

# Ecological site R018XC102CA

## Steep Thermic Clayey Shallow

Last updated: 4/24/2024  
Accessed: 05/05/2024

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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): 018X–Sierra Nevada Foothills

Major Land Resource Area (MLRA) 18, Sierra Nevada Foothills is located entirely in California and runs north to south adjacent to and down-slope of the west side of the Sierra Nevada Mountains (MLRA 22A). MLRA 18 includes rolling to steep dissected hills and low mountains, with several very steep river valleys. Climate is distinctively Mediterranean (xeric soil moisture regime) with hot, dry summers, and relatively cool, wet winters. Most of the precipitation comes as rain; average annual precipitation ranges from 15 to 55 inches in most of the area (precipitation generally increases with elevation and from south to north). Soil temperature regime is thermic; mean annual air temperature generally ranges between 52 and 64 degrees F. Geology is rather complex in this region; there were several volcanic flow and ashfall events, as well as tectonic uplift, during the past 25 million years that contributed to the current landscape.

### LRU notes

LRU 18XC is located on moderate to steep mountains and hills in the Sierra Nevada Foothills east of Fresno, CA. The major differences between the southern and northern foothills are the dryer climate (12 to 37 inches of annual precipitation), greater summer/winter temperature variation, and steeper topography of the southern foothills. The geology of this region is predominately granitoid. The elevation ranges between 300 and 4100 feet above sea level. Warmer temperatures and lower precipitation (than at higher latitudes) allow for blue oak grasslands to exist at higher elevations. The soil temperature regime is primarily thermic, however some mesic soils are found at higher elevations of 18XC. At these upper elevations, the break in soil temperature regime (between thermic and mesic) is highly aspect dependent. Southern and western aspects at the steep, high elevations promote chamise-yucca plant assemblages. Buckeye is common in the concave positions. Riparian trees that are generally absent from the northern LRU's include California Sycamore (*Plantanus racemosa*) and lemon scented gum (*Eucalyptus citriodora*).

### Classification relationships

#### CLASSIFICATION RELATIONSHIPS

This site is located within M261F, the Sierra Nevada Foothills Section, (McNab et al., 2007) of the National Hierarchical Framework of Ecological Units (Cleland et al., 1997), M261Fc, the Lower Granitic Foothills and M261Fd, Southern Granitic Foothills Subsections.

Level III and Level IV ecoregions systems (Omernik, 1987, and EPA, 2011) are: Level III, Central California Foothills and Coastal Mountains and Level IV, Ecoregion 6c, Southern Sierran Foothills.

### Ecological site concept

This site is characterized by moderately deep, fine-textured soils occurring on steep to very steep foothills typically formed on residuum weathered from gabbro. Slopes typically range from 17 to 60%. Precipitation typically ranges

from 18 to 27 inches per year, and elevation ranges from 700 to 2300 feet.

The overriding abiotic factors controlling vegetation expression on this site are high clay percent (40% or more) and the smectitic mineralogy which leads to shrink-swell properties. These factors, coupled with steep, water shedding positions prevent the establishment of woody vegetation and severely impact productivity of range plants. Infiltration of water is limited; roots may not be able to exploit the entire profile depth due to seasonal cracking during drying cycles. These are also highly erodible landscapes. The main soil component is Cibo. Cibo soils are moderately deep, well drained soils and classified as fine, smectitic, thermic Aridic Haploxererts.

This vegetation community consists of annual grasses and forbs. Dominant plants include soft brome (*Bromus hordeaceus*), wild oat (*Avena fatua*), fillaree (*Erodium* spp.), bur clover, (*Medicago hispida*), ripgut brome (*Bromus diandrus*), fescue (*Festuca* spp.), and red brome (*Bromus rubens*).

### Associated sites

R018XE047CA	<b>CLAYEY 12-16"</b> This site commonly occurs nearby.
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### Similar sites

R018XC103CA	<b>Lithic Thermic Foothills</b> Site relationships being developed.
R018XC101CA	<b>Thermic Clayey Terraces and Hills</b> Site relationships being developed.

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Bromus hordeaceus</i> (2) <i>Avena fatua</i>

### Physiographic features

This site occurs on elevations typically ranging from 700 to 2300 feet on slopes typically ranging from 17 to 60%.

**Table 2. Representative physiographic features**

Slope shape across	(1) Convex
Slope shape up-down	(1) Convex
Landforms	(1) Foothills > Hill
Runoff class	Medium
Flooding frequency	None
Ponding frequency	None
Elevation	213–701 m
Slope	17–60%
Aspect	W, NW, N

**Table 3. Representative physiographic features (actual ranges)**

Runoff class	Medium
Flooding frequency	None
Ponding frequency	None

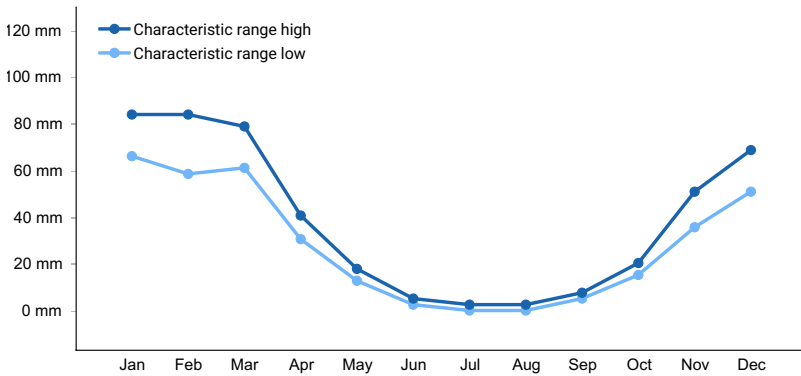
Elevation	15–1,402 m
Slope	3–70%

## Climatic features

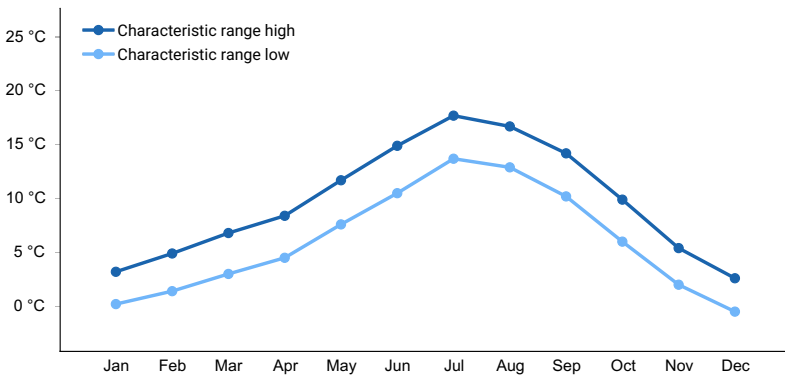
This ecological site is characterized by hot, dry summers and cool, wet winters, a typical Mediterranean climate. Mean annual precipitation ranges from 13 to 18 inches and usually falls from October to May. Mean annual temperature ranges from 61 to 64 degrees F with 139 to 206 frost free days.

**Table 4. Representative climatic features**

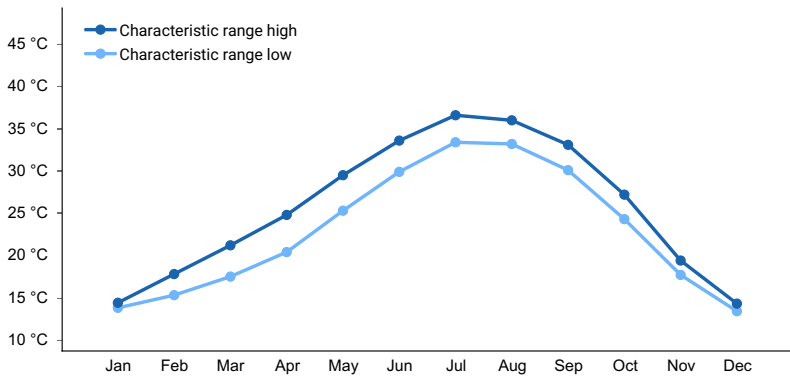
Frost-free period (characteristic range)	139-206 days
Freeze-free period (characteristic range)	248-365 days
Precipitation total (characteristic range)	330-457 mm
Frost-free period (actual range)	113-214 days
Freeze-free period (actual range)	190-365 days
Precipitation total (actual range)	330-508 mm
Frost-free period (average)	170 days
Freeze-free period (average)	300 days
Precipitation total (average)	406 mm



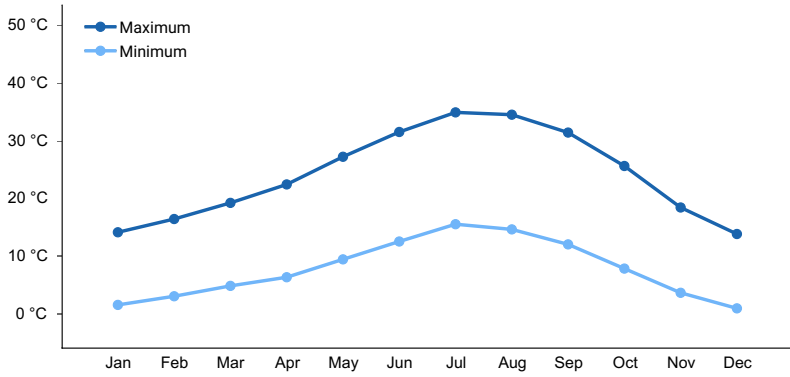
**Figure 1. Monthly precipitation range**



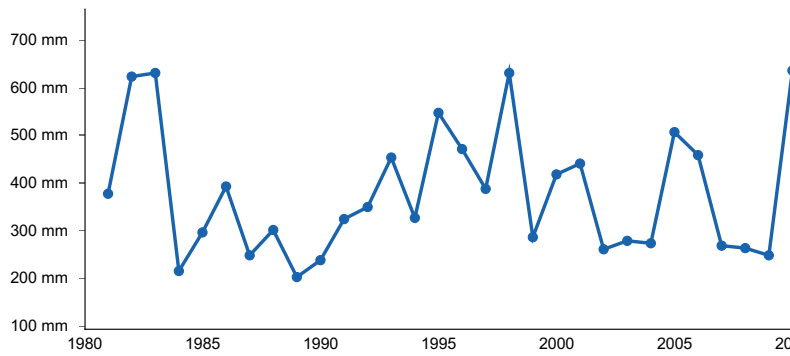
**Figure 2. Monthly minimum temperature range**



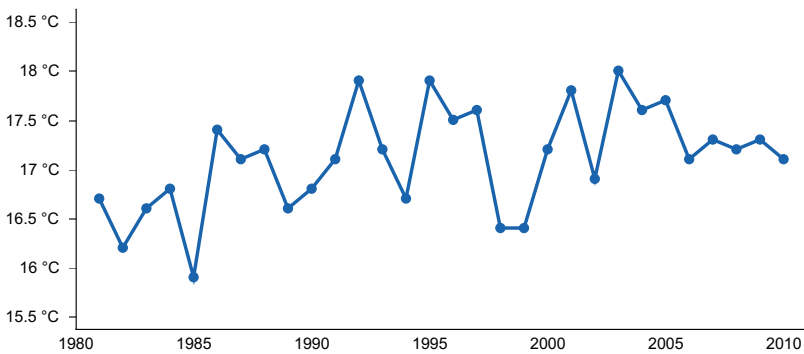
**Figure 3. Monthly maximum temperature range**



**Figure 4. Monthly average minimum and maximum temperature**



**Figure 5. Annual precipitation pattern**



**Figure 6. Annual average temperature pattern**

### Climate stations used

- (1) LEMON COVE [USC00044890], Woodlake, CA
- (2) LINDSAY [USC00044957], Lindsay, CA
- (3) GLENNVILLE [USC00043463], Glennville, CA

## Influencing water features

Due to the topographic position, this site does not have water features.

## Wetland description

N/A

## Soil features

The soils in this ecological site are formed from residuum of basic granitoid rock. The typical depth is moderately deep, and the particle size control section is fine. Surface texture is clay and the bedrock is a restrictive layer found between 20 and 35 inches of depth. Gravels (< 3 inch diameter) cover up to 28% of the soil surface, while larger fragments (= 3 inch diameter) only cover up to 5% percent of the surface. Subsurface gravels make up between 0 to 20% of the soil volume while larger fragments are 0 to 5% profile volume. The soils in this ecological site are well drained and the permeability class is moderately slow. The Available Water Capacity (AWC) is 3.4 to 5.2 inches and the pH of the top 10 inches of the soil ranges from 7 to 7.5 while in the subsoil the range is from 7.1 to 7.5.

The most common soil correlated to this ecological site is Cibo, a fine, smectitic, thermic Aridic Haploxerert.

**Table 5. Representative soil features**

Parent material	(1) Residuum–igneous rock (2) Residuum–gabbro
Surface texture	(1) Clay
Family particle size	(1) Fine
Drainage class	Well drained
Permeability class	Moderately slow
Depth to restrictive layer	58–89 cm
Soil depth	58–89 cm
Surface fragment cover <=3"	6–28%
Surface fragment cover >3"	4–5%
Available water capacity (0-101.6cm)	8.64–13.21 cm
Soil reaction (1:1 water) (0-25.4cm)	7–7.5
Subsurface fragment volume <=3" (0-152.4cm)	1–19%
Subsurface fragment volume >3" (0-152.4cm)	0–5%

**Table 6. Representative soil features (actual values)**

Drainage class	Well drained
Permeability class	Moderately slow
Depth to restrictive layer	51–127 cm
Soil depth	51–127 cm
Surface fragment cover <=3"	0–28%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	8.13–14.48 cm

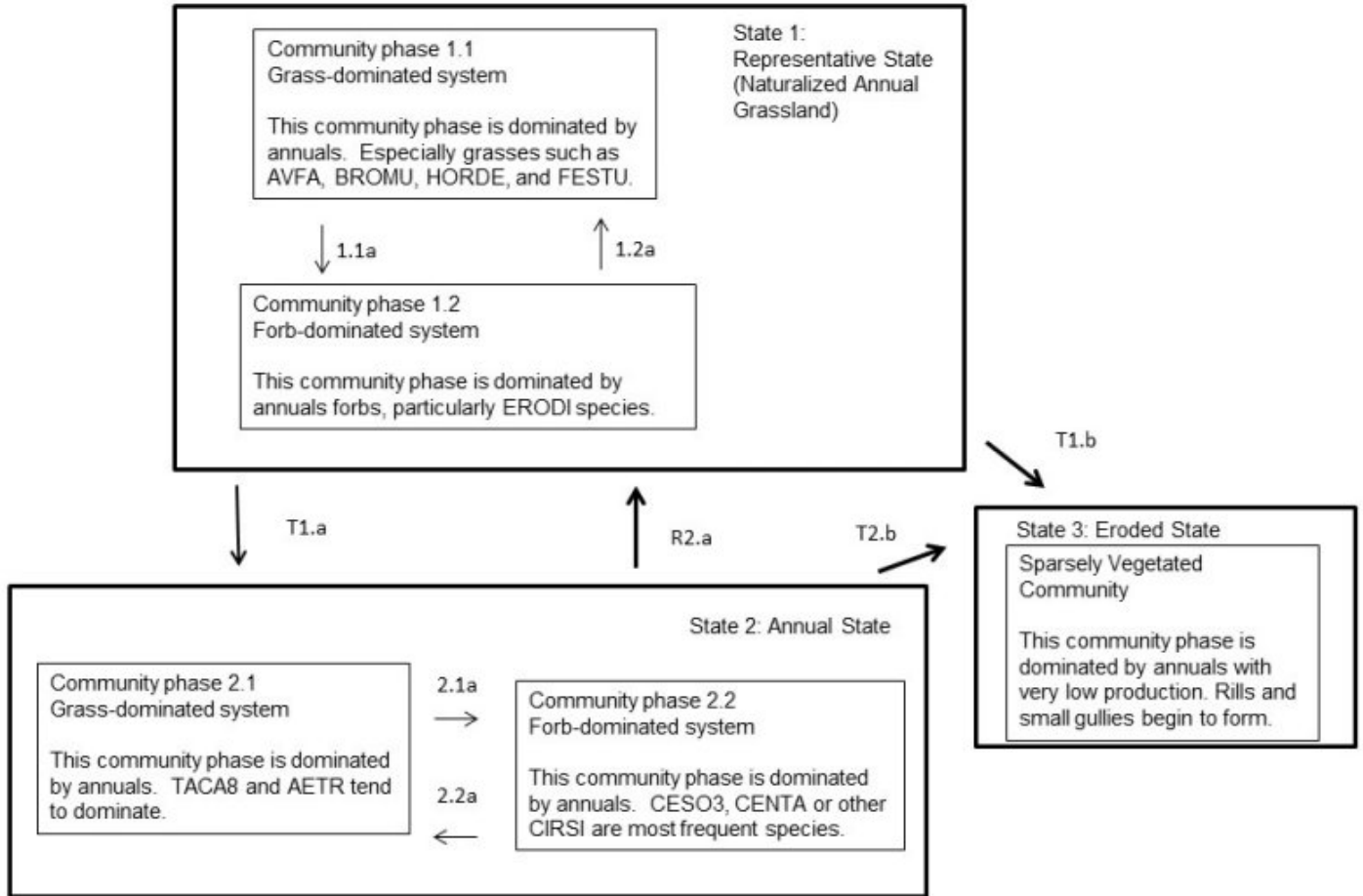
Soil reaction (1:1 water) (0-25.4cm)	6.1–8.4
Subsurface fragment volume <=3" (0-152.4cm)	0–33%
Subsurface fragment volume >3" (0-152.4cm)	0–10%

## Ecological dynamics

### State and transition model

STM: R018XC102CA

Steep Thermic Clayey Shallow



## Community pathways and Transitions

T1.a This transition occurs after invasive plants causing negative affects to society become established.

1.1a This community pathway occurs as forbs become more dominant, often following low winter precipitation and reduced litter layers.

1.2a This community pathway occurs as grasses become more dominant, often in response to higher litter levels.

T2.a This transition occurs after removal of vegetation in conjunction with heavy precipitation.

R2.a This restoration pathway occurs with integrated weed management.

2.1a This community pathway occurs as forbs become more dominant, often following low winter precipitation and reduced litter layers.

2.2a This community pathway occurs as grasses become more dominant, often in response to higher litter levels.

T3.a This transition occurs after removal of vegetation in conjunction with heavy precipitation.

## State 1

### Representative State (Naturalized Annual Grassland)

#### Community 1.1

##### Grass-dominated system



This community phase is dominated by annuals. Especially grasses such as AVFA, BROMU, HORDE, and FESTU

#### Community 1.2

##### Forb-dominated system



This community phase is dominated by annuals forbs, particularly ERODI species

### Pathway 1.1a Community 1.1 to 1.2



Grass-dominated system



Forb-dominated system

This community pathway occurs as forbs become more dominant, often following low winter precipitation and reduced litter layers.

### Pathway 1.2a Community 1.2 to 1.1



Forb-dominated system



Grass-dominated system

This community pathway occurs as grasses become more dominant, often in response to higher litter levels.

## State 2 Annual State

### Community 2.1 Grass-dominated system





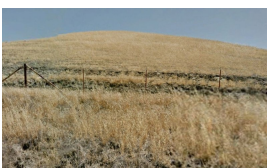
This community phase is dominated by annuals. TACA8 and AETR tend to dominate.

**Community 2.2  
Forb-dominated system**



This community phase is dominated by annuals. CESO3, CENTA or other CIRSI are most frequent species

**Pathway 2.1a  
Community 2.1 to 2.2**



Grass-dominated system



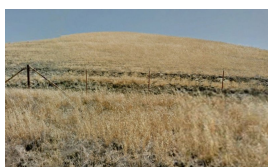
Forb-dominated system

This community pathway occurs as forbs become more dominant, often following low winter precipitation and reduced litter layers.

**Pathway 2.2a  
Community 2.2 to 2.1**



Forb-dominated system



Grass-dominated system

This community pathway occurs as grasses become more dominant, often in response to higher litter levels.

### **State 3 Sparsely Vegetated Community**

#### **Community 3.1 Sparsely Vegetated Community**



This community phase is dominated by annuals with very low production. Rills and small gullies begin to form.

#### **Transition T1.a State 1 to 2**

This transition occurs after invasive plants causing negative affects to society become established.

#### **Transition T State 1 to 3**

#### **Restoration pathway R2.a State 2 to 1**

This restoration pathway occurs with integrated weed management.

#### **Transition T State 2 to 3**

### **Additional community tables**

#### **Inventory data references**

Inventory data to be collected using future projects based on priorities.

### **References**

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### **Other references**

Other References

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## Contributors

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## Approval

Kendra Moseley, 4/24/2024

## 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	05/05/2024
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:**  

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2. **Presence of water flow patterns:**  

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3. **Number and height of erosional pedestals or terracettes:**  

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**  

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5. **Number of gullies and erosion associated with gullies:**  

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6. **Extent of wind scoured, blowouts and/or depositional areas:**  

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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:**

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