United States Department of Agriculture
NRCS Natural Resources Conservation Service

Ecological Site Description

UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site Name: Shallow Fine Loamy

Quercus douglasii - Pinus sabiniana / *Ceanothus cuneatus - Adenostoma fasciculatum* / *Bromus - Hordeum*
(blue oak - California foothill pine / buckbrush - chamise / brome - barley)

Site ID: R015XI006CA

Major Land Resource Area: 015 - Central California Coast Range

Physiographic Features

This site is on hilly and mountainous uplands covering more that 50,000 acres in San Luis Obispo and Monterey Counties. Elevation is 180 to 3700 feet. Slope is 5 to 75 percent. These soils formed in material weathered from sandstone and shale.

Land Form: (1) Hill

	Minimum	Maximum
Elevation (feet):	180	3700
Slope (percent):	5	75
Water Table Depth (inches):		
Flooding:		
Frequency:		
Duration:	None	None
Ponding:		
Depth (inches):		
Frequency:		
Duration:	None	None
Runoff Class:	High	Very high
Aspect:	North	

South

Climatic Features

The climate on this site is characterized by mild cool winters with hot dry summers. Mean annual precipitation is 12 to 50 inches. Mean annual temperature is 57 degrees to 63 degrees F; mean January temperature is about 49 degrees F; and mean July temperature is about 77 degrees F. The frost-free season is about 130 to 330 days. Mean monthly precipitation is reported in the maximum precipitation row.

Precipitation and temperature 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).

	Minimum	Maximum
Frost-free period (days):	130	330
Freeze-free period (days):	0	0
Mean annual precipitation (inches):	12.0	50.0

Monthly precipitation (inches) and temperature (°F):

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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.	2.75	2.75	2.75	1.25	0.25	0.25	0.25	0.25	0.25	0.75	2.25	2.25
Temp. Min.	36.9	38.1	40.5	42.2	48.1	55.4	60.9	60.6	56.2	48.9	39.1	34.8
Temp. Max.	61.3	63.2	66.6	72.9	79.2	87.3	93.9	93.7	88.4	80.5	66.2	61.6

Climate Stations:

Influencing Water Features

Intermittent streams drain these sites.

Wetland Description: System Subsystem Class

Representative Soil Features

The soils in this ecological site are shallow, well drained soils that formed in material weathered from sandstone, mudstone and shale. Soil available water holding capacity ranges from 0.17 to 0.21 in/in.

CA665 168 Millsholm-Ayar complex
CA665 169, 170 Millsholm-Dibble
CA665 171 Millsholm-Montara complex
CA665 172 Millsholm-Rock outcrop complex
CA667 531 Saltos-Millsholm complex
CA053 MhG Millsholm shallow loam
CA053 Mk Millsholm – Alo complex
CA053 Mm Millsholm - Gazos
CA113 MrG2 Millsholm

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:

Permeability Class:

	Minimum	Maximum
Depth (inches):	30	36
Electrical Conductivity (mmhos/cm):		
Sodium Absorption Ratio:		
Calcium Carbonate Equivalent (percent):		
Soil Reaction (1:1 Water):		
Soil Reaction (0.01M CaCl2):		
Available Water Capacity (inches):	3.2	3.2

Plant Communities

Ecological Dynamics of the Site

Before European settlement, the historic plant community is assumed to have been a blue oak (Quercus douglasii) savanna, that was often in a mosaic with grassland and chaparral on the same soils. The understory of this site was dominated by native annual and perennial grasses and forbs. The reference state for this ecological site is similar to its pre-European state; however, density of shrubs and foothill pine (Pinus sabiniana) may be different due to fire suppression and annual grasses and forbs now dominate the understory.

The reference state for this ecological site is a blue oak savanna mixed in a mosaic with chaparral and grassland patches. The grassland patches are dominated by annual grasses and forbs interspersed in a mosaic with the savanna and chaparral patches. In addition to chamise (Adenostema fasiculatum), wedgeleaf ceanothus (Ceanothus cuneatus), buckwheat (Eriogonom spp.) and other coastal sage scrub species may occur in the shrub patches. Understory species and grassland patches are frequently dominated by soft chess brome (Bromus hordeaceus), ripgut brome (Bromus diandrus), annual fescue (Vulpia myuros), red brome (Bromus madritensis), and filaree (Erodium spp).

Competition between the species that germinate or resprout following fire or other disturbances, mediated by weather and soil moisture conditions, greatly influence the vegetation states present in the oak-woodlands. On some soils, geological substrates, and aspects; tree, shrub and grass patches are all possible vegetations states. Shallow soils, coarse and rocky soils and southern aspects sometimes limit vegetation to shrub dominated states. Frequent fire tends to result in vegetation states dominated by an annual grass or oak-annual grass community. Protection from fire and grazing may result in a very slow increase in shrubs and foothill pine contributing to increased fuel loads. Shrub canopy may reach into tree canopy along the edge between chaparral and oak patches increasing the chances of a crown fire. However, oak tree canopy is usually dispersed reducing the potential for crown fires.

Blue oak trees are long-lived species that evolved under low severity understory fires that naturally occur at intervals of about 25 years (McClaran 1986). Many mature blue oaks range from 100 to 200 years old but some blue oaks have been aged at more than 400 years (McClaran 1986). Blue oak is adapted to fire by sprouting

from the root crown but blue oak resprouting may decline with age (Burns and Honkala 1990). Blue oak is a vigorous sprouter in some locations and not in others. Fire top-kills blue oak seedlings and saplings. Foothill pine (Pinus sabiniana) is increasing in blue oak-foothill pine communities due to fire suppression and lack of blue oak regeneration (Borchart et al. 1991).

Shrub invasion into the blue oak savanna is possible but limited. When it occurs the shrub layer on this site may include chamise (Adenostema fasiculatum) which is a resprouting species, but also includes germinating species such as wedgeleaf ceanothus (Ceanothus cuneatus), California sage brush (Artemisia californica) and black sage (Salvia mellifera). California sagebrush is also capable of resprouting following damage to above ground portions of the plant. Frequent burning can remove the germinating species from the site. These species also occur in adjacent shrub patches as part of the tree-shrub-grass mosaic.

The historic herbaceous understory layer of the plant community is not known, having been replaced by annual grasses and forbs of European origin during the colonization of California (Burcham 1957, Bartolome 1987, Baker 1989). The tree and shrub layers remain intact and fire is a normal component of these plant communities that were managed by the Native American population to provide food and fiber (Blackburn and Anderson 1993). Prior to European settlement in the mid-1800s fire frequency was approximately every 25 years (McClaran 1986). Fires were more frequent (5 to 15 years) following settlement before and after the gold rush (Pavlik 1991, Mensing 1992, Stephens 1997). The intentional use of fire by ranchers and others to reduce brush from 1850 to the 1950s contributed to this frequent fire interval. While prescribed burning continues today, foothill subdivision, urbanization and air quality concerns have reduced the use of fire as a management tool. Today fire frequency is more likely to be on the order of 25 to 50 years. Prescribed burning, mechanical and chemical brush control have been used to remove the shrub and tree layers but are infrequently used at the beginning of the 21st century (Murphy and Crampton 1964, Murphy and Berry 1973).

Species composition and productivity of the annual dominated grassland and understory grasses and forbs 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 result in filaree dominated understory. Following a fire filaree may dominate the site for up to three years (Parsons and Stohlgren 1989, McDougald et al 1991).

Oak Woodland Plant Community

This ecological site is a mosaic of blue oak savanna, open grassland and chamise chaparral. In some locations mosaics have been correlated with geological substrate (Cole 1980) and soil characteristics (Harrison et al. 1971). However, other researches have found each of these vegetation types on most soil depths, slopes, aspects and all geological substrates suggesting that disturbance (fire) and/or biological factors (competition, grazing and browsing) are important determinants of the patchy distribution of these vegetation types (Wells 1962, Callaway and Davis 1993) at a scale smaller than an ecological site or even a soil mapping unit (see photo above).

The understory and open grassland patches are dominated by annual grasses and forbs of European origin. As germination, seedling establishment and plant growth progress during the growing season, species composition changes depending primarily on residue levels and the timing and amount of precipitation and temperature (George et al. 2001a). Consequently, understory and open 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 in this ESD as is done in 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.

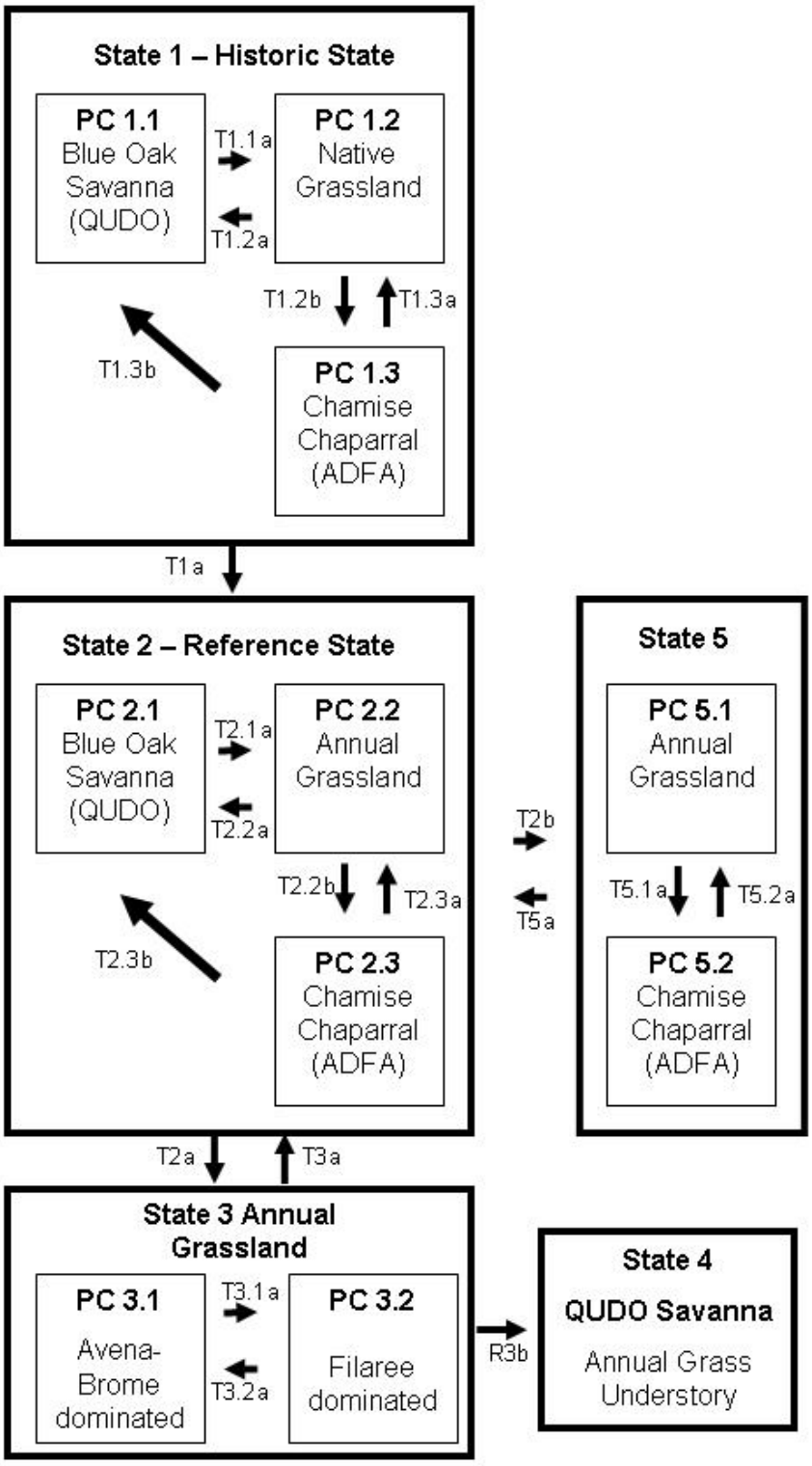
The tree layer is dominated by blue oak (Quercus douglasii), with some foothill pine (Pinus sabiniana). The shrub layer is dominated by chamise (Adenostema fasiculatum) but may also include buckwheat (Eriogonum spp), black sage (Salvia mellifera), and wedgeleaf ceanothus (Ceanothus cuneatus), and California sage brush

(Artemisia californica). The understory is dominated by annual grasses and forbs of European origin. Patches on shallow soils are often dominated by filaree or other low growing forbs. Native perennial grasses may be present.

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. This ecological site supports oak-woodland, chaparral and grassland vegetation patches. Forage production decreases as the canopy cover of trees and shrubs increases above 25 percent.

Production curves are provided as examples of monthly forage production for normal (1800 lb/a), favorable (1400 lb/a), and unfavorable (1000 lb/a) years. Annual plant growth begins with germination following the first fall rains (George et al. 2001). 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.



Shallow Fine Loamy State and Transition Model

State 1: Historic State

State 1: The assumed historic state is a mosaic of blue oak savanna, annual grassland and chamise chaparral similar to that in State 2. There is a tendency for the oak savanna to occur on north facing slopes, grassland on south fancing slopes and chaparral on steep, rocky slopes. State 1 assumes that native annual and perennial grasses and forbs were common in the tree and shrub understory and the open grassland patches but there is no record of the species composition. In State 1, fire was more frequent and was not suppressed as is commonly the case in State 2. Under a more frequent fire regime, the chaparral community canopy cover may have been reduced compared to State 2. Additionally, foothill pine was probably less prevalent in State 1.

Transitions :

Protection from fire and grazing tends to support transition from grassland to shrubland or woodland. Grazing tends to slow these transitions. Fire tends to eliminate or mask vegetation patterns associated with topography.

T1.1a - similar to T2.1a with a native grass and forb understory and grassland.

T1.2a – similar to T2.2a with a native grass and forb understory and grassland.

T1.2b – similar to T2.2b with a native grass and forb understory and grassland.

T1.3a – similar to T2.3a with a native grass and forb understory and grassland.

T1.3b – similar to T2.3b with a native grass and forb understory and grassland.

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: Reference State - Plant Communities 2.1, 2.2 & 2.3

State 2: The reference state is a mosaic of blue oak savanna, annual grassland and chamise chaparral. There is a tendency for the oak savanna to occur on north facing slopes, grassland on south fancing slopes and chaparral on steep, rocky slopes. Fire suppression has resulted in longer intervals between fires resulting in fewer ground fires and more intense crown fires. Natural fires in State 1 would have been ignited by lightening, whereas anthropogenic fires were ignited most commonly by Native Americans. Fire in State 2 is often man-caused, but can be started by lightening as well, however the timing and frequency of the fire has probably changed from State 1 to State 2.

Plant community 2.1 (PC 2.1): Oak woodlands are dominated by blue oak (Quercus douglasii) with an annual grass understory.

Plant community 2.2 (PC 2.2): Annual grasslands are often dominated by soft chess brome (Bromus hordeaceus), and ripgut brome (B. diandrus), red brome (B. rubens) and annual fescue (Vulpia myuros).

Plant community 2.3 (PC 2.3): Chaparral communities dominated by chamise (Adenostema fasciculatum) but also including ceanothus (Ceanothus spp.), black sage (Salvia mellifera) and California sagebrush (Artemisia californica).

Transitions :

Protection from fire and grazing tends to support transition from grassland to shrubland or woodland. Grazing tends to slow these transitions. Fire tends to eliminate or mask vegetation patterns associated with topography.

T2.1a (PC 2.1 to State PC 2.2): Grazing, catastrophic fire and poor oak regeneration may result in conversion of oak-woodland to annual grassland. Mature stands of blue oaks may have a reduced capacity to resprout. Where oaks are not naturally regenerating and blue oak stands are mature, conversion to grassland could occur as blue oaks die. Catastrophic fire in a mature blue oak stand that lacks the capacity to regenerate could result in rapid conversion to annual grassland. Firewood cutting and woody plant control for range improvement can also contribute to this transition. Oak removal on steep unstable slopes often leads to erosion and mass wasting during high rainfall years. Removal of trees leads to loss of soil fertility.

T2.2a (PC 2.2 to State PC 2.1): Annual grasslands are rarely converted directly to oak-woodland by natural processes (Callaway and Davis 2993) but can be converted using artificial regeneration practices as described in T16 (McCreary 2001). Transition from grassland to oak-woodland is difficult for several reasons. Lack of shade from overstory trees and shrubs reduces survival of seedlings to the sapling stage. Annual grasses often deplete soil moisture at rapid rates, suppressing oak seedling survival (Gordon 2989).

T2.2b (PC 2.2 to State PC 2.3): Protection from fire and grazing facilitates replacement of grassland by chaparral. This transition is more likely on exposed, south facing slopes than on sheltered topography of north facing slopes.

T2.3a (PC 2.3 to State PC 2.2): Transition of chaparral back to annual grassland is unusual. Fire tends to maintain chaparral community, especially on rocky substrates. Frequent fire and heavy grazing on loamy soils may support this transition. Goats have been used on this site to covert chamise chaparral to grassland.

T2.3b (PC 2.3 to State PC 2.1): On some soils oak-woodlands may eventually replace chaparral with protection from burning and grazing (Callaway and Davis 1993). This transition may take several decades. Shrubs may act as nurse plants for oak seedlings. On excessively drained rocky soils this transition is less likely to occur resulting in a chaparral edaphic climax. This transition is based on theoretical models rather than actual observation.

T2a (State 2 to State 3 - Type conversion from woodland/shrubland to grassland): Use of mechanical and chemical tree and shrub control and prescribed burning remove all trees and shrubs resulting in a conversion from woodland to annual grassland. In some cases this transition may be irreversible without artificial regeneration of native woody species, especially if frequent fires and grazing suppress seedlings of woody species. Seeding and fertilization often accompanied tree and shrub control. At low canopy covers fire or natural mortality could remove woody species and conditions for resprouting or acorn germination and seedling establishment may be unfavorable.

Shallow Fine Loamy Ecological Site

State 2: Reference State - Plant Communities 2.1, 2.2 & 2.3 Plant Species Composition:

Grass/Grasslike

Group	Group Name	Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
8 - Non-native cool season annual grass				0	0
		ripgut grass	*Bromus diandrus*	0	0
		soft brome	*Bromus hordeaceus*	0	0
		red brome	*Bromus rubens*	0	0
			Gastridium ventricosum (Syn)	0	0
		barley	*Hordeum*	0	0
		fescue	*Vulpia*	0	0

Forb

Group	Group Name	Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
12 - Native annual forb				0	0
		plantain	*Plantago*	0	0
14 - Non-native annual forb				0	0
		redstem stork's bill	*Erodium cicutarium*	0	0

Shrub/Vine

Group	Group Name	Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
17 - Native Shrub				0	0
		chamise	*Adenostoma fasciculatum*	0	0
		buckbrush	*Ceanothus cuneatus*	0	0
		buckwheat	*Eriogonum*	0	0

Tree

Group	Group Name	Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
23	Native Coniferous Tree			0	0
		California foothill pine	*Pinus sabiniana*	0	0
24	Native Deciduous Tree			0	0
		blue oak	*Quercus douglasii*	0	0

Annual Production by Plant Type:

Plant Type	Annual Production (lbs/AC) Low	Representative Value	High
Forb	200	280	360
Shrub/Vine	800	1120	1440
Total:	1000	1400	1800

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 70	0 to 60			80 to 100					0 to 20

Structure of Canopy Cover (%)

	Grasses/Grasslike	Forbs	Shrubs/Vines	Trees
<=0.5 feet		0 to 20		
> 0.5 - < 1 feet	80 to 100			
< 1 - >= 2 feet				
> 2 - < 4.5 feet				
< 4.5 - >= 13 feet			0 to 70	
> 13 - < 40 feet				0 to 60

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 exgtending 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

State 3: Annual Grassland

State 3: Annual grassland with species composition fluctuating in response to weather, grazing, fire and fertility. Plant community 3.1 (PC 3.1) is dominated by wild oats (Avena spp), soft brome (Bromus hordeaceus) and ripgut brome (B. diandrus). Plant community 3.2 (PC 3.2) is dominated by filaree (Erodium spp) or other decumbent species.

T3a (State 3 to State 2): Recovery from grassland conversions may take decades or may be irreversible depending on the intensity and type of brush control practices. Repeated fires and grazing help to maintain the grassland. Blue oaks and other woody plants may colonize adjacent open grasslands but seedlings are seldom found more than 30 m from existing tree canopy.

T3.1a (PC 3.1 to 3.2): 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.

T3.2a (PC 3.2 to 3.1): 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.

R3b (State 3 to State 4): Planting, weed control and protection of blue oak seedlings from animal damage can successfully restore blue oaks (McCreary 2001).

State 3: Annual Grassland Plant Species Composition:

Grass/Grasslike

Group	Group Name	Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
8	Non-native cool season annual grass			0	0
		ripgut grass	*Bromus diandrus*	0	0
		soft brome	*Bromus hordeaceus*	0	0
		red brome	*Bromus rubens*	0	0
			Gastridium ventricosum (Syn)	0	0
		barley	*Hordeum*	0	0
		fescue	*Vulpia*	0	0

Forb

Group	Group Name	Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
12	Native annual forb			0	0

	plantain	*Plantago*	0	0
14 - Non-native annual forb			0	0
	redstem stork's bill	*Erodium cicutarium*	0	0

Annual Production by Plant Type:

	Annual Production (lbs/AC)		
Plant Type	Low	Representative Value	High
Forb	200	280	360
Grass/Grasslike	800	1120	1440
Total:	1000	1400	1800

Structure and Cover:

Structure of Canopy Cover (%)

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

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 exgtending 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

State 4: Blue Oak Savanna

State 4: Blue oak savanna. Artificially regenerated oak woodland with an annual grass understory. Allen Class: Blue Oak/Grass or Blue Oak-Understory Blue Oak/Grass.

State 5: Chaparral and Annual Grassland Mosaic

State 5: Chaparral and annual grassland mosaic.

T5.1a (PC 5.1 to State PC 5.2): Protection from fire and grazing facilitates replacement of grassland by chaparral. This transition is more likely on exposed, south facing slopes than on sheltered topography of north facing slopes.

T5.2a (PC 5.2 to State PC 5.1): Transition of chaparral back to annual grassland is unusual. Fire tends to maintain chaparral community, especially on rocky substrates. Frequent fire and heavy grazing on loamy soils may support this transition. Goats have been used on this site to covert chamise chaparral to grassland.

Ecological Site Interpretations

Animal Community:

Wildlife

Of the 632 terrestrial vertebrates (amphibians, reptiles, birds, and mammals) native to California, over 300 species use oak woodlands for food, cover and reproduction, including at lest 120 species of mammals, 147 species of birds and approximately 60 species of amphibians and reptiles (Tietje et al. 2005). Common species on this site include California quail (Callipepla californicus), Beechey ground squirrels (Spermophilus beecheyi), Botta pocket gopher (Thomomys bottae mewa), Blacktailed jackrabbit (Lepus californicus), and mule deer (Odocoileus hemionus). The rich rodent and lagomorph population is an important food source for common predators including: bobcat (Lynx rufus californicus), coyote (Canis latrans) and the Pacific rattlesnake (Crotalus viridis oreganus). The value of this site for food or cover changes seasonally with the vegetation. In habitat planning each plant community and each species needs must be considered individually and collectively.
Wildlife

Deer, rodents and rabbits browses blue oak contributing to poor regeneration. Acorns are eaten by at least a dozen species of songbirds, several upland game birds, rodents, deer, feral and domestic pig, and all other classes of livestock (Adams et al. 1992, Duncan and Clawson 1980, Sampson and Jespersen 1963). Acorns are a critical food source for deer (Burns and Honkala 1990). Studies in the central Sierra Nevada foothills showed that blue oak woodland is utilized by 92 species of birds, 60 of which nest there (Block and Morrison 1990). The California Wildlife Habitat Database (Mayer and Laudenslayer 1988), maintained by California Department of Fish and Game, can provide extensive information on wildlife species that may occur in the habitat type on this site.

Grazing and Browsing

The annual dominated understory of this plant community is 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. Goats have been used on this site to reduce chamise and shift community toward grassland. The browse value of common oak woodland species is listed in Sampson and Jespersen (1963).

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 rapid and soil erosion hazard is high.

Recreational Uses:

Hunting, horseback riding, and hiking are common recreational pursuits.

Wood Products:

Firewood cutting of blue oak, once prevalent, has decreased as voluntary and county regulatory actions to protect blue oaks that are weak resprouters on this site.

Other Products:

Native Americans have historically used and managed the blue oak woodlands for food and fiber.

Other Information:

Revegetation/Restoration Of Disturbed Areas

Oak Restoration: Natural regeneration of blue oaks may be limited because they are weak resprouters on some dry sites and because of a number of factors that limit seed germination, seedling establishment and survival to the tree stage. Competition for soil moisture from the understory annual plants, acorn and seedling damage by rodents, livestock grazing and changed fire regimes are important factors that can reduce blue oak regeneration. McCreary (2001) provides an extensive review of oak regeneration problems and practices on California’s oak woodlands.

Native Grass Restoration: While, the soils on this ecological site support remnant native perennial grasses, competition from non-native annuals will prevent successful re-introduction of native grasses.

Annual Legumes And Annual Grasses: Rainfall at this site is probably marginal for successful annual legume seedings. The high cost of seeding and fertilization has reduced the use of this practice.

Poisonous/Non-native Plants

Poisonous Plants: Poisonous plants that may occur on this ecological site include locoweed (Astragalus spp), fiddleneck (Amsinkia spp), Mexican whorled milkweed (Asclepias fascicularia), groundsel (Senecio vulgaris), larkspur (Delphinium spp), and tarweed (Hemizonia spp). Yellow starthistle (Centaurea solstitialis) may be present and is poisonous to horses. Oleander (Nerium oleander), an ornamental frequently used in foothill landscapes, is very toxic to humans and animals and should be kept away from pasture fence lines. Livestock poisoning is often 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 asperum), cheatgrass (Bromus tectorum) , yellow starthistle and Maltese starthistle also called tocolote (Centaurea melitensis) are invaders of concern.

Supporting Information

Associated Sites:

Site Name	Site ID	Site Narrative

Similar Sites:

Site Name	Site ID	Site Narrative
SHALLOW FINE LOAMY	R015XF038CA	
SHALLOW FINE LOAMY	R015XE043CA	
SHALLOW FINE LOAMY	R015XD070CA	

State Correlation:
This site has been correlated with the following states:
CA

Inventory Data References:
KSpark.5 35.8830000 120.4501667
MDBobcat06 38.5172508 122.0802192
Rlpark.1 35.8826167 120.4533667
RLpark.2 35.8843100 120.4478100
Rlpark1-3 35.8865093 120.4475063
Rlpark1-4 35.8840100 120.4502501

Type Locality:

Relationship to Other Established Classifications:
This blue oak dominated site may include the following Allen-Diaz Classes: 1) Blue Oak/Grass, 2) Blue Oak-Foothill Pine/Wedgeleaf Ceanothus/Grass, 3) Blue Oak-Understory Blue Oak/Grass (Allen-Diaz et al. 1989). This site includes Blue Oak Woodland (BOW) and Blue Oak-Foothill Pine (BOP) of the California Wildlife Habitat Relationships System. The Society for Range Management Cover Type for this site is Blue Oak Woodland.

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Site Description Approval:

Author	Date	Approval	Date
Melvin George, Royce Larsen, Morgan Doran, and Karl Striby	5/14/2004		

Reference Sheet

Author(s)/participant(s):

Contact for lead author:

Date: **MLRA:** 015X **Ecological Site:** Shallow Fine Loamy R015XI006CA 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

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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 in NOT expected in the reference state for the ecological site:

17. Perennial plant reproductive capability: