

Resource Inventory

A photograph of three horses grazing in a lush green field. The horse on the left is brown with a white blaze and a white patch on its side. The middle horse is dark brown or black. The horse on the right is brown with white speckles. In the background, there is a green fence and a dense line of trees under a cloudy sky.

Scott Oneto

University of California Cooperative Extension

Taking stock of your land's resources

- Inventory of soil, water, and forage resources
- Monitor
 - Mapping resources
 - Photo Points



Soil Resources

- What is the potential of your soil?
- What are the limiting factors?
- How can management maintain or improve soil productivity?



Water Resources

- What is your source of water?
- How much do you need?
- What are the costs?



Forage Production

- How much forage will my land provide?
- When should I graze?
- How many animals will it support?
- How does management effect total forage?



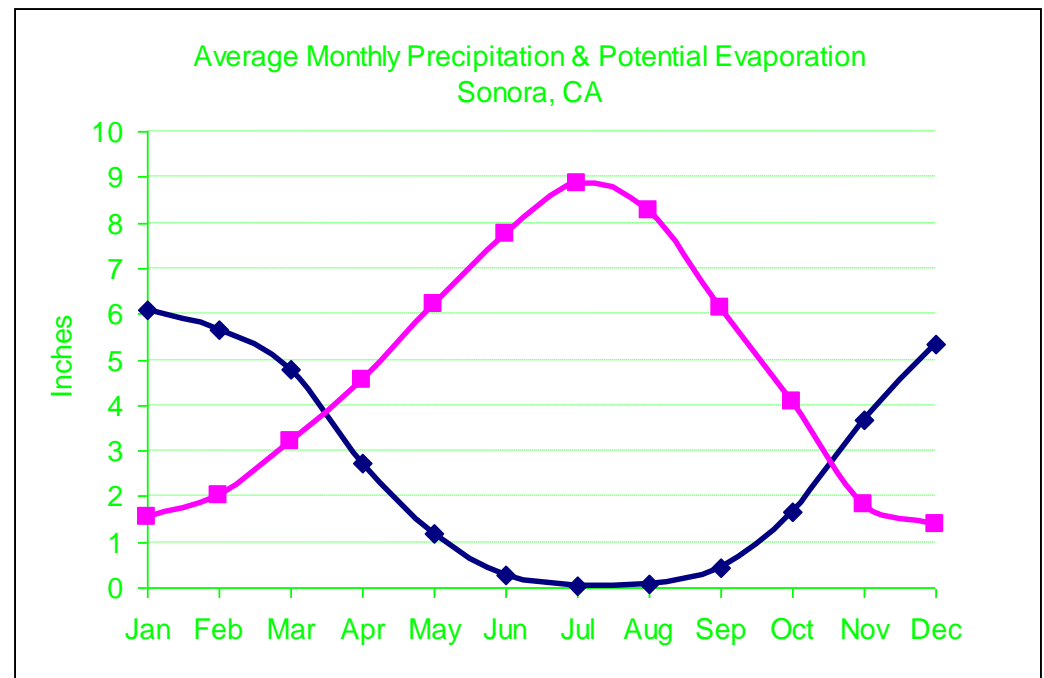
Factors that determine soil productivity

- Rainfall & Temperature
- Topography
- Soil depth
- Texture
- Structure
- Organic matter content



Factors you can't control

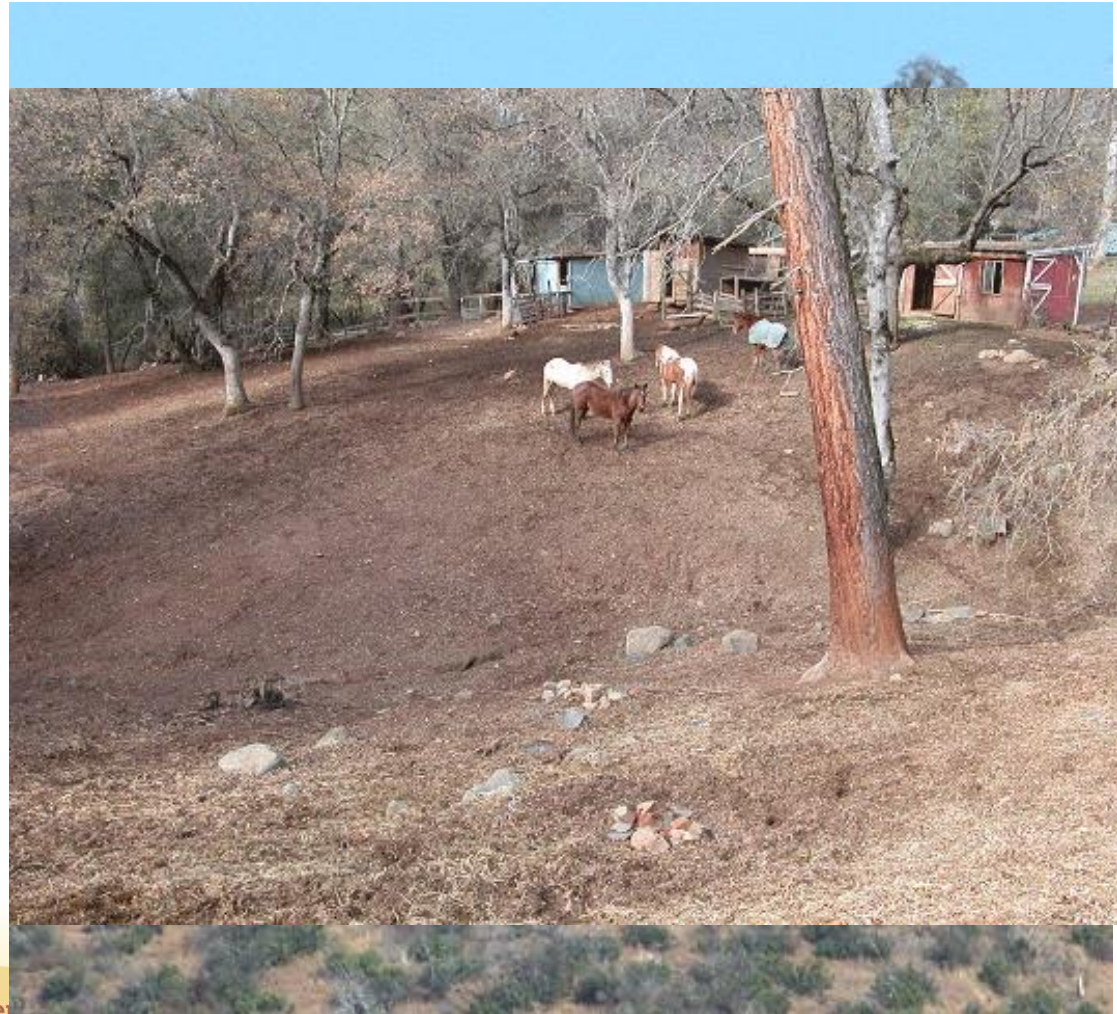
- **Rainfall & Temperature**
- Topography
- Soil depth
- Texture



From the Western Regional Climate Center: <http://www.wrcc.dri.edu>

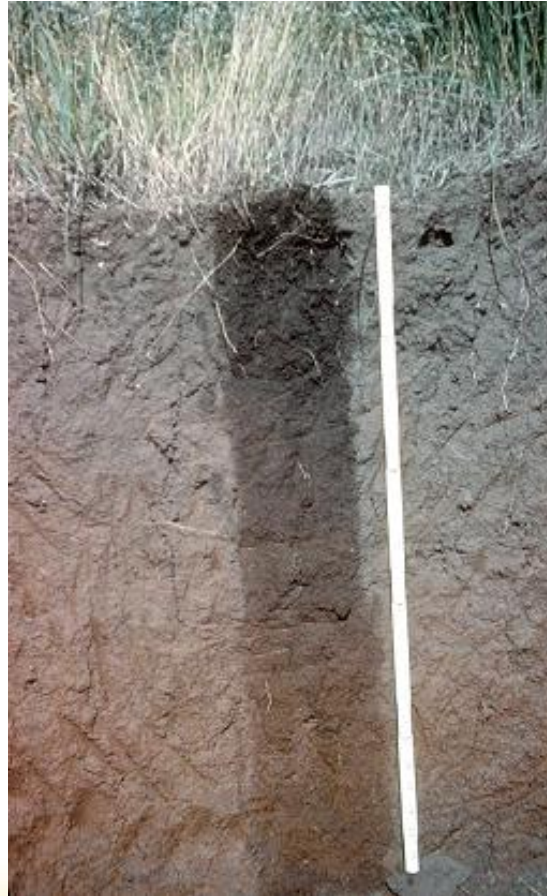
Factors you can't control

- Rainfall & Temperature
- **Topography**
- Soil depth
- Texture



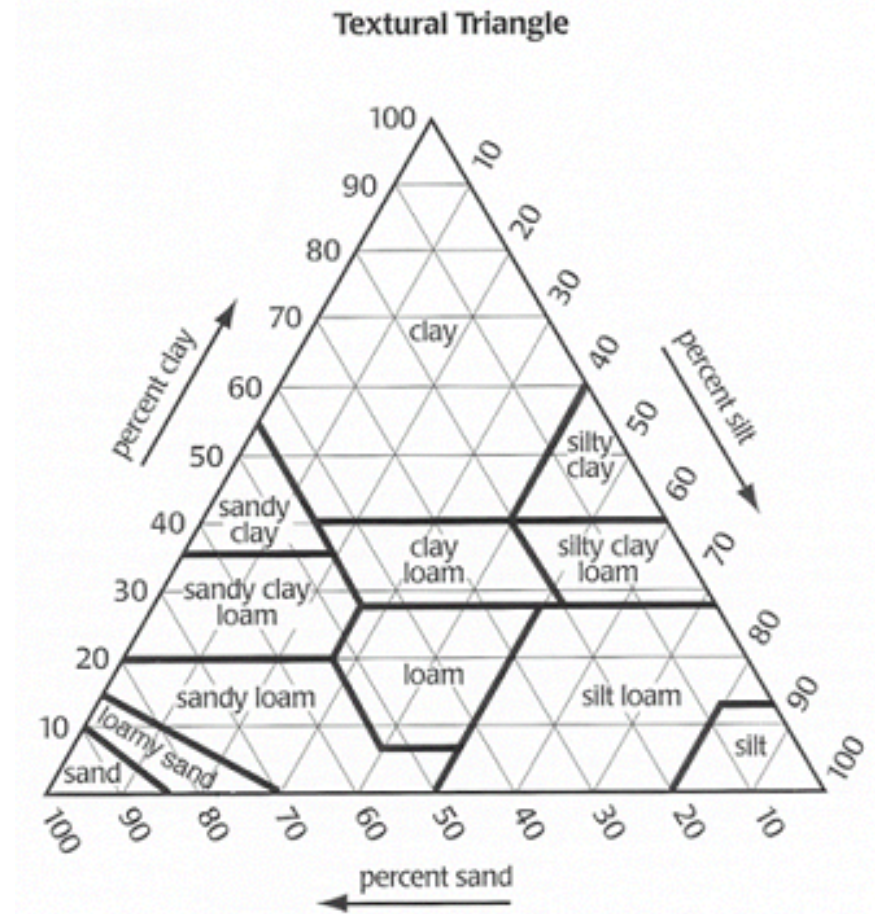
Factors you can't control

- Rainfall & Temperature
- Topography
- **Soil depth**
- Texture



Factors you can't control

- Rainfall & Temperature
- Topography
- Soil depth
- **Texture**
 - Proportions of sand, silt, & clay in soil



Factors you can manage

- **Structure**
- Organic matter content



Factors you can manage

- Structure
- **Organic matter content**



How do I determine my soils?

- Traditionally these books were printed and made available at
 - UC Cooperative Extension
 - USDA Natural Resource Conservation Service
 - County library
- Today most counties have data available online
 - <https://websoilsurvey.nrcs.usda.gov>

Search

Area of Interest

Import AOI

Quick Navigation

Address

State and County

Soil Survey Area

Latitude and Longitude

PLSS (Section, Township, Range)

Bureau of Land Management

Department of Defense

Forest Service

National Park Service

Hydrologic Unit

Area of Interest Interactive Map

Legend

View Extent: Contiguous U.S. | Scale: (not to scale)

Search

Area of Interest
 Open All | Close All

AOI Properties
 Clear AOI

AOI Information

Name:

Map Unit Symbols
 Use Soil Survey Area Map Unit Symbols
 Use National Map Unit Symbols

Area (acres) 26.7

Soil Data Available from Web Soil Survey

Amador Area, California (CA628)

Data Availability	Tabular and Spatial, complete
Tabular Data	Version 8, Sep 12, 2016
Spatial Data	Version 3, Dec 4, 2013

Clear AOI

Import AOI

Export AOI

Quick Navigation

- Address
- State and County
- Soil Survey Area
- Latitude and Longitude
- PLSS (Section, Township, Range)
- Bureau of Land Management
- Department of Defense
- Forest Service
- National Park Service
- Hydrologic Unit

Area of Interest Interactive Map

Legend

View Extent: Contiguous U.S. | Scale: (not to scale)

Search

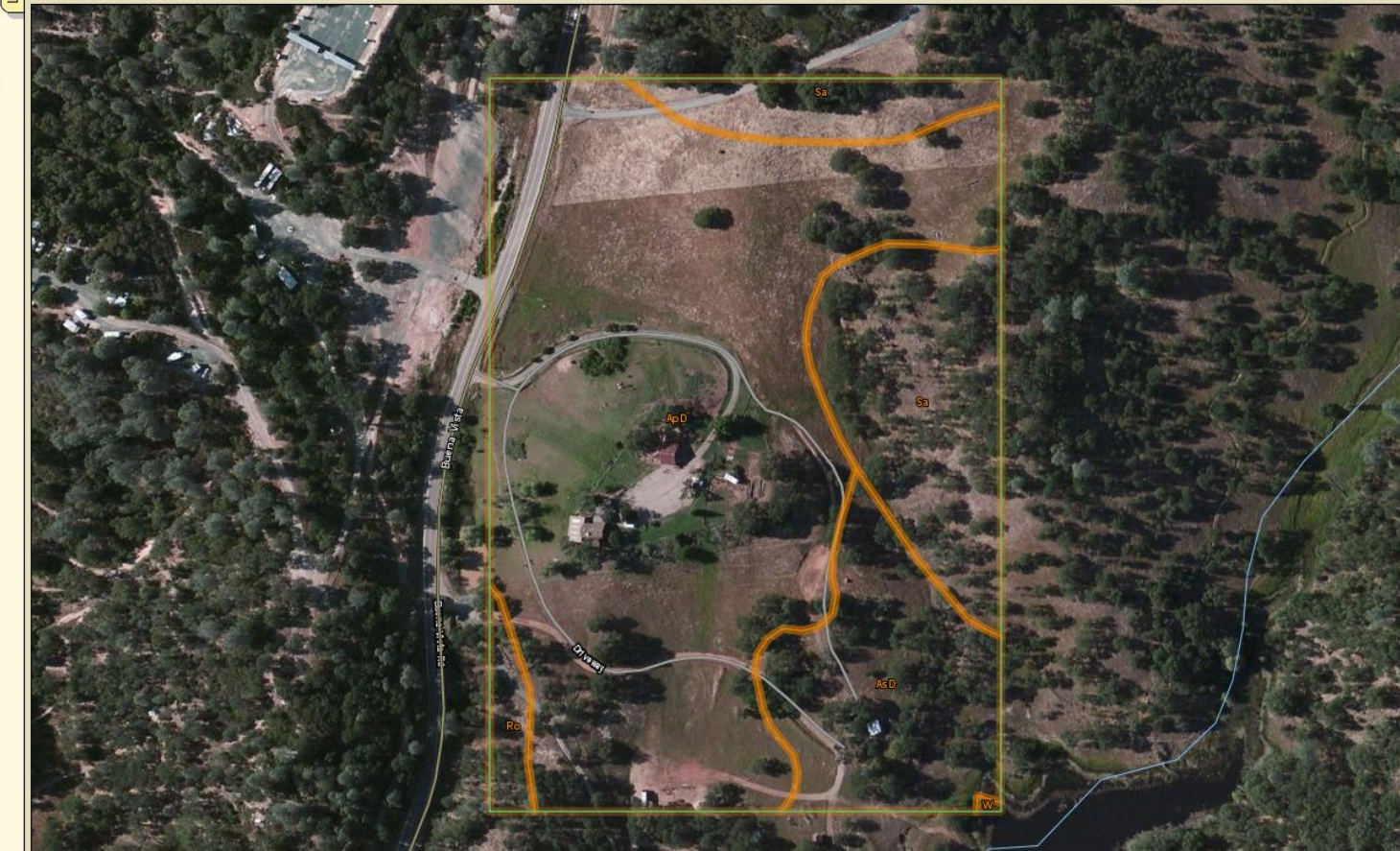
Map Unit Legend

Amador Area, California (CA628)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ApD	Auburn silt loam, 0 to 31 percent slopes	17.3	64.7%
AsD	Auburn very rocky silt loam, 3 to 31 percent slopes	3.8	14.1%
Ro	Rock land	0.5	2.0%
Sa	Sedimentary rock land	5.1	19.2%
W	Water	0.0	0.1%
Totals for Area of Interest		26.7	100.0%

Soil Map

Legend Scale (not to scale)



Search

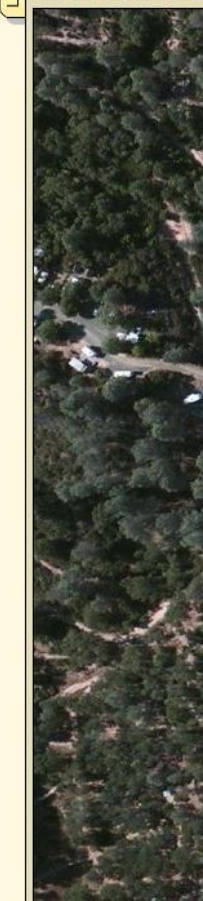
Map Unit Legend

Soil Map Legend

Amador Area, California (CA628)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ApD	Auburn silt loam, 0 to 31 percent slopes	17.3	64.7%
AsD	Auburn very rocky silt loam, 3 to 31 percent slopes	3.8	14.1%
Ro	Rock land	0.5	2.0%
Sa	Sedimentary rock land	5.1	19.2%
W	Water	0.0	0.1%
Totals for Area of Interest		26.7	100.0%

Soil Map



Map Unit Description

Printable Version

Report - Map Unit Description

Printable Version

Amador Area, California

ApD—Auburn silt loam, 0 to 31 percent slopes

Map Unit Setting

National map unit symbol: hj2p
 Elevation: 500 to 1,200 feet
 Mean annual precipitation: 20 to 30 inches
 Mean annual air temperature: 59 to 63 degrees F
 Frost-free period: 225 to 300 days
 Farmland classification: Not prime farmland

Map Unit Composition

Auburn and similar soils: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Auburn Setting

Landform: Hills
 Landform position (two-dimensional): Backslope
 Landform position (three-dimensional): Side slope
 Down-slope shape: Concave
 Across-slope shape: Convex
 Parent material: Amphibolite schist

Typical profile

H1 - 0 to 9 inches: silt loam
 H2 - 9 to 14 inches: silt loam
 H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 31 percent
 Depth to restrictive feature: 10 to 28 inches to lithic bedrock
 Natural drainage class: Well drained
 Runoff class: Very high
 Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
 Depth to water table: More than 80 inches
 Frequency of flooding: None
 Frequency of ponding: None
 Available water storage in profile: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): 4e
 Land capability classification (nonirrigated): 4e
 Hydrologic Soil Group: D
 Ecological site: SHALLOW ROCKY LOAM FOOTHILLS (R018XD090CA)
 Hydric soil rating: No

Another online resource: UC Davis California Soil Resource Lab

<https://casoilresource.lawr.ucdavis.edu>

The screenshot displays the SoilWeb interface. On the left, a sidebar contains several sections:

- Soil Profiles:** A vertical bar shows soil horizons with their depths: A1 (0-5 cm), A2 (5-23 cm), Bt1 (23-36 cm), Bt2 (36-43 cm), and 2R (43-46 cm). Below this is a 'Typical Profile' dropdown and buttons for 'Org. Matter', 'Clay', 'Sand', 'Ksat', 'pH', 'Kr Factor', 'EC', 'SAR', 'CaCO3', 'Gypsum', 'CEC @ pH7', and 'Linear Ext.'.
- Soil Taxonomy:** A list of soil classification details:
 - Order: [Alfisols](#)
 - Suborder: [Keralfs](#) [Map of Suborders](#)
 - Greatgroup: [Haploxeralfs](#)
 - Subgroup: [Lithic Mollic Haploxeralfs](#)
 - Family: [Loamy-skeletal, mixed, superactive, thermic Lithic Mollic Haploxeralfs](#)
 - Soil Series: [Pardee](#)
 - Data: [Component](#) [All Horizons](#) [Lab Data](#)
- Land Classification:** Includes 'CA Storie Index: Grade 5 - Very Poor (18)', 'Land Capability Class (non-irrigated): 6-e', 'Land Capability Class (irrigated): -', 'Ecological Site Description: [UPLAND TERRACES](#)', and 'Forage Suitability Group: n/a'.
- Hydraulic and Erosion Ratings:** A section with a downward arrow.
- Forest Productivity:** A section with an upward arrow, stating 'No data are available.'
- Soil Suitability Ratings:** A section with a downward arrow.

The main area of the interface is a map showing an aerial view of a landscape with yellow outlines delineating different soil types. Labels on the map include IrE, PaD, PnC, LaC, SWE, W, and FxD. The top of the browser window shows the URL 'https://casoilresource.lawr.ucdavis.edu/gmap/' and the UC Davis and NRCS logos. The bottom right corner of the map area shows coordinates: Lat: 38.2268, Lon: -120.9337, and a scale bar for 100 meters.

Factors determining how much water you have and how much you need



Determining sources of water

- Wells
- Utilities
- Streams
- Ditches
- Lakes or ponds

USGS
science for a changing world

Science In Your Watershed

[Climate and Land Use Change](#) || [Core Science Systems](#) || [Ecosystems](#) || [Energy and Minerals](#) || [E](#)

"Science in Your Watershed"

- ▶ Home
- ▶ [Locate Your Watershed \(Legacy HUC's\)](#)
- ▶ [Locate Your Stream Site \(Legacy HUC's\)](#)
- ▶ [Locate Your Well Site \(Legacy HUC's\)](#)
- ▶ [Locate Your Stream Site by WBD](#)
- ▶ [Links By Watershed](#)
- ▶ [Information Discovery](#)
 - ▶ Active Projects
 - ▶ Databases
 - ▶ Publications
 - ▶ Reports
- ▶ [Data Integration:](#)
 - ▶ Watersheds
 - ▶ Education
- ▶ [Case Studies:](#)
 - ▶ Analysis
 - ▶ Assessment
 - ▶ Characterization
 - ▶ Management
 - ▶ Stream Restoration
- ▶ [Customer Service](#)
- ▶ [Glossaries](#)
- ▶ [Conferences/Events](#)

Thursday, April 11, 2007 10:06 AM

Additional Information for this Watershed

[USGS Water](#) | [Surf Your Watershed](#) | [Know Your Watershed](#)

<https://water.usgs.gov/wsc/index.html>

Stock Water Needs

- Large animals drink 8 to 12 gallons of water per day
- Consumption is highest during the summer when many sources are dry
- Water sources can create soil compaction, erosion or damage to stream banks or ponds

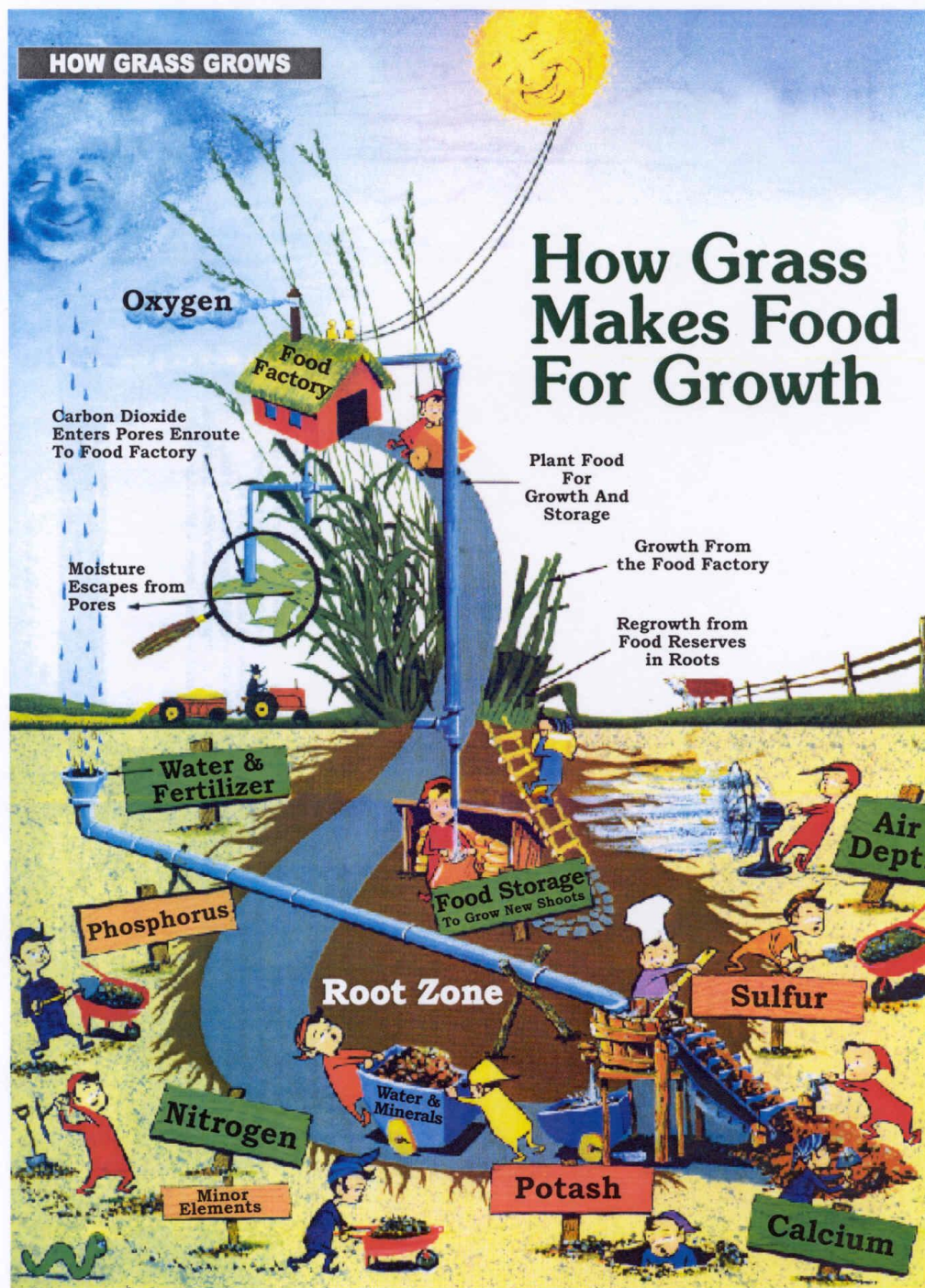




Now that you have taken stock of your soil and water resources, the next step is to estimate your forage production potential for animals.

HOW GRASS GROWS

How Grass Makes Food For Growth



AUM – Animal Unit Month

- Animal Unit - forage consumption of one 1000-pound animal (cow)
- Animal Unit Month - amount of forage required for one animal unit for one month (AUM)
- All other animals are compared to one 1000-pound animal (cow)

AUM equivalents

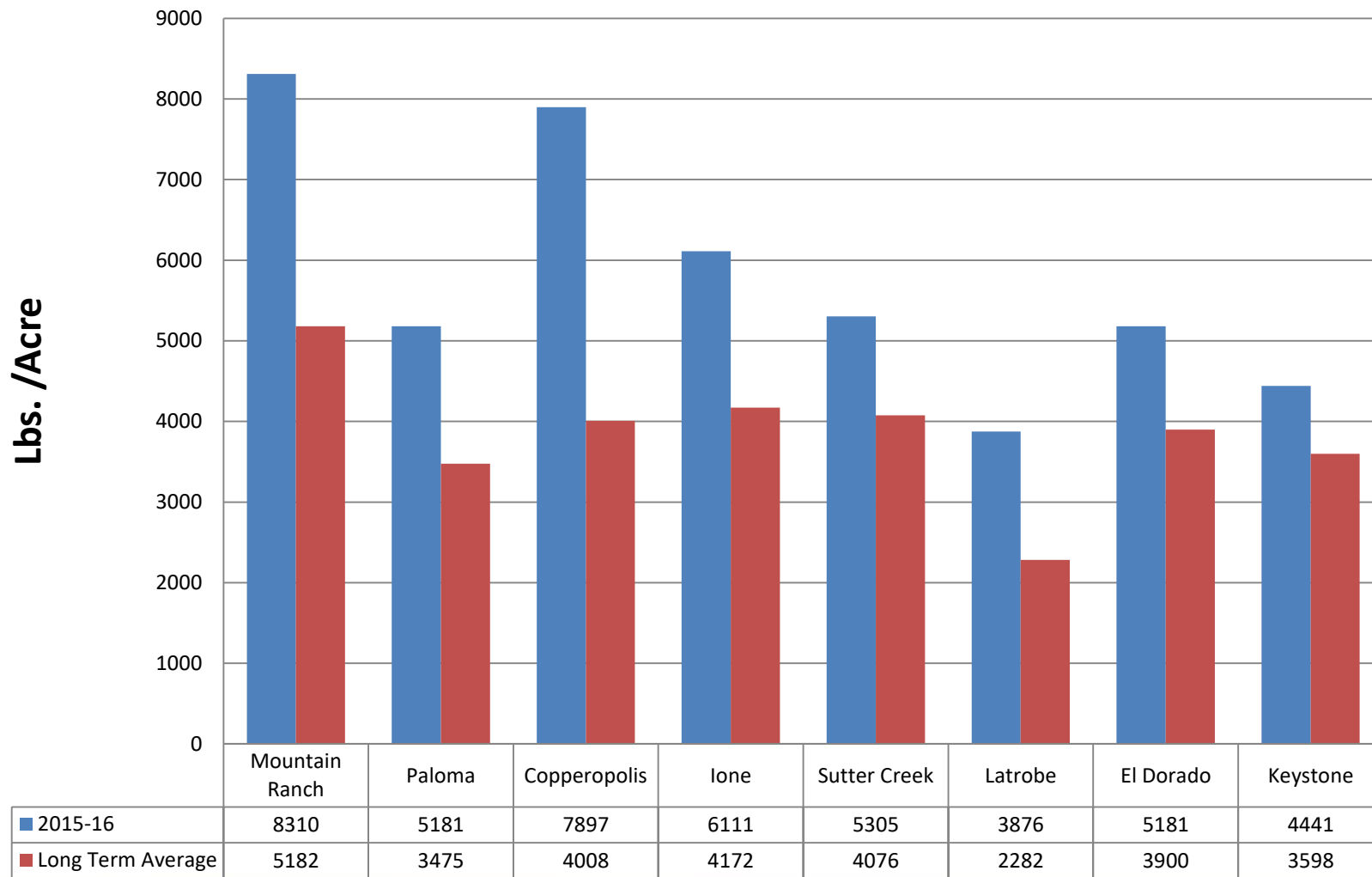
Species	AUM	Species	AUM
Cow	1.00	Sheep	0.20
Bull	1.30	Goat	0.20
Weaned Calf	0.50	Llama	0.30
Mature Horse	1.25	Deer	0.20
Yearling Horse	0.75	Elk	0.50

Range Considerations

Estimates are difficult to make because:

- Extreme variations due to rainfall amount and timing
- Complex relationships due to soil and vegetation types
- Management style and weed infestation
 - i.e. a heavy crop of yellow starthistle can reduce production by 75%.

Sierra Nevada Annual Range Forage Production 2015-16 Season



How much feed do I have?

Formula for determining potential production per acre:

- 1,000 lbs. of forage will carry one animal unit for one month (AUM)
- 75% of forage is available for livestock use
- Proper management dictates that 600 lbs. of feed must be left at the end of season per acre (this is called residual dry matter RDM)

For Paloma: forage production is estimated to be 3,500 pounds per acre

The management unit's average forage production is 3,500 lbs./acre (with 2,625 lbs./acre available to livestock) and RDM needs to be 600 lbs./acre.

2,625 lbs./acre - 600 lbs. RDM/acre

1,000 lbs./AUM = 2 AUM/acre

Annual production of forage

- Acres of pasture
- AUMs of forage per acre
- Total forage production

$$\underline{10} \text{ acres} \times \underline{2} \text{ AUMs/acre}$$

$$= \underline{20} \text{ AUMs}$$

Balancing feed and forage using AUMs

- Determine whether your animals' feed and forage requirements balance with your land's production
- Forage is what your animals consume by grazing
- Feed is defined as hay you provide an animal

Monitoring

- Use observations and common sense
- If there isn't enough feed in your pasture, you are overstocked regardless of what the calculations said



Monitoring made easy

Develop a ranch map

- Show resource inventory (soils, roads, ponds, streams, barns, crops, fences, etc.)
- Shows property layout and gives an accurate measure of productive and non-productive areas
- Manage land more effectively

RDM Mapping 2014


Woody Cover	0 - 20% Slope	>20% Slope
0 - 25	<500; T: >750	<750; T: >1000
25 - 50	<500; T: >750	<750; T: >1000
50 - 75	<500; T: >750	<500; T: >750
75 - 100	<500; T: >750	<500; T: >750

*Total at bottom, Target and high reached by water. RDM, Measured in the field

Legend

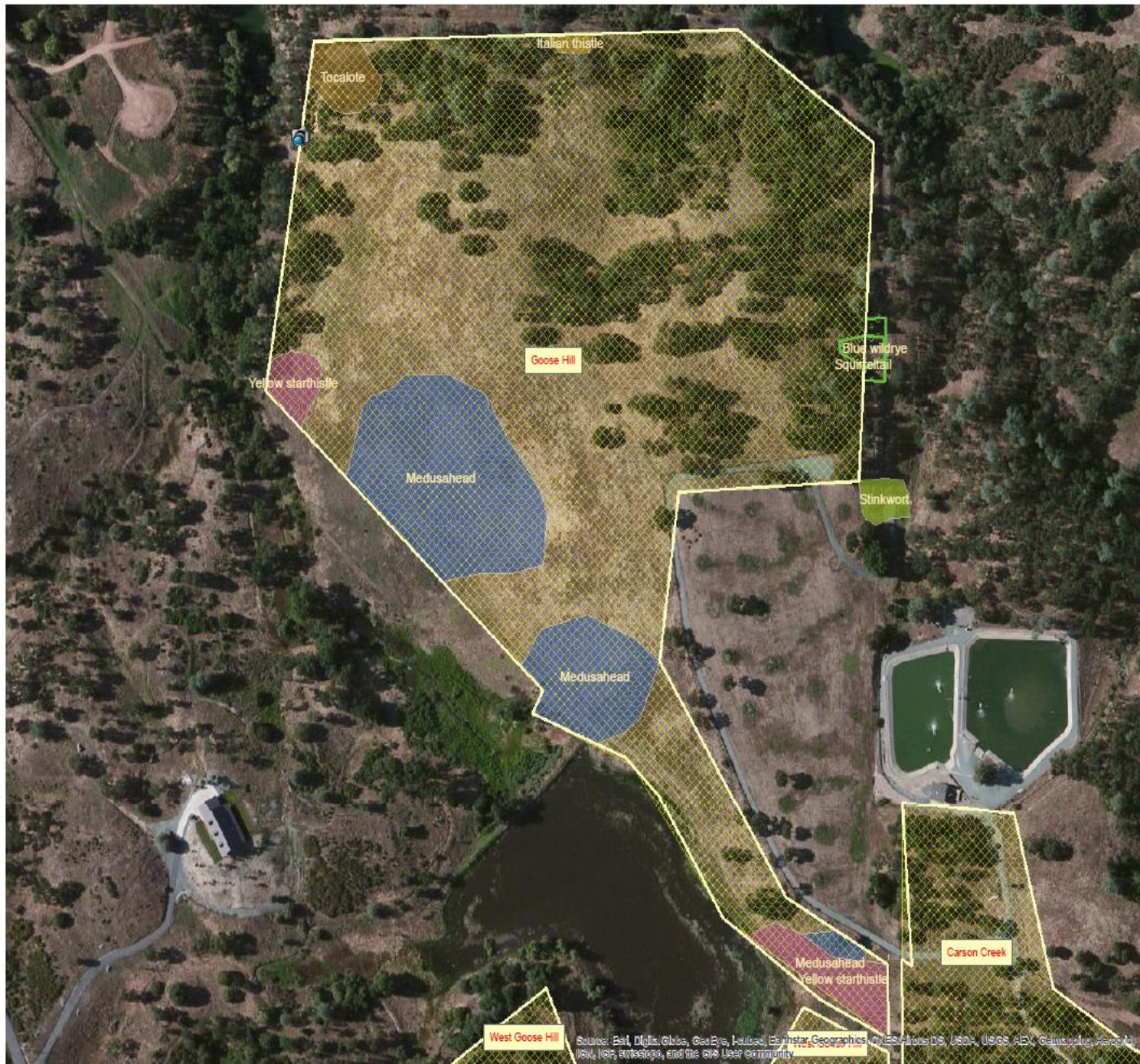
-  Photo Point
-  Pasture
-  Troughs
-  Native Grasses
- RDM Level**
-  Burn
-  Below
-  Target
-  Above
- Weed**
-  Barb goatgrass
-  Fiddleneck
-  French broom
-  Horehound
-  Italian thistle
-  Medusahead
-  Milk thistle
-  Oblong spurge
-  Skeletonweed
-  Stinkwort
-  Tocalote
-  Yellow starthistle

Goose Hill

Pasture# 1016 
 Acres 34
 AUMs 16-20
 Grazing Season 12
 Lessee: Kuiken

0 75 150 300 Feet

Map Produced by University of California
 Cooperative Extension
 Scott Cross & Thomas Raczinski
 Aerial Imagery: June 2011



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, IIR, and the GIS User Community

RDM Mapping 2015

Woody Cover	0-20% Slope	>20% Slope
0-25	<500; T: >750	<750; T: >1000
25-50	<500; T: >750	<750; T: >1000
50-75	<500; T: >750	<500; T: >750
75-100	<500; T: >750	<500; T: >750

*Based on below, target and high ranked by water RDM. Viewshed 1/30/15

Legend

- Ponds
- Troughs
- Water Tanks
- Spring Boxes
- Photo Point
- Roads
- Pasture
- Native Grasses
- Weed**
- Barb goatgrass
- Fiddleneck
- French broom
- Horehound
- Italian thistle
- Medusahead
- Milk thistle
- Oblong spurge
- Skeletonweed
- Stinkwort
- Tocalote
- Yellow starthistle
- RDM Level**
- Burn
- Below
- Target
- Above

Goose Hill

Pasture# 1016 N
 Acres 34
 AUMs 16-20
 Grazing Season 12
 Lessee: Kuiken

0 75 150 300 Feet

Map Produced by: University of California
 Cooperative Extension
 Scott Cross, S. Theresa Beuchett
 RDM Weed sampling conducted: Sept 4, 10, 15, 18
 Aerial Imagery: June 2011




Source: Esri, DigitalGlobe, GeoEye, Earthstar, GeoGraphics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, iSat, Swire, and the GIS User Community

RDM Mapping 2016

Woody Cover	0 - 20% Slope	>20% Slope
0 - 25	<500; T; >750	<750; T; >1000
25 - 50	<500; T; >750	<750; T; >1000
50 - 75	<500; T; >750	<500; T; >750
75 - 100	<500; T; >750	<500; T; >750

*Based on below, target and high ranked by water RDM. Modified 8/30/16

Legend

- Ponds
- Troughs
- Water Tanks
- Spring Boxes
- Photo Point
- Roads
- Pasture
- Native Grasses
- Weed**
- Barb goatgrass
- Fiddleneck
- French broom
- Horehound
- Italian thistle
- Klamath weed
- Medusahead
- Milk thistle
- Oblong spurge
- Skeletonweed
- Stinkwort
- Tocalote
- Yellow starthistle
- RDM Level**
- Burn
- Below
- Target
- Above

Goose Hill

Pasture# 1016

Acres 34

AUMs 16-20

Grazing Season 12

Lessee: Kuiken

0 75 150 300 Feet

Map Produced by University of California
Cooperative Extension
Scott O'Neil & Theresa Sacchetti
RDM / Weed mapping conducted: Sept 4, 10, 15, 16
Aerial Imagery: June 2011



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroV, GEBCO, Swisstopo, and the GIS User Community

Monitoring made easy

- Develop Photo Points
- “A photo point is a location from which a specific field of view can be relocated and rephotographed repeatedly”
 - Uses
 - Monitor growth and change of vegetation over time
 - Time lapse of ranch
 - Materials needed
 - Record book or data form
 - Camera
 - Compass

Goose Hill



Photo Point 2
ph pt established, taken from post with boundary marker looking S

2014



Photo Point 2—est. 2014
ph pt established, taken from post with boundary marker looking S

2015



Questions?