

**FORT RESOLUTION FISH MONITORING PROGRAM
(1992-1993)**

**Concentrations of Metals and Trace Elements in Muscle and
Liver of Fish Collected from Great Slave Lake, Fort
Resolution Area, NWT.**

Final Report

Prepared for:
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November 1997

ABSTRACT

During community consultations in 1992 and 1993, the citizens of Fort Resolution expressed their concerns about the quality of the fish from Great Slave Lake in the Resolution Bay and the old Pine Point pumphouse areas. To address their concern, the Water Resources Division of the Department of Indian Affairs and Northern Development (DIAND) with the cooperation of the Department of Fisheries and Oceans (DFO), designed a program to evaluate the levels of heavy metals in fish from the area.

Thirty-five fish were collected in 1992, near the community of Fort Resolution. During the fall of 1993, forty-eight fish were captured in the vicinity of Dawson Landing and Pine Point, with the help of local fisherman. All samples were analyzed for 28 elements including arsenic, cadmium, copper, lead, mercury, nickel and zinc.

Fish from these areas were found to be robust, with very low concentrations of metals that are typical of levels found in fish from unexploited lakes of the southwest portion of the Northwest Territories.

ACKNOWLEDGMENTS

The Department of Indian and Northern Affairs would like to acknowledge the efforts of the following people in the completion of this study: Juanetta Sanderson for the design, Wayne Starling for the implementation; fishermen Louis Lafferty, Gabriel Lafferty, Burt Buckley, and Fisheries and Oceans staff for catching and processing the fish samples; Mario Paris for ageing the fish; and Brian Latham, Steve Moore, Anne Wilson, Glen Stephens, Wayne Puznicki and Julie Chouinard who spent time to review the first versions of this report.

This study was funded by Action on Water Program of the Arctic Environmental Strategy

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1.0 INTRODUCTION

Lead and zinc deposits were exploited between 1964 and 1988 at the Pine Point mine site, which is located approximately 55 km southwest from Fort Resolution and approximately eight kilometers south of Great Slave Lake. The terrain between the lake and the mine site is poorly drained, low lying swamps and muskegs (Figure 2; Starling, pers. comm., 1997).

Fish are a traditional source of food for the residents of the communities established along the shores of Great Slave Lake, and in 1992, during a community consultation in Fort Resolution, people expressed concerns about the quality of the fish in the Fort Resolution Harbour. The people felt that the flesh of fish in this area may be contaminated from mining developments discharging wastes which potentially flow into Great Slave Lake (Starling, 1992).

To address this concern, the Water Resources Division of the Department of Indian Affairs and Northern Development (DIAND) with the cooperation of the Department of Fisheries and Oceans (DFO) designed a study to evaluate the concentration of metals and other trace elements in fish from Resolution Bay. Muscle of walleye (*Stizostedion vitreum vitreum*), northern pike (*Esox lucius*), lake whitefish (*Coregonus clupeaformis*), burbot (*Lota lota*) and longnose sucker (*Catostomus catostomus*), as well as burbot livers, were collected during the fall of 1992. These species were chosen for the study as they are consumed by the residents of Fort Resolution. Burbot livers were of particular concern, as metals tend to concentrate in larger quantities in hepatic tissues.

Further consultation a year later clarified that the residents of Fort Resolution were not only concerned with those fish close to their community. They wished to know the present status of the fish from Great Slave Lake at sites adjacent to Dawson Landing and the old Pine Point water intake pumphouse area. They were concerned about the potential impact of the tailings effluents from the abandoned lead-zinc mine at Pine Point on the fish resources in this area of the lake. The best time and locations to collect fish were discussed with local people and the program was modified to include fish from traditional fishing sites in this area.

This report presents the results of analyses performed on the 35 fish collected in 1992, near the community of Fort Resolution, and the 48 fish captured during the fall of 1993, in the vicinity of Dawson Landing and the old Pine Point water intake pumphouse. The characteristics of the fish captured and the concentrations of the metals of major concern i.e. arsenic, cadmium, copper, lead, mercury, nickel, and zinc are discussed. These results are compared to levels measured in the same species from various locations in the southwest portion of the Northwest Territories. The comparative data available include: historical levels from Great Slave Lake, Fort Resolution area (Stein & Miller, 1972); concentrations measured recently in fish from the Slave River, which empties into Great Slave Lake; and from Leland Lake which is located east of the Slave River. Results from Yellowknife Bay of Great Slave Lake and Trout Lake are also presented.

2.0 STUDY AREA

Fort Resolution, a small settlement of about 515 people, is located along the south shore of Great Slave Lake in the southwestern part of the Northwest Territories, approximately 120 km east of Hay River (Figure 1). The fish collected for the present study are from Great Slave Lake, more specifically from Resolution Bay near the settlement (Site 1), the Dawson Landing area (Site 2), and the old Pine Point water intake pumphouse area (Site 3; Figure 2). To simplify the text, the fish from these three locations will be referred to as being from the Fort Resolution area.

Great Slave Lake is part of the Mackenzie River drainage basin, which flows over 4200 km from its headwaters at the B.C.- Alberta border to the Arctic Ocean and drains almost 1,800,000 km² of land (Environment Canada, 1976; Figure 1). Great Slave Lake extends for almost 100 km directly north of Fort Resolution, where the shoreline meets the Canadian Shield. To the south, the lake is bordered by muskeg terrain of low gradient. Fort Resolution is part of the Great Slave Plain, formed of Paleozoic strata (Allison & Neilsen, 1981; Environment Canada, 1976), which has a low sensitivity to erosion (Dirschl, 1975).

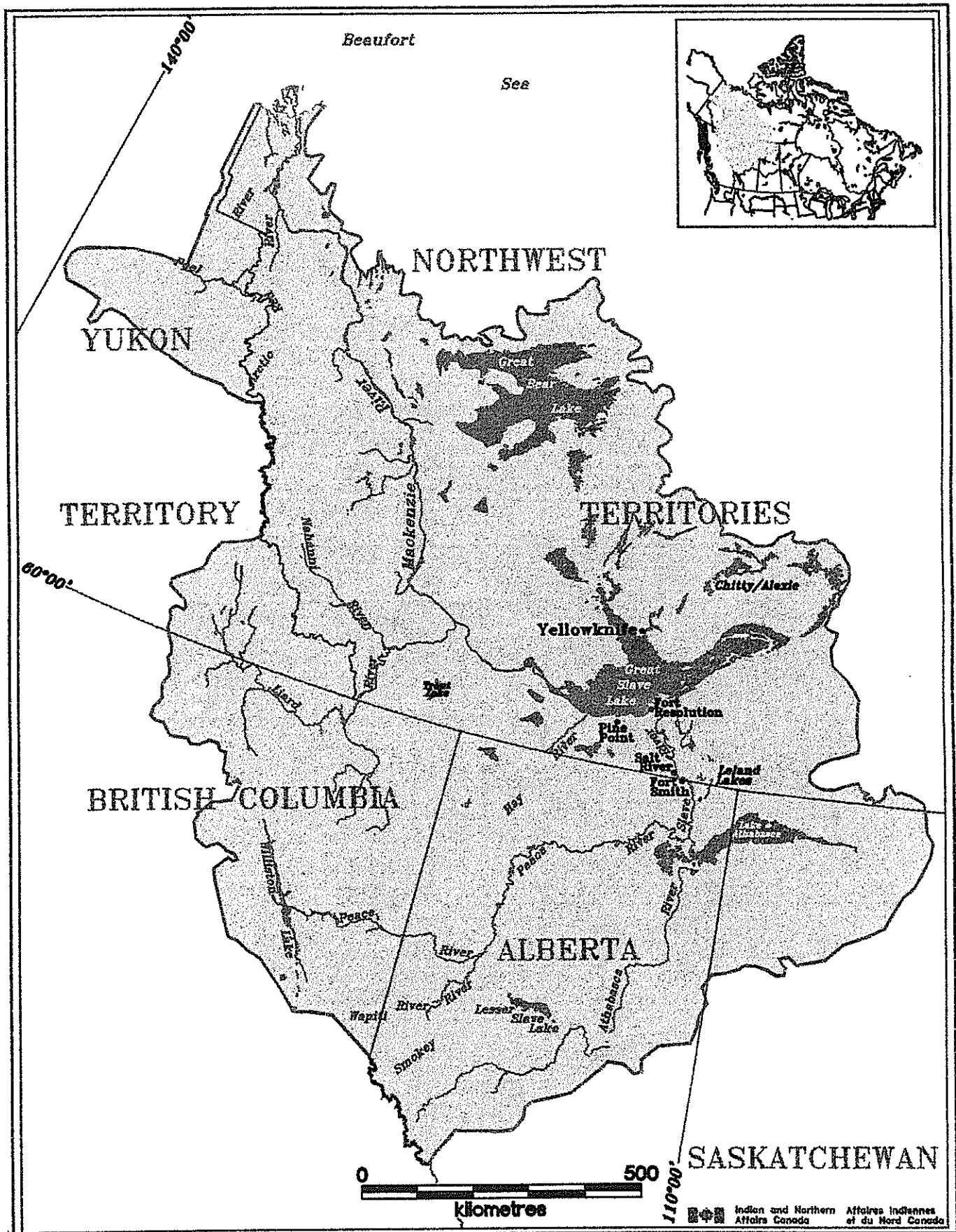


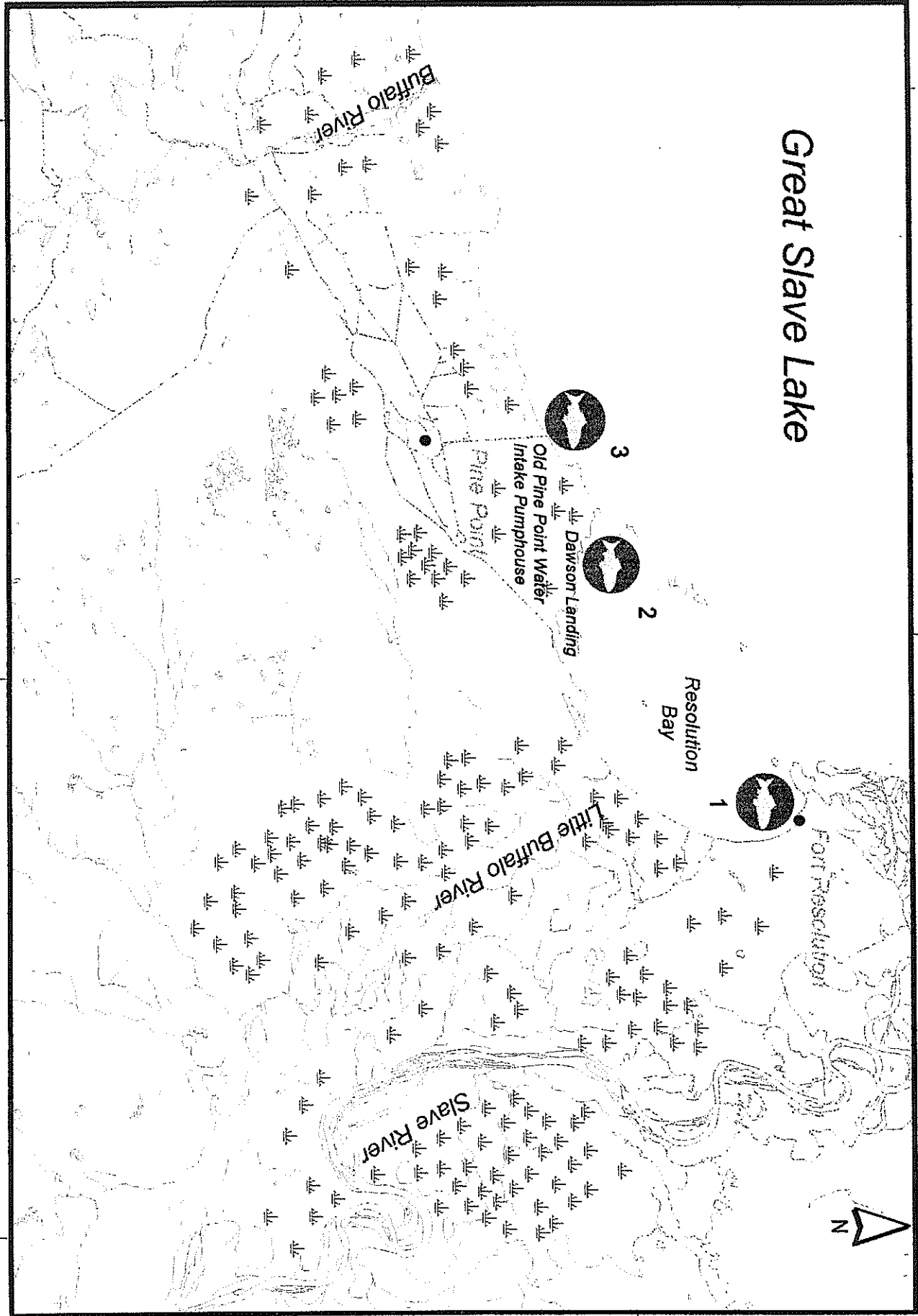
Figure 1. Mackenzie River Basin and Study Area.

115°

114°

113°

Great Slave Lake



61°

61°

115°

114°

113°

Figure 2. Fort Resolution Fish Monitoring Program Sample Sites.



3.0 STUDY BACKGROUND

3.1 PINE POINT MINE

An overview of the decommissioned Pine Point Mine (Figure 2) can be found in Evans *et al.* (1997). Briefly, the mine, located approximately 55 km from Fort Resolution, began its activities in 1964 and in 1988 the concentrator shut down (Cominco Ltd., 1992). Abandonment and restoration of the property was completed in the early 1990s.

The mine exploited the lead-zinc deposits in the area using open pit mining methods. The ore was transported to the mill to be processed to extract lead and zinc concentrates. The process involved the addition of calcium hydroxide (lime), sodium cyanide, sodium sulphite, copper sulphate and sodium isopropyl xanthate. Process waters were recycled in the mill and tailings were pumped via a "T-shaped" trestle into a diked area, immediately north of the mill site. Decanted effluents were released in a controlled manner through one of two concrete spillway structures into the muskeg area, a minimum of eight kilometers from the waters of Great Slave Lake (Evans *et al.*, 1997).

Since the 1970's water samples were collected from the receiving environment during the spring and fall from a network of stations between the tailings containment area and Great Slave Lake. The sampling sites, 15 in all, were part of the Surveillance Network Program established by the Water Licence, and sample collection was performed prior to and following the periods of effluent release from the tailings pond (Starling, pers.comm, 1997). Concentrations of lead, zinc, copper and suspended solids were regulated. DIAND reviewed the licencing files from 1985 to 1995. The water quality parameters regulated by the licence, with the exception of zinc, were well below the effluent quality requirements established under the licence.

Concentrations of zinc in the spring samples between 1989 and 1992 suggested progressive reduction in the concentration of zinc over time (Cominco Ltd., 1992). Still in 1992, when Cominco Ltd. applied for their water licence renewal, it was the only water characteristic which made the

tailings decant unsuitable for release without treatment. The release of effluents is still monitored at the outlet of the tailings pond and at the Great Slave Lake shoreline, among other locations. Since 1992, zinc levels never exceeded the concentration of 1.00 mg/L for any grab sample stipulated in the licence (Starling, pers.comm., 1997).

Recently, Evans *et al.* (1997) conducted a study which included water, sediment and fish samples collected from Great Slave Lake between the old Pine Point pumphouse area and the Slave River. Their study concluded that there is presently no evidence, with regards to these media, of enriched concentrations of metals offshore of the decommissioned Pine Point Mine site. Metal concentrations in sediments were at background levels, with occasional higher concentrations which were related to the mineralogy of the sediment. The concentrations of metals in fish from Resolution Bay were similar to those in the Slave and Little Buffalo Rivers and to the levels found in the early 1970s by Stein and Miller (1972). Based on the results of the water samples, the Slave and Little Buffalo Rivers appeared, however, to be enriched sources of metals.

There is therefore, no evidence that the decommissioned Pine Point Mine is adversely impacting Great Slave Lake and the surrounding area (Evans *et al.*, 1997).

3.2 COMPARATIVE SITES

3.2.1 Control sites and other locations used for comparison.

Results from this study are compared to the data collected during the Slave River Environmental Quality Monitoring Program (Sanderson *et al.* 1997), as comparative data are available for all the elements analyzed in this study. Samples from the SREQMP were collected by the same staff and analyzed by the same laboratory as for the present study.

The levels of metals present in the fish collected from Leland Lake and Alexie Lake were assumed to be representative of normal levels in the southwest portion of the Northwest Territories, as these water bodies are not influenced by anthropogenic activities. The Slave River drains into Great Slave Lake near Fort Resolution so fish from the two water bodies may mix with those from Great Slave

Lake. In this report, levels of metals in fish from Fort Resolution which are comparable to the concentrations found in fish from Leland and Alexie Lakes are considered background levels. Although the fish from the Slave River had slightly higher concentrations of metals than those from these control lakes, the differences were suspected to be due to the geology (Grey *et al.*, 1995).

Leland Lake can be regarded as the best control site for this study as it is part of the Mackenzie River drainage basin, it lies in the same geological region as Fort Resolution, and its fish populations are spatially separate (Grey *et al.*, 1995) from those collected for this study (Figure 1). Therefore the results are presented for comparison of the ranges of concentrations that may be present in fish from the area. Alexie Lake, which serves as a control for burbot since burbot were not caught in Leland Lake, is located north of Yellowknife (Figure 1).

Historical data from the study of Stein and Miller (1972) are also presented. Fish for this study were collected in Great Slave Lake between the Buffalo River and the Little Buffalo River (Figure 2).

Data from other locations in the Northwest Territories are also presented. Trout Lake (Figure 1), as with Leland Lake and Alexie Lake, is not affected by any industrial activities and the populations of fish are separated from those of Great Slave Lake by distance as well as physical barriers (Swyripa *et al.* 1993).

The data from the Yellowknife-Back Bay study (Jackson *et al.*, 1996) represent levels in an area impacted by mining development. The impacts of the gold mining exploitation on the Great Slave Lake north shore environment have recently been studied (Jackson *et al.* 1996). Arsenic and mercury are two major pollutants that have been released from the liquid and gaseous output of the gold mines in the last sixty years. Metals presently monitored by the mine include arsenic, copper, lead, nickel and zinc.

Moore *et al.* (1978) and Jackson *et al.* (1996) investigated the water, sediment, benthic fauna and fish of the Yellowknife-Back Bay area. Their studies tend to show that the area impacted by the

mine effluent is restricted to the Yellowknife-Back Bay area. It seems therefore unlikely that the fish from Fort Resolution area would be impacted by the mine effluents entering Great Slave Lake on the north shore. Movement of the metals released from the mine effluents across Great Slave Lake has not been shown.

3.2.2 Limitation to the comparisons.

The fishing equipment and the sampling time of the fish are factors that influence the size, range of ages and maturity of fish collected, while the detection limit and concentration of a substance in a tissue may vary slightly between analytical laboratories. Since these factors were not consistent for each of the studies statistical comparisons of the data were not attempted and instead the ranges of values are presented.

All the fish from the Slave River, Leland Lake, Yellowknife-Back Bay and Trout Lake, with the exception of burbot from the first three locations, were collected with 89 mm and 114 mm stretched mesh gillnets during the open water season (June to September). Burbot from Alexie Lake, Slave River and Yellowknife-Back Bay were caught during the winter with set lines. Most of the fish from Fort Resolution were captured with 140 mm stretched mesh gillnets during the fall. Therefore, the maturity of the fish from this study may differ from that of the fish from other locations, with selectivity towards a range of larger and older fish.

Samples from this study, the Slave River, Alexie Lake and Leland Lake were analyzed for metals at Cantest Ltd., while samples from Yellowknife-Back Bay and Trout Lake were analyzed at the Freshwater Institute in Winnipeg. Inter-laboratory variation is therefore possible.

Historical data from the study of Stein and Miller (1972) are presented in the text. However, due to the lack of information about the sampling methods, the biological characteristics of the fish and the analytical methods, it is difficult to comment accurately on the variation of concentrations observed and therefore concentrations are mentioned for comparative purposes only.

4.0 MATERIALS AND METHODS

4.1 FISH COLLECTION

Fish samples were obtained for this study with the assistance of local fishermen, who were hired to locate the traditional fishing sites and collect the fish. The 1992 fish were caught in Resolution Bay, approximately two kilometers southwest of the community, on October 6th. In 1993, a portion of the fish was captured at Dawson Landing (60°59.855'N, 114° 10.818'W), but most fish were collected from an area close to the old Pine Point water intake pumphouse (60°58.112'N, 114° 23.592'W) on September 20th and 21st. Sampling sites are identified on Figure 2.

Although a few fish were caught with 89mm (3.5 in.) and 114mm (4.5 in.) stretched mesh gillnets, most fish were obtained from 140mm (5.5in.) gillnets, which is the commercial fishing mesh size on Great Slave Lake. This mesh size allowed for the capture of larger and older fish than those usually captured by subsistence fisherman, who likely use gillnets of smaller mesh sizes. Therefore the fish collected for this study could be likely to have accumulated higher quantities of any heavy metals present and bioavailable in the area.

Live fish were collected from the net, put into fish tubs and transported to land, where they were transferred to coolers.

4.2 FISH PROCESSING

The fish were trucked in coolers to the DFO laboratory in Hay River for processing. Fork length was measured to the nearest millimeter (total length for burbot), and round weight was taken to the nearest gram using an electronic scale. Ageing structures were removed as follows: lake whitefish - scales and otoliths in 1992, otoliths in 1993; northern pike - cleithrum; walleye - operculum bone; burbot - otoliths; longnose sucker - fin rays. Fish were aged using the methods summarized in Appendix 1. A visual assessment of sex and reproductive maturity was made for each fish. Appendix 2 details the maturity codes.

Two muscle samples of 100g each were removed from the right side of the fish using a filleting knife. Burbot livers and fish muscle samples were individually placed in sterile, contaminant free bags and frozen on dry ice. In 1992, one muscle sample from each fish was shipped frozen to Cantest Ltd. for metals analysis, while the other samples were sent to the Freshwater Institute in Winnipeg for toxaphene analysis as part of a separate study. The results for lake whitefish muscles and burbot livers are presented in Muir *et al.*, 1996. In 1993, the other 100g samples were archived in the DFO freezer at -37°C for subsequent analysis if necessary. The remainder of each fish was not retained.

4.3 ANALYSIS OF SAMPLES FOR HEAVY METALS

Dorsal muscle and burbot liver samples were digested and analyzed for metals by Cantest Ltd. in Vancouver using the analytical method described in Appendix 3 (Cantest, 1993). The percent moisture was determined by drying an aliquot of tissue at 105°C (Appendix 3).

4.4 DATA ANALYSIS

The data were compiled on an IBM compatible microcomputer using Lotus 1-2-3, Version 5. Results of the heavy metal analyses were converted from dry weight concentrations to wet weight concentrations using the following formula:

$$\text{Wet Weight concentration } (\mu\text{g/g}) = \text{Dry weight concentration } (\mu\text{g/g}) \times (1 - (\% \text{ moisture}/100))$$

All the dry weight results and QAQC data, are presented in Appendix 4. The percentages of variation between the lab results and the certified values for the reference materials tested ranged between 0.02 and 51%.

The wet weight data are separated by species in Appendices 5 to 10. The detection limits for the various elements are presented in Table 1. These limits have also been converted to wet weight of tissue, based on an average percent moisture of 80% for muscle and 50% for liver and are therefore consistent with the data set.

Basic statistics were computed with Lotus 1-2-3 Version 5. Maximum, minimum, mean, standard deviation, number of samples and number of samples below detection were determined for each parameter (Appendices 5 through 10). For those cases where at least one value was above detection, means were calculated using half the detection limit. This method is similar to that used for comparative data presented in this report. Calculation of the means reported in Appendices 5 through 10, and Table 4 is further explained in Appendix 11.

The assessment of the overall condition of each fish was determined using Fulton's condition factor (K), which was calculated as:

$$K = (W \times 10^5) / L^3$$

where W is the round weight in grams and L is the fork length (total length for burbot) in millimeters.

Table 1 : Detection limits ($\mu\text{g/g}$) for the metals analyses performed on fish muscle and liver samples from Great Slave Lake, Fort Resolution Area, 1992 and 1993.

Metal		Dry weight	Wet weight	
			Muscle	Liver
Aluminum	Al	5	1	2.5
Antimony	Sb	5	1	2.5
Arsenic	As	0.05	0.01	0.03
Barium	Ba	0.05	0.01	0.03
Beryllium	Be	0.1	0.02	0.05
Bismuth	Bi	15	3	7.5
Boron	B	0.5	0.1	0.25
Cadmium	Cd	0.05	0.01	0.03
Calcium	Ca	0.5	0.1	0.25
Chromium	Cr	1.5	0.3	0.75
Cobalt	Co	0.5	0.1	0.25
Copper	Cu	0.05	0.01	0.03
Iron	Fe	1	0.2	0.5
Lead	Pb	0.05	0.01	0.03
Magnesium	Mg	0.05	0.01	0.03
Manganese	Mn	0.1	0.02	0.05
Mercury	Hg	0.005	0.001	0.003
Molybdenum	Mo	1	0.2	0.5
Nickel	Ni	0.25	0.05	0.13
Phosphorus	P	10	2	5
Potassium	K	0.5	0.1	0.25
Silver	Ag	1	0.2	0.5
Sodium	Na	0.5	0.1	0.25
Strontium	Sr	0.05	0.01	0.03
Tin	Sn	1	0.2	0.5
Titanium	Ti	0.15	0.03	0.08
Vanadium	V	0.5	0.1	0.25
Zinc	Zn	0.05	0.01	0.03

5.0 RESULTS and DISCUSSION

5.1 BIOLOGICAL EVALUATION

Table 2 summarizes the biological descriptors and the condition factors for the five fish species caught in Great Slave Lake during the fall of 1992 and 1993 for this study. Comparative data for the same species from other locations in the southwest portion of the Northwest Territories are presented in Table 3.

Fish from the Fort Resolution area, although of similar mean age as the fish from other locations, are somewhat larger and heavier than the ones presented in Table 3. The difference in mesh size likely explains the selectivity of larger fish; gillnets of 140 mm were used for the collection of fish in the present study while fish from other areas were caught with 89 and 114 mm mesh gillnets. This selectivity is also reflected in the range of ages. Younger fish, between 3 to 10 years old depending on the species, were not captured in this study.

Fulton's condition factor allows a comparison with fish from other locations. Factors that influence the interpretation of the K values include variables that influence the weight and length of a fish, such as its stage of maturity, its age and the growth rate of its species. As the comparative fish were not necessarily at the same stage of maturity and the nets used were of different selectivity, it is preferable to compare the ranges of K factors between sites. Table 2 shows that the K values for the fish from Fort Resolution usually lie on the higher end of the ranges presented in Table 3: the fish for this study are therefore robust.

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Table 2 Biological descriptors by species of fish from Great Slave Lake, Fort Resolution area, 1992 and 1993.

Species	N	Age		Length		Weight		KFactor					
		Mean	SD	Range	Mean	SD	Range	Mean	SD	Range			
Lake whitefish *	20	13	2	9-18	432	33	365-497	1356	416	625-2422	1.64	0.21	1.24-2.08
Lake whitefish **	30	13	2	9-18	441	35	365-522	1499	487	625-2487	1.70	0.24	1.24-2.42
Northern pike	20	9	2	6-13	666	91	479-835	2502	946	839-4445	0.81	0.04	0.73-0.88
Burbot	21	13	2	11-18	687	52	620-841	2252	539	1585-3708	0.69	0.06	0.59-0.80
Walleye	9	11	4	8-20	471	36	432-539	1396	275	1061-1863	1.33	0.10	1.12-1.47
Longnose sucker	13	13	3	10-20	474	29	427-534	1511	275	1128-2142	1.41	0.09	1.20-1.41

* Fish tested for metals.

**Fish tested for metals plus additional fish collected during the course of the study.

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Table 3 Comparative Biological Descriptors for fish collected in various locations in the southwest portion of the Northwest Territories.

Species	N	Age (years)			Length (mm)			Weight (g)			KFactor			
		Mean	SD	Range	Mean	SD	Range	Mean	SD	Mean	SD	Range		
Lake whitefish	Slave River	183	10	2	5-15	381	22	337-472	803	165	502-1420	1.44	0.12	1.05-1.93
	Leland Lake	79	14	6	6-30	439	28	343-530	1202	211	500-1685	1.41	0.14	0.77-1.88
	Alexie Lake	13	10	6	5-26	360	77	235-490	769	467	200-1700	1.46	0.11	1.20-1.61
	Yellowknife Bay	195	11	-	5-23	401	52	294-882	885	254	319-1565	1.37	-	0.7-3.33
Trout Lake	7	8	3	6-13	340	66	250-435	574	351	205-1205	1.31	0.10	1.06-1.46	
Northern pike	Slave River	126	8	3	3-17	608	80	443-1019	1764	999	435-9460	0.73	0.09	0.41-0.94
	Leland Lake	68	9	2	5-16	596	79	404-770	1551	727	759-4109	0.70	0.10	0.48-1.24
	Yellowknife Bay	83	8	-	3-19	601	80	472-875	1693	724	491-4107	0.75	-	0.33-0.9
	Trout Lake	1	6	-	-	629	9	622-635	2075	248	1900-2250	0.83	0.10	0.79-0.88
Burrbot	Slave River	146	10	4	4-20	580	95	406-900	1469	906	414-5866	0.69	0.08	0.50-0.99
	Alexie Lake	89	8	2	3-16	504	68	320-690	1084	447	224-2313	0.80	0.09	0.63-1.07
	Yellowknife Bay	68	13	-	3-27	587	74	360-765	1401	516	308-2923	0.67	-	0.38-0.84
Walleye	Slave River	198	9	3	4-20	429	39	355-558	931	302	500-2310	1.14	0.10	0.89-1.48
	Leland Lake	96	13	5	5-25	472	48	366-568	1240	365	556-1995	1.15	0.11	0.91-1.85
	Yellowknife Bay	30	10	-	7-15	406	34	346-476	806	243	388-1398	1.18	-	0.52-1.33
	Trout Lake	20	9	1	7-12	474	67	355-375	1203	439	535-2030	1.1	0.2	0.47-1.31
Longnose sucker	Yellowknife Bay	29	10	-	5-15	401	38	348-493	914	233	609-1510	1.40	-	1.05-1.67
	Trout Lake	16	16	4	7-22	472	17	437-495	1529	198	1200-1987	1.45	0.10	1.30-1.64

* The numbers in this column are different than the "N" for age because not all the fish were aged. These numbers are for length, weight and K factors.

Slave River, Leland Lake and Alexie Lake data: Sanderson et al. 1997

Trout Lake data: Swirypa et al. 1993

Yellowknife Bay data: Jackson et al. 1996

5.2 HEAVY METAL EVALUATION

The concentration of heavy metals in fish is a major concern, especially in those eaten by people. Heavy metals may bioconcentrate in fish, thereby posing an increased health risk to humans which consume them. High concentrations of heavy metals can also lead to various health problems in the fish themselves. Toxemia may develop in the fish which can lead to direct mortality, biological accumulation, chronic toxicity or changes in physiological functions (Post, 1987). Reproduction, respiration and locomotion may also be affected by exposure (Kelly, 1988).

Table 4 summarizes the concentrations of arsenic, cadmium, copper, lead, mercury, nickel and zinc measured in the tissues of lake whitefish, northern pike, walleye, burbot and longnose sucker collected near Fort Resolution during 1992 and 1993. Although other elements will be discussed, these metals are handled below in detail because:

- 1) these elements are contained in mining effluents or were used for the processing of the ore, as mentioned in Section 3.0;
- 2) residents of Fort Resolution felt that the flesh of fish from Great Slave Lake may be contaminated from mining discharges;
- 3) they are usually of particular interest, e.g. cadmium which is an impurity in the lead-zinc ore.

The dataset for this study were submitted to Health Canada for assessment. As the levels were not found to pose a health hazard to consumers, no restrictions were given for the consumption of these fish.

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Table 4 Heavy metal concentration (µg/g wet weight) in muscle (1992 and 1993) and liver (1992) of fish from Great Slave Lake, Fort Resolution area.

Species	Metals (Detection limits µg/g)													
	Arsenic (0.01)	Cadmium (0.01)	Copper (0.01)	Lead (0.01)	Mercury (0.001)	Nickel (0.05)	Zinc (0.01)	Arsenic (0.03)	Cadmium (0.03)	Copper (0.03)	Lead (0.03)	Mercury (0.003)	Nickel (0.13)	Zinc (0.03)
Lake whitefish	Mean	<0.01	0.32	0.01	0.047	<0.05	2.78							
	SD	0.01	0.11	0.02	0.068	-	0.30							
	Range	<0.01-0.04	0.12-0.57	<0.01-0.11	<0.01-0.11	0.012-0.265	<0.05	2.28-3.39						
	N	20	20	20	20	20	20	20						
	n	18	0	17	0	0	20	0						
Northern pike	Mean	0.01	0.22	0.01	0.216	<0.05	3.75							
	SD	0.001	0.07	0.01	0.103	-	0.63							
	Range	<0.01-0.02	0.09-0.37	<0.01-0.03	<0.01-0.03	0.089-0.546	<0.05	2.68-5.20						
	N	20	20	20	20	20	20	20						
	n	18	0	16	0	0	20	0						
Walleye	Mean	<0.01	0.24	0.01	<0.01	<0.05	3.66							
	SD	0.001	0.07	0.004	0.004	0.157	1.03							
	Range	<0.01-0.01	0.15-0.38	<0.01-0.02	<0.01-0.02	0.015-0.495	<0.05-0.07	2.98-6.23						
	N	9	9	9	9	9	9	9						
	n	7	0	8	0	0	8	0						
Longnose sucker	Mean	<0.01	0.56	0.02	0.02	0.051	3.46							
	SD	-	0.22	0.03	0.03	0.017	0.67							
	Range	<0.01-0.06	0.31-1.08	<0.01-0.11	<0.01-0.11	0.033-0.091	<0.05	2.78-5.15						
	N	13	13	13	13	13	13	13						
	n	4	0	7	0	0	13	0						
Burbot	Mean	0.01	0.28	0.01	0.01	0.117	3.54							
	SD	0.01	0.10	0.01	0.01	0.025	0.65							
	Range	<0.01-0.03	0.16-0.56	<0.01-0.04	<0.01-0.04	0.068-0.169	<0.05-0.07	2.79-4.87						
	N	21	21	21	21	21	21	21						
	n	9	17	0	18	0	18	0						
Liver	Mean	<0.03	5.98	<0.03	<0.03	0.025	15.97							
	SD	-	3.19	-	-	0.017	4.11							
	Range	<0.03	1.62-9.94	<0.03	<0.03	0.009-0.057	<0.13	11.45-25.64						
	N	10	10	10	10	10	10	10						
	n	10	0	10	10	0	10	0						

NOTES:
 To calculate the basic statistics, half the detection limit was used for values below detection.
 Muscle detection limit were converted from dry weight using an average moisture of 80%.
 Liver detection limits were converted from dry weight using an average moisture of 50%.

SD: Standard deviation
 N: Number of samples
 n: Number of samples below the detection limit

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Table 5 Comparative Metal Data ($\mu\text{g/g}$ wet weight) for fish collected from various locations in the southwest portion of the Northwest Territories.

Species	Tissue	Location	N	Arsenic	Cadmium	Copper	Lead	Mercury	Nickel	Zinc
Lake whitefish	Muscle	Slave River	76	<0.01-0.88	<0.01-0.04	0.12-0.69	<0.01-0.29	0.02-0.12	<0.05-0.43	2.26-10.14
		Leland Lake	40	<0.01-0.14	<0.01-0.03	<0.01-3.19	<0.01-0.08	0.03-0.30	<0.05-0.08	2.16-9.51
		Yellowknife Bay	195	0.02-1.11	<0.0001-0.025	0.13-1.41	<0.03	0.02-0.22	<0.02-0.12	1.3-4.95
		Trout Lake	7	<0.1-0.013	<0.01	0.21-0.66	<0.01-0.067	0.014-0.033	<0.05	3.35-4.33
Northern pike	Muscle	Slave River	66	<0.01-1.03	<0.01-0.03	<0.01-1.46	<0.01-0.07	0.06-0.52	<0.05-0.63	2.84-17.37
		Leland Lake	32	<0.01-0.05	<0.01-0.01	<0.01-1.44	<0.01-0.07	0.11-1.09	<0.05-0.58	3.41-25.4
		Yellowknife Bay	109	0.03-0.80	<0.0001-0.02	0.17-0.99	<0.03	0.08-0.47	<0.02	2.06-5.87
		Trout Lake	2	<0.01-0.018	<0.01	0.77-0.85	0.020-0.022	0.08-0.13	<0.05	5.18-5.95
Burbot	Muscle	Slave River	36	<0.01-0.08	<0.01-0.02	0.10-0.38	<0.01-0.02	0.02-0.21	<0.05-0.08	1.79-6.36
		Alexie Lake	22	<0.01-0.29	<0.01-0.07	0.10-0.44	<0.01-0.02	0.07-0.24	<0.05-0.06	1.92-6.43
		Yellowknife Bay	73	0.08-0.66	<0.0001-0.01	0.16-0.96	<0.03	0.06-0.39	<0.02	2.52-7.35
		Trout Lake	13	0.01-0.027	<0.01-0.014	0.16-0.70	<0.01-0.038	0.05-0.18	<0.05-0.06	4.89-8.04
Walleye	Liver	Slave River	36	<0.025-1.33	<0.025-0.33	1.27-16.52	<0.025-0.04	<0.025-0.07	<0.125	5.39-28.5
		Alexie Lake	22	<0.025-0.32	<0.025	1.29-9.37	<0.025	0.01-0.09	<0.125	4.87-19.4
		Yellowknife Bay	73	0.05-3.34	0.01-1.80	1.25-24.3	<0.05-0.13	0.01-0.14	<0.04-0.53	8.47-26.08
Walleye	Muscle	Slave River	72	<0.01-0.26	<0.01-0.02	<0.01-0.99	<0.01-0.13	0.05-0.97	<0.05-0.85	2.70-8.03
		Leland Lake	38	<0.01-0.07	<0.01-0.02	0.11-1.04	<0.01-0.32	0.11-0.80	<0.05-0.58	2.53-7.55
		Yellowknife Bay	30	<0.05-0.20	0.0004-0.01	0.16-0.84	<0.03	0.07-0.24	<0.02	2.43-5.12
		Trout Lake	20	<0.01-0.03	<0.01	0.19-0.70	<0.01-0.305	0.03-0.23	<0.05-0.089	4.09-5.04
Longnose sucker	Muscle	Yellowknife Bay	30	0.08-0.39	<0.0001-0.004	0.16-1.41	<0.03	0.021-0.1	<0.02	2.19-3.85
		Trout Lake	16	<0.01-0.021	<0.01	0.29-1.23	<0.01-0.49	0.03-0.07	<0.05-0.094	3.56-6.13

Slave River, Leland Lake and Alexie Lake data: Sanderson et al. 1997

Trout Lake data: Swirypa et al. 1993

Yellowknife Bay data: Jackson et al. 1996

5.2.1 Arsenic

In the aquatic environment, arsenic is most often present as arsenic trioxide, a highly soluble and very toxic form (McKee & Wolf, 1963; Santaniello, 1971). Arsenic is a by-product of the smelting and roasting of ores such as copper, lead, gold, silver and cobalt (McNeely *et al.*, 1979). At Pine Point Mine, arsenic was not of concern and therefore it was not regulated. However, the extraction of gold by two mines in Yellowknife produces arsenic residues (Jackson *et al.*, 1996).

Arsenious ions accumulate mainly in the liver (Falk *et al.*, 1973), but also concentrate in the muscle cells, where they have the potential to interfere with enzyme activity (Drill, 1958). Health Canada has not yet established a guideline for arsenic.

Levels of arsenic in the fish muscle samples from Fort Resolution were between 0.01 and 0.11 $\mu\text{g/g}$ (Table 4), with 31% of the samples below detection ($<0.01\mu\text{g/g}$). Lake whitefish revealed the highest mean concentration (0.05 $\mu\text{g/g}$) with the maximum level (0.11 $\mu\text{g/g}$) detected in an 18 year old female (Appendix 7). For each species, comparison of the age of the fish to the concentration of arsenic in the muscle, did not reveal any trend. Furthermore, all of the burbot livers tested were below detection ($<0.03\mu\text{g/g}$). This suggests that accumulation of arsenic in the fish in the Fort Resolution area is minimal.

Table 5 shows the ranges of concentrations recorded for the same species of fish from various locations in the southwest portion of the Northwest Territories. The levels of arsenic found in fish from Fort Resolution ($<0.01- 0.11\mu\text{g/g}$) were similar to the levels found in Leland Lake ($<0.01- 0.14\mu\text{g/g}$), which is not directly influenced by industrial activities. This shows that the arsenic levels in the fish collected for this study are representative of typical background levels in the area. In addition, the levels of arsenic in fish from Fort Resolution did not compare to the levels reported for Yellowknife Bay (Table 5), the maximum concentration (0.11 $\mu\text{g/g}$) in fish from Fort Resolution lies at the lower end of the range ($<0.01-1.11 \mu\text{g/g}$) of values reported for Yellowknife Bay . This suggests that the arsenic from the mine effluents across the lake did not affect the fish in the Fort Resolution area.

These observations show that arsenic is not a major pollutant of the fish from Fort Resolution.

5.2.2 Cadmium

The toxicity of cadmium in freshwater fish is mainly governed by the chemical nature of the water and in particular those characteristics associated with its hardness. These regulate the solubility of cadmium, the chemical species present and the biological factors within the fish that control the rates of cadmium uptake (Sprague, 1987). Generally, cadmium accumulates in kidney, liver and gill tissues and to a lesser extent in the muscles (Windom *et al.*, 1973). Health Canada has not yet set a fish consumption guideline for cadmium.

Cadmium was only detected in ten of the 83 muscle samples analyzed and at concentrations close to the detection limit ($0.01\mu\text{g/g}$; Table 4). The mean concentration for each individual species was below or at the detection limit. The highest value, $0.04\mu\text{g/g}$, was found in a 13 year old male lake whitefish (Appendix 7). Windom *et al.* (1973) noted that higher levels of cadmium are found in lower trophic level fish such as lake whitefish, than in predatory fish such as northern pike. However, lake whitefish from Fort Resolution showed levels identical ($<0.01\text{-}0.04\mu\text{g/g}$) to those found in other species ($<0.01\text{-}0.03\mu\text{g/g}$). Moreover, none of the livers tested revealed the presence of the metal ($<0.03\mu\text{g/g}$).

The concentrations of cadmium measured in fish collected for this study are within the ranges of values observed in fish from unexploited sites (Leland, Alexie and Trout Lakes) and from the Slave River (Table 5). In Alexie Lake, cadmium concentrations in burbot liver collected during the SREQMP showed levels as high as $0.33\mu\text{g/g}$. The lower levels in the fish from Fort Resolution may suggest that these fish are not exposed to significant quantities of cadmium.

Cadmium is often present as an impurity in lead-zinc ores, but at Pine Point, it formed less than 0.01% of the feed material (Stein & Miller, 1972). In 1971, the only burbot liver tested revealed a concentration of $0.2\mu\text{g/g}$. The maximum mean level in muscle ($0.12\mu\text{g/g}$) was found in northern pike (n=8) and walleye (n=8), while the lowest mean ($0.03\mu\text{g/g}$) was in whitefish. These levels

could not be attributed to the mine since they were similar to the levels found in other areas of the Northwest Territories (Stein & Miller, 1972). Compared to these data, cadmium levels in the 1992 and 1993 samples were relatively low.

All of these observations show that the concentrations of cadmium in fish from Fort Resolution collected during the present study are low and can be said to be typical of background concentrations.

5.2.3 Copper

Copper is an essential trace element commonly found in freshwater lakes. It is a vital nutrient for all plant and animal life. It acts as a constituent of metalloenzymes and respiratory pigments (Demayo *et al.*, 1982) and consequently has important biochemical functions. Copper can however be toxic to organisms under certain environmental conditions and at elevated concentrations (Forstner & Wittman, 1982).

Copper is not considered to be a cumulative toxin since most of it is excreted by the body, and very little is retained (Falk *et al.*, 1973). To date, Health Canada has not established tolerance limits for copper.

Copper was present in all the muscle samples analyzed, ranging from 0.09 to 1.08 $\mu\text{g/g}$ (Table 4). Longnose sucker muscle contained the highest mean concentration (0.56 $\mu\text{g/g}$), while the lowest mean concentrations were observed in northern pike (0.22 $\mu\text{g/g}$) and walleye (0.24 $\mu\text{g/g}$). All levels were within the range of concentrations reported for Leland Lake (Table 5), and should therefore be considered typical background levels. In 1992, concentrations of copper in burbot liver ranged from 1.62 to 9.94 $\mu\text{g/g}$, which is at the lower end of the range observed in the Slave River.

Mean copper levels in fish taken near Fort Resolution during 1992 and 1993 were lower than those reported by Stein and Miller (1972). The highest mean concentration in the earlier study (0.82 $\mu\text{g/g}$) was found in northern pike (n=4) caught in the area of Paulette Island. Copper was measured for

only one burbot ($16\mu\text{g/g}$) captured near the mouth of the Little Buffalo River in 1971, and found to be higher than the maximum measured during the course of this study ($9.94\mu\text{g/g}$).

5.2.4 Lead

The toxicity of lead is, to a great extent, determined by the chemistry of the water in which it is found. Generally, the softer the water and the lower the pH, the greater the amount of lead absorbed by the fish (Jaworski, 1978). The primary mode of uptake of lead ions is directly through the gills (Merlini & Pozzi, 1977). Once in the fish, lead deposits in the bones, scales, kidney, liver and muscle tissue (Spry & Wiener, 1991). However, as is the case with cadmium, lead does not biomagnify in aquatic food chains, nor does the level of lead in an individual typically rise with increasing body size or age (Spry and Wiener, 1991). Health Canada has set not yet established a guideline for lead.

Lead was detected in 17 of the 83 fish muscle samples analyzed, at concentrations ranging from 0.01 to $0.11\mu\text{g/g}$ (Table 4). The highest concentration ($0.11\mu\text{g/g}$) was measured in a 13 year old lake whitefish and a 20 year old longnose sucker. Lead was below detection ($0.03\mu\text{g/g}$) for all burbot livers tested. Comparison of the concentrations of lead with other sites (Table 5) shows that levels in fish collected from this study are similar to those observed in relatively undisturbed lakes i.e. Leland and Trout Lakes, and can therefore be considered typical background concentrations.

In comparison to the results from the muscle tissue of fish caught near Fort Resolution from 1971 (Stein and Miller, 1972), lead levels in the fish muscle tissue from this study are low. In 1971, mean concentrations of lead were up to $0.16\mu\text{g/g}$ for walleye (n=3), $0.17\mu\text{g/g}$ for northern pike (n=4) and $0.11\mu\text{g/g}$ for whitefish (n=10), compared respectively to <0.01 , 0.01 and $0.01\mu\text{g/g}$ in this study.

Overall, the recent levels of lead found in fish of the area are not particularly elevated.

5.2.5 Mercury

Mercury and its compounds occur naturally in the environment but anthropogenic activities have increased its availability (Lafontaine, 1994). Within the Northwest Territories, there are several geological zones that have relatively high mercury content, including the area around Great Bear Lake and Great Slave Lake (Cameron and Jonasson, 1972). Grey *et al.* (1995) observed comparable levels of mercury in the Slave River and control lakes and suggested that they reflected geological sources or atmospheric deposition, rather than anthropogenic point sources. Mercury was not used at Pine Point mine.

Mercury was detected in all of the fish muscle and liver samples analyzed from Fort Resolution from 1992 and 1993. Muscle concentrations ranged from 0.012 to 0.546 $\mu\text{g/g}$ (Table 4). These ranges of values for fish muscle were similar to the values found in Leland Lake (Table 5). The levels in liver samples from Fort Resolution varied between 0.009 and 0.057 $\mu\text{g/g}$ (Table 4) and compared to the concentrations observed in burbot livers from Alexie Lake and the Slave River (Table 5). Mercury measured in fish from the Fort Resolution area in 1992 and 1993 could therefore be of natural origin or a result of atmospheric deposition.

Mercury biomagnifies, and as a consequence, within a given fish community, piscivorous fish tend to contain higher mercury concentrations than lower order fish, a finding which was observed in this study. Northern pike, walleye, and burbot revealed the highest average mercury content, with 0.216, 0.212 and 0.117 $\mu\text{g/g}$ respectively, while levels in lake whitefish and longnose sucker muscle samples were of 0.047 and 0.051 $\mu\text{g/g}$.

In Canada, the maximum allowable level of mercury for human consumption in the edible portion of commercial fish is 0.5 $\mu\text{g/g}$ (Jerome, pers. comm., 1997). Although the averages for each species are well below this limit, three of the 83 fish captured were close, or at this limit; an eight year old northern pike (0.546 $\mu\text{g/g}$), and two walleye of 20 and 12 years old (0.495 and 0.434 $\mu\text{g/g}$).

For frequent consumption, a tolerance of 0.2 $\mu\text{g/g}$ has been set by the Medical Services Branch of Health Canada (Jerome, pers. comm., 1997). The average concentrations for both northern pike and walleye were at this allowable limit. However, the fish for this study were collected with commercial gillnet sizes thereby selecting bigger and older fish. Older fish tend to contain higher levels of mercury, since this metal is not easily excreted and accumulates in tissues. If gill nets of smaller mesh sizes were used, levels of mercury in fish would likely have been lower. Health Canada reviewed these concentrations and considered that the levels of metals measured in the muscle and liver samples of all species would not pose a health hazard to consumers (Appendix 12).

The mean concentrations of mercury in fish from Fort Resolution in 1992 and 1993 were similar to those observed in 1971. The maximum averages reported by Stein and Miller (1972) for muscle samples are as follows: northern pike (0.30 $\mu\text{g/g}$; n=2), whitefish (0.13 $\mu\text{g/g}$; n=3), and walleye (0.16 $\mu\text{g/g}$; n=2), compared respectively to 0.216, 0.047 and 0.212 $\mu\text{g/g}$ in this study.

5.2.6 Nickel

Although nickel is not a water pollution concern in its pure state, nickel salts such as nickel ammonium sulphate, nickel nitrate and nickel chloride, which are soluble in water, are potentially toxic (McNeely *et al.*, 1979). Fish species may accumulate nickel from their environment but there is little evidence for biomagnification in aquatic food chains (Stokes *et al.*, 1981). Health Canada has not yet set a fish consumption guideline for nickel.

The mean concentrations of nickel in the muscle of all five fish species were below the detection limit of 0.05 $\mu\text{g/g}$ (Table 4). Nickel was only detected in one walleye and two burbot muscle samples at a maximum concentration (0.07 $\mu\text{g/g}$) which is slightly above the detection limit. Similar or higher concentrations of nickel were observed in fish muscle from Leland Lake. Nickel was below detection (0.13 $\mu\text{g/g}$) in all liver samples from the current study and in the Alexie Lake and Slave River samples (Table 5). The levels of nickel in fish muscle and liver samples caught near Fort Resolution during 1992 and 1993 are typical of those found in unexploited lakes of the area and so could be regarded as background levels.

The maximum concentration of nickel reported by Stein and Miller (1972) was 0.2 $\mu\text{g/g}$ for a northern pike muscle and 0.1 $\mu\text{g/g}$ for a burbot liver.

5.2.7 Zinc

Zinc is a trace element of major importance in the metabolic functions of cells, but it can also be toxic to aquatic life when it is present in high concentrations. The sensitivity of fish to zinc varies with the species, size and age of the fish, and also with the physical and chemical characteristics of the water. Higher zinc levels in solution are thought to decrease food uptake in fish, lower reproductive rates and inhibit respiration (Spear, 1981). Weiss and Bolts (1957) associated the presence of zinc to the production of gill mucus precipitates, which reduce effective respiration, which in turn induces stress that may cause death. Falk *et al.* (1973) noted that most of the literature which refers to zinc poisoning in fish indicates that stress and/or death is due to the disruption or destruction of gill tissue. Health Canada has not yet set a fish consumption guideline for zinc.

Although zinc is the element of concern in the Pine Point tailings pond, the levels in the effluent are monitored and kept under limits (0.5 mg/L) set by the Water Licence.

Zinc concentrations in the muscle of fish from Fort Resolution ranged from 2.28 to 6.23 $\mu\text{g/g}$. Northern pike had the highest mean concentration of zinc (3.75 $\mu\text{g/g}$), while lake whitefish revealed the lowest (2.78 $\mu\text{g/g}$; Table 4). Levels of zinc in burbot liver samples ranged from 11.45 to 25.64 $\mu\text{g/g}$, with a mean of 15.97 $\mu\text{g/g}$. These concentrations are within the range of values measured in muscle of fish from Leland Lake and burbot livers from the Slave River and Alexie Lake (Table 5) and could therefore be regarded as normal background levels.

Stein and Miller (1972) reported concentrations of zinc in muscle ranging from 1.68 for whitefish (N=1) to 10.09 in white sucker (n=10). The one burbot liver tested had 29 $\mu\text{g/g}$ of zinc. The mean concentrations measured during the present study are at the lower end of the range of mean values detected in 1972.

5.2.8 Other elements

Tables 6 through 10 compare the range of values for all the other elements measured in the present study to the concentrations measured in fish from the Slave River, Leland Lake and Alexie Lake. Comparative data are not available for longnose sucker and the summary table for this species was included in Appendix 10.

In fish from Fort Resolution, aluminum, antimony, beryllium, bismuth, chromium, cobalt, molybdenum, silver, tin, titanium and vanadium were below detection in all liver samples. Except for aluminum and titanium, these metals were also below detection limit in all muscle. Aluminum was detectable in the muscle of two lake whitefish (site 2), one burbot (site 3) and one longnose sucker (site 3), while titanium was above detection in the muscle of two burbot (site 1 and 3) and one lake whitefish (site 2). All other elements are natural constituents of living fish.

Tables 6 to 10 show that the levels of all elements are in the range of values measured for fish from the area.

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Table 6: Comparison of concentrations of the various elements (µg/g wet weight) analyzed in WALLEYE MUSCLE from Great Slave Lake, Fort Resolution area, and from Slave River and Leland Lake, NWT.

PARAMETER	Fort Resolution		Slave River*		Leland Lake*	
	Detection Limit	% of samples Below Detection	Minimum	Maximum	Minimum	Maximum
% Moisture						
Aluminum	1	100	<1	<1	72.8	81.3
Antimony	1	100	<1	<1	<1	9.13
Arsenic	0.01	56	0.01	0.03	<0.01	0.07
Barium	0.01	78	<0.01	0.02	<0.01	0.19
Beryllium	0.02	100	<0.02	<0.02	<0.02	0.05
Bismuth	3	100	<3	<3	<3	<3
Boron	0.1	0	0.12	6.32	<0.1	10.24
Cadmium	0.01	78	<0.01	0.01	<0.01	0.02
Calcium	0.1	0	73.50	185.85	51	3635
Chromium	0.3	100	<0.3	<0.3	<0.2	1.12
Cobalt	0.1	100	<0.1	<0.1	<0.1	<0.1
Copper	0.01	0	0.15	0.38	<0.01	1.04
Iron	0.2	0	1.22	2.90	1.35	11.44
Lead	0.01	89	<0.01	0.02	<0.01	0.32
Magnesium	0.01	0	208.24	293.18	228	332
Manganese	0.02	0	0.04	0.09	0.05	0.35
Mercury	0.001	0	0.01	0.50	0.11	0.8
Molybdenum	0.2	100	<0.2	<0.2	<0.2	<0.2
Nickel	0.05	89	<0.05	0.07	<0.05	0.58
Phosphorous	2	0	6115	7603	4243	11454
Potassium	0.1	0	3868	4347	3249	5163
Silver	0.2	100	<0.2	<0.2	<0.2	<0.2
Sodium	0.1	0	123	319	192	2445
Strontium	0.01	0	0.01	0.14	0.03	4.8
Tin	0.2	100	<0.2	<0.2	<0.2	<0.2
Titanium	0.03	100	<0.03	<0.03	<0.03	0.28
Vanadium	0.1	100	<0.1	<0.1	<0.1	<0.1
Zinc	0.01	0	2.98	6.23	2.53	7.55

*Sanderson et al., 1997

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Table 7: Comparison of concentrations of the various elements (µg/g wet weight) analyzed in NORTHERN PIKE MUSCLE from Great Slave Lake, Fort Resolution area, and from Slave River and Leland Lake, NWT.

PARAMETER	Fort Resolution		Slave River*		Leland Lake*	
	Detection Limit	% of samples Below Detection	Minimum	Maximum	Minimum	Maximum
% Moisture						
Aluminum	1	100	<1	<1	78.3	82.6
Antimony	1	100	<1	<1	<1	1.56
Arsenic	0.01	30	<0.01	0.05	<0.01	<1
Barium	0.01	10	<0.01	0.18	<0.01	0.05
Beryllium	0.02	100	<0.02	<0.02	<0.02	0.47
Bismuth	3	100	<3	<3	<3	<0.02
Boron	0.1	15	<0.1	5.61	<0.1	<3
Cadmium	0.01	90	<0.01	0.02	<0.01	0.58
Calcium	0.1	0	93	1273	<0.01	0.01
Chromium	0.3	100	<0.3	<0.3	113	5444
Cobalt	0.1	100	<0.1	<0.1	<0.2	2.08
Copper	0.01	0	0.09	0.37	<0.1	<0.1
Iron	0.2	0	1.07	2.29	<0.01	1.44
Lead	0.01	80	<0.01	0.03	0.65	55
Magnesium	0.01	0	270	330	<0.01	0.07
Manganese	0.02	0	0.07	0.42	224	340
Mercury	0.001	0	0.089	0.546	0.08	2.93
Molybdenum	0.2	100	<0.2	<0.2	0.06	1.09
Nickel	0.05	100	<0.05	<0.05	<0.2	<0.2
Phosphorous	2	0	6424	8516	<0.05	0.58
Potassium	0.1	0	3649	4324	6137	13821
Silver	0.2	100	<0.2	<0.2	3022	5029
Sodium	0.1	0	87	513	<0.2	<0.2
Strontium	0.01	0	0.03	1.06	119	451
Tin	0.2	100	<0.2	<0.2	0.03	8.65
Titanium	0.03	100	<0.03	<0.03	<0.2	<0.2
Vanadium	0.1	100	<0.1	<0.1	<0.03	0.12
Zinc	0.01	0	2.68	5.20	<0.1	<0.1

*Sanderson et al., 1997

FORT RESOLUTION FISH MONITORING PROGRAM

Table 8: Comparison of concentrations of the various elements (µg/g wet weight) analyzed in LAKE WHITEFISH MUSCLE from Great Slave Lake, Fort Resolution area, and from Slave River and Leland Lake, NWT.

PARAMETER	Detection Limit	Fort Resolution		Slave River*		Leland Lake*	
		% of samples Below Detection	Minimum Maximum	% of samples Below Detection	Minimum Maximum	% of samples Below Detection	Minimum Maximum
%Moisture							
Aluminum	1	90	<1 7.01	84	73.4 81.8	0	75.4 83.3
Antimony	1	100	<1 <1	100	<1 <1	95	<1 6.97
Arsenic	0.01	10	<0.01 0.11	26	<0.01 0.88	43	<0.01 0.14
Barium	0.01	10	<0.01 0.22	16	<0.01 0.88	35	<0.01 0.21
Beryllium	0.02	100	<0.02 <0.02	100	<0.02 <0.02	100	<0.02 <0.02
Bismuth	3	100	<3 <3	100	<3 <3	100	<3 <3
Boron	0.1	0	0.19 0.83	25	<0.1 0.7	10	<0.1 8.61
Cadmium	0.01	90	<0.01 0.04	93	<0.01 0.04	93	<0.01 0.03
Calcium	0.1	0	53 808	0	44 4194	0	51 3779
Chromium	0.3	100	<0.3 <0.3	89	<0.2 0.95	100	<0.2 <0.3
Cobalt	0.1	100	<0.1 <0.1	100	<0.1 <0.1	100	<0.1 <0.1
Copper	0.01	0	0.12 0.57	0	0.12 0.69	5	<0.01 3.19
Iron	0.2	0	1.39 7.63	0	1.93 12.41	0	1.84 6.5
Lead	0.01	85	<0.01 0.11	87	<0.01 0.29	85	<0.01 0.08
Magnesium	0.01	0	214 290	0	216 322	0	217 315
Manganese	0.02	0	0.12 0.22	0	0.07 0.66	0	0.06 2.24
Mercury	0.001	0	0.012 0.265	0	0.02 0.12	0	0.03 0.3
Molybdenum	0.2	100	<0.2 <0.2	100	<0.2 <0.2	100	<0.2 <0.2
Nickel	0.05	100	<0.05 <0.05	80	<0.05 0.43	95	<0.05 0.08
Phosphorous	2	0	5999 8182	0	6422 11619	0	6256 11902
Potassium	0.1	0	3549 4733	0	3312 5014	0	3504 5448
Silver	0.2	100	<0.2 <0.2	100	<0.2 <0.2	100	<0.2 <0.2
Sodium	0.1	0	134 618	0	175 743	0	196 642
Strontium	0.01	0	0.05 1.44	0	0.04 8.99	0	0.05 11.16
Tin	0.2	100	<0.2 <0.2	100	<0.2 <0.2	100	<0.2 <0.2
Titanium	0.03	95	<0.03 0.37	92	<0.03 0.36	85	<0.03 0.24
Vanadium	0.1	100	<0.1 <0.1	100	<0.1 <0.1	100	<0.1 <0.1
Zinc	0.01	0	2.28 3.39	0	2.26 10.14	0	2.16 9.51

*Sanderson et al., 1997

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Table 9: Comparison of concentrations of the various elements (µg/g wet weight) analyzed in BURBOT MUSCLE from Great Slave Lake, Fort Resolution area, and from Slave River and Alexie Lake, NWT

PARAMETER	Fort Resolution			Slave River*			Alexie Lake*		
	Detection Limit	% of samples Below Detection	Minimum Maximum	% of samples Below Detection	Minimum Maximum	% of samples Below Detection	Minimum Maximum		
% Moisture									
Aluminum	1	95	1 5.5	94	62.3 83.9	0	78.2 83.2		
Antimony	1	100	<1 <1	100	<1 <1	100	<1 <1		
Arsenic	0.01	43	<0.01 0.03	6	<0.01 0.08	23	<0.01 0.29		
Barium	0.01	14	<0.01 0.15	17	<0.01 0.58	50	<0.01 0.19		
Beryllium	0.02	100	<0.02 <0.02	100	<0.02 <0.02	100	<0.02 <0.02		
Bismuth	3	100	<3 <3	100	<3 <3	100	<3 <3		
Boron	0.1	0	0.15 0.77	36	<0.1 0.74	32	<0.1 0.69		
Cadmium	0.01	81	<0.01 0.03	97	<0.01 0.02	91	<0.01 0.07		
Calcium	0.1	0	73.5 598.5	0	37 612	0	37 869		
Chromium	0.3	100	<0.3 <0.3	100	<0.2 <0.3	100	<0.3 <0.3		
Cobalt	0.1	100	<0.1 <0.1	100	<0.1 <0.1	100	<0.1 <0.1		
Copper	0.01	0	0.16 0.56	0	0.1 0.38	0	0.1 0.44		
Iron	0.2	0	1.41 18.26	0	0.87 4.84	0	0.73 2.4		
Lead	0.01	86	<0.01 0.04	81	<0.01 0.02	86	<0.01 0.02		
Magnesium	0.01	0	200 274	0	103 271	0	99 248		
Manganese	0.02	0	0.13 0.49	0	0.05 0.29	0	0.08 0.56		
Mercury	0.001	0	0.068 0.169	0	0.02 0.21	0	0.07 0.24		
Molybdenum	0.2	100	<0.2 <0.2	100	<0.2 <0.2	100	<0.2 <0.2		
Nickel	0.05	86	<0.05 0.07	83	<0.05 0.08	95	<0.05 0.06		
Phosphorous	2	0	4843 7233	0	2852 7811	0	2978 7823		
Potassium	0.1	0	3177 4100	0	1838 4851	0	1840 4085		
Silver	0.2	100	<0.2 <0.2	100	<0.2 <0.2	100	<0.2 <0.2		
Sodium	0.1	0	194 482	0	179 1031	0	193 855		
Strontium	0.01	0	0.06 0.83	0	0.03 1.02	0	0.03 0.62		
Tin	0.2	100	<0.2 <0.2	100	<0.2 <0.2	100	<0.2 <0.2		
Titanium	0.03	90	<0.03 0.43	94	<0.03 0.13	95	<0.03 0.31		
Vanadium	0.1	100	<0.1 <0.1	97	<0.1 <0.1	95	<0.1 <0.1		
Zinc	0.01	0	2.79 4.87	0	1.79 6.36	0	1.92 6.43		

*Sanderson et al., 1997

FORT RESOLUTION FISH MONITORING PROGRAM
Table 10: Comparison of concentrations of the various elements (µg/g wet weight) analyzed in BURBOT LIVER from Great Slave Lake, Fort Resolution area, and from Slave River and Alexie Lake, NWT.

PARAMETER	Fort Resolution			Slave River*			Alexie Lake*		
	Detection Limit	% of samples Below Detection	Minimum Maximum	% of samples Below Detection	Minimum Maximum	% of samples Below Detection	Minimum Maximum		
% Moisture									
Aluminum	2.5	100	<2.5 <2.5	0	40 64.8	0	29.4 67.6		
Antimony	2.5	100	<2.5 <2.5	100	<2.5 <2.5	95	<2.2 3.08		
Arsenic	0.03	100	<0.03 <0.03	31	<0.025 1.33	100	<2.5 <2.5		
Barium	0.03	60	<0.03 0.06	78	<0.025 0.06	45	<0.025 0.32		
Beryllium	0.05	100	<0.05 <0.05	100	<0.05 <0.05	86	<0.025 0.03		
Bismuth	7.5	100	<7.5 <7.5	100	<7.5 <7.5	100	<0.05 <0.05		
Boron	0.25	10	<0.25 0.94	36	<0.25 1.43	100	<3 <3		
Cadmium	0.03	100	<0.03 <0.03	22	<0.025 0.33	36	<0.1 1.92		
Calcium	0.25	0	17 80	0	9 117	100	<0.025 <0.025		
Chromium	0.75	100	<0.75 <0.75	0	<0.5 <0.75	0	10 89		
Cobalt	0.25	100	<0.25 <0.25	100	<0.25 <0.25	95	<0.5 0.75		
Copper	0.03	0	1.62 9.94	94	<0.25 <0.25	100	<0.25 <0.25		
Iron	0.5	0	14 159	0	1.27 16.52	0	1.29 9.39		
Lead	0.03	100	<0.03 <0.03	0	3.78 77.22	0	5.14 33.56		
Magnesium	0.03	0	62 146	92	<0.025 0.04	100	<0.025 <0.025		
Manganese	0.05	0	0.34 0.97	0	31 200	0	39 154		
Mercury	0.003	0	0.009 0.057	0	0.1 1.2	0	0.09 1.62		
Molybdenum	0.5	100	<0.5 <0.5	6	<0.0025 0.07	0	0.01 0.09		
Nickel	0.13	100	<0.13 <0.13	100	<0.5 <0.5	100	<0.5 <0.5		
Phosphorous	5	0	3962 8627	0	<0.125 <0.125	100	<0.125 <0.125		
Potassium	0.25	0	1816 2719	0	1815 11581	0	2696 36851		
Silver	0.5	100	<0.5 <0.5	0	1006 3157	0	1053 3414		
Sodium	0.25	0	406 1079	100	<0.5 <0.5	100	<0.5 <0.5		
Strontium	0.03	0	0.04 0.15	0	0.02 0.17	0	180 944		
Tin	0.5	100	<0.5 <0.5	14	0.49 2.13	5	<0.025 0.11		
Titanium	0.05	100	<0.08 <0.08	56	<0.075 <0.075	55	<0.2 1.59		
Vanadium	0.25	100	<0.25 <0.25	97	<0.25 <0.25	100	<0.075 <0.075		
Zinc	0.03	0	11.45 25.64	100	<0.25 <0.25	100	<0.1 <0.25		
				0	5.39 28.5	0	4.87 19.4		

*Sanderson et al., 1997

6.0 CONCLUSION

As indicated by the condition factors, lake whitefish, northern pike, walleye, burbot and longnose sucker caught in Great Slave Lake near the settlement of Fort Resolution during the fall of 1992 and 1993 were in very good condition. These values were comparable to those reported in fish collected from various locations in the southwest portion of the Northwest Territories.

The mean concentrations of mercury in the five species of fish were well below the maximum allowable level ($0.5 \mu\text{g/g}$) established by Health Canada for the edible portion of fish. However, the averages for northern pike ($0.216 \mu\text{g/g}$) and walleye ($0.212 \mu\text{g/g}$) were at the tolerance limit ($0.2 \mu\text{g/g}$) for frequent consumption. The fish for this study were collected with commercial gillnet sizes thereby selecting bigger and older fish. As mercury bioaccumulates, older fish tend to contain higher levels of the metal. These concentrations are not unusual however, since Fort Resolution seems to be part of a geological zone that has relatively high mercury content (Cameron and Jonasson, 1972; Grey *et al.*, 1995). Similar levels of mercury were found in Leland Lake, Alexie Lake and the Slave River.

Health Canada reviewed the data presented in this study and considered that the levels of metals measured in the muscle and liver samples submitted would not pose a health hazard to consumers (Appendix 12).

The concentrations of the 28 elements also appeared to be typical of background levels for the area. In particular, for the metals of concern (arsenic, cadmium, copper, lead, mercury, nickel and zinc), levels were similar to those found in Leland Lake, a lake in the area not directly affected by anthropogenic activities. Due to the lack of information about the sampling methods, the biological characteristics of the fish and the analytical methods, it was not possible to assess if levels of metals have changed since 1971. However the concentrations of copper, cadmium, lead, nickel and zinc reported in the current study were lower or on the lower end of the range of values measured by Stein and Miller (1972). Based on the results of this study, there is no evidence that the decommissioned Pine Point Mine has caused adverse impacts on the fish of Great Slave Lake.

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APPENDICES

APPENDIX 1: FISH AGEING TECHNIQUES

Mario Paris, Consultant, Yellowknife

Ageing was done using various techniques according to the type of structure.

1. Scale (lake whitefish, *Coregonus clupeaformis*).

Scales were selected using a dissecting scope to eliminate regenerated scales. Annuli reading was executed directly on a microfiche screen. Two scales were read to confirm the results.

2. Cleithrum (northern pike *Esox lucius*) Operculum bone (walleye *Stizosteidon vitreum vitreum*)

Bones were boiled to remove any soft tissues prior to ageing. Once cleaned and air dried, the age was determined by counting annuli through a dissecting scope with transmitted light.

3. Fin Rays (longnose sucker *Catostomus catostomus*).

Pectoral fins were desiccated at room temperature. Once dried, they were coated with liquid epoxy and left to harden on a wax sheet for 48 hours. An Isomet saw (diamond blade 4" x 0.004") was used to slice three to five slices (0.5 to 1 mm thick) of the proximal section of the fin rays. The sections were mounted permanently on microscope slides and labeled. Age was read with a microscope at 20X using transmitted light.

4. Otoliths (lake whitefish *Coregonus clupeaformis* and burbot *Lota lota*).

Over the course the study, the methodology to age lake whitefish changed. Scale readings were compared with otolith reading and it appeared that the second structure revealed a more accurate age. The following page is a short discussion and description of the methods that were used for the Fort Resolution study:

Ageing northern fish:

Various methods exist to age otoliths. The read-through and crack and burn, with soaking in green methyl solution methods were used at first. Ages obtained from these methods are presented in the "Age crack\burn on otolith" column of the appendices.

The disadvantages of these methods are numerous:

- Very old northern fish which grow slowly (for example fish from unexploited lakes) were difficult to age with accuracy. The cracking of the otoliths, especially the thick ones, was not always precisely through the nucleus of the otolith.
- After roasting - a process necessary to highlight the annuli - the otoliths tend to crumble which reduced the storage life and possibility of reviewing the age of the same structure.
- the read-through method is effective only with very young fish.

A thin-slice method was developed to circumscribe these disadvantages.

Preparation of the otoliths

The first step consisted in embedding the otoliths in a V-shape trough lined with Parafilm plastic and filled with fast-drying epoxy, made of resin and hardener in a proportion of 2:1. The otoliths were then left to dry at room temperature. Twenty-four hours later, the Parafilm was cut and we were left with a stick of epoxy in which individual structures were embedded. The otoliths were labeled i.e. a number was printed on the epoxy.

Thin-slicing the otoliths:

Two to three days were necessary for the epoxy to attain a rigidity suitable for the separation of the structures. A piece of epoxy containing an otolith was fastened on the moving arm of the Isomet saw and thinly sliced using a diamond blade of 0.04 inches by 4 inches in diameter. Water was used as a lubricating medium. Each otolith was sliced four to five times as thinly as possible (~0.5mm), near and through the nucleus. The individual slices were gently rinsed in water and air-dried before being permanently mounted on a microscope glass slide (1" x 3") in the order they were sliced. The slides were labeled with the sampling number, location of capture, date and species.

Reading an otolith:

Once the mounting medium was dried, the slides were read under a microscope. A Leitz Laborlux 12 microscope was used in combination with 4X and 10X lenses depending on the density of annuli. The reading was done and accepted when two slices showed the same age twice.

APPENDIX 2: RELATIVE STAGES OF FISH MATURITY.

Relative stages of maturity used for the Fort Resolution Monitoring Program.

Maturity Codes		Maturity Stage
F	M	
1	6	Immature: -virgin fish, gonad thin and threadlike, often incomplete
2	7	Maturing: -virgin or non-virgin fish not spawning in current year, gonad full length, firm, eggs of small size, gonads partially filling body cavity (< 50%).
3	8	Mature: -fish spawning in current year, gonads full size filling body cavity, eggs prominent, full size (> 50%).
4	9	Ripe: -mature fish in spawning condition, eggs translucent, milt or eggs expelled under slight pressure.
5	10	Spent: -mature fish completed spawning, gonads collapsed with ruptured blood vessels prominent.

APPENDIX 3: HEAVY METAL DETERMINATION PROCEDURES FOR FISH TISSUES.

Cantest Ltd. laboratory in Vancouver used the following method to determine the concentration of heavy metals in the dorsal muscle samples submitted:

"Sample dissolution was achieved after accurately weighing out representative subsamples "as received" into acid washed pyrex beakers with watch glasses. To each sample 7 ml of Seastar Chemicals Ultra Pure Double Distilled Nitric Acid was added and digested over low heat for a period of four hours. After the initial nitric acid digestion, the samples were allowed to cool and 5 ml of Seastar Chemicals Ultra Pure Doubled Distilled Perchloric Acid was added. Samples were then further digested until very dense perchloric fumes were expelled. Samples were again allowed to cool and then diluted to 50.0 ml with an ultra pure water. A minimum of three reagent blanks and the National Research Council NRC number DORM-1 (Dogfish Tissue) certified references material were digested and analyzed concurrently.

Arsenic, cadmium, lead and nickel were determined using a Varian Model Spectra 400 Zeeman Background Corrected Graphite Furnace. Mercury was measured using a Pharmacia Model 100 M Mercury Monitor equipped with a Servo Graphic Recorder Model 410. No pretreatment of the solutions was needed prior to mercury determination. Copper, zinc and cross-check of high cadmium values were determined using a Varian Model 475 Direct Flame Atomic Absorption Spectrophotometer. The remaining elements reported were determined using a Jarrell Ash Model # 975 Inductively Coupled Argon Plasma Spectrograph, equipped with a Minipuls 2 Peristaltic Pump and an "All Glass" MAK High Pressure Nebulizer.

The moisture values reported were determined on separate aliquots after drying at 105 C overnight."

Appendix 4

Biological Descriptors of the 83 Fish of Five Species caught near Fort Resolution in 1992 and 1993, and Concentrations ($\mu\text{g/g}$ dry weight) of 28 Elements in the MUSCLE and LIVER Tissues Tested.

FORT RESOLUTION MONITORING PROGRAM

Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Location	Length (mm)	Weight (g)	K Factor	Maturity	Ageing Structure	Age	Age Crack/Burn on Otolith
-	1	LKWH	92/10/06	-	Resolution Bay	484	1792.8	1.58	3-4	Scales	14	-
-	2	LKWH	92/10/06	-	Resolution Bay	522	2487.1	1.75	4	Scales	16	-
-	3	LKWH	92/10/06	-	Resolution Bay	463	1961	1.98	3-4	Scales	13	-
-	4	LKWH	92/10/06	-	Resolution Bay	430	1326	1.67	-	Scales	14	-
-	5	LKWH	92/10/06	-	Resolution Bay	442	1476	1.71	9	Scales	15	-
-	6	LKWH	92/10/06	-	Resolution Bay	416	1304	1.81	9	Scales	14	-
-	7	LKWH	92/10/06	-	Resolution Bay	440	1338.7	1.57	9	Scales	12	-
-	8	LKWH	92/10/06	-	Resolution Bay	464	2414	2.42	4	Scales	12	-
-	9	LKWH	92/10/06	-	Resolution Bay	427	1292	1.66	9	Scales	13	-
-	10	LKWH	92/10/06	-	Resolution Bay	499	2463	1.98	4	Scales	17	-
7894J-101	11	WALL	92/10/06	Muscle	Resolution Bay	447	1179.4	1.32	-	Operculum	8	-
7894J-102	12	WALL	92/10/06	Muscle	Resolution Bay	487	1574	1.36	-	Operculum	10	-
7894J-103	13	WALL	92/10/06	Muscle	Resolution Bay	539	1758	1.12	-	Operculum	20	-
7894J-104	14	NRPK	92/10/06	Muscle	Resolution Bay	615	1936.6	0.83	2	Cleithrum	11	-
7894J-105	15	NRPK	92/10/06	Muscle	Resolution Bay	554	1413	0.83	2-3	Cleithrum	12	-
7894J-106	16	NRPK	92/10/06	Muscle	Resolution Bay	655	2342	0.83	2-3	Cleithrum	9	-
7894J-107	17	NRPK	92/10/06	Muscle	Resolution Bay	752	3515	0.83	2-3	Cleithrum	9	-
7894J-108	18	NRPK	92/10/06	Muscle	Resolution Bay	835	4445	0.76	2-3	Cleithrum	12	-
7894J-109	19	NRPK	92/10/06	Muscle	Resolution Bay	740	3274	0.81	2-3	Cleithrum	9	-
7894J-110	20	NRPK	92/10/06	Muscle	Resolution Bay	651	2228	0.81	2-3	Cleithrum	13	-
7894J-111	21	NRPK	92/10/06	Muscle	Resolution Bay	673	2660	0.87	2-3	Cleithrum	9	-
7894J-112	22	NRPK	92/10/06	Muscle	Resolution Bay	592	1769	0.85	7	Cleithrum	8	-
7894J-113	23	NRPK	92/10/06	Muscle	Resolution Bay	665	2341	0.80	2-3	Cleithrum	11	-

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Appendix 4: Fish Muscle and Liver, Biological Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Location	Length (mm)	Weight (g)	K Factor	Maturity	Ageing Structure	Age	Age Crack/Burn on Otolith
7894J-114	24	LKWH	92/10/06	Muscle	Resolution Bay	452	1480	1.60	8	Otolith	13	14
7894J-115	25	LKWH	92/10/06	Muscle	Resolution Bay	435	1376	1.67	8	Otolith	14	16
7894J-116	26	LKWH	92/10/06	Muscle	Resolution Bay	458	1634	1.70	9	Otolith	15	13
7894J-117	27	LKWH	92/10/06	Muscle	Resolution Bay	423	1219	1.61	9	Otolith	11	14
7894J-118	28	LKWH	92/10/06	Muscle	Resolution Bay	485	2277	2.00	4	Otolith	15	14
7894J-119	29	LKWH	92/10/06	Muscle	Resolution Bay	414	1229	1.73	9	Otolith	13	14
7894J-120	30	LKWH	92/10/06	Muscle	Resolution Bay	497	2422	1.97	4	Otolith	18	15
7894J-121	31	LKWH	92/10/06	Muscle	Resolution Bay	437	1297	1.55	9	Otolith	13	14
7894J-122	32	LKWH	92/10/06	Muscle	Resolution Bay	410	1431	2.08	4	Otolith	13	15
7894J-123	33	LKWH	92/10/06	Muscle	Resolution Bay	441	1377	1.61	9	Otolith	12	16
7894J-124	34	BRBT	92/10/06	Muscle	Resolution Bay	620	1709.3	0.72	1	Otolith	11	9
7894J-125	35	BRBT	92/10/06	Muscle	Resolution Bay	671	2170	0.72	3	Otolith	15	15
7894J-126	36	BRBT	92/10/06	Muscle	Resolution Bay	658	1868.4	0.66	8	Otolith	12	12
7894J-127	37	BRBT	92/10/06	Muscle	Resolution Bay	698	2395.1	0.70	8	Otolith	13	13
7894J-128	38	BRBT	92/10/06	Muscle	Resolution Bay	648	2106.3	0.77	3	Otolith	11	9
7894J-129	39	BRBT	92/10/06	Muscle	Resolution Bay	682	2332.3	0.74	3	Otolith	11	10
7894J-130	40	BRBT	92/10/06	Muscle	Resolution Bay	841	3707.7	0.62	3	Otolith	18	17
7894J-131	41	BRBT	92/10/06	Muscle	Resolution Bay	769	2991.1	0.66	3	Otolith	15	15
7894J-132	42	BRBT	92/10/06	Muscle	Resolution Bay	695	2029.1	0.60	2	Otolith	14	12
7894J-133	43	BRBT	92/10/06	Muscle	Resolution Bay	636	1864.6	0.72	3	Otolith	13	11
7894J-134	44	LNSC	92/10/06	Muscle	Resolution Bay	470	1434.3	1.38	7	Fin	20	-
7894J-135	45	LNSC	92/10/06	Muscle	Resolution Bay	475	1542.9	1.44	3	Fin	17	-

FORT RESOLUTION MONITORING PROGRAM

Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Location	Length (mm)	Weight (g)	K Factor	Maturity	Ageing Structure	Age	Age Crack/Burn on Otolith
7894J-136	34	BRBT	92/10/06	Liver	Resolution Bay	620	1709.3	0.72	1	Otolith	11	9
7894J-137	35	BRBT	92/10/06	Liver	Resolution Bay	671	2170	0.72	3	Otolith	15	15
7894J-138	36	BRBT	92/10/06	Liver	Resolution Bay	658	1868.4	0.66	8	Otolith	12	12
7894J-139	37	BRBT	92/10/06	Liver	Resolution Bay	698	2395.1	0.70	8	Otolith	13	13
7894J-140	38	BRBT	92/10/06	Liver	Resolution Bay	648	2106.3	0.77	3	Otolith	11	9
7894J-141	39	BRBT	92/10/06	Liver	Resolution Bay	682	2332.3	0.74	3	Otolith	11	10
7894J-142	40	BRBT	92/10/06	Liver	Resolution Bay	841	3707.7	0.62	3	Otolith	18	17
7894J-143	41	BRBT	92/10/06	Liver	Resolution Bay	769	2991.1	0.66	3	Otolith	15	15
7894J-144	42	BRBT	92/10/06	Liver	Resolution Bay	695	2029.1	0.60	2	Otolith	14	12
7894J-145	43	BRBT	92/10/06	Liver	Resolution Bay	636	1864.6	0.72	3	Otolith	13	11
0625K-1	DL93001	BRBT	93/09/20	Muscle	Dawson Landing	631	1585	0.63	-	Otolith	12	-
0625K-2	DL93002	LNSC	93/09/20	Muscle	Dawson Landing	462	1500	1.52	-	Fin	10	-
0625K-3	DL93003	LKWH	93/09/20	Muscle	Dawson Landing	438	1476	1.76	-	Otolith	14	11
0625K-4	DL93004	LKWH	93/09/20	Muscle	Dawson Landing	424	1167	1.53	-	Otolith	11	10
0625K-5	DL93005	LKWH	93/09/20	Muscle	Dawson Landing	427	1401	1.80	-	Otolith	15	14
0625K-6	PP93006	BRBT	93/09/20	Muscle	Pine Point	695	2104	0.63	-	Otolith	15	-
0625K-7	PP93007	BRBT	93/09/20	Muscle	Pine Point	656	1658	0.59	-	Otolith	11	-
0625K-8	PP93008	BRBT	93/09/20	Muscle	Pine Point	704	2693	0.77	-	Otolith	15	-
0625K-9	PP93009	BRBT	93/09/20	Muscle	Pine Point	661	1752	0.61	-	Otolith	11	-
0625K-10	PP93010	BRBT	93/09/20	Muscle	Pine Point	684	2284	0.71	-	Otolith	12	-

FORT RESOLUTION MONITORING PROGRAM

Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Location	Length (mm)	Weight (g)	K Factor	Maturity	Ageing Structure	Age	Age Crack/Burn on Otolith
0625K-11	PP93011	BRBT	93/09/20	Muscle	Pine Point	732	3055	0.78	-	Otolith	13	-
0625K-12	PP93012	BRBT	93/09/20	Muscle	Pine Point	664	2335	0.80	-	Otolith	14	-
0625K-13	PP93013	BRBT	93/09/20	Muscle	Pine Point	751	2790	0.66	-	Otolith	14	-
0625K-14	PP93014	BRBT	93/09/20	Muscle	Pine Point	687	2065	0.64	-	Otolith	11	-
0625K-15	PP93015	BRBT	93/09/20	Muscle	Pine Point	644	1789	0.67	-	Otolith	12	-
0625K-16	PP93016	NRPK	93/09/20	Muscle	Pine Point	729	3421	0.88	-	Cleithrum	11	-
0625K-17	PP93017	NRPK	93/09/20	Muscle	Pine Point	696	2727	0.81	-	Cleithrum	8	-
0625K-18	PP93018	NRPK	93/09/20	Muscle	Pine Point	683	2618	0.82	-	Cleithrum	9	-
0625K-19	PP93019	NRPK	93/09/20	Muscle	Pine Point	479	839	0.76	-	Cleithrum	6	-
0625K-20	PP93020	LNSC	93/09/20	Muscle	Pine Point	436	1147	1.38	-	Fin	10	-
0625K-21	PP93021	LNSC	93/09/20	Muscle	Pine Point	460	1444	1.48	-	Fin	10	-
0625K-22	PP93022	LNSC	93/09/20	Muscle	Pine Point	534	2142	1.41	-	Fin	17	-
0625K-23	PP93023	LNSC	93/09/20	Muscle	Pine Point	504	1780	1.39	-	Fin	11	-
0625K-24	PP93024	LNSC	93/09/20	Muscle	Pine Point	427	1128	1.45	-	Fin	15	-
0625K-25	PP93025	LNSC	93/09/20	Muscle	Pine Point	487	1774	1.54	-	Fin	10	-
0625K-26	PP93026	LNSC	93/09/20	Muscle	Pine Point	492	1582	1.33	-	Fin	11	-
0625K-27	PP93027	LNSC	93/09/20	Muscle	Pine Point	459	1261	1.30	-	Fin	11	-
0625K-28	PP93028	LNSC	93/09/20	Muscle	Pine Point	457	1402	1.47	-	Fin	12	-
0625K-29	PP93029	LNSC	93/09/20	Muscle	Pine Point	501	1510	1.20	-	Fin	11	-
0625K-30	PP93030	WALL	93/09/20	Muscle	Pine Point	448	1302	1.45	-	Operculum	9	-
0625K-31	PP93031	WALL	93/09/21	Muscle	Pine Point	444	1283	1.47	-	Operculum	10	-
0625K-32	PP93032	WALL	93/09/21	Muscle	Pine Point	432	1061	1.32	-	Operculum	8	-
0625K-33	PP93033	WALL	93/09/21	Muscle	Pine Point	475	1347	1.26	-	Operculum	12	-
0625K-34	PP93034	WALL	93/09/21	Muscle	Pine Point	523	1863	1.30	-	Operculum	10	-
0625K-35	PP93035	WALL	93/09/21	Muscle	Pine Point	446	1198	1.35	-	Operculum	8	-

FORT RESOLUTION MONITORING PROGRAM

Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Location	Length (mm)	Weight (g)	K Factor	Maturity	Ageing Structure	Age	Age Crack/Burn on Otolith
0625K-36	PP93036	NRPK	93/09/21	Muscle	Pine Point	807	4132	0.79	-	Cleithrum	8	-
0625K-37	PP93037	NRPK	93/09/21	Muscle	Pine Point	709	2651	0.74	-	Cleithrum	6	-
0625K-38	PP93038	NRPK	93/09/21	Muscle	Pine Point	657	2070	0.73	-	Cleithrum	7	-
0625K-39	PP93039	NRPK	93/09/21	Muscle	Pine Point	674	2606	0.86	-	Cleithrum	10	-
0625K-40	DL93040	NRPK	93/09/21	Muscle	Dawson Landing	661	2205	0.76	-	Cleithrum	12	-
0625K-41	DL93041	NRPK	93/09/21	Muscle	Dawson Landing	486	840	0.73	-	Cleithrum	6	-
0625K-42	DL93042	LKWH	93/09/21	Muscle	Dawson Landing	398	1028	1.63	-	Otolith	12	12
0625K-43	DL93043	LKWH	93/09/21	Muscle	Dawson Landing	478	1349	1.24	-	Otolith	9	6
0625K-44	DL93044	LKWH	93/09/21	Muscle	Dawson Landing	373	767	1.48	-	Otolith	10	10
0625K-45	DL93045	LKWH	93/09/21	Muscle	Dawson Landing	420	1154	1.56	-	Otolith	15	9
0625K-46	DL93046	LKWH	93/09/21	Muscle	Dawson Landing	365	625	1.29	-	Otolith	11	10
0625K-47	DL93047	LKWH	93/09/21	Muscle	Dawson Landing	418	1057	1.45	-	Otolith	10	11
0625K-48	DL93048	LKWH	93/09/21	Muscle	Dawson Landing	445	1354	1.54	-	Otolith	12	12

FORT RESOLUTION MONITORING PROGRAM

Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Location	Length (mm)	Weight (g)	K Factor	Maturity	Ageing Structure	Age Crack/Burn on Otolith	
QAQC Data												
7894J	Blank-1	-	24/07/93	Reagent Blank	-	-	-	-	-	-	-	
7894J	Blank-2	-	24/07/93	Reagent Blank	-	-	-	-	-	-	-	
7894J	Blank-3	-	24/07/93	Reagent Blank	-	-	-	-	-	-	-	
7894J	TORT-1	Lobster	17/06/93	Tissue	-	Sample	-	-	-	-	-	
7894J	TORT-1	Lobster	24/06/93	Tissue	-	Sample	-	-	-	-	-	
7894J	TORT-1	Lobster	06/07/93	Tissue	-	Sample	-	-	-	-	-	
7894J	TORT-1	Lobster	-	Tissue	-	Certified Value	-	-	-	-	-	
7894J	DORM-1	Dogfish	17/06/93	Muscle	-	Sample	-	-	-	-	-	
7894J	DORM-1	Dogfish	24/06/93	Muscle	-	Sample	-	-	-	-	-	
7894J	DORM-1	Dogfish	06/07/93	Muscle	-	Sample	-	-	-	-	-	
7894J	DORM-1	Dogfish	24/07/93	Muscle	-	Sample	-	-	-	-	-	
7894J	DORM-1	Dogfish	-	Muscle	-	Certified Value	-	-	-	-	-	
7894J	DOLT-2	Dogfish	17/06/93	Liver	-	Sample	-	-	-	-	-	
7894J	DOLT-2	Dogfish	24/06/93	Liver	-	Sample	-	-	-	-	-	
7894J	DOLT-2	Dogfish	06/07/93	Liver	-	Sample	-	-	-	-	-	
7894J	DOLT-2	Dogfish	24/07/93	Liver	-	Sample	-	-	-	-	-	
7894J	DOLT-2	Dogfish	-	Liver	-	Certified Value	-	-	-	-	-	

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	% Moisture H ₂ O	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba
-	1	LKWH	92/10/06	-	-	-	-	-	-
-	2	LKWH	92/10/06	-	-	-	-	-	-
-	3	LKWH	92/10/06	-	-	-	-	-	-
-	4	LKWH	92/10/06	-	-	-	-	-	-
-	5	LKWH	92/10/06	-	-	-	-	-	-
-	6	LKWH	92/10/06	-	-	-	-	-	-
-	7	LKWH	92/10/06	-	-	-	-	-	-
-	8	LKWH	92/10/06	-	-	-	-	-	-
-	9	LKWH	92/10/06	-	-	-	-	-	-
-	10	LKWH	92/10/06	-	-	-	-	-	-
7894J-101	11	WALL	92/10/06	Muscle	78.7	< 5.0	< 5.0	< 0.05	< 0.05
7894J-102	12	WALL	92/10/06	Muscle	78.6	< 5.0	< 5.0	< 0.05	< 0.05
7894J-103	13	WALL	92/10/06	Muscle	81	< 5.0	< 5.0	< 0.05	< 0.05
7894J-104	14	NRPK	92/10/06	Muscle	78.9	< 5.0	< 5.0	< 0.05	0.29
7894J-105	15	NRPK	92/10/06	Muscle	79.6	< 5.0	< 5.0	< 0.05	0.88
7894J-106	16	NRPK	92/10/06	Muscle	81.4	< 5.0	< 5.0	0.24	< 0.05
7894J-107	17	NRPK	92/10/06	Muscle	78	< 5.0	< 5.0	0.17	0.30
7894J-108	18	NRPK	92/10/06	Muscle	78.2	< 5.0	< 5.0	0.13	0.18
7894J-109	19	NRPK	92/10/06	Muscle	80.2	< 5.0	< 5.0	0.15	0.30
7894J-110	20	NRPK	92/10/06	Muscle	79.7	< 5.0	< 5.0	0.16	0.16
7894J-111	21	NRPK	92/10/06	Muscle	79	< 5.0	< 5.0	0.17	0.26
7894J-112	22	NRPK	92/10/06	Muscle	81	< 5.0	< 5.0	0.21	0.54
7894J-113	23	NRPK	92/10/06	Muscle	79.8	< 5.0	< 5.0	0.13	< 0.05

FORT RESOLUTION MONITORING PROGRAM

Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	% Moisture H ₂ O	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba
7894J-114	24	LKWH	92/10/06	Muscle	73.7	< 5.0	< 5.0	0.25	0.06
7894J-115	25	LKWH	92/10/06	Muscle	72.3	< 5.0	< 5.0	0.22	0.33
7894J-116	26	LKWH	92/10/06	Muscle	70.3	< 5.0	< 5.0	0.35	0.06
7894J-117	27	LKWH	92/10/06	Muscle	68.3	< 5.0	< 5.0	0.22	0.19
7894J-118	28	LKWH	92/10/06	Muscle	67.1	< 5.0	< 5.0	0.30	0.24
7894J-119	29	LKWH	92/10/06	Muscle	73.7	< 5.0	< 5.0	0.24	0.34
7894J-120	30	LKWH	92/10/06	Muscle	69.8	< 5.0	< 5.0	0.36	0.33
7894J-121	31	LKWH	92/10/06	Muscle	66.2	< 5.0	< 5.0	0.28	0.65
7894J-122	32	LKWH	92/10/06	Muscle	69.8	< 5.0	< 5.0	0.22	0.28
7894J-123	33	LKWH	92/10/06	Muscle	69.3	< 5.0	< 5.0	0.24	0.27
7894J-124	34	BRBT	92/10/06	Muscle	83.3	< 5.0	< 5.0	0.12	<
7894J-125	35	BRBT	92/10/06	Muscle	80.7	< 5.0	< 5.0	0.13	0.09
7894J-126	36	BRBT	92/10/06	Muscle	81.4	< 5.0	< 5.0	0.10	0.75
7894J-127	37	BRBT	92/10/06	Muscle	80.7	< 5.0	< 5.0	0.15	0.15
7894J-128	38	BRBT	92/10/06	Muscle	81.8	< 5.0	< 5.0	0.16	0.21
7894J-129	39	BRBT	92/10/06	Muscle	80	< 5.0	< 5.0	0.15	0.08
7894J-130	40	BRBT	92/10/06	Muscle	80.5	< 5.0	< 5.0	0.12	0.16
7894J-131	41	BRBT	92/10/06	Muscle	79.2	< 5.0	< 5.0	0.08	0.63
7894J-132	42	BRBT	92/10/06	Muscle	82.4	< 5.0	< 5.0	0.10	0.10
7894J-133	43	BRBT	92/10/06	Muscle	83.3	< 5.0	< 5.0	0.15	0.51
7894J-134	44	LNSC	92/10/06	Muscle	78.8	< 5.0	< 5.0	0.26	0.39
7894J-135	45	LNSC	92/10/06	Muscle	76.3	< 5.0	< 5.0	0.17	0.24

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	% Moisture H ₂ O	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba
7894J-136	34	BRBT	92/10/06	Liver	56.5	< 5.0	< 5.0	< 0.05	0.12
7894J-137	35	BRBT	92/10/06	Liver	39.1	< 5.0	< 5.0	< 0.05	< 0.05
7894J-138	36	BRBT	92/10/06	Liver	46.6	< 5.0	< 5.0	< 0.05	0.07
7894J-139	37	BRBT	92/10/06	Liver	43.4	< 5.0	< 5.0	< 0.05	< 0.05
7894J-140	38	BRBT	92/10/06	Liver	41.2	< 5.0	< 5.0	< 0.05	0.07
7894J-141	39	BRBT	92/10/06	Liver	48.1	< 5.0	< 5.0	< 0.05	< 0.05
7894J-142	40	BRBT	92/10/06	Liver	41.7	< 5.0	< 5.0	< 0.05	< 0.05
7894J-143	41	BRBT	92/10/06	Liver	54.1	< 5.0	< 5.0	< 0.05	< 0.05
7894J-144	42	BRBT	92/10/06	Liver	63.6	< 5.0	< 5.0	< 0.05	0.16
7894J-145	43	BRBT	92/10/06	Liver	44.4	< 5.0	< 5.0	< 0.05	< 0.05
0625K-1	DL93001	BRBT	93/09/20	Muscle	80.7	< 5.0	< 5.0	< 0.05	0.52
0625K-2	DL93002	LNSC	93/09/20	Muscle	75.6	< 5.0	< 5.0	0.16	0.32
0625K-3	DL93003	LKWH	93/09/20	Muscle	70.1	23.4	< 5.0	0.18	0.36
0625K-4	DL93004	LKWH	93/09/20	Muscle	75.4	< 5.0	< 5.0	< 0.05	0.07
0625K-5	DL93005	LKWH	93/09/20	Muscle	71.0	7.0	< 5.0	0.14	0.24
0625K-6	PP93006	BRBT	93/09/20	Muscle	81.2	< 5.0	< 5.0	< 0.05	< 0.05
0625K-7	PP93007	BRBT	93/09/20	Muscle	81.3	< 5.0	< 5.0	< 0.05	0.32
0625K-8	PP93008	BRBT	93/09/20	Muscle	79.8	27.1	< 5.0	< 0.05	0.09
0625K-9	PP93009	BRBT	93/09/20	Muscle	81.6	< 5.0	< 5.0	0.10	0.77
0625K-10	PP93010	BRBT	93/09/20	Muscle	80.4	< 5.0	< 5.0	< 0.05	0.38

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	% Moisture H ₂ O	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba
0625K-11	PP93011	BRBT	93/09/20	Muscle	81.2	< 5.0	< 5.0	< 0.05	0.09
0625K-12	PP93012	BRBT	93/09/20	Muscle	80.5	< 5.0	< 5.0	< 0.05	0.78
0625K-13	PP93013	BRBT	93/09/20	Muscle	82.6	< 5.0	< 5.0	< 0.05	0.62
0625K-14	PP93014	BRBT	93/09/20	Muscle	81.5	< 5.0	< 5.0	< 0.08	< 0.05
0625K-15	PP93015	BRBT	93/09/20	Muscle	84.0	< 5.0	< 5.0	< 0.05	0.82
0625K-16	PP93016	NRPK	93/09/20	Muscle	78.2	< 5.0	< 5.0	< 0.05	0.22
0625K-17	PP93017	NRPK	93/09/20	Muscle	79.9	< 5.0	< 5.0	< 0.05	0.14
0625K-18	PP93018	NRPK	93/09/20	Muscle	80.0	< 5.0	< 5.0	< 0.05	0.21
0625K-19	PP93019	NRPK	93/09/20	Muscle	80.2	< 5.0	< 5.0	< 0.05	0.09
0625K-20	PP93020	LNSC	93/09/20	Muscle	76.9	< 5.0	< 5.0	< 0.09	0.10
0625K-21	PP93021	LNSC	93/09/20	Muscle	77.4	< 5.0	< 5.0	< 0.05	0.17
0625K-22	PP93022	LNSC	93/09/20	Muscle	74.8	< 5.0	< 5.0	< 0.09	0.68
0625K-23	PP93023	LNSC	93/09/20	Muscle	78.4	< 5.0	< 5.0	< 0.05	0.20
0625K-24	PP93024	LNSC	93/09/20	Muscle	75.4	< 5.0	< 5.0	< 0.15	0.29
0625K-25	PP93025	LNSC	93/09/20	Muscle	76.2	< 5.0	< 5.0	< 0.08	0.64
0625K-26	PP93026	LNSC	93/09/20	Muscle	77.8	< 5.0	< 5.0	< 0.05	0.24
0625K-27	PP93027	LNSC	93/09/20	Muscle	76.1	6.5	< 5.0	< 0.05	0.45
0625K-28	PP93028	LNSC	93/09/20	Muscle	77.5	< 5.0	< 5.0	< 0.08	0.08
0625K-29	PP93029	LNSC	93/09/20	Muscle	78.9	< 5.0	< 5.0	< 0.09	0.36
0625K-30	PP93030	WALL	93/09/20	Muscle	80.3	< 5.0	< 5.0	< 0.11	< 0.05
0625K-31	PP93031	WALL	93/09/21	Muscle	80.5	< 5.0	< 5.0	< 0.05	< 0.05
0625K-32	PP93032	WALL	93/09/21	Muscle	79.0	< 5.0	< 5.0	< 0.05	< 0.05
0625K-33	PP93033	WALL	93/09/21	Muscle	81.1	< 5.0	< 5.0	< 0.05	0.09
0625K-34	PP93034	WALL	93/09/21	Muscle	78.2	< 5.0	< 5.0	< 0.13	< 0.05
0625K-35	PP93035	WALL	93/09/21	Muscle	79.2	< 5.0	< 5.0	< 0.09	0.09

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	% Moisture H ₂ O	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba
0625K-36	PP93036	NRPK	93/09/21	Muscle	76.6	< 5.0	< 5.0	0.23	0.15
0625K-37	PP93037	NRPK	93/09/21	Muscle	77.0	< 5.0	< 5.0	0.13	0.19
0625K-38	PP93038	NRPK	93/09/21	Muscle	77.1	< 5.0	< 5.0	0.12	0.25
0625K-39	PP93039	NRPK	93/09/21	Muscle	77.6	< 5.0	< 5.0	0.06	0.20
0625K-40	DL93040	NRPK	93/09/21	Muscle	78.1	< 5.0	< 5.0	0.06	0.37
0625K-41	DL93041	NRPK	93/09/21	Muscle	80.5	< 5.0	< 5.0	0.08	0.49
0625K-42	DL93042	LKWH	93/09/21	Muscle	68.5	< 5.0	< 5.0	0.12	0.09
0625K-43	DL93043	LKWH	93/09/21	Muscle	73.9	< 5.0	< 5.0	0.06	0.19
0625K-44	DL93044	LKWH	93/09/21	Muscle	75.1	< 5.0	< 5.0	0.13	0.07
0625K-45	DL93045	LKWH	93/09/21	Muscle	73.4	< 5.0	< 5.0	0.08	0.27
0625K-46	DL93046	LKWH	93/09/21	Muscle	78.4	< 5.0	< 5.0	< 0.05	0.44
0625K-47	DL93047	LKWH	93/09/21	Muscle	73.8	< 5.0	< 5.0	0.09	< 0.05
0625K-48	DL93048	LKWH	93/09/21	Muscle	76.4	< 5.0	< 5.0	0.09	< 0.05

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	% Moisture H2O	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba
QAQC data									
0625K	Blank-1	-	94/01/09	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
0625K	Blank-2	-	94/01/09	Reagent Blank	-	< 0.15	< 0.15	0.004	< 0.001
0625K	Blank-3	-	94/01/09	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
0625K	Blank-1	-	94/01/16	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
0625K	Blank-2	-	94/01/16	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
0625K	Blank-3	-	94/01/16	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
0625K	TORT-1	Lobster	94/01/09	Tissue	-	-	-	20.0	-
0625K	TORT-1	Lobster	94/01/16	Tissue	-	-	-	24.3	-
0625K	TORT-1	Lobster		Tissue	-	-	-	24.6	-
0625K	DOLT-2	Dogfish	94/01/09	Liver	-	28.0	-	14.3	-
0625K	DOLT-2	Dogfish	94/01/16	Liver	-	18.0	-	13.0	-
0625K	DOLT-2	Dogfish		Liver	-	25.2	-	16.6	-
7894J	Blank-1	-	17/06/93	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
7894J	Blank-2	-	17/06/93	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
7894J	Blank-3	-	17/06/93	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
7894J	Blank-1	-	24/06/93	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
7894J	Blank-2	-	24/06/93	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
7894J	Blank-3	-	24/06/93	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
7894J	Blank-1	-	06/07/93	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
7894J	Blank-2	-	06/07/93	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
7894J	Blank-3	-	06/07/93	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	% Moisture H ₂ O	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba
QAQC Data									
7894J	Blank-1	-	24/07/93	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
7894J	Blank-2	-	24/07/93	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
7894J	Blank-3	-	24/07/93	Reagent Blank	-	< 0.15	< 0.15	< 0.001	< 0.001
7894J	TORT-1	Lobster	17/06/93	Tissue	-	-	-	24	-
7894J	TORT-1	Lobster	24/06/93	Tissue	-	-	-	24.3	-
7894J	TORT-1	Lobster	06/07/93	Tissue	-	-	-	22.3	-
7894J	TORT-1	Lobster	-	Tissue	-	-	-	24.6	-
7894J	DORM-1	Dogfish	17/06/93	Muscle	-	-	-	17.5	-
7894J	DORM-1	Dogfish	24/06/93	Muscle	-	-	-	15	-
7894J	DORM-1	Dogfish	06/07/93	Muscle	-	-	-	16.3	-
7894J	DORM-1	Dogfish	24/07/93	Muscle	-	-	-	15	-
7894J	DORM-1	Dogfish	-	Muscle	-	-	-	17.7	-
7894J	DOLT-2	Dogfish	17/06/93	Liver	-	18.5	-	14.8	-
7894J	DOLT-2	Dogfish	24/06/93	Liver	-	22.5	-	15	-
7894J	DOLT-2	Dogfish	06/07/93	Liver	-	20.8	-	16.3	-
7894J	DOLT-2	Dogfish	24/07/93	Liver	-	22.3	-	15	-
7894J	DOLT-2	Dogfish	-	Liver	-	25.2	-	16.6	-

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Beryllium Be	Bismuth Bi	Boron B	Cadmium Cd	Calcium Ca
-	1	LKWH	92/10/06	-	-	-	-	-	-
-	2	LKWH	92/10/06	-	-	-	-	-	-
-	3	LKWH	92/10/06	-	-	-	-	-	-
-	4	LKWH	92/10/06	-	-	-	-	-	-
-	5	LKWH	92/10/06	-	-	-	-	-	-
-	6	LKWH	92/10/06	-	-	-	-	-	-
-	7	LKWH	92/10/06	-	-	-	-	-	-
-	8	LKWH	92/10/06	-	-	-	-	-	-
-	9	LKWH	92/10/06	-	-	-	-	-	-
-	10	LKWH	92/10/06	-	-	-	-	-	-
7894J-101	11	WALL	92/10/06	Muscle	< 0.1	15	21.2	< 0.05	830
7894J-102	12	WALL	92/10/06	Muscle	< 0.1	15	29.6	< 0.05	450
7894J-103	13	WALL	92/10/06	Muscle	< 0.1	15	25.6	< 0.05	450
7894J-104	14	NRPK	92/10/06	Muscle	< 0.1	15	21.7	< 0.05	3600
7894J-105	15	NRPK	92/10/06	Muscle	< 0.1	15	27.5	< 0.05	6240
7894J-106	16	NRPK	92/10/06	Muscle	< 0.1	15	3.6	< 0.05	970
7894J-107	17	NRPK	92/10/06	Muscle	< 0.1	15	3.2	< 0.05	3810
7894J-108	18	NRPK	92/10/06	Muscle	< 0.1	15	0.5	< 0.05	1640
7894J-109	19	NRPK	92/10/06	Muscle	< 0.1	15	1.10	< 0.05	2590
7894J-110	20	NRPK	92/10/06	Muscle	< 0.1	15	0.5	< 0.05	1620
7894J-111	21	NRPK	92/10/06	Muscle	< 0.1	15	1.22	< 0.05	2120
7894J-112	22	NRPK	92/10/06	Muscle	< 0.1	15	1.04	< 0.05	3450
7894J-113	23	NRPK	92/10/06	Muscle	< 0.1	15	0.5	< 0.05	460

7894J-114	24	LKWH	92/10/06	Muscle	<	0.1	<	15	0.92	<	0.05	1620
7894J-115	25	LKWH	92/10/06	Muscle	<	0.1	<	15	0.92	<	0.05	1620
7894J-116	26	LKWH	92/10/06	Muscle	<	0.1	<	15	1.02	<	0.05	780
7894J-117	27	LKWH	92/10/06	Muscle	<	0.1	<	15	0.90	<	0.05	1010
7894J-118	28	LKWH	92/10/06	Muscle	<	0.1	<	15	1.69	<	0.05	940
7894J-119	29	LKWH	92/10/06	Muscle	<	0.1	<	15	1.03	<	0.05	1440
7894J-120	30	LKWH	92/10/06	Muscle	<	0.1	<	15	1.44	<	0.05	1380
7894J-121	31	LKWH	92/10/06	Muscle	<	0.1	<	15	1.08	<	0.11	2390
7894J-122	32	LKWH	92/10/06	Muscle	<	0.1	<	15	1.57	<	0.05	890
7894J-123	33	LKWH	92/10/06	Muscle	<	0.1	<	15	1.14	<	0.05	950
7894J-124	34	BRBT	92/10/06	Muscle	<	0.1	<	15	1.28	<	0.05	440
7894J-125	35	BRBT	92/10/06	Muscle	<	0.1	<	15	1.79	<	0.05	420
7894J-126	36	BRBT	92/10/06	Muscle	<	0.1	<	15	2.19	<	0.10	1620
7894J-127	37	BRBT	92/10/06	Muscle	<	0.1	<	15	1.28	<	0.05	420
7894J-128	38	BRBT	92/10/06	Muscle	<	0.1	<	15	1.49	<	0.05	480
7894J-129	39	BRBT	92/10/06	Muscle	<	0.1	<	15	1.41	<	0.15	480
7894J-130	40	BRBT	92/10/06	Muscle	<	0.1	<	15	1.04	<	0.08	490
7894J-131	41	BRBT	92/10/06	Muscle	<	0.1	<	15	1.47	<	0.05	2440
7894J-132	42	BRBT	92/10/06	Muscle	<	0.1	<	15	1.08	<	0.05	440
7894J-133	43	BRBT	92/10/06	Muscle	<	0.1	<	15	1.22	<	0.05	1160
7894J-134	44	LNSC	92/10/06	Muscle	<	0.1	<	15	1.35	<	0.05	1090
7894J-135	45	LNSC	92/10/06	Muscle	<	0.1	<	15	1.15	<	0.05	780

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Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Beryllium Be	Bismuth Bi	Boron B	Cadmium Cd	Calcium Ca
7894J-136	34	BRBT	92/10/06	Liver	<	15	1.11	<	170
7894J-137	35	BRBT	92/10/06	Liver	<	15	0.55	<	30
7894J-138	36	BRBT	92/10/06	Liver	<	15	0.64	<	120
7894J-139	37	BRBT	92/10/06	Liver	<	15	0.89	<	50
7894J-140	38	BRBT	92/10/06	Liver	<	15	0.55	<	40
7894J-141	39	BRBT	92/10/06	Liver	<	15	0.76	<	40
7894J-142	40	BRBT	92/10/06	Liver	<	15	1.61	<	40
7894J-143	41	BRBT	92/10/06	Liver	<	15	0.69	<	70
7894J-144	42	BRBT	92/10/06	Liver	<	15	1.49	<	220
7894J-145	43	BRBT	92/10/06	Liver	<	15	0.5	<	30
0625K-1	DL93001	BRBT	93/09/20	Muscle	<	-	1.8	<	448
0625K-2	DL93002	LNSC	93/09/20	Muscle	<	-	1.0	<	1210
0625K-3	DL93003	LKWH	93/09/20	Muscle	<	-	0.6	<	1010
0625K-4	DL93004	LKWH	93/09/20	Muscle	<	-	1.3	<	325
0625K-5	DL93005	LKWH	93/09/20	Muscle	<	-	1.1	<	1067
0625K-6	PP93006	BRBT	93/09/20	Muscle	<	-	0.8	<	445
0625K-7	PP93007	BRBT	93/09/20	Muscle	<	-	1.2	<	1980
0625K-8	PP93008	BRBT	93/09/20	Muscle	<	-	1.6	<	500
0625K-9	PP93009	BRBT	93/09/20	Muscle	<	-	4.2	<	1950
0625K-10	PP93010	BRBT	93/09/20	Muscle	<	-	1.5	<	1490

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Beryllium Be	Bismuth Bi	Boron B	Cadmium Cd	Calcium Ca
0625K-11	PP93011	BRBT	93/09/20	Muscle	<	-	1.4	<	460
0625K-12	PP93012	BRBT	93/09/20	Muscle	<	-	1.8	0.14	3070
0625K-13	PP93013	BRBT	93/09/20	Muscle	<	-	1.4	0.05	1750
0625K-14	PP93014	BRBT	93/09/20	Muscle	<	-	1.6	0.05	499
0625K-15	PP93015	BRBT	93/09/20	Muscle	<	-	2.2	0.05	2270
0625K-16	PP93016	NRPK	93/09/20	Muscle	<	-	2.5	0.05	2150
0625K-17	PP93017	NRPK	93/09/20	Muscle	<	-	2.1	0.05	2920
0625K-18	PP93018	NRPK	93/09/20	Muscle	<	-	1.1	0.05	2620
0625K-19	PP93019	NRPK	93/09/20	Muscle	<	-	1.5	0.05	1480
0625K-20	PP93020	LNSC	93/09/20	Muscle	<	-	2.0	0.05	790
0625K-21	PP93021	LNSC	93/09/20	Muscle	<	-	1.6	0.05	1230
0625K-22	PP93022	LNSC	93/09/20	Muscle	<	-	1.1	0.05	4200
0625K-23	PP93023	LNSC	93/09/20	Muscle	<	-	1.4	0.05	748
0625K-24	PP93024	LNSC	93/09/20	Muscle	<	-	0.9	0.05	1150
0625K-25	PP93025	LNSC	93/09/20	Muscle	<	-	1.7	0.05	1190
0625K-26	PP93026	LNSC	93/09/20	Muscle	<	-	1.3	0.05	1150
0625K-27	PP93027	LNSC	93/09/20	Muscle	<	-	1.3	0.05	971
0625K-28	PP93028	LNSC	93/09/20	Muscle	<	-	1.0	0.05	468
0625K-29	PP93029	LNSC	93/09/20	Muscle	<	-	1.9	0.05	1890
0625K-30	PP93030	WALL	93/09/20	Muscle	<	-	1.8	0.07	741
0625K-31	PP93031	WALL	93/09/21	Muscle	<	-	1.4	0.05	403
0625K-32	PP93032	WALL	93/09/21	Muscle	<	-	1.8	0.05	350
0625K-33	PP93033	WALL	93/09/21	Muscle	<	-	1.7	0.05	406
0625K-34	PP93034	WALL	93/09/21	Muscle	<	-	0.6	0.05	853
0625K-35	PP93035	WALL	93/09/21	Muscle	<	-	1.9	0.06	806

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Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Beryllium Be	Bismuth Bi	Boron B	Cadmium Cd	Calcium Ca
0625K-36	PP93036	NRPK	93/09/21	Muscle	< 0.1	-	1.4	< 0.05	1810
0625K-37	PP93037	NRPK	93/09/21	Muscle	< 0.1	-	1.8	< 0.05	1850
0625K-38	PP93038	NRPK	93/09/21	Muscle	< 0.1	-	1.7	< 0.05	2990
0625K-39	PP93039	NRPK	93/09/21	Muscle	< 0.1	-	0.9	< 0.06	2890
0625K-40	DL93040	NRPK	93/09/21	Muscle	< 0.1	-	1.2	< 0.08	4170
0625K-41	DL93041	NRPK	93/09/21	Muscle	< 0.1	-	1.7	< 0.05	3380
0625K-42	DL93042	LKWH	93/09/21	Muscle	< 0.1	-	0.7	< 0.05	428
0625K-43	DL93043	LKWH	93/09/21	Muscle	< 0.1	-	3.2	< 0.05	1880
0625K-44	DL93044	LKWH	93/09/21	Muscle	< 0.1	-	1.6	< 0.05	212
0625K-45	DL93045	LKWH	93/09/21	Muscle	< 0.1	-	1.7	< 0.05	1090
0625K-46	DL93046	LKWH	93/09/21	Muscle	< 0.1	-	1.3	< 0.09	2450
0625K-47	DL93047	LKWH	93/09/21	Muscle	< 0.1	-	1.5	< 0.05	237
0625K-48	DL93048	LKWH	93/09/21	Muscle	< 0.1	-	2.2	< 0.05	268

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Beryllium Be	Bismuth Bi	Boron B	Cadmium Cd	Calcium Ca
QAQC data									
0625K	Blank-1	-	94/01/09	Reagent Blank	< 0.003	< 0.5	0.027	< 0.001	0.014
0625K	Blank-2	-	94/01/09	Reagent Blank	< 0.003	< 0.5	0.016	< 0.001	< 0.01
0625K	Blank-3	-	94/01/09	Reagent Blank	< 0.003	< 0.5	0.015	< 0.001	< 0.014
0625K	Blank-1	-	94/01/16	Reagent Blank	< 0.003	< 0.5	0.019	< 0.001	0.051
0625K	Blank-2	-	94/01/16	Reagent Blank	< 0.003	< 0.5	< 0.01	< 0.001	< 0.01
0625K	Blank-3	-	94/01/16	Reagent Blank	< 0.003	< 0.5	0.01	< 0.001	< 0.01
0625K	TORT-1	Lobster	94/01/09	Tissue	-	-	-	24.5	8100
0625K	TORT-1	Lobster	94/01/16	Tissue	-	-	-	24.5	8100
0625K	TORT-1	Lobster		Tissue	-	-	-	26.3	8950
0625K	DOLT-2	Dogfish	94/01/09	Liver	-	-	-	20.3	-
0625K	DOLT-2	Dogfish	94/01/16	Liver	-	-	-	19.8	-
0625K	DOLT-2	Dogfish		Liver	-	-	-	20.8	-
7894J	Blank-1	-	17/06/93	Reagent Blank	< 0.003	< 0.5	0.018	< 0.001	0.034
7894J	Blank-2	-	17/06/93	Reagent Blank	< 0.003	< 0.5	0.022	< 0.001	0.054
7894J	Blank-3	-	17/06/93	Reagent Blank	< 0.003	< 0.5	0.048	< 0.001	0.091
7894J	Blank-1	-	24/06/93	Reagent Blank	< 0.003	< 0.5	< 0.01	< 0.001	< 0.01
7894J	Blank-2	-	24/06/93	Reagent Blank	< 0.003	< 0.5	0.016	< 0.001	< 0.01
7894J	Blank-3	-	24/06/93	Reagent Blank	< 0.003	< 0.5	< 0.01	< 0.001	< 0.01
7894J	Blank-1	-	06/07/93	Reagent Blank	< 0.003	< 0.5	< 0.01	< 0.001	< 0.01
7894J	Blank-2	-	06/07/93	Reagent Blank	< 0.003	< 0.5	< 0.01	< 0.001	< 0.01
7894J	Blank-3	-	06/07/93	Reagent Blank	< 0.003	< 0.5	< 0.01	< 0.001	< 0.01

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Beryllium Be	Bismuth Bi	Boron B	Cadmium Cd	Calcium Ca
QAQC Data									
7894J	Blank-1	-	24/07/93	Reagent Blank	< 0.003	< 0.5	0.034	< 0.001	0.051
7894J	Blank-2	-	24/07/93	Reagent Blank	< 0.003	< 0.5	0.012	< 0.001	0.1
7894J	Blank-3	-	24/07/93	Reagent Blank	< 0.003	< 0.5	0.031	< 0.001	0.047
7894J	TORT-1	Lobster	17/06/93	Tissue	-	-	-	26.8	8750
7894J	TORT-1	Lobster	24/06/93	Tissue	-	-	-	23.5	8630
7894J	TORT-1	Lobster	06/07/93	Tissue	-	-	-	28.5	8950
7894J	TORT-1	Lobster	-	Tissue	-	-	-	26.3	8950
7894J	DORM-1	Dogfish	17/06/93	Muscle	-	-	-	0.1	-
7894J	DORM-1	Dogfish	24/06/93	Muscle	-	-	-	0.07	-
7894J	DORM-1	Dogfish	06/07/93	Muscle	-	-	-	0.1	-
7894J	DORM-1	Dogfish	24/07/93	Muscle	-	-	-	0.08	-
7894J	DORM-1	Dogfish	-	Muscle	-	-	-	0.086	-
7894J	DOLT-2	Dogfish	17/06/93	Liver	-	-	-	21	-
7894J	DOLT-2	Dogfish	24/06/93	Liver	-	-	-	20.3	-
7894J	DOLT-2	Dogfish	06/07/93	Liver	-	-	-	20.8	-
7894J	DOLT-2	Dogfish	24/07/93	Liver	-	-	-	21.5	-
7894J	DOLT-2	Dogfish	-	Liver	-	-	-	20.8	-

FORT RESOLUTION MONITORING PROGRAM

Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
-	1	LKWH	92/10/06	-	-	-	-	-	-
-	2	LKWH	92/10/06	-	-	-	-	-	-
-	3	LKWH	92/10/06	-	-	-	-	-	-
-	4	LKWH	92/10/06	-	-	-	-	-	-
-	5	LKWH	92/10/06	-	-	-	-	-	-
-	6	LKWH	92/10/06	-	-	-	-	-	-
-	7	LKWH	92/10/06	-	-	-	-	-	-
-	8	LKWH	92/10/06	-	-	-	-	-	-
-	9	LKWH	92/10/06	-	-	-	-	-	-
-	10	LKWH	92/10/06	-	-	-	-	-	-
7894J-101	11	WALL	92/10/06	Muscle	< 1.5	< 0.5	0.69	8.4	< 0.05
7894J-102	12	WALL	92/10/06	Muscle	< 1.5	< 0.5	0.82	9.5	< 0.05
7894J-103	13	WALL	92/10/06	Muscle	< 1.5	< 0.5	0.93	10.3	< 0.05
7894J-104	14	NRPK	92/10/06	Muscle	< 1.5	< 0.5	0.40	5.5	< 0.05
7894J-105	15	NRPK	92/10/06	Muscle	< 1.5	< 0.5	0.77	7.8	< 0.05
7894J-106	16	NRPK	92/10/06	Muscle	< 1.5	< 0.5	1.47	12.3	0.14
7894J-107	17	NRPK	92/10/06	Muscle	< 1.5	< 0.5	0.72	7.6	0.08
7894J-108	18	NRPK	92/10/06	Muscle	< 1.5	< 0.5	0.75	9.2	< 0.05
7894J-109	19	NRPK	92/10/06	Muscle	< 1.5	< 0.5	0.57	8.3	< 0.05
7894J-110	20	NRPK	92/10/06	Muscle	< 1.5	< 0.5	1.04	9.2	< 0.05
7894J-111	21	NRPK	92/10/06	Muscle	< 1.5	< 0.5	0.74	5.2	< 0.05
7894J-112	22	NRPK	92/10/06	Muscle	< 1.5	< 0.5	0.91	7.5	< 0.05
7894J-113	23	NRPK	92/10/06	Muscle	< 1.5	< 0.5	0.90	6.4	0.09

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
7894J-114	24	LKWH	92/10/06	Muscle	< 1.5	< 0.5	1.36	9.2	0.41
7894J-115	25	LKWH	92/10/06	Muscle	< 1.5	< 0.5	0.96	10.4	< 0.05
7894J-116	26	LKWH	92/10/06	Muscle	< 1.5	< 0.5	0.41	8.3	< 0.05
7894J-117	27	LKWH	92/10/06	Muscle	< 1.5	< 0.5	1.29	13.7	< 0.05
7894J-118	28	LKWH	92/10/06	Muscle	< 1.5	< 0.5	0.66	7.8	< 0.05
7894J-119	29	LKWH	92/10/06	Muscle	< 1.5	< 0.5	1.45	12.0	< 0.05
7894J-120	30	LKWH	92/10/06	Muscle	< 1.5	< 0.5	0.68	13.6	< 0.05
7894J-121	31	LKWH	92/10/06	Muscle	< 1.5	< 0.5	0.71	10.5	< 0.05
7894J-122	32	LKWH	92/10/06	Muscle	< 1.5	< 0.5	1.17	8.0	< 0.05
7894J-123	33	LKWH	92/10/06	Muscle	< 1.5	< 0.5	1.02	10.2	< 0.05
7894J-124	34	BRBT	92/10/06	Muscle	< 1.5	< 0.5	1.05	13.4	< 0.05
7894J-125	35	BRBT	92/10/06	Muscle	< 1.5	< 0.5	1.66	9.9	< 0.05
7894J-126	36	BRBT	92/10/06	Muscle	< 1.5	< 0.5	2.34	98.2	< 0.05
7894J-127	37	BRBT	92/10/06	Muscle	< 1.5	< 0.5	1.92	13.3	< 0.05
7894J-128	38	BRBT	92/10/06	Muscle	< 1.5	< 0.5	2.08	11.2	< 0.05
7894J-129	39	BRBT	92/10/06	Muscle	< 1.5	< 0.5	0.92	9.2	< 0.05
7894J-130	40	BRBT	92/10/06	Muscle	< 1.5	< 0.5	1.04	8.6	< 0.05
7894J-131	41	BRBT	92/10/06	Muscle	< 1.5	< 0.5	1.19	16.7	< 0.05
7894J-132	42	BRBT	92/10/06	Muscle	< 1.5	< 0.5	1.03	13.8	< 0.05
7894J-133	43	BRBT	92/10/06	Muscle	< 1.5	< 0.5	0.97	13.7	< 0.05
7894J-134	44	LNSC	92/10/06	Muscle	< 1.5	< 0.5	2.30	25.6	0.52
7894J-135	45	LNSC	92/10/06	Muscle	< 1.5	< 0.5	1.64	20.0	0.05

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
7894J-136	34	BRBT	92/10/06	Liver	< 1.5	0.5	4.03	133.3	< 0.05
7894J-137	35	BRBT	92/10/06	Liver	< 1.5	0.5	5.55	24.8	< 0.05
7894J-138	36	BRBT	92/10/06	Liver	< 1.5	0.5	13.5	49.3	< 0.05
7894J-139	37	BRBT	92/10/06	Liver	< 1.5	0.5	14.4	51.3	< 0.05
7894J-140	38	BRBT	92/10/06	Liver	< 1.5	0.5	8.21	23.4	< 0.05
7894J-141	39	BRBT	92/10/06	Liver	< 1.5	0.5	19.2	43.4	< 0.05
7894J-142	40	BRBT	92/10/06	Liver	< 1.5	0.5	7.39	29.9	< 0.05
7894J-143	41	BRBT	92/10/06	Liver	< 1.5	0.5	3.53	66.0	< 0.05
7894J-144	42	BRBT	92/10/06	Liver	< 1.5	0.5	24.7	435.9	< 0.05
7894J-145	43	BRBT	92/10/06	Liver	< 1.5	0.5	17.2	34.6	< 0.05
0625K-1	DL93001	BRBT	93/09/20	Muscle	< 1.5	0.5	2.90	17	< 0.05
0625K-2	DL93002	LNSC	93/09/20	Muscle	< 1.5	0.5	2.32	26	0.20
0625K-3	DL93003	LKWH	93/09/20	Muscle	< 1.5	0.5	0.98	26	0.11
0625K-4	DL93004	LKWH	93/09/20	Muscle	< 1.5	0.5	1.60	15	0.06
0625K-5	DL93005	LKWH	93/09/20	Muscle	< 1.5	0.5	0.92	17.3	< 0.05
0625K-6	PP93006	BRBT	93/09/20	Muscle	< 1.5	0.5	1.02	7.6	< 0.05
0625K-7	PP93007	BRBT	93/09/20	Muscle	< 1.5	0.5	1.07	15.8	0.07
0625K-8	PP93008	BRBT	93/09/20	Muscle	< 1.5	0.5	1.36	30.4	0.19
0625K-9	PP93009	BRBT	93/09/20	Muscle	< 1.5	0.5	1.34	7.7	< 0.05
0625K-10	PP93010	BRBT	93/09/20	Muscle	< 1.5	0.5	1.72	7.3	< 0.05

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
0625K-11	PP93011	BRBT	93/09/20	Muscle	< 1.5	< 0.5	2.03	17.5	< 0.05
0625K-12	PP93012	BRBT	93/09/20	Muscle	< 1.5	< 0.5	1.36	7.4	< 0.05
0625K-13	PP93013	BRBT	93/09/20	Muscle	< 1.5	< 0.5	1.54	17.5	0.19
0625K-14	PP93014	BRBT	93/09/20	Muscle	< 1.5	< 0.5	1.30	8.4	< 0.05
0625K-15	PP93015	BRBT	93/09/20	Muscle	< 1.5	< 0.5	1.42	10.8	< 0.05
0625K-16	PP93016	NRPK	93/09/20	Muscle	< 1.5	< 0.5	1.09	7.0	< 0.05
0625K-17	PP93017	NRPK	93/09/20	Muscle	< 1.5	< 0.5	1.05	5.5	< 0.05
0625K-18	PP93018	NRPK	93/09/20	Muscle	< 1.5	< 0.5	1.01	5.5	< 0.05
0625K-19	PP93019	NRPK	93/09/20	Muscle	< 1.5	< 0.5	1.13	8.3	0.15
0625K-20	PP93020	LNSC	93/09/20	Muscle	< 1.5	< 0.5	2.28	11.1	< 0.05
0625K-21	PP93021	LNSC	93/09/20	Muscle	< 1.5	< 0.5	1.72	15	< 0.05
0625K-22	PP93022	LNSC	93/09/20	Muscle	< 1.5	< 0.5	3.41	32	< 0.05
0625K-23	PP93023	LNSC	93/09/20	Muscle	< 1.5	< 0.5	1.96	13	0.11
0625K-24	PP93024	LNSC	93/09/20	Muscle	< 1.5	< 0.5	4.41	43	< 0.05
0625K-25	PP93025	LNSC	93/09/20	Muscle	< 1.5	< 0.5	2.27	19.4	< 0.05
0625K-26	PP93026	LNSC	93/09/20	Muscle	< 1.5	< 0.5	3.48	17.0	0.08
0625K-27	PP93027	LNSC	93/09/20	Muscle	< 1.5	< 0.5	1.58	17.1	0.05
0625K-28	PP93028	LNSC	93/09/20	Muscle	< 1.5	< 0.5	1.40	8.0	< 0.05
0625K-29	PP93029	LNSC	93/09/20	Muscle	< 1.5	< 0.5	2.67	17.8	< 0.05
0625K-30	PP93030	WALL	93/09/20	Muscle	< 1.5	< 0.5	1.16	6.6	0.09
0625K-31	PP93031	WALL	93/09/21	Muscle	< 1.5	< 0.5	0.97	8.2	< 0.05
0625K-32	PP93032	WALL	93/09/21	Muscle	< 1.5	< 0.5	1.38	9.3	< 0.05
0625K-33	PP93033	WALL	93/09/21	Muscle	< 1.5	< 0.5	1.35	15.3	< 0.05
0625K-34	PP93034	WALL	93/09/21	Muscle	< 1.5	< 0.5	1.30	13.0	< 0.05
0625K-35	PP93035	WALL	93/09/21	Muscle	< 1.5	< 0.5	1.83	5.9	< 0.05

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
0625K-36	PP93036	NRPK	93/09/21	Muscle	< 1.5	0.5	1.57	6.9	< 0.05
0625K-37	PP93037	NRPK	93/09/21	Muscle	< 1.5	0.5	1.07	7.3	< 0.05
0625K-38	PP93038	NRPK	93/09/21	Muscle	< 1.5	0.5	1.40	4.7	< 0.05
0625K-39	PP93039	NRPK	93/09/21	Muscle	< 1.5	0.5	0.98	8.5	< 0.05
0625K-40	DL93040	NRPK	93/09/21	Muscle	< 1.5	0.5	1.33	8.1	< 0.05
0625K-41	DL93041	NRPK	93/09/21	Muscle	< 1.5	0.5	1.67	11.8	< 0.05
0625K-42	DL93042	LKWH	93/09/21	Muscle	< 1.5	0.5	0.99	9.6	< 0.05
0625K-43	DL93043	LKWH	93/09/21	Muscle	< 1.5	0.5	1.06	6.0	< 0.05
0625K-44	DL93044	LKWH	93/09/21	Muscle	< 1.5	0.5	2.29	22.6	< 0.05
0625K-45	DL93045	LKWH	93/09/21	Muscle	< 1.5	0.5	1.24	9.1	< 0.05
0625K-46	DL93046	LKWH	93/09/21	Muscle	< 1.5	0.5	0.97	6.4	< 0.05
0625K-47	DL93047	LKWH	93/09/21	Muscle	< 1.5	0.5	2.04	19.3	< 0.05
0625K-48	DL93048	LKWH	93/09/21	Muscle	< 1.5	0.5	1.82	17.0	< 0.05

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
QAQC data									
0625K	Blank-1	-	94/01/09	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	< 0.001
0625K	Blank-2	-	94/01/09	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	< 0.001
0625K	Blank-3	-	94/01/09	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	< 0.001
0625K	Blank-1	-	94/01/16	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	0.002
0625K	Blank-2	-	94/01/16	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	0.001
0625K	Blank-3	-	94/01/16	Reagent Blank	< 0.03	< 0.02	0.016	< 0.03	0.001
0625K	TORT-1	Lobster	94/01/09	Tissue	2.13	1	393	176	11.5
0625K	TORT-1	Lobster	94/01/16	Tissue	1.9	1	393	172	10.8
0625K	TORT-1	Lobster		Tissue	2.4	0.42	439	186	10.4
0625K	DOLT-2	Dogfish	94/01/09	Liver	< 1.5	1	27.3	1060	0.20
0625K	DOLT-2	Dogfish	94/01/16	Liver	< 1.5	1	26.5	1040	0.30
0625K	DOLT-2	Dogfish		Liver	0.37	0.24	25.8	1103	0.22
7894J	Blank-1	-	17/06/93	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	< 0.001
7894J	Blank-2	-	17/06/93	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	0.004
7894J	Blank-3	-	17/06/93	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	0.001
7894J	Blank-1	-	24/06/93	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	0.004
7894J	Blank-2	-	24/06/93	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	0.003
7894J	Blank-3	-	24/06/93	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	0.003
7894J	Blank-1	-	06/07/93	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	0.001
7894J	Blank-2	-	06/07/93	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	0.001
7894J	Blank-3	-	06/07/93	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	0.001

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
QAQC Data									
7894J	Blank-1	-	24/07/93	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	0.002
7894J	Blank-2	-	24/07/93	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	0.002
7894J	Blank-3	-	24/07/93	Reagent Blank	< 0.03	< 0.02	< 0.01	< 0.03	0.002
7894J	TORT-1	Lobster	17/06/93	Tissue	2.2	1	408	182	10.6
7894J	TORT-1	Lobster	24/06/93	Tissue	2.2	1	400	162	9.5
7894J	TORT-1	Lobster	06/07/93	Tissue	2.1	1	423	181	9.25
7894J	TORT-1	Lobster	-	Tissue	2.4	0.42	439	186	10.4
7894J	DORM-1	Dogfish	17/06/93	Muscle	3	1	5.5	63.8	0.35
7894J	DORM-1	Dogfish	24/06/93	Muscle	3	1	5	63.5	0.4
7894J	DORM-1	Dogfish	06/07/93	Muscle	3.5	1	5.5	63.5	0.3
7894J	DORM-1	Dogfish	24/07/93	Muscle	3.25	-	5	70	0.38
7894J	DORM-1	Dogfish	-	Muscle	3.6	0.49	5.22	63.6	0.4
7894J	DOLT-2	Dogfish	17/06/93	Liver	1.5	1	22	1150	0.18
7894J	DOLT-2	Dogfish	24/06/93	Liver	1.5	1	26.3	978	0.25
7894J	DOLT-2	Dogfish	06/07/93	Liver	1.5	1	25	963	0.25
7894J	DOLT-2	Dogfish	24/07/93	Liver	1.5	1	23.5	1010	0.2
7894J	DOLT-2	Dogfish	-	Liver	0.37	0.24	25.8	1103	0.22

FORT RESOLUTION MONITORING PROGRAM

Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
-	1	LKWH	92/10/06	-	-	-	-	-	-
-	2	LKWH	92/10/06	-	-	-	-	-	-
-	3	LKWH	92/10/06	-	-	-	-	-	-
-	4	LKWH	92/10/06	-	-	-	-	-	-
-	5	LKWH	92/10/06	-	-	-	-	-	-
-	6	LKWH	92/10/06	-	-	-	-	-	-
-	7	LKWH	92/10/06	-	-	-	-	-	-
-	8	LKWH	92/10/06	-	-	-	-	-	-
-	9	LKWH	92/10/06	-	-	-	-	-	-
-	10	LKWH	92/10/06	-	-	-	-	-	-
7894J-101	11	WALL	92/10/06	Muscle	1360	0.37	0.658	< 1.0	< 0.25
7894J-102	12	WALL	92/10/06	Muscle	1370	0.32	0.068	< 1.0	< 0.25
7894J-103	13	WALL	92/10/06	Muscle	1250	0.30	2.608	< 1.0	< 0.25
7894J-104	14	NRPK	92/10/06	Muscle	1350	1.14	0.773	< 1.0	< 0.25
7894J-105	15	NRPK	92/10/06	Muscle	1430	1.77	1.013	< 1.0	< 0.25
7894J-106	16	NRPK	92/10/06	Muscle	1450	0.66	0.996	< 1.0	< 0.25
7894J-107	17	NRPK	92/10/06	Muscle	1500	0.68	0.722	< 1.0	< 0.25
7894J-108	18	NRPK	92/10/06	Muscle	1420	0.48	1.716	< 1.0	< 0.25
7894J-109	19	NRPK	92/10/06	Muscle	1390	0.95	1.308	< 1.0	< 0.25
7894J-110	20	NRPK	92/10/06	Muscle	1430	0.85	0.858	< 1.0	< 0.25
7894J-111	21	NRPK	92/10/06	Muscle	1400	0.83	0.698	< 1.0	< 0.25
7894J-112	22	NRPK	92/10/06	Muscle	1430	1.49	1.576	< 1.0	< 0.25
7894J-113	23	NRPK	92/10/06	Muscle	1400	0.34	1.160	< 1.0	< 0.25

FORT RESOLUTION MONITORING PROGRAM

Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
7894J-114	24	LKWH	92/10/06	Muscle	980	0.57	0.852	< 1.0	< 0.25
7894J-115	25	LKWH	92/10/06	Muscle	940	0.54	0.077	< 1.0	< 0.25
7894J-116	26	LKWH	92/10/06	Muscle	760	0.57	0.891	< 1.0	< 0.25
7894J-117	27	LKWH	92/10/06	Muscle	770	0.55	0.063	< 1.0	< 0.25
7894J-118	28	LKWH	92/10/06	Muscle	690	0.7	0.087	< 1.0	< 0.25
7894J-119	29	LKWH	92/10/06	Muscle	930	0.76	0.062	< 1.0	< 0.25
7894J-120	30	LKWH	92/10/06	Muscle	710	0.50	0.101	< 1.0	< 0.25
7894J-121	31	LKWH	92/10/06	Muscle	670	0.65	0.037	< 1.0	< 0.25
7894J-122	32	LKWH	92/10/06	Muscle	820	0.61	0.095	< 1.0	< 0.25
7894J-123	33	LKWH	92/10/06	Muscle	850	0.51	0.072	< 1.0	< 0.25
7894J-124	34	BRBT	92/10/06	Muscle	1200	0.93	0.496	< 1.0	< 0.25
7894J-125	35	BRBT	92/10/06	Muscle	1200	0.67	0.808	< 1.0	< 0.25
7894J-126	36	BRBT	92/10/06	Muscle	1200	2.64	0.498	< 1.0	< 0.25
7894J-127	37	BRBT	92/10/06	Muscle	1130	1.13	0.738	< 1.0	< 0.25
7894J-128	38	BRBT	92/10/06	Muscle	1190	0.91	0.534	< 1.0	< 0.25
7894J-129	39	BRBT	92/10/06	Muscle	1370	0.65	0.496	< 1.0	0.27
7894J-130	40	BRBT	92/10/06	Muscle	1180	0.85	0.707	< 1.0	< 0.25
7894J-131	41	BRBT	92/10/06	Muscle	1200	1.03	0.813	< 1.0	< 0.25
7894J-132	42	BRBT	92/10/06	Muscle	1220	1.03	0.724	< 1.0	< 0.25
7894J-133	43	BRBT	92/10/06	Muscle	1480	0.87	0.799	< 1.0	< 0.25
7894J-134	44	LNSC	92/10/06	Muscle	1150	0.70	0.165	< 1.0	< 0.25
7894J-135	45	LNSC	92/10/06	Muscle	1140	0.57	0.296	< 1.0	< 0.25

FORT RESOLUTION MONITORING PROGRAM

Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
7894J-136	34	BRBT	92/10/06	Liver	250	1.73	0.038	<	0.25
7894J-137	35	BRBT	92/10/06	Liver	130	0.77	0.031	<	0.25
7894J-138	36	BRBT	92/10/06	Liver	150	0.94	0.017	<	0.25
7894J-139	37	BRBT	92/10/06	Liver	110	0.60	0.028	<	0.25
7894J-140	38	BRBT	92/10/06	Liver	170	1.35	0.020	<	0.25
7894J-141	39	BRBT	92/10/06	Liver	200	1.12	0.027	<	0.25
7894J-142	40	BRBT	92/10/06	Liver	150	0.98	0.031	<	0.25
7894J-143	41	BRBT	92/10/06	Liver	250	1.68	0.070	<	0.25
7894J-144	42	BRBT	92/10/06	Liver	400	2.66	0.144	<	0.25
7894J-145	43	BRBT	92/10/06	Liver	120	1.31	0.103	<	0.25
0625K-1	DL93001	BRBT	93/09/20	Muscle	1280	0.86	0.761	<	0.25
0625K-2	DL93002	LNSC	93/09/20	Muscle	1170	0.60	0.192	<	0.25
0625K-3	DL93003	LKWH	93/09/20	Muscle	759	0.65	0.068	<	0.25
0625K-4	DL93004	LKWH	93/09/20	Muscle	1090	0.52	0.087	<	0.25
0625K-5	DL93005	LKWH	93/09/20	Muscle	834	0.63	0.081	<	0.25
0625K-6	PP93006	BRBT	93/09/20	Muscle	1220	0.89	0.561	<	0.25
0625K-7	PP93007	BRBT	93/09/20	Muscle	1370	1.30	0.691	<	0.25
0625K-8	PP93008	BRBT	93/09/20	Muscle	1230	0.89	0.593	<	0.25
0625K-9	PP93009	BRBT	93/09/20	Muscle	1240	0.96	0.488	<	0.25
0625K-10	PP93010	BRBT	93/09/20	Muscle	1151	0.72	0.573	<	0.25

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
0625K-11	PP93011	BRBT	93/09/20	Muscle	1070	0.71	0.653	<	0.3
0625K-12	PP93012	BRBT	93/09/20	Muscle	1250	0.86	0.564	<	0.25
0625K-13	PP93013	BRBT	93/09/20	Muscle	1210	0.77	0.617	<	0.25
0625K-14	PP93014	BRBT	93/09/20	Muscle	1310	1.17	0.595	<	0.4
0625K-15	PP93015	BRBT	93/09/20	Muscle	1330	1.22	0.421	<	0.25
0625K-16	PP93016	NRPK	93/09/20	Muscle	1360	0.48	0.730	<	0.25
0625K-17	PP93017	NRPK	93/09/20	Muscle	1390	1.01	0.747	<	0.25
0625K-18	PP93018	NRPK	93/09/20	Muscle	1440	0.55	0.447	<	0.25
0625K-19	PP93019	NRPK	93/09/20	Muscle	1450	0.70	0.524	<	0.25
0625K-20	PP93020	LNSC	93/09/20	Muscle	1070	0.6	0.178	<	0.25
0625K-21	PP93021	LNSC	93/09/20	Muscle	1330	0.56	0.236	<	0.25
0625K-22	PP93022	LNSC	93/09/20	Muscle	1070	0.89	0.362	<	0.25
0625K-23	PP93023	LNSC	93/09/20	Muscle	1270	0.74	0.151	<	0.25
0625K-24	PP93024	LNSC	93/09/20	Muscle	962	0.62	0.136	<	0.25
0625K-25	PP93025	LNSC	93/09/20	Muscle	1070	0.51	0.174	<	0.25
0625K-26	PP93026	LNSC	93/09/20	Muscle	1430	0.53	0.279	<	0.25
0625K-27	PP93027	LNSC	93/09/20	Muscle	1300	0.77	0.195	<	0.25
0625K-28	PP93028	LNSC	93/09/20	Muscle	1250	0.64	0.196	<	0.25
0625K-29	PP93029	LNSC	93/09/20	Muscle	1230	0.89	0.285	<	0.25
0625K-30	PP93030	WALL	93/09/20	Muscle	1280	0.26	0.633	<	0.25
0625K-31	PP93031	WALL	93/09/21	Muscle	1250	0.31	0.692	<	0.3
0625K-32	PP93032	WALL	93/09/21	Muscle	1250	0.31	0.985	<	0.25
0625K-33	PP93033	WALL	93/09/21	Muscle	1100	0.19	2.293	<	0.25
0625K-34	PP93034	WALL	93/09/21	Muscle	1300	0.22	1.104	<	0.25
0625K-35	PP93035	WALL	93/09/21	Muscle	1310	0.42	0.576	<	0.25

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
0625K-36	PP93036	NRPK	93/09/21	Muscle	1260	0.46	2.332	< 1.0	< 0.25
0625K-37	PP93037	NRPK	93/09/21	Muscle	1200	0.69	0.815	< 1.0	< 0.25
0625K-38	PP93038	NRPK	93/09/21	Muscle	1310	0.55	0.901	< 1.0	< 0.25
0625K-39	PP93039	NRPK	93/09/21	Muscle	1440	0.69	0.700	< 1.0	< 0.25
0625K-40	DL93040	NRPK	93/09/21	Muscle	1400	0.79	1.169	< 1.0	< 0.25
0625K-41	DL93041	NRPK	93/09/21	Muscle	1430	2.15	1.366	< 1.0	< 0.25
0625K-42	DL93042	LKWH	93/09/21	Muscle	785	0.39	0.052	< 1.0	< 0.25
0625K-43	DL93043	LKWH	93/09/21	Muscle	929	0.60	0.136	< 1.0	< 0.25
0625K-44	DL93044	LKWH	93/09/21	Muscle	863	0.64	0.147	< 1.0	< 0.25
0625K-45	DL93045	LKWH	93/09/21	Muscle	1050	0.66	0.086	< 1.0	< 0.25
0625K-46	DL93046	LKWH	93/09/21	Muscle	1340	1.01	0.129	< 1.0	< 0.25
0625K-47	DL93047	LKWH	93/09/21	Muscle	990	0.48	0.141	< 1.0	< 0.25
0625K-48	DL93048	LKWH	93/09/21	Muscle	1000	0.53	0.166	< 1.0	< 0.25

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Appendix 4: Fish Muscle and Liver, Biological Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
QAQC data									
0625K	Blank-1	-	94/01/09	Reagent Blank	0.028	< 0.003	< 0.001	< 0.04	< 0.005
0625K	Blank-2	-	94/01/09	Reagent Blank	0.026	< 0.003	< 0.001	< 0.04	< 0.005
0625K	Blank-3	-	94/01/09	Reagent Blank	0.028	< 0.003	< 0.001	< 0.04	< 0.005
0625K	Blank-1	-	94/01/16	Reagent Blank	0.030	< 0.003	< 0.001	< 0.04	< 0.005
0625K	Blank-2	-	94/01/16	Reagent Blank	0.028	< 0.003	< 0.001	< 0.04	< 0.005
0625K	Blank-3	-	94/01/16	Reagent Blank	0.028	< 0.003	< 0.001	< 0.04	< 0.005
0625K	TORT-1	Lobster	94/01/09	Tissue	2190	19.0	0.30	< 2.0	2.5
0625K	TORT-1	Lobster	94/01/16	Tissue	2100	19.3	0.31	< 2.0	1.8
0625K	TORT-1	Lobster		Tissue	2550	23.4	0.33	1.5	2.3
0625K	DOLT-2	Dogfish	94/01/09	Liver	-	5.50	2.07	-	0.30
0625K	DOLT-2	Dogfish	94/01/16	Liver	-	5.25	0.06	-	0.25
0625K	DOLT-2	Dogfish		Liver	-	6.88	1.99	-	0.20
7894J	Blank-1	-	17/06/93	Reagent Blank	0.026	< 0.003	< 0.0001	< 0.04	< 0.005
7894J	Blank-2	-	17/06/93	Reagent Blank	0.03	< 0.003	< 0.0001	< 0.04	< 0.005
7894J	Blank-3	-	17/06/93	Reagent Blank	0.033	< 0.003	< 0.0001	< 0.04	< 0.005
7894J	Blank-1	-	24/06/93	Reagent Blank	0.028	< 0.003	< 0.0001	< 0.04	< 0.005
7894J	Blank-2	-	24/06/93	Reagent Blank	0.034	< 0.003	< 0.0001	< 0.04	< 0.005
7894J	Blank-3	-	24/06/93	Reagent Blank	0.043	< 0.003	< 0.0001	< 0.04	< 0.005
7894J	Blank-1	-	06/07/93	Reagent Blank	0.028	< 0.003	< 0.0001	< 0.04	< 0.005
7894J	Blank-2	-	06/07/93	Reagent Blank	0.027	< 0.003	< 0.0001	< 0.04	< 0.005
7894J	Blank-3	-	06/07/93	Reagent Blank	0.03	< 0.003	< 0.0001	< 0.04	< 0.005

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
QAQC Data									
7894J	Blank-1	-	24/07/93	Reagent Blank	0.032	<	< 0.0001	< 0.04	< 0.005
7894J	Blank-2	-	24/07/93	Reagent Blank	0.036	<	< 0.0001	< 0.04	< 0.006
7894J	Blank-3	-	24/07/93	Reagent Blank	0.03	<	< 0.0001	< 0.04	< 0.005
7894J	TORT-1	Lobster	17/06/93	Tissue	2350	22.8	0.5	1.9	2.28
7894J	TORT-1	Lobster	24/06/93	Tissue	2130	19.8	0.45	2	2.15
7894J	TORT-1	Lobster	06/07/93	Tissue	2270	20.5	0.47	2	2.64
7894J	TORT-1	Lobster	-	Tissue	2550	23.4	0.33	1.5	2.3
7894J	DORM-1	Dogfish	17/06/93	Muscle	1120	1.1	0.8	-	1.1
7894J	DORM-1	Dogfish	24/06/93	Muscle	1060	0.95	0.78	-	0.93
7894J	DORM-1	Dogfish	06/07/93	Muscle	1080	1.3	0.7	-	0.9
7894J	DORM-1	Dogfish	24/07/93	Muscle	1100	1.15	0.78	-	1.2
7894J	DORM-1	Dogfish	-	Muscle	1210	1.32	0.798	-	1.2
7894J	DOLT-2	Dogfish	17/06/93	Liver	635	5.25	1.7	-	0.25
7894J	DOLT-2	Dogfish	24/06/93	Liver	-	5.3	1.7	-	0.3
7894J	DOLT-2	Dogfish	06/07/93	Liver	-	5.75	1.95	-	0.3
7894J	DOLT-2	Dogfish	24/07/93	Liver	-	6.25	2	-	0.27
7894J	DOLT-2	Dogfish	-	Liver	-	6.88	1.99	-	0.2

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Phosphorous PO4	Potassium K	Silver Ag	Sodium Na	Strontium Sr
-	1	LKWH	92/10/06	-	-	-	-	-	-
-	2	LKWH	92/10/06	-	-	-	-	-	-
-	3	LKWH	92/10/06	-	-	-	-	-	-
-	4	LKWH	92/10/06	-	-	-	-	-	-
-	5	LKWH	92/10/06	-	-	-	-	-	-
-	6	LKWH	92/10/06	-	-	-	-	-	-
-	7	LKWH	92/10/06	-	-	-	-	-	-
-	8	LKWH	92/10/06	-	-	-	-	-	-
-	9	LKWH	92/10/06	-	-	-	-	-	-
-	10	LKWH	92/10/06	-	-	-	-	-	-
7894J-101	11	WALL	92/10/06	Muscle	33400	19900	< 1.0	1250	0.66
7894J-102	12	WALL	92/10/06	Muscle	31500	19000	< 1.0	590	0.23
7894J-103	13	WALL	92/10/06	Muscle	34600	22400	< 1.0	1460	0.15
7894J-104	14	NRPK	92/10/06	Muscle	37500	19200	< 1.0	860	3.09
7894J-105	15	NRPK	92/10/06	Muscle	41300	20100	< 1.0	1470	5.21
7894J-106	16	NRPK	92/10/06	Muscle	34600	20300	< 1.0	470	0.81
7894J-107	17	NRPK	92/10/06	Muscle	38500	18900	< 1.0	1290	3.74
7894J-108	18	NRPK	92/10/06	Muscle	33500	18100	< 1.0	1090	1.23
7894J-109	19	NRPK	92/10/06	Muscle	33400	18900	< 1.0	1000	2.16
7894J-110	20	NRPK	92/10/06	Muscle	34500	18900	< 1.0	1960	1.38
7894J-111	21	NRPK	92/10/06	Muscle	34500	19000	< 1.0	1180	2.22
7894J-112	22	NRPK	92/10/06	Muscle	35800	19800	< 1.0	1170	3.48
7894J-113	23	NRPK	92/10/06	Muscle	31800	19900	< 1.0	2540	0.13

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Phosphorous PO4	Potassium K	Silver Ag	Sodium Na	Strontium Sr
7894J-114	24	LKWH	92/10/06	Muscle	25800	15200	<	1930	0.98
7894J-115	25	LKWH	92/10/06	Muscle	26100	15300	<	1660	3.16
7894J-116	26	LKWH	92/10/06	Muscle	20200	12400	<	570	1.24
7894J-117	27	LKWH	92/10/06	Muscle	22500	12900	<	1950	2.16
7894J-118	28	LKWH	92/10/06	Muscle	19200	11600	<	830	1.81
7894J-119	29	LKWH	92/10/06	Muscle	23700	14300	<	510	2.82
7894J-120	30	LKWH	92/10/06	Muscle	21000	12000	<	1060	2.49
7894J-121	31	LKWH	92/10/06	Muscle	20300	10500	<	980	4.26
7894J-122	32	LKWH	92/10/06	Muscle	21600	13700	<	1110	1.72
7894J-123	33	LKWH	92/10/06	Muscle	22800	13100	<	580	1.68
7894J-124	34	BRBT	92/10/06	Muscle	29000	20500	<	1170	0.35
7894J-125	35	BRBT	92/10/06	Muscle	30100	19000	<	1590	0.31
7894J-126	36	BRBT	92/10/06	Muscle	29800	18700	<	1500	2.49
7894J-127	37	BRBT	92/10/06	Muscle	28200	18200	<	1870	0.34
7894J-128	38	BRBT	92/10/06	Muscle	32100	20700	<	1440	0.43
7894J-129	39	BRBT	92/10/06	Muscle	30600	20500	<	1720	0.34
7894J-130	40	BRBT	92/10/06	Muscle	26800	17900	<	1800	0.51
7894J-131	41	BRBT	92/10/06	Muscle	32000	18700	<	2290	3.53
7894J-132	42	BRBT	92/10/06	Muscle	31800	20900	<	1810	0.39
7894J-133	43	BRBT	92/10/06	Muscle	34700	21500	<	2450	1.63
7894J-134	44	LNSC	92/10/06	Muscle	30200	18800	<	450	1.17
7894J-135	45	LNSC	92/10/06	Muscle	28300	17900	<	960	0.78

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Phosphorous PO4	Potassium K	Silver Ag	Sodium Na	Strontium Sr
7894J-136	34	BRBT	92/10/06	Liver	14000	4820	<	1290	0.35
7894J-137	35	BRBT	92/10/06	Liver	8300	3590	<	710	0.08
7894J-138	36	BRBT	92/10/06	Liver	9000	3400	<	960	0.24
7894J-139	37	BRBT	92/10/06	Liver	7000	3480	<	1180	0.11
7894J-140	38	BRBT	92/10/06	Liver	9600	4060	<	690	0.10
7894J-141	39	BRBT	92/10/06	Liver	11200	5080	<	1130	0.08
7894J-142	40	BRBT	92/10/06	Liver	8100	3760	<	780	0.08
7894J-143	41	BRBT	92/10/06	Liver	14400	5380	<	2350	0.12
7894J-144	42	BRBT	92/10/06	Liver	23700	7470	<	2380	0.37
7894J-145	43	BRBT	92/10/06	Liver	7500	3940	<	900	0.07
0625K-1	DL93001	BRBT	93/09/20	Muscle	31900	19300	<	2030	0.38
0625K-2	DL93002	LNSC	93/09/20	Muscle	32400	18000	<	1150	1.16
0625K-3	DL93003	LKWH	93/09/20	Muscle	23200	12500	<	1180	1.90
0625K-4	DL93004	LKWH	93/09/20	Muscle	27900	16000	<	1100	0.42
0625K-5	DL93005	LKWH	93/09/20	Muscle	24400	13600	<	983	1.79
0625K-6	PP93006	BRBT	93/09/20	Muscle	32000	19900	<	1630	0.31
0625K-7	PP93007	BRBT	93/09/20	Muscle	35400	19700	<	1420	2.60
0625K-8	PP93008	BRBT	93/09/20	Muscle	34600	19300	<	2020	0.56
0625K-9	PP93009	BRBT	93/09/20	Muscle	36700	20100	<	1430	2.78
0625K-10	PP93010	BRBT	93/09/20	Muscle	34800	18600	<	1870	2.04

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Phosphorous PO4	Potassium K	Silver Ag	Sodium Na	Strontium Sr
0625K-11	PP93011	BRBT	93/09/20	Muscle	32500	16900	<	2560	0.52
0625K-12	PP93012	BRBT	93/09/20	Muscle	37100	19700	<	2130	4.28
0625K-13	PP93013	BRBT	93/09/20	Muscle	35900	18300	<	1450	3.08
0625K-14	PP93014	BRBT	93/09/20	Muscle	33300	20800	<	1620	0.34
0625K-15	PP93015	BRBT	93/09/20	Muscle	36700	20300	<	1210	3.07
0625K-16	PP93016	NRPK	93/09/20	Muscle	36400	18700	<	1150	1.75
0625K-17	PP93017	NRPK	93/09/20	Muscle	38900	20700	<	618	2.93
0625K-18	PP93018	NRPK	93/09/20	Muscle	36400	19700	<	709	2.07
0625K-19	PP93019	NRPK	93/09/20	Muscle	33200	18900	<	1100	2.01
0625K-20	PP93020	LNSC	93/09/20	Muscle	28800	17000	<	830	0.61
0625K-21	PP93021	LNSC	93/09/20	Muscle	32300	19900	<	1010	1.16
0625K-22	PP93022	LNSC	93/09/20	Muscle	35300	17000	<	1150	4.43
0625K-23	PP93023	LNSC	93/09/20	Muscle	32400	19300	<	1100	0.57
0625K-24	PP93024	LNSC	93/09/20	Muscle	30500	16500	<	815	1.14
0625K-25	PP93025	LNSC	93/09/20	Muscle	29400	17100	<	1000	1.31
0625K-26	PP93026	LNSC	93/09/20	Muscle	33900	20100	<	972	1.13
0625K-27	PP93027	LNSC	93/09/20	Muscle	31200	19200	<	947	0.89
0625K-28	PP93028	LNSC	93/09/20	Muscle	28700	18300	<	640	0.20
0625K-29	PP93029	LNSC	93/09/20	Muscle	34900	20000	<	996	1.82
0625K-30	PP93030	WALL	93/09/20	Muscle	32200	19600	<	625	0.37
0625K-31	PP93031	WALL	93/09/21	Muscle	32800	21200	<	1110	0.05
0625K-32	PP93032	WALL	93/09/21	Muscle	32700	20700	<	1520	0.13
0625K-33	PP93033	WALL	93/09/21	Muscle	32300	20800	<	1300	0.37
0625K-34	PP93034	WALL	93/09/21	Muscle	34900	19900	<	1140	0.48
0625K-35	PP93035	WALL	93/09/21	Muscle	35200	20600	<	938	0.37

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data ($\mu\text{g/g dw}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Phosphorous PO ₄	Potassium K	Silver Ag	Sodium Na	Strontium Sr
0625K-36	PP93036	NRPK	93/09/21	Muscle	32400	15600	<	1470	3.10
0625K-37	PP93037	NRPK	93/09/21	Muscle	31600	16800	<	1110	1.49
0625K-38	PP93038	NRPK	93/09/21	Muscle	35600	18000	<	1240	2.58
0625K-39	PP93039	NRPK	93/09/21	Muscle	36200	19000	<	1460	2.69
0625K-40	DL93040	NRPK	93/09/21	Muscle	38800	19700	<	850	4.08
0625K-41	DL93041	NRPK	93/09/21	Muscle	38200	20600	<	857	2.01
0625K-42	DL93042	LKWH	93/09/21	Muscle	20600	12500	<	833	0.75
0625K-43	DL93043	LKWH	93/09/21	Muscle	31300	16100	<	1130	3.33
0625K-44	DL93044	LKWH	93/09/21	Muscle	27700	16100	<	1180	0.21
0625K-45	DL93045	LKWH	93/09/21	Muscle	29600	16300	<	1130	2.25
0625K-46	DL93046	LKWH	93/09/21	Muscle	37100	21900	<	1160	4.43
0625K-47	DL93047	LKWH	93/09/21	Muscle	28000	16000	<	1020	0.26
0625K-48	DL93048	LKWH	93/09/21	Muscle	27500	17400	<	973	0.32

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Phosphorous PO4	Potassium K	Silver Ag	Sodium Na	Strontium Sr
QAQC data									
0625K	Blank-1	-	94/01/09	Reagent Blank	<	<	<	<	<
0625K	Blank-2	-	94/01/09	Reagent Blank	<	<	<	<	<
0625K	Blank-3	-	94/01/09	Reagent Blank	<	<	<	<	<
0625K	Blank-1	-	94/01/16	Reagent Blank	<	<	<	<	<
0625K	Blank-2	-	94/01/16	Reagent Blank	<	<	<	<	<
0625K	Blank-3	-	94/01/16	Reagent Blank	<	<	<	<	<
0625K	TORT-1	Lobster	94/01/09	Tissue	26200	9300	-	33000	98.3
0625K	TORT-1	Lobster	94/01/16	Tissue	25800	9400	-	33500	98.5
0625K	TORT-1	Lobster		Tissue	26900	10400	-	36700	113
0625K	DOLT-2	Dogfish	94/01/09	Liver	-	-	-	-	-
0625K	DOLT-2	Dogfish	94/01/16	Liver	-	-	-	-	-
0625K	DOLT-2	Dogfish		Liver	-	-	-	-	-
7894J	Blank-1	-	17/06/93	Reagent Blank	<	<	<	<	<
7894J	Blank-2	-	17/06/93	Reagent Blank	<	<	<	<	<
7894J	Blank-3	-	17/06/93	Reagent Blank	<	<	<	<	<
7894J	Blank-1	-	24/06/93	Reagent Blank	<	<	<	<	<
7894J	Blank-2	-	24/06/93	Reagent Blank	<	<	<	<	<
7894J	Blank-3	-	24/06/93	Reagent Blank	<	<	<	<	<
7894J	Blank-1	-	06/07/93	Reagent Blank	<	0.38	<	<	<
7894J	Blank-2	-	06/07/93	Reagent Blank	<	0.11	<	<	<
7894J	Blank-3	-	06/07/93	Reagent Blank	<	0.27	<	<	<

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Phosphorous PO4	Potassium K	Silver Ag	Sodium Na	Strontium Sr
QAQC Data									
7894J	Blank-1	-	24/07/93	Reagent Blank	<	0.11	<	0.1	<
7894J	Blank-2	-	24/07/93	Reagent Blank	<	0.23	<	0.1	<
7894J	Blank-3	-	24/07/93	Reagent Blank	<	0.19	<	0.1	<
7894J	TORT-1	Lobster	17/06/93	Tissue	26300	-	-	32500	107
7894J	TORT-1	Lobster	24/06/93	Tissue	26300	-	-	36500	101
7894J	TORT-1	Lobster	06/07/93	Tissue	27000	10900	-	36500	107
7894J	TORT-1	Lobster	-	Tissue	26900	10400	-	36700	113
7894J	DORM-1	Dogfish	17/06/93	Muscle	-	-	-	7500	-
7894J	DORM-1	Dogfish	24/06/93	Muscle	-	-	-	8570	-
7894J	DORM-1	Dogfish	06/07/93	Muscle	-	13900	-	7530	-
7894J	DORM-1	Dogfish	24/07/93	Muscle	-	14100	-	7220	-
7894J	DORM-1	Dogfish	-	Muscle	-	15900	-	8000	-
7894J	DOLT-2	Dogfish	17/06/93	Liver	-	-	-	-	-
7894J	DOLT-2	Dogfish	24/06/93	Liver	-	-	-	-	-
7894J	DOLT-2	Dogfish	06/07/93	Liver	-	-	-	-	-
7894J	DOLT-2	Dogfish	24/07/93	Liver	-	-	-	-	-
7894J	DOLT-2	Dogfish	-	Liver	-	-	-	-	-

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn
-	1	LKWH	92/10/06	-	-	-	-	-
-	2	LKWH	92/10/06	-	-	-	-	-
-	3	LKWH	92/10/06	-	-	-	-	-
-	4	LKWH	92/10/06	-	-	-	-	-
-	5	LKWH	92/10/06	-	-	-	-	-
-	6	LKWH	92/10/06	-	-	-	-	-
-	7	LKWH	92/10/06	-	-	-	-	-
-	8	LKWH	92/10/06	-	-	-	-	-
-	9	LKWH	92/10/06	-	-	-	-	-
-	10	LKWH	92/10/06	-	-	-	-	-
7894J-101	11	WALL	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	19.4
7894J-102	12	WALL	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	29.1
7894J-103	13	WALL	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	16.2
7894J-104	14	NRPK	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	18.8
7894J-105	15	NRPK	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	21.1
7894J-106	16	NRPK	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	24.7
7894J-107	17	NRPK	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	20.4
7894J-108	18	NRPK	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	16.7
7894J-109	19	NRPK	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	15.5
7894J-110	20	NRPK	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	25.6
7894J-111	21	NRPK	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	13.5
7894J-112	22	NRPK	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	14.1
7894J-113	23	NRPK	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	15.9

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn
7894J-114	24	LKWH	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	9.5
7894J-115	25	LKWH	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	9.9
7894J-116	26	LKWH	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	8.0
7894J-117	27	LKWH	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	8.2
7894J-118	28	LKWH	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	6.9
7894J-119	29	LKWH	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	10.3
7894J-120	30	LKWH	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	8.7
7894J-121	31	LKWH	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	9.9
7894J-122	32	LKWH	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	8.6
7894J-123	33	LKWH	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	9.9
7894J-124	34	BRBT	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	16.9
7894J-125	35	BRBT	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	16.6
7894J-126	36	BRBT	92/10/06	Muscle	< 1.0	2.29	< 0.5	20.4
7894J-127	37	BRBT	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	17.7
7894J-128	38	BRBT	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	17.6
7894J-129	39	BRBT	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	14.1
7894J-130	40	BRBT	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	14.3
7894J-131	41	BRBT	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	18.6
7894J-132	42	BRBT	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	17.7
7894J-133	43	BRBT	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	22.9
7894J-134	44	LNSC	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	14.3
7894J-135	45	LNSC	92/10/06	Muscle	< 1.0	< 0.15	< 0.5	17.1

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn
7894J-136	34	BRBT	92/10/06	Liver	< 1.0	< 0.15	< 0.5	36.3
7894J-137	35	BRBT	92/10/06	Liver	< 1.0	< 0.15	< 0.5	18.8
7894J-138	36	BRBT	92/10/06	Liver	< 1.0	< 0.15	< 0.5	32.5
7894J-139	37	BRBT	92/10/06	Liver	< 1.0	< 0.15	< 0.5	27.7
7894J-140	38	BRBT	92/10/06	Liver	< 1.0	< 0.15	< 0.5	23.5
7894J-141	39	BRBT	92/10/06	Liver	< 1.0	< 0.15	< 0.5	37.2
7894J-142	40	BRBT	92/10/06	Liver	< 1.0	< 0.15	< 0.5	21.9
7894J-143	41	BRBT	92/10/06	Liver	< 1.0	< 0.15	< 0.5	28.5
7894J-144	42	BRBT	92/10/06	Liver	< 1.0	< 0.15	< 0.5	70.4
7894J-145	43	BRBT	92/10/06	Liver	< 1.0	< 0.15	< 0.5	26.8
0625K-1	DL93001	BRBT	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	25.2
0625K-2	DL93002	LNSC	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	17.2
0625K-3	DL93003	LKWH	93/09/20	Muscle	< 1.0	1.2	< 0.5	10.1
0625K-4	DL93004	LKWH	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	11.1
0625K-5	DL93005	LKWH	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	9.34
0625K-6	PP93006	BRBT	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	16.5
0625K-7	PP93007	BRBT	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	18.5
0625K-8	PP93008	BRBT	93/09/20	Muscle	< 1.0	1.1	< 0.5	22.9
0625K-9	PP93009	BRBT	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	17.7
0625K-10	PP93010	BRBT	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	18.9

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Appendix 4: Fish Muscle and Liver, Biological Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn
0625K-11	PP93011	BRBT	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	25.1
0625K-12	PP93012	BRBT	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	19.0
0625K-13	PP93013	BRBT	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	24.7
0625K-14	PP93014	BRBT	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	15.9
0625K-15	PP93015	BRBT	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	17.4
0625K-16	PP93016	NRPK	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	17.5
0625K-17	PP93017	NRPK	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	16.9
0625K-18	PP93018	NRPK	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	17.3
0625K-19	PP93019	NRPK	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	15.3
0625K-20	PP93020	LNSC	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	12.6
0625K-21	PP93021	LNSC	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	13.3
0625K-22	PP93022	LNSC	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	15.4
0625K-23	PP93023	LNSC	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	14.7
0625K-24	PP93024	LNSC	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	20.9
0625K-25	PP93025	LNSC	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	13.9
0625K-26	PP93026	LNSC	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	14.2
0625K-27	PP93027	LNSC	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	13.8
0625K-28	PP93028	LNSC	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	12.4
0625K-29	PP93029	LNSC	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	14.7
0625K-30	PP93030	WALL	93/09/20	Muscle	< 1.0	< 0.15	< 0.5	16.7
0625K-31	PP93031	WALL	93/09/21	Muscle	< 1.0	< 0.15	< 0.5	15.9
0625K-32	PP93032	WALL	93/09/21	Muscle	< 1.0	< 0.15	< 0.5	14.2
0625K-33	PP93033	WALL	93/09/21	Muscle	< 1.0	< 0.15	< 0.5	15.8
0625K-34	PP93034	WALL	93/09/21	Muscle	< 1.0	< 0.15	< 0.5	16.9
0625K-35	PP93035	WALL	93/09/21	Muscle	< 1.0	< 0.15	< 0.5	16.8

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Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn
0625K-36	PP93036	NRPK	93/09/21	Muscle	<	0.15	<	16.5
0625K-37	PP93037	NRPK	93/09/21	Muscle	<	0.15	<	17.6
0625K-38	PP93038	NRPK	93/09/21	Muscle	<	0.15	<	18.6
0625K-39	PP93039	NRPK	93/09/21	Muscle	<	0.15	<	17.1
0625K-40	DL93040	NRPK	93/09/21	Muscle	<	0.15	<	17.1
0625K-41	DL93041	NRPK	93/09/21	Muscle	<	0.15	<	18.1
0625K-42	DL93042	LKWH	93/09/21	Muscle	<	0.15	<	9.3
0625K-43	DL93043	LKWH	93/09/21	Muscle	<	0.15	<	11.0
0625K-44	DL93044	LKWH	93/09/21	Muscle	<	0.15	<	13.6
0625K-45	DL93045	LKWH	93/09/21	Muscle	<	0.15	<	9.3
0625K-46	DL93046	LKWH	93/09/21	Muscle	<	0.15	<	13.3
0625K-47	DL93047	LKWH	93/09/21	Muscle	<	0.15	<	11.9
0625K-48	DL93048	LKWH	93/09/21	Muscle	<	0.15	<	10.9

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Appendix 4: Fish Muscle and Liver, Biological Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn
QAQC data								
0625K	Blank-1	-	94/01/09	Reagent Blank	< 0.03	< 0.006	< 0.01	0.035
0625K	Blank-2	-	94/01/09	Reagent Blank	< 0.03	< 0.006	< 0.01	< 0.01
0625K	Blank-3	-	94/01/09	Reagent Blank	< 0.03	< 0.006	< 0.01	0.015
0625K	Blank-1	-	94/01/16	Reagent Blank	< 0.03	< 0.006	< 0.01	< 0.01
0625K	Blank-2	-	94/01/16	Reagent Blank	< 0.03	< 0.006	< 0.01	< 0.01
0625K	Blank-3	-	94/01/16	Reagent Blank	< 0.03	< 0.006	< 0.01	< 0.01
0625K	TORT-1	Lobster	94/01/09	Tissue	-	-	1.2	161
0625K	TORT-1	Lobster	94/01/16	Tissue	-	-	0.93	189
0625K	TORT-1	Lobster		Tissue	-	-	1.4	177
0625K	DOLT-2	Dogfish	94/01/09	Liver	-	-	-	87.5
0625K	DOLT-2	Dogfish	94/01/16	Liver	-	-	-	90.3
0625K	DOLT-2	Dogfish		Liver	-	-	-	85.8
7894J	Blank-1	-	17/06/93	Reagent Blank	< 0.03	< 0.006	< 0.01	0.013
7894J	Blank-2	-	17/06/93	Reagent Blank	< 0.03	< 0.006	< 0.01	< 0.01
7894J	Blank-3	-	17/06/93	Reagent Blank	< 0.03	< 0.006	< 0.01	< 0.01
7894J	Blank-1	-	24/06/93	Reagent Blank	< 0.03	< 0.006	< 0.01	< 0.01
7894J	Blank-2	-	24/06/93	Reagent Blank	< 0.03	< 0.006	< 0.01	< 0.01
7894J	Blank-3	-	24/06/93	Reagent Blank	< 0.03	< 0.006	< 0.01	< 0.01
7894J	Blank-1	-	06/07/93	Reagent Blank	< 0.03	< 0.006	< 0.01	< 0.01
7894J	Blank-2	-	06/07/93	Reagent Blank	< 0.03	< 0.006	< 0.01	< 0.01
7894J	Blank-3	-	06/07/93	Reagent Blank	< 0.03	< 0.006	< 0.01	< 0.01

FORT RESOLUTION MONITORING PROGRAM

Appendix 4: Fish Muscle and Liver, Biological
Descriptors, and Metal Data (µg/g dw)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn
QAQC Data								
7894J	Blank-1	-	24/07/93	Reagent Blank	< 0.03	< 0.006	< 0.01	0.021
7894J	Blank-2	-	24/07/93	Reagent Blank	< 0.03	< 0.006	< 0.01	0.02
7894J	Blank-3	-	24/07/93	Reagent Blank	< 0.03	< 0.006	< 0.01	< 0.01
7894J	TORT-1	Lobster	17/06/93	Tissue	-	-	1.15	164
7894J	TORT-1	Lobster	24/06/93	Tissue	-	-	0.78	154
7894J	TORT-1	Lobster	06/07/93	Tissue	-	-	1.1	181
7894J	TORT-1	Lobster	-	Tissue	-	-	1.4	177
7894J	DORM-1	Dogfish	17/06/93	Muscle	-	-	-	19.8
7894J	DORM-1	Dogfish	24/06/93	Muscle	-	-	-	21.5
7894J	DORM-1	Dogfish	06/07/93	Muscle	-	-	-	18.8
7894J	DORM-1	Dogfish	24/07/93	Muscle	-	-	-	20
7894J	DORM-1	Dogfish	-	Muscle	-	-	-	21.3
7894J	DOLT-2	Dogfish	17/06/93	Liver	-	-	-	77.5
7894J	DOLT-2	Dogfish	24/06/93	Liver	-	-	-	80
7894J	DOLT-2	Dogfish	06/07/93	Liver	-	-	-	91.8
7894J	DOLT-2	Dogfish	24/07/93	Liver	-	-	-	82
7894J	DOLT-2	Dogfish	-	Liver	-	-	-	85.8

APPENDIX 5

Biological Descriptors of WALLEYE caught near Fort
Resolution in 1992 and 1993, and Concentrations ($\mu\text{g/g}$ wet
weight) of 28 elements in MUSCLE Tissues.

FORT RESOLUTION FISH MONITORING PROGRAM

Appendix 5: Summary of heavy metal concentrations ($\mu\text{g/g}$ wet weight) in the muscle tissues of Walleye.

PARAMETER	YEARS OF RECORD	# OF SAMPLES	# OF NON DETECTS	DETECTION LIMITS	MINIMUM	MAXIMUM	COMMENTS
Aluminum	92, 93	9	9	1	<1	<1	** All non-detects
Antimony	92, 93	9	9	1	<1	<1	** All non-detects
Arsenic	92, 93	9	5	0.01	0.01	0.03	
Barium	92, 93	9	7	0.01	<0.01	0.02	
Beryllium	92, 93	9	9	0.02	<0.02	<0.02	** All non-detects
Bismuth	92	3	3	3	<3	<3	** All non-detects
Boron	92, 93	9	0	-	0.12	6.32	
Cadmium	92, 93	9	7	0.01	<0.01	0.01	
Calcium	92, 93	9	0	-	73.50	185.85	
Chromium	92, 93	9	9	0.3	<0.3	<0.3	** All non-detects
Cobalt	92, 93	9	9	0.1	<0.1	<0.1	** All non-detects
Copper	92, 93	9	0	-	0.15	0.38	
Iron	92, 93	9	0	-	1.22	2.90	
Lead	92, 93	9	8	0.01	<0.01	0.02	
Magnesium	92, 93	9	0	-	208.24	293.18	
Manganese	92, 93	9	0	-	0.04	0.09	
Mercury	92, 93	9	0	-	0.01	0.50	
Molybdenum	92, 93	9	9	0.2	<0.2	<0.2	** All non-detects
Nickel	92, 93	9	8	0.05	<0.05	0.07	
Phosphorous	92, 93	9	0	-	6115	7603	
Potassium	92, 93	9	0	-	3868	4347	
Silver	92, 93	9	9	0.2	<0.2	<0.2	** All non-detects
Sodium	92, 93	9	0	-	123	319	
Strontium	92, 93	9	0	-	0.01	0.14	
Tin	92, 93	9	9	0.2	<0.2	<0.2	** All non-detects
Titanium	92, 93	9	9	0.03	<0.03	<0.03	** All non-detects
Vanadium	92, 93	9	9	0.1	<0.1	<0.1	** All non-detects
Zinc	92, 93	9	0	-	2.98	6.23	

FORT RESOLUTION FISH MONITORING PROGRAM

Appendix 5: Walleye Muscle, Biological Descriptors
and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Location	Length (mm)	Weight (g)	K Factor	Maturity	Ageing Structure	Age
7894J-101	11	WALL	92/10/06	Muscle	Resolution Bay	447	1179.4	1.32	-	Operculum	8
7894J-102	12	WALL	92/10/06	Muscle	Resolution Bay	487	1574	1.36	-	Operculum	10
7894J-103	13	WALL	92/10/06	Muscle	Resolution Bay	539	1758	1.12	-	Operculum	20
0625K-30	PP93030	WALL	93/09/20	Muscle	Pine Point	448	1302	1.45	-	Operculum	9
0625K-31	PP93031	WALL	93/09/21	Muscle	Pine Point	444	1283	1.47	-	Operculum	10
0625K-32	PP93032	WALL	93/09/21	Muscle	Pine Point	432	1061	1.32	-	Operculum	8
0625K-33	PP93033	WALL	93/09/21	Muscle	Pine Point	475	1347	1.26	-	Operculum	12
0625K-34	PP93034	WALL	93/09/21	Muscle	Pine Point	523	1863	1.30	-	Operculum	10
0625K-35	PP93035	WALL	93/09/21	Muscle	Pine Point	446	1198	1.35	-	Operculum	8
<hr/>											
				Max.		539	1863	1.47	-	-	20
				Min.		432	1061	1.12	-	-	8
				Mean		471	1396	1.33	-	-	11
				SD		38	275	0.10	-	-	4
				N		9	9	9	-	-	9
				n		-	-	-	-	-	-

FORT RESOLUTION FISH MONITORING PROGRAM

Appendix 5: Walleye Muscle, Biological Descriptors
and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	% Moisture H ₂ O	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
7894J-101	11	WALL	92/10/06	Muscle	78.7	<	1.0	<	0.01	<
7894J-102	12	WALL	92/10/06	Muscle	78.6	<	1.0	<	0.01	<
7894J-103	13	WALL	92/10/06	Muscle	81	<	1.0	<	0.01	<
0625K-30	PP93030	WALL	93/09/20	Muscle	80.3	<	1.0	<	0.01	<
0625K-31	PP93031	WALL	93/09/21	Muscle	80.5	<	1.0	<	0.01	<
0625K-32	PP93032	WALL	93/09/21	Muscle	79.0	<	1.0	<	0.01	<
0625K-33	PP93033	WALL	93/09/21	Muscle	81.1	<	1.0	<	0.01	<
0625K-34	PP93034	WALL	93/09/21	Muscle	78.2	<	1.0	<	0.03	<
0625K-35	PP93035	WALL	93/09/21	Muscle	79.2	<	1.0	<	0.02	<
<hr/>										
				Max.	81	<	1.0	<	0.03	<
				Min.	78	<	1.0	<	0.01	<
				Mean	80	<	1.0	<	0.01	<
				SD	1	0.0	0.0	0.01	0.00	0.00
				N	9	9	9	9	9	9
				n	-	9	9	5	7	9

FORT RESOLUTION FISH MONITORING PROGRAM

Appendix 5: Walleye Muscle, Biological Descriptors
and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Bismuth Bi	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co
7894J-101	11	WALL	92/10/06	Muscle	3	4.52	0.01	176.8	0.3	<
7894J-102	12	WALL	92/10/06	Muscle	3	6.32	0.01	96.3	0.3	<
7894J-103	13	WALL	92/10/06	Muscle	3	4.86	0.01	85.5	0.3	<
0625K-30	PP93030	WALL	93/09/20	Muscle	-	0.35	0.01	146.1	0.3	<
0625K-31	PP93031	WALL	93/09/21	Muscle	-	0.27	0.01	78.5	0.3	<
0625K-32	PP93032	WALL	93/09/21	Muscle	-	0.37	0.01	73.5	0.3	<
0625K-33	PP93033	WALL	93/09/21	Muscle	-	0.33	0.01	76.8	0.3	<
0625K-34	PP93034	WALL	93/09/21	Muscle	-	0.12	0.01	185.9	0.3	<
0625K-35	PP93035	WALL	93/09/21	Muscle	-	0.40	0.01	167.4	0.3	<

				Max.	3	6.32	0.01	185.9	0.3	<
				Min.	3	0.12	0.01	73.5	0.3	<
				Mean	3	1.95	0.01	120.8	0.3	<
				SD	0	2.51	0.001	47.4	0.0	0.0
				N	3	9	9	9	9	9
				n	3	0	7	0	9	9

FORT RESOLUTION FISH MONITORING PROGRAM

Appendix 5: Walleye Muscle, Biological Descriptors
and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn
7894J-101	11	WALL	92/10/06	Muscle	0.15	1.79	<	289.68	0.08
7894J-102	12	WALL	92/10/06	Muscle	0.18	2.04	<	293.18	0.07
7894J-103	13	WALL	92/10/06	Muscle	0.18	1.96	<	237.50	0.06
0625K-30	PP93030	WALL	93/09/20	Muscle	0.23	1.31	0.02	252.57	0.05
0625K-31	PP93031	WALL	93/09/21	Muscle	0.19	1.60	0.01	243.23	0.06
0625K-32	PP93032	WALL	93/09/21	Muscle	0.29	1.96	0.01	262.51	0.07
0625K-33	PP93033	WALL	93/09/21	Muscle	0.25	2.90	0.01	208.24	0.04
0625K-34	PP93034	WALL	93/09/21	Muscle	0.28	2.83	0.01	283.22	0.05
0625K-35	PP93035	WALL	93/09/21	Muscle	0.38	1.22	0.01	272.25	0.09
Max.									
Min.									
Mean									
SD									
N									
n									

FORT RESOLUTION FISH MONITORING PROGRAM

Appendix 5: Walleye Muscle, Biological Descriptors
and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorous PO4	Potassium K
7894J-101	11	WALL	92/10/06	Muscle	0.140	<	0.05	7114	4239
7894J-102	12	WALL	92/10/06	Muscle	0.015	<	0.05	6741	4066
7894J-103	13	WALL	92/10/06	Muscle	0.495	<	0.05	6574	4256
0625K-30	PP93030	WALL	93/09/20	Muscle	0.125	<	0.05	6354	3867
0625K-31	PP93031	WALL	93/09/21	Muscle	0.135	<	0.07	6382	4125
0625K-32	PP93032	WALL	93/09/21	Muscle	0.207	<	0.05	6867	4347
0625K-33	PP93033	WALL	93/09/21	Muscle	0.434	<	0.05	6115	3938
0625K-34	PP93034	WALL	93/09/21	Muscle	0.241	<	0.05	7603	4335
0625K-35	PP93035	WALL	93/09/21	Muscle	0.120	<	0.05	7315	4281
				Max.	0.495	<	0.07	7603	4347
				Min.	0.015	<	0.05	6115	3867
				Mean	0.212	<	0.05	6785	4162
				SD	0.157	0.0	0.01	489	174
				N	9	9	9	9	9
				n	0	9	8	0	0

FORT RESOLUTION FISH MONITORING PROGRAM

Appendix 5: Walleye Muscle, Biological Descriptors
and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Silver Ag	Sodium Na	Strontium Sr	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn
7894J-101	11	WALL	92/10/06	Muscle	< 0.2	266.3	0.14	< 0.2	< 0.03	< 0.1	4.13
7894J-102	12	WALL	92/10/06	Muscle	< 0.2	126.3	0.05	< 0.2	< 0.03	< 0.1	6.23
7894J-103	13	WALL	92/10/06	Muscle	< 0.2	277.4	0.03	< 0.2	< 0.03	< 0.1	3.08
0625K-30	PP93030	WALL	93/09/20	Muscle	< 0.2	123.3	0.07	< 0.2	< 0.03	< 0.1	3.30
0625K-31	PP93031	WALL	93/09/21	Muscle	< 0.2	216.0	0.01	< 0.2	< 0.03	< 0.1	3.09
0625K-32	PP93032	WALL	93/09/21	Muscle	< 0.2	319.2	0.03	< 0.2	< 0.03	< 0.1	2.98
0625K-33	PP93033	WALL	93/09/21	Muscle	< 0.2	246.1	0.07	< 0.2	< 0.03	< 0.1	2.99
0625K-34	PP93034	WALL	93/09/21	Muscle	< 0.2	248.4	0.10	< 0.2	< 0.03	< 0.1	3.68
0625K-35	PP93035	WALL	93/09/21	Muscle	< 0.2	195.0	0.08	< 0.2	< 0.03	< 0.1	3.49
				Max.	< 0.2	319.2	0.14	< 0.2	< 0.03	< 0.1	6.23
				Min.	< 0.2	123.3	0.01	< 0.2	< 0.03	< 0.1	2.98
				Mean	< 0.2	224.2	0.06	< 0.2	< 0.03	< 0.1	3.66
				SD	0.0	66.5	0.04	0.0	0.00	0.0	1.03
				N	9	9	9	9	9	9	9
				n	9	0	0	9	9	9	0

APPENDIX 6

Biological Descriptors of NORTHERN PIKE caught near Fort Resolution in 1992 and 1993, and Concentrations ($\mu\text{g/g}$ wet weight) of 28 Elements in MUSCLE Tissues.

FORT RESOLUTION MONITORING PROGRAM

Appendix 6: Summary of heavy metal concentrations ($\mu\text{g/g}$ wet weight) in the muscle tissues of Northern pike.

PARAMETER	YEARS OF RECORD	# OF SAMPLES	# OF NO DETECTS	DETECTION LIMITS	MINIMUM	MAXIMUM	COMMENTS
Aluminum	92, 93	20	20	1	<1	<1	All non-detects
Antimony	92, 93	20	20	1	<1	<1	All non-detects
Arsenic	92, 93	20	6	0.01	<0.01	0.05	
Barium	92, 93	20	2	0.01	<0.01	0.18	
Beryllium	92, 93	20	20	0.02	<0.02	<0.02	All non-detects
Bismuth	92	10	10	3	<3	<3	All non-detects
Boron	92, 93	20	3	0.1	<0.1	5.61	
Cadmium	92, 93	20	18	0.01	<0.01	0.02	
Calcium	92, 93	20	0	-	93	1273	
Chromium	92, 93	20	20	0.3	<0.3	<0.3	All non-detects
Cobalt	92, 93	20	20	0.1	<0.1	<0.1	All non-detects
Copper	92, 93	20	0	-	0.09	0.37	
Iron	92, 93	20	0	-	1.07	2.29	
Lead	92, 93	20	16	0.01	<0.01	0.03	
Magnesium	92, 93	20	0	-	270	330	
Manganese	92, 93	20	0	-	0.07	0.42	
Mercury	92, 93	20	0	-	0.089	0.546	
Molybdenum	92, 93	20	20	0.2	<0.2	<0.2	All non-detects
Nickel	92, 93	20	20	0.05	<0.05	<0.05	All non-detects
Phosphorous	92, 93	20	0	-	6424	8516	
Potassium	92, 93	20	0	-	3649	4324	
Silver	92, 93	20	20	0.2	<0.2	<0.2	All non-detects
Sodium	92, 93	20	0	-	87	513	
Strontium	92, 93	20	0	-	0.03	1.06	
Tin	92, 93	20	20	0.2	<0.2	<0.2	All non-detects
Titanium	92, 93	20	20	0.03	<0.03	<0.03	All non-detects
Vanadium	92, 93	20	20	0.1	<0.1	<0.1	All non-detects
Zinc	92, 93	20	0	-	2.68	5.20	

FORT RESOLUTION MONITORING PROGRAM

Appendix 6: Northern Pike Muscle, Biological
Descriptors and Metal Data (µg/g ww).

Lab Number	Sample Number	Species	Date of Collection	Tissue	% Moisture H2O	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
7894J-104	14	NRPK	92/10/06	Muscle	78.9	< 1.0	< 1.0	< 0.01	0.06	< 0.02
7894J-105	15	NRPK	92/10/06	Muscle	79.6	< 1.0	< 1.0	0.01	0.18	< 0.02
7894J-106	16	NRPK	92/10/06	Muscle	81.4	< 1.0	< 1.0	0.04	0.01	< 0.02
7894J-107	17	NRPK	92/10/06	Muscle	78	< 1.0	< 1.0	0.04	0.07	< 0.02
7894J-108	18	NRPK	92/10/06	Muscle	78.2	< 1.0	< 1.0	0.03	0.04	< 0.02
7894J-109	19	NRPK	92/10/06	Muscle	80.2	< 1.0	< 1.0	0.03	0.06	< 0.02
7894J-110	20	NRPK	92/10/06	Muscle	79.7	< 1.0	< 1.0	0.03	0.03	< 0.02
7894J-111	21	NRPK	92/10/06	Muscle	79	< 1.0	< 1.0	0.04	0.05	< 0.02
7894J-112	22	NRPK	92/10/06	Muscle	81	< 1.0	< 1.0	0.04	0.10	< 0.02
7894J-113	23	NRPK	92/10/06	Muscle	79.8	< 1.0	< 1.0	0.03	0.01	< 0.02
0625K-16	PP93016	NRPK	93/09/20	Muscle	78.2	< 1.0	< 1.0	0.01	0.05	< 0.02
0625K-17	PP93017	NRPK	93/09/20	Muscle	79.9	< 1.0	< 1.0	0.01	0.03	< 0.02
0625K-18	PP93018	NRPK	93/09/20	Muscle	80.0	< 1.0	< 1.0	0.01	0.04	< 0.02
0625K-19	PP93019	NRPK	93/09/20	Muscle	80.2	< 1.0	< 1.0	0.01	0.02	< 0.02
0625K-36	PP93036	NRPK	93/09/21	Muscle	76.6	< 1.0	< 1.0	0.05	0.04	< 0.02
0625K-37	PP93037	NRPK	93/09/21	Muscle	77.0	< 1.0	< 1.0	0.03	0.04	< 0.02
0625K-38	PP93038	NRPK	93/09/21	Muscle	77.1	< 1.0	< 1.0	0.03	0.06	< 0.02
0625K-39	PP93039	NRPK	93/09/21	Muscle	77.6	< 1.0	< 1.0	0.01	0.05	< 0.02
0625K-40	DL93040	NRPK	93/09/21	Muscle	78.1	< 1.0	< 1.0	0.01	0.08	< 0.02
0625K-41	DL93041	NRPK	93/09/21	Muscle	80.5	< 1.0	< 1.0	0.02	0.10	< 0.02
				Max.	81.4	< 1.0	< 1.0	0.05	0.18	< 0.02
				Min.	76.6	< 1.0	< 1.0	< 0.01	0.01	< 0.02
				Mean	79.0	< 1.0	< 1.0	0.02	0.06	< 0.02
				SD	1.4	0.0	0.0	0.01	0.04	0.00
				N	20	20	20	20	20	20
				n	-	20	20	6	2	20

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Appendix 6: Northern Pike Muscle, Biological
Descriptors and Metal Data (µg/g ww).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Bismuth Bi	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co
7894J-104	14	NRPK	92/10/06	Muscle	<	4.58	<	759.6	<	<
7894J-105	15	NRPK	92/10/06	Muscle	<	5.61	<	1273.0	<	<
7894J-106	16	NRPK	92/10/06	Muscle	<	0.67	<	180.4	<	<
7894J-107	17	NRPK	92/10/06	Muscle	<	0.70	<	838.2	<	<
7894J-108	18	NRPK	92/10/06	Muscle	<	0.1	<	357.5	<	<
7894J-109	19	NRPK	92/10/06	Muscle	<	0.22	<	512.8	<	<
7894J-110	20	NRPK	92/10/06	Muscle	<	0.1	<	328.9	<	<
7894J-111	21	NRPK	92/10/06	Muscle	<	0.26	<	445.2	<	<
7894J-112	22	NRPK	92/10/06	Muscle	<	0.20	<	655.5	<	<
7894J-113	23	NRPK	92/10/06	Muscle	<	0.1	<	92.9	<	<
0625K-16	PP93016	NRPK	93/09/20	Muscle	-	0.54	<	469.2	<	<
0625K-17	PP93017	NRPK	93/09/20	Muscle	-	0.42	<	588.2	<	<
0625K-18	PP93018	NRPK	93/09/20	Muscle	-	0.23	<	523.8	<	<
0625K-19	PP93019	NRPK	93/09/20	Muscle	-	0.29	<	292.9	<	<
0625K-36	PP93036	NRPK	93/09/21	Muscle	-	0.32	<	423.3	<	<
0625K-37	PP93037	NRPK	93/09/21	Muscle	-	0.41	<	425.1	<	<
0625K-38	PP93038	NRPK	93/09/21	Muscle	-	0.40	<	685.7	<	<
0625K-39	PP93039	NRPK	93/09/21	Muscle	-	0.20	<	646.0	<	<
0625K-40	DL93040	NRPK	93/09/21	Muscle	-	0.27	<	915.3	<	<
0625K-41	DL93041	NRPK	93/09/21	Muscle	-	0.32	<	659.6	<	<
				Max.	<	5.61	<	1273.0	<	<
				Min.	<	0.10	<	92.9	<	<
				Mean	<	0.80	<	553.7	<	<
				SD	0	1.49	0.00	269.9	0.0	0.0
				N	10	20	20	20	20	20
				n	10	3	18	0	20	20

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Appendix 6: Northern Pike Muscle: Biological
Descriptors and Metal Data (µg/g ww).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg
7894J-104	14	NRPK	92/10/06	Muscle	0.09	1.16	<	284.85	0.24	0.163
7894J-105	15	NRPK	92/10/06	Muscle	0.16	1.58	<	291.72	0.36	0.207
7894J-106	16	NRPK	92/10/06	Muscle	0.27	2.29	0.03	269.70	0.12	0.185
7894J-107	17	NRPK	92/10/06	Muscle	0.16	1.68	0.02	330.00	0.15	0.159
7894J-108	18	NRPK	92/10/06	Muscle	0.16	2.01	<	309.56	0.11	0.374
7894J-109	19	NRPK	92/10/06	Muscle	0.11	1.65	<	275.22	0.19	0.259
7894J-110	20	NRPK	92/10/06	Muscle	0.21	1.88	<	290.29	0.17	0.174
7894J-111	21	NRPK	92/10/06	Muscle	0.16	1.10	<	294.00	0.17	0.147
7894J-112	22	NRPK	92/10/06	Muscle	0.17	1.42	<	271.70	0.17	0.299
7894J-113	23	NRPK	92/10/06	Muscle	0.18	1.30	0.02	282.80	0.28	0.234
0625K-16	PP93016	NRPK	93/09/20	Muscle	0.24	1.53	<	296.80	0.10	0.159
0625K-17	PP93017	NRPK	93/09/20	Muscle	0.21	1.11	<	280.02	0.20	0.150
0625K-18	PP93018	NRPK	93/09/20	Muscle	0.20	1.10	<	287.87	0.11	0.089
0625K-19	PP93019	NRPK	93/09/20	Muscle	0.22	1.64	0.03	286.94	0.14	0.104
0625K-36	PP93036	NRPK	93/09/21	Muscle	0.37	1.61	<	294.69	0.11	0.546
0625K-37	PP93037	NRPK	93/09/21	Muscle	0.25	1.67	<	275.77	0.16	0.187
0625K-38	PP93038	NRPK	93/09/21	Muscle	0.32	1.07	<	300.44	0.13	0.207
0625K-39	PP93039	NRPK	93/09/21	Muscle	0.22	1.91	<	321.87	0.15	0.157
0625K-40	DL93040	NRPK	93/09/21	Muscle	0.29	1.77	<	307.29	0.17	0.257
0625K-41	DL93041	NRPK	93/09/21	Muscle	0.32	2.29	<	279.05	0.42	0.267
				Max.	0.37	2.29	0.03	330.00	0.42	0.546
				Min.	0.09	1.07	<	269.70	0.07	0.089
				Mean	0.22	1.59	0.01	291.53	0.18	0.216
				SD	0.07	0.38	0.01	16.10	0.09	0.103
				N	20	20	20	20	20	20
				n	0	0	16	0	0	0

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Appendix 6: Northern Pike Muscle, Biological
Descriptors and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Molybdenum Mo	Nickel Ni	Phosphorous PO4	Potassium K	Silver Ag
7894J-104	14	NRPK	92/10/06	Muscle	<	0.05	7913	4051	<
7894J-105	15	NRPK	92/10/06	Muscle	<	0.05	8425	4100	<
7894J-106	16	NRPK	92/10/06	Muscle	<	0.05	6436	3776	<
7894J-107	17	NRPK	92/10/06	Muscle	<	0.05	8470	4158	<
7894J-108	18	NRPK	92/10/06	Muscle	<	0.05	7303	3946	<
7894J-109	19	NRPK	92/10/06	Muscle	<	0.05	6613	3742	<
7894J-110	20	NRPK	92/10/06	Muscle	<	0.05	7004	3837	<
7894J-111	21	NRPK	92/10/06	Muscle	<	0.05	7245	3990	<
7894J-112	22	NRPK	92/10/06	Muscle	<	0.05	6802	3762	<
7894J-113	23	NRPK	92/10/06	Muscle	<	0.05	6424	4020	<
0625K-16	PP93016	NRPK	93/09/20	Muscle	<	0.05	7944	4081	<
0625K-17	PP93017	NRPK	93/09/20	Muscle	<	0.05	7836	4170	<
0625K-18	PP93018	NRPK	93/09/20	Muscle	<	0.05	7277	3938	<
0625K-19	PP93019	NRPK	93/09/20	Muscle	<	0.05	6570	3740	<
0625K-36	PP93036	NRPK	93/09/21	Muscle	<	0.05	7578	3649	<
0625K-37	PP93037	NRPK	93/09/21	Muscle	<	0.05	7262	3861	<
0625K-38	PP93038	NRPK	93/09/21	Muscle	<	0.05	8165	4128	<
0625K-39	PP93039	NRPK	93/09/21	Muscle	<	0.05	8091	4247	<
0625K-40	DL93040	NRPK	93/09/21	Muscle	<	0.05	8516	4324	<
0625K-41	DL93041	NRPK	93/09/21	Muscle	<	0.05	7454	4020	<
				Max.	<	0.05	8516	4324	<
				Min.	<	0.05	6424	3649	<
				Mean	<	0.05	7466	3977	<
				SD	0.0	0.00	687	187	0.0
				N	20	20	20	20	20
				n	20	20	0	0	20

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Appendix 6: Northern Pike Muscle, Biological
Descriptors and Metal Data (µg/g ww).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Sodium Na	Strontium Sr	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn
7894J-104	14	NRPK	92/10/06	Muscle	181.5	0.65	<	0.03	<	3.96
7894J-105	15	NRPK	92/10/06	Muscle	299.9	1.06	<	0.03	<	4.30
7894J-106	16	NRPK	92/10/06	Muscle	87.4	0.15	<	0.03	<	4.59
7894J-107	17	NRPK	92/10/06	Muscle	283.8	0.82	<	0.03	<	4.48
7894J-108	18	NRPK	92/10/06	Muscle	237.6	0.27	<	0.03	<	3.64
7894J-109	19	NRPK	92/10/06	Muscle	198.0	0.43	<	0.03	<	3.08
7894J-110	20	NRPK	92/10/06	Muscle	397.9	0.28	<	0.03	<	5.20
7894J-111	21	NRPK	92/10/06	Muscle	247.8	0.47	<	0.03	<	2.84
7894J-112	22	NRPK	92/10/06	Muscle	222.3	0.66	<	0.03	<	2.68
7894J-113	23	NRPK	92/10/06	Muscle	513.1	0.03	<	0.03	<	3.21
0625K-16	PP93016	NRPK	93/09/20	Muscle	251.0	0.38	<	0.03	<	3.81
0625K-17	PP93017	NRPK	93/09/20	Muscle	124.6	0.59	<	0.03	<	3.41
0625K-18	PP93018	NRPK	93/09/20	Muscle	141.7	0.41	<	0.03	<	3.46
0625K-19	PP93019	NRPK	93/09/20	Muscle	217.7	0.40	<	0.03	<	3.02
0625K-36	PP93036	NRPK	93/09/21	Muscle	343.8	0.73	<	0.03	<	3.85
0625K-37	PP93037	NRPK	93/09/21	Muscle	255.1	0.34	<	0.03	<	4.04
0625K-38	PP93038	NRPK	93/09/21	Muscle	284.4	0.59	<	0.03	<	4.27
0625K-39	PP93039	NRPK	93/09/21	Muscle	326.3	0.60	<	0.03	<	3.82
0625K-40	DL93040	NRPK	93/09/21	Muscle	186.6	0.90	<	0.03	<	3.76
0625K-41	DL93041	NRPK	93/09/21	Muscle	167.2	0.39	<	0.03	<	3.54

				Max.	513.1	1.06	<	0.03	<	5.20
				Min.	87.4	0.03	<	0.03	<	2.68
				Mean	248.4	0.51	<	0.03	<	3.75
				SD	98.6	0.25	<	0.00	<	0.63
				N	20	20	20	20	20	20
				n	0	0	20	20	20	0

APPENDIX 7

Biological Descriptors of LAKE WHITEFISH caught near Fort Resolution in 1992 and 1993, and Concentrations ($\mu\text{g/g}$ wet weight) of 28 Elements in MUSCLE Tissues.

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Appendix 7: Summary of heavy metal concentrations (µg/g wet weight) in the muscle tissues of Lake whitefish.

PARAMETER	YEARS OF RECORD	# OF SAMPLES	# OF NO DETECTS	# OF NO DETECTION LIMITS	MINIMUM	MAXIMUM	COMMENTS
Aluminum	92, 93	20	18	1	<1	7.01	-
Antimony	92, 93	20	20	1	<1	<1	All non-detects
Arsenic	92, 93	20	2	0.01	<0.01	0.11	-
Barium	92, 93	20	2	0.01	<0.01	0.22	-
Beryllium	92, 93	20	20	0.02	<0.02	<0.02	All non-detects
Bismuth	92	10	10	3	<3	<3	All non-detects
Boron	92, 93	20	0	-	0.19	0.83	-
Cadmium	92, 93	20	18	0.01	<0.01	0.04	-
Calcium	92, 93	20	0	-	53	808	-
Chromium	92, 93	20	20	0.3	<0.3	<0.3	All non-detects
Cobalt	92, 93	20	20	0.1	<0.1	<0.1	All non-detects
Copper	92, 93	20	0	-	0.12	0.57	-
Iron	92, 93	20	0	-	1.39	7.63	-
Lead	92, 93	20	17	0.01	<0.01	0.11	-
Magnesium	92, 93	20	0	-	214.4200	289.6200	-
Manganese	92, 93	20	0	-	0.12	0.22	-
Mercury	92, 93	20	0	-	0.012	0.265	-
Molybdenum	92, 93	20	20	0.2	<0.2	<0.2	All non-detects
Nickel	92, 93	20	20	0.05	<0.05	<0.05	All non-detects
Phosphorous	92, 93	20	0	-	5999	8182	-
Potassium	92, 93	20	0	-	3549	4733	-
Silver	92, 93	20	20	0.2	<0.2	<0.2	All non-detects
Sodium	92, 93	20	0	-	134	618	-
Strontium	92, 93	20	0	-	0.05	1.44	-
Tin	92, 93	20	20	0.2	<0.2	<0.2	All non-detects
Titanium	92, 93	20	19	0.03	<0.03	0.37	-
Vanadium	92, 93	20	20	0.1	<0.1	<0.1	All non-detects
Zinc	92, 93	20	0	-	2.28	3.39	-

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Appendix 7: Lake Whitefish Muscle, Biological Descriptors and Metal Data (µg/g ww).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Location	Length (mm)	Weight (g)	K Factor	Maturity	Ageing Structure	Age	Age Crack/Burn on Otolith
-	1	LKWH	92/10/06	-	Resolution Bay	484	1792.8	1.58	3-4	Scales	14	-
-	2	LKWH	92/10/06	-	Resolution Bay	522	2487.1	1.75	4	Scales	16	-
-	3	LKWH	92/10/06	-	Resolution Bay	463	1961	1.98	3-4	Scales	13	-
-	4	LKWH	92/10/06	-	Resolution Bay	430	1326	1.67	-	Scales	14	-
-	5	LKWH	92/10/06	-	Resolution Bay	442	1476	1.71	9	Scales	15	-
-	6	LKWH	92/10/06	-	Resolution Bay	416	1304	1.81	9	Scales	14	-
-	7	LKWH	92/10/06	-	Resolution Bay	440	1338.7	1.57	9	Scales	12	-
-	8	LKWH	92/10/06	-	Resolution Bay	464	2414	2.42	4	Scales	12	-
-	9	LKWH	92/10/06	-	Resolution Bay	427	1292	1.66	9	Scales	13	-
-	10	LKWH	92/10/06	-	Resolution Bay	499	2463	1.98	4	Scales	17	-
7894J-114	24	LKWH	92/10/06	Muscle	Resolution Bay	452	1480	1.60	8	Otolith	13	14
7894J-115	25	LKWH	92/10/06	Muscle	Resolution Bay	435	1376	1.67	8	Otolith	14	16
7894J-116	26	LKWH	92/10/06	Muscle	Resolution Bay	458	1634	1.70	9	Otolith	15	13
7894J-117	27	LKWH	92/10/06	Muscle	Resolution Bay	423	1219	1.61	9	Otolith	11	14
7894J-118	28	LKWH	92/10/06	Muscle	Resolution Bay	485	2277	2.00	4	Otolith	15	14
7894J-119	29	LKWH	92/10/06	Muscle	Resolution Bay	414	1229	1.73	9	Otolith	13	14
7894J-120	30	LKWH	92/10/06	Muscle	Resolution Bay	497	2422	1.97	4	Otolith	18	15
7894J-121	31	LKWH	92/10/06	Muscle	Resolution Bay	437	1297	1.55	9	Otolith	13	14
7894J-122	32	LKWH	92/10/06	Muscle	Resolution Bay	410	1431	2.08	4	Otolith	13	15
7894J-123	33	LKWH	92/10/06	Muscle	Resolution Bay	441	1377	1.61	9	Otolith	12	16
0625K-3	DL93003	LKWH	93/09/20	Muscle	Dawson Landing	438	1476	1.76	-	Otolith	14	11
0625K-4	DL93004	LKWH	93/09/20	Muscle	Dawson Landing	424	1167	1.53	-	Otolith	11	10
0625K-5	DL93005	LKWH	93/09/20	Muscle	Dawson Landing	427	1401	1.80	-	Otolith	15	12
0625K-42	DL93042	LKWH	93/09/21	Muscle	Dawson Landing	398	1028	1.63	-	Otolith	12	14
0625K-43	DL93043	LKWH	93/09/21	Muscle	Dawson Landing	478	1349	1.24	-	Otolith	9	6
0625K-44	DL93044	LKWH	93/09/21	Muscle	Dawson Landing	373	767	1.48	-	Otolith	10	10
0625K-45	DL93045	LKWH	93/09/21	Muscle	Dawson Landing	420	1154	1.56	-	Otolith	15	9
0625K-46	DL93046	LKWH	93/09/21	Muscle	Dawson Landing	365	625	1.29	-	Otolith	11	10
0625K-47	DL93047	LKWH	93/09/21	Muscle	Dawson Landing	418	1057	1.45	-	Otolith	10	11
0625K-48	DL93048	LKWH	93/09/21	Muscle	Dawson Landing	445	1354	1.54	-	Otolith	12	12
				Max.		497	2422	2.08			18	16
				Min.		365	625	1.24			9	6
				Mean		432	1356	1.64			13	13
				SD		33	416	0.21			2	3
				N		20	20	20			20	20
				n		-	-	-			-	-

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Appendix 7: Lake Whitefish Muscle, Biological Descriptors and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	% Moisture H ₂ O	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Bismuth Bi
-	1	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	2	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	3	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	4	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	5	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	6	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	7	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	8	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	9	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	10	LKWH	92/10/06	-	-	-	-	-	-	-	-
7894J-114	24	LKWH	92/10/06	Muscle	73.7	< 1.0	< 1.0	0.07	0.02	< 0.02	< 3
7894J-115	25	LKWH	92/10/06	Muscle	72.3	< 1.0	< 1.0	0.06	0.09	< 0.02	< 3
7894J-116	26	LKWH	92/10/06	Muscle	70.3	< 1.0	< 1.0	0.10	0.02	< 0.02	< 3
7894J-117	27	LKWH	92/10/06	Muscle	68.3	< 1.0	< 1.0	0.07	0.06	< 0.02	< 3
7894J-118	28	LKWH	92/10/06	Muscle	67.1	< 1.0	< 1.0	0.10	0.08	< 0.02	< 3
7894J-119	29	LKWH	92/10/06	Muscle	73.7	< 1.0	< 1.0	0.06	0.09	< 0.02	< 3
7894J-120	30	LKWH	92/10/06	Muscle	69.8	< 1.0	< 1.0	0.11	0.10	< 0.02	< 3
7894J-121	31	LKWH	92/10/06	Muscle	66.2	< 1.0	< 1.0	0.10	0.22	< 0.02	< 3
7894J-122	32	LKWH	92/10/06	Muscle	69.8	< 1.0	< 1.0	0.06	0.08	< 0.02	< 3
7894J-123	33	LKWH	92/10/06	Muscle	69.3	< 1.0	< 1.0	0.07	0.08	< 0.02	< 3
0625K-3	DL93003	LKWH	93/09/20	Muscle	70.1	7.01	< 1.0	0.05	0.11	< 0.02	< -
0625K-4	DL93004	LKWH	93/09/20	Muscle	75.4	< 1.0	< 1.0	0.01	0.02	< 0.02	< -
0625K-5	DL93005	LKWH	93/09/20	Muscle	71.0	2.04	< 1.0	0.04	0.07	< 0.02	< -
0625K-42	DL93042	LKWH	93/09/21	Muscle	68.5	< 1.0	< 1.0	0.02	0.03	< 0.02	< -
0625K-43	DL93043	LKWH	93/09/21	Muscle	73.9	< 1.0	< 1.0	0.02	0.05	< 0.02	< -
0625K-44	DL93044	LKWH	93/09/21	Muscle	75.1	< 1.0	< 1.0	0.03	0.02	< 0.02	< -
0625K-45	DL93045	LKWH	93/09/21	Muscle	73.4	< 1.0	< 1.0	0.01	0.07	< 0.02	< -
0625K-46	DL93046	LKWH	93/09/21	Muscle	78.4	< 1.0	< 1.0	< 0.01	0.10	< 0.02	< -
0625K-47	DL93047	LKWH	93/09/21	Muscle	73.8	< 1.0	< 1.0	0.02	0.01	< 0.02	< -
0625K-48	DL93048	LKWH	93/09/21	Muscle	76.4	< 1.0	< 1.0	0.02	0.01	< 0.02	< -
				Max.	78.4	7.0	< 1.0	0.11	0.22	< 0.02	< 3
				Min.	66.2	< 1.0	< 1.0	< 0.01	0.01	< 0.02	< 3
				Mean	71.8	1.0	< 1.0	0.05	0.07	< 0.02	< 3
				SD	3.3	1.5	0.0	0.03	0.05	0.00	0
				N	20	20	20	20	20	20	10
				n	20	18	20	2	2	20	10

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Appendix 7: Lake Whitefish Muscle, Biological Descriptors and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe
-	1	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	2	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	3	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	4	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	5	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	6	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	7	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	8	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	9	LKWH	92/10/06	-	-	-	-	-	-	-	-
-	10	LKWH	92/10/06	-	-	-	-	-	-	-	-
7894J-114	24	LKWH	92/10/06	Muscle	0.22	< 0.01	157.8	< 0.3	< 0.1	0.36	2.41
7894J-115	25	LKWH	92/10/06	Muscle	0.26	< 0.01	448.7	< 0.3	< 0.1	0.27	2.88
7894J-116	26	LKWH	92/10/06	Muscle	0.30	< 0.01	231.7	< 0.3	< 0.1	0.12	2.46
7894J-117	27	LKWH	92/10/06	Muscle	0.29	< 0.01	320.2	< 0.3	< 0.1	0.41	4.34
7894J-118	28	LKWH	92/10/06	Muscle	0.55	< 0.01	309.3	< 0.3	< 0.1	0.22	2.58
7894J-119	29	LKWH	92/10/06	Muscle	0.27	< 0.01	378.7	< 0.3	< 0.1	0.38	3.17
7894J-120	30	LKWH	92/10/06	Muscle	0.44	< 0.01	416.8	< 0.3	< 0.1	0.20	4.11
7894J-121	31	LKWH	92/10/06	Muscle	0.36	< 0.04	807.8	< 0.3	< 0.1	0.24	3.55
7894J-122	32	LKWH	92/10/06	Muscle	0.47	< 0.01	268.8	< 0.3	< 0.1	0.35	2.41
7894J-123	33	LKWH	92/10/06	Muscle	0.35	< 0.01	291.7	< 0.3	< 0.1	0.31	3.13
0625K-3	DL93003	LKWH	93/09/20	Muscle	0.19	< 0.01	302.0	< 0.3	< 0.1	0.29	7.63
0625K-4	DL93004	LKWH	93/09/20	Muscle	0.32	< 0.01	79.8	< 0.3	< 0.1	0.39	3.68
0625K-5	DL93005	LKWH	93/09/20	Muscle	0.32	< 0.01	309.3	< 0.3	< 0.1	0.27	5.02
0625K-42	DL93042	LKWH	93/09/21	Muscle	0.23	< 0.01	135.1	< 0.3	< 0.1	0.31	3.02
0625K-43	DL93043	LKWH	93/09/21	Muscle	0.83	< 0.01	491.4	< 0.3	< 0.1	0.28	1.58
0625K-44	DL93044	LKWH	93/09/21	Muscle	0.40	< 0.01	52.8	< 0.3	< 0.1	0.57	5.63
0625K-45	DL93045	LKWH	93/09/21	Muscle	0.44	< 0.01	290.1	< 0.3	< 0.1	0.33	2.43
0625K-46	DL93046	LKWH	93/09/21	Muscle	0.28	< 0.02	529.5	< 0.3	< 0.1	0.21	1.39
0625K-47	DL93047	LKWH	93/09/21	Muscle	0.39	< 0.01	62.2	< 0.3	< 0.1	0.53	5.05
0625K-48	DL93048	LKWH	93/09/21	Muscle	0.52	< 0.01	63.3	< 0.3	< 0.1	0.43	4.02
				Max.	0.83	0.04	807.8	< 0.3	< 0.1	0.57	7.63
				Min.	0.19	< 0.01	52.8	< 0.3	< 0.1	0.12	1.39
				Mean	0.37	< 0.01	297.3	< 0.3	< 0.1	0.32	3.52
				SD	0.15	0.01	187.1	0.0	0.0	0.11	1.49
				N	20	20	20	20	20	20	20
				n	0	18	0	20	20	0	0

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Appendix 7: Lake Whitefish Muscle, Biological
Descriptors and Metal Data (µg/g ww).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
-	1	LKWH	92/10/06	-	-	-	-	-	-	-
-	2	LKWH	92/10/06	-	-	-	-	-	-	-
-	3	LKWH	92/10/06	-	-	-	-	-	-	-
-	4	LKWH	92/10/06	-	-	-	-	-	-	-
-	5	LKWH	92/10/06	-	-	-	-	-	-	-
-	6	LKWH	92/10/06	-	-	-	-	-	-	-
-	7	LKWH	92/10/06	-	-	-	-	-	-	-
-	8	LKWH	92/10/06	-	-	-	-	-	-	-
-	9	LKWH	92/10/06	-	-	-	-	-	-	-
-	10	LKWH	92/10/06	-	-	-	-	-	-	-
7894J-114	24	LKWH	92/10/06	Muscle	0.11	257.74	0.15	0.224	0.2	<
7894J-115	25	LKWH	92/10/06	Muscle	0.01	260.38	0.15	0.021	0.2	<
7894J-116	26	LKWH	92/10/06	Muscle	<	225.72	0.17	0.265	0.2	<
7894J-117	27	LKWH	92/10/06	Muscle	<	244.09	0.17	0.020	0.2	<
7894J-118	28	LKWH	92/10/06	Muscle	<	227.01	0.23	0.029	0.2	<
7894J-119	29	LKWH	92/10/06	Muscle	<	244.59	0.20	0.016	0.2	<
7894J-120	30	LKWH	92/10/06	Muscle	<	214.42	0.15	0.031	0.2	<
7894J-121	31	LKWH	92/10/06	Muscle	<	226.46	0.22	0.012	0.2	<
7894J-122	32	LKWH	92/10/06	Muscle	<	247.64	0.19	0.029	0.2	<
7894J-123	33	LKWH	92/10/06	Muscle	<	260.95	0.16	0.022	0.2	<
0625K-3	DL93003	LKWH	93/09/20	Muscle	0.03	227.11	0.20	0.020	0.2	<
0625K-4	DL93004	LKWH	93/09/20	Muscle	0.06	267.71	0.13	0.021	0.2	<
0625K-5	DL93005	LKWH	93/09/20	Muscle	0.01	241.78	0.18	0.024	0.2	<
0625K-42	DL93042	LKWH	93/09/21	Muscle	<	247.55	0.12	0.016	0.2	<
0625K-43	DL93043	LKWH	93/09/21	Muscle	<	242.98	0.16	0.036	0.2	<
0625K-44	DL93044	LKWH	93/09/21	Muscle	<	215.18	0.16	0.037	0.2	<
0625K-45	DL93045	LKWH	93/09/21	Muscle	<	279.46	0.18	0.023	0.2	<
0625K-46	DL93046	LKWH	93/09/21	Muscle	<	289.62	0.22	0.028	0.2	<
0625K-47	DL93047	LKWH	93/09/21	Muscle	<	259.53	0.13	0.037	0.2	<
0625K-48	DL93048	LKWH	93/09/21	Muscle	<	235.94	0.12	0.039	0.2	<
				Max.	0.11	289.62	0.23	0.265	0.2	<
				Min.	<	214.42	0.12	0.012	0.2	<
				Mean	0.01	245.79	0.17	0.047	0.2	<
				SD	0.02	20.31	0.03	0.068	0.0	0.00
				N	20	20	20	20	20	20
				n	17	0	0	0	20	20

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Appendix 7: Lake Whitefish Muscle, Biological Descriptors and Metal Data (µg/g ww).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Phosphorous PO4	Potassium K	Silver Ag	Sodium Na	Strontium Sr
-	1	LKWH	92/10/06	-	-	-	-	-	-
-	2	LKWH	92/10/06	-	-	-	-	-	-
-	3	LKWH	92/10/06	-	-	-	-	-	-
-	4	LKWH	92/10/06	-	-	-	-	-	-
-	5	LKWH	92/10/06	-	-	-	-	-	-
-	6	LKWH	92/10/06	-	-	-	-	-	-
-	7	LKWH	92/10/06	-	-	-	-	-	-
-	8	LKWH	92/10/06	-	-	-	-	-	-
-	9	LKWH	92/10/06	-	-	-	-	-	-
-	10	LKWH	92/10/06	-	-	-	-	-	-
7894J-114	24	LKWH	92/10/06	Muscle	6785	3998	< 0.2	507.6	0.26
7894J-115	25	LKWH	92/10/06	Muscle	7230	4238	< 0.2	459.8	0.88
7894J-116	26	LKWH	92/10/06	Muscle	5999	3683	< 0.2	169.3	0.37
7894J-117	27	LKWH	92/10/06	Muscle	7133	4089	< 0.2	618.2	0.69
7894J-118	28	LKWH	92/10/06	Muscle	6317	3816	< 0.2	273.1	0.59
7894J-119	29	LKWH	92/10/06	Muscle	6233	3761	< 0.2	134.1	0.74
7894J-120	30	LKWH	92/10/06	Muscle	6342	3624	< 0.2	320.1	0.75
7894J-121	31	LKWH	92/10/06	Muscle	6861	3549	< 0.2	331.2	1.44
7894J-122	32	LKWH	92/10/06	Muscle	6523	4137	< 0.2	335.2	0.52
7894J-123	33	LKWH	92/10/06	Muscle	7000	4022	< 0.2	178.1	0.52
0625K-3	DL93003	LKWH	93/09/20	Muscle	6938	3738	< 0.2	352.9	0.57
0625K-4	DL93004	LKWH	93/09/20	Muscle	6852	3930	< 0.2	270.2	0.10
0625K-5	DL93005	LKWH	93/09/20	Muscle	7070	3941	< 0.2	284.7	0.24
0625K-42	DL93042	LKWH	93/09/21	Muscle	6496	3942	< 0.2	262.7	0.24
0625K-43	DL93043	LKWH	93/09/21	Muscle	8182	4209	< 0.2	295.4	0.87
0625K-44	DL93044	LKWH	93/09/21	Muscle	6909	4016	< 0.2	294.3	0.05
0625K-45	DL93045	LKWH	93/09/21	Muscle	7878	4338	< 0.2	300.7	0.60
0625K-46	DL93046	LKWH	93/09/21	Muscle	8018	4733	< 0.2	250.7	0.96
0625K-47	DL93047	LKWH	93/09/21	Muscle	7339	4194	< 0.2	267.4	0.07
0625K-48	DL93048	LKWH	93/09/21	Muscle	6488	4105	< 0.2	229.6	0.08
				Max.	8182	4733	< 0.2	618.2	1.44
				Min.	5999	3549	< 0.2	134.1	0.05
				Mean	6930	4003	< 0.2	306.8	0.54
				SD	591	276	0.0	113.7	0.35
				N	20	20	20	20	20
				n	0	0	20	0	0

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Appendix 7: Lake Whitefish Muscle, Biological Descriptors and Metal Data (µg/g ww).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn
-	1	LKWH	92/10/06	-	-	-	-	-
-	2	LKWH	92/10/06	-	-	-	-	-
-	3	LKWH	92/10/06	-	-	-	-	-
-	4	LKWH	92/10/06	-	-	-	-	-
-	5	LKWH	92/10/06	-	-	-	-	-
-	6	LKWH	92/10/06	-	-	-	-	-
-	7	LKWH	92/10/06	-	-	-	-	-
-	8	LKWH	92/10/06	-	-	-	-	-
-	9	LKWH	92/10/06	-	-	-	-	-
-	10	LKWH	92/10/06	-	-	-	-	-
7894J-114	24	LKWH	92/10/06	Muscle	< 0.2	< 0.03	< 0.1	2.49
7894J-115	25	LKWH	92/10/06	Muscle	< 0.2	< 0.03	< 0.1	2.75
7894J-116	26	LKWH	92/10/06	Muscle	< 0.2	< 0.03	< 0.1	2.36
7894J-117	27	LKWH	92/10/06	Muscle	< 0.2	< 0.03	< 0.1	2.61
7894J-118	28	LKWH	92/10/06	Muscle	< 0.2	< 0.03	< 0.1	2.28
7894J-119	29	LKWH	92/10/06	Muscle	< 0.2	< 0.03	< 0.1	2.72
7894J-120	30	LKWH	92/10/06	Muscle	< 0.2	< 0.03	< 0.1	2.64
7894J-121	31	LKWH	92/10/06	Muscle	< 0.2	< 0.03	< 0.1	3.36
7894J-122	32	LKWH	92/10/06	Muscle	< 0.2	< 0.03	< 0.1	2.60
7894J-123	33	LKWH	92/10/06	Muscle	< 0.2	< 0.03	< 0.1	3.04
0625K-3	DL93003	LKWH	93/09/20	Muscle	< 0.2	0.37	< 0.1	3.02
0625K-4	DL93004	LKWH	93/09/20	Muscle	< 0.2	< 0.03	< 0.1	2.74
0625K-5	DL93005	LKWH	93/09/20	Muscle	< 0.2	< 0.03	< 0.1	2.71
0625K-42	DL93042	LKWH	93/09/21	Muscle	< 0.2	< 0.03	< 0.1	2.93
0625K-43	DL93043	LKWH	93/09/21	Muscle	< 0.2	< 0.03	< 0.1	2.86
0625K-44	DL93044	LKWH	93/09/21	Muscle	< 0.2	< 0.03	< 0.1	3.39
0625K-45	DL93045	LKWH	93/09/21	Muscle	< 0.2	< 0.03	< 0.1	2.48
0625K-46	DL93046	LKWH	93/09/21	Muscle	< 0.2	< 0.03	< 0.1	2.87
0625K-47	DL93047	LKWH	93/09/21	Muscle	< 0.2	< 0.03	< 0.1	3.11
0625K-48	DL93048	LKWH	93/09/21	Muscle	< 0.2	< 0.03	< 0.1	2.58
				Max.	< 0.2	0.37	< 0.1	3.39
				Min.	< 0.2	< 0.03	< 0.1	2.28
				Mean	< 0.2	0.03	< 0.1	2.78
				SD	0.0	0.08	0.0	0.30
				N	20	20	20	20
				n	20	19	20	0

APPENDIX 8

Biological Descriptors of BURBOT caught near Fort Resolution
in 1992 and 1993, and Concentrations ($\mu\text{g/g}$ wet weight) of 28
Elements in MUSCLE Tissues.

FORT RESOLUTION FISH MONITORING PROGRAM

Appendix 8: Summary of heavy metal concentrations (µg/g wet weight) in the muscle tissues of Burbot.

PARAMETER	YEARS OF RECORD	# OF SAMPLES	# OF NO DETECTS	DETECTION LIMITS	MINIMUM	MAXIMUM	COMMENTS
Aluminum	92, 93	21	20	1	<1	5.5	-
Antimony	92, 93	21	21	1	<1	<1	All non-detects
Arsenic	92, 93	21	9	0.01	<0.01	0.03	-
Barium	92, 93	21	3	0.01	<0.01	0.15	-
Beryllium	92, 93	21	21	0.02	<0.02	<0.02	All non-detects
Bismuth	92	10	10	3	<3	<3	All non-detects
Boron	92, 93	21	0	-	0.15	0.77	-
Cadmium	92, 93	21	17	0.01	<0.01	0.03	-
Calcium	92, 93	21	0	-	73.5	598.5	-
Chromium	92, 93	21	21	0.3	<0.3	<0.3	All non-detects
Cobalt	92, 93	21	21	0.1	<0.1	<0.1	All non-detects
Copper	92, 93	21	0	-	0.16	0.56	-
Iron	92, 93	21	0	-	1.41	18.26	-
Lead	92, 93	21	18	0.01	<0.01	0.04	-
Magnesium	92, 93	21	0	-	200	274	-
Manganese	92, 93	21	0	-	0.13	0.49	-
Mercury	92, 93	21	0	-	0.068	0.169	-
Molybdenum	92, 93	21	21	0.2	<0.2	<0.2	All non-detects
Nickel	92, 93	21	18	0.05	<0.05	0.07	-
Phosphorous	92, 93	21	0	-	4843	7233	-
Potassium	92, 93	21	0	-	3177	4100	-
Silver	92, 93	21	21	0.2	<0.2	<0.2	All non-detects
Sodium	92, 93	21	0	-	194	482	-
Strontium	92, 93	21	0	-	0.06	0.83	-
Tin	92, 93	21	21	0.2	<0.2	<0.2	All non-detects
Titanium	92, 93	21	19	0.03	<0.03	0.43	-
Vanadium	92, 93	21	21	0.1	<0.1	<0.1	All non-detects
Zinc	92, 93	21	0	-	2.79	4.87	-

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Appendix 8: Burbot Muscle, Biological Descriptors
and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Location	Length (mm)	Weight (g)	K Factor	Maturity	Ageing Structure	Age	Age Crack/Burn on Otolith
7894J-124	34	BRBT	92/10/06	Muscle	Resolution Bay	620	1709.3	0.72	1	Otolith	11	9
7894J-125	35	BRBT	92/10/06	Muscle	Resolution Bay	671	2170	0.72	3	Otolith	15	15
7894J-126	36	BRBT	92/10/06	Muscle	Resolution Bay	658	1868.4	0.66	8	Otolith	12	12
7894J-127	37	BRBT	92/10/06	Muscle	Resolution Bay	698	2395.1	0.70	8	Otolith	13	13
7894J-128	38	BRBT	92/10/06	Muscle	Resolution Bay	648	2106.3	0.77	3	Otolith	11	9
7894J-129	39	BRBT	92/10/06	Muscle	Resolution Bay	682	2332.3	0.74	3	Otolith	11	10
7894J-130	40	BRBT	92/10/06	Muscle	Resolution Bay	841	3707.7	0.62	3	Otolith	18	17
7894J-131	41	BRBT	92/10/06	Muscle	Resolution Bay	769	2991.1	0.66	3	Otolith	15	15
7894J-132	42	BRBT	92/10/06	Muscle	Resolution Bay	695	2029.1	0.60	2	Otolith	14	12
7894J-133	43	BRBT	92/10/06	Muscle	Resolution Bay	636	1864.6	0.72	3	Otolith	13	11
0625K-1	DL93001	BRBT	93/09/20	Muscle	Dawson Landing	631	1585	0.63	-	Otolith	12	-
0625K-6	PP93006	BRBT	93/09/20	Muscle	Pine Point	695	2104	0.63	-	Otolith	15	-
0625K-7	PP93007	BRBT	93/09/20	Muscle	Pine Point	656	1658	0.59	-	Otolith	11	-
0625K-8	PP93008	BRBT	93/09/20	Muscle	Pine Point	704	2693	0.77	-	Otolith	15	-
0625K-9	PP93009	BRBT	93/09/20	Muscle	Pine Point	661	1752	0.61	-	Otolith	11	-
0625K-10	PP93010	BRBT	93/09/20	Muscle	Pine Point	684	2284	0.71	-	Otolith	12	-
0625K-11	PP93011	BRBT	93/09/20	Muscle	Pine Point	732	3055	0.78	-	Otolith	13	-
0625K-12	PP93012	BRBT	93/09/20	Muscle	Pine Point	664	2335	0.80	-	Otolith	14	-
0625K-13	PP93013	BRBT	93/09/20	Muscle	Pine Point	751	2790	0.66	-	Otolith	14	-
0625K-14	PP93014	BRBT	93/09/20	Muscle	Pine Point	687	2065	0.64	-	Otolith	11	-
0625K-15	PP93015	BRBT	93/09/20	Muscle	Pine Point	644	1789	0.67	-	Otolith	12	-
				Max.		841	3708	0.80			18	17
				Min.		620	1585	0.59			11	9
				Mean		687	2252	0.69			13	12
				SD		52	539	0.06			2	3
				N		21	21	21			21	10
				n		-	-	-			-	-

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Appendix 8: Burbot Muscle, Biological Descriptors
and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	% Moisture H2O	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
7894J-124	34	BRBT	92/10/06	Muscle	83.3	<	<	0.02	<	<
7894J-125	35	BRBT	92/10/06	Muscle	80.7	<	1.0	0.03	0.01	<
7894J-126	36	BRBT	92/10/06	Muscle	81.4	<	1.0	0.02	0.02	<
7894J-127	37	BRBT	92/10/06	Muscle	80.7	<	1.0	0.03	0.14	<
7894J-128	38	BRBT	92/10/06	Muscle	81.8	<	1.0	0.03	0.03	<
7894J-129	39	BRBT	92/10/06	Muscle	80	<	1.0	0.03	0.04	<
7894J-130	40	BRBT	92/10/06	Muscle	80.5	<	1.0	0.02	0.02	<
7894J-131	41	BRBT	92/10/06	Muscle	79.2	<	1.0	0.02	0.03	<
7894J-132	42	BRBT	92/10/06	Muscle	82.4	<	1.0	0.02	0.13	<
7894J-133	43	BRBT	92/10/06	Muscle	83.3	<	1.0	0.02	0.02	<
0625K-1	DL93001	BRBT	93/09/20	Muscle	80.7	<	1.0	0.01	0.10	<
0625K-6	PP93006	BRBT	93/09/20	Muscle	81.2	<	1.0	0.01	0.01	<
0625K-7	PP93007	BRBT	93/09/20	Muscle	81.3	<	1.0	0.01	0.06	<
0625K-8	PP93008	BRBT	93/09/20	Muscle	79.8	<	1.0	0.01	0.02	<
0625K-9	PP93009	BRBT	93/09/20	Muscle	81.6	5.47	1.0	0.02	0.14	<
0625K-10	PP93010	BRBT	93/09/20	Muscle	80.4	<	1.0	0.01	0.07	<
0625K-11	PP93011	BRBT	93/09/20	Muscle	81.2	<	1.0	0.01	0.02	<
0625K-12	PP93012	BRBT	93/09/20	Muscle	80.5	<	1.0	0.01	0.15	<
0625K-13	PP93013	BRBT	93/09/20	Muscle	82.6	<	1.0	0.01	0.11	<
0625K-14	PP93014	BRBT	93/09/20	Muscle	81.5	<	1.0	0.01	0.01	<
0625K-15	PP93015	BRBT	93/09/20	Muscle	84.0	<	1.0	0.01	0.13	<
				Max.	84.0	5.5	1.0	0.03	0.15	<
				Min.	79.2	<	1.0	0.01	0.01	<
				Mean	81.3	<	1.0	0.02	0.06	<
				SD	1.2	1.1	0.0	0.01	0.05	0.00
				N	21	21	21	21	21	21
				n	-	20	21	9	3	21

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Appendix 8: Burbot Muscle, Biological Descriptors
and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Bismuth Bi	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co
7894J-124	34	BRBT	92/10/06	Muscle	<	0.21	<	73.5	<	<
7894J-125	36	BRBT	92/10/06	Muscle	<	0.34	<	81.1	<	<
7894J-126	36	BRBT	92/10/06	Muscle	<	0.41	<	301.3	<	<
7894J-127	37	BRBT	92/10/06	Muscle	<	0.25	<	81.1	<	<
7894J-128	38	BRBT	92/10/06	Muscle	<	0.27	<	87.4	<	<
7894J-129	39	BRBT	92/10/06	Muscle	<	0.28	<	96.0	<	<
7894J-130	40	BRBT	92/10/06	Muscle	<	0.20	<	95.6	<	<
7894J-131	41	BRBT	92/10/06	Muscle	<	0.31	<	507.5	<	<
7894J-132	42	BRBT	92/10/06	Muscle	<	0.19	<	77.4	<	<
7894J-133	43	BRBT	92/10/06	Muscle	<	0.20	<	193.7	<	<
0625K-1	DL93001	BRBT	93/09/20	Muscle	-	0.34	<	86.6	<	<
0625K-6	PP93006	BRBT	93/09/20	Muscle	-	0.15	<	83.9	<	<
0625K-7	PP93007	BRBT	93/09/20	Muscle	-	0.23	<	369.9	<	<
0625K-8	PP93008	BRBT	93/09/20	Muscle	-	0.32	<	100.9	<	<
0625K-9	PP93009	BRBT	93/09/20	Muscle	-	0.77	<	358.1	<	<
0625K-10	PP93010	BRBT	93/09/20	Muscle	-	0.30	<	291.6	<	<
0625K-11	PP93011	BRBT	93/09/20	Muscle	-	0.27	<	86.7	<	<
0625K-12	PP93012	BRBT	93/09/20	Muscle	-	0.36	<	598.5	<	<
0625K-13	PP93013	BRBT	93/09/20	Muscle	-	0.25	<	303.8	<	<
0625K-14	PP93014	BRBT	93/09/20	Muscle	-	0.29	<	92.2	<	<
0625K-15	PP93015	BRBT	93/09/20	Muscle	-	0.36	<	364.0	<	<
				Max.	<	0.77	<	598.5	<	<
				Min.	<	0.15	<	73.5	<	<
				Mean	<	0.30	<	206.2	<	<
				SD	0.0	0.14	0.01	160.8	0.0	0.0
				N	10	21	21	21	21	21
				n	10	0	17	0	21	21

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Appendix 8: Burbot Muscle, Biological Descriptors
and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg
7894J-124	34	BRBT	92/10/06	Muscle	0.18	2.24	<	200.40	0.16	0.083
7894J-125	35	BRBT	92/10/06	Muscle	0.32	1.92	<	231.60	0.13	0.156
7894J-126	36	BRBT	92/10/06	Muscle	0.44	18.26	<	223.20	0.49	0.093
7894J-127	37	BRBT	92/10/06	Muscle	0.37	2.56	<	218.09	0.22	0.142
7894J-128	38	BRBT	92/10/06	Muscle	0.38	2.04	<	216.58	0.17	0.097
7894J-129	39	BRBT	92/10/06	Muscle	0.18	1.83	<	274.00	0.13	0.099
7894J-130	40	BRBT	92/10/06	Muscle	0.20	1.69	<	230.10	0.16	0.138
7894J-131	41	BRBT	92/10/06	Muscle	0.25	3.47	<	249.60	0.21	0.169
7894J-132	42	BRBT	92/10/06	Muscle	0.18	2.43	<	214.72	0.18	0.127
7894J-133	43	BRBT	92/10/06	Muscle	0.16	2.29	<	247.16	0.14	0.133
0625K-1	DL93001	BRBT	93/09/20	Muscle	0.56	3.31	<	247.34	0.17	0.147
0625K-6	PP93006	BRBT	93/09/20	Muscle	0.19	1.43	<	229.89	0.17	0.106
0625K-7	PP93007	BRBT	93/09/20	Muscle	0.20	2.94	<	255.91	0.24	0.129
0625K-8	PP93008	BRBT	93/09/20	Muscle	0.27	6.13	0.04	248.19	0.18	0.120
0625K-9	PP93009	BRBT	93/09/20	Muscle	0.25	1.41	<	227.69	0.18	0.090
0625K-10	PP93010	BRBT	93/09/20	Muscle	0.34	1.43	<	225.36	0.14	0.112
0625K-11	PP93011	BRBT	93/09/20	Muscle	0.38	3.30	<	201.60	0.13	0.123
0625K-12	PP93012	BRBT	93/09/20	Muscle	0.27	1.44	<	243.69	0.17	0.110
0625K-13	PP93013	BRBT	93/09/20	Muscle	0.27	3.03	0.03	210.05	0.13	0.107
0625K-14	PP93014	BRBT	93/09/20	Muscle	0.24	1.55	<	241.96	0.22	0.110
0625K-15	PP93015	BRBT	93/09/20	Muscle	0.23	1.74	<	213.24	0.20	0.068
				Max.	0.56	18.26	0.04	274.00	0.49	0.169
				Min.	0.16	1.41	<	200.40	0.13	0.068
				Mean	0.28	3.16	0.01	230.97	0.19	0.117
				SD	0.10	3.63	0.01	19.00	0.08	0.025
				N	21	21	21	21	21	21
				n	0	0	18	0	0	0

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Appendix 8: Burbot Muscle, Biological Descriptors and Metal Data (µg/g ww).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Molybdenum Mo	Nickel Ni	Phosphorous PO4	Potassium K	Silver Ag	Sodium Na
7894J-124	34	BRBT	92/10/06	Muscle	<	0.05	4843	3423	<	195.4
7894J-125	35	BRBT	92/10/06	Muscle	<	0.05	5809	3667	<	306.9
7894J-126	36	BRBT	92/10/06	Muscle	<	0.05	5543	3478	<	279.0
7894J-127	37	BRBT	92/10/06	Muscle	<	0.05	5443	3513	<	360.9
7894J-128	38	BRBT	92/10/06	Muscle	<	0.05	5842	3767	<	262.1
7894J-129	39	BRBT	92/10/06	Muscle	<	0.05	6120	4100	<	344.0
7894J-130	40	BRBT	92/10/06	Muscle	<	0.05	5226	3491	<	351.0
7894J-131	41	BRBT	92/10/06	Muscle	<	0.05	6656	3890	<	476.3
7894J-132	42	BRBT	92/10/06	Muscle	<	0.05	5597	3678	<	318.6
7894J-133	43	BRBT	92/10/06	Muscle	<	0.05	5795	3590	<	409.1
0625K-1	DL93001	BRBT	93/09/20	Muscle	<	0.05	6164	3729	<	392.3
0625K-6	PP93006	BRBT	93/09/20	Muscle	<	0.05	6030	3750	<	307.1
0625K-7	PP93007	BRBT	93/09/20	Muscle	<	0.05	6613	3680	<	265.2
0625K-8	PP93008	BRBT	93/09/20	Muscle	<	0.05	6982	3894	<	407.6
0625K-9	PP93009	BRBT	93/09/20	Muscle	<	0.05	6739	3691	<	262.6
0625K-10	PP93010	BRBT	93/09/20	Muscle	<	0.05	6811	3640	<	366.0
0625K-11	PP93011	BRBT	93/09/20	Muscle	<	0.06	6123	3184	<	482.3
0625K-12	PP93012	BRBT	93/09/20	Muscle	<	0.05	7233	3841	<	415.2
0625K-13	PP93013	BRBT	93/09/20	Muscle	<	0.05	6232	3177	<	251.7
0625K-14	PP93014	BRBT	93/09/20	Muscle	<	0.07	6151	3842	<	299.2
0625K-15	PP93015	BRBT	93/09/20	Muscle	<	0.05	5884	3255	<	194.0
				Max.	<	0.07	7233	4100	<	482.3
				Min.	<	0.05	4843	3177	<	194.0
				Mean	<	0.05	6087	3632	<	330.8
				SD	0.0	0.01	600	239	0.0	81.2
				N	21	21	21	21	21	21
				n	21	18	0	0	21	0

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Appendix 8: Burbot Muscle, Biological Descriptors
and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Strontium Sr	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn
7894J-124	34	BRBT	92/10/06	Muscle	0.06	<	0.03	<	2.83
7894J-125	35	BRBT	92/10/06	Muscle	0.06	<	0.03	<	3.21
7894J-126	36	BRBT	92/10/06	Muscle	0.46	<	0.43	<	3.80
7894J-127	37	BRBT	92/10/06	Muscle	0.07	<	0.03	<	3.42
7894J-128	38	BRBT	92/10/06	Muscle	0.08	<	0.03	<	3.21
7894J-129	39	BRBT	92/10/06	Muscle	0.07	<	0.03	<	2.82
7894J-130	40	BRBT	92/10/06	Muscle	0.10	<	0.03	<	2.80
7894J-131	41	BRBT	92/10/06	Muscle	0.73	<	0.03	<	3.88
7894J-132	42	BRBT	92/10/06	Muscle	0.07	<	0.03	<	3.12
7894J-133	43	BRBT	92/10/06	Muscle	0.27	<	0.03	<	3.82
0625K-1	DL93001	BRBT	93/09/20	Muscle	0.07	<	0.03	<	4.87
0625K-6	PP93006	BRBT	93/09/20	Muscle	0.06	<	0.03	<	3.11
0625K-7	PP93007	BRBT	93/09/20	Muscle	0.49	<	0.03	<	3.46
0625K-8	PP93008	BRBT	93/09/20	Muscle	0.11	<	0.22	<	4.62
0625K-9	PP93009	BRBT	93/09/20	Muscle	0.51	<	0.03	<	3.25
0625K-10	PP93010	BRBT	93/09/20	Muscle	0.40	<	0.03	<	3.71
0625K-11	PP93011	BRBT	93/09/20	Muscle	0.10	<	0.03	<	4.73
0625K-12	PP93012	BRBT	93/09/20	Muscle	0.83	<	0.03	<	3.71
0625K-13	PP93013	BRBT	93/09/20	Muscle	0.54	<	0.03	<	4.28
0625K-14	PP93014	BRBT	93/09/20	Muscle	0.06	<	0.03	<	2.94
0625K-15	PP93015	BRBT	93/09/20	Muscle	0.49	<	0.03	<	2.79
				Max.	0.83	<	0.43	<	4.87
				Min.	0.06	<	0.03	<	2.79
				Mean	0.27	<	0.05	<	3.54
				SD	0.25		0.10		0.65
				N	21		21		21
				n	0		19		0

APPENDIX 9

Biological Descriptors of BURBOT caught near Fort Resolution
in 1992 and 1993, and Concentrations ($\mu\text{g/g}$ wet weight) of 28
Elements in LIVER Tissues.

FORT RESOLUTION MONITORING PROGRAM

Appendix 9: Summary of heavy metal concentrations (µg/g wet weight) in the liver tissues of Burbot.

PARAMETER	YEARS OF RECORD	# OF SAMPLES	# OF NO DETECTS	DETECTION LIMITS	MINIMUM	MAXIMUM	COMMENTS
Aluminum	92	10	10	2.5	<2.5	<2.5	All non-detects
Antimony	92	10	10	2.5	<2.5	<2.5	All non-detects
Arsenic	92	10	10	0.03	<0.03	<0.03	All non-detects
Barium	92	10	6	0.03	<0.03	0.06	-
Beryllium	92	10	10	0.05	<0.05	<0.05	All non-detects
Bismuth	92	10	10	7.5	<7.5	<7.5	All non-detects
Boron	92	10	1	0.25	<0.25	0.94	-
Cadmium	92	10	10	0.03	<0.03	<0.03	All non-detects
Calcium	92	10	0	-	17	80	-
Chromium	92	10	10	0.75	<0.75	<0.75	All non-detects
Cobalt	92	10	10	0.25	<0.25	<0.25	All non-detects
Copper	92	10	0	-	1.62	9.94	-
Iron	92	10	0	-	14	159	-
Lead	92	10	10	0.03	<0.03	<0.03	All non-detects
Magnesium	92	10	0	-	62	146	-
Manganese	92	10	0	-	0.34	0.97	-
Mercury	92	10	0	-	0.009	0.057	-
Molybdenum	92	10	10	0.5	<0.5	<0.5	All non-detects
Nickel	92	10	10	0.13	<0.13	<0.13	All non-detects
Phosphorous	92	10	0	-	3962	8627	-
Potassium	92	10	0	-	1816	2719	-
Silver	92	10	10	0.5	<0.5	<0.5	All non-detects
Sodium	92	10	0	-	406	1079	-
Strontium	92	10	0	-	0.04	0.15	-
Tin	92	10	10	0.5	<0.5	<0.5	All non-detects
Titanium	92	10	10	0.08	<0.08	<0.08	All non-detects
Vanadium	92	10	10	0.25	<0.25	<0.25	All non-detects
Zinc	92	10	0	-	11.45	25.64	-

FORT RESOLUTION MONITORING PROGRAM

Appendix 9: Burbot Liver, Biological Descriptors and
Metal Data ($\mu\text{g/g ww}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Location	Length (mm)	Weight (g)	K Factor	Maturity	Ageing Structure	Age	Age Crack/Burn on Otolith
7894J-136	34	BRBT	92/10/06	Liver	Resolution Bay	620	1709.3	0.72	1	Otolith	11	9
7894J-137	35	BRBT	92/10/06	Liver	Resolution Bay	671	2170	0.72	3	Otolith	15	15
7894J-138	36	BRBT	92/10/06	Liver	Resolution Bay	658	1868.4	0.66	8	Otolith	12	12
7894J-139	37	BRBT	92/10/06	Liver	Resolution Bay	698	2395.1	0.70	8	Otolith	13	13
7894J-140	38	BRBT	92/10/06	Liver	Resolution Bay	648	2106.3	0.77	3	Otolith	11	9
7894J-141	39	BRBT	92/10/06	Liver	Resolution Bay	682	2332.3	0.74	3	Otolith	11	10
7894J-142	40	BRBT	92/10/06	Liver	Resolution Bay	841	3707.7	0.62	3	Otolith	18	17
7894J-143	41	BRBT	92/10/06	Liver	Resolution Bay	769	2991.1	0.66	3	Otolith	15	15
7894J-144	42	BRBT	92/10/06	Liver	Resolution Bay	695	2029.1	0.60	2	Otolith	14	12
7894J-145	43	BRBT	92/10/06	Liver	Resolution Bay	636	1864.6	0.72	3	Otolith	13	11
				Max.		841	3708	0.77			18	17
				Min.		620	1709	0.60			11	9
				Mean		692	2317	0.69			13	12
				SD		67	607	0.05			2	3
				N		10	10	10			10	10
				n		-	-	-			-	-

FORT RESOLUTION MONITORING PROGRAM

Appendix 9: Burbot Liver, Biological Descriptors and
Metal Data ($\mu\text{g/g ww}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	% Moisture H ₂ O	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
7894J-136	34	BRBT	92/10/06	Liver	56.5	< 2.5	< 2.5	< 0.03	0.05	< 0.05
7894J-137	35	BRBT	92/10/06	Liver	39.1	< 2.5	< 2.5	< 0.03	0.03	< 0.05
7894J-138	36	BRBT	92/10/06	Liver	46.6	< 2.5	< 2.5	< 0.03	0.04	< 0.05
7894J-139	37	BRBT	92/10/06	Liver	43.4	< 2.5	< 2.5	< 0.03	0.03	< 0.05
7894J-140	38	BRBT	92/10/06	Liver	41.2	< 2.5	< 2.5	< 0.03	0.04	< 0.05
7894J-141	39	BRBT	92/10/06	Liver	48.1	< 2.5	< 2.5	< 0.03	0.03	< 0.05
7894J-142	40	BRBT	92/10/06	Liver	41.7	< 2.5	< 2.5	< 0.03	0.03	< 0.05
7894J-143	41	BRBT	92/10/06	Liver	54.1	< 2.5	< 2.5	< 0.03	0.03	< 0.05
7894J-144	42	BRBT	92/10/06	Liver	63.6	< 2.5	< 2.5	< 0.03	0.06	< 0.05
7894J-145	43	BRBT	92/10/06	Liver	44.4	< 2.5	< 2.5	< 0.03	0.03	< 0.05
					Max.	< 2.5	< 2.5	< 0.03	0.06	< 0.05
					Min.	< 2.5	< 2.5	< 0.03	0.03	< 0.05
					Mean	< 2.5	< 2.5	< 0.03	0.03	< 0.05
					SD	0.0	0.0	0.00	0.02	0.00
					N	10	10	10	10	10
					n	10	10	10	6	10

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Appendix 9: Burbot Liver, Biological Descriptors and
Metal Data ($\mu\text{g/g ww}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Bismuth Bi	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co
7894J-136	34	BRBT	92/10/06	Liver	7.5	0.48	0.03	74.0	0.75	0.25
7894J-137	35	BRBT	92/10/06	Liver	7.5	0.34	0.03	18.3	0.75	0.25
7894J-138	36	BRBT	92/10/06	Liver	7.5	0.34	0.03	64.1	0.75	0.25
7894J-139	37	BRBT	92/10/06	Liver	7.5	0.50	0.03	28.3	0.75	0.25
7894J-140	38	BRBT	92/10/06	Liver	7.5	0.32	0.03	23.5	0.75	0.25
7894J-141	39	BRBT	92/10/06	Liver	7.5	0.39	0.03	20.8	0.75	0.25
7894J-142	40	BRBT	92/10/06	Liver	7.5	0.94	0.03	23.3	0.75	0.25
7894J-143	41	BRBT	92/10/06	Liver	7.5	0.31	0.03	32.1	0.75	0.25
7894J-144	42	BRBT	92/10/06	Liver	7.5	0.54	0.03	80.1	0.75	0.25
7894J-145	43	BRBT	92/10/06	Liver	7.5	0.25	0.03	16.7	0.75	0.25
				Max.	7.5	0.94	0.03	80.1	0.75	0.25
				Min.	7.5	0.25	0.03	16.7	0.75	0.25
				Mean	7.5	0.43	0.03	38.1	0.75	0.25
				SD	0.0	0.21	0.00	24.6	0.00	0.00
				N	10	10	10	10	10	10
				n	10	1	10	0	10	10

FORT RESOLUTION MONITORING PROGRAM

Appendix 9: Burbot Liver, Biological Descriptors and
Metal Data ($\mu\text{g/g ww}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg
7894J-136	34	BRBT	92/10/06	Liver	1.75	57.99	< 0.03	108.75	0.75	0.017
7894J-137	35	BRBT	92/10/06	Liver	3.38	15.10	< 0.03	79.17	0.47	0.019
7894J-138	36	BRBT	92/10/06	Liver	7.22	26.34	< 0.03	80.10	0.50	0.009
7894J-139	37	BRBT	92/10/06	Liver	8.15	29.01	< 0.03	62.26	0.34	0.016
7894J-140	38	BRBT	92/10/06	Liver	4.83	13.77	< 0.03	99.96	0.79	0.012
7894J-141	39	BRBT	92/10/06	Liver	9.94	22.54	< 0.03	103.80	0.58	0.014
7894J-142	40	BRBT	92/10/06	Liver	4.31	17.42	< 0.03	87.45	0.57	0.018
7894J-143	41	BRBT	92/10/06	Liver	1.62	30.32	< 0.03	114.75	0.77	0.032
7894J-144	42	BRBT	92/10/06	Liver	9.00	158.67	< 0.03	145.60	0.97	0.052
7894J-145	43	BRBT	92/10/06	Liver	9.57	19.26	< 0.03	66.72	0.73	0.057

				Max.	9.94	158.67	< 0.03	145.60	0.97	0.057
				Min.	1.62	13.77	< 0.03	62.26	0.34	0.009
				Mean	5.98	39.04	< 0.03	94.86	0.65	0.025
				SD	3.19	43.91	0.00	25.04	0.19	0.017
				N	10	10	10	10	10	10
				n	0	0	10	0	0	0

FORT RESOLUTION MONITORING PROGRAM

Appendix 9: Burbot Liver, Biological Descriptors and
Metal Data ($\mu\text{g/g ww}$)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Molybdenum Mo	Nickel Ni	Phosphorous PO4	Potassium K	Silver Ag	Sodium Na
7894J-136	34	BRBT	92/10/06	Liver	<	0.13	6090	2097	<	561.2
7894J-137	35	BRBT	92/10/06	Liver	<	0.13	5055	2186	<	432.4
7894J-138	36	BRBT	92/10/06	Liver	<	0.13	4806	1816	<	512.6
7894J-139	37	BRBT	92/10/06	Liver	<	0.13	3962	1970	<	667.9
7894J-140	38	BRBT	92/10/06	Liver	<	0.13	5645	2387	<	405.7
7894J-141	39	BRBT	92/10/06	Liver	<	0.13	5813	2637	<	586.5
7894J-142	40	BRBT	92/10/06	Liver	<	0.13	4722	2192	<	454.7
7894J-143	41	BRBT	92/10/06	Liver	<	0.13	6610	2469	<	1078.7
7894J-144	42	BRBT	92/10/06	Liver	<	0.13	8627	2719	<	866.3
7894J-145	43	BRBT	92/10/06	Liver	<	0.13	4170	2191	<	500.4
Max.										
Min.										
Mean										
SD										
N										
n										
					0.5	0.13	8627	2719	<	1078.7
					<	0.13	3962	1816	<	405.7
					<	0.13	5550	2266	<	606.6
					0.0	0.00	1369	286	0.0	213.5
					10	10	10	10	10	10
					10	10	0	0	10	0

FORT RESOLUTION MONITORING PROGRAM

Appendix 9: Burbot Liver, Biological Descriptors and
Metal Data (µg/g ww)

Lab Number	Sample Number	Species	Date of Collection	Tissue	Strontium Sr	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn
7894J-136	34	BRBT	92/10/06	Liver	0.15	<	0.08	<	15.79
7894J-137	35	BRBT	92/10/06	Liver	0.05	<	0.08	<	11.45
7894J-138	36	BRBT	92/10/06	Liver	0.13	<	0.08	<	17.37
7894J-139	37	BRBT	92/10/06	Liver	0.06	<	0.08	<	15.67
7894J-140	38	BRBT	92/10/06	Liver	0.06	<	0.08	<	13.83
7894J-141	39	BRBT	92/10/06	Liver	0.04	<	0.08	<	19.30
7894J-142	40	BRBT	92/10/06	Liver	0.05	<	0.08	<	12.74
7894J-143	41	BRBT	92/10/06	Liver	0.06	<	0.08	<	13.06
7894J-144	42	BRBT	92/10/06	Liver	0.14	<	0.08	<	25.64
7894J-145	43	BRBT	92/10/06	Liver	0.04	<	0.08	<	14.89
Max.									
Min.									
Mean									
SD									
N									
n									

APPENDIX 10

Biological Descriptors of LONGNOSE SUCKER caught near Fort Resolution in 1992 and 1993, and Concentrations ($\mu\text{g/g}$ wet weight) of 28 Elements in MUSCLE Tissues.

FORT RESOLUTION MONITORING PROGRAM

Appendix 10: Summary of heavy metal concentrations ($\mu\text{g/g}$ wet weight) in the muscle tissues of Longnose sucker.

PARAMETER	YEARS OF RECORD	# OF SAMPLES	# OF NO DETECTS	DETECTION LIMITS	MINIMUM	MAXIMUM	COMMENTS
Aluminum	92, 93	13	12	1	<1	1.55	-
Antimony	92, 93	13	13	1	<1	<1	All non-detects
Arsenic	92, 93	13	4	0.01	<0.01	0.06	-
Barium	92, 93	13	0	-	0.02	0.17	-
Beryllium	92, 93	13	13	0.02	<0.02	<0.02	All non-detects
Bismuth	92	2	2	3	<3	<3	All non-detects
Boron	92, 93	13	0	-	0.22	0.47	-
Cadmium	92, 93	13	13	0.01	<0.01	<0.01	All non-detects
Calcium	92, 93	13	0	-	105	1060	-
Chromium	92, 93	13	13	0.3	<0.3	<0.3	All non-detects
Cobalt	92, 93	13	13	0.1	<0.1	<0.1	All non-detects
Copper	92, 93	13	0	-	0.31	1.08	-
Iron	92, 93	13	0	-	1.80	10.66	-
Lead	92, 93	13	7	0.01	<0.01	0.11	-
Magnesium	92, 93	13	0	-	237	317	-
Manganese	92, 93	13	0	-	0.12	0.22	-
Mercury	92, 93	13	0	-	0.033	0.091	-
Molybdenum	92, 93	13	13	0.2	<0.2	<0.2	All non-detects
Nickel	92, 93	13	13	0.05	<0.05	<0.05	All non-detects
Phosphorous	92, 93	13	0	-	6402	8910	-
Potassium	92, 93	13	0	-	3928	4590	-
Silver	92, 93	13	13	0.2	<0.2	<0.2	All non-detects
Sodium	92, 93	13	0	-	95	290	-
Strontium	92, 93	13	0	-	0.04	1.12	-
Tin	92, 93	13	13	0.2	<0.2	<0.2	All non-detects
Titanium	92, 93	13	13	0.03	<0.03	<0.03	All non-detects
Vanadium	92, 93	13	13	0.1	<0.1	<0.1	All non-detects
Zinc	92, 93	13	0	-	2.78	5.15	-

FORT RESOLUTION MONITORING PROGRAM

Appendix 10: Longnose Sucker Muscle, Biological
Descriptors and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Location	Length (mm)	Weight (g)	K Factor	Maturity	Ageing Structure	Age
789AJ-134	44	LNSC	92/10/06	Muscle	Resolution Bay	470	1434.3	1.38	7	Fin	20
789AJ-135	45	LNSC	92/10/06	Muscle	Resolution Bay	475	1542.9	1.44	3	Fin	17
0625K-2	DL93002	LNSC	93/09/20	Muscle	Dawson Landing	462	1500	1.52	-	Fin	10
0625K-20	PP93020	LNSC	93/09/20	Muscle	Pine Point	436	1147	1.38	-	Fin	10
0625K-21	PP93021	LNSC	93/09/20	Muscle	Pine Point	460	1444	1.48	-	Fin	10
0625K-22	PP93022	LNSC	93/09/20	Muscle	Pine Point	534	2142	1.41	-	Fin	17
0625K-23	PP93023	LNSC	93/09/20	Muscle	Pine Point	504	1780	1.39	-	Fin	11
0625K-24	PP93024	LNSC	93/09/20	Muscle	Pine Point	427	1128	1.45	-	Fin	15
0625K-25	PP93025	LNSC	93/09/20	Muscle	Pine Point	487	1774	1.54	-	Fin	10
0625K-26	PP93026	LNSC	93/09/20	Muscle	Pine Point	492	1582	1.33	-	Fin	11
0625K-27	PP93027	LNSC	93/09/20	Muscle	Pine Point	459	1261	1.30	-	Fin	11
0625K-28	PP93028	LNSC	93/09/20	Muscle	Pine Point	457	1402	1.47	-	Fin	12
0625K-29	PP93029	LNSC	93/09/20	Muscle	Pine Point	501	1510	1.20	-	Fin	11
Max.											
534											
Min.											
427											
Mean											
474											
SD											
29											
N											
13											
n											
-											

FORT RESOLUTION MONITORING PROGRAM

Appendix 10: Longnose Sucker Muscle, Biological
Descriptors and Metal Data ($\mu\text{g/g ww}$).

Lab Number	Sample Number	Species	Date of Collection	Tissue	% Moisture H ₂ O	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
7894J-134	44	LNSC	92/10/06	Muscle	78.8	< 1.0	< 1.0	0.06	0.08	< 0.02
7894J-135	45	LNSC	92/10/06	Muscle	76.3	< 1.0	< 1.0	0.04	0.06	< 0.02
0625K-2	DL93002	LNSC	93/09/20	Muscle	75.6	< 1.0	< 1.0	0.04	0.08	< 0.02
0625K-20	PP93020	LNSC	93/09/20	Muscle	76.9	< 1.0	< 1.0	0.02	0.02	< 0.02
0625K-21	PP93021	LNSC	93/09/20	Muscle	77.4	< 1.0	< 1.0	0.01	0.04	< 0.02
0625K-22	PP93022	LNSC	93/09/20	Muscle	74.8	< 1.0	< 1.0	0.02	0.17	< 0.02
0625K-23	PP93023	LNSC	93/09/20	Muscle	78.4	< 1.0	< 1.0	0.01	0.04	< 0.02
0625K-24	PP93024	LNSC	93/09/20	Muscle	75.4	< 1.0	< 1.0	0.04	0.07	< 0.02
0625K-25	PP93025	LNSC	93/09/20	Muscle	76.2	< 1.0	< 1.0	0.02	0.15	< 0.02
0625K-26	PP93026	LNSC	93/09/20	Muscle	77.8	< 1.0	< 1.0	0.01	0.05	< 0.02
0625K-27	PP93027	LNSC	93/09/20	Muscle	76.1	1.56	< 1.0	0.01	0.11	< 0.02
0625K-28	PP93028	LNSC	93/09/20	Muscle	77.5	< 1.0	< 1.0	0.02	0.02	< 0.02
0625K-29	PP93029	LNSC	93/09/20	Muscle	78.9	< 1.0	< 1.0	0.02	0.07	< 0.02
				Max.	78.9	1.55	< 1.0	0.06	0.17	< 0.02
				Min.	74.8	< 1.00	< 1.0	0.01	0.02	< 0.02
				Mean	76.9	< 1.00	< 1.0	0.02	0.08	< 0.02
				SD	1.3	0.29	0.0	0.02	0.05	0.00
				N	13	13	13	13	13	13
				n	-	12	13	4	0	13

FORT RESOLUTION MONITORING PROGRAM

Appendix 10: Longnose Sucker Muscle, Biological
Descriptors and Metal Data (µg/g ww).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Bismuth Bi	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co
7894J-134	44	LNSC	92/10/06	Muscle	<	0.29	<	231.1	<	<
7894J-135	45	LNSC	92/10/06	Muscle	<	0.27	<	184.9	<	<
0625K-2	DL93002	LNSC	93/09/20	Muscle	-	0.23	<	294.8	<	<
0625K-20	PP93020	LNSC	93/09/20	Muscle	-	0.47	<	182.6	<	<
0625K-21	PP93021	LNSC	93/09/20	Muscle	-	0.37	<	277.4	<	<
0625K-22	PP93022	LNSC	93/09/20	Muscle	-	0.28	<	1060.1	<	<
0625K-23	PP93023	LNSC	93/09/20	Muscle	-	0.30	<	161.6	<	<
0625K-24	PP93024	LNSC	93/09/20	Muscle	-	0.23	<	282.9	<	<
0625K-25	PP93025	LNSC	93/09/20	Muscle	-	0.39	<	283.3	<	<
0625K-26	PP93026	LNSC	93/09/20	Muscle	-	0.30	<	254.8	<	<
0625K-27	PP93027	LNSC	93/09/20	Muscle	-	0.31	<	232.2	<	<
0625K-28	PP93028	LNSC	93/09/20	Muscle	-	0.22	<	105.0	<	<
0625K-29	PP93029	LNSC	93/09/20	Muscle	-	0.39	<	398.6	<	<
				Max.	<	0.47	<	1060.1	<	<
				Min.	<	0.22	<	105.0	<	<
				Mean	<	0.31	<	303.8	<	<
				SD	0	0.08	0.00	238.7	0.0	0.0
				N	2	13	13	13	13	13
				n	2	0	13	0	13	13

FORT RESOLUTION MONITORING PROGRAM

Appendix 10: Longnose Sucker Muscle, Biological
Descriptors and Metal Data (µg/g ww).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn
7894J-134	44	LNSC	92/10/06	Muscle	0.49	5.43	0.11	243.80	0.15
7894J-135	45	LNSC	92/10/06	Muscle	0.39	4.75	0.01	270.18	0.14
0625K-2	DL93002	LNSC	93/09/20	Muscle	0.57	6.24	0.05	285.04	0.15
0625K-20	PP93020	LNSC	93/09/20	Muscle	0.53	2.56	<	247.26	0.14
0625K-21	PP93021	LNSC	93/09/20	Muscle	0.39	3.49	<	299.92	0.13
0625K-22	PP93022	LNSC	93/09/20	Muscle	0.86	8.09	<	270.08	0.22
0625K-23	PP93023	LNSC	93/09/20	Muscle	0.42	2.74	0.02	274.32	0.16
0625K-24	PP93024	LNSC	93/09/20	Muscle	1.08	10.66	<	236.66	0.15
0625K-25	PP93025	LNSC	93/09/20	Muscle	0.54	4.63	<	254.78	0.12
0625K-26	PP93026	LNSC	93/09/20	Muscle	0.77	3.77	0.02	316.86	0.12
0625K-27	PP93027	LNSC	93/09/20	Muscle	0.38	4.08	0.01	310.78	0.18
0625K-28	PP93028	LNSC	93/09/20	Muscle	0.31	1.80	<	280.71	0.14
0625K-29	PP93029	LNSC	93/09/20	Muscle	0.56	3.75	<	259.39	0.19
Max.									
Min.									
Mean									
SD									
N									
n									
					1.08	10.66	0.11	316.86	0.22
					0.31	1.80	<	236.66	0.12
					0.56	4.77	0.02	273.06	0.15
					0.22	2.42	0.03	25.25	0.03
					13	13	13	13	13
					0	0	7	0	0

FORT RESOLUTION MONITORING PROGRAM

Appendix 10: Longnose Sucker Muscle, Biological
Descriptors and Metal Data (µg/g ww).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorous PO4	Potassium K
7894J-134	44	LNSC	92/10/06	Muscle	0.035	<	<	6402	3986
7894J-135	45	LNSC	92/10/06	Muscle	0.070	<	<	6707	4242
0625K-2	DL93002	LNSC	93/09/20	Muscle	0.047	<	<	7893	4385
0625K-20	PP93020	LNSC	93/09/20	Muscle	0.041	<	<	6655	3928
0625K-21	PP93021	LNSC	93/09/20	Muscle	0.053	<	<	7284	4488
0625K-22	PP93022	LNSC	93/09/20	Muscle	0.091	<	<	8910	4291
0625K-23	PP93023	LNSC	93/09/20	Muscle	0.033	<	<	6998	4169
0625K-24	PP93024	LNSC	93/09/20	Muscle	0.033	<	<	7503	4059
0625K-25	PP93025	LNSC	93/09/20	Muscle	0.041	<	<	7000	4072
0625K-26	PP93026	LNSC	93/09/20	Muscle	0.062	<	<	7512	4454
0625K-27	PP93027	LNSC	93/09/20	Muscle	0.047	<	<	7459	4590
0625K-28	PP93028	LNSC	93/09/20	Muscle	0.044	<	<	6445	4110
0625K-29	PP93029	LNSC	93/09/20	Muscle	0.060	<	<	7360	4218
				Max.	0.091	<	<	8910	4590
				Min.	0.033	<	<	6402	3928
				Mean	0.051	<	<	7241	4230
				SD	0.017	0.0	0.00	677	204
				N	13	13	13	13	13
				n	0	13	13	0	0

FORT RESOLUTION MONITORING PROGRAM

Appendix 10: Longnose Sucker Muscle, Biological
Descriptors and Metal Data (µg/g ww).

Lab Number	Sample Number	Species	Date of Collection	Tissue	Silver Ag	Sodium Na	Strontium Sr	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn
7894J-134	44	LNSC	92/10/06	Muscle	< 0.2	95.4	0.25	< 0.2	< 0.03	< 0.1	3.04
7894J-135	45	LNSC	92/10/06	Muscle	< 0.2	227.5	0.19	< 0.2	< 0.03	< 0.1	4.04
0625K-2	DL93002	LNSC	93/09/20	Muscle	< 0.2	280.2	0.28	< 0.2	< 0.03	< 0.1	4.19
0625K-20	PP93020	LNSC	93/09/20	Muscle	< 0.2	191.7	0.14	< 0.2	< 0.03	< 0.1	2.91
0625K-21	PP93021	LNSC	93/09/20	Muscle	< 0.2	227.8	0.26	< 0.2	< 0.03	< 0.1	3.01
0625K-22	PP93022	LNSC	93/09/20	Muscle	< 0.2	290.3	1.12	< 0.2	< 0.03	< 0.1	3.87
0625K-23	PP93023	LNSC	93/09/20	Muscle	< 0.2	237.6	0.12	< 0.2	< 0.03	< 0.1	3.18
0625K-24	PP93024	LNSC	93/09/20	Muscle	< 0.2	200.5	0.28	< 0.2	< 0.03	< 0.1	5.15
0625K-25	PP93025	LNSC	93/09/20	Muscle	< 0.2	238.1	0.31	< 0.2	< 0.03	< 0.1	3.30
0625K-26	PP93026	LNSC	93/09/20	Muscle	< 0.2	215.3	0.25	< 0.2	< 0.03	< 0.1	3.14
0625K-27	PP93027	LNSC	93/09/20	Muscle	< 0.2	226.3	0.21	< 0.2	< 0.03	< 0.1	3.30
0625K-28	PP93028	LNSC	93/09/20	Muscle	< 0.2	143.6	0.04	< 0.2	< 0.03	< 0.1	2.78
0625K-29	PP93029	LNSC	93/09/20	Muscle	< 0.2	210.0	0.38	< 0.2	< 0.03	< 0.1	3.09
				Max.	< 0.2	290.3	1.12	< 0.2	< 0.03	< 0.1	5.15
				Min.	< 0.2	95.4	0.04	< 0.2	< 0.03	< 0.1	2.78
				Mean	< 0.2	214.2	0.30	< 0.2	< 0.03	< 0.1	3.46
				SD	0.0	51.3	0.26	0.0	0.00	0.0	0.67
				N	13	13	13	13	13	13	13
				n	13	0	0	13	13	13	0

APPENDIX 11

Data Handling for presentation

APPENDIX 11: DATA HANDLING FOR PRESENTATION

Means in Appendices 5 through 10, and in Table 4, are reported as follows:

		Sample		
		<½ below D.L.	>½ below D.L.	All below D.L.
Mean	Above D.L.	Mean	Mean	N/A
	below D.L. but >¾ D.L.	<D.L.	D.L. value	N/A
	below D.L. but <¾ D.L.	<D.L.	<D.L.	<D.L.

where D.L.= detection limit

Note: the standard deviations were calculated with half the detection limit value for samples below detection

Example: If more than half of the samples were below the wet weight detection limit and the mean (calculated with half the detection limit for values below detection) was above the detection limit, then this mean value was reported.

APPENDIX 12

Health Canada Human Health Risk Assessment

Health and Welfare
Canada

Santé et Bien-être social
Canada

Health Protection
Branch

Direction générale de la
protection de la santé

Bureau of Chemical Safety
Room 309B, Banting Building
Ottawa, Ontario
K1A 0L2

February 16, 1994

*data
1st copy only*

Mr. J.A. MacKinnon
Head, Environmental Health
Medical Directorate
Government of the Northwest Territories
Yellowknife, Northwest Territories
X1A 2L9

Dear Mr. MacKinnon:

This will refer to your letter dated November 23, 1993 and the enclosed data on the levels of metals measured in fish samples collected from the Fort Resolution area of the Northwest Territories. Officers in the Bureau have now completed their evaluation.

Based on the results provided by the Department of Fisheries and Oceans laboratory in Yellowknife, the levels of the metals measured in the liver and muscle of burbot and in the muscle of walleye, northern pike, lake whitefish and longnose sucker, caught in the Fort Resolution area of Great Slave Lake, would not pose a health hazard to consumers.

I trust that these comments will be of assistance to you.

Yours truly,

H.B.S. Conacher, Ph.D.
A/Director
Bureau of Chemical Safety

INDIAN AND
NORTHERN AFFAIRS
CANADA
N.W.T. REGION
MAR 10 1994
WATER RESOURCES DIVISION
YELLOWKNIFE, NT



Health and Welfare
Canada

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Health Protection
Branch

Direction générale de la
protection de la santé

Bureau of Chemical Safety
Room 309B, Banting Building
Ottawa, Ontario
K1A 0L2

May 10, 1994

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Mr. J.A. MacKinnon
Head, Environmental Health
Medical Directorate
Government of the Northwest Territories
Yellowknife, Northwest Territories
X1A 2L9

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1992, 1993*

Dear Mr. Mackinnon:

This will refer to Mr. Greg Wirch's letter to Gordon Boulton of this Bureau, dated March 13, 1994, and the enclosed data on the levels of metals measured in fish samples collected from the Fort Resolution area of the Northwest Territories in 1993. Officers in the Bureau have now completed their evaluation.

Based on the 1993 results provided by the Department of Fisheries and Oceans laboratory in Yellowknife, with the exception of antimony, the levels of the metals measured in the muscle of walleye, northern pike, lake whitefish, burbot and longnose sucker, caught in the Fort Resolution area of Great Slave Lake, would not pose a health hazard to consumers. With regard to antimony, the detection limit for this metal, determined by D.F.O., is considered to be too high to complete a meaningful assessment.

I trust that these comments will be of assistance to you.

Yours truly,

for

H.B.S. Conacher, Ph.D.
A/Director