# Lesson Plan 18.
# Streams and Gullies

## Goals/Overview:

Explain importance of properly managing streams, gullies, and other waterways to maintain ranch water quality while improving grazing management options and minimizing impacts to overall ranch viability.

## Learning Objectives:

1. Understand the hydrology and erosion process of headcuts and identify them before they cross a stability threshold that leads to significant gully formation and soil erosion.
2. Gain ability to estimate volume of sediment with potential erosion as a tool to prioritize sites to correct.
3. Learn about the role of riparian vegetation in filtering storm runoff and controlling erosion.
4. Understand the conditions that warrant riparian fencing and alternative practices that attract livestock away from riparian corridors.
5. Understand multiple options have been proven to improve riparian vegetation by changing grazing management. Riparian grazing, restoration, and enhancement methods used with success on ranches include: 1) controlling the timing and duration of riparian grazing by fencing riparian corridors within existing pastures, 2) fencing riparian areas to exclude livestock, 3) changing the type/age class of livestock, 4) reducing duration of grazing, or 5) reducing grazing intensity and controlling season of use."E qo r rgvgr{ "tgo qxkpi " rkxguvqem'j cu"pqv'dggp"vj g"dguv'tguvqtcvkqp" o gvj qf "qt"vj g"qpr{ "uqnwkqp"hqt"gxgt{ "ukvg0
6. Learn about options for revegetating streams with trees, using multiple species. Consider the appropriate species in your area. For example, in coastal California, taller tree species with upright growth, such as a 15-year-old box elder (*Acer negundo*), are able to compete with arroyo willow (small trees), need less maintenance, and use less water. Other tall, canopy-forming tree species include Pacific willow (*Salix lucida*), Fremont cottonwood (*Populus fremontii*), and Oregon ash (*Fraxinus latifolia*).

## Introduction/Hook:

- The start of large gullies could be tied to specific weather events. Participants can compare when gullies formed on their ranches (1964, 1982, 1986, 1997, 1998, 2006, and so on) compared to the ranch being visited. Were there specific storm events, perhaps in El Niño years, that caused significant erosion?
- Stockpiled and well-managed riparian vegetation near streams and gullies can be an important forage resource, especially during drought years, during late summer and early fall.

## Materials/Speakers:

- Invited speaker and facilitator of discussion would be someone with knowledge in watershed management and soil science from UCCE, NRCS, RCD, or other relevant organization.
- Consider inviting Water Board staff to review regulations and learn about ranch streams.
- Invite NRCS and RCD staff to be available to explain funding sources for projects to remedy stream and gully water quality problems.
- Bring copies of the RWQP Template and extra copies of the Pasture Assessment—Worksheet 4, Stream Assessment—Worksheet 5, Future Water Quality Projects—Worksheet 7, Monitoring—Worksheet 10, and the worksheets from the Sediment Delivery Inventory and Monitoring publication.
- Provide attendees handouts of pertinent resources.

## Time Allocated:

Allow 2 to 4 hours, including lunch (40 minutes for presentations, 30 minutes for question/answer, 10 minutes for reviewing regs, 20 minutes for traveling

within ranch, 30 minutes for lunch, and 1 to 2 hours for discussing sites).

## Procedures/Activities/Strategies/Questions:

- Visit the host ranch, preferably with the rancher and invited speakers, several days prior to the field tour to plan site visits, discussion points, and the tour progression/flow.
- Choose a host ranch that has a mix of implemented fixes and current problems that can be visited and discussed during the field tour.
- Welcome; attendees introduce themselves if new attendees are present. Introduce and thank the landowner for hosting.
- Ask landowner and/or ranch manager to tell the history of ranch being visited. Be careful to ask appropriate questions that the landowner has considered ahead of time and prioritized adequately.
- Observe and review accessible conservation and restoration project sites along streams and gullies. Share information on why and how project was conducted and how well it has reduced erosion risk.
- At an actual or potential erosion site, work through the sediment assessment forms in the Sediment Delivery Inventory and Monitoring publication so that participants know how to assess sites on their ranch.
- Discuss historical observations of attendees around their ranches following large rainfall events and when gullies began to form.
- Review Pasture Assessment—Worksheet 4, Stream Assessment—Worksheet 5, and Monitoring—Worksheet 10 from RWQP Template during and after guided walk around ranch.
- Explain how NRCS cost-share funds and other grant funds can help landowners "fix" problematic sites.
- Complete the Session Evaluation Form (appendix A).

## Conclusion/Self-assessment:

- Discuss potential opportunities to improve riparian vegetation on participants' ranches. Have fun with group predicting outcomes and brainstorming options for how to design projects that balance trade-offs, and acknowledge concerns.
- Locate and compare active and stable headcuts on the ranch. Will the information about estimating potential erosion volumes help you manage and prioritize your streams and gullies for reducing sediment delivery downstream?

## Resources:

Lennox, M. S., D. J. Lewis, J. Gustafson, K. W. Tate, and E. R. Atwill. 2007. Water Quality Treatment for Livestock Feeding and Exercise Areas on California Coastal Dairy Farms and Ranches. Oakland: UC Agriculture and Natural Resources Publication 8210. https://anrcatalog.ucanr.edu/pdf/8210.pdf

Lennox, M. S., D. J. Lewis, R. D. Jackson, J. Harper, S. Larson, and K. W. Tate. 2011. Development of vegetation and aquatic habitat in restored riparian sites of California's North Coast rangelands. Restoration Ecology 19(2): 225–233. https://doi.10.1111/j.1526-100X.2009.00558.x

Lewis, D. J., E. R. Atwill, M. S. Lennox, L. Hou, B. Karle, and K. W. Tate. 2005. Linking on-farm dairy management practices to storm-flow fecal coliform loading for California coastal watersheds. Environmental Monitoring and Assessment 107:407–425. https://doi.org/10.1007/s10661-005-3911-7

Lewis, D. J., E. R. Atwill, M. S. Lennox, M. D. G. Pereira, W. A. Miller, P. A. Conrad, and K. W. Tate. 2009. Reducing microbial contamination in storm runoff from high use areas in California coastal dairy pastures. Water Science and Technology 60(7):1731–1743. https://doi.10.2166/wst.2009.561

Lewis, D. J., K. W. Tate and J. M. Harper. 2000. Sediment Delivery Inventory and Monitoring. Oakland: UC Agriculture and Natural Resources Publication 8014. http://anrcatalog.ucanr.edu/pdf/8014.pdf

O'Geen A. T., R. A. Dahlgren, A. Swarowsky, K. W. Tate, D. J. Lewis, and M. J. Singer. 2010. Research connects soil hydrology and stream water chemistry in California oak woodlands. California Agriculture 64(2):78–84. https://doi.org/10.3733/ca.v064n02p78

Wong, K. M. 2007. Islands in a sea of grass. The Bay. April 1. https://baynature.org/article/islands-in-a-sea-of-grass/

## Next Steps/Future Lessons:

- Consider historical pasture productivity changes resulting from erosion—gullies, streams and/or sheet/rill types of erosion. How has carrying capacity of ranches changed over preceding decades?