

TR-410

Lone Star Healthy Streams Final Report

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Runoff of *Escherichia coli* (*E. coli*) and other fecal indicator bacteria from grazing lands has been identified as a significant source of bacterial contamination in need of reductions to improve water quality. Development of best management practices to address these bacterial issues is critical to the success of watershed restoration efforts. The effects of alternative water supplies and grazing management were evaluated to assess their effectiveness as best management practices (BMPs).

Providing alternative water supplies for cattle reduced the time cattle spent in the creek by 43% from 3.0 to 1.7 minutes/animal unit/day. Observed pre- and post-treatment *E. coli* loads suggested similar reductions (57%); however, this project could not conclusively attribute the observed *E. coli* loading reductions to providing alternative water because of the lack of statistical significance of these observations, the decrease in flow observed during the post-treatment period, and the observed increase in *E. coli* levels during the post-treatment period. Lack of producer response to extreme drought conditions may have confounded these data.

The evaluation of grazing management found rotational grazing, if timed appropriately, was an effective practice for reducing *E. coli* runoff. The impact of grazing timing in relation to runoff events was much more significant than the impact of the level of grazing (i.e. moderately stocked or heavy stocked) or stocking rate. When runoff occurred more than two weeks following grazing, *E. coli* levels in runoff were decreased more than 88%. As a result of these findings, it is recommended that creek pastures and other hydrologically connected areas be grazed during periods when runoff is less likely (e.g. summer and winter in much of Texas) and upland sites be grazed during rainy seasons when runoff is more likely to occur. Background levels were considerable and relatively consistent among sites, with median levels typically ranging from 3,700 to 5,500 cfu/100 mL. These levels should be considered when applying water quality models to develop total maximum daily loads and other analyses. Finally, project members observed more

than 80% of the samples exceeded Texas Water Quality Standards for *E. coli*. In light of this and other findings of this project, project members recommend that exemptions from the current standards be made for storm flows and wildlife, or additional research be conducted to accurately define bacterial quality for runoff and establish rational water quality standards.

Based on the review of existing programs and compiled literature on bacterial runoff and BMPs; input from the Texas State Soil and Water Conservation Board (TSSWCB), Lone Star Healthy Streams (LSHS) Steering Committee, and internal Texas AgriLife Extension Service Planning Team; and results from the field demonstrations, the LSHS education program for grazing beef cattle was developed. The LSHS program consists of a PowerPoint presentation, Voice-Over PowerPoint presentation, and an accompanying *Lone Star Healthy Streams Beef Cattle Manual*. Portions of this program were delivered to audiences at over 40 events throughout the state, reaching well over 2,200 participants. In addition, unique visitors to the "Improving Water Quality of Grazing Lands" website exceeded 1,100. This highly beneficial program will continue to be carried out throughout the state in coordination with the TSSWCB and other project partners.

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