

American Water Resources Association
2009 SUMMER SPECIALTY CONFERENCE
Adaptive Management of Water Resources II
June 29 – July 1, 2009
Snowbird, UT

Monday, June 29

1:30 PM – 3:00 PM

Session 6: Adaptive Management in TMDLs

1. 20 years of TMDL Implementation: Adaptive Management of Phosphorus Concentrations in the Tualatin River, OR - Charles Logue, Clean Water Services, Hillsboro, OR (co-authors: Bob Baumgartner, Jan Miller)

In 1988 a phosphorus TMDL was developed for the Tualatin River in Oregon, among the first TMDLs developed in the country. This paper chronicles the process and progress of the implementation of that TMDL through 2008 and how adaptive management and an integrated watershed management approach was employed to work toward sustainable practices to effectively achieve the goals for the TMDL. The TMDL was originally developed to address pH violations and aesthetics. A single municipal wastewater utility (Clean Water Services) serves the Tualatin basin and has invested over \$400 M to provide advanced wastewater facilities to meet the stringent effluent requirements which were a result of the 1988 TMDL. Since that time, substantial water quality monitoring and modeling have provided a much greater understanding of dynamic nature of the Tualatin River. In 2001, the TMDL was revised to recognize the impact of natural groundwater flows to water quality in the river. Currently, the TMDL is being reconsidered again to respond to increased population growth in the basin, allow for the relocation of two of the discharge points from the treatment facilities, as well as, the substitution of wetlands treatment in lieu of traditional advanced treatment technologies which require significant energy and chemical inputs. The paper shows how the regulatory framework has been adapted to meet the water quality impacts and at the same time allow for the growth and prosperity of the watershed.

2. Adaptive Management of East Canyon Creek – A Watershed Approach - Kathy Lombardi, SWCA Environmental Consultants, Salt Lake City, UT

East Canyon Creek, part of the larger East Canyon Reservoir watershed, presently finds itself at the center of considerable and focused adaptive management. East Canyon Creek watershed drains Park City, Utah, several major ski resorts, and a portion of the Snyderville Basin. The lands within the watershed are almost entirely privately owned, adding to the complexity of managing its water resources. One of the constant pressures of water resource management in the west is trying to balance the ever-present demands of growth with that of preserving our intrinsically valuable water resources. SWCA Environmental Consultants has been actively supporting adaptive water resource management efforts in the Snyderville Basin since 2006. Namely, we've been cooperatively engaged with a variety of stakeholders who are purposefully working to further the adaptive management of East Canyon Creek through active land management, identification of water quality impairments through the TMDL process, and physical restoration of the creek itself. In late 2006, SWCA began working with Swaner Preserve, a non-profit manager of more than 1,200 acres of open space, on the baseline characterization of water resources present on the Preserve. We then partnered with Utah Division of Environmental Quality in the reassessment of the TMDL for East Canyon Reservoir and East Canyon Creek, originally prepared in 2000. The 2008 TMDL revision allowed for the development of water quality endpoints that would accommodate the anticipated growth within Snyderville Basin while also improving the cold-water fishery beneficial use designated for East Canyon Creek. The reassessment of the TMDL was, by its very nature, adaptive, and has afforded us a clearer picture of the issues still inhibiting East Canyon Creek from functioning at its highest potential. The revised TMDL shed more light on the legacy problems of limited DO and the linkages between DO fluctuation, sediment and nutrient loading, geomorphology, and flow. In the end run, it was determined that the geomorphic function of East Canyon Creek exacerbates water quality problems and is why we now find ourselves full circle, partnering with NRCS and others to focus on selected physical restoration efforts along the creek in 2009 and beyond.

3. East Canyon Reservoir Water Quality Improvement and Revised Total Phosphorus TMDL - Erica Gaddis, SWCA Environmental Consultants, Salt Lake City, UT

The East Canyon Reservoir watershed drains 145 square miles that includes Park City, several major ski resorts, and a portion of Snyderville Basin. The cold water game fish designated use (3A) was identified as partially supported on the State of Utah 1998 303(d) list. This led to the development of a TMDL for East Canyon Reservoir in 2000. Since 2000, the only point source in the watershed, the East Canyon Water Reclamation Facility, has reduced nutrient loads to East Canyon Creek significantly. In addition, best management practices (BMPs) have been implemented to reduce nutrient runoff from nonpoint sources throughout the watershed. Load reduction efforts have been reflected in improved water quality in East Canyon Reservoir. A revised TMDL for East Canyon Reservoir was prepared for the Utah Division of Environmental Quality in October 2008 in order to accommodate anticipated growth in Snyderville Basin. Water quality endpoints identified for the revised East Canyon Reservoir TMDL aim to improve conditions for the cold water fishery beneficial use while also protecting recreational uses of the reservoir. They include dissolved oxygen, chlorophyll a and total phosphorus endpoints. Results from the East Canyon Reservoir W2 model indicate that attainment of reservoir water quality endpoints requires a reduction of the total phosphorus load to the reservoir of 730 kgTP/year, which represents an overall reduction of 22%. However, future growth projections for the ECWRF require additional allocation to this source above the allocation identified in the 2000 TMDL (663 kgTP/year). To compensate for the required increase identified for this point source, a 50% reduction of other sources (nonpoint and internal reservoir load) has been identified. The East Canyon Reservoir Project Implementation Plan (PIP) that accompanies this TMDL provides reasonable assurance that these load reductions can be attained through implementation of BMPs throughout the watershed in addition to in-reservoir treatments. The PIP identifies land use specific BMPs, priority subbasins for implementation, a time frame for implementation, a coordination plan, a monitoring plan, and unit costs associated with recommended structural BMPs.

4. Adaptive Management in a Nation-wide Implementation of Water Quality Telemonitoring System for Controlling Point Sources Discharge in Korea - Hyunook Kim, University of Seoul, Seoul, South Korea (co-authors: Seokki Lee, Donghee Jung, Junhung Lee)

In many technologically advanced countries, extensive implementation of water quality telemonitoring systems (TMS) has been considered a cost-effective strategy to control the discharge of pollutants from point sources including domestic or industrial wastewater treatment plants (WWTPs) and to preserve receiving water body clean. However, due to the data accuracy or reliability, uncertainty, no country has utilized on-line data from the system for administrative purposes, such as calculation of penalties or fines for violating WWTP discharge permits. Rather it has been utilized for the purpose of WWTP process monitoring. In order to efficiently control or regulate effluent water quality, the Korean government has initiated nation-wide implementation of water quality TMS for WWTPs in Korean. The entire domestic and industrial WWTPs with the capacity of equal to or more than 200 m³/day are required to install a TMS for effluent pH, BOD₅ (or COD_{Mn}), TN, TP, and SS at their outfall (discharge point) by the end of September 2009; it was included in a law regarding water quality control and water ecosystem protection on April 27th 2007. The data collected by each TMS will be sent to the Environmental Management Corporation, a governmental agency at the frequency of once every 5 minutes. Based on the data, the agency will determine if any WWTP violates the permit requirement. So far, 187 WWTPs (with the capacity of 4000 m³/day or more) out of the total 969 WWTPs which are subject to the law have installed the system and are sending their water quality data to the agency. In this paper, we will describe the background of the nation-wide TMS implementation and how the system helps the government to pursue a national TMDL program using adaptive management on a watershed basis. In addition, issues raised in the process of the TMS implementation and the future direction of the Korean government's water quality management will be discussed.