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: Silt Loam (Gazos)

Quercus agrifolia / *Toxicodendron diversilobum* - *Baccharis pilularis* / *Bromus* - *Avena fatua*
(California live oak / Pacific poison oak - dwarf chaparral broom / brome - wild oat)

Site ID: R015XI045CA

Major Land Resource Area: 015 - Central California Coast Range

Physiographic Features

This coastal ecological site covers more than 100,000 acres along California's central coast from San Benito County to Santa Barbara County. This site occurs on the ocean facing hillsides of the first low mountains in the Coast Range at an elevation of 50 and 4000 feet.

Land Form: (1) Hill

	Minimum	Maximum
Elevation (feet):	50	4000
Slope (percent):	9	75
Water Table Depth (inches):		
Flooding:		
Frequency:		
Duration:	None	None
Ponding:		
Depth (inches):		
Frequency:		
Duration:	None	None
Runoff Class:	High	Very high
Aspect:	No Influence on this site	

Climatic Features

The climate on this site is characterized by mild cool winters. The average January temperature is about 53 degrees F., the average July temperature is about 76 degrees F., and the mean annual temperature is about 58 degrees to 65 degrees F. The average annual precipitation ranges from 16 to 24 inches, with most falling as rain from November to March.

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). Mean monthly precipitation is entered in the maximum precipitation row.

	Minimum	Maximum
Frost-free period (days):	275	350
Freeze-free period (days):	0	0
Mean annual precipitation (inches):	16.0	24.0

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.	4.5	4.0	3.5	2.0	0.25	0.25	0.25	0.25	0.25	0.75	3.0	3.75
Temp. Min.	40.6	41.6	42.6	43.9	46.7	50.3	52.8	53.3	52.1	48.5	44.2	40.4
Temp. Max.	64.9	65.9	66.4	70.4	71.6	75.6	77.8	79.2	79.2	77.4	70.8	65.9

Climate Stations:

Influencing Water Features

Intermittent streams drain these sites

Wetland
Description: System Subsystem Class

Representative Soil Features

This ecological site consists of well drained silt loam soils that formed in material weathered from sandstone and shale. The depth to bedrock is 29 to 36 inches. Available water holding capacity is about 1.6 inches. Permeability is moderately slow. This ecological site can be found at elevations from 50 to 4000 feet. 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.

Monterey County (CA053), California

CA053 GfE Gazos silt loam, 15 to 30 percent slopes
CA053 GfF Gazos silt loam, 30 to 50 percent slopes

Northern Santa Barbara Area (CA672), California

CA672 GsD Gazos clay loam, 9 to 15 percent slopes
CA672 GsE Gazos clay loam, 15 to 30 percent slopes
CA672 GsF Gazos clay loam, 30 to 45 percent slopes

CA672 GsG Gazos clay loam, 45 to 75 percent slopes

San Benito County (CA069), California

CA069 GfFmo Gazos silt loam, 30 to 50 percent slopes

San Luis Obispo County (CA664), California, Coastal Part

CA664 142 Gaviota fine sandy loam, 15 to 50 percent slopes
CA664 143 Gazos-Lodo clay loams, 15 to 30 percent slopes
CA664 144 Gazos-Lodo clay loams, 30 to 50 percent slopes CA664 145 Gazos-Lodo clay loams, 50 to 75 percent slopes

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

CA665 144 Gazos shaly clay loam, 9 to 30 percent slopes
CA665 145 Gazos shaly clay loam, 30 to 50 percent slopes

Predominant Parent Materials:
Kind: Residuum
Origin: Sandstone and shale

Surface Texture: (1) Silt loam

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: Moderately slow To Moderately slow

	Minimum	Maximum
Depth (inches):	29	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):	1.6	1.6

Plant Communities

Ecological Dynamics of the Site

Before European settlement, the natural plant community for this ecological site is assumed to have been a mosaic of grassland, shrub and coast live oak (Quercus agrifolia) 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 coast live oak, coastal scrub and annual grassland. Native perennial grasses, such as purple needlegrass (Nasella pulcra), may be present in small amounts. Black

sage (Salvia mellifera), poison oak(Toxicodendron diversiloba) and deerweed (Lotus scoparius) may be found in the shrub layer. The understory and grassland patches are frequently dominated by bromes (Bromus spp), wild oats (Avena spp), filaree (Erodium spp), and annual legumes(Trifolium spp and Medicago spp).

Fire frequency largely defines the extent of coastal scrub, grassland, and oak woodland in the coast range. Without fire or grazing coastal scrub species tend to be slowly replaced by coast live oak. Burning and grazing tend to slow the transition from grassland to coyote brush scrub and to oak woodland (Callaway 1990, Ford and Hayes 2007). 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. Frequent fire tends to result in vegetation states dominated by an annual grass or oak-annual grass community. Protection from fire and grazing results in a gradual increase in shrubs contributing to increased fuel loads. If the shrub canopy reaches into the tree canopy the potential for crown fires increases. However coast live oak is extremely resistant to fire. Trees damaged by fire resprout from their base.

Coast live oak trees are long-lived species that evolved under low severity understory fires that are estimated to have naturally occurred at intervals of 10 to 30 years (Greenlee and Langenheim 1990). Beginning in the mid-1900s fire return intervals are estimated to have increased to as much as 50 to 75 years. Coast live oak is adapted to fire by having a thick bark and by sprouting from the root crown following fire. The shrub layer on this ecological site is dominated by coyote brush and poison oak which also resprout.

The historic herbaceous 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 soils in this ecological site support oak patches of few to many trees and annual grassland. 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 10 to 30 years (Greenlee and Langenheim 1990). Following European settlement before and after the gold rush fire was frequent (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 50 to 75 years. Prescribed burning, mechanical and chemical brush control have been used to remove the shrub and tree layers but is 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 dominated by coast live oak, poison oak, coyote brush and open grassland patches. In some cases this ecological site occurs as an annual grassland with no tree or shrub overstory. Coast live oaks generally occur on mesic sites such as north slopes, alluvial terraces, canyon bottoms, or upper streambanks (Brophy 1973, Lewis 1991, and Davidson et al. 2001). Coast live oak's preference for mesic sites is most pronounced in the southern part of its range (Martin 1982). The oak woodlands of California are a multi-layered mosaic of tree, shrub and grass patches. In some locations these 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 1991) at a scale smaller than

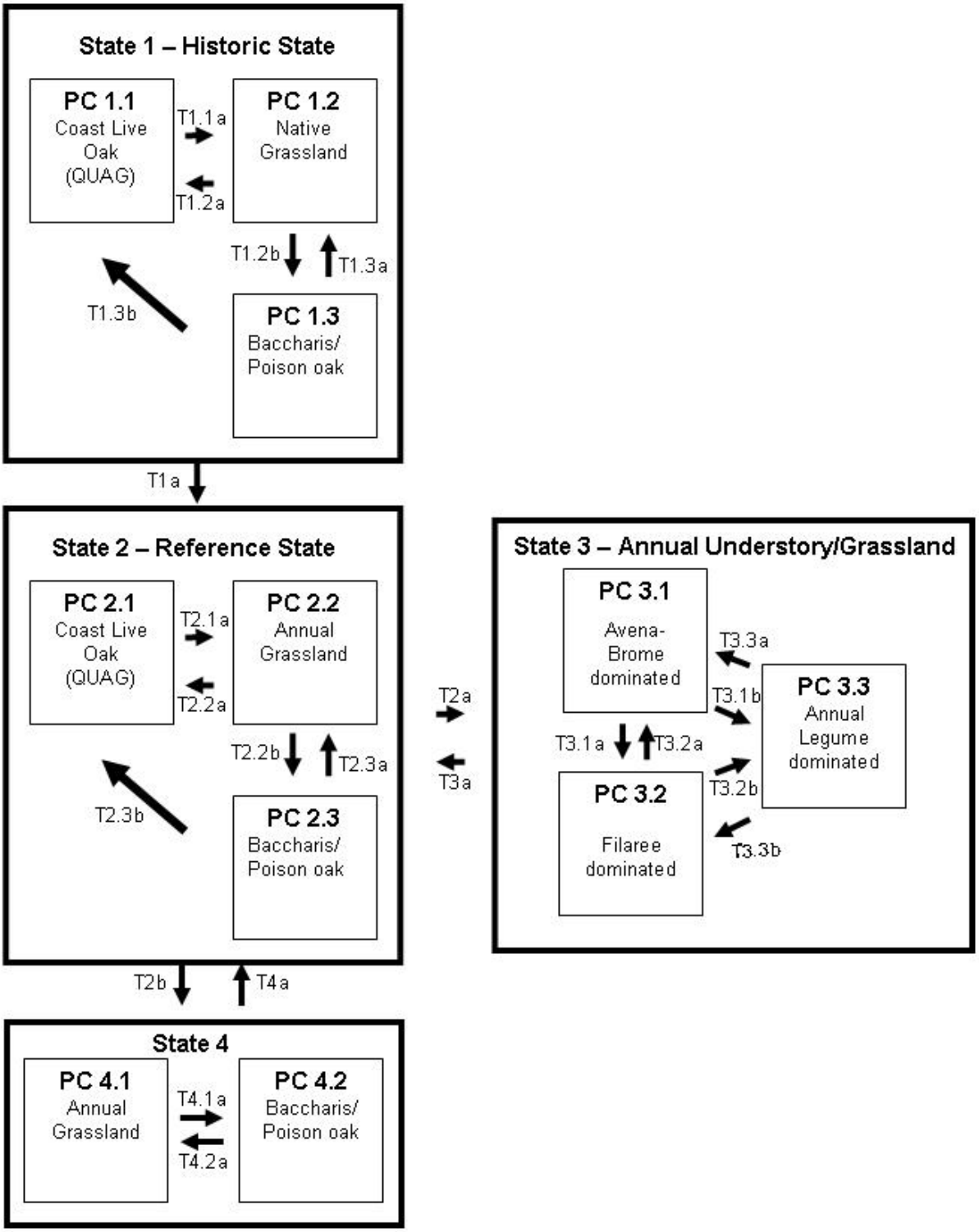
an ecological site or even a soil mapping unit. Given this mosaic of multi-layered vegetation types there is wide amplitude in expected species composition and amounts on the same soil series or association within an ecological site. Therefore these sites were delineated more on the basis of soil characteristics and long-term understory production than on species composition.

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 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 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 commonly supports an open annual grassland intermixed with a coast live oak dominated savanna.

Production curves are provided as examples of monthly forage production for normal (2000 lb/a), favorable (3000 lb/a), and unfavorable (1500 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
PC 1.1
Coast Live Oak (QUAG)
T1.1a
T1.2a
PC 1.2
Native Grassland
T1.2b
T1.3a
T1.3b
PC 1.3
Baccharis/ Poison oak
T1a
State 2 – Reference State
PC 2.1
Coast Live Oak (QUAG)
T2.1a
T2.2a
PC 2.2
Annual Grassland
T2.2b
T2.3a
T2.3b
PC 2.3
Baccharis/ Poison oak
T2b
T4a
T2a
T3a
State 3 – Annual Understory/Grassland
PC 3.1
Avena-Brome dominated
T3.3a
T3.1b
PC 3.3
Annual Legume dominated
T3.1a
T3.2a
T3.2b
PC 3.2
Filaree dominated
T3.3b
State 4
PC 4.1
Annual Grassland
T4.1a
T4.2a
PC 4.2
Baccharis/ Poison oak

State 1: Historic State

State 1: The assumed historic state is a mosaic of coast live oak savanna, annual grassland and California sagebrush similar to that in State 2. 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 California sagebrush community 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 savanna. 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 - Pland Communities 2.1, 2.2, & 2.3

State 2: The reference state is a mosaic of coast live oak savanna, annual grassland and California sagebrush dominated coastal scrub. 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 coast live oak (Quercus agrifolia) 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): California sagebrush communities are dominated by California sagebrush (Artemisa californiaca) other coastal sage scrub species may also be present such as black or purple sage (Salvia mellifera or S. leucophylla), and California buckwheat (Erigonium fasciculatum).

T2.1a (PC 2.1 to State PC 2.2): Grazing, catastrophic fire and poor oak regeneration may result in conversion of oak patches to annual grassland. Because coast live oak is more resistant to fire than most other oaks this

transition is rare. 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. Sudden oak death could lead to this transition. As of 2007 Monterey County was the southern most location of sudden oak.

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 T19 (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 coastal scrub. 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 coastal scrub back to annual grassland occurs with protection from fire and/or grazing. Goats have been used on this site to convert coastal scrub to grassland.

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

T2b (State 2 to State 4): Similar to T2a but firewood cutting or selective chemical treatments remove trees and leave the shrub layer as plants or in the seedbed.

State 2: Reference State - Pland 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
2 - Native perennial cool season grass				0	0
		California brome	*Bromus carinatus*	0	0
		blue wildrye	*Elymus glaucus*	0	0
		deergrass	*Muhlenbergia rigens*	0	0
		purple needlegrass	*Nassella pulchra*	0	0
6 - Non-native perennial grass				0	0
		orchardgrass	*Dactylis glomerata*	0	0
8 - Non-native cool season annual grass				0	0
		wild oat	*Avena fatua*	0	0
		purple false brome	*Brachypodium distachyon*	0	0
		ripgut grass	*Bromus diandrus*	0	0
		soft brome	*Bromus hordeaceus*	0	0
		red brome	*Bromus rubens*	0	0
		barley	*Hordeum*	0	0
		Italian ryegrass	*Lolium perenne ssp. multiflorum*	0	0
		fescue	*Vulpia*	0	0

Forb

Group	Group Name	Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
12 - Native forb				0	0
		tarweed	*Hemizonia*	0	0

14			0	0
	Italian thistle	*Carduus pycnocephalus*	0	0
	stork's bill	*Erodium*	0	0
	bedstraw	*Galium*	0	0
	lupine	*Lupinus*	0	0
	burclover	*Medicago polymorpha*	0	0
	clover	*Trifolium*	0	0

Shrub/Vine

Group	Group Name	Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
17	Native shrubs			0	0
		dwarf chaparral broom	*Baccharis pilularis*	0	0
		toyon	*Heteromeles arbutifolia*	0	0
		common deerweed	*Lotus scoparius*	0	0
		black sage	*Salvia mellifera*	0	0
		Pacific poison oak	*Toxicodendron diversilobum*	0	0

Tree

Group	Group Name	Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
25	Native non-deciduous shrub			0	0
		California live oak	*Quercus agrifolia*	0	0

Annual Production by Plant Type:

Plant Type	Annual Production (lbs/AC) Low	Representative Value	High
Forb	300	400	600
Grass/Grasslike	1200	1600	2400
Total:	1500	2000	3000

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 25	0 to 40			0 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			0 to 25	
< 4.5 - >= 13 feet				0 to 40

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 3A (PC 3A) is dominated by wild oats (Avena spp), soft brome (Bromus hordeaceus) and ripgut brome (B. diandrus). Plant community 3B (PC 3B) is dominated by filaree (Erodium spp) or other decumbent species. Plant community 3 C is dominated by bur clover (Medicago polymorpha) or other annual legumes.

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. Coast live 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.

T3.1b and 3.2b (PC 3.1 or PC 3.2 to 3.3): Annual legume seeding. Sulfur and/or phosphorus fertilization are required to maintain productive annual legume stands. Close grazing helps to maintain legume composition.

T3.3a (PC 3.3 to PC 3.1): Grasses increase with improved soil fertility and light grazing

T3.3b (PC 3.3 to PC 3.2): With loss of fertility and close grazing annual legumes are replaced by filaree.

State 3: Annual Grassland Plant Species Composition:

Grass/Grasslike

Group	Group Name	Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
2	Native perennial grass			0	0
		California brome	*Bromus carinatus*	0	0
		blue wildrye	*Elymus glaucus*	0	0
		deergrass	*Muhlenbergia rigens*	0	0
		purple needlegrass	*Nassella pulchra*	0	0
6	Non-native perennial grass			0	0
		orchardgrass	*Dactylis glomerata*	0	0
8	Non-native cool season annual grass			0	0
		wild oat	*Avena fatua*	0	0
		purple false brome	*Brachypodium distachyon*	0	0
		ripgut grass	*Bromus diandrus*	0	0
		soft brome	*Bromus hordeaceus*	0	0
		red brome	*Bromus rubens*	0	0
		barley	*Hordeum*	0	0
		Italian ryegrass	*Lolium perenne ssp. multiflorum*	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
		tarweed	*Hemizonia*	0	0
14				0	0
		Italian thistle	*Carduus pycnocephalus*	0	0
		stork's bill	*Erodium*	0	0
		bedstraw	*Galium*	0	0
		burclover	*Medicago polymorpha*	0	0
		clover	*Trifolium*	0	0

Annual Production by Plant Type:

Plant Type	Annual Production (lbs/AC) Low	Representative Value	High
Forb	300	400	600
Grass/Grasslike	1200	1600	2400
Total:	1500	2000	3000

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 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: Shrub - Annual Grassland Mosaic

State 4: California sagebrush and annual grassland mosaic.

T4a (State 4 to 2): On deeper soils with better moisture holding capacity coast live oaks regenerate from acorns that germinate under canopy of shrubs (Callaway and D'Antonio 1991, Muick 1997). This is a slow successional process.

T4.1a (PC 4.1 to State PC 4.2): Protection from fire and grazing facilitates replacement of grassland by coastal scrub. This transition is more likely on exposed, south facing slopes than on sheltered topography of north facing slopes.

T4.2a (PC 4.2 to State PC 4.1): Frequent fire facilitates the transition from coastal scrub back to annual grassland. Heavy grazing may also support this transition. Goats have been used to reduce shrubs in coastal sage scrub.

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.

Columbian black tailed deer, California mule deer, and lagomorphs, browse coast live oak and rodents graze and browse in this community. 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 (Burns and Honkala 1990). Acorns of the coast live oak are of particular value to acorn feeders, as they are retained on the tree for up to 8 months (Callaway and Davis 1998). Acorn-dependent birds include the acorn woodpecker, yellow-billed magpie, and scrub jay. Acorns comprise over 50% of diets of the acorn woodpecker and scrub jay in fall and winter. 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 Sampson and Jespersen (1963).

Plant Preference by Animal Kind:

Hydrology Functions:
The watersheds associated with these sites are drained by intermittent to permanent streams. In dry years these

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, once prevalent, has decreased as voluntary and county regulatory actions to protect oak woodlands have been implemented.

Other Products:
Native Americans have historically used and managed the oak woodlands for food and fiber.

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Other Information:
Revegetation/Restoration Of Disturbed Areas

Oak Restoration:

Natural regeneration of coast live oaks is generally not limited because they are resistant to fire and strong resprouters. Competition for soil moisture from the understory annual plants, acorn and seedling damage by rodents, livestock grazing, sudden oak death and changed fire regimes are important factors that may reduce coast live 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 has prevented 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), and fiddleneck (Amsinkia spp). Livestock poisoning is usually 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), goatgrass (Aegilops triuncialis), Maltese starthistle or tocalote (Centaurea melitensis) and Italian thistle (Carduus pycnocephalus) are potential invaders of concern.

Supporting Information

Associated Sites:

Site Name	Site ID	Site Narrative

Similar Sites:

Site Name Site ID Site Narrative

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

Inventory Data References:

The plant communities for this site have been determined by vegetation surveys of species composition and productivity on these soils by University of California Cooperative Extension and USDA Natural Resources Conservation Service in 2004 and 2005. Former range site productivity and species composition were reviewed and compared to data collected in 2004 and 2005.

KOhuas.2 35.1405100 120.4750700
KOhuas.4 35.2402667 120.7829833
RLhuas.1 35.2364030 120.7939500
RLhuas.3 35.2401667 120.7841667
SBpalocorona4 36.5184066 121.8938853
SLpalocorona4 36.5184067 121.8938853
SBseranoCalPoly1 35.3338439 120.6510590
SLpeterson1 35.3275616 120.6422446

Type Locality:

Relationship to Other Established Classifications:

This ecological site may include the following Allen-Diaz Classes: 1) coast live oak, 2) coast live oak-grass, and 3) coast live oak-poison oak-grass.

Other References:
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Site Description Approval:

Author	Date	Approval	Date
Melvin George, Royce Larsen, Karl Striby, Ken Oster, Stephanie Larson, and Shiela Barry	5/14/2004		

Reference Sheet

Author(s)/participant(s):

Contact for lead author:

Date: **MLRA:** 015X **Ecological Site:** Silt Loam (Gazos) R015XI045CA 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):

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9. Soil surface structure and SOM content (include type and strength of structure, and A-horizon color and thickness):

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10. Effect on plant community composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:

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11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):

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12. Functional/Structural Groups (list in order of descending dominance by above-ground 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:

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13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):

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14. Average percent litter cover (%) and depth (inches):

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15. Expected annual production (this is TOTAL above-ground production, not just forage production:

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16. Potential invasive (including noxious) species (native and non-native). List Species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicator, we are describing what in NOT expected in the reference state for the ecological site:

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17. Perennial plant reproductive capability:
