

Texas A&M AgriLife
Texas Water Resources Institute

Fate and Transport of Bacteria in Rural Texas Streams
FY07 CWA Section 319(h)
TSSWCB Project No. 07-06

Quarter no. 3 From 4/01/08 Through 6/30/08

I. Abstract

The QAPP for the project was approved during the quarter and now sampling has begun. Using the list of landowners that the Brazos County SWCD board supplied, we were able to obtain permission from one landowner to conduct studies on his property. In total two landowners were identified as willing collaborators. Although this is not as many landowners as initially desired, these two landowners own about 2,500 acres that represents almost all land types and uses within the watershed. Initial site visits were made to each property and sampling efforts were coordinated with researchers and landowners. Wildlife surveying and fecal sampling was initiated in June upon approval of the QAPP. This surveying and sampling will continue into the next quarter. An initial set of fecal samples has been sent to the BAEN lab for analysis and are currently being analyzed.

II. Overall Progress and Results by Task

TASK 1: Project Coordination and Administration

Subtask 1.1: TWRI will prepare electronic quarterly reports for submission to the TSSWCB. All progress reports will be provided to all Project Participants.

The following actions have been completed during this reporting period:

- a. The year 1, quarter 3 report was completed and sent to the TSSWCB on July 15, 2008.

25% Complete

Subtask 1.2: TWRI will coordinate quarterly meetings (in person or TTVN) as appropriate with project participants to discuss project activities, project schedule, lines of responsibility, communication needs, and other requirements.

The following actions have been completed during this reporting period:

- a. Several meetings have been held during the last quarter to discuss project activities and progress being made.

20% Complete

Subtask 1.3: TWRI will attend meetings with the TSSWCB project manager and other meetings, as needed, to review project status, deliverables, etc.

The following actions have been completed during this reporting period:

- a. A trip was made to TSSWCB headquarters on May 22, the project was discussed with the TSSWCB project manager during that meeting.

15% Complete

Subtask 1.4: TWRI will submit appropriate Reimbursement Forms.

The following actions have been completed during this reporting period:

- a. As of March 31, 2008, a total of \$6,370 or 2% of total project funding has been expended.

2% Complete

Subtask 1.5: TWRI will develop (Months 1-3), host and maintain (Months 3-36) an internet website for the dissemination of information.

The following actions have been completed during this reporting period:

- a. The project website has been completed and is now available online. The web address for this site is: <http://bft.tamu.edu>.
- b. The project will be updated at least quarterly throughout the course of this project.

91% Complete

Subtask 1.6: TWRI and Texas AgriLife Extension will work together to develop the Final report.

The following actions have been completed during this reporting period:

- a. No activity to report at this time.

0% Complete

Subtask 1.7: TWRI and Extension will work together to develop publications, brochures and reports that will be disseminated for educational purposes.

The following actions have been completed during this reporting period:

- a. No activity to report at this time.

0% Complete

Task 2: Development of Quality Assurance Project Plan

Subtask 2.1: TWRI will develop a QAPP that will detail project goals and objectives relating to water quality monitoring activities; identify the data needed to fulfill those objectives; list field and laboratory methods; describe procedures and schedules to be followed; and specify a data management structure and the quality assurance protocols.

The following actions have been completed during this reporting period:

- a. The QAPP has been developed and approved by TSSWCB and EPA.

100% Complete

Subtask 2.2: Provide annual revisions to the QAPP and amendments, as necessary, to the TSSWCB and EPA.

The following actions have been completed during this reporting period:

- a. No activity to report at this time.

0% Complete

Task 3: Conducting sanitary surveys to identify potential *E. coli* contributing sources in the impaired watershed

Subtask 3.1: Choose a suitable watershed from the provided list of bacteria impaired stream segments

The following actions have been completed during this reporting period:

- a. This subtask is completed. Cedar Creek, Segment 1209G, in the Brazos River basin was selected for this study. This subtask is now complete.

100% Complete

Subtask 3.2: Travel to the selected watershed and conduct a renaissance survey of the watershed and sources

The following actions have been completed during this reporting period:

- a. Dr. Karthikeyan, Israel Parker and Lucas Gregory traveled to the watershed May 2nd and met with one landowner that has agreed to allow sanitary surveys to be conducted.
- b. In total, two landowners have agreed to cooperate on the project. Several others were contacted but preferred not to participate. The two properties that we will have access to total about 2,500 acres.
- c. GIS was used to delineate the research areas to be used within these properties. This information was used to develop trapping and camera grids.

100% Complete

Subtask 3.3: Conduct a thorough sanitary survey to identify various wildlife sources that contribute E. coli loads during winter. This survey will be conducted by a wildlife expert.

The following actions have been completed during this reporting period:

- a. Prior to QAPP approval, appropriate research permits and equipment were acquired in preparation for the upcoming wildlife survey.

5% Complete

Subtask 3.4: Conduct a through sanitary survey to identify various domestic livestock and poultry sources and waste streams that contribute E. coli loads during winter. This survey will be conducted by an extension county agent and/or an animal-production agriculture expert.

The following actions have been completed during this reporting period:

- a. No activity to report at this time.

0% Complete

Subtask 3.5: Verify and update wildlife survey with inputs from stakeholders and Texas Parks and Wildlife personnel and domestic animal survey with inputs from stakeholders, ranchers, and extension county agents.

The following actions have been completed during this reporting period:

- a. No activity to report at this time.

0% Complete

Subtask 3.6: Conduct a thorough sanitary survey to identify various wildlife sources that contribute E. coli loads during summer. This survey will be conducted by a wildlife expert.

The following actions have been completed during this reporting period:

- b. Prior to QAPP approval, appropriate research permits and equipment were acquired in preparation for the upcoming wildlife survey.
- c. Upon approval of the QAPP, the cooperating landowners were contacted and plans were made to initiate the wildlife survey.
- d. Trapping began and random fecal transects were established in June 2008 and will continue throughout the summer

25% Complete

Subtask 3.7: Conduct a through sanitary survey to identify various domestic livestock and poultry sources and waste streams that contribute E. coli loads during summer. This survey will be conducted by an extension county agent and/or an animal-production agriculture expert.

The following actions have been completed during this reporting period:

- a. No activity to report at this time.

0% Complete

Subtask 3.8: Verify and update wildlife survey with inputs from stakeholders and Texas Parks and Wildlife personnel and domestic animal survey with inputs from stakeholders, ranchers, and county Extension agents.

The following actions have been completed during this reporting period:

- a. No activity to report at this time.

0% Complete

Task 4: Conducting demonstration experiments to characterize and quantify *E. coli* loads from identified sources

Subtask 4.1: Collect feces samples of relevant and dominant identified sources (five maximum) and samples of waste streams (five maximum) identified in Task 4 during winter.

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete

*Subtask 4.2: Extract feces samples and waste streams for *E. coli* collected during winter.*

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete

*Subtask 4.3: Analyze samples collected during winter for *E. coli* using EPA's approved enumeration technique*

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete

*Subtask 4.4: Calculate the *E. coli* load resulting from all identified sources collected during winter*

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete

Subtask 4.5: Collect feces samples of relevant and dominant identified sources (five maximum) and samples of waste streams (five maximum) identified in Task 3 during summer.

The following actions have been completed during this reporting period:

- a. An initial set of fecal material samples has been collected and delivered to the BAEN lab for analysis.

20% Complete

Subtask 4.6: Extract feces samples and waste streams for E. coli collected during summer.

The following actions have been completed during this reporting period:

- a. Samples received are currently being analyzed.

10% Complete

Subtask 4.7: Analyze samples collected during summer for E. coli using EPA's approved enumeration technique

The following actions have been completed during this reporting period:

- b. Samples received are currently being analyzed.

10% Complete

Subtask 4.8: Calculate the E. coli load resulting from all identified sources collected during summer

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete**Task 5: Monitoring fate (survival, growth, re-growth, and die-off) of E. coli under different environmental conditions**

Subtask 5.1: Prepare collected samples in Task 4.5 for this monitoring study.

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete

Subtask 5.2: Measure growth kinetics of E. coli in different sources under varying environmental conditions

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete

Subtask 5.3: Measure survival of E. coli in different sources under varying environmental conditions

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete

Subtask 5.4: Measure re-growth of E. coli in different sources under optimum conditions

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete

Task 6: Monitoring concentration of E. coli in the instrumented stream as a result of rainfall and runoff events

Subtask 6.1: Collect water samples during summer for two rainfall-runoff events.

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete

Subtask 6.2: Collect water samples during winter for two rainfall-runoff events.

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete

Subtask 6.3: Collect stream bed sediments after each water sample collection periods.

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete

Subtask 6.4: Analyze water and sediment for E. coli concentrations

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete

Subtask 6.5: Measure growth kinetics, survival, and re-growth E. coli in stream bed sediments under different environment conditions

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete

Subtask 6.6: Mechanically disturb stream bed sediments four times; twice each during summer and winter, collect grab water samples, and analyze the samples for E. coli

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

0% Complete

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

- a. Two landowners have agreed to cooperate on the project and allow sampling to be conducted on their properties. Ideally, more landowners would have been willing to cooperate; however, the two landowners that did agree to cooperate own approximately 2,500 acres that spans a representative portion of the watershed.
- b. The QAPP for the project was approved during the last quarter, and has enabled the initiation of the sampling.

IV. Projected Work for Next Quarter

- Work during the upcoming quarter will focus on conducting the sanitary survey of the watershed for the summer season and collecting fecal samples.
- Laboratory analysis will be conducted as samples are received.
- Project personnel have received the appropriate training on enumeration techniques for *E. coli* in soil, sediment, fecal and water samples. Collection methods, storage, processing, extraction, enumeration, bio-hazard disposal, and quality assurance/quality control protocols were all discussed during training.