USDA Natural Resources Conservation Service

Ecological site EX043B23A174
Subirrigated (Sb) Absaroka Lower Foothills

Last updated: 10/04/2019
Accessed: 05/18/2024

General information

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

MLRA notes

Major Land Resource Area (MLRA): 043B–Central Rocky Mountains

Major Land Resource Unit (MLRA) 43B: Central Rocky Mountains

43B – Central Rocky Mountains – The Central Rocky Mountains extends from northern Montana to southern extent of Wyoming and from Idaho to central Wyoming. The southern extent of 43B is comprised of a combination of metamorphic, igneous, and sedimentary mountains and foothills. Climatic changes across this extent are broad and create several unique breaks in the landscape.

Further information regarding MLRAs, refer to: United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.
Available electronically at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook.

LRU notes

Land Resource Unit (LRU) 43B23A: Absaroka Lower Foothills

Based on the shifts in geology, precipitation patterns and other climatic factors, as well as elevations and vegetation, the Absaroka Range was divided into LRU 23. Further division of this LRU is necessary due to the gradient moving from the foothills to the summit, as well as aspect shifts (north/east face versus south/west face). Subset A is set for the lower elevations within the foothills with 10 to 14 inches of precipitation. To verify or identify the LRU A (the referenced LRU for this ecological site), refer to the Wyoming LRU matrix key contained within the Ecological Site Key. This particular LRU occurs along the eastern lower foothills of the Absaroka Range. This LRU starts north of Clark, WY and runs to the Thermopolis, WY area. Once the foothills cross into the Northern Beartooth Range, the climatic patterns and elevational changes shifts the plant community and allows for a break in LRU's near the Montana state line. As the LRU follows to the south and tracks east with the intersection of the Absaroka and Owl Creek Ranges, the face changes aspect and geology creating a shift in plant dynamics and a break in the LRU. The extent of soils currently correlated to this ecological site does not fit within the digitized boundary. Many of the noted soils are provisional and will be reviewed and corrected in mapping update projects. Other map units are correlated as small inclusions within other MLRA’s/LRU’s based on elevation, landform, and biological references.

Moisture Regime: Aridic Ustic or Ustic Aridic – Progressive Initial mapping has shown that soil correlations completed prior to 2014 were identified as ustic aridic, after further evaluation of climatic and soil taxonomy information the proper moisture regime is aridic ustic. Both are recorded here until an update project is completed to correct the previous correlations.

Moisture Regime: Aquic - [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 aquic for this particular site or in rare cases, aridic ustic. All three are recorded here until an update project is completed to correct the previous correlations.

Temperature Regime: Frigid
Dominant Cover: Rangeland – Sagebrush Steppe (major species is Wyoming Big Sagebrush)
Representative Value (RV) Effective Precipitation: 10-14 inches (254 – 355 mm)
RV Frost-Free Days: 80-110 days

Classification relationships

Relationship to Other Established Classification Systems:

National Vegetation Classification System (NVC):
3 Xeromorphic Woodland, Scrub & Herb Vegetation Class
3.B Cool Semi-Desert Scrub & Grassland Subclass
3.B.1 Cool Semi-Desert Scrub & Grassland formation
3.B.1.NE Western North American Cool Semi-Desert Scrub & Grassland Division
M169 Great Basin & Intermountain Tall Sagebrush Shrubland & Steppe Macrogroup

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 influence by a water table below soil surface through the entire growing season (within 40 inches), and water may move over the surface from run-in but only for short periods.
• Slope is <6%
• Soils are:
- Shallow, moderately deep, deep, or very deep (depth to restrictive layer is greater than 10” (25 cm).
- Poorly to moderately well drained
- Textures usually range from loamy sand to clay loam
- Clay content is < 60% in mineral soil surface 4”.
- With an average particle size class < 40% clay
- Not saline, sodic, or saline-sodic, gypsic

Associated sites

R032XY306WY	**Clayey Overflow (CyO) 10-14" East Precipitation Zone** Clayey Overflow sites occur up-slope from the subirrigated site, on the stream terrace or alluvial vans in depressional areas. Clayey Overflow sites lack the influence from a water table and can be found on upland positions, but will occur on lowland positions as well.
R032XY330WY	**Overflow (Ov) 10-14" East Precipitation Zone** Overflow sites occur up-slope from the subirrigated site, on the stream terrace or alluvial vans in depressional areas. Overflow sites lack the influence from a water table and can be found on upland positions, but will occur on lowland positions as well.
R032XY328WY	**Lowland (LL) 10-14" East Precipitation Zone** Lowland sites are found in a complex with subirrigated and wetland sites. Subirrigated is the transition from the wettest site (wetland) to the drier site (lowland).
R032XY378WY	**Wetland (WL) 10-14" East Precipitation Zone** Wetland sites are found in a complex with Subirrigated and Lowland sites. Subirrigated is the transition from the wettest site (wetland) to the drier site (lowland).

Similar sites

R043BY374WY	**Subirrigated (Sb) 15-19” Foothills and Mountains East Precipitation Zone** Subirrigated 15-19” Foothills and Mountains East Precipitation Zone has higher production than this site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix*
Herbaceous	(1) *Leymus cinereus* (2) *Elymus trachycaulus*

Legacy ID

R043BX574WY

Physiographic features

This site is located on nearly level land adjacent to streams that run water at least during the major part of the growing season. In isolated areas, irrigation derived water tables on stream terraces will correlate to this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Foothills > Alluvial fan (2) Foothills > Drainageway (3) Foothills > Flood plain (4) Foothills > Stream terrace
Runoff class	Negligible to low
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Occasional to frequent
Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to frequent
Elevation	1,646–2,286 m
Slope	0–6%
Ponding depth	0–8 cm
Water table depth	30–152 cm
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

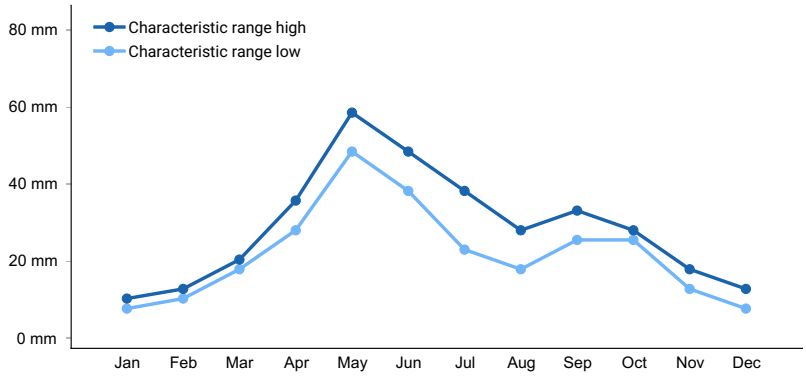


Figure 1. Monthly precipitation range

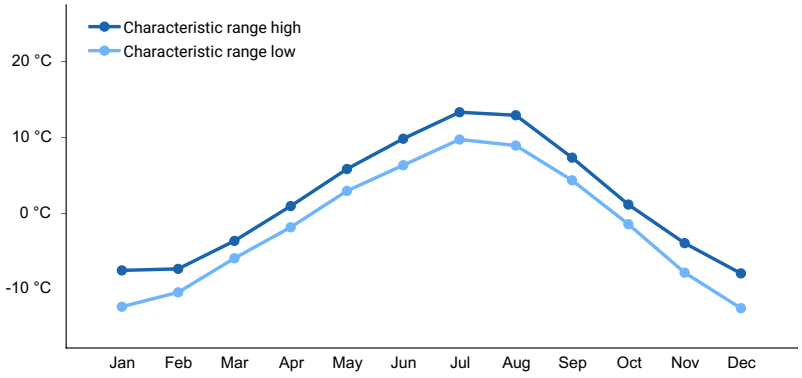


Figure 2. Monthly minimum temperature range

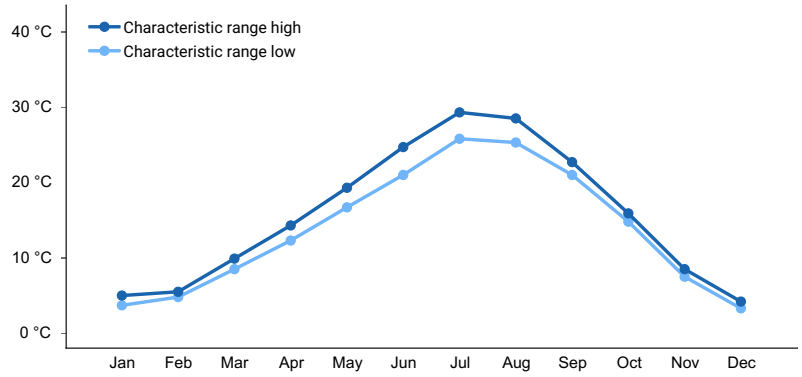


Figure 3. Monthly maximum temperature range

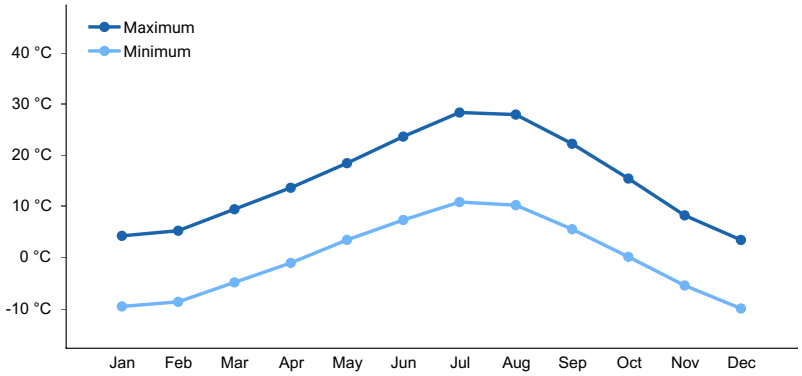


Figure 4. Monthly average minimum and maximum temperature

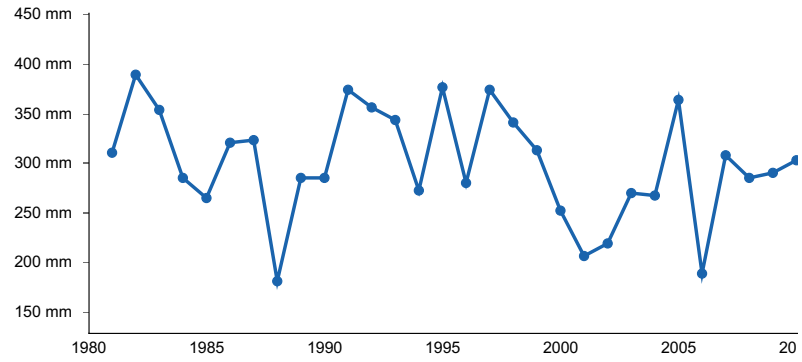


Figure 5. Annual precipitation pattern

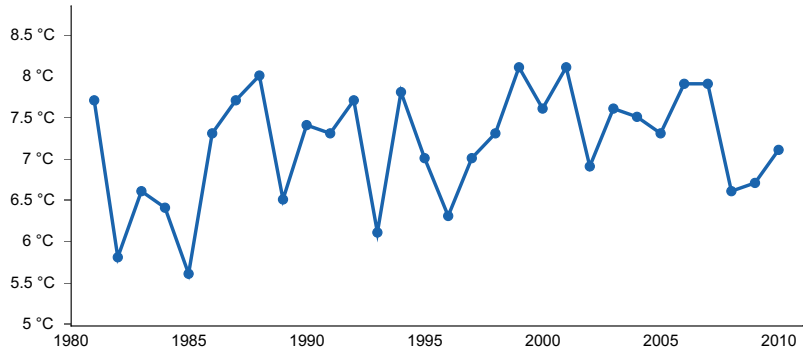


Figure 6. Annual average temperature pattern

Climate stations used

- (1) BUFFALO BILL DAM [USC00481175], Cody, WY
- (2) WAPITI 1NE [USC00489467], Cody, WY
- (3) CODY 21 SW [USC00481855], Cody, WY
- (4) SUNSHINE 3NE [USC00488758], Meeteetse, WY
- (5) THERMOPOLIS 25WNW [USC00488888], Thermopolis, WY
- (6) THERMOPOLIS [USC00488875], Thermopolis, WY

Influencing water features

The characteristics of these soils have influence from ground water that is within 40 inches of the soil surface and will be just below the surface for all of the growing season. Water over the surface from run-in may occur but only for short periods of time. These soils are moderately deep to deep and poorly to somewhat well drained.

Wetland description

No wetland classification determined for this site.
Stream Type: C (Rosgen)

Soil features

The soils of this site are moderately deep to very deep poorly drained to moderately well drained soils formed in mixed alluvium. These soils have slow to rapid permeability. These soils have water tables below the surface for all of the growing season. These areas may have water over the surface from run-in but only for short periods. The soil characteristics having the most influence on the plant community are depth to a water table during the growing season and the minimal amount of soluble salts.

Major Soil Series correlated to this site include: Albicalis-like, Baden-like, Hagga-like, Jedsteer, Tefton-like, Toddcan, Whistlecreek-like

Table 4. Representative soil features

Parent material	(1) Alluvium–igneous, metamorphic and sedimentary rock
Surface texture	(1) Gravelly loam (2) Cobbly clay loam (3) Clay (4) Sandy loam (5) Loamy sand (6) Silt loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained to poorly drained
Permeability class	Slow to rapid

Soil depth	51–152 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	5.59–16.76 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–10
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

Potential vegetation on this site is dominated by plants that can tolerate a water table near the surface for most of the growing season. Significant vegetation includes tall and mid cool season grasses, and a variety of riparian shrubs and forbs. The expected potential composition for this site is about 70% grasses, 10% forbs and 20% woody plants. The composition and production will vary naturally due to historical use, fluctuating precipitation and fire frequency.

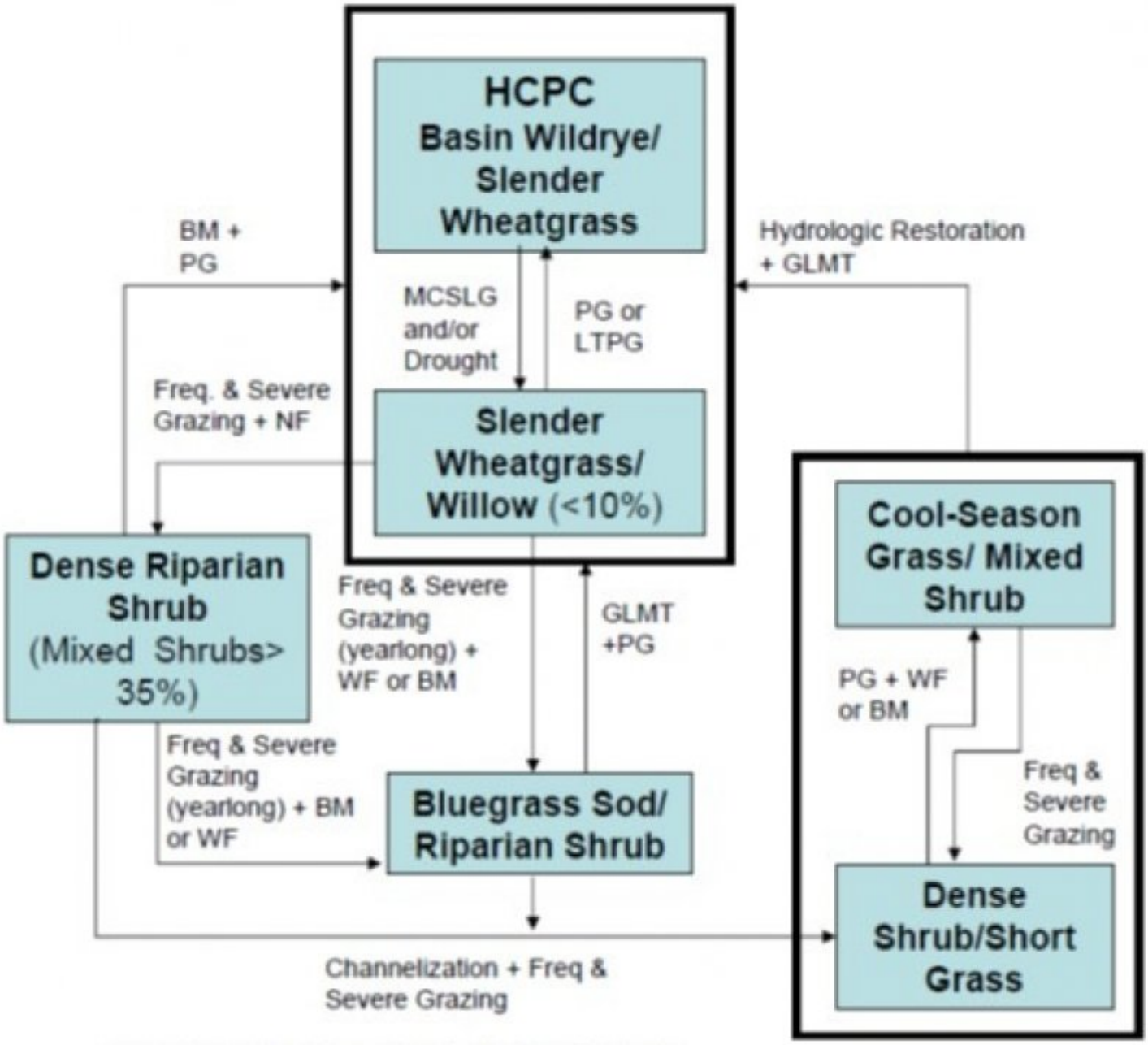
As this site deteriorates, species such as willows, wild rose, and boxelder will increase. Weedy annuals and Kentucky bluegrass will invade. Cool season grasses such as basin wildrye and slender wheatgrass will decrease in frequency and production.

The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

Plant Community Narratives
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

State 1
Basin Wildrye/Slender Wheatgrass

Community 1.1
Basin Wildrye/Slender Wheatgrass

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores, a water table within reach of the herbaceous plants through most of the growing season, and periodic fires. Potential vegetation is about 70% grasses or grass-like plants, 10% forbs and 20% woody plants. Cool season tall and mid-grasses dominate this state. The major grasses include basin wildrye and slender wheatgrass. Other grasses occurring in this state include tufted hairgrass, rhizomatous wheatgrasses, big bluegrass, and bluejoint reedgrass. Riparian shrubs comprise the primary overstory species, but may include tree species as well. A variety of forbs occurs in this state as well (see Plant Composition Table). The total annual production (air-dry weight) of this state is about 3600 pounds per acre, but it can range from about 2800 lbs./acre in unfavorable years to about 4500 lbs./acre in above average years. This plant community is extremely stable and 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 (site/soil stability, watershed function, and biologic integrity). Transitions or pathways leading to other plant communities are as follows: • Moderate, continuous season-long grazing and Drought will convert this plant community to the Slender Wheatgrass/Willow Plant Community. Prolonged drought will exacerbate this transition, as periodic flooding of the site will not occur.

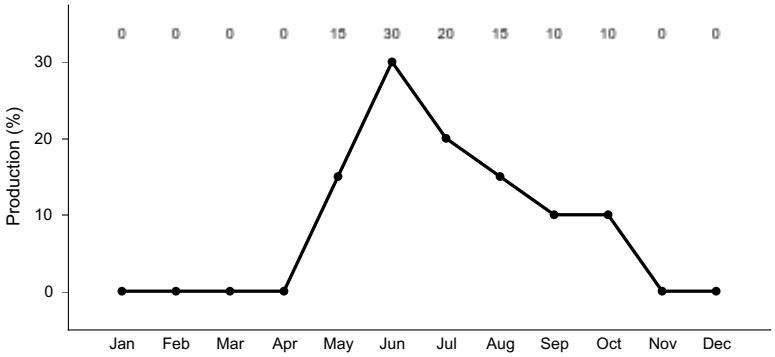


Figure 8. Plant community growth curve (percent production by month). WY0703, 1014E Free water sites - WL, Sb, SS.

State 2
Slender Wheatgrass/ Willow

Community 2.1
Slender Wheatgrass/ Willow

This plant community evolved under moderate grazing by domestic livestock, a water table within reach of the herbaceous plants through most of the growing season, and fire suppression. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grasses, and miscellaneous forbs. Willows and other riparian shrubs comprise up to about one-third of the total annual production of this plant community. Dominant grasses include slender wheatgrass, rhizomatous wheatgrasses, and bluejoint reedgrass. Grasses/grasslikes of secondary importance include big, and Canby bluegrasses, and inland sedge. Forbs include similar species as the HCPC. Willows and a variety of riparian species comprise most of the total annual shrub production. When compared to the Historical Climax Plant Community, basin wildrye has decreased. Rhizomatous wheatgrasses, all species of bluegrass and inland sedge have increased. All Shrubs and forbs have also increased. The total annual production (air-dry weight) of this state is about 3200 pounds per acre, but it can range from about 2600 lbs./acre in unfavorable years to about 3600 lbs./acre in above average years. This state is stable and protected from excessive erosion. The biotic integrity of this plant community is intact. The watershed is functioning. Water flow patterns and litter movement may be occurring but in isolated areas. Incidence of pedestalling is minimal. Soils are mostly stable and the surface shows minimum soil loss. Transitional pathways leading to other plant communities are as follows: • Prescribed grazing over the long-term will result in a plant community very similar to the Historic Climax Plant Community. In addition, the removal of fire suppression will allow a somewhat natural fire regime to reoccur to more easily transition between this plant community and the HCPC. A prescribed fire treatment can be useful to hasten this transition if desired. Without fire as a natural component, the frequency and production of shrub species may continue to be higher than desired in the HCPC. • Frequent and severe grazing plus fire or brush control will convert this plant community to a Bluegrass Sod/

Riparian Shrub Plant Community. • Frequent and severe grazing plus no fire or brush control will convert this plant community to the Dense Riparian Shrub Plant Community.

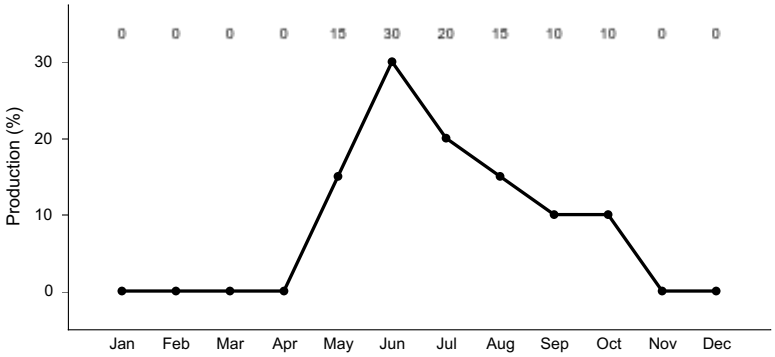


Figure 9. Plant community growth curve (percent production by month). WY0703, 1014E Free water sites - WL, Sb, SS.

State 3
Dense Riparian Shrub

Community 3.1
Dense Riparian Shrub

This plant community evolved under frequent and severe grazing and no fire or brush control. Extended periods of drought will exacerbate this situation. The hydrologic features of this site are still functioning. Shrubs dominate this state as the herbaceous plants have been removed by shading from the shrubs as well as grazing pressure. Tall and medium cool season grasses have been reduced or eliminated. The annual grasses, warm season grasses, and annual forbs have increased in the small patches where the shrubs have not become too dense. Total annual production is mostly from shrubs and these condensed patches of herbaceous plants. Shrubs make up greater than 35% of the total annual production and typically account for more than two thirds of this production. When compared with the HCPC, the annual production is slightly less but the dense shrub component makes up for the loss in herbaceous production. The total annual production (air-dry weight) of this state is about 2800 pounds per acre, but it can range from about 2600 lbs./acre in unfavorable years to about 3200 lbs./acre in above average years. This plant community is resistant to change as the stand becomes more decadent. The dense nature of this state makes any fire during the summer extremely intense and if burned usually results in delayed succession, as the soils are usually sterile. 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 exception is if trampling or browsing of the shrubs is severe enough and sustained for a number of years to reduce frequency and production of the shrubs on the site or even possible total removal. The dense overstory, warm-season grasses, weedy species and bare ground can compromise the biotic integrity. Plant diversity is moderate to poor and the potential for native grasses to reproduce is minimal. The shift in the vegetative structure and function is moderate to extreme, the biotic integrity is minimally functional as the dominant tall and mid-grasses have been reduced. The soil of this state is somewhat protected where the sod patches are located but erosion has accelerated between the patches where bare ground is common. Water flow patterns and pedestalling are obvious. Hummocks are likely present but not usually pervasive. Infiltration is reduced and runoff is increased. Rill channels may be noticeable in the interspaces and gullies may be establishing where rills have concentrated. Transitional pathways leading to other plant communities are as follows: • Brush management plus prescribed grazing will convert this plant community to HCPC. • Wildfire or brush Management plus frequent and severe grazing (yearlong) will convert this plant community to a Bluegrass Sod/ Riparian Shrub Plant Community. • Channelization plus frequent and severe grazing will convert this plant community to a Dense Shrub/Warm-Season Grass Plant Community.

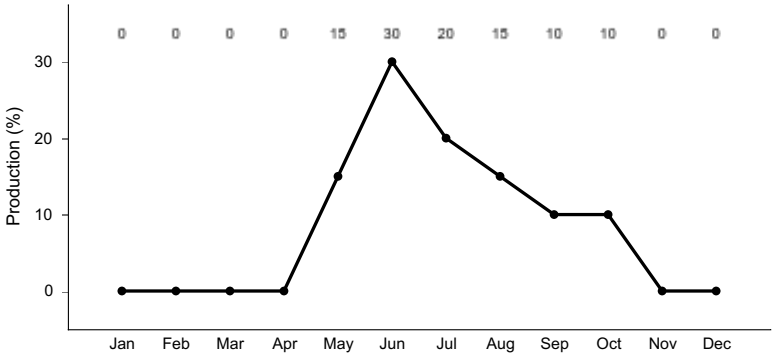


Figure 10. Plant community growth curve (percent production by month). WY0703, 1014E Free water sites - WL, Sb, SS.

State 4
Bluegrass Sod/ Riparian Shrub

Community 4.1
Bluegrass Sod/ Riparian Shrub

This plant community is the result of long-term improper grazing use. The hydrologic features of this site may or may not be functioning as flooding is occurring but may be less than in the past. This plant community is dominated by a dense short grass sod of Kentucky bluegrass and includes a mosaic of riparian shrub overstory. Weedy forbs are prevalent and noxious weeds such as Russian knapweed, Canada thistle, and leafy spurge have invaded the site, if a seed source is available. Shrub species include willows, western snowberry, water birch, shrubby cinquefoil, and wild rose. When compared to the Historic Climax Plant Community, the tall and medium grasses are reduced or absent. Short warm season grasses are dominant and weedy annuals are common. Shrubs will have increased as a percentage of the total production, but will not dominate as the sod prevents a homogeneous shrub cover. Areas of bare ground may have increased in patches and total production has decreased. Total production is reduced but the increase in shrubs and Kentucky bluegrass offset some of the loss of tall and mid perennial grasses. The total annual production (air-dry weight) of this state is about 2600 pounds per acre, but it can range from about 2200 lbs./acre in unfavorable years to about 3000 lbs./acre in above average years. The sod component of this plant community is extremely resistant to change 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 mostly not functional as plant diversity is poor especially amongst herbaceous species. The vegetative structure is not intact, as warm season grasses and weedy plants are prevalent and the tall and most of the mid-grasses are absent. This sod bound plant community is very resistant to water infiltration. While this sod protects the site itself, excessive runoff increases erosion on bare ground and can cause rill channels and gully erosion. Water flow patterns are obvious in the bare ground areas and shrubs and sod patches are pedestalled. Hummocks are usually present and may be widespread. Rill channels are noticeable in the interspaces and gullies may be establishing where rills have concentrated. The watershed may or may not be functioning, as runoff is excessive and erosional processes are accelerated. Transitional pathways leading to other plant communities are as follows • Grazing land mechanical treatment, plus prescribed grazing and/or brush management or wildfire will convert this plant community in to the Slender Wheatgrass/Willow Plant Community. This sod is extremely resistant to change and will require grazing land mechanical treatments, such as chiseling, to change to a different state. Reseeding areas with native plant species and implementing proper grazing management will accelerate this change where few desirable plants remain. Fire may also be necessary to open up areas dominated by riparian shrubs. • Channelization plus frequent and severe grazing will convert this plant community to a Dense Shrub/Short Grass Plant Community.

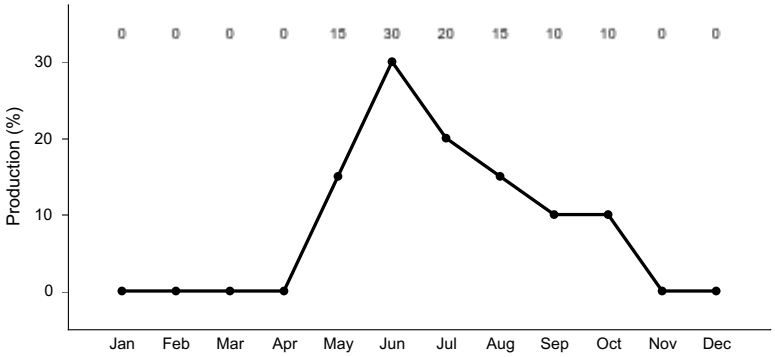


Figure 11. Plant community growth curve (percent production by month). WY0703, 1014E Free water sites - WL, Sb, SS.

State 5
Dense Shrub/ Short Grass

Community 5.1
Dense Shrub/ Short Grass

This plant community evolved under frequent and severe grazing and channelization or down cutting of an adjacent water source. The disruption in the natural hydrologic regime is either directly caused by human, such as dams or dikes, or indirectly through accelerated erosion and channelization. Extended periods of drought will exacerbate this situation. Upland plants are more pronounced and shrubs dominate the site. Shrub species can vary and range from a dominant basin big sagebrush and/or rubber rabbitbrush plant community on drier warmer sites to cooler wetter sites with a mixture of sagebrush and isolated patches of riparian species. Tall and medium cool season grasses have been reduced or eliminated. Dense sod patches of Kentucky bluegrass and/or upland short grasses occur amongst the shrubs and bare ground. The annual grasses and forbs such as cheatgrass, kochia, halogeton, and Russian thistle, are prevalent along with noxious weeds such as Russian knapweed. Total annual production is mostly from shrubs and these short grasses. Shrubs make up greater than 40% of the total annual production. When compared with the HCPC, the annual production is reduced but the dense shrub component makes up for some of this loss in total production. The total annual production (air-dry weight) of this state is about 1500 pounds per acre, but it can range from about 1000 lbs./acre in unfavorable years to about 1800 lbs./acre in above average years. This plant community is resistant to change as the stand becomes more decadent. These areas may actually become more susceptible to severe fire as the brush becomes denser and the fire loads increase. Continued frequent and severe grazing or the removal of grazing does not seem to affect the plant composition or structure of the plant community. Short grasses, weedy species and bare ground compromise the biotic integrity. Plant diversity is poor and the potential for native grasses to reproduce is absent. The shift in the vegetative structure and function is extreme and the biotic integrity is lost. The soil of this state is somewhat protected where the sod patches are located and the dense shrubs occur, but erosion has accelerated in places between the patches where bare ground may be common. Water flow patterns and pedestalling are obvious. Infiltration is reduced and runoff is increased. Rill channels may be noticeable in the interspaces. Transitional pathways leading to other plant communities are as follows: • Brush management plus prescribed grazing without restoring the hydrologic function, will convert this plant community to a Cool-Season Grass/Mixed Shrub Plant Community. • Hydrologic restoration and grazing land mechanical treatment, will convert this plant community in to the Slender Wheatgrass/Willow Plant Community. Restoring the hydrological function of an area is usually very expensive and may take many years. This may require reintroducing both periodic flooding and an overflow regime. In addition, grazing land mechanical treatment, such as chiseling, and reseeding with natives to accelerate recovery is usually required. Fire may also be necessary to open up areas dominated by riparian shrubs so seedlings can establish.

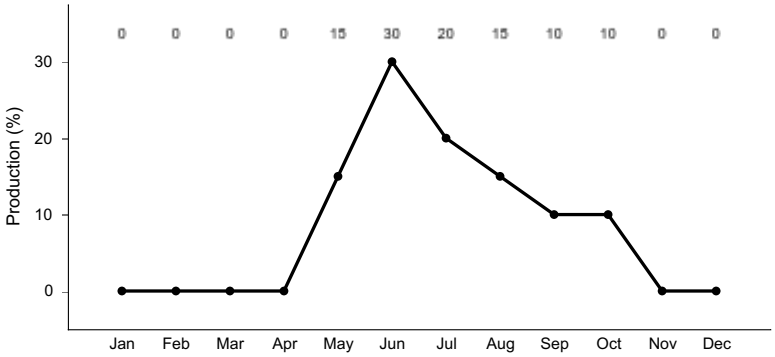


Figure 12. Plant community growth curve (percent production by month). WY0703, 1014E Free water sites - WL, Sb, SS.

State 6
Cool-Season Grass/ Mixed Shrub

Community 6.1
Cool-Season Grass/ Mixed Shrub

This plant community can occur where the Dense Shrub/Short Grass Plant Community under goes brush management treatment and a prescribed grazing management practice is implemented. Preferred cool season grasses have reestablished and shrubs have been controlled, but are still a part of the community. Upland plants are more pronounced as the hydrologic regime has been disrupted and the water table has been greatly altered. This state is dominated by an overstory of a variety of shrubs, such as basin big sagebrush, rubber rabbitbrush, and silver sagebrush. Small patches of riparian shrubs may remain where moisture can accumulate. Perennial cool season mid-grasses have once again reestablished such as rhizomatous wheatgrasses, Indian ricegrass, needleandthread, and bottlebrush squirreltail. Other grasses include Sandberg bluegrass and blue grama. Basin wildrye and slender wheatgrass may also be reestablishing but will not be at the frequency or productivity found in the HCPC. Patches of annuals such as cheatgrass and other weedy annual forbs such as halogeton, Russian thistle, and kochia may persist on this site. Noxious weeds such as Russian knapweed may also remain if not treated. The interspaces between plants will have diminished in size. When compared with the HCPC, the annual production has been significantly reduced and the plant composition is clearly unique as upland plants now make up the balance of the species. The total annual production (air-dry weight) of this state is about 1800 pounds per acre, but it can range from about 1200 lbs./acre in unfavorable years to about 2400 lbs./acre in above average years. This plant community is mostly resistant to change, but species composition can be altered through long-term overgrazing. The herbaceous component is stable, but does not include most climax species. Plant vigor and replacement capabilities are sufficient. The biotic community is not intact because of the predominant upland plants and lack of climax grass species. Plant diversity is moderate. Soils are mostly stable and recent soil loss is minimal. This should not be confused with evidence of remnant erosion. Water flow patterns and litter movement is stable but is still occurring on steeper slopes. Incidence of pedestalling is improving. The watershed is not functioning. Transitional pathways leading to other plant communities are as follows: • Frequent and severe grazing will convert this plant community to the Dense Shrub/Short Grass Plant Community. Prolonged drought will exacerbate this transition. • Hydrologic restoration and grazing land mechanical treatment, will convert this plant community to the Slender Wheatgrass/Willow Plant Community. Restoring the hydrological function of an area is usually very expensive and may take many years. This may require reintroducing both periodic flooding and an overflow regime. In addition, grazing land mechanical treatment, such as chiseling, and reseeding with natives to accelerate recovery is usually required. Fire may also be necessary to open up areas dominated by riparian shrubs so seedlings can establish.

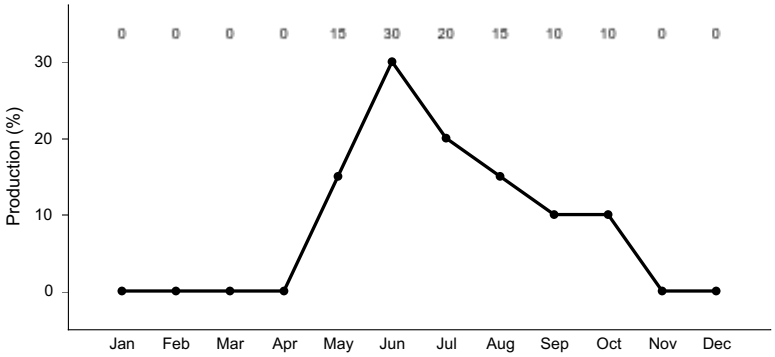


Figure 13. Plant community growth curve (percent production by month). WY0703, 1014E Free water sites - WL, Sb, SS.

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				1412–2018	
	basin wildrye	LECI4	*Leymus cinereus*	1412–2018	–
2				605–1009	
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	605–1009	–
3				404–1009	
	Grass, perennial	2GP	*Grass, perennial*	0–202	–
	Macoun's reedgrass	CACAM	*Calamagrostis canadensis var. macouniana*	0–202	–
	inland sedge	CAIN11	*Carex interior*	0–202	–
	thickspike wheatgrass	ELLA3	*Elymus lanceolatus*	0–202	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–202	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0–202	–
Forb					
4				0–404	
	Forb, perennial	2FP	*Forb, perennial*	0–202	–
	yarrow	ACHIL	*Achillea*	0–202	–
	water hemlock	CICUT	*Cicuta*	0–202	–
	horsetail	EQUIS	*Equisetum*	0–202	–
	fleabane	ERIGE2	*Erigeron*	0–202	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–202	–
	common cowparsnip	HEMA80	*Heracleum maximum*	0–202	–
	iris	IRIS	*Iris*	0–202	–
	mint	MENTH	*Mentha*	0–202	–
	phlox	PHLOX	*Phlox*	0–202	–
	American bistort	POBI6	*Polygonum bistortoides*	0–202	–
	cinquefoil	POTEN	*Potentilla*	0–202	–
	buttercup	RANUN	*Ranunculus*	0–202	–
	dock	RUMEX	*Rumex*	0–202	–

	dock	RUMEX	*Rumex*	0–202	
	goldenbanner	THERM	*Thermopsis*	0–202	–
	clover	TRIFO	*Trifolium*	0–202	–
	swamp verbena	VEHA2	*Verbena hastata*	0–202	–
Shrub/Vine					
5				202–1009	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–202	–
	boxelder	ACNE2	*Acer negundo*	0–202	–
	water birch	BEOC2	*Betula occidentalis*	0–202	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–202	–
	narrowleaf cottonwood	POAN3	*Populus angustifolia*	0–202	–
	Woods' rose	ROWOW	*Rosa woodsii var. woodsii*	0–202	–
	willow	SALIX	*Salix*	0–202	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0–202	–

Animal community

Animal Community - Wildlife Interpretations

Historic Climax Plant Community: The predominance of grasses and shrubs in this plant community favors grazers and mixed-feeders, such as bison, elk, moose, deer, and antelope. Suitable thermal and escape cover exists. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for upland game birds including sage grouse. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Many grassland obligate small mammals would occur here.

Slender Wheatgrass/Willow Plant Community: This plant community is extremely useful for the same large grazers that would use the Historic Climax Plant Community. It provides forage year around forage and cover and especially during critical times such as times of drought and winter. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for upland game birds including sage grouse. Good grasshopper habitat equals good foraging for birds. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Many grassland obligate small mammals would occur here.

Dense Riparian Shrub Plant Community: This plant community can provide important winter cover and forage for mule deer, moose, and antelope during that critical time. Grazers, however, will find little forage value in this state. The plant community composition comprises little diversity, and thus, less apt to meet all the seasonal needs of large grazers. The dense shrub cover does provide good thermal and escape cover for both large animals and upland birds.

Bluegrass Sod/Riparian Shrub Plant Community : This plant community may be useful for the same large grazers 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 some animals. It may provide some foraging opportunities for sage grouse when it occurs proximal to woody cover. Good grasshopper habitat equals good foraging for birds. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles.

Dense Shrub/Short Grass Plant Community: The proximity to water makes this state important for wildlife such as birds, mule deer, and whitetail deer. However, the plant community composition is less diverse and productive, and thus, less apt to meet the seasonal needs of these animals. The dense shrub cover does provide good thermal and escape cover for both large animals and upland birds. However, it provides little foraging opportunities for upland game birds, as fewer forbs are available. Many grassland obligate small mammals would occur here.

Cool-Season Grass/Mixed Shrub Plant Community: The proximity to water makes this state important for wildlife such as birds, mule deer, and whitetail deer. The plant community composition is diverse, and able to meet the seasonal needs of these animals. It will provide foraging opportunities for upland game birds and sage grouse.

Good grasshopper habitat equals good foraging for birds. Many grassland obligate small mammals would occur here.

Animal Community – Grazing Interpretations

The following table lists suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These conservative estimates 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 (lb./ac)	Carrying Capacity* (AUM/ac)
Historic Climax Plant Community	2800-4500	2.0
Slender Wheatgrass/Willow	2600-3600	1.5
Dense Riparian Shrub	2600-3200	0.6
Bluegrass Sod/Riparian Shrub	2200-3000	1.0
Dense Shrub/Short Grass	1000-1800	.30
Cool-Season Grass/Mixed Shrub	1200-2400	.35

* - 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 rapid. Runoff potential for this site varies from low to moderate depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where short-grasses form a strong sod and dominate the site. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information).

Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. Pedestals are only slightly present in association with bunchgrasses. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game species. The wide varieties of plants, which bloom from spring until fall, have an esthetic value that appeals to visitors.

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 Everet 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 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 (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

D. Tranas

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)	Ray Gullion, E. Bainter

Contact for lead author	ray.gullion@wy.usda.gov or 307-347-2456
Date	05/02/2008
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 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 typically 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 exhibits slight movement only associated with 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 typically 6.0.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface highly variable, from 2 to 20 inches (5-50 cm) in depth with OM of 1-3%.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community consists of 55-75% grasses, 15% forbs, and 10-30% shrubs. Dense plant canopy (75-100%) and litter plus moderate to moderately rapid infiltration rates result in minimal to nonexistent 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 tall, cool season bunchgrasses

    Sub-dominant: perennial shrubs rhizomatous grass-likes

    Other: perennial forbs cool season rhizomatous grasses

    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 1-25% of total canopy measurement with total litter (including beneath the plant canopy) from 75-100% expected. Herbaceous litter depth typically ranges from 10-25 mm. Woody litter can be up to a couple inches (4-6cm).

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 2800 - 4500 lb/ac (3650 lb/ac average); Metric: 3136 - 5040 kg/ha (4088 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% and presence of noxious weeds or Kentucky bluegrass are the most common indicators of a threshold being crossed. Willows, wild rose, boxelder, Baltic rush, inland sedge and shrubby cinquefoil are common increasers. Kentucky bluegrass and Canada thistle are common invasive species.

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