



Kenai River Baseline Water Quality Monitoring 2025 Preliminary Summary

PRELIMINARY RESULTS

Results subject to change pending QA/QC review and EPA WQX submission

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Contents

Contents	2
Executive Summary	4
Acronyms	5
Overview	6
Study Area	7
2025 Sampling Events	9
Parameters Analyzed	10
Preliminary Results	11
Preliminary Threshold Comparison	13
Field Quality Control	16
Next Steps	19
Appendix: Project Collaborators	20

AI disclosure: This document was drafted with assistance from Posit Assistant, an AI tool developed by Posit PBC. Posit Assistant was used to help write data processing code in the R programming language and draft text. All analytical decisions, data quality judgments, and factual content were reviewed and approved by KWF staff. The preliminary findings and regulatory comparisons in this document reflect KWF's own evaluation of preliminary data.



Alaska Department of Environmental Conservation staff collect water samples on the middle Kenai River in 2025.

Executive Summary

Kenai Watershed Forum (KWF) coordinated bi-annual baseline water quality monitoring events on the Kenai River and its major tributaries in 2025. Sampling was completed at 20 sites in spring (April 30, 2025) and 22 sites in summer (July 23, 2025), spanning from Kenai Lake (River Mile 82) to the river mouth (River Mile 1.5). Laboratory analysis of metals, nutrients, and hydrocarbons was performed by SGS North America; fecal coliform (FC) and total suspended solids (TSS) were analyzed by the City of Soldotna Wastewater Treatment Plant; field parameters (temperature, specific conductance, dissolved oxygen, and pH) were measured with a YSI ProQuatro field meter, and turbidity was measured with a Hach 2100P portable turbidimeter.

Results for most parameters were within applicable water quality standards. Notable preliminary findings include:

- **Iron** exceeded the 1 mg/L aquatic life chronic criterion at 11 site-events across both seasons. Elevated iron is a recurring pattern in the Kenai River watershed, particularly at lower-river and wetland-draining tributary sites, and is consistent with the long-term monitoring record.
- **Lead** (dissolved) exceeded its hardness-adjusted aquatic life chronic threshold at one summer site (Beaver Creek, RM 10). The corresponding field duplicate at that site was non-detect, raising a question about the result's veracity; this result will receive additional scrutiny during full QA/QC review.
- **Hydrocarbons (BTEX)** were below laboratory detection limits at all four summer sampling sites.
- No threshold exceedances were identified for Arsenic, Cadmium, Chromium, Copper, Zinc, Nitrate + Nitrite, or Fecal Coliform.

These results are preliminary. Data have not undergone full QA/QC review and have not been submitted to the U.S. EPA Water Quality Exchange (WQX). Values are subject to change. Next steps include formal QA/QC evaluation per the KWF Quality Assurance Project Plan, data submission to EPA WQX, and integration of 2025 results into the KWF long-term baseline water quality report.

Acronyms

Table 1: Acronyms used in this report.

Acronym	Definition
ADEC	Alaska Department of Environmental Conservation
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes (petroleum hydrocarbons)
CDX	EPA Central Data Exchange (data submission portal)
EPA	U.S. Environmental Protection Agency
FC	Fecal Coliform
J (flag)	Qualified detection; value is between the LOD and the LOQ
KWF	Kenai Watershed Forum
LOD	Laboratory Detection Limit; the lowest concentration at which a compound can be reliably detected
LOQ	Laboratory Quantitation Limit; the lowest concentration that can be reliably measured and reported
QAPP	Quality Assurance Project Plan
QC	Quality Control
RM	River Mile
RPD	Relative Percent Difference; a measure of agreement between two measurements of the same sample
SGS	SGS North America (environmental laboratory)
SWWTP	Soldotna Wastewater Treatment Plant
TSS	Total Suspended Solids
U (flag)	Non-detect; the compound was not detected at or above the LOD
WQP	EPA Water Quality Portal (public data repository)
WQX	Water Quality Exchange (EPA data standard and submission system)

Overview

Kenai Watershed Forum (KWF) has coordinated baseline water quality monitoring on the Kenai River and its major tributaries since 2000. More information about the project and access to data and reports are available at the links below.

Resource	Link
Project website	kenaiwatershed.org/kenai-river-baseline-water-quality-monitoring
2025 raw data files	kenaiwatershed.org/news-media/summer-2025-kenai-river-water-quality-monitoring-data-preliminary-results-available
Media coverage (KDLL, August 2025)	kdll.org : “Peninsula water monitoring project aims to improve salmon habitat”
Full report (in progress)	kenai-watershed-forum.github.io/kenai-river-wqx

Sampling occurs twice each year, in spring (April/May) and summer (July/Aug) at up to 22 established monitoring sites spanning the river from Kenai Lake (River Mile 82) to the river mouth (River Mile 1.5). Laboratory analysis is performed by SGS North America; fecal coliform (FC) and total suspended solids (TSS) analysis is performed by the City of Soldotna Wastewater Treatment Plant (SWWTP).

In 2026 and in years going forward, TSS samples will be processed by the City of Kenai Wastewater Treatment Plant.

Results are submitted to the U.S. EPA Water Quality Portal, where they are accessible to the public and used by the Alaska Department of Environmental Conservation (ADEC) in its Integrated Report on water quality conditions in Alaska.

Study Area

Kenai River Watershed, Alaska

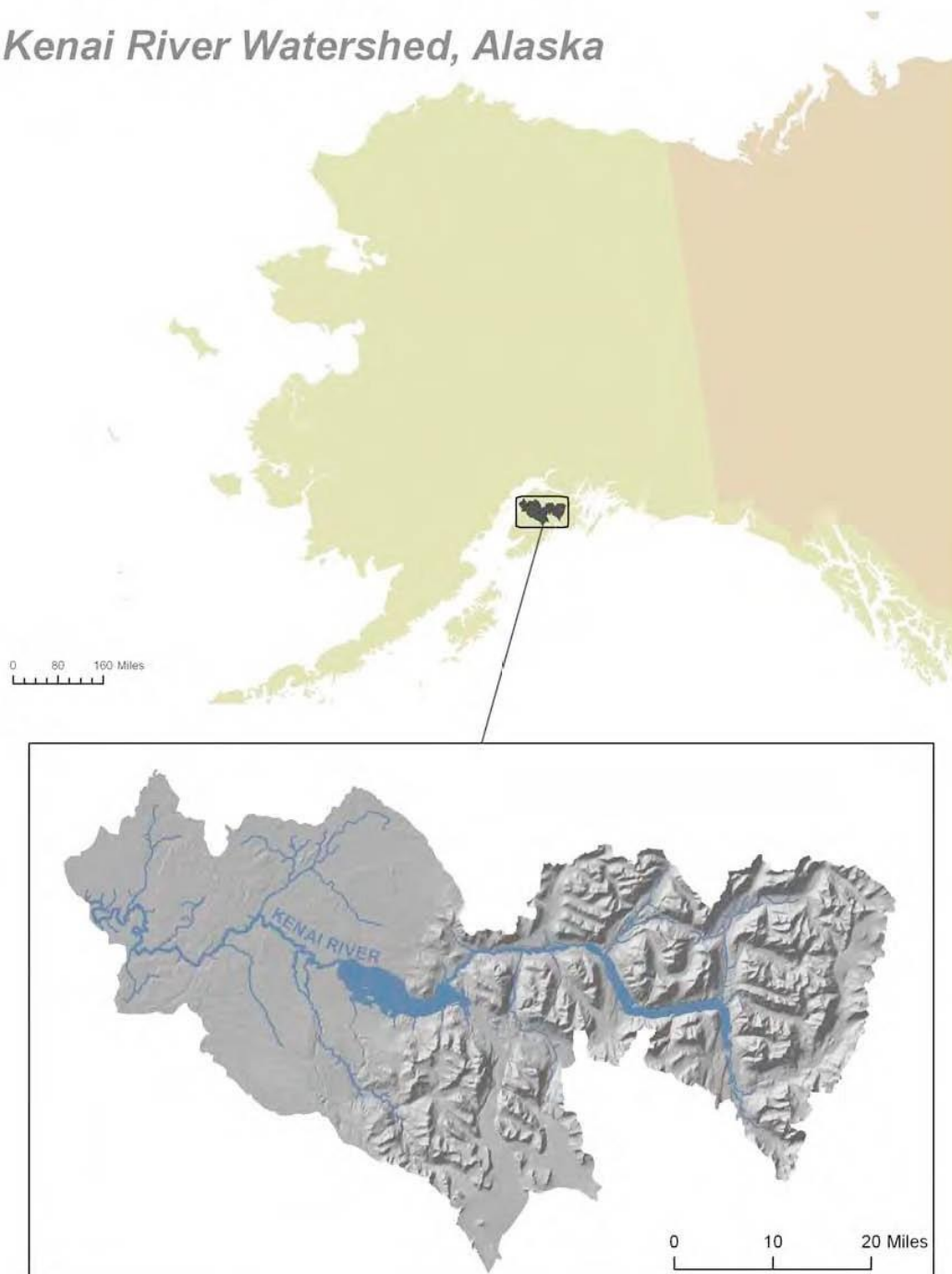


Figure 1: Location of the Kenai River Watershed within Alaska.

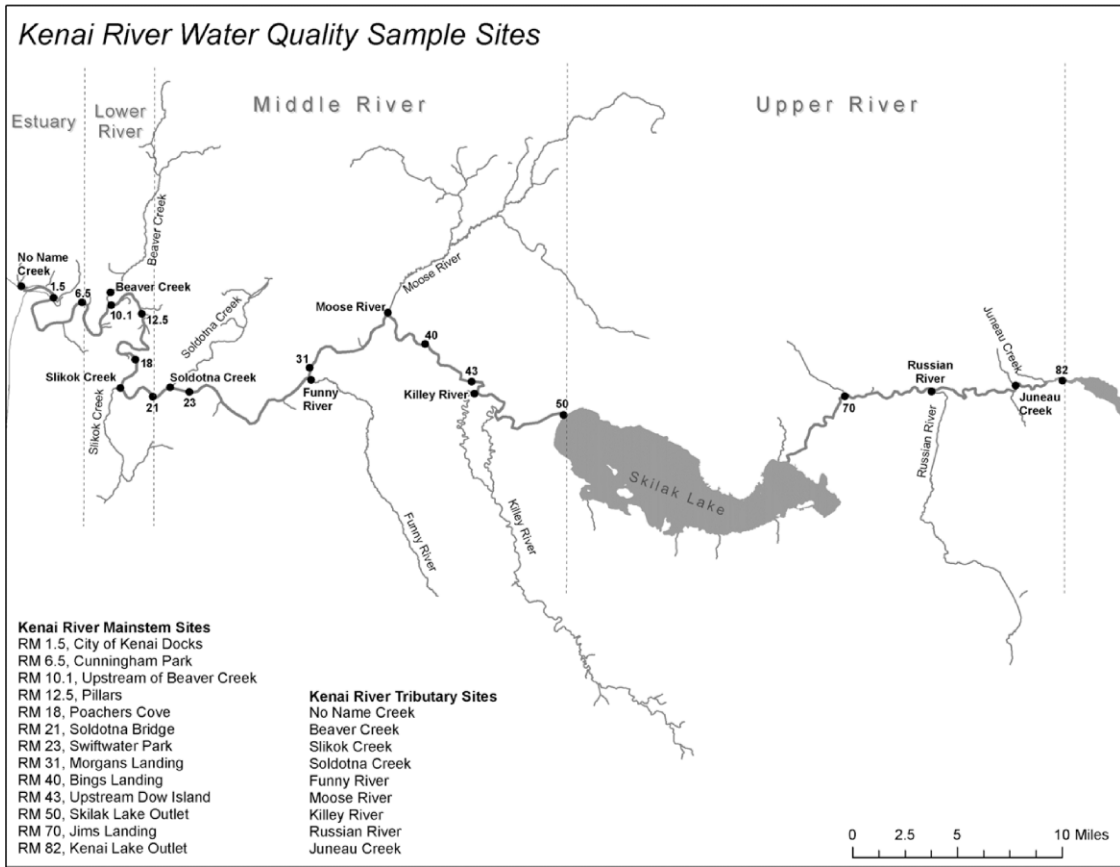


Figure 2: Location of water quality sampling sites on the Kenai River and its major tributaries.

2025 Sampling Events

Table 2: 2025 sampling events.

Season	Date	Monitoring sites	Notes
Spring	April 30, 2025	20	Metals and nutrients; TSS and FC
Summer	July 23, 2025	22	Metals, nutrients, and hydrocarbons (BTEX); TSS and FC

Hydrocarbon (BTEX) analysis is not conducted in spring by design: boat activity on the river is minimal in April and May, and the risk of petroleum-related contamination from vessel traffic is negligible during that period.

Parameters Analyzed

Table 3: Parameters analyzed by season and analytical fraction. “Dissolved” metals were filtered through a 0.45 µm membrane prior to analysis; “Total” metals were unfiltered. FC and TSS were analyzed by SWWTP; temperature, specific conductance, dissolved oxygen, and pH by YSI ProQuatro meter; turbidity by Hach 2100P portable turbidimeter.

Parameter group	Parameter	Fraction	Seasons sampled
Dissolved metals	Arsenic	Dissolved	Spring and Summer
Dissolved metals	Cadmium	Dissolved	Spring and Summer
Dissolved metals	Chromium	Dissolved	Spring and Summer
Dissolved metals	Lead	Dissolved	Spring and Summer
Metals	Copper	Dissolved	Spring and Summer
Metals	Copper	Total	Spring and Summer
Metals	Zinc	Dissolved	Spring and Summer
Metals	Zinc	Total	Spring and Summer
Total metals	Calcium	Total	Spring and Summer
Total metals	Iron	Total	Spring and Summer
Total metals	Magnesium	Total	Spring and Summer
Nutrients	Nitrate + Nitrite (as N)	Total	Spring and Summer
Nutrients	Total Phosphorus	Total	Spring and Summer
Hydrocarbons (BTEX)	Benzene	Volatile	Summer
Hydrocarbons (BTEX)	Ethylbenzene	Volatile	Summer
Hydrocarbons (BTEX)	Toluene	Volatile	Summer
Hydrocarbons (BTEX)	Total Xylenes	Volatile	Summer
Hydrocarbons (BTEX)	o-Xylene	Volatile	Summer
Hydrocarbons (BTEX)	p/m-Xylene	Volatile	Summer
Field parameters	Dissolved Oxygen	Total	Spring and Summer
Field parameters	Fecal Coliform	None	Spring and Summer
Field parameters	Specific Conductance	Total	Spring and Summer
Field parameters	Total Suspended Solids	Suspended	Spring and Summer
Field parameters	Turbidity	Total	Spring and Summer
Field parameters	Water Temperature	Total	Spring and Summer
Field parameters	pH	Total	Spring and Summer

Preliminary Results

The tables below summarize measured concentrations across all primary sampling sites. Ranges show the minimum and maximum detected values; non-detected parameters show the laboratory LOD. Some parameters were analyzed at a subset of sites. “J” indicates a qualified detection between the LOD and LOQ.

Spring 2025 (April 30, 2025)

Table 4: Spring 2025 preliminary results summary.

Parameter group	Parameter	Fraction	Unit	n sites	Result range
Dissolved metals	Arsenic	Dissolved	ug/L	11	1.54 - 5.24 (6/11 detected)
Dissolved metals	Cadmium	Dissolved	ug/L	11	Non-detect (LOD: 0.375)
Dissolved metals	Chromium	Dissolved	ug/L	11	Non-detect (LOD: 3.75)
Dissolved metals	Lead	Dissolved	ug/L	11	Non-detect (LOD: 1.50)
Metals	Copper	Dissolved	ug/L	11	19.0 - 19.0 (1/11 detected)
Metals	Copper	Total	ug/L	11	1.42 - 48.1 (3/11 detected)
Metals	Zinc	Dissolved	ug/L	11	5.20 - 22.9
Metals	Zinc	Total	ug/L	11	3.84 - 54.6 (7/11 detected)
Total metals	Calcium	Total	mg/L	19	9.05 - 158.
Total metals	Iron	Total	mg/L	19	0.0845 - 17.8 (16/19 detected)
Total metals	Magnesium	Total	mg/L	19	1.00 - 396.
Nutrients	Nitrate + Nitrite (as N)	Total	mg/L	20	0.0566 - 1.11
Nutrients	Total Phosphorus	Total	mg/L	20	0.0151 - 0.473 (8/20 detected)
Field parameters	Dissolved Oxygen	Total	mg/L	16	10.7 - 16.9
Field parameters	Fecal Coliform	None	CFU/100mL	20	1.00 - 164. (12/20 detected)
Field parameters	Specific Conductance	Total	uS/cm	19	67.0 - 2.14e+04
Field parameters	Total Suspended Solids	Suspended	mg/L	22	0.200 - 493. (20/22 detected)
Field parameters	Turbidity	Total	NTU	19	0.505 - 344.
Field parameters	Water Temperature	Total	deg C	19	2.60 - 6.10
Field parameters	pH	Total	s.u.	19	6.14 - 7.80

Summer 2025 (July 23, 2025)

Table 5: Summer 2025 preliminary results summary.

Parameter group	Parameter	Fraction	Unit	n sites	Result range
Dissolved metals	Arsenic	Dissolved	ug/L	13	1.50 - 7.57 (6/13 detected)
Dissolved metals	Cadmium	Dissolved	ug/L	13	Non-detect (LOD: 0.375)
Dissolved metals	Chromium	Dissolved	ug/L	13	Non-detect (LOD: 3.75)
Dissolved metals	Lead	Dissolved	ug/L	13	7.36 - 7.36 (1/13 detected)
Metals	Copper	Dissolved	ug/L	13	Non-detect (LOD: 2.25)
Metals	Copper	Total	ug/L	13	1.25 - 36.0 (3/13 detected)
Metals	Zinc	Dissolved	ug/L	13	17.1 - 17.1 (1/13 detected)
Metals	Zinc	Total	ug/L	13	3.36 - 87.2 (8/13 detected)
Total metals	Calcium	Total	mg/L	22	6.54 - 24.9
Total metals	Iron	Total	mg/L	22	0.215 - 26.4 (17/22 detected)
Total metals	Magnesium	Total	mg/L	22	0.920 - 13.9
Nutrients	Nitrate + Nitrite (as N)	Total	mg/L	22	0.0532 - 1.02
Nutrients	Total Phosphorus	Total	mg/L	22	0.0156 - 0.662 (9/22 detected)
Hydrocarbons (BTEX)	Benzene	Volatile	ug/L	4	Non-detect (LOD: 0.300)
Hydrocarbons (BTEX)	Ethylbenzene	Volatile	ug/L	4	Non-detect (LOD: 0.750)
Hydrocarbons (BTEX)	Toluene	Volatile	ug/L	4	Non-detect (LOD: 0.750)
Hydrocarbons (BTEX)	Total Xylenes	Volatile	ug/L	4	Non-detect (LOD: 2.25)
Hydrocarbons (BTEX)	o-Xylene	Volatile	ug/L	4	Non-detect (LOD: 0.750)
Hydrocarbons (BTEX)	p/m-Xylene	Volatile	ug/L	4	Non-detect (LOD: 1.50)
Field parameters	Dissolved Oxygen	Total	mg/L	22	8.30 - 12.7
Field parameters	Fecal Coliform	None	CFU/100mL	22	1.00 - 400. (15/22 detected)
Field parameters	Specific Conductance	Total	uS/cm	22	0.0399 - 145.
Field parameters	Total Suspended Solids	Suspended	mg/L	22	1.00 - 763.
Field parameters	Turbidity	Total	NTU	22	0.490 - 896.
Field parameters	Water Temperature	Total	deg C	22	8.50 - 16.7
Field parameters	pH	Total	s.u.	22	6.30 - 8.03

BTEX compounds were analyzed at 4 sites: RM 1.5 (Kenai City Dock), RM 6.5 (Cunningham Park), RM 40 (Bing's Landing), and RM 43 (Upstream of Dow Island). All BTEX compounds were below laboratory detection limits at all four sites.

Preliminary Threshold Comparison

Table 6 identifies measurements that preliminarily exceed applicable water quality standards. Two categories of standards are referenced:

- **Aquatic life chronic standards** (Alaska Department of Environmental Conservation 2023b; U.S. Environmental Protection Agency 2024): protect aquatic organisms and salmon habitat; these are the primary regulatory standards for the Kenai River.
- **Drinking water standards** (Alaska Department of Environmental Conservation 2023a): included for context; the Kenai River is not a designated drinking water source.

Thresholds for hardness-dependent metals (Cadmium, Chromium, Copper, Lead, Zinc) are computed per site using measured calcium and magnesium concentrations, following ADEC criteria formulas (Alaska Department of Environmental Conservation 2023b). Those input values are themselves preliminary and may change after QA/QC. **No regulatory determination can be made from these data.**

Table 6: Preliminary threshold comparisons for values with flagged potential exceedances. "Ratio" = measured value divided by the applicable threshold. PRELIMINARY: values have not been fully QA/QC reviewed. Hardness-dependent thresholds are computed per site from preliminary Ca/Mg values using ADEC 18 AAC 70 chronic aquatic life criteria formulas and may change after QA/QC review.

Season	Site	Parameter	Measured	Threshold	Unit	Ratio	Standard
Spring	RM 0-No Name Creek	Iron	4.47	1.00	mg/L	4.5	Aquatic life chronic (ADEC 18 AAC 70 / USEPA 1976)
Spring	RM 1.5 -Kenai City Dock	Iron	17.80	1.00	mg/L	17.8	Aquatic life chronic (ADEC 18 AAC 70 / USEPA 1976)
Spring	RM 10-Beaver Creek	Iron	3.46	1.00	mg/L	3.5	Aquatic life chronic (ADEC 18 AAC 70 / USEPA 1976)
Spring	RM 19-Slikok Creek	Iron	1.47	1.00	mg/L	1.5	Aquatic life chronic (ADEC 18 AAC 70 / USEPA 1976)
Spring	RM 22-Soldotna Creek	Iron	1.13	1.00	mg/L	1.1	Aquatic life chronic (ADEC 18 AAC 70 / USEPA 1976)
Spring	RM 30-Funny River	Iron	1.04	1.00	mg/L	1.0	Aquatic life chronic (ADEC 18 AAC 70 / USEPA 1976)
Summer	RM0-No Name Creek	Iron	3.61	1.00	mg/L	3.6	Aquatic life chronic (ADEC 18 AAC 70 / USEPA 1976)
Summer	RM1.5-Kenai City Dock	Iron	26.40	1.00	mg/L	26.4	Aquatic life chronic (ADEC 18 AAC 70 / USEPA 1976)
Summer	RM10-Beaver Creek	Iron	2.76	1.00	mg/L	2.8	Aquatic life chronic (ADEC 18 AAC 70 / USEPA 1976)
Summer	RM19-Slikok Creek	Iron	1.87	1.00	mg/L	1.9	Aquatic life chronic (ADEC 18 AAC 70 / USEPA 1976)
Summer	RM6.5-Cunningham Park	Iron	1.24	1.00	mg/L	1.2	Aquatic life chronic (ADEC 18 AAC 70 / USEPA 1976)
Summer	RM10-Beaver Creek	Lead	7.36	1.72	ug/L	4.3	Aquatic life chronic (ADEC 18 AAC 70)

Iron (11 site-events): Iron exceeds the 1 mg/L aquatic life chronic criterion (U.S. Environmental Protection Agency 1976; Alaska Department of Environmental Conservation 2023b) at several tributary and lower-river sites in both seasons. Elevated iron is common in glacially influenced and wetland-draining streams in the Kenai River watershed and is consistent with historical monitoring results. The most elevated values occur at RM 1.5 (Kenai City Dock), where tidal mixing substantially increases dissolved mineral content. These results will be evaluated in context of the full dataset during QA/QC review.

Lead (1 site-event): A dissolved lead concentration of 7.36 µg/L was measured at Beaver Creek (RM 10) during the summer sampling event. The hardness-adjusted aquatic life chronic threshold at that site is 1.72 µg/L, placing the measured value at 4.3× the threshold. This detection was confirmed by the laboratory above the reporting limit. **However, the corresponding field duplicate was non-detect for lead (see Field QC section below), which raises a question about the validity of this result.** It will receive additional scrutiny during the full QA/QC review.

No exceedances were identified for Arsenic, Cadmium, Chromium, Copper, Zinc, Nitrate + Nitrite (as N), or BTEX compounds.

Field Quality Control

Field QC samples are collected alongside environmental samples to detect potential contamination introduced during collection, preservation, or transport, and to assess measurement precision. All results below are preliminary.

Field Blanks (Metals)

Field blanks were collected at two sites per season and analyzed for the same suite of metals as primary samples. All results should ideally be non-detect; any detection in a field blank may indicate contamination introduced during sampling.

Table 7: Field blank detections (non-detect results not shown). "J" indicates a qualified trace detection between the LOD and LOQ.

Season	Site	Parameter	Result
Spring	RM 1.5-Kenai City Dock	Zinc	J: 9.2 ug/L (below LOQ)
Spring	RM 19-Slikok Creek	Zinc	J: 6.74 ug/L (below LOQ)
Spring	RM 19-Slikok Creek	Zinc	J: 5.43 ug/L (below LOQ)
Summer	RM22-Soldotna Creek	Zinc	J: 3.61 ug/L (below LOQ)

All field blank detections were for Zinc at trace levels below the reporting LOQ (J-flag). These low-level detections do not necessarily indicate problematic contamination, but they are noted for transparency and will be considered during QA/QC review of primary Zinc results.

Trip Blanks (BTEX)

Trip blanks for hydrocarbon (BTEX) analysis were collected for the summer sampling event. A trip blank travels with the sample containers throughout collection and is used to detect contamination from the sampling process or transport. Two trip blanks covered the four BTEX sampling sites.

Table 8: Summer 2025 BTEX trip blank results. All compounds were non-detect in both trip blanks, indicating no contamination was introduced during sample collection or transport.

Trip blank	Compound	Result
RM1.5&6.5 trip blank	Benzene	Non-detect (LOD: 0.3 ug/L)
RM1.5&6.5 trip blank	Ethylbenzene	Non-detect (LOD: 0.75 ug/L)
RM1.5&6.5 trip blank	P & M -Xylene	Non-detect (LOD: 1.5 ug/L)
RM1.5&6.5 trip blank	Toluene	Non-detect (LOD: 0.75 ug/L)
RM1.5&6.5 trip blank	Xylenes (total)	Non-detect (LOD: 2.25 ug/L)
RM1.5&6.5 trip blank	o-Xylene	Non-detect (LOD: 0.75 ug/L)
RM40&43 trip blank	Benzene	Non-detect (LOD: 0.3 ug/L)
RM40&43 trip blank	Ethylbenzene	Non-detect (LOD: 0.75 ug/L)
RM40&43 trip blank	P & M -Xylene	Non-detect (LOD: 1.5 ug/L)
RM40&43 trip blank	Toluene	Non-detect (LOD: 0.75 ug/L)
RM40&43 trip blank	Xylenes (total)	Non-detect (LOD: 2.25 ug/L)
RM40&43 trip blank	o-Xylene	Non-detect (LOD: 0.75 ug/L)

Field Duplicates

Field duplicate samples were collected for all parameters at two sites per season. The RPD between a primary sample and its duplicate indicates measurement precision. Values below 10–20% RPD are generally considered acceptable. Only pairs where both the primary and duplicate produced detectable results are shown; non-detect pairs are excluded from RPD calculation.

Table 9: Field duplicate precision summary by site. RPD = relative percent difference between primary and duplicate samples. Parameters with RPD > 20% are listed; non-detect pairs are excluded.

Season	Site	Pairs	RPD > 20%	Flagged parameters
Spring	Poachers Cove	10	1	Total Suspended Solids
Spring	Soldotna Creek	8	2	Total Suspended Solids, Turbidity
Summer	Beaver Creek	11	2	Total Suspended Solids, Dissolved Oxygen
Summer	Swiftwater Park	6	1	Total Suspended Solids

Note: The dissolved Lead result at Beaver Creek (RM 10, summer), flagged as a potential exceedance in [Table 6](#), was detected at 7.36 µg/L in the primary sample but was non-detect in the field duplicate. This discrepancy does not appear in [Table 9](#) (since non-detect duplicates are excluded from RPD calculation), but it is an important QC flag that will receive additional scrutiny during QA/QC review.

Next Steps

The following steps remain before 2025 data are finalized:

1. **Full QA/QC review** in accordance with the KWF QAPP, including holding time verification, matrix spike recovery assessment, and resolution of the Lead field duplicate discrepancy at Beaver Creek.
2. **Data submission to EPA WQX** via the EPA Central Data Exchange (CDX). Upon successful upload, 2025 results will be publicly accessible through the EPA Water Quality Portal and How's My Waterway.
3. **Integration into the KWF baseline water quality report**, covering the full period of record (2000–present).

Questions about this summary may be directed to Kenai Watershed Forum at kenaiwatershed.org. The data processing pipeline for this report is maintained at github.com/Kenai-Watershed-Forum/kenai-river-wqx for technical inquiries.

Appendix: Project Collaborators

The following organizations provided in-kind and/or financial support for baseline water quality sampling in 2025. This project is also supported by a Memorandum of Understanding renewed in 2025 by sixteen participating organizations. For the current partner list and MOU, see kenaiwatershed.org/kenai-river-baseline-water-quality-monitoring.

Current Entities Contributing In-kind and/or Financial Support

- Alaska Department of Environmental Conservation
- Alaska Department of Fish and Game
- Alaska Department of Natural Resources
- City of Kenai
- City of Soldotna
- Cook Inlet Aquaculture Association
- Defenders of Wildlife
- Kenai National Wildlife Refuge
- Kenai Peninsula Borough
- Kenai Peninsula Fish Habitat Partnership
- Kenai Peninsula Trout Unlimited
- Kenaitze Indian Tribe
- Mister Kenai Sportfishing
- Salamatof Tribe
- SGS North America, Inc.
- Tyonek Tribal Conservation District
- U.S. Fish and Wildlife Service
- U.S. Forest Service

References

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<https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table>.