

## Lesson Plan 4.

# Rangeland Hydrology, Soil Characteristics, Sediments, and Maps

### Goals/Overview

Understand rangeland hydrology and soil erosion concepts and how they affect water quality. Practical applications of these concepts include the effects of organic matter on pasture production, water quality, soil texture, stability in rain events, and water infiltration. Participants should be able to evaluate areas on a ranch with respect to infiltration, vulnerability to erosion, and hydrologic connectivity from compacted soil areas.

### Learning Objectives:

1. Understand the importance of soil for water quality management and pasture production.
2. Understand hydrologic connectivity resulting from compaction and the rainfall-runoff relationships previously discussed.
3. Review the fate and transport of common rangeland pollutants and “hydrologic connectivity.”
4. Understand different types of erosion, sediment sources, and fate and transport of sediments.
5. Gain ability to locate areas without infiltration and delineate where runoff goes.
6. Become comfortable using resources online and drawing on experts within conservation partnerships to assist with assessing and evaluating individual ranch water quality challenges.

### Introduction/Hook:

- Review any historical maps participants bring to share.
- Provide tools for learning about soil properties at individual ranches, such as UC Davis Soils Web apps and USDA-NRCS resources.

### Materials/Speakers:

- Consider the amount of detail to be covered in workshop portion compared to field day components and when that will occur. This topic

may be completely covered during a field day if electronic resources are available.

- Have internet interface available for laptop to demonstrate online tools such as NRCS Web Soil Survey. Use GIS, Google Earth, or other aerial photos with soil layers from UC Davis Soils Web application.
- Invited speaker would be someone with knowledge in soil science, potentially from UCCE, NRCS, or an RCD.
- Educational video: “[Streamflow Generation in California Rangelands](#)” (32 minutes).
- Educational video: “[Fate and Transport of Sediment](#)” (28 minutes).
- Educational video: “[Drought Management](#)” (15 minutes, depending on local issues).
- Water Board staff invited to learn about program and continue to build relationships with landowners.
- Provide example of binder with RWQP from Tomales Bay or Napa/Sonoma watersheds; review maps produced for specific ranches and go over soils map details, scale, and uses.
- Provide attendees handouts of pertinent resources.
- Food and beverages—snacks and coffee/tea suffice during introductory meetings.

### Time Allocated:

Allow 1.5 to 2 hours (60 minutes for presentations and 30 minutes for questions).

### Procedures/Activities/Strategies/Questions:

- Review any recent observations of attendees around their ranches following rainfall events.
- Discuss important soil properties, using county soil survey, with examples of specific map units common to participants' ranches.
- Discuss measuring rainfall and connections to streamflow generation.

- Present video: “Streamflow Generation in California Rangelands”
- Present video: “Fate and Transport of Sediment.”
- Review geologic maps and landforms common to certain soil series within watershed.
- Compare and contrast fate and transport of sediments in rangeland watersheds.
- Present video: “Drought Management on California Rangelands” (depending on local issues).
- Discuss legacy soil erosion issues and expectations for handling legacy sites in RWQP.
- Complete the Session Evaluation Form (appendix A).

### Conclusion/Self-assessment:

- Have participants identify where and when a majority of erosion occurred over last 50 years.
- Have them consider if vegetation cover and productivity passively healed in eroded areas or if active management was needed.

### Resources:

- Lewis, D. J., K. W. Tate, J. M. Harper, and J. Price. 2001. Survey identifies sediment sources in North Coast rangelands. *California Agriculture* 55(4):32–37. <https://escholarship.org/uc/item/1nh5291b>
- Natural Resources Conservation Service. 2001. Rangeland Sheet 9. Rangeland Soil Quality—Water Erosion. [https://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs142p2\\_051599.pdf](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051599.pdf)
- Natural Resources Conservation Service. 2020. Web Soil Survey. <https://websoilsurvey.nrcs.usda.gov/app/>
- O’Geen, A. T., R. Elkins, and D. Lewis. 2006. Reducing Runoff from Irrigated Lands: Erodibility of Agricultural Soils, with Examples in Lake and Mendocino Counties. Oakland: UC Agriculture and Natural Resources Publication 8194. <https://anrcatalog.ucanr.edu/pdf/8194.pdf>
- UC Agriculture and Natural Resources. 2020. SoilWeb: An online soil survey browser. <https://casoilresource.lawr.ucdavis.edu/gmap/>

### Next Steps/Future Lessons:

- Participants should consider the effectiveness of previously completed conservation practices on their ranch.
- Participants should consider how practices have changed sediment delivery, pasture productivity and ranch viability.
- Suggest that participants view previews for videos 11, 12, and 13 prior to Lesson Plan 5.