



Arid West Water Quality Research Project ACCOMPLISHMENTS AND IMPACTS

**Arizona Water & Pollution
Control Association**

**Mesa, AZ
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- **The Arid West Water Quality Research Project (AWWQRP) has conducted significant research on water quality issues in arid West ecosystems over the last twelve years.**
- **This presentation will focus on the most recent research and policy papers from the AWWQRP, including the “User’s Guide” which is currently being published and provides positive recommendations for arid West water quality issues.**

Presentation Overview



- 💧 Project Overview
- 💧 Phase I Research
- 💧 Phase II Research
- 💧 Outreach Efforts
- 💧 Regulatory Support

Project Overview

- 💧 Initiated in 1995 (P.L. 103-327)
- 💧 Funded through an U.S. EPA Assistance Grant
 - ✓ Phase I - \$5,000,000
 - ✓ Phase II - \$500,000
- 💧 Project Purpose: Improve scientific basis for regulation of water quality and protection of species, habitats and uses of effluent dependent and ephemeral waters in the arid West



Project Overview

- *U.S. EPA* – Participation by both Headquarters & Region 9 staff
- *Regulatory Working Group* – 15 stakeholders representing both public and private interests; ensured that project research had firm regulatory basis and that research activities focused on important regulatory concerns
- *Scientific Advisory Group* – scientists with experience in water quality research; made certain that project research had a strong scientific basis, were properly designed and technically sound

Research Summary

💧 Phase I Grant

- ✓ \$5,000,000
- ✓ Completed in Spring 2006
- ✓ Eight research projects funded
- ✓ Numerous outreach activities

💧 Phase II Grant

- ✓ \$500,000 supplement
- ✓ Completed April 2007
- ✓ One major research study; two minor studies
- ✓ User's Guide Development
- ✓ Continued outreach

Arid West Waters

- Water quality standards issues in effluent-dependent and ephemeral waters



**Santa Fe River, NM – Upstream
of Discharge**



**Santa Fe River, NM – Below
Discharge**

Santa Cruz River Nogales, AZ

Effluent-Dependent Water



Upstream of discharge



100 meters below discharge



1.5 miles downstream of discharge

Crow Creek, Wyoming ***Effluent-Dominated*** ***Water***



Upstream of discharge



Below Crow WWTP discharge



**Below Dry Cr. WWTP
discharge**

Phase I Projects

- ◆ Pre-Research Survey of Municipal NPDES Dischargers (Discharger's Survey)
- ◆ Habitat Characterization Study
- ◆ Extant Criteria Evaluation
- ◆ Evaluation of the Reliability of the Biotic Ligand Model Predictions for Copper Toxicity in Waters Characteristic of the Arid West
- ◆ Hardness-Dependent Ammonia Toxicity and the Potential Use of the Water Effect Ratio

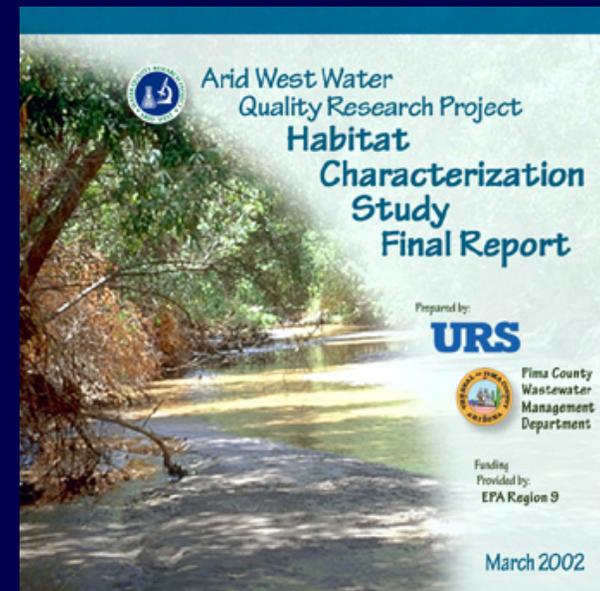
Phase I Projects

- Evaluation of the EPA Recalculation Procedure in Arid West Effluent-Dependent Waters
- User's Guide for Development of Site-Specific Water Quality Standards in Arid West Effluent-Dependent Streams
- WERF/AWWQRP – Evaluation of WET Testing as an Indicator of Aquatic Health in Effluent-Dominated Streams

Phase I Research - Highlights

💧 *Habitat Characterization Study*

- ✓ Ten case studies of effluent-dependent and effluent-dominated waters (physical, chemical and biological)
- ✓ Conceptual framework to guide future research
- ✓ Compilation of aquatic species lists for effluent-dependent waters
- ✓ Information provided to EPA for consideration in its policy development for effluent-dependent waters



Phase I Research - Highlights

- ◆ *Evaluation of the Reliability of the Biotic Ligand Model Predictions for Copper Toxicity in Waters Characteristic of the Arid West*
 - ✓ Provides support for use of the BLM model in arid west waters
 - ✓ Recommended modifications to the model to take into account arid west chemistries (Mg)
 - ✓ Research incorporated into EPA's 2007 revision to its copper aquatic life criteria guidance



Phase I Research - Highlights

- *Evaluation of the EPA Recalculation Procedure in Arid West Effluent-Dependent Waters*
 - ✓ Updated EPA's toxicity databases for five constituents
 - ✓ Used arid west species lists for recalculations
 - ✓ Recommended revision to EPA's "8 family rule"
 - ✓ Data used to support efforts to revise criteria:
 - Aluminum – California's Santa Ana Regional Water Quality Board; Environment Canada
 - Ammonia – Colorado Wastewater Utility Council

Phase II Projects

- 💧 Major Research Project - *Aquatic Communities of Ephemeral Streams*
- 💧 Minor Research Projects
 - ✓ Use of the Recalculation Procedure in Combination with BLM-based Copper Acute Criteria
 - ✓ Relative Role of Sodium and Alkalinity vs. Hardness Cations in Controlling Acute Ammonia Toxicity to Aquatic Organisms
- 💧 User's Guide Development – Compilation of AWWQRP research project results placed in a regulatory context

Phase II Research - Highlights

- 💧 *Aquatic Communities of Ephemeral Streams*
 - ✓ Ephemeral streams – flows only in response to precipitation event; channel is at all times above the groundwater table



Pantano Wash, southeastern Arizona

Phase II Research - Highlights

- 💧 *Aquatic Communities of Ephemeral Streams*
 - ✓ Original research on ephemeral stream communities
 - ✓ Species lists from three different ecoregions – Arizona, New Mexico and Colorado
 - ✓ Duration/persistence data – both flow and biological communities
 - ✓ Supports development of site-specific or ephemeral stream-type criteria



Phase II Research - Highlights

- 💧 *User's Guide* – provides project research findings in a regulatory context
 - ✓ Arid west water characteristics
 - ✓ Summaries of each AWWQRP research project
 - ✓ Approaches for refining uses and criteria
 - ✓ Regulatory case study examples
 - ✓ Working through the regulatory process
- 💧 Includes CD with project reports and *User's Guide* supporting material



Project Outreach

- *Directed Outreach* – directed by AWWQRP office; required of research teams
- *Extended Outreach* – Advisory groups conducted their own outreach; provided numerous forums or opportunities to share information

Project Outreach

💧 *Publications and Mail-outs*

- ✓ Reports provided via mail-outs, website and User's Guide
- ✓ Extant Criteria Evaluation Report – 2007 SETAC publication (Relevance of Ambient Water Quality Criteria for Ephemeral and Effluent-Dependent Watercourses in the Arid Western United States)
- ✓ Peer-reviewed papers in scientific journals
- ✓ Trade publications

Real World Applications

- ◆ Agencies/organizations that have utilized AWWQRP research
 - ◆ Colorado DEQ & agencies
 - ◆ Nevada agencies
 - ◆ California agencies
 - ◆ Wyoming DEQ & agencies
 - ◆ Society of Environmental Toxicology and Chemistry (SETAC)
 - ◆ Western Governors' Association/
Western States Water Council
(WGA/WSWC)
 - ◆ EPA Headquarters & Regions
 - ◆ Canada Department of the Environment



Support to Regional and National Water Quality Issues

- Opportunities to support regulatory activities have been numerous
 - ✓ Copper Biotic Ligand Model development
 - ✓ Water quality standards development, especially for aluminum and ammonia
 - ✓ Support effluent-dependent waters policy development with Western State's Water Council
 - ✓ Support EPA's development of its Q&A document for water quality standards development in effluent-dependent waters



Arid West Water Quality Research Project

Questions

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