Final Report

Needs Assessment of Tribal Requirements for Instruction in the Use of Statistically-Based Aquatic Water Quality Monitoring Techniques

Cooperative Agreement Number: CR 829095

Prepared for

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Cover Photograph: Tommy Siyuja, Sr. (Environmental Director), Dianna Sue Uqualla (Water Operator Technician), and Marian Marshall (Environmental Specialist) taking a GPS reading and measuring conductivity at a footbridge crossing Havasu Creek on the Havasupai Reservation.

Printed on partially-recycled paper.

ABSTRACT

This report was written to document the need for statistically-based aquatic water quality monitoring techniques by selected American Indian Tribes. It is available for use by any public agency. It was developed to document learning needs of the Tribes for electronic learning materials under development by the Space-time Aquatic Resources Monitoring and Analysis Program (STARMAP) of the Department of Statistics at Colorado State University. The goal is to document the needs of ten American Indian Tribes for the design of aquatic water quality monitoring plans and the statistical analysis of the data. The selected American Indian Tribes are situated on reservations within USEPA Region IX (Arizona, California, and Nevada) except the Southern Ute Indian Tribe which is situated in USEPA Region VIII. A Tribal needs assessment form was developed to document Tribal responses to a set of specific questions.

Tribal needs for the design of monitoring plans reflects environmental programs in their infancy and at a crisis-management level. Criteria for selecting monitoring sites predominantly addresses the detection and quantification of water quality contaminants. Current tribal aquatic water quality monitoring plans appear to be based on responses to specific tribal needs as opposed to comprehensive plans. Future tribal monitoring plans appear to also be based on specific (not comprehensive) tribal needs other than the San Carlos Apache Tribe and the Southern Ute Indian Tribe which are pursuing water quality baseline establishment and developing tribal water quality standards. The Tribe's are not required (states are required) by the USEPA to produce Section 305(b) Water Quality Assessment Reports, which would provide useful guidelines for the design of water quality monitoring plans. The tribal needs for monitoring cultural uses of tribal waters is very definitive and reflects the tribe's differences with state programs in that the tribes actively pursue protection of culturally-sensitive water uses. Cultural uses of water include hand-dredging of clays for making pottery and wetland plant harvesting (e.g., cottonwood and willow) for constructing sweat lodges or cradle boards. The Tribes rely heavily on contractual consultants and continued federal funding is needed to maintain Tribal accessibility to outside expertise and cross-training of Tribal employees. Tribal needs for statistical analyses include temporal trend analysis and database management software and statistical programs that are user-friendly without the need for extensive workshop training.

The research reported here was developed under a subcontract from Colorado State University on behalf of STARMAP to Water Quality Technology, Inc. The primary funding is STAR Research Assistance Agreement CR-829095, awarded by the U.S. Environmental Protection Agency (EPA) to Colorado State University. This document has not been formally reviewed by EPA. The views expressed here are solely those of subcontractor and STARMAP. EPA does not endorse any products or commercial services mentioned herein.

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1.0 INTRODUCTION

1.1 Purpose

The purpose of this report is to document the need for statistically-based aquatic water quality monitoring techniques by selected American Indian Tribes for use by the U.S. Environmental Protection Agency (USEPA) in testing electronic instructional materials under development.

1.2 Goal

The study goal is to document the needs of ten American Indian Tribes for the design of aquatic water quality monitoring plans and the statistical analysis of the data.

1.3 Objectives

The objectives of the study are designed to address the purpose and goal of the study and are as follows:

Objective #1: Contact cooperative water quality tribal representatives

Objective #2: Discuss current and future tribal aquatic water quality monitoring plans

Objective #3: Solicit information on tribal needs for the design of water quality monitoring plans, including the selection of monitoring sites

Objective #4: Solicit information on tribal needs for statistical analyses

Objective #5: Solicit information on tribal needs for dealing with consultants

The deliverables for this study are production of a final report documenting the tribal needs assessment results including one-page summaries of individual tribal needs for aquatic water quality design and analyses.

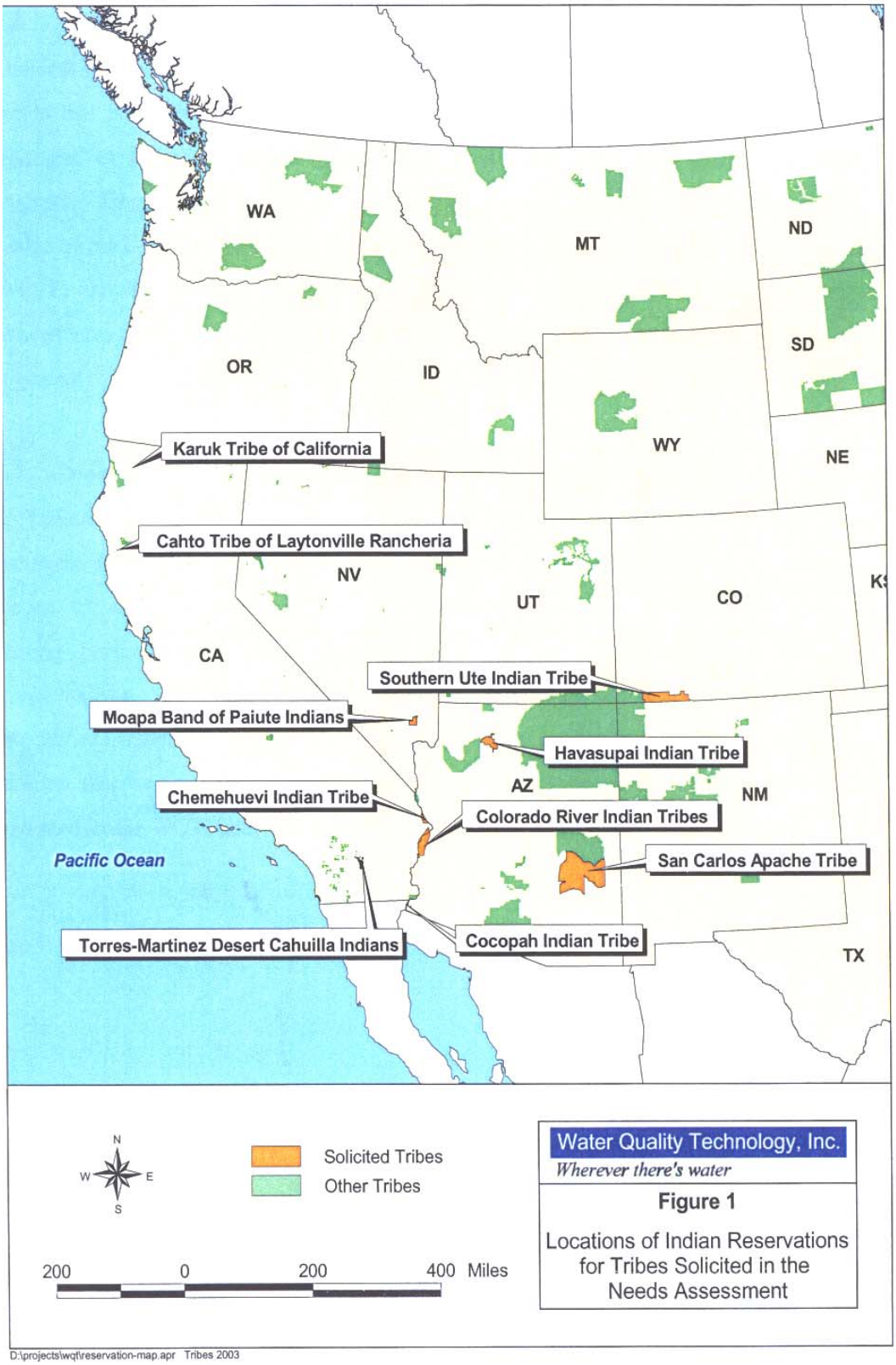
2.0 ASSESSMENT METHODOLOGY

2.1 Select Ten American Indian Tribes for Solicitation

American Indian Tribes are the target audience. Ten Tribes are selected along with water quality tribal representatives as part of the needs assessment. An understanding of a Tribe's water quality monitoring programs and an existing relationship with key Tribal representatives are anticipated to facilitate a more thorough assessment of Tribal needs by Water Quality Technology, Inc. (WQTI) personnel. Since WQTI has a working relationship with certain American Indian Tribes through existing USEPA subcontracts, these Tribes have been selected for the needs assessment process.

- Cahto Tribe of Laytonville Rancheria
- Chemehuevi Indian Tribe
- Cocopah Indian Tribe
- Colorado River Indian Tribes
- Havasupai Indian Tribe
- Karuk Tribe of California
- Moapa Band of Paiute Indians
- San Carlos Apache Tribe
- Southern Ute Indian Tribe
- Torres Martinez Desert Cuchilla Indians

All of these American Indian Tribes are situated on reservations within USEPA Region IX (Arizona, California, and Nevada) except the Southern Ute Indian Tribe which is situated in USEPA Region VIII as indicated in ***Figure 1***.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Southern Ute Indian Tribe
Moapa Band of Paiute Indians
Havasupai Indian Tribe
Chemehuevi Indian Tribe
Colorado River Indian Tribes
San Carlos Apache Tribe
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Water Quality Technology, Inc.
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Figure 1
Locations of Indian Reservations for Tribes Solicited in the Needs Assessment
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2.2 Contact Water Quality Tribal Representatives

A critical component of the Tribal needs assessment process is to identify a key Tribal contact person that is either currently responsible for developing aquatic water quality monitoring programs, or is knowledgeable of the Tribal need for aquatic water quality monitoring programs. Since most Tribal aquatic water quality monitoring programs are fully or partially funded by the USEPA under Clean Water Act Section 106 Water Pollution Control Programs (WPCP) and WQTI's existing subcontracts are also under the WPCP, key Tribal contact persons have previously been identified by WQTI and are presented below in ***Table 1*** as well as general reservation information.

2.3 Solicit Information on Statistically-Based Monitoring Needs

To facilitate the solicitation process, a Tribal needs assessment form was developed to document Tribal responses to a set of specific questions (***Appendix A***). The likelihood of success for soliciting information from Tribal representatives was increased as a result of existing personal relationships between the WQTI interview person and the Tribal representatives. When possible, WQTI interviews were conducted in person as part of visits to American Indian Reservations. The interviews were interactive and informal in that any question that was not fully understood by the Tribal representative was more thoroughly presented by the WQTI interview person.

Table 1. Summary of Indian Tribe and Tribal Contact Person

Indian Tribe	Location	Acreage	Population	Major Waterbodies	Contact Person	Title
Chemehuevi Indian Tribe	Havasu Lake, California	32,000	400	Havasu Lake Colorado River	Mr. Marcus Black	Water Quality Technician
Cahto Tribe of Laytonville Indians	Laytonville, California	200	140	Cahto Creek	Ms. Dawn Caye	Environmental Director
Cocopah Indian Tribe	Somerton, Arizona	6,374	520	Colorado River Limnitrophe canals	Mr. John Swenson	Director, Environmental Protection Office
Colorado River Indian Tribes	Parker, Arizona	268,692	7,865	Colorado River 7 lakes	Mr. Dillon Esquerra	Water Quality Technician
Havasupai Tribe	Supai, Arizona	185,000	400	Havasu Springs Havasu Creek	Ms. Dianna Sue Uqualla	Water Operator Technician
Karuk Tribe of California	Orleans, California	1,168	359	Klamath River Salmon River Sacred Pond at Katimin	Mr. Scott Quinn	Water Resources Coordinator
Moapa Band of Paiute Indians	Moapa, Nevada	71,954	279 (enrollment)	Muddy River Hogan Spring Duck Pond South	Ms. Colleen Trujillo	Water Quality Specialist
San Carlos Apache Tribe	San Carlos, Arizona	1,854,396	10,750	Gila River Salt River San Carlos Lake	Ms. Loretta Stone	Environmental Programs Specialist
Southern Ute Indian Tribe	Ignacio, Colorado	710,000 (exterior boundary)	5,000	Animas River La Plata river Pine River	Ms. Michiko Burns	Water Quality Program Manager
Torres Martinez Desert Cuchilla Indians	Thermal, California	24,822	260	Salton Sea Whitewater River	Ms. Debi Livesay	Environmental Programs Coordinator

3.0 RESULTS AND DISCUSSION

3.1 Tribal Needs Assessment Results

The results of the Tribal needs assessments are summarized in ***Table 2***. Ten American Indian Tribes have been contacted for completion of the individual Tribal needs assessment forms (***Appendix A***.).

3.2 Discussion of Tribal Needs Assessment Results

Current tribal aquatic water quality monitoring plans appear to be based on responses to specific tribal needs as opposed to comprehensive plans. Future tribal monitoring plans appear to also be based on specific (not comprehensive) tribal needs other than the San Carlos Apache Tribe and Southern Ute Indian Tribe, which are pursuing water quality baseline establishment and developing tribal water quality standards. Tribal needs for the design of monitoring plans reflect environmental programs in their infancy and at a crisis-management level. The Tribe's are not required (States are required.) by the USEPA to produce Section 305(b) Water Quality Assessment Reports (USEPA 1997b), which would provide useful guidelines for the design of water quality monitoring plans. The tribal needs for monitoring cultural uses of tribal waters is very definitive and reflects the tribe's differences from state programs since the tribes actively pursue protection of culturally-sensitive water uses. Many Tribes actively purse protection of wetland plants that are used for construction of sweat lodges, cradle boards, and ramadas. Although pottery making is not practiced widely these days, the location of clay sources in surface waters is an environmental protection concern for many Tribes. Criteria for selecting monitoring sites predominantly addresses the detection and quantification of water quality contaminants as well as the proximity to potential contaminant sources. Some Tribes are pursuing protection of fisheries for which USEPA guidance for assessing fish consumption concerns is available (USEPA 1997a). Tribal needs for statistical analyses include database management software and statistical programs that are user-friendly without the need for extensive workshop training. Tribal needs for dealing with consultants involve maintaining sufficient federal funding to hire highly qualified and easily accessible consultants to provide the tribe with expertise and cross-training.

Table 2. Summary of Tribal Needs Assessment Results

Needs Assessment Question	Tribal Representative Response	Indian Tribe
1. What are your current tribal aquatic water quality monitoring plans?	-Beach bacteria monitoring; High school outreach; incidental discharge responses -Monitoring beneficial use support of aquatic life in tribal waters -Contribute to regional pesticide uses for NPDES permits -Sampling weekly in Lake Havasu for bacteria (*E. coli* and total coliform) -Surface water monitoring, expand into wetlands and cultural protection -Purchase water quality equip. for monitoring the Muddy River chemistry and flow -Addressing pesticide uses, salinity, manganese, and lack of surface water flows -Monitoring on Cahto Creek but need to hire an environmental specialist -Monthly bacteria sampling (total coliform and fecal coliform) -Mainstem Klamath River sampling for turbidity, pH, cond., water temp., and flow	-CRIT -SCAT -TMCI -CHIT -SUIT -MBPI -CIT -CTLR -HT -KTOC
2. What are your future tribal aquatic water quality monitoring plans?	-Development of a GIS-based water quality database; additional data entry needs -Monitor to ensure support T&E species, such as the Gila Chub fish -Develop water quality standards and establish baseline database -Not sure, but planning increased bacterial monitoring for recreational uses -Improve standards, assess coal-bed methane/assert non-COE-jurisdiction wetlands -Implement GIS mapping for reservation water balance (including ground water) -Monthly surface water/ground water sampling, municipal dump contaminant eval. -Clean-up of the main creek, reintroduce salmon, develop standards, monitor flows -Evaluate other springs for drinking water sources, monitor salt cedar presence -Continue current monitoring but expand to tributaries (to the Klamath River)	-CRIT -SCAT -TMCI -CHIT -SUIT -MBPI -CIT -CTLR -HT -KTOC

Table 2. Summary of Tribal Needs Assessment Results (continued)

Needs Assessment Question	Tribal Representative Response	Indian Tribe
3. What are your tribal needs for the design of water quality monitoring plans?	-Truck purchase; in-house laboratory capabilities; water quality equipment training -To detect the presence of any contamination in Tribal waters -Development of a QAPP and surface water/ ground water protection -Delineate watersheds using a geographical information system (GIS) -Better GIS mapping of wetlands and cultural sensitive areas, reduce NPS impacts -A good database to work from to project Tribal needs for water quality -Continue preserving Colorado R. riparian zones, develop ground water protection. -Need funding/training so we are currently only designing plans for future projects -Recr. uses, drinking water quality, salt cedar eradication, cultural use preservation -Based on the potential for exceedances of water quality standards	-CRIT -SCAT -TMCI -CHIT -SUIT -MBPI -CIT -CTLR -HT -KTOC
4. What are your tribal needs for monitoring cultural uses of waterbodies?	-Tribal archeologist coordination; maintaining water quality of cultural waters -Protection of willows used for basket weaving and water used for sweat lodges -Source aquifer protection to protect culturally-significant springs -Restoring native wetland plant species for basket weaving/making cradle boards -Incorporating cultural preservation and voicing concern for cultural wetlands -Protect culturally-sensitive spring and canyon areas, including ancestral ponds -Protect cultural uses of water such as wetland plants and clays for pottery -Conducting a cultural survey that addresses cultural fisheries and wetland plants -Preserve cottonwood trees for sweat lodges and cradle boards, preserve springs -Once water quality standards are in place, then cultural use monitoring will begin	-CRIT -SCAT -TMCI -CHIT -SUIT -MBPI -CIT -CTLR -HT -KTOC

Table 2. Summary of Tribal Needs Assessment Results (continued)

Needs Assessment Question	Tribal Representative Response	Indian Tribe
5. What are your criteria for selecting water quality monitoring sites?	-Issues of concern for human health, fish & wildlife, and potential degradation	-CRIT
	-Proximity to drinking water sources/populations; USTs; tribal uses; industrial uses	-SCAT
	-Monitor existing wells and upstream/downstream of surface waters	-TMCI
	-High water usage areas by Tribal members and the public	-CHIT
	-Upstream/downstream of reservation, major watershed streams and tributaries	-SUIT
	-Based on hydrology studies, such as potential drinking sources and cultural areas	-MBPI
	-Upstream/downstream of reservation, existing water wells for quality of aquifers	-CIT
	-Upstream/downstream of reservation, proximity to contamanant sources	-CTLR
	-Pristine areas, Havasu Creek/Havasu Springs, emergency drinking water sources	-HT
	-We monitor impaired waters. Upstream/downstream of contaminant sources	-KTOC
6. What are your tribal needs for statistical analyses?	-Need a good program to access and analyze data without the need for workshops	-CRIT
	-Contaminant level extremes especially standards exceedances; baseline statistics	-SCAT
	-Baseline ranges/mean values; temporal trends in contaminants/water tables	-TMCI
	-Not sure, but geometric means are used for bacteria calculations	-CHIT
	-Need personnel that can understand statistics and interpret statistical results	-SUIT
	-Funding is needed to determine what statistical analyses are needed for the Tribe	-MBPI
	-Interpretation (GIS/spreadsheet) of water quality/quantity. Changing water levels	-CIT
	-Temporal trend analyses for contaminants	-CTLR
	-Baseline water quality using means/standard deviations to determine degradation	-HT
	-Temporal and spatial changes among monitoring site contaminant levels	-KTOC

Table 2. Summary of Tribal Needs Assessment Results (continued)

Needs Assessment Question	Tribal Representative Response	Indian Tribe
7. What are your tribal needs for dealing with consultants?	-Need more accessible consultants especially quick responses on-site as needed	-CRIT
	-Heavy reliance on Ph.D. consultants for water quality expertise and cross-training	-SCAT
	-Need increased federal funding for hiring expert and truthful consultants	-TMCI
	-On-going need until expertise of consultants is no longer needed	-CHIT
	-Establish EPA limits on funding/time for use of consultants, need EPA direction	-SUIT
	-A pamphlet that lists consultants and their expertise and contact information	-MBPI
	-Lack of tribal resources requires consultants to fill gaps and train tribal employees	-CIT
	-Problems with consultants not abiding by a set contractual amount/scope of work	-CTLR
	-Provide understanding/importance of our waters, teach us GPS/water quality tools	-HT
	-Need hiring money. Ensure they do what the Tribe wants. Consistent relationship	-KTOC

Legend:
CHIT = Chemehuevi Indian Tribe
CIT = Cocopah Indian Tribe
CTLR = Cahto Tribe of Laytonville Rancheria
HT = Havasupai Tribe
KTOC = Karuk Tribe of California
CRIT = Colorado River Indian Tribes
MBPI = Moapa Band of Paiute Indians
SCAT = San Carlos Apache Tribe
SUIT = Southern Ute Indian Tribe
TMCI = Torres Martinez Desert Cahuilla Indians

4.0 RECOMMENDATIONS

The following general Tribal needs for instruction in the use of statistically-based aquatic water quality monitoring techniques are apparent as indicated on the ten Tribal needs assessment forms (***Appendix A***).

(1) The Tribes need regulatory guidance for development of water quality monitoring plans in the form of required Section 305(b) reporting which is currently only required of by the states.

(2) The Tribes voiced the need to have the monitoring and protection of cultural uses of waters addressed in instructional materials under development.

(3) The Tribes voiced the need for user-friendly temporal trend and water quality database management software.

(4) The Tribes voiced the need for geographical information system (GIS) training.

(5) The Tribes voiced the need for educational materials on the appropriate use of statistics in aquatic water quality monitoring assessments.

(6) The Tribes voiced the need for a user-friendly statistical analysis program.

(7) The Tribes voiced the need for sufficient and continued federal funding to hire consultants as needed for expertise and cross-training of Tribal employees.

5.0 REFERENCES CITED

U.S. Environmental Protection Agency. 1997a. *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 2 Risk Assessment and Fish Consumption Limits.* Office of Water. EPA 823-B-97-009. Washington, DC.

U.S. Environmental Protection Agency. 1997b. *Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates*. Office of Water. EPA-841-B-97-002A. Washington, DC.