USDA Natural Resources Conservation Service

Ecological site R058AE012MT
Saline Lowland (SL) RRU 58A-E 10-14" p.z.

Accessed: 05/11/2025

General information

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

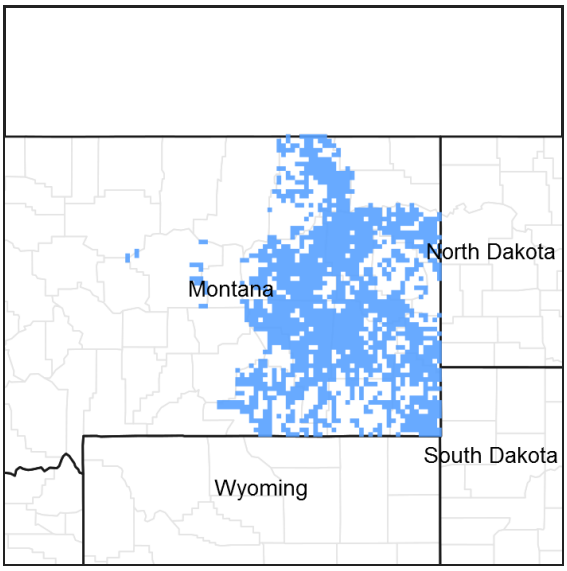


Figure 1. Mapped extent

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

Similar sites

R058AE014MT	**Dense Clay (DC) RRU 58A-E 10-14" p.z.** The Dense Clay site will be more similar to a Saline Upland in that the production is much lower and the plant community is very sparse.
R058AE011MT	**Saline Upland (SU) RRU 58A-E 10-14" p.z.** The Saline Upland site may have similar plants, but is much more sparse and low producing.
R058AE193MT	**Silty-Saline (SiS) RRU 58A-E 10-14" p.z.** The Silty-Saline site will have more non-salt tolerant plants present.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This ecological site occurs on subirrigated or overflow areas where salt and/or alkali accumulations are apparent and salt tolerant plants dominate the vegetative component. Slopes are mainly less than 4 percent, and aspect is

not significant.

Table 2. Representative physiographic features

Landforms	(1) Depression (2) Drainageway (3) Stream terrace
Flooding frequency	Occasional to none
Ponding duration	Brief (2 to 7 days)
Ponding frequency	Occasional
Elevation	1,900–3,500 ft
Slope	0–4%
Ponding depth	0–4 in
Water table depth	36–60 in
Aspect	Aspect is not a significant factor

Climatic features

MLRAs 58A and 60B are considered to have a continental climate characterized by cold winters, hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature are typical. The climate is the result of this MLRA's location in the geographic center of North America. There are few natural barriers on the northern Great Plains and the winds move freely across the plains and account for rapid changes in temperature. Seasonal precipitation is often limiting for plant growth. Annual fluctuations in species composition and total production are typical depending on the amount and timing of rainfall.
Temperatures can be very extreme in this part of Montana. Summer daytime temperatures are typically quite warm, generally averaging in the mid to upper 80º's F for July and August. Summertime temperatures will typically reach in the 100º's F at some point during the summer, and can reach 90º F any month between May and September. Conversely, winter temperatures can be cold, averaging in the mid teens to mid 20º's F for December and January. There will typically be several days of below zero temperatures each winter. It is not uncommon for temperatures to reach 30–40º F below zero, or even colder, most any winter.

Spring can be windy throughout these MLRA's, with winds averaging over 10 mph about 15 percent of the time. Speeds of 50 mph or stronger can occasionally occur as a weather system crosses this part of Montana.

MLRAs 58AE and 60BE have been divided into two distinct precipitation zones for the purpose of developing ecological site descriptions: 10–14" Mean Annual Precipitation (MAP) and 15–19" MAP.

10–14 inch zone:

The majority of the rangeland in these areas falls within the 11 to 13 inch range. During an average year, 70 to 75 percent of the annual precipitation falls between April and September, which are the primary growing season months.

Snowfall is not heavy in the area, averaging 28 total inches in the 10-14 inch MAP (Yellowstone Valley). Heavy snowfall occurs infrequently, usually late in the winter or early spring. Snow cover is typically 1 to 3 inches.

The frost free (32º F.) season averages about 105 to 145 days each year in the uplands, to nearly 170 days along the Yellowstone River Valley.

For local climate station information, refer to http://www.wcc.nrcs.usda.gov/cgibin/state.pl?state=mt.

Table 3. Representative climatic features

Frost-free period (average)	145 days

Freeze-free period (average)	170 days
Precipitation total (average)	14 in

Influencing water features

Where this site is influenced by overflow, the associated stream is ephemeral (i.e., flows only in response to a precipitation event or snow melt). A water table within approximately 30 to 36 inches of the surface may be present.

Soil features

These soils are moderately to strongly saline or sodic. Salt and/or sodium accumulations are apparent on the soil surface. Soil depth and texture are not determining factors for this site. Permeability is variable, depending somewhat on surface texture, crusting, and the amount of salt and/or sodium present.

Table 4. Representative soil features

Surface texture	(1) Loam (2) Clay loam (3) Silty clay loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat poorly drained
Permeability class	Moderate
Soil depth	40–60 in
Available water capacity (0-40in)	4–10 in
Calcium carbonate equivalent (0-40in)	5–10%
Electrical conductivity (0-40in)	8–24 mmhos/cm
Sodium adsorption ratio (0-40in)	15–40
Soil reaction (1:1 water) (0-40in)	7.9–9.6

Ecological dynamics

This site developed under Northern Great Plains climatic conditions, which included the natural influence of large herbivores and occasional fire. The plant community upon
which interpretations are primarily based is the Historic Climax Plant Community (HCPC). This community is described as a reference to understand the original potential of this site, and is not always considered to be the management goal for every acre of rangeland. The following descriptions should enable the landowner or manager to better understand which plant communities occupy their land, and assist with setting goals for vegetation management. It can also be useful to understand the environmental and economic values of each plant community. This site is considered moderately resilient to disturbance as it has moderate soil limitations for plant growth. Changes may occur to the Historic Climax Plant Community due to management actions and/or climatic conditions. Under continued adverse impacts, a moderate decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments, this site can more readily return to a community that resembles the Historic Climax Plant Community.

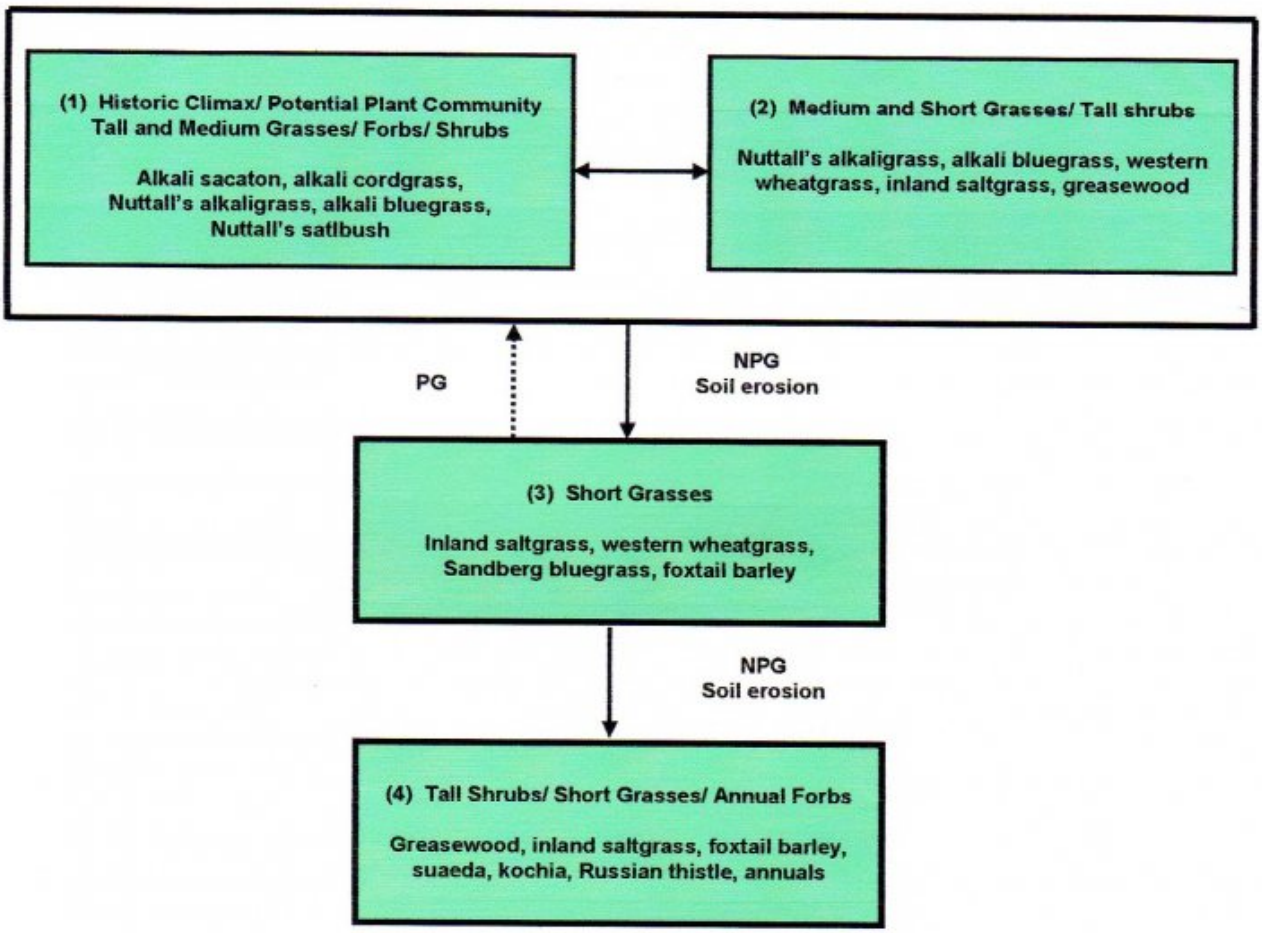
Continual adverse impacts to the site over a period of years results in a departure from the HCPC, with a decrease of the taller, more palatable species such as alkali cordgrass, alkali sacaton, alkali bluegrass, Nuttall’s alkaligrass, western wheatgrass, and Nuttall’s saltbush. These plants will be replaced by inland saltgrass, bottlebrush squirreltail, other less palatable grasses, sedges, forbs, and greasewood.

Plants that are not a part of the climax community that are most likely to invade are foxtail barley, annual grasses, and annual and biennial forbs: red glasswort, Pursh seepweed, lambsquarter, kochia and Russian thistle.

State and transition model

MLRA: 58A – Sedimentary Plains, East
MLRA: 60B – Pierre Shale Plains, East
R058AE012MT, R060BE587MT

Plant Communities and Transitional Pathways (diagram)



Smaller boxes within a larger box indicate that these communities will normally shift among themselves with slight variations in precipitation and other disturbances. Moving outside the larger box indicates the community has crossed a threshold (heavier line) and will require intensive treatment to improve or change the plant community. Dashed lines returning to a state (within the heavy lines) indicates a reduced probability of success, and will usually require major economic inputs, or a more intensive grazing strategy.

Note: Not all species present in the community are listed in this table. Species listed are representative of the plant functional groups that occur in the community.

PG = Prescribed Grazing: Use of a planned grazing strategy to balance animal forage demand with available forage resources. Timing, duration, and frequency of grazing are controlled and some type of grazing rotation is applied to allow for plant recovery following grazing.

NPG = Non-Prescribed Grazing: Grazing which has taken place that does not control the factors as listed above, or animal forage demand is higher than the available forage supply.

State 1
Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs

Community 1.1
Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs

This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HCPC) for this site. This plant community is a mixture of cool and warm season grasses, including alkali sacaton, alkali cordgrass, Nuttall's alkaligrass, alkali bluegrass, western wheatgrass, and Nuttall's saltbush. There are also several short grasses and sedges, and forbs in small percentages. This is a very highly productive site due to the extra moisture it receives from run-in or a water table. This plant community is well adapted to the Northern Great Plains climatic conditions. The diversity in plant species and the presence of tall, deep-rooted perennial grasses allows for moderately high drought tolerance. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). Plants on this site have strong, healthy root systems that allow production to increase significantly with favorable precipitation. Abundant plant litter is available for soil building and moisture retention. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. This plant community provides for soil stability and a functioning hydrologic cycle.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1125	1875	2625
Shrub/Vine	300	500	700
Forb	75	125	175
Total	**1500**	**2500**	**3500**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	5-20%
Grass/grasslike foliar cover	40-70%
Forb foliar cover	1-5%
Non-vascular plants	0%
Biological crusts	0-1%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 7. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	1-5%
Grass/grasslike basal cover	8-13%
Forb basal cover	1-2%
Non-vascular plants	0%
Biological crusts	0-1%
Litter	15-25%
Surface fragments >0.25" and <=3"	0-1%
Surface fragments >3"	0%
Bedrock	0%
Water	0%

Bare ground	55-75%

Table 8. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	–	–
>0.5 <= 1	–	–	–	–
>1 <= 2	–	5-20%	40-70%	1-5%
>2 <= 4.5	–	–	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

State 2
Plant Community 2: Medium and Short Grasses/ Tall Shrubs

Community 2.1
Plant Community 2: Medium and Short Grasses/ Tall Shrubs

Slight variations affecting the Historic Climax or Potential Plant Community can result in a community that is dominated more by the medium and short grass components, such as the Nuttall's alkaligrass and alkali bluegrass. Inland saltgrass and greasewood may also take on more of a dominance. Grass biomass production and litter become reduced on the site as the taller grasses disappear, increasing evaporation and reducing moisture retention. Additional open space in the community can result in undesirable invader species. This plant community provides for moderate soil stability.

State 3
Plant Community 3: Short Grasses

Community 3.1
Plant Community 3: Short Grasses

With continued heavy disturbance the site will become dominated by short grasses, such as inland saltgrass, western wheatgrass, and Sandberg bluegrass. Foxtail barley also becomes prevalent on the site. This plant community is still highly productive due to the extra moisture it receives, but the taller grasses are generally absent. Undesirable weeds often begin to invade onto the site.

State 4
Plant Community 4: Tall Shrubs/ Short Grasses/ Annual forbs

Community 4.1
Plant Community 4: Tall Shrubs/ Short Grasses/ Annual forbs

With prolonged disturbance on this site, excessive soil erosion occurs, and the plant community consists of large areas of bare ground (with exposed salts) between the plants. This site is less productive, and is dominated by inland saltgrass and greasewood, along with undesirable forbs such as seepweed, kochia, and Russian thistle, and annual grasses. Plant Communities 3 and 4 have lost many of the attributes of a healthy rangeland, including good infiltration, minimal erosion and runoff, nutrient cycling and energy use.

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Native grasses**			1110–2275	
	alkali cordgrass	SPGR	*Spartina gracilis*	150–875	–
	alkali sacaton	SPAI	*Sporobolus airoides*	225–700	–
	western wheatgrass	PASM	*Pascopyrum smithii*	150–525	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	75–350	–
	saltgrass	DISP	*Distichlis spicata*	75–350	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–175	–
2	**Native grasses, sedge, and rushes**			15–350	
	Grass, perennial	2GP	*Grass, perennial*	15–175	–
	clustered field sedge	CAPR5	*Carex praegracilis*	15–175	–
	sedge	CAREX	*Carex*	15–175	–
	squirreltail	ELEL5	*Elymus elymoides*	15–175	–
	rush	JUNCU	*Juncus*	15–175	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	15–175	–
	Sandberg bluegrass	POSE	*Poa secunda*	15–175	–
3	**Native grasses**			1–2	
	foxtail barley	HOJU	*Hordeum jubatum*	1–2	–
Forb					
4	**Native forbs**			75–175	
	Forb, perennial	2FP	*Forb, perennial*	15–30	–
	buckwheat	ERIOG	*Eriogonum*	15–30	–
	povertyweed	IVAX	*Iva axillaris*	15–30	–
	knotweed	POLYG4	*Polygonum*	15–30	–
	red swampfire	SARU	*Salicornia rubra*	15–30	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	15–30	–
Shrub/Vine					
5	**Native shrubs and half-shrubs**			300–700	
	Shrub, broadleaf	2SB	*Shrub, broadleaf*	15–350	–
	Nuttall's saltbush	ATNU2	*Atriplex nuttallii*	15–350	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	15–350	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	15–350	–

Animal community

Livestock Grazing Interpretations:

Managed livestock grazing is suitable on this site as it has the potential to produce an abundance of high quality forage. This is often a preferred site for grazing by livestock due to the extra moisture, and animals tend to congregate in these areas. In order to maintain the productivity of this site, stocking rates must be managed carefully on adjoining sites with less production to be sure livestock drift onto the Saline Lowland site is not excessive. Management objectives should include maintenance or improvement of the plant community. Shorter grazing periods and adequate re-growth after grazing are recommended for plant maintenance and recovery. Heavy stocking and season-long use of this site can be detrimental and will alter the plant community composition and production over time.

Whenever Plant Community 2 (medium and short grasses) occurs, grazing management strategies need to be implemented to avoid further deterioration. This community is still stable, productive, and healthy provided it receives proper management. This community will respond fairly quickly to improved grazing management, including increased growing season rest of key forage plants. Improved grazing management alone can usually move this community back towards one resembling the potential community.

Plant Community 3 may still produce an abundance of forage due to the extra moisture, but the forage quality is not nearly as high as that in Community 1 or 2.

Plant Community 4 has extremely reduced forage value, as many of the dominant species are unpalatable to livestock.

Once this site is occupied by Plant Community 3 or 4, it will be more difficult to restore it to a community that resembles the potential with grazing management alone. Additional growing season rest is often necessary for re-establishment of the desired species and to restore the stability and health of the site. Brush management and range seeding may be necessary to restore native grasses.

WILDLIFE INTERPRETATIONS:

The following is a description of habitat values for the different plant communities that may occupy the site:

Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs (HCPC):

The diverse mixture of warm and cool season grasses and shrubs, combined with relatively high productivity, provides habitat for numerous wildlife species. Grazers and mixed feeders find good nutrition levels over a long time period. Big game animals have thermal and escape cover (shrubs) interspersed with feeding areas. Nuttall's saltbush
and other shrubs provide winter browsing for mule deer and pronghorn. Litter cover and residual grasses provide good habitat for ground-nesting birds and a variety of small mammals. Lark buntings, Brewer's sparrow, meadowlarks and dabbling ducks, such as mallards and blue-winged teal, may nest in this community. Raptors, particularly the northern harrier, find abundant prey here. Example small mammals include seeders like the harvest mouse, olive-backed pocket mouse and deer mouse as well as herbivores like the prairie vole. Raccoons may search for ground nests in this type.

Plant Community 2: Medium and Short Grasses/ Tall Shrubs:

Loss of warm season grasses (alkali sacaton, cordgrass) shortens the period of high nutrition for grazers and mixed feeders. A reduction in plant species and life form diversity generally results in less overall wildlife species richness. A decline in litter cover reduces habitat value for ground-nesting birds. Small mammal species composition shifts toward seed eaters like the deer mouse. Brewer's sparrows and lark buntings are examples of breeding birds that may use this ecological stage.

Plant Community 3 and 4: Tall Shrubs/ Short Grasses/ Annuals:

Wildlife habitat values are generally quite low. Ring-necked pheasants may feed on annual weed seeds when this community occurs near cropland. Ground-nesting bird habitat is very poor. Small mammal populations consist mainly of deer mice, which make use of abundant seed production.

Hydrological functions

The soils associated with this ecological site are generally in Hydrologic Soil Group C. The infiltration rates for these soils will generally be moderate. The runoff potential for this site is low. Runoff curve numbers generally range from 64 to 89.

Good hydrologic conditions exist on rangelands if plant cover (grass, litter, and brush canopy) is greater than 70 percent. Fair conditions exist when cover is between 30 and 70 percent, and poor conditions exist when cover is less than 30 percent. Sites in high similarity to HCPC (Plant Communities 1 and 2) generally have enough plant

cover and litter to optimize infiltration, minimize runoff and erosion, and have a good hydrologic condition. The deep root systems of the potential vegetation help maintain or increase infiltration rates and reduce runoff.

Sites in low similarity (Plant Communities 3 and 4) are generally considered to be in poor hydrologic condition as the majority of plant cover is from more shallow-rooted species and shrubs.

Erosion is minor for sites in high similarity. Rills and gullies should not be present. Water flow patterns, if present, will be barely observable. Plant pedestals are essentially non-existent. Plant litter remains in place and is not moved by erosion. Soil surfaces should not be compacted or crusted. Plant cover and litter helps retain soil moisture for use by the plants. Maintaining a healthy stand of perennial vegetation will optimize the amount of precipitation that is received. (Reference: Engineering Field Manual, Chapter 2 and Montana Supplement 4).

Recreational uses

This site provides recreational opportunities for big game and upland bird hunting, and hiking. The forbs have flowers that appeal to photographers. This site provides valuable open space and visual aesthetics.

Other information

The following is an example of how to calculate the recommended stocking rate. This example does not use production estimates from this specific ecological site. You will need to adjust the annual production values and run the calculations using total annual production values from the ecological sites encountered on each individual ranch/pasture. Before making specific recommendations, an on-site evaluation must be made.

Example of total annual production amounts by type of year:
Favorable years = 2200 lbs/acre
Normal years = 1480 lbs/acre
Unfavorable years = 1200 lbs/acre

It is recommended that on slopes of 30% or less, stocking rate should be derived from the total annual production pounds minus 500 pounds for residual dry matter and 25% harvest efficiency. On slopes over 30%, stocking rate is derived from total annual production pounds minus 800 pounds for residual dry matter and 25% harvest efficiency. Refer to the NRCS National Range and Pasture Handbook for a list of Animal Unit Equivalents.

Sample Calculations using Favorable Year production amounts:

< 30% slopes: AUM/AC = [(2200-500)(0.25)]/915 lbs/month for one AU = 0.46 AUM/AC
AC/AUM = (1.0 AU)/(0.46AUM/AC) = 2.2 AC/AUM

> 30% slopes: AUM/AC = [(2200-800)(0.25)]/915 lbs/month for one AU = 0.38 AUM/AC
AC/AUM = (1.0 AU)/(0.38 AUM/AC) = 2.6 AC/AUM

NOTE: 915 lbs/month for one Animal Unit is used as the baseline for maintenance requirements. This equates to 30 lbs/day of air-dry forage (1200 lb cow at 2.5% of body weight).

Inventory data references

NRCS-Production & Composition Record for Native Grazing Lands (Range-417): 3

BLM-Soil & Vegetation Inventory Method (SVIM) Data: 6

NRCS-Range Condition Record (ECS-2): 30

NRCS-Range/Soil Correlation Observations & Soil 232 notes: 15

Contributors

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Rangeland health reference sheet

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

Author(s)/participant(s)	T. DeCock; R Kilian
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Date	06/11/2014
Approved by	Jon Siddoway
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills should not be present.

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2. **Presence of water flow patterns:** Barely observable.

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3. **Number and height of erosional pedestals or terracettes:** Essentially non-existent.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is < 5 %. Bare ground will occur as small areas less than 2 inches in diameter.

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5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present. Existing gullies should be “healed” with a good vegetative cover.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

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7. **Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Surface Soil Aggregate Stability under plant canopy should typically be 3. Surface Soil Aggregate Stability not

under plant canopy should typically be 2 or slightly less.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Use soil survey series description.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** High grass canopy and basal cover and small gaps between plants should reduce raindrop impact and slow overland flow, providing increased time for infiltration to occur. A combination of shallow and deep rooted species has a positive effect on infiltration.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer; slight soil surface crusting may be present.

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Warm season, mid-stature, bunch grasses = Warm season, tall- stature, rhizomatous grasses

    Sub-dominant: Shrubs > Cool season, mid-stature, rhizomatous grasses = Warm season, mid- stature, rhizomatous grasses

    Other: Minor components: sedges, rushes, forbs, cool season, short- stature, bunch grasses

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very low.

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14. **Average percent litter cover (%) and depth (in):** Litter cover is in contact with soil surface.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 3000 – 3500 lbs/ac (13 to 14 inch precip.) 1500 – 2500 lbs/ac (10 to 12 inch precip.)

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Halogeton, Sulphur cinquefoil, common tansy, oxeye daisy, Leafy spurge, knapweeds, whitetop, Dalmatian toadflax, yellow toadflax, St. Johnswort, perennial pepperweed , foxtail barley, Russian olive, salt cedar.

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17. **Perennial plant reproductive capability:** All species are capable of reproducing.