



Ecological Site Description

UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site Name: Shallow Loamy Upland

Quercus douglasii / *Baccharis pilularis* - *Toxicodendron diversilobum* / *Bromus* - *Erodium*
(blue oak / dwarf chaparral broom - Pacific poison oak / brome - stork's bill)

Site ID: R015XI011CA

Major Land Resource Area: 015 - Central California Coast Range

Physiographic Features

This ecological site occurs on more than 200,000 acres of the Coast Range in Alameda, Contra Costa, western San Joaquin, western Stanislaus, eastern Santa Clara and San Benito Counties. The site ranges in elevation from 100 to 3,000 feet on north slopes and up to 3,800 feet on south-facing slopes. Slopes range from 9 to 75 percent.

<u>Land Form:</u>	(1) Mountain		
		<u>Minimum</u>	<u>Maximum</u>
<u>Elevation (feet):</u>		100	3800
<u>Slope (percent):</u>		9	75
<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
 Runoff Class: Medium Very high
 Aspect: No Influence on this site

Climatic Features

The climate on this ecological site is dry subhumid mesothermal with cool moist winters and warm dry summers. The mean annual precipitation is 14 to 20 inches. Mean annual temperature is 57 to 64 degrees F., average January temperature is 46 to 51 degrees F., and average July temperature is 70 to 77 degrees F. The frost-free period is 220 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>	220	300										
<u>Freeze-free period (days):</u>	0	0										
<u>Mean annual precipitation (inches):</u>	14.0	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.	3.75	3.25	3.0	1.5	0.25	0.25	0.25	0.25	0.25	1.0	2.7	2.75
Temp. Min.	39.4	41.3	43.1	45.1	50.1	55.6	60.6	60.3	57.8	51.6	43.6	38.9
Temp. Max.	56.5	59.5	62.1	67.7	74.5	82.1	87.7	87.3	83.7	75.7	63.1	57.0

Climate Stations:

Influencing Water Features

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

Wetland

Description: System Subsystem Class

Representative Soil Features

This site is dominated by the clayey Vallecitos series which consists of shallow, well drained soils formed in material weathered from metamorphosed sandstone and shale dominantly of the Franciscan Formation. The available water holding capacity is 2.8 inches. Fertility of these soils is generally low due to low nutrient content of the parent material or low organic matter build up. Nutrient concentration is often higher under oak trees.

Alameda Area (CA609), California

CA609 VaD2 Vallecitos rocky loam, 15 to 30 percent slopes

CA609 VaE2 Vallecitos rocky loam, 30 to 45 percent slopes, eroded

CA609 VaF2 Vallecitos rocky loam, 45 to 75 percent slopes, eroded

CA609 VaG2es Vallecitos rocky loam, 50 to 75 percent slopes, eroded

Western Part Alameda County(CA610), California,

CA610 153 Vallecitos-Rock outcrop complex, 30 to 50 percent slopes

Contra Costa County (CA013), California

CA013 VaF Vallecitos loam, 30 to 50 percent slopes

Eastern Santa Clara Area (CA646), California

CA646 VaE2 Vallecitos rocky loam, 15 to 30 percent slopes, eroded

CA646 VaF2sb Vallecitos rocky loam, 45 to 75 percent slopes, eroded

CA646 VaG2 Vallecitos rocky loam, 50 to 75 percent slopes, eroded

San Benito County (CA069), California

CA069 VaD Vallecitos loam, 9 to 15 percent slopes

CA069 VaE Vallecitos loam, 15 to 30 percent slopes

CA069 VaE2es Vallecitos rocky loam, 15 to 30 percent slopes, eroded

CA069 VaF Vallecitos loam, 30 to 50 percent slopes

CA069 VaF2 Vallecitos loam, 30 to 50 percent slopes, eroded

CA069 VaG2es Vallecitos rocky loam, 50 to 75 percent slopes, eroded

CA069 VrE2 Vallecitos rocky loam, 9 to 30 percent slopes, eroded

CA069 VrF2 Vallecitos rocky loam, 30 to 50 percent slopes, eroded

San Joaquin County (CA077), California

CA077 176 Honker-Vallecitos-Gonzaga complex, 30 to 50 percent slopes

CA077 177 Honker-Vallecitos-Honker eroded complex, 30 to 50 percent slopes

CA077 178 Honker-Vallecitos-Honker eroded complex, 50 to 75 percent slopes

Western Stanislaus County (CA642), California

CA642 610 Honker-Vallecitos-Honker, eroded, complex, 30 to 50 percent slopes

CA642 611 Honker-Vallecitos-Honker, eroded, complex, 50 to 75 percent slopes

CA642 612 Honker-Vallecitos-Gonzaga complex, 30 to 50 percent slopes

Predominant Parent Materials:

Kind: Residium

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

	<u>Minimum</u>	<u>Maximum</u>
<u>Depth (inches):</u>	16	20
<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 CaCl₂):</u>		
<u>Available Water Capacity (inches):</u>	2.8	2.8

Plant Communities

Ecological Dynamics of the Site

Ecological Dynamics

Before European settlement, the natural plant community for this ecological site is assumed to have been a mosaic of grassland, shrub and blue oak (*Quercus douglasii*) patches. The grassland and 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 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 mosaic of blue oak, coyote brush scrub (Ford and Hayes 2007) and annual grassland. The native perennial, purple needlegrass (*Nasella pulcra*), may be present in small amounts. Coyote brush (*Baccharis pilularis*) is common in the shrub layer but other shrubs may also be found including sage (*Salvia clevelandii*), monkey flower (*Mimulus aurantiacus*) and poison oak (*Toxicodendron diversiloba*). Black oak (*Q. kelloggii*) and California buckeye (*Aesculus californica*) are infrequently present in the tree layer. The understory and grassland patches are frequently dominated by bromes (*Bromus* spp), wild oats (*Avena* spp), 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 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.

Blue oak occurs along the drier inland portions of the coast range (MLRA 15). Blue oak trees are long-lived and 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 declines 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. Protection from fire has decreased fire frequency allowing shrubs to extend into the oak canopy providing a ladder for fire. Resprouts are vulnerable to grazing/browsing by wildlife and domestic livestock for the first few years after fire.

The shrub layer is dominated by coyote brush, sage and poison oak. These species may be top killed by fire but resprout from the base. Monkey flower is a sub-shrub that germinates following fire.

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 coyote brush scrub. 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 tree layer is dominated by blue oak (*Quercus douglasii*), with some foothill pine (*Pinus sabiniana*). The shrub layer, when present, is dominated by coyote bush (*Baccharis pilularis*) but may also include sage (*Salvia clevelandii*), and poison oak (*Toxicodendron diversiloba*). 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.

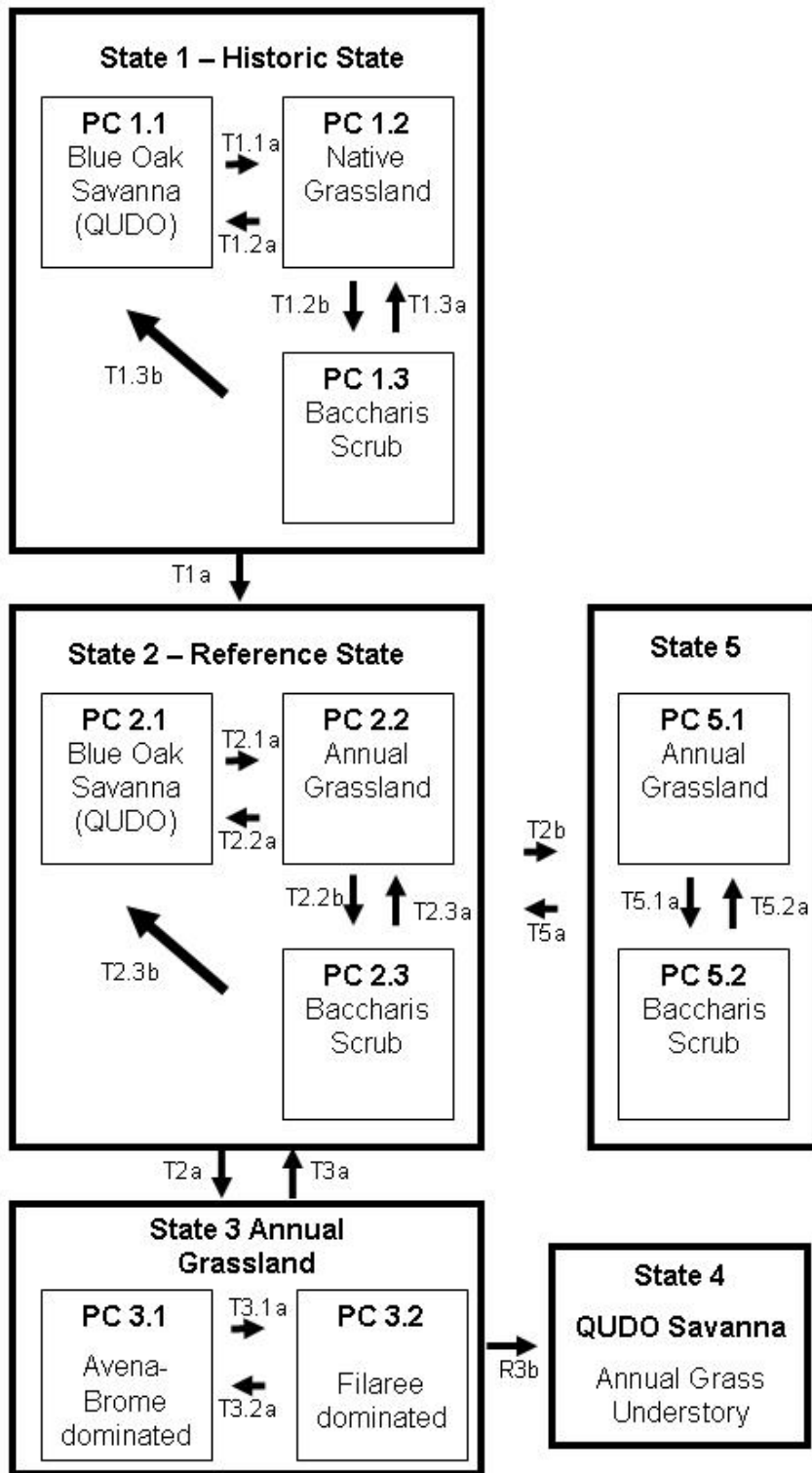
The understory and open grassland patches are dominated by annual grasses and forbs of European origin. As germination, seedling establishment and plant growth progress during the growing season, species composition changes depending primarily on residue levels and the timing and amount of precipitation 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.

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.



State 1: Historic State

State 1: The assumed historic state is a mosaic of blue oak savanna or woodland, annual grassland and shrubs similar to that in State 2. There is a tendency for the blue oaks to occur on north facing slopes, and grassland on south facing 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, shrub canopy cover may have been reduced compared to State 2.

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 and 2.2

State 2: The reference state is a mosaic of blue oaks, annual grassland and shrubs. There is a tendency for the oaks to occur on north facing slopes, and grasslands on south facing 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 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 riggut brome (*B. diandrus*), red brome (*B. rubens*) and annual fescue (*Vulpia myuros*).

Plant community 2.3 (PC 2.3): Coyote brush (*Baccharis pilularis*) is common in the shrub layer but other shrubs may also be found including sage (*Salvia clevelandii*), monkey flower (*Mimulus aurantiacus*) and poison oak (*Toxicodendron diversiloba*).

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 2003) but can be converted using artificial regeneration practices as described in R3b (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 1989).

T2.2b (PC 2.2 to State PC 2.3): Protection from fire and grazing facilitates replacement of the grassland by coyote brush and other shrubs.

T2.3a (PC 2.3 to State PC 2.2): Frequent fire and grazing can facilitate the transition of coyote scrub back to annual grassland. Goats have been used to convert shrublands to grassland or to reduce shrubland development.

T2.3b (PC 2.3 to State PC 2.1): On some soils oak-woodlands may eventually replace shrubs 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.

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.



State 2: Reference State - Plant Communities 2.1 and 2.2 Plant Species Composition:

Grass/Grasslike				Annual Production in Pounds Per Acre	
<u>Group</u>	<u>Group Name</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Low</u>	<u>High</u>
2 -	Native cool season perennial grass	purple needlegrass	<i>Nassella pulchra</i>	0	0
8 -	Non-native cool season annual grass	wild oat	<i>Avena fatua</i>	0	0
		ripgut grass	<i>Bromus diandrus</i>	0	0
		soft brome	<i>Bromus hordeaceus</i>	0	0
		red brome	<i>Bromus rubens</i>	0	0
		barley	<i>Hordeum</i>	0	0
11 -	Native perennial forb	brodiaea	<i>Brodiaea</i>	0	0
Forb				Annual Production in Pounds Per Acre	
<u>Group</u>	<u>Group Name</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Low</u>	<u>High</u>
12 -	Native annual forb	tarweed	<i>Hemizonia</i>	0	0
		dotseed plantain	<i>Plantago erecta</i>	0	0
14 -	Non-native annual forb	common yarrow	<i>Achillea millefolium</i>	0	0
		soft blow wifes	<i>Achyrrachaena mollis</i>	0	0
		Italian thistle	<i>Carduus pycnocephalus</i>	0	0

wavyleaf soap plant	<i>Chlorogalum pomeridianum</i>	0	0
stork's bill	<i>Erodium</i>	0	0
California lomatium	<i>Lomatium californicum</i>	0	0

Shrub/Vine

Annual Production
in Pounds Per Acre

Group	Group Name	Common Name	Scientific Name	Low	High
17 - Native shrub				0	0
		dwarf chaparral broom	<i>Baccharis pilularis</i>	0	0
			<i>Mimulus aurantiacus (Syn)</i>	0	0
		fragrant sage	<i>Salvia clevelandii</i>	0	0
			<i>Sambucus mexicana (Syn)</i>	0	0
		Pacific poison oak	<i>Toxicodendron diversilobum</i>	0	0

Tree

Annual Production
in Pounds Per Acre

Group	Group Name	Common Name	Scientific Name	Low	High
24 - Native Deciduous Tree				0	0
		California buckeye	<i>Aesculus californica</i>	0	0
		blue oak	<i>Quercus douglasii</i>	0	0
		California black oak	<i>Quercus kelloggii</i>	0	0

Annual Production by Plant Type:

Plant Type	Annual Production (lbs/AC)		
	Low	Representative Value	High
Forb	240	400	500
Grass/Grasslike	960	1600	2000
Total:	1200	2000	2500

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 40			0 to 100					0 to 20

Structure of Canopy Cover (%)

	Grasses/Grasslike	Forbs	Shrubs/Vines	Trees
≤ 0.5 feet				
> 0.5 - < 1 feet	80 to 100	0 to 20		
< 1 - ≥ 2 feet			0 to 30	
> 2 - < 4.5 feet			0 to 70	
< 4.5 - ≥ 13 feet				
> 13 - < 40 feet				0 to 40

Forest Understory Composition:

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

<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>
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

<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>
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

<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>
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. Coyote brush commonly invades grasslands via seed dispersal into the grassland.

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				Annual Production in Pounds Per Acre	
<u>Group</u>	<u>Group Name</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Low</u>	<u>High</u>
2 -	Native cool season perennial grass	purple needlegrass	<i>Nassella pulchra</i>	0	0
8 -	Non-native cool season annual grass	wild oat	<i>Avena fatua</i>	0	0
		ripgut grass	<i>Bromus diandrus</i>	0	0
		soft brome	<i>Bromus hordeaceus</i>	0	0
		red brome	<i>Bromus rubens</i>	0	0
		barley	<i>Hordeum</i>	0	0

Forb				Annual Production in Pounds Per Acre	
<u>Group</u>	<u>Group Name</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Low</u>	<u>High</u>
12 -	Native annual forb	brodiaea	<i>Brodiaea</i>	0	0
		tarweed	<i>Hemizonia</i>	0	0
		dotseed plantain	<i>Plantago erecta</i>	0	0
14 -	Non-native annual forb	common yarrow	<i>Achillea millefolium</i>	0	0
		soft blow wifes	<i>Achyrrachaena mollis</i>	0	0
		Italian thistle	<i>Carduus pycnocephalus</i>	0	0
		wavyleaf soap plant	<i>Chlorogalum pomeridianum</i>	0	0
		stork's bill	<i>Erodium</i>	0	0
		California lomatium	<i>Lomatium californicum</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	240	200	500
Grass/Grasslike	960	1600	2000
Total:	1200	1800	2500

Structure and Cover:

Ground Cover (%)

<u>Vegetative Cover</u>						<u>Non-Vegetative Cover</u>					
<u>Grass/Grasslike</u>	<u>Forb</u>	<u>Shrub/Vine</u>	<u>Tree</u>	<u>Non-Vascular Plants</u>	<u>Biological Crust</u>	<u>Litter</u>	<u>Surface Fragments > 1/4 & ≤ 3"</u>	<u>Surface Fragments > 3"</u>	<u>Bedrock</u>	<u>Water</u>	<u>Bare Ground</u>
80 to 100	0 to 20					0 to 100					0 to 30

Structure of Canopy Cover (%)

	<u>Grasses/Grasslike</u>	<u>Forbs</u>	<u>Shrubs/Vines</u>	<u>Trees</u>
<u>≤ 0.5 feet</u>	80 to 100	0 to 20		
<u>> 0.5 - < 1 feet</u>	0 to 50	0 to 10		

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

<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>
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

<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>
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

<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>
0	15	70	5	0	0	0	0	0	0	5	5

State 4: Restored 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: Shrubland and Annual Grassland Mosaic

State 5: Shrubland and annual grassland mosaic.

T5.1a (PC 5.1 to State PC 5.2): Protection from fire and grazing facilitates replacement of grassland by coyote brush and other shrubs

T5.2a (PC 5.2 to State PC 5.1): Frequent fire and grazing can facilitate the transition of coyote scrub back to annual grassland. Goats have been used to covert shrublands to grassland or to reduce shrubland development.

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 least 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*), Audubon cottontail (*Sylvilagus audubonii vallicola*), and deer (*Odocoileus* spp). 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 oregonus*). 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.

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, black-tailed 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, which migrate from high-elevation dry summer ranges to blue oak woodland for fall and winter forage (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. The browse value of common oak woodland species can be found in UC Publication 4010 "California Range Brushlands and Browse Plants"(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:

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

Wood Products:

Firewood cutting of blue oak, once prevalent, has decreased with increased public awareness of poor blue oak regeneration.

Other Products:

Native Americans have historically used and managed the blue oak woodlands for food and fiber. Although south of the Mother Lode, some mining for gold has occurred in the area in the past.

Other Information:

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:

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*) 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:

KOsunol1 37.5101921 121.7998901
SANTATHERESA3 37.2168739 121.7833126
TWcarnegie10 37.6220670 121.6016170
TWcarnegie9 37.6174830 121.5909000
TWmurphey1 37.4836520 121.3015860

Type Locality:

Relationship to Other Established Classifications:

This blue oak dominated site may include the following Allen-Diaz Classes: 1) Blue Oak-Grass (Allen Diaz et al. 1989). This site includes the Blue Oak Woodland (BOW) of the California Wildlife Habitat Relationships System. The Society for Range Management Cover Type for this site is Blue Oak Woodland.

Other References:

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Site Description Approval:

<u>Author</u>	<u>Date</u>	<u>Approval</u>	<u>Date</u>
Melvin George, Theresa Ward, Ken Oster and, and Shiela Barry	5/14/2004		

Reference Sheet

Author(s)/participant(s):

Contact for lead author:

Date: **MLRA:** 015X **Ecological Site:** Shallow Loamy Upland R015XI011CA 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:**

17. Perennial plant reproductive capability:
