USDA Natural Resources
Conservation Service

Ecological site R030XB007NV
GRANITIC LOAM 5-7 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.

Ecological site concept

This site occurs on fan piedmonts, fan remnants, and alluvial fans on all exposures. Slopes range from 0 to 30 percent, but slope gradients of 4 to 15 percent are typical. Elevations are 1500 to 4500 feet.The soils associated with this site are very deep and have formed in mixed alluvium. Soils are noncalcareous.

This site is linked to the grouped concept R030XB137CA.

Associated sites

R030XB008NV	**SHALLOW GRANITIC HILL 5-7 P.Z.**
R030XB039NV	**LIMY FAN 5-7 P.Z.**
R030XB075NV	**GRAVELLY FAN 5-7 P.Z.**

Similar sites

R030XB018NV	**GRANITIC LOAM 3-5 P.Z.** Less productive site; ENFA-VIDE2 major shrubs with AMDU2; ERFAP rare to minor spp.
R030XB062NV	**GRANITIC SLOPE 3-5 P.Z.** AMDU2-KRPA-SEAR8 codominant shrubs
R030XB102NV	**GRAVELLY LOAM 5-7 P.Z.** EULA5 major shrub
R030XB087NV	**GRANITIC SLOPE 5-7 P.Z.** AMDU2-SEAR8 codominant shrubs

R030XB060NV	**GRANITIC NORTH SLOPE 5-7 P.Z.** PLRI3 dominant plant; more productive site; ERFAP dominant shrub
R030XB008NV	**SHALLOW GRANITIC HILL 5-7 P.Z.** Less productive site
R030XB075NV	**GRAVELLY FAN 5-7 P.Z.** More productive site; PLRI3 dominant plant; MESP2 common

Table 1. Dominant plant species

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

Physiographic features

This site occurs on fan piedmonts, fan remnants, and alluvial fans on all exposures. Slopes range from 0 to 30 percent, but slope gradients of 4 to 15 percent are typical. Elevations are 1500 to 4500 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan piedmont (2) Alluvial fan (3) Fan remnant
Elevation	1,500–4,500 ft
Slope	0–30%
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 57 to 63 degrees F. The average growing season is about 180 to 240 days.

Table 3. Representative climatic features

Frost-free period (average)	240 days
Freeze-free period (average)	
Precipitation total (average)	7 in

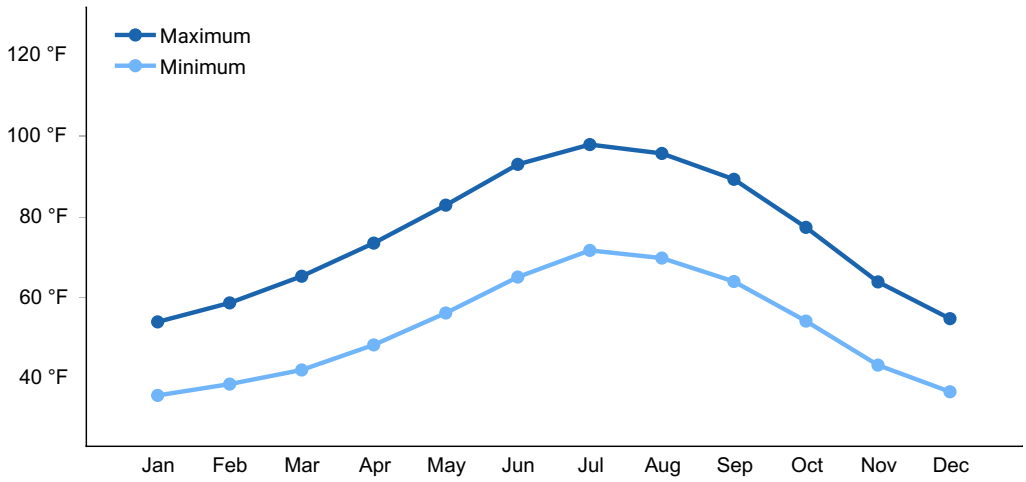


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There is no influencing water features associated with this site.

Soil features

The soils associated with this site are very deep and have formed in mixed alluvium. Soils are noncalcareous. Water intake rates are moderately slow and the soils are well drained. Available water capacity is moderate and runoff is medium. The soil series associated with this site includes Lanip. Lanip has an argillic and a calcic horizon.

Table 4. Representative soil features

Surface texture	(1) Very gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow
Soil depth	72–84 in
Surface fragment cover <=3"	45–50%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	5.3–5.4 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–2 mmhos/cm

Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	7.9–9
Subsurface fragment volume <=3" (Depth not specified)	9–50%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

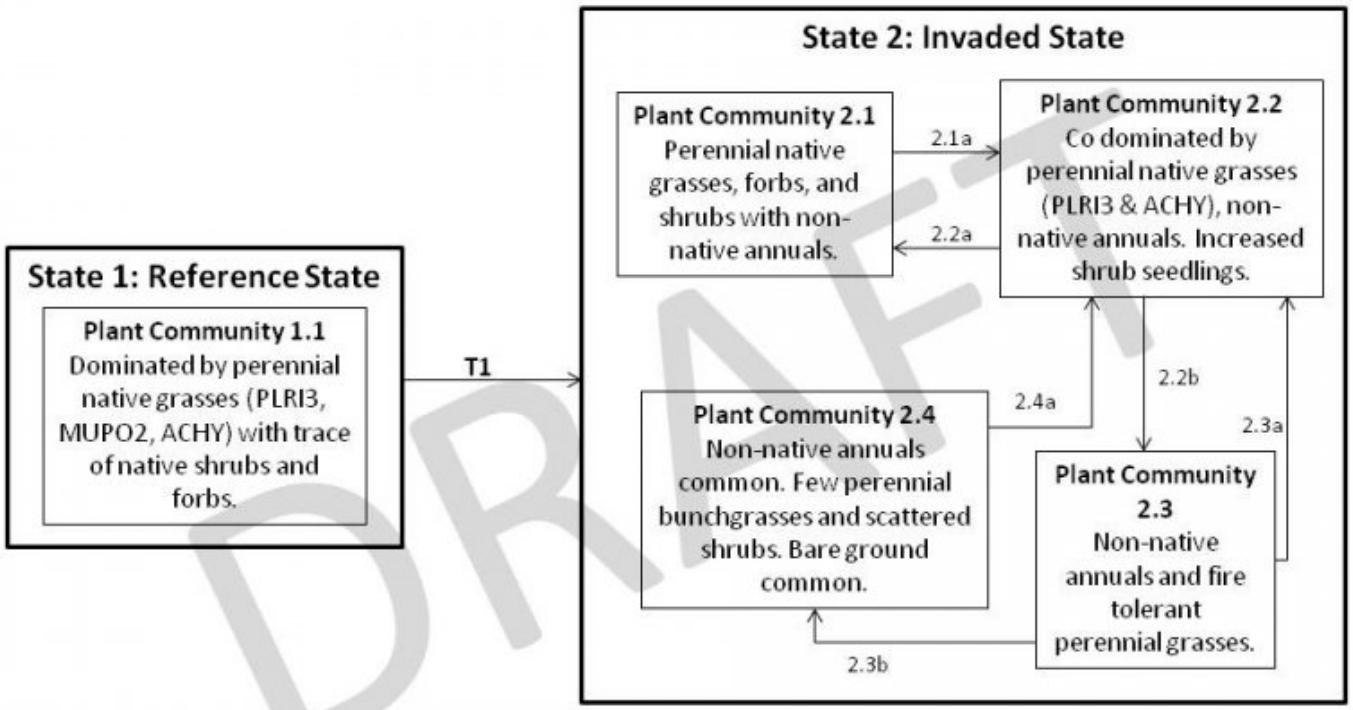
Half of the annual precipitation comes in the summer, increasing production and the presence of warm season grasses. The dominant grasses on this ecological site are large bunchgrasses which provide valuable organic matter. Litter and old shoots are incorporated into the soil increasing the organic matter and therefore the nutrient availability compared to other desert soils. Run-in moisture is positively influenced by the abundance of vegetation on the landscape, providing more places for infiltration. Elevated levels of soil organic matter and infiltration help make this site more resilient, than the surrounding area, following a disturbance.

Perennial grass species found on this ecological site include a combination of cool and warm season species. Big galleta, Indian ricegrass, desert needlegrass (*Achnatherum speciosum*), fluffgrass (*Dasyochloa pulchella*), and threeawn (Aristida spp.) are the most common. The relative species diversity of this site makes it more resilient. Species richness contributes to overall increased ecological stability. The ecological functions of different species overlap, so that even if a species is removed, ecological function will persist due to the compensation by other species with similar function (Peterson et al. 1998).

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. Fire generally kills white bursage and creosotebush. Range ratany is top-killed by fire. Range ratany resprouts from the root crown after fire. Ephedra is top-killed by fire. 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. Desert needlegrass has persistent dead leaf bases, which make it susceptible to burning. Fire removes the accumulation; a rapid, cool fire will not burn deep into the root crown. Most perennial grasses have root crowns that can survive wildfire.As ecological condition

deteriorates, perennial grasses and forbs decrease as creosotebush and white bursage become more dominant. Introduced annual forbs and grasses are invaders on this site.

State and transition model



State 1
Reference State

This state represents the natural range of variability under pristine conditions. Community phase changes are driven by natural disturbances such as periodic drought, wildfire and insect attack. This site experiences light to moderate grazing by wildlife. Timing of disturbances combined with weather events determines plant community dynamics.

Community 1.1
Reference Plant Community

The reference plant community is dominated by white bursage, big galleta, bush muhly, and desert needlegrass. Potential vegetative composition is about 35% perennial and annual grasses, 10% annual and perennial forbs and 55% shrubs. Approximate ground cover (basal and crown) is 5 to 15 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	110	193	275
Grass/Grasslike	70	122	175
Forb	20	35	50
Total	**200**	**350**	**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. AMDU would persist after this invasion by non-native annuals, but the other shrubs and desirable grasses would either be unsuccessful in competing with the non-natives or removed from the system. A biotic threshold has been crossed, with the introduction of non-native annuals that cannot be removed from the system. The presence of non-native have the potential to alter disturbance regimes significantly from their natural or historic range of disturbances.

Community 2.1
Plant Community Phase 2.1

This plant community is compositionally similar to the Reference Plant Community with a trace of non-native annuals in the understory. Ecological function has not changed at this time, however the resiliency of the state has been reduced by the presence of non-natives.

Community 2.2
Plant Community Phase 2.2

This plant community is characterized by an increase of non-native annual biomass. Non-native species take advantage of increased light and nutrient resources post fire. Perennial bunchgrasses sprout from the root crown post fire. Recruitment of early successional species increases dramatically from seed provided by an offsite source.

Community 2.3
Plant Community Phase 2.3

This plant community is dominated by non-native annuals. Minor amount of perennial

bunchgrasses and shrubs remain in the plant community. Loss of perennial vegetation leads to altered ecological processes including increased erosion and changes in the nutrient cycling dynamics.

Community 2.4
Plant Community Phase 2.4

This plant community is characterized by heavy anthropogenic disturbance. Native grasses and shrubs have reduced vigor and are experiencing little to no recruitment. Non-native species persist even under an increased disturbance regime. Increase in amount of bare ground, site is susceptible to erosion.

Pathway 2.1a
Community 2.1 to 2.2

Fire reduces woody vegetation and favors an increase of herbaceous biomass, native and non-native.

Pathway 2.2a
Community 2.2 to 2.1

With time and exclusion of fire, native woody species mature. Non-native annuals persist through recovery.

Pathway 2.2b
Community 2.2 to 2.3

Frequent repeated fire removes native perennials from the site and favors non-native annuals.

Pathway 2.3a
Community 2.3 to 2.2

Exclusion of fire and time allows resilient native species to regenerate.

Pathway 2.3b
Community 2.3 to 2.4

Increased anthropogenic impacts will decrease native vegetation and increase bare ground.

Pathway 2.4a
Community 2.4 to 2.2

Removal of disturbance increases vigor and reproduction of native species.

Transition 1
State 1 to 2

Introduction of non-native species due to anthropogenic disturbances including OHV use, dry land farming, grazing, linear corridors, mining, military 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**			88–140	
	big galleta	PLRI3	*Pleuraphis rigida*	52–70	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	18–35	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	18–35	–
2	**Secondary Perennial Grasses**			1–28	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	2–11	–
	threeawn	ARIST	*Aristida*	2–11	–
3	**Annual Grasses**			1–28	
Forb					
4	**Secondary Perennial Forbs**			7–28	
	low woollygrass	DAPU7	*Dasyochloa pulchella*	2–11	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	2–7	–
5	**Annual Forbs**			1–28	
Shrub/Vine					
6	**Primary Shrubs**			92–187	
	burrobush	AMDU2	*Ambrosia dumosa*	70–105	–
	jointfir	EPHED	*Ephedra*	4–28	–
	Eastern Mojave buckwheat	ERFAP	*Eriogonum fasciculatum var. polifolium*	4–28	–
	creosote bush	LATR2	*Larrea tridentata*	7–28	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	2–7	–
7	**Secondary Shrubs**			18–53	
	button brittlebush	ENFR	*Encelia frutescens*	4–11	–
	burrobrush	HYMEN3	*Hymenoclea*	4–11	–
	desert-thorn	LYCIU	*Lycium*	4–11	–
	Fremont's dalea	PSFR	*Psorothamnus fremontii*	4–11	–
	Mojave sage	SAMO3	*Salvia mohavensis*	4–11	–
	shortspine horsebrush	TESP2	*Tetradymia spinosa*	4–11	–
	Mojave yucca	YUSC2	*Yucca schidigera*	4–11	–

Animal community

Livestock Interpretation:
This site has limited value for livestock grazing, due to the low forage production. Grazing management should be keyed to dominant grasses 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. Range ratany is an important forage species for all classes of livestock. Palatability of range ratany is rated fair to good for cattle and sheep. Ephedra is important winter range browse for domestic cattle, sheep and goats. 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). Young desert needlegrass is palatable to all classes of livestock. Mature herbage is moderately grazed by horses and cattle, but rarely grazed by sheep.

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. Range ratany is an important forage species for deer. Mule deer browse range ratany year-long with seasonal peaks. Mule deer peak use is from February to April and from August to October. Mule deer, bighorn sheep, and pronghorn browse ephedra, especially in spring and late summer when new growth is available. 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. The palatability of bush muhly for wildlife species is rated fair to poor. 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.

Hydrological functions

Overland flow and sediment yield diminish with increasing plant cover. Abundance of deep-rooted perennial grasses infiltration during precipitation events. Sparse shrub canopy and associated litter break raindrop impact and aid in infiltration. Runoff is medium , permeability is moderately low and water flow patterns are none to rare.

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.

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	
Township/Range/Section	T32S R65E S13
General legal description	About 8 miles west of Lauglin, along Nevada Highway 163, Clark County, Nevada.

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

HA/GKB

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	03/22/2010
Approved by	Kendra Moseley
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.

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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.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare with occurrence typically limited to areas within water flow patterns.

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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 ±5%.

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 (<10 ft) 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 4 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 weak thick platy. Soil surface colors are light 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 break raindrop impact. Medium to coarse textured surface soils have moderate 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. Subsoil argillic or calcic horizons 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: Mojave Desert shrubs

Sub-dominant: warm- season, perennial grasses > cool-season, perennial bunchgrasses > deep-rooted, perennial, forbs > annual forbs

Other:

Additional:

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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.

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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces 5% and depth (±¼ inch).

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season ±350lbs/ac.

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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:** Potential 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.
