Final Report
Water Quality Program for Lake Granbury, Texas

Texas A&M AgriLife
Texas Water Resources Institute
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INTRODUCTION

The overall goal for this project was to provide a mechanism to educate local stakeholders about water quality issues that affect Lake Granbury. This project provided an assessment of existing and potential water quality threats related to on-going non-point source (NPS) water pollution within the Lake Granbury Watershed. The Texas Water Resources Institute (TWRI) and Texas AgriLife Extension Service are assisting BRA and TCEQ develop a Watershed Protection Plan (WPP), aimed to improve and protect water quality within the Brazos River Basin. Educational information developed during this project provided Federal, State and local decision makers with a variety of mechanisms that can be employed to prevent additional degradation of water quality in the watershed.

PROJECT BACKGROUND

Lake Granbury is a critical water supply in North Central Texas, providing water for over 250,000 people in more than 15 cities. It provides water for industrial use, including cooling water for a natural gas–fired steam electric power plant and the Comanche Peak nuclear power plant. It is also a recreation haven for local water enthusiasts.

Recent studies by the Brazos River Authority (BRA) have detected contamination of fecal coliform bacteria in several areas of the lake, primarily in coves with poor water circulation. As a result, BRA will work with the Texas Commission on Environmental Quality (TCEQ) and a consortium of local entities and federal and state agencies to implement an integrated watershed protection plan designed to reduce bacterial contamination. This project is funded by the Environmental Protection Agency under CWA Section 319.

A substantial portion of the developed area around Lake Granbury, which lies wholly within Hood County, is unincorporated subdivisions that do not have sewage collection systems and centralized sewage treatment facilities. There are an estimated 9,000 septic tanks located around Lake Granbury, with absorption fields installed on small lots in close proximity to the lake. Most of the inhabited areas around the lake exist on man-made coves. The coves are shallow, dead-end bodies of water with little mixing or interaction with the main body of the reservoir. Many of these systems were installed before the 1997 On-Site Sewage Facility (OSSF) rule changes. The 1997 rule changes required a site and soil evaluation to determine the sites capacity to treat wastewater. A onsite wastewater treatment system was then selected based on the ability to effectively treat the wastewater. New development in areas without centralized collection and treatment systems rely on individual onsite wastewater treatment systems for their wastewater infrastructure.

There are eight permitted wastewater treatment plants in Hood County and the population served by the existing permitted facilities is estimated to be less than 50 percent of the current county population.

In 1993 a cooperative study between the Texas Water Commission, the BRA and the Hood County Health Unit first identified an increase in fecal coliform levels in the lake. The *On-site Wastewater Treatment Units at Lake Granbury and the Possible Impact Upon the Water Quality of the Lake Study* identified the most notable area of concern to be in the coves.

In 1995 a study titled, *Survey of Conditions and Impact of Septic Tank Pollution on the Water Quality in Lake Granbury*, indicated that the soils in which septic tanks are installed around Lake Granbury are generally not well-suited for septic tanks and absorption fields. Another finding was that almost all on-site systems around the lake include absorption fields that do not provide a capacity that would comply with current State criteria.

The combination of previous studies indicate a concern for water quality from on-site sewage systems and forecasts show that Hood County population will likely increase from its current level of about 42,000 persons to over 78,000 persons by the year 2030. With this information in mind, the development of a feasibility study to bring a regional sewage system to Hood County and eliminate the on-site sewage facilities was completed in 2000. The *Hood County Regional Sewerage System Feasibility Study* was a cooperative effort between BRA and the Hood County Intergovernmental Coalition. The estimated capital costs for this regional wastewater facility was estimated to be approximately $149,900,000 with annual operation and maintenance costs estimated to be approximately $16,231,000.

Beginning in May 2001, BRA began collecting water quality samples on a monthly basis at over 50 cove locations. Some of the locations showed no elevated concentrations of *E. coli* and were later discontinued. Some locations were added after a year of monitoring as new information was acquired on possible source locations. The data generated from this effort indicates that many of the canals on Lake Granbury are impacted by *E. coli* issues and indicate a concern for public health and contact recreation. The data also indicates that the water quality in the coves is most influenced by the surrounding land use, rather than by the main body of the lake.

Declining water quality in Lake Granbury has begun to negatively affect the use of the lake. Lake Granbury is the lifeblood of Hood County, with the majority of the county's communities relying on the lake for drinking water, irrigation, industry, and recreation. The economy in Hood County is closely tied to Lake Granbury and the environmental condition of the lake is crucial to the county's residents.

PROJECT RESULTS

In order to help correct existing water problems and protect the future of Lake Granbury, the residents and lake users need a better understanding of lake water quality issues and applicable best management practices. Therefore, the objectives of this project were to:

- Hold public meetings to educate stakeholders and clients within the watershed about

water quality and its protection
- Provide public educational programs to help achieve improved water quality
- Conduct training events on proper operation and maintenance of on-site wastewater treatment systems and collective facilities

Since January 2007, a team of Texas AgriLife Extension educators led by Dr. Bruce Lesikar, Professor and Associate Department Head in the Department of Biological and Agricultural Engineering at Texas A&M University have developed over 20 generalized and watershed-specific fact sheets about various topics including fecal coliform contamination and sources, on-site wastewater treatment, collective wastewater treatment systems, graywater systems, pet waste management, nutrient and sediment loading, landscape chemicals, and management practices to minimize loadings, including urban and agricultural nonpoint source pollution.

Several presentations were made at public meetings and educational programs to over 160 individuals, on topics including water quality standards, on-site wastewater treatment system maintenance, regional collection systems, identification of malfunctioning on-site wastewater treatment system, rainwater harvesting, and groundwater management. The onsite wastewater treatment systems program addresses the needs of the practitioners and homeowners. The wastewater practitioners participated in a training program describing the use of advanced treatment units to remove contaminants of concern from the wastewater. Facts sheets describing graywater use and its potential impact on water quality will address the issue of graywater systems discharging water into waterways. Additional fact sheets describing wastewater treatment technologies were revised to address the new State regulations which became effective on September 11, 2008.

Marty Vahlenkamp, Texas AgriLife Extension Agent in Hood County was instrumental in hosting educational programs and sharing information with the public. Along with these presentations, team members worked with the North Central Texas Council of Governments and the Hood County Extension agent to distribute water quality information through Public Service Announcements and the local media. A demonstration garden was constructed near the Extension Office which contains a rainwater harvesting demonstration. These rainwater harvesting demonstrations are a stormwater management best management that teaches basic hydrology. Most people recognize the water captured in a tank as a water supply. However, many participants increase their water literacy through implementing a rainwater harvesting project. The participant gains information about the quantity of water running off a surface and the contaminants that can be absorbed by the water as it runs across a surface. The volume of water generated during a rainfall event is quantified and the amount available for capture from a specific size surface is calculated. The participants must also determine the volume of water needed to meet the functions performed on a daily basis (landscape irrigation, bathing, toilet flushing, and drinking water). The individual must then properly size the tanks to meet their water needs based on the available rainfall, rainfall distribution pattern, catchment area and potential for a drought. Ultimately, the participants are learning valuable information that will assist them make informed decision regarding management and protection of our critical water resources.

The project team is working with BRA and TCEQ to incorporate current and future educational activities into an education and outreach plan for the Lake Granbury Watershed Protection Plan. A draft of this plan was presented at the stakeholder meeting in August 2008 for input and approval.

In addition to educating the public on water quality problems in Lake Granbury, the project team collaborated with Espey Consultants, BRA and Texas AgriLife Research to conduct a preliminary dye study of on-site wastewater treatment systems in the Lake Granbury watershed. The systems of six households in the Oak Trail Shores subdivision where evaluated for there efficiency and workability. Dye was placed in the system and readings where taken in nearby coves to determine if the systems where contributing directly or indirectly to the water quality. Additionally, soil cores and water table measurements were taken as a data gathering exercise from which the team is developing a model to evaluate septic systems for the subdivision and potential loading of bacteria and nutrients.

The administrative task of this project was managed by the Texas A&M AgriLife Texas Water Resources Institute (TWRI). Besides submitting final reports and conducting meetings, TWRI created an Internet Web site that contains copies of all the fact sheets, other educational publications and reports. The Web site can be accessed at the following address: http://lakegranbury.tamu.edu. TWRI also assisted BRA and TCEQ developing a stakeholder group for the development of a watershed protection plan for the Lake Granbury Watershed.

FUTURE WORK/CONCLUSION

The education programs provided through this project will to lead to a change in behavior and create a sense of ownership of Lake Granbury and ultimately lead to improved water quality. In looking forward to FY 2008, Texas AgriLife Extension Service specialists will continue to work with BRA, TCEQ, the local county Extension agent and local watershed stakeholders to develop and present information on how to protect and improve water quality. Major activities will include development of additional fact sheets, continue to hold Lake Granbury stakeholder meetings and conduct informational meetings for homeowner associations, practitioners, and local officials.