United States Department of Agriculture
Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

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

Site ID: R043BY350WY

Major Land Resource Area: 43B – Central Rocky Mountains

Physiographic Features

This site occurs on nearly level to 30% slopes.

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

	Minimum	Maximum
Elevation (feet):	6000	9000
Slope (percent):	0	30
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	moderately 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:

	Minimum	Maximum	5 yrs. out of 10 between
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	

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:	**System**	**Subsystem**	**Class**	**Sub-class**
None	None	None	None	None

Stream Type: None

Representative Soil Features

The soils of this site are deep to moderately deep (greater than 20"to bedrock), well drained and rapidly permeable. The surface soil is at least 3 to 6 "thick (depending on texture and permeability of the subsoil) and will include the following soil textures: fine sandy loam, sandy loam or loamy very fine sand. Coarser topsoils may be included if underlain by finer textured subsoils.

Parent Material Kind: alluvium, eolian deposits, residuum
Parent Material Origin: sandstone, unspecified
Surface Texture: fine sandy loam, sandy loam
Surface Texture Modifier: none
Subsurface Texture Group: sandy loam
Surface Fragments ≤ 3" (% Cover): 0
Surface Fragments > 3" (%Cover): 0
Subsurface Fragments ≤ 3" (% Volume): 0
Subsurface Fragments > 3" (% Volume): 0

	Minimum	**Maximum**
Drainage Class:	well drained	excessively well drained
Permeability Class:	moderately rapid	rapid
Depth (inches):	20	>60
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":	2	6.1
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 big sagebrush, and a variety of forbs. The expected potential composition for this site is about 70% grasses, 20% forbs and 10% woody plants. The composition and production will vary naturally due to historical use, fluctuating precipitation and fire frequency.

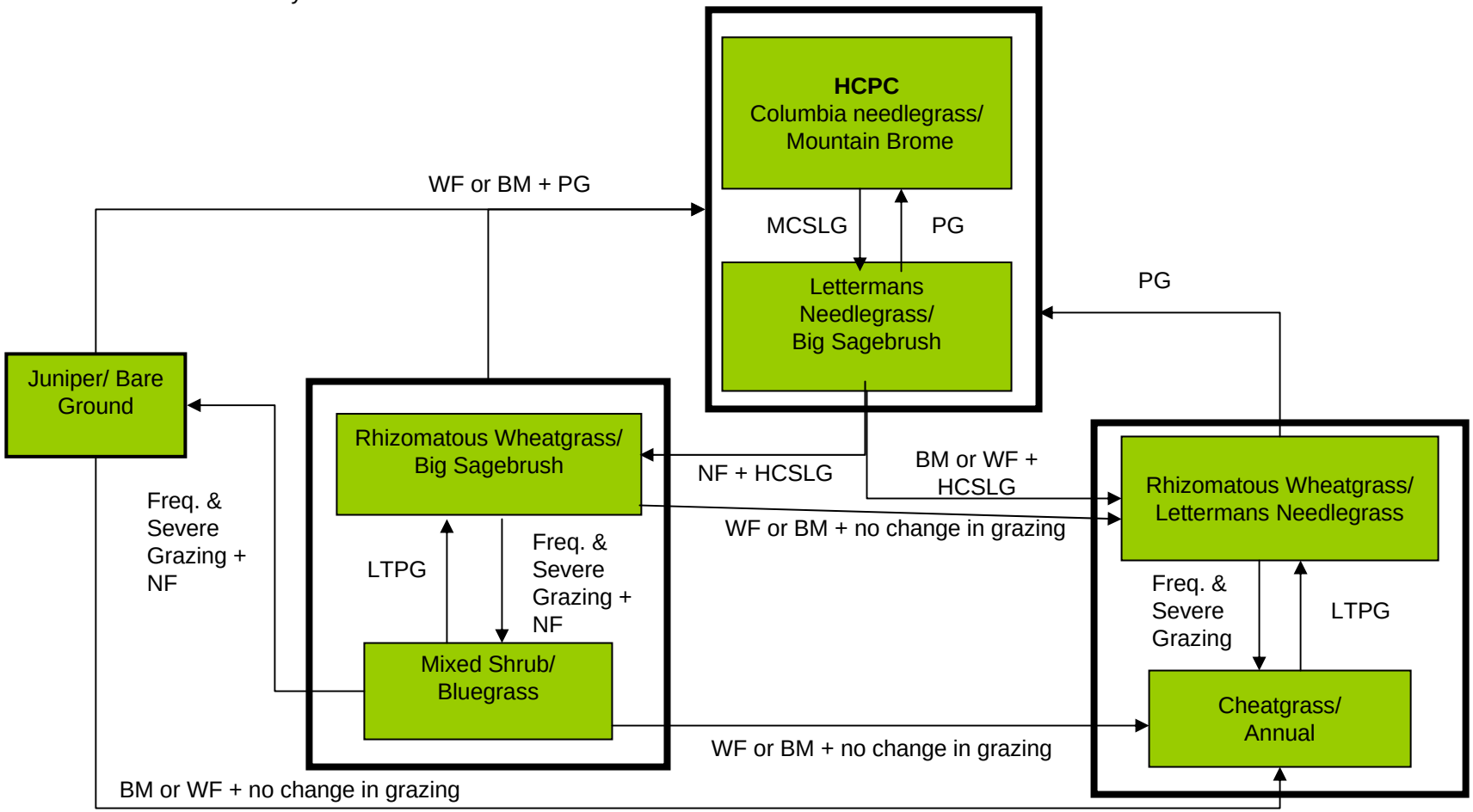
As this site deteriorates species such as bluegrasses, rhizomatous wheatgrasses and big sagebrush will increase. Cool season grasses, such as Columbia needlegrass and mountain brome, will decrease in frequency and production. As conditions continue to deteriorate annuals such as cheatgrass will invade.

Big sagebrush and/or juniper 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. Where junipers naturally occur, this site can become almost entirely covered with juniper. Limber pine may be present on this site but will rarely turn into a dominant species. 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.

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: 1350		
			Group	lbs./acre	% Comp.
GRASSES AND GRASS-LIKES					
GRASSES/GRASSLIKES					
Columbia needlegrass	Achnatherum nelsonii	ACNE9	1	473 - 675	35 - 50
Mountain brome	Bromus marginatus	BRMA4	2	68 - 203	5 - 15
Rhizomatous wheatgrass	Pascopyrum smithii	PASM	3	0 - 135	0 - 10
Lettermans needlegrass	Achnatherum nelsonii	ACLE9	4	0 - 135	0 - 10
Prairie junegrass	Koeleria macrantha	KOMA	5	0 - 135	0 - 10
MISC. GRASSES/GRASSLIKES			**6**	**68 - 203**	**5 - 15**
Big bluegrass	Poa ampla (syn. P. secunda)	POAM	6	0 - 68	0 - 5
Bluebunch wheatgrass	Pseudoroegneria spicata	PSSP6	6	0 - 68	0 - 5
Canby bluegrass	Poa canbyi (syn. P. secunda)	POCA (POSE)	6	0 - 68	0 - 5
Needleandthread grass	Hesperostipa comata	HECO26	6	0 - 68	0 - 5
Nodding brome	Bromus anomalus	BRAN	6	0 - 68	0 - 5
Pumpelly brome	Bromus inermis spp. pumpellianus	BRINP5	6	0 - 68	0 - 5
Sandberg bluegrass	Poa secunda	POSE	6	0 - 68	0 - 5
Slender wheatgrass	Elymus trachycaulus	ELTR7	6	0 - 68	0 - 5
Upland sedges	Carex spp.	CAREX	6	0 - 68	0 - 5
other perennial grasses (native)		2GP	6	0 - 68	0 - 5
FORBS			**7**	**135 - 270**	**10 - 20**
Aster	Eucephalus spp.	EUCEP2	7	0 - 68	0 - 5
Chickweed	Cerastium arvense	CEAR4	7	0 - 68	0 - 5
Deathcamas	Zigadenus spp.	ZIGAD	7	0 - 68	0 - 5
Fleabane	Erigeron spp.	ERIGE2	7	0 - 68	0 - 5
Franklin's sagewort	Arenaria franklinii	ARFR	7	0 - 68	0 - 5
Fringed sagewort	Artemisia frigida	ARFR4	7	0 - 68	0 - 5
Larkspur	Delphinium spp.	DELPH	7	0 - 68	0 - 5
Lupine	Lupinus spp.	LUPIN	7	0 - 68	0 - 5
Missouri milkvetch	Astragalus missouriensis	ASMI10	7	0 - 68	0 - 5
Paintbrush	Castilleja spp.	CAST	7	0 - 68	0 - 5
Parsnipflower buckwheat	Eriogonum heracleoides	ERHE2	7	0 - 68	0 - 5
Phlox	Phlox spp.	PHLOX	7	0 - 68	0 - 5
Pussytoes	Antennaria rosea	ANRO2	7	0 - 68	0 - 5
Western yarrow	Achillea lanulosa	ACHIL	7	0 - 68	0 - 5
Wild onion	Allium textile	ALTE	7	0 - 68	0 - 5
other perennial forbs (native)		2FP	7	0 - 68	0 - 5
TREES/SHRUBS					
Big sagebrush	Artemisia tridentata	ARTR2	8	0 - 135	0 - 10
MISC. SHRUBS			**9**	**0 - 68**	**0 - 5**
Juniper	Juniperus scopulorum	JUSC2	9	0 - 68	0 - 5
Limber pine	Pinus flexilis	PIFL2	9	0 - 68	0 - 5
other shrubs & half shrubs (native)		2SHRUB	9	0 - 68	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, Mountain Brome 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 70% grasses or grass-like plants, 20% forbs, and 10% woody plants. The cyclical nature of the fire regime in this community prevents big sagebrush and/or juniper from being the dominant landscape. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning.

Cool season midgrasses dominate the state. The major grasses include Columbia needlegrass, mountain brome, rhizomatous wheatgrass, and prairie junegrass. Big sagebrush is a conspicuous element of this state, occurring in a mosaic pattern, and makes up 5 to 10% of the annual production. A variety of forbs also occurs in this state and plant diversity is high (see Plant Composition Table).

Annual production ranges from 1100 to 1600 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 *Lettermans Needlegrass/Big Sagebrush Plant Community.*

Lettermans Needlegrass/Big Sagebrush 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 community. Cool-season grasses make up the majority of the understory with the balance made up of miscellaneous forbs.

Dominant grasses include Lettermans needlegrass, rhizomatous wheatgrass, needleandthread, prairie junegrass, and of less frequency Columbia needlegrass and mountain brome. Grasses of secondary importance include bluebunch wheatgrass, nodding brome, slender wheatgrass, bluegrasses, pumpelly

brome, and upland sedges. Forbs commonly found in this plant community include asters, phlox, hawksbeard, buckwheat, pussytoes, lupine, paintbrush, agoseris, fringed sagewort, and larkspurs. Sagebrush can make up 15% to 20% of the total annual production and to a less extent juniper and limber pine will be included.

When compared to the Historical Climax Plant Community, big sagebrush and/or juniper and limber pine, Lettermans needlegrass, rhizomatous wheatgrasses, and bluegrasses have increased. Columbia needlegrass and mountain brome 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 900 and 1400 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. Wind scouring and deposition areas are few. 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/Big Sagebrush 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.

Rhizomatous Wheatgrass/Big Sagebrush Plant Community
This plant community currently is found under heavy continuous season-long grazing by livestock and protection from fire. Big sagebrush is 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, needleandthread, prairie junegrass, bluegrasses and of less frequency Columbia needlegrass, and mountain brome. Grasses of secondary importance

include slender wheatgrass, nodding brome, bluebunch wheatgrass, and upland sedges. Forbs commonly found in this plant community include asters, phlox, hawksbeard, buckwheat, pussytoes, lupine, paintbrush, agoseris, fringed sagewort, and larkspurs. Big sagebrush and juniper can make up to 30% of the total annual production.

When compared to the Historic Climax Plant Community, big sagebrush, juniper, limber pine, bluegrasses, prairie junegrass, and rhizomatous wheatgrasses have increased. Most of the preferred grasses 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 700 to 1200 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 or wildfire 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.

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

- No fire plus frequent and severe season-long grazing will convert the plant community to the *Juniper/Bare Ground Plant Community*. This will occur where growing conditions are more favorable for juniper than for big sagebrush.

Mixed Shrub/Bluegrass Plant Community
This plant community is the result of frequent and severe grazing and protection from fire. Big sagebrush and juniper are the dominant shrubs of this plant community, but other shrubs and limber pine will occur

and the total production will exceed 30%. The under story has been significantly altered and the preferred cool season grasses have been eliminated or greatly reduced.

The dominant grasses are Sandberg, mutton, big, and Canby bluegrasses and upland sedges. Weedy annual species such as cheatgrass, povertyweed, gumweed, and stickseed occupy the site. Big sagebrush and juniper are the dominant shrubs. Noxious weeds such as Canada thistle and/or leafy spurge 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 significantly reduced or absent, but the shrub production has increased significantly and compensates for some of the decline in the herbaceous production. 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 600 to 1000 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:

- Prescribed grazing plus brush management or wildfire will eventually 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 often be required regardless of the brush treatment to reestablish the major cool-season grasses.

- Long-term prescribed grazing will convert this plant community to the *Rhizomatous Wheatgrass/ Big Sagebrush Plant Community*. This may take years and if conditions are right.

- Brush management or Wildfire with no change in grazing management will convert this plant community to the Cheatgrass/*Annual Plant Community*.

- No fire plus frequent and severe grazing will convert the plant community to the *Juniper/Bare Ground Plant Community*. This will occur where growing conditions are more favorable for juniper than for big sagebrush.

Juniper/Bare Ground Plant Community

This plant community is the result of frequent and severe grazing and protection from fire. This is likely only where conditions are more conducive for juniper. Juniper is the dominant shrub of this plant community, but limber pine can also be a component. The under story has been significantly altered and the preferred cool season grasses have been eliminated or greatly reduced.

The dominant grasses are the bluegrasses such as Sandberg, mutton, big, and Canby. Weedy annual species such as cheatgrass, povertyweed, gumweed, and stickseed occupy the site. Juniper is the dominant shrub. Noxious weeds such as Canada thistle and/or leafy spurge 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 and tree production has increased significantly and compensates for some of the decline in the herbaceous production. 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 500 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 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 are 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:

- Prescribed grazing plus either wildfire or 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.

- Brush management or Wildfire with no change in grazing management will convert this plant community to the Cheatgrass/*Annual Plant Community*.

Rhizomatous Wheatgrass/Lettermans 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 shrubs from this plant community. 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, Lettermans needlegrass, needleandthread, bluegrasses, prairie junegrass, nodding brome, and slender wheatgrass, and of less frequency Columbia needlegrass, and mountain brome. Forbs commonly found in this plant community include asters, phlox, hawksbeard, buckwheat, pussytoes, lupine, paintbrush, agoseris, and larkspurs.

When compared to the Historical Climax Plant Community, rhizomatous wheatgrass, Lettermans needlegrass, needleandthread, prairie junegrass, and bluegrasses have increased. Columbia needlegrass, mountain brome, and big sagebrush, have decreased or been removed. Production of the preferred cool-season grasses has been reduced. Cheatgrass can be common and in large patches, but mostly invaded areas are relatively small.

Annual production ranges from 900 to 1300 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. 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 near HCPC. Reestablishing the big sagebrush may be difficult and may take many years. Seeding may be required to reestablish any of the lost major bunchgrasses.

- Frequent and severe grazing will convert this plant community to a *Cheatgrass/Annual Plant Community.*

Cheatgrass/Annual Plant Community
This plant community evolved under frequent and severe grazing and the 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 areas. The interspaces between plants have expanded leaving the amount of bare ground more prevalent and more soil surface exposed to erosive elements.

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. The dominant grasses are the bluegrass such as Sandberg, mutton, big, and Canby. Weedy annual species such as cheatgrass, povertyweed, gumweed, and stickseed occupy the site. Noxious weeds have usually invaded the site if a seed source is available.

Annual production ranges from 350 to 650 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 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:

- Long Term Prescribed Grazing will convert this plant community to the *Rhizomatous Wheatgrass/Lettermans Needlegrass plant community*.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

Columbia Needlegrass/Mountain Brome 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.

Lettermans Needlegrass/Big Sagebrush 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 and antelope may use this state for foraging and cover year-round, as would cottontail and jack rabbits. Due to the location of these sites on the foot slopes of mountains and important shrubs for browsing, these are valuable for elk and deer winter ranges. 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/Big Sagebrush 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 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.

Juniper/Bare Ground Plant Community:
This plant community can provide important winter and escape cover for elk, mule deer and antelope, as the juniper and limber pine can approach 70% cover. However, due to the lack of quality browsing and herbaceous species, this site provides only a minimal source of forage for most wildlife species. Specific bird species such as the nuthatches, western tanager, western kingbird, mountain bluebird, wood-warblers, and northern flicker frequent this site.

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.

Cheatgrass/Annual Plant Community:
This community provides limited foraging for elk and other grazers. They may be used as a foraging site by chukars 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 occuring 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	PSSP6	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 muhly	Muhlenbergia richardsonis	MURI	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Meadow barley	Hordeum brachyantherum	HOBR2	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 muhly	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	CASTI3	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
Stonecrop	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		
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.	CHRYS9	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	Symphoricarpus 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 tripartitia	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/Mountain Brome	1100-1600	.6
Lettermans Needlegrass/Big Sagebrush	900-1400	.5
Rhizomatous WG/Big Sagebrush	700-1200	.4
Mixed Shrub/Bluegrass	600-1000	.3
Juniper/Bare Ground	500-900	.15
Rhizomatous WG/ Lettermans Needlegrass	900-1300	.4
Cheatgrass/Annual	350-650	.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 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

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B, with localized areas in hydrologic group C. Infiltration potential for this site varies from moderately rapid to rapid depending on soil hydrologic group and ground cover. Runoff varies from low to moderate. 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 that bloom from spring until fall have an esthetic value that appeals to visitors. Other recreational uses may include hiking, camping, mountain biking, and in the winter snowshoeing and cross-country skiing.

Wood Products

No appreciable wood products are present on the site.

Other Products
None noted.

Supporting Information

Associated Sites

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

Similar Sites
() – Sandy 10-14" Foothills and Basins East P.Z., 032XY350WY 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