

## **Ecological site EX043B23A144 Saline Upland (SU) Absaroka Lower Foothills**

Last updated: 5/01/2024  
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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](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 Saltbush Scrub Macrogroup

G301 *Atriplex corrugate* – *Artemisia pedatifida* – *Picrothamnus desertorum* Dwarf-Scrub Group

CEGL001439 *Atriplex gardneri* – Bud Sagebrush Dwarf-shrubland

CEGL001445 *Atriplex gardneri* / *Pascopyrum smithii* Dwarf-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 does not receive any additional water
- Slope is < 30%
- Soils are:
  - saline, sodic, or saline-sodic
  - Shallow, moderately deep, deep, or very deep (> 10" (25 cm) deep))
  - With < 3% stone and boulder cover and < 20% cobble and gravel cover
  - Not skeletal (<35% rock fragments) within 20" (51 cm) of mineral soil surface
  - Textures usually range from very fine sandy loam to clay loam or clay.

Saline Upland ecological site exist on well drained soils, derived from alkaline or sodic residuum weathered from a composite of sedimentary sources. Saline Upland spans all soil textures (sandy through clayey) grouping them based on the chemical similarities. There is a range of response based on textures varying in production and management responses between those sites that are sandy across to those sites with higher clay content, further exploration is needed to determine if division of the site is warranted. The need may exist to separate saline/sodic soils that are influenced strongly by gypsum or calcium carbonate accumulations; however, verification with soil laboratory data samples are needed.

## Associated sites

R032XY322WY	<b>Loamy (Ly) 10-14" East Precipitation Zone</b> Loamy sites are found on various upland positions where inter-bedded shales and sandstone formations create intermixed pockets with saline upland sites. Loamy occurring on concave areas where salts have been flushed lower in the profile, encouraging more desirable species to grow.
R032XY340WY	<b>Saline Lowland Drained (SLDr) 10-14" East Precipitation Zone</b> Saline Lowland Drained sites are found on relic stream terraces where down-cutting has removed the water table from reach of the plant community but receives some overland flow. As move up the landform, off of old floodplains/stream terraces, the site will transition into Saline Upland.

## Similar sites

R032XY144WY	<b>Saline Upland (SU) 5-9" Big Horn Basin Precipitation Zone</b> Saline Upland 5-9
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R032XY244WY	<b>Saline Upland (SU) 5-9" Wind River Basin Precipitation Zone</b> Saline Upland 5-9
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**Table 1. Dominant plant species**

Tree	Not specified
Shrub	(1) <i>Atriplex gardneri</i> (2) <i>Artemisia pedatifida</i>
Herbaceous	(1) <i>Achnatherum hymenoides</i> (2) <i>Elymus elymoides</i>

## Legacy ID

R043BX544WY

## Physiographic features

This site occurs on nearly level to moderately sloping land.

**Table 2. Representative physiographic features**

Landforms	(1) Foothills > Erosion remnant (2) Foothills > Alluvial fan (3) Foothills > Colluvial apron
Runoff class	Negligible to medium
Flooding duration	Extremely brief (0.1 to 4 hours) to brief (2 to 7 days)
Flooding frequency	None to rare
Elevation	1,646–2,286 m
Slope	0–15%
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.

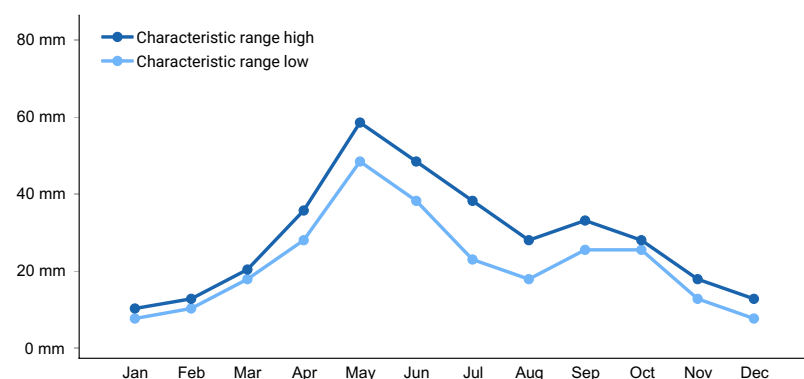
Review of a 30 year trend of data for Average Temperature as well as Average Precipitation, there has been a warming trend, but as the last 12 years graphed, the temperatures have swayed high and low, but overall it has maintained a steady trajectory, neither increasing nor decreasing. Where on the moisture 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.

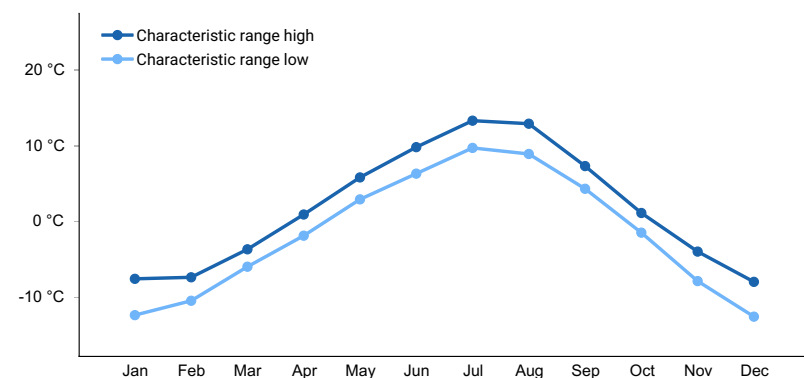
For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/>. "Buffalo Bill Dam", "Cody 21SW", "Thermopolis", "Thermopolis 25WNW" and "Wapiti 1NE" are the representative weather stations within LRU D. The following graphs 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**

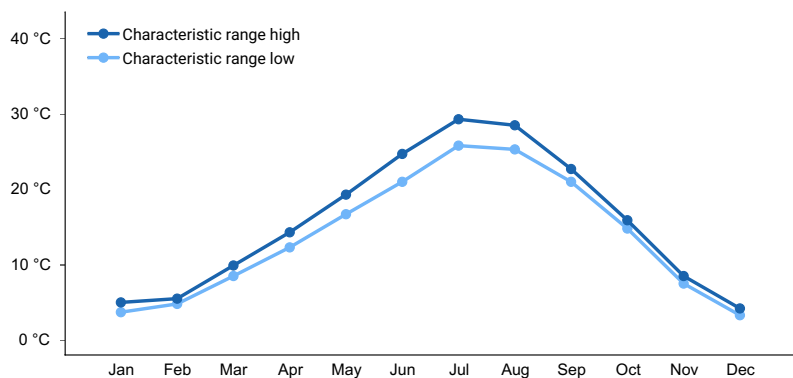
Frost-free period (characteristic range)	64-106 days
Freeze-free period (characteristic range)	101-144 days
Precipitation total (characteristic range)	279-305 mm
Frost-free period (actual range)	46-118 days
Freeze-free period (actual range)	88-147 days
Precipitation total (actual range)	254-330 mm
Frost-free period (average)	80 days
Freeze-free period (average)	117 days
Precipitation total (average)	305 mm



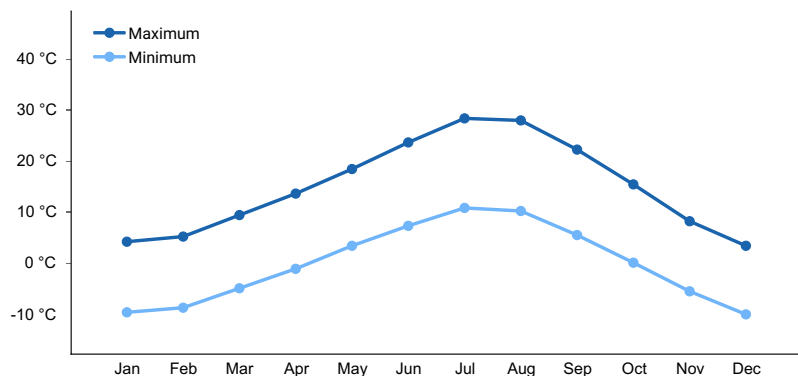
**Figure 1. Monthly precipitation range**



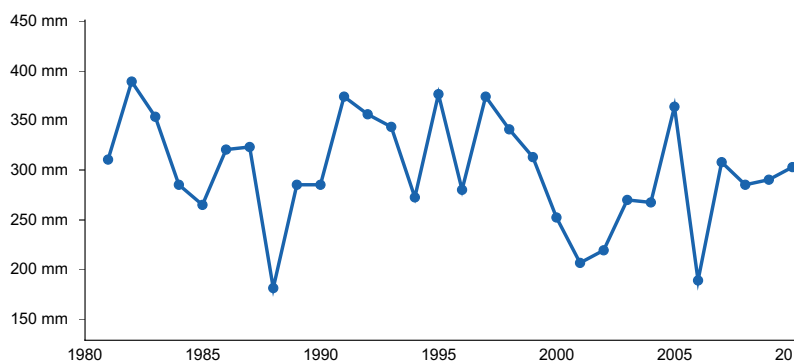
**Figure 2. Monthly minimum temperature range**



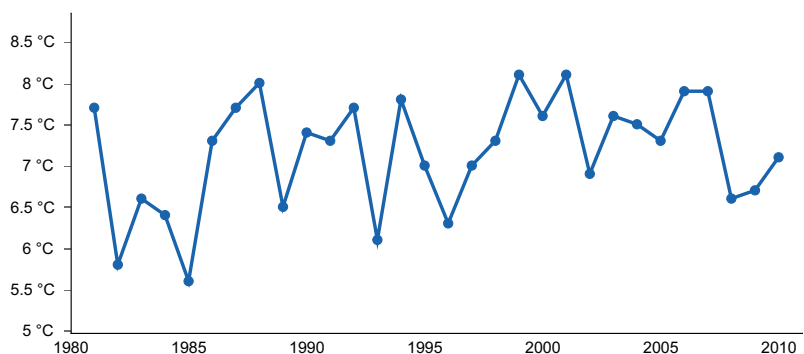
**Figure 3. Monthly maximum temperature range**



**Figure 4. Monthly average minimum and maximum temperature**



**Figure 5. Annual precipitation pattern**



**Figure 6. Annual average temperature pattern**

## Climate stations used

- (1) THERMOPOLIS [USC00488875], Thermopolis, WY
- (2) THERMOPOLIS 25WNW [USC00488888], Thermopolis, WY
- (3) SUNSHINE 3NE [USC00488758], Meeteetse, WY

- (4) CODY 21 SW [USC00481855], Cody, WY
- (5) WAPITI 1NE [USC00489467], Cody, WY
- (6) BUFFALO BILL DAM [USC00481175], Cody, WY

## Influencing water features

The characteristics of these upland soils have no influence from ground water (water table below 60 inches (150 cm)) and have minimal influence from surface water/overland flow. There may be isolated features that are affected by snow pack that persists longer than surrounding areas due to position on the landform (shaded/protected pockets).

## Soil features

The soils of this site may be 10-20 inches deep but are usually moderately deep (greater than 20" to bedrock) to very deep well-drained soils formed in alluvium from sodic or alkaline materials. These soils have moderate to slow permeability and are moderately to strongly saline and/or alkaline. The surface soil will vary from 2 to 6 inches in thickness. Some soils may contain more soluble salts in the subsoils than in the surface soils. The soil characteristic having the most influence on the plant community is the high quantity of soluble salts.

Major Soil Series correlated to this site include: Arvada and Kishona

**Table 4. Representative soil features**

Parent material	(1) Slope alluvium—sedimentary rock (2) Residuum—sedimentary rock
Surface texture	(1) Loam (2) Very fine sandy loam (3) Sandy clay loam (4) Clay loam (5) Silt loam (6) Clay
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Slow to moderate
Depth to restrictive layer	25 cm
Soil depth	51–152 cm
Available water capacity (0-101.6cm)	3.56–16 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	4–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	13–40
Soil reaction (1:1 water) (0-101.6cm)	7.4–10

## Ecological dynamics

Potential vegetation on this site is dominated by salt tolerant plants and drought resistant mid cool-season perennial grasses. The expected potential composition for this site is about 50% grasses, 10% forbs and 40% woody plants. The composition and production will vary naturally due to historical use, fluctuating precipitation and fire frequency.

As this site deteriorates, species such as birdfoot sagebrush and greasewood will increase. Weedy annuals will invade. Cool season grasses such as Indian ricegrass, bottlebrush squirreltail, and rhizomatous wheatgrasses will

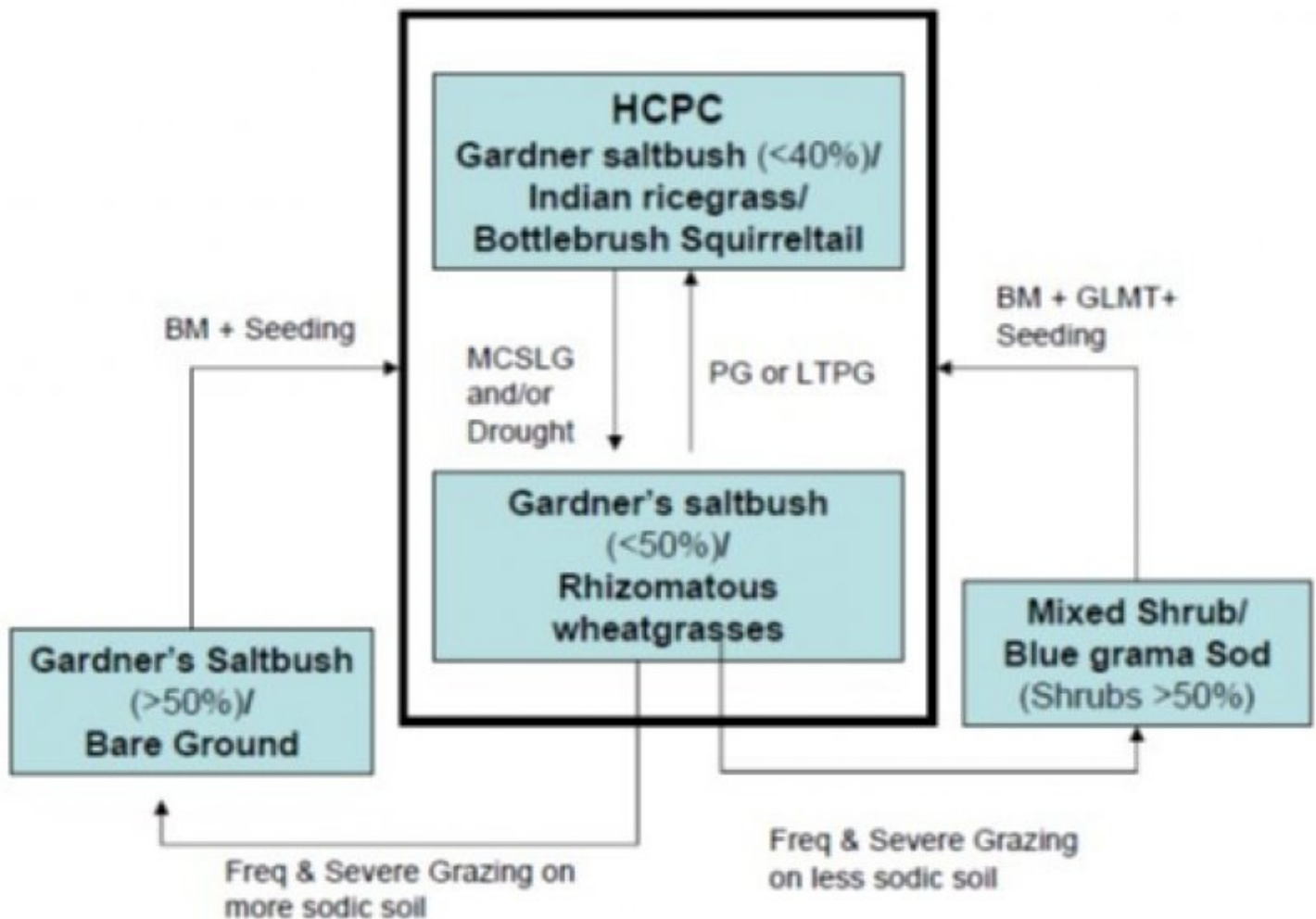
decrease in frequency and production.

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.

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they probably are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more data is collected, some of these plant communities may be revised or removed, and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities”. According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities (DPC’s) will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

## **State and transition model**



**BM** - Brush Management (fire, chemical, mechanical)  
**Freq. & Severe Grazing** - Frequent and Severe Utilization of the Cool-season Mid-grasses during the Growing Season  
**GLMT** - Grazing Land Mechanical Treatment  
**LTPG** - Long-term Prescribed Grazing  
**MCSLG** - Moderate, Continuous Season-long Grazing  
**NU, NF** - No Use and No Fire  
**PG** - Prescribed Grazing (proper stocking rates with adequate recovery periods during the growing season)  
**VLTPG** - Very Long-term Prescribed Grazing (could possibly take generations)  
**WF** - Wildfire



## Community 1.1

### Gardner's saltbush/ Indian ricegrass/ Bottlebrush Squirreiltail

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores and droughty saline and/or alkali soils. This plant community can be found on areas that are properly managed with grazing and on areas receiving short periods of rest. Potential vegetation is about 50% grasses or grass-like plants, 10% forbs, and 40% woody plants. Gardner's saltbush dominates this state. Other salt tolerant shrubs include winterfat and birdfoot sagebrush. The major grasses include Indian ricegrass, bottlebrush squirreiltail, and rhizomatous wheatgrasses. Other grasses occurring in this state include Sandberg bluegrass and bluebunch wheatgrass. A variety of forbs also occurs in this state and plant diversity is high (see Plant Composition Table). The total annual production (air-dry weight) of this state is about 450 pounds per acre, but it can range from about 275 lbs./acre in unfavorable years to about 650 lbs./acre in above average years. This state is fragile, but well adapted to the Northern Intermountain Desertic Basins climate. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community, but is difficult to reestablish when damaged. (Site/soil stability, watershed function, and biologic integrity). Transitions or pathways leading to other plant communities are as follows: • Moderate, Continuous Season-Long grazing will convert this plant community to the Gardner's Saltbush/Rhizomatous Wheatgrasses Plant Community.

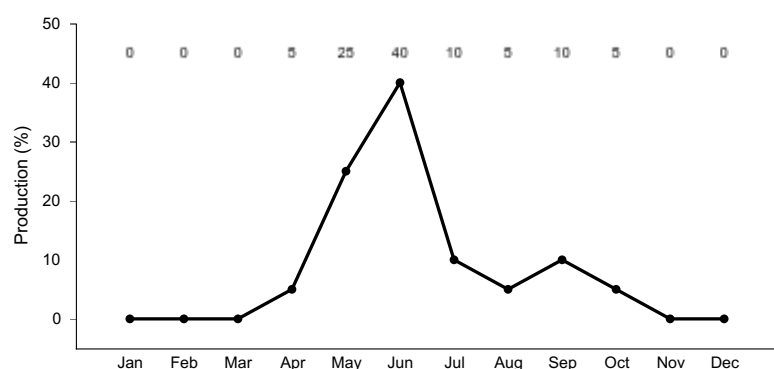


Figure 8. Plant community growth curve (percent production by month). WY0701, 10-14E upland sites.

## State 2

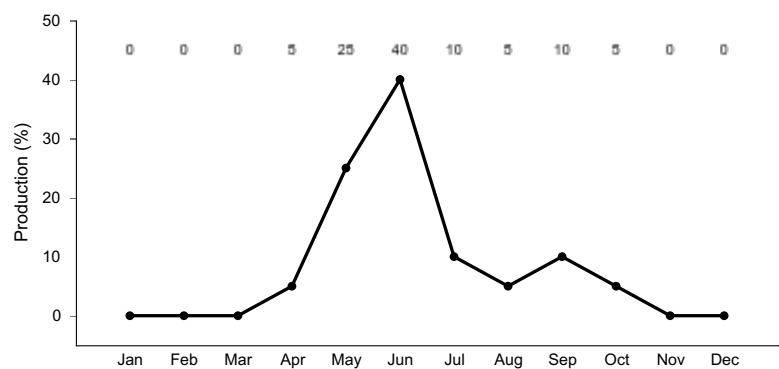
### Gardner's saltbush/ Rhizomatous wheatgrasses

## Community 2.1

### Gardner's saltbush/ Rhizomatous wheatgrasses

Historically, this plant community evolved under grazing by large ungulates. Currently this vegetation state is found under moderate, season-long grazing by livestock. Prolonged drought can also play an important role and will exacerbate these conditions. Gardner's saltbush and rhizomatous wheatgrasses are major components of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. The dominant grasses include rhizomatous wheatgrasses, bottlebrush squirreiltail, Sandberg bluegrass, and blue grama. Forbs commonly found in this plant community include smooth woodyaster, Cous biscuitroot, wild onion, and leafy wildparsley. Plains pricklypear and winterfat can also occur. When compared to the Historic Climax Plant Community, birdfoot sagebrush and blue grama have increased. Plains pricklypear cactus will have invaded, but occurs only in small patches. Indian ricegrass has decreased and may occur in only trace amounts within the patches of pricklypear. In addition, winterfat may or may not have changed depending on the season of use. The total annual production (air-dry weight) of this state is about 360 pounds per acre, but it can range from about 225 lbs./acre in unfavorable years to about 575 lbs./acre in above average years. This plant community is relatively resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. The herbaceous component is mostly intact and plant vigor and replacement capabilities are sufficient. Water flow patterns and litter movement may occur, but is not extensive. Incidence of pedestalling is minimal. Soils are mostly stable and the surface shows minimum soil loss. The watershed is functioning and the biotic community is intact. Transitional pathways leading to other plant communities are as follows: • Prescribed grazing or Long Term Prescribed Grazing will prevent further deterioration and over the long-term may return this state to near Historic Climax Plant Community Plant Community. • Frequent and severe grazing on less sodic soils will convert

this plant community to a Mixed Shrub/Blue Grama Sod Plant Community. • Frequent and severe grazing on more sodic soils will convert this state to Gardner’s Saltbush/*Bare Ground* Plant Community.

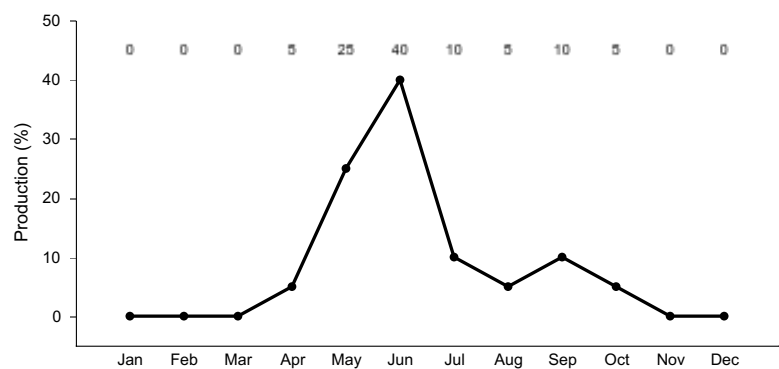


**Figure 9. Plant community growth curve (percent production by month). WY0701, 10-14E upland sites.**

## State 3 Mixed Shrub/ Blue grama Sod

### Community 3.1 Mixed Shrub/ Blue grama Sod

This plant community evolved under frequent and severe grazing on less sodic soils. Gardner’s saltbush, birdfoot sagebrush, greasewood, and blue grama are the dominant species of this plant community. A dense sod of blue grama can be common but mostly occurs in large mosaic patterns. Cool-season grasses have been mostly eliminated and if still present can only be found within patches of plains pricklypear. The dominant grass is blue grama but Sandberg bluegrass can be present. Cactus often has increased. Noxious weeds such as Russian knapweed and halogeton may invade the site. When compared with the HCPC or the Gardner’s Saltbush/Rhizomatous Wheatgrasses Plant Communities, the annual production is lower as is the production of Gardner’s saltbush and the perennial cool-season grasses. The total annual production (air-dry weight) of this state is about 225 pounds per acre, but it can range from about 125 lbs./acre in unfavorable years to about 450 lbs./acre in above average years. This plant community is resistant to change as the stand of blue grama is established and continued frequent and severe grazing or the removal of grazing does not seem to affect the plant composition or structure of the plant community. The biotic integrity of this state is minimally functional and plant diversity is moderate to low. Plant vigor is weakened and replacement capabilities are limited due to the reduced number of cool-season grasses. This state is stable and protected from excessive erosion. The sod formed by these grasses is resistant to water infiltration. While the soil is protected by this sod, excessive runoff may occur off-site. As a result, rills or other more severe erosion can occur on the adjoining sites. The watershed may or may not be functioning, as runoff may affect adjoining sites. The biotic integrity of this plant community is not intact. Transitions or pathways leading to other plant communities are as follows: • Grazing land mechanical treatment (chiseling and seeding, etc.) followed by prescribed grazing and BM if needed will return this plant community to near Historic Climax Plant Community.



**Figure 10. Plant community growth curve (percent production by month). WY0701, 10-14E upland sites.**

State 4  
Gardner's Saltbush/ Bare Ground

Community 4.1  
Gardner's Saltbush/ Bare Ground

This plant community can occur where sites are subjected to continuous yearlong grazing and where soils are highly sodic. Gardner's saltbush dominates this state and in some cases comprises almost 100% of the plant community. The interspaces between plants have expanded significantly leaving the amount of bare ground prevalent and the soil surface exposed to erosive elements. Cool season grasses have been eliminated or greatly reduced. Noxious weeds such as Russian knapweed and halogeton have likely invaded the large openings and can overwhelm the site. When compared to the HCPC, plant production is greatly diminished due to the excessive amount of bare ground. The total annual production (air-dry weight) of this state is about 125 pounds per acre, but it can range from about 50 lbs./acre in unfavorable years to about 225 lbs./acre in above average years. This plant community is resistant to change as the stand becomes more decadent. These areas may actually be more resistant to fire as less fine fuels are available and the bare ground between the sagebrush plants is increased. Continued frequent and severe grazing or the removal of grazing does not seem to affect the plant composition or structure of the plant community. Plant diversity is extremely low. The plant vigor is diminished and replacement capabilities are severely reduced due to the decrease in the number of cool-season grasses. Plant litter is noticeably less when compared to the HCPC. Soil erosion is accelerated because of increased bare ground. Water flow patterns and pedestalling are obvious. Infiltration is reduced and runoff is increased. Rill channels may be noticeable in the interspaces and gullies may be establishing where rills have concentrated down slope. Transitional pathways leading to other plant communities are as follows: • Brush Management and seeding, followed by prescribed grazing, will return this plant community at or near the HCPC.

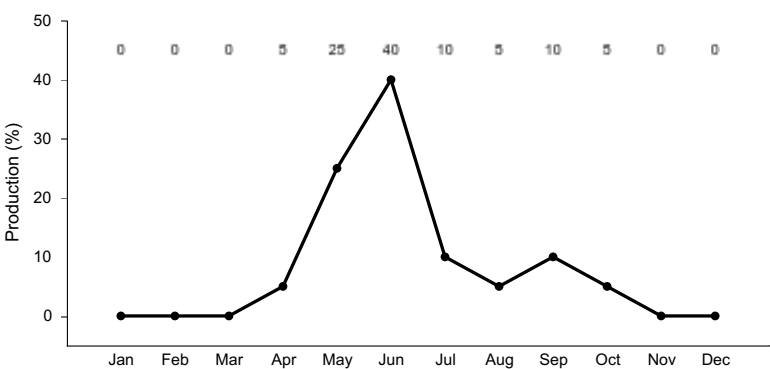


Figure 11. Plant community growth curve (percent production by month). WY0701, 10-14E upland sites.

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1				50–101	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	50–101	–
2				50–101	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	50–101	–
3				26–76	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	26–76	–
4				0–50	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–26	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–26	–
	Montana wheatgrass	ELAL7	<i>Elymus albicans</i>	0–26	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–26	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	0–26	–
<b>Forb</b>					
5				0–50	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–26	–
	textile onion	ALTE	<i>Allium textile</i>	0–26	–
	sulphur-flower buckwheat	ERUM	<i>Eriogonum umbellatum</i>	0–26	–
	cous biscuitroot	LOCO4	<i>Lomatium cous</i>	0–26	–
	leafy wildparsley	MUDI	<i>Musineon divaricatum</i>	0–26	–
	salsify	TRPO	<i>Tragopogon porrifolius</i>	0–26	–
	woodyaster	XYLOR	<i>Xylorhiza</i>	0–26	–
<b>Shrub/Vine</b>					
6				0–26	
	birdfoot sagebrush	ARPE6	<i>Artemisia pedatifida</i>	0–26	–
7				0–26	
	bud sagebrush	PIDE4	<i>Picrothamnus desertorum</i>	0–26	–
8				101–202	
	Gardner's saltbush	ATGA	<i>Atriplex gardneri</i>	101–202	–
9				0–26	
	winterfat	KRASC	<i>Krascheninnikovia</i>	0–26	–
10				0–26	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–26	–

## Animal community

### Animal Community – Wildlife Interpretations

Historic Climax Plant Community: The predominance of woody plants in this plant community provides winter grazing for mixed-feeders, such elk, and antelope. Suitable thermal and escape cover for these animals are limited due to the short stature of the woody plants. When found adjacent to sagebrush-dominated states, this plant community may provide lek sites for sage grouse. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Some grassland obligate small mammals would occur here.

Gardner's Saltbush/Rhizomatous Wheatgrasses Plant Community: The combination of shrubs, grasses, and forbs can provide a forage source for large animals. Suitable thermal and escape cover for these animals are limited due to the short stature of the woody plants. When found adjacent to sagebrush-dominated states, this plant community may provide lek sites for sage grouse. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Some grassland obligate small mammals would occur here.

Mixed Shrub/Blue Grama Sod Plant Community: These communities provide limited foraging for antelope and other grazers. This community may be used as a foraging site by sage grouse if proximal to woody cover. Generally, these are not target plant communities for wildlife habitat management.

Gardner's Saltbush/*Bare Ground* Plant Community: This plant community exhibits a low level of plant species diversity. It may provide some forage value for antelope, but 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)

Historic Climax Plant Community 275-650 .25

Gardner's Saltbush/Rhizomatous Wheatgrasses 225-575 .20

Mixed Shrub/Blue Grama Sod 125-450 .12

Gardner's Saltbush/*Bare Ground* 50-225 .05

\* - 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 and salinity are the principal factors 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 slow to moderate. 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. 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 may be present. Cryptogamic crusts are present, but only cover 1-2% of the soil surface.

### Recreational uses

This site provides some hunting opportunities for upland game species.

## Wood products

No appreciable wood products are present on the site.

## Other products

none noted

## Inventory data references

Information presented in the original site description was derived from NRCS inventory data. Field observations from range trained personnel were also used. Those involved in developing the original site include: Chris Krassin, Range Management Specialist, NRCS and Everett Bainter, Range Management Specialist. 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: Chris Krassin, Range Management Specialist, NRCS and Everett 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 (9.6 hoop used to estimate 10 points, clipped a minimum of 3 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.)

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## **Contributors**

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## **Approval**

Kirt Walstad, 5/01/2024

## **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)	Ray Gullion, E. Bainter
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Date	05/01/2008
Approved by	Kirt Walstad
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.  

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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 20-45%.  

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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:** Minimal to nonexistent.  

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7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter expected to move only in small amounts (to leeward side of shrubs) due to wind.  

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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 5 (under plant canopy), but average values should be 4.0 or greater.  

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Typically an A-horizon of greater than 3 inches (7 cm) with medium platy structure and color hues of 10YR or 5Y, values of 5-7, and chromas of 2-4. Sometimes a shallow E-horizon of 1 inch (3 cm) with weak platy structure that is grayish brown (i.e. 2.5Y 5/2) will replace the A-horizon. Organic matter typically ranges from 1 to 2%.



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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 30-65% grasses, 5% forbs, and 30-65% shrubs. Evenly distributed plant canopy (35-70%) and litter, but slow infiltration rates result in slight to moderate runoff. Basal cover is typically less than 5% for this site and does very little to effect 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, but some soil crusting in dry conditions is typical.
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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: perennial shrubs = mid-size, cool season bunchgrasses
- Sub-dominant: cool season rhizomatous grasses
- Other: short, cool season bunchgrasses = perennial forbs
- Additional:
- 
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimal decadence.
- 
14. **Average percent litter cover (%) and depth ( in):** Litter ranges from 10-30% of total canopy measurement with total litter (including beneath the plant canopy) from 25-50% expected. Herbaceous litter depth is typically shallow, ranging from 2-7 mm. Woody litter can be up to an inch (3 cm).
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 275-650 lb/ac (460 lb/ac average); Metric: 308-728 kg/ha (518 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 60% is the most common indicator of a threshold being crossed. Birdfoot sagebrush, greasewood, Sandberg bluegrass, and phlox are common increasers. Halogeton, kochia, and Russian thistle are common invasive species in disturbed sites.
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17. **Perennial plant reproductive capability:** All species are capable of reproducing, except in drought years.
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