1. Introduction

The Santa Cruz River originates in Arizona, looping down into Sonora, Mexico, and flows north back into Arizona. Historically, the Santa Cruz River was perennial until it reached Tubac, Arizona and supported lush vegetation and riparian ecosystem. In the Tucson area, perennial water existed near San Xavier Mission. The shallow groundwater and perennial water near San Xavier contributed to a stand of huge mesquite trees known as 'The Great Mesquite Forest' which provided unique habitat for birds and other biota. Perennial water also existed at the base of A Mountain. Late in the 19th century a dam was constructed to form Silverlake, where a hotel was built so patrons could enjoy the water.

In the middle of the 19th century, the Santa Cruz riparian ecosystem began declining because of deforestation, overgrazing, extensive drought and regional downcutting – some of which was initiated by non-Indian settlement activities. By the mid-1900's, agricultural water demands, mining activities and urbanization led to a groundwater overdraft had resulted in lowering groundwater table and loss of the perennial water in the Santa Cruz River near Tucson. Riparian vegetation continued to die off as a result of the decline of the groundwater table and continued wood cutting.

In the 1950s, a wastewater reclamation facility (WRF) was built at Roger Rd near the Santa Cruz River. In the early years, most of the effluent generated by that plant was supplied to farmers. In 1971 the Roger Rd plant began discharging to the Santa Cruz River. By 1973 flows were perennial at the USGS flow gauging station at Cortaro Rd. In 1977, a second treatment plant at Ina Rd came on line and also began discharging excess effluent from the (WRFs) into the Lower Santa Cruz River (LSCR). The perennial effluent flows downstream of the WRFs led to the development of an effluent-dependent riparian ecosystem. The LSCR currently supports and provides habitat for a variety of wildlife and plant species with a perennial supply of effluent. The effluent-dependent reach is dominated by cottonwood-willow and sustains roughly 300 acres of riparian woodland. Open water, weedy fields, and abundant natural vegetation make this part of the river an important stop-over for migrating birds, including waterfowl and raptors, and provide habitat for bird species that have declined in other parts of Pima County due to past land-use change.

The effluent-dependent LSCR has been a source of community concern for recharge, water quality and preservation of riparian habitat. The wetland ecosystem along the river is heavily influenced by river management and effluent practices. The City of Tucson and Pima County released a 2011-2015 Action Plan for Water Sustainability, specifically recognizing the need to preserve/enhance riparian and aquatic habitat by developing a Lower Santa Cruz River Management Plan as a regional priority (Respect for the Environment: Goal 4). Pima County Regional Wastewater Reclamation Department (RWRD) has launched a Pima County Regional Optimization Master Plan (ROMP) in

order to develop the optimal treatment process and plan to comply with regulatory requirements to reduce total nitrogen concentrations in discharged effluent. ROMP upgrades to the WRFs are designed to significantly improve water quality of the effluent. The upgrade in water quality anticipated by ROMP upgrade leads to a commensurate interest in using the effluent as an alternative to other supplies such as groundwater. Water providers, including Tucson Water, Metro Water and Oro Valley Water and non-providers such as Pima County have interest in taking effluent to be used for non-potable uses such as turf irrigation, and riparian enhancement. Furthermore, Tucson Water and Pima County Regional Wastewater are planning to use reclaimed water to recharge along the LSCR, as well as the east side of Tucson.

This report summarized historical changes of the LSCR, focusing on channel flow, effluent discharge, infiltration, channel morphology, water quality, macro invertebrate and vegetation. Infiltration rate and scour and deposition were modeled for existing conditions. The modeling analysis will be a basis for the assessment of impacts of ROMP on the LSCR. This report also summarized possible changes and impacts by ROMP.

Acknowledgment:

This report serves as in-kind cost share for a Wetland Grant from EPA Region IX, Charting the Wetland Health of the Lower Santa Cruz River (EPA Grant 00T83301). We are grateful to the EPA, and their Project Officer Elizabeth Goldmann, for their support of our efforts to monitor wetland conditions on the Lower Santa Cruz River