

**Texas A&M AgriLife Research
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. 8 From 7/1/09 Through 9/30/09

I. Abstract

Work this quarter has focused on the collection of fecal samples and the identification of bacteria sources in the watershed. Samples were collected from feral hog by means of hunters as well as the euthanizing of feral hogs by the landowners. After 20 days of conducting camera trapping, approximately 2,000-3,000 photos were taken. 9 days of hog capture were conducted while 7-10 of these days were pre-baited at the hog capture locations. Also, 30 days of deer capture were conducted (6 deer samples were collected) and again, 7-10 of these days were pre-baited at the deer capture locations. Other work this quarter consisted of measuring the growth and survival of *E. coli* under different environmental conditions.

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. (Month 1 - 36).

The following actions have been completed during this reporting period:

- a. The year 2, quarter 4 report was completed and sent to the TSSWCB on October 9, 2009.

66% 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. (Month 1 – 36).

The following actions have been completed during this reporting period:

- a. Project leads and TWRI project manager held a brief meeting to discuss the progression of the project and future activities.

66% Complete

Subtask 1.3: TWRI will attend meetings with the TSSWCB project manager and other meetings, as needed, to review project status, deliverables, etc. (Month 1 – 36).

The following actions have been completed during this reporting period:

- b. Project leads and TWRI project manager held a brief meeting to discuss the progression of the project and future activities.

66% Complete

Subtask 1.4: TWRI will submit appropriate Reimbursement Forms. (Month 1 – 36).

The following actions have been completed during this reporting period:

- a. As of August 31, 2009, a total of \$154,742.98 or 51.5% of total project funding has been expended.

52% Complete

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

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.

97% Complete

Subtask 1.6: TWRI and Texas AgriLife Extension will work together to develop the Final report. (Month 30 – 36).

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. (Month 1 – 36).

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. (Month 1 – 6).

The following actions have been completed during this reporting period:

- a. This task is complete.

100% Complete

Subtask 2.2: Provide annual revisions to the QAPP and amendments, as necessary, to the TSSWCB and EPA. (Month 6 – 36).

The following actions have been completed during this reporting period:

- a. The Annual QAPP revision was approved August 24, 2009

50% 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. (Month 1 – 2).

The following actions have been completed during this reporting period:

- a. This task is complete.

100% Complete

Subtask 3.2: Travel to the selected watershed and conduct a renaissance survey of the watershed and sources. (Month 6 – 8).

The following actions have been completed during this reporting period:

- a. This task is complete.

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. (Month 6 – 8).

The following actions have been completed during this reporting period:

- a. This task is complete.

100% Complete

Subtask 3.4: Conduct a thorough 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. (Month 6 – 8).

The following actions have been completed during this reporting period:

- a. Information on poultry litter application has been requested from TSSWCB's Centerville Field Office; but has not been received as of yet. Contact will be made again this quarter in an effort to retrieve the information.

30% 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. (Month 6 – 8).

The following actions have been completed during this reporting period:

- a. Contact has been made with the Texas Parks and Wildlife Department for help in finding properties for hog and deer trapping.

20% 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. (Month 8 – 12).

The following actions have been completed during this reporting period:

- a. 20 consecutive days of camera trapping were conducted and approximately 2,000-3,000 photos were taken.
- b. 9 days of hog capture were conducted and 20 hogs were captured. Pre-bated for 7-10 days at all hog capture locations
- c. 30 days of deer capture were conducted and 6 deer samples were collected. Pre-bated for 7-10 days at all deer capture locations
- d. conducted 75 fecal transects

80% Complete

Subtask 3.7: Conduct a thorough 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. (Month 8 – 12).

The following actions have been completed during this reporting period:

- b. Information on poultry litter application has been requested from TSSWCB's Centerville Field Office; but has not been received as of yet.

20% 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. (Month 12 – 14).

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

15% 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. (Month 6 – 8).

The following actions have been completed during this reporting period:

- a. White tail deer trapping has been used and will be continuing into the next quarter.
- b. Fecal samples have been collected from deer and feral hogs.

86% Complete

*Subtask 4.2: Extract feces samples and waste streams for *E. coli* collected during winter. (Month 6 – 8).*

The following actions have been completed during this reporting period:

- a. Samples collected this quarter have not been extracted yet.

0% Complete

*Subtask 4.3: Analyze samples collected during winter for *E. coli* using EPA's approved enumeration technique. (Month 6 – 8).*

The following actions have been completed during this reporting period:

- a. Samples collected this quarter have not yet been analyzed.

0% Complete

*Subtask 4.4: Calculate the *E. coli* load resulting from all identified sources collected during winter. (Month 8 – 10).*

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. (Month 10 – 12).

The following actions have been completed during this reporting period:

- a. Fecal material samples were collected regularly from an identified ranch.
- b. The collected samples were delivered to the BAEN lab for analysis.

60% Complete

Subtask 4.6: Extract feces samples and waste streams for E. coli collected during summer. (Month 10 – 12).

The following actions have been completed during this reporting period:

- a. *E. coli* is extracted from all the samples that gave positive results upon analysis.

55% Complete

Subtask 4.7: Analyze samples collected during summer for E. coli using EPA's approved enumeration technique. (Month 10 – 12).

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

20% Complete

Subtask 4.8: Calculate the E. coli load resulting from all identified sources collected during summer. (Month 12 – 14).

The following actions have been completed during this reporting period:

- a. No activity to report this quarter.

25% 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. (Month 12)

The following actions have been completed during this reporting period:

- a. No activity to report at this time

45% Complete

Subtask 5.2: Measure growth kinetics of E. coli in different sources under varying environmental conditions. (Month 12 – 20).

The following actions have been completed during this reporting period:

- a. No activity to report at this time

45% Complete

Subtask 5.3: Measure survival of E. coli in different sources under varying environmental conditions. (Month 12 – 20).

The following actions have been completed during this reporting period:

- a. No activity to report at this time

45% Complete

Subtask 5.4: Measure re-growth of E. coli in different sources under optimum conditions. (Month 20 – 26).

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. (Month 8 - 32).

The following actions have been completed during this reporting period:

- a. No activity to report at this time.

30% Complete

Subtask 6.2: Collect water samples during winter for two rainfall-runoff events. (Month 8 – 32).

The following actions have been completed during this reporting period:

- a. No activity to report at this time.

0% Complete

Subtask 6.3: Collect stream bed sediments after each water sample collection periods. (Month 8 – 32).

The following actions have been completed during this reporting period:

- b. No activity to report at this time.

35% Complete

Subtask 6.4: Analyze water and sediment for E. coli concentrations. (Month 8 – 34).

The following actions have been completed during this reporting period:

- c. No activity to report at this time.

25% Complete

Subtask 6.5: Measure growth kinetics, survival, and re-growth E. coli in stream bed sediments under different environment conditions. (Month 9 – 32).

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. (Month 9 – 32).

The following actions have been completed during this reporting period:

- a. No activity to report this quarter

30% Complete

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

- a. Runoff producing rainfall events continue to elude the monitoring area; as a result runoff sample collection is lagging behind.

IV. Projected Work for Next Quarter

- More fecal samples are being received therefore the laboratory analysis will continue.

- Out of the samples analyzed, some samples will be selected and prepared for monitoring fate of *E. coli* under different environmental conditions. The growth kinetics and survival of *E. coli* will be measured under varying environmental conditions and its re-growth will be monitored under optimum conditions.
- Conduct White-tailed Deer and feral hog trapping to collect further fecal samples and estimate watershed populations.