

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Shallow Loamy 15-19" Foothills and Mountains East Precipitation Zone,

Site ID: R043BY362WY

Major Land Resource Area: 43B – Central Rocky Mountains

Physiographic Features

This site occurs on most slopes and along ridge tops.

Landform: Hillsides, alluvial fans, ridges & stream terraces **Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	6000	9000
Slope (percent):	20	50
Water Table Depth (inches):	None within 60 inches	
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	0	0
Frequency:	None	None
Duration:	None	None
Runoff Class:	negligible	high

Climatic features

Annual precipitation ranges from 15-19 inches per year. June is generally the wettest month. July, August, and September are somewhat less with daily amounts rarely exceeding one inch.

Snowfall is quite heavy in the area. Annual snowfall averages about 150 inches.

Because of the varied topography, the wind will vary considerably for different parts of the area. The wind is usually much lighter at the lower elevations and in the valleys as compared with the higher terrain. The average winter wind velocity is 8.5 mph while the summer wind velocity averages 7.5 mph. Winds during storms and on ridges may exceed 45 mph.

Growth of native cool-season plants begins about May 1 to May 15 and continues to about October 10.

The following information is from the "Crandall Creek" climate station, at the lower end of this precipitation zone:

	<u>Minimum</u>	<u>Maximum</u>	<u>5 yrs. out of 10 between</u>
Frost-free period (days):	16	80	July 8 – August 20
Freeze-free period (days):	37	120	June 17 – September 5
Mean Annual Precipitation (inches):	10.24	21.23	

Site Type: Rangeland

Shallow Loamy (SwLy) 15-19" East P.Z.

MLRA: 43B – Central Rocky Mountains

R043BY362WY

Mean annual precipitation: 14.90 inches

Mean annual air temperature: 38.16 °F (21.88°F Avg. Min. to 54.66°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. There are no other climate station(s) known to be representative of this precipitation zone.

Influencing Water Features

Wetland Description:	<u>System</u>	<u>Subsystem</u>	<u>Class</u>	<u>Sub-class</u>
None	None	None	None	None

Stream Type: None

Representative Soil Features

The soils of this site are shallow (less than 20" to bedrock) well-drained soils formed in alluvium over residuum or in residuum. These soils have moderately slow to moderate permeability and may occur on all slopes. The bedrock may be any kind except igneous, which is virtually impenetrable to plant roots. The soil characteristic having the most influence on the plant community is the shallow depth.

Parent Material Kind: alluvium and residuum

Parent Material Origin: sandstone, limestone, shale

Surface Texture: loam, silt loam, clay loam, very fine sandy loam

Surface Texture Modifier: none

Subsurface Texture Group: loam

Surface Fragments ≤ 3" (% Cover): 0 to 10

Surface Fragments > 3" (%Cover): 0 to 20

Subsurface Fragments ≤ 3" (% Volume): 0 to 15

Subsurface Fragments > 3" (% Volume): 0

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	well	well
Permeability Class:	moderate	moderately rapid
Depth (inches):	10	20
Electrical Conductivity (mmhos/cm) ≤20":	0	4
Sodium Absorption Ratio ≤20":	0	5
Soil Reaction (1:1 Water) ≤20":	6.6	8.4
Soil Reaction (0.1M CaCl2) ≤20":	NA	NA
Available Water Capacity (inches) ≤30":	1.1	4.2
Calcium Carbonate Equivalent (percent) ≤20":	0	5

Plant Communities

Ecological Dynamics of the Site:

Potential vegetation on this site is dominated by mid cool-season perennial grasses. Other significant vegetation includes black and big sagebrush, antelope bitterbrush and a variety of forbs. On areas along the west slopes of the Big Horn Mountains, mountain mahogany is the significant shrub. 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.

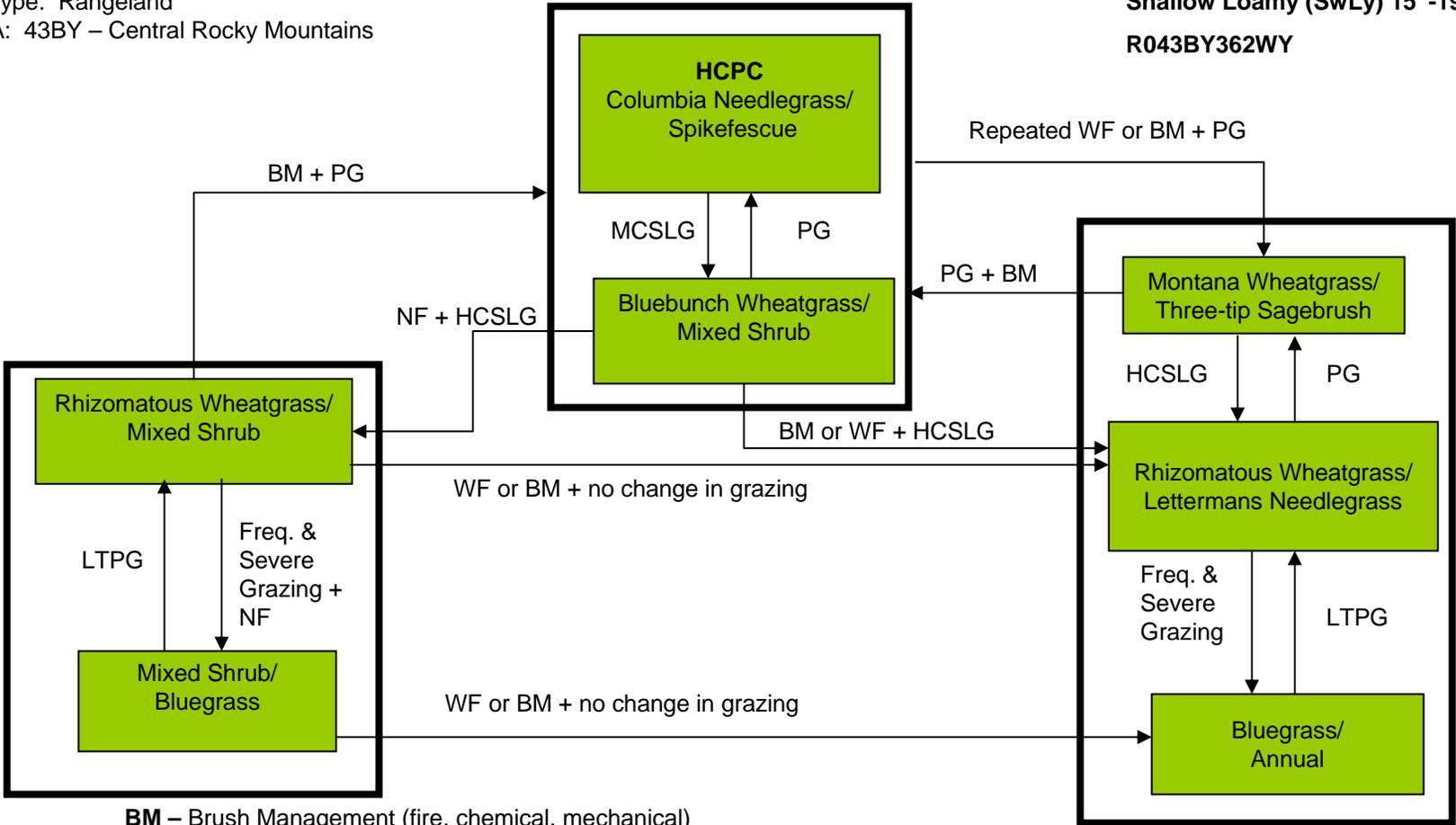
As this site deteriorates, species such as bluegrasses, rhizomatous wheatgrasses and black and big sagebrush will increase. Cool season grasses such as Columbia needlegrass, spikefescue, bluebunch wheatgrass, and Idaho fescue will decrease in frequency and production. As conditions continue to deteriorate annuals such as cheatgrass will invade.

Big sagebrush may become dominant on areas with an absence of fire. Wildfires are actively controlled in recent times and as a result old decadent stands of big sagebrush persist. Chemical and mechanical controls have replaced the historic role of fire on this site. Recently, prescribed burning has regained some popularity.

The big sagebrush component may not be as resilient once it has been removed or severely reduced, if a vigorous stand of grass exists and is maintained. The exception to this is where the herbaceous component is severely degraded at the time of treatment, growing conditions are unfavorable after treatment, and/or recovery of herbaceous species are inadequate due to poor grazing management. Regeneration of big sagebrush may also be suppressed if three-tip sagebrush and rubber rabbitbrush is established. This situation is more likely to develop in areas where fires have occurred in a relatively short cycle. Three-tip and rubber rabbitbrush are strong resprouters and will out compete other shrubs where a site is disturbed. Any thinning project should be designed in a way to maintain the viability of the stand and to consider wildlife requirements.

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.



- 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
- HCSLG** – Heavy, 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)
- Na** – Moderate Sodium in Soil
- WF** – Wildfire

**Plant Community Composition and Group Annual Production
Reference Plant Community (HCPC)**

COMMON NAME/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Annual Production (Normal Year) Total: 850		
			Group	Lbs./acre	% Comp.
GRASSES AND GRASS-LIKES					
GRASSES/GRASSLIKES					
Columbia needlegrass	Achnatherum nelsonii	ACNE9	1	85 - 213	10 - 25
Idaho fescue	Festuca idahoensis	FEID	2	85 - 213	10 - 25
Spikefescue	Leucopoa kingii	LEK12	3	85 - 213	10 - 25
Bluebunch wheatgrass	Pseudoroegneria spicata	PSSP6	4	85 - 170	10 - 20
Prairie junegrass	Koeleria macrantha	KOMA	5	0 - 85	0 - 10
Rhizomatous wheatgrass	Pascopyrum smithii	PASM	6	0 - 85	0 - 10
MISC. GRASSES/GRASSLIKES					
Big bluegrass	Poa ampla	POAM	7	0 - 43	0 - 5
California oatgrass	Danthonia californica	DACA3	7	0 - 43	0 - 5
Canby bluegrass	Poa canbyi (syn. P. secunda)	POCA (POSE)	7	0 - 43	0 - 5
Indian ricegrass	Achnatherum hymenoides	ACHY	7	0 - 43	0 - 5
Lettermans needlegrass	Achnatherum lettermani	ACLE9	7	0 - 43	0 - 5
Montana wheatgrass	Elymus albicans	ELAL7	7	0 - 43	0 - 5
Mountain brome	Bromus marginatus	BRMA4	7	0 - 43	0 - 5
Needleandthread grass	Hesperostipa comata	HECO26	7	0 - 43	0 - 5
Nodding brome	Bromus anomalus	BRAN	7	0 - 43	0 - 5
One-spike oatgrass	Danthonia unispicata	DAUN	7	0 - 43	0 - 5
Pumpelly brome	Bromus inermis spp. pumpellianus	BRINP5	7	0 - 43	0 - 5
Sandberg bluegrass	Poa secunda	POSE	7	0 - 43	0 - 5
Slender wheatgrass	Elymus trachycaulus	ELTR7	7	0 - 43	0 - 5
Spike trisetum	Trisetum spicatum	TRSP2	7	0 - 43	0 - 5
Upland sedges	Carex spp.	CAREX	7	0 - 43	0 - 5
other perennial grasses (native)		2GP	7	0 - 43	0 - 5
FORBS					
Agoseris	Agoseris spp.	AGOSE	8	0 - 43	0 - 5
American vetch	Vicia americana	VIAM	8	0 - 43	0 - 5
Aster	Eucephalus spp.	EUCEP2	8	0 - 43	0 - 5
Balsamroot	Balsamorhiza spp.	BALSA	8	0 - 43	0 - 5
Biscuitroot	Lomatium spp.	LOMAT	8	0 - 43	0 - 5
Buckwheat	Eriogonum spp.	ERIOG	8	0 - 43	0 - 5
Field chickweed	Cerastium arvense	CEAR4	8	0 - 43	0 - 5
Flax	Linum spp.	LINUM	8	0 - 43	0 - 5
Groundsel	Tephrosieris spp.	TEPHR3	8	0 - 43	0 - 5
Larkspur	Delphinium spp.	DELPH	8	0 - 43	0 - 5
Lupine	Lupinus spp.	LUPIN	8	0 - 43	0 - 5
Phlox	Phlox spp.	PHLOX	8	0 - 43	0 - 5
Pussytoes	Antennaria rosea	ANRO2	8	0 - 43	0 - 5
Stonecrop	Sedum spp.	SEDUM	8	0 - 43	0 - 5
Sunflower (perennial)	Helianthus spp.	HELIA3	8	0 - 43	0 - 5
Western yarrow	Achillea lanulosa	ACHIL	8	0 - 43	0 - 5
other perennial forbs (native)		2FP	8	0 - 43	0 - 5
TREES/SHRUBS					
Black sagebrush and/or	Artemisia nova	ARNO4	9	0 - 85	0 - 10
Mountain mahogany	Cercocarpus spp.	CERCO	9	0 - 85	0 - 10
MISC. SHRUBS					
Antelope bitterbrush	Purshia tridentata	PUTR2	10	0 - 43	0 - 5
Big sagebrush	Artemisia tridentata	ARTR2	10	0 - 43	0 - 5
Serviceberry	Amelanchier alnifolia	AMAL2	10	0 - 43	0 - 5
other shrubs & half shrubs (native)		2SHRUB	10	0 - 43	0 - 5

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors.

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.

Columbia Needlegrass/Spikefescue Plant Community

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores and periodic fires. Potential vegetation is about 75% grasses or grass-like plants, 10% forbs, and 15% woody plants. The cyclical nature of the fire regime in this community prevents 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 periods of rest.

Cool season midgrasses dominate the state. The major grasses include Columbia needlegrass, spikefescue, Idaho fescue, and bluebunch wheatgrass. Big and black sagebrush are conspicuous element of this state, occurring in a mosaic pattern, and makes up 5 to 10% of the annual production. On areas along the west slope of the Big Horn Mountains, mountain mahogany is the dominant shrub. A variety of forbs also occurs in this state and plant diversity is high (see Plant Composition Table).

Annual production on this state ranges from 500 to 1000 pounds depending on climatic conditions.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number:

Growth curve name:

Growth curve description:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	15	40	20	10	10	0	0	0

(Monthly percentages of total annual growth)

This plant community is extremely stable and well adapted to the Central Rocky Mountains 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 *Bluebunch Wheatgrass/Mixed Shrub Plant Community*.
- Repeated Wild Fire or Brush Management + Prescribed Grazing will convert the HCPC to the *Montana Wheatgrass/Three-tip Sagebrush/ Plant Community*.

Bluebunch Wheatgrass/Mixed Shrub Plant Community

Historically, this plant community evolved under grazing by large ungulates and a low fire frequency. Currently, this site is normally found under a moderate, season-long grazing regime 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. Shrubs are important components of this plant

Site Type: Rangeland

Shallow Loamy (SwLy) 15-19" East P.Z.

MLRA: 43B – Central Rocky Mountains

R043BY362WY

community. Cool-season grasses make up the majority of the understory with the balance made up of miscellaneous forbs.

Dominant grasses include bluebunch wheatgrass, Idaho fescue, rhizomatous wheatgrass, prairie junegrass, and of less frequency Columbia needlegrass and spikefescue. Grasses of secondary importance include Lettermans needlegrass, slender wheatgrass, bluegrasses, needleandthread, and spike trisetum. Forbs commonly found in this plant community include asters, phlox, buckwheat, pussytoes, lupine, paintbrush, agoseris, and larkspurs. Sagebrushes and antelope bitterbrush make up from 15% to 20% of the total annual production. On areas along the west slope of the Big Horn Mountains, mountain mahogany is the dominant shrub on this site and comprises 15% to 20% of the total annual production.

When compared to the Historical Climax Plant Community, big and black sagebrushes or mountain mahogany, rhizomatous wheatgrasses, and bluegrasses have increased. Columbia needlegrass and spikefescue have decreased, often occurring only where protected from grazing by the sagebrush canopy. Some weedy species such as cheatgrass may have invaded the site but are in small patches.

This state produces between 450 and 950 pounds annually, depending on the growing conditions.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number:

Growth curve name:

Growth curve description:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	15	40	20	10	10	0	0	0

(Monthly percentages of total annual growth)

This plant community is resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. The herbaceous component is mostly intact and plant vigor and replacement capabilities are sufficient. Water flow patterns and litter movement may 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 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.
- Heavy, continuous, season-long grazing plus no fires will convert the plant community to the *Rhizomatous Wheatgrass/ Mixed Shrub Plant Community*. The probability of this occurring is high. This is especially evident on areas where drought or heavy browsing does not adversely impact the shrub stand.
- Heavy, continuous, season-long grazing plus wildfire or brush management will convert the plant community to a *Rhizomatous Wheatgrass/Lettermans Needlegrass Plant Community*. The probability for this is high, especially on areas where the shrubs have been heavily browsed or removed by natural or human causes. Drought can also exacerbate this transition.
- Repeated Wild Fire or Brush Management + Prescribed Grazing will convert the *HCPC* to the *Montana Wheatgrass/Three-tip Sagebrush/ Plant Community*.

Rhizomatous Wheatgrass/Mixed Shrub Plant Community

This plant community currently is found under heavy continuous season-long grazing by livestock and protection from fire. Shrubs are a significant component of this plant community. Cool-season grasses make up the majority of the understory, but some of the preferred grasses have been reduced or are absent.

Dominant grasses include rhizomatous wheatgrass, Lettermans needlegrass, prairie junegrass, bluegrasses and of less frequency Columbia needlegrass, spikefescue, Idaho fescue and bluebunch wheatgrass. Grasses of secondary importance include slender wheatgrass, spike trisetum, Indian ricegrass, needleandthread, one-spike oatgrass, and upland sedge. Forbs commonly found in this plant community include argosies, biscuitroot, groundsel, buckwheat, phlox, lupine, larkspur, stonecrop, pussytoes, and American vetch. Black and big sagebrushes and antelope bitterbrush can make up to 30% of the total annual production. On areas along the west slope of the Big Horn Mountains, mountain mahogany replaces black sagebrush as the dominant shrub on this site.

When compared to the Historic Climax Plant Community, black sagebrush or mountain mahogany, big sagebrush, bluegrasses, prairie junegrass, and rhizomatous wheatgrasses have increased. Most of the preferred grasses and antelope bitterbrush have been reduced and some are absent. Some annuals, such as cheatgrass, have invaded the site, but are not yet abundant.

Annual production ranges from 400 to 800 pounds.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number:

Growth curve name:

Growth curve description:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	15	40	20	10	10	0	0	0

(Monthly percentages of total annual growth)

This plant community is resistant to change as the shrubs become more abundant. These areas may actually be more resistant to fire as less fine fuels are available and the bare ground between the shrubs is increased. The herbaceous component is not as diverse and plant vigor and species regeneration capabilities of some cool-season perennials are deficient. The removal of grazing does not seem to affect the plant composition or structure of the plant community.

Soil erosion is accelerated because of increased bare ground. Water flow patterns and pedestalling is more noticeable. Infiltration is reduced and runoff is increased. Rill channels may be noticeable in the interspaces on steeper areas and gullies may be establishing where rills have concentrated down slope.

Transitions or pathways leading to other plant communities are as follows:

- Prescribed grazing plus brush management will convert this plant community to near HCPC. If prescribed fire is used as a means to reduce or remove the shrubs, 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 will be required regardless of the brush treatment to reestablish the major cool-season grasses.
- Frequent and Severe Grazing plus no fires will convert the plant community to the *Mixed Shrub/Bluegrass Plant Community*. The probability of this occurring is high and is especially evident on areas where drought or heavy browsing does not adversely impact the shrub stand.

Site Type: Rangeland

Shallow Loamy (SwLy) 15-19" East P.Z.

MLRA: 43B – Central Rocky Mountains

R043BY362WY

- Brush management or Wildfire with no change in grazing management will convert this plant community to the *Rhizomatous Wheatgrass/Lettermans Needlegrass Plant Community*.

Mixed Shrub/Bluegrass Plant Community

This plant community is the result of frequent and severe grazing and protection from fire. Big sagebrush is the dominant shrub of this plant community as the annual production of shrubs exceeds 30%. Big sagebrush is a significant component of the plant community and the preferred cool season grasses have been eliminated or greatly reduced. The interspaces between plants have expanded leaving the amount of bare ground more prevalent and more soil surface exposed to erosive elements.

The dominant grasses are the bluegrass such as Sandberg, mutton, big, and Canby. Weedy annual species such as cheatgrass, kochia, Russian thistle, and a variety of mustards may occupy the site. Big sagebrush is the dominant shrub. Noxious weeds such as Canada thistle may invade the site if a seed source is available. When compared with the HCPC the annual production is less, as the major cool-season grasses are reduced, but the shrub production has increased significantly and compensates for some of the decline in the herbaceous production.

Annual production ranges from 300 to 700 pounds.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number:

Growth curve name:

Growth curve description:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	15	40	20	10	10	0	0	0

(Monthly percentages of total annual growth)

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 shrubs is increased. The herbaceous component is not as diverse and plant vigor and species regeneration capabilities of cool-season perennials are deficient. The removal of grazing does not seem to affect the plant composition or structure of the plant community.

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:

- Long-term prescribed grazing will convert this plant community to the *Big Sagebrush/Rhizomatous Wheatgrass Plant Community*.
- Brush management or Wildfire with no change in grazing management will convert this plant community to the *Bluegrass/Annual Plant Community*.

Montana Wheatgrass/Three-tip Sagebrush Plant Community

This plant community currently is found under prescribed grazing and is perpetuated by a fire cycle which maintains the removal of big sagebrush. Three-tip sagebrush and Montana wheatgrass are significant components of this plant community. Cool-season grasses remain an important component, but some bunchgrasses are not as abundant.

Dominant grasses include Montana wheatgrass, prairie junegrass, and rhizomatous wheatgrasses, and of less frequency Columbia needlegrass, Idaho fescue, bluebunch wheatgrass, and spikefescue. Grasses of secondary importance include one-spike oatgrass, slender wheatgrass, spike trisetum, and bluegrasses. Forbs commonly found in this plant community include phlox, groundsel, penstemon,

Site Type: Rangeland

Shallow Loamy (SwLy) 15-19" East P.Z.

MLRA: 43B – Central Rocky Mountains

R043BY362WY

larkspur, lupine, pussytoes, miner’s candle, hawksbeard, and milkvetch. Three-tip sagebrush along with pockets of black sagebrush comprise as much as 25% of the total production.

When compared to the Historical Climax Plant Community, Montana wheatgrass, and rhizomatous wheatgrass have increased. Columbia needlegrass, bluebunch wheatgrass, spikefescue, and Idaho fescue have decreased. Production of cool-season grasses has remained about the same. Cheatgrass can be common and in large patches, but most invaded areas are relatively small.

Annual production ranges from 450 to 900 pounds.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number:

Growth curve name:

Growth curve description:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	15	40	20	10	10	0	0	0

(Monthly percentages of total annual growth)

This plant community is resistant to change as once three-tip becomes the dominant shrubs it is difficult for other shrubs to become established. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. The herbaceous component is mostly intact and plant vigor and replacement capabilities are sufficient. Water flow patterns and litter movement may 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 and brush management will convert this plant community to the *HCPC*. Controlling three-tip sagebrush is difficult as it is a strong resprouter. Reestablishing the black sagebrush or mountain mahogany and the antelope bitterbrush may be difficult and may take many years.
- Heavy, continuous, season-long grazing will convert this plant community to a *Rhizomatous Wheatgrass/Lettermans Needlegrass Plant community*. More than likely, three-tip sage will persist in varying degrees as it is difficult to control and is a strong resprouter.

Rhizomatous Wheatgrass/Letterman Needlegrass Plant Community

This plant community currently is found under heavy continuous season-long grazing by livestock and is perpetuated by either brush management or a wildfire, which removes big sagebrush from this plant community. Three-tip sagebrush can be a significant component of this plant community, but also may be lacking. Some of the major cool-season bunchgrasses associated with this ecological site have been reduced and some may have been removed.

Dominant grasses include rhizomatous wheatgrasses, Letterman needlegrass, bluegrasses, prairie junegrass, spike trisetum, and Montana wheatgrass, and of less frequency Columbia needlegrass, Idaho fescue, bluebunch wheatgrass, and spikefescue. Forbs commonly found in this plant community include phlox, groundsel, biscuitroot, locoweed, larkspur, lupine, pussytoes, miner’s candle, hawksbeard, and milkvetch. Three-tip sagebrush can comprise as much as 25% of the total production.

When compared to the Historical Climax Plant Community, rhizomatous wheatgrass, prairie junegrass, and Montana wheatgrass have increased. Columbia needlegrass, bluebunch wheatgrass, Idaho fescue, and big sagebrush have decreased or been removed. Production of the preferred cool-season grasses

Site Type: Rangeland
 MLRA: 43B – Central Rocky Mountains

**Shallow Loamy (SwLy) 15-19”EAsT P.Z.
 R043BY362WY**

has been reduced. Cheatgrass can be common and in large patches, but mostly invaded areas are relatively small.

Annual production ranges from 350 to 750 pounds.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number:

Growth curve name:

Growth curve description:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	15	40	20	10	10	0	0	0

(Monthly percentages of total annual growth)

This plant community is resistant to change as the herbaceous species present are well adapted to grazing and if three-tip becomes the dominant shrub it is difficult for other shrubs to become established. However, species composition can be altered through long-term overgrazing. The herbaceous component is mostly intact, but some cool-season bunchgrasses associated with the site have been reduced or removed. Plant vigor and replacement capabilities are sufficient for some species but not all. Water flow patterns and litter movement is occurring but only on steeper slopes. Incidence of pedestalling is moderate to slight. Soils are mostly stable and the surface shows minimum soil loss. The watershed is functioning and the biotic community is partially intact.

Transitions or pathways leading to other plant communities are as follows:

- Prescribed grazing will convert this plant community to the *Montana Wheatgrass/Three-tip Sagebrush Plant community*.
- Frequent and Severe Grazing will convert this plant community to a *Bluegrass/Annual Plant Community*. If three-tip sage is present more than likely it will persist in varying degrees as it is difficult to control.

Bluegrass/Annual Plant Community

This plant community evolved under frequent and severe grazing and the big sagebrush shrub component has been removed by heavy browsing, wildfire or human means. Weedy annuals and bluegrasses are the most dominant plants and occupy any open bare ground area. Three-tip sagebrush may or may not be present on this site. However, it is common for this shrub to occur as it is a strong resprouter and may quickly re-establish the site after a disturbance.

Compared to the HCPC, weedy annual species and bluegrasses are widespread and virtually all of the major cool-season mid-grasses are absent or severely decreased. Big sagebrush has also been removed. Weedy annuals may include cheatgrass, kochia, Russian thistle, and a variety of mustards. Bluegrass species will include Sandberg, mutton, Canby, and big. Noxious weeds such as 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 and more soil surface exposed to erosive elements.

Annual production ranges from 200 to 500 pounds.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number:

Growth curve name:

Growth curve description:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	15	40	20	10	10	0	0	0

(Monthly percentages of total annual growth)

Site Type: Rangeland

Shallow Loamy (SwLy) 15-19" East P.Z.

MLRA: 43B – Central Rocky Mountains

R043BY362WY

This plant community is relatively stable and resistant to overgrazing. Annuals and bluegrasses are effectively competing against the establishment of perennial cool-season grasses. Plant diversity is greatly altered and the herbaceous component is not intact. Recruitment of the major perennial grasses is not occurring and the replacement potential is absent. The biotic integrity is missing.

The soils are unstable and not protected from excessive erosion. Rill channels and maybe even gullies may be present on site and adjacent areas are impacted by excessive runoff. Water flow patterns and pedestalling are obvious. The watershed is not functioning.

Transitions or pathways leading to other plant communities are as follows:

- Prescribed grazing will convert this plant community to the *Rhizomatous Wheatgrass/Lettermans Needlegrass Plant community*.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

Columbia Needlegrass/Spikefescue Plant Community (HCPC):

The predominance of grasses in this plant community favors grazers and mixed-feeders, such as deer, bison, elk, 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. Due to the location of these sites on the foot slopes of mountains they are valuable for elk and deer winter ranges. 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 meadowlark, lark bunting, sage thrasher, horned larks, red-tail and ferruginous hawks, and golden eagles. Many grassland obligate small mammals would occur here.

Bluebunch Wheatgrass/Mixed Shrub Plant Community:

The combination of an overstory of big sagebrush and an understory of grasses and forbs 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, elk, 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. Other birds that would frequent this plant community include western meadowlark, lark bunting, sage thrasher, horned larks, red-tail and ferruginous hawks, and golden eagles.

Rhizomatous Wheatgrass/Mixed Shrub Plant Community:

The combination of an overstory of big sagebrush and an understory of grasses and forbs 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, elk, 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. Other birds that would frequent this plant community include western meadowlark, lark bunting, sage thrasher, horned larks, red-tail and ferruginous hawks, and golden eagles.

Mixed Shrub/Bluegrass 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 escape and thermal cover for large ungulates, as well as nesting and brood rearing habitat for

Site Type: Rangeland

Shallow Loamy (SwLy) 15-19" East P.Z.

MLRA: 43B – Central Rocky Mountains

R043BY362WY

sage grouse. Other birds that would frequent this plant community include western meadowlark, lark bunting, sage thrasher, horned larks, red-tail and ferruginous hawks, and golden eagles. Due to the lack of herbaceous production and diversity of mid cool season grasses on this site, it is not as beneficial to grazers.

Montana Wheatgrass/Three-tip Sagebrush Plant Community:

The production of herbaceous species provided for good foraging to grazers. However, the lack of tall or mid growing shrubs does not benefit browsers nor provides cover for many wildlife species. As these site greens-up sooner in the spring, this site tends to provide early new growth for foraging large and small mammals. If located adjacent to shrub dominated sites, It provides good foraging habitat for sage grouse.

Rhizomatous Wheatgrass/Lettermans Needlegrass Plant Community:

The production of herbaceous species provided for good foraging for grazers. However, the lack of tall or mid growing shrubs does not benefit browsers nor provides cover for many wildlife species. As these site greens-up sooner in the spring, this site tends to provide early new growth for foraging large and small mammals. If located adjacent to shrub dominated sites, It provides good foraging habitat for sage grouse.

Bluegrass/Annual Plant Community:

This community provides limited foraging for antelope and other grazers. They may be used as a foraging site by sage grouse if proximal to woody cover. Generally, these are not target plant communities for wildlife habitat management.

Animal Preferences (Quarterly - 1,2,3,4) for commonly occurring plants in MLRA 43BY, 15-19 inch Foothills and Mountains East

COMMON NAME/ GROUP NAME	SCIENTIFIC NAME	SCIENTIFIC SYMBOL	Cattle	Sheep	Horses	Mule Deer	Antelope	Elk	Moose	Mtn. Sheep
GRASSES/GRASSLIKES										
Alpine timothy	Phleum alpinum	PHAL2	PPPP	PPPP	PPPP	DDDD	UUUU	PPPP	DDDD	DDDD
Baltic rush	Juncus balticus	JUBA	DDDD	UUUU	DDDD	UUUU	UUUU	DDDD	UUUU	UUUU
Big bluegrass	Poa ampla (syn. To Poa secunda)	POAM (POSE)	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Bluebunch wheatgrass	Pseudoroegneria spicata	PSP6	PPPP	PPPP	PPPP	DDDD	DDDD	PPPP	DDDD	DDDD
Bluejoint reedgrass	Calamagrostis canadensis	CACAM	PPPP	DDDD	PPPP	UUUU	UUUU	PPPP	DDDD	DDDD
Bottlebrush squirreltail	Elymus elymoides	ELELE	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
California oatgrass (danthonia)	Danthonia californica	DACA3	PPPP	PPPP	PPPP	DDDD	DDDD	PPPP	DDDD	DDDD
Canby bluegrass	Poa canbyi (syn. to Poa secunda)	POCA (POSE)	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Columbia needlegrass	Achnatherum nelsonii	ACNE9	PPPP	PPPP	DDDD	DDDD	DDDD	PPPP	DDDD	DDDD
Dunehead sedge	Carex phaeocephala	CAPH2	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Idaho fescue	Festuca idahoensis	FEID	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Indian ricegrass	Achnatherum hymenoides	ACHY	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Letterman needlegrass	Achnatherum lettermanii	ACLE9	PPPP	PPPP	DDDD	DDDD	DDDD	PPPP	DDDD	DDDD
Low growing sedges (low sedge)	Carex spp.	CAREX	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Mat mulch	Muhlenbergia richardsonis	MURI	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Meadow barley	Hordeum brachyantherum	HOB2	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Montana wheatgrass (Griffiths wheatgrass)	Elymus albicans	ELAL7	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Mountain brome	Bromus marginatus	BRMA4	PPPP	PPPP	DDDD	DDDD	UUUU	PPPP	DDDD	DDDD
Mountain mulch	Muhlenbergia montana	MUMO	DDDD	DDDD	DDDD	DDDD	UUUU	DDDD	DDDD	DDDD
Mutton bluegrass	Poa fendleriana	POFE	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Nebraska sedge	Carex nebrascensis	CANE2	PPPP	PPPP	PPPP	DDDD	DDDD	PPPP	DDDD	DDDD
Needleandthread	Hesperostipa	HESPE11	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Nodding brome	Bromus anomalus	BRAN	PPPP	PPPP	DDDD	DDDD	UUUU	PPPP	DDDD	DDDD
Northern reedgrass	Calamagrostis stricta ssp. inexpansa	CAST13	PPPP	DDDD	PPPP	UUUU	UUUU	PPPP	DDDD	DDDD
One-spike oatgrass	Danthonia unispicata	DAUN	DDDD	PPPP	DDDD	PPPP	DDDD	DDDD	DDDD	DDDD
Prairie junegrass	Koeleria macrantha	KOMA	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Pumpelly brome	Bromus inermis spp. pumpellianus	BRINP5	PPPP	PPPP	DDDD	DDDD	UUUU	PPPP	DDDD	DDDD
Sandberg bluegrass	Poa secunda	POSE	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Slender wheatgrass	Elymus trachycaulus	ELTR7	PPPP	DDDD	PPPP	DDDD	DDDD	PPPP	DDDD	DDDD
Slough sedge	Carex obnupta	CAOB3	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Spikefescue	Leucopoa kingii	LEK12	PPPP	DDDD	PPPP	PPPP	DDDD	PPPP	DDDD	DDDD
Spike trisetum	Trisetum spicatum	TRSP2	PPPP	DDDD	PPPP	DDDD	DDDD	PPPP	DDDD	DDDD
Tall mannagrass	Glyceria elata (syn. G. striata)	GLEL (GLST)	DDDD	UUUU	DDDD	UUUU	UUUU	DDDD	DDDD	DDDD
Thickspike wheatgrass	Elymus lanceolatus ssp. lanceolatus	ELLAL	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Timber oatgrass (danthonia)	Danthonia intermedia	DAIN	DDDD	DDDD	DDDD	UUUU	UUUU	DDDD	DDDD	DDDD
Tufted hairgrass	Deschampsia caespitosa	DECA18	PPPP	PPPP	PPPP	DDDD	DDDD	PPPP	DDDD	DDDD
Upland sedges	Carex spp.	CAREX	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Western wheatgrass	Pascopyrum smithii	PASM	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
FORBS										
American bistort	Polygonum bistortoides	POB16	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Arnica	Arnica	ARNIC	UUUU	UUUU	UUUU	DDDD	UUUU	UUUU	UUUU	UUUU
Asters	Eucephalus spp.	EUCEP2	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Chickweed (field chickweed)	Cerastium arvense	CEAR4	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Docks	Rumex spp.	RUMEX	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Fleabanes	Erigeron spp.	ERIGE2	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Goldenrod	Oligoneuron	OLIGO3	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Iris	Iris spp.	IRIS	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Larkspur (poisonous in spring before flowering)	Delphinium spp.	DELPH	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Lupine (may be poisonous after seedpots mature)	Lupinus spp.	LUPIN	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Mule-ears wyethia	Wyethia	WYETH	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Pale agoseris	Agoseris glauca	AGGL	DDDD	PPPP	DDDD	PPPP	DDDD	DDDD	DDDD	DDDD
Phlox	Phlox spp.	PHLOX	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Pussytoes	Antennaria spp.	ANTEN	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Sandwort	Arenaria spp.	ARENA	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Stonewort	Sedum spp.	SEDUM	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Water hemlock	Cicuta spp.	CICUT	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT
Waterleaf	Hydrophyllum	HYDRO4	DDDD	PPPP	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Water sedge	Carex aquatilis	CAAQ	DDDD	UUUU	DDDD	UUUU	UUUU	DDDD	DDDD	UUUU
Western yarrow	Achillea millefolium	ACMIO	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Wild strawberry (false strawberry)	Fragaria vesca	FRVE	DDDD	PPPP	DDDD	PPPP	PPPP	DDDD	PPPP	PPPP
TREES, SHRUBS & HALF-SHRUBS										
Antelope bitterbrush	Purshia tridentata	PUTR2	PPPP	PPPP	DDDD	PPPP	PPPP	PPPP	PPPP	PPPP
Alpine laurel (bog kalmia)	Kalmia microphylla	KAMI	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT
Big sagebrush	Artemisia tridentata	ARTR2	DDDD	DDDD	UUUU	DDDD	DDDD	DDDD	DDDD	DDDD
Black sagebrush	Artemisia nova	ARNO4	DDDD	DDDD	UUUU	DDDD	DDDD	DDDD	DDDD	DDDD
Bog birch	Beula pumila	BEPU4	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Boxelder	Acer negundo L. var. Interius	ACNE12	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Chokecherry (leaves are poisonous in sheep & cattle)	Prunus virginiana	PRVIV	DDDD	DDDD	DDDD	UUUU	UUUU	DDDD	DDDD	DDDD
Limber pine	Pinus flexilis	PIFL2	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Mountainmahogany	Cercocarpus spp.	CERCO	PPPP	PPPP	DDDD	PPPP	UUUU	PPPP	PPPP	DDDD
Ponderosa pine	Pinus ponderosa	PIPO	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Rabbitbrush	Chrysothamnus spp.	CHRS9	UUUU	PPPP	UUUU	DDDD	PPPP	UUUU	UUUU	DDDD
Redosier Dogwood	Cornus sericea	COCA16	UUUU	UUUU	UUUU	PPPP	UUUU	PPPP	PPPP	UUUU
Serviceberry	Amelanchier alnifolia	AMAL2	DDDD	PPPP	UUUU	PPPP	UUUU	DDDD	DDDD	DDDD
Shrubby cinquefoil	Dasiphora floribunda	DAFL3	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Silver sagebrush	Artemisia cana	ARCA13	DDDD	DDDD	DDDD	PPPP	PPPP	DDDD	DDDD	DDDD
Snowberry	Symphoricarpos occidentalis	SYOC	UUUU	UUUU	UUUU	DDDD	UUUU	UUUU	UUUU	UUUU
Snowbrush ceanothus	Ceanothus velutinus	CEVE	PPPP	DDDD	DDDD	DDDD	UUUU	PPPP	DDDD	DDDD
Three-tip sagebrush	Artemisia tripartita	ARTR4	UUUU	DDDD	UUUU	UUUU	DDDD	UUUU	DDDD	DDDD
Water birch	Beula occidentalis	BEOC2	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Willow	Salix spp.	SALIX	DDDD	PPPP	DDDD	PPPP	UUUU	DDDD	PPPP	DDDD

N = not used; U = undesirable; D = desirable; P = preferred; T = toxic

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 (Lb./ac)	Carrying Capacity* (AUM/ac)
Columbia Needlegrass/Spikefescue	500-1000	.4
Bluebunch WG/Mixed Shrub	450-950	.35
Rhizomatous WG/Mixed Shrub	400-800	.3
Mixed Shrub/Bluegrass	300-700	.2
Montana WG/Three-tip Sagebrush	450-900	.3
Rhizomatous WG/Lettermans Needlegrass	350-750	.2
Bluegrass/Annual	200-500	.1

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

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide 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.

Hydrology Functions

Climate is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group D due to its shallow feature. Infiltration and runoff potential for this site varies from moderate to high depending on soil hydrologic group and water table. Runoff will be high on this site since the soil saturate easy and due to its shallow characteristic and water holding capacity. (Refer to Part 630, NRCS National Engineering Handbook for detailed hydraulic 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 such as bluebunch wheatgrass. 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 that bloom from spring until fall have an esthetic value that appeals to visitors. Other recreational uses may include hiking, camping, and mountain biking.

Wood Products

No appreciable wood products are present on the site.

Site Type: Rangeland
MLRA: 43B – Central Rocky Mountains

**Shallow Loamy (SwLy) 15-19" East P.Z.
R043BY362WY**

Other Products

None noted.

Supporting Information

Associated Sites

Loamy	043BY322WY Foothills and Mountains East P.Z.
Shallow Sandy	043BY366WY Foothills and Mountains East P.Z.
Coarse Upland	043BY308WY Foothills and Mountains East P.Z.

Similar Sites

() – Shallow Loamy 10-14" Foothills and Basins East P.Z., 032XY362WY has lower production.

Inventory Data References (narrative)

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used. Those involved in developing this site include: Chris Krassin, Range Management Specialist, James Haverkamp, Range Management Specialist, Steven Gullion, Range Management Specialist, James Mischke, District Conservationist, and Everet Bainter, State Range Management Specialist. Other sources used as references include USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

Inventory Data References

Site Correlation

Type Locality

Field Offices

Cody, Dubois, Fort Washakie, Greybull, Lander, Powell, Riverton, Thermopolis, Worland

Relationship to Other Established Classifications

Other References

Site Description Approval

State Range Management Specialist

Date