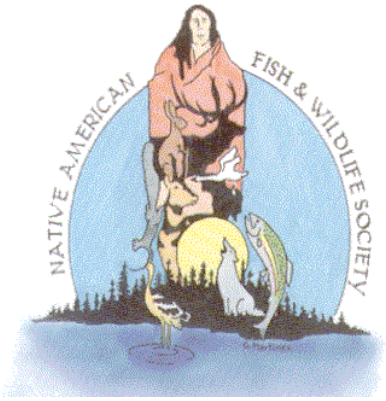

Guide for Alaskan Tribal Quality Assurance Project Plans for Water Quality Monitoring

Water Quality and Aquatic Environment Monitoring Project
Native American Fish and Wildlife Society - Alaska Region

131 W 6th Suite 3.
Anchorage, AK. 99501
Ph: (907) 222-6002
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Guide for Alaskan Tribal QAPP Template

Limited Scope

One extremely important component of planning water quality monitoring efforts is to refine the scope and objectives of the research to be able to answer the specific questions posed. There are many factors that will affect what your Tribal Council or Inter-Tribal Watershed Council's data objectives are. The following attempts to gather necessary knowledge to guide the development of your QAPP. While many monitoring needs are broad and ecosystem wide, a QAPP refines the scope to an easily definable focus. Your Tribe may be interested in conducting assessment work in a wide range of areas but your QAPP must be quite focused. Remember that data itself has no value without application to management. This focus is needed for two reasons:

1.) Limitations of funding and staff time.
2.) Necessity of limited research scope to ensure useful management data.

Categorical Limitations

Another important component is the overall scope of the QAPP template developed by Native American Fish and Wildlife Society (Society) and others. This template has SOP's for fresh water monitoring including major rivers, wadable streams, lakes, wetlands, traditional drinking water, and residential drinking water. While the Society can provide assistance with QAPP's for salt water, soils, plants, and fish and animal tissue, the Water Quality and Aquatic Environment Monitoring Project (WQAEMP) training and this template do not meet those needs. Additionally, we strongly suggest working with relevant state, federal and Tribal staff to refine your scope.

Confidentiality and Traditional Knowledge

Please note that the information you present here may need to be kept confidential. In this case the Society and contracted instructors will help your tribe with the QAPP but will not share your details with the class as a whole, nor retain a copy of your QAPP unless authorized by your Tribal Council. However, in order to assist with quality assurance and quality control the Society and/or contracted instructors will need a copy of your QAPP. Also EPA and DEC will need a copy for review in order to approve it. No one involved in the workshop has a regulatory responsibility, meaning that we can provide support without posing a risk to Tribal sovereignty and confidential traditional knowledge.

This process is to help your community develop a QAPP and will not be used for other purposes unless permitted by your Tribal Council.

Traditional Knowledge is an important component that should be utilized to generate better management information. In the process of learning about QAPP's don't forget to integrate the unique experiences and knowledge that your community brings to these efforts.

A note on contributors:

The Citizens' Environmental Monitoring Program (CEMP) Partnership of the Cook Inlet Watershed were instrumental in the development of the QAPP template. While NAFWS has no formal agreement or partnership with these groups, we do share the need to make the QAPP

process attainable for Alaskans to gather court-defensible and government fundable research to protect subsistence resources. Our combination of efforts has resulted in a relatively comprehensive list of SOP's that serve both organizations' constituents well. As an organization whose' interest is in providing technical support in natural resource and environmental management for Tribes we make no alliances with interest groups but do share technical resources to better serve our constituents.

A1. Title and Approval Page

List who should get copies of your QAPP, these would be agencies who you will be reporting to, and who would be support or a resource to your project.

Example:

Name: Chris Pace
Title: Quality Assurance Officer
Project:
Organization: U.S. EPA, Region 10

Signature:_____ Date: _____

Name: Greg Kellogg

Signature:_____ Date: _____

Name: Joel Cooper
Title: Project Manager
Project: Cook Inlet Watershed Health Project
Title: Quality Assurance Officer
Project: Cook Inlet Water Quality and Aquaitic Environment Monitoring Project
Organization: Cook Inlet Keeper

Signature:_____ Date: _____

Name: Dan Bogan
Title: Quality Assurance Officer
Project: Alaska Biological Monitoring and Assessment Program
Organization: University of Alaska Anchorage
Environment and Natural Resources Institute

Signature:_____ Date: _____

Name: Ray Rolonde
Title: Technical Advisor
Project: Marine Advisory Program
Organization: University of Alaska Fairbanks
Signature:_____ Date: _____

Title: Project Officer
Project: USEPA Region 10 - Alaska Operations Office
Organization: U.S. EPA, Region 10

Signature:_____ Date: _____

Name: Joyce Beelman
Title: State Water Quality Assurance Officer
Project: Air and Water Data and Monitoring Program
Organization: Division of Air and Water Quality
Alaska Department of Environmental Conservation

Signature:_____ Date: _____

Name: Karen E. Stickman
Title: Project Coordinator
Project: Water Quality and Aquatic Environment Monitoring Project
Organization: Native American Fish and Wildlife Society

A2. Table of Contents

A3. Distribution List

This list includes the names and addresses of those who receive copies of this approved QAPP and subsequent revisions. It is not the list of those who receive data reports.

EXAMPLE:

Official copies of this QAPP and accompanying documents and any subsequent revisions will be provided to:

U.S. Environmental Protection Agency

Name:	Chris Pace	
Title:	Quality Assurance Officer	
Organization:	U.S. EPA, Region 10	206-553-1792
Name:	Greg Kellogg	
Title:		
Organization:	USEPA Region 10 - Alaska Operations Office	907-271-6328

Alaska Department of Environmental Conservation

Name:	Joyce Beelman	
Title:	State Water Quality Assurance Officer	
Project:	Air and Water Data and Monitoring Program	
Organization:	Division of Air and Water Quality	
	Alaska Department of Environmental Conservation	907-451-2141

University of Alaska, Anchorage

Name:	Dan Renella	
Title:	Quality Assurance Officer	
Project:	Alaska Biological Monitoring and Assessment Program	
Organization:	University of Alaska Anchorage	
	Environment and Natural Resources Institute	907-257-2734

A4. Project/Task Organization

How much staff time can your council commit to this monitoring effort per year with existing programs? Who is available in your community that can serve on the committee or have a role on your staff. Elders can take part by offering advice on their observations over the years. High School students can serve as volunteer interns for educational purposes. Identify other resources in your area, are there other research projects or trained scientists (such as Park service or FRI etc.) that you can utilize.

What future funding services may be sought to support your program, and how may they limit or expand the scope of your project?

Identify your technical and administrative resources and find out who will be able to provide support on your QAPP team.

a. Create a flow chart for your QAPP team
b. Detail the responsibilities of each team member
c. Problem Identification / Background

Title	Name	Organization	Responsibility
Project Manager			
QA Officer			
QA Officer			
Field and Lab Leader			

List any other resource people or agencies that may participate in your QA team.

EXAMPLE #1 from KWF

Project Task Organization

Key Contacts and Responsibilities

Robert Ruffner - Kenai Watershed Forum - Project Manager- Oversees the water quality monitoring efforts and projects conducted by the Kenai Watershed Forum. Provides and / or ensures adequate training is completed for each of the team members conducting water quality monitoring throughout the project. Has completed training in each of the monitoring elements outlined in the plan.

Ole Andersson - Kenai Watershed Forum- Project Quality Assurance Officer - Supervises and trains water quality monitors and other volunteers. Completed phase V training with the Cook Inlet Keepers CEMP program. Trained in the deployment and retrieval of SPMD's and LDPE's,

Agency Baseline Sampling protocols, YSI and Hydrolab meters. Responsible for overall supervision of quality assurance and data entry.

Mike Pollen **-** President of Northern Testing Laboratory **(NTL) -** Subcontractor for Kenai River Water Quality Assessment element of the project. Provides training of Agency Staff for data collection and oversee all analysis of work to be performed at NTL laboratory. This contract will be used to ensure proper sampling of 20 Kenai River Watershed sites and analysis of water quality beyond the capacity of the Soldotna wastewater treatment plant.

Dr. Jeep Rice **-** Auke Bay Laboratory - Subcontractor for Semipermiable Polymeric Membrane Device work. Jeep or Auke Bay staff will periodically be on site during deployment and retrieval of SPMD's in the Kenai River Watershed. Will oversee all analysis of SPMD's to be performed at the Auke Bay.

Rick Wood –City of Soldotna wastewater treatment operator plays a significant role in the Kenai River Water Quality Assessment. Will perform and work cooperatively with the project QA officer for a variety of water quality analysis as a partnership between the City of Soldotna's and the Kenai Watershed Forum.

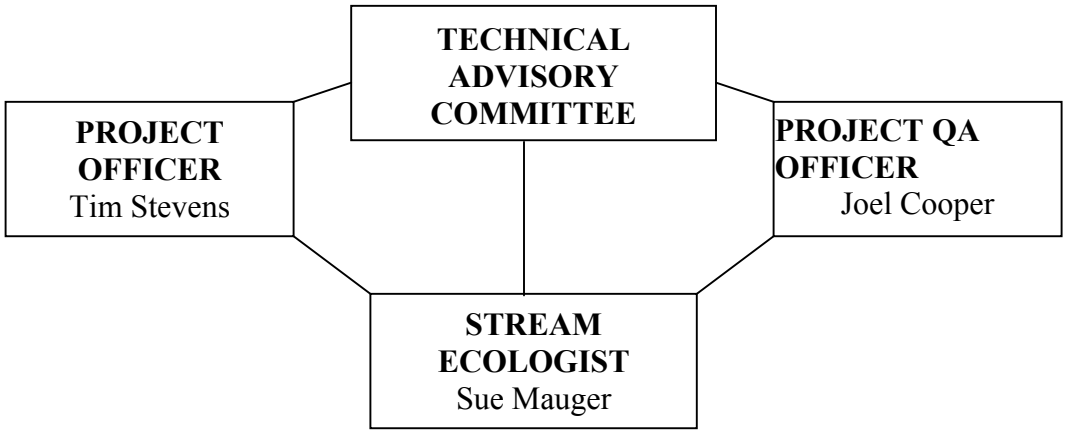
Kelly Shea **-** Kenai Watershed Forum has signatory authority for the Kenai Watershed Forum in the absence of Robert Ruffner.

Technical Advisory Committee – The technical advisory committee will review results obtained from the monitoring effort on an annual basis. The committee may at any time ask for additional information on any aspect of the project. If monitoring data raises a particular concern, the advisory committee will be ask to suggest and review any changes to the monitoring plan. KWF will not be bound to implement any changes, but will give serious consideration to their input and will follow the committee's wishes if feasible.

Example #2 from LKPWHP

PROJECT / TASK ORGANIZATION

Figure F-1 ORGANIZATIONAL CHART



Responsibilities

Tim Stevens, Project Officer, ADEC
Responsible for overall project management and grant implementation.

Joel Cooper, Project QA Officer, Cook Inlet Keeper
Responsible for technical support and overall quality assurance.

Sue Mauger, Project Stream Ecologist, Cook Inlet Keeper
Responsible for preparation of sampling plan, sample collection and testing, data management and analysis, quality control and production of reports.

In addition to the personnel listed above, the Lower Kenai Peninsula Watershed Health Project is guided by a Technical Advisory Committee (TAC) made up of professionals representing various federal, state and local agencies and diverse scientific backgrounds. See Appendix A for a complete list of TAC members.

Collected data will be provided in report form to the Homer Soil and Water Conservation District and will be made available to all interested government agencies and citizens. Primary data users are the Homer Soil and Water Conservation District, Cook Inlet Keeper and local, state and federal agencies involved in support of this project.

A5. Problem Identification / Background

What does your community suspect as the reason or reasons this fresh water is currently impacted? Are these reasons limited to just chemical, biological, or physical parameters or do they involve all?

What are your reasons for conducting monitoring?

Baseline	Specific Habitat Impacts	Effect of Fuel Spill
[ ]	[ ]	[ ]

Pollution from Dump	Non-point Source Pollution
[ ]	[ ]

Impact From Existing Mine or Development	Any Others
[ ]	[ ]

Background to Assist with Answering Questions:
One limitation of the scientific process is that we must narrowly define what the broad issues are. In other words, if we are discussing a loss of King Salmon return in a wadable stream in Southeast Alaska we may say our reason for monitoring is to understand why returns are low.

This is too broad to test using scientific methods. It is preferable that we test a hypothesis that is provable. For example, a car dump is adjacent to this stream and heavy metals are suspected of polluting the system. Our reason is still the same, to understand why returns are diminishing, but our focus is now on a select group of analytes and at a specific time in the rearing life stage.

What new impacts might occur in your watershed?

In what timeframe do each of these impacts occur? In other words, of each potential impact you have noted what may occur in the next 5 years, 10 years, 20 years, 50 years, 100+ years?

What Scientific research has been done that addresses the resources that are monitored by your QAPP. *Use handouts to research data*. Once you've conducted a thorough literature review, share the findings with your QAPP team to incorporate any relevant information to your plan.

What traditional knowledge could direct the focus, methodology, and interpretation of this research?

Is this documented in surveys or interviews?

Example #1 - LKPWHP

PROBLEM IDENTIFICATION / BACKGROUND

Current and potential changes in land use and management within the Deep Creek, Stariski Creek, Ninilchik River and Anchor River watersheds are having an unknown impact on water quality.

No one can say for sure whether pollution and human impacts are directly harming the resources of these rich watersheds. While a great deal of information has been collected by government agencies (USGS in particular), the fact remains that there is not enough baseline data available to determine the effects of point and non-point source pollution on the water quality and habitat of these streams.

The streams of the lower Kenai Peninsula support multi-million dollar sport and commercial fisheries, and provide important subsistence resources for native and other groups. Citizens, industry and resource managers need a comprehensive and ongoing inventory of water quality in order to track changes and understand impacts. Only with this kind of information can we make economically and environmentally sound decisions.

Many state and federal agencies lack the resources to conduct thorough water quality monitoring at a representative number of sites over an extended period. The Lower Kenai Peninsula

Watershed Health Project collects accurate baseline data in a cost effective manner for the benefit of local citizens and government agencies alike.

Example #2 - CEMP

PROBLEM IDENTIFICATION / BACKGROUND

Cook Inlet is a large and dynamic embayment in southcentral Alaska. Although it is still relatively pristine, the Cook Inlet Basin is beginning to show the signs of environmental stress associated with increased population, development and urbanization. Currently this 39,000 square mile catchment basin is home to roughly two thirds of Alaska's human population. Long-time residents have seen local declines in inter-tidal biological communities and species abundance in Cook Inlet waters, but no one can say for sure whether pollution and human impacts are directly harming the resources of Cook Inlet. While a number of studies have been done by government, universities, and industry, the fact remains that there is not enough baseline data available to determine the effects of point and non-point source pollution on the water quality of the Cook Inlet Basin.

Cook Inlet waters support multi-million dollar sport and commercial fisheries, and provide important subsistence resources for native and other groups. Citizens, industry and resource managers need a comprehensive on-going water quality monitoring program to understand the potential effects of water pollution on Cook Inlet's magnificent but threatened resources in order to make economically and environmentally sound decisions.

Many state and federal agencies lack the resources to conduct continuous water quality monitoring projects at a representative number of sites throughout the basin. Cook Inlet Keeper's Citizen's Environmental Monitoring Program can collect accurate baseline data using trained volunteers in a cost effective manner while also raising public awareness of water quality issues and the watershed concept.

A6. Project / Task Description

What is the primary focus of your QAPP? If your focus is somewhat broad please note the percentage of your focus in each category for example, 100% of traditional drinking water.

Major Rivers	Wadable Streams	Lakes	Wetlands
[ ]	[ ]	[ ]	[ ]

Traditional Drinking Water	Residential Drinking Water
[ ]	[ ]

What type of monitoring do you plan on conducting, physical, biological and/or chemical?

For chemical testing, what analytes are you interested in. We will address which methods will meet your needs in the Data Quality Objectives element. For now all you need to do is list what you want to test for. We suggest your QAPP team and agency resources be relied upon to provide support to your choice of analytes and that efforts be made to generate data that is comparable to past research.

What are the objectives of your research?
Many of the responses below overlap categorically. Pick one or two that are your primary objective.

1. [ ] To assess impacts from present activities.
2. [ ] To develop baseline information to protect water from future impacts using state and federal laws. This involves many years of data gathering.
3. [ ] To develop a baseline screening for water quality and identify potential impacts to water quality. This involves screening for problems and is intended to guide more refined efforts in the future. This doesn't necessarily involve many years of data gathering
4. [ ] To assess physical habitat limitations to fish and identify methods of restoration.
5. [ ] To file for listing as "at risk" or "impaired" water body under Clean Water Act.
6. [ ] To file for in-stream flow for; fish and wildlife, water quality, or aesthetic value.
7. [ ] Other (Please describe).

If you answered 5 or 6 from the above question then your research will be directed by state and federal agencies which require specific methods. Many of these methods will be included in the QAPP template, but only answer the following question if you responded with 1-4 in the above.

Based on the objectives of your research how will you evaluate your results?

Will you compare results to standards? If so which standards?

Create a timeline which details when specific tasks will be completed. From the Project / Task Organization design element you already have your QAPP team assembled, in the timeline you simply detail when the tasks will be completed and ideally, by whom.

Example #1 CEMP

PROJECT / TASK DESCRIPTION

The Cook Inlet Keeper (Keeper) is a 501(c)(3) nonprofit organization based in Homer, Alaska, dedicated to protecting Cook Inlet waters and the life they sustain. Because citizens are the true owners of public water resources, Keeper strives to involve them in hands-on activities aimed at improving and protecting habitat and water quality, promoting resource stewardship, and establishing an environmental database for the Cook Inlet Basin.

The objectives of Keeper's Citizens Environmental Monitoring Program are to:

- inventory baseline water quality in the waters of Cook Inlet Basin;
- detect and report significant changes and track water quality trends;
- raise public awareness of the importance of water quality through hands on involvement.

To promote these objectives Keeper has selected water quality parameters that will enhance understanding of overall environmental health (see Section V. of the Volunteer Training Manual for a discussion of the importance of each testing parameter) and testing methods that have proven successful in citizen based programs throughout the United States.

Refinements in methods or additional testing parameters may be incorporated in this project in the future if it is determined that such changes would enhance efforts to achieve project goals and assuming additional funding is available. Any such changes will be submitted for EPA and ADEC approval.

General comparisons will be made between data collected and the water quality index developed by the National Sanitation Foundation as well as state and federal water quality standards as applicable. Data may be used by government agencies, landowners, and other resources managers to enhance understanding of basic water quality status and to identify water quality trends.

To develop and refine an Inlet-wide sampling program, Keeper has initiated a pilot project to monitor surface water quality in the Kachemak Bay region. In 1998, Keeper will expand its water quality monitoring efforts to include sites on Anchor River, Stariski Creek, Deep Creek and Ninilchik River. Keeper is also working with the Kenai Watershed Forum in training volunteers to monitor sites on the lower Kenai River. In the future Keeper will seek to foster monitoring throughout the Cook Inlet Basin, and will begin to incorporate water column and sediment sampling to gain a more comprehensive sense of water quality in Cook Inlet.

Keeper staff train citizens and groups to take surface water samples using water test kits containing a combination of LaMotte, Hach, Hanna and Micrology Laboratories equipment and supplies. Monitor training courses are held quarterly and retraining/Quality Control (QC) sessions are held biannually (see Section 8). Volunteers are instructed to monitor 16 times per year -- once each month from September through April and twice a month from May through August (see Table T-1).

Individual citizens and citizen teams test surface water samples primarily for **water temperature**, **turbidity** (clarity), **pH**, **salinity**, and **dissolved oxygen**. Current monitoring also includes tests for water color, conductivity, oxidation-reduction potential (ORP) and screening tests for nutrients (nitrate-nitrogen & ortho-phosphate), and bacteria (E. coli & total coliform). In the future additional test parameters may be incorporated including macroinvertebrates, heavy metals and hydrocarbons, as well as boat based programs for sediment and water column testing. These elements will be addressed in a future addendum to, or edition of this QAPP as they are implemented.

Citizens are also encouraged to record narrative environmental data, and to photograph each site. These visual and other observations complement the quantitative physical and chemical data collected at each established monitoring site.

Data collected by volunteers is turned in to the Keeper office where it is entered in the CEMP data system. Test results can then be evaluated using the water quality index developed by the National Sanitation Foundation and compared to state and federal water quality standards as applicable. As understanding of Cook Inlet water quality conditions increases, Keeper will work with other interested parties to develop a Cook Inlet-specific water quality index. This data will be made available on Keeper's web site and a data analysis and summary report will be published annually.

Keeper's water quality monitoring program is an on-going project designed to continue as long as funding allows.

Table T-1: ANNUAL SCHEDULE OF TASKS

MAJOR TASK CATEGORIES	J	F	M	A	M	J	J	A	S	O	N	D
volunteer training		X			X			X			X	
volunteer retraining/quality control			X						X			
monthly testing	X	X	X	X	XX	XX	XX	XX	X	X	X	X
data entry	X	X	X	X	X	X	X	X	X	X	X	X
annual analysis report	X											
annual QAPP review				X								

Example #2 Matanuska-Susitna Borough

General Overview of Project

The goals of the MSB Water Quality Monitoring Program are:

$ A more informed public.
$ Useful information for public agency use.
$ Useful information for local decision-makers.

The volunteer-based program will create a more informed public through outreach and education. The public will become better informed about water quality, the importance of good water quality and the means to protect its integrity. A sense of stewardship will be created by using volunteers to monitor the boroughs' lakes.

Data collected by volunteers will be turned in to the Matanuska-Susitna Borough Planning Department, where it will be entered into a database. It will later be compared to state and federal standards using reference conditions established by the Alaska Department of Fish and Game. The trophic status of individual lakes will be evaluated after several years of data is collected.

The study will also provide baseline information about the water quality of the borough. This baseline information will be used by local, state and federal agencies and local decision-makers. Over time, the baseline data will be used to predict problems and develop and evaluate management practices relating to water quality.

Lake/ponds: Data will be collected by citizen volunteers in accordance with this Quality Assurance Project plan.

- Samples will be taken from lakes and tested in a laboratory for Chlorophyll *a* and phosphorus.
- Hydrolab and Quanta probes will be used to test:
    - temperature
    - conductivity
    - pH
    - dissolved oxygen.
- Surveys will be conducted by volunteers for wildlife, birds, human use and land use.
- Water clarity will be assessed using a Secchi disk.

In future years, it is envisioned that volunteers will be trained to collect and classify macroinvertebrates utilizing protocols established by the Environmental and Natural Resource Institute. Additionally, the volunteer program and testing procedures will be reviewed and revised as necessary.

Project Timetable

MAJOR TASKS	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Train Borough Staff	X	X									X	X
Evaluate Survey Form	X	X									X	X
Evaluate Sampling Protocols For Volunteers											X	X
Outreach to Citizens to Gather Support & Volunteers		X	X	X								
Select Sites			X	X								
Training Volunteers				X	X	X						
Take Samples					X	X	X	X	X	X		
Analyze Samples					X	X	X	X	X	X		
Input Data into Database					X	X	X	X	X	X	X	X
Draft & Distribute Annual Report	X										X	X

Reporting

Quarterly reports will be made to the Alaska Department of Environmental Conservation in accordance with the signed grant agreement. Additionally, an annual report will be published and made available to volunteers, elected and appointed officials, agencies and other interested parties at no cost.

A7. Data Quality Objectives for Measurement Data

Using your list of analytes you will test for, from the [Project / Task Description] element of your plan you can now choose the testing methods from the Data Quality Objectives Table that will answer your questions. This will become Appendix E of your QAPP. Note, you are not limited to just the methods listed on this table. Your Technical Advisors may suggest other methods.

The SOP's offer many specific testing methods. You have many options regarding methodology. For example, there may be five of more methods of testing the same thing. Your needs define which is the best method. Sometimes you'll just want inexpensive screening tools to raise "red flags" to potential problems. In this case you can plan follow-up testing with different tools if the results are alarming or above regulatory requirements. In some situations you may already know that you need data quality that is relevant to specific regulatory laws. For example, if you know a new activity will make the stream silty or muddy you could conduct turbidity and settlable solids analysis under a QAPP using methods needed for regulatory compliance. This could document conditions before, during and after, allowing for regulatory review of impacts.

The primary limiting factor to any Tribal water quality monitoring effort is available funds. Funding will direct your scope, objectives, and methodology. The first step is to familiarize your self with the methodologies. The second is to define your parameters of interest. Third, your will choose specific tests based on funding/time limitations. In other words, when authoring your QAPP, at the [Data Quality Objectives for Measuring Data] design element, go back to the [Project Task Description] element and carefully choose the tests of primary and secondary importance. Make sure that your project objectives are met by the equipment you choose.

1. Familiarize yourself with methodologies
2. Define analytes of interest
3. Chose methods

Type

Field - Field-Lab - Lab

Field
This refers to a method that is conducted in the field.

Field – Lab
This refers to a method that can be conducted in the field or in a lab.

Lab
This refers to a method that must be conducted in a lab.

USE

Screener - Baseline - Regulatory

Screener

- Often used to find out if there is an immediate problem
- Red flag screening tests are used due to their broad range and ability to inexpensively capture problems.

Baseline

- Often used to define natural or historic conditions
  - This is important because some regulations require knowledge of background / baseline conditions.
- Knowledge of baseline conditions allows for accurate assessment of future impacts
- Generally, greater accuracy costs more and takes more time.
- Greater accuracy is needed in some tests while not in others. Sometimes regulatory approved tests are necessary.

Regulatory approval

- Usually used to hold state, federal and private entities liable for excedances of water quality standards
- Just getting a test approved in a QAPP doesn't mean it will work for regulatory compliance. While data gathered in red flag screening tests can be defended in court using your QAPP, they

are not sufficient alone without follow-up testing using regulatory approved methods.

Improved accuracy and regulatory approval means increased cost and difficulty. Carefully balance your needs with money and choose what your data quality objectives are.

A8. Training Requirements / Certification

The Society has provided certificates of completion for participation in the Phase I, II, & III Water Quality and Aquatic Environment Monitoring Workshop. The training will also be referred to in a separate SOP.

However, the QAPP template and associated SOP's are the product of many water testing organizations' efforts. The tests which were included in the Phase I workshop have SOP's written and are pending approval, there are also many other tests used by other organizations throughout the state. One of the benefits of writing a QAPP is that you can then use EPA dollars to pay for monitoring efforts and equipment. If you choose to use equipment that you have not been trained to use the Society may be able to provide training to your Tribe or review the availability of the appropriate training in the state. Additionally, most tests require quality control measures that involve use of standards, blanks, duplicates, etc. The Society hopes to be able to provide ongoing support in QC as well. We are hoping to provide this service from our own grant support but due to the long-term nature of monitoring efforts cannot necessarily offer this service without support from Tribes. Please work with Society staff to make sure the training requirements you include in your QAPP are appropriate for the methods you choose.

As part of the WQAEMP training program, NAFWS provide personnel with a three ring binder of materials that includes: Part I of *Stream Corridor Restoration Principal, Processes, and Practices* (http://www.usda.gov/stream_restoration/newtofc.htm); information on safety and access; information on equipment care and waste disposal; SOPs for the methods they utilize; a list of responsibilities (see example below); information on data management and reporting; a field procedure guide; Field Identification of Coastal Juvenile Salmonids; Stream Keepers Field Guide; Guide to Pacific Northwest Aquatic Invertebrates; Educational level Guide to Macroinvertebrates of Alaska; and information on quality control and quality assurance.

EXAMPLE

SUMMARY OF VOLUNTEER MONITOR RESPONSIBLIITIES

TRAINING

- Attend Phase I through III training sessions.
- Volunteers are encouraged to ask questions throughout the training sessions.

SAFETY

- Make safety a priority.
- Know the chemical you are handling.
- Be prepared for the elements.
- Don't take unnecessary risks.

MONITORING SCHEDULE

- Monitor twice a month May, June, July & August (second and last Sunday at 2:00 PM).
- Monitor once a month September-April (last Sunday of the month at 2:00 PM).

FIELD PROCEDURES

- Retain a copy of the Field Procedure Checklist with their monitoring kit.
- For each test follow procedures outlined in Field Procedure Checklist.

DATA MANAGEMENT

- Follow method procedures and record results after completion of each test legibly on observation datasheet.
- Fill out datasheet completely.
- For tests that not performed at the site enter NA.
- For tests that cannot be performed due to chemical or equipment failure enter reason why test could not be performed.
- If a mistake is made, draw one line through characters in question, enter the new characters to the immediate right of the lined-out entries, and initial and date the change immediately after the new characters.
- Turn in observation datasheet in a timely manner.

RESPONSE

- Inform Project Coordinator or Quality Control Coordinator as soon as possible of any anomalous data or other problems that may need to addressed

KIT MANAGEMENT

- Before each sampling event volunteers are asked to inspect all equipment. Thermometers (air and water), bottles and test tubes, color comparators,

hydrometer, droppers, and other related testing equipment are checked for cracks, breaks, or malfunctions.
- Calibrate Hanna meter following procedures in Field Procedure Checklist prior to sampling.
- Clean and store equipment and supplies as described under Cleaning and Maintaining Equipment and Supplies in Field Procedure Checklist.
- Works with the Quality Control Coordinator to assure that monitoring kits have current reagents and functioning equipment on a regular basis.

CHEMICAL WASTE MANAGEMNT

- Dispose of chemical waste according to procedure outlined in Field Procedure Checklist.
- Work with QC Coordinator to assure that chemical waste is disposed of properly.

ANNUAL RE-CERTIFICATION

- Attend at least one annual re-certification, Phase IV.

PERFORMANCE STANDARD

- Analyze at least one set of performance evaluation samples annually.

REPLICATE ANALYSIS

- Perform at least one replicate analysis each year at monitoring site.

A9. Documentation and Records

Procedures will be guided by a data management system and from SOP's. Documentation and records address the following components.

- Personnel
- Equipment
- Data
- Sampling location
- Laboratory information

Depending on the testing methods you choose the documentation and records requirements will be different.

B. Measurement and Data Acquisition

B1. Sample Process Design

Sampling Parameters
Select sampling parameters and methods from the Methods Reference Table. This will become Appendix C of you QAPP. Note, you are not limited to just the methods listed on this table. Your Technical Advisors may suggest other methods.

Sampling Frequency
How often will you sample?

Where will you sample?
What is the exact location of the sampling site, using GPS and maps? You will need to fill in the sample station table provided. This will become Appendix G of your QAPP.

Based on Project / Task Description design element you will have chosen analytes to test for. To meet the project objectives it is very important to have sufficient technical support to design the locations and frequencies needed. Sometimes monitoring events are based on calendar days, other times on storm events, but mostly on the availability of funds which may limit many project's ability to conduct assessment at appropriate frequencies and in a sufficient number of locations.

Example #1 – **LKPWHP**

SAMPLING PROCESS DESIGN

Sample Site Selection

In order to meet the objectives described in Section 6, the project's design called for selecting four sampling sites on each of the four streams to be studied. Three of these sites were to become monitoring stations and the fourth was to be designated as an alternate site. The following criteria (Ashton 1998) were considered in site selection.

- **Private property access** - if a site requires entering or crossing private property the landowner will be involved in the site selection process and permission will be obtained in writing prior to using the site for sampling.
- **Historical data** – special consideration is given to sites where water quality data has previously been collected.
- **Parameters previously measured** – consideration is given to which of the parameter previously measured at each site coincide with the parameters to be measured in this project.
- **Representativeness** - sampling sites should be located to be representative of a particular reach and not targeted to one specific point source or outfall.
- **Logistical access** – consideration is given to site proximity and accessibility
- **Actual field checks** - each sites is to be visited prior the start of sampling to verify accessibility, representativeness, safety, and appropriateness.

Historical water quality data on the four streams has been collected and summarized in Appendix G. These data, along with the other criteria listed above, were reviewed by the Technical Advisory Committee (TAC) and potential sites were ranked using a site selection matrix. Sites were ranked using a 1 to 3 scale, with one being the highest and three being the lowest (Appendix I).

The TAC decided that project objectives would be better served by altering the original study design. It was noted that the Anchor River watershed is quite large and contains at least two important tributaries while the Stariski Creek watershed is considerably smaller and contains no significant tributaries. In light of this, one site was removed from Stariski Creek and a site was added to the Anchor River drainage. In August 1999, the Upper Anchor River monitoring station was changed from its original location at the headwaters to Beaver Creek, a small tributary that is more accessible (Appendix B).

Each site has been assigned a site number and is identified by its latitude, longitude and elevation as determined using a GIS mapping program and data from previous sampling. Site locations will be verified on site using GPS equipment.

Sampling Parameters

As described in Section 6, testing parameters were selected based on their usefulness in inventorying water quality and projecting the general "health" of the water bodies in question. Consideration was also given to data collected by previous studies on these streams and to the costs related to testing each parameter as related to available funding. The parameters to be tested are listed in Tables T-2 and T-3.

Sampling Frequency

The original plan called for sampling at all stations twice a month May through October and once a month November through April. In the fall of 1999, this schedule was amended to include monitoring at a minimum of six sites each month during the winter. In the spring of 2000, the plan was amended further to take samples at all monitoring stations every six weeks from May through October, with an additional sample taken from each site during a high flow event.

Given the climate of Southcentral Alaska, it is likely that some sites may not be reasonably accessible on the scheduled sampling date. The Stream Ecologist will make efforts to reschedule samplings as weather allows, but this may not always be possible.

Site Safety Plans

Safety is a priority at all times for Cook Inlet Keeper staff and volunteers. Sampling sites were selected, in part, because they are safely accessible. The Stream Ecologist visited each selected site before sampling began to locate the safest access route and identify potential hazards. Permission from landowners was obtained prior to the first sampling event. The Project Stream Ecologist is accompanied at all times by a volunteer field assistant. A cell phone is also made available for use.

In winter months the Stream Ecologist and volunteer assistant will exercise caution in sampling sites with no direct road or winter trail access and will not sample when weather conditions are extreme. Sampling may, at times, require that holes be chopped and maintained in ice-covered fresh water sites, but sampling will not be conducted when thin ice prevents safe access.

The Stream Ecologist and volunteer assistants will use rubber gloves and goggles or eye glasses at all times during sampling and analysis. When wading is required, personnel will wear chest waders or hip boots. Personnel are trained to dress appropriately for weather and to be prepared for variable conditions which may require wearing extra layers of warm clothing and waterproof gear during all seasons.

Example #2 – CEMP

10. SAMPLING PROCESS DESIGN

Sample Site Selection

In order to obtain useful baseline inventory and monitoring information as described in Section 6, it is critical to select sampling sites which are representative of the various hydrologic, geographic, biologic, land use, and other conditions within the watershed. Because of the variability and distribution of human population densities

in the Cook Inlet region, site selection should ensure a balance between more impacted and less impacted areas. In the challenging transitional and sub-arctic climate of Southcentral Alaska, it is also necessary to select sites which are safely and reasonably accessible. Finally, to maintain volunteer involvement, it is important to select monitoring sites in which volunteer team members have a personal interest.

Applying the above criteria, the Keeper has established twenty-two, (22) fresh water, near-shore and shore-based sampling stations in the Kachemak Bay watershed to conduct its pilot project. These sites include stations at or near: Anchor Point, Bluff Point/Diamond Creek, Bishops Beach, Bidarka Creek, Beluga Slough, Mud Bay, Homer Boat Harbor, McNeil Creek, Fritz Creek, East End Road, Fox River Flats, Bear Cove, Halibut Cove, Peterson Bay, Eldred Passage, Kasitna-Jakolof Bay, Barbara Creek, Seldovia Boat Harbor, Seldovia Bay, English Bay and Port Graham Bay (see Appendix G for Sampling Station Map). Sixteen (16) additional sites have been proposed for future testing. Data collected from established pilot project sites prior to approval of this QAPP is included in the CEMP data system and will be identified as such in annual reports.

Each site is given a name and identified by a site number and a location description, as well as by its latitude, longitude and elevation as determined using USGS 1:63,360 scale topographical maps and on site GPS readings. Site selection for future monitoring within the basin will be based on similar factors.

Sampling Parameters & Collection Frequency

As described in Section 6, testing parameters are selected based on their usefulness in inventorying water quality and projecting the general "health" of the water bodies in question. Due to cost concerns, only the more affordable sampling parameters have been selected to ensure the viability of long term monitoring. Primary sampling parameters in the CEMP's surface water testing include: water temperature, turbidity (clarity), pH, salinity, and dissolved oxygen; secondary parameters include: color, conductivity, oxidation-reduction potential, and screening test for nutrients (nitrate-nitrogen and ortho-phosphate), and bacteria (fecal and total coliform).

Surface water samples are taken at all monitoring stations monthly between September and April, and twice monthly from May through August for a total of 16 sampling events per site per year. The sampling period is designated as the last Sunday of each month (as well as the second Sunday of each month from May through August), plus or minus two days (i.e. Friday through Tuesday). The recommended time for sampling is 2:00 PM, and the time allowance range is from 1:00 PM to 5:00 PM. The initial sampling design is not tide dependent, although tide stage will be specifically recorded during field sampling and considered during data analysis.
Monitors are assigned to teams of two or more volunteers with one volunteer monitor identified as the team leader. If volunteers cannot conduct a scheduled sampling, they are instructed to contact their team leader or the Environmental Monitoring Coordinator as soon as possible, so that an alternate monitor can be found

The impact of rain events on water quality is a factor to be considered in the Keeper program. Monitors are asked to maintain a regular monitoring schedule regardless of precipitation and to document past and present weather conditions at the time of sampling. Given the climate of Southcentral Alaska it is likely that some sites may not be reasonably accessible on the appointed sampling date. Keeper staff will make efforts to reschedule samplings as weather allows, but since this may not always be possible, a total of 12 sampling events per year at any one site will be considered to be a complete set of data for that site. Table T-2 summarizes the water quality parameters currently monitored by the CEMP.

Site Safety Plans

Sampling sites are selected, in part, because they are safely accessible. Keeper personnel make an effort to visit each selected site before sampling begins to locate safe access routes and identify any potential hazards. If sites, or access routes to sites, are located on private property, written permission from landowners is obtained prior to the first sampling event. Monitors are instructed to use safe access routes and warned of site-specific hazards.

Whenever possible, monitors are to conduct samplings as a team. In winter months, monitors are instructed to exercise caution in sampling sites with no direct road or winter trail access and not to sample when weather conditions are extreme. Monitors may, at times, be required to chop and maintain holes in ice covered fresh water sites, but they are instructed not to monitor if ice may be too thin to support them safely.

Volunteers are provided with rubber gloves and told to wear them, as well as goggles or eye glasses at all times during sampling and analysis. Monitors who must sample their sites by wading in from shore are instructed to wear rubber boots, and all monitors are advised to dress appropriately and be prepared for variable weather conditions which may include wearing extra layers of warm clothing and waterproof outer gear during all seasons.

Volunteer safety is an integral part of monitor training and is covered in greater detail in Section IV of the Volunteer Training Manual (Appendix D).

B2. Sampling Method Requirements

Sampling method requirements will be conducted as outlined in each method's Standard Operating Procedure. In addition, each method's SOP identifies the parameter it measures, sampling equipment, container, method of preservation, and maximum holding time before prior analysis. See each methods SOP.

B3. Sample Handling and Custody Procedures

Sample handling procedures apply to projects that bring samples from the field to the lab for analysis, identification or storage. This process is listed in the QAPP template.

B4. Analytical Methods Requirements

The methods you selected from the Methods Reference Table and the Data Quality Objectives Table for your QAPP identify your analytical methods requirements and will become Appendix C and E of your QAPP Also, additional information is provided in each method's SOP.

B5. Quality Control Requirements

List the number and types of field and laboratory quality control samples your staff will take. These are listed in the QAPP template.

B6. Instrument/Equipment Testing, Inspection, and Maintenance Requirements

Describe your plan for routine inspection and preventive maintenance of field and lab equipment and facilities. Include what equipment will be routinely inspected, and what spare parts and replacement equipment will be on hand to keep field and lab operations running smoothly. Include an equipment maintenance schedule, if appropriate. This process is described in the QAPP template.

B7. Instrument Calibration and Frequency

Identify how you will calibrate sampling and analytical instruments. Include information on how frequently instruments will be calibrated, and the types of standards or certified equipment that will be used to calibrate sampling instruments. Indicate how you will maintain calibration records and ensure that records can be traced to each instrument. Instrument calibration procedures for biological monitoring programs should include routine procedures that ensure that equipment is clean and in working order. For your QAPP all instrument calibration procedures are described in each method's SOP.

B8. Inspection and Acceptance Requirements for Supplies

Describe how you determine if supplies such as sample bottles, nets, and reagents are adequate for your program's needs. The QAPP template describes this process.

B9. Data Acquisition Requirements

Identify any types of data your project uses that are not obtained through your monitoring activities. Examples of these types of data include historical information, information from topographical maps or aerial photos, or reports from other monitoring groups. Discuss any limits on the use of this data resulting from uncertainty about its quality.
The QAPP template describes this process.

B10. Data Management

One example of a database is the CEMP Partnership of the Cook Inlet Watershed database. The CEMP Partnership database committee has been working with ADEC and USEPA to develop this data management system through funds provided by the Exxon Valdez Oil Spill Trustees Council and USF&WS.

The objectives of this database project include:
1) Create a consistent data management system where all citizen groups, Tribes and agencies can equally share, report and review their water quality and habitat data;

2) Interface citizen / Tribal-collected data with EPA's STORET to make it more useful to agencies; and

3) Make habitat and water quality data accessible on the Internet in a user-friendly, interactive format with links to GIS maps, photos and graphs. (Note: This component of the project will not be completed with these funds. However, the database is being coordinated with CIIMMS to develop an interactive format for the Internet.)

This database will be demonstrated in the Phase III training.

C. Assessment and Oversight

C1. Assessment and Response Actions

Discuss how you evaluate field, lab, and data management activities, organizations (such as contract labs an individual in the course of your project. The QAPP template describes this process.

C2. Reports

Identify the frequency, content, and distribution of reports to data users, sponsors, and partnership organizations that detail project status, results of internal assessments and audits, and how QA problems have been resolved. The QAPP template describes this process. See Cook Inlet Keeper's water quality report for an example.

D. Data Validation and Usability

D1. Data Review, Validation and Verification Requirements

State how you review data and make decisions regarding accepting, rejecting, or qualifying the data. Just a brief statement is needed here. The QAPP template describes this process.

D2. Validation and Verification Methods

Describe the procedures you will use to validate and verify data. The QAPP template describes this process.

D3. Reconciliation with Data Quality Objectives

Once the data results are compiled, describe the process for determining whether the data meet project objectives. The QAPP template describes this process.

APPENDIX A

Technical Advisory Committee

MEMBER LIST

APPENDIX B

PERSONNEL TRAINING RECORD

APPENDIX C

METHODS REFERENCE TABLE

APPENDIX D

LIST OF DOCUMENTS
(*Methods in your QAPP)*

APPENDIX E

DATA QUALITY OBJECTIVES TABLE

APPENDIX F

DATASHEET

APPENDIX G

SAMPLING STATION

APPENDIX H

SAMPLE CUSTODY FORM