

# DEVELOPING A TRIBAL WATER MONITORING STRATEGY

Supplement to the Clean Water Act Section 106 Tribal Guidance



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## **Developing a Tribal Water Monitoring Strategy Supplement to the Clean Water Act Section 106 Tribal Guidance**

### **Introduction**

#### **What is the purpose of this tribal water monitoring strategy document?**

The *Final Guidance on Awards of Grants to Indian Tribes under Section 106 of the Clean Water Act* (the Tribal 106 Guidance)<sup>a</sup>, requires tribes, whose CWA 106 grants start in calendar year 2007 with fiscal year 2007 funding, to develop a tribal Assessment Report. The tribal Assessment Reports are comprised of three elements: (1) a description of your monitoring strategy, (2) a water quality assessment, and (3) electronic copies of surface water quality data for nine basic parameters submitted in a STORET-compatible format. This document addresses development of a water quality monitoring strategy. Similar documents are available for both water quality assessment reports and electronic submission of data (refer to the sections on data management and reporting below for more information).

In developing a strategy, as per the Tribal 106 Guidance, the items below should be seen as topic areas to cover and examples of the types of information that should be included in the strategy. This document is meant to provide additional detail about how to describe your current and future program in relationship to the ten elements of a monitoring and assessment program. Example tables have been included in Attachment A for selected Elements and may serve as a useful starting point for reviewing/describing your monitoring program. These tables are intended to serve as general examples only. They can be modified to reflect the specifics of your tribe's monitoring and assessment program.

The complexity of the strategy you describe will depend on the sophistication of your monitoring program. Your strategy description can vary in length as long as you adequately describe a program that meets your data and information needs and considers future needs. The format should be based on what works best for each tribe. The strategy should be updated every 3-5 years, or more often as appropriate, to reflect progress and changes in the program. Considerations for "Fundamental" and "Intermediate/Mature" water quality programs (see definitions in the glossary [Attachment C] or in the Tribal 106 Guidance) are identified under each Element in the following section, in tables. Intermediate programs should consider all items in the right hand column of these tables, but may be addressing fewer objectives than mature programs. Mature programs should include all items identified in the template.

In developing your monitoring strategy and developing objectives, you should keep in mind how these link to EPA's *2006-2011 EPA Strategic Plan*<sup>b</sup> including the target showing water quality

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<sup>a</sup> EPA. Office of Water. Office of Wastewater Management. 2006. *Final Guidance on Awards of Grants to Indian Tribes under Section 106 of the Clean Water Act for Fiscal Years 2007 and Beyond*. EPA 832-R-06-003. (<http://www.epa.gov/owm/cwfinance/106tgg07.htm>)

<sup>b</sup> EPA. 2006. *2006-2011 EPA Strategic Plan*. EPA 190-R-006-001. (<http://www.epa.gov/ocfo/plan/plan.htm>) See page 40 (sub-objective 2.2.1—improve water quality on a watershed basis) for the strategic target to improve water quality in tribal waters. Specifically, the target states, "[b]y 2012, improve water quality in Indian country at not fewer than 50 baseline monitoring stations in tribal waters ... (cumulative) (i.e., show improvement in one or more

improvement in tribal waters (SP-14) (see references for more information about this strategic target). Monitoring efforts associated with a variety of objectives should support this measure. Developing data reports and/or water quality assessment reports based on your monitoring strategy will provide one mechanism for sharing information with EPA.

This document assumes familiarity with the terms and information in the Tribal 106 Guidance. This template is relevant for fundamental, intermediate, and mature programs regardless of your tribe's approach to implementing its water quality program (e.g., the nonregulatory, tribal law water quality protection, or EPA-approved water quality protection approaches described in the Tribal 106 Guidance).

This document has been reviewed and approved for publication by EPA. Mention of trade names or commercial products or services does not convey, and should not be interpreted as conveying, official EPA approval, endorsement, or recommendation. Any use of words such as "should" or "may" are not intended to be mandatory language, rather, these are statements of suggestion that a tribal program may or may not adopt depending upon available resources.

### **What is a monitoring strategy?**

A monitoring strategy is a long-term plan for meeting identified water resource objectives. The document describes current and future monitoring plans and incorporates a timeline for implementation, including milestones, to address needed enhancements. The monitoring strategy should be comprehensive in scope (i.e., serve all water quality management needs and address all tribal waters, including all waterbody types, e.g., streams, rivers, lakes, Great Lakes, reservoirs, estuaries, coastal areas, wetlands, and groundwater). The strategy should also identify the issues and needs that are currently impediments to an adequate monitoring program. Where possible, a monitoring strategy will document plans and needed resources for filling current gaps/weaknesses in your monitoring program. This document provides additional guidance on what should be included in a monitoring strategy.

### **How does a monitoring strategy differ from a Quality Assurance Project Plan or an annual work plan?**

While a monitoring strategy is long-term plan for meeting all water quality management needs, a quality assurance project plan (QAPP) documents the type and quality of data needed for specific environmental decisions/objectives. The QAPP describes why, where and how samples will be collected, how samples will be analyzed, the quality of data needed, how data will be evaluated and decisions that will be made based on the data. A monitoring strategy is required, but components of a monitoring strategy may be found in existing QAPPs. Tribes and regional staff may evaluate existing QAPPs and other programmatic documents to determine which monitoring strategy elements are/are not covered. Based on these evaluations, regions will

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of seven key parameters: dissolved oxygen, pH, water temperature, total nitrogen, total phosphorus, pathogen indicators, and turbidity). (2005 baseline: 185 monitoring stations on tribal waters located where water quality has been depressed and activities are underway or planned to improve water quality, out of an estimated 1,661 stations operated by tribes.)”

determine what additional information must be documented to meet the Tribal 106 Guidance monitoring strategy requirements.

An annual work plan is a more project specific document than a monitoring strategy. The work plan identifies activities your tribe will accomplish for a set period of time and for a set amount of money. A work plan includes activities related to managing the water program/grant, conducting public education/outreach, monitoring and assessment, and other topics. The monitoring and assessment component of your work plan will be linked to your monitoring strategy. It is important to note, however, the work plan will not necessarily include all of the plans/objectives identified in your strategy. A monitoring strategy describes activities and enhancements that will be incorporated into your program over a longer time period making it more comprehensive in scope than a work plan.

# Elements of a Monitoring Strategy

## I. Monitoring Program Strategy

**EPA and the tribe should be able to answer “yes” to each of the questions below for the strategy to be deemed acceptable.** In some cases, gaps or weaknesses may still exist; and if these gaps are identified in the strategy document, the strategy will still be evaluated as acceptable. Fundamental programs may also discuss with their regional office whether separate strategies for individual monitoring efforts should be considered.

Fundamental Programs	Intermediate/Mature Programs
<p>A. Does your monitoring strategy cover each of the Elements II-X below?</p> <p>B. Does your monitoring strategy include background information on tribal waters including extent of water resource (e.g. an atlas), condition (if known), other pertinent information to put monitoring program objectives in context, and amount of data currently available (e.g. number of years of data)?</p> <p>C. Does your monitoring strategy consider all waterbody types on the Reservation and make clear which type the tribe is focusing on, e.g., streams, rivers, lakes, ponds, springs, wetlands, Great Lakes, groundwater, Estuaries, reservoirs, coastal areas?</p> <p>D. Does your monitoring strategy consider resources needed to implement major priorities? Consider:</p> <ul style="list-style-type: none"> <li>- Training (e.g., training on data management, data analysis, or other)</li> <li>- Laboratory needs</li> <li>- Staffing needs (full- and part-time employees)</li> <li>- Equipment</li> </ul> <p>E. Does your strategy extend over a 2-5 year period?</p> <p>F. Does your strategy include a schedule, not to exceed ten years, for implementation of major priorities?</p> <p>Note: EPA recommends that fundamental programs give special attention to ensuring that data management, assessment methodologies, and reporting capabilities are developed during the first several years of program implementation.</p>	<p>A. Does your monitoring strategy cover each of the Elements II-X below?</p> <p>B. Does your monitoring strategy include background information on tribal waters including extent of water resource (e.g. an atlas), condition (if known), other pertinent information to put monitoring program objectives in context, and amount of data currently available (e.g., number of years of data)?</p> <p>C. Does your monitoring strategy consider all waterbody types on the Reservation, e.g., streams, rivers, lakes, ponds, springs, wetlands, Great Lakes, groundwater, estuaries, reservoirs, coastal areas? (All of these waterbodies do not have to be included in work/sampling plans, but the monitoring strategy should discuss interrelationship of these waterbodies and identify assessment goals for determining the condition of each waterbody type - may be a long range goal.)</p> <p>D. Does your monitoring strategy consider current and future monitoring needs (that is, does it plan for environmental information needs as your programs expand)? In addition to general resource needs, consider:</p> <ul style="list-style-type: none"> <li>- Research or pilot testing that might be needed to develop certain aspects of your program.</li> <li>- Training</li> <li>- Laboratory needs</li> <li>- FTE (staffing needs)</li> <li>- Equipment</li> </ul> <p>E. Does your strategy extend over a 5-10 year period?</p> <p>F. Does your strategy include a schedule, not to exceed ten years, for implementation (including plans to address gaps/weaknesses to achieve</p>

## II. Monitoring Objectives

Objectives should identify why data are needed and how data are used. Conducting monitoring to “collect data” is not an acceptable objective. An example of how tribes might consider documenting their objectives is included in Table 1 in Attachment A.

<b>Fundamental Programs</b>	<b>Intermediate/Mature Programs</b>
<p>A. Identify the current questions/objectives you are addressing that require water quality data. EPA recommends that fundamental programs consider actively working on objectives such as:</p> <ul style="list-style-type: none"> <li>– Watershed/reservation-wide assessments to assess condition and address other priority objectives (See list of objectives below. Although many of these objectives are relevant to intermediate and mature programs, fundamental programs <b>may choose</b> to identify them as long-term objectives. The strategy should include a timeframe for revisiting long-term objectives, if identified.)</li> <li>– Identification of waters needing restoration and those needing protection</li> <li>– Evaluation of restoration/protection projects at various scales (e.g., what water quality improvements occurred as a result of implementing a shoreline stabilization or a local ordinance)</li> </ul>	<p>Include “A” under Fundamental Programs and:</p> <ul style="list-style-type: none"> <li>B. Identify questions/objectives for which decision makers/programs will need information in the future (consider program growth, introduction of new programs, expansion to cover additional waterbody types).</li> <li>C. Prioritize monitoring objectives and/or programs (this should play into your schedule for making enhancements/improvements to the program over time).</li> <li>D. Identify the scale at which you need to answer each of the priority questions/address objectives (reservation-wide, watershed, waterbody specific).</li> </ul>

Example objectives may include:

- 100% assessment of waters on the reservation.
  - Establishment of a baseline of water quality condition for all waters for all pertinent uses over a set time frame (status)
  - Periodic Reassessment (trends)
- Development/refinement of designated uses (tiered)
- Refinement of water quality criteria
- Identification of waters needing restoration and those needing protection
- Identification of causes/sources (point and nonpoint)
- Development of restoration/protection plans
- Information for permitting (as needed)
- Evaluation of program/projects at various scales (e.g., what water quality improvements occurred as a result of implementing a shoreline stabilization or a local ordinance); this would also include evaluating locations for the tribal Water Quality Reporting measure in EPA’s Strategic Plan (SP-14).
- Emergency monitoring (fish kills, spills)



- Other

Additional details pertinent to your tribal program should be considered with each of the objectives (e.g., what trends are you tracking and why).

### III. Monitoring Design

Monitoring objectives outline what questions you are trying to answer with your monitoring program. The monitoring design lays out where, on the ground, you will actually collect your samples to meet your monitoring objectives. Designs can include:

- Census
- Probability-based
- Judgmental or targeted, including upstream/downstream designs
- Rotating basin
- Watershed
- Intensive
- Fixed station

For more information about these designs, please see the glossary (Attachment C) or page 4-15 of the Tribal 106 Guidance.

Fundamental Programs	Intermediate/Mature Programs
<p>A. Describe the monitoring programs and networks (e.g., other sources of information) used to meet each of your objectives (some designs will support more than one objective). Describe the designs and number of stations typically sampled each year.</p> <p>B. Identify which of your objectives are not yet met by identified designs or could use additional sites, different designs, greater frequency, etc. (e.g., what are the gaps/weaknesses in your current program for meeting your objectives?). For example:</p> <ul style="list-style-type: none"> <li>- Perhaps you cannot yet monitor all lakes or all wetlands.</li> <li>- Perhaps you are starting up a nonpoint source (NPS) implementation program and will need program designs to monitor the success of implementation projects.</li> </ul> <p>Note: Fundamental programs may choose to include possible designs for some important unmet needs as well.</p> <p>C. Describe how you allocate your resources (# stations, # times sampled) to meet objectives (see Table 2 in Attachment A for an example).</p>	<p>Include all items under Fundamental Programs; and</p> <ul style="list-style-type: none"> <li>- Consider all waterbody types when identifying designs under “A”; and</li> <li>- Describe designs that address gaps/weaknesses and include plans for implementing them (under “B”). (As noted under Element I, some waterbody types may not have such plans but should still be identified as gaps.)</li> </ul>



<p>D. Identify and describe other monitoring networks you use (e.g., universities, U.S. Geological Survey [USGS], states, watershed organizations and partners, other tribes) to help meet objectives. Describe the objectives they serve.</p>	
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#### IV. Core and Supplemental Water Quality Indicators

Now that your monitoring strategy has outlined the why and where of your monitoring program, this section deals with what environmental data (indicators) to collect at each site. An example format for summarizing this information is shown in Attachment A, Table 3.

<b>Fundamental Programs</b>	<b>Intermediate/Mature Programs</b>
<p>A. Identify which of the nine Tribal 106 Guidance parameters you are or will be testing for and identify at what waterbody types these parameters will be sampled (see page 4-11 in the Tribal 106 Guidance).</p> <p>B. Identify any additional core and supplemental indicators/parameters that are or will be used to achieve your objectives. (See chart on page 4-10 of Tribal 106 Guidance)</p> <p>C. Describe which indicators/parameters support each of your objectives.</p> <p>Note: Fundamental programs may choose to identify some indicators that need to be developed over time to meet priority objectives.</p>	<p>Include all items under Fundamental Programs; and</p> <p>D. Identify gaps in your current indicators/parameters and/or methods for supporting all current and future objectives including adding any of the remaining nine Tribal 106 Guidance parameters as your program advances. Consider ways to address these gaps.</p>

## V. Quality Assurance

Your monitoring strategy needs to outline the procedures that you will follow to ensure that your data are of sufficient quality to meet the objectives. Attachment A, Table 4 provides an example format for summarizing this information.

Fundamental Programs	Intermediate/Mature Programs
<p>A. Briefly describe the QAPPs that are in place for sampling projects (identify initial grant number, date approved, and how often the QAPP is updated).</p> <p>B. Identify the issues to be included in a quality assurance/quality control (QA/QC) review (see page 4-20 of the Tribal 106 Guidance).</p>	<p>Include “A” under Fundamental Programs and:</p> <p>C. Also consider describing Standard Operating Procedures (SOPs), plans for Quality Management Plans or other QA related issues such as training, lab QA processes, auditing procedures (internal or external) etc.</p> <p>D. Briefly describe the QA/QC process for reviewing field and laboratory data. Highlight any significant QC findings identified and discuss the corrective action(s) taken or planned.</p>

## VI. Data Management

Your strategy should describe how you will manage your data both within the tribal government and how these data will be submitted to EPA. Please see Attachment B for information about EPA’s current database—STORage and RETrieval (STORET)<sup>c</sup> and the Water Quality Exchange (WQX).

Fundamental Programs	Intermediate/Mature Programs
<p>A. Describe data management system(s) (spreadsheet, database, etc.) for various waterbody types and programs. Indicate how tribal program managers/staff have access to data.</p> <p>B. Describe data plans/schedule for assembling data in a STORET-compatible format and identify additional technical assistance that is needed.</p> <p>C. Identify the parameters for which data will be stored in STORET.</p>	<p>Include all items under Fundamental Programs; and</p> <ul style="list-style-type: none"> <li>– for “B”, consider including plans for moving data to the National STORET site via EPA’s web-based interface (in development, see Attachment B) – interim steps may include moving data to regional sites</li> </ul> <p>D. Describe how you store assessment data (whether water quality is good or poor, is meeting/not meeting uses, etc.) See EPA’s Assessment Database (ADB) Web site at <a href="http://www.epa.gov/waters/adb/">http://www.epa.gov/waters/adb/</a> or <a href="http://www.epa.gov/owow/tmdl/2006IRG/report/2006irg-appendix.pdf">http://www.epa.gov/owow/tmdl/2006IRG/report/2006irg-appendix.pdf</a>, page A-8, for information on possible data elements you may wish to include in your storage system.)</p>

<sup>c</sup> “STORET” refers to EPA’s STORage and RETrieval Data Warehouse, a repository for water quality, biological, and physical data on surface water and ground water collected by federal, state, and local agencies, tribes, volunteer groups, academics, and others. A new framework for data submission, called Water Quality Exchange (WQX), facilitates water quality data submission and exchange between EPA and its data partners. For more information about STORET/WQX, please visit <http://www.epa.gov/storet/>.

	<p>E. Describe the scale/resolution of mapping you use. For example:</p> <ul style="list-style-type: none"> <li>– National Hydrography Dataset (NHD), 1:100,000</li> <li>– NHD, 1:24,000</li> <li>– Other</li> </ul> <p>F. Describe how your data and assessment results are geo-referenced and the program’s existing geographic information system (GIS) capabilities. If you do not yet geo-reference your data, provide plans for moving toward this capability (including training and equipment needs).</p> <p>G. Describe whether and how you store/access land use data or other geo-spatial data such as aerial photography.</p>
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## VII. Data Analysis/Assessment

Once data have been collected in the field and have returned from the lab, the raw data need to be analyzed and interpreted to assess water quality conditions. Your monitoring strategy should describe the general procedures used to assess data. Please note, EPA is developing supplements on developing a water quality assessment and reporting data.

Fundamental Programs	Intermediate/Mature Programs
<p>A. Describe how/if assessments are done. If you do not yet interpret your data, provide details on your plans/resource needs to conduct assessments. Keep in mind analyses needed to address EPA Strategic Plan measures.</p> <p>B. Identify other sources of information you use in data analysis.</p> <p>C. Describe gaps in your analytical capabilities/methodologies (insufficient information, training needs, etc.) Consider ways to address these.</p> <p>Note: Fundamental programs may choose to describe training needs related to data analysis and assessment (“F” under Intermediate/Mature Programs).</p>	<p>Include all items under Fundamental Programs; and</p> <p>D. Describe other data analysis processes you use for addressing objectives (trend analysis, etc.). Describe the databases/software used to complete these analyses.</p> <p>E. If the tribe has a methodology for assessing attainment of water quality standards based on analysis of various types of data (chemical, physical, biological, land use) from various sources, it should be documented for all waterbody types. If the tribe intends to assess EPA-approved or tribal water quality standards, describe plans for developing an assessment methodology. The methodology includes criteria for compiling, analyzing, and integrating all readily available and existing information (e.g., USGS data, volunteer monitoring data, discharge monitoring reports).</p> <p>F. Describe any training needs you have related to data analysis.</p>

## VIII. Reporting

The monitoring strategy should describe how the products of your data analysis will make its way to those who are interested in the results, such as the Tribal Council, the general public and EPA. An example format for summarizing information pertaining to your reports is provided in Attachment A, Table 5. EPA has developed additional information/guidance on data assessment and reporting to meet the water quality assessment component of the tribal Assessment Reports<sup>d</sup>.

Fundamental Programs	Intermediate/Mature Programs
<p>A. Describe all major reports and products the tribe produces using water quality information. Be sure to relate back to overall objectives and consider reporting needed to address EPA Strategic Plan measures (e.g., if you have Stations identified in the baseline for the tribal Water Quality Reporting measure in EPA’s Strategic Plan (SP-14)).</p>	<p>Include “A” under Fundamental Programs; and</p> <p>B. Describe plans for ensuring that decision-makers receive information in a timely manner. Describe how monitoring results are communicated to Tribal Council.</p> <p>C. Identify gaps that exist and ways to address them.</p>

## IX. Programmatic Evaluation

Your strategy should also include a process for looking at your monitoring program to see how things are going and how to continue to improve it. An example description is provided in Attachment A.

Fundamental Programs	Intermediate/Mature Programs
<p>A. Describe the process you use to annually review your monitoring program. This may be met by existing discussions held with your EPA regional office.</p>	<p>Include “A” under Fundamental Programs, and:</p> <p>B. Describe the internal process you use to systematically and regularly look at your monitoring to see if it is providing the answers to support your needs, goals, and objectives, including addressing program enhancements such as expanding to new waterbody types, introducing new indicators, etc.</p> <ul style="list-style-type: none"> <li>– EPA recommends an annual review and a more comprehensive review every five years.</li> </ul>

## X. General Support and Infrastructure

The strategy should lay out what resources you currently put into monitoring and those you need to address all of the objectives that your tribe has to manage its water resources.

<sup>d</sup> U.S. EPA Tribal Monitoring Strategy and Assessment Workgroup. 2008. *Data Assessment and Reporting: Supplement to the Clean Water Act Section 106 Tribal Guidance*.

<b>Fundamental Programs</b>	<b>Intermediate/Mature Programs</b>
<p>A. Describe the resources of your current program.</p> <p>B. Consider resources that are needed for major priorities or next steps in your program.</p> <p>Categories you should consider for “A” and “B” include:</p> <ul style="list-style-type: none"> <li>- Staffing</li> <li>- Training</li> <li>- Equipment</li> <li>- Lab resources, etc.</li> </ul>	<p>Include “A” under Fundamental Programs, and:</p> <p>C. Consider the resources that are needed for additional important aspects of your program that are not yet being implemented. Again, consider:</p> <ul style="list-style-type: none"> <li>- Staffing (full- and part-time employees)</li> <li>- Training</li> <li>- Equipment</li> <li>- Lab resources</li> <li>- Other, as appropriate</li> </ul> <p>Some questions that might be helpful in thinking about resource needs include:</p> <ul style="list-style-type: none"> <li>- Does the tribe currently have the right expertise to implement priorities? If not, describe what additional expertise is needed (e.g., wetland biologist, data analyst, etc.).</li> <li>- Is appropriate training available to personnel to develop and enhance skills as needed? Describe. What else is needed?</li> <li>- Are laboratory resources sufficient to support the monitoring program (whether tribal labs or contract labs)? What would be needed if the program was expanded to address gaps/weaknesses (e.g., estimate of lab costs to implement wetlands program)?</li> </ul>

## ATTACHMENT A: Examples for Presenting Information for Selected Elements

Note: Examples provided for Elements II, III, IV, V, VIII, and IX only

### II. Monitoring Objectives

**Example:** Table 1 outlines a few monitoring objectives relevant to fundamental and more advanced tribal programs. The program area column highlights the monitoring program area. The objective on the right captures the specific question or objective the program is intended to address. Tribes may use this or another format to help present monitoring objectives.

<b>Program Area</b>	<b>Objectives (examples)</b>
Overall Water Quality Program	<ol style="list-style-type: none"> <li>1. Assess whether water quality criteria are being met and beneficial uses are being supported for waterbodies across the reservation (Overall Water Quality).</li> <li>2. Establish a baseline of water quality condition for all waters for all pertinent uses over a set time frame.</li> <li>3. Periodically reassess the baseline water quality to look for changes (Status and Trends).</li> </ol>
Nonpoint Source (NPS) Program	<ol style="list-style-type: none"> <li>1. Identify waters needing restoration.</li> <li>2. Determine the effectiveness of individual NPS projects in meeting water quality criteria and supporting beneficial uses.</li> <li>3. Evaluate cumulative watershed impacts from best management practice (BMP) installation.</li> </ol>
Water Quality Standards	<ol style="list-style-type: none"> <li>1. Identify the reference condition for streams to use in the development of biological criteria.</li> <li>2. Develop and refine water quality standards.</li> </ol>
Wetlands	<ol style="list-style-type: none"> <li>1. Develop indicators and assess beneficial use attainment.</li> </ol>

### III. Monitoring Design

**Example:** Table 2 describes the details of how each program/objective is implemented. The design column refers to the examples listed above such as targeted, probabilistic, etc. The number of sites and sampling frequency summarize the information by year. “Resources” captures the staff time required to conduct the monitoring and the last column provides a brief description of the program. This type of summary table can accompany more detailed narrative information about each monitoring design.

<b>Table 2. Summary of various monitoring activities and their design</b>					
<b>Example</b>					
<b>Program Area</b>	<b>Design</b>	<b># Sites</b>	<b>Frequency</b>	<b>Resources</b>	<b>Program Description</b>
<b>Ongoing Ambient Program</b>					
Overall Water Quality	Rotating basin with intensive targeted sites.	15	Quarterly Sampling	2 FTE for 3 months	2001 – Big Muddy 2002 – James 2003 – Clear Creek 2004 – Maple River To be resumed in 2005 following the same rotation
Water Quality Status & Trends	Fixed station network of integrator sites.	10	Annually	2 FTE for 1 month	Begun in 2000. Located at the mouth of main tributaries and where the streams flow into and off the Reservation. Long-term sites for trends.
NPS Effectiveness Monitoring	Targeted design upstream/ downstream of NPS projects	6 sites/ 3 projects	Monthly sampling during the summer	1 FTE	NPS sampling targets sites above and below BMP implementation projects. Sampling for each project covers a 2-4 year timeframe.
Reference Sites	Full program To Be Developed				



## IV. Core and Supplemental Water Quality Indicators

**Example:** Table 3 provides an example format for summarizing the core and supplemental indicators/parameters collected as part of each monitoring program. Modify this list to reflect the current indicators used by your program. You may choose to substitute a table(s) from other documents (e.g., quality assurance project plans [QAPPs] or sampling and analysis plans) and add information on analytical methods, reporting limits, etc. See also page 4-9 of the Tribal 106 Guidance for an example of how the Gila River Indian Community in central Arizona documented the relationship between their goals, sub-goals, and water quality indicators, as well as how they tracked their indicators.

<b>Water Resource Type and/or CWA Program Area</b>	<b>Dissolved Oxygen</b>	<b>Water Temperature</b>	<b>Conductivity</b>	<b>pH</b>	<b>Turbidity</b>	<b>Nutrients (TP/ TN)</b>	<b>Physical habitat</b>	<b>Macroinvertebrates</b>	<b>Pathogens</b>	<b>Other (please specify)</b>
Overall Water Quality (Rotating Basin Sites)	X	X		X	X	X				
Water Quality Status & Trends (Fixed Station Network)	X	X	X	X	X	X		X		
NPS Effectiveness Monitoring	X		X	X	X	X		X		
Reference Site Sampling (Wadeable Streams)	TBD									

## V. Quality Assurance

**Example:** Since you probably have various quality assurance/quality control (QA/QC) documents, a simple way to display that information is to summarize it in tabular format. Table 4 lists the range of QAPPs and standard operating procedures (SOPs) that the tribe has developed. Including the date of the document shows when the information was updated and when EPA approval was received.

<b>Type</b>	<b>Title and Grant Number</b>	<b>Completion Date</b>	<b>EPA Approval/Date</b>
QAPP	Sampling and Water Quality Assessment of Streams & Rivers (updated earlier QAPP); add grant #	6/1/2005	Yes – 8/1/2005
QAPP	Sampling and Water Quality Assessment of Streams & Rivers; add grant #	2/1/2002	Yes – 3/1/2002

QA Report	A Summary of QA/QC Findings for 2005 Sampling Results; add grant #	12/1/2005	N/A
SOP	Field Procedures Manual; add grant #	5/1/2004	Yes – 6/15/2004

## VIII. Reporting

**Example:** Table 5 provides an example template to record the various reports and documents that you prepare. Include reports submitted to EPA, Tribal Council, or the general public.

<b>Table 5. Tribal Reports</b>			
<b>Example</b>			
<b>Report</b>	<b>Timeframe</b>	<b>Entities receiving copies of the report</b>	<b>Comments</b>
Data Report	Annual		Report summarizes results from data collection efforts, identifies waters needing restoration, and highlights data gaps.
NPS Assessment Report	Completed on Date		
NPS Annual Summary	Completed on Date		
Tribal Water Quality Assessment Report	As negotiated with your Regional office.		Serves as the primary assessment of water quality conditions on the Reservation

## IX. Programmatic Evaluation

**Example:** An example of a general evaluation process between the tribe and EPA is provided below.

*A primary need identified through development of the monitoring strategy is the need for a more comprehensive annual process for reviewing existing monitoring programs. This process should address programmatic coordination and evaluate the effectiveness of monitoring and assessment programs. Each program would evaluate its data needs and identify gaps and priorities that may be changing due to resource limitations, new and emerging issues and changing program objectives. This should be part of a continuous improvement feedback loop.*

*An annual review and update of the monitoring strategy between (identify appropriate) tribal and regional EPA staff have been identified as important to implementing the strategy. Specific areas of focus will be selected annually based on priorities outlined in the strategy.*

## **ATTACHMENT B: EPA's STORET/WQX System Support**

**Note:** An additional supplemental document such as this one has been developed called *Data Management: Supplement to the Clean Water Act Section 106 Tribal Guidance* that specifically discusses performing data management for data submission in a STORET-compatible format.

**STORET and WQX:** EPA maintains a database that contains water quality information for the nation's waters. The database, known as STORET, contains data collected since 1999, along with older data that have been properly documented and migrated. STORET contains raw biological, chemical, and physical data on surface water and ground water collected by federal, state, and local agencies, tribes, volunteer groups, academics, and others. As noted in U.S. EPA's recently released *Final Guidance on Awards of Grants to Indian Tribes under Section 106 of the Clean Water Act*, tribes will be required to submit electronic reports of certain data elements discussed in the guidance to EPA in a STORET-compatible format.

The Water Quality Exchange, or WQX, facilitates water quality data submission and exchange between EPA and its data partners. WQX consists of standard data formats for sharing data with EPA, a centralized national database, and enhancement of the existing STORET/WQX Data Warehouse. As a part of this new system for data sharing, U.S. EPA has developed a number of tools and services to facilitate its use.

Additional information on STORET/WQX can be found at <http://www.epa.gov/storet>.

**Supporting Tribal Data Management and Data Transfer:** EPA will support data management and exchange activities for the tribes through a series of tools and methods. EPA will provide web-based tools to administer the data sharing process rather than requiring tribes to run local copies of STORET. These tools will accept the submission of files generated by tribal data systems and assist with any rule checking or translation issues. EPA will provide training on how to use these web tools so that tribes can submit files on their own without extra assistance. EPA will also provide phone and email technical support to answer any questions on the process for submitting data or use of the web tools.

Submitting data to EPA's STORET/WQX system works most efficiently after formal training on basic data management principles and common practices of data standardization and sharing goals. EPA will provide training to the tribes on how best to manage data generated from field measurements or results analyzed by laboratories. EPA will also provide documentation and guidance on how to best conform to the rules to submit data to STORET/WQX along with "templates" to be used to learn how data should be structured. EPA encourages tribes to seek out their own data management solution that best meets their needs, while also striving to match the minimum standards set by STORET/WQX. Once tribal data systems are properly set up, submitting data to STORET/WQX should become routine.

**Templates:** A template for submitting data is currently available (see [http://www.epa.gov/storet/national\\_websim.html](http://www.epa.gov/storet/national_websim.html)). Work is underway on biological and habitat templates.

## ATTACHMENT C: Glossary

**Assessment database (ADB)** – EPA’s ADB is a relational database application for tracking water quality assessment data, including use attainment, and causes and sources of impairment. (For more information, please visit <http://www.epa.gov/waters/adb/> or <http://www.epa.gov/owow/tmdl/2006IRG/report/2006irg-appendix.pdf>, page A-8.)

**Assessment methodology** – An assessment methodology includes criteria for compiling, analyzing, and integrating all readily available and existing water quality information (e.g., USGS data, volunteer monitoring data, discharge monitoring reports). The term is often used in reference to the assessment of water quality data based on water quality standards, but it can be applied to other assessment processes.

**Best management practices (BMPs)** – Best management practices are effective and practical methods used for preventing or reducing pollution from nonpoint sources. A related term is “management measures”, which refer to a group of cost-effective practices implemented cooperatively to achieve more comprehensive goals, such as reducing the load of sediment from a field to a receiving waterbody. (For more information, please see example photographs of BMPs available at <http://www.epa.gov/owow/nps/ex-bmps.html>. The Center for Watershed Protection Web site at [http://www.cwp.org/stormwater\\_mgt.htm](http://www.cwp.org/stormwater_mgt.htm) also has information about stormwater BMPs.)

**Census** (monitoring design) – This monitoring design approach involves monitoring every waterbody on a reservation (see also page 4-15 of the Tribal 106 Guidance at <http://www.epa.gov/owm/cwfinance/final-tribal-guidance.pdf>).

**Core water quality indicators** – Core indicators provide basic information about the aquatic environment (Tribal 106 Guidance, page 4-10; see also list of recommended core indicators in table on page 4-10 of the guidance).

**Designated use** – A designated use is a classification specified in water quality standards for each waterbody or segment describing the level of protection from perturbation afforded by the regulatory programs. The designated aquatic life uses established by the state or authorized tribes set forth the goals for restoration and/or baseline conditions for maintenance and prevention from future degradation of the aquatic life in specific waterbodies (see <http://www.epa.gov/waterscience/biocriteria/glossary.html>).

**Elements** (of a monitoring and assessment program) – The ten basic elements of a water monitoring program as described in the Tribal 106 Guidance (page 4-3) include the following:

1. monitoring program strategy
2. monitoring objectives
3. monitoring design
4. core and supplemental water quality indicators
5. quality assurance
6. data management

7. data analysis and assessment
8. reporting
9. programmatic evaluation
10. general support and infrastructure planning

**Fixed station** (monitoring design) – Fixed station networks monitor the same sites over a long period of time. These are often used to establish long-term trends in water quality at these sites.

**Full-time equivalent (FTE)** – This term is used to determine the number of full-time employees available to work on various projects within an organization, and institutions have varying definitions for this term.

**Fundamental programs** – Fundamental program activities establish the foundation for a successful tribal water quality program and help you identify water quality goals and objectives for your program (Tribal 106 Guidance, page 1-6).

**Geo-referencing** – Geo-referencing describes the process of locating an entity in ‘real world’ coordinates. For example, you would geo-reference your house by determining its latitude and longitude coordinates. Geo-referencing has become more prominent in recent years due to the increasing availability of Geographic Information System (GIS) tools designed to facilitate this process. The Reach Indexing Tool (RIT) is an example of such a tool. It is designed to facilitate the location and identification of surface water entities, which have associated attribute data stored in a database, and to geo-reference them to EPA’s National Hydrography Dataset (NHD). For more information, please visit <http://www.epa.gov/owow/monitoring/georef/>.

**Goals** – The desired outcomes for your water quality program, which are based on your water quality needs (Tribal 106 Guidance, page 3-12).

**Integrator sites** – Stream sampling sites located down-stream of drainage basins that are large and complex and often contain multiple environmental settings. Most integrator sites are on major streams with drainage basins that include a substantial portion of the study area of interest.

**Intensive** (monitoring design) – Intensive survey designs incorporate a large number of sites in an area (e.g., a watershed) for a specified period. This design may take the form of an intensive basin/watershed survey or a site-specific study.

**Intermediate programs**– Intermediate water quality program activities build the tribal water quality program and advance the program to meet its water quality goals and objectives (Tribal 106 Guidance, page 1-6).

**Judgmental or targeted** (monitoring design) – Judgmental or targeted monitoring designs are based on land use, geological setting, and other natural and human influences (page 6 of *Elements of a State Water Monitoring and Assessment Program* (U.S. EPA 2003) available at <http://www.epa.gov/owow/monitoring/elements/>).

**Mature programs** – Mature water quality program activities enable tribes to achieve the goals and objectives of their programs as well as develop new water quality goals and objectives (Tribal 106 Guidance, page 1-6).

**Monitoring strategy** – A long-term monitoring strategy serves as the foundation for a monitoring program and addresses how the program will meet water management needs (see page 4-1 of the Tribal 106 Guidance for more information).

**National Hydrography Dataset (NHD)** – The NHD is a comprehensive set of digital spatial data that contains information about surface water features such as lakes, ponds, streams, rivers, springs and wells. Within the NHD, surface water features are combined to form “reaches”, which provide the framework for linking water-related data to the NHD surface water drainage network. These linkages enable the analysis and display of these water-related data in upstream and downstream order. (For more information, please visit <http://nhd.usgs.gov/>.)

**Nonpoint source (NPS)** – Nonpoint sources are diffuse pollution sources (i.e., without a single point of origin or not introduced into a receiving stream from a specific outlet). NPS pollution occurs when rainfall, snowmelt, or irrigation runs over land or through the ground, picks up pollutants, and deposits them into rivers, lakes, and coastal waters or introduces them into ground water. Common nonpoint sources are agriculture, forestry, urban, mining, construction, dams, channels, land disposal, saltwater intrusion, and city streets. (Source: <http://www.epa.gov/trs> and <http://www.epa.gov/waterscience/biocriteria/glossary.html>.)

**Objectives** – The activities you take to achieve your water quality goals (see page 3-12 of the Tribal 106 Guidance).

**Parameters** (see page 4-11 of the Tribal 106) – The nine parameters in the guidance are classified as fundamental, intermediate, or mature based on the level of complexity required by the monitoring and reporting activities associated with that parameter. The nine parameters include:

Fundamental reporting parameters:

1. dissolved oxygen
2. pH
3. water temperature
4. turbidity

Intermediate reporting parameters:

5. phosphorus
6. total nitrogen

Mature reporting parameters:

7. macroinvertebrates
8. *E. coli* or enterococci
9. basic habitat information

**Point source** – A point source refers to any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure,



container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. (Source: <http://www.epa.gov/trs/>.)

**Probability-based** (monitoring design) – A probability-based monitoring design (or statistically valid survey) is based on some form of random selection of sites or sampling locations. This approach eliminates the potential for sampling bias toward waters with known problems. A probability-based design allows the extrapolation from a relatively small sample of monitored sites to the entire population of water body types covered by the design. (For more information, see page 4-15 of the Tribal 106 Guidance.)

**Quality Assurance Project Plan (QAPP)** – A QAPP is a written document that outlines procedures that a monitoring project will use to ensure that the samples collected and analyzed, the data stored and managed, and the reports produced are of sufficient quality to meet project needs. The QAPP documents the technical and quality aspects of a project (monitoring, detection limits, analytical methods, data management and analysis, reporting) and provides a blueprint for obtaining the type and quality of environmental and information needed (For more information, see page 4-4 of the Tribal 106 Guidance or visit EPA’s terminology reference system at <http://www.epa.gov/trs/>).

**Quality assurance/quality control (QA/QC)** – QA/QC refers to a system of procedures, checks, audits, and corrective actions to ensure that all technical, operational, monitoring, and reporting activities are of the highest achievable quality (<http://www.epa.gov/trs/>). QA is a management or oversight function; it deals with setting policy and running an administrative system of management controls that cover planning, implementation, and review of data collection activities and the use of data in decision making. QC is a technical function that includes all the scientific precautions, such as calibrations and duplications, needed to acquire data of known and adequate quality. (For more information, see page 4-4 of the Tribal 106 Guidance or visit <http://www.epa.gov/quality/>).

**Quality management plans** – A quality management plan documents how an organization will plan, implement, and assess the effectiveness of its quality assurance and quality control operations. Specifically, it describes how an organization structures its quality system, the quality policies and procedures, areas of application, and roles, responsibilities, and authorities. (For more information, please visit <http://www.epa.gov/quality/qmps.html>.)

**Rotating basin** (monitoring design) – A rotating basin monitoring design targets certain basins within a state or region for intensive and/or probability-based monitoring. The basins change each year so that over a period of time (typically five years), the entire state or region is monitored.

**STORET** (STORage and RETrieval data system) – STORET is a repository for water quality, biological, and physical data and is used by state environmental agencies, EPA and other federal agencies, tribes, universities, private citizens, and many others. (For more information, please visit <http://www.epa.gov/storet/>.)

**Strategic plan measures** – EPA’s 2006-2011 strategic plan describes the programmatic and quantitative measures for improving water quality nationwide and sets long-term goals for the next five years (see page 1-4 of the Tribal 106 Guidance). The measures include strategic targets that U.S. EPA uses to track progress quantitatively. (The plan is available online at <http://www.epa.gov/ocfo/plan/plan.htm>.)

**Supplemental water quality indicators** – Supplemental indicators provide specific or additional information (to supplement core indicators) and can be used to support a special study or screen for a potential pollutant. (For more information, including a list of recommended supplemental indicators, see page 4-10 of the Tribal 106 Guidance.)

**Water quality criteria** – Water quality criteria are adopted by states and authorized tribes to protect designated uses (numeric pollutant concentrations and narrative requirements). Section 304(a)(1) of the CWA requires EPA to develop criteria for water quality that accurately reflects the latest scientific knowledge. These criteria are based solely on data and scientific judgments on pollutant concentrations and environmental or human health effects. Section 304(a) also provides guidance to states and tribes in adopting water quality standards. Criteria are developed for the protection of aquatic life as well as for human health. (For more information, please visit <http://www.epa.gov/waterscience/criteria/>.)

**Water quality exchange (WQX)** –EPA is working on improvements to the STORET database through the development of WQX. WQX will facilitate water quality data submission and exchange between EPA and its data partners. WQX consists of standard data formats for sharing data with EPA, a centralized national database, and enhancement of the existing STORET/WQX data warehouse. (For more information, please see Attachment B and visit [http://www.epa.gov/storet/future\\_storet.html](http://www.epa.gov/storet/future_storet.html).)

**Water quality indicators** – Water quality indicators are measurements that you can use to assess the quality of a water body and that can be compared over time. The indicators can measure the physical (e.g., temperature), chemical (e.g., phosphorus, nitrogen), or biological (macroinvertebrates, bacteria) characteristics of waterbodies. (For more information, see page 4-1 of the Tribal 106 Guidance.)

**Water quality standards** – Water quality standards are the foundation of the water quality-based pollution control program mandated by the Clean Water Act. Water quality standards define the goals for a waterbody by designating its uses, setting criteria, to protect those uses, and establishing provisions to protect waterbodies from pollutants. A water quality standard consists of four basic elements:

1. designated uses of the water body (e.g., recreation, water supply, aquatic life, agriculture),
2. water quality criteria to protect designated uses (numeric pollutant concentrations and narrative requirements),
3. an antidegradation policy to maintain and protect existing uses and high quality waters, and

4. general policies addressing implementation issues (e.g., low flows, variances, mixing zones).

**Watershed** (monitoring design) – A special intensive design where sites are selected specifically to evaluate watershed-wide water quality objectives.