Ecological site R043BY172WY
Stony High Mountains

Accessed: 05/10/2025

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.

Associated sites

R043BY162WY	**Shallow Loamy High Mountains** Shallow Loamy
R043BY170WY	**Steep Stony High Mountains** Steep Stony

Similar sites

R043BY108WY	**Coarse Upland High Mountains** Coarse Upland (CU) 20+M has higher production, larger coarse fragments (boulders), and different shrub species.
R043BY170WY	**Steep Stony High Mountains** Steep Stony (St) 20+M has higher production and different shrub species.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site usually occurs on gentle to steep mountain slopes, valley bottoms, and outwash fans.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Alluvial fan (3) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	6,500–12,000 ft
Slope	0–30%
Ponding depth	0 in

Climatic features

Annual precipitation is fairly evenly distributed through the year and averages over 20 inches. Snows are heavy and usually remain in place during the winter. Annual snowfall averages 150 to 200 inches per year. 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. This is predominantly due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks in winter move rapidly from northwest to southeast and account for extreme minimum temperatures.

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.

Growth of native cool season plants begins about June 1 at lower elevations, as late as July 15 at higher elevations, and continues until the beginning of September.

The following information is from the “Moran 5 WNW” climate station:

Minimum Maximum 5 yrs. out of 10 between
Frost-free period (days): 31 78 June 30 – August 24
Freeze-free period (days): 65 118 June 5 – September 9

Annual Precipitation (inches): <20.78 >29.35 (2 years in 10)

Mean annual precipitation: 25.23 inches

Mean annual air temperature: 36.5?F (22.1?F Avg. Min. to 50.9?F Avg. Max.)

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at http://www.wcc.nrcs.usda.gov/cgibin/state.pl?state=wy website. Other climate station representative of this precipitation zone include ”Alta 1 NW”, “Lake Yellowstone”, “Moose”, “Old Faithful”, and “Snake River” in Teton County; “Bedford 3 SE” in Lincoln County; and “Bondurant” in Sublette County.

Table 3. Representative climatic features

Frost-free period (average)	78 days
Freeze-free period (average)	118 days
Precipitation total (average)	29 in

Influencing water features

Soil features

The soils of this site are moderately deep to deep (greater than 20” to bedrock), well-drained, and stony and/or bouldery. Coarse fragments are greater than 35 percent, by volume, within the first 20 inches of soil, usually increasing with depth. Roots penetrate the soil material to at least 20 inches in most places.

Table 4. Representative soil features

Surface texture	(1) Gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately slow to moderately rapid
Soil depth	20–60 in
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0–5%

Available water capacity (0-40in)	2–4 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	10–30%
Subsurface fragment volume >3" (Depth not specified)	0–15%

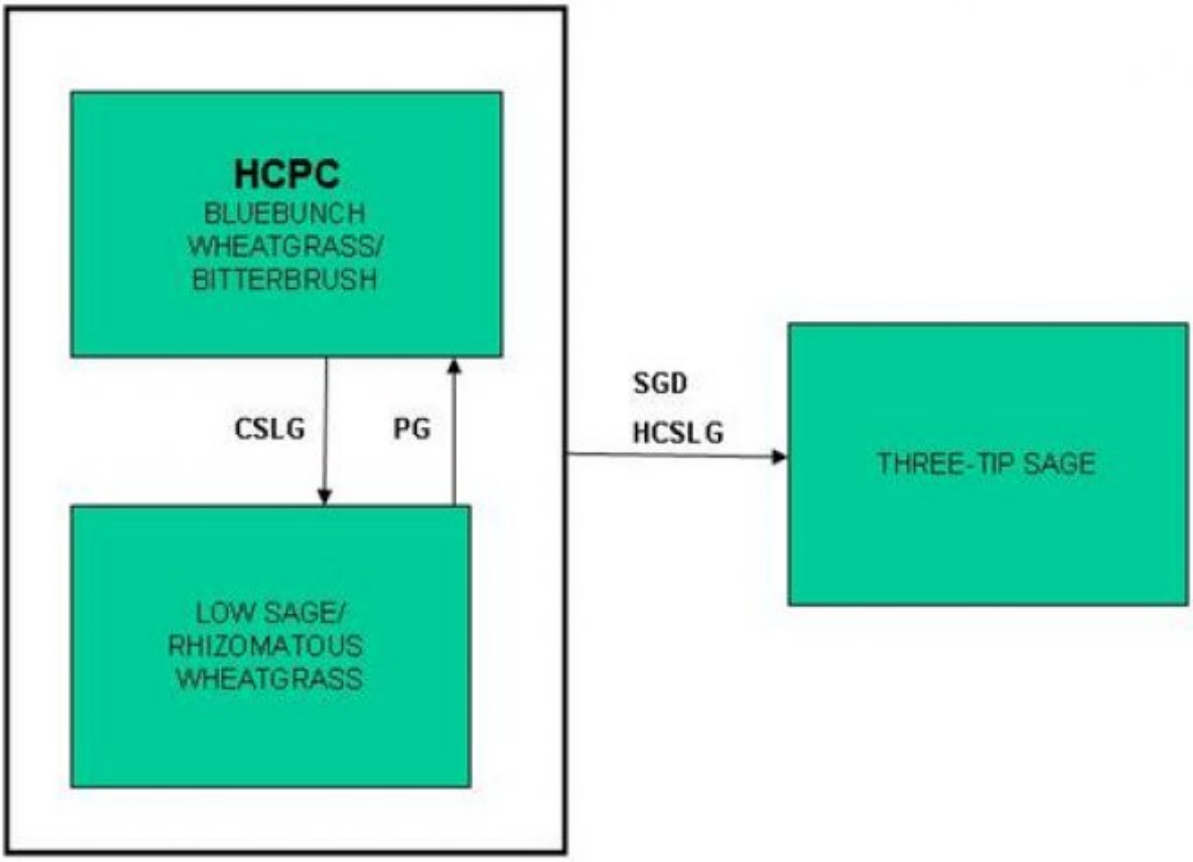
Ecological dynamics

As this site deteriorates, species such as rhizomatous wheatgrass, timber oatgrass, and low sagebrush will increase. Bluebunch wheatgrass, spike fescue, and bitterbrush will decrease in frequency and production. This site has relatively low productivity potential, and is not well suited to grazing improvement practices unless treated as part of a larger unit containing more productive areas.

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
Bluebunch Wheatgrass/Bitterbrush Plant Community (HCPC)

Community 1.1
Bluebunch Wheatgrass/Bitterbrush Plant Community (HCPC)

The interpretive plant community for this site is the Historic Climax Plant Community. Potential vegetation is estimated at 55% grasses or grass-like plants, 10% forbs, and 35% woody plants. The major grasses include bluebunch wheatgrass, spike fescue, and Idaho fescue. Other grasses include big, Canby, and mutton bluegrass, prairie junegrass, Letterman, western, and Columbia needlegrass, thickspike and slender wheatgrass, mountain muhly, one-spike and timber oatgrass, bottlebrush squirreltail, spike trisetum, oniongrass, and bentgrass. The major woody plants are bitterbrush and low sagebrush. Other woody plants may include mountain big and three-tip sagebrush and snowberry. A typical plant composition for this state consists of bluebunch wheatgrass 25-35%, spike fescue 15-25%, Idaho fescue 5-10%, other grasses and grass-like plants 10-20%, perennial forbs 5-10%, bitterbrush 5-10%, low sagebrush 5-10%, and 5-15% other woody plants. Ground cover, by ocular estimate, varies from 35-40%. The total annual production (air-dry weight) of this state is about 1000 pounds per acre, but it can range from about 750 lbs./acre in unfavorable years to about 1200 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0101 Growth curve name: 20+M, UPLAND SITES Growth curve description: ALL UPLAND 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 stable and well adapted to the Central Rocky Mountains climatic conditions. The diversity in plant species allows for high drought resistance. 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: • Severe Ground Disturbance with Heavy, Continuous Season-long Grazing will convert this plant community to the Three-tip Sage State. • Continuous Season-long Grazing will convert the plant community to the Low Sage/Rhizomatous Wheatgrass State.

State 2
Low Sage/Rhizomatous Wheatgrass Plant Community

Community 2.1
Low Sage/Rhizomatous Wheatgrass Plant Community

This plant community is a result of improper grazing management practices. The stand is composed of almost entirely low sage and rhizomatous wheatgrass with such forbs as phlox and goldenweed present as well. This state is commonly found on exposed, windswept ridges that are subject to harsh climatic conditions as well as severe winter use due to their exposed nature. The total annual production (air-dry weight) of this state is about 750 pounds per acre, but it can range from about 500 lbs./acre in unfavorable years to about 1000 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0101 Growth curve name: 20+M, UPLAND SITES Growth curve description: ALL UPLAND 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 stable and protected from excessive erosion. The biotic integrity of this plant community is usually intact, however forage value will decrease and wildlife values will shift toward different species. The watershed is functioning. Transitional pathways leading to other plant communities are as follows: • Severe Ground Disturbance followed by Heavy, Continuous Season-long Grazing will convert this plant community to the Three-tip Sage State. • Prescribed Grazing will return this state to near Historic Climax Plant Community (Bluebunch Wheatgrass/Bitterbrush State).

State 3
Three-tip Sage Plant Community

Community 3.1
Three-tip Sage Plant Community

This plant community is the result of wildfire or severe ground disturbance followed by improper grazing management practices. Dominant species include rabbitbrush and three-tip sagebrush. The total annual production (air-dry weight) of this state is about 500 pounds per acre, but it can range from about 200 lbs./acre in unfavorable

years to about 800 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0101 Growth curve name: 20+M, UPLAND SITES Growth curve description: ALL UPLAND 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 unstable and vulnerable to excessive erosion. The biotic integrity of this plant community is at risk depending on how far a shift has occurred in plant composition toward sprouting shrubs and annual forbs. The watershed is usually at risk or nonfunctioning due to an increase in bare ground. Transitional pathways leading to other plant communities are as follows: It is not often practicable or economically feasible to convert this plant community at the present time.

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				250–350	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	250–350	–
2				150–250	
	spike fescue	LEKI2	*Leucopoa kingii*	150–250	–
3				50–100	
	Idaho fescue	FEID	*Festuca idahoensis*	50–100	–
4				100–200	
	Grass, perennial	2GP	*Grass, perennial*	0–50	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–50	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	0–50	–
	western needlegrass	ACOC3	*Achnatherum occidentale*	0–50	–
	bentgrass	AGROS2	*Agrostis*	0–50	–
	timber oatgrass	DAIN	*Danthonia intermedia*	0–50	–
	onespike danthonia	DAUN	*Danthonia unispicata*	0–50	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	0–50	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–50	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–50	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–50	–
	oniongrass	MEBU	*Melica bulbosa*	0–50	–
	mountain muhly	MUMO	*Muhlenbergia montana*	0–50	–
	muttongrass	POFE	*Poa fendleriana*	0–50	–
	spike trisetum	TRSP2	*Trisetum spicatum*	0–50	–
Forb					
5				50–100	
	Forb, perennial	2FP	*Forb, perennial*	0–50	–
	common yarrow	ACMI2	*Achillea millefolium*	0–50	–
	agoseris	AGOSE	*Agoseris*	0–50	–
	pussytoes	ANTEN	*Antennaria*	0–50	–
	sandwort	ARENA	*Arenaria*	0–50	–
	milkvetch	ASTRA	*Astragalus*	0–50	–
	balsamroot	BALSA	*Balsamorhiza*	0–50	–

	Indian paintbrush	CASTI2	*Castilleja*	0–50	–
	hawksbeard	CREPI	*Crepis*	0–50	–
	fleabane	ERIGE2	*Erigeron*	0–50	–
	buckwheat	ERIOG	*Eriogonum*	0–50	–
	stoneseed	LITHO3	*Lithospermum*	0–50	–
	desertparsley	LOMAT	*Lomatium*	0–50	–
	lupine	LUPIN	*Lupinus*	0–50	–
	creeping barberry	MARE11	*Mahonia repens*	0–50	–
	bluebells	MERTE	*Mertensia*	0–50	–
	owl's-clover	ORTHO	*Orthocarpus*	0–50	–
	ragwort	PACKE	*Packera*	0–50	–
	phlox	PHLOX	*Phlox*	0–50	–
	stonecrop	SEDUM	*Sedum*	0–50	–
	ragwort	SENEC	*Senecio*	0–50	–
	aster	SYMPH4	*Symphyotrichum*	0–50	–
	clover	TRIFO	*Trifolium*	0–50	–
	American vetch	VIAM	*Vicia americana*	0–50	–
Shrub/Vine					
6				50–100	
	antelope bitterbrush	PUTR2	*Purshia tridentata*	50–100	–
7				50–100	
	little sagebrush	ARAR8	*Artemisia arbuscula*	50–100	–
8				50–150	
	Shrub, deciduous	2SD	*Shrub, deciduous*	0–50	–
	Shrub, evergreen	2SE	*Shrub, evergreen*	0–50	–
	Tree, deciduous	2TD	*Tree, deciduous*	0–50	–
	Tree, evergreen	2TE	*Tree, evergreen*	0–50	–
	threetip sagebrush	ARTR4	*Artemisia tripartita*	0–50	–
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	0–50	–
	snowberry	SYMPH	*Symphoricarpos*	0–50	–

Animal community

Animal Community – Wildlife Interpretations
Bluebunch Wheatgrass/Bitterbrush Plant Community (HCPC): When blown clear, this plant community provides limited winter forage for large grazers when snow depth prevents foraging on other sites. Otherwise, it is mostly used by wildlife in transit to other habitats.

Low Sage/Rhizomatous 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.

Three-tip Sage Plant Community: This plant community exhibits a low level of plant species diversity. In most cases, it is not a desirable plant community to select as a wildlife habitat management objective.

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)
Bluebunch Wheatgrass/Bitterbrush (HCPC) 750-1200 0.3
Low Sage/Rhizomatous Wheatgrass 500-1000 0.2
Three-tip Sage 200-800 0.1

* - 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 ranges from moderately slow to moderate. Runoff potential for this site varies from low to moderate depending on soil hydrologic group and ground cover (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.

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

Contributors

K. Clause

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	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rare to nonexistent. Where present, short and widely spaced.

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

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

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground can range from 0-25%.

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

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

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

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Index ratings range from 2 (interspaces) to 6 (under plant canopy), but average values should be 3.5 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 4-16% 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 55-80% grasses, 10% forbs, and 10-35% shrubs. Evenly distributed plant canopy (50-75%) and litter plus moderate infiltration rates result in minimal runoff. Basal cover is typically less than 15% and marginally affects runoff on this site. Surface rock fragments of 20-50% 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:

    Sub-dominant:

    Other:

    Additional: Mid-size, cool season bunchgrasses>> perennial shrubs>perennial forbs>cool season rhizomatous grasses=short cool season bunchgrasses

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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 15-20% of total canopy measurement with total litter (including beneath the plant canopy) from 40-60% expected. Herbaceous litter depth typically ranges from 3-10mm. 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):** English: 750-1200 lb/ac (1000 lb/ac average); Metric 840-1344 kg/ha (1120 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 40% is the most common indicator of a threshold being crossed. Rabbitbrush, Sandberg bluegrass, buckwheat, yarrow, and phlox 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.