

Texas Water Resources Institute

Evaluation and Demonstration of BMPs for Cattle on Grazing Lands for the Lone Star Healthy Streams Program State General Revenue Nonpoint Source Grant Program FY2010 Workplan 10-52

Quarter no. 8 from 3/1/12 through 5/31/12

I. Abstract

This quarter, evaluation of grazing management continued with one grazing treatment being conducted and four runoff events occurring at the Beef Cattle Systems Center sites. Monitoring is winding down, however, as the project nears completion. In addition to the continued evaluation of grazing management, two rip-rap trials, one shade structure trial, and one alternative water trial were conducted this quarter at the McGregor AgriLife Research Center. Results from work to date continued to be transferred to landowners, natural resource agencies, and others through (1) the project website to 136 unique visitors, (2) presentations at 9 events to almost 600 participants, and (3) submission of two journal articles for publication. Further, project results were used to support development of an Interim Practice Standard for Practice Code 717 Livestock Shade Structure by the NRCS. Next quarter, all data analysis will be completed, a final report will be drafted, and all project deliverables will be submitted.

II. Overall Progress and Results by Task

TASK 1: Project Administration and Coordination

Subtask 1.1: TWRI will prepare electronic quarterly progress reports (QPRs) for submission to the TSSWCB. QPRs shall document all activities performed within a quarter and shall be submitted by the 15th of December, March, June, and September. QPRs shall be posted to the project website and distributed to all project partners.

The following actions have been completed during this reporting period:

- a. TWRI submitted the final Quarterly Progress Report on June 15, 2012.

100% Complete

Subtask 1.2: TWRI will perform accounting functions for project funds and will submit appropriate Reimbursement Forms to TSSWCB at least quarterly.

The following actions have been completed during this reporting period:

- a. Expenditures as of 2/29/12 totaled \$114,503 or 71% of total project funding.

71% Complete

Subtask 1.3: TWRI will host coordination meetings, conference calls, or TTVN meetings with the TSSWCB and SCSC, and include as appropriate SAML, ESSM, and USDA-ARS, approximately quarterly to discuss project activities, project schedule, communication needs, deliverables, and other requirements. TWRI will develop lists of action items needed following each project coordination meeting and distribute to project personnel. These coordination meetings may be held concurrently with TSSWCB project 09-06 coordination meetings.

The following actions have been completed during this reporting period:

- a. No coordination meetings were held this quarter.

92% Complete

Subtask 1.4: TWRI and/or SCSC will attend and participate in public meetings as appropriate in order to communicate project goals, activities and accomplishments to affected parties. Such meetings may include, but are not limited to, the Annual Meeting of Texas SWCD Directors, the TSCRA Annual Convention and various leadership meetings, the TFB Annual Convention and various leadership meetings, Clean Rivers Program Basin Steering Committee meetings, and watershed stakeholder meetings for certain TMDLs and WPPs.

The following actions have been completed during this reporting period:

- a. TWRI presented info on BMPs for reducing bacteria runoff from grazing lands at:
 - 5/22/12 - 2012 Land Grant & Sea Grant National Water Conference – 50 people
 - 6/7/12 – Southeast and South Central Texas Regional Watershed Coordination Steering Committee meeting – 20 people

92% Complete

Subtask 1.5: TWRI and SCSC will develop and disseminate project informational materials, including, but not limited to flyers, brochures, news releases, and other appropriate promotional publications. As appropriate, TWRI will include information about the project, as appropriate, in the tx H2O, New Waves e-letter, AgriLife News, USDA-ARS News, and livestock industry trade publications. TSSWCB will be provided such informational materials and publications developed by TWRI and SCSC for review prior to distribution.

The following actions have been completed during this reporting period:

- a. No progress to report this quarter.

92% Complete

Subtask 1.6: TWRI will continue to host and maintain an internet website <http://grazinglands-wq.tamu.edu/> for the dissemination of information.

The following actions have been completed during this reporting period:

- a. This quarter, the website (<http://lshs.tamu.edu>) was viewed by 136 unique visitors.

92% Complete

Subtask 1.7: TWRI and SCSC will continue to utilize the LSHS Project Steering Committee organized through TSSWCB project 06-05. At a minimum, membership shall be composed of TSSWCB, certain SWCDs, AgriLife Extension, AgriLife Research, TWRI, USDA-NRCS, USDA-ARS, TDA, GLCI, TFB, TSCRA, ICA, and TCFA. This LSHS Project Steering Committee will provide input on the evaluation of BMP effectiveness, identification of demonstration sites, modifications to the LSHS curriculum, and general project coordination. This LSHS Project Steering Committee will meet as frequently as needed, likely annually. This Project Steering Committee may meet concurrently with the Program Steering Committee established through TSSWCB project 09-06.

The following actions have been completed during this reporting period:

- a. The final Project Steering Committee meeting for the project was held at the Annual SWCD Association meeting in San Antonio on October 24, 2011.

100% Complete

Subtask 1.8: TWRI, in collaboration with SCSC and SAML, will develop and submit a Final Report at the culmination of the project. This Final Report will document project performance related to each project goal, measure of success, and task. A draft of this Final Report will be submitted to TSSWCB for review prior to finalizing the document. This Final Report, and any associated project Technical Reports, will be permanently housed in the TWRI online Reports Database.

The following actions have been completed during this reporting period:

- a. No progress to report this quarter. The Final Report will be completed next quarter.

0% Complete

TASK 2: Quality Assurance

Subtask 2.1: TWRI will develop a QAPP for activities in Task 3 consistent with EPA Requirements for Quality Assurance Project Plans (QA/R-5) and the TSSWCB Environmental Data Quality Management Plan.

The following actions have been completed during this reporting period:

- a. The QAPP was approved by the TSSWCB on September 30, 2010.

100% Complete

Subtask 2.2: TWRI will submit revisions and necessary amendments to the QAPP as needed.

The following actions have been completed during this reporting period:

- a. No further QAPP revisions are needed.

100% Complete

TASK 3: Evaluate and Demonstrate BMPs to Reduce Fecal and Bacteria Loading From Cattle on Grazing Lands

Subtask 3.1: SCSC, with assistance from TWRI, will continue the evaluation of grazing management and stocking rates/densities at the Brazos Bottom (BB1, BB2, BB3), Welder Wildlife Refuge (WWR1, WWR2, WWR3) and Riesel (SW12, W10) demonstration sites. Runoff samples from three grazing treatments [no grazing, moderate grazing, and heavy grazing (2 x moderate grazing)] will be evaluated at the Brazos Bottom and Welder Wildlife Refuge and from two grazing treatments [no grazing and moderate grazing] will be evaluated at Riesel. ISCO automated samplers will be used to collect flow integrated samples and data on runoff quality and quantity and rainfall amounts and intensity. E. coli and other bacteria (i.e., Enterococcus, fecal coliform) levels in runoff will be measured and bacteria loadings will be determined. SAML will analyze all samples using EPA-approved methods as outlined in the QAPP. SAML is NELAC certified for E. coli and will use EPA-approved methods for analysis of all samples.

The following actions have been completed during this reporting period:

- a. Brazos Bottom
 - Equipment maintenance was performed on Mar 9, Apr 16, May 16,
 - Sites BB2 and BB3 were grazed Apr 11-15
 - Runoff events occurred Mar 9, 10, 20, 29
- b. Welder Wildlife Refuge
 - Equipment maintenance was performed on Mar 7, Apr 17, May 17, May 30
 - Began deconstruction of WWR-2 & WWR-3
 - No runoff occurred this quarter.

92% Complete

Subtask 3.2: SCSC, with assistance from TWRI and ESSM, will evaluate the effectiveness of certain structural BMPs in modifying cattle movement to change fecal deposition patterns and reducing bacteria runoff. BMPs that have been identified as needing evaluation include (1) portable shade facilities/structures, (2) protected stream access points or stream crossing, (3) rip-rap application designed to limit cattle access to riparian areas, and (4) alternative water supplies designed to draw cattle away from waterbodies. Changes in cattle movement will be evaluated using GPS collars as described in Subtask 3.5. Reductions in bacteria contributions will be calculated based on the reduced time cattle spend in the stream and riparian area. Evaluation of protected stream access points or stream crossings will be dependent on finding a suitable cooperator where USDA-NRCS is designing and constructing this practice.

The following actions have been completed during this reporting period:

- a. Rip-rap trial was run Apr 13-18 and Apr 26 - May 18
- b. GPS shade trial occurred Mar 28 - Apr 18
- c. GPS water trial occurred Apr 26 - May 18

92% Complete

Subtask 3.3: SCSC will continue to gather information from the growing body of literature on 1) bacteria fate and transport, 2) effects of grazing cattle on bacterial levels in waterbodies, and 3) effect

of BMPs designed to minimize grazing cattle impacts on riparian areas and bacteria loading. A compendium of this literature will be posted on the project website.

The following actions have been completed during this reporting period:

- a. SCSC continues to gather information and post it on the Lone Star Healthy Streams website as follows: <http://lshs.tamu.edu/research/bibliography>.

92% Complete

Subtask 3.4: SCSC will identify cooperator(s) to conduct the BMP demonstration and evaluation with assistance of the LSHS Project Steering Committee, local SWCDs, USDA-NRCS, TWRI, and local AgriLife Extension agents. For the evaluation of protected stream access points or stream crossings, and possibly alternative water supplies, SCSC and TWRI will work closely with USDA-NRCS and local SWCDs to identify potential cooperators where these practices are being planned. Funding will be provided to the cooperator(s) as needed to implement BMPs and participate in the BMP demonstration and evaluation. SCSC and TWRI will encourage the cooperator(s) to obtain a certified WQMP from the TSSWCB.

The following actions have been completed during this reporting period:

- a. BMP demonstrations will be conducted at the Beef Cattle Systems Center, Welder Wildlife Refuge, McGregor AgriLife Research Center, and USDA-ARS Riesel Research Center.

100% Complete

Subtask 3.5: SCSC and ESSM will assess cattle behavior in response to BMPs to be evaluated in Subtask 3.2 utilizing Lotek GPS collars to determine the amount of time cattle spend in the stream and riparian areas before and after BMP implementation. TWRI will assist with GPS collar data analysis.

The following actions have been completed during this reporting period:

- a. Analyzed GPS data points of cattle within 25 & 50 feet of the stream and shade pavilion.

100% Complete

Subtask 3.6: SCSC will transfer results from BMP effectiveness studies to landowners, natural resource agencies, and others through the LSHS Program and other publications in order to increase BMP adoption rates and participation in federal and state technical and financial assistance programs. SCSC, with assistance from TWRI and USDA-ARS and in cooperation with local SWCDs and local Extension and USDA-NRCS staff, will conduct at least 1 field day at a demonstration sites to highlight the BMP effectiveness studies and promote adoption of BMPs by ranchers.

The following actions have been completed during this reporting period:

- a. SCSC transferred results from BMP effectiveness studies to landowners at:
 - 3/23/12 - McGregor – 64 people
 - 3/29/12 - Athens – 189 people
 - 3/31/12 - Fort Worth – 80 people
 - 4/5/12 - Lampasas – 24 people
 - 4/13/12 - College Station – 19 people

- 4/27/12 - Schulenburg – 58 people
- 5/24/12 - Hamilton, Freestone, Milam, Coryell, McLennan, Eastland, Falls, and Comanche Counties – 82 people

92% Complete

Subtask 3.7: In order to determine and document the synergistic effectiveness of BMPs prescribed in a WQMP in reducing bacteria loading from grazing cattle, a team consisting of SAML, USDA-ARS, SCSC TWRI, and others as appropriate, will design a water quality monitoring regime for evaluating whole-farm effect of implementing WQMPs on livestock operations. This team will work with the LSHS Project Steering Committee and other project partners to identify prospective cooperating ranches across an array of ecoregions and climatic zones. To the extent possible, the monitoring regime will be designed for watersheds with on-going WPP or TMDL development or implementation. The monitoring regime will be designed such that results are transferable to other watersheds. The monitoring regime will take advantage of all available and suitable methodologies, including Bacterial Source Tracking (BST). The monitoring regime will be incorporated into a proposed scope of work and budget.

The following actions have been completed during this reporting period:

- a. TWRI and USDA-ARS are working on developing a proposed scope of work and budget.

50% Complete

Subtask 3.8: Through TSSWCB project 09-50, USDA-ARS is developing an easy-to-use Texas BMP Evaluation Tool (TBET) to aid in science-based BMP selection on-farm and cost-effective conservation spending. Specifically, TBET is being designed to 1) assist land managers and agency planners in conservation practice decision-making related to on-farm (field-scale) alternatives and effectiveness, and 2) facilitate evaluation and reporting of agricultural nonpoint source load reductions from WQMP implementation. SCSC and TWRI will work with USDA-ARS to incorporate findings from the BMP evaluations in this project into TBET, to the extent practical.

The following actions have been completed during this reporting period:

- a. TWRI is working to transfer data collected to USDA-ARS for incorporation into TBET.

50% Complete

Subtask 3.9: SCSC, with assistance from TWRI and TSSWCB, will work very closely with the USDA-NRCS to provide USDA-NRCS with the information they need to establish a practice standard for Livestock Shade Structure as a BMP to effect cattle movement and fecal deposition patterns and impact pollutant loading and water quality. Examples of this practice standard (717) exist in South Carolina, Georgia, Florida, and Virginia.

The following actions have been completed during this reporting period:

- a. On March 1, NRCS provided TWRI with the Interim Practice Standard for Practice Code 717 Livestock Shade Structure for review.
- b. On March 30, TWRI provided minor edits to NRCS on the Practice Standard.

92% Complete

Subtask 3.10: SCSC, with assistance from TWRI, will develop technical reports, refereed journal articles, Extension Fact Sheets, and other publications as appropriate, summarizing the results of the demonstrations (grazing management treatments and structural BMP evaluation) and the analysis of the impacts of BMPs on bacteria runoff.

The following actions have been completed during this reporting period:

- a. As results are being generated they are being transferred to Jennifer Peterson to be included in the LSHS BMP manuals, website and searchable database in conjunction with TSSWCB Project 09-06.
- b. Two journal articles have been submitted to date regarding BMP evaluations as follows:
 - K. L. Wagner, L. A. Redmon, T. J. Gentry, R. D. Harmel. 2012. Assessment of cattle grazing effects on *E. coli* runoff. *Transactions of ASABE*.
 - K. L. Wagner, L. A. Redmon, T. J. Gentry, R. D. Harmel. 2012. Effects of an off-stream watering facility on cattle behavior and instream *E. coli* levels. *Journal of the SWCS*.

92% Complete

III. Related Issues/Current Problems and Favorable of Unusual Developments

- N/A

IV. Projected Work for Next Quarter

- Complete evaluation of all project data
- Continue site maintenance and sampling through July
- Develop and submit final report
- Transfer results to USDA-ARS
- Continue transferring results to landowners through LSHS programs
- Present results at International Soil and Water Conservation Society meeting in Ft. Worth
- Develop and submit scope of work and budget for WQMP evaluation