USDA Natural Resources
Conservation Service

Ecological site R030XY227CA
Sandy Thermic Narrow Channels

Last updated: 10/21/2024
Accessed: 11/21/2024

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.

MLRA notes

Major Land Resource Area (MLRA): 030X–Mojave Basin and Range

MLRA statement:
Major Land Resource Area (MLRA) 30, Mojave Desert, is found in southern California, southern Nevada, the extreme southwest corner of Utah and northwestern Arizona within the Basin and Range Province of the Intermontane Plateaus. The climate of the area is hot (primarily hyperthermic and thermic; however at higher elevations, generally above 5000 feet, mesic, cryic and frigid) and dry (aridic). Elevations range from below sea level to over 12,000 feet in the higher mountain areas found within the MLRA. Due to the extreme elevational range found within this MLRA, LRUs were designated to group the MLRA into similar land units.

XY Land Resource Unit (LRU):
This LRU is found throughout the Mojave Desert MLRA. This LRU designation is set aside for ecological sites that are driven by environmental or chemical features that override the climatic designations of the other LRU's or are atypical compared to the surrounding landscape. Common overriding XY characteristics within this MLRA include: ephemeral streams subject to flash flood events, riparian areas or other water features, and soils with strong chemical influence (Na, Ca, etc).

Ecological site concept

This ecological site occurs on gently sloping, narrow, first and occasionally second order ephemeral drainageways in the eastern Mojave Desert. This site has developed in response to frequent, low-intensity flash flood events from runoff from adjacent fan remnants and hills. Soils are very deep sands with little soil development. Increased water availability due to flooding and greater water storage in the deep sands increases the productivity and diversity of this site relative to adjacent uplands. The rare eastern Mojave endemic, Mojave desert plum (*Prunus eremophila*) is a characteristic species of this ecological site. Other important species include catclaw acacia (Acacia greggii), purple sage (*Salvia dorrii*), big galleta (*Pleuraphis rigida*), and bush muhly (*Muhlenbergia porteri*).

Associated sites

R030XB107NV	**COARSE GRAVELLY LOAM 5-7 P.Z.** This site occurs on adjacent fan remnant footslopes with occasional flooding.
R030XB231CA	**Shallow To Moderately Deep Petrocalcic Fan Remnants (Provisional)** This site occurs on adjacent fan remnants. Creosote bush (Larrea tridentata), winterfat (Krascheninnikovia lanata), and burrobush (Ambrosia dumosa) are dominant species.

Similar sites

R030XY202CA	**Very Rarely To Rarely Flooded Thermic Ephemeral Stream** This ecological site occurs on Torripsamments in the western Mojave Desert with less summer precipitation. California jointfir (Ephedra californica), burrobush, and Mojave indigobush (Psorothamnus arborescens) are dominant species and Mojave desert plum is not present.
R030XY188CA	**Slightly Alkaline, Rarely To Occasionally Flooded Ephemeral Stream** This site occurs at lower elevations. Hall's shrubby spurge (Tetracoccus hallii) is a dominant species and Mojave desert plum is not present.
R030XY219CA	**Ustic Ephemeral Drainageway Order 3** This site occurs on much larger, more complex drainageways. Mojave desert plum is not present.
R030XY220CA	**Ustic Ephemeral Drainageways Order 2** This ecological site occurs on larger order drainageways, and has a greater complexity of community components. Mojave desert plum is not present.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Prunus eremophila* (2) *Acacia greggii*
Herbaceous	(1) *Pleuraphis rigida* (2) *Muhlenbergia porteri*

Physiographic features

This ecological site occurs on narrow, gently sloping, first and second order ephemeral drainageways. Elevations range from 3410 to 3870 feet, and slopes range from 1 to 4 percent. These drainageways experience frequent flash-flooding from runoff in adjacent hills. Runoff class within drainageways is negligible.

Table 2. Representative physiographic features

Landforms	(1) Wash
Flooding frequency	Frequent
Elevation	1,036–1,189 m
Slope	1–4%

Climatic features

Eastern Mojave Desert

Table 3. Representative climatic features

Frost-free period (average)	320 days
Freeze-free period (average)	
Precipitation total (average)	4,445 mm

Influencing water features

This ecological site is associated with order 1 and 2 ephemeral stream systems, and includes all associated landforms.

Soil features

The soils associated with this site are very deep, sandy soils formed in alluvium from metamorphic and sedimentary rock. They are somewhat excessively drained with rapid permeability. They have minimal soil development. Surface textures are sand and subsurface textures (from depths of 1 to 59 inches) are sand and loamy sand. The surface

cover of rock fragments less than 3 inches in diameter averages 25 percent and surface rock fragments greater than 3 inches are negligible. Subsurface rock fragments (from depths of 1 to 59 inches) less than 3 inches in diameter average 9 percent by volume and rock fragments greater than 3 inches are negligible.

This ecological site is associated with the following soil series: Morongo (mixed, thermic Typic Torripsamments).

This ecological site has been correlated with the following mapunits and soil components in the Mojave National Preserve soil survey area (CA795):

208 ; Bluesnake loamy sand, 1 to 4 percent slopes ; Morongo ; frequently flooded ; 1

Table 4. Representative soil features

Surface texture	(1) Sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Rapid
Soil depth	152 cm
Surface fragment cover <=3"	25%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	4.06–7.87 cm
Calcium carbonate equivalent (0-101.6cm)	0–1%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	9%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This ecological site occurs on gently sloping, narrow, first and occasionally second order ephemeral drainageways in the eastern Mojave Desert. These drainageways receive frequent flash flooding from runoff from adjacent fan remnants and hills. Soils are very deep sands with little soil development. Ephemeral drainageways, even small ones such as this ecological site, are ecologically important components of arid ecosystems where water is the principal limiting resource (e.g. Schlesinger and Jones 1984, Levick et al. 2008, Schwinning et al. 2010). Small drainage systems direct the flow of surface water, thereby temporarily increasing water availability during flooding (Schwinning et al. 2010). Very deep coarse-textured soils also act to store water in arid ecosystems (Noy-Meir 1973), so the temporal availability of water is higher in ephemeral drainageways than surrounding uplands (Schwinning et al. 2010). This increase in the amount and availability of water increases the productivity and cover of vegetation in these systems relative to adjacent uplands, and allows for a xeroriparian plant community to occur (Levick et al. 2008). The xeroriparian community is comprised of drought-tolerant species that also may occur on upland sites, but is more productive, has higher cover, and is typically more diverse than adjacent upland sites.

Soil disturbance from flash flood events is the primary driver of plant community dynamics within this ecological site. Ephemeral streams lack permanent flow except in response to rainfall events (Balling and Wells 1990, Bull 1997, Levick et al. 2008). These ephemeral streams are characterized by extreme and rapid variations in flooding regime, and a high degree of temporal and spatial variability in hydrologic processes (Bull 1997, Stanley et al. 1997, Levick

et al. 2008, Shaw and Cooper 2008). Physical disturbance of soils as a result of flash flooding makes predictability of the plant community low except when considered at a coarse scale. Typical runoff events may result in an apparently stable mosaic of plant species distribution, while more extreme events may completely reconfigure the mosaic and establish the foundation of a new or modified plant community mosaic until the next extreme runoff event occurs.

The vegetation of this ecological site consists of a unique xeroriparian assemblage. All species occurring on the site may occur in upland habitats. The rare eastern Mojave Desert endemic (CNPS Inventory of Rare and Endangered Plants on list 1B.2) Mojave desert plum is a characteristic species of this ecological site. Mojave desert plum was described as a new species in 2002 (Prigge 2002), and is known only from the Vontrigger Hills area of the Mojave National Preserve (Consortium of California Herbaria (ucjeps.berkeley.edu/consortium/). Mojave desert plum habitat is typically small ephemeral drainageways, but it may also occur on adjacent hills. This species is thought to be a neo-endemic, recently evolved from the more common desert almond (*Prunus fasciculata*), which occurs in similar habitats, but little is known about the ecology of *P. eremophila*. Further data collection on the abiotic factors characteristic of Mojave desert plum habitat versus desert almond habitat is required, as is research into how these two species differ ecologically.

Other characteristic species include catclaw acacia (Acacia gregii), purple sage (*Salvia dorrii*), and big galleta (*Pleuraphis rigida*). Catclaw acacia usually reaches dominance only where there is regular flooding, or where surface fragments channel water (Sawyer et al. 2009). Purple sage and big galleta frequently occur on upland habitats, but are often abundant on disturbed soils, or soils receiving additional run-on.

Disturbances such as drought, fire, and human hydrologic alterations can affect the community composition and/or hydrologic process of this ecological site. Episodic drought is characteristic of the desert (Hereford et al. 2006), and can cause mortality or die-back of vegetation. Decreased vegetative cover can lead to increase in erosion and change sediment deposition patterns, possibly increasing the chance of channel migration. Historically fire was very uncommon in these ephemeral drainages, and since the dominant species of this site recover rapidly or increase in response to fire, fire is not considered a direct threat to this ecological site. However the presence of continuous and flashy fuels from non-native grasses in adjacent upland sites has increased the frequency of fire in adjacent communities (Brooks 1999, 2005, Brooks et al. 2007, DeFalco et al. 2010, Brooks 2011, Engel and Abella 2011), and loss of vegetation cover in these hills can contribute to increased flooding and sediment deposition in this ecological site. This could have a number of effects, including increased scouring of xeroriparian vegetation within the drainage channels causing temporary decreases in vegetative cover; widening of channels, which would increase the complexity of plant communities in the ecological site (i.e. areas receiving different flooding intensity or frequency would be dominated by different suites of species); sediment deposition could cause channel avulsion; abandoned channels would be less suitable to support the vegetation of this ecological site.

State and transition model

R030XY227CA Sandy Thermic Narrow Channels
Prunus eremophila – Acacia greggii/Pleuraphis rigida
Mojave desert plum – catclaw acacia/big galleta

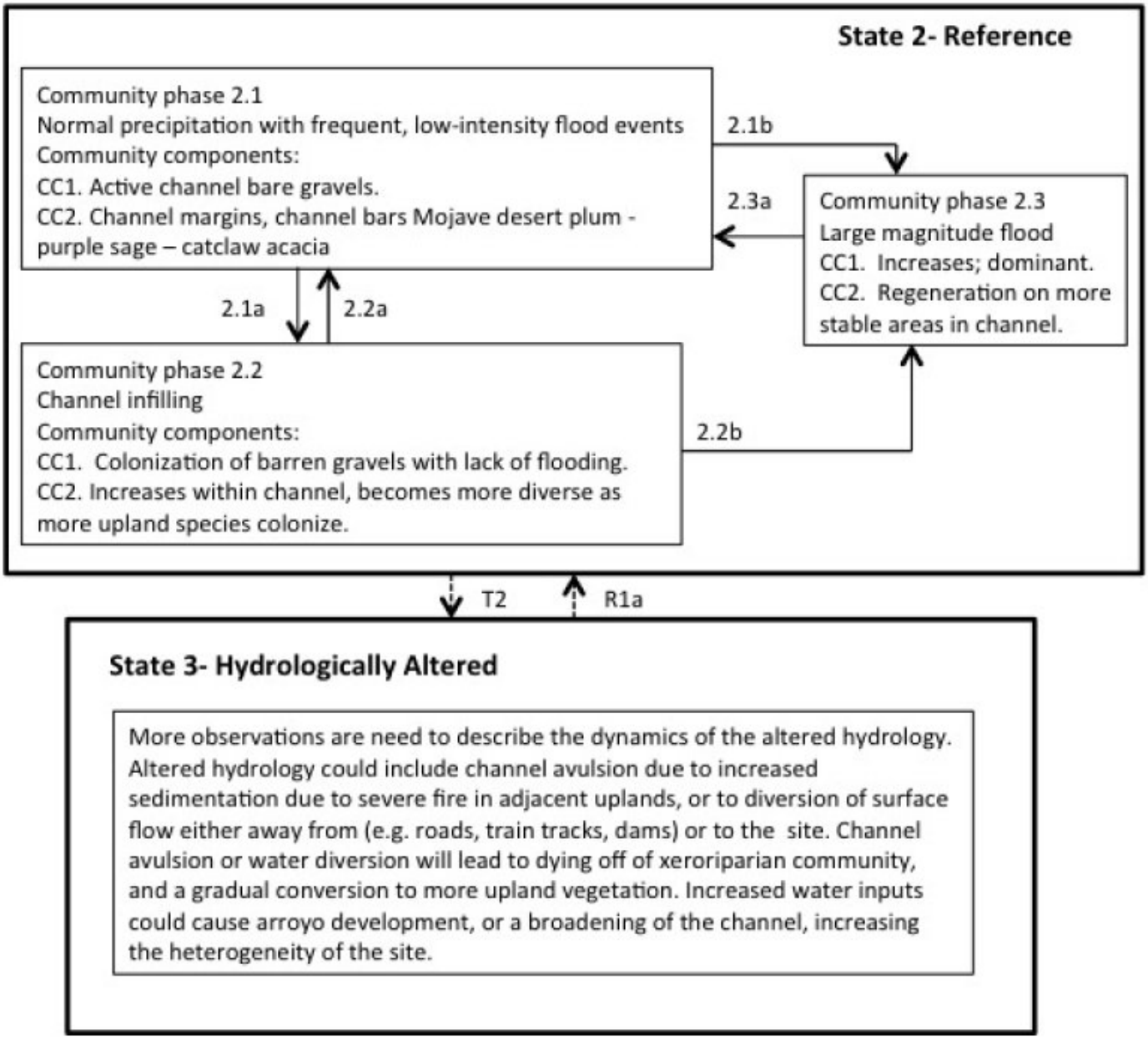

Figure 1. R030XY227CA

State 1
Reference

Community 1.1
Reference Community

Figure 2. Community Phase 2.1

At any given point along the stream the following community components are generally present. The relative spatial extent of these communities varies as the channel morphology fluctuates from flash flood events. Steeper reaches may be more incised with less chance of sheet flow over the banks. In lower slope reaches sediment fills the main channel, increasing the chance of sheet flow across the area. Areas with sheet flow have a higher area of surface disturbance and will have more disturbance dependent species. Two community components are present, including: Community Component 1 (CC1) Active Channel This area is dominated by barren gravels and sand. There is very little vegetation in this zone due to frequent scouring from floods. Community Component 2 (CC2) Channel Margins and Bars This community occurs on low relief bars within the channel and on channel margins. It is dominated by Mojave desert plum. Purple sage, catclaw acacia, peachthorn (*Lycium cooperi*), big galleta, burrobush (*Hymenoclea salsola*), bush muhly (*Muhlenbergia porteri*) and other mixed shrubs and forbs are also present.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	224	336	448
Grass/Grasslike	112	179	241
Forb	45	56	84
Total	**381**	**571**	**773**

Community 1.2
Channel infilling [Provisional]

This community phase is characterized by channel infilling and narrowing, and an increase in vegetation. It typically occurs late in the recurrence interval between large flooding events, when repeated smaller floods have resulted in sediment deposition, and existing vegetation has spread within the channel and trapped further sediment in channel bars. Upland species are likely to become more prevalent as they colonize more stable areas. This phase is most susceptible to a channel altering large magnitude flood because of the reduced flow capacity in narrower channels. If accompanied by drought there will be an overall decline in vegetation and an increase in bare ground, making this phase highly susceptible to scouring and channel incision with a severe flood event.

Community 1.3
Large magnitude flood [Provisional]

This community phase develops in response to intense flooding, which scours vegetation in and along the channel. Most small and shallow rooted species, such as purple sage, perennial grass species, and perennial forbs, are removed, as are some deep rooted species such as Mojave desert plum and catclaw acacia. Mojave desert plum and catclaw acacia quickly resprout from the root base in response to mechanical damage. Shallow rooted species will colonize from seed relatively quickly.

Pathway 1.1a
Community 1.1 to 1.2

This pathway occurs with time without a large magnitude flood event.

Pathway 1.1b
Community 1.1 to 1.3

This pathway occurs in response to high intensity flooding that clears most of the existing channel vegetation.

Pathway 1.2a
Community 1.2 to 1.3

Occurs with a large magnitude flood event that removes the majority of channel vegetation and structures.

Pathway 1.3a
Community 1.3 to 1.1

This pathway occurs with time without a large magnitude flood event.

State 2
Hydrologically Altered (Provisional)

This state represents the most common and most ecologically intact condition for this ecological site at the present time.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	**Shrubs**			224–448	
	peach thorn	LYCO2	*Lycium cooperi*	90–157	1–3
	Mojave Desert plum	PRER4	*Prunus eremophila*	34–78	8–10
	Nevada jointfir	EPNE	*Ephedra nevadensis*	22–67	1–3
	catclaw acacia	ACGR	*Acacia greggii*	0–56	2–6
	purple sage	SADO4	*Salvia dorrii*	22–45	2–6
	burrobrush	HYSA	*Hymenoclea salsola*	17–39	2–8
	littleleaf ratany	KRER	*Krameria erecta*	11–34	0–1
	water jacket	LYAN	*Lycium andersonii*	0–22	0–1
	Mexican bladdersage	SAME	*Salazaria mexicana*	0–11	0–2
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	1–6	1–15
	Cooper's goldenbush	ERCO23	*Ericameria cooperi*	0–6	0–1
	Joshua tree	YUBR	*Yucca brevifolia*	0–6	0–1
	Mojave yucca	YUSC2	*Yucca schidigera*	0–6	0–1
	beavertail pricklypear	OPBA2	*Opuntia basilaris*	0–6	0–1
Grass/Grasslike					
2	**Native Perennial Grasses**			112–213	
	big galleta	PLRI3	*Pleuraphis rigida*	67–135	6–10
	bush muhly	MUPO2	*Muhlenbergia porteri*	34–78	2–4
	desert needlegrass	ACSP12	*Achnatherum speciosum*	0–6	0–1
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–6	0–1
	squirreltail	ELEL5	*Elymus elymoides*	0–1	0–1
4	**Native Annual Grasses**			0–22	
	needle grama	BOAR	*Bouteloua aristidoides*	0–22	0–2
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–11	0–1
6	**Non-native Annual Grasses**			0–6	
	red brome	BRRU2	*Bromus rubens*	0–6	0–2
Forb					
3	**Native Perennial Forbs**			34–67	
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	34–67	0–2
	Colorado four o'clock	MIMU	*Mirabilis multiflora*	0–11	0–1
5	**Native Annual Forbs**			0–6	
	fringed amaranth	AMFI	*Amaranthus fimbriatus*	0–6	0–1
7	**Non-native Annual Forbs**			0–6	
	redstem stork's bill	ERCI6	*Erodium cicutarium*	0–6	0–1
	little hogweed	POOL	*Portulaca oleracea*	0–6	0–1

Recreational uses

This site is of botanical interest, as Mojave Desert Plum is known only from this area of the eastern Mojave Desert.

Inventory data references

High intensity sampling (Caudle et al. 2013) was used to describe this ecological site. Site characteristics such as aspect, slope, elevation and UTMS were recorded for each plot, along with complete species inventory by ocular percent cover. The line-point intercept method was used to measure foliar cover, groundcover, and vegetation structure. At either 300 or 100 points along a 600- or 400-foot step transect, ground cover and intercepted plant species were recorded by height. The first hit method (Herrick et al. 2009) was used to generate the foliar cover values entered in the community phase composition tables. Annual production was estimated using the double-weight sampling method outlined in the National Range and Pasture Handbook and in Sampling Vegetation Attributes (NRCS 2003 and Interagency Technical Reference 1999 pgs. 102 - 115). For herbaceous vegetation, ten 9.6 square foot circular sub-plots were evenly distributed along a 200 foot transect. For woody and larger herbaceous species production was estimated in four 21'X21' square plots along the same transect. Weight units were collected for each species encountered in the production plots. The number of weight units for each species is then estimated for all plots.

Community Phase 2.1:

2013CA795203B, Mojave National Preserve (8/7/13)

Type locality

Location 1: San Bernardino County, CA	
UTM zone	N
UTM northing	3886955
UTM easting	656971
General legal description	The type location is approximately 2.4 miles at 73 degrees from Bobcat Hills highpoint in the Mojave National Preserve.

Other references

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Contributors

Alice Lee Miller

Approval

Kendra Moseley, 10/21/2024

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	11/21/2024
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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

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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):**

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

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

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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):**

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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:

    Sub-dominant:

    Other:

    Additional:

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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:**