M H. Brown

KENAI RIVER WATER QUALITY MONITORING PLAN

WORK GROUP NOTEBOOK

FALL & WINTER 1997/1998

KENAI RIVER WATER QUALITY MONITORING PLAN
Work Group Notebook

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November 21, 1997

Kenai River Water Quality Monitoring Plan
Work Group Sign-In Sheet

DATE: January 12, 1998

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Kenai River Water Quality Monitoring Plan
Work Group Sign-In Sheet

DATE: February 9, 1998

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Sent: Tuesday, February 10, 1998 11:39 AM
To: sanderson@tnc.alaska.net
Cc: rhagenstein@tnc.alaska.net; ghazen@tnc.alaska.net; loakley@tnc.alaska.net; lhildreth@tnc.alaska.net; mhbrown@alaska.net; pjackson@tnc.alaska.net; edovichin@tnc.alaska.net; cwolfe@tnc.alaska.net
Subject: IDEAS FOR "BEST PRACTICES"

WQ Monitoring Coalition

>>From rperkins@tnc.org Tue Feb 10 06:38:50 1998
>From: rperkins@tnc.org
>Date: Tue, 10 Feb 98 10:14:38 EST
>To: <Comm=contacts=TNC%COMM%TNCHQ@tnc.org>, <Directors%COMM%TNCHQ@tnc.org>
>Cc: <rjagadeesan@tnc.org>
>Reply-To: <rperkins@tnc.org>
>Errors-to: <rperkins@tnc.org>
>Subject: IDEAS FOR "BEST PRACTICES"
>X-Incognito-SN: 500
>X-Incognito-Version: 4.10.130
>
>Calling all Communicators ---
>
>
>As many of you know, the back page of the "One Conservancy" newsletter
>features a series of "Best Practices" articles, designed to share the
>Conservancy's creative thinking and techniques. These brief stories (each
>about one page long) represent one of the most effective ways of communicating
>our best ideas and practices with other staff members.
>
>By encouraging some practical "plagiarism" throughout the organization, these
>"Best Practices" articles can help spread good ideas among our far-flung
>staff. Moreover, because this section of the newsletter has been so
>well-received, we plan to put the articles on our Intranet (KAPOK) in the
>coming months. So while we've received a lot of good ideas to date, we need
>even more for the new year!
>
>Story ideas can include anything from "best practices" on community outreach
>to fundraising to on-the-ground projects and sites to the nuts-and-bolts of
>ecoregional planning. So when you hear of interesting strategies, projects,
>and/or ideas in your state or region, please pass them along to Raji
>Jagadeesan in the form of a quick e-mail/note/etc. with a contact name(s).
>Her home office telephone number is 703/841-4521; the internal e-mail address
>is Raji Jagadeesan@CCO@TNCHQ, and for those of you outside the network, you
>can e-mail rjagadeesan@tnc.org. Thank you again for all your help!
>
>If you have any questions or need clarification you can give me a call as
>well. Thanks in advance for your ideas and suggestions.
>
>
>Regina Perkins
>Field Relations Manager - Communications
>ph/703-841-4836 fax/703-841-9692
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KENAI RIVER WATER QUALITY MONITORING PLAN

Fact Sheet

December, 1997

The Kenai River watershed drains about 2, 170 square miles of the Kenai Peninsula. The river supports a popular and productive fishery that generates as much as $78 million a year in direct economic benefit to the local economy and has about 330,000 angler days of fishing effort. A healthy Kenai River contributes to a healthy Kenai Peninsula economy.

Recent years have seen an increase in the number of activities related to ensuring a healthy river. Many individuals, agencies, tribal organizations, and citizen groups are interested in tracking the health of the Kenai River by developing and implementing a water quality monitoring plan. The *Kenai River Comprehensive Management Plan* and the *Upper Kenai River Cooperative Plan* include several recommendations specific to water quality monitoring.

During the fall of 1997 twenty-one representatives from local governments, state and federal agencies, citizen groups and the community college met to discuss current Kenai River water quality monitoring activities. A Work Group was formed to develop an approach for coordinating future water quality monitoring activities.

The Work Group identified three basics considerations:

First, any new water quality monitoring plan should be integrated with existing plans for the Kenai River. This is to reduce duplication and streamline data collection.

Second, identify acceptable sampling methods and protocols. This is to ensure that the data collected by any agency, citizen group, tribe, school group or individual who follows the agreed upon methods will be contributing to baseline data on the river.

Third, coordinate efforts to assemble, maintain, and make available the baseline data. This is to make it easier to access the information for community discussion and understanding of change's in water quality through time.

The Work Group developed a draft goal for the coordinated approach:

To provide a water quality monitoring strategy to ensure the environmental integrity of the Kenai River watershed.

To achieve this goal the Work Group identified four objectives:

(1) Develop a coordinated water quality monitoring plan;

(2) Develop an implementation strategy to carry out the water quality monitoring plan;

(3) Develop an evaluation assessment to assess the results of the water quality monitoring plan and describe a process to make adjustments to the plan; and

(4) Develop a public outreach/education plan.

During the next several months the Work Group will be discussing: how will existing organizations coordinate efforts? What water quality indicators to measure, and where and when to measure? How to make this information available to those who want it?

For further information, please contact:

Michelle Brown,
The Nature Conservancy 262-6377

or

Les Buchholz,
ADEC &
KRSMA Board Member 262-5210

Kenai River Water Quality Monitoring Plan
Work Group Facsimile Cover Sheet

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Kenai River Water Quality Monitoring Plan
Work Group Sign-In Sheet

DATE: March 16, 1998

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KENAI RIVER WATER QUALITY MONITORING COALITION
PROPOSED MATRIX OF LEVELS OF WATER QUALITY MONITORING

The matrix provides a general framework within which a wide variety of agencies, local governments, tribes, schools and community groups can discuss pooling their information to provide a watershed-wide understanding of baseline conditions. One of the basic concepts with using a matrix approach is that it can lead to more consistent monitoring by describing the data quality goal and the uses associated with that goal. The matrix describes, but does not dictate, the way data is collected or used. What the matrix does do, is provide a common language for recognizing the quality of water quality monitoring data.

For the Kenai River Water Quality Monitoring Coalition some considerations include:

1. What factors determine how to identify the level in the matrix data are considered to be part of?

   Recommend four factors: quality assurance/quality control protocols, monitoring methods, the education and training of the monitors, and the data management. (See tables)

2. When would this matrix approach be started? Would following it ever be required?

   Recommend a phased approach for coalition members to use the matrix. During the phase-in period identify, discuss, and resolve data and methods comparability issues. Whether or not using the matrix approach would be required depends on coalition members.

3. How flexible is the matrix within each level to accommodate a wide variety of data collectors while also ensuring comparability of information?

   Recommend a one or two year trial period in which to identify issues and develop adjustments to matrix.

4. Why should any particular (agency, local government, tribe, or community group) use the matrix approach to water quality monitoring?

   In the past water quality data was collected using a variety of methods and techniques. This information can not necessarily be compared with one another. With shrinking budgets, using a common approach means that information can be shared among different groups. Typically a land manager, local government, land owner, or community group is interested in a portion of the watershed. By using the matrix approach the information can be combined to provide a watershed-wide data base of information.

References

Nonpoint Source News-Notes, 1997, *Washington Volunteers Monitors Aspire to Better Data*, August/September, 1997, Issue #49, pp. 19-20.

Volunteer Environmental Monitoring Network, 1997, *Merrimack River Watershed Study Design Workbook*, Final Report, November, 1997, 97 p.

PROPOSED MATRIX OF LEVELS OF WATER QUALITY MONITORING

Level	Data Quality Goal	Description	Typical Data Users	Typical Data Uses
One	To increase awareness and knowledge of resource values and conditions	This level is to provide an awareness of water resource values and conditions to aid in individual and community understanding. This does not require rigorous sampling and anlytical methods.	• Students • Teachers	• Aid in learning basics of water quality • Awareness
Two	To provide evaluation and assessment at the community or watershed level	To aid landowners with learning about and understanding water quality. There is some scientific precision to detect gross changes, though techniques might not notice subtle changes. This data is aid in education of volunteers, landowners and to provide basic information relatively easily and inexpensively	• Volunteers • Landowners • River users • General Public • Agencies • Interest groups	• Stewardship • Community understanding of water quality
Three	To meet evaluation and assessment requirements of state and federal agencies	This level is to provide data to aid agencies with understanding the resource, to provide local decision makers with accurate To be able to detect subtle changes over time and space.	• Agency staff • Local government staff • Local government decision makers	• Provide baseline of detailed knowledge about water quality for resource managers • Meet specific agency objectives • Resource assessments
Four	To meet national scientific peer review requirements	This level requires a very high degree of scientific understanding and practice. This level is collected for scientific peer review publications. Data collected at this level requires use of the most precise, accurate and sensitive methods with a rigorous program to assure data quality.	• Scientific audience • National comparisons • Agency staff	• Comparison with other ecoregions of the world • Developing long-term scientific baseline

PROPOSED MATRIX OF LEVELS OF WATER QUALITY MONITORING

Level	Data Management	Data Presentation	Typical Funding Sources	Relationship to Other Levels
One	Data is collected for general description; there is no requirement for recording or storage further use	There is no data presentation required	• Agency staff support • Teacher support • Non-profit staff support • Local sponsorships	This level is primarily for education and understanding, any summaries would be used by level 2
Two	Data is recorded, stored, reviewed for basic consistency	Data is presented in annual report, project report, or stored in project file; no system to ensure quality of data presented	• Agency grants • Volunteer efforts • Local sponsorships • Agency budget	This level provides a baseline of basically repeatable data about status and trends of water quality. Data would provide general knowledge between level 3 sampling locations. Could provide "red flag" info to agencies.
Three	Data is recorded, stored, and reviewed within an electronic database; basic statistics are used to check the quality of the data.	Data is presented in annual report, project report, or electronic file; there is a described method or system to ensure quality of data presented.	• Agency-to-agency grants • Agency line-item funding	This level provides baseline of data to indentify subtle changes to water quality
Four	Data is recorded, stored, and reviewed to ensure accuracy of data base; has staff with specific responsibility for ensuring data quality	Data is presented in annual report, peer reviewed publications, or limited access, internet accessible database	• Agency line-item funding • National Priority Projects • Research funding	This level provides scientific baseline information to add to national and international scientific understanding of ecosystem

PROPOSED MATRIX OF LEVELS OF WATER QUALITY MONITORING

Level	QA/QC Protocols	Examples of QA/QC Guidelines	Desired Education /Training	Examples of Activities
One	No formal QA/QC plan required.	Field observations on standard forms, EPA Streamwalk or Alaska Water Watch Stream Survey	Volunteer or student with brief orientation supervised by level two trained teacher or supervisor.	General field observations, basic field sampling
Two	Basic written plan, includes: purpose, parameters, methods, sites, schedule	General guidelines such as Michaud's *A Citizen's Guideto Understanding & Monitoring,* GREEN field manuals	Volunteer, student or technician supervised by an expert monitor	Field sampling; analysis using field kits
Three	Formal QA plan for specific project or generic plan for organization (ie. meets 24 requirements of EPA's Volunteer Monitoring Guide to QAPP, 1996), all tests needing lab analysis done at an accredited lab	Technical guidelines such as APHA Standard Methods, Agency lab manuals, (add others)	Trained personnel with experience or training on specific techniques and methods; receives periodic refresher training	Using calibrated meters for field measurements or following the protocols in a current APHA Standard Methods; lab analyses
Four	Follows formal QA plan, documents how it is implemented	National guidelines such as NAQWA protocols, scientifically peer reviewed protocols	Professional/qualified individual with degree and specific training or equivalent experience, periodic review and refresher training with peers	Sampling to determine scientific understanding of the physcial, chemical or biological characteristics

Ginnie Litchfield
ADF+G

Water Quality Assessment for the Kenai River (Level III)

Chemical, biological and physical parameters would be assessed in order to describe water quality status and trends of the Kenai River watershed. The following parameters could be examined for a cost of approximately $5,000 per site per season. All field work would be done by local professional personnel and all analyses the responsibilitiy of Alaska Dept. of Fish & Game's Limnology Laboratory located on K-Beach Road in Soldotna. The cost per site would vary according to total amount of sites sampled, cooperative efforts, use of trained volunteers to assist professional staff, and the length of the ice-free season. A more detailed project proposal will be submitted upon request.

General Tests

Specific Conductance
pH
Alkalinity
Turbidity
Color
Total Solids
Total Dissolved Solids
Suspended Solids

Total and Dissolved Nutrients

Total Phosphorus
Total Filterable Phosphorus
Filterable Reactive Phosphorus
Total Kjeldahl Nitrogen
Total Ammonia
Nitrate & Nitrite
Reactive Silicon

Trace Metals

Calcium
Magnesium
Iron
Lead
Arsenic
Chromium
Zinc
Cadmium
Copper

Biological Parameters

Benthic Macroinvertebrate Assessment
Fecal Coliform Bacteria
Biochemical Oxygen Demand
Periphyton

Hydrocarbons

GRO/BTEX method Ak 101/EPA 8020
DRO/RRO method Ak 102/103

Physical Parameters

Temperature
Dissolved Oxygen
Substrate embeddedness and cobble size
flow velocity

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January 21, 1998

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During the Jan. 12, meeting of the KRWQMP Work Group there was some discussion regarding water quality sampling points, number of sampling points, level of sampling points, tiered plan, and cost that may be involved with sampling. Also, there was some discussion on funding, or maybe lack of funding, for a Kenai River Watershed Water Quality Monitoring Plan. In retrospect, I believe the discussion was going in the direction of having a scaled down plan because there has been no reliable funding identified.

I believe the group should proceed with the most ambitious plan that would address future needs of the watershed. Something along the lines of the proposal presented by Joe Dorava, USGS at the Jan. 12 meeting.

Granted, there have been no funding sources identified, however, when the group seeks funding the first thing that will be required of a potential funding source is; *a work plan and budget.*

I would propose a tiered plan with up to 3 scenarios:
1. Tier 1: all sites (17) at level 3 or higher.

2. Tier 2: X number (6) of sites at level 3 or higher and remaining sites (11) at level 2.

3. Tier 3: 3 sites at level 3 or higher and remaining (14) sites divided between levels 1 & 2.

These thoughts are being provided now because of a possible schedule conflict with the Jan. 26 meeting.

Herb Cook
USDA-NRCS
Kenai SWCD

cc: Mike Swan, Kenai SWCD

KENAI RIVER WATER QUALITY MONITORING COALITION
CONSIDERATIONS FOR SAMPLING SITE SELECTION

There are many factors that contribute to selecting sites for baseline monitoring. The following is a list of considerations to use in developing an initial selection of sample locations for the Kenai River Water Quality Monitoring Plan. The list is from several publications and discussions by the work group.

1. The data quality goal will influence a variety of factors related to the collection, analysis, management, and presentation of water quality data (see matrix of levels of water quality monitoring).

2. If a site requires entering or crossing private property the land owner should be involved in the site selection process and permission must be obtained in writing prior to using the site for sampling.

3. Consider using sites that have previously been sampled.

4. Consider proximity and accessibility in selecting sampling sites.

5. For sampling water in rivers and tributaries, select sites where the waters at the site are well mixed by turbulence upstream. Recognize that sites most suitable for physical, chemical, or biological sampling may vary within a given reach of the river or tributary. Locate sample sites well below tributaries to avoid sampling the tributary plume when what is wanted is the water quality of the mainstem.

6. Sample sites should be located to be representative of a particular reach and not targeted to one specific point source or outfall.

7. Field check the long-term reference sites to check accessibility, representativeness, safety, and appropriateness.

8. When selecting sites consider the relationship of level two, three and four sites so the most information can be collected for the minimum costs.

9. Pick a manageable, and affordable, number of sites.

After the initial selection of sampling sites there are many detailed considerations to include in site selection. These detailed considerations include:

1. Most monitoring programs are based on a combination of two primary types of sample design: probabilistic or targeted. In probabilistic designs sampling sites or sampling events are selected at random to provide an unbiased sampling of the waterbody. In targeted designs, sampling sites are selected based on known existing problems or a knowledge of upcoming events in the watershed.

2. Frequency of sampling should be based on several factors (after Sherwani and Moreau, 1975):

   A. Response time of the system,
   B. Expected variability of the parameter,
   C. Half-life and response time of constituents,
   D. Seasonal fluctuation and random effects,
   E. Representativeness under different conditions of flow,
   F. Short-term pollution events,
   G. Variability and types of the inputs into the system,
   H. Magnitude of response.

3. Sample type classifications include (after EPA, 1997):

   A. Instantaneous or continuous;
   B. Discrete or composite;
   C. surface, soil profile, and bottom; and
   D. time-integrated, depth-integrated, or flow-integrated;

KENAI RIVER WATER QUALITY MONITORING COALITION
STEPS TO SELECTING SAMPLING SITE LOCATIONS

The following provides a step-wise process for selecting sampling sites for the Kenai River Water Quality Monitoring Plan. Recognize the process of selecting sites will consist of several iterations. The first iteration consists of identifying sites based on each organization's or person's particular knowledge of the river and places to be sampled. The second iteration consists of the meeting Feb. 9th. where the work group will discuss each members recommendations and develop a preliminary list of proposed sampling site locations. The third iteration will consist of minor adjustments of the results of the Feb. 9th. meeting and acceptance of the preliminary list by the work group. The fourth iteration will consist of circulating the draft monitoring plan for review by the public, agency staff and interest groups.

Please read through all the steps twice before working through them. For the first iteration spend no more than 1 to 2 hours.

Step 1: Think about the reason or purpose your particular agency, local government, tribe, community group, or school conducts water quality monitoring.

Step 2: Based on step 1, select the level, or levels, that support your organizations reason for conducting water quality monitoring. Refer to the "Matrix of Levels of Water Quality Monitoring" for a description of the levels (the Matrix was faxed to work group members January 21, 1998 -- call William Ashton if you can not find this). Some organizations may collect data at two or three different levels.

Step 3: Identify the particular area(s) of the watershed or reach(es) of river your particular organization feels should be included in monitoring. Use water quality data your organization has collected in the past to assist with this step. (If your organization already collects water quality data, assume the site is for a standard set of physical, chemical, biological and narrative indicators of water quality.)

Step 4: Review the "Summary of Water Quality Sampling Within the Kenai River Watershed" to identify if there is any historic sampling sites in the areas of interest. (The "Summary" was mailed to work group members in early January.)

Step 5: Review the "Considerations for Sampling Site Selection." (the revised "Considerations" are included with this fax).

Step 6: Select sites that appear to meet your particular level(s). Use your copy of the Kenai River Comprehensive Management Plan to locate your preliminary selection by river mile (RM). (See Map 4-1 through Map 4-4 in the Plan for river mile locations. The maps are following page 51 in the September, 1997 version.)

Step 7: Use the following tables to summarize your preliminary selections. Write the site location in the column that corresponds with the reach, tributary or level.

Step 8: During the Feb. 9th. meeting the work group will discuss each work group members preliminary list of sampling sites.

Step 9: A preliminary list of the sampling sites for the Kenai River Water Quality Monitoring Plan will be developed from these discussions. (This preliminary list will be made available for wider review and discussion.)

SAMPLING SITE LOCATIONS FOR KENAI RIVER WATER QUALITY MONITORING PLAN
(Kenai River Mainstem)

Organization:_____

Matrix Level	Reach 1 RM 0 - 11.4	Reach 2 RM 11.4 - 21	Reach 3 RM 21 - 36.5	Reach 4 RM 36.5 - 50	Reach 5 Skilak Lake	Reach 6 Skilak Lake to Kenai Lake	Reach 7 Kenai Lake	Above Kenai Lake	Total Number of sites per Matrix Level
1									
2		A							
3		B							
4									

Example: A. The Kenai Watershed Forum has sampled at river mile (RM) ~11.4 in 1997.
B. The Alaska Dept. of Fish & Game has sampled at river mile (RM) 12 in 1989, 1990 & 1991.

SAMPLING SITE LOCATIONS FOR KENAI RIVER WATER QUALITY MONITORING PLAN
(Kenai River Tributaries)

Organization:_____

Matrix Level	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River	Other _____	Total Number of sites per Matrix level
1		A							
2									
3					B				
4									

Example: A. The adopt-a-stream program at K-Beach Elementary collects samples on Slikok Creek at foot bridge near college
B. The Alaska Dept. of Fish & Game has sampled at Moose River in 1989, 1990 & 1991

KENAI RIVER WATER QUALITY MONITORING COALITION
CRITERIA FOR EVALUATING SOLUTIONS

During the work group meetings some of the discussion identified what to include in the coalition and the monitoring plan. The following is a listing of these informal criteria from which to evaluate any solutions the work group comes up with. In the context of the work group discussions on the coalition and monitoring plan the definition of the word *criteria* is, " a standard, rule or test on which a judgment or decision can be based." In other words, the work group uses the following statements to test whether or not a specific recommendation is accepted by the work group in the development of the monitoring plan and organizing the coalition. They are not listed in any order of priority.

What other criteria do we need or want?

COALITION

1. The coalition recognizes the importance of the Kenai River to the human and ecological community, the evolving understanding of the factors that contribute to maintaining the health of the river and the communities that depend upon it, and the benefit of baseline water quality information to improving the understanding of the Kenai River.

2. The purpose of the coalition is to coordinate and encourage efforts of agencies, local governments, tribes and existing organizations in the collection, analysis, management, data availability and funding of baseline water quality data.

3. The purpose of the coalition is not to be a regulatory agency, though it does recognize that the appropriate agencies will use the information for regulatory purposes when a "red flag" is observed during sampling or analysis.

4. The coalition provides a forum for members to: discuss differences in methods, protocols, etc.; come to a common understanding of the relationships among the different approaches; develop agreement on common elements for coalition members, where appropriate; and for members of the public to learn more and become involved in the Kenai River water quality efforts.

5. Membership in the coalition does not limit agencies, local governments, tribes or organizations in the collection or use of data for purposes other than that of the coalition.

6. The coalition and monitoring plan are coordinated with other plans within the Kenai River Watershed that address water quality.

7. All data collected by coalition members for the Kenai River water quality monitoring plan are public information.

MONITORING PLAN

1. The purpose of the Kenai River Water Quality Monitoring Plan is to develop an approach to the systematic, long-term collection, analysis, management and dissemination of baseline water quality data in the Kenai River Watershed.

2. Baseline water quality data includes physical, chemical, biological, and narrative data that is representative of existing conditions, identifies natural variability and serves as a benchmark from which to measure future changes in water quality.

3. Includes specific levels of data quality goals so that data users know the data quality goal of specific data;

4. Provides a description of common terminology or data descriptors and a process for developing agreement on common terminology or data descriptors, as appropriate.

5. The plan recognizes the interrelationships of all aspects of the hydrologic system (mainstem, tributaries, wetlands, lakes, glaciers and estuary) and uses a phased approach in developing a more complete understanding of these relationships.

6. The plan is developed to be proactive, open to participation by interested parties, adaptable to new information and evolves as knowledge of the river evolves and includes a process to review and adjust, as appropriate, methods and data collection activities.

IMPLEMENTATION PLAN

1. The purpose of the implementation plan is to provide a list of tasks recommended to complete the monitoring plan. The list may serve as a guide to agencies, local governments, tribes or organizations in developing funding or grant requests.

2. Includes a process for periodic review and adjustments to the monitoring plan based on data results.

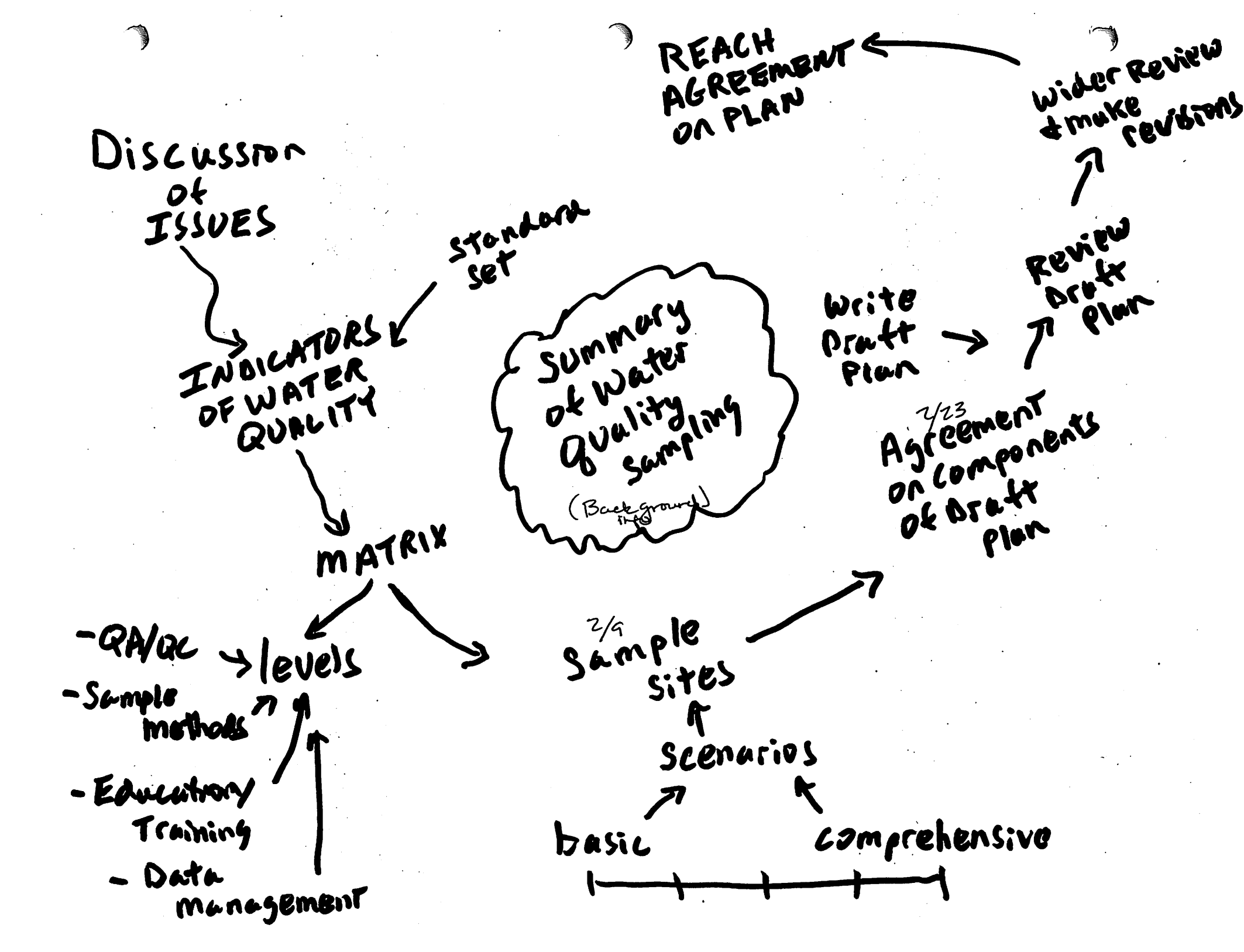
EVALUATION PLAN

1. Provides a set of measures that can be used once every five years to evaluate whether or not the goals of the monitoring program are being met.

PUBLIC OUTREACH/EDUCATION PLAN

1. Provides a means to provide or present sampling results to the community in a "user friendly" way.

2. Provides a means for the public to comment and provide ideas and suggestions on the plan.


REACH AGREEMENT ON PLAN
Wider Review & make revisions
Discussion of ISSUES
Standards set
Review Draft Plan
Write Draft Plan
INDICATORS OF WATER QUALITY
Summary of water quality sampling
(Background info)
2/23
Agreement on components of draft plan
MATRIX
-QA/QC
-Sample methods
-Educational Training
- Data management
levels
2/9
Sample sites
Scenarios
basic
comprehensive

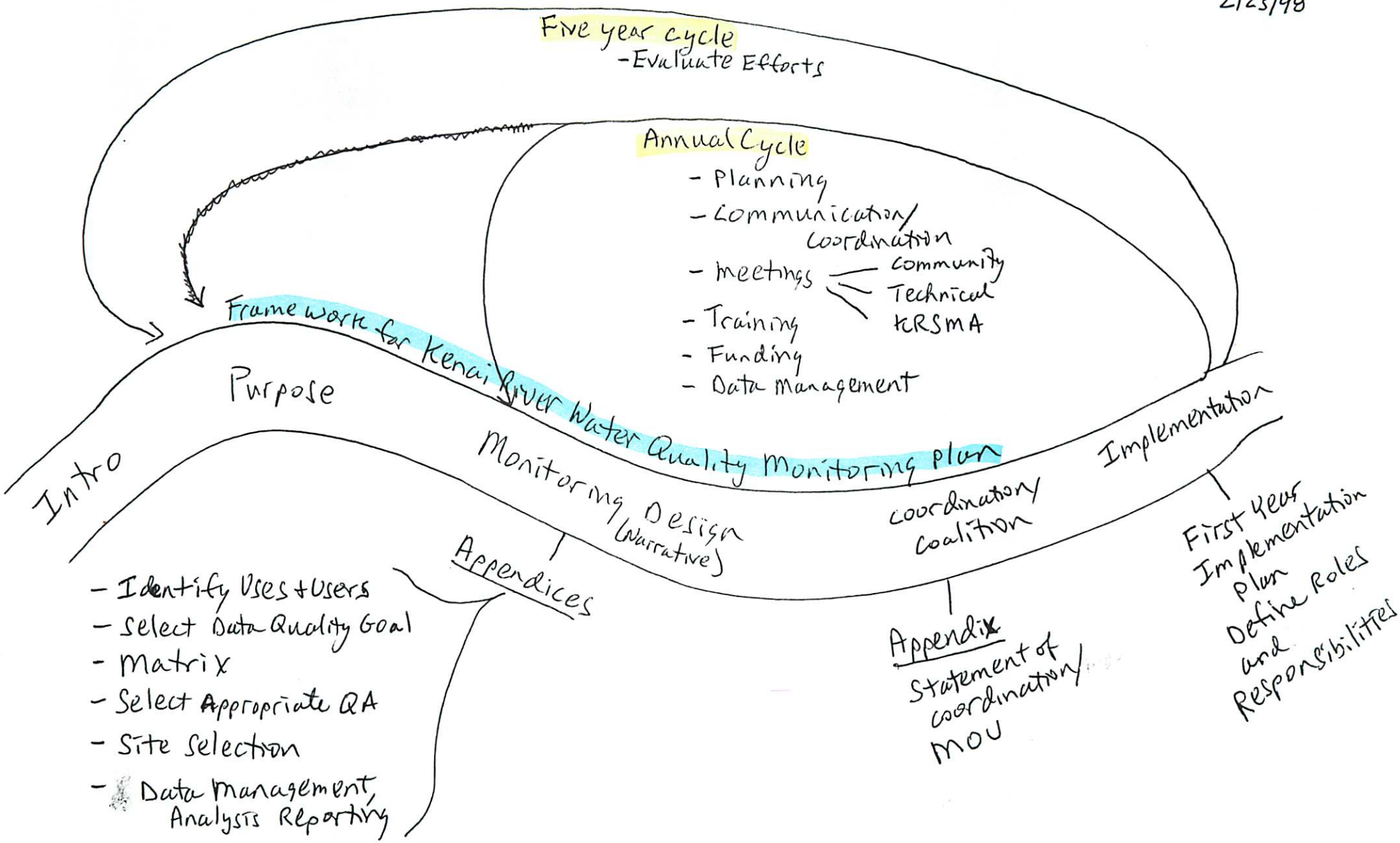
→ Phil → TNC Canton Rd. letter
→ FAX 283-8158

→ WQ monitoring for Upper River
letter of support

→ Wetland Inventory → EPA
50's, 60's, 70's

Feb. 26

2/23/98


Five year cycle
-Evaluate Efforts
Annual Cycle
- Planning
- Communication/ Coordination
- meetings
community
Technical
KRSMA
- Training
- Funding
- Data Management
Framework for Kenai River Water Quality Monitoring plan
Intro
Purpose
Monitoring Design (Narrative)
Implementation
coordination/ coalition
Appendices
- Identify Uses + Users
- Select Data Quality Goal
- Matrix
- Select Appropriate QA
- Site Selection
- Data Management, Analysis Reporting
Appendix
Statement of coordination/ MOU
First Year Implementation Plan
Define Roles and Responsibilities

KENAI RIVER WATER QUALITY MONITORING PLAN
WATERSHED CHARACTERISTICS
December 15, 1997

Watershed characteristics includes relevant information that might help in developing the monitoring plan or interpretation of collected data. The relationship between land use and water quality is based on information on the natural ecosystem, land use, population, and potential or actual sources of pollution.

1. Hydrologic System

   - Hydrologic Subsystems
   - Discharge Characteristics
   - Water Quality Characteristics
   - Sampling Locations

2. Aquatic Resources

   - Fisheries - WQ correlation with fish count
   - Macroinvertebrates

3. Human Use

   - Population Growth
   - Patterns of Growth
   - Land Ownership
   - Land Use
   - Potential/Actual Sources of Pollution

A desired outcome of the watershed characterization is an understanding of the existing and potential trends in land use and their impacts on water quality.

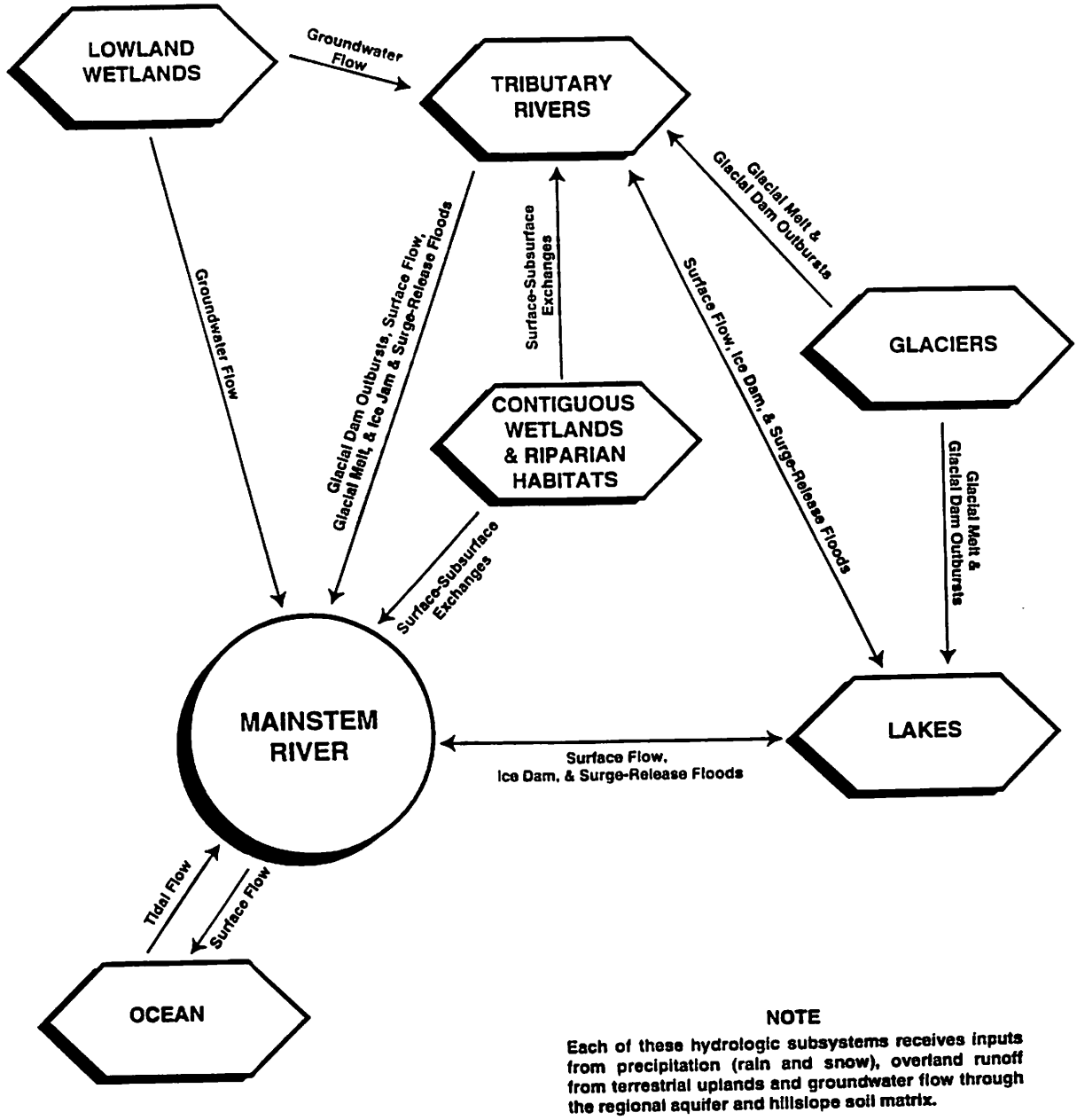
Based on your knowledge of the Kenai River watershed and the Work Group discussion:

1. What additional information needs to be collected to describe existing conditions?

2. Describe potential trends that are emerging that could affect water quality?

These answers will be used to guide the development of the rest of the plan.

Figure 2-1
Conceptual Hydrologic Model: Kenai River Watershed



NOTE

Each of these hydrologic subsystems receives inputs from precipitation (rain and snow), overland runoff from terrestrial uplands and groundwater flow through the regional aquifer and hillslope soil matrix.

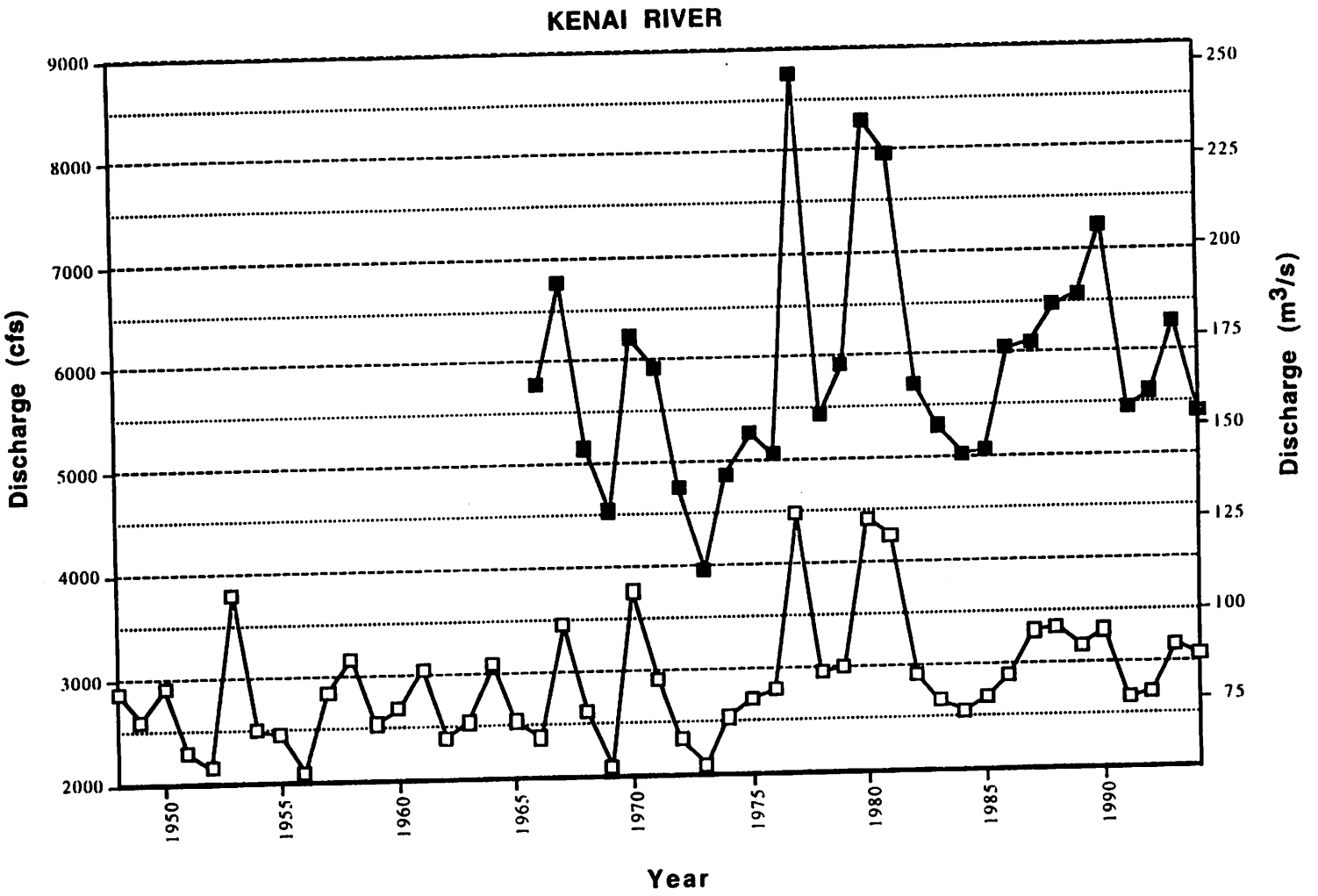


Figure 3. Mean annual Kenai River discharge recorded at the Cooper Landing (lower line) and Soldotna USGS gauging stations.

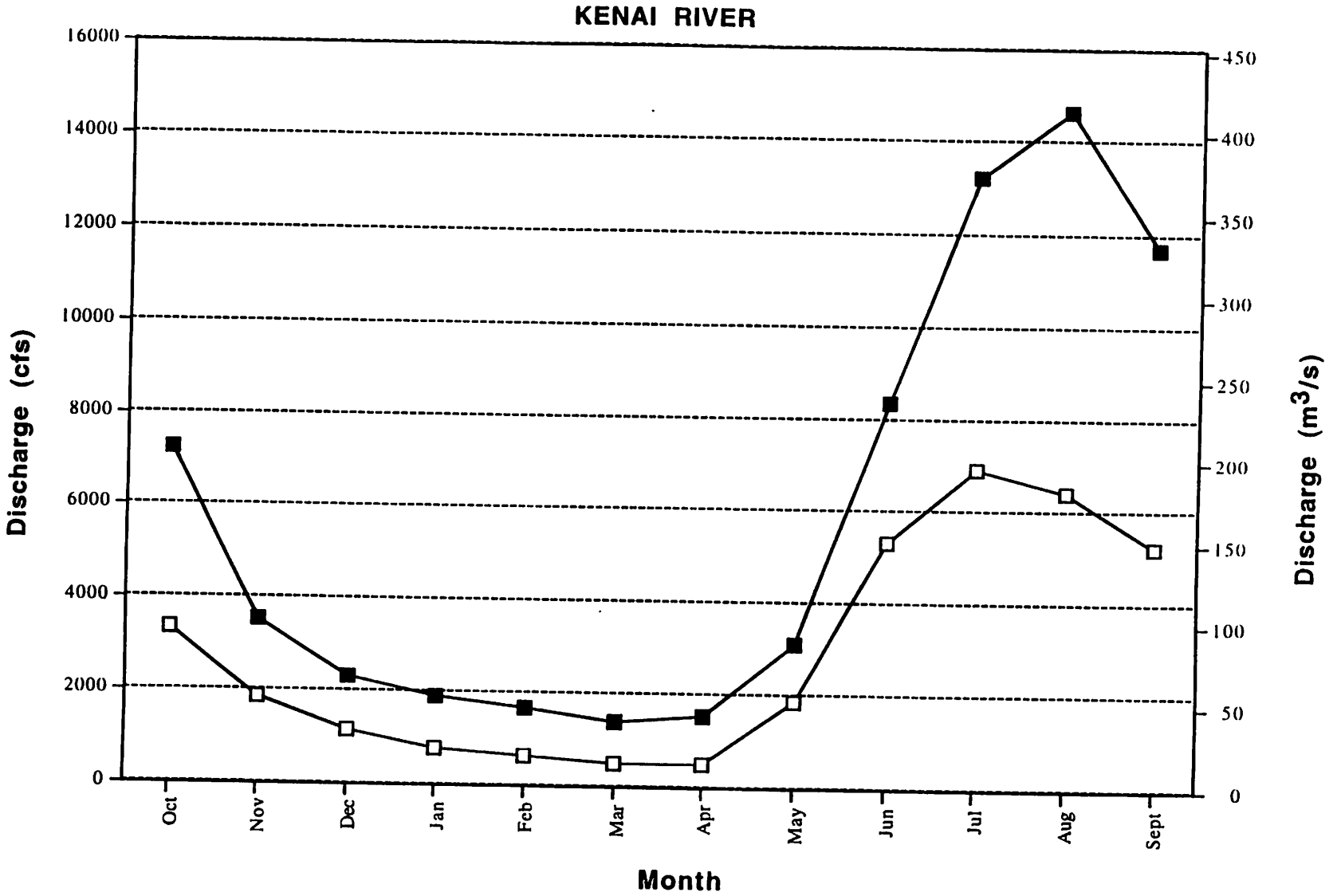


Figure 4. Mean monthly Kenai River discharge at Cooper Landing (1948-1994) and Soldotna (1966-1994).

POPULATION GROWTH AND TOURISM TRENDS

Population growth of communities along the Kenai River has increased 182 percent since 1970 (Table 1). The community of Sterling and the City of Soldotna have experienced substantial population increases (438 percent and 231 percent respectively) since 1970.

Table. 1 Kenai River Population Growth, 1970 - 1995.

City/Census Area	1970	1980	1985	1990	1995
Cooper Landing	--	116	386	243	283
Sterling	--	919	1,732	3,802	4,949
Ridgeway	--	--	--	2,018	2,312
Soldotna (city)	1,202	2,320	3,818	3,482	3,990
Kenai (city)	3,533	4,324	6,518	6,327	7,006
TOTAL BOROUGH	16,586	25,282	39,144	40,802	46,759

Source: Alaska Department of Labor.

VISITOR USE AND TRENDS

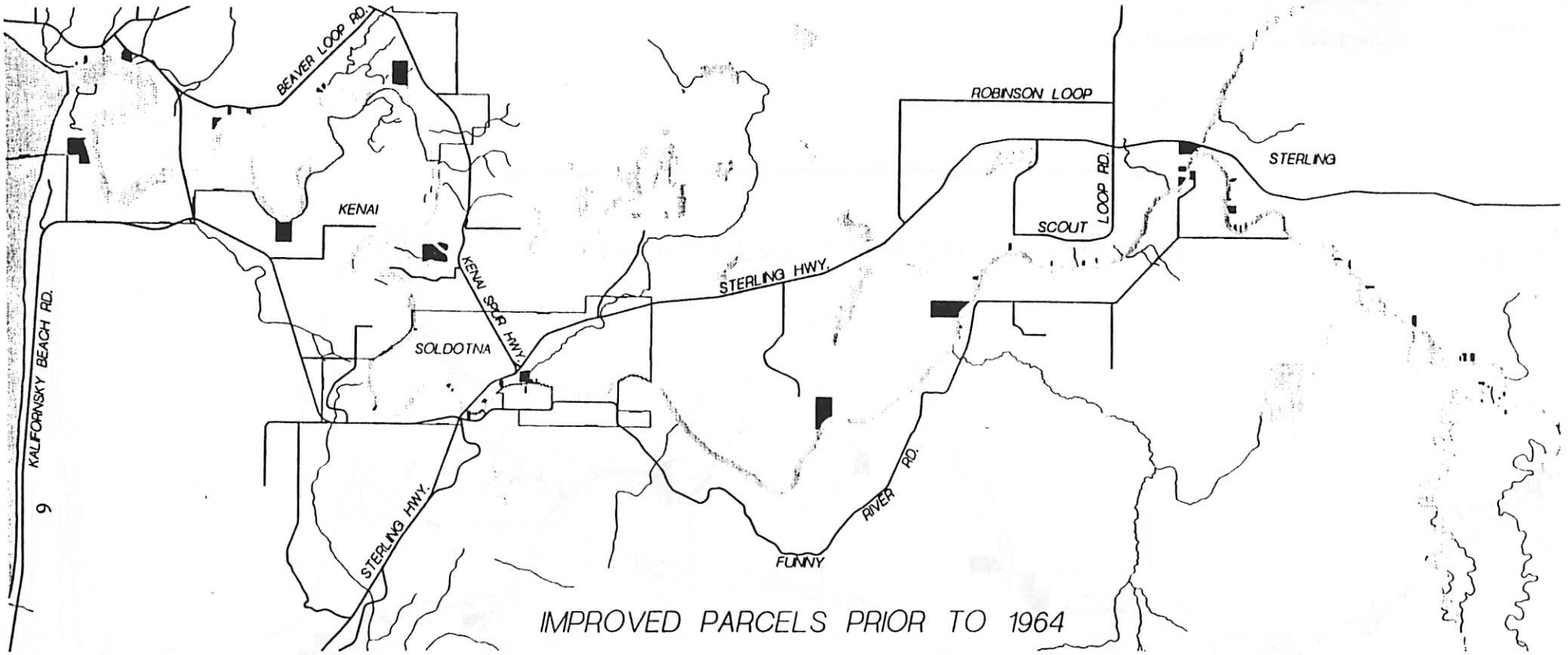
The number of vistors to the Kenai River increased 36 percent from 1989 to 1993 (Table 2). The largest concentration of visitors to the Kenai Peninsula is from the Anchorage area. While Alaska residents comprise the majority of Kenai River visitors, data indicates overall use may be stabilizing and even reducing in average length of stay and number of visits annually. In contrast, non-resident visitor numbers show substantial growth.

Table 2. Visitor trends on the Kenai Peninsula, 1989 and 1993.

Summer 1989		Summer 1993		
Number of Visitors	% of All Visitors to Alaska	Number of Visitors	% of All Visitors to Alaska	% Increase in Visitor Numbers, 1989-1993
121,300	23%	165,100	20%	36%
160,400	31%	185,000	22%	15%

Source: The McDowell Group, Alaska Visitor Statistics Program.

For further information: Emily Dekker-Fiala, KNWR, (907) 262-7021



Parcels shown depict 101 improved waterfront parcels along the Kenai River prior to 1964.

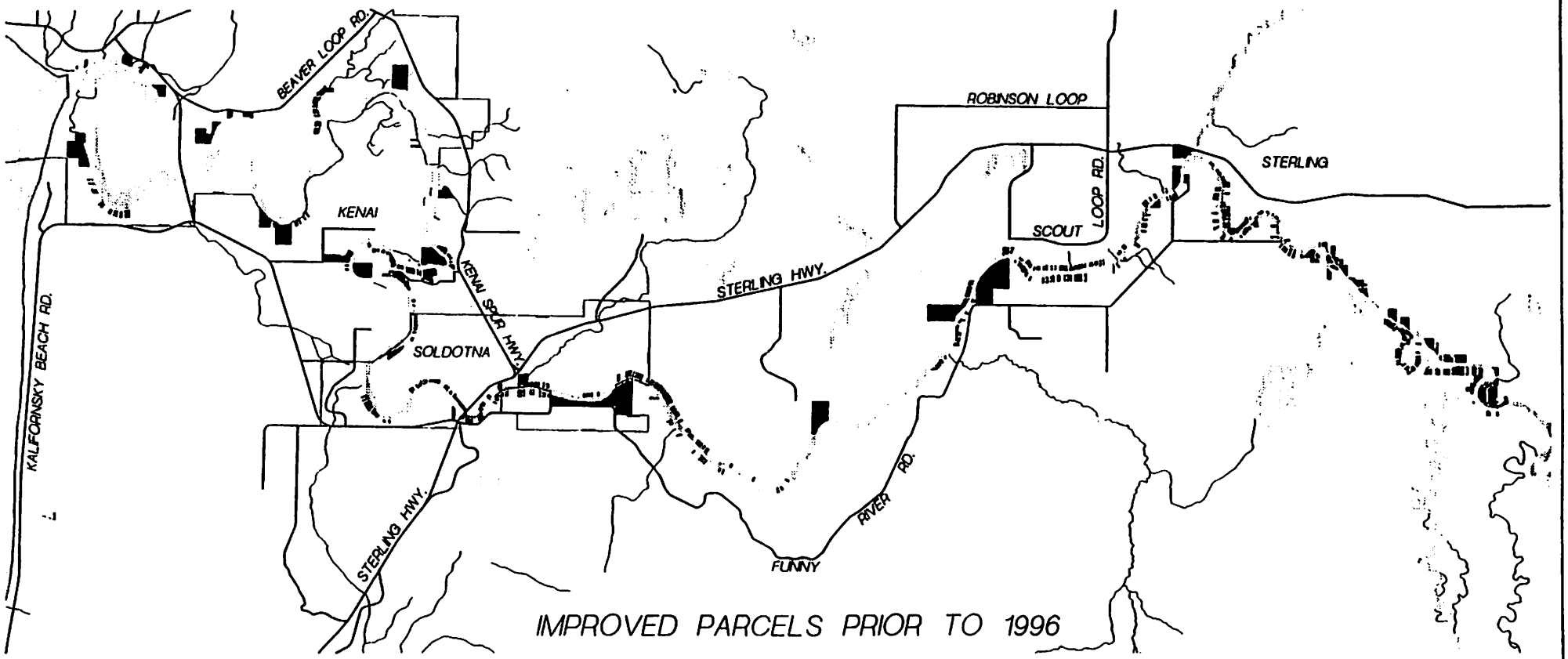
REVISION BLOCK

NORTH

KENAI PENINSULA BOROUGH
GIS DIVISION
KENAI RIVER DEVELOPMENT
FIGURE 2

SCALE: 1" = 1.5 MI | DATE: 3/1/1996

Figure 2: 101 Improved waterfront parcels along the Kenai River prior to 1964.



Parcels shown depict 944 improved waterfront parcels along the Kenai River prior to 1996.

DEVISION BLOCK

NORTH

KENAI PENINSULA BOROUGH
GIS DIVISION
KENAI RIVER DEVELOPMENT
FIGURE 3
SCALE 1" = 1.5 MI
DATE 3/1/1998

Figure 3: 944 Improved waterfront parcels along the Kenai River prior to 1996.

quantitative method of evaluating the value of wildlife and recreation on the Kenai National Wildlife Refuge.

More recent land use trends along portions of the lower Kenai River corridor have been mapped or summarized (Lehner 1992, Liepitz and Muhlberg 1993, Liepitz 1994). All of the state river-access sites have been badly overused, and 1/2 of private land have some level of human development. The development included banks disturbed by trampling, grazing, cleared land, buildings, roads, and river access. However, federal, state and City of Kenai lands were in an undeveloped status.

Bank trampling was extensive on federal lands. Interpretations of aerial photography of the Kenai River from 1963-1964 was compared to 1993 field surveys to evaluate rates of development. Results indicated that over 76% of the modified banks and structures that were observed in the 1993-1994 field surveys have been introduced since 1963-1964. The majority of these changes were due to increased bank stabilization efforts and the construction of boat docks and groins or jetties.

The most recent land-ownership information on water frontage from the lower Kenai River corridor (Liepitz 1994) was assessed by the Alaska Department of Fish and Game (Table 30). Thirty-three percent was privately owned, the Federal Government owned 30%, 19% was owned by the State of Alaska, Native corporations owned 9%, and local governments owned 9%.

Table 30. The land-ownership status of water frontage along the lower Kenai River (from Liepitz 1994).

Ownership	Percent of river frontage	Kilometers of river frontage
U.S. Kenai National Wildlife Refuge	23	61
U.S. Chugach National Forest	7	21
Private residential	28	74
State of Alaska	19	50
Cook Inlet Region, Inc., and Salamatof Native Corporation	9	21
City of Kenai	8	22
Private commercial	5	11
Soldotna, and Kenai Peninsula Borough	1	2

VEGETATION

Post-pleistocene vegetation information for the region was described and is of interest for understanding vegetation change. Some of the available information included the history of vegetation in the Cook Inlet region since de-glaciation (Ager et al. 1985), a study of the so-called Kenai flora of Alaska (Hollick 1911), a review of late-Pleistocene environments of North Pacific North America (Heusser 1960), and a history of Holocene vegetation in Alaska (Ager 1983). The information was general in nature.

CLASSIFICATION

Various vegetation based classifications have been developed within the Kenai River watershed at the community type level (level V from Viereck et al. 1992) and lower hierarchical levels (levels I-IV; Batten et al. 1978, Eldridge

Table 2-1
Ecosystem-Based Subsystem/Stresses Matrix

An assessment of the extent to which the identified 11 stresses contribute to stress in each subsystem. The value represents the assessed potential magnitude of negative effect of the stress on the particular system. 1 = low; 2 = medium; 3 = high; N/A = not applicable (not included in average).

SUBSYSTEMS	STRESSES											
	Impede Migration	Eutrophi-cation	Habitat Degrada-tion	Ground-water Flow Alteration	Surface Water Flow Alteration	Tempera-ture Altera-tion	Altered Biological Assem-blages	Altered Escape-ment	Sediment-ation	Altered Water Chemis-try	Habitat Fragment-ation	Total/ Average
Lakes	2	3	3	1	2	3	2	2	1	2	1	22/2
Mainstem Riverine	2	2	2	2	3	2	2	2	2	2	2	23/2.09
Tributary Riverine	2	2	2	2	3	2	2	2	2	2	2	23/2.09
Contiguous Wetlands and Riparian	2	3	3	3	3	2	3	2	2	3	3	29/2.64
Lowland Wetlands	1	2	2	2	3	2	3	1	1	2	2	21/1.91
Estuarine	2	2	2	1	3	1	1	2	1	2	2	19/1.73
Ocean	1	1	1	N/A	1	1	1	1	1	1	1	10/1
Upland Terrestrial	1	N/A	3	1	2	2	3	1	N/A	N/A	2	15/1.87
Total	**13**	**15**	**18**	**12**	**20**	**15**	**17**	**13**	**10**	**14**	**15**	
Average Score (excludes N/A's)	**1.63**	**2.14**	**2.25**	**1.71**	**2.5**	**1.86**	**2.13**	**1.63**	**1.43**	**2**	**1.88**	

Table 2-3
Ecosystem-Based Stresses/Sources Matrix

The assessed negative value for the 22 human activities or structures. The value is the potential magnitude of negative effect of the stress on the particular system. 1 = low; 2 = medium; 3 = high; N/A = not applicable (not included in average).

SOURCE OF STRESS	STRESS											
	Impede Migration	Eutrophication	Habitat Degradation	Groundwater Flow Alteration	Surface Water Flow Alteration	Temperature Alteration	Altered Biological Assemblages	Altered Escapement	Sedimentation	Altered Water Chemistry	Habitat Fragmentation	Total/ Average
Groins	2	N/A	1	N/A	N/A	N/A	1	1	1	N/A	1	7/1.17
Boat basin	1	1	1	N/A	N/A	1	N/A	N/A	1	1	1	7/1
Culvert	1	1	2	N/A	3	1	1	1	2	1	2	15/1.5
Septic	N/A	3	1	1	N/A	N/A	2	N/A	N/A	3	1	11/1.83
Groundwater pumping	1	1	2	3	2	1	1	N/A	N/A	1	1	13/1.44
Wetland drain/fill	2	3	3	2	3	1	3	N/A	3	3	3	26/2.6
Contaminants	1	1	2	N/A	N/A	N/A	1	N/A	N/A	3	1	9/1.5
Channelization	1	N/A	2	1	2	1	1	N/A	2	1	1	12/1.33
Boat wakes	1	N/A	1	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	3/1
Bank trampling	1	1	1	1	1	1	1	N/A	2	1	1	11/1.1
Riparian vegetation removal	2	1	3	1	2	2	2	N/A	2	1	2	18/1.8
Commercial fishing	1	1	N/A	N/A	N/A	N/A	1	3	N/A	1	N/A	7/1.4
Angling	1	1	N/A	N/A	N/A	N/A	1	3	N/A	1	N/A	7/1.4
Timber harvest	2	2	2	2	3	2	3	N/A	3	2	3	24/2.4
Anchor dragging	1	N/A	1	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	3/1
Alien species introduction	1	1	2	N/A	1	N/A	3	N/A	N/A	1	1	10/1.43
Sw diversion	2	1	2	2	3	2	1	N/A	2	2	2	19/1.9
Sand/gravel extraction	1	1	3	1	2	1	1	N/A	3	2	2	17/1.7
Boat launch	1	N/A	1	N/A	N/A	1	N/A	1	1	1	1	7/1
Bank alteration	1	1	2	1	1	1	1	1	1	N/A	1	11/1.1
Road construction	2	2	3	2	3	1	2	1	3	3	3	25/2.27
Land development	3	1	3	2	3	2	2	1	2	2	3	24/2.18
Total	**29**	**23**	**38**	**19**	**29**	**18**	**28**	**12**	**30**	**30**	**30**	
Average source score	**1.38**	**1.35**	**1.9**	**1.58**	**2.23**	**1.29**	**1.56**	**1.5**	**1.88**	**1.67**	**1.67**	

POTENTIAL/ACTUAL SOURCES OF POLLUTION

RM ~44	Kenai Keys	Subdivision along Kenai River
RM ~36.4	Moose River Bridge Sterling Hwy	DOT/PF stormwater outfalls into Moose River
RM ~22	Soldotna Airport	Airport runway and apron runoff, outfall to Kenai River
Soldotna Cr.	Fred Meyer	Parking lot runoff, outfall to Soldotna Creek
RM ~21.6	DOT/PF Yard	Drains to river, undergoing site characterization for UST
RM~21.5	Highway Outfall	DOT/PF stormwater outfall into Kenai River
RM ~21.2	River Terace	Contaminated site
RM ~21.1	Soldotna Bridge	DOT/PF stormwater outfall into Kenai River
RM ~20.8	City of Soldotna	Municipal Treatment Plant Outfall into Kenai River
RM ~20.6	Kobuk St	City of Soldotna stormwater outfall into Kenai River
RM ~18.0	Mary Dale St	City of Soldotna stormwater outfall into Kenai River
RM ~ 17.4	Knight Drive	City of Soldotna stormwater outfall into Kenai River
RM ~14.3	Big Eddy	DOT/PF stormwater outfall into Kenai River
RM ~1.0	Processor Creek	DOT/PF stormwater outfall into Kenai River
	KMart/Carrs	Parking lot runoff

KENAI RIVER WATER QUALITY MONITORING PLAN
GOALS AND OBJECTIVES
November 24, 1997

The group agreed upon these draft goals for the plan (from 11/11/97 meeting):

Develop an approach to water quality monitoring (that is) concerned with the ~~continued~~ health of the Kenai River.

~~Develop~~ a coordinated water quality monitoring plan, implementation strategy and evaluation assessment that enjoys broad support

There was discussion of two draft objectives to achieve the goals of the plan (from 11/11/97 meeting):

1. The Coalition is to coordinate water quality monitoring for effective management of the fishery and wildlife resources, habitat areas, recreational, and development activities in the Kenai River watershed.'

2. Develop a description/definition for the phrase 'health of the river,' consider the following:
   - protection of biodiversity
   - support of human activity
   - ability of system to restore itself to equilibrium after a disturbance
   - sustainability of the river
   - a healthy river contributes to a healthy economy

- Consider these goals and objectives in the context of the Kenai River Comprehensive Management Plan goals (Section 4.3 & 4.4, page 38; Section 4.5.5, pages 74 & 75; Section 4.5.10, pages 94-96).

- Consider them in context of the Upper Kenai River Cooperative Plan description of limits of acceptable change.

- Are there goals and objectives from other plans that should be considered in developing the ones for this plan?

Please discuss the draft goals and objectives, then:

1. Review and revise these goals.

2. Review and revise these objectives. What additional objectives are needed?

These answers will be used to guide the development of the rest of the plan.

A refresher on goals and objectives
From the Kenai River Comprehensive Management Plan

4-1 Goals are intended to describe desired end states. Objectives are meant to be more precise descriptions of that end state or of the means to achieve a goal. Both are to be distinguished from standards and policies. Standards are the thresholds (oftentimes quantitative) used to define objectives or are performance criteria used to measure success in achieving an objective. Policies are those statements (usually qualitative) that guide decision making in the management of some process -- in this case, river management. The Management Plan includes the use of all of these components -- goals, objectives, standards, and policies.

KENAI RIVER WATER QUALITY MONITORING PLAN
ELEMENTS OF THE PLAN (DRAFT)
November 21, 1997

Issues and Concerns Related to Water Quality
Identify the issues raised by the community, industry, river front property owners, agency staff. Include issues are raised by other plans.

Goal(s), a Description of Desired Future Condition, and Objectives
Describe the goal of this plan. Include a description of a 'desired future condition.' (see other plans.) Identify objectives to achieve the goal(s) of the plan.

Coalition 'Structure' and Operations
Describe what form the coalition will have, how it coordinates among its members and process for making decisions.

Watershed Characteristics Relevant to Water Quality Monitoring.
Collect relevant information that might help in the monitoring design or interpretation of collected data.

Indicators of Water Quality
Identify the indicators to be used in the monitoring program.

Develop Sampling Design
The sampling design must provide answers to: Why sample? What to sample? When to sample? Where to sample? How many samples?

Quality Assurance/Quality Control Program
Describe field sample collection methods, sample processing, laboratory analysis, data validation, data entry and management, statistical analyses, and data interpretation and reporting.

Training and Education.
Describe training needs for people taking samples and managing data. Describe education needs for community on presenting the results of water quality monitoring.

Data Management Plan
Describe the recording process for collecting, analyzing, reporting, transferring, and storing data. This would also include making the data available for potential users.

Implementation Strategy
List the recommended tasks and develop a schedule of who is to do what by when. Identify sources of funding.

Evaluation Assessment
Describe how the monitoring activities will be evaluated to ensure they are meeting the goals of the plan. Include a means for revising the plan.

KENAI RIVER WATER QUALITY MONITORING PLAN
DEVELOP SAMPLING DESIGN
November 24, 1997

Water Quality monitoring can be grouped into the following general purposes:

1. Describing status and trends.
   For example: USGS data collection
   ADF&G baseline sampling
   Volunteer monitoring

   To measure the natural variability, through watershed + seasonal + understand status of land use + correlation w/ WQ. Develop baseline data

2. Describing and ranking existing and emerging problems.
   For example: Trout Unlimited storm drain sampling

3. Designing management and regulatory programs.
   For example: UAA bioassessment monitoring
   Corp of Engineers permitting

4. Evaluating program effectiveness.
   For example: Upper River Cooperative Plan

5. Responding to emergencies.
   For example: ADEC enforcement monitoring

6. Community education
   For example: Adopt-a-Stream
   Volunteer monitoring

For each one of these general purposes:

1. Discuss what each purpose means for a Kenai River WQ Monitoring Plan.

2. Add to the list of examples of who is doing what within each purpose (some may be listed for more than one purpose).

3. Develop criteria for each purpose that can be used with our existing knowledge of the river to select locations and priorities for water quality sampling.

These answers will be used to identify specific areas of the river for specific kinds of monitoring by specific organizations.

KENAI RIVER WATER QUALITY MONITORING PLAN
INDICATORS OF WATER QUALITY
December 15, 1997

Indicators provide information on environmental and ecosystem quality or give reliable evidence of trends in quality. An environmental indicator is, "a measurable feature which singly or in combination provides managerial and scientifically useful evidence of environmental and ecosystem quality or reliable evidence of trends in quality."

Indicators encompass a broad suite of measures that include tools for assessment of physical, chemical/toxicological, and biological/ecological conditions and processes at several scales. Water quality standards are one of the most common indicators used by agencies.

Of primary importance is that the indicator must be able to meet the objectives of the plan. Selection of indicators should consider:

1. Scientific Validity - the methodology should be produce data that are valid and quantitative or qualitative and allow for comparisons on temporal and spatial levels.

2. Practical Considerations - includes monitoring costs, availability of experienced personnel, generally accepted methods, the practical application of technology, and the environmental impacts caused by the monitoring.

3. Programmatic Considerations - includes relevance of the indicator to objectives of the plan, can the indicator be communicated to decision makers and the general public, and do the indicators include the range of environmental conditions that can be expected.

Based on your knowledge and the Work Group discussion of the watershed characteristics:

1. Should the plan select indicators based on the suspected pollutant sources? Or should the plan include a broader range of indicators to describe the ecosystem?

2. Should the monitoring plan include indicators of watershed management in addition to indicators of water quality?

These answers will be used in developing the sampling design.

Table 1. Sampling Guidelines for Suspected Pollutant Sources.
1 = normally useful; 2 = occasionally useful; 3 = seldom useful; "-" = generally not useful (Huntamer and Hyre 1991).

	Agricul. Runoff	Primary WTP	Secondary WTP	Advanced WTP	Receiving Waters	Drinking Water	Domestic Wells	Stream Samples	Marine Samples	Brewery	Cooling Water	Boiler Water	Steam & Electric
PHYSICAL AND GENERAL INORGANICS													
Turbidity	1	-	-	-	2	1	1	2	2	1	-	-	-
pH	1	1	1	1	1	1	1	1	2	1	1	1	2
Conductivity	2	1	1	1	1	2	1	1	3	-	1	1	-
Total Alkalinity	3	-	1	1	2	2	2	2	2	-	-	1	-
Acidity	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, Total	3	-	-	-	2	-	2	2	-	-	1	1	-
Chloride	3	-	-	-	3	1	1	2	-	-	1	1	-
Fluoride, Total	-	-	-	-	-	1	1	-	-	-	2	-	-
Sulfate	-	-	-	-	-	2	2	-	-	-	-	2	-
Cyanide, Total	3	-	-	-	3	-	3	3	-	-	2	2	2
Color	2	-	-	-	3	2	2	3	3	1	-	-	-
Salinity	-	-	-	-	-	-	-	-	1	-	-	-	-
OXYGEN DEMAND AND CARBON													
BOD_5	-	1	1	1	1	1	-	2	-	1	-	-	-
BOD_5-Carboneous	-	3	1	2	2	-	-	-	-	-	-	-	-
COD-Chemical Oxygen Demand	2	1	1	1	3	-	3	2	-	1	-	-	-
TOC-Total Organic Carbon	2	2	2	2	2	-	3	3	2	-	-	-	-
SOLIDS													
TSS-Total Suspended Solids	-	1	1	1	1	-	3	1	2	1	1	1	1
TS-Total Solids	-	1	1	1	-	-	-	-	-	-	-	-	-
TVSS Volatile Solids	-	3	1	1	-	-	-	-	3	-	-	-	-
SS Settleable Solids	3	1	1	1	2	-	3	3	3	1	-	-	-
Percent Total Solids	-	1	1	1	-	-	-	-	-	-	-	-	-
NUTRIENTS													
Ammonia	1	1	1	1	1	1	1	1	1	2	1	1	1
Nitrate-Nitrite	1	1	1	1	1	1	1	1	1	1	1	1	-
Total Phosphorus	1	1	1	1	2	-	3	1	1	1	2	2	2
Soluble Reactive Phosphorus	1	2	2	2	2	-	-	1	1	-	1	1	-
TKN Kjeldahl Nitrogen	-	3	3	3	3	-	-	-	3	-	-	-	-
BIOLOGICAL													
Fecal Coliform Bacteria	1	1	1	1	1	1	1	1	1	1	-	-	1
Total Coliform Bacteria	-	-	-	-	3	-	-	-	-	-	-	-	2
Fish Bioassay	-	-	-	-	-	-	-	-	-	-	-	-	-
Percent Lipids	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1. Continued.

	Agricult. Runoff	Primary WTP	Secondary WTP	Advanced WTP	Receiving Waters	Drinking Water	Domestic Wells	Stream Samples	Marine Samples	Brewery	Cooling Water	Boiler Water	Steam & Electric
GC/MS ORGANIC SCANS													
Base-Neutrals/Acids	-	2	2	2	2	-	-	2	-	-	1	1	-
Base-Neutrals Only	-	-	-	-	-	-	-	-	-	-	-	-	-
Acids Only	-	-	-	-	-	2	-	-	-	-	-	-	2
Volatile Organics	-	2	2	2	2	3	1	2	-	-	1	-	-
GC ORGANIC SCANS													
Pesticides/PCBs	1	2	2	2	2	2	-	2	-	-	-	-	-
PCBs Only	-	-	-	-	-	-	-	-	-	-	2	2	1
Purgeable Halocarbons	2	-	-	-	-	-	1	2	-	-	-	-	-
Herbicides	1	-	-	-	-	2	-	2	-	-	-	-	-
MISCELLANEOUS ORGANICS													
PAH Polycyclic Aromatics	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil Identification	-	-	-	-	3	-	-	-	-	-	-	-	2
Phenolics	3	3	3	3	3	1	3	3	3	-	2	2	1
Oil & Grease	3	-	-	-	3	-	3	-	3	1	1	1	1
Flashpoint	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons	-	-	-	-	-	-	-	-	-	-	-	-	-
TOX	1	-	-	-	1	2	-	-	-	1	-	-	-
Trihalomethanes	-	2	2	2	-	2	3	3	-	-	-	-	-
METALS													
Priority Pollutant Metals	-	-	-	-	-	-	-	-	-	-	-	-	-
EP TOX Metals	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific Metals													
Copper	-	1	1	1	1	2	2	2	3	-	1	1	1
Nickel	-	-	-	-	1	-	-	-	3	-	2	1	1
Chromium	-	2	2	2	2	2	2	3	2	-	2	2	2
Lead	-	2	2	2	2	2	2	2	2	-	2	2	1
Zinc	-	1	1	1	2	2	2	2	3	-	2	2	1
Cadmium	-	1	1	1	1	2	2	2	2	-	-	-	-

Table 1. Continued.

	Paint & Ink	Aluminum Mill Effluent	Landfill Leachate	Toxic Waste Sites	Chemical Plants	Inorganic Chemicals	Oil Refineries	Ground Water	Timber Industry	Electro-plating	Car Washes	Meat Prod. Industry	Pulp Mill Effluent
PHYSICAL AND GENERAL INORGANICS													
Turbidity	-	2	2	2	-	-	2	-	-	-	1	1	2
pH	2	1	1	1	1	1	1	1	1	1	1	1	1
Conductivity	-	1	1	1	-	1	1	1	-	-	-	-	-
Total Alkalinity	-	3	2	-	-	-	3	2	-	-	1	-	2
Acidity	-	-	-	-	-	-	-	2	-	-	-	-	-
Hardness, Total	-	3	3	2	-	-	3	2	-	-	-	-	3
Chloride	-	3	1	-	-	1	2	1	-	-	-	-	3
Fluoride, Total	1	1	-	-	1	-	-	2	-	-	-	-	-
Sulfate	-	-	3	-	1	-	-	2	-	-	-	-	-
Cyanide, Total	-	2	3	2	1	1	2	2	-	-	-	-	3
Color	-	3	2	-	-	-	2	2	1	-	-	1	2
Salinity	-	-	-	-	-	-	-	-	-	-	-	-	-
OXYGEN DEMAND AND CARBON													
BOD_5	-	-	-	-	-	-	-	-	-	-	-	-	-
BOD_5 Carbonaceous	-	-	-	-	-	-	-	-	-	-	-	-	-
COD-Chemical Oxygen Demand	1	3	1	1	1	2	1	-	1	1	1	1	1
TOC-Total Organic Carbon	1	3	2	2	1	-	1	2	2	-	-	-	1
SOLIDS													
TSS-Total Suspended Solids	-	1	2	-	1	1	1	2	1	1	1	1	-
TS-Total Solids	-	1	2	-	-	1	2	2	2	-	-	-	-
TVSS-Volatile Solids	-	-	-	-	-	-	-	-	2	-	-	-	-
SS-Settleable Solids	-	3	3	-	-	-	3	-	1	-	-	1	1
Percent Total Solids	-	-	-	-	-	-	-	-	-	-	-	-	-
NUTRIENTS													
Ammonia	-	2	1	-	1	2	1	1	2	-	2	1	2
Nitrate-Nitrite	-	-	2	-	-	2	2	2	-	-	-	-	2
Total Phosphorus	-	2	3	-	-	-	2	2	-	-	1	1	2
Soluble Reactive Phosphorus	-	-	-	-	-	-	-	-	-	-	-	-	-
TKN Kjeldahl Nitrogen	-	-	-	-	-	-	-	-	-	-	-	-	-
BIOLOGICAL													
Fecal Coliform Bacteria	-	3	3	-	-	-	-	-	-	-	-	1	-
Total Coliform Bacteria	-	-	-	-	-	-	1	-	-	-	-	2	-
Fish Bioassay	-	-	-	2	-	-	1	-	-	-	-	2	-
Percent Lipids	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1. Continued.

	Paint & Ink	Aluminum Mill Effluent	Landfill Leachate	Toxic Waste Sites	Chemical Plants	Inorganic Chemicals	Oil Refineries	Ground Water	Timber Industry	Electro-plating	Car Washes	Meat Prod. Industry	Pulp Mill Effluent
GC/MS ORGANIC SCANS													
Base-Neutrals/Acids	1	-	2	1	1	-	1	2	3	-	-	-	2
Base-Neutrals Only	-	-	-	-	-	-	-	-	-	-	-	-	-
Acids Only	3	-	-	-	1	2	2	-	1	-	-	2	-
Volatile Organics	1	1	1	1	1	1	1	2	3	-	-	-	1
GC ORGANIC SCANS													
Pesticides/PCBs	-	-	-	1	1	-	2	2	2	-	-	-	2
PCBs Only	-	-	-	1	2	-	-	3	-	-	-	-	1
Purgeable Halocarbons	1	-	-	2	-	-	-	1	-	-	-	-	-
Herbicides	1	-	-	2	2	-	-	2	1	-	-	-	1
MISCELLANEOUS ORGANICS													
PAH Polycyclic Aromatics	1	-	-	2	-	-	-	2	2	-	-	-	-
Oil Identification	-	-	-	-	-	-	1	2	-	-	-	-	-
Phenolics	1	2	2	2	1	2	1	2	1	-	-	1	2
Oil & Grease	1	2	3	2	1	1	1	2	1	1	1	1	2
Flashpoint	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons	-	-	3	2	-	-	-	3	-	-	-	-	-
TOX	-	-	-	-	-	-	-	1	-	-	-	1	1
Trihalomethanes	-	-	-	-	-	-	-	2	-	-	-	-	-
METALS													
Priority Pollutant Metals	-	-	1	1	1	-	-	-	-	-	-	-	-
EP TOX Metals	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific Metals													
Copper	1	2	2	2	1	2	2	1	1	2	1	1	-
Nickel	-	2	2	2	1	2	2	-	1	-	1	-	-
Chromium	2	2	2	-	1	-	-	1	-	-	1	2	-
Lead	2	2	2	2	1	2	2	2	-	2	1	2	-
Zinc	2	2	2	1	1	2	2	2	1	2	1	2	-
Cadmium	2	2	2	2	1	2	2	2	2	-	-	2	-

Table 1. Continued.

	Leather Tanning	Cement/Concrete Industry	Iron/Steel Industry	Hazardous Waste	Organic Pesticides	Cooling Tower Blowdown	Boiler Blowdown	Sediment Samples	Fish & Shellfish	Electronics Industry	Chemical Spills	Acid Rain	Wood Treatment
PHYSICAL AND GENERAL INORGANICS													
Turbidity	-	-	-	-	-	-	-	-	-	-	-	1	1
pH	1	1	1	1	1	-	-	-	-	-	-	-	1
Conductivity	-	-	-	-	-	-	-	-	-	-	-	1	-
Total Alkalinity	-	1	-	-	2	-	-	-	-	-	-	1	-
Acidity	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, Total	-	-	1	-	2	-	-	-	-	-	-	-	-
Chloride	-	-	1	-	2	-	-	-	-	-	-	-	-
Fluoride, Total	-	-	-	-	-	-	-	-	-	-	-	1	-
Sulfate	-	-	1	-	1	1	-	-	-	-	-	-	-
Cyanide, Total	-	-	1	-	1	1	-	-	-	-	-	-	-
Color	1	-	-	-	-	-	-	-	-	-	-	-	-
Salinity	-	-	-	-	-	-	-	-	-	-	-	-	-
OXYGEN DEMAND AND CARBON													
BOD_5	-	-	-	-	-	-	-	-	-	-	-	-	-
BOD_5-Carbonaceous	-	-	-	-	-	-	-	-	-	-	-	-	-
COD-Chemical Oxygen Demand	1	2	-	-	1	-	-	-	-	-	-	-	1
TOC-Total Organic Carbon	1	-	-	2	1	-	-	1	-	-	-	-	2
SOLIDS													
TSS-Total Suspended Solids	1	1	1	-	1	1	-	-	-	-	-	-	-
TS-Total Solids	1	-	-	-	-	1	-	-	-	-	-	-	-
TVSS-Volatile Solids	1	-	-	-	-	-	-	-	-	-	-	-	-
SS-Settleable Solids	-	-	-	-	2	-	-	-	-	-	-	-	-
Percent Total Solids	-	-	-	-	-	-	-	1	1	-	-	-	-
NUTRIENTS													
Ammonia	1	-	1	-	-	1	2	-	-	-	-	1	-
Nitrate-Nitrite	-	-	-	-	2	-	-	-	-	-	-	-	-
Total Phosphorus	-	1	-	-	2	-	1	-	-	-	-	-	-
Soluble Reactive Phosphorus	-	-	-	-	-	-	-	-	-	-	-	-	-
TKN Kjeldahl Nitrogen	-	-	-	-	-	-	-	-	-	-	-	-	-
BIOLOGICAL													
Fecal Coliform Bacteria	-	-	-	-	-	-	-	-	2	-	-	-	-
Total Coliform Bacteria	-	-	-	-	-	-	-	-	-	-	-	-	-
Fish Bioassay	-	-	-	2	-	-	-	-	-	-	-	-	-
Percent Lipids	-	-	-	-	-	-	-	-	1	-	-	-	-

Table 1. Continued.

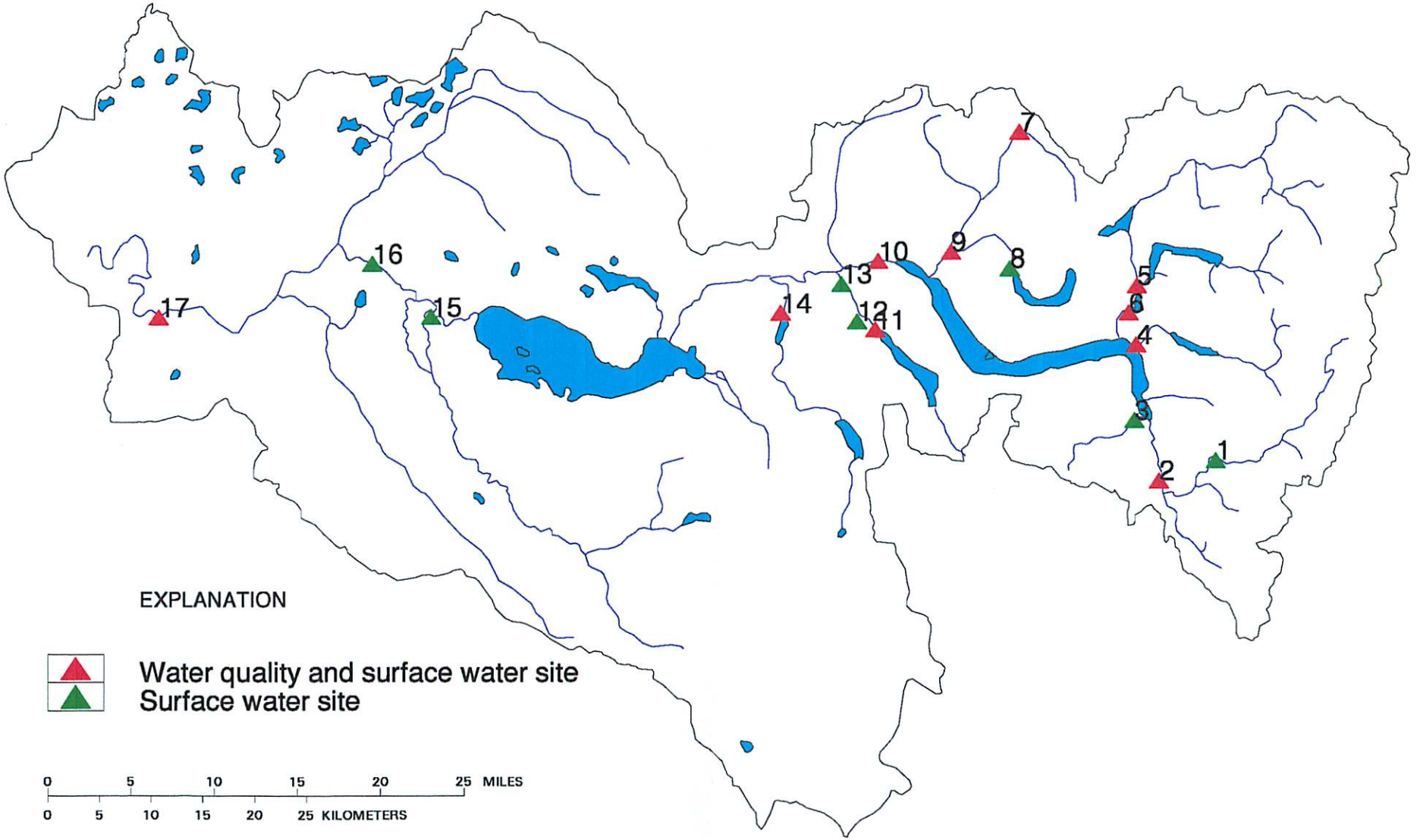
	Leather Tanning	Cement/Concrete Industry	Iron/Steel Industry	Hazardous Waste	Organic Pesticides	Cooling Tower Blowdown	Boiler Blowdown	Sediment Samples	Fish & Shellfish	Electronics Industry	Chemical Spills	Acid Rain	Wood Treatment
GC/MS ORGANIC SCANS													
Base-Neutrals/Acids	1	-	2	2	2	-	1	1	3	-	-	-	-
Base-Neutrals Only	-	-	-	-	-	-	-	-	-	-	-	-	-
Acids Only	-	-	1	2	3	-	1	-	-	-	-	-	1
Volatile Organics	-	-	-	1	2	2	-	2	3	-	-	-	1
GC ORGANIC SCANS													
Pesticides/PCBs	2	-	-	1	1	-	-	1	1	-	-	-	1
PCBs Only	-	-	-	2	-	-	-	1	1	-	-	-	-
Purgeable Halocarbons	-	-	-	2	2	2	-	-	3	-	-	-	-
Herbicides	-	-	-	2	1	-	-	3	3	-	-	-	-
MISCELLANEOUS ORGANICS													
PAH Polycyclic Aromatics	-	-	1	2	-	-	-	2	-	-	-	-	1
Oil Identification	-	-	-	-	-	-	-	3	-	-	2	-	2
Phenolics	2	-	1	2	1	2	1	2	2	-	-	-	1
Oil & Grease	1	-	1	-	1	1	1	-	-	-	-	-	1
Flashpoint	-	-	-	2	-	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons	-	-	-	2	3	-	-	-	-	-	-	-	-
TOX	-	-	-	-	-	-	-	-	-	-	-	-	1
Trihalomethanes	-	-	-	-	-	-	-	-	-	-	-	-	-
METALS													
Priority Pollutant Metals	-	-	-	-	-	-	2	2	-	-	-	-	-
EP TOX Metals	-	-	1	-	-	-	-	-	-	-	-	-	-
Specific Metals													
Copper	-	1	2	-	1	1	1	1	-	-	-	1	1
Nickel	-	1	2	1	1	-	2	3	-	-	-	3	1
Chromium	-	-	2	1	-	-	2	2	-	-	-	1	1
Lead	-	-	2	1	1	-	1	1	-	-	-	3	1
Zinc	1	1	2	1	1	-	1	1	-	-	-	2	1
Cadmium	-	1	2	1	1	-	1	1	-	-	-	-	-

STREAMFLOW AND WATER QUALITY SITES - KENAI RIVER WATERSHED

Map Number	Site
1	Snow River near Divide
2	Snow River near Seward
3	Porcupine Creek near Primrose
4	Ptarmigan Creek at Lawing
5	Grant Creek near Moose Pass
6	Trail River near Lawing
7	Quartz Creek at Gilpatricks
8	Crescent Creek near Moose Pass
9	Crescent Creek near Cooper Landing
10	Kenai River at Cooper Landing
11	Cooper Creek near Cooper Landing
12	Stetson Creek near Cooper Landing
13	Cooper Creek near mouth near Cooper Landing
14	Russian River near Cooper Landing
15	Kenai River below Skilak Lake outlet
16	Kenai River below mouth of Killey River
17	Kenai River at Soldotna

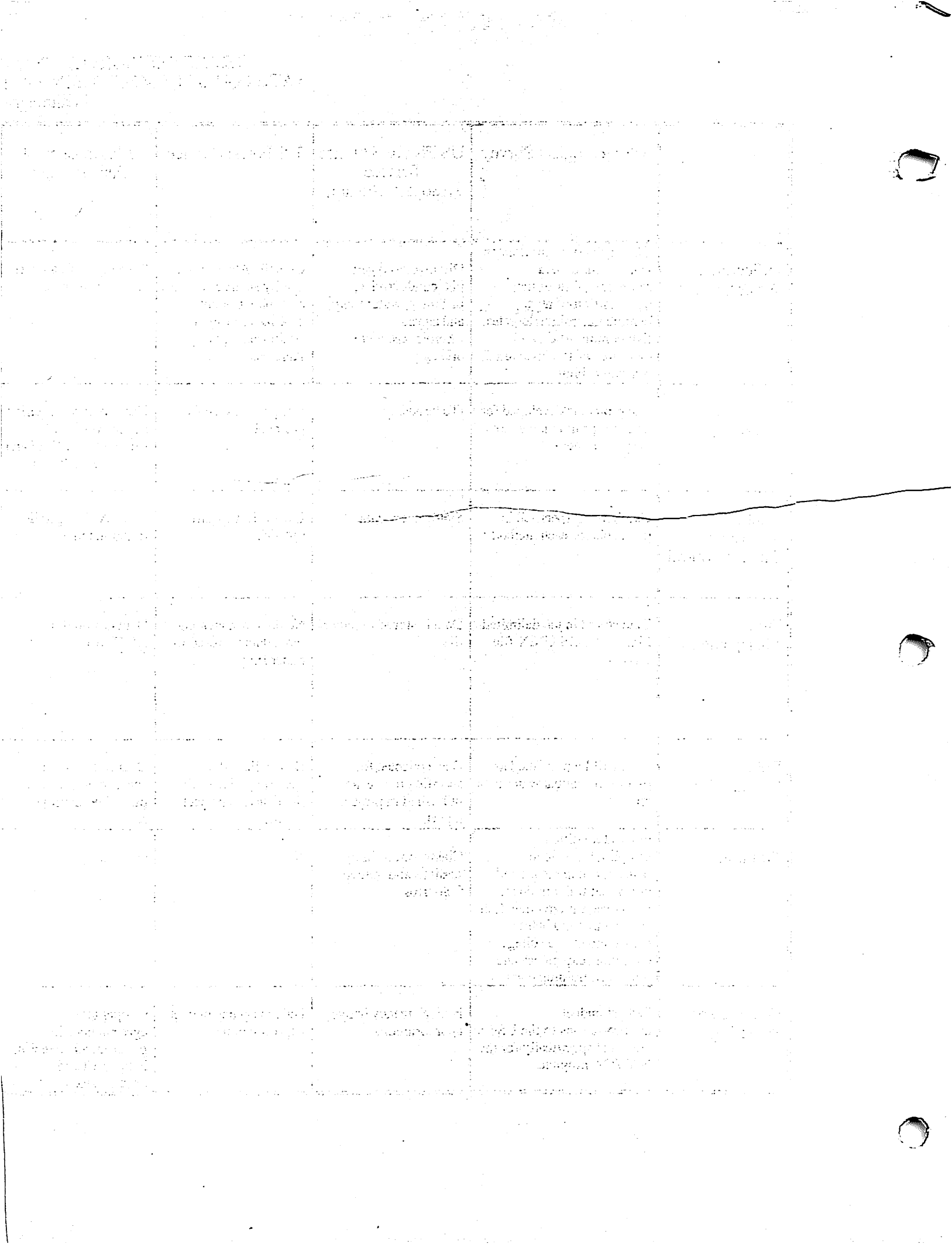
U.S.G.S. EPA Data is Publication

STREAMFLOW AND WATER QUALITY SITES – KENAI RIVER WATERSHED



RESULTS OF SURVEY OF ORG
WATER QUALITY MONITORING WIT
(Preliminary

	US Geological Survey	US Fish & Wildlife Service (Adopt-A-Stream)	US Forest Service	Alaska Dept. of Fish & Game
Indicators of Water Quality	Chemical concentrations in water column, bed sediments, fish tissue, composition of algae, benthic macroinvertebrates, fish communities, and measures of the instream & riparian habitat	Dissolved oxygen pH, conductivity, turbidity, water temp, and aquatic macroinvertebrate diversity	Uses the Alaska water quality standards. Uses best management practices as way to attain water quality standards.	Uses the Alaska water quality standards.
Sampling Protocols	Use protocols developed for national program, can not vary from them	(To be added)	Use project specific protocols	Use protocols specified in the ADF&G Limnological Field and Laboratory Manaual
Quality Assurance/ Quality Control	Use QA/QC specified in protocols for each method	Staff review data	Use project specific QA/QC	Use QA/QC specified in lab manual
Data Management	Data stored in tab delimited files on USGS UNIX file servers	Data is stored in paper file	No data management plan, data is stored in paper files.	Data is stored in ACCESS
Data Presentation	Data will be published as part of the annual water data reports	Data collected for specific projects are published in project report.	Data collected for specific projects are published in project report.	Data collected for specific projects are published in project report
Training	For water column sampling: a college education, experience and two week training class. For algae, invertebrate, fish community and habitat measurements: a college education, experience and one-week training class.	Classroom training sessions and guided field trips	N/A	(To be added)
Funding for Sampling	Federal budget appropriations to the USGS are made specifically for the NAWQA program	Federal agency budget appropriations	Federal agency budget appropriations	Cooperative agreements with government agencies, local gov't and organizations



ANIZATIONS CONDUCTING
IN THE KENAI RIVER WATERSHED
raft 1/6/98)

Alaska Dept. of Environmental Conservation	Alaska Dept. of Natural Resources	Cook Inlet Keepers	Cook Inlet Regional Citizens Advisory Council	University of Alaska Anchorage Environmental & Natural Resources Institute
Use Alaska water quality standards	Inorganic chemical constituents, volatile and semi-volatile organic compounds, microbiological parameters, biological parameters	Use Alaska water quality standards and visual observations	Use Alaska water quality standards and polynuclear aromatic hydrocarbon	Bioassessment - Benthic macroinvertebrates
(To be added)	(To be added)	(To be added)	(To be added)	Developing Rapid Bioassessment Methods as part of Alaska Stream Condition Index
Developed generic QAQP statewide protocol that apply to sampling conducted on Kenai River.	(To be added)	Developed a generic QAPP based on EPA guidelines and use LaMotte kit sampling protocols	(To be added)	Developed generic QA/QC plan that is used for any site sampled.
No overall data management plan. Results of sampling typically reside in project-specific paper file.	No overall data management plan. Use 'STREAMS' database for stream discharge data. Use 'Kenai QW' database for groundwater data	Currently developing a data management plan, data will be stored in ACCESS	(To be added)	Data is entered into an EXCEL spreadsheet then imported into an ACCESS database.
Data is stored in office project files	Data is presented in project reports or stored in paper files	(To be added)	(To be added)	Data is presented in project reports
Training classes offered on an 'as needed basis' based on statewide needs of employees	Short courses to stay current on procedures	Four part training: Phase I 4 hr in-house laboratory session; Phase II: 4 hr field demonstration; Phase III: 3-4 hr site-specific "check-out; Phase IV: annual recertification	(To be added)	For scientific sampling expertise level is high. Developing simplified sampling protocols and training for volunteers.
State agency budget for specific criminal/civil enforcement only, federal grants on project specific basis	Cooperative agreement with government agencies, local gov't and organizations.	State/federal agency grants & private foundations	(To be added)	Grants from state agencies for project specific work

STATE OF ALASKA AGENCY AUTHORITIES RELATED TO WATER QUALITY

Subject	Agency	Description
Powers of the Dept. AS 46.03.020	Alaska Dept. of Environmental Conservation	(10) Adopt regulations providing for (A) Control, prevention, and abatement of air, water or land or subsurface pollution.
Water quality enhancements, water supply, sewage, and solid waste facilities grants. AS 46.03.030	Alaska Dept. of Environmental Conservation	(b) The department may grant to a municipality, as funds are available, a grant for any of the following: (1) a water quality enhancement project;
Alaska clean water fund AS 46.03.032	Alaska Dept. of Environmental Conservation	(a) There is established as a separate fund the Alaska clean water fund, ... (b) The provisions of this section shall be liberally construed in order to carry out the purposes for which they were enacted. (d) Except as otherwise limited by federal law, the Alaska clean water fund may be used (1) for the following categories or projects: (B) implementing a management program for controlling water pollution from nonpoint sources under 33 U.S.C. 1329, including planning, designing, building, constructing, and rehabilitating a solid waste management system; and (C) developing and implementing an estuary conservation and management program 33 U.S.C. 1330;
Water pollution control plan AS 46.03.060	Alaska Dept. of Environmental Conservation	The department shall develop comprehensive plans for water pollution control in the state and conduct investigations it considers advisable and necessary for the discharge of its duties.
Hydrological and seismic hazard data declared to be of public interest AS 41.08.017 (a)	Alaska Dept. of Natural Resources Div. of Mining & Water	Systematic collection, recording, evaluation, and distribution of data on the quantity, location, and quality of water of the state in the ground, on the surface of the ground, or along the coasts, are in the public interest and necessary to the orderly domestic and industrial development of the state.

STATE OF ALASKA AGENCY AUTHORITIES RELATED TO WATER QUALITY

Subject	Agency	Description
Regulation of the Board of Fisheries AS 16.05.251	Alaska Board of Fisheries	(a) The Board of Fisheries may adopt regulations it considers advisable in accordance with AS 44.62 (Administrative Procedure Act) for (7) watershed and habitat improvement, and management, conservation, protection, use, disposal, propagation, and stocking of fish;
Protection of fish and game AS 16.05.870	Alaska Dept. of Fish & Game	(a) The commissioner shall, in accordance with AS 44.62 (Administrative Procedure Act), specify the various rivers, lakes, and streams or parts of them that are important for the spawning, rearing, or migration of anadromous fish. (b) If a person or governmental agency desires to construct a hydraulic project, or use, divert, obstruct, pollute, or change the natural flow or bed of a specified river, lake, or stream, or to use wheeled, tracked, or excavating equipment or log-dragging equipment in the bed of a specified river, lake, or stream, the person or governmental agency shall notify the commissioner of this intention before beginning of the construction or use.
Interference with salmon spawning streams and waters AS 16.10.010	Alaska Dept. of Environmental Conservation (check)	(a) A person may not, without first applying for and obtaining a permit or license from the Department of Environmental Conservation (1) obstruct, divert, or pollute waters of the state, either fresh or salt, utilized by salmon in the propagation of the species, by felling trees or timber in those waters, casting, passing, throwing, or dumping tree limbs or foliage, underbrush, stumps, rubbish, earth, stones, rock, or other debris, or passing or dumping sawdust, planer shavings, or other waste or refuse of any kind in those waters; (3) render the waters described in (1) of this subsection inaccessible or uninhabitable for salmon for spawning or propagation.

KENAI RIVER WATER QUALITY MONITORING COALITION
October 15, 1997

MEETING SUMMARY

Michelle Brown, Kenai Field Representative for The Nature Conservancy (TNC), welcomed people and described TNC's efforts on the Kenai River since 1993. She then described background information on Kenai River water quality issues and the reasoning for forming a work group at this time to develop a water quality monitoring plan for the Kenai River. She then introduced William Ashton of EcoSynergy, the facilitator for the process, who described the agenda for the evening and introduced the agency and community group speakers. Each speaker described what their agency or group has done or is currently doing in terms of water quality monitoring of the Kenai River.

Ben Ellis of the Kenai River Special Management Area Board reviewed the Kenai River Comprehensive Plan Recommendations for a water quality study. He described that during development of the Comp Plan the issue of interest to people after guides or boats was water quality. The study by ADF&G in 1989 & 1990 raised a red flag about impacts to water quality. These studies pointed to the need for more baseline data and improved data management. He commented TNC for pulling together agencies and community groups to develop the water quality monitoring plan. The Kenai River Sportfishing Assoc., Inc. gave a $10,000 grant for water quality data gathering to Trout Unlimited in 1997. The Kenai River Sportfish Assoc., Inc. is planning on making $20,000 to 30,000 available for water quality monitoring efforts.

Joe Dorava of the U.S. Geological Survey gave an overview of previous work the Water Resources Division has conducted on the Kenai River. The streamflow gage at Cooper Landing has 50 years of record and the gage at Soldotna has 30 years of record. The EPA report *Aquatic and terrestrial resources of the Kenai River watershed: A synthesis of publications* has a summary of the USGS water quality data collected to date. He described how the Kenai River is one of the most important watershed in the country in terms of high productivity. He then described a series of USGS reports on the Kenai River relating to erosion and sedimentation, effects of hydraulic structures on the river, and effects of boat wakes on bank erosion. There is a National Water-Quality Assessment (NAWQA) Program study in the Cook Inlet Basin that is in the second year of a ten year study. The NAWQA study will focus on how suburbanization, intense recreational use, timber harvesting and associated road building, mining, and petroleum and petrochemical development will influence water quality in general and salmon fisheries in particular. The Kenai River will have two study sites in this effort.

A question from the audience asked, "If the USGS is doing all the sampling, why do we need this process?" There was discussion by Joe and several people in the audience about the constraints of the NAWQA program and whether or not it will be able to address local concerns. There was discussion of how local efforts on water quality monitoring could be coordinated with the USGS efforts.

Next Deidre St Louis from the Chugach National Forest, Seward District, described the Upper Kenai River Cooperative Plan. The Plan was the cooperative effort of several state and federal agencies, local government, native organizations and local residents. There was extensive two year involvement to identify desired future conditions and indicators for meeting the desired future conditions. She stressed the importance of identifying the standard, with early warning signs the limit is being reached, and the management action that will be taken once the predetermined level is reached. If the management action is not identified before hand there may be difficulties with developing the action once the standard has been met. Another point she made is to not "reinvent the wheel," there has all ready been quite a bit of work conducted on the Kenai River, build on

that experience and expertise. She also described the benefits of multi-agency effort, specifically that they are able to pool resources to accomplish more.

Jenny Litchfield, Alaska Department of Fish & Game, described a multi-agency effort in 1989 and 1990 to obtain baseline information on specific sections of the Kenai River. They did not see a major impact, though they did find data that lead to evaluation of the impact of the Soldotna wastewater treatment plant. In 1993 ADF&G conducted a low level effort to look at status and trends. In 1996 monitoring noticed the natural effects of flood events on benthic invertebrates. In 1997 worked with Trout Unlimited on assessing the impacts of stormwater runoff on benthic invertebrate populations. She stressed the importance of localized studies in monitoring impacts of stormwater runoff and effects of increased pavement area. She is in full support of the TNC efforts. She said it is also important to include wetlands assessment in the plan. Her main concerns are the degradation of aquatic resources that contribute to the loss of fish habitat.

Les Buchholz, Alaska Department of Environmental Conservation, contrasted the resource agency and the compliance agency and how funding cuts are affecting compliance activities. Specifically the Kenai Peninsula Borough is picking up the subdivision plan review. Stormwater outfalls are not specifically covered under ADEC regulations, though ADEC is reviewing the designs under the general plan review regulations. They are using the Municipality of Anchorage management practices in conducting their plan review. He pointed out the water quality standards include physical and chemical parameters but do not include biological indicators (such as the ones being used in the Upper River Cooperative Plan). ADEC is assisting agency's and community groups through the 319 Nonpoint Source Pollution Grant Program. Typically ADEC receives little or no funding for ambient water quality monitoring. He described the need to resolve the fragmentation of data management and the need for more data on stormwater outfalls. He said ADEC is a strong supporter of the TNC process.

Next Bob Shavelson of Cook Inlet Keeper described the background of citizen monitoring, there are twenty-one Keeper programs nationally. The Cook Inlet Keeper has a technical advisory committee and a citizen advisory panel. They are developing a quality assurance plan for their sampling program. They provide citizen training in how to collect specific water quality monitoring parameters. A pilot program is underway in Kachemak Bay and will soon move out to other areas of Cook Inlet. He commented that one of the key elements of a Keeper program is it increases people's awareness of stewardship and that through their actions they can effect change. Their sampling is looking at saltwater and estuarine, as well as, freshwater.

Robert Ruffner of the Kenai Watershed Forum described the citizen monitoring efforts of the Forum. They have twelve people who received training from Cook Inlet Keeper and are continuing their monitoring efforts. He said there are many people interested in citizen monitoring and as part of this plan to address the concern that citizen's don't know what they are doing. He is interested in the plan identifying the role of citizen monitoring.

Small groups were formed to answer three questions. The answers are to guide the work group in developing the draft Kenai River Water Quality Monitoring Plan.

1. What are the concerns about water quality & locations of potential/actual pollution sources the work group should consider in developing the plan? (Besides those identified in Kenai River Comprehensive Management Plan)

- Aesthetic changes in the water such as site & sounds, expectations & experiences.
- Changes in water quality that could affect human health, and the health of animals, plants and the ecosystem.
- The economic impacts of decreased water quality on fishing, tourism and land value: water quality is the base of the sustainable economy in the Kenai River.

- The cumulative effects of development, the effects of loss of buffers.
- The impacts of changes in water quality on recreation and the impacts of recreation users on water quality ie. providing facilities for fishers
- How will lag times between changes in the watershed and impact on water quality be included?
- How will effects from tributary streams be included, specifically: structures such as dams, obstructions, or diversions; impacts to surface water quality or quantity; and impacts to groundwater quality and quantity.
- Allocation of water quantity to maintain instream flows (which then also have an influence in water quality), concern about the potential for diversions related to future oil wells.
- Does a group like the coalition play police?
- Will the plan include wetlands or lake monitoring? Or functional monitoring of wetlands?
- What are the threshholds and what actions will be taken at these threshholds?
- How will the water quality monitoring be tied into fish habitat considerations: enhancement, restoration or maintenance.
- The effect of outboard motor activity all along the river.
- People bring non-Kenai River fish waste into the basin, all along the river.
- Development of drainage (channelized and non-channelized) all along the river.
- Impacts of urbanization and land use changes, increase in pavement and impervious surfaces.
- Operations of septic systems.
- Loss of wetlands.
- Human waste along the river from recreational use of river, providing facilities and fecal coliform levels.
- Accelerated sedimentation.
- Changes in water temperature and water flow.
- Introduction of exotic species.

Location considerations included

- Look at land use ie. subdivisions, forestry, contaminated sites, point sources
- Control sites, sites that will serve as "background" from which any changes in the water quality will be measured
- NAWQA stratification and its selection of sites in relationship to other work on the river
- The variability based on time vs. space
- Check protocols for site location criteria
- How will the tributaries be included?

2. What roles should the following have in developing and carrying out the plan?

- State and federal agencies provide funding
- State and federal agencies establish standards for consistency such as protocols, QA/QC requirements for monitoring, data collection, data storage and management
- Get a commitment from agencies to participate
- State and federal agencies serve as a clearing house for information
- Recognize the limits of agency authorities
- State and Federal agencies <u>should</u> be vehicle for data base
- State gov't requires a lead agency (ADNR, ADEC, or ADF&G???)
- Adopt-A-Stream and Stream Watch are agency sponsored public education
- Consider making water quality monitoring coalition a technical committee to KRSMA
- Have one agency in the lead
- The Work Group facilitates coordination of efforts/needs

- All groups should do everything.
- Agencies and community groups should cooperate on it (the water quality plan), other groups won't be involved.
- Groups and local agencies should encourage employees to participate.
- Native groups need to be involved
- All should be involved in planning process - all stakeholders.

3. What other questions to ask?

- Funding -- Who, When, How much
- What are the objectives?
- Mid-year adjustments, how are they made?
- Standards for action/decisions?
- Cumulative impacts - how are they evaluated?

During the small group discussions a sign-up sheet for the work group and a time for the first meeting was selected, November 11th. William Ashton described next steps and the meeting finished at approximately 10 pm.

KENAI RIVER WATER QUALITY MONITORING COALITION
WORK GROUP MEETING
December 15, 1997

MEETING SUMMARY (Draft)

The Work Group met at the Kenai Peninsula Borough conference room. The meeting started with updates on contacts and meetings. Michelle Brown described conversations with various Alaska Native groups. She received comments from CIRI about their level of interest in the process. They are coordinating with the USGS for several NAQWA sites. Michelle mentioned she and William Ashton gave a brief presentation to the land use subcommittee of the Kenai Peninsula Borough Assembly and will give a brief presentation to the Kenai City Council. She then asked who might be available to give a presentation to the Soldotna City Council on January 14th. William Ashton will provide the presentation.

Les Buchholz gave a brief description about volunteer, or citizen, monitoring being conducted in a way that crosses private land. There was a discussion what different groups do in terms of working with land owners. There was some concern that any monitoring done in conjunction with this monitoring plan should ask private land owners prior to sampling.

Vicki Davis mentioned that USFWS has $5,000 for water quality monitoring as part of the Upper Kenai River Cooperative Plan for the current federal fiscal year. She asked for suggestions and direction from the group. Several ideas were discussed, with no specifics given.

After the updates William Ashton lead a discussion of watershed characteristics as they relate to water quality monitoring. The discussion focused on three subject areas:

1. Hydrologic System

- Hydrologic Subsystems - In the development of a monitoring plan there are considerations of ambient or nature conditions. This includes seasonal variability and downstream changes due to watershed influences such as glaciers, wetlands, lakes, tidal influence and lowland tributaries.

- Discharge Characteristics - The influence of glaciers and lakes on regulating streamflow and recognizing the differences between mainstem and tributary characteristics. There was some discussion on the effects on water quality and when to focus sampling efforts.

- Water Quality Characteristics - The natural variability due to glacier sediment during the summer, lowland tributaries, and effects of lakes all interact to affect Kenai River water quality.

- Sampling Locations - There are several longer term stations on the mainstem where there is record of water quality sampling. There are also numerous sites where one-time or limited sampling has occurred. A map of the watershed was displayed with a majority of the sampling locations identified. Additional sampling by different agencies and groups was identified for adding to the list for further consideration.

2. Aquatic Resources

- Fisheries - The fisheries resource is of primary importance, the use of the mainstem and tributaries varies by life stages and by species of fish. During the discussion several people commented the water quality monitoring plan should focus on the aquatic system as a whole rather than specific locations based on their use by a particular species or life stage.

- Macroinvertebrates - There is a growing awareness by a variety of agencies that macroinvertebrate sampling is a way of measuring changes in water quality. There was a discussion of the sampling done to date and acceptance of various methods and techniques. There was general agreement that the plan should include macroinvertebrate sampling.

3. Human Use

- Population Growth - The Kenai - Soldotna area has experienced extensive growth since the 1950's. As has the riverfront property near Sterling.

- Patterns of Growth - Growth in the cities of Kenai and Soldotna are expected to be slower than the unincorporated areas. The area projected to grow the most in the next several years is the Sterling area.

- Land Ownership and Management- Most of the headwater areas are in Federal land management units. Riverfront property is owned by a mixed of federal, state, and local governments; native, and private landowners.

- Potential/Actual Sources of Pollution - There was a discussion of whether the monitoring plan look at specific activities or be more general in its selection of sample sites. It was agreed that the monitoring plan should focus on locating long-term sites for sampling rather than identifying specific activities to target and sample.

The discussion concluded with several comments about developing the plan with the awareness of several trends within the watershed: loss of wetlands due to development, subdivision roads, logging, increased recreational use of the river and boat traffic.

The discussion focused next on indicators of water quality. Indicators encompass a broad suite of measures that include tools for assessment of physical, chemical/toxicological, and biological/ecological conditions and processes at several scales. Water quality standards are one of the most common indicators used by agencies.

Of primary importance is that the indicator must be able to meet the objectives of the plan. Selection of indicators should consider:

1. Scientific Validity - the methodology should be produce data that are valid and quantitative or qualitative and allow for comparisons on temporal and spatial levels.

2. Practical Considerations - includes monitoring costs, availability of experienced personnel, generally accepted methods, the practical application of technology, and the environmental impacts caused by the monitoring.

3. Programmatic Considerations - includes relevance of the indicator to objectives of the plan, can the indicator be communicated to decision makers and the general

public, and do the indicators include the range of environmental conditions that can be expected.

During the discussion there were several comments about the collection of uniform and consistent data, the need for baseline data for a range of uses, the need for a "who to call" protocol if volunteer monitoring finds evaluated levels, sampling conducted for the plan is for general trends and conditions - not enforcement sampling, and develop a tiered approach. The tiers would be by use of the data and QA/QC of the data collection and management methods.

William Ashton finished with a brief description of process so far, where we are now and proposed next steps in the process. This will be reviewed and discussed in more detail at the next meeting.

CONVENE THE PROCESS

- "Framework" describes work-to-date
- Convene the group
- Agree on format and schedule

FOCUS ON THE ISSUES

- Identify issues
- Discuss perspectives
- Develop initial goal and objectives
- Information sharing and collection <----- Where we are 12/15/97

FOCUS ON SOLUTIONS

- Develop & agree on criteria for evaluating solutions
- Develop range of potential solutions
- Screen reasonable possibilities
- Evaluate choices

REACH AGREEMENT

- Select choices
- Wider review and comment on choices
- Reach agreement on choices
- Agree on roles & responsibilities for implementation
- Agree on monitoring and evaluation of plan

PLAN IMPLEMENTATION

- 1998 Field season activities
- Review of field season
- Adjust and plan for 1999 field season

The next meetings are: Jan. 12, 1998 from 3-6 pm at the Kenai National Wildlife Refuge on Ski Hill Road. The rest are: Jan. 26, Feb. 9 & 23, 1998 from 3-6 pm at the Kenai Borough Building, Conference Room A & B.

Please note the one change in location !!!!

KENAI RIVER WATER QUALITY MONITORING COALITION
WORK GROUP MEETING
January 12, 1998

MEETING SUMMARY (Draft)

The Work Group met at the Kenai National Wildlife Refuge conference room. The meeting started with updates on contacts and meetings. Vicki Davis reminded the group that USFWS has $5,000 for water quality monitoring as part of the Upper Kenai River Cooperative Plan for the current federal fiscal year. She asked for suggestions and direction from the group as to ideas for monitoring. Again several ideas were discussed, with no specifics concluded upon.

Joe Dorava described the USGS NAQWA meetings with other agencies. He passed out the list of parameters to be tested for at NAQWA sites. Then he described a proposal for ecological assessment for the Kenai River watershed. The proposal described the objectives, the work plan, the data to be collected, and the estimated cost per site for NAQWA sites.

William Ashton described a presentation Michelle Brown gave to the Kenai City Council. This lead to the Mayor asking Keith Kornelis of the Dept. of Public Works to attend the work group meetings. William mentioned he is giving a presentation to the Soldotna City Council on January 14th.

Then William presented a summary of the work done to date, a description of the tables listing historic water quality sampling in the Kenai River watershed, and the results of the survey of organizations conducting water quality monitoring in the watershed. A discussion of past sampling efforts followed. Opinions varied about the usefulness of the current water quality data. Some felt the data is not very useful and can not answer questions about issues today. While others felt there is some useful information, though not all of it has been collected in a consistent manner or using consistent parameters. Some felt there is some fairly good baseline data, but additional sites are needed and the sampling needs to be continued. Then there was a description of how the lakes drive water quality in the middle and lower river, followed by a discussion of the need to focus on what is being done and not being done to avoid duplication.

Several people asked how would the monitoring plan would be funded. Several sources were identified: agency base budget; cost challenge grants; various Clean Water Act grants - 319 nonpoint source grants, 104(b)(3) grants, 106 grants; EXXON Valdez Restoration grants; Capital Improvement Projects (state funding); chamber of commerce; sport fishing group; direct federal funding; sponsorships; industry funding; or water quality monitoring tax credit (proposed). No specific efforts were suggested to pursue funding. There was discussion of developing with the monitoring plan a proposed budget to accomplish the recommendations.

In the meeting of November 11th the work group agreed to use a tiered approach to the sampling plan. William Ashton described the approaches used by the Washington State Dept. of Ecology and the Volunteer Environmental Monitoring Network in New England. He gave two handouts that provided a description of the different QA/QC protocols for each level. The group then discussed the various levels, asked questions as to how the approach works. After further discussion the group agreed with developing the details of the level approach for the Kenai River and using data quality as a descriptor of the differences between each level.

The levels would start with one being the most basic quality control then progress to level four being the strictest level of quality control. Level one would include sampling efforts such as Adopt-A-Stream and water watch. This level is primarily for collecting data for education and basic awareness of water quality. Level two would include volunteer monitoring and basic agency monitoring that does not use a formal QA/QC plan and uses field analysis of samples. Level three would include sampling that follows a formal QA/QC plan and uses lab analysis of samples. Level four would include sampling conducted according to national scientifically peer reviewed protocols. William agreed to draft a description of levels for work group review and discussion.

The next meeting is: January 26th from 3-6 pm at the Kenai Borough Building, Conference Room A & B. The rest are: Feb. 9 & 23, 1998 from 3-6 pm at the Kenai Borough Building, Conference Room A & B.

KENAI RIVER WATER QUALITY MONITORING COALITION
WORK GROUP MEETING
January 26, 1998

MEETING SUMMARY (Draft)

The Work Group met at the Kenai Peninsula Borough conference room B. The meeting started with updates on contacts and meetings. Ginny Litchfield mentioned that ADF&G is sponsoring a workshop on Data Management Feb. 25 to 27 at Alyeska Prince Hotel in Girdwood. The focus of the workshop is Statewide Alaska Salmon Workshop: Databases and applications for fisheries management. For more information contact Debbie Hart at ADF&G Juneau 465-6153, email debbieah@fishgame.state.ak.us. Michelle Brown said she is giving a presentation to the Kenaiztie (sp) on Feb. 11th, she invited other work group members to join her. She will give an overview of the work group goals and results to date and ask for their input to the process.

Vicki Davis reminded the group that USFWS has $5,000 for water quality monitoring as part of the Upper Kenai River Cooperative Plan for the current federal fiscal year. She mentioned there is a meeting of the Upper Kenai River Cooperative Plan group tentatively planned for Feb. 10th, contact her for more details. There was some discussion that ADF&G Sport Fish might be interested in some of the sampling. She asked for suggestions and direction from the group as to ideas for monitoring.

William Ashton described a presentation he gave to the Soldotna City Council on the work of the work group. He also described two conversations with Walt Arthur of the Kenai River Property Owners Assoc. to provide him background on the process and the progress of the work group. William then gave some background on a proposal being developed by ADEC in coordination with ADNR on water quality data management for Cook Inlet.

Joe Dorava mentioned the US Army Corps of Engineers will be starting a watershed assessment of the Kenai River Watershed. It is a one year process and will be starting as soon as they finish a watershed assessment of the Chena River watershed. Bob Shavelson referred to results of the Cook Inlet stakeholders process that included recommendations on water quality data management and a proposal for a tax incentive for water quality monitoring. Steve Bonebrake commented that one of the problems with previous water quality sampling efforts was the lack of sustained funding.

William Ashton then lead a review, discussion and revision of the "Criteria for Evaluating Solutions" (sent with the last fax). These criteria will be used to test whether or not a specific recommendation is accepted by the work group in the development of the coalition or the work plan. The work group revised the proposed list. The members present accepted the criteria, conditioned on review of the revised criteria at the next meeting.

Then the group discussed the "Proposed Matrix of Levels of Water Quality Monitoring" (sent with the last fax). This matrix describes the four levels in terms of: data quality goals, data, users, data uses, QA/QC protocols, education/training, data management, and data presentation. The group discussed the question of what factors would determine whether or not a specific data set is one level or another. The factors are QA/QC protocols, sampling methods, education and training of the person doing the sampling, and the data management. A sub-committee formed to discuss the details of the matrix and report back to the entire work group at the Feb. 26th meeting. Joe Dorava, Ginny Litchfield, Bob Shavelson and Robert Ruffner (pending his OK) agreed to serve on

the sub-committee. If other work group members want to participate please contact Joe Dorava. The tentative meeting time is 10 am. to Noon Feb. 16th by teleconference.

Ginny Litchfield presented a rough estimate of the cost of a level 3 sample for one season. This estimate will provide a general working number for comparison purposes. The actual costs will vary depending on coordination among agencies and community groups that could save money on boats and support staff.

Next the work group discussed the "Considerations for Sampling Site Selection" (sent with the last fax). The list was revised and there were suggestions on adding to the list. There was discussion of whether or not to include random selection of sites as a consideration. The group decided to add to the list based on data quality goal, elevation and other factors. These considerations, as revised, will provide guidance to coalition members in selecting sites sampled by the coalition.

The meeting finished with an open discussion of the pros and cons of different coalition structures. There was general agreement, for the monitoring plan to survive past being a paper exercise the implementation will have to be an active process. Several ideas were discussed about the need for an active administrative group to coordinate among the various agencies, local governments and community groups interested in the water quality monitoring plan.

The next meeting will focus on selecting specific sites for sampling. William Ashton is developing a sheet explaining the process of individual site selection that will be faxed to work group members. For the initial selection process the work group decided select sites based on:

1. The specific and unique knowledge their agency, local government, or community group has of the watershed,

2. Location within the various reaches of the river as described in the Kenai River Comprehensive Management Plan (this is to ensure sites representative of the entire river),

3. The level described in the "Proposed Matrix of Levels of Water Quality Monitoring," and

4. The "Considerations for Sampling Site Selection" (revised 1/29/98).

During the next meeting the work group will discuss combining the different perspectives into a common set of sites.

The next meeting is: February 9th from 3-6 pm at the Kenai Borough Building, Conference Room A & B. The last scheduled meeting is: Feb. 23, 1998 from 3-6 pm at the Kenai Borough Building, Conference Room A & B.

THE NATIONWIDE STRATEGY FOR IMPROVING WATER-QUALITY MONITORING IN THE UNITED STATES

FINAL REPORT OF THE INTERGOVERNMENTAL TASK FORCE ON MONITORING WATER QUALITY
TECHNICAL APPENDIXES

CONTENTS

Technical Appendixes

TECHNICAL APPENDIX A

GLOSSARY OF WATER-QUALITY-MONITORING TERMS

Terms were provided by the agencies listed within the parentheses.

The definitions in this appendix are solely related to the use of these terms in Technical Appendixes A through O. Other definitions for these terms may apply when the terms are used elsewhere.

Adverse effect An action that has an apparent direct or indirect negative effect on the conservation and recovery of an ecosystem component listed as threatened or endangered [U.S. Forest Service (USFS)].

Ambient monitoring All forms of monitoring conducted beyond the immediate influence of a discharge pipe or injection well and may include sampling of sediments and living resources [U.S. Environmental Protection Agency (USEPA) Region 5].

Ancillary data

A. Other categories of data (see Water-quality data) critical to interpreting water-quality data and formulating courses of action. These ancillary categories of data will be considered only as they relate to information management and data sharing. Ancillary data critical to water-quality decisionmaking include, but are not limited to, land use/land cover; water use; population and demographics; soils, geology, and geochemistry; municipal and industrial waste disposal; agricultural and domestic chemical applications; climatological data; and human health and ecological effects [Intergovernmental Task Force on Monitoring Water Quality (ITFM)].

B. Those variables that might influence the indicators independent of what they are designed to denoefte [Environmental Monitoring and Assessment Program (EMAP)].

C. Data that are collected as a consequence of collecting target data, but that are not considered to be essential (Ohio EPA).

Aquatic community An association of interacting populations of aquatic organisms in a given water body or habitat (USEPA Region 5).

Aquatic ecosystem The stream channel, lake or estuary bed, water, and (or) biotic communities and the habitat features that occur therein (USFS).

Aquatic habitat Environments characterized by the presence of standing or flowing water (USFS).

Aquifer A body of rock that is sufficiently permeable to conduct ground water and to yield economically significant quantities of water to wells and springs [Bates, Robert L., and Jackson, Julia A., eds., 1987, Glossary of Geology (3d ed.): Alexandria, Va., American Geological Institute, p. 33].

Assessed waters Water bodies for which the State is able to make use-support decisions based on actual information. Such waters are not limited to those that have been directly monitored; it is appropriate in many cases to make judgments based on other information (USEPA Region 5, modified).

Beneficial uses Management objectives.

Benthic fauna (or benthos) Organisms attached to or resting on the bottom or living in the bottom sediments of a water body (USEPA Region 5).

Bioaccumulate The net uptake of a material by an organism from food, water, and (or) respiration that results in elevated internal concentrations [U.S. Fish and Wildlife Service (USFWS)].

Biological assessment An evaluation of the biological condition of a water body by using biological surveys and other direct measurements of a resident biota in surface water (USEPA Region 5).

Biological criteria (or biocriteria) Numerical values or narrative expressions that describe the reference biological integrity of aquatic communities that inhabit water of a given designated aquatic life use (USEPA Region 5).

Biological integrity Functionally defined as the condition of the aquatic community that inhabits unimpaired water bodies of a specified habitat as measured by community structure and function (USEPA Region 5).

Biological monitoring (or biomonitoring) The use of a biological entity as a detector and its response as a measure to determine environmental conditions. Toxicity tests and biological surveys are common biomonitoring methods (USEPA Region 5).

Biological survey (or biosurvey) Consists of collecting, processing, and analyzing representative portions of a resident aquatic community to determine the community structure and function (USEPA Region 5).

Biomonitoring The measurement of biological parameters in repetition to assess the current status and changes in time of the parameters measured (USFWS).

Community component Any portion of a biological community. The community component may pertain to the taxonomic group (fish, invertebrates, algae), the taxonomic category (phylum, order, family, genus, species), the feeding strategy (herbivore, omnivore, carnivore), or organizational level (individual, population, community association) of a biological entity within the aquatic community (USEPA Region 5).

Compliance monitoring A type of monitoring done to ensure the meeting of immediate statutory requirements, the control of long-term water quality, the quality of receiving waters as determined by testing effluents, or the maintenance of standards during and after construction of a project (modified from Resh, D. M., and Rosenberg, V.H., eds., 1993, Freshwater Biomonitoring and Benthic Macroinvertebrates: New York, Chapman and Hall, 488 p).

Contaminant A material added by humans or natural activities that may, in sufficient concentrations, render the environment unacceptable for biota. The mere presence of these materials is not necessarily harmful (USFWS).

Critical habitat Those areas designated as critical for the survival and recovery of threatened or endangered species (USFS).

Data comparability The characteristics that allow information from many sources to be of definable or equivalent quality so that this information can be used to address program objectives not necessarily related to those for which the data were collected. These characteristics need to be defined but would likely include detection limit precision, accuracy, bias, and so forth (ITFM/Data Methods Collection Task Group).

Data quality objectives In the context of water- quality monitoring, the characteristics or goals that are determined by a monitoring or interpretive program to be essential to the usefulness of the data. They would include, but not be limited to, the specification of delineation of the limits of precision and bias of measurements, the completeness of sampling and measurements, the representativeness of sites relative to program objectives, the validity of data, and so forth (ITFM/Data Methods Collection Task Group).

Deep-water habitats Permanently flooded lands that lie below the deep-water boundary of wetlands (USFS).

Designated uses

A. A classification specified in water-quality standards for each water body or segment that relates to the level of protection from perturbation afforded by the regulatory agency (USEPA/OST).

B. Describes the chemical, physical, and (or) biological attributes covered by the use; this is, in essence, the narrative "criteria" (Ohio EPA).

C. Uses specified in water-quality standards for each water body or segment whether or not they are being attained (USEPA Region 5).

Diversity The distribution and abundance of different kinds of plant and animal species and communities in a specified area (USFS).

Ecological indicators Plant or animal species, communities, or special habitats with a narrow range of ecological tolerance. For example, in forest areas, such indicators may be selected for emphasis and monitored during forest plan implementation because their presence and abundance serve as a barometer of ecological conditions within a management unit (USFS).

Ecoregions (or regions of ecological similarity) A homogeneous area defined by similarity of climate, landform, soil, potential natural vegetation, hydrology, or other ecologically relevant variable. Regions of ecological similarity help define the potential designated use classifications of specific water bodies (USEPA Region 5).

Ecosystem A system that is made up of a community of animals, plants, and bacteria and its interrelated physical and chemical environment (USFWS).

Effectiveness monitoring Documents how well the management practices meet intended objectives for the riparian area. Monitoring evaluates the cause and effect relations between management activities and conditions of the riparian dependent resources. Terrestrial and instream methods constitute monitoring that evaluates and documents the total effectiveness of site-specific actions (USFS).

Emerging environmental problems Problems that may be new and (or) are becoming known because of better monitoring and use of indicators (Ohio EPA).

Endangered species

A. Any species in danger of extinction throughout all or a significant portion of its range (USFS).

B. Animals, birds, fish, plants, or other living organisms that are threatened with extinction by manmade or natural changes in their environment. Requirements for declaring a species endangered are contained in Endangered Species Act.

Environmental indicators A measurable feature or features that provide managerially and scientifically useful evidence of environmental and ecosystem quality or reliable evidence of trends in quality (ITFM).

Equivalency Any body of procedures and techniques of sample collection and (or) analysis for a parameter of interest that has been demonstrated in specific cases to produce results not statistically different to those obtained from a reference method (ITFM).

Estuarine habitat Tidal habitats and adjacent tidal wetlands that are usually semienclosed by land but have open, partly obstructed, or sporadic access to the open ocean and in which ocean water is at least occasionally diluted by freshwater runoff from the land (USFS).

Exposure indicators An environmental characteristic measured to provide evidence of the occurrence or magnitude of contact with a physical, chemical, or biological stressor (EMAP).

Featured (or species emphasis) A species of high public interest and demand. The management goal for these species usually is to maintain or improve habitat capability when economically and biologically feasible (USFS).

Fish and wildlife Any nondomesticated member of the animal kingdom that includes, without limitation, any mammal, fish, bird, amphibian, reptile, mollusk, crustacean, arthropod, or other invertebrate and that includes any part, product, egg, or offspring thereof or the dead body or parts thereof (USFS).

Fixed-station monitoring The repeated long-term sampling or measurement of parameters at representative points for the purpose of determining environmental quality characteristics and trends (USEPA Region 5).

Geographic information systems (GIS) A computerized system for combining, displaying, and analyzing geographic data. GIS produces maps for environmental planning and management by integrating physical and biological information (soils, vegetation, hydrology, living resources, and so forth) and cultural information (population, political boundaries, roads, bank and shoreline development, and so forth) (USEPA Region 5).

Habitat

A. A place where the physical and biological elements of ecosystems provide a suitable environment, and the food, cover, and space resources needed for plant and animal existence (USFS).

B. The physical/chemical theater in which the ecological play takes place; it is a template for the biota, their interactions, and their evolution (Hutchinson, 1965; Southwood, 1977).

Habitat capability The estimated carrying capacity of an area to support a wildlife, fish, or sensitive plant population. Habitat capability can be stated as being existing or future and normally is expressed in numbers of animals, pounds of fish, or acres of plants (USFS).

Habitat indicator A physical, chemical, or biological attribute measured to characterize the conditions necessary to support an organism, population, community, or ecosystem in the absence of stressors (EMAP).

Impact A change in the chemical, physical, or biological quality or condition of a water body caused by external sources (USEPA Region 5).

Impairment A detrimental effect on the biological integrity of a water body caused by impact that prevents attainment of the designated use (USEPA Region 5).

Implementation monitoring Documents whether or not management practices were applied as designed. Project and contract administration is a part of implementation monitoring (USFS).

Index period The sampling period during which selection is based on the temporal behavior of the indicator and the practical considerations for sampling (Ohio EPA, modified).

Indigenous species A species that originally inhabited a particular geographic area (USFS, modified).

Lacustrine habitat All wetland and deep-water habitats with the following characteristics: situated in a topographical depression or a dammed river channel; lacking trees, shrubs, persistent emergents, emergent mosses, or lichens with greater than 30 percent aerial coverage; and total area that exceeds 20 acres (USFS).

Listed species Any species of fish, wildlife, or plant officially designated by an agency as being endangered or threatened (USFS, modified).

Management indicators Plant and animal species, communities, or special habitats that are selected for emphasis in planning and that are monitored during forest-plan implementation to assess the effects of management activities on their populations and the populations of other species with similar habitat needs that they may represent (USFS).

Management indicator species Any species, group of species, or species habitat element selected to focus management attention for the purpose of resource production, population recovery, maintenance of population viability, or ecosystem diversity (USFS).

Metadata Information that describes the content, quality, condition, and other characteristics of data [Federal Geographic Data Committee (FGDC)].

Method comparability The characteristics that allow data produced by multiple methods to meet or exceed the data-quality objectives of primary or secondary data users. These characteristics need to be defined but would likely include data-quality objectives, bias, precision, information on data comparability, and so forth (ITFM/Data Methods Collection Task Group).

Method validation The process of substantiating a method to meet certain performance criteria for sampling and (or) analytical and (or) data handling operations (ITFM)

Metric A biological attribute, some feature or characteristic of the biotic assemblage, that reflects ambient conditions, especially the influence of human actions on these conditions (ITFM; Technical Appendix G).

Monitoring

A. The repeated measurement of some parameters to assess the current status and changes over time of the parameters measured (USFWS).

B. Periodic or continuous surveillance or testing to determine the level of compliance with statutory requirements and (or) pollutant levels in various media or in humans, animals, and other living things (ITFM).

National Pollutant Discharge Elimination System A permit program under Section 402 of the Clean Water Act that imposes discharge limitations on point sources by basing them on the effluent limitation capabilities of a control technology or on local water-quality standards (USEPA Region 5).

Native species Any animal and plant species originally in the United States (USFS).

Nonpoint-source pollution A contributory factor to water pollution that cannot be traced to a specific spot; for example, pollution that results from water runoff from urban areas, construction sites, agricultural and silvicultural operations, and so forth (USEPA Region 5).

Palustrine habitat All nontidal wetlands that are dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and all such wetlands in tidal areas where salinity owing to ocean-derived salts is below 0.5 part per thousand. Also, all wetlands that lack such vegetation but with all the following characteristics: areas of less than 20 acres (for example, a pond); active waves form a bedrock shoreline, features lacking; water depth in the deepest part of a basin of less than 6.5 feet at low water; and salinity owing to ocean-derived salts that is less than 0.5 part per thousand (USFS).

Peer-reviewed literature A referable, obtainable, published document that is reviewed by a minimum of two technical reviewers who are located external to the author's organization (ITFM).

Perennial streams Permanently inundated surface stream courses. Surface water flows throughout the year except in years of infrequent drought (USFS).

Performance-based methods system A system that permits the use of any appropriate measurement methods that demonstrates the ability to meet established performance criteria and that complies with specified data-quality needs. Performance criteria, such as precision, bias, sensitivity, specificity, and detection limit, must be designated, and a method-validation process must be documented (ITFM).

Point-source pollution Pollution discharged through a pipe or some other discrete source from municipal water-treatment plants, factories, confined animal feedlots, or combined sewers
(USEPA Region 5).

Population

A. For the purposes of natural-resource planning, the set of individuals of the same species that occurs within the natural resource of interest (USFS, modified).

B. An aggregate of interbreeding individuals of a biological species within a specified location (USEPA Region 5).

Potential habitat Habitat that is suitable for, but currently unoccupied by, the species or community in question (USFS).

Prelaboratory Methods that include all activities involved in collecting, preparing, and delivering a sample to the place of analysis. For a traditional water sample, this would include activities and equipment for collecting, filtering, bottling, preserving, and shipping the sample. In the case of an in situ measurement, there would be no prelaboratory method. In the case of a field analysis of ground water for alkalinity, prelaboratory methods would include of pumping the sample and keeping it pressurized and out of contact with the atmosphere (ITFM/Data Methods Collection Task Group).

Reference value/conditions

A. A single measurement or set of selected measurements of unimpaired water bodies characteristic of an ecoregion and (or) habitat (USEPA/OST).

B. The chemical, physical, or biological quality or condition that is exhibited at either a single site or an aggregation of sites that represent the least impacted or reasonably attainable condition at the least impacted reference sites (Ohio EPA).

Response indicator An environmental indicator measured to provide evidence of the biological condition of a resource at the organism, population, community, or ecosystem level of organization (EMAP).

Riparian Of, pertaining to, or situated or dwelling on the bank of a river or other water body (Shuh-shiaw Lo, 1992, Glossary of Hydrology: Littleton, Colo., Water Resources Publications, p. 1250).

Riparian areas Geographically delineable areas with distinctive resource values and characteristics that compose the aquatic and riparian ecosystems (USFS, modified).

Riparian dependent resources Resources that owe their existence to a riparian area (USFS).

Riparian ecosystems A transition between the aquatic ecosystem and the adjacent terrestrial
ecosystem; these are identified by soil characteristics or distinctive vegetation communities that require free or unbound water (USFS).

Riparian habitat The transition zone between aquatic and upland habitat. These habitats are related to and influenced by surface or subsurface waters, especially the margins of streams, lakes, ponds, wetlands, seeps, and ditches (USFS, modified).

River reach A river or stream segment of a specific length. Most reaches extend between the points of confluence with other streams (USEPA Region 5).

Riverine habitat All wetlands and deep-water habitats within a channel, with two exceptions--wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens and habitats with water that contains ocean-derived salt in excess of 0.5 part per thousand.

Selection criteria A set of statements that describe suitable indicators or a rationale for selecting indicators (ITFM).

Sensitive species Those plant and animal species for which population viability is a concern (USFS).

Standard As used in American Society for Testing and Materials (ASTM), a document that has been developed and established within the consensus principles of the ASTM and that meets the approval requirements of ASTM procedures and regulations. The term "standard" serves as an adjective in

the title of documents, such as test methods, practices, and specifications, to connote specified consensus and approval. The various types of standard documents are based on the needs and usage as prescribed by the technical committees of the ASTM. "Consensus principles " include timely and adequate notice to all known interested parties; opportunity for all affected interests to participate in the deliberations, discussions, and decisions that affect the proposal; maintenance of records of discussions, decisions, and data accumulated in standards development; timely publication and distribution of minutes of meetings; distribution of ballots to all eligible voters and full reporting of results; and careful attention to minority opinions throughout.

Stressor indicator A characteristic measured to quantify a natural process, an environmental hazard, or a management action that results in changes in exposure and habitat (EMAP).

Threatened species Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (USFS).

Threatened waters Waters that fully support their designated uses, but may not support uses in the future unless pollution-control action is taken because of anticipated sources or adverse pollution trends (USEPA Region 5).

Total maximum daily load The total allowable pollutant load to a receiving water such that any additional loading will produce a violation of water-quality standards (USEPA Region 5).

Toxic Relating to harmful effects to biota caused by a substance or contaminant (USFWS).

Toxicity test A procedure to determine the toxicity of a chemical or an effluent by using living organisms. A toxicity test measures the degree of effect on exposed test organisms of a specific chemical or effluent (USEPA Region 5).

Validation monitoring Determines if predictive model coefficients are adequately protecting the targeted resources. A long-term commitment to data collection is often required to establish an adequate data base. If the standard, which requires use of 50 percent or less of streamside herbaceous forage, for example, fails to achieve the desired instream habitat condition, then the standard would have to be modified for less forage consumption in the riparian complex(es) (USFS, modified).

Viable population A population that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range in the planning area (USFS).

Water-quality criteria Criteria that comprise numerical and narrative criteria. Numerical criteria are scientifically derived ambient concentrations developed by the USEPA or the States for various pollutants of concern so that human health and aquatic life can be protected. Narrative criteria are statements that describe the desired water-quality goal (USEPA Region 5).

Water-quality data Chemical, biological, and physical measurements or observations of the characteristics of surface and ground waters, atmospheric deposition, potable water, treated effluents, and waste water and of the immediate environment in which the water exists.

Water-quality information Derived through analysis, interpretation, and presentation of water-quality and ancillary data (ITFM).

Water-quality limited segment A stretch or area of surface water where technology-based controls are not sufficient to prevent violations of water-quality standards. In such cases, new permit limitations are based on ambient-water-quality considerations (USEPA Region 5).

Water-quality monitoring An integrated activity for evaluating the physical, chemical, and biological character of water in relation to human health, ecological conditions, and designated water uses (ITFM/Technical Appendix B).

Water-quality standard A law or regulation that consists of the beneficial designated use or uses of a water body, the numerical and narrative water-quality criteria that are necessary to protect the use or uses of that particular water body, and an antidegradation statement (USEPA Region 5).

Water-resource quality

A. The condition of water or some water-related resource as measured by biological surveys, habitat-quality assessments, chemical-specific analyses of pollutants in water bodies, and toxicity tests (USEPA/OST).

B. The condition of water or some water-related resource as measured by the following: habitat quality, energy dynamics, chemical quality, hydrological regime, and biotic factors (Ohio EPA).

Watershed The land area that drains into a stream, river, lake, estuary, or coastal zone (USEPA
Region 5).

Wetlands Habitat that is transitional between terrestrial and aquatic where the water table is usually at or near the land surface or land that is covered by shallow water. Wetlands have one or more of the following characteristics: at least periodically, the land supports predominantly hydrophytic plants; the substrate is predominantly undrained hydric soil; and the substrate is nonsoil and is saturated with water or covered by shallow water at sometime during the yearly growing season (USFS).

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KENAI RIVER WATER QUALITY MONITORING COALITION
WORK GROUP MEETING
February 9, 1998

MEETING SUMMARY (Draft)

The Work Group met at the Kenai Peninsula Borough conference room B. The meeting began with updates on contacts and meetings. William Ashton started off with an update of the agency staff and community members he is briefing on the progress of the work group. He spoke with Dave Blanchet, hydrologist with the USFS; Mary Maurer, water quality person with ADNR; and Walt Arthur, Kenai River Property Owners Assoc. William will give a presentation during a luncheon meeting of the Alaska Section of the American Water Resources Association Feb. 18th.

Vicki Davis gave an update on the funding the USFWS has for water quality monitoring as part of the Upper Kenai River Cooperative Plan for the current federal fiscal year. She noted the meeting of the Upper Kenai River Cooperative Plan group is tentatively planned for March. She mentioned that the USFWS is in the process of talking with the USGS about sampling two locations between Skilak Lake and the eastern refuge boundary. There was a discussion on the pros and cons of the locations and approach to sampling. She also spoke with Dwayne Harp, District Ranger for the USFS in Seward to brief him on the progress of the group.

Phil North mentioned a project that will be starting this spring to develop a trend analysis in wetlands modification in the central Kenai Peninsula from data from the 1950's to 1990's. The group discussed the project, who is working on it and who might be interested in the results.

William Ashton then provided a review of the results of the work group to date and how these results contribute to sampling site selection. They include:

1. Discussion of issues - in these meetings the group decided to focus on baseline monitoring. (Meetings October 15th, November 11th & 24th.)

2. The work group focus on baseline monitoring to measure the status and trends of water quality in the river and not target specific sources or locations. (Meetings November 24th & December 15th.)

3. Discussion of a summary of water quality sampling within the Kenai River watershed - identifying the location and extent of historic information. (Meeting January 12th.)

4. Development of a set of *Criteria for Evaluating Solutions* for use in selecting specific recommendations in the water quality monitoring plan. (Meeting January 26th.)

5. Discussion of a proposed matrix to describe the relationship of the data needs of various organizations with a variety of water quality sampling considerations. This matrix describes four levels of water quality monitoring. (Meeting January 12th & 26th)

6. Development of a list of *Considerations for Sampling Site Selection.* (Meeting January 26th.)

7. General agreement among work group members to develop a water quality monitoring plan that includes a wide range of groups who have, or are currently, collecting water quality data. This includes: schools, volunteer groups, agencies (state and federal), tribes, local governments, and universities.

William Ashton reviewed the list of previous water quality sampling efforts on the Kenai River. Ginny Litchfield briefly described the ADF&G sampling efforts in the late 1980's and early 1990's.

The group discussed the complexity and difficulty of using a matrix approach. The group agreed that while the mainstem was the first priority of sampling within the hydrologic system, the plan also needs to include (at least by reference) the tributaries, lakes and wetlands, and the intent to sample them as funding becomes available.

There was a discussion of the river reach identification and whether to use the reaches designated in the Kenai River Comprehensive Management Plan or the reaches designated in the ADF&G reports on the river habitat (the 309 reports). After a discussion of the pros and cons of each approach, the group decided to use the reach designations used by the ADF&G projects and by the borough.

The group then discussed selecting sample sites considering several scenarios, using an approach suggested by Herb Cook. The range is from a basic set (these are sites that already have funding for sampling) to a comprehensive set (these are the maximum number of sites the work group is interested in sampling, but no funding has been secured). The basic set of sites includes two USGS NAWQA sites, several Kenai Watershed Forum sites and several Adopt-a-Stream sites. The group then discussed what a comprehensive set of sites might include. There were additional comments about the complexity of the matrix approach and the difficulty of presenting it to people who have not been part of the work group. It was pointed out the three dimensions of the selection of sample sites: the first dimension is the levels (described in the matrix), the second dimension is the portion of the hydrologic subsystem (the mainstem, tributaries, wetlands, and lakes), and the third dimension is the location within the hydrologic subsystem (the river mile location or geographic location). Even though it is complex, the work group does want to use the matrix approach.

The work group started at river mile zero and progressed upstream identifying specific locations along the river they felt were appropriate places for sampling at specific levels. At some locations more than one level was recommended (see attached table). During the process the discussion referred to the matrix and the need to clarify the descriptions of how sampling is identified for a particular level. The group also discussed the need to include accessibility and safety of the site as a consideration in selecting a particular level. For example, a level one site (that may have school children visit it) has different accessibility and safety considerations than a level three site (that is more likely to have trained adults visit it who are use to working around rivers).

The next meeting will focus on three areas.

1. A report back by the matrix sub-committee on the discussions and recommendations they have on revisions to the matrix.

2. A discussion of the sampling sites by looking at different scenarios (of proposed sites) and the approximate costs and benefits of each scenario. (This information will be faxed to work group members next week).

3. A discussion of the contents of the draft monitoring plan, the process for review and revision of the plan, and next steps for agency and community review and comment on draft water quality monitoring plan.

The next meeting is: February 23rd from 3-6 pm at the Kenai Borough Building, Conference Room A & B. **A reminder that we scheduled one more work group meeting for March 16, 1998 from 3-6 pm at the Kenai Borough Building, Conference Room A & B. Please add this meeting to your calendar.**

PRELIMINARY LIST OF WORK GROUP SELECTED
SAMPLING SITE LOCATIONS FOR KENAI RIVER WATER QUALITY MONITORING PLAN
(Kenai River Mainstem, by River Mile)

Matrix Level	Reach 1 RM 0 - 10.0	Reach 2 RM 10.0 - 17.6	Reach 3 RM 17.6 - 39.5	Reach 4 RM 39.5 - 50.0	Reach 5 Skilak Lake	Reach 6 RM 65.0 to 82.0	Reach 7 Kenai Lake	Above Kenai Lake	Total Number of sites per Matrix Level
1	5.6	12.4 Pillars	18.8 Slikok Cr.	36.3 Izaak Walton	Lower Campground	69.6 Jim's Landing			11
		13.8 L. Big Eddy	20.3 Centennial		Upper Campground				
		16.8	22.0 Soldotna Cr.						
2	0.0	12.4 Pillars	18.8 Slikok Cr.	39.5 Bings Landing		69.6 Jim's Landing			17
	1.0 Kenai C. Dock	13.8 L. Big Eddy	20.3 Centennial			73.6 Sportsman L.			
	4.0 Ames Bridge	16.8	22.0 Soldotna Cr.			76.3 Schooner Bend			
	10.0		23.0 Swiftwater			79.0 Cooper Cr. C.			
			27.5 Refuge land						
3	0.0	11.5 Eagle Rock	17.6	36.2 (By boat)		69.6 Jim's Landing			16
	6.0 (By boat)	13.8 L. Big Eddy	23.0 Swiftwater	39.5 Bings Landing		73.6 Sportsman L.			
		16.8	31.0 Morgans L.	43.0 @ Killey R.		76.3 Schooner Bend			
				50.0		79.0 Cooper Cr. C.			
						82.0			
4	10.0		21.1 Soldotna Br.	50.0 ? (43.0?)		69.6			5
						73.6			

NOTE: This preliminary list is for discussion purposes only and subject to change based on Work Group review. No sampling sites are identified for Reach 7 or above Kenai Lake as of this date.

February 12, 1998

TECHNICAL APPENDIX B

FRAMEWORK FOR A WATER-QUALITY-MONITORING PROGRAM

Water-quality monitoring is a critical support for any water-management program. In this framework, water-quality monitoring is defined as "an integrated activity for evaluating the physical, chemical, and biological character of water in relation to human health, ecological conditions, and designated water uses." It includes the monitoring of rivers, lakes, reservoirs, estuaries, coastal water, atmospheric precipitation, wetlands, and ground water. Without correct information, the state of the Nation's water resources cannot be assessed, effective preservation and remediation programs cannot be run, and program success cannot be evaluated. To help water managers of programs of all levels from national to local collect data that will be shared and useful for meeting multiple objectives at all levels, the ITFM sets forth the following framework for monitoring programs.

Water-quality monitoring can be grouped into the following general purposes:

* Describing status and trends.
* Describing and ranking existing and emerging problems.
* Designing management and regulatory programs.
* Evaluating program effectiveness.
* Responding to emergencies.

Although monitoring may vary in kind or intensity among the five purposes, they share a common design framework and the implementation steps outlined below.

In designing the implementing monitoring programs for surface and ground waters, it is vital to take into consideration the differences in the spatial and temporal characteristics, as well as the accessibility to monitoring of each of the resources. Equally important to the success of a program is the formulation and implementation of an effective data-management system and effective methods of communication and information exchange among collaborators, customers, and the general public.

I. Purpose

A. Purposes and expectations--Identify general purposes and expectations for the monitoring program.

B. Specific program purposes--To the degree possible, identify the specific purposes of the monitoring program.

C. Share purposes--Determine if other data collectors and users have similar purposes that may influence other monitoring programs.

D. Customers--Who needs the data or information and for what reason? Determine if other agencies share the same purposes and if they can effectively combine resources.

E. Boundaries and timeframes--Identify general geographic boundaries

and timeframes to the monitoring program

F. Environmental indicators--Chose environmental indicators to measure the achievement of identified program purposes.

II. Coordinate/collaborate.

A. Establish working Rrlations--Establish a working relation with Federal, State, Tribal, local, academic, and private agencies that collect and use water-quality information. If the agency has many programs, then integrate the individual monitoring programs into overall program goals.

B. Incorporate needs of others--If possible, incorporate needs of other agencies into the purposes of the program. Ensure the inclusion of data qualifiers with stored data so others know the accuracy and precision of the environmental data that was collected and analyzed

III. Design.

A. Existing environmental setting--Identify and describe the existing environmental setting, including its hydrology (surface and ground waters), biota, and resource use.

B. Existing water-quality problems--Evaluate existing information to depict the known or suspected surface- and ground-water-quality conditions, problems, or information gaps; provide a current conceptual understanding; and identify management concerns and alternatives.

C. Environmental indicators and data parameters--Determine the environmental indicators and habitat and related chemical, physical, biological, and ancillary data parameters to be monitored.

D. Reference conditions--Establish reference conditions for environmental indicators that can be monitored to provide a baseline water-quality assessment.

E. Data-quality objectives--Define the level of confidence needed, based on the data collected, to support testing management alternatives.

F. Data-set characteristics--Determine the basis for a monitoring design that will allow successful interpretation of the data at a resolution that meets project purposes. The basis for monitoring should include statistical reliability and geographic, geohydrologic, geochemical, biological, land use/land cover, and temporal variability.

G. Quality-assurance plan--Develop a quality-assurance plan (QA) plan that documents data accuracy and precision, representativeness of the data, completeness of the data set, and comparability of data relative to data collected by others.

H. Monitoring design--Develop a sampling design that could include fixed station, synoptic, event sampling, and intensive surveys; location of sites, such as a stratified random design; and physical,

chemical, biological, and ancillary indicators.

I. Data-collection methods.--Develop sampling plans and identify standardized protocols and methods (performance based if possible) and document data to enable data comparison with other monitoring programs. Identify personnel and equipment needed

J. Timing--Describe the duration of the sampling program and the frequency and seasonality of sampling.

K. Field and laboratory analytical support--Identify field and laboratory protocols or performance-based methods, which include detection level, accuracy, precision turnaround time, and sample preservation.

L. Data management--Describe the data-management protocol, which includes data archiving, data sharing, and data security that can be followed. Ensure that all data includes metadata, such as location (latitude and longitude), date, time, and a description of collection and analytical methods, and QA data.

M. Training--As necessary, train staff to collect, manage, interpret, or present water-quality data and information.

N. Interpretation--Identify interpretative methods that are compatible with data being collected and program purposes.

O. Communications--Determine how data and interpretive information can be communicated; for example, press releases, public meetings, agency meetings, conferences, popular publications, agency reports, journal articles, and so forth.

P. Costs--Determine the program costs and sources of funding

Q. Iterative--Develop feedback mechanisms to fine-tune design.

IV. Implementation.

A. Establish and document sites--Construct wells, shelters, gage houses, staff gages, and other needed structures as needed in preparation for data collection;. document ancillary data for sites.

B. Collect data--Collect data according to monitoring design and protocols; coordinate with other agencies where appropriate.

C. Review results--Review data-collection activities to ensure that protocols and QA plan are being followed and that data is complete and meets stated purposes.

D. Store and manage data--Archive data in such a manner that the accuracy and precision are maintained.

E. Share data--Provide data for other agencies upon request.

F. Summarize data--Provide data-summary information to managers when applicable.

V. Interpretation.

A. Data reliability--Define the accuracy and precision of environmental data by using quality-control data.

B. Interpret data to meet stated purposes--Interpret the data, which include a description of the water-resources system, by using existing environmental and ancillary data to provide information useful to making water-quality-management decisions.

C. Statistical methods and model documentation--Use statistical packages and deterministic models that are well documented.

D. Management alternatives--Test management alternatives when they are known.

E. Coordinate interpretations--Consider management alternatives when interpreting data to meet the needs of collaborators and customers.

VI. Evaluate monitoring program.

A. Meet goals and objectives--Determine if monitoring program goals and objectives were met.

B. Identify problems--Identify any monitoring problems associated with collecting and analyzing samples; storing, disseminating, and interpreting data; and reporting the information to managers and the public.

C. Evaluate costs--Evaluate the costs of the monitoring program relative to other costs, such as clean up, lost environment, and product produced.

D. Feedback--Use results of evaluation monitoring program to identify current and future needs and activities of agencies and data users.

VII. Communication.

A. Coordinate--Participate in the distribution of information to and with other agencies.

B. Write and distribute technical reports--Describe current water-quality conditions, spatial distribution, temporal variability, source, cause, transport, fate, and effects of contaminants to humans, aquifers, and ecosystems as appropriate.

C. Communicate with multiple audiences--Write lay reports or executive summaries for nontechnical audiences and peer review reports for technical audiences.

D. Make presentations--Make presentations to assist management and the

public in understanding the significance of results.

E. Make data available--Provide basic data for other data users as requested.

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TECHNICAL APPENDIX C

TERMS OF REFERENCE--NATIONAL WATER-QUALITY MONITORING COUNCIL

I. Official designation.

The National Water-Quality Monitoring Council (National Council) is the permanent successor to the Intergovernmental Task Force on Monitoring Water Quality (ITFM).

II. Purpose, scope, applicability, and functions.

A. Purpose--The overall purpose of the National Council is to support water-quality-information aspects of natural-resources management and environmental protection. The National Council has a broad mandate that encompasses water-quality monitoring and assessment, which includes considerations of water quality in relation to water quantity. The purpose of the National Council is to coordinate and provide guidance and technical support for the voluntary implementation of the recommendations presented in the Strategy for Improving Water-Quality Monitoring in the United States (the strategy) by government agencies and the private sector. The intent of the strategy, presented in the final report of the ITFM, is to stimulate the monitoring improvements needed to achieve comparable and scientifically defensible information, interpretations, and evaluations of water-quality conditions. The information is required to support decisionmaking at local, State, Tribal, interstate, and national scales.

B. Scope--The scope of the National Council includes reviewing activities for monitoring the quality of fresh surface water, estuary and near-coastal water, ground water, and precipitation at local, regional, and national levels. The National Council will provide guidance for the collection, management, and use of water-quality information. This information is needed to assess status and trends, to identify and prioritize existing and emerging problems, to develop and implement management and regulatory programs and to evaluate compliance with environmental requirements and the effectiveness of programs and projects. Regarding marine environments, the National Council will assist the U.S. Environmental Protection Agency (USEPA), the National Oceanic and Atmospheric Administration (NOAA), the States, and the Tribes in their joint activities to gather water-quality-monitoring information.

The National Council will address and provide guidance for each of the following aspects of water-quality monitoring: institutional coordination and collaboration, identifying the objectives for monitoring, program design, environmental indicators and standard descriptors of aquatic and riparian conditions, reference conditions and sites, station selection, methods and data comparability, quality assurance and control, information management and data sharing, ancillary data needed to interpret basic water-quality data and information, data-interpretation and analysis techniques, reporting

findings and information, training, incentives for participating in the strategy, benefits and costs of monitoring, evaluation of monitoring activities, and other issues necessary to the successful implementation of the strategy.

C. Applicability--As resources are available and consistent with applicable legal requirements, organizations that voluntarily choose to participate in implementing the strategy will implement ITFM recommendations and voluntarily use the guidelines and procedures developed by the National Council and accepted by the Advisory Committee on Water Information (ACWI).

D. Functions--The specific functions and tasks of the National Council include the following:

1. Maintain the institutional framework--To implement the strategy, establish and maintain collaborative partnerships that link monitoring organizations at the national, regional, State, Tribal, and watershed levels.

2. Evaluate progress--Evaluate and report the progress in implementing the strategy every 5 years beginning in 2000. The evaluation will include accomplishments, plans, recommendations, and a list of organizations that participate in implementing the strategy. The report will be distributed to Governors, the heads of executive agencies, the President, the Congress, and other interested parties.

3. Data quality and documentation--Develop and foster the implementation of monitoring activities for which the data quality is known and the documentation is adequate to support information sharing.

4. Indicators--Establish and maintain a process to identify and distribute comparable physical, chemical, and biological indicators to measure progress in meeting water-quality goals at the national and large regional levels. As part of the process to support comparable and policy-relevant indicators, produce guidance for implementing national indicators. Coordinate planning for implementing comparable indicators. (The plans will include agency-specific actions, data-quality guidelines, and schedules for reporting data intended for use in national assessment activities.) Encourage similar collaboration to achieve comparable and relevant indicators at the State and the watershed levels.

5. Information management and sharing--Provide easy access to and support of the sharing of information holdings by creating links among information systems that will constitute a nationwide distributed water-information network. The system links and the information-sharing networks will include Federal, State, Tribal, local, and private organizations among the primary and the secondary users of water-quality information.

6. Data elements, codes, and reference tables--Adopt and maintain an agreed-upon data-element glossary to provide common terminology and definitions for documenting water-quality data; that is, metadata. Continue to update and refine the data-elements glossary to meet additional requirements. Coordinate support for interagency efforts to maintain, update, and distribute common taxonomic and other codes and reference tables for use in automated data systems containing water-quality information. In particular, support the Interagency Taxonomy Information System.

7. Methods and data comparability--Provide technical guidance and coordinate other support necessary to achieve comparable measurements that have known quality. To carry out these functions, the permanent Methods and Data Comparability Board (MDCB) will be established. The MDCB will include a balanced membership of organizations that represent Federal, State, Tribal, interstate, and local government agencies and the private sector.

8. National assessment--Foster collaboration among organizations that participate in national, multistate, or State assessments of water-quality conditions and trends. Develop and distribute guidelines and procedures to improve the interpretation and integration of the physical, chemical, and biological/ecological data needed to describe water-quality conditions and trends and to understand the factors that cause water-quality conditions to change.

9. Reporting and public education--Foster a better understanding of water-quality conditions, trends, and issues among decisionmakers and the general public by developing and implementing common or linked information-presentation and reporting methods, which would include suggested presentation formats.

10. Information dissemination--Establish a mechanism that uses modern information technology to make the activities, conventions, protocols, and guidelines that are part of the strategy widely accessible. The mechanism should be maintained over time as required to meet users needs and to document the evolving infrastructure that supports the strategy.

11. Training--Identify training requirements and recommend training activities to make the most effective use of monitoring resources and to facilitate data quality, comparability, and sharing.

12. International activities--Through existing mechanisms, foster communication, collaboration, and consensus to improve the availability and utility of water-quality information internationally. The National Council will learn from experts in other countries and evaluate technology and information for its applicability in the United States. Also, the National Council will share technology and information developed in the United States with other countries; in particular, the National Council will collaborate with appropriate entities under the North American Free Trade Agreement.

III. Membership.

A. The National Council shall comprise a balanced membership of Federal, interstate, State, Tribal, local, and municipal government agencies and the private sector, which will include volunteer monitoring groups. The membership will include organizations that collect, analyze, interpret, disseminate, or use water-quality monitoring information, as well as those that develop monitoring technology, guidelines, and (or) standards.

B. State membership on the National Council will include one State agency representative from each of the 10 Federal regions. To allow full State participation over time, membership will rotate among the States in one-half of the regions every 2 years. To initiate the rotation on the National Council, States in Regions I, III, V, VII, and IX will rotate at the end of the first 2 years. States in Regions II, IV, VI, VIII, and X will rotate at the end of the first 4 years. Within each region, representatives of State water-quality-monitoring agencies will elect their representative to the National Council. State representatives will serve 4-year terms once the rotation noted above is established.

C. The Director of the U.S. Geological Survey (USGS) and the Assistant Administrator for Water of the USEPA will designate an additional 11 member organizations that have differing viewpoints and water-quality-monitoring and assessment functions. Other organizations that participate on the National Council will represent the following interests: Native Americans, agriculture, environmental interest groups, industry, local agencies and municipalities, river-basin commissions, and (or) in associations, universities, and volunteer monitoring groups. Nominations for this category of membership will be by members of the ACWI and other interested organizations. These other member organizations will serve 4-year terms and can be redesignated.

D. Each member organization will designate their representative and an alternate to the National Council.

E. The USGS and the USEPA will serve as cochairs of the National Council. The USGS will provide the Executive Secretariat for the National Council. Including the USGS and USEPA, Federal membership on the National Council will not exceed 10 representatives and will include the following organizations: the U.S. Department of Commerce/NOAA, the Tennessee Valley Authority, the U.S. Army Corps of Engineers, the U.S. Department of Agriculture, the U.S. Department of Energy, the USEPA/Offices of Water, the U.S. Department of the Interior/USGS, and either the National Biological Service or the U.S. Fish and Wildlife Service. Additional Federal member organizations up to a total of 10 can participate as mutually agreed by the cochairs of the National Council. The Office of Management and Budget (OMB) will be invited to participate as a nonvoting member.

F. To ensure appropriate balance and expertise on the National Council, the cochairs may jointly designate additional member organizations not

to exceed a total membership of 35.

G. Representatives or alternates are expected to attend all meetings of the National Council. If a member organization is not represented at three consecutive meetings, then the cochairs of the National Council may appoint a new member organization to replace the member that has failed to participate. The cochairs will consult with the member organization before removing it from the National Council.

IV. Meetings and procedures.

A. The National Council will meet a minimum of three times a year and at other times as designated by the cochairs. The cochairs will jointly determine the dates, times, and locations of the meetings in consultation with the members.

B. Representatives to the National Council will receive no pay, allowances, or benefits by reason of their service on the National Council. However, while away from their homes or regular places of business and in the performance of services for the National Council, non-Federal representatives to the National Council will be allowed travel expenses if needed. Travel expenses will include per diem in lieu of subsistence, in the same manner as persons employed intermittently in Government service are allowed such expenses under Section 5703 of Title 5 of the United States Code.

C. The presence of two-thirds of the representatives or designated alternates of the member organizations will constitute the quorum necessary to conduct business. The National Council will conduct business in an open fashion by attempting to discuss fully and resolve all issues through consensus and by recognizing the legitimate interests and diverse views of the National Council members. If complete agreement cannot be attained, then the following procedures will apply:

1. A consensus will exist unless one or more representatives request a vote.

2. If a vote is requested, then Robert's Rules of Order will apply, and the cochairs will poll the National Council. An affirmative vote of two-thirds of the members present will constitute approval. Each member organization may cast one vote.

3. Actions that constitute final reports or recommendations intended for nationwide implementation as part of the strategy will be signed by the cochairs. Representatives may prepare minority reports and provide them to the executive secretary within 1 week of a decision. Minority reports will be included in the final majority reports.

4. Agreements by the National Council may be reached in formal session or in writing on an individual basis after every delegate is advised in advance by the cochairs.

D. As resources are available and consistent with applicable legal requirements, organizations that chose to participate in the strategy will implement ITFM recommendations and will use the guidelines developed by the MDCB (or other subordinate groups) and approved by the National Council.

E. Before adopting guidelines or recommendations for voluntary implementation nationwide as part of the strategy, the National Council will announce proposed actions and products in the Federal Register for the purpose of obtaining public review and comments.

F. Summaries with action items of National Council meetings will be prepared by the executive secretary and distributed to all members and to the chair of the ACWI. In addition, meeting summaries and other documents will be available for public access and review.

G. Transcripts of each National Council meeting, recommendations adopted, and copies of all studies and reports received, issued, or approved in conjunction with the activities of the National Council will be available for public inspection on the Internet and for review and copying at the following location:

Office of Water Data Coordination
417 National Center
U.S. Geological Survey
12201 Sunrise Valley Drive
Reston, Virginia 22092

V. Period of time necessary for the activities of the National Council --The total period of time necessary for the National Council to carry out its activities is estimated to be for as long as the Federal Government has responsibilities and interests related to monitoring water quality.

VI. Official to whom the National Council reports--The National Council reports to the chair of the ACWI.

VII. Support services--Support services and executive secretariat for the activities of the National Council will be provided by the USGS. In addition, the USEPA and other organizations will provide services and other support to the National Council as mutually agreed.

VIII. Duties of the National Council--The duties of the National Council are to provide information and develop advice as set forth in Section II.

IX. Termination date--The National Council will operate for as long as the strategy is implemented. The chair of the ACWI has the authority to terminate the National Council in consultation with the member organizations of the ACWI and the National Council.

X. Subordinate groups--For assistance in conducting its business, the National Council may establish subordinate groups. Such groups will gather information, conduct research, analyze relevant issues and facts, and draft proposed position papers and (or) recommendations for deliberation by the

National Council. These groups, which will be established by the cochairs, will have the balanced perspectives and knowledge necessary to perform their assigned functions. Representatives that serve on subordinate groups may include organizations or experts that are not members of the National Council or the ACWI, but that provide the knowledgeable and interested individuals needed to carry out the assigned tasks. The "Terms of Reference" for permanent groups, such as the MDCB, will be reviewed and approved by the National Council and forwarded to the ACWI for concurrence. These groups will report directly to the National Council or, in some cases, through another subordinate group.

XI. Authority--The National Council is part of the Water Information Coordination Program mandated by OMB Memorandum No. 92-01, dated December 10, 1991. The National Council reports to the ACWI that operates under the Federal Advisory Committee Act.

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Washington Volunteer Monitors Aspire to Better Data

No one knows exactly how many volunteer monitors there are in the United States (the last official count, in 1993-1994, tallied over 340,000), but Washington state has nearly 160 groups with 8,000 volunteers monitoring water alone. All this activity generates a lot of data -- and a potential nightmare for quality assurance.

A 1996 survey of the state's volunteer monitors revealed that most are eager to have their data used by state and local agencies, but according to Annie Phillips, a Washington Department of Ecology environmental education specialist, "Different groups use different methods, standards, and levels of quality." This disparity can make it difficult for agencies to use data from volunteers.

The survey, conducted by the Department of Ecology (Ecology) and the Governor's Council on Environmental Education, produced a statewide list of the location of monitoring projects, the parameters measured, and the methods and quality assurance protocols used by the monitors. "It became clear that each of the various groups did things their own way, and therefore, their data were inconsistent and of unknown quality," Phillips said.

To solve this problem, Ecology developed a matrix to characterize the methods and quality of the data collected by volunteers. The agency categorizes data from each volunteer monitoring group according to criteria such as quality assurance/quality control protocols, monitoring methods, and the education and training of the monitors. "We developed the matrix as a kind of ranking system to give a standard description for the quality of data produced for a specific project," explained Phillips.

Level	Quality Assurance/Control (QA/QC) Protocols	Examples of QA/QC Guidelines	Examples of Activities	Desired Education/ Training	General uses of Data by Ecology
One	No formal QA/QC plan required	Field observations on standard forms; EPA Streamwalk	General field observations, including the number and diversity of organisms	Volunteer or student with brief orientation	Educational, general awareness
Two	Basic written plan - purpose, parameters, methods, sites, schedule	GREEN field manuals; Color comparator kit instructions	Field sampling; analysis using field kits; observing categorical abundance*** of organisms and identifying them to the order level	Volunteer, student or technician supervised by an expert monitor	Educational; watershed characterization; red flag or early warning
Three	Formal QA plan (*i.e. meets 24 requirements of EPA's new Vol. Mon. Guide to QAPP, 1996*); all tests needing lab analysis done at an accredited lab	Technical guidelines (*e.g., Adopt-A-Stream's Streamkeepers Field Guide, 1995; Michaud's Citizen's Guide to Monitoring, 1991; EPA's Volunteer Monitoring Methods Manuals*)	Using calibrated meters for field measurements or following the protocols in a current *APHA Standard Methods*; collecting and analyzing water samples; identifying benthics to the family level; volunteer portion of Ecology's lake water quality assessments	Trained volunteer (*e.g., Streamkeepers); technician with experience or training or a participant in an established volunteer monitoring program*	Screening level information; scoping phase of watershed approach; 305(b) Report*; Best Management Practices (BMP) evaluation data; water quantity/ flow data
Four	Follows formal QA plan and documents exactly how it is implemented; sample chain of custody	Ecology technical guidelines (*e.g. Cusimano 1994, Coots 1995*); *Plotnikoff's Instream Biological Assessment Monitoring Protocols, 1994*	Toxic substance sampling; sampling for enforcement purposes; bioassays; identifying benthics to the genus/species level	Professional/ Qualified individual with degree and specific training *or equivalent experience*	Baseline, impact and ambient assessments; action planning/ policy development; permitting; compliance/enforcement; 303(d) List**

Ecology's 305(b) Report shows whether waterbodies support beneficial uses such as swimming and fishing - or whether these uses are impaired. Contributions of data are solicited from various sources, but must meet high standards (see Level 3).

**Ecology's 303(d) List shows impaired and threatened waters that don't or probably couldn't meet applicable water quality standards. Ecology accepts data for this list from outside sources, but it must meet the highest professional standards (see Level 4). Both are published every two years.*

***Categories of abundance: absent, rare, present, abundant, very abundant*

Publication #96-2014-WQ&FA May 1996

Washington Volunteer Monitors Aspire to Better Data

The matrix influences, but doesn't dictate, the way data is used. For example, Level One data, gathered through general field observations, can be used for general public awareness. Level Four, using technical guidelines for toxic substance sampling, bioassays, and taxonomic classification qualifies for use in impact assessments, planning, permitting, and enforcement.

Survey Taps Volunteer Monitors

[Adapted from *Watch Over Washington Survey Report* (October 1996). Responses to this survey came from 158 groups representing over 11,500 people.]

Volunteer profile

- ✔ 7,567 volunteers monitor some aspect of water — surface or groundwater, quality or quantity, lakes, streams and rivers, or estuaries
- ✔ 6,258 monitor benthic macroinvertebrates;
- ✔ 6,120 monitor vegetation;
- ✔ 8,620 monitor wildlife;
- ✔ 2,168 monitor wetlands;
- ✔ 6,314 monitor things such as weather, land use, sediments, and/or construction sites. (Most monitor more than one resource.)

Over half the volunteers are students; the rest are members of neighborhood associations or the general public. Of the student monitors, 21% are elementary students, 22% attend middle school, 40% are high school students, and 17% are college or graduate students.

Many classrooms are affiliated with GREEN (Global Rivers Environmental Education Network), NatureMapping, or Adopt-A-Stream; many community groups were trained by Adopt-A-Stream.

The average number of years these groups have been in operation is 4.9. Nearly two-thirds use email.

How credible is their work?

5,456 monitors collect data at Level Two on the matrix; 2,317 at Level One; 1,894 at Level Three.

Why do they monitor?

61% education/awareness, 21% to collect baseline data, and the rest checked various reasons — red flag/early warning, enforcement/compliance, research, a specific project, or land use impact.

Using the matrix will "facilitate better, more consistent monitoring," said Phillips. It was also the first step, she says, in achieving recognition by agency scientists. "It was kind of a bargain. If the volunteer group is willing to work *this* hard, we will look at their data for *these* purposes. But if they only want to go *this* far, we will only look at it for *this* purpose."

The matrix has gone a long way toward convincing skeptics that volunteer monitoring can go beyond outreach. Some are even acknowledging that the very highest quality volunteer data could be used for 305(b) reports and the state's 303(d) list, if certain requirements are met.

Washington's volunteers seem more than ready to accept the challenge. Three-quarters of the volunteer coordinators surveyed would like their groups to receive training, and half want to monitor additional resources or parameters. "Our survey showed most volunteers are eager to meet high standards. We want to help the volunteers develop skill levels which will support their needs," said Phillips.

To accommodate the widespread enthusiasm for volunteer monitor training, Ecology is linking volunteers through "Watch Over Washington," or WOW. Using a Web site (http://www.wa.gov.gov/ecology/wq/wow.html) as a virtual central meeting place, volunteer monitors can locate other monitoring activities in their areas and access training opportunities. Coordinators of monitoring groups can keep abreast of what other groups are doing and contact each other to combine resources. They can also learn about, and announce, events, resources, tools, new methods, environmental reports, and success stories on the Web site. There will also be a section, or FAQ as it is called, for frequently asked questions about monitoring.

Support for such a citizen monitoring network is overwhelming. Almost three-quarters of the volunteers surveyed indicate that they are very interested in participating. Although new and still fairly informal, a number of contacts have already occurred via the network's roster of members organized by watershed. Phillips is active as a catalyst as well. She explained, "When I learn of a project starting up, I tell them about other projects in the area that might act as mentors or partners. For instance, I recently put two college instructors in the Puyallup River watershed in contact with each other. One was hoping to start up a monitoring program; the other had already established his. I thought they might share equipment and lab services."

[For more information, contact Annie Phillips, Environmental Education Specialist, Washington State Department of Ecology, P.O. Box 47600, Olympia, WA 98504-7600. Phone: (360) 407-6408; fax (360) 407-6574; email: aphi461@ecy.wa.gov. Or contact Beverly Isenson, Special Assistant, Governor's Council on Environmental Education, P.O. Box 40900, Olympia, WA 98504-0900. Phone: (360) 407-7317; email: beverlyi@parks.wa.gov.]

USERS AND USES OF MONITORING INFORMATION: BACKGROUND INFORMATION

Volunteer monitors are faced with a fundamental question common to all project planners; how do you produce the highest quality product for the least amount of work, expertise and money – all of which seem to be in chronically short supply? The answer to this rests on the relationship between the producer (the data provider) and the consumer (the data user). What are the user's expectations for quality of the product? Depending on the user, the expectations may vary greatly. The farmer and the agency scientist may have very different ideas on what constitutes credible data. A volunteer program can make just as big a mistake, by "over-designing" the program - spending too much on fancy equipment, training and technique – as by taking too little care. On the one hand, over-design can mean fewer sites or dates can be monitored, or it could mean that the group "burns out" faster. On the other hand, all effort may be wasted if the target audience does not respect and will not use the data.

To establish a program that is "just right" in terms of efficiency and rigor, we recommend some simple rules:

- know what you want to use the data for
- know who you want to use the data, and what their expectations are
- develop data quality objectives that meet your target audiences' needs
- design and conduct sampling programs that achieve those data quality objectives
- don't spend any more effort than is necessary!

In this section, we'll review the basics of the first two rules – users and uses of watershed monitoring data.

Users and Uses of Watershed Monitoring Data

Data *uses* and data *users* are different things that are closely tied together. A data *use* is an activity, program, or forum that achieves an end with the help of the data, or information. Examples: a court case that charges someone with violating a discharge permit, development of a fisheries management plan, determining if a public beach is safe for swimming, or educating the watershed association's board (and the larger community) on the general health of the river. Data *users* are the people and institutions who make the decisions. Examples (based on those above): the judge deciding the case, the fisheries agency, the town health officer – and the bathers, the watershed association and the general public. The challenge for the volunteer monitor is to determine which actions and which decision-makers are important enough to convince, and then figure out what they need in order to be convinced.

To help volunteer monitors on the latter question, we have developed a list – based on our experience – of common data users and uses of water monitoring data.

Table 1. Data Users and Uses

User	Uses
1. Individual Citizens	· Risk assessment · (Should I actually jump in that water?) · Stewardship · Support for policy & program expenditures and changes
2. Legislators	· Set and evaluate goals, policies, and programs
3. Regulators	· Program planning, management, and evaluation · Protect human and ecosystem health · Compliance with standards and permits · Funding · 305(b) reports
4. Resource Managers (e.g. Farmers, Conservation Commissions, non-regulatory agencies, large land owners)	· Plan and policy development · Operational decision making · Conflict and dispute resolution · Program evaluation · Resource evaluation
5. Municipalities and Industry (Dischargers)	· Water supply and discharge planning and management · Identifying sites for development · Standards and permit compliance · Identifying sites for protection · Public health · Economic development/Tourism
6. Environmental Groups	· Self and government policy and program evaluation · Support programs – ORW designation (or suing) · Stewardship, environmental awareness, education · Advocacy support
7. Scientists	· Improve scientific understanding of ecological relationships
8. Civic Groups	· Boosterism – economic development/tourism · Advocacy · Stewardship · Stakeholder roles
9. Educational Institutions	· Awareness · Stewardship · Involvement · Career Development
10. Monitoring Groups	· Advocacy · Program evaluation · Monitoring program evaluation

DATA QUALITY GOALS: BACKGROUND INFORMATION

Once you've identified the intended users and uses of your data, you need to establish data quality goals. These are narrative statements that link the quality of data with the intended use of the data. Most of your other monitoring decisions (what, how, where, how often) will be based on your data quality goals.

We've identified four possible data quality goals for the VEMN:

1) **Level of quality necessary to meet legal, regulatory and scientific peer review requirements**
2) **Meets evaluation and assessment requirements of state and federal agencies.**
3) **Meets requirements for evaluation, assessment and management at the community or watershed level.**
4) **Data quality sufficient to increase awareness and knowledge of resource values and conditions.**

These goals are arranged in decreasing order of the scientific rigor required to meet them. They are not the only possible goals. Think of the following goals as benchmarks along a continuum of rigor, expense, time, and commitment. A brief discussion of each follows:

1) **Level of quality necessary to meet legal, regulatory and scientific peer review requirements.**

   This goal, requires a very high level of scientific rigor that can stand up to the highest level of scrutiny in a court of law, regulatory proceeding, or peer review for a scientific journal that reports research results. Meeting this goal will require that you use the most precise, accurate and sensitive methods available and that you undertake a rigorous program to assure the quality of your results. This is a very difficult and potentially prohibitively expensive goal to meet. Given some of the inherent issues associated with using non-professionals to collect data, it's highly unlikely that data collected by volunteer monitors will be used this way.

2) **Meets evaluation and assessment requirements of state and federal agencies.**

   Evaluation and assessment are data uses that enable decision-makers to make non-regulatory water management decisions about allocating staff and funding resources to address problems. Data that meets this goal can be included in EPA and state biennial reports to Congress (also known as 305(b)) reports that describe the extent to which waters support their designated uses and values. This goal requires that the indicators; the precision, accuracy, and sensitivity of the methods; the sites; the frequency; and the quality assurance measures you choose match or are equivalent to those used by agency programs. While still a challenging goal, state and federal agencies in the watershed have begun to use volunteer monitoring data gathered in this way. Remember that your audience here are professional water resources people who understand the limits of your ability to collect water monitoring data, but who also need data to supplement their own. Depending on the nature of the monitoring, meeting this goals may require substantial human and financial resources.

3) **Meets requirements for evaluation, assessment and management at the community or watershed level.**

Evaluation, assessment, and management decisions at the community or watershed level typically involve municipal and landowner land and water planning and use decisions. It may be as simple as an individual deciding whether or not the water is clean enough to swim in or a farmer deciding whether or not to fence dairy cows out of the stream. Or it may involve local regulations that protect water quality by establishing undeveloped areas along the water body. This goal requires that the indicators; the precision, accuracy, and sensitivity of the methods; the sites; the frequency; and the quality assurance measures you choose convince both professional and non-professional water resource managers at the community level that your data is reliable. While a degree of scientific rigor is required, your methods may be geared toward identifying gross problems, for example, rather than subtle changes over time and space. Community level resource managers may or may not have a good understanding of aquatic ecosystems and monitoring, so you may need to educate them at the same time. Many volunteer monitoring groups meet this goal using relatively easy and inexpensive methods.

4) **Data quality sufficient to increase awareness and knowledge of resource values and conditions.**

Awareness of water resource values and conditions is a pre-requisite for public support of efforts to restore, protect, and maintain water resources. In this case, then audience is the general public. Your monitoring program should be tailored toward increasing public understanding of problems, opportunities, and special resource values that enhance the quality of life in the area. This does not require rigorous sampling and analytical methods. Many school water monitoring programs, for example, use simple and inexpensive methods just to expose get students to experience the water itself, teach the concept of monitoring, and to reveal ecological processes at work in the real world. All volunteer monitoring programs meet this goal to one degree or another, just by getting people to experience their local stream or lake.

Many programs start with the least rigorous goal, and evolve into more sophisticated efforts over time. Which data quality goal(s) you select depends on the intended users and uses or your data.

DATA USES APPROPRIATE FOR THE DATA QUALITY GOALS

This section lists appropriate data uses for each of the four data quality goals described above. By consulting this list – and consulting the VEMN for assistance in applying it to a particular survey, volunteer monitors should be able to design programs that are tailored to the intended users and uses.

Level 1 Uses: *LEVEL OF QUALITY NECESSARY TO MEET LEGAL, REGULATORY, AND SCIENTIFIC PEER REVIEW REQUIREMENTS.*

- inclusion in 305(b) reports
- determine compliance with permit requirements
- enforce pollution control laws and regulations
- improve scientific understanding

Level 2 Uses: *MEETS EVALUATION AND ASSESSMENT REQUIREMENTS OF STATE AND FEDERAL AGENCIES.*

- inclusion in 305(b) reports
- determine if water quality standards are being met
- evaluate effectiveness of pollution control programs
- evaluate effectiveness of pollution control projects
- discharge planning and management
- determine human / ecosystem health
- improve scientific understanding
- develop public support for program/policy funding and decisions
- program panning/management: determine where and how to allocated human and financial resources
- advocacy for legislation, funding, management decisions
- evaluate resources for different uses
- resolve conflicts
- operational decisions for equipment and land management
- land use planning
- career development

Level 3 Uses: *MEETS REQUIREMENTS FOR EVALUATION, ASSESSMENT AND MANAGEMENT AT THE COMMUNITY OR WATERSHED LEVEL.*

- risk assessment (individual)
- develop public support for program/policy funding and decisions
- program panning/management: determine where and how to allocated human and financial resources
- advocacy for legislation, funding, management decisions
- evaluate resources for different uses
- resolve conflicts
- operational decisions for equipment and land management
- land use planning
- career development
- funding

Level 4 Uses: *DATA QUALITY SUFFICIENT TO INCREASE AWARENESS AND KNOWLEDGE OF RESOURCE VALUES AND CONDITIONS.*

- education/awareness/stewardship
- boosterism: advertise availability of high quality community resources
- funding

HB 402

HOUSE BILL NO. 402

IN THE LEGISLATURE OF THE STATE OF ALASKA

TWENTIETH LEGISLATURE - SECOND SESSION

BY THE HOUSE RULES COMMITTEE BY REQUEST OF THE GOVERNOR

Introduced: 2/12/98

Referred: House Special Committee on Oil and Gas, Resources, Finance

A BILL

FOR AN ACT ENTITLED

"An Act providing for a Cook Inlet watershed water quality monitoring project tax credit under the Alaska Net Income Tax Act; and providing for an effective date."

BE IT ENACTED BY THE STATE OF ALASKA:

* Section 1. FINDINGS AND PURPOSE. (a) The legislature finds that

(1) the state's watersheds are valuable resources that warrant careful study and monitoring, and that on-going water quality monitoring projects throughout the state should be encouraged;

(2) the effectiveness of an incentive program for private industry to establish voluntary water quality monitoring can be determined by a five-year program limited to one geographic region;

(3) the Cook Inlet watershed is unique and valuable, and that Alaskans benefit from the multiple uses of this watershed;

(4) scientific study of the Cook Inlet watershed will help to ensure that future generations will enjoy continued benefits from the watershed;

(5) understanding of the watershed will be greatly enhanced by additional information regarding water quality and factors affecting water quality;

(6) additional water quality monitoring will provide a public benefit;

(7) private industry is in a position to assist state government in acquiring water quality information; and

(8) a single private entity has little incentive to invest in a voluntary water quality monitoring project in the Cook Inlet watershed.

(b) The purpose of this Act is to provide the incentive to private industry to conduct necessary monitoring beyond that required for compliance purposes by providing a tax credit against the Alaska net income tax for an investment in a qualified water quality monitoring project in the Cook Inlet watershed.

* Sec. 2. AS 43.20 is amended by adding a new section to article 1 to read:

Sec. 43.20.048. Cook Inlet watershed water quality monitoring project credit. (a) A taxpayer may claim a tax credit of 60 percent of its qualified expenditures in the state in a year beginning after December 31, 1998 and before January 1, 2004 for a qualified Cook Inlet watershed water quality monitoring project that was in operation in the state after December 31, 1998 and before January 1, 2004, as evidenced in a certification of qualified expenditures for the project issued to the taxpayer by the Department of Environmental Conservation under AS 46.03.095 .

(b) The tax credit allowed under this section, in combination with any carry forward of unused credit under (c) of this section,

(1) may not exceed the lesser of $100,000 or 50 percent of the taxpayer's tax liability, per year; and

(2) notwithstanding any other provision of this title, shall be taken before all other credits allowed by this title.

(c) An unused tax credit under this section may be carried forward and applied against the taxpayer's tax liability in a subsequent tax year, except that the unused credit may not be carried forward to a tax year beginning after December 31, 2006.

(d) Expenditures for which a credit is claimed under this section may not be considered for any other credit under this title.

(e) A taxpayer in arrears in the payment of a tax levied in this title or in any payment required by AS 23.20 or AS 23.30 is not entitled to a credit under this section. For purposes of this subsection, a taxpayer is not in arrears if the payment is under an administrative or judicial appeal or is the subject of judicial action.

* Sec. 3. AS 46.03 is amended by adding a new section to read:

Sec. 46.03.095. Certification of qualified expenditures for Cook Inlet watershed water quality monitoring projects. (a) For purposes of the tax credit allowed under AS 43.20.048 , a corporation may apply to the department for certification of qualified expenditures by the corporation in the preceding year for a qualified Cook Inlet watershed water quality monitoring project. With the application, the corporation shall submit verification, as required by the department, that the

(1) project is a qualified project under (c) of this section;

(2) expenditures for which certification is sought were qualified expenditures; and

(3) project operations were begun in the state after December 31, 1998 and before January 1, 2004.

(b) The department shall issue to an applicant corporation a certification of qualified expenditures for a project if the department determines that

(1) the project is a qualified project under (c) of this section;

(2) the corporation's expenditures for which certification is sought were qualified expenditures; and

(3) project operations were begun in the state after December 31, 1998 and before January 1, 2004.

(c) For purposes of this section, a project is a qualified project if

(1) the department approved the project's design before the project's implementation;

(2) the project will contribute information identified as being necessary by the water quality monitoring plan for the Cook Inlet watershed maintained by the department or the project provides other monitoring determined necessary by the department;

(3) the department determines that the project consisted entirely or primarily of water quality monitoring not required by a statute, regulation, lease, stipulation, permit, court or administrative order, or other legal requirement;

(4) all water quality monitoring under the project was conducted using generally accepted quality control procedures as approved by the department;

(5) the corporation has agreed to treat all information generated by the project as public information, subject to public disclosure, and to make the information available for public inspection, upon request, during normal business hours; and

(6) the project complies with regulations adopted by the department under this section.

(d) If a corporation has been issued an initial certification of qualified expenditures under this section for a project and operations under that project continue into a succeeding year, the corporation may apply for a subsequent certification of qualified expenditures for the project. The department shall issue a subsequent certification of qualified expenditures for a continuing project under this subsection if the requirements of this section and regulations adopted under this section continue to be met. However, even if the requirements of this section and regulations adopted under this section are met at the time of application under this subsection, the department may deny subsequent certification under this subsection if the department finds that the project was not operated in compliance with the requirements of this section and regulations adopted under this section in the preceding year.

(e) The department may not approve project design for more than six proposed projects in a calendar year.

(f) In reviewing a proposed project's design or in making a determination under (b) of this section, the department may request from an advisory group with expertise in water quality projects

(1) an evaluation of and recommendation concerning the proposed project's design; or

(2) an evaluation of and recommendation concerning a corporation's application for certification under this section.

(g) The department may adopt regulations to implement this section, including regulations that

(1) establish standards for approving a proposed project's design and for limiting the number of approvals as required by (e) of this section;

(2) establish additional standards that must be met in order for a project to be considered a qualified project;

(3) establish application and other fees necessary to cover department costs in administering the certification program;

(4) establish application and other procedures, including procedures for requesting department approval of a proposed project's design and for application for a subsequent certification under (d) of this section;

(5) establish the forms of verification of qualified expenditures that must be submitted with an application under (a) or (d) of this section.

(h) In this section,

(1) "direct expenditures"

(A) includes providing financing to a third party so long as that financing was used entirely to carry out the project or a portion of the project;

(B) does not include overhead costs;

(2) "project" means a Cook Inlet watershed water quality monitoring project; and

(3) "qualified expenditures" means direct expenditures made

(A) in the state in the preceding year for water quality monitoring that was not required by a statute, regulation, lease, stipulation, permit, court or administrative order, or other legal requirement; and

(B) after December 31, 1998 and before January 1, 2004.

* Sec. 4. If a court enters a final judgment declaring the credit provided in this Act to be unconstitutional, secs. 2 and 3 of this Act are repealed effective December 31, 1998 and all credits shall be denied and recovered by assessment to the extent allowed by law.

* Sec. 5. Sections 1 - 3 of this Act are repealed.

* Sec. 6. APPLICABILITY. This Act applies to tax years beginning after December 31, 1998.

* Sec. 7. TRANSITION: REGULATIONS. Notwithstanding sec. 9 of this Act, the Department of Revenue and the Department of Environmental Conservation may proceed to adopt regulations to implement their respective provisions in this Act. The regulations take effect under AS 44.62 (Administrative Procedure Act), but not before the effective date of secs. 1 - 3 of this Act.

* Sec. 8. Section 7 of this Act takes effect immediately under AS 01.10.070 (c).

* Sec. 9. Section 1 - 4 and 6 of this Act take effect January 1, 1999.

* Sec. 10. Section 5 of this Act takes effect January 1, 2007.

HB0403

HB 403

HOUSE BILL NO. 403

IN THE LEGISLATURE OF THE STATE OF ALASKA

TWENTIETH LEGISLATURE - SECOND SESSION

BY REPRESENTATIVES MULDER, Ryan

Introduced: 2/12/98

Referred: House Special Committee on Military and Veterans' Affairs, Finance