Ecological site R030XB058NV
GRANITIC FAN 5-7 P.Z.

Last updated: 2/24/2025
Accessed: 05/11/2025

General information

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

Ecological site concept

This site occurs on fan remnants. Slope gradients of 2 to 8 percent are typical. Elevations are 2500 to 3600 feet. The soils of this site are derived from granite, schist or gneiss parent materials. These soils are shallow to moderately deep to an argillic horizon, a duripan, or a petrocalcic horizon.

This is a group concept and provisional STM that also covers R030XB059NV.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Larrea tridentata* (2) *Ambrosia dumosa*
Herbaceous	(1) *Muhlenbergia porteri* (2) *Achnatherum speciosum*

Physiographic features

This site occurs on fan remnants. Slope gradients of 2 to 8 percent are typical. Elevations are 2500 to 3600 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant
Flooding frequency	None
Ponding frequency	None
Elevation	2,500–3,600 ft
Slope	2–8%
Water table depth	0 in
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is arid, characterized by cool, moist winters, and hot, dry summers. Average annual precipitation is 5 to 7 inches. Mean annual air temperature is 62 to 66 degrees F. The average growing season is about 210 to 250 days.

Table 3. Representative climatic features

Frost-free period (average)	250 days

Freeze-free period (average)	
Precipitation total (average)	7 in

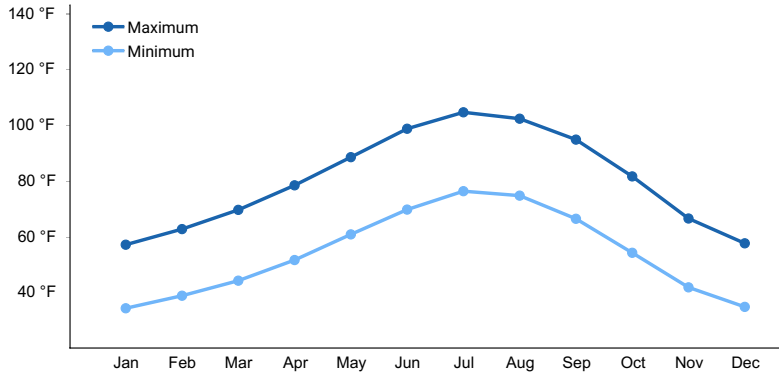


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils of this site are derived from granite, schist or gneiss parent materials. These soils are shallow to moderately deep to an argillic horizon, a duripan, or a petrocalcic horizon. The soils are well drained, have slow runoff and have moderate permeability. The soil series associated with this site includes; Arizo, Commiski, Crosgrain, Filaree, Lastchance, Orwash, Shamock, and Tenwell.

Table 4. Representative soil features

Surface texture	(1) Extremely gravelly loam (2) Very gravelly fine sandy loam (3) Extremely gravelly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately slow
Soil depth	24–60 in
Surface fragment cover <=3"	35–62%
Surface fragment cover >3"	2–10%
Available water capacity (0-40in)	0.9–4.1 in
Calcium carbonate equivalent (0-40in)	20–50%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	1–13
Soil reaction (1:1 water) (0-40in)	7.9–9
Subsurface fragment volume <=3" (Depth not specified)	25–62%
Subsurface fragment volume >3" (Depth not specified)	2–29%

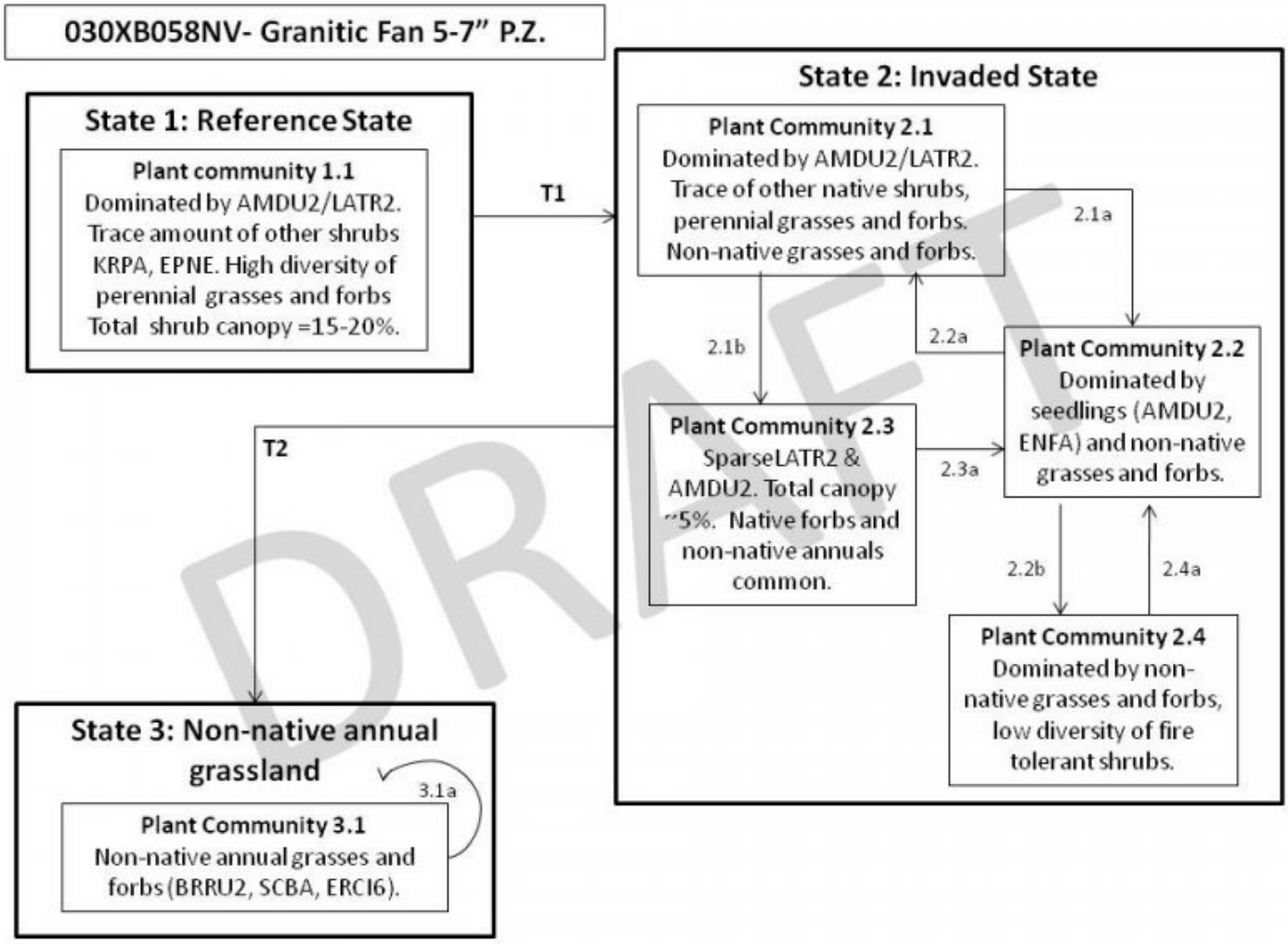
Ecological dynamics

This ecological site is dominanted by creosostebush and white bursage. Ambrosia generally dominates more developed soils with the ability to hold moisture in the upper soil profile. The shallow roots of white bursage are able to effectively use moisture stored in the upper horizons when it is available and survive for extended periods of time when it is not (Hamerlynck et al. 2002). Ambrosia is not able to dominate the deep, weakly developed, coarse textured soils that store water deep in the profile, which is ideal for Larrea. The spatial distribution of soils allows Ambrosia and Larrea to share dominance on these ecological sites. Ambrosia and Larrea can share dominance throughout the successional process, although the relative abundance is likely to change (Marshall 1994). Creosotebush commonly uses white bursage as a nurse plant, young creosotebushes are frequently found rooted beneath mature white bursage plants (Marshall 1995). White bursage is well adapted to the desert environment but prolonged periods of drought will result a reduction of biomass and possibly kill the plant. Under natural conditions, low available fuel and low fire return interval allowed the establishment of long-lived desert perennial communities.

Fine, sandy alluvium on these sites provides material that the wind redistributes to mound-like coppice dunes beneath creosotebush canopies. Heights of coppice dunes increase as a function of creosotebush cover and are tallest on young alluvial surfaces. Moisture absorbed by and stored in the coppice dune enhances plant performance, in turn contributing to the plant’s effectiveness as a windbreak allowing for further deposition of eolian sands (McAuliffe et al 2007). Nutrient concentrations in this shrub community are spatially variable. Nutrient resources are concentrated under shrub canopy relative to the interspaces, called islands of fertility (Kieft et al. 1998).

Most fires in the Mojave Desert are infrequent and of low severity because production of annual and perennial herbs seldom provides a fuel load capable of sustaining fire. Fires in creosotebush scrub were an infrequent event in pre-settlement desert habitats, because fine fuels from winter annual plants were probably sparse, only occurring in large amounts during exceptionally wet winters. Fire kills many creosotebush. Creosotebush is poorly adapted to fire because of its limited sprouting ability. Creosotebush survives some fires that burn patchily or are of low severity. Fire generally kills white bursage. Fire top-kills bush muhly and causes at least short-term decline of bush muhly. Recovery time is thought to vary considerably and is dependent on post fire weather and competition. Bush muhly establishes after fire by sprouting from the root crown and from soil-stored seed. Response to a single fire event may be favorable. Bush muhly's loosely arranged culms burn cooler and transfer less heat to the root crown compared to culms of more compact bunchgrasses. However, bush muhly declines under repeated desert grassland fires enhanced by cheatgrass (*Bromus tectorum*) and red brome (*B. rubens*). Fire top-kills desert needlegrass. Most needlegrasses (Achnatherum spp.), especially young plants, are very susceptible to fire damage. Surviving tufts of desert needlegrass probably will sprout. Desert needlegrass has persistent dead leaf bases, which make it susceptible to burning.

State and transition model



State 1
Reference State

This state represents the natural range of variability under pristine conditions. Community phase changes are primarily driven by long-term drought and insect attack. Wildfire is infrequent and patchy in this ecological site due to low fuel loading and widely spaced shrubs.

Community 1.1
Reference Plant Community

The Reference Plant Community is characterized by an open canopy of shrubs and perennial grasses. The plant community is dominated by bush muhly, desert needlegrass, creosotebush, and white bursage. Potential vegetative composition is about 20% grasses, 10% annual and perennial forbs, and 70% shrubs. Approximate ground cover (basal and crown) is less than 10 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	70	210	350
Grass/Grasslike	20	60	100
Forb	10	30	50
Total	**100**	**300**	**500**

State 2
Invaded

Introduced annuals such as red brome, schismus and redstem stork's bill have invaded the reference plant community and have become a dominant component of the herbaceous cover. This invasion of non-natives is attributed to a combination of factors including: 1) surface disturbances, 2) changes in the kinds of animals and their grazing patterns, 3) drought, and 4) changes in fire history. These non-natives annuals are highly flammable and promote wildfires where fires historically have been infrequent. The Invaded State is characterized by the presence of non-native species. A biotic threshold has been crossed, with the introduction of non-native annuals that cannot be removed from the system. At this time ecological function has not changed, however the resiliency of the state has been reduced by the presence of non-native annual species. The non-natives have the potential to alter disturbance regimes significantly from their natural or historic range of disturbances. LATR and AMDU persist after invasion by non-native annuals, but the other shrubs and desirable grasses may be unsuccessful in competing with the non-natives.

Community 2.1
Plant Community 2.1

This plant community is compositionally similar to the Reference Plant Community with the presence of non-native species in the understory. At this time ecological processes remain largely unchanged at this time.

Community 2.2
Plant Community 2.2

This plant community is dominated by seedlings of native species tolerant of post fire conditions and non-native annuals. Limited creosotebush and other mature shrubs will remain, surviving individuals act as nurse plants. Seedlings are dominated by white bursage and brittlebush.

Community 2.3
Plant Community 2.3

This plant community is characterized by heavy disturbance. Total shrub canopy is reduced. Remaining vegetation exists as islands on the landscape. Non-natives are able to persist with increased disturbance. Shrubs experience reduced vigor due to increased soil compaction.

Community 2.4
Plant Community 2.4

This plant community is characterized by an increased in non-native annual biomass. This plant community is identified as “at-risk”. Few species from the reference community remain in this community phase due to unfavorable conditions created by a shorter fire return interval.

Pathway 2.1a
Community 2.1 to 2.2

Large or small scale fire removes long-lived shrub community and herbaceous vegetation. Mature shrubs experience high rates of mortality.

Pathway 2.1b
Community 2.1 to 2.3

Heavy reoccurring disturbance decrease shrub canopy.

Pathway 2.2a
Community 2.2 to 2.1

Natural regeneration over time and absence of fire shrubs mature and densities increase.

Pathway 2.2b
Community 2.2 to 2.4

Reoccurring fire favors establishment non-native annuals and excludes native woody perennials.

Pathway 2.3a
Community 2.3 to 2.2

Natural regeneration overtime and continued absence of fire and/or removal of disturbance native perennial seedlings establish from adjacent in-tack shrub communities.

Pathway 2.4a
Community 2.4 to 2.2

Natural regeneration over time and the absence of fire allows shrub seedlings to establish from nearby seed source.

State 3
Non-native annual grassland

An abiotic threshold has been crossed, triggered by a frequent and repeated fire. Native species are unable to establish and persist in the presence of increased fire, favoring the establishment of annual grassland. Ecological processes including energy capture and nutrient cycling have changes dramatically.

Community 3.1
Plant Community 3.1

This plant community is characterized by frequent fire return interval and a monoculture of non-native annual grasses. This alternative stable state is extremely persistent due to strong feedbacks, including fire regimes and soil nutrient cycling.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			27–84	
	desert needlegrass	ACSP12	*Achnatherum speciosum*	15–45	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	6–24	–
	big galleta	PLRI3	*Pleuraphis rigida*	6–15	–
2	**Secondary Perennial Grasses**			1–15	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	2–6	–
	threeawn	ARIST	*Aristida*	2–6	–
3	**Annual Grasses**			1–15	
Forb					
4	**Perennial Forbs**			6–24	
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	2–6	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–5	–
5	**Annual Forbs**			1–24	
Shrub/Vine					
6	**Primary Shrubs**			90–180	
	burrobush	AMDU2	*Ambrosia dumosa*	45–90	–
	creosote bush	LATR2	*Larrea tridentata*	45–90	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	0–5	–
7	**Secondary Shrubs**			15–60	
	brittlebush	ENFA	*Encelia farinosa*	3–9	–
	Virgin River brittlebush	ENVI	*Encelia virginensis*	3–9	–
	jointfir	EPHED	*Ephedra*	3–9	–
	goldenbush	ERICA2	*Ericameria*	3–9	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	3–9	–
	water jacket	LYAN	*Lycium andersonii*	3–9	–
	Mojave yucca	YUSC2	*Yucca schidigera*	3–9	–

Animal community

Livestock Interpretations:
This site has limited value for livestock grazing, due to the low forage production. Grazing management should be keyed to perennial grass or palatable shrub production. White bursage is an important browse species. Browsing pressure on white bursage is particularly heavy during years of low precipitation, when production of winter annuals is low. White bursage is of intermediate forage value. It is fair to good forage for horses and fair to poor for cattle and sheep. However, because there is often little other forage where white bursage grows, it is often highly valuable to browsing animals. Many animals bed in or under creosotebush. Domestic sheep dig shallow beds under creosotebush because it provides the only shade in the desert scrub community. Creosotebush is unpalatable to livestock. Consumption of creosotebush may be fatal to sheep. Young desert needlegrass is palatable to all classes of livestock. Mature herbage is moderately grazed by horses and cattle, but rarely grazed by sheep. Bush muhly is readily eaten by livestock throughout the year when available; however, it is usually not abundant enough to provide much forage. It is grazed heavily in winter when other species become scarce. Because of its branching habit, it is extremely susceptible to heavy grazing. Bush muhly is damaged when continuously grazed to a stubble height of less than 4 inches (10 cm). Big galleta is considered a valuable forage plant for cattle and domestic sheep. Its coarse, rigid culms make it relatively resistant to heavy grazing and trampling.

Stocking rates vary over time depending upon season of use, climate variations, site, and previous and current

management goals. A safe starting stocking rate is an estimated stocking rate that is fine tuned by the client by adaptive management through the year and from year to year.

Wildlife Interpretations:
White bursage is an important browse species for wildlife. Many small mammals browse creosotebush or consume its seeds. Desert reptiles and amphibians use creosotebush as a food source and perch site and hibernate or estivate in burrows under creosotebush, avoiding predators and excessive daytime temperatures. Young desert needlegrass is palatable to many species of wildlife. Desert needlegrass produces considerable basal foliage and is good forage while young. Desert bighorn sheep graze desert needlegrass. The palatability of bush muhly for wildlife species is rated fair to poor. In southern Nevada, big galleta is heavily utilized by bighorn sheep and in some blackbrush communities it is referred to as preferred habitat. Mule deer utilize trace amounts of big galleta.

Hydrological functions

Runoff is medium to high. Permeability is moderate to moderately slow.

Recreational uses

Aesthetic value is derived from the diverse floral and faunal composition and the colorful flowering of wild flowers and shrubs during the spring and early summer. This site offers rewarding opportunities to photographers and for nature study. This site is used for camping and hiking and has potential for upland and big game hunting.

Other products

White bursage is a host for sandfood, a parasitic plant with a sweet, succulent, subterranean flowerstalk. Sandfood was a valuable food supply for Native Americans. Creosotebush has been highly valued for its medicinal properties by desert peoples. It has been used to treat at least 14 illnesses. Twigs and leaves may be boiled as tea, steamed, pounded into a powder, pressed into a poultice, or heated into an infusion.

Other information

White bursage may be used to revegetate disturbed sites in southwestern deserts. Creosotebush may be used to rehabilitate disturbed environments in southwestern deserts. Once established, creosotebush may improve sites for annuals that grow under its canopy by trapping fine soil, organic matter, and symbiont propagules. It may also increase water infiltration and storage. Big galleta's clumped growth form stabilizes blowing sand.

Type locality

Location 1: Clark County, NV

Other references

Fire Effects Information System (Online; http://www.fs.fed.us/database/feis/).

Hamerlynck, E.P., J.R. McAuliffe, E.V. McDonald and S.D. Smith. 2002. Ecological Responses of Two Mojave Desert Shrubs to Soils Horizon Development and Soil Water Dynamics. Ecology. 83.3: 768-779.

McAuliffe, J.R., E.P. Hamerlynck, and M.C. Eppes. 2007. Landscape dynamics fostering the development and persistence of long-lived creosotebush (Larrea tridentata) clones in the Mojave Desert. J. of Arid Environments. 69:96-126.

USDA-NRCS Plants Database (Online; http://plants.usda.gov/).

Contributors

RWA

Approval

Sarah Quistberg, 2/24/2025

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)	GK BRACKLEY
Contact for lead author	State Rangeland Management Specialist
Date	04/01/2010
Approved by	Sarah Quistberg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are none to rare, but may be evident in areas recently subjected to summer convection storms.

2. **Presence of water flow patterns:** Water flow patterns are none to rare. A few water flow patterns may be evident in areas recently subjected to summer convection storms. Where flow patterns are observed, they are short in length and stable.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare with occurrence typically limited to areas within water flow patterns.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground ±50%; surface rock fragments to ±35%; shrub canopy to 10%; basal area for perennial herbaceous plants ±1%.

5. **Number of gullies and erosion associated with gullies:** None

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

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) expected to move distance of slope length during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during catastrophic events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability values should be 1 to 3 on the coarse soil textures found on this site. (To be field tested.)

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface soil structure is typically single grained to medium platy. Soil surface colors are light and typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is less than 1 percent.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Shrub canopy and associated litter break raindrop impact.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Platy or massive sub-surface horizons, subsoil argillic horizons or duripan are not to be interpreted as compacted layers.

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: Reference Plant Community: Mojave Desert shrubs

    Sub-dominant: cool-season, perennial bunchgrasses = warm- season, perennial grasses = deep-rooted, perennial, forbs = fibrous, shallow-rooted, perennial forbs = annual forbs

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs common and standing dead shrub canopy material may be as much as 25% of total woody canopy; mature bunchgrasses commonly (±15%) have dead centers.

14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (Trace).

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season ±300lbs/ac.

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: Invaders on this site include Red brome, filaree, and Mediterranean grass.

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17. **Perennial plant reproductive capability:** All functional groups should reproduce in above average growing season years.
