

Ecological site R032XY328WY

Lowland (LL) 10-14" East Precipitation Zone

Accessed: 05/16/2024

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.

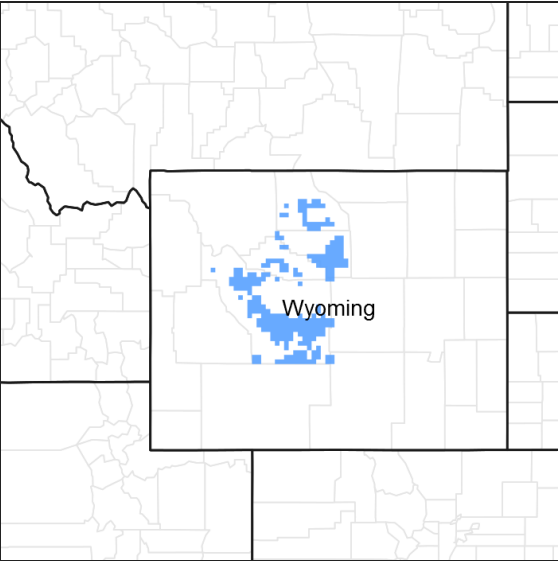


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Associated sites

R032XY304WY	Clayey (Cy) 10-14" East Precipitation Zone
R032XY306WY	Clayey Overflow (CyO) 10-14" East Precipitation Zone
R032XY322WY	Loamy (Ly) 10-14" East Precipitation Zone
R032XY330WY	Overflow (Ov) 10-14" East Precipitation Zone

Similar sites

R032XY228WY	Lowland (LL) 5-9" Wind River Basin Precipitation Zone
R032XY128WY	Lowland (LL) 5-9" Big Horn Basin Precipitation Zone

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

## 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.

**Table 2. Representative physiographic features**

Landforms	(1) Alluvial fan (2) Drainageway (3) Stream terrace
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	1,646–2,286 m
Slope	0–6%
Ponding depth	0 cm
Water table depth	91–152 cm
Aspect	Aspect is not a significant factor

## Climatic features

Annual precipitation ranges from 10-14 inches per year. The normal precipitation pattern shows the least amount of precipitation in December, January, and February, increasing to a peak during the latter part of May. Amounts decrease through June, July, and August and then increase some in September. 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 exceeds 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.

Winds are generally not strong as compared to the rest of the state. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 75 mph.

Growth of native cool-season plants begins about April 15 and continues to about July 15. Cool weather and moisture in September may produce some green up of cool season plants that will continue to late October.

The following information is from the “Thermopolis 2” climate station:

Minimum Maximum 5 yrs. out of 10 between

Frost-free period (days): 74 149 May 23 – September 16

Freeze-free period (days): 112 180 May 8 – October 1

Annual Precipitation (inches): 7.6 21.9

Mean annual precipitation: 12.35 inches

Mean annual air temperature: 46.2 F (30.1 F Avg. Min. to 62.3 F Avg. Max.)

For detailed information, visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/> website. Other climate station(s) representative of this precipitation zone include “Grass Creek 1E”, “Thermopolis”, Thermopolis 25NW”, “Buffalo Bill Dam” and “Black Mountain”.

**Table 3. Representative climatic features**

Frost-free period (average)	149 days
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Freeze-free period (average)	180 days
Precipitation total (average)	356 mm

## Influencing water features

Stream Type: C (Rosgen)

## Soil features

The soils of this site are moderately deep to very deep poorly drained to well-drained soils formed in mixed alluvium. These soils have slow to rapid permeability. The surface soil will be highly variable and vary from 2 to 8 inches in thickness over gravel or bedrock. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. A fluctuating water table occurs in these areas that is usually deeper than 3 feet but within the reach of trees. 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:

**Table 4. Representative soil features**

Surface texture	(1) Loam (2) Clay loam (3) Clay
Family particle size	(1) 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)	2.54–15.24 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 tall and mid cool-season perennial grasses, which are adapted to occasional overflows during flooding conditions and a water table near the surface during these times. Other significant vegetation includes narrowleaf cottonwood and a variety of riparian shrubs and forbs. The expected potential composition for this site is about 60% grasses, 15% forbs and 25% 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 basin big sagebrush, wild rose, silver buffaloberry, and boxelder will increase. Weedy annuals will invade. Cool season grasses such as basin wildrye, green needlegrass, and slender wheatgrass will decrease in frequency and production. In cases of hydrologic disruption and/or channelization upland species will increase and cottonwood stands will become increasingly mature and regeneration will cease.

Fire behavior plays an important role in this plant community especially due to the addition of tree species as part of the vegetative composition. The intensity of a fire determines vegetative succession and structure. Low intensive, or ground fires, typically result in thinning of cottonwoods and provide microsites, which can quickly be colonized by new saplings and riparian shrubs. These transitions are relatively short lived and tend to be mosaic in nature. As such, these areas maintain a mixed age stand of mature and younger trees with a sapling understory.

Moderate or severe fires, however, usually result in total stand mortality, as cottonwood trees are not very resistant to high temperatures. Under these scenarios, cottonwood seedlings may or may not quickly become established depending on if the soils are sterilized. Eventually, if the conditions are right, seedlings will establish, but it may take decades to return to a multiage mature stand. As a result of any wildfire, shrubs can also play an important role as to what plants will emerge first and what will the species composition develop into after fire succession. The effects of fire in these plant communities have not been adequately studied and the understanding of fire succession is minimal.

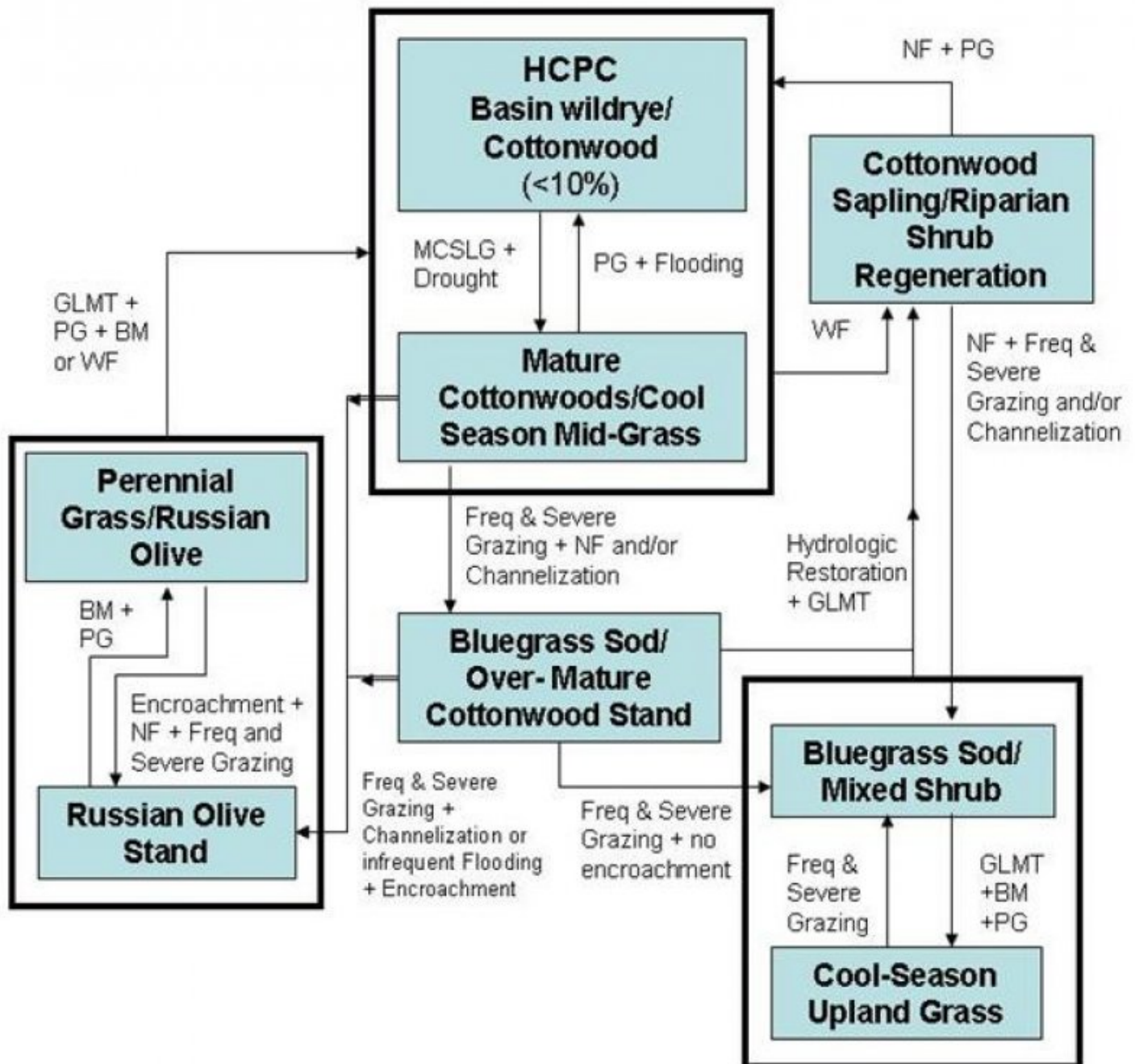
The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical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

State 1  
Basin Wildrye/Cottonwood

Community 1.1  
Basin Wildrye/Cottonwood

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores, occasional overflows during flooding events, and periodic fires. Potential vegetation is about 60% grasses or grass-like plants, 15% forbs and 25% woody plants. Cool season tall and mid-grasses dominate this state. The major grasses include basin wildrye, slender wheatgrass, green needlegrass, and rhizomatous wheatgrasses. Other grasses occurring in this state include Canada wildrye, big bluegrass, and prairie sandreed. Narrowleaf cottonwood of various age classes comprises the primary overstory species, while basin big sagebrush and a variety of riparian shrub species comprise the main shrub species. 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 2300 pounds per acre, but it can range from about 1600 lbs./acre in unfavorable years to about 3000 lbs./acre in above average years. This plant community is extremely stable and well adapted to the Northern Intermountain Desertic Basins climatic conditions. 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 Mature cottonwoods/Cool-Season Mid-Grass Plant Community. Prolonged drought will exacerbate this transition, as periodic flooding of the site will not occur. • Wildfires (if severe) will convert this plant community to the Cottonwood Sapling/Riparian Shrub Regeneration Plant community.

Figure 4. Plant community growth curve (percent production by month).  
WY0702, 10-14E Extra water sites - LL, SL, Ov, CyO.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	20	30	20	10	15			

State 2  
Mature Cottonwoods/Cool Season Mid-Grass

Community 2.1  
Mature Cottonwoods/Cool Season Mid-Grass

This plant community evolved under moderate grazing by domestic livestock, periodic flooding, 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 grass, and miscellaneous forbs. Cottonwood, sagebrush, and riparian shrubs comprise >35% of the total annual production of this plant community. Dominant grasses include slender wheatgrass, rhizomatous wheatgrasses, needleandthread, and bottlebrush squirreltail. Grasses of secondary importance include Sandberg bluegrass, big bluegrass, and Canada wildrye. Basin big and silver sagebrush and a variety of riparian species comprise most of the total annual shrub production. Cottonwood stands are still a prominent part of the plant community. When compared to the Historical Climax Plant Community, basin wildrye has decreased. Green needlegrass, rhizomatous wheatgrasses, big bluegrass, and Sandberg bluegrass and other more upland grass species have increased. Willow, basin big sagebrush, snowberry, silver buffaloberry, and wild rose have increased. The percentage of mature cottonwoods to younger aged trees has increased although young saplings and mid aged trees are still healthy and flourish in this site. Cottonwood saplings are not as extensive. The total annual production (air-dry weight) of this state is about 2000 pounds per acre, but it can range from about 1300 lbs./acre in unfavorable years to about 2800 lbs./acre in above average years. This state is stable and protected from excessive erosion once established. The biotic integrity of this plant community is intact. However, a slight decline in the cottonwood reproduction is evident and may affect the vigor of the stand over a long period. This is true especially if no low intensive or ground fires occur or if conditions are not right for seedling establishment. 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 and reoccurrence of periodic flooding will result in a plant community very similar to the Historic Climax Plant Community. Low intensive fires will hasten this transition. • Wildfires (if severe) will convert this plant community to the Cottonwood Sapling/Riparian Shrub

Regeneration Plant community. • Frequent and severe grazing plus channelization and no fire, will convert this plant community to a Bluegrass Sod/Over-Mature Cottonwood Stand Plant Community. • Frequent and severe grazing plus channelization or infrequent flooding plus encroachment, will convert this plant community to the Russian olive Stand Plant community. This transition to a more regulated hydrologic regime favors the proliferation of Russian olive and if a seed source is available, colonization will usually occur.

**Figure 5. Plant community growth curve (percent production by month).**  
**WY0702, 10-14E Extra water sites - LL, SL, Ov, CyO.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	20	30	20	10	15			

## State 3

### Cottonwood Sapling/ Riparian Shrub Regeneratoin

#### Community 3.1

##### Cottonwood Sapling/ Riparian Shrub Regeneratoin

Historically, this plant community was probably considered rare as the natural fire regime within a riparian community provided for more frequent and less severe fires. These low intensive or ground fires resulted in thinning of the cottonwood stand and provided microsites, which quickly were colonized by new saplings. These transitions were relatively short lived, because of the moist soil conditions, adaptability of the species, and mosaic nature of the fire. As such, these areas maintained the mixed age stands, which is synonymous with the HCPC. Today these low intensity fires can still occur and under this situation, the natural regeneration of vegetation is considered a transitional phase of this ecological site and not a separate plant community. This plant community is now more common, as fire suppression has resulted in more fuels and when fires do occur these fires are normally more intense and can affect larger areas. Severe fires typically result in the total mortality of the stand, as cottonwoods are not very resistant to high temperatures. Subsequently, the regeneration of cottonwood trees to a multiage mature stand can take decades. This is especially true if the soils are sterilized. This transition to a mature cottonwood plant community usually occurs only after the saplings become mature trees and shading by the expanding canopy helps to suppress the dominant shrub understory component. Given the extent of the burned areas and prolonged time to transition to a multiage cottonwood stand, this site can become relatively stable. Under this situation, these sites should be considered separate plant communities. Riparian shrubs such as willow, wild rose, snowberry, and gooseberry dominate this plant community. Cottonwood saplings regeneration will depend on availability of seeds and seed bed conditions. Shrubs and cottonwood saplings usually make at least 40% and can even reach to 80% of the total production. On sites where there was a healthy stand of perennial grasses prior to the fire, these grasses can quickly become reestablished and will diminish the total frequency and production of shrubs and saplings. Dominant grasses may include rhizomatous wheatgrasses, green needlegrass, and slender wheatgrass. Grasses of secondary importance include Sandberg bluegrass and big bluegrass. Bare ground can also be pronounced and weedy annuals may be extensive. Noxious weeds such as Russian knapweed, Canada thistle, and leafy spurge may also become established and should be treated. When compared to the HCPC the production is less but the re-growth after a fire and amount of shrubs offset some of the reduction in the total production. The total annual production (air-dry weight) of this state varies depending on the stage of the succession but about 1500 pounds per acre is normal. It can range from about 1000 lbs./acre in unfavorable years to about 2000 lbs./acre in above average years. This state is relatively stable but grazing the site before the vegetation becomes stabilized is not recommended. Erosion may be excessive until the site is revegetated. Erosion control may be necessary if soil loss is excessive, however, cottonwood regeneration depends on exposed bare soil. The biotic integrity of this plant community is in intact. The watershed is functioning. Transitional pathways leading to other plant communities are as follows: • No fire plus prescribed grazing will result in a plant community very similar to the Historic Climax Plant Community. Periodic flooding will hasten this transition. • No fire plus frequent and severe grazing and/or channelization or infrequent flooding will convert this plant community to a Bluegrass Sod/Mixed Shrub Plant community. • Fire will keep this in the Cottonwood Sapling/Riparian Shrub Regeneration Plant community.

**Figure 6. Plant community growth curve (percent production by month).**  
**WY0702, 10-14E Extra water sites - LL, SL, Ov, CyO.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	20	30	20	10	15			

## State 4

### Bluegrass Sod/Over-Mature Cottonwood Stand

#### Community 4.1

#### Bluegrass Sod/Over-Mature Cottonwood Stand

This plant community is the result of long-term improper grazing use and an interruption in the frequency of flooding or channelization. The disruption, either directly by humans, such as dams or dikes, or indirectly through accelerated erosion and channelization, has caused an interruption in the natural flooding regime. Extended periods of drought will exacerbate this situation. Usually fire has been removed from this plant community as bluegrass is a poor conductor of fire. This plant community is dominated by a dense short grass sod of bluegrass and includes a mosaic of mature cottonwoods, sagebrush and riparian shrub overstory. Weedy forbs are prevalent and noxious weeds such as Russian knapweed, Canada thistle, and leafy spurge may invade the site if a seed source is available. Shrub species include big and silver sagebrushes, rubber rabbitbrush, willows, western snowberry, and wild rose. The cottonwood stands consist of old-growth trees, which are in a state of decline. Standing dead, dying branches and downed trees are evident. When compared to the Historic Climax Plant Community, the tall and medium grasses are mostly absent. Short 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. Russian olive may begin invading this site and if conditions are right and left uncontrolled, will begin the process of displacing cottonwoods as the main tree species. Total production is only slightly reduced as shrubs offset the loss of tall and mid perennial grasses. The total annual production (air-dry weight) of this state is about 1600 pounds per acre, but it can range from about 1200 lbs./acre in unfavorable years to about 2000 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 the amount of herbaceous species. The vegetative structure is not intact as the cottonwoods are not reproducing due to the sod. The shrub component may still be within a reasonable percentage of the total composition as the HCPC. 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. Rill channels are noticeable in the interspaces and gullies may be establishing where rills have concentrated. The watershed is not functioning, as runoff is excessive and erosional processes are accelerated and the season overflow and water table is absent. Transitional pathways leading to other plant communities are as follows • Hydrologic restoration and grazing land mechanical treatment, will convert this plant community in to the Cottonwood Sapling/Riparian Shrub Regeneration 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, the bluegrass sod may require grazing land mechanical treatments, such as chiseling and reseeding with natives to accelerate recovery where few desirable plants remain. Fire may also be necessary to open up areas dominated by riparian shrubs so cottonwood seedlings can again become established. • Frequent and severe grazing plus no encroachment, will convert this plant community to the Bluegrass Sod/Mixed Shrub Plant community. • Frequent and severe grazing plus channelization or infrequent flooding plus encroachment, will convert this plant community to the Russian Olive Stand Plant community. This transition to a more regulated hydrologic regime favors the proliferation of Russian olive and if a seed source is available, colonization will usually occur.

Figure 7. Plant community growth curve (percent production by month).  
WY0702, 10-14E Extra water sites - LL, SL, Ov, CyO.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	20	30	20	10	15			

## State 5

### Bluegrass Sod/Mixed Shrub



Community 5.1  
Bluegrass Sod/Mixed Shrub

This plant community evolved under frequent and severe grazing as well as the disruption of the hydrologic cycle. The cottonwood trees have been mostly removed with the exception of a few mature trees near the new incised stream channel. Short grasses and shrubs dominate, but species composition depends on the characteristic of the site. Shrub species frequency can range from a dominant basin big sagebrush plant community on drier warmer sites to a mixture of sagebrush and riparian species on cooler wetter sites. Tall and medium cool season grasses have been reduced or eliminated. Dense sod patches of bluegrass and/or upland warm season 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 grasses. Shrubs can make up to 40% of the total annual production. When compared with the Bluegrass Sod/Over-Mature Cottonwood Stand Plant Community or HCPC, the annual production is reduced as more bare ground is now exposed but the bluegrass and shrub component makes up for some of this loss in total production. The total annual production (air-dry weight) of this state is about 1250 pounds per acre, but it can range from about 1000 lbs./acre in unfavorable years to about 1500 lbs./acre in above average years. This plant community is resistant to change as the sod and shrubs become more dominant. These areas may actually become less susceptible to severe fire as the sod becomes denser. 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: • Grazing Land Management Treatment plus brush management plus prescribed grazing will convert this plant community to a Cool-Season Upland Grass Plant Community. • Hydrologic restoration and grazing land mechanical treatment, will convert this plant community in to the Cottonwood Sapling/Riparian Shrub Regeneration 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, the bluegrass sod may require grazing land mechanical treatments, such as chiseling and reseeding with natives to accelerate recovery where few desirable plants remain. Fire may also be necessary to open up areas dominated by riparian shrubs so cottonwood seedlings can again be established.

Figure 8. Plant community growth curve (percent production by month).  
WY0702, 10-14E Extra water sites - LL, SL, Ov, CyO.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	20	30	20	10	15			

State 6  
Cool-Season Upland Grass

Community 6.1  
Cool-Season Upland Grass

This plant community can occur where the Bluegrass Sod/Mixed Shrub Plant Community undergoes grazing land mechanical treatment, brush management and prescribed grazing but the hydrology has not be restored. Preferred cool season grasses have been established and shrubs have been controlled, but the upland plants are more the dominant species. Cottonwood trees are not a part of this community and will not be able to reestablish. This site 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 been established such as rhizomatous wheatgrasses, Indian ricegrass, needleandthread, and bottlebrush squirreltail. Other important grasses include Sandberg bluegrass and blue grama. Basin wildrye and slender wheatgrass may also be reestablishing in small pockets where additional moisture accumulates but will be infrequent. 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 Bluegrass Sod/Mixed Shrub Plant community. Prolonged drought will exacerbate this transition. • Hydrologic restoration and grazing land mechanical treatment, will convert this plant community in to the Cottonwood Sapling/Riparian Shrub Regeneration 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, the bluegrass sod may require grazing land mechanical treatments, such as chiseling and reseeded with natives to accelerate recovery where few desirable plants remain. Fire may also be necessary to open up areas dominated by riparian shrubs so cottonwood seedlings can again be established.

**Figure 9. Plant community growth curve (percent production by month).**  
**WY0702, 10-14E Extra water sites - LL, SL, Ov, CyO.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	20	30	20	10	15			

## State 7

### Russian Olive Stand

### Community 7.1

#### Russian Olive Stand

This plant community is the result of a disruption in the hydrologic system of the watershed and usually improper grazing use. The disruption, either directly by humans, such as dams or dikes, or indirectly through accelerated erosion and channelization has caused an interruption in the natural flooding regime. Normal flooding patterns are no longer possible, which is a main feature of this ecological site and a must for cottonwood recruitment. Without normal flooding Russian olive proliferates and colonizes the site. Shrubs can be common and dense, but the composition varies depending on the available moisture and soil texture. Past cottonwood galleries now are comprised mostly of mature dying trees or standing dead. Russian olive is the main tree-like overstory species and basin big sagebrush, silver sagebrush, and rubber rabbitbrush comprise the main shrub species. The understory is made-up of primarily short grasses or cheatgrass. Noxious weeds will have likely invaded the site such as Russian knapweed, Canada thistle, and leafy spurge. The interspaces between plants increase in size leaving mostly bare ground, which is exposed to erosion or further invasion by weedy plants. Plant diversity is poor. When compared with the HCPC, the annual production is reduced as the tall and mid-grasses have been replaced, but the Russian olive and shrub production compensates for some of the decline in the herbaceous production. The total annual production (air-dry weight) of this state is about 1250 pounds per acre, but it can range from about 1000 lbs./acre in unfavorable years to about 1500 lbs./acre in above average years. This plant community is resistant to change as the Russian olive stand becomes more dominant. These areas may actually be more resistant to fire as less fine fuels are available and the bare ground between the shrubs 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. Russian olives, annual grasses, weedy species and bare ground compromise the biotic integrity. Plant diversity is poor and the potential for native tall and mid perennial grasses to reproduce is absent. The shift in the vegetative structure and function is extreme and the biotic integrity is lost. The watershed is not functioning correctly, as the normal flooding regime is eliminated. Infiltration is reduced and excessive runoff is common. The biotic integrity is lacking and invasive species are widespread. Transitional pathways leading to other plant communities are as follows • Brush management plus prescribed grazing and seeding if necessary will convert this plant community to a Perennial Grass/Russian Olive Plant community. Russian olive plants will continue to be a main component of this community as suppression or containment of this plant is usually temporary and will not result in total eradication. • Grazing land mechanical treatment, brush management, and prescribed grazing may convert this plant community

to the Historic Climax Plant Community, but recovery is mostly impractical as both the return to a natural hydrologic regime and the total removal of Russian olive is both expensive and typically not obtainable. Russian olive will still probably persist as suppression and containment of this plant is optimal. Any methods of control should be followed by revegetation to reduce regeneration of this plant and other weedy species.

Figure 10. Plant community growth curve (percent production by month).  
WY0702, 10-14E Extra water sites - LL, SL, Ov, CyO.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	20	30	20	10	15			

## State 8 Perennial Grass/ Russian Olive

### Community 8.1 Perennial Grass/ Russian Olive

This plant community occurs where control of Russian olive has been successful, but the natural hydrologic regime has not and will not return to pre-channelization or to a periodic flooding regime. Russian olives if controlled are confined to localized patches. Mid upland grasses have been established, but the tall grasses associated with riparian areas have been removed. Upland species are now the dominant plants. These plants make up the understory species in this plant community. Dominant grasses include rhizomatous wheatgrasses, needleandthread, and bottlebrush squirreltail. Other grasses include Sandberg bluegrass, blue grama and threadleaf sedge. Forbs commonly found in this plant community include smooth woodyaster, scarlet globemallow fringed sagewort, hairy goldaster, and phlox. Willows may be present in small patches, but most have been replaced as have the other riparian shrubs. When compared to the Historical Climax Plant Community, the production of perennial grasses and total production have been greatly reduced. The total annual production (air-dry weight) of this state is about 1500 pounds per acre, but it can range from about 1200 lbs./acre in unfavorable years to about 2000 lbs./acre in above average years. This plant community is mostly resistant to change, but species composition can be altered by encroachment and improper grazing. The herbaceous component is stable, but does not comprise the composition of HCPC. Plant vigor and replacement capabilities are sufficient. The biotic community is not intact because the tall grasses associated with the riparian areas are absent and Russian olive is still a part of the plant community. Plant diversity is moderate. Soils are mostly stable and recent soil loss is minimal. Water flow patterns and litter movement is stable. Incidence of pedestalling is improving. The watershed is not functioning due to disruption in the hydrologic regime. Transitional pathways leading to other plant communities are as follows: • Frequent and severe grazing plus encroachment will convert this plant community to the Russian olive Stand Plant community. Drought will exacerbate this conversion. • Grazing land mechanical treatment, brush management, and prescribed grazing may convert this plant community to the Historic Climax Plant Community, but recovery is mostly impractical as both the return to a natural hydrologic regime and the total removal of Russian olive is both expensive and typically not obtainable. Russian olive will still probably persist as suppression and containment of this plant is optimal. Any methods of control should be followed by revegetation to reduce regeneration of this plant and other weedy species.

Figure 11. Plant community growth curve (percent production by month).  
WY0702, 10-14E Extra water sites - LL, SL, Ov, CyO.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	20	30	20	10	15			

## 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				387–773	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	387–773	–
2				129–387	

	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	129–387	–
3				129–387	
	green needlegrass	NAVI4	<i>Nassella viridula</i>	129–387	–
4				129–387	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	129–387	–
5				0–258	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–129	–
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	0–129	–
	sedge	CAREX	<i>Carex</i>	0–129	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0–129	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–129	–
<b>Forb</b>					
6				129–387	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–129	–
	silverweed cinquefoil	ARAN7	<i>Argentina anserina</i>	0–129	–
	milkvetch	ASTRA	<i>Astragalus</i>	0–129	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0–129	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	0–129	–
	larkspur	DELPH	<i>Delphinium</i>	0–129	–
	aster	EUCEP2	<i>Eucephalus</i>	0–129	–
	lupine	LUPIN	<i>Lupinus</i>	0–129	–
	phlox	PHLOX	<i>Phlox</i>	0–129	–
	dock	RUMEX	<i>Rumex</i>	0–129	–
	clover	TRIFO	<i>Trifolium</i>	0–129	–
<b>Shrub/Vine</b>					
7				129–258	
	narrowleaf cottonwood	POAN3	<i>Populus angustifolia</i>	129–258	–
8				258–387	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–129	–
	boxelder	ACNE2	<i>Acer negundo</i>	0–129	–
	silver sagebrush	ARCA13	<i>Artemisia cana</i>	0–129	–
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0–129	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0–129	–
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	0–129	–
	golden currant	RIAU	<i>Ribes aureum</i>	0–129	–
	Woods' rose	ROWOW	<i>Rosa woodsii</i> var. <i>woodsii</i>	0–129	–
	willow	SALIX	<i>Salix</i>	0–129	–
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	0–129	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0–129	–

## Animal community

Animal Community – Wildlife Interpretations

Historic Climax Plant Community: The abundant production and proximity to water make this state important favors grazers and mixed-feeders, such as bison, elk, deer, and antelope. This also provides suitable thermal and escape

cover for these animals. This plant community may provide brood rearing/foraging areas for upland game birds as well as lek sites. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Bald eagles may also frequent this area if adjacent to large streams or rivers and may even nest in this site. Many grassland obligate small mammals would occur here.

**Mature Cottonwoods/Cool Season Mid-Grass:** The abundant production and proximity to water make this state important favors grazers and mixed-feeders, such as bison, elk, deer, and antelope. This also provides suitable thermal and escape cover for these animals. This plant community may provide brood rearing/foraging areas for upland birds and sage grouse, as well as lek sites. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Bald eagles may also frequent this area if adjacent to large streams or rivers and may even nest in this site. Many grassland obligate small mammals would occur here.

**Cottonwood Sapling/Riparian Shrub Regeneration:** This plant community may be useful for the same large grazers that would use the Historic Climax Plant Community. Usually after a fire, young succulent plants are preferred as are young shrubs by these large ungulates. Once reestablished this site may provide foraging and nesting opportunities for upland game birds as well as songbirds. Many grassland obligate small mammals would occur here.

**Bluegrass Sod/Over-Mature Cottonwood Stand:** The proximity to water makes this state important for wildlife such as birds, mule deer, and whitetail deer. Grazers may find the sod grass preferable, however, mixed-feeders will find less diverse and productive plants. Some thermal and escape cover exists but is not as common as found in some of the other states. It may provide some 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.

**Bluegrass Sod/Mixed Shrub:** 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 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 Upland Grass:** The proximity to water makes this state important for wildlife such as birds, mule deer, and whitetail deer. The plant community composition is diverse, able to meet the seasonal needs of these animals. It will provide some 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.

**Russian Olive Stand:** The proximity to water makes this state important for wildlife such as birds, mule deer, and whitetail deer. This is useful for the same large grazers that would use the Historic Climax Plant Community. The low production of herbaceous understory of this plant community decreases the foraging potential and cover for many wildlife species. The increase in tall shrubs, however, makes this an attractive site for thermal and escape cover for large grazers and upland birds. It can provide foraging and nesting opportunities for songbirds. Some species utilize the Russian olive berries for food and are attracted to these colonized areas.

**Perennial Grass/Russian Olive:** The abundant production and proximity to water make this state important for wildlife such as birds, mule deer, and whitetail deer. This plant community is useful for the same large grazers that would use the Historic Climax Plant Community. The increase in tall shrubs production makes this even more attractive to some wildlife due to the increase in thermal and escape cover. It can provide foraging and nesting opportunities for upland game birds and songbirds. Some species utilize the Russian olive berries for food and are attracted to these colonized areas.

## 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 1600-3000 .60

Mature Cottonwoods/Cool Season Mid-Grass 1300-2800 .50

Cottonwood Sapling/Riparian Shrub Regeneration 1000-2000 .35

Bluegrass Sod/O-M Cottonwood Stand 1200-2000 .22

Bluegrass Sod/Mixed Shrub 1000-1500 .15

Cool-Season Upland Grass 1200-2400 .35

Russian Olive Stand 1000-1500 .15

Perennial Grass/Russian Olive 1200-2000 .22

\* - 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

Boxelder and cottonwood trees have no real commercial value. A limited amount of wood could be harvested as firewood.

### Other products

none noted

### Inventory data references

Information presented here has been derived from NRCS inventory data. Field observations from range trained personnel were also used. Those involved in developing this 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.

## Contributors

Ray Gullion

## Rangeland health reference sheet

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

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Date	05/01/2008
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.

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

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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 0-20%.

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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 in water flow patterns.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Index ratings range from 2 (interspaces) to 6 (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 8 to 20 inches (20-50 cm) with highly variable structure and color. Organic matter is typically 1 to 5%.
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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 50-70% grasses, 20% forbs, and 10-30% shrubs/trees. Dense plant canopy (75-100%) and litter plus moderate to rapid infiltration rates result in minimal to nonexistent runoff. Basal cover is typically greater than 5% for this site and does effectively reduce runoff on this site. Surface gravels are common on this site, which provide site stability, but reduce infiltration.
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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer exists.
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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**
- Dominant: mid-size, cool season bunchgrasses> tall, cool season bunchgrasses=cool season rhizomatous grasses=perennial shrubs=perennial forbs>trees>short, cool season bunchgrasses
- Sub-dominant:
- Other:
- 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/tree component.
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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 75-100% expected. Herbaceous litter depth typically ranges from 10-25 mm. Woody litter can be up to several inches (>8 cm).
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 1600-3000 lb/ac (2300 lb/ac average); Metric: 1792-3360 kg/ha (2576 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 50% or noxious weed invasion are the most common indicators of a threshold being crossed. Basin big sagebrush, silver buffaloberry, boxelder and woods rose are common increasers. Perennial pepperweed, annual mustards, Canada thistle, Russian knapweed, and Kentucky bluegrass are common invasive species.



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