
California Rangeland Assessment and Mapping Reference (Mar 2014)

California Interagency Rangeland Assessment and Mapping Work Group

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List of Acronyms

BLM – Bureau of Land Management

CDOC – California Department of Conservation

CALFIRE – California Department of Forestry and Fire Protection

CDFA – California Department of Food & Agriculture

CDFW – California Department of Fish & Wildlife

CLCC – California Landscape Conservation Cooperative

CNPS – California Native Plant Society

CNRA – California Natural Resources Agency

CRAM – California Rapid Assessment Method

DOI – U.S. Department of Interior

DWR – Department of Water Resources

FRAP – Fire Resource and Assessment Program

GIN – Greeninfo Network

MRLC – Multi-Resolution Land Characteristics Consortium

NCED – National Conservation Easement Database

NIFTT - National Interagency Fuels Technology Transfer

NRCS – Natural Resource Conservation Service

SFEI – San Francisco Estuary Institute

SWRCB – State Water Resources Control Board

TNC – The Nature Conservancy

UCB - University of California at Berkeley

UCD – University of California at Davis

USDA – United States Department of Agriculture

USEPA – United States Environmental Protection Agency

USFS – United States Forest Service

USFWS – United States Fish and Wildlife Service

USGS – United States Geological Survey

WCB – Wildlife Conservation Board

Background

The California Interagency Rangeland Assessment and Mapping work group developed through conversation between the State Water Resources Control Board and the Cal Fire's Fire and Resource Program (FRAP). Other state and federal agencies have been invited to discuss various issues relevant to assessing and mapping rangelands in California. The work group has met ad hoc on three occasions over the course of the last year. One of the initial discussions of the work group was to identify some of the data gaps for the 2015 FRAP assessment. The 2015 assessment is used to inform the development of state and federal agency management and policy on forest and rangelands throughout California. Subsequent work group discussion identified the need for consensus across agencies on the definition of rangeland and grazing land. Key data gaps include an update to the statewide vegetation layer and a comprehensive collection of the various rangeland conservation efforts. These key data will assist a number of agencies in addressing various environmental challenges more effectively. At present the focus of this document is on the availability and suitability of spatial data related to rangeland and grazing land for assessment and mapping.

Purpose

- Provide a reference for the definitions of *rangeland* and *grazing land* relevant to California;
- Catalog current spatial data products used to assess rangelands;
- Facilitate rapid assessment of the latest geospatial data relevant to rangelands in California;
- Provide a concise collection of literature on assessment and mapping of rangelands;
- Stimulate dialog on the appropriate use and limitations of available data;

Future iterations of this reference may include:

- Spatial accuracy reports
- Spatial data processing methods and procedures
- Organized collection of data sources for rangeland assessment indicators
- More thorough coverage of NGO and Academic sources of data

Rangeland and Grazing Land Definitions

Rangeland

California Public Resource Code § 4789.2(i).

Land on which the existing vegetation, whether growing naturally or through management, is suitable for grazing or browsing of domestic livestock for at least a portion of the year. Rangeland includes any natural grasslands, savannas, shrublands (including chaparral), deserts, wetlands, and woodlands (including Eastside ponderosa pine, pinyon, juniper, and oak) which support a vegetative cover of native grasses, grasslike plants, forbs, shrubs, or naturalized species.

California Wildlife Conservation Board

Land on which the historic climax plant community is predominantly grasses, grass like plants, forbs, or shrubs. Includes land revegetated naturally or artificially when routine management of that vegetation is accomplished mainly through manipulation of grazing. Rangeland includes native or naturalized grasslands, savanna, shrub lands, most deserts, alpine communities, coastal marshes and wet meadows.

USDA Forest Service

Land primarily composed of grasses, forbs, or shrubs. This includes lands vegetated naturally or artificially to provide a plant cover managed like native vegetation and does not meet the definition of pasture. The area must be at least 1.0 acre in size and 120.0 feet wide.¹

Society for Rangeland Management (adopted by BLM)

Land on which the indigenous vegetation (climax or natural potential) is predominantly grasses, grass-like plants, forbs, or shrubs and is managed as a natural ecosystem. If plants are introduced, they are managed similarly. Rangelands include natural grasslands, savannas, shrublands, many deserts, tundra, alpine communities, marshes, and meadows.²

Grazing Land

California Gov Code § 65570(b)(3).

Land on which the existing vegetation, whether grown naturally or through management, is suitable for grazing or browsing of livestock.

California Wildlife Conservation Board

(1) A collective term for rangeland, pastureland, grazing forest land, native and naturalized pasture, hayland, and grazed cropland. Although grazing is generally a predominate use, the term is used independent of any use. (2) Land is used primarily for production of forage plants maintained or manipulated primarily through grazing management. Includes all land having plants harvestable by grazing without reference to land tenure, other land uses or management practices.

USDA-Natural Resources Conservation Service

A collective term used for rangeland, pastureland, grazed forestland, native and naturalized pasture, hayland, and grazed cropland. Although grazing is generally a predominant use on grazing lands, the term is also applied independently of any actual use for grazing. Grazing land is also described as land used for production of forage plants maintained or manipulated primarily through grazing management. It includes all lands having plants harvestable by grazing without reference to land tenure, other land uses, management, or treatment practices.³

¹ USFS. 2013. Interior West Forest Inventory & Analysis: P2 field procedures. Washington, DC, USA: USDA. 86 p

² Bedell, T.E. 1998. Glossary of Terms Used in Range Management: A Definition of Terms Commonly Used in Range Management. 4th Edition. Glossary Update Task Group, Society for Range Management. Denver, CO.

³ NRCS 2003 National Range and Pasture Handbook. Grazing Lands Technology Institute. Fort Worth, TX. USDA. 214 p

Table 1. Comparison of agency Land Cover/Use geospatial data

Source	Data	Collection Cycle (Last collection)	Data Collection Method	Format	Scope	Resolution (raster) or Minimum Map Unit (vector)
CALFIRE	fveg	Varies (2006) ¹	Multi-Source	Raster	Statewide	30 meters
CDFW	Vegetation Classification and Mapping Program	Ongoing ²	Field Survey, aerial photo interpretation, and GIS editing	Vector	Statewide ³	Varies by project area
DWR	Land Use Survey	Varies	NAIP imagery; Field GPS	Vector	Statewide	Crop field (sub-parcel)
CDOC	California Important Farmland	Biennial (2010) ⁴	Aerial photo interpretation; field sample verification	Vector	Statewide (Non-Fed)	<u>≥10 acres</u>
MRLC	National Land Cover Database	5-year (2011)	Landsat ETM+	Raster	Nationwide	<u>30 meters</u>
USFS	CALVEG	Ongoing (2009)	Landsat TM, Aerial photo	Vector	Statewide	<u>2.5 acres</u>
USDA	Crop Data Layer	Annual (2012)	Landsat TM/ETM+	Raster	Nationwide	<u>30 meters</u>
USDA	National Resources Inventory	5-year (2012)	Aerial photo interpretation; field sample verification	Point	Nationwide (Non-Fed)	n/a
USGS	Remote Sensing Phenology	Annual (2012)	Satellite (Multi-Sensor)	Raster	Nationwide	<u>≥30 meters</u>
USDA, DOI, TNC, NIFTT	LANDFIRE	2-year (2010)	Landsat ETM+	Raster	Nationwide	<u>30 meters</u>

¹ Next update of 'fveg' is anticipated late 2014.

² Some project area collection cycles are ongoing other project areas are one time

³ Projects areas vary in scope throughout the State

⁴ Changes to program resources in 2011 altered the update for 2012, a limited number of counties are being updated for 2014

Table 2. Agency spatial datasets for assessing Non-Federal Rangeland or Grazing Land in California.

Source	Program Website <i>Link to Datasets</i>	Scope <i>Theme</i>	Description
CDOC	Farmland Mapping & Monitoring Program Important Farmland Data Availability	Statewide (Non-Federal) <i>Agricultural Landuse</i>	Provides data to decision makers for use in planning for the present and future use of California's agricultural land resources (including grazing land.)
NRCS	National Resources Inventory Rangeland Resource Assessment	Eco-region or Common Resource Area (Non-Federal) <i>Resource Inventory</i>	Reports rangeland resource conditions based on NRI samples taken 2003-2006 The CRA layer was created for the rangeland reporting regions where resource concerns, problems, or treatment needs are similar.
CALFIRE	Fire and Resource Assessment Program	Statewide	Average potential production of above ground biomass (annual leaf growth of herbs, grasses, and shrubs) was modeled using Natural Resources Conservation Service (NRCS) range productivity data. PRC § 4126(c) Lands in areas which are principally used or useful for range or forage purposes, which are contiguous to the lands described in subdivisions (a) and (b).
	Range Productivity ¹	<i>Animal Forage Model</i>	
	State Responsibility Area	<i>Fire Response/ Planning</i> <i>Vegetation Treatment</i>	

¹ This dataset will not be updated or used for the 2015 assessment (K. Larvie, per comms)

Table 3. Federal Agency spatial data on grazing allotments in California

Source	Website	Spatial Data	Last updated
BLM	California GIS	California Grazing Allotments	11/27/2013
USFS (R4)	Humboldt-Toiyabe NF Geospatial Data	Allotment	3/24/2008
		Pasture (subunit of Allotment)	3/24/2008
USFS (R5)	Regional Level Datasets	Allotments and Pastures	10/31/2008

Table 4. Rangeland related spatial data, programs, and projects in California.

Source	Website	Scope	Purpose
CDOC	California Farmland Conservancy Program	Statewide	Provides grant funding for projects which use and support agricultural conservation easements for protection of agricultural lands.
CDFA	Ecosystem Services Database	Statewide	Identifies social and environmental benefits from agriculture
CDFW	Wildlife Conservation Board Approved Projects	Statewide	Location and attributes for WCB approved projects
CLCC	California Landscape Conservation Cooperative	Ecoregion	Integrates science and management to address climate change threats to CA rangelands
CNPS	Manual of California Vegetation Database Project	Statewide	To increase exposure and broaden applications of the Manual of CA Vegetation, the database is for archiving, accessing, and adding to this vegetation information; and to make it available publicly via the web
GIN	California Protected Areas Database California Conservation Easement Database	Statewide Statewide	Multi-jurisdictional planning, habitat conservation programs, land use plans Sharing and managing conservation easement information
NRCS	SSURGO	Nationwide	Source of geospatial Soil Survey data
SFEI	Ecoatlas	Statewide	Interactive maps, general wetland conditions based on CRAM
SWRCB	303d Water Rights	Statewide Statewide	Clean Water Act listed impaired water bodies Livestock Stockpond certificate and Stockwater permit information
UCB	Wieslander Vegetation Type Map	Statewide	Provide digitized data for ecological and geospatial analysis of the earliest vegetation surveys
UCD	Natural Resources Project Inventory California Rangelands	Statewide Statewide	Location and attribute data on natural resource projects Provides links to variety of assessment and mapping related topics
USDA	National Agricultural Statistics Service	Nationwide	Census and survey data for agriculture services
	Farm and Ranch Lands Protection Program	Nationwide	Provides matching funds to help purchase development rights to keep productive farm and rangeland in agricultural uses.
	Grassland Reserve Program	Nationwide	Voluntary conservation program that emphasizes support for working grazing operations. (requires a grazing management plan from participants.)
CNRA	California General Plans Rural	Statewide	Land use classifications for natural resource and infrastructure planning
USEPA	Grants Reporting & Tracking System	Nationwide	Provides grant information on individual non-point source pollution projects.
USFWS	California Foothill Legacy Area	Multi-County	Establish an easement program to encourage continued ranching without creating new regulatory requirements

Table 5. Rangeland Assessment and Mapping Bibliography

Category	Citation
	Jantz, P., Preusser, B., Fujikawa, J., Kuhn, J., Bersbach, C., Gelbard, J., Davis, F. 2007. <u>Regulatory Protection and Conservation: In California Grasslands</u> . Ecology and Management, ed. 23. University of California Press, Berkeley, CA.
	Kroeger, T., F. Casey, P. Alvarez, M. Cheatum and L. Tavassoli. 2009. <u>An Economic Analysis of the Benefits of Habitat Conservation on California Rangelands</u> . Conservation Economics White Paper. Conservation Economics Program. Washington, DC: Defenders of Wildlife. 91 pp.
<i>Conservation</i>	The Nature Conservancy. 2007. <u>Biological Prioritization of Rangelands: Approach and Methods</u> .
	Weltz, M., Jolley, L., Goodrich, D., Boykin, K., Nearing, M., Stone, J., Guertin, P., Hernandez, M., Spaeth, K., Pierson, F., Morris, C., Kepner, B. 2011. <u>Techniques for assessing the environmental outcomes of conservation practices applied to rangeland watersheds</u> . Journal of Soil and Water Conservation. 66(5): 154A- 162A
	Wetzel, W., Lacher, I., Swezey, D., Moffitt, S., Manning, D.. 2012. <u>Analysis reveals potential rangeland impacts if Williamson Act eliminated</u> . California Agriculture. Vol. 66. No. 4.
	Andersen, M., et. al. 2002 <u>California's cattle and beef industry at the crossroads</u> . California Agriculture. Vol. 56. No. 5
<i>Demography</i>	Frerichs, B., Cromwell, D. 2002. <u>Characteristics of the Range Livestock Industry</u> . Technical Working Paper 10-01-02. Cal Fire FRAP. Sacramento, CA.
	Ferranto, S., Huntsinger, L., Getz, C., Nakamura, G., Stewart, W., Drill, S., Valachovic, Y., DeLasaux, M., Kelly, M. 2011. <u>Forest and rangeland owners value land for Natural amenities and as financial investment</u> . California Agriculture. Vol. 65. No. 4.
<i>Historical</i>	Burcham, L. 1957. California Rangeland. An Historic-Ecological Study of the Range Resource of California . Division of Forestry, Department of Natural Resources, State of California.
	Beetle, A., 1947. Distribution of the Native Grasses of California . Hilgardia. California Agricultural Experiment Station. Vol. 17 No. 9.

Mapping

Buck-Diaz, J., Harbert, B., Evens, J. 2011. [California Rangeland Monitoring and Mapping](#): A Focus on Grassland Habitats of the San Joaquin Valley and Carrizo Plain. California Native Plant Society.

Cal Fire FRAP. 2003. [Rangeland Area and Condition](#). Forest and Rangeland Assessment. Chapter 2 Productive Capacity.

Harris, N., Frost, W., McDougald, N., George, M., Nielsen, D. 2002. [Long-term residual dry matter mapping for monitoring California hardwood rangelands](#). USDA Forest Service Gen. Tech. Rep. PSW-GTR-184

Hogan, S. 2012. [Geographical Approach to California Rangeland Water Quality and its Associated Biogeochemical Influences](#). M.S.Thesis, UC Davis.

Reeves, M., Mitchell, J. 2011. [Extent of Coterminous US Rangelands Quantifying Implications of Differing Agency Perspectives](#). Rangeland Ecology Management Volume 64, pg 585–597.

Soil

DOC. 2003. [Important Farmland Mapping Categories and Soil Taxonomy Terms](#). Farmland Mapping and monitoring Program. Sacramento, CA.

Holstein, G. 2011. [Geology, Climate, and California Prairie Distribution](#). Fremontia. Journal of the California Native Plant Society. Vol 39:2, 39:3, pg 22.

Vegetation

CDFW. 2000. [Standards and Guidelines for CWHR Species Models](#). California Department of Fish and Game, California Interagency Wildlife Task Group. Sacramento, CA.

CNPS. 2007. [Grassland Initiative Bibliography](#). California Native Plant Society, Sacramento, Ca.

FGDC. 2008. [Vegetation Classification Standard](#). FGDC-STD-005. Vegetation Subcommittee, Federal Geographic Data Committee, FGDC Secretariat, U.S. Geological Survey. Reston, VA. 119p.

Keeler-Wolf, T. 2007. [The History of Vegetation Classification and Mapping in California](#). Terrestrial Vegetation of California. pp. 1–42. University of California Press, Berkeley, CA.

Shuang, L., Potter, C., Hiatt, C. 2012. [Monitoring of Net Primary Production in California Rangelands Using Landsat and MODIS Satellite Remote Sensing](#). Natural Resources. 3: 56-65.

Shiflet, T. 1994. [Rangeland Cover Types of the U.S.](#) Society for Range Management.