Western Riparian Areas

- < 1% of arid western landscapes
- Private and public ownership
- Critical aquatic habitat
- Sensitive species
- Forage production
- Clean water
- Nutrient and flood attenuation

Livestock and Riparian Areas

Conflicting experiences and opinions

Is Sustainable Riparian Grazing Possible?

- **Absolutely Not!**
  - Livestock decimate wetlands!

- **Absolutely!**
  - Riparian areas NEED the cow!

- **"Best Available Science"**
  - Livestock decimate wetlands!
  - Riparian areas NEED the cow!
  - It actually depends upon sustainable management…

Sustainable Riparian Grazing

Research and Management Eras

1) A body of case studies & research from the 1970's through mid-1990's that demonstrates the negative outcomes of management to optimize meat and fiber.

Sustainable Riparian Grazing

1970s through mid-1990s research body

Examples

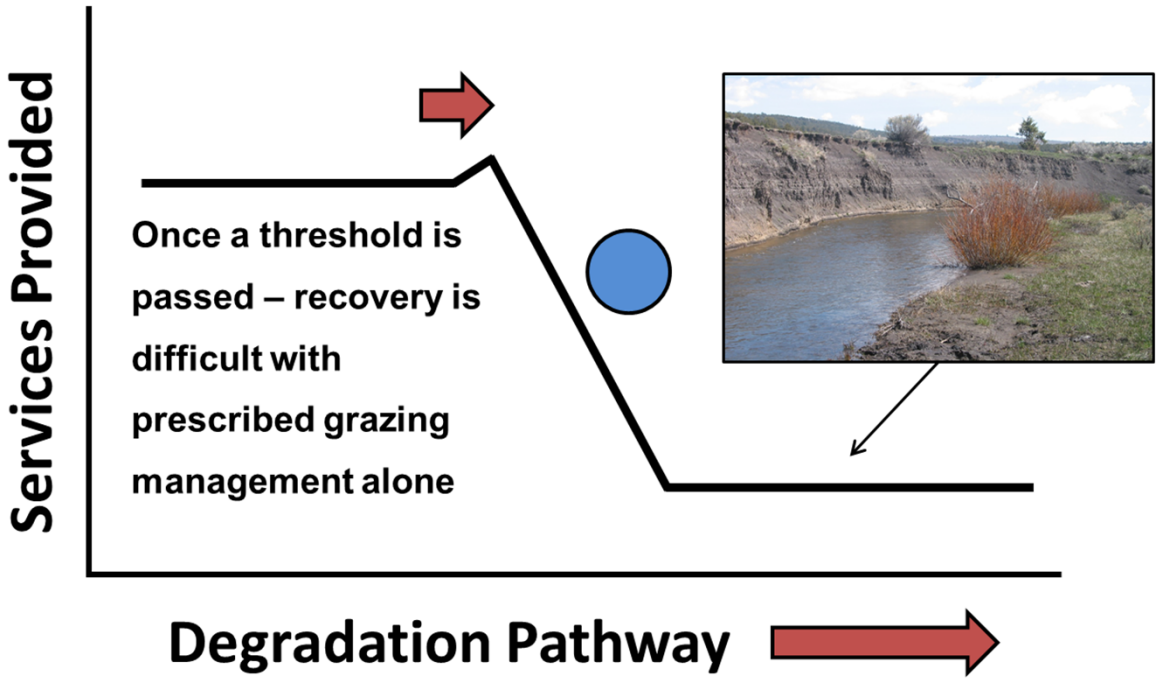
Kauffman and Krueger. 1984. ***Livestock impacts on riparian ecosystems and streamside management implications: a review.*** Range Management.

Trimble and Mendel. 1995. ***The cow as a geomorphic agent—a critical review.*** Geomorphology.

Belsky et al. 1999. ***Survey of livestock influences on stream and riparian ecosystems in the western U.S.*** Soil Water Conservation.

Unmanaged Riparian Grazing

- damage to riparian vegetation → less rooting
- unstable stream banks
- stream channel erosion
- loss of water table, habitat, and water quality



Armour et al. 1994. *The Effects of Livestock Grazing on Western Riparian and Stream Ecosystem*. Fisheries.

"Overgrazing of riparian areas and streams by domestic livestock has damaged thousands of linear miles in these ecosystems."

"The position of the American Fisheries Society is to advocate for livestock management practices that result in recovery and protection of riparian and stream ecosystems associated with public and private lands."

Late 1990s – early 2000s

Riparian Grazing Standards and Guidelines
(ex. USFS Reg. 5)

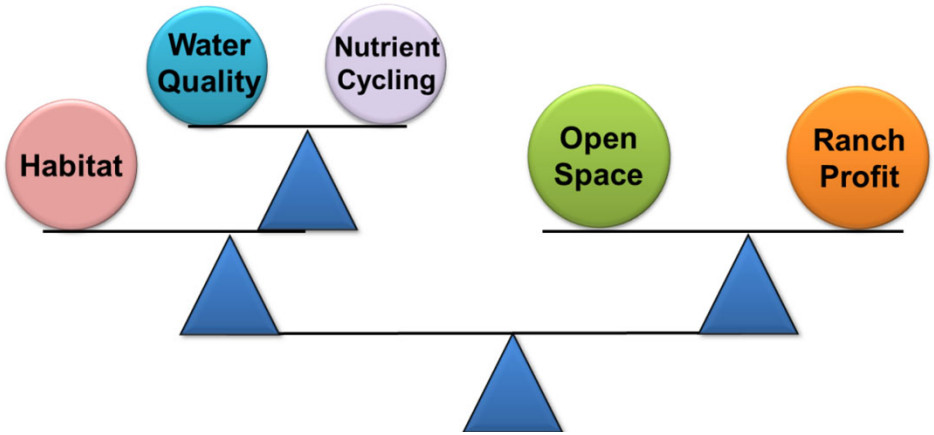
- **Herbaceous Vegetation Use** – Limits on the percentage of meadow forage production that can be used (e.g., 40%).
- **Herbaceous Stubble Height** – Sets a minimum residual height for meadow forage following grazing (e.g., 4 inches).
- **Browse on Riparian Woody Plants** – Limits on the percentage of new year's leader growth which can be browsed on species such as aspen and willow (e.g., 20%).
- **Streambank Disturbance** – Limits the amount of livestock hoof damage or trampling on streambanks (e.g., 10%).

Sustainable Riparian Grazing

Research and Management Eras

1) A body of case studies & research from the 1970's through mid-1990's that demonstrates the negative outcomes of management to optimize meat and fiber.

2) A contemporary body of research demonstrates the effectiveness of modern management for enhancing riparian health.



Sustainable Riparian Grazing

Contemporary research body

Examples

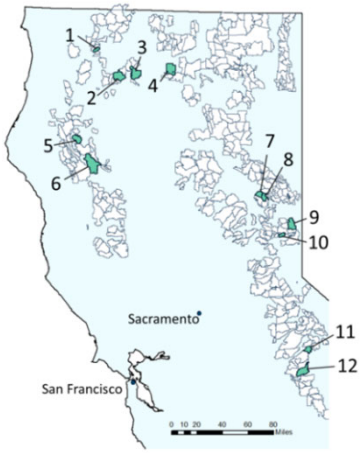
Clary. 1999. ***Stream channel and vegetation responses to late spring cattle grazing.*** J. of Range Management.

George et al. 2011. ***A scientific assessment of the effectiveness of riparian management practices.*** USDA Rangeland CEAP.

Freitas et al. 2014. ***Montane meadow plant community response to grazing.*** Environmental Management.

Oles et al. 2017. ***Riparian meadow response to modern conservation grazing.*** Environmental Management.

Contemporary Research Body



"Cattle grazing, recreation, and clean water can be compatible goals across these national forest lands"
Roche et al. 2013 PLOS ONE

"Aspen w≤ 20% of leader growth removed annually grow above the browse line within several years. "
Jones et al. 2009. Range. Ecol. Mange.

"No benefit to Yosemite toad in fenced meadows compared to USFS riparian grazing standards and guidelines"
McIlroy et al. 2013 PLOS ONE

Contemporary Research Body

Conservation Biology

Effects of Cattle Grazing on Diversity in Ephemeral Wetlands

Efectos del Apacentamiento de Ganado sobre la Diversidad en Humedales Efímeros

JAYMEE T. MARTY

First published: 01 September 2005 | https://doi.org/10.1111/j.1523-1739.2005.00198.x | Citations: 160

RESTORATION ECOLOGY
The Journal of the Society for Ecological Restoration
SER

RESEARCH ARTICLE

Loss of biodiversity and hydrologic function in seasonal wetlands persists over 10 years of livestock grazing removal

Jaymee T. Marty

First published: 20 May 2015 | https://doi.org/10.1111/rec.12226 | Citations: 28

Journal of Applied Ecology
BRITISH ECOLOGICAL SOCIETY

RESEARCH ARTICLE | Open Access

Vernal pool wetlands respond to livestock grazing, exclusion and reintroduction

Julia S. Michaels, Kenneth W. Tate, Valerie T. Eviner

First published: 10 September 2021 | https://doi.org/10.1111/1365-2664.14001

Grazing for conservation

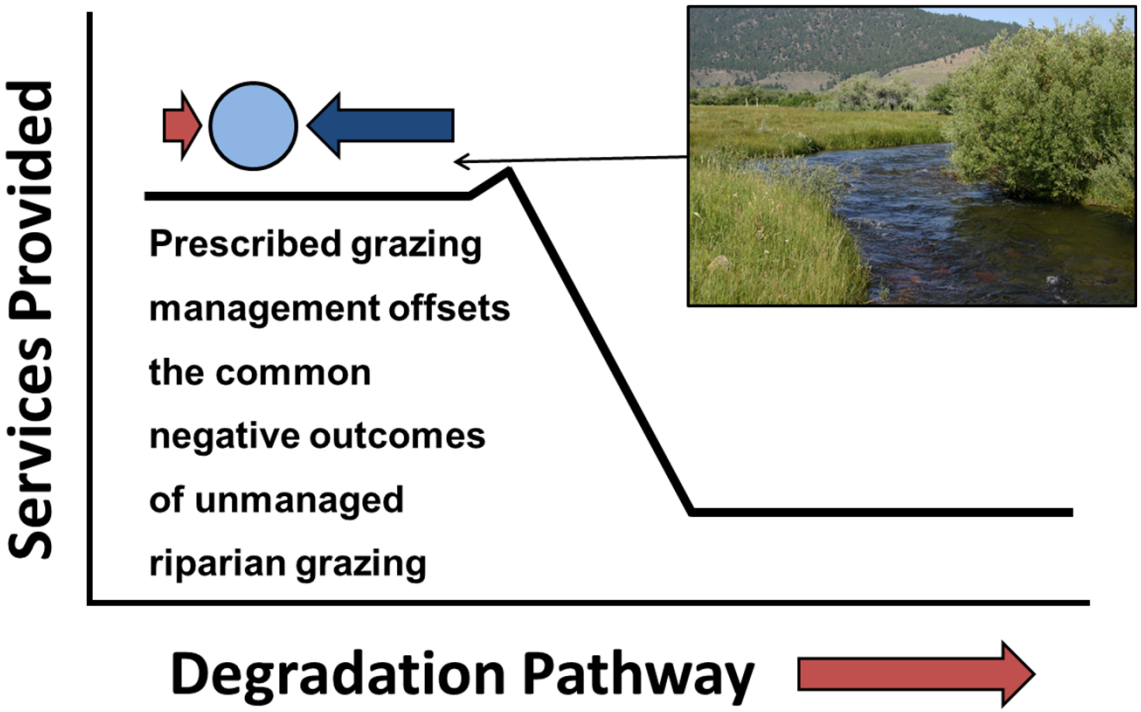
U.S. Fish and Wildlife Service · Follow
3 min read · Feb 18, 2022

83

Cattle's taste for non-native grasses helps vernal pools thrive

Sustainable Riparian Grazing

- set riparian enhancement goals
- set targets/limits on livestock browse on desired plants, and disturbance to stream banks
- adaptive grazing management to meet these targets

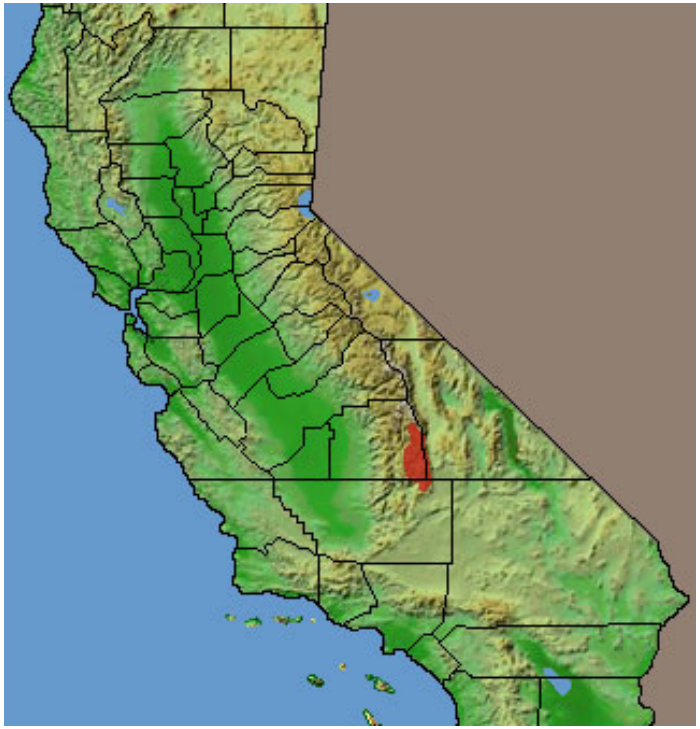


Sustainable Riparian Grazing:
Two Management Scale Case Studies

1. **Recovery of degraded meadows under sustainable grazing**
2. **Riparian friendly grazing survey**

Recovery of degraded meadows under sustainable grazing

- Inyo National Forest, Kern Plateau
- Riparian grazing standards 1990s/early 2000s



Recovery of degraded meadows under sustainable grazing

Odion et al. 1988. *Cattle grazing in S.E. Sierran meadows: ecosystem change and prospects*. Plant Bio. Of E. Calif.

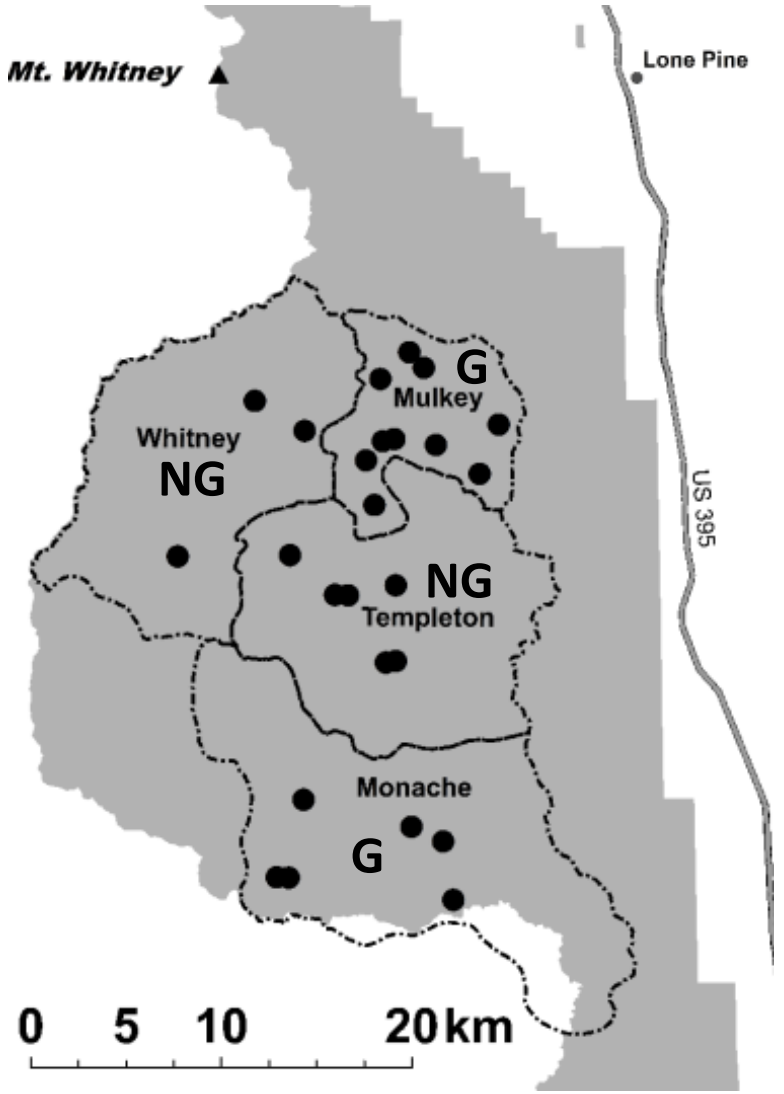
- Examined herbaceous vegetation responses following 2 years of grazing exclusion on the Templeton Allotment
- Found significantly greater herbaceous plant densities inside the exclosure
- Found over 80% use of herbaceous veg., 75 % browse on willows, over 50% bare ground….

Recovery of degraded meadows under sustainable grazing

Four Grazing Allotments

2 grazed, 2 not grazed

Allotment	Prior to 2000	After 2000
Monache	no riparian standards	riparian standards
Mulkey	no riparian standards	riparian standards
Templeton	no riparian standards	no grazing
Whitney	no riparian standards	no grazing



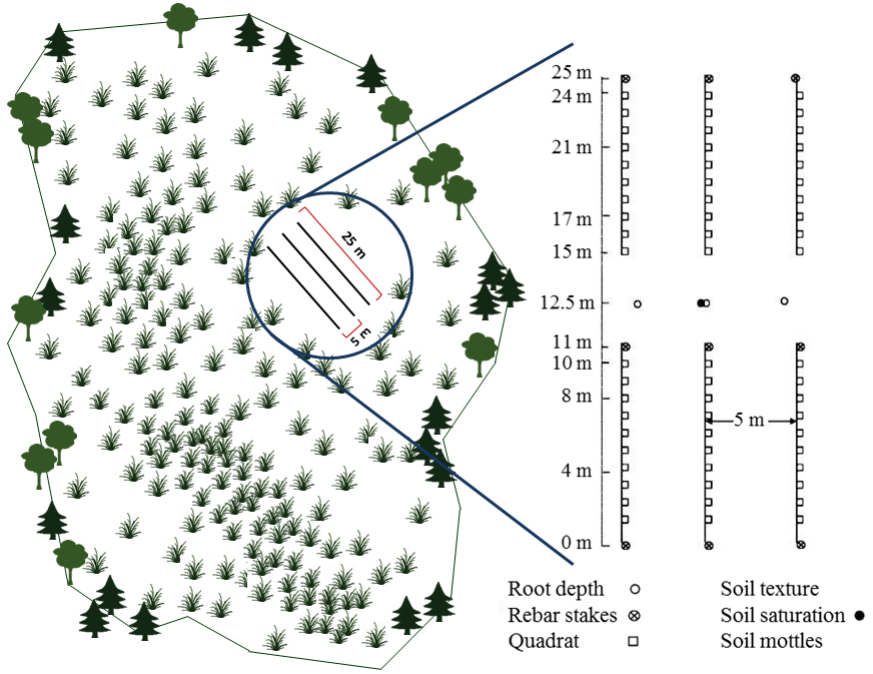
Recovery of degraded meadows under sustainable grazing

10 Years of Data on Meadow Response

2000 = baseline, 2005 = 5 years post, 2010 = 10 years post

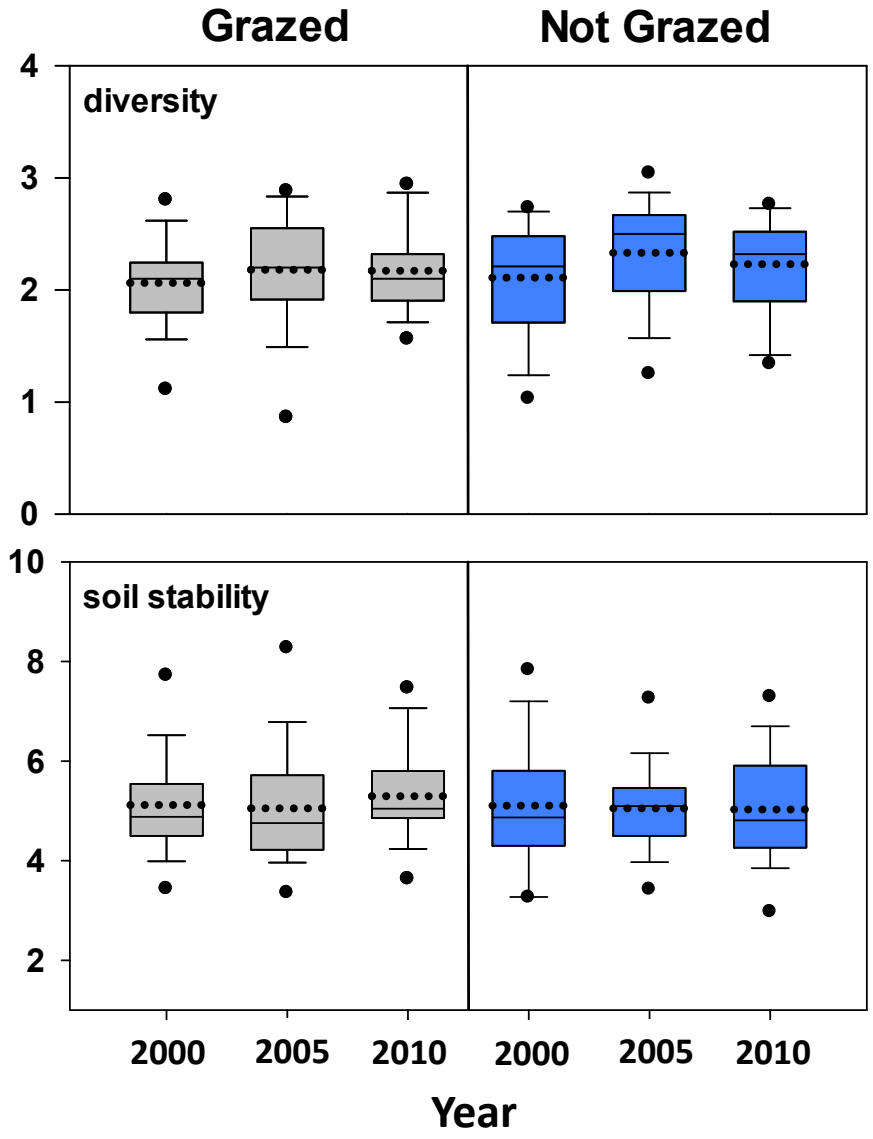
Long term, permanent transects established in meadows throughout each allotment.

Herbaceous plant community health metrics (e.g., diversity, richness, soil stabilizers, invasive spp.)



Sustainable grazing versus No grazing

- Non-grazed meadows did not recover at a greater rate than grazed meadows.
- Species richness and diversity increased the same across grazed and not grazed meadows over the decade.



Recovery of degraded meadows under sustainable grazing

Wait a minute!!

Odion et al. ***1988.*** *Cattle grazing in S.E. Sierran meadows: ecosystem change and prospects*. Plant Bio. Of E. Calif.

VS

Freitas et al. ***2014.*** *Montane meadow plant community response to grazing.* Environmental Management.

Recovery of degraded meadows under sustainable grazing

Wait a minute!!

Odion et al. ***1988***.
80% use of herb. veg., 75% browse, >50% bare ground

vs

Freitas et al. ***2014***.
<40% use of herb. veg., <10% browse, <5% bare ground

Sustainable Riparian Grazing:
Two Management Scale Case Studies

1. Recovery of degraded meadows under sustainable grazing

2. **Riparian friendly grazing survey**

Riparian Friendly Grazing Survey

Survey of 130 Grazed Riparian Areas

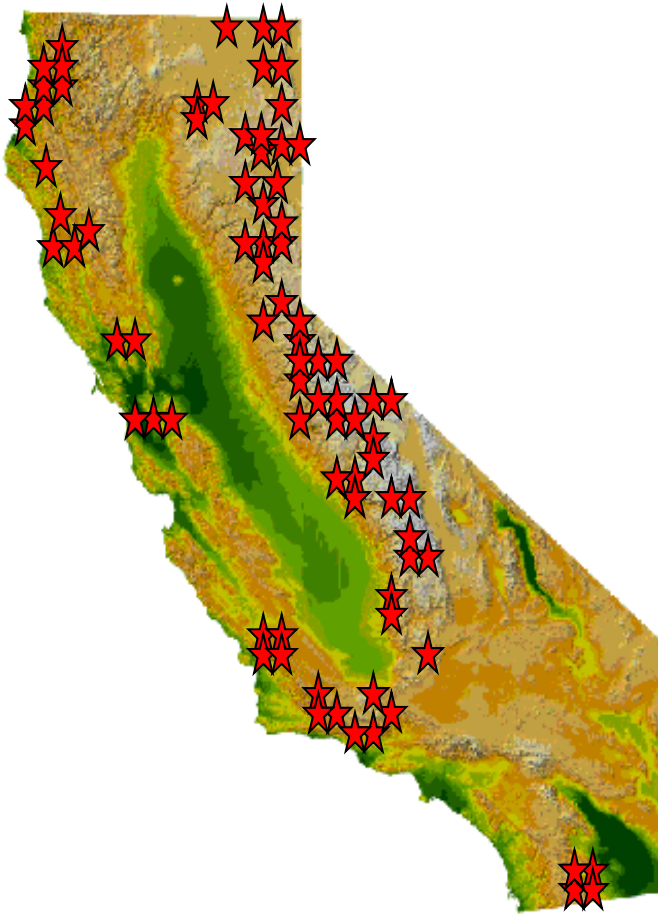
treams across CA

anging from

xcellent to poor

ealth.

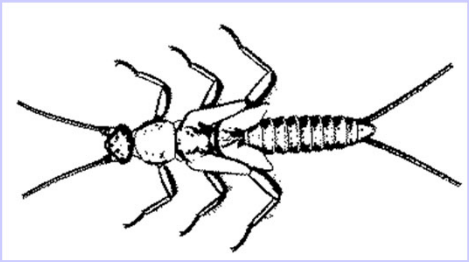
- Which practices were associated with excellent and poor health?



EPA – CDFW Stream Health Assessment

stability

fish habitat



macroinverts.

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION #	RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE / TIME AM PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat; at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is <0.3 m/s, deep is >0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Overall Health Score

0 – 5	poor
6 – 10	marginal
11 – 15	suboptimal
16 – 20	optimal

Grazing Management

Off-site water, herding, season, frequency, fencing, etc.

Site Characteristics

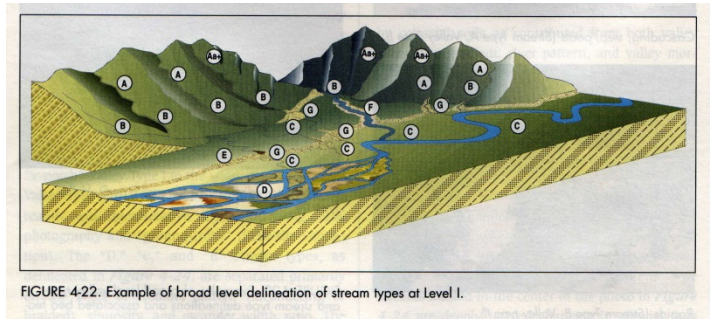


FIGURE 4-22. Example of broad level delineation of stream types at Level I.

Elevation, channel slope, substrate, watershed disturb., past disturb., etc.

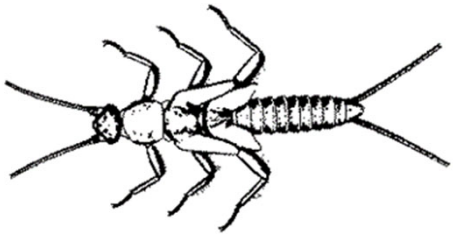
Correlated to Riparian Health

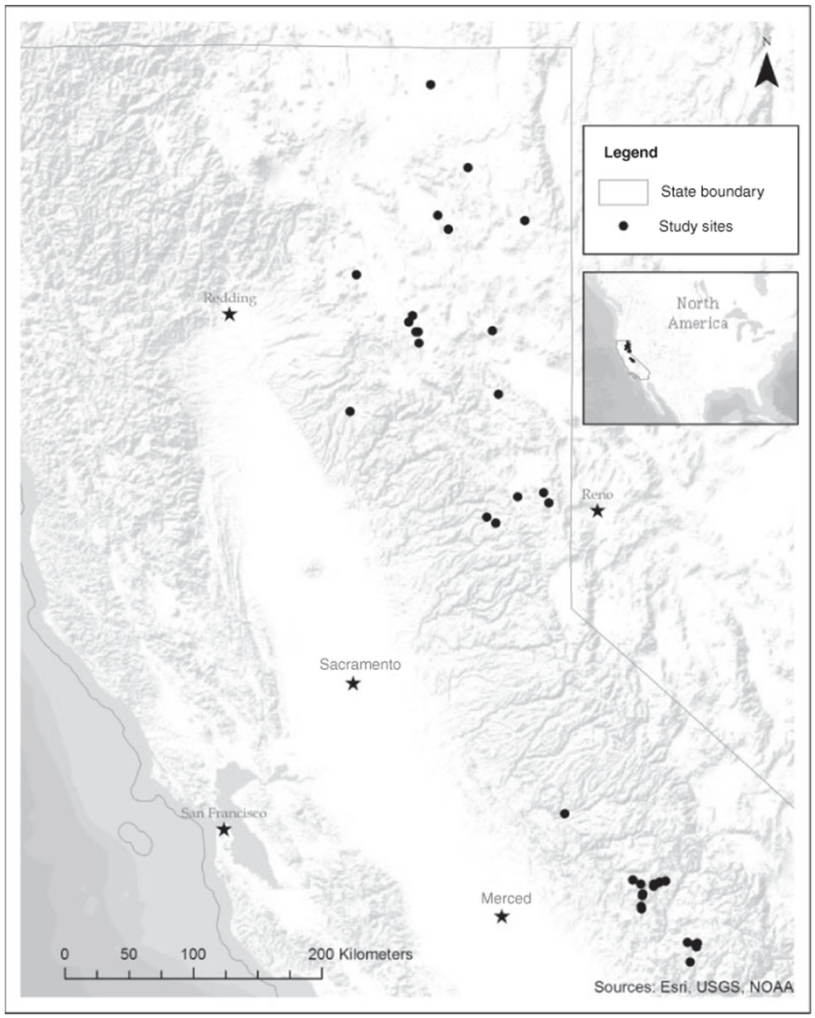
- Off-stream attractants such as water tanks and supplement – days/yr (+).
- Herding to control utilization and time spent in riparian area – days/yr (+).
- Rest period duration – days/yr (+).
- Grazing duration – days/yr (-).
- Cattle density (cows/ac) during grazing bouts (-).
- Frequency of grazing bouts per yr (-).

Derose, et al. 2020. *Riparian Health Improves with Managerial Effort to Implement Livestock Distribution Practices*. The Rangeland Journal.

Surveyed 46 grazed riparian areas:

- Stocking rate and livestock distributional practices
- Riparian health by benthic macroinvertebrates





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Surveyed 46 grazed riparian areas:

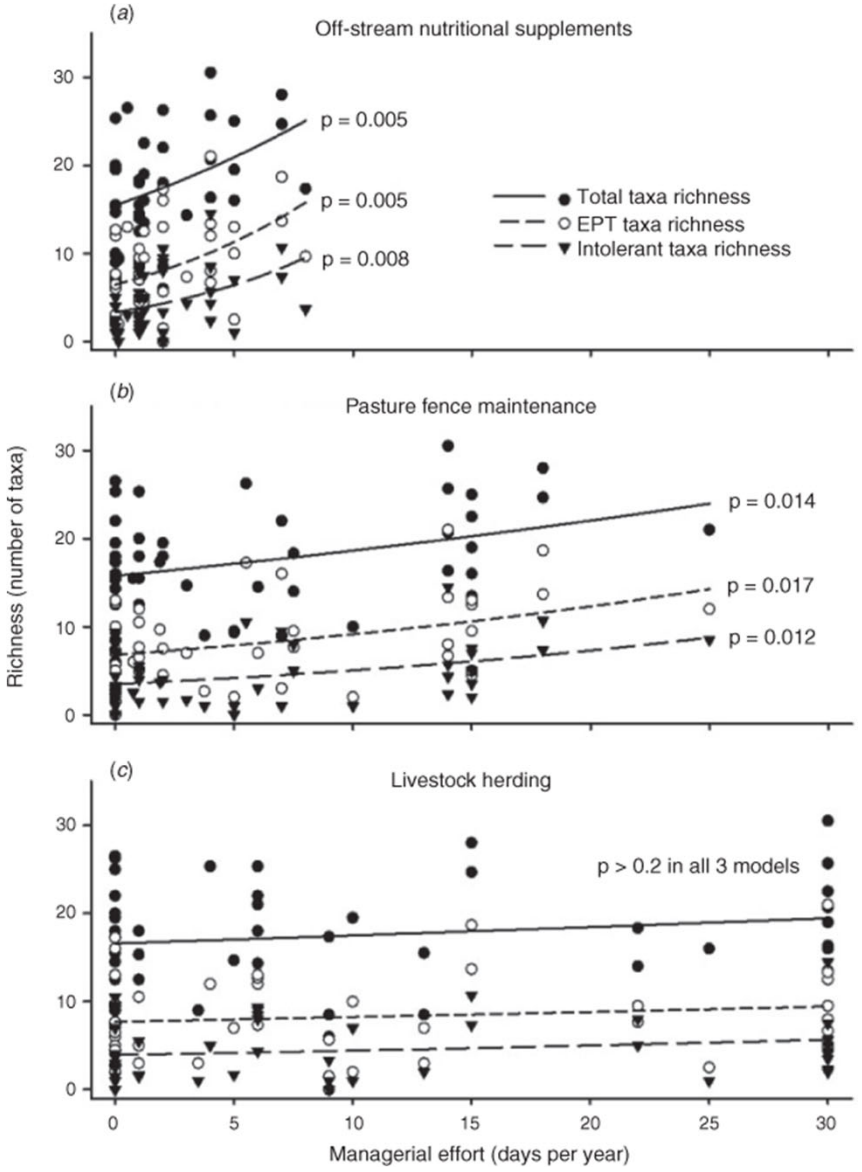
- Stocking rate and livestock distributional practices
- Riparian health by benthic macroinvertebrates

Results:

- Riparian health not correlated to stocking rate, nor implementation (yes/no) of distributional practices.
- Riparian health correlated to managerial effort to implement distributional practices.

Effort Matters:

- Practices that manage livestock access can improve riparian health by as much as 53 percent with a week's investment per grazing season.



Sustainable Riparian Grazing
Striking a Multiple Use Balance

- **The biophysical science is not conflicting**
  - **Research conducted during the different "grazing eras" likely do accurately reflect the divergent outcomes of the policies and strategies of each era.**

1994 ≠ 2023

Sustainable Riparian Grazing
Striking a Multiple Use Balance

- **The biophysical science is clear**
  - **Grazing management without conservation goals degrades riparian health.**

Sustainable Riparian Grazing
Striking a Multiple Use Balance

- **The biophysical science is clear**
  - Grazing management without conservation goals degrades riparian health.
  - **Grazing management with conservation goals enhances riparian health.**

Sustainable Riparian Grazing

- set riparian enhancement goals
- set targets/limits on livestock browse on desired plants, and disturbance to stream banks
- adaptive grazing management to meet these targets