USDA Natural Resources Conservation Service

Ecological site R042BB016NM Draw, Desert Shrub

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General information

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

Figure 1. Mapped extent

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

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs as desert drainage ways, draws or swales, which dissect plains, piedmonts, or low hills. These drainage ways may be narrow fingers or broad swales which appear almost flat but are in fact lower than surrounding terrain. The site receives and transports runoff water from both higher elevations within its own confines and from surrounding sites. Flooding may occur as may as two or three times a year in favorable years, but deep wetting is not the usual result of any one overflow occasion. Slopes average less than 3 percent and direction
of slope varies without significance. Elevations range from about 3800 to 5000 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Drainageway (2) Draw (3) Swale
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Ponding frequency	None to occasional
Elevation	3,800–5,000 ft
Slope	1–3%
Water table depth	99 in
Aspect	Aspect is not a significant factor

Climatic features

Annual average precipitation ranges from 7.35 to 11.90 inches. Wide fluctuations from year to year are common, ranging from a low of about 2 inches to a high of over 20 inches. At least one-half of the annual precipitation comes in the form of rainfall during July, August, and September. Precipitation in the form of snow or sleet averages less than 4 inches annually. The average annual air temperature is about 60 degree F. Summer maximums can exceed

100 degrees F. and winter minimums can go below zero. The average frost-free season exceeds 200 days and extends from April 1 to November 1. Both the temperature regime and rainfall distribution favor warm-season perennial plants on this site. Spring moisture conditions are only occasionally adequate to cause significant growth during this period of year. High winds from the west and southwest are common from March to June, which further tends to create poor soil moisture conditions in the springtime.

Climate data was obtained from
http://www.wrcc.dri.edu/summary/climsmnm.html

Table 3. Representative climatic features

Frost-free period (average)	205 days
Freeze-free period (average)	227 days
Precipitation total (average)	12 in

Influencing water features

This site is not influenced by wetland or streams.

Soil features

The soils are deep to very deep. Surface textures are silty clay loams, sandy clay loams, clays, and silt loams. Substratum textures are Silty clay, silt loam, clay, silty clay loam and occasionally a stratified lenses of very fine sandy loam.

The soils tend to seal on the surface when vegetative cover is reduced or removed, crack noticeably, and are greatly subject to gullying, piping, and draining.

Minimum and maximum values listed below represent the characteristic soils for this site.

characteristic soils:
Verhalen
Armijo
Largo
Sotim
Marconi
Reyab
Tome

Table 4. Representative soil features

Surface texture	(1) Silty clay loam (2) Clay loam (3) Clay
Family particle size	(1) Clayey
Drainage class	Well drained to moderately well drained
Permeability class	Moderately slow to very slow
Soil depth	24–72 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	4–7 in

Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–8 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

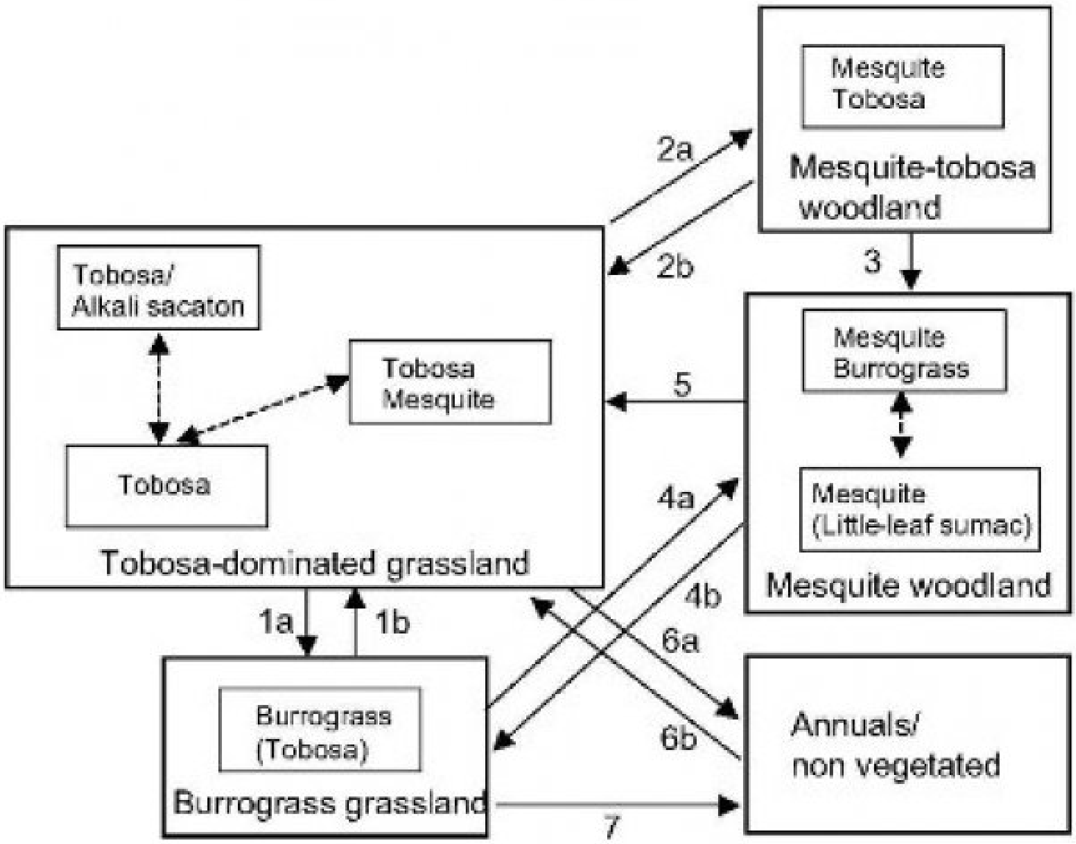
Overview

Vegetation patterns in this site are governed largely by patterns in the flow of run-in water. This site may intergrade with the Clayey site depending on microtopographic effects on drainage and run-in water and areas within Clayey sites may behave like draws. Draw sites are often upslope from Bottomland sites. In SD-2, the Draw site appears in two distinct landscape positions, 1) in long, narrow (e.g. 100 m wide) swales that receive and transport run-in water from adjacent, hills (e.g. Gravelly or Limestone Hills sites) and 2) in broad (e.g. 1000 m) swales that are only slightly lower than the surrounding upland sites (e.g. Loamy or Sandy sites). The historic plant community type of the Draw site is dominated by tobosa (*Pleuraphis mutica*) and to a lesser extent by alkali sacaton (*Sporobolus airoides*) and vine mesquite (*Panicum obtusum*). Blue grama (*Bouteloua gracilis*) can be an important component of many draws and may have dominated many draws in the past. Initial stages of change due to grazing are characterized by loss of species diversity and dominance by tobosa. Transitions to burrograss (*Scleropogon brevifolius*) may occur in response to the redistribution of run-in water via loss of grass, and subsequent erosion and gullying. This may also facilitate mesquite (*Prosopis glandulosa*) invasion. Subsequent overgrazing may reduce the tobosa cover, resulting in a mesquite woodland state. Degradation of burrograss grasslands due to severe disturbance may result in an annual-dominated state.

No studies exist that address the causes of transitions within this site. Overall, tobosa and burrograss grasslands characteristic of draw soils are more stable and recover faster than black grama grasslands in the face of drought, likely due to the presence of heavier soils and a run-on landscape position. Additionally, tobosa is often less palatable than grasses found in adjacent ecological sites, leading to reduced utilization of this ecological site. Overutilization of tobosa, however, may occur during spring when plants are reproducing (Phil Smith, BLM Las Cruces, personal communication

State and transition model

State-Transition model: MLRA 42, SD-2, Nonsaline fine-soils group: Draw



1a. Overgrazing, reduction of grass cover, reduction of soil moisture input, soil crust formation
1b. Gully destruction and grazing rest
2a. Reduction of soil moisture input, increases in bare patches, reduction of fire frequency, mesquite exceed 0.5 in. diameter.
2b. Mesquite removal and reestablishment of hydrologic function and/or historic fire frequency
3. Overgrazing, gullying, soil degradation
4a. Mesquite invasion. 4b. Mesquite removal.
5a, 6. Severe disturbance and soil degradation. 5b. Restoration of soil permeability, hydrology, and seeding

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

Figure 4. SD-2; Draw

Tobosa-dominated grassland state: The historic plant community is believed to be tobosa-dominated and may include alkali sacaton or vine mesquite in microsites (depressions) where water collects for periods longer than a few days. Blue grama may have been dominant or co-dominant with tobosa in many draws (Phil Smith, BLM Las Cruces, personal communication) and blue grama tends to increase in abundance with grazing rest. Sideoats grama (*Bouteloua curtipendula*) and cane bluestem (*Bothriochloa barbinodis*) are also present. Production ranges from 2000 lbs/acre in favorable years to 600 lbs/acre in unfavorable years. At its most pristine, the draw site is characterized by a high diversity of grasses. Retrogression within this state results in the reduction or loss of blue grama, vine mesquite, cane bluestem, and other grasses due to grazing and/or a reduction of soil moisture availability, and a homogeneous stand of tobosa remains. These grasses may become locally extinct, but could be reintroduced through natural or management means. Mesquite and other shrubs or trees (e.g. desert willow *Chilopsis linearis*, littleleaf sumac *Rhus microphylla*, fourwing saltbush *Atriplex canescens*) may be present and persist in low densities, especially at draw margins. Tobosa is reputedly fire tolerant. Given the large fuel loads typical of draw sites, fire may have been an important feature of the site. Diagnosis: Cover of grasses high, nearly continuous. Alkali sacaton and vine mesquite present. Mesquite are small or sparse if present, and bare patches are small (< 50 cm) and infrequent. Litter cover dominates most plant interspaces. This site appears as a grassy swale dominated by mid-grasses, rhizomatous and stoloniferous short-grasses, and some tall-grasses. It may, in some instances, have a component of shrubs and trees (such as desert willow) that are both dominant in stature and natural to the site, where occasional deeper soil wetting occurs. Substantial amounts of woody species beyond an aspect sort of dominance usually represent an abnormal increase or an invasion of these plants. Both numbers and kinds of forbs are quite variable and are dependent upon moisture and temperature conditions at any given time. Mesquite may be considered to have become naturalized to the site in minor amounts. Transition to burrograss state (1a): This can occur in response to changes in water flow or soil permeability catalyzed by overgrazing. Removal of tobosa may increase the rate of water flow down the draw and result in gullying. Channelization of subsequent flood waters into the gully diverts run-in water that favors tobosa and produces conditions more suitable for burrograss (see Paulsen and Ares 1962, Gibbens and Beck 1988). The physical blockage of water flow by dams may have a similar effect. Alternatively, exposure of soil to raindrop impact may promote soil crusting and erosion and reduce infiltration. A temporal decline in rainfall amounts and water flow in some draws could lead to similar changes without much grazing pressure (Campbell 1931). Key indicators of approach to transition: Decreases in grass diversity and tobosa cover, increases in burrograss cover, increases in bare ground cover, decreases in litter cover, decreases in flooding frequency and duration. The presence of blockage to surface flow would be an important indicator. Transition to mesquite-tobosa woodland state (2a): Overgrazing of tobosa, erosion, and resultant channelization or the impedance of surface water flow may facilitate the encroachment of honey mesquite or other shrubs into draws. The mechanism underlying this response may be a reduction in soil moisture that favors mesquite establishment. Alternatively, increasing mesquite establishment in degraded draws may be due to diminished competition from tobosa or lowered frequency of fire-generated disturbances due to grazing. Fire may remove (or topkill) small (< 3.5 yr old, < 0.5 inch stem diameter) mesquite (Wright et al. 1976). The maintenance of a shrubfree grassland using fire cannot be achieved once herbaceous cover is less than 600 lbs/acre (Wright and Bailey 1980). Thus, once grass biomass has permanently declined below this value (e.g. when burrograss dominates), the control of mesquite with fire is not possible. Key indicators of approach to transition: Decreases in grass cover, increases in bare ground cover, decreases in litter cover, decreases in flooding frequency and duration. If mesquite plant density is increasing, then the transition may have occurred. It is possible that mesquite seedlings normally increase until the next fire disturbance, but there are no data to support or refute this. Transition to annual-dominated state (6a): This can occur if continued extreme overutilization, mechanical disturbance due to offroad vehicle use, and subsequent soil loss and/or physical degradation decreases water infiltration and seedling germination. Under such conditions, only an ephemeral, annual-dominated community may persist. Key indicators of approach to transition: Decrease in tobosa or burrograss cover, increased decadence of grasses, increases in bare ground cover and mean bare ground patch size, evidence of soil physical crusting and shrink-swell cracking, and erosion including rills and pedestalling.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	516	1118	1720
Shrub/Vine	42	91	140
Forb	42	91	140
Total	**600**	**1300**	**2000**

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	0%
Grass/grasslike basal cover	40%
Forb basal cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	25%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	35%

Figure 6. Plant community growth curve (percent production by month). NM2508, R042XB016NM-Draw Warm Season Plant- HCPC. SD-2 Draw HCPC Warm Season Plant Community.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	10	10	25	30	15	5	0	0

State 2
Mesquite-Tobosa-Woodland

Community 2.1
Mesquite-Tobosa-Woodland

Additional States: Mesquite-tobosa woodland state: The amount and duration of soil moisture is hypothesized to be below a value that permits the persistence and growth of mesquite or, in some cases, other shrubs such as little-leaf sumac. Alternatively, fire frequency may be too low to suppress woody growth once the fuel provided by tobosa is lowered below a certain level (Wright et al. 1976). Mesquite tends to increase under these conditions. Tobosa may be locally extirpated due to grazing pressure but may recolonize with shrub removal and restored hydrologic inputs, and usually exists somewhere in the site. Diagnosis: Tobosa cover discontinous and patchy. Vine mesquite and alkali sacaton are usually absent. Large (> 1 m tall) mesquite are present, bare ground is associated with shrubs and patches may be large (> 2m). Transition to mesquite woodland state (3): Overgrazing or disturbance reduces the remaining tobosa. Soil degradation, gullying, and nutrient loss then accelerates the continued reduction of tobosa. Key indicators of approach to transition: Decreases in tobosa cover, increases in bare ground cover, decreases in litter cover, decreases in flooding frequency and duration, terracetes, rills, gullies, soil sealing. Transition to tobosa-dominated grassland state (2b): Mechanical removal of mesquite with restored hydrology, if necessary, and subsequent recovery of tobosa cover and fire frequencies. Seeding should not be necessary.

State 3
Burrograss Grassland

Community 3.1
Burrograss Grassland

Burrograss grassland: This state is dominated by burrograss. Bare ground dominates the remaining ground cover. The availability of soil moisture is hypothesized to be lower in this state than in the tobosa-dominated state (c.f. Gile and Grossman 1997, Herbel and Gibbens 1989). This state has been found on the downslope side of earthen water tanks and does not appear to be common. Transition to mesquite woodland state (4a): This can occur when mesquite is introduced after burrograss dominance, if the environmental conditions are suitable for mesquite germination. Fire cannot be used to control mesquite in burrograss grasslands. Key indicators of approach to transition: Unknown, perhaps only presence of mesquite seed vectors. Transition to tobosa-dominated grassland state (1b): Mechanical destruction of gullies or dams, and the use of water spreaders to promote a more even distribution of water could create conditions favorable to tobosa establishment and dominance (c.f. Rango et al., in press). Transition to annual-dominated state (7): As for 6a above.

State 4
Mesquite Woodland

Community 4.1
Mesquite Woodland

Mesquite woodland: Grasses are sparse, especially tobosa. Burrograss may dominate some patches, but bare ground and mesquite dominate the aspect of the site. Soil compaction may be important and permeability may be low. Diagnosis: Tobosa is absent or reduced to a few plants or patches. Burrograss may dominate some patches. Large (> 1 m tall) mesquite are abundant, and bare ground patches are interconnected or is nearly continuous. Transition to burrograss grassland state (4b): Removal of mesquite using mechanical means and herbicide. This may result in increases in burrograss cover if mesquite competes with the grass. Mesquite may recolonize. Transition to tobosa-dominated grassland state (5): Removal of mesquite using mechanical means and herbicide with restoration of soil permeability (pitting?) and surface hydrologic inputs. Seeding is probably necessary.

State 5
Annual-Dominated

Community 5.1
Annual-Dominated

Annual-dominated: The extreme drying and formation of physical soil crusts with extreme reductions in grass cover inhibits perennial plant establishment. Under these conditions, and in the absence of established shrubs, annual plants dominate (e.g cocklebur; Xanthum strumarium). Transition to tobosa-dominated grassland state (6b): Restoration of soil permeability (pitting?) and surface hydrologic inputs. Seeding is probably necessary. Information sources and theoretical background: Communities and states are derived largely from observations by Brandon Bestelmeyer and Jim Powell. Communities are usually defined by the primary and secondary dominant plant species, but sometimes emphasize dominant species of differing life-forms. Transitions are derived from expert opinion and are founded upon two hypotheses (same as in the Bottomland site). The channelization hypothesis holds that the loss of herbaceous vegetation cover increases erosion and channelization, and that channelization reduces soil moisture availability to grasses across broad areas. Changes in soil moisture availability, in turn, lead directly to changes in the composition of dominant plants (Gile and Grossman 1997). The fire hypothesis holds that vegetation change is limited only by limitations in the dispersal and growth of dominant shrub species. Once shrub propagules are present, vegetation change is inevitable without periodic disturbances such as fire (Brown and Archer 1989). Finally, the competition hypothesis holds that tobosa grassland maintenance depends upon the competitive exclusion of shrub seedlings due to limitations in light or nutrients (c.f. Van Auken and Bush 1990). There may be a threshold grass density below which the probability of shrub establishment increases rapidly, leading to a transition to the shrubland type.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Warm Season**			650–780	
	tobosagrass	PLMU3	*Pleuraphis mutica*	650–780	–
2	**Warm Season**			195–260	
	vine mesquite	PAOB	*Panicum obtusum*	195–260	–
	alkali sacaton	SPAI	*Sporobolus airoides*	195–260	–
3	**Warm Season**			65–130	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	65–130	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	65–130	–
	Arizona cottontop	DICA8	*Digitaria californica*	65–130	–
4	**Warm Season**			13–65	
	threeawn	ARIST	*Aristida*	13–65	–
	feather fingergrass	CHVI4	*Chloris virgata*	13–65	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	13–65	–
	burrograss	SCBR2	*Scleropogon brevifolius*	13–65	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	13–65	–
5	**Warm Season**			13–39	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	13–39	–
Shrub/Vine					
6	**Shrub**			39–104	
	whitethorn acacia	ACCO2	*Acacia constricta*	39–104	–
	desert willow	CHLI2	*Chilopsis linearis*	39–104	–
	snakewood	CONDA	*Condalia*	39–104	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	39–104	–
	littleleaf sumac	RHMI3	*Rhus microphylla*	39–104	–
7	**Shrub**			13–39	
	fourwing saltbush	ATCA2	*Atriplex canescens*	13–39	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	13–39	–
	crown of thorns	KOSP	*Koeberlinia spinosa*	13–39	–
	honey mesquite	PRGL2	*Prosopis glandulosa*	13–39	–
Forb					
8	**Forb**			13–39	
	dwarf desertpeony	ACNA2	*Acourtia nana*	13–39	–
	Texan phacelia	PHINT	*Phacelia integrifolia var. texana*	13–39	–
	woolly plantain	PLPA2	*Plantago patagonica*	13–39	–
	globemallow	SPHAE	*Sphaeralcea*	13–39	–
	vervain	VERBE	*Verbena*	13–39	–
9	**Forb**			39–104	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	39–104	–

Animal community

Habitat provided by this site supports a resident animal community that is characterized by pronghorn antelope, black-tailed jackrabbit, coyote, sparrow hawk, scaled quail, meadowlark, coachwhip, western diamondback rattlesnake, and western spadefoot toad. Where present, desert willow, littleleaf sumac, mesquite, and species of condalia provide nesting for black-throated sparrow, mockingbird, and mourning dove. At higher elevations, where the site occurs closer to mountain foothills, mule deer occasionally find cover on this site.

Hydrological functions

The runoff curve numbers are determined by field investigations using hydraulic cover conditions and hydrologic soil groups.

Hydrologic Interpretations
Soil Series Hydrologic Group
Armendaris C
Armijo D
Largo B
Sotim B
Marconi C
Reyab B
Tome B
Verhalen D

Recreational uses

This site offers limited recreational potential for hiking, horseback riding, nature observation and photography. It also provides hunting for quail, dove, antelope, and sometimes mule deer. Picnicking and camping are ill-advised due to the possibility of flooding.

A variety of wildflowers are present when conditions are right, from spring through fall, and the lush vegetative growth resulting from summer flooding makes this site contrast sharply with other less productive sites.

Wood products

This site has litle or no significant value for wood products, although driftwood is sometimes collected for use in making a variety of curiosities, decorations etc.

Other products

This site is suitable for grazing during all seasons of the year. It is best adapted for cattle, especially to cows with calves big enough to take a substantial amount of milk, when grasses are greenest following summer flooding or overflow.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index Ac/AUM
100 - 76 2.9 – 3.8
75 – 51 3.6 – 5.0
50 – 26 4.7 – 7.5
25 – 0 7.5 - +

Other references

Other References:

Data collection for this site was done in conjunction with the progressive soil surveys within the Southern Desertic Basins, Plains and Mountains, Major Land Resource Areas of New Mexico. This site has been mapped and correlated with soils in the following soil surveys. Sierra County Dona Ana County Grant County Hidalgo County Luna County Otero County

Characteristic Soils Are:
Mimbres silty clay loam (overflow)
Russler silt loam (overflow)
Verhalen silty clay loam (overflow)
Stellar clay loam (overflow)
Largo silt loam (overflow)

Other Soils included are:
Uban sandy clay loam (overflow)
Russler sandy clay loam (overflow)
Stellar sandy clay loam (overflow)
Tome silt loam (overflow)

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)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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:

    Sub-dominant:

    Other:

    Additional:

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

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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:**

17. **Perennial plant reproductive capability:**