USDA Natural Resources
Conservation Service

Ecological site R030XB034NV
SANDY PLAIN 5-7 P.Z.

Last updated: 2/18/2025
Accessed: 05/13/2025

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 inset fans, sand sheets and alluvial flats on all exposures. Slope range from 0 to 15 percent, but slopes of 0 to 8 percent are typical. Elevations are 1700 to 3800 feet. The soils associated with this site are moderately deep to very deep and well to excessively drained. The soils are coarse textured and have less than 35 percent gravels on the soil surface.

This site is also part of group concept R030XB148CA.

Associated sites

R030XB033NV	**SANDY PLAIN 7-9 P.Z.**
R030XB039NV	**LIMY FAN 5-7 P.Z.**

Similar sites

R030XB004NV	**SANDY 5-7 P.Z.** less productive site
R030XB121NV	**SANDY PLAIN 3-5 P.Z.** Occurs on broad alluvial plains; more productive site
R030XB054NV	**SANDY 3-5 P.Z.** less productive site
R030XB075NV	**GRAVELLY FAN 5-7 P.Z.** MESP2 major shrub
R030XB039NV	**LIMY FAN 5-7 P.Z.** More productive site; greater shrub diversity; occurs on inset fans
R030XB034NV	**SANDY PLAIN 5-7 P.Z.** More productive site; MUPO2 major grass
R030XB033NV	**SANDY PLAIN 7-9 P.Z.** BOER4 major species
R030XB063NV	**SANDHILL 5-7 P.Z.** ACHY-PLRI3 codominant
R030XB032NV	**DRY FLOODPLAIN** ATCA2 dominant shrub
R030XB037NV	**LIMY SAND 5-7 P.Z.** Less productive site

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Pleuraphis rigida*

Physiographic features

This site occurs on inset fans, sand sheets and alluvial flats on all exposures. Slope range from 0 to 15 percent, but slopes of 0 to 8 percent are typical. Elevations are 1700 to 3800 feet.

Table 2. Representative physiographic features

Landforms	(1) Inset fan (2) Sand sheet (3) Alluvial flat
Flooding duration	Very brief (4 to 48 hours) to extremely brief (0.1 to 4 hours)
Flooding frequency	Very rare to rare
Ponding frequency	None
Elevation	1,700–3,800 ft
Slope	0–15%
Aspect	Aspect is not a significant factor

Climatic features

The climate of the Mojave Desert has extreme fluctuations of daily temperatures, strong seasonal winds, and clear skies. The climate is arid and is characterized with cool, moist winters and hot, dry summers. Most of the rainfall falls between November and April. Summer convection storms from July to September may contribute up to 25 percent of the annual precipitation. Average annual precipitation is 5 to 7 inches. Mean annual air temperature is 56 to 60 degrees F. The average growing season is about 190 to 220 days.

Table 3. Representative climatic features

Frost-free period (average)	220 days
Freeze-free period (average)	
Precipitation total (average)	7 in

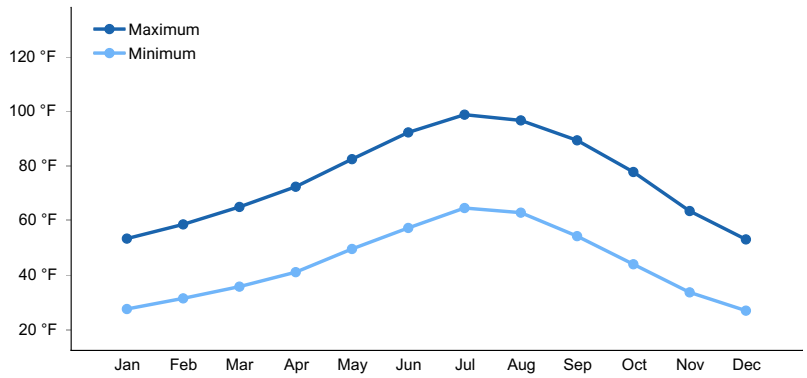


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are moderately deep to very deep and well to excessively drained. The soils are coarse textured and have less than 35 percent gravels on the soil surface. These soils have negligible to high runoff and moderately rapid to rapid permeability. Available water holding capacity is very low to moderate. Potential for sheet and rill erosion is moderate. The soil series associated with this site include: Bluepoint, Corbilt, Geta, Grapevine, and Moapa.

Table 4. Representative soil features

Surface texture	(1) Gravelly loamy fine sand (2) Gravelly sandy loam (3) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	21–84 in
Surface fragment cover <=3"	5–35%
Surface fragment cover >3"	0–10%
Available water capacity (0-40in)	2.3–5.2 in
Calcium carbonate equivalent (0-40in)	0–35%
Electrical conductivity (0-40in)	0–8 mmhos/cm
Sodium adsorption ratio (0-40in)	0–12
Soil reaction (1:1 water) (0-40in)	7.9–9.6
Subsurface fragment volume <=3" (Depth not specified)	0–25%
Subsurface fragment volume >3" (Depth not specified)	0–10%

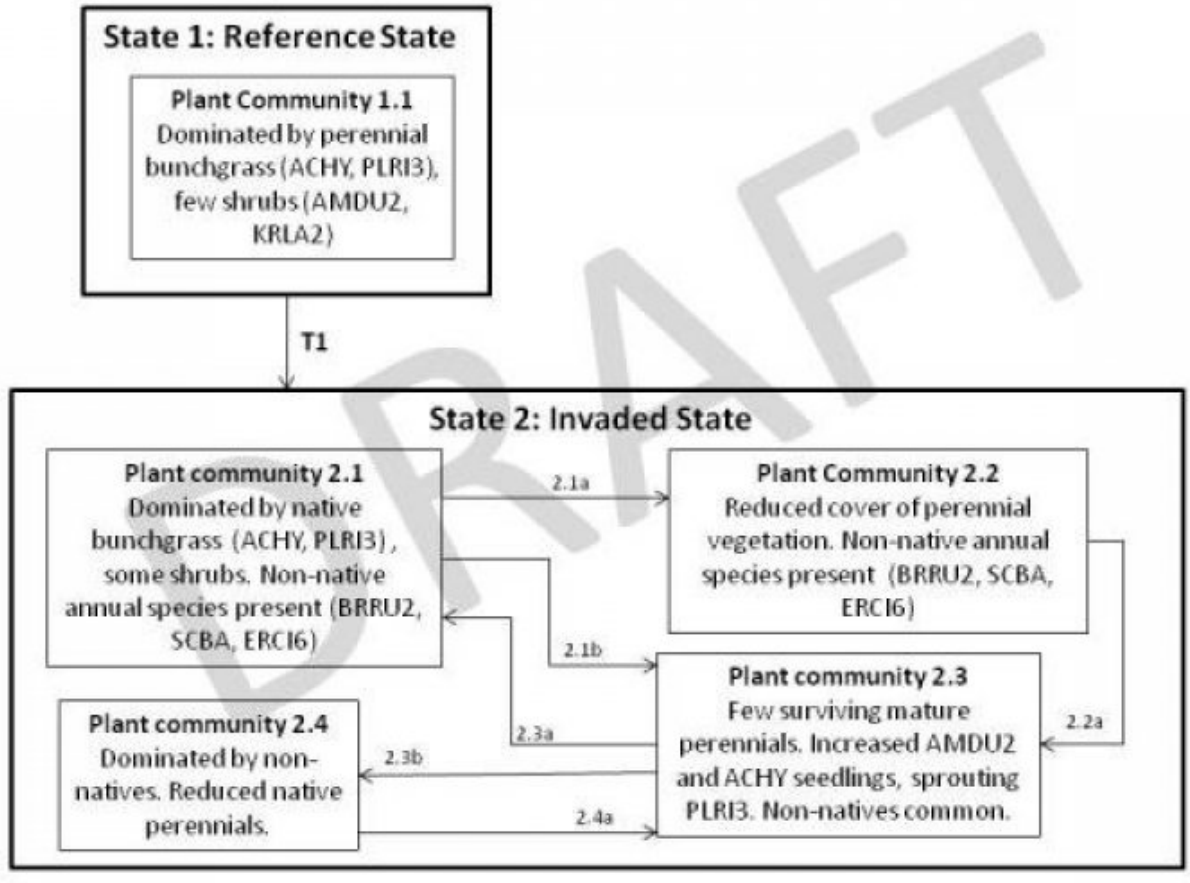
Ecological dynamics

This site is characterized by sandy soils which contribute to higher productivity and cover of perennial grasses. The primary organizing principle is the inverse-texture hypothesis, which predicts that plant communities on coarse textured soils should have higher above-ground net primary productivity than communities on fine textured soils. Sandy or coarse textured soils have greater rates of infiltration and precipitation is percolated deeper into the soil profile. On sandy sites, the surface horizon dries out quickly and forms a barrier to the conductance and evaporation of water held in the deeper soil horizons (Lane et al. 1998). This process protects moisture from being lost to evaporation, increasing the available water in the soil profile and positively contributing to the primary productivity of these sites.

Variation in the timing and amount of rainfall is particularly important in favoring species with different physiological characteristics: there is strong relationship between summer rainfall patterns and desert grasslands (McClaran and Van Devender 1995). Perennial grass recruitment occurs from seeds, rihizomes and stolons. Rainfall and runoff is unevenly distributed across the landscape, contributing to the spatial distribution of functional and structural groups. Desert grasses are intensive exploiters, which mean the extract a large proportion of their moisture from shallow soil horizons (Burgess 1995). Intensive exploiters are very effective competitors for limited moisture and tend to be very resilient. Long-term drought greatly influences plant community dynamics. Drought induced canopy die-back and mortality, is common during periods of below average precipitation, especially among juveniles (Hamerlynck and McAuliffe 2008).

Fire Ecology:
Historically, these sites would have experienced infrequent, stand replacing fires, carried by a relatively high cover of perennial grasses and shrubs (Brooks and Minnich 2006). Degree of fire damage is largely dependent on the seasonality of the burn. Plants in dormancy or during drought years may be adversely affected. Damage to big galleta from fire varies. If big galleta is dry, damage may be severe. However, when plants are green, fire will tend to be less severe and damage may be minimal, with big galleta recovering quickly. Fire top-kills bush muhly. A nonrhizomatous species, bush muhly regenerates following fire from soil-stored seed. Burning causes at least short-term decline of bush muhly. Recovery time is thought to vary considerably and is probably dependent on postfire weather and competition. When ungrazed, bush muhly's dense growth may contribute to fire spread. It may be most susceptible to fire damage when growing beneath shrubs because of increased fuels and higher temperatures as shrubs burn. Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas. Sand dropseed is usually killed or topkilled by fire. Sand dropseed has the potential for postfire regeneration and seedling establishment as seeds within burned areas may remain viable. However postfire regeneration responses may differ according to relative abiotic and biotic site characteristics. Mesa dropseed is damaged by fire, but its susceptibility relative to other grasses, and its period of recovery, are poorly understood.

State and transition model



State 1
Reference State

This state represents the natural range of variability under pristine conditions. This state is dominated by perennial bunchgrasses and primary natural disturbance mechanisms affecting this ecological site are wildfire, long-term drought and insect attack. Timing for disturbance in combination with weather events determines plant community

dynamics. This site may experience light to moderate grazing by wildlife. Additional run-in moisture aids in maintaining the community phases of this state, by favoring a greater dominance by grasses with a lesser component of shrubs. This site is distinguished by higher ecological resistance and resilience due to the increased annual production, additional moisture, and higher amounts of organic matter when compared to the surrounding sites.

Community 1.1
Reference Plant Community

The reference plant community is dominated by big galleta. Bush muhly and Indian ricegrass are other important species associated with this site. Potential vegetative composition is about 90% grasses, 5% perennial and annual forbs and 5% shrubs. Approximate ground cover (basal and crown) is less than 25 to 40 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	810	1170	1620
Shrub/Vine	45	65	90
Forb	45	65	90
Total	**900**	**1300**	**1800**

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. PLRI3 would persist after invasion by non-native annuals, but the other species may be unsuccessful in competing with non-natives and could be removed from the system. A biotic threshold has been crossed by the introduction of non-native annuals that cannot be removed from the system and will alter disturbance regimes significantly from their natural or historic range of disturbances. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of non-native annual species.

Community 2.1
Plant Community Phase 2.1

The plant composition is similar to the Reference Plant Community. Ecological function has not changed but the resilience has decreased due to the presence of non-native annuals.

Community 2.2
Plant Community Phase 2.2

This plant community is characterized by a reduction in perennial grass cover and an increase of non-native annuals and bare ground. Heavy disturbance has decreased the perennial vegetative cover that is beneficial for soil stabilization and nutrient cycling.

Community 2.3
Plant Community Phase 2.3

This plant community is characterized by few surviving mature perennials. Disturbance tolerant shrubs and rhizomatous bunchgrasses are scattered through the plant community. Loss of mature vegetation will encourage seedling growth of burrobush and Indian ricegrass. Seed is provided by surrounding unburned areas. Non-native annuals are common throughout the site.

Community 2.4
Plant Community Phase 2.4

This plant community is characterized by the dominance of non-native annuals; perennial vegetative cover is severely reduced.

Pathway 2.1a
Community 2.1 to 2.2

Frequent and repeated disturbance, heavy grazing, small fire, or prolonged drought will decrease abundance of perennial bunchgrasses.

Pathway 2.1b
Community 2.1 to 2.3

Large fire will initially remove shrubs and perennial grasses.

Pathway 2.2a
Community 2.2 to 2.3

A decreased level of disturbance or a year with increased precipitation will encourage a flush of vegetative growth.

Pathway 2.3a
Community 2.3 to 2.1

Controlling disturbance on this site allows perennials to mature, successfully reproduce and return to dominance.

Pathway 2.3b
Community 2.3 to 2.4

Increased fire, resulting from a continuous bed of fine fuels reduces perennial vegetative cover.

Pathway 2.4a
Community 2.4 to 2.3

Reducing the level of disturbance initiates native species regeneration.

Transition 1
State 1 to 2

Introduction of non-native species due to anthropogenic disturbance including OHV use, dry land farming, grazing, linear corridors, mining, military training operations, and settlements.

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**			1001–1495	
	big galleta	PLRI3	*Pleuraphis rigida*	780–975	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	65–260	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	130–260	–
	dropseed	SPORO	*Sporobolus*	26–65	–
	spike dropseed	SPCO4	*Sporobolus contractus*	9–22	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	9–22	–
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	9–22	–
2	**Secondary Perennial Grasses**			26–65	
	desert needlegrass	ACSP12	*Achnatherum speciosum*	7–39	–
3	**Annual Grasses**			1–39	
	sixweeks grama	BOBA2	*Bouteloua barbata*	7–39	–
Forb					
4	**Perennial Forbs**			26–104	
	milkvetch	ASTRA	*Astragalus*	7–39	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	7–39	–
5	**Annual Forbs**			13–65	
Shrub/Vine					
6	**Shrubs**			26–104	
	rayless goldenhead	ACSP	*Acamptopappus sphaerocephalus*	13–26	–
	burrobush	AMDU2	*Ambrosia dumosa*	13–26	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	13–26	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	13–26	–
	Eastern Mojave buckwheat	ERFAP	*Eriogonum fasciculatum var. polifolium*	13–26	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	13–26	–
	creosote bush	LATR2	*Larrea tridentata*	13–26	–
	water jacket	LYAN	*Lycium andersonii*	13–26	–
	Joshua tree	YUBR	*Yucca brevifolia*	13–26	–
	Mojave yucca	YUSC2	*Yucca schidigera*	13–26	–

Animal community

Livestock Interpretations:
This site is suitable for livestock grazing. Grazing management should be keyed to dominant perennial grasses production. 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. 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). Indian ricegrass is highly palatable to all classes of livestock in both green and cured condition. It supplies a source of green feed before most other native grasses have produced much new growth. Sand dropseed provides fair to good forage for livestock. Sand dropseed's value as livestock forage is regional and dependent upon season. If fall rains are adequate, sand dropseed may have a period of renewed growth, producing new shoots in old sheaths. The persistent green base throughout winter makes sand dropseed an important desert winter range plant. In

general, sand dropseed provides fair winter forage for domestic sheep and is preferred by cattle. Cattle eat mesa dropseed all year long. Use is heaviest during the summer when the plant is actively growing. Mesa dropseed becomes unpalatable and low in nutrition at maturity.
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:
In southern Nevada, big galleta is heavily utilized by bighorn sheep. Mule deer utilize trace amounts of big galleta. The palatability of bush muhly for wildlife species is rated fair to poor. Indian ricegrass is eaten by pronghorn in moderate amounts whenever available. A number of heteromyid rodents inhabiting desert rangelands show preference for seed of Indian ricegrass. Indian ricegrass is an important component of jackrabbit diets in spring and summer. Indian ricegrass seed provides food for many species of birds. Doves, for example, eat large amounts of shattered Indian ricegrass seed lying on the ground. Sand dropseed provides poor forage for wildlife. Large mammals in general show little use of sand dropseed. Sand dropseed is not preferred by pronghorn, elk, and deer. Small mammals and birds utilize sand dropseed to a greater extent than large mammals. Pronghorns consume mesa dropseed. Mesa dropseed becomes unpalatable and low in nutrition at maturity.

Hydrological functions

Runoff is negligible to high. Permeability is moderately rapid to rapid. Hydrologic soil groups are A, B and C.

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

Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used the seed as a reserve food source. Sand dropseed is an edible grass used by Native Americans. Native Americans used mesa dropseed seeds as food.

Other information

Big galleta's clumped growth form stabilizes blowing sand. Sand dropseed is recommended as a component of grass seed mixtures for sandy and heavy to semi-sandy soils.

Type locality

Location 1: Lincoln County, NV	
Township/Range/Section	T9S R65E S28
General legal description	About 15 miles southwest of Elgin, Kane Springs Valley, Lincoln County, Nevada. This site also occurs in Clark county.

Other references

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

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

Contributors

RRK/GKB

Approval

Kendra Moseley, 2/18/2025

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)	P Novak-Echenique
Contact for lead author	Sate Rangeland Management Specialist
Date	03/15/2010
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None

2. **Presence of water flow patterns:** Water flow patterns are none to rare. A few waterflow 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 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 up to 50%; surface rock fragments to 35%; shrub canopy to 5%; basal area for perennial herbaceous plants ±20%.

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 large rainfall 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 3 to 6 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 pale browns and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is less than to 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 provide some protection from raindrop impact. Medium to coarse textured surface soils have moderate rapid to rapid infiltration.

---

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

---

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: Deep-rooted warm-season, perennial grasses (i.e., big galleta & bush muhly)

    Sub-dominant: deep-rooted, cool-season, perennial bunchgrasses > Mojave Desert shrubs > perennial forbs > annual forbs = shallow-rooted, perennial grasses = annual grasses

    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 30-35% and depth (<¼-inch).

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season ±1300lbs/ac. Favorable years ±1300 lbs/ac and unfavorable years ±900 lbs/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:** Potential invaders include red brome, redstem filaree, annual mustards, and Mediterranean

grass.

---

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