

## **Ecological site R030XC236CA**

### **Lithic Slopes**

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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

##### **MLRA Description:**

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 and dry with mostly hyperthermic and thermic soil temperature regimes. However, at higher elevations of this MLRA, generally above 5,000 feet, soil temperature regimes can be mesic, cryic and frigid. The most arid regimes of this MLRA can receive less than 4 inches (100 mm) Elevations range from below sea level to over 12,000 feet (3650 meters) in the higher mountain areas found within the MLRA. Due to the extreme elevational range found within this MLRA, land resource units (LRUs) were designated to group the MLRA into similar land units.

#### **LRU notes**

##### **LRU Description:**

The Bi-Modal Semi-Arid (XC) Land Resource Unit (LRU), represents a semi-arid zone as defined by the United Nations Food and Agriculture Organization and is a semi-arid region distinguished by other semi-arid regions of the Mojave by the amounts of summer precipitation it receives. Semi-arid regions in the western Mojave can experience hot and very dry summers whereas regions within the XC LRU can receive more than 2.5 inches (63.5 mm) of rain during the months of July, August and September. The Bi-Modal Semi-Arid LRU is found primarily in eastern Mojave such as in Nevada at the higher elevations, in California in the New York, Providence, Castle and Clark Mountain Ranges as well as the Cerbat and Virgin Mountains of Arizona. Elevations range from approximately 4000 to 12,000 feet (1500 to 3650 meters) and precipitation ranges 8 to 18 inches (200 – 450 mm) per year in the form of rain. Snow is not uncommon in this LRU with the chance of receiving 3 to 48 inches of snow per year. Due to the relatively high volume of summer rainfall, soil moisture regimes may have been designated as ustic-aridic, however emerging soil moisture data suggests the xeric-aridic soil moisture regime may be more appropriate and is likely to dominate this LRU. Soils within this LRU also have a cool thermic or cooler soil temperature regime. The combination of cooler temperatures [mean annual air temperatures lower than 62 degrees F (17 degrees C)] with summer monsoonal rains help to create a unique climate within the Mojave Desert which may be more similar to the Southern Nevada Basin and Range (MLRA). Vegetation at the lower elevations of this LRU includes blackbrush, Joshua tree, juniper, pinyon pine, and mountain big sagebrush. At the higher elevations, vegetation includes oaks, Mojave sagebrush, Ponderosa pine, white fir, limber pine and the Great Basin bristlecone pine.

#### **Ecological site concept**

Precip. Range: 7-9"

Soil moisture regime: Aridic bordering on ustic\*\*

Soil temperature: Thermic

Landforms: hills and mountain slopes\*\*

Slopes: 8 to 50%

Elevation Range: 4400 to 5700\*\*

Parent material: residuum, colluvium

Parent material kind: volcanic

Flooding: none

Distinguishing soil characteristics: \*\* Lithic soils, high percentage of large surface rock fragments

Depth class: very shallow to shallow\*\*

Particle size class: loamy skeletal

Surface texture: coarse loamy

Subsurface texture: Loamy

Common reference plants: Mojave buckwheat, black grama, big galleta

Common disturbed plants: threeawns, cheesebush, snakeweeds

Production range: 430-620-800

This is a group concept and provisional STM that also covers the following ecological sites: R030XC170CA, R030XB015NV

## Similar sites

R030XB015NV	<b>SHALLOW GRAVELLY SLOPE 7-9 P.Z.</b> Same ecological site
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Eriogonum fasciculatum</i>
Herbaceous	(1) <i>Bouteloua eriopoda</i> (2) <i>Pleuraphis rigida</i>

## Physiographic features

This site occurs on hills and mountain sideslopes on all aspects. Slopes range from 8 to 50%. Elevations are 4400 to 5700 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain slope
Elevation	1,341–1,737 m
Slope	8–50%
Aspect	Aspect is not a significant factor

## Climatic features

## Influencing water features

## Soil features

The soils associated with this ecological site formed in residuum and colluvium from volcanic parent material. They are shallow to very shallow to bedrock. Surface textures are coarse-loamy and subsurface textures are loamy. Surface rock fragments range from 35 to 65 percent, and are comprised of gravel, cobble, or stones. An argillic horizon occurs from 4 to 15 inches. Depth to bedrock is 4 to 20 inches. Soils have a thermic temperature regime and an typic aridic moisture regime. The soils correlated with this site are classified as Lithic Ustic Haplargids. The soil series that have been correlated with this ecological site include Pantak.

The Pantak series consists of very shallow and shallow, well drained soils formed in mixed slope alluvium,

colluvium, and residuum from igneous rock. Surface textures are coarse-loamy with very gravelly sandy loam and very gravelly sandy clay loam beneath. Surface rock fragments range from 35 to 65 percent, and are comprised of gravel, cobble, or stones. An argillic horizon occurs from 4 to 15 inches. Depth to bedrock is 4 to 20 inches. Pantak soils are on pediments, hills and mountains with slopes of 5 to 60 percent. These soils are classified as Loamy-skeletal, mixed, superactive, thermic Lithic Ustic Haplargids

**Table 3. Representative soil features**

Parent material	(1) Residuum–volcanic breccia
Surface texture	(1) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Soil depth	10–51 cm
Surface fragment cover <=3"	35–65%

## Ecological dynamics

This ecological site is found on steep, rocky hill and mountain slopes with volcanic parent material and very shallow to shallow soils. The reference plant community is co-dominated by shrubs and perennial grasses. A high percentage of surface rock fragments and rock outcrop increases run-on, and increases microsites available for plant establishment. This supports a high diversity of shrub species and reduces strong dominance by any one or two species. Buckwheat species (Mojave buckwheat and bastardsage) are characteristic shrubs of this site. Both thrive in shallow, coarse-textured rocky soils. Big galleta (*Pleuraphis rigida*), galleta (*Pleuraphis jamesii*) and black grama (*Bouteloua eriopoda*) are the dominant perennial grass species. Increased run-on supports a productive grass component.

Invasion by annual grasses, grazing and fire and the major disturbances affecting this site.

The invasive annual grass red brome (*Bromus rubens*) is naturalized throughout the current potential plant community.

Prolonged or heavy grazing reduces palatable shrub species like Mojave buckwheat and bastardsage, as well as perennial grass species. Unpalatable grasses like threeawn become dominant along with short-lived, unpalatable shrubs (snakeweed, cheesbush). In addition, site susceptibility to invasion by non-native annual grasses (red brome, schismus spp) and forbs (pignut [*Hoffmannsegia glauca*] and little hogweed [*Portulaca oleracea*] increases.

The species that dominate this site are relatively resilient to fire, and because diversity is characteristically high in the reference plant community, fire does not have as big of an impact on this plant community as it does in other desert communities. Big galleta, galleta and black grama all resprout after fire, and can increase in dominance after fire because of reduced competition with shrubs species, especially if adequate or above average precipitation occurs. Mojave buckwheat may be killed by severe fire, but it quickly colonizes burned areas. Bastardsage resprouts after fire.The changes that do occur after fire increase an increase in the proportion of perennial and annual grass, and short-lived shrubs like cheesebush (*Hymenoclea salsola*) and broom snakeweed (*Gutierrezia sarothrae*) also increase.

## State and transition model

## R030XB236CA Lithic Volcanic Slopes

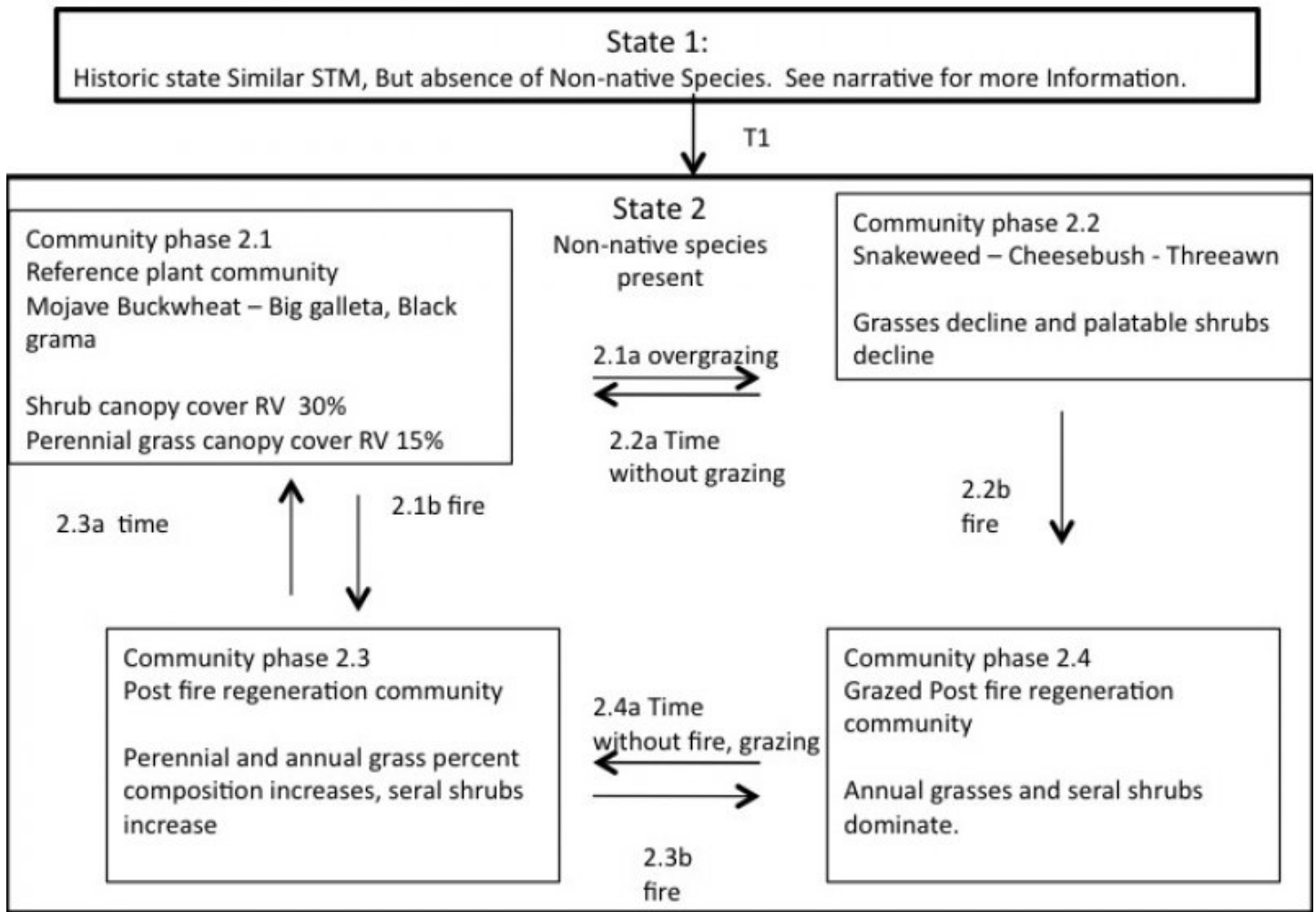


Figure 1. R030XB236CA

### State 1 Historic

State 1 represents the historic-natural condition for this ecological site. It is similar to State 2, but has only native species.

## State 2

### Non-native species present

The current potential plant community is dominated by Mojave buckwheat (*Eriogonum fasciculatum*), big galleta (*Pleuraphis rigida*), galleta (*Pleuraphis jamesii*) and black grama (*Bouteloua eriopoda*). A high diversity of other shrub species is typically present. A high diversity of annual forbs and grasses are seasonally abundant. Total canopy cover is about 50%, and production is 620 pounds per acre.

### Community 2.1

#### buckwheat - big galleta - black grama



Figure 2. Community phase 2.1

The current potential plant community is dominated by buckwheat species, big galleta and black grama. A high diversity of other shrubs are present, and annual forbs and grasses are seasonally abundant.

Table 4. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	—	432	—
Grass/Grasslike	—	247	—
Forb	—	15	—
<b>Total</b>	—	<b>694</b>	—

### Community 2.2

#### Grazed - Snakeweed – Cheesebush - Threeawn

This community phase occurs with prolonged or heavy grazing. Palatable shrubs and grasses decline, and unpalatable species increase.

### Community 2.3

#### Fire regeneration

This community phase occurs with moderate to high intensity fire. The proportion of perennial and annual grass species increases, and the proportion of short-lived shrubs such as snakeweed increases.

### Community 2.4

#### Burned and Grazed

This community phase occurs with moderate to severe fire in Community phase 2.2.

### Pathway 2.1a

## Community 2.1 to 2.2

This pathway occurs with prolonged or heavy grazing.

### Pathway 2.1b

## Community 2.1 to 2.3

This pathway occurs with severe wildfire

### Pathway 2.1

## Community 2.2 to 2.1

This pathway occurs with time without grazing.

### Pathway 2.3a

## Community 2.3 to 2.1

This pathway occurs with time without fire.

### Pathway 2.3b

## Community 2.3 to 2.4

This pathway occurs with moderate to severe fire.

### Pathway 2.4a

## Community 2.4 to 2.3

This pathway occurs with time with no fire and no grazing.

## State 3

### Repeated fire, non-native annual grasses dominate

This State occurs after repeated fire with short fire-return intervals. Red brome, big galleta and black grama dominate the site with a mix of short-lived shrub species.

## Additional community tables

Table 5. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Shrub/Vine</b>					
1	<b>Native shrubs</b>			247–471	
	Eastern Mojave buckwheat	ERFA2	<i>Eriogonum fasciculatum</i>	66–122	5–10
	bastardsage	ERWR	<i>Eriogonum wrightii</i>	45–84	1–5
	Engelmann's hedgehog cactus	ECEN	<i>Echinocereus engelmannii</i>	43–58	0–1
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	34–52	1–3
	banana yucca	YUBA	<i>Yucca baccata</i>	25–47	1–3
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	12–24	1–2
	rough menodora	MESC	<i>Menodora scabra</i>	10–15	0–1
	buck-horn cholla	CYAC8	<i>Cylindropuntia acanthocarpa</i>	1–13	0–2
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0–13	0–1
	Cooper's goldenbush	ERCO23	<i>Ericameria cooperi</i>	0–11	0–2
	narrowleaf goldenbush	ERLI6	<i>Ericameria linearifolia</i>	0–11	0–1

	burrobrush	HYSA	<i>Hymenoclea salsola</i>	0–11	0–1
	littleleaf ratany	KRER	<i>Krameria erecta</i>	7–11	0–1
	dollarjoint pricklypear	OPCH	<i>Opuntia chlorotica</i>	1–9	0–1
	grizzlybear pricklypear	OPPOE	<i>Opuntia polyacantha</i> var. <i>erinacea</i>	1–9	0–1
	Mexican bladdersage	SAME	<i>Salazaria mexicana</i>	0–6	0–1
	brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	0–4	0–1
	Jaeger's Joshua tree	YUBRJ	<i>Yucca brevifolia</i> var. <i>jaegeriana</i>	0–3	0–1
	Parish's goldeneye	VIPA14	<i>Viguiera parishii</i>	0–2	0–1
<b>Grass/Grasslike</b>					
2	<b>Native perennial grasses</b>			157–291	
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	135–247	8–15
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	135–247	0–12
	black grama	BOER4	<i>Bouteloua eriopoda</i>	16–56	5–15
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	4–9	1–5
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	6–9	0–2
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–2	0–1
3	<b>Native annual grasses</b>			9–13	
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	7–11	3–5
	needle grama	BOAR	<i>Bouteloua aristidoides</i>	0–3	1–4
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	0–2	1–3
4	<b>Non-native annual grasses</b>			0–13	
	red brome	BRRU2	<i>Bromus rubens</i>	4–13	3–8
<b>Forb</b>					
5	<b>Native annual forbs</b>			10–19	
	whitemargin sandmat	CHAL11	<i>Chamaesyce albomarginata</i>	0–13	0–1
	Colorado four o'clock	MIMU	<i>Mirabilis multiflora</i>	0–1	0–1
	bristly fiddleneck	AMTE3	<i>Amsinckia tessellata</i>	0–1	0–1
	slender spiderling	BOTR	<i>Boerhavia triquetra</i>	0–1	0–1
6	<b>Non-native annual forbs</b>			0–6	
	redstem stork's bill	ERCI6	<i>Erodium cicutarium</i>	0–1	0–2
	little hogweed	POOL	<i>Portulaca oleracea</i>	0–1	0–1

## Approval

Sarah Quistberg, 2/25/2025

## 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
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Contact for lead author	
Date	05/02/2013
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. A few rills can be expected on steeper slopes 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 but can be expected in areas recently subjected to summer convection storms, usually on steeper slopes. These are short (<1m) and not connected.  

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare. Occurrence is usually limited to areas of 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 10-15%; surface cover of rock fragments up to 75%; shrub canopy to 15%; foliar cover of perennial herbaceous plants  $\pm$  10%.  

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

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

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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 large rainfall events.  

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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):** Soil stability values should be 3 to 6 on most soil textures found on this site. (To be field tested.)  

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically moderately thick to weak thin platy. Soil surface colors are pale brown to very dark brown when moist. Organic matter of the surface 2 to 4 inches is typically less than 1 percent dropping off quickly below. Organic matter content can be more or less depending on micro-topography.  

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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.

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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):** Compacted layers are none. Subsoil paralithic horizons or duripans are not to be interpreted as compacted.
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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: Mojave Desert shrubs

Sub-dominant: Warm-season, perennial bunchgrasses > cool-season, perennial bunchgrasses > perennial forbs > annual grasses = 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; some of the mature bunchgrasses (<10%) have dead centers.
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14. **Average percent litter cover (%) and depth ( in):** 25 to 30 percent, under canopy and interspaces <1/4 inch in depth
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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  $\pm$  250 lbs/ac. Favorable years  $\pm$ 400 lbs/ac and unfavorable years  $\pm$ 150 lbs/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, redstem filaree, annual mustards and Mediterranean grass.
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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season year. Little growth or reproduction occurs during extreme or extended drought periods.
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