

Modeling Nutrient Loads from Poultry Operations in the Toledo Bend Reservoir and Sam Rayburn Reservoir Watersheds.

Texas State Soil and Water Conservation Board

CWA Section 319(h) Project #04-6

Nonpoint Source Summary Page

1. Title of Project: Modeling Nutrient Loads from Poultry Operations in Toledo Bend Reservoir and Sam Rayburn Reservoir Watersheds.

2. Project Goals/Objectives: (1) Collect GIS, landuse, management, and measured data for selected watersheds. (2) Where measured data is available, calibrate SWAT watershed model to measured flow, sediment and nutrients. (3) Simulate nutrient load for current conditions. (4) Simulate for pre and post BMP implementation conditions.

3. Project Tasks: (1) Simulate nutrient loadings for pre and post implementation conditions in the Toledo Bend Reservoir and Sam Rayburn Reservoir watersheds; (2) Prepare final report for each watershed.

4. Measures of Success: Estimate the reduction in nutrients including phosphorus and nitrate loadings to rivers and lakes.

5. Project Type: Statewide (); Watershed (X); Demonstration ()

6. Waterbody Type: River (X); Groundwater (); Other ()

7. Project Location: Sam Rayburn Reservoir (*Segment 0610*) and Toledo Bend Reservoir (*Segment 0504*)

8. NPS Management Program Reference: State of Texas Agricultural/Silvicultural Nonpoint Source Management Program

9. NPS Assessment Report Status: Impaired (); Impacted (X); Threatened (); Other ()

10. Key Project Activities: Hire Staff (); Monitoring (); Regulatory Assistance (); Technical Assistance (); Education (); Implementation (); Demonstration (X); Other – watershed modeling (X)

11. NPS Management Program Elements: Milestones from the “Texas Nonpoint Source Pollution Assessment Report and Management Program”, which will be implemented include: (1) Coordinating with Federal, State, and Local Programs (2) Committing to technology transfer, technical support, administrative support and cooperation between agencies and programs for the prevention of NPS pollution.

12. Project Costs: Federal (\$96,000); Non-Federal Match (\$0); Total Project (\$96,000)

13. Project Management: Texas State Soil and Water Conservation Board Cooperating entities: Natural Resources Conservation Service-Water Resources Assessment Team, Blackland Research & Extension Center.

Project Period: March 1, 2006 to February 28, 2008

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Workplan

Problem/Need Statement:

In 2000 the Sam Rayburn Reservoir (segment 0610) and Toledo Bend Reservoir (segment 0504) were identified as having a NPS pollution concern for low dissolved oxygen and placed on the 303(d) List. That same year the Texas Commission on Environmental Quality (TCEQ) began monitoring to develop a TMDL for the Sam Rayburn Reservoir. In June 2001, the TSSWCB initiated a series of projects to implement best management practices (BMPs) on poultry facilities in the Toledo Bend Reservoir and Sam Rayburn Reservoir watersheds. Since the inception of these projects more than 300 facilities in these two watersheds have implemented BMPs thru a TSSWCB approved Water Quality Management Plan (WQMP). These WQMPs typically focus on management measures such as proper animal waste utilization, nutrient management, and pest management, but can include structural BMPs as well as other management practices. These BMPs employ the best available technology to reduce nutrient loadings to lakes and streams.

Implementing BMPs on such a large number of facilities undoubtedly has a positive impact on water quality; however, it is impossible to know the exact amount of nutrient load reductions without setting up a monitoring site at each place that water enters a stream. Monitoring on such a large scale is extremely cost prohibited. Modeling offers a more cost-effective means to estimate load reductions

General Project Description:

The proposed project will consist of using a computer model and geographic information systems (GIS) to simulate the effects of applying best management practices on nutrient loadings in watersheds above Toledo Bend and Sam Rayburn Reservoirs. All of the Sam Rayburn watershed and most of the Toledo Bend watershed will be simulated. The portion of the Toledo Bend watershed that will not be simulated is located above USGS stream gage 08022040.

The Soil and Water Assessment Tool (SWAT) will be used to quantify the effects of applying BMPs on nutrient loadings to streams, rivers, and lakes in each watershed. The Natural Resources Conservation Service (NRCS) Water Resources Assessment Team (WRAT) located at the Blackland Research and Extension Center (BREC) will conduct the model simulations.

GIS and measured data will be collected for each of the watersheds. It is anticipated that most of the data will have a scale of 1:24,000 with a 30-meter resolution. Examples of GIS data that may be used are SSURGO (Soil Survey Geographic) and CBMS (Computer Based Mapping System) soils, USGS NLCD (National Land Cover Dataset) landuse, and the USGS 30-meter resolution digital elevation model (DEM). Measured precipitation and temperature will be collected from National Weather Service climate stations for input to SWAT. Measured stream flow will be collected at USGS stream gage stations, and measured sediment will be obtained from reservoir owners/operators, or the Texas Water Development Board.

Within each watershed, information on typical crops and management practices (e.g. tillage, grass management, manure application rate and timing) will be obtained from local NRCS and SWCD field offices. Existing BMPs (e.g. terraces, waterways, buffers, manure management methods) will be determined from field office records. SWAT inputs will be adjusted to accurately represent existing conditions and management.

After collecting all available data for a watershed, the SWAT model will be calibrated to measured stream flow, sediment, and nutrients. If measured data is not available for a particular watershed, SWAT inputs will be selected and adjusted based on recent research and calibration in other watersheds. After calibration, the existing condition will be simulated for approximately 30-year period to determine nutrient loading to the lake.

To simulate the treated condition, BMPs, which may affect nutrient runoff, will be assumed applied on all land used for poultry waste application. Appropriate adjustments will be made to SWAT inputs, and the same time period will be simulated. Model outputs for the existing condition and treated condition will be compared to determine the effects on nutrient loading to the lake or stream.

A final report for each watershed will be prepared.

Tasks, Objectives, Schedules, and Estimated Costs:

Task 1: Development of a Quality Assurance Project plan (QAPP) (Month 1 thru Month 6)

Cost: \$5000 (Federal); \$0 (Non-Federal Match); \$5000 (Total)

Objective: Develop a QAPP to be approved by EPA

Deliverables:

- Quality Assurance Project Plan – A QAPP must be submitted to EPA, through the TSSWCB, 60 days prior to the initiation of any modeling.

TASK 2: Watershed Simulations

Costs: \$91,000 (Federal); \$0 (Non-Federal Match); \$91,000 (Total)

Objective: Model the effects of BMPs on nutrient loadings to lakes and/or rivers in Toledo Bend and Sam Rayburn watersheds.

Subtask 1.1 Toledo Bend Reservoir Simulations (\$48,000). (Month 7 thru 13)

Subtask 1.2 Sam Rayburn Reservoir Simulations (\$48,000). (Month 14 thru 20)

Deliverables:

- Quarterly reports
- Final report for each watershed

TASK 3: Project Report and Documentation (Month 21 thru Month 24)

Final four months will be dedicated to writing the final reports and technical documentation of the project for submission to EPA, TSSWCB and referred journal articles.

Coordination, Roles and Responsibilities:

Participating organizations and agencies along with their roles in this project include:

- **Texas State Soil and Water Conservation Board** – Project Lead – Work with and assist as needed local SWCDs in collecting data on crops, typical land management, manure applications, existing BMPs, and planned BMPs in each watershed.
- **Natural Resources Conservation Service-Water Resources Assessment Team** – Collect GIS and measured data, and simulate current and treated conditions for each watershed to determine effects of BMPs on nutrient runoff and loading.

Public Participation:

This is an internal TSSWCB project with the NRSC-WRAT. This project will provide estimates of the beneficial effects of BMPs on nutrient runoff and loading in the selected watersheds.

Measures of Success:

- Estimates of reductions in nutrient loadings to streams, rivers and lakes in each watershed.

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BUDGET

Object Class Category	Federal Funds	Non-Federal Match	Total
1.Personnel:	0	0	0
2.Fringe Benefits:	0	0	0
3.Travel:	0	0	0
4.Equipment:	0	0	0
5.Supplies:	0	0	0
6.Contractual:			
NRCS-WRAT (modeling)	\$96,000	0	96,000
7.Construction:	0	0	0
8.Other Direct Costs:	0	0	0
9.Total Direct Costs:	\$96,000	0	\$96,000
10.Indirect Costs:	0	0	0
11.Total Project Costs:	\$96,000	0	\$96,000

