

US EPA ARCHIVE DOCUMENT

**1. STATE INNOVATION GRANT PROGRAM PREPROPOSAL PACKAGE**

**a. Project Title:**

MODELING ANALYSIS FOR RELATIVELY UNIMPAIRED STREAMS IN  
LOWLAND AND DELTAIC WATERSHEDS ALONG THE GULF COAST

**b. Applicant:**

Louisiana Department of Environmental Quality  
Funding Opportunity Number: EPA-AO-OPEI-07-01

**c. Key Personnel and Contact Information:**

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**d. Total Project Cost**

*[Budgetary Information Withheld by U.S. EPA]*

**e. Project Period**

Anticipated starting date: February 1<sup>st</sup>, 2008  
Anticipated ending date: November 30<sup>th</sup>, 2010

**f. Summary Statement**

There is a lack of public information about the nonpoint pollutant loading characteristics of streams in lowland and deltaic streams in which the primary loading source is resuspension of the bottom silt/sediment materials. This project will address that issue and enable state agencies and their partners to better identify/differentiate natural background nonpoint loads and man-made nonpoint loads.

**g. Statutory Authority and Flexibility**

This project will be completed under the statutory authority provided by the United States' Clean Water Act, Sections 104(b) and 303(d) and the State of Louisiana's Environmental Quality Act, R.S. 30:2011 and R.S. 30:2074.

#### **h. State Agency Support**

This project is supported by Barbara Romanowsky, Administrator of the Water Quality Assessment Division, Office of Environmental Assessment.

## **2. Pre-Proposal Project Narrative**

### **a. Project Description**

The Clean Water Act requires that Total Maximum Daily Load (TMDL) studies be completed for all navigable waters of the United States. Section 303(d) of the Clean Water Act requires that impaired waterbodies are given the highest priority for TMDL development.

The Louisiana Department of Environmental Quality (LDEQ) has been developing watershed-based TMDLs for dissolved oxygen since 1999.

Under the Louisiana Department of Environmental Quality's current monitoring strategy, every watershed is sampled 12 times during every four-year period. This data is used to assess the watershed based on its designated use. Assessments are made for conventional parameters, metals, pH, noxious aquatic species, and dissolved oxygen. A waterbody is scheduled for TMDL development if it is designated as impaired for a particular parameter. Under an agreement between EPA and LDEQ, EPA develops most of the TMDLs for conservative parameters and some of the TMDLs for dissolved oxygen in Louisiana waterbodies. LDEQ develops most of the TMDLs for dissolved oxygen.

Once a waterbody is placed on the 303(d) list, reconnaissance surveys and a discharger inventory are conducted. A watershed survey plan is developed. Once the watershed survey and sample testing is completed, model development begins.

The first step of the modeling process involves analyzing and summarizing the data. The appropriate modeling software is selected after reviewing the data, the geographical aspects of the waterbody, and the internal processes of the waterbody.

The second step is to develop a calibrated model. The model is set up so that it simulates the entire study area. All loads are designated in the model. The model is adjusted so that it reproduces the instream concentrations that were measured in the field. When this process is successfully completed, the model is declared to be calibrated. The calibrated model then serves as the basis for any projection models.

Projection models are developed by modifying the calibrated model to reflect critical conditions and facility wasteloads. Critical conditions may vary seasonally. The parameters that determine the critical conditions are based on the parameter being modeled. In the case of dissolved oxygen, parameters that define critical conditions stream temperature and stream flow. According to EPA and LDEQ, the critical conditions for dissolved oxygen are the 90<sup>th</sup> percentile for temperature and the 7Q10 for stream flow.

Projection models are developed to determine the loads that the waterbody can assimilate while supporting a predetermined criterion. These models may show that a significant reduction in the point source or nonpoint source loading may be required. At this stage of the process, LDEQ works with various stakeholders on a case-by-case basis.

The TMDL report is compiled and submitted to EPA for review and comment after all of the modeling is complete. The report is also made available to the general public for review and comment. Once all comments have been addressed, the complete report is submitted to EPA for final approval. The final TMDL results are added to the state's Water Quality Management Plan (WQMP).

On many occasions, LDEQ personnel must review a completed TMDL in regards to a new facility or an upgrade for an existing facility. If the TMDL must be modified, the appropriate changes are made in the Water Quality Management Plan.

Louisiana has taken significant measures in the past to reduce the loading produced by the various major and minor point source dischargers. This includes the establishment of statewide policies to set the permit limits for various types and sizes of facilities. The next logical step is to reduce the nonpoint source dischargers. The most typical form of nonpoint source pollutant loading is sheet flow runoff following rainstorms. This project is focused on identifying/quantifying "natural" nonpoint loads which originate from areas not impacted by man.

A key factor in addressing the nonpoint source loads is the establishment of natural background nonpoint source loads. Without such information, man-made nonpoint source loads cannot be addressed as a separate entity. Once natural background nonpoint source loads are established, man-made nonpoint source loads can be addressed by determining the appropriate load reductions and using best management practices (BMPs) that can achieve these load reductions.

In some cases, instream load concentrations may be at or near the established natural background loads. This may indicate the point sources are the primary source of loading. Thus, established natural background loading values play a key role evaluating the impact of point source loads and nonpoint source loads.

LDEQ has established natural background loading values for CBOD and NBOD in the past. These values were obtained from relatively unimpaired streams that were considered “reference streams”. However, the BOD testing procedure being used at that time utilized a nitrogen suppressant to differentiate the CBOD from the NBOD values. Since completion of that project, LDEQ personnel have recognized that this nitrogen suppressant was failing. LDEQ has also discovered that some of the samples obtained during those surveys contained both fast and slow decaying CBOD values. These factors have prohibited the use of the existing reference stream data except in the most general/overall terms.

Therefore, LDEQ is currently unable to differentiate the natural background nonpoint loads from the man-made nonpoint loads as often requested by EPA. This modeling project will produce nonpoint loads for relatively unimpaired (reference) streams. The results will be representative of natural background nonpoint loads for streams in lowland and deltaic watersheds along the Gulf Coast. The results may also be applicable to other coastal watersheds in the United States and other countries.

Recognizing the shortcomings of the earlier project, LDEQ has already begun the process to update the project by collecting and processing new water samples using a newer more reliable 60 day BOD test. Data has been collected and processed for 19 reference streams within the state of Louisiana. These reference streams will be modeled to produce nonpoint loading for oxygen-demanding substances. The values should be representative of natural background conditions. Evaluation of the man-made loading will be more effective with valid knowledge of the natural background nonpoint loading.

The project will include the following tasks:

1. Data organization and analysis
2. Reference stream modeling
3. Development of the methodology documentation and final report
4. Review of the final report
5. Final presentation

The project will enhance the ability of states and other agencies to evaluate the impacts of nonpoint loading. Various water quality models have indicated that nonpoint loading is the primary cause of dissolved oxygen impairments, yet regulatory agencies have been focused on point source loads.

LDEQ personnel conducted previous work on this project. However, personnel cuts and the impacts of Hurricanes Katrina and Rita have inhibited the department’s ability to complete the project.

**b. Program Guidelines, Eligibility, Requirements, and Selection Criteria**

EPA requires that nonpoint loading be considered as a part of any TMDL project. In most cases, EPA requests that we differentiate between natural background nonpoint loads and man-made nonpoint loads.

Reference stream data pertaining to dissolved oxygen and the loading of oxygen demanding substances is almost nonexistent. This is especially true for areas consisting of lowland deltaic streams. The new information and technology developed by this project will diversify environmental protection tools and approaches.

These results will better enable states to identify natural background nonpoint loading, thereby providing a better evaluation of the impacts of man-made loads. These man-made loads include both point and nonpoint sources. The information may be applied to lowland deltaic streams throughout the nation. Over the long term, the information will aid in the restoration and maintenance of water quality wherever it is applied. Better information reduces the cost of water and wastewater infrastructure.

New and updated information regarding background nonpoint loads will enable regulatory agencies to address major and minor point source facilities appropriately. LDEQ has successfully addressed many of its minor facilities throughout the state with its General Permit Program. The facilities are characterized by the amount and type of wastewater discharge. All facilities of a particular type that fall within a given range of discharge volume are provided with the same permit limits.

This project will be completed under the statutory authority provided by the United States' Clean Water Act, Sections 104(b) and 303(d) and the State of Louisiana's Environmental Quality Act, R.S. 30:2011 and R.S. 30:2074.

This project will promote three goals of EPA's 2003-2008 strategic Plan. They are as follows:

Goal 2 – Clean and Safe Water

The ultimate goal of this project is to enable various agencies to ensure that clean and safe water is available for the general public.

Goal 4 – Healthy Communities and Ecosystems

The ability to better evaluate natural background and man-made nonpoint loading will promote and protect healthy communities and ecosystems.

Goal 5 – Compliance and Environmental Stewardship

Compliance and environmental stewardship will also be enhanced by the improved ability to evaluate the natural background nonpoint loading and the impacts of man-made loads (point or nonpoint).

The state of Louisiana has not had the opportunity to participate in the State Innovation Grant Program.

**c. Environmental Outputs**

The final product will include instream concentrations and nonpoint loading values. The values will be developed from data that was collected and sampled by LDEQ. The BOD sampling was conducted according to the standard BOD analysis sampling methods. The instream BOD concentrations will be developed using LDEQ's BOD analysis spreadsheet. The results will include both fast and slow decaying CBOD concentrations, decay rates, and lag times as well as NBOD concentrations, decay rates, and lag times.

The nonpoint loading values will be developed by completing a modeling analysis for each waterbody. The results will include the total nonpoint loading, and sediment oxygen demand (SOD). The total nonpoint loading will be further segregated into CBOD loading (fast and slow decaying) and NBOD loading. Total nonpoint loading and SOD will be expressed in terms of gm O<sub>2</sub>/m<sup>2</sup>/day. Nonpoint CBOD and NBOD loading will be expressed in terms of kg/day.

LDEQ has completed much of the initial work, including data collection, analysis, and preparation. The data includes water quality laboratory sample results, continuous monitor instrument measurements made in stream, flow measurements corresponding to the sampling and continuous monitor data, and stream characterization data for 19 streams in the state of Louisiana. This work was completed with state funding. LDEQ's ability to complete the project has been eliminated by the impact of Hurricanes Katrina and Rita and the resulting loss of modeling personnel and state funding. Any federal funds applied to this project will be complimentary

Progress reports will be provided at various stages of the project. A final report will be provided and made available to the public. Full documentation of the modeling methodology will be provided in the final report. The anticipated project schedule is listed below.

- |   |                                   |
|---|-----------------------------------|
| 1. Data organization and analysis                                   | March 30 <sup>th</sup> , 2008     |
| 2. Reference stream modeling  | March 30 <sup>th</sup> , 2010     |
| 3. Development of the methodology<br>documentation and final report | June 30 <sup>th</sup> , 2010      |
| 4. Review of the final report                                       | September 30 <sup>th</sup> , 2010 |
| 5. Final presentation   | November 30 <sup>th</sup> , 2010  |



If it becomes evident that the modeling will take more time or funding than anticipated, the highest priority will be given to a predetermined subset of the original list of reference streams. The project will then be limited to the subset of reference streams. Additional streams will be addressed as time and funding permit.

Data was collected for this project prior to Hurricanes Katrina and Rita by LDEQ. Water quality, continuous monitor, flow, and stream characterization data was collected for 19 reference streams in the state of Louisiana.

**d. Environmental Outcomes**

The results will expand and enhance prior reference stream work that was conducted by LDEQ and its contractors.

With new information, states and other regulatory agencies will be able to address natural background and man-made nonpoint loads in streams that are modeled under the national TMDL program. Modelers will be able to differentiate reductions in man-made nonpoint BOD loads that are required to meet any dissolved oxygen criterion from reductions in natural background nonpoint loads. This modeling provides the basis for nonpoint BMP implementation programs.

These values will be applicable throughout the southeastern and eastern coastal regions of the United States. They may also be applicable to other areas of the world with similar climatology, geography, and hydrology.

Many of the reference streams are located in the Pontchartrain and Sabine Basins, which were heavily damaged by Hurricanes Katrina and Rita. The natural background loading values developed for these streams will be essential in the development of TMDLs and load reductions for streams in the Pontchartrain and Sabine Basins. The results will also help determine the impacts of the hurricanes on streams in these basins and their recovery status.

**e. Public Involvement**

LDEQ (and its contractor) will be the primary participant(s). Any sites added to the project will require new surveys at those sites. In each case, a local public announcement will be provided. The final report will be submitted to EPA and be posted for review and comments on LDEQ's public website shown below:

<http://www.deq.louisiana.gov>

**f. Collaboration or Partnerships**



There has been no assistance (contractual or otherwise) for this project within the last three years.

LDEQ personnel conducted previous work on this project. However, personnel cuts and the impacts of Hurricanes Katrina and Rita have inhibited the department's ability to complete the project. LDEQ is proposing that the remainder of the project be funded through a grant provided by the FY 2007 National Center for Environmental Innovation State Innovation Grant Program. The grant number is EPA-AO-OPEI-07-01.

LDEQ personnel will perform contract/project management duties, project mapping, review the final report as well as provide for the information transformation.

### **3. Pre-proposal Budget Summary**

*[Budgetary Information Withheld by U.S. EPA]*

### **4. Environmental Results Past Performance**

LDEQ is currently working with EPA on the Performance Partnership Grant Program, the 106 Water Program Grant, the 604(b) Water Quality Management Grant Program and the Section 319 Grant Program.

LDEQ has successfully completed many environmental projects under these grants in years past including but not limited to the 1994-1995 Reference Stream Project. LDEQ has produced seventy-nine TMDLs in the Mermentau, Vermillion, Calcasieu, Ouachita and Barataria Basins since the watershed program began in 1999. Most of the TMDLs addressed dissolved oxygen and/or nutrients. Some of the TMDLs addressed dissolved metals. These TMDLs were either fully or partially funded by EPA.

Under Section 319 of the Clean Water Act, LDEQ has implemented projects and programs to reduce nonpoint source pollutants in the Mermentau, Vermilion-Teche, and Calcasieu River Basins. Both section 319 and USDA funds have been utilized to implement projects in the Ouachita River Basin. These project and programs have included activities such as:

1. TMDL development
2. Updating landuse data
3. BMP implementation
4. Monitoring (Post implementation)
5. Public education and awareness programs

EPA is interested in any state programs that follow the Environmental Results Program (ERP) or Environmental Management System (EMS) models.

LDEQ has successfully implemented the statewide General Permit program and the Municipal Stormwater (MS4) program. These programs are consistent with the requirements of an ERP. Both of these programs allow LDEQ to address large numbers of small sources of pollution.

LDEQ's Nonpoint Source Implementation Plans are consistent with the stated requirements of both an ERP and an EMS. The implementation plans work on a voluntary basis, incorporate public involvement, and allow LDEQ to address a large number of small sources of pollution.

## **5. Programmatic Capability**

The Louisiana Department of Environmental Quality is responsible for the environmental well-being of the State of Louisiana. This involves the establishment of narrative standards and numerical criteria, regulatory permitting, public education, and emergency response to environmental and public health hazards.

The Water Quality Modeling Section (WQM) resides in LDEQ's Office of Environmental Assessment (OEA). The WQM section includes five LDEQ modelers that have successfully completed many approved dissolved oxygen and nutrient TMDLs over the last ten years. LDEQ has met all TMDL deadlines since the establishment of the watershed-based TMDL program and the court-ordered TMDL schedule. All modelers and one scientist are extremely knowledgeable in the assessment, TMDL, and implementation processes.

The LDEQ Standards, Assessment, and Nonpoint (SAN) Section also exists in LDEQ's Office of Environmental Assessment. This section has worked tirelessly with EPA to develop several Use Attainability Analyses (UAAs). The section has many years of experience regarding public education programs and the development of implementation plans.