



## Ecological Site Description

# UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

## ECOLOGICAL SITE DESCRIPTION

### ECOLOGICAL SITE CHARACTERISTICS

**Site Type:** Rangeland

**Site Name:** Clayey Terrace

// *Bromus* - *Erodium*  
(// brome - stork's bill)

**Site ID:** R015XI010CA

**Major Land Resource Area:** 015 - Central California Coast Range

### Physiographic Features

Within MLRA 15, this ecological site extends across about 160,000 acres along the Coast Range from Yolo County to San Luis Obispo County. It is an upland site occurring on valley terraces at elevations from 20 to 2000 feet. Slope is 0 to 30 percent.

Land Form: (1) Terrace

	<u>Minimum</u>	<u>Maximum</u>
<u>Elevation (feet):</u>	20	2000
<u>Slope (percent):</u>	0	30
<u>Water Table Depth (inches):</u>		
<u>Flooding:</u>		
Frequency:	None	None
Duration:	None	None
<u>Ponding:</u>		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
<u>Runoff Class:</u>	Low	High
<u>Aspect:</u>	No Influence on this site	

## **Climatic Features**

The mean annual temperature for this ecological site is 57 degrees to 62 degrees F. The mean January temperature is about 45 degrees to 48 degrees F. and the mean July temperature about 65 degrees F. The frost-free season is 200 to 300 days.

Most moisture falls as rain from October to May and is produced by winter storms that move into California from the Pacific Ocean in an easterly or southeasterly direction. Monthly precipitation and temperature averages are 1971-2000 means from the PRISM Group, Oregon Climate Service, Oregon State University, Corvallis, Oregon (Daly 2006). Frost free period obtained from map unit descriptions (Soil Data Mart). Mean monthly precipitation is reported in the Maximum precipitation row.

	<u>Minimum</u>					<u>Maximum</u>						
<u>Frost-free period (days):</u>	200					300						
<u>Freeze-free period (days):</u>	0					0						
<u>Mean annual precipitation (inches):</u>	12.0					20.0						
<u>Monthly precipitation (inches) and temperature (°F):</u>												
	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Precip. Min.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Precip. Max.	2.25	2.25	2.25	0.75	0.25	0.25	0.25	0.25	0.25	0.25	1.75	1.75
Temp. Min.	37.0	39.6	42.7	46.2	46.3	50.0	52.7	50.0	43.0	41.0	39.5	35.5
Temp. Max.	62.4	67.4	72.4	75.4	77.9	82.0	86.0	86.0	85.0	79.8	68.9	65.0

Climate Stations:

## **Influencing Water Features**

Intermittent streams feeding into permanent higher order streams drain these sites.

Wetland

<u>Description:</u>	<u>System</u>	<u>Subsystem</u>	<u>Class</u>
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## **Representative Soil Features**

The Rincon series consists of deep, well drained soils that formed in alluvium from sedimentary rocks. Rincon soils are on old alluvial fans of stream and marine terraces, and have slopes of 0 to 30 percent. Throughout its range it has frequently been converted to crop production.

Alameda Area (CA609), California

CA609 Rc Rincon loam, 0 to 3 percent slopes

CA609 RdA Rincon clay loam, 0 to 3 percent slopes

CA609 RdB Rincon clay loam, 3 to 7 percent slopes

Contra Costa County (CA013), California

CA013 RbA Rincon Clay Loam, 0 To 2 Percent Slopes

CA013 RbC Rincon Clay Loam, 2 To 9 Percent Slopes

CA013 RbD Rincon Clay Loam, 9 To 15 Percent Slopes

CA013 RcA Rincon Clay Loam, Wet, 0 To 2 Percent Slopes

Eastern Santa Clara Area (CA646), California

CA646 RaA Rincon clay loam, 0 to 2 percent slopes 610 0.1  
 CA646 RaC2 Rincon clay loam, 2 to 9 percent slopes, eroded 870 0.2

Monterey County (CA053), California

CA053 RaA Rincon clay loam, 0 to 2 percent slopes  
 CA053 RaC Rincon clay loam, 2 to 9 percent slopes  
 CA053 RaD Rincon clay loam, 9 to 15 percent slopes  
 CA053 RaE Rincon clay loam, 15 to 30 percent slopes  
 Napa County (CA055), California

CA055 RoAso Rincon clay loam, 0 to 2 percent slope  
 CA055 RoCso Rincon clay loam, 2 to 9 percent slopes

San Benito County (CA069), California

CA069 RnA Rincon loam, 0 to 2 percent slopes  
 CA069 RnC Rincon loam, 2 to 9 percent slopes  
 CA069 RnD2 Rincon loam, 9 to 15 percent slopes, eroded  
 CA069 RsA Rincon silty clay loam, 0 to 2 percent slopes  
 CA069 RsC Rincon silty clay loam, 2 to 9 percent slopes  
 CA069 RsD2 Rincon silty clay loam, 9 to 15 percent slopes, eroded

San Luis Obispo County (CA665), California, Paso Robles Area

CA665 187 Rincon clay loam, 0 to 2 percent slopes  
 CA665 188 Rincon clay loam, 2 to 9 percent slopes  
 CA665 189 Rincon clay loam, 9 to 15 percent slopes

Solano County (CA095), California

CA095 RnC Rincon loam, 2 to 9 percent slopes  
 CA095 RoA Rincon clay loam, 0 to 2 percent slope  
 CA095 RoC Rincon clay loam, 2 to 9 percent slopes

Yolo County (CA113), California

CA113 Rg Rincon silty clay loam

Predominant Parent Materials:

Kind: Residuum

Origin: Sandstone and shale

Surface Texture:

Subsurface Texture Group:

Minimum

Maximum

Surface Fragments <=3" (% Cover):

Surface Fragments > 3" (% Cover):

Subsurface Fragments <=3" (% Volume):

Subsurface Fragments > 3" (% Volume):

Drainage Class: Well drained To Well drained

Permeability Class: Slow To Slow

Minimum

Maximum

<u>Depth (inches):</u>	49	60
<u>Electrical Conductivity (mmhos/cm):</u>		
<u>Sodium Absorption Ratio:</u>		
<u>Calcium Carbonate Equivalent (percent):</u>		
<u>Soil Reaction (1:1 Water):</u>		
<u>Soil Reaction (0.01M CaCl<sub>2</sub>):</u>		
<u>Available Water Capacity (inches):</u>	10.2	10.2

## **Plant Communities**

### **Ecological Dynamics of the Site**

This grassland site is dominated by annual grasses and forbs of European origin. Annual grasses include wild oats (*Avena* spp), soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), and foxtail fescue (*Vulpia myuros*). Common forbs include filaree, true clovers, and bur clover. Shallow soils are often dominated by filaree or other low growing forbs. Deep soils with higher water holding capacity are often dominated by wild oats and other tall annual grasses. Blue oaks (*Quercus douglasii*) may occur along drainage channels providing less than 5 percent canopy cover on the site.

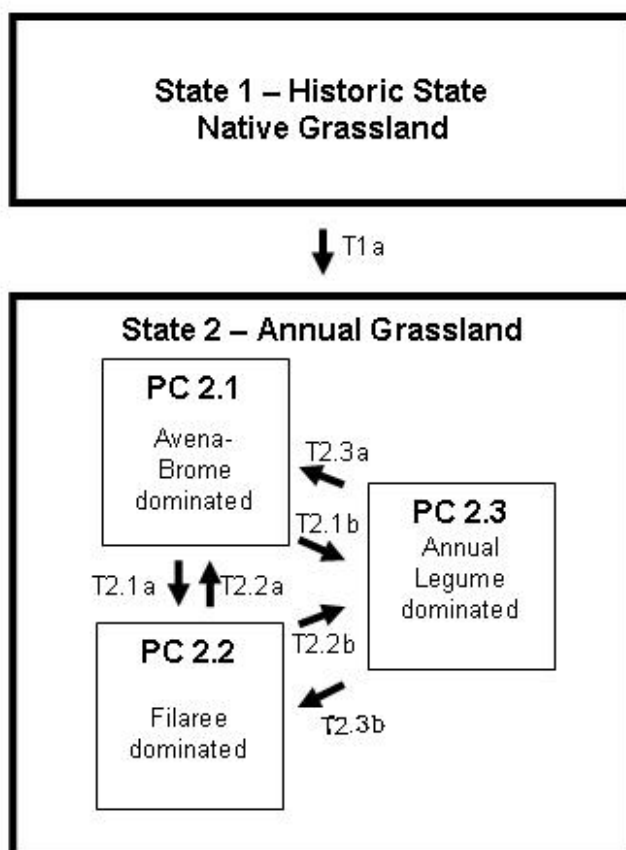
As germination, seedling establishment and plant growth progress during the growing season, species composition changes depending primarily on the timing and amount of precipitation and temperature (George et al. 2001a). Consequently, grassland species composition varies seasonally and annually. Unlike many perennial dominated grasslands, kinds and amounts (weight or cover) of herbaceous species are not stable and annually predictable. Therefore, exact percentages by weight or ground cover are not reported for this ecological site as is done in more stable perennial dominated ecosystems. Instead several species are listed, several of which can be expected to dominate the composition in some years and be present in most years.

Species composition and productivity of the annual grasslands vary greatly within and between years and is greatly influenced by the timing and amount of precipitation and the amount of residual dry matter (George et al. 2001a). Grass dominated years occur when rainfall is well-distributed or greater than normal. Filaree years occur in low rainfall years or when residual dry matter (Bartolome et al. 2002) is low. Drought, heavy grazing and fire may result in a filaree dominated grassland. Following a fire filaree may dominate the site for up to three years (Parsons and Stohlgren 1989, McDougald et al 1991).

### **Total Annual Production and Growth Curve**

Forage production and species composition is largely controlled by four factors: precipitation, temperature, soil characteristics and plant residue (George et al. 2001a). Precipitation and temperature control the timing and characteristics of four distinct phases of forage growth: break of season (germination and onset of growth), winter growth, rapid spring growth, and peak forage production. March and April are usually the months when 50 to 75 percent of the annual production occurs. The cold months of December and January often produce only 0 to 5 percent of the annual production. During cold weather seasonal and annual variation in production during each of these seasons contributes to the variable total annual production in the annual dominated understory and open grass patches.

Production curves are examples of monthly forage production for normal (3000 lb/a), favorable (4500 lb/a), and unfavorable (2000 lb/a) years. Annual plant growth begins with germination following the first fall rains (George et al. 2001a). Germination commonly begins within 1 week of receiving 0.5 to 1.0 inch of rainfall. This normally occurs late in October or early November. Temperatures commonly turn cold in mid-November. The longer the period between germination and the onset of cold temperatures the greater is fall herbage production. Early rains followed by an extended dry period can result in loss of most of the initial wave of germination. This is known as a "false break" and will be followed by a second germination wave when adequate rainfall resumes. The onset of rapid spring growth coincides with warming spring temperatures commonly in mid-February. The rapid spring growth period continues until soil moisture is depleted following the end of the rainy season. The longer the period from mid-February to soil moisture depletion, the greater is spring production.

**State 1: Historic State**

State 1: The assumed historic state is a native grassland composed of native annual and perennial grasses and forbs. In State 1, fire was more frequent and was not suppressed as is commonly the case in State 2. While remnant native grasses and forbs may be found on this site the historic species composition and productivity are unknown.

#### Transitions :

T1a (State 1 to State 2): Invasion by exotic annual species, yearlong continuous grazing, drought, fire suppression and cultivation reduced or destroyed the native perennial grass and forb component of the assumed historic plant community (Burcham 1957, Bartolome 1987, Baker 1989). Apparently this is an irreversible transition in a time frame relevant to management. Restoration of native perennial herbaceous vegetation is a recurring management objective that has been largely unsuccessful. Researchers, managers and citizens groups have been unsuccessful at reversing the loss of native perennial grasses. Competition from invasive annuals and long dry summers apparently are insurmountable. Annual grasses and forbs are more competitive for soil moisture than native perennials reducing oak seedling survival (Gordon et al. 1989, Corbin and D'Antonio 2004).

#### **State 2: Annual Grassland**

State 2: Annual grassland with species composition fluctuating in response to weather, grazing, fire and fertility. Plant community 2.1 (PC 2.1) is dominated by wild oats (*Avena* spp), soft brome (*Bromus hordeaceus*) and ripgut brome (*B. diandrus*). Plant community 2.2 (PC 2.2) is dominated by filaree (*Erodium* spp) or other decumbent species. Plant community 2.3 (PC 2.3) is dominated by bur clover (*Medicago polymorpha*) or other annual legumes.

T2.1a (PC 2.1 to 2.2): Filaree increases in response to low litter levels. Litter levels reduced by poor growing conditions, fire or heavy grazing. Long periods of inadequate rainfall within the growing season reduce grasses.

T2.2a (PC 2.2 to 2.1): Annual grasses increase in filaree patches. Light to moderate grazing increases litter. Mulching effect of litter favors annual grass seedlings. Annual grasses shade filaree and other forb seedlings. Nitrogen fertilization favors increase in grasses.

T2.1b and 2.2b (PC 2.1 or PC 2.2 to 2.3): Annual legume seeding. Sulfur and/or phosphorus fertilization are required to maintain productive annual legume stands. Close grazing helps to maintain legume composition.

T2.3a (PC 2.3 to PC 2.1): Grasses increase with improved soil fertility and light grazing

T2.3b (PC 2.3 to PC 2.2): With loss of fertility and close grazing annual legumes are replaced by filaree.



## Clayey Terrace Ecological Site

### State 2: Annual Grassland Plant Species Composition:

#### Grass/Grasslike

<u>Group</u>	<u>Group Name</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Annual Production in Pounds Per Acre</u>	
				<u>Low</u>	<u>High</u>
8 - Non-native cool season annual grass				0	0
		wild oat	<i>Avena fatua</i>	0	0
		ripgut grass	<i>Bromus diandrus</i>	0	0
		soft brome	<i>Bromus hordeaceus</i>	0	0
		barley	<i>Hordeum</i>	0	0
		rat-tail fescue	<i>Vulpia myuros</i>	0	0

#### Forb

<u>Group</u>	<u>Group Name</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Annual Production in Pounds Per Acre</u>	
				<u>Low</u>	<u>High</u>
12 - Native annual forb				0	0
		fiddleneck	<i>Amsinckia</i>	0	0
		Indian paintbrush	<i>Castilleja</i>	0	0
			<i>Lotus purshianus (Syn)</i>	0	0
14 - Non-native annual forb				0	0
		thistle	<i>Cirsium</i>	0	0
		stork's bill	<i>Erodium</i>	0	0
		burclover	<i>Medicago polymorpha</i>	0	0
		clover	<i>Trifolium</i>	0	0

### Annual Production by Plant Type:

<u>Plant Type</u>	<u>Annual Production (lbs/AC)</u>		
	<u>Low</u>	<u>Representative Value</u>	<u>High</u>
Forb	400	600	900

Grass/Grasslike	1600	2400	3600
Total:	2000	3000	4500

**Structure and Cover:****Ground Cover (%)**

Vegetative Cover						Non-Vegetative Cover					
Grass/ Grasslike	Forb	Shrub/ Vine	Tree	Non- Vascular Plants	Biological Crust	Litter	Surface Fragments ≥ 1/4 & ≤ 3"	Surface Fragments ≥ 3"	Bedrock	Water	Bare Ground
80 to 100	0 to 20					0 to 100					0 to 20

**Structure of Canopy Cover (%)**

	Grasses/Grasslike	Forbs	Shrubs/Vines	Trees
≤ 0.5 feet	0 to 0	0 to 20		
≥ 0.5 - < 1 feet	80 to 100	0 to 0		

**Plant Growth Curve:****Growth Curve Number:** CA1501**Growth Curve Name:** Annual rangeland (Normal Production Year)**Growth Curve Description:** Growth curve for a normal (average) production year resulting from the production year starting in November and extending into early May. Growth curve is for oak-woodlands and associated annual grasslands.**Percent Production by Month**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	10	25	40	5	0	0	0	0	0	10	10

**Plant Growth Curve:****Growth Curve Number:** CA1502**Growth Curve Name:** Annual rangeland (Favorable Production Year)**Growth Curve Description:** Growth curve for a favorable production year resulting from the production year starting in October and extending through May. Growth curve is for oak-woodlands and associated annual grasslands.**Percent Production by Month**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	10	20	30	25	0	0	0	0	5	5	5

**Plant Growth Curve:****Growth Curve Number:** CA1503**Growth Curve Name:** Annual rangeland (Unfavorable Production Year)**Growth Curve Description:** Growth curve for an unfavorable production year resulting from the production year starting in October and extending through May. Growth curve is for oak-woodlands and associated annual grasslands.**Percent Production by Month**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	15	70	5	0	0	0	0	0	0	5	5

**Ecological Site Interpretations**



## Animal Community:

### Wildlife

Many wildlife species use the annual grasslands for foraging (Mayer and Laudenslayer 1988), but some require special habitat features such as cliffs, caves, ponds, or habitats with woody plants for breeding, resting, and escape cover. Characteristic reptiles that breed in annual grassland habitats include the western fence lizard (*Sceloporus occidentalis*), common garter snake (*Thamnophis sirtalis*), and western rattlesnake (*Crotalus viridis*) (Basey and Sinclear 1980). Mammals typically found in this habitat include the black-tailed jackrabbit (*Lepus californicus*), California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), western harvest mouse (*Reithrodontomys megalotis*), California vole (*Microtus californicus*), badger (*Taxidea taxus*), and coyote (*Canis latrans*) (White et al. 1980). Common birds known to breed in annual grasslands include the burrowing owl (*Althene cucularia*), short-eared owl (*Asio flammeus*), horned lark (*Eremophila alpestris*), and western meadowlark (*Sturnella neglecta*) (Verner et al. 1980). This habitat also provides important foraging habitat for the turkey vulture (*Cathartes aura*), and the American kestrel (*Falco sparverius*).

### Grazing and Browsing

The annual grasslands are used by domestic livestock and wildlife throughout the year. Currently and historically use has been primarily by cow-calf operations but stocker cattle are also grass fed on these plant communities. While sheep use may have been greater in the past it is currently limited. The main problem for livestock production on this site is lack of natural water sources during most of the year.

The plant communities on this site are suitable for grazing by all classes of livestock at any season. However, forage quality declines below the nutritional needs of many kinds and classes of livestock during the 6 to 8 month dry season. Matching the nutrient demands of livestock with the nutrients supplied by range forage is a balancing act for a considerable portion of each year (George et al. 2001b). The quality of range forage varies with plant species, season, location, and range improvement practices. Range forage is optimal for livestock growth and production for only a short period of the year. Early in the growing season, forage may be of high nutrient content, but high water content in the forage may result in rapid passage through the rumen and incomplete nutrient extraction.

## Plant Preference by Animal Kind:

### Hydrology Functions:

The watersheds associated with these sites are drained by intermittent streams that only flow during the wet season. In dry years these intermittent streams may not flow at all. Runoff on these soils is low to rapid and soil erosion hazard is high.

### Recreational Uses:

Bird watching, hunting, camping, horseback riding, all terrain vehicle riding, and hiking in spring and near developed reservoirs are common recreational pursuits

### Wood Products:

N/A

### Other Products:

The Rincon soil series has frequently been converted to crop production.

### Other Information:

### Native Grass Restoration:

Native perennial grasses may occur on this ecological site in very small amounts. There is no known practice or

group of practices that can successfully restore native grasses on this ecological site.

#### Annual Legumes and Annual Grasses:

Where slopes are not steep this site is a good candidate for annual legume or annual grass seedings. Annual clovers and medics have been successfully grown on this ecological site but stand maintenance requires adequate sulfur and/or phosphorus fertilizer and close grazing.

#### Poisonous/Non-native Plants

##### Poisonous Plants:

There are potentially several poisonous plants on this ecological site. Pyrrolizidine alkaloids in fiddleneck (*Amsinckia* spp.) can cause liver damage in livestock. Acorns and oak leaves taken in excess may be toxic. Livestock poisoning is a result of hungry animals being concentrated on toxic plants.

##### Invasive Species:

The understory and open grassland vegetation on this site is dominated by non-native annuals that invaded during the colonization of California. The species composition of the pre-colonization community is unknown. Medusahead (*Taeniatherum caput-medusae*), Italian thistle (*Carduus pycnocephalus*) and yellow starthistle (*Centaurea solstitialis*) and other thistles (*Cirsium*) may invade this ecological site.

## **Supporting Information**

#### Associated Sites:

<u>Site Name</u>	<u>Site ID</u>	<u>Site Narrative</u>
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#### Similar Sites:

<u>Site Name</u>	<u>Site ID</u>	<u>Site Narrative</u>
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#### State Correlation:

This site has been correlated with the following states:  
CA

#### Inventory Data References:

The following University of California Cooperative Extension transects were used to describe this ecological site:

DMtisdale1 36.09.43.238 121.01.18.026  
MGjpeaslee2 36.9.29.31 121.01.16.82  
MGjpeaslee3 36.9.24.48 121.01.15.1

#### Type Locality:

##### Relationship to Other Established Classifications:

Annual Grassland habitat has been described as Valley Grassland (Munz and Keck 1959, Heady 1977), Valley and Foothill Grassland (Cheatham and Haller 1975), California Prairie (Küchler 1977), Annual Grasslands Ecosystem (Garrison et al. 1977), Brome grass, Fescue, Needlegrass, and Wild Oats series (Paysen et al. 1980), and Annual Grass-Forb series (Parker and Matyas 1981).

Other References:  
References

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#### Site Description Approval:

<u>Author</u>	<u>Date</u>	<u>Approval</u>	<u>Date</u>
Melvin George, and Danny Marquis	5/14/2004		

## Reference Sheet

**Author(s)/participant(s):**

**Contact for lead author:**

**Date:**            **MLRA:** 015X            **Ecological Site:** Clayey Terrace R015XI010CA    This *must* be verified based on soils and climate (see Ecological Site Description). Current plant community cannot be used to identify the ecological site.

**Composition (indicators 10 and 12) based on:**    Annual Production,    Foliar Cover,    Biomass

**Indicators.** For each indicator, describe the potential for the site. Where possible, (1) use numbers, (2) include expected range of values for above- and below-average years for **each** community and natural disturbance regimes within the reference state, when appropriate and (3) cite data. Continue descriptions on separate sheet.

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

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

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

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

- 
- 5. Number of gullies and erosion associated with gullies:**
- 
- 6. Extent of wind scoured, blowouts and/or depositional areas:**
- 
- 7. Amount of litter movement (describe size and distance expected to travel):**
- 
- 8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**
- 
- 9. Soil surface structure and SOM content (include type and strength of structure, and A-horizon color and thickness):**
- 
- 10. Effect on plant community composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**
- 
- 11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**
- 
- 12. Functional/Structural Groups (list in order of descending dominance by above-ground weight using symbols: >>, >, = to indicate much greater than, greater than, and equal to) with dominants and sub-dominants and "others" on separate lines:**  
Dominant:  
Sub-dominant:  
Other:  
Additional:
- 
- 13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
- 
- 14. Average percent litter cover (%) and depth ( inches):**
- 
- 15. Expected annual production (this is TOTAL above-ground production, not just forage production:**
- 
- 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 indicator, 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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