Kenai Watershed Forum

Water Quality Assessment of the Kenai River Watershed from July 2000 to July 2006

By Jennifer J. McCard

Kenai Watershed Forum

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Conversions:

1 gram = 1000 micrograms

°F = 9/5(°C) + 32

Unit Abbreviations:
mg/L = milligrams per liter
µg/L = micrograms per liter
CFU/100m = coliform forming units per 100 milliliters
µS/cm = microsiemens per centimeter
NTU= nephelometric turbidity unit

Acronyms:
EPA (United States Environmental Protection Agency)
ADEC (Alaska Department of Environmental Conservation)
DRO (Diesel Range Organics)
GRO (Gasoline Range Organics)
RRO (Residual Range Organics)
BTEX (Benzene, Toluene, Ethylbenzene, and Xylenes)

Abstract

The Kenai Watershed Forum and several governmental agencies formed a cooperative partnership to collect and analyze water samples from 13 locations along the Kenai River mainstem and from 8 of its tributaries every April and July from 2000 to 2006. Laboratory analysis was conducted on dissolved metals, total metals, nutrients, hydrocarbons, fecal coliform bacteria, and several other parameters. These results are herein compared to Alaska and federal water quality standards for freshwater aquatic life. Total metals had relatively few exceedances, excluding zinc levels in Slikok Creek and Soldotna Creek. Iron levels consistently exceeded the standard, especially in the Kenai River estuary and in the tributaries. Calcium and magnesium do not have applicable Alaska or federal standards; however, they were highest in the estuary and in Soldotna Creek. Nitrate concentrations decreased from Kenai Lake to the estuary while phosphorus increased. In the lower river, median hydrocarbon concentrations exceeded the Alaska standard during July. Total suspended solids and turbidity levels were highest in the estuary and in the Killey River. Water temperatures exceeded several standards in July, especially in the Moose River and other tributaries. Further study and any necessary restoration should be considered for locations with exceedances of zinc, hydrocarbons, iron, and water temperature.

Introduction

This report summarizes water quality data collected between July 2000 and July 2006 from 21 sampling locations in the Kenai River mainstem and its tributaries. Local, state, federal, and tribal government entities, as well as several local area non-profits, formed a cooperative partnership so that sampling teams from various agencies were able to collect water samples twice per year, once in late April and once in late July, and this effort continues beyond the publication of this report. The locations of the sampling sites are identified with maps, GPS coordinates, and photographs. Trends in the data are highlighted, and the results are compared to the Alaska and federal water quality standards for freshwater aquatic life.

The water quality data focuses on metals, nutrients, hydrocarbons, fecal coliform bacteria, and various field parameters. Arsenic, cadmium, chromium, copper, lead, and zinc are the dissolved metals that have been analyzed, and calcium, iron, and magnesium were reported as total metals. Additionally, the report focuses on the nutrients nitrate and phosphorus. Specifically, the hydrocarbons that were collected and analyzed include diesel range organics, gasoline range organics, residual range organics, benzene, toluene, ethylbenzene, m,p-xylene, and o-xylene. Fecal coliform bacteria, pH, specific conductance, total suspended solids, turbidity, and water temperature are the remaining parameters that have been included in the analysis.

The results are displayed in graphs with associated written analyses and tables. The graphs display the mean and variance for each parameter at a specific location, and these graphs are separated depending on whether the data was collected in April or in July. In some cases, parameters were present in levels that could not be detected by current laboratory analysis, and when this occurred with over 90% of the samples, scatter plots have been displayed omitting the unknown low levels. Complete data tables can be found in Appendix 1 and 4, which are organized by parameter and site location, respectively.

Description of the Study Area

Located in southcentral Alaska, the Kenai River is part of the Cook Inlet Basin and is intricately linked to the surrounding communities through sport and commercial fishing, tourism, recreation, and the propagation of fish and wildlife (see Figure 1). Five species of Pacific salmon flourish in the Kenai River Watershed, comprising 30% of the commercial chinook harvest and 40% of the commercial sockeye harvest (Glass, 1999). Surface runoff, groundwater composition, natural minerals, aquatic plants and animals, and human activities can affect water quality in this area (Glass, 1999). Potential sources of pollution from humans include gasoline-powered boat engines, agriculture, mining, street runoff, and perforated septic tanks.

Acknowledgements

This study could not have been completed without the assistance and cooperation of many state agencies including the Alaska Department of Environmental Conservation (ADEC), the Alaska Department of Natural Resources, and the Alaska Department of Fish and Game. The Kenaitze Indian Tribe, Cook Inlet Aquaculture, the Nature Conservancy, Analytica Laboratories, Northern Testing Laboratories, and the Kenai River Sport Fishing Association also supported this project. Additional cooperation transpired with the United States Forest Service, the United States Fish and Wildlife Service through the Kenai National Wildlife Refuge, the Kenai Peninsula Borough, the City of Soldotna, and the City of Kenai. Finally, many landowners graciously allowed access to the Kenai River and its tributaries from their property.

Methods

Water samples were collected at 13 locations along the Kenai River mainstem and from 8 tributaries near their confluence points (see Figure 2). These locations were chosen by dozens of participants in order to accurately represent the Kenai River Watershed's ambient water quality conditions (Ashton, 1998). Sampling occurred in late April and late July each year beginning in July 2000.

After a half-day training session, staff from governmental and non-governmental agencies dispersed to sampling locations in teams of two or more to collect samples. All samples were collected on the same day, and the timing of the sampling coincided with an outgoing tide, near low tide, to reduce the potential of collecting water from Cook Inlet. Typically, the individual collecting the sample waded into the water until the water level was around two feet deep, and the sample was collected while facing upstream. If the individual collected the sample using a boat, the samples were collected from the bow while the boat faced upstream. The bottles were placed approximately one foot below the surface to collect the water samples and then preserved for transportation to the laboratory. Beginning in April 2002, two duplicate samples were collected for quality control. These procedures follow the protocols established in a Quality Assurance Project Plan that was approved by the ADEC in 2001.

Maps of the Kenai River Watershed

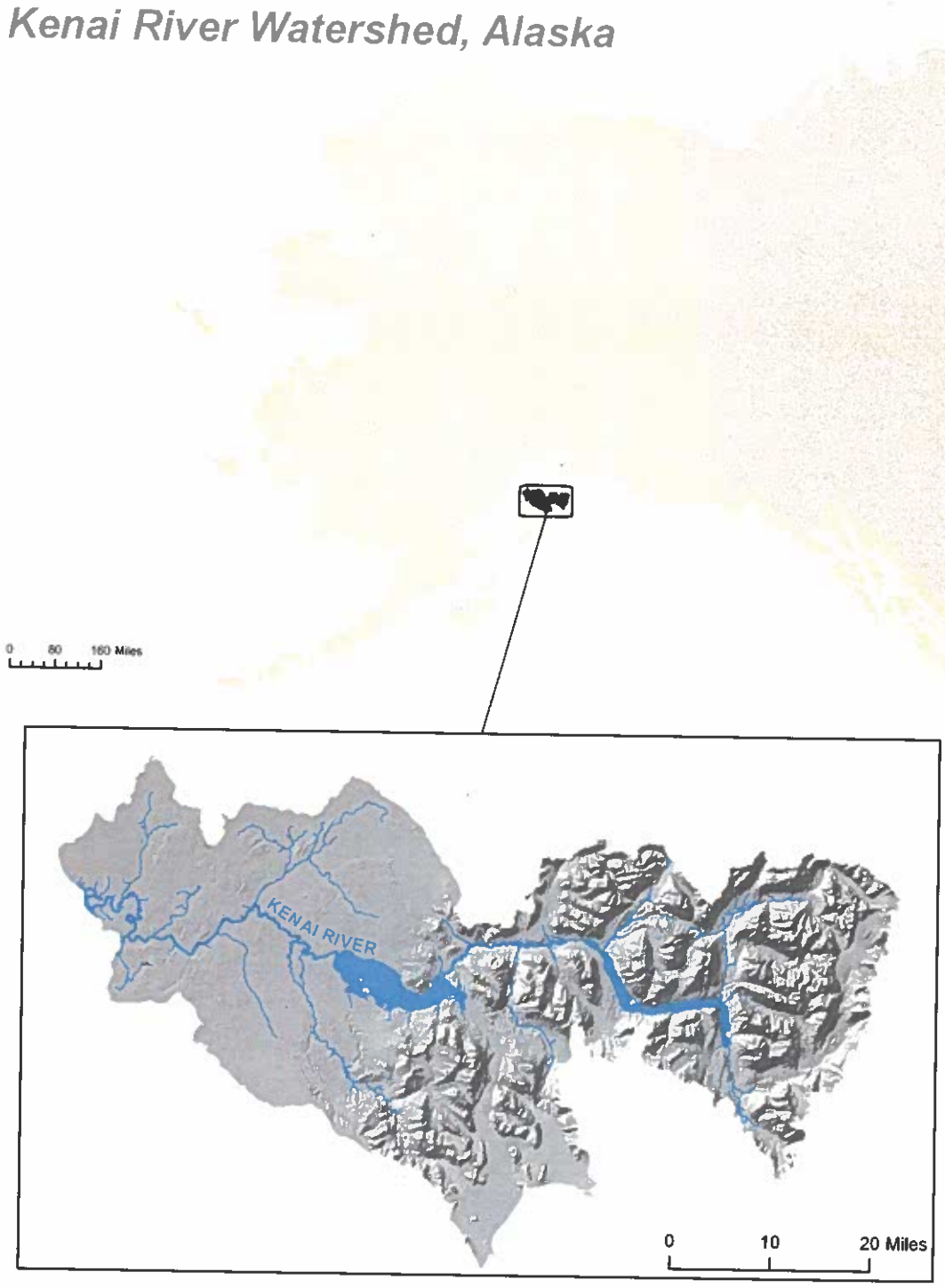

Figure 1: Location of the Kenai River Watershed.

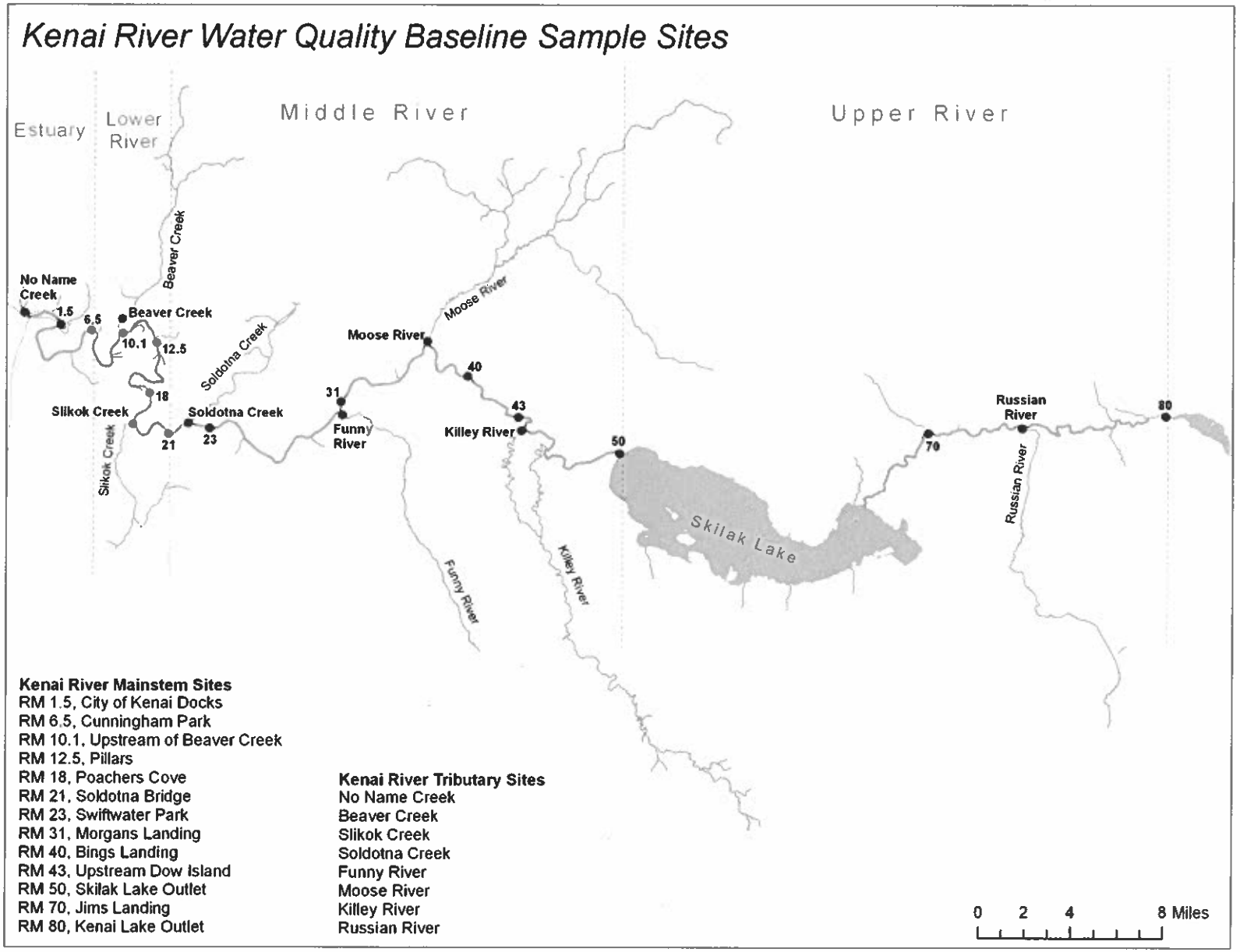

Figure 2: The Kenai River water quality baseline sample sites.

Sampling Site Descriptions and Photographs

Kenai River Mile 80

This site is near the Kenai Lake Outlet and Kenai Lake Bridge and is located at 60.492007 N and -149.810844 W. Samples are typically collected downstream of the boat launch.

Figure 3: Kenai River Mile 80 (Kenai Lake Outlet) on 04/26/2005.

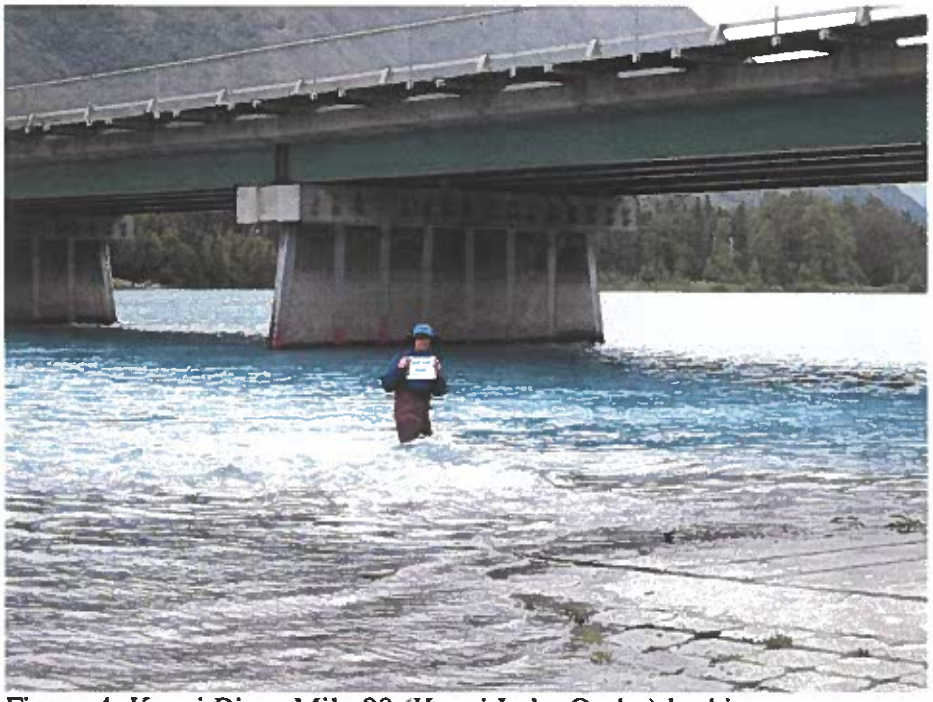

Figure 4: Kenai River Mile 80 (Kenai Lake Outlet) looking upstream on 07/25/2006.

Kenai River Mile 70

This site is near Jim's Landing and is located at 60.481392 N and -150.115020 W. The sample is typically collected 40 feet downstream of the boat launch.

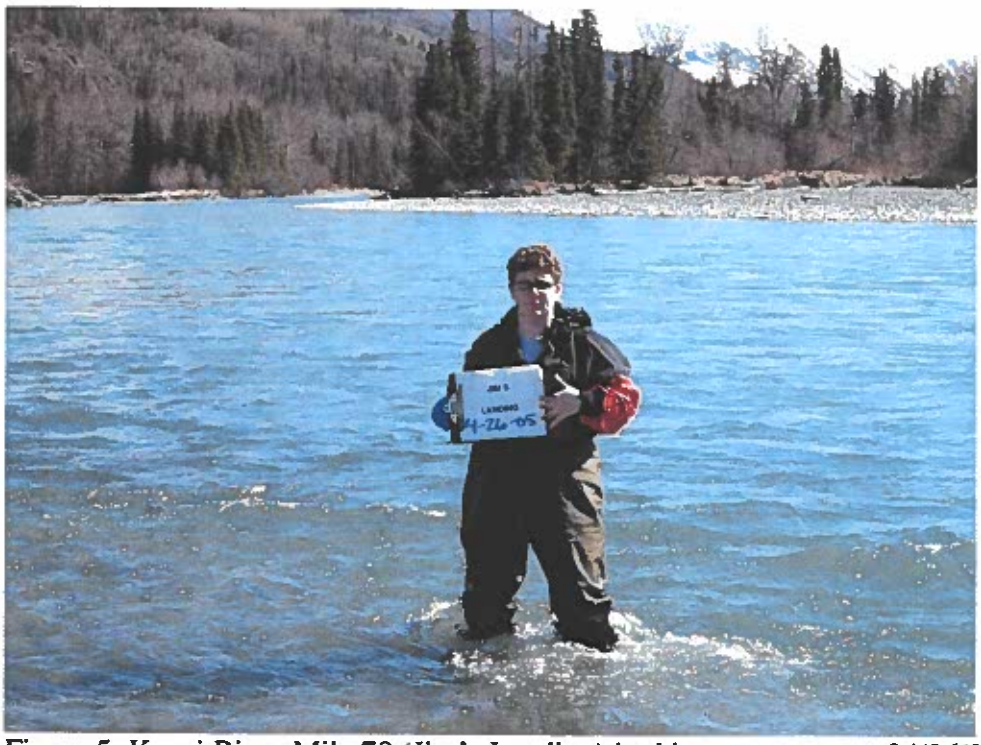

Figure 5: Kenai River Mile 70 (Jim's Landing) looking upstream on 04/26/2005.

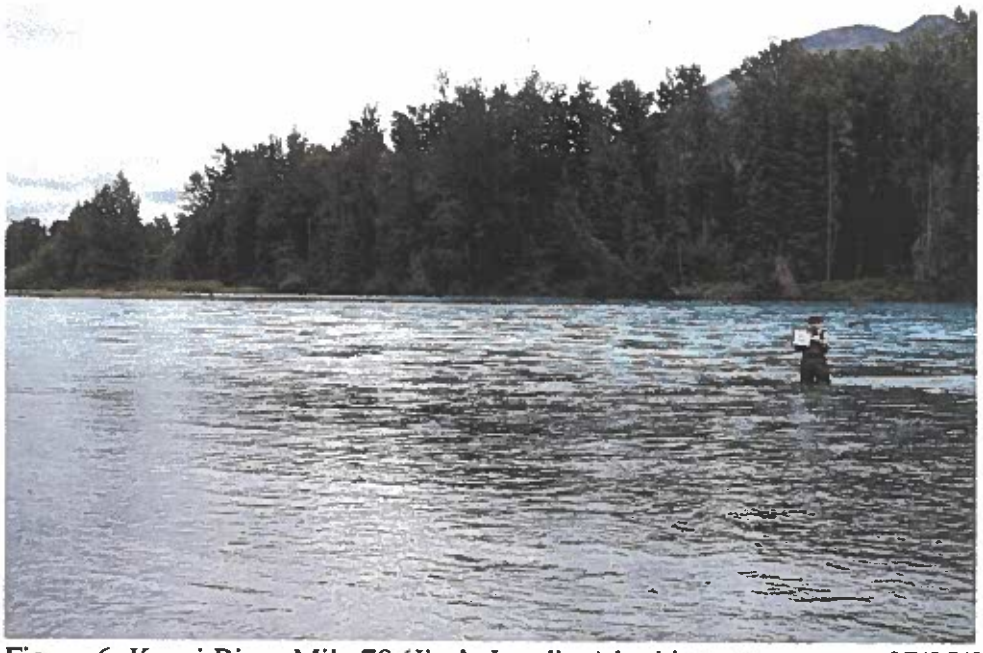

Figure 6: Kenai River Mile 70 (Jim's Landing) looking upstream on 07/25/2006.

Kenai River Mile 50

This site is near the Skilak Lake Outflow and is located at 60.467517 N and -150.507789 W. Samples are typically collected between the swan signs off of the south bank.

Figure 7: Kenai River Mile 50 (Skilak Lake Outflow) on 04/26/2005.

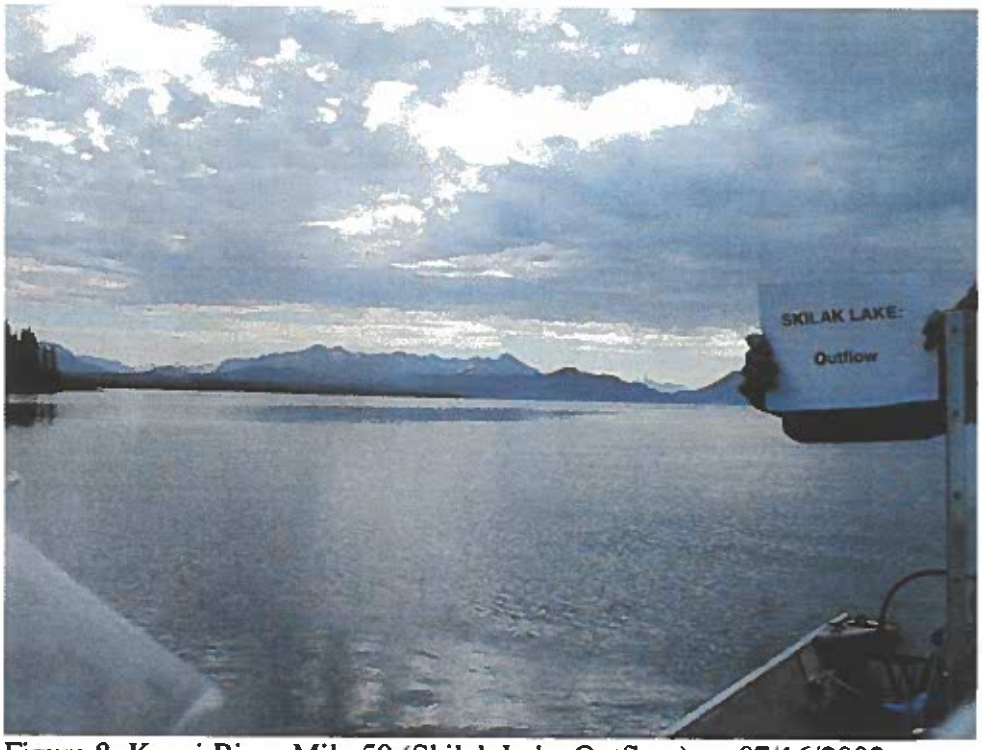

Figure 8: Kenai River Mile 50 (Skilak Lake Outflow) on 07/16/2002.

Kenai River Mile 43

This site is upstream of Dow Island and is located at 60.489844 N and -150.636905 W. The samples are typically collected 100 feet upstream of the point of Dow Island.

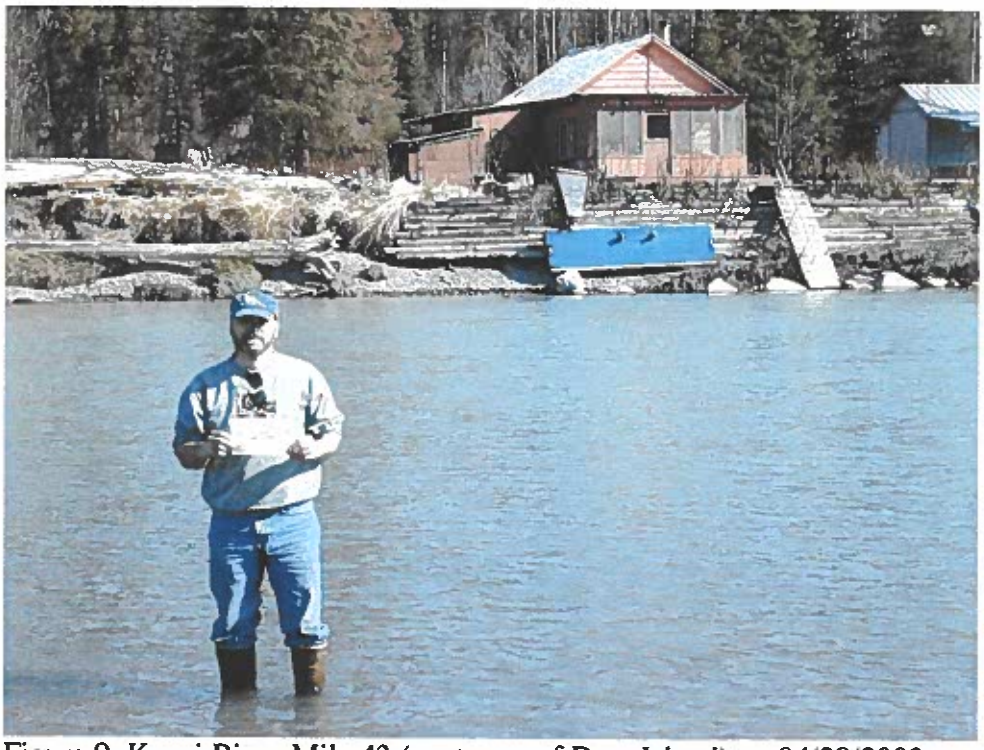

Figure 9: Kenai River Mile 43 (upstream of Dow Island) on 04/29/2003.

Figure 10: Kenai River Mile 43 (upstream of Dow Island) on 07/20/2004.

Kenai River Mile 40

This site is near Bings Landing and is located at 60.515441 N and -150.702069 W. Samples are typically collected in front of the boat launch near the center of the river.

Figure 11: Kenai River Mile 40 (Bings Landing) right bank on 04/25/2006.

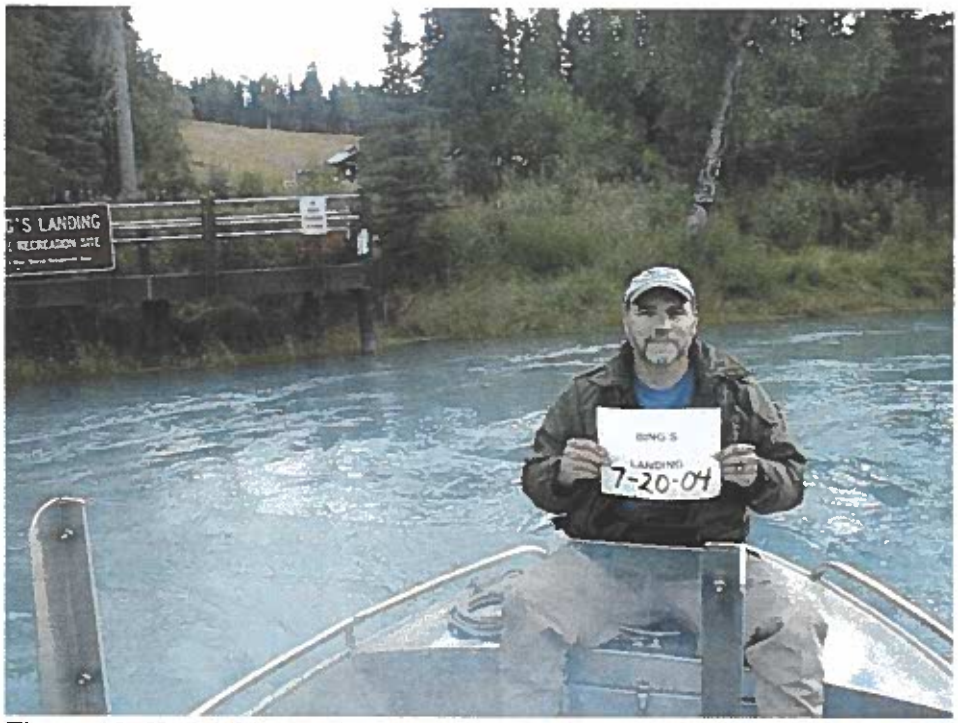

Figure 12: Kenai River Mile 40 (Bings Landing) on 07/20/2004.

Kenai River Mile 31

This site is near Morgan's Landing and is located at 60.498284 N and -150.863121 W. Sampling typically occurs down the abandoned steep road behind the headquarters building.

Figure 13: Kenai River Mile 31 (Morgan's Landing) on 04/25/2006.

Figure 14: Kenai River Mile 31 (Morgan's Landing) on 07/26/2005.

Kenai River Mile 23

This site is near Swiftwater Park and is located at 60.480338 N and -151.030847 W. Samples are typically collected mid-channel in front of the ramp.

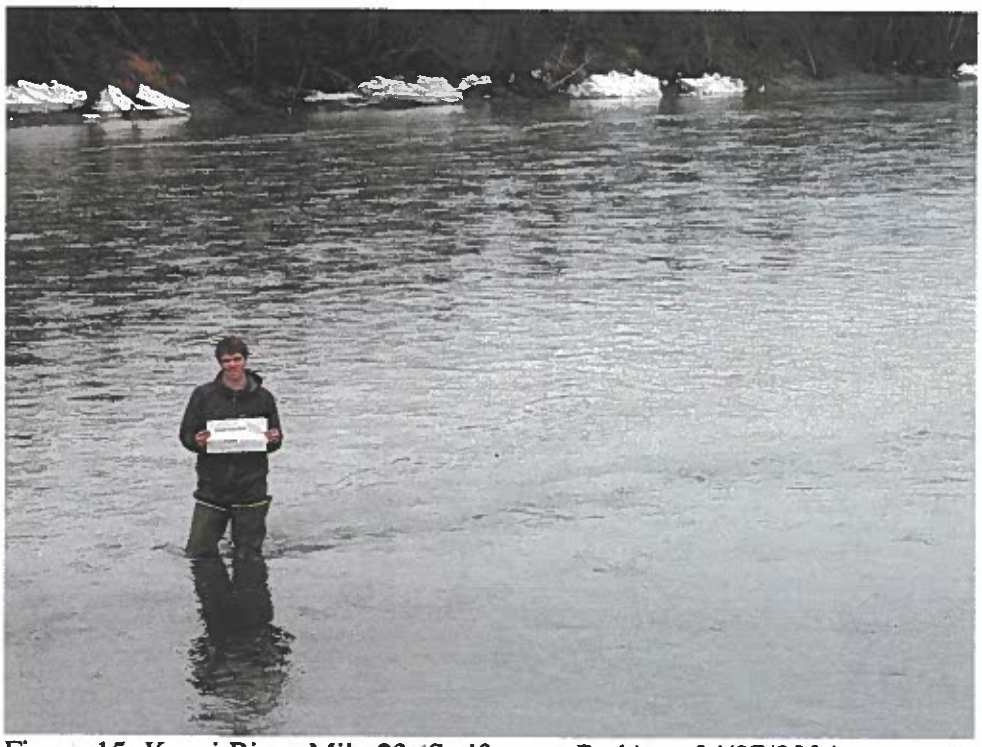

Figure 15: Kenai River Mile 23 (Swiftwater Park) on 04/27/2004.

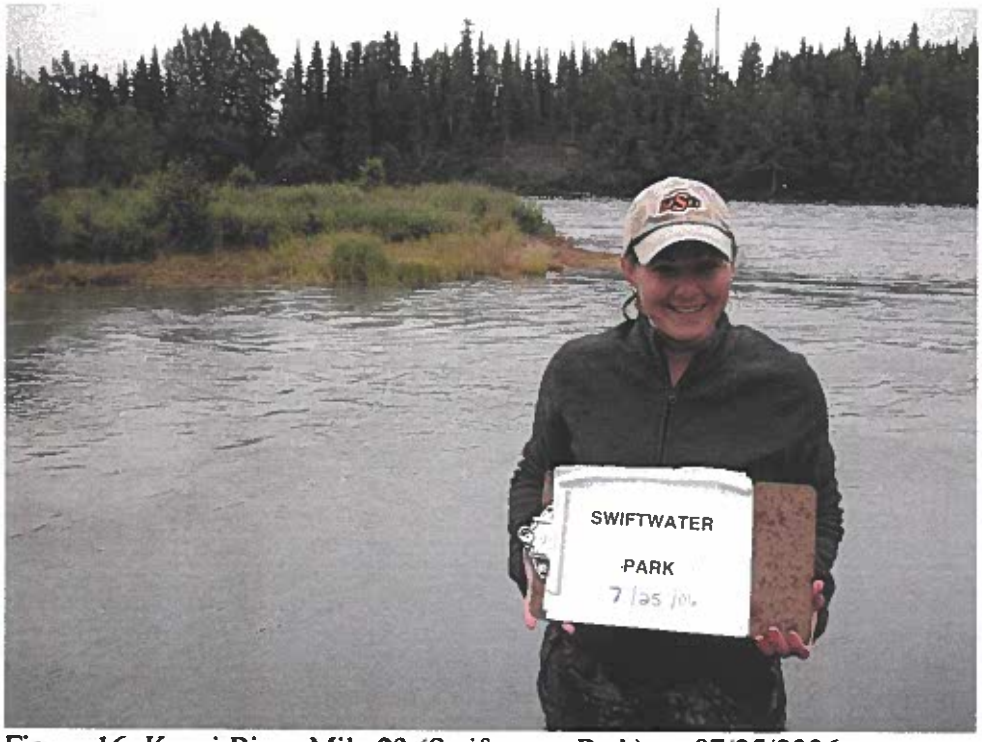

Figure 16: Kenai River Mile 23 (Swiftwater Park) on 07/25/2006.

Kenai River Mile 21

This site is near the Soldotna Bridge and is located at 60.476634 N and -151.082099 W. Samples are typically collected 20 feet downstream of the bridge on the south bank.

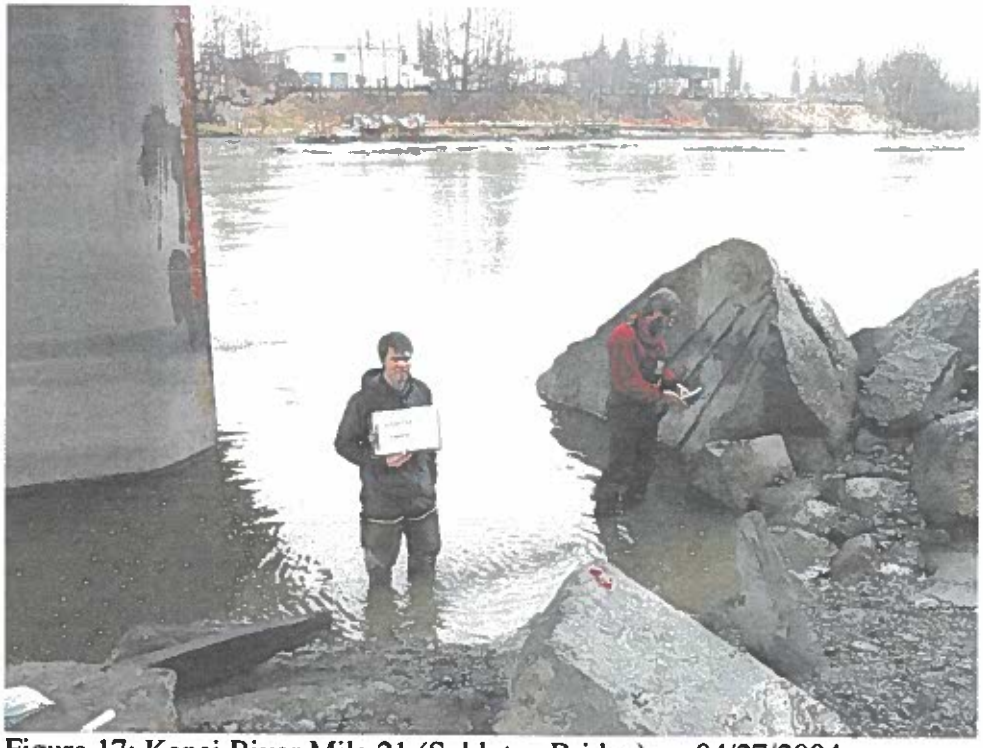

Figure 17: Kenai River Mile 21 (Soldotna Bridge) on 04/27/2004.

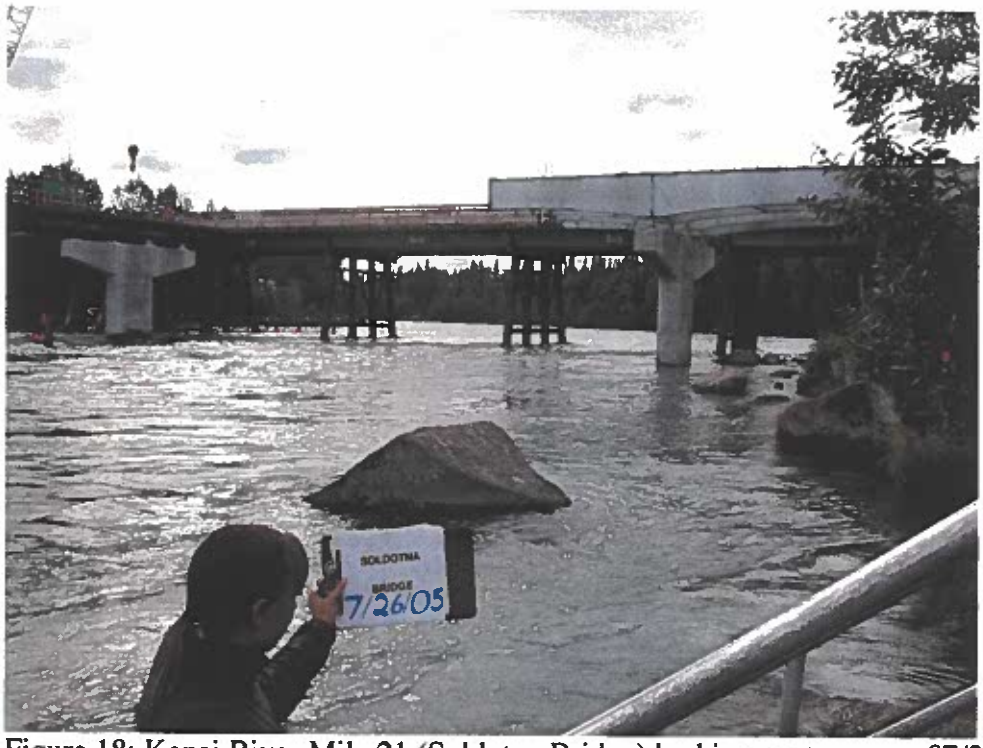

Figure 18: Kenai River Mile 21 (Soldotna Bridge) looking upstream on 07/26/2005.

Kenai River Mile 18

This site is near Poacher's Cove and is located at 60.502005 N and -151.106973 W. Samples are typically collected mid-channel just downstream of an island.

Figure 19: Kenai River Mile 18 (Poacher's Cove) on 04/26/2005.

Figure 20: Kenai River Mile 18 (Poacher's Cove) on 07/22/2003.

Kenai River Mile 12.5

This site is near the Pillars Boat Launch and is located at 60.533743 N and -151.099258 W. Samples are typically collected toward the center of the river across from the dock.

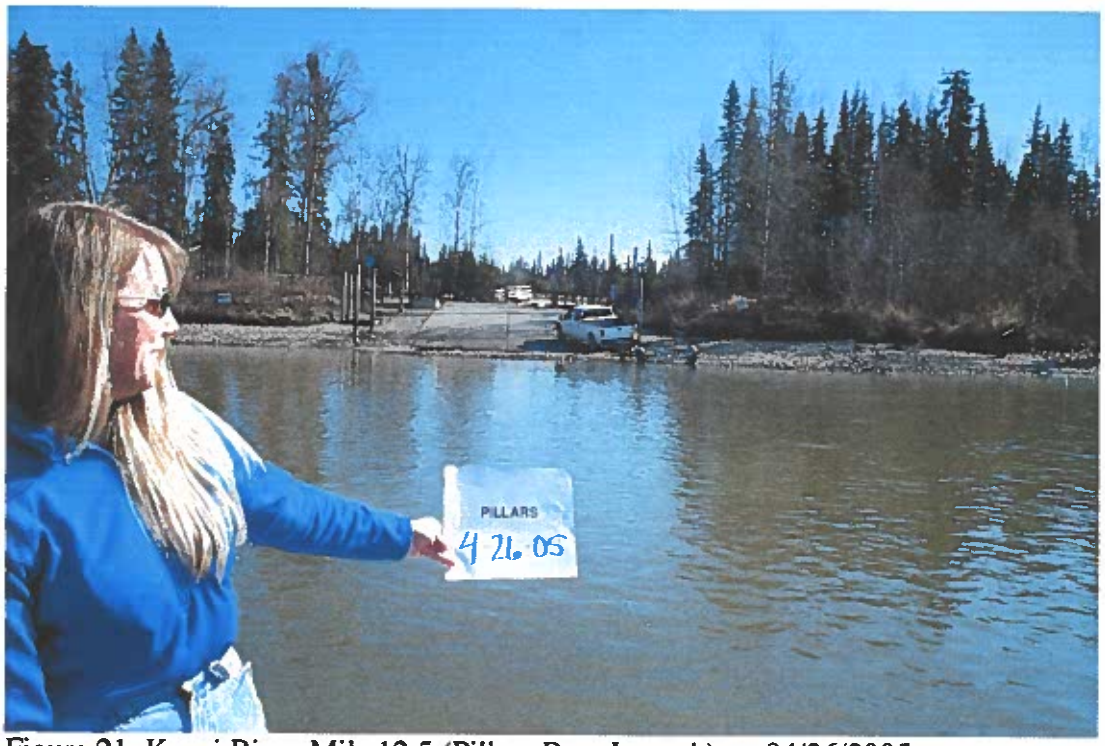

Figure 21: Kenai River Mile 12.5 (Pillars Boat Launch) on 04/26/2005.

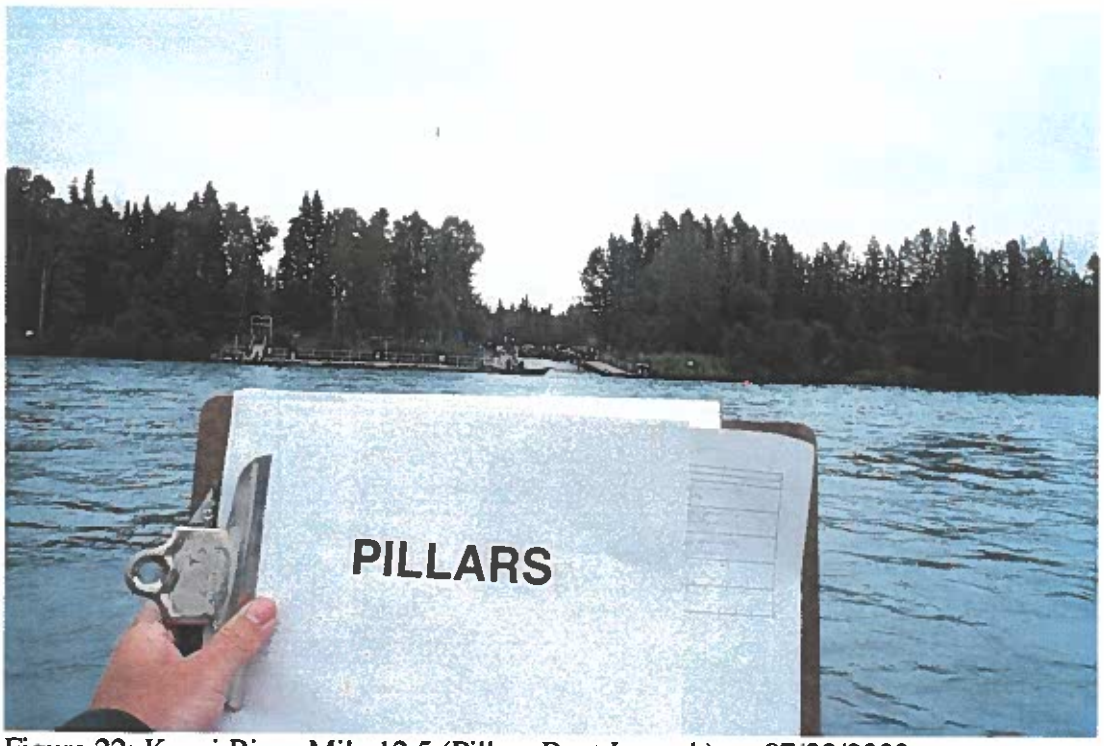

Figure 22: Kenai River Mile 12.5 (Pillars Boat Launch) on 07/22/2003.

Kenai River Mile 10.1

This site is upstream of Beaver Creek and is located at 60.539279 N and -151.142263 W. Samples are typically collected 200 yards upstream of the Beaver Creek and Kenai River confluence. During July 2000, April 2001, and July 2001, samples were collected downstream of the Kenai River and Beaver Creek confluence, and no samples were collected from this site in April 2002.

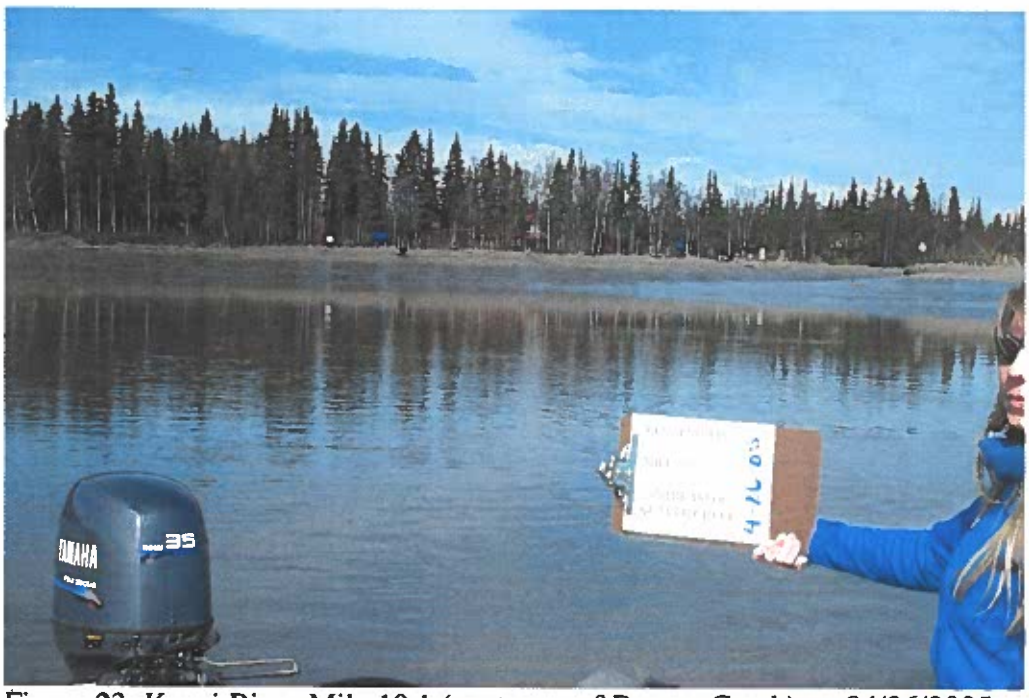

Figure 23: Kenai River Mile 10.1 (upstream of Beaver Creek) on 04/26/2005.

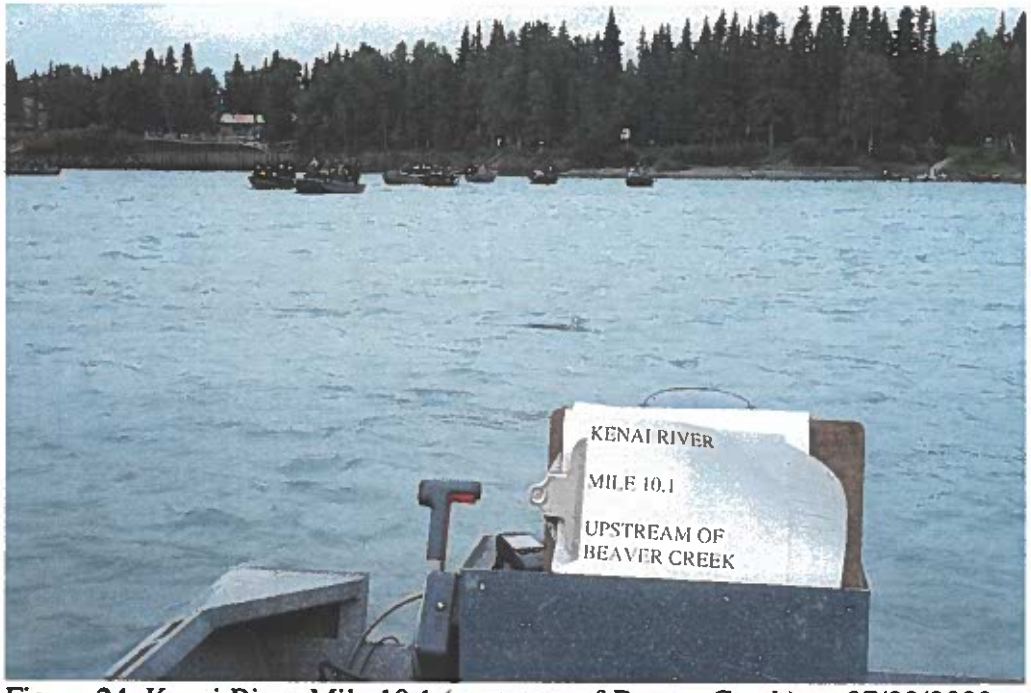

Figure 24: Kenai River Mile 10.1 (upstream of Beaver Creek) on 07/22/2003.

Kenai River Mile 6.5

This site is near Cunningham Park and is located at 60.5408100 N and -151.182780 W. Sampling typically occurs straight out from the public-use boardwalk and can vary due to the tidal stage.

Figure 25: Kenai River Mile 6.5 (Cunningham Park) on 04/26/2005.

Figure 26: Kenai River Mile 6.5 (Cunningham Park) on 07/26/2005.

Kenai River Mile 1.5

This site is near the City of Kenai Dock and is located at 60.543680 N and -151.222940 W. Samples are typically collected at the north end of the public fueling dock.

Figure 27: Kenai River Mile 1.5 (Kenai City Dock) on 04/26/2005.

Figure 28: Kenai River Mile 1.5 (Kenai City Dock) on 07/26/2005.

Russian River

This site is a Kenai River tributary and is located at 60.484622 N and -149.993955 W. Samples are typically collected 90 feet upstream of the sanctuary sign.

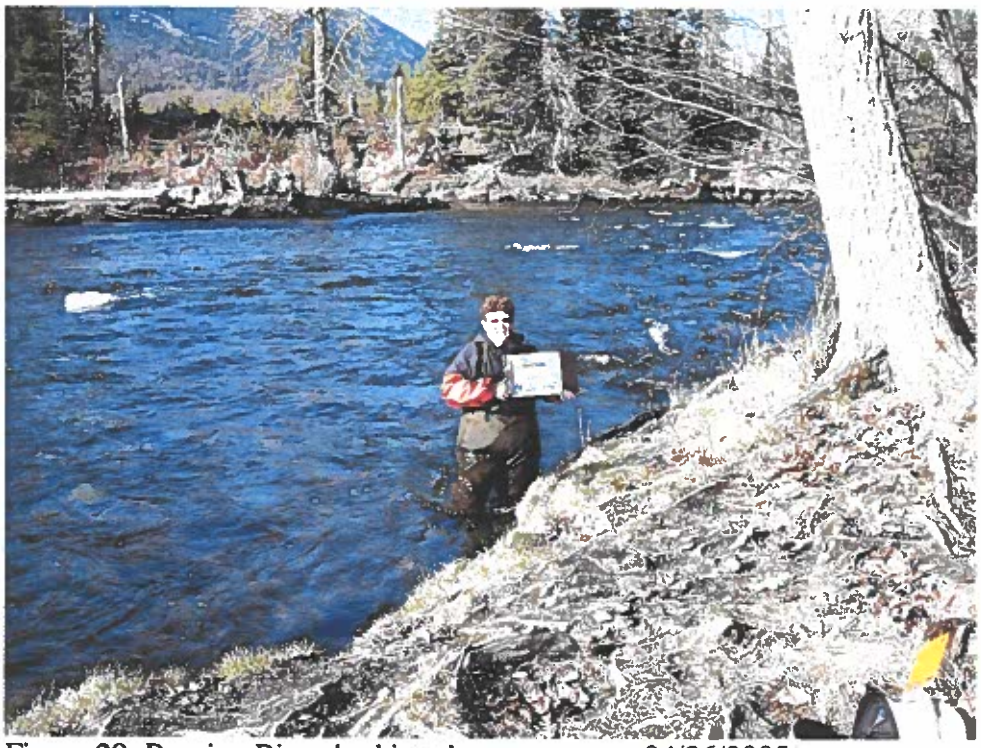

Figure 29: Russian River looking downstream on 04/26/2005.

Figure 30: Russian River looking upstream on 07/25/2006.

Killey River

This site is a Kenai River tributary and is located at 60.481518 N and -150.632498 W. Sampling typically occurs 100 yards upstream from the Kenai River confluence across from the fish table.

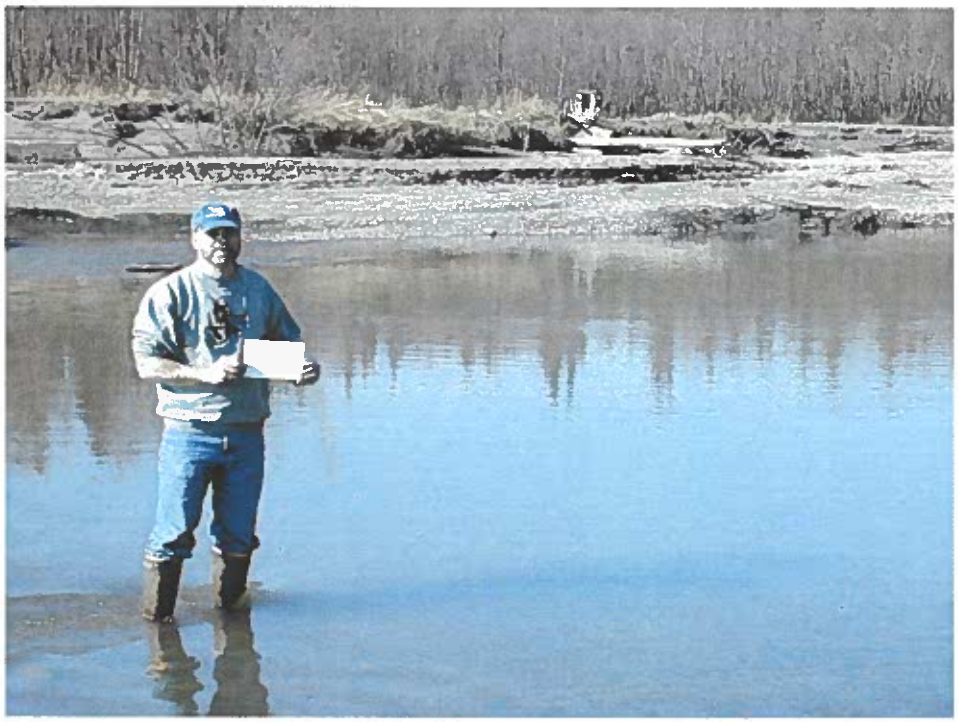

Figure 31: Killey River on 04/29/2003.

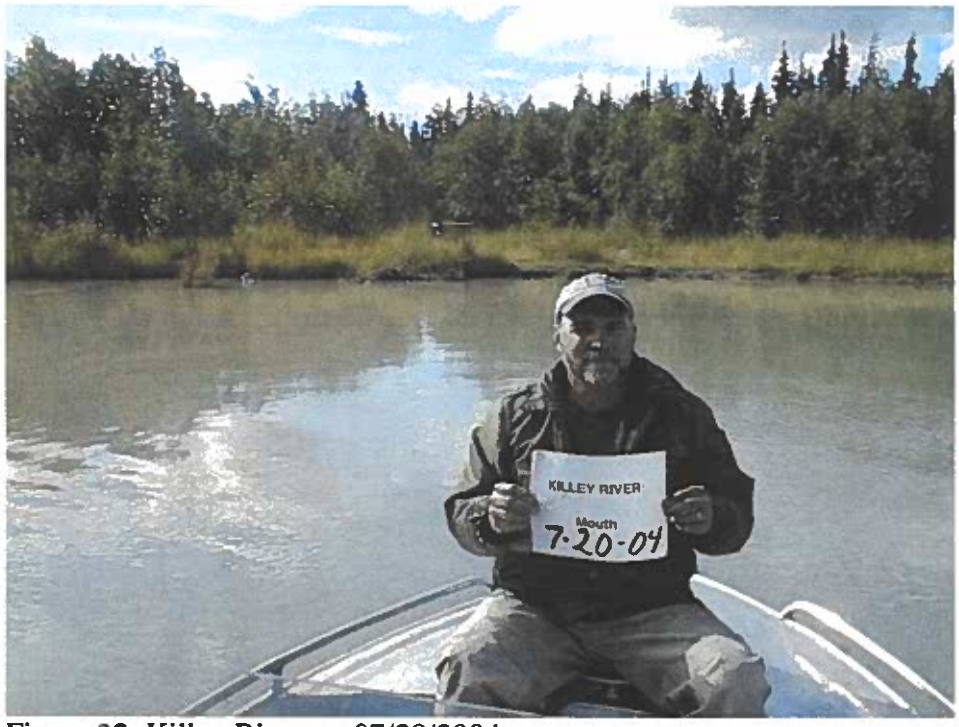

Figure 32: Killey River on 07/20/2004.

Moose River

This site is a Kenai River tributary and is located at 60.536870 N and -150.754724 W. Sampling typically occurs upstream of the parking area.

Figure 33: Moose River on 04/25/2006.

Figure 34: Moose River on 07/26/2005.

Funny River

This site is a Kenai River tributary and is located at 60.489963 N and -150.860982 W. Samples are typically collected 75 feet downstream of the bridge.

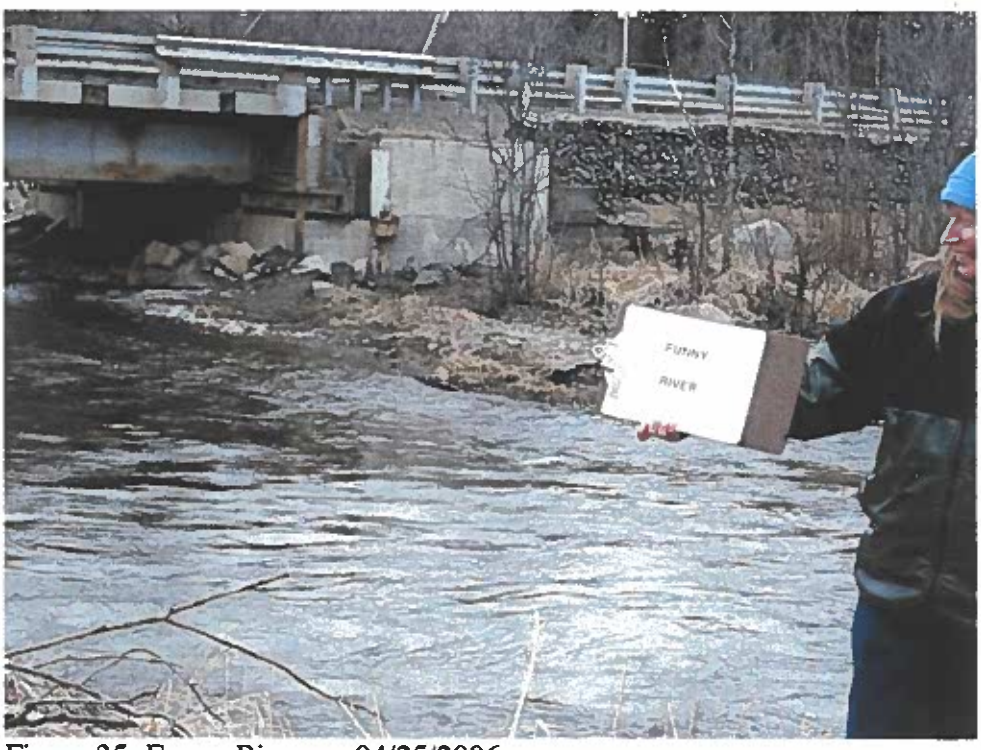

Figure 35: Funny River on 04/25/2006.

Figure 36: Funny River on 07/26/2005.

Soldotna Creek

This site is a Kenai River tributary and is located at 60.483364 N and -151.057656 W. Sampling typically occurs mid-channel off the edge of the chain link fence.

Figure 37: Soldotna Creek on 04/26/2005.

Figure 38: Soldotna Creek on 07/25/2006.

Slikok Creek

This site is a Kenai River tributary and is located at 60.482318 N and -151.127053 W. Samples are typically collected in the mid-channel of Slikok Creek.

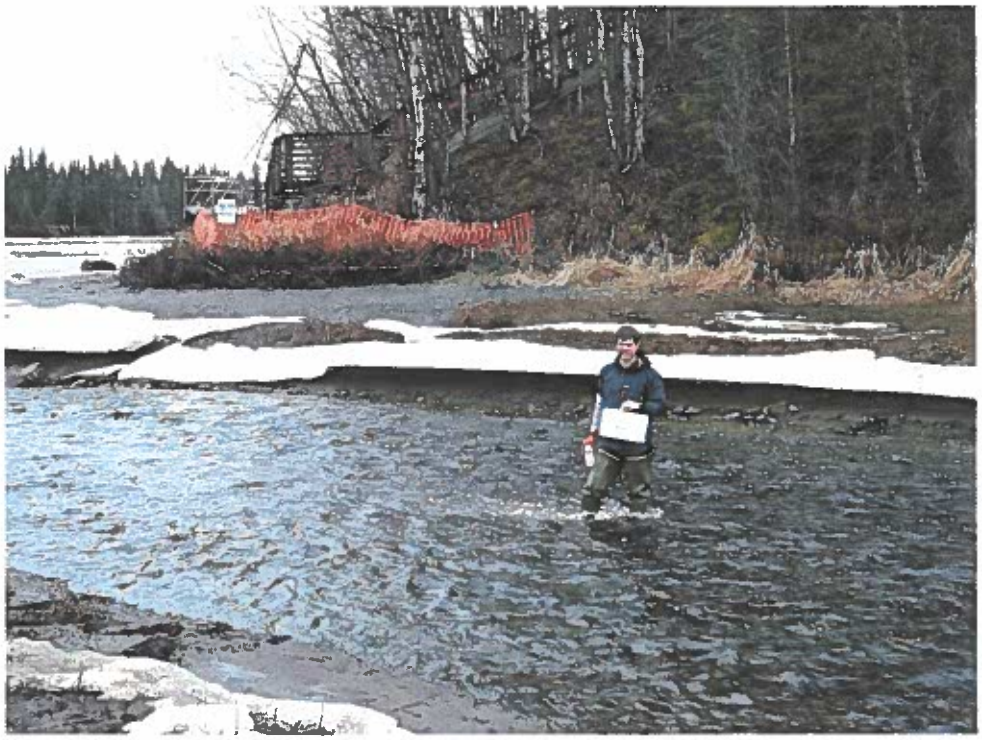

Figure 39: Slikok Creek on 04/27/2004.

Figure 40: Slikok Creek on 07/25/2006.

Beaver Creek

This site is a Kenai River tributary and is located at 60.548029 N and -151.143240 W. Sampling at this site commenced in April 2002.

Figure 41: Beaver Creek on 04/26/2005.

Figure 42: Beaver Creek on 07/16/2002.

No Name Creek

This site is a Kenai River tributary and is located at 60.550888 N and -151.268417 W. Samples are typically collected approximately 500 feet upstream of the confluence with the Kenai River, just upstream of the footbridge.

Figure 43: No Name Creek on 04/26/2005.

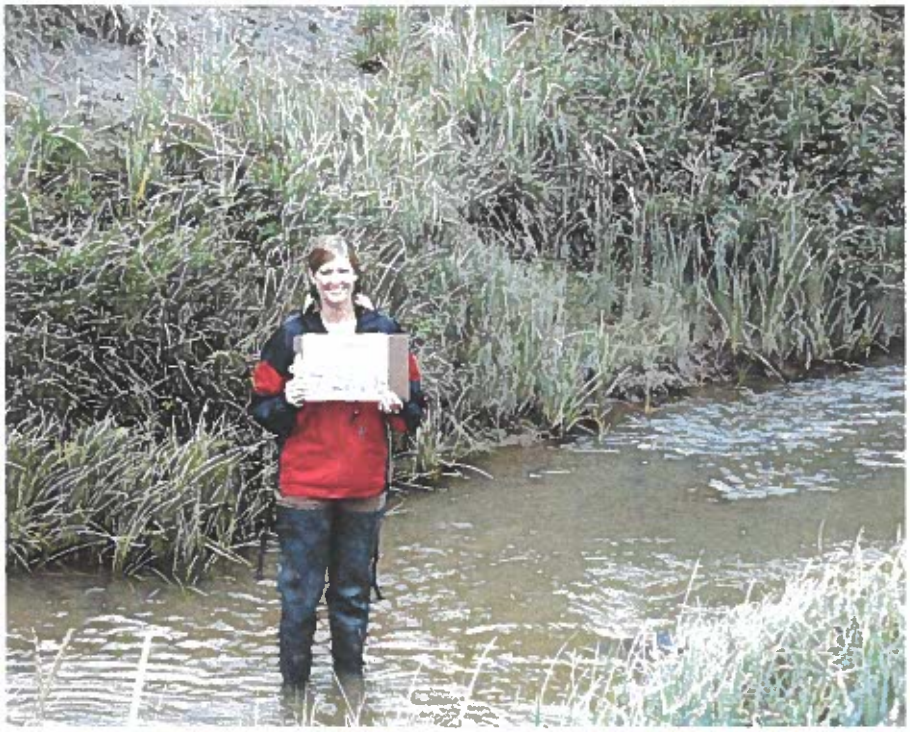

Figure 44: No Name Creek on 07/26/2005.

Parameters and Graphs

Interpreting Box Plots

Each of the following graphs displays the sampling results for a specific parameter, like arsenic. Within these graphs, a box and extending lines represent the results reported at each sampling site. A horizontal line within the box corresponds to the median of the data. The box contains 50% of the data and the vertical lines display the minimum and maximum values. Any data points that fall outside of the acceptable range are outliers and are portrayed as small circles.

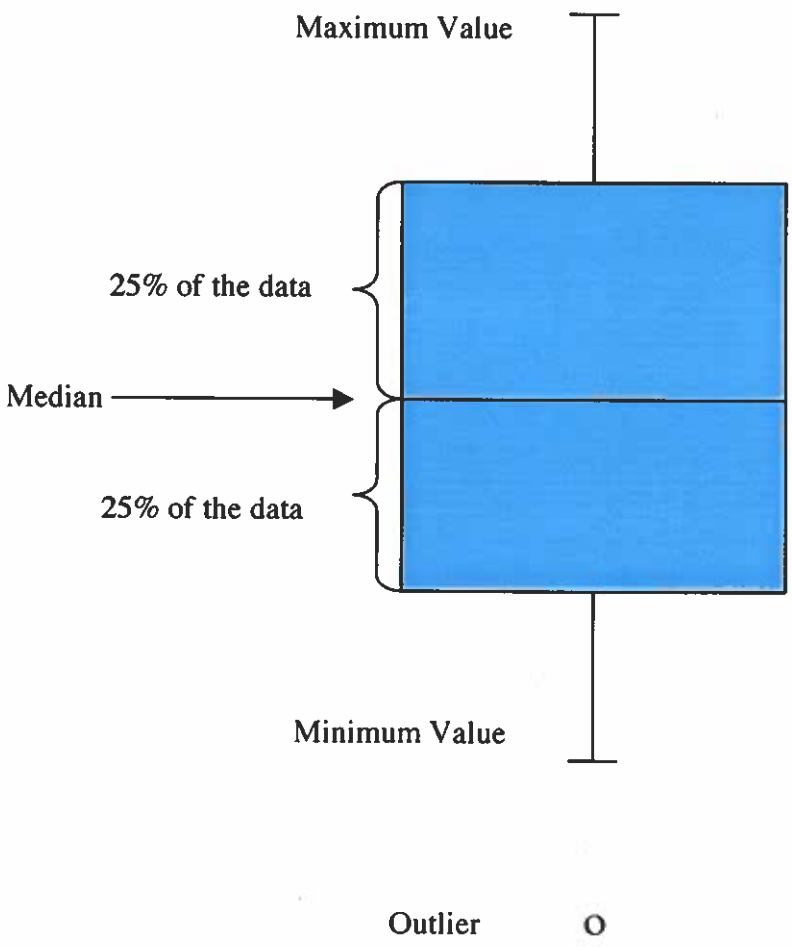

Figure 45: Diagram of the components of a box plot.

Arsenic

Natural sources of arsenic in the Cook Inlet Basin include volcanic ash, glaciation, and mineral deposits, and only a minimal contribution of arsenic results from human activities like wood preservation (Glass and Frenzel, 2001). Arsenic is naturally present as a compound in rocks within the Kenai River Watershed, and as a dissolved metal, it can be acutely or chronically toxic to fish (Glass, 1999). The Alaska Department of Environmental Conservation (ADEC) and the United States Environmental Protection Agency (USEPA) have set the standard at 150 micrograms per liter (μg/L) for freshwater aquatic life chronically exposed to arsenic (see Appendix 2) (USEPA, 2006; ADEC, 2003).

None of the samples exceeded the Alaska or federal standard for freshwater aquatic life at any sampling location in April or July. The highest level detected in the mainstem was 12.5 μg/L at Mile 1.5 in April 2006, and arsenic was not detected on many occasions below the method detection limit (MDL) of 0.25 μg/L in April of 2005 and in April and July of 2004. In the Kenai River mainstem, Mile 1.5 had the highest median level followed by Mile 6.5. In both the mainstem and tributaries, higher arsenic levels occurred in the July samples, and there were more detected levels in April and July of 2006 than any of the previous years.

Arsenic was detected on more occasions in the tributaries than in the mainstem; the highest concentration on the mainstem occurred at Mile 1.5 where arsenic was detected on 5 sampling dates, while arsenic was detected on all 13 sampling dates at Beaver Creek, Soldotna Creek, and Moose River. The concentrations of arsenic ranged from a high of 11.3 μg/L in Soldotna Creek in July 2004 to below the MDL of 0.25 μg/L in many locations in April of 2005 and in April and July of 2004. Of the tributaries, Soldotna Creek had the highest median level, followed by Moose River and then Beaver Creek in both April and July. No Name Creek had the fewest incidences of arsenic detection of all the tributaries.

Concentrations of arsenic are generally lower in surface streams than in groundwater, which is typically the source of drinking water (Glass and Frenzel, 2001). The USEPA set the criterion for arsenic in drinking water at 10 μg/L because arsenic has been linked to cancer, skin damage, and circulatory problems (USEPA, 2003). Although the levels of arsenic reported in this study do not exceed the national criterion for the health of an aquatic community in freshwater, groundwater may contain concentrations that are hazardous to human health, and all sources of drinking water should be tested for arsenic.

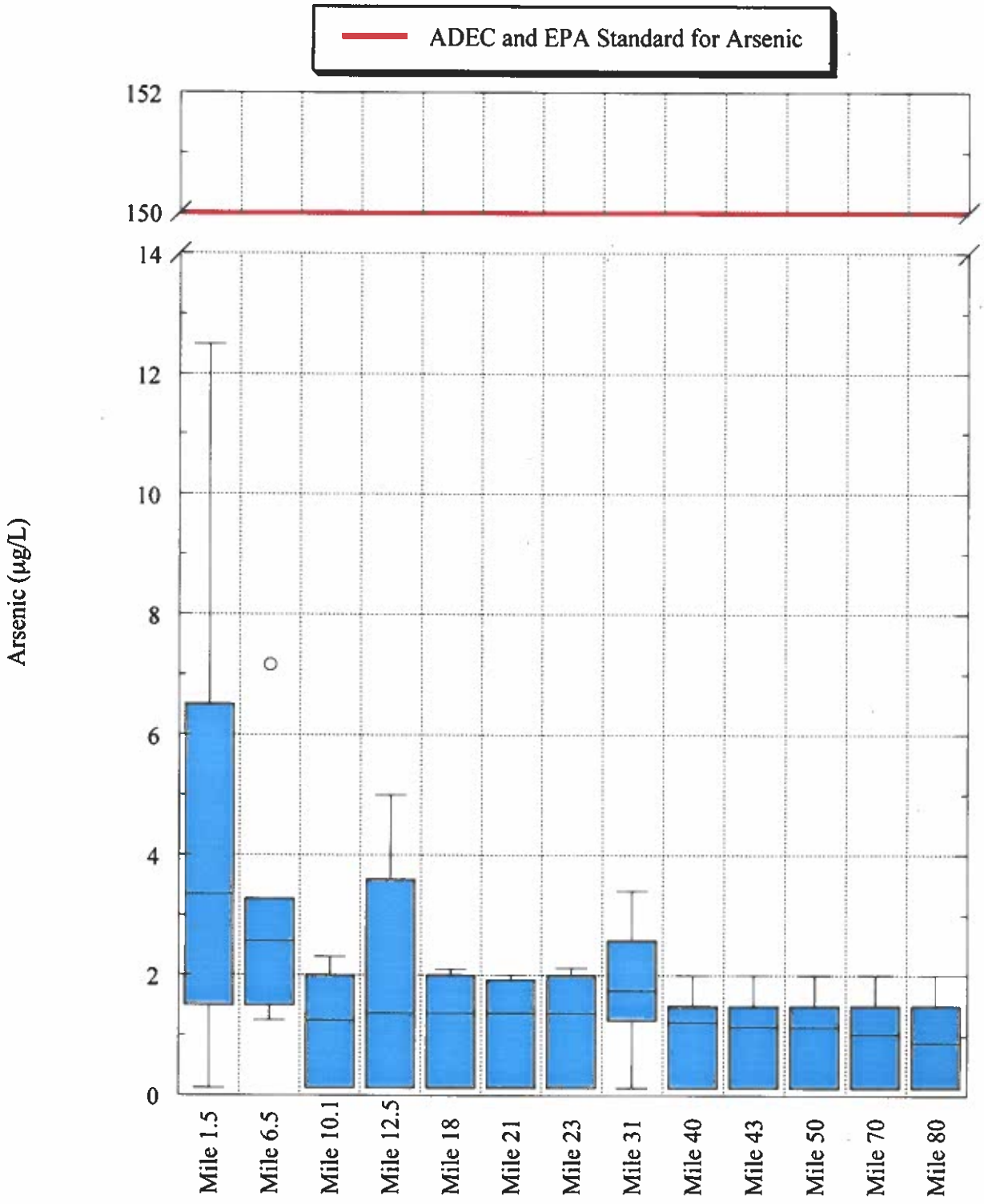

Figure 46: Arsenic sampled in the Kenai River mainstem during April 2001 to 2006. Since 75% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

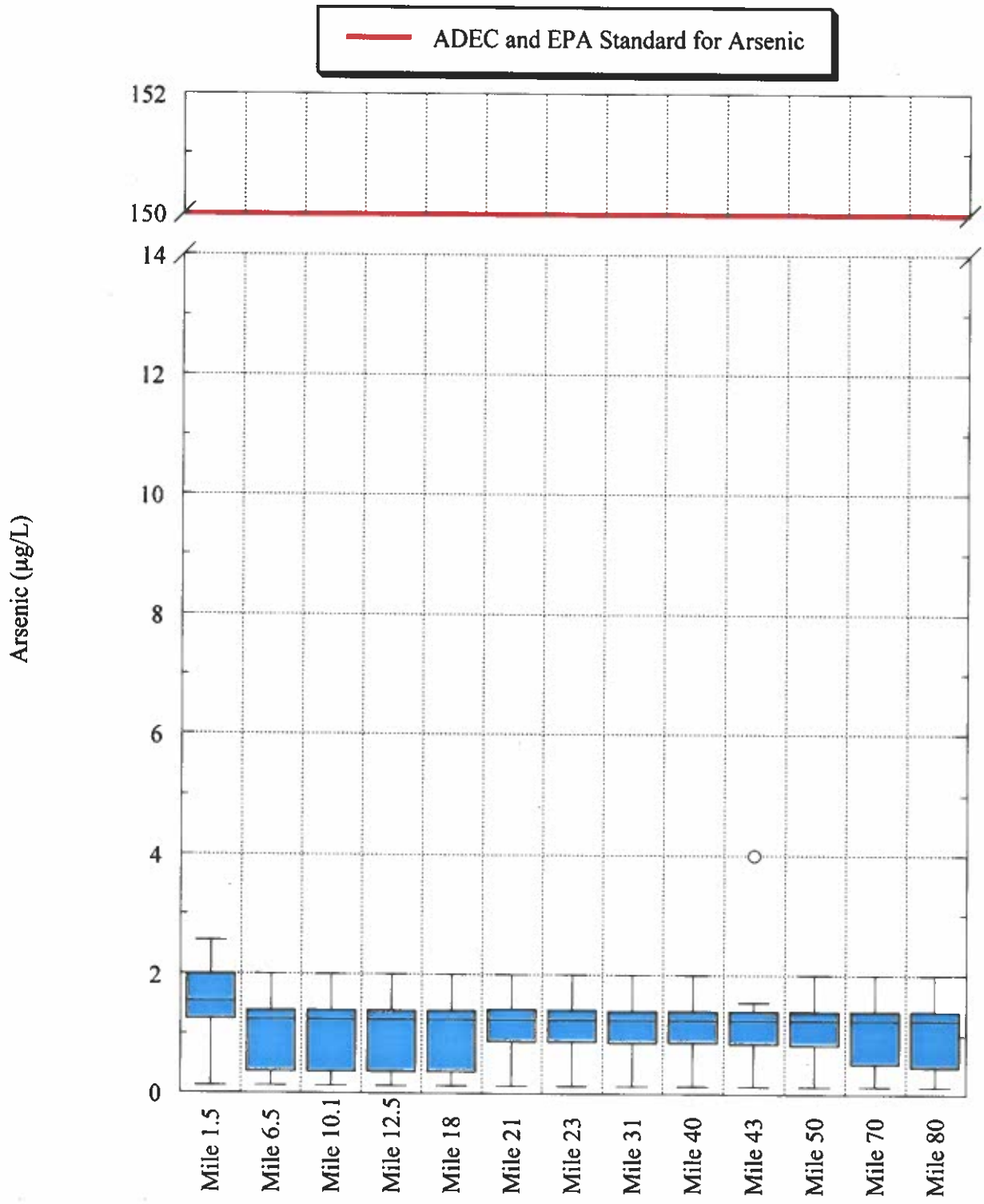

Figure 47: Arsenic sampled in the Kenai River mainstem during July 2000 to 2006. Since 88% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

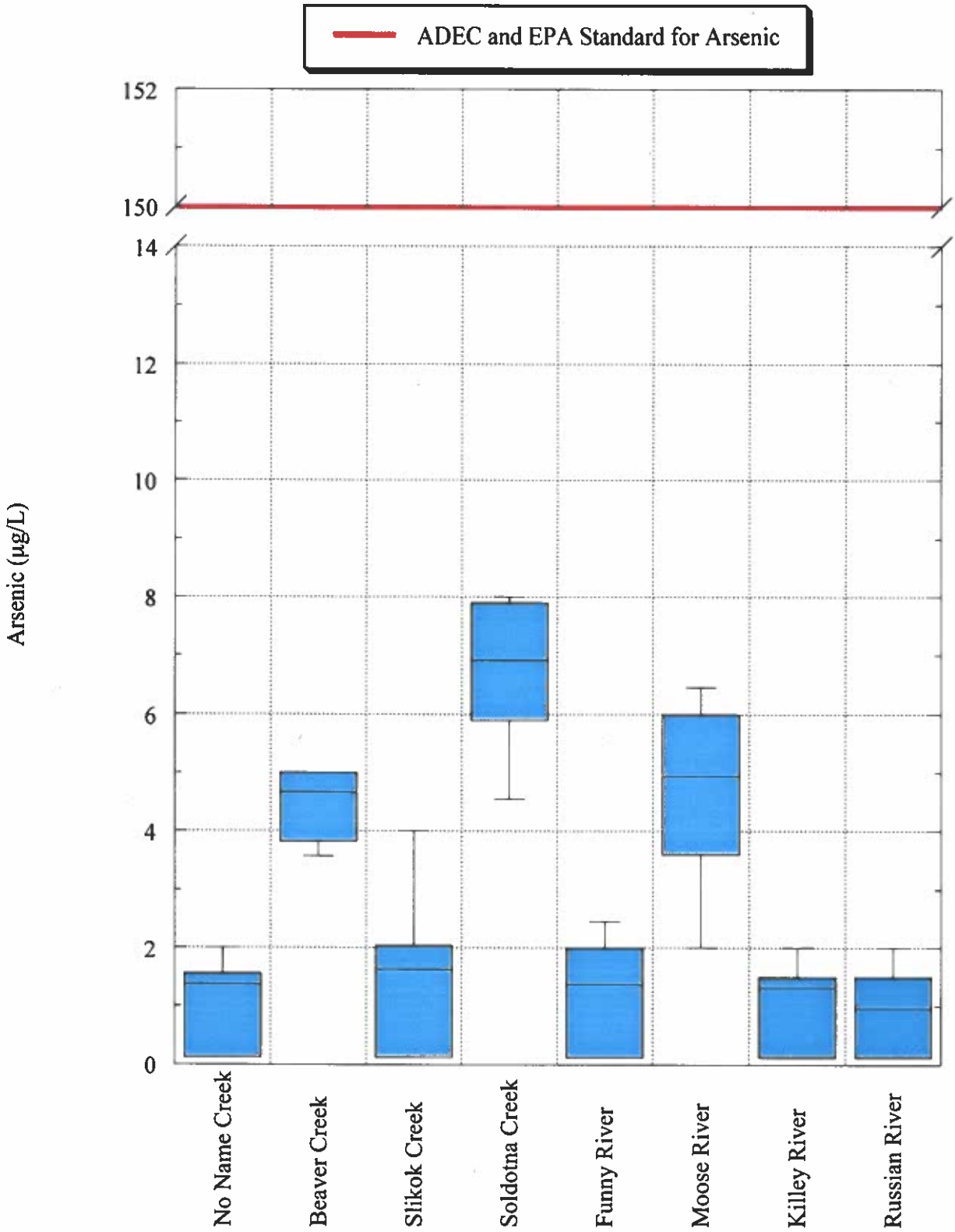

Figure 48: Arsenic sampled in Kenai River tributaries during April 2001 to 2006. Since 53% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

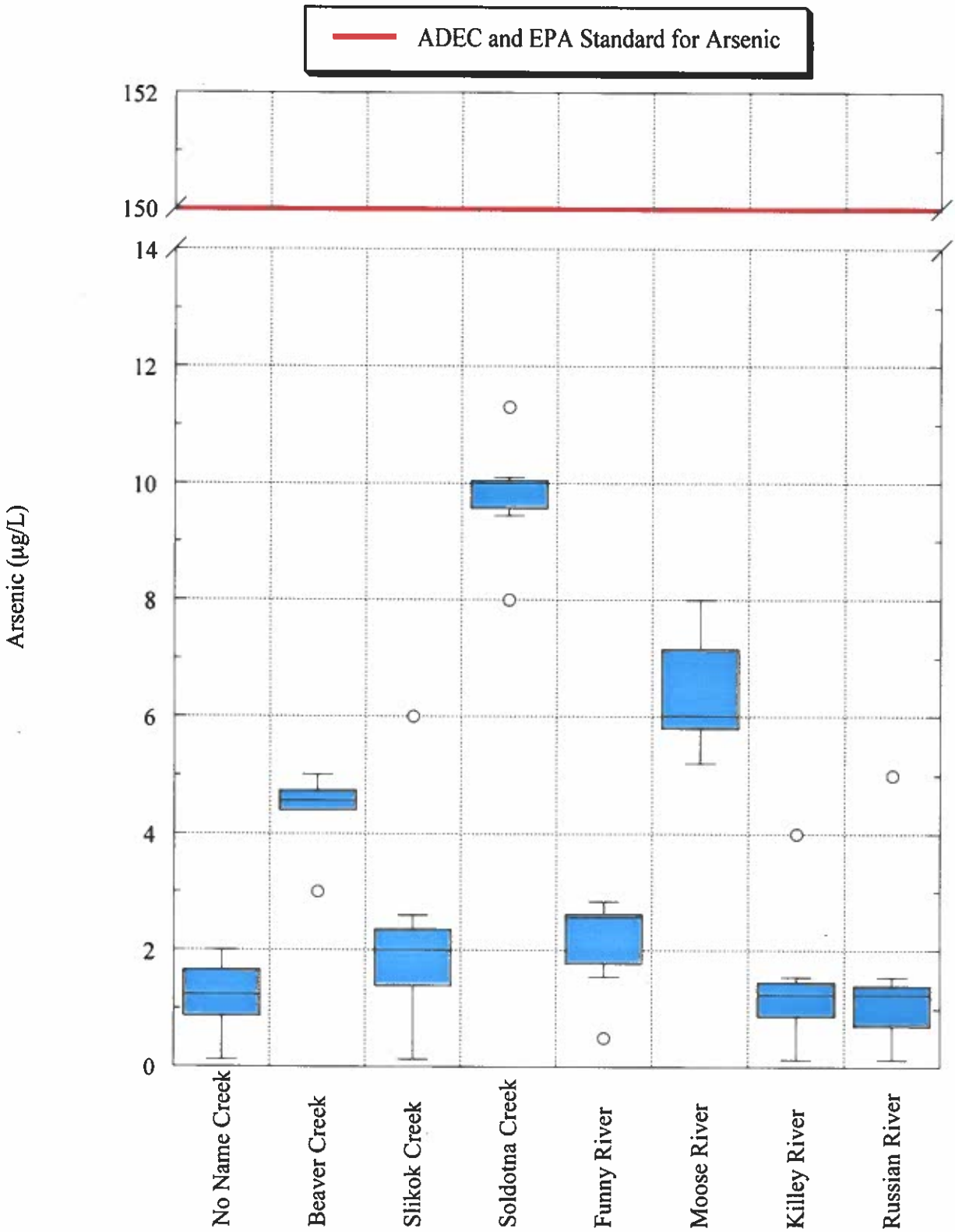

Figure 49: Arsenic sampled in Kenai River tributaries during July 2000 to 2006. Since 41% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

Cadmium

Cadmium is a rare elemental metal that can occur naturally in freshwater at concentrations of less than 0.1 μg/L, but at slightly increased concentrations, it can be toxic to aquatic life (USEPA, 2001). Additional cadmium can enter the hydrologic cycle as a component of fertilizer, pesticide, pigment, and as a result of iron and steel production, coal combustion, and mining waste (USEPA, 2001). The ADEC and the EPA have set the standard for cadmium at a range of 0.0650 μg/L to 0.64 μg/L, depending on hardness, for chronically exposed freshwater aquatic life (see Appendix 2) (EPA, 2006; ADEC, 2003).

In the mainstem, concentrations of cadmium ranged from a high of 8 μg/L at Mile 21 in July 2000 to the lowest levels that were below the MDL of 0.062 μg/L in April and July of 2006 that occurred in multiple locations. In the Kenai River mainstem, cadmium samples at Mile 1.5, Mile 21, and Mile 80 exceeded the standard on one occasion each, and cadmium was not detected at any other mainstem sites.

The highest level of cadmium ever detected in the tributaries was 63 μg/L at Soldotna Creek in July 2002, and the lowest was below the MDL of 0.062 μg/L that occurred in April and July of 2006. Cadmium was detected once above the standard in Soldotna Creek, and all other tributary samples did not exceed the standard.

Since so few cadmium samples were detected, trends were difficult to determine and should be interpreted with caution. In April, cadmium was only reported once, in contrast to July samples in which it was reported seven times. In April of 2001, 2003, 2004, 2005 and July 2001 through 2005, the method reporting limits (MRL) were mainly higher than the standard, so it is unknown whether these samples exceeded the standard.

Site	Date	Hardness (mg/L)	Standard (μg/L)	Result Value (μg/L)
Mile 1.5	4/10/02	1617.86	0.64	1.1
Mile 21	7/18/00	29.45	0.11	8
Mile 80	7/20/04	35.91	0.12	1
Soldotna Creek	7/16/02	79.51	0.21	63

Table 1: Summary table of hardness-dependent exceedances for cadmium.

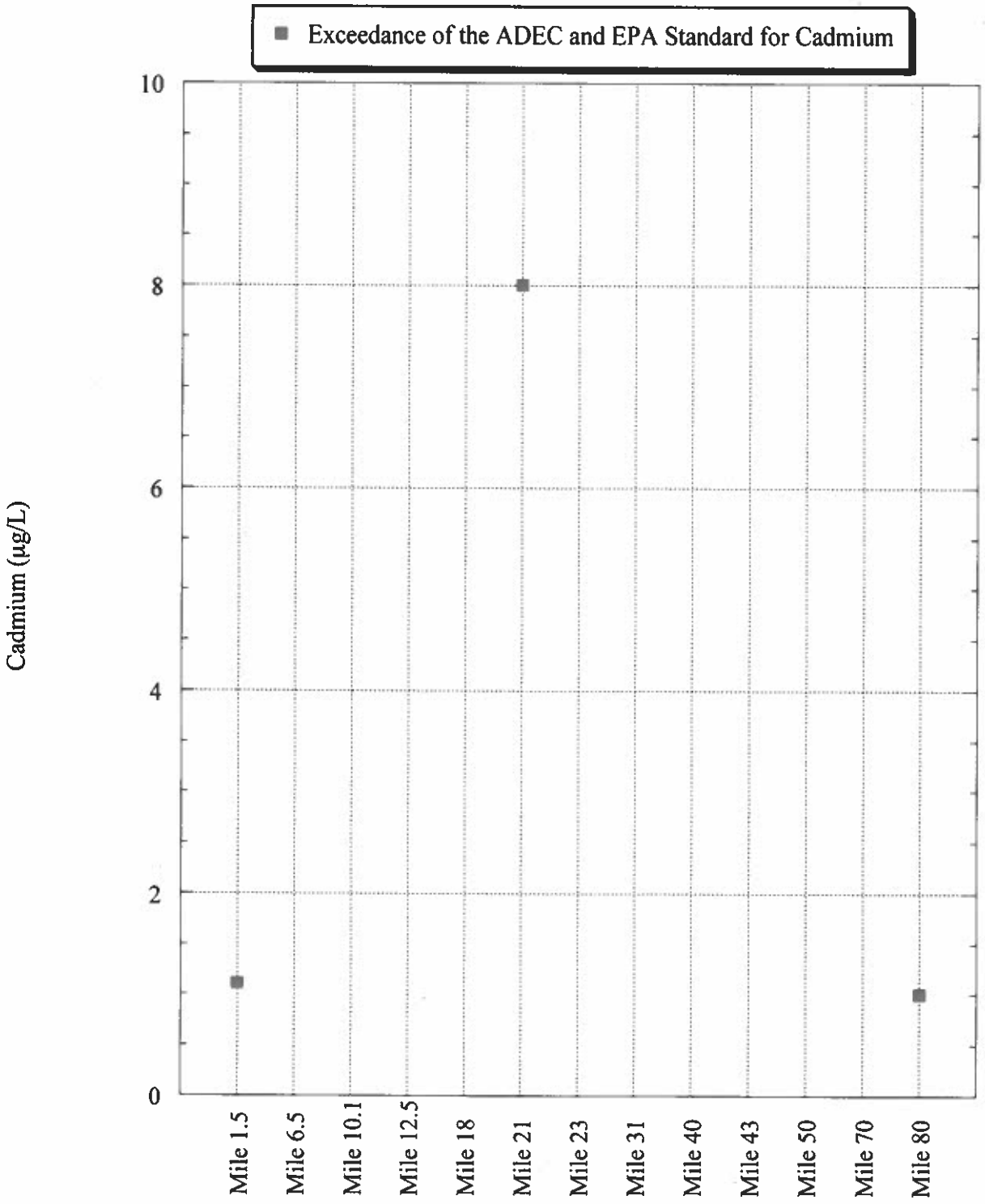

Figure 50: Cadmium sampled in the Kenai River mainstem during April 2001 to 2006 and July 2000 to 2006, with hardness-dependent standards and exceedances. 98% of the samples had results below the MRL or MDL, so those results are not included in the graph.

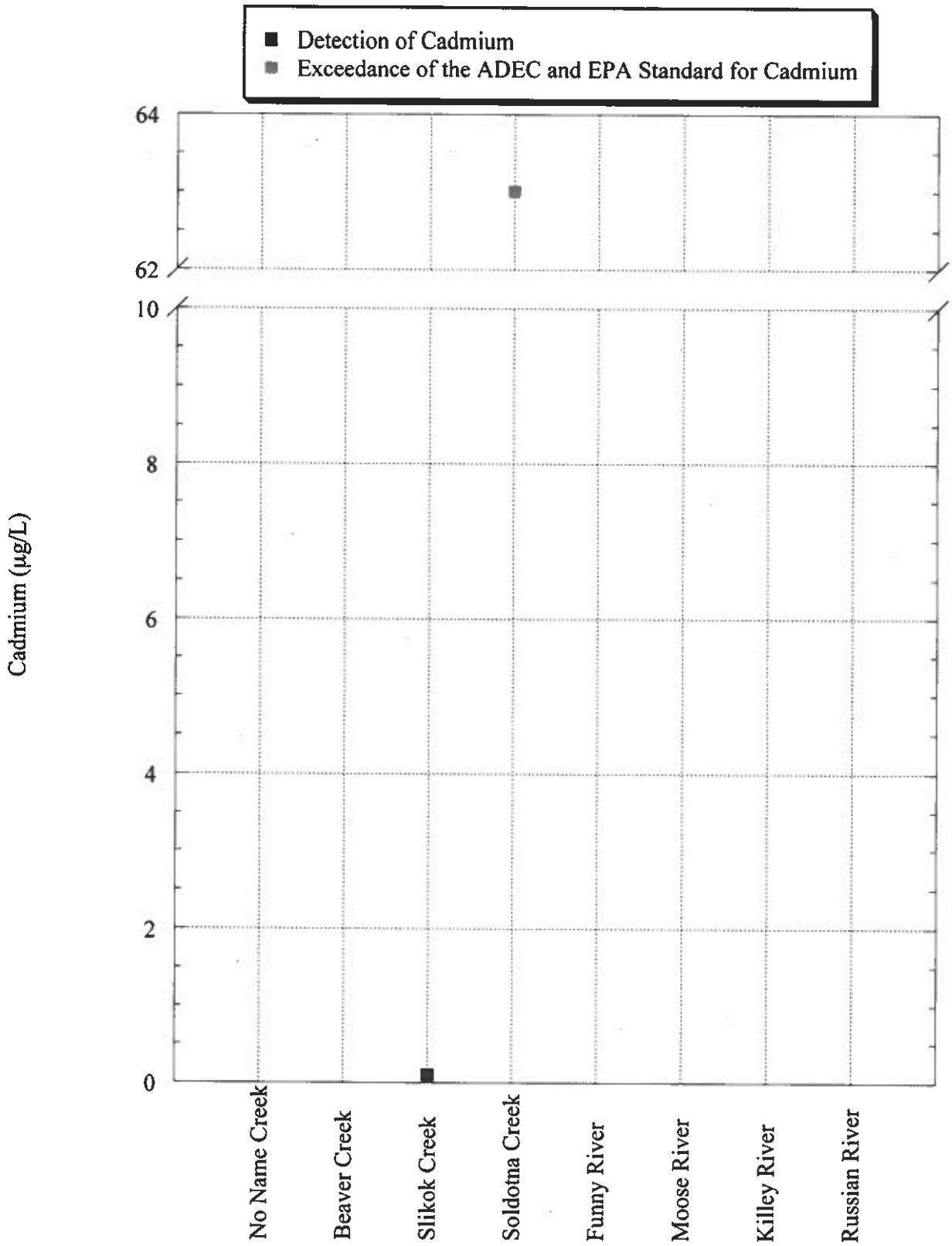

Figure 51: Cadmium sampled in Kenai River tributaries during April 2001 to 2006 and July 2000 to 2006, with hardness-dependent standards and exceedances. 98% of the samples had results below the MRL or MDL, so those results are not included in the graph.

Chromium

In rivers and streams, chromium is an elemental metal that typically exists as hexavalent or trivalent chromium (USEPA, 1980a). Non-natural sources of chromium salts include the metal finishing industry, textile manufacturing, leather tanning, paint, fungicides, and wood preservatives (USEPA, 1980a). At a concentration of 21 μg/L of hexavalent chromium, river algae cannot photosynthesize, and the growth in weight of chinook salmon can be reduced by approximately ten percent at a concentration of 16 μg/L (USEPA, 1980a). Consequently, the ADEC and the USEPA have set the standard for hexavalent chromium at 11 μg/L and at a range of 15.52 μg/L to 230.67 μg/L for trivalent chromium, depending on hardness, for chronically exposed freshwater aquatic life (see Appendix 2) (EPA, 2006; ADEC, 2003). The standard for hexavalent chromium is not displayed on the following graphs because the analysis did not distinguish between trivalent and hexavalent chromium.

None of the medians for the mainstem or the tributaries exceeded the freshwater aquatic life standard for hexavalent or trivalent chromium, although single samples did detect concentrations above the hexavalent chromium standard at Mile 6.5, Mile 10.1, Mile 21, and Beaver Creek. The standard for trivalent chromium was not exceeded at any site along the mainstem or tributaries during any sampling event. The highest concentration of chromium in the mainstem was 25 μg/L at Mile 21 in July 2000, and the lowest levels occurred below the MDL of 0.36 μg/L in April and July of 2004 and April 2005. In the mainstem, Mile 6.5 was the only location with a median above 1 μg/L, which occurred only in April.

Chromium concentrations in the tributaries ranged from a high of 16.4 μg/L at Beaver Creek in July 2006 to less than the MDL of 0.36 μg/L in April and July of 2004 and April 2005. The medians of chromium in the tributaries were all below or equal to 1 μg/L. In the tributaries, higher levels of chromium were reported in July compared to April, while a seasonal trend was difficult to distinguish in the mainstem. More chromium was detected in 2006 than any of the previous years in both the tributaries and the mainstem.

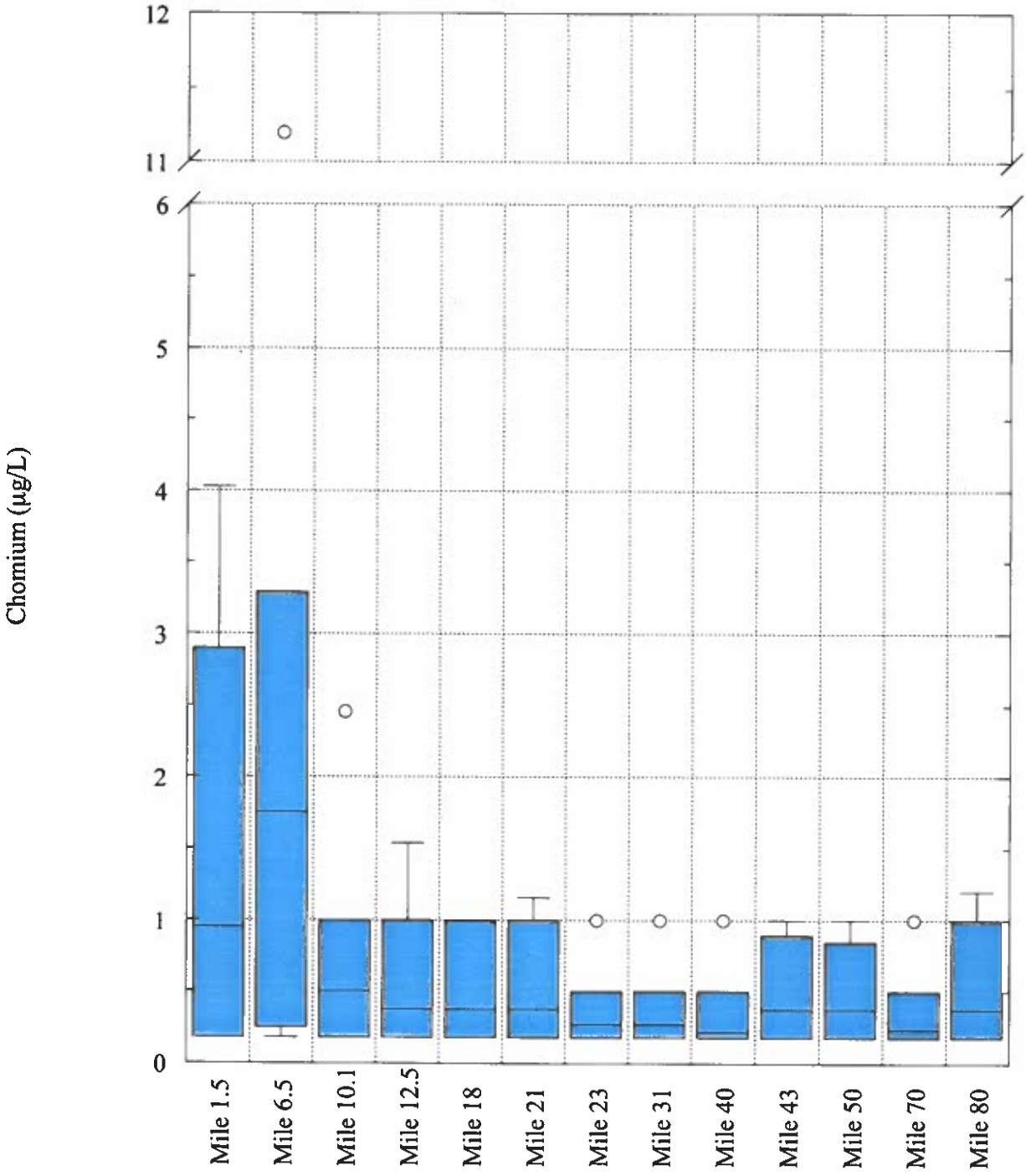

Figure 52: Chromium sampled in the Kenai River mainstem during April 2001 to 2006. Since 78% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

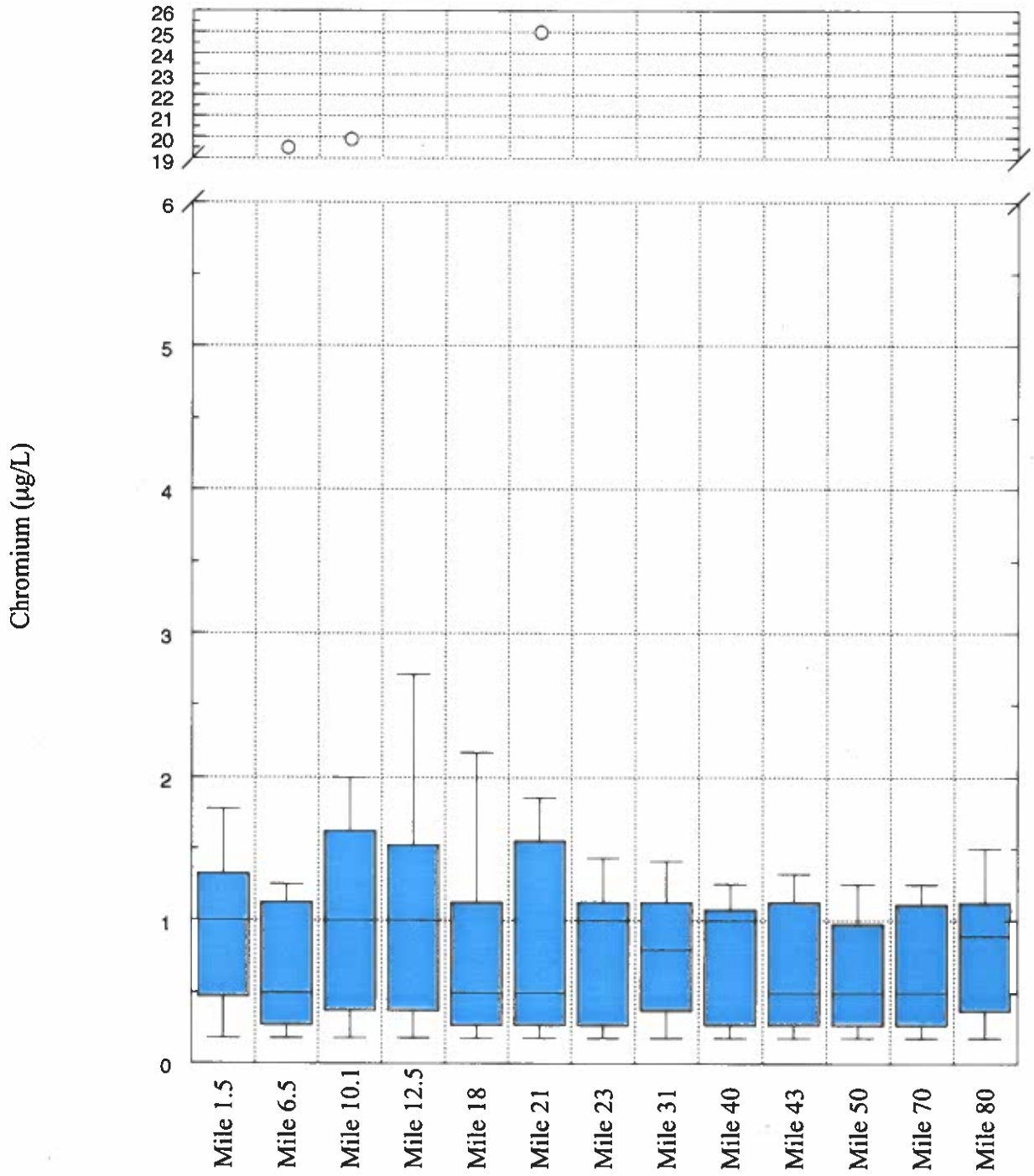

Figure 53: Chromium sampled in the Kenai River mainstem during July 2000 to 2006. Since 76% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

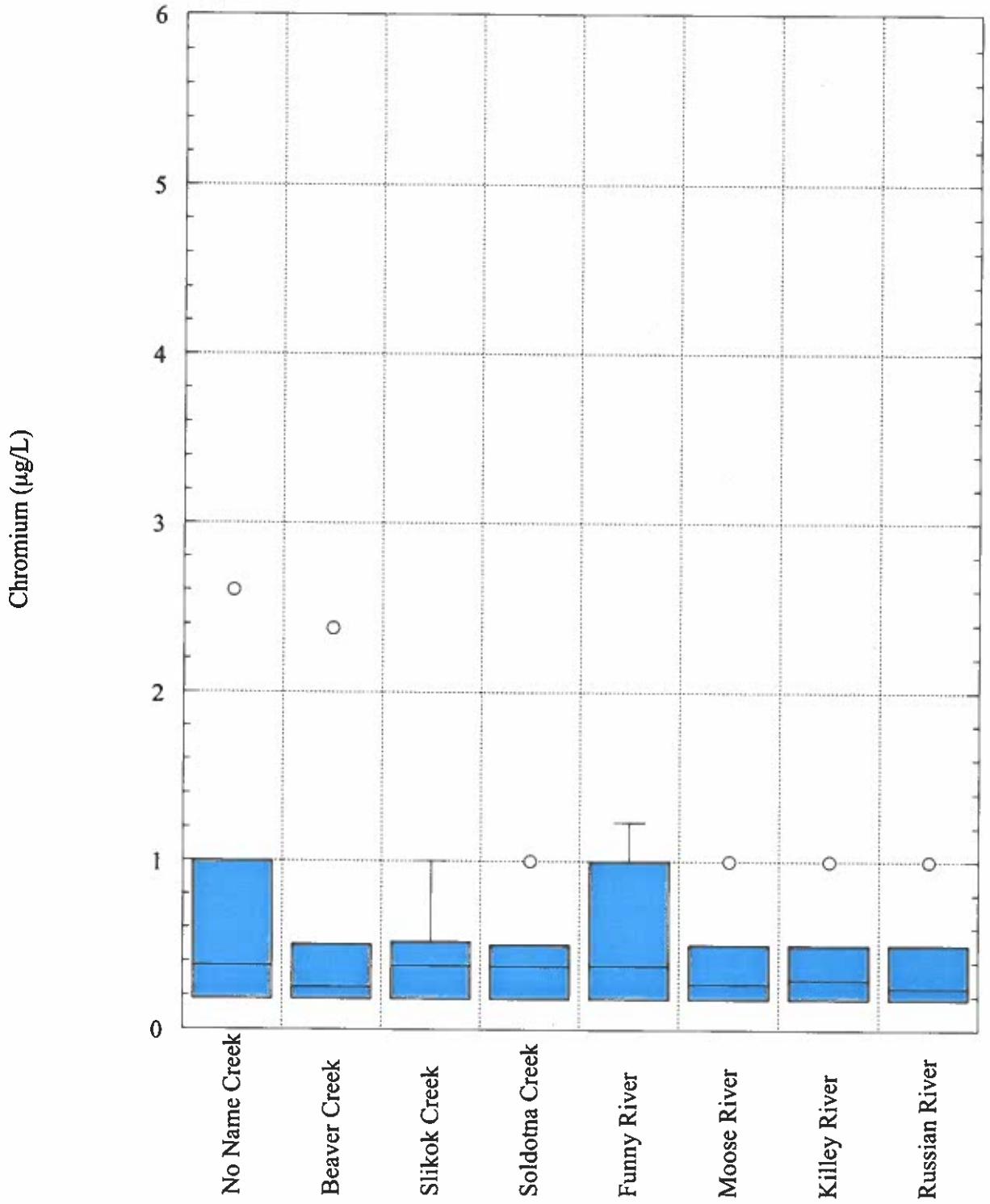

Figure 54: Chromium sampled in Kenai River tributaries during April 2001 to 2006. Since 83% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

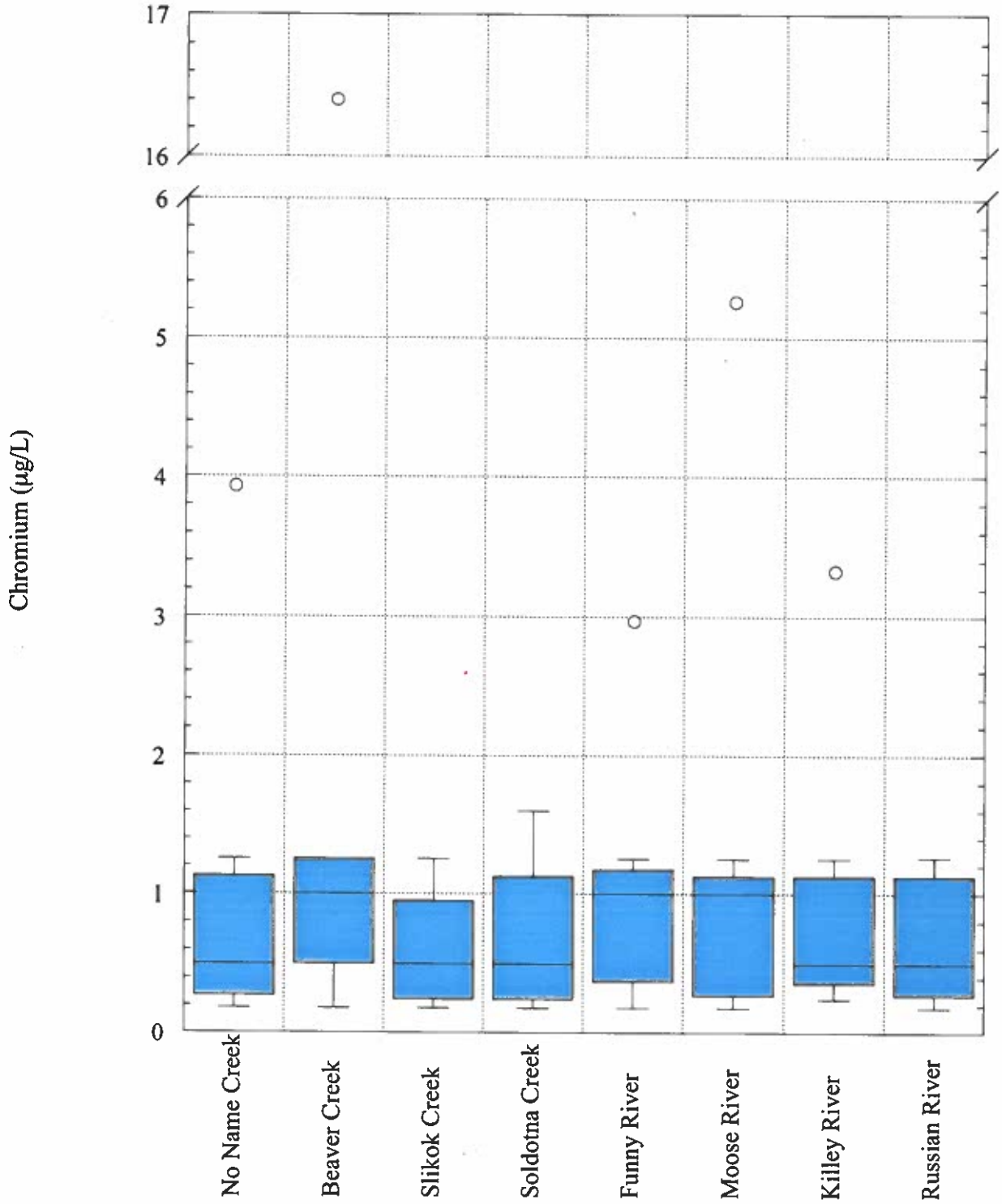

Figure 55: Chromium sampled in Kenai River tributaries during July 2000 to 2006. Since 78% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

Copper

Typically present in surface waters, naturally low concentrations of copper are essential as micronutrients for plants and animals, but elevated levels can be toxic to certain aquatic species (USEPA, 2007). Concentrations of copper can increase in surface waters due to discharges from mining, the leather industry, electrical equipment, and fabricated metal products (USEPA, 2007). The standard for copper, set by the ADEC, ranges from 1.75 µg/L to 29.28 µg/L, depending on hardness, for chronic exposure to aquatic life in freshwater (see Appendix 2) (ADEC 2003).

The highest concentration of copper in the mainstem was reported at 443 µg/L at Mile 21 in July 2000, and the lowest levels were below the MDL of 0.12 µg/L in April and July of 2004 and April 2005. In July, two exceedances occurred at Mile 31, and copper concentrations exceeded the criteria once during individual sampling dates at Mile 6.5, Mile 10.1, Mile 21, Mile 70, and Mile 80. Mile 1.5 had one exceedance in April and one exceedance in July. Higher levels occurred in the estuary, while the lowest concentrations were detected at Mile 40, Mile 43, and Mile 50.

Copper concentrations in the tributaries ranged from 13 µg/L in the Killey River in April 2002 to below the MDL of 0.12 µg/L that occurred in many locations in April and July of 2004 and April 2005. Exceedances in April occurred in single instances in the Killey River and No Name Creek, and single exceedances in July occurred at Russian River, Killey River, and Slikok Creek.

Median concentrations and the number of exceedances were generally higher in July than in April in the tributaries and the mainstem. More detected concentrations occurred in 2006, but this may be partially due to the large fluctuation in MDLs and MRLs. From July 2000 to July 2003, the MDLs or MRLs were higher than the standard, so it is unknown if many of these samples exceeded the standard.

Site	Date	Hardness (mg/L)	Standard (µg/L)	Result Value (µg/L)
Mile 1.5	4/29/03	2449.76	29.28	100
	7/26/05	43.74	4.42	8.44
Mile 6.5	7/25/06	34.12	3.57	4.84
Mile 10.1	7/25/06	29.95	3.2	3.29
Mile 21	7/18/00	29.45	3.15	443
Mile 31	7/18/00	30.07	3.21	9
	7/26/05	28	3.02	21.1
Mile 70	7/18/00	47.8	4.76	6
Mile 80	7/18/00	33.92	3.56	5
No Name Creek	4/26/05	16.96	1.97	8.21
Slikok Creek	7/20/04	49.6	4.92	12.1
Killey River	4/10/02	26.51	2.88	13
	7/20/04	14.9	1.76	8.42
Russian River	7/18/00	39.41	4.04	7

Table 2: Summary of hardness-dependent exceedances for copper.

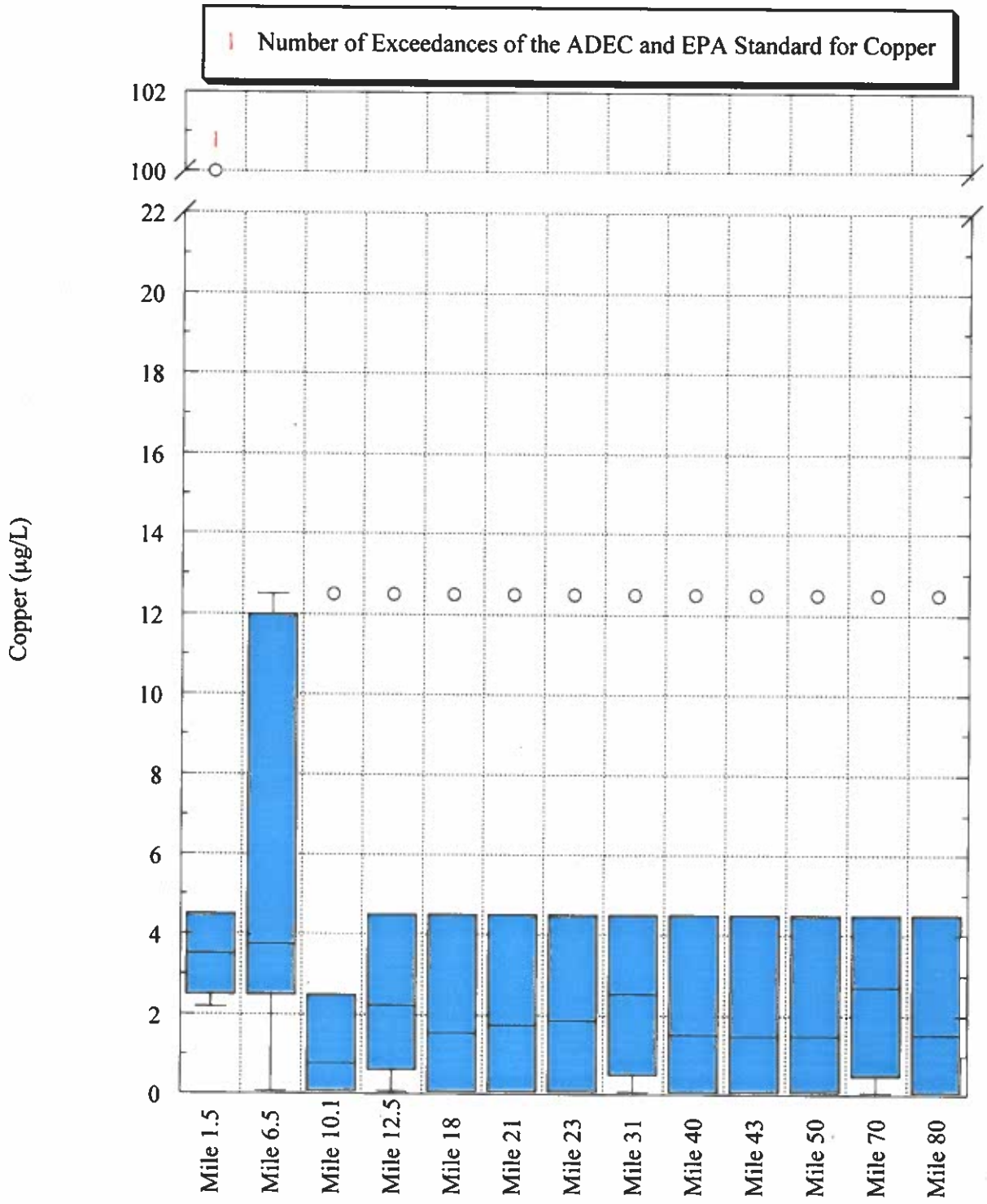

Figure 56: Copper sampled in the Kenai River mainstem during April 2001 to 2006, with hardness-dependent standards and exceedances. Since 74% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

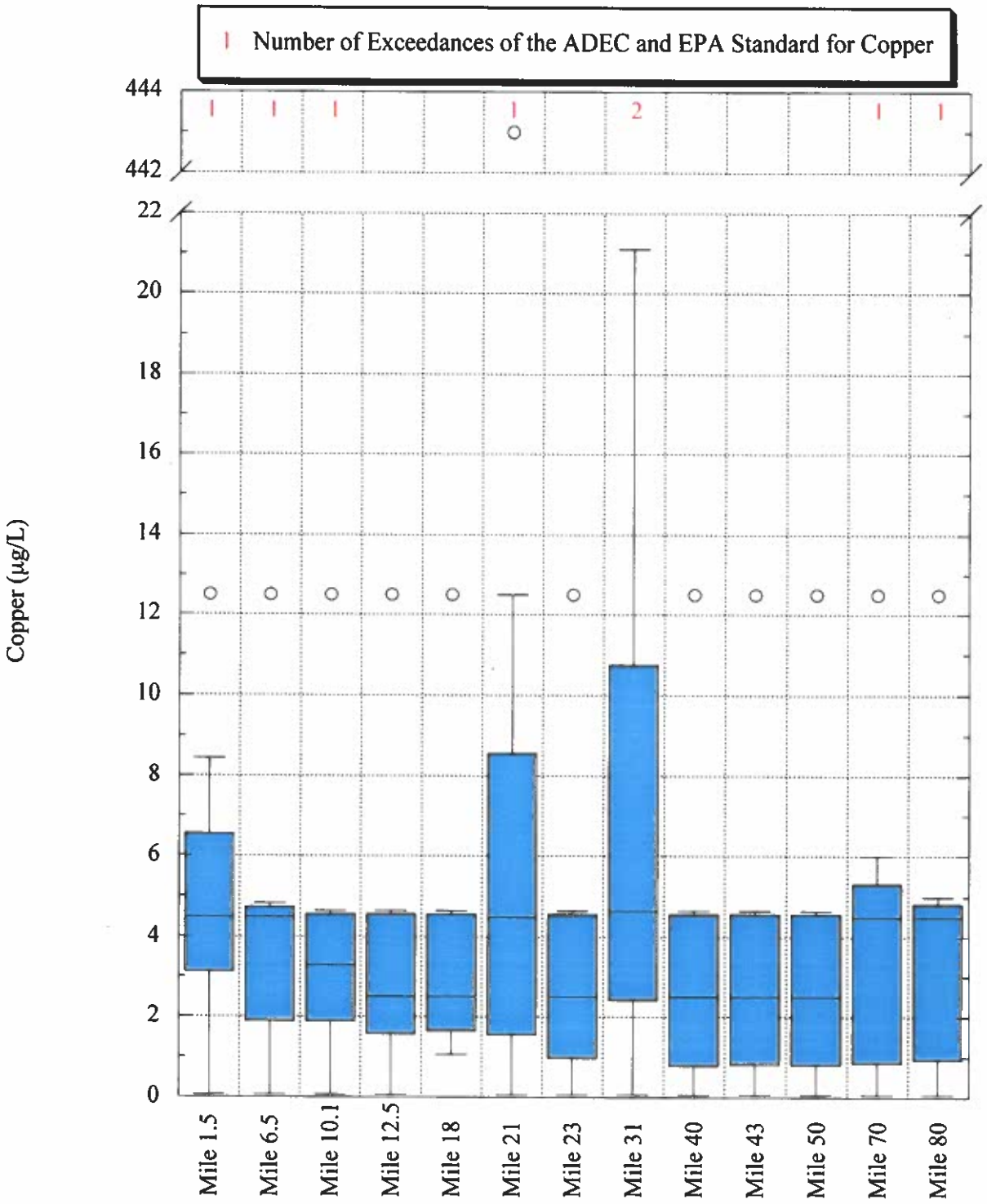

Figure 57: Copper sampled in the Kenai River mainstem during July 2000 to 2006, with hardness-dependent standards and exceedances. Since 78% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

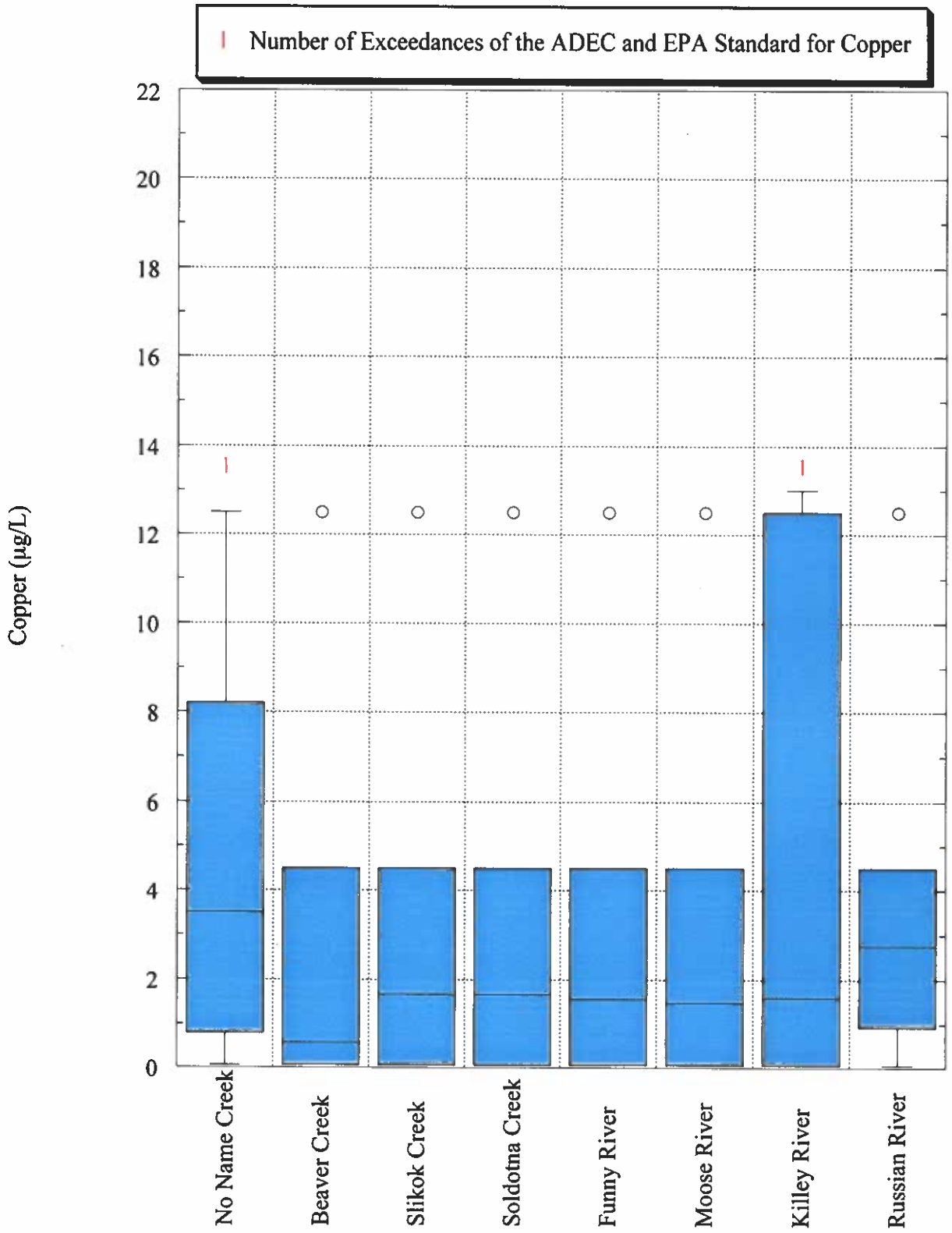

Figure 58: Copper sampled in Kenai River tributaries during April 2001 to 2006, with hardness-dependent standards and exceedances. Since 77% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

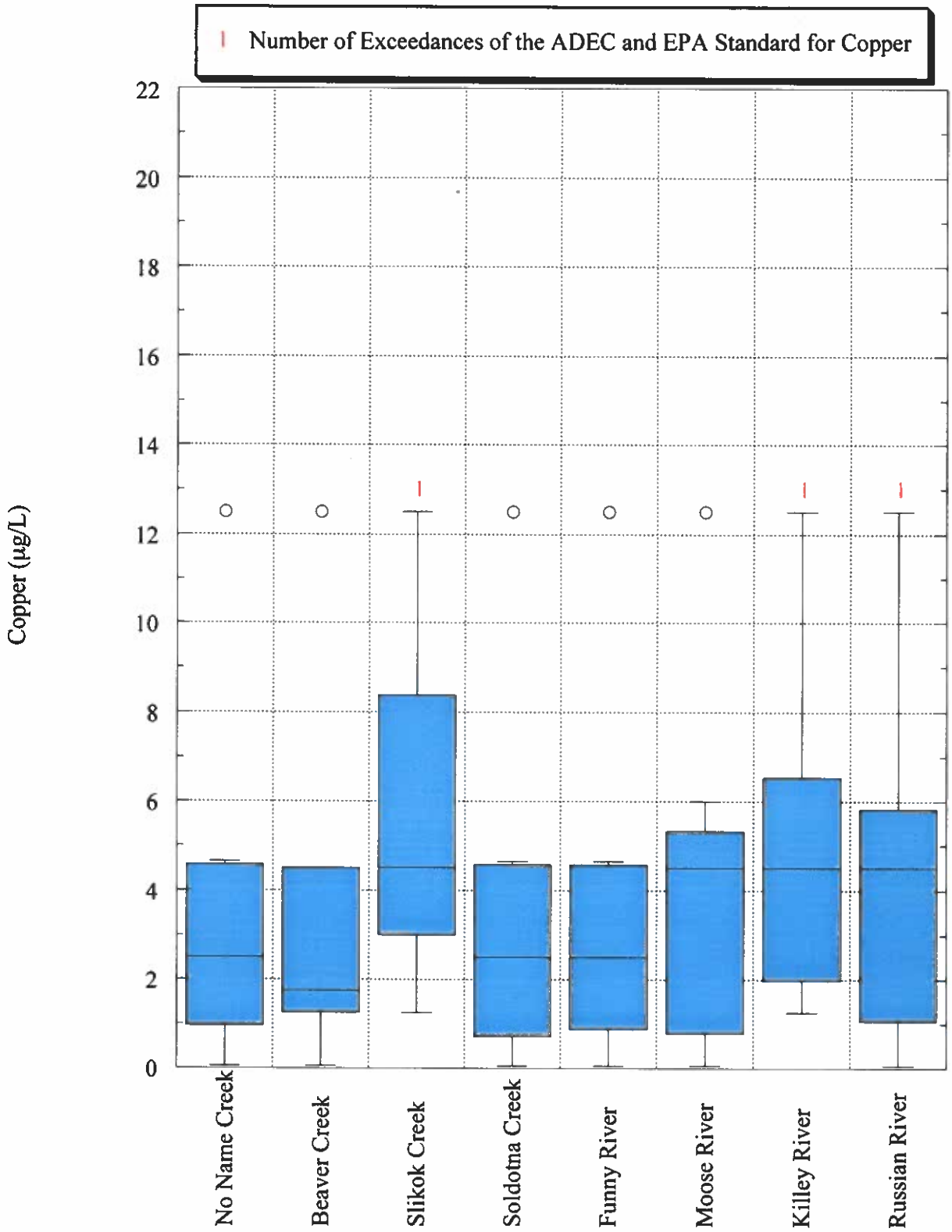

Figure 59: Copper sampled in Kenai River tributaries during July 2000 to 2006, with hardness-dependent standards and exceedances. Since 80% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

Lead

Metallic lead and lead minerals are not classified as soluble in water, but they can be solubilized by certain acids, and a selection of industrial lead compounds are water soluble upon production (USEPA, 1980b). Lead is a component in electroplating, metallurgy, construction materials, plastic, and electronic equipment, and it can enter surface water through precipitation, dust, street runoff, and wastewater discharges (USEPA, 1980b). Exposure to lead can cause delayed embryonic development, reduced growth, and suppressed reproduction in fish, and spinal deformities in rainbow trout fry (USEPA, 1980b). Determined by the ADEC and the USEPA, the standard for lead ranges from 0.300 to 10.94 µg/L, depending on hardness, for the chronic exposure of aquatic life in freshwater (see Appendix 2) (ADEC, 2003; USEPA, 2006).

The highest concentration of lead in the mainstem was 468 µg/L and was sampled at Mile 31 during July 2005, and the lowest levels occurred below the MDL of 0.030 µg/L at many locations in April and July of 2006. Exceedances occurred only in July, when lead exceeded the criteria twice at Mile 21, and once at Mile 1.5, Mile 6.5, Mile 10.1, Mile 31, Mile 40, and Mile 80. Mile 1.5 and Mile 6.5 exhibited the most instances of detection in April and July. At Mile 12.5, Mile 18, Mile 43, Mile 50, and Mile 70, no concentrations of lead were ever reported.

The concentration of lead in the tributaries ranged from a high of 3.92 µg/L at Beaver Creek in July 2006, and the lowest levels were below the MDL of 0.030 µg/L at many locations in April and July of 2006. The Killey River and Beaver Creek each exceeded the criteria on one occasion in July. No lead was ever reported in Slikok Creek, Soldotna Creek, Funny River, and Russian River. More instances of detection occurred in April and July of 2006 than any previous years in both the tributaries and the mainstem. The MDLs were higher than the standard from July 2000 through July 2003 and July 2005, so it is unknown whether exceedances occurred in many of these samples.

Site	Date	Hardness (mg/L)	Standard (µg/L)	Result Value (µg/L)
Mile 1.5	7/26/05	43.74	1.01	2.7
Mile 6.5	7/25/06	34.12	0.77	19
Mile 10.1	7/25/06	29.95	0.66	1.7
Mile 21	7/18/00	29.45	0.65	106
	7/25/06	29.95	0.66	1.9
Mile 31	7/26/05	28	0.61	468
Mile 40	7/24/01	28.87	0.64	1.5
Mile 80	7/16/02	31.12	0.69	4
Beaver Creek	7/25/06	67.04	1.62	3.9
Killey River	7/20/04	14.9	0.3	1.2

Table 3: Summary of hardness-dependent exceedances for lead.

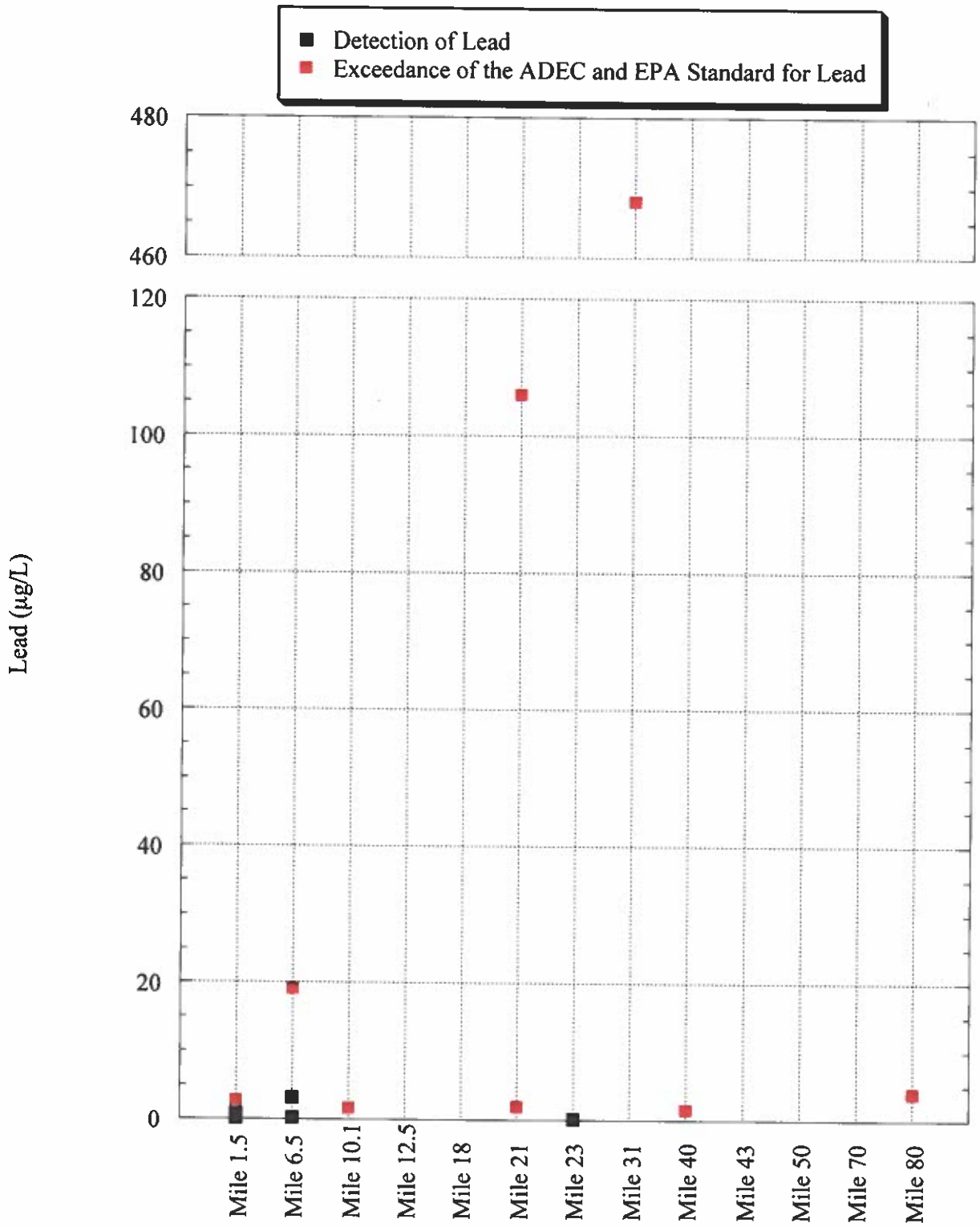

Figure 60: Lead sampled in the Kenai River mainstem during April 2001 to 2006 and July 2000 to 2006, with hardness-dependent standards and exceedances. 92% of the samples had results below the MRL or MDL, so those results are not included in the graph.

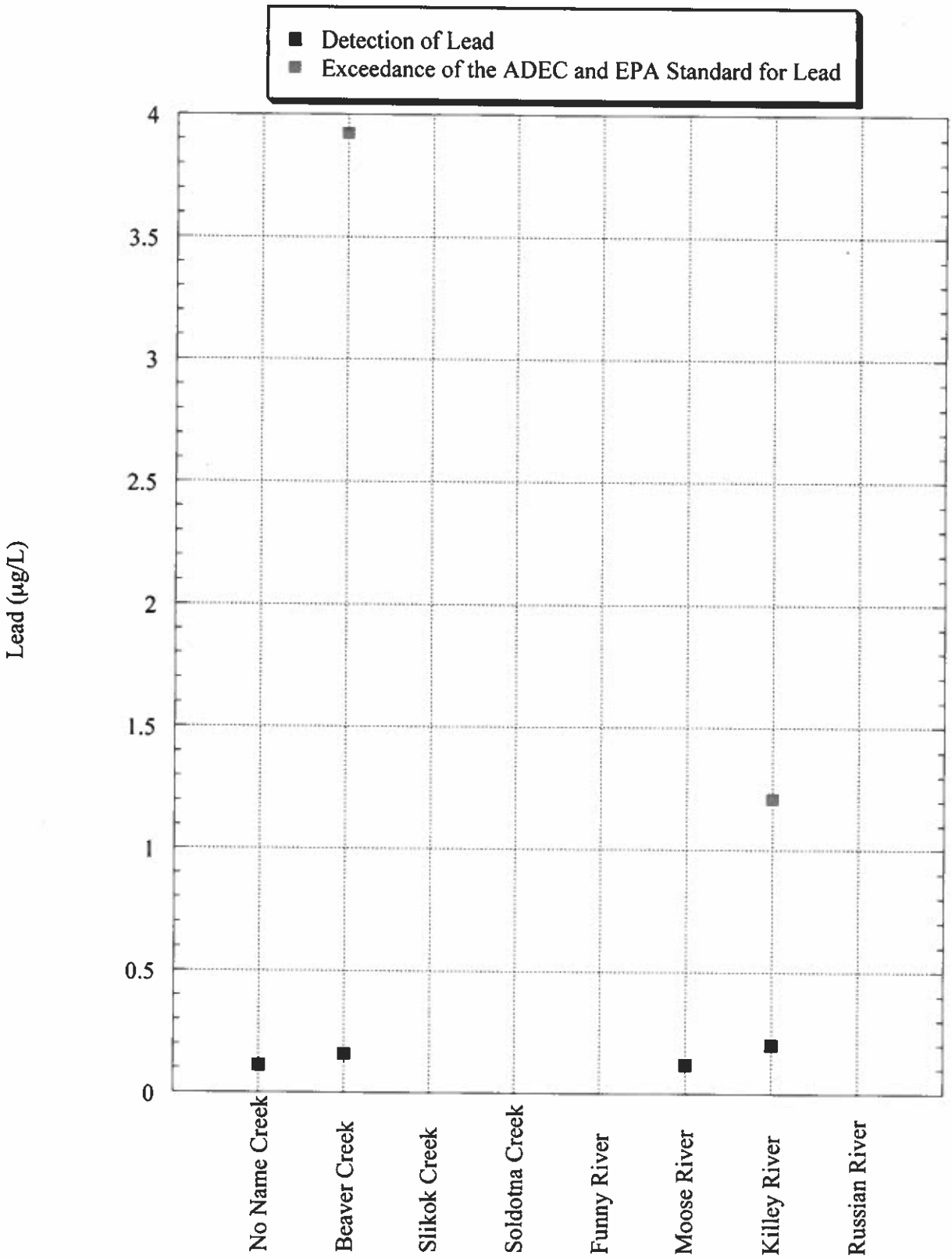

Figure 61: Lead sampled in the Kenai River tributaries during April 2001 to April 2006 and July 2000 to 2006, with hardness-dependent standards and exceedances. 94% of the samples had results below the MRL or MDL, so those results are not included in the graph.

Zinc

Zinc enters surface water naturally through the weathering of bedrock and is an essential micronutrient for all plants and animals (USEPA, 1987). Additional zinc can enter surface water because it is widely used for galvanizing steel, as an alloy, in rubber, and in paint (USEPA, 1987). The ADEC and the USEPA have set the standard for zinc ranging from 23.4 to 382.4 μg/L, depending on hardness, for the chronic exposure of freshwater aquatic life (see Appendix 2) (ADEC, 2003; USEPA, 2006).

The highest level recorded in the mainstem was 2900 μg/L in July 2000 at Mile 21, and the lowest level occurred at Mile 31 in July 2006 with a concentration of 0.521 μg/L. In April, exceedances occurred once at Mile 18, Mile 23, Mile 31, and Mile 43. More exceedances in the mainstem occurred during July with two exceedances each at Mile 6.5, Mile 10.1, and Mile 31. Additionally, single instances of exceedance in July occurred at Mile 1.5, Mile 12.5, Mile 18, Mile 21, Mile 43, Mile 50, and Mile 70. The only two sites along the mainstem that did not experience exceedances were Mile 40 and Mile 80. The Kenai River estuary had higher median concentrations than the rest of the river in both July and April. Relatively higher medians also occurred at Mile 31, Mile 21, and Mile 10.1 in April and July. Generally, higher median concentrations were observed in April, but more exceedances occurred in July.

Zinc concentrations in the tributaries ranged from a high of 122 μg/L in No Name Creek during April 2002 to a low of 0.831 μg/L in Moose River during July 2006. In April, exceedances of the criteria occurred five times at No Name Creek and four times at Slikok Creek. In the other tributaries, exceedances occurred twice at Beaver Creek and Funny River and once at Soldotna Creek and the Killey River during April. In July, exceedances occurred twice at Funny River and the Killey River, and No Name Creek and Slikok Creek also experienced one exceedance. No exceedances occurred in the Moose River or Russian River in April or July. No Name Creek had the highest median of all the tributaries, with Beaver Creek and Slikok Creek close behind in April and July. In the tributaries, zinc concentrations and the number of exceedances were greater in April. In April and July 2003, the MRL of 50 μg/L was higher than most of the standards, so incidences of exceedance are unknown in many of these samples.

Site	Date	Hardness (mg/L)	Standard (µg/L)	Result Value (µg/L)
Mile 1.5	7/22/03	35.68	49.33	65
Mile 6.5	7/22/03	32.79	45.93	55
	7/25/06	34.12	47.5	52.1
Mile 10.1	7/22/03	28.5	40.78	51
	7/25/06	29.95	42.53	60
Mile 12.5	7/20/04	29.3	41.76	55.7
Mile 18	7/20/04	29.74	42.28	59.4
	4/26/05	35.17	48.73	51.1
Mile 21	7/18/00	29.45	41.93	2900
Mile 23	4/27/04	30.75	43.49	45.2
Mile 31	4/27/04	30.82	43.57	45.7
	7/20/04	29.86	42.43	44.1
	7/26/05	28	40.18	51.2
Mile 43	7/16/02	27.13	39.11	40
	4/27/04	28.68	41.01	42.3
Mile 50	7/24/01	27.97	40.14	48.5
Mile 70	7/16/02	31.58	44.48	50
No Name Creek	4/11/01	35.01	48.55	84
	4/10/02	42.03	56.68	122
	7/22/03	50.58	66.31	75
	4/27/04	28.84	41.2	61.9
	4/26/05	16.96	26.27	63.3
	4/25/06	33.29	46.52	52.2
Beaver Creek	4/26/05	32.38	45.44	59.1
	4/25/06	31.67	44.59	46.4
Slikok Creek	4/11/01	18.74	28.59	41
	7/24/01	47.29	62.63	69.4
	4/29/03	41.47	56.04	69
	4/27/04	23.49	34.62	39.5
	4/26/05	25.11	36.64	47.9
Soldotna Creek	4/26/05	38.4	52.51	58.6
Funny River	4/10/02	43.05	57.84	70
	7/16/02	31.93	44.91	51
	4/29/03	31.58	44.49	52
	7/20/04	37.39	51.34	59.1
Killey River	7/24/01	15.25	24.01	34.4
	4/27/04	25.79	37.48	37.9
	7/20/04	14.9	23.54	49.5

Table 4: Summary of hardness-dependent exceedances for zinc.

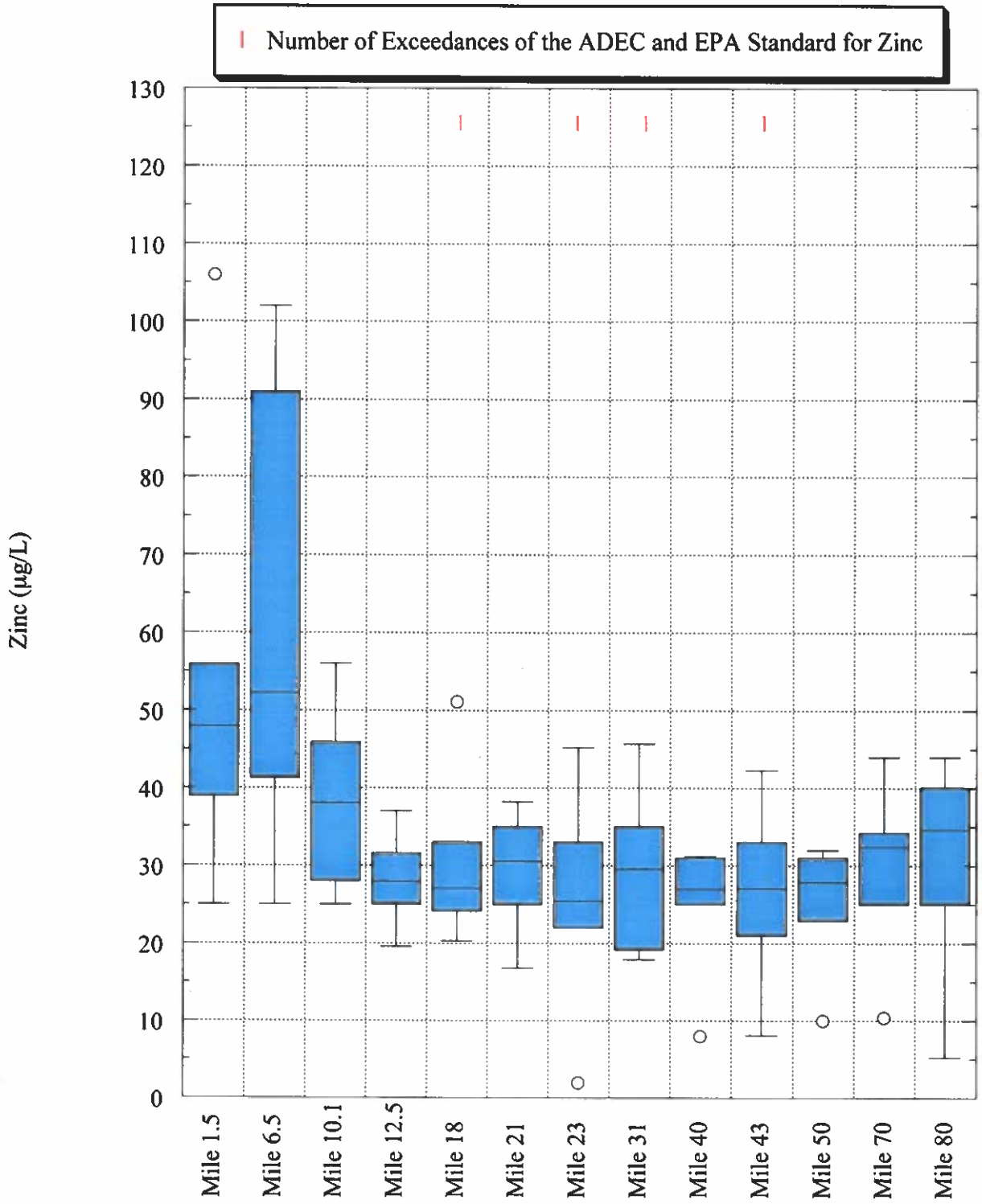

Figure 62: Zinc sampled in the Kenai River mainstem during April 2001 to 2006. Since 17% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

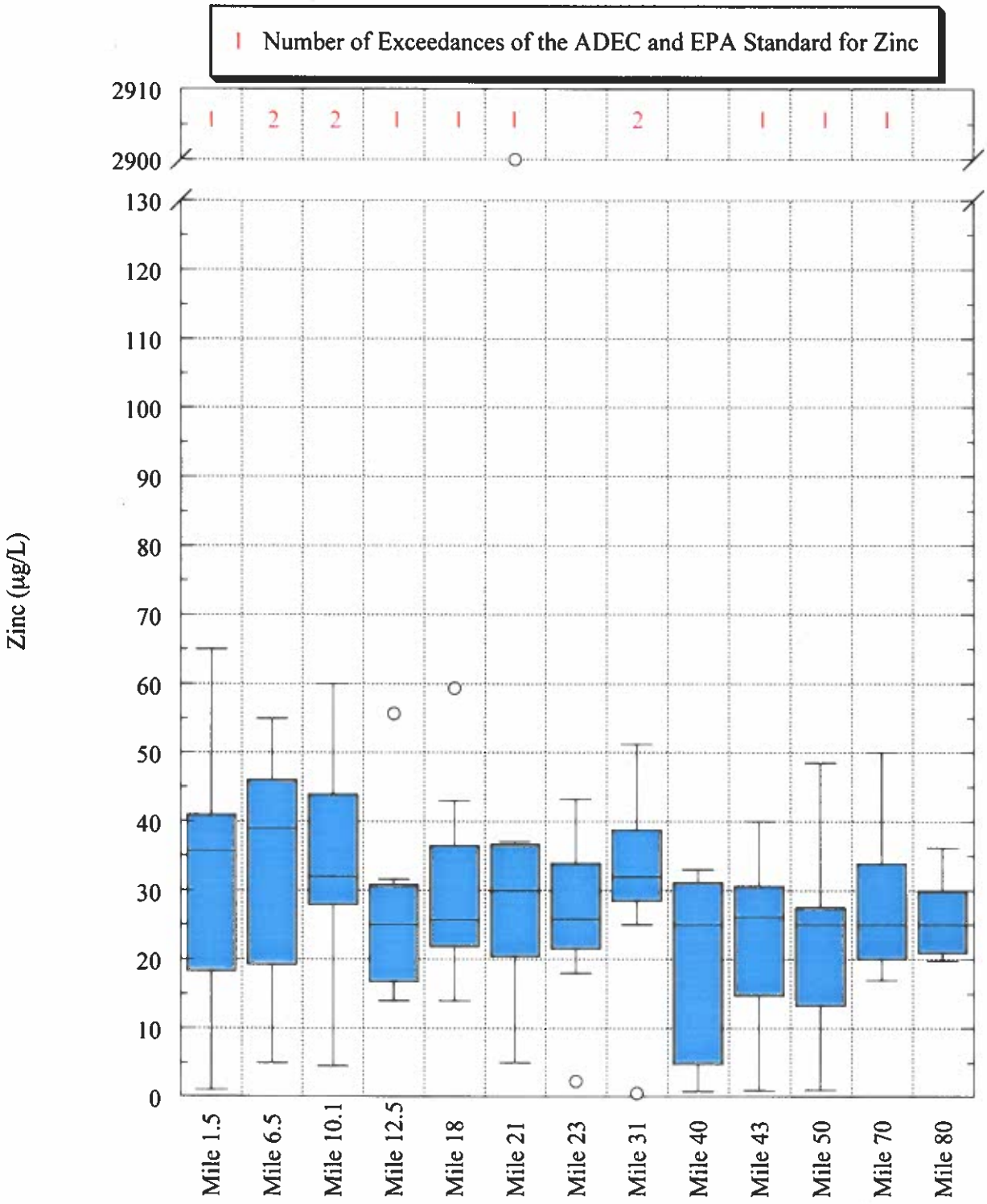

Figure 63: Zinc sampled in the Kenai River mainstem during July 2000 to 2006. Since 19% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

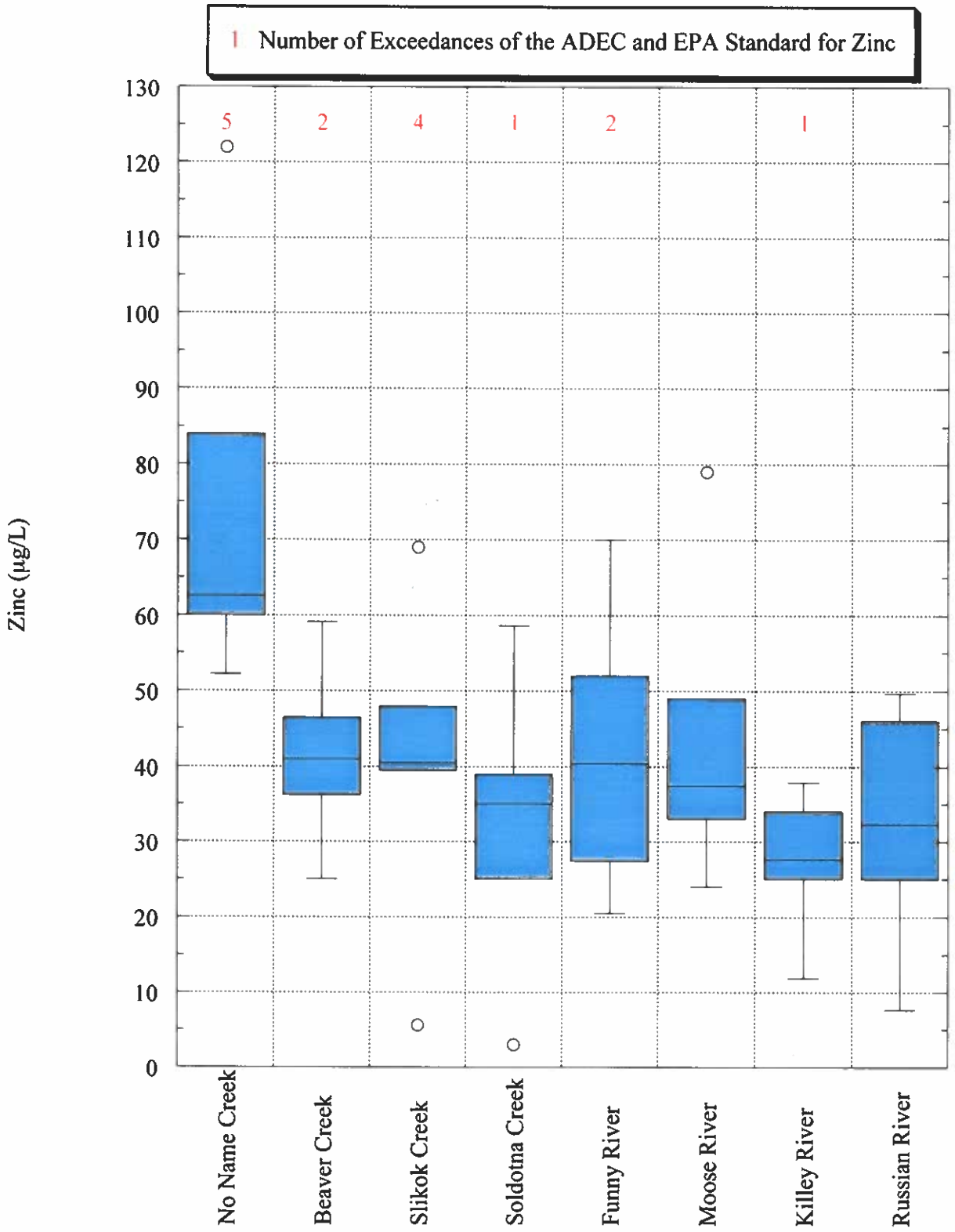

Figure 64: Zinc sampled in Kenai River tributaries during April 2001 to 2006. Since 9% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

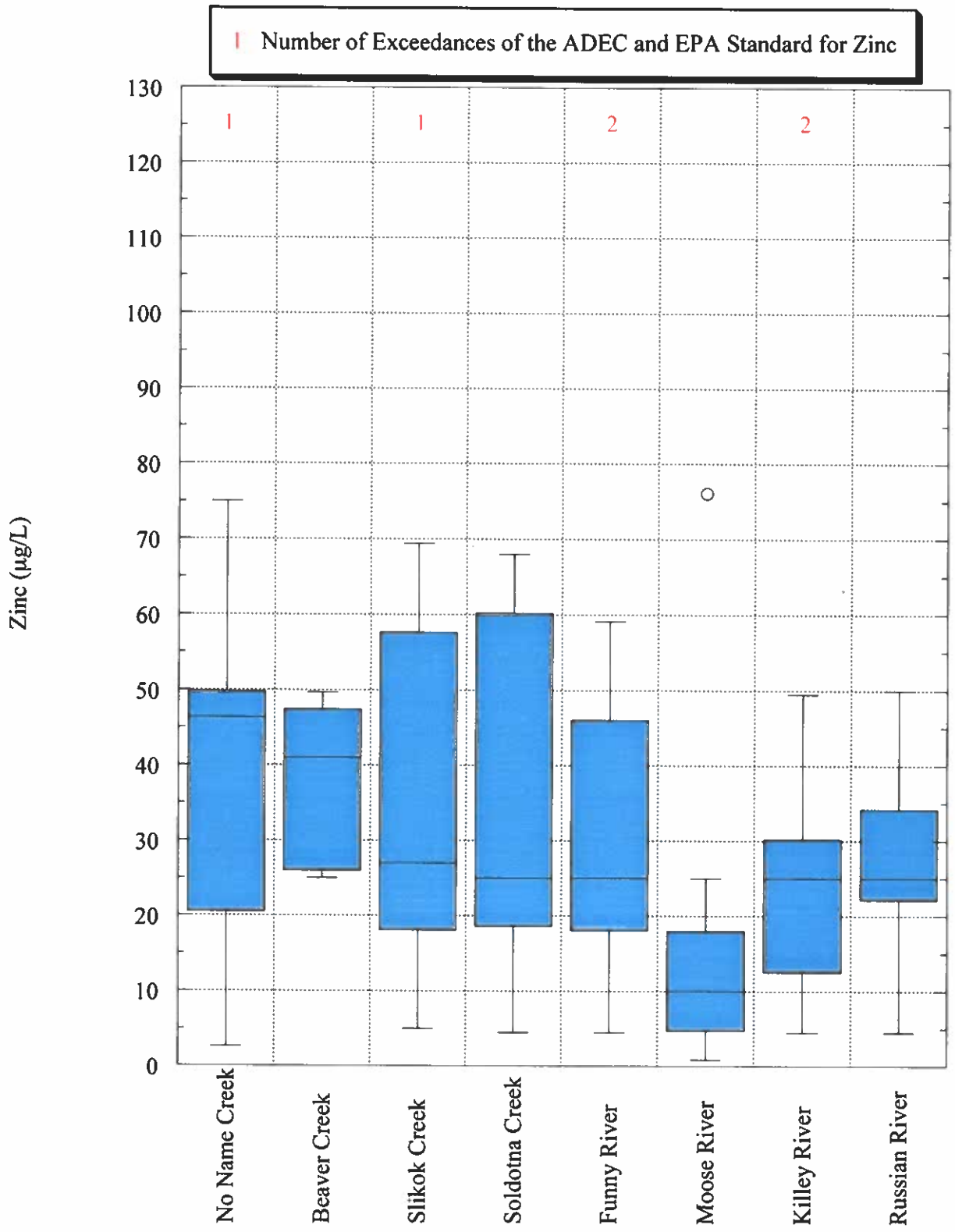

Figure 65: Zinc sampled in Kenai River tributaries during July 2000 to 2006. Since 26% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

Calcium

Both plants and animals require calcium as an essential element, and calcium is important to water quality because it is directly linked to the hardness of water (Glass, 2001). There is not an ADEC or USEPA standard for the chronic exposure of freshwater aquatic life to calcium.

The highest value in the mainstem occurred during April 2002 at Mile 1.5 with a concentration of 107.65 mg/L, and the lowest value was 8.83 mg/L at Mile 50 in April 2004. Relatively high medians in April and July occurred at Mile 1.5, Mile 6.5, Mile 70, and Mile 80. In April and July, the low median at Mile 43 may be linked to the low calcium concentration in the Killey River. Russian River had high levels of calcium and could be the cause of elevated concentrations at Mile 70. In the mainstem, calcium levels were higher in April than in July.

In the tributaries, the lowest concentration was 3.3 mg/L sampled from the Killey River during July 2003, and the highest concentration occurred in the Moose River at 25.7 mg/L during July 2004. In April and July, the Moose River and Soldotna Creek had relatively high medians, and the Killey River had relatively low medians. In April, the tributaries had concentrations lower than the mainstem, but during July, most of the tributaries had higher levels of calcium than the mainstem. The tributaries had higher levels of calcium in July than in April, excluding Russian River and the Killey River. Soldotna Creek exhibited the largest seasonal difference in medians, changing from near 11 mg/L in April to around 22 mg/L in July.

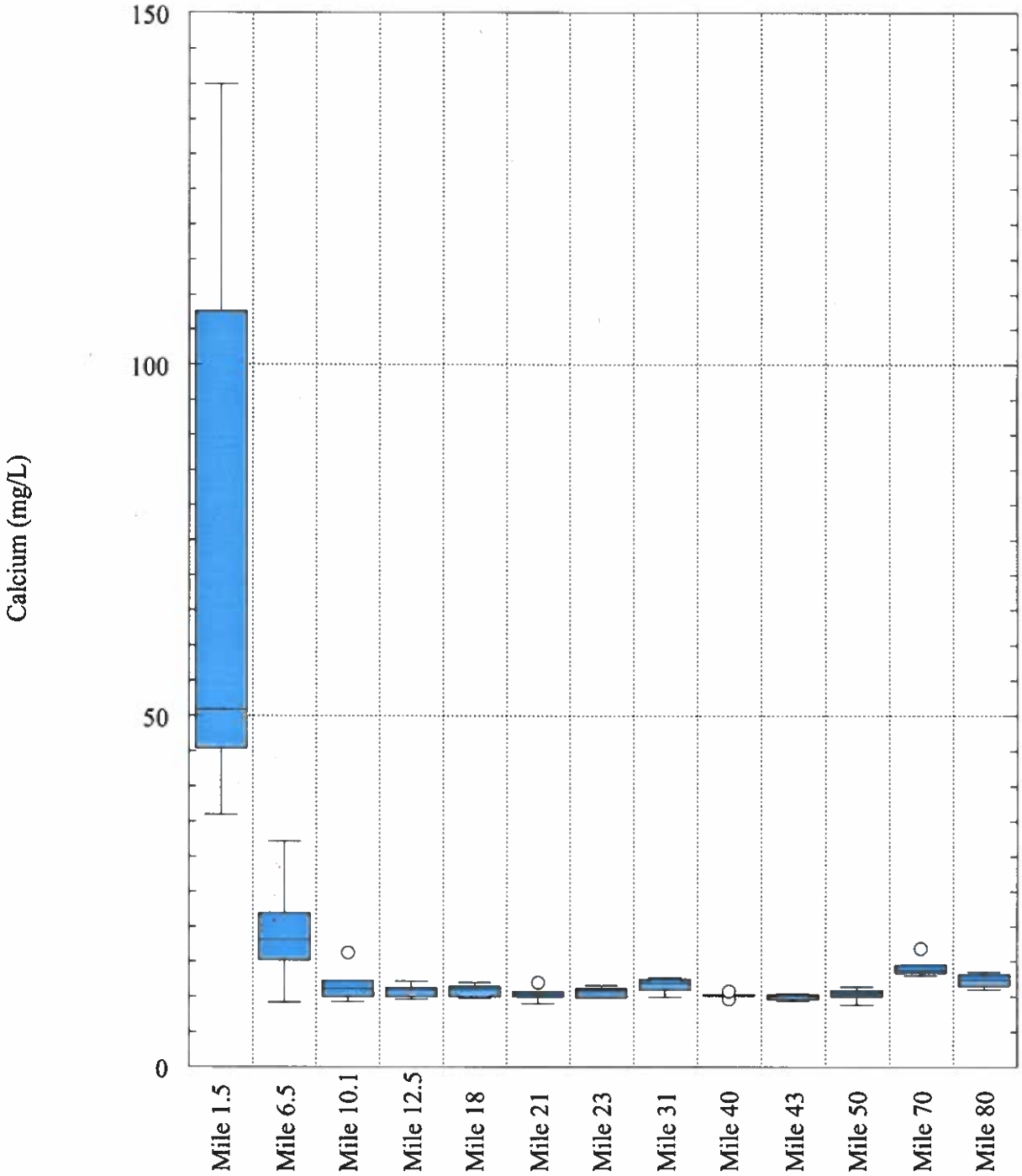

Figure 66: Calcium sampled in the Kenai River mainstem during April 2001 to 2006.

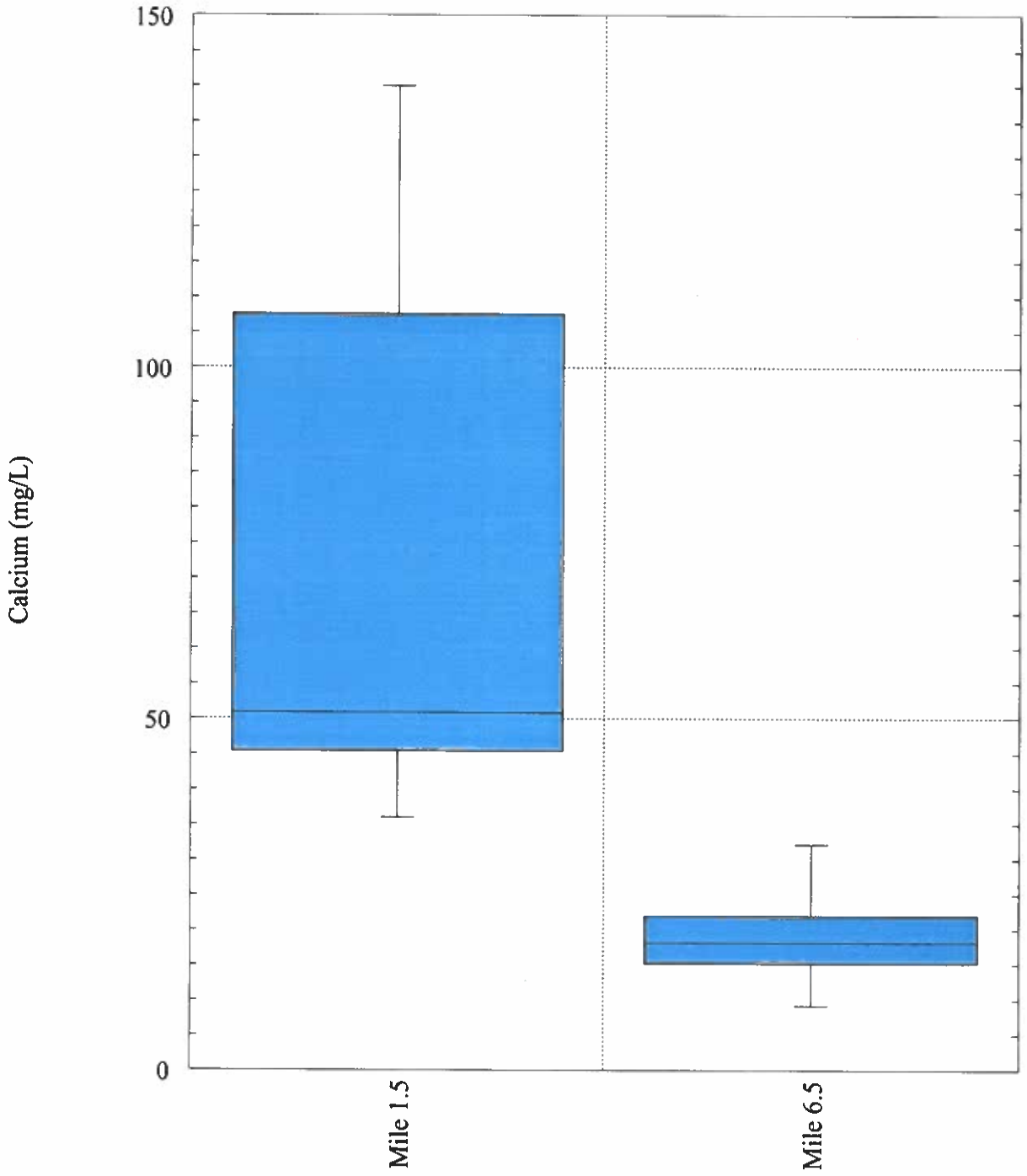

Figure 67: Calcium sampled in the Kenai River estuary during April 2001 to 2006.

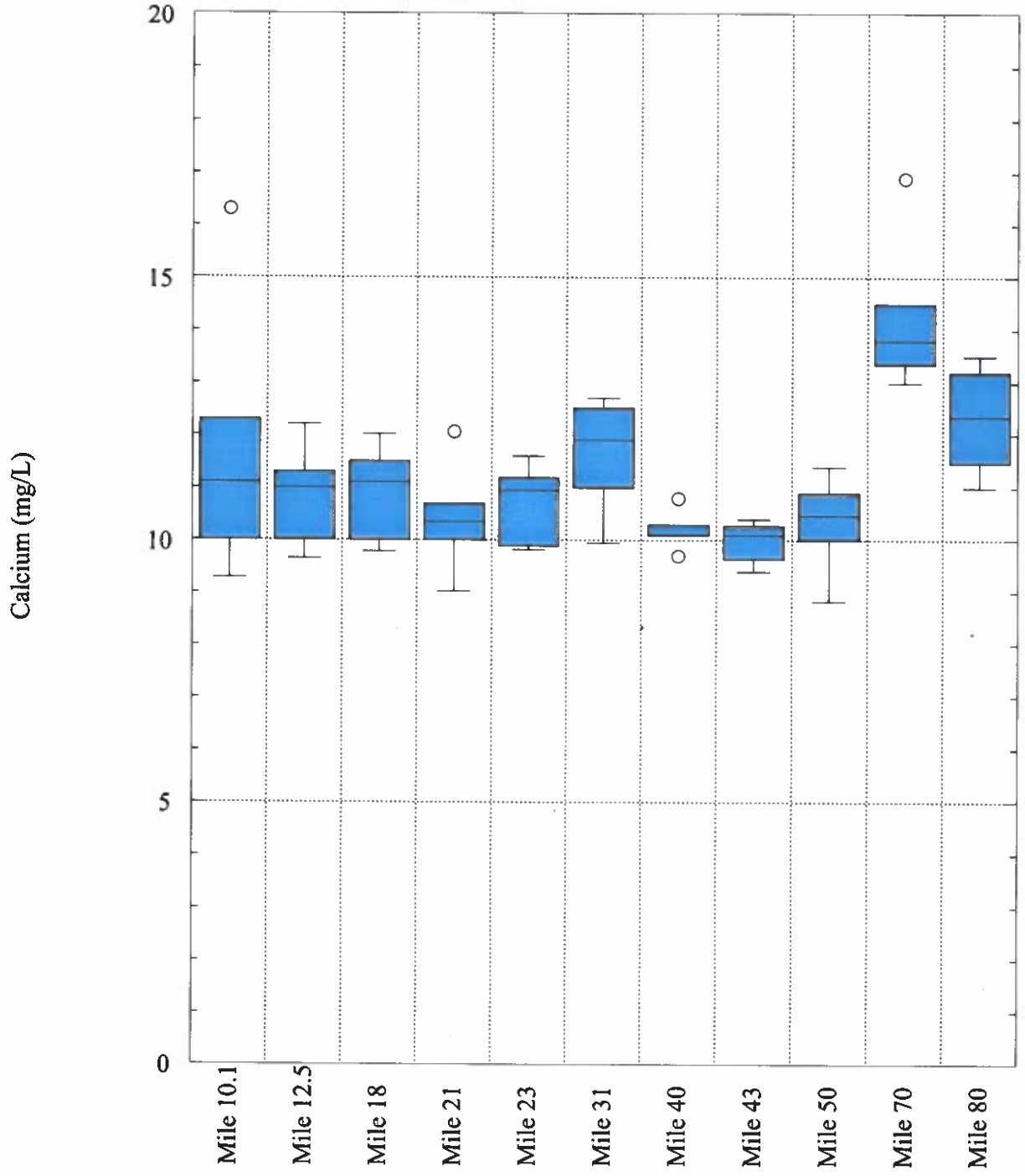

Figure 68: Calcium sampled in the Lower, Middle, and Upper Kenai River mainstem (excluding the Kenai River estuary) during April 2001 to 2006.

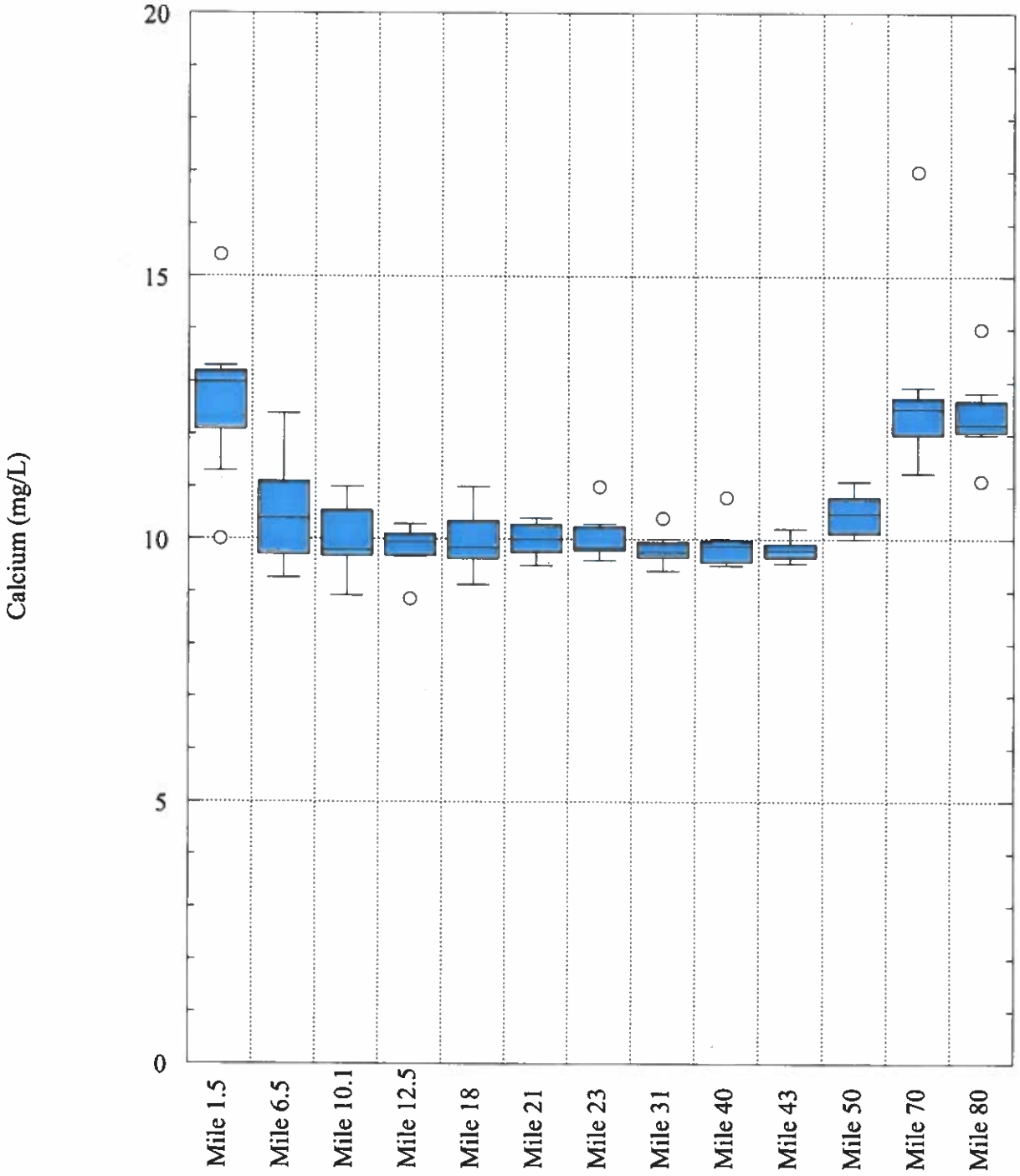

Figure 69: Calcium sampled in the Kenai River mainstem during July 2000 to 2006.

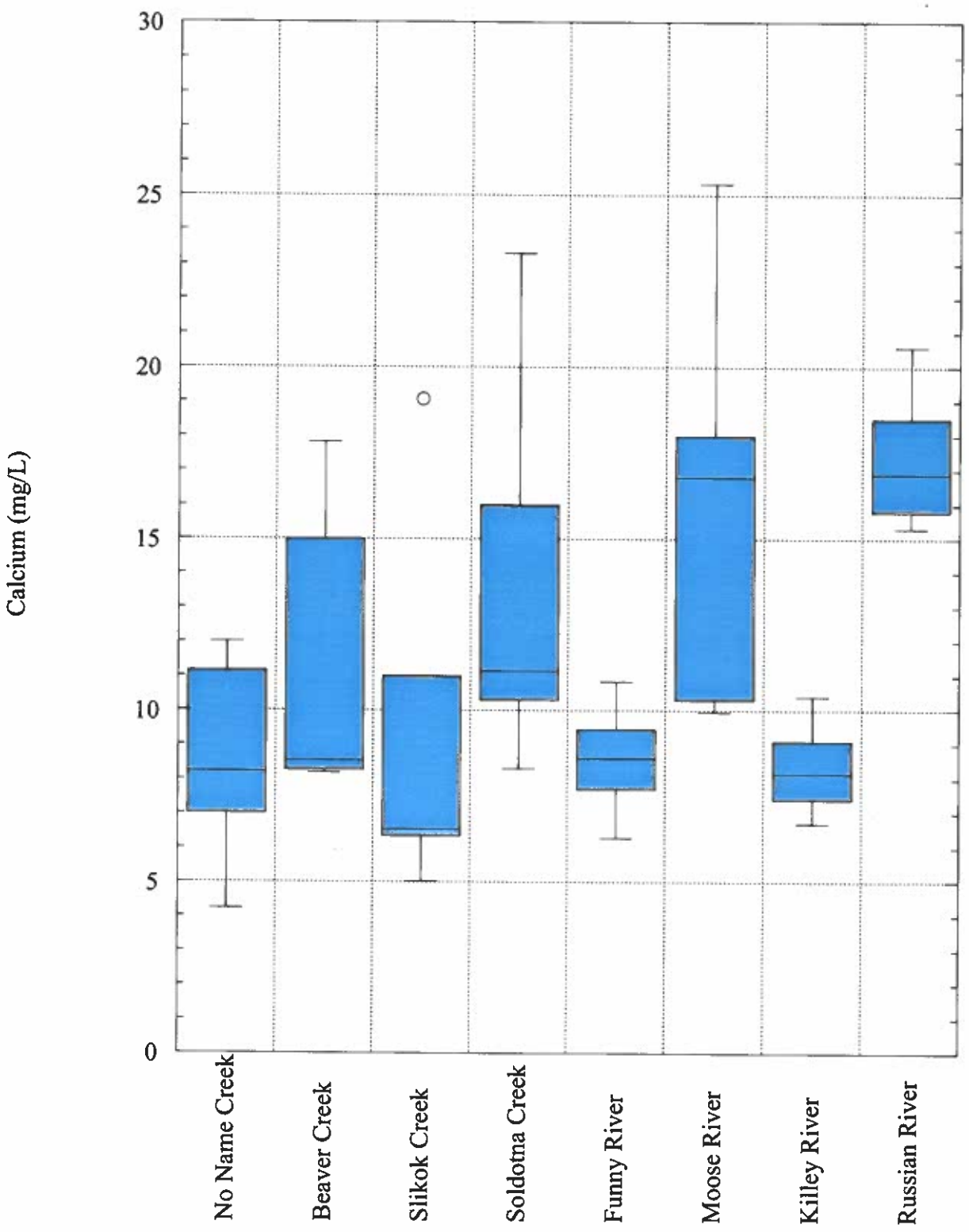

Figure 70: Calcium sampled in Kenai River tributaries during April 2001 to 2006.

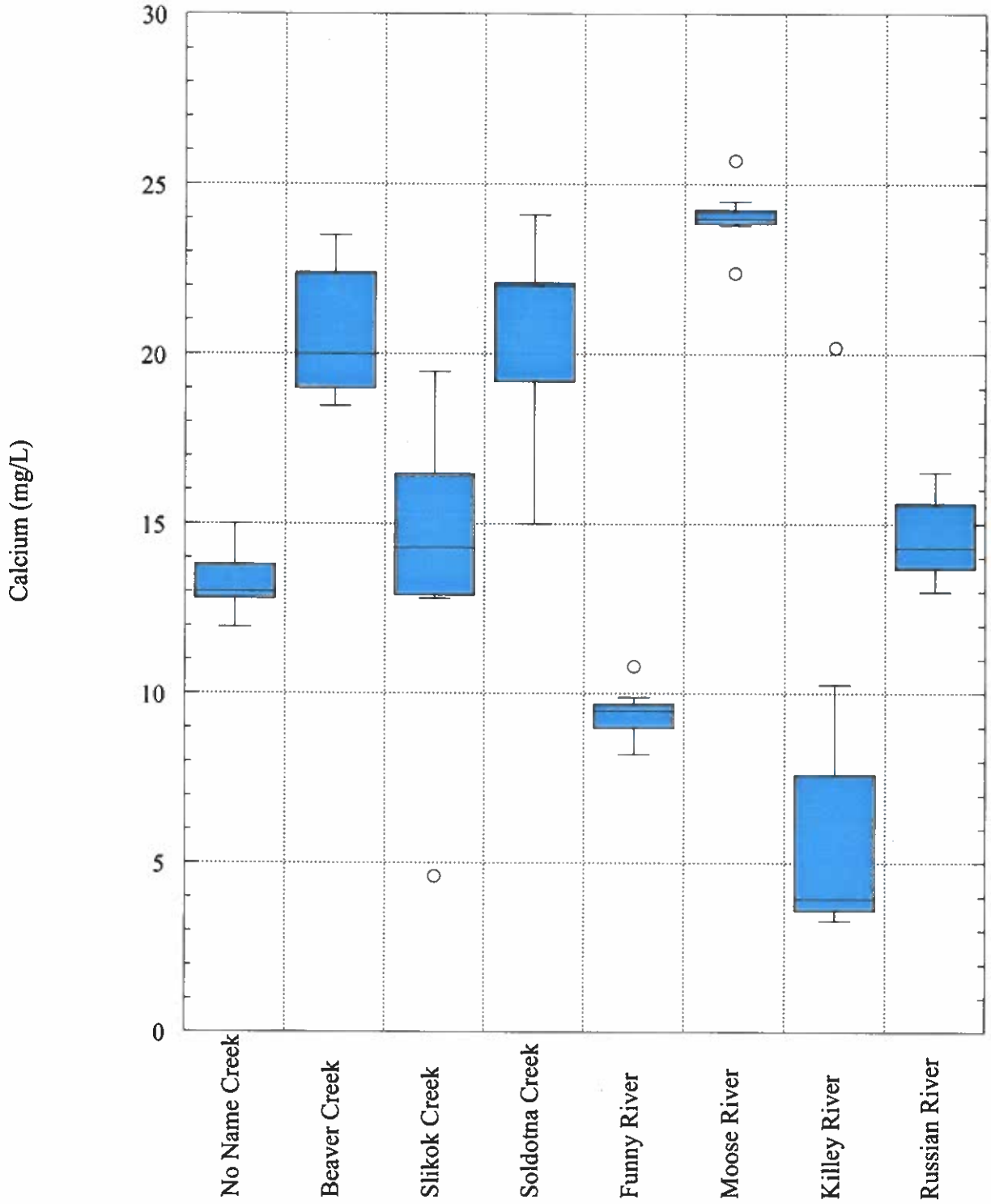

Figure 71: Calcium sampled in Kenai River tributaries during July 2000 to 2006.

Iron

Naturally present in many rocks and soils, iron is required by plants and animals for metabolism (Glass, 2001). Sources of detrimental levels of iron are industrial waste, mining, and iron-rich groundwater, and when high concentrations of iron react with dissolved oxygen, precipitates form that can harm salmon eggs and other aquatic life (USEPA, 1976). The ADEC and the USEPA have set the iron standard for the chronic exposure of freshwater aquatic life at 1 mg/L (see Appendix 2) (ADEC, 2003; USEPA, 2006).

In the mainstem, the highest concentration of iron was 128 mg/L, which occurred at Mile 6.5 during April 2006, and 0.05 mg/L was the lowest concentration that occurred at Mile 50 during July 2002. Mile 1.5 and Mile 6.5 had the highest medians during April and July, and both of these locations exceeded the standard in the majority of samples. In April, the median at Mile 10.1 also exceeded the standard, but the medians from all other mainstem locations were below the standard in both April and July. There was a general upward trend in iron concentration from Kenai Lake to the estuary, with a significant increase between Mile 50 and Mile 43 during July.

This boost may be linked to the confluence of the Killey River at Mile 44, which has the highest median of all the tributaries and exceeded the standard in July. Additionally, the boost in the mainstem does not occur in July, and the iron concentration in the Killey River is so much lower that the median does not exceed the standard. The concentrations in the tributaries ranged from a high of 9.99 mg/L in the Killey River in July 2006 to Russian River, which had the lowest concentration at below the MDL of 0.0027 mg/L during July 2006. No Name Creek, Beaver Creek, and Slikok Creek all had medians exceeding the standard in both July and April. Soldotna Creek, Funny River, and Moose River exceeded the standard only during April. Russian River had the lowest iron levels with most of the samples reported below the MDL or MRL. In both the tributaries and the mainstem, iron levels were much higher in April than July. The tributaries generally had higher medians than the mainstem.

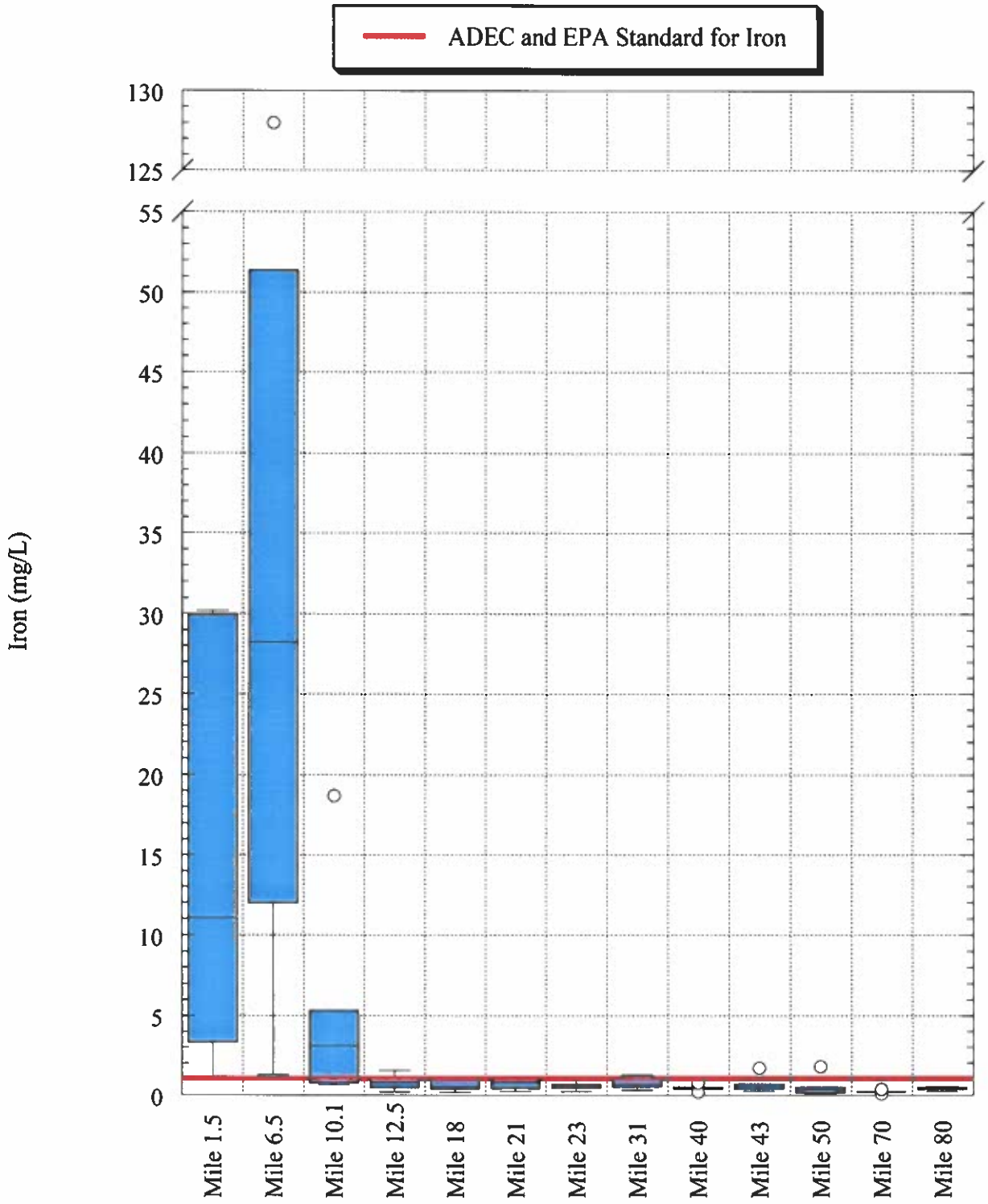

Figure 72: Iron sampled in the Kenai River mainstem during April 2001 to 2006.

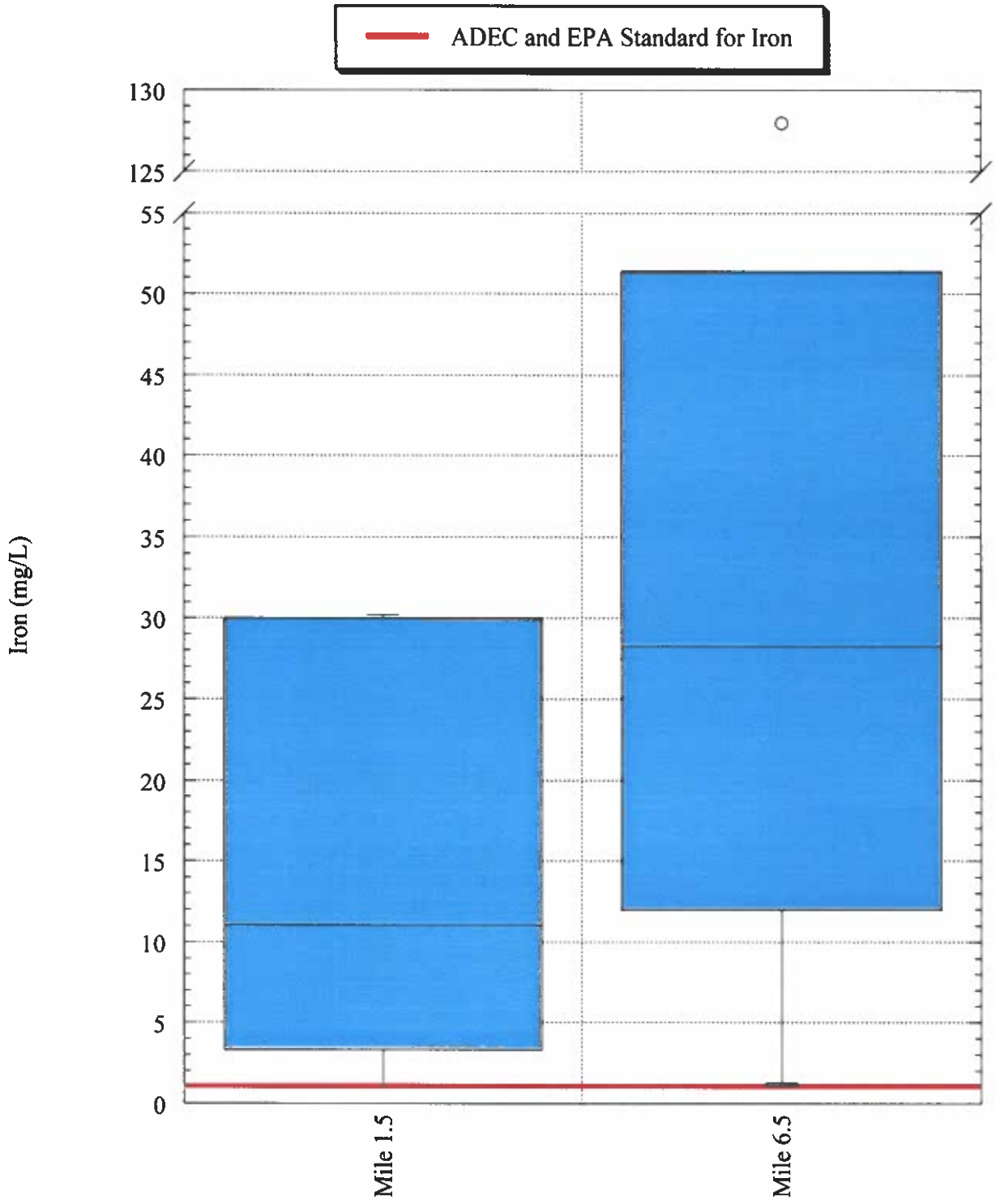

Figure 73: Iron sampled in the Kenai River estuary during April 2001 to 2006.

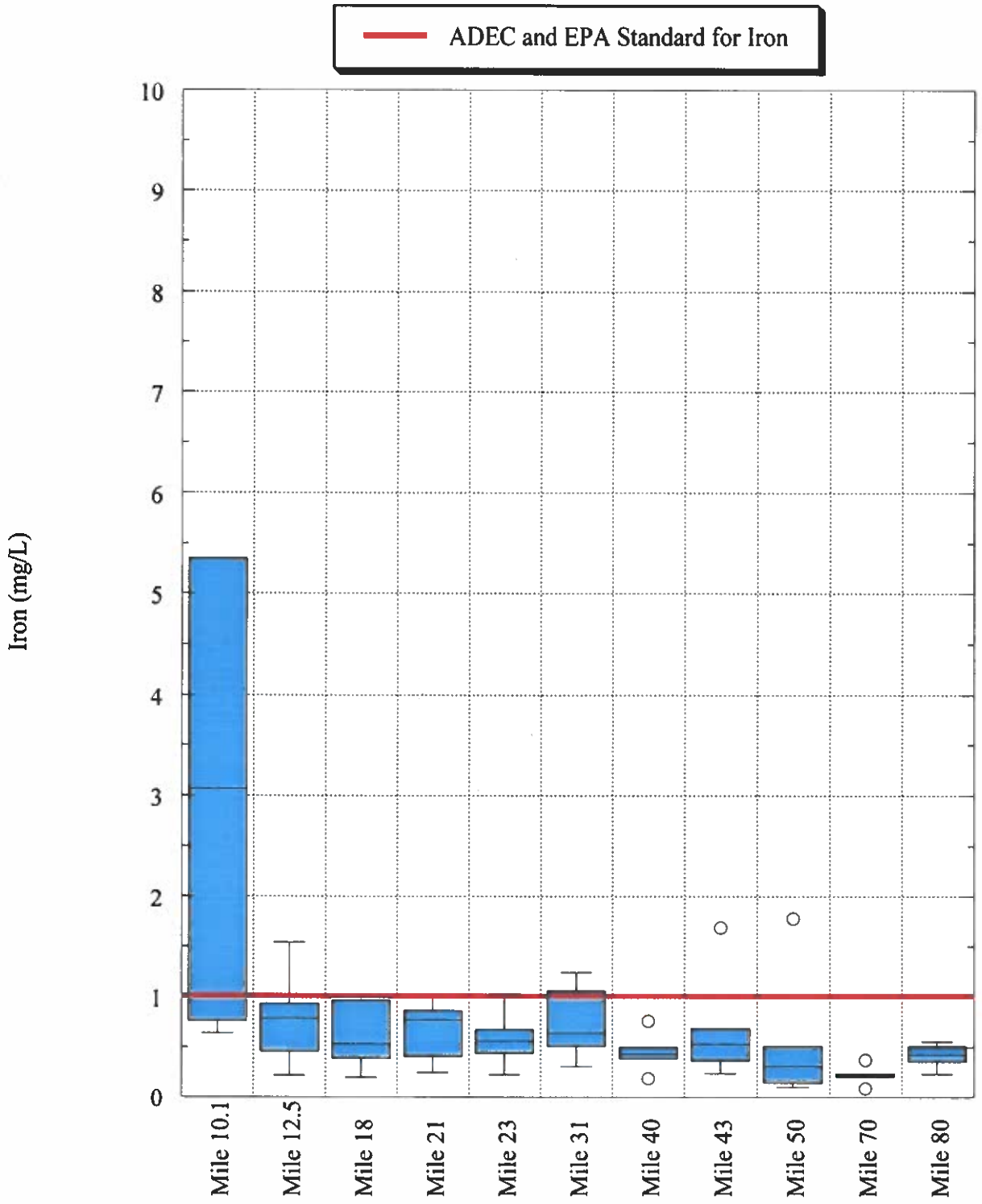

Figure 74: Iron sampled in the Lower, Middle, and Upper Kenai River mainstem (excluding the Kenai River estuary) during April 2001 to 2006.

Figure 75: Iron sampled in the Kenai River mainstem during July 2000 to 2006.

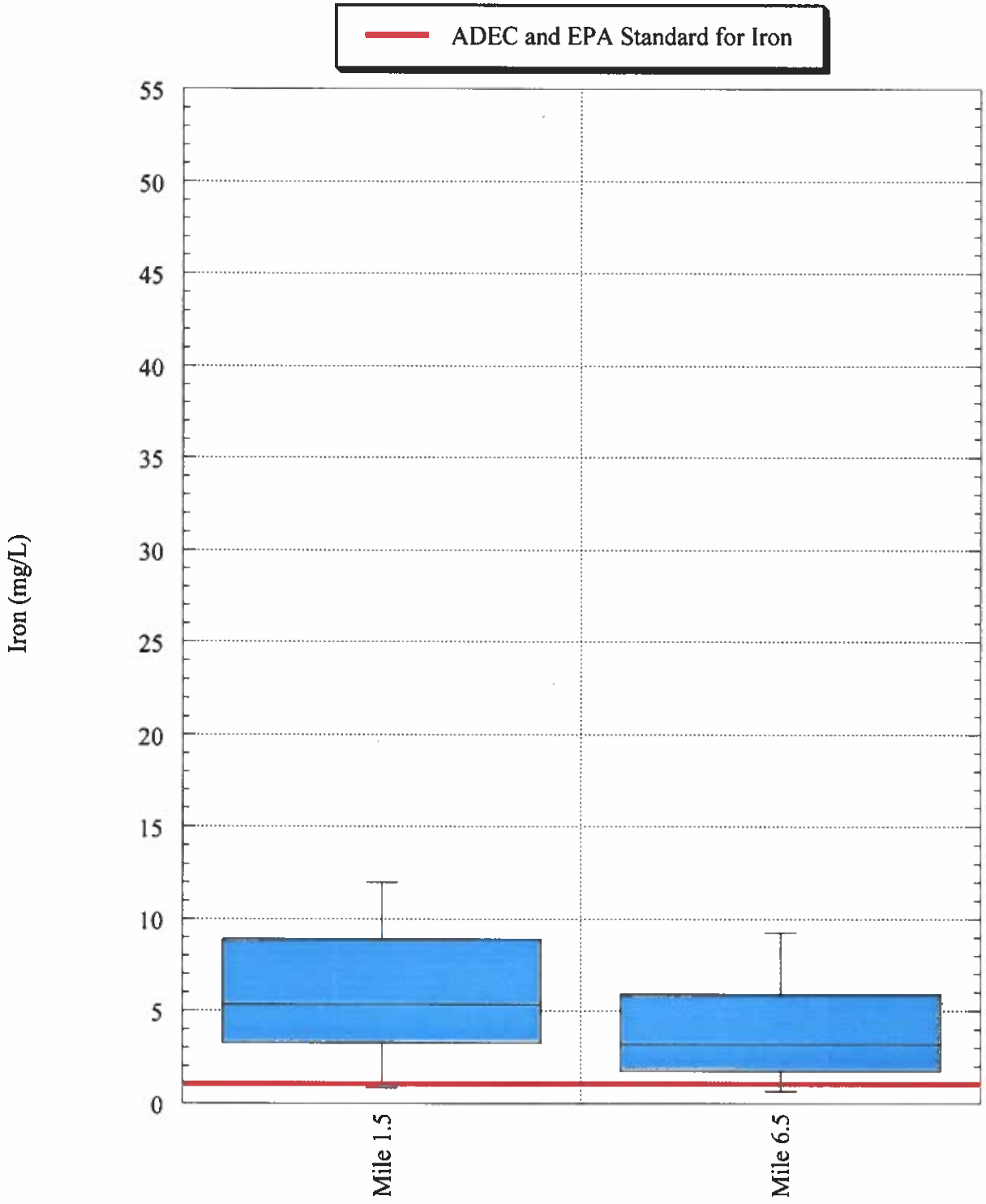

Figure 76: Iron sampled in the Kenai River estuary during July 2000 to 2006.

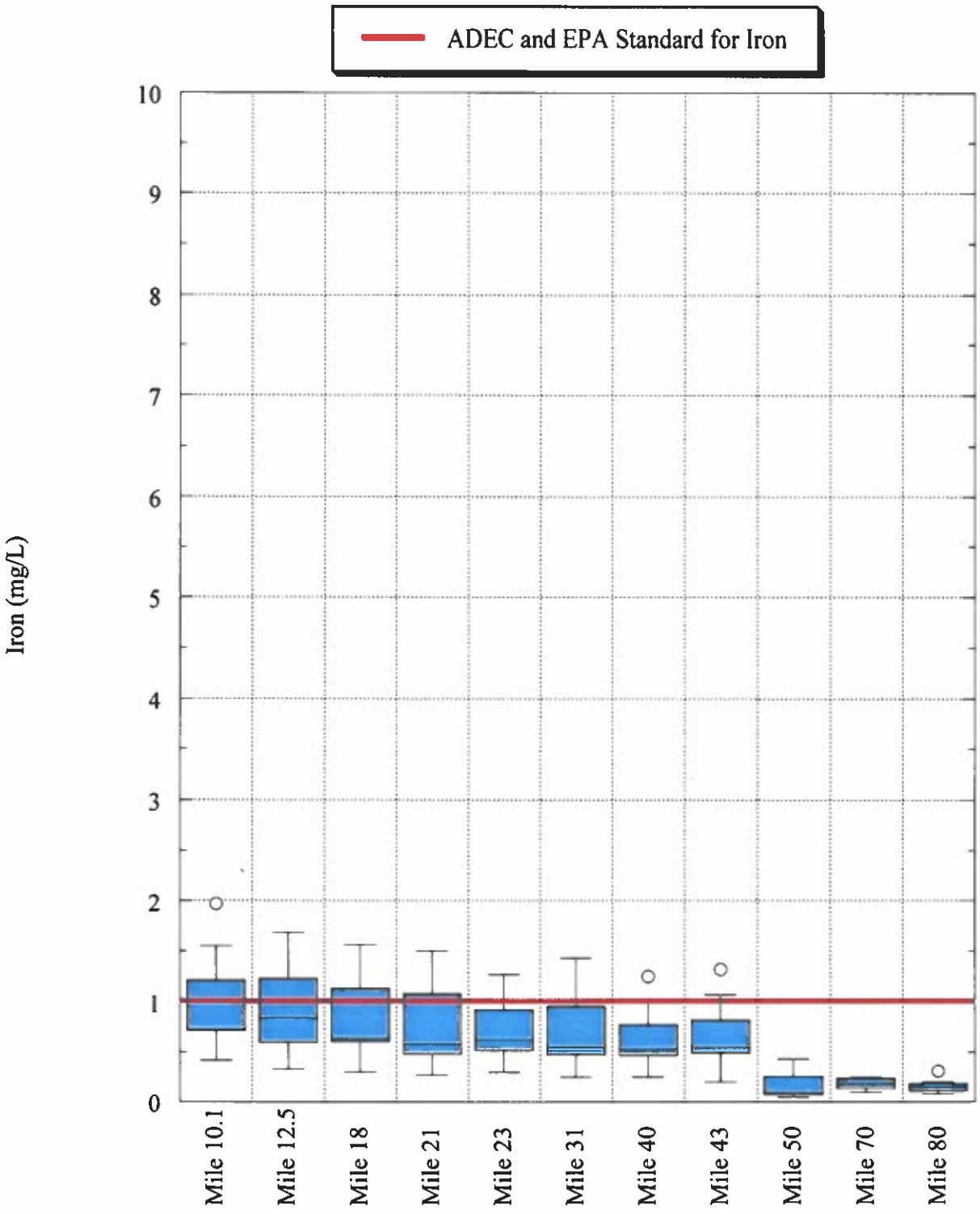

Figure 77: Iron sampled in the Lower, Middle, and Upper Kenai River mainstem (excluding the Kenai River estuary) during July 2000 to 2006.

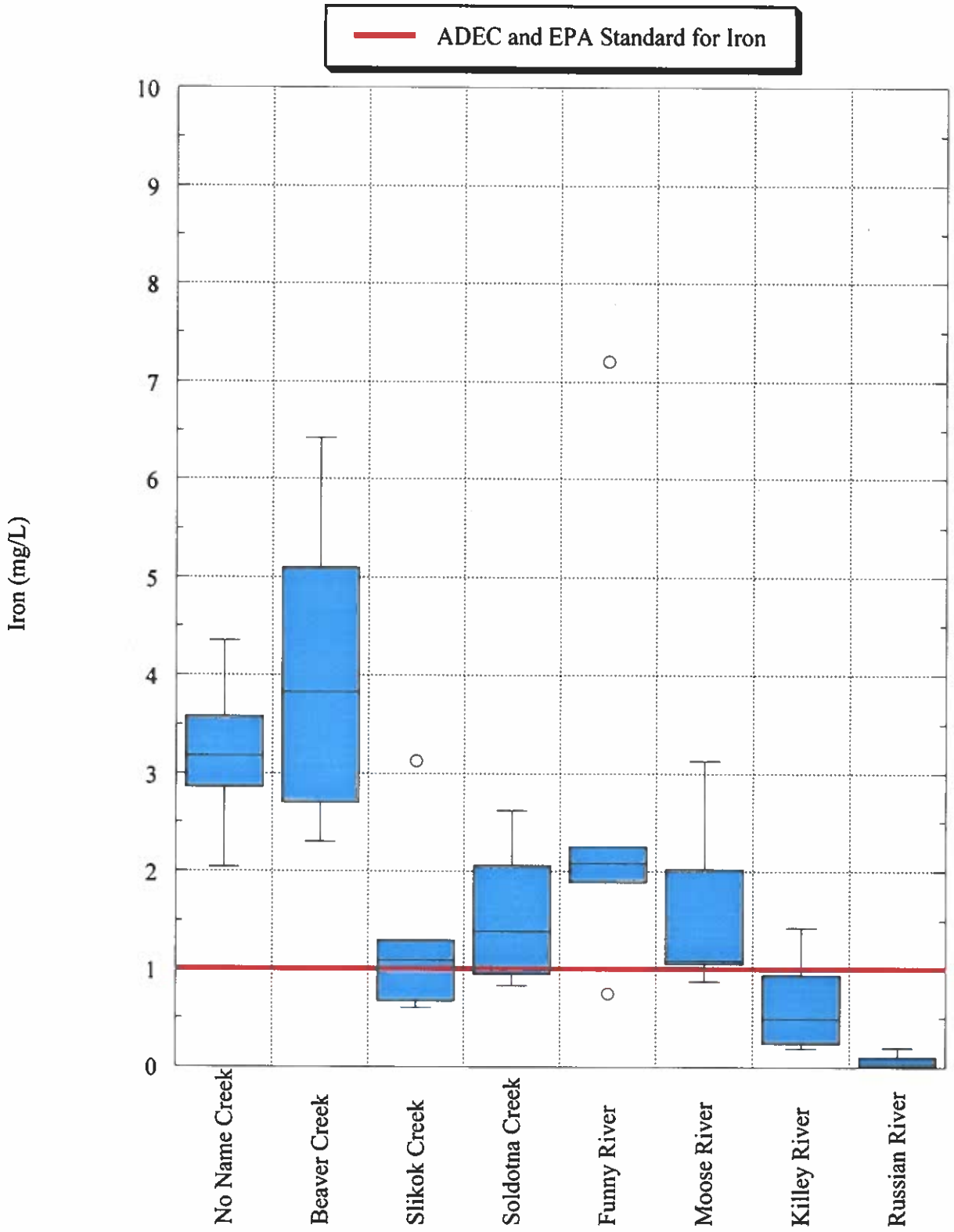

Figure 78: Iron sampled in Kenai River tributaries during April 2001 to 2006. Since 9% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

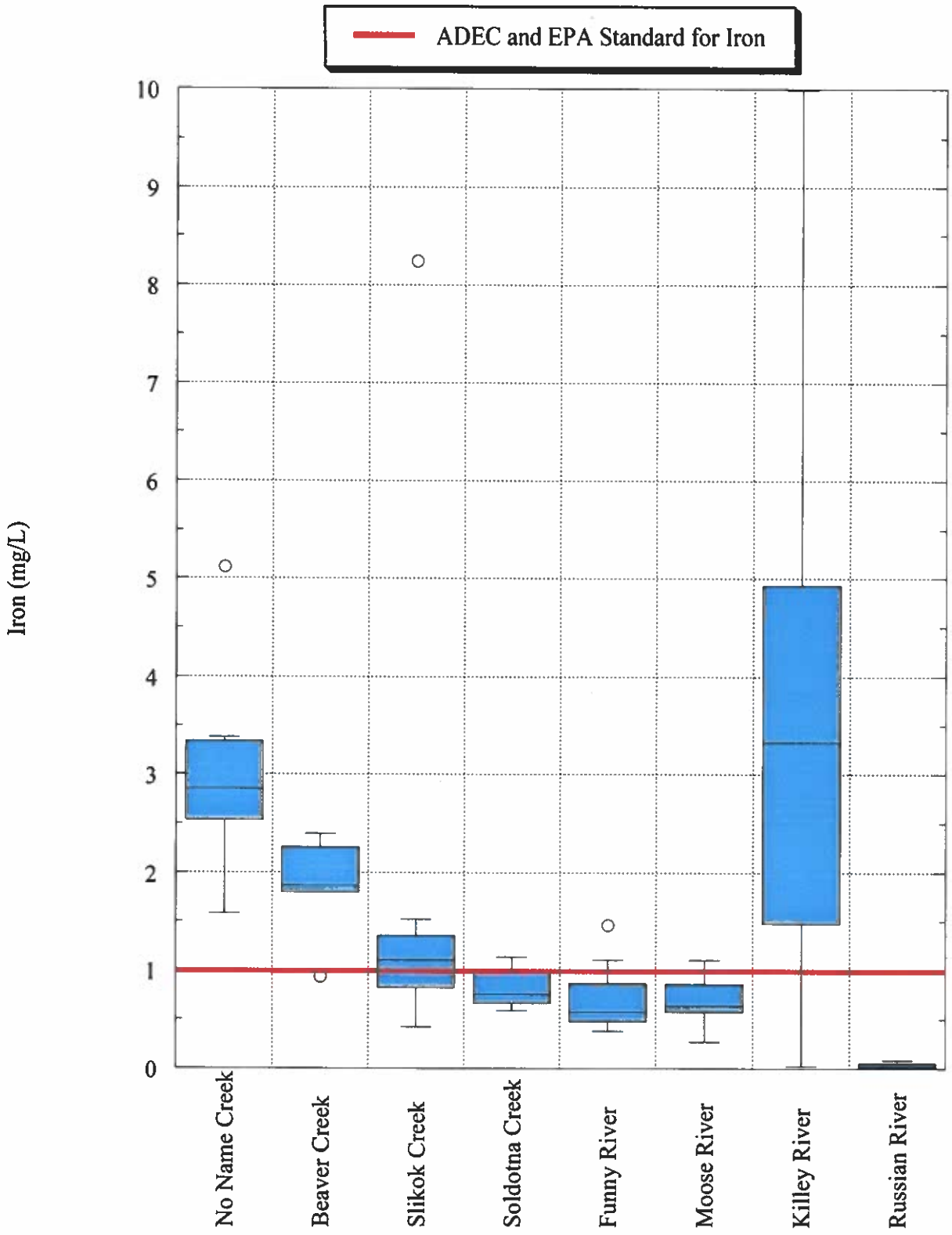

Figure 79: Iron sampled in Kenai River tributaries during July 2000 to 2006. Since 11% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

Magnesium

As an essential element, magnesium concentrations can significantly impact plants and animals, and magnesium also influences water quality because it contributes to hardness (Glass, 2001). Neither the USEPA nor the ADEC has set a water quality standard for magnesium concentrations in freshwater for chronically exposed aquatic life.

In the mainstem, the highest concentration of magnesium was 510 mg/L and occurred at Mile 1.5 during April 2003, while the lowest level was 0.729 mg/L at Mile 50 in July 2001. In both April and July, Mile 1.5 had the highest median followed by Mile 6.5. There was a general upward trend in magnesium levels from Kenai Lake to the estuary in both April and July. Magnesium levels were higher upstream of Skilak Lake, and at the outlet, magnesium dropped to the lowest levels recorded in the watershed. In the mainstem, magnesium concentrations were higher in April than in July.

The concentrations in the tributaries ranged from the high of 7.7 mg/L in July 2001 at No Name Creek to 0.746 mg/L in April 2004 at the Killey River. The Killey River and Russian River both had low medians in comparison to the other tributaries like Soldotna Creek, which had the highest median during April and July. Excluding the estuary, the tributaries generally had higher levels of magnesium than the mainstem. In the tributaries, median concentrations were higher in July than in April, excluding Russian River.

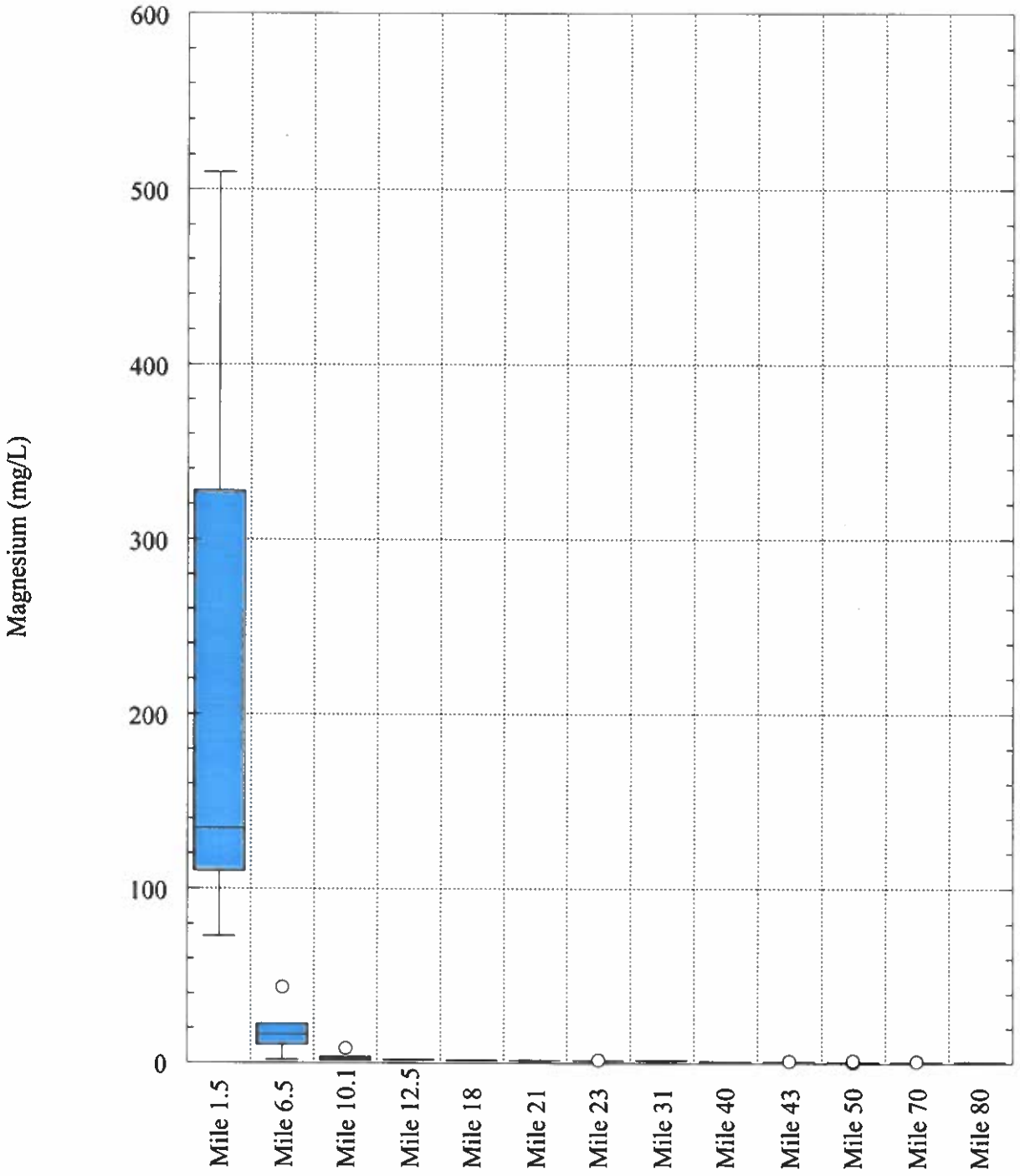

Figure 80: Magnesium sampled in the Kenai River mainstem during April 2001 to 2006.

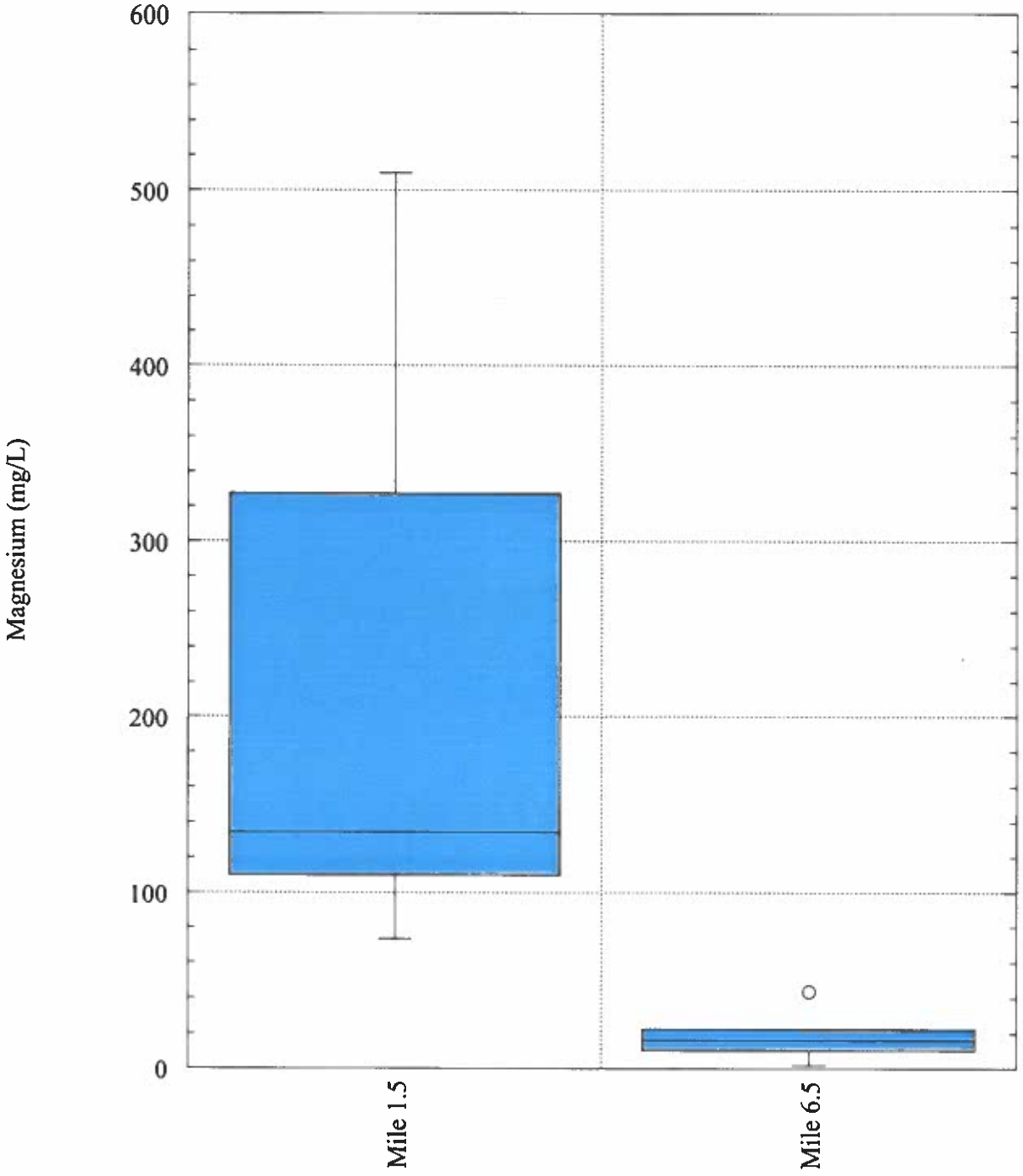

Figure 81: Magnesium sampled in the Kenai River estuary during April 2001 to 2006.

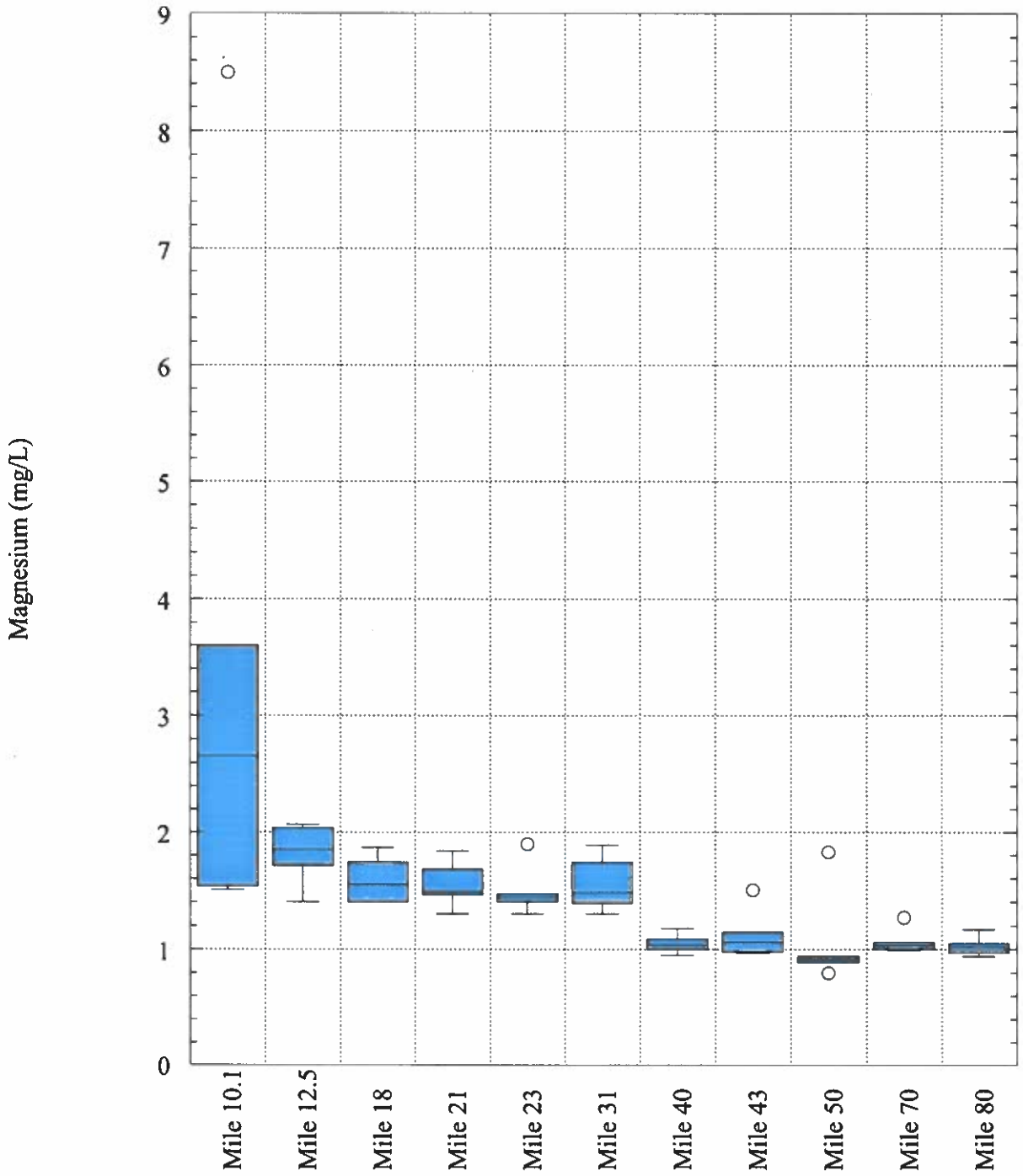

Figure 82: Magnesium sampled in the Lower, Middle, and Upper Kenai River mainstem during April 2001 to 2006.

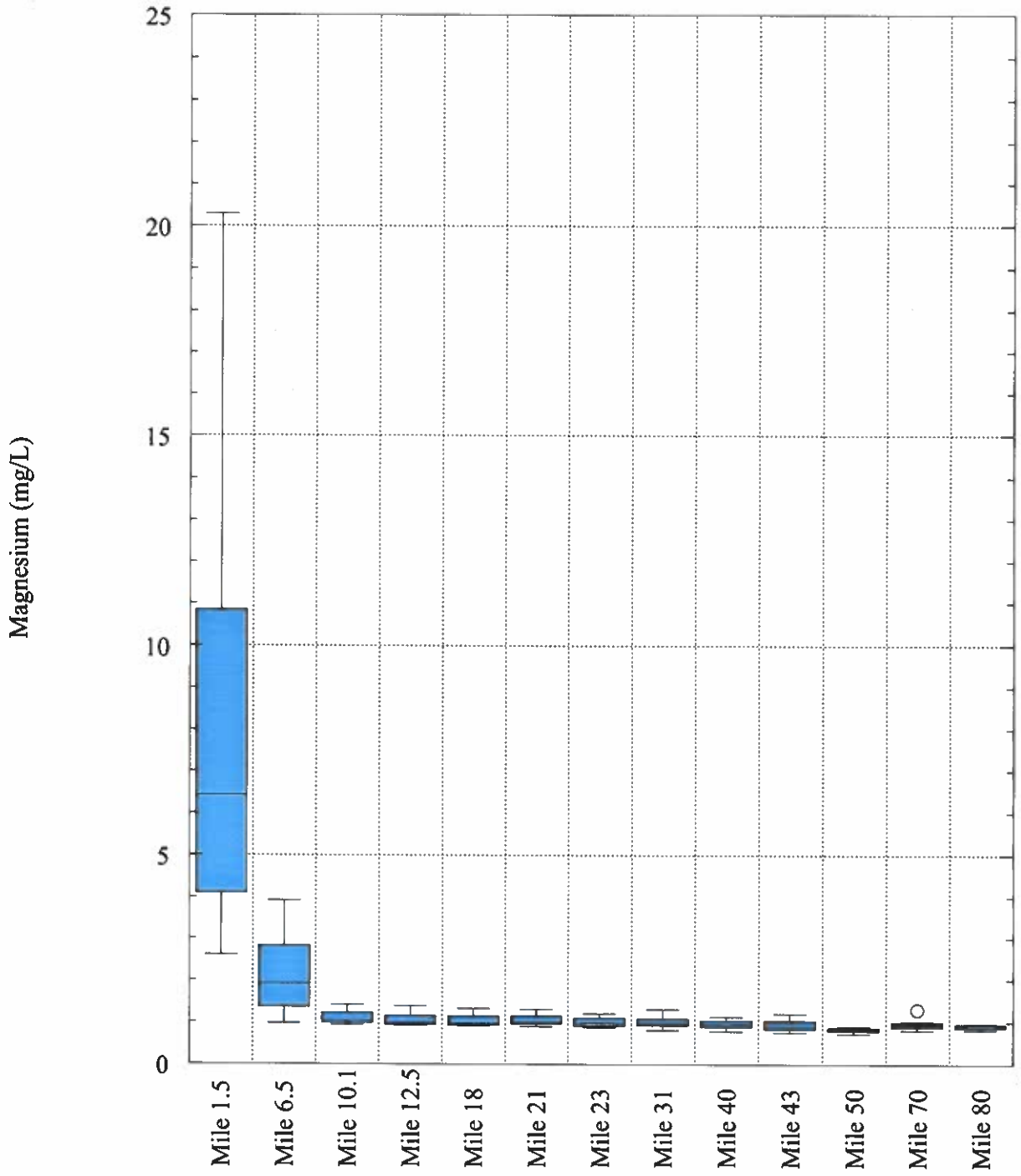

Figure 83: Magnesium sampled in the Kenai River mainstem during July 2000 to 2006.

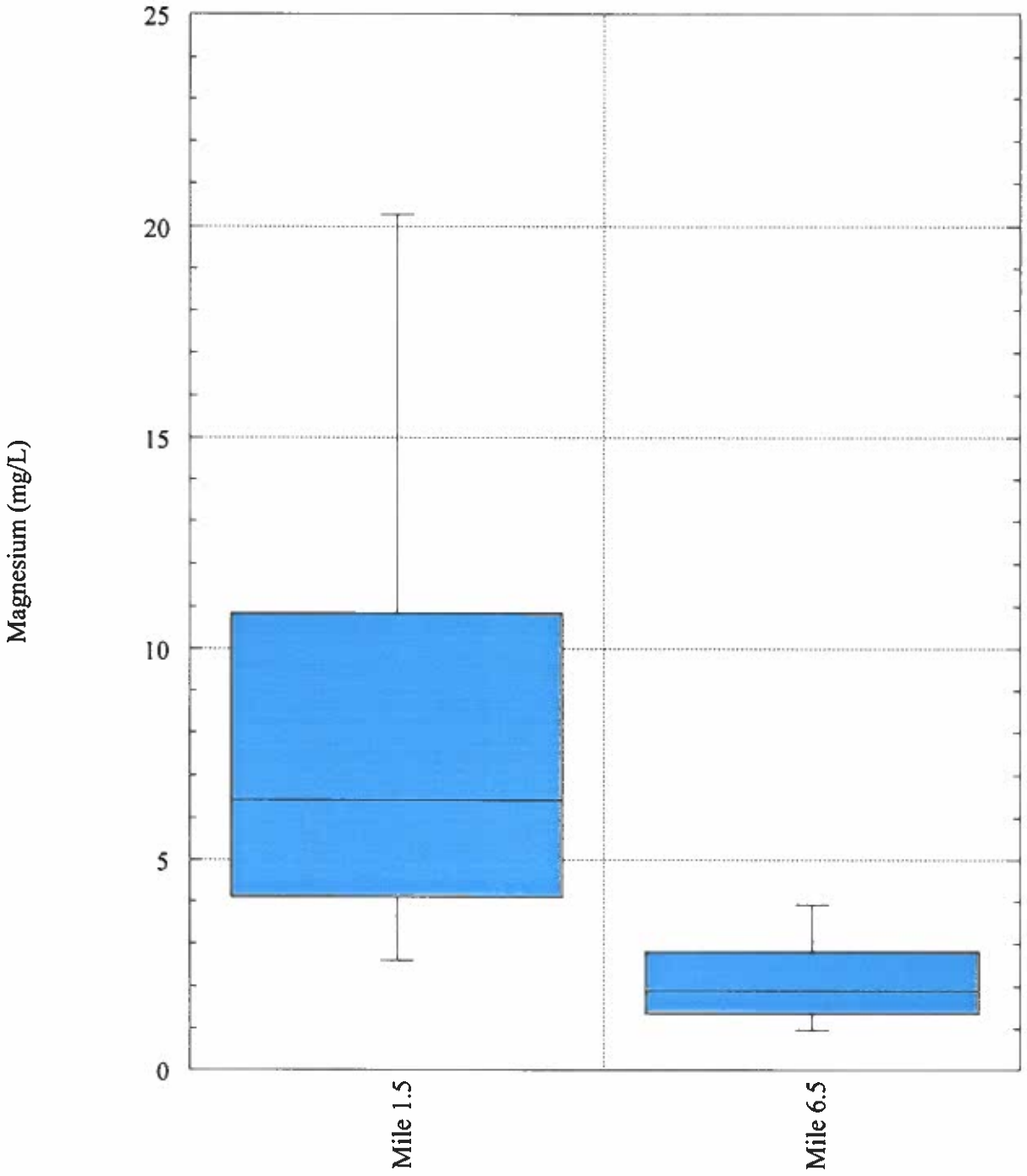

Figure 84: Magnesium sampled in the Kenai River estuary during July 2000 to 2006.

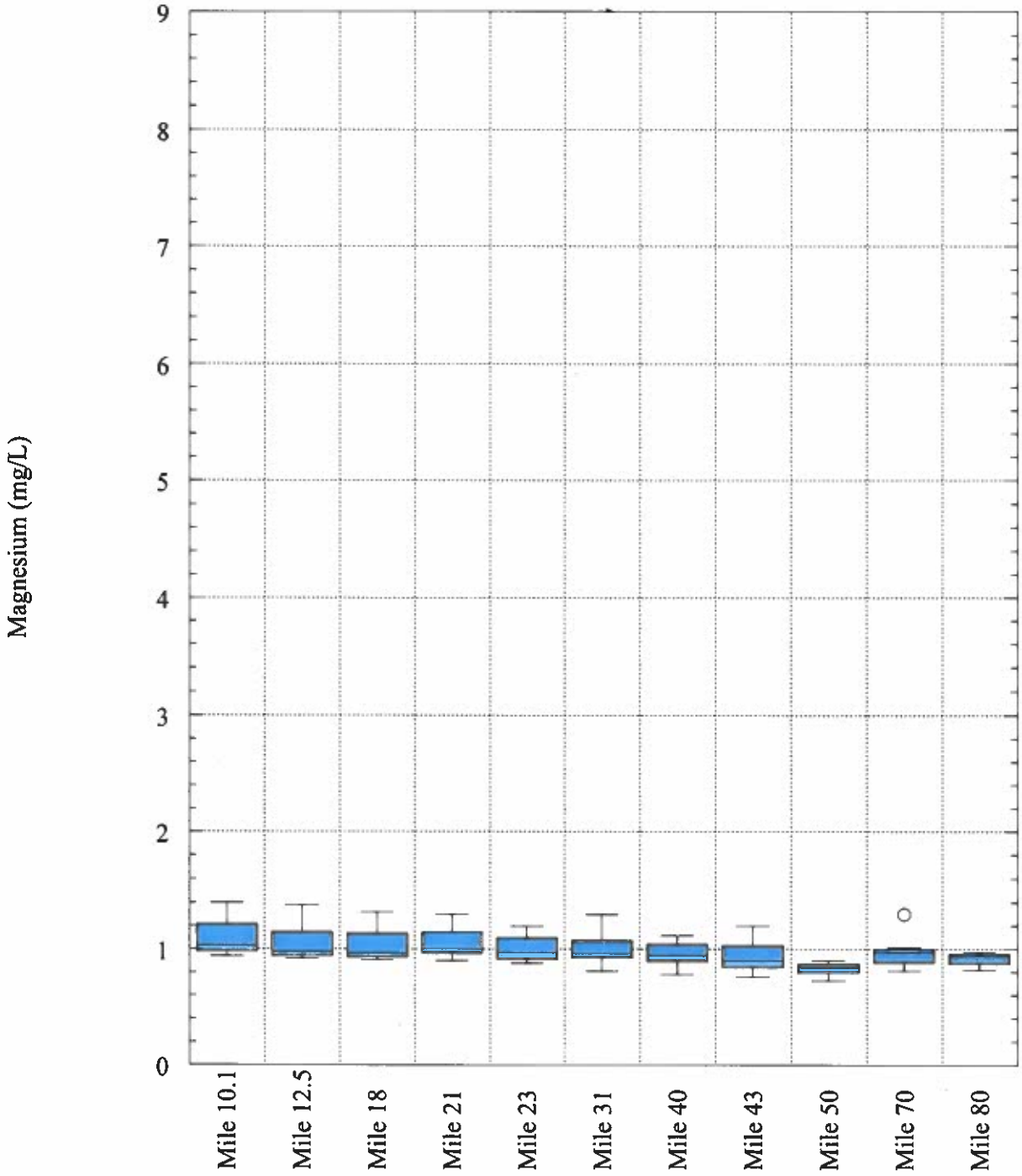

Figure 85: Magnesium sampled in the Lower, Middle, and Upper Kenai River mainstem (excluding the estuary) during July 2000 to 2006.

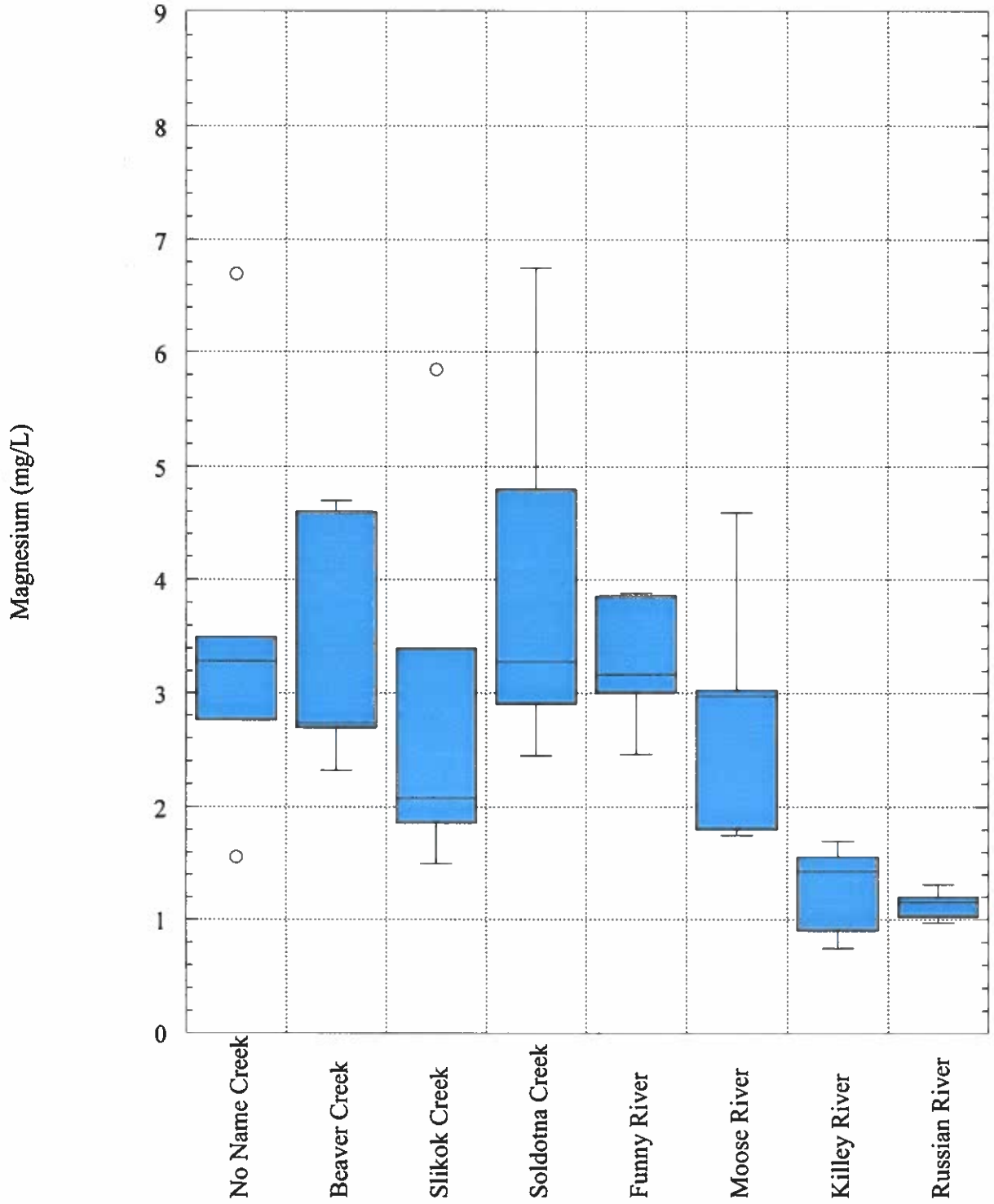

Figure 86: Magnesium sampled in Kenai River tributaries during April 2001 to 2006.

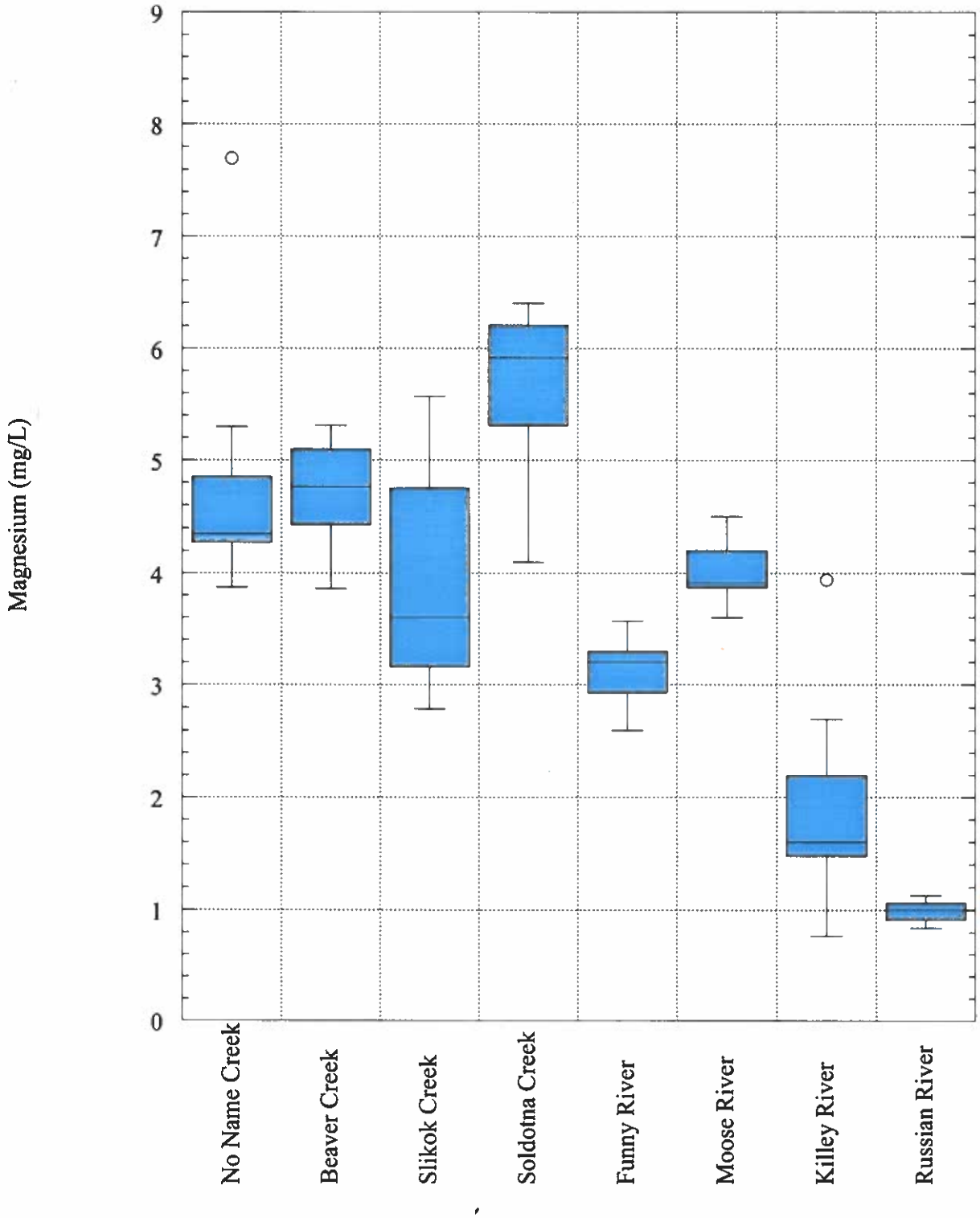

Figure 87: Magnesium sampled in Kenai River tributaries during July 2000 to 2006.

Nitrate

Inorganic nitrogen is generally present in well-aerated, natural streams in the form of nitrate (Glass, 1999). Nitrate enters the hydrologic cycle as a result of precipitation, plant residue, natural minerals, fertilizer, and septic tanks (Glass, 2001). Neither the USEPA nor the ADEC have set a nitrate standard for chronically exposed freshwater aquatic life.

In the mainstem, the highest concentration of nitrate was 0.706 mg/L at Mile 70 during April 2005, and in many instances, nitrate levels were below the MDL of 0.015 mg/L in April 2004, 2005, and 2006. In April, the mainstem had a general downward trend from Kenai Lake to the estuary, excluding the higher medians at Mile 70 and Mile 1.5. The medians in July had a downward trend from Mile 80 through Mile 40, but then the medians hovered around 0.15 mg/L through the Lower Kenai River and dropped slightly in the estuary. Overall, nitrate levels were slightly lower in April than July for the mainstem.

The tributaries generally had lower levels of nitrate than the mainstem, with the exception of Russian River. The highest level of nitrate in the tributaries occurred at Russian River with a concentration of 1.11 mg/L during April 2005, and the lowest levels occurred at many locations below the MDL of 0.015 mg/L in April and July of 2004, April 2005, and April and July of 2006. Of the tributaries, Russian River had the highest medians in July and especially in April, which may explain the high median at Mile 70. The Killey River in April and Slikok Creek in July had the next highest medians. Moose River and Beaver Creek had levels below the MDL or MRL during all sampling events. Russian River had a higher median in April than July, while the other tributaries had too many values below the MDL and MRL to establish a clear seasonal trend.

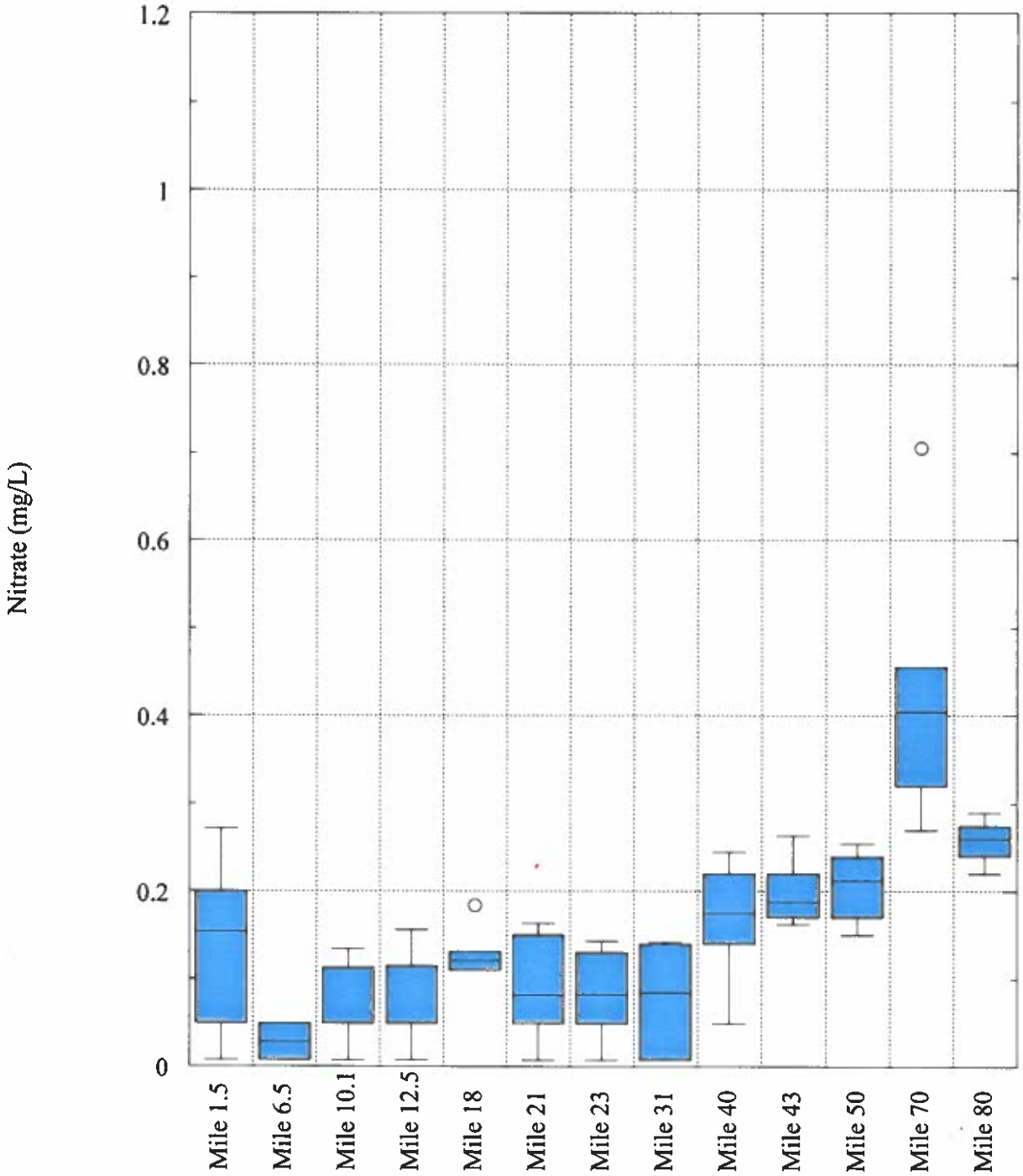

Figure 88: Nitrate sampled in the Kenai River mainstem during April 2001 to 2006. Since 32% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

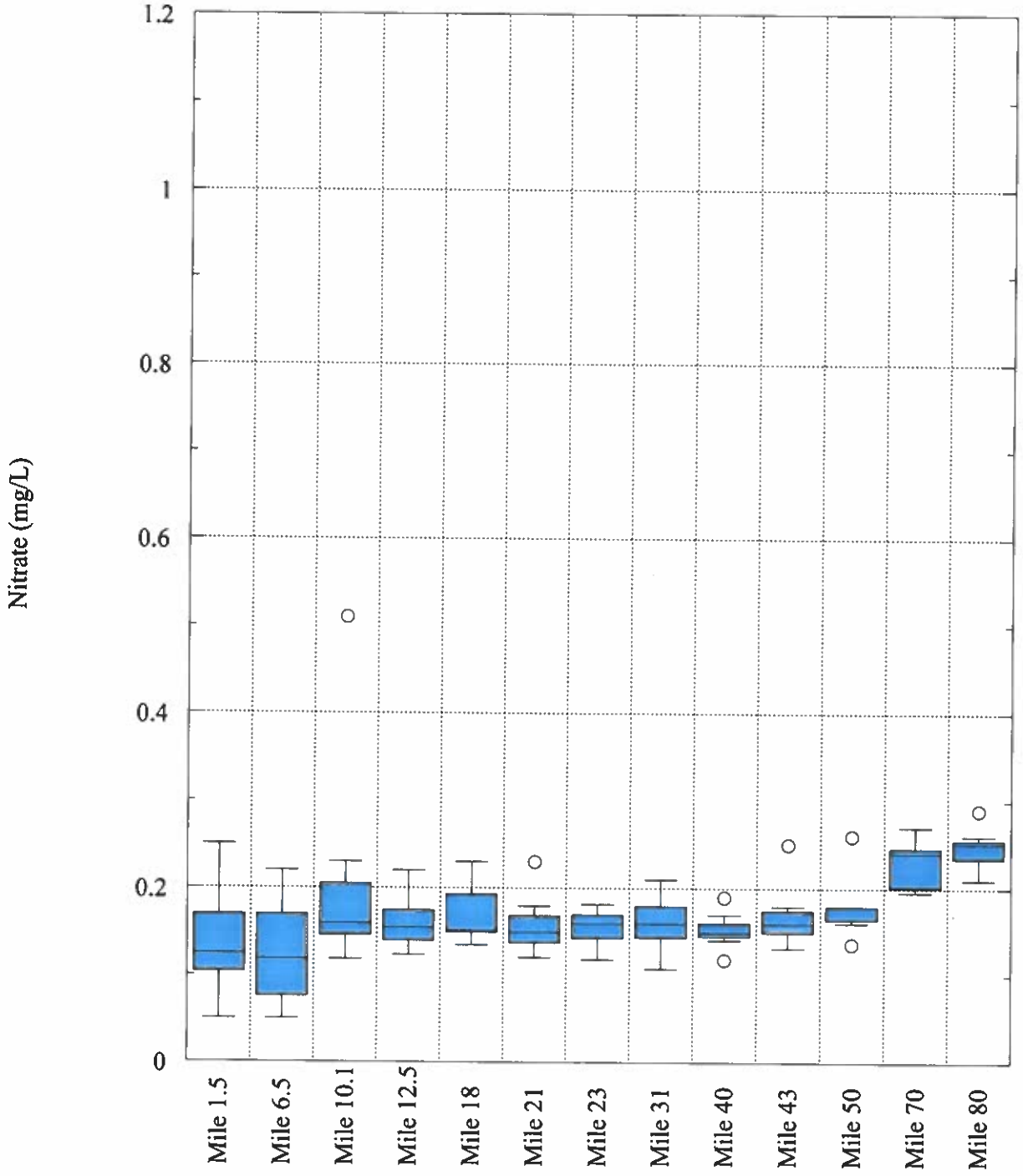

Figure 89: Nitrate sampled in the Kenai River mainstem during July 2000 to 2006. Since 3% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

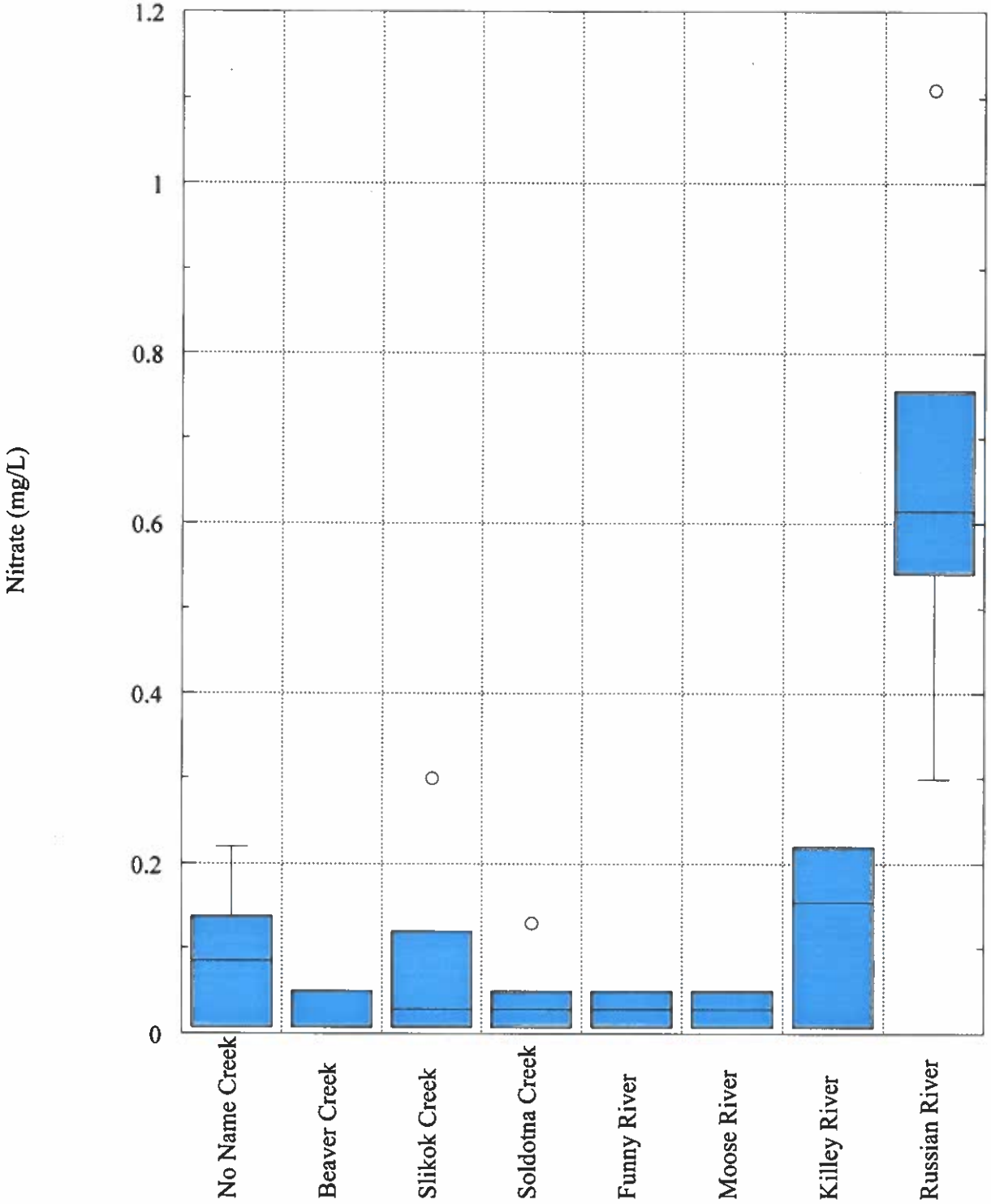

Figure 90: Nitrate sampled in Kenai River tributaries during April 2001 to 2006. Since 66% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

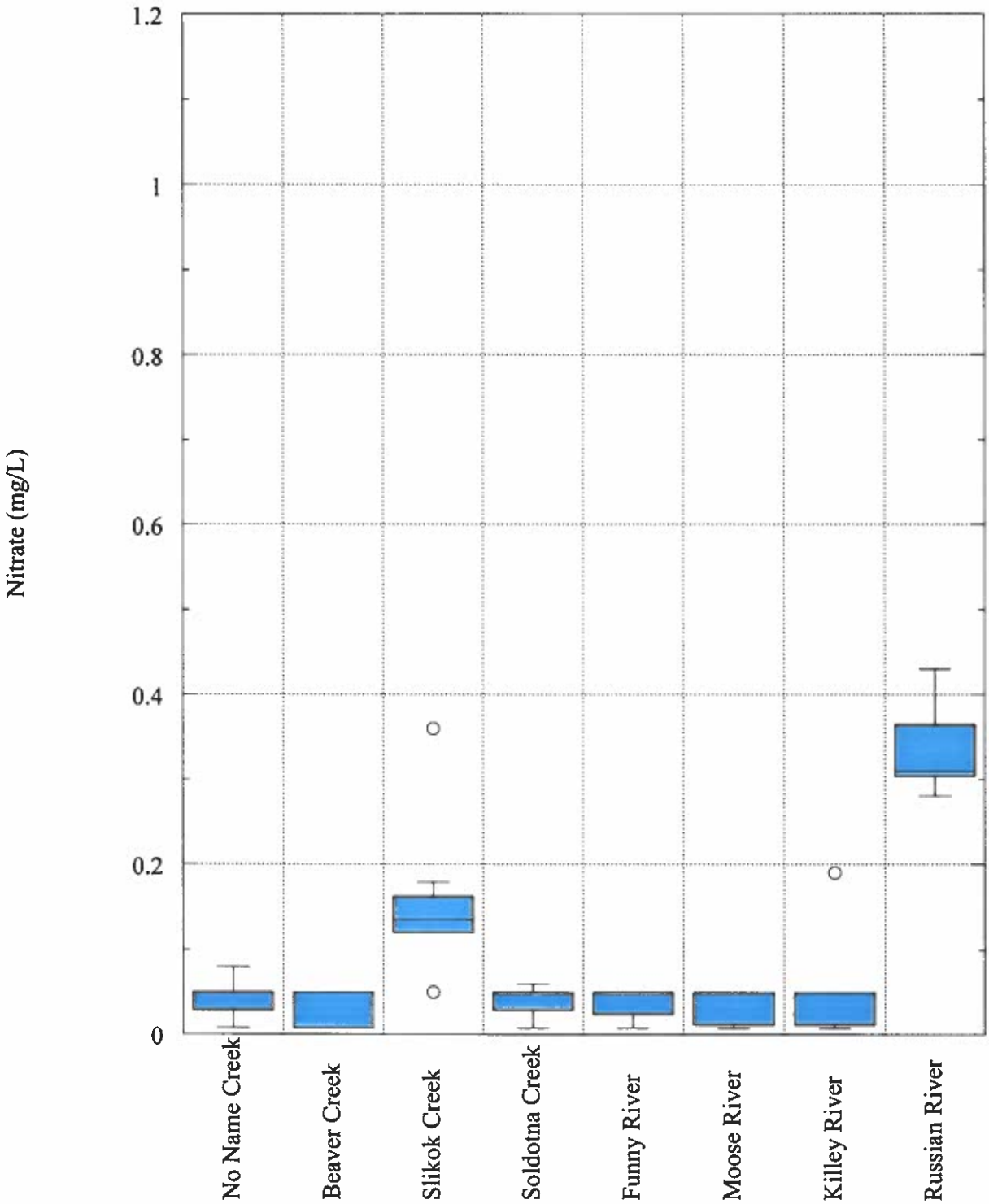

Figure 91: Nitrate sampled in Kenai River tributaries during July 2000 to 2006. Since 69% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

Phosphorus

Plants and animals require the essential element phosphorus for growth, and most concentrations are not toxic to aquatic or human life (Glass, 1999). As a nutrient, phosphorus is significant to water quality because in high concentrations, it can lead to excessive algal growth and eutrophic conditions (Glass, 1999). The ADEC and the USEPA do not have a standard for phosphorus for chronic exposure to aquatic life in freshwater.

The highest level of phosphorus ever recorded occurred at Mile 6.5 in April 2005 with a concentration of 1.42 mg/L, and the lowest levels occurred on many occasions below the MDL of 0.0020 mg/L in April and July 2004. The estuary had significantly higher medians and variance than the rest of the mainstem in July and April. The lowest concentrations of phosphorus occurred between Mile 40 and Mile 80. In the mainstem, there was a general upward trend in phosphorus concentration from Kenai Lake to the estuary with a relatively higher median at Mile 31. The phosphorus levels of 0.058 mg/L and 0.098 mg/L caused the higher median at Mile 31 for April 2006 and July 2006, respectively.

In the tributaries, phosphorus ranged from 0.57 mg/L in the Killey River during July 2006 to below the MDL of 0.0020 mg/L at many locations in April and July of 2004. The Killey River had the highest median in July but dropped to the second lowest median in April. Soldotna Creek, Funny River, and Beaver Creek had relatively high medians during both April and July. In contrast, Russian River displayed the lowest median in both April and July. Phosphorus levels were slightly higher in April than in July in both the mainstem and the tributaries, excluding the Killey River. In April and July, concentrations in the tributaries and the mainstem were relatively similar.

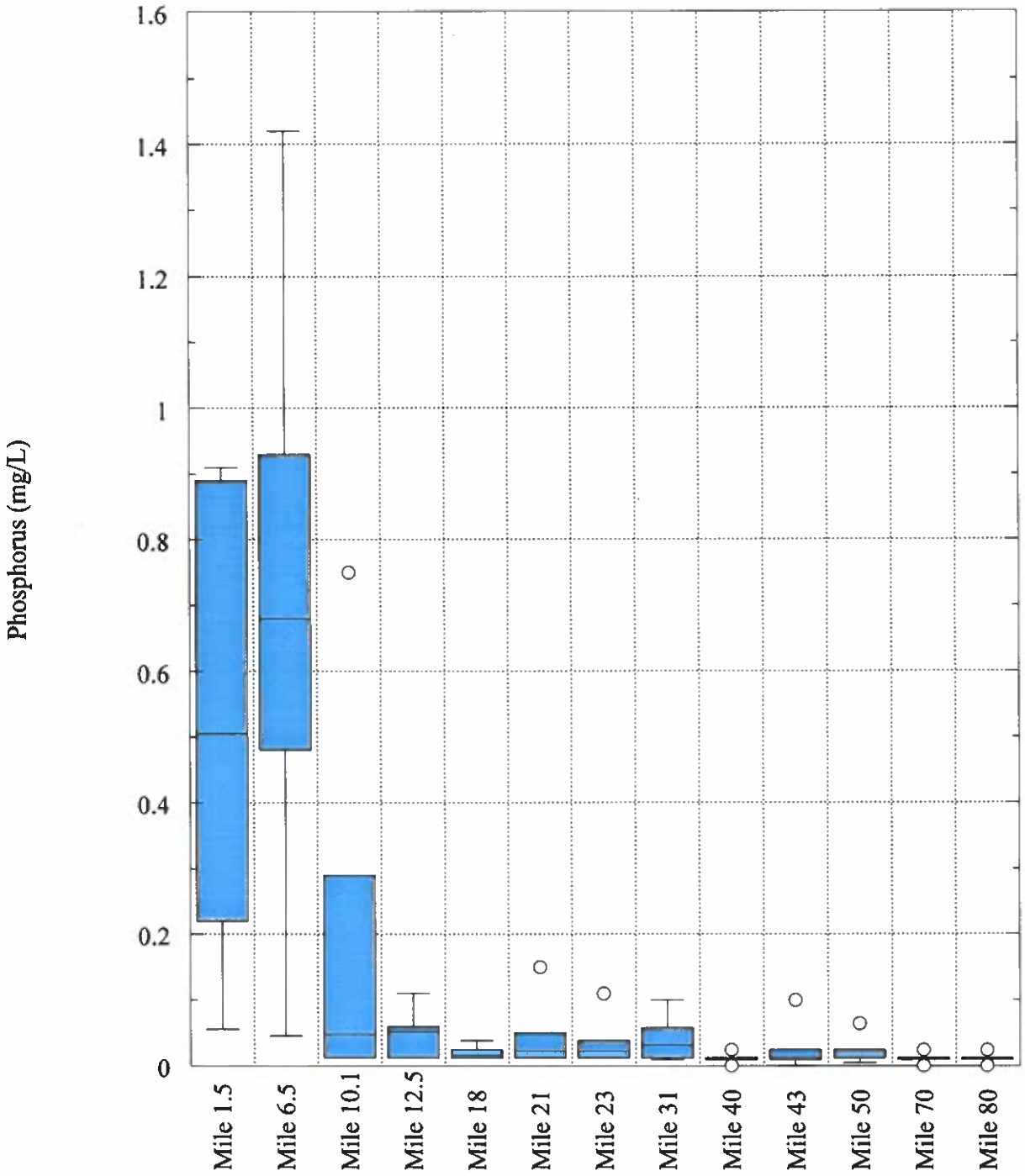

Figure 92: Phosphorus sampled in the Kenai River mainstem during April 2001 to 2006. Since 52% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

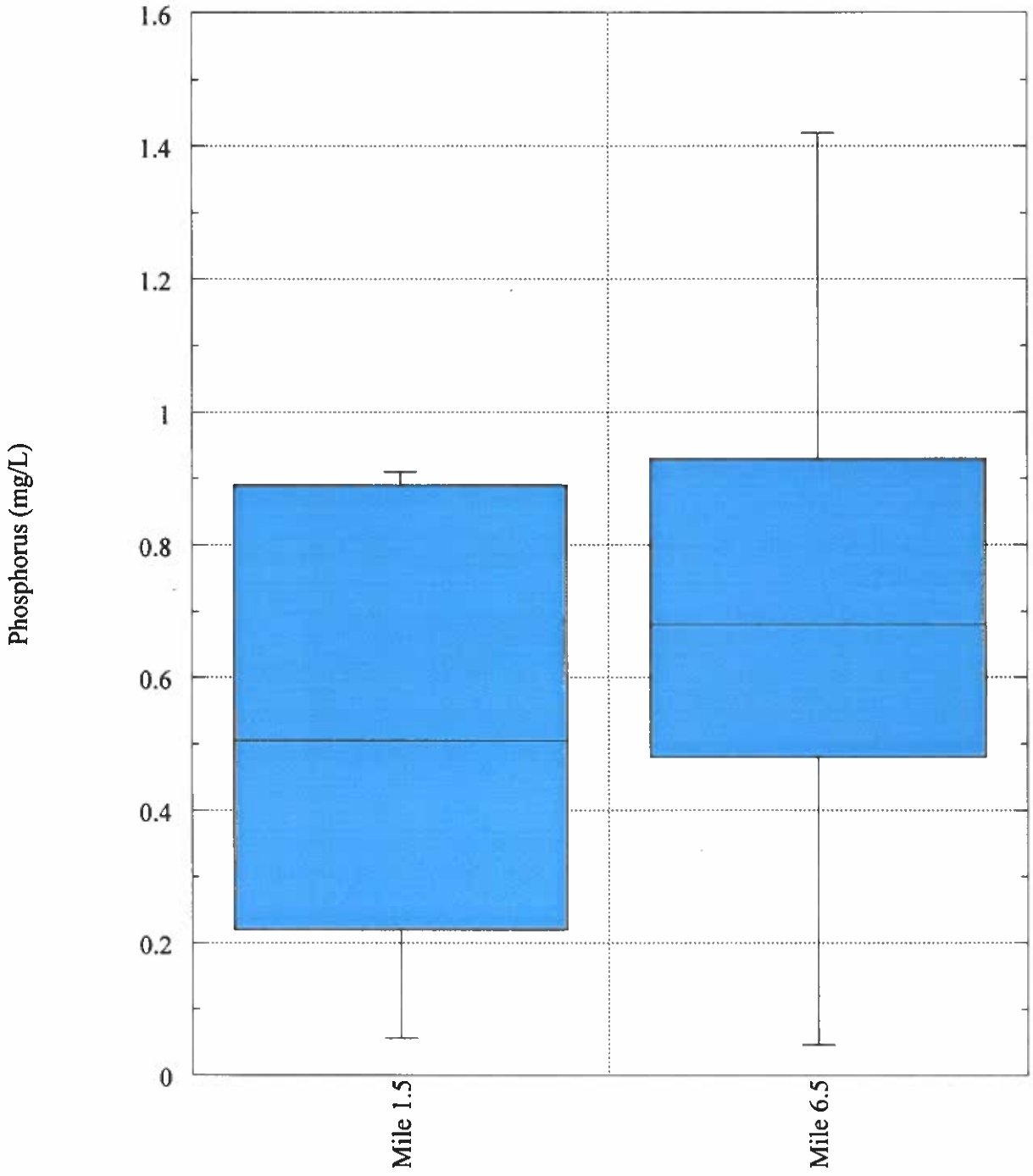

Figure 93: Phosphorus sampled in the Kenai River estuary during April 2001 to 2006.

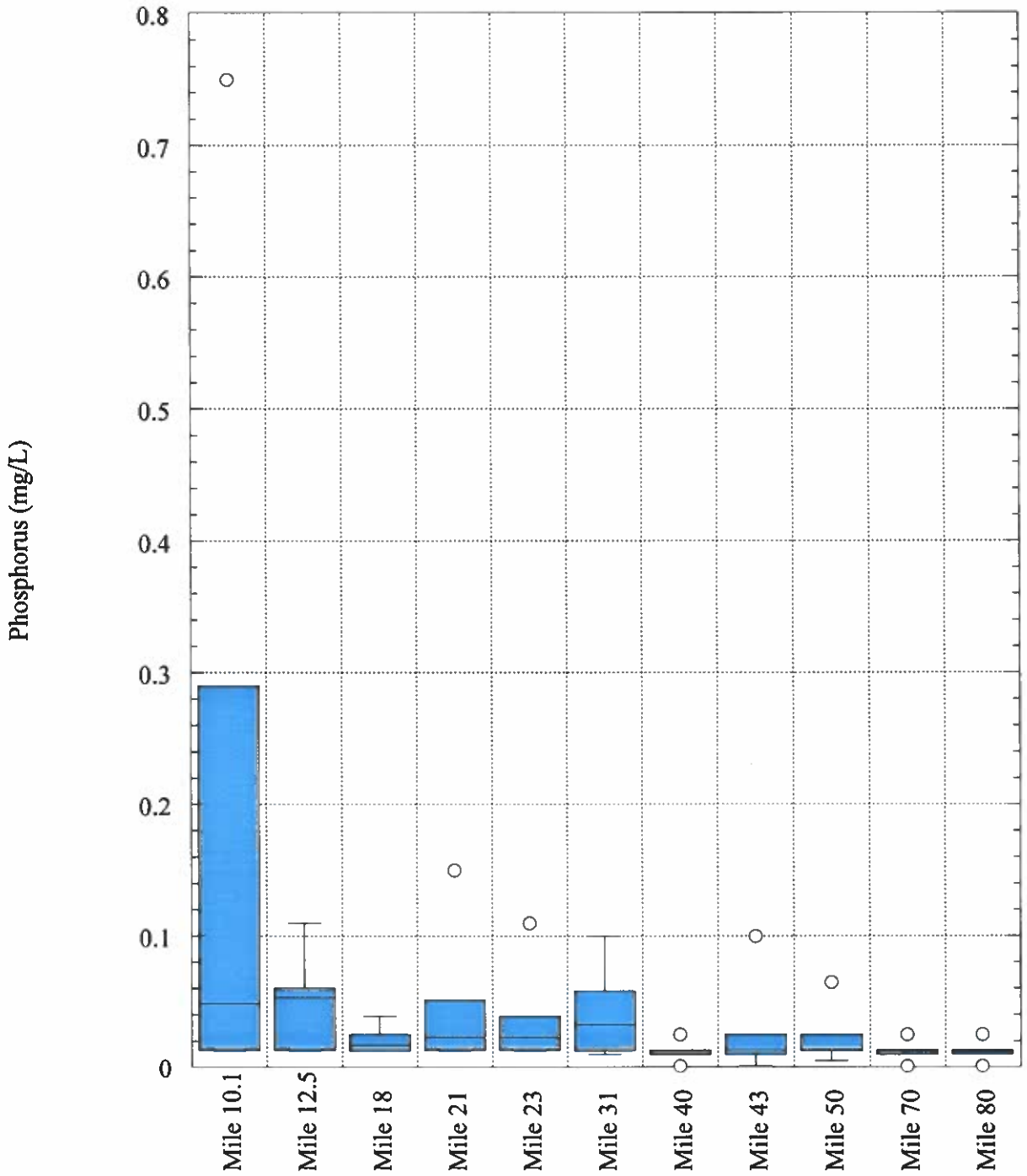

Figure 94: Phosphorus sampled in the Lower, Middle, and Upper Kenai River mainstem during April 2001 to 2006. Since 62% of the samples displayed on this graph are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

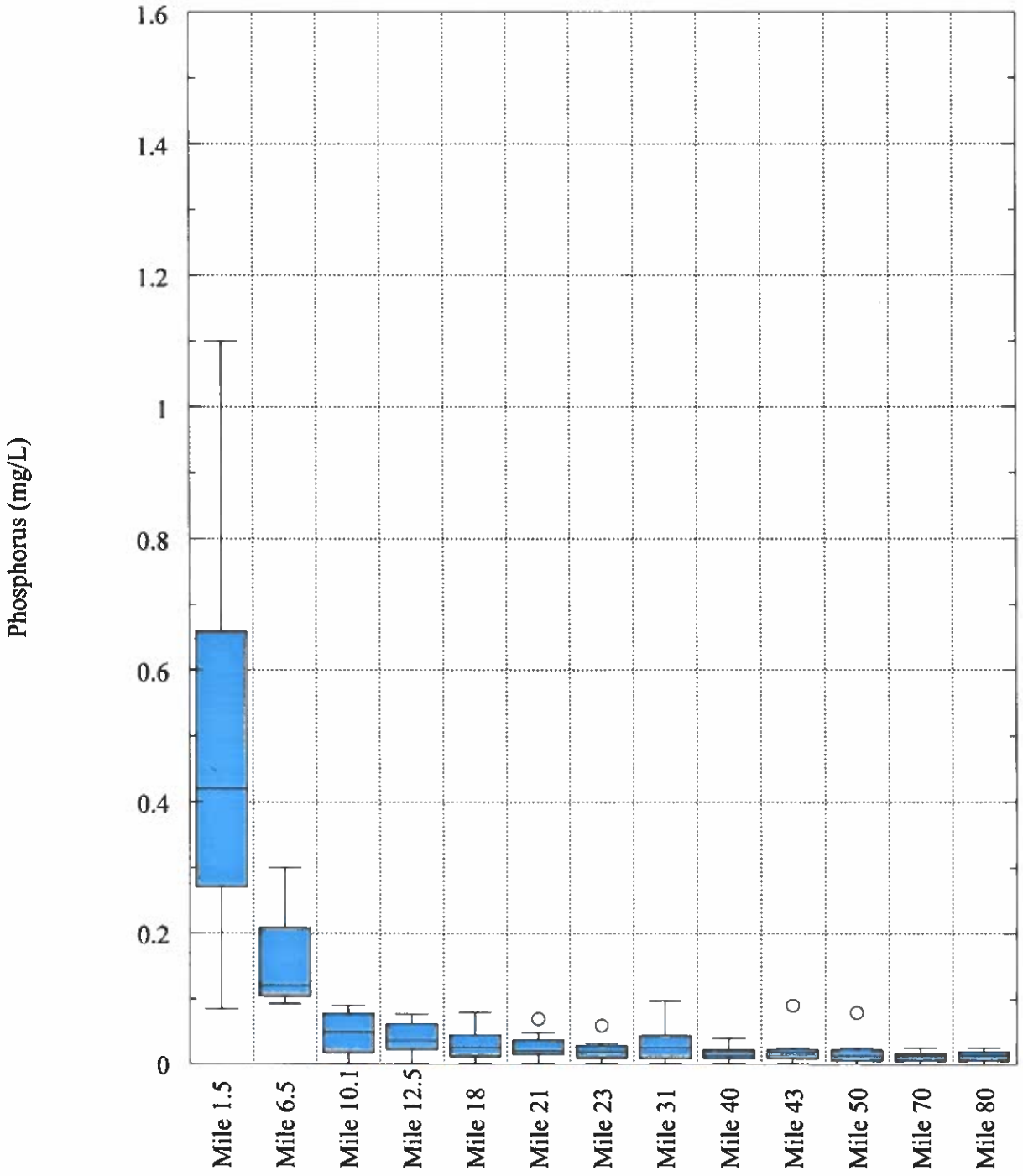

Figure 95: Phosphorus sampled in the Kenai River mainstem during July 2000 to 2006. Since 52% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

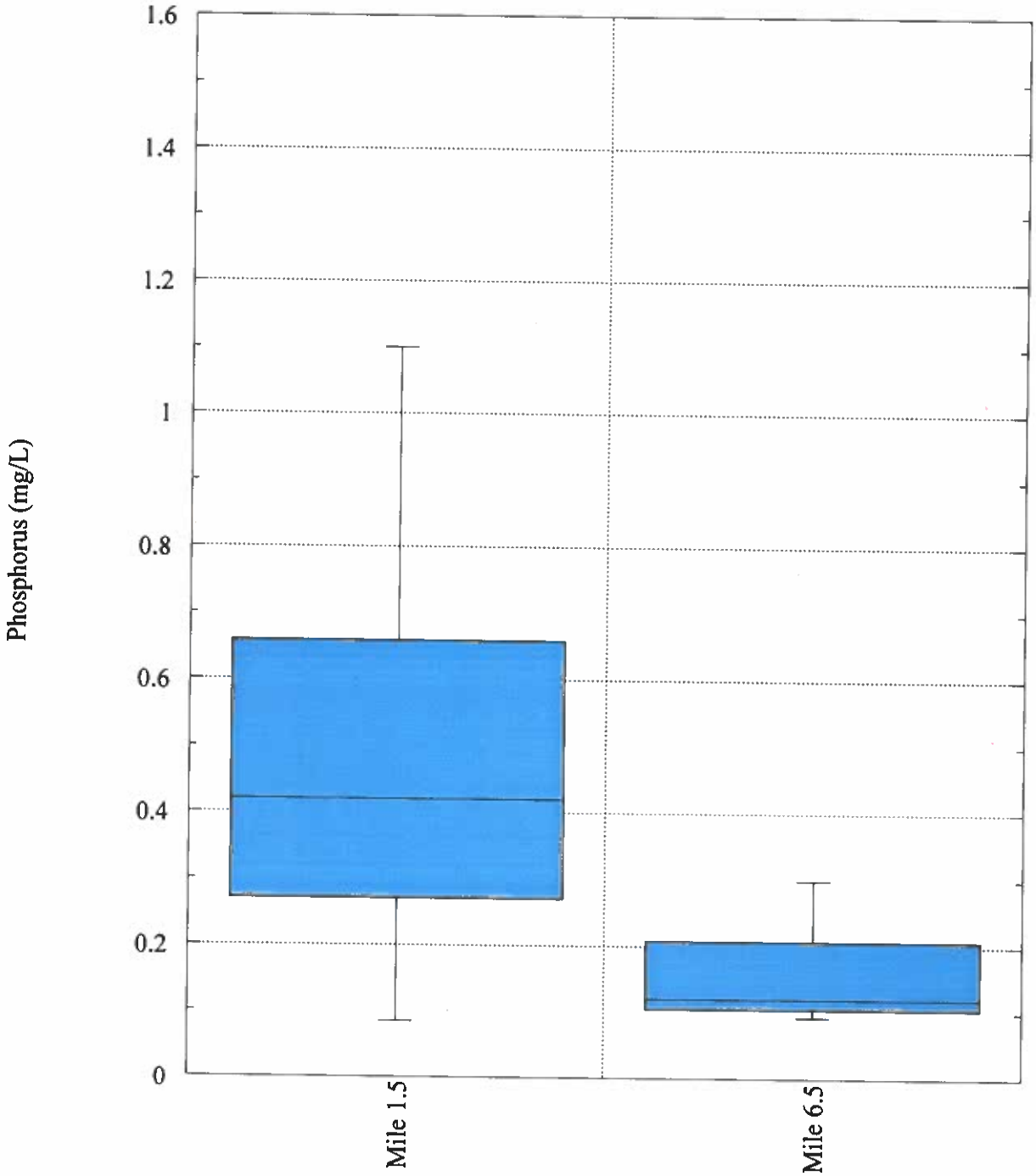

Figure 96: Phosphorus sampled in the Kenai River estuary during July 2000 to 2006.

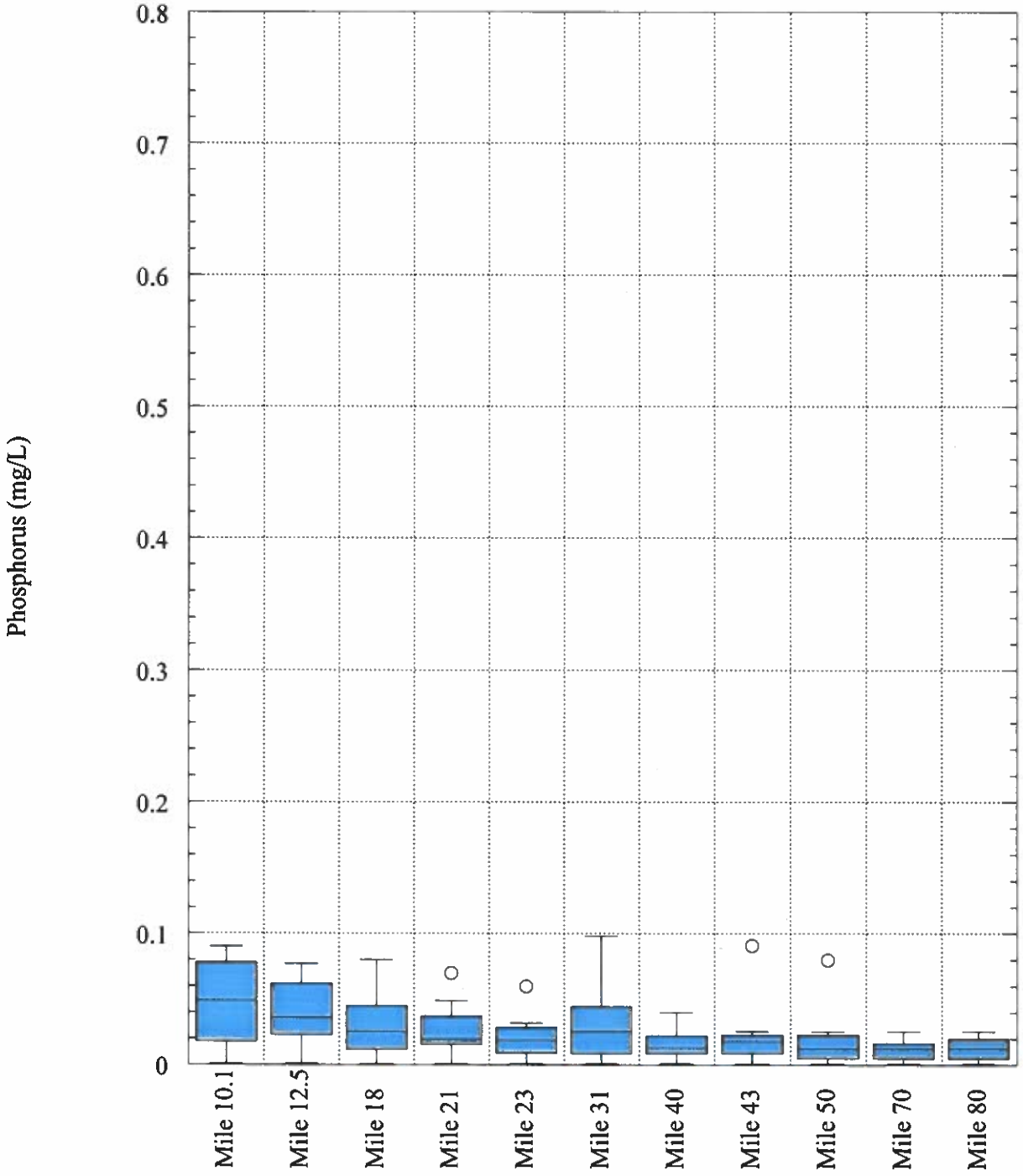

Figure 97: Phosphorus sampled in the Kenai River mainstem (excluding the Kenai River estuary) during July 2000 to 2006. Since 62% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

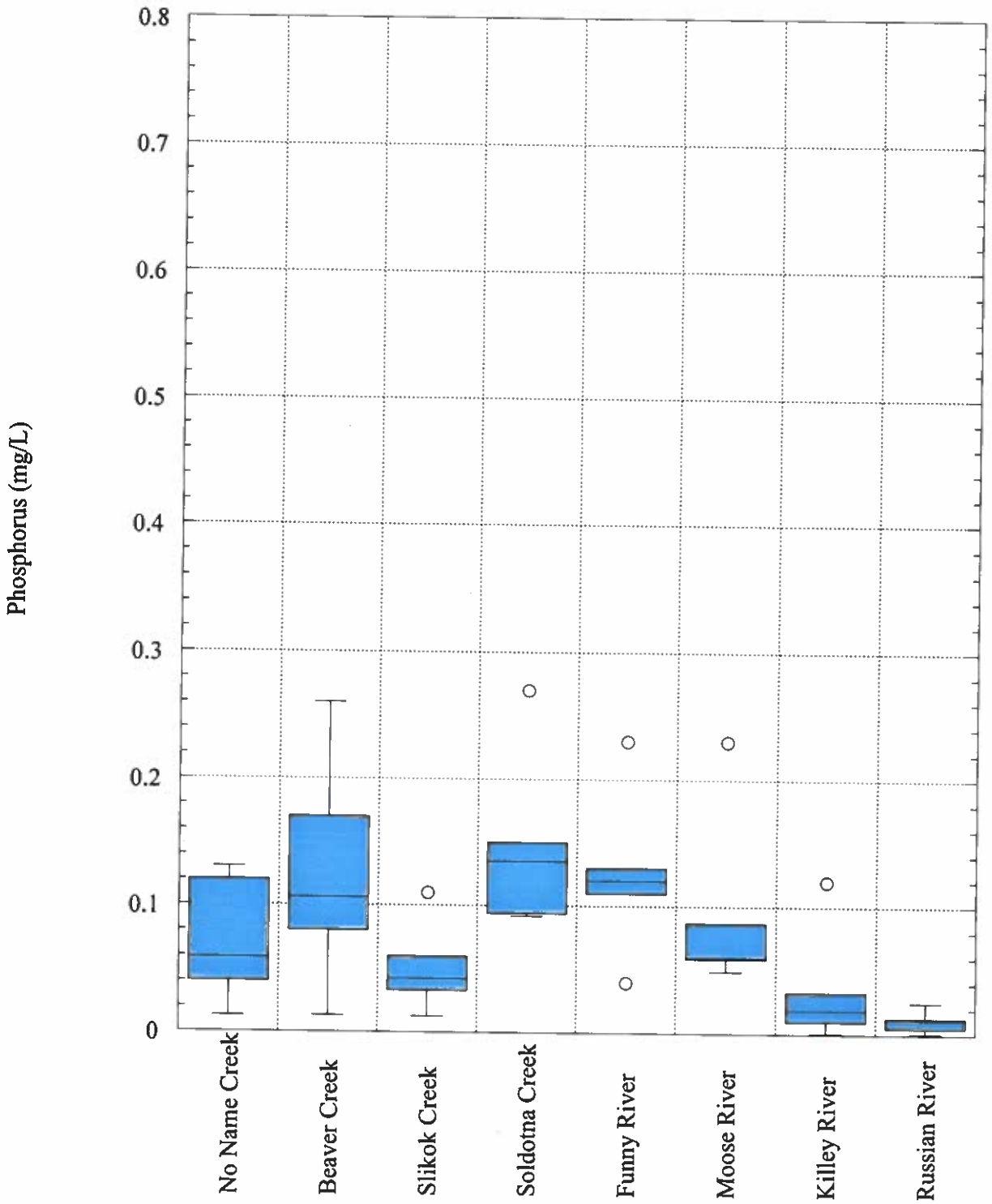

Figure 98: Phosphorus sampled in Kenai River tributaries during April 2001 to 2006. Since 26% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

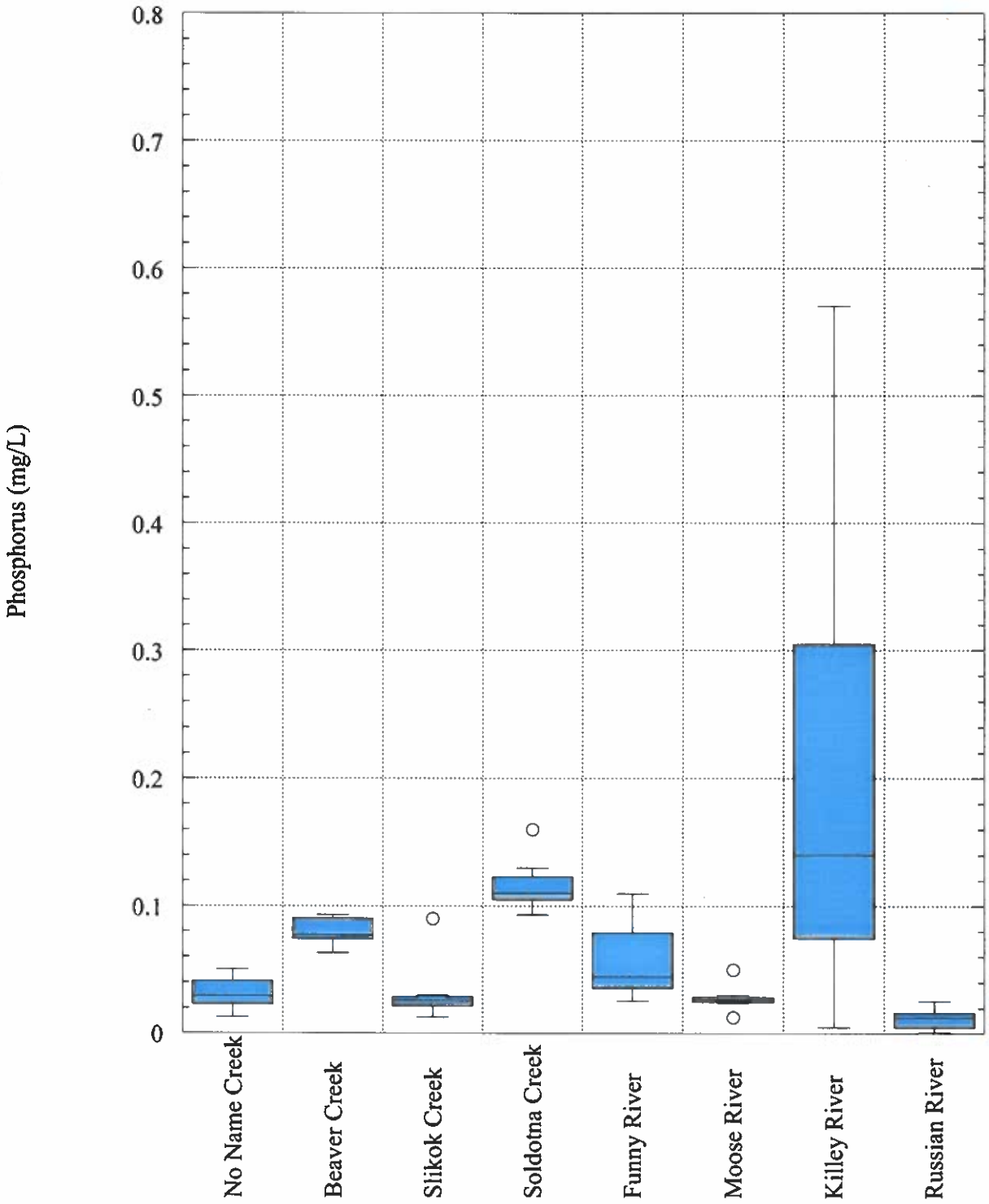

Figure 99: Phosphorus sampled in Kenai River tributaries during July 2000 to 2006. Since 31% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

Diesel Range Organics

Diesel range organics (DRO) consist of diesel fuels and associated byproducts, and include the n-alkane range from C_{10} to C_{25} (ADEC, 2007). Although the ADEC and the USEPA do not have a standard for the chronic exposure of freshwater aquatic life to DRO, it was included in this study to cover a broad range of hydrocarbons and narrow down potential sources.

In the mainstem, DRO concentrations ranged from a high of 0.29 mg/L that occurred at Mile 1.5 and Mile 31 during April 2001 to the lowest levels that occurred at multiple locations at concentrations below the MDL of 0.0060 mg/L in April 2005. In April, DRO was reported only in 2001 at Mile 1.5, Mile 10.1, and Mile 31, and the reported levels were only slightly higher than the MRLs. The July samples in the mainstem were all below the MDL or MRL, and therefore, more DRO was detected in April than in July.

The highest level of diesel range organics was 0.37 mg/L at Soldotna Creek in July 2000, and the lowest levels occurred in multiple instances below the MDL of 0.0060 mg/L in April 2005. In April, DRO was reported only in 2001 at Slikok Creek, Soldotna Creek, and Moose River, while during July, the only tributary to report DRO was Soldotna Creek in 2000. In the tributaries, there were also more instances of detection in April than in July. The concentrations observed in the tributaries were higher than those detected in the mainstem.

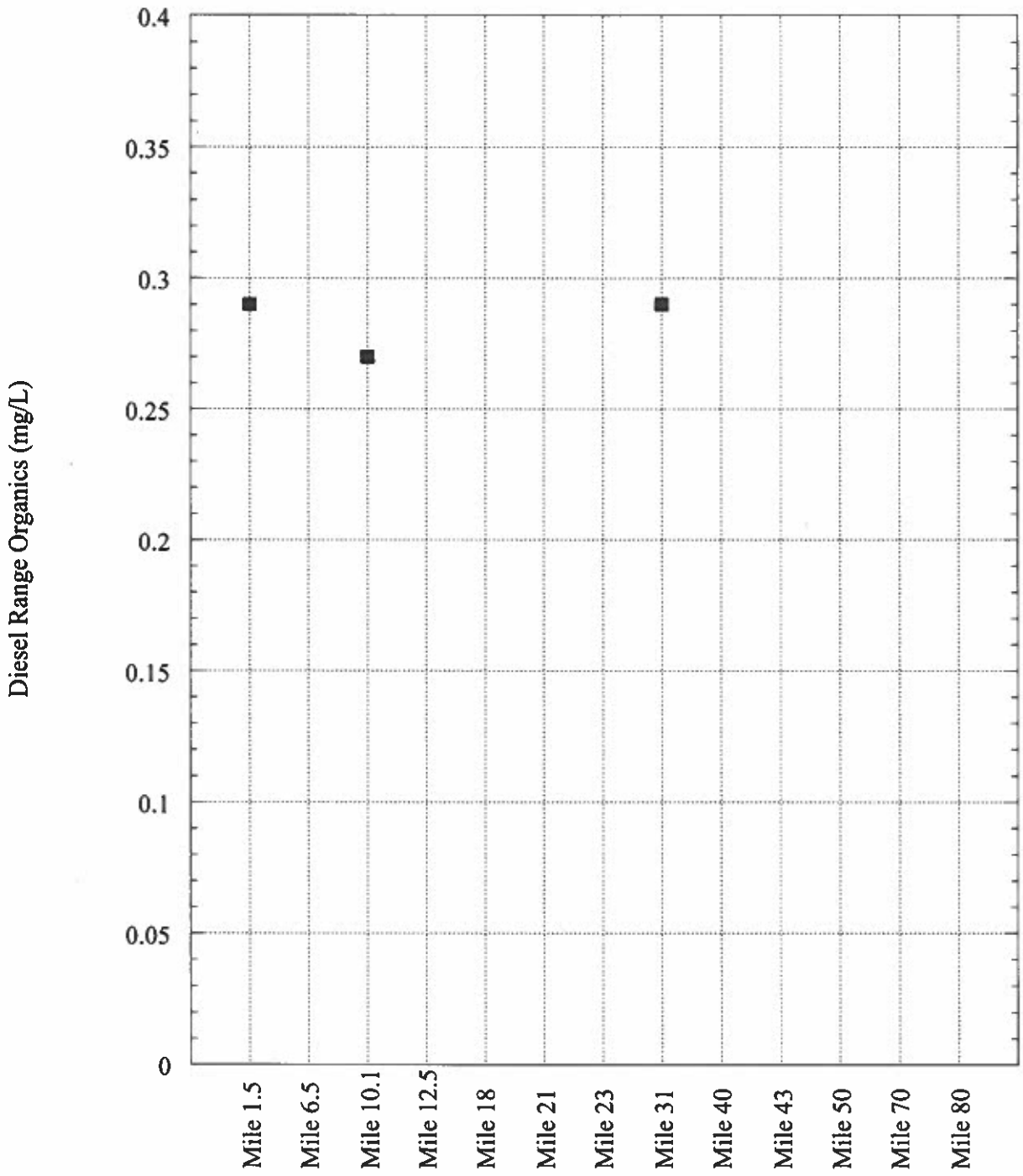

Figure 100: Diesel range organics sampled in the Kenai River mainstem during April 2001 to 2005 and July 2000 to 2006. 98% of the samples had results below the MRL or MDL, so those results are not included in the graph.

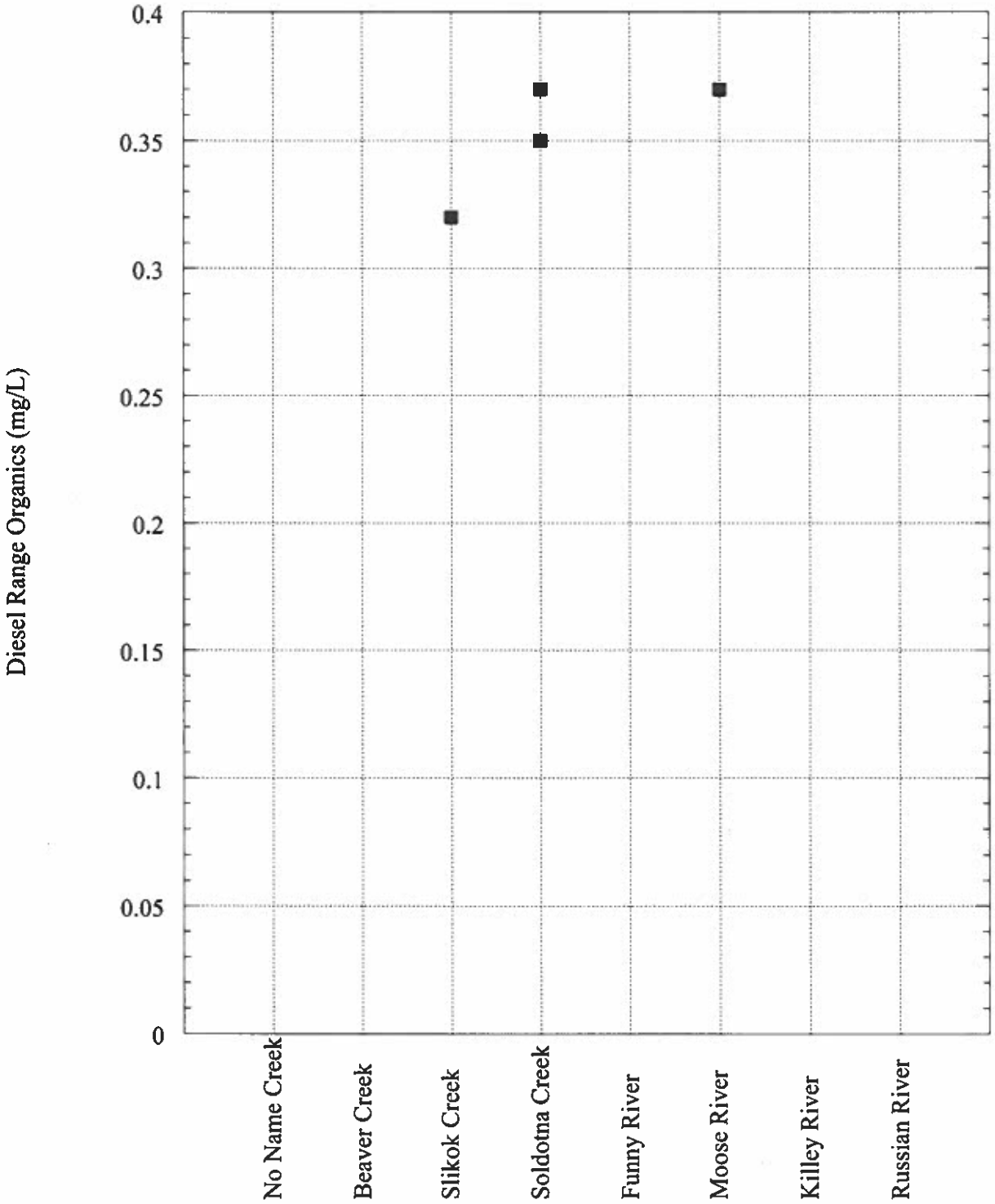

Figure 101: Diesel range organics sampled in Kenai River tributaries during April 2001 to 2005 and July 2000 to 2006. 96% of the samples had results below the MRL or MDL, so those results are not included in the graph.

Gasoline Range Organics

Gasoline Range Organics (GRO) are comprised of gasoline fuels and by-products, including benzene, toluene, ethylbenzene, and xylene (BTEX), and GRO corresponds to the n-alkane range of C_6 to C_{10} (ADEC, 2007). Although there is an ADEC standard specifically for BTEX, there is not an ADEC or USEPA standard applicable to GRO as a whole for the chronic exposure of freshwater aquatic life.

The highest level of gasoline range organics was 38.3 μg/L at Mile 1.5 in July 2002, and many samples were below the MDL of 3.0 μg/L in April 2004. Gasoline range organics have only been detected in July at Mile 1.5, Mile 6.5, and Mile 10.1 in the mainstem and were never detected in the tributaries. Although no concentrations were reported in July 2005, this may be due to the exceptionally high MRL of 100 μg/L. More gasoline range organics were detected in July since none were reported in April.

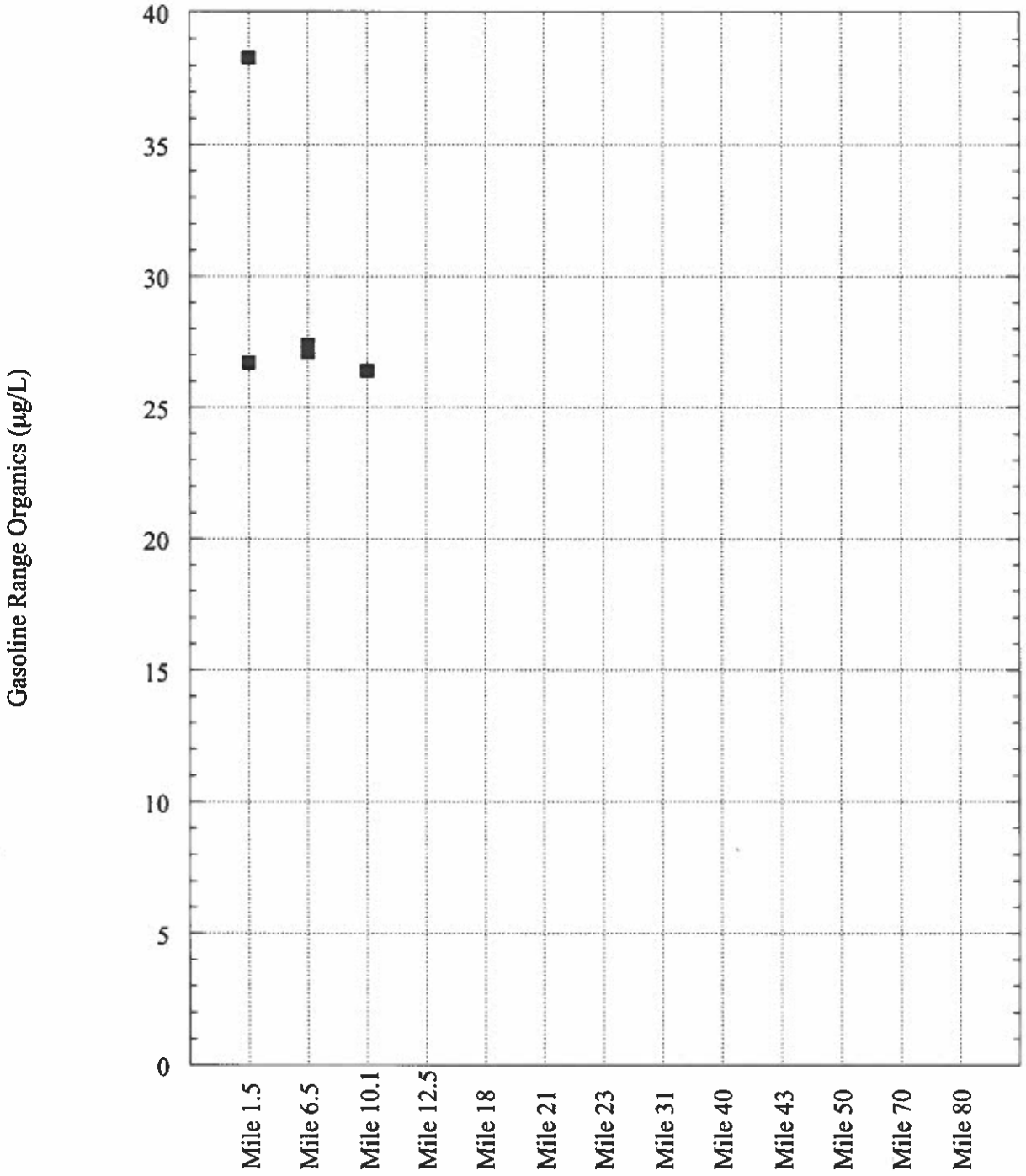

Figure 102: Gasoline range organics sampled in the Kenai River mainstem during April 2001 to 2004, July 2000 to 2003, and July 2005. 96% of the samples had results below the MRL or MDL, so those results are not included in the graph.

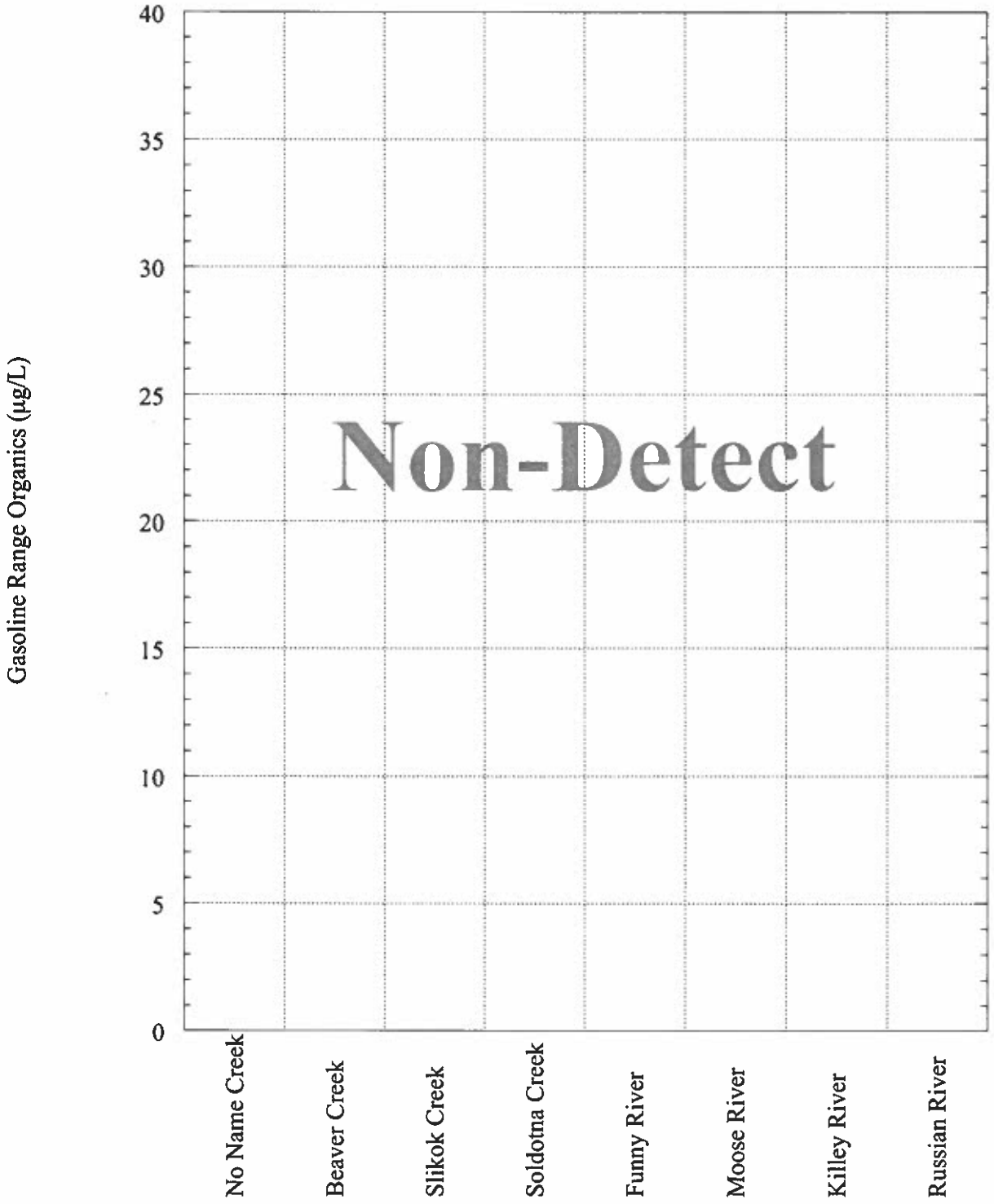

Figure 103: Gasoline range organics sampled in Kenai River tributaries during April 2001 to 2004, July 2000 to 2003, and July 2005. All of the samples are reported as below the MRL or MDL.

Residual Range Organics

Heavy fuel products, like asphalt or Bunker C fuel, are referred to as residual range organics (RRO) and include the n-alkane range of C_{25} to C_{36} (ADEC, 2007). RRO was included in this study to cover a broad range of hydrocarbons, however, there is no ADEC or USEPA standard for freshwater aquatic life chronically exposed to RRO.

The only instance of detection in the mainstem occurred at Mile 23 with a concentration of 4.75 during July 2000, and the lowest levels were reported in numerous locations below the MDL of 0.032 mg/L in April and July of 2004. The highest concentration of RRO ever detected was 5.67 mg/L in Soldotna Creek during July of 2000, and the lowest levels in the tributaries occurred in multiple instances below the MDL of 0.032 mg/L in April of 2004. In April, No Name Creek was the only location that reportedly contained RRO, and in July 2004, No Name Creek also contained RRO. The only other tributary to report RRO was Soldotna Creek in July 2000. In July, there were three detected concentrations compared to one in April, and more detected levels occurred in the tributaries than the mainstem.

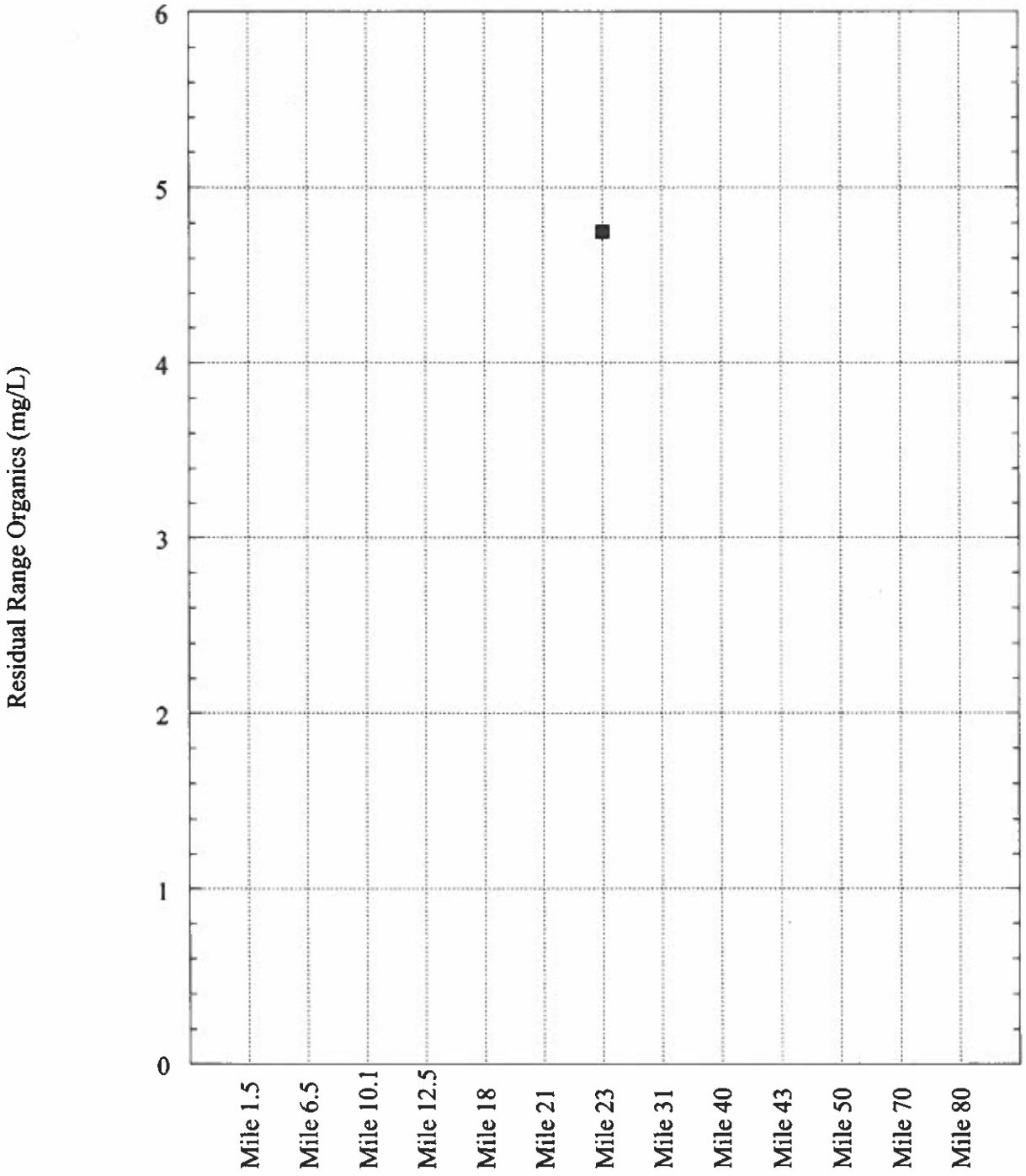

Figure 104: Residual range organics sampled in the Kenai River mainstem during April 2001 to 2005 and July 2000 to 2006. 99% of the samples had results below the MRL or MDL, so those results are not included in the graph.

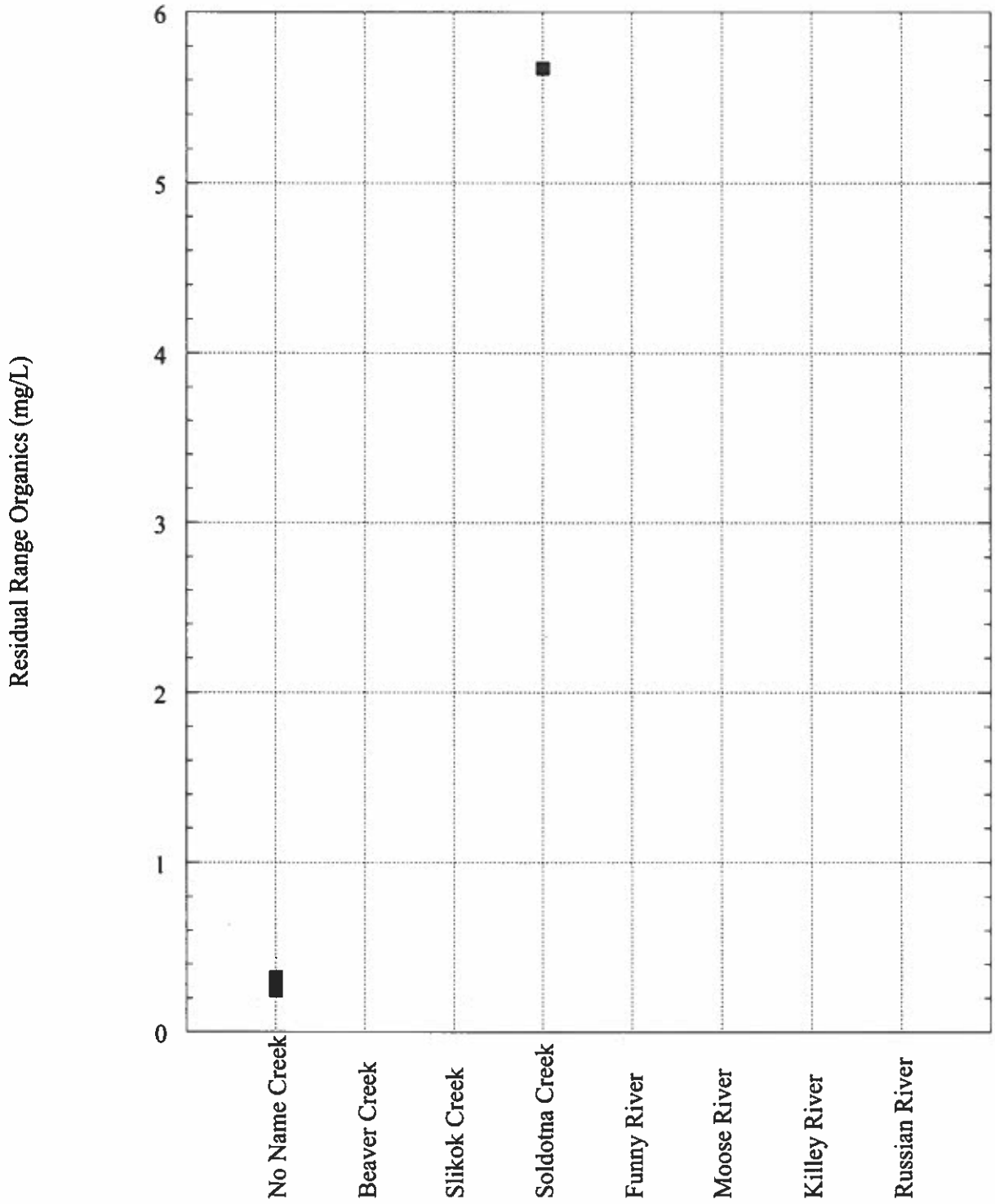

Figure 105: Residual range organics sampled in Kenai River tributaries during April 2001 to 2005 and July 2000 to 2006. Since 97% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

Total BTEX

Benzene, toluene, ethylbenzene, m,p-xylene, and o-xylene are the aromatic hydrocarbons that are commonly referred to as BTEX. Volcanoes and forest fires are natural sources of benzene, and benzene is also a component in cigarette smoke, crude oil, and gasoline (ATSDR, 2005a). Benzene breaks down slowly in water and soil, but concentrations do not build up in plants and animals (ATSDR, 2005a). A natural part of crude oil, toluene is used to produce gasoline, paint, paint thinner, lacquer, and adhesives (ATSDR, 2001). Toluene can enter surface water due to petroleum or solvent spills and engine exhaust, but does not buildup to high concentrations in animals (ATSDR, 2001). Ethylbenzene is a colorless liquid found naturally in coal tar and petroleum, and is often used as a solvent and as a component in fuel, ink, insecticide, and paint (ATSDR, 1999). Xylene has three forms or isomers called meta-xylene, para-xylene, and ortho-xylene, which are reported in this study as m,p-xylene and o-xylene. As a natural part of petroleum and coal tar, xylene has many uses as a solvent, cleaner, paint thinner, and a small component of gasoline (ATSDR, 2005b). Once xylene enters surface water, it evaporates quickly into the air, but a small amount can concentrate in aquatic life (ATSDR, 2005b). The ADEC standard is 10 μg/L for total aromatic hydrocarbons in freshwater for the growth and propagation of fish, shellfish, other aquatic life, and wildlife (see Appendix 2) (ADEC, 2006). Additionally, the ADEC requires that surface waters do not have any floating oil, film, sheen, or discoloration due to hydrocarbons and that in shoreline or bottom sediments, there cannot be any concentration of petroleum hydrocarbons that cause deleterious effects to aquatic life (ADEC, 2006).

The highest level of BTEX in the mainstem occurred at Mile 1.5 at a level of 15.2 μg/L in July 2002, and the lowest levels were reported as non-detect because they were below the MDLs and MRLs. No BTEX was reported in any of the April samples, but high levels were detected in the lower river during July. The median of BTEX exceeded the Alaska standard at Mile 1.5, and individual samples from Mile 6.5 exceeded the standard during July of 2000 and 2001. A clear upward trend is evident from Mile 31 to Mile 1.5, and Mile 40 and Mile 43 show BTEX medians above the next three downstream sites. No BTEX was ever detected at Mile 50 or Mile 70, and only toluene was detected on one occasion at Mile 80.

In the tributaries, concentrations ranged from 6.65 μg/L in the Moose River in July 2002 to non-detects reported in many instances. None of the tributaries had reported levels above the standard, and most never had any reported levels at all. However, Beaver Creek and the Moose River each had multiple instances of detection, and the Killey River reported one occasion of detection in July 2002.

All of the aromatic hydrocarbons of BTEX are typically associated with gasoline (Oasis Environmental, Inc., 2004). Litchfield and Kyle suggest that motorized boats could be the primary contamination source since peak times of outboard motor use coincided with peak concentrations of BTEX (1992). In 2003, the Kenai Watershed Forum determined that the majority of hydrocarbon contamination resulted from unburned refined gasoline product with outboard motors as the most likely source.

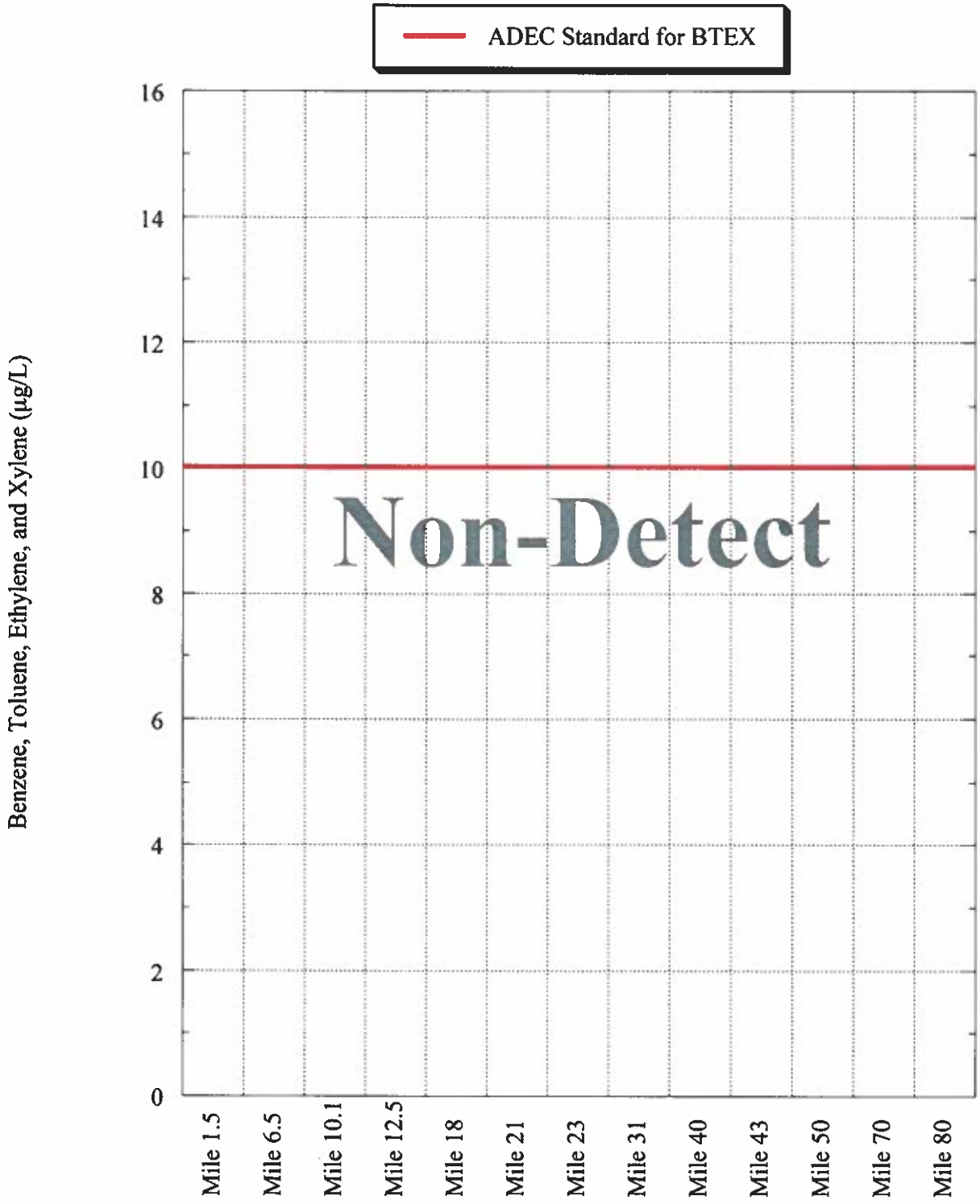

Figure 106: BTEX sampled in the Kenai River mainstem during April 2001 to 2005. All of the samples are reported as below the MRL or MDL.

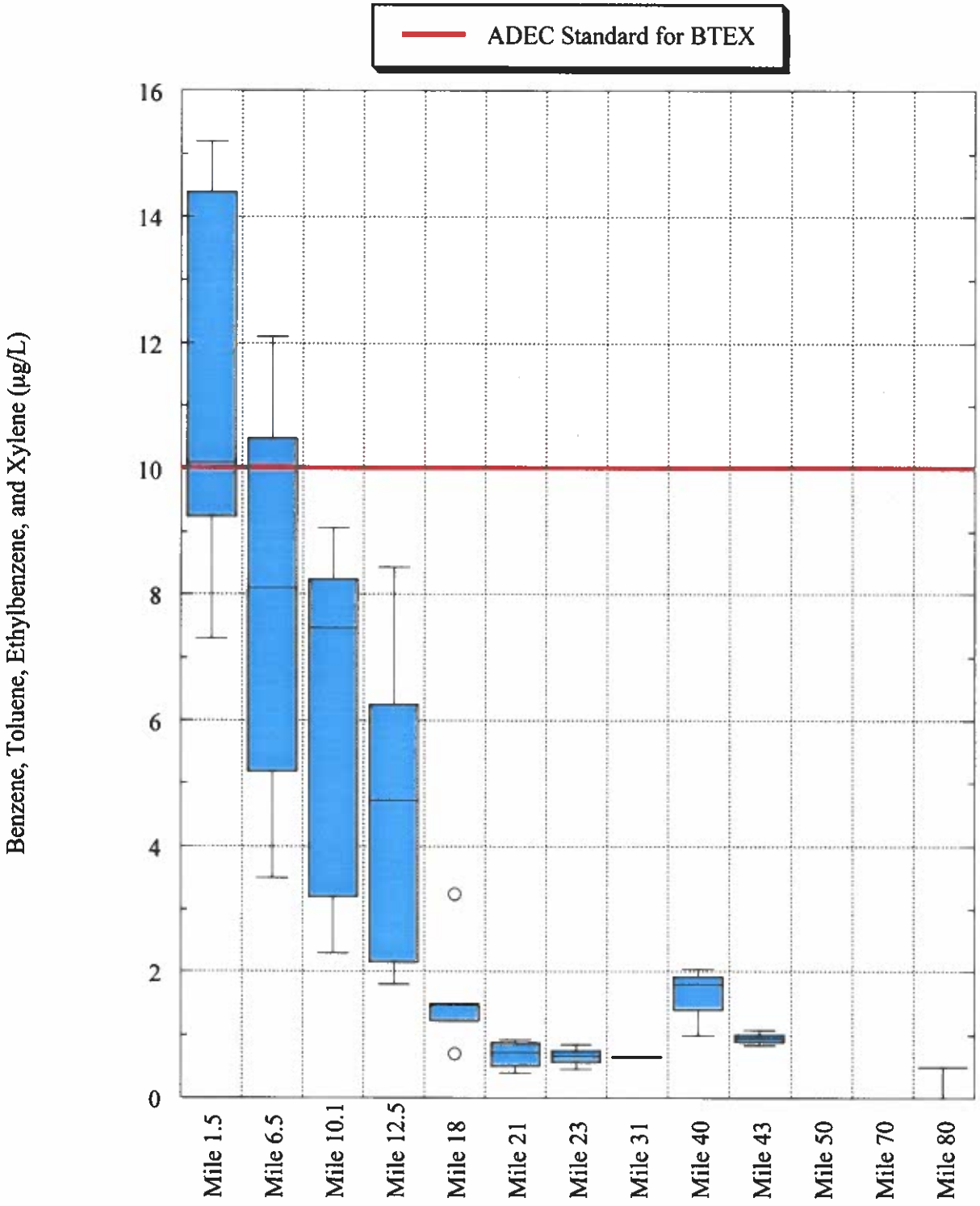

Figure 107: Total BTEX sampled in the Kenai River mainstem during July 2000 to 2006. This graph does not include instances of non-detect, in which all of the BTEX samples were reported as below the MRL or MDL.

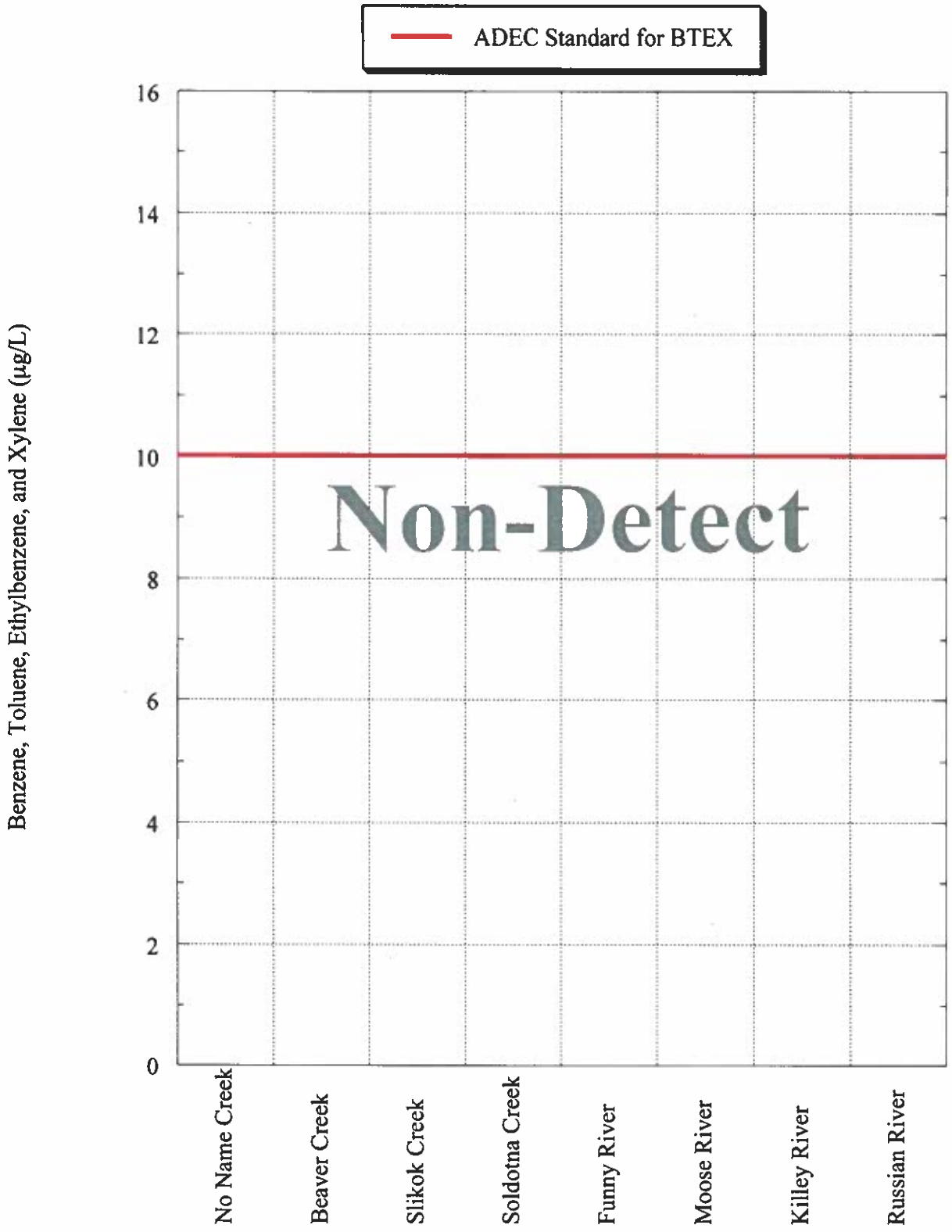

Figure 108: BTEX sampled in Kenai River tributaries during April 2001 to 2005. All of the samples are reported as below the MRL or MDL.

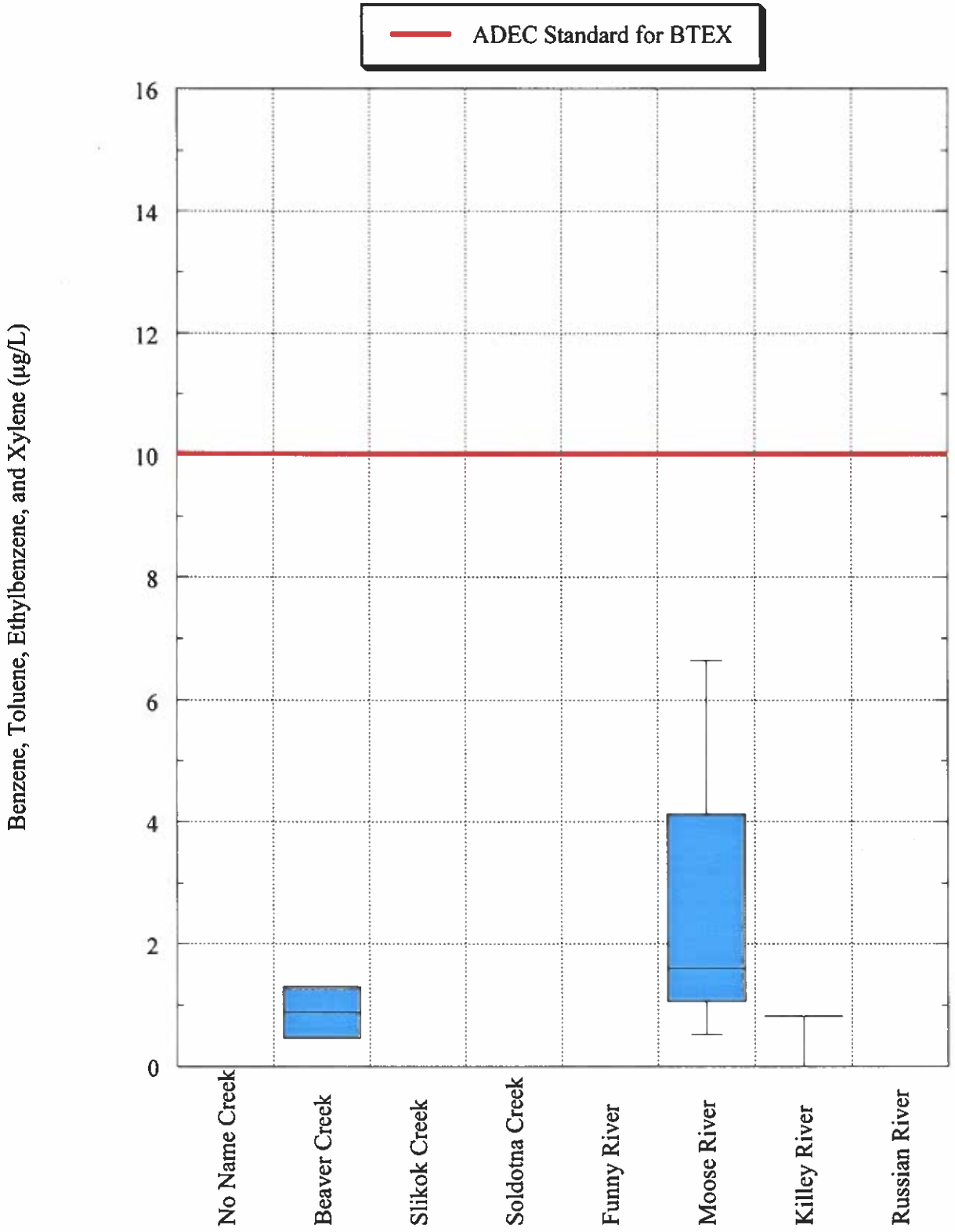

Figure 109: Total BTEX sampled in Kenai River tributaries during July 2000 to 2006. This graph does not include instances of non-detect, in which all of the BTEX samples were reported as below the MRL or MDL.

Fecal Coliform Bacteria

The presence of fecal coliform bacteria in surface water indicates fecal contamination from warm-blooded animals, which is linked to disease-causing viruses and bacteria (Glass, 1999). Sources of fecal coliform bacteria include waste from septic systems, domestic animals, waterfowl, and other wildlife (Glass, 1999). The ADEC and USEPA standards for fecal coliform bacteria do not apply to these study results because both require multiple samples to be collected within a 30-day period. For reference, the ADEC standard states that in a 30-day period, the geometric mean of samples may not exceed 200 CFU/100m, and not more than 10% of the total samples may exceed 400 CFU/100m for secondary forms of recreation in freshwater (see Appendix 2) (ADEC, 2006).

The highest level recorded was 2980 CFU/100m at Mile 6.5 during July 2002, however this sample may be unreliable because the duplicate sample was below the MDL of 10 CFU/100m. The next highest recorded concentration in the mainstem was 580 CFU/100m at Mile 6.5 during July of 2003, and the lowest levels were 0 CFU/100m during April 2001-2004 and April 2006 at several locations. The highest median in the mainstem occurred at Mile 6.5 in both April and July, followed by Mile 1.5. The other medians along the mainstem were all below 10 CFU/100m for July and April, and no fecal coliform bacteria were ever detected at Mile 50. The concentration of fecal coliform was generally higher in July than in April in the mainstem and the tributaries.

In the tributaries, the concentration of fecal coliform ranged from a high of 520 CFU/100m in Soldotna Creek during April 2001 to 0 CFU/100m in April 2001-2004, April 2006, and July 2002 at multiple sites. During April, Soldotna Creek had the highest median, and during July, Slikok Creek had the highest median. In July, the median concentrations were relatively high in No Name Creek and Beaver Creek, in addition to Slikok Creek. Russian River, Killey River, and Moose River all had relatively low medians during April and July. In July, the tributaries had higher median concentrations of fecal coliform than the mainstem, but in April, the levels in the tributaries and the mainstem were more similar.

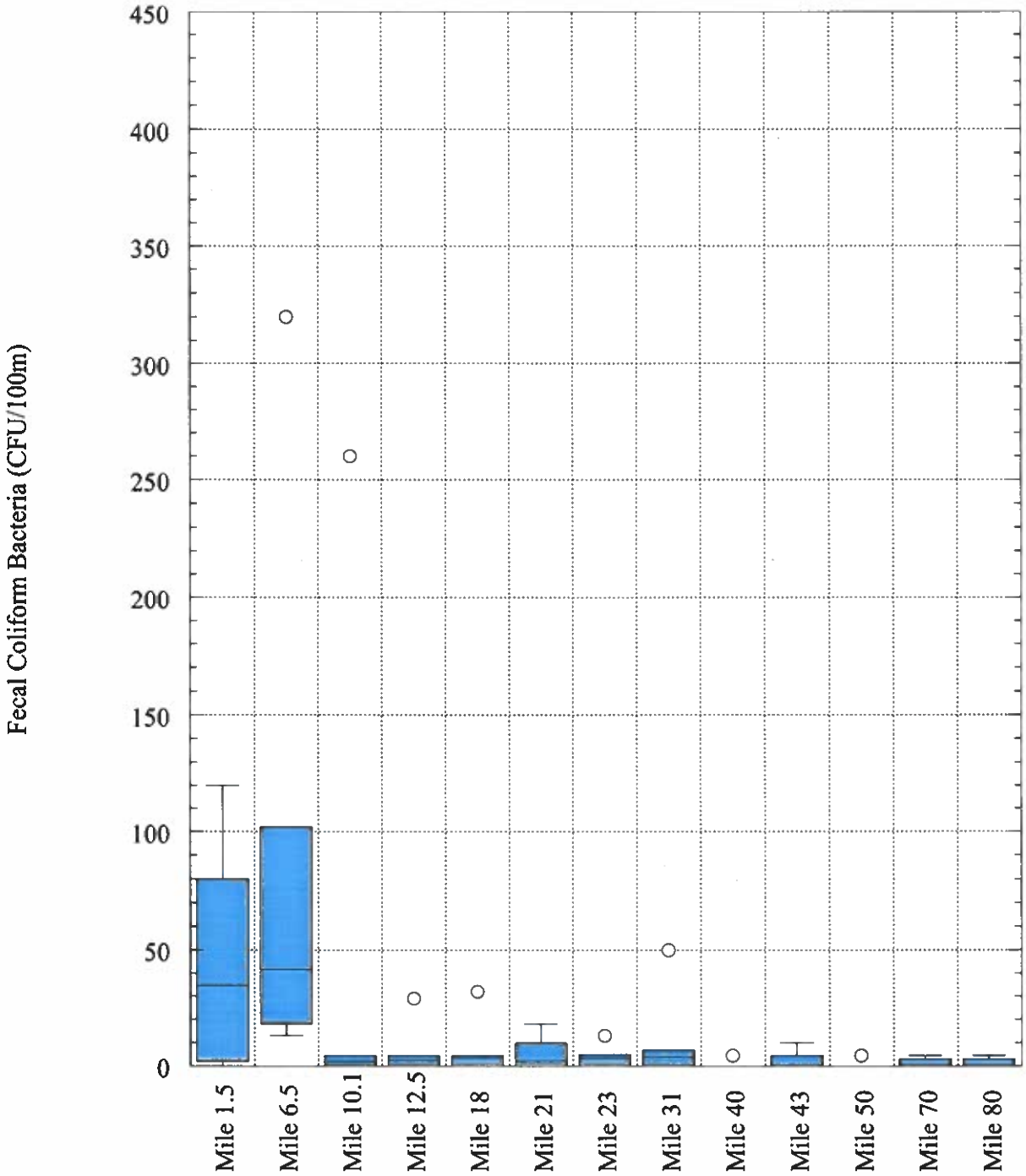

Figure 110: Fecal coliform bacteria sampled in the Kenai River mainstem during April 2001 to 2006. Since 14% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

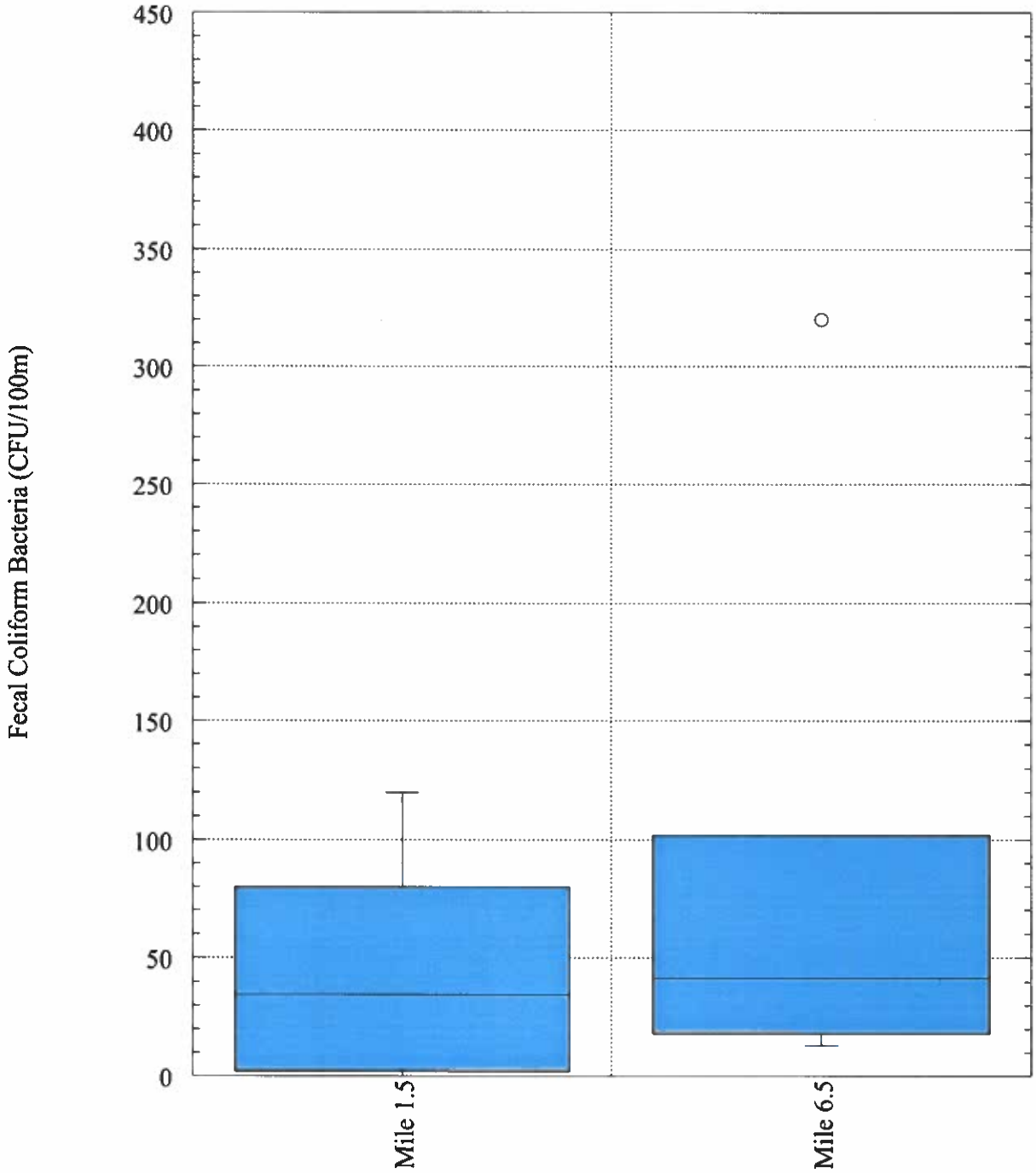

Figure 111: Fecal coliform bacteria sampled in the Kenai River estuary during April 2001 to 2006.

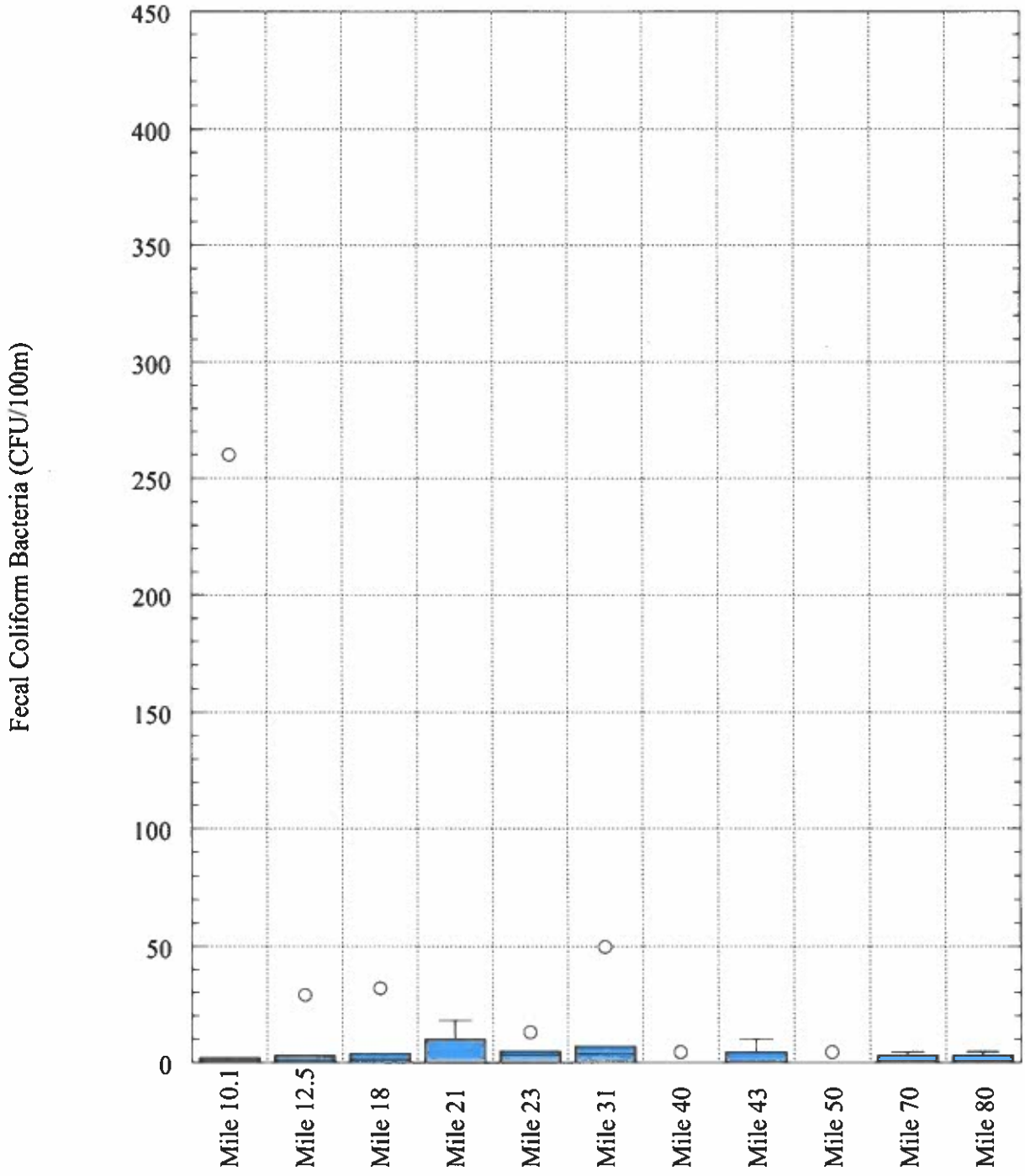

Figure 112: Fecal coliform bacteria sampled in the Lower, Middle, and Upper Kenai River during April 2001 to 2006. Since 17% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

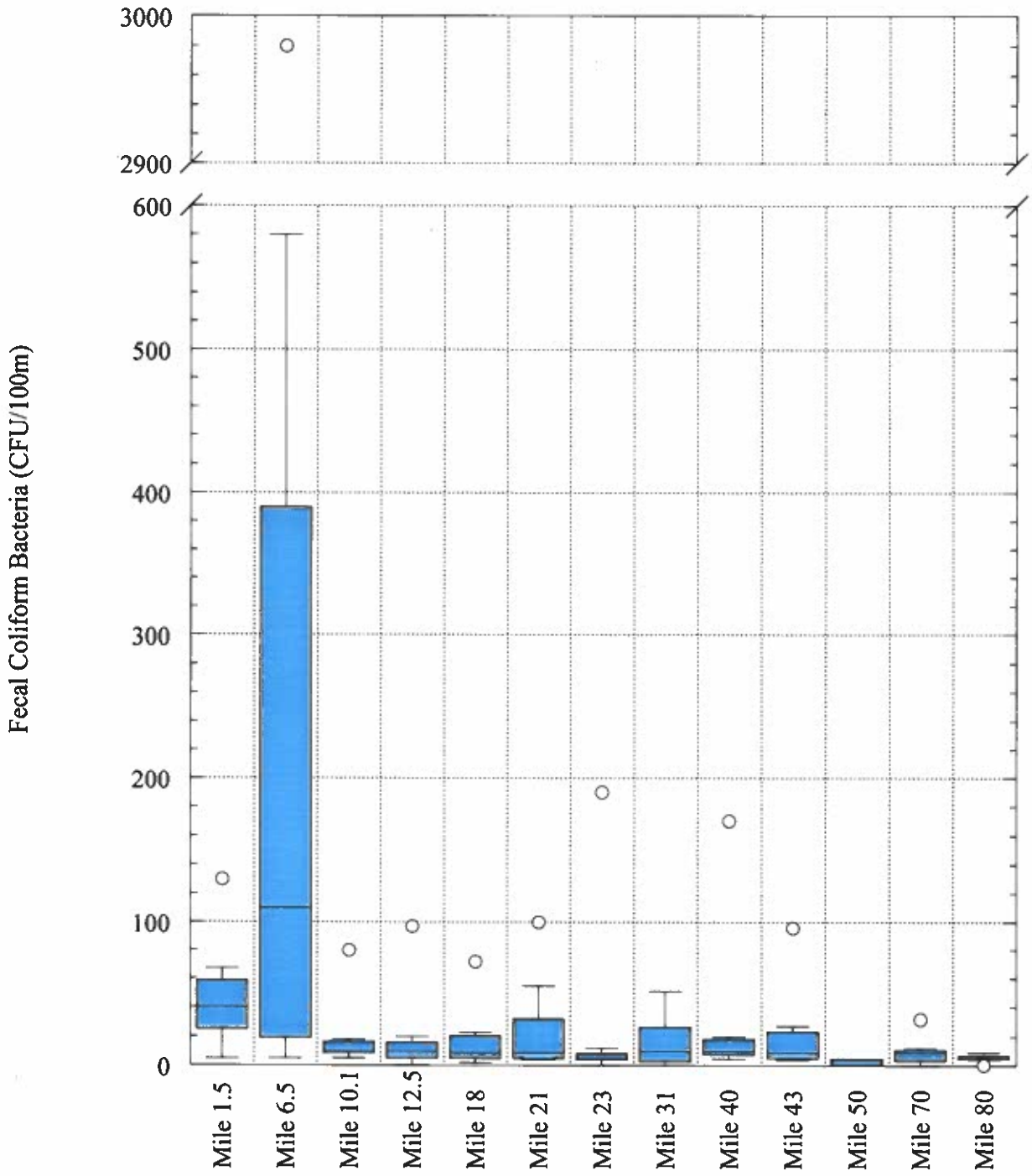

Figure 113: Fecal coliform bacteria sampled in the Kenai River mainstem during July 2000 to 2006. Since 35% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

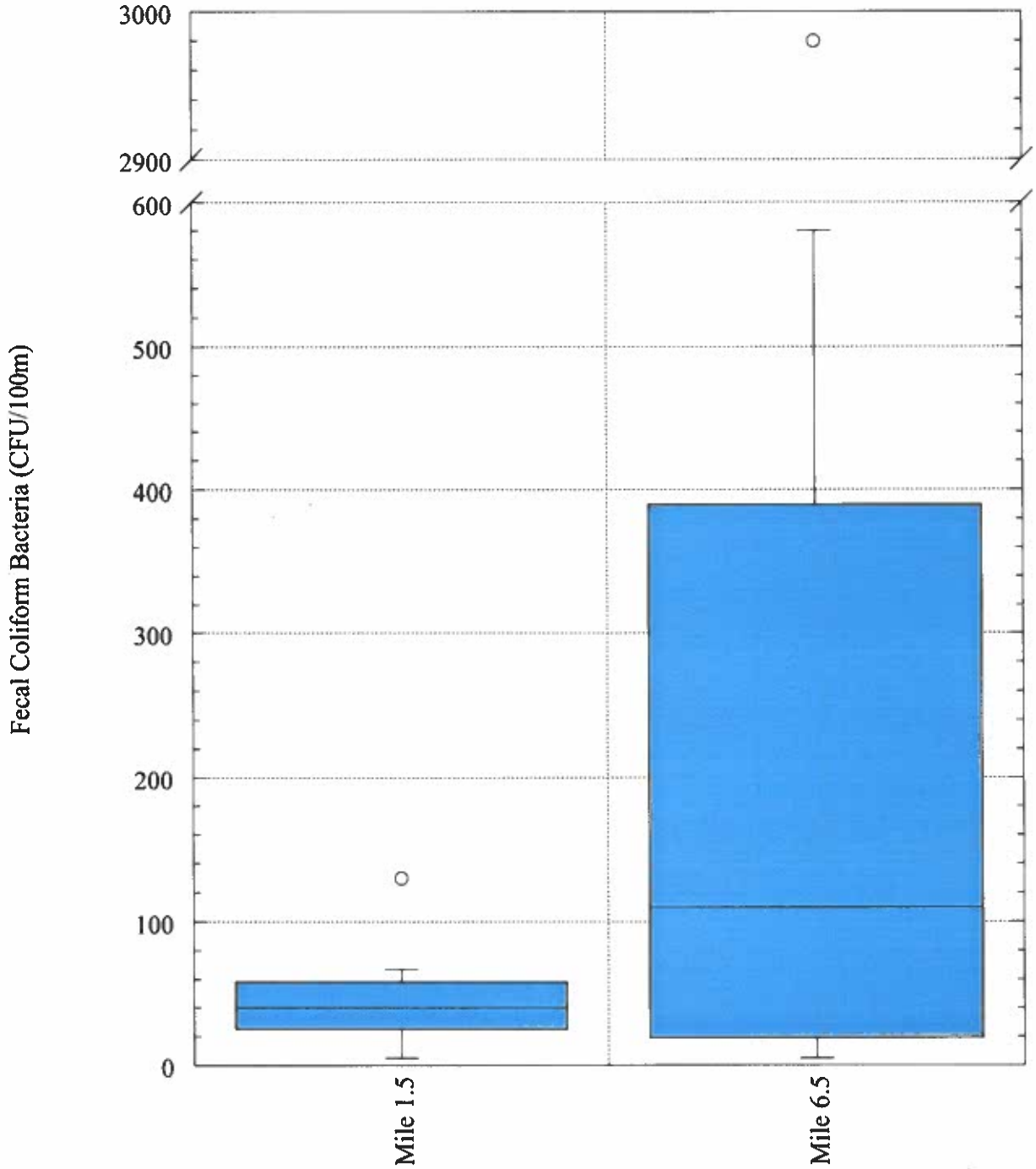

Figure 114: Fecal coliform bacteria sampled in the Kenai River estuary during July 2000 to 2006. Since 14% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

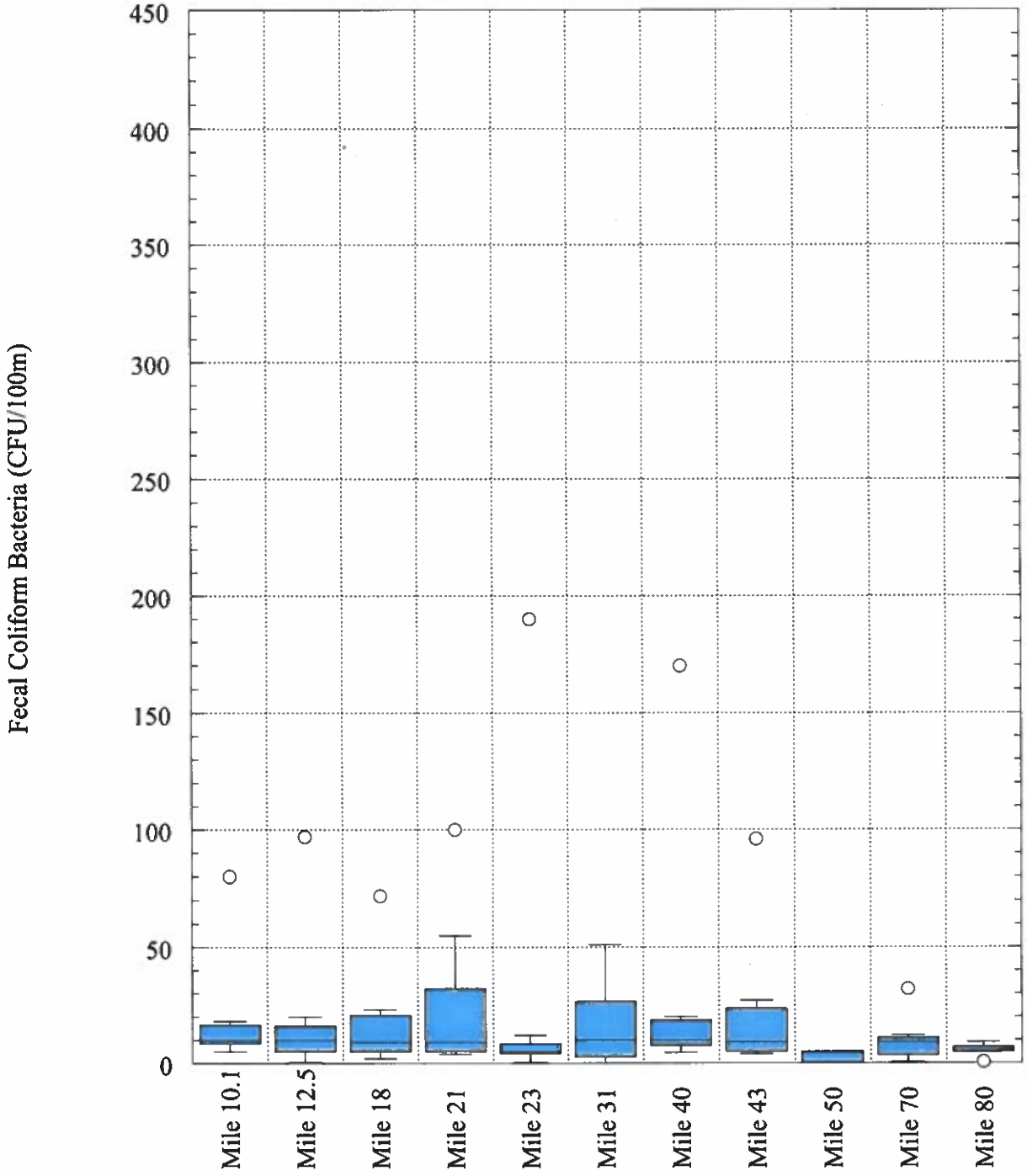

Figure 115: Fecal coliform bacteria sampled in the Lower, Middle, and Upper Kenai River mainstem (excluding the Kenai River estuary) during July 2000 to 2006. Since 39% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

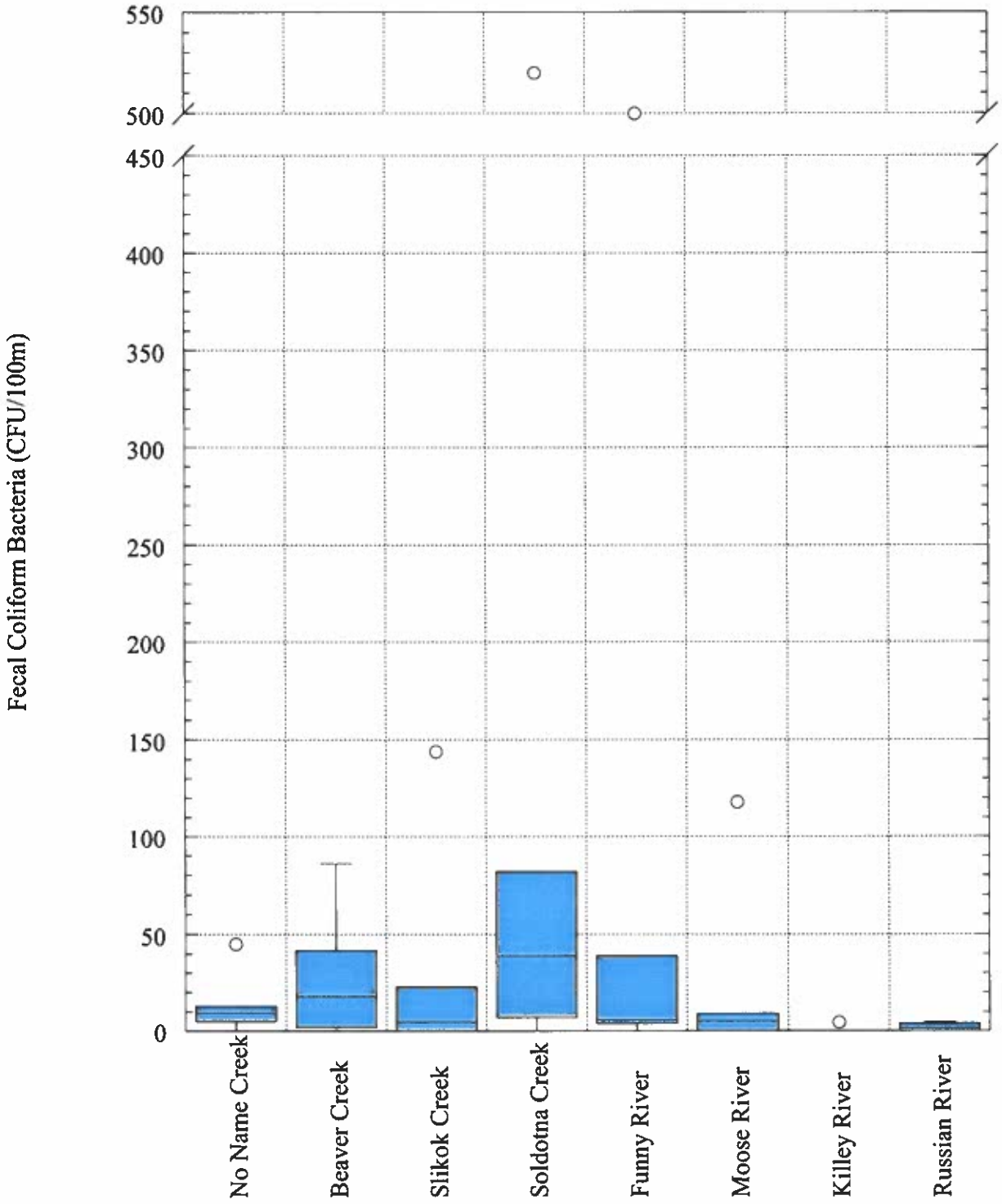

Figure 116: Fecal coliform bacteria sampled in Kenai River tributaries during April 2001 to 2006. Since 11% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

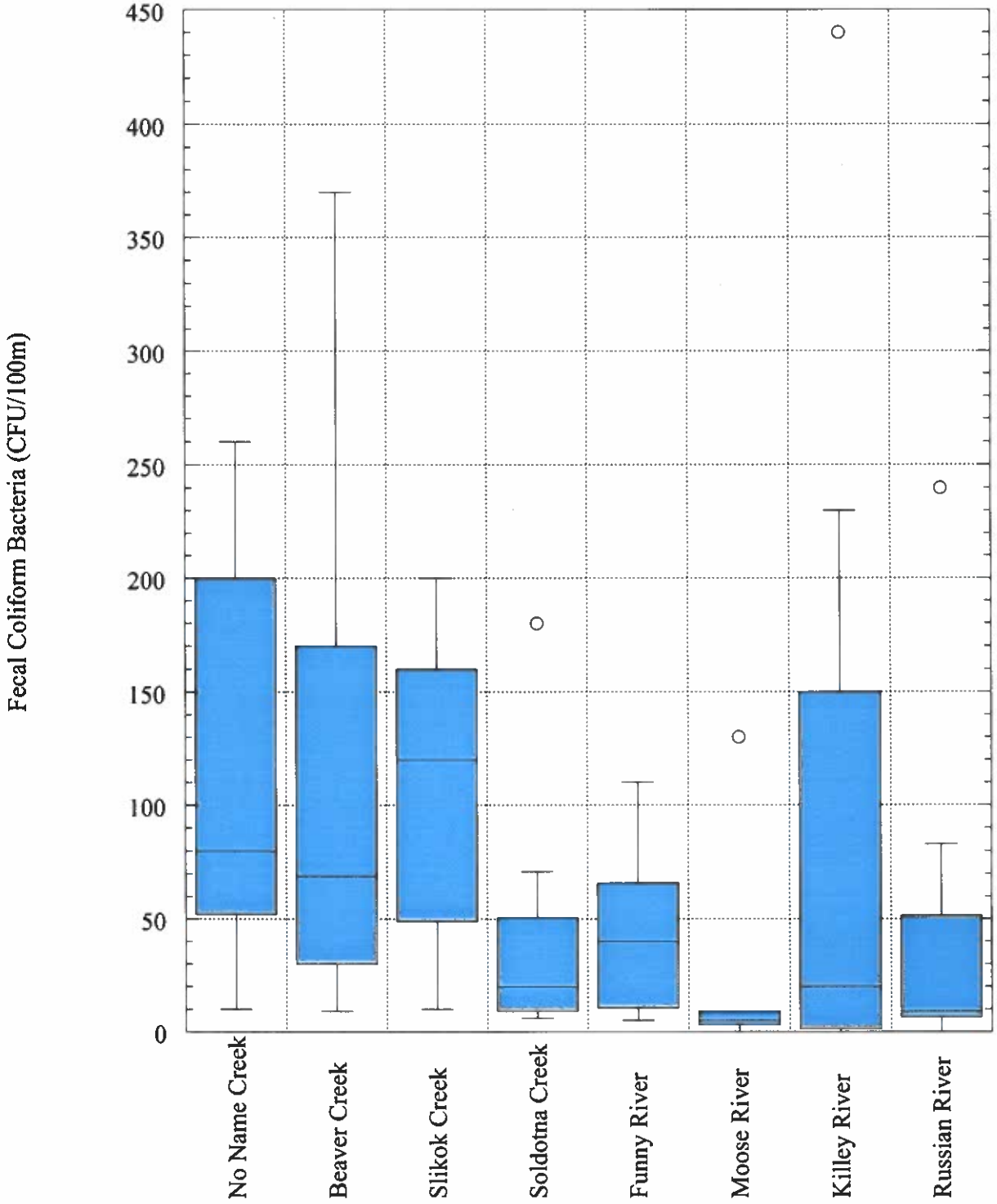

Figure 117: Fecal coliform bacteria sampled in Kenai River tributaries during July 2000 to 2006. Since 7% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

pH

The concentration of hydrogen-ion activity is represented by a pH measurement on a logarithmic scale ranging from 0 to 14 with acidic conditions closer to 0 and alkaline conditions closer to 14 (Glass, 1999). Values of pH ranging from 6.5 to 8.0 are typical in unpolluted river water, and these values can be affected by both natural and human processes (Glass, 1999). The ADEC standard for pH maintains that freshwater may not have a pH less than 6.5 or greater than 8.5 for the growth and propagation of fish, shellfish, other aquatic life and wildlife (see Appendix 2) (ADEC, 2006). Additionally, the standard stipulates that the pH may not vary more than 0.5 pH units from natural conditions and that in any water with a pH naturally outside the specified range, variation of pH must be toward the specified range (ADEC, 2006).

In the mainstem, the pH ranged from a high of 8.52 at Mile 50 in July 2002 to a low of 6.33 at Mile 43 in April of 2004. All the medians along the mainstem were between 7 and 8 for April and July, so they did not exceed the upper and lower limits. Individual samples exceeded the lower limit once at Mile 12.5 and Mile 43 in April, and the upper limit was exceeded by a single sample at Mile 50 in July. The pH was generally lower in April in comparison to July in both the mainstem and the tributaries.

The highest pH ever sampled was 9.03 at Moose River during July 2002, and the lowest was 6.2 at No Name Creek in April 2005. The medians of the tributaries did not exceed either the upper or lower pH limit. The lower limit was exceeded on one occasion each in No Name Creek, Beaver Creek, and Slikok Creek in April, and one sample from the Moose River exceeded the upper limit in July. The Moose River had the highest median pH in July, followed by the Russian River. From April to July, the Killey River median remained near 7, while the other tributaries increased toward 7.5. Excluding the Moose River, the April samples from the tributaries and the mainstem displayed greater variability than the July samples.

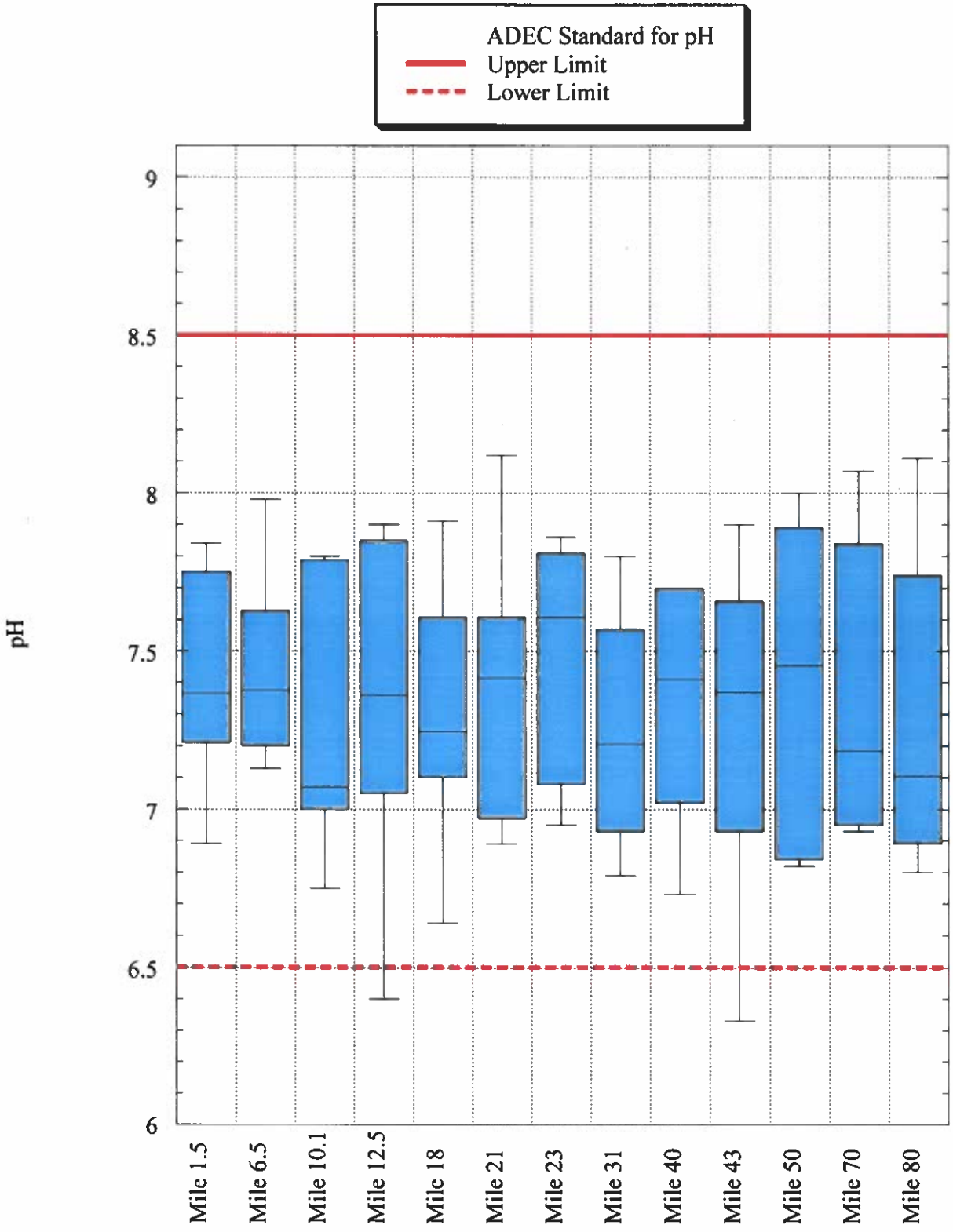

Figure 118: pH sampled in the Kenai River mainstem during April 2001 to 2006.

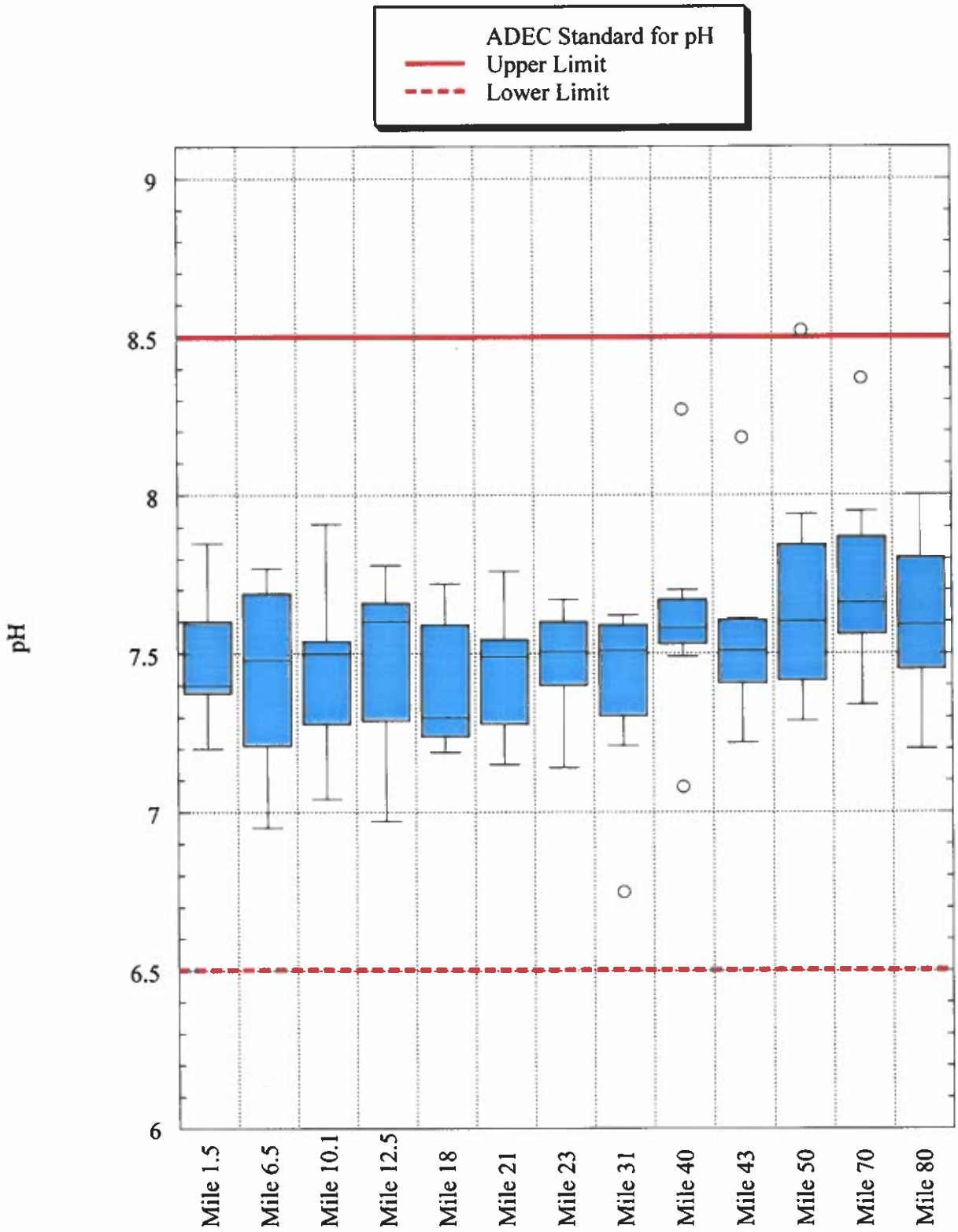

Figure 119: pH sampled in the Kenai River mainstem during July 2000 to 2006.

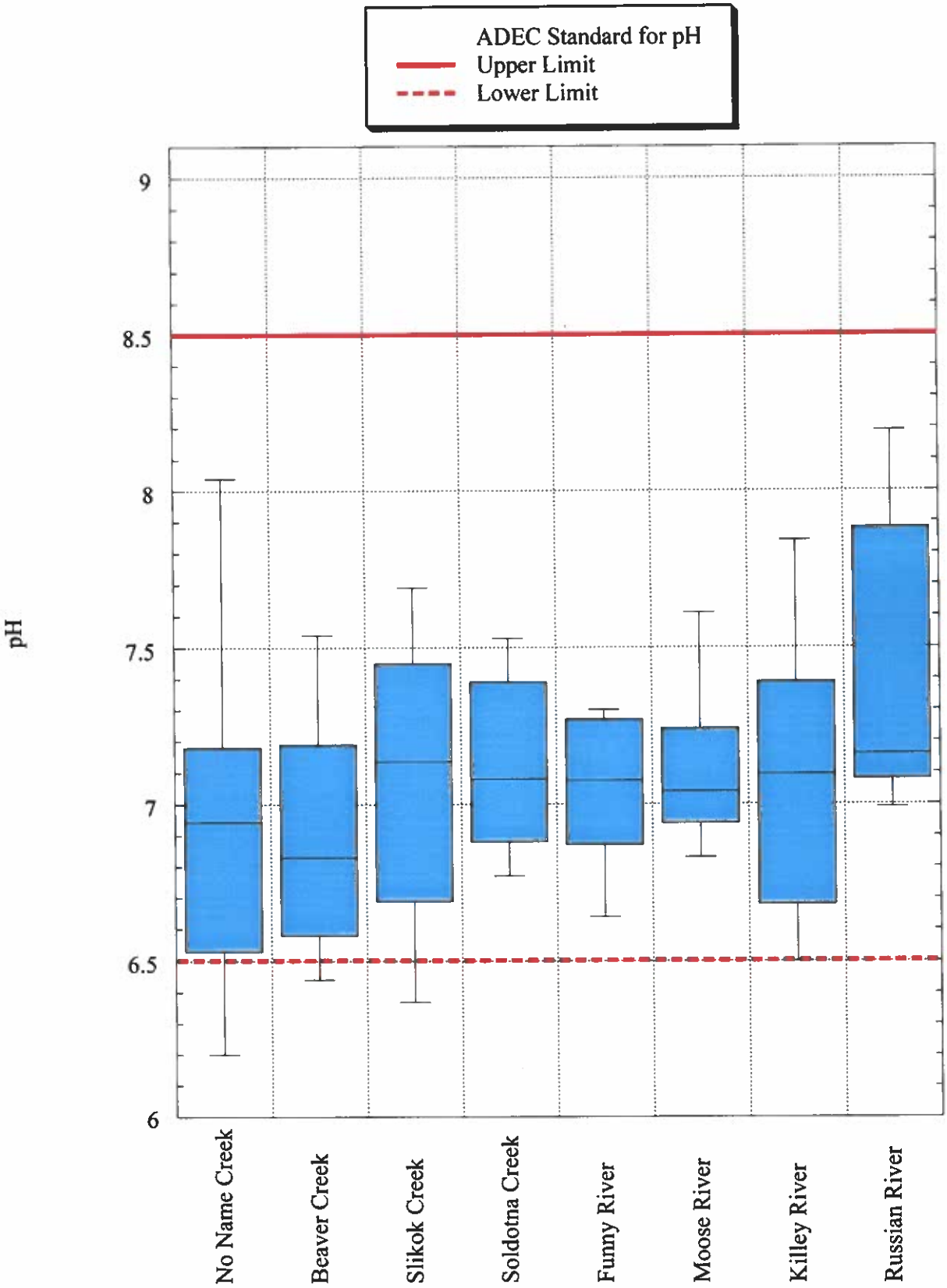

Figure 120: pH sampled in Kenai River tributaries during April 2001 to 2006.

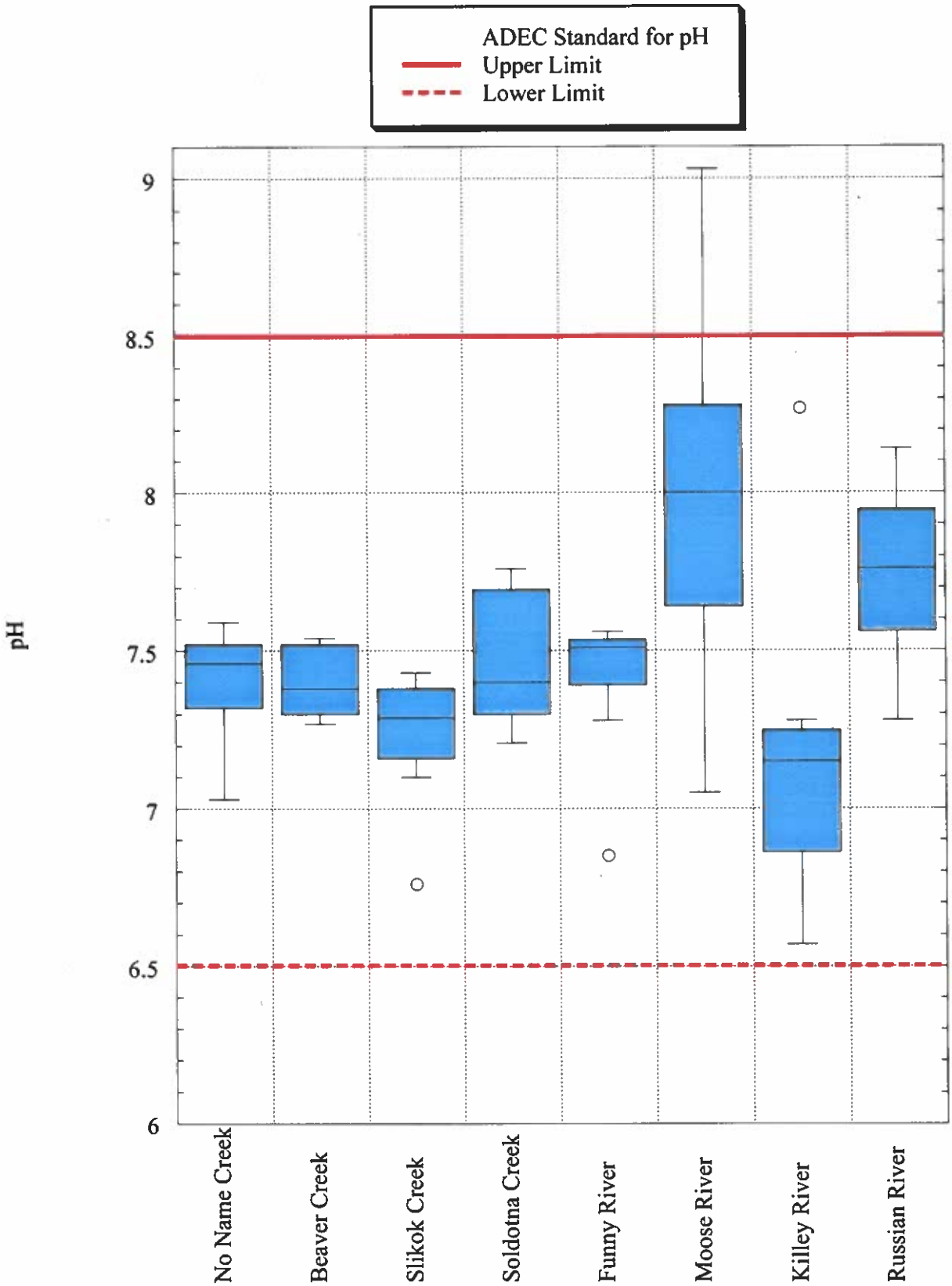

Figure 121: pH sampled in Kenai River tributaries during July 2000 to 2006.

Specific Conductance

The capacity of water to conduct electricity is measured by specific conductance, and the level of specific conductance also correlates with the concentration of calcium, dissolved solids, and the water's hardness (Glass, 1999). There is not currently an ADEC or USEPA standard for specific conductance for aquatic life in freshwater.

The highest level of specific conductance in the mainstem was 21100 µS/cm, which was sampled at Mile 1.5 in April 2003, and the lowest level was 37.7 µS/cm at Mile 50 in April 2004. Mile 1.5 had the greatest variance and the highest median in both April and July, followed by Mile 6.5 in April and Mile 70 in July. From Mile 10.1 to Mile 50, the specific conductivity medians only varied within a span of 15 µS/cm in both April and July, with the lowest median at Mile 43. Above Skilak Lake at Mile 70 and Mile 80, specific conductivity was higher relative to the rest of the mainstem, excluding the estuary. Specific conductivity was higher in April than in July throughout the mainstem.

In the tributaries, specific conductance ranged from a high of 366.8 µS/cm in No Name Creek during July 2001 to the lowest level of 18 µS/cm in the Killey River during July 2004. The Killey River maintained the lowest median during April and July, while the highest median was in No Name Creek in April and Soldotna Creek in July. The tributaries had higher levels of specific conductance in July, except for the Killey River and Russian River. In July, the tributaries generally had higher medians than the mainstem, but a corresponding trend was not apparent in the April data.

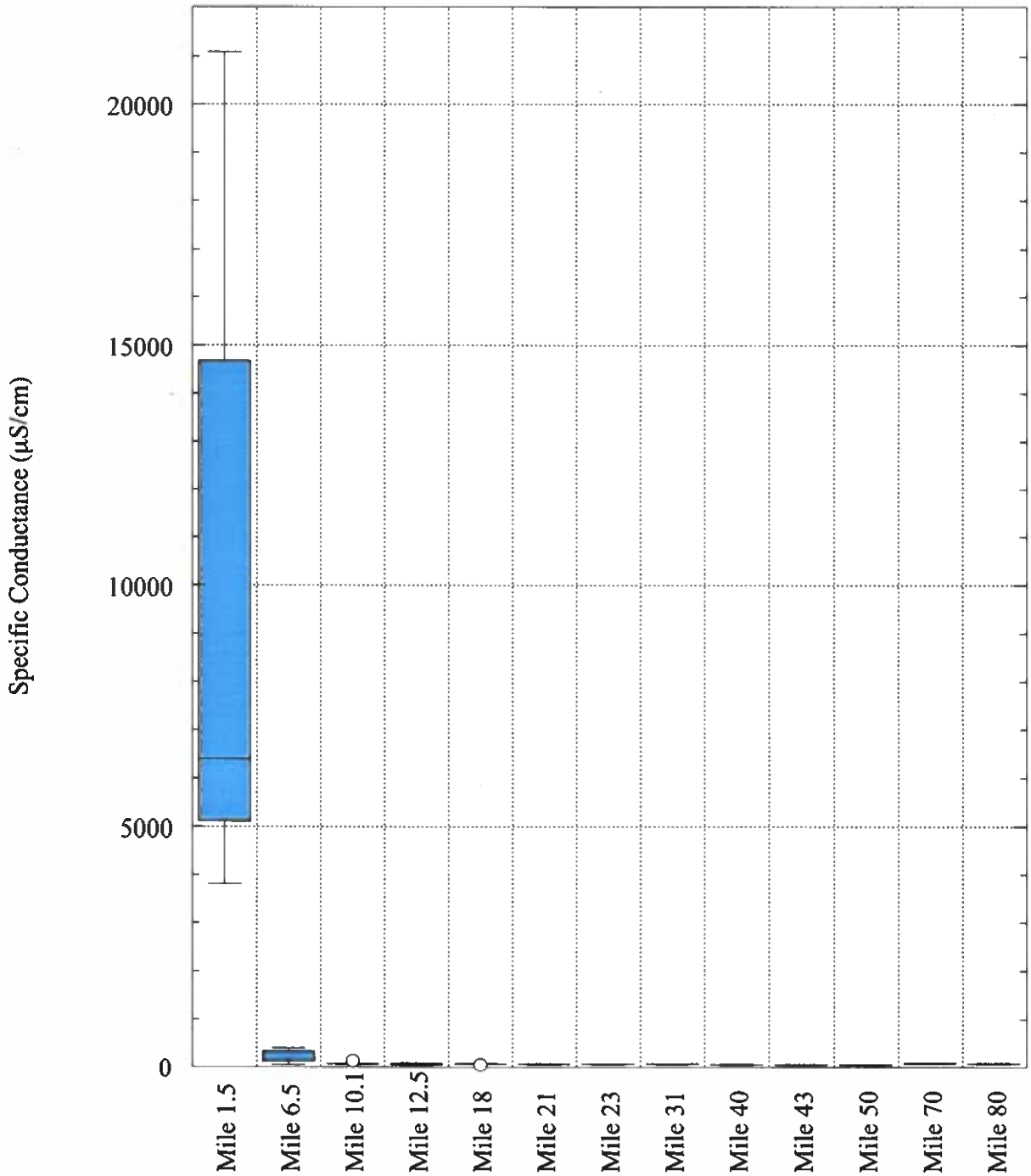

Figure 122: Specific conductance sampled in the Kenai River mainstem during April 2001 to 2006.

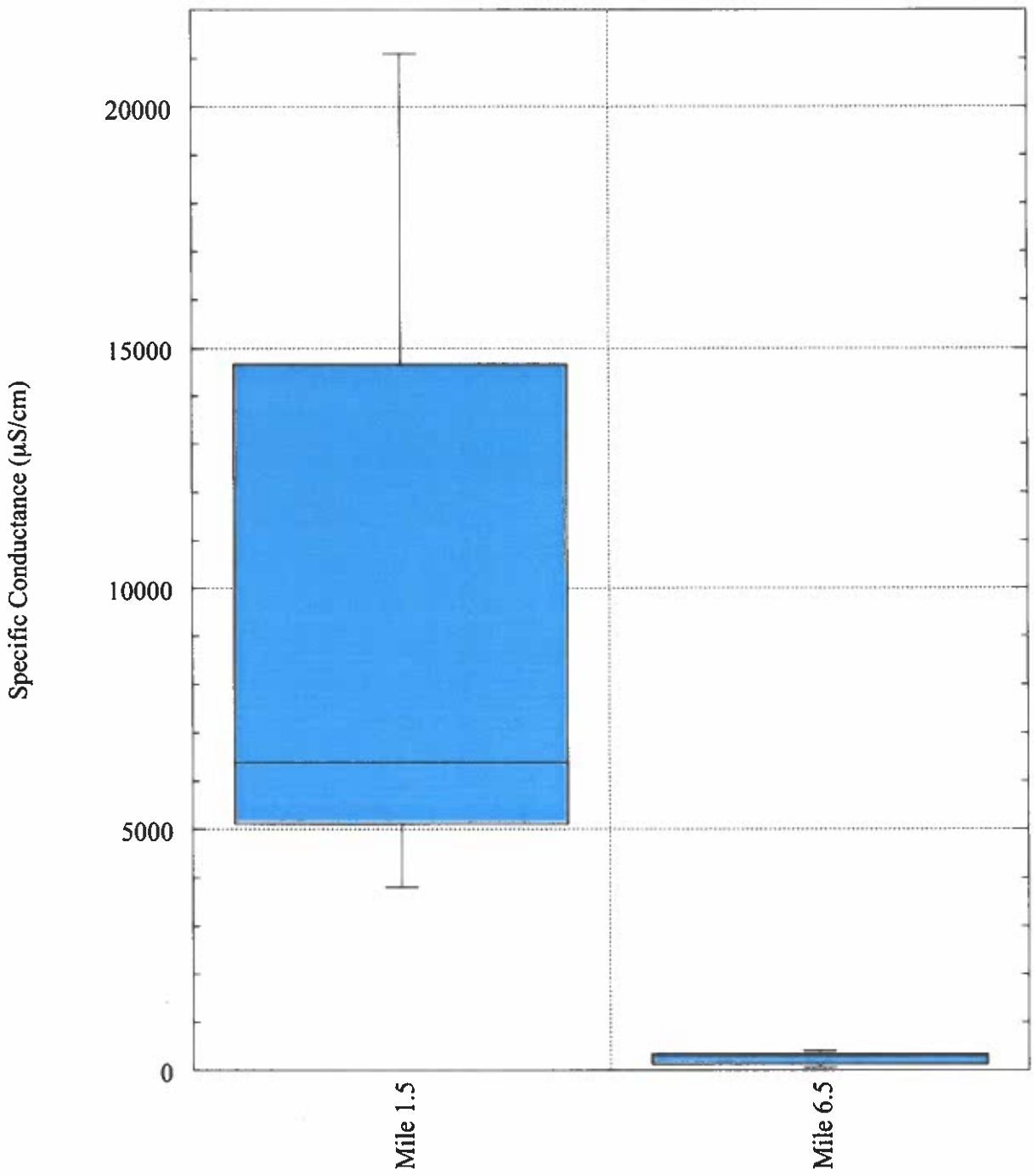

Figure 123: Specific conductance sampled in the Kenai River estuary during April 2001 to 2006.

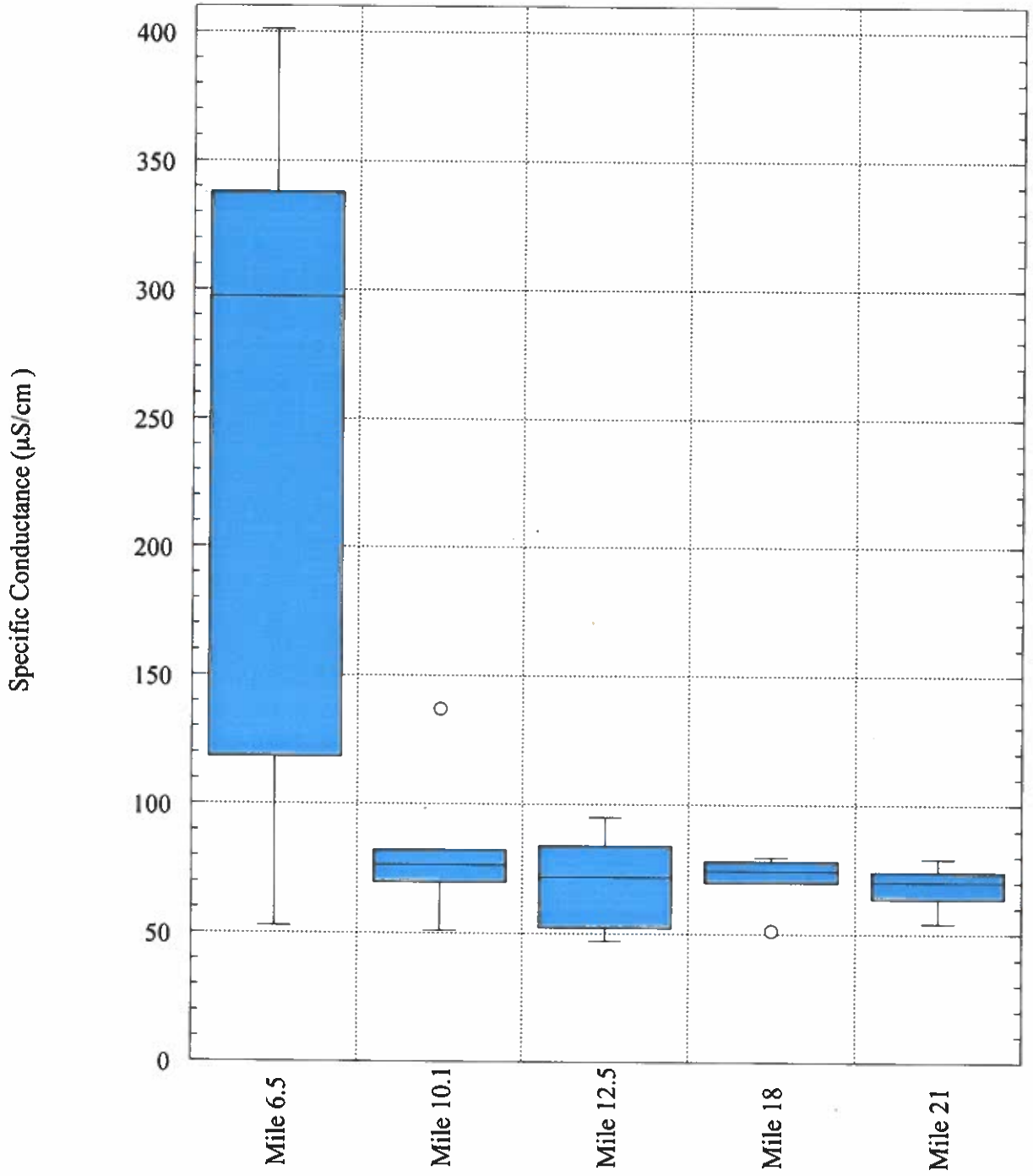

Figure 124: Specific conductance sampled in the Lower Kenai River, including Mile 6.5, during April 2001 to 2006.

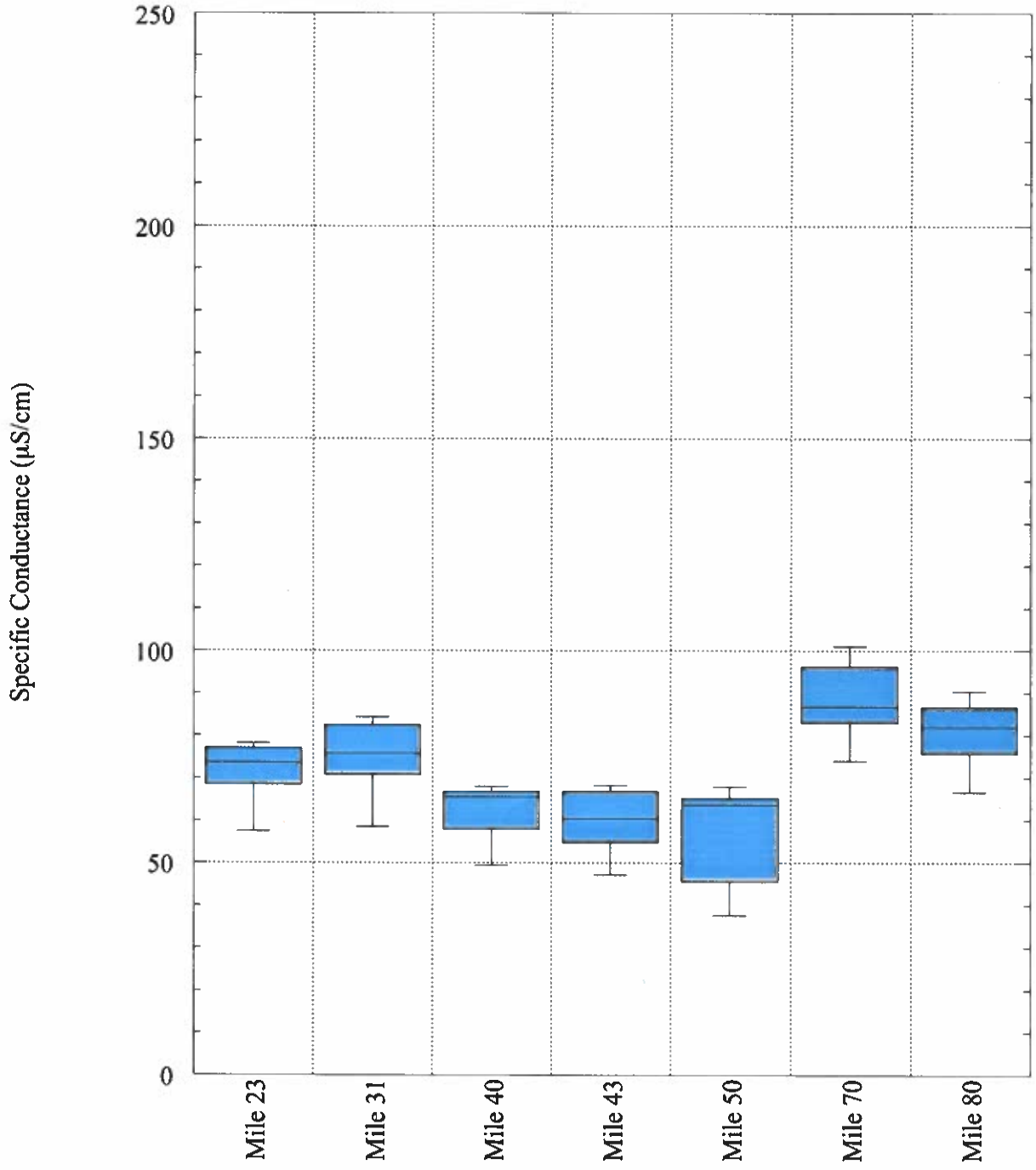

Figure 125: Specific conductance sampled in the Middle and Upper Kenai River during April 2001 to 2006.

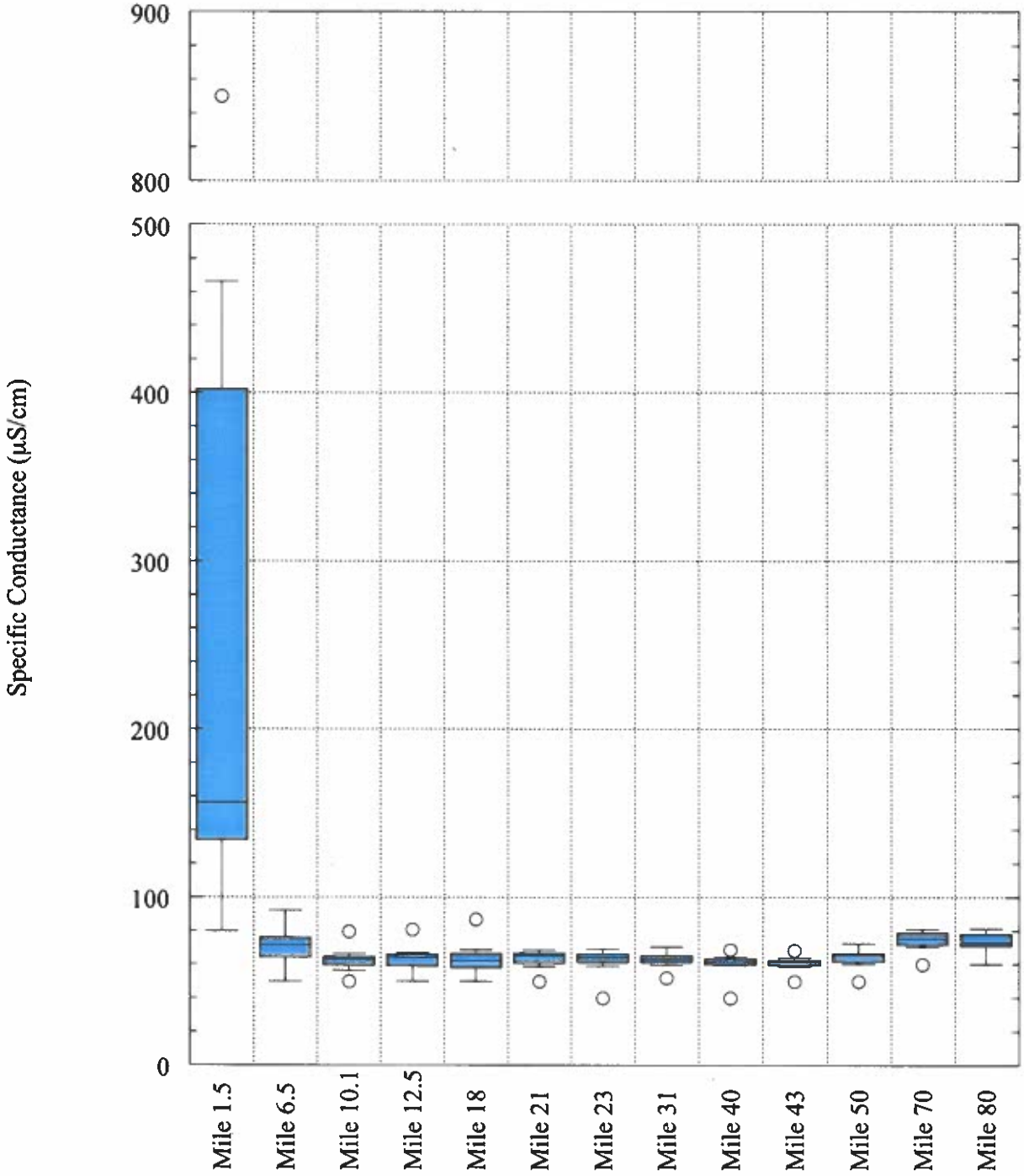

Figure 126: Specific conductance sampled in the Kenai River mainstem during July 2000 to 2006.

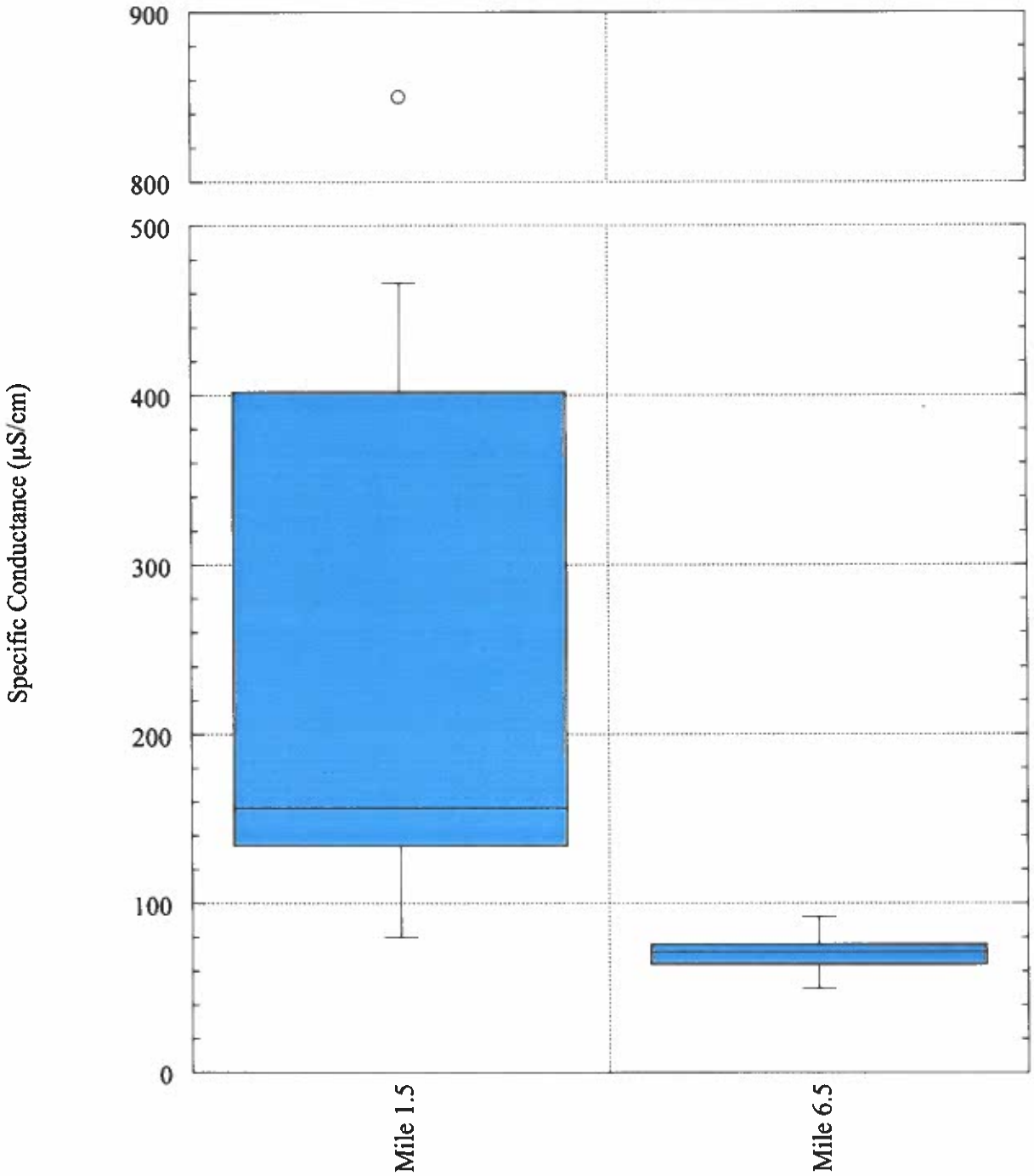

Figure 127: Specific conductance sampled in the Kenai River estuary during July 2000 to 2006.

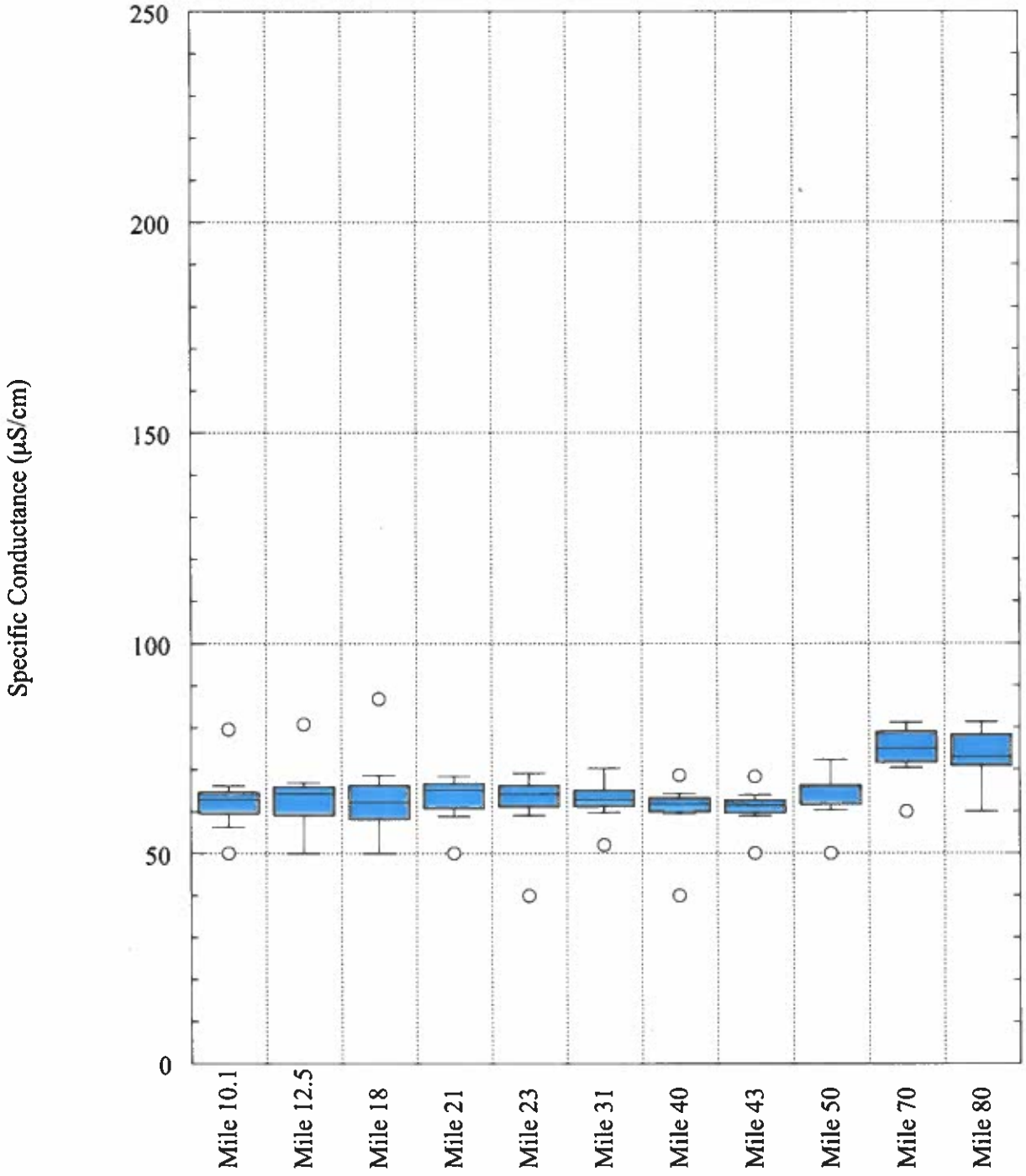

Figure 128: Specific conductance sampled in the Lower, Middle, and Upper Kenai River mainstem during July 2000 to 2006.

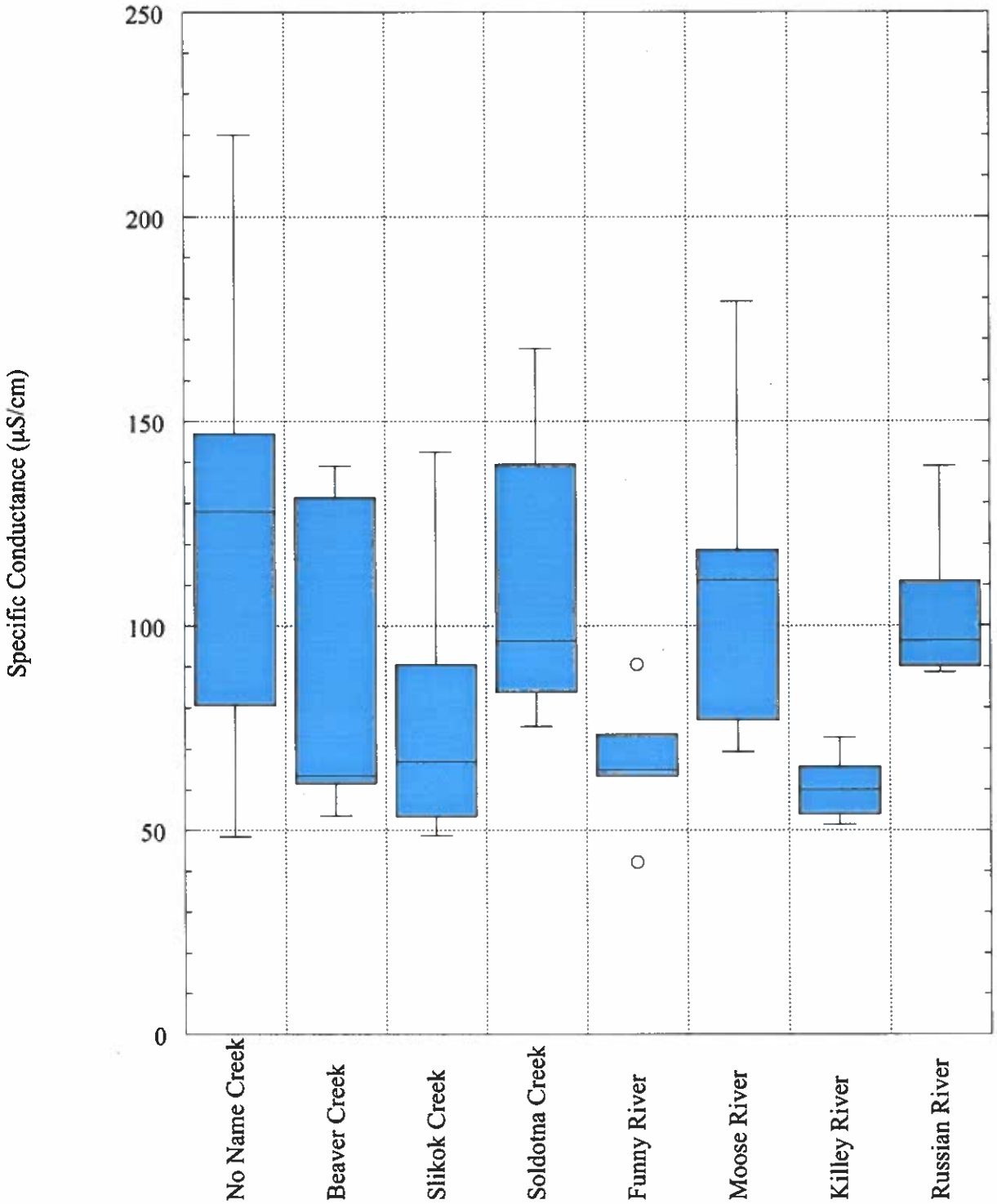

Figure 129: Specific conductance sampled in Kenai River tributaries during April 2001 to 2006.

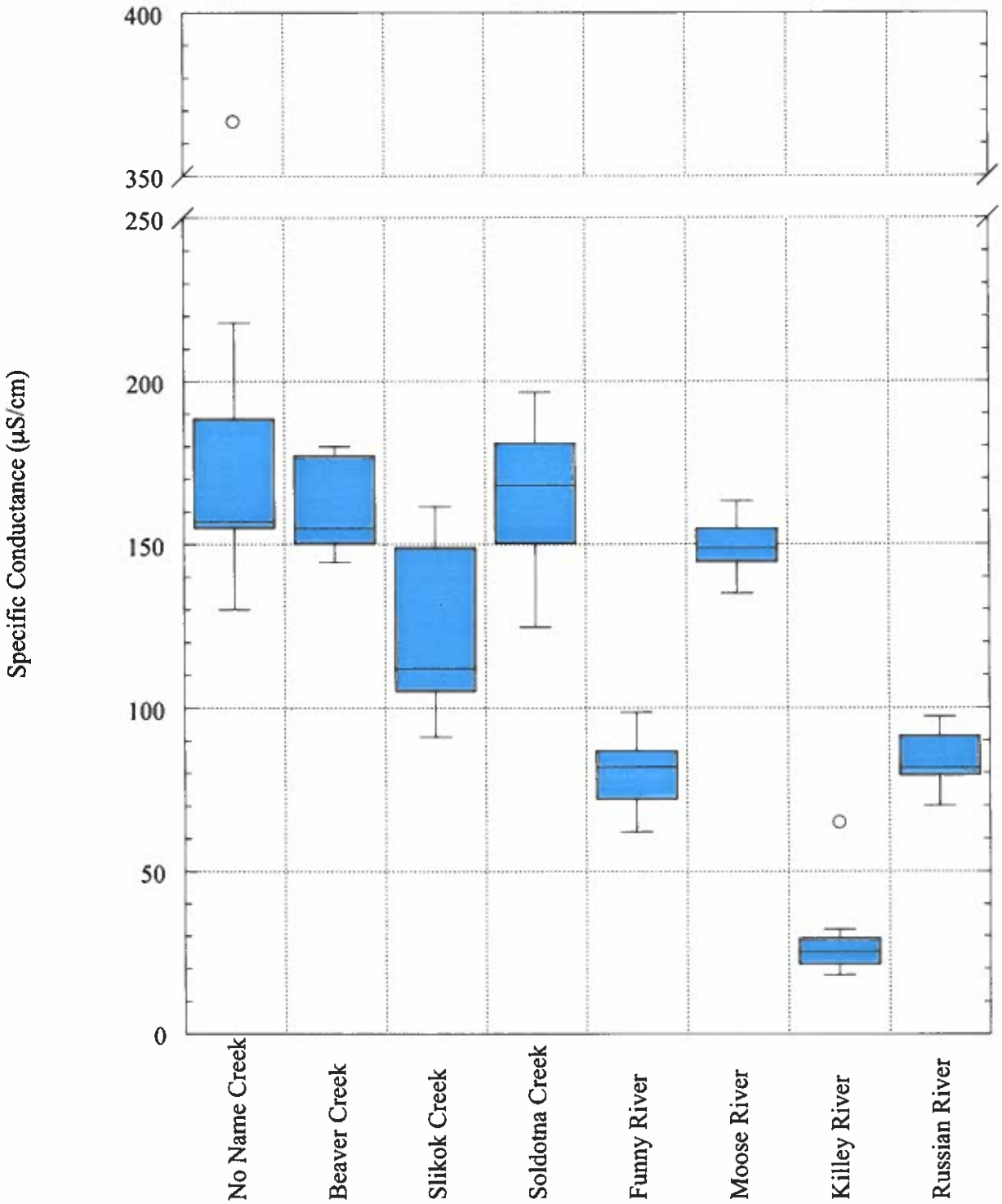

Figure 130: Specific conductance sampled in Kenai River tributaries during July 2000 to 2006.

Total Suspended Solids

The concentration of total suspended solids is a way of measuring the amount of mineral and organic particles that are transported in the water column (Bash and others, 2001). Erosion increases the amount of suspended sediment in surface water and can be naturally caused by glaciers, fires, and floods (Glass, 1999). In the Cook Inlet Basin, glaciers are the main cause of erosion, but mining, logging, construction, and recreation can also contribute to elevated levels of suspended sediment (Glass, 1999). High concentrations of suspended sediment can be lethal to post-larval fish, and incubating eggs can suffer severe mortality rates because settled sediment prevents the exchange of oxygen (Glass, 1999). As such, the ADEC standard requires that fine sediment in the range of 0.1 mm to 4.0 mm cannot increase over 5% by weight higher than natural conditions in gravel beds used by anadromous or resident fish for spawning, and the sediment can never exceed a maximum of 30% by weight in freshwater for the growth and propagation of fish, shellfish, other aquatic life, and wildlife (see Appendix 2) (ADEC, 2006). More generally, the ADEC standard also states that the amount of deposited or suspended sediment cannot cause adverse effects on aquatic life, including their habitat and reproduction (ADEC, 2006).

The concentration of 2073 mg/L at Mile 6.5 during April 2006 was the highest level of total suspended solids recorded in the mainstem, and the lowest concentration was less than the MDL of 0.48 mg/L at Mile 80 during April 2005. The estuary had much higher medians than the rest of the mainstem in both July and April. The medians were lowest in April and July in the Upper River from Mile 80 to Mile 50. Between Mile 50 and Mile 43, the concentration of total suspended solids increased, possibly due to the influence of the Killey River, which had higher levels of total suspended solids than the mainstem, especially in July. From Mile 43 to Mile 31, the medians in April and July for total suspended solids decreased, and then there was an increase in the medians from Mile 23 to the estuary. During April, the concentrations in the estuary were significantly higher than in July, but this pattern was not as clear in the remainder of the mainstem.

In the tributaries, the concentration of total suspended solids ranged from a high of 210 mg/L in the Killey River in July 2005 to a low of less than the MDL of 0.48 mg/L in the Russian River during April 2005. The Killey River had the highest median and largest variance by far in July. Funny River also had a relatively large degree of variance, but had a similar median to the other tributaries, excluding the Killey River in July. During April, Funny River had the highest median and a relatively large degree of variance, although Beaver Creek exhibited the most variance. Russian River had the lowest median of total suspended solids in both April and July. Excluding Russian River, the tributaries had higher medians during April rather than July. Generally, the tributaries had higher levels of total suspended solids than the mainstem in April and lower levels than the mainstem in July.

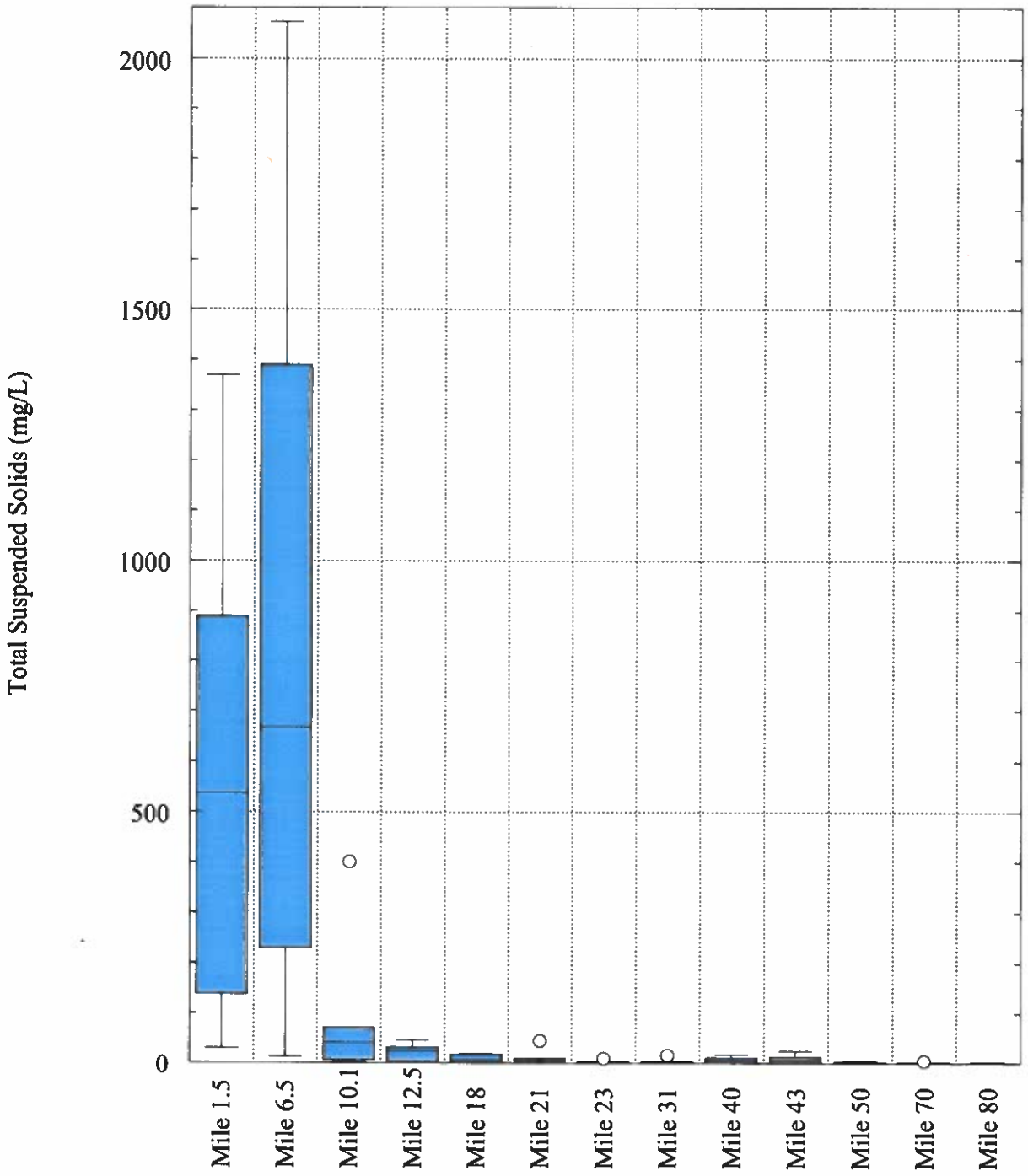

Figure 131: Total suspended solids sampled in the Kenai River mainstem during April 2001 to 2006. Since 4% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

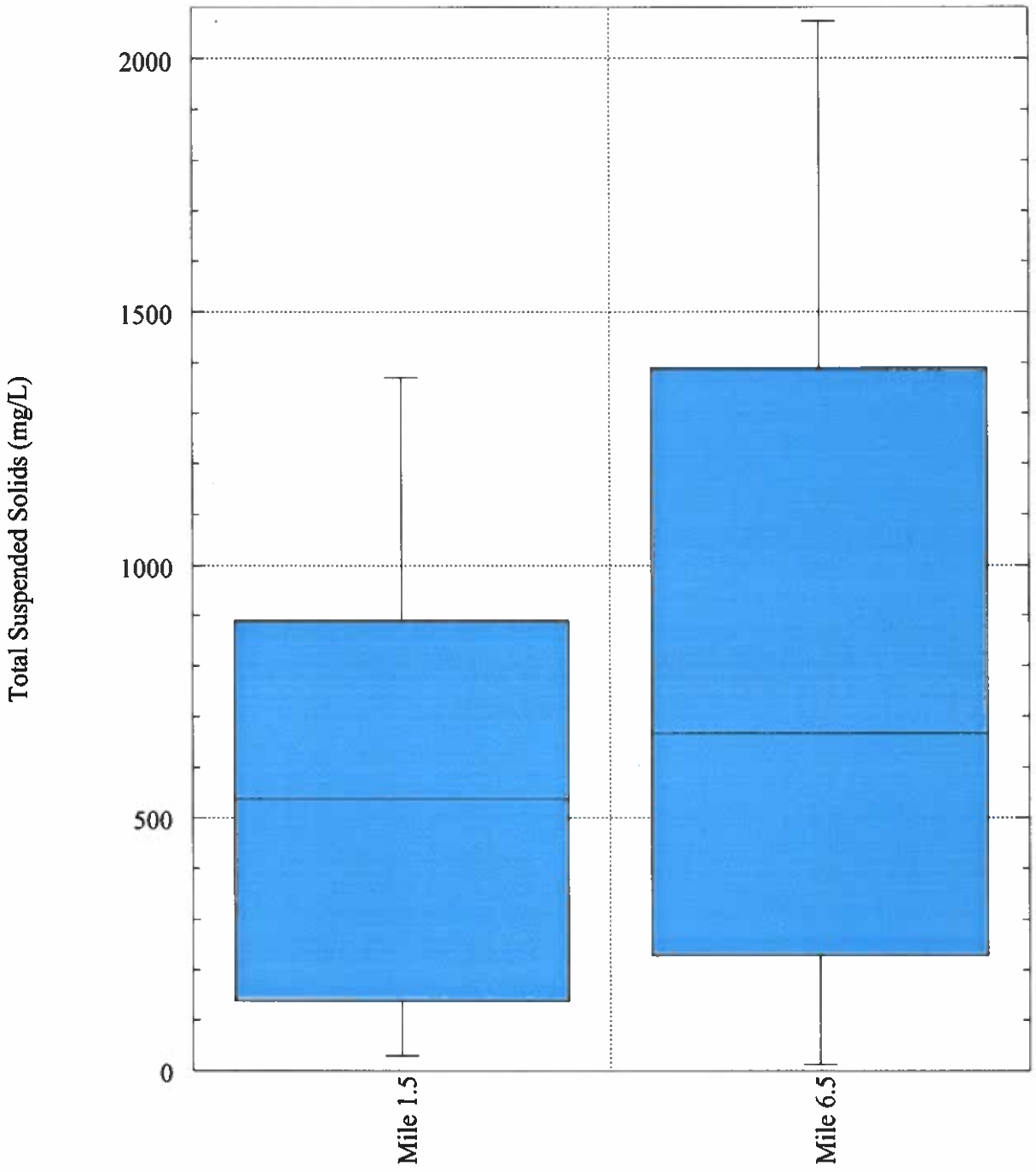

Figure 132: Total suspended solids sampled in the Kenai River estuary during April 2001 to 2006.

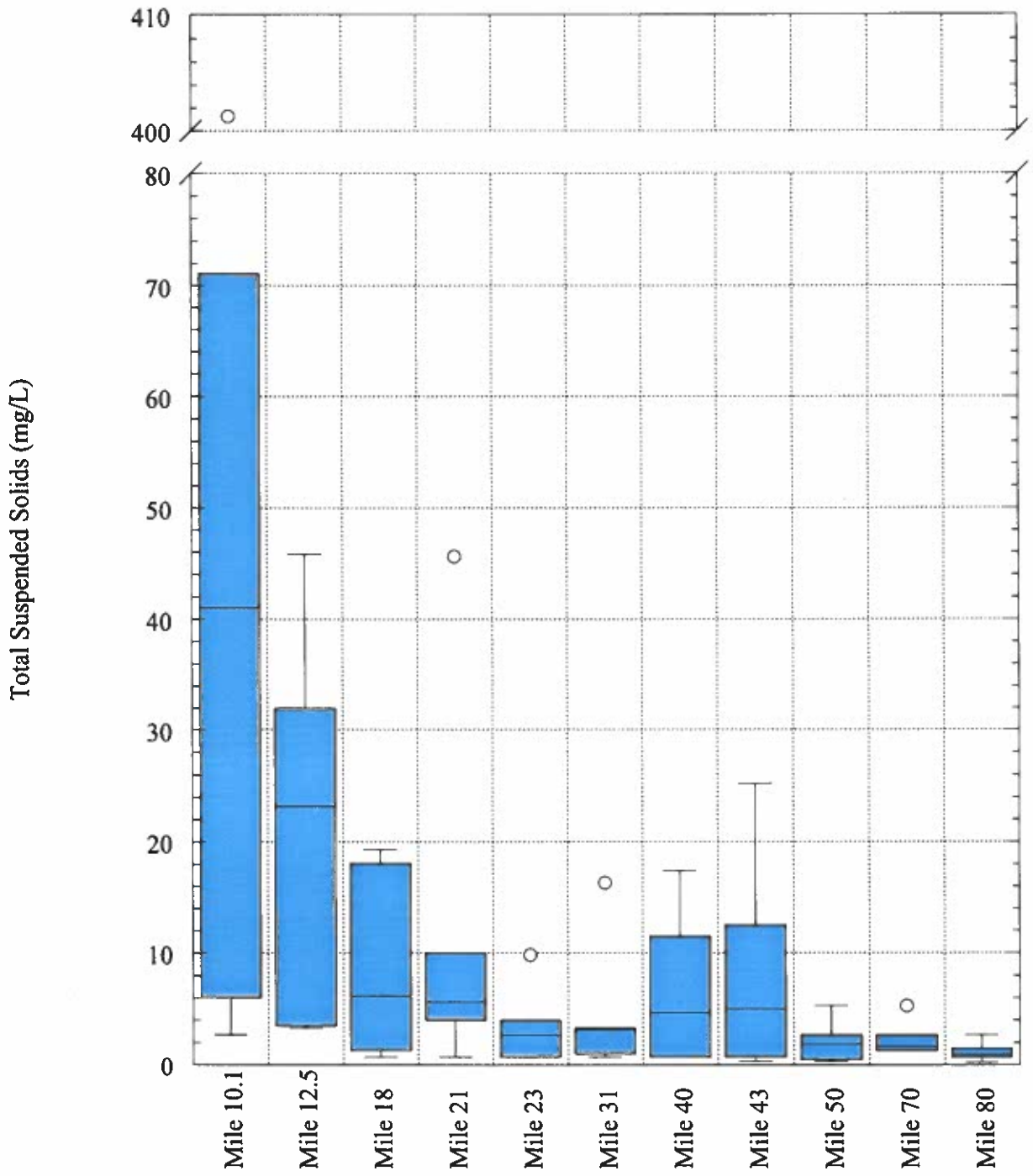

Figure 133: Total suspended solids sampled in the Lower, Middle, and Upper Kenai River mainstem during April 2001 to 2006. Since 5% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

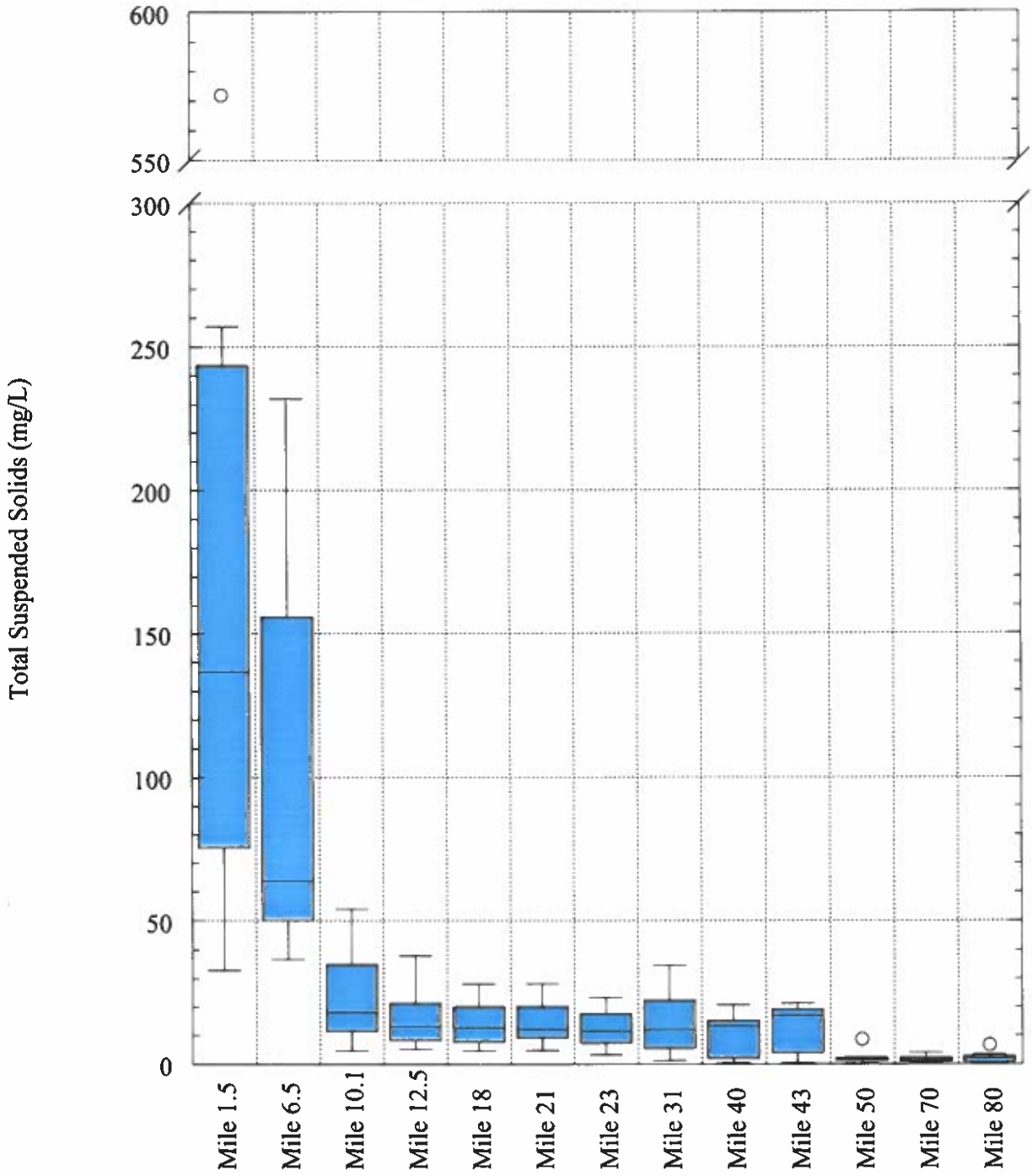

Figure 134: Total suspended solids sampled in the Kenai River mainstem during July 2000 to 2006. Since 10% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

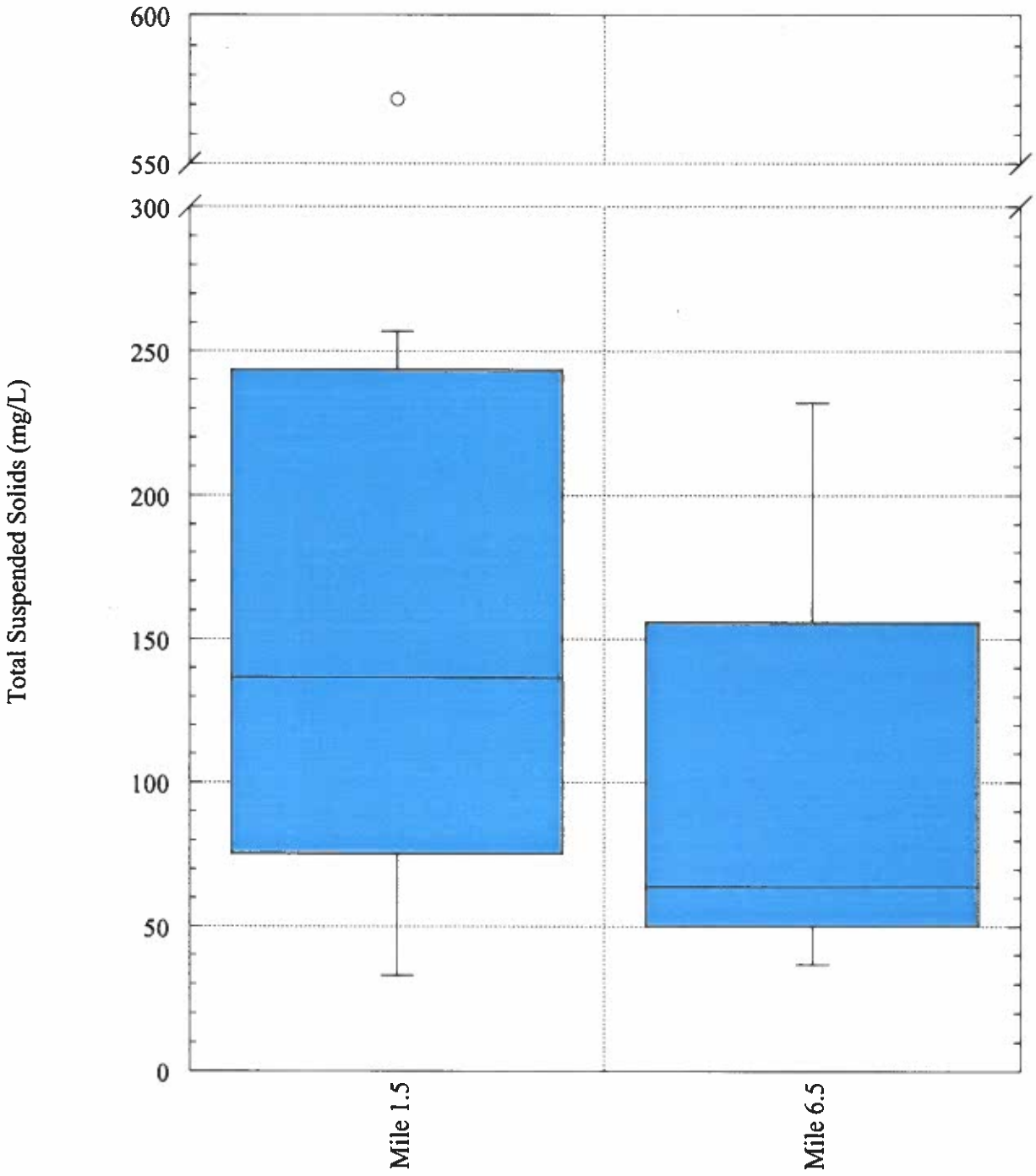

Figure 135: Total suspended solids sampled in the Kenai River estuary during July 2000 to 2006.

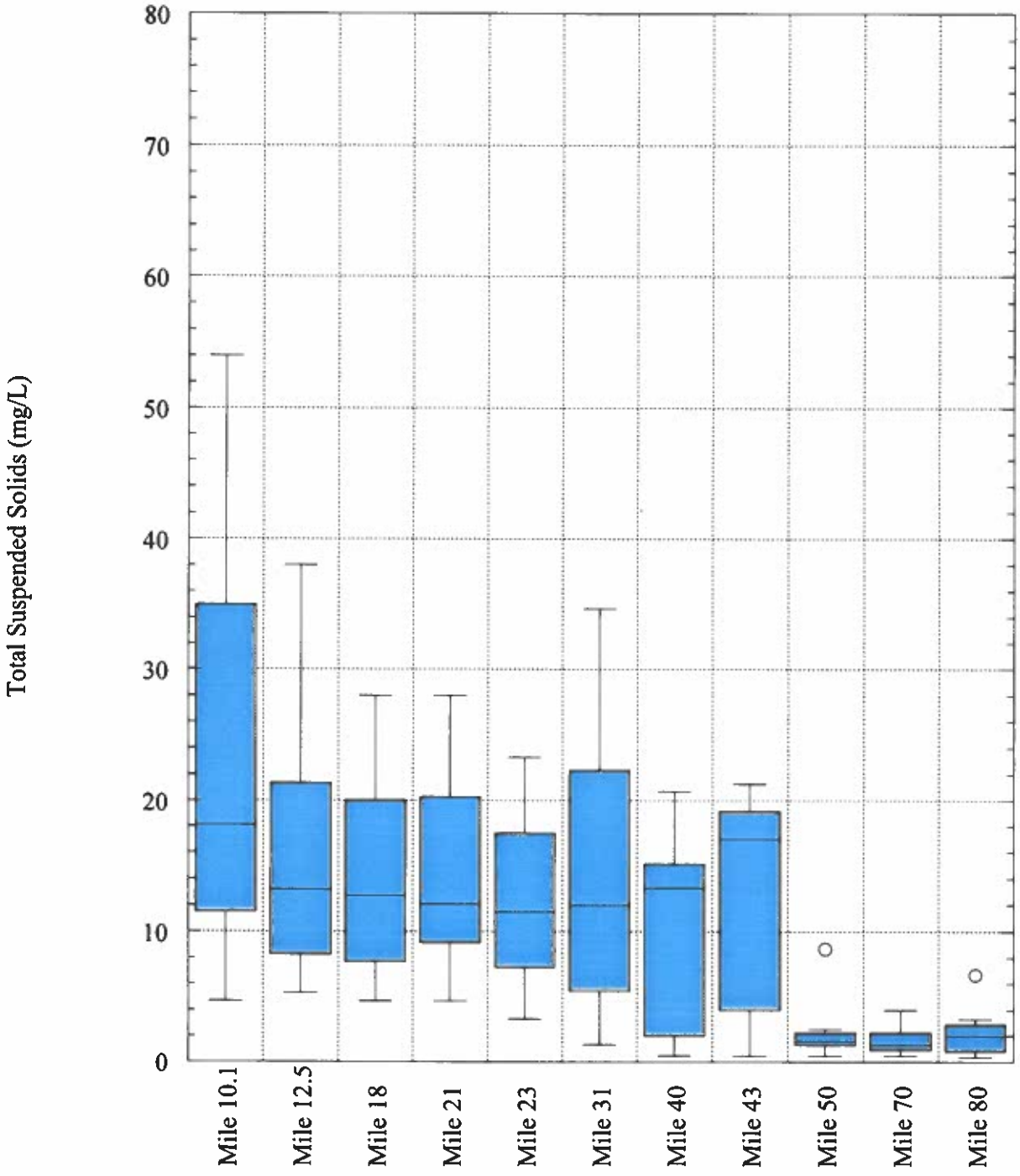

Figure 136: Total suspended solids sampled in the Lower, Middle, and Upper Kenai River mainstem (excluding the Kenai River estuary) during July 2000 to 2006. Since 12% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

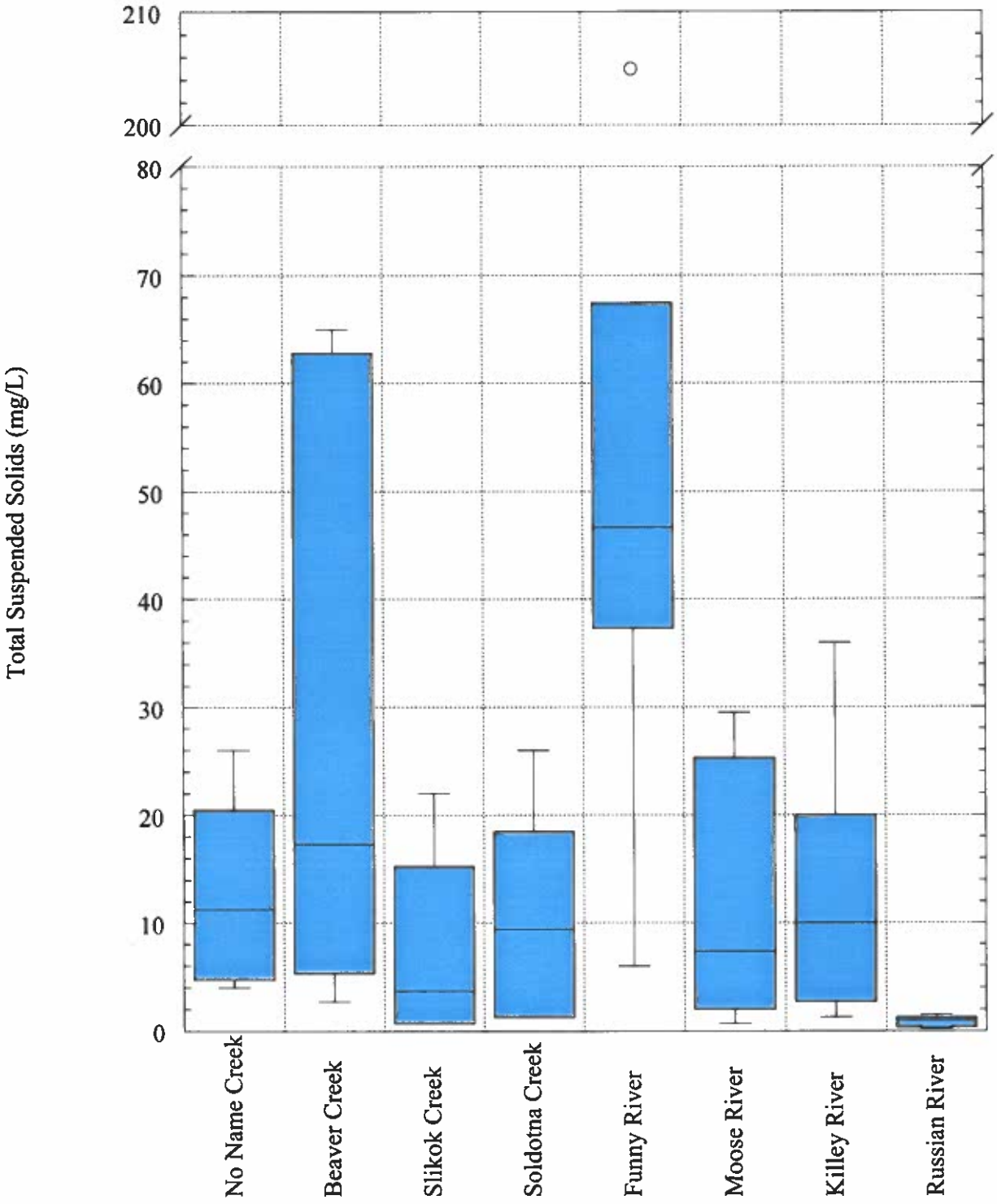

Figure 137: Total suspended solids sampled in Kenai River tributaries during April 2001 to 2006. Since 4% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

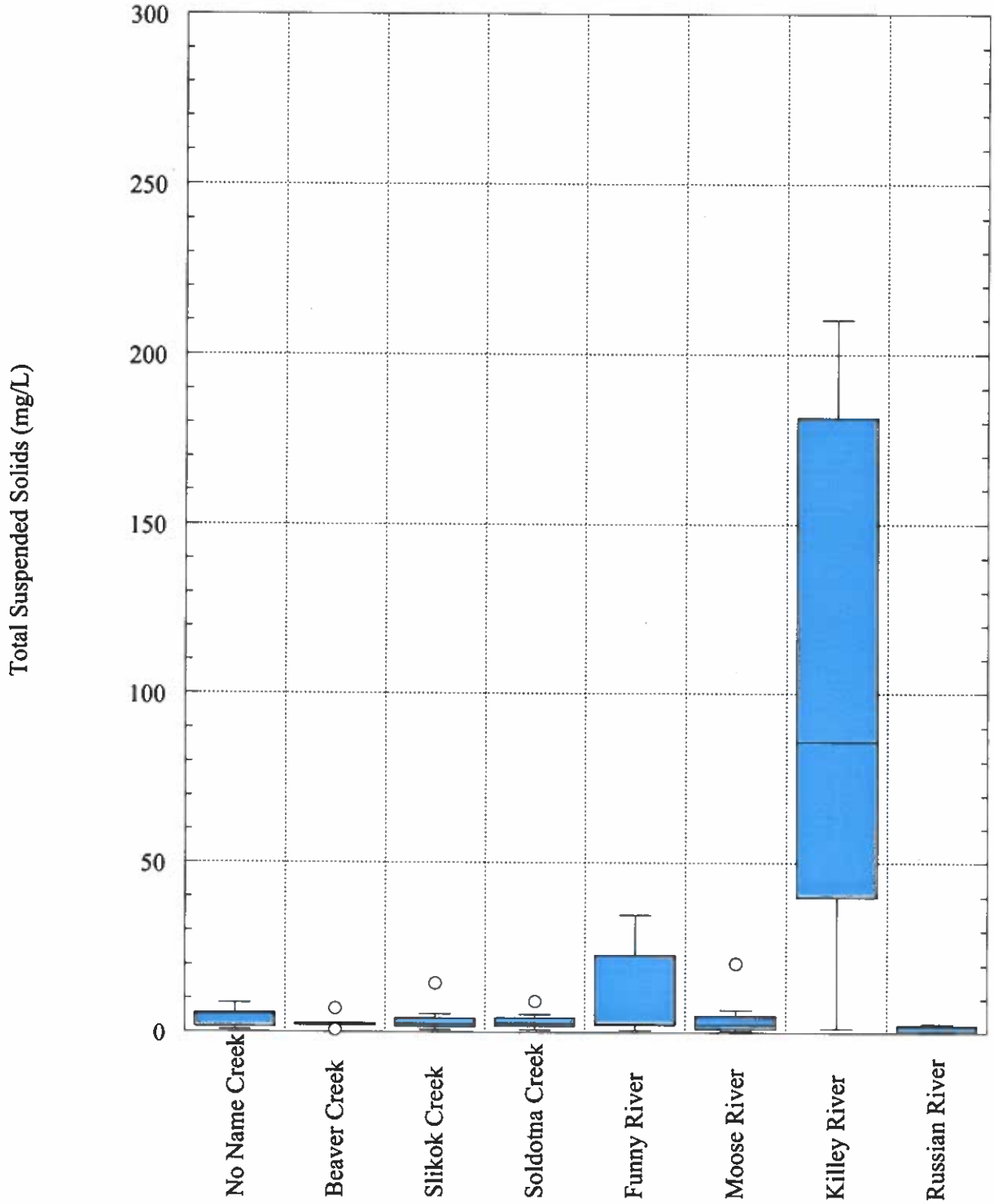

Figure 138: Total suspended solids sampled Kenai River tributaries during July 2000 to 2006. Since 19% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

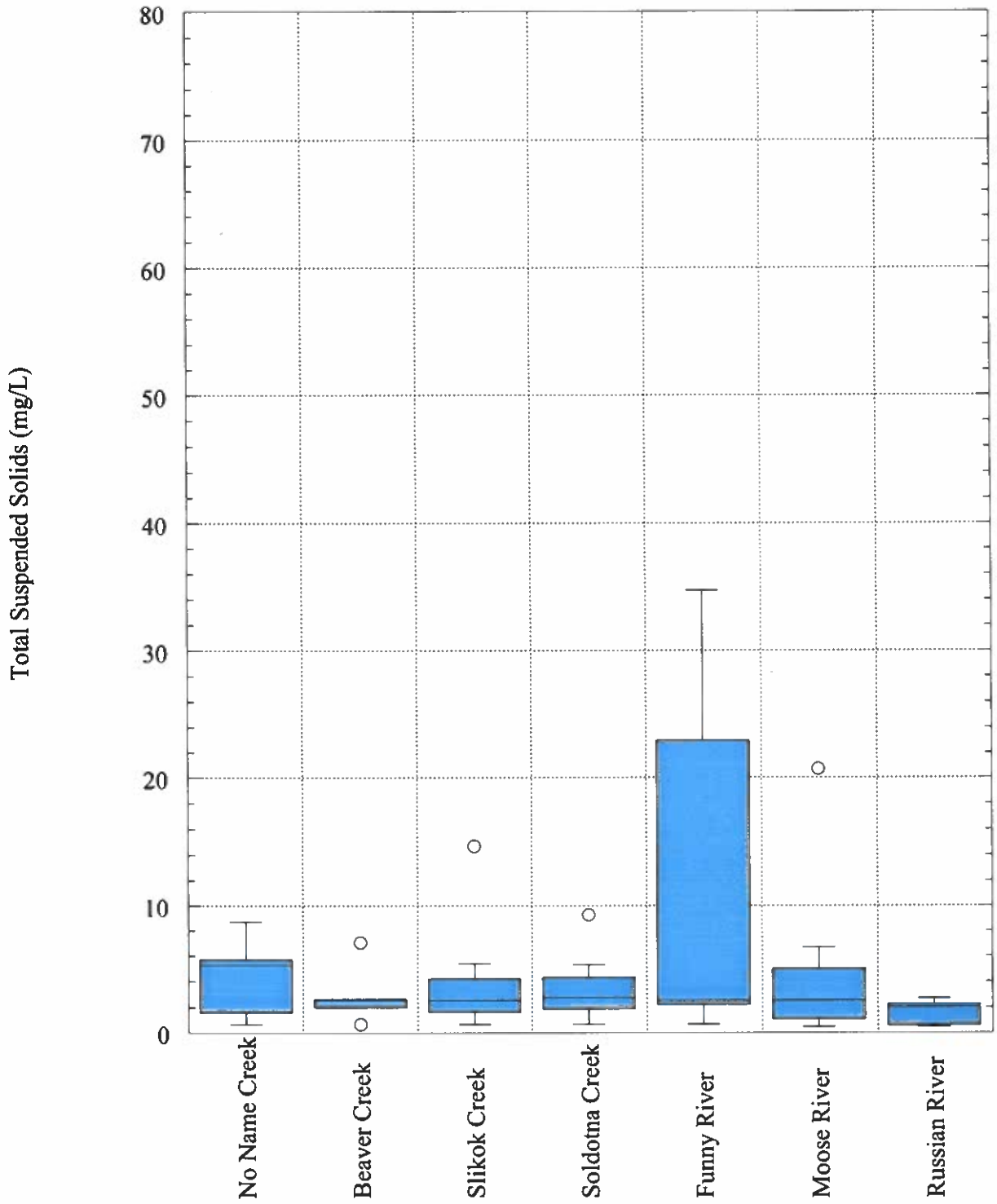

Figure 139: Total suspended solids sampled Kenai River tributaries, excluding the Killey River, during July 2000 to 2006. Since 21% of the samples are reported as below the MRL or MDL, these values have been estimated using values that are half of the MRL or MDL.

Turbidity

Turbidity measures the degree to which suspended and dissolved materials cause light to scatter instead of being transmitted in straight lines, and these materials consist of silt, clay, chemicals, microscopic organisms, and fine organic or inorganic matter (Bash and others, 2001). Turbidity varies naturally; higher turbidities are typically found in watersheds fed by glacial meltwater, and turbidity generally increases from headwater tributaries to mainstems and estuaries (Bash and others, 2001). Even though salmonids can naturally live in turbid water systems, they do not always cope well with increases in suspended sediments, and these high levels in suspended sediments can cause fatalities, while lower levels can result in difficulty finding food, reduced growth, increased stress, and difficulty migrating (Bash and others, 2001). The ADEC standard states that turbidity may not exceed 25 NTU above natural conditions in freshwater or 5 NTU above natural conditions in lakes for the growth and propagation of fish, shellfish, other aquatic life, and wildlife (see Appendix 2) (ADEC, 2006).

The highest level of turbidity occurred at Mile 6.5 in April 2006 and was detected at 3200 NTU, and the lowest level in the mainstem was 1.4 NTU at Mile 50 in July 2002. The highest medians and degree of variance for turbidity were in the estuary for both April and July, and the lowest median occurred at Mile 50. The medians for turbidity decreased from Mile 80 to Mile 50 during April and July. In July, from Mile 43 to Mile 1.5, the median level of turbidity generally increased. A similar trend occurred in April, but was less apparent from Mile 43 to Mile 31. The April medians in the estuary and Upper River were higher than the July medians, but the rest of the mainstem had higher medians in July.

In the tributaries, the highest level of turbidity was 129.9 NTU at the Killey River in July 2006, and the lowest level was at Russian River with the level of 0.02 NTU from July 2006. During July, the Killey River had the highest median at 80 NTU, while the other tributaries all had medians less than 20 NTU. In April, Funny River had the highest median, followed by No Name Creek and then Beaver Creek. Russian River had the lowest turbidity median in both July and April. Killey River exhibited the largest seasonal difference in medians by increasing around 74 NTU from April to July. In contrast, Funny River decreased approximately 20 NTU during July. The tributaries did not display a clear seasonal trend for increased or decreased turbidity.

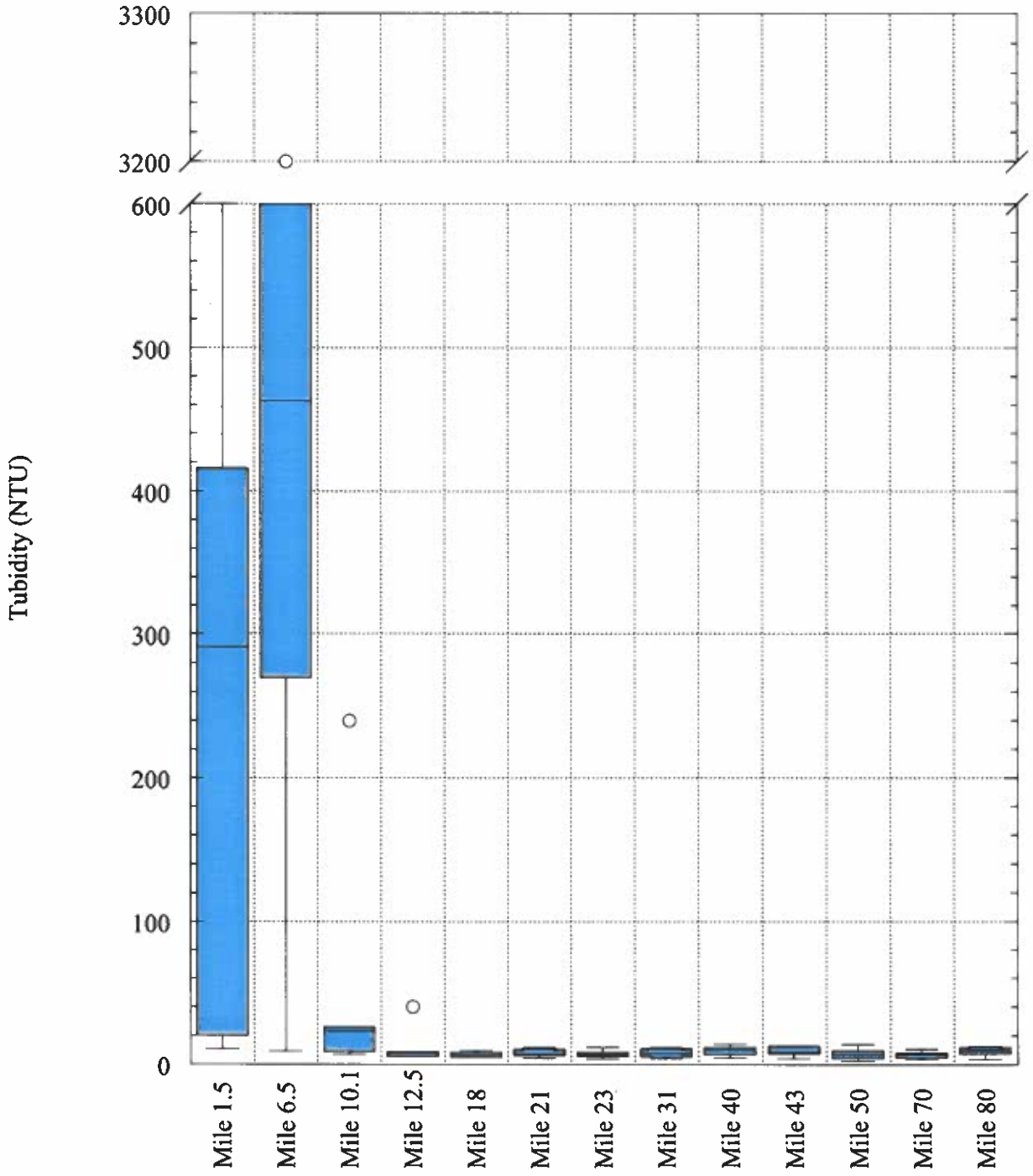

Figure 140: Turbidity sampled in the Kenai River mainstem during April 2001 to 2006.

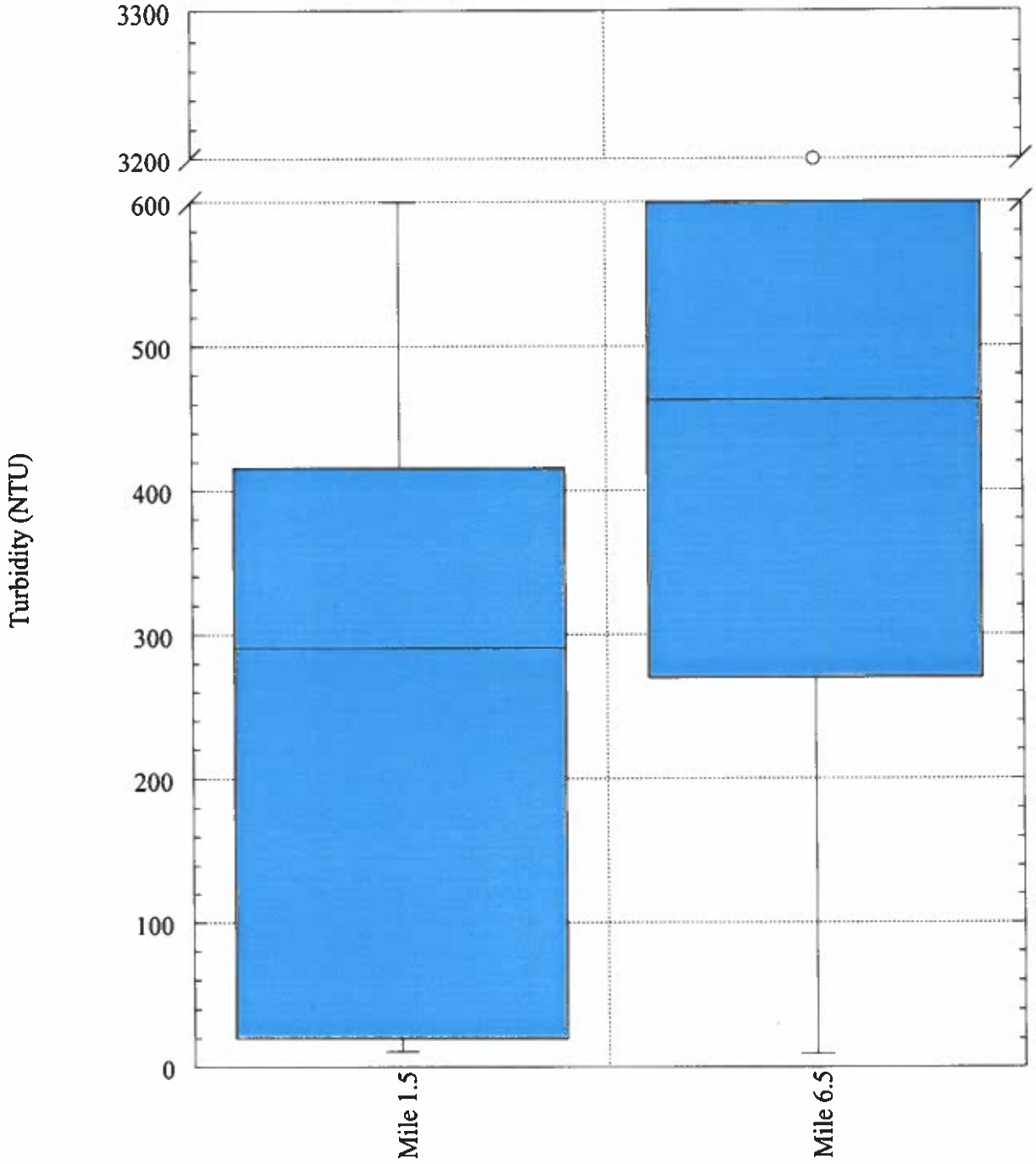

Figure 141: Turbidity sampled in the Kenai River estuary during April 2001 to 2006.

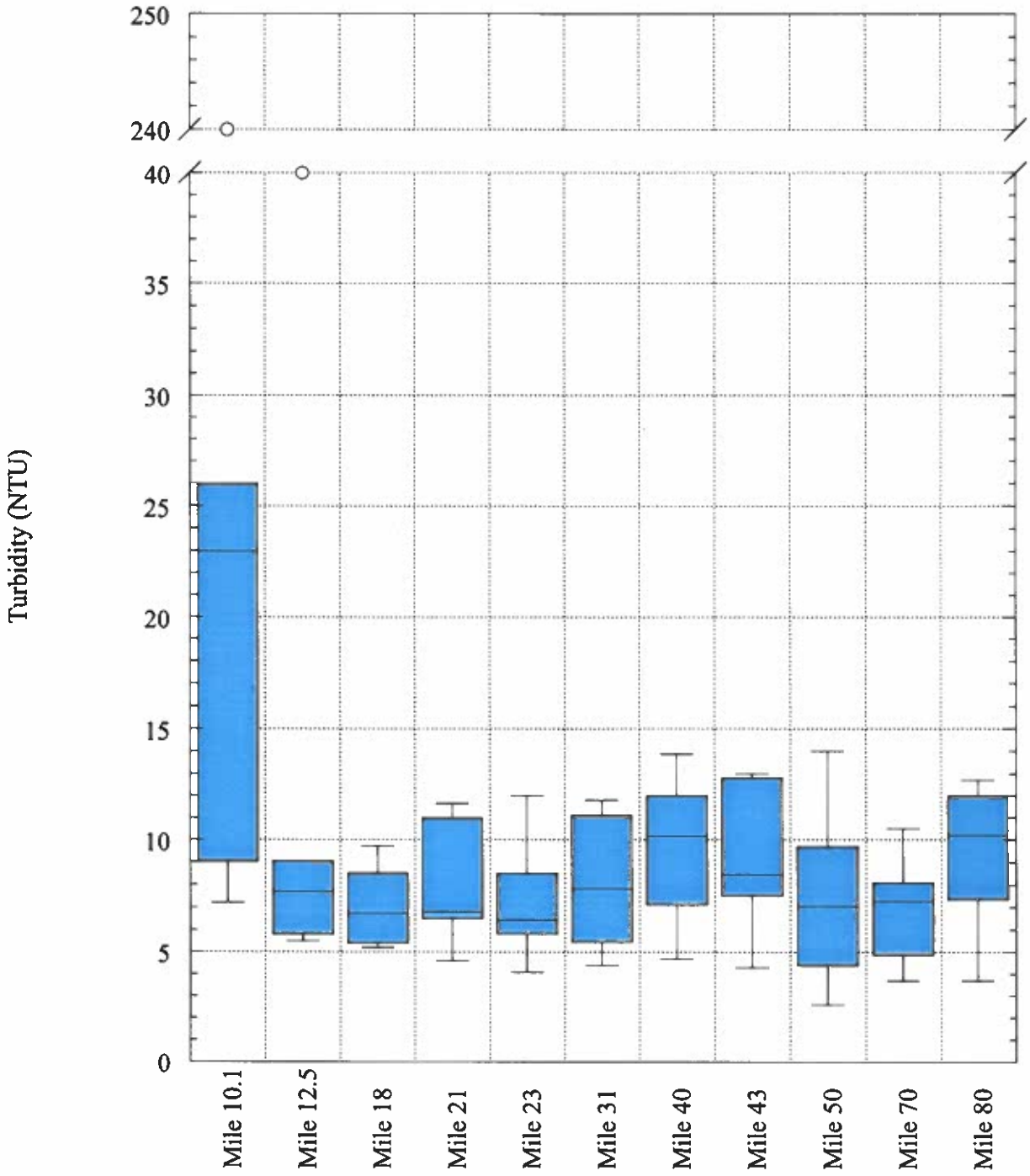

Figure 142: Turbidity sampled in the Lower, Middle, and Upper Kenai River mainstem during April 2001 to 2006.

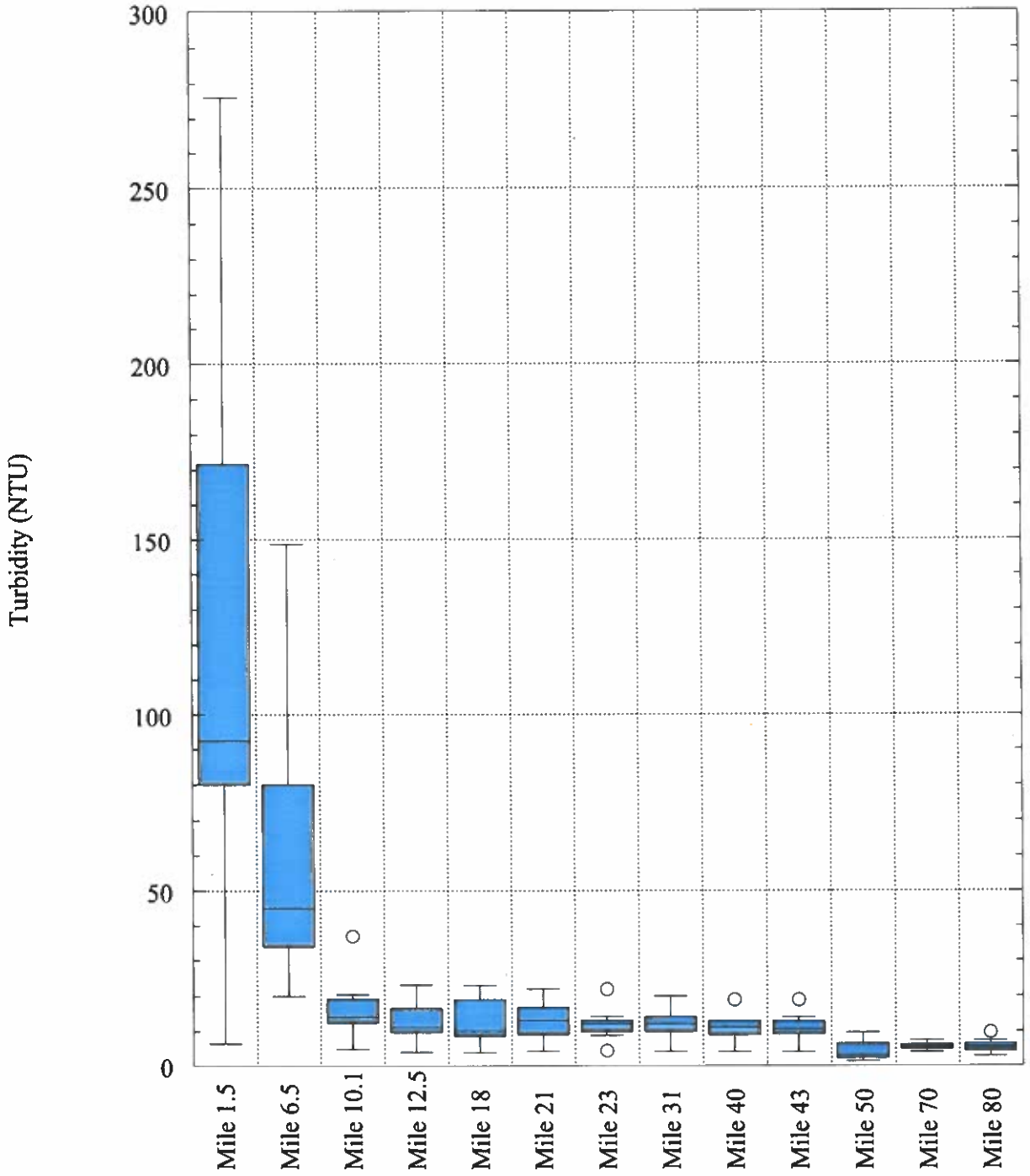

Figure 143: Turbidity sampled in the Kenai River mainstem during July 2000 to 2006.

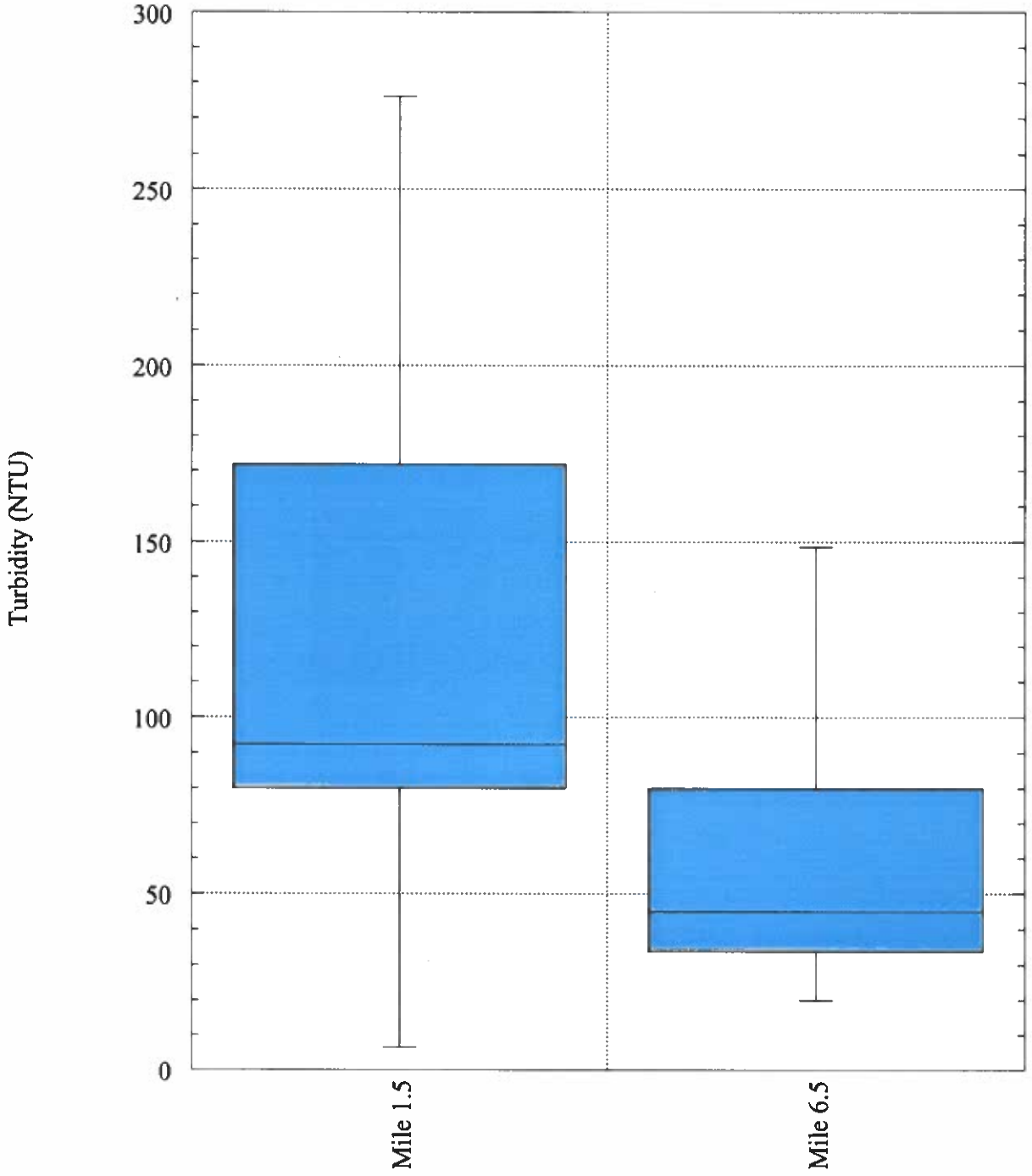

Figure 144: Turbidity sampled in the Kenai River estuary during July 2000 to 2006.

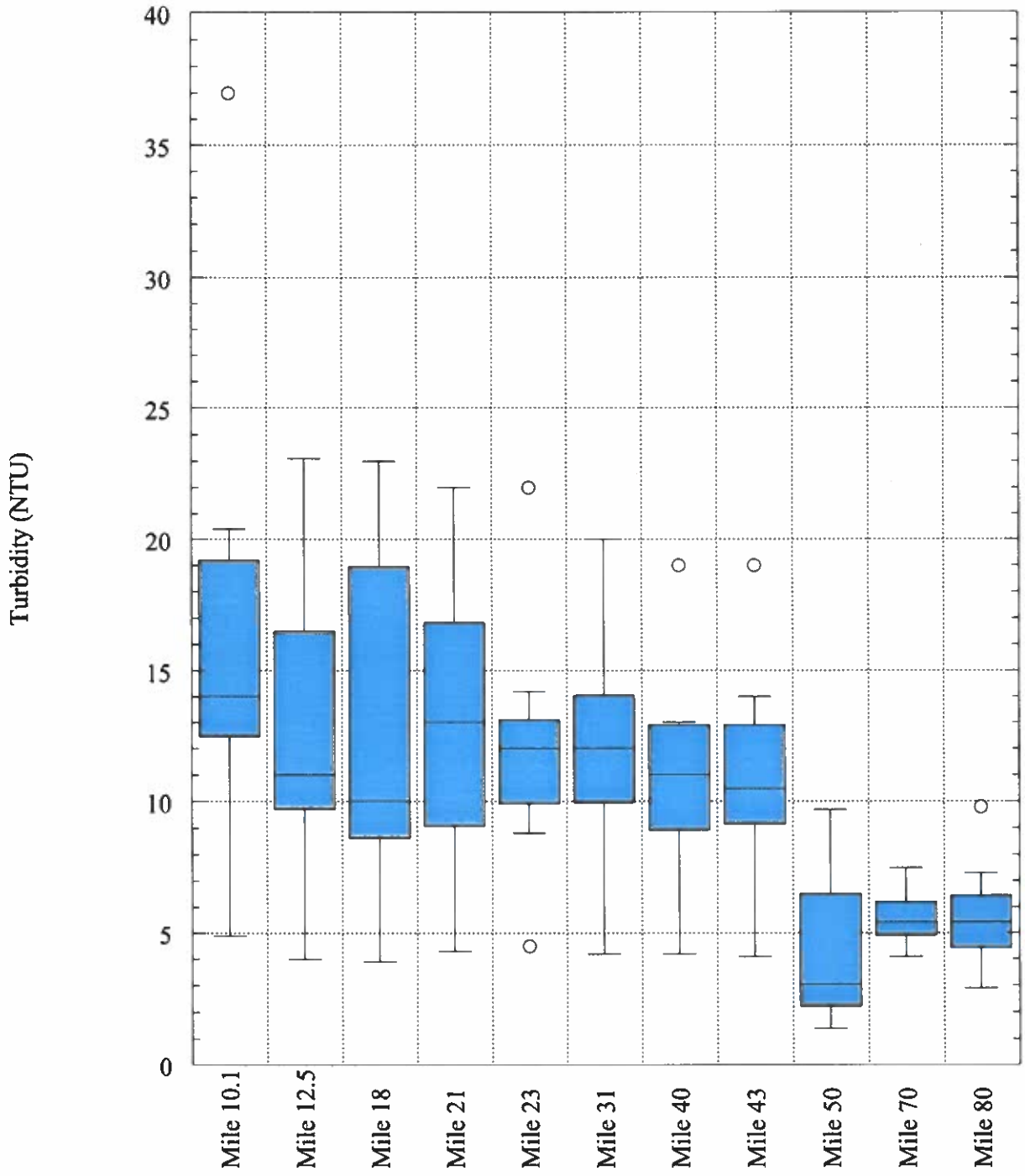

Figure 145: Turbidity sampled in the Lower, Middle, and Upper Kenai River mainstem during July 2000 to 2006.

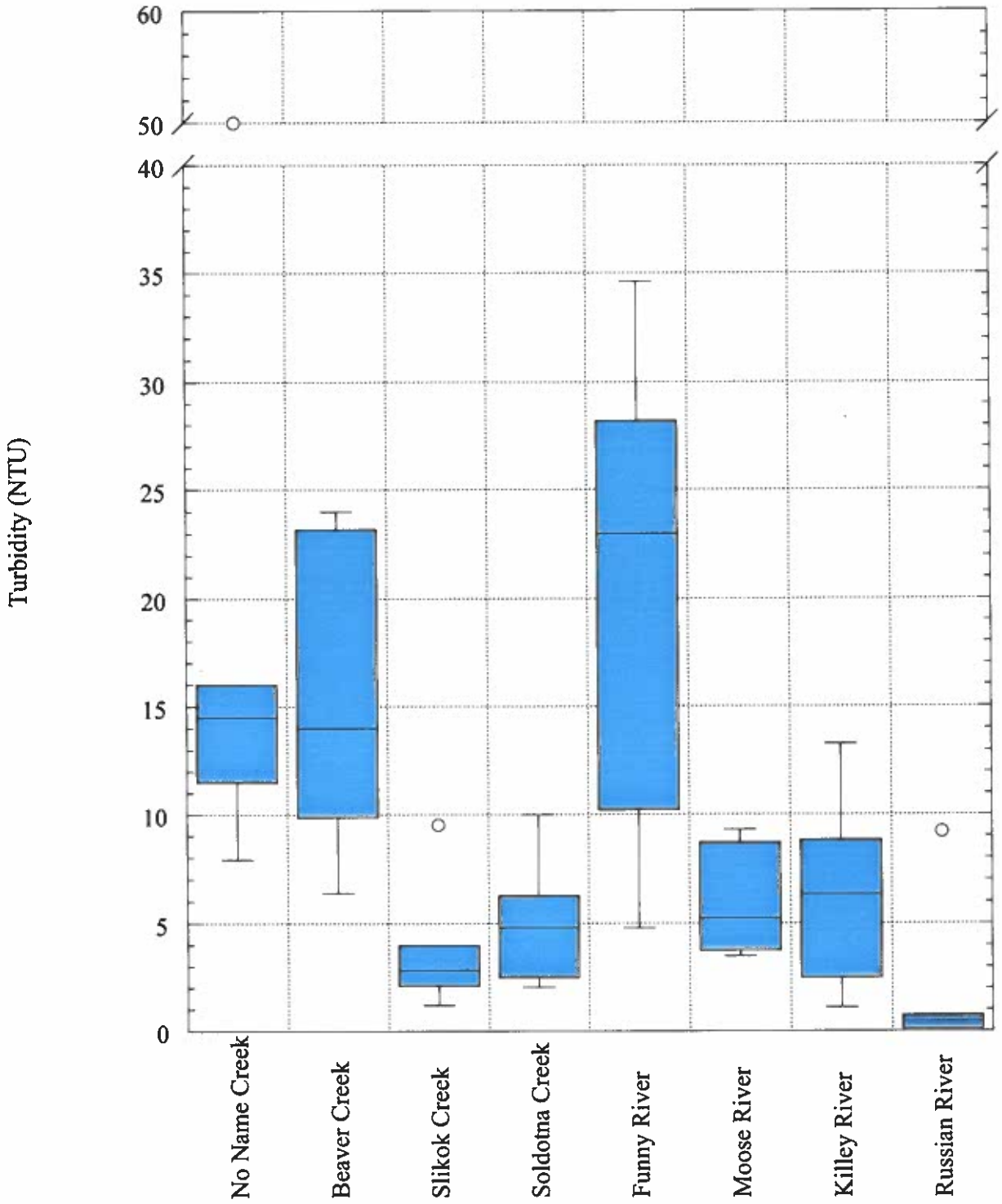

Figure 146: Turbidity sampled in Kenai River tributaries during April 2001 to 2006.

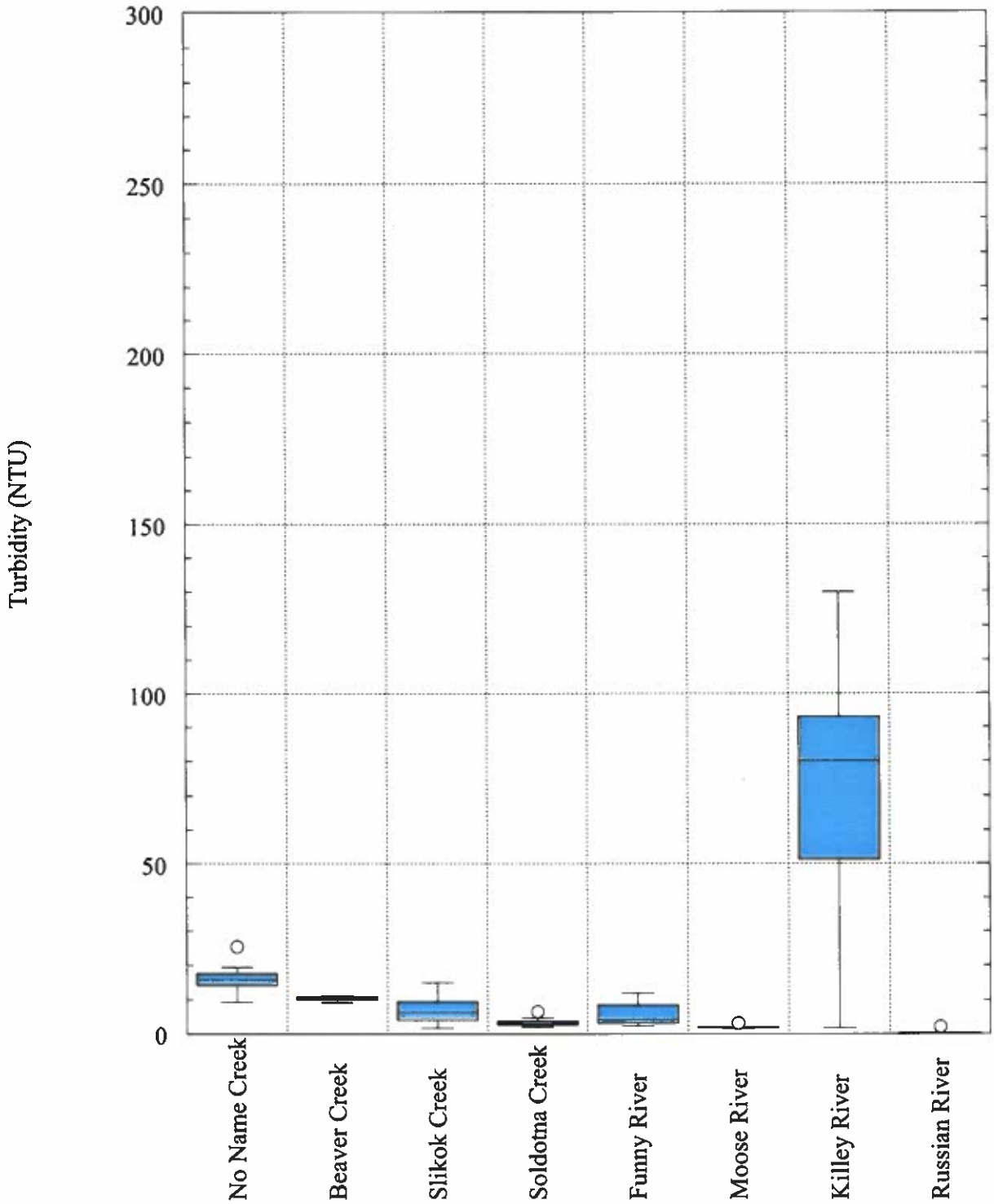

Figure 147: Turbidity sampled in Kenai River tributaries during July 2000 to 2006.

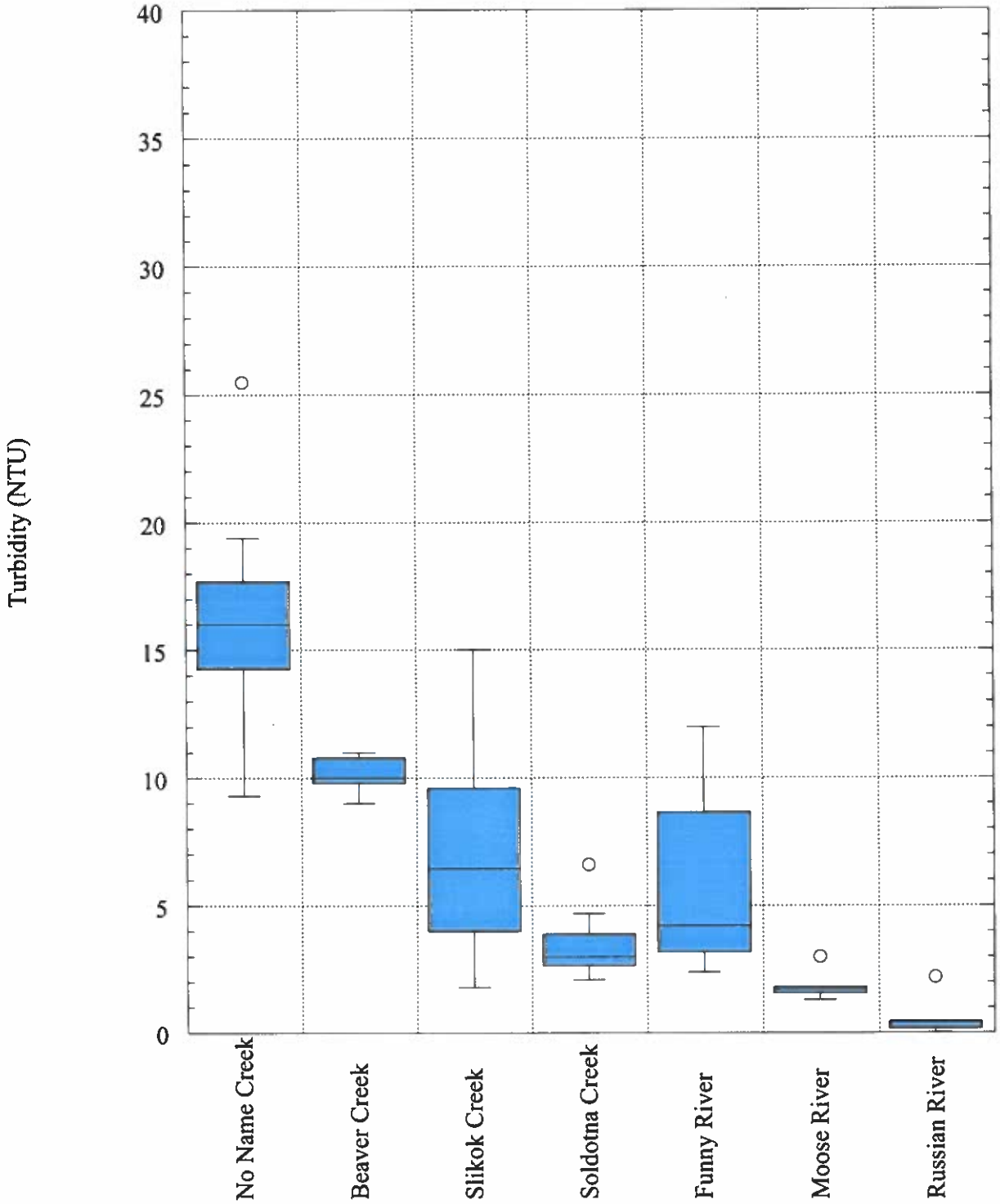

Figure 148: Turbidity sampled in Kenai River tributaries, excluding the Killey River, during July 2000 to 2006.

Water Temperature

Water temperature varies seasonally and as a result of glacial activity and anthropogenic sources. Low water temperatures between 0°C and 4°C can result in low growth rates for fish, but much higher water temperatures can encourage disease, competitors, predators, mortality, and an oxygen-deprived habitat (Kyle and Brabets, 2001). The ADEC has five temperature standards for the growth and propagation of fish, shellfish, other aquatic life, and wildlife in freshwater; the water temperature must remain below 20°C in all areas, below 15°C in rearing areas and migration routes, and below 13°C in egg and fry incubation and spawning areas (see Appendix 2) (ADEC, 2006).

The highest temperature recorded on the mainstem occurred at Mile 6.5 in July 2004 with a value of 16.6°C, and the lowest recorded temperature along the mainstem was –0.15°C at Mile 12.5 in April 2002. In April, none of the temperatures exceeded any of the standards at any location in the mainstem, and there was a general upward trend from Mile 80 to Mile 1.5. During July, the medians at Mile 1.5 and Mile 6.5 were very close to exceeding the standards for egg and fry incubation and spawning areas, and no medians exceeded the other standards. There was a general upward trend from Mile 80 to Mile 1.5, with an upward jump in the median at Mile 50, the outlet of Skilak Lake.

In the tributaries, the highest temperature was 19°C in the Moose River during July 2003, and the lowest temperature was –0.21°C in the Killey River during April 2002. In April, no samples exceeded any standards, and all tributaries had medians below 5°C, with the highest at Beaver Creek and the lowest at Funny River. During July, the medians of No Name Creek, Beaver Creek, Soldotna Creek, and Moose River exceeded the standards for egg and fry incubation and spawning areas, and the median at Moose River also exceeded the standards for rearing areas and migration routes. The coldest tributary in July was the Killey River, followed by Funny River and then Slikok Creek. The median water temperatures were higher in July than in April for all sampling locations in both the mainstem and the tributaries.

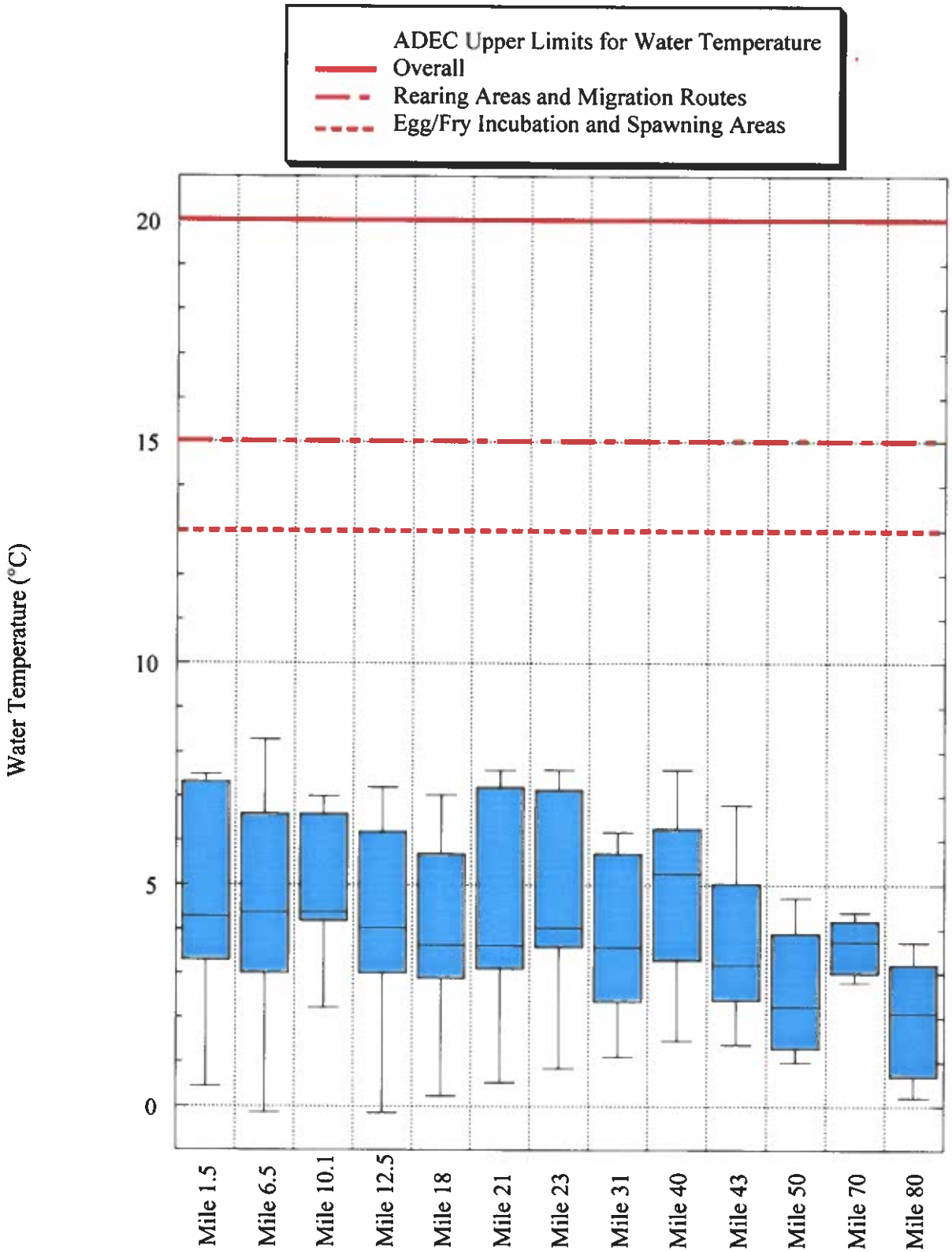

Figure 149: Water temperature sampled in the Kenai River mainstem during April 2001 to 2006.

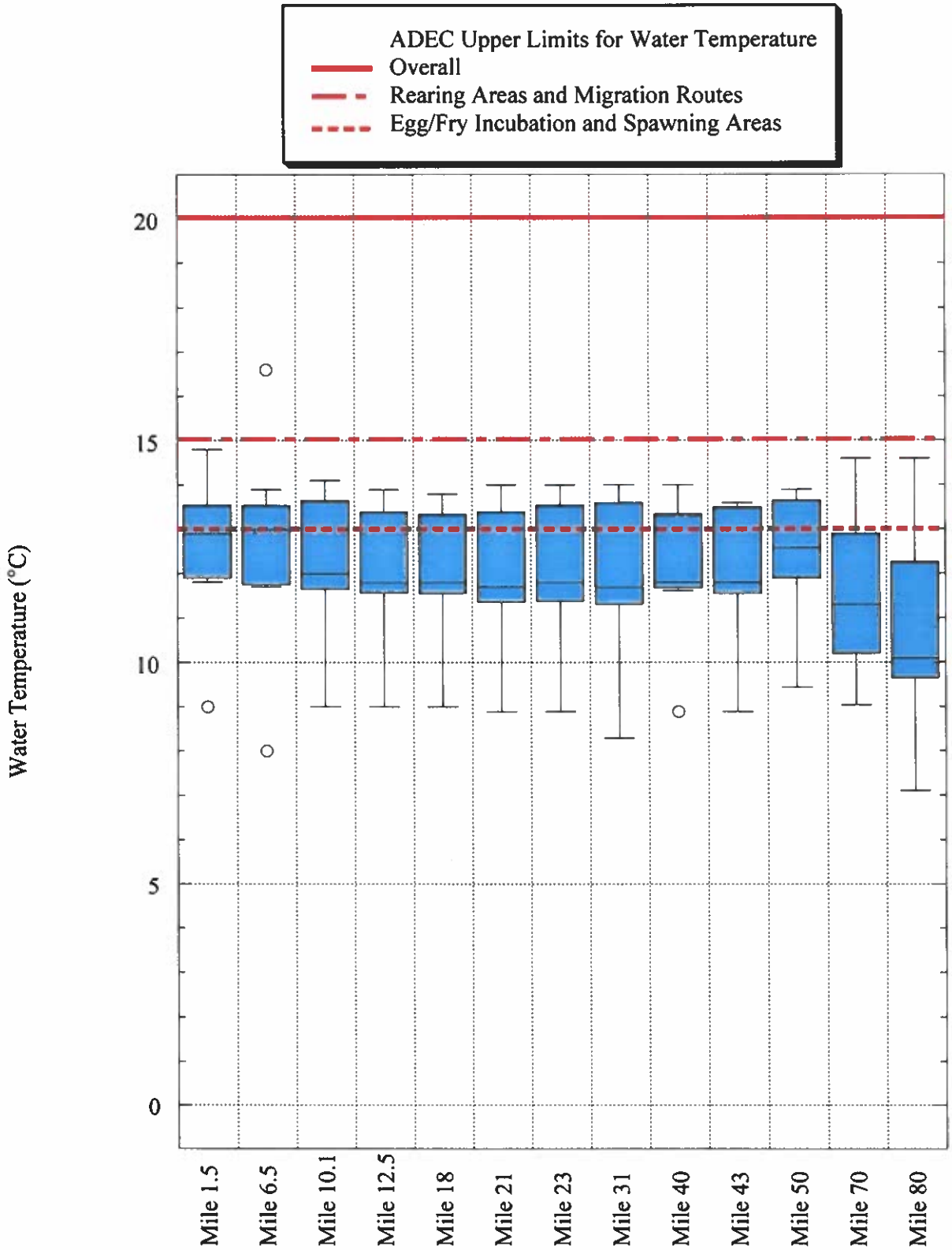

Figure 150: Water temperature sampled in the Kenai River mainstem during July 2000 to 2006.

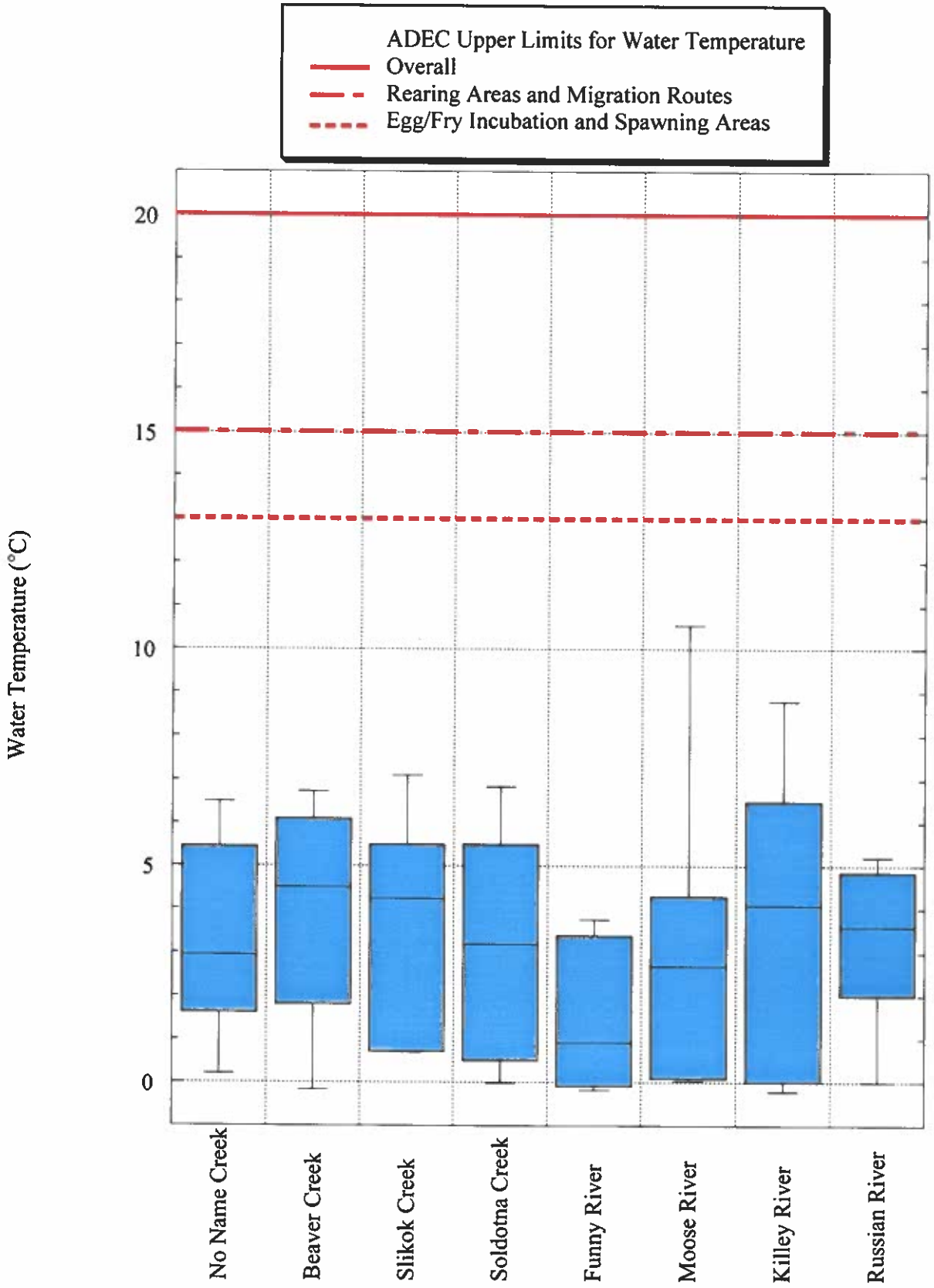

Figure 151: Water temperature sampled in Kenai River tributaries during April 2001 to 2006.

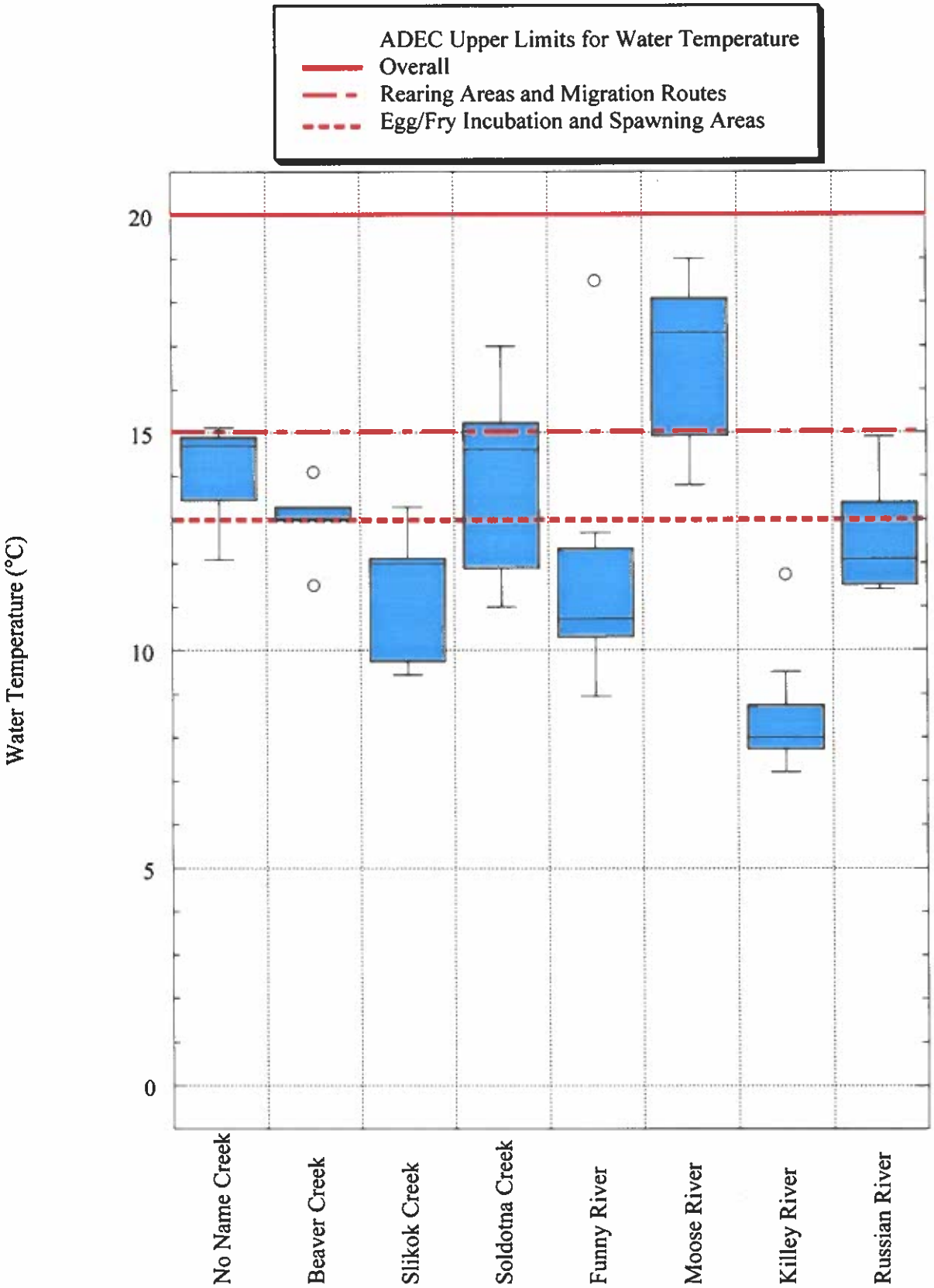

Figure 152: Water temperature sampled in Kenai River tributaries during July 2000 to 2006.

Data Quality Analysis

Beginning in April 2002, duplicate samples were collected at two sites immediately after the normal samples using the same collection, preservation, transportation, and laboratory procedures. The results from the normal sample and the duplicate sample were compared to determine the accuracy and quality control of the sampling effort. The following chart displays a summary of the amount of incidences when the normal and duplicate sample results differed by more than 10% (see Appendices 5 and 6 for full data set).

In April, all of the parameters had five or fewer incidences where the normal and duplicate sample results differed by over 10%. Calcium and pH had the best quality control comparisons, while total suspended solids had the highest amount of differences in April. During July, fecal coliform bacteria, total suspended solids, and zinc had seven incidences where the normal and duplicate samples differed by greater than 10%, and the other parameters had better quality control results, especially the pH samples.

Parameter	Number of April duplicate samples that have relative-percentage differences greater than 10%	Number of July duplicate samples that have relative-percentage differences greater than 10%
Arsenic	2	2
Cadmium	0	1
Chromium	2	1
Copper	2	4
Lead	1	3
Zinc	3	7
Calcium	0	2
Iron	2	5
Magnesium	2	5
Nitrate	0	5
Phosphorus	2	5
Diesel Range Organics	0	1
Gas Range Organics	0	0
Residual Range Organics	0	0
Benzene	0	2
Ethylbenzene	0	4
Toluene	0	1
M,P-Xylene	0	2
O-Xylene	0	1
Conductivity	1	2
Fecal Coliform	4	7
pH	0	0
TSS	5	7
Turbidity	3	4
Water Temperature	1	0

Table 5: Summary of data quality analysis for April and July for all parameters.

Report Summary

Water quality data was collected from the Kenai River and its tributaries from July 2000 through July 2006, and sampling efforts continue past the completion of this report. Several local non-profit organizations, along with local, state, federal, and tribal governments contributed to the sampling effort by providing teams to collect samples at 13 mainstem and 8 tributary sites. Samples were analyzed for metals, nutrients, hydrocarbons, and several other water quality parameters. The results were compared to state and federal water quality standards that apply to freshwater aquatic life.

Dissolved metals were generally reported in small concentrations with few exceedances of state or federal standards, many reported below laboratory detection methods. Arsenic levels were generally higher in the tributaries, but no samples exceeded the standards at any time. Laboratory methods for detecting cadmium did not measure concentrations to low enough levels to determine if there were exceedances for many sampling events; however, even when detection procedures improved, very few incidences of detection occurred. Trivalent chromium was never reported at levels above the standard. It is possible that hexavalent chromium may have exceeded the standard on four occasions, but the laboratory analysis did not distinguish between the two isomers of chromium.

In the early sampling years, the amount of exceedances of the copper criteria are unknown due to laboratory detection limits, but few exceedances occurred even when methods improved. Similarly for lead, reporting limits were too high for several sampling periods, and lead had few exceedances, with the most at Mile 21 and all exceedances occurring in July. Of the dissolved metals, zinc had the most exceedances with many occurring in No Name Creek and Slikok Creek during April.

The total metals, calcium, iron, and magnesium, display a spatial trend, increasing from Kenai Lake outlet to the Kenai River estuary, and they all had higher concentrations in April. There is no Alaska or federal water quality standard that applies to calcium and magnesium concentrations for freshwater aquatic life, so neither experienced any exceedances. Calcium levels were highest in the estuary, most likely due to tidal influence, and concentrations were also high in the Upper Kenai River, Moose River, and Soldotna Creek. Magnesium levels dropped at the Skilak Lake outlet to the lowest levels in the mainstem, and then rose throughout the remainder of the river heading downstream. The tributaries generally had higher concentrations of magnesium and iron than the mainstem (excluding the estuary). Iron levels usually exceeded the standard in all tributaries except for the Russian River, and the Killey River had the highest concentration of iron in April. Iron levels generally increased downriver, and exceedances of the iron standard on the mainstem were typical from Mile 10.1 through the estuary.

The two nutrients included in this study, nitrate and phosphorus, displayed very different spatial trends. From Kenai Lake to the estuary, nitrate levels decreased. Moose River and Beaver Creek had relatively low levels of nitrate, while Russian River had a very high concentration of nitrate. In contrast, Russian River had very low levels of phosphorus, and there was a general upward trend from Kenai Lake to the estuary with high levels of phosphorus in the Killey River.

Sampling for diesel range organics, gasoline range organics, and residual range organics was useful in narrowing down the main source of hydrocarbons present: benzene, toluene, ethylbenzene, and xylene (BTEX). Very few detections occurred for any of the range organics.

The laboratory detection limits were too high during several sampling events to detect exceedances of gasoline range organics and residual range organics. All of the detected gasoline range organics occurred downstream of Mile 10.1 during July. BTEX concentrations showed an upward trend from the Middle Kenai River to the estuary, with the median BTEX level at Mile 1.5 exceeding the standard and several instances of exceedance reported at Mile 6.5. No detections of BTEX occurred in April, indicating outboard motors as the primary source of contamination.

Fecal coliform bacteria, pH, and specific conductance all had very few to zero exceedances. All of the median levels of fecal coliform bacteria were below 200 CFU/100m, although the highest levels occurred at Mile 6.5, Slikok Creek, Beaver Creek, and No Name Creek in July. Most of the exceedances of the pH standards occurred below the lower limit in April, but overall, there were very few samples outside of the acceptable range. Specific conductance was higher in April, especially at the estuary, No Name Creek, Soldotna Creek, the Moose River, and Russian River.

The remaining characteristics of total suspended solids, turbidity, and water temperature had high levels in several areas. The concentration of total suspended solids was highest in the estuary in April and July, along with high levels in the Killey River in April. Russian River had the lowest median for total suspended solids and turbidity. In July, turbidity samples displayed a general increasing trend moving downriver, with the highest levels at the estuary and the Killey River. Water temperature also increased from the Kenai Lake Outlet to the estuary, although there were no exceedances in the mainstem or tributaries during April. In July, medians in the estuary were very close to exceeding the upper limits for spawning areas and egg and fry incubation. The medians exceeded the upper limits for spawning areas and egg and fry incubation in No Name Creek, Beaver Creek, Soldotna Creek, and the Moose River in July. Additionally, the Moose River also exceeded the standards for rearing areas and migration routes.

After analyzing all of the data and corresponding trends, the Kenai Watershed Forum highlights four areas of concern for aquatic life in the Kenai River Watershed:

1. **Hydrocarbon** concentrations consistently exceeded the Alaska standard in the mainstem of the Lower Kenai River during the July sampling events.
2. **Zinc** levels in No Name Creek and Slikok Creek were often higher than the state and federal standards.
3. **Iron** median levels regularly exceeded the standard in the estuary and in No Name Creek, Beaver Creek, Slikok Creek, Soldotna Creek, Funny River, Moose River, and the Killey River, especially in April.
4. **Water temperatures** in the Moose River typically exceeded four of Alaska's standards, and two of the standards were regularly exceeded in No Name Creek, Beaver Creek, and Soldotna Creek during July.

In conclusion, these highlighted areas of concern warrant more intensive monitoring and any necessary restoration, so that the Kenai River can continue to support fishing, recreation, tourism, and the propagation of fish and wildlife.

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Appendix 1. Data Tables Organized by Parameter

Less than (<) indicates the sample is below the MRL or MDL of the following value, and these data are grey in color. ND indicates an instance of non-detect, in which all of the BTEX samples were reported as below the MRL or MDL, and these data are also shown in grey.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	<4	<4	<4	5	<4	<4	<4	<4	<4	<4	<4	<4	<4
4/10/02	<3	<3		<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
4/29/03	4.7	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
4/27/04	<0.25	3.28	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
4/26/05	6.51	7.17	<0.25	<0.25	<0.25	<0.25	<0.25	3.41	<0.25	<0.25	<0.25	<0.25	<0.25
4/25/06	12.5	3.14	2.31	3.6	2.1	1.93	2.12	2.58	1.2	1.05	1.04	0.807	0.525
7/18/00	<4	<4	<4	<4	<4	<4	<4	<4	<4	4	<4	<4	<4
7/24/01	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1
7/16/02	2[1]	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
7/22/03	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
7/20/04	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
7/26/05	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
7/25/06	2.56	<0.44	<0.44	<0.44	<0.44	1.3	1.29	1.22	1.23	1.19	1.15	0.523	0.405

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	<4		<4	7	<4	<4	<4	<4
4/10/02	<3	5[1]	4[1]	8[1]	<3	6[4]	<3	<3
4/29/03	<2.5	5	<2.5	5.9	<2.5	4	<2.5	<2.5
4/27/04	<0.25	3.82	<0.25	4.54	<0.25	3.6	<0.25	<0.25
4/26/05	<0.25	3.57	<0.25	6.84	<0.25	6.46	<0.25	<0.25
4/25/06	1.56	4.66	2.04	7.9	2.46	5.87	1.39	0.682
7/18/00	<4		6	10	<4	8	4	5
7/24/01	<3.1		<3.1	9.7	<3.1	6.7[1]	<3.1	<3.1
7/16/02	<1	3	2	8	<1	6	<1	<1
7/22/03	<2.5	4.4[1]	2.6[1]	10	2.6	5.2	<2.5	<2.5
7/20/04	<0.25	4.74	<0.25	11.3	2.83	6.01	<0.25	<0.25
7/26/05	<2.5	5.01	<2.5	10.1	2.56	5.58	<2.5	<2.5
7/25/06	1.78	4.57	2.11	9.44	2.63	7.63	1.38	0.919

Table 6: Arsenic sampled in µg/L.

[1] Best Available Estimate

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4/10/02	1.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4/29/03	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
4/27/04	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
4/26/05	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
4/25/06	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062
7/18/00	<0.1	0.1	<0.1	<0.1	<0.1	8	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
7/24/01	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
7/16/02	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
7/22/03	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
7/20/04	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	1
7/26/05	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
7/25/06	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4/10/02	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4/29/03	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
4/27/04	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
4/26/05	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
4/25/06	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062
7/18/00	<0.1		0.1	<0.1	<0.1	<0.1	<0.1	<0.1
7/24/01	<0.14		<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
7/16/02	<2	<2	<2	63	<2	<2	<2	<2
7/22/03	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
7/20/04	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
7/26/05	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
7/25/06	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062

Table 7: Cadmium sampled in µg/L.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
4/10/02	0.9[2]	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4/29/03	2.9	2.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4/27/04	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
4/26/05	<0.36	11.2	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
4/25/06	4.03	3.29	2.46	1.54	0.996	1.16	0.299	0.299	0.19	0.894	0.846	0.227	1.2
7/18/00	<2	<2	<2	<2	<2	25	<2	<2	<2	<2	<2	<2	<2
7/24/01	<0.49	<0.49	<0.49	<0.49	<0.49	<0.49	<0.49	<0.49	<0.49	<0.49	<0.49	<0.49	<0.49
7/16/02	0.7[2]	<0.6	2[2]	1.8[2]	<0.6	<0.6	<0.6	0.8[2]	<0.6	<0.6	<0.6	<0.6	1.5[2]
7/22/03	1.4	<1	<1	<1	<1	<1	1	<1	1	<1	<1	<1	<1
7/20/04	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
7/26/05	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
7/25/06	1.78	19.5	19.9	2.71	2.17	1.86	1.43	1.41	1.15	1.32	0.952	1.22	0.898

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	<2		<2	<2	<2	<2	<2	<2
4/10/02	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4/29/03	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4/27/04	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
4/26/05	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
4/25/06	2.6	2.38	0.517	0.493	1.23	0.29	0.341	0.248
7/18/00	<2		<2	<2	<2	<2	<2	<2
7/24/01	<0.49		<0.49	<0.49	<0.49	<0.49	<0.49	<0.49
7/16/02	<0.6	1[2]	0.9[2]	1.6[2]	1.1[2]	<0.6	<0.6	<0.6
7/22/03	<1	<1	<1	<1	<1	1	<1	<1
7/20/04	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	3.33	<0.36
7/26/05	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
7/25/06	3.93	16.4	<0.49	<0.49	2.97	5.26	0.42	1.26

Table 8: Chromium sampled in µg/L.

[2] Best Available Estimate

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
4/10/02	<9	<9		<9	<9	<9	<9	<9	<9	<9	<9	<9	<9
4/29/03	100	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
4/27/04	2.19	<0.12	<0.12	1.97	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
4/26/05	3.73	12	<0.12	<0.12	<0.12	<0.12	<0.12	2.59	<0.12	<0.12	<0.12	2.94	<0.12
4/25/06	3.28	2.99	0.772	0.604	0.596	0.997	1.23	0.493	0.543	0.479	0.483	0.474	0.548
7/18/00	<5	<5	<5	<5	<5	443	<5	9	<5	<5	<5	6	5
7/24/01	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3
7/16/02	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9
7/22/03	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
7/20/04	<0.12	<0.12	<0.12	<0.12	1.06	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
7/26/05	8.44	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	21.1	<2.5	<2.5	<2.5	<2.5	<2.5
7/25/06	3.75	4.84	3.29	1.88	2.04	1.85	0.687	0.332	0.319	0.376	0.372	0.446	0.613

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	<5		<5	<5	<5	<5	<5	<5
4/10/02	<9	<9	<9	<9	<9	<9	13[3]	<9
4/29/03	<25	<25	<25	<25	<25	<25	<25	<25
4/27/04	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
4/26/05	8.21	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	3
4/25/06	0.792	0.567	0.837	0.832	0.616	0.449	0.692	0.928
7/18/00	<5		<5	<5	<5	6	<5	7
7/24/01	<9.3		<9.3	<9.3	<9.3	<9.3	<9.3	<9.3
7/16/02	<9	<9	<9	<9	<9	<9	<9	<9
7/22/03	<25	<25	<25	<25	<25	<25	<25	<25
7/20/04	<0.12	<0.12	12.1	<0.12	<0.12	<0.12	8.42	<0.12
7/26/05	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
7/25/06	0.665	1.74	3.51	<0.34	0.5	0.315	1.45	0.869

Table 9: Copper sampled in µg/L.

[3] Best Available Estimate

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
4/10/02	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4/29/03	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
4/27/04	1.34	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052
4/26/05	<0.052	3.06	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052
4/25/06	0.113	0.26	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
7/18/00	<4	<4	<4	<4	<4	106	<4	<4	<4	<4	<4	<4	<4
7/24/01	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.5[4]	<1.1	<1.1	<1.1	<1.1
7/16/02	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	4[4]
7/22/03	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
7/20/04	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052
7/26/05	2.73	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	468	<1.0	<1.0	<1.0	<1.0	<1.0
7/25/06	0.279	19	1.65	<0.030	<0.030	1.93	0.165	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	<4		<4	<4	<4	<4	<4	<4
4/10/02	<1	<1	<1	<1	<1	<1	<1	<1
4/29/03	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
4/27/04	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052
4/26/05	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052
4/25/06	0.111	0.158	<0.030	<0.030	<0.030	0.118	<0.030	<0.030
7/18/00	<4		<4	<4	<4	<4	<4	<4
7/24/01	<1.1		<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
7/16/02	<2	<2	<2	<2	<2	<2	<2	<2
7/22/03	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
7/20/04	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	1.21	<0.052
7/26/05	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
7/25/06	<0.030	3.92	<0.030	<0.030	<0.030	<0.030	0.201	<0.030

Table 10: Lead sampled in µg/L.

[4] Best Available Estimate

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	55	91	56	26	29	35	22	34	28	29	32	44	44
4/10/02	106	57		37	33	32	33	35	31	33	31	34	36
4/29/03	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
4/27/04	40.8	41.3	38	31.6	24.1	38.2	45.2	45.7	31.2	42.3	30.6	34.2	40.1
4/26/05	55.9	102	45.9	29.8	51.1	29	25.8	17.9	25.8	21	22.9	30.7	33.1
4/25/06	38.9	47.4	28	19.6	20.3	16.8	1.96	19.2	7.96	8.08	10	10.4	5.19
7/18/00	<9	10	<9	14	14	2900	18	32	<9	<9	11	17	21
7/24/01	36.2	28.4[5]	36.9	31.6	43	37.1	43.2	33.5	29.8[5]	32.5	48.5	34.6	36.2
7/16/02	32	39	31	30[5]	30[5]	30[5]	36	32	33	40	26[5]	50	32
7/22/03	65	55	51	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
7/20/04	35.7	39.9	32	55.7	59.4	36.3	31.9	44.1	32.5	28.8	29.1	33.2	27.9
7/26/05	45.8	<10	24.9	14.4	25.7	<10	25.8	51.2	<10	26.1	15.6	19.1	19.8
7/25/06	0.94	52.1	60	19.1	18.7	15.8	2.25	0.521	0.778	0.893	0.976	20.9	20.9

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	84		41	33	34	33	28	46
4/10/02	122	41	40	37	70	79	34	34
4/29/03	60	<50	69	<50	52	49	<50	<50
4/27/04	61.9	36.2	39.5	39	27.4	41.3	37.9	49.7
4/26/05	63.3	59.1	47.9	58.6	46.8	24	27.2	30.6
4/25/06	52.2	46.4	5.59	3	20.5	33.6	11.9	7.6
7/18/00	12		27	<9	<9	10	<9	<9
7/24/01	46.3		69.4	68	41	76.1	34.4	34.6
7/16/02	29[5]	41	61	57	51	<9	26[5]	50
7/22/03	75	<50	<50	<50	<50	<50	<50	<50
7/20/04	48.5	47.4	54.2	63.4	59.1	11	49.5	33.8
7/26/05	51.1	26	<10	19.4	16.2	<10	19.9	19.6
7/25/06	2.62	49.7	11.2	17.8	20	0.831	5.21	24.7

Table 11: Zinc sampled in µg/L.

[5] Best Available Estimate

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	36	19.3	16.3	11.3	11.2	10.7	10.9	11.4	10.3	10.2	10.6	14.5	12.9
4/10/02	107.65	15.19		12.2	12.01	12.06	11.19	12.52	10.09	10.28	10.35	13.35	11.47
4/29/03	140	17	10	10	10	10	11	11	9.7	9.4	10	13	11
4/27/04	47.4	9.2	9.28	9.65	9.79	9.02	9.89	9.95	10.1	9.64	8.83	13.6	11.8
4/26/05	54.4	22	12.3	11.1	11	10.1	11.6	12.7	10.8	10.4	10.9	14	13.2
4/25/06	45.4	32.2	11.1	10.9	11.5	10.6	9.82	12.4	10.1	9.99	11.4	16.9	13.5
7/18/00	11.3	9.42	9.77	9.68	9.76	9.65	9.74	9.9	9.88	9.79	10.5	17	12.1
7/24/01	13	11	11	10	11	10	11	10	10	10	10	12	14
7/16/02	15.41	11.2	10.6	10.29	10.4	10.36	10.29	9.4	9.56	9.61	10.22	11.26	11.11
7/22/03	10	10	9.6	9.7	9.5	9.5	9.6	9.6	9.5	9.7	10	12	12
7/20/04	13.1	12.4	10.5	10.2	10.3	10.4	10.2	10.4	10.8	10.2	11.1	12.9	12.8
7/26/05	12.9	9.27	8.93	8.87	9.14	10.2	9.85	9.72	9.58	9.54	10.5	12.5	12.5
7/25/06	13.3	10.4	9.8	9.95	9.85	9.85	9.84	9.76	9.95	9.82	11.1	12.5	12.2

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	8.25		5.03	10.8	9.45	10.3	10.4	18.5
4/10/02	11.16	17.82	19.06	23.31	10.84	25.33	8.06	20.59
4/29/03	12	15	11	16	7.7	18	7.4	18
4/27/04	7	8.25	6.34	8.3	6.28	9.95	9.1	15.3
4/26/05	4.22	8.53	6.61	10.3	8.11	17.2	8.26	15.8
4/25/06	8.17	8.18	6.47	11.5	9.07	16.4	6.71	15.8
7/18/00	12.8		14.3	19.2	8.88	24.5	3.95	14.3
7/24/01	15		13	15	9.1	24	3.8	13
7/16/02	11.96	18.48	19.48	22.08	8.22	22.38	10.26	13.36
7/22/03	13	20	18	22	9.5	24	3.3	14
7/20/04	13.5	23.5	14.9	24.1	9.88	25.7	3.41	15.9
7/26/05	14.1	22.4	4.61	22.1	10.8	23.8	20.2	15.3
7/25/06	12.8	19	12.8	19.2	9.48	23.9	4.99	16.5

Table 12: Calcium sampled in mg/L.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	30.2	27.5	18.7	0.22	0.2	0.41	0.46	0.62	0.39	0.37	0.25	0.09	0.51
4/10/02	7.7	11.97		1.54	0.39	0.25	0.23	0.31	0.19	0.24	0.1[6]	0.24	0.41
4/29/03	3.3	29	0.64	0.46	0.45	0.83	0.44	0.51	0.4	0.43	0.51	0.22	0.36
4/27/04	0.958	1.25	0.763	0.706	0.612	0.715	0.678	0.665	0.501	0.633	1.78	0.376	0.555
4/26/05	30	51.4	5.35	0.934	0.987	1.02	1.03	1.24	0.763	1.69	0.377	0.215	0.234
4/25/06	14.4	128	3.07	0.866	0.964	0.866	0.66	1.06	0.46	0.688	0.147	0.209	0.442
7/18/00	11.9	2.3	1.97	1.6	1.54	1.5	1.19	1.43	1.25	1.32	0.43	0.25	0.15
7/24/01	4.5	1.2	0.718	0.575	0.586	0.582	0.599	0.714	0.531	0.547	0.091[6]	0.101[6]	0.084[6]
7/16/02	5.34	8.42	0.42	0.33	0.3	0.27	0.3	0.25	0.25	0.2	0.05[6]	0.16	0.17
7/22/03	2	3.2	0.87	0.84	0.72	0.76	0.66	0.53	0.52	0.57	0.27	0.23	0.31
7/20/04	12	9.27	0.71	0.62	0.629	0.562	0.625	0.549	0.54	0.503	0.242	0.189	0.199
7/26/05	0.838	0.649	0.728	0.855	0.639	0.404	0.435	0.419	0.42	0.476	0.0888	0.113	0.0867
7/25/06	5.95	3.37	1.55	1.68	1.56	1.4	1.27	1.2	1.01	1.07	0.0628	0.243	0.136

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	2.86		0.67	1.62	1.89	1.08	0.31	<0.04
4/10/02	2.04	2.3	1.27	1.16	0.75	1.06	0.19	<0.03
4/29/03	3.2	5.1	1.3	0.95	2.2	1.1	0.67	<0.11
4/27/04	3.58	2.7	0.603	0.832	1.96	0.876	0.242	0.104
4/26/05	3.16	3.83	0.917	2.06	2.25	2.02	0.941	<0.0040
4/25/06	4.35	6.42	3.13	2.62	7.21	3.13	1.43	0.199
7/18/00	2.85		1.18	1.13	1.46	1.1	6.26	<0.04
7/24/01	2.5		0.842	0.613	1.1	0.64	2.9	0.083[6]
7/16/02	1.58	1.87	0.42	0.72	0.38	0.63	0.06[6]	0.06[6]
7/22/03	3.3	1.8	1.1	0.59	0.58	0.27	3.6	<0.10
7/20/04	2.57	2.4	0.802	0.761	0.387	0.521	3.33	<0.0040
7/26/05	5.12	0.931	8.24	0.867	0.574	0.85	<0.050	<0.050
7/25/06	3.38	2.26	1.52	1.09	0.629	0.867	9.99	<0.0027

Table 13: Iron sampled in mg/L.

[6] Best Available Estimate

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	73.3	17.7	8.5	1.8	1.4	1.3	1.3	1.5	1	1	0.9	1	1
4/10/02	327.6	10.29		2.04	1.58	1.47	1.41	1.39	0.95	0.97	0.8	1.01	0.97
4/29/03	510	15	1.5	1.4	1.4	1.5	1.4	1.3	1	0.98	0.93	0.99	0.94
4/27/04	128	1.86	1.53	1.71	1.52	1.46	1.47	1.45	1.07	1.12	1.83	1.06	1.03
4/26/05	141	22.6	3.6	1.9	1.87	1.84	1.9	1.89	1.18	1.5	0.943	1.06	1.05
4/25/06	110	43.8	2.66	2.07	1.74	1.68	1.46	1.74	1.09	1.15	0.889	1.27	1.17
7/18/00	5.4	1.6	1.4	1.3	1.3	1.3	1.2	1.3	1.1	1.2	0.9	1.3	0.9
7/24/01	9.2	1.1	1	0.979	0.909	1	1	0.962	0.947	0.804	0.729	0.812	0.847
7/16/02	20.29	3.66	0.96	0.92	0.91	0.9	0.88	0.81	0.78	0.76	0.75	0.84	0.82
7/22/03	2.6	1.9	1.1	1	0.95	1	0.97	0.96	0.92	0.93	0.84	0.93	0.94
7/20/04	6.42	3.92	1.03	0.931	0.977	0.963	0.918	0.945	0.983	0.903	0.875	0.97	0.959
7/26/05	2.8	0.969	0.939	0.948	0.965	0.961	0.907	0.906	0.867	0.881	0.844	0.99	0.952
7/25/06	12.5	1.98	1.33	1.38	1.32	1.3	1.2	1.19	1.12	1.13	0.869	1.01	0.969

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	3.5		1.5	2.9	3	1.8	0.9	1.1
4/10/02	3.44	4.6	5.85	6.75	3.88	4.59	1.55	1.31
4/29/03	6.7	4.7	3.4	4.8	3	3	1.3	1.2
4/27/04	2.76	2.32	1.86	2.45	2.46	1.75	0.746	0.97
4/26/05	1.56	2.69	2.09	3.08	3.33	3.03	1.7	1.02
4/25/06	3.13	2.73	2.06	3.48	3.86	2.94	1.56	1.2
7/18/00	4.3		4	5.1	3.2	3.9	2.7	0.9
7/24/01	7.7		3.6	4.1	2.6	3.6	1.4	0.84
7/16/02	3.87	4.43	5.57	5.92	2.77	3.84	0.77	0.93
7/22/03	4.4	5.1	5.5	6.4	3.3	4.5	1.6	1
7/20/04	4.25	5.31	3.01	6.4	3.09	4.16	1.55	1.04
7/26/05	5.3	3.86	3.3	6.01	3.57	3.91	1.69	1.09
7/25/06	4.35	4.76	2.79	5.52	3.29	4.25	3.94	1.13

Table 14: Magnesium sampled in mg/L.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	<0.10	<0.10	<0.10	<0.10	0.13	<0.10	<0.10	<0.10	<0.10	0.17	0.17	0.32	0.24
4/10/02	0.2	<0.10		<0.10	0.11	0.15	0.13	0.14	0.22	0.22	0.22	0.27	0.22
4/29/03	0.16	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	0.12	0.14	0.17	0.15	0.4	0.25
4/27/04	0.272	<0.015	0.113	0.115	0.131	0.115	0.116	<0.015	0.198	0.206	0.255	0.456	0.271
4/26/05	0.147	<0.015	0.134	0.156	0.184	0.163	0.143	0.142	0.245	0.264	0.24	0.706	0.29
4/25/06	<0.015	<0.015	<0.015	<0.015	0.112	<0.015	<0.015	<0.015	0.152	0.162	0.205	0.409	0.275
7/18/00	0.18	0.15	0.16	0.15	0.15	0.14	0.15	0.16	0.19	0.17	0.18	0.2	0.21
7/24/01	0.25	0.22	0.23	0.22	0.23	0.23	0.17	0.21	0.15	0.25	0.26	0.27	0.29
7/16/02	0.1	<0.10	0.15	0.17	0.23	0.15	0.16	0.2	0.15	0.16	0.18	0.25	0.26
7/22/03	0.16	0.19	0.18	0.18	0.15	0.18	0.17	0.16	0.17	0.18	0.18	0.24	0.24
7/20/04	0.125	0.102	0.143	0.155	0.156	0.158	0.182	0.149	0.152	0.159	0.161	0.203	0.229
7/26/05	<0.10	<0.10	0.119	0.124	0.135	0.121	0.119	0.108	0.119	0.132	0.137	0.196	0.251
7/25/06	0.108	0.119	0.51	0.13	0.152	0.136	0.136	0.139	0.141	0.141	0.169	0.242	0.251

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	<0.10		<0.10	<0.10	<0.10	<0.10	0.22	0.59
4/10/02	0.22	<0.10	0.3	0.13	<0.10	<0.10	0.15	0.64
4/29/03	0.12	<0.10	0.12	<0.10	<0.10	<0.10	0.22	0.54
4/27/04	0.138	<0.015	<0.015	<0.015	<0.015	<0.015	0.159	0.756
4/26/05	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	1.11
4/25/06	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.299
7/18/00	0.08		0.12	0.06	0.04	<0.03	<0.03	0.31
7/24/01	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	0.36
7/16/02	<0.10	<0.10	0.36	<0.10	<0.10	<0.10	0.19	0.37
7/22/03	<0.10	<0.10	0.12	<0.10	<0.10	<0.10	<0.10	0.3
7/20/04	<0.015	<0.015	0.179	<0.015	<0.015	<0.015	<0.015	0.281
7/26/05	<0.10	<0.10	0.135	<0.10	<0.10	<0.10	<0.10	0.308
7/25/06	<0.015	<0.015	0.146	<0.015	<0.015	<0.015	<0.015	0.43

Table 15: Nitrate sampled in mg/L.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	0.91	0.84	0.75	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4/10/02	0.35	0.48		0.06	0.02[7]	0.02[7]	0.02[7]	0.01[7]	0.01[7]	0.01[7]	<0.01	0.01[7]	0.01[7]
4/29/03	0.22	0.93	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
4/27/04	0.056	0.046	0.048	0.045	0.039	0.051	0.039	0.039	<0.0020	<0.0020	0.065	<0.0020	<0.0020
4/26/05	0.89	1.42	0.29	0.11	<0.025	0.15	0.11	0.1	<0.025	0.1	<0.025	<0.025	<0.025
4/25/06	0.66	0.52	<0.026	<0.026	<0.026	<0.026	<0.026	0.058	<0.026	<0.026	<0.026	<0.026	<0.026
7/18/00	0.81	0.11	0.09	0.06	0.06	0.07	0.06	0.05	0.04	<0.04	<0.04	<0.04	<0.04
7/24/01	0.221	0.093	0.072	0.064	0.08	0.018[7]	0.019[7]	0.039	0.019[7]	0.018[7]	<0.010	<0.010	
7/16/02	0.42	0.3	0.01[7]	0.02[7]	0.01[7]	0.02[7]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
7/22/03	0.085	0.12	0.049	0.036	0.03	0.049	0.032	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
7/20/04	0.507	0.267	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
7/26/05	1.1	0.099	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051
7/25/06	0.32	0.15	0.084	0.077	<0.026	<0.026	<0.026	0.098	<0.026	0.091	0.08	<0.026	<0.026

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	0.12		0.06	0.15	0.12	0.06	<0.05	<0.05
4/10/02	0.04	0.08	0.05	0.12	0.04	0.06	0.01[7]	<0.01
4/29/03	<0.025	0.17	0.033	0.092	0.13	0.049	0.033	<0.025
4/27/04	0.057	0.106	0.035	0.094	0.11	0.059	<0.0020	<0.0020
4/26/05	0.13	0.26	<0.025	0.27	0.23	0.23	0.12	<0.025
4/25/06	0.06	<0.026	0.11	0.15	0.12	0.087	<0.026	<0.026
7/18/00	<0.04		<0.04	0.1	0.11	0.05	0.21	<0.04
7/24/01	0.029[7]		0.023[7]	0.093	0.07	0.024[7]	0.088	<0.010
7/16/02	0.05	0.09	0.09	0.11	0.04	0.03[7]	<0.01	<0.01
7/22/03	0.04	0.063	0.03	0.11	0.044	0.027	0.14	<0.025
7/20/04	0.042	0.0742	0.0279	0.116	0.0311	0.0263	0.0614	<0.0020
7/26/05	<0.051	0.077	<0.051	0.13	<0.051	<0.051	0.4	<0.051
7/25/06	<0.026	0.093	<0.026	0.16	0.088	<0.026	0.57	<0.026

Table 16: Phosphorus sampled in mg/L.

[7] Best Available Estimate

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	0.29	<0.25	0.27	<0.27	<0.25	<0.25	<0.27	0.29	<0.27	<0.27	<0.25	<0.27	<0.27
4/10/02	<0.26	<0.27		<0.26	<0.25	<0.26	<0.27	<0.25	<0.25	<0.25	<0.25	<0.29	<0.29
4/29/03	<0.39	<0.39	<0.44	<0.42	<0.43	<0.43	<0.43	<0.43	<0.43	<0.42	<0.42	<0.39	<0.40
4/27/04	<0.024	<0.020	<0.022	<0.022	<0.022	<0.021	<0.020	<0.022	<0.020	<0.021	<0.020	<0.021	<0.022
4/26/05	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060
7/18/00	<0.29	<0.28	<0.27	<0.29	<0.28	<0.30	<0.25	<0.25	<0.27	<0.27	<0.25	<0.28	<0.27
7/24/01	<0.27	<0.26	<0.26	<0.26	<0.25	<0.26	<0.27	<0.27	<0.26	<0.27	<0.26	<0.27	<0.27
7/16/02	<0.26	<0.26	<0.28	<0.26	<0.27	<0.30	<0.26	<0.27	<0.26	<0.27	<0.25	<0.26	<0.25
7/22/03	<0.38	<0.38	<0.41	<0.40	<0.42	<0.40	<0.41	<0.43	<0.42	<0.40	<0.40	<0.41	<0.41
7/20/04	<0.021	<0.021	<0.022	<0.022	<0.023	<0.024	<0.022	<0.023	<0.021	<0.024	<0.020	<0.023	<0.023
7/26/05	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
7/25/06	<0.0065	<0.0064	<0.0065	<0.0066	<0.0065	<0.0065	<0.0064	<0.0064	<0.0064	<0.0065	<0.0064	<0.0064	<0.0064

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	<0.25		0.32	0.35	<0.25	0.37	<0.27	<0.25
4/10/02	<0.26	<0.26	<0.26	<0.26	<0.26	<0.25	<0.25	<0.27
4/29/03	<0.40	<0.44	<0.42	<0.43	<0.42	<0.44	<0.43	<0.41
4/27/04	<0.021	<0.022	<0.021	<0.022	<0.021	<0.022	<0.021	<0.022
4/26/05	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060
7/18/00	<0.25		<0.25	0.37	<0.25	<0.25	<0.25	<0.28
7/24/01	<0.27		<0.26	<0.27	<0.28	<0.25	<0.27	<0.27
7/16/02	<0.27	<0.27	<0.25	<0.25	<0.27	<0.27	<0.25	<0.25
7/22/03	<0.39	<0.41	<0.81	<0.40	<0.45	<0.42	<0.41	<0.42
7/20/04	<0.022	<0.022	<0.022	<0.022	<0.022	<0.023	<0.021	<0.022
7/26/05	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
7/25/06	<0.0065	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064	<0.0063

Table 17: Diesel range organics sampled in mg/L.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
4/10/02	<25.0	<25.0		<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
4/29/03	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
4/27/04	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
7/18/00	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
7/24/01	26.7	27.1	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
7/16/02	38.3	27.4	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
7/22/03	<25.0	<25.0	26.4	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
7/26/05	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	<25.0		<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
4/10/02	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
4/29/03	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
4/27/04	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
7/18/00	<25.0		<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
7/24/01	<25.0		<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
7/16/02	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
7/22/03	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
7/26/05	<100	<100	<100	<100	<100	<100	<100	<100

Table 18: Gasoline range organics sampled in µg/L.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	<2.53	<2.53	<2.53	<2.66	<2.53	<2.53	<2.70	<2.53	<2.70	<2.70	<2.53	<2.66	<2.66
4/10/02	<2.58	<2.69		<2.58	<2.53	<2.58	<2.66	<2.53	<2.53	<2.53	<2.53	<2.94	<2.91
4/29/03	<2.59	<2.63	<2.91	<2.81	<2.84	<2.84	<2.84	<2.84	<2.84	<2.81	<2.81	<2.58	<2.65
4/27/04	<0.037	<0.032	<0.034	<0.034	<0.034	<0.032	<0.032	<0.034	<0.032	<0.032	<0.032	<0.033	<0.034
4/26/05	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
7/18/00	<3.39	<3.28	<3.24	<3.43	<3.26	<3.51	4.75	<2.98	<3.17	<3.19	<2.98	<3.28	<3.17
7/24/01	<2.69	<2.58	<2.58	<2.58	<2.53	<2.63	<2.69	<2.69	<2.63	<2.66	<2.63	<2.69	<2.69
7/16/02	<2.55	<2.55	<2.81	<2.63	<2.72	<3.01	<2.60	<2.75	<2.60	<2.69	<2.53	<2.60	<2.53
7/22/03	<2.53	<2.53	<2.75	<2.69	<2.78	<2.69	<2.72	<2.87	<2.78	<2.69	<2.69	<2.75	<2.75
7/20/04	<0.032	<0.033	<0.034	<0.034	<0.036	<0.037	<0.034	<0.036	<0.033	<0.037	<0.032	<0.036	<0.036
7/26/05	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/25/06	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.21	<0.22	<0.21	<0.22	<0.22

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	<2.53		<2.53	<2.66	<2.53	<2.53	<2.66	<2.53
4/10/02	<2.60	<2.58	<2.58	<2.58	<2.55	<2.53	<2.53	<2.72
4/29/03	<2.65	<2.91	<2.78	<2.84	<2.78	<2.94	<2.84	<2.70
4/27/04	0.24	<0.034	<0.032	<0.034	<0.032	<0.034	<0.032	<0.034
4/26/05	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
7/18/00	<2.98		<2.98	5.67	<2.98	<2.98	<2.98	<3.35
7/24/01	<2.69		<2.58	<2.75	<2.81	<2.53	<2.66	<2.66
7/16/02	<2.75	<2.75	<2.53	<2.53	<2.66	<2.72	<2.53	<2.53
7/22/03	<2.63	<2.72	<5.38	<2.69	<3.01	<2.81	<2.72	<2.78
7/20/04	0.32	<0.034	<0.034	<0.034	<0.035	<0.036	<0.033	<0.034
7/26/05	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/25/06	<0.22	<0.22	<0.21	<0.21	<0.22	<0.22	<0.22	<0.21

Table 19: Residual range organics sampled in mg/L.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
4/10/02	<0.50	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/29/03	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/27/04	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
4/26/05	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074
7/18/00	1.22	1.56	1.09	1.06	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
7/24/01	1.28	1.7	1.12	0.87	0.49	<0.30	<0.30	<0.30	0.3	0.3	<0.30	<0.30	<0.30
7/16/02	2.2	1.31	1.33	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/22/03	<0.50	0.65	1.15	0.76	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/20/04	2.2	1.1	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
7/26/05	1.4	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
7/25/06	<0.074	1.7	1	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	<0.30		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
4/10/02	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/29/03	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/27/04	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
4/26/05	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074
7/18/00	<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
7/24/01	<0.30		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
7/16/02	<0.50	<0.50	<0.50	<0.50	<0.50	0.88	<0.50	<0.50
7/22/03	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/20/04	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
7/26/05	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
7/25/06	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074

Table 20: Benzene sampled in μg/L.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/10/02	<0.50	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/29/03	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/27/04	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24
4/26/05	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078
7/18/00	4.77	5.91	4.35	4.27	1.28	0.62	<0.50	<0.50	<0.50	1.08	<0.50	<0.50	<0.50
7/24/01	4.2	5.45	3.67	2.86	1.56	0.84	0.67	0.63	0.7	0.65	<0.50	<0.50	<0.50
7/16/02	6.39	3.75	3.77	2.58	1.23	0.93	0.85	0.66	1	0.84	<0.50	<0.50	<0.50
7/22/03	<0.50	1.78	3.23	2.14	0.71	0.4[8]	0.46[8]	<0.50	<0.50	<0.50	<0.50	<0.50	0.49[8]
7/20/04	5.9	3.2	2.8	1.8	1.5	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24
7/26/05	3.5	2.5	2.3	2.1	<1.0	<1.0	<1.0	<1.0	1.8	<1.0	<1.0	<1.0	<1.0
7/25/06	<0.078	3.9	2.6	2.2	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/10/02	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/29/03	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/27/04	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24
4/26/05	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078
7/18/00	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/24/01	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/16/02	<0.50	0.47[9]	<0.50	<0.50	<0.50	2.83	0.82	<0.50
7/22/03	<0.50	<0.50	<0.50	<0.50	<0.50	0.52	<0.50	<0.50
7/20/04	<0.24	<0.24	<0.24	<0.24	<0.24	1.6	<0.24	<0.24
7/26/05	<1.0	1.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
7/25/06	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078	<0.078

Table 21: Toluene sampled in µg/L.

[8] Estimated Value
[9] Estimated Value Below MRL

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.30	<0.30	<0.30
4/10/02	<0.50	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/29/03	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/27/04	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
4/26/05	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088
7/18/00	0.56	0.51	0.31	0.31	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
7/24/01	0.5	0.66	0.43	0.33	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
7/16/02	1.09	0.65	0.66	0.46[10]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/22/03	<0.50	<0.50	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/20/04	1	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
7/26/05	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
7/25/06	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.30
4/10/02	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/29/03	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/27/04	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
4/26/05	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088
7/18/00	<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
7/24/01	<0.30		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
7/16/02	<0.50	<0.50	<0.50	<0.50	<0.50	0.5	<0.50	<0.50
7/22/03	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/20/04	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
7/26/05	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
7/25/06	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088	<0.088

Table 22: Ethylbenzene sampled in µg/L.

[10] Estimated Value Below MRL

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/10/02	<1.00	<1.00		<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
4/29/03	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
4/26/05	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
7/18/00	2.49	2.91	1.97	1.96	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/24/01	2.25	2.84	1.89	1.51	0.84	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/16/02	3.84	2.41	2.33	1.71	<1.00	<1.00	<1.00	<1.00	1.04	<1.00	<1.00	<1.00	<1.00
7/22/03	<1.00	1.14	1.8	1.27	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
7/20/04	3.8	2	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41
7/26/05	2.4	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
7/25/06	<0.20	2.5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20		

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/10/02	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
4/29/03	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
4/26/05	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
7/18/00	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/24/01	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/16/02	<1.00	<1.00	<1.00	<1.00	<1.00	1.74	<1.00	<1.00
7/22/03	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
7/20/04	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41
7/26/05	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
7/25/06	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	

Table 23: M, P-Xylene sampled in µg/L.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
4/10/02	<0.50	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/29/03	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/26/05	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
7/18/00	1.06	1.22	0.87	0.84	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
7/24/01	1.01	1.2	0.79	0.61	0.36	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
7/16/02	1.68	1	0.98	0.69	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/22/03	<0.50	0.49[11]	0.79	0.55	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/20/04	1.5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
7/26/05	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
7/25/06	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20		

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	<0.30		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
4/10/02	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/29/03	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4/26/05	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
7/18/00	<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
7/24/01	<0.30		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
7/16/02	<0.50	<0.50	<0.50	<0.50	<0.50	0.7	<0.50	<0.50
7/22/03	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
7/20/04	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
7/26/05	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
7/25/06	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	

Table 24: O-Xylene sampled in µg/L.

[11] Estimated Value

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/27/04	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63
7/25/06												<0.20	<0.20

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/27/04	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63
7/25/06								<0.20

Table 25: Total xylenes sampled in μg/L.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4/10/02	ND	ND	~~ND~~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4/29/03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4/27/04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4/26/05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
7/18/00	10.1	12.11	8.59	8.44	1.48	0.62	ND	ND	ND	1.08	ND	ND	ND
7/24/01	9.24	11.85	7.9	6.18	3.25	0.84	0.67	0.63	1	0.95	ND	ND	ND
7/16/02	15.2	9.12	9.07	6.34	1.23	0.93	0.85	0.66	2.04	0.84	ND	ND	ND
7/16/03	ND	4.06	7.47	4.72	0.71	0.4	0.46	ND	ND	ND	ND	ND	0.49
7/20/04	14.4	6.3	2.8	1.8	1.5	ND	ND	ND	ND	ND	ND	ND	ND
7/26/05	7.3	3.5	2.3	2.1	ND	ND	ND	ND	1.8	ND	ND	ND	ND
7/25/06	ND	8.1	3.6	2.2	ND	ND	ND	ND	ND	ND	ND	ND	ND

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	ND	~~ND~~	ND	ND	ND	ND	ND	ND
4/10/02	ND	ND	ND	ND	ND	ND	ND	ND
4/29/03	ND	ND	ND	ND	ND	ND	ND	ND
4/27/04	ND	ND	ND	ND	ND	ND	ND	ND
4/26/05	ND	ND	ND	ND	ND	ND	ND	ND
7/18/00	ND		ND	ND	ND	ND	ND	ND
7/24/01	ND		ND	ND	ND	ND	ND	ND
7/16/02	ND	0.47	ND	ND	ND	6.65	0.82	ND
7/22/03	ND	ND	ND	ND	ND	0.52	ND	ND
7/20/04	ND	ND	ND	ND	ND	1.6	ND	ND
7/26/05	ND	1.3	ND	ND	ND	ND	ND	ND
7/25/06	ND	ND	ND	ND	ND	ND	ND	ND

Table 26: Total BTEX sampled in µg/L.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	80	320	260	29	32	18	5	50	0	10	0	0	0
4/10/02	0	64		0	0	0	0	0	0	0	0	0	0
4/29/03	2	13	0	0	0	0	0	0	0	0	0	0	0
4/27/04	17	19	2	3	4	0	2	7	0	0	0	3	3
4/26/05	120	18	<9.1	<9.1	<9.1	<9.1	<9.1	<9.1	<9.1	<9.1	<9.1	<9.1	<9.1
4/25/06	52	102	0	2	3	10	13	3	0	0	0	0	0
7/18/00	14	15	8	10	2	4	4	0	10	4	<10	2	8
7/24/01	40	<10	10	<10	<10	<10	<10	10	10	<10	<10	10	<10
7/16/02	<10	2980	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
7/22/03	50	580	9	20	9	9	<9	20	<9	9	<9	9	<9
7/20/04	130	200	18	<1	18	55	<1	<1	170	27	<1	<1	9
7/26/05	36	23	15	12	23	9.3	12	33	17	20	<1.3	12	<1.3
7/25/06	67	110	80	97	72	100	190	51	20	96	<1	32	6

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	13		144	520	500	118	0	4
4/10/02	0	0	0	7	0	0	0	0
4/29/03	9	2	0	0	4	0	0	0
4/27/04	5	42	5	10	7	9	0	3
4/26/05	45	18	<9.1	82	<9.1	<9.1	<9.1	<9.1
4/25/06	10	86	23	68	39	6	0	0
7/18/00	40		16	6	<10	2	2	8
7/24/01	170		10	30	40	<10	70	<10
7/16/02	10	30	160	20	10	0	0	0
7/22/03	80	9	200	9	110	9	20	20
7/20/04	64	170	82	9	64	9	<1	9
7/26/05	230	69	120	71	11	4	440	240
7/25/06	260	370	160	180	68	130	230	83

Table 27: Fecal coliform bacteria sampled in CFU/100m.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	7.21	7.46	7.8	7.66	7.61	7.5	7.86	7.34	7.7	7.9	8	8.07	8.11
4/10/02	6.89	7.98		7.9	7.36	7.61	7.75	7.8	7.7	7.66	7.89	7.05	7.28
4/29/03	7.84	7.63	7.79	7.85	7.91	8.12	7.81	7.57	7.56	7.46	7.41	7.84	7.74
4/27/04	7.45	7.2	6.75	6.4	6.64	6.89	6.95	6.93	6.73	6.33	6.84	6.93	6.8
4/26/05	7.75	7.29	7.07	7.06	7.13	7.33	7.47	6.79	7.26	7.28	7.5	7.32	6.93
4/25/06	7.28	7.13	7	7.05	7.1	6.97	7.08	7.07	7.02	6.93	6.82	6.95	6.89
7/18/00	7.85	7.71	7.58	7.61	7.6	7.15	7.14	6.75	7.08	7.22	7.29	7.95	8
7/24/01	7.35	7.77	7.5	7.71	7.58	7.49	7.51	7.6	7.57	7.51	7.94	8.37	7.81
7/16/02	7.4	7.67	7.91	7.78	7.72	7.76		7.62	8.27	8.18	8.52	7.79	7.8
7/22/03	7.4	7	7.3	7.2	7.3	7.4	7.4	7.4	7.7	7.3	7.5	7.5	7.4
7/20/04	7.2	7.42	7.5	7.38	7.26	7.57	7.67	7.21	7.49	7.51	7.33	7.34	7.2
7/26/05	7.63	6.95	7.04	6.97	7.22	7.52	7.5	7.58	7.58	7.61	7.6	7.66	7.59
7/25/06	7.57	7.48	7.26	7.6	7.19	7.16	7.6	7.51	7.64	7.6	7.75	7.62	7.5

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	6.89		7.45	7.1	7.27	6.94	7.84	8.19
4/10/02	7.18	7.19	7.36	7.39	7.3	7.24	7.39	7.15
4/29/03	8.04	7.54	7.69	7.53	7.26	7.61	7.18	7.88
4/27/04	6.53	6.44	6.37	6.77	6.64	6.98	6.68	7.08
4/26/05	6.2	6.58	6.69	6.88	6.89	6.83	7.01	7.17
4/25/06	7	6.83	6.91	7.06	6.87	7.1	6.5	6.99
7/18/00	7.03		6.76	7.21	6.85	7.05	6.57	8.14
7/24/01	7.46		7.29	7.24	7.56	7.35	7.22	8.05
7/16/02	7.46	7.54	7.4	7.76	7.54	9.03	8.27	7.84
7/22/03	7.3	7.3	7.1	7.4	7.5	8.4	6.7	7.4
7/20/04	7.34	7.38	7.36	7.68	7.51	8	7.15	7.28
7/26/05	7.59	7.27	7.43	7.36	7.28	7.93	7.02	7.72
7/25/06	7.58	7.52	7.22	7.71	7.53	8.16	7.28	7.76

Table 28: pH.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	3810	401	137	95	79.7	79.2	75.2	76.4	66.1	54.8	64.7	89.2	86.6
4/10/02	14675	338		47.1	73.5	68	68.5	75	65.1	65	62.5	101	90.4
4/29/03	21100	330	69.7	69.1	70	63.6	71.9	70.8	57.9	55.7	45.6	74	66.7
4/27/04	6350	52.8	51	52.2	51.3	54.1	57.4	58.5	49.4	47.2	37.7	83	75.7
4/26/05	6420	118.3	76.6	74.8	75.5	72.6	77	84.3	66.8	66.8	65.3	84.3	79.2
4/25/06	5110	265	82.3	84	78.2	74.1	78.1	82.4	68	68.2	67.9	96.2	84.6
7/18/00	80	50	50	50	50	50	40	52	40	50	50	60	60
7/24/01	466.2	79.6	79.6	80.8	86.9	68.4	69.1	70.3	68.6	68.3	72.3	79.9	81.3
7/16/02	850.4	65.8	56.3	56.2	55.8	58.8	59	62.5	61.7	61.4	62.8	70.4	69.5
7/22/03	126	72.9	62.8	64.2	63.9	65	64.1	64.7	59.4	58.9	60.3	72.8	73
7/20/04	141.9	71.5	63	65.1	60.4	67.7	68.1	59.7	60.3	60.3	66.3	75	72.2
7/26/05	338	92.2	66.1	66.8	68.6	65.7	64.4	65.4	64.2	63.8	66.2	81.2	79
7/25/06	156.1	62.3	62.6	62	62.2	62.5	63.3	62.7	62.2	61.4	65.8	78.3	77.6

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	143		78.9	97.9	73.6	77	72.8	111
4/10/02	146.9	139.1	142.4	167.8	90.5	179.3	65.7	139
4/29/03	220	131.4	90.5	139.5	63.3	118.7	54	98
4/27/04	80.6	53.6	48.7	75.5	42.2	69.3	51.4	94.6
4/26/05	48.4	61.6	54.8	83.8	65.8	114.4	64.1	88.6
4/25/06	113	63.4	53.4	94.6	64	108	55.9	90.1
7/18/00	130		100	140	62	135	20	70
7/24/01	366.8		110.3	124.7	69.5	152.8	32	80.8
7/16/02	153.2	144.6	149.2	168	74.5	148.9	65	77.7
7/22/03	157	155	149	180	84.9	157	22.7	81.6
7/20/04	156.7	177.1	161.6	196.6	88.9	163.3	18	91
7/26/05	218	180	112	182	98.7	141	26.8	97.3
7/25/06	158.9	150.1	91.1	160.5	81.8	148.1	25.2	91.9

Table 29: Specific conductance sampled in µS/cm.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	838	670.7	401.3	32	19.3	4	2.7	3.3	8	7.3	2.7	2.7	2.7
4/10/02	236.7	228.7		30.7	7.3	5.3	2.7	0.7	0.7	2.7	2	5.3	1.3
4/29/03	138	663.3	2.7	45.8	0.7	0.7	0.7	1	0.7	0.7	5.3	1.3	0.7
4/27/04	30	13.3	6	3.3	1.3	10	0.7	3.2	1.3	<0.7	<0.7	1.3	0.7
4/26/05	1370	1390	71.1	15.6	18.1	45.6	9.84	16.3	17.4	25.2	1.79	1.84	<0.48
4/25/06	889.5	2073	41	3.5	5	6	4		11.5	12.5	0.5	1.5	1.5
7/18/00	230	64	54	28	28	21.3	23.3	28	20.7	21.3	8.7	4	2
7/24/01	115.3	36.7	26	14.7	12.7	19.3	18	34.7	13.3	17.3	2	0.7	6.7
7/16/02	136.7	232	4.7	5.3	4.7	4.7	3.3	1.3	2	2	1.3	2	<0.7
7/22/03	35.3	53.3	11.3	8.7	8	8.7	7.3	4.7	2	6	1.3	1.3	3.3
7/20/04	257	231	11.7	7.84	7.39	9.64	7.28	6.2	<0.92	<0.91	<0.91	<0.98	<0.96
7/26/05	572	46.8	18.1	13.2	15.1	12.1	11.5	16.7	14.2	21	1.58	1.13	1.13
7/25/06	33	81	44	38	25	28	17	12	16	17	<5.0	<5.0	<5.0

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	26		15.3	26	50	9.3	6	1.3
4/10/02	4.7	5.3	2	1.3	6	2	2.7	1.3
4/29/03	4	2.7	0.7	2	37.3	0.7	1.3	0.7
4/27/04	14.7	17.3	0.7	1.3	43.3	5.4	36	<0.7
4/26/05	7.8	62.8	5.38	16.8	67.5	25.3	20	<0.48
4/25/06	20.5	65	22	18.5	205	29.5	14	1.5
7/18/00	8.7		14.7	9.3	32.7	20.7	162	2
7/24/01	6		1.3	5.3	34.7	6.7	86	2
7/16/02	0.7	2	2	1.3	0.7	3.3	1.3	2.7
7/22/03	0.7	0.7	0.7	0.7	2	0.7	64	0.7
7/20/04	5.22	7.09	3.02	3.35	2.45	<1.0	16	<0.98
7/26/05	5.43	2.65	5.4	2.71	13.2	1.49	210	<0.95
7/25/06	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	201	<5.0

Table 30: Total suspended solids sampled in mg/L.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	600	500	240	5.8	5.4	6.6	6.6	11.1	10	8.5	7.5	3.7	3.7
4/10/02	170	270		40	5.2	4.6	4.1	4.4	4.7	4.3	2.6	8.1	12
4/29/03	20	600	9	8.5	8.5	11	8.5	10	12	13	14	7.5	10
4/27/04	10.7	9.35	7.2	6.9	6.5	7	6.3	5.45	10.3	8.4	6.6	10.5	12.7
4/26/05	412	425.5	23	9.04	9.71	11.65	12.01	11.79	13.89	12.81	9.7	4.87	7.34
4/25/06	416	3200	26	5.5	6.98	6.5	5.82	5.63	7.11	7.51	4.4	7.03	10.39
7/18/00	160	45	37	22	23	22	22	20	19	19	9.7	5.4	5.6
7/24/01	85	20	18	11	10	13	12	12	11	10	2.7	4.1	2.9
7/16/02	75	110	4.9	4	3.9	4.3	4.5	4.2	4.2	4.1	1.4	6.8	7.3
7/22/03	6.5	50	14	11	15	15	12	14	13	14	7.7	7.5	9.8
7/20/04	183.5	148.6	11	10.3	9.3	10.4	11	9.5	9.2	8.3	5.3	5.6	5.4
7/26/05	276	28.4	13.92	9.14	7.96	7.77	8.82	10.41	8.65	10.45	3.03	4.46	4.22
7/25/06	92.4	39.3	20.4	23.1	22.9	18.7	14.2	14.1	12.8	11.8	1.75	5.36	4.6

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	50		4	10	34.6	8.7	8.8	0.1
4/10/02	16	14	3.2	4.5	4.8	5	1.1	0.1
4/29/03	16	24	2.5	2.5	22	3.5	8.5	0.4
4/27/04	13	6.4	2.1	2.05	10.2	3.75	13.3	0.75
4/26/05	7.9	9.86	1.21	5.15	28.2	5.48	4.18	0.53
4/25/06	11.49	23.2	9.51	6.28	24	9.29	2.48	9.2
7/18/00	16		15	6.6	11	3.0	90	0.45
7/24/01	14		2.7	2.1	12	1.8	65	2.2
7/16/02	9.3	10	1.8	2.5	3.6	1.8	1.8	0.28
7/22/03	16	11	5.3	2.8	6.3	1.39	80	0.45
7/20/04	14.5	9	7.2	3	2.4	1.3	37.4	0.4
7/26/05	25.5	10.8	6.45	3.1	4.22	1.72	96.3	0.05
7/25/06	19.4	9.8	12.02	4.7	2.76	1.72	129.9	0.02

Table 31: Turbidity sampled in NTU.

Date	Mile 1.5	Mile 6.5	Mile 10.1	Mile 12.5	Mile 18	Mile 21	Mile 23	Mile 31	Mile 40	Mile 43	Mile 50	Mile 70	Mile 80
4/11/01	4	4.28	2.22	3.78	2.89	3.28	3.78	2.36	4.6	2.4	4.72	3	2
4/10/02	0.45	-0.14		-0.15	0.24	0.54	0.85	1.11	1.48	1.39	1.3		0.68
4/29/03	7.33	8.3	7	7.2	7.03	7.59	7.14	6.18	6.27	5.03	3.92	3.73	3.72
4/27/04	4.6	4.5	4.4	4.3	4.4	4	4.3	4.2	3.3	2.7	1	2.8	0.2
4/26/05	7.5	6.6	6.6	6.2	5.7	7.2	7.6	5.7	7.6	6.8	2	4.4	3.2
4/25/06	3.3	3	4.2	3	2.9	3.1	3.6	3	5.9	3.7	2.5	4.2	2.2
7/18/00	9	8	9	9	9	8.89	8.89	8.29	8.89	8.89	9.44	10	10
7/24/01	11.8	11.8	12	11.8	11.8	11.7	11.8	11.69	11.74	11.58	12.58	11.3	11.5
7/16/02	12.9	13.18	11.69	11.52	11.41	11.2	11.35	11.12	11.61	11.52	11.99	9.04	9.31
7/22/03	13	13	13.5	13	13	14	14	14	14	13.5	13.5	12	13
7/20/04	14.8	16.6	14.1	13.9	13.7	13.5	13.5	13.2	12.9	13.5	13.9	14.6	14.6
7/26/05	14.1	13.9	13.8	13.8	13.8	13.3	13.6	14	13.8	13.6	13.8	13.8	7.1
7/25/06	12	11.7	11.6	11.6	11.7	11.5	11.4	11.5	11.8	11.8	11.8	10.4	10.1

Date	No Name Creek	Beaver Creek	Slikok Creek	Soldotna Creek	Funny River	Moose River	Killey River	Russian River
4/11/01	1.61		3.78	0.5	0.04	0.03	8.8	2
4/10/02	0.2	-0.17	0.71	-0.02	-0.18	0.09	-0.21	0
4/29/03	5.45	6.73	5.49	6.83	3.76	10.56	5.36	4.85
4/27/04	4.2	4.5	4.7	4.9	1.8	4.3	2.8	3.3
4/26/05	6.5	6.1	7.1	5.5	3.4	4.3	6.5	5.2
4/25/06	1.7	1.8	0.7	1.5	-0.1	1.1	0	3.9
7/18/00	12.09		9.44	11.67	8.95	13.93	7.78	11.39
7/24/01	15.12		12.04	14.62	10.72	15.92	7.67	11.5
7/16/02	14.5	13.03	9.6	14.78	10.7	17.48	11.74	12.09
7/22/03	15	13	12	17	12	19	8	13
7/20/04	14.8	14.1	13.3	15.7	18.5	18.7	9.5	14.9
7/26/05	14.7	13.3	12.2	12.1	12.7	17.3	8	13.8
7/25/06	12.4	11.5	9.9	11	9.9	13.8	7.2	11.5

Table 32: Water temperature sampled in °C.

Appendix 2. Water Quality Standards

Parameter	ADEC Standard	EPA Standard	References
Arsenic	150 µg/L for aquatic life, fresh water, and chronic exposure.	150 µg/L for a priority toxic pollutant, fresh water, and Criterion Continuous Concentration (CCC).	• ADEC, (2003), Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. Data accessed on May 3, 2007 at *http://www.epa.gov/waterscience standards/ wqslibrary/ak/ak_10_toxics_manual.pdf* • EPA, (2006), National Recommended Water Quality Criteria: EPA data available on the World Wide Web, accessed May 3, 2007 at *http://epa.gov/waterscience/ criteria/nrwqc-2006.pdf*
Cadmium	$(e^{7.409(\ln \text{hardness})-4.719})$ (1.1101672-[(ln hardness) (0.041838)]) for aquatic life, fresh water, and chronic exposure.	$(e^{7.409(\ln \text{hardness})-4.719})$ (1.1101672-[(ln hardness) (0.041838)]) for a priority toxic pollutant, fresh water, and CCC.	• ADEC, (2003), Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. Data accessed on May 3, 2007 at *http://www.epa.gov/waterscience standards/ wqslibrary/ak/ak_10_toxics_manual.pdf* • EPA, (2006), National Recommended Water Quality Criteria: EPA data available on the World Wide Web, accessed May 3, 2007 at *http://epa.gov/waterscience/ criteria/nrwqc-2006.pdf*
Chromium III	$(e^{0.819(\ln \text{hardness})+0.6848})(0.860)$ for aquatic life, fresh water, and chronic exposure.	$(e^{0.819(\ln \text{hardness})+0.6848})(0.860)$ for a priority toxic pollutant, fresh water, and CCC.	• ADEC, (2003), Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. Data accessed on May 3, 2007 at *http://www.epa.gov/waterscience standards/ wqslibrary/ak/ak_10_toxics_manual.pdf* • EPA, (2006), National Recommended Water Quality Criteria: EPA data available on the World Wide Web, accessed May 3, 2007 at *http://epa.gov/waterscience/ criteria/nrwqc-2006.pdf*

Parameter	ADEC Standard	EPA Standard	References
Chromium VI	11 µg/L for aquatic life, fresh water, and chronic exposure.	11 µg/L for a priority toxic pollutant, fresh water, and CCC.	• ADEC, (2003), Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. Data accessed on May 3, 2007 at *http://www.epa.gov/waterscience standards/ wqslibrary/ak/ak_10_toxics_manual.pdf* • EPA, (2006), National Recommended Water Quality Criteria: EPA data available on the World Wide Web, accessed May 3, 2007 at *http://epa.gov/waterscience/ criteria/nrwqc-2006.pdf*
Copper	$(e^{0.8545(\ln \text{hardness})-1.702})$ (0.960) for aquatic life, fresh water, and chronic exposure.	See EPA, 2007.	• ADEC, (2003), Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. Data accessed on May 3, 2007 at *http://www.epa.gov/waterscience standards/ wqslibrary/ak/ak_10_toxics_manual.pdf* • EPA, (2007), Aquatic Life Ambient Freshwater Quality Criteria-Copper 2007 Revision (EPA-822-R-07-001): EPA data available on the World Wide Web, accessed May 4, 2007 at *http://earth1.epa.gov/ waterscience/criteria/copper/2007/criteria-full.pdf*
Lead	$(e^{1.273(\ln \text{hardness})-4.705})$ (1.46203-[(ln hardness) (0.145712) for aquatic life, fresh water, and chronic exposure.	$(e^{1.273(\ln \text{hardness})-4.705})$ (1.46203-[(ln hardness) (0.145712) for a priority toxic pollutant, fresh water, and CCC.	• ADEC, (2003), Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. Data accessed on May 3, 2007 at *http://www.epa.gov/waterscience standards/ wqslibrary/ak/ak_10_toxics_manual.pdf* • EPA, (2006), National Recommended Water Quality Criteria: EPA data available on the World Wide Web, accessed May 3, 2007 at *http://epa.gov/waterscience/ criteria/nrwqc-2006.pdf*

Parameter	ADEC Standard	EPA Standard	References
Zinc	$(e^{0.8473(\ln \text{hardness})+0.884})$ (0.986) for aquatic life, fresh water, and chronic exposure.	$(e^{0.8473(\ln \text{hardness})+0.884})$ (0.986) for a priority toxic pollutant, fresh water, and CCC.	• ADEC, (2003), Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. Data accessed on May 3, 2007 at *http://www.epa.gov/waterscience standards/ wqslibrary/ak/ak_10_toxics_manual.pdf* • EPA, (2006), National Recommended Water Quality Criteria: EPA data available on the World Wide Web, accessed May 3, 2007 at *http://epa.gov/waterscience/ criteria/nrwqc-2006.pdf*
Calcium	None applicable to aquatic life, fresh water, and chronic exposure.	None applicable to a priority or non-priority pollutant, fresh water, and CCC.	
Iron	1 mg/L for aquatic life, fresh water, and chronic exposure.	1 mg/L for a non-priority pollutant, fresh water, and CCC.	• ADEC, (2003), Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. Data accessed on May 3, 2007 at *http://www.epa.gov/waterscience standards/ wqslibrary/ak/ak_10_toxics_manual.pdf* • EPA, (2006), National Recommended Water Quality Criteria: EPA data available on the World Wide Web, accessed May 3, 2007 at *http://epa.gov/waterscience/ criteria/nrwqc-2006.pdf*
Magnesium	None applicable to aquatic life, fresh water, and chronic exposure.	None applicable to a priority or non-priority pollutant, fresh water, and CCC.	
Nitrate	None applicable to aquatic life, fresh water, and chronic exposure.	None applicable to a priority or non-priority pollutant, fresh water, and CCC.	

Parameter	ADEC Standard	EPA Standard	References
Fecal Coliform Bacteria	Not applicable to the sampling methods used in this study.	Not applicable to the sampling methods used in this study.	• ADEC, (2006), Water Quality Standards, 18 AAC 70, data accessed on May 3, 2007 at *http://www.dec.state.ak.us regulations/pdfs/18%20AAC%2070%20as%20Amended%20Through%20December%2028,%202006.pdf* • EPA, (1986), Quality Criteria for Water 1986 [The Gold Book] (EPA 440/5-86-001, May 1996): EPA data available on the World Wide Web, accessed May 3, 2007 at *http://epa.gov/waterscience/criteria/goldbook.pdf*
pH	For fresh water growth and propagation of fish, shellfish, other aquatic life, and wildlife: May not be less than 6.5 or greater than 8.5. May not vary more than 0.5 pH unit from natural conditions.	6.5-9 for a non-priority pollutant, fresh water, and CCC.	• ADEC, (2006), Water Quality Standards, 18 AAC 70, data accessed on May 3, 2007 at *http://www.dec.state.ak.us regulations/pdfs/18%20AAC%2070%20as%20Amended%20Through%20December%2028,%202006.pdf* • EPA, (2006), National Recommended Water Quality Criteria: EPA data available on the World Wide Web, accessed May 3, 2007 at *http://epa.gov/waterscience/criteria/nrwqc-2006.pdf*
Specific Conductance	None applicable to aquatic life, fresh water, and chronic exposure.	None applicable to a priority or non-priority pollutant, fresh water, and CCC.	

Parameter	ADEC Standard	EPA Standard	References
Total Suspended Solids	For fresh water growth and propagation of fish, shellfish, other aquatic life, and wildlife: The percent accumulation of fine sediment in the range of 0.1 mm to 4.0 mm in the gravel bed of waters used by anadromous or resident fish for spawning may not be increased more than 5% by weight above natural conditions. In no case may the 0.1 mm to 4.0 mm fine sediment range in those gravel beds exceed a maximum of 30% by weight. In all other surface waters no sediment loads (suspended or deposited) that can cause adverse effects on aquatic animal or plant life, their reproduction or habitat may be present.	For fresh water fish and other aquatic life: Settleable and suspended solids should not reduce the depth of the compensation point for photosynthetic activity by more than 10 percent from the seasonably established norm for aquatic life.	• ADEC, (2006), Water Quality Standards, 18 AAC 70, data accessed on May 3, 2007 at *http://www.dec.state.ak.us regulations/pdfs/18%20AAC%2070%20as%20Amended%20Through%20December%2028,%202006.pdf* • EPA, (1986), Quality Criteria for Water 1986 [The Gold Book] (EPA 440/5-86-001, May 1996): EPA data available on the World Wide Web, accessed May 3, 2007 at *http://epa.gov/waterscience/criteria/goldbook.pdf*
Turbidity	For fresh water growth and propagation of fish, shellfish, other aquatic life, and wildlife: May not exceed 25 NTU above natural conditions. For all lake waters, may not exceed 5 NTU above natural conditions.	For fresh water fish and other aquatic life: Settleable and suspended solids should not reduce the depth of the compensation point for photosynthetic activity by more than 10 percent from the seasonably established norm for aquatic life.	• ADEC, (2006), Water Quality Standards, 18 AAC 70, data accessed on May 3, 2007 at *http://www.dec.state.ak.us regulations/pdfs/18%20AAC%2070%20as%20Amended%20Through%20December%2028,%202006.pdf* • EPA, (1986), Quality Criteria for Water 1986 [The Gold Book] (EPA 440/5-86-001, May 1996): EPA data available on the World Wide Web, accessed May 3, 2007 at *http://epa.gov/waterscience/criteria/goldbook.pdf*

Parameter	ADEC Standard	EPA Standard	References
Water Temperature	For fresh water growth and propagation of fish, shellfish, other aquatic life, and wildlife: May not exceed 20°C at any time. The following maximum temperatures may not be exceeded, where applicable: Migration routes 15°C Spawning areas 13°C Rearing areas 15°C Egg & fry incubation 13°C For all other waters, the weekly average temperature may not exceed site-specific requirements needed to preserve normal species diversity or to prevent appearance of nuisance organisms.	Not applicable in Alaska to a non-priority pollutant, fresh water, and CCC.	• ADEC, (2006), Water Quality Standards, 18 AAC 70, data accessed on May 3, 2007 at *http://www.dec.state.ak.us regulations/pdfs/18%20AAC%2070%20as%20Amended%20Through%20December%2028,%202006.pdf* • EPA, (1986), Quality Criteria for Water 1986 [The Gold Book] (EPA 440/5-86-001, May 1996): EPA data available on the World Wide Web, accessed May 3, 2007 at *http://epa.gov/waterscience/criteria/goldbook.pdf*

Appendix 3. Hardness-Dependent Standards and Exceedances Summary Tables

Parameter	Site	Date	Hardness[12] (mg/L)	Standard (µg/L)	Result Value (µg/L)
Cadmium	Mile 1.5	4/10/02	1617.86	0.64[13]	1.1
	Mile 21	7/18/00	29.45	0.11	8
	Mile 80	7/20/04	35.91	0.12	1
	Soldotna Creek	7/16/02	79.51	0.21	63
Chromium III	No Exceedances				
Copper	Mile 1.5	4/29/03	2449.76	29.28[13]	100
		7/26/05	43.74	4.42	8.44
	Mile 6.5	7/25/06	34.12	3.57	4.84
	Mile 10.1	7/25/06	29.95	3.2	3.29
	Mile 21	7/18/00	29.45	3.15	443
	Mile 31	7/18/00	30.07	3.21	9
		7/26/05	28	3.02	21.1
	Mile 70	7/18/00	47.8	4.76	6
	Mile 80	7/18/00	33.92	3.56	5
	No Name Creek	4/26/05	16.96	1.97	8.21
	Slikok Creek	7/20/04	49.6	4.92	12.1
	Killey River	4/10/02	26.51	2.88	13
		7/20/04	14.9	1.76	8.42
	Russian River	7/18/00	39.41	4.04	7
Lead	Mile 1.5	7/26/05	43.74	1.01	2.7
	Mile 6.5	7/25/06	34.12	0.77	19
	Mile 10.1	7/25/06	29.95	0.66	1.7
	Mile 21	7/18/00	29.45	0.65	106
		7/25/06	29.95	0.66	1.9
	Mile 31	7/26/05	28	0.61	468
	Mile 40	7/24/01	28.87	0.64	1.5
	Mile 80	7/16/02	31.12	0.69	4
	Beaver Creek	7/25/06	67.04	1.62	3.9
	Killey River	7/20/04	14.9	0.3	1.2

[12] Hardness was calculated using the following formula:
2.497(Calcium in mg/L) + 4.119(Magnesium in mg/L) (Clesceri and others, 1998).
[13] Standard calculated with the hardness value of 400 mg/l (ADEC, 2003).

Parameter	Site	Date	Hardness (mg/L)	Standard (µg/L)	Result Value (µg/L)
Zinc	Mile 1.5	7/22/03	35.68	49.33	65
	Mile 6.5	7/22/03	32.79	45.93	55
		7/25/06	34.12	47.5	52.1
	Mile 10.1	7/22/03	28.5	40.78	51
		7/25/06	29.95	42.53	60
	Mile 12.5	7/20/04	29.3	41.76	55.7
	Mile 18	7/20/04	29.74	42.28	59.4
		4/26/05	35.17	48.73	51.1
	Mile 21	7/18/00	29.45	41.93	2900
	Mile 23	4/27/04	30.75	43.49	45.2
	Mile 31	4/27/04	30.82	43.57	45.7
		7/20/04	29.86	42.43	44.1
		7/26/05	28	40.18	51.2
	Mile 43	7/16/02	27.13	39.11	40
		4/27/04	28.68	41.01	42.3
	Mile 50	7/24/01	27.97	40.14	48.5
	Mile 70	7/16/02	31.58	44.48	50
	No Name Creek	4/11/01	35.01	48.55	84
		4/10/02	42.03	56.68	122
		7/22/03	50.58	66.31	75
		4/27/04	28.84	41.2	61.9
		4/26/05	16.96	26.27	63.3
		4/25/06	33.29	46.52	52.2
	Beaver Creek	4/26/05	32.38	45.44	59.1
		4/25/06	31.67	44.59	46.4
	Slikok Creek	4/11/01	18.74	28.59	41
		7/24/01	47.29	62.63	69.4
		4/29/03	41.47	56.04	69
		4/27/04	23.49	34.62	39.5
		4/26/05	25.11	36.64	47.9
	Soldotna Creek	4/26/05	38.4	52.51	58.6
	Funny River	4/10/02	43.05	57.84	70
		7/16/02	31.93	44.91	51
		4/29/03	31.58	44.49	52
		7/20/04	37.39	51.34	59.1
	Killey River	7/24/01	15.25	24.01	34.4
		4/27/04	25.79	37.48	37.9
		7/20/04	14.9	23.54	49.5

Appendix 4. Data Tables Organized by Site Location

Less than (<) indicates the sample is below the MRL and MDL of the following value, and these data are grey in color. ND indicates an instance of non-detect, in which all of the BTEX samples were reported as below the MRL or MDL, and these data are also shown in grey.

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	55	36
4/10/02	<3	1.1	0.914	<9	<1	106	107.65
4/29/03	4.7	<2.5	2.9	100	<2.5	<50	140
4/27/04	<0.25	<0.18	<0.36	2.19	1.34	40.8	47.4
4/26/05	6.51	<0.18	<0.36	3.73	<0.052	55.9	54.4
4/25/06	12.5	<0.062	4.03	3.28	0.113	38.9	45.4
7/18/00	<4	<0.1	<2	<5	<4	<9	11.3
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	36.2	13
7/16/02	2[14]	<2	0.7[14]	<9	<2	32	15.41
7/22/03	<2.5	<2.5	1.4	<25	<2.5	65	10
7/20/04	<0.25	<0.18	<0.36	<0.12	<0.052	35.7	13.1
7/26/05	<2.5	<1.0	<2.5	8.44	2.73	45.8	12.9
7/25/06	2.56	<0.062	1.78	3.75	0.279	0.94	13.3
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	30.2	73.3	<0.10	0.91	0.29	<25.0	<2.53
4/10/02	7.7	327.6	0.2	0.35	<0.26	<25.0	<2.58
4/29/03	3.3	510	0.16	0.22	<0.39	<25.0	<2.59
4/27/04	0.958	128	0.272	0.056	<0.024	<3.0	<0.037
4/26/05	30	141	0.147	0.89	<0.0060		<0.20
4/25/06	14.4	110	<0.015	0.66			
7/18/00	11.9	5.4	0.18	0.81	<0.29	<25.0	<3.39
7/24/01	4.5	9.2	0.25	0.221	<0.27	26.7	<2.69
7/16/02	5.34	20.29	0.1	0.42	<0.26	38.3	<2.55
7/22/03	2	2.6	0.16	0.085	<0.38	<25.0	<2.53
7/20/04	12	6.42	0.125	0.507	<0.021		<0.032
7/26/05	0.838	2.8	<0.10	1.1	<0.10	<100	<0.50
7/25/06	5.95	12.5	0.108	0.32	<0.0065		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	80	7.21	3810	838	600	4
4/10/02	ND	0	6.89	14675	236.7	170	0.45
4/29/03	ND	2	7.84	21100	138	20	7.33
4/27/04	ND	17	7.45	6350	30	10.7	4.6
4/26/05	ND	120	7.75	6420	1370	412	7.5
4/25/06		52	7.28	5110	889.5	416	3.3
7/18/00	10.1	14	7.85	80	230	160	9
7/24/01	9.24	40	7.35	466.2	115.3	85	11.8
7/16/02	15.2	<10	7.4	850.4	136.7	75	12.9
7/22/03	ND	50	7.4	126	35.3	6.5	13
7/20/04	14.4	130	7.2	141.9	257	183.5	14.8
7/26/05	7.3	36	7.63	338	572	276	14.1
7/25/06	ND	67	7.57	156.1	33	92.4	12

Table 33: All parameters sampled at Mile 1.5.

[14] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	91	19.3
4/10/02	<3	<0.1	<0.5	<9	<1	57	15.19
4/29/03	<2.5	<2.5	2.5	<25	<2.5	<50	17
4/27/04	3.28	<0.18	<0.36	<0.12	<0.052	41.3	9.2
4/26/05	7.17	<0.18	11.2	12	3.06	102	22
4/25/06	3.14	<0.062	3.29	2.99	0.26	47.4	32.2
7/18/00	<4	0.1	<2	<5	<4	10	9.42
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	28.4[15]	11
7/16/02	<1	<2	<0.6	<9	<2	39	11.2
7/22/03	<2.5	<2.5	<1	<25	<2.5	55	10
7/20/04	<0.25	<0.18	<0.36	<0.12	<0.052	39.9	12.4
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	<10	9.27
7/25/06	<0.44	<0.062	19.5	4.84	19	52.1	10.4
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	17.7	<0.10	<0.10	0.84	<0.25	<25.0	<2.53
4/10/02	10.29	<0.10	<0.10	0.48	<0.27	<25.0	<2.69
4/29/03	15	<0.10	<0.10	0.93	<0.39	<25.0	<2.63
4/27/04	1.86	<0.015	<0.015	0.046	<0.020	<3.0	<0.032
4/26/05	22.6	<0.015	<0.015	1.42	<0.0060		<0.20
4/25/06	43.8	<0.015	<0.015	0.52			
7/18/00	1.6	0.15	0.15	0.11	<0.28	<25.0	<3.28
7/24/01	1.1	0.22	0.22	0.093	<0.26	27.1	<2.58
7/16/02	3.66	<0.10	<0.10	0.3	<0.26	27.4	<2.55
7/22/03	1.9	0.19	0.19	0.12	<0.38	<25.0	<2.53
7/20/04	3.92	0.102	0.102	0.267	<0.021		<0.033
7/26/05	0.969	<0.10	<0.10	0.099	<0.10	<100	<0.50
7/25/06	1.98	0.119	0.119	0.15	<0.0064		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	320	7.46	401	670.7	500	4.28
4/10/02	ND	64	7.98	338	228.7	270	-0.14
4/29/03	ND	13	7.63	330	663.3	600	8.3
4/27/04	ND	19	7.2	52.8	13.3	9.35	4.5
4/26/05	ND	18	7.29	118.3	1390	425.5	6.6
4/25/06		102	7.13	265	2073	3200	3
7/18/00	12.11	15	7.71	50	64	45	8
7/24/01	11.85	<10	7.77	79.6	36.7	20	11.8
7/16/02	9.12	2980	7.67	65.8	232	110	13.18
7/22/03	4.06	580	7	72.9	53.3	50	13
7/20/04	6.3	200	7.42	71.5	231	148.6	16.6
7/26/05	3.5	23	6.95	92.2	46.8	28.4	13.9
7/25/06	8.1	110	7.48	62.3	81	39.3	11.7

Table 46: All parameters sampled at Mile 6.5.

[15] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	56	16.3
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	<50	10
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	38	9.28
4/26/05	<0.25	<0.18	<0.36	<0.12	<0.052	45.9	12.3
4/25/06	2.31	<0.062	2.46	0.772	<0.030	28	11.1
7/18/00	<4	<0.1	<2	<5	<4	<9	9.77
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	36.9	11
7/16/02	<1	<2	2[16]	<9	<2	31	10.6
7/22/03	<2.5	<2.5	<1	<25	<2.5	51	9.6
7/20/04	<0.25	<0.18	<0.36	<0.12	<0.052	32	10.5
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	24.9	8.93
7/25/06	<0.44	<0.062	19.9	3.29	1.65	60	9.8
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	18.7	8.5	<0.10	0.75	0.27	<25.0	<2.53
4/29/03	0.64	1.5	<0.10	<0.025	<0.44	<25.0	<2.91
4/27/04	0.763	1.53	0.113	0.048	<0.022	<3.0	<0.034
4/26/05	5.35	3.6	0.134	0.29	<0.0060		<0.20
4/25/06	3.07	2.66	<0.015	<0.026			
7/18/00	1.97	1.4	0.16	0.09	<0.27	<25.0	<3.24
7/24/01	0.718	1	0.23	0.072	<0.26	<25.0	<2.58
7/16/02	0.42	0.96	0.15	0.01[16]	<0.28	<25.0	<2.81
7/22/03	0.87	1.1	0.18	0.049	<0.41	26.4	<2.75
7/20/04	0.71	1.03	0.143	<0.0020	<0.022		<0.034
7/26/05	0.728	0.939	0.119	<0.051	<0.10	<100	<0.50
7/25/06	1.55	1.33	0.51	0.084	<0.0065		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	260	7.8	137	401.3	240	2.22
4/29/03	ND	0	7.79	69.7	2.7	9	7
4/27/04	ND	2	6.75	51	6	7.2	4.4
4/26/05	ND	<9.1	7.07	76.6	71.1	23	6.6
4/25/06		0	7	82.3	41	26	4.2
7/18/00	8.59	8	7.58	50	54	37	9
7/24/01	7.9	10	7.5	79.6	26	18	12
7/16/02	9.07	<10	7.91	56.3	4.7	4.9	11.69
7/22/03	7.47	9	7.3	62.8	11.3	14	13.5
7/20/04	2.8	18	7.5	63	11.7	11	14.1
7/26/05	2.3	15	7.04	66.1	18.1	13.92	13.8
7/25/06	3.6	80	7.26	62.6	44	20.4	11.6

Table 47: All parameters sampled at Mile 10.1.

[16] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	5	<0.5	<2	<5	<4	26	11.3
4/10/02	<3	<0.1	<0.5	<9	<1	37	12.2
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	<50	10
4/27/04	<0.25	<0.18	<0.36	1.97	<0.052	31.6	9.65
4/26/05	<0.25	<0.18	<0.36	<0.12	<0.052	29.8	11.1
4/25/06	3.6	<0.062	1.54	0.604	<0.030	19.6	10.9
7/18/00	<4	<0.1	<2	<5	<4	14	9.68
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	31.6	10
7/16/02	<1	<2	1.8[17]	<9	<2	30[17]	10.29
7/22/03	<2.5	<2.5	<1	<25	<2.5	<50	9.7
7/20/04	<0.25	<0.18	<0.36	<0.12	<0.052	55.7	10.2
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	14.4	8.87
7/25/06	<0.44	<0.062	2.71	1.88	<0.030	19.1	9.95
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	0.22	1.8	<0.10	0.06	<0.27	<25.0	<2.66
4/10/02	1.54	2.04	<0.10	0.06	<0.26	<25.0	<2.58
4/29/03	0.46	1.4	<0.10	<0.025	<0.42	<25.0	<2.81
4/27/04	0.706	1.71	0.115	0.045	<0.022	<3.0	<0.034
4/26/05	0.934	1.9	0.156	0.11	<0.0060		<0.20
4/25/06	0.866	2.07	<0.015	<0.026			
7/18/00	1.6	1.3	0.15	0.06	<0.29	<25.0	<3.43
7/24/01	0.575	0.979	0.22	0.064	<0.26	<25.0	<2.58
7/16/02	0.33	0.92	0.17	0.02[17]	<0.26	<25.0	<2.63
7/22/03	0.84	1	0.18	0.036	<0.40	<25.0	<2.69
7/20/04	0.62	0.931	0.155	<0.0020	<0.022		<0.034
7/26/05	0.855	0.948	0.124	<0.051	<0.10	<100	<0.50
7/25/06	1.68	1.38	0.13	0.077	<0.0066		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	29	7.66	95	32	5.8	3.78
4/10/02	ND	0	7.9	47.1	30.7	40	-0.15
4/29/03	ND	0	7.85	69.1	45.8	8.5	7.2
4/27/04	ND	3	6.4	52.2	3.3	6.9	4.3
4/26/05	ND	<9.1	7.06	74.8	15.6	9.04	6.2
4/25/06		2	7.05	84	3.5	5.5	3
7/18/00	8.44	10	7.61	50	28	22	9
7/24/01	6.18	<10	7.71	80.8	14.7	11	11.8
7/16/02	6.34	<10	7.78	56.2	5.3	4	11.52
7/22/03	4.72	20	7.2	64.2	8.7	11	13
7/20/04	1.8	<1	7.38	65.1	7.84	10.3	13.9
7/26/05	2.1	12	6.97	66.8	13.2	9.14	13.8
7/25/06	2.2	97	7.6	62	38	23.1	11.6

Table 48: All parameters sampled at Mile 12.5.

[17] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	29	11.2
4/10/02	<3	<0.1	<0.5	<9	<1	33	12.01
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	<50	10
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	24.1	9.79
4/26/05	<0.25	<0.18	<0.36	<0.12	<0.052	51.1	11
4/25/06	2.1	<0.062	0.996	0.596	<0.030	20.3	11.5
7/18/00	<4	<0.1	<2	<5	<4	14	9.76
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	43	11
7/16/02	<1	<2	<0.6	<9	<2	30[18]	10.4
7/22/03	<2.5	<2.5	<1	<25	<2.5	<50	9.5
7/20/04	<0.25	<0.18	<0.36	1.06	<0.052	59.4	10.3
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	25.7	9.14
7/25/06	<0.44	<0.062	2.17	2.04	<0.030	18.7	9.85
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	0.2	1.4	0.13	<0.05	<0.25	<25.0	<2.53
4/10/02	0.39	1.58	0.11	0.02[18]	<0.25	<25.0	<2.53
4/29/03	0.45	1.4	0.11	<0.025	<0.43	<25.0	<2.84
4/27/04	0.612	1.52	0.131	0.039	<0.022	<3.0	<0.034
4/26/05	0.987	1.87	0.184	<0.025	<0.0060		<0.20
4/25/06	0.964	1.74	0.112	<0.026			
7/18/00	1.54	1.3	0.15	0.06	<0.28	<25.0	<3.26
7/24/01	0.586	0.909	0.23	0.08	<0.25	<25.0	<2.53
7/16/02	0.3	0.91	0.23	0.01[18]	<0.27	<25.0	<2.72
7/22/03	0.72	0.95	0.15	0.03	<0.42	<25.0	<2.78
7/20/04	0.629	0.977	0.156	<0.0020	<0.023		<0.036
7/26/05	0.639	0.965	0.135	<0.051	<0.10	<100	<0.50
7/25/06	1.56	1.32	0.152	<0.026	<0.0065		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	32	7.61	79.7	19.3	5.4	2.89
4/10/02	ND	0	7.36	73.5	7.3	5.2	0.24
4/29/03	ND	0	7.91	70	0.7	8.5	7.03
4/27/04	ND	4	6.64	51.3	1.3	6.5	4.4
4/26/05	ND	<9.1	7.13	75.5	18.1	9.71	5.7
4/25/06		3	7.1	78.2	5	6.98	2.9
7/18/00	1.48	2	7.6	50	28	23	9
7/24/01	3.25	<10	7.58	86.9	12.7	10	11.8
7/16/02	1.23	<10	7.72	55.8	4.7	3.9	11.41
7/22/03	0.71	9	7.3	63.9	8	15	13
7/20/04	1.5	18	7.26	60.4	7.39	9.3	13.7
7/26/05	ND	23	7.22	68.6	15.1	7.96	13.8
7/25/06	ND	72	7.19	62.2	25	22.9	11.7

Table 49: All parameters sampled at Mile 18.

[18] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	35	10.7
4/10/02	<3	<0.1	<0.5	<9	<1	32	12.06
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	<50	10
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	38.2	9.02
4/26/05	<0.25	<0.18	<0.36	<0.12	<0.052	29	10.1
4/25/06	1.93	<0.062	1.16	0.997	<0.030	16.8	10.6
7/18/00	<4	8	25	443	106	2900	9.65
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	37.1	10
7/16/02	<1	<2	<0.6	<9	<2	30[3]	10.36
7/22/03	<2.5	<2.5	<1	<25	<2.5	<50	9.5
7/20/04	<0.25	<0.18	<0.36	<0.12	<0.052	36.3	10.4
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	<10	10.2
7/25/06	1.3	<0.062	1.86	1.85	1.93	15.8	9.85
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	0.41	1.3	<0.10	<0.05	<0.25	<25.0	<2.53
4/10/02	0.25	1.47	0.15	0.02[19]	<0.26	<25.0	<2.58
4/29/03	0.83	1.5	<0.10	<0.025	<0.43	<25.0	<2.84
4/27/04	0.715	1.46	0.115	0.051	<0.021	<3.0	<0.032
4/26/05	1.02	1.84	0.163	0.15	<0.0060		<0.20
4/25/06	0.866	1.68	<0.015	<0.026			
7/18/00	1.5	1.3	0.14	0.07	<0.30	<25.0	<3.51
7/24/01	0.582	1	0.23	0.018[19]	<0.26	<25.0	<2.63
7/16/02	0.27	0.9	0.15	0.02[19]	<0.30	<25.0	<3.01
7/22/03	0.76	1	0.18	0.049	<0.40	<25.0	<2.69
7/20/04	0.562	0.963	0.158	<0.0020	<0.024		<0.037
7/26/05	0.404	0.961	0.121	<0.051	<0.10	<100	<0.50
7/25/06	1.4	1.3	0.136	<0.026	<0.0065		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	18	7.5	79.2	4	6.6	3.28
4/10/02	ND	0	7.61	68	5.3	4.6	0.54
4/29/03	ND	0	8.12	63.6	0.7	11	7.59
4/27/04	ND	0	6.89	54.1	10	7	4
4/26/05	ND	<9.1	7.33	72.6	45.6	11.65	7.2
4/25/06		10	6.97	74.1	6	6.5	3.1
7/18/00	0.62	4	7.15	50	21.3	22	8.89
7/24/01	0.84	<10	7.49	68.4	19.3	13	11.7
7/16/02	0.93	<10	7.76	58.8	4.7	4.3	11.2
7/22/03	0.4	9	7.4	65	8.7	15	14
7/20/04	ND	55	7.57	67.7	9.64	10.4	13.5
7/26/05	ND	9.3	7.52	65.7	12.1	7.77	13.3
7/25/06	ND	100	7.16	62.5	28	18.7	11.5

Table 50: All parameters sampled at Mile 21.

[19] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	22	10.9
4/10/02	<3	<0.1	<0.5	<9	<1	33	11.19
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	<50	11
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	45.2	9.89
4/26/05	<0.25	<0.18	<0.36	<0.12	<0.052	25.8	11.6
4/25/06	2.12	<0.062	0.299	1.23	<0.030	1.96	9.82
7/18/00	<4	0.1	<2	<5	<4	18	9.74
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	43.2	11
7/16/02	<1	<2	<0.6	<9	<2	36	10.29
7/22/03	<2.5	<2.5	1	<25	<2.5	<50	9.6
7/20/04	<0.25	<0.18	<0.36	<0.12	<0.052	31.9	10.2
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	25.8	9.85
7/25/06	1.29	<0.062	1.43	0.687	0.165	2.25	9.84
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	0.46	1.3	<0.10	<0.05	<0.27	<25.0	<2.70
4/10/02	0.23	1.41	0.13	0.02[20]	<0.27	<25.0	<2.66
4/29/03	0.44	1.4	<0.10	<0.025	<0.43	<25.0	<2.84
4/27/04	0.678	1.47	0.116	0.039	<0.020	<3.0	<0.032
4/26/05	1.03	1.9	0.143	0.11	<0.0060		<0.20
4/25/06	0.66	1.46	<0.015	<0.026			
7/18/00	1.19	1.2	0.15	0.06	<0.25	<25.0	4.75
7/24/01	0.599	1	0.17	0.019[20]	<0.27	<25.0	<2.69
7/16/02	0.3	0.88	0.16	<0.01	<0.26	<25.0	<2.60
7/22/03	0.66	0.97	0.17	0.032	<0.41	<25.0	<2.72
7/20/04	0.625	0.918	0.182	<0.0020	<0.022		<0.034
7/26/05	0.435	0.907	0.119	<0.051	<0.10	<100	<0.50
7/25/06	1.27	1.2	0.136	<0.026	<0.0064		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	5	7.86	75.2	2.7	6.6	3.78
4/10/02	ND	0	7.75	68.5	2.7	4.1	0.85
4/29/03	ND	0	7.81	71.9	0.7	8.5	7.14
4/27/04	ND	2	6.95	57.4	0.7	6.3	4.3
4/26/05	ND	<9.1	7.47	77	9.84	12.01	7.6
4/25/06		13	7.08	78.1	4	5.82	3.6
7/18/00	ND	4	7.14	40	23.3	22	8.89
7/24/01	0.67	<10	7.51	69.1	18	12	11.8
7/16/02	0.85	<10		59	3.3	4.5	11.35
7/22/03	0.46	<9	7.4	64.1	7.3	12	14
7/20/04	ND	<1	7.67	68.1	7.28	11	13.5
7/26/05	ND	12	7.5	64.4	11.5	8.82	13.6
7/25/06	ND	190	7.6	63.3	17	14.2	11.4

Table 51: All parameters sampled at Mile 23.

[20] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	34	11.4
4/10/02	<3	<0.1	<0.5	<9	<1	35	12.52
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	<50	11
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	45.7	9.95
4/26/05	3.41	<0.18	<0.36	2.59	<0.052	17.9	12.7
4/25/06	2.58	<0.062	0.299	0.493	<0.030	19.2	12.4
7/18/00	<4	0.1	<2	9	<4	32	9.9
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	33.5	10
7/16/02	<1	<2	0.8[21]	<9	<2	32	9.4
7/22/03	<2.5	<2.5	<1	<25	<2.5	<50	9.6
7/20/04	<0.25	<0.18	<0.36	<0.12	<0.052	44.1	10.4
7/26/05	<2.5	<1.0	<2.5	21.1	468	51.2	9.72
7/25/06	1.22	<0.062	1.41	0.332	<0.030	0.521	9.76
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	0.62	1.5	<0.10	<0.05	0.29	<25.0	<2.53
4/10/02	0.31	1.39	0.14	0.01[21]	<0.25	<25.0	<2.53
4/29/03	0.51	1.3	0.12	<0.025	<0.43	<25.0	<2.84
4/27/04	0.665	1.45	<0.015	0.039	<0.022	<3.0	<0.034
4/26/05	1.24	1.89	0.142	0.1	<0.0060		<0.20
4/25/06	1.06	1.74	<0.015	0.058			
7/18/00	1.43	1.3	0.16	0.05	<0.25	<25.0	<2.98
7/24/01	0.714	0.962	0.21	0.039	<0.27	<25.0	<2.69
7/16/02	0.25	0.81	0.2	<0.01	<0.27	<25.0	<2.75
7/22/03	0.53	0.96	0.16	<0.025	<0.43	<25.0	<2.87
7/20/04	0.549	0.945	0.149	<0.0020	<0.023		<0.036
7/26/05	0.419	0.906	0.108	<0.051	<0.10	<100	<0.50
7/25/06	1.2	1.19	0.139	0.098	<0.0064		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	50	7.34	76.4	3.3	11.1	2.36
4/10/02	ND	0	7.8	75	0.7	4.4	1.11
4/29/03	ND	0	7.57	70.8	1	10	6.18
4/27/04	ND	7	6.93	58.5	3.2	5.45	4.2
4/26/05	ND	<9.1	6.79	84.3	16.3	11.79	5.7
4/25/06		3	7.07	82.4		5.63	3
7/18/00	ND	0	6.75	52	28	20	8.29
7/24/01	0.63	10	7.6	70.3	34.7	12	11.69
7/16/02	0.66	<10	7.62	62.5	1.3	4.2	11.12
7/22/03	ND	20	7.4	64.7	4.7	14	14
7/20/04	ND	<1	7.21	59.7	6.2	9.5	13.2
7/26/05	ND	33	7.58	65.4	16.7	10.41	14
7/25/06	ND	51	7.51	62.7	12	14.1	11.5

Table 52: All parameters sampled at Mile 31.

[21] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	28	10.3
4/10/02	<3	<0.1	<0.5	<9	<1	31	10.09
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	<50	9.7
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	31.2	10.1
4/26/05	<0.25	<0.18	<0.36	<0.12	<0.052	25.8	10.8
4/25/06	1.2	<0.062	0.19	0.543	<0.030	7.96	10.1
7/18/00	<4	<0.1	<2	<5	<4	<9	9.88
7/24/01	<3.1	<0.14	<0.49	<9.3	1.5[22]	29.8[22]	10
7/16/02	<1	<2	<0.6	<9	<2	33	9.56
7/22/03	<2.5	<2.5	1	<25	<2.5	<50	9.5
7/20/04	<0.25	<0.18	<0.36	<0.12	<0.052	32.5	10.8
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	<10	9.58
7/25/06	1.23	<0.062	1.15	0.319	<0.030	0.778	9.95
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	0.39	1	<0.10	<0.05	<0.27	<25.0	<2.70
4/10/02	0.19	0.95	0.22	0.01[5]	<0.25	<25.0	<2.53
4/29/03	0.4	1	0.14	<0.025	<0.43	<25.0	<2.84
4/27/04	0.501	1.07	0.198	<0.0020	<0.020	<3.0	<0.032
4/26/05	0.763	1.18	0.245	<0.025	<0.0060		<0.20
4/25/06	0.46	1.09	0.152	<0.026			
7/18/00	1.25	1.1	0.19	0.04	<0.27	<25.0	<3.17
7/24/01	0.531	0.947	0.15	0.019[22]	<0.26	<25.0	<2.63
7/16/02	0.25	0.78	0.15	<0.01	<0.26	<25.0	<2.60
7/22/03	0.52	0.92	0.17	<0.025	<0.42	<25.0	<2.78
7/20/04	0.54	0.983	0.152	<0.0020	<0.021		<0.033
7/26/05	0.42	0.867	0.119	<0.051	<0.10	<100	<0.50
7/25/06	1.01	1.12	0.141	<0.026	<0.0064		<0.21
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	0	7.7	66.1	8	10	4.6
4/10/02	ND	0	7.7	65.1	0.7	4.7	1.48
4/29/03	ND	0	7.56	57.9	0.7	12	6.27
4/27/04	ND	0	6.73	49.4	1.3	10.3	3.3
4/26/05	ND	<9.1	7.26	66.8	17.4	13.89	7.6
4/25/06		0	7.02	68	11.5	7.11	5.9
7/18/00	ND	10	7.08	40	20.7	19	8.89
7/24/01	1	10	7.57	68.6	13.3	11	11.74
7/16/02	2.04	<10	8.27	61.7	2	4.2	11.61
7/22/03	ND	<9	7.7	59.4	2	13	14
7/20/04	ND	170	7.49	60.3	<0.92	9.2	12.9
7/26/05	1.8	17	7.58	64.2	14.2	8.65	13.8
7/25/06	ND	20	7.64	62.2	16	12.8	11.8

Table 53: All parameters sampled at Mile 40.

[22] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	29	10.2
4/10/02	<3	<0.1	<0.5	<9	<1	33	10.28
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	<50	9.4
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	42.3	9.64
4/26/05	<0.25	<0.18	<0.36	<0.12	<0.052	21	10.4
4/25/06	1.05	<0.062	0.894	0.479	<0.030	8.08	9.99
7/18/00	4	<0.1	<2	<5	<4	<9	9.79
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	32.5	10
7/16/02	<1	<2	<0.6	<9	<2	40	9.61
7/22/03	<2.5	<2.5	<1	<25	<2.5	<50	9.7
7/20/04	<0.25	<0.18	<0.36	<0.12	<0.052	28.8	10.2
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	26.1	9.54
7/25/06	1.19	<0.062	1.32	0.376	<0.030	0.893	9.82
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	0.37	1	0.17	<0.05	<0.27	<25.0	<2.70
4/10/02	0.24	0.97	0.22	0.01[23]	<0.25	<25.0	<2.53
4/29/03	0.43	0.98	0.17	<0.025	<0.42	<25.0	<2.81
4/27/04	0.633	1.12	0.206	<0.0020	<0.021	<3.0	<0.032
4/26/05	1.69	1.5	0.264	0.1	<0.0060		<0.20
4/25/06	0.688	1.15	0.162	<0.026			
7/18/00	1.32	1.2	0.17	<0.04	<0.27	<25.0	<3.19
7/24/01	0.547	0.804	0.25	0.018[23]	<0.27	<25.0	<2.66
7/16/02	0.2	0.76	0.16	<0.01	<0.27	<25.0	<2.69
7/22/03	0.57	0.93	0.18	<0.025	<0.40	<25.0	<2.69
7/20/04	0.503	0.903	0.159	<0.0020	<0.024		<0.037
7/26/05	0.476	0.881	0.132	<0.051	<0.10	<100	<0.50
7/25/06	1.07	1.13	0.141	0.091	<0.0065		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	10	7.9	54.8	7.3	8.5	2.4
4/10/02	ND	0	7.66	65	2.7	4.3	1.39
4/29/03	ND	0	7.46	55.7	0.7	13	5.03
4/27/04	ND	0	6.33	47.2	<0.7	8.4	2.7
4/26/05	ND	<9.1	7.28	66.8	25.2	12.81	6.8
4/25/06		0	6.93	68.2	12.5	7.51	3.7
7/18/00	1.08	4	7.22	50	21.3	19	8.89
7/24/01	0.95	<10	7.51	68.3	17.3	10	11.58
7/16/02	0.84	<10	8.18	61.4	2	4.1	11.52
7/22/03	ND	9	7.3	58.9	6	14	13.5
7/20/04	ND	27	7.51	60.3	<0.91	8.3	13.5
7/26/05	ND	20	7.61	63.8	21	10.45	13.6
7/25/06	ND	96	7.6	61.4	17	11.8	11.8

Table 54: All parameters sampled at Mile 43.

[23] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	32	10.6
4/10/02	<3	<0.1	<0.5	<9	<1	31	10.35
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	<50	10
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	30.6	8.83
4/26/05	<0.25	<0.18	<0.36	<0.12	<0.052	22.9	10.9
4/25/06	1.04	<0.062	0.846	0.483	<0.030	10	11.4
7/18/00	<4	<0.1	<2	<5	<4	11	10.5
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	48.5	10
7/16/02	<1	<2	<0.6	<9	<2	26[24]	10.22
7/22/03	<2.5	<2.5	<1	<25	<2.5	<50	10
7/20/04	<0.25	<0.18	<0.36	<0.12	<0.052	29.1	11.1
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	15.6	10.5
7/25/06	1.15	<0.062	0.952	0.372	<0.030	0.976	11.1
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	0.25	0.9	0.17	<0.05	<0.25	<25.0	<2.53
4/10/02	0.1[24]	0.8	0.22	<0.01	<0.25	<25.0	<2.53
4/29/03	0.51	0.93	0.15	<0.025	<0.42	<25.0	<2.81
4/27/04	1.78	1.83	0.255	0.065	<0.020	<3.0	<0.032
4/26/05	0.377	0.943	0.24	<0.025	<0.0060		<0.20
4/25/06	0.147	0.889	0.205	<0.026			
7/18/00	0.43	0.9	0.18	<0.04	<0.25	<25.0	<2.98
7/24/01	0.091[24]	0.729	0.26	<0.010	<0.26	<25.0	<2.63
7/16/02	0.05[24]	0.75	0.18	<0.01	<0.25	<25.0	<2.53
7/22/03	0.27	0.84	0.18	<0.025	<0.40	<25.0	<2.69
7/20/04	0.242	0.875	0.161	<0.0020	<0.020		<0.032
7/26/05	0.0888	0.844	0.137	<0.051	<0.10	<100	<0.50
7/25/06	0.0628	0.869	0.169	0.08	<0.0064		<0.21
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	0	8	64.7	2.7	7.5	4.72
4/10/02	ND	0	7.89	62.5	2	2.6	1.3
4/29/03	ND	0	7.41	45.6	5.3	14	3.92
4/27/04	ND	0	6.84	37.7	<0.7	6.6	1
4/26/05	ND	<9.1	7.5	65.3	1.79	9.7	2
4/25/06		0	6.82	67.9	0.5	4.4	2.5
7/18/00	ND	<10	7.29	50	8.7	9.7	9.44
7/24/01	ND	<10	7.94	72.3	2	2.7	12.58
7/16/02	ND	<10	8.52	62.8	1.3	1.4	11.99
7/22/03	ND	<9	7.5	60.3	1.3	7.7	13.5
7/20/04	ND	<1	7.33	66.3	<0.91	5.3	13.9
7/26/05	ND	<1.3	7.6	66.2	1.58	3.03	13.8
7/25/06	ND	<1	7.75	65.8	<5.0	1.75	11.8

Table 55: All parameters sampled at Mile 50.

[24] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	44	14.5
4/10/02	<3	<0.1	<0.5	<9	<1	34	13.35
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	<50	13
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	34.2	13.6
4/26/05	<0.25	<0.18	<0.36	2.94	<0.052	30.7	14
4/25/06	0.807	<0.062	0.227	0.474	<0.030	10.4	16.9
7/18/00	<4	<0.1	<2	6	<4	17	17
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	34.6	12
7/16/02	<1	<2	<0.6	<9	<2	50	11.26
7/22/03	<2.5	<2.5	<1	<25	<2.5	<50	12
7/20/04	<0.25	<0.18	<0.36	<0.12	<0.052	33.2	12.9
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	19.1	12.5
7/25/06	0.523	<0.062	1.22	0.446	<0.030	20.9	12.5
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	0.09	1	0.32	<0.05	<0.27	<25.0	<2.66
4/10/02	0.24	1.01	0.27	0.01[25]	<0.29	<25.0	<2.94
4/29/03	0.22	0.99	0.4	<0.025	<0.39	<25.0	<2.58
4/27/04	0.376	1.06	0.456	<0.0020	<0.021	<3.0	<0.033
4/26/05	0.215	1.06	0.706	<0.025	<0.0060		<0.20
4/25/06	0.209	1.27	0.409	<0.026			
7/18/00	0.25	1.3	0.2	<0.04	<0.28	<25.0	<3.28
7/24/01	0.101[25]	0.812	0.27	<0.010	<0.27	<25.0	<2.69
7/16/02	0.16	0.84	0.25	<0.01	<0.26	<25.0	<2.60
7/22/03	0.23	0.93	0.24	<0.025	<0.41	<25.0	<2.75
7/20/04	0.189	0.97	0.203	<0.0020	<0.023		<0.036
7/26/05	0.113	0.99	0.196	<0.051	<0.10	<100	<0.50
7/25/06	0.243	1.01	0.242	<0.026	<0.0064		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	0	8.07	89.2	2.7	3.7	3
4/10/02	ND	0	7.05	101	5.3	8.1	
4/29/03	ND	0	7.84	74	1.3	7.5	3.73
4/27/04	ND	3	6.93	83	1.3	10.5	2.8
4/26/05	ND	<9.1	7.32	84.3	1.84	4.87	4.4
4/25/06		0	6.95	96.2	1.5	7.03	4.2
7/18/00	ND	2	7.95	60	4	5.4	10
7/24/01	ND	10	8.37	79.9	0.7	4.1	11.3
7/16/02	ND	<10	7.79	70.4	2	6.8	9.04
7/22/03	ND	9	7.5	72.8	1.3	7.5	12
7/20/04	ND	<1	7.34	75	<0.98	5.6	14.6
7/26/05	ND	12	7.66	81.2	1.13	4.46	13.8
7/25/06	ND	32	7.62	78.3	<5.0	5.36	10.4

Table 56: All parameters sampled at Mile 70.

[25] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	44	12.9
4/10/02	<3	<0.1	<0.5	<9	<1	36	11.47
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	<50	11
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	40.1	11.8
4/26/05	<0.25	<0.18	<0.36	<0.12	<0.052	33.1	13.2
4/25/06	0.525	<0.062	1.2	0.548	<0.030	5.19	13.5
7/18/00	<4	<0.1	<2	5	<4	21	12.1
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	36.2	14
7/16/02	<1	<2	1.5[26]	<9	4[26]	32	11.11
7/22/03	<2.5	<2.5	<1	<25	<2.5	<50	12
7/20/04	<0.25	1	<0.36	<0.12	<0.052	27.9	12.8
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	19.8	12.5
7/25/06	0.405	<0.062	0.898	0.613	<0.030	20.9	12.2
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	0.51	1	0.24	<0.05	<0.27	<25.0	<2.66
4/10/02	0.41	0.97	0.22	0.01[26]	<0.29	<25.0	<2.91
4/29/03	0.36	0.94	0.25	<0.025	<0.40	<25.0	<2.65
4/27/04	0.555	1.03	0.271	<0.0020	<0.022	<3.0	<0.034
4/26/05	0.234	1.05	0.29	<0.025	<0.0060		<0.20
4/25/06	0.442	1.17	0.275	<0.026			
7/18/00	0.15	0.9	0.21	<0.04	<0.27	<25.0	<3.17
7/24/01	0.084[26]	0.847	0.29		<0.27	<25.0	<2.69
7/16/02	0.17	0.82	0.26	<0.01	<0.25	<25.0	<2.53
7/22/03	0.31	0.94	0.24	<0.025	<0.41	<25.0	<2.75
7/20/04	0.199	0.959	0.229	<0.0020	<0.023		<0.036
7/26/05	0.0867	0.952	0.251	<0.051	<0.10	<100	<0.50
7/25/06	0.136	0.969	0.251	<0.026	<0.0064		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	0	8.11	86.6	2.7	3.7	2
4/10/02	ND	0	7.28	90.4	1.3	12	0.68
4/29/03	ND	0	7.74	66.7	0.7	10	3.72
4/27/04	ND	3	6.8	75.7	0.7	12.7	0.2
4/26/05	ND	<9.1	6.93	79.2	<0.48	7.34	3.2
4/25/06		0	6.89	84.6	1.5	10.39	2.2
7/18/00	ND	8	8	60	2	5.6	10
7/24/01	ND	<10	7.81	81.3	6.7	2.9	11.5
7/16/02	ND	<10	7.8	69.5	<0.7	7.3	9.31
7/22/03	0.49	<9	7.4	73	3.3	9.8	13
7/20/04	ND	9	7.2	72.2	<0.96	5.4	14.6
7/26/05	ND	<1.3	7.59	79	1.13	4.22	7.1
7/25/06	ND	6	7.5	77.6	<5.0	4.6	10.1

Table 57: All parameters sampled at Mile 80.

[26] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	84	8.25
4/10/02	<3	<0.1	<0.5	<9	<1	122	11.16
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	60	12
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	61.9	7
4/26/05	<0.25	<0.18	<0.36	8.21	<0.052	63.3	4.22
4/25/06	1.56	<0.062	2.6	0.792	0.111	52.2	8.17
7/18/00	<4	<0.1	<2	<5	<4	12	12.8
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	46.3	15
7/16/02	<1	<2	<0.6	<9	<2	29[27]	11.96
7/22/03	<2.5	<2.5	<1	<25	<2.5	75	13
7/20/04	<0.25	<0.18	<0.36	<0.12	<0.052	48.5	13.5
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	51.1	14.1
7/25/06	1.78	<0.062	3.93	0.665	<0.030	2.62	12.8
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	2.86	3.5	<0.10	0.12	<0.25	<25.0	<2.53
4/10/02	2.04	3.44	0.22	0.04	<0.26	<25.0	<2.60
4/29/03	3.2	6.7	0.12	<0.025	<0.40	<25.0	<2.65
4/27/04	3.58	2.76	0.138	0.057	<0.021	<3.0	0.24
4/26/05	3.16	1.56	<0.015	0.13	<0.0060		<0.20
4/25/06	4.35	3.13	<0.015	0.06			
7/18/00	2.85	4.3	0.08	<0.04	<0.25	<25.0	<2.98
7/24/01	2.5	7.7	<0.10	0.029[27]	<0.27	<25.0	<2.69
7/16/02	1.58	3.87	<0.10	0.05	<0.27	<25.0	<2.75
7/22/03	3.3	4.4	<0.10	0.04	<0.39	<25.0	<2.63
7/20/04	2.57	4.25	<0.015	0.042	<0.022		0.32
7/26/05	5.12	5.3	<0.10	<0.051	<0.10	<100	<0.50
7/25/06	3.38	4.35	<0.015	<0.026	<0.0065		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	13	6.89	143	26	50	1.61
4/10/02	ND	0	7.18	146.9	4.7	16	0.2
4/29/03	ND	9	8.04	220	4	16	5.45
4/27/04	ND	5	6.53	80.6	14.7	13	4.2
4/26/05	ND	45	6.2	48.4	7.8	7.9	6.5
4/25/06		10	7	113	20.5	11.49	1.7
7/18/00	ND	40	7.03	130	8.7	16	12.09
7/24/01	ND	170	7.46	366.8	6	14	15.12
7/16/02	ND	10	7.46	153.2	0.7	9.3	14.5
7/22/03	ND	80	7.3	157	0.7	16	15
7/20/04	ND	64	7.34	156.7	5.22	14.5	14.8
7/26/05	ND	230	7.59	218	5.43	25.5	14.7
7/25/06	ND	260	7.58	158.9	<5.0	19.4	12.4

Table 58: All parameters sampled at No Name Creek.

[27] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/10/02	5[28]	<0.1	<0.5	<9	<1	41	17.82
4/29/03	5	<2.5	<1.0	<25	<2.5	<50	15
4/27/04	3.82	<0.18	<0.36	<0.12	<0.052	36.2	8.25
4/26/05	3.57	<0.18	<0.36	<0.12	<0.052	59.1	8.53
4/25/06	4.66	<0.062	2.38	0.567	0.158	46.4	8.18
7/16/02	3	<2	12	<9	<2	41	18.48
7/22/03	4.4[28]	<2.5	<1	<25	<2.5	<50	20
7/20/04	4.74	<0.18	<0.36	<0.12	<0.052	47.4	23.5
7/26/05	5.01	<1.0	<2.5	<2.5	<1.0	26	22.4
7/25/06	4.57	<0.062	16.4	1.74	3.92	49.7	19
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/10/02	2.3	4.6	<0.10	0.08	<0.26	<25.0	<2.58
4/29/03	5.1	4.7	<0.10	0.17	<0.44	<25.0	<2.91
4/27/04	2.7	2.32	<0.015	0.106	<0.022	<3.0	<0.034
4/26/05	3.83	2.69	<0.015	0.26	<0.0060		<0.20
4/25/06	6.42	2.73	<0.015	<0.026			
7/16/02	1.87	4.43	<0.10	0.09	<0.27	<25.0	<2.75
7/22/03	1.8	5.1	<0.10	0.063	<0.41	<25.0	<2.72
7/20/04	2.4	5.31	<0.015	0.0742	<0.022		<0.034
7/26/05	0.931	3.86	<0.10	0.077	<0.10	<100	<0.50
7/25/06	2.26	4.76	<0.015	0.093	<0.0064		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/10/02	ND	0	7.19	139.1	5.3	14	-0.17
4/29/03	ND	2	7.54	131.4	2.7	24	6.73
4/27/04	ND	42	6.44	53.6	17.3	6.4	4.5
4/26/05	ND	18	6.58	61.6	62.8	9.86	6.1
4/25/06		86	6.83	63.4	65	23.2	1.8
7/16/02	0.47	30	7.54	144.6	2	10	13.03
7/22/03	ND	9	7.3	155	0.7	11	13
7/20/04	ND	170	7.38	177.1	7.09	9	14.1
7/26/05	1.3	69	7.27	180	2.65	10.8	13.3
7/25/06	ND	370	7.52	150.1	<5.0	9.8	11.5

Table 59: All parameters sampled at Beaver Creek.

[28] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	41	5.03
4/10/02	4[29]	<0.1	<0.5	<9	<1	40	19.06
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	69	11
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	39.5	6.34
4/26/05	<0.25	<0.18	<0.36	<0.12	<0.052	47.9	6.61
4/25/06	2.04	<0.062	0.517	0.837	<0.030	5.59	6.47
7/18/00	6	0.1	<2	<5	<4	27	14.3
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	69.4	13
7/16/02	2	<2	0.9[29]	<9	<2	61	19.48
7/22/03	2.6[29]	<2.5	<1	<25	<2.5	<50	18
7/20/04	<0.25	<0.18	<0.36	12.1	<0.052	54.2	14.9
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	<10	4.61
7/25/06	2.11	<0.062	<0.49	3.51	<0.030	11.2	12.8
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	0.67	1.5	<0.10	0.06	0.32	<25.0	<2.53
4/10/02	1.27	5.85	0.3	0.05	<0.26	<25.0	<2.58
4/29/03	1.3	3.4	0.12	0.033	<0.42	<25.0	<2.78
4/27/04	0.603	1.86	<0.015	0.035	<0.021	<3.0	<0.032
4/26/05	0.917	2.09	<0.015	<0.025	<0.0060		<0.20
4/25/06	3.13	2.06	<0.015	0.11			
7/18/00	1.18	4	0.12	<0.04	<0.25	<25.0	<2.98
7/24/01	0.842	3.6	<0.10	0.023[29]	<0.26	<25.0	<2.58
7/16/02	0.42	5.57	0.36	0.09	<0.25	<25.0	<2.53
7/22/03	1.1	5.5	0.12	0.03	<0.81	<25.0	<5.38
7/20/04	0.802	3.01	0.179	0.0279	<0.022		<0.034
7/26/05	8.24	3.3	0.135	<0.051	<0.10	<100	<0.50
7/25/06	1.52	2.79	0.146	<0.026	<0.0064		<0.21
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	144	7.45	78.9	15.3	4	3.78
4/10/02	ND	0	7.36	142.4	2	3.2	0.71
4/29/03	ND	0	7.69	90.5	0.7	2.5	5.49
4/27/04	ND	5	6.37	48.7	0.7	2.1	4.7
4/26/05	ND	<9.1	6.69	54.8	5.38	1.21	7.1
4/25/06		23	6.91	53.4	22	9.51	0.7
7/18/00	ND	16	6.76	100	14.7	15	9.44
7/24/01	ND	10	7.29	110.3	1.3	2.7	12.04
7/16/02	ND	160	7.4	149.2	2	1.8	9.6
7/22/03	ND	200	7.1	149	0.7	5.3	12
7/20/04	ND	82	7.36	161.6	3.02	7.2	13.3
7/26/05	ND	120	7.43	112	5.4	6.45	12.2
7/25/06	ND	160	7.22	91.1	<5.0	12.02	9.9

Table 60: All parameters sampled at Slikok Creek.

[29] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	7	<0.5	<2	<5	<4	33	10.8
4/10/02	8[30]	<0.1	<0.5	<9	<1	37	23.31
4/29/03	5.9	<2.5	<1.0	<25	<2.5	<50	16
4/27/04	4.54	<0.18	<0.36	<0.12	<0.052	39	8.3
4/26/05	6.84	<0.18	<0.36	<0.12	<0.052	58.6	10.3
4/25/06	7.9	<0.062	0.493	0.832	<0.030	3	11.5
7/18/00	10	<0.1	<2	<5	<4	<9	19.2
7/24/01	9.7	<0.14	<0.49	<9.3	<1.1	68	15
7/16/02	8	63	1.6[30]	<9	<2	57	22.08
7/22/03	10	<2.5	<1	<25	<2.5	<50	22
7/20/04	11.3	<0.18	<0.36	<0.12	<0.052	63.4	24.1
7/26/05	10.1	<1.0	<2.5	<2.5	<1.0	19.4	22.1
7/25/06	9.44	<0.062	<0.49	<0.34	<0.030	17.8	19.2
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	1.62	2.9	<0.10	0.15	0.35	<25.0	<2.66
4/10/02	1.16	6.75	0.13	0.12	<0.26	<25.0	<2.58
4/29/03	0.95	4.8	<0.10	0.092	<0.43	<25.0	<2.84
4/27/04	0.832	2.45	<0.015	0.094	<0.022	<3.0	<0.034
4/26/05	2.06	3.08	<0.015	0.27	<0.0060		<0.20
4/25/06	2.62	3.48	<0.015	0.15			
7/18/00	1.13	5.1	0.06	0.1	0.37	<25.0	5.67
7/24/01	0.613	4.1	<0.10	0.093	<0.27	<25.0	<2.75
7/16/02	0.72	5.92	<0.10	0.11	<0.25	<25.0	<2.53
7/22/03	0.59	6.4	<0.10	0.11	<0.40	<25.0	<2.69
7/20/04	0.761	6.4	<0.015	0.116	<0.022		<0.034
7/26/05	0.867	6.01	<0.10	0.13	<0.10	<100	<0.50
7/25/06	1.09	5.52	<0.015	0.16	<0.0064		<0.21
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	520	7.1	97.9	26	10	0.5
4/10/02	ND	7	7.39	167.8	1.3	4.5	-0.02
4/29/03	ND	0	7.53	139.5	2	2.5	6.83
4/27/04	ND	10	6.77	75.5	1.3	2.05	4.9
4/26/05	ND	82	6.88	83.8	16.8	5.15	5.5
4/25/06		68	7.06	94.6	18.5	6.28	1.5
7/18/00	ND	6	7.21	140	9.3	6.6	11.67
7/24/01	ND	30	7.24	124.7	5.3	2.1	14.62
7/16/02	ND	20	7.76	168	1.3	2.5	14.78
7/22/03	ND	9	7.4	180	0.7	2.8	17
7/20/04	ND	9	7.68	196.6	3.35	3	15.7
7/26/05	ND	71	7.36	182	2.71	3.1	12.1
7/25/06	ND	180	7.71	160.5	<5.0	4.7	11

Table 61: All parameters sampled at Soldotna Creek.

[30] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	34	9.45
4/10/02	<3	<0.1	<0.5	<9	<1	70	10.84
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	52	7.7
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	27.4	6.28
4/26/05	<0.25	<0.18	<0.36	<0.12	<0.052	46.8	8.11
4/25/06	2.46	<0.062	1.23	0.616	<0.030	20.5	9.07
7/18/00	<4	<0.1	<2	<5	<4	<9	8.88
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	41	9.1
7/16/02	<1	<2	1.1[31]	<9	<2	51	8.22
7/22/03	2.6	<2.5	<1	<25	<2.5	<50	9.5
7/20/04	2.83	<0.18	<0.36	<0.12	<0.052	59.1	9.88
7/26/05	2.56	<1.0	<2.5	<2.5	<1.0	16.2	10.8
7/25/06	2.63	<0.062	2.97	0.5	<0.030	20	9.48
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	1.89	3	<0.10	0.12	<0.25	<25.0	<2.53
4/10/02	0.75	3.88	<0.10	0.04	<0.26	<25.0	<2.55
4/29/03	2.2	3	<0.10	0.13	<0.42	<25.0	<2.78
4/27/04	1.96	2.46	<0.015	0.11	<0.021	<3.0	<0.032
4/26/05	2.25	3.33	<0.015	0.23	<0.0060		<0.20
4/25/06	7.21	3.86	<0.015	0.12			
7/18/00	1.46	3.2	0.04	0.11	<0.25	<25.0	<2.98
7/24/01	1.1	2.6	<0.10	0.07	<0.28	<25.0	<2.81
7/16/02	0.38	2.77	<0.10	0.04	<0.27	<25.0	<2.66
7/22/03	0.58	3.3	<0.10	0.044	<0.45	<25.0	<3.01
7/20/04	0.387	3.09	<0.015	0.0311	<0.022		<0.035
7/26/05	0.574	3.57	<0.10	<0.051	<0.10	<100	<0.50
7/25/06	0.629	3.29	<0.015	0.088	<0.0064		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	500	7.27	73.6	50	34.6	0.04
4/10/02	ND	0	7.3	90.5	6	4.8	-0.18
4/29/03	ND	4	7.26	63.3	37.3	22	3.76
4/27/04	ND	7	6.64	42.2	43.3	10.2	1.8
4/26/05	ND	<9.1	6.89	65.8	67.5	28.2	3.4
4/25/06		39	6.87	64	205	24	-0.1
7/18/00	ND	<10	6.85	62	32.7	11	8.95
7/24/01	ND	40	7.56	69.5	34.7	12	10.72
7/16/02	ND	10	7.54	74.5	0.7	3.6	10.7
7/22/03	ND	110	7.5	84.9	2	6.3	12
7/20/04	ND	64	7.51	88.9	2.45	2.4	18.5
7/26/05	ND	11	7.28	98.7	13.2	4.22	12.7
7/25/06	ND	68	7.53	81.8	<5.0	2.76	9.9

Table 62: All parameters sampled at Funny River.

[31] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	33	10.3
4/10/02	6[32]	<0.1	<0.5	<9	<1	79	25.33
4/29/03	4	<2.5	<1.0	<25	<2.5	49	18
4/27/04	3.6	<0.18	<0.36	<0.12	<0.052	41.3	9.95
4/26/05	6.46	<0.18	<0.36	<0.12	<0.052	24	17.2
4/25/06	5.87	<0.062	0.29	0.449	0.118	33.6	16.4
7/18/00	8	<0.1	<2	6	<4	10	24.5
7/24/01	6.7[32]	<0.14	<0.49	<9.3	<1.1	76.1	24
7/16/02	6	<2	<0.6	<9	<2	<9	22.38
7/22/03	5.2	<2.5	1	<25	<2.5	<50	24
7/20/04	6.01	<0.18	<0.36	<0.12	<0.052	11	25.7
7/26/05	5.58	<1.0	<2.5	<2.5	<1.0	<10	23.8
7/25/06	7.63	<0.062	5.26	0.315	<0.030	0.831	23.9
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	1.08	1.8	<0.10	0.06	0.37	<25.0	<2.53
4/10/02	1.06	4.59	<0.10	0.06	<0.25	<25.0	<2.53
4/29/03	1.1	3	<0.10	0.049	<0.44	<25.0	<2.94
4/27/04	0.876	1.75	<0.015	0.059	<0.022	<3.0	<0.034
4/26/05	2.02	3.03	<0.015	0.23	<0.0060		<0.20
4/25/06	3.13	2.94	<0.015	0.087			
7/18/00	1.1	3.9	<0.03	0.05	<0.25	<25.0	<2.98
7/24/01	0.64	3.6	<0.10	0.024[32]	<0.25	<25.0	<2.53
7/16/02	0.63	3.84	<0.10	0.03[32]	<0.27	<25.0	<2.72
7/22/03	0.27	4.5	<0.10	0.027	<0.42	<25.0	<2.81
7/20/04	0.521	4.16	<0.015	0.0263	<0.023		<0.036
7/26/05	0.85	3.91	<0.10	<0.051	<0.10	<100	<0.50
7/25/06	0.867	4.25	<0.015	<0.026	<0.0064		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	118	6.94	77	9.3	8.7	0.03
4/10/02	ND	0	7.24	179.3	2	5	0.09
4/29/03	ND	0	7.61	118.7	0.7	3.5	10.56
4/27/04	ND	9	6.98	69.3	5.4	3.75	4.3
4/26/05	ND	<9.1	6.83	114.4	25.3	5.48	4.3
4/25/06		6	7.1	108	29.5	9.29	1.1
7/18/00	ND	2	7.05	135	20.7	3.0	13.93
7/24/01	ND	<10	7.35	152.8	6.7	1.8	15.92
7/16/02	6.65	0	9.03	148.9	3.3	1.8	17.48
7/22/03	0.52	9	8.4	157	0.7	1.39	19
7/20/04	1.6	9	8	163.3	<1.0	1.3	18.7
7/26/05	ND	4	7.93	141	1.49	1.72	17.3
7/25/06	ND	130	8.16	148.1	<5.0	1.72	13.8

Table 63: All parameters sampled at Moose River.

[32] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	28	10.4
4/10/02	<3	<0.1	<0.5	13[33]	<1	34	8.06
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	<50	7.4
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	37.9	9.1
4/26/05	<0.25	<0.18	<0.36	<0.12	<0.052	27.2	8.26
4/25/06	1.39	<0.062	0.341	0.692	<0.030	11.9	6.71
7/18/00	4	<0.1	<2	<5	<4	<9	3.95
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	34.4	3.8
7/16/02	<1	<2	<0.6	<9	<2	26[33]	10.26
7/22/03	<2.5	<2.5	<1	<25	<2.5	<50	3.3
7/20/04	<0.25	<0.18	3.33	8.42	1.21	49.5	3.41
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	19.9	20.2
7/25/06	1.38	<0.062	0.42	1.45	0.201	5.21	4.99
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	0.31	0.9	0.22	<0.05	<0.27	<25.0	<2.66
4/10/02	0.19	1.55	0.15	0.01[33]	<0.25	<25.0	<2.53
4/29/03	0.67	1.3	0.22	0.033	<0.43	<25.0	<2.84
4/27/04	0.242	0.746	0.159	<0.0020	<0.021	<3.0	<0.032
4/26/05	0.941	1.7	<0.015	0.12	<0.0060		<0.20
4/25/06	1.43	1.56	<0.015	<0.026			
7/18/00	6.26	2.7	<0.03	0.21	<0.25	<25.0	<2.98
7/24/01	2.9	1.4	<0.10	0.088	<0.27	<25.0	<2.66
7/16/02	0.06[33]	0.77	0.19	<0.01	<0.25	<25.0	<2.53
7/22/03	3.6	1.6	<0.10	0.14	<0.41	<25.0	<2.72
7/20/04	3.33	1.55	<0.015	0.0614	<0.021		<0.033
7/26/05	<0.050	1.69	<0.10	0.4	<0.10	<100	<0.50
7/25/06	9.99	3.94	<0.015	0.57	<0.0064		<0.22
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	0	7.84	72.8	6	8.8	8.8
4/10/02	ND	0	7.39	65.7	2.7	1.1	-0.21
4/29/03	ND	0	7.18	54	1.3	8.5	5.36
4/27/04	ND	0	6.68	51.4	36	13.3	2.8
4/26/05	ND	<9.1	7.01	64.1	20	4.18	6.5
4/25/06		0	6.5	55.9	14	2.48	0
7/18/00	ND	2	6.57	20	162	90	7.78
7/24/01	ND	70	7.22	32	86	65	7.67
7/16/02	0.82	0	8.27	65	1.3	1.8	11.74
7/22/03	ND	20	6.7	22.7	64	80	8
7/20/04	ND	<1	7.15	18	16	37.4	9.5
7/26/05	ND	440	7.02	26.8	210	96.3	8
7/25/06	ND	230	7.28	25.2	201	129.9	7.2

Table 64: All parameters sampled at Killey River.

[33] Best Available Estimate

Date	Arsenic (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Calcium (µg/L)
4/11/01	<4	<0.5	<2	<5	<4	46	18.5
4/10/02	<3	<0.1	<0.5	<9	<1	34	20.59
4/29/03	<2.5	<2.5	<1.0	<25	<2.5	<50	18
4/27/04	<0.25	<0.18	<0.36	<0.12	<0.052	49.7	15.3
4/26/05	<0.25	<0.18	<0.36	3	<0.052	30.6	15.8
4/25/06	0.682	<0.062	0.248	0.928	<0.030	7.6	15.8
7/18/00	5	<0.1	<2	7	<4	<9	14.3
7/24/01	<3.1	<0.14	<0.49	<9.3	<1.1	34.6	13
7/16/02	<1	<2	<0.6	<9	<2	50	13.36
7/22/03	<2.5	<2.5	<1	<25	<2.5	<50	14
7/20/04	<0.25	<0.18	<0.36	<0.12	<0.052	33.8	15.9
7/26/05	<2.5	<1.0	<2.5	<2.5	<1.0	19.6	15.3
7/25/06	0.919	<0.062	1.26	0.869	<0.030	24.7	16.5
Date	**Iron (µg/L)**	**Magnesium (µg/L)**	**Nitrate (mg/L)**	**Phosphorus (mg/L)**	**DRO (mg/L)**	**GRO (µg/L)**	**RRO (mg/L)**
4/11/01	<0.04	1.1	0.59	<0.05	<0.25	<25.0	<2.53
4/10/02	<0.03	1.31	0.64	<0.01	<0.27	<25.0	<2.72
4/29/03	<0.11	1.2	0.54	<0.025	<0.41	<25.0	<2.70
4/27/04	0.104	0.97	0.756	<0.0020	<0.022	<3.0	<0.034
4/26/05	<0.0040	1.02	1.11	<0.025	<0.0060		<0.20
4/25/06	0.199	1.2	0.299	<0.026			
7/18/00	<0.04	0.9	0.31	<0.04	<0.28	<25.0	<3.35
7/24/01	0.083[34]	0.84	0.36	<0.010	<0.27	<25.0	<2.66
7/16/02	0.06[34]	0.93	0.37	<0.01	<0.25	<25.0	<2.53
7/22/03	<0.10	1	0.3	<0.025	<0.42	<25.0	<2.78
7/20/04	<0.0040	1.04	0.281	<0.0020	<0.022		<0.034
7/26/05	<0.050	1.09	0.308	<0.051	<0.10	<100	<0.50
7/25/06	<0.0027	1.13	0.43	<0.026	<0.0063		<0.21
Date	**BTEX (µg/L)**	**Fecal (CFU/100m)**	**pH**	**Conductivity (µS/cm)**	**TSS (mg/L)**	**Turbidity (NTU)**	**Water Temp.(°C)**
4/11/01	ND	4	8.19	111	1.3	0.1	2
4/10/02	ND	0	7.15	139	1.3	0.1	0
4/29/03	ND	0	7.88	98	0.7	0.4	4.85
4/27/04	ND	3	7.08	94.6	<0.7	0.75	3.3
4/26/05	ND	<9.1	7.17	88.6	<0.48	0.53	5.2
4/25/06		0	6.99	90.1	1.5	9.2	3.9
7/18/00	ND	8	8.14	70	2	0.45	11.39
7/24/01	ND	<10	8.05	80.8	2	2.2	11.5
7/16/02	ND	0	7.84	77.7	2.7	0.28	12.09
7/22/03	ND	20	7.4	81.6	0.7	0.45	13
7/20/04	ND	9	7.28	91	<0.98	0.4	14.9
7/26/05	ND	240	7.72	97.3	<0.95	0.05	13.8
7/25/06	ND	83	7.76	91.9	<5.0	0.02	11.5

Table 65: All parameters sampled at Russian River.

[34] Best Available Estimate

Appendix 5. Data Quality Analysis Tables for April

Metal (unit)	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference [35]	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Arsenic (µg/L)	4/10/02	Beaver Creek	5[36]	3[2]	50%	2
	4/10/02	Mile 6.5	<3	<3	0%	
	4/29/03	Soldotna Creek	5.9	6.5	10%	
	4/29/03	Mile 43	<2.5	<2.5	0%	
	4/27/04	Funny River	<0.25	<0.25	0%	
	4/27/04	Mile 6.5	3.28	2.61	23%	
	4/26/05	Russian River	<0.25	<0.25	0%	
	4/26/05	Mile 40	<0.25	<0.25	0%	
	4/25/06	Funny River	2.46	2.38	3%	
	4/25/06	Mile 70	0.807	0.799	1%	
Cadmium (µg/L)	4/10/02	Beaver Creek	<0.1	<0.1	0%	0
	4/10/02	Mile 6.5	<0.1	<0.1	0%	
	4/29/03	Soldotna Creek	<2.5	<2.5	0%	
	4/29/03	Mile 43	<2.5	<2.5	0%	
	4/27/04	Funny River	<0.18	<0.18	0%	
	4/27/04	Mile 6.5	<0.18	<0.18	0%	
	4/26/05	Russian River	<0.18	<0.18	0%	
	4/26/05	Mile 40	<0.18	<0.18	0%	
	4/25/06	Funny River	<0.062	<0.062	0%	
	4/25/06	Mile 70	<0.062	<0.062	0%	
Chromium (µg/L)	4/10/02	Beaver Creek	<0.5	<0.5	0%	2
	4/10/02	Mile 6.5	<0.5	<0.5	0%	
	4/29/03	Soldotna Creek	<1.0	<1.0	0%	
	4/29/03	Mile 43	<1.0	<1.0	0%	
	4/27/04	Funny River	<0.36	<0.36	0%	
	4/27/04	Mile 6.5	<0.36	<0.36	0%	
	4/26/05	Russian River	<0.36	<0.36	0%	
	4/26/05	Mile 40	<0.36	<0.36	0%	
	4/25/06	Funny River	1.23	0.555	76%	
	4/25/06	Mile 70	0.227	0.301	28%	

[35] The difference between the normal sample value and the duplicate divided by their average.
[36] Best Available Estimate

Metal	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Copper (µg/L)	4/10/02	Beaver Creek	<9	<9	0%	2
	4/10/02	Mile 6.5	<9	<9	0%	
	4/29/03	Soldotna Creek	<25	<25	0%	
	4/29/03	Mile 43	<25	<25	0%	
	4/27/04	Funny River	<0.12	<0.12	0%	
	4/27/04	Mile 6.5	<0.12	<0.12	0%	
	4/26/05	Russian River	3	<0.12	185%	
	4/26/05	Mile 40	<0.12	<0.12	0%	
	4/25/06	Funny River	0.616	0.655	6%	
	4/25/06	Mile 70	0.474	1.11	80%	
Lead (µg/L)	4/10/02	Beaver Creek	<1	<1	0%	1
	4/10/02	Mile 6.5	<1	<1	0%	
	4/29/03	Soldotna Creek	<2.5	<2.5	0%	
	4/29/03	Mile 43	<2.5	<2.5	0%	
	4/27/04	Funny River	<0.052	<0.052	0%	
	4/27/04	Mile 6.5	<0.052	<0.052	0%	
	4/26/05	Russian River	<0.052	<0.052	0%	
	4/26/05	Mile 40	<0.052	<0.052	0%	
	4/25/06	Funny River	<0.030	<0.030	0%	
	4/25/06	Mile 70	<0.030	0.117	118%	
Zinc (µg/L)	4/10/02	Beaver Creek	41	39	5%	3
	4/10/02	Mile 6.5	57	57	0%	
	4/29/03	Soldotna Creek	<50	51	2%	
	4/29/03	Mile 43	<50	<50	0%	
	4/27/04	Funny River	27.4	11.2	70%	
	4/27/04	Mile 6.5	41.3	41.3	0%	
	4/26/05	Russian River	30.6	24.4	23%	
	4/26/05	Mile 40	25.8	23.4	10%	
	4/25/06	Funny River	20.5	36.2	55%	
	4/25/06	Mile 70	10.4	15	36%	

Metal	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Calcium (mg/L)	4/10/02	Beaver Creek	17.82	18.33	3%	0
	4/10/02	Mile 6.5	15.19	15.58	3%	
	4/29/03	Soldotna Creek	16	16	0%	
	4/29/03	Mile 43	9.4	9.6	2%	
	4/27/04	Funny River	6.28	6.25	0%	
	4/27/04	Mile 6.5	9.2	9.05	2%	
	4/26/05	Russian River	15.8	14.9	6%	
	4/26/05	Mile 40	10.8	10.4	4%	
	4/25/06	Funny River	9.07	9.6	6%	
	4/25/06	Mile 70	16.9	17	1%	
Iron (mg/L)	4/10/02	Beaver Creek	2.3	2.32	1%	2
	4/10/02	Mile 6.5	11.97	11.89	1%	
	4/29/03	Soldotna Creek	0.95	0.96	1%	
	4/29/03	Mile 43	0.43	0.42	2%	
	4/27/04	Funny River	1.96	1.89	4%	
	4/27/04	Mile 6.5	1.25	0.952	27%	
	4/26/05	Russian River	<0.0040	<0.0040	0%	
	4/26/05	Mile 40	0.763	0.755	1%	
	4/25/06	Funny River	7.21	9.48	27%	
	4/25/06	Mile 70	0.209	0.205	2%	
Magnesium (mg/L)	4/10/02	Beaver Creek	4.6	4.57	1%	2
	4/10/02	Mile 6.5	10.29	10.28	0%	
	4/29/03	Soldotna Creek	4.8	4.9	2%	
	4/29/03	Mile 43	0.98	0.98	0%	
	4/27/04	Funny River	2.46	2.46	0%	
	4/27/04	Mile 6.5	1.86	1.64	13%	
	4/26/05	Russian River	1.02	0.92	10%	
	4/26/05	Mile 40	1.18	1.24	5%	
	4/25/06	Funny River	3.86	4.47	15%	
	4/25/06	Mile 70	1.27	1.29	2%	

Nutrient (unit)	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Nitrate (mg/L)	4/10/02	Beaver Creek	<0.10	<0.10	0%	0
	4/10/02	Mile 6.5	<0.10	<0.10	0%	
	4/29/03	Soldotna Creek	<0.10	<0.10	0%	
	4/29/03	Mile 43	0.17	0.17	0%	
	4/27/04	Funny River	<0.015	<0.015	0%	
	4/27/04	Mile 6.5	<0.015	<0.015	0%	
	4/26/05	Russian River	1.11	1.19	7%	
	4/26/05	Mile 40	0.245	0.24	2%	
	4/25/06	Funny River	<0.015	<0.015	0%	
	4/25/06	Mile 70	0.409	0.378	8%	
Phosphorus (mg/L)	4/10/02	Beaver Creek	0.08	0.08	0%	2
	4/10/02	Mile 6.5	0.48	0.42	13%	
	4/29/03	Soldotna Creek	0.092	0.094	2%	
	4/29/03	Mile 43	<0.025	<0.025	0%	
	4/27/04	Funny River	0.11	0.103	7%	
	4/27/04	Mile 6.5	0.046	0.039	16%	
	4/26/05	Russian River	<0.025	<0.025	0%	
	4/26/05	Mile 40	<0.025	<0.025	0%	
	4/25/06	Funny River	0.12	0.11	9%	
	4/25/06	Mile 70	<0.026	<0.026	0%	

Hydrocarbon (unit)	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Diesel Range Organics (mg/L)	4/10/02	Beaver Creek	<0.26	<0.26	0%	0
	4/10/02	Mile 6.5	<0.27	<0.27	0%	
	4/29/03	Soldotna Creek	<0.43	<0.43	0%	
	4/29/03	Mile 43	<0.42	<0.42	0%	
	4/27/04	Funny River	<0.021	<0.021	0%	
	4/27/04	Mile 6.5	<0.021	<0.021	0%	
	4/26/05	Russian River	<0.0060	<0.0060	0%	
	4/26/05	Mile 40	<0.0060	<0.0060	0%	
Gasoline Range Organics (µg/L)	4/10/02	Beaver Creek	<25.0	<25.0	0%	0
	4/10/02	Mile 6.5	<25.0	<25.0	0%	
	4/29/03	Soldotna Creek	<25.0	<25.0	0%	
	4/29/03	Mile 43	<25.0	<25.0	0%	
	4/27/04	Funny River	<3.0	<3.0	0%	
	4/27/04	Mile 6.5	<3.0	<3.0	0%	
Residual Range Organics (mg/L)	4/10/02	Beaver Creek	<2.58	<2.58	0%	0
	4/10/02	Mile 6.5	<2.69	<2.69	0%	
	4/29/03	Soldotna Creek	<2.84	<2.84	0%	
	4/29/03	Mile 43	<2.81	<2.81	0%	
	4/27/04	Funny River	<0.32	<0.32	0%	
	4/27/04	Mile 6.5	<0.32	<0.32	0%	
	4/26/05	Russian River	<0.20	<0.20	0%	
	4/26/05	Mile 40	<0.20	<0.20	0%	
Benzene (µg/L)	4/10/02	Beaver Creek	<0.50	<0.50	0%	0
	4/10/02	Mile 6.5	<0.50	<0.50	0%	
	4/29/03	Soldotna Creek	<0.50	<0.50	0%	
	4/29/03	Mile 43	<0.50	<0.50	0%	
	4/27/04	Funny River	<0.15	<0.15	0%	
	4/27/04	Mile 6.5	<0.15	<0.15	0%	
	4/26/05	Russian River	<0.074	<0.074	0%	
	4/26/05	Mile 40	<0.074	<0.074	0%	

Hydrocarbon	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Ethylbenzene (µg/L)	4/10/02	Beaver Creek	<0.50	<0.50	0%	0
	4/10/02	Mile 6.5	<0.50	<0.50	0%	
	4/29/03	Soldotna Creek	<0.50	<0.50	0%	
	4/29/03	Mile 43	<0.50	<0.50	0%	
	4/27/04	Funny River	<0.18	<0.18	0%	
	4/27/04	Mile 6.5	<0.18	<0.18	0%	
	4/26/05	Russian River	<0.088	<0.088	0%	
	4/26/05	Mile 40	<0.088	<0.088	0%	
Toluene (µg/L)	4/10/02	Beaver Creek	<0.50	<0.50	0%	0
	4/10/02	Mile 6.5	<0.50	<0.50	0%	
	4/29/03	Soldotna Creek	<0.50	<0.50	0%	
	4/29/03	Mile 43	<0.50	<0.50	0%	
	4/27/04	Funny River	<0.24	<0.24	0%	
	4/27/04	Mile 6.5	<0.24	<0.24	0%	
	4/26/05	Russian River	<0.078	<0.078	0%	
	4/26/05	Mile 40	<0.078	<0.078	0%	
M,P-Xylene (µg/L)	4/10/02	Beaver Creek	<1.00	<1.00	0%	0
	4/10/02	Mile 6.5	<1.00	<1.00	0%	
	4/29/03	Soldotna Creek	<1.00	<1.00	0%	
	4/29/03	Mile 43	<1.00	<1.00	0%	
	4/26/05	Russian River	<0.20	<0.20	0%	
	4/26/05	Mile 40	<0.20	<0.20	0%	
O-Xylene (µg/L)	4/10/02	Beaver Creek	<0.50	<0.50	0%	0
	4/10/02	Mile 6.5	<0.50	<0.50	0%	
	4/29/03	Soldotna Creek	<0.50	<0.50	0%	
	4/29/03	Mile 43	<0.50	<0.50	0%	
	4/26/05	Russian River	<0.20	<0.20	0%	
	4/26/05	Mile 40	<0.20	<0.20	0%	
Total Xylene (µg/L)	4/27/04	Funny River	<0.63	<0.63	0%	0
	4/27/04	Mile 6.5	<0.63	<0.63	0%	

Additional Parameters	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Fecal Coliform Bacteria (CFU/100m)	4/10/02	Beaver Creek	0	0	0%	4
	4/10/02	Mile 6.5	64	40	46%	
	4/29/03	Soldotna Creek	0	0	0%	
	4/29/03	Mile 43	0	0	0%	
	4/27/04	Funny River	7	5	33%	
	4/27/04	Mile 6.5	19	4	130%	
	4/26/05	Russian River	<9.1	<9.1	0%	
	4/26/05	Mile 40	<9.1	<9.1	0%	
	4/25/06	Funny River	39	54	32%	
	4/25/06	Mile 70	0	0	0%	
pH	4/10/02	Beaver Creek	7.19	7.29	1%	0
	4/10/02	Mile 6.5	7.98	7.86	2%	
	4/29/03	Soldotna Creek	7.53	7.53	0%	
	4/29/03	Mile 43	7.46	7.46	0%	
	4/27/04	Funny River	6.64	6.75	2%	
	4/27/04	Mile 6.5	7.2	6.64	8%	
	4/26/05	Russian River	7.17	7.25	1%	
	4/26/05	Mile 40	7.26	7.11	2%	
	4/25/06	Funny River	7.16	7.22	1%	
	4/25/06	Mile 70	7.25	7.22	0%	
Specific Conductance (µS/cm)	4/10/02	Beaver Creek	11.59	11.02	5%	1
	4/10/02	Mile 6.5	12.53	12.44	1%	
	4/29/03	Soldotna Creek	139.5	139.5	0%	
	4/29/03	Mile 43	55.7	55.7	0%	
	4/27/04	Funny River	42.2	43.6	3%	
	4/27/04	Mile 6.5	52.8	60.4	13%	
	4/26/05	Russian River	88.6	88.2	0%	
	4/26/05	Mile 40	66.8	66.4	1%	
	4/25/06	Funny River	64	63.5	1%	
	4/25/06	Mile 70	96.2	96.6	0%	

Additional Parameters	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Total Suspended Solids (mg/L)	4/10/02	Beaver Creek	5.3	4.7	12%	5
	4/10/02	Mile 6.5	228.7	288	23%	
	4/29/03	Soldotna Creek	2	2	0%	
	4/29/03	Mile 43	0.7	0.7	0%	
	4/27/04	Funny River	43.3	38	13%	
	4/27/04	Mile 6.5	13.3	12.7	5%	
	4/26/05	Russian River	<0.47	<0.47	0%	
	4/26/05	Mile 40	17.4	10.5	49%	
	4/25/06	Funny River	205	190.5	7%	
	4/25/06	Mile 70	1.5	2.5	50%	
Turbidity (NTU)	4/10/02	Beaver Creek	14	14	0%	3
	4/10/02	Mile 6.5	270	270	0%	
	4/29/03	Soldotna Creek	2.5	2.5	0%	
	4/29/03	Mile 43	13	13	0%	
	4/27/04	Funny River	10.2	10.3	1%	
	4/27/04	Mile 6.5	9.35	12.6	30%	
	4/26/05	Russian River	0.53	0.37	36%	
	4/26/05	Mile 40	13.89	13.21	5%	
	4/25/06	Funny River	24	42.7	56%	
	4/25/06	Mile 70	7.03	7.13	1%	
Water Temperature (°C)	4/10/02	Beaver Creek	-0.17	-0.16	6%	1
	4/10/02	Mile 6.5	-0.14	-0.16	13%	
	4/29/03	Soldotna Creek	6.83	6.83	0%	
	4/29/03	Mile 43	5.03	5.03	0%	
	4/27/04	Funny River	1.8	1.8	0%	
	4/27/04	Mile 6.5	4.5	4.5	0%	
	4/26/05	Russian River	5.2	5.2	0%	
	4/26/05	Mile 40	7.6	7.6	0%	
	4/25/06	Funny River	-0.1	-0.1	0%	
	4/25/06	Mile 70	4.2	4.2	0%	

Appendix 6. Data Quality Analysis Tables for July

Metal	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Arsenic (µg/L)	7/16/02	Beaver Creek	3[37]	4[37]	29%	2
	7/16/02	Mile 6.5	<1	<1	0%	
	7/22/03	No Name Creek	<2.5	<2.5	0%	
	7/22/03	Mile 10.1	<2.5	<2.5	0%	
	7/20/04	Mile 6.5	<0.25	<0.25	0%	
	7/20/04	Mile 10.1	<0.25	<0.25	0%	
	7/26/05	Mile 31	<2.5	<2.5	0%	
	7/26/05	Mile 70	<2.5	<2.5	0%	
	7/25/06	Mile 1.5	2.56	1.61	46%	
	7/25/06	Mile 23	1.29	1.2	7%	
Cadmium (µg/L)	7/16/02	Beaver Creek	<2	<2	0%	1
	7/16/02	Mile 6.5	<2	<2	0%	
	7/22/03	No Name Creek	<2.5	<2.5	0%	
	7/22/03	Mile 10.1	<2.5	<2.5	0%	
	7/20/04	Mile 6.5	<0.18	<0.18	0%	
	7/20/04	Mile 10.1	<0.18	1.05	141%	
	7/26/05	Mile 31	<1.0	<1.0	0%	
	7/26/05	Mile 70	<1.0	<1.0	0%	
	7/25/06	Mile 1.5	<0.062	<0.062	0%	
	7/25/06	Mile 23	<0.062	<0.062	0%	
Chromium (µg/L)	7/16/02	Beaver Creek	1[37]	1[37]	0%	1
	7/16/02	Mile 6.5	<0.6	<0.6	0%	
	7/22/03	No Name Creek	<1	<1	0%	
	7/22/03	Mile 10.1	<1	<1	0%	
	7/20/04	Mile 6.5	<0.36	<0.36	0%	
	7/20/04	Mile 10.1	<0.36	<0.36	0%	
	7/26/05	Mile 31	<2.5	<2.5	0%	
	7/26/05	Mile 70	<2.5	<2.5	0%	
	7/25/06	Mile 1.5	1.78	1.71	4%	
	7/25/06	Mile 23	1.43	0.977	38%	

[37] Best Available Estimate

Metal (unit)	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Copper (µg/L)	7/16/02	Beaver Creek	<9	<9	0%	4
	7/16/02	Mile 6.5	<9	<9	0%	
	7/22/03	No Name Creek	<25	<25	0%	
	7/22/03	Mile 10.1	<25	<25	0%	
	7/20/04	Mile 6.5	<0.12	<0.12	0%	
	7/20/04	Mile 10.1	<0.12	1.37	168%	
	7/26/05	Mile 31	21.1	<2.5	158%	
	7/26/05	Mile 70	<2.5	<2.5	0%	
	7/25/06	Mile 1.5	3.75	1.19	104%	
	7/25/06	Mile 23	0.687	0.397	54%	
Lead (µg/L)	7/16/02	Beaver Creek	<2	<2	0%	3
	7/16/02	Mile 6.5	<2	<2	0%	
	7/22/03	No Name Creek	<2.5	<2.5	0%	
	7/22/03	Mile 10.1	<2.5	<2.5	0%	
	7/20/04	Mile 6.5	<0.052	<0.052	0%	
	7/20/04	Mile 10.1	<0.052	<0.052	0%	
	7/26/05	Mile 31	468	<1.0	199%	
	7/26/05	Mile 70	<1.0	<1.0	0%	
	7/25/06	Mile 1.5	0.279	1.71	144%	
	7/25/06	Mile 23	0.165	<0.084	65%	
Zinc (µg/L)	7/16/02	Beaver Creek	41	69	51%	7
	7/16/02	Mile 6.5	39	42	7%	
	7/22/03	No Name Creek	75	78	4%	
	7/22/03	Mile 10.1	51	<50	2%	
	7/20/04	Mile 6.5	39.9	78.3	65%	
	7/20/04	Mile 10.1	32	44.8	33%	
	7/26/05	Mile 31	51.2	<10	135%	
	7/26/05	Mile 70	19.1	<10	63%	
	7/25/06	Mile 1.5	0.94	0.561	50%	
	7/25/06	Mile 23	2.25	1.01	76%	

Metal (unit)	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Calcium (mg/L)	7/16/02	Beaver Creek	18.48	19.33	4%	2
	7/16/02	Mile 6.5	11.2	11.88	6%	
	7/22/03	No Name Creek	13	13	0%	
	7/22/03	Mile 10.1	9.6	9.6	0%	
	7/20/04	Mile 6.5	12.4	12.6	2%	
	7/20/04	Mile 10.1	10.5	10.7	2%	
	7/26/05	Mile 31	9.72	20.6	72%	
	7/26/05	Mile 70	12.5	12.4	1%	
	7/25/06	Mile 1.5	13.3	11.7	13%	
	7/25/06	Mile 23	9.84	10	2%	
Iron (mg/L)	7/16/02	Beaver Creek	1.87	1.89	1%	5
	7/16/02	Mile 6.5	8.42	8.02	5%	
	7/22/03	No Name Creek	3.3	3.6	9%	
	7/22/03	Mile 10.1	0.87	0.82	6%	
	7/20/04	Mile 6.5	9.27	6.57	34%	
	7/20/04	Mile 10.1	0.71	0.708	0%	
	7/26/05	Mile 31	0.419	<0.050	157%	
	7/26/05	Mile 70	0.113	0.0986	14%	
	7/25/06	Mile 1.5	5.95	8.68	37%	
	7/25/06	Mile 23	1.27	1.78	33%	
Magnesium (mg/L)	7/16/02	Beaver Creek	4.43	4.73	7%	5
	7/16/02	Mile 6.5	3.66	3.58	2%	
	7/22/03	No Name Creek	4.4	4.4	0%	
	7/22/03	Mile 10.1	1.1	1	10%	
	7/20/04	Mile 6.5	3.92	3.25	19%	
	7/20/04	Mile 10.1	1.03	1.04	1%	
	7/26/05	Mile 31	0.906	1.15	24%	
	7/26/05	Mile 70	0.99	0.941	5%	
	7/25/06	Mile 1.5	12.5	7.2	54%	
	7/25/06	Mile 23	1.2	1.39	15%	

Nutrient (unit)	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Nitrate (mg/L)	7/16/02	Beaver Creek	<0.10	<0.10	0%	5
	7/16/02	Mile 6.5	<0.10	0.14	33%	
	7/22/03	No Name Creek	<0.10	<0.10	0%	
	7/22/03	Mile 10.1	0.18	0.2	11%	
	7/20/04	Mile 6.5	0.102	<0.015	149%	
	7/20/04	Mile 10.1	0.143	0.168	16%	
	7/26/05	Mile 31	0.108	0.111	3%	
	7/26/05	Mile 70	0.196	0.205	4%	
	7/25/06	Mile 1.5	0.108	<0.015	151%	
	7/25/06	Mile 23	0.136	0.139	2%	
Phosphorus (mg/L)	7/16/02	Beaver Creek	0.09	0.07	25%	5
	7/16/02	Mile 6.5	0.3	0.38	24%	
	7/22/03	No Name Creek	0.04	0.04	0%	
	7/22/03	Mile 10.1	0.04	0.036	11%	
	7/20/04	Mile 6.5	0.267	0.148	57%	
	7/20/04	Mile 10.1	<0.0020	<0.0020	0%	
	7/26/05	Mile 31	<0.051	<0.051	0%	
	7/26/05	Mile 70	<0.051	<0.051	0%	
	7/25/06	Mile 1.5	0.32	0.18	56%	
	7/25/06	Mile 23	<0.026	<0.026	0%	

Hydrocarbon (unit)	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Diesel Range Organics (mg/L)	7/16/02	Beaver Creek	<0.27	<0.28	4%	1
	7/16/02	Mile 6.5	<0.26	<0.26	0%	
	7/22/03	No Name Creek	<0.39	<0.38	26%	
	7/22/03	Mile 10.1	<0.41	<0.41	0%	
	7/20/04	Mile 6.5	<0.021	<0.022	5%	
	7/20/04	Mile 10.1	<0.022	<0.022	0%	
	7/26/05	Mile 31	<0.10	<0.10	0%	
	7/26/05	Mile 70	<0.10	<0.10	0%	
	7/25/06	Mile 1.5	<0.0065	<0.0064	2%	
	7/25/06	Mile 23	<0.0064	<0.0064	0%	
Gasoline Range Organics (µg/L)	7/16/02	Beaver Creek	<25.0	<25.0	0%	0
	7/16/02	Mile 6.5	<25.0	<25.0	0%	
	7/22/03	No Name Creek	<25.0	<25.0	0%	
	7/22/03	Mile 10.1	<25.0	<25.0	0%	
	7/26/05	Mile 31	<100	<100	0%	
	7/26/05	Mile 70	<100	<100	0%	
Residual Range Organics (mg/L)	7/16/02	Beaver Creek	<0.27	<0.28	4%	0
	7/16/02	Mile 6.5	<0.26	<0.26	0%	
	7/22/03	No Name Creek	<0.39	<0.38	3%	
	7/22/03	Mile 10.1	<0.41	<0.41	0%	
	7/20/04	Mile 6.5	<0.021	<0.022	5%	
	7/20/04	Mile 10.1	<0.022	<0.022	0%	
	7/26/05	Mile 31	<0.10	<0.10	0%	
	7/26/05	Mile 70	<0.10	<0.10	0%	
	7/25/06	Mile 1.5	<0.0065	<0.0064	2%	
	7/25/06	Mile 23	<0.0064	<0.0064	0%	

Hydrocarbon (unit)	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Benzene (µg/L)	7/16/02	Beaver Creek	<0.50	<0.50	0%	2
	7/16/02	Mile 6.5	1.31	1.8	32%	
	7/22/03	No Name Creek	<0.50	<0.50	0%	
	7/22/03	Mile 10.1	1.15	1.14	1%	
	7/20/04	Mile 6.5	1.1	1.2	9%	
	7/20/04	Mile 10.1	<0.15	1.3	159%	
	7/26/05	Mile 31	<1.0	<1.0	0%	
	7/26/05	Mile 70	<1.0	<1.0	0%	
	7/25/06	Mile 1.5	<0.074	<0.074	0%	
	7/25/06	Mile 23	<0.074	<0.074	0%	
Toluene (µg/L)	7/16/02	Beaver Creek	0.47	0.63	29%	4
	7/16/02	Mile 6.5	3.75	3.37	11%	
	7/16/02	No Name Creek	<0.50	<0.50	0%	
	7/16/02	Mile 10.1	3.23	3.33	3%	
	7/20/04	Mile 6.5	3.2	3.2	0%	
	7/20/04	Mile 10.1	2.8	3.6	25%	
	7/26/05	Mile 31	<1.0	<1.0	0%	
	7/26/05	Mile 70	<1.0	<1.0	0%	
	7/25/06	Mile 1.5	<0.078	1.5	180%	
	7/25/06	Mile 23	<0.078	<0.078	0%	
Ethylbenzene (µg/L)	7/16/02	Beaver Creek	<0.50	<0.50	0%	1
	7/16/02	Mile 6.5	0.65	0.57	13%	
	7/22/03	No Name Creek	<0.50	<0.50	0%	
	7/22/03	Mile 10.1	0.5	0.52	4%	
	7/20/04	Mile 6.5	<0.18	<0.18	0%	
	7/20/04	Mile 10.1	<0.18	<0.18	0%	
	7/26/05	Mile 31	<1.0	<1.0	0%	
	7/26/05	Mile 70	<1.0	<1.0	0%	
	7/25/06	Mile 1.5	<0.088	<0.088	0%	
	7/25/06	Mile 23	<0.088	<0.088	0%	

Hydrocarbon (unit)	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
M,P-Xylene (µg/L)	7/16/02	Beaver Creek	<1.00	<1.00	0%	2
	7/16/02	Mile 6.5	2.41	2	19%	
	7/22/03	No Name Creek	<1.00	<1.00	0%	
	7/22/03	Mile 10.1	1.8	1.94	7%	
	7/20/04	Mile 6.5	2	2	0%	
	7/20/04	Mile 10.1	<0.41	2.3	139%	
	7/26/05	Mile 31	<1.00	<1.00	0%	
	7/26/05	Mile 70	<1.00	<1.00	0%	
	7/25/06	Mile 1.5	<0.20	<0.20	0%	
	7/25/06	Mile 23	<0.20	<0.20	0%	
O-Xylene (µg/L)	7/16/02	t10	<0.50	<0.50	0%	1
	7/16/02	RM6.5	1	0.83	19%	
	7/22/03	t0	<0.50	<0.50	0%	
	7/22/03	RM10.1	0.79	0.84	6%	
	7/20/04	RM6.5	<0.20	<0.20	0%	
	7/20/04	RM10.1	<0.20	<0.20	0%	
	7/26/05	RM31	<1.0	<1.0	0%	
	7/26/05	RM70	<1.0	<1.0	0%	
	7/25/06	RM1.5	<0.20	<0.20	0%	
	7/25/06	RM23	<0.20	<0.20	0%	

Additional Parameters	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Fecal Coliform Bacteria (CFU/100m)	7/16/02	Beaver Creek	30	<10	100%	7
	7/16/02	Mile 6.5	2980	<10	199%	
	7/22/03	No Name Creek	80	100	22%	
	7/22/03	Mile 10.1	20	20	0%	
	7/20/04	Mile 6.5	200	680	109%	
	7/20/04	Mile 10.1	18	27	40%	
	7/26/05	Mile 31	33	24	32%	
	7/26/05	Mile 70	12	12	0%	
	7/25/06	Mile 1.5	67	160	82%	
	7/25/06	Mile 23	190	200	5%	
pH	7/16/02	Beaver Creek	7.54	7.48	1%	0
	7/16/02	Mile 6.5	7.67	7.51	2%	
	7/22/03	No Name Creek	7.3	7.3	0%	
	7/22/03	Mile 10.1	7.3	7.3	0%	
	7/20/04	Mile 6.5	7.5	7.47	0%	
	7/20/04	Mile 10.1	7.42	7.33	1%	
	7/26/05	Mile 31	7.58	7.6	0%	
	7/26/05	Mile 70	7.66	7.56	1%	
	7/25/06	Mile 1.5	7.57	7.5	1%	
	7/25/06	Mile 23	7.6	7.56	0%	
Specific Conductance (µS/cm)	7/16/02	Beaver Creek	144.6	144.8	0%	2
	7/16/02	Mile 6.5	65.8	64.5	2%	
	7/22/03	No Name Creek	157	161	3%	
	7/22/03	Mile 10.1	62.8	61.9	1%	
	7/20/04	Mile 6.5	71.5	82.6	14%	
	7/20/04	Mile 10.1	63	61.6	2%	
	7/26/05	Mile 31	65.4	66.2	1%	
	7/26/05	Mile 70	81.2	80.4	1%	
	7/25/06	Mile 1.5	156.1	249	46%	
	7/25/06	Mile 23	63.3	62.3	2%	

Additional Parameters	Sample Date	Location	Normal Sample Value	Duplicate Sample Value	Relative Percentage Difference	Number of Duplicate Samples That Have Relative Percentage Differences Greater Than 10 Percent
Total Suspended Solids (mg/L)	7/16/02	Beaver Creek	2	2	0%	7
	7/16/02	Mile 6.5	232	179.3	26%	
	7/22/03	No Name Creek	0.7	4.7	148%	
	7/22/03	Mile 10.1	11.3	12	6%	
	7/20/04	Mile 6.5	231	138	50%	
	7/20/04	Mile 10.1	11.7	9.02	26%	
	7/26/05	Mile 31	16.7	16.6	1%	
	7/26/05	Mile 70	1.13	<0.95	17%	
	7/25/06	Mile 1.5	33	253	154%	
	7/25/06	Mile 23	17	28	49%	
Turbidity (NTU)	7/16/02	Beaver Creek	10	10	0%	4
	7/16/02	Mile 6.5	110	110	0%	
	7/22/03	No Name Creek	16	18	12%	
	7/22/03	Mile 10.1	14	16	13%	
	7/20/04	Mile 6.5	148.6	110.2	30%	
	7/20/04	Mile 10.1	11	10.8	2%	
	7/26/05	Mile 31	10.41	10.23	2%	
	7/26/05	Mile 70	4.46	4.48	0%	
	7/25/06	Mile 1.5	92.4	146.6	45%	
	7/25/06	Mile 23	14.2	14.3	1%	
Water Temperature (°C)	7/16/02	Beaver Creek	13.03	13.19	1%	0
	7/16/02	Mile 6.5	13.18	13.05	1%	
	7/22/03	No Name Creek	15	15	0%	
	7/22/03	Mile 10.1	13.5	13.5	0%	
	7/20/04	Mile 6.5	16.6	16.4	1%	
	7/20/04	Mile 10.1	14.1	14.1	0%	
	7/26/05	Mile 31	14	14	0%	
	7/26/05	Mile 70	13.8	13.8	0%	
	7/25/06	Mile 1.5	12	12	0%	
	7/25/06	Mile 23	11.4	11.4	0%	