

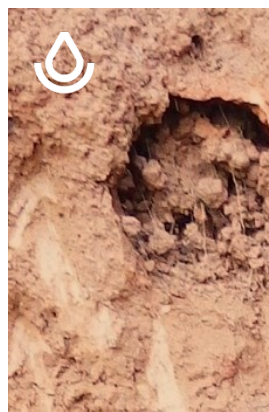


United States Department of Agriculture



CALIFORNIA

Natural
Resources
Conservation
Service



Using Web Soil Survey – the Four Steps

Andrew G. Brown, USDA-NRCS Soil Scientist, Sonora, CA.

Natural
Resources
Conservation
Service

nrcs.usda.gov/

Access digital soils data in four easy steps

1

Define.

Area of Interest (AOI)

Use the **Area of Interest** tab to define your area of interest. You can navigate to an area by zooming in on a map or by selecting from a Quick Navigation choice list. After you find the area, define it as the Area of Interest (AOI) by drawing a rectangle or a polygon around it using a map tool. You must complete this step before you can go on to the next three steps.

2

View.

Soil Map

Click the **Soil Map** tab to view or print a map of the soils in your area and view a description of the soils.

3

Explore.

Soil Data Explorer

Click the **Soil Data Explorer** tab to access soil data for your area and determine the suitability of the soils for a particular use. The items you want saved in a report can be added to your shopping cart.

4

Check Out.

Shopping Cart (Free)

Use the **Shopping Cart** tab to get your custom report immediately or download it later.

<https://websoilsurvey.sc.egov.usda.gov/>



Natural
Resources
Conservation
Service

nrcs.usda.gov/

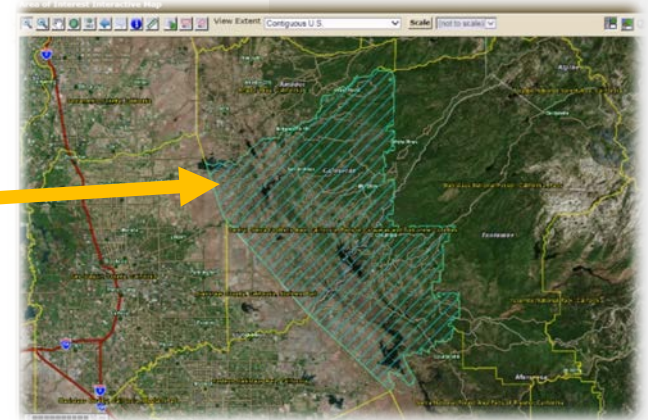
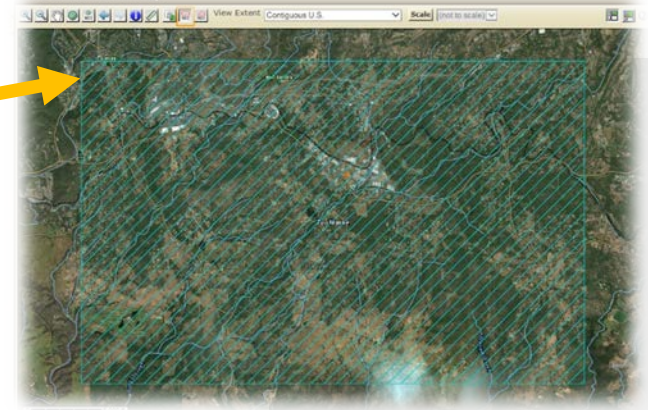
1. DEFINE an Area of Interest (AOI)



Draw custom AOI

AOI from Soil Survey Area / County

Name	Area	Data	Version
Central Sierra Foothills Area, California, Parts of Calaveras and Tuolumne Counties	CA630	Tabular and Spatial, complete	Survey Area: Version 3, Sep 17, 2018 Tabular: Version 3, Sep 17, 2018 Spatial: Version 2, Sep 14, 2018
Stamplaus National Forest, California, Parts	CA731	Tabular and Spatial, complete	Survey Area: Version 11, Sep 12, 2018 Tabular: Version 11, Sep 12, 2018 Spatial: Version 4, Sep 12, 2018
Yosemite National Park, California	CA790	Tabular and Spatial, complete	Survey Area: Version 10, Sep 13, 2018 Tabular: Version 9, Sep 13, 2018 Spatial: Version 2



There are many ways to **define your AOI** in WSS.

You can also **import multipart areas** from a **shapefile**!





1. DEFINE an Area of Interest (SoilWeb)



1. Navigate to UC Davis CA Soil Resource
Lab Google Maps App

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

2. Open the Menu to
Zoom To Location

3. Click 'Link to WSS'

4. View SoilWeb AOI in
Web Soil Survey

Zoom To Location

Settings when finding my current location:

Desired accuracy: 100 m

Maximum wait: 10 sec

☐ Automatically display soil data after my location is determined

- OR -

Enter a location:

Locations may be entered as:

- Complete address
- City, state
- Zip code
- Landmark (Example: Mt. Diablo, CA)

- OR -

Enter a latitude/longitude:

Enter latitude and longitude in decimal degrees, separated by a comma. Use positive values for degrees North and East, and negative values for degrees South and West.

Example: 38.543, -121.739

Natural
Resources
Conservation
Service

nrcs.usda.gov/

Alternately, you can find your AOI using the SoilWeb Google Maps App - just click "Link to WSS" in the top-right corner to import the map panel as your AOI.





2. VIEW the Soil Map

Area of Interest (AOI) **Soil Map** Soil Data Explorer Download Soils Data Shopping Cart (Free)

Search **Soil Map** Legend Scale 1:24,000 ± 1 %

Basic Search Enter keywords Clear Search

Advanced Search Clear Search

Map Unit Legend

Map Unit	Soil	Area (sq. mi.)	Percent of Area
3020	Iron Mountain-Rock outcrop complex, 3 to 15 percent slopes	5.7	0.0%
3021	Iron Mountain-Crozler-Rock outcrop complex, 15 to 30 percent slopes	34.4	0.2%
6070	Sierra-Verjales-Aquiduct-Haploxeralfs complex, 0 to 8 percent slopes	2,728.4	14.7%
6071	Sierra-Flanly complex, 3 to 15 percent slopes	138.2	2.4%
6074	Sierra-Orose complex, 8 to 30 percent slopes	4,796.7	5.8%

Map Legend

Layer Properties Menu

- ☐ Soil Survey Areas
- ☒ Soil Map Unit Polygons
- ☐ Soil Map Unit Lines
- ☒ Soil Map Unit Points
- ☐ Soil Rating Polygons
- ☐ Soil Rating Lines
- ☐ Soil Rating Points
- ☒ Special Point Features
- ☒ Special Line Features
- ☐ Political Features
 - ☐ States
 - ☐ Counties
 - ☐ Urban Areas
 - ☐ Cities
 - ☐ Postal Code
 - ☐ PLSS Township and Range
 - ☐ PLSS Section
- ☐ Federal Land
 - ☐ BIA
 - ☐ Bureau of Land Management
 - ☐ Bureau of Reclamation
 - ☐ Department of Defense
 - ☐ Fish and Wildlife Service
 - ☐ Forest Service
 - ☐ National Park Service
 - ☐ Tennessee Valley Authority
- ☒ Water Features
 - ☐ Oceans
 - ☒ Streams and Canals
 - ☒ 8-Digit Hydrologic Units
- ☒ Transportation
 - ☒ Rails
 - ☒ Interstate Highways
 - ☒ US Routes
 - ☒ Major Roads
 - ☒ Local Roads
- ☒ Background
 - ☒ Topographic Map
 - ☒ Aerial Photography



3. EXPLORE the Data (*Map Unit Descriptions*)

Map Unit Description

Printable Version

Report — Map Unit Description

Central Sierra Foothills Area, California, Parts of Calaveras and Tuolumne Counties

6070- **Sierra-Verjeles-Aquic Haploxeralfs complex**, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2lk4t
Elevation: 1,160 to 2,710 feet
Mean annual precipitation: 30 to 41 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 205 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Sierra and similar soils: 40 percent
Verjeles and similar soils: 36 percent
Aquic haploxeralfs and similar soils: 15 percent
Minor components: 9 percent

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

Description of **Sierra**

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Colluvium over residuum derived from granitoid

Typical profile

A - 0 to 4 inches: fine sandy loam
BA - 4 to 8 inches: loam
Bt1 - 8 to 20 inches: loam
Bt2 - 20 to 32 inches: clay loam
BCt - 32 to 59 inches: paragravelly clay loam

Properties and qualities

Slope: 0 to 8 percent
Percent of area covered with surface fragments: 0.0 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)

Where is the map unit used?
What it is called?

What soils occur in the map unit?

Major (named) components:

- Setting (landform, parent material)
- Typical profile (horizons, depths, texture)
- Properties and restrictions
- Interpretive classes and groups

Interpretive groups

Land capability classification (irrigated): 5e
Land capability classification (nonirrigated): 5e
Hydrologic Soil Group: C
Ecological site: Thermic Granitic Foothills 27-40 PZ (F018XI205CA)
Hydric soil rating: No

Minor Components

Hurleton, very cobbly

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: Thermic Granitic Foothills 27-40 PZ (F018XI205CA)
Hydric soil rating: No

Aqualfs

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: Low Gradient, Concave Depressions (R018XI111CA)
Hydric soil rating: Yes

Rock outcrop, mafic plutonic

Percent of map unit: 2 percent
Landform: Hills
Hydric soil rating: No

Minor components:
emphasize landform
and ecological site
differences

Natural
Resources
Conservation
Service

nrcs.usda.gov/



3. EXPLORE the Data (*Suitability / Limitations*)

Intro to Soils **Suitabilities and Limitations for Use** Soil Properties and Qualities Ecological Site Assessment Soil Reports

Search

Basic Search
Enter keywords

Advanced Search

Suitabilities and Limitations Ratings

Open All Close All

Building Site Development
Construction Materials
Disaster Recovery Planning

California Revised Storie Index (CA)

View Description View Rating

View Options

Map ☒
Table ☒
Description of Rating ☒
Rating Options ☒ Detailed Description

Advanced Options

View Description View Rating

Conservation Tree and Shrub Group
Ecological Site ID
Ecological Site Name
Farmland Classification
Hydric Rating by Map Unit
Irrigated Capability Class
Irrigated Capability Subclass
National Commodity Crop Productivity Index
NH Forest Soil Group
Nonirrigated Capability Class
Nonirrigated Capability Subclass
Order of Soil Survey

Map — California Revised Storie Index (CA)

Scale 1:44,300 ± 1 %

Printable Version Add to Shopping Cart

Add to Shopping Cart (free!)
adds current rating to your custom report

The Revised Storie Index assesses the productivity of a soil from the following four characteristics:

- Factor A: degree of soil profile development
- Factor B: texture of the surface layer
- Factor C: steepness of slope
- Factor X: drainage class, landform, erosion class, flooding and ponding frequency and duration, soil pH, soluble salt content as measured by electrical conductivity, and sodium adsorption ratio

Revised Storie Index numerical ratings have been combined into six classes as follows:

- Grade 1: Excellent (81 to 100)
- Grade 2: Good (61 to 80)
- Grade 3: Fair (41 to 60)
- Grade 4: Poor (21 to 40)
- Grade 5: Very poor (11 to 20)
- Grade 6: Nonagricultural (10 or less)

EXAMPLE 1. VIEWING A RATING - California (Revised) Storie Index



View Rating colors polygons with rating classes

View Description describes the factors considered in the rating

Natural
Resources
Conservation
Service

nrcs.usda.gov/

3. EXPLORE the Data (*Suitability / Limitations*)

Tables — California Revised Storie Index (CA) — Summary By Map Unit

Summary by Map Unit — Central Sierra Foothills Area, California, Parts of Calaveras and Tuolumne Counties (CA630)					
Summary by Map Unit — Central Sierra Foothills Area, California, Parts of Calaveras and Tuolumne Counties (CA630)					
Map unit symbol	Map unit name	Rating	Component name (percent)	Acres in AOI	Percent of AOI
3020	Iron Mountain-Rock outcrop complex, 3 to 15 percent slopes	Grade 5 - Very Poor	Iron Mountain (75%)	5.7	0.0%
3021	Iron Mountain-Crozier-Rock outcrop complex, 15 to 60 percent slopes	Grade 6 - Nonagricultural	Iron Mountain (40%)	34.4	0.2%
6070	Sierra-Verjeles-Aquic Haploxeralfs complex, 0 to 8 percent slopes	Grade 3 - Fair	Verjeles (36%)	2,728.4	14.7%
			Aquic Haploxeralfs (15%)		
6071	Sierra-Flanly complex, 3 to 15 percent slopes	Grade 3 - Fair	Flanly (40%)	438.2	2.4%
			Hurleton (10%)		
6074	Sierra-Orose complex, 8 to 30 percent slopes	Grade 2 - Good	Sierra (70%)	4,796.7	25.8%
6075	Sierra-Flanly complex, 30 to 60 percent slopes	Grade 3 - Fair	Sierra (50%)	1,194.5	6.4%
			Flanly (30%)		
6076	Auberry-Hurleton-Rock outcrop complex, 20 to 60 percent slopes	Grade 3 - Fair	Auberry (45%)	902.2	4.8%
6202	Musick-Ultic Haploxeralfs, moderately well drained, complex, 1 to 8 percent slopes	Grade 1 - Excellent	Musick (60%)	202.6	1.1%
6205	Musick fine sandy loam, 3 to 8 percent slopes	Grade 1 - Excellent	Musick (88%)	116.2	0.6%
			Wukusick (5%)		
6206	Musick-Hotaw complex, 8 to 30 percent slopes	Grade 2 - Good	Musick (64%)	1,569.2	8.4%
			Wukusick (5%)		
6207	Musick-Hotaw-Chawanakee complex, 30 to 60 percent slopes	Grade 3 - Fair	Musick (55%)	964.0	5.2%
			Hotaw (20%)		
			Wukusick (5%)		

Storie Grade: lower grade is “better” (more suited to irrigated ag.)

Grades 5 and 6:
Very shallow soils on wide range of slopes

Grade 3:
Moderately deep soils on low slopes (<15%)

Grades 2 and 3:
Deep or moderately deep soils (on steeper slopes)

Grade 1:
Very deep soils on low slopes

EXAMPLE 1. VIEWING A RATING - California (Revised) Storie Index



3. EXPLORE the Data (Soil Properties)

Properties and Qualities Ratings

Open All Close All ?

Soil Chemical Properties ?

Calcium Carbonate (CaCO₃)

Cation-Exchange Capacity (CEC-7)

Effective Cation-Exchange Capacity (ECEC)

Electrical Conductivity (EC)

Gypsum

pH (1 to 1 Water)

View Description View Rating

View Options ?

Advanced Options ?

View Description View Rating

Sodium Adsorption Ratio (SAR)

Soil Erosion Factors ?

Soil Health Properties ?

Soil Physical Properties ?

Soil Qualities and Features ?

Water Features ?

Using Advanced Options, you can change the way ratings are generated for Map Units that have *several soil components*

Advanced Options ?

Aggregation Method

Component Percent Cutoff

Tie-break Rule

Interpret Nulls as Zero

Layer Options (Horizon Aggregation Method)

View Description View Rating

Dominant Condition

Dominant Component

Weighted Average

Minimum or Maximum

Lower

Higher

Yes

No

Surface Layer (Not applicable)

Depth Range (Weighted Average)

Top Depth

Bottom Depth

Inches

Centimeters

All Layers (Weighted Average)

COMPONENT AGGREGATION METHODS

- Dominant Condition: apply rating to all components; add percentages in each rating class; returns rating for **most prevalent rating class**
- Dominant Component: returns rating of **component with highest percentage**
- Weighted-average: apply rating to all components; returns the **component-percentage-weighted-average rating**
- Minimum or Maximum: apply rating to all components; returns the **most/least limiting/suitable rating**

EXAMPLE 2. ADVANCED COMPONENT AGGREGATION

Natural
Resources
Conservation
Service

nrcs.usda.gov/

3. EXPLORE the Data (Soil Properties)

Properties and Qualities Ratings

Open All

Close All

Soil Chemical Properties

Calcium Carbonate (CaCO₃)

Cation-Exchange Capacity (CEC-7)

Effective Cation-Exchange Capacity (ECEC)

Electrical Conductivity (EC)

Gypsum

pH (1 to 1 Water)

View Description

View Rating

View Options

Advanced Options

View Description

View Rating

Sodium Adsorption Ratio (SAR)

Soil Erosion Factors

Soil Health Properties

Soil Physical Properties

Soil Qualities and Features

Water Features

Also, in Advanced Options you can set rules for excluding data/components, as well as averaging horizon data (across depth) within components

Advanced Options

Aggregation Method

Dominant Component

Component Percent Cutoff

Tie-break Rule

☐ Lower
 ☒ Higher

Interpret Nulls as Zero

☒ Yes
 ☐ No

Layer Options (Horizon Aggregation Method)

☐ Surface Layer (Not applicable)
 ☒ Depth Range (Weighted Average)

Top Depth

Bottom Depth

☐ Inches
 ☒ Centimeters

☐ All Layers (Weighted Average)

View Description

View Rating

ADVANCED OPTIONS

- Component Percent Cutoff: ignore all components with percentage less than this number
- Tie-break Rule: In case of a tie when determining dominance, return the lower or higher rating?
- Interpret Nulls as Zero: Fill in empty values with zero? (*be careful*)

HORIZON AGGREGATION

- Surface layer: only use surface horizon?
- All Layers: rate by depth-weighted-average of all layers in each component
- Depth range: Calculate depth-weighted average of the layers in range specified

EXAMPLE 2 (continued). ADVANCED HORIZON AGGREGATION

Natural
Resources
Conservation
Service

nrcs.usda.gov/

3. EXPLORE the Data (Soil Properties)

pH (1 to 1 Water)

[View Description](#) [View Rating](#) ?

View Options ?

Advanced Options ?

Aggregation Method: **Minimum or Maximum** ▼

Component Percent Cutoff: **15**

Tie-break Rule: ☒ Lower ☐ Higher

Interpret Nulls as Zero: ☐ Yes ☒ No

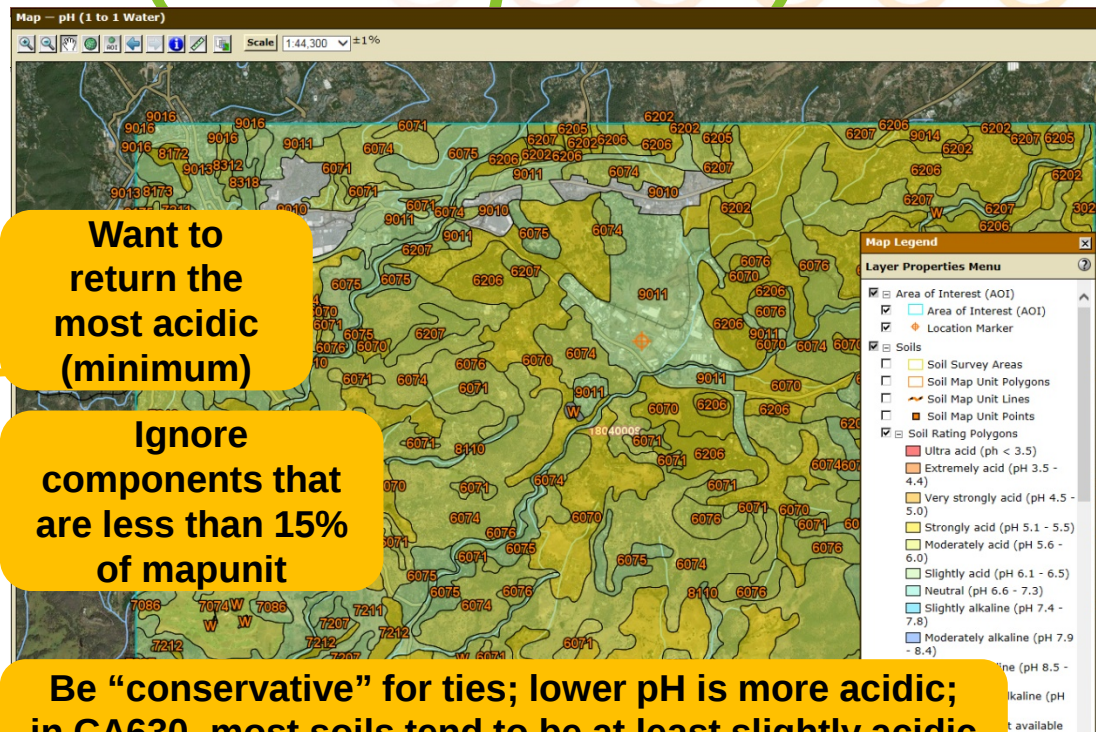
Layer Options (Horizon Aggregation Method): ☐ Surface Layer (Not applicable) ☒ Depth Range (Weighted Average)

Top Depth: **0**

Bottom Depth: **10**

☐ Inches ☒ Centimeters

☐ All Layers (Weighted Average)



Want to return the most acidic (minimum)

Ignore components that are less than 15% of mapunit

Be “conservative” for ties; lower pH is more acidic; in CA630, most soils tend to be at least slightly acidic and the *lower* values will *generally* be “more limiting”

Calculate the depth weighted-average pH for each component for soil layers within 0-10cm depth interval

EXAMPLE 2 (continued). pH 1:1 water 0-10cm rating

GOAL: Show the “most limiting” soil pH in upper 10 cm (4 inches)



3. EXPLORE the Data (Soil Data Explorer)

Intro to Soils

Suitabilities and Limitations for Use

Soil Properties and Qualities

Ecological Site Assessment

Soil Reports

Table of Contents

View Selected Topics ?

- ☐ All Uses
 - ☐ Introduction to Soils
 - ☐ Soils 101
 - ☐ Information for Land Users
 - ☐ Cropland
 - ☐ Land capability classification
 - ☐ Soil erosion and crop production
 - ☐ Cropland management
 - ☐ Forestland
 - ☐ Grazed Forestland
 - ☐ Forest Canopy
 - ☐ Forest Overstory
 - ☐ Forest Understory
 - ☐ Forest Productivity
 - ☐ Forestland Ecological Sites
 - ☐ Forestland Management
 - ☐ Agroforestry
 - ☐ Pastureland and Hayland
 - ☐ Forage
 - ☐ Pastureland Condition
 - ☐ Horticulture
 - ☐ Nutrient Management

Ecological Sites

All Ecological Sites

View All Ecological Sites Info ?

View Options

Dominant Ecological Site Map ☒

Ecological Sites by Map Unit Component Table ☒

Basic Options

Ecological Site Type Rangeland

View All Ecological Sites Info

Soil Reports

Open All Close All ?

- AOI Inventory ?
- Disaster Recovery Planning ?
- Land Classifications ?
- Land Management ?
- Soil Chemical Properties ?
- Soil Erosion ?
- Soil Health ?
- Soil Physical Properties ?
- Soil Qualities and Features ?
- Vegetative Productivity ?
- Waste Management ?
- Water Features ?
- Water Management ?

In addition to suitability/limitation/property ratings, the Soil Data Explorer tab allows you to review basic soil science definitions and Ecological Site information.

Also, you can generate independent Soil Reports to summarize various classifications, interpretations and soil properties in a tabular format.

Natural
Resources
Conservation
Service

nrcs.usda.gov/



4. CHECK OUT (make custom resource report)

Report Properties

Title

Title Custom Soil Resource Report for Central Sierra Foothills Area, California, Parts of Calaveras and Tuolumne Counties

Subtitle

☐ Area of Interest Name: (none defined)

☒ Custom Subtitle:

Sonora, CA Area

☐ None

Map Options

Map Scale

Printed Sheet Size

Show UTM Coordinate Ticks ☒

Table of Contents

- ☒ Custom Soil Resource Report for Central Sierra Foothills Area, California, Parts of Calaveras and Tuolumne Counties: Sonora, CA Area
 - ☒ Cover
 - ☒ Preface
 - ☒ Contents
 - ☒ How Soil Surveys Are Made
 - ☒ Soil Map
 - ☒ Soil Map
 - ☒ Map Unit Legend
 - ☒ Map Unit Description
 - ☒ Soil Data Explorer
 - ☒ All Uses
 - ☒ Suitabilities and Limitations for Use
 - ☒ Land Classifications
 - ☒ California Revised Storie Index (CA): Sonora, CA Area
 - ☒ Soil Properties and Qualities
 - ☒ Soil Chemical Properties
 - ☒ pH (1 to 1 Water): Sonora, CA Area
 - ☒ Soil Reports
 - ☒ Land Management
 - ☒ Damage by Fire and Seedling Mortality on Forestland: Sonora, CA

USDA United States Department of Agriculture
 NRCS Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Central Sierra Foothills Area, California, Parts of Calaveras and Tuolumne Counties

Sonora, CA Area

3. Check Out (top right corner of WSS window)!

Check Out

4. View or print PDF output

1. Set report subtitle and output size

2. Check Table of Contents (note items added under Soil Data Explorer section)



Natural Resources Conservation Service

nrcs.usda.gov/

Optional: Skipping the AOI



Area of Interest (AOI) | Soil Map | Soil Data Explorer | **Download Soils Data** | Shopping Cart (Free)

Download Soils Data for...

Your AOI (SSURGO)

Soil Survey Area (SSURGO)

General Information

Link [Description of Soil Survey Geographic \(SSURGO\) Database](#)

Download Contents Tabular data, spatial data (if available), template database (if selected), and FGDC metadata

Spatial Data Format ESRI Shapefile, Geographic WGS84

Options

State

County (optional)

Only show Soil Survey Areas updated since...

Sort by...

Include Template Database ☒

Soil Survey Area (SSURGO) Download Links

Name	Area Symbol	Data Availability	Version	Template Database	Download Size	Download Link
Central Sierra Foothills Area, California, Parts of Calaveras and Tuolumne Counties	CA630	Tabular and Spatial, complete	Survey Area: Version 3, Sep 17, 2018 Tabular: Version 3, Sep 17, 2018 Spatial: Version 2, Sep 14, 2018	soildb_US_2003 Access 2003 Version 36	30.0 MB	wss_SSA_CA630_soildb_US_2003_[2018-09-17].zip
Stanislaus National Forest, California, Parts	CA731	Tabular and Spatial, complete	Survey Area: Version 11, Sep 12, 2018 Tabular: Version 11, Sep 12, 2018 Spatial: Version 4, Sep 12, 2018	soildb_US_2003 Access 2003 Version 36	36.0 MB	wss_SSA_CA731_soildb_US_2003_[2018-09-12].zip
Yosemite National Park, California	CA790	Tabular and Spatial, complete	Survey Area: Version 10, Sep 13, 2018 Tabular: Version 9, Sep 13, 2018	soildb_US_2003 Access 2003 Version 36	18.5 MB	wss_SSA_CA790_soildb_US_2003_[2018-09-13].zip

For GIS/external use -- directly download SSURGO data in .ZIP format via 'Download Soils Data' tab

- No need to specify AOI
- Search soil surveys by State/County
- Tabular data delivered as MS Access database
- Spatial layers delivered as shapefile

