Erosion Prediction Procedure (RUSLE2) Manual

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Table of Contents

List of Figures vii
1. Introduction 1-1
   1.1 Overview of Permit Requirements 1-1
   1.1.1 Notice of Termination (NOT) 1-2
   1.1.2 TMDL Requirements 1-2
   1.1.3 Surface Water Buffers 1-2
   1.2 Design Responsibility 1-2
   1.2.1 Design Phase 1-2
   1.2.2 Construction Phase 1-3
   1.3 Manual Objectives 1-3
2. Soil Erosion 2-1
   2.1 Types of Soil Erosion 2-1
   2.1.1 Overland Flow Erosion 2-1
   2.1.2 Concentrated Flow Erosion 2-2
   2.2 Factors Affecting Soil Erosion 2-2
   2.3 Erosion Process 2-2
   2.4 Soil Erosion and RUSLE2 2-3
3. Erosion Prediction Using RUSLE2 3-1
   3.1 The RUSLE2 Model 3-1
   3.2 Vegetative Cover Effects 3-1
   3.3 Caltrans RUSLE2 Database 3-3
   3.4 USDA RUSLE2 Limitations 3-3
4. Install and Setup RUSLE2 4-1
   4.1 Archive Previous Databases and Project-Specific Data 4-1
   4.2 Install RUSLE2 4-1
   4.3 Load and Set Database Path 4-3
   4.4 Updating Caltrans Databases 4-7
5. Using the RUSLE2 Model 5-1
   5.1 Project Phases 5-1
   5.2 RUSLE2 Interface 5-2
   5.3 Project Location 5-2
   5.4 Climate 5-3
   5.5 Soils 5-3
   5.6 Representative Areas 5-3
   5.7 Topography: Slope Length and Grade 5-4
   5.8 Managements 5-4

Caltrans

5.9 Soil Moisture Regimes....5-5
5.10 Land Cover....5-7
5.10.1 Vegetative Canopy Cover Type and Density....5-7
5.10.2 Rock Cover....5-11
5.11 Sediment Controls....5-11
5.12 Pre-configured Managements....5-11
5.13 Creating New Managements....5-12
5.14 Project Erosion Rate Limits....5-14
6. Problem Statement, Example 1....6-1
7. Pre-construction Run, Example 1....7-1
7.1 Project Set Up....7-1
7.2 RUSLE2 Profile Step 1: Choose Location to Set Climate....7-2
7.3 Determine the Representative Area(s) Topography....7-4
7.4 RUSLE2 Profile Step 2: Choose Soil Type....7-7
7.5 RUSLE2 Profile Step 3: Set Slope Topography....7-12
7.6 RUSLE2 Profile Step 4: Select and Modify Management....7-14
7.7 RUSLE2 Pre-construction Findings....7-16
8. Post-construction Run, Example 1....8-1
8.1 Project Set Up....8-1
8.2 RUSLE2 Profile Step 1: Choose Location to Set Climate....8-2
8.3 Determine the Representative Area(s) Topography....8-2
8.4 RUSLE2 Profile Step 2: Choose Soil Type....8-3
8.5 RUSLE2 Profile Step 3: Set Slope Topography....8-4
8.6 RUSLE2 Profile Step 4: Select and Modify Management....8-4
8.7 RUSLE2 Profile Step 5: Set Supporting Practices....8-5
8.8 RUSLE2 Profile Step 6: Set Sediment Barrier System....8-5
8.9 RUSLE2 Post-construction Findings....8-7
9. Construction Run, Example 1....9-1
9.1 Project Set Up....9-1
9.2 RUSLE2 Profile Step 1: Choose Location to Set Climate....9-2
9.3 Determine the Representative Area(s) Topography....9-2
9.4 RUSLE2 Profile Step 2: Choose Soil Type....9-3
9.5 RUSLE2 Profile Step 3: Set Slope Topography....9-4
9.6 RUSLE2 Profile Step 4: Select and Modify Management....9-5
9.7 RUSLE2 Profile Step 5: Set Supporting Practices....9-6
9.8 RUSLE2 Profile Step 6: Set Sediment Barrier System....9-7
9.9 RUSLE2 Construction Findings....9-9
10. Reporting and Documentation....10-1
10.1 Example 1 Deliverables....10-1
10.2 RUSLE2 Outputs for SWDR....10-1

10.3 RUSLE2 Outputs for SWPPP 10-3
Appendix A: TMDL Table H2 ....A
Appendix B: NRCS Precipitation Lookup Key and Maps ....B
Appendix C: Definitions of Caltrans Construction Site BMPs in RUSLE2 ....
Appendix D: RUSLE2 Output Cover Sheet....A

List of Figures

Figure 2-1. Soil erosion, overland flow....2-1
Figure 2-2. RUSLE2 key definitions....2-3
Figure 2-3. Slope length, origin of overland flow to concentrated flow channel....2-4
Figure 2-4. Complex slope with multiple segments 2-4
Figure 3-1. Typical annual growth pattern for grasses and forbs....3-2
Figure 3-2. Typical 15-year growth pattern and surface cover for grasses and forbs....3-2
Figure 4-1. RUSLE2 application installation 4-2
Figure 4-2. RUSLE2 installation location 4-2
Figure 4-3. RUSLE2 startup database error 4-3
Figure 4-4. RUSLE2 initial setup....4-3
Figure 4-5. Set RUSLE2 startup user access file 4-4
Figure 4-6. Open profile template 4-4
Figure 4-7. Set RUSLE2 startup profile template....4-5
Figure 4-8. Save profile template....4-5
Figure 4-9. Save profile template, error 4-6
Figure 4-10. Set RUSLE2 database path 4-6
Figure 4-11. Set RUSLE2 startup database 4-7
Figure 4-12. Import updates to Caltrans database 4-8
Figure 4-13. Caltrans database updates import: Warning 4-8
Figure 4-14. Caltrans database updates import: Object replace 4-9
Figure 5-1. RUSLE2 profile interface....5-2
Figure 5-2. Soil moisture regimes map legend 5-5
Figure 5-3. Soil moisture regimes map....5-6
Figure 5-4. Vegetation/Rock coverage classification....5-8
Figure 5-5. Vegetative canopy cover approximately 30 percent....5-9

Figure 5-6. Vegetative canopy cover approximately 60 percent 5-9
Figure 5-7. Vegetative canopy cover approximately 80 percent 5-10
Figure 5-8. Vegetative canopy cover approximately 95 percent 5-10
Figure 5-9. Saving an updated management file 5-11
Figure 5-10. Saving updated management reference 5-12
Figure 5-11. Open the -Local Management files....5-12
Figure 5-12. Select -Local Management files\default....5-13
Figure 5-13. Edit operations and dates to customize Management....5-13
Figure 6-1. Example 1: EC-1 Erosion Control Plan 6-2
Figure 6-2. Example 1: ECQ-1 Erosion Control Quantities sheet 6-3
Figure 6-3. Example 1: Typical cross section for the proposed roadway....6-4
Figure 6-4. Example 1: EC-1 Water Pollution Control Drawing. 6-5
Figure 7-1. RUSLE2: Open profile 7-1
Figure 7-2. RUSLE2: Default base profile....7-1
Figure 7-3. RUSLE2: Save-as to Profiles folder 7-2
Figure 7-4. Postmile Services: Postmile Query Tool 7-2
Figure 7-5. RUSLE2 precipitation map lookup key 7-3
Figure 7-6. Precipitation for RUSLE2 map....7-3
Figure 7-7. Precipitation for RUSLE2 map, zoomed in 7-4
Figure 7-8. RUSLE2 Profile Step 1: Choose location 7-4
Figure 7-9. Existing concentrated flow paths within the project area 7-5
Figure 7-10. Three transects identified as potential representative areas 7-5
Figure 7-11. Example 1: Slope length....7-6
Figure 7-12. Example 1: Segment lengths and grade, plan view 7-7
Figure 7-13. Example 1: Segment lengths and grade, cross section....7-7
Figure 7-14. Postmile Services Postmile Query Tool: Geo-coordinates 7-8
Figure 7-15. USDA Web Soil Survey website 7-8
Figure 7-16. USDA Web Soil Survey: Location 7-9
Figure 7-17. USDA Web Soil Survey: AOI 7-9
Figure 7-18. USDA Web Soil Survey: Soil map tab 7-10
Figure 7-19. RUSLE2 Profile Step 2: Add segment 7-11
Figure 7-20. RUSLE2 Profile Step 2: Update segments 7-11
Figure 7-21. RUSLE2 Profile Step 2: Soil type selection, dominant component....7-12
Figure 7-22. RUSLE2 Profile Step 2: Soil type selection 7-12

Figure 7-23. RUSLE2 Profile Step 3: Add segment 7-13
Figure 7-24. RUSLE2 Profile Step 3: Update segment lengths 7-13
Figure 7-25. RUSLE2 Profile Step 3: Update segment steepness 7-14
Figure 7-26. Google Earth street view at project site 7-14
Figure 7-27. Soil moisture regions map, project location 7-15
Figure 7-28. RUSLE2 Profile Step 4: Update Managements 7-16
Figure 7-29. RUSLE2 Profile: Pre-construction sediment delivery 7-16
Figure 8-1. RUSLE2: Open profile 8-1
Figure 8-2. RUSLE2: Save-as to Profiles folder 8-1
Figure 8-3. Example 1: Slope length 8-2
Figure 8-4. Example 1: Segment lengths and grade, plan view 8-3
Figure 8-5. Example 1: Segment lengths and grade, cross section 8-3
Figure 8-6. RUSLE2 Profile Step 4: Update Managements 8-5
Figure 8-7. RUSLE2 Profile Step 6: Set barrier system 8-5
Figure 8-8. RUSLE2 Profile Step 6: Wizard 8-6
Figure 8-9. RUSLE2 Profile Step 6: Wizard error text 8-6
Figure 8-10. RUSLE2 Profile Step 6: Wizard applied 8-6
Figure 8-11. RUSLE2 Profile Step 4: Updated managements 8-7
Figure 8-12. RUSLE2 Profile: Post-construction sediment delivery 8-7
Figure 9-1. RUSLE2: Open profile 9-1
Figure 9-2. RUSLE2: Save-as to Profiles folder 9-1
Figure 9-3. Example 1: Slope length 9-2
Figure 9-4. Example 1: Segment lengths and grade, cross section 9-3
Figure 9-5. Example 1: RUSLE2, Updating Slope Length 9-3
Figure 9-6. Example 1: Step 2, Selecting Soil Type 9-4
Figure 9-7. Example 1: Step 3, Setting Slope Topography 9-5
Figure 9-8. RUSLE2 Profile Step 4: Update Managements 9-6
Figure 9-9. RUSLE2 Profile Step 5: Set supporting practices 9-6
Figure 9-10. RUSLE2 Profile Step 5: Set sediment trap location 9-7
Figure 9-11. RUSLE2 Profile Step 5: Set sediment trap location pop-up 9-7
Figure 9-12. RUSLE2 Profile Step 5: Updated Supporting Practices Impact 9-7
Figure 9-13. RUSLE2 Profile Step 6: Set barrier system 9-7
Figure 9-14. RUSLE2 Profile Step 6: Wizard 9-8
Figure 9-15. RUSLE2 Profile Step 4: Updated managements with silt fence 9-8

Figure 9-16. RUSLE2 Profile: Construction sediment delivery 9-9
Figure 10-1. RUSLE2: Open worksheet 10-1
Figure 10-2. RUSLE2: Save-as to Worksheet folder 10-1
Figure 10-3. RUSLE2: SWDR Worksheet 10-2
Figure 10-4. RUSLE2: SWDR Worksheet Print Template Error 10-2
Figure 10-5. RUSLE2: Select print template for SWDR worksheet 10-2
Figure 10-6. RUSLE2: Example SWDR worksheet printout 10-3
Figure 10-7. RUSLE2: Open worksheet 10-3
Figure 10-8. RUSLE2: Save-as to Worksheet folder 10-4
Figure 10-9. RUSLE2: SWPPP worksheet 10-4
Figure 10-10. RUSLE2: SWPPP Worksheet Print Template Error 10-5
Figure 10-11. RUSLE2: Select print template for SWPPP worksheet 10-5
Figure 10-12. RUSLE2: Example SWPPP worksheet printout 10-6

Section 1

Introduction

Caltrans has adopted the Revised Universal Soil Loss Equation, Version 2 (RUSLE2) program as the preferred Erosion Prediction Procedure (EPP). This EPP RUSLE2 Manual (Manual) provides guidance on how to predict expected erosion rates at California Department of Transportation (Caltrans) construction sites. The RUSLE2 program is the end-product of more than 70 years of scientific research and field experience and is the best available and practical technology for soil-loss estimation. Caltrans uses RUSLE2 to predict erosion rates on project sites for the following project phases:

- Pre-construction: The period prior to any significant ground-disturbing activity at the project site.
- Post-construction: The period after construction is complete including all construction work, installation of permanent[1] erosion control, and a 5-year vegetation establishment.
- Construction: The period including all construction work and installation of temporary[2] BMPs to protect disturbed areas until the post-construction phase commences. This run is only required for projects within a Total Maximum Daily Load (TMDL) watershed or projects without a 401 or 404 Clean Water Act (CWA) permit that disturb a surface water buffer.

This Manual is organized around an example that is used to demonstrate how to use the RUSLE2 program step-by-step for the pre-construction, post-construction, and construction phases as the example project is in a TMDL area. The RUSLE2 program should be used concurrently with this Manual to step through the example.

1.1 Overview of Permit Requirements

The State Water Resources Control Board (SWRCB) issued a Statewide Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Caltrans Permit) to Caltrans, to regulate stormwater and non-stormwater discharges from Caltrans properties and facilities, and discharges associated with operation and maintenance of the State highway system. For construction projects, the Caltrans Permit requires projects to obtain coverage for stormwater discharges associated with construction activities under Order No. 2022-0057-DWQ NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit, CGP) or the Lake Tahoe Construction General Permit (LTCGP) Order R6T-2016-0010.

The CGP and LTCGP allow the use of RUSLE2 to demonstrate final soil stabilization during the Notice of Termination (NOT) for the project. For projects within a TMDL area, the CGP requires RUSLE2 runs to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project. The CGP also allows the use of the RUSLE2 model to estimate average annual soil loss, which informs the sediment risk score for Risk Level Determination.

[1] BMPs are considered permanent when they are used after construction activities are complete.

[2] BMPs are considered temporary when they are used during construction.

RUSLE2 may be used to provide computational proof of erosion control under the permit conditions described below.

1.1.1 Notice of Termination (NOT)

To achieve NOT for both the CGP and LTCGP, Caltrans must demonstrate that the project site meets the required termination criteria (i.e., that final stabilization is achieved). RUSLE2 is an option to demonstrate final stabilization by showing that the post-construction erosion rate is less than or equal to the pre-construction rate.

1.1.2 TMDL Requirements

Some TMDL watersheds have assigned waste load allocations (WLAs) listed in Attachment H of the CGP, see the RUSLE2 Compliance Table for TMDL Requirements in Appendix A of this document. The following Water Board Regions have WLAs for the listed TMDLs:

- Region 1 (North Coast Regional Water Quality Control Board) - Sediment TMDLs
- Region 4 (Los Angeles Regional Water Quality Control Board) - Metals and Toxics TMDLs
- Region 8 (Santa Ana Regional Water Quality Control Board) - Metals and Toxics TMDLs, Nutrients TMDLs

Under Attachment H of the CGP, RUSLE2 modeling is required to demonstrate compliance with these TMDL WLAs. This is because the primary transport mechanism for most TMDL pollutants associated with construction is the mobilization and discharge of sediment.

1.1.3 Surface Water Buffers

The CGP includes a specific requirement for projects that have construction activities within or close to surface water buffers. Waters of the United States and Waters of the State, which include creeks, streams, rivers, oceans, reservoirs, wetlands, estuaries, and lakes, must be protected within 50-feet of the top of bank or high-water level during the 2-year event. A natural buffer area of at least 50-feet should be provided. When a natural buffer area of at least 50-feet is not feasible, equivalent erosion and sediment controls must be implemented. Use RUSLE2 to show that the sediment delivery using the BMP strategy (construction run) is less than or equal to the sediment delivery from the undisturbed natural buffer (pre-construction run). Generally, the construction run will be provided by the Contractor. Caltrans projects that have a Clean Water Act § 401 Certification or projects that are § 404 projects are exempt from this requirement.

1.2 Design Responsibility

RUSLE2 is used as a guide to inform erosion control planning and practices for a specific site. Caltrans has the responsibility during design and construction to plan and implement effective erosion and sediment controls at each project site. Users of RUSLE2 are responsible for collecting accurate data, including information on soil characteristics, land use, rainfall patterns, topography, and erosion and sediment control practices. RUSLE2 can help users identify areas that are vulnerable to erosion.

1.2.1 Design Phase

During the design phase, the Project Engineer (PE) and/or Project Landscape Architect (LA) uses RUSLE2 to calculate predicted erosion rates for pre-construction and post-construction conditions. The PE/LA will use the erosion control plan sheets from the project plans for the post-construction run. The post-construction run can also be used to evaluate different combinations of permanent erosion control practices. The RUSLE2 output showing that post-construction erosion is less than or equal to pre-construction conditions is a required attachment to the Plans Specification & Estimate (PS&E) Stormwater Data Report (SWDR).

RUSLE2 is a planning tool that predicts soil erosion rates. While RUSLE2 can analyze different BMP combinations, it is not a design tool. Specifically, RUSLE2 does not evaluate loads including local or global slope stability. Coordinate on design criteria with other functional experts such as District Maintenance, District Hydraulics, District Landscape Architect, and Geotechnical Design, as applicable.

1.2.2 Construction Phase

During the construction phase, the Resident Engineer (RE) can use RUSLE2 in addition to photographs to demonstrate that final stabilization is achieved when applying for the NOT. Refer to the NOT form found on the Caltrans Division of Construction Forms website for required documentation. The post-construction RUSLE2 run prepared during the design phase should be evaluated to ensure it conforms to the construction measures installed for final slope stabilization.

For projects in TMDL areas, a RUSLE2 construction run is required to show that temporary construction BMPs are sufficient to prevent sediment delivery during rain events and during periods with exposed soils. The construction run models temporary BMPs included in the Water Pollution Control Drawings (WPCD) submitted by the Contractor and included in the project Stormwater Pollution Prevention Plan (SWPPP). The RUSLE2 output showing that construction erosion is less than or equal to either the pre-construction condition or to the WLA is a required attachment to the SWPPP as Attachment J: RUSLE2 Outputs.

For projects that disturb natural surface water buffers, a RUSLE2 construction run is required to show that temporary BMPs are sufficient to protect the waterbody. The RUSLE2 output showing that construction erosion for that area is less than or equal to the undisturbed buffer (pre-construction condition) is required. Generally, the construction run will be provided by the Contractor.

1.3 Manual Objectives

The objectives of this Manual are to:

- Provide a background on the fundamental concepts and processes related to soil erosion, such as rainfall, runoff, sediment transport, and deposition.
- Provide an overview of what RUSLE2 is and how the program predicts erosion.
- Demonstrate how to install and set up the RUSLE2 program files, including the Caltrans databases and templates.
- Describe the user interface and to instruct users on how to gather the necessary project data needed as RUSLE2 inputs.
- Provide consistency with existing Caltrans manuals, procedures, policies, and practices for assessing project site conditions when identifying resources for collecting project-specific information needed for RUSLE2.
- Demonstrate and explain how to navigate and use the RUSLE2 software interface, including inputting data, setting up scenarios, and interpreting results at the pre-construction, post-construction, and construction phases.
- Provide consistency with documenting and reporting RUSLE2 findings for permit compliance.

Section 2

Soil Erosion

Soil erosion is a complex process that includes the detachment and conveyance of soil particles, the deposition of soil particles, and sediment transport. Factors such as surface roughness, plant canopy, mulch on the soil, and other variables affect soil erosion. The effects of these variables must be considered when estimating soil erosion and when making decisions on appropriate erosion control practices.

2.1 Types of Soil Erosion

There are four types of soil erosion that are caused by the effects of water: inter-rill, rill, gully, and stream channel. These four types of soil erosion can be combined and analyzed as either overland flow or concentrated flow.

2.1.1 Overland Flow Erosion

Rill and inter-rill areas combine to make up the overland flow areas. Rills are numerous small channels eroded by overland flow that move uniformly down the slope. Inter-rills are the smooth area between the rills where erosion is caused by raindrop impact. When rainfall intensity exceeds soil infiltration rates, the excess water runs off as overland flow, which causes inter-rill and rill erosion, as shown in Figure 2-1. The arrow in the figure illustrates a typical overland flow path from the origin of overland flow to a concentrated flow channel. RUSLE2 only applies to the portion of the landscape where overland flow occurs.

Figure 2-1. Soil erosion, overland flow

2.1.2 Concentrated Flow Erosion

Gullies, including ephemeral and classical gullies, and stream channel areas combine to make up concentrated flow areas. RUSLE2 does not address erosion caused by concentrated flows.

2.2 Factors Affecting Soil Erosion

Soil erosion is affected by four main factors:

- Climate (precipitation and temperature)
- Soil erodibility
- Topography (the length, grade, and overland flow path)
- Land use (cover and land practices).

Climate: A rainfall erosivity index has been developed based on rainfall amount and intensity. This index varies from a low of about 5 in the desert areas to 700 in the southeastern US. If all things are equal among sites, soil erosion varies directly with this index. Rainfall amount and temperature also affect soil erosion by affecting decomposition of biomass on and in the soil.

Soil Erodibility: Soil texture is a major variable that affects soil susceptibility to erosion. Soils high in silt are easily eroded. Soils high in clay or sand are not easily eroded. Soils are identified as various components that make up map units. Soil properties are assigned by soil component and map unit. These properties are specified when the name of a soil mapping unit is selected in the RUSLE2 program.

Topography: The shape and configuration of the land's surface has a significant influence on erosion. The grade, or steepness, of a slope and the slope length affect soil loss. Water flows more rapidly down steeper slopes, increasing its erosive power. On steep slopes, erosion tends to be more intense as it can transport sediment more efficiently. Runoff that accumulates on long slopes is also highly erodible, especially when it flows over steep slopes.

Land Use: Land use plays a pivotal role in soil erosion control. It encompasses a wide range of practices that can be employed to mitigate erosion. These practices are categorized into two subgroups: soil stabilization and sediment control. Soil stabilization practices involve methods such as vegetation preservation, mulch application, and temporary cover to prevent erosion. Sediment control complements soil stabilization efforts and can include silt fencing, sediment traps, and fiber rolls. Soil stabilization and sediment control work in tandem to promote sediment deposition and reduce sediment transport.

2.3 Erosion Process

There are three steps in which soil erodes from a slope:

- Detachment
- Deposition
- Sediment Transport

Detachment is the process of soil particles separating from the soil mass. Detachment adds to the sediment load and occurs by raindrop impact, flow, and wind. Detachment separates all particle sizes that are in the soil. Soil particles that become detached from the soil mass are referred to as sediment.

Deposition is the accumulation of sediment on the soil surface and is expressed as mass/area. Deposition reduces the amount of sediment being transported. When deposition occurs, the coarse and dense particles are deposited first, with the fine particles continuing downstream before being deposited.

Sediment transport is the movement of sediment downslope and then through the flow system. Although the splash from raindrop impact can move sediment downslope, this process is inefficient and does not compare to the sediment load transported by flow.

2.4 Soil Erosion and RUSLE2

Several soil erosion definitions are key to properly selecting topographic inputs and to understanding results from RUSLE2. Some of the key definitions needed for RUSLE2 are shown in Figure 2-2 and defined below.

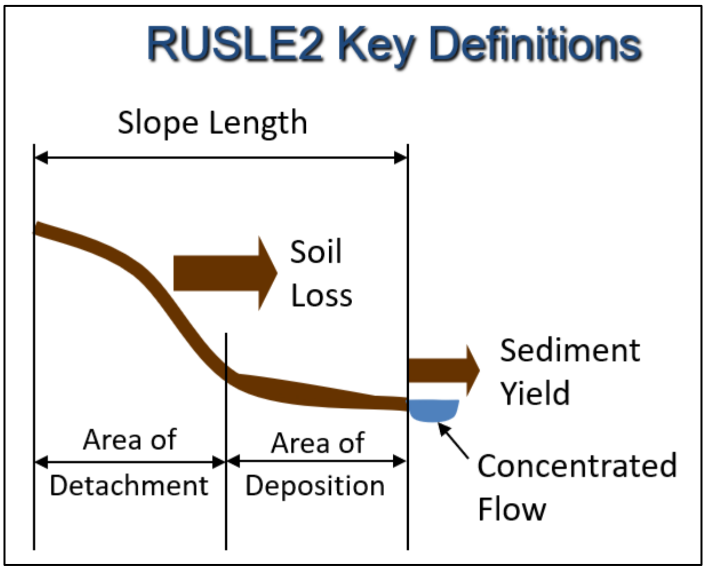


Figure 2-2. RUSLE2 key definitions

The **slope length** is the distance from the origin of overland flow to where it enters a defined concentrated flow channel (Figures 2-1, 2-3, and 2-4, red arrow). **Soil loss** is a term used to denote the sediment load leaving the area of detachment. This sediment load is expressed as the mass lost divided by the area that produced the sediment (i.e., tons/acre).

Sediment yield is the sediment load at the end of the slope length at the point where it enters a defined concentrated flow channel. If **deposition** occurs as illustrated, sediment yield from the slope length of the landscape will be less than soil loss. If no deposition occurs such as on uniform and convex slopes, soil loss and sediment yield will be equal.

Figures 2-3 and 2-4 show how a complex slope is broken into segments of different grades as inputs for RUSLE2.

Figure 2-3. Slope length, origin of overland flow to concentrated flow channel

Figure 2-4. Complex slope with multiple segments

Section 3

Erosion Prediction Using RUSLE2

The RUSLE2 program was developed by the United States Department of Agriculture (USDA) to guide conservation planning and to estimate soil loss and sediment delivery. Caltrans adopted the USDA RUSLE2 program to facilitate erosion prediction calculations for sediment delivery on highway construction projects.

3.1 The RUSLE2 Model

RUSLE2 is a tool used for erosion control planning to estimate soil erosion at a project site. RUSLE2 only applies to sites with exposed soils subjected to overland flows. RUSLE2 uses a set of equations that compute values for soil loss and sediment delivery as a function of the four main factors that affect soil erosion.

A powerful feature of RUSLE2 is that it is land use independent. By using fundamental variables to represent cover-management effects, RUSLE2 can be applied to any land use. RUSLE2 applies to cropland, rangeland, disturbed forestland, construction sites, reclaimed mined land, landfills, military training sites, and other areas where mineral soil is exposed to the forces of raindrop impact and where overland flow is produced by rainfall in excess of infiltration.

The development of the RUSLE2 model is spearheaded by the USDA-Agricultural Research Service (ARS), which plays a pivotal role in enhancing the scientific foundation within the model and refining its user interface. RUSLE2 was modified further in a version known as the ARS version, which has a database of highly disturbed lands and is more suitable for construction projects.

3.2 Vegetative Cover Effects

Establishing vegetative cover is key to attaining erosion control in most construction projects, with the exception of projects in paved urban areas or desert environments. RUSLE2 simulates the growth of annual grasses and forbs based on the growth curve of California native grasses. This curve has peak biomass production in spring and dormancy in summer because of drought. An example of the typical annual growth pattern used in RUSLE2 for grasses and forbs is shown in Figure 3-1.

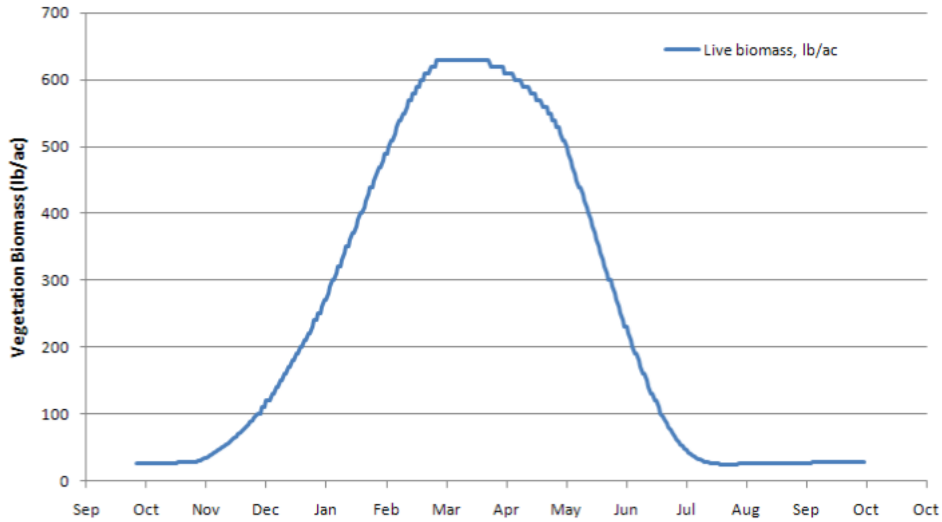


Figure 3-1. Typical annual growth pattern for grasses and forbs

In RUSLE2, BMPs with vegetation are typically simulated for 15 years to model post-construction average annual erosion. An example of the 15-year growth pattern used in RUSLE2 for grasses and forbs in California is shown in Figure 3-2. It shows an increasing growth rate during the first 4 years, with steady state growth in years 5 through 15. This figure also illustrates how a 1-inch compost blanket supplemented the net surface cover for the first few years while the vegetation was becoming established. This combination of a compost blanket and vegetation is an example of the benefits of using an initial surface cover that degrades over time to support vegetation establishment.

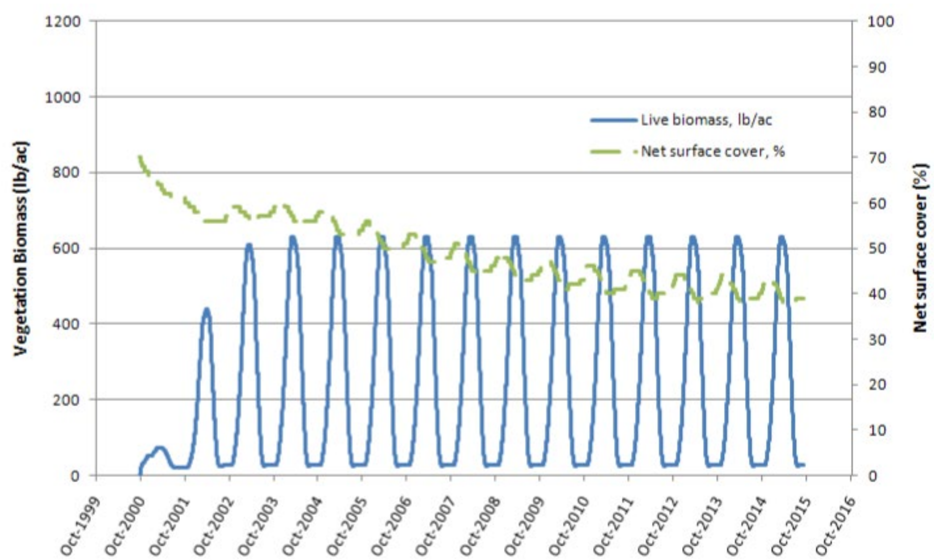


Figure 3-2. Typical 15-year growth pattern and surface cover for grasses and forbs

The vegetative growth cycle assumes that after the plant reaches maturity, stems, leaves, and seeds cover the soil surface and roots biodegrade under the surface at rates based on climatic factors. This annual cycle repeats itself until a steady state is achieved after approximately 4 years. RUSLE2 simulates the growth of some perennial shrubs, but trees were not included because of the diversity of species and the complexity of estimating cover given the wide range of tree growth habits present in California.

3.3 Caltrans RUSLE2 Database

The USDA RUSLE2 program allows users to create and use their own databases. RUSLE2 databases are a collection of pre-determined and stored values used to describe field conditions and incorporate site-specific information, which can improve the accuracy of erosion predictions for specific locations. The RUSLE2 databases can be locked so that existing information in the database cannot be changed. Information can be added to the database, but existing information cannot be changed.

Caltrans developed a database that encompasses the necessary information targeted to California and Caltrans-specific BMPs to allow users to predict and plan for erosion control on Caltrans projects. To customize the RUSLE2 program for Caltrans purposes, a reorganization of the program database and corresponding folders was required. The soil survey data and management zone data for California were loaded and typical construction site management options, such as fiber rolls and track-walked side slopes, were added. The addition of applicable Caltrans BMPs required the matching and replacing of BMPs from the original RUSLE2 database with those Caltrans BMPs that are most similar. A number of options for items such as strip farming were removed as they are not applicable to Caltrans construction sites.

3.4 USDA RUSLE2 Limitations

The USDA RUSLE2 User's Reference Guide is a useful reference that provides detailed explanations of how RUSLE2 operates, guidelines for selecting input values, and instructions on applying RUSLE2 to estimate erosion across a wide array of conditions. The USDA RUSLE2 user guide can be found at: https://www.ars.usda.gov/ARSUserFiles/60600505/RUSLE/RUSLE2_User_Ref_Guide.pdf

While RUSLE2 is a valuable tool for estimating soil erosion it does have some limitations, including but not limited to:

- Data Requirements. RUSLE2 relies on various data inputs, including climate, soil, topography, and land management information. Obtaining accurate and up-to-date data for these inputs can be challenging, particularly in regions with limited data availability.
- Sensitivity to Input Data. The accuracy of RUSLE2 results is highly sensitive to the quality of input data. Small errors or inaccuracies in input values can lead to significant errors in erosion estimates. For confidence level in model results, see the Disclaimer text on the RUSLE2 Outputs (Section 10 of this Manual)
- Simplification of Processes. RUSLE2 simplifies complex erosion processes into equations, which may not fully capture all the intricacies of erosion in certain landscapes or under specific conditions. For example, it may not adequately account for the impact of BMPs.
- Limited Spatial and Temporal Resolution. RUSLE2 provides erosion estimates at a coarse spatial and temporal resolution. It may not be suitable for assessing erosion at fine scales or for capturing short-term, high-intensity rainfall events.
- Assumption of Steady-State Conditions. RUSLE2 assumes steady-state conditions, which means it may not accurately predict erosion in areas undergoing rapid land use changes or in response to extreme weather events.

- Limited Representation of Vegetation. The model's representation of vegetation cover and its effects on erosion can be oversimplified. It may not fully account for the variability in plant types and densities. Additionally, the effect of wind on both how the canopy intercepts raindrops and on the erosivity of raindrops is not considered in RUSLE2.
- Inherent Uncertainty. Like all models, RUSLE2 carries inherent uncertainty. It provides estimates based on equations and assumptions, and the actual erosion rates may vary from the predictions.
- Complexity for Non-technical Users. RUSLE2 can be complex for non-technical users to understand and apply effectively. Training and expertise are often required to use the model accurately.
- Scale and Generalization. RUSLE2 is a generalized model and may not capture erosion dynamics accurately at very small or very large scales or in highly heterogeneous landscapes.
- Lack of Future Climate Consideration. The model does not account for potential changes in climate patterns, which can impact erosion rates in the long term.

Despite these limitations, RUSLE2 remains a valuable tool for estimating and managing soil erosion. It can provide useful insights for erosion control when used judiciously and in conjunction with local knowledge and field observations.

Section 4

Install and Setup RUSLE2

The RUSLE2 program should be used concurrently with this Manual. This section steps through the RUSLE2 program installation and setup. RUSLE2 runs on just about all Windows operating systems. RUSLE2 loads large database files quickly and performs complex slope scenarios on nearly all machines in use today. New users will do a complete install of RUSLE2. Experienced users with projects created prior to 2024, will first create an archive of their existing database then install the new RUSLE2 files. An archive is required to prevent loss of project specific data previously created in RUSLE2.

4.1 Archive Previous Databases and Project-Specific Data

In RUSLE2, database files (ending in .gdb) contain local soils, climate, local managements, templates, and profiles worksheets that have been created while using RUSLE2. Experienced users should archive their existing databases, prior to downloading and running the new installer, in order to recreate project-specific RUSLE2 files later.

The calculations embedded in the RULSE2 programming have been expanded and the Caltrans database was updated in 2024. Due to the improved programing, recreating exactly the project-specific sediment delivery results that were created before 2024 will be difficult. Therefore, users should archive their existing installer and database to prevent loss of prior work. Database updates include new soil survey data and management zone data for California, updated Caltrans construction-specific BMPs, and deletion of farming-related managements.

It is not recommended to have multiple versions of RUSLE2 installed on one computer because each version will make a change to the computer registry. Multiple versions may not function properly. The August 2011 RUSLE2 installer can be requested from the HQ Office of Hydraulics and Stormwater Design.

Importing (i.e., merging) databases that pre-date 2024 into the new Caltrans database is not recommended because of the reorganization, creation of new folders, and removal of some folders. For ongoing projects, users should consider re-creating project-specific managements and profiles to gain the benefit of the improved programming.

To archive an earlier version, create a folder called “RUSLE2 Archive Folder [Today’s Date]” in a location that is not locked in your C:/ directory such as Desktop or Documents. Archive your existing database (file with extension .gdb) into the newly created folder. This folder can be used for storing all RUSLE2 database files for later use. Archiving should be done prior to installing the latest Caltrans RUSLE2 package. When needed, access the prior database by setting the database path in RUSLE2. Refer to Section 4.3, Step 3.

4.2 Install RUSLE2

The Caltrans RUSLE2 installer, including the RUSLE2 program and Caltrans databases, is available for download on the Caltrans Storm Water website at:

https://dot.ca.gov/programs/design/hydraulics-stormwater/bsddd-erosion-prediction-with-rusle2

If you have an older version of RUSLE2 installed on your computer, you must uninstall it but first review Section 4.1 above to archive your database. Once your current RUSLE2 files are archived, then you must uninstall the older version and then install the updated program files.

If you are not the administrator on your computer, you may need to contact your Information Technology department to have the RUSLE2 program installed on your machine. If you are the administrator or if you have access, download the RUSLE2ver2.7.2.9_CALTRANSdatabase11192024Setup.exe file to your system hard drive. Unzip or extract the file if it is zipped or compressed. Double click on the .exe file then select Options:

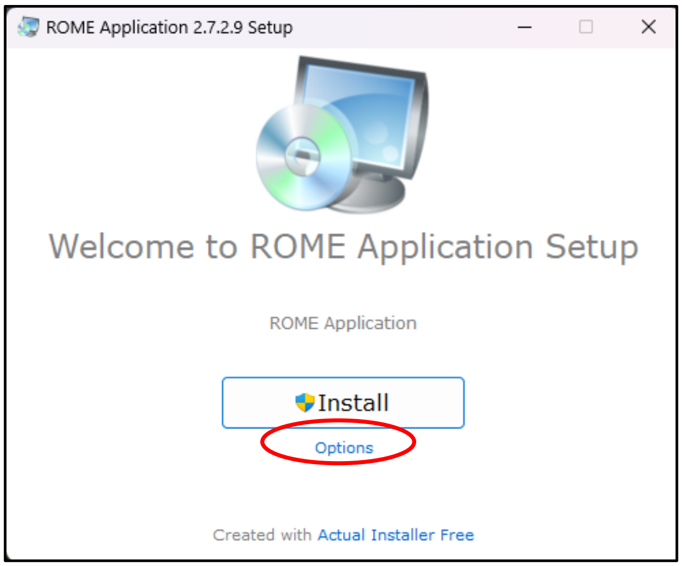


Figure 4-1. RUSLE2 application installation

In the Options menu, choose the Desktop or a location not locked by the Admin on the C:/ drive, such as Documents, as the Destination Folder to install the program, see Figure 4-2. Do not install RUSLE2 in the Program Files folder (default location) unless user access can be allowed so that RUSLE2 can write files in this folder; this is a problem with newer versions of Windows.

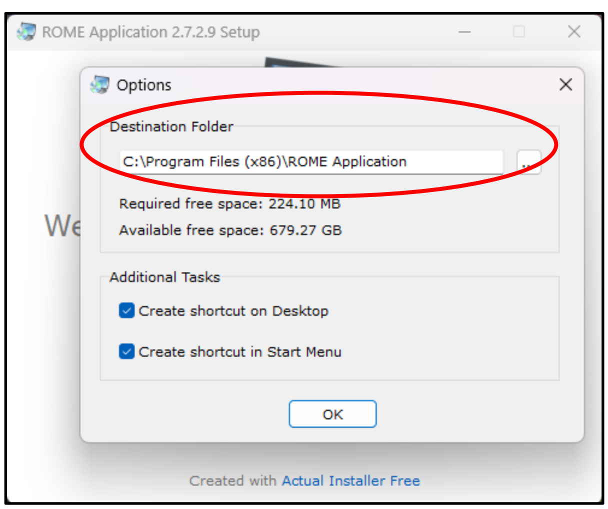


Figure 4-2. RUSLE2 installation location

Once the Destination Folder is designated select OK, then click Install and a folder called ROME Application will be created at that location. The RUSLE2 program will appear in the Start Menu and desktop as ROME Application. Alternatively, you can access the application by opening the Binaries folder, and double clicking on RUSLE2.exe.

Note to experienced RUSLE2 users: verify the application version installed on your machine. You may only need to update the database. In that case, refer to Section 4.4.

4.3 Load and Set Database Path

Upon first launch of the newly installed RUSLE2 program, you may get the error shown in Figure 4-3.

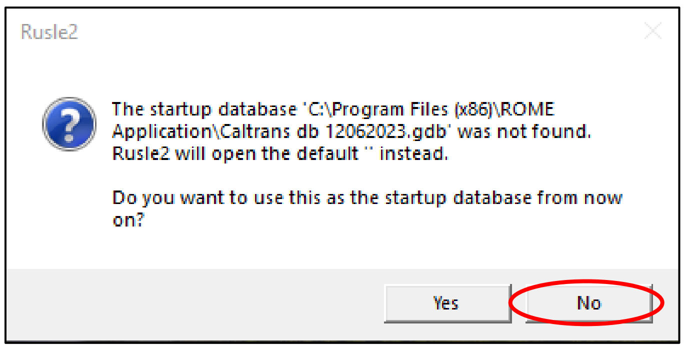


Figure 4-3. RUSLE2 startup database error

If this error occurs, select No then continue with the steps in this section. You should not receive this error once your database path is set in Step 3 below.

Launch RUSLE2 and use the following steps to load and set the correct User Access Level, Profile Template, and Caltrans database that appear in the bottom right side of the RUSLE2 screen, as shown in Figure 4-4. When opening the program for the first time, these may differ from what is shown in Figure 4-4. The following steps walk through how to set these to the correct items.

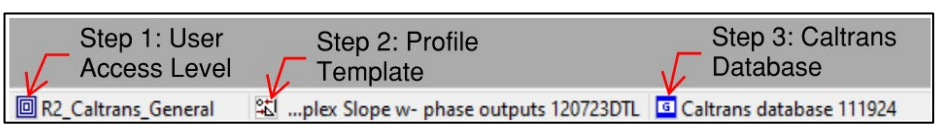


Figure 4-4. RUSLE2 initial setup

Step 1. Set the User Access Level. Access level is listed in the bottom right-hand corner. There are two User Access Levels available: R2_ARS_General and R2_Caltrans_General. Set the User Access to R2_Caltrans_General. Left click on the access name in the lower right part of the screen. Select R2_Caltrans_General from the Current Access dropdown menu and click the box to check use this access on startup. It may already be selected. Click OK:

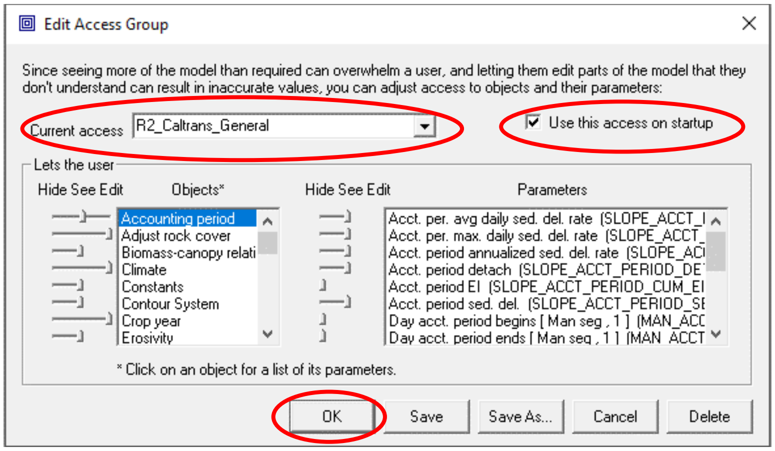


Figure 4-5. Set RUSLE2 startup user access file

Step 2. Set the Start Up Profile Template. Go to Help/Introduction and select CALTRANS Construction site Complex Slope w- phase outputs 120723DTL from the bottom of the template list, then select Profile, then OK.

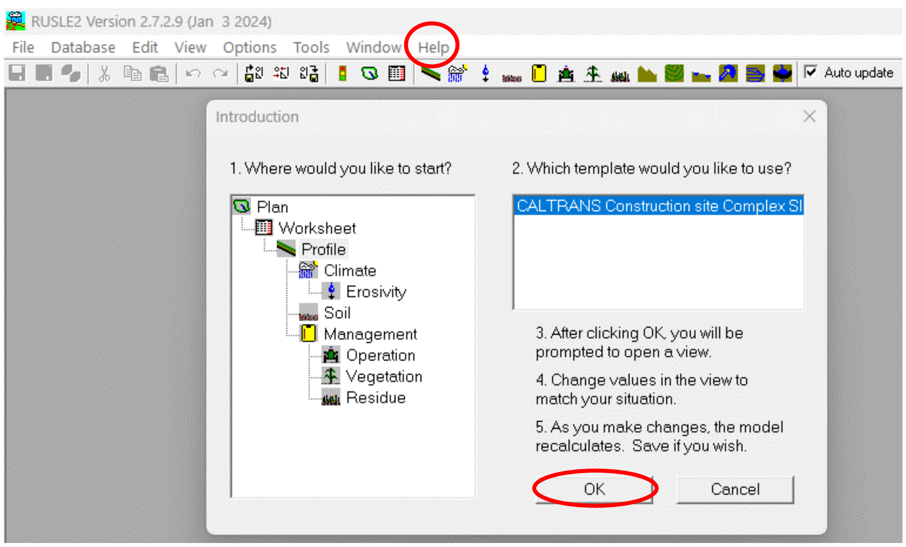


Figure 4-6. Open profile template

Click Cancel the open profile pop up window. In the lower right part of the screen, left click on the profile template. In the pop-up window click the Startup Tab, click the box to check use this template on startup, then click OK.

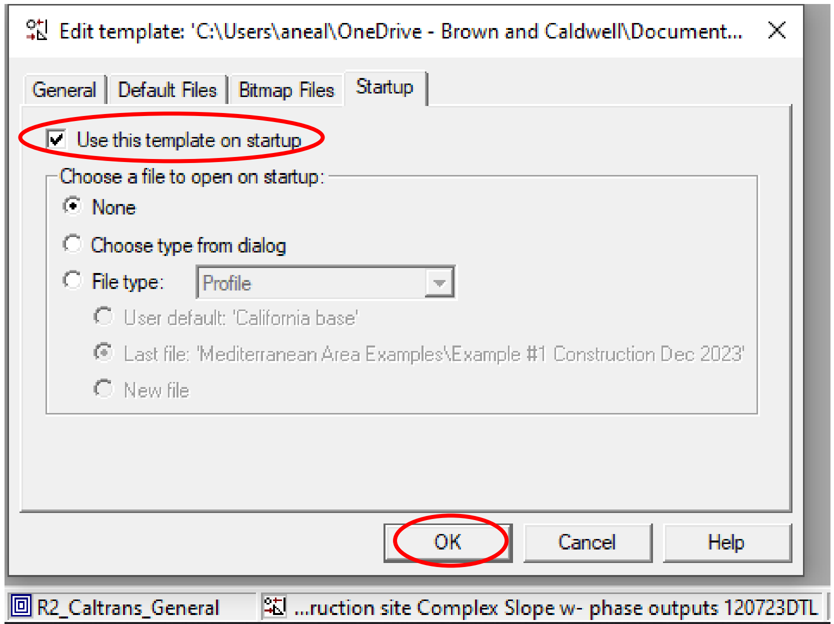


Figure 4-7. Set RUSLE2 startup profile template

Save the profile template in the RUSLE2 for CALTRANS 10_24_2024\Users folder. This Users folder is a subfolder of the RUSLE2 application. In this example, the installer files were saved to the Documents\ProgramData folder:

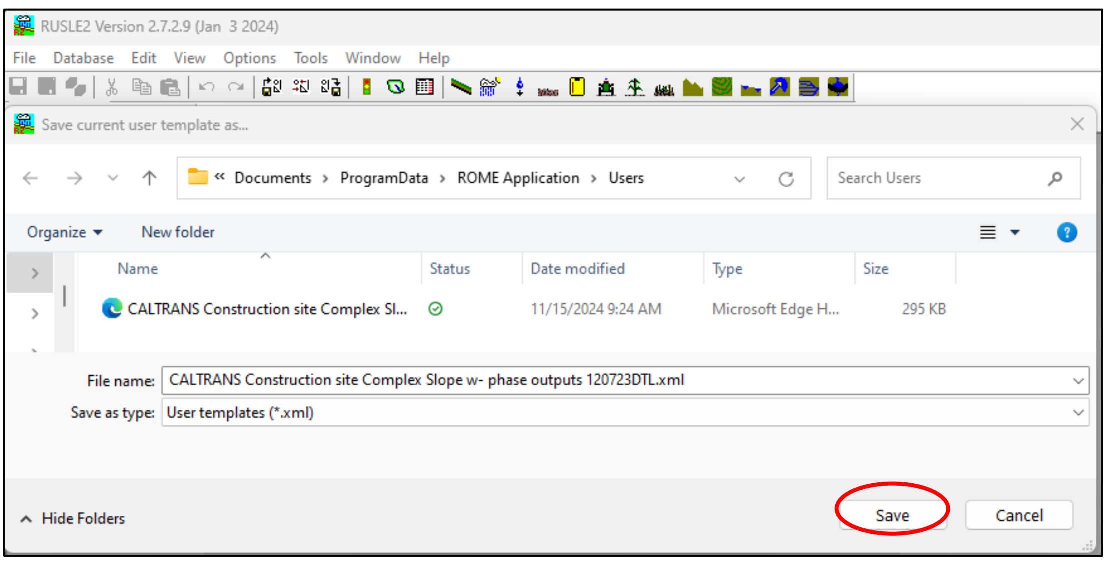


Figure 4-8. Save profile template

If you get this error, click Yes:

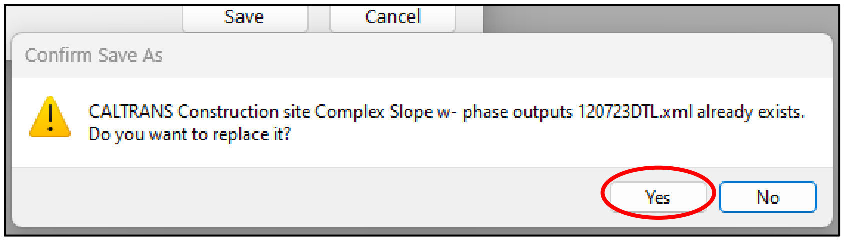


Figure 4-9. Save profile template, error

Step 3. Load and Set the Database Path: If the correct database name is not displayed in the lower right corner, right click the database attribute (where it is displaying the incorrect name) and select Open alternate to choose the correct database. The program should automatically open to the folder that the installer is saved to. In this example, the installer files were saved to the Documents\ProgramData folder and the database file (.gdb) is in the main folder. Select the file then click Open:

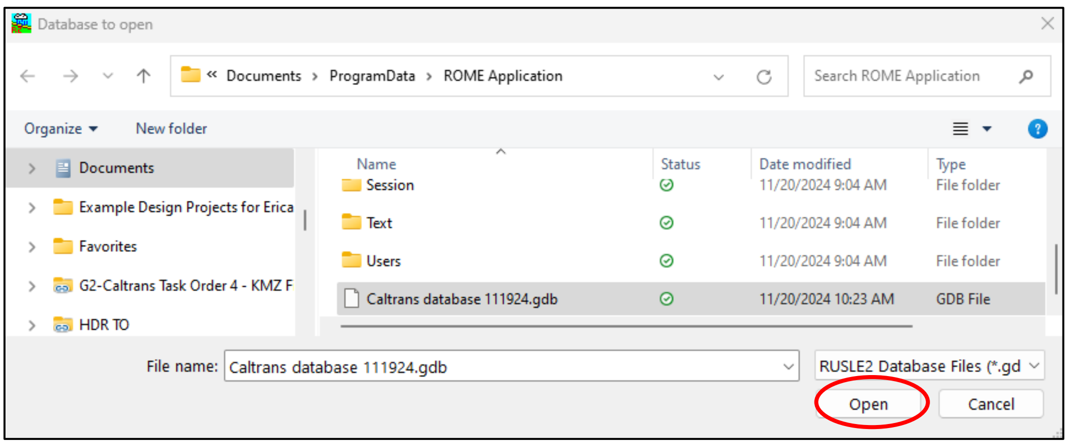


Figure 4-10. Set RUSLE2 database path

Once the correct database file is loaded, open the Database drop-down menu and click on Startup database. Reopen the Database drop-down menu to ensure that Startup database is checked:

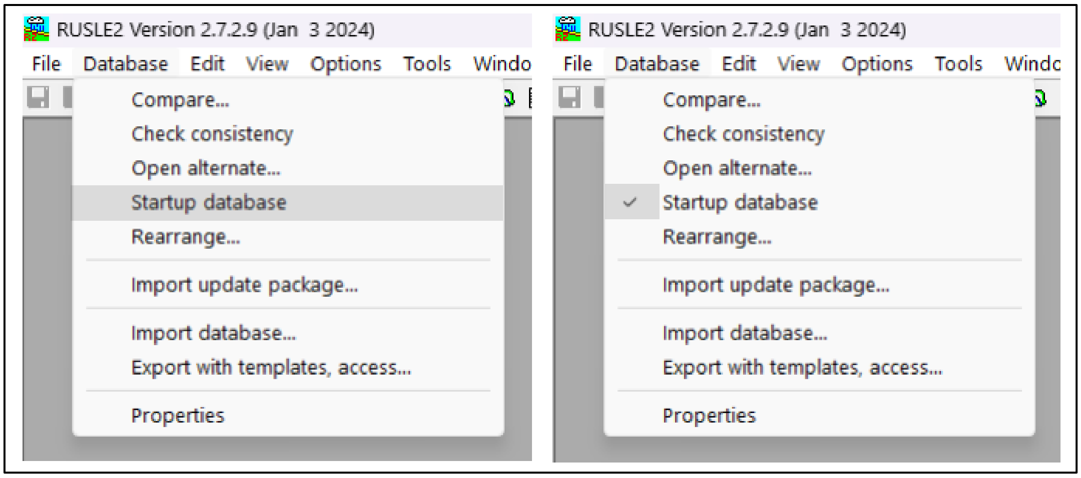


Figure 4-11. Set RUSLE2 startup database

4.4 Updating Caltrans Databases

Caltrans may update the RUSLE2 database periodically. Updates will be posted to the Caltrans Storm Water website and updated database files will include the update date in the name. The updated database can be downloaded and saved to the RUSLE2 application folder. Within the main application folder, the database files are those that end with .gdb. New database files may be saved here and set to load in RUSLE2 by following Step 3 in Section 4.3.

For experienced RUSLE2 users who have created Local Managements and project-specific files, redirecting the program to a new database will lead to lost files. In this case, the updated database files need to be imported into the installed database files. NOTE: It is not recommended to import (i.e., merge) databases that pre-date 2024 into the new Caltrans database. See Section 4.1 for instruction on how to archive older databases. For databases that were created in 2024 and later, users can import prior databases into the latest Caltrans database release without issues using this guidance.

To update your database with a release after 2024, download the updated database and save it to your existing RUSLE2 program files in the ROME Application\Import folder. Next, open RUSLE2 and select Database\Import Database.

A split screen will appear (Figure 4-12) with the left side being the contents of the new database to import and the right side being the installed database. Select all the files and dependents in the source on the left side and import it into the installed database and into the same folder, then click Import.

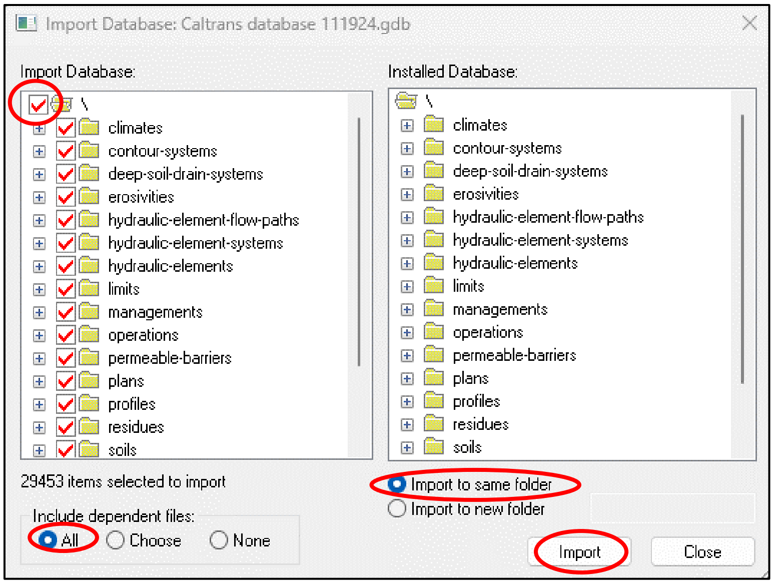


Figure 4-12. Import updates to Caltrans database

A warning pop-up saying that you cannot edit after import will appear, select OK:

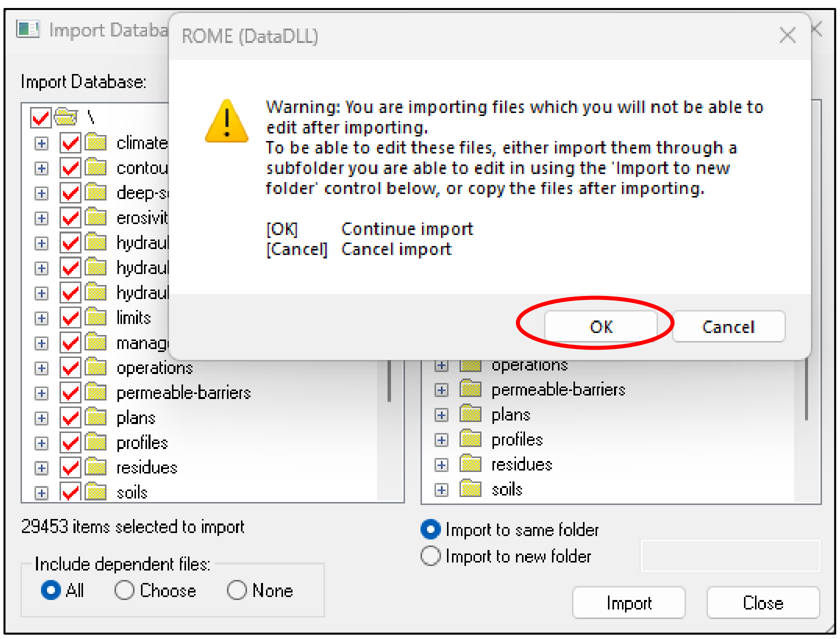


Figure 4-13. Caltrans database updates import: Warning

A pop-up asking to confirm object replacement will appear, select Yes to All:

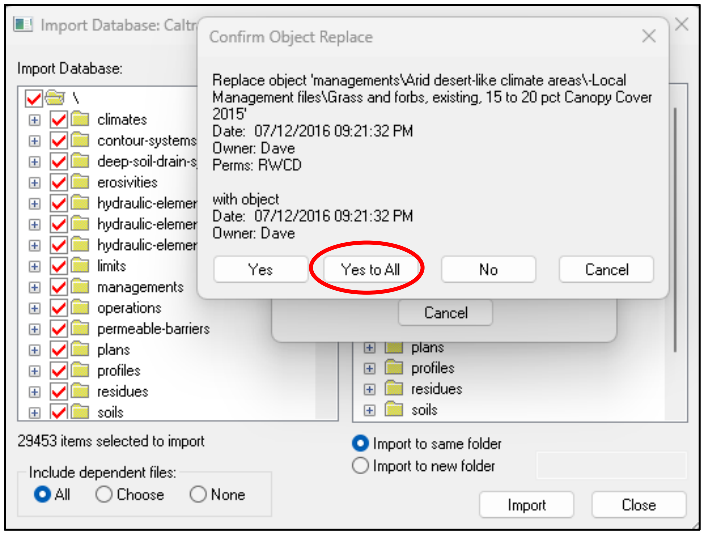


Figure 4-14. Caltrans database updates import: Object replace

Section 5

Using the RUSLE2 Model

To predict soil erosion using RUSLE2, specific project information and data are needed for the model that typically include:

- Climate Data: precipitation data that is used to estimate the erosive power of rainfall events.
- Soils data: soil texture, erodibility, and other relevant soil properties
- Topographic data: information on the terrain and grade of the area of interest for each phase of the project.
- Land use and land cover data: types of vegetation and land management practices (i.e., BMPs) on the project site and the percent cover.
- Field measurements (optional): In some cases, field measurements may be necessary to calibrate and validate the model or to provide specific data that is not available through existing sources. This can include soil observations and observations of existing cover and land management practices.

It is essential that the project data used as RUSLE2 model inputs be accurate and representative of the site. Use the project location to gather data needed for the RUSLE2 model. Project data sources are described in this section.

5.1 Project Phases

RUSLE2 is used to model and predict erosion rates for pre-construction, post-construction, and construction phases of a project.

Pre-construction: The existing condition site data is used to determine the pre-construction sediment delivery for the project site prior to the start of any project construction activities. For this run most of the project data will be found in online resources and project plans.

The pre-construction run generates the baseline for use in evaluating the subsequent project phases.

Post-construction: The post-construction site data is used to determine if the designed permanent erosion control is sufficient. This analysis also can be used as an iterative process for selecting permanent soil stabilization BMPs. For this run the project data from pre-construction is updated with information found in project reports (e.g., PS&E plans, geotechnical report).

The post-construction run is used to show final stabilization for the NOT.

Construction: The construction phase is used to determine if the Contractor selected temporary erosion and sediment controls are sufficient. This analysis can also be used as an iterative process for selecting temporary BMPs to meet the requirements of Table H-2 of the CGP (see Appendix A). For this run the project data from pre-construction is updated with the information from the WPCDs submitted by the Contractor in the SWPPP and from project reports (e.g., PS&E Plans, geotechnical report).

The construction run is only applicable to CGP projects in a TMDL watershed or projects that disturb a surface water buffer area. Generally, the construction run will be provided by the Contractor.

5.2 RUSLE2 Interface

The RUSLE2 Profile models an overland flow path that brings together climate, soils, topography, cover, and roughness data, with temporary and permanent BMPs. Figure 5-1 shows the default Profile from RUSLE2. Step 1 is climate. Step 2 is soils data. Step 3 is topography. Step 4 is Management, which incorporates both cover and BMPs. Step 5 is supporting practices like sediment traps. Step 6 is a wizard to install sediment barriers like silt fences and fiber rolls.

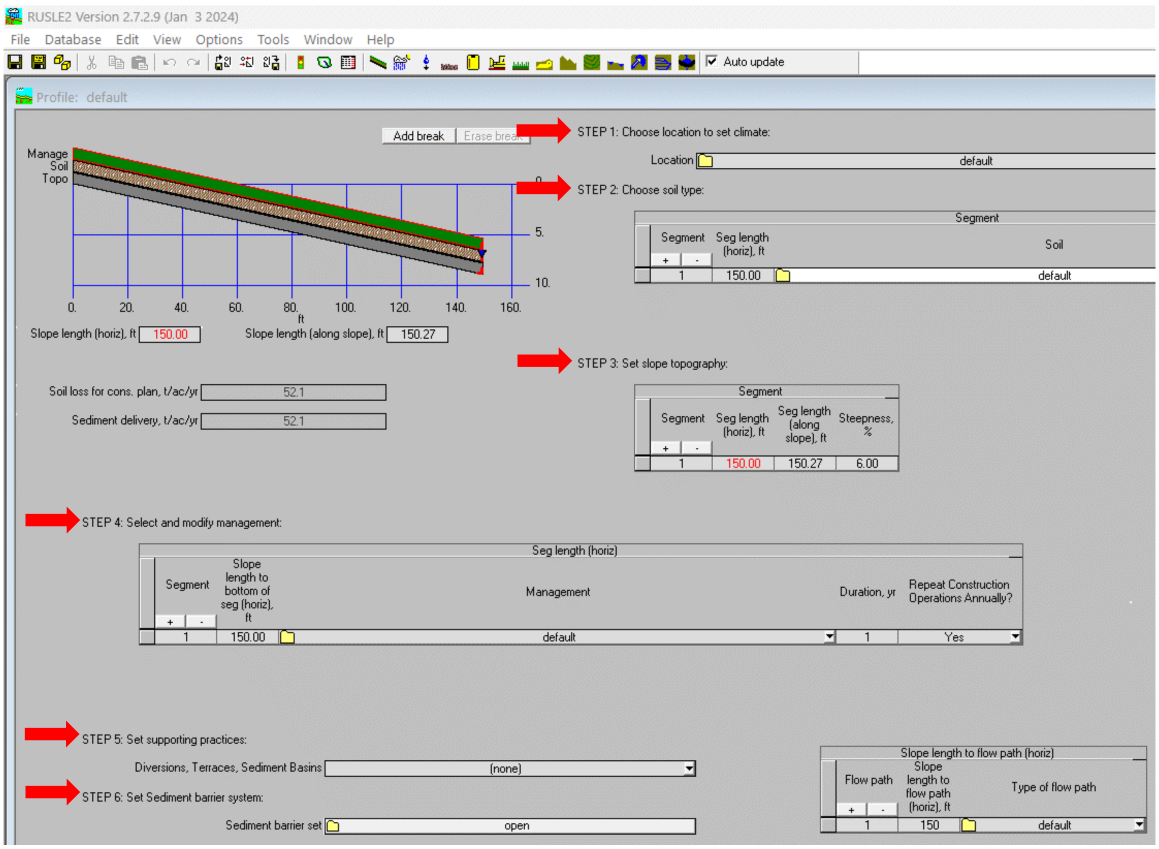


Figure 5-1. RUSLE2 profile interface

5.3 Project Location

Prior to setting up and running the model, project data must be collected. To start, locate the project on a map. Use the Postmile Services Postmile Query Tool to find the location based on the project County, Route, and Postmile from the project plans. This tool is found at:

https://postmile.dot.ca.gov/PMQT/PostmileQueryTool.html

Next, verify if the project is located within a TMDL watershed. Refer to the 2022 Construction Stormwater General Permit TMDL Map Tool available at:

https://gispublic.waterboards.ca.gov/portal/home/item.html?id=4220e74487744f6cad19326bb978c9bc

5.4 Climate

The climate is set based on the project location and data is derived from precipitation and weather patterns. The climate location options in the RUSLE2 Profile Step 1 pull-down menu are based on the county the project is in then on the rainfall depth at the project site. Project rainfall depth is determined using the Natural Resource Conservation Service (NRCS) precipitation maps in Appendix B. Using the county name from the project plans and the Lookup Key in Appendix B, find the appropriate NRCS precipitation map. Locate the project on the NRCS precipitation map to determine the precipitation range for the project.

5.5 Soils

Soils data found in the project geotechnical report is used as inputs for RUSLE2 Profile Step 2. When a geotechnical report is not available, use the following procedure:

For pre-construction runs on undisturbed sites, identify the soil map unit(s) on the USDA/NRCS Web Soil Survey. The map unit symbols match the options in the RUSLE2 database. Access the USDA-NRCS Web Soil Survey website at:

https://websoilsurvey.nrcs.usda.gov/app/

To choose a soil record for the project location, use the geo-coordinates from the Postmile Services Postmile Query Tool as inputs for the Web Soil Survey (see Section 5.3). The coordinates are entered on the Area of Interest Tab under the Latitude and Longitude or Current Location search bar on the left. Create an Area of Interest (AOI) encompassing the project area using the buttons above the map. Then click on the Soil Map tab to determine the dominant soil type(s) for the project area. Enter the project soils in RUSLE2 using the SSURGO folder in the soils drop-down menu.

For pre-construction runs on disturbed soils, use the Disturbed/Mixed Soils by Texture in the soils drop-down menu. Choose a disturbed soil that has a similar texture as the soil identified for the pre-construction undisturbed condition in the previous step.

The post-construction soil texture and corresponding properties should be estimated based on the configuration of the final design, project reports, and project requirements, such as soil amendments. Consult with District Landscape Architect and District Geotechnical as needed.

5.6 Representative Areas

Selecting appropriate representative areas for a project is crucial for obtaining accurate results in RUSLE2. Evaluate the project for the dominant slopes in length and grade and the most critical slope length and grade. When evaluating slopes for criticality, remember to consider the consequence of slope failure.

Clearly define the boundaries of your project area. Choose representative transects through the project area. Transects begin at the origin of overland flow and end at the location at which concentrated flows begin. Recognize that soil properties, land use, topography, and climate can vary within the project area. Consider the entire project to determine the dominant, critical areas to include. Steeper slopes are typically more prone to erosion however, a representative area may not necessarily be the steepest. Look for slopes that are most likely to fail due to soils, land use, and flow patterns.

Determine the number and location of representative areas for the project. A project can have one or many representative areas. Each representative area is evaluated with RUSLE2. For example, if a project has five representative areas the project will have five pre-construction runs, five post-construction runs, and, if applicable, five construction runs.

5.7 Topography: Slope Length and Grade

Slope topography is a physical component used to determine soil erosion rates. Slope topography includes slope length and grade. Complex slopes are represented with multiple segments, each with specific length and grade, for RUSLE2 Profile Step 2.

Slope length in RUSLE2 is the distance from the origin of overland flow to the start of concentrated flow. The origin of overland flow is at the watershed boundary, not necessarily the project boundary. Concentrated flow begins where sheet flow and rills converge.

Slope grade, or steepness, is the difference in elevation divided by the slope length.

To accurately measure the slope length and grade, high-resolution topographic data for the representative area(s) are needed. While it is always best to measure slopes on site, the existing and proposed base mapping from the project grading plans are commonly used for this purpose.

To estimate the construction phase topography, consider the project schedule. For some projects, the construction phase will be more closely aligned with the pre-construction phase than the post-construction phase topography.

It's essential to ensure that the topographic data, grade calculations, and flow path delineation are accurate and representative of the actual conditions on the project site during each phase of construction. Errors or inaccuracies in these data can lead to incorrect estimates of soil erosion.

5.8 Managements

Managements refer to the various land management practices and BMP measures implemented to reduce soil erosion at each phase of the project. BMPs are temporary when they are used during construction and permanent when they are used after construction activities are complete. In RUSLE2, the temporary and permanent practices differ by how long they are simulated to be in service. Temporary practices are modeled in use for 2 years, whereas permanent practices with vegetation are modeled in use for 15 years. Managements are developed for RUSLE Profile Step 4.

Managements are created for each project phase based on construction operations, vegetation, type of cover, and erosion and sediment control BMPs implemented. Managements are developed using existing conditions and project-specific erosion and sediment control BMPs included in the project design to describe the day-to-day changes at the site. The existing conditions, construction activities, and BMPs implemented all affect soil erosion rates. Construction activities like changes in cover and soil surface roughness, movement of construction equipment across the site, and erosion control BMPs like removal or addition of mulch or compost, and hydroseeding are entered directly into RUSLE2 Profile Step 4. RUSLE2 layers the sediment control BMPs like silt fence, fiber rolls, and sediment traps, into the Management using Steps 5 and 6. RUSLE2 can model multiple BMPs installed at the same location.

To estimate soil loss and sediment delivery, RUSLE2 runs the timeline of activities included in the managements (developed using Profile Steps 4, 5, and 6) against the daily climate data for the soil conditions and topography information supplied in the profile.

Sections 5.9 and 5.10 describe the project data required to develop project management scenarios for use in RUSLE2 Profile Step 4. Section 5.11 describes sediment control BMPs that may be used during construction for use in RUSLE2 Profile Steps 5 and 6. Refer to Appendix D for a list comparing RUSLE2 practice names to the Caltrans Construction Site BMPs and California Stormwater Quality Association (CASQA) BMP names.

5.9 Soil Moisture Regimes

Soil moisture regimes (i.e., Mediterranean, Arid, Cool Humid) are assigned to the project based on the region or location of project site. The project soil moisture regime, or climate area, is used when selecting Managements from the pull-down menu for RUSLE2 Profile Step 4.

The soil moisture regime is a major determinant of the productivity of terrestrial ecosystems, including agricultural systems. The soil moisture regimes are defined based on the levels of the groundwater table and the amounts of soil water available to plants during a given year in a particular region.

The soil moisture regimes shown in Figure 5-3 are associated with the following folders in RUSLE2:

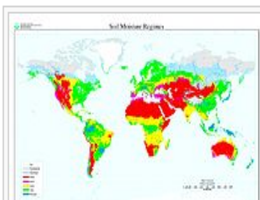
- Mediterranean climate areas = XERIC and XERIC-ARIDIC
- Arid desert-like climate areas = TYPIC-ARIDIC and USTIC
- Cool humid climate areas = UDIC

Soil Moisture Regimes (SMR) [edit]

The soil moisture regime, often reflective of climatic factors, is a major determinant of the productivity of terrestrial ecosystems, including agricultural systems. The soil moisture regimes are defined based on the levels of the groundwater table and the amounts of soil water available to plants during a given year in a particular region. Several moisture regime classes are used to characterize soils.

Soil Moisture Regime	Major Characteristics
Aquic	Soil is saturated with water and virtually free of gaseous oxygen for sufficient periods of time, such that there is evidence of poor aeration (gleying and mottling); Common in wetlands
Udic	Soil moisture is sufficiently high year-round in most years to meet plant requirement; Common in humid regions
Ustic	Soil moisture is intermediate between Udic and Aridic regimes; generally, plant-available moisture during the growing season, but severe periods of drought may occur; Common in semi-arid regions
Aridic	Soil is dry for at least half of the growing season and moist for less than 90 consecutive days; Common in arid (desert-like) regions
Xeric	Soil moisture regime is found in Mediterranean-type climates, with cool, moist winters and warm, dry summers. Like the Ustic Regime, it is characterized as having long periods of drought in the summer

Map of United States Distribution of Soil Moisture Regimes



Map of Global Distribution of Soil Moisture Regimes

Figure 5-2. Soil moisture regimes map legend

Figure 5-3. Soil moisture regimes map

Note: If the project soil moisture cannot be determined from the soil moisture regimes map, use an alternate source. One option is the Web Soil Survey (See Section 5.5). Under the Soil Data Explorer tab, expand Suitabilities and Limitations for Use/Land Classifications/Soil Moisture Class, then select View Rating. Not all areas of California have an assigned Soil Moisture Class in the Web Soil Survey.

5.10 Land Cover

The managements in RUSLE2 Profile Step 4 are based on project climate area, site conditions, findings from site visits, Google Earth research, and project design plans/drawings. Site visits and Google Earth Street View can provide a better understanding of existing cover type and can assist in estimating vegetative density. Project Erosion Control Plan sheets and Design Plans can provide a better understanding of proposed conditions. Project Water Pollution Control Plans can provide a better understanding of the proposed construction conditions.

5.10.1 Vegetative Canopy Cover Type and Density

The vegetative canopy cover type and the percent of vegetation canopy cover for the project representative area(s) must be estimated. Vegetative canopy cover is vegetation that intercepts the raindrops. Open spaces within the canopy (e.g., the space between adjacent plants) are not considered canopy in RUSLE2. Canopy cover is essentially the shade that is cast at high noon.

The project representative area(s) are visually inspected to evaluate the existing vegetation type. The RUSLE2 database developed for Caltrans has subdivided vegetative cover types into the following categories for each climate area as applicable:

- Grass and forbs
- Mixed grass and shrubs
- Shrub vegetation
- Woody established vegetation
- Bare ground

Next determine the vegetative canopy cover density for use in selecting the cover options in RUSLE2. Cover options range from 5 percent to 95 percent. Canopy cover should be determined by evaluating the ratio of the vegetative canopy cover to other types of cover (e.g., rock cover) to avoid total percentages greater than 100 percent. Figure 5-4 gives a graphical overview of how different cover percentages may appear.

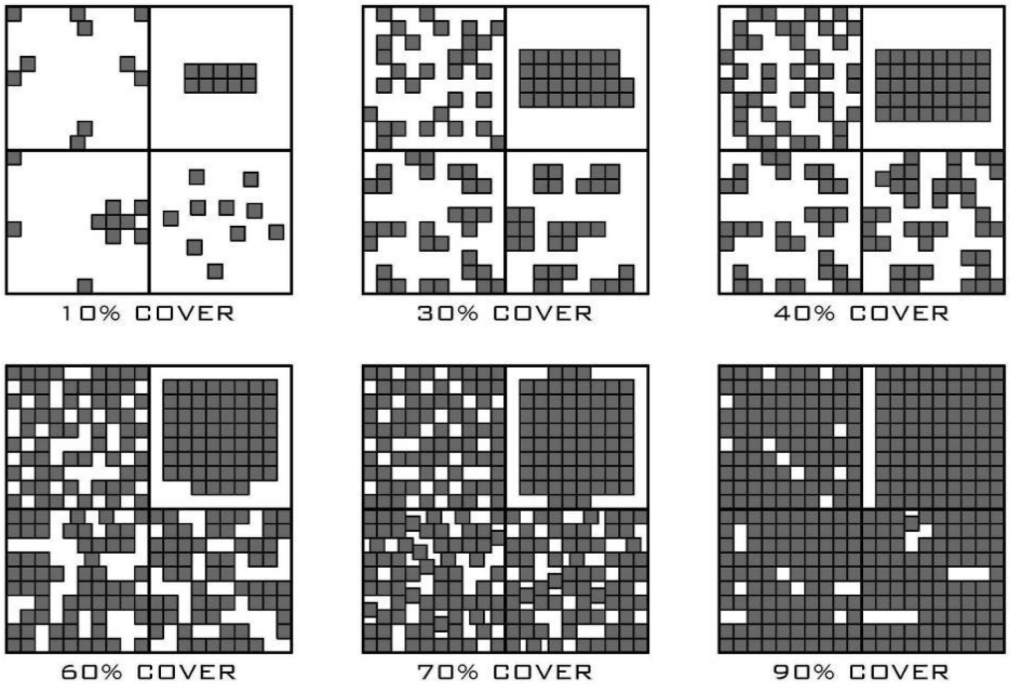


Figure 5-4. Vegetation/Rock coverage classification

The vegetative canopy cover density can be subdivided into the following categories:

- Sparce: 0 percent to 25 percent vegetative canopy cover
- Sparce to moderate: 25 percent to 35 percent vegetative canopy cover
- Moderate: 35 percent to 70 percent vegetative canopy cover
- Dense: More than 70 percent vegetative canopy cover

Examples of vegetative canopy cover are shown in Figures 5-5 to 5-8.

Figure 5-5. Vegetative canopy cover approximately 30 percent

Figure 5-6. Vegetative canopy cover approximately 60 percent

Figure 5-7. Vegetative canopy cover approximately 80 percent

Figure 5-8. Vegetative canopy cover approximately 95 percent

5.10.2 Rock Cover

Rock fragments are unattached pieces of rock material three-eighths inches or greater in diameter. Rock cover reduces soil loss and should be incorporated into the erosion model. Site rock cover is determined using the same visual technique as used for the vegetation cover shown in Figure 5-4.

Existing areas of rock cover can be identified in RUSLE2 as rock slope protection. The value for rock cover should consider the values for other cover types to avoid overlapping values when the various cover percentages are combined (i.e., to avoid total percentages greater than 100 percent).

5.11 Sediment Controls

Most Caltrans designs will include an erosion control plan that includes linear sediment control BMPs to be used during and after construction. Common sediment control BMPs include silt fence, fiber rolls, gravel bag berms, and sediment traps, and can include terraces and diversions.

When a project design or WPCD calls for diversion ditches, terraces, sediment trap, or sediment basin enter the BMP in RUSLE2 Profile Step 5. RUSLE2 simply models water impoundment; therefore, select Water and Sediment Control Basins for both sediment traps and sediment basins.

Generally, Caltrans construction projects, at a minimum, will install silt fence around the perimeter of the disturbed soil area to prevent sediment from leaving the site. Some construction projects will use additional practices like fiber rolls and gravel bag berms. These BMPs are entered in RUSLE2 Profile Step 6.

5.12 Pre-configured Managements

Caltrans developed a database that encompasses the necessary information targeted to Caltrans-specific managements (e.g., BMPs) to allow users to predict and plan for erosion and sediment control on Caltrans projects. The pre-configured Caltrans managements are automatically loaded when the Caltrans database is selected in the RUSLE2 program start-up. Managements are applicable for all project phases.

When using a pre-configured management, click on the folder next to the management name to review the project elements included and the execution dates and durations. Make sure that the dates and durations are applicable to the project. For example, if the project construction schedule specifies grading for 6 weeks in June, ensure that the dates and duration in RUSLE2 reflect that. If the dates and/or durations need to be updated, make the changes, then select the save-as icon from the main RUSLE2 menu bar:

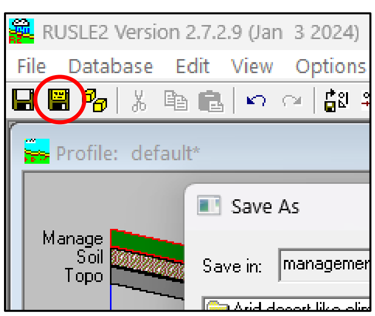


Figure 5-9. Saving an updated management file

When saving a new management from within a profile, RUSLE2 will ask what to do with the old reference to the original management. Always choose the 3rd choice, Replace only the reference from where you drilled down into the old file with a reference to this new one:

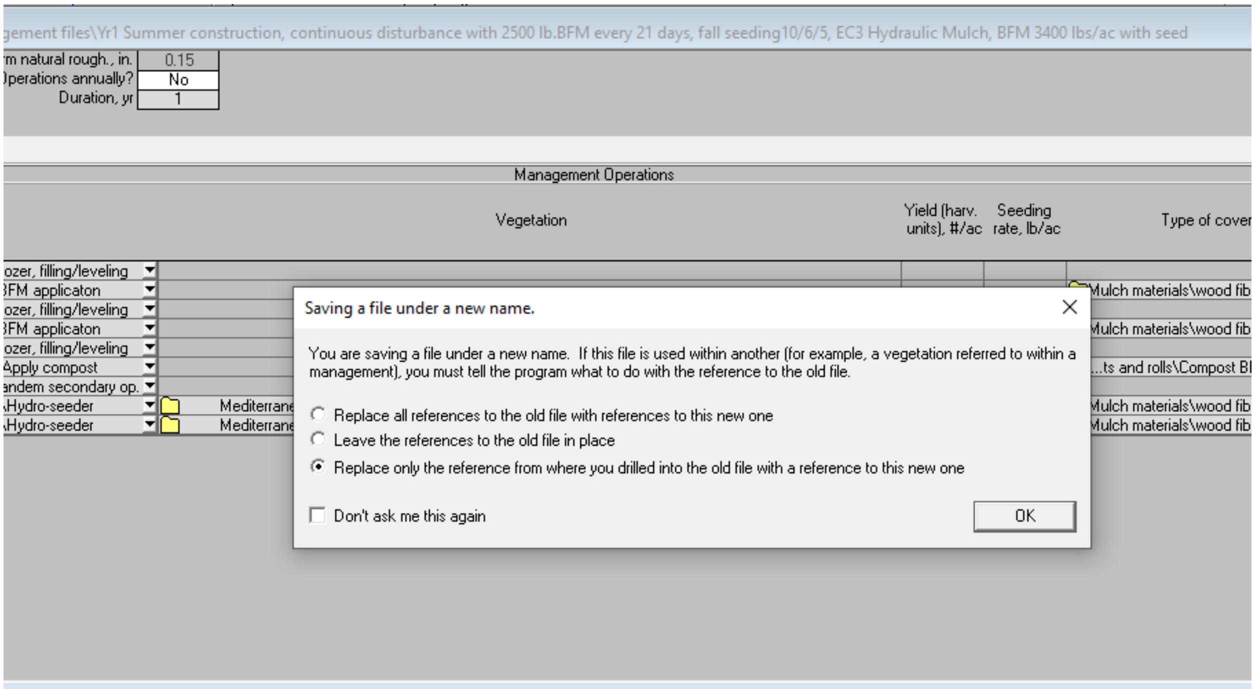


Figure 5-10. Saving updated management reference

5.13 Creating New Managements

When none of the pre-configured managements are appropriate for a project, a new management must be created.

From the Profile screen, use the dropdown arrow in the Management box to open the -Local Managements files folder in the project climate area. The project climate area is assumed to be Mediterranean.

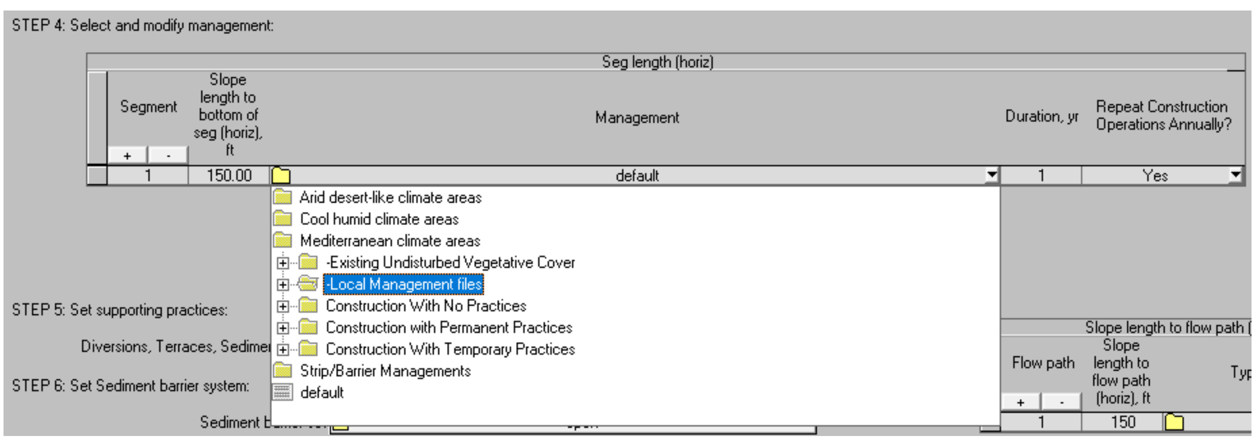


Figure 5-11. Open the -Local Management files

Select default from the -Local Management files folder.

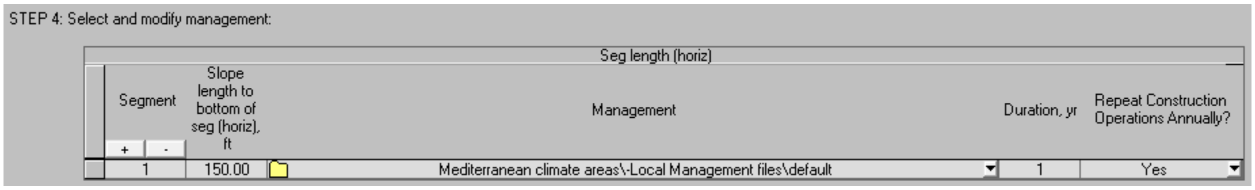


Figure 5-12. Select -Local Management files\default

Next use the yellow folder icon to open the management screen. Add dates and select operations starting with the first grading pass on the site and continue through final erosion control (e.g., seedbed preparation, seeding and mulching operations). The seeding operation requires a vegetation file and a seeding rate to trigger growth. If mulch is called for, accept the default value or select a different mulch and amount as specified in the project Erosion Control Quantities. Set the Repeat Construction Operations annually? toggle to No since this sequence of operations is not repeated annually.

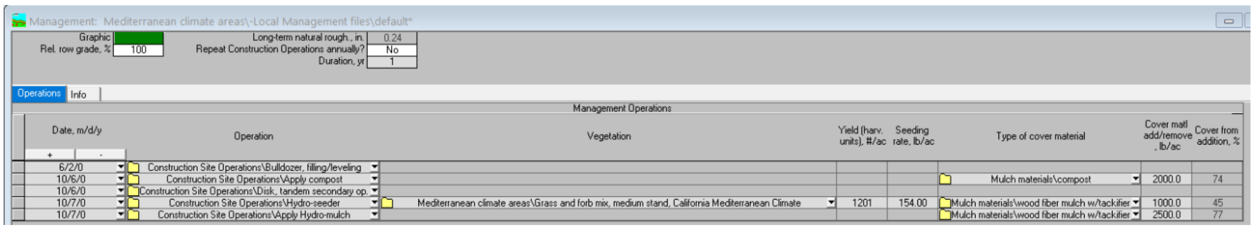


Figure 5-13. Edit operations and dates to customize Management

Notice the asterisk behind the Management file name which indicates your changes have not been saved. Select the save-as icon from the main RUSLE2 menu bar, rename the file to a name that represents the system being used, then save to the -Local Management files subfolder. RUSLE2 will ask what to do with the old reference to the original management. Always choose the 3rd choice, Replace only the reference from where you drilled down into the old file with a reference to this new one, shown above in Figure 5-10. Close the management screen and return to the profile.

Drill down into the Adjust Yield object located to the right of the management table in RUSLE2 Profile Step 4 screen. Adjust the yield and observe the change in maximum vegetative canopy to represent the production level of the mature vegetation as it would eventually be on the constructed site on which the run is being made. It may be significantly less than the original soil. This is important since RUSLE2 models canopy development and residue production based on this projected yield in this run. Residue refers to the amount of above and below ground plant material that remains in the soil. Since this yield adjustment is for the current profile run, it overrides the default yield shown in the management.

Rarely are construction sites considered permanently protected the day permanent erosion control is installed. RUSLE2 models the canopy development over the establishment period as well as the decay of applied mulch products to get outputs for a duration longer than just the construction period detailed in the management. Having this information is useful in projecting when erosion and sediment delivery rates will be back to pre-construction levels.

5.14 Project Erosion Rate Limits

The primary goal of RUSLE2 is to guide erosion and sediment control design to ensure that the construction project does not contribute to the degradation of receiving waters through an increase of sediment delivery. RUSLE2 is used to estimate the long-term average annual soil erosion rates for a given location or area in its existing condition. The soil erosion rates of the existing condition (i.e., pre-construction) are used as the project erosion rate limit, except for TMDL projects. For projects in a TMDL area, refer to Appendix A for WLAs.

Section 6

Problem Statement, Example 1

A Caltrans project consists of roadway restoration including construction of a new retaining wall along State Route 162, at post-mile (PM) 16.16, in Mendocino County. The damage is attributed to storm events that occurred in 2020/2021. This project is in a TMDL area.

Project elements include construction of a retaining wall, removal and replacement of two existing culverts, construction of one bioretention swale, and road improvements.

The following anticipated construction activities are of water quality concern: excavation and stock piling of cut material; trenching, stockpiling, and removal of existing culverts; concrete and tieback grouting operations; haul and storage of material and equipment; general equipment movement and access within and to/from the site.

The disturbed soil area (DSA) is more than 1.0 acre and therefore must comply with the CGP. The project is a Risk Level 3, and the total construction cost is estimated to be $5M.

Construction is projected to occur in stages between 4/14/2025 and 10/10/2025. Stage 1 is drainage system work, including construction of the bioretention swale from 4/14/2025 to 5/29/2025. Stage 2 is retaining wall construction from 6/2/2025 to 10/5/2025. And Stage 3 is road reconstruction and final erosion control from 10/6/2025 to 10/10/2025.

A silt fence will be installed at the grading limits prior to the start of construction. Erosion Control plans are shown in Figures 6-1 and 6-2.

Note: Slope repairs on the north side of Route 162 are being completed in cooperation with the adjacent property owner under a separate contract. The efforts are being reported independent of this project, as the slope drains to a ditch and crosses through the project as concentrated flow. This project only considers erosion created by the sheet flow generated by the portion of Route 162 that drains south and the existing pervious area from the south edge of pavement to the location where flows concentrate.

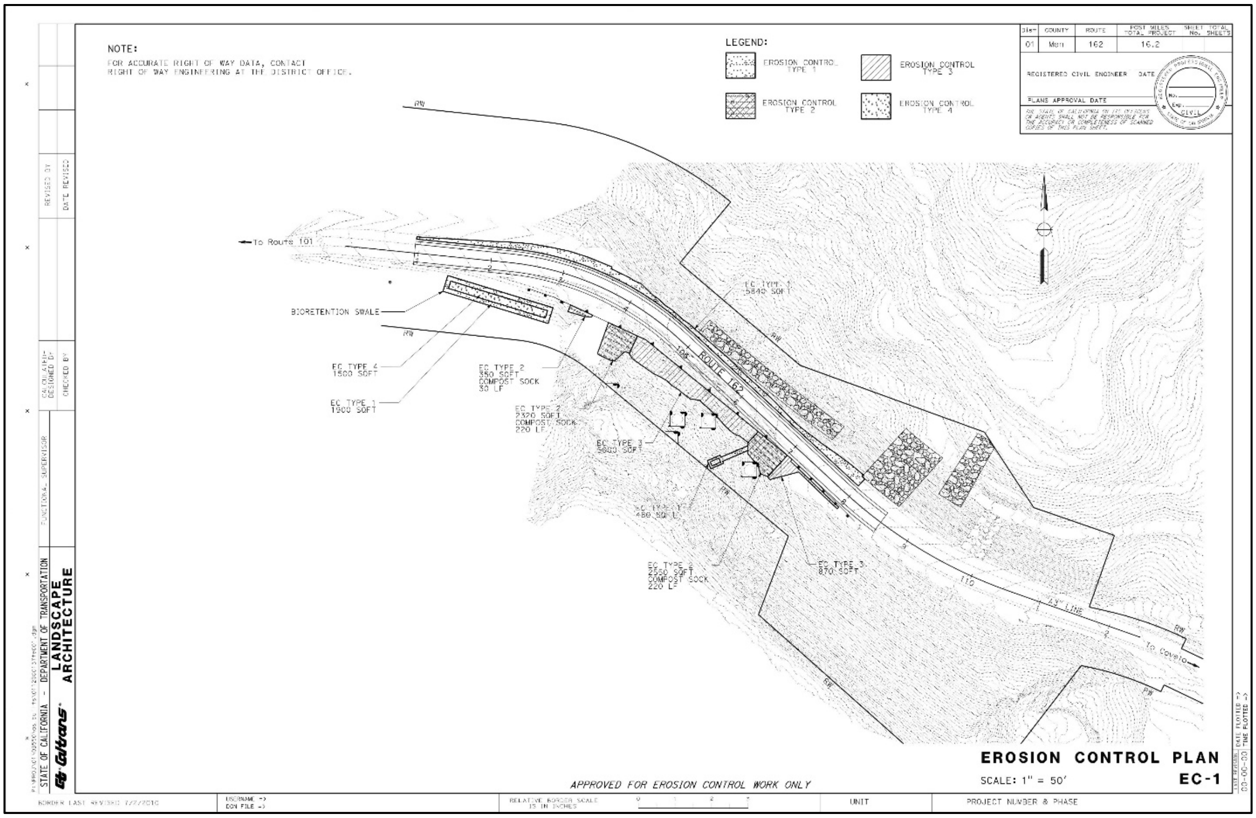


Figure 6-1. Example 1: EC-1 Erosion Control Plan

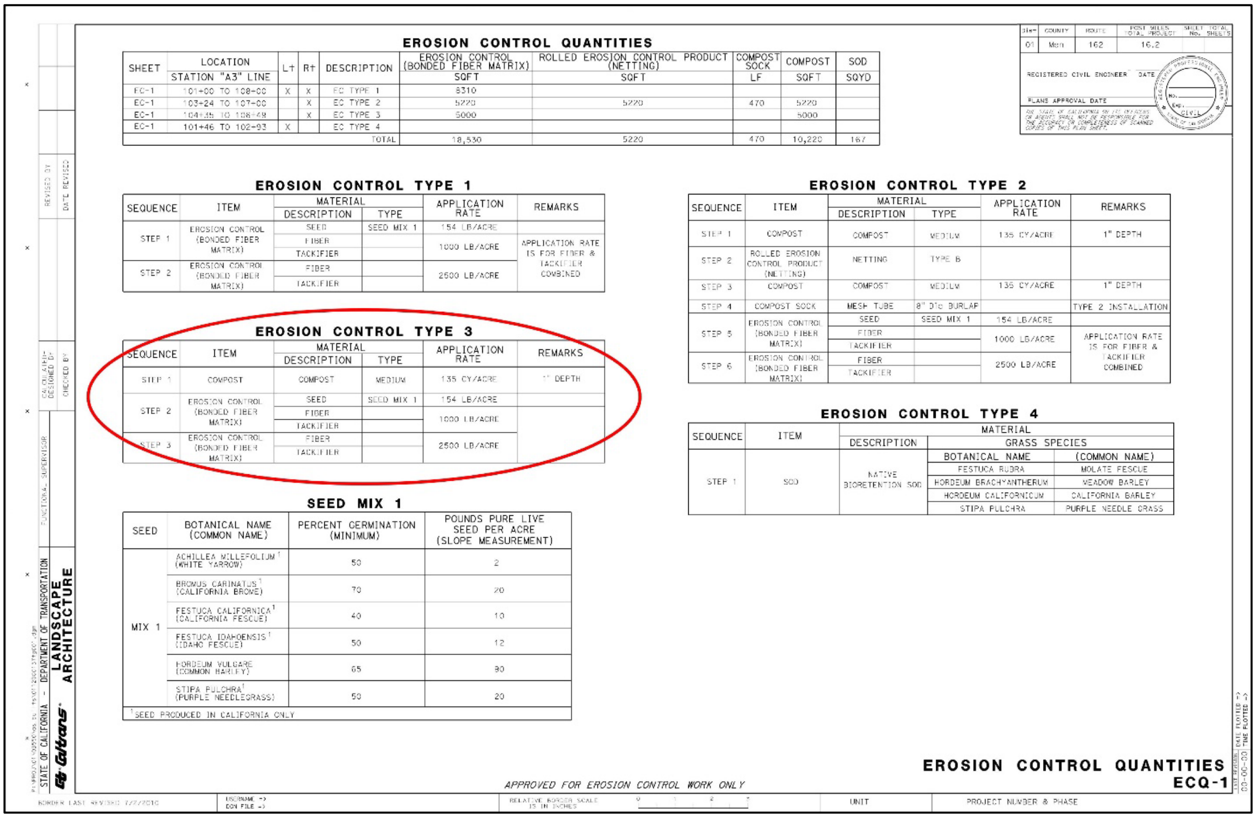


Figure 6-2. Example 1: ECQ-1 Erosion Control Quantities sheet

Part A (Design Phase): The Project Engineer has asked you to provide RUSLE2 documentation for the PS&E phase SWDR to validate that the post-construction soil erosion rates is less than or equal to the pre-construction soil erosion rate. Use the project information above and the provided design drawings to create the RUSLE2 documentation. Note: Use project grading plans when erosion control plans do not include contours.

Assumptions:

- A silt fence will be installed at the limits of grading for the duration of construction.
- Final soil stabilization for all disturbed areas will consist of Erosion Control Type 3 as shown on the Erosion Control Quantities sheet, Figure 6-2.
- At the end of construction, the Contractor will cut down the silt fence but will not remove it entirely.

Specific information to solve for:

- Number of representative areas (dominant, critical) for the project
- Pre-construction soil erosion rate
  - The typical cross section for the existing roadway is 25 ft asphalt pavement from the hinge point to the edge of shoulder and has an 8 percent superelevation.
- Post-construction soil erosion rate

- The typical cross section for the proposed roadway (Figure 6-3) is 35 ft asphalt pavement from the hinge point to the top of wall and has an 8 percent superelevation. Grading limits are shown in Figure 6-1.

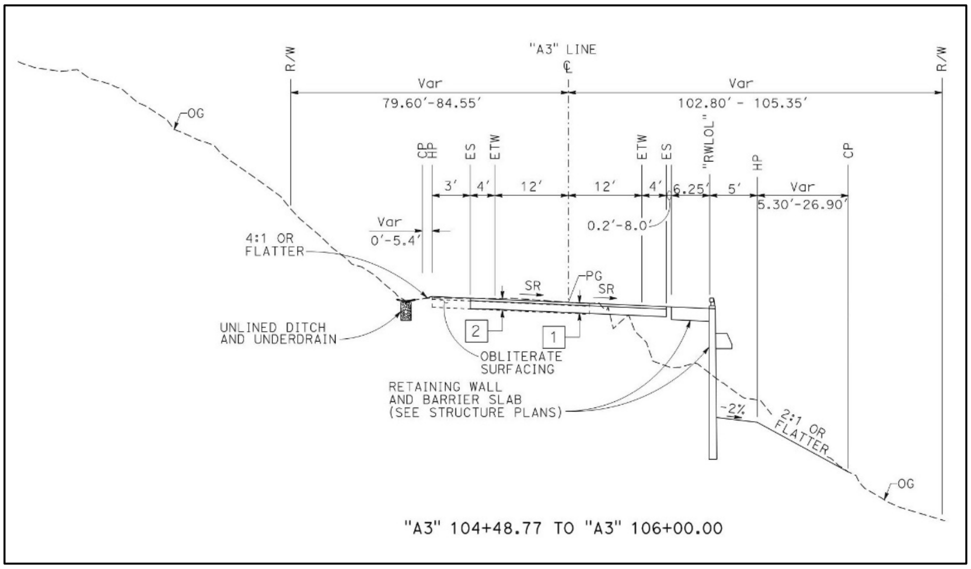


Figure 6-3. Example 1: Typical cross section for the proposed roadway

Part B (Construction Phase): The Water Pollution Control Manager has provided the WPCD shown in Figure 6-4. The Contractor plans to install two temporary sediment traps; one at the location of rock slope protection for Drainage System 2 at Station 106+36 and the other as shown on the WPCD. The Contractor plans to use SS-3 (hydraulic mulch), SC-4 (check dams), and SC-6 (gravel bag berms) for the disturbed areas, as needed. Temporary BMPs must be installed 2-days prior to a rain event.

While the construction run is generally provided by the Contractor, the RE needs you to complete this task. You must determine if this water pollution control plan is sufficient to comply with TMDL RUSLE2 requirements. You have been asked to provide RUSLE2 documentation for TMDL compliance to be used as an attachment to the Contractors SWPPP. The RE found the RUSLE2 files created at PS&E in the project folder and gave them to you. This will be the first time the files have been used and updated during the construction phase.

Specific information to solve for:

- Number of representative areas (dominant, critical) for the project
- Construction soil erosion rate
  - Assume that temporary BMPs are needed for three rain events occurring on September 13, September 20, and September 27.

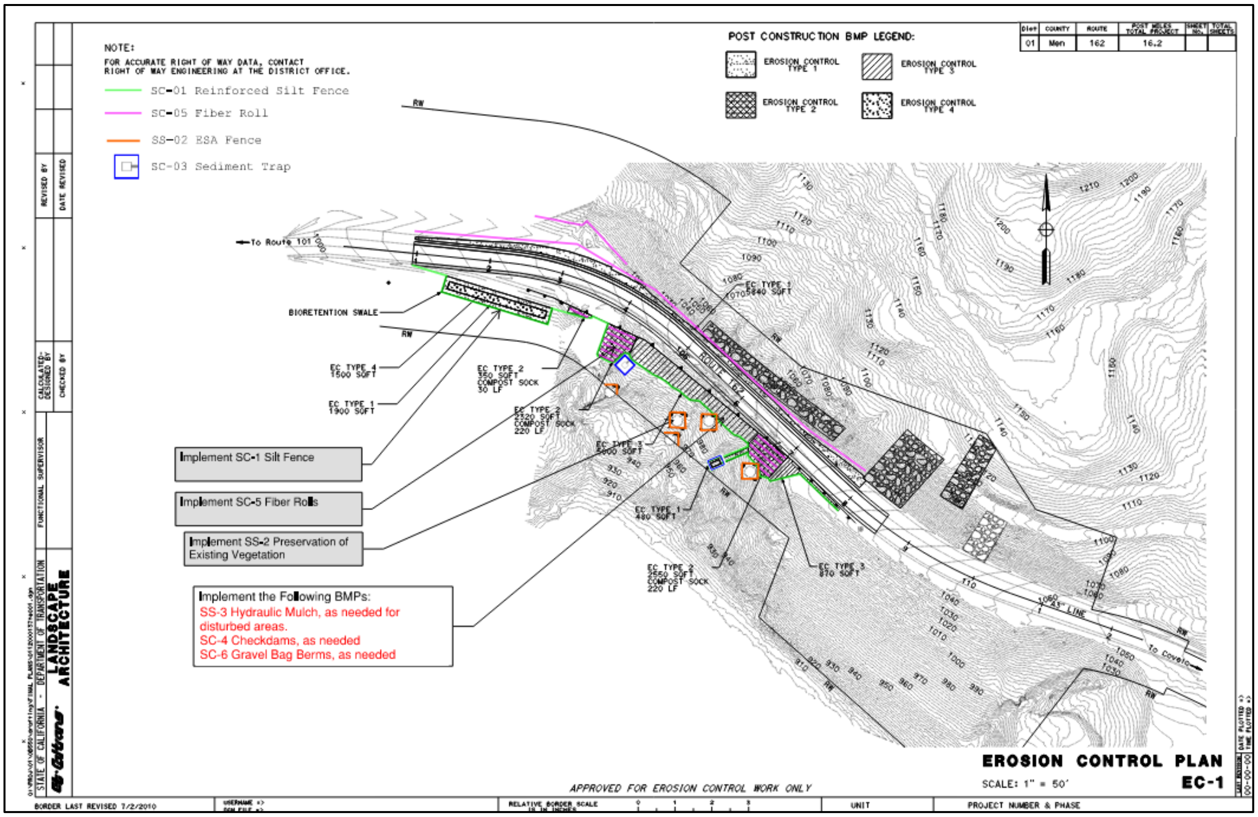


Figure 6-4. Example 1: EC-1 Water Pollution Control Drawing.

Section 7

Pre-construction Run, Example 1

In this section, a step-by-step demonstration for creating a pre-construction RUSLE2 run will be presented to answer Example 1, Part A (Design Phase). It is assumed that the RUSLE2 program is being used to follow along with the section text.

7.1 Project Set Up

Open RUSLE2, then click on the Profile icon:

Figure 7-1. RUSLE2: Open profile

Open a default base profile:

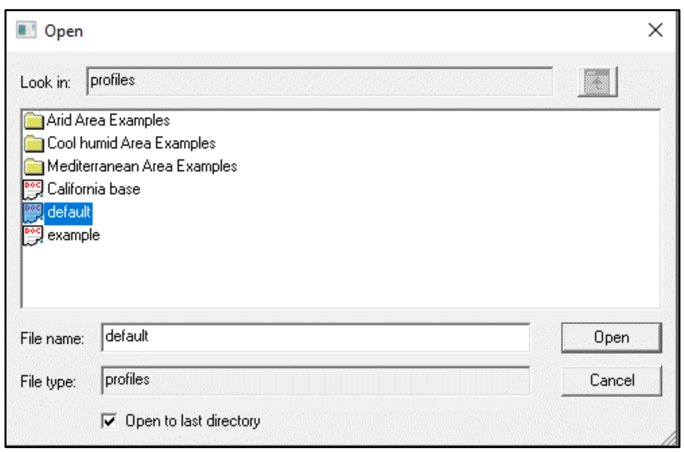


Figure 7-2. RUSLE2: Default base profile

Once open, save-as Ex #1 Pre-construction in the Profiles folder:

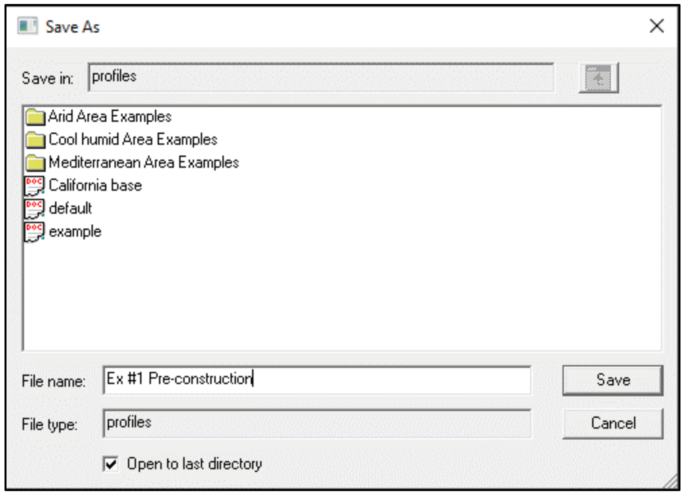


Figure 7-3. RUSLE2: Save-as to Profiles folder

If you are unable to save-as, the RUSLE2 application has been installed in a write-protected location. Uninstall the application and return to Section 4.2 and reinstall in a location that is not protected. The Desktop or Documents folders work well.

7.2 RUSLE2 Profile Step 1: Choose Location to Set Climate

The Problem Statement says the project is along SR 162, PM 16.16, in Mendocino County. The locations in the pull-down menu refer to rainfall depths within the County based on NRCS precipitation maps. First, find the project PM on a map then locate the project on the NRCS precipitation map.

Use the Postmile Services Postmile Query Tool to find SR 162, PM 16.16. This tool, shown in Figure 7-4, is found at:

https://postmile.dot.ca.gov/PMQT/PostmileQueryTool.html

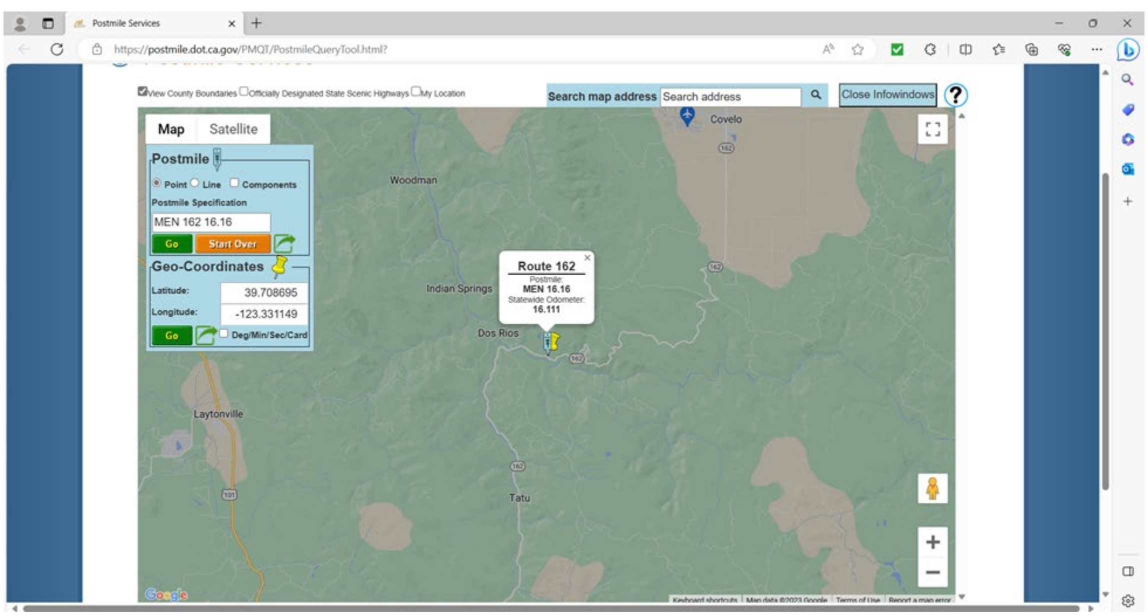


Figure 7-4. Postmile Services: Postmile Query Tool

Then, use the Lookup Key in Appendix B to get the appropriate NRCS precipitation map name for Mendocino County:

RUSLE2 Precipitation Map Reference for California Counties

CA County Name	CA NRCS Precipitation Map Name	Area Covered
Fresno County	Rusle2Precip_FresnoA.pdf	San Joaquin Valley
Glenn County	Rusle2Precip_WillowsB.pdf	Glenn County
Humboldt County	Rusle2Precip_EurekaB.pdf	Humboldt County, Trinity County
Imperial County	Rusle2Precip_BlytheB.pdf	Imperial County, Eastern Riverside County
Inyo County	Rusle2Precip_BishopB.pd	Inyo County, South Mono County
Kern County	Rusle2Precip_BakersfieldB.pdf	Kern County
Kings County	Rusle2Precip_FresnoA.pdf	San Joaquin Valley
Lake County	Rusle2Precip_LakeportB.pdf	Lake County
Lassen County	Rusle2Precip_SusanvilleB.pdf	Parts of Modoc County and Lassen Counties
	Rusle2Precip_AlturasB.pdf	Parts of Modoc County, Lassen County, and Washoe Co., NV
	Rusle2Precip_McArthurB.pdf	Parts of Shasta, Siskiyou, Lassen, and Modoc Counties
Los Angeles County	Rusle2Precip_LancasterB.pd	Los Angeles County, Orange County
Madera County	Rusle2Precip_FresnoA.pdf	San Joaquin Valley
	Rusle2Precip_MaderaA.pdf	San Joaquin Valley
Marin County	Rusle2Precip_PetalumaB.pdf	Sonoma County, Marin County
Mariposa County	Rusle2Precip_FresnoA.pdf.	San Joaquin Valley
	Rusle2Precip_MariposaA.pdf	Tuolumne, Alpine, Marapose, Stanislaus, Amador, Calaveras
	Rusle2Precip_JacksonA.pdf	Tuolumne, Alpine, Marapose, Stanislaus, Amador, Calaveras
Mendocino County	Rusle2Precip_UkiahB.pdf	Mendocino County
Merced County	Rusle2Precip_FresnoA.pdf	San Joaquin Valley
	Rusle2Precip_TulelakeB.pdf	Parts of Siskiyou and Modoc Counties

Figure 7-5. RUSLE2 precipitation map lookup key

Locate and open the Rusle2Precip_UkiahB.pdf file and use the zoom button to find the project location:

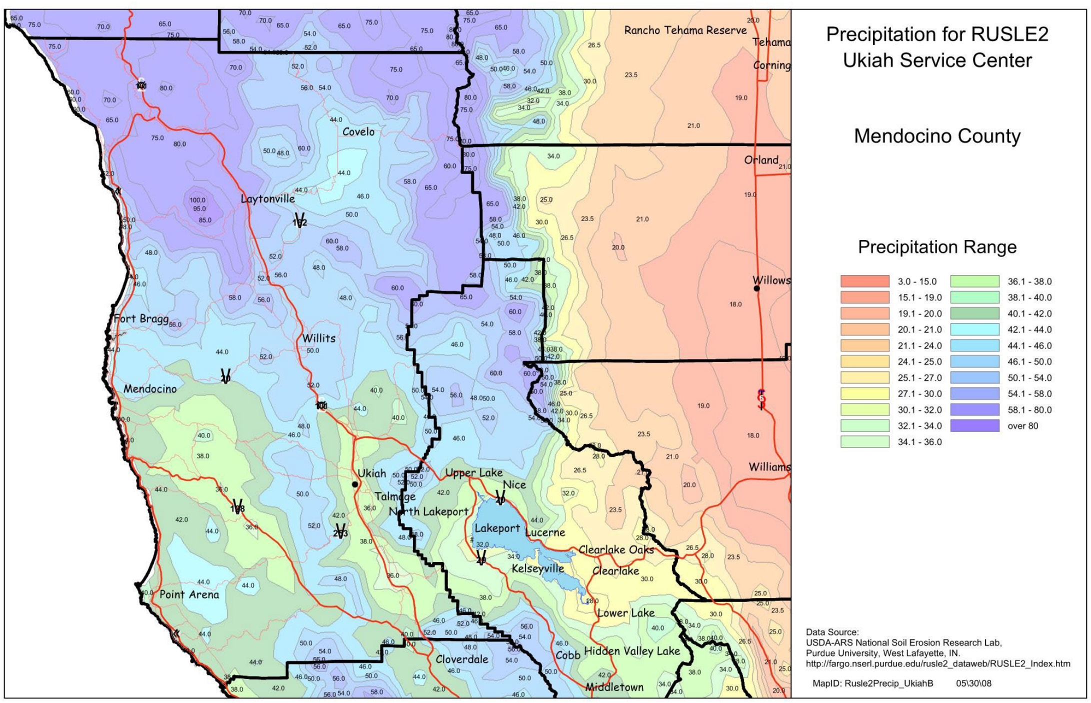


Figure 7-6. Precipitation for RUSLE2 map

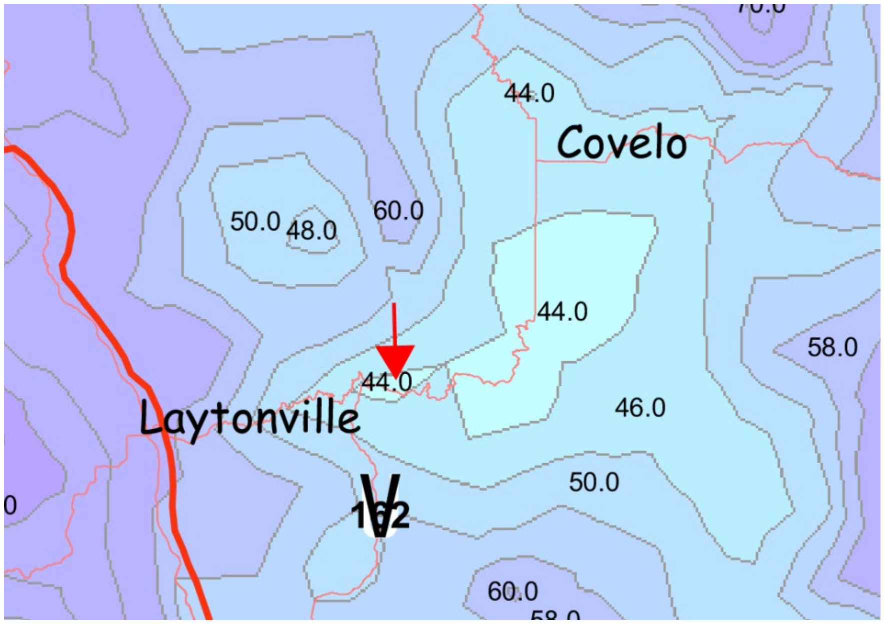


Figure 7-7. Precipitation for RUSLE2 map, zoomed in

The precipitation polygon covering this area is 44 inches annual precipitation. Note that the adjacent areas are in a 46 inch precipitation polygon.

Use the down arrow on the right side of the Location box and drill down into USA\California\Mendocino County and select the 44-to-48-inch rainfall record (_R44-48):

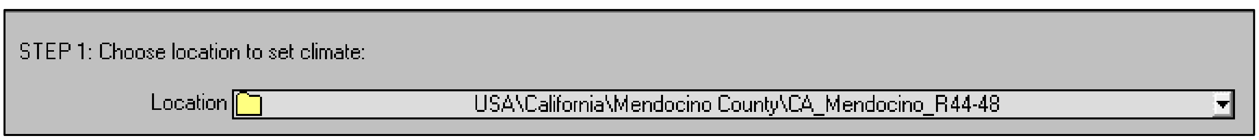


Figure 7-8. RUSLE2 Profile Step 1: Choose location

7.3 Determine the Representative Area(s) Topography

Next, evaluate the project area to identify how many representative areas (dominant, critical) the project has. First, use the EC-1 sheet topography to identify the existing concentrated flow paths. Concentrated flows begin where the sheet and rill flows end.

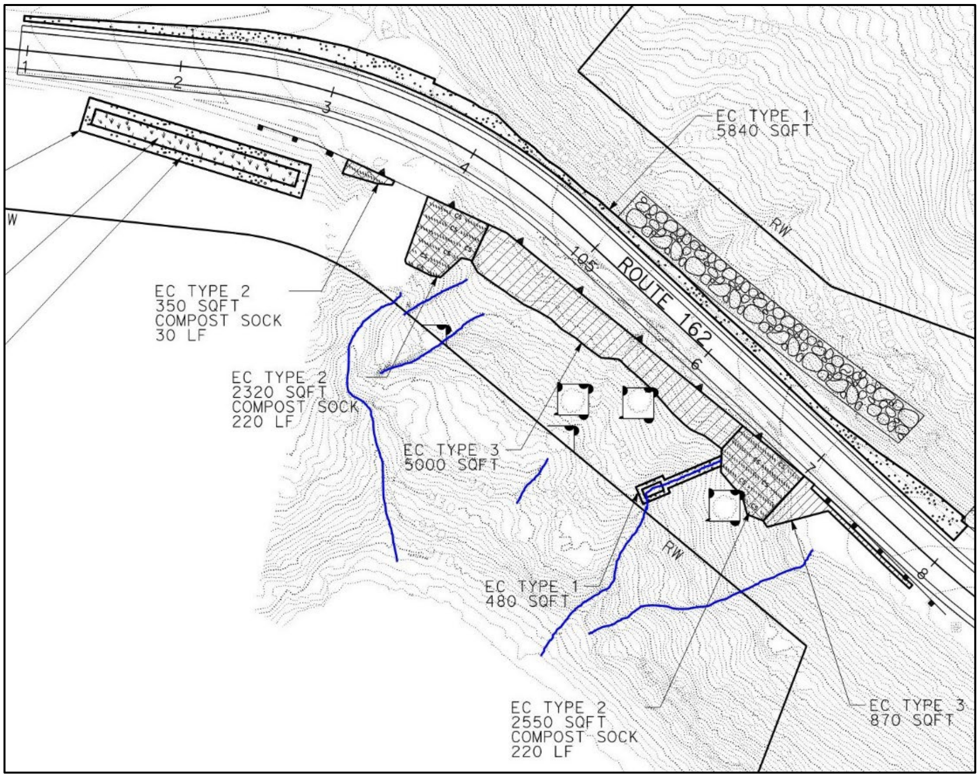


Figure 7-9. Existing concentrated flow paths within the project area

Next, identify transects from the origin of overland flow (edge of pavement) to the location where concentrated flows begin as potential representative areas. The origin of overland flow and the total slope length will not always be within the right-of-way.

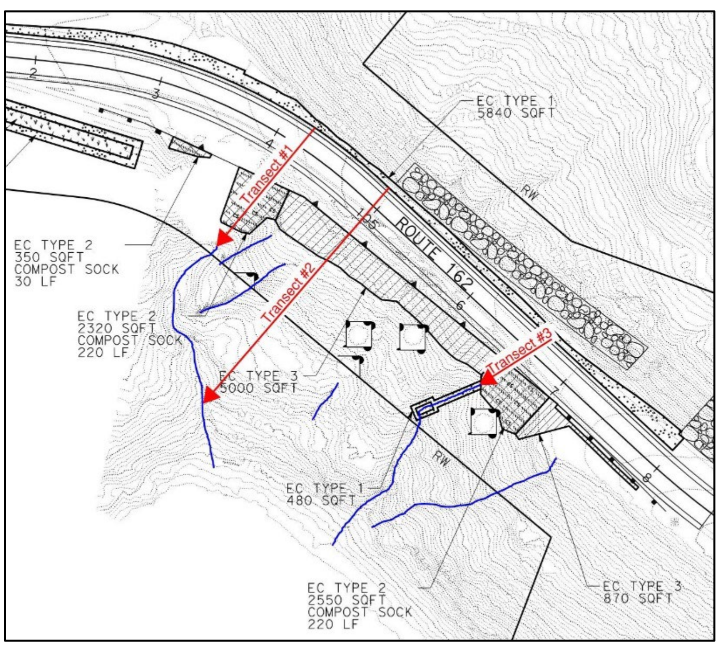


Figure 7-10. Three transects identified as potential representative areas

For this project, Transect #2 is the one project representative area because most of the overland flow from the project site will take a similar path (length and grade) down the slope before concentrated flow begins.

With the representative area identified, slope length can be determined. Slope length used in RUSLE2 is measured from the origin of overland flow at the top of the watershed to the point where runoff concentrates. While it's always best to measure slope topography on-site, the project plans can be used to measure and calculate grade for pre-construction, post-construction, and construction runs.

Using the measure tool in PDF we find that the slope length is 225 ft.

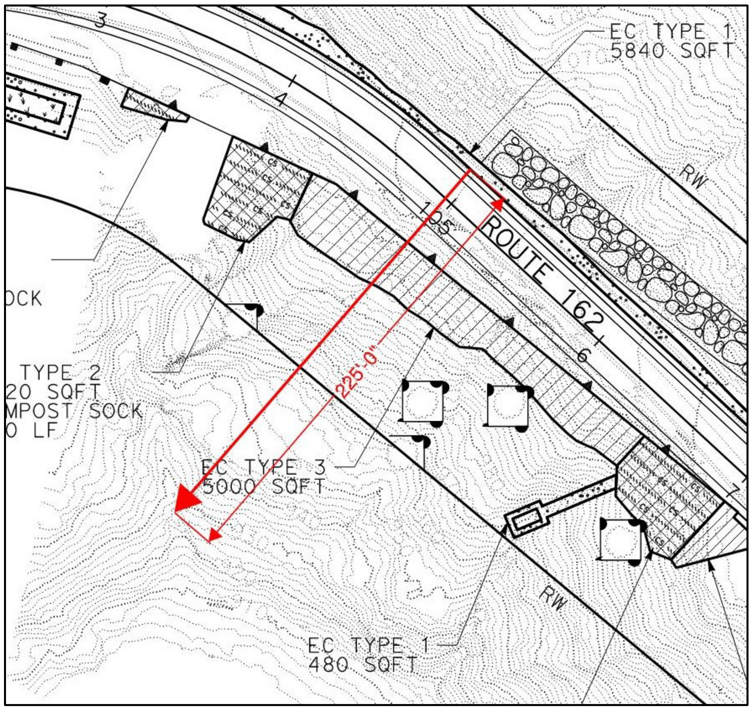


Figure 7-11. Example 1: Slope length

Next, break the slope into segments that represent changes in grade. The representative area has two segments: Segment 1 is the paved roadway and Segment 2 is the existing vegetated portion. From the Problem Statement, we know Segment 1 is 25 ft and 8 percent grade. Segment 2 is calculated as 200 ft, that is using the slope length minus Segment 1 length. Using the EC-1 sheet topography the grade of Segment 2 is calculated to be 47 percent. Pre-construction segment lengths and grades in plan view and cross section view are shown in Figures 7-12 and 7-13, respectively.

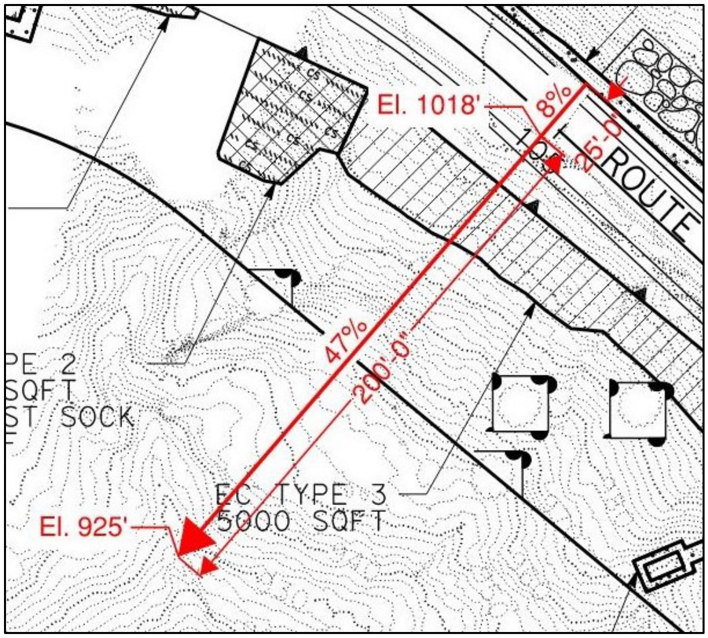


Figure 7-12. Example 1: Segment lengths and grade, plan view

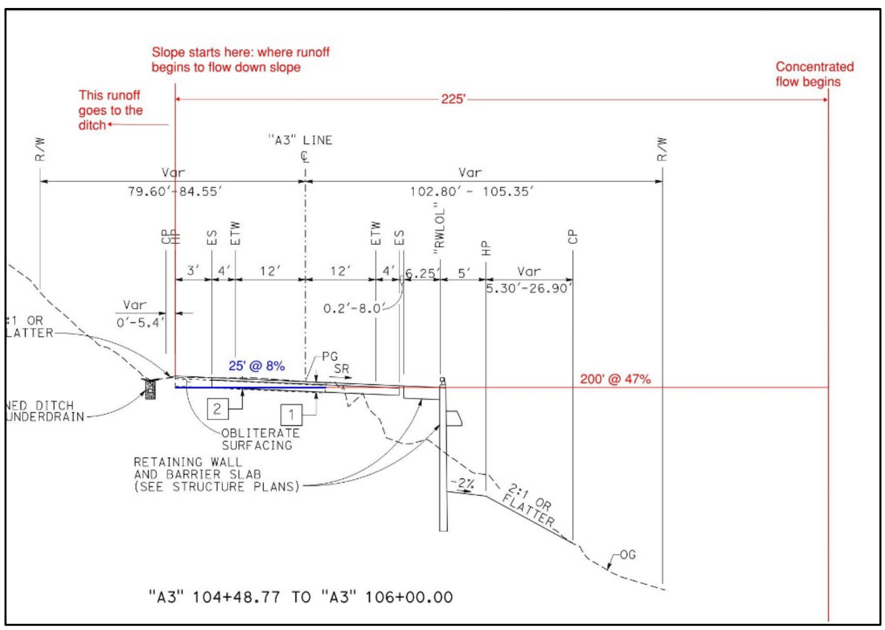


Figure 7-13. Example 1: Segment lengths and grade, cross section

Therefore, the project representative area is a 225 ft slope that includes a 25 ft, 8 percent paved segment at the top and a 200 ft, 47 percent segment to the bottom.

7.4 RUSLE2 Profile Step 2: Choose Soil Type

Next, find the soil record for the project location. Use the Geo Coordinates (latitude and longitude) from the Postmile Services Postmile Query Tool to find the project location:

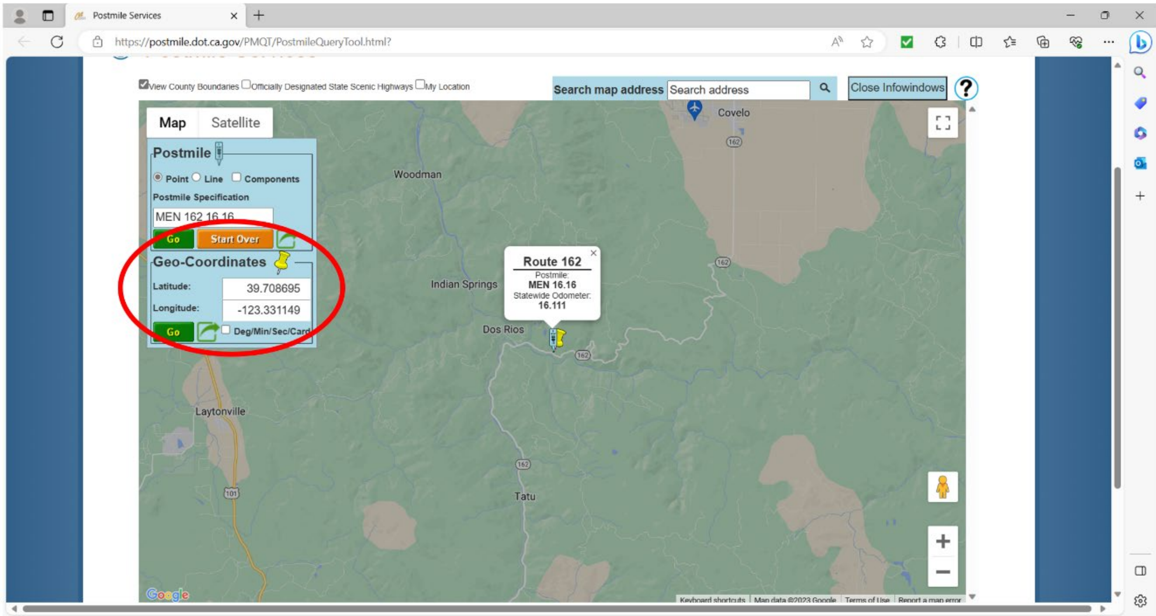


Figure 7-14. Postmile Services Postmile Query Tool: Geo-coordinates

Go to the USDA Web Soil Survey website at: https://websoilsurvey.nrcs.usda.gov/app/ then click the green Start WSS button:

Figure 7-15. USDA Web Soil Survey website

On the AOI tab, expand the dropdown on the left called Latitude and Longitude or Current Location. Enter the latitude and longitude from Figure 7-14 then click the View button.

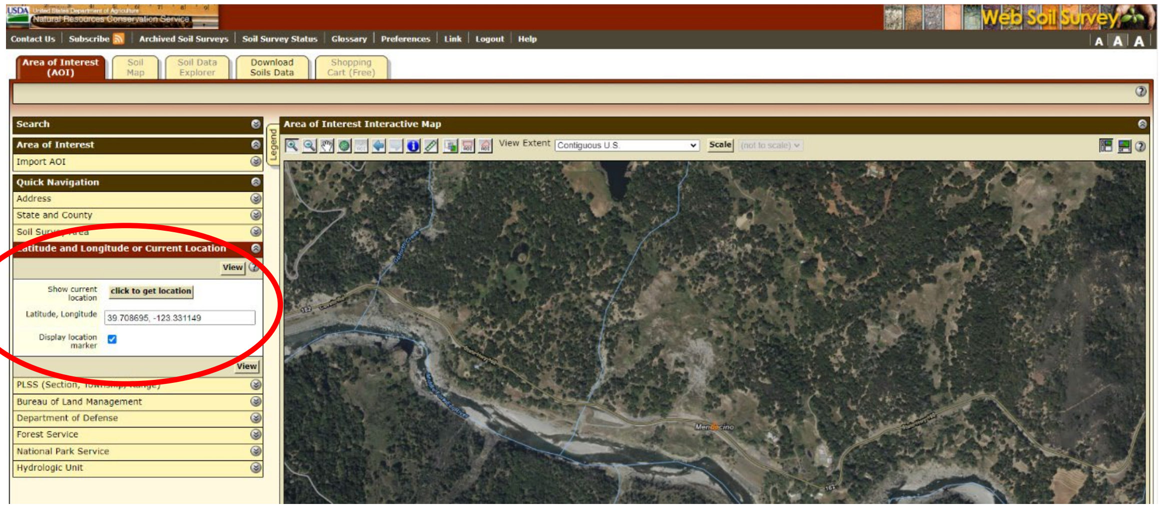


Figure 7-16. USDA Web Soil Survey: Location

Next, using the EC-1 sheet given in the Problem Statement, create an AOI encompassing the project site and surrounding soils using the AOI polygon feature. The AOI button tool is on the top bar above the map.

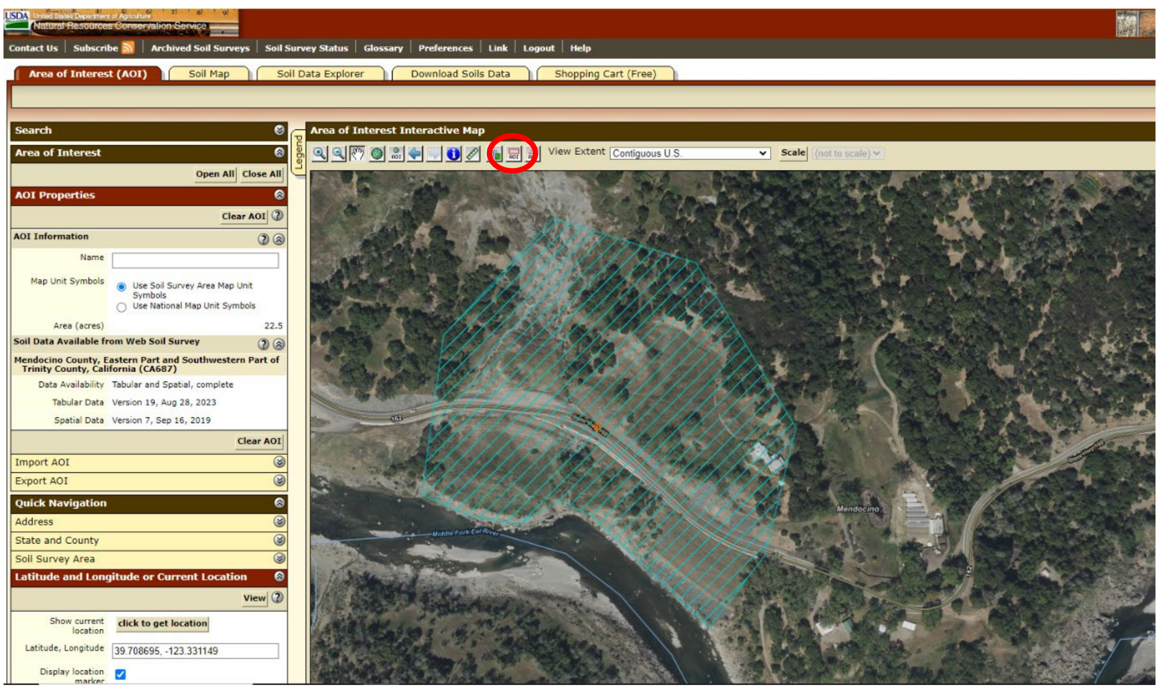


Figure 7-17. USDA Web Soil Survey: AOI

Next, switch to the Soil Map tab to determine the soil map location and the dominant project soil type.

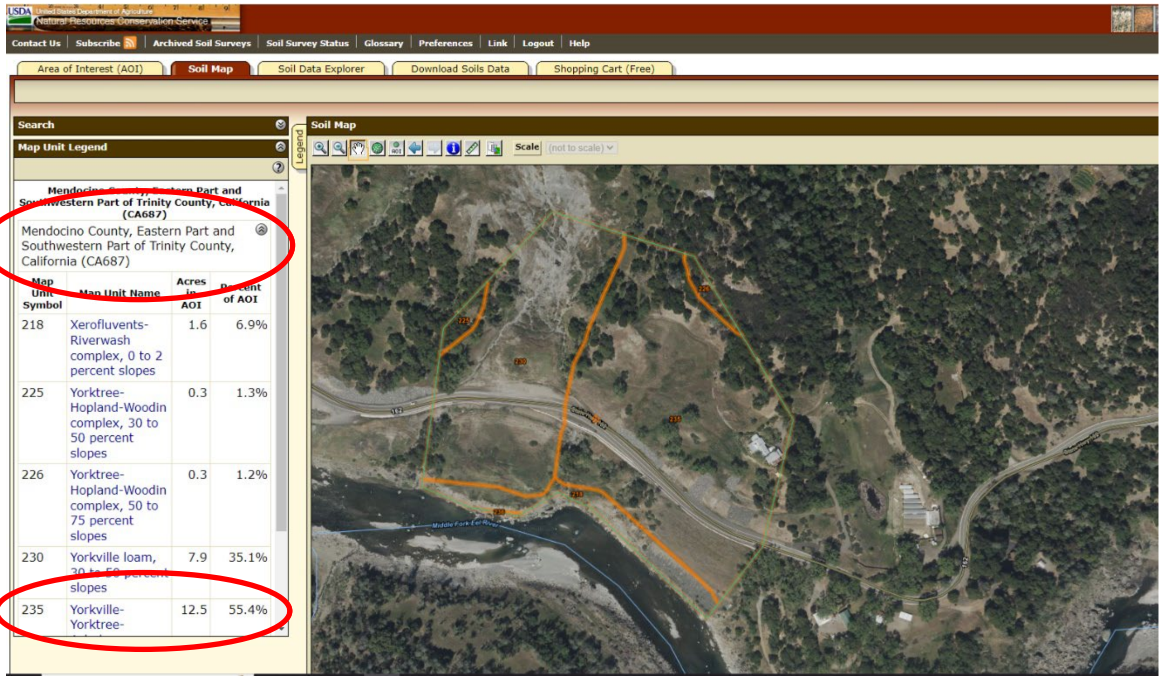


Figure 7-18. USDA Web Soil Survey: Soil map tab

Based on the USGS Web Soil Survey, the project is in Mendocino County, Eastern Part and Southwestern part of Trinity County, California. Based on the representative area of the project location, the soil map unit symbol is 235.

Back in the RUSLE2 Profile screen, update the Slope length (horiz), ft under the graph to the total slope length of 225 ft. Next, add a segment to the soil layer (Step 2) to account for the roadway segment. Segment breaks can be added in one of two ways: by using the (+) button under Segment in Step 2 (shown in Figure 7-19) or by using the Add break button above the chart (shown in Figure 7-20). When you add a length to the first soil layer using the (+) button this pop-up appears, select Yes:

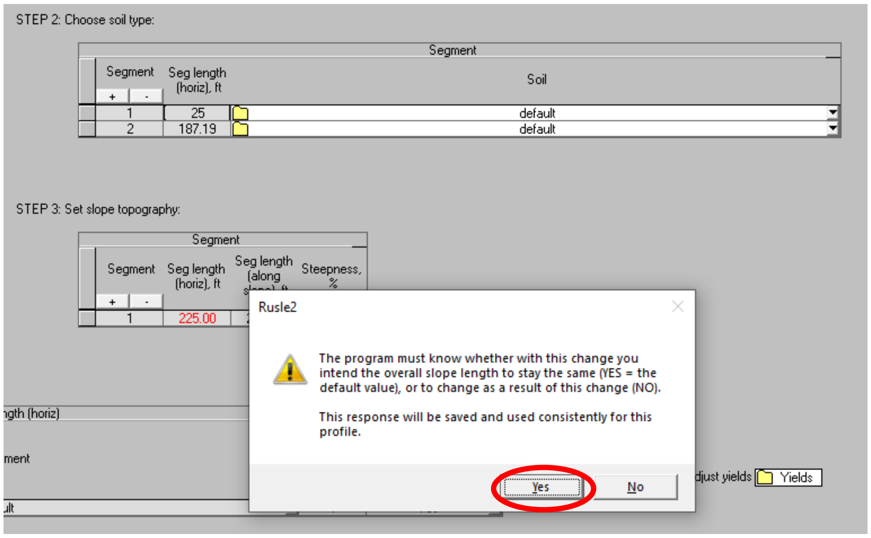


Figure 7-19. RUSLE2 Profile Step 2: Add segment

By selecting Yes, RUSLE2 will not allow the Slope length (horiz), ft under the graph (circled in Figure 7-20) to update based on the segment lengths entered in Step 2.

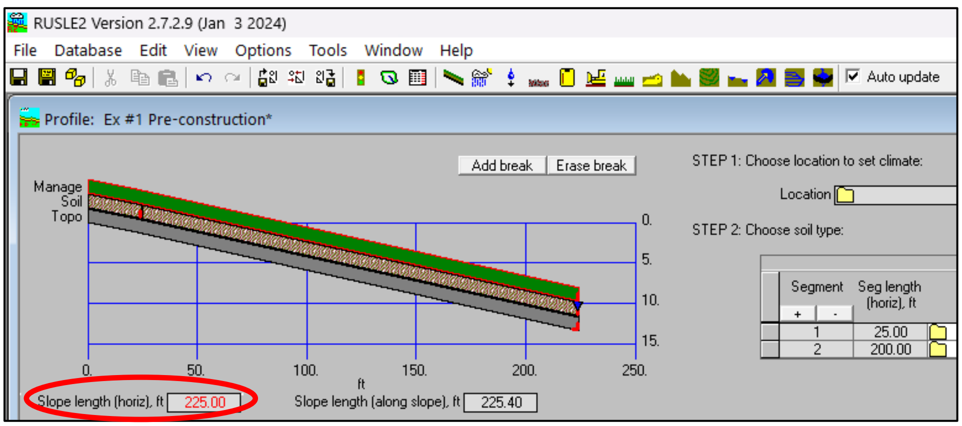


Figure 7-20. RUSLE2 Profile Step 2: Update segments

Continuing with Step 2, update the segment lengths to 25 ft for Segment 1 (roadway) and 200 ft for Segment 2 (vegetation). Verify that Slope length (horiz), ft under the graph is the total slope length of 225 ft. Now update the soils type for the two segments.

Start with Segment 2 because this is the undisturbed area. Drill down into SSURGO/Mendocino County, Eastern Part and Southwestern part of Trinity County, California/235 Yorkville-Yorktree-Ashokawna complex, 30 to 50 percent slopes, MLRA 5.

There are three soil components that make up 235: Ashokawna Gravelly loam 15 percent, Yorktree Loam 25 percent, and Yorkville Loam 45 percent. Since the project location within the map unit is unknown, simply select the dominant component (i.e., the component with the highest percent within the map unit).

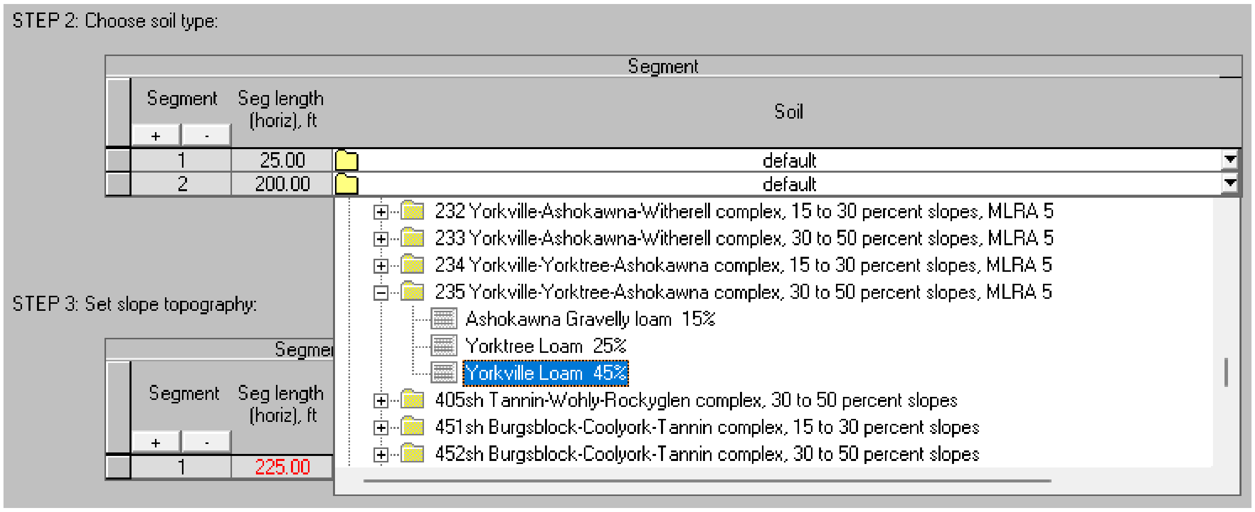


Figure 7-21. RUSLE2 Profile Step 2: Soil type selection, dominant component

Since the original construction of the road in Segment 1 disturbed the natural ground, choose a disturbed soil that has a similar texture as the existing soil. The existing soil is primarily Yorkville loam. Use the down arrow on the right side of the Soil box and drill down into Disturbed/Mixed Soils by Texture/loam (l OM, s perm), for low organic material, slow permeability.

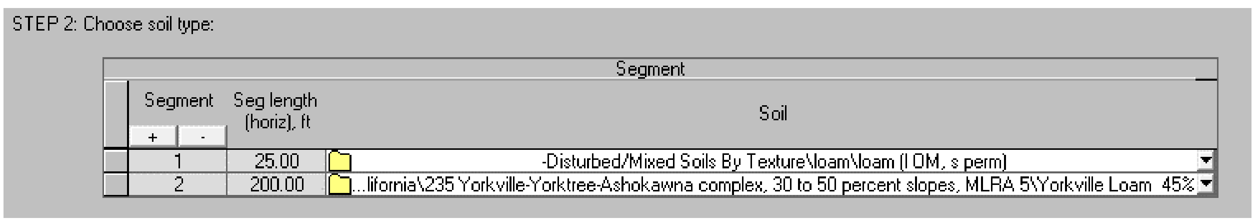


Figure 7-22. RUSLE2 Profile Step 2: Soil type selection

7.5 RUSLE2 Profile Step 3: Set Slope Topography

Update Step 3 using the representative area segments, lengths, and grades from Section 7.3. For RUSLE2 Profile Step 3, first add a Segment to the topo layer using the Add break button above the chart. If you use the + button in the Segment column to add a topo segment, select Yes when this pop-up appears:

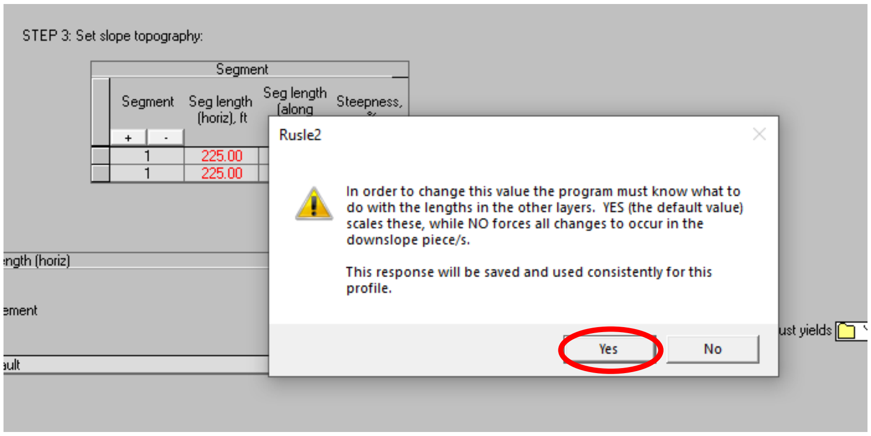


Figure 7-23. RUSLE2 Profile Step 3: Add segment

By selecting Yes, RUSLE2 will use the total Slope length (horiz), ft under the graph to update based on the segment lengths entered for Step 2, 3, and 4 segments (circled in Figure 7-24):

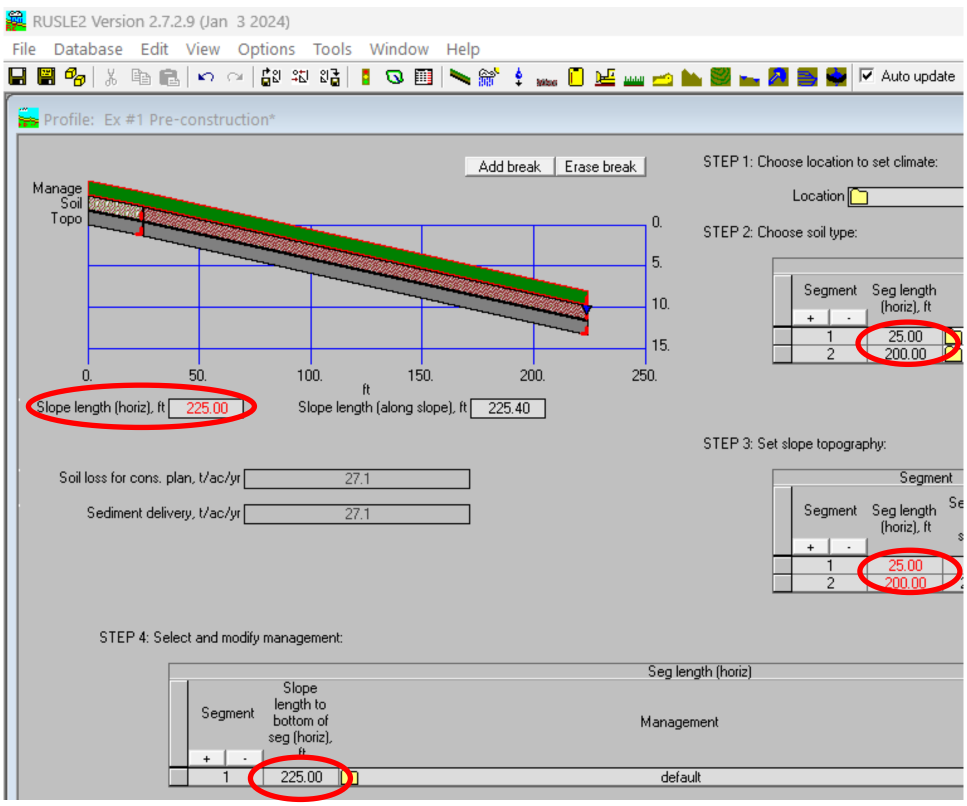
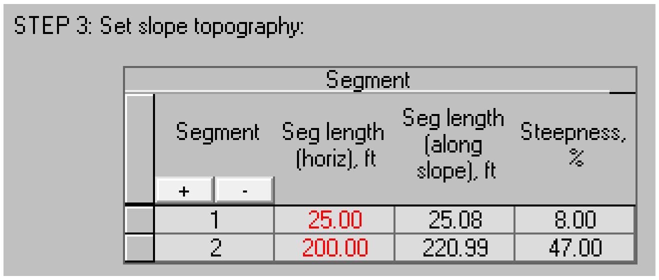


Figure 7-24. RUSLE2 Profile Step 3: Update segment lengths

Now update the topography for the two segments. For Segment 1, segment length is 25 ft and grade is 8 percent. For Segment 2, segment length is 200 ft and grade is 47 percent.



STEP 3: Set slope topography:

Segment	Seg length (horiz), ft	Seg length (along slope), ft	Steepness, %
1	25.00	25.08	8.00
2	200.00	220.99	47.00

Figure 7-25. RUSLE2 Profile Step 3: Update segment steepness

7.6 RUSLE2 Profile Step 4: Select and Modify Management

For the pre-construction condition, managements are based on project climate, existing conditions, findings from site visits, Google Earth research, and project design drawings. We know that Segment 1 is asphalt roadway from the Problem Statement.

Using Google Earth Street View, we gain a better understanding of pre-construction conditions and can estimate vegetation coverage. Using the Google Earth image in Figure 7-26, we can estimate that Segment 2 is about 65 percent covered by a mixture of grass and forbs.

Figure 7-26. Google Earth street view at project site

Management files have been created for and contain vegetation files based on actual USDA NRCS plant data collected within the Arid (Aridic), Cool Humid (Udic), and Mediterranean (Xeric) soil moisture regions in California. Using the soil moisture regions map in Figure 7-27 and the project location map in Figure 7-4, we see that the project is in northeast Mendocino County, which is in the Mediterranean (Xeric) region, shown with a red arrow in Figure 7-27.

Figure 7-27. Soil moisture regions map, project location

Back in the RUSLE2 Profile screen, add a management segment using the + button. Update the managements for the two segments by selecting a previously saved management file that represents the paved segment and the pre-construction grass and forbs condition. Add managements from the top of slope down. The length of the management is measured from the bottom of the segment to the top of the slope.

For Segment 1, segment length is 25 ft, management is Mediterranean climate areas\-Local Management files\Asphalt paving 1/1/, and repeat operations annually is No.

For Segment 2, segment length is 225 ft (Segment 1 + 200 ft), management is Mediterranean climate areas\-Existing Undisturbed Vegetative Cover\Grass and forbs, existing, 60 to 70 pct Canopy Cover, and repeat operations annually is Yes.

The final column Repeat Construction Operations Annually refers directly to the segment management. For asphalt roadway, repeat annually is No because the asphalt is not reinstalled each year. For grasses and forbs, repeat annually is Yes because vegetation has an annual growing cycle for which RUSLE2 accounts.

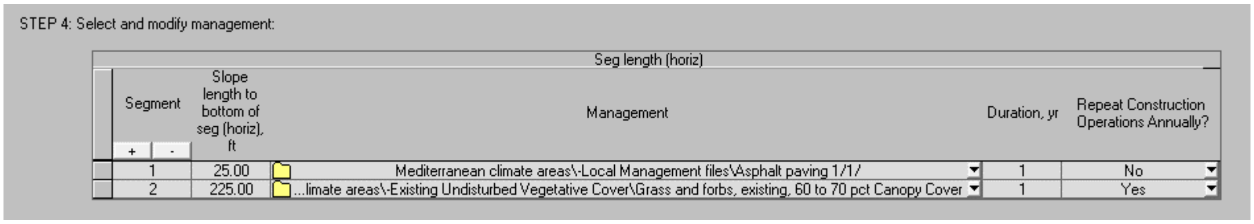


Figure 7-28. RUSLE2 Profile Step 4: Update Managements

7.7 RUSLE2 Pre-construction Findings

Profile Step 5 is used for supporting practices like diversions, terraces, and sediment basins (sediment traps). Profile Step 6 is used for sediment barrier systems like silt fence and fiber rolls. These practices are not used during the pre-construction run therefore, Steps 5 and 6 are not used.

The project pre-construction sediment delivery is 21.4 tons per acre per year (t/ac/yr). Save the file.

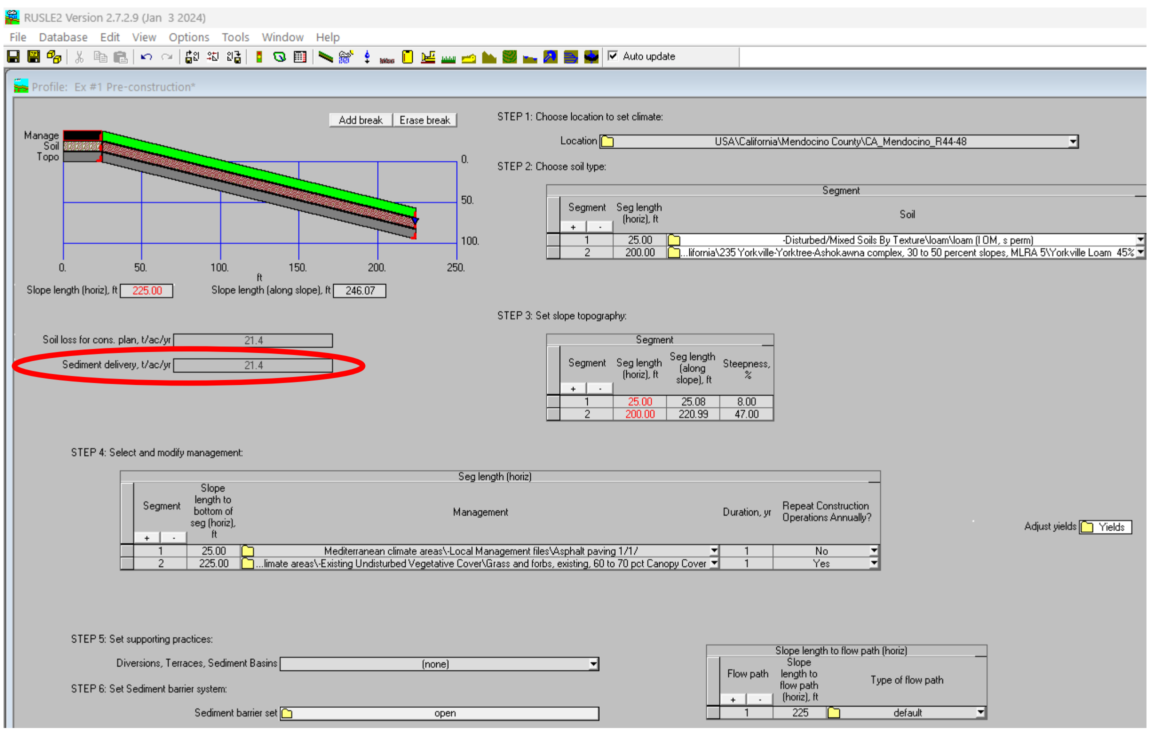


Figure 7-29. RUSLE2 Profile: Pre-construction sediment delivery

Example files have been created for your use. These examples will be helpful if you have trouble getting the same results as shown in the guide. Back in the RUSLE2 program go to File/Open/Profile/Mediterranean Area Examples/Example #1 Pre-Construction 102124. In this profile you will see the managements and the files selected to represent the construction activities and durations from the Problem Statement. Click on the yellow folder in the management column to explore the managements. The inputs and outputs in this example file should be the same as your Ex#1 Pre-Construction file.

Section 8

Post-construction Run, Example 1

In this section, a step-by-step demonstration of creating a post-construction RUSLE2 run will be presented to answer Example 1, Part A. It is assumed that the RUSLE2 program is being used to follow along with the section text.

RUSLE2 is a planning tool that predicts soil erosion rates. While RUSLE2 can analyze different BMP combinations, it is not a design tool. Specifically, this model does not evaluate structural or geotechnical loads, including local or global slope stability. Coordinate with other functional experts such as District Maintenance, District Hydraulics, District Landscape Architect, and Geotechnical Design, as applicable.

8.1 Project Set Up

Open RUSLE2 then click on the Profile icon:

Figure 8-1. RUSLE2: Open profile

Open a default base profile then save-as Ex #1 Post-construction in the Profiles folder:

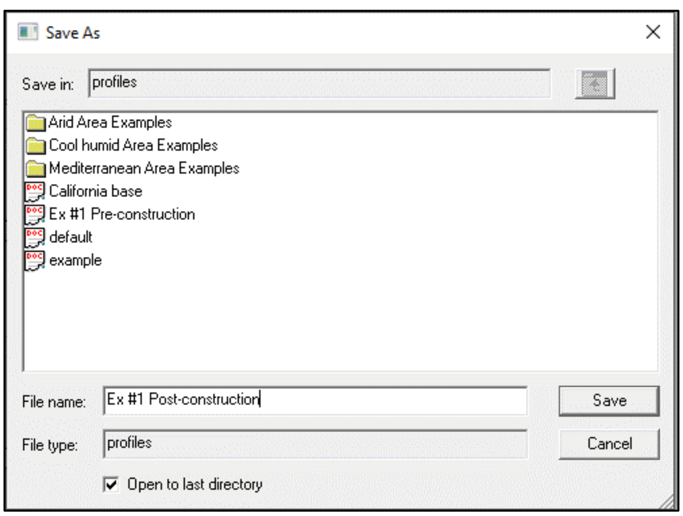


Figure 8-2. RUSLE2: Save-as to Profiles folder

8.2 RUSLE2 Profile Step 1: Choose Location to Set Climate

Since the project location is the same as the pre-construction run, the climate is the same. Select: USA\California\Mendocino County\CA_Mendocino_R44-48. Refer to Section 7.2 to review the detailed steps for choosing the location to set the climate.

8.3 Determine the Representative Area(s) Topography

The representative area(s) can be different for the pre-construction and post-construction runs. The three transects drawn for the pre-construction phase cross through the construction DSA and therefore are appropriate to evaluate for the post-construction phase.

For this project, Transect #2 is the one project representative area for the post-construction run. This is because most of the overland flow from the project area that contacts the DSA will take a similar path down the slope before concentrated flow begins. The typical cross-section at the location of Transect #2 from the project plans shows a change in drainage pattern. The roadway runoff is concentrated along a dike at the top of wall then conveyed downstream. Therefore, the post-construction slope length will be less than pre-construction. The post-construction slope length is 183 ft.

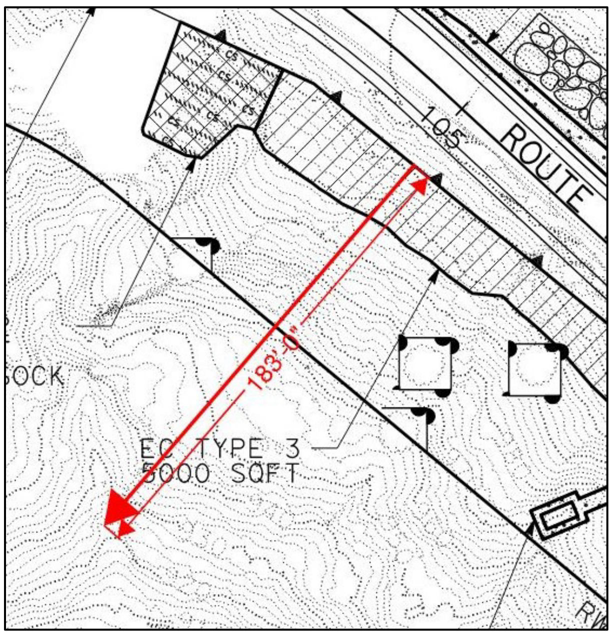


Figure 8-3. Example 1: Slope length

Next, break the slope into segments that represent changes in grade. The representative area has two segments: Segment 1 is the construction disturbed area and Segment 2 is the existing vegetated portion. Segment 1 is 26 ft as measured off the EC-1 sheet and 50 percent grade from the cross-section. Segment 2 is calculated as 157 ft (slope length minus Segment 1 length) and the grade is 47 percent as calculated for pre-construction. Post-construction segment lengths and grades are shown in plan and cross-section views in Figures 8-4 and 8-5, respectively.

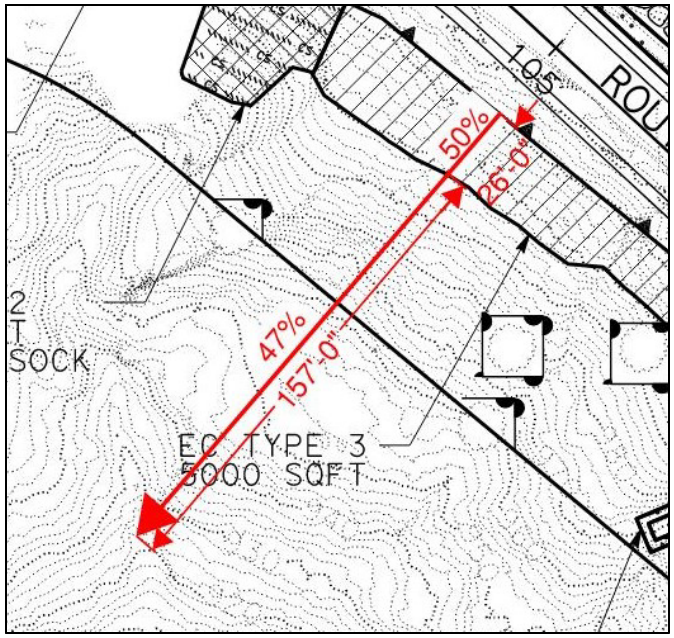


Figure 8-4. Example 1: Segment lengths and grade, plan view

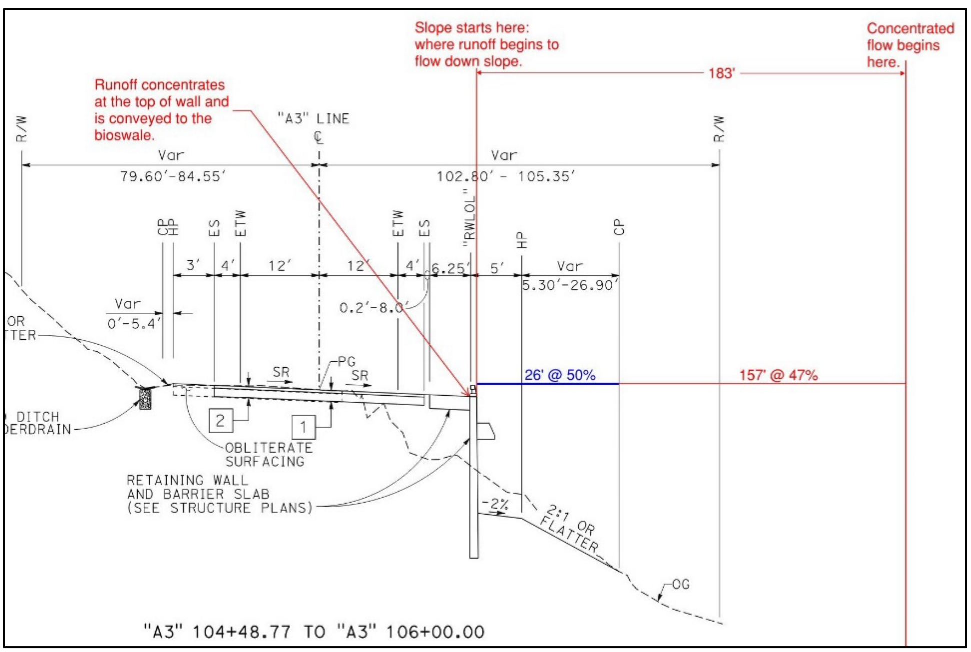


Figure 8-5. Example 1: Segment lengths and grade, cross section

8.4 RUSLE2 Profile Step 2: Choose Soil Type

When available, the soil types from the project geotechnical report are used. Typically, existing roadway will be on its own soil layer because for most Caltrans projects, borings would not be drilled for the roadway. The post-construction representative area is 183 ft long and has two soil segments: disturbed soil and undisturbed soil.

Go to the RUSLE2 Profile screen, update the Slope length (horiz), ft under the graph to the total slope length of 183 ft. Next, add one segment to Step 2 to account for the segments identified in Section 8.3 using the + button. When you add the segments in Step 2 the same pop-up from Section 7 will appear, select Yes.

Update the segment lengths to: Segment 1, 26 ft of disturbed soil for the regraded area and for Segment 2, 157 ft of undisturbed vegetated area. Verify that Slope length (horiz), ft under the graph is the total slope length of 183 ft.

Now update the soil types for the two segments. Since the Problem Statement contains no geotechnical report information, use the same soil types from the pre-construction run.

For Segment 1, use the down arrow on the right side of the Soil box and drill down into Disturbed/Mixed Soils by Texture/loam (l OM, s perm). For Segment 2, drill down into SSURGO/Mendocino County, Eastern Part and Southwestern part of Trinity County, California/235 Yorkville-Yorktree-Ashokawna complex, 30 to 50 percent slopes, MLRA 5/Yorkville Loam 45 percent.

8.5 RUSLE2 Profile Step 3: Set Slope Topography

The post-construction slope length is 183 ft, and two topography segments were identified using the typical cross-section in Figure 8-5. Segment 1 is a 26 ft, 50 percent regraded segment. Segment 2 is a 157 ft, 47 percent undisturbed vegetated area (same as pre-construction).

Go to the RUSLE2 Profile screen and add one segment to Step 3 using the + button. When you add the segments in Step 2 and/or 3 the same pop-up from Section 7 will appear, select Yes.

Update the slope topography segments then verify that Slope length (horiz), ft under the graph is the total slope length of 183 ft.

8.6 RUSLE2 Profile Step 4: Select and Modify Management

For the post-construction condition, the managements are primarily based on the project erosion control drawings, common construction activities required by the project scope, and the construction schedule.

The project location is the same as pre-construction, so continue to select managements from the Mediterranean (Xeric) climate area folder. In addition to the two slope topography segments, a new segment for silt fence/perimeter fence must be added to Step 6.

Enter management segments working from the top of the slope down. The length of the management is measured from the bottom of the segment to the top of the slope. The representative area includes wall construction, road improvements, minor grading, and permanent erosion control. Therefore, the managements must include Stage 2 and Stage 3 construction dates from the Problem Statement. Refer to Appendix D for a list comparing RUSLE2 practice names to the Caltrans Construction Site BMPs and CASQA BMP names.

Segment 1 is 26 ft of grading construction starting June 2, 2025 through permanent erosion control installation on October 6, 2025. Segment 2 is 183 ft of undisturbed vegetated area. For this example, Local Managements have been created. For Segment 1, click on the down arrow and navigate to Mediterranean climate areas/-Local Management files/Yr1 Summer Const, temp BMP 2500 lb. BFM 3x, Yr1 Fall EC, compost, BFM 3500 lbs/ac with seed. The Duration is 5 years to account for plant establishment and enter No for Repeat construction operations annually?. For Segment 2, use Mediterranean climate areas\-Existing Undisturbed Vegetative

Cover\Grass and forbs, existing, 60 to 70 pct Canopy Cover, the same management from pre-construction. By selecting Yes for Repeat Construction Operations Annually? for existing vegetation, RUSLE2 models the vegetation growth cycle each year Click on the yellow folders to review the activities and dates used in each management.

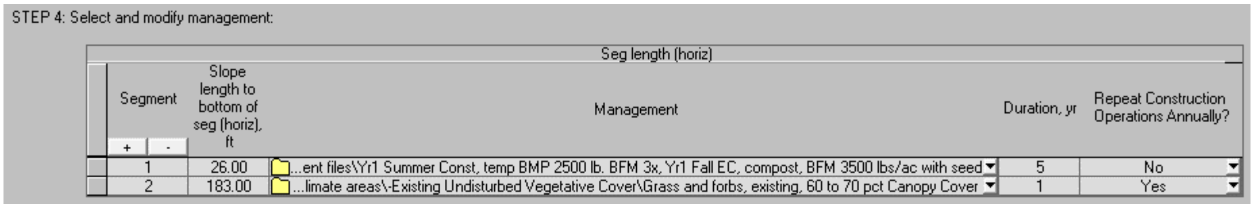


Figure 8-6. RUSLE2 Profile Step 4: Update Managements

8.7 RUSLE2 Profile Step 5: Set Supporting Practices

Profile Step 5 is used for supporting practices like diversions, terraces, and sediment basins (sediment traps). These practices are not used during the post-construction run therefore, Step 5 is not used.

8.8 RUSLE2 Profile Step 6: Set Sediment Barrier System

The Problem Statement says that the Contractor will not uninstall the silt fence at the end of construction. Therefore, the silt fence needs to be included in the post-construction run in Profile Step 6. Click on the yellow folder next to Sediment barrier set to open the wizard:

Figure 8-7. RUSLE2 Profile Step 6: Set barrier system

The top portion of the wizard is used when multiple barriers are installed on a slope at a specific spacing or total number. This would typically be used for multiple fiber rolls installed along a slope. Since the example requires use of one silt fence, the Barriers table in the middle of the window is used.

Select Silt Fence reinforced with metal fabric for sediment barrier type. The silt fence is 1-ft wide and installed outside of the grading area and within the existing vegetated area. The How Place? column refers to the location of the silt fence installation. Select User set to place the silt fence at the limit of grading. The distance from the top of slope to the bottom of silt fence is 27-ft. The silt fence is installed prior to the start of construction so use 4/13/25 as the barrier installation date. The operation installing barrier is Install – Remove Sediment Control Barrier\Install Permeable Barriers. Since the problem statement says that the silt fence will remain in place, there is no removal date or operation. Leave the barrier removal date as 1/1/0 and barrier removal operation as (none).

Select APPLY!! to add the silt fence to Step 4 Managements:

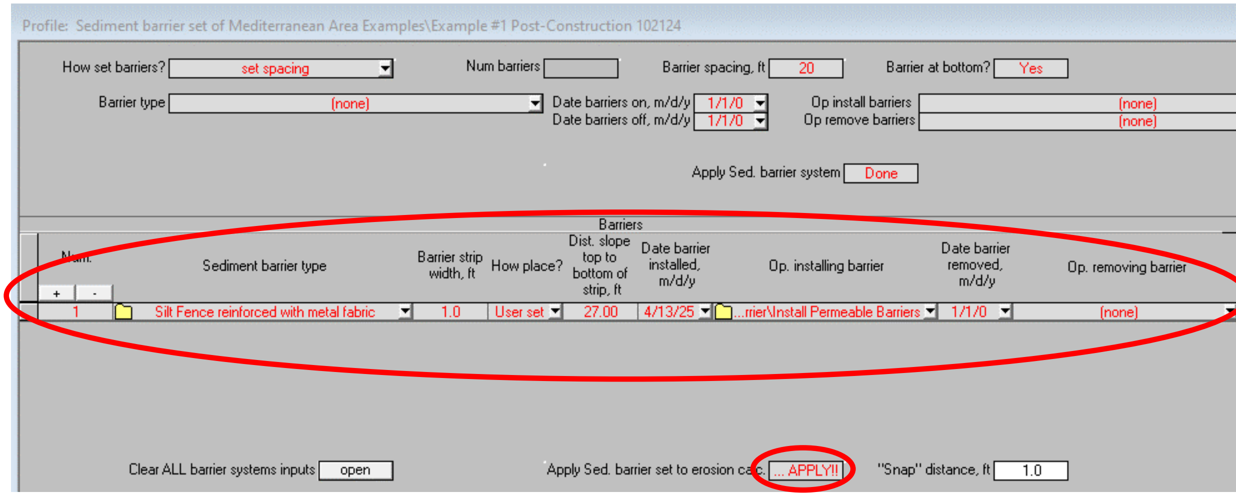


Figure 8-8. RUSLE2 Profile Step 6: Wizard

You may receive this Warning, if so, select OK:

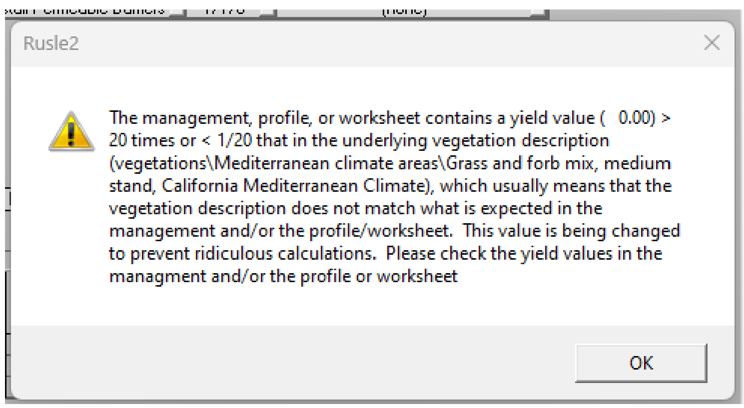


Figure 8-9. RUSLE2 Profile Step 6: Wizard error text

Once you select APPLY!! the table text is no longer red:

Figure 8-10. RUSLE2 Profile Step 6: Wizard applied

At the bottom of the window, select Apply/Close to return to the RUSLE2 profile screen. The Managements in Step 4 will now show a new segment for the silt fence called MAN_PTR:INTERNAL(2):

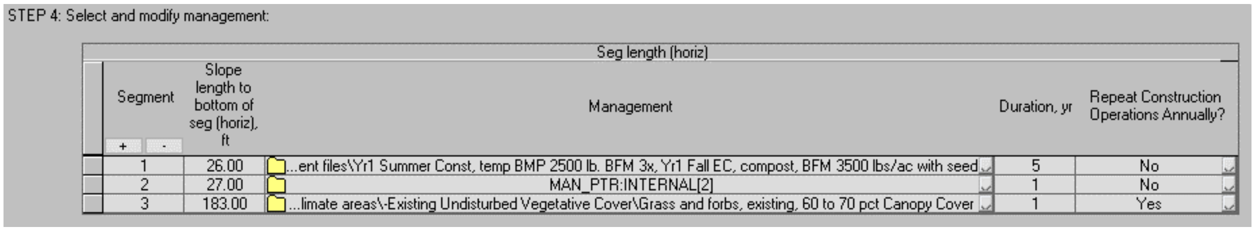


Figure 8-11. RUSLE2 Profile Step 4: Updated managements

8.9 RUSLE2 Post-construction Findings

The project post-construction sediment delivery is 19.8 t/ac /yr. Save the file.

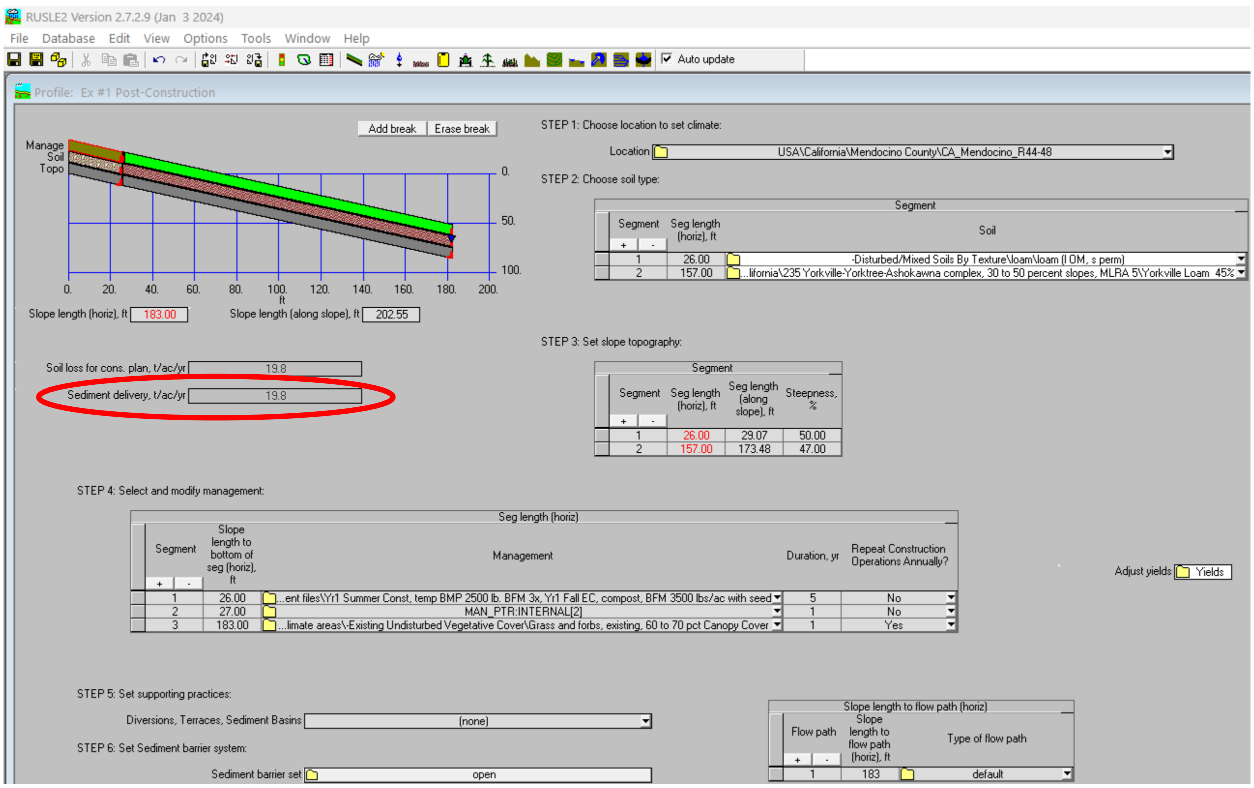


Figure 8-12. RUSLE2 Profile: Post-construction sediment delivery

Example files have been created for your use. These examples will be helpful if you have trouble getting the same results as shown in the guide. Back in the RUSLE2 program go to File/Open/Profile/Mediterranean Area Examples/Example #1 Post-Construction 102124. In this profile you will see the managements and the files selected to represent the construction activities and durations from the Problem Statement. Click on the yellow folder in the management column to explore the managements. The inputs and outputs in this example file should be the same as your Ex#1 Post-Construction file.

Section 9

Construction Run, Example 1

In this section, a step-by-step demonstration of creating a construction RUSLE2 run will be presented to answer Example 1, Part B. It is assumed that the RUSLE2 program is being used to follow along with the section text.

The RUSLE2 construction phase run is only required for projects within a TMDL watershed or projects that disturb a surface water buffer without a 401 or 404 Clean Water Act (CWA) permit. Generally, the construction run will be provided by the Contractor.

RUSLE2 is a planning tool that predicts soil erosion rates. While RUSLE2 can analyze different BMP combinations, it is not a design tool. Specifically, the model does not evaluate structural or geotechnical loads, including local or global slope stability. Coordinate with other functional experts such as District Maintenance, District Hydraulics, District Landscape Architect, and Geotechnical Design, as applicable.

9.1 Project Set Up

Open RUSLE2 then click on the Profile icon:

Figure 9-1. RUSLE2: Open profile

Open a default base profile then save-as Ex #1 Construction in the Profiles folder:

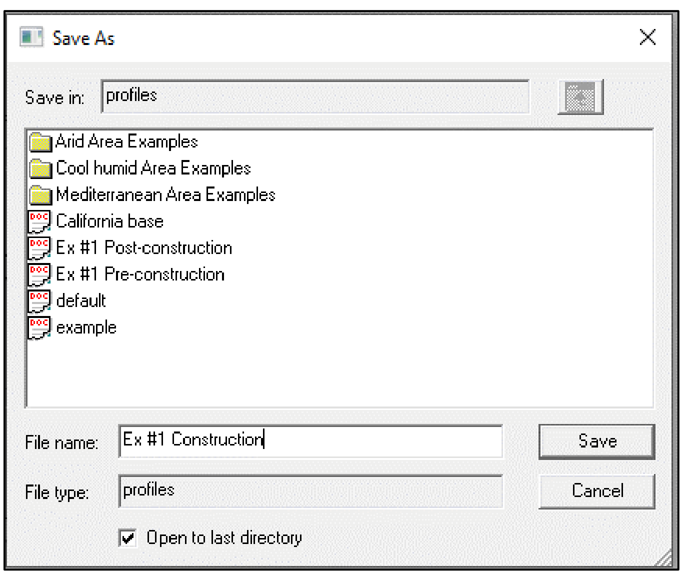


Figure 9-2. RUSLE2: Save-as to Profiles folder

9.2 RUSLE2 Profile Step 1: Choose Location to Set Climate

No change is needed. Since the project location is the same, the pre-construction climate is still valid. Select: USA\California\Mendocino County\CA_Mendocino_R44-48.

9.3 Determine the Representative Area(s) Topography

The representative area can be different for the pre-construction, post-construction, and construction runs. The three transects drawn for pre-construction phase cross through the construction DSA and therefore are appropriate to evaluate for the construction phase.

For this project, Transect #2 is the one project representative area for the construction run. This is because most of the overland flow from the project area that contacts the DSA will take a similar path down the slope before concentrated flow begins. While the typical cross-section from the project plans shows a change in drainage pattern, that change will not occur until completion of the retaining wall construction. A good assumption for the site configuration during construction is that the contractor will install a k-rail system at the edge of existing pavement for safety, and that roadway runoff will continue to sheet flow through the project area as the wall is being built. Therefore, the construction slope length is the same as pre-construction, 225 ft.

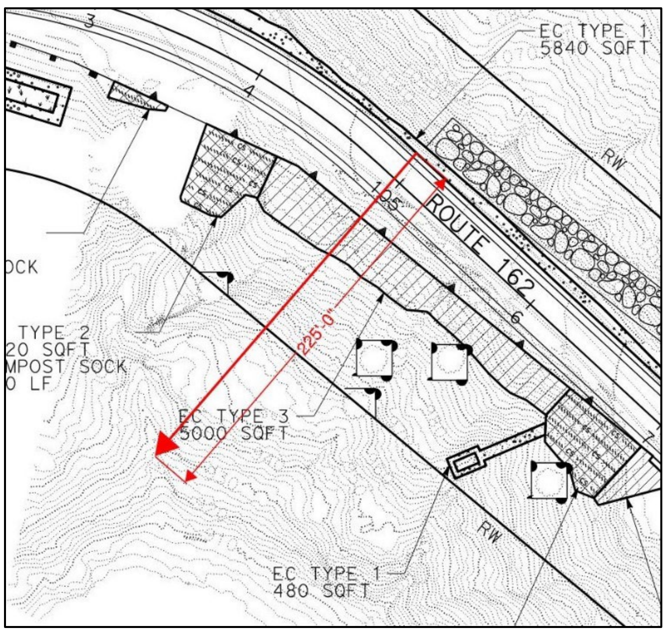


Figure 9-3. Example 1: Slope length

Next, break the slope into segments representing changes in grade. The representative area has four segments: Segment 1 is the paved roadway, Segments 2 and 3 are the construction disturbed area, and Segment 4 is the undisturbed vegetated portion. Segment 1 is 25 ft and 8 percent grade from the Problem Statement. Segment 2 is 20 ft as measured off the EC-1 sheet and 2 percent grade because it is assumed that the Contractor will use this area to construct the wall. Segment 3 is 23 ft as measured off the EC-1 sheet and 50 percent grade from the typical cross section. Segment 4 is calculated to be 157 ft using the slope length minus Segments 1, 2, and 3 lengths and the grade is 47 percent as calculated for pre-construction. Construction segment lengths and grades are shown in Figure 9-4.

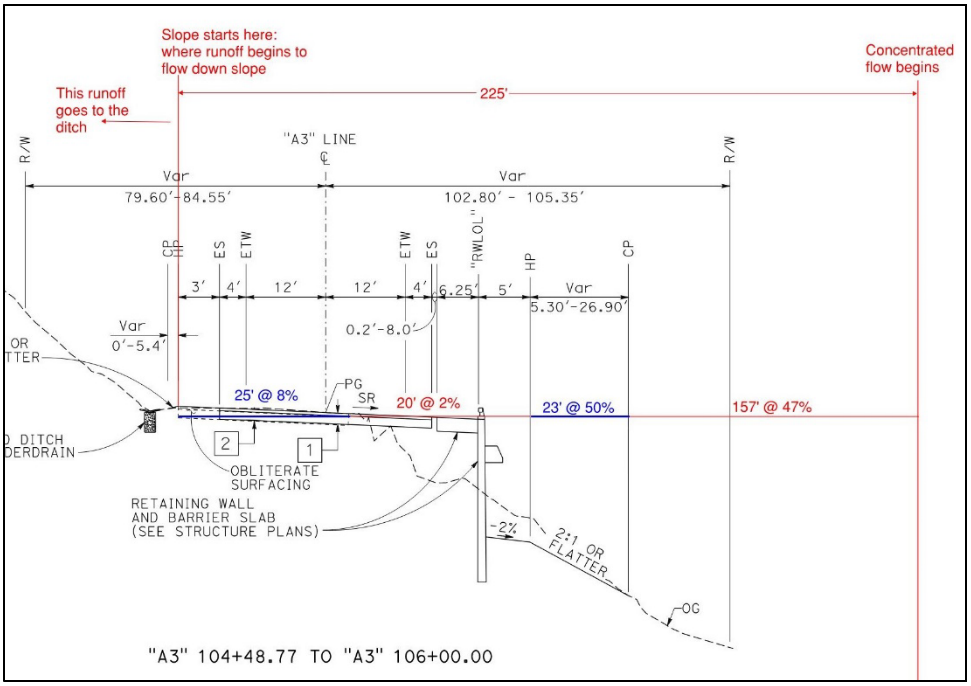


Figure 9-4. Example 1: Segment lengths and grade, cross section

9.4 RUSLE2 Profile Step 2: Choose Soil Type

Since the Problem Statement contains no geotechnical report information, use the same soil types from the pre-construction and post-construction runs. The construction representative area is 225 ft long and has three segments with two soil types: disturbed soil and undisturbed soil. Note, two soil segments, consolidating the roadway, wall construction, and grading segments by soil type, could have also been used.

Go to the RUSLE2 Profile screen, update the Slope length (horiz), ft under the graph to the total slope length of 225 ft.

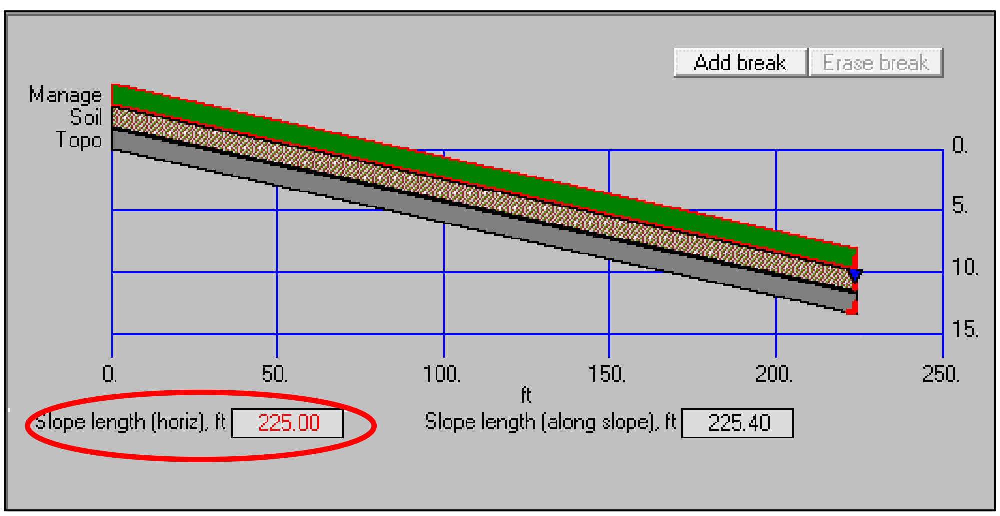


Figure 9-5. Example 1: RUSLE2, Updating Slope Length

Next, add two segments to Step 2 to account for the roadway segment, the DSA, and the undisturbed soil area as identified in Section 8.3 using the + button.

When you add the segments in Step 2, the same pop-up from Section 7 will appear, select Yes.

Update the segment lengths to 25 ft for Segment 1 (roadway), 43 ft disturbed soil including the wall construction area and regraded slope area for Segment 2, and 157 ft of undisturbed vegetated area for Segment 3. Verify that Slope length (horiz), ft under the graph is the total slope length of 225 ft.

Now update the soils type for the two segments using the soil types from previous runs. For Segments 1 and 2, use the down arrow on the right side of the Soil box and drill down into Disturbed/Mixed Soils by Texture/loam (l OM, s perm). For Segment 3, drill down into SSURGO/Mendocino County, Eastern Part and Southwestern part of Trinity County, California/235/Yorkville Loam 45 percent.

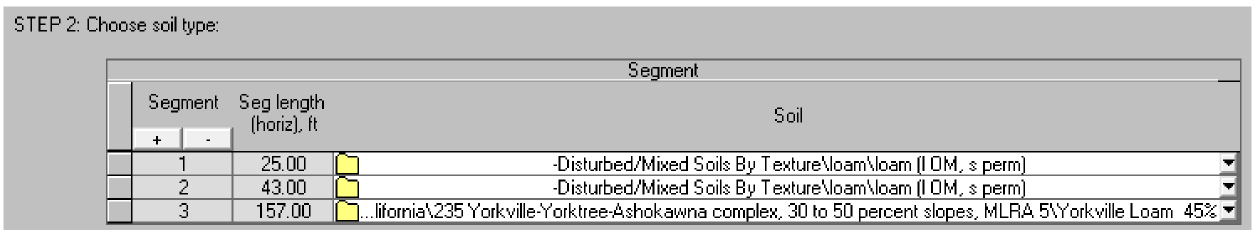


Figure 9-6. Example 1: Step 2, Selecting Soil Type

9.5 RUSLE2 Profile Step 3: Set Slope Topography

The construction slope length is 225 ft and four topography segments were identified using the typical cross-section in Figure 9-4: Segment 1, 25 ft, 8 percent paved slope segment at the top (roadway given in Problem Statement), Segment 2, 20 ft, 2 percent wall construction area, Segment 3, 23 ft, 50 percent regraded slope segment, and Segment 4, 157 ft, 47 percent undisturbed vegetated area (same as pre-construction and post-construction).

Go to the RUSLE2 Profile screen, add three segments to Step 3 using the + button. When you add the segments in Step 2 and/or 3 the same pop-up from Section 7 will appear, select Yes.

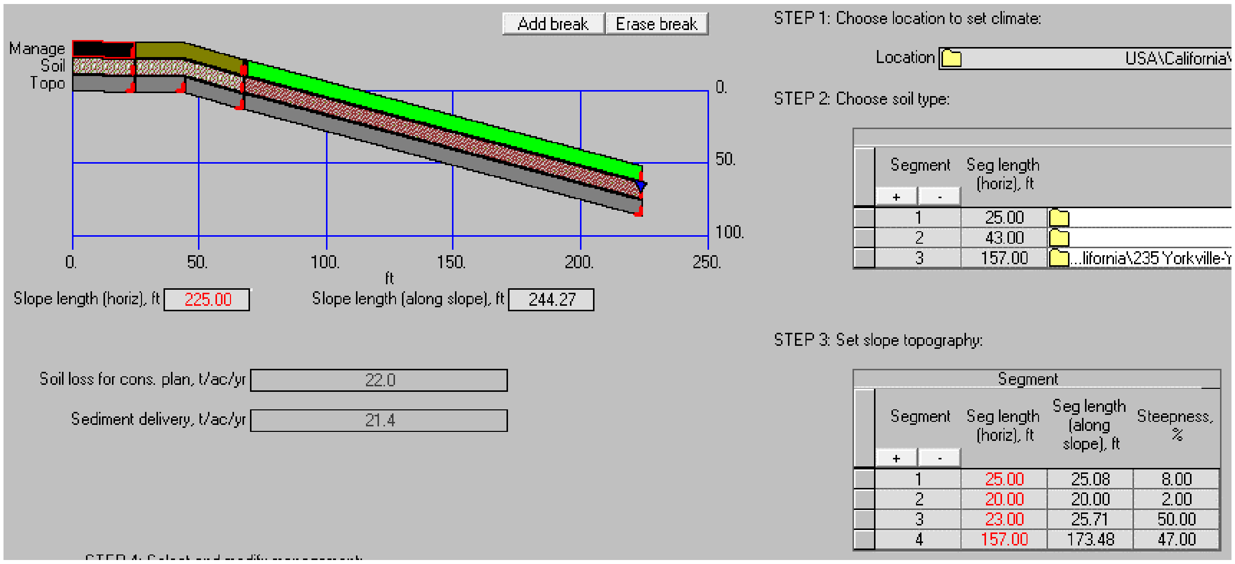


Figure 9-7. Example 1: Step 3, Setting Slope Topography

Update the slope topography segments then verify that Slope length (horiz), ft under the graph is the total slope length of 225 ft.

9.6 RUSLE2 Profile Step 4: Select and Modify Management

For the construction condition, the managements are primarily based on the project WPCDs, common construction activities required by the project scope, and the construction schedule.

The project location is the same so continue to select managements from the Mediterranean (Xeric) climate area folder.

Enter management segments working from the top of the slope down. The management length is measured from the bottom of the segment to the top of the slope. The representative area includes road improvements, wall construction, minor grading, and permanent erosion control. Therefore, the managements must include Stage 2 and Stage 3 construction dates from the Problem Statement. Refer to Appendix D for a list comparing RUSLE2 practice names to the Caltrans Construction Site BMPs and CASQA BMP names.

Go to the RUSLE2 Profile screen, add two segments to Step 4 using the + button (you should have three segments total).

Segment 1 is 25 ft of existing asphalt that will be maintained throughout construction. Segment 2 is 68 ft of grading construction including wall construction. Segment 3 is 225 ft of undisturbed vegetated area.

Use the saved managements. For Segment 1, click on the down arrow and navigate to -Mediterranean climate areas\-Local Management files\Asphalt paving 1/1/.

For Segment 2, click on the down arrow and navigate to Mediterranean climate areas\-Local Management files\Yr1 Summer Const, temp BMP 2500 lb. BFM 3x, Yr1 Fall EC, compost, BFM 3500 lbs/ac with seed. Change the Duration of Segment 2 to 5 years to account for plant establishment.

For Segment 3 use Mediterranean climate areas\-Existing Undisturbed Vegetative Cover\Grass and forbs, existing, 60 to 70 pct Canopy Cover, the same management from pre-construction and post-construction. By selecting Yes for Repeat Construction Operations Annually? for existing vegetation, RUSLE2 models the vegetation growth cycle each year.

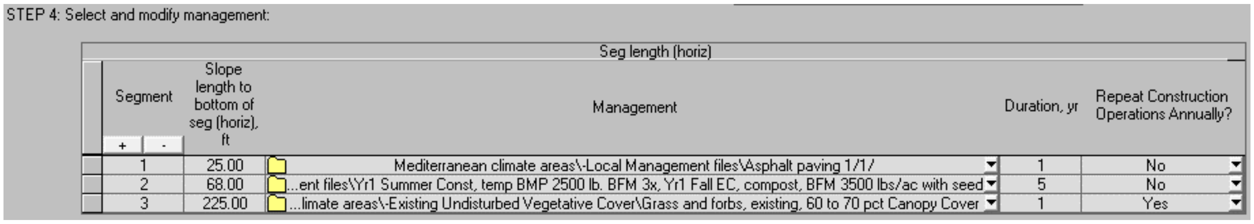


Figure 9-8. RUSLE2 Profile Step 4: Update Managements

Click on the yellow folders to review the activities and start dates used in each management. Update dates as needed to reflect construction timing. When updating dates, start at the bottom of the operations list.

Segment 1 management starts on January 1, 2025. Segment 2 is a custom management with multiple operations that was created for this example. Segment 2 starts with grading on June 2, 2025 and ends with permanent erosion control installation October 7, 2025.

Segment 3 management starts on Oct 15, 2024. When the project includes undisturbed vegetation that is protected during construction, start the operation the year before.

9.7 RUSLE2 Profile Step 5: Set Supporting Practices

Profile Step 5 is used for the construction run to model the sediment traps. While the sediment trap shown on the WPCP is not directly intercepted by Transect #2, it is included in the example because it is assumed to treat runoff from the vicinity.

RUSLE2 models sediment traps and sediment basins in the same way; therefore, use sediment basin in RUSLE2. Click on the down arrow to display a menu of practices and select 1 Water and Sediment Control Basin in middle of RUSLE slope:

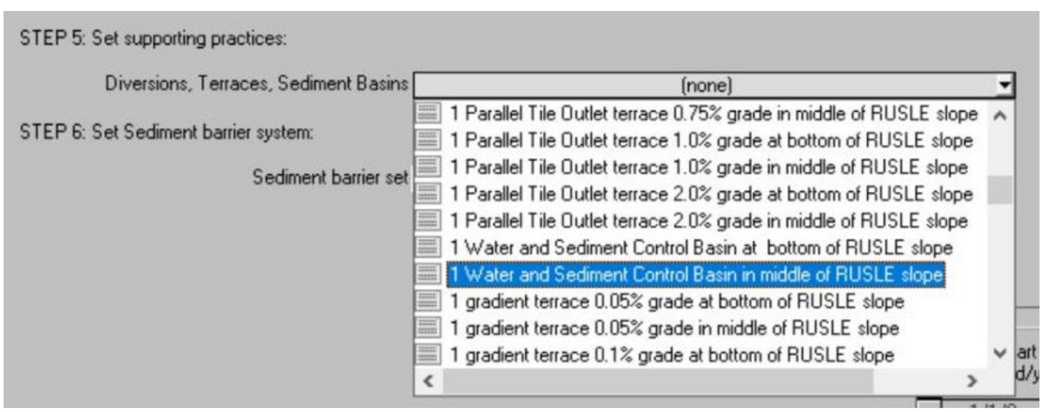
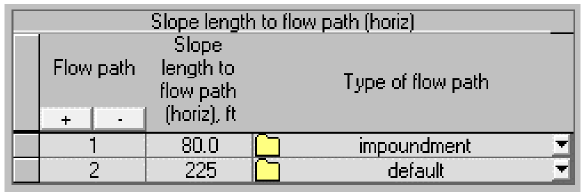


Figure 9-9. RUSLE2 Profile Step 5: Set supporting practices

Now update the location of the sediment trap to be just downstream of the silt fence by updating the Slope length to flow path (horiz), ft from 113 to 80.0:



Flow path	Slope length to flow path (horiz), ft	Type of flow path
1	80.0	impoundment
2	225	default

Figure 9-10. RUSLE2 Profile Step 5: Set sediment trap location

When updating the following pop-up notification will appear. Select “Yes.”

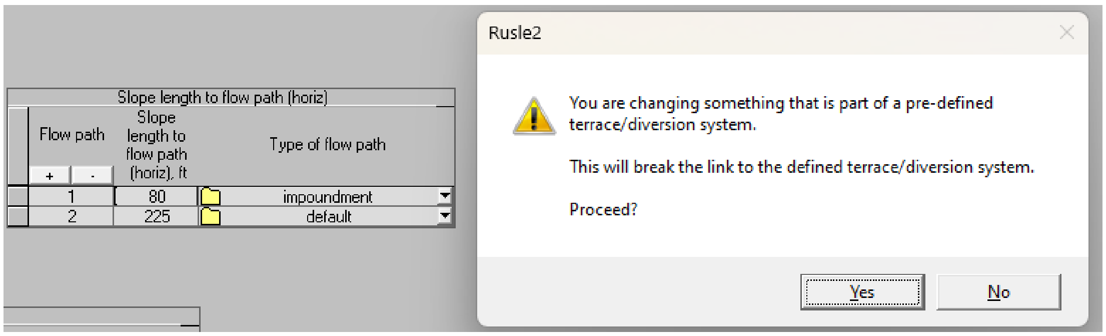


Figure 9-11. RUSLE2 Profile Step 5: Set sediment trap location pop-up

Adding a sediment trap reduces both soil loss and sediment delivery rates under the graph. The sediment delivery is more significantly affected; this is correct because the trap prevents sediment from discharging into downstream systems.

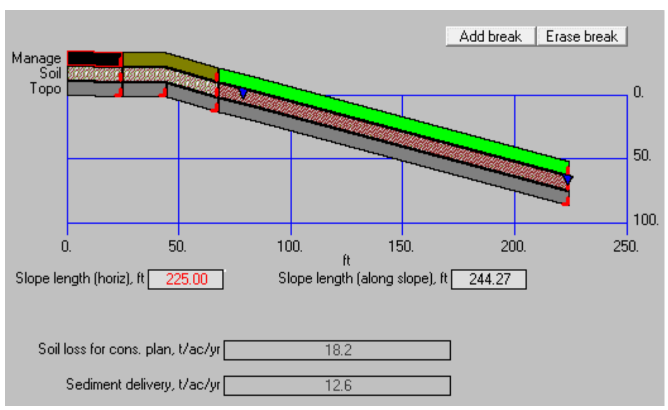


Figure 9-12. RUSLE2 Profile Step 5: Updated Supporting Practices Impact

9.8 RUSLE2 Profile Step 6: Set Sediment Barrier System

The silt fence needs to be included in the construction run in Profile Step 6. Click on the yellow folder next to Sediment barrier set to open the wizard:

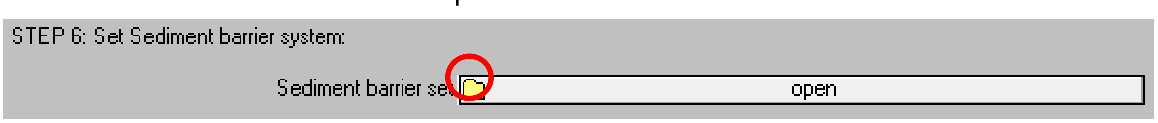


Figure 9-13. RUSLE2 Profile Step 6: Set barrier system

The top portion of the wizard is used when multiple barriers are installed on a slope at a specific spacing or total number. This would typically be used for multiple fiber rolls installed along a slope. Since the example requires use of one silt fence, the Barriers table in the middle of the window is used.

Select Silt Fence reinforced with metal fabric for sediment barrier type. The silt fence is 1-ft wide and installed outside of the grading area and within the existing vegetated area. The How Place? column refers to the location of the silt fence installation. Select User set to place the silt fence at the limit of grading. The distance from the top of slope to the bottom of silt fence is 69-ft. The silt fence is installed prior to the start of construction so use 4/13/25 as the barrier installation date. The operation installing barrier is Install – Remove Sediment Control Barrier\Install Permeable Barriers. Since the problem statement says that the silt fence will remain in place, there is no removal date or operation. Leave the barrier removal date as 1/1/0 and barrier removal operation as (none).

Select APPLY!! to add the silt fence to Step 4 Managements:

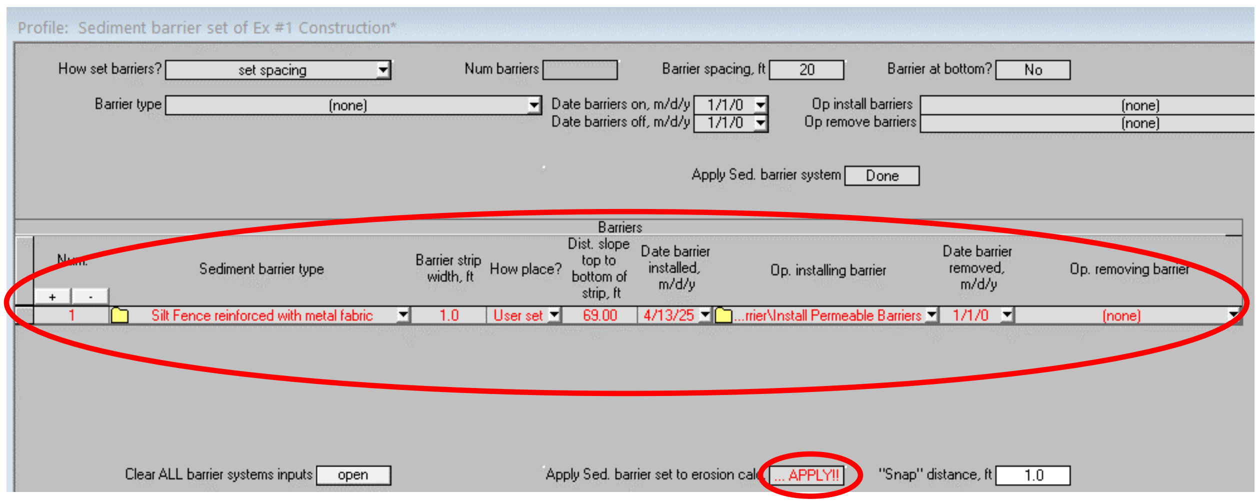


Figure 9-14. RUSLE2 Profile Step 6: Wizard

At the bottom of the window, select Apply/Close to return to the RUSLE2 profile screen. The Managements in Step 4 will now show a new segment for the silt fence called MAN_PTR:INTERNAL(#). The duration should be 1 year; update as needed:

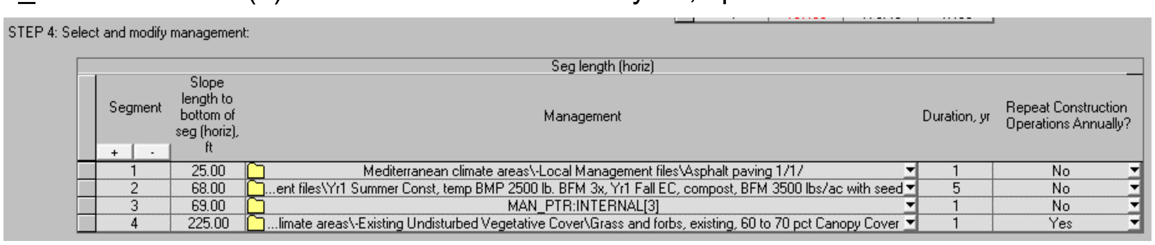


Figure 9-15. RUSLE2 Profile Step 4: Updated managements with silt fence

9.9 RUSLE2 Construction Findings

The project construction sediment delivery is 12.7 t/ac/yr. Save the file.

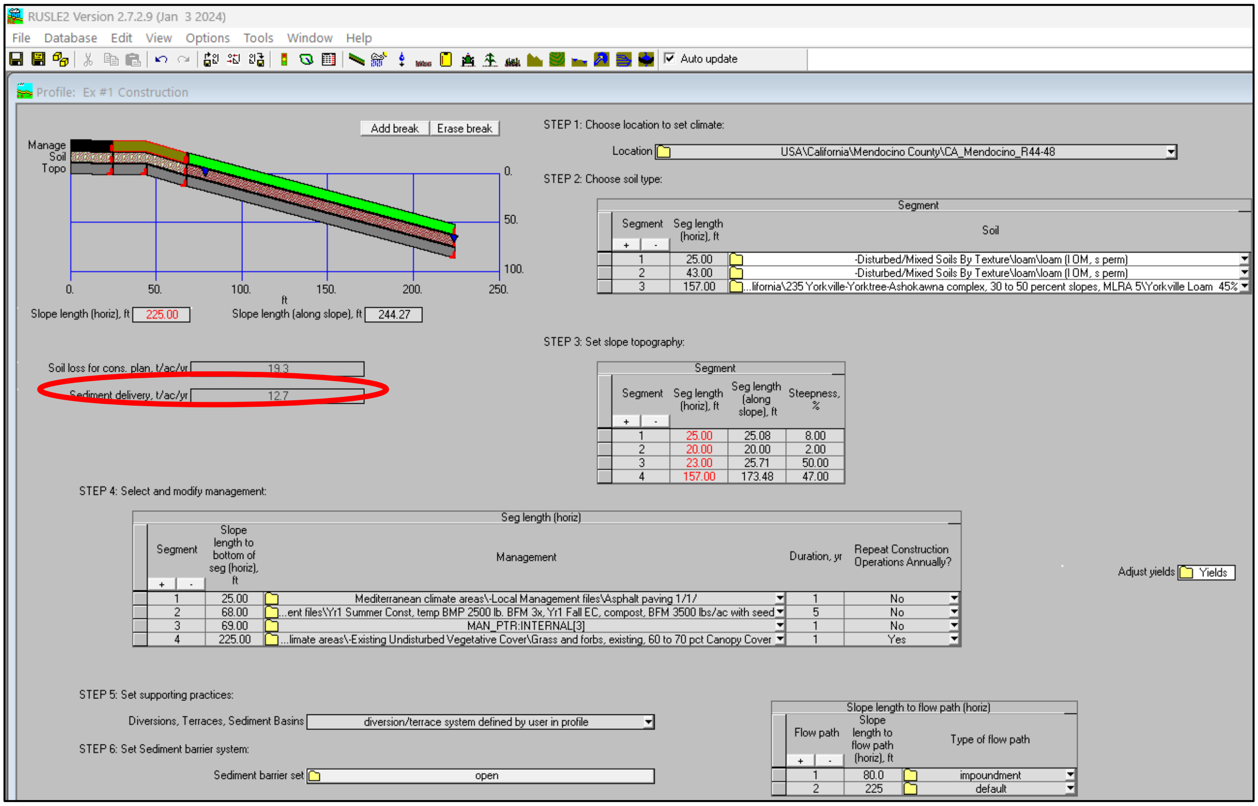


Figure 9-16. RUSLE2 Profile: Construction sediment delivery

Example files have been created for your use. These examples will be helpful if you have trouble getting the same results as shown in the guide. Back in the RUSLE2 program go to File/Open/Profile/Mediterranean Area Examples/Example #1 Construction 102424. In this profile you will see the managements and the files selected to represent the construction activities and durations from the Problem Statement. Click on the yellow folder in the management column to explore the managements. The inputs and outputs in this example file should be the same as your Ex#1 Construction file.

Section 10

Reporting and Documentation

Once the pre-construction, post-construction, and construction runs (if applicable) are set up and reviewed, they are used to create the RUSLE2 output. The output summarizes the findings from the selected profile runs so they can be reported and documented.

10.1 Example 1 Deliverables

The pre-construction, post-construction, and construction runs are complete. In Section 6, the example problem requests the RUSLE2 documentation for the PS&E phase SWDR be provided. Additionally, the RUSLE2 documentation for TMDL compliance to be used as an attachment to the Contractors SWPPP needs to be provided. Sections 10.2 and 10.3 demonstrate how to generate the required documentation. It is assumed that the RUSLE2 program is being used to follow along with the Section 10.2 and 10.3 text.

10.2 RUSLE2 Outputs for SWDR

Open RUSLE2 then click on the Worksheet icon:

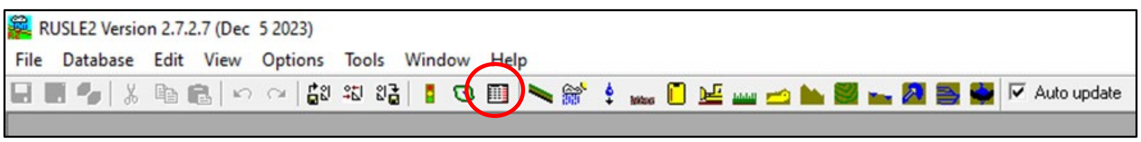


Figure 10-1. RUSLE2: Open worksheet

Open the default worksheet. Once open, save-as Ex #1 SWDR Output in the worksheets folder:

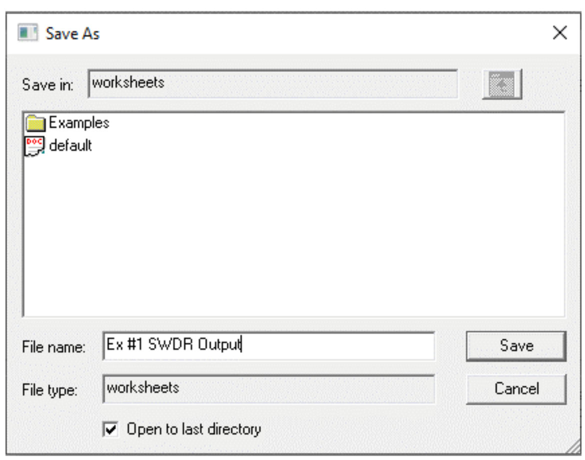


Figure 10-2. RUSLE2: Save-as to Worksheet folder

In the worksheet click on the Compare Different Profiles tab. Click on the + button in the Hillslope column. Then use the down arrow to find then select previously saved profiles for the pre-construction and post-construction runs. Add project information at the top of the window and a summary of the run in the Info box. For Project Name, enter "Example #1 Slip-out Repair and Roadway Reconstruction." For Project Location and Site/Station, enter "State Route 162, PM 16.16, in Mendocino County." In the Info box, enter "Example #1 RUSLE2 Comparison, SWDR Output, SR 162 at PM 16.16, Mendocino County, TMDL Area." This information will be on the printout of the final output. Save the worksheet.

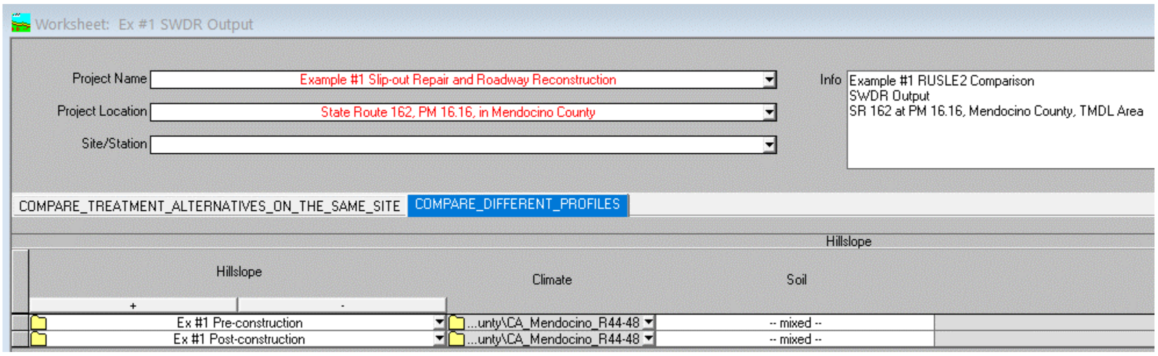


Figure 10-3. RUSLE2: SWDR Worksheet

Next go to File/Print Report. After receiving the following notification, click Yes.

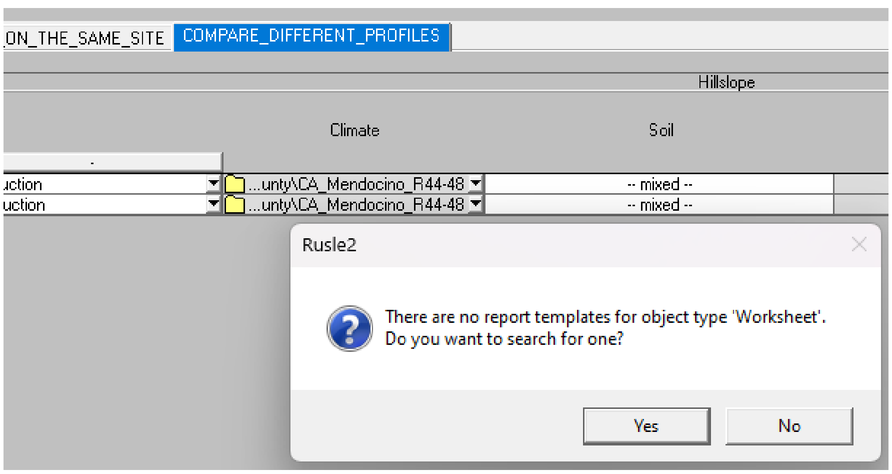


Figure 10-4. RUSLE2: SWDR Worksheet Print Template Error

Navigate to the CALTRANS folder and select the CALTRANS Worksheet compare different profiles.wrk.dot file then select Open:

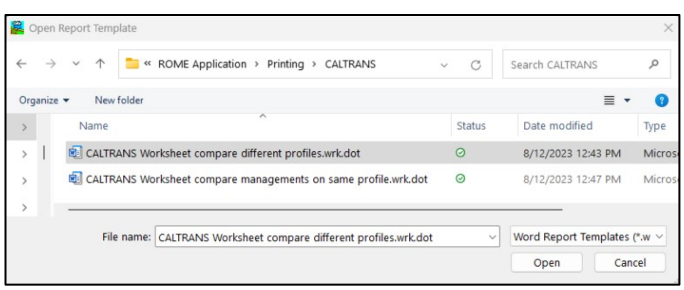


Figure 10-5. RUSLE2: Select print template for SWDR worksheet

The RUSLE2 output will open in Word where it can be saved as a PDF to a project specific folder or emailed to the Project Engineer. A sample printout is shown in Figure 10-6. Include the cover sheet in Appendix D with the submittal.

Caltrans

RUSLE2 Worksheet Erosion Calculation Record

Info: Example #1 RUSLE2 Comparison
SWDR Output
SR 162 at PM 16.16, Mendocino County, TMDL Area

Project Name: Example #1 Slip-out Repair and Roadway Reconstruction

Project Location: State Route 162, PM 16.16, in Mendocino County

Site/Station: State Route 162, PM 16.16, in Mendocino County

Outputs:
Comparison of Different Profiles

Hillslope	*Climate*	*Soil*	*Management*	*Sediment delivery, t/ac/yr*
Mediterranean Area Examples\Example #1 Pre-Construction 102124*	USA\California\Mendocino County\CA_Mendocino_R44-48	-- mixed --	-- mixed --	21.4
Mediterranean Area Examples\Example #1 Post-Construction 102124	USA\California\Mendocino County\CA_Mendocino_R44-48	-- mixed --	-- mixed --	19.8

Figure 10-6. RUSLE2: Example SWDR worksheet printout

10.3 RUSLE2 Outputs for SWPPP

Open RUSLE2 then click on the Worksheet icon:

Figure 10-7. RUSLE2: Open worksheet

Open the default worksheet. Once open, save-as Ex #1 SWPPP Output in the worksheets folder:

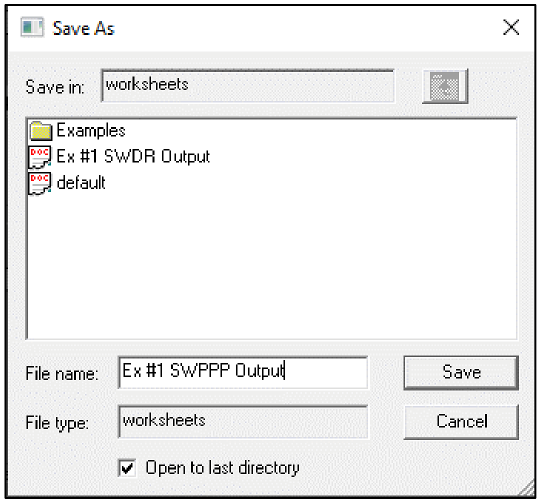


Figure 10-8. RUSLE2: Save-as to Worksheet folder

In the worksheet click on the Compare Different Profiles tab. Click on the + button in the Hillslope column. Then use the down arrow to find then select previously saved profiles for the pre-construction and construction runs. Add project information at the top of the window and a summary of the run in the Info box. For Project Name, enter “Example #1 Slip-out Repair and Roadway Reconstruction.” For Project Location and Site/Station, enter “State Route 162, PM 16.16, in Mendocino County.” In the Info box, enter “Example #1 RUSLE2 Comparison, SWPPP Output, SR 162 at PM 16.16, Mendocino County, TMDL Area.” This information will be on the printout of the final output. Save the worksheet.

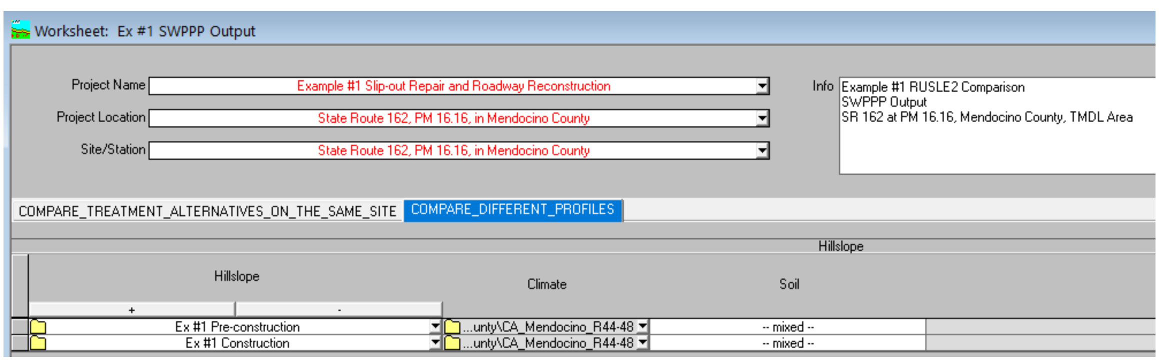


Figure 10-9. RUSLE2: SWPPP worksheet

Next go to File/Print Report. After receiving the following notification, click Yes.

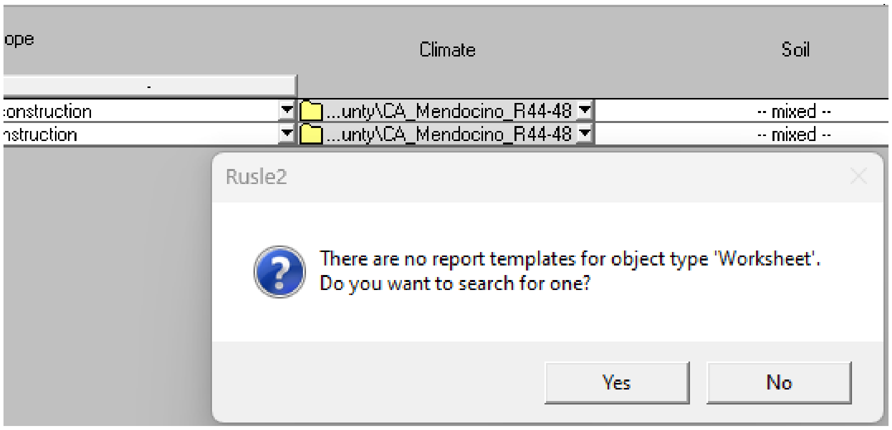


Figure 10-10. RUSLE2: SWPPP Worksheet Print Template Error

Navigate to the CALTRANS folder and select the CALTRANS Worksheet compare different profiles.wrk.dot file then select Open:

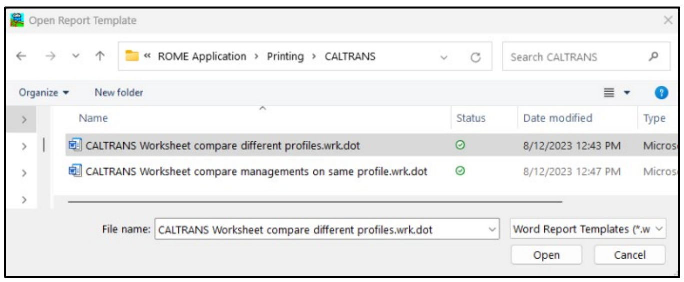


Figure 10-11. RUSLE2: Select print template for SWPPP worksheet

The RUSLE2 output will open in Word where it can be saved as a PDF to a project specific folder or emailed to the RE. Include the cover sheet in Appendix D with the submittal.

RUSLE2 Worksheet Erosion Calculation Record

Info: Example #1 RUSLE2 Comparison
SWPPP Output
SR 162 at PM 16.16, Mendocino County, TMDL Area

Project Name: Example #1 Slip-out Repair and Roadway Reconstruction

Project Location: State Route 162, PM 16.16, in Mendocino County

Site/Station: State Route 162, PM 16.16, in Mendocino County

Outputs:
Comparison of Different Profiles

Hillslope	*Climate*	*Soil*	*Management*	*Sediment delivery, t/ac/yr*
Mediterranean Area Examples\Example #1 Pre-Construction 102124*	USA\California\Mendocino County\CA_Mendocino_R44-48	-- mixed --	-- mixed --	21.4
Mediterranean Area Examples\Example #1 Construction 102424	USA\California\Mendocino County\CA_Mendocino_R44-48	-- mixed --	-- mixed --	12.7

Figure 10-12. RUSLE2: Example SWPPP worksheet printout

Appendix A: TMDL Table H2

CGP TMDL H-2 Table

Sediment
Metals and Toxins
Toxics

RWQCB	TMDL	Applicable Water Body/ Watershed	Pollutants	Compliance Actions	NAL/NEL	WLA (tons/mi^2/yr)	Summary of requirement
North Coast Regional Water Quality Control Board (Region 1)	Albion River Sediment TMDL	Albion River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	no WLA on Table H-3	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are comprable to pre-project rates
North Coast Regional Water Quality Control Board (Region 1)	Big River Sediment TMDL	Big River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	no WLA on Table H-3	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are comprable to pre-project rates
North Coast Regional Water Quality Control Board (Region 1)	Eel River – Lower Main Sediment TMDL	Lower Eel River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	no WLA on Table H-3	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are comprable to pre-project rates
North Coast Regional Water Quality Control Board (Region 1)	Eel River – Middle Fork Sediment TMDL	Middle Fork Eel River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	Watershed 23, Black Butte subwatershed 7, Elk Creek Subwatershed 41, Round Valley Subw 9, Upper Middle Fork Subw 9, Williams/Thatchr Sub 19	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are equal to or less than the site specific allocation for sediment loading.
North Coast Regional Water Quality Control Board (Region 1)	Eel River – Middle Main Sediment TMDL	Middle Main Eel River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	no WLA on Table H-3	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are comprable to pre-project rates
North Coast Regional Water Quality Control Board (Region 1)	Eel River – North Fork Sediment TMDL	North Fork Eel River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	no WLA on Table H-3	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are comprable to pre-project rates
North Coast Regional Water Quality Control Board (Region 1)	Eel River – South Fork Sediment TMDL	South Fork Eel River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	no WLA on Table H-3	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are comprable to pre-project rates
North Coast Regional Water Quality Control Board (Region 1)	Eel River – Upper Main Sediment TMDL	Upper Eel River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	36 (Large Features>3000 yds3)	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are equal to or less than the site specific allocation for sediment loading.
North Coast Regional Water Quality Control Board (Region 1)	Gualala River Sediment TMDL	Gualala River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	no WLA on Table H-3	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are comprable to pre-project rates
North Coast Regional Water Quality Control Board (Region 1)	Mad River Sediment TMDL	Mad River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	174 (Roads)	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are equal to or less than the site specific allocation for sediment loading.
North Coast Regional Water Quality Control Board (Region 1)	Mattole River Sediment TMDL	Mattole River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	no WLA on Table H-3	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are comprable to pre-project rates
North Coast Regional Water Quality Control Board (Region 1)	Navarro River Sediment TMDL	Navarro River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	no WLA on Table H-3	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are comprable to pre-project rates
North Coast Regional Water Quality Control Board (Region 1)	Noyo River Sediment TMDL	Noyo River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	no WLA on Table H-3	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are comprable to pre-project rates

CGP TMDL H-2 Table

Sediment
Metals and Toxins
Toxics

RWQCB	TMDL	Applicable Water Body/ Watershed	Pollutants	Compliance Actions	NAL/NEL	WLA (tons/mi^2/yr)	Summary of requirement
North Coast Regional Water Quality Control Board (Region 1)	Ten Mile River Sediment TMDL	Ten Mile River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	no WLA on Table H-3	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are comprable to pre-project rates
North Coast Regional Water Quality Control Board (Region 1)	Trinity River Sediment TMDL	Trinity River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	See table trinity	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are equal to or less than the site specific allocation for sediment loading.
North Coast Regional Water Quality Control Board (Region 1)	Van Duzen River Sediment TMDL	Van Duzen River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	None	no WLA on Table H-3	RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are comprable to pre-project rates
Los Angeles Regional Water Quality Control Board (Region 4)	Ballona Creek Metals TMDL	Ballona Creek or Sepulveda Canyon Channel	Copper, Lead, and Zinc	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project
Los Angeles Regional Water Quality Control Board (Region 4)	Ballona Creek Estuary Toxics TMDL	Ballona Creek or Ballona Creek Estuary	Cadmium, Chlordane, Copper, DDT, Lead, PCBs, Silver, and Zinc	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project
Los Angeles Regional Water Quality Control Board (Region 4)	Calleguas Creek Watershed Metals and Selenium TMDL	Calleguas Creek or Conejo Creek	Copper, Nickel, and Selenium	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project
Los Angeles Regional Water Quality Control Board (Region 4)	Calleguas Creek Watershed Metals and Selenium TMDL	Calleguas Creek or Conejo Creek	Mercury	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project
Los Angeles Regional Water Quality Control Board (Region 4)	Calleguas Creek Watershed Metals and Selenium TMDL	Revolon Slough	Copper, Nickel, and Selenium	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project
Los Angeles Regional Water Quality Control Board (Region 4)	Calleguas Creek Watershed Metals and Selenium TMDL	Revolon Slough	Mercury	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project
Los Angeles Regional Water Quality Control Board (Region 4)	Calleguas Creek Watershed Organo-chlorine Pesticides and PCBs TMDL	Calleguas Creek Watershed	Chlordane, 4,4-DDD, 4,4-DDE, 4,4-DDT, Dieldrin, PCBs, and Toxaphene	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project
Los Angeles Regional Water Quality Control Board (Region 4)	Colorado Lagoon Toxics TMDL	Colorado Lagoon Watershed	Chlordane, Dieldrin, DDT, Lead, PAHs, PCBs, and Zinc	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project

CGP TMDL H-2 Table

Sediment
Metals and Toxins
Toxics

RWQCB	TMDL	Applicable Water Body/ Watershed	Pollutants	Compliance Actions	NAL/NEL	WLA (tons/mi^2/yr)	Summary of requirement
Los Angeles Regional Water Quality Control Board (Region 4)	Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel Estuary and Greater Los Angeles/ Long Beach Harbor Waters including: Inner and Outer Harbor Main Channel, Southwest Slip, Cabrillo Marina, Inner Cabrillo Beach, Los Angeles River Estuary, San Pedro Bay	Copper, DDT, Lead, PAHs, PCBs, and Zinc	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	None		Implement BMPs that are as protective as pre-construction conditions, use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are comprable to pre-project rates
Los Angeles Regional Water Quality Control Board (Region 4)	Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel Estuary	Cadmium	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2 below.	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project
Los Angeles Regional Water Quality Control Board (Region 4)	Los Angeles and Long Beach Harbor Waters TMDL	Consoli-dated Slip	Cadmium, Chromium, and Mercury	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2 below.	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project
Los Angeles Regional Water Quality Control Board (Region 4)	Los Angeles and Long Beach Harbor Waters TMDL	Fish Harbor	Mercury	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2 below.	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project
Los Angeles Regional Water Quality Control Board (Region 4)	Machado Lake Toxics TMDL	Machado Lake, Drain 553, Wilmington Drain, Project 77/510, and Walteria Lake	Chlordane, DDD (all cogeners), DDE (all cogeners), DDT (all cogeners), Dieldrin, Total DDTs, and Total PCBs	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	None		Implement BMPs that are as protective as pre-construction conditions, use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project to prove they are comprable to pre-project rates
Los Angeles Regional Water Quality Control Board (Region 4)	Marina del Rey Harbor Toxics TMDL	Marina del Rey Harbor	Chlordane, Copper, Lead, p,p'-DDE, Total DDTs, Total PCBs, and Zinc	Comply with General Permit and the additional Metals and Toxics TMDL Requirements in Section I.G.2 below.	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project
Los Angeles Regional Water Quality Control Board (Region 4)	Oxnard Drain No. 3 TMDL	Oxnard Drain No. 3	4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Bifenthrin, Chlordane, Chlorpyrifos, Dieldrin, PCBs, Sediment Toxicity, and Toxaphene	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project
Los Angeles Regional Water Quality Control Board (Region 4)	Santa Monica Bay DDTs and PCBs TMDL	Santa Monica Bay	DDT and PCBs	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project
Santa Ana Regional Water Quality Control Board (Region 8)	San Diego Creek and Newport Bay Nutrients TMDL	San Diego Creek, Newport Bay Watershed	Total Phosphorus	Comply with General Permit and the additional TMDL Requirements in Section I.D.2 below.	None		verify pollutant source assessment in SWPPP,Comply with sediment and SS BMPs, provide RUSLE2 models to show erosion loss is not over pre-development
Santa Ana Regional Water Quality Control Board (Region 8)	San Diego Creek and Newport Bay Organo-chlorine Compounds TMDL	San Diego Creek Watershed	Total DDT and Toxaphene	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project

CGP TMDL H-2 Table

	Sediment
	Metals and Toxins
	Toxics

RWQCB	TMDL	Applicable Water Body/ Watershed	Pollutants	Compliance Actions	NAL/NEL	WLA (tons/mi^2/yr)	Summary of requirement
Santa Ana Regional Water Quality Control Board (Region 8)	San Diego Creek and Newport Bay Organo-chlorine Compounds TMDL	Upper Newport Bay	Chlordane, Total DDT, and Total PCBs	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project
Santa Ana Regional Water Quality Control Board (Region 8)	San Diego Creek and Newport Bay Organo-chlorine Compounds TMDL	Lower Newport Bay	Chlordane, Total DDT, and Total PCBs	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	None		Comply with the site-specific erosion and sediment control, Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project

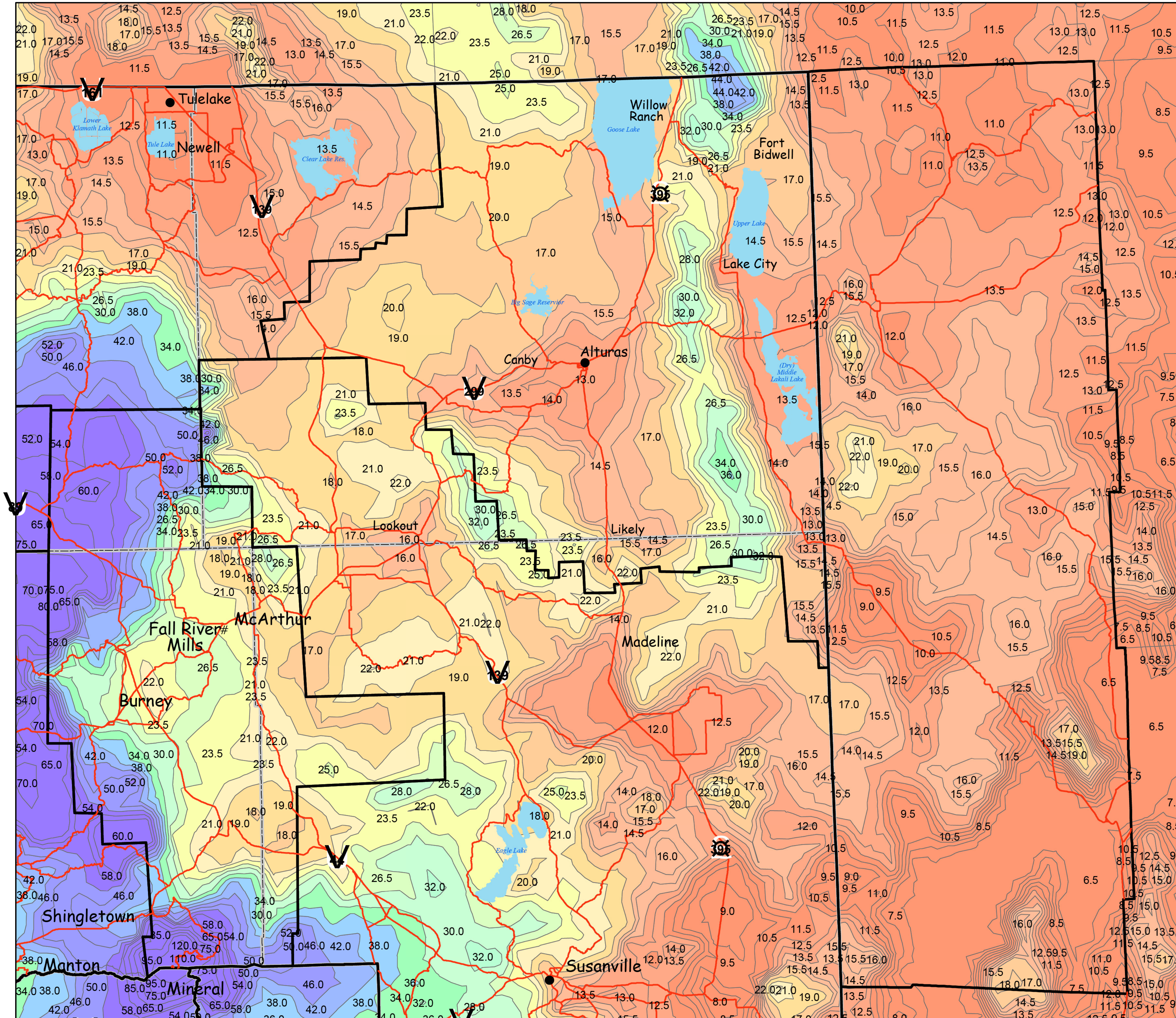
Appendix B: NRCS Precipitation Lookup Key and Maps

RUSLE2 Precipitation Map Reference for California Counties

CA County Name	CA NRCS Precipitation Map Name	Area Covered
Alameda County	Rusle2Precip_LivermoreB.pdf	Alameda County
Alpine County	Rusle2Precip_JacksonA.pdf	Tuolumne, Alpine, Maraposa, Stanislaus, Amador, Calaveras
	Rusle2Precip_SouthLakeTahoeB.pdf	Parts of Placer, Alpine and El Dorado Counties
Amador County	Rusle2Precip_JacksonA.pdf	Tuolumne, Alpine, Maraposa, Stanislaus, Amador, Calaveras
Butte County	Rusle2Precip_OrovilleB.pdf	Butte County
Calaveras County	Rusle2Precip_JacksonA.pdf	Tuolumne, Alpine, Maraposa, Stanislaus, Amador, Calaveras
Colusa County	Rusle2Precip_ColusaB.pdf	Colusa County
Contra Costa County	Rusle2Precip_ConcordB.pdf	Contra Costa County
Del Norte County	Rusle2Precip_CrescentCityB.pdf	Del Norte County
El Dorado County	Rusle2Precip_SouthLakeTahoeB.pdf	Parts of Placer and El Dorado Counties
	Rusle2Precip_PlacervilleB.pdf	El Dorado County
Fresno County	Rusle2Precip_FresnoA.pdf	San Joaquin Valley
Glenn County	Rusle2Precip_WillowsB.pdf	Glenn County
Humboldt County	Rusle2Precip_EurekaB.pdf	Humboldt County, Trinity County
Imperial County	Rusle2Precip_BlytheB.pdf	Imperial County, Eastern Riverside County
Inyo County	Rusle2Precip_BishopB.pd	Inyo County, South Mono County
Kern County	Rusle2Precip_BakersfieldB.pdf	Kern County
Kings County	Rusle2Precip_FresnoA.pdf	San Joaquin Valley
Lake County	Rusle2Precip_LakeportB.pdf	Lake County
Lassen County	Rusle2Precip_SusanvilleB.pdf	Parts of Modoc County and Lassen Counties
	Rusle2Precip_AlturasB.pdf	Parts of Modoc County, Lassen County, and Washoe Co., NV
	Rusle2Precip_McArthurB.pdf	Parts of Shasta, Siskiyou, Lassen, and Modoc Counties
Los Angeles County	Rusle2Precip_LancasterB.pd	Los Angeles County, Orange County
Madera County	Rusle2Precip_FresnoA.pdf	San Joaquin Valley
	Rusle2Precip_MaderaA.pdf	San Joaquin Valley
Marin County	Rusle2Precip_PetalumaB.pdf	Sonoma County, Marin County
Mariposa County	Rusle2Precip_FresnoA.pdf.	San Joaquin Valley
	Rusle2Precip_MariposaA.pdf	Tuolumne, Alpine, Maraposa, Stanislaus, Amador, Calaveras
	Rusle2Precip_JacksonA.pdf	Tuolumne, Alpine, Maraposa, Stanislaus, Amador, Calaveras
Mendocino County	Rusle2Precip_UkiahB.pdf	Mendocino County
Merced County	Rusle2Precip_FresnoA.pdf	San Joaquin Valley
Modoc County	Rusle2Precip_TulelakeB.pdf	Parts of Siskiyou and Modoc Counties
	Rusle2Precip_SusanvilleB.pdf	Parts of Modoc County and Lassen Counties
	Rusle2Precip_McArthurB.pdf	Parts of Shasta, Siskiyou, Lassen and Modoc Counties
	Rusle2Precip_AlturasB.pdf	Parts of Modoc County, Lassen County, and Washoe Co., NV
Mono County	Rusle2Precip_BishopB.pd	Inyo County, South Mono County
Monterey County	Rusle2Precip_SalinasA.pdf	Monterey County, San Benito County
Napa County	Rusle2Precip_NapaB.pdf	Napa County
Nevada County	Rusle2Precip_GrassValleyB.pdf	Nevada County, Western Sierra County
Orange County	Rusle2Precip_LancasterB.pd	Los Angeles County, Orange County
Placer County	Rusle2Precip_SouthLakeTahoeB.pdf	Parts of Placer and El Dorado Counties
	Rusle2Precip_AuburnB.pdf	Placer County
Plumas County	Rusle2Precip_QuincyB.pdf	Plumas County, Eastern Sierra County
Riverside County	Rusle2Precip_RedlandsB.pdf	Western Riverside County, SW San Bernardino County
	Rusle2Precip_BlytheB.pdf	Imperial County, Eastern Riverside County
Sacramento County	Rusle2Precip_ElkGroveB.pdf	Sacramento County
San Benito County	Rusle2Precip_SalinasA.pdf	Monterey County, San Benito County
	Rusle2Precip_HollisterB.pdf	San Benito County, Santa Clara County
San Bernardino County	Rusle2Precip_VictorvilleA.pdf	San Bernardino County
	Rusle2Precip_RedlandsB.pdf	Western Riverside County, SW San Bernardino County
San Diego County	Rusle2Precip_EscondidoB.pdf	San Diego County
San Francisco County	Rusle2Precip_HalfMoonBayB.pdf	San Francisco County, San Mateo County
San Joaquin County	Rusle2Precip_ModestoA.pdf	San Joaquin, Stanislaus Counites
San Luis Obispo County	Rusle2Precip_TempletonB.pdf	San Luis Obispo County
San Mateo County	Rusle2Precip_HalfMoonBayB.pdf	San Francisco County, San Mateo County
Santa Barbara County	Rusle2Precip_SantaMariaB.pdf	Santa Barbara County
Santa Clara County	Rusle2Precip_HollisterB.pdf	San Benito County, Santa Clara County

RUSLE2 Precipitation Map Reference for California Counties

CA County Name	CA NRCS Precipitation Map Name	Area Covered
Santa Cruz County	Rusle2Precip_CapitolaB.pdf	Santa Cruz County
Shasta County	Rusle2Precip_ReddingB.pdf	Shasta County
	Rusle2Precip_McArthurB.pdf	Parts of Shasta, Siskiyou, Lassen, and Modoc Counties
Sierra County	Rusle2Precip_QuincyB.pdf	Plumas County, Eastern Sierra County
	Rusle2Precip_GrassValleyB.pdf	Nevada County, Western Sierra County
Siskiyou County	Rusle2Precip_YrekaB.pdf	West/Central Siskiyou County
	Rusle2Precip_TulelakeB.pdf	Parts of Siskiyou and Modoc Counties
	Rusle2Precip_McArthurB.pdf	Parts of Shasta, Siskiyou, Lassen, and Modoc Counties
Solano County	Rusle2Precip_DixonB.pdf	Solano County
Sonoma County	Rusle2Precip_PetalumaB.pdf	Sonoma County, Marin County
Stanislaus County	Rusle2Precip_ModestoA.pdf	San Joaquin, Stanislaus Counites
	Rusle2Precip_MercedA.pdf	San Joaquin, Stanislaus, and Merced Counites
	Rusle2Precip_JacksonA.pdf	Tuolumne, Alpine, Mariposa, Stanislaus, Amador, Calaveras
Sutter County	Rusle2Precip_YubaCityB.pdf	Yuba County, Sutter County
Tehama County	Rusle2Precip_RedbluffB.pdf	Tehama County
Trinity County	Rusle2Precip_EurekaB.pdf	Humboldt County, Trinity County
Tulare County	Rusle2Precip_FresnoA.pdf	San Joaquin Valley
Tuolumne County	Rusle2Precip_MariposaA.pdf	Tuolumne, Alpine, Maraposa, Stanislaus, Amador, Calaveras
	Rusle2Precip_JacksonA.pdf	Tuolumne, Alpine, Maraposa, Stanislaus, Amador, Calaveras
Ventura County	Rusle2Precip_SomisB.pdf	Ventura County
Yolo County	Rusle2Precip_WoodlandB.pdf	Yolo County
Yuba County	Rusle2Precip_YubaCityB.pdf	Yuba County, Sutter County



Precipitation for RUSLE2
Alturas Service Center

parts of Modoc County, Lassen County, and Washoe Co.,NV

Precipitation Range

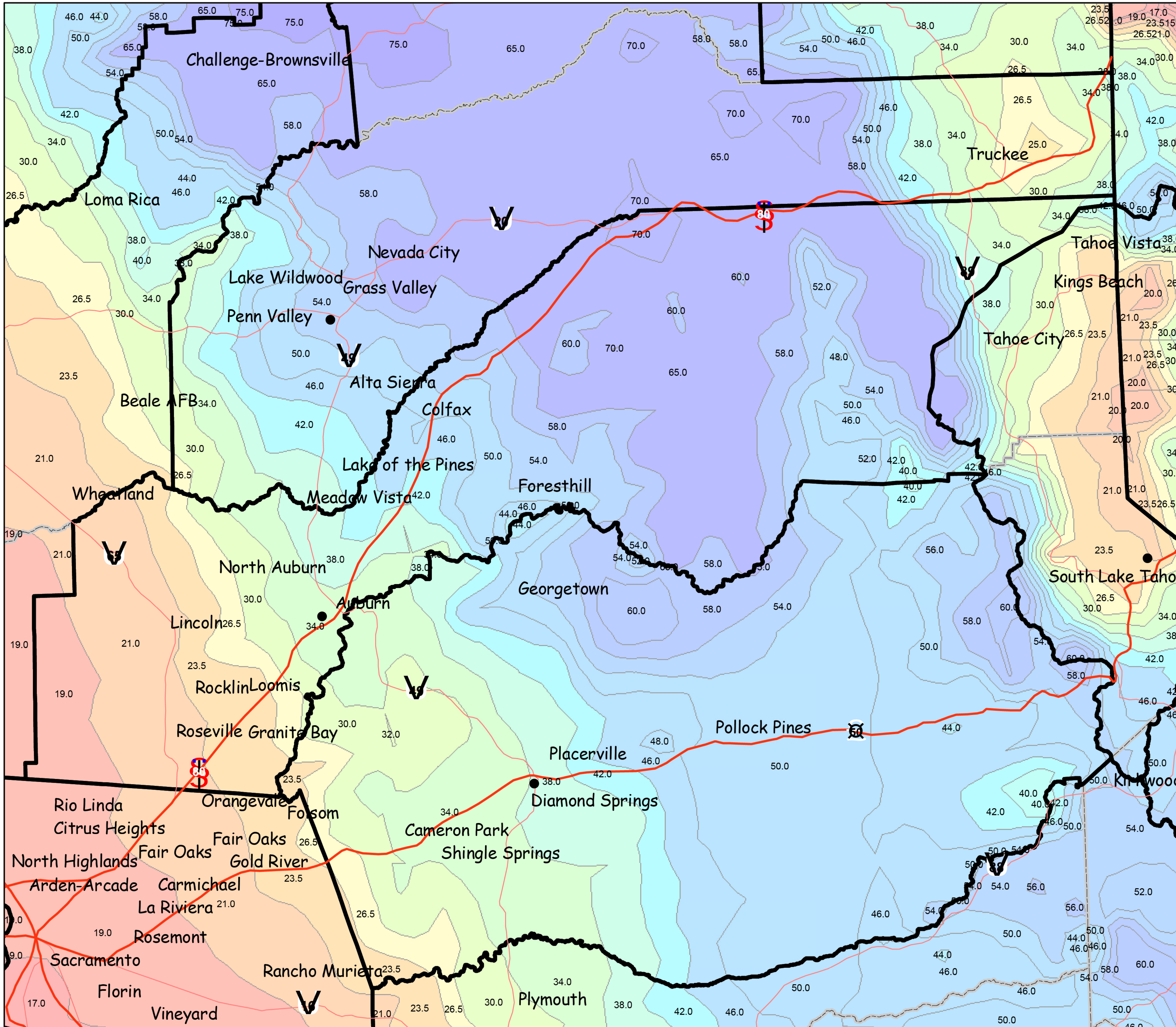
- 3.0 - 12.0
- 12.1 - 14.0
- 14.1 - 16.0
- 16.1 - 18.0
- 18.1 - 20.0
- 20.1 - 22.0
- 22.1 - 24.0
- 24.1 - 25.0
- 25.1 - 27.0
- 27.1 - 30.0
- 30.1 - 32.0
- 32.1 - 34.0
- 34.1 - 36.0
- 36.1 - 38.0
- 38.1 - 40.0
- 40.1 - 44.0
- 44.1 - 50.0
- 50.1 - 200.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_AlturasB 05\30\08

Precipitation for RUSLE2 Auburn Service Center

Placer County



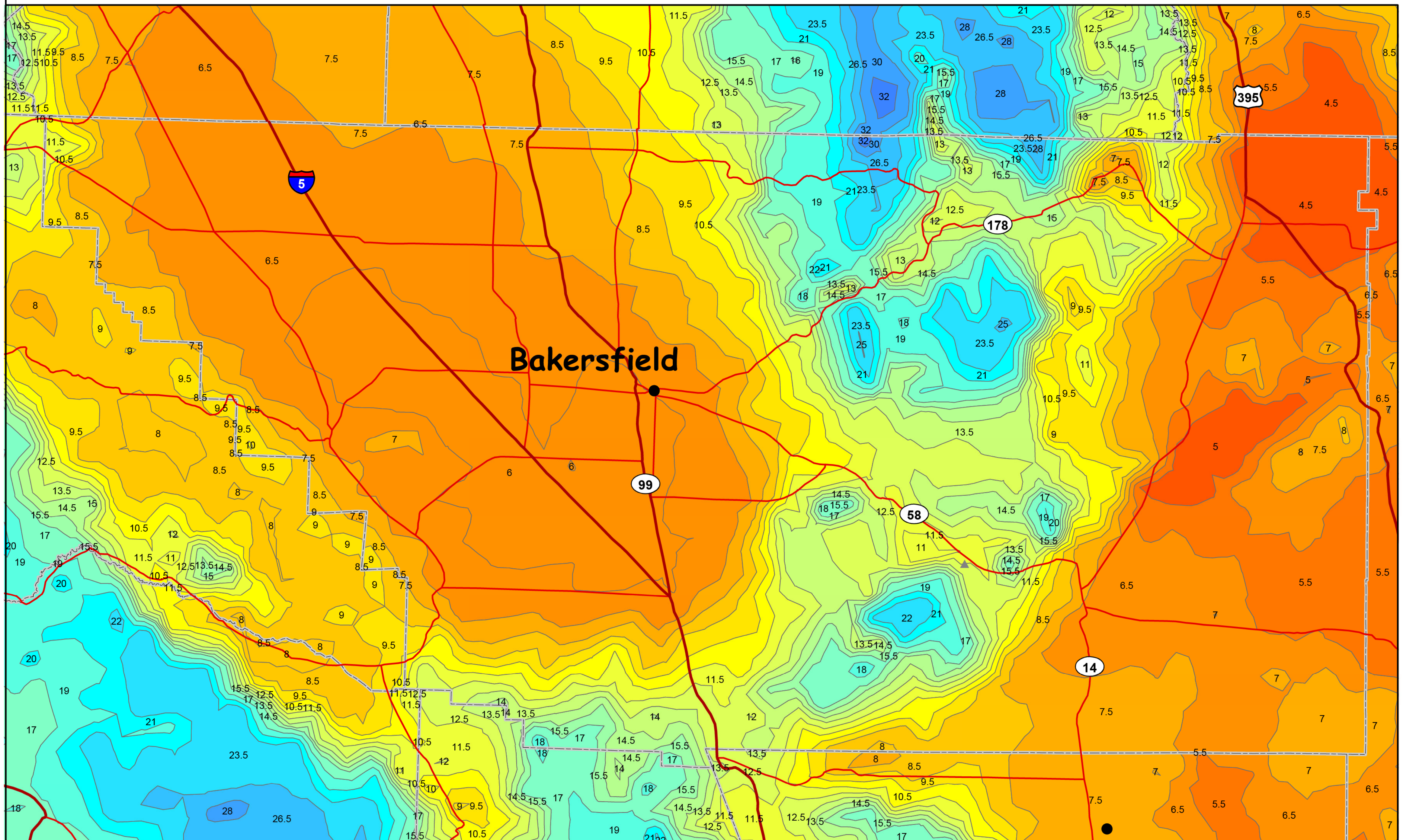
Precipitation Range

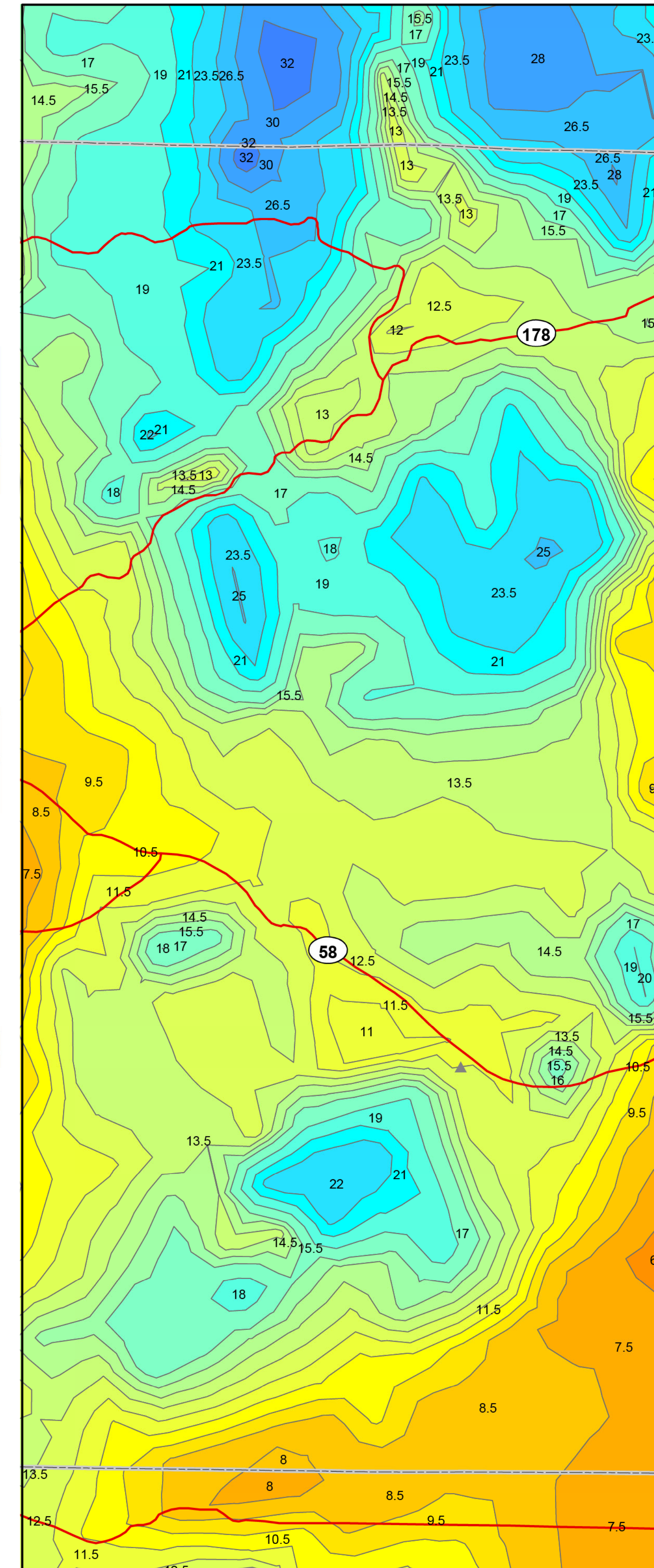
3.0 - 18.0	34.1 - 36.0
18.1 - 19.0	36.1 - 38.0
19.1 - 20.0	38.1 - 40.0
20.1 - 21.0	40.1 - 42.0
21.1 - 24.0	42.1 - 44.0
24.1 - 25.0	44.1 - 50.0
25.1 - 27.0	50.1 - 54.0
27.1 - 30.0	54.1 - 60.0
30.1 - 32.0	60.1 - 70.0
32.1 - 34.0	70.1 - 356.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_AuburnB 05\20\08

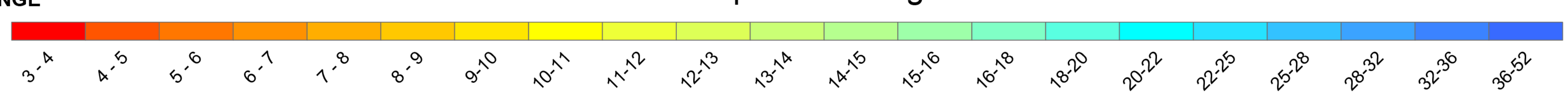
Precipitation for RUSLE2 - Kern County
Bakersfield Service Area





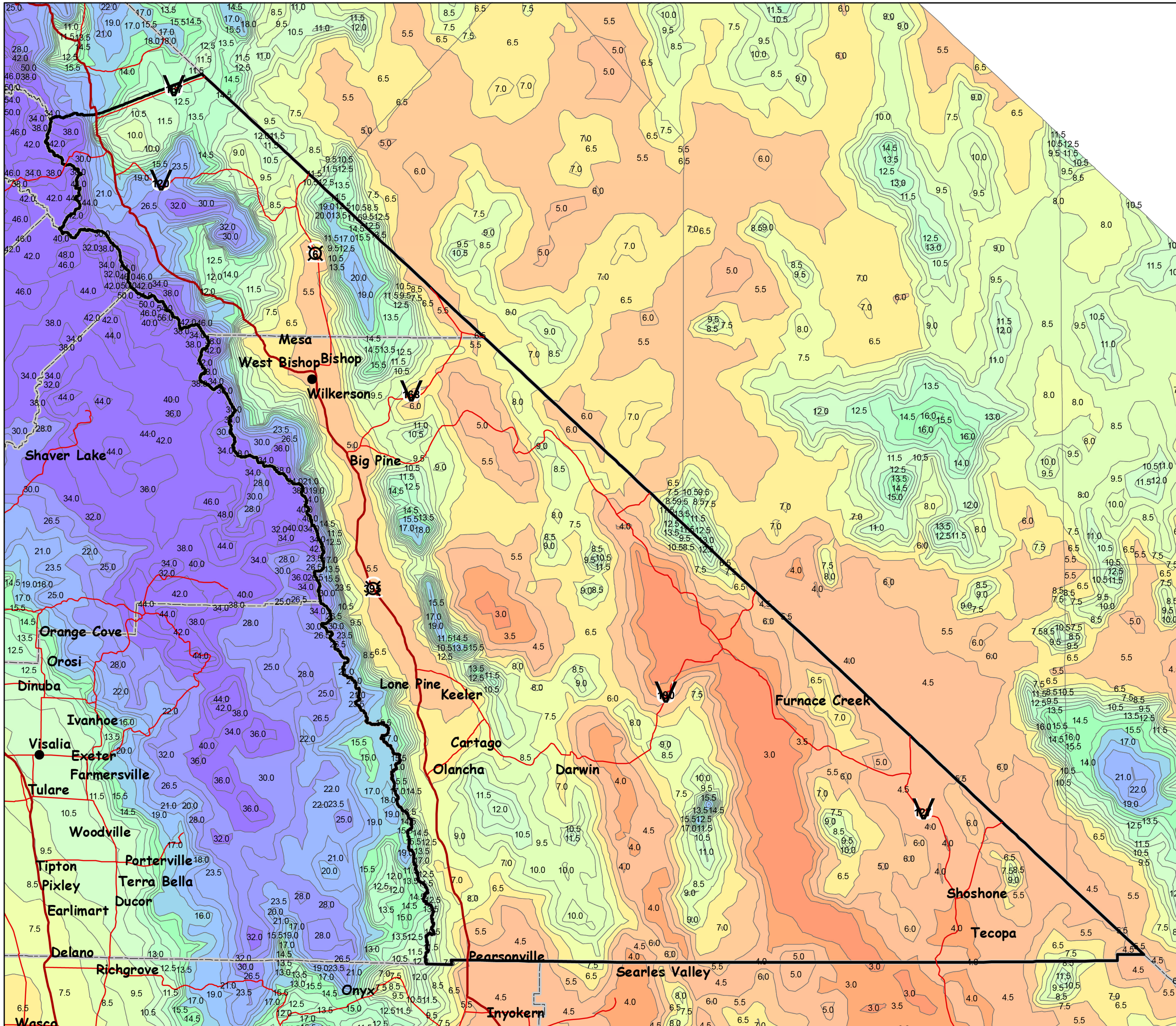
RANGE

Precipitation Range



Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_BakersfieldA 04\12\08



Precipitation for RUSLE2 Bishop Service Area

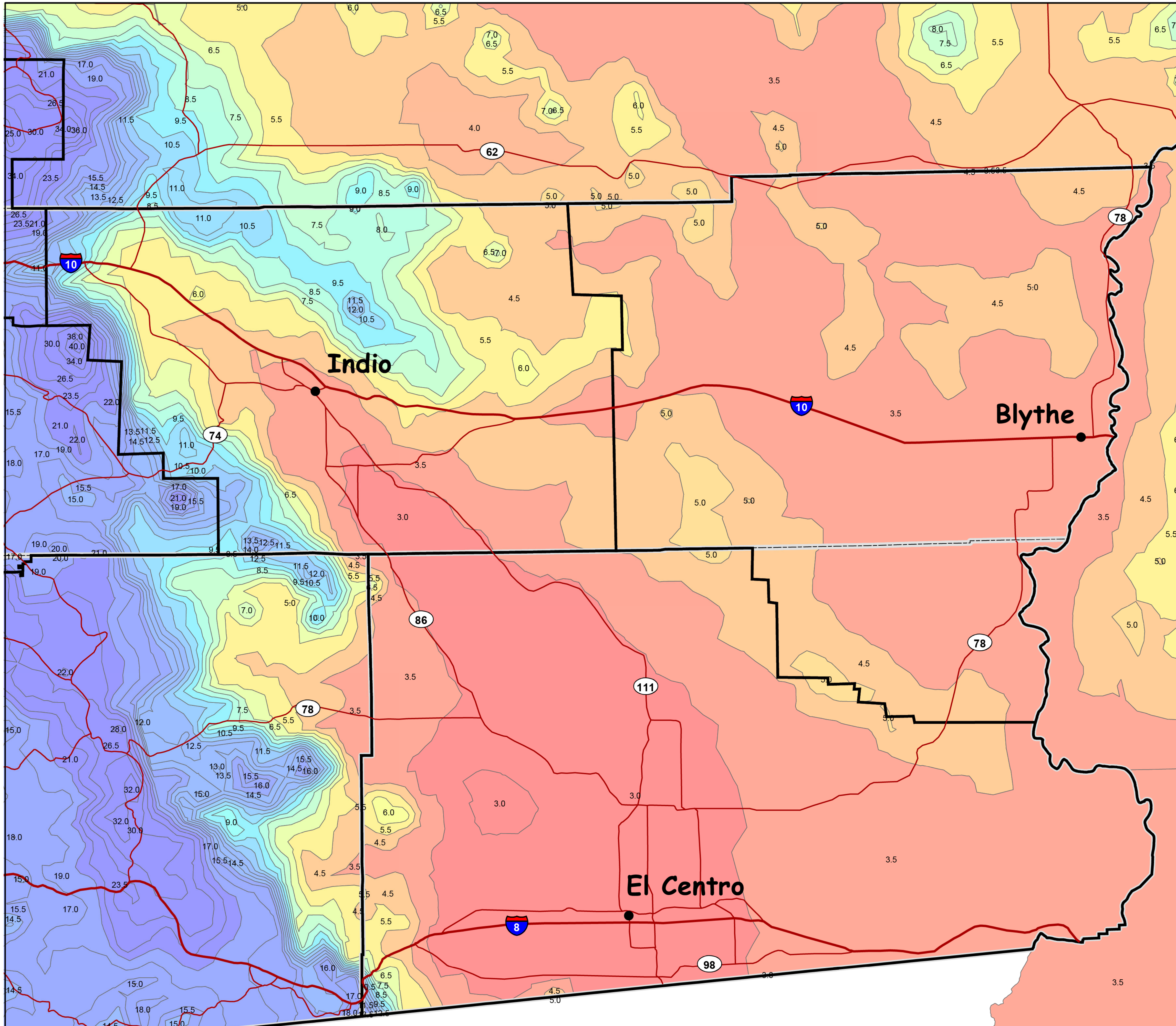
Inyo County S. Mono County

Precipitation Range

3.0	12.1 - 14.0
3.1 - 4.0	14.1 - 16.0
4.1 - 5.0	16.1 - 18.0
5.1 - 6.0	18.1 - 20.0
6.1 - 7.0	20.1 - 24.0
7.1 - 8.0	24.1 - 30.0
8.1 - 10.0	30.1 - 60.0
10.1 - 12.0	

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_BishopB 05\19\08



Precipitation for RUSLE2 Service Areas: Indio, Blythe, El Centro

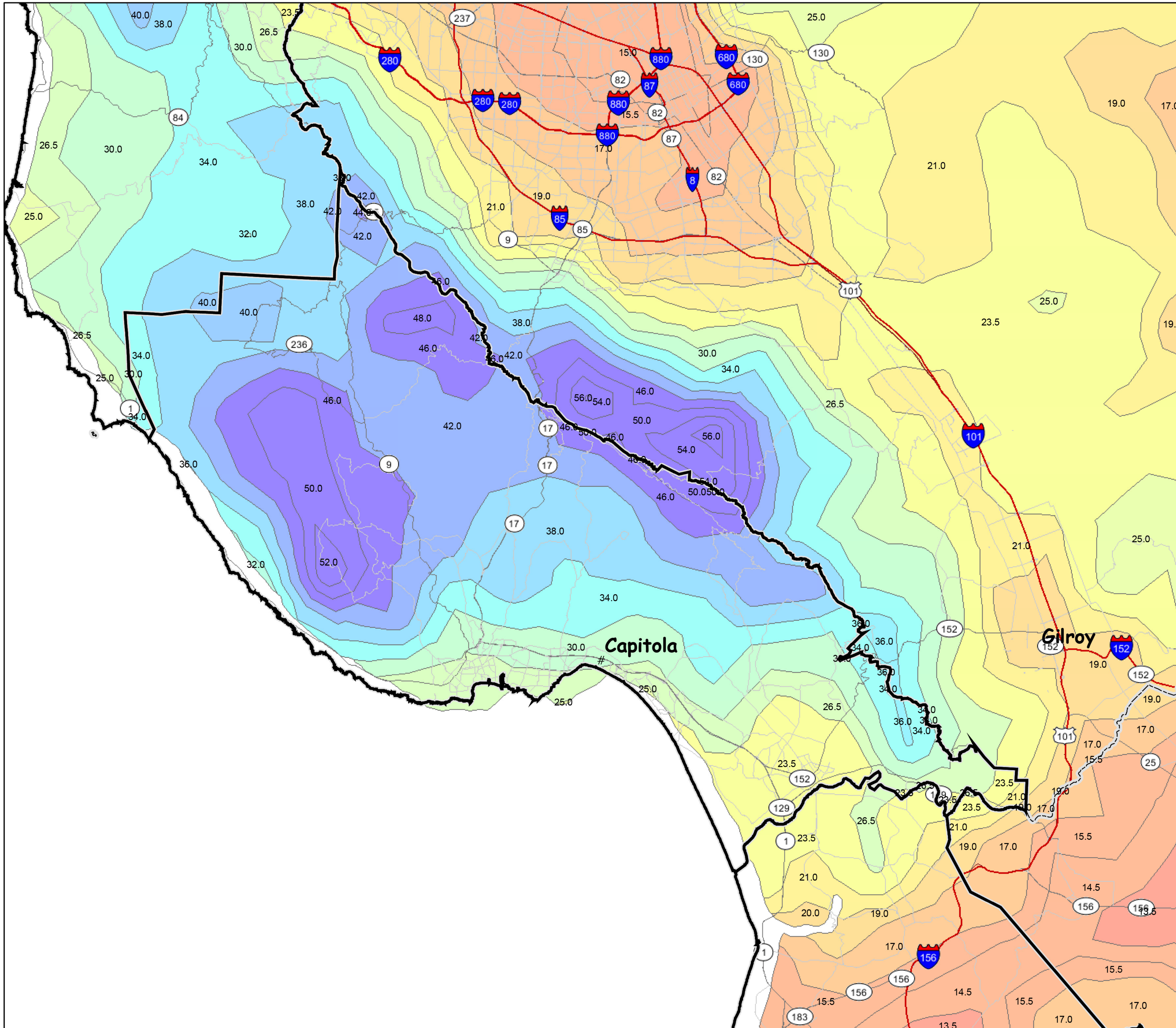
Imperial County
Eastern Riverside County

Precipitation Range

	3.0		7.5
	3.5		8.0, 8.5
	4.0		9.0
	4.5		9.5, 10.0
	5.0		10.5, 11.0
	5.5		11.5, 12.0
	6.0		12.5 - 15.0
	6.5		15.5 - 20.0
	7.0		20.0 - 50.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_BlytheB 05\12\08



Precipitation for RUSLE2 Capitola Service Area

Santa Cruz County

Precipitation Range

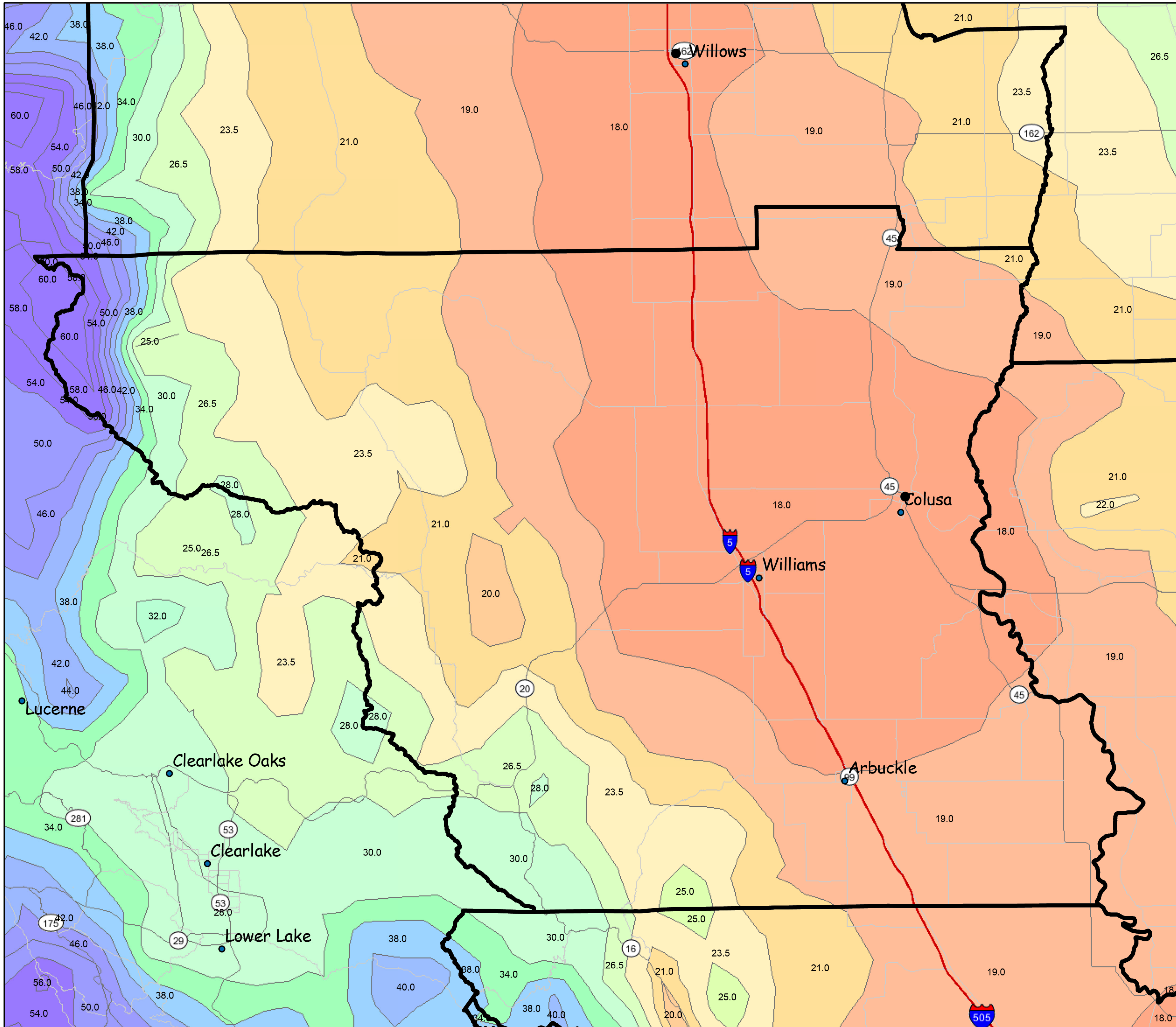
3.0 - 12.0	28.1 - 30.0
12.1 - 14.0	30.1 - 32.0
14.1 - 16.0	32.1 - 34.0
16.1 - 18.0	34.1 - 36.0
18.1 - 20.0	36.1 - 38.0
20.1 - 22.0	38.1 - 40.0
22.1 - 24.0	40.1 - 42.0
24.1 - 26.0	42.1 - 44.0
26.1 - 28.0	over 44

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_CapitolaB 05\19\08

Precipitation for RUSLE2
Colusa Service Center

Colusa County

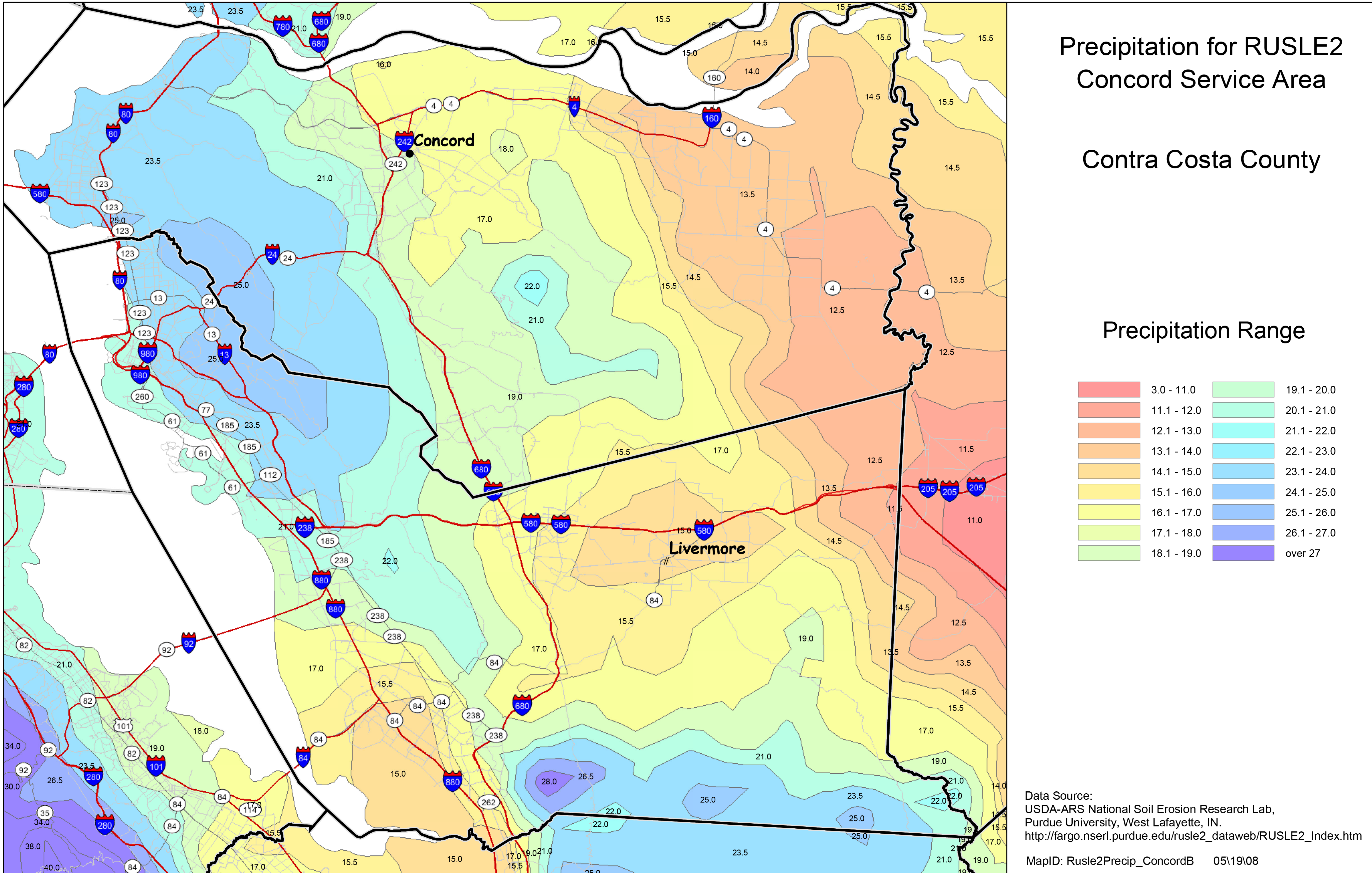


Precipitation Range

3.0 - 17.0	27.1 - 30.0
17.1 - 18.0	30.1 - 32.0
18.1 - 19.0	32.1 - 34.0
19.1 - 20.0	34.1 - 36.0
20.1 - 21.0	36.1 - 38.0
21.1 - 24.0	38.1 - 40.0
24.1 - 24.0	40.1 - 44.0
24.1 - 25.0	44.1 - 50.0
25.1 - 27.0	over 50

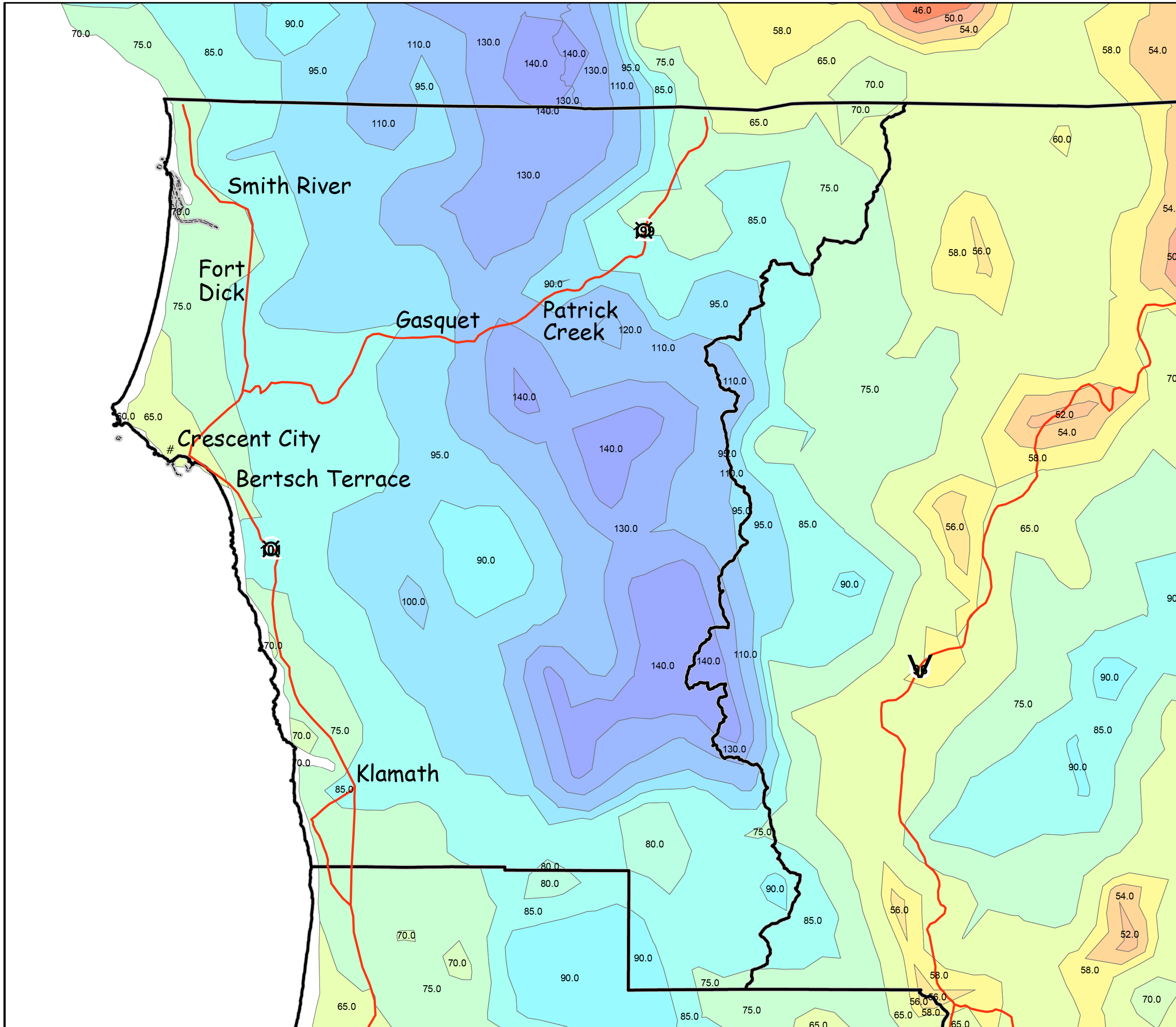
Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_ColusaB 05\19\08


Precipitation for RUSLE2
Concord Service Area
Contra Costa County
Precipitation Range
3.0 - 11.0
11.1 - 12.0
12.1 - 13.0
13.1 - 14.0
14.1 - 15.0
15.1 - 16.0
16.1 - 17.0
17.1 - 18.0
18.1 - 19.0
19.1 - 20.0
20.1 - 21.0
21.1 - 22.0
22.1 - 23.0
23.1 - 24.0
24.1 - 25.0
25.1 - 26.0
26.1 - 27.0
over 27
Concord
Livermore
Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm
MapID: Rusle2Precip_ConcordB 05\19\08

Precipitation for RUSLE2
Crescent City Service Center

Del Norte County

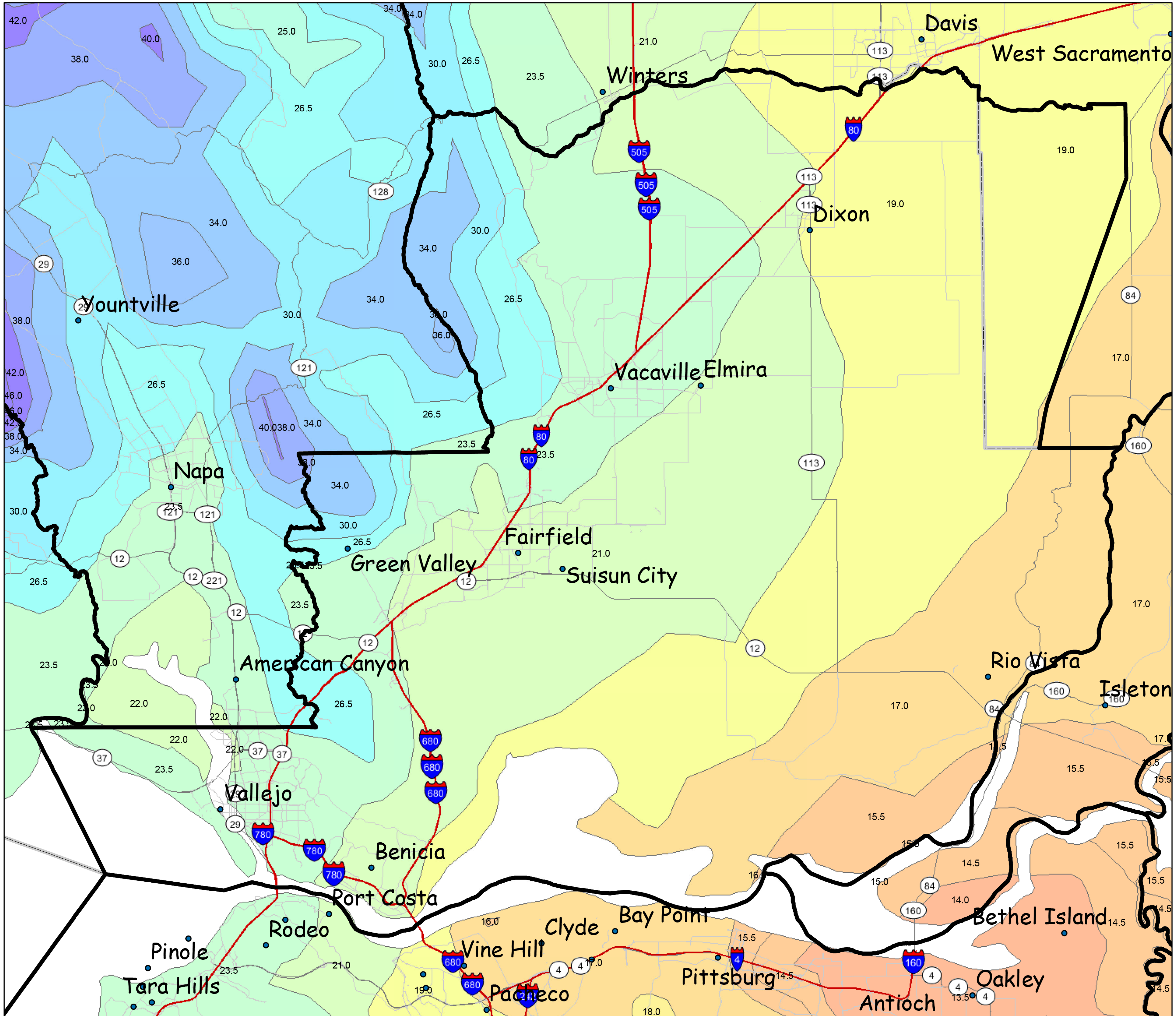


Precipitation Range

3.0 - 46.0	70.1 - 75.0
46.1 - 48.0	75.1 - 80.0
48.1 - 50.0	80.1 - 85.0
50.1 - 52.0	85.1 - 90.0
52.1 - 54.0	90.1 - 95.0
54.1 - 56.0	95.1 - 100.0
56.1 - 58.0	100.1 - 120.0
58.1 - 60.0	120.1 - 130.0
60.1 - 65.0	130.1 - 140.0
65.1 - 70.0	140.1 - 356.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_CrescentCityB 05\30\08



Precipitation for RUSLE2
Dixon Service Center

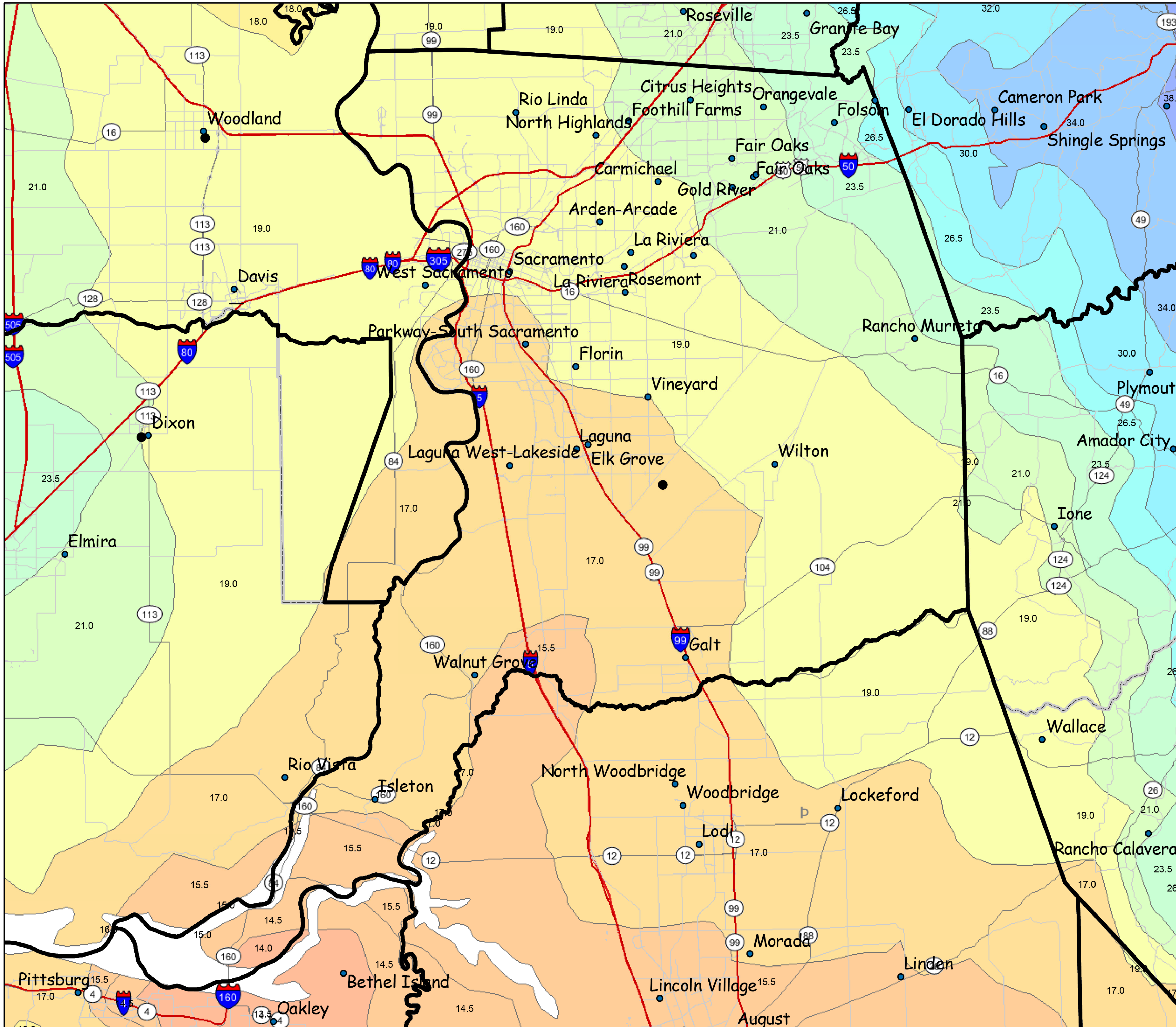
Solano County

Precipitation Range

3.0 - 12.0	22.1 - 24.0
12.1 - 13.0	24.1 - 26.0
13.1 - 14.0	26.1 - 28.0
14.1 - 16.0	28.1 - 30.0
16.1 - 17.0	30.1 - 32.0
17.1 - 18.0	32.1 - 34.0
18.1 - 19.0	34.1 - 36.0
19.1 - 20.0	36.1 - 38.0
20.1 - 22.0	Over 38

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_DixonB 05\19\08



Precipitation for RUSLE2
Elk Grove Service Center

Sacramento County

Precipitation Range

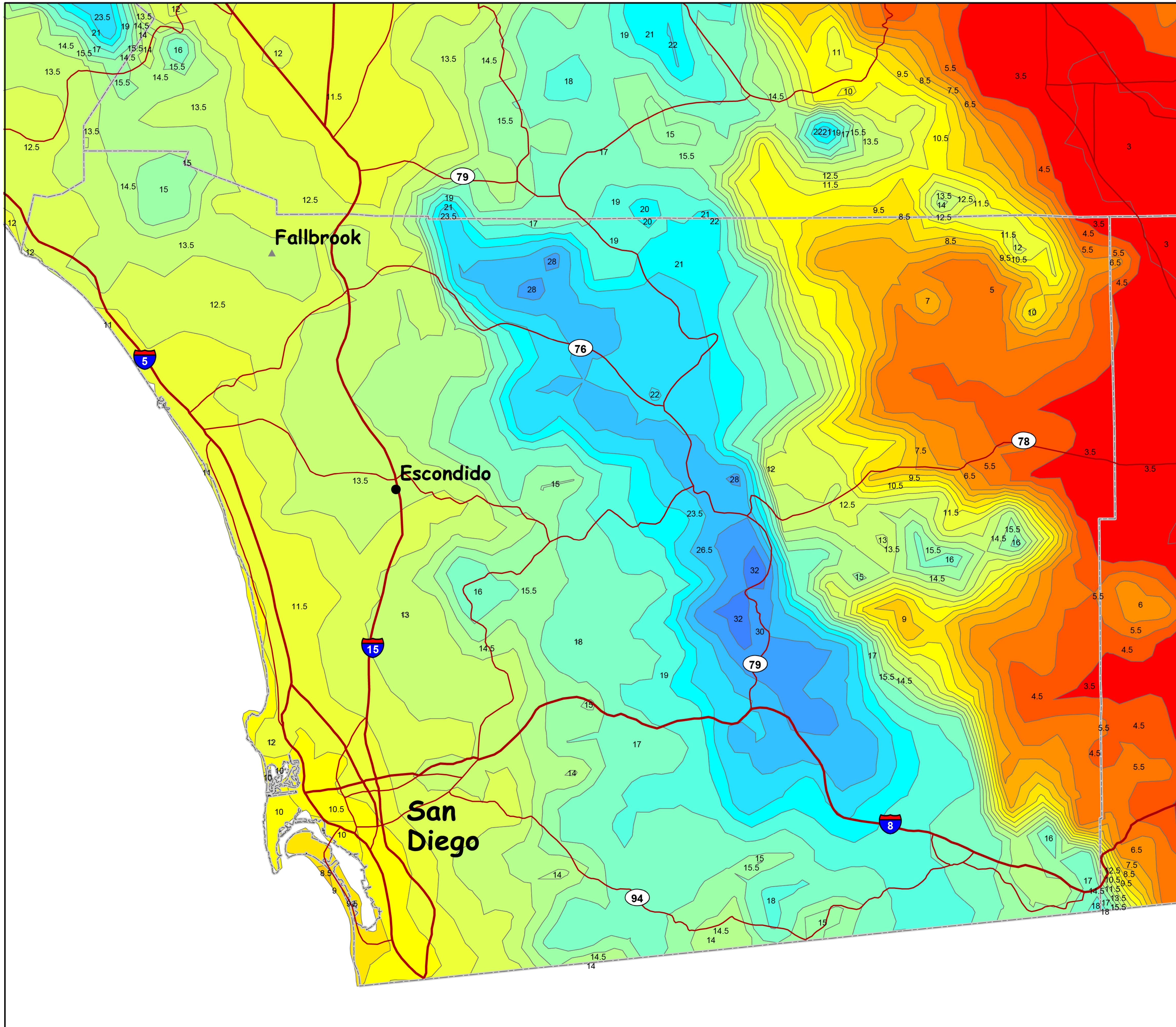
3.0 - 12.0	22.1 - 24.0
12.1 - 13.0	24.1 - 26.0
13.1 - 14.0	26.1 - 28.0
14.1 - 16.0	28.1 - 30.0
16.1 - 17.0	30.1 - 32.0
17.1 - 18.0	32.1 - 34.0
18.1 - 19.0	34.1 - 36.0
19.1 - 20.0	36.1 - 38.0
20.1 - 22.0	Over 38

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_ElkGroveB 05\19\08

Precipitation for RUSLE2 Escondido Service Area

San Diego County



Precipitation Range

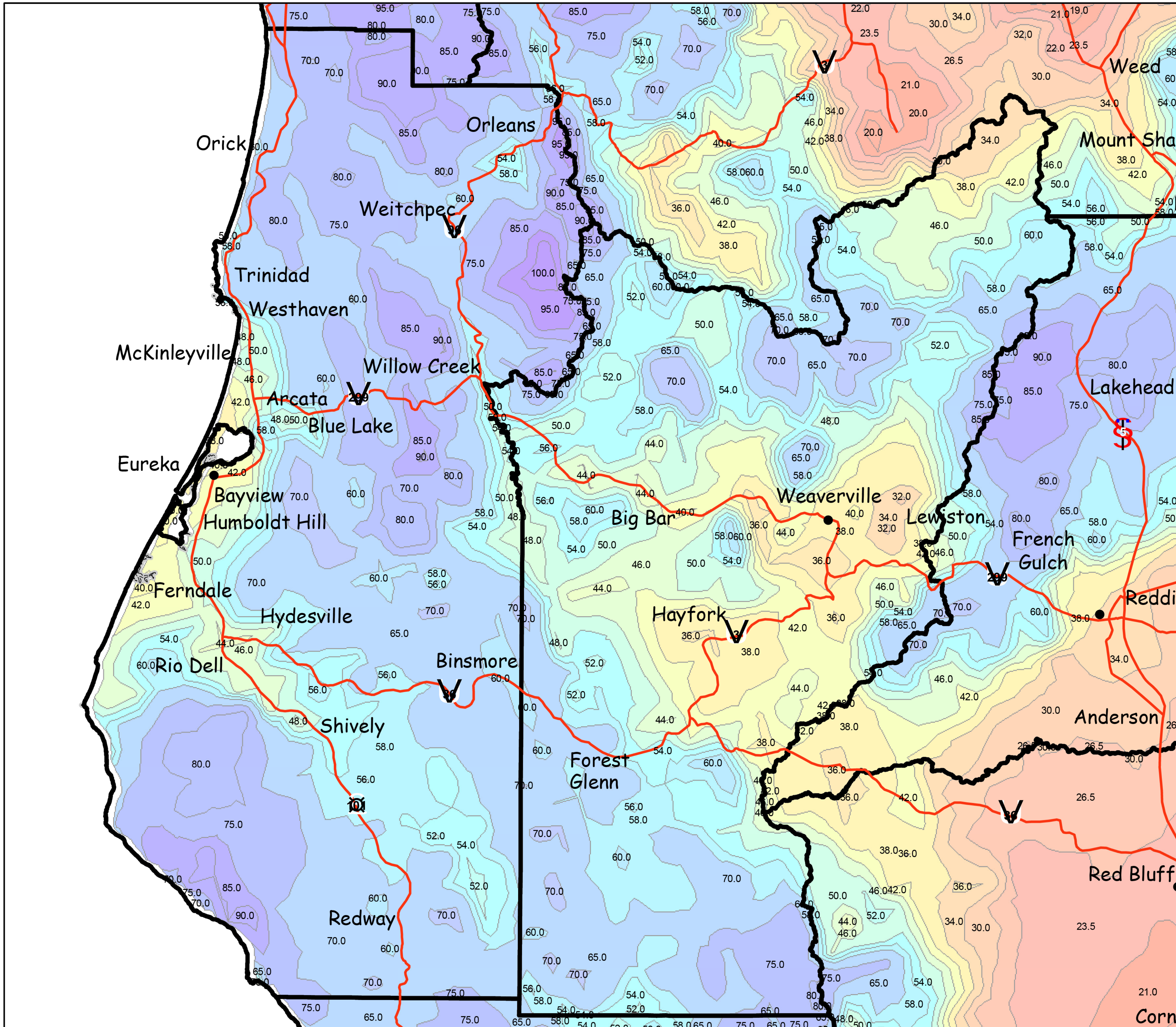
3 - 4	13-14
4 - 5	14-15
5 - 6	15-16
6 - 7	16-18
7 - 8	18-20
8 - 9	20-22
9-10	22-25
10-11	25-28
11-12	28-32
12-13	32-36
	36-52

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_Escondido 05\12\08

Precipitation for RUSLE2
Eureka Service Center
Weaverville Service Center

Humboldt County
Trinity County



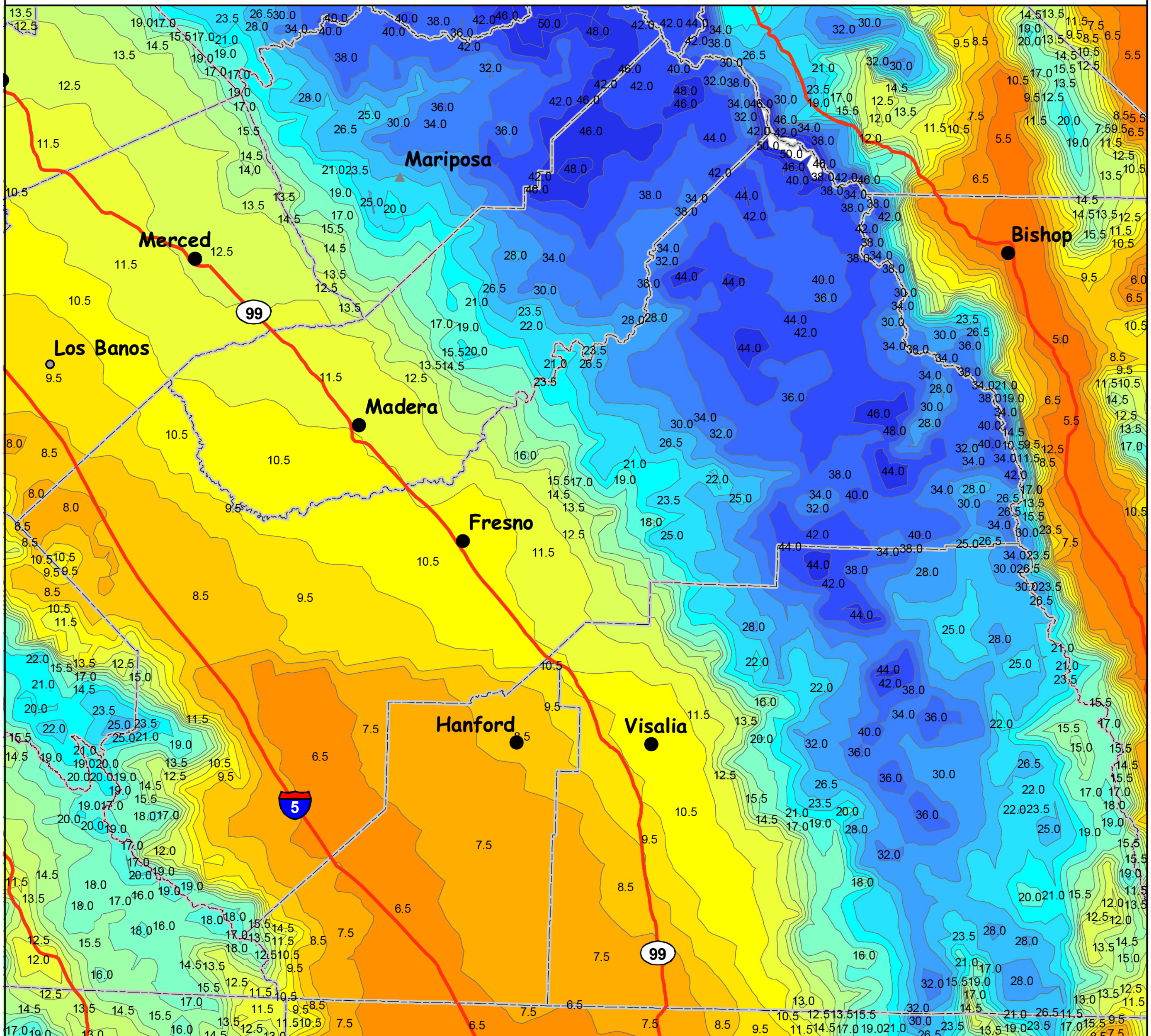
Precipitation Range

3.0 - 21.0	46.1 - 48.0
21.1 - 24.0	48.1 - 50.0
24.1 - 28.0	50.1 - 52.0
28.1 - 32.0	52.1 - 54.0
32.1 - 34.0	54.1 - 58.0
34.1 - 36.0	58.1 - 60.0
36.1 - 38.0	60.1 - 65.0
38.1 - 40.0	65.1 - 70.0
40.1 - 42.0	70.1 - 80.0
42.1 - 44.0	80.1 - 90.0
44.1 - 46.0	over 90

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_EurekaB 05\30\08

Precipitation for RUSLE2 - San Joaquin Valley
Madera, Fresno, Hanford, and Visalia Service Areas



Precipitation Range

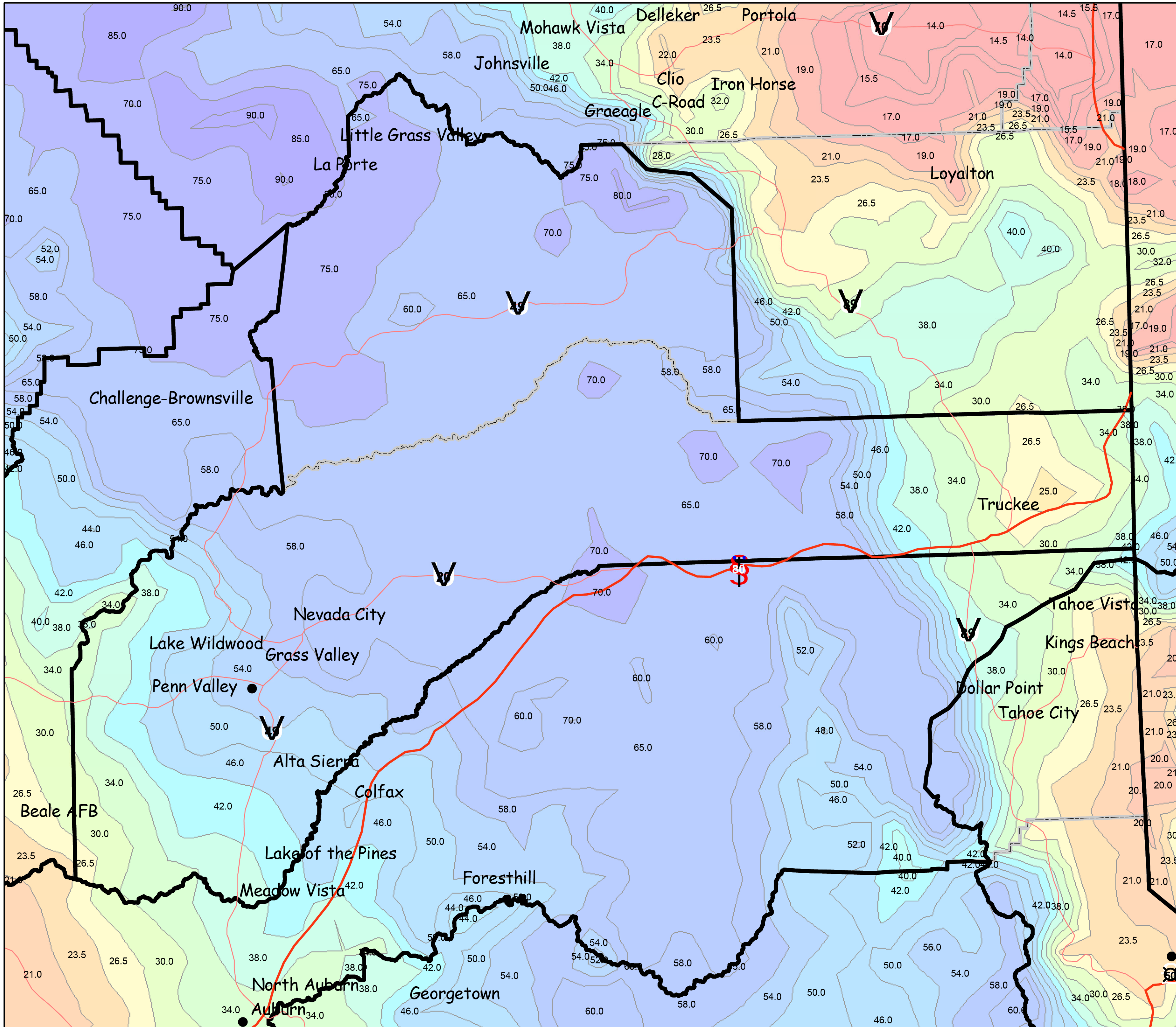
5 - 6	8 - 9	11-12	14-15	18-20	25-28	36-40
6 - 7	9-10	12-13	15-16	20-22	28-32	40-44
7 - 8	10-11	13-14	16-18	22-25	32-36	44-52

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_Fresno 04\12\08

Precipitation for RUSLE2
Grass Valley Service Center

Nevada County
Western Sierra County

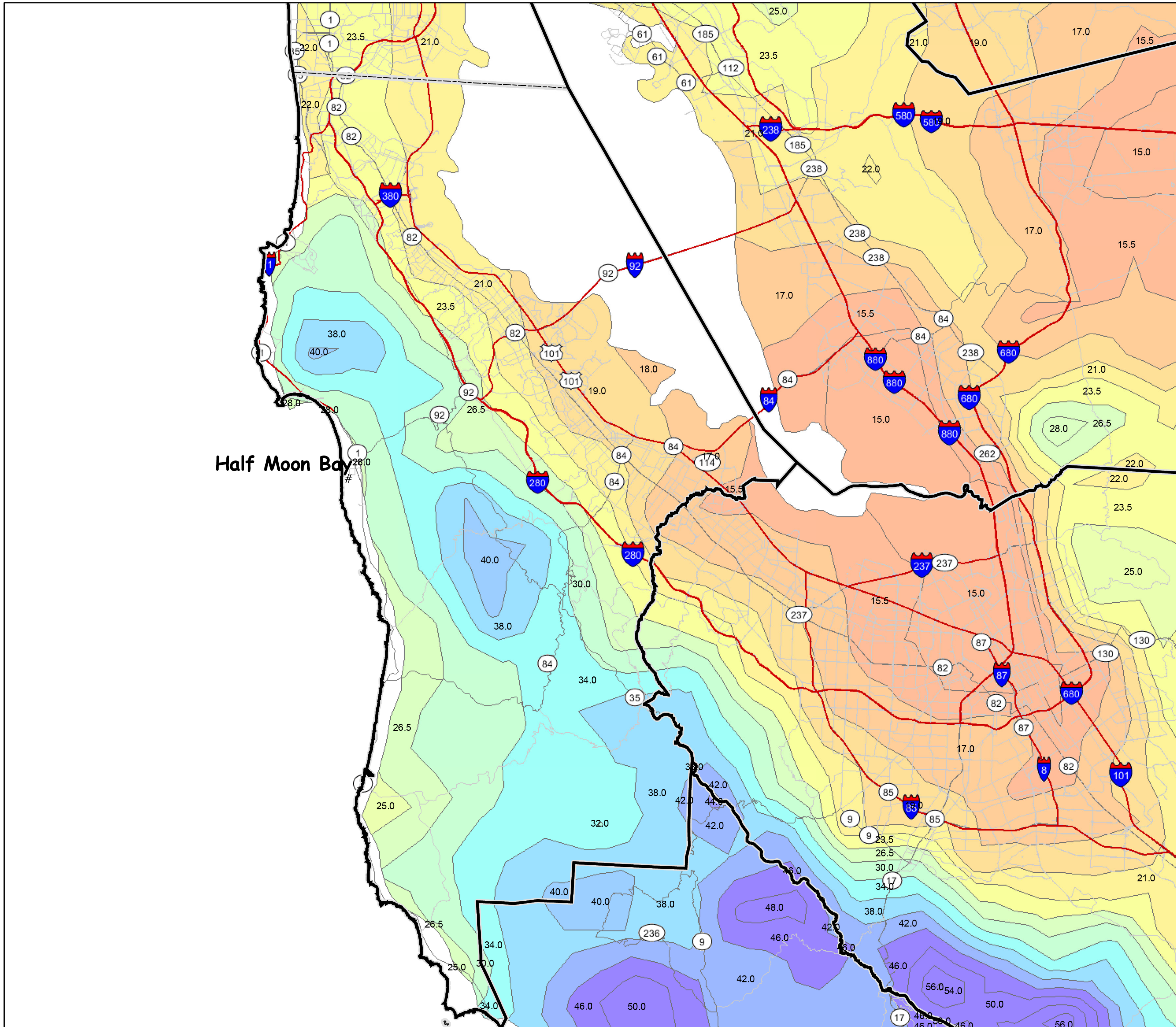


Precipitation Range

3.0 - 18.0	34.1 - 36.0
18.1 - 19.0	36.1 - 38.0
19.1 - 20.0	38.1 - 40.0
20.1 - 21.0	40.1 - 42.0
21.1 - 24.0	42.1 - 44.0
24.1 - 25.0	44.1 - 50.0
25.1 - 27.0	50.1 - 54.0
27.1 - 30.0	54.1 - 65.0
30.1 - 32.0	65.1 - 77.0
32.1 - 34.0	77.1 - 356.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_GrassValleyB 05\20\08



Precipitation for RUSLE2
Half Moon Bay Service Area

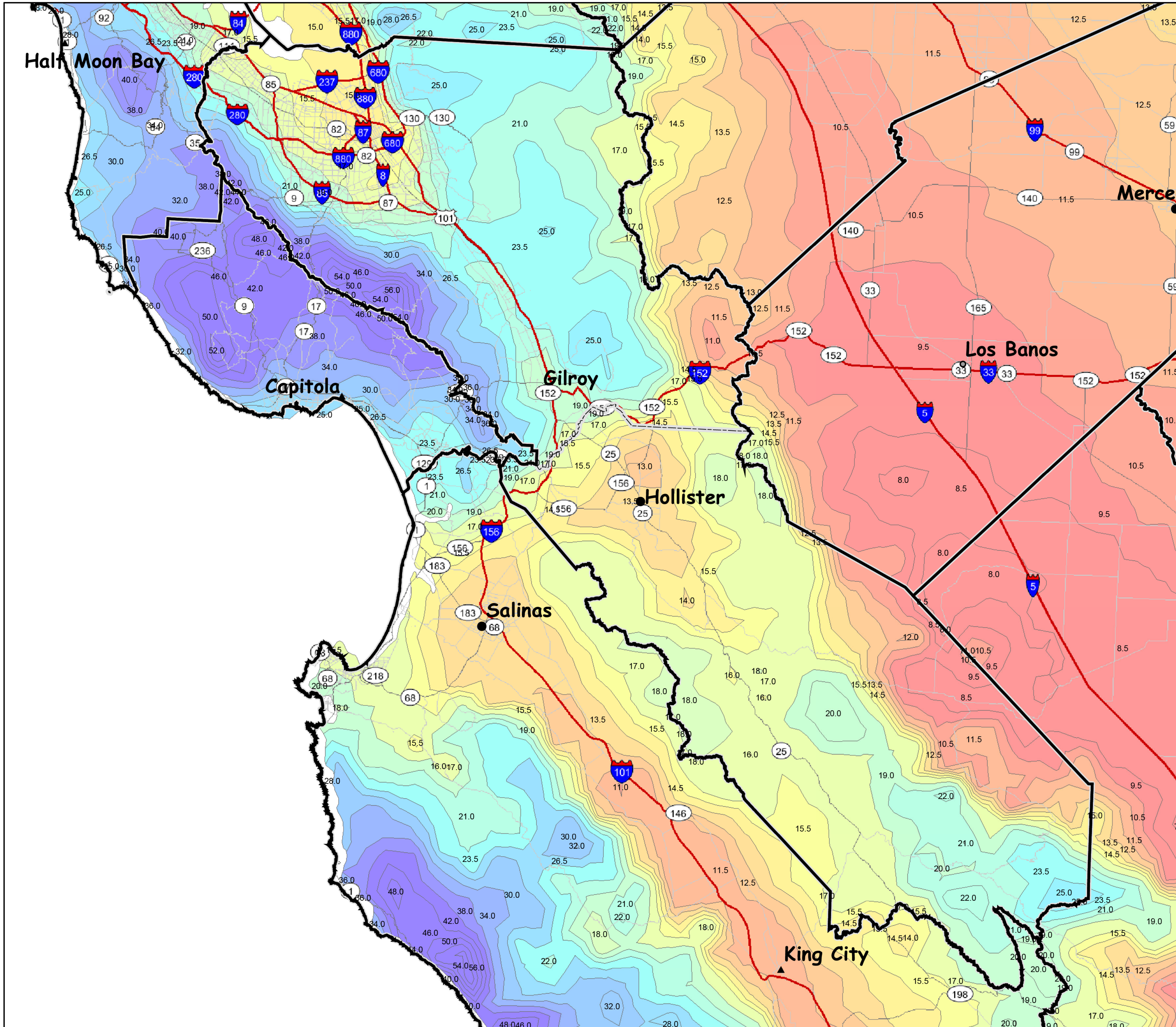
San Mateo County
San Francisco County

Precipitation Range

3.0 - 12.0	28.1 - 30.0
12.1 - 14.0	30.1 - 32.0
14.1 - 16.0	32.1 - 34.0
16.1 - 18.0	34.1 - 36.0
18.1 - 20.0	36.1 - 38.0
20.1 - 22.0	38.1 - 40.0
22.1 - 24.0	40.1 - 42.0
24.1 - 26.0	42.1 - 44.0
26.1 - 28.0	over 44

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_HalfMoonBayB 05\19\08



Precipitation for RUSLE2 Hollister Service Area

San Benito County
Santa Clara County

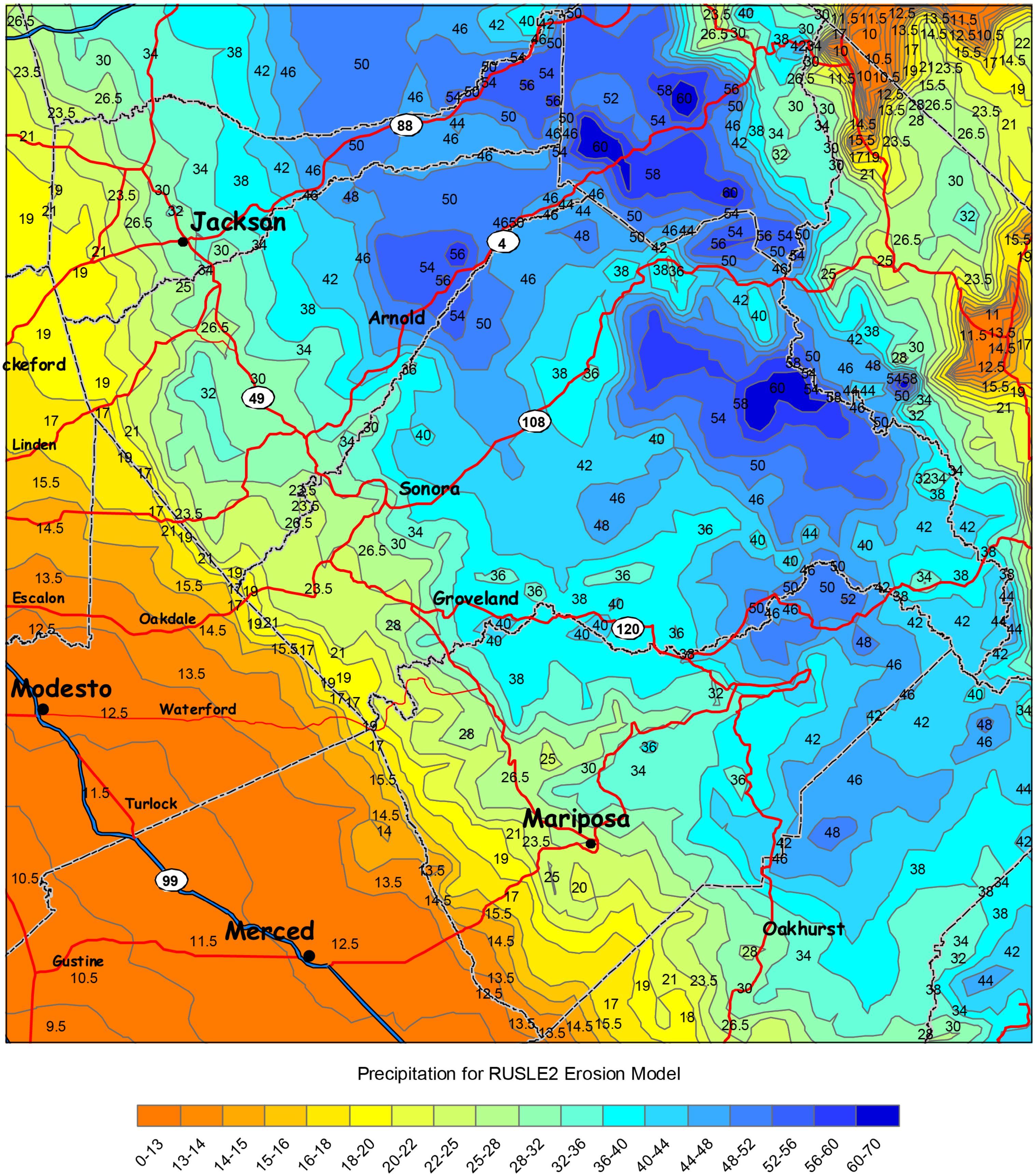
Precipitation Range

3.0 - 10.0	18.5 - 20.0
10.5 - 11.0	20.5 - 22.0
11.5 - 12.0	22.5 - 24.0
12.5 - 13.0	24.5 - 26.0
13.5 - 14.0	26.5 - 28.0
14.5 - 15.0	28.5 - 32.0
15.5 - 16.0	32.5 - 36.0
16.5 - 17.0	36.5 - 40.0
17.5 - 18.0	40.5 - 60.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_HollisterB 05\12\08

Precipitation for RUSLE2
Jackson & Mariposa Service Areas

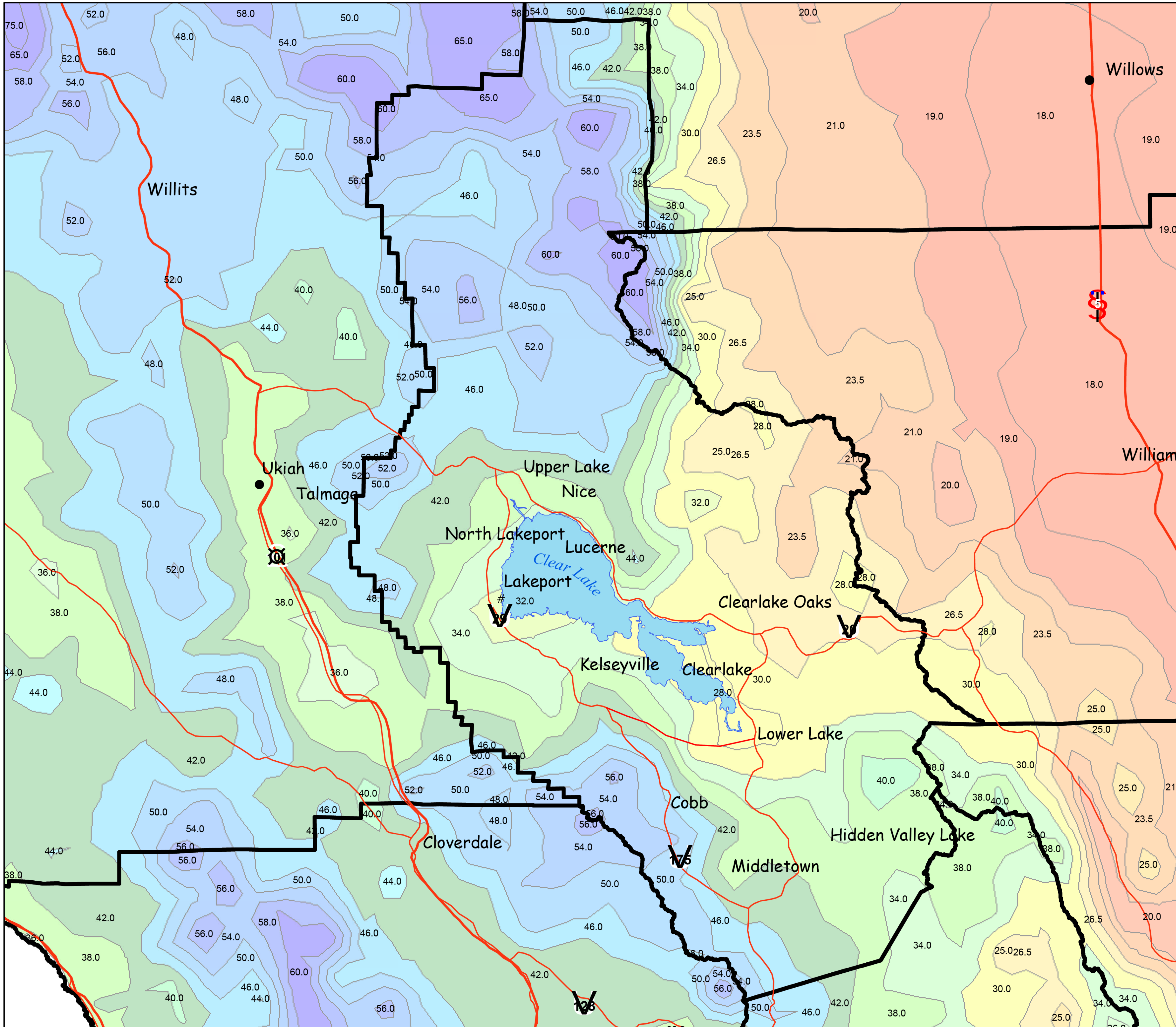


Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.

MapID: Rusle2Precip_JacksonMariposa 02\12\08

Precipitation for RUSLE2 Lakeport Service Center

Lake County

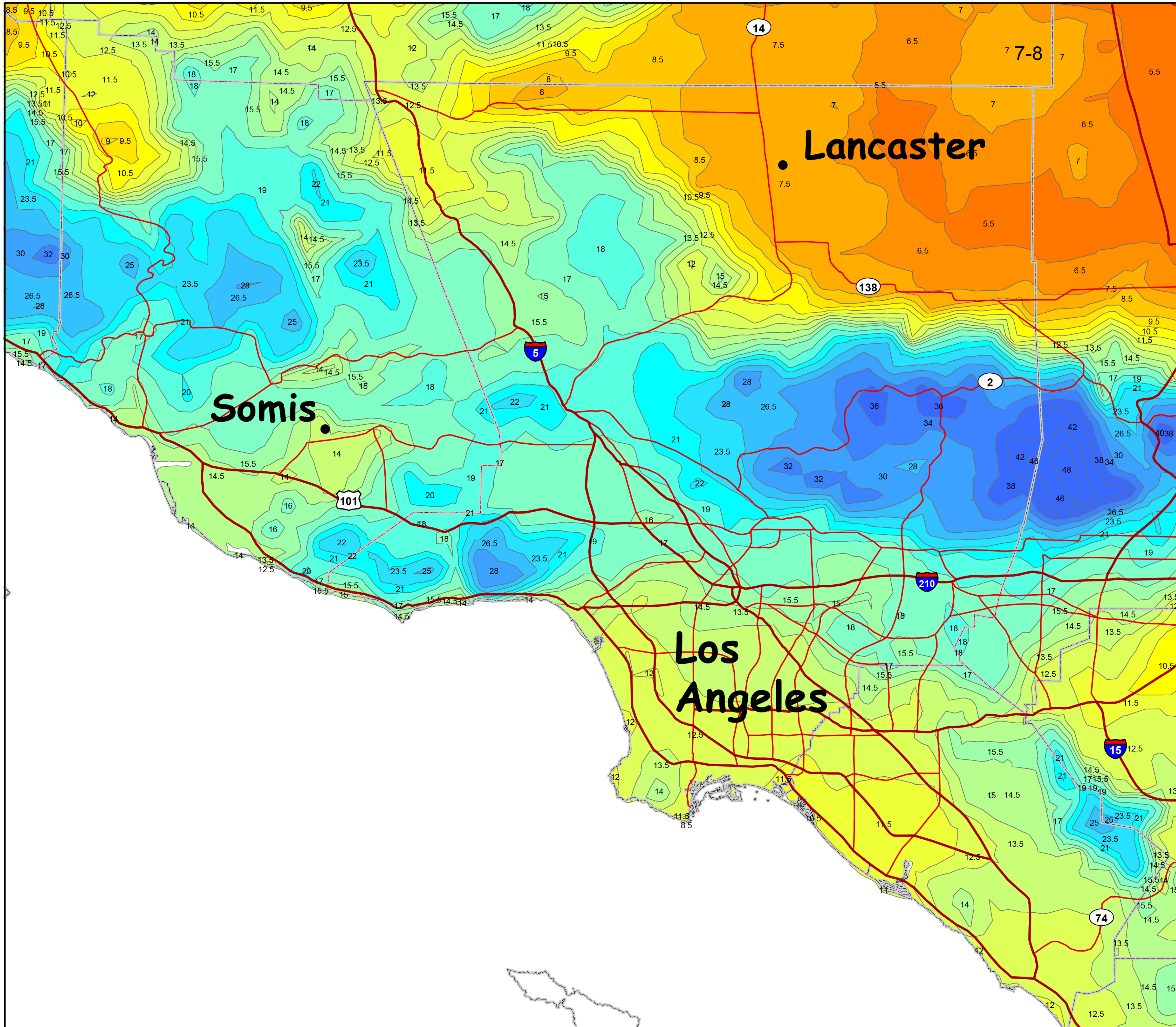


Precipitation Range

3.0 - 15.0	36.1 - 38.0
15.1 - 19.0	38.1 - 40.0
19.1 - 20.0	40.1 - 42.0
20.1 - 21.0	42.1 - 44.0
21.1 - 24.0	44.1 - 46.0
24.1 - 25.0	46.1 - 50.0
25.1 - 27.0	50.1 - 54.0
27.1 - 30.0	54.1 - 58.0
30.1 - 32.0	58.1 - 80.0
32.1 - 34.0	over 80
34.1 - 36.0	

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_LakeportB 05\20\08



Precipitation for RUSLE2 Lancaster Service Area

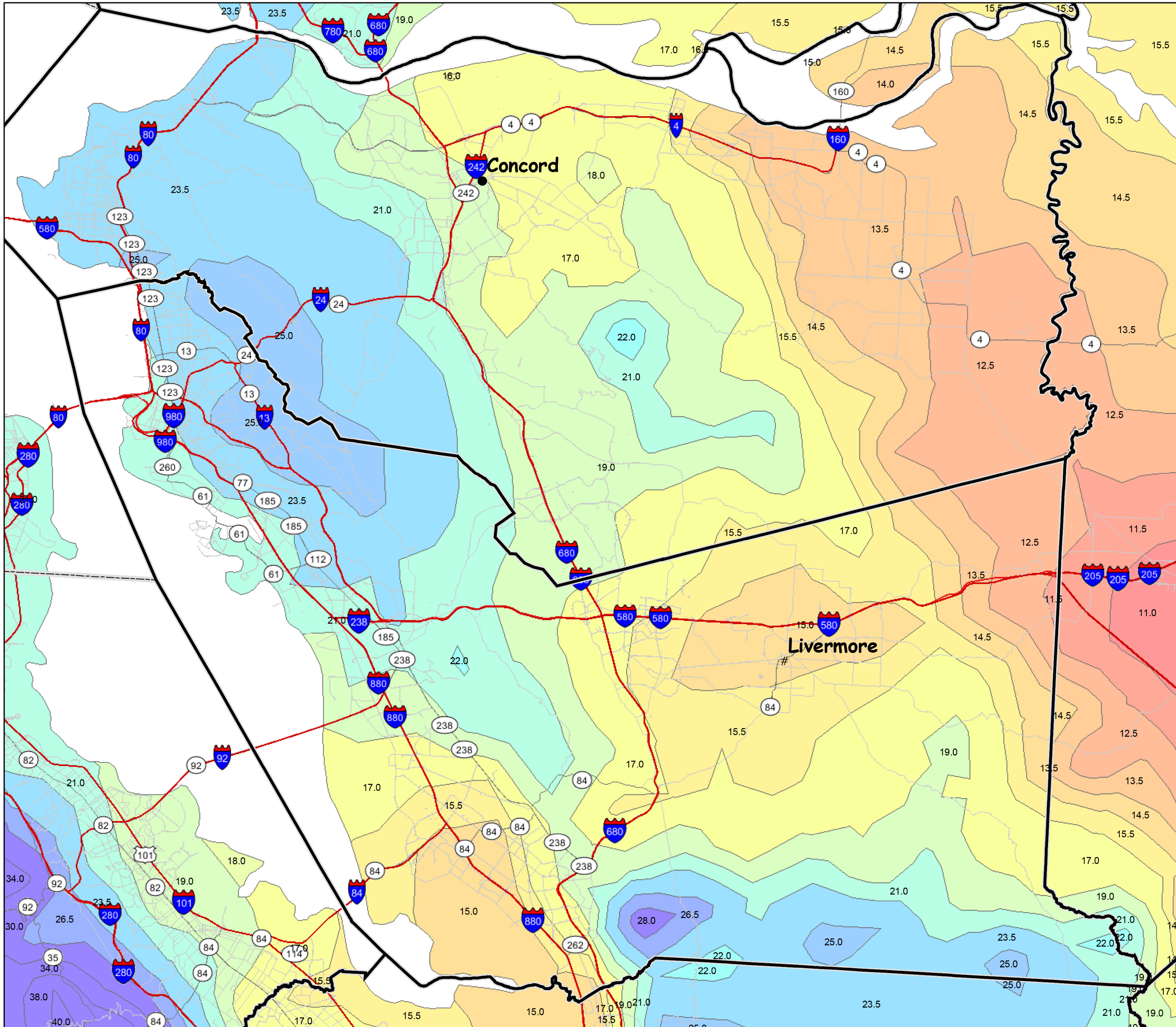
Los Angeles County Orange County

Precipitation Range

- 3 - 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- 8 - 9
- 9-10
- 10-11
- 11-12
- 12-13
- 13-14
- 14-15
- 15-16
- 16-18
- 18-20
- 20-22
- 22-25
- 25-28
- 28-32
- 32-36
- 36-52

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_LancasterB 05\12\08



Precipitation for RUSLE2 Livermore Service Area

Alameda County

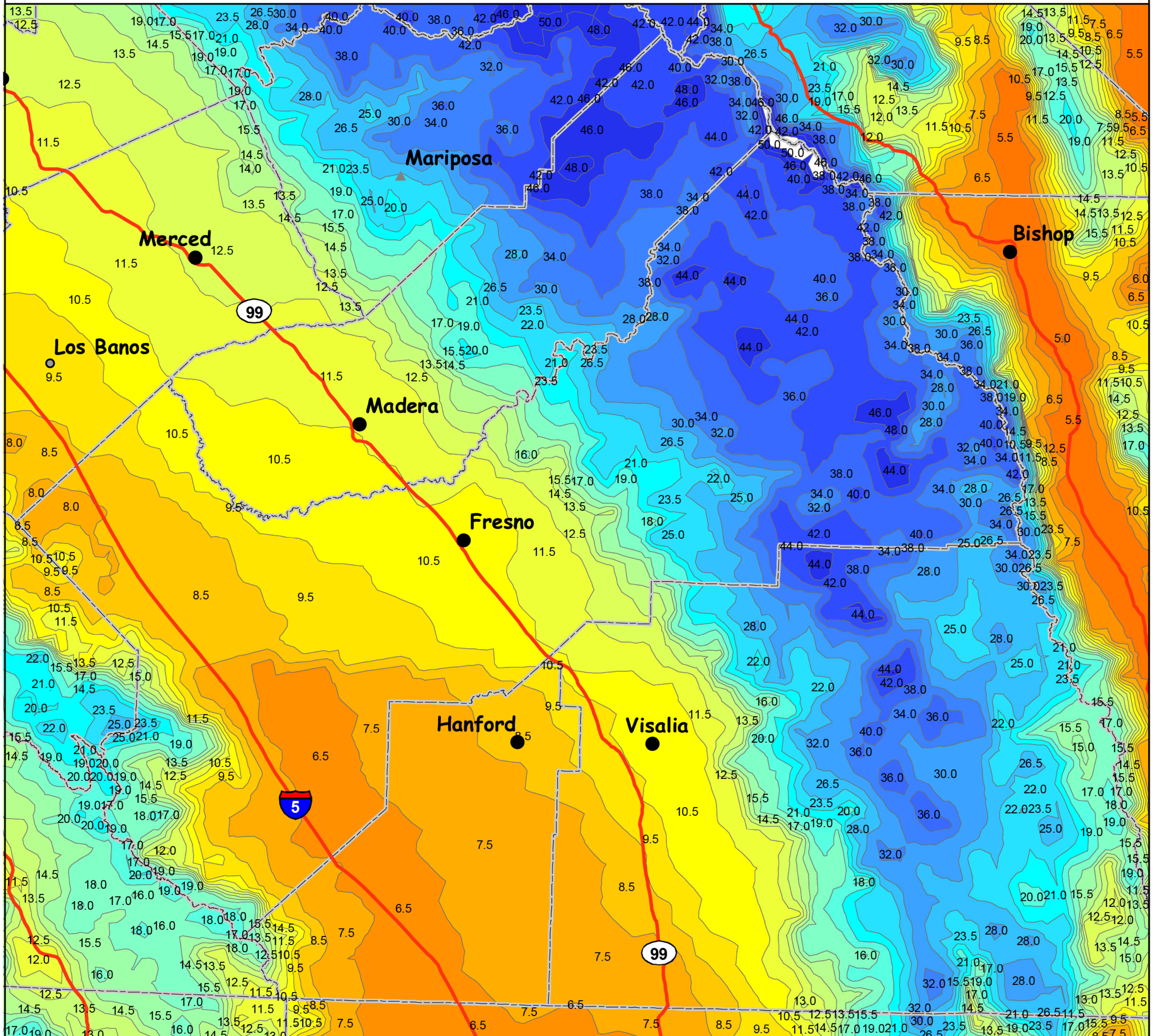
Precipitation Range

3.0 - 11.0	19.1 - 20.0
11.1 - 12.0	20.1 - 21.0
12.1 - 13.0	21.1 - 22.0
13.1 - 14.0	22.1 - 23.0
14.1 - 15.0	23.1 - 24.0
15.1 - 16.0	24.1 - 25.0
16.1 - 17.0	25.1 - 26.0
17.1 - 18.0	26.1 - 27.0
18.1 - 19.0	over 27

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_LivermoreB 05\19\08

Precipitation for RUSLE2 - San Joaquin Valley
Madera, Fresno, Hanford, and Visalia Service Areas



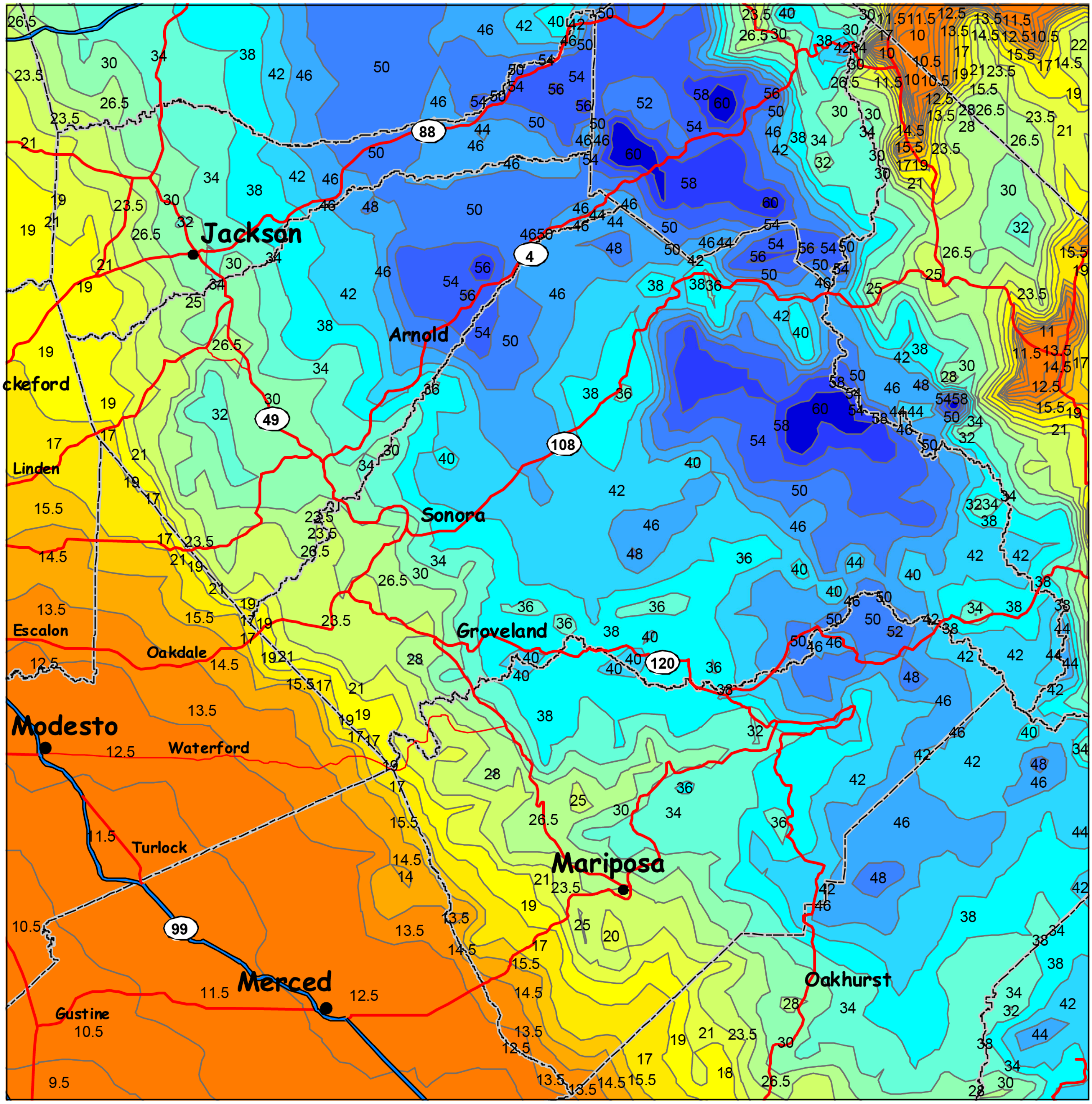
Precipitation Range

5 - 6	8 - 9	11-12	14-15	18-20	25-28	36-40
6 - 7	9-10	12-13	15-16	20-22	28-32	40-44
7 - 8	10-11	13-14	16-18	22-25	32-36	44-52

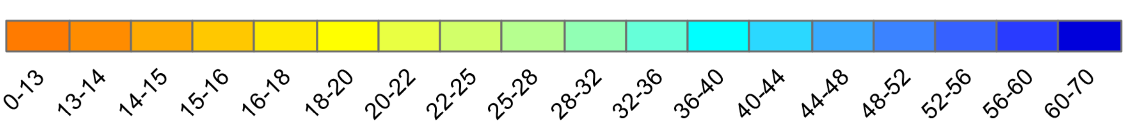
Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_Madera 04\12\08

Precipitation for RUSLE2
Jackson & Mariposa Service Areas

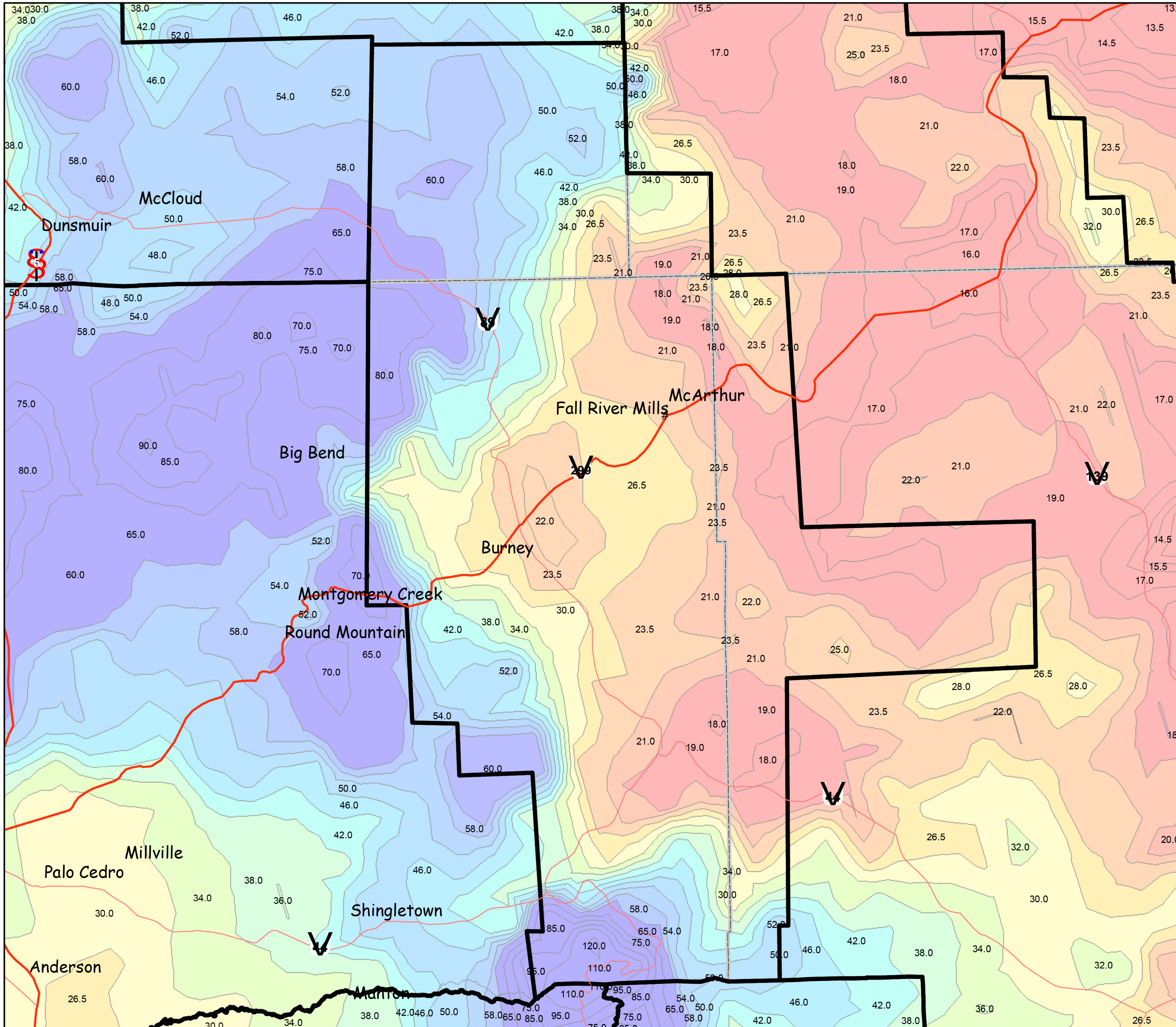


Precipitation for RUSLE2 Erosion Model



Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.

MapID: Rusle2Precip_JacksonMariposa 02\12\08



Precipitation for RUSLE2 McArthur Service Center

Parts of Shasta, Siskiyou, Lassen and Modoc Counties

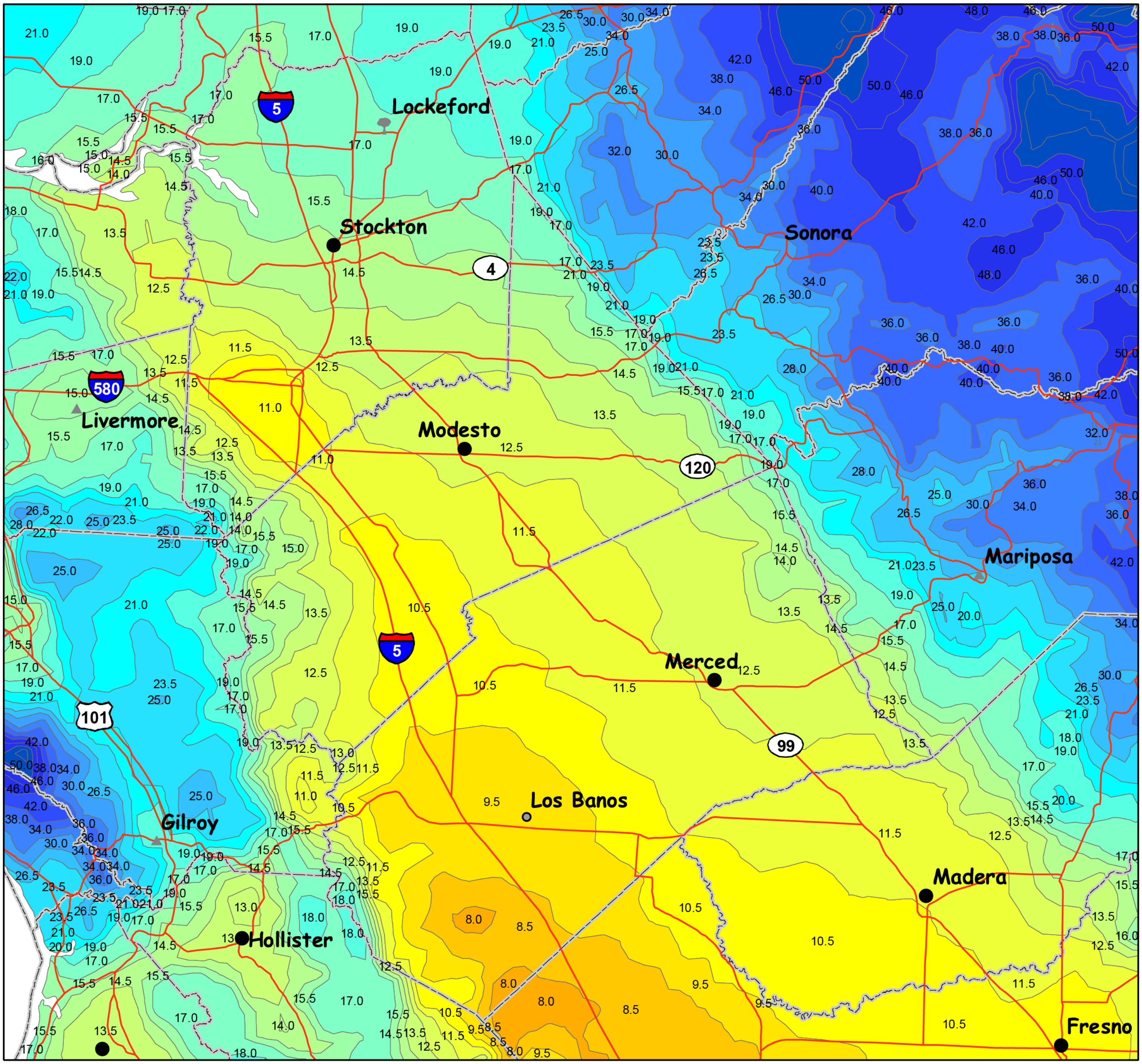
Precipitation Range

3.0 - 19.0	36.1 - 38.0
19.1 - 20.0	38.1 - 40.0
20.1 - 21.0	40.1 - 42.0
21.1 - 24.0	42.1 - 44.0
24.1 - 25.0	44.1 - 46.0
25.1 - 27.0	46.1 - 50.0
27.1 - 30.0	50.1 - 54.0
30.1 - 32.0	54.1 - 58.0
32.1 - 34.0	58.1 - 60.0
34.1 - 36.0	over 60

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_McArthurB 05\20\08

Precipitation for RUSLE2 - San Joaquin Valley North
San Joaquin, Stanislaus and Merced Counites



Precipitation Range

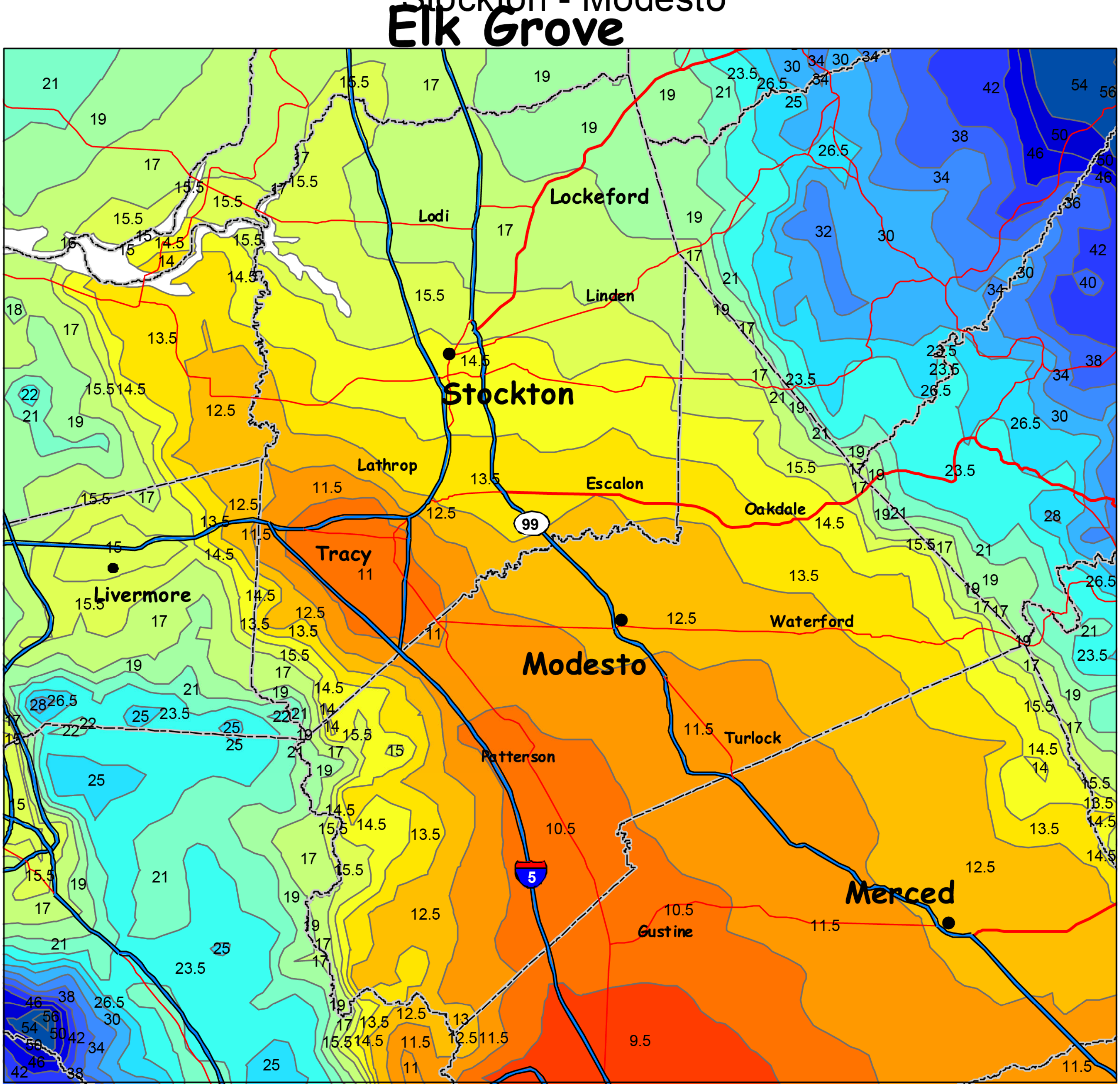
5 - 6	8 - 9	11-12	14-15	18-20	25-28	36-40
6 - 7	9-10	12-13	15-16	20-22	28-32	40-44
7 - 8	10-11	13-14	16-18	22-25	32-36	44-52

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.

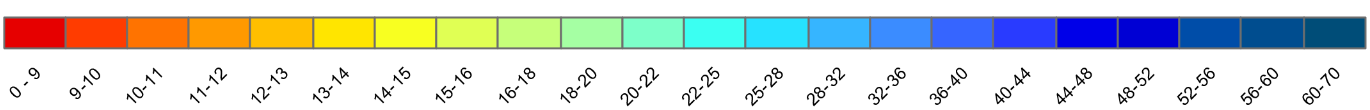
MapID: Rusle2Precip_SanJoaqNorth 11\08\07

Precipitation for RUSLE2

Stockton - Modesto



Precipitation Factor for RUSLE2 Erosion Model

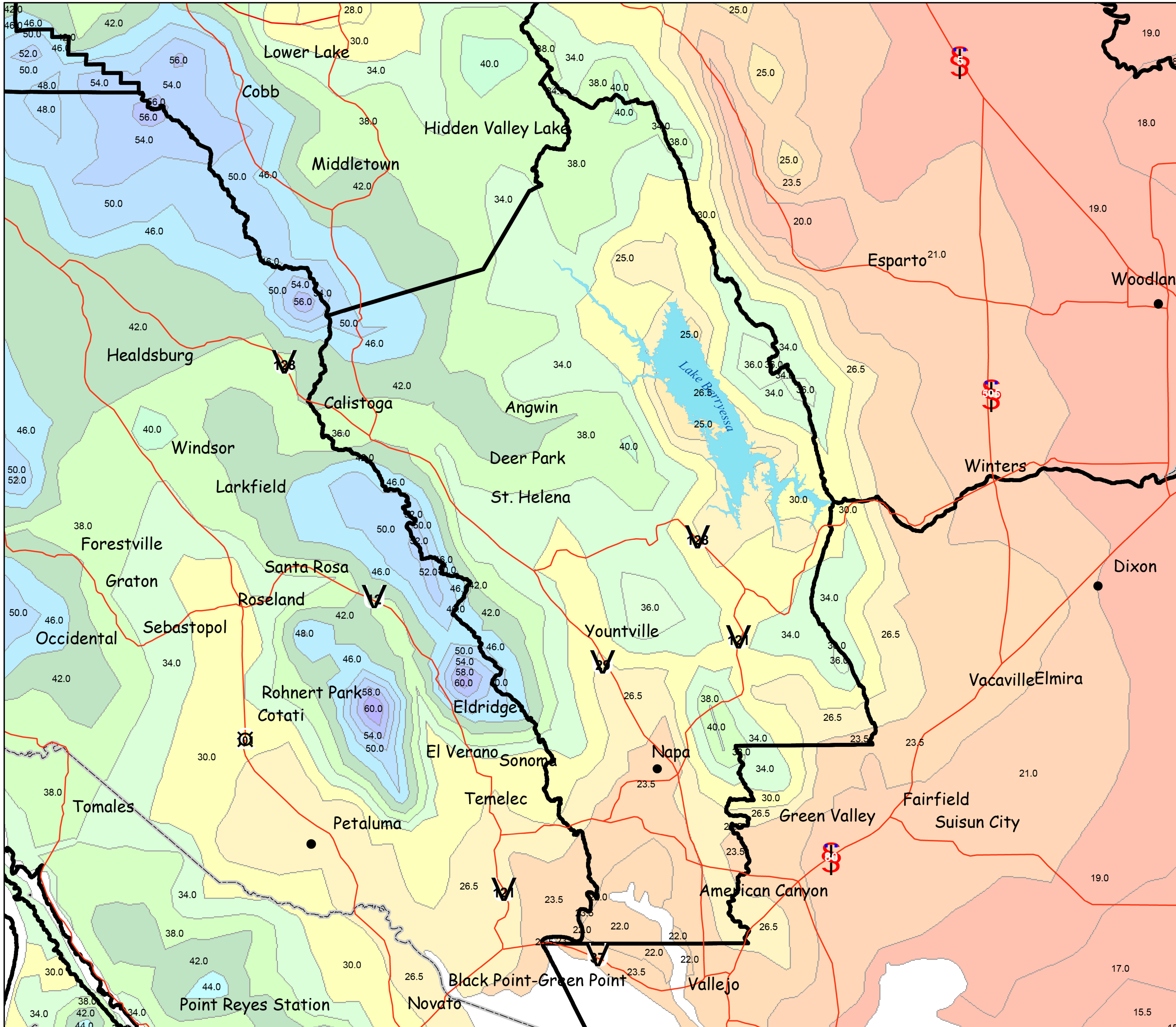


Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.

MapID: Rusle2Precip_StocktonModesto 02\12\08

Precipitation for RUSLE2
Napa Service Center

Napa County

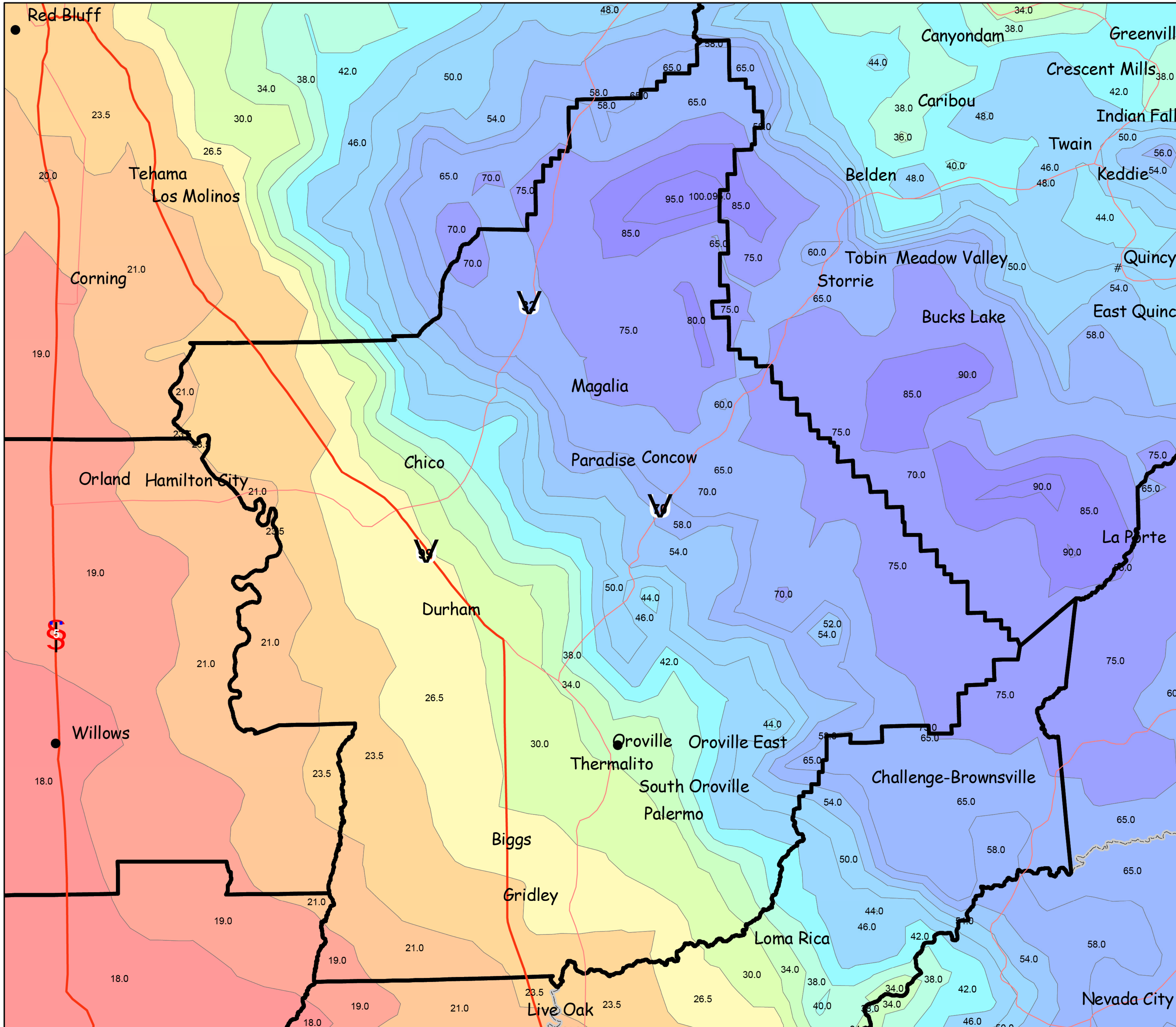


Precipitation Range

3.0 - 15.0	36.1 - 38.0
15.1 - 19.0	38.1 - 40.0
19.1 - 20.0	40.1 - 42.0
20.1 - 21.0	42.1 - 44.0
21.1 - 24.0	44.1 - 46.0
24.1 - 25.0	46.1 - 50.0
25.1 - 27.0	50.1 - 54.0
27.1 - 30.0	54.1 - 58.0
30.1 - 32.0	58.1 - 80.0
32.1 - 34.0	over 80
34.1 - 36.0	

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_NapaB 05\29\08



Precipitation for RUSLE2 Oroville Service Center

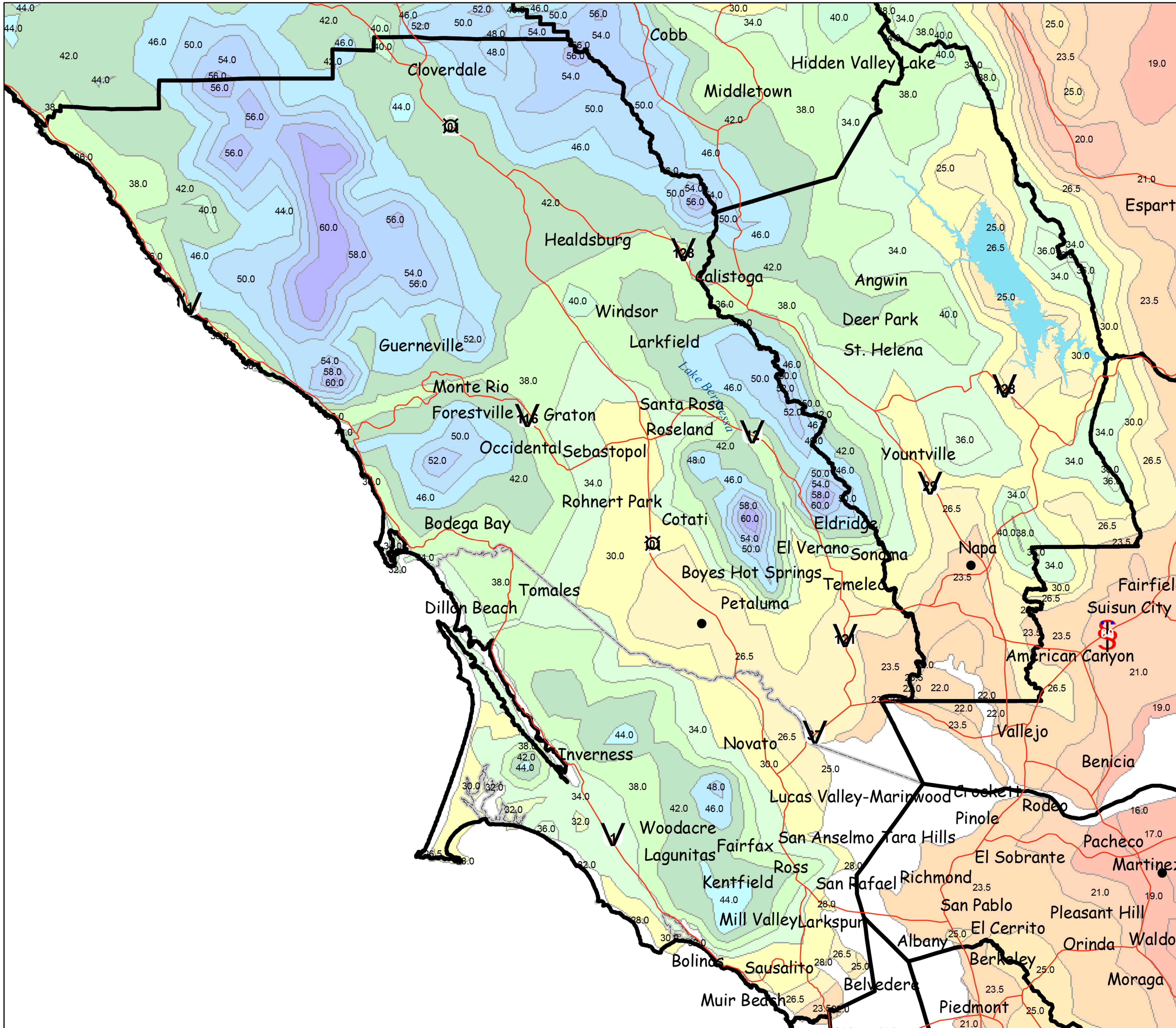
Butte County

Precipitation Range

3.0 - 18.0	34.1 - 36.0
18.1 - 19.0	36.1 - 38.0
19.1 - 20.0	38.1 - 40.0
20.1 - 21.0	40.1 - 42.0
21.1 - 24.0	42.1 - 44.0
24.1 - 25.0	44.1 - 50.0
25.1 - 27.0	50.1 - 54.0
27.1 - 30.0	54.1 - 65.0
30.1 - 32.0	65.1 - 77.0
32.1 - 34.0	77.1 - 356.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_ButteB 05\19\08



Precipitation for RUSLE2
Petaluma Service Center

Sonoma County
Marin County

Precipitation Range

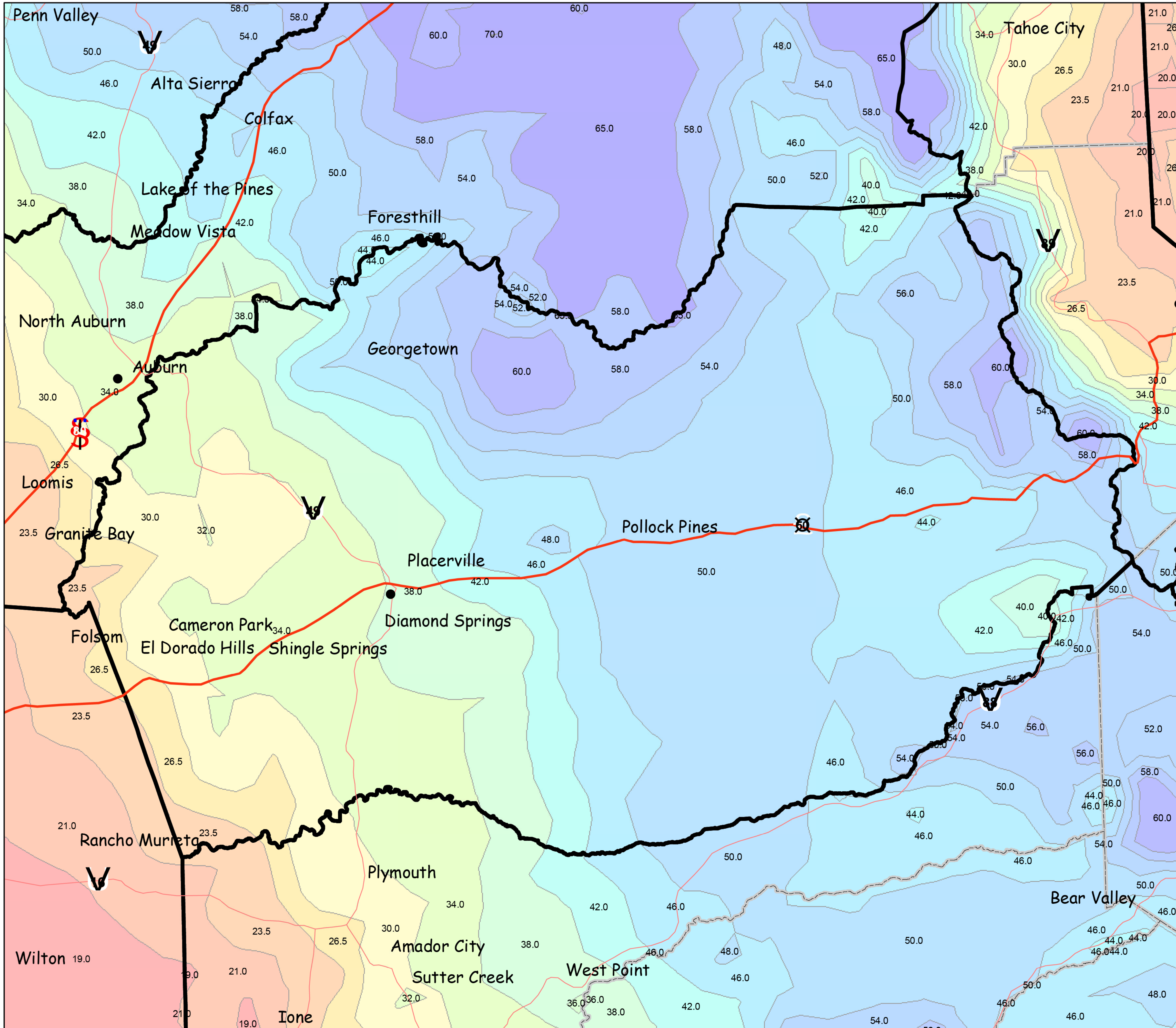
3.0 - 15.0	36.1 - 38.0
15.1 - 19.0	38.1 - 40.0
19.1 - 20.0	40.1 - 42.0
20.1 - 21.0	42.1 - 44.0
21.1 - 24.0	44.1 - 46.0
24.1 - 25.0	46.1 - 50.0
25.1 - 27.0	50.1 - 54.0
27.1 - 30.0	54.1 - 58.0
30.1 - 32.0	58.1 - 80.0
32.1 - 34.0	over 80
34.1 - 36.0	

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_PetalumaB 05\30\08

Precipitation for RUSLE2
Placerville Service Center

El Dorado County

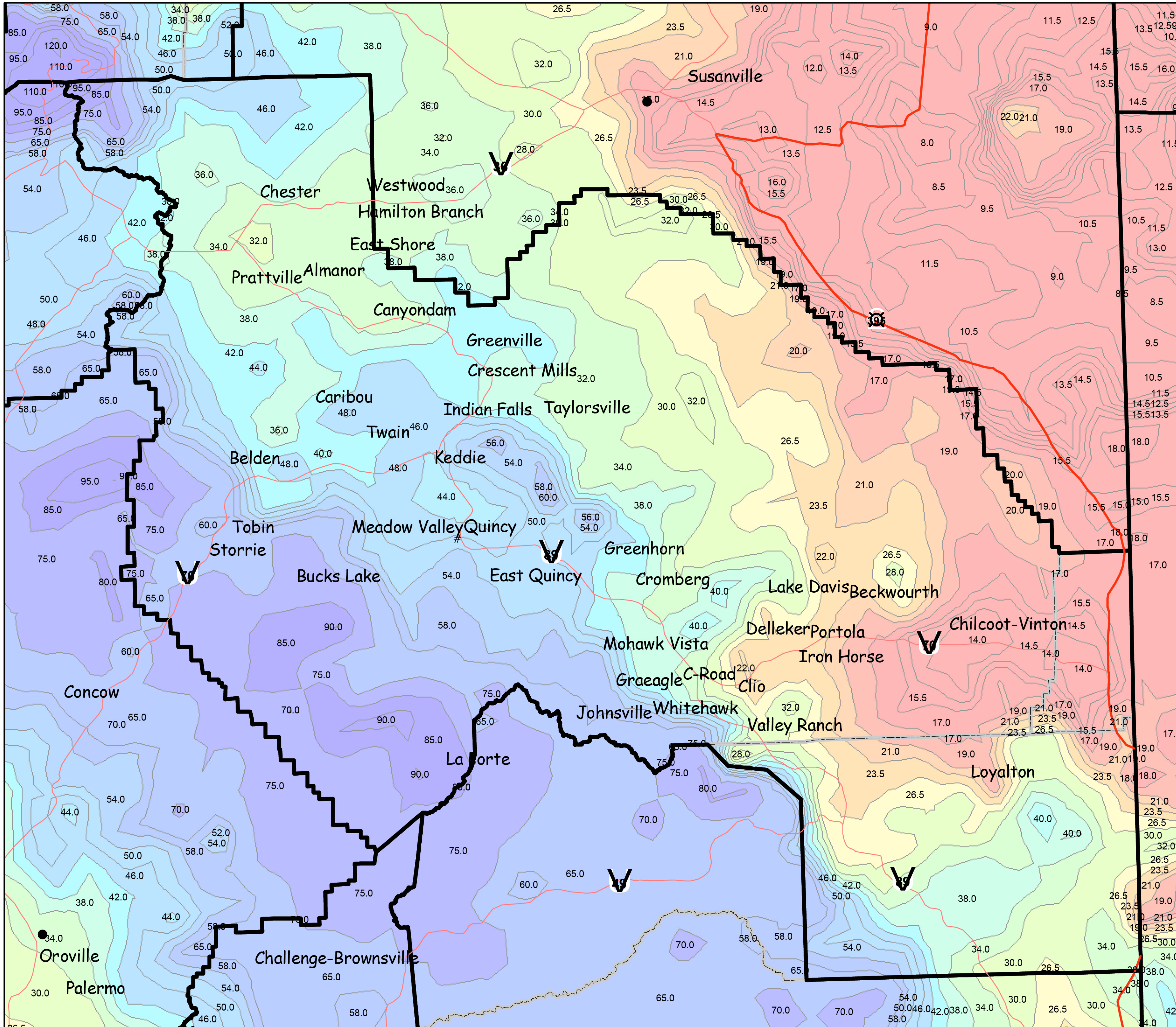


Precipitation Range

3.0 - 19.0	36.1 - 38.0
19.1 - 20.0	38.1 - 40.0
20.1 - 21.0	40.1 - 42.0
21.1 - 24.0	42.1 - 44.0
24.1 - 25.0	44.1 - 46.0
25.1 - 27.0	46.1 - 50.0
27.1 - 30.0	50.1 - 54.0
30.1 - 32.0	54.1 - 58.0
32.1 - 34.0	58.1 - 60.0
34.1 - 36.0	over 60

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_PlacervilleB 05\20\08



Precipitation for RUSLE2 Quincy Service Center

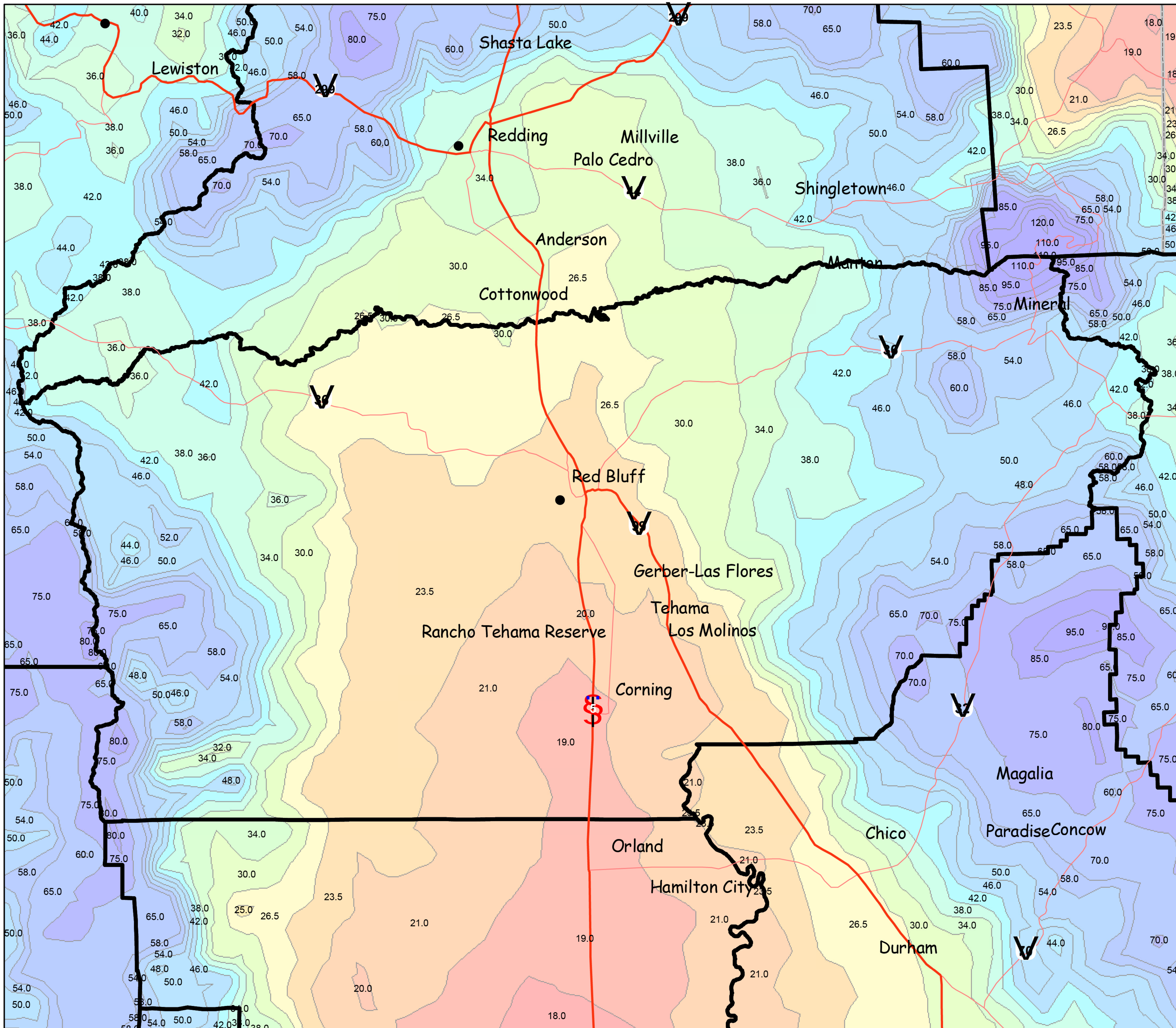
Plumas County Eastern Sierra County

Precipitation Range

3.0 - 18.0	34.1 - 36.0
18.1 - 19.0	36.1 - 38.0
19.1 - 20.0	38.1 - 40.0
20.1 - 21.0	40.1 - 42.0
21.1 - 24.0	42.1 - 44.0
24.1 - 25.0	44.1 - 50.0
25.1 - 27.0	50.1 - 54.0
27.1 - 30.0	54.1 - 65.0
30.1 - 32.0	65.1 - 77.0
32.1 - 34.0	77.1 - 356.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_QuincyB 05\19\08



Precipitation for RUSLE2
Red Bluff Service Center

Tehama County

Precipitation Range

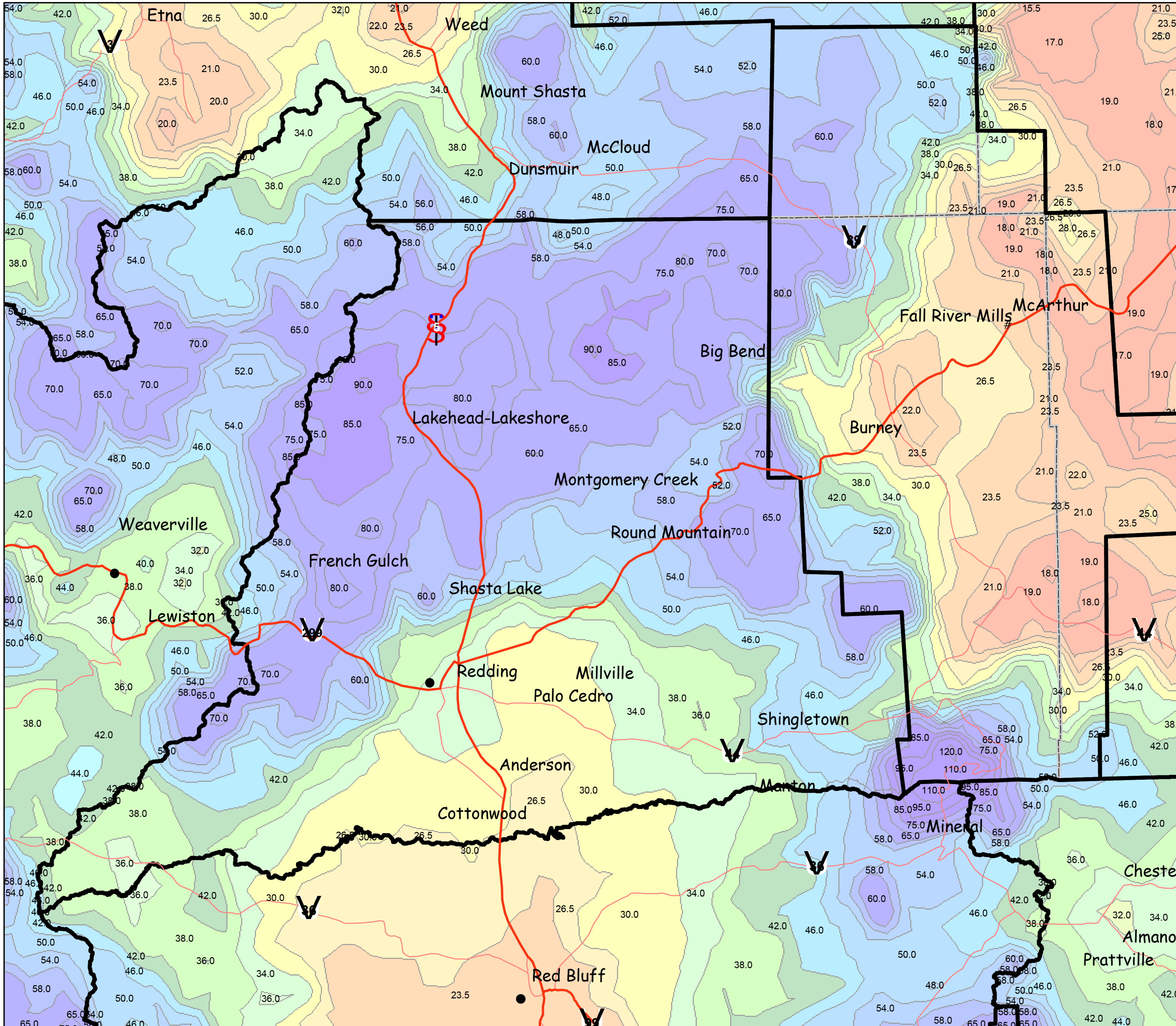
3.0 - 18.0	34.1 - 36.0
18.1 - 19.0	36.1 - 38.0
19.1 - 20.0	38.1 - 40.0
20.1 - 21.0	40.1 - 42.0
21.1 - 24.0	42.1 - 44.0
24.1 - 25.0	44.1 - 50.0
25.1 - 27.0	50.1 - 54.0
27.1 - 30.0	54.1 - 65.0
30.1 - 32.0	65.1 - 77.0
32.1 - 34.0	77.1 - 356.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_RedBluffB 05\19\08

Precipitation for RUSLE2 Redding Service Center

Shasta County



Precipitation Range

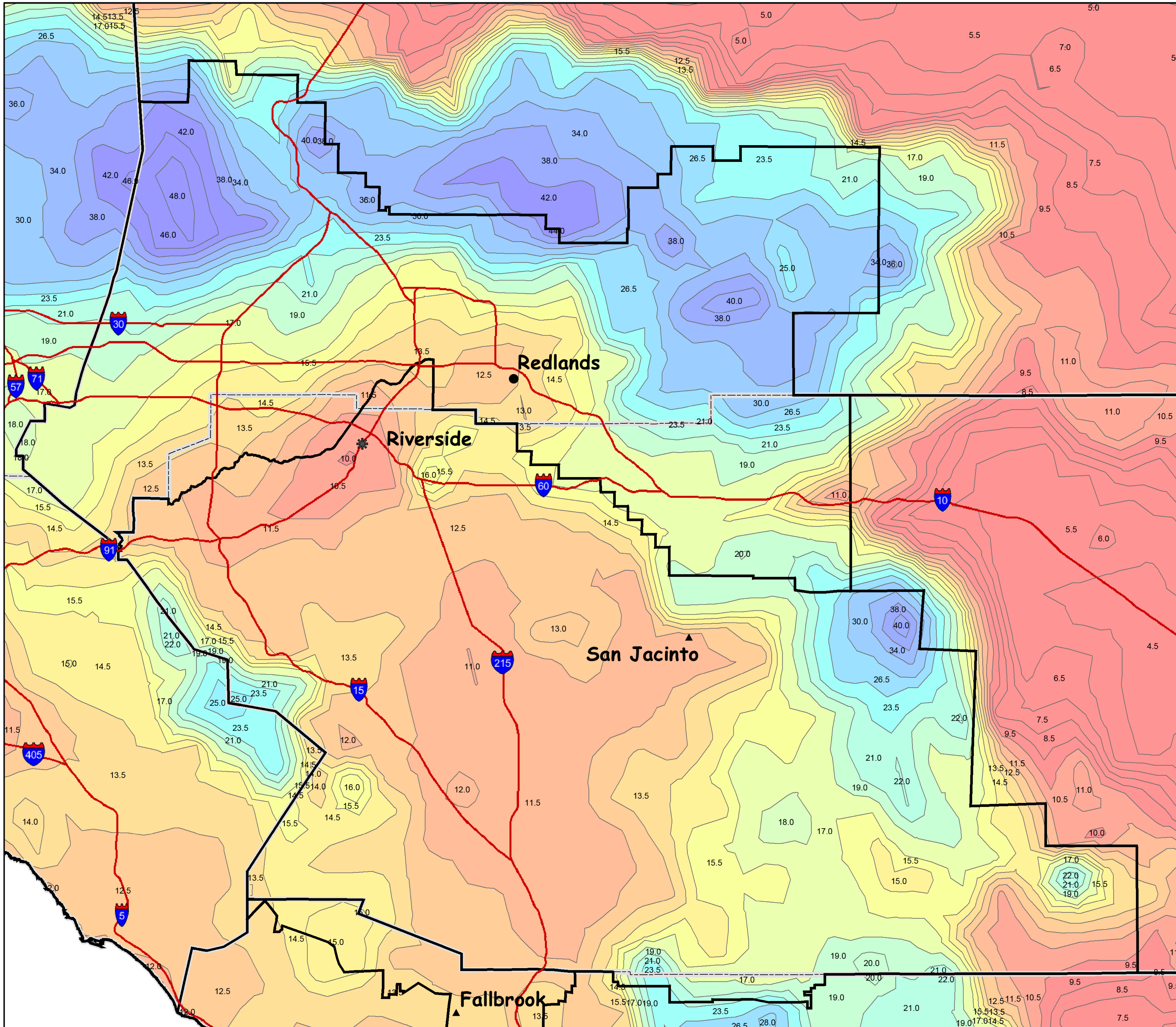
3.0 - 15.0	36.1 - 38.0
15.1 - 19.0	38.1 - 40.0
19.1 - 20.0	40.1 - 42.0
20.1 - 21.0	42.1 - 44.0
21.1 - 24.0	44.1 - 46.0
24.1 - 25.0	46.1 - 50.0
25.1 - 27.0	50.1 - 54.0
27.1 - 30.0	54.1 - 58.0
30.1 - 32.0	58.1 - 80.0
32.1 - 34.0	over 80
34.1 - 36.0	

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_ReddingB 05\20\08

Precipitation for RUSLE2 Service Areas: Redlands, San Jacinto

Western Riverside County SW San Bernardino Co.



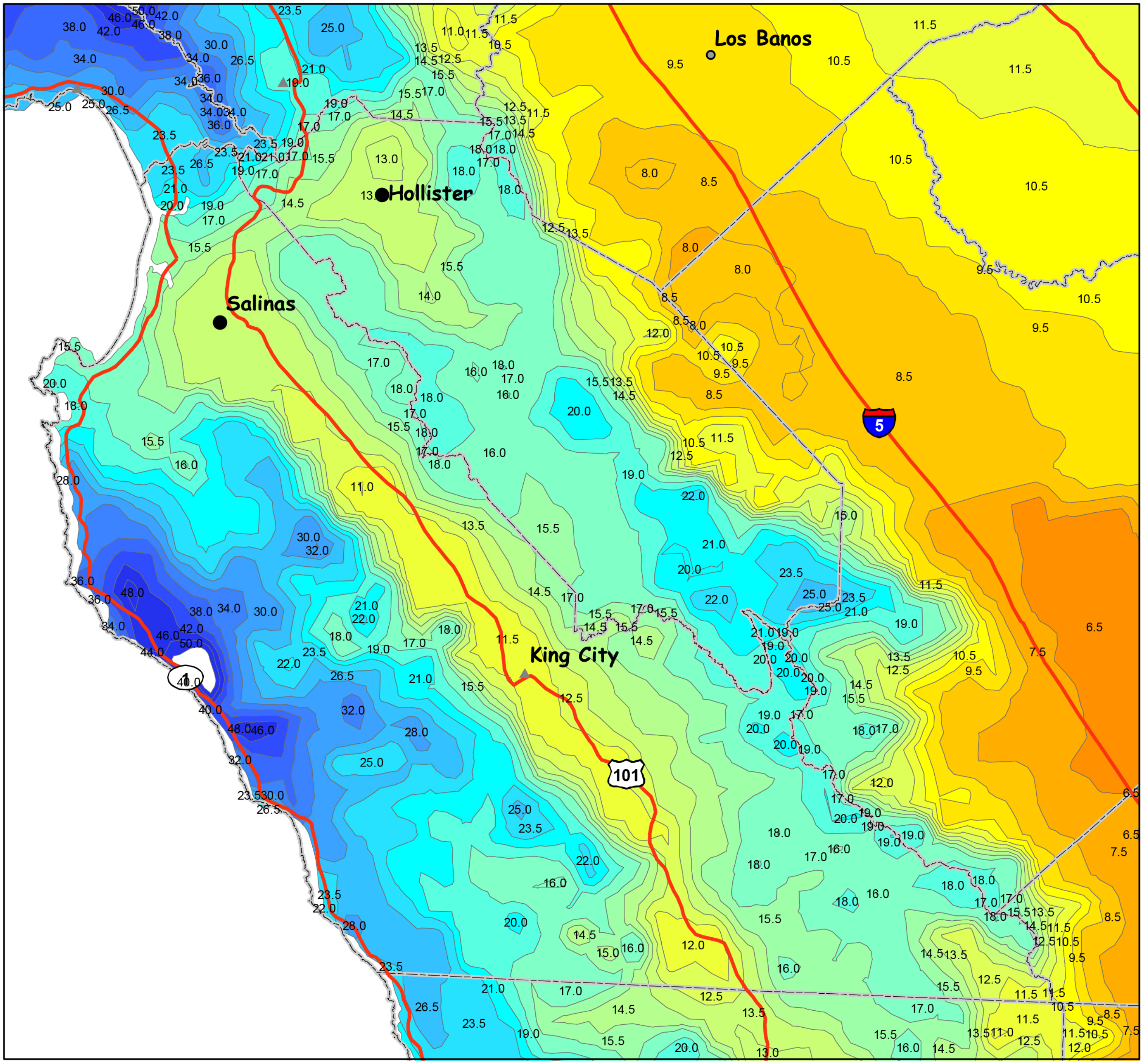
Precipitation Range

3.0 - 10.0	18.5 - 20.0
10.5 - 11.0	20.5 - 22.0
11.5 - 12.0	22.5 - 24.0
12.5 - 13.0	24.5 - 26.0
13.5 - 14.0	26.5 - 28.0
14.5 - 15.0	28.5 - 32.0
15.5 - 16.0	32.5 - 36.0
16.5 - 17.0	36.5 - 40.0
17.5 - 18.0	40.5 - 50.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_RedlandsB 05\12\08

Precipitation for RUSLE2
Monterey and San Benito Counites



Precipitation Range

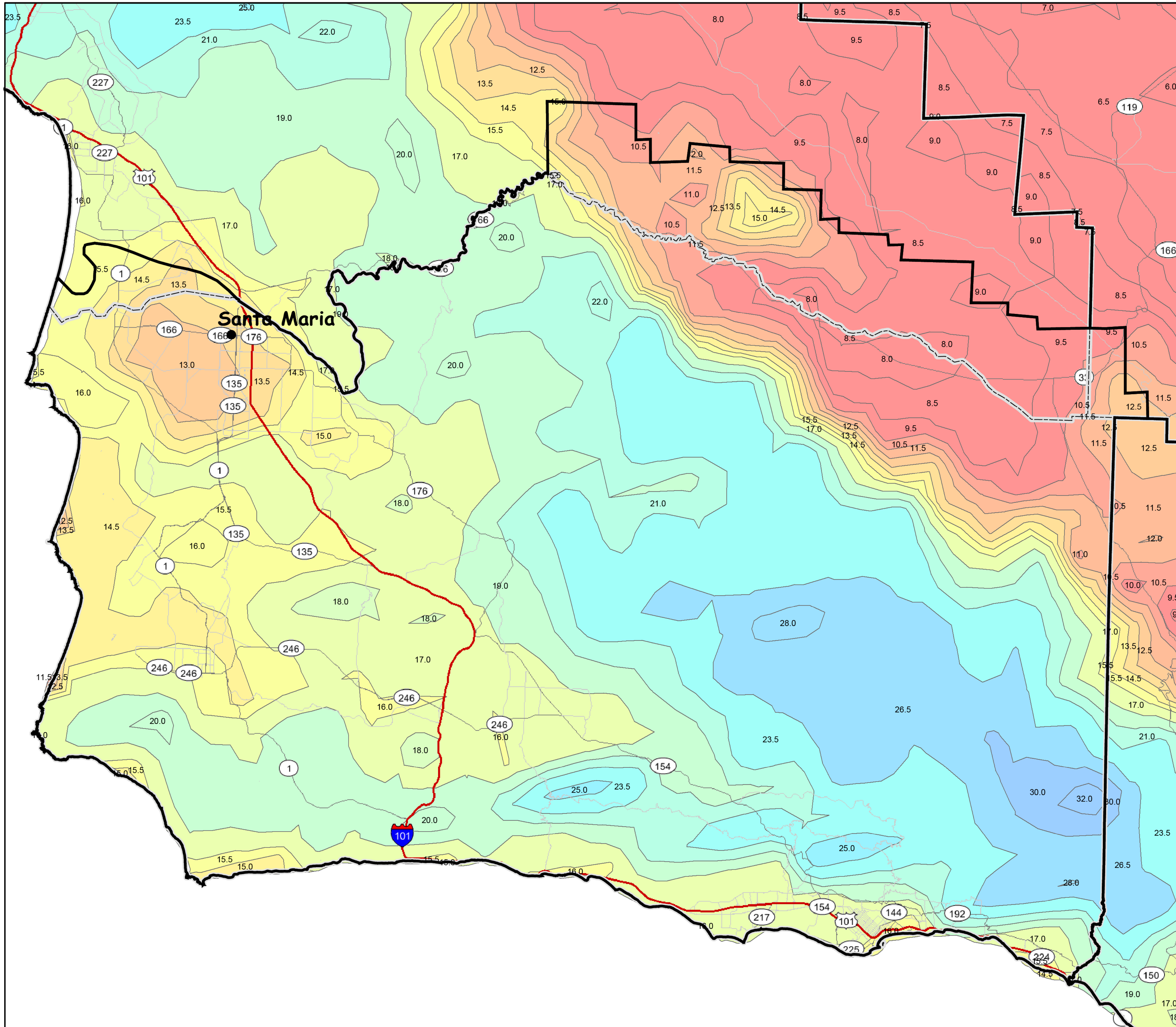
5 - 6	8 - 9	11-12	14-15	18-20	25-28	36-40
6 - 7	9-10	12-13	15-16	20-22	28-32	40-44
7 - 8	10-11	13-14	16-18	22-25	32-36	44-52

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.

MapID: Rusle2Precip_Monterey 11\08\07

Precipitation for RUSLE2 Santa Maria Service Area

Santa Barbara County

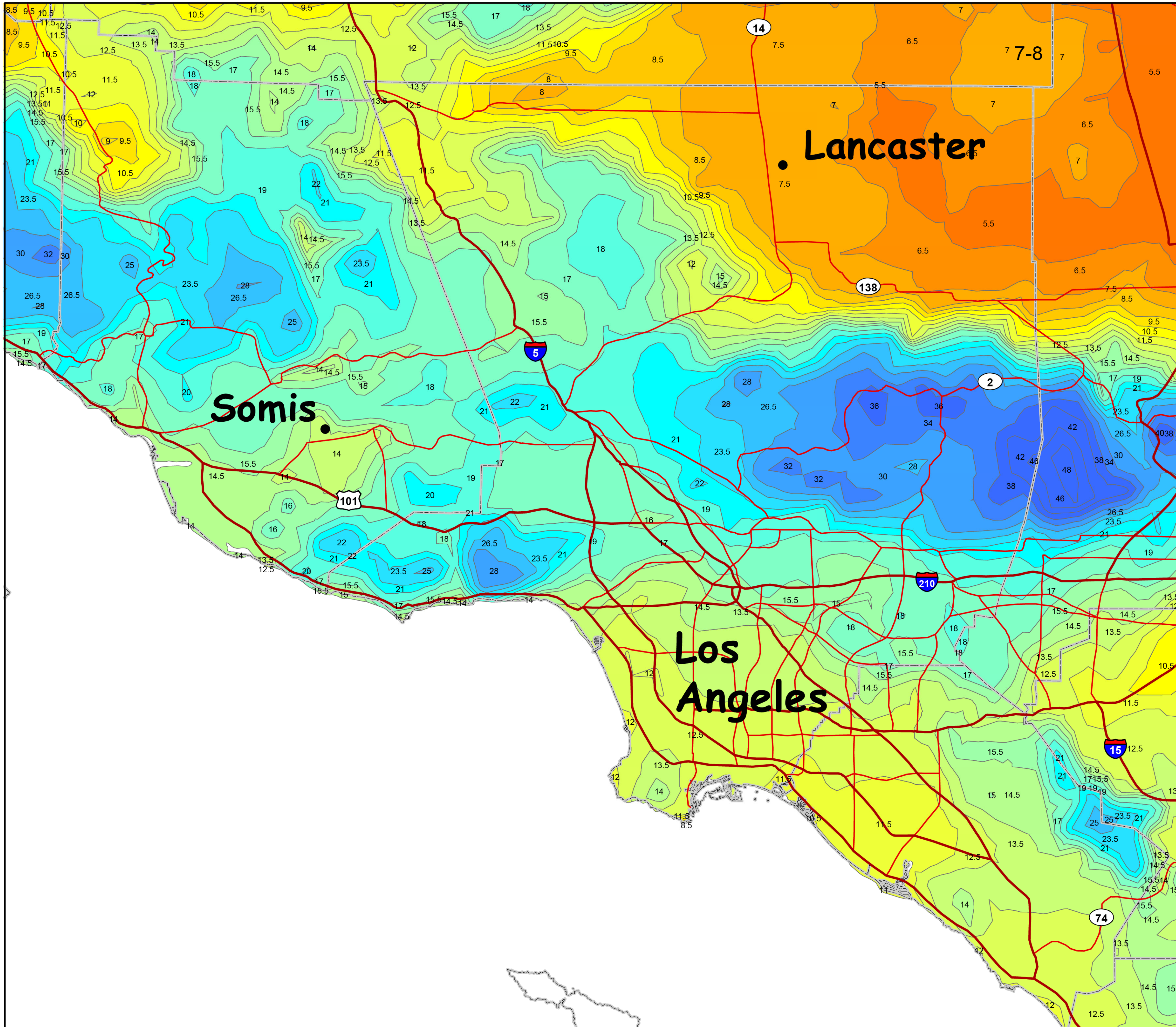


Precipitation Range

3.0 - 10.0	18.5 - 20.0
10.5 - 11.0	20.5 - 22.0
11.5 - 12.0	22.5 - 24.0
12.5 - 13.0	24.5 - 26.0
13.5 - 14.0	26.5 - 28.0
14.5 - 15.0	28.5 - 32.0
15.5 - 16.0	32.5 - 36.0
16.5 - 17.0	36.5 - 40.0
17.5 - 18.0	40.5 - 50.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_SantaMariaB 05\12\08



Precipitation for RUSLE2 Somis Service Area

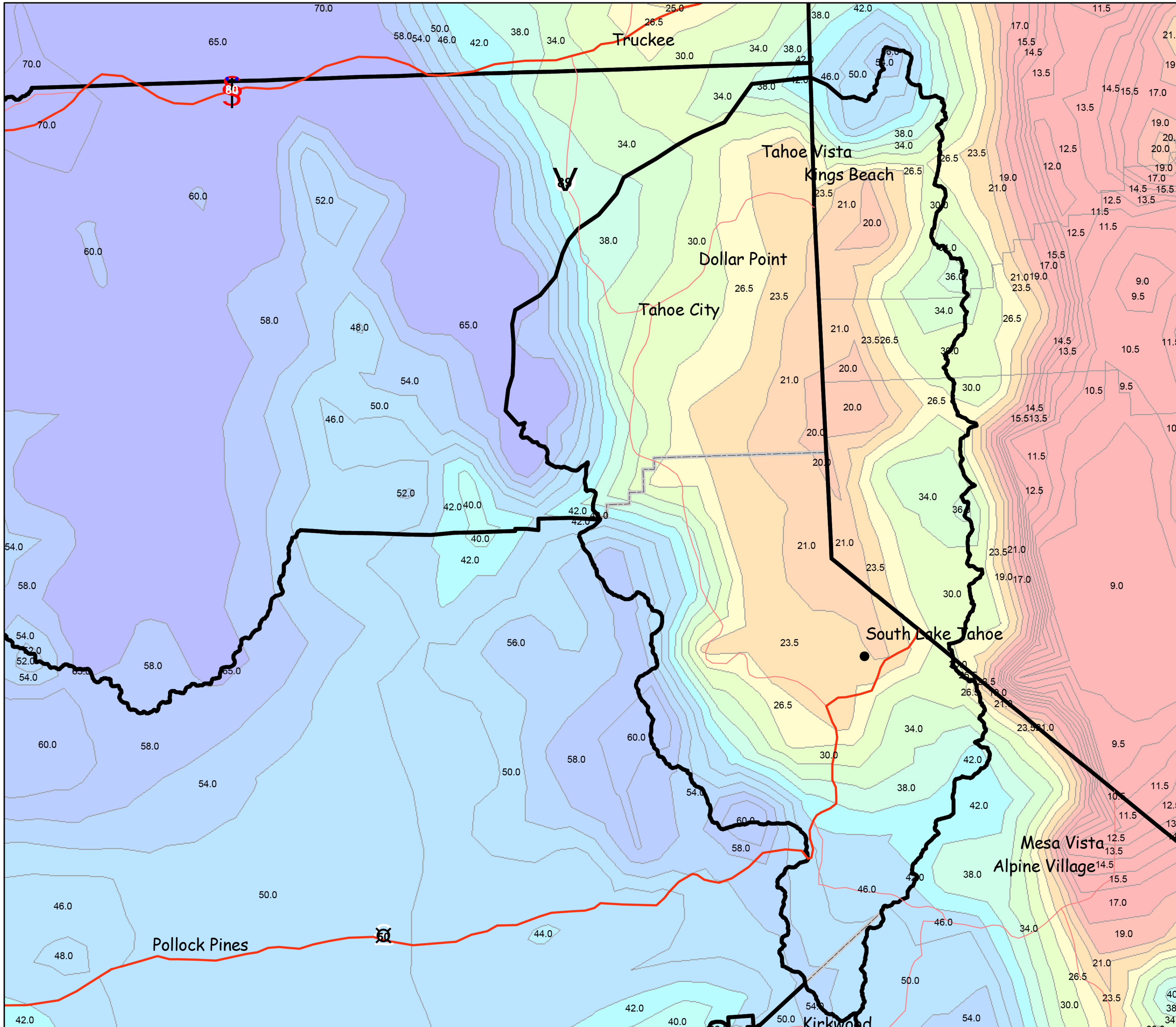
Ventura County

Precipitation Range

3 - 4	13-14
4 - 5	14-15
5 - 6	15-16
6 - 7	16-18
7 - 8	18-20
8 - 9	20-22
9-10	22-25
10-11	25-28
11-12	28-32
12-13	32-36
	36-52

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_SomisB 05\12\08



Precipitation for RUSLE2
S Lake Tahoe Service Center

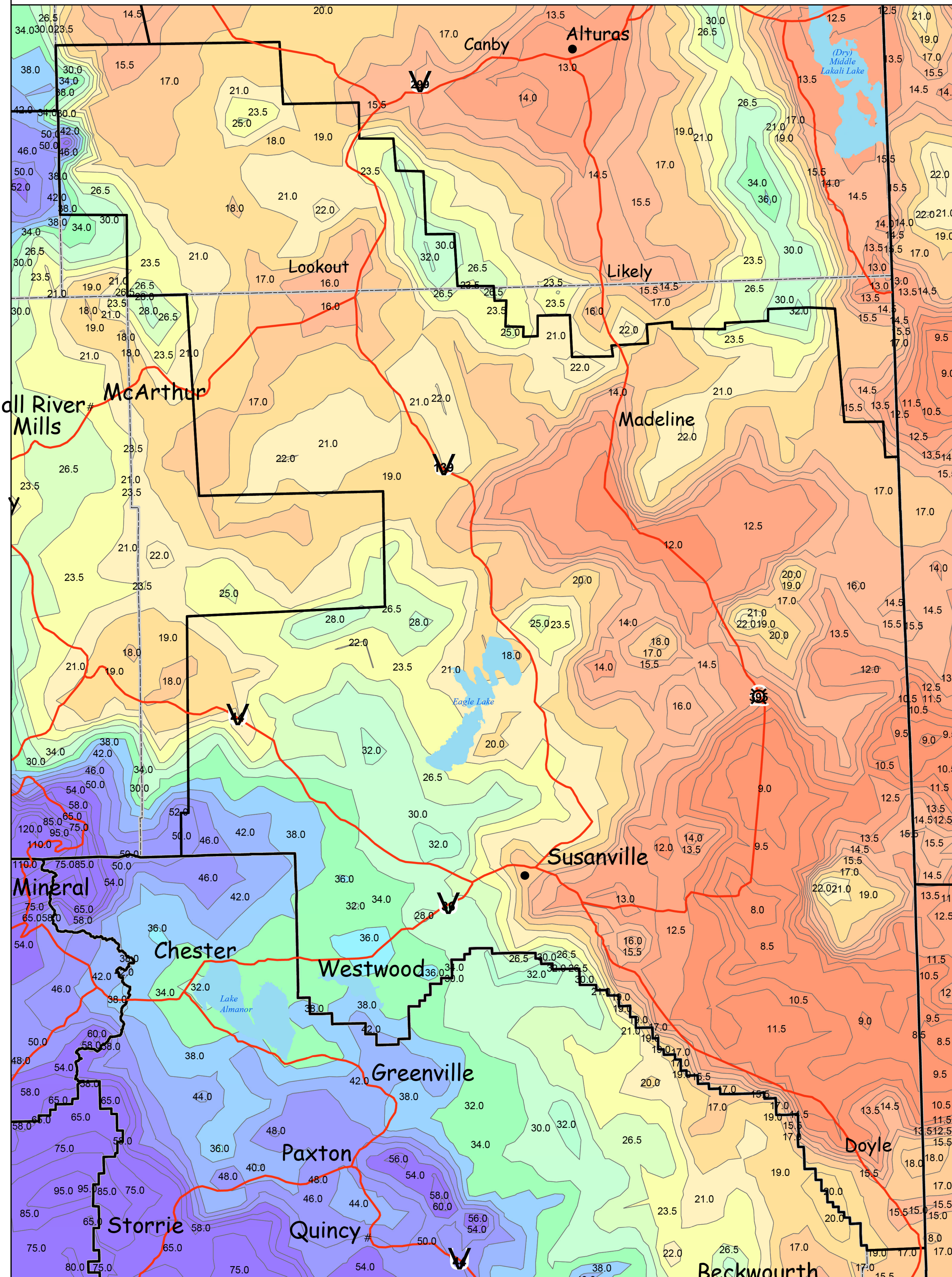
Precipitation Range

3.0 - 18.0	34.1 - 36.0
18.1 - 19.0	36.1 - 38.0
19.1 - 20.0	38.1 - 40.0
20.1 - 21.0	40.1 - 42.0
21.1 - 24.0	42.1 - 44.0
24.1 - 25.0	44.1 - 50.0
25.1 - 27.0	50.1 - 54.0
27.1 - 30.0	54.1 - 60.0
30.1 - 32.0	60.1 - 70.0
32.1 - 34.0	70.1 - 356.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_sLakeTahoeB 05\20\08

Precipitation for RUSLE2 - Susanville Service Area parts of Modoc County and Lassen Counties

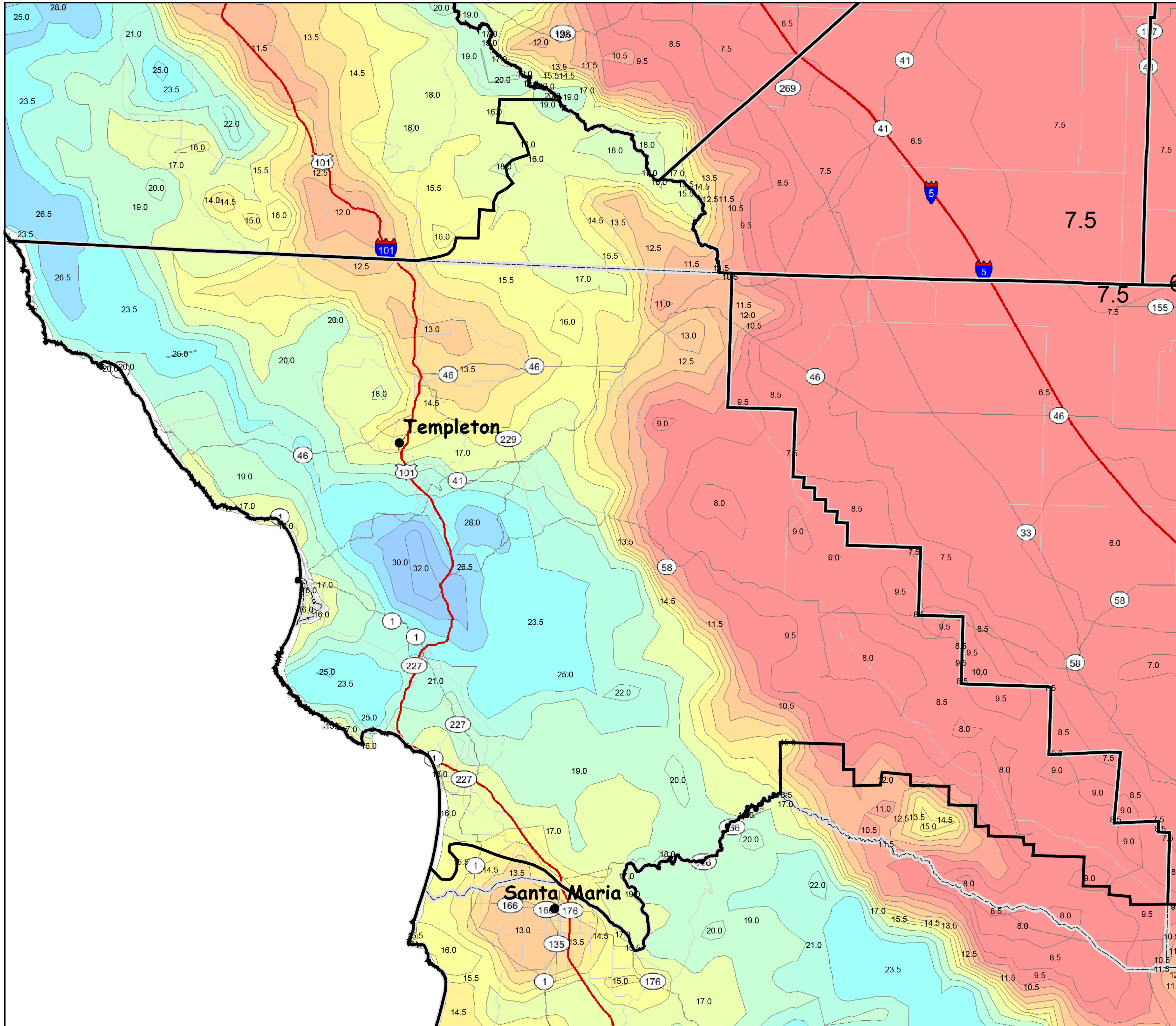


Precipitation Range

3.0 - 12.0 | 12.1 - 14.0 | 14.1 - 16.0 | 16.1 - 18.0 | 18.1 - 20.0 | 20.1 - 22.0 | 22.1 - 24.0 | 24.1 - 25.0 | 25.1 - 27.0 | 27.1 - 30.0 | 30.1 - 32.0 | 32.1 - 34.0 | 34.1 - 36.0 | 36.1 - 38.0 | 38.1 - 40.0 | 40.1 - 44.0 | 44.1 - 50.0 | 50.1 - 200.0

Data Source:
USDA-ARS National Soil Erosion Research Lab, Purdue University, West Lafayette, IN. http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_SusanvilleB 05\30\08



Precipitation for RUSLE2 Templeton Service Area

San Luis Obispo County

Precipitation Range

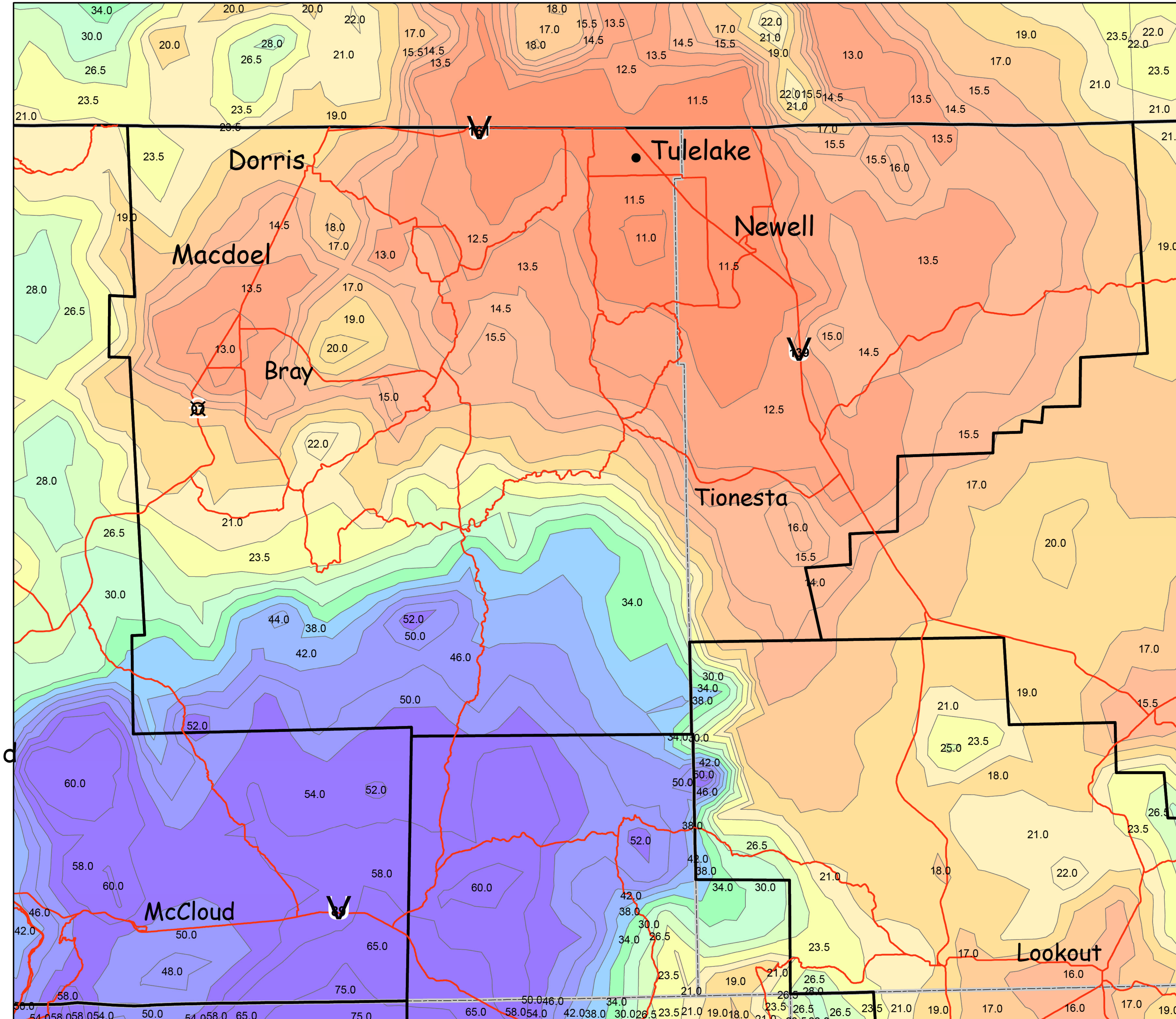
3.0 - 10.0	18.5 - 20.0
10.5 - 11.0	20.5 - 22.0
11.5 - 12.0	22.5 - 24.0
12.5 - 13.0	24.5 - 26.0
13.5 - 14.0	26.5 - 28.0
14.5 - 15.0	28.5 - 32.0
15.5 - 16.0	32.5 - 36.0
16.5 - 17.0	36.5 - 40.0
17.5 - 18.0	40.5 - 50.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_TempletonB 05\12\08

Precipitation for RUSLE2
Tulelake Service Center

Parts of Siskiyou County and Modoc County



Precipitation Range

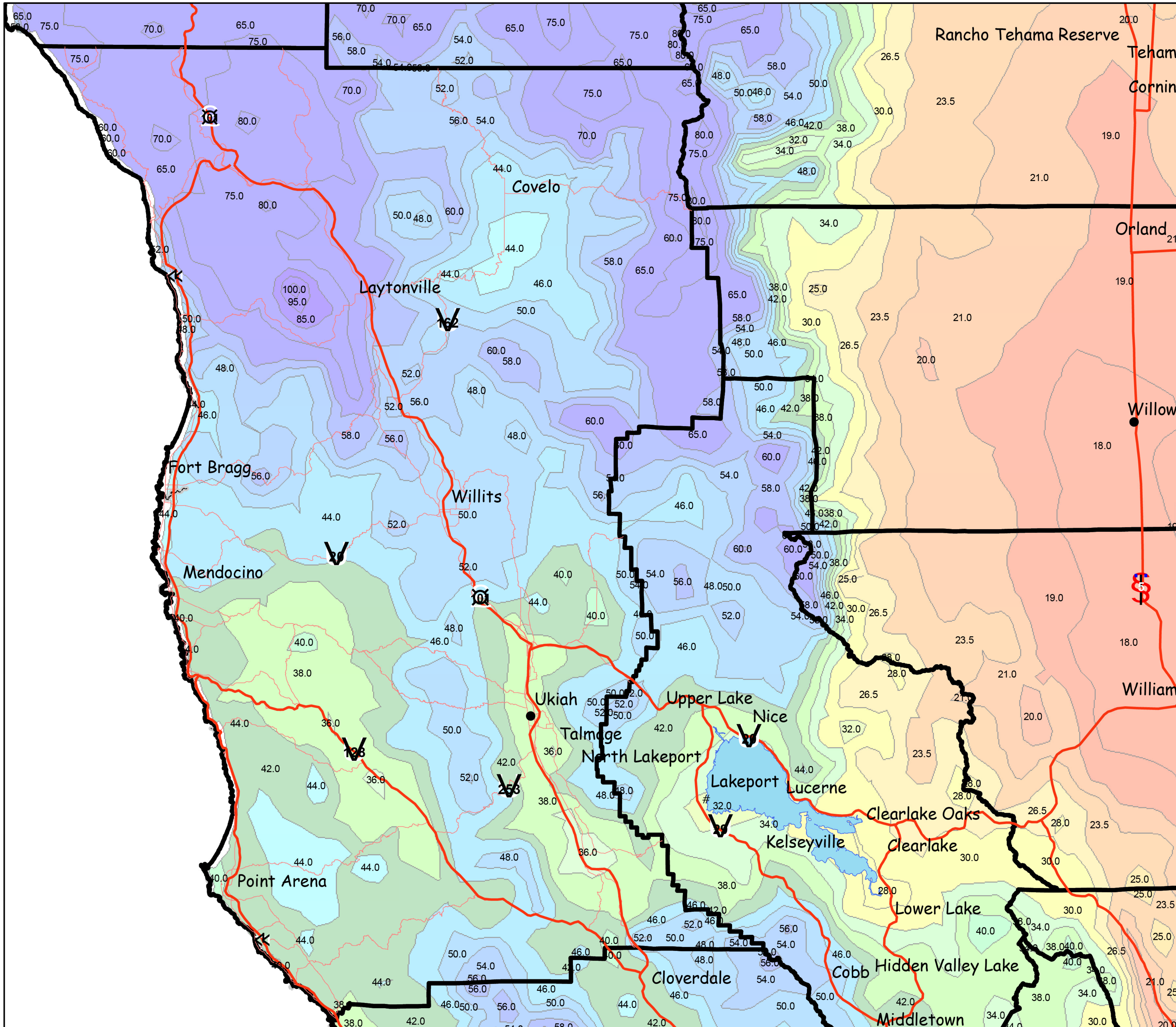
3.0 - 12.0	27.1 - 30.0
12.1 - 14.0	30.1 - 32.0
14.1 - 16.0	32.1 - 34.0
16.1 - 18.0	34.1 - 36.0
18.1 - 20.0	36.1 - 38.0
20.1 - 22.0	38.1 - 40.0
22.1 - 24.0	40.1 - 44.0
24.1 - 25.0	44.1 - 50.0
25.1 - 27.0	50.1 - 200.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_TulelakeB 05\30\08

Precipitation for RUSLE2
Ukiah Service Center

Mendocino County



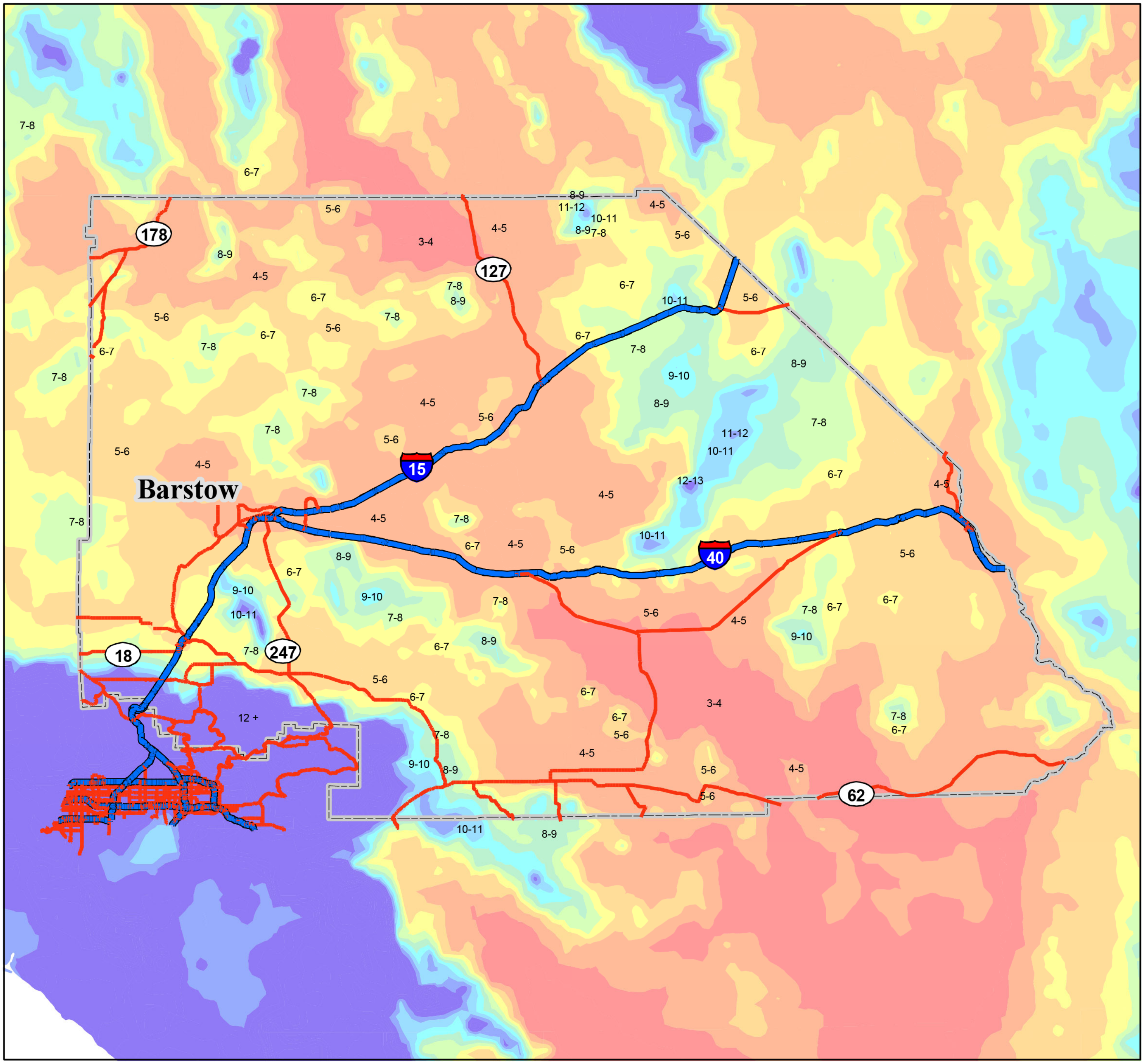
Precipitation Range

3.0 - 15.0	36.1 - 38.0
15.1 - 19.0	38.1 - 40.0
19.1 - 20.0	40.1 - 42.0
20.1 - 21.0	42.1 - 44.0
21.1 - 24.0	44.1 - 46.0
24.1 - 25.0	46.1 - 50.0
25.1 - 27.0	50.1 - 54.0
27.1 - 30.0	54.1 - 58.0
30.1 - 32.0	58.1 - 80.0
32.1 - 34.0	over 80
34.1 - 36.0	

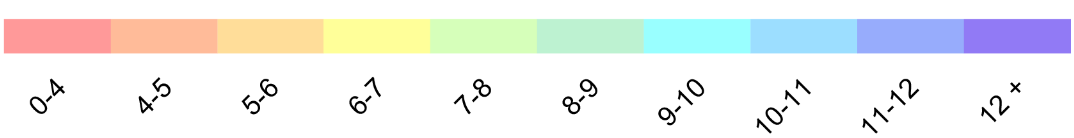
Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_UkiahB 05\30\08

Precipitation for RUSLE2 - Victorville Service Center



Precipitation Range

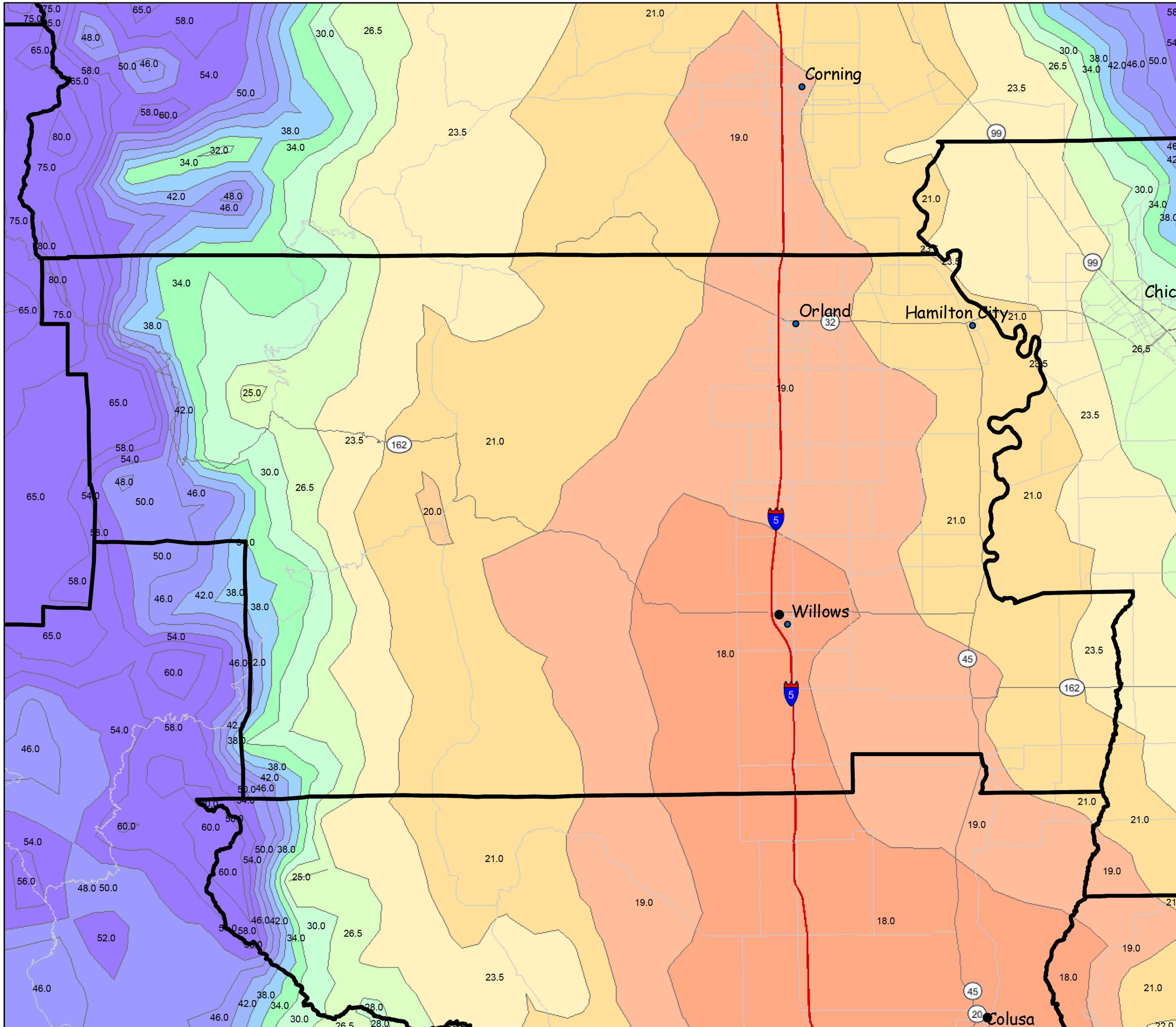


Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.

MapID: rusleprecip_victorville 02\08\07

Precipitation for RUSLE2
Willows Service Center

Glenn County



Precipitation Range

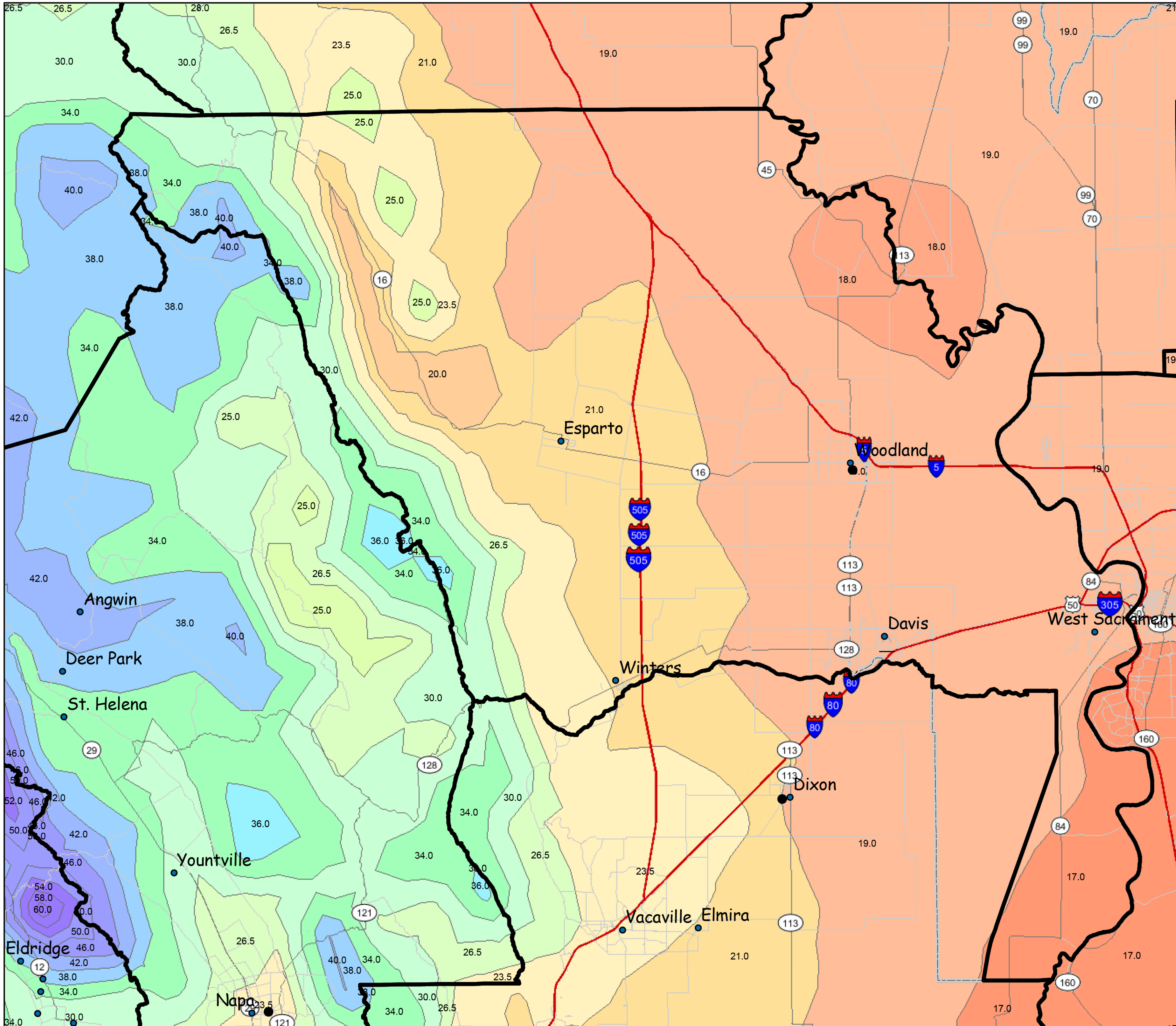
3.0 - 17.0	27.1 - 30.0
17.1 - 18.0	30.1 - 32.0
18.1 - 19.0	32.1 - 34.0
19.1 - 20.0	34.1 - 36.0
20.1 - 21.0	36.1 - 38.0
21.1 - 24.0	38.1 - 40.0
24.1 - 24.0	40.1 - 44.0
24.1 - 25.0	44.1 - 50.0
25.1 - 27.0	over 50

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_WillowsB 05\19\08

Precipitation for RUSLE2 Woodland Service Center

Yolo County



Precipitation Range

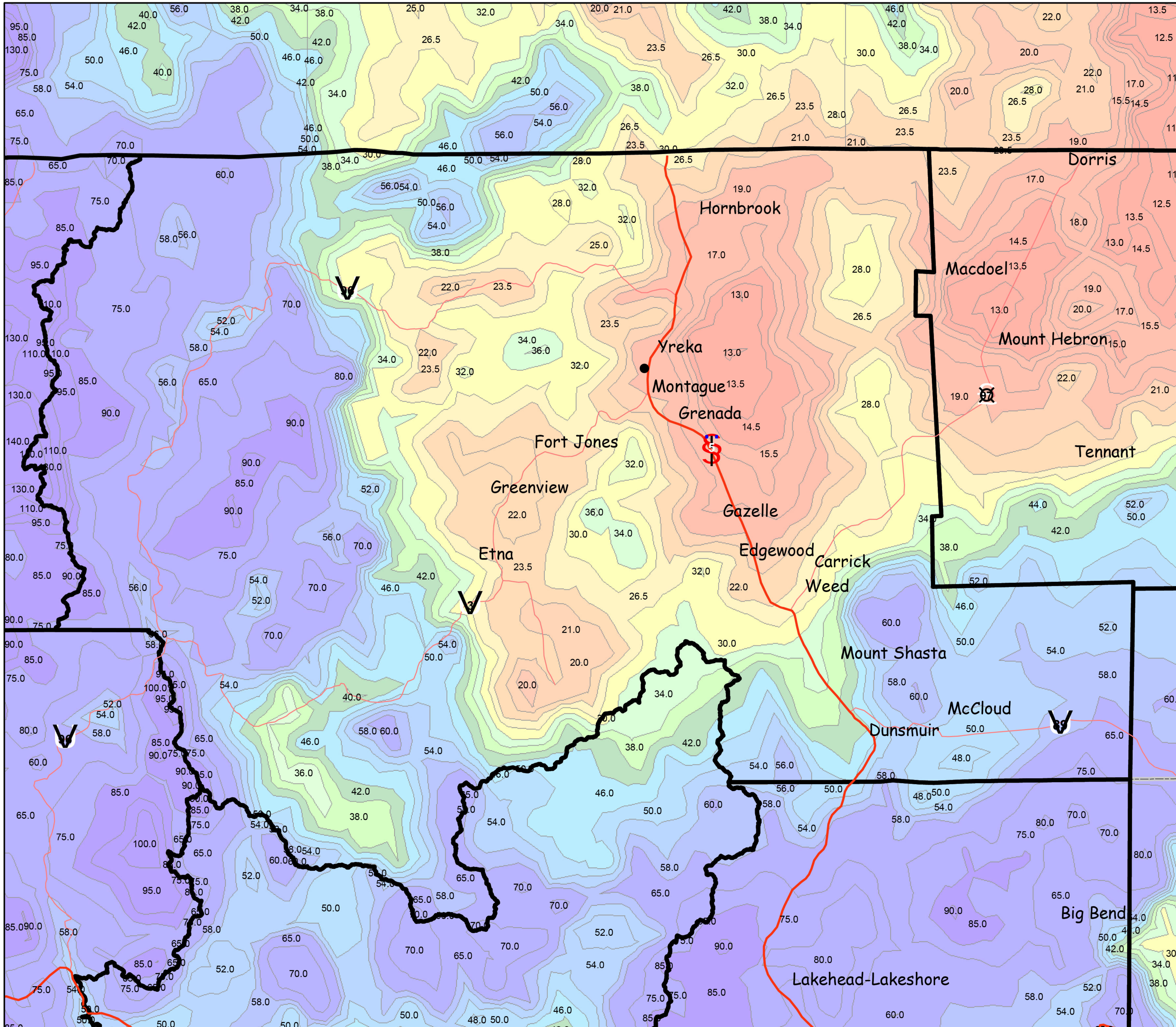
3.0 - 17.0	27.1 - 30.0
17.1 - 18.0	30.1 - 32.0
18.1 - 19.0	32.1 - 34.0
19.1 - 20.0	34.1 - 36.0
20.1 - 21.0	36.1 - 38.0
21.1 - 24.0	38.1 - 40.0
24.1 - 24.0	40.1 - 44.0
24.1 - 25.0	44.1 - 50.0
25.1 - 27.0	over 50

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_WoodlandB 05\19\08

Precipitation for RUSLE2
Yreka Service Center

West/Central Siskiyou County

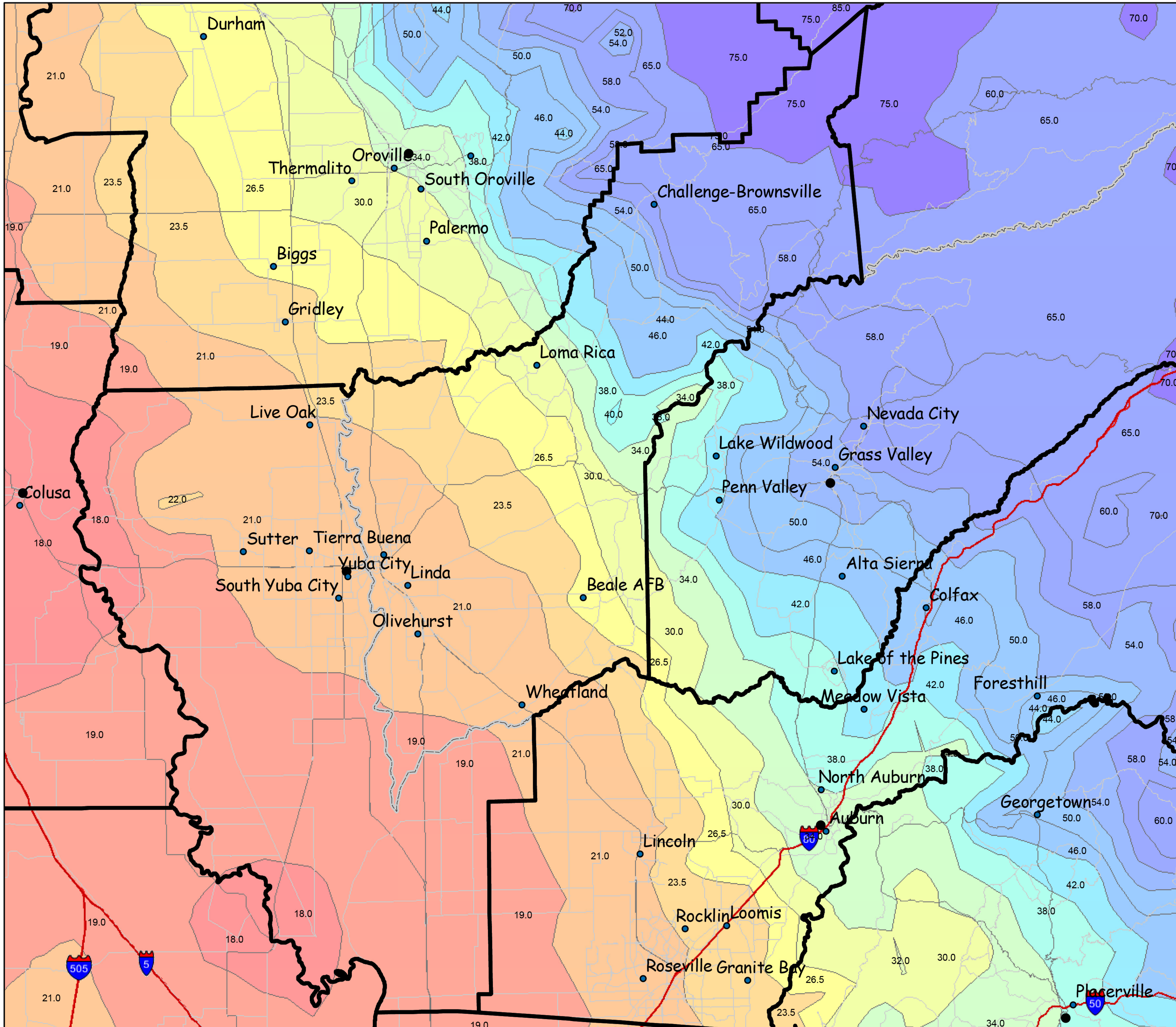


Precipitation Range

3.0 - 15.0	36.1 - 38.0
15.1 - 19.0	38.1 - 40.0
19.1 - 20.0	40.1 - 42.0
20.1 - 21.0	42.1 - 44.0
21.1 - 24.0	44.1 - 46.0
24.1 - 25.0	46.1 - 50.0
25.1 - 27.0	50.1 - 54.0
27.1 - 30.0	54.1 - 58.0
30.1 - 32.0	58.1 - 80.0
32.1 - 34.0	over 80
34.1 - 36.0	

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_YrekaB 05\20\08



Precipitation for RUSLE2
Yuba City Service Center

Sutter County
Yuba County

Precipitation Range

- 3.0 - 18.0
- 18.1 - 19.0
- 19.1 - 20.0
- 20.1 - 21.0
- 21.1 - 24.0
- 24.1 - 25.0
- 25.1 - 27.0
- 27.1 - 30.0
- 30.1 - 32.0
- 32.1 - 34.0
- 34.1 - 36.0
- 36.1 - 38.0
- 38.1 - 40.0
- 40.1 - 42.0
- 42.1 - 44.0
- 44.1 - 50.0
- 50.1 - 54.0
- 54.1 - 65.0
- 65.1 - 356.0

Data Source:
USDA-ARS National Soil Erosion Research Lab,
Purdue University, West Lafayette, IN.
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

MapID: Rusle2Precip_YubaCityB 05\19\08

Appendix C: Definitions of Caltrans Construction Site BMPs in RUSLE2

APPENDIX C
REFERENCE GUIDE: CALTRANS CONSTRUCTION BMPs IN RUSLE2

Caltrans RUSLE2 Program (2024 version)			Caltrans Storm Water Quality Handbooks Construction Site BMP Manual		CASQA Stormwater BMP Handbook: Construction	
BMP Type	Practice Name in RUSLE2 [1]	Description [2, 3, 4, 5, 6]	ID	BMP Type	ID	BMP Type
SOIL STABILIZATION						
Not modeled in RUSLE2.			SS-1	Scheduling	EC-1	Scheduling
			SS-2	Preservation of Existing Vegetation	EC-2	Preservation of Existing Vegetation
Hydraulic mulch	Hydraulic Mulch 2500 lbs	2500 lb/ac of fiber only. Tackifier is included, but not part of dry weight.	SS-3	Hydraulic Mulch	EC-3	Hydraulic Mulch
	Hydraulic Mulch PSFM 2500 lbs	2500 lb/ac of fiber only. Adhesive PSFM is included, but not part of dry weight.				
	Hydraulic Mulch, BFM 3400 lbs/ac	3400 lb/ac of fiber only. Adhesive BFM is included, but not part of dry weight.				
Hydraulic mulch w/ seed	Hydraulic Mulch, PSFM 2500 lbs with seed	2500 lb/ac of fiber mulch with tackifier (PSFM). Seed mix of grass and forbs, good stand, applied with hydroseeder. Starting storage biomass of 40 lb/ac and 600 lb/ac yield.				
	Hydraulic Mulch, BFM 3400 lbs/ac with seed	3400 lb/ac of fiber mulch with tackifier (BFM). Seed mix of grass and forbs, good stand, applied with hydroseeder. Starting storage biomass of 40 lb/ac and 600 lb/ac yield.				
	Fall Hydroseeding, 3000 lbs BFM, 200 T. rock mulch, [low/medium] condition	3000 lb/ac of fiber mulch with tackifier (BFM) with 200 tons per acre of rock slope protection. Seed mix of grass and forbs, good stand, applied with hydroseeder. Arid/desert: 230 lb/ac yield (low condition); Mediterranean: 600 lb/ac yield(medium condition); Cool/humid: 990 lb/ac yield (medium condition).				
	Spring Hydroseeding, 3000 lbs BFM, 200 T. rock mulch, [low/medium] condition	3000 lb/ac of fiber mulch with tackifier (BFM) with 200 tons per acre of rock slope protection. Seed mix of grass and forbs, good stand, applied with hydroseeder. Arid/desert: 230 lb/ac yield (low condition); Mediterranean: 600 lb/ac yield(medium condition); Cool/humid: 4492 lb/ac yield (medium condition).				
	Summer Hydroseeding, 3000 lbs BFM, 200 T. rock mulch, [low/medium] condition	3000 lb/ac of fiber mulch with tackifier (BFM) with 200 tons per acre of rock slope protection. Seed mix of grass and forbs, good stand, applied with hydroseeder. Arid/desert: 230 lb/ac yield (low condition); Mediterranean: 600 lb/ac yield(medium condition); Cool/humid: 4492 lb/ac yield (medium condition).				
	Winter Hydroseeding, 3000 lbs BFM, 200 T. rock mulch, [low/medium] condition	3000 lb/ac of fiber mulch with tackifier (BFM) with 200 tons per acre of rock slope protection. Seed mix of grass and forbs, good stand, applied with hydroseeder. Arid/desert: 230 lb/ac yield (low condition); Mediterranean: 600-707 lb/ac yield(medium condition); Cool/humid: 707 lb/ac yield (medium condition).				

APPENDIX C
REFERENCE GUIDE: CALTRANS CONSTRUCTION BMPs IN RUSLE2

Caltrans RUSLE2 Program (2024 version)			Caltrans Storm Water Quality Handbooks Construction Site BMP Manual		CASQA Stormwater BMP Handbook: Construction	
BMP Type	**Practice Name in RUSLE2 [1]**	**Description [2, 3, 4, 5, 6]**	**ID**	**BMP Type**	**ID**	**BMP Type**
Hydraulic mulch w/ volunteer vegetation	Hydraulic Mulch 2500 lbs+tackifier+volunteer veg	2500 lb/ac of fiber mulch with tackifier. Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.	SS-3	Hydraulic Mulch	EC-3	Hydraulic Mulch
	Hydraulic Mulch PSFM 2500 lbs + volunteer veg	2500 lb/ac of fiber mulch with tackifier (PSFM). Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.				
	Hydraulic Mulch, BFM 3400 lbs/ac + volunteer veg	3400 lb/ac of fiber mulch with tackifier (BFM). Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.				
Hydroseeding	Hydroseeding, grain or annual rye with fiber emulsion	Winter wheat seed, applied with hydroseeder, 707 lb/ac harvest yield. Hydroseed mixture includes 2000 lb/ac of fiber mulch with tackifier.	SS-4	Hydroseeding	EC-4	Hydroseeding
	Hydroseeding, grain or annual rye with fiber emulsion with volunteer vegetation	Winter wheat seed, applied with hydroseeder, 400-707 lb/ac harvest yield. Additional seed mix of volunteer grass and forbs, poor stand. Hydroseed mixture includes 2000 lb/ac of fiber mulch with tackifier.				
	Hydroseeding + fiber + tackifier + 2000lb punched straw	Seed mix of grass and forbs, good stand, applied with hydroseeder. Starting storage biomass of 50 lb/ac and 600 lb/ac yield. Hydroseed mixture includes 2500 lb/ac of fiber mulch with tackifier. Includes 2000 lb/ac (1 ton) of straw mulch, applied with sheepsfoot roller.				
	Hydroseeding + fiber + tackifier + 2000lb blown straw	Seed mix of grass and forbs, good stand, applied with hydroseeder. Starting storage biomass of 50 lb/ac and 600 lb/ac yield. Hydroseed mixture includes 2500 lb/ac of fiber mulch with tackifier. Includes 2000 lb/ac (1 ton) of blown straw mulch.				
	Hydroseeding + fiber + tackifier + 4000lb blown straw	Seed mix of grass and forbs, good stand, applied with hydroseeder. Starting storage biomass of 50 lb/ac and 600 lb/ac yield. Hydroseed mixture includes 2500 lb/ac of fiber mulch with tackifier. Includes 4000 lb/ac (2 tons) of blown straw mulch.				
Soil Binders	[Fall/Winter/Spring/Summer] Emulsified Petroleum binder soil stabilant only after construction	Emulsified petroleum binder applied at manufacturer recommended rate. Select based on the season of planned application [Fall, Spring, or Summer].	SS-5	Soil Binders	EC-5	Soil Binders
	[Fall/Winter/Spring/Summer] Guar binder soil stabilant only after construction	Guar gum based tackifier treated with dispersing agents, applied at minimum application rates by slope of 40 to 70 lb/ac. Select based on the season of planned application [Fall, Spring, or Summer].				
	[Fall/Winter/Spring/Summer] Gypsum cementous binder soil stabilant only after construction	Gypsum cementous binder mixed with water and mulch and applied at a rate of 4,000 to 12,000 lb/ac. Select based on the season of planned application [Fall, Spring, or Summer].				
	[Fall/Spring/Summer] Pitch or rosin emulsion binder soil stabilant only after construction	Pitch or rosin emulsion binder applied at the rate specified by the manufacturer. Select based on the season of planned application [Fall, Spring, or Summer].				
	[Fall/Winter/Spring/Summer] Polyacrylamide binder soil stabilant only after construction	Polyacrylamide binder applied at the rate of 5 lb/ac. Select based on the season of planned application [Fall, Spring, or Summer].				
	[Fall/Winter/Spring/Summer] Psyllium binder soil stabilant only after construction	Psyllium based soil binder applied at a rate of 80 to 200 lb/ac. Select based on the season of planned application [Fall, Spring, or Summer].				

APPENDIX C
REFERENCE GUIDE: CALTRANS CONSTRUCTION BMPs IN RUSLE2

Caltrans RUSLE2 Program (2024 version)			Caltrans Storm Water Quality Handbooks Construction Site BMP Manual		CASQA Stormwater BMP Handbook: Construction	
BMP Type	**Practice Name in RUSLE2 (1)**	**Description (2, 3, 4, 5, 6)**	**ID**	**BMP Type**	**ID**	**BMP Type**
Soil Binders	[Fall/Winter/Spring/Summer] Starch binder soil stabilant only after construction	Water soluble granular cornstarch mixed with water and applied at the rate of 150 lb/ac. Select based on the season of planned application [Fall, Spring, or Summer].	SS-5	Soil Binders	EC-5	Soil Binders
Straw mulch	Straw Mulch 2000 lbs/ac	Applied at 2000 lb/ac (1 ton).	SS-6	Straw Mulch	EC-6	Straw Mulch
	Straw Mulch 4000 lbs/ac	Applied at 4000 lb/ac (2 tons).				
Straw mulch w/ seed	Straw Mulch 2000 lbs/ac, with seed	2000 lb/ac (1 ton) of straw mulch, applied with crimper. Seed mix of grass and forbs, good stand, applied with broadcast seeder. Starting storage biomass of 40 lb/ac and 600 lb/ac yield.				
	Straw Mulch 4000 lbs/ac, with seed	4000 lb/ac (2 tons) of straw mulch, applied with crimper. Seed mix of grass and forbs, good stand, applied with broadcast seeder. Starting storage biomass of 40 lb/ac and 600 lb/ac yield.				
	Fall Drilled seeding, 4000 lbs crimped straw mulch, medium condition	4000 lb/ac (2 tons) of straw mulch, applied with crimper. Seed mix of grass and forbs, good stand, applied with drill seeder in Fall. Starting storage biomass of 40 lb/ac and 600 lb/ac yield. (yield = 230 lb/ac for Arid, 4492 for Cool humid)				
	Spring Drilled seeding, 4000 lbs crimped straw mulch, medium condition	4000 lb/ac (2 tons) of straw mulch, applied with crimper. Seed mix of grass and forbs, good stand, applied with drill seeder in Spring. Starting storage biomass of 40 lb/ac and 600 lb/ac yield.				
	Summer Drilled seeding, 4000 lbs crimped straw mulch, medium condition	4000 lb/ac (2 tons) of straw mulch, applied with crimper. Seed mix of grass and forbs, good stand, applied with drill seeder in Fall. Starting storage biomass of 40 lb/ac and 600 lb/ac yield.				
	Winter Drilled seeding, 4000 lbs crimped straw mulch, medium condition	4000 lb/ac (2 tons) of straw mulch, applied with crimper. Seed mix of grass and forbs, good stand, applied with drill seeder in Fall. Starting storage biomass of 40 lb/ac and 600-707 lb/ac yield.				
Straw mulch w/ volunteer vegetation	Straw Mulch 2000 lbs/ac with volunteer vegetation	2000 lb/ac (1 ton) of straw mulch. Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.				
	Straw Mulch 4000 lbs/ac with volunteer vegetation	4000 lb/ac (2 tons) of straw mulch. Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.				
Pine needle mulch	Spread Pine Needles, 2000 lbs/ac	Applied at 2000 lb/ac (1 ton).				
	Spread Pine Needles, 4000 lbs/ac	Applied at 4000 lb/ac (2 tons).				
Pine needle mulch w/ volunteer vegetation	Spread Pine Needles, 2000 lbs/ac with volunteer vegetation	Applied at 2000 lb/ac (1 ton). Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.				
	Spread Pine Needles, 4000 lbs/ac with volunteer vegetation	Applied at 4000 lb/ac (2 tons). Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.				
Woodstraw mulch	Woodstraw mulch, 4000 lbs per ac	Engineered wood strand erosion control mulch applied at 4,000 lb/ac (2 tons).				
	Woodstraw mulch, 7,500 lbs per ac	Engineered wood strand erosion control mulch applied at 7,500 lb/ac (3.75 tons).				
	Woodstraw mulch, 14,000 lbs per ac	Engineered wood strand erosion control mulch applied at 14,000 lb/ac (7 tons).				

APPENDIX C
REFERENCE GUIDE: CALTRANS CONSTRUCTION BMPs IN RUSLE2

Caltrans RUSLE2 Program (2024 version)			Caltrans Storm Water Quality Handbooks Construction Site BMP Manual		CASQA Stormwater BMP Handbook: Construction	
BMP Type	Practice Name in RUSLE2 (1)	Description (2, 3, 4, 5, 6)	ID	BMP Type	ID	BMP Type
Rolled erosion control products (RECP)	Coconut/Coir Netting RECP	Open weave netting, decays slowly.	SS-7	Geotextiles, Plastic Covers, and Erosion Control Blankets / Mats	EC-7	Geotextiles and Mats
	Combination Straw/Coir RECP	70% straw/30% coconut fiber blanket with double netting, decays moderately slowly.				
	Curled Wood Fiber RECP	Excelsior blanket with double netting.				
	Jute Netting RECP	Open weave netting, moderate decay rate.				
	Straw Blanket RECP	Blanket with double netting, decays rapidly.				
Rolled erosion control products (RECP) w/ seed	Coconut/Coir Netting RECP with seed	Open weave netting, decays slowly. Seed mix of grass and forbs, good stand, applied with broadcast seeder. Starting storage biomass of 40 lb/ac and 600 lb/ac yield.				
	Combination Straw/Coir RECP with seed	70% straw/30% coconut fiber blanket with double netting, decays moderately slowly. Seed mix of grass and forbs, good stand, applied with broadcast seeder. Starting storage biomass of 40 lb/ac and 600 lb/ac yield.				
	Curled wood fiber RECP with seed	Excelsior blanket with double netting. Seed mix of grass and forbs, good stand, applied with broadcast seeder. Starting storage biomass of 40 lb/ac and 600 lb/ac yield.				
	Jute Netting RECP with seed	Open weave netting, moderate decay rate. Seed mix of grass and forbs, good stand, applied with broadcast seeder. Starting storage biomass of 40 lb/ac and 600 lb/ac yield.				
	Straw Blanket RECP with seed	Blanket with double netting, decays rapidly. Seed mix of grass and forbs, good stand, applied with broadcast seeder. Starting storage biomass of 40 lb/ac and 600 lb/ac yield.				
Rolled erosion control products (RECP) w/ volunteer vegetation	Coconut/Coir Netting RECP with volunteer vegetation	Open weave netting, decays slowly. Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.				
	Combination Straw/Coir RECP with volunteer vegetation	70% straw/30% coconut fiber blanket with double netting, decays moderately slowly. Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.				
	Curled wood fiber RECP with volunteer vegetation	Excelsior blanket with double netting. Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.				
	Jute Netting RECP with volunteer vegetation	Open weave netting, moderate decay rate. Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.				
	Straw Blanket RECP with volunteer vegetation	Blanket with double netting, decays rapidly. Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.				
Compost erosion control blankets (CECB)	0.5 inch Compost Blanket CECB	0.5-inch thick CECB, with 54,800 lb/ac of medium coarse compost.	SS-8	Wood Mulching	EC-8 EC-14	Wood Mulching Compost Blanket
	1 inch Compost Blanket CECB	1-inch thick CECB, with 108,000 lb/ac of medium coarse compost.				
	2 inch Compost Blanket CECB	2-inch thick CECB, with 216,000 lb/ac of medium coarse compost.				

APPENDIX C
REFERENCE GUIDE: CALTRANS CONSTRUCTION BMPs IN RUSLE2

Caltrans RUSLE2 Program (2024 version)			Caltrans Storm Water Quality Handbooks Construction Site BMP Manual		CASQA Stormwater BMP Handbook: Construction	
BMP Type	**Practice Name in RUSLE2 [1]**	**Description [2, 3, 4, 5, 6]**	**ID**	**BMP Type**	**ID**	**BMP Type**
Compost erosion control blankets (CECB) w/ seed	0.5 inch Compost blanket with seed	0.5-inch thick CECB, with 54,800 lb/ac of medium coarse compost. Seed mix of grass and forbs, good stand, applied with hydroseeder. Starting storage biomass of 40 lb/ac and 600 lb/ac yield. Hydroseed mixture includes 1500 lb/ac of fiber mulch with tackifier.	SS-8	Wood Mulching	EC-8 EC-14	Wood Mulching Compost Blanket
	1 inch Compost blanket with seed	1-inch thick CECB, with 108,000 lb/ac of medium coarse compost. Seed mix of grass and forbs, good stand, applied with hydroseeder. Starting storage biomass of 40 lb/ac and 600 lb/ac yield. Hydroseed mixture includes 1500 lb/ac of fiber mulch with tackifier.				
	2 inch Compost blanket with seed	2-inch thick CECB, with 216,000 lb/ac of medium coarse compost. Seed mix of grass and forbs, good stand, applied with hydroseeder. Starting storage biomass of 40 lb/ac and 600 lb/ac yield. Hydroseed mixture includes 1500 lb/ac of fiber mulch with tackifier.				
Compost erosion control blankets (CECB) w/ volunteer vegetation	0.5 inch Compost Blanket CECB with volunteer vegetation	0.5-inch thick CECB, with 54,800 lb/ac of medium coarse compost. Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.				
	1 inch Compost Blanket CECB with volunteer vegetation	1-inch thick CECB, with 108,000 lb/ac of medium coarse compost. Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.				
	2 inch Compost Blanket CECB with volunteer vegetation	2-inch thick CECB, with 216,000 lb/ac of medium coarse compost. Seed mix of volunteer grass and forbs, poor stand. Starting storage biomass of 10 lb/ac and 60 lb/ac yield.				
Modeled in RUSLE2 under "Diversions, Terraces, Sediment Basins" (Step 5).			SS-9	Earth Dikes / Drainage Swales and Lined Ditches	EC-9	Earth Dikes and Drainage Swales
Not modeled in RUSLE2.			SS-10	Outlet Protection / Velocity Dissipation Devices	EC-10	Velocity Dissipation Devices
			SS-11	Slope Drains	EC-11	Slope Drains
			SS-12	Streambank Stabilization	EC-12	Streambank Stabilization
See "Compost erosion control blankets" sections.			See SS-8 above.		See EC-14 above.	
Soil Preparation/ Roughening [7]	bare cut slope, track walked	Bare soil from cutting, tracked machinery up and down the slope to leave horizontal depressions in the soil, on the contour.	Not in Caltrans BMP Manual.		EC-15	Soil Preparation / Roughening
	bare cut slope, track walked with volunteer vegetation	Bare soil from cutting, tracked machinery up and down the slope to leave horizontal depressions in the soil, on the contour. Seed mix of volunteer grass and forbs, poor stand.				
	bare fill slope, track walked	Bare fill slope or stockpile, tracked machinery up and down the slope to leave horizontal depressions in the soil, on the contour.				
	bare fill slope, track walked with volunteer vegetation	Bare fill slope or stockpile, tracked machinery up and down the slope to leave horizontal depressions in the soil, on the contour. Seed mix of volunteer grass and forbs, poor stand.				
	bare, rough	Bare slopes, shallow grooves by track walking, scarifying, sheepsfoot rolling, or imprinting.				
	bare, rough with volunteer vegetation	Bare slopes, shallow grooves by track walking, scarifying, sheepsfoot rolling, or imprinting. Seed mix of volunteer grass and forbs, poor stand.				

APPENDIX C
REFERENCE GUIDE: CALTRANS CONSTRUCTION BMPs IN RUSLE2

Caltrans RUSLE2 Program (2024 version)			Caltrans Storm Water Quality Handbooks Construction Site BMP Manual		CASQA Stormwater BMP Handbook: Construction	
BMP Type	Practice Name in RUSLE2 [1]	Description [2, 3, 4, 5, 6]	ID	BMP Type	ID	BMP Type
Soil Preparation/ Roughening [7]	ripping/ ridging 12 in high	Bare slopes, Ripping/ridging soil to leave 12 inch high horizontal depressions in the soil, on the contour.	Not in Caltrans BMP Manual.		EC-15	Soil Preparation / Roughening
	ripping/ ridging 12 in high with volunteer vegetation	Bare slopes, Ripping/ridging soil to leave 12 inch high horizontal depressions in the soil, on the contour. Seed mix of volunteer grass and forbs, poor stand.				
	ripping/ ridging 6 in high	Bare slopes, Ripping/ridging soil to leave 6 inch high horizontal depressions in the soil, on the contour.				
	ripping/ ridging 6 in high with volunteer vegetation	Bare slopes, Ripping/ridging soil to leave 6 inch high horizontal depressions in the soil, on the contour. Seed mix of volunteer grass and forbs, poor stand.				
	track walking	Tracked machinery up and down the slope to leave horizontal depressions in the soil, on the contour.				
	track walking with volunteer vegetation	Tracked machinery up and down the slope to leave horizontal depressions in the soil, on the contour. Seed mix of volunteer grass and forbs, poor stand.				
Rock slope protection	Rock slope protection	Applied at 200,000 lb/ac, rock size of 6- to 12-inches and greater is the norm.	Not in Caltrans BMP Manual.		EC-16	Non-vegetative Stabilization
SEDIMENT CONTROL						
Silt fence	Silt Fence - SE-1	Moderate permeable barrier retardance class in RUSLE2. Refers to "retardance" to surface water flow.	SC-1	Silt Fence	SE-1	Silt Fence
	Silt Fence reinforced with metal fabric	Moderate permeable barrier retardance class in RUSLE2. Refers to "retardance" to surface water flow.				
	Silt Fence reinforced with straw bales	Extreme permeable barrier retardance class in RUSLE2. Refers to "retardance" to surface water flow.				
Modeled in RUSLE2 under "Diversions, Terraces, Sediment Basins" Step 5.			SC-2	Sediment / Desilting Basin	SE-2	Sediment Basin
Modeled in RUSLE2 under "Diversions, Terraces, Sediment Basins" Step 5.			SC-3	Sediment Trap	SE-3	Sediment Trap
Not modeled in RUSLE2.			SC-4	Check Dam	SE-4	Check Dams
Fiber rolls	Fiber roll, wattle 6 inch	6-inch diameter straw wattle. Low permeable barrier retardance class in RUSLE2. Refers to "retardance" to surface water flow.	SC-5	Fiber Rolls	SE-5	Fiber Rolls
	Fiber roll, wattle 9 inch	9-inch diameter straw wattle. Moderate permeable barrier retardance class in RUSLE2. Refers to "retardance" to surface water flow.				
	Fiber roll, wattle 12 inch	12-inch diameter straw wattle. High permeable barrier retardance class in RUSLE2. Refers to "retardance" to surface water flow.				
	Fiber roll, wattle 24 inch	24-inch diameter straw wattle. Extreme permeable barrier retardance class in RUSLE2. Refers to "retardance" to surface water flow.				
Compost sock	Compost Sock, 8-inch	8-inch diameter. Moderate permeable barrier retardance class in RUSLE2. Refers to "retardance" to surface water flow.			SE-13	Compost Socks and Berms
	Compost Sock, 12-inch	12-inch diameter. High permeable barrier retardance class in RUSLE2. Refers to "retardance" to surface water flow.				
Gravel bag berm	Gravel Bag Berm SE-6	1-inch gravel. Moderate permeable barrier retardance class in RUSLE2. Refers to "retardance" to surface water flow.	SC-6	Gravel Bag Berm	SE-6	Gravel Bag Berm

APPENDIX C
REFERENCE GUIDE: CALTRANS CONSTRUCTION BMPs IN RUSLE2

Caltrans RUSLE2 Program (2024 version)			Caltrans Storm Water Quality Handbooks Construction Site BMP Manual		CASQA Stormwater BMP Handbook: Construction	
BMP Type	Practice Name in RUSLE2 (1)	Description (2, 3, 4, 5, 6)	ID	BMP Type	ID	BMP Type
Not modeled in RUSLE2.			SC-7	Street Sweeping and Vacuuming	SE-7	Street Sweeping and Vacuuming
Sandbag barrier	Sand Bag Barrier SE-8	Course sand. Moderate permeable barrier retardance class in RUSLE2. Refers to "retardance" to surface water flow.	SC-8	Sandbag Barrier	SE-8	Sandbag Barrier
Straw bale barrier	Straw Bale Barrier- SE-9	High permeable barrier retardance class in RUSLE2. Refers to "retardance" to surface water flow.	SC-9	Straw Bale Barrier	SE-9	Straw Bale Barrier
Not modeled in RUSLE2.			SC-10	Storm Drain Inlet Protection	SE-10	Storm Drain Inlet Protection
See "Fiber rolls" section.			See SC-5 above.		SE-13	Compost Socks and Berms (near SE-5 above)

NOTES:

(1) BMPs in the RUSLE2 Management Tab are listed in both the temporary BMPs folder (Construction phase) and permanent BMPs folder (Post-construction phase) under the similar names. They differ by how long they are simulated to be in service by RUSLE2. The Construction phase BMPs are modeled in use for 2 years, whereas the Post-construction phase vegetated BMPs are modeled in use for 15 years.

(2) Application rates (lb/ac) are dry weights of fiber material. Tackifiers and stabilizing emulsions, if included in the mixture, are not part of the dry weights.

(3) Materials (e.g., wood fiber, netting, tackifier, etc) used in the BMPs are biodegradable.

(4) Caltrans RUSLE2 uses a mix of perennial ryegrass and white clover to model a seed mix of grass and forbs. For Winter seed applications, small grain annuals are added.

(5) Fiber for hydromulch can be wood, cellulose (paper), or an alternative fiber such as cotton or corn stalks, fine screened compost, or a combination. RUSLE2 does not show a difference in the type of fiber used.

(6) Tackifier for Bonded Fiber Matrix (BFM) is a high performance, cross-linked adhesive. Polymer Stabilized Fiber Matrix (PSFM) uses polyacrylamide (PAM). PAM is a passive treatment technology triggering additional requirements under the CGP, see Attachment G. Other hydromulch applications use guar, psyllium, starch, polymeric blends, polysaccharides, or a combination. RUSLE2 does not show a difference in the type of tackifier used.

(7) Soil roughening is not a standalone BMP and should be installed in combination with other Soil Stabilization BMPs

ACRONYMS:

BFM = Bonded fiber matrix
CECB = Compost erosion control blanket
EC = Erosion control
NS = Non-stormwater management
PSFM = Polymer stabilized fiber matrix
RECP = Rolled erosion control product

SC = Sediment control
SE = Sediment control
SS = Soil stabilization
TC = Tracking control
WE = Wind erosion
WM = Waste management and materials pollution control

Appendix D: RUSLE2 Output Cover Sheet

This cover sheet, along with the RUSLE2 outputs, must be attached to the SWDR at PS&E.

This cover sheet, along with the RUSLE2 outputs, must be inserted into Attachment J of the projects' SWPPP for projects that have coverage under the CGP.

RUSLE2 OUTPUT COVER SHEET

Caltrans®

Contract Number (EA):_______________
Project Identifier: __________________
District-County-Route: ____________
Post Mile Limits: __________________
RUSLE2 Model Developer (name and title): __________________
RUSLE2 Model Completion Date (insert date): __________________

The attached output documents the following condition: (check all that apply)

☐ Pre-construction vs Post-construction Output – Design Phase

☐ Pre-construction vs Post-construction Output – NOT

☐ Pre-construction vs Construction Output – TMDL Project

☐ Pre-construction vs Construction Output – Surface Water Buffer Project