



Western SARE

Phil Rasmussen, Coordinator
Utah State University
Agricultural Science Building
Room 305
4865 Old Main Hill
Logan, Utah 84322-4865
phone: (435) 797-2257
fax: (435) 797-3344

Professional Development Program

Morgan Doran
California PDP Coordinator
Livestock & Natural Resource Farm
Advisor
University of California Cooperative
Extension
501 Texas Street
Fairfield, CA 94533
707.784.1326
mpdor@ucdavis.edu

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IMPROVING RIPARIAN HEALTH

Introduction

Livestock grazing on streams associated with mountain meadows in California can negatively impact riparian vegetation, stream stability, water quality, and wildlife habitat. However, we have observed degradation at some grazed meadows but not others. This reflects differences in grazing management and meadow/stream resiliency to grazing. It is our opinion that identifying and promoting sustainable riparian grazing management is dependent upon: 1) working directly with grazing managers to identify grazing practices that maintain riparian health yet are logistically and economically



Above, cattle graze a healthy fenced riparian area. At right, a project participant collects stream insects.

feasible; and 2) conducting research at the management scale to insure the results are relevant at the management scale.

Project Objectives

- Identify grazing management activities associated with healthy mountain meadow streams
- Extend these recommendations to grazing managers, regulators, and policy makers

Study Sites

Fifty-eight grazed meadow-stream riparian areas were enrolled in this cross-sectional survey. Sites were located on both public and private grazing lands across the Sierra Nevada Range, the southern Cascade Range, and the Modoc Plateau.

Site Characteristics

Stream substrate type (silt/sand, gravel, cobble), solar radiation/canopy cover, channel width and depth, streambank erosion/vegetative cover, etc.

Data Collection

Grazing Management

One-on-one, on-site survey



of the grazing manager (e.g., number of head, class of livestock, season of use, time spent herding to distribute livestock).

Riparian Health Assessment

A first approximation of riparian health was determined for each site using the U.S. EPA *Habitat Assessment Field Data Sheet* (HAFDS), which assigns a health score of 0 (very poor) to 20 (excellent) based upon an 11-panel questionnaire.

A direct measure of riparian health was made by sampling in-stream macroinvertebrate (insect) community, taxonomic ID, and calculation

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The Western Region, one of four SARE regions nationwide, is administered through Utah State University.

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of macro-based indicators of stream health (e.g., % sample composed of taxa intolerant of pollution, richness, diversity).

Correlation of Grazing Management to Riparian Health

USEPA HAFDS Riparian Health Score: Linear regression analysis was used to identify grazing management activities and site characteristics that were positively and negatively correlated with U.S. EPA HAFDS health score (0 to 20). $P < 0.10$ for significance.

In-stream Macroinvertebrate Metrics: Negative binomial regression analysis was used to identify grazing management activities that were positively and negatively correlated with 10 macroinvertebrate metrics sensitive to changes in stream conditions (e.g. water temperature, sedimentation). Independent variables were grazing management and site characteristics, $P < 0.10$ for significance.

Results

Grazing and EPA Riparian Health Score

Positive Grazing Management: Riparian health score was positively correlated to the time a manager invests to maintain off-stream livestock attractants such as salt, supplemental feeds, and drinking water ($p < 0.05$). The practice of providing off-site attractants was not significant, rather the time invested to insure the practice is effective. Time spent herding to distribute livestock from meadow to meadow, or into uplands, was also positively correlated with riparian health score.

Negative Grazing Management: Livestock density (head/ac) on the pasture or allotment containing the meadow was negatively associated with riparian health score, as was the frequency, or number of times per year, the meadow was grazed dur-



Above, a grazed healthy meadow stream bank stands in stark contrast to the grazed unhealthy stream bank below.



ing a single year. These variables reflect overall grazing pressure applied to the meadow.

Grazing and Macroinvertebrate Metrics

Livestock Distribution Effort: The overall time invested in activities to distribute livestock away from meadows and associated streams was the only grazing activity correlated with macroinvertebrate metrics. Basically, as the amount of time per year spent herding livestock, placing and regularly moving salt/mineral, and checking the working order of off-stream drinking water sources increased there was an associated increase in the macroinvertebrate metrics indicative of healthy ripar-

ian conditions. There was also a reduction in the metrics indicative of riparian degradation.

Conclusions

Management of livestock distribution is a critical management activity to enhance and sustain riparian health in mountain meadow grazing systems. Simple distribution tools such as herding, salting, and off-stream water are effective for protecting riparian areas, but management effort must be invested to assure success.

Expectations for stream health based upon macroinvertebrate metrics must account for inherent site differences in stream substrate type.