# 1. Introduction

This document represents the total maximum daily load (TMDL) analysis and implementation plan for the East Canyon Reservoir watershed as required by law.

The Federal Water Pollution Control Act (FWPCA) is the primary federal legislation that protects surface waters such as lakes and rivers. This legislation, originally enacted in 1948, was further expanded and enhanced in 1972 and became known as the Clean Water Act (CWA). This act has been and continues to be subject to change as new information and a more complete understanding of the natural system and our impacts (both positive and negative) are identified. A more thorough discussion of the CWA can be found in *The Clean Water Act: An Owner's Manual* (Elder et al. 1999).

The main purpose of the CWA is to improve and protect water quality through restoration and maintenance of the physical, chemical, and biological integrity of the nation's waterways. The CWA provides a mechanism to evaluate the status of the nation's waters, designate beneficial uses for specific waterbodies, and establish criteria for water quality to protect those uses.

In addition, Section 303(d) of the CWA requires that each state to submit a list of waters that fail state water quality standards. This list of impaired waters must be submitted to the U.S. Environmental Protection Agency (EPA) every two years. For each impaired segment, the CWA requires a TMDL study for each pollutant responsible for the impairment. Once the state has identified the pollutant load discharged from both point and nonpoint sources, controls can be implemented to reduce the daily load of pollutants until the waterbody is brought back into compliance with water quality standards. Once developed, TMDLs are submitted to the EPA for approval. The Utah Department of Environmental Quality (UDEQ) is directed by Utah Code Title 19, Chapter 5, Water Quality Act, 19-5-104 (powers and duties of board), to develop TMDLs.

## 1.1 THE TOTAL MAXIMUM DAILY LOAD PROCESS

A TMDL study describes the amount of an identified pollutant that a specific stream, lake, river, or other waterbody can contain while preserving its beneficial uses and maintaining state water quality standards.

Those TMDLs completed by the State of Utah include watershed-based plans for restoring beneficial uses of impaired waterbodies. These plans identify the causes of impairment and determine the reduction in pollutant loads necessary to meet standards and restore beneficial uses. Water quality criteria are specific to each use. Of particular importance to the beneficial uses in East Canyon Reservoir and East Canyon Creek are dissolved oxygen (DO), bacteria, temperature, pH, total dissolved solids (TDS), phosphorus, and nitrogen.

The TMDL process involves an evaluation of available data from listed waterbodies to determine the maximum allowable load from point and nonpoint sources of pollution. Pollutant load refers to the quantity of pollution contributed to a waterbody from a single point (e.g., a permitted industrial facility or a wastewater treatment plant (WWTT) or from a group of diffuse sources (e.g., an urban development, agricultural fields, and upland erosion).

A TMDL study outlines a watershed-wide or basin-wide pollution budget for a waterbody. The budget is determined by the amount of pollutants that can be added without causing exceedances of water quality standards; this amount is referred to as the waterbody's loading capacity. Calculations for pollutant loading capacity take into account seasonal variations, natural and background sources of loading, and a margin of safety (MOS) to allow for uncertainty in the analysis. Once the loading capacity is determined, sources of the pollutants are considered.

### 1.1.1 POINT SOURCES

Point sources of pollution such as WWTPs typically involve pipes that convey discharges directly into a waterbody. A point source is simply described as a discrete discharge of pollutants, as through a pipe or similar conveyance. A technical definition exists in federal regulation at 40 CFR 122.2. Point sources are grouped into a waste load allocation (WLA), which will become part of the TMDL equation.

### 1.1.2 NONPOINT SOURCES

Nonpoint sources such as roads, farmland, residential landscapes, and construction sites contribute pollution diffusely through runoff. Pollution may result from sources and activities such as livestock grazing, timber harvesting, leaking underground storage tanks, septic systems, fertilizers and pesticides applied to residential yards, construction sites, stream channel alteration, and other diffuse sources. Nonpoint sources are groups into a load allocation (LA) which will become part of the TMDL equation.

### 1.1.3 LOAD ALLOCATIONS (LA)

Once all point and nonpoint sources are accounted for, pollutants are then allocated among the sources in a manner that will describe the maximum amount of each pollutant (the total maximum load) that can be discharged into a waterbody over a specified amount of time while maintaining water quality standards. The LAs, distributed among the sources, indicate the maximum amount of a pollutant that can be discharged. Ultimately the responsibility for improving water quality belongs to everyone who lives, works, or recreates in the watershed. The TMDL study does not mandate how load reductions must be attained, but it provides recommendations, particularly for nonpoint sources.

Nonpoint sources, grouped as LAs, and point sources, grouped as WLAs, are combined with a MOS when designating the total pollutant load capacity or budget. The MOS accounts for uncertainty in the loading calculations. Combined, the loading capacity equation is:

Loading capacity: **TMDL = WLAs + LAs + MOS**

### 1.1.4 TMDL SCOPE

Once all point and nonpoint sources are accounted for, including the MOS, TMDLs are drafted to allocate the total pollutant loading among the various sources in a manner that meets water quality standards. The objective of TMDLs is to reduce loading from all point and nonpoint sources to restore the designated beneficial uses of a waterbody.

The TMDL does not specify how sources must attain their particular LA. The TMDL does not dictate best management practices (BMPs) for a source or otherwise tell the source how to meet the reduction goal.

## 1.2 WHY SHOULD TMDLS BE WRITTEN?

The primary purpose of TMDLs is to accurately estimate the contribution of point and nonpoint sources to total pollutant loads in a waterbody. In the State of Utah, as in many other states, the process of identifying waterbodies for TMDL plans, developing the proper methods to calculate loads from all pollutant sources, and implementing programs to reduce loads in order to meet water quality goals are all ongoing processes. Completing TMDLs for all waterbodies may take years; some will be completed more quickly than others depending on the cause of impairment and the degree to which it is impaired.

Over the past 25 years, pollution control efforts under the CWA have focused on controlling point sources of pollution through the National Pollutant Discharge Elimination System (NPDES) permitting process. Although water quality has improved in many instances, the goals of the CWA have not been met in a

number of waterbodies. Data from the EPA suggest that nonpoint sources are now the largest source of pollution in streams and lakes (EPA 2000a).

The implementation of TMDLs should help identify specific links between various sources of pollutants and their aggregate load in waterbodies. The EPA expects that the data collected as part of this process will help local, state, and federal agencies focus and improve their efforts to restore impaired waters.

## 1.3 WHO IS RESPONSIBLE FOR WRITING TMDLS?

The federal CWA grants individual states the first opportunity to establish TMDLs. In Utah, the bulk of the TMDL work is done by the UDEQ and submitted to the EPA for their approval. However, if the states do not set TMDLs to the EPA's satisfaction, then the EPA is required to do so (CWA §303[d]).

Federal and state statutes require the opportunity for public participation in the TMDL process. Participants may include permitted facilities, affected landowners, regulatory and other governmental agencies, local governments, public interest groups, and concerned citizens. Watershed associations and similar local organizations are encouraged to foster communication, planning, and consensus among those concerned individuals or groups.

## 1.4 ELEMENTS OF A TMDL

Generally, TMDLs generally consist of three major sections:

- Waterbody and watershed assessment
- Loading analysis
- Implementation plan(s)

### 1.4.1 WATERBODY AND WATERSHED ASSESSMENT

Assessment of the waterbody and watershed describe the affected area, the water quality concerns and status of designated beneficial uses of individual waterbodies, nature and location of pollution sources, and a summary of past and ongoing management activities.

### 1.4.2 LOADING ANALYSIS

A loading analysis provides an estimate of a waterbody's pollutant load capacity and outlines TMDL allocations in accordance with EPA regulations (40 CFR 130.2). The sum of LAs and WLAs must meet the load capacity, with a portion of the load reserved for the MOS. Minor nonpoint sources may receive a lumped allocation.

Generally, a loading analysis is required for each pollutant of concern. However it is recognized that some listed pollutants are actually water quality problems that result from other pollutants. For example, habitat may be affected by sediment or by DO from nutrients that cause nuisance aquatic growths. In such cases, one listed stressor may be addressed by the loading analysis of another.

Although loading analyses are intended to provide a quantitative assessment of pollutant loads, federal regulations allow that "loads may be expressed as mass per unit time, toxicity, or other appropriate measures" (40 CFR 130.2[I]). In many cases, less data will be available than may be considered optimal for loading analysis. This cannot delay TMDL development. Federal regulations also acknowledge that "load allocations are best estimates of the loading, which may vary from reasonably accurate estimates to gross allotments" (40 CFR 130.2[g]).

A complete loading analysis lays out a general pollution control strategy and an expected time frame in which water quality standards will be met. For narrative criteria (criteria based on a qualitative description

rather than quantifiable criteria), the measure of attainment of water quality standards is the full support of the waterbody's designated beneficial uses. Long recovery periods (greater than five years) are expected for TMDLs dealing with nonpoint sediment or temperature sources. Interim water quality targets are recommended in these instances. Along with the load reductions, these targets set the sideboards within which specific actions are scheduled in the subsequent implementation plan.

### 1.4.3 IMPLEMENTATION PLAN(S)

Point source WLAs are implemented through an existing regulatory program under the federal CWA called the NPDES permit program (CWA Section 402). The EPA has delegated authority to the State of Utah to administer its own water quality regulatory permit program (UPDES permits). These permits set effluent quality limitations and require the implementation of best available technologies that may include specific BMPs already established by the EPA through existing regulation.

The LA covers nonpoint sources and therefore is not covered by any specific regulatory program. Rather, the LA is usually implemented through incentive-based programs, volunteer efforts, or government-funded projects. Provided that a viable trading framework is in place, pollutant trading is allowed between or within the LA and the WLA categories, but the MOS cannot be traded.

In most cases, pollution load data already exists for most permitted point sources through the NPDES permitting process. A similar level of data density is seldom available for nonpoint sources. Therefore, the TMDL process must develop load calculations for nonpoint sources of pollution and for natural sources of pollution. In many circumstances, nonpoint source contributions are broken down into additional categories such as agriculture, development, forestry, or mining.

Because identifying specific nonpoint sources of pollution for an entire watershed is practically impossible, data is rarely collected on individual nonpoint sources that contribute pollutant loading to a waterbody. Instead, most TMDLs focus on estimating the cumulative or combined contribution of all nonpoint sources.