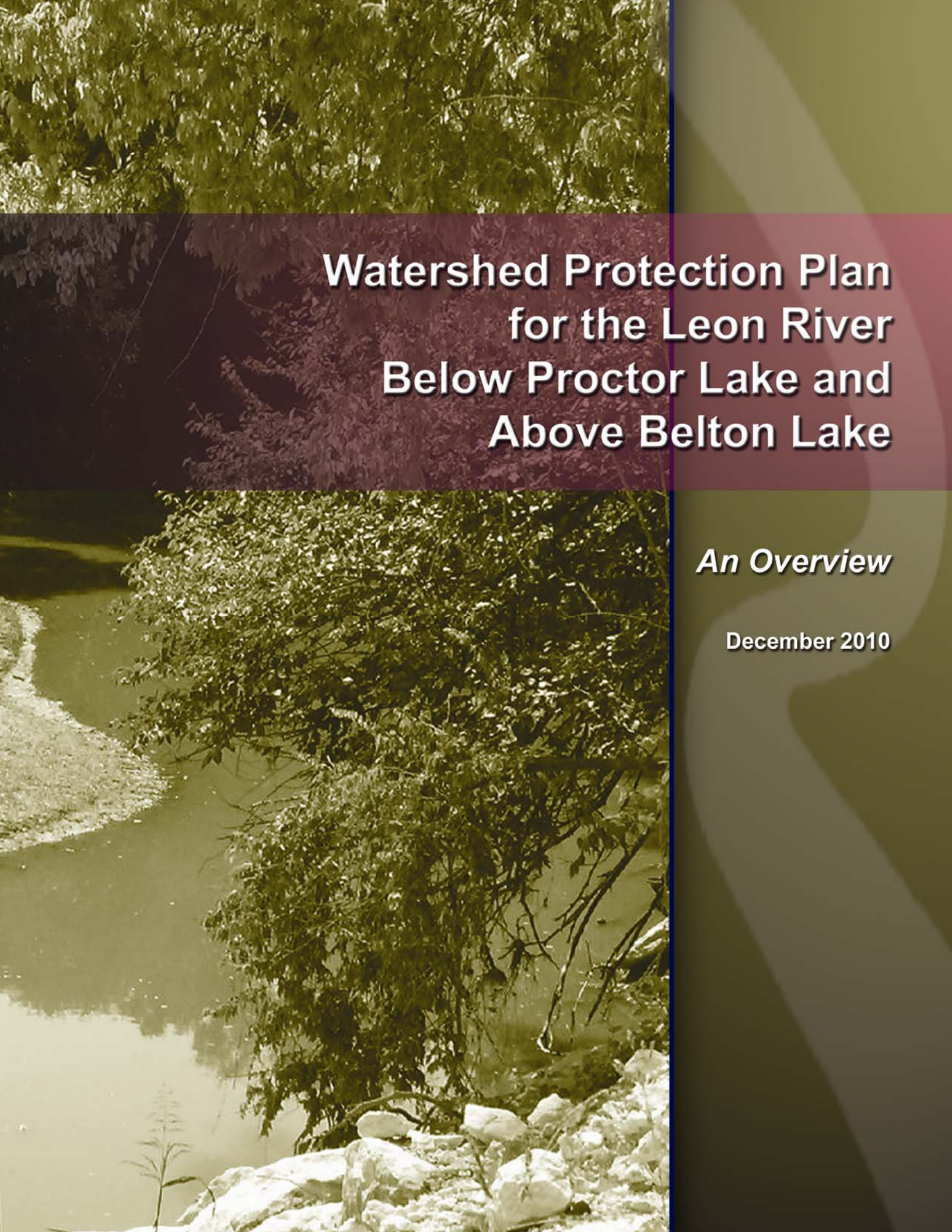


Watershed Protection Plan for the Leon River Below Proctor Lake and Above Belton Lake

An Overview

December 2010

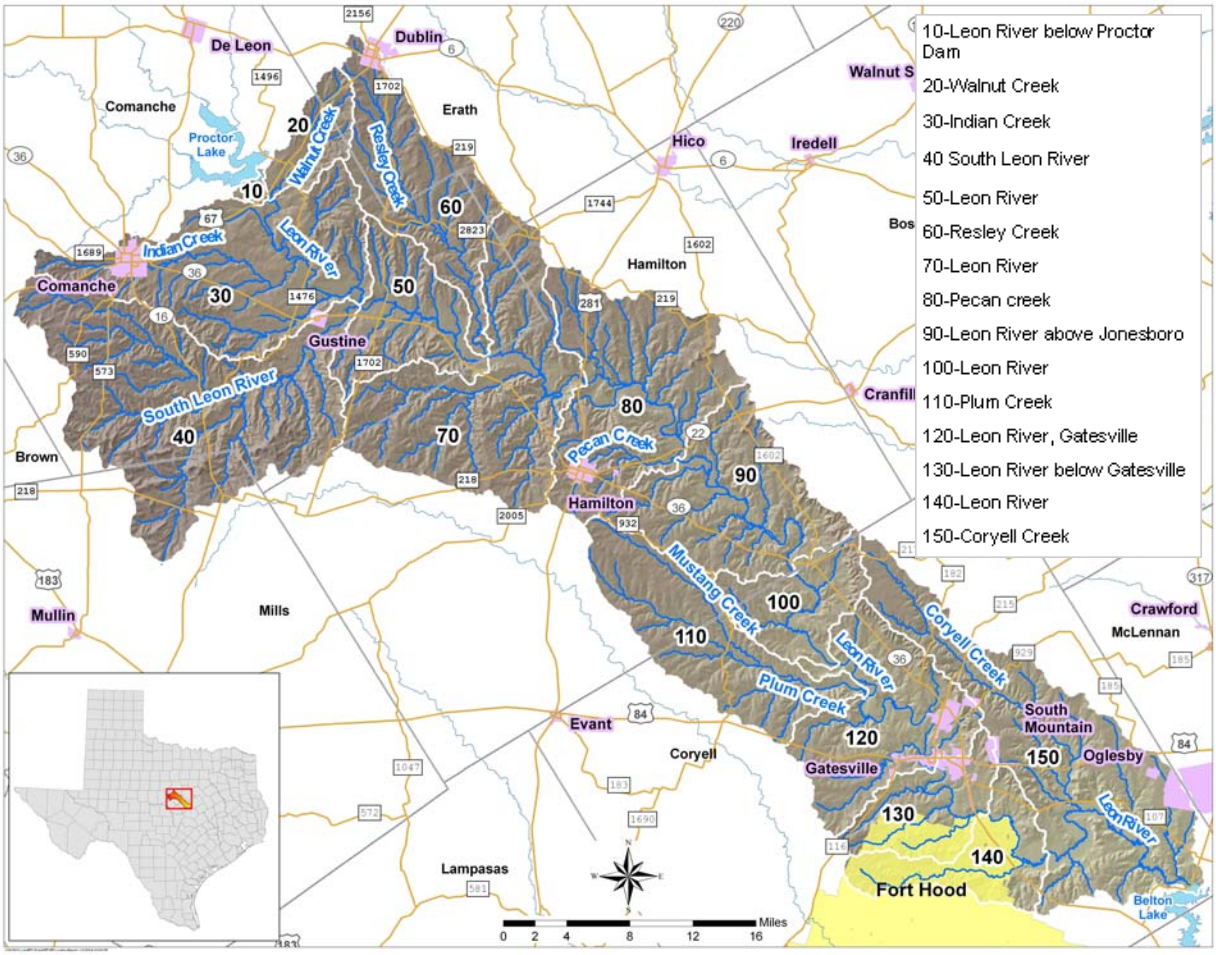
Watershed Protection Plan for the Leon River below Proctor Lake and above Belton Lake: An Overview

Introduction

The Leon River Watershed Protection Plan (WPP) is a comprehensive watershed-based strategy, developed by local farmers, ranchers, landowners, dairy operators, municipalities and counties, to improve water quality in the Leon River. The Leon River WPP describes current water quality conditions, identifies pollutant sources, prescribes management strategies to reduce contributions from those sources, estimates effectiveness of identified management strategies, and outlines a monitoring plan to evaluate the effectiveness of implementing the WPP. The implementation schedule for the Leon River WPP is from 2011-2020; however, the WPP is considered a 'living' document and will need to be reviewed and revised periodically to ensure that the implementation of management strategies identified in the plan result in improved water quality.

The Leon River watershed, located in the Brazos River Basin, is bound by Proctor Lake upstream and Belton Lake downstream. The Leon River, between these two reservoirs, is 190 miles long and the watershed is approximately 1,375 square miles covering portions of Comanche, Erath, Hamilton, and Coryell Counties. A small portion of the watershed lies within Mills County.

Map of the Leon River Watershed below Proctor Lake by Subwatershed



Background

The Leon River below Proctor Lake was initially placed on the State of Texas Clean Water Act §303(d) List of impaired waters in 1996 for having bacteria concentrations that exceed water quality standards. In 2004 and 2006, several tributaries to the Leon River were added to the §303(d) List of impaired waters, including Walnut Creek, Indian Creek, South Leon River, Resley Creek, and Pecan Creek. Elevated nutrient concentrations have also been identified as a concern in areas of the watershed.

Placement of the Leon River on the §303(d) List caused the Texas Commission on Environmental Quality (TCEQ) to initiate the development of a total maximum daily load (TMDL). A TMDL is a daily pollution budget that establishes the amount of a particular pollutant that a waterbody can receive and still meet state water quality standards. Based on additional data collection efforts, data analysis and modeling, and a series of stakeholder meetings, a draft TMDL report prepared by TCEQ proposed a 22 percent reduction in bacteria loadings in the upper watershed of the Leon River could restore water quality to meet water quality standards. In 2008, the TCEQ delayed the final adoption of the Leon River TMDL in response to the potential for revisions to the state's water quality standards for contact recreation.

As a result of the TMDL, local stakeholders requested that the Brazos River Authority (BRA) assist in developing the Leon River WPP. Funding for the development of the Leon River WPP was provided by the Texas State Soil and Water Conservation Board and the U.S. Environmental Protection Agency through a federal Clean Water Act §319(h) nonpoint source grant to the Brazos River Authority.

The Leon River WPP identifies implementation strategies supported by stakeholders that will reduce bacteria levels in creeks and rivers in the Leon River watershed over time with minimal consequence to the livelihoods of the citizens in the watershed. The WPP is guided by the common objective expressed by the Leon River watershed stakeholders – "to restore and maintain water quality so that citizens in the watershed may enjoy the water resources with little risk to their health."

What is a Watershed Protection Plan (WPP)?

A WPP serves as a mechanism for addressing complex water quality issues across the entire Leon River watershed and is being used as a tool to integrate activities and prioritize implementation projects based upon technical merit and benefits to Leon River watershed stakeholders. The WPP promotes a unified approach to seeking funds for implementation and creates a coordinated public communication and education program. The overall goal of the WPP is to sustain a stakeholder-driven process to promote adoption of voluntary management strategies throughout the watershed that will improve water quality and the overall health of the watershed. The Leon River WPP addresses the nine elements fundamental to a successful plan:

- Identifying the causes and sources of pollution that need to be managed
- Estimating pollutant reductions expected from implementing the plan
- Describing the management measures that need to be implemented
- Estimating the amount of technical and financial assistance needed to implement the plan
- Establishing an education and outreach program to enhance understanding of water quality issues
- Setting a schedule for implementation of management strategies
- Describing interim, measurable milestones for determining whether implementation of management measures is occurring
- Describing the criteria for assessing load reductions and water quality improvements
- Establishing a water quality monitoring plan to evaluate effectiveness of implementation and measure success in achieving water quality goals

Communication with Stakeholders

The Leon River WPP was developed through a public participation process facilitated by BRA and Parsons, a private consulting firm. Key goals were to make the process accessible, allow meaningful contribution to decision-making, and apply the best available science to make informed decisions.

Stakeholders formed five focus groups of similar constituencies representing: farmers and ranchers, the dairy industry, municipal officials/government, county officials/ government, and landowners. Each focus group was asked to evaluate and select the management strategies that they felt were practical and could be realistically implemented. While there were a number of different perspectives, every focus group shared the same set of guiding principles.

A working committee of representatives from each of the five focus groups was brought together to advance interaction between the different focus groups and facilitate the communication necessary to obtain support for the integration of implementation strategies and promote consensus among Leon River watershed stakeholders.

Guiding Principles for the Leon River Working Committee and Focus Groups

- Respect property rights through voluntary participation of landowners in implementing the strategies identified in the WPP.
- Using watersheds as management units, the water resource becomes the focal point and citizens and managers are able to gain a more complete understanding of the stressors that affect the Leon River.
- Despite the complexity associated with managing water resources and the uncertainty associated with understanding environmental systems, local citizens have a role in establishing what the desired water quality goals should be for the Leon River and its tributaries.
- Despite the inherent challenges associated with improving water quality conditions, the focus groups acknowledge and support the implementation of voluntary management strategies if they are affordable, reasonable, and proven to work.
- The success and long-term commitment to ensure that watershed stewardship strategies will be implemented will depend on the establishment of an institutional framework that can secure local support; provide technical assistance; promote education and outreach; and evaluate progress toward attaining water quality goals.
- Attaining and leveraging private, local, regional, state and federal financial resources is critical to increase support and participation in advancing the implementation of voluntary watershed stewardship strategies for improving water quality.
- Local support is necessary to achieve pollutant reduction goals and water quality restoration. However, there is uncertainty associated with what can be accomplished given environmental, temporal and financial constraints that exist.

Sources and Causes of Pollution in the Leon River

Characterizing the sources and causes of bacteria and nutrient loading in each subwatershed is a critical step in determining appropriate and effective methods and locations of management strategies aimed at restoring water quality in the Leon River watershed. The information used for this WPP was based on published work, available data, livestock census, observations, and stakeholder input. The draft TMDL report released by TCEQ in 2008 provided an assessment of the sources and causes of high bacteria levels upstream of Hwy 281. Watershed reconnaissance surveys were conducted in fall 2008, in four different geographic areas to further identify pollutant sources and causes as part of the development of this WPP. Stakeholders provided their perspectives during development of this WPP.

Pollutant Source Categories

Various pollutant sources identified during the TCEQ TMDL process were confirmed through reconnaissance surveys and stakeholder input. These pollutant sources were organized into source categories to represent different pollutant contributions throughout the Leon River watershed. A total of nine different bacteria pollutant categories were evaluated in each subwatershed to understand the makeup of bacteria sources for better identification, prioritization and implementation of management strategies to address these sources. These source categories were classified either as “Direct Discharges” during normal, dry weather conditions or “Stormwater Wash Off” during high flows from rainfall events. Quantification of pollutant loads was derived from a watershed loading model established to support development of the draft TCEQ bacteria TMDL. Additional information used to modify the approach to estimating pollutant loads by subwatershed included potential causes provided by stakeholders and information available in the literature.

Results of the model simulation indicate the major source of bacteria loading to the watershed is from direct discharges during normal flows. By isolating sources in the model it was determined that direct deposition consisted of at least 65 percent of the total contribution in all subwatersheds. Direct deposition is primarily from illicit discharges of polluted water or from warm-blooded animals, such as wildlife and livestock, roaming near or in creeks where they deposit fecal matter directly in the water. Stormwater wash off from residential, commercial, and industrial areas was also a significant source of at least 25 percent of the total contribution in all subwatersheds. These sources consist primarily of things such as failing septic systems, overflows in the wastewater collection system, and pets and wildlife residing in residential areas.

Direct Discharges	
Wastewater Treatment Facilities	<1%
Wastewater Collection Systems	2%
On-Site Sewage Facilities (Septic Systems)	<1%
Direct Deposition	65%
Storm Water Wash Off	
Forestland	<1%
Cropland	<1%
Rangeland	7%
Dairy Waste Application Fields	<1%
Residential, Commercial, and Industrial	25%

Percentage of total *E. coli* loading by source to the Leon River Watershed

Watershed Management Strategies for Improving Water Quality

Stakeholders of the Leon River watershed recognize the need to implement management strategies over time to reduce bacteria loads to achieve water quality goals. Focus groups were able to contribute their knowledge of strategies that mitigate bacteria loads which are currently in place or under construction. Management strategies address both point and nonpoint sources that contribute to bacteria loads in creeks and rivers. The success of long-term implementation of this WPP is dependent on the ability to implement the proposed strategies and verify that water quality has improved. Although many suggestions were made, a group of management strategies were selected based on viability and cost. Stakeholders worked to develop management strategies that can be implemented by counties, cities, landowners, dairy operators, farmers, and ranchers. Certain management strategies will likely address multiple sources of bacteria.

Watershed Management Strategies Identified in the WPP by Source Category

Management Strategies to Address Direct Discharges to Waterbody		
Source	**Management Strategy**	**Objective**
Wastewater Treatment Facilities (WWTF)	WWTF improvements	To enhance their treatment facilities to reduce the potential for releasing raw sewage
	Operational changes	
Wastewater Collection Systems	Grease trap ordinance	To develop and enforce an ordinance to reduce the buildup of grease that could block collection systems
	Replace sewers	To repair failing parts of the collection system
	Sanitary Sewer Overflow plan	To address issues that cause sanitary sewer overflows
On-site Sewage Facilities or Septic Systems (OSSFs)	Address failing OSSFs	To repair, replace, and remove failed OSSFs within city and rural areas
Direct Deposition	Feral hog management	To reduce the number of feral hogs in the area
	Deer population management	To better manage deer populations in the area
	Alternative watering sources	To construct alternative watering sources away from creeks
	Dead animal disposal facility	To encourage proper disposal of animal carcasses
Management Strategies to Address Storm Water Wash Off		
Source	**Management Strategy**	**Objective**
Forestland	Deer population management	To better manage deer populations in the area
	Feral hog management	To reduce the number of feral hogs in the area
Cropland	Not considered a significant source of bacteria loading; no management strategies are recommended	Not applicable
Rangeland	Development of Water Quality Management Plans	To work with local Soil and Water Conservation Districts to develop conservation plans geared toward protecting water quality
Dairy Waste Application Fields	Manure management	To improve manure application through training, new technologies, and other practices
Residential, Commercial, and Industrial	Strategies to address residential, commercial, and industrial developments	To introduce best management practices to reduce the accumulation of sewage and runoff from developed areas

Education and Outreach

In addition to the construction, maintenance, and operation of specific management practices, stakeholders identified a wide array of outreach and education programs to promote overall stewardship of the watershed and assist in achieving water quality goals. Outreach and education activities identified in the WPP include:

- Work with federal, state and local entities to organize training sessions and workshops promoting management strategies listed in the WPP
- Series of workshops describing technical and financial assistance available to farmers and ranchers for the development and implementation of whole-farm Water Quality Management Plans through the Texas State Soil and Water Conservation Board, as well as federal Farm Bill financial assistance programs offered through the USDA Natural Resources Conservation Service
- Feral hog workshops to educate landowners on the detrimental impacts that feral hogs can have on the environment and management and trapping techniques
- Training for landowners who lease land for hunting in an effort to strengthen stewardship language in their contracts with hunters
- Training for businesses and homeowners with septic systems educating them on proper maintenance methods
- Training for inspectors, installers, and maintenance providers of septic systems
- TCEQ training sessions for municipalities for Wastewater Treatment Operators and Wastewater Collection System Operators
- Distribution of educational information and brochures targeted at absentee landowners
- Landowner workshops on the benefits of Wildlife Management Plans
- Dairy Outreach Program Area (DOPA) training with new modules to fully incorporate bacteria sources and appropriate best management practices
- Training workshops for municipal and county leadership on stream bank and riparian protection and preparation of ordinances that can mitigate storm water runoff
- Training workshops to provide technical support and recommendations to educate ranchers on proper grazing management
- Campaign to promote the need and benefits of soil testing for proper nutrient management
- Municipal training workshops for refining fats, oil, and grease ordinances; nutrient management for homeowners; and urban nonpoint source best management practices
- Texas Watershed Steward Program workshops to empower citizens to take leadership roles in water resources management

Implementation Schedule

A 10-year timeline, beginning in 2011, was proposed for the implementation of management strategies. Management strategies were categorized into the following groups based on stakeholder interpretation of when each strategy might be practically implemented given all external factors.

- Management strategies currently being implemented, planned, or constructed,
- Management strategies that should be initiated between 2011 and 2015 (1-5 years), and
- Management strategies that should be initiated between 2016 and 2020 (6-10 years).

Some management strategies may require additional time for planning, legal or permit approvals, acquisition of funding, and hiring staff.

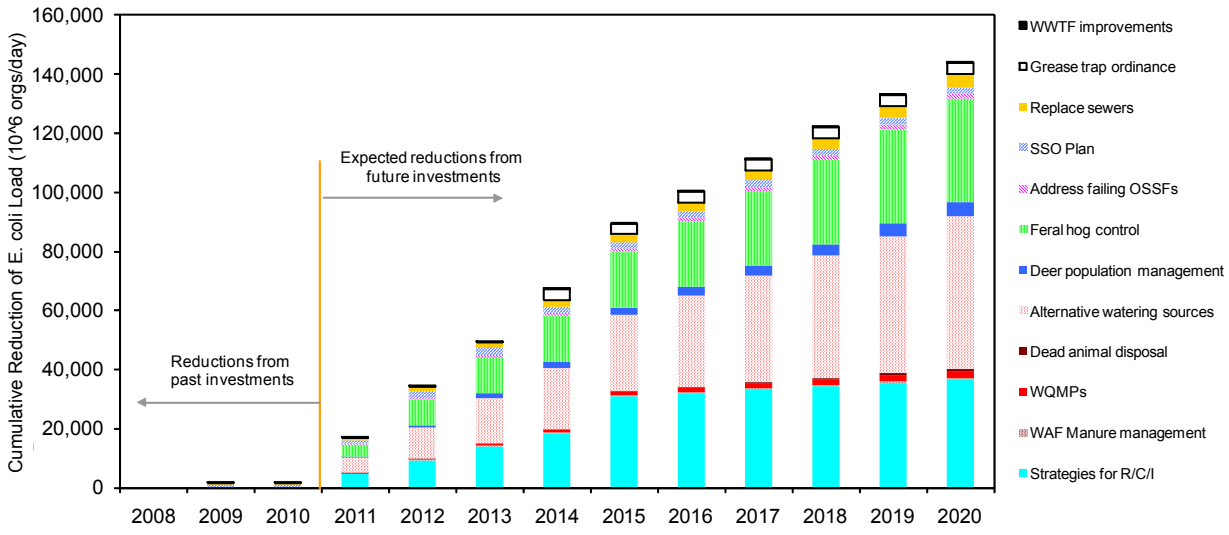
Improving Water Quality

Leon River watershed stakeholders established a water quality goal of achieving long-term geometric mean concentrations less than 206 colony forming units of *E. coli* bacteria per 100 mL of water for each subwatershed. The ultimate goal of the WPP is to achieve state water quality standards in the Leon River extending beyond the 10-year implementation timeframe of the WPP. The graph below illustrates the predicted reduction in loading of *E. coli* to the Leon River if the management strategies identified in the WPP are fully implemented. This reduction in loading would achieve water quality goals set forth in the WPP.

While a specific water quality goal for nutrients is not established by stakeholders, it is recognized that achieving the bacteria goals will have a direct corollary benefit on decreasing nutrient loads and subsequent chlorophyll-*a* and dissolved oxygen impacts.

Stakeholders acknowledge that taking no reasonable action to decrease bacteria or nutrient levels is not acceptable and further acknowledge that they ultimately have the responsibility of making the appropriate changes to land stewardship and business practices, social habits, and local government administration.

Cumulative Reductions for the Leon River Watershed



Institutional Framework for Implementation

Implementing the WPP will require a consistent level of commitment on the part of local stakeholders. The WPP recommends the establishment of a Watershed Steering Committee (WSC) to promote implementation of best management practices, conduct outreach and education efforts, acquire funding support, and track, evaluate and communicate water quality improvements. To accomplish these important and time-demanding activities, the WPP also identifies the need for a full-time Watershed Coordinator.

The Watershed Coordinator attends to the day-to-day business of providing communication, coordination and technical assistance to the WSC and Leon River watershed stakeholders involved in implementing the WPP. The Watershed Coordinator advises the WSC on technical, financial, scheduling, outreach, and educational aspects associated with existing or future management strategies in the WPP. In addition, the Watershed Coordinator participates in any and all activities held in the Leon River watershed to promote water quality improvements and implementation and serves as a liaison to all local, regional, state, and federal agencies participating in water quality management activities in the watershed.

The Leon River Watershed Coordinator serves as the primary conduit of information to landowners regarding the WPP and implementation efforts. The Leon River Watershed Coordinator is responsible for tracking the implementation of specific management measures and education programs and for reporting to stakeholders on the progress in achieving the water quality and other natural resource goals identified in the WPP.

BRA and Parsons served as the Leon River Watershed Coordinator during the development of the WPP. The WSC will select an appropriate entity to be the Watershed Coordinator to guide the implementation of the WPP.

Financial Resource Needs

Discussions with the focus groups, working committee, and local, state, and federal funding entities provided general information that was used to estimate financial needs. The WPP provides a summary of the estimated financial assistance needed to support implementation of the Leon River WPP from 2011-2020. Some initial investments in wastewater infrastructure have already been made by the cities of Dublin, Hamilton, and Gatesville and are accounted for since these improvements will likely result in bacteria load reductions. Successful acquisition of funding sources that can sustain implementation is essential if the goals of the WPP are to be achieved.

There are various federal and state programs available to provide funding for many of the management strategies identified in the Leon River WPP. Non-governmental organizations may also provide financial support to local governments or landowners to implement projects that promote land stewardship and improve water quality.

Long-term Monitoring Strategy

The monitoring strategy described in the WPP relies on the use of in-stream water quality data collected through routine sampling to demonstrate success at restoring water quality in the Leon River. Ambient water quality monitoring stations have been established at downstream sites on each subwatershed. These sites will be used for evaluating short-term and long-term water quality conditions at the subwatershed scale. The data collected at these sites will measure progress, guide decision-making and assist with adaptive management.

Measuring and Reporting Progress

Measuring progress is fundamental to guiding decision-making throughout implementation. A multi-tiered evaluation framework to track progress is described in the WPP including interim measurable milestones to track programmatic and social indicators and environmental indicators to track water quality changes and attainment of goals. Tracking and timely reporting of these milestones and indicators will provide valuable information to stakeholders and water resource managers in making practical adjustments to implementing management strategies.

Adaptive Management

Despite the uncertainty created by the complexities of environmental systems and their impact on human and environmental health, implementation of the Leon River WPP can move forward by adhering to adaptive management principles. As management strategies are implemented, tracking progress through a multi-tiered evaluation framework will provide information necessary to make adjustments to the WPP. With this approach, bacteria load reductions and progress toward achieving water quality goals can be tracked to evaluate progress and revise the plan as needed.

How do I Become Involved?

For more information on the Leon River WPP, or to learn how you can get involved in implementation activities, visit http://www.brazos.org/LeonRiverWPP.asp or contact the Leon River Watershed Coordinator.

Funding for the development of this Leon River Watershed Protection Plan was provided by the Texas State Soil and Water Conservation Board and U.S. Environmental Protection Agency through a federal Clean Water Act §319(h) nonpoint source grant to the Brazos River Authority.