



Ecological Site Description

UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site Name: Clay Loam (Linne)

// *Bromus - Avena fatua*
(// brome - wild oat)

Site ID: R015XI017CA

Major Land Resource Area: 015 - Central California Coast Range

Physiographic Features

This ecological site extends across more than 280,000 acres along the Coast Range. It is an upland site occurring on hills and mountains at elevations from 100 to 2500 feet. Slope is 0 to 75 percent.

Land Form:	(1) Hill		
		<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):		100	2500
Slope (percent):		0	75
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 climate is subhumid mesothermal with warm dry summers and cool moist winters. Mean annual precipitation is 10 to 24 inches. Average January temperature is 45 degrees to 55 degrees F., average July temperature is 67 degrees to 79 degrees F., and the mean annual temperature is 55 degrees to 62 degrees F. The average freeze-free season is 200 to 330 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.

	<u>Minimum</u>		<u>Maximum</u>									
<u>Frost-free period (days):</u>	200		330									
<u>Freeze-free period (days):</u>	0		0									
<u>Mean annual precipitation (inches):</u>	10.0		25.0									
<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.	3.54	2.82	2.54	1.18	0.25	0.25	0.25	0.25	0.25	1.04	2.54	2.75
Temp. Min.	35.0	36.4	38.9	40.0	45.4	51.9	57.8	57.5	53.5	46.1	37.5	33.0
Temp. Max.	60.6	62.4	65.3	71.5	79.2	87.9	94.5	94.4	89.0	79.7	66.3	61.1

Climate Stations:

Influencing Water Features

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

Wetland

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

This ecological site consists of moderately deep, well drained soils that formed in material weathered from fairly soft shale and sandstone (Linne) and soils formed in residuum weathered from calcareous soft shale (Shedd).

Monterey County, California

LaD Linne silty clay loam 5 to 15 percent slopes
 LaE Linne silty clay loam, 15 to 30 percent slopes
 LaF Linne silty clay loam, 30 to 50 percent slopes
 LbD Linne-Diablo complex, 9 to 15 percent slopes
 LbE Linne-Diablo complex, 15 to 30 percent slopes
 LcE Linne-Shedd silty clay loams, 15 to 30 percent slopes
 LcF Linne-Shedd silty clay loams, 30 to 50 percent slopes
 LcF2 Linne-Shedd silty clay loams, 15 to 50 percent slopes, eroded

LcG2 Linne-Shedd silty clay loams, 50 to 75 percent slopes, eroded
 SmG3 Shedd silt loam, 30 to 75 percent slopes, severely eroded
 SnD Shedd silty clay loam, 9 to 15 percent slopes
 SnE Shedd silty clay loam, 15 to 30 percent slopes
 SnF2 Shedd silty clay loam, 30 to 50 percent slopes, eroded

San Luis Obispo County, California, Paso Robles Area

152 Linne-Calodo complex, 9 to 30 percent slopes
 153 Linne-Calodo complex, 30 to 50 percent slopes
 154 Linne-Calodo complex, 50 to 75 percent slopes
 155 Linne-Diablo complex, 9 to 15 percent slopes
 156 Linne-Zakme complex, 30 to 50 percent slopes

Northern Santa Barbara Area, California

LcD Linne clay loam, 9 to 15 percent slopes
 LcE Linne clay loam, 15 to 30 percent slopes
 LcF Linne clay loam, 30 to 45 percent slopes
 SrE Shedd silty clay loam, 15 to 30 percent slopes
 SrF Shedd silty clay loam, 30 to 45 percent slopes
 SrG Shedd silty clay loam, 45 to 75 percent slopes
 SrG3 Shedd silty clay loam, 30 to 75 percent slopes, severely eroded
 SsE Shedd silty clay loam, diatomaceous variant, 15 to 30 percent slopes
 SsF Shedd silty clay loam, diatomaceous variant, 30 to 45 percent slopes
 SsG Shedd silty clay loam, diatomaceous variant, 45 to 75 percent slopes

Predominant Parent Materials:

Kind: Residuum

Origin: 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: Moderately slow To Moderate

Minimum

Maximum

Depth (inches):

20

40

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):

0.0

0.0

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 (*Erodium* spp), true clovers (*Trifolium* spp), and bur clover (*Medicago polymorpha*). 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.

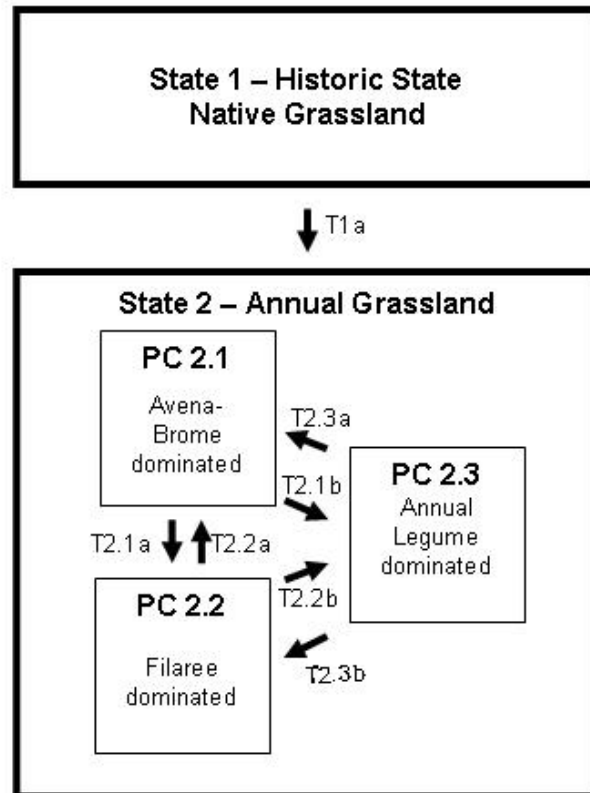
As germination, seedling establishment and plant growth progress during the growing season, species composition changes depending primarily on the timing and amount of precipitation and temperature (George et al. 2001a). Consequently, grassland species composition varies seasonally and annually. Unlike 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 (2000 lb/a), favorable (2500 lb/a), and unfavorable (1000 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.



Annual Grassland 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.

Transition

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 riggut 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.



Annual Grassland

State 2: Annual Grassland Plant Species Composition:

Grass/Grasslike				Annual Production in Pounds Per Acre	
Group	Group Name	Common Name	Scientific Name	Low	High
8 -	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
	<i>Bromus madritensis ssp. rubens (Syn)</i>	0	0
barley	<i>Hordeum</i>	0	0
	<i>Lolium multiflorum (Syn)</i>	0	0
rat-tail fescue	<i>Vulpia myuros</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			0	0
		fiddleneck	<i>Amsinckia</i>	0	0
14 -	Non-native annual forb			0	0
		stork's bill	<i>Erodium</i>	0	0
		lupine	<i>Lupinus</i>	0	0
		burclover	<i>Medicago polymorpha</i>	0	0
		clover	<i>Trifolium</i>	0	0

Annual Production by Plant Type:

<u>Plant Type</u>	<u>Annual Production (lbs/AC)</u>		
	<u>Low</u>	<u>Representative Value</u>	<u>High</u>
Forb	200	400	500
Grass/Grasslike	800	1600	2000
Total:	1000	2000	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>
≤ 0.5 feet	80 to 100	0 to 20		
> 0.5 - < 1 feet	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

Ecological Site Interpretations

Animal Community:

Wildlife

Many wildlife species use the annual grasslands for foraging (Mayer and Laudenslayer 1988), but some require special habitat features such as cliffs, caves, ponds, or habitats with woody plants for breeding, resting, and escape cover. Characteristic reptiles that breed in annual grassland habitats include the western fence lizard (*Sceloporus occidentalis*), common garter snake (*Thamnophis sirtalis*), and western rattlesnake (*Crotalus viridis*) (Basey and Sinclear 1980). Mammals typically found in this habitat include the black-tailed jackrabbit (*Lepus californicus*), California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), western harvest mouse (*Reithrodontomys megalotis*), California vole (*Microtus californicus*), badger (*Taxidea taxus*), and coyote (*Canis latrans*) (White et al. 1980). The endangered San Joaquin kit fox (*Vulpes macrotis mutica*) is also found in and adjacent to this habitat (U.S. Fish and Wildlife Service 1983). Common birds known to breed in annual grasslands include the burrowing owl (*Althea cucularia*), short-eared owl (*Asio flammeus*), horned lark (*Eremophila alpestris*), and western meadowlark (*Sturnella neglecta*) (Verner et al. 1980). This habitat also provides important foraging habitat for the turkey vulture (*Cathartes aura*), and the American kestrel (*Falco sparverius*).

Grazing and Browsing

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

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

incomplete nutrient extraction.

Plant Preference by Animal Kind:

Hydrology Functions:

The watersheds associated with these sites are drained by intermittent streams that only flow during the wet season. In dry years these intermittent streams may not flow at all. Runoff on these soils is 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:

Other Products:

Other Information:

Native Grass Restoration:

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

Annual Legumes and Annual Grasses:

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

Poisonous/Non-native Plants

Poisonous Plants:

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

Invasive Species:

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

MGjpeaslee4 36.10.22.87 121.0.41.24
SBMinnis1 37.4659159 121.8696682
SBminnis1_05 37.4656566 121.8702662
MGcreston1 35.29.12.427 120.26.45.947
MGcreston3 35.29.10.096 120.26.42.170
RLcreston2 35.4859800 120.4473800
DMpeaslee1 36.10.20.19 121.00.51.455
Kodelvalle1 37.5981882 121.6909942
MGjpeaslee1 36.09.32.246 120.59.51.962
SBdelvalle2 37.5986796 121.6914207

Type Locality:

Relationship to Other Established Classifications:

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

Other References:

References

Baker, H.G. Sources of the naturalized grasses and herbs in California. In: Huenneke, L.F. and H.A. Mooney (ed.). 1989. Grassland Structure and Function: California Annual Grassland. Kluwer Academic Publishers, Dordrecht, Netherlands. Pg 29-38.

Bartolome, J. W. 1987. California grassland and oak savannah. Rangelands 9:122-125.

Bartolome, J.W., W.F. Frost, N.K. McDougald and M. Connor. 2002. California guidelines for residual dry matter (RDM) management on coastal and foothill annual rangelands. Rangeland Monitoring Series. Publ. 8092, Div. of Agr. and Nat Res., Univ. of Calif. 8pp.

Basey, H. E., and D. A. Sinclear. 1980. Amphibians and reptiles. Pages 13-74 In J. Verner and A. S. Boss, tech. coords. California wildlife and their habitats: western Sierra Nevada. U.S. Dep. Agric., For. Serv. (Berkeley, Calif.), Gen. Tech. Rep. PSW-37.

Burcham, L. T. 1957. California Rangeland. Div. Forestry, Sacramento, Calif. 261 pgs.

Cheatham, N. H., and J. R. Haller. 1975. An annotated list of California habitat types. Univ. of California Natural Land and Water Reserve System, unpubl. manuscript.

Corbin, Jeffrey D. and Carla M D'Antonio. 2004. Competition between native perennial and exotic annual grasses: Implications for an historical invasion. Ecology 85:1273-1283.

Daly, Christopher. 2006. Guidelines for assessing the suitability of spatial climate data sets. Internat. J. of Climatology 26: 707-721.

Garrison, G. A., A. J. Bjugstad, D. A. Duncan, M. E. Lewis and D. R. Smith. 1977. Vegetation and environmental features of forest and range ecosystems. U.S. Dep. Agric., For. Serv., Handbook No. 475.

George, Mel, Jim Bartolome, Neil McDougald, Mike Connor, Charles Vaughn and Gary Markegard. 2001a. Annual Range Forage Production. ANR Publ. 8018, Div. of Agric. And Nat. Res., Univ. of Calif., Oakland, Calif. 9 pgs.

George, Melvin, Glenn Nader, Neil McDougald, Mike Connor, and Bill Frost. 2001b. Annual Rangeland Forage Quality. ANR Publ. 8022, Div. of Agric. And Nat. Res., Univ. of Calif., Oakland, Calif. 13 pgs.

Gordon, D.P., J.M. Whelker, J.M. Menke, and K.J. Rice. 1989. Neighborhood competition between annual plants and blue oak (*Quercus douglasii*) seedlings. *Oecologia* 79:533-51.

Heady, H. F. 1977. Valley grassland. Pages 491 514 In M. G. Barbour and J. Major, eds. *Terrestrial vegetation of California*. John Wiley and Sons, New York.

Kuchler, A. W. 1977. Appendix: the map of the natural vegetation of California. Pages 909-938 In M. G. Barbour and J. Major, eds, *Terrestrial vegetation of California*. John Wiley and Sons, New York.

Mayer K. E., W. F. Laudenslayer. (Eds.) 1988. *A guide to wildlife habitats of California*. California Dept. of Forestry and Fire Protection, Sacramento.

McDougald, N.K. W.E. Frost, and W.J. Clawson. 1991. Estimating the cost of replacing forage losses on annual rangeland. Leaflet 21494. Division of Agric. and Nat. Res., Univ. of Calif., Oakland, Calif.

Munz, P. A., and D. D. Keck. 1959. *A California flora*. Univ of California Press, Berkeley.

Parker, I., and W. J. Matyas. 1981. CALVEG: a classification of Californian vegetation. U.S. Dep. Agric., For. Serv., Reg. Ecol. Group, San Francisco.

Parsons, D.J and T.K. Stohlgren. 1989. Effects of varying fire regimes on annual grasslands in the southern Sierra Nevada of California. *Madroño*, 36:154-168.

Paysen, T. E., J. A. Derby, H. Black, Jr., V. C. Bleich, and J. W. Mincks. 1980. A vegetation classification system applied to southern California. U.S. Dep. Agric., For. Serv., (Berkeley, Calif.) Gen. Tech. Rep. PSW-45.

U.S. Fish and Wildlife Service 1983b. San Joaquin kit fox recovery program. U.S. Dep. Interior, Fish and Wildl. Serv. Portland, Ore.

Rice, Kevin J. and Erin K. Espeland. 2006. *Genes on the Range: Population Genetics* (in press)

White, M., R. H. Barrett, A. S. Boss, T. F. Newman, T. J. Rahn, and D. F. Williams. 1980. Mammals. Pages 321-424 In J. Verner and A. S. Boss, tech. coords. *California wildlife and their habitats: western Sierra Nevada*. U.S. Dep. Agric. For. Serv.,(Berkeley, Calif.), Gen. Tech. Rep. PSW-37.

Site Description Approval:

<u>Author</u>	<u>Date</u>	<u>Approval</u>	<u>Date</u>
Melvin George, Royce Larsen, Sheila Barry, Karly Striby, Ken Oster and Danny Marquis	5/14/2004		

Reference Sheet

Author(s)/participant(s):

Contact for lead author:

Date: **MLRA:** 015X **Ecological Site:** Clay Loam (Linne) R015XI017CA 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:
