

An Assessment of Grazing Land BMPs for Riparian Area Protection

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Institute**

2004 303(d) List - Bacteria Related Impairments



Texas Commission on Environmental Quality
 Total Maximum Daily Load Program
 Mail Code 203
 Post Office Box 13087
 Austin, Texas 78711-3087
 Map Created On May 11, 2006

Recreational Use Impairments

Addressed by a TMDL	72	39%
Additional Data Needed	111	61%

Oyster Water Impairments

Addressed by a TMDL	13	93%
Additional Data Needed	1	7%

Total 197

A Upper Bosque Area



B Houston Metro Area



Legend

- Bacteria Impairments 2004
- Oyster Water Impairments
- Counties
- Streams
- Reservoirs/Bays
- Cities



C Orange County Area

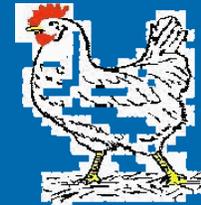
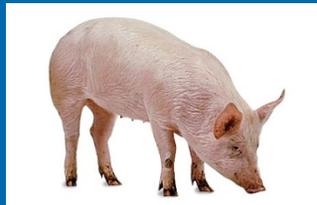
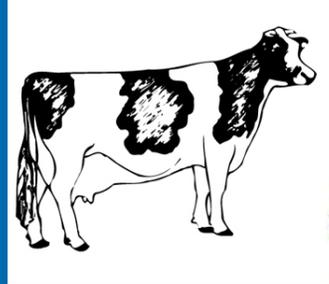
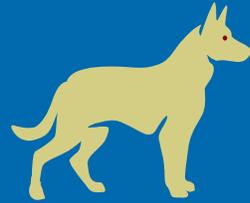


Bacteria

**#1 Cause of
 Water Quality
 Impairment
 in Texas**

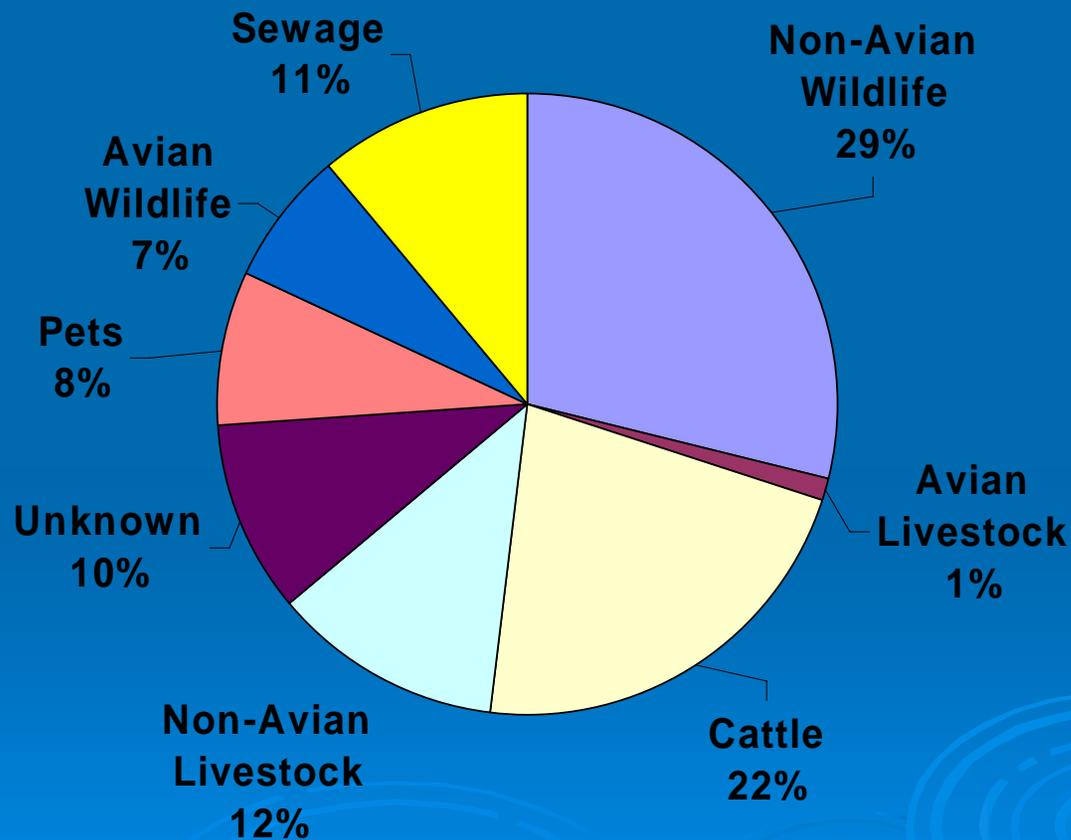


Sources of Bacteria



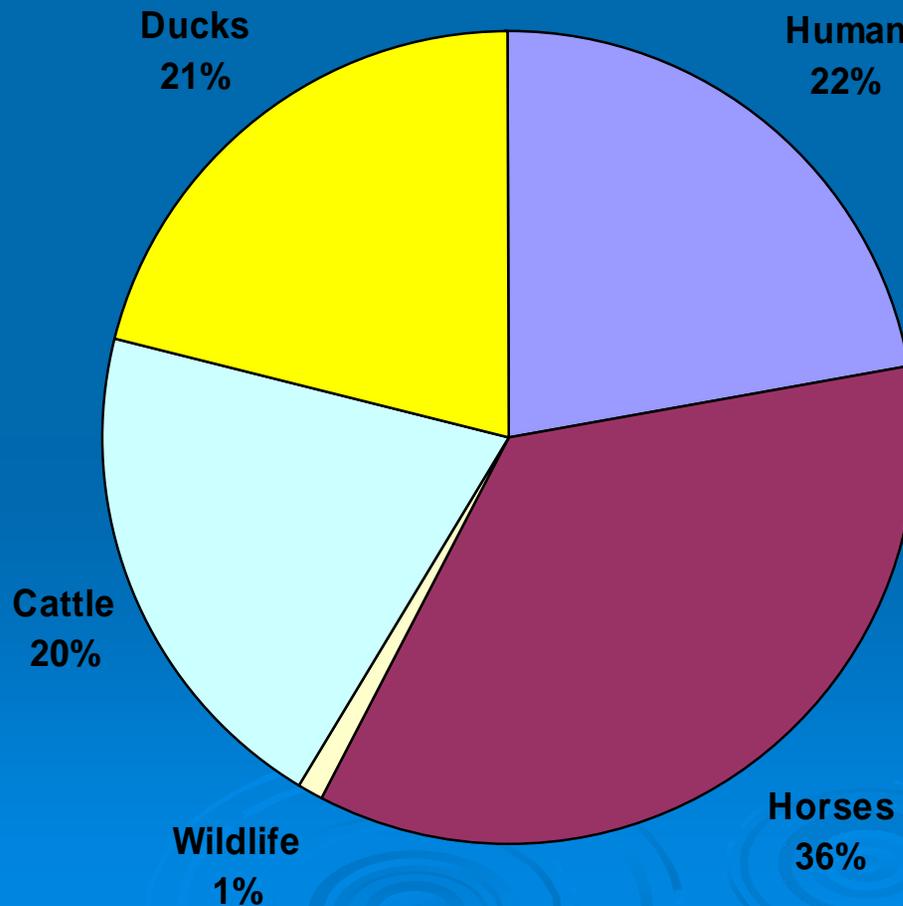
Peach Creek Bacteria TMDL

Major sources according to bacterial source tracking



Copano Bay Bacteria TMDL

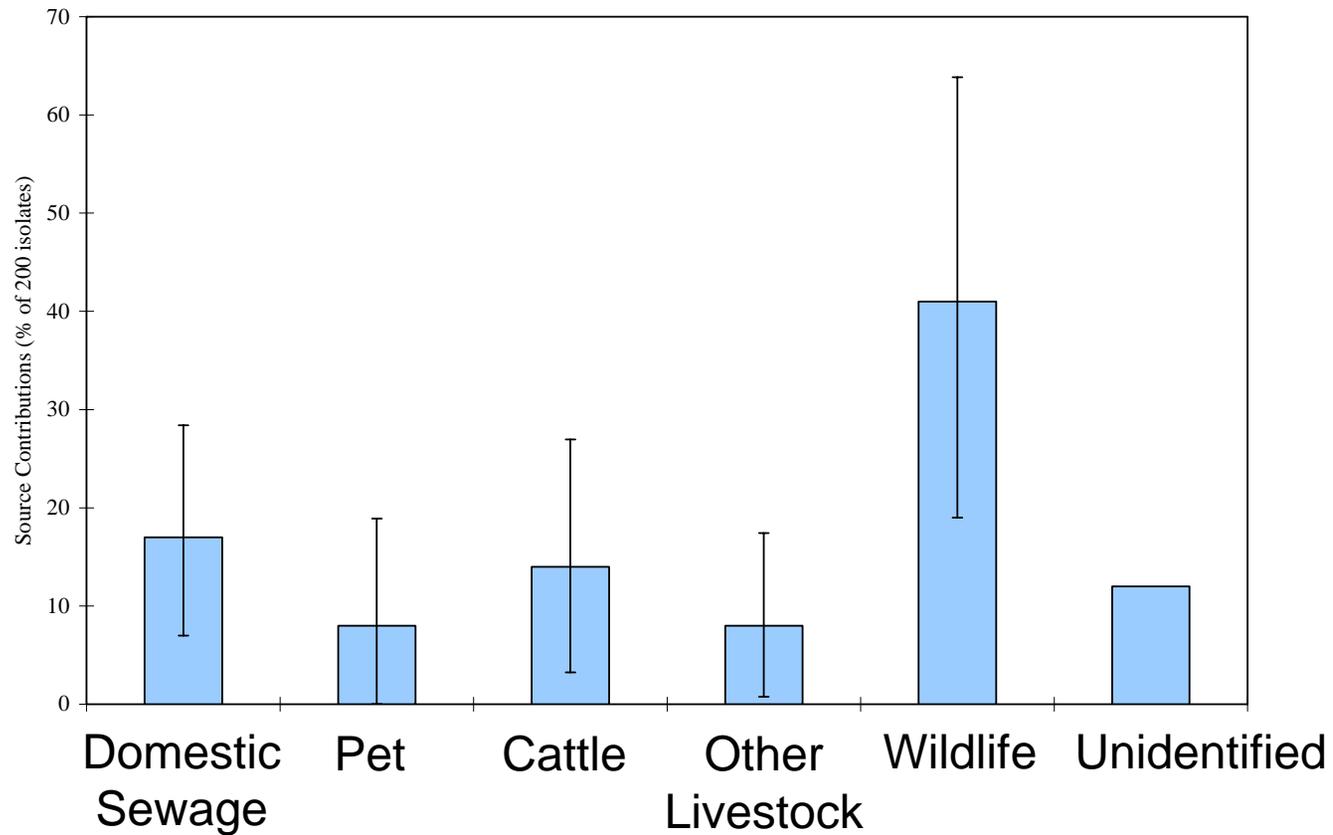
Sources according to bacteria source tracking



Leon River

BST Results = 15% from cattle & 10% from other livestock

Leon River



What can ranchers do?



Reduce cattle's time in & near stream



Maintain adequate ground cover



How can you reduce the amount of time cattle spend in & near stream?

➤ Why do cattle spend time in & nr streams?

- Drinking water
- Shade
- Grazing
- Get away from flies
- Cooling

➤ What can you do to address these?

- Fence off stream
 - Provide other sources of water and shade
 - Practice good grazing management
 - Practice good herdsmanship
- 

What can you do to improve / maintain adequate ground cover?

- Stocking Rate / Grazing Systems
- Forage Selection / Management
- Nutrient & Pest Management



TSSWCB, EPA & USDA-NRCS provided funding to Texas A&M to:

1. Evaluate effects of providing alternative water on:
 - Percent time cattle spend near stream
 - Bacteria (*E. coli*) loading
 2. Evaluate effects of grazing management on bacteria runoff from:
 - Rangeland
 - Improved pasture
 - Irrigated pasture
- 

Alternative Water Source

- Encourages livestock to obtain water away from the stream.
- Easy to implement
- NRCS & TSSWCB cost-share programs help reduce costs.



Without an alternative water source, this producer is out of business...



Environmental Benefits of Alternative Water

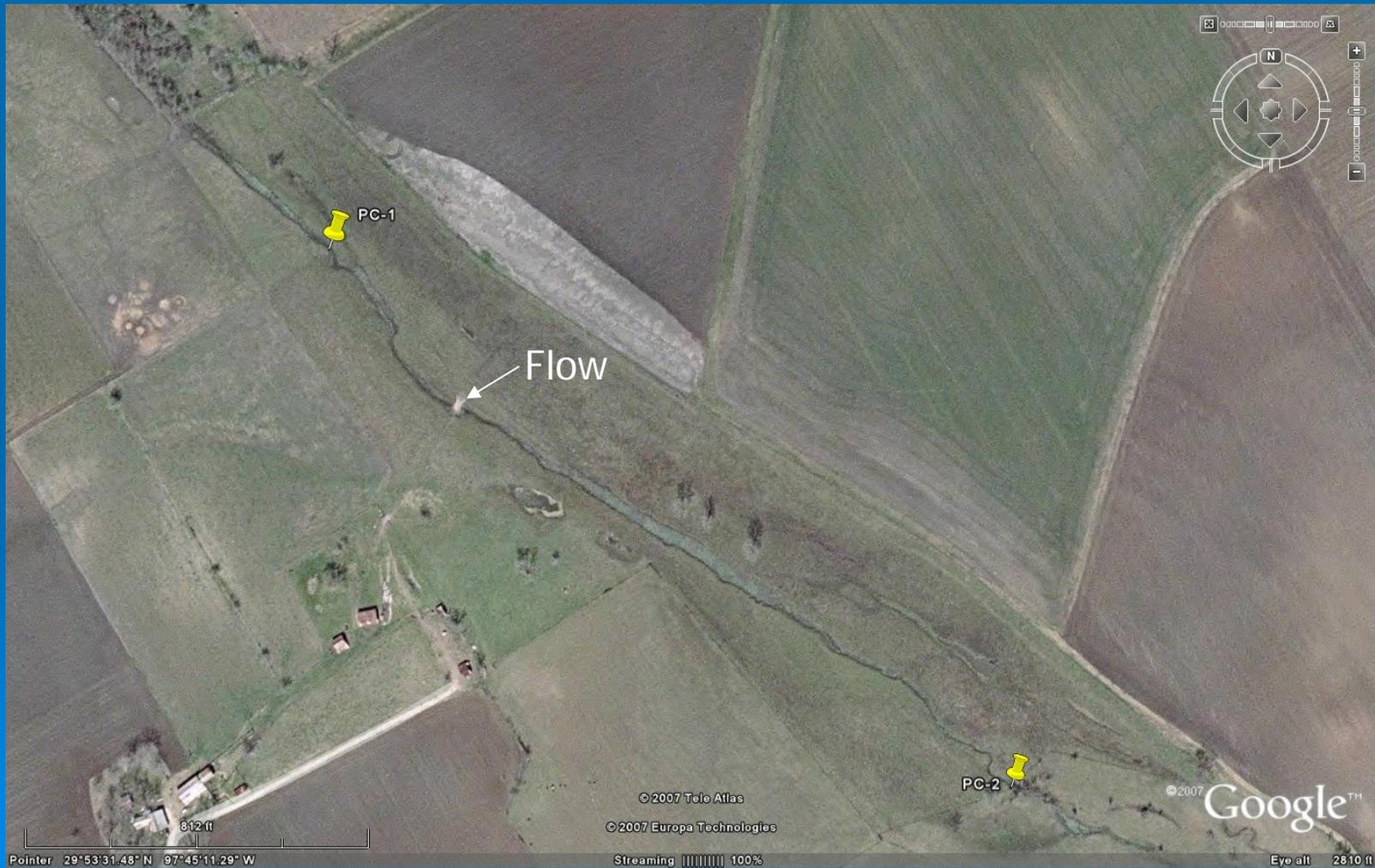
- **Studies in VA, NC, and OR found:**
 - 81% decrease in drinking from stream
 - 59% decrease in loafing at stream
 - 77% decrease in sedimentation
 - 96% decrease in suspended solids
 - 56% decrease in nitrogen
 - 98% decrease in phosphorus

Objective 1 - Alternative Water (Clear Fork of Plum Creek, Lockhart)



Alternative Water Evaluation

Samples collected bi-monthly at ranch inlet (PC1) & outlet (PC2)



Objective 1 – Methods

➤ Flow Measurement

- Calculated from flow depth using Manning's Equation

➤ *E. coli* Analyses

- EPA Method 1603



➤ Treatments

- Year 1:
 - No alternative water provided
- Year 2:
 - Alternative water provided along with stream access

Alternative Water Evaluation

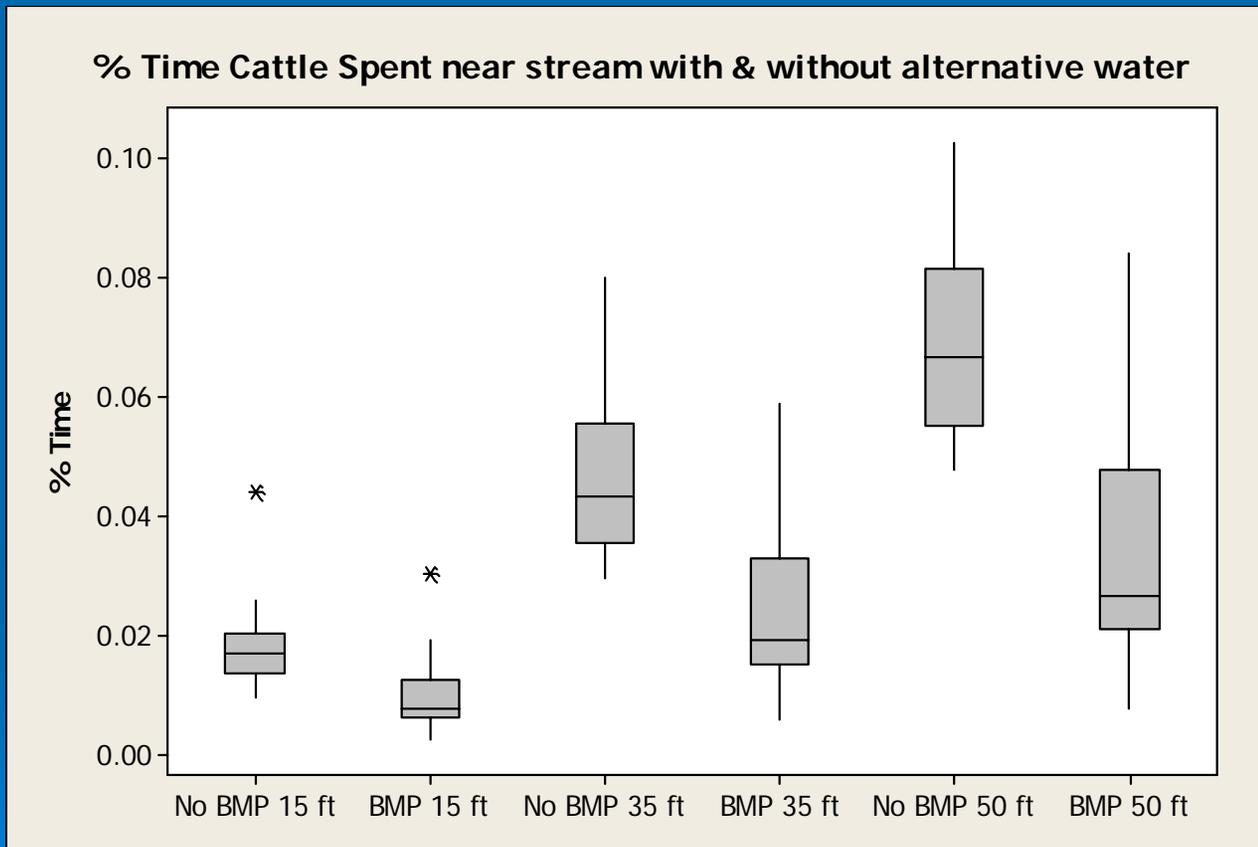
Cattle Tracking – quarterly using GPS collars



Alternative Water Evaluation GPS Collar Results



Alternative Water Evaluation GPS Collar Results



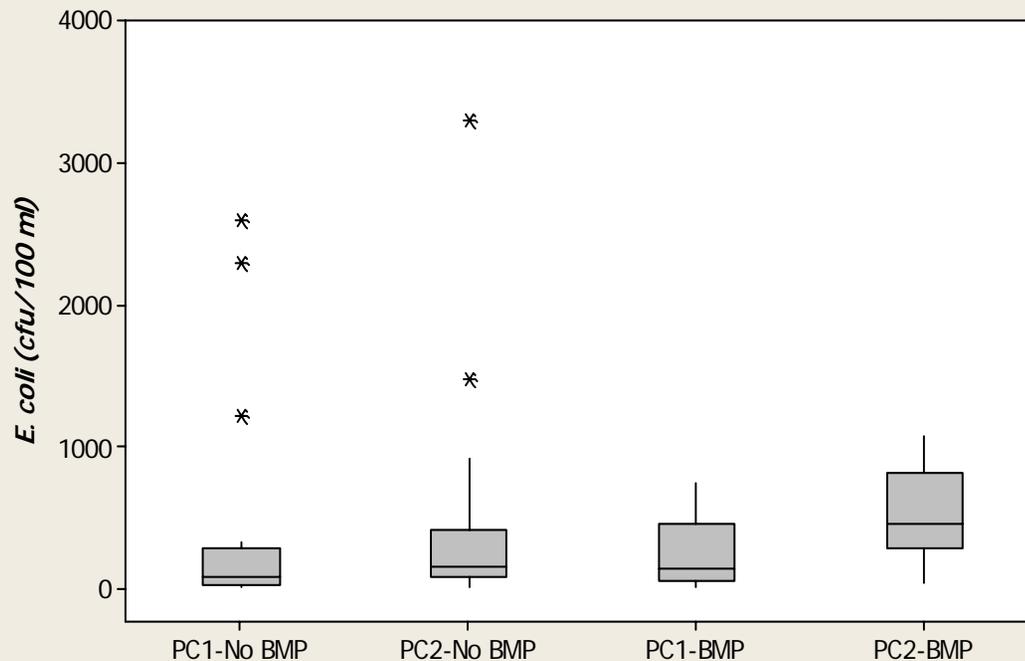
- Statistically significant difference between treatments at 15, 35 and 50 ft

% Time Near Stream	15 ft	35 ft	50 ft
Without Alternative Water	1.8%	4.5%	6.8%
With Alternative Water	0.9%	2.2%	3.2%
Percent Reduction	-48%	-52%	-53%

Alternative water supply effectiveness

Reduction in Time Spent near Stream	Reference
48-53%	This Study
53%	Clawson (1993)
75%	Godwin and Miner (1996)

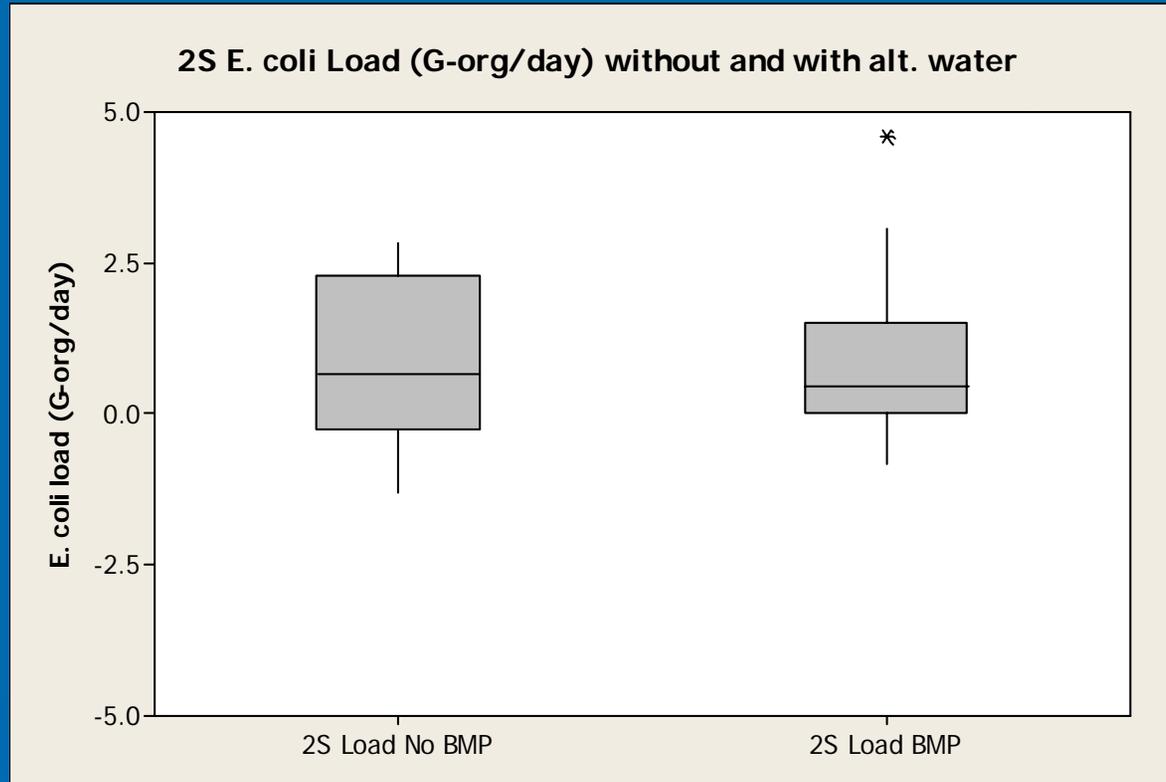
E. coli levels at PC1 & PC2 with & without alt. water



Alternative Water Effect on *E. coli* Conc.

- No significant difference btwn PC1 & PC2 before treatment ($p=0.1835$)
- Median *E. coli* conc. (without alt. water)
 - PC1 = 89 cfu/100 ml
 - PC2 = 161 cfu/100 ml
- Significant difference btwn PC1 & PC2 after treatment ($p=0.0209$)
- Median *E. coli* conc. (with alt. water)
 - PC1 = 147 cfu/100 ml
 - PC2 = 470 cfu/100 ml

Alt. Water Effect on *E. coli* Load



- Median daily load (billion org./day)
 - Pre-BMP = 0.82
 - Post-BMP = 0.45

- Pre-BMP & post-BMP load not significantly different ($p=0.7566$)

Alternative Water Source

Bacteria Reduction	Reference
57 – 95% (FC)	Byers et al. 2005
51% (FC)	Sheffield 1997
45% (<i>E. coli</i>)	<i>This study (reduction not statistically significant)</i>

Alternative Water Source

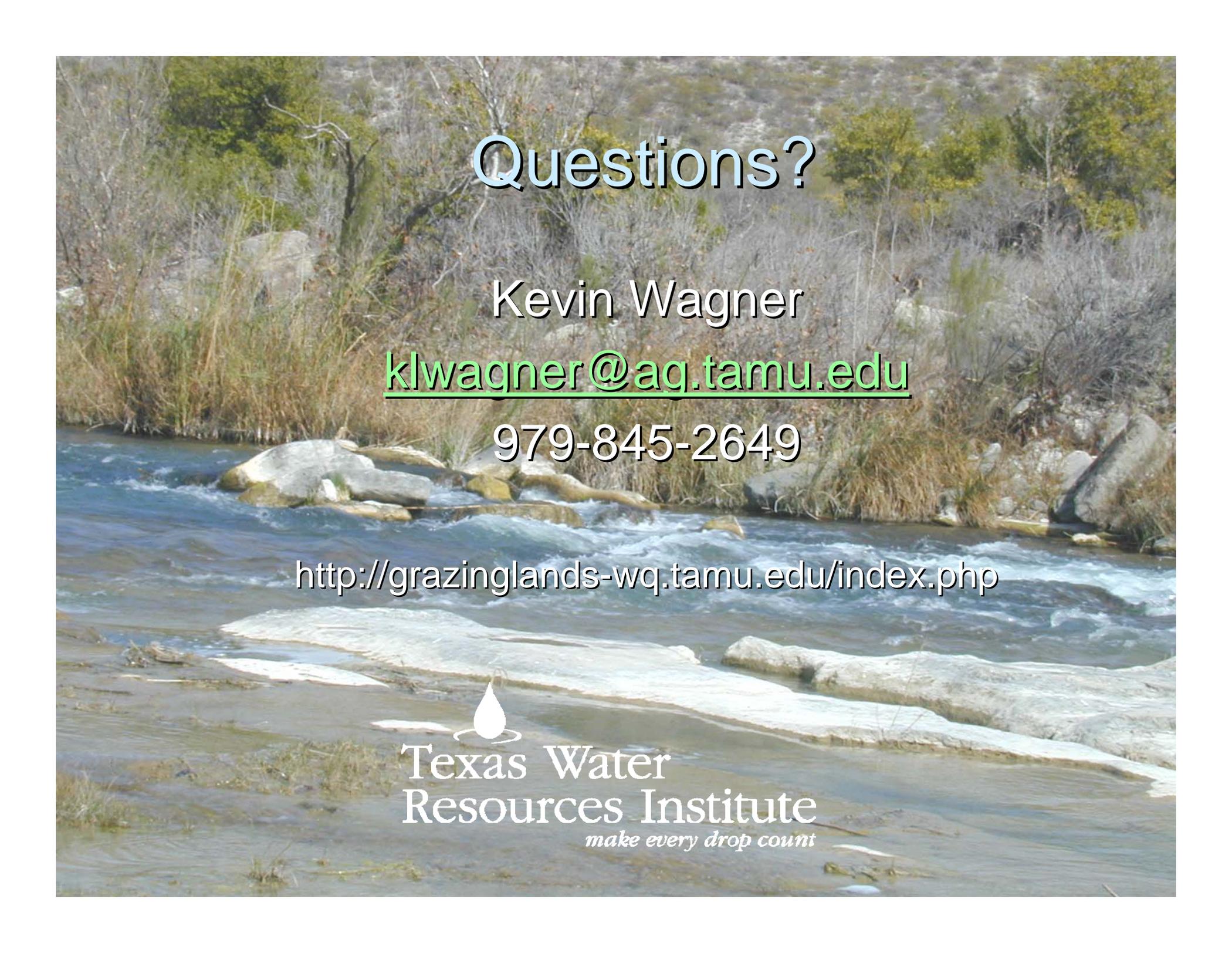
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Exclusionary Fencing

Fecal Coliform Reduction	Reference
30%	Brenner et al. 1994
41%	Brenner 1996
66%	Line 2003

Conclusions - Alternative Water

- Statistically significant reduction (of 48-53%) observed in the % time cattle spent within 15, 35, and 50 ft of the stream as a result of providing alternative water
- However, no concurrent statistically significant change in *E. coli* levels
 - Possibly due to degraded range conditions resulting from prolonged drought
 - Indicates importance of good grazing management needed with alternative water



Questions?

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<http://grazinglands-wq.tamu.edu/index.php>



Texas Water
Resources Institute
make every drop count