ADEQ Arizona Department of Environmental Quality

Santa Cruz River and Nogales Wash Total Maximum Daily Load Studies

Total Maximum Daily Load Unit
Surface Water Section
Water Quality Division
Arizona Department of Environmental Quality

Santa Cruz River Researcher's Day
March 27, 2008


Monitoring
Fixed Station network
Ambient Streams and Lakes
Groundwater
Targeted Studies
Assessments
305(b) Report
303(d) List
TMDL Development
Identify Stressors
Collect Data
Determine Loadings
Assign Allocations
Develop Implementation Plan
Improvement Strategies
Watershed Based Plans
Permits (AZPDES/APP)
319 Projects
Effectiveness Monitoring
Determine load reductions
Standards Development
Triennial Review
Site Specific Standards
Water Quality Standards

What is a TMDL?

Total Maximum Daily Load

The maximum amount (load) of a water quality parameter which can be carried by a waterbody without causing an exceedance of surface water quality standards.

Expressed as mass/time (i.e. g/day)

Calculating a TMDL

- Load Allocations (LA)
  - Non-point sources (i.e. precipitation runoff)
  - Little regulatory authority
- Waste Load Allocations (WLA)
  - Point source (i.e. end of pipe discharge)
  - Regulated thru AZPDES permits
- Margin of safety (MOS)
- Considers natural background

$$TMDL = \sum LA + \sum WLA + MOS$$

Why is a TMDL study done?

Clean Water Act

- "Protect and preserve the physical, chemical, and biological integrity of the nations waters"

ADEQ Water Quality Assessment Report

- Describes the status of surface and ground water resources every two years

- The Integrated Report includes a list of Arizona's impaired waters - 303(d) List

- The 303(d) List is prioritized based on human health, parameters of concern, and magnitude of exceedance

- A TMDL must be completed within 15 years of the original 303(d) listing

How is a TMDL done?

- Existing Data review - Review data that lead to determination of impairment.

- Sampling Design - Conduct watershed reconnaissance and literature review. Determine conditions to sample, sample site location, and parameters for analyses.

- Data Collection and Review - Collect samples according to Sample and Analysis Plan. Review data and determine if exceedances are occurring.

- Stakeholder involvement – Hold several public meetings to discuss project design, goals, and results. Include local landowners and managers early in the process.

- Perform data analysis - Determine appropriate method to analyze data. Modeling efforts can range from simple to complex.

- Public Review - Distribute draft TMDL report for a 30-day comment period followed by a 45-day Arizona Administrative Register notice.

- Submit final TMDL report to EPA for approval.

What are the goals of a TMDL?

- Determine the sources and critical conditions for loading that result in water quality exceedances.

- Determine the load reductions necessary to meet water quality standards.

- Develop a TMDL implementation plan that describes potential Best Management Practices (BMPs) and funding sources.

TMDL Implementation Plan

Action plan outlining the affordable, efficient, and effective alternatives to restore water quality

TMDL Study is a *Pollution Budget*

TMDL Implementation Plan is an *Action Plan*

$$TMDL = \sum LA + \sum WLA + MOS$$

TMDL Implementation Plan

- Causes & Sources
- Load Reductions
- Management Measures
  - BMPs
  - Education and Outreach
- Resources
  - Technical
  - Financial Assistance
  - Watershed Partnerships
- Schedule/Milestones
- Effectiveness Monitoring

Implementation requires collaborative input from stakeholders

Effectiveness Monitoring

- ADEQ required to revisit waterbodies within 5 years after completion of TMDL
- Develop Effectiveness SAP after implementation has occurred
- Collect data under critical conditions defined in TMDL
- Measure the effectiveness of remediation
- Determine if standards are now being attained- with the goal of delisting the waterbody

Current Studies

- 16 stream TMDLs
- 10 lake TMDLs
- 6 effectiveness monitoring studies
- Complaint Investigations - fish kills, algal blooms, strange odors/colors, etc
- Fish Tissue - collect fish tissue to compare with mercury standard
- Tekran Deployment - measures dry concentrations of mercury which are used to determine dry deposition rates to support mercury TMDL development
- Mercury Deposition Network (MDN) site - measures mercury concentration in precipitation to determine atmospheric wet deposition rates

Santa Cruz River

Mexico Border to Nogales International WWTP

Designated Uses

- Aquatic & Wildlife (warm water) (A&Ww)
- Domestic Water Source (DWS)
- Full Body Contact (FBC)
- Fish consumption (FC)
- Agricultural Irrigation (AgI)
- Agricultural Livestock Watering (AgL)

Impaired for *Escherichia coli* (*E. coli*) exceedances of FBC standard

Originally listed as impaired in 2002 305(b) assessment

Stream segment below IWWTP is not currently listed although recent data show exceedances

Nogales Wash

Mexico Border to Potrero Creek

Designated Uses

- Aquatic & Wildlife (warm water) (A&Ww)
- Full Body Contact (FBC)

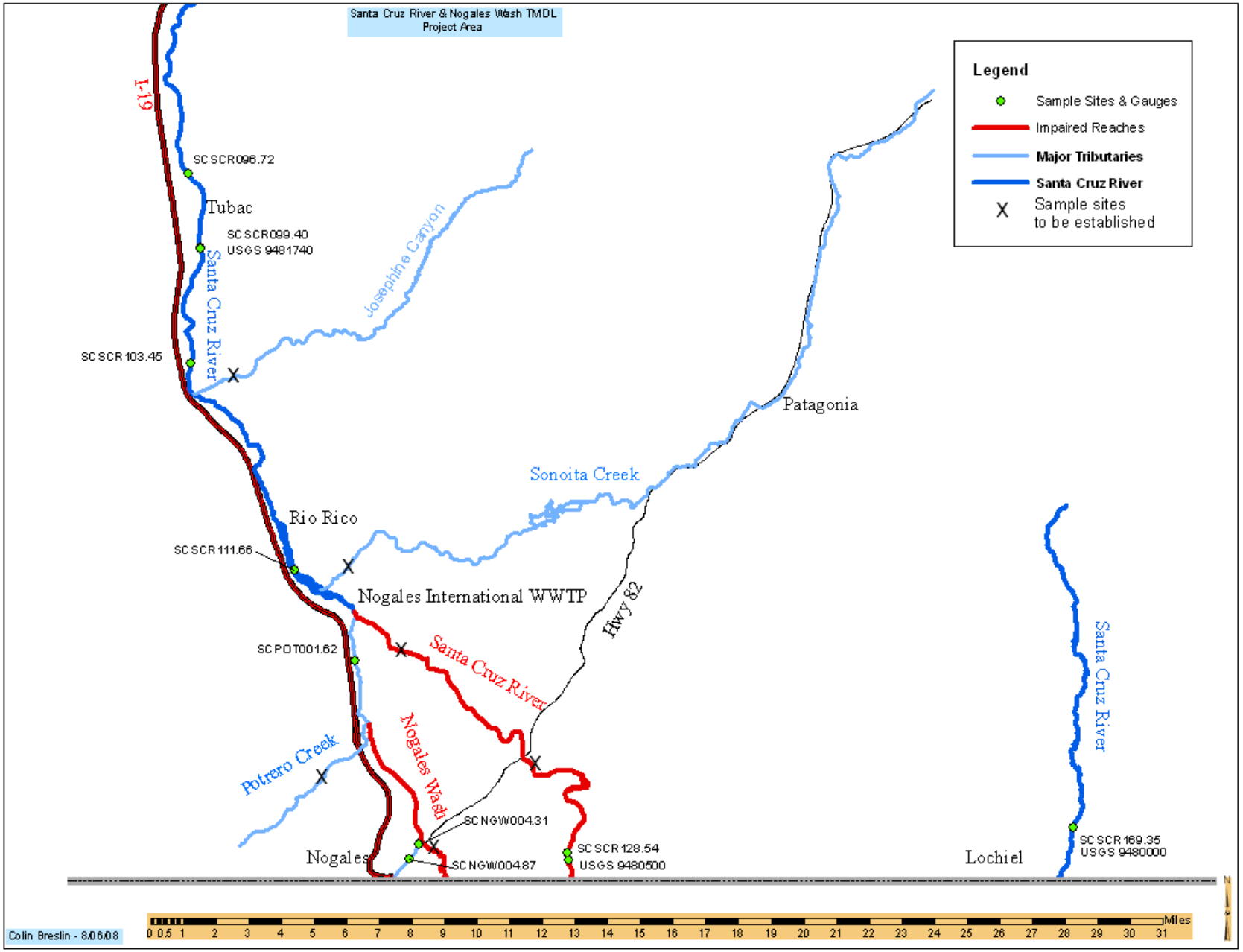
Impaired for *E. coli* (1998),
ammonia (2004),
chlorine (1996),
and dissolved copper (2004)

Sampling and Analysis Plan

Targeted sampling conditions
- Base flow (warm and cold)
- Storm runoff

Parameters
- Limited suite
- Full suite

Sample sites
- Located within impaired reaches
- Above and below impaired reaches
- Major tributaries


Santa Cruz River & Nogales Wash TMDL
Project Area
Legend
Sample Sites & Gauges
Impaired Reaches
Major Tributaries
Santa Cruz River
Sample sites
to be established
I-19
SCSCR096.72
Tubac
SCSCR099.40
USGS 9481740
Santa Cruz River
Josephine Canyon
SCSCR103.45
Patagonia
Sonoita Creek
Rio Rico
SCSCR111.66
Nogales International WWTP
Hwy 82
SCPOT001.62
Santa Cruz River
Potrero Creek
Nogales Wash
SCNGW004.31
Nogales
SCNGW004.87
SCSCR128.54
USGS 9480500
Lochiel
Santa Cruz River
SCSCR169.35
USGS 9480000
Colin Breslin - 8/06/08
0 0.5 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Miles

Current and Future Activities

Collected warm and cold water baseflow samples

- Nogales Wash- *E. coli*, ammonia and chlorine exceedances measured
- Santa Cruz River- *E. coli* exceedances measured below Nogales WWTP

Coordinate efforts with FOSCR and other

Collect samples for MST analysis

Target storm runoff sampling in spring and summer 2009

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