Ecological site R030XY222CA
Typic Aridic Ephemeral Drainageway Order 3 4-7" p.z.

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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.

MLRA notes

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

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.

LRU notes

XY Land Resource Unit (LRU):
This LRU is found throughout the Mojave Desert MLRA. These sites 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).

Classification relationships

Chilopsis linearis Woodland Alliance (Sawyer et al. 2009)

Ericameria paniculata - Ambrosia eriocentra Shrubland Association (Sawyer et al. 2009)

Ecological site concept

This site occurs on large sized (typically order 3) ephemeral drainageways with braided channels at elevations of approximately 3,000 to 4,500 feet. Slopes are typically 1 to 4 percent. These drainageways occur on middle positions of alluvial fans, where depositional forces are more prominent than erosive forces. Soils are very deep sands formed from mixed rock. They generally have a typic aridic soil moisture regime. The site is a complex of landforms and vegetation communities that are dictated by flooding intensity and frequency. This site encompasses very rarely to rarely flooded stream terraces, rarely to occasionally flooded inset fans, bars and stream margins, and frequently flooded stream margins and channels. The most frequently flooded positions are occupied by patches of desert willow (Chilopsis linearis) and catclaw acacia (Acacia greggii). Occasionally flooded positions are occupied by a Mojave rabbibrush (Ericameria paniculata) - woolly fruit bur ragweed (Ambrosia eriocentra) community. Very rarely to rarely flooded positions are occupied by mixed shrub community dominated by burrobrush (*Hymenoclea salsola*) and creosote bush (Larrea tridentata). These large drainages provide a relatively consistent deep-water source, which supports desert willow communities.

Associated sites

R030XB039NV	**LIMY FAN 5-7 P.Z.** Occurs on adjacent footslopes and inset fans on very deep soils that receive very rare to occasional flooding. Big galleta is dominant.
R030XB107NV	**COARSE GRAVELLY LOAM 5-7 P.Z.** Occurs on adjacent hills and fan remnants with moderately deep soils with a calcic or petrocalcic horizon and/or an argillic horizon. Blackbrush and big galleta are important species.
R030XB183CA	**Loamy Very Deep Fan Remnants** Occurs on adjacent fan remnants with well-developed argillic horizons. Blackbrush and creosote bush co-dominate.
R030XB231CA	**Shallow To Moderately Deep Petrocalcic Fan Remnants (Provisional)** This site occurs on adjacent fan remnants with soils that are shallow to a petrocalcic horizon. Creosote bush and winterfat (Krascheninnikovia lanata) are dominant species.
R030XB173CA	**Coarse Loamy Very Deep Fan Remnants** Occurs on adjacent fan remnants with very deep soils with sandy or sandy loam surface textures and loamy sand or sandy loam subsurface textures. Blackbrush (Coleogyne ramosissima) and Joshua Tree (Yucca brevifolia var. brevifolia) dominate the site, and big galleta is an important species.
R030XY219CA	**Ustic Ephemeral Drainageway Order 3** Occurs on adjacent higher elevation drainageways that merge into this site. Higher elevation drainageways support black grama (Bouteloua eriopoda) and big galleta (Pleuraphis rigida) terraces.

Similar sites

R030XY219CA	**Ustic Ephemeral Drainageway Order 3** This ecological site has an ustic intergrade soil moisture regime. A perennial grass dominated rarely flooded community with black grama (Bouteloua eriopoda) and big galleta (Pleuraphis rigida) is a significant community component.
R030XB051NV	**UPLAND WASH** This site is probably very similar to R030XY222CA; it occurs on similar soils over a similar elevation range. However the size of the drainage system is not described, and the species list does not include desert willow or Mojave rabbitbrush.
R030XY220CA	**Ustic Ephemeral Drainageways Order 2** This ecological site occurs on smaller drainageways and has an ustic intergrade soil moisture regime. A perennial grass dominated rarely flooded community with black grama (Bouteloua eriopoda) and big galleta (Pleuraphis rigida) is a significant community component. Desert willow is absent.

Table 1. Dominant plant species

Tree	(1) *Chilopsis linearis* (2) *Acacia greggii*
Shrub	(1) *Ericameria paniculata* (2) *Ambrosia eriocentra*
Herbaceous	Not specified

Physiographic features

This ecological site is found on large (typically order 3) braided ephemeral streams and associated landforms. Elevations range from 3,260 to 5,000 feet, but elevations below 4,500 feet are typical. Slopes range from 1 to 4 percent. The site is a complex dictated by flash flooding intensity and frequency, and encompasses very rarely to rarely flooded stream terraces, rarely to occasionally flooded inset fans and stream margins, and frequently flooded stream margins and channels. Runoff class is negligible to very low.

Table 2. Representative physiographic features

Landforms	(1) Drainageway (2) Inset fan (3) Bar
Flooding frequency	Very rare to frequent
Elevation	3,260–5,000 ft
Slope	1–4%

Climatic features

The climate is arid with hot summers and warm, moist winters. The mean annual precipitation is 4 to 7 inches, mean annual air temperature is 16.5 to 20 degrees C. (62 to 68 degrees F.), and the frost-free season is 270 to 370 days.

Table 3. Representative climatic features

Frost-free period (average)	320 days
Freeze-free period (average)	
Precipitation total (average)	7 in

Influencing water features

This ecological site is associated with large sized ephemeral stream systems, and includes associated channels, bars, stream terraces and inset fans.

Soil features

The soils associated with this ecological site are very deep, well to excessively drained sands that formed in alluvium from granite, andesite, igneous, sedimentary, metamorphic, limestone, and dolomite rock. The soil moisture regime is generally typic aridic. Surface textures are sand, gravelly sand, loamy sand, very gravelly coarse sand, loamy fine sand, and sandy loam. Subsurface horizon textures (1 to 59 inches) include gravelly and very gravelly coarse sand, gravelly and very gravelly sand, loamy sand, loamy fine sand and sand. Surface rock fragments less than 3 inches in diameter range from 3 to 49 percent cover, and larger fragments range from 0 to 3 percent cover. Subsurface percent by volume of rock fragments less than 3 inches ranges from 7 to 55, and larger fragments range from 0 to 5.

Soils associated with this ecological site include Morongo (mixed, thermic Typic Torripsamments), Arizo (Sandy-skeletal, mixed, thermic Typic Torriorthents), Cajon (Mixed, thermic Typic Torripsamments), Hypoint (Sandy, mixed, thermic Typic Torriorthents), and Boomerang (Sandy, mixed, thermic Ustic Torriorthents).

This ecological site is correlated with the following map units and soil components in the Mojave National Preserve Soil Survey: (Map unit number; Map unit name; Component; phase; component percent)
413 ; Cajon loamy sand, 1 to 4 percent slopes, flooded ; Cajon ; rarely flooded ; 80 ; Cajon ; occasionally flooded ; 10 ; Cajon ; frequently flooded ; 3
212 ; Vontrigger sandy loam, 1 to 8 percent slopes ; Morongo ; rarely flooded ; 3 ; Morongo ; occasionally flooded ; 2
204 ; Noshade fine sandy loam, 1 to 4 percent slopes ; Arizo ; occasionally flooded ; 3

402 ; Yorktain complex, 1 to 4 percent slopes ; Cajon ; occasionally flooded ; 2 ; Hypoint ; frequently flooded ; 1
401 ; Caruthers fine sandy loam, 1 to 4 percent slopes ; Hypoint ; occasionally flooded ; 3
214 ; Jumborox loamy sand, 2 to 4 percet slopes ; Arizo ; frequently flooded ; 2
4305 ; Stonekey-Sagamore complex, 2 to 8 percent slopes ; Boomerang ; very rarely flooded ; 2
405 ; Baldspot sandy loam, 1 to 4 percent slopes ; Cajon ; frequently flooded ; 1
213 ; Catbob loamy sand, 4 to 15 percent slopes ; Morongo ; frequently flooded ; 1

Table 4. Representative soil features

Parent material	(1) Alluvium–granite
Surface texture	(1) Loamy sand (2) Very gravelly coarse sand (3) Sand
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	60 in
Surface fragment cover <=3"	3–49%
Surface fragment cover >3"	0–3%
Available water capacity (0-40in)	0.8–4.3 in
Calcium carbonate equivalent (0-40in)	0–1%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	6–8.4
Subsurface fragment volume <=3" (Depth not specified)	7–55%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

This site occurs on large sized (typically order 3) ephemeral drainageways with braided channels at elevations of approximately 3,000 to 4,500 feet. Slopes are typically 1 to 4 percent. These drainageways occur on the middle portions of alluvial fans, where depositional forces are more prominent than erosive forces. Soils are very deep sands formed from mixed rock, and they generally have a typic aridic soil moisture regime. The site is a complex of landforms and vegetation communities that are dictated by flooding intensity and frequency. This site encompasses very rarely to rarely flooded stream terraces, rarely to occasionally flooded inset fans, bars and stream margins, and frequently flooded stream margins and channels. Frequently flooded stream margins are occupied by patches of desert willow and catclaw acacia. Frequently to occasionally flooded channels and bars are occupied by a Mojave rabbitbrush and woolly fruit bur ragweed community. Very rarely to rarely flooded terraces are occupied by mixed shrub community dominated by burrobrush and creosote bush with a high diversity of other shrubs. These large drainages provide a relatively consistent deep-water source, which supports desert willow communities.

Although ephemeral stream processes are much more variable than perennial streams, a properly functioning ephemeral drainageway will provide similar hydrological and biological functions as perennial streams (Hild et al. 2007, Levick et al. 2008, Vyverberg 2010). Ephemeral streams maintain water quality by allowing energy dissipation during high water flow. They transport nutrients and sediments, store sediments and nutrients in deposition zones, provide temporary storage of surface water, and longer duration storage of subsurface water. They also support a disproportionate share of biodiversity (Hild et al. 2007, Levick et al. 2008, Vyverberg 2010). The drought-tolerant vegetation that occurs within ephemeral streams is referred to as xeroriparian vegetation. It is distinct from the surrounding landforms due to a difference in species composition, size, and production (Johnson et al. 1984, Levick et al. 2008). Xeroriparian vegetation is present because of the increased availability of water and flood disturbances in these drainageways. This vegetation protects soils from erosion and influences flow by providing bank and channel roughness, and initiates formation and maintenance of channel bars ((Levick et al. 2008, Vyverberg 2010, Stein et al. 2011). The structure and forage provided by xeroriparian vegetation, and the availability of water, although brief, significantly increases animal abundance along ephemeral streams relative to upland areas. The open channels provide important migration corridors for wildlife (Levick et al. 2008).

Soil disturbance from flash flood events is the primary driver of plant community dynamics within this ecological site. Ephemeral streams flow only in response to rainfall events, and flow may last only minutes or days (Bull 1997, Levick et al. 2008, Vyverberg 2010). Extreme and rapid variations in flooding regime, and a high degree of temporal and spatial variability in hydrologic processes is characteristic (Bull 1997, Stanley et al. 1997, Levick et al. 2008, Shaw and Cooper 2008, Vyverberg 2010). Episodic high magnitude events that may occur only a few times a decade or century function to ‘reset’ vegetation and channel form (Levick et al. 2008, Stein et al. 2011). Smaller more frequent flood events deposit sediment, leading to channel infilling and eventually channel avulsion dynamics. Channel avulsion is the “diversion of the majority of the surface flow to a different channel, with total or partial abandonment of the original channel” (Field 2001).. As sediment deposits in the main channel of the depositional zone, and as vegetation colonizes stream channels, banks and bars, the likelihood of channel avulsion increases because of decreased channel volume (Levick et al. 2008). Channel avulsion is frequently observed in the depositional environment of this ecological site.

Extreme temporal and spatial variability in disturbance events, water availability, sediment flux, and channel migrations result in a dynamic complex of hydrologically and disturbance determined plant communities that do not conform to an equilibrium model of vegetation community dynamics (Vyverberg 2010, Stein et al. 2011). Physical disturbance of soils and vegetation as a result of flash flooding makes predictability of temporary channel development and configuration very low except when considered at a coarse scale. Typical runoff events may result in an apparently stable mosaic of plant species distribution and channel configuration, 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. Vegetation communities reflect the time in the recurrence interval, or time between large magnitude 'reset' events. Early on in the recurrence interval there is lower diversity in the communities present, with dominance by short-lived species. For the majority of the interval, a mixture of long-lived and short-lived species is present. The late phase of the cycle is characterized by abundant vegetation with narrowing of the channel, making it more susceptible to resetting by a large flood as flow capacity diminishes.

Other disturbances such as drought, climate change, fire, grazing, mining, and land development can affect community composition and/or hydrologic processes. Cycles of drought are inherent to the desert, and can cause significant mortality or die-back of vegetation (e.g. Hereford et al. 2006). Decreased vegetative cover can lead to an increase in erosion and change sediment deposition patterns, possibly increasing the chance of channel migration. Global climate change models for the desert southwest predict increased drought intensity, increased warming and drying, and greater variability in precipitation (Levick et al. 2008). These changes could lead to a decline in xeroriparian vegetation with greater intensity floods and erosion.

Historically fire was 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, native annual vegetation may fuel fire in adjacent communities, especially after high precipitation years. Further, 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). The loss of vegetation cover in adjacent communities 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; widening of channels, which would increase the complexity of plant communities in the ecological site (areas receiving different flooding intensity or frequency would be dominated by different suites of species); and sediment deposition and channel avulsion.

Livestock grazing has impacted this ecological site. Ranching was established in the eastern Mojave desert in approximately 1875 (Nystrom 2003). Grazing occurred unregulated in the area until the passage of the Taylor Grazing Act in 1934, which divided public land into allotments that were regulated by the Bureau of Land Management (BLM), and among other things, called for fenced ranges and multiple developed water sources (http://www.blm.gov/wy/st/en/field_offices/Casper/range/taylor.1.html). The Federal Land Policy and Management Policy Act of 1976 (FLPMA) brought further regulations, including 10-year grazing permits. In 1994 the California Desert Protection Act created the Mojave National Preserve, and the National Park Service took over management of grazing allotments in much of the eastern Mojave.

Most of the area occupied by this ecological site within the Mojave National Preserve was retired from grazing in 2000 (Kim 2004), and ecological communities are still recovering. Cattle and burros preferentially use riparian habitat because of access to water, shade, and productive vegetation (e.g. Kauffman and Kruegger 1984, Kie and Boroski 1996, Belsky et al. 1999). Livestock grazing can alter riparian vegetation species composition by selective grazing, plant cover removal, trampling stream banks, and compacting soil (Kauffman and Kruegger 1984, Trimble and Mendel 1995, Belsky et al. 1999 Increased runoff resulting from compacted soil and/or loss of vegetation may have led to channel incision, more intense flooding erosion, loss of sheet flow, and declining xeroriparian communities. Grazing in adjacent upland communities may have further increased runoff, erosion, and incision (Trimble and Mendel 1995, Belsky et al. 1999). Since ungrazed examples or detailed historical data of this system do not exist, it is not possible to quantify these impacts here.

Altered hydrological processes such as surface flow diversions, ground water depletion, and loss of the xeroriparian vegetation can have irreversible impacts such as headward erosion, increased flooding and sediment deposition, and/or channel abandonment (Nishikawa et al. 2004, Levick et al. 2008, and Stein et al. 2011). Impermeable surfaces (such as pavement, homes, malls, etc.) reduces soil water infiltration, creates higher runoff, greater peak flows, and more frequent high intensity flooding events (Levick et al. 2008). Stream channelization also increases flood intensity and sediment transport within some reaches, while reducing flow to other reaches. Dams and improperly constructed roads and railroads can cause aggradation and flooding upstream, channel incision and channel abandonment downstream (Levick et al. 2008). Channel abandonment, incision and/or significant reductions in flow can convert xeroriparian vegetation communities to upland communities by altering traditional flow patterns. Channel incision may also scour channel features and lead to more frequent high intensity floods, reduce channel vegetation diversity and create a community dominated by short-lived species that can withstand the new flooding regime.

When disturbances such as those describe above affect the hydrologic function of this ephemeral stream system, this ecological site has the potential to transition to hydrologically altered states (States 2 and 3). Data are not available to describe these states, and they are described in general terms as provisional states in the state-and-transition model.

All tabular data listed for a specific community phase within this ecological site description represent a summary of one or more field data collection plots taken in communities within the community phase. Although such data are valuable in understanding the phase (kinds and amounts of ground and surface materials, canopy characteristics, community phase overstory and understory species, production and composition, and growth), it typically does not represent the absolute range of characteristics nor an exhaustive listing of species for all the dynamic communities within each specific community phase.

State and transition model

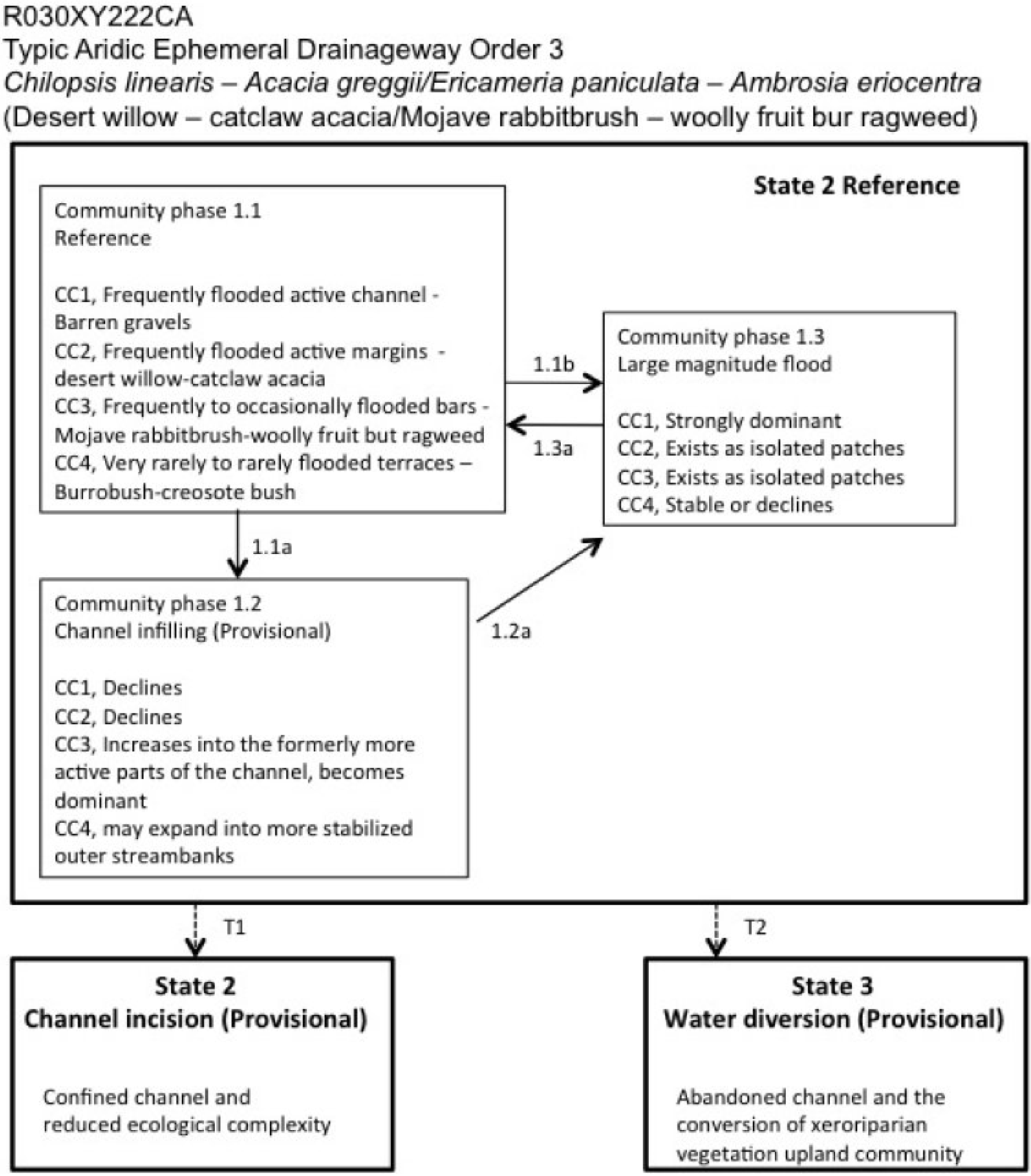

Figure 1. R030XY222CA

State 1
Reference

This state is maintained by unimpaired hydrologic function. It is characterized by a high degree of natural variability, with infrequent large magnitude flooding events periodically 'resetting' channel morphology and vegetation communities. More frequent smaller scale events interact with channel vegetation to increase channel complexity with time since a large event. This state develops with frequent moderate intensity flows, and consistent larger floods within 10-20 year time periods. Changes in flooding frequency over the extent of the landform affect vegetation composition.

Community 1.1
Reference

Figure 2. Community Component 2 and 3

Figure 3. Community Component 4

Figure 4. Community Component 1

Although equilibrium conditions and a traditional climax community do not occur within this ecological site, this community phase is most typical for the majority of the recovery period between large high magnitude flood events. 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 flooding events, and with time since flood events. Steeper reaches may be more incised with less chance of sheet flow out of the main channel. These reaches tend to have a higher abundance of bare gravels and sparser vegetation, with less of the rarely flooded community component (community component 4). In lower slope reaches sediment fills the main channel, increasing the chance of sheet flow across the area, and creating a broader area of disturbance that supports a greater area of xeroriparian vegetation. Stable terraces are more likely to occur on the inside of meanders and along the banks of straight channel reaches. The following community components are present: Community Component 1 (CC1), Frequently Flooded Active Channels This area is dominated by barren gravels and sand. There is very little vegetation in this zone due to frequent scouring from floods. Multiple active channels may be present in the large watercourses of this site. These gravels may support a high diversity of native annual forbs during high precipitation years, but these have not been adequately inventoried (due to a lack of high winter precipitation during the data collection period) to describe here. Community Component 2 (CC2), Frequently Flooded Channel Margins This community component is dominated by desert willow and catclaw acacia. Desert willow is a long-lived (>100 years), winter deciduous phreatophyte. It reproduces sexually by wind-dispersed seed, as well as asexually by crown-sprouting following mechanical disturbance {Uchytil, 1990}. Seedlings establish in freshly deposited sediment, and require moisture for establishment (Uchytil 1990). Seeds are dispersed in the fall and winter and probably do not remain viable beyond the spring after dispersal {Magill, 1974}. Fruit production may be inhibited during drought {DePree, 1978; Petersen, 1982}. Desert willow may colonize freshly deposited sediment, and then act to trap further sediments, thereby creating islands within the active channel {Gardner, 1951}, and it also acts to stabilize stream banks (Uchytil 1990). Stands of desert willow are often absent from apparently suitable washes, indicating that this community can come and go (Sawyer et al. 2009). Long periods of drought and/or water diversion will cause a dying off of desert willow. A sparse community of secondary shrub species is typically present and may include Mojave rabbitbrush, woolly fruit bur ragweed, desert almond (*Prunus fasciculata*), burrobrush (*Hymenoclea salsola*), peachthorn (*Lycium cooperi*), and Nevada jointfir (*Ephedra nevadensis*i). Forbs and grasses were not recorded in this community component. Community Component 3 (CC3), Frequently to Occasionally Flooded Bars/Channels/Inset Fans This community phase is a relatively low diversity shrub community dominated by Mojave rabbitbrush and woolly fuit bur ragweed. Mojave rabbitbrush is associated with larger drainageways that flood every few years (Sawyer et al. 2009). Large flooding events will remove the majority of this community, but seeds dispersed by the flood will readily establish and quickly colonize newly barren areas (Sawyer et al. 2009). The dominant shrubs in this component are all adapted to regular soil disturbance. Woolly fruit bur ragweed occurs in ephemeral stream systems in the eastern Mojave Desert into northern Arizona and southern Utah (Baldwin 2002). Secondary shrubs include purple sage (*Salvia dorrii*), burrobrush, and Mexican paperbag bush (*Salazaria mexicana*). Forbs are a sparse component of this community component. Perennial species recorded include desert globemallow (*Sphaeralcea ambigua*), and brownplume wirelettuce (*Stephanomeria pauciflora*), and annual species include miniature woollystar (*Eriastrum diffusum*), bristly fiddleneck (*Amsinckia tessellata*), Davidson's buckwheat (*Eriogonum davidsonii*), and the non-native red-stem stork's bill (*Erodium cicutarium*). Community Component 4 (CC4), Very Rarely to Rarely Flooded Bars and Terraces This component has high diversity and variability, as it strongly reflects adjacent upland communities, as well as more disturbance adapted species. This component is typically dominated by a diverse shrubland community, with burrobrush and creosote bush dominant. Burrobrush is a pioneer species can quickly colonize disturbed areas, and may establish in ephemeral washes and upland sites (Sawyer et al. 2009), while creosote bush is a long-lived dominant of adjacent uplands. Nevada jointfir and peachthorn are important secondary shrubs. A diversity of minor upland shrubs is also present, the composition of which is highly variable, but may include water jacket (*Lycium andersonii*), littleleaf ratany (*Krameria erecta*), threadleaf snakeweed (*Gutierrezia microcephala*), eastern Mojave buckwheat (*Eriogonum fasciculatum*), rayless goldenhead (*Acamptopappus* *sphaerocephalus*), buck-horn cholla (*Cylindropuntia acanthocarpa*), desert almond, Mexican paperbag bush, banana yucca (*Yucca baccata*), and Mojave yucca (*Yucca schidigera*), among others. Grasses are sparse in this component, with the perennial bush muhly (Muhlenbergeia porteri) the dominant grass. The summer annual sixweeks grama may be present after summer precipitation, and the non-natives cheatgrass, red brome, and common Mediterranean grass are typically present, with red brome the most abundant. The non-native annual forb red stem stork's bill may be abundant in this component. Other forbs are sparse, and may include bristly fiddleneck, Cooper's dogweed (*Adenophyllum cooperi*), Davidson's eriogonum, yucca buckwheat (*Eriogonum plumatella*), Colorado four o'clock (*Mirabilis multiflora*), canaigre dock (*Rumex hymenosepalus*), and the summer annual manybristle cinchweed (*Pectis papposa*).

Community 1.2
Channel infilling [Provisional]

This community phase is characterized by channel infilling and narrowing by increases in stream 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 may become more prevalent. This phase is susceptible to the effects of large magnitude floods because narrower channels have reduced flow capacity. The following community components are present: CC1, Frequently Flooded Active Channel The active channel has narrowed in this phase. CC2, Frequently Flooded Active Margins This component declines. CC3, Frequently to occasionally Flooded Bars This component increases into the formerly more active parts of the channel, and becomes dominant in this phase. CC4, Rarely Flooded Bars and Terraces This component is relatively stable, but may expand into more stabilized outer streambanks.

Community 1.3
High magnitude flood

Figure 6. Community Phase 1.3

This community phase occurs after a large magnitude flood event that clears most of the channel vegetation and in channel features. Data are not available to determine the range of frequency of these events, but they are likely decadal or longer. A channel dominated by barren gravels characterizes this community phase. The following community components are present: CC1, Frequently Flooded Active Channel The newly scoured channel dominates the drainageway, and very little vegetation is present due to recent scouring and/or sediment deposition. These gravels contain a seedbank for colonizing vegetation (Stromberg et al. 2009), which thrive in freshly deposited sediment. These gravels may support a high diversity of native annual forbs during high precipitation years. CC2, Frequently Flooded Active Margins This component exists as isolated patches in this phase. Desert willow trees are likely to survive, and damaged trees will resprout. Desert willow and Mojave rabbitbrush will colonize freshly deposited sediments. CC3, Frequently to Occasionally Flooded Bars This component exists as isolated patches that will aid in recolonization. CC4, Very Rarely to Rarely Flooded Terraces This component is relatively stable, but if the flood was large enough it may decline due to scouring or sediment deposition.

Pathway 1.1a
Community 1.1 to 1.2

Occurs with a long period of time without a large magnitude flood event. Recurrent cycles of deposition from smaller more frequent flood events leads to vegetation colonization and channel infilling.

Pathway 1.1b
Community 1.1 to 1.3

Reference

High magnitude flood

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

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

High magnitude flood

Reference

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

State 2
Channel Incision (Provisional)

This state is characterized by a confined channel, which lowers of the complexity of ecological communities. Short-lived pioneering species dominate, and there is a decline in vigor on the rarely flooded terraces.. Fire in upland communities, especially on the adjacent mountain slopes that provide run-off and sediment to this site, is likely to increase the severity and frequency of high magnitude flood events, and result in increased sediment deposition (Stein et al. 2011). Grazing in upland communities may also increase flooding and sediment deposition (Trimble and Mendel 1995, Belsky et al. 1999). Both fire and grazing may also result in channel incision in different reaches, especially those that are higher in elevation and/or confined and steeper.

State 3
Water Diversion (Provisional)

An abandoned channel and the conversion of xeroriparian vegetation (Desert willow and catclaw acacia) to an upland community (Creosote bush communities) characterizes this state. Modifications such as dam building, railroads, roads, and drainage ditches will impact the function of these drainageways (Levick et al. 2008, Stein et al. 2011). Railroads established in the Mojave Desert in the early 1900’s impacted thousands of smaller drainageways, causing aggradation on upslope positions (Griffiths et al. 2006), and channel abandonment and loss or decline of xeroriarian vegetation on downslope positions.

Transition 1
State 1 to 2

This transition may occur with severe flooding due to loss of soil stability from fire, grazing, global climate change, and hydrological modifications that concentrate flow.

Transition 3
State 1 to 3

This transition may occur with hydrological modifications that divert flow (roads, railways, dams); channel aggradation from excess sediment deposition due to upland erosion; global climate change; or ongoing drought.

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Tree					
2	**CC2 - Trees**			25–75	
4	**CC4 Trees**			25–75	
Shrub/Vine					
2	**CC2 Shrubs**			2–30	
	catclaw acacia	ACGR	*Acacia greggii*	30–45	1–3
	desert willow	CHLI2	*Chilopsis linearis*	20–30	2–4
	desert almond	PRFA	*Prunus fasciculata*	0–10	0–3
	woolly fruit bur ragweed	AMER	*Ambrosia eriocentra*	0–5	0–2
	Mojave rabbitbrush	ERPA29	*Ericameria paniculata*	0–5	0–2
	burrobrush	HYSA	*Hymenoclea salsola*	0–5	0–2
	peach thorn	LYCO2	*Lycium cooperi*	0–5	0–1
	Nevada jointfir	EPNE	*Ephedra nevadensis*	0–5	0–1
3	**CC3 Shrubs**			235–425	
	Mojave rabbitbrush	ERPA29	*Ericameria paniculata*	25–310	5–22
	woolly fruit bur ragweed	AMER	*Ambrosia eriocentra*	25–157	8–10
	purple sage	SADO4	*Salvia dorrii*	10–40	2–4
	burrobrush	HYSA	*Hymenoclea salsola*	5–20	2–4
	Mexican bladdersage	SAME	*Salazaria mexicana*	0–20	0–2
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	0–2	0–1
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	0–2	0–1
	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–2	0–1
	Davidson's buckwheat	ERDA4	*Eriogonum davidsonii*	0–1	0–1
	miniature woollystar	ERDI2	*Eriastrum diffusum*	0–1	0–1
	redstem stork's bill	ERCI6	*Erodium cicutarium*	0–1	0–1
4	**CC4 Shrubs**			370–520	

4	**CC4 Shrubs**			370–520	
Forb					
3	**CC3 Forbs**			0–4	
	burrobrush	HYSA	*Hymenoclea salsola*	135–190	15–20
	redstem stork's bill	ERCI6	*Erodium cicutarium*	0–165	0–20
	peach thorn	LYCO2	*Lycium cooperi*	50–150	1–3
	Joshua tree	YUBR	*Yucca brevifolia*	25–75	1–2
	creosote bush	LATR2	*Larrea tridentata*	40–65	3–5
	Nevada jointfir	EPNE	*Ephedra nevadensis*	30–45	2–4
	bush muhly	MUPO2	*Muhlenbergia porteri*	24–33	2–4
	red brome	BRRU2	*Bromus rubens*	0–15	0–5
	water jacket	LYAN	*Lycium andersonii*	5–10	1–3
	purple sage	SADO4	*Salvia dorrii*	3–10	1–3
	buck-horn cholla	CYAC8	*Cylindropuntia acanthocarpa*	5–10	1–3
	littleleaf ratany	KRER	*Krameria erecta*	0–10	0–2
	Davidson's buckwheat	ERDA4	*Eriogonum davidsonii*	0–10	0–2
	Mexican bladdersage	SAME	*Salazaria mexicana*	0–10	0–2
	banana yucca	YUBA	*Yucca baccata*	0–10	0–2
	Mojave yucca	YUSC2	*Yucca schidigera*	0–10	0–2
	desert almond	PRFA	*Prunus fasciculata*	0–10	0–2
	Eastern Mojave buckwheat	ERFA2	*Eriogonum fasciculatum*	0–10	0–2
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–5	0–1
	rayless goldenhead	ACSP	*Acamptopappus sphaerocephalus*	0–4	0–2
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	0–2	0–1
	yucca buckwheat	ERPL3	*Eriogonum plumatella*	0–1	0–1
	Colorado four o'clock	MIMU	*Mirabilis multiflora*	0–1	0–1
	manybristle chinchweed	PEPA2	*Pectis papposa*	0–1	0–1
	canaigre dock	RUHY	*Rumex hymenosepalus*	0–1	0–1
	common Mediterranean grass	SCBA	*Schismus barbatus*	0–1	0–1
	Cooper's dogweed	ADCO2	*Adenophyllum cooperi*	0–1	0–1

	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–1	0–1
	cheatgrass	BRTE	*Bromus tectorum*	0–1	0–1
4	**CC4 Forbs**			5–147	
Grass/Grasslike					
4	**CC4 Grasses**			25–50	

Animal community

Small animals live in this ecological site. Animal diversity in this ecological site is likely high relative to upland areas due to the heterogeneity of the site and the availability of forage and water. Streambanks provide habitat for structural burrows. Ephemeral drainages are important wildlife migration corridors.

Hydrological functions

Ephemeral drainages provide some similar hydrologic functions as perennial streams. A properly functioning system will maintain water quality by allowing energy dissipation during high water flow. These systems transport nutrients and sediments, and store sediments and nutrients in deposition zones. Ephemeral drainages provide temporary storage of surface water, and longer duration storage of subsurface water (Levick et al. 2008).

Recreational uses

These drainageways provide open travel corridors for cross-country hiking. Wildflower displays may be abundant after adequate precipitation.

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 1.1:
2012CA795280
2012CA795262
2012CA795259

Community Phase 1.3:
2013CA795500

Type locality

Location 1: San Bernardino County, CA	
UTM zone	N
UTM northing	3890611
UTM easting	674296
General legal description	The type location is approximately 3.77 miles at 100 degrees from Eagle Mountain in the Mojave National Preserve, and approximately 5.6 miles east from Lanfair Road.

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Contributors

Alice Miller

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	07/11/2025
Approved by	Sarah Quistberg
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):**

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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):**

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

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

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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:**

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17. **Perennial plant reproductive capability:**
