

Chapter 1: Introduction

Watersheds

A watershed is a geographical area defined by natural boundaries, such as ridges or mountains, that collect and channel water, including rainfall and runoff, into a common outlet, typically a river, lake, or ocean. All land surfaces on Earth are included in a watershed. Watersheds encapsulate the entire ecosystem of interconnected land and water bodies within its confines.

Types of Pollution

Point source pollution refers to the discharge of pollutants or contaminants from specific, identifiable sources. These sources typically include industrial facilities, wastewater treatment plants, and specific pipes or outlets. Point source pollution can be more easily regulated and monitored because it comes from an easily defined source, making it possible to measure and control the release of pollutants.

Nonpoint source pollution, on the other hand, refers to the widespread and diffuse contamination of water bodies, often caused by the collection of pollutants as rainfall turns into runoff over impervious surfaces in the watershed. Unlike point sources pollution, nonpoint source pollution does not have a single, easily identifiable source. Instead, it results from a combination of factors such as agricultural runoff and impervious urban areas. Managing and mitigating nonpoint source pollution is more challenging due to its diffuse nature and the need for broadscale, holistic environmental management strategies.

The Watershed Approach

The United States Environmental Protection Agency (EPA) describes the watershed approach as “a flexible framework for managing water resource quality and quantity within a specified drainage area of watershed” (EPA 2008). This approach uses watershed stakeholders to assist in making management decisions for the watershed. Stakeholders are anyone that lives, works, or has interest in the watershed. This could be individuals or groups, organizations, or agencies. Stakeholders are involved throughout the entire watershed protection plan development process, which is critical for effectively selection, designing, and implementing management strategies that improve or protect the watershed’s water quality.

Watershed Protection Plans

Watershed protection plans (WPP) vary in methodology, content, and remediation options due to different characteristics of each watershed, impairments, and community needs and desires. All watershed protection plans contain the common fundamental elements as defined by the EPA and listed below:

- A. Identification of causes and sources of impairments
- B. Expected load reductions from management strategies
- C. Proposed management measures
- D. Identified technical and financial assistance to implement management measures
- E. Information, education, and public participation needed to support implementation
- F. Schedule for implementation
- G. Milestones to track progress
- H. Criteria to determine success

I. Water quality monitoring

Detailed information on the EPA's Elements of Successful Watershed Protection Plans is located in Appendix D.

Adaptive Management

Adaptive management is defined as “an intentional approach to making decisions and adjustments in response to new information and changes in context”. When using adaptive management in watershed protection plans, an iterative plan is developed to reduce pollutants and contaminants in the watershed to acceptable levels. After the plan has been implemented, verification is necessary to make sure the plan is working as designed. Verification can take the form of testing, monitoring, evaluating strategies, and revising management approaches as new information and societal needs are determined. If the plan is not working as expected, adjustments are made, the new plan is put in place, and the new plan is verified at a future date. This continues until the pollutants and contaminants have dropped to acceptable levels.

Education and Outreach

Without education, outreach, and engagement, the WPP is unlikely to be as successful as it could be. Long-term commitments from stakeholders are essential to accomplishing a comprehensive WPP in the Rowlett Creek watershed. Education and outreach components of the WPP include keeping stakeholders informed of project activities through periodic emails and meetings, and updated websites, providing information about appropriate nest management practices to be implemented in the watershed, and identifying and forming partnerships to lead the implementation effort.

Problem Statement

Rowlett Creek does not meet water quality standards for primary contact recreation according to the Texas Commission on Environmental Quality's Texas Water Quality Inventory and 303(d) List due to elevated bacteria. Additionally, the nitrate nitrogen and total phosphorus levels are of concern in the downstream portions.

Response

Texas A&M AgriLife Extension performed a watershed Characterization assessment for Rowlett Creek in collaboration with the City of Plano and the Southern Methodist University (SMU). The process was stakeholder driven and a stakeholder partnership was developed. A steering committee from the Stakeholder partnership was also created and reviewed all modeling done in the characterization phase. Load Duration Curves (LDC) for bacteria, NO_x, Total Phosphorus, TSS, NH₄-N and Kjeldahl Nitrogen were developed for 5 subwatershed to identify sources of bacteria. This document presents the development of a full WPP for the Rowlett Creek Watershed developed with Stakeholder participation.