


## Managing Grazing for Water Quality Integrating research and management



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## Some Risk Factors



- Heavy grazing - excessive soil compaction, riparian degradation, reduced filtration, heavy fecal loading.
- Livestock allowed frequent contact with surface water.
- Grazing during periods of runoff.
- Fecal deposition in areas of high runoff.

## Some Opportunities



- Pathogen prevalence low in beef cattle, some confined to certain classes.
- Rangelands have great capacity to filter pollutants in runoff.
- Pathogens can die quickly in fecal pats during spring-fall.
- Think tool box – not silver bullet.

## Microbial Water Quality & Cattle Grazing Organizing Our Knowledge

Factors that increase risk of water pollution with pathogens

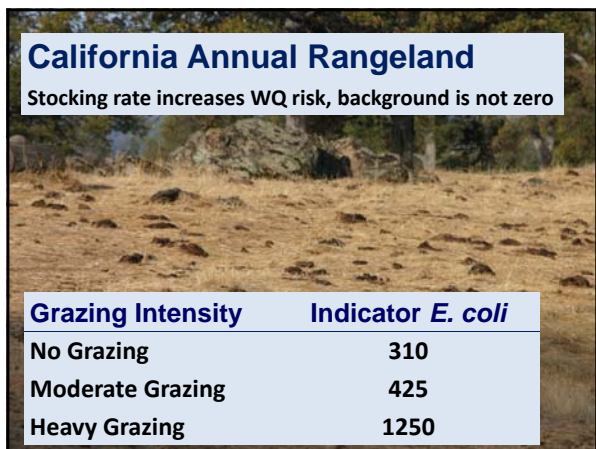
<b>High stocking rates</b> <ul style="list-style-type: none"> <li>• more fecal load</li> <li>• more defecation in water, near water, and runoff areas</li> <li>• more runoff and pathogen transport</li> </ul>	<b>Herd infected</b> <ul style="list-style-type: none"> <li>• calves &lt; 4 mo</li> <li>• calving during rainy season</li> <li>• long calving season</li> </ul>	<b>Distribution - space</b> <ul style="list-style-type: none"> <li>• cattle defecate in water</li> <li>• cattle defecate near water</li> <li>• cattle defecate in runoff areas</li> </ul>	<b>Distribution - time</b> <ul style="list-style-type: none"> <li>• cattle defecate near water during rainy season</li> <li>• cattle defecate in runoff areas during runoff</li> </ul>
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Factors that reduce risk of water pollution with pathogens

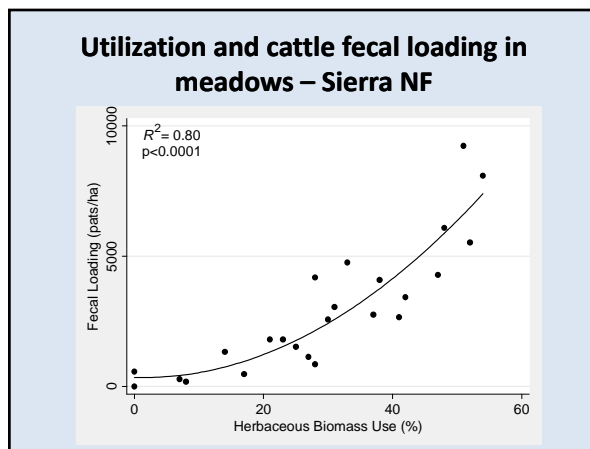
<b>Moderate Grazing</b> <ul style="list-style-type: none"> <li>• set cattle numbers in balance with forage production</li> <li>• enhance soil hydrologic health</li> </ul>	<b>Manage Calving</b> <ul style="list-style-type: none"> <li>• keep calves &lt; 4 mo away from water</li> <li>• offset calving from rainy season</li> <li>• shorten calving season</li> </ul>	<b>Manage Cattle Distribution</b> <ul style="list-style-type: none"> <li>• provide off-stream water</li> <li>• place supplemental feed away from water and runoff areas</li> <li>• create riparian/runoff pastures</li> <li>• create buffer strips</li> </ul>	<b>Manage Grazing Time</b> <ul style="list-style-type: none"> <li>• reduce cattle grazing near water during rainy season</li> <li>• reduce cattle grazing in runoff areas prior to and during runoff</li> </ul>
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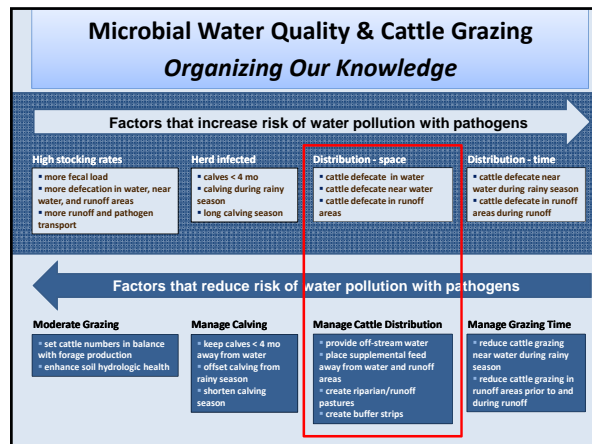
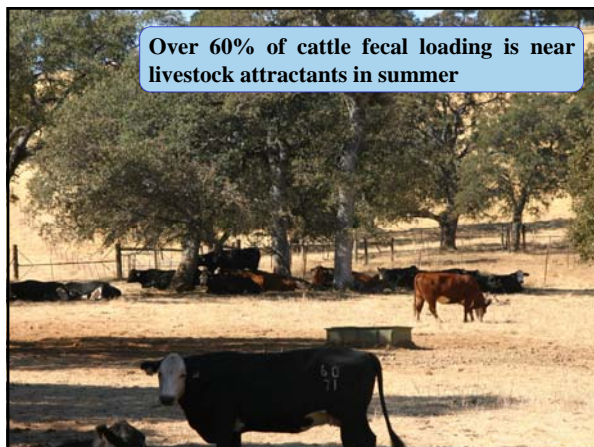
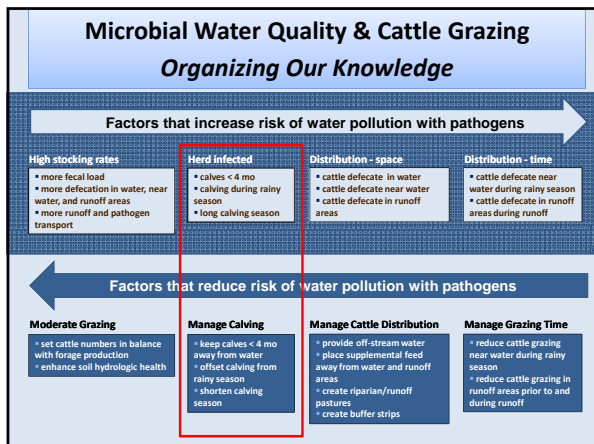
## California Annual Rangeland

Stocking rate increases WQ risk, background is not zero



Grazing Intensity	Indicator <i>E. coli</i>
No Grazing	310
Moderate Grazing	425
Heavy Grazing	1250





### Do you know where your supplement is?

- Move existing supplement and water sites away from streams.
- Evaluate trails leading to and from existing and proposed sites – do they link site to stream during storms?

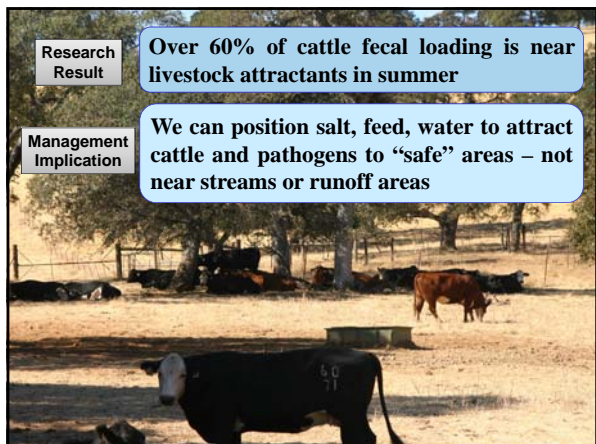


Research Result

Over 60% of cattle fecal loading is near livestock attractants in summer

Management Implication

We can position salt, feed, water to attract cattle and pathogens to “safe” areas – not near streams or runoff areas



## Opportunity

CA rangelands have great capacity to filter microbial and other pollutants transported in surface runoff



Research Result

>90% of *E. coli* retained in the fecal pat or trapped within 1 ft

Rainfall

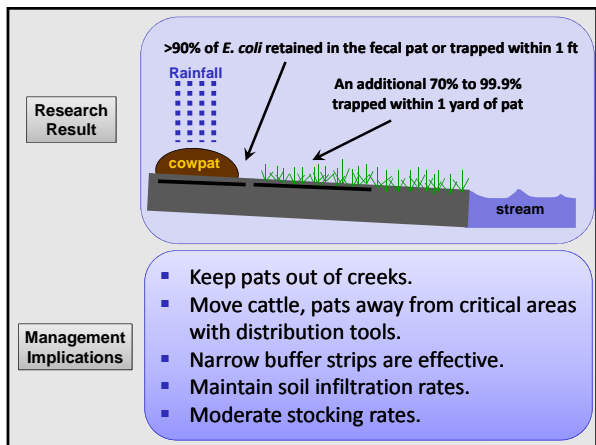
cowpat

stream

An additional 70% to 99.9% trapped within 1 yard of pat

Management Implications

- Keep pats out of creeks.
- Move cattle, pats away from critical areas with distribution tools.
- Narrow buffer strips are effective.
- Maintain soil infiltration rates.
- Moderate stocking rates.


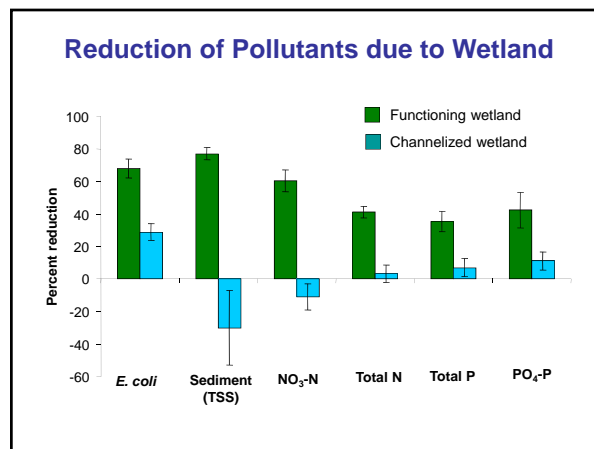


### Vegetative Filter Strips and Wetlands

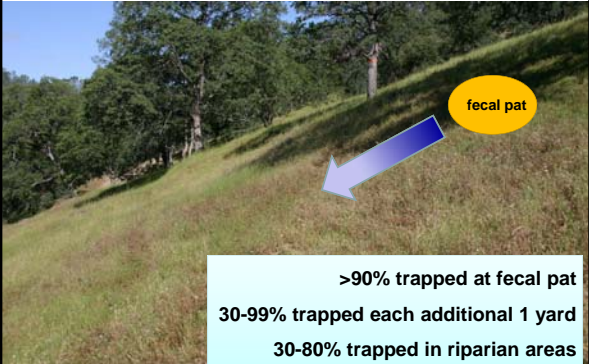
A water quality tool



### Functioning riparian areas filter pollutants from runoff

**Distribute cow pats away from streams and the whole range is a buffer**



**>90% trapped at fecal pat**  
**30-99% trapped each additional 1 yard**  
**30-80% trapped in riparian areas**

**Microbial Water Quality & Cattle Grazing**  
**Organizing Our Knowledge**

**Factors that increase risk of water pollution with pathogens**

<b>High stocking rates</b> • more fecal load • more defecation in water, near water, and runoff areas • more runoff and pathogen transport	<b>Herd infected</b> • calves < 4 mo • calving during rainy season • long calving season	<b>Distribution - space</b> • cattle defecate in water • cattle defecate near water • cattle defecate in runoff areas	<b>Distribution - time</b> • cattle defecate near water during rainy season • cattle defecate in runoff areas during runoff
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**Factors that reduce risk of water pollution with pathogens**

<b>Moderate Grazing</b> • set cattle numbers in balance with forage production • enhance soil hydrologic health	<b>Manage Calving</b> • keep calves < 4 mo away from water • offset calving from rainy season • shorten calving season	<b>Manage Cattle Distribution</b> • provide off-stream water • place supplemental feed away from water and runoff areas • create riparian/runoff pastures • create buffer strips	<b>Manage Grazing Time</b> • reduce cattle grazing near water during rainy season • reduce cattle grazing in runoff areas prior to and during runoff
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**Opportunity**



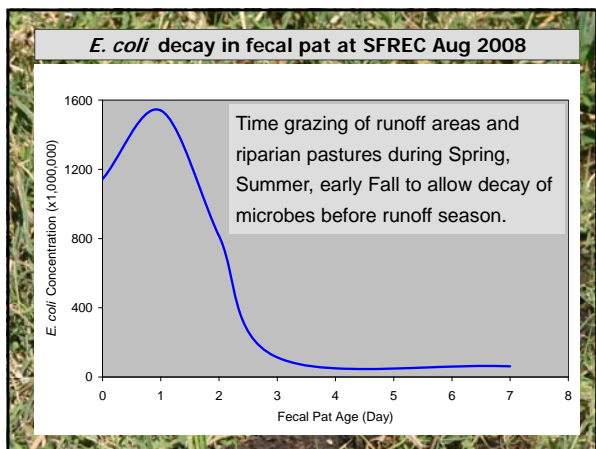
**Microbial pollutants die fast in fecal pats during Spring, Summer, Fall**

**C. parvum survival in cow pats on range**

	Days until >90% dead	Fecal Pat Temperature (F)
<b>Research</b>	72	50
<b>Result</b>	29	68
	5	86
	<1	104

**Translation**  
 Once temperature in a cow fecal pat exceeds 104 °F all of the *C. parvum* in that pat die within a matter of hours. Fecal pats in direct sun achieve 104 °F once air temperature reaches 78 °F.

**Management Implication**  
 We can use this fact to time grazing in critical runoff areas so that there are enough days above 78 °F to neutralize any *C. parvum* in cattle fecal pats prior to rainfall and runoff.



**Fencing to manage grazing along streams.**

- Exclusionary buffers,** vegetation management for weeds, fuels, N uptake, etc.
- Riparian pastures,** integrate into rotational grazing program based on timing, intensity, frequency of use.



**Fencing to manage grazing along streams.**

- Reduce time spent in and near water - difficult during dry season without fencing.
- Control time of use near stream.
- Control intensity of use near stream.
- May not be needed.

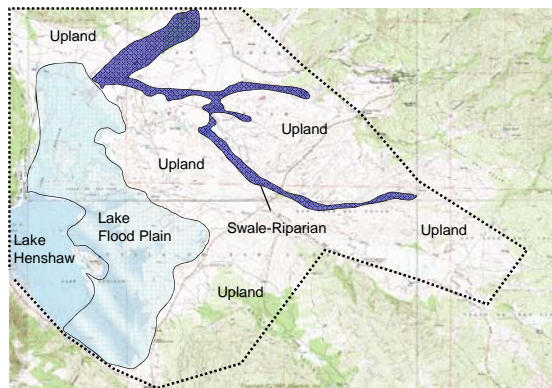


**Example – putting the pieces together**

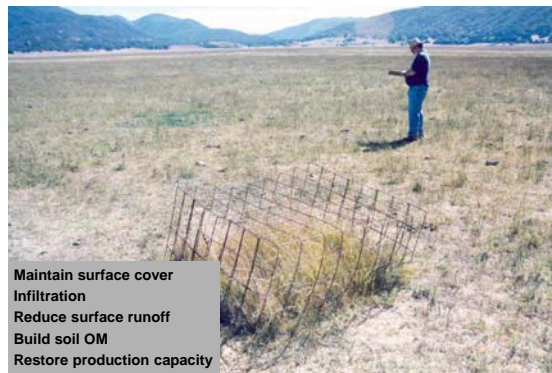
- Warner Ranch
- Drinking water for Vista, CA
- Owned by Vista Irrigation District
- Evaluated grazing plan – leased for dairy replacement heifers.



**Warner Ranch – Lower Lake Henshaw Watershed**

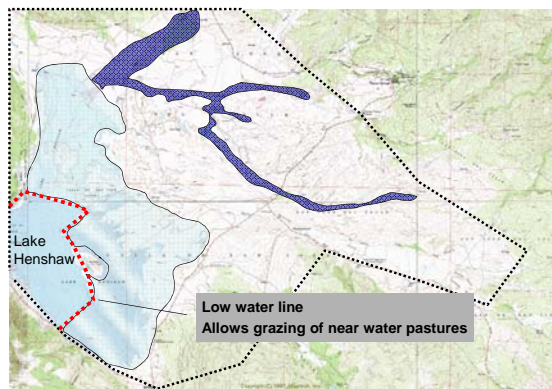


**First Step – establish and achieve RDM standards**



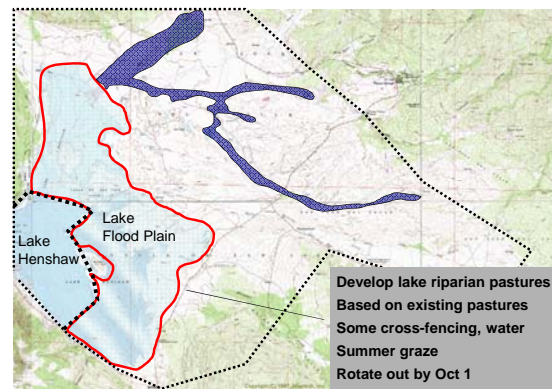
- Maintain surface cover
- Infiltration
- Reduce surface runoff
- Build soil OM
- Restore production capacity

**Second Step – Control access to Lake Henshaw**

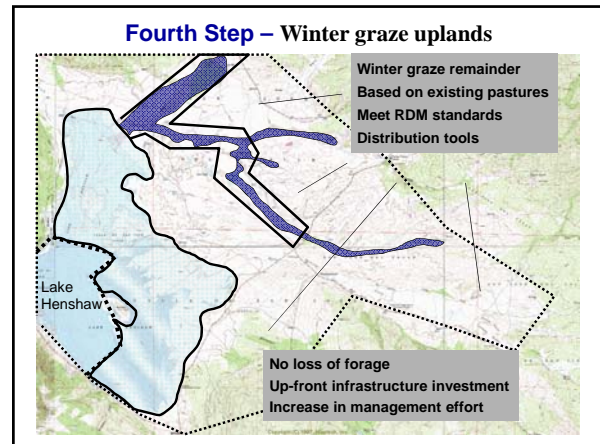
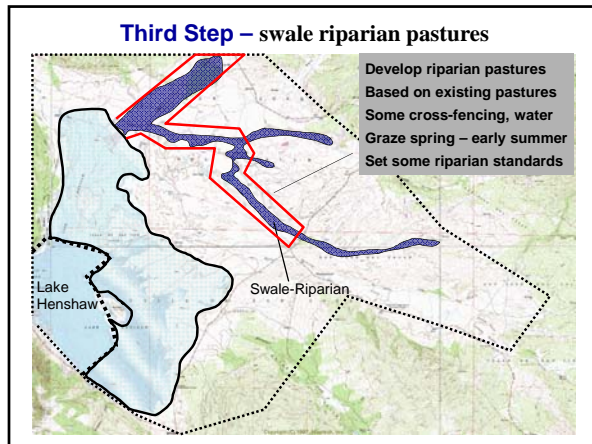


Low water line  
Allows grazing of near water pastures

**Second Step – Lake riparian pastures**



Develop lake riparian pastures  
Based on existing pastures  
Some cross-fencing, water  
Summer graze  
Rotate out by Oct 1



**We are working to get the science organized, translated, and available**

California Rangeland Watershed Laboratory  
<http://rangelandwatersheds.ucdavis.edu>

A photograph showing a herd of black and brown cattle grazing in a dry, grassy field. A road and trees are visible in the background.