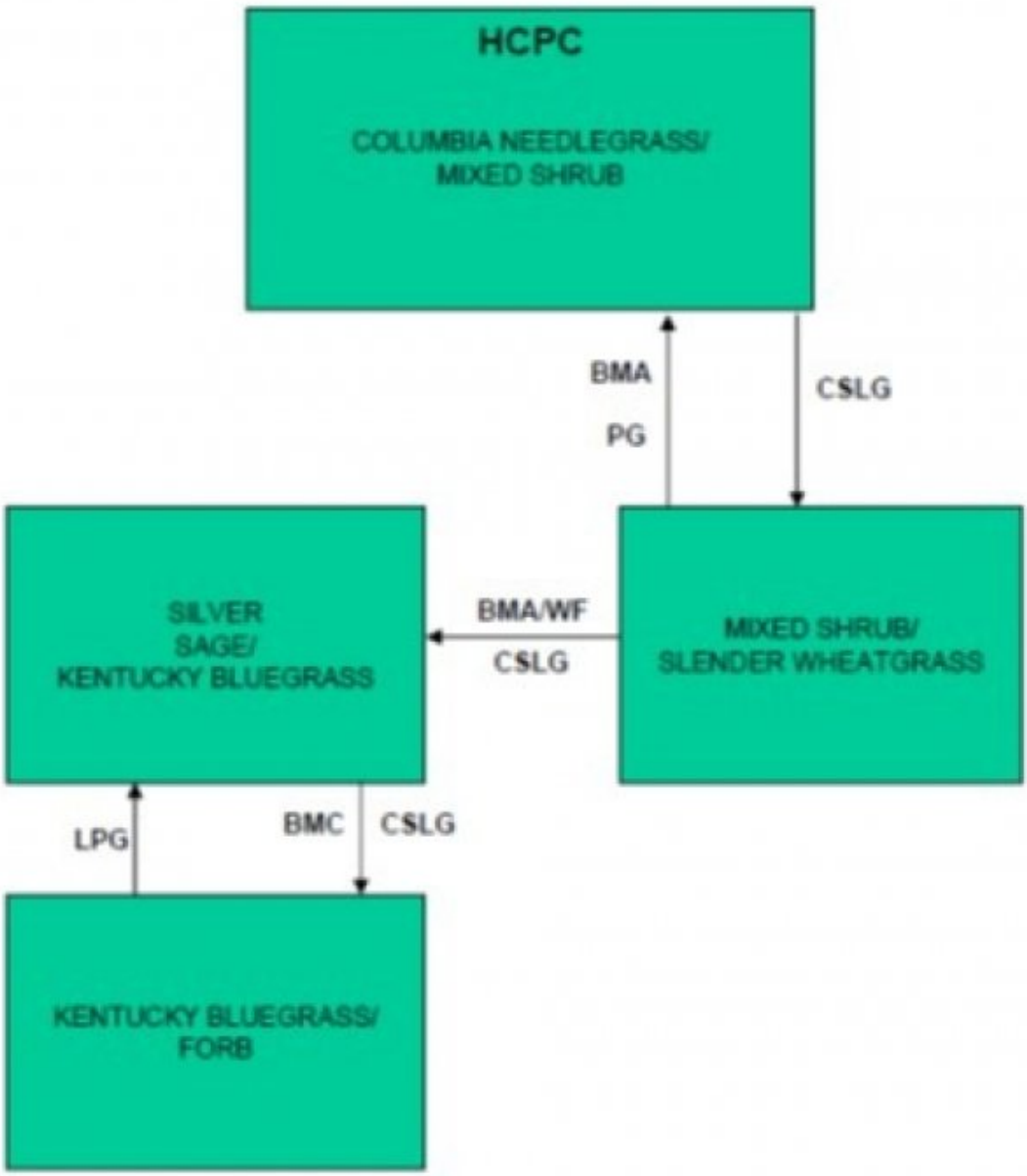
Ecological dynamics

As this site deteriorates from improper grazing management, species such rhizomatous wheatgrass, Letterman needlegrass, silver and mountain big sage, and snowberry will increase. Kentucky bluegrass and introduced forbs such as dandelion often invade. Cool season grasses such as blue wildrye, slender wheatgrass, Columbia needlegrass, and mountain brome 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



BMA – Brush Management (all methods)
BMC – Brush Management (chemical)
BMF – Brush Management (fire)
BMM – Brush Management (mechanical)
CSP – Chemical Seedbed Preparation
CSLG – Continuous Season-long Grazing
DR – Drainage
CSG – Continuous Spring Grazing
HB – Heavy Browse
HCSLG – Heavy Continuous Season-long Grazing
HI – Heavy Inundation
LPG – Long-term Prescribed Grazing
MT – Mechanical Treatment (chiseling, ripping, pitting)
NF – No Fire
NS – Natural Succession
NWC – Noxious Weed Control
NWI – Noxious Weed Invasion
NU – Nonuse
P&C – Plow & Crop (including hay)
PG – Prescribed Grazing
RPT – Re-plant Trees
RS – Re-seed
SGD – Severe Ground Disturbance
SHC – Severe Hoof Compaction
WD – Wildlife Damage (Beaver)
WF - Wildfire

State 1

Columbia Needlegrass/Mixed Shrub Plant Community (HCPC)

Community 1.1
Columbia Needlegrass/Mixed Shrub Plant Community (HCPC)

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores and is suited for grazing by domestic livestock. Potential vegetation is estimated at 65% grasses or grass-like plants, 20% forbs and 15% woody plants. The major grasses include Columbia needlegrass, tufted hairgrass, mountain brome, blue wildrye, slender wheatgrass, and Idaho fescue. Other grasses may include alpine timothy, nodding brome, big and Canby bluegrass, Letterman and western needlegrass, thickspike wheatgrass, spike fescue, sun and dunehead sedge, oniongrass, timber oatgrass, and prairie junegrass. Woody plants may include silver and mountain big sagebrush, chokecherry, snowberry, serviceberry, willows, and rose. A typical plant community consists of Colulmbia needlegrass 5-15%, tufted hairgrass 5-15%, mountain brome 5-15%, blue wildrye 5-10%, slender wheatgrass 5-10%, Idaho fescue 5-10%, other perennial grasses 10-20%, perennial forbs 10-20%, and 5-15% woody plants. Ground cover, by ocular estimate, varies from 65-80%. The total annual production (air-dry weight) of this state is about 3500 pounds per acre, but it can range from about 2500 lbs./acre in unfavorable years to about 4000 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0102 Growth curve name: 20+M, EXTRA WATER SITES Growth curve description: OV EXTRA WATER SITES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 0 5 30 40 20 5 0 0 0 (Monthly percentages of total annual growth) This plant community is extremely stable and well adapted to the Central Rocky Mountains climatic conditions. The diversity in plant species and additional moisture allows for high drought tolerance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity). Transitions or pathways leading to other plant communities are as follows: • Continuous Season-Long Grazing will convert this plant community to the Mixed Shrub/Slender Wheatgrass State.

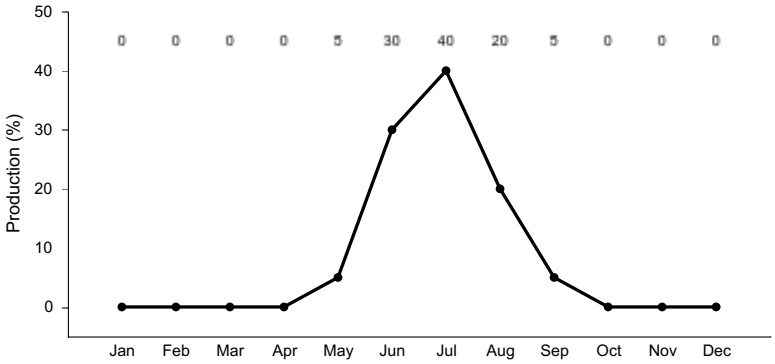


Figure 8. Plant community growth curve (percent production by month). WY0102, 20+ extra water sites.

State 2
Mixed Shrub/Slender Wheatgrass Plant Community

Community 2.1
Mixed Shrub/Slender Wheatgrass Plant Community

This plant community evolved under continuous grazing by domestic livestock. Dominant grasses include Idaho fescue, rhizomatous wheatgrass, Kentucky bluegrass, and Sandberg bluegrass. Mountain big sagebrush and snowberry have increased, with annual production often exceeding 40%. Silver sagebrush and rabbitbrush are of secondary importance. The total annual production (air-dry weight) of this state is about 3000 pounds per acre, but it can range from about 2000 lbs./acre in unfavorable years to about 4000 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0102 Growth curve name: 20+M, EXTRA WATER SITES Growth curve description: OV EXTRA WATER SITES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 0 5 30 40 20 5 0 0 0 (Monthly percentages of total annual growth) The state is moderately stable and somewhat vulnerable to excessive erosion. The biotic integrity of this plant community is usually intact. However, it can be at risk depending on how far a shift has occurred in plant composition toward mountain big sagebrush. The watershed is usually functioning. However, it can become at risk when canopy cover of big sagebrush and/or bare ground increases. Transitional pathways leading

to other plant communities are as follows: • Brush Management followed by deferment for 1 to 2 years as part of a Prescribed Grazing plan will eventually result in a plant community very similar to the Historic Climax Plant Community (Columbia Needlegrass/Mixed Shrub State). Care should be taken when planning brush management to consider wildlife habitat and critical winter ranges. • Brush Management or Wildfire followed by Continuous Season-long Grazing will result in the Silver Sage/Kentucky Bluegrass State.

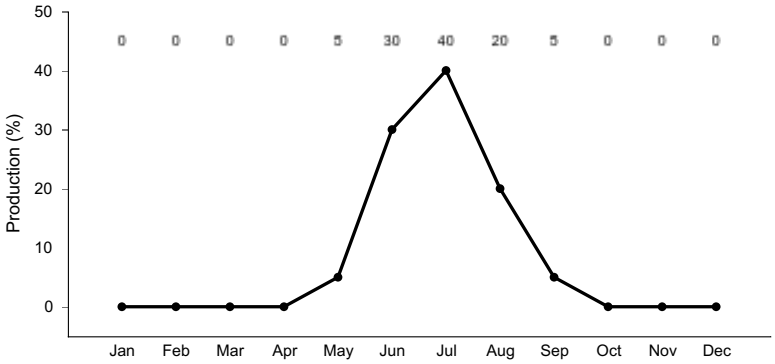


Figure 9. Plant community growth curve (percent production by month). WY0102, 20+ extra water sites.

State 3
Silver Sage/Kentucky Bluegrass Plant Community

Community 3.1
Silver Sage/Kentucky Bluegrass Plant Community

This plant community is the result of long-term improper grazing use after wildfire or brush management practices. Sprouting woody species such as silver sagebrush and rabbitbrush dominate this state. Noxious weeds such as Canada thistle may invade. Other forbs such as dandelion, lupine, aster, and buckwheat increase. Large bunchgrasses and mountain big sage have been lost or only remnants remain. The total annual production (air-dry weight) of this state is about 2000 pounds per acre, but it can range from about 1000 lbs./acre in unfavorable years to about 3000 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0102 Growth curve name: 20+M, EXTRA WATER SITES Growth curve description: OV EXTRA WATER SITES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 0 5 30 40 20 5 0 0 0 (Monthly percentages of total annual growth) The biotic integrity is threatened by the invasion of noxious weeds. The soil of this state is not protected. The watershed may produce excessive runoff. Transitional pathways leading to other plant communities are as follows: • Chemical Brush Management followed by Continuous Season-long Grazing will result in the Kentucky Bluegrass/Forb State.

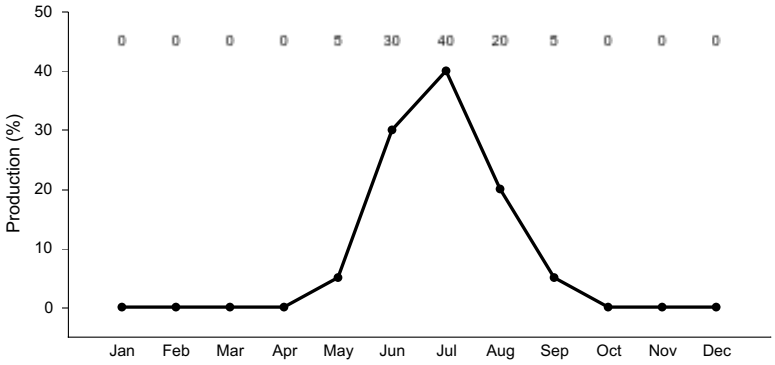


Figure 10. Plant community growth curve (percent production by month). WY0102, 20+ extra water sites.

State 4
Kentucky Bluegrass/Forb Plant Community

Community 4.1
Kentucky Bluegrass/Forb Plant Community

This plant community is the result of long-term improper grazing use after wildfire or chemical brush management practices. Introduced grasses and forbs such as Kentucky bluegrass and dandelion dominate this state. Noxious weeds such as musk and Canada thistle often invade. The total annual production (air-dry weight) of this state is about 1000 pounds per acre, but it can range from about 500 lbs./acre in unfavorable years to about 1500 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0102 Growth curve name: 20+M, EXTRA WATER SITES Growth curve description: OV EXTRA WATER SITES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 0 5 30 40 20 5 0 0 0 (Monthly percentages of total annual growth) The biotic integrity is threatened by the invasion of noxious weeds. The soil of this state is not protected. The watershed may produce excessive runoff. Transitional pathways leading to other plant communities are as follows: • Long Term Prescribed Grazing may eventually return this state to the Silver Sage/Kentucky Bluegrass State.

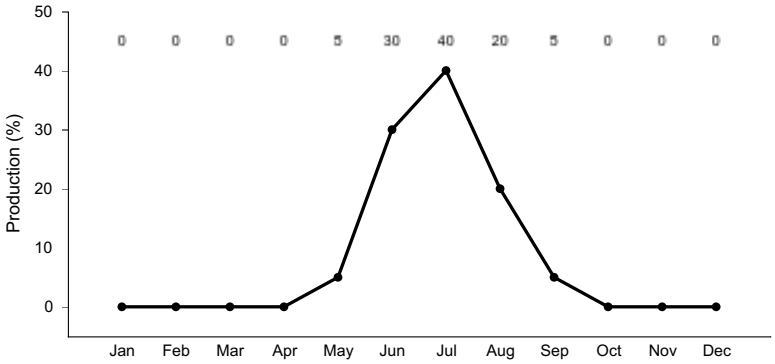


Figure 11. Plant community growth curve (percent production by month). WY0102, 20+ extra water sites.

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				196–588	
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	196–588	–
2				196–588	
3				196–588	
	mountain brome	BRMA4	*Bromus marginatus*	196–588	–
4				196–392	
	blue wildrye	ELGL	*Elymus glaucus*	196–392	–
5				196–392	
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	196–392	–
6				196–392	
	Idaho fescue	FEID	*Festuca idahoensis*	196–392	–
7				392–785	
	Grass, perennial	2GP	*Grass, perennial*	0–196	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–196	–
	western needlegrass	ACOC3	*Achnatherum occidentale*	0–196	–
	Porter brome	BRPO2	*Bromus porteri*	0–196	–
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	0–196	–
	dunhead sedge	CAPH2	*Carex phaeocephala*	0–196	–
	timber oatgrass	DAIN	*Danthonia intermedia*	0–196	–
	thickspike wheatgrass	ELLA	*Elymus lanceolatus ssp.*	0–196	

	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–196	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–196	–
	spike fescue	LEKI2	*Leucopoa kingii*	0–196	–
	oniongrass	MEBU	*Melica bulbosa*	0–196	–
	alpine timothy	PHAL2	*Phleum alpinum*	0–196	–
Forb					
8				392–785	
	Forb, perennial	2FP	*Forb, perennial*	0–196	–
	common yarrow	ACMI2	*Achillea millefolium*	0–196	–
	agoseris	AGOSE	*Agoseris*	0–196	–
	pussytoes	ANTEN	*Antennaria*	0–196	–
	columbine	AQUIL	*Aquilegia*	0–196	–
	sandwort	ARENA	*Arenaria*	0–196	–
	milkvetch	ASTRA	*Astragalus*	0–196	–
	bellflower	CAMPA	*Campanula*	0–196	–
	Indian paintbrush	CASTI2	*Castilleja*	0–196	–
	elk thistle	CIFO	*Cirsium foliosum*	0–196	–
	springbeauty	CLAYT	*Claytonia*	0–196	–
	larkspur	DELPH	*Delphinium*	0–196	–
	fleabane	ERIGE2	*Erigeron*	0–196	–
	buckwheat	ERIOG	*Eriogonum*	0–196	–
	aster	EUCEP2	*Eucephalus*	0–196	–
	geranium	GERAN	*Geranium*	0–196	–
	avens	GEUM	*Geum*	0–196	–
	streambank wild hollyhock	ILRI	*Iliamna rivularis*	0–196	–
	pea	LATHY	*Lathyrus*	0–196	–
	bladderpod	LESQU	*Lesquerella*	0–196	–
	stoneseed	LITHO3	*Lithospermum*	0–196	–
	lupine	LUPIN	*Lupinus*	0–196	–
	mayflower	MAIAN	*Maianthemum*	0–196	–
	creeping barberry	MARE11	*Mahonia repens*	0–196	–
	forget-me-not	MYOSO	*Myosotis*	0–196	–
	ragwort	PACKE	*Packera*	0–196	–
	beardtongue	PENST	*Penstemon*	0–196	–
	phacelia	PHACE	*Phacelia*	0–196	–
	phlox	PHLOX	*Phlox*	0–196	–
	cinquefoil	POTEN	*Potentilla*	0–196	–
	buttercup	RANUN	*Ranunculus*	0–196	–
	stonecrop	SEDUM	*Sedum*	0–196	–
	ragwort	SENEC	*Senecio*	0–196	–
	starwort	STELL	*Stellaria*	0–196	–
	meadow-rue	THALI2	*Thalictrum*	0–196	–
	clover	TRIFO	*Trifolium*	0–196	–

	American vetch	VIAM	*Vicia americana*	0–196	–
	violet	VIOLA	*Viola*	0–196	–
Shrub/Vine					
9				196–588	
	Shrub, deciduous	2SD	*Shrub, deciduous*	0–196	–
	Shrub, evergreen	2SE	*Shrub, evergreen*	0–196	–
	Tree, deciduous	2TD	*Tree, deciduous*	0–196	–
	Tree, evergreen	2TE	*Tree, evergreen*	0–196	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	0–196	–
	silver sagebrush	ARCA13	*Artemisia cana*	0–196	–
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	0–196	–
	chokecherry	PRVI	*Prunus virginiana*	0–196	–
	Woods' rose	ROWOW	*Rosa woodsii var. woodsii*	0–196	–
	willow	SALIX	*Salix*	0–196	–
	russet buffaloberry	SHCA	*Shepherdia canadensis*	0–196	–
	snowberry	SYMPH	*Symphoricarpos*	0–196	–

Animal community

Animal Community – Wildlife Interpretations

Columbia Needlegrass/Mixed Shrub 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. Mountain big sage provides 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.

Mixed Shrub/Slender Wheatgrass 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.

Animal Community – Grazing Interpretations

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

Plant Community Production Carrying Capacity*
(lb./ac) (AUM/ac)
Columbia Needlegrass/Mixed Shrub (HCPC) 2500-4000 1.1

Mixed Shrub/Slender Wheatgrass 2000-4000 0.9
Silver Sage/Kentucky Bluegrass 1000-3000 0.6
Kentucky Bluegrass/Forb 500-1500 0.3

* - 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. Infiltration ranges from moderate to rapid. Runoff potential for this site varies from moderate to high depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. 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

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, USDI and USDA Interpreting Indicators of Rangeland Health Version 3, and USDA NRCS Soil Surveys from various counties.

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

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

Inventory Data References:
Ocular field estimations observed by trained personnel were completed at each site. Then sites were selected where a 100-foot tape was stretched, and the following sample procedures were completed by inventory staff. For full sampling protocol and guidelines with forms please refer to the Wyoming ESI Operating Procedures, compiled in 2012 for the Powell and Rock Springs Soil Survey Office, USDA-NRCS.
• Double Sampling Production Data (4.8 square foot hoop used to estimate 10 points, clipped a minimum of 2 of

these estimated points, with two 21-foot X 21-foot square extended shrub plots).
• Line Point Intercept (over story and understory captured with soil cover). Height of herbaceous and woody cover is collected every three feet along established transect.)
• Continuous Line Intercept (Woody Canopy Cover, with minimum gap of 0.2 of a foot for all woody species and succulents. Intercept height collected at each measurement.),
• Gap Intercept (Basal Gap measured with a minimum gap requirement of 0.7 foot.),
• Sample Point (10 – 1-meter square point photographs taken at set distances on transect. Red using the sample point computer program established by the High Plains Agricultural Research Center, WY).
• Soil Stability (Slake Test – surface and subsurface samples collected and processed according to the soil stability guidelines provided by the Jornada Research Center, NM.)

Other references

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

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

Bestelmeyer, B., J. R. Brown, K. M. Havstad, B. Alexander, G. Chavez, J. E. Herrick. 2003. Development and use of state and transition models for rangelands. Journal of Range Management 56(2):114-126.

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

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

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

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

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

Pellant, M., P. Shaver, D. A. Pyke, and J. E. Herrick. 2005. Interpreting indicators of rangeland health. Version 4. Technical Reference 1734-6.

USDI-BLM. Ricketts, M. J., R. S. Noggles, and B. Landgraf-Gibbons. 2004. Pryor Mountain Wild Horse Range Survey and Assessment. USDA-Natural Resources Conservation Service.

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

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

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

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

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

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

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

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

USDA/NRCS Soil survey manuals for appropriate counties within MLRA 43B.

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

Contributors

K. Clause

Approval

Scott Woodall, 10/04/2019

Rangeland health reference sheet

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

Author(s)/participant(s)	K. Clause, E. Bainter
Contact for lead author	karen.clause@wy.usda.gov or 307-367-2257
Date	03/16/2007
Approved by	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

---

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 is less than 5%.

---

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

---

6. **Extent of wind scoured, blowouts and/or depositional areas:** Minimal to nonexistent.

---

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

---

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Index ratings range from 3 (interspaces) to 6 (under plant canopy), but average values should be 4.0 or greater.

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil data is limited for this site. Soil OM of 10-16% is expected.

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community consists of 65-80% grasses, 20% forbs, and 0-15% shrubs. Dense plant canopy (75-95%) and litter plus moderate infiltration rates result in minimal runoff. Basal cover is typically greater than 5% for this site and effectively reduces runoff on this site.

---

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.

---

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

    Dominant: mid-size, cool season bunchgrasses

    Sub-dominant: perennial forbs perennial shrubs tall, cool season bunchgrasses

    Other: cool season rhizomatous grasses = short, cool season bunchgrasses

    Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimal decadence, typically associated with shrub component.

---

14. **Average percent litter cover (%) and depth (in):** Litter ranges from 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).

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 2500-4000 lb/ac (3500 lb/ac average); Metric: 2800-4480 kg/ha (3920 kg/ha average).

---

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

---

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