Improving Water Quality in the Arroyo Colorado

One TMDL for Dissolved Oxygen

Water Quality in the Arroyo Colorado

The state of Texas requires that water quality in the Arroyo Colorado be suitable for swimming, fishing, and a healthy aquatic ecosystem. However, water quality analyses have revealed that dissolved oxygen levels are sometimes too low downstream of the Port of Harlingen (Segment 2201) to provide optimum conditions for fish and other aquatic life. Oxygen gas, which dissolves in water, is essential for the survival of aquatic life. While the amount of dissolved oxygen in water fluctuates naturally, various human activities can cause unusually or chronically low dissolved oxygen levels which may harm fish and other aquatic organisms.

In response to these conditions, the TCEQ is working to establish a Total Maximum Daily Load (TMDL) to improve conditions in the Arroyo Colorado. The goal of a TMDL is to determine the amount (or load) of a pollutant that a body of water can receive and still support its designated uses. This allowable load is then allocated among all the potential sources of pollution within the watershed. In the case of the Arroyo Colorado, this determination is complicated by the highly altered aquatic habitat and flow regime that are the result of the physical alterations made to the stream to sustain commercial navigation.

In 2007, the Arroyo Colorado Watershed Partnership, a group of local stakeholders and interested parties, developed "A Watershed Protection Plan for the Arroyo Colorado – Phase I" (Arroyo WPP). The Arroyo WPP document describes the measures proposed for implementation between 2007 and 2015 to improve water quality and natural habitat in the Arroyo Colorado. Additional information about the Arroyo Colorado WPP can be found at: <www.tceq.state.tx.us/implementation/water/tmdl/13-arroyo.html> or <www.arroyocolorado.org>

Learn more about water quality standards, monitoring, and TMDLs by reading *Clean Water for Texas: Working Together for Water Quality*, also available on the Web at <www.tceq.org/goto/tmdl>.

Description of the Arroyo Colorado Watershed

The Arroyo Colorado, an ancient distributary channel of the Rio Grande, extends about 90 miles from Mission, Texas, to the Laguna Madre in the Lower Rio Grande Valley. Flow in the Arroyo Colorado is sustained by wastewater discharges, agricultural irrigation return flows, urban runoff, and base flows from shallow groundwater. Although an integral part of a major floodway system, water is rarely diverted directly from the Rio Grande into the Arroyo Colorado (direct diversions occur only during major flood events). The Arroyo is also the major source of fresh water to the lower Laguna Madre, an economically and ecologically important resource to the region.

The Arroyo Colorado watershed (1,828 square kilometers) is a flat coastal plain that slopes gently toward the Gulf of Mexico. The fertile farmland, long growing season, and access to water from the Rio Grande for irrigation make this region one of the most productive agricultural areas in the U.S. The Laguna Atascosa National Wildlife Refuge and several county and city parks are located within the Arroyo Colorado watershed. The mild climate, semi-tropical plants and animals, and many recreational opportunities draw large numbers of people to the Arroyo Colorado watershed. One third of the stream is used for shipping from the Gulf Intracoastal Waterway to the Port of Harlingen.

Project Development

In 1998, the TCEQ and the Texas State Soil and Water Conservation Board (TSSWCB) initiated an effort to develop a TMDL for dissolved oxygen in the tidal segment of the Arroyo Colorado. The first phase of this effort was completed in June of 2002. Phase 1 determined that a combination of nutrient loading from the watershed and hydraulic effects in the dredged navigational channel in the tidal portion result in periodic but severe episodes of hypoxia (low dissolved oxygen) in the upper reach of the tidal segment of the Arroyo near the city of Rio Hondo. The current TMDL effort (Phase 2) is focused on collecting new data and refining watershed, hydrodynamic and water quality models to determine the loading reductions and/or physical modifications necessary to achieve appropriate dissolved oxygen concentrations.

The TCEQ is partnering with the Texas A&M University System to continue the research into the causes of low dissolved oxygen in the Arroyo Colorado. Using the Soil and Water Assessment Tool (SWAT), researchers at Texas Agrilife's Blackland Research and Extension Center are currently developing a computer model of the Arroyo Colorado watershed capable of estimating pollutant loads from all human activities in the watershed, including extremely accurate estimates of the effects of agricultural production on the Arroyo Colorado. Together with targeted monitoring, additional water modeling and special studies conducted by the United States Geological Survey (USGS), the research will be used to determine a TMDL for pollutants causing low dissolved oxygen in the Arroyo Colorado.

Public Participation Process

The Arroyo Colorado Watershed Partnership advises the TCEQ on this project. The group is composed of representatives from permitted wastewater dischargers, agriculture groups, universities, citizen groups, and local, state, regional, and federal government agencies. A specialized work group of the committee has been formed to guide the data collection and modeling efforts for this TMDL project.

For More Information

For information on upcoming meetings and documents available for review, contact one of the following representatives from the Texas Commission on Environmental Quality (TCEQ) or the Texas State Soil and Water Conservation Board (TSSWCB). Or visit our Web site at <www.tceq.org/goto/tmdl/> or the Arroyo Colorado watershed partnership website at <www.arroyocolorado.org>

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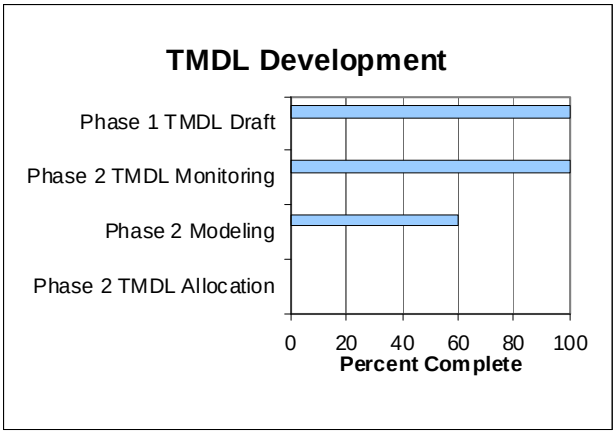
TMDL Development Status (Phase 2)

Start Date: July 2006
Projected End Date: December 2014



TMDL Project Highlights

- In September 2002, Phase 1 of the TMDL was completed, including a "zero load" (natural land cover only) scenario. Modeling results indicate that the dissolved oxygen problem in the tidal segment is related as much to the physical setting and geomorphology of the Arroyo Colorado as it is to the loading of nutrients and oxygen-demanding substances from the non-tidal segment.
- Phase 2 was initiated in July 2006 to refine the TMDL developed under Phase 1.
- Monitoring under Phase 2 was completed in May 2007.
- Development of the SWAT watershed model began in January 2007. Hydrodynamic and water quality modeling for Phase 2 is scheduled to begin in September 2010.
- A Watershed Protection Plan to address dissolved oxygen and bacteria impairments in the Arroyo Colorado was published by the Arroyo Colorado Watershed Partnership in January 2007. A copy of the plan can be found at <www.arroyocolorado.org>.