Ecological Site Description

UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site Name: Coastal Clayey (Diablo, Cibo, Cropley) high prod

/ / *Bromus - Lolium*
(/ / brome - ryegrass)

Site ID: R015XI020CA

Major Land Resource Area: 015 - Central California Coast Range

Physiographic Features

This ecological site constitutes about 70,000 acres on coastal hills and alluvial fans that are located between the ocean and the first ridge of the coast range, mainly in San Luis Obispo County. Slopes range from 0 to 25 percent and elevations from 25 to 1000 feet.

Land Form: (1) Hill

	Minimum	Maximum
Elevation (feet):	25	1000
Slope (percent):	0	50
Water Table Depth (inches):		
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
Runoff Class:	Medium	Very high

Aspect: No Influence on this site

Climatic Features

The average annual precipitation ranges from 10 to 35 inches and increases with elevation. 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. Mean annual temperature is 57 degrees to 62 degrees F. The mean January temperature is about 45 degrees to 53 degrees F. and the mean July temperature about 65-75 degrees F. The frost-free season is 275 to 350 days.

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.

	Minimum	Maximum
Frost-free period (days):	275	350
Freeze-free period (days):	0	0
Mean annual precipitation (inches):	10.0	35.0

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.	3.25	2.25	1.75	1.25	0.25	0.25	0.25	0.25	0.75	0.75	2.25	2.75
Temp. Min.	42.0	43.0	44.0	48.0	51.0	53.0	54.0	54.0	49.0	44.0	39.0	35.0
Temp. Max.	63.0	65.0	67.0	70.0	73.0	76.0	77.0	78.0	79.0	77.0	71.0	65.0

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 ecological site consists of clay soils in the Diablo, Cropley, and Cibo series. While these soils occur in other ecological sites this site describes those with very high productivity due to their proximity to the coast, primarily in the coastal valley extending inland from Morro Bay to the city of San Luis Obispo.

San Luis Obispo County, CA, Coastal Part

127 Cropley clay, 0 to 2 percent slopes
128 Cropley clay, 2 to 9 percent slopes
129 Diablo clay, 5 to 9 percent slopes
130 Diablo and Cibo clays, 9 to 15 percent slopes
131 Diablo and Cibo clays, 15 to 30 percent slopes
132 Diablo and Cibo clays, 30 to 50 percent slopes
133 Diablo-Lodo complex, 15 to 50 percent slopes

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

Surface Texture: (1) Clay loam

Subsurface Texture Group: Clayey

	Minimum	Maximum
Surface Fragments <=3" (% Cover):		
Surface Fragments > 3" (% Cover):		
Subsurface Fragments <=3" (% Volume):		
Subsurface Fragments > 3" (% Volume):		

Drainage Class: Well drained To Moderately well drained

Permeability Class: Slow To Moderate

	Minimum	Maximum
Depth (inches):	50	54
Electrical Conductivity (mmhos/cm):		
Sodium Absorption Ratio:		
Calcium Carbonate Equivalent (percent):	1	2
Soil Reaction (1:1 Water):		
Soil Reaction (0.01M CaCl2):		
Available Water Capacity (inches):	7.0	8.0

Plant Communities

Ecological Dynamics of the Site

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

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

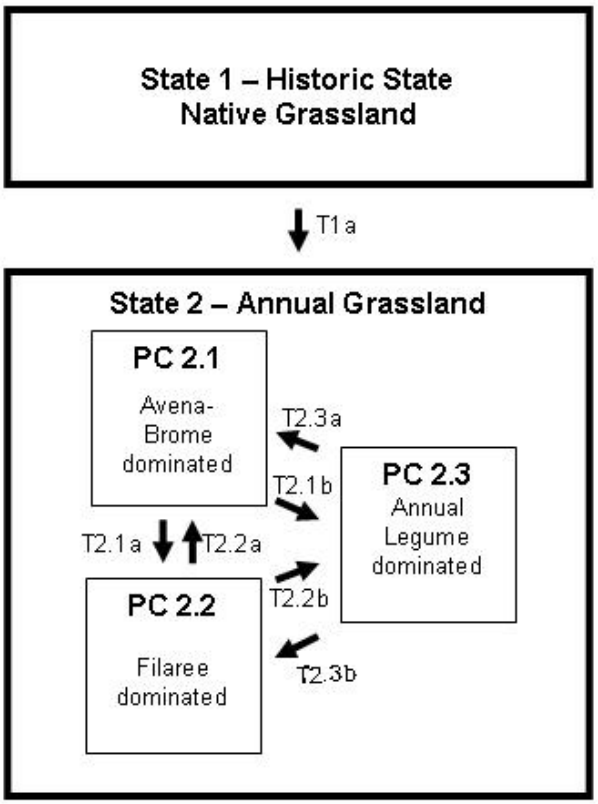
Species composition and productivity of the annual grasslands vary greatly within and between years and is greatly influenced by the timing and amount of precipitation and the amount of residual dry matter (George et al. 2001a). Grass dominated years occur when rainfall is well-distributed or greater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

Total Annual Production and Growth Curve

Forage production and species composition is largely controlled by four factors: precipitation, temperature, soil characteristics and plant residue (George et al. 2001a). Precipitation and temperature control the timing and

characteristics of four distinct phases of forage growth: break of season (germination and onset of growth), winter growth, rapid spring growth, and peak forage production. March and April are usually the months when 50 to 75 percent of the annual production occurs. The cold months of December and January often produce only 0 to 5 percent of the annual production. During cold weather seasonal and annual variation in production during each of these seasons contributes to the variable total annual production in the annual dominated understory and open grass patches.

Production curves are examples of monthly forage production for normal (5000 lb/a), favorable (6500 lb/a), and unfavorable (3500 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 and Transition Model

State 1: Historic State

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

Transitions :

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

State 2: Annual Grassland

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

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

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

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

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

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

Coastal Clayey Ecological Site

State 2: Annual Grassland Plant Species Composition:

Grass/Grasslike

Group	Group Name	Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
2 - Native cool season perennial grass				0	0
		purple needlegrass	*Nassella pulchra*	0	0
8 - Annual Grass				0	0
		wild oat	*Avena fatua*	0	0
		ripgut grass	*Bromus diandrus*	0	0
		soft brome	*Bromus hordeaceus*	0	0
		red brome	*Bromus rubens*	0	0
		barley	*Hordeum*	0	0
			Lolium multiflorum (Syn)	0	0
		rat-tail fescue	*Vulpia myuros*	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 - Annual Forb				0	0
		black mustard	*Brassica nigra*	0	0
		Italian thistle	*Carduus pycnocephalus*	0	0
		Maltese star-thistle	*Centaurea melitensis*	0	0
		yellow star-thistle	*Centaurea solstitialis*	0	0
		field bindweed	*Convolvulus arvensis*	0	0

stork's bill	*Erodium*	0	0
lupine	*Lupinus*	0	0
burclover	*Medicago polymorpha*	0	0
rose clover	*Trifolium hirtum*	0	0

Annual Production by Plant Type:

	Annual Production (lbs/AC)		
Plant Type	Low	Representative Value	High
Forb	700	1000	1300
Grass/Grasslike	2800	4000	5200
Total:	3500	5000	6500

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 30

Structure of Canopy Cover (%)

	Grasses/Grasslike	Forbs	Shrubs/Vines	Trees
<=0.5 feet	0 to 70	0 to 100		
> 0.5 - < 1 feet	0 to 70	0 to 50		
< 1 - >= 2 feet	0 to 70	0 to 20		

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

Ecological Site Interpretations

Animal Community:
Wildlife

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

Grazing and Browsing

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

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

Plant Preference by Animal Kind:

Hydrology Functions:
The watersheds associated with these sites are drained by intermittent streams that only flow during the wet season. In dry years these intermittent streams may not flow at all. Runoff on these soils is 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:
Some soils in this ecological site are used for crop production and some have been farmed in the past but have been returned to grasslands.

Other Information:
Native Grass Restoration:

Native perennial grasses may occur on this ecological site in very small amounts. There is no known practice or group of practices that can successfully restore native grasses on this ecological site.

Annual Legumes and Annual Grasses:

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

Poisonous/Non-native Plants

Poisonous Plants:

There are potentially several poisonous plants on this ecological site. Pyrrolizidine alkaloids in fiddleneck (Amsinkia 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 solstitalis) may invade this ecological site.

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

SBescuelaCalPoly1 35.3453380 120.7398318
SBmaino1 35.3676150 120.8216489

SBpetersonCalPoly2 35.3198658 120.6473657
SBescuelaCalPoly2 35.3512711 120.7411584
SLserano 35.3349357 120.6590743
TWserrano 35.3330120 120.6524160

Type Locality:

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

Other References:
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Site Description Approval:

Author	Date	Approval	Date
Melvin George, Sheila Barry, Theresa Ward, Stephanie Larsen, Josh Daly, Royce Larsen and Karl Striby	5/14/2004		

Reference Sheet

Author(s)/participant(s):

Contact for lead author:

Date: **MLRA:** 015X **Ecological Site:** Coastal Clayey (Diablo, Cibo, Cropley) high prod

R015XI020CA 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 in NOT expected in the reference state for the ecological site:

17. Perennial plant reproductive capability: