

Statewide Delivery of the Beef Cattle, Dairy Cattle, Poultry, and Horse Components of the Lone Star Healthy Streams



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List of Acronyms and Abbreviations

Ac – acre	GLCI – Grazing Lands Conservation Initiative
AgriLife – Texas A&M AgriLife	Ha – hectare
ALEC – Department of Agricultural Leadership Education and Communication	Hvy – Heavy
ARS – Agricultural Research Service	LSHS – Lone Star Healthy Streams
AU – Animal Unit, 1000 pounds live weight	Max. – Maximum
AUD – Animal Unit Day	Min. – Minimum
AUM – Animal Unit Month	mL – milliliter
AUY – Animal Unit Year	Mod. – Moderate
BCSC – Beef Cattle Systems Center	mos. – months
BMP – Best Management Practice	NRCS – USDA Natural Resources Conservation Service
BST – Bacterial Source Tracking	PI – Principal Investigator
CEU – Continuing Education Unit	Q1 – First Quartile (25 th percentile)
CFU – Colony Forming Units, measure of fecal bacteria present in samples	Q3 – Third Quartile (75 th percentile)
CIG – Conservation Innovation Grant	QPR – Quarterly Progress Report
Conc. – Concentration	RTD – Rapid Transfer Device
CWA – Clean Water Act	SR – Stocking Rate in acres per animal unit
<i>E. coli</i> – <i>Escherichia coli</i>	Std. Dev. – Standard Deviation
EMC – Event Mean Concentration	SWCD – Soil and Water Conservation District
EPA – Environmental Protection Agency	TCEQ – Texas Commission on Environmental Quality
EQIP – Environmental Quality Incentives Program	TDA – Texas Department of Agriculture
Extension – Texas A&M AgriLife Extension Service	TMDL – Total Maximum Daily Load
FSA – Farm Services Agency	TSSWCB – Texas State Soil and Water Conservation Board
FY – Fiscal Year	TWRI – Texas Water Resources Institute
Geo Mean – Geometric Mean	USDA – United States Department of Agriculture
GI – gastrointestinal	WPP – Watershed Protection Plan

Introduction

Problem/Need Statement

Excessive levels of fecal indicator bacteria (e.g. E. coli) remain a major cause of water quality impairment throughout Texas. According to the 2010 Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d), a total of 621 impairments are included in Category 5. Impairments due to elevated bacteria represented the highest percentage (51%) of those included in Category 5. Total Maximum Daily Loads (TMDLs), TMDL Implementation Plans (I-Plans), and watershed protection plans (WPPs) are being developed to address these impairments.

Fecal indicator bacteria are common inhabitants of the intestines of all warm-blooded animals, including livestock. Although watersheds can be affected by microbial pollution from a wide variety of sources, livestock are increasingly under scrutiny. In order to alleviate this, preclude potential regulatory implications, and most importantly, protect human health, progressive implementation of best management practices (BMPs) is needed. To achieve this progressive implementation of BMPs, significant resources will be needed to educate livestock and poultry producers as well as landowners on bacteria impairments, their causes, and most importantly, BMPs that can be implemented to reduce bacterial contamination.

Due to the magnitude of the bacteria issues in the state, this problem is not isolated to one watershed or region, but is a need statewide. Through the joint vision of the Texas State Soil and Water Conservation Board and Texas A&M AgriLife Extension Service (Extension), a program was specifically designed and developed to provide this information to landowners. The Lone Star Healthy Streams (LSHS) education program was first developed to address bacteria originating from beef cattle operations (TSSWCB project 06-05 Lone Star Healthy Streams) and later expanded to address dairy cattle, horse operations, poultry operations, and feral hogs (TSSWCB project 09-06 Development of a Synergistic, Comprehensive Statewide Lone Star Healthy Streams Program). Through these projects, presentations were developed, manuals were published, and other resources were made available for online delivery.

In addition, this project will include a program evaluation component which will seek to better assess knowledge gained, adoption of BMPs, and perhaps more importantly, potential barriers that exist in the adoption and implementation of BMPs by Texas livestock and poultry producers as well as landowners. An evaluation instrument will be used to investigate how demographic, socioeconomic, policy, and farm characteristics play a role in a producer's decision to adopt one or more BMPs that are known to reduce bacterial contamination of waterbodies.

The LSHS program is an important water quality education initiative in Texas. This project has provided implementation of the LSHS program to support and enhance current and future watershed protection efforts in Texas and provide a basis for gaining landowner participation and adoption of BMPs.

General Project Description

This project will deliver the Lone Star Healthy Streams program through local and distance education events in targeted watersheds across Texas.

Extension will work with Extension Regional Program Directors, County Extension Agents, and Extension Specialists around the state to deliver this program in bacteria impaired watersheds through local or distance education which uses Centra Symposium or Lync software. The delivery will take place in conjunction with County Extension Agents and their program planning committees; continued use of the LSHS website, and additional written materials as needed.

Locations for training programs will be selected in concert with the TSSWCB and will target bacteria impaired watersheds where livestock and poultry have been identified as potential contributors, as well as those watersheds currently undergoing development and/or implementation of a WPP, TMDL, or I-Plan. Training programs will also be conducted at field days, conferences, and other county extension events as necessary.

Both local and distance education programs will vary in length and topic depending on the audience or location of the program. Distance education events will be delivered using software such as Centra Symposium and/or Lync. These software programs allow a presenter to load materials onto a platform while interested participants log in from a remote site to listen and view the presentation live. Presentations can also be recorded so that participants who missed the live presentation can log on at a later time to listen to the presentation and view the presentation materials. A minimum of 20 local events and 6 distance education events will be conducted. Curriculum and training materials have been developed to address topics and BMPs related to beef cattle, dairy cattle, poultry, and horses. As part of each training program, participants will learn about water quality law and policy, sources of bacteria in Texas waterways, bacteria fate and transport, benefits of voluntary conservation practices, sources of financial and technical assistance, and livestock-specific BMPs that are designed to reduce bacterial contamination of runoff.

The impacts and effectiveness of the LSHS program will be assessed using a multi-stage evaluation approach. The first stage will use a pre-test/post-test evaluation strategy which will be utilized at the beginning and end of both watershed and computer-based training programs. The pre-test will ask knowledge-based questions that will include a combination of multiple choice and true/false questions. The post-test will measure the same knowledge-based questions to determine the knowledge change of participants. In addition, the post-test will include 'satisfaction' questions and 'intentions to adopt' questions. The 'intentions to adopt' questions will focus on BMPs that participants should adopt based on what they have learned and the practice's ability to reduce bacterial contamination.

The second stage of the evaluation approach will utilize a more lengthy evaluation instrument designed specifically to evaluate the factors that motivate and barriers that limit producer adoption/implementation and sustained management of BMPs known to reduce bacterial contamination of waterbodies. Demographic, socioeconomic, policy, and farm characteristics data will be analyzed to identify and better understand the controlling factors. The evaluation will be mailed to participants who have attended LSHS programs as well as to a random sample of livestock producers and landowners in Texas.

In addition, the distribution of educational materials, engagement and back channel statistics/chatter of social networking, and website activity will all be tracked and reported.

Project Goals

The goal of this project is to reduce the levels of bacterial contamination of Texas watersheds from beef cattle, dairy cattle, poultry, and horses. This goal will be accomplished by meeting the objectives of:

- 1) Facilitating the statewide implementation of the Lone Star Healthy Streams (LSHS) education program through local and distance education,
- 2) Educational events will be targeted toward livestock and poultry producers in bacteria impaired watersheds where these animals have been identified as potential sources,
- 3) Evaluated to better assess changes in producer knowledge and understanding regarding bacteria pollution and BMPs to minimize bacterial contamination, expected adoption of BMPs, and any barriers to BMP adoption and implementation in Texas.

Measures of Success

- Delivery of a minimum of 20 LSHS local and 6 distance educational trainings.
- Number of livestock producers and landowners participating in educational events delivered locally or through distance education.
- Number of unique visitors to the LSHS project website.
- Number of factsheets, publications, and other educational materials distributed regarding the LSHS program and BMPs to reduce bacterial contamination.
- Increased knowledge and understanding of livestock producers and landowners on bacteria pollution and BMPs to reduce bacteria runoff, increased understanding of the expected adoption of BMPs, increased understanding of the barriers associated with BMP adoption and implementation as measured by surveys and pre/post evaluations

Methods and Results

Task 1: Project Administration

Objectives: Administer, coordinate, and monitor all work performed under the project including technical and financial supervision and preparation of quarterly progress and final reports.

Subtask 1.1: Preparation of Quarterly Reports

Extension prepared QPRs for submission to the TSSWCB. QPRs documented all activities performed within a quarter and were then submitted by the 15th of January, April, July and October to the TSSWCB. QPRs were also distributed to all project partners.

Subtask 1.2: Perform Accounting Functions

Extension performed accounting functions for project funds and submitted appropriate reimbursement Forms to TSSWCB at least quarterly. These forms are routed through Texas A&M Sponsored Research Services and then submitted to TSSWCB.

Subtask 1.3: Coordination of Project Meetings

Extension will host coordination meetings or conference calls, at least quarterly, with project partners to discuss project activities, project schedule, communication needs, deliverables, and other requirements. Extension will develop lists of action items needed following each project coordination meeting and distribute to project personnel.

Numerous meetings and phone calls were held each quarter throughout the project time period.

Subtask 1.4: Participation of Final Report

Extension, with assistance from project partners, developed the final report assessing the effectiveness of the LSHS program, including the local and distance education events.

Task 2: Coordinate and Deliver LSHS

Objective: Deliver a statewide educational program that provides landowners and land managers applicable information on water quality law and policy, sources of bacteria in Texas waterways, bacteria fate and transport, benefits of voluntary conservation practices, sources of technical assistance and financial incentives, and livestock-specific BMPs that are designed to reduce bacterial contamination of runoff. Extension will work in cooperation with the TSSWCB and other agencies and organizations as appropriate to guide program delivery and selection of training locations.

Subtask 2.1: Employ a Program Specialist

Extension will employ a Program Specialist who will serve under the leadership of the Extension State Forage Specialist as the full-time LSHS Program Coordinator and will be responsible for promoting, coordinating, and delivering local and distance education LSHS training events.

Extension hired Jennifer Peterson to serve in this role. Upon her leaving in September of 2014, the position was vacant until January of 2015 at which time Matt Brown was hired.

Subtask 2.2: Educational Program Location Selection

Extension worked in concert with TSSWCB and state and local organizations to select locations for the LSHS training events. Extension coordinated efforts with state agencies, county extension agents, and organizations already involved in WPP/TMDL processes in specific watersheds.

Subtask 2.3: LSHS Marketing

Extension actively marketed the LSHS programs through news releases (AgriLife News and local media outlets), Internet postings, newsletter announcements, public/conference presentations, flyers, etc., to enhance awareness and utilization. TSSWCB was provided all promotional materials for review and approval prior to distribution.

Subtask 2.4: LSHS Program Coordination and Planning

Extension coordinated with Extension Regional Program Directors, County Extension Agents, local SWCDs, NRCS, TSSWCB, and others to deliver the LSHS educational program to bacteria-impaired or threatened watersheds throughout the state. Trainings included the standardized presentation developed in Subtask 3.3 of TSSWCB project 09-06 Development of a Synergistic, Comprehensive Statewide Lone Star Healthy Streams Program. Production characteristics of each watershed dictated LSHS components to be discussed along with the mode of delivery (local or distance) for each program. During the project time period, over 75 LSHS programs were held, 71 being face to face 7 being distance programs where three or more counties hosted the event at a time. LSHS was also invited to a Four State conference and presented to 48 landowners and producers from Texas, Oklahoma, Arkansas, and Louisiana. As the project progressed, word spread about the usefulness of the information being presented and in many cases county extension agents outside of targeted watersheds were asking for the program to be brought to their county. LSHS was delivered in the watersheds of the Lampasas River, Mill Creek, Leon River, Navasota River, Geronimo Creek, Plum Creek, Lavaca River, Upper Llano River, Double Bayou, and Attoyac Bayou WPPs and in the watersheds of the Carters Creek, Copano Bay, North Bosque River, Trinity River, Little River, San Antonio River, Oso Bay, and Oso Creek TMDLs.

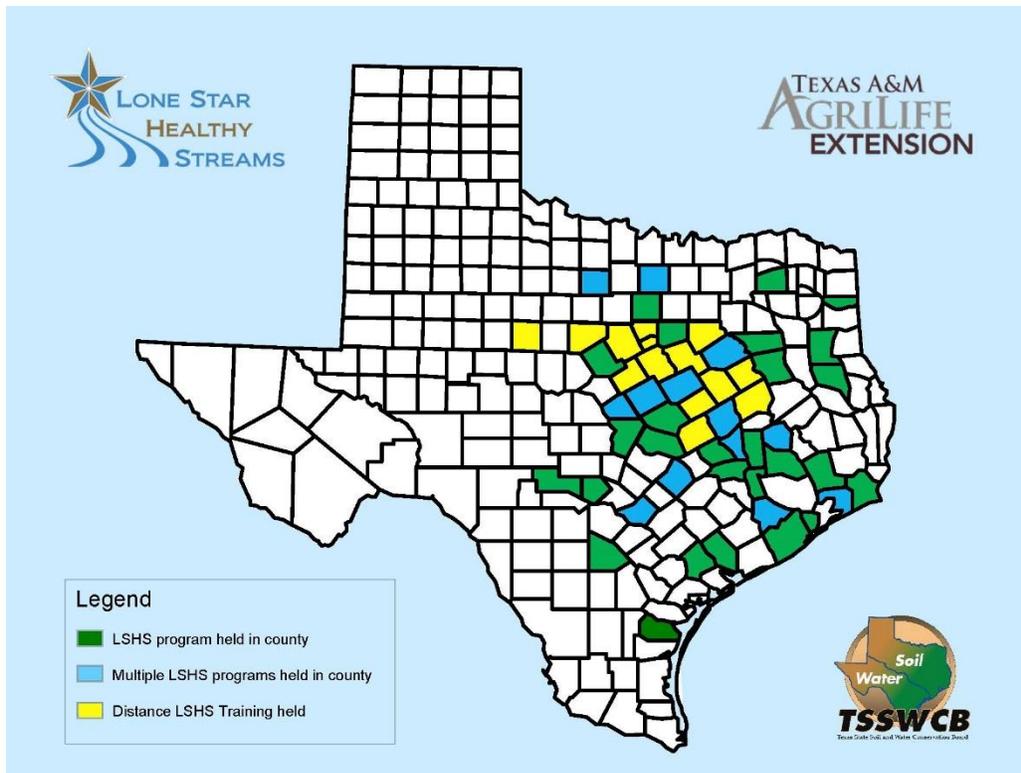


Figure 1: Map of LSHS program locations

Subtask 2.5: Meeting Participation

Extension participated in meetings as appropriate in order to efficiently and effectively achieve project goals and summarize activities and achievements made throughout the course of this project. Such meetings included, but were not limited to, local soil and water conservation districts (SWCDs), the Texas Watershed Planning Short Course, Texas Watershed Coordinator Roundtables, the TSSWCB Regional Watershed Coordination Steering Committee, the annual meetings of Texas Soil and Water Conservation District Directors, the National Water Quality Conference, American Society of Agronomy annual meeting, and the Society for Range Management annual meeting.

Subtask 2.6: LSHS Website

Extension, with assistance from TWRI, continued to host and maintain a LSHS program website (<http://lshs.tamu.edu/>) to serve as a public clearinghouse for all project related information. All workshop information as well as other material has been available at this website. The number of unique visitors to the website and the distribution of Lone Star Healthy Streams educational materials will be tracked to assess its impact and reported each quarter. Throughout the course of this project the LSHS website was visited 3,359 times by 2,598 unique visitors.

Task 3: LSHS Effectiveness

Objective: To measure both knowledge and behavior changes of individuals participating in the LSHS program using a staged evaluation approach.

Subtask 3.1: LSHS Program Evaluation

With assistance from the department of Agricultural Leadership Education and Communication, develop and conduct pre-test/post-test evaluations (for both local and distance education events) to measure changes in knowledge of participants regarding water quality law and policy, sources of bacteria in Texas waterways, bacteria fate and transport, benefits of voluntary conservation practices, sources of financial and technical assistance, and livestock-specific BMPs that are designed to reduce bacterial contamination of runoff; to evaluate participant satisfaction with the program; and to evaluate participant's intentions to change their behavior as a result of the program.

Overall satisfaction of the LSHS program by over 4,800 participants was 98% mostly to completely satisfied. 78% of program participants indicated that their understanding of the topics discussed improved and 99% would recommend the LSHS program to others. Of the program participants that answered the evaluation question, 56% indicated that they are likely to adopt one or more BMPs.

Subtask 3.2: BMP Evaluation Mailout

With assistance from ALEC, develop and deliver stage 2 mailout evaluation specifically designed to assess the barriers and factors related to the adoption and implementation of BMPs known to reduce bacterial contamination of water bodies. Results from this mailout are included in subtask 3.3.

Subtask 3.3: BMP Adaptation Evaluation

With assistance from ALEC, analyze demographic, socioeconomic, policy, and farm characteristics data to better understand the factors involved in producer adoption of BMPs. Results will be used to periodically evaluate and modify LSHS education program materials. Adoption rates were lowest for erosion and sediment control practices and highest for grazing management practices. The highest adopted practice overall was watering facilities with over 80% of producers indicating as having adopted this practice in the last 5-year period. The lowest adopted practice overall was filter strips with a 15.6% adoption rate. The responses also showed the adoption of BMPs by Texas beef cattle producers is influenced by variables related to capacity, attitudes, environmental awareness, and farm characteristics. This evaluation also suggested that the number of visits with county extension agents and extension personnel to be the most significant factor influencing conservation practice adoption.

Subtask 3.4: Mailout and Adaptation Summary

Extension, with assistance from ALEC, will develop research briefs summarizing results and project updates. Briefs will be developed for the purposes of documenting and enhancing the success of future LSHS and similar training programs. Results show that the most success came from integrating the local county extension agent in the planning and advertising of programs.

Conclusion

The goal of this project was to promote healthy watersheds and improve water quality through delivery of the Lone Star Healthy Streams program, using both local and distance education in targeted watersheds across the state. This was accomplished through the education of Texas livestock and poultry producers and land managers on how to best protect Texas waterways from bacterial contributions associated with the production of livestock and poultry. In addition, this project aimed to better understand the barriers and factors associated with the adoption and implementation of BMPs known to reduce bacterial contamination in waterways and develop recommendations for enhanced landowner participation.

The LSHS program or portions of this program were delivered to audiences at over 75 events throughout the state, reaching well over 4,800 participants. Landowners and livestock producers were eager to come to an extension managed program and adaptation of practices were as high as 80% depending on the particular practice. Attendees were not only interested in how to improve the efficiency of their land but had great interest in land stewardship and the contribution their land has to improving water quality. In addition, unique visitors to the LSHS website exceeded 2,500. This highly beneficial program will continue to be carried out throughout the state in coordination with the TSSWCB and other project partners.