Research Agenda

Purpose—Selection of research activities to fund is based on the Research Agenda established by Project participants. Periodically updating this agenda is critical to the success of the Project since it provides a mechanism to ensure that research activities are conducted in a coordinated fashion. For example, experience with the completed and ongoing research projects has illustrated the benefits of linking projects, that is, data generated and synthesized in one research project can provide the foundation for subsequent projects.

Establishment of Original Research Agenda—The arid West comprises many different interests, stakeholders and water quality concerns. Accordingly, it was recognized at the onset of the Project that it was essential to establish a research agenda that was representative of the issues and concerns prevalent in the arid West. To develop this agenda, the AWWQRP organized and hosted a conference in Tucson, Arizona in 1997. The conference summary is available at http://www.co.pima.az.us/wwm/wqrp/index.html. The purpose of this conference was to bring together people with interests in arid West water quality issues and identify water quality concerns within four general areas:

- Habitats of Concern;
- Biological and Ecological Criteria and Standards;
- Chemical Criteria and Standards; and
- Whole Effluent Toxicity (WET) Testing.

Over 100 conference participants, representing federal, state, local and tribal government agencies, wastewater dischargers, and university researchers, attended breakout sessions devoted to identifying research needs under each of these areas and formulating specific questions to be researched. The RWG prioritized this list of critical/candidate issues, which was then consolidated and modified to create the Research Agenda (Table 1).

Refinement of the Research Agenda—The Project continues to utilize the original Research Agenda topics and uses the results of commissioned research projects and input received from Project participants and public outreach efforts to update and/or identify specific projects for consideration for RFQs. This process will guide the Project through the next phase of commissioned research studies.

Table 1. Research Agenda

Research Topic Areas	Examples of Research Interest
Habitats of Concern	▪ Establish the basic descriptions of environmental conditions (physical, chemical, biological), which define beneficial use of effluent-dependent and ephemeral stream habitats, which have been attained and preserved under existing discharge conditions. Consideration should be given to the effect that historical discharges and conditions may have had on current uses. The influence of stormwater flows was recognized as a major consideration in defining effects on habitats in arid environments. ▪ Identify the types of habitats that currently exist below effluent discharge and stormwater discharge points, e.g., community structure and habitat function. ▪ Evaluate attainable environmental benefits of arid ephemeral stream habitats affected by discharges of treated effluents and stormwater. Determine the environmental benefits of habitats associated with effluent-dependent watercourses. ▪ Determine the resiliency of arid West stream habitats to variation in water quality indicators (including chemical species), and effects on beneficial uses. ▪ Identify and describe physical, chemical and biological ephemeral water characteristics. ▪ Stream changes associated with changes in ratio of natural and effluent waters.
Biological and Ecological Criteria and Standards	▪ Determine the variability of biological communities of arid effluent-dependent waters and ephemeral streams. ▪ Define the range of biologically acceptable reference conditions for arid effluent-dependent and ephemeral streams that offer net ecological benefit. ▪ Define the differential response of biological communities to stormwater from natural landscape drainage, agricultural lands and municipal environments.
Whole Effluent Toxicity (WET)	▪ Identify conditions in arid ecosystem ephemeral and effluent-dependent streams appropriate for WET testing application in arid regions, including in relation to stormwater flows. ▪ Assess the sensitivity of current test species to typical chemical and physical characteristics of effluent-dependent and ephemeral source waters in the arid West. Improve the test protocol, including solution matrix effects, rearing environment, and selection of native arid species in order to separate effects of effluents from effects of natural conditions, including stormwater flows. The relationship of test results to observed measures of downstream biological integrity needs to be established for representative stream segments. ▪ Determine the correlation between test response of current test species and native species of typical arid effluent-dependent and ephemeral streams including "toxic" events.
Chemical Criteria and Standards	▪ Determine chemical quality indicators (nutrients, metals and organics) thresholds and exposure conditions (frequency, duration, and intensity of stress) needed to maintain existing arid West ephemeral and effluent-dependent stream environmental benefits. ▪ Develop Biotic Ligand Model predictions for metal toxicity in arid West waters. ▪ Conduct studies to understand effect of diel pH variation on metal and ammonia standards.