

# Ecological site DX032X01W106 Clayey Overflow (CyO) Big Horn Basin Wet

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## General information

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

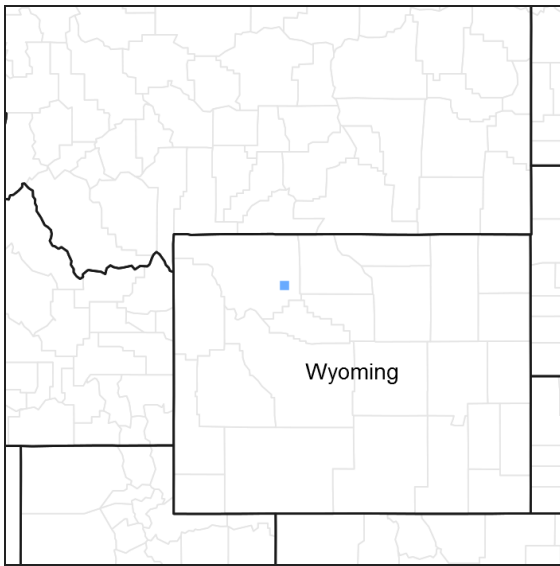


Figure 1. Mapped extent

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.

## MLRA notes

Major Land Resource Area (MLRA): 032X–Northern Intermountain Desertic Basins

Major land resource area (MLRA):

032X – Northern Intermountain Desertic Basins – This MLRA is comprised of two major Basins, the Big Horn and Wind River. These two basins are distinctly different and are split by LRU's to allow individual ESD descriptions. These warm basins are surrounded by uplifts and rimmed by mountains, creating a unique set of plant responses and communities. Unique characteristics of the geology and geomorphology single these two basins out.

Further information regarding MLRAs, refer to: United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. Available electronically at: [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2\\_053624#handbook](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook).

## LRU notes

Land Resource Unit (LRU):

32X01W (WY): This LRU is the Big Horn Basin within MLRA 32. This LRU is lower in elevation, slightly warmer and

receives slightly less overall precipitation than the Wind River Basin (LRU 02). This LRU was originally divided into two LRU's - LRU A which was the core and LRU B which was the rim. With the most current standards, this LRU is divided into two Subsets. This group is ambiguous of the two official subsets and will be referred to as Subset W, capturing those sites that are a factor of water or other processes outside of the general subset divisions (climate). As the LRU shifts outer edges, aspect and relation to the major bodies of water and taller land forms create minor shifts in soil chemistry influencing the variety of ecological sites and plant interactions. 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, land form, and biological references.

Moisture Regime: typic aridic, or ustic aridic.

Temperature Regime: Mesic

Dominant Cover: Rangeland, with Saltbush flats the dominant vegetative cover for this MLRA.

Representative Value (RV) Effective Precipitation: 5-14 inches (127 – 355 mm)

RV Frost-Free Days: 105-150 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

G302 Artemisia Tridentata - Artemisia tripartita - Purshia tridentata Big Sagebrush Steppe Group

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.g Big Horn Salt Desert Shrub Basin

## Ecological site concept

- Site receives significant additional effective moisture as overland flow.
- Slope is < 30%
- Soils are:
  - o Textures range from fine sandy loam to clay in top 4" (10 cm) of mineral soil surface
  - o Clay content is ≥18% in top 4" (10 cm) of mineral soil surface
  - o All subsurface horizons in the particle size control section have a weighted average of > 35% clay. (The particle size control section is the segment of the profile from either the start of an argillic horizon for 50 cm's or from 25-100 cm's).
  - o Moderately deep to very deep (20-80+ in. (50-200+ cm)
  - o <3% stone and boulder cover and occasionally up to 10% cobble and gravel cover
  - o Not skeletal (<35% rock fragments) within 20" (50 cm) of mineral soil surface
  - o None to Slightly effervescent throughout top 20" (50 cm) of mineral soil surface
  - o Non-saline, sodic, or saline-sodic

## Associated sites

R032XY350WY	<b>Sandy (Sy) 10-14" East Precipitation Zone</b> Sandy deposits along the toe of an inter-bedded escarpment may contain areas of Clayey Overflow.
R032XY304WY	<b>Clayey (Cy) 10-14" East Precipitation Zone</b> Clayey sites will contain inclusions of Clayey overflow in concave positions of a slope.

R032XY322WY	<b>Loamy (Ly) 10-14" East Precipitation Zone</b> Loamy sites along the toe of an inter-bedded escarpment may contain areas of Clayey Overflow.
R032XY328WY	<b>Lowland (LL) 10-14" East Precipitation Zone</b> Depositional areas within the Lowland site may contain Clayey overflow.

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata ssp. tridentata</i>
Herbaceous	(1) <i>Pascopyrum smithii</i> (2) <i>Nassella viridula</i>

## Legacy ID

R032XB106WY

## Physiographic features

This site is located on nearly level land and either adjacent to streams that run water at least during the major part of the growing season or on alluvial fans adjacent to toe slopes or foothills.

**Table 2. Representative physiographic features**

Landforms	(1) Intermontane basin > Alluvial fan (2) Intermontane basin > Stream terrace
Runoff class	Negligible to low
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to occasional
Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to rare
Elevation	1,646–2,286 m
Slope	0–30%
Aspect	Aspect is not a significant factor

## Climatic features

Annual precipitation and modeled relative effective annual precipitation ranges from 5 to 14 inches (127 – 355 mm). The normal precipitation pattern shows peaks in May and June and a secondary peak in September. The noted peaks account for approximately 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 approximately on April 1st and continues through to July 1st. Cool weather and moisture in September may produce some green up of cool season plants that will continue to late October. For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/>. "Basin", "Clark 3NE", "Cody", "Cody 12SE", "Emblem", "Greybull", "Heart

Mtn", "Lovell", "Powell Fld Stn", "Worland FAA AP", and "Worland" are the representative weather stations for LRU A. 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)	92-115 days
Freeze-free period (characteristic range)	116-138 days
Precipitation total (characteristic range)	178-229 mm
Frost-free period (actual range)	90-118 days
Freeze-free period (actual range)	112-147 days
Precipitation total (actual range)	178-254 mm
Frost-free period (average)	105 days
Freeze-free period (average)	129 days
Precipitation total (average)	203 mm

### Climate stations used

- (1) WORLAND [USW00024062], Worland, WY
- (2) WORLAND [USC00489770], Worland, WY
- (3) BASIN [USC00480540], Basin, WY
- (4) GREYBULL [USC00484080], Greybull, WY
- (5) EMBLEM [USC00483031], Burlington, WY
- (6) CODY 12SE [USC00481850], Meeteetse, WY
- (7) CODY [USC00481840], Cody, WY
- (8) LOVELL [USC00485770], Lovell, WY
- (9) POWELL FLD STN [USC00487388], Powell, WY
- (10) HEART MTN [USC00484411], Powell, WY
- (11) CLARK 3NE [USC00481775], Powell, WY

### Influencing water features

No water table is present on these sites. However, site receives significant additional effective moisture from overland flow from adjacent upland sites or from overflow during high spring run-off. Site is generally adjacent to an active channel (intermittent or perennial), but is also found on upland sites where runoff may accumulate (concave/linear positions).

### Soil features

The soils of this site are very deep to moderately deep (greater than 20" to bedrock), moderately well to well-drained that formed in alluvium or alluvium over residuum. These soils have slow to moderate permeability. The surface soil will vary from 2 to 5 inches deep. These soils may develop severe cracks. The soil characteristics having the most influence on plants are the heavy texture and the additional available moisture. These areas receive additional water from overflow of intermittent streams or runoff from adjacent slopes.

**Table 4. Representative soil features**

Parent material	(1) Alluvium–calcareous shale (2) Residuum–interbedded sedimentary rock
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Surface texture	(1) Clay loam (2) Clay (3) Silty clay loam (4) Fine sandy loam (5) Loam (6) Sandy clay
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderate
Soil depth	51–152 cm
Surface fragment cover <=3"	0–10%
Available water capacity (0-101.6cm)	7.62–16 cm
Calcium carbonate equivalent (0-101.6cm)	0–20%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–13
Soil reaction (1:1 water) (0-101.6cm)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0–10%

## Ecological dynamics

**\*\*Disclaimer\*\*** This PROVISIONAL ecological site was developed for an extended MLRA concept where the foothills (10-14" precipitation Frigid climatic zone) was included in this site. This has created an exaggerated or elevated production value for this site description.

Potential vegetation on this site is dominated by tall and mid cool-season perennial grasses. Other significant vegetation includes basin big sagebrush, silver sagebrush, rubber rabbitbrush, and a variety of forbs. The expected potential composition for this site is about 75% grasses, 10% forbs and 15% 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 rhizomatous wheatgrasses, blue grama, Sandberg bluegrass, and basin big sagebrush will increase. Plains pricklypear and weedy annuals will invade. Cool-season grasses such as, basin wildrye, green needlegrass, slender wheatgrass, needleandthread, and Indian ricegrass will decrease in frequency and production.

Typically, many of these overflow sites have been altered or modified, due to its productive features and proximity to water. Consequently, basin big sagebrush, which is specifically tied to the ecological feature of this site, has lost much of its original habitat. As basin big sagebrush is not a resilient plant, once removed it will require many years before the stand can be replaced. Some stands may never be replaced, if a vigorous stand of grass exists and is maintained.

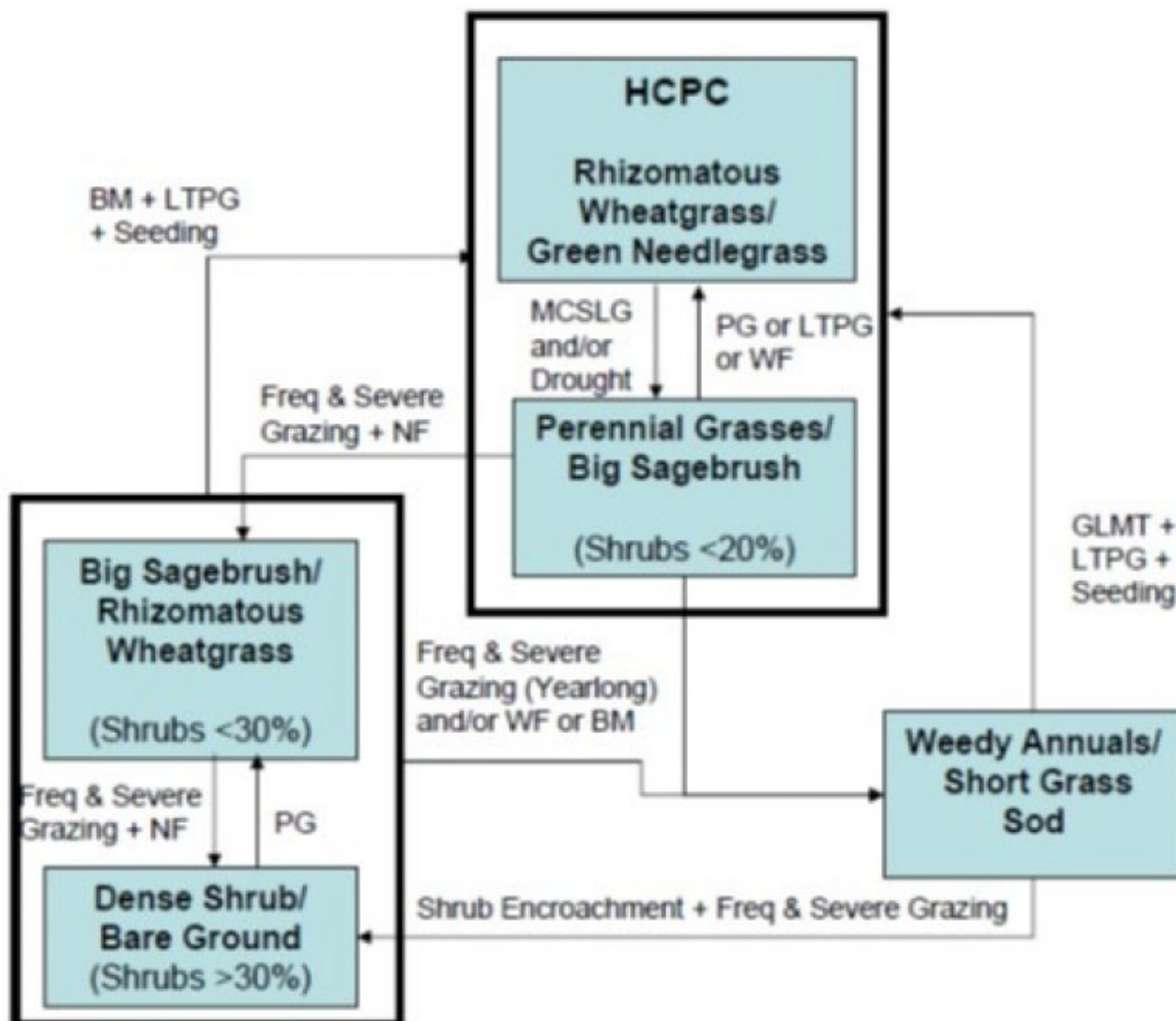
In some instances, basin big sagebrush may become dominant on areas with an absence of fire and sufficient amount of overflow. If treatment of a stand is necessary, thinning is usually preferred instead of total removal. This can be accomplished by chemical, mechanical or closely monitored burning.

The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going

from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

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

### **State and transition model**



**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)

## Community 1.1

### Rhizomatous Wheatgrass/Green needlegrass

This plant community is the interpretive plant community for this site and is considered to be the Historic Climax Plant Community (HCPC). This state evolved with grazing by large herbivores, additional overflow moisture, and periodic fires. The cyclical nature of the fire regime in this community prevented big sagebrush from being the dominant landscape. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and on areas receiving occasional short periods of rest. The potential vegetation is about 75% grasses or grass-like plants, 10% forbs, and 15% woody plants. Cool season tall and mid-grasses dominate this state. The major grasses include rhizomatous wheatgrasses, green needlegrass, and basin wildrye. Other grasses occurring in this state include Indian ricegrass, bottlebrush squirreltail, prairie junegrass, and Sandberg and Canby bluegrasses. Basin big sagebrush, silver sagebrush, winterfat, and rubber rabbitbrush are conspicuous elements of this state and occur in a mosaic pattern. 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 1,800 lbs./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 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 will convert the plant community to the Perennial Grass/Big Sagebrush Plant Community. Prolonged drought will exacerbate this transition.

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 2

### Perennial Grasses/ Big Sagebrush

#### Community 2.1

#### Perennial Grasses/ Big Sagebrush

Historically, this plant community evolved under grazing and a low fire frequency. Currently, it is found under moderate, season-long grazing by livestock and will be exacerbated by prolonged drought conditions. In addition, the fire regime for this site has been modified and extended periods without fire is now common. This plant community is still dominated by cool-season grasses, while short warm-season grasses and miscellaneous forbs account for the balance of the understory. Basin big sagebrush is now a conspicuous part of the overall production and accounts for the majority of the overstory. The dominant grasses include rhizomatous wheatgrasses, green needlegrass, and bottlebrush squirreltail. Grasses and grass-like species of secondary importance include prairie junegrass, blue grama, Sandberg bluegrass and threadleaf sedge. Forbs commonly found in this plant community include scarlet globemallow, fringed sagewort, wavyleaf paintbrush, little larkspur, and Hood's phlox. Basin big sagebrush along with possibly silver sagebrush and rubber rabbitbrush can make up to 20% of the annual production. The overstory of shrubs and understory of grass and forbs provide a diverse plant community. When compared to the Historic Climax Plant Community, big sagebrush and rhizomatous wheatgrasses have increased. Plains pricklypear cactus will have invaded, but occurs only in small patches. Basin wildrye and Indian ricegrass have decreased and may occur in only trace amounts under the sagebrush canopy or within the patches of pricklypear. Total production has decreased, but the increase of shrubs has offset some of this loss. The total annual production (air-dry weight) of this state is about 1500 pounds per acre, but it can range from about 1100 lbs./acre in unfavorable years to about 2000 lbs./acre in above average years. This plant community is resistant to change. The herbaceous species present are adapted to grazing; however, species composition can be altered through long-term overgrazing. The herbaceous component is mostly intact and plant vigor and replacement capabilities are sufficient. Water flow patterns and litter movement may be occurring but only on steeper slopes. Incidence of pedestalling is minimal. Soils are mostly stable and the surface shows minimum soil loss. The watershed is functioning and the biotic community is intact. Transitions or pathways leading to other plant communities are as follows: • Prescribed grazing or possibly long-term prescribed grazing, will convert this plant community to the HCPC. The probability of this occurring is high especially if rotational grazing along with short



deferred grazing is implemented as part of the prescribed method of use. 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, but close monitoring is advised to make sure total removal of basin big sagebrush is avoided. • Frequent and severe grazing plus no fire, will convert the plant community to the Big Sagebrush/Rhizomatous Wheatgrass Plant Community. The probability of this occurring is high. This is especially evident on areas where sagebrush stands are not adversely impacted by drought or heavy browsing of the occasional wildfires. • Frequent and severe grazing (yearlong grazing) plus wildfire or brush control, will convert the plant community to the Weedy Annuals/Short Grass Sod Plant Community. The probability of this occurring is high, especially, if the sagebrush stand has been severely affected by drought or heavy use or has been removed altogether.

**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 3 Big Sagebrush/ Rhizomatous Wheatgrass

#### Community 3.1 Big Sagebrush/ Rhizomatous Wheatgrass

This plant community is the result of frequent and severe grazing and protection from fire. This improper grazing has negatively affected the tall and some of the mid perennial grasses. Most of the preferred cool season grasses have been reduced. Shrubs specifically basin big sagebrush and including silver sagebrush and rubber rabbitbrush account for up to about one-third of the total production of this plant community. The dominant grasses are rhizomatous wheatgrasses, prairie junegrass, Sandberg bluegrass, threadleaf sedge, and blue grama. Weedy annual species such as cheatgrass may occur in patches if a seed source is available. Cactus and sageworts often increase. The interspaces between plants have expanded leaving the amount of bare ground more prevalent. As compared with the HCPC or the Perennial Grass/Big Sagebrush Plant Communities, the annual production is less, but the increase in shrub and rhizomatous wheatgrass production compensates for some of the loss of the tall and mid perennial production. The total annual production (air-dry weight) of this state is about 1200 pounds per acre, but it can range from about 800 lbs./acre in unfavorable years to about 1600 lbs./acre in above average years. This plant community is relatively resistant to change as the stand becomes more decadent, although continued improper grazing can eventually lead to the reduction in the rhizomatous wheatgrasses and increase the dominance of shrubs. These areas may actually become more resistant to fire as less fine fuels are available and the bare ground between the sagebrush plants is increased. Plant diversity is moderate. The plant vigor is diminished and replacement capabilities are limited due to the reduced number of cool-season grasses. Plant litter is noticeably less when compared to the HCPC. Soil erosion is accelerated because of increased bare ground. Water flow patterns and pedestalling are obvious. Infiltration is reduced and runoff is increased. Rill channels may be noticeable in the interspaces and gullies may be establishing where rills have concentrated down slope. Transitions or pathways leading to other plant communities are as follows: • Brush Management, followed by long term prescribed grazing, and seeding if needed, will return this plant community to near Historic Climax Plant Community condition. • Frequent and severe grazing plus no wildfire will result in the Dense Shrub/*Bare Ground* Plant community. • Wildfire or brush management and/or frequent and severe grazing (yearlong), will convert the plant community to the Weedy Annuals/Short Grass Sod Plant Community.

**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			

### State 4 Dense Shrub/ bare ground

## Community 4.1 Dense Shrub/ bare ground

This plant community is the result of frequent and severe grazing and protection of fire. Basin big sagebrush usually dominates this plant community with the occasional heavy patches of silver sagebrush and rubber rabbitbrush. However, on sites, which have burned or the basin big sagebrush removed, silver sagebrush and rubber rabbitbrush will now dominate. The annual production of shrubs exceeds 30% of the total production and usually is much higher. Most of the preferred cool season grasses have been greatly reduced or eliminated. The dominant grasses are rhizomatous wheatgrasses, prairie junegrass, Sandberg bluegrass, and blue grama. Weedy annual species such as cheatgrass may occupy the site if a seed source is available. Cactus and sageworts often increase. Noxious weeds such as Russian knapweed, leafy spurge, or Canada thistle may invade the site if a seed source is available. The interspaces between plants have expanded leaving the amount of bare ground more prevalent. As compared with the HCPC or the Perennial Grasses/Big Sagebrush Plant Communities, the annual production is less, but the shrub production compensates for some of the decline in the herbaceous production. The total annual production (air-dry weight) of this state is about 1200 pounds per acre, but it can range from about 800 lbs./acre in unfavorable years to about 1500 lbs./acre in above average years. This plant community is resistant to change as the stand becomes more decadent. These areas may actually be more resistant to fire as less fine fuels are available and the bare ground between the sagebrush plants is increased. Continued frequent and severe grazing or the removal of grazing does not seem to affect the composition or structure of the plant community unless the shrub component has been lost by trampling. Plant diversity is moderate to poor. The plant vigor is diminished and replacement capabilities are limited due to the reduced number of cool-season grasses. Plant litter is noticeably less when compared to the HCPC. Soil erosion is accelerated because of increased bare ground. Water flow patterns and pedestalling are obvious. Infiltration is reduced and runoff is increased. Rill channels may be noticeable in the interspaces and gullies may be establishing where rills have concentrated down slope. Transitions or pathways leading to other plant communities are as follows: • Brush Management, followed by long term prescribed grazing, and seeding if needed, will return this plant community at or near the HCPC. If treatment of a stand is necessary thinning is usually preferred instead of total removal. This can be accomplished by chemical, mechanical or closely monitored burning. Close monitoring is advised to make sure total removal of basin big sagebrush is avoided. If prescribed fire is used, sufficient fine fuels will need to be present. This may require deferment from grazing prior to treatment. Post management is critical to ensure success. This can range from two or more years of rest to partial growing season deferment, depending on the condition of the understory at the time of treatment and the growing conditions following treatment. Seeding of native grasses is generally recommended after fire if the grasses have been removed or a seed source is not available. • Prescribed Grazing or possibly Long Term Prescribed Grazing will convert the plant community to the Big Sagebrush/Rhizomatous Wheatgrass Plant Community. • Wildfire or brush management and/or frequent and severe grazing (yearlong), will convert the plant community to the Weedy Annuals/Short Grass Sod Plant Community.

Figure 12. 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 Weedy Annuals/ Short grass sod

### Community 5.1 Weedy Annuals/ Short grass sod

This plant community is the result of frequent and severe yearlong grazing, which have adversely affected the perennial grasses as well as the addition of other impacts that can affect the shrub component. These factors include drought and wildfires, trampling, and human brush control measures. Annual grasses and forbs along with areas of a dense sod of short grass dominates this state. Pricklypear cactus can become dense enough in patches so that livestock cannot graze forage growing within the cactus clumps. Basin big and silver sagebrush have been reduced to small patches or in some cases removed. Rubber rabbitbrush may be the sole remaining shrub on the site. Weedy annual species occupy the site and can even dominate. These annuals include cheatgrass, mustards and stickseed. Noxious weeds such as Russian knapweed, leafy spurge, or Canada thistle may invade if a seed source is available and can occupy large patches. When compared to the Historic Climax Plant Community, blue

grama, and threadleaf sedge have increased. Pricklypear and weedy annuals have increased. All cool-season tall and mid-grasses, forbs, and most shrubs have been greatly reduced. Production has been significantly decreased. The total annual production (air-dry weight) of this state is about 500 pounds per acre, but it can range from about 300 lbs./acre in unfavorable years to about 800 lbs./acre in above average years. The vegetation is resistant to change and continued improper grazing does not affect the vegetative structure. The biotic integrity of this state is not functional and plant diversity is extremely low. The plant vigor is significantly weakened and replacement capabilities are limited due to the absences of cool-season grasses. This plant community is resistant to water infiltration on the sod occupied sites. While this sod protects the site itself, un-sodded areas are affected by excessive runoff that can cause rills and gully erosion. Water flow patterns are obvious in the bare ground areas and pedestalling is apparent along the sod edges. Rill channels are noticeable in the interspaces and down slope. The watershed may or may not be functioning, as runoff may affect adjoining sites. Transitions or pathways leading to other plant communities are as follows: • Grazing land mechanical treatment (seeding, chiseling, etc.) and pricklypear cactus control and seeding (if needed), followed by long term prescribed grazing, will return this plant community to near Historic Climax Plant Community condition. • Shrub encroachment and continued severe and frequent grazing will result in the Dense Shrub/*Bare Ground* Plant community.

**Figure 13. 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				504–706	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	504–706	–
2				404–605	
	green needlegrass	NAVI4	<i>Nassella viridula</i>	404–605	–
3				101–303	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	101–303	–
4				101–303	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–101	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0–101	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–101	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0–101	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	0–101	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	0–101	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–101	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–101	–
<b>Forb</b>					
5				20–202	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–101	–
	textile onion	ALTE	<i>Allium textile</i>	0–101	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	0–101	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0–101	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	0–101	–
	larkspur	DELPH	<i>Delphinium</i>	0–101	–
	parsnipflower buckwheat	ERHE2	<i>Eriogonum heracleoides</i>	0–101	–
	fleabane	ERIGE2	<i>Erigeron</i>	0–101	–
	bigseed biscuitroot	LOMA3	<i>Lomatium macrocarpum</i>	0–101	–
	desertparsley	LOMAT	<i>Lomatium</i>	0–101	–
	phlox	PHLOX	<i>Phlox</i>	0–101	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	0–101	–
	stemless mock goldenweed	STAC	<i>Stenotus acaulis</i>	0–101	–
<b>Shrub/Vine</b>					
6				101–303	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–101	–
	silver sagebrush	ARCA13	<i>Artemisia cana</i>	0–101	–
	basin big sagebrush	ARTRT	<i>Artemisia tridentata ssp. tridentata</i>	0–101	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0–101	–
	winterfat	KRASC	<i>Krascheninnikovia</i>	0–101	–

## Animal community

## Animal Community – Wildlife Interpretations

Rhizomatous Wheatgrass/Green Needlegrass (HCPC): The predominance of grasses in this plant community favors grazers and mixed-feeders, such as bison, elk, deer, and antelope. Suitable thermal and escape cover for deer may be limited due to the low quantities of woody plants. However, topographical variations could provide some escape cover. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for sage grouse, as well as lek sites. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Many grassland obligate small mammals would occur here.

Perennial Grasses/Big Sagebrush Plant Community: The combination of an overstory of shrubs and an understory of grasses and forbs plus its proximity to water provides a very diverse plant community for wildlife. The crowns of sagebrush tend to break up hard crusted snow on winter ranges, so mule deer and antelope may use this state for foraging and cover year-round, as would cottontail and jack rabbits. It provides important winter, nesting, brood-rearing, and foraging habitat for sage grouse. Brewer's sparrows' nest in big sagebrush plants and hosts of other nesting birds utilize stands in the 20-30% cover range.

Big Sagebrush/Rhizomatous Wheatgrass Plant Community: The combination of an overstory of shrubs and an understory of grasses and forbs plus its proximity provides a very diverse plant community for wildlife. The crowns of sagebrush tend to break up hard crusted snow on winter ranges, so mule deer and antelope may use this state for foraging and cover year-round, as would cottontail and jack rabbits. It provides important winter, nesting, brood-rearing, and foraging habitat for sage grouse. Brewer's sparrows' nest in big sagebrush plants and hosts of other nesting birds utilize stands in the 20-30% cover range.

Dense Shrub/*Bare Ground* Plant Community: This plant community can provide important winter foraging for elk, mule deer and antelope, as sagebrush can approach 15% protein and 40-60% digestibility during that time. This community provides excellent escape and thermal cover for large ungulates, as well as nesting habitat for upland game birds including sage grouse.

Weedy Annuals/Short Grass Plant Community: These communities provide limited foraging for antelope and other grazers. They may be used as a foraging site by sage grouse if proximal to woody cover and if the Historic Climax Plant Community or the Perennial Grasses/ Big Sagebrush Plant Community is limiting. Generally, these are not target plant communities for wildlife habitat management.

## 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)

Rhizomatous Wheatgrass/Green Needlegrass 1200-2400 .60

Perennial Grass/Big Sagebrush 1100-2000 .50

Big Sagebrush/Rhizomatous Wheatgrass 800-1600 .25

Dense Shrub/*Bare Ground* 800-1500 .20

Weedy Annuals/Short Grass 300-800 .15

\* - Continuous, season-long grazing by cattle under average growing conditions.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use

needs to be supplemented with protein because the quality does not meet minimum livestock requirements.

## Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B and C, with localized areas in hydrologic group D. Infiltration ranges from moderately slow to moderate. Runoff potential for this site varies from low to moderate depending on soil hydrologic group and ground cover. 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 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 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.

## Contributors

D. Tranas

## Approval

Scott Woodall, 9/05/2019

## 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.

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Date	05/01/2008
Approved by	Marji Patz
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** Rare to nonexistent.  
\_\_\_\_\_
2. **Presence of water flow patterns:** Water flow patterns sometimes evident in ephemeral floodplain zone where this site occurs.  
\_\_\_\_\_
3. **Number and height of erosional pedestals or terracettes:** Rare to nonexistent.  
\_\_\_\_\_
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground can range from 5-20%.  
\_\_\_\_\_
5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present.  
\_\_\_\_\_
6. **Extent of wind scoured, blowouts and/or depositional areas:** Minimal to nonexistent.  
\_\_\_\_\_
7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter expected to move in water flow patterns.  
\_\_\_\_\_
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Index ratings range from 2 (interspaces) to 6 (under plant canopy), but average values should be 2.5 or greater.  
\_\_\_\_\_
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil data is limited for this site. Described A-horizons vary from 1 to 2 inches (3-5 cm). Organic matter is typically 1 to 2%.  
\_\_\_\_\_
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community consists of 60-75% grasses, 20% forbs, and 5-20% shrubs. Moderate plant canopy (50-70%) and litter plus slow to moderately slow infiltration rates result in slight to moderate runoff. Basal cover is typically around 2-3% for this site and does not effectively reduce 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.

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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: cool season rhizomatous grasses

Sub-dominant: mid-size, cool season bunchgrasses=tall, cool season bunchgrasses

Other: perennial shrubs = perennial forbs short, cool season bunchgrasses

Additional:

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

14. **Average percent litter cover (%) and depth ( in):** Litter ranges from 20-40% of total canopy measurement with total litter (including beneath the plant canopy) from 75-90% expected. Herbaceous litter depth typically ranges from 10-25 mm. Woody litter can be up to several inches (>8 cm).
- 

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 1200-2400 lb/ac (1800 lb/ac average); Metric: 1344-2688 kg/ha (2016 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 40% or noxious weed invasion are the most common indicators of a threshold being crossed. Rhizomatous wheatgrasses, Blue grama, Sandberg bluegrass, and Basin big sagebrush are common increasers. Annual weeds such as pepperweed and blue mustard are common invasive species on disturbed sites.
- 

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