

**1997 KENAI RIVER
WATER QUALITY ANALYSES**

**NON-POINT SOURCE
INVESTIGATIONS**

A TROUT UNLIMITED PROJECT

**PROJECT MANAGER
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BRIEF HISTORY

In 1988 the Alaska legislature granted \$100,000 to the Alaska State Parks to create a baseline database for Kenai River water quality. A state park advisory board member and Trout Unlimited (TU) activist, Dennis H. Randa, lobbied for these monies. Once the funds were committed, he accepted the responsibility for designing and drafting the plan for developing that database.

Calling upon TU experts for advice there were two revelations. First, there was little known about developing a database for a relatively pristine watershed (other efforts were essentially organized for restoration purposes). And second, there was a rapidly evolving process being developed around this type of issue (water quality data development). The content of the plan included parameters of chemical science and biological indicators.

From this initial attempt to organize a pristine watershed database a first draft was generated and circulated to federal, state and other interested parties for critique. A second draft was generated from this feedback, approved, and the project was essentially launched. Alaska Department of Fish and Game limnology lab staff, U.S. Fish and Wildlife Service staff along with parks personnel and TU volunteers accomplished the sample acquisitions and data development. Cooperation between and within these entities enabled the collection of data across a period of time spanning from 1989 until 1993. Data collected in 1993 indicated that there had apparently been a change in the biological indicator (benthic invertebrate) communities near river mile 17. The money ran out and no further funds were budgeted for investigating this change.

Several years passed without action by state agencies with regard to the biological alarm discovered in 1993. Persistent pursuit of funding for investigation of this alarm resulted in the Clean Water Act Section 319 grant to TU in early 1997. These funds were granted to assess the suspected impacts of urban non-point discharges into the Kenai River.

The grant required a 40% matching component from sources other than government. Support from Kenai River Sportfishing, Inc. (KRSI), the Kenai River Guides Association, and in-kind donations of time and effort from the ADF&G limnology lab and Dennis Randa fulfilled the requirements. The project was designed to be conducted in 1997 and a completed report due by May of 1998. Delays in contractor reporting delayed that final report until early winter of 1999.

PROJECT DESIGN AND IMPLEMENTATION

The 1997 project was designed to investigate two areas of concern regarding non-point discharge impacts upon the Kenai River: (1) urban impacts in the middle river near Soldotna (biological indicators), and (2) industrial and urban impacts upon the estuary near Kenai (sediment analysis).

INVESTIGATE DECLINE OF BIOLOGICAL INDICATORS.

Benthic data obtained from previous studies indicated potential contamination of the river water from unknown sources. Continuation of the benthic macroinvertebrate investigation was conducted with the intention of evaluating the effects of the discharges between river miles 28 and 14 by sampling the areas above and below the discharges. These areas were identified as possessing the greatest potential for introduction of contaminants into the river. A control sample was taken above most urban development at about river mile 28. There were 14 total sites. The Alaska Department of Fish & Game limnology lab personnel who conducted the previous benthic investigations were contracted to conduct this .

INVESTIGATE ESTUARY SEDIMENTS.

Samples of sediments were taken from 6 sites within the estuary between river mile 0 and 5. These samples were evaluated consistent with a sediment quality triad approach. The samples were analyzed for chemicals and metals consistent with National Status and Trends standards, and were subject to benthic population analysis and Microtox analysis. Kinnetic Laboratories, Inc. (KLI) was contracted to conduct this study.

COOPERATIVE EFFORT WITH CIRCAC ENVIRONMENTAL COMMITTEE

In conjunction with a concurrent effort to collect estuarine sediment samples from the Kenai River by the Cook Inlet Region Citizen Advisory Council's Environmental Monitoring Committee, the TU project was able to combine with their (EMC's) efforts. This reduced costs and provided duplicate sediment samples for sediment grain size and hydrocarbon evaluation. There were 25 total sites ranging from RM 13 to offshore. Kinnetic Laboratories, Inc. (KLI) was contracted to conduct this study.

SUMMARY OF RESULTS

KENAI RIVER (SOLDOTNA) AREA

Benthic macroinvertebrate investigations disclosed two areas of certain urban discharge impacts: (1) City of Soldotna's sewage treatment plant discharge, and (2) the urban area as a whole when compared with the upriver control site. The surprise here was that all of the samples taken below the control demonstrated some level of change attributable to decline of water quality.

KENAI RIVER ESTUARY (KENAI) AREA

Chemical analyses of sediments in the estuary disclosed the presence of DDTs, PCB compounds, pesticides, and a semivolatile organic compound (p-Cresol). These were above detection limits but below expected effects levels. Metal concentrations were below the lower effects level with the exception of copper at four sites and cadmium at one site. Again, these metals did not exceed expected effects levels. Sediments collected from RM 3 contained the most detected contaminants.

Toxicity testing disclosed the presence of toxic sediments at three of the six sites with one of those three, RM 3, being the most toxic.

Biological sampling disclosed a typically sparse community of invertebrates, not unusual for a dynamic estuary environment.

Hydrocarbon analyses conducted on the EMC sediment samples disclosed the presence of hydrocarbons at most of the sites. Four sites showed elevated levels relative to the other sites. However, all sites showed concentrations below the expected effects range. One of those four (RM 3.0) consistently showed high hydrocarbon levels, which were also determined to not be weathered in relation to the other sites.

CONCLUSIONS AND RECOMMENDATIONS FOR SOLDOTNA

KENAI RIVER (SOLDOTNA) AREA

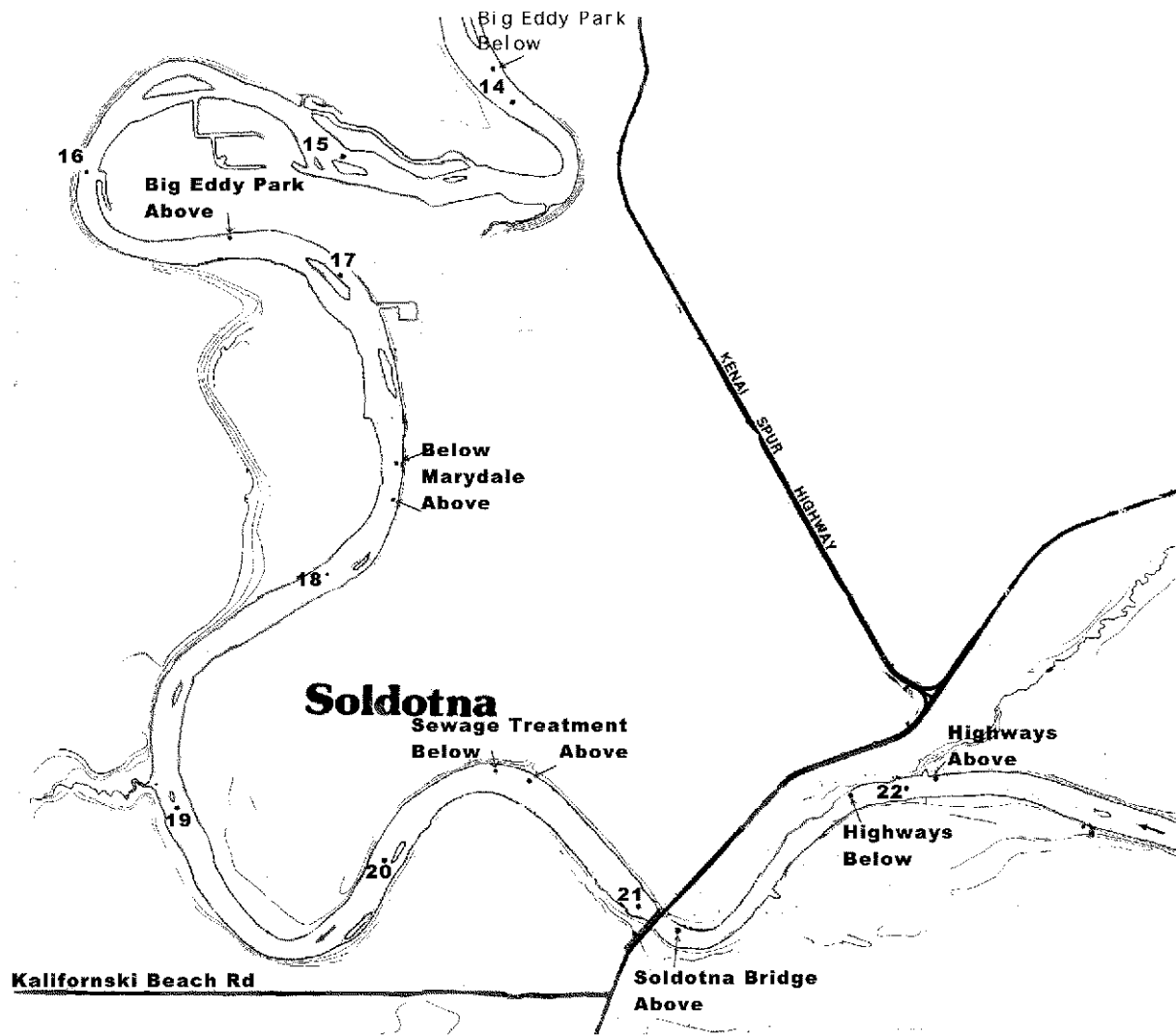
Evaluation of benthic communities is a widely accepted method for evaluating the relative condition of the health of aquatic ecosystems. The data developed from such studies cannot identify exactly what the contaminant was or, without careful site selection, where it came from. What it does do is document the presence of and the effect of that contamination. It measures the change, in biological terms, caused by that contaminant.

In this case the presence of the urban discharges has caused a measurable change in the type and populations of macroinvertebrates living in and near the Kenai River, between river miles 14 and 28. The data indicate that the Soldotna City sewage plant discharge has caused the greatest disturbance of natural populations of these important aquatic residents.

The ideal solution for the City of Soldotna is to discharge its treated wastewater directly into the seawater of Cook Inlet. Realizing that this is a long-term solution, a very important short-term solution is recommended: immediate installation of a continuous monitor and alarm checking for the presence of the chlorine in the discharge stream. Chlorine is a biocide and as such is potentially immediately fatal to aquatic life forms. The treatment plant waste discharged into the Kenai River during the winter possesses the greatest potential for ecological damage. The flows are at the season's minimum and the waters are covered with ice; representing the highest concentrations (least dilution) and a reduced opportunity for contact with the air necessary for diffusion of the chlorine. Historically Soldotna's chlorine system failures have been in the winter.

It is further recommended that the City of Soldotna install hydrocarbon absorbent and heavy metal settlement systems in all of the storm drain systems within the city's jurisdiction. The city should also take advantage of the cleansing properties of wetlands areas and direct all storm discharges through them. The city should take ownership of wetlands as a high value property for protecting public interests and obtain more wetlands whenever the opportunity presents.

The city should also inventory all private waste water systems adjacent to the Kenai River and tributaries within the city limits, with the intent of informing the owner of failure consequences. Previous Kenai River water studies have disclosed the presence of fecal coliform in all urbanized Kenai River tributaries.



Kenai River RM 14 to 23

CONCLUSIONS AND RECOMMENDATIONS FOR KENAI

KENAI RIVER ESTUARY (KENAI) AREA

This effort provides but a glimpse of the condition of the sediments of the Kenai River estuary. Six sites do not make any basis for a comprehensive evaluation.

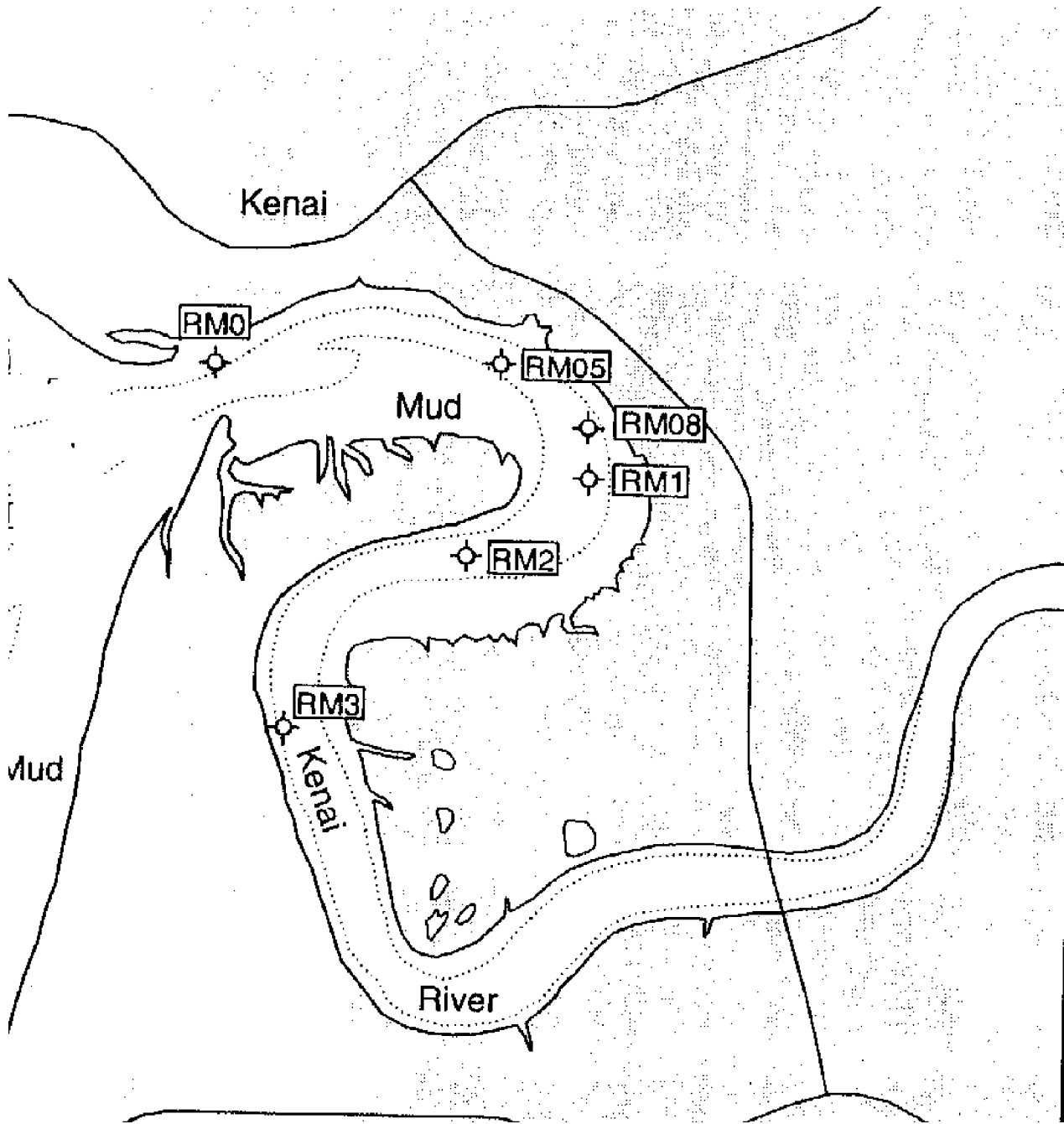
Evaluation of sediments can only offer the observer a hint of what has transpired within the water column over time. Sediments are just that, soils previously in solution which have settled out of the solution. Adhering to them may be some of the contaminants they were exposed to before they settled. Because sediment-bound contaminants are not usually bio-available (available for uptake by living things), they of themselves are generally only an indication of what was bio-available in solution before adhering to the particle of soil.

The perseverance of these contaminants in the sediments at the levels they were found indicates a long-term pattern of discharge. Without a larger data base (more samples) the area affected by the discharges can only be estimated. The source and concentration of the discharges can only be guessed at as well. The long history of the presence of the fish processing industry and the use of the estuary as a harbor by the fishing fleet and the type of contaminants present would suggest a source of contaminant discharge from the industry and the fishing fleet.

The City of Kenai, through ordinance and budget actions, should establish the physical presence of and authority of a harbor patrol. The primary responsibility of this patrol should be to educate and inform the users of the Kenai River estuary (harbor) area of the implications of discharge violations and be prepared to prosecute these violations when appropriate. The evaluation of fleet behavior and processing plant material handling policies would be appropriate. The Kenai River waters are flowing over City of Kenai property and the city should be concerned about violations taking place on their property.

The city should also install hydrocarbon absorbent and heavy metal settlement systems in all of the storm drain systems within the city limits. The city should also take advantage of the cleansing properties of wetlands areas and direct all storm discharges through them. The city should take ownership of wetlands as a high value property for protecting public interests and obtain more wetlands whenever the opportunity presents.

Suggestions for action by the city could include requirements for the processors to only discharge waste during ebbing tide conditions. The Army Corps of Engineers presently require this of some processor discharges into the Kasilof River.



Kenai River Estuary RM 0 to 6

CONCLUSIONS AND RECOMMENDATIONS

KENAI PENINSULA BOROUGH

Even though this investigation addressed areas primarily included within the city limits of Kenai and Soldotna much of the Kenai River lies outside of these cities and therefore it is appropriate for the Kenai Borough to address the urban development impacts.

It is important for the borough to understand that while the Alaska Department of Environmental Conservation is the state's agency responsible for water quality the agency has developed criteria for drinking water quality standards and not criteria for aquatic habitat standards. This is to say that while fecal coliform may be important criteria for drinking water, fecals of themselves are not harmful to aquatic inhabitants. It is the other substances of whose presence is only suggested by the presence of fecal coliform that effect the quality of aquatic habitats.

Water quality investigations conducted by ADF&G (Litchfield and Kile Report #111, 1991, and Report #XXX, 1992) disclosed increasing coliform counts in the urbanized tributaries of the Kenai River. The highest counts came from below the Soldotna Bridge and were approaching ADEC criteria for secondary water recreation use (contact warnings). Beaver Creek consistently produced the highest fecal coliform counts. All urbanized tributaries possessed elevated coliform counts.

Neither the Kenai Borough nor the State of Alaska presently requires permits for private septic system construction. Neither governmental body requires as built construction inspection of these systems. The evidence is present that there are septic wastes discharging directly into the Kenai River and its tributaries.

It is recommended that the Kenai Peninsula Borough pass ordinances and budget necessary funds for the creation of a position responsible for: (1) determining the presence of septic systems in violation of state construction standards; (2) monitoring for compliance with state and federal standards for human waste system discharge.

The borough should also require the installation of hydrocarbon absorbent and heavy metal settlement systems in all of the storm drain systems within the borough. The borough should also take advantage of the cleansing properties of wetlands areas and require all storm discharges be directed through them. The borough should maintain ownership of wetlands as a high property value for protecting public interests and obtain more whenever the opportunity presents.

CONCLUSIONS AND RECOMMENDATIONS

ALASKA BOARD OF FISHERIES

Pursuant to AS 16.05.221.a.7 and a.12 the Alaska Board of Fisheries should be interested in the content of this report as it applies to the use of the Kenai River estuary by commercial fishing industry participants, industrial support services to the fleet of commercial fishing boats using the area and commercial fish processing plants and their related service activities.

This area is an integral and important area of habitat for salmonids as they migrate from and return to their natal spawning and rearing habitats. These important commercial, sport and subsistence species rely upon this area for feeding and migration habitat. Anadromous species require estuarine habitats for biological adaptation as they move from fresh to salt water and vice versa. It is a link in the chain of habitats used and relied upon for sustained existence of many species of wildlife, migratory birds and anadromous fish.

This water quality investigation of sediments within the Kenai River estuary demonstrates a long term and chronic (ab)use of the area. While the data cannot be directly linked to discharges produced by users of this area it certainly can be linked by proximity to the industrial users. River mile three sample site lies just a few feet from the docks of two canneries and the area is used heavily by hundreds of boats mooring to nearby buoys.

The soil sample collected and processed from this site produced hits from chemical, toxicity and hydrocarbon analysis. The sample when removed from the water column released a strong hydrogen sulfide odor.

There were only six sites sampled for analysis and one of these was an upstream control site. The number of hits produced by the five samples collected should be sufficient to alarm anyone concerned with the resource and aquatic inhabitants present in the area.

The Alaska Board of Fisheries has demonstrated its concern about behavior of participants involved in harvest of board controlled resources. The board directed sport fishing interests that they (the board) would restrict future allocations if they (the anglers) did not manage their impacts upon the riparian habitats of the Kenai River. Not to diminish the importance of riparian areas to fish habitats, but water quality is far more integral to the critical habitats of fishes than riparian areas.

It is recommended that the Alaska Board of Fisheries use similar encouragement for the commercial industrial interests using the Kenai River estuary as a harbor area to clean up their behavior within the estuary.