Lone Star Healthy Streams:
Reducing Bacteria Levels in Texas Waterways

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Introduction

According to the *DRAFT 2006 Water Quality Inventory and 303(d) List*, 306 water bodies are impaired in Texas with a total of 419 impairments (Fig. 1). Of these, approximately half of the impairments are due to excessive bacteria.

Bacterial source tracking work in a number of water bodies has identified a contribution from grazing cattle to the bacteria loading of these streams. Grazing lands, which represent the dominant land use in the majority of watersheds in Texas, have received little attention until recently regarding the effect of grazing livestock on water quality. Thus, implementation of watershed management practices on grazing lands are critical to the success of water resource protection efforts in the state.

Landowner education and voluntary adoption of best management practices (BMPs) could substantially reduce bacterial contamination of streams and water bodies and reduce the likelihood of increased regulatory oversight. The Texas State Soil and Water Conservation Board (TSSWCB), local Soil and Water Conservation Districts (SWCDs) and the USDA-NRCS support producers through technical assistance and cost-share programs enabling implementation of BMPs. For such measures to be effective, however, they must be properly implemented and managed to ensure sustainability. In addition, these practices must be compatible with the overall management system and not result in additional economic burden to agricultural producers.

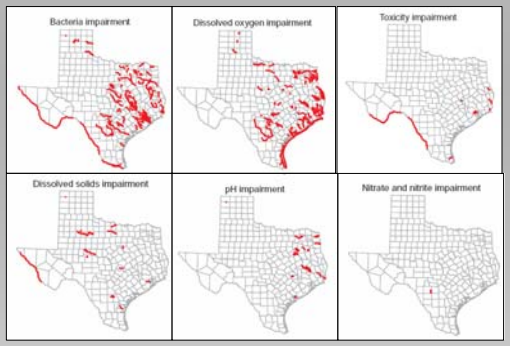

Figure 1. Water quality impairments in Texas, 2006, TCEQ.

Objectives

The goal of *LONE STAR HEALTHY STREAMS* is to reduce levels of bacteria in Texas watersheds from grazing beef cattle (Fig 2). This goal will be accomplished by:

- Developing an educational curriculum delivering current knowledge in production and environmental management of grazing lands and their associated watersheds,
- Evaluating and demonstrating effectiveness of value-added BMPs in reducing bacteria of streams in a pilot watershed,
- Testing the functionality of the education program and making necessary changes and program modifications based on the results of the pilot project,
- Promoting Statewide adoption of appropriate BMPs and other watershed/water quality protection activities through education, outreach and technology transfer.

General Project Description

This project is funded with 319 funds provided by the TSSWCB and will be a partnership among the primary federal and state agencies that interface with beef cattle producers relative to environmental management.

Figure 2. Management strategies and educational programs are needed to reduce bacteria levels in water bodies due to grazing livestock.

Among the main partners, AgriLife Extension's role in the project will be to assess and compile current knowledge regarding BMPs that protect grazing lands watersheds from bacteria contamination, demonstrate and evaluate value-added BMPs in the pilot watershed, and determine the efficacy of the BMPs. Texas Water Resources Institute will be responsible for project management and making timely reports to TSSWCB and EPA.

A Project Steering Committee providing input into curriculum development and program delivery will be established that includes representatives from:

- Texas State Soil and Water Conservation Board,
- Soil and Water Conservation Districts,
- USDA-NRCS and Farm Services Agency,
- Texas Water Resources Institute,
- Texas AgriLife Extension Service,
- Texas AgriLife Research,
- Texas Department of Agriculture,
- Grazing Lands Conservation Initiative,
- Other state and federal agencies as appropriate,
- Representatives from key commodity groups including:
  - Texas Farm Bureau,
  - Texas and Southwestern Cattle Raisers Association,
  - Independent Cattlemen's Association of Texas.

Additionally, local producers will be asked to serve on the Project Steering Committee.

The BMP evaluated during the first project will be an alternative water source. Extension will assess effects of this BMP on cattle behavior, bacteria levels, and other water quality parameters (e.g. nutrients and sediment), and the economic impact for beef cattle producers.

Based on results of the initial education program and BMP demonstration/evaluation in the pilot watershed, an educational program will be developed and delivered state-wide to grazing lands owners and managers to bring heightened awareness of the issue regarding bacteria contamination of watersheds by grazing animals and to encourage adoption of BMPs designed to reduce bacterial loading to Texas streams and water ways.

Results to Date

Beginning in July 2007, twice-monthly sampling of a perennial stream in an impaired watershed began. Water to existing troughs was turned off, thus forcing existing cattle to water in the stream. Water both entering and exiting the project ranch was sampled for *E. coli*. Results thus far for *E. coli* levels are shown in Figure 3. Also in July 2007, random cattle in the project herd were fitted with GPS collars for three weeks to document movement patterns. Data points were collected every five minutes to attempt to determine cattle movements. Cattle were subsequently re-collared during October 2007 and January 2008.

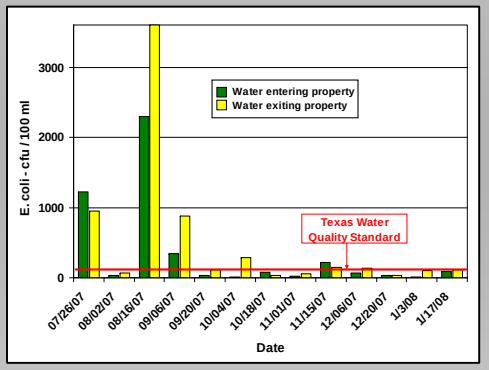

Figure 3. *E. coli* levels entering and leaving project grazing management unit.

GPS data for July and October has indicated that, although cattle are being forced to water in the project stream, only 6.8% and 6.1% of the cattle's time was spend within 50' of either side of the stream for July and October, respectively. Once YR 1 benchmark data is obtained, water to the troughs will be made available and water sampling for *E. coli* and GPS data describing cattle behavior will be repeated to determine the value of alternative water development in altering cattle movement away from the stream. Additional information will be obtained in YR 3 to validate the first two years of results.

Summary

AgriLife Extension education programs are designed to target specific audiences and to deliver current, unbiased, science-based information and technology. With an increasing focus on more holistic watershed management, however, there is an opportunity for AgriLife Extension personnel to use the *LONE STAR HEALTHY STREAMS* Program as a vehicle to expand the overall knowledge base of beef cattle producers regarding watershed management and BMPs for reducing bacteria contamination of streams. Through linkages with existing programs, the burden on producers and County Extension faculty could be minimized, while the knowledge base and potential for producers to participate in, and ultimately affect changes in watershed protection, could be realized.

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