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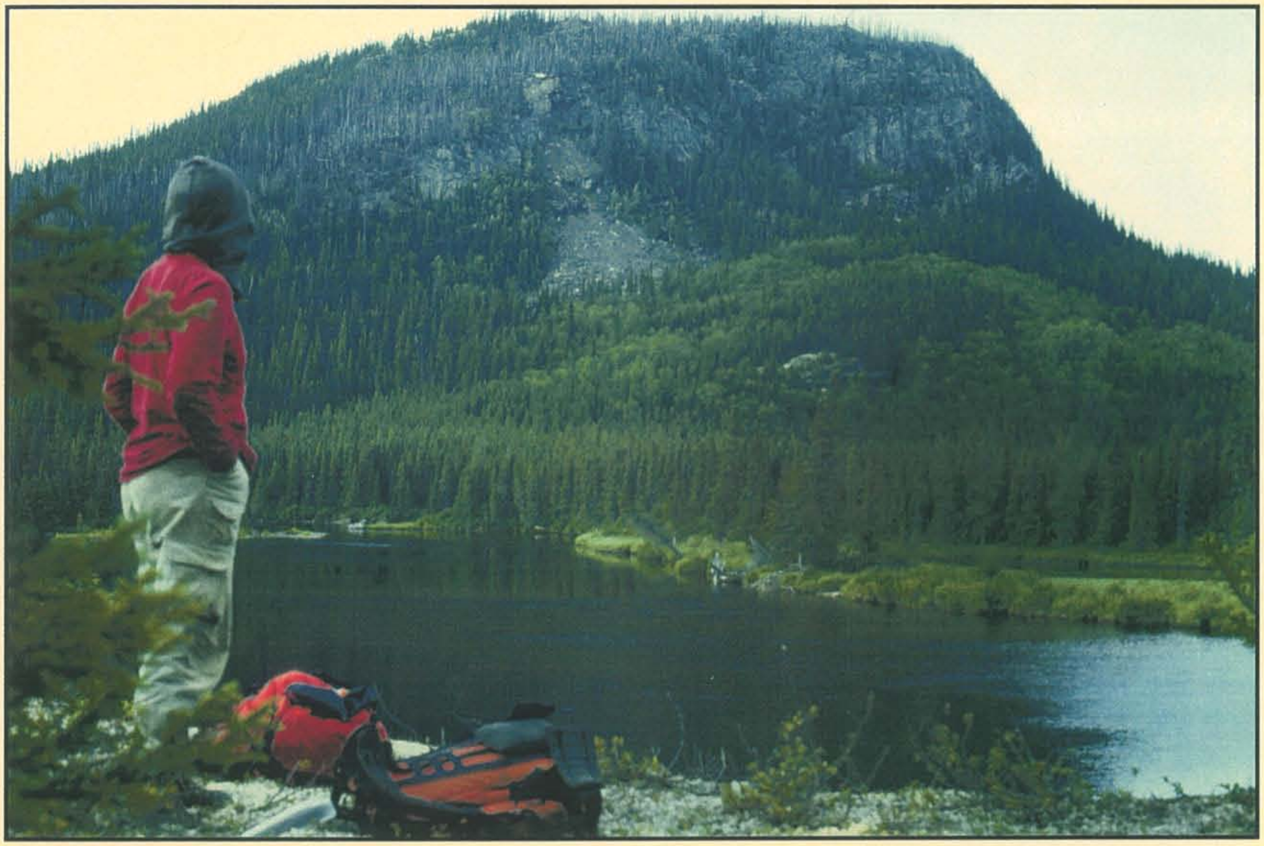

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REGIONAL SOIL, TILL AND STREAM-WATER SURVEYS FOR BASE METALS OVER LAKE-SEDIMENT ANOMALIES IN CENTRAL LABRADOR (Parts of NTS areas 13E/6 and 13K/5)

John W. McConnell

St. John's, Newfoundland
October 23, 2001

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ABSTRACT

Regional soil/till and stream-water surveys were conducted in the Wilson Lake and Seal Lake areas of central Labrador to investigate Ni–Cu and Cu anomalies in lake sediment and lake water. The Wilson Lake area is within the Grenville Province and is predominantly underlain by granulite-facies paragneiss. The Seal Lake area is located within the Central Mineral Belt and is underlain by Mesoproterozoic rocks of the Seal Lake Group including siltstone, shale, quartzite, subaerial basalt flows and gabbro sills, all of which have been regionally metamorphosed to greenschist facies. About 418 samples of mostly C-horizon till were collected from 3 grids covering 105 km^2 *at a density of 4 sites per km*^{2}*. They were analyzed for 47 elements and loss-on-ignition. Analyses of site duplicates indicate that data from B- and C-horizons are very similar for many elements of economic interest, particularly for As, Cr, Ni and Pb. This suggests that for these elements, data from soils may be compared directly with data from till. Copper and most rare-earth-elements are depleted in the B-horizon relative to the C-horizon. In the Wilson Lake survey, a strong, linear, Ni–Mg anomaly extends for at least 14 km in an east–west direction, suggesting the presence of an unmapped mafic component of the paragneiss. Stream water was collected from 111 sites in the two areas and analyzed for pH, conductivity, F,* SO_4 *and 21 trace metals. In the Wilson Lake area, water data also depict a zone of high Ni and Mg values corresponding to the till anomaly. The mineral potential of this feature is unknown. In the Seal Lake area, a cluster of high Cu values from till in the central part of the northern grid provides a focus for further exploration. Till results from the southern Thomas River grid are surprisingly low in view of the very high Cu content in sediment from two small lakes within the grid. Two water samples from a stream draining one of these lakes, however, have high Cu levels.*

INTRODUCTION

This report summarizes the highlights of a regional soil and till survey, with ancillary stream water sampling, conducted in 1999, in the Wilson Lake and Seal Lake areas of central Labrador. The survey was the final phase of a two-year program to investigate regional base-metal anomalies in reconnaissance lake-sediment data. The first phase consisted of a high-density lake-sediment and water survey covering 4 areas of central Labrador (McConnell, 2000a, b). From this work, the Wilson Lake and Seal Lake areas were selected for the till survey. The detailed lake survey revealed an area of anomalous Ni in sediment and water extending from the western part of NTS map area 13E/7 to the eastern part of NTS map area 13E/6. The area is underlain by paragneiss although mafic intrusive rocks are found nearby. Some ground was staked in the general vicinity following the Voisey's Bay Cu–Ni discovery in 1994.

The Seal Lake area has received more exploration attention and many minor Cu occurrences have been reported. The lake survey highlighted some of these known occurrences but also identified areas of high Cu in lake sediment and water outside of the known areas of mineralization. Two areas were selected for till surveying. The first and larger area lies between Seal and Wuchusk lakes and is mapped as underlain by gabbro and siliciclastic rocks. It was chosen because of anomalous Cu in lake water and elevated values in sediment. It has not received as much exploration attention as areas to the south of Seal Lake where most Cu mineralization has been discovered. A second smaller till survey was conducted in the Thomas River area to investigate two very high values of Cu in lake sediment – 241 and 1273 ppm. This area is also underlain by gabbro and siliciclastic rocks. Several minor occurrences of Cu mineralization are known within one kilometre of the grid area.

LOCATION AND ACCESS

The Wilson Lake survey area includes parts of NTS map sheets 13E/6 and 13E/7 (Figure 1). The new route of the Trans-Labrador highway passes very close to the triangular lake adjacent to the southwest corner of the survey grid. Float planes can land on this lake, as well as the lakes adjacent to the southeast and north sides of the grid. Suitable campsites are available on all 3 lakes. All points on the grid can be accessed from these lakes using canoe and foot traverses.

The Seal Lake survey areas include parts of NTS map sheet 13K/5 (Figure 1). Access is by float plane to Seal or Wuchusk lakes. Suitable campsite are plentiful. Both grid areas are accessible by motorized canoe or small outboard from Seal Lake. The southern grid can be accessed via the Naskaupi River and Thomas River. The north side of the large grid is accessed from Wuchusk Lake, which itself is accessed via the Naskaupi River requiring a portage or powered ascent of rapids at the east end of Seal Lake. The latter method may not be possible at times of high or low water.

PREVIOUS WORK

The earliest geochemical work reported from the Wilson Lake area includes stream-sediment and heavy-mineral surveys conducted by BRINEX Limited in 1969 and summarized in unpublished company reports. Some of these data were used and published by Callahan (1980). A regional lake-sediment and water survey using a sample density of about 1 per 13 km^2 was conducted in 1982 by the Geological Survey of Canada (Friske *et*

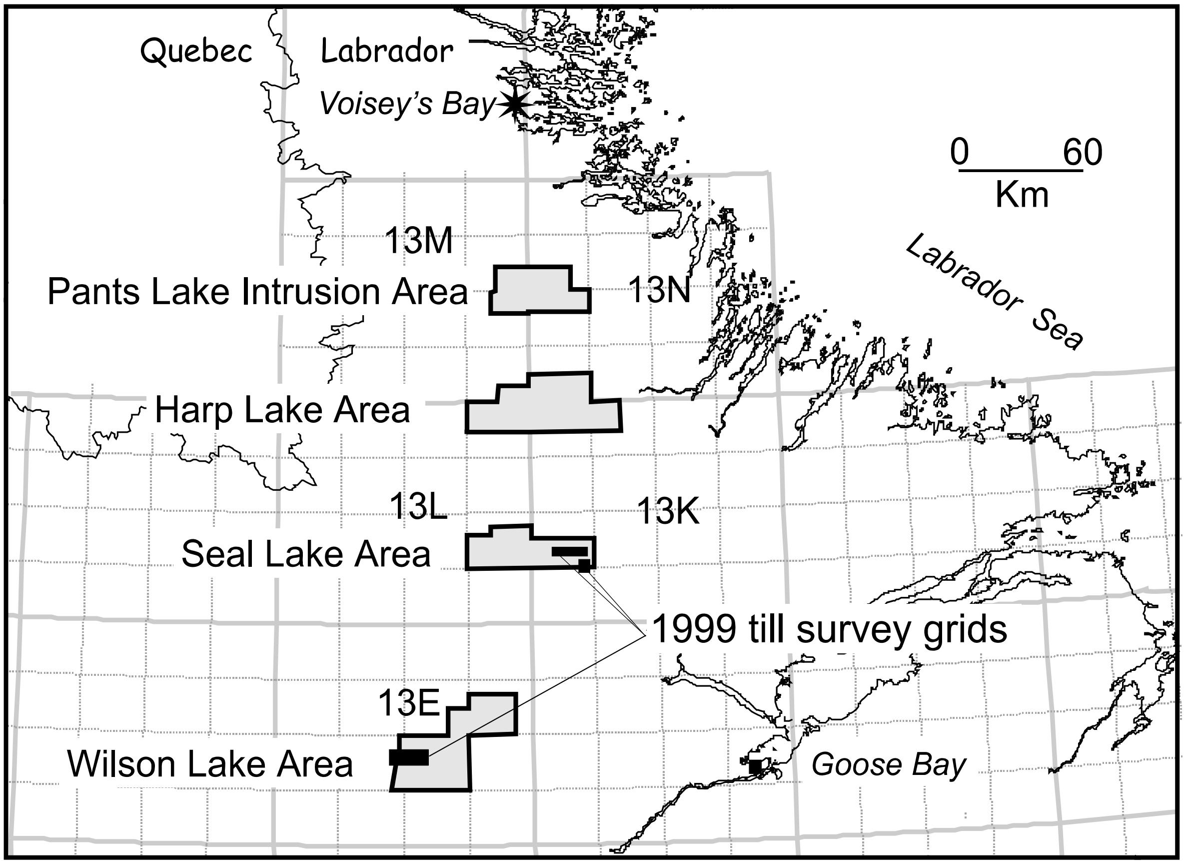


Figure 1. *Location of 1998 follow-up lake surveys and 1999 soil/till and stream survey areas.*

al., 1993a). This survey revealed anomalous Ni in lake sediment in the present Wilson Lake survey area. The regional-lake survey in the Seal Lake area showed elevated values of Cu and Ni (Friske *et al.*, 1993b, c). The most recent survey in both areas is a high-density lake-sediment and water survey conducted by the Geological Survey of Newfoundland and Labrador at a sample density of about 1 per 5 km^2 (McConnell, 2000a, b). In the Wilson Lake area, these data revealed a broad zone of elevated Ni in both sediment and water in eastern NTS map area 13E/06 and western NTS map area 13E/07 (Figures 2-4). In the Seal Lake survey area, high values of Cu in sediment and water are present; in several instances these are associated with known Cu mineralization (Figures 5 and 6).

GEOLOGY AND MINERALIZATION

Wilson Lake Area

The survey area is located in the northern Grenville Province and is underlain by rocks of the Wilson Lake Allochthon, predominantly 1680 to 1660 Ma granulite-facies paragneiss (Disappointment Lake gneiss) and lesser amounts of mafic gneiss, derived from gabbronorite and/or diorite. Although not shown within the survey area, minor ultramafic intrusive rocks have been noted (Thomas, 1993). The most recent field mapping is that of Thomas (1993) and Thomas *et al.* (2000) at 1:100 000 scale. The area has received only modest exploration attention, mostly by BRINEX Limited in the

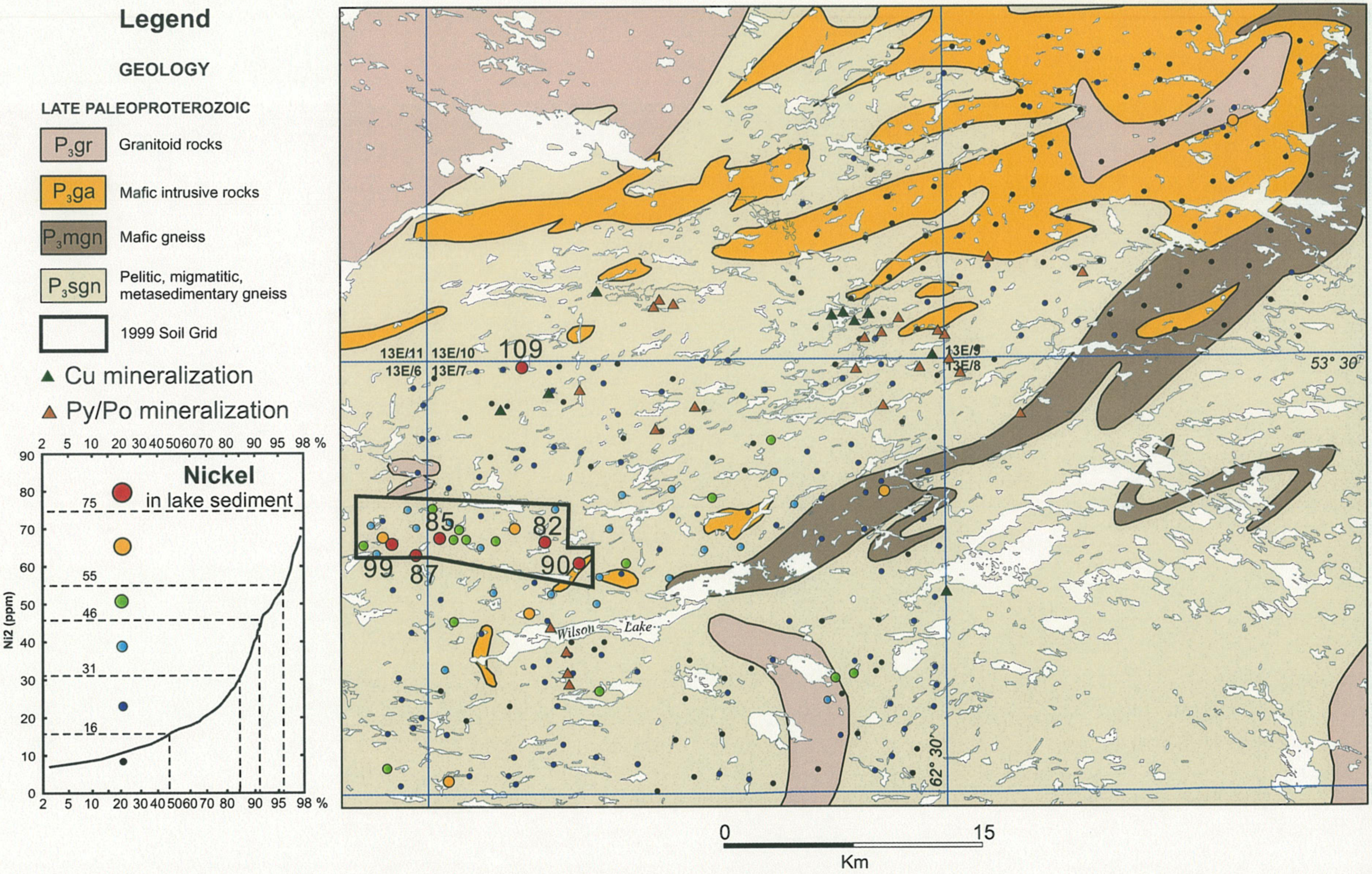


Figure 2. *Nickel (Ni2) in lake sediment and location of soil/till survey, Wilson Lake area.*

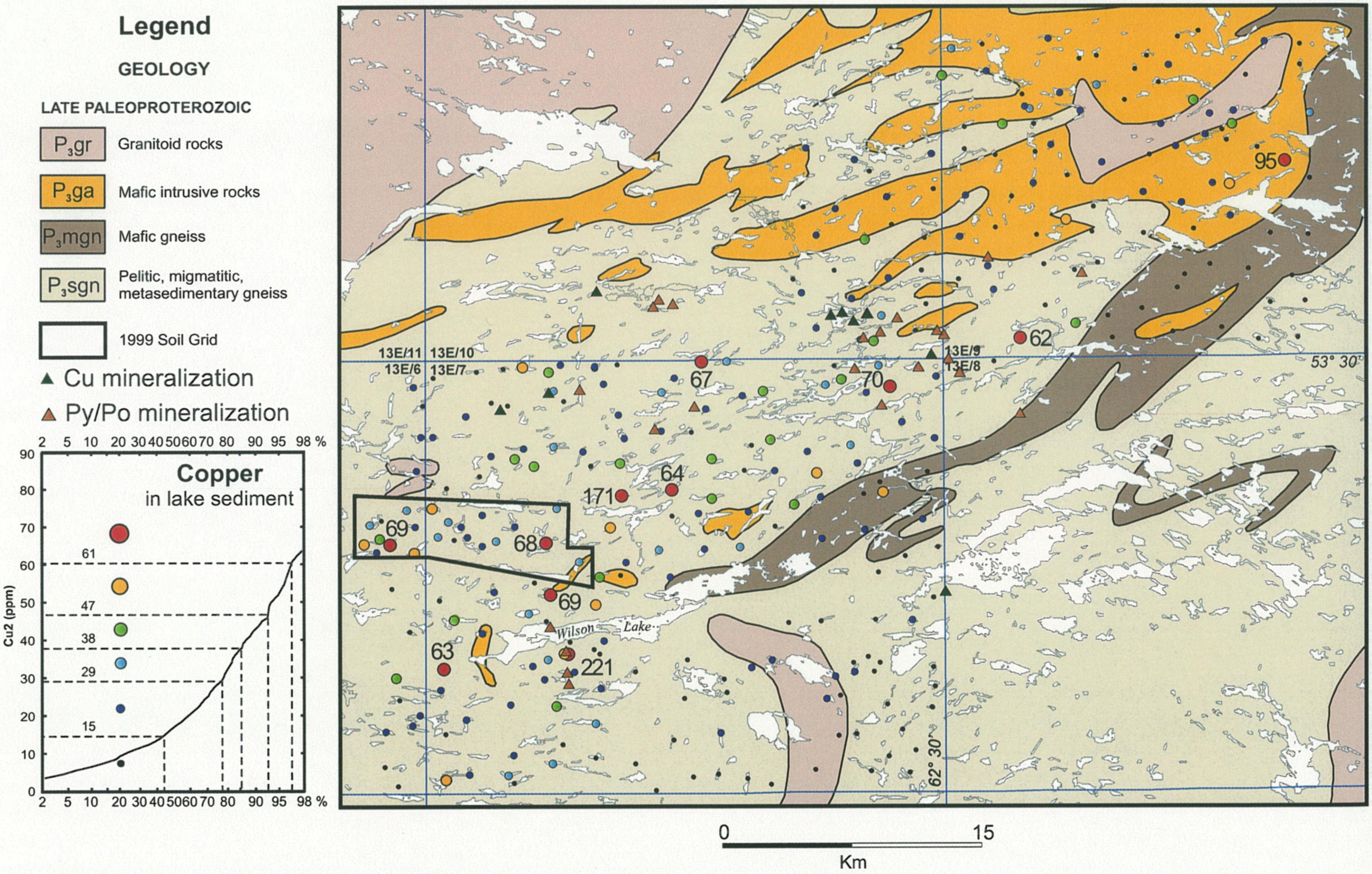


Figure 3. *Copper (Cu2) in lake sediment and location of soil/till survey, Wilson Lake area.*

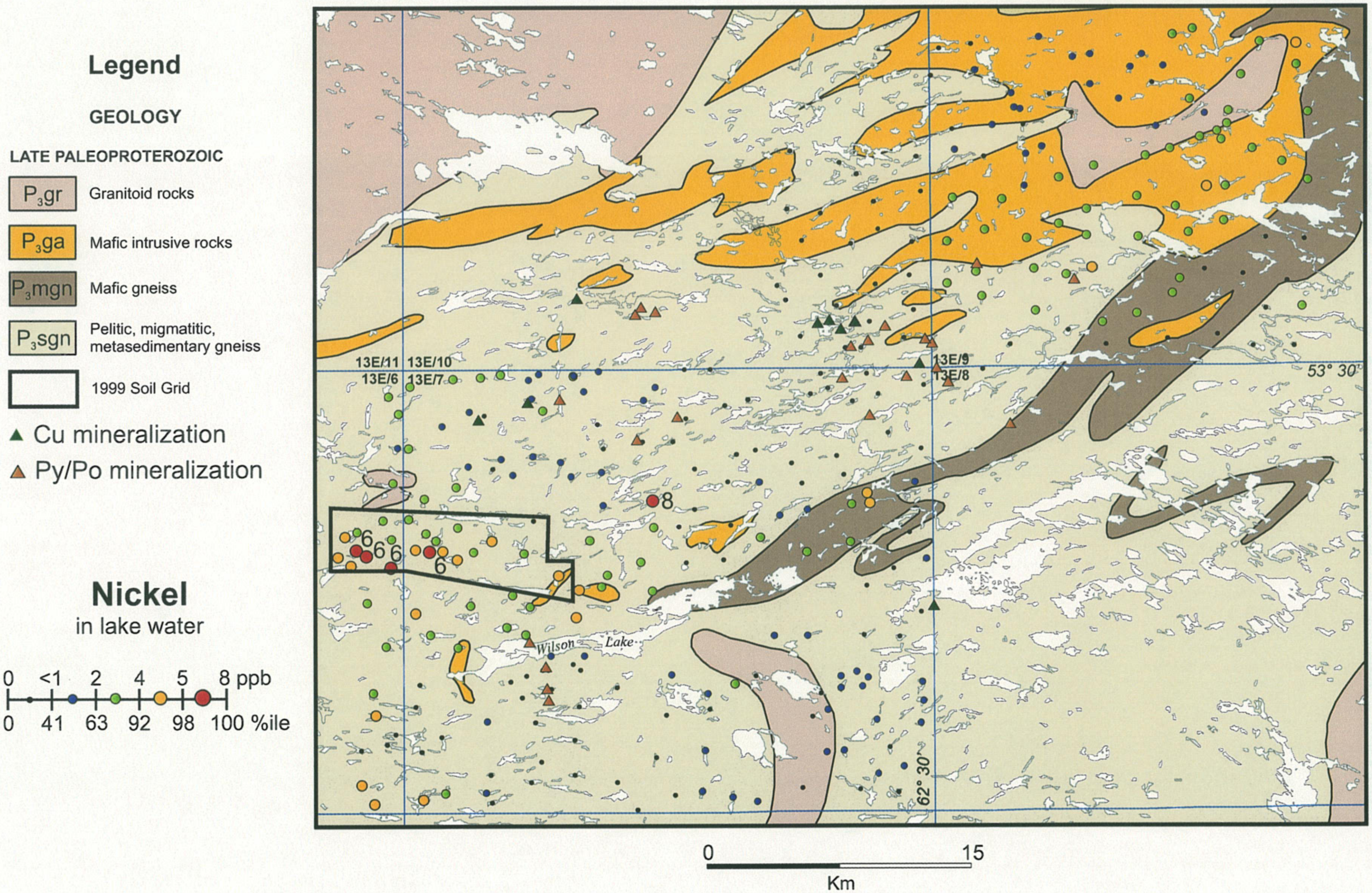


Figure 4. *Nickel in lake water and location of soil/till survey, Wilson Lake area.*

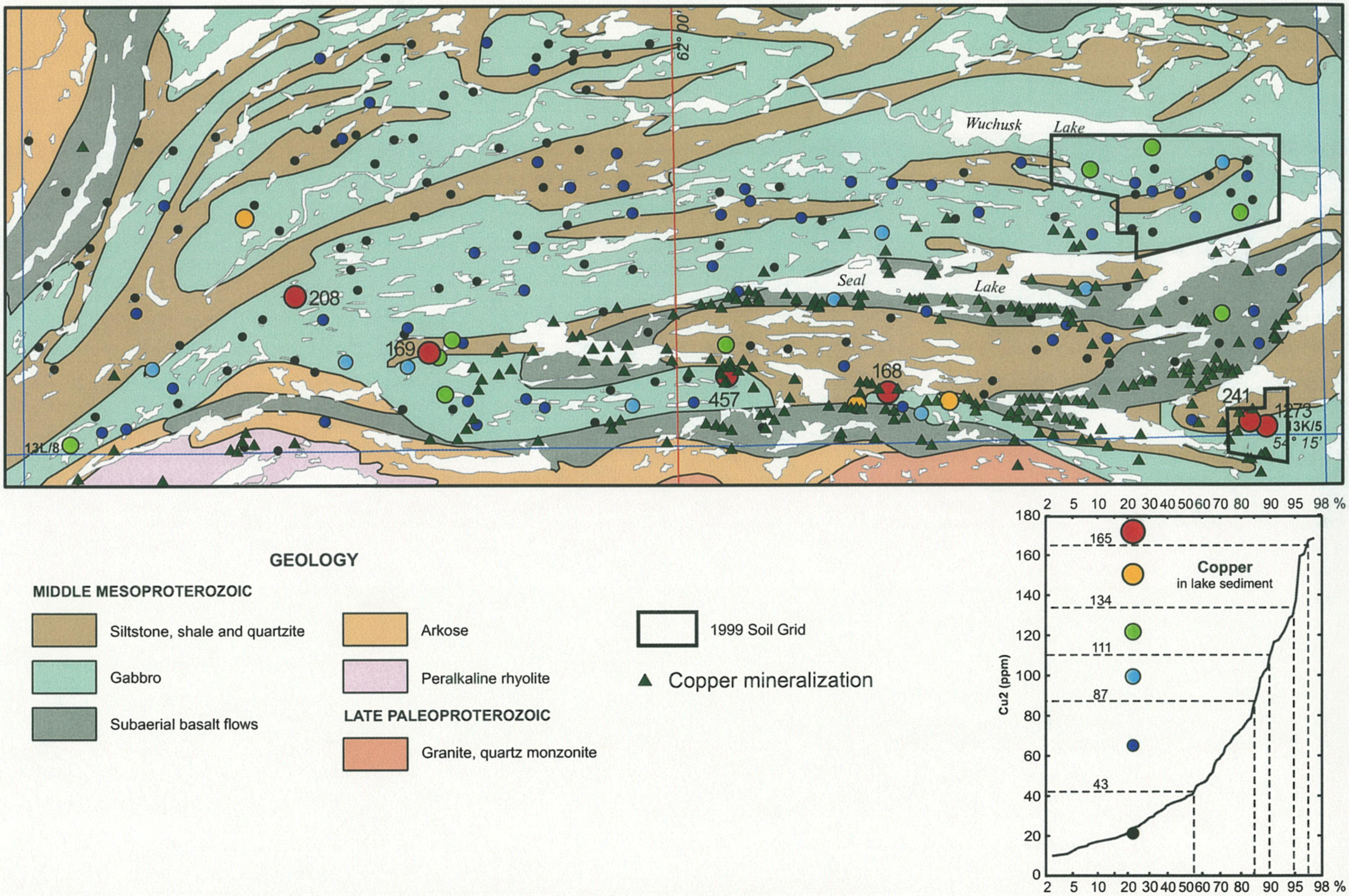


Figure 5. *Copper (Cu2) in lake sediment and location of soil/till survey, Seal Lake area.*

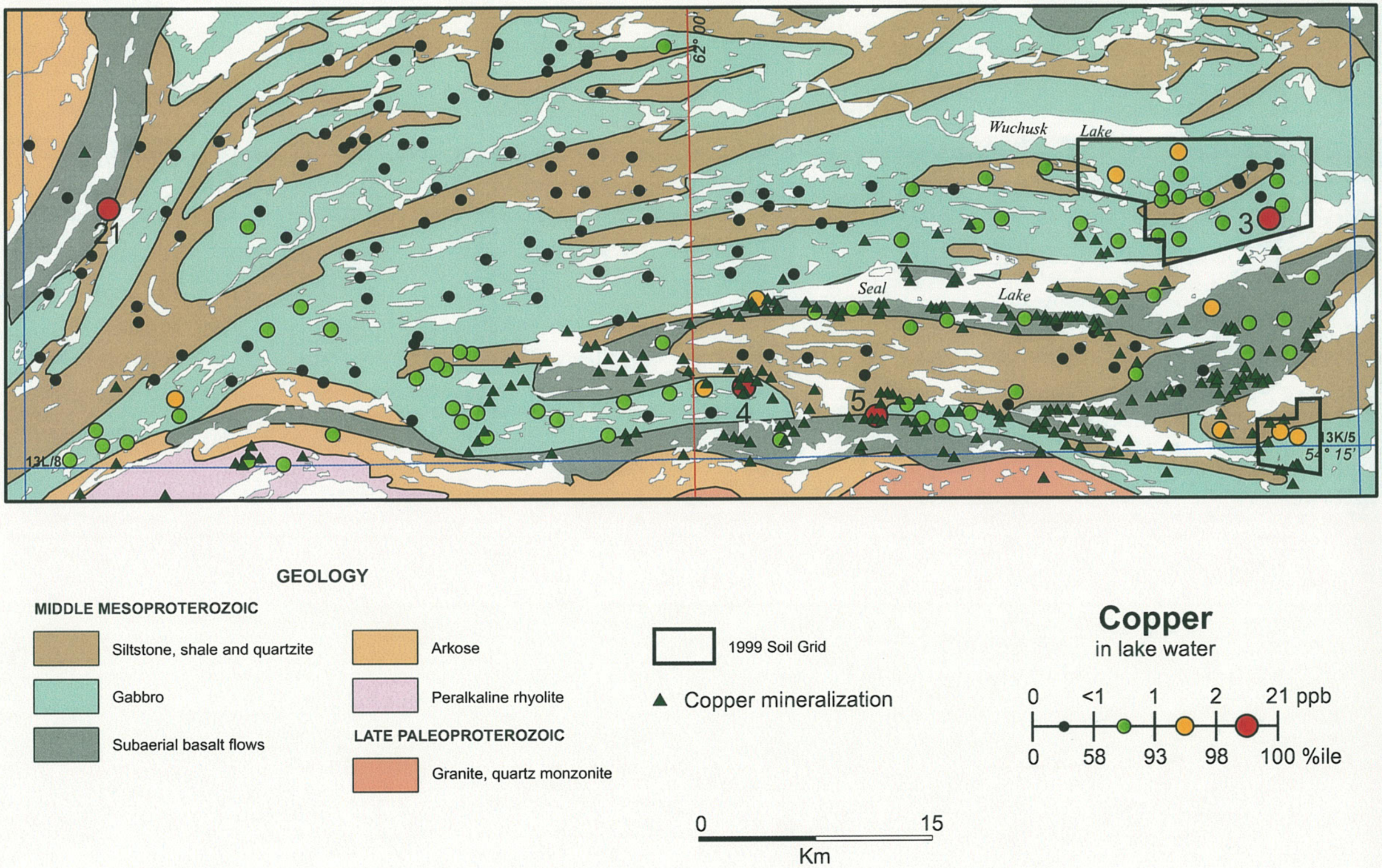


Figure 6. *Copper in lake water and location of soil/till survey, Seal Lake area.*

1950s, and again in the mid 1990s following the Voisey's Bay Ni–Cu–Co discovery. The several minor base-metal occurrences known in the general area are described in the Geological Survey's Mineral Occurrence Database System (Stapleton and Smith, 2000). None are located in the immediate survey area although two outcrops of minor sulphide mineralization were noted during the conduct of this survey. Nickel–chromium mineralization in dunite is reported 8 km west of the soil grid (Thomas, 1993).

Seal Lake Area

This area is located within the Central Mineral Belt and is underlain by Mesoproterozoic rocks of the Seal Lake Group including siltstone, shale, quartzite, subaerial basalt flows and gabbro sills that have been regionally metamorphosed to greenschist facies (Wardle, 1994). The two survey grids are underlain by three units: an intrusive gabbro forming the Naskaupi Sills and two siliciclastic units: the Wuchusk Lake unit (dominantly quartzite) and the Whiskey Lake unit (dominantly argillite).

There are over 230 showings, occurrences and prospects of copper mineralization in the surveyed area (Stapleton and Smith, 2000). Mineralization commonly occurs as chalcocite, bornite, native copper and chalcopyrite. Several of the more thoroughly explored prospects note the presence of anomalous silver values. Most of the exploration for these occurrences took place in the 1950s by Frobisher Limited and later in the 1970s by BRINEX Limited. Little work has taken place since the release of regional lake-sediment data for the area. The most comprehensive summary of the nature of the Seal Lake Group geology and associated mineralization is that of Brummer and Mann (1961). They note that the mineralization occurs in quartz–carbonate veins and/or shear zones, mostly within amygdaloidal basalt, diabase and clastic (meta)sedimentary rocks including quartzite, shale, slate, argillite and phyllite. Wilton (1996) regards the copper mineralization to be the result of a single mineralizing event in which copper-rich fluids penetrated zones of weakness such as shear zones and contacts during Grenville deformation.

SURFICIAL ENVIRONMENT

During the Wisconsinan, ice flow in central Labrador was easterly but varied locally. In the Wilson Lake area, glacial striae indicate two flow directions – an earlier northeasterly flow and a later southeasterly one (Klassen and Thompson, 1993). This left a thin veneer of till, often drumlinized, over much of the region. In the Seal Lake area there is evidence of three ice-flow directions – an early northeastward one, a middle flow to the east and a late flow to the southeast. Till thickness over the Seal Lake Group supracrustal rocks is between 2 and 3 m.

SAMPLE COLLECTION, PREPARATION AND ANALYSES

A total of 418 soil/till, 114 stream water and 16 rock samples were collected. Glacial flow from the west is likely to have developed geochemical dispersal trains trending easterly from any mineralized zones or areas of metal enrichment. Generally, soil sampling was conducted along lines oriented at approximately right angles to glacial flow to maximize the likelihood of intersecting any dispersal trains. To further enhance the likelihood of intersecting anomalous dispersion and of obtaining at least one sample reflecting any concealed mineralization, lines were more widely spaced than were the samples along the lines. Lines were located 1 km apart and samples collected every 200 m along the lines. Wherever possible, C-horizon till was collected. This material is nearly unweathered and has a simpler geochemical history compared to B-horizon soil – the more standard exploration medium. In some cases, where soils were shallow, the parent till was oxidized all the way to bedrock and only B- or B-C-horizon material was available. The major drawback to collecting till, instead of soil, is that it is considerably more time consuming to obtain. Typically, hand-dug pits to a depth of 60 to 70 cm are required instead of the 25 to 40 cm typical for B-horizon soil. However, because the samples were relatively widely spaced, a substantial amount of time was required to access each site hence the additional time spent on collecting a better sample was justified. In all, 226 samples of C-horizon, 77 samples of BC-horizon and 115 samples of B-horizon were collected.

As a check on the relative merits of the two media in this part of Labrador, site-duplicate samples (but not horizon duplicates) from both B- and C-horizons were collected at 15 sites. The median depth of the B-horizon in these samples was 30 cm and the median depth of the C-horizon was 60 cm. Samples of typical bedrock as well as outcrops of sulphide mineralization discovered during the field work were obtained as well.

Soil samples were partially sun-dried in the field and further oven dried at 60°C at the Geological Survey's geochemical laboratory. One in 20 was selected as a laboratory duplicate and split in a riffle splitter. Each sample was then sifted in a stainless steel sieve to <180 mm. As a check on quality control, a laboratory standard of known composition and a split of a sample were included within each batch of 20 samples. Samples were analyzed for 47 elements and loss-on-ignition. These elements and the four methods employed are listed in Table 1. Several elements (e.g., Fe, Ba, Co, Ni, etc.) were analyzed by more than one method. In some cases, clearly preferred methods are indicated. A selection of element determinations and field observations for the soil and till samples are listed in Appendix 1. Full digital data listings are provided in the accompanying diskette.

Water samples were collected from 111 sites. Two clean 250 ml nalgene bottles were filled at each site, generally from the centre of the stream. One bottle was reserved for pH and conductivity analyses, the other for trace metal analyses. The waters for trace element samples were filtered using a 0.45 µm millipore filtration apparatus. Water samples were stored in a cool environment prior to shipping to the laboratory in St. John's where they were analyzed for pH, conductivity, F, SO_4 and 21 trace metals. The analytical methods are summarized in Table 2. A selection of element determinations and field observations for the water samples are listed in Appendix 2. Full digital data listings are provided in the accompanying diskette.

DESCRIPTION AND DISCUSSION OF RESULTS

Influence of Sample Depth and Soil Horizon

Prior to evaluating the overall results of the survey, it is worth considering whether the horizon sampled (B, B-C or C) has a significant influence on the analytical results. One method of determining this is to make some simplifying assumptions and let sample depth act as a proxy for horizon; i.e., the deeper the sample the more likely it represents less weathered material and more closely it represents the parent till. Table 3 lists the Spearman correlation coefficients for elements vs. depth from the two survey areas. Some elements having analyses of questionable quality have been omitted. Coefficients are sorted by increasing value for the Wilson Lake area. Coefficients >|0.17| are significantly correlated at the 99% confidence level. At the Wilson Lake area, 10 of 45

Table 1. Analytical methods for soil and till samples

ELEMENTS	METHOD	DIGESTION/ PREPARATION
As1, Au1, Ba1, Br1, Ca1, Ce1, Co1, Cr1, Cs1, Eu1, Fe1, Hf1, La1, Lu1, Mo1, Na1, Nd1, Ni1, Rb1, Sb1, Sc1, Se1, Sm1, Sr1, Ta1, Tb1, Th1, U1, W1, Yb1, Zn1, Zr1	Neutron Activation Analysis (INAA)	5 to 10 g in shrink-wrapped vial. (total analysis)
Al2, As2, Ba2, Be2, Ce2, Co2, Cu2, Dy2, Fe2, K2, La2, Li2, Mg2, Mn2, Na2, Nb2, Ni2, P2, Pb2, Rb2, Sc2, Sr2, Ti2, V2, Y2, Zn2*, Zr2	Inductively Coupled Plasma Emission Spectroscopy (ICP-ES)[1]	HF-$HClO_4$-HCl (total digestion)
Cr2, Mo2	Atomic Absorption Spectroscopy (AA)[1]	HF-$HClO_4$-HCl (total digestion)
Ag6	Atomic Absorption Spectroscopy (AA)[2]	HNO_3
F9	Fluoride-ion selective electrode	Fusion with Na_2CO_3-KNO_3 flux
Loss-on-ignition (LOI)	Gravimetric using muffle furnace raised to 500°C	

* Indicates preferred method of analysis.

[1] Finch, C.J., 1998.
[2] Wagenbauer, H.A., Riley, C.A. and Dawe, G., 1983.

Table 2. Analytical methods for stream-water samples

ANALYSIS	METHOD	PREPARATION
pH	Corning combination pH electrode	None
Conductivity	Corning conductivity sensor	None
Ca, Fe, K, Mg, Mn, Na, Si, SO_4	ICP-emission spectroscopy[1]	Filtration (0.45 µm) and HNO_3 acidification
Al, Ba, Be, Co, Cr, Cu, Li, Mo, Ni, P, Sr, Ti, Y, Zn	ICP ultrasonic nebulizer[1]	Filtration (0.45 µm) and HNO_3 acidification

[1] Finch, C.J., 1998.

Table 3. Spearman correlation coefficients for elements and sample depth at Wilson Lake area (N=214) and Seal Lake area (N=203). Coef-ficients are sorted for the Wilson Lake area.

	Wilson	Seal
LOI	-0.27	-0.23
Br1	-0.26	-0.08
Mo2	-0.18	-0.15
W1	-0.10	0.01
Hf1	-0.09	-0.09
Ce1	-0.09	0.27
Ta1	-0.08	0.11
Th1	-0.08	0.16
Nd1	-0.08	0.19
La1	-0.08	0.21
Tb1	-0.07	0.21
Sm1	-0.07	0.23
Al2	-0.06	-0.05
Zr2	-0.05	0.06
Au1	-0.04	0.12
Zn2	-0.03	0.10
Li2	-0.03	0.07
F9	-0.03	0.13
As1	-0.02	0.01
Nb2	-0.01	0.10
Fe2	-0.01	-0.03
Cs1	-0.01	-0.11
Fe1	0.00	-0.03
Ti2	0.00	-0.04
V2	0.00	-0.09
Co2	0.01	0.15
Sc2	0.01	0.14
U1	0.02	0.05
Sb1	0.03	0.11
Ba1	0.03	0.02
Cr1	0.03	0.01
Yb1	0.04	0.18
Mg2	0.04	0.07
Ni2	0.05	0.10
Pb2	0.10	0.04
Cu2	0.15	0.19
P2	0.17	0.19
Mn2	0.17	0.24
Be2	0.18	0.21
Dy2	0.21	0.29
Y2	0.21	0.27
Rb2	0.22	0.08
Ca2	0.24	0.14
Na2	0.25	0.15
K2	0.27	0.07
Sr2	0.29	0.09

Correlations >|0.17| are significant at the 99% confidence level

elements are so correlated: in order of increasing correlation, Be, Dy, Y, Rb, Ca, Na, K and Sr are positively correlated and Br and Mo are negatively correlated. At Seal Lake, 13 elements correlate significantly with depth: Yb, P, Cu, Nd, Tb, Be, La, Sm, Mn, Ce, Y and Dy are positively correlated and Mo is negatively correlated. The correlations for these elements, although significant, are weak, all being <|0.3|. Gener-ally, the rare-earth-elements show significant correlations at both areas but of the base and precious metals considered in this report, only Cu at Seal Lake is likely affected.

Another method of assessing the association between soil horizon and element content is to compare results from site-duplicate samples where B- and C-horizons were sampled at the same site. Six elements – As, Cr, Cu, Mg, Ni and Pb – were selected for consideration here because of their use as either direct indicators of mineralization or for mapping concealed bedrock. Scatterplots of the these elements are shown in Figure 7 in which the B-horizon and C-horizon fields are separated by a 45° line. It is apparent that, except for Cu, the data from the two horizons correlate strongly as indicated by Spearman correlation coefficients >0.7. The elements As and Cr show no preference for either horizon as seen by the fairly even distribution of points in both the B- and C-horizon fields. Ni and Pb show a weak enrichment in the C-horizon. Cu shows a strong enrichment in the C-horizon and Mg a moderate one.

Table 4 lists median, minimum and maximum values for this same sample set of site duplicates for 13 elements, LOI and depth. Here again, only the median Cu value shows a substantial increase in the C horizon relative to the B horizon.

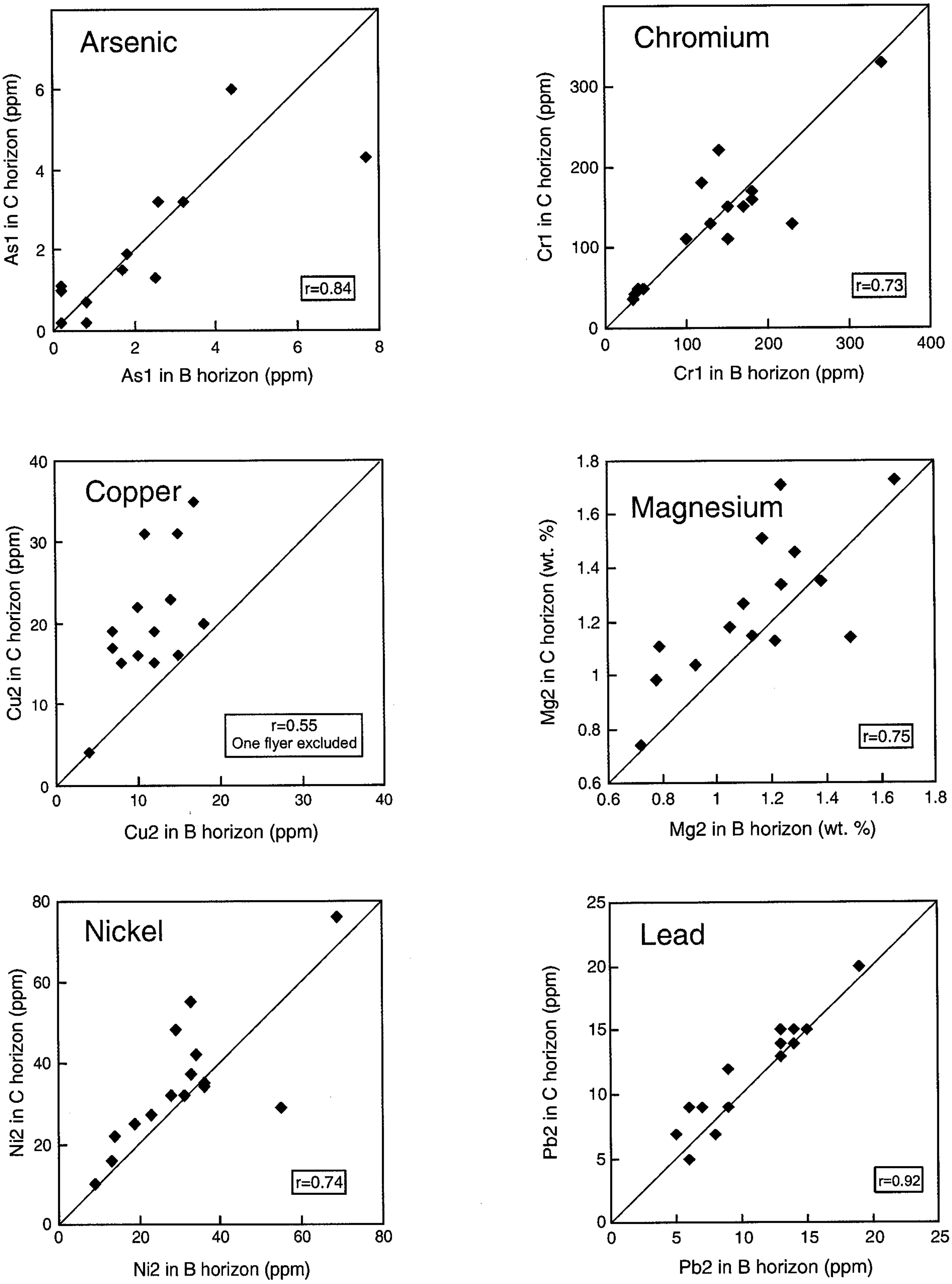


Figure 7. *Scatterplots of As1, Cr1, Cu2, Mg2, Ni2 and Pb2 in B and C horizons of site duplicates.*

Table 4. Medians and ranges of selected elements of site duplicates by soil horizon (n=15 sites, 32 samples)

	B horizon Median	C horizon Median	B horizon Minimum	B horizon Maximum	C horizon Minimum	C horizon Maximum
As1	0.8	1.1	0.2	7.7	<0.5	6
Au1, ppb	<1	<1	<1	1	<1	2
Co2	12	14	8	16	9	18
Cr2	144	133	38	261	41	191
Cu2	12	19	4	27	4	89
F9	342	393	238	413	294	597
Fe2, wt. %	4.26	4.21	3.25	4.94	2.74	4.87
LOI, wt. %	5.8	2.1	2.4	16	1.2	3.9
Mg2, wt. %	1.17	1.18	0.72	1.65	0.74	1.73
Mn2	684	735	422	794	435	807
Ni2	31	32	9	69	10	76
Pb2	13	13	5	19	5	20
Sb1	<0.1	0.2	<0.1	0.3	<0.1	0.5
Zn2	43	47	37	73	36	88
Depth (cm)	30	60	25	40	50	70

Statistical Analyses - Soil and Till

*Summary Statistics***.** To quantify the range and distribution characteristics of the analytical data and permit comparison between the two survey areas, median, minimum and maximum values for the Wilson Lake and Seal Lake analytical data are tabulated in Table 5. From this it is apparent that Cr, Ni, Sr, Th, Ba and Mg are considerably more abundant in the Wilson Lake data than in Seal Lake, and Sb, As, Li, U and Cu are more abundant in the data from Seal Lake.

Cumulative Frequency Plots. Cumulative frequency plots of seventeen elements and LOI are shown in Figures 8a and 8b. These plots are useful for comparing the distributions of a given element in the two areas. For example, Cr, F, Mg and Ni are much more abundant in the Wilson Lake survey, whereas As, Cu, Nb, Sb and Ti are more abundant in the Seal Lake survey. Beyond comparing relative abundances, the shapes of the curves reveal information about the nature of the various distributions. Ni at Seal Lake (Fig. 8b) shows a smooth trend up to about 30 ppm where there is a sharp break and a second inflection at about 40 ppm. When data from this segment of the curve are grouped separately and plotted, they reveal a tight geographic pattern that appears to reflect underlying mafic bedrock. Similar breaks in other elements are used to group data for plotting element distribution maps below.

Histograms of analytical data. Histograms of Au, Co, Cr, Cu, Mg and Ni for the two areas are shown in Figure 9. Axis dimensions are the same for a given element for both areas to facilitate comparison of distributions and log scales are used throughout. Histograms permit ready visualization of element distri-butions and also the presence of outliers or extreme values.

Correlation Analysis. Correlation coefficients show the strength of inter-element

Table 5. Median, minimum and maximum values of soil and till data at Wilson Lake (N=215) and Seal Lake (N=203) areas

	Wilson Median	Seal Median	Wilson Minimum	Seal Minimum	Wilson Maximum	Seal Maximum
Ag6	<0.1	<0.1	<0.1	<0.1	0.2	0.30
Al2	6.78	6.37	5.45	5.32	7.81	8.84
As1	<0.5	2.7	<0.5	<0.5	2.5	13
Au1, ppb	<1	<1	<1	<1	6	8
Ba1	790	500	280	220	1100	890
Be2	1.5	1.9	1.1	1.0	1.8	4.4
Br1	6.5	6.7	0.5	0.5	74	32
Ca2, wt.%	1.86	1.53	0.74	0.58	2.3	2.85
Ce1	93	76	47	31	150	150
Co2	15	13	7	6	41	39
Cr1	200	45	65	23	1800	230
Cs1	<1	1	<1	<1	3	3.0
Cu2	14	19	1	4	105	190
Dy2	4.1	4.2	2.5	1.8	5.6	10.5
F9	407	303	97	144	709	813
Fe1, wt.%	4.12	3.7	2.17	1.69	11.1	7.25
Fe2, wt.%	4.38	4.00	2.26	1.87	10.81	7.72
Hf1	11	11	6	7	19	19
K2, wt.%	2.04	1.71	0.74	0.66	2.4	3.92
La1	56	40	31	20	87	88
Li2	9.0	12.9	4.6	5.7	14.1	31.1
LOI, wt.%	4.3	3.9	1.2	1	49.6	20.4
Mg2, wt.%	1.4	0.98	0.7	0.49	5.3	3.16
Mn2	730	542	402	275	1375	1247
Mo1	<1	<1	<1	<1	6	20
Na1, wt.%	1.97	1.99	0.78	0.76	2.44	2.47
Nb2	12	15	8	9	21	22
Ni2	42	18	12	7	255	89
P2	935	716	172	135	1542	1645
Pb2	11	9	1	1	17	52
Rb1	49	57	18	2	82	120
Sb1	<0.1	0.3	<0.1	<0.1	0.5	0.6
Sc1	13	10	8.7	6.6	21	19
Sm1	7.1	5.73	3.7	2.4	10	12
Sr2	397	229	157	82	454	409
Ta1	0.6	0.83	0.1	0.1	1.5	1.8
Tb1	0.9	0.83	0.2	0.2	1.4	2
Th1	9.7	5.8	5.2	3.3	21	12
Ti2	4983	5551	2788	3968	11786	10952
U1	1.0	1.4	0.1	0.1	1.9	17
V2	90	79	52	56	221	237
Y2	25	26	15	13	33	55
Zn2	48	53	26	28	77	101
Zr2	83	171	40	85	136	264
Depth (cm)	50	50	20	25	80	85

Note: data in ppm unless otherwise indicated

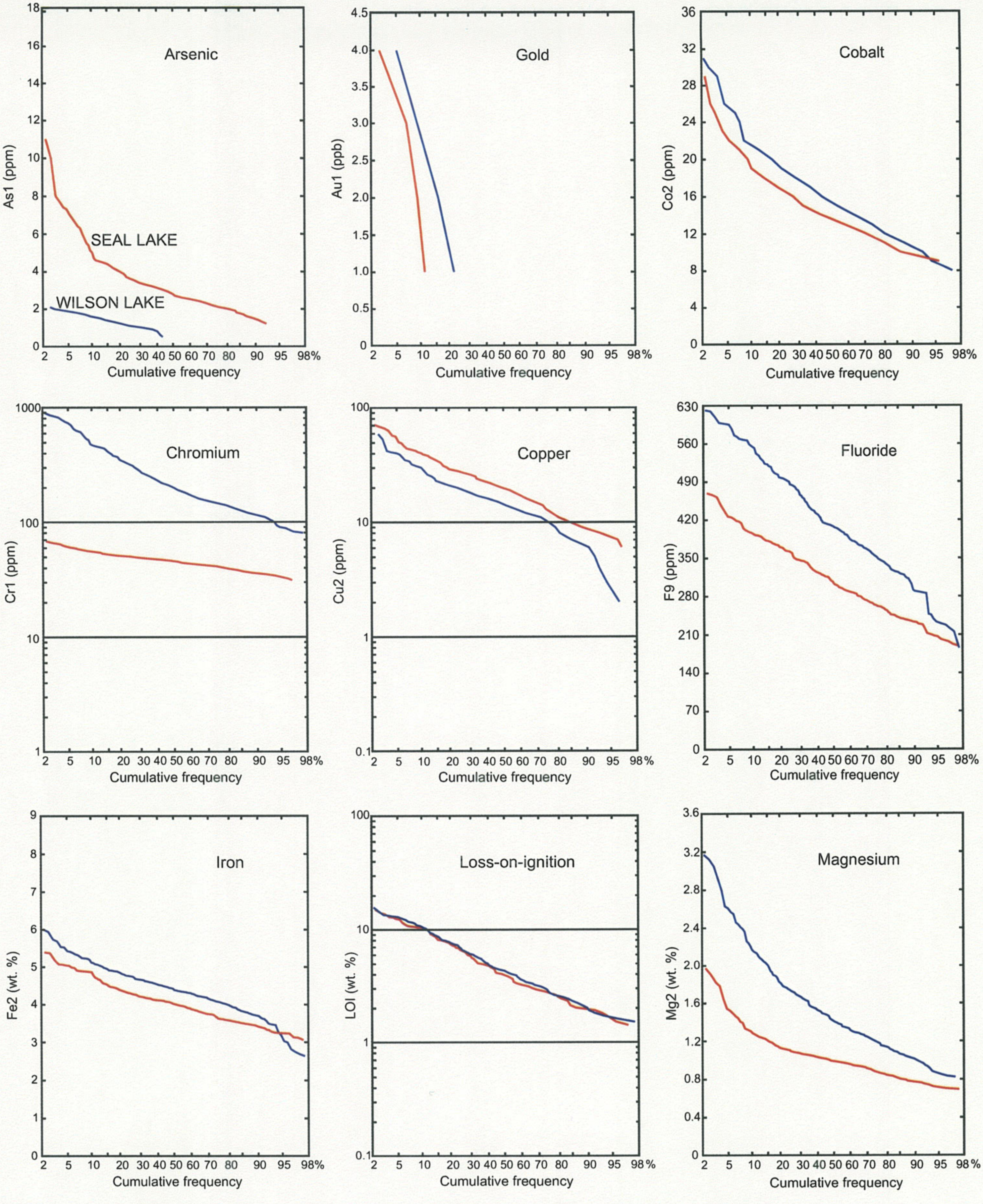


Figure 8a. *Cumulative frequency plots of As1, Au1, Co2, Cr1, Cu2, F9, Fe2, LOI and Mg2 in soil and till, Wilson and Seal Lakes areas.*

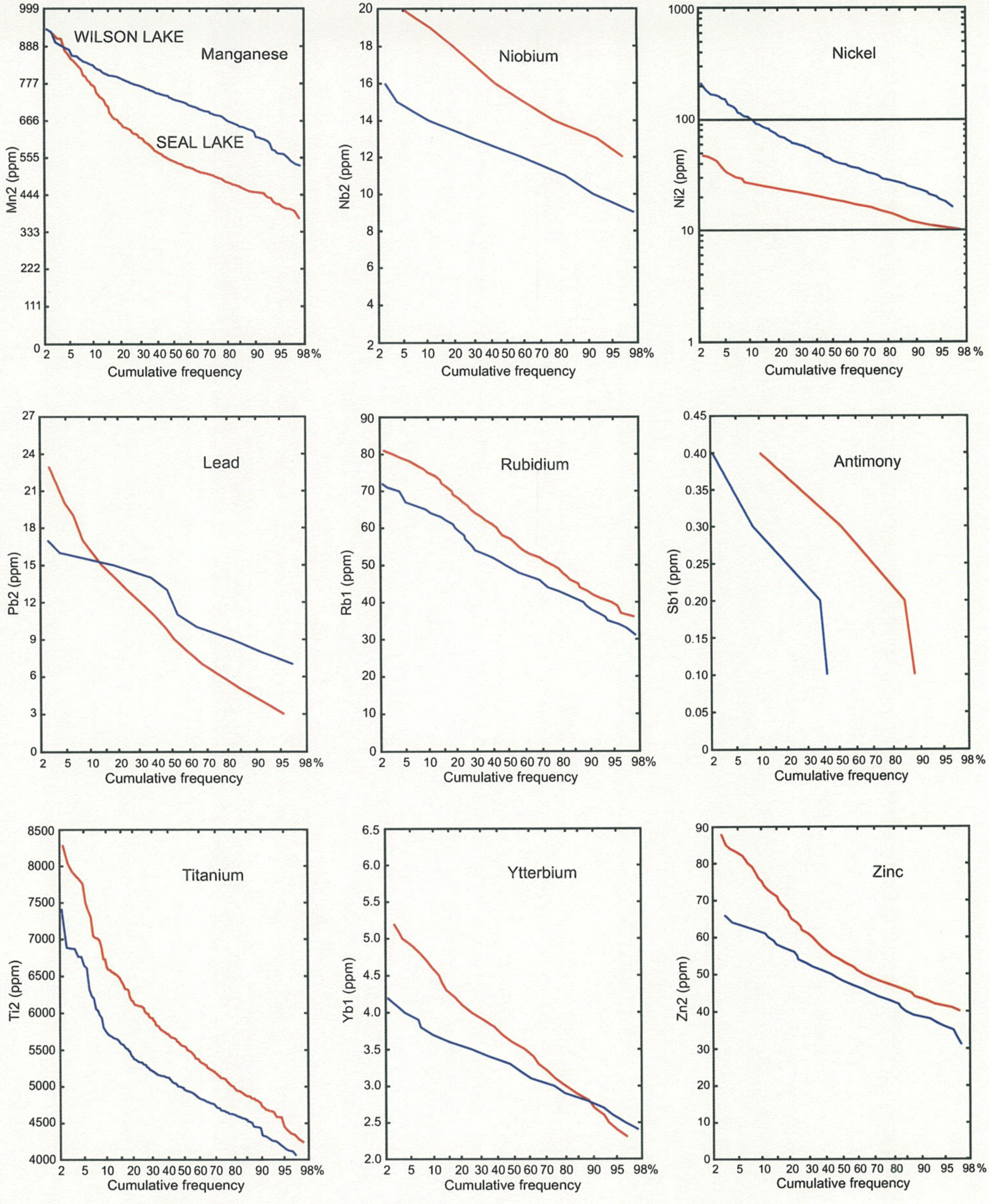


Figure 8b. *Cumulative frequency plots of Mn2 Nb2, Ni2, Pb2, Rb1, Sb1, Ti2, Yb1 and Zn2 in soil and till, Wilson and Seal Lakes areas.*

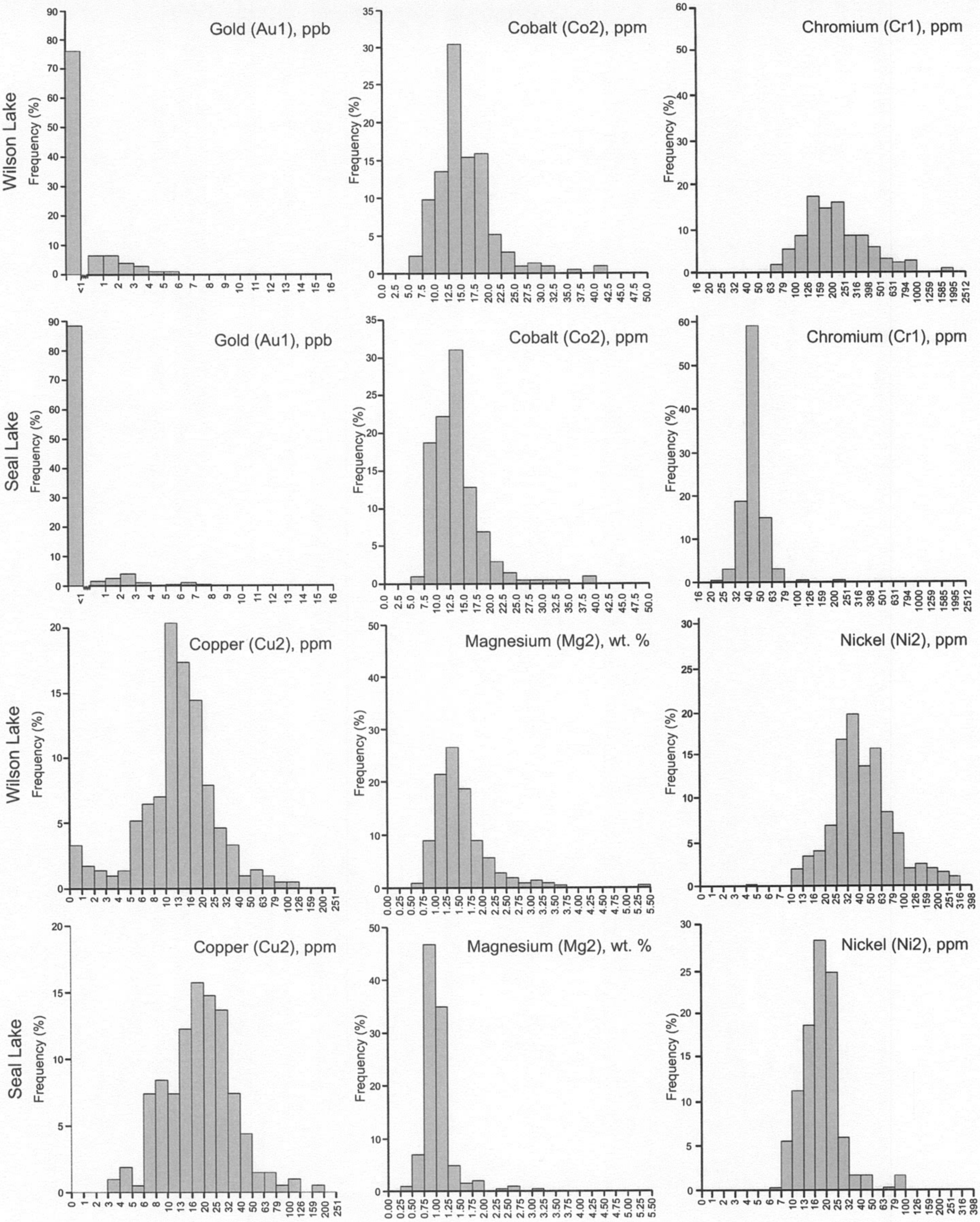


Figure 9. *Histograms of Au, Co, Cr, Cu, Mg and Ni in soil and till in Wilson and Seal lakes areas.*

associations; i.e., the tendency for pairs of elements to vary sympathetically (positive correlations) or inversely (negative correlations) with each other in a given sample population. (For example, if Au is associated with As (arsenopyrite) in an area, this relationship may show as a positive correlation.) Iron and manganese (hydr)oxides frequently act as significant scavenging agents for many metals in soils and sediments. For some elements, this may be so extreme as to require normalizing, or even outright rejection, of the data involved. Spearman ranked correlation coefficients have been calculated for several pairs of elements in the soil data. Spearman correlations make no assumptions about the nature or shape of the component populations.

Tables 6 and 7 present the coefficients between most of the elements analyzed and a selection of base metals, precious metals and a few others. Statistically, correlations >|0.17| at Wilson Lake and >|0.18| at Seal Lake are significant at the 99% confidence level. However, for practical purposes correlations of <|0.6| generally do not call for adjustment of values when dealing with scavenging agents like Fe and Mn. That is, enough of the element signal is present that satisfactory results may be obtained by treating only the raw values. For elements with coefficients >|0.6|, procedures such as regression analysis may be employed to minimize the component of the signal due to scavenging. At Wilson Lake, neither Fe nor Mn appears to be strongly scavenging the base metals. Cobalt appears to moderately scavenged at Wilson Lake by both Fe (r=0.61) and Mn (r=0.65) and this effect should be considered if plotting raw Co2 values. The strongest correlations of interest include Ni2 and Mg2 (r=0.96), Ni2 and Cr1 (r=0.89) and Ni2 and Co2 (r=0.89) suggesting a lithological or mineralogical association. Similarly at Seal Lake, scavenging does not seem to be a problem for most elements although Mn2 appears to be scavenging Co2 (r=0.70) and Zn2 (r=0.60). As at Wilson Lake, the Seal Lake data show a strong association of Ni–Co–Mg.

Figures 10 and 11 provide an overview of the relative strengths of correlations of most variables with Fe1, Mn2 and LOI in both the Wilson Lake and Seal Lake surveys. Correlations are ranked in order of strength.

Statistical Analyses - Stream Water

Summary Statistics. Medians, means and ranges of water data are shown for Wilson Lake in Table 8 and Seal Lake in Table 9. For many of the “trace” metals, more than half the samples have values below detection limit. In both areas, these include Be, Co, Cu, Li, Mo, Ni, P, SO_4, Ti, Y and Zn and at Seal Lake, Cr. Nonetheless, there is much useful information in the data with > detection limit values. Some of the data reflect the contrasting lithology of the two areas. Median values of Ba, Ca and Sr are considerably higher in waters from the sedimentary terrane of Seal Lake than those from the igneous/metamorphic terrane of Wilson Lake. Values of pH and conductivity are also higher. Conversely maximum values of Cr, Ni , Co and Mg are higher from the Wilson Lake area.

Cumulative Frequency Plots. Graphs of cumulative frequency plots of Ca, conductivity, Mg, pH, Sr and Zn in water in the Wilson Lake and Seal Lake areas are presented in Figure 12. As noted above, many elements have too few samples above detection limit to produce effective plots. The graphs show distinct populations that tabular data do not. For example, Ca and conductivity values at Seal Lake are not only much higher than at Wilson Lake, they are represented by at least 3 subpopulations, the sharpest break being between 4.5 and 9 ppm Ca. Although the median Mg values are identical in both

Table 6. Spearman correlation coefficients for selected elements and variables in soil and till, Wilson Lake survey (N=215)

	As1	Au1	Cr1	Cu2	F9	Fe1	La1	Mg2	Mn2	Ni2	Pb2	Sb1	U1	Zn2	Depth	LOI
Al2	-0.04	-0.04	-0.40	0.43	0.37	-0.21	0.21	-0.12	-0.17	-0.20	0.00	0.05	-0.02	0.23	-0.06	-0.20
As1	**1.00**	-0.08	0.07	0.00	0.03	-0.01	-0.09	0.04	-0.03	0.02	0.00	-0.10	-0.01	0.04	-0.02	0.09
Au1	-0.08	**1.00**	0.08	0.05	0.05	-0.01	0.01	0.11	0.08	0.11	-0.08	0.01	-0.06	0.04	-0.04	-0.15
Ba1	-0.09	0.08	-0.03	0.32	0.33	-0.07	0.41	0.13	-0.00	0.07	0.30	0.03	0.03	0.23	0.03	-0.44
Be1	-0.03	-0.04	-0.42	0.14	0.13	-0.37	0.02	-0.27	-0.14	-0.29	0.18	0.16	0.26	-0.14	0.18	-0.39
Br1	0.04	-0.06	-0.10	-0.10	-0.23	0.04	-0.20	-0.19	-0.30	-0.17	-0.34	-0.06	-0.10	-0.15	-0.26	0.70
Ca2	-0.13	0.12	-0.30	0.34	0.18	-0.18	0.17	-0.13	0.18	-0.15	0.31	0.12	0.07	-0.08	0.24	-0.70
Ce1	-0.10	0.01	0.18	0.50	0.55	0.41	0.87	0.36	0.41	0.29	0.15	0.02	0.10	0.50	-0.09	-0.31
Co2	0.02	0.10	0.73	0.45	0.64	0.61	0.37	0.95	0.65	0.89	-0.20	-0.10	-0.16	0.82	0.01	-0.14
Cr1	0.07	0.08	**1.00**	0.17	0.29	0.54	0.20	0.84	0.43	0.89	-0.22	-0.11	-0.18	0.42	0.03	-0.01
Cs1	0.07	0.05	0.06	0.15	0.40	0.16	0.25	0.22	0.10	0.13	0.01	-0.11	0.08	0.41	-0.01	-0.04
Cu2	0.00	0.05	0.17	**1.00**	0.49	0.22	0.37	0.37	0.32	0.34	-0.08	-0.04	-0.14	0.41	0.15	-0.31
Dy2	-0.17	-0.05	-0.36	0.18	0.16	-0.01	0.30	-0.22	0.19	-0.26	0.37	0.17	0.26	-0.04	0.21	-0.39
F9	0.03	0.05	0.29	0.49	**1.00**	0.29	0.53	0.59	0.32	0.49	-0.01	0.01	0.09	0.78	-0.03	-0.17
Fe1	-0.01	-0.01	0.54	0.22	0.29	**1.00**	0.39	0.56	0.65	0.51	-0.11	-0.15	-0.11	0.56	0.00	0.10
Fe2	-0.07	0.04	0.46	0.16	0.21	0.87	0.24	0.52	0.76	0.48	-0.09	-0.08	-0.17	0.48	-0.01	0.09
Hf1	0.03	-0.07	0.02	-0.24	0.01	0.17	0.51	-0.03	0.04	-0.06	-0.06	0.08	0.27	0.04	-0.09	0.08
K2	-0.03	0.02	-0.20	0.27	0.27	-0.35	0.26	-0.04	0.03	-0.08	0.25	0.10	0.02	0.07	0.27	-0.73
La1	-0.09	0.01	0.20	0.37	0.53	0.39	**1.00**	0.33	0.36	0.27	0.04	0.07	0.21	0.43	-0.08	-0.27
Li2	0.13	0.00	0.17	0.36	0.67	0.23	0.22	0.47	0.23	0.36	-0.17	-0.11	0.04	0.75	-0.03	0.00
Mg2	0.04	0.11	0.84	0.37	0.59	0.56	0.33	**1.00**	0.59	0.96	-0.22	-0.10	-0.15	0.73	0.04	-0.11
Mn2	-0.03	0.08	0.43	0.32	0.32	0.65	0.36	0.59	**1.00**	0.52	0.03	-0.01	-0.10	0.53	0.17	-0.32
Mo2	0.08	0.04	-0.21	-0.13	-0.09	-0.19	-0.15	-0.25	-0.29	-0.23	-0.10	-0.11	-0.13	-0.14	-0.18	0.06
Na2	-0.08	0.02	-0.48	0.15	0.01	-0.50	0.02	-0.37	-0.16	-0.37	0.30	0.14	0.13	-0.28	0.25	-0.66
Nb2	-0.00	0.02	-0.16	-0.32	0.08	0.06	0.11	-0.13	0.10	-0.19	0.07	0.15	0.28	0.10	-0.01	0.07
Nd1	-0.07	-0.03	0.05	0.42	0.59	0.30	0.81	0.22	0.26	0.15	0.20	0.07	0.20	0.43	-0.08	-0.22
Ni2	0.02	0.11	0.89	0.34	0.49	0.51	0.27	0.96	0.52	**1.00**	-0.28	-0.08	-0.18	0.59	0.05	-0.10
P2	-0.03	0.10	-0.01	0.38	0.43	-0.03	0.34	0.10	0.19	0.11	0.10	0.13	0.20	0.10	0.17	-0.34
Pb2	0.00	-0.08	-0.22	-0.08	-0.01	-0.11	0.04	-0.22	0.03	-0.28	**1.00**	0.19	0.21	-0.08	0.10	-0.34
Rb2	0.03	-0.04	-0.34	0.14	0.27	-0.41	0.13	-0.18	-0.09	-0.24	0.35	0.15	0.22	0.05	0.22	-0.55
Sb1	-0.10	0.01	-0.11	-0.04	0.01	-0.15	0.07	-0.10	-0.01	-0.08	0.19	**1.00**	0.10	-0.10	0.03	-0.07
Sc2	-0.03	0.03	0.21	0.24	0.51	0.65	0.45	0.46	0.72	0.34	0.05	0.03	0.03	0.68	0.01	-0.05
Sm1	-0.05	-0.01	0.15	0.46	0.59	0.39	0.94	0.32	0.35	0.26	0.08	0.04	0.21	0.46	-0.07	-0.26
Sr2	-0.16	0.07	-0.30	0.22	0.10	-0.31	0.18	-0.20	0.01	-0.19	0.34	0.20	0.12	-0.20	0.29	-0.73
Ta1	0.10	0.01	0.00	-0.33	-0.18	0.06	-0.07	-0.13	-0.06	-0.12	0.08	0.03	0.04	-0.10	-0.08	0.12
Tb1	-0.10	-0.01	0.00	0.11	0.26	0.22	0.60	0.09	0.13	0.07	-0.03	0.14	0.18	0.19	-0.07	-0.10
Th1	-0.12	-0.03	0.14	0.32	0.42	0.47	0.77	0.25	0.40	0.16	0.32	-0.01	0.14	0.41	-0.08	-0.21
Ti2	-0.12	0.02	0.17	-0.22	-0.02	0.50	0.16	0.15	0.53	0.09	0.20	0.11	0.00	0.21	0.00	0.06
U1	-0.01	-0.06	-0.18	-0.14	0.09	-0.11	0.21	-0.15	-0.10	-0.18	0.21	0.10	**1.00**	-0.02	0.02	0.04
V2	-0.08	0.04	0.35	0.09	0.20	0.80	0.29	0.44	0.77	0.35	0.03	-0.02	-0.16	0.47	0.00	-0.01
W1	-0.06	-0.04	-0.02	-0.11	0.06	0.05	0.10	0.09	0.11	0.06	0.05	0.07	0.11	0.11	-0.10	0.11
Y2	-0.11	0.01	-0.38	0.18	0.12	-0.12	0.25	-0.26	0.17	-0.28	0.30	0.18	0.25	-0.15	0.21	-0.47
Yb1	-0.07	-0.07	-0.16	0.05	0.20	0.11	0.54	-0.10	0.19	-0.12	0.26	0.17	0.31	0.03	0.04	-0.33
Zn2	0.04	0.04	0.42	0.41	0.78	0.56	0.43	0.73	0.53	0.59	-0.08	-0.10	-0.02	**1.00**	-0.03	-0.01
Zr2	-0.02	-0.03	-0.34	-0.30	0.01	-0.28	0.16	-0.33	-0.14	-0.38	0.44	0.24	0.42	-0.15	-0.05	-0.14
Depth	-0.02	-0.04	0.03	0.15	-0.03	0.00	-0.08	0.04	0.17	0.05	0.10	0.03	0.02	-0.03	**1.00**	-0.27
LOI	0.09	-0.15	-0.01	-0.31	-0.17	0.10	-0.27	-0.11	-0.32	-0.10	-0.34	-0.07	0.04	-0.01	-0.27	**1.00**

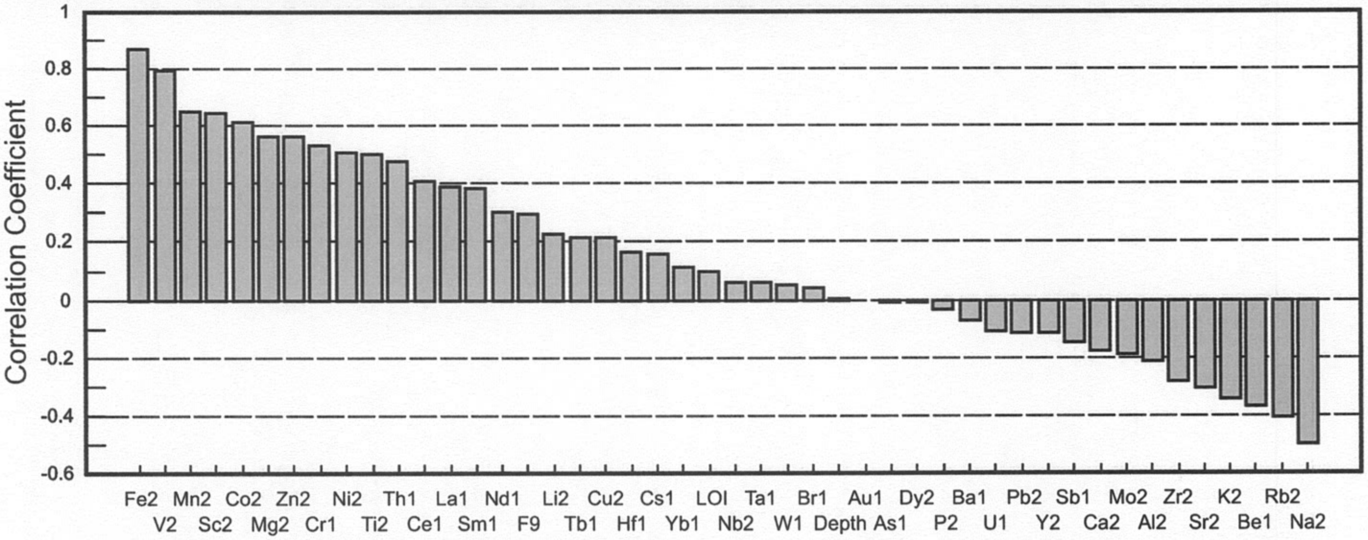
Note: correlations >|0.17| are significant at the 99% confidence level

Table 7. Spearman correlation coefficients for selected elements and variables in soil and till, Seal Lake survey (N=203)

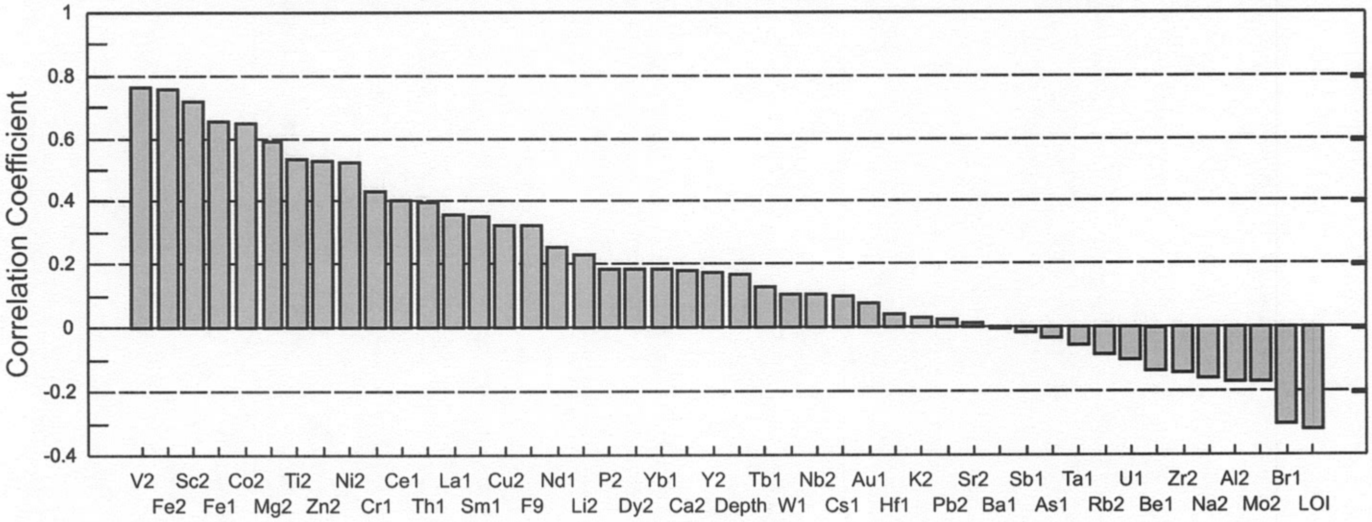
	As1	Au1	Cr1	Cu2	F9	Fe1	La1	Mg2	Mn2	Ni2	Pb2	Sb1	U1	Zn2	Depth	LOI
Al2	-0.15	0.07	0.41	0.26	-0.03	0.20	-0.14	0.38	-0.01	0.43	-0.09	0.05	0.07	0.31	-0.05	0.28
As1	**1.00**	-0.04	-0.09	0.00	0.50	0.27	0.42	0.04	0.04	-0.09	0.11	0.30	0.35	0.00	0.01	-0.15
Au1	-0.04	**1.00**	0.07	0.22	0.10	0.03	0.08	0.14	0.10	0.21	0.02	-0.01	0.04	0.14	0.12	-0.13
Ba1	0.24	0.03	-0.11	0.04	0.29	-0.06	0.40	-0.16	-0.15	-0.16	0.09	0.25	0.32	0.04	0.02	-0.16
Be1	0.23	0.06	-0.22	0.26	0.49	0.06	0.78	0.05	0.27	0.12	0.55	0.35	0.34	0.55	0.21	-0.18
Br1	-0.18	-0.06	0.15	0.00	-0.34	0.17	-0.23	-0.03	-0.20	-0.00	0.16	0.01	0.04	0.13	-0.07	0.85
Ca2	-0.30	0.13	0.35	0.32	-0.10	-0.02	-0.20	0.39	0.42	0.45	-0.31	-0.26	-0.28	-0.04	0.14	-0.35
Ce1	0.46	0.06	-0.11	0.34	0.62	0.17	0.92	0.12	0.30	0.14	0.32	0.46	0.55	0.39	0.27	-0.37
Co2	-0.03	0.16	0.58	0.69	0.17	0.43	0.08	0.86	0.70	0.93	0.15	0.07	0.07	0.68	0.15	-0.10
Cr1	-0.09	0.07	**1.00**	0.33	-0.16	0.66	-0.21	0.54	0.42	0.58	-0.06	-0.10	0.04	0.38	0.01	0.15
Cs1	0.18	0.01	-0.02	0.08	0.32	0.25	0.36	0.15	0.11	0.06	0.37	0.26	0.35	0.42	-0.10	0.05
Cu2	0.00	0.22	0.33	**1.00**	0.22	0.20	0.26	0.61	0.46	0.70	0.24	0.12	0.12	0.49	0.19	-0.13
Dy2	0.28	0.12	-0.04	0.44	0.58	0.20	0.85	0.23	0.47	0.24	0.35	0.30	0.43	0.49	0.29	-0.31
F9	0.50	0.10	-0.16	0.22	**1.00**	0.11	0.69	0.26	0.26	0.11	0.21	0.31	0.40	0.33	0.13	-0.39
Fe1	0.27	0.03	0.66	0.20	0.11	**1.00**	0.14	0.44	0.43	0.36	0.18	0.12	0.20	0.44	-0.03	0.21
Fe2	0.24	0.01	0.64	0.21	0.09	0.94	0.08	0.50	0.50	0.40	0.17	0.13	0.16	0.46	-0.03	0.22
Hf1	-0.02	0.02	0.07	-0.17	-0.03	0.03	0.14	-0.17	0.13	-0.16	0.06	-0.04	0.17	-0.02	-0.09	-0.04
K2	0.35	0.00	-0.42	-0.01	0.67	-0.19	0.59	-0.01	0.02	-0.12	0.20	0.24	0.34	0.19	0.07	-0.44
La1	0.42	0.08	-0.21	0.26	0.69	0.14	**1.00**	0.04	0.25	0.02	0.38	0.38	0.51	0.35	0.21	-0.36
Li2	0.27	0.01	0.01	0.30	0.48	0.26	0.57	0.29	0.27	0.29	0.57	0.39	0.39	0.75	0.07	0.06
Mg2	0.04	0.14	0.54	0.61	0.26	0.44	0.04	**1.00**	0.61	0.88	0.10	0.13	0.11	0.58	0.07	-0.08
Mn2	0.04	0.10	0.42	0.46	0.26	0.43	0.25	0.61	**1.00**	0.57	0.29	0.05	0.06	0.60	0.24	-0.27
Mo2	-0.02	-0.05	-0.04	-0.05	-0.08	0.02	-0.07	-0.01	-0.07	-0.04	0.18	0.01	0.06	0.14	-0.15	0.43
Na2	0.19	0.02	-0.35	-0.03	0.39	-0.37	0.33	-0.16	-0.09	-0.23	-0.22	0.12	0.02	-0.33	0.14	-0.70
Nb2	0.16	-0.06	0.04	0.13	0.24	0.34	0.51	0.06	0.45	0.01	0.71	0.31	0.30	0.46	0.10	-0.05
Nd1	0.44	0.11	-0.16	0.24	0.66	0.16	0.95	0.06	0.22	0.04	0.35	0.41	0.53	0.32	0.19	-0.36
Ni2	-0.09	0.21	0.58	0.70	0.11	0.36	0.02	0.88	0.57	**1.00**	0.07	0.01	0.03	0.61	0.10	-0.09
P2	0.33	-0.05	-0.06	0.18	0.61	0.15	0.51	0.09	0.25	0.03	0.03	0.20	0.25	0.11	0.19	-0.26
Pb2	0.11	0.02	-0.06	0.24	0.21	0.18	0.38	0.10	0.29	0.07	**1.00**	0.31	0.26	0.55	0.04	0.15
Rb2	0.35	-0.03	-0.38	-0.10	0.60	-0.09	0.63	-0.11	0.04	-0.19	0.32	0.37	0.33	0.27	0.08	-0.35
Sb1	0.30	-0.01	-0.10	0.12	0.31	0.12	0.38	0.13	0.05	0.01	0.31	**1.00**	0.29	0.22	0.11	-0.02
Sc2	0.00	0.16	0.67	0.49	0.14	0.53	0.12	0.74	0.64	0.71	0.03	0.09	0.13	0.48	0.14	-0.17
Sm1	0.43	0.11	-0.09	0.34	0.66	0.21	0.96	0.14	0.29	0.14	0.30	0.40	0.55	0.38	0.23	-0.34
Sr2	-0.16	0.02	-0.08	-0.14	-0.01	-0.39	-0.08	-0.22	-0.09	-0.19	-0.40	-0.19	-0.18	-0.44	0.09	-0.48
Ta1	0.18	-0.03	-0.03	0.06	0.18	0.07	0.23	0.01	0.10	-0.04	0.01	0.08	0.08	0.00	0.11	-0.20
Tb1	0.23	0.14	0.04	0.31	0.46	0.26	0.76	0.19	0.33	0.21	0.33	0.29	0.52	0.42	0.21	-0.18
Th1	0.43	0.03	-0.04	0.23	0.59	0.26	0.82	0.04	0.14	0.03	0.42	0.42	0.57	0.43	0.16	-0.12
Ti2	-0.09	0.07	0.60	0.08	-0.24	0.46	-0.27	0.33	0.48	0.29	-0.06	-0.08	-0.04	0.14	-0.04	-0.02
U1	0.35	0.04	0.04	0.12	0.40	0.20	0.51	0.11	0.06	0.03	0.26	0.29	**1.00**	0.28	0.05	0.01
V2	0.08	0.04	0.72	0.18	-0.06	0.69	-0.26	0.62	0.55	0.49	0.02	-0.06	0.01	0.35	-0.09	0.15
W1	-0.00	0.11	0.07	0.04	0.09	0.03	0.10	0.05	0.12	0.05	-0.01	0.07	-0.01	0.09	0.01	-0.01
Y2	0.23	0.14	-0.05	0.42	0.57	0.18	0.84	0.22	0.52	0.22	0.42	0.26	0.40	0.49	0.27	-0.34
Yb1	0.38	0.07	-0.06	0.31	0.55	0.28	0.86	0.17	0.36	0.15	0.42	0.43	0.55	0.49	0.18	-0.24
Zn2	0.00	0.14	0.38	0.49	0.33	0.44	0.35	0.58	0.60	0.61	0.55	0.22	0.28	**1.00**	0.10	0.08
Zr2	0.10	0.03	-0.06	-0.00	0.24	0.14	0.53	-0.08	0.23	-0.07	0.48	0.23	0.37	0.35	0.06	-0.13
Depth	0.01	0.12	0.01	0.19	0.13	-0.03	0.21	0.07	0.24	0.10	0.04	0.11	0.05	0.10	**1.00**	-0.23
LOI	-0.15	-0.13	0.15	-0.13	-0.39	0.21	-0.36	-0.08	-0.27	-0.09	0.15	-0.02	0.01	0.08	-0.23	**1.00**

Note: correlations >|0.18| are significant at the 99% confidence level.

Correlation of Iron (Fe1) with element content in soil, Wilson Lake Survey



Correlation of Manganese (Mn2) with element content in soil, Wilson Lake Survey



Correlation of LOI with element content in soil, Wilson Lake Survey

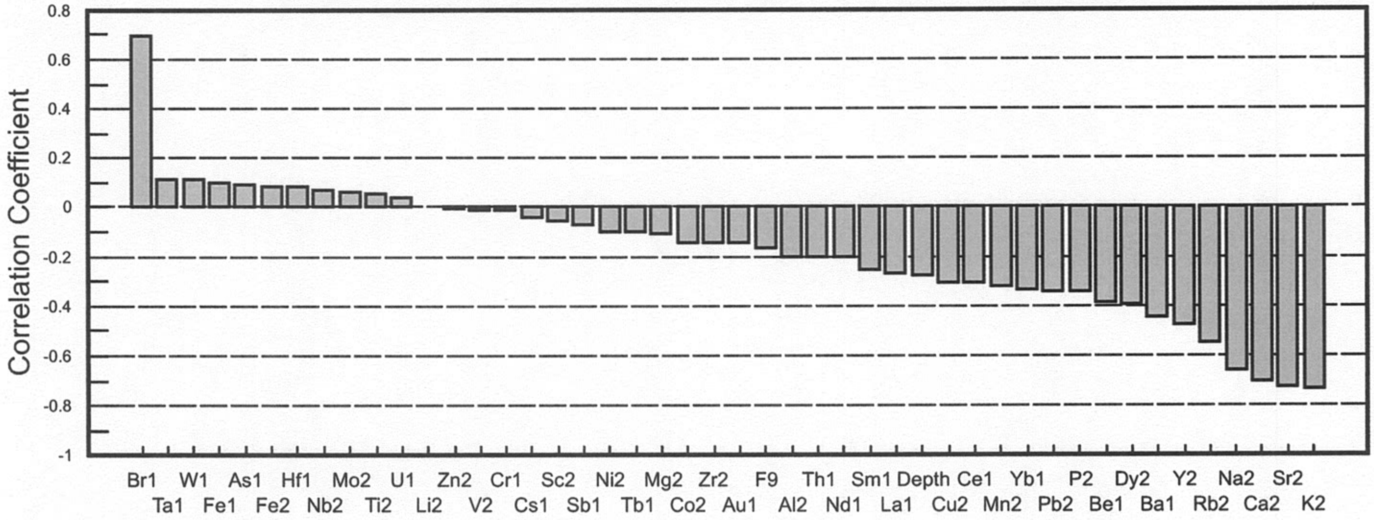
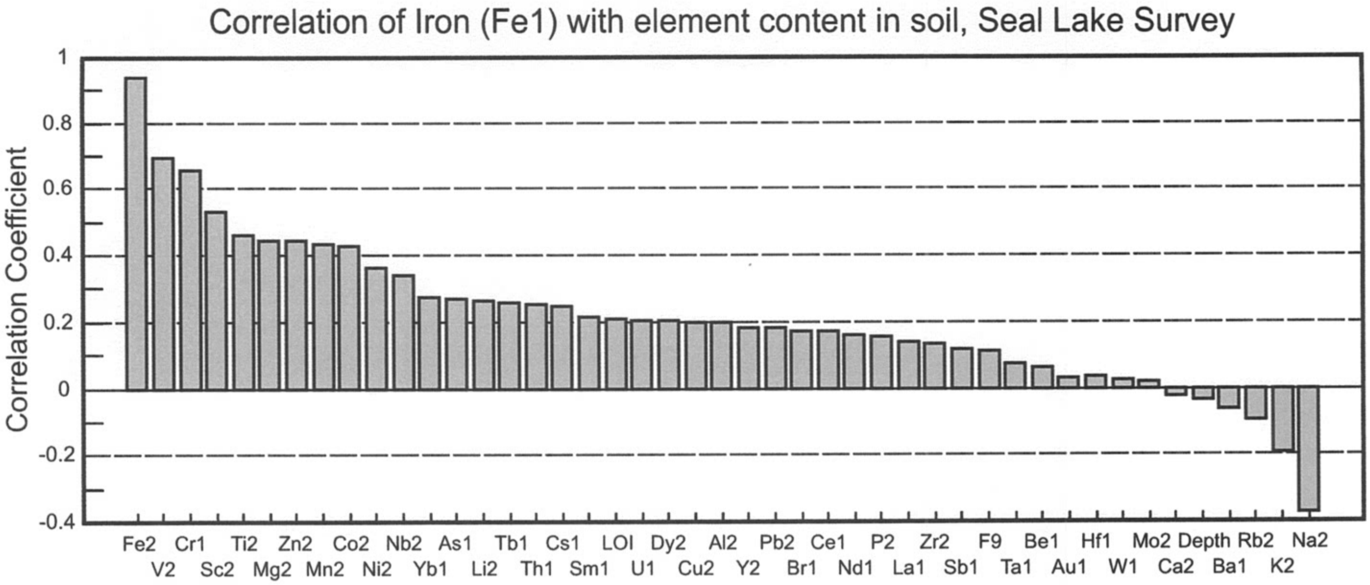
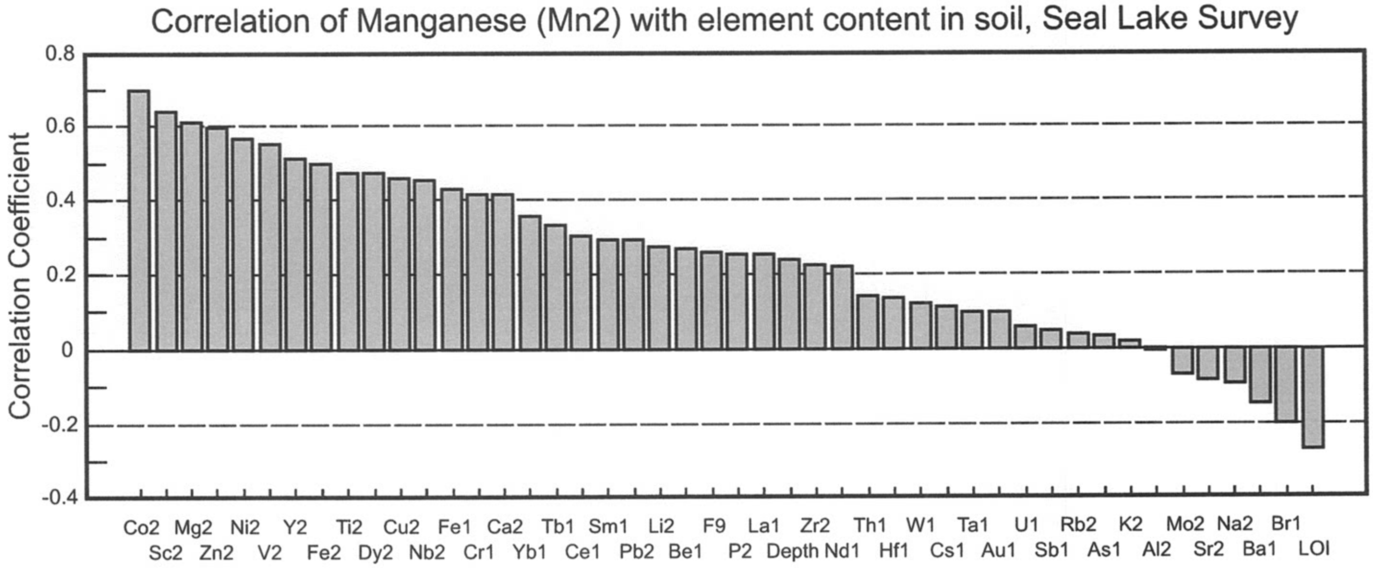


Figure 10. *Spearman correlation coefficients for Fe2, Mn2 and LOI with element content in soil and till, Wilson Lake survey (N=203).*


Correlation of Iron (Fe1) with element content in soil, Seal Lake Survey


Correlation of Manganese (Mn2) with element content in soil, Seal Lake Survey

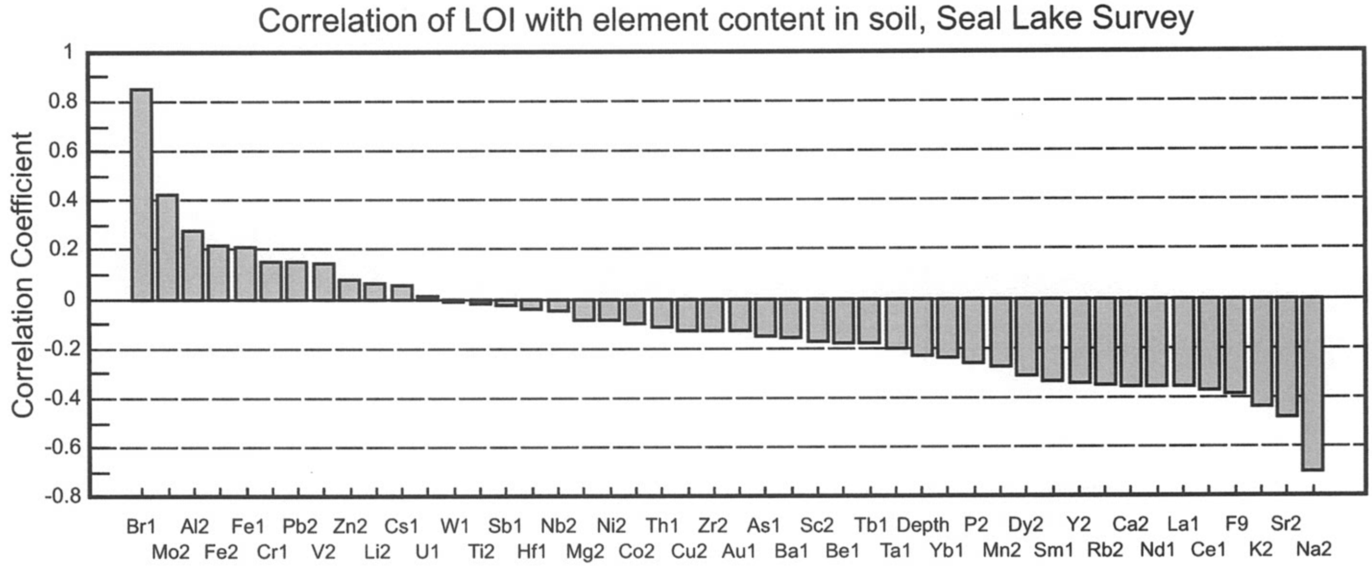

Correlation of LOI with element content in soil, Seal Lake Survey

Figure 11. *Spearman correlation coefficients for Fe2, Mn2 and LOI with element content in soil and till, Seal Lake survey (N=203).*

Table 8. Summary statistics for stream-water data, Wilson Lake area. Element values in ppb unless otherwise indicated (N=59)

Element	Median	Mean (Arithmetic)	Mean (Geometric)	Standard Deviation (Arithmetic)	Standard Deviation (Logarithmic)	Minimum	Maximum
Al	121	133	123	55.59	0.18	42	328
Ba	4	4	4	2.27	0.18	2	14
Be	<0.1	<0.1	<0.1	0.01	0.05	<0.1	0.1
Ca, ppm	0.47	0.52	0.47	0.25	0.18	0.18	1.60
Co	<0.5	<0.5	<0.5	0.03	0.02	<0.5	0.7
Cr	0.5	0.7	0.6	0.25	0.13	<0.5	2
Cu	<0.5	0.6	0.6	0.18	0.11	<0.5	1
Fe	78	101	75	88.60	0.36	5	609
K, ppm	0.17	0.17	0.2	0.09	0.23	0.1	0.5
Li	<0.5	0.6	0.5	0.38	0.13	<0.5	3
Mg, ppm	0.59	0.72	0.62	0.42	0.24	0.20	2.17
Mn	2.0	2.8	2.0	3.34	0.30	1.0	24
Mo	<0.5	<0.5	<0.5	0.00	0.00	<0.5	1
Na, ppm	0.35	0.36	0.33	0.13	0.16	0.11	0.75
Ni	<0.5	0.7	0.6	0.57	0.20	<0.5	3
P	<2	3	2.3	4.16	0.21	<2	31
Si, ppm	1.47	1.69	1.45	0.96	0.24	0.27	4.54
SO_4, ppm	<0.1	<0.1	<0.1	0.01	0.02	<0.1	0.1
Sr	5.6	5.8	5.4	2.60	0.17	2.3	18.9
Ti	<0.5	0.7	0.6	0.48	0.19	<0.5	3
Y	<0.3	<0.3	<0.3	0.00	0.00	<0.3	0.2
Zn	<0.5	0.5	<0.5	1.21	0.31	<0.5	7.6
Conductivity, µS	10.68	11.99	11.33	4.52	0.14	6.36	28.10
pH	6.20	**	6.24	**	0.36	4.78	6.89

** pH is defined as a logarithmic value

Table 9. Summary statistics for stream-water data, Seal Lake area. Element values in ppb unless otherwise indicated (N=52)

Element	Median	Mean (Arithmetic)	Mean (Geometric)	Standard Deviation (Arithmetic)	Standard Deviation (Logarithmic)	Minimum	Maximum
Al	60	86	69	64.98	0.28	17	327
Ba	12	22	13	27.93	0.42	2	147
Be	<0.1	<0.1	<0.1	0.01	0.06	0.1	0.1
Ca, ppm	3.26	4.36	3.33	3.29	0.32	1.01	13.00
Co	<0.5	<0.5	<0.5	0.00	0.00	<0.5	<0.5
Cr	<0.5	<0.5	<0.5	0.00	0.00	<0.5	<0.5
Cu	<0.5	0.6	0.6	0.37	0.15	<0.5	2
Fe	40	53	38	57.95	0.36	5	393
K, ppm	0.16	0.2	0.16	0.07	0.19	0.1	0.4
Li	<0.5	<0.5	<0.5	0.23	0.10	<0.5	2
Mg, ppm	0.59	0.64	0.61	0.22	0.14	0.27	1.20
Mn	1.0	3.9	1.8	13.51	0.36	1.0	99
Mo	<0.5	<0.5	<0.5	0.07	0.04	<0.5	1
Na, ppm	0.64	0.64	0.62	0.16	0.12	0.30	1.11
Ni	<0.5	<0.5	<0.5	0.00	0.00	<0.5	<0.5
P	<2	2.2	2.1	0.71	0.09	<2	5
Si, ppm	2.09	2.32	2.12	1.00	0.18	1.01	5.30
SO4, ppm	<0.1	<0.1	<0.1	0.12	0.20	0.1	0.7
Sr	9.9	14.4	10.5	12.65	0.34	3.0	60.1
Ti	<0.5	0.6	0.6	0.33	0.15	<0.5	2
Y	<0.3	<0.3	<0.3	0.08	0.11	<0.3	0.6
Zn	<0.5	<0.5	<0.5	0.00	0.00	<0.5	<0.5
Conductivity, µS	25.45	33.22	28.66	18.87	0.23	12.87	79.80
pH	6.92	**	6.85	**	0.58	3.90	7.54

** pH is defined as a logarithmic value

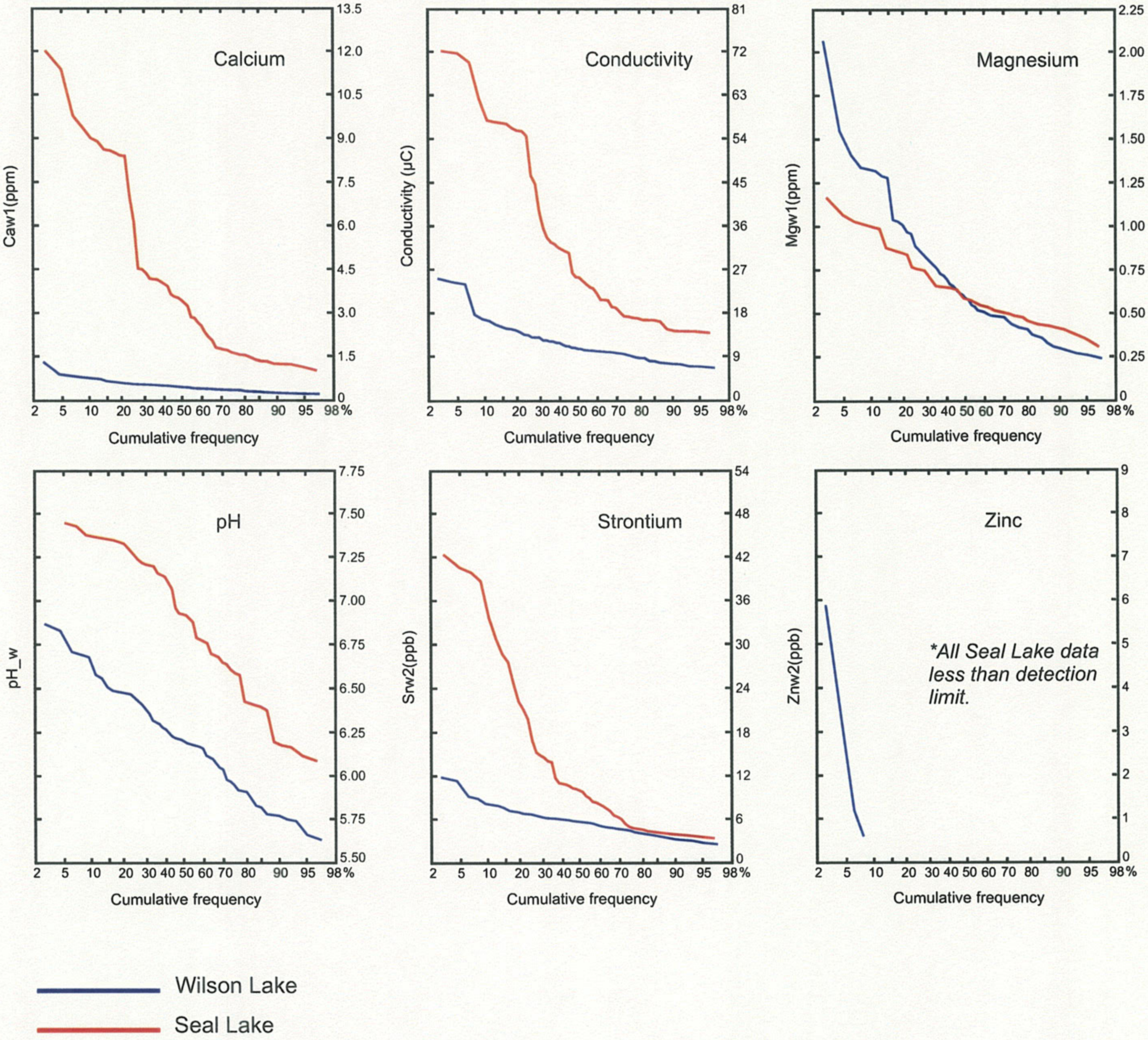


Figure 12. *Cumulative frequency plots of Caw1, conductivity, Mgw1 pH, Srw2 and Znw2 in stream water, Wilson and Seal Lakes areas.*

areas, the cumulative frequency plot of the Wilson Lake data indicates one subpopulation with a range of 0.25 to 1.00 ppm and one or two other populations with a range of 1.3 to >2 ppm.

Element Distribution in Soil and Till, Wilson Lake Survey

The locations of numbered sample sites, geology and drainage systems are shown in Figure 13. Site numbers are referenced in the discussion of element distribution maps.

Nickel. Nickel is the element of most interest in the Wilson Lake survey area. The cumulative frequency plot shows sharp population breaks at 106, 146 and 187 ppm (Figure 14). When these ranges are grouped and plotted the resulting geochemical map reveals a pattern of high values forming a narrow, semi-continuous, 14-km-long, east–west-trending zone through the centre of the grid. A secondary weaker trends underlies the south central portion of the grid possibly merging with the main trend near site #1587 and underlies a sulphide-bearing boulder near site #1635.

Copper. The distribution of Cu (Figure 15) has some similarities in shape to the pattern of Ni. At the east end of the grid, three samples with high Cu (69, 59 and 59 ppm) are either coincident with, or adjacent to, samples with high Ni values. However, unlike Ni, all the high Cu values are confined to the east half of the grid. The samples with the highest Cu values (100 and 105 ppm) have only background Ni values. Similarly, samples with high Ni values in the central and west part of the grid have only background Cu values.

Gold. The distribution of Au is shown in Figure 16. The values are unremarkable, the highest being 6 ppb. Of the 4 highest, however, 2 are coincident with samples belonging to the class of highest Cu values, and the remaining two have elevated Cu values suggesting a possible Cu-Au mineralization association.

Arsenic. The distribution of As is somewhat unusual in that it is not significantly correlated with any other element (Table 4). Its cumulative frequency plot is linear over its detectable range indicating the absence of distinctive component populations (Figure 17). The distribution of samples with high values is seemingly random except for a five sample cluster of elevated values (#1625, -26, -28, -30 and -37) in the north central area. One of these is associated with a high Au value (6 ppb). Additionally, the other sample with 6 ppb Au value also has an elevated As content.

Fluoride. The distribution of high F values is strongly concentrated in the east end of the grid area (Figure 18). In addition to having strong correlations with rare earth elements as might be expected, it has surprisingly strong correlations with several mafic associated elements - Ni (r=0.49), Cu (r=0.49) and Mg (r=0.59). This can be seen in the maps of Ni, Cu and Mg in which several of the sites with high values in the metals also have high F values. Fluoride also correlates strongly with Zn2 (r=0.78).

Magnesium. The distribution of Mg (Figure 19) is included to show its very strong similarity to that of Ni suggesting that the distribution of Ni is explained by the presence of an un-mapped mafic or ultramafic host rock. The elements have an extremely strong correlation (r=0.96).

Lead. The distribution of lead is strongly bi-modal as shown by the cumulative frequency plot in Figure 20. Most of the highest value are found at the west end of the grid. A second area of high values underlies the north-central portion of the grid.

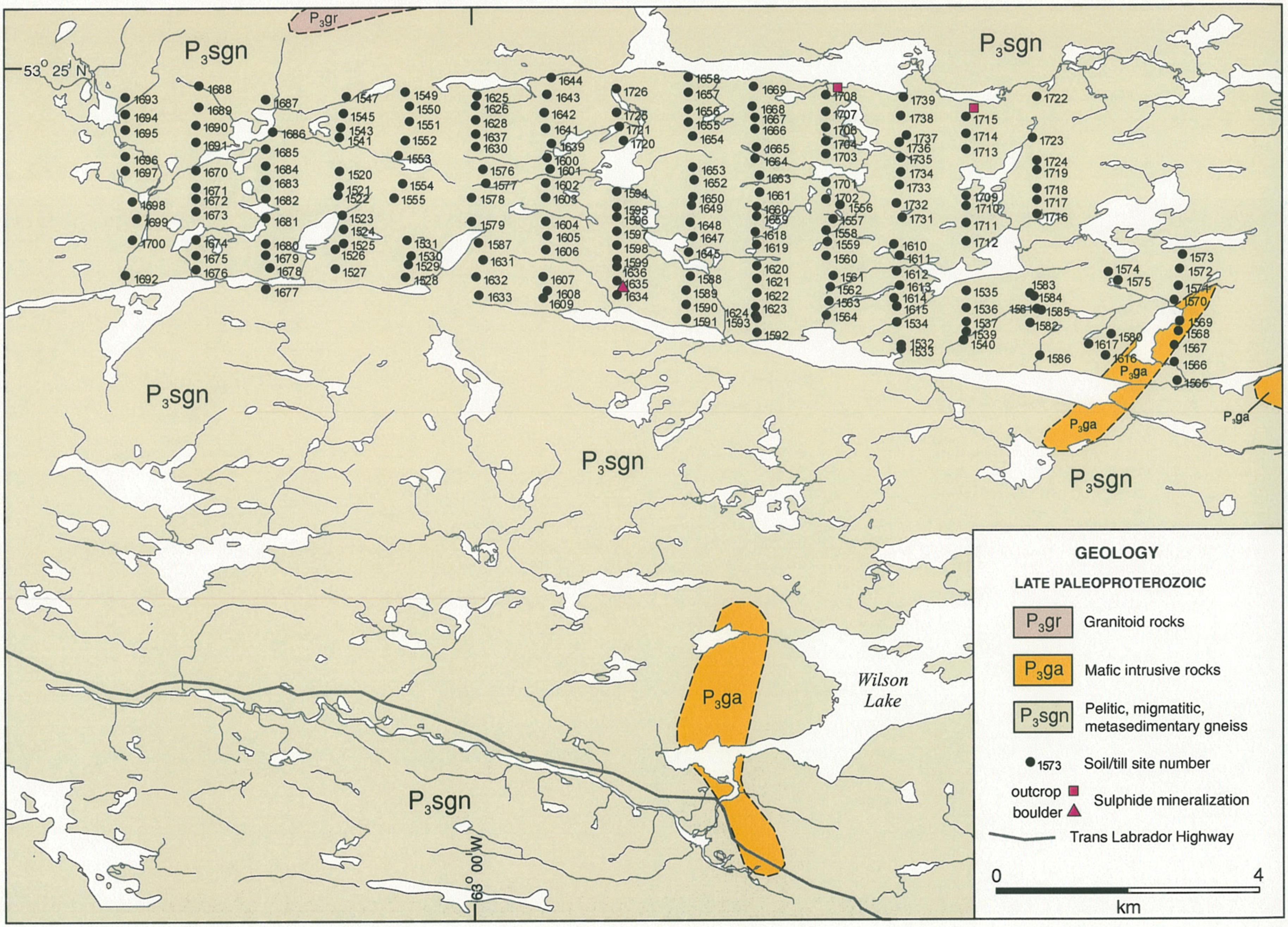


Figure 13. *Locations of soil and till sample sites, Wilson Lake area. (Note: to obtain full field number add 6230000)*

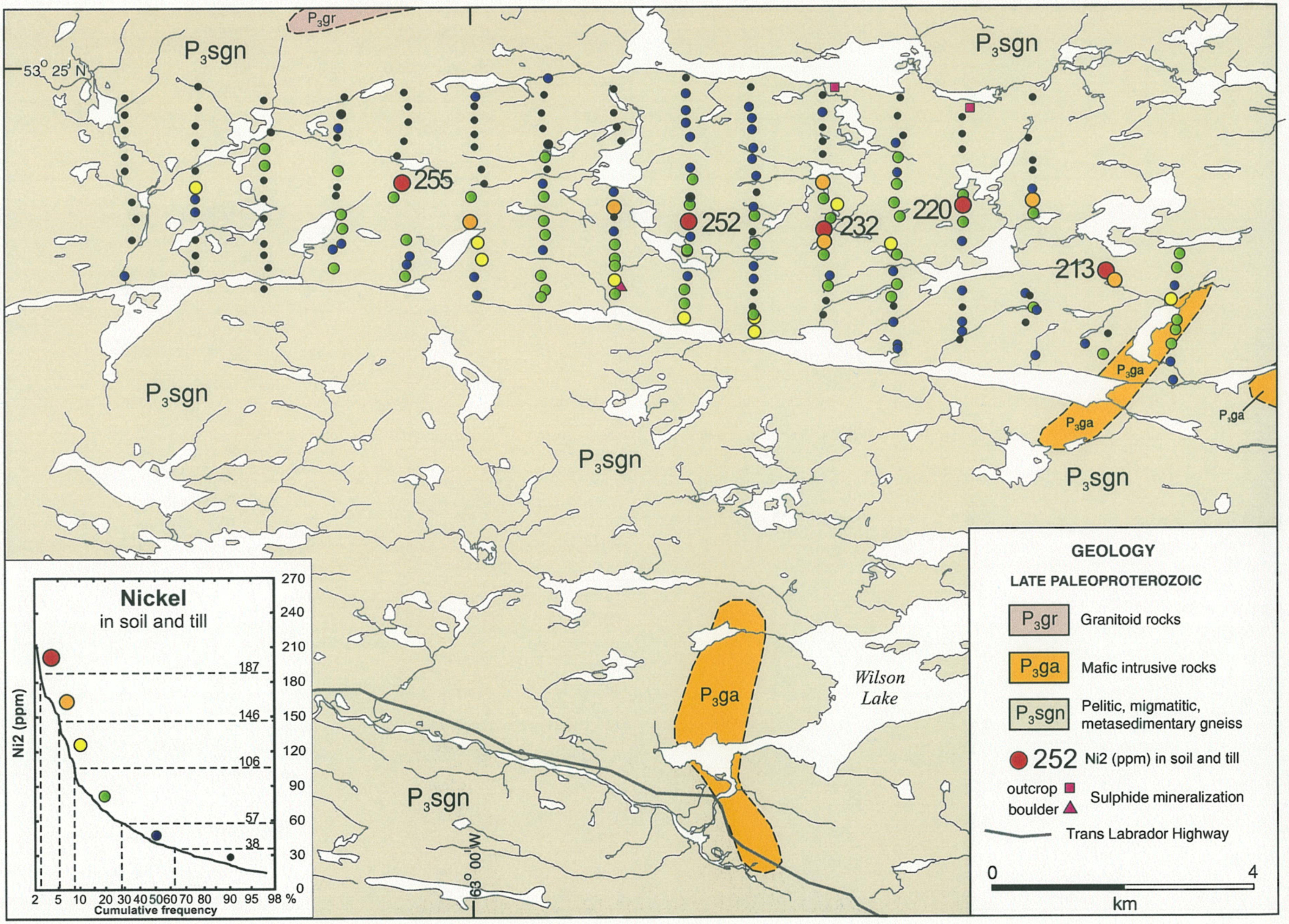


Figure 14. *Nickel (Ni2) in soil and till, Wilson Lake area.*

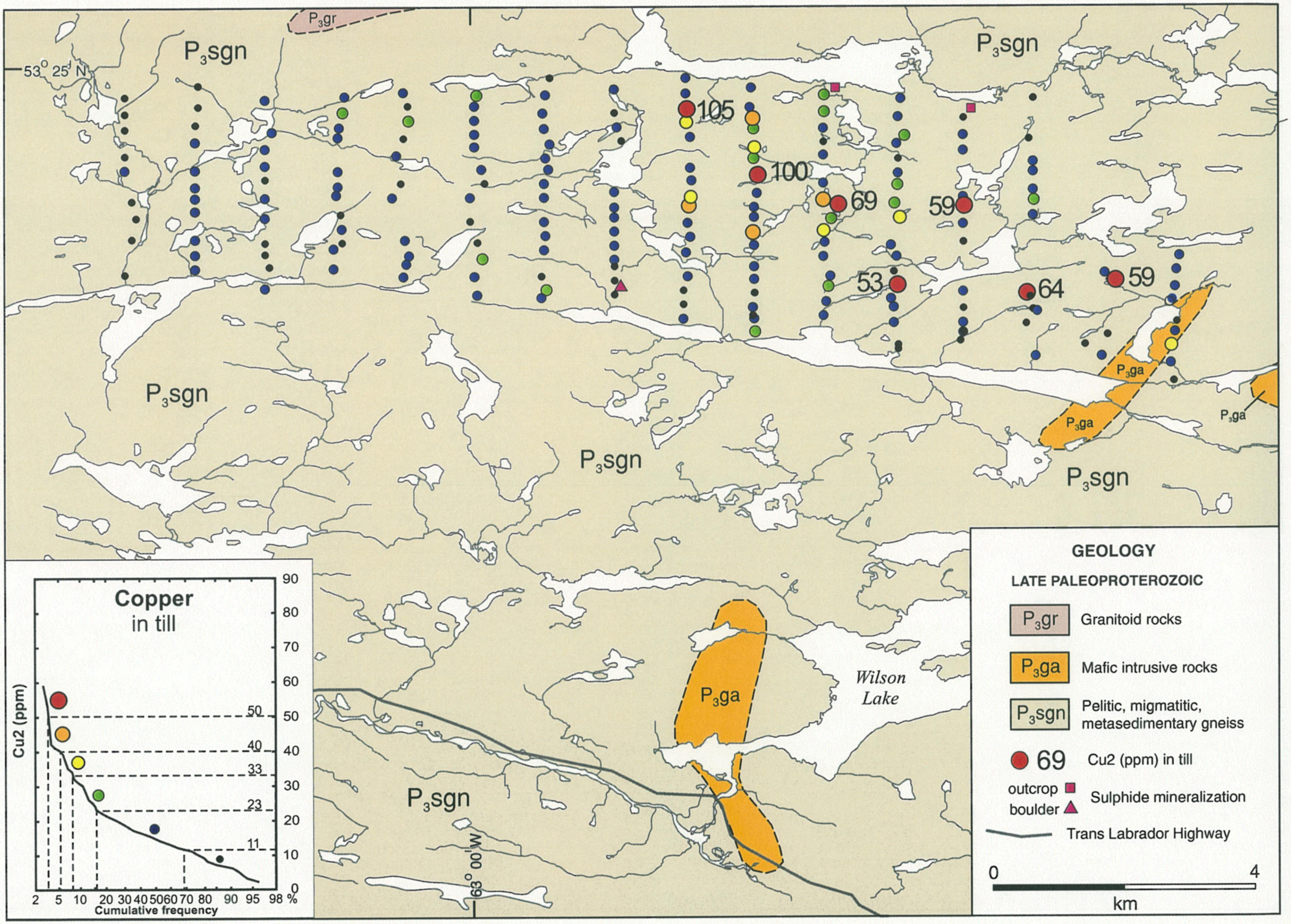


Figure 15. *Copper (Cu2) in soil and till, Wilson Lake area.*

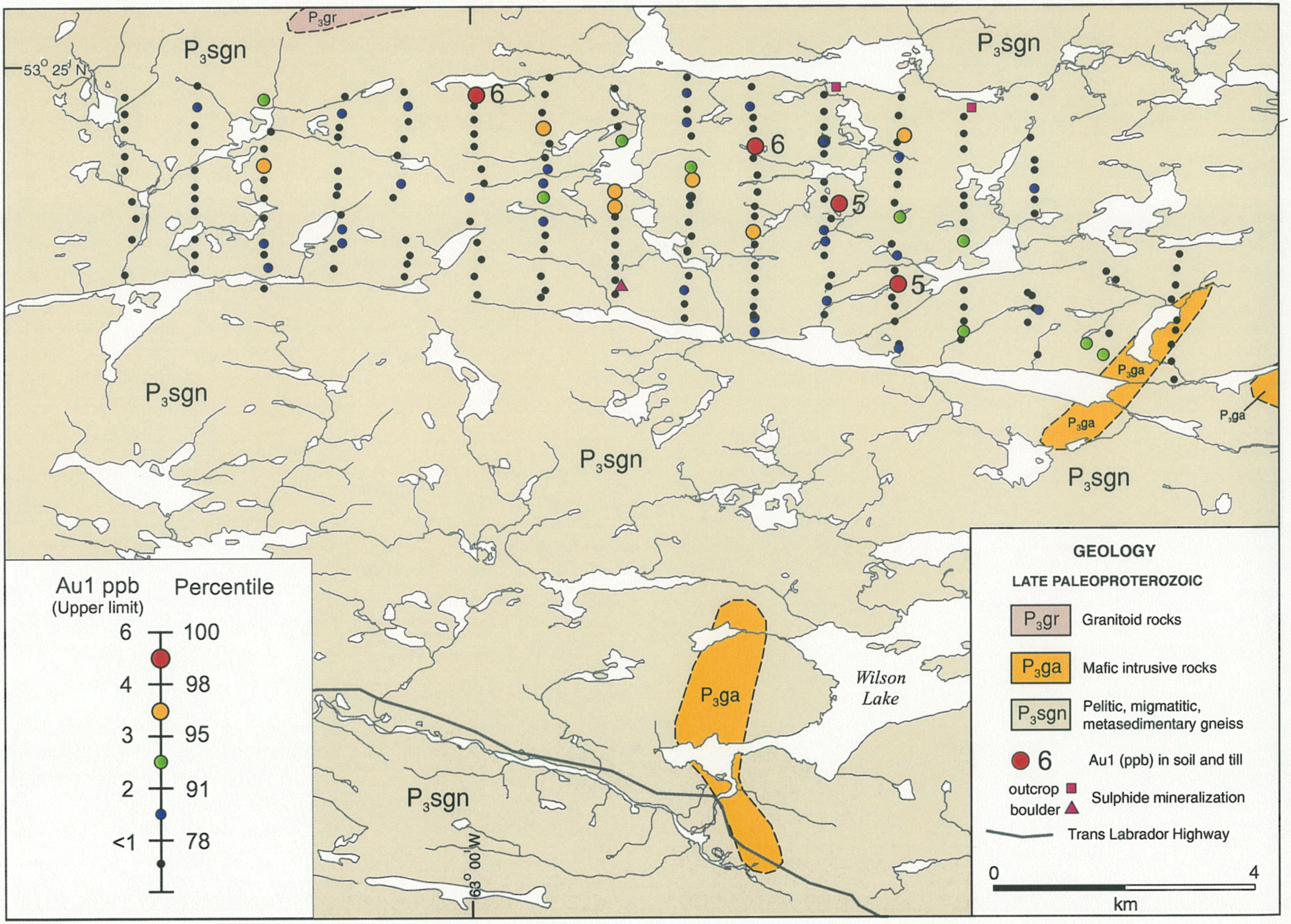


Figure 16. *Gold (Au1) in soil and till, Wilson Lake area.*

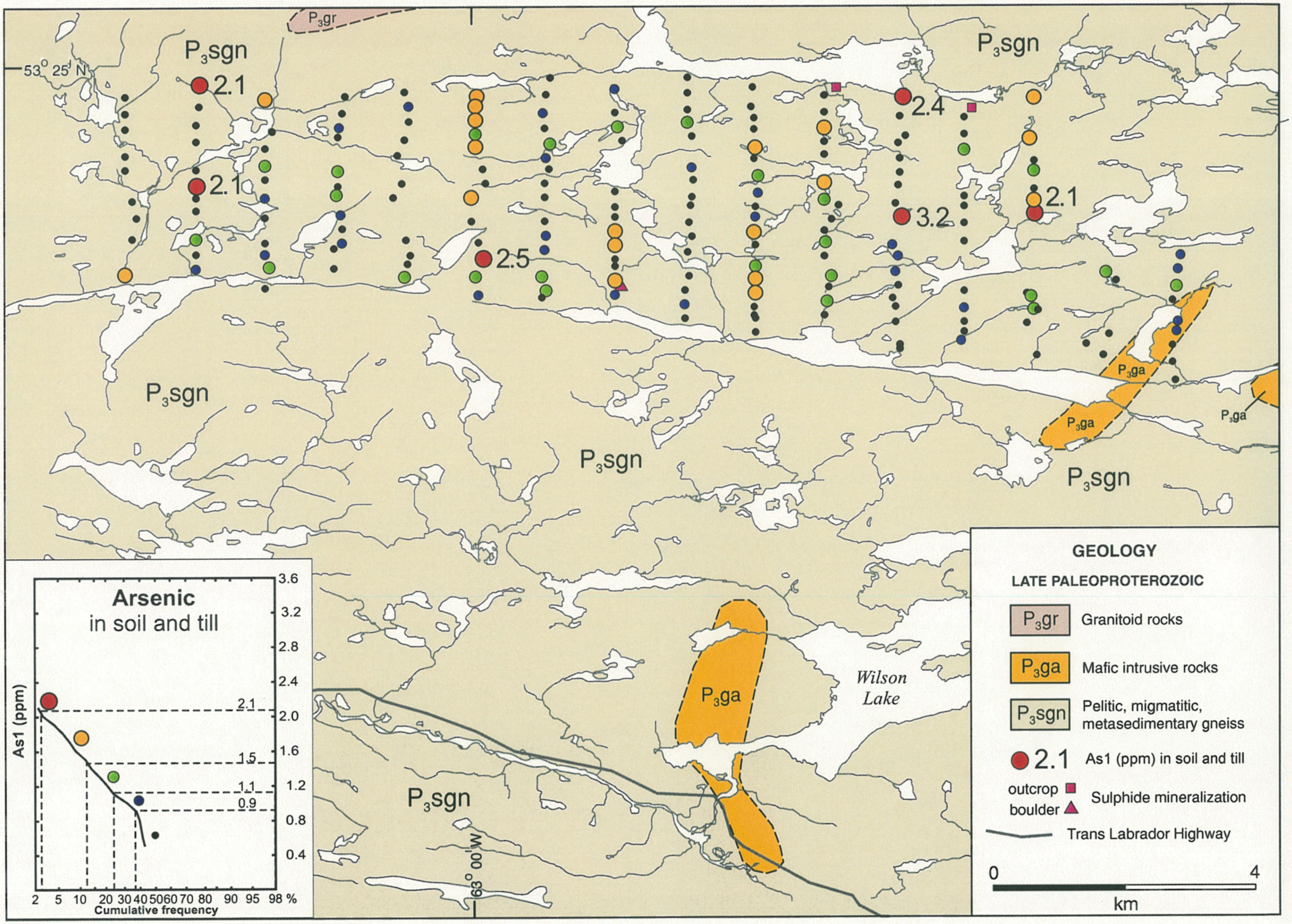


Figure 17. *Arsenic (As1) in soil and till, Wilson Lake area.*

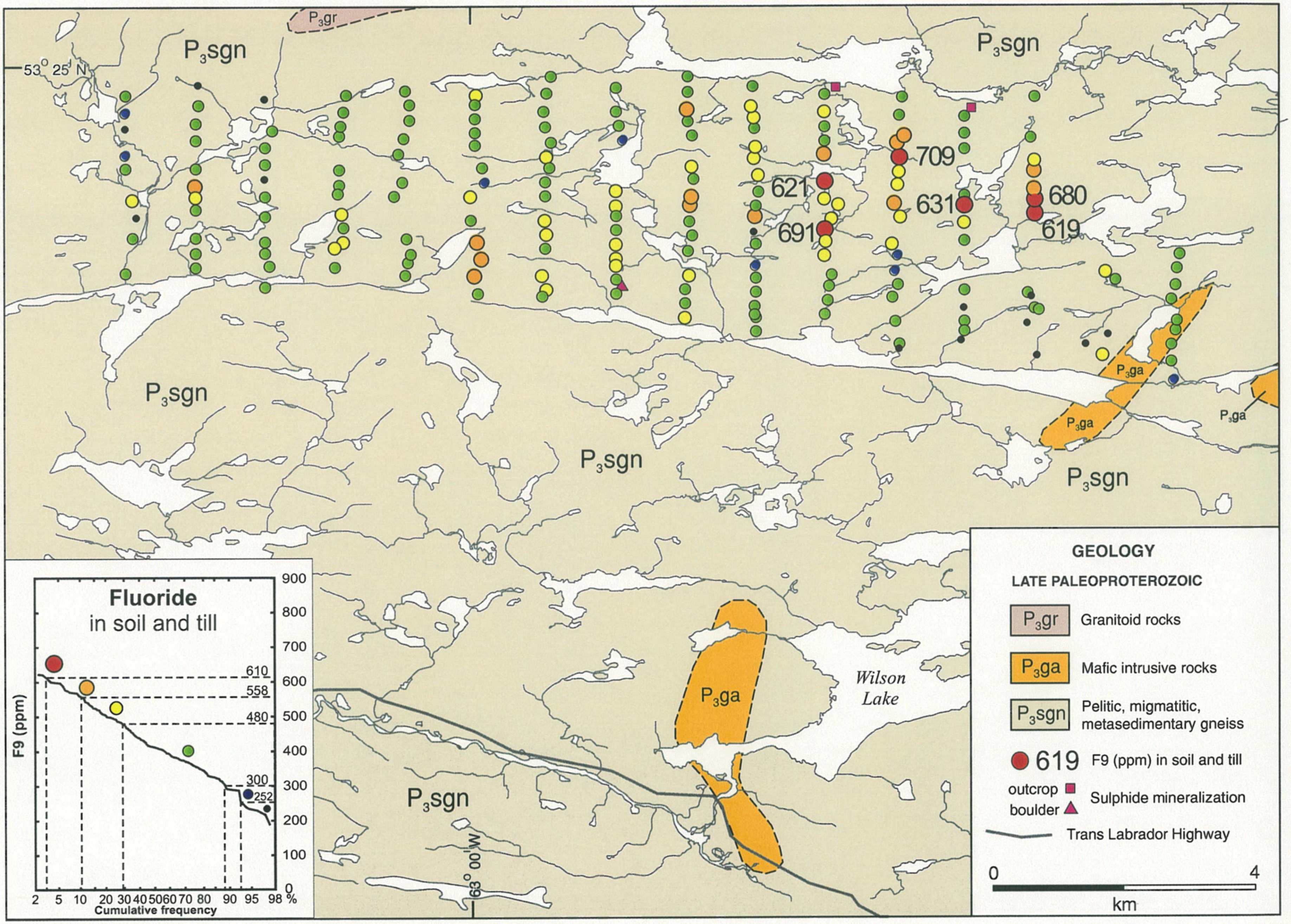


Figure 18. *Fluoride (F9) in soil and till, Wilson Lake area.*

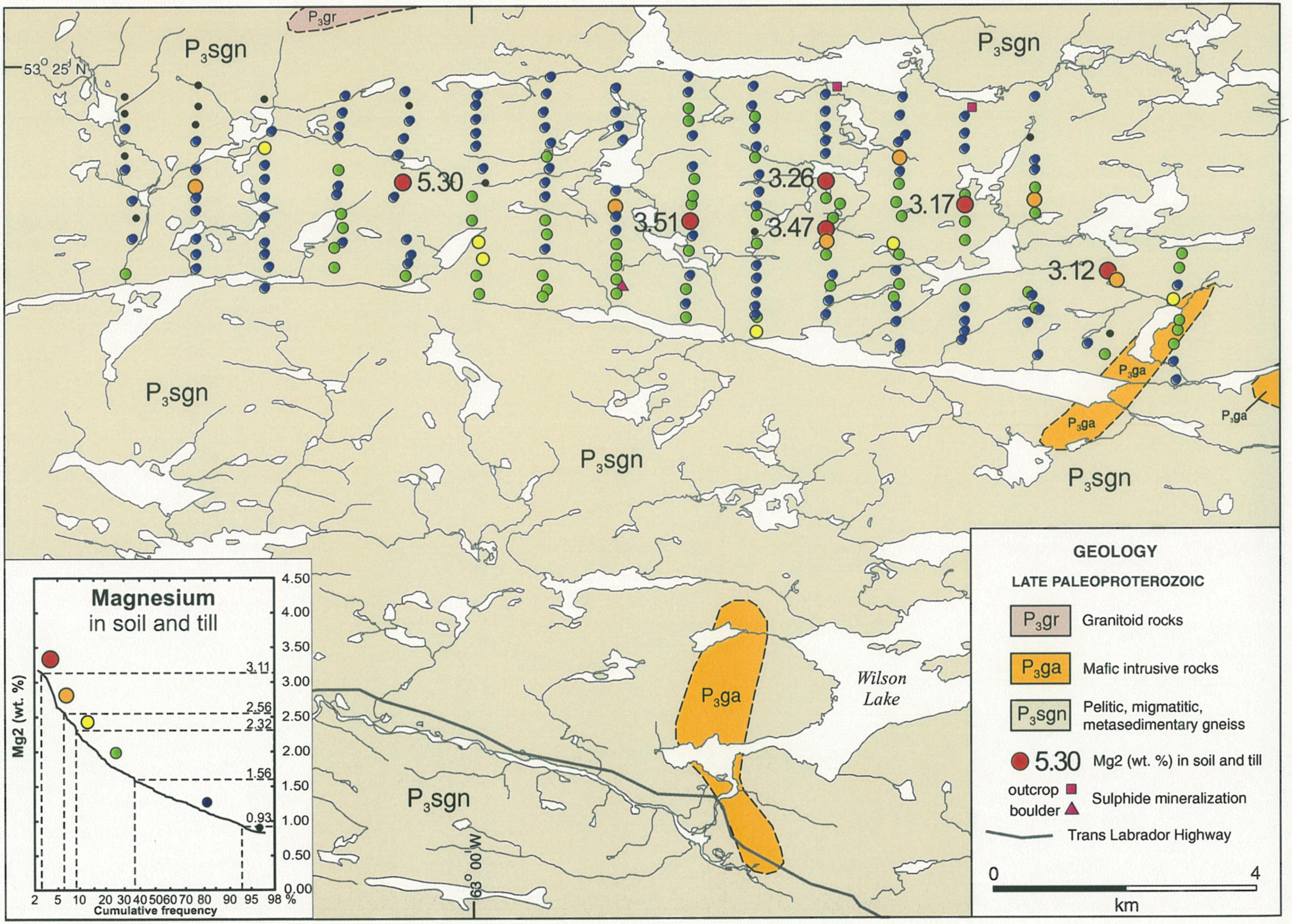


Figure 19. *Magnesium (Mg2) in soil and till, Wilson Lake area.*

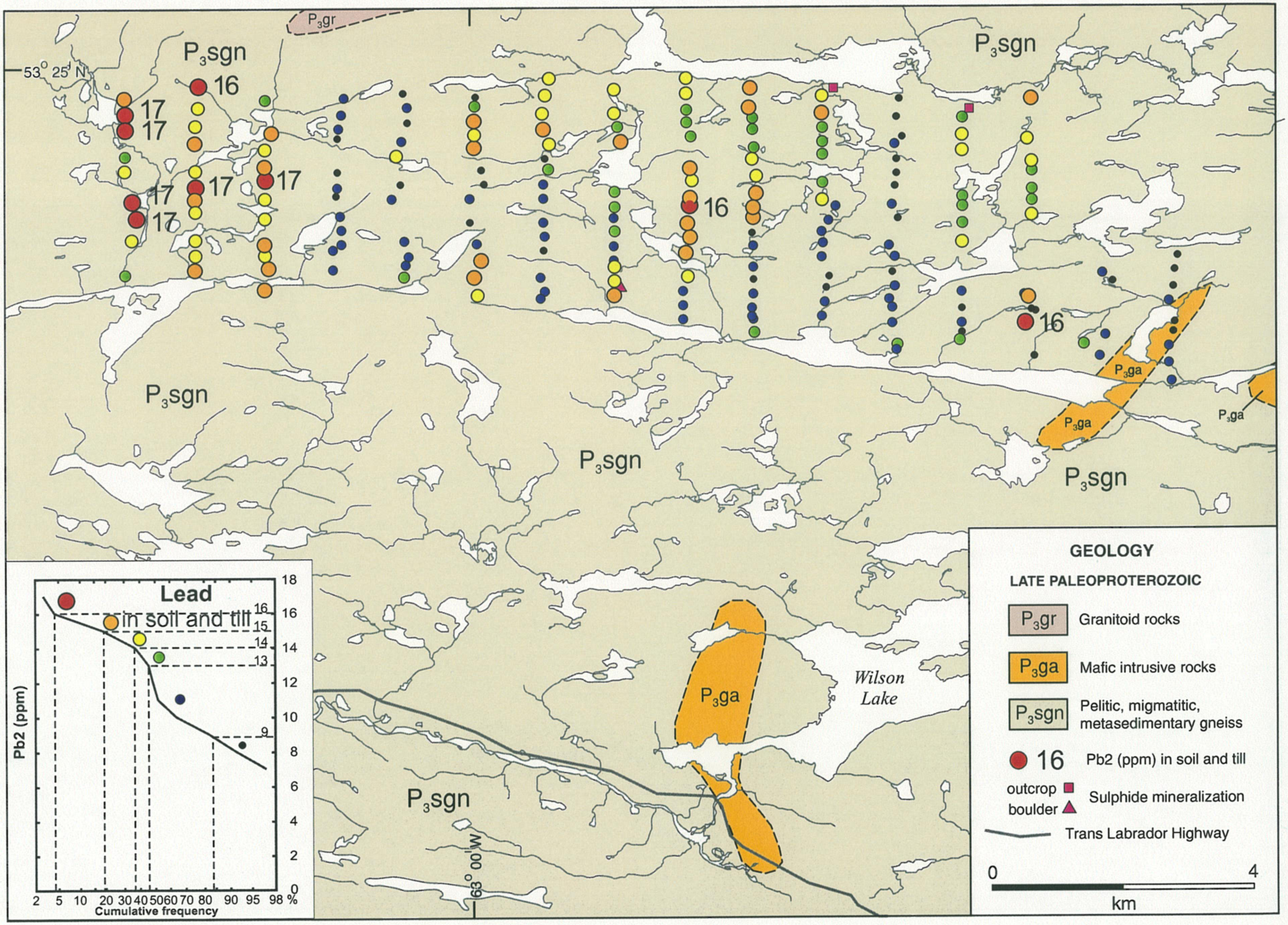


Figure 20. *Lead (Pb2) in soil and till, Wilson Lake area*

Zinc. The distribution of Zn is similar in some respects to that of F with which it correlates strongly (r=0.78). The correlation appears strongest in the mid ranges of the Zn distribution. The highest Zn values lack such a strong correlation (Figure 21).

Element Distribution in Soil and Till, Seal Lake Survey

The locations of numbered sample sites, geology, significant mineralization and drainage systems in the Seal Lake area are shown in Figure 22.

Copper. A map of the distribution of Cu2 in till is shown in Figure 23. Also shown are the three copper "prospects" and a "showing" that are known in the area (Stapleton and Smith, 2000). The two northern prospects are in quartz veins hosted by siliciclastic rocks. The southern prospect is in "diabase". The showing is also in siliciclastic rocks. There are a further 107 "indications" of Cu that are not shown that consist mostly of Cu stains and smears along fractures in various rock types. The larger of the two grids encloses a region of anomalous Cu in lake sediment between Seal and Wuchusk lakes. No till sampling was conducted in the northern margin between the grid and Wuchusk Lake and the adjoining Naskaupi River due to a blanket of sand and gravel. Elsewhere, the Quaternary cover appears to consist of locally derived till. Most of the highest Cu samples are located in the central part of the grid, overlying, or near, the quartzite dominated Wuchusk Lake unit. The highest sample, 190 ppm Cu, is located about 1.5 km east and down-ice of the sedimentary unit in an area presumably underlain by gabbro.

The low Cu response in till in the southern Thomas River grid is surprising because the two small lakes contained within the grid (Figure 5), have Cu in lake sediment values of 241 and 1273 ppm Cu – amongst the highest recorded in the survey.

Nickel. The distribution of Ni (Figure 24) is similar to that of Cu, as suggested by a correlation coefficient of 0.70.

Gold. The four highest Au values (Figure 25) are in the 6-8 ppb range. All of these samples occur very close to the contact of siliciclastic rocks with the gabbro. There is no obvious correlation with As or Sb although the 6 ppb sample from the Thomas River area has elevated values of both As and Sb.

Arsenic. The distribution of the highest As values coincides with the areas underlain by siliciclastic rocks (Figure 26). The cumulative frequency plot has a sharp break at 8 ppm and all samples with values greater than this are from siliciclastic areas and all of the next lowest group either overlie or are immediately down-ice of the this lithology.

Antimony. The distribution of Sb (Figure 27) does not correlate closely with that of Au or As except in the Thomas River area where the three highest Sb samples also fall in the highest arsenic classification.

Magnesium. The distribution of high Mg samples (Figure 28) seems to be controlled by proximity to the Wuchusk Lake unit - predominantly quartzite - a somewhat surprising correlation. There is also quite a strong correlation of high Mg values with high Cu values in the same area.

Lead. The distribution of high Pb values (Figure 29) does not appear to coincide with the distribution of other metals discussed nor with bedrock lithology. There is a strong geographic clustering in the northwest part of the northern grid but from areas underlain by both clastic and gabbroic rocks.

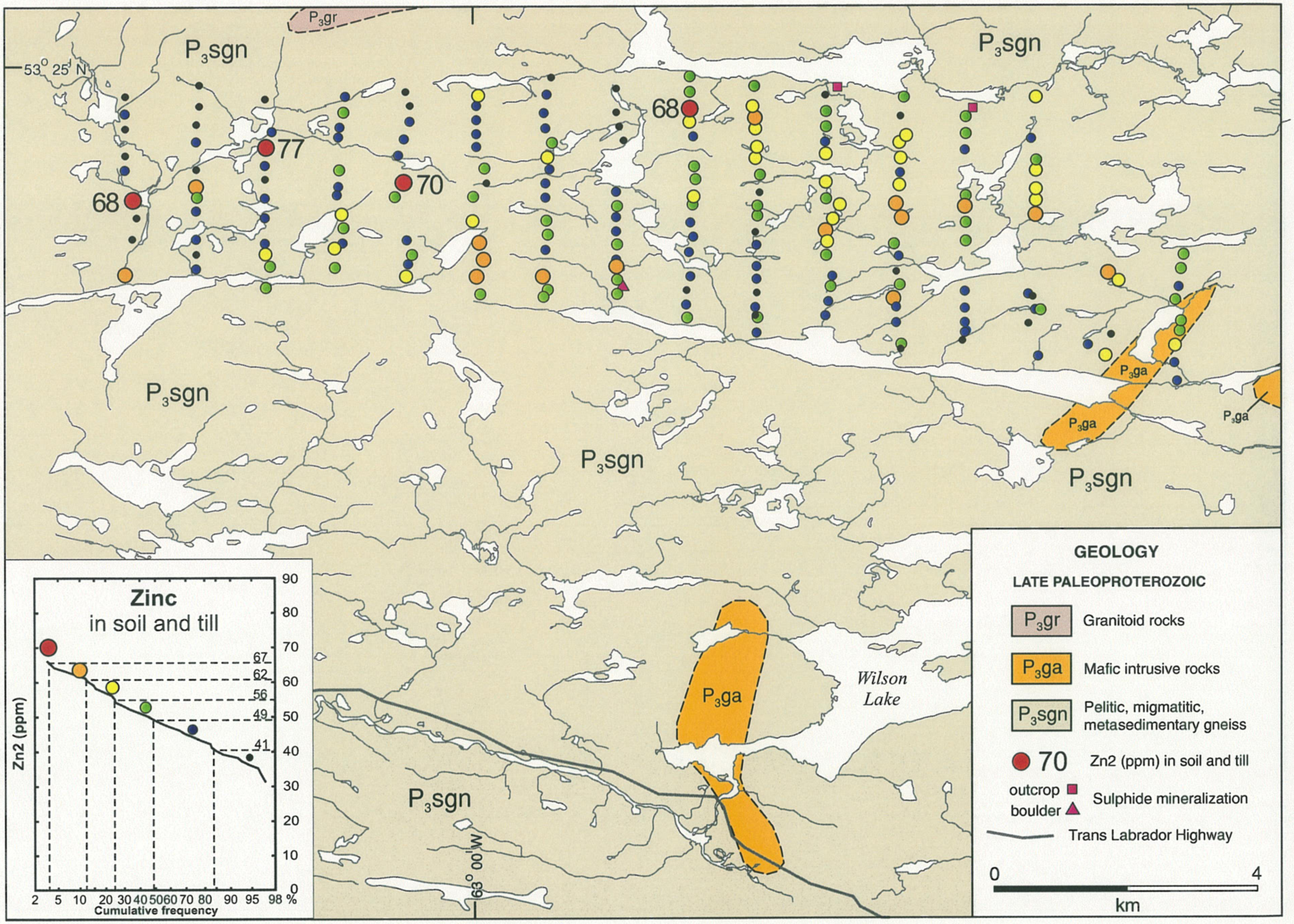


Figure 21. *Zinc (Zn2) in soil and till, Wilson Lake area.*

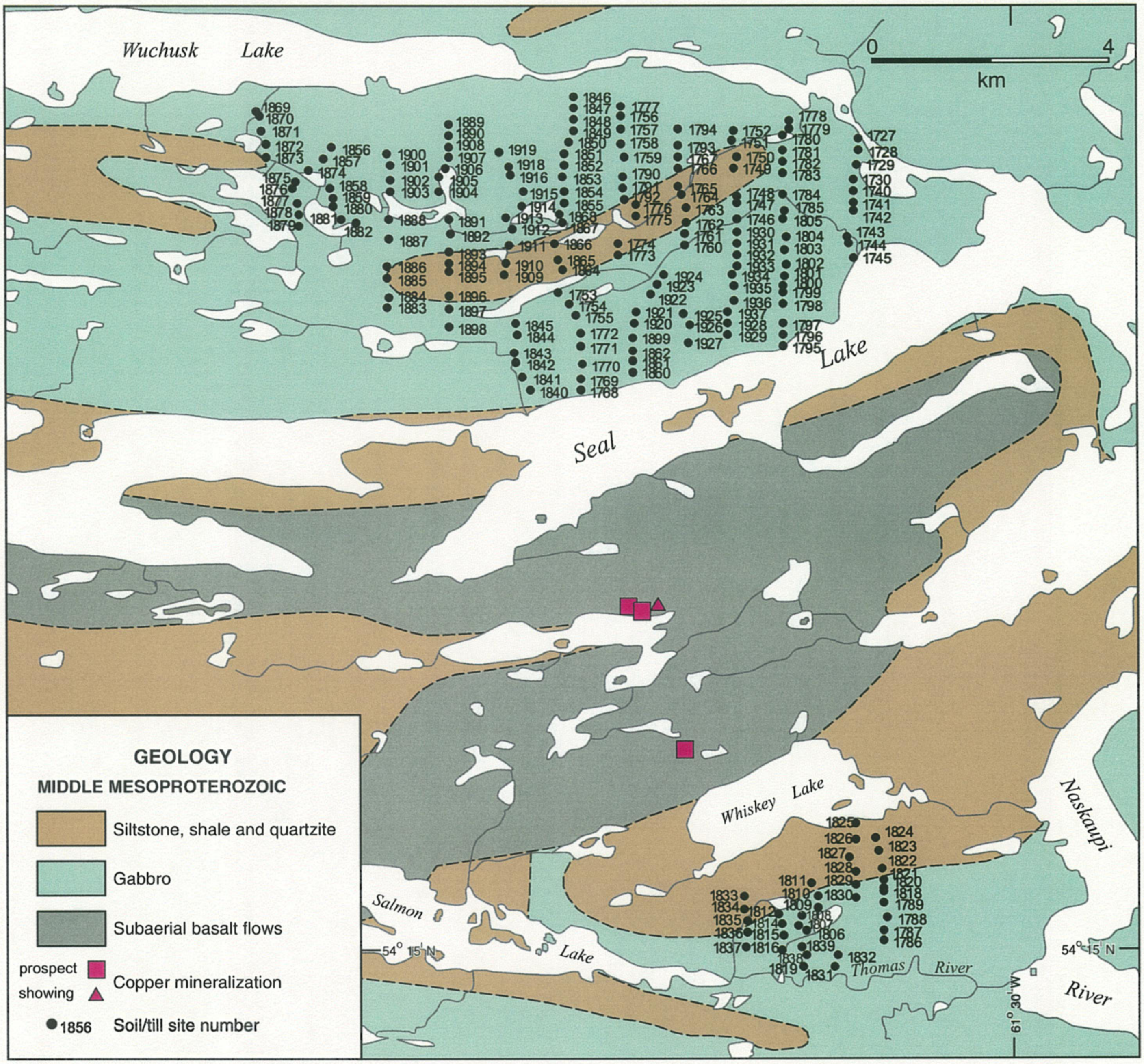


Figure 22. *Locations of soil and till sample sites, Seal Lake area. (Note: to obtain full field number add 6230000)*

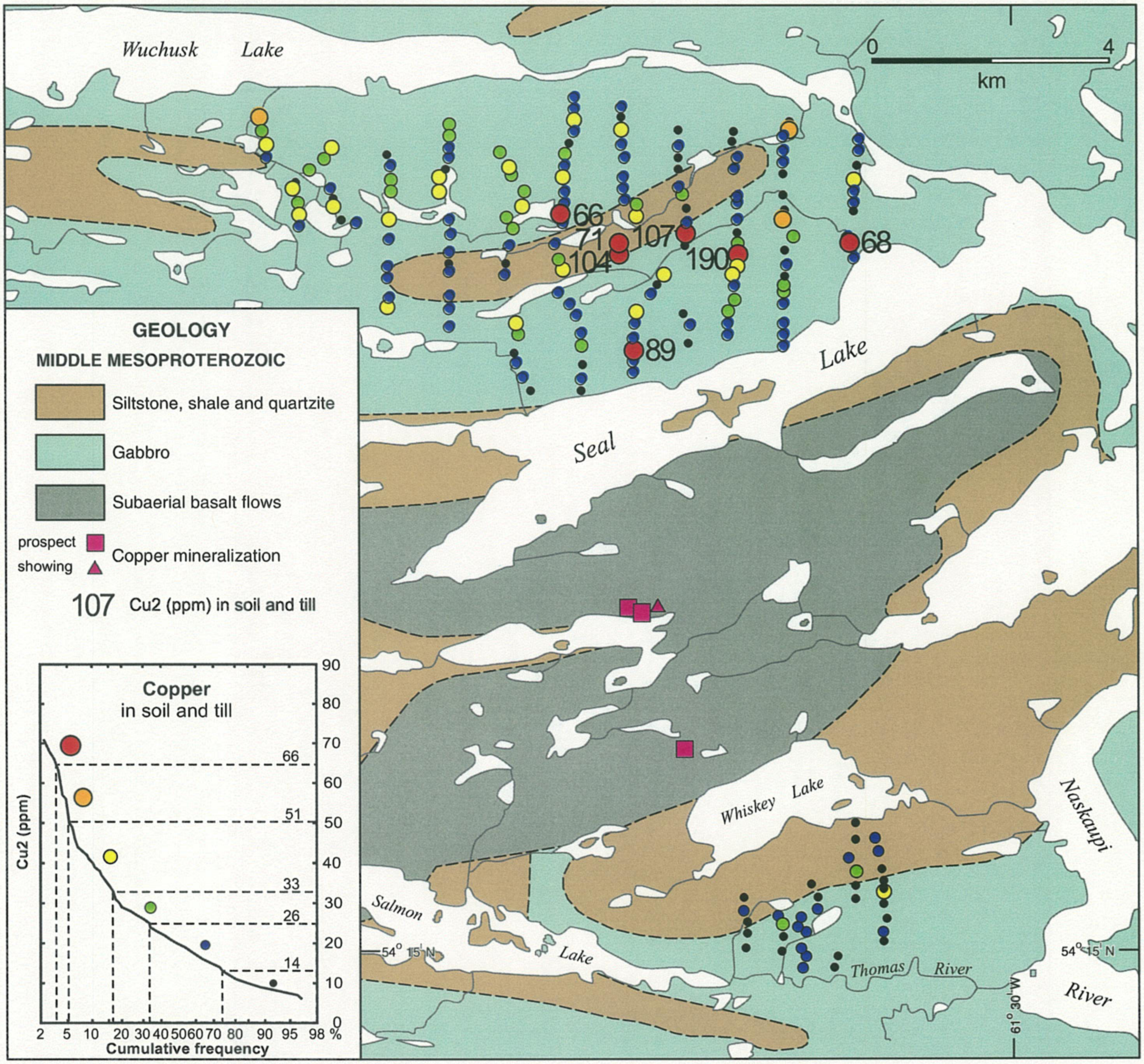


Figure 23. *Copper (Cu2) in soil and till, Seal Lake area.*

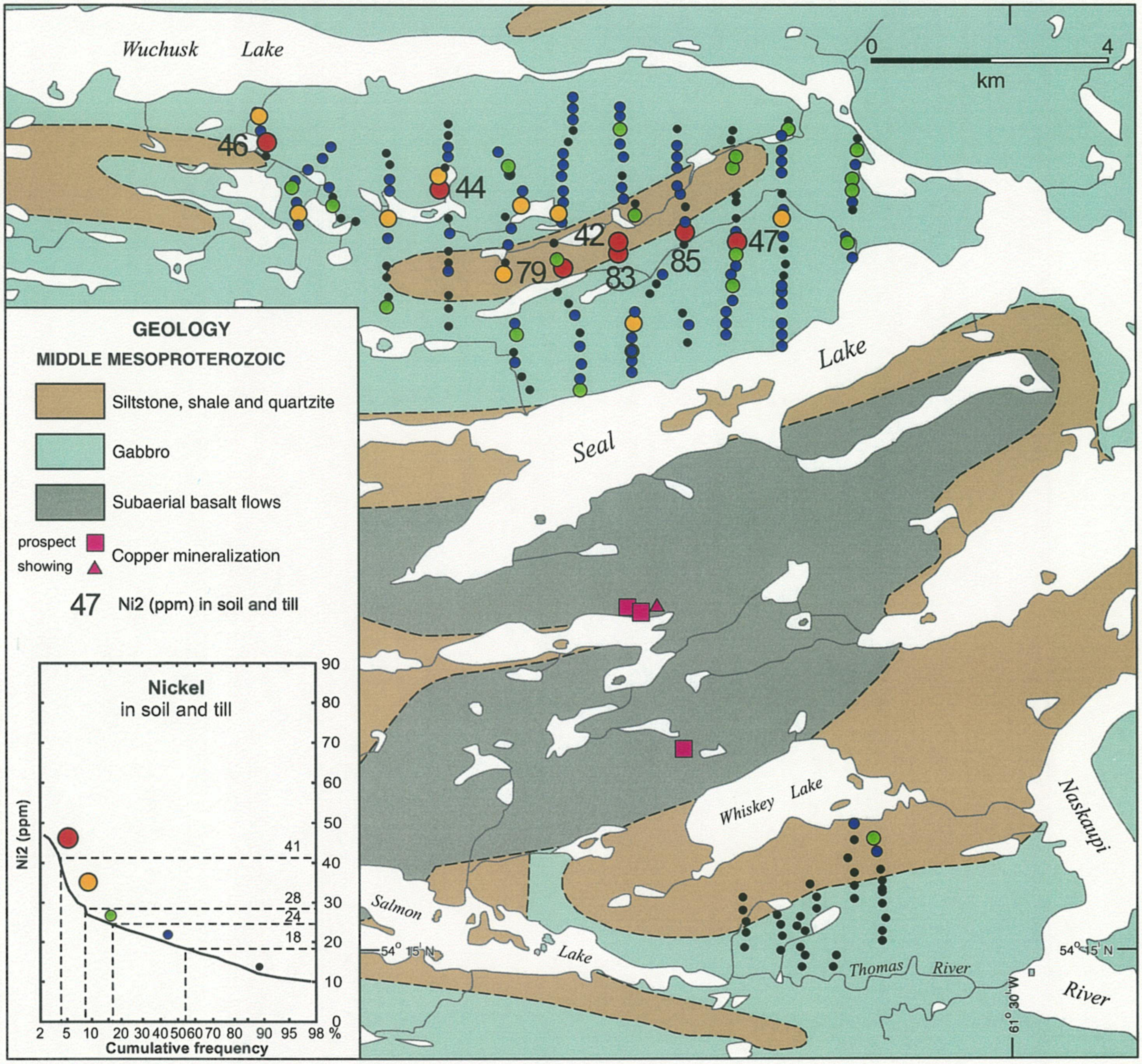


Figure 24. *Nickel (Ni2) in soil and till, Seal Lake area.*

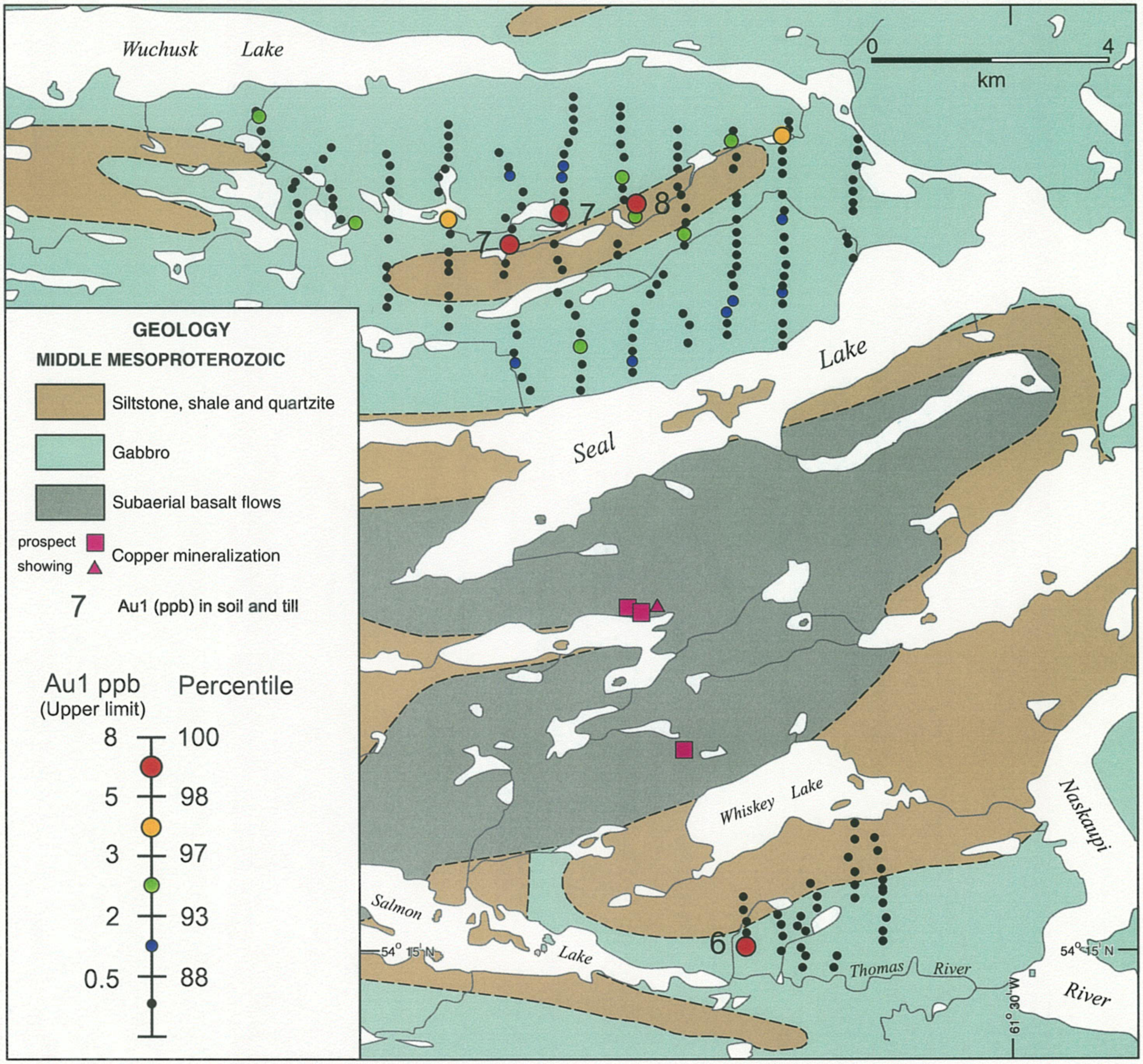


Figure 25. *Gold (Au1) in soil and till, Seal Lake area.*

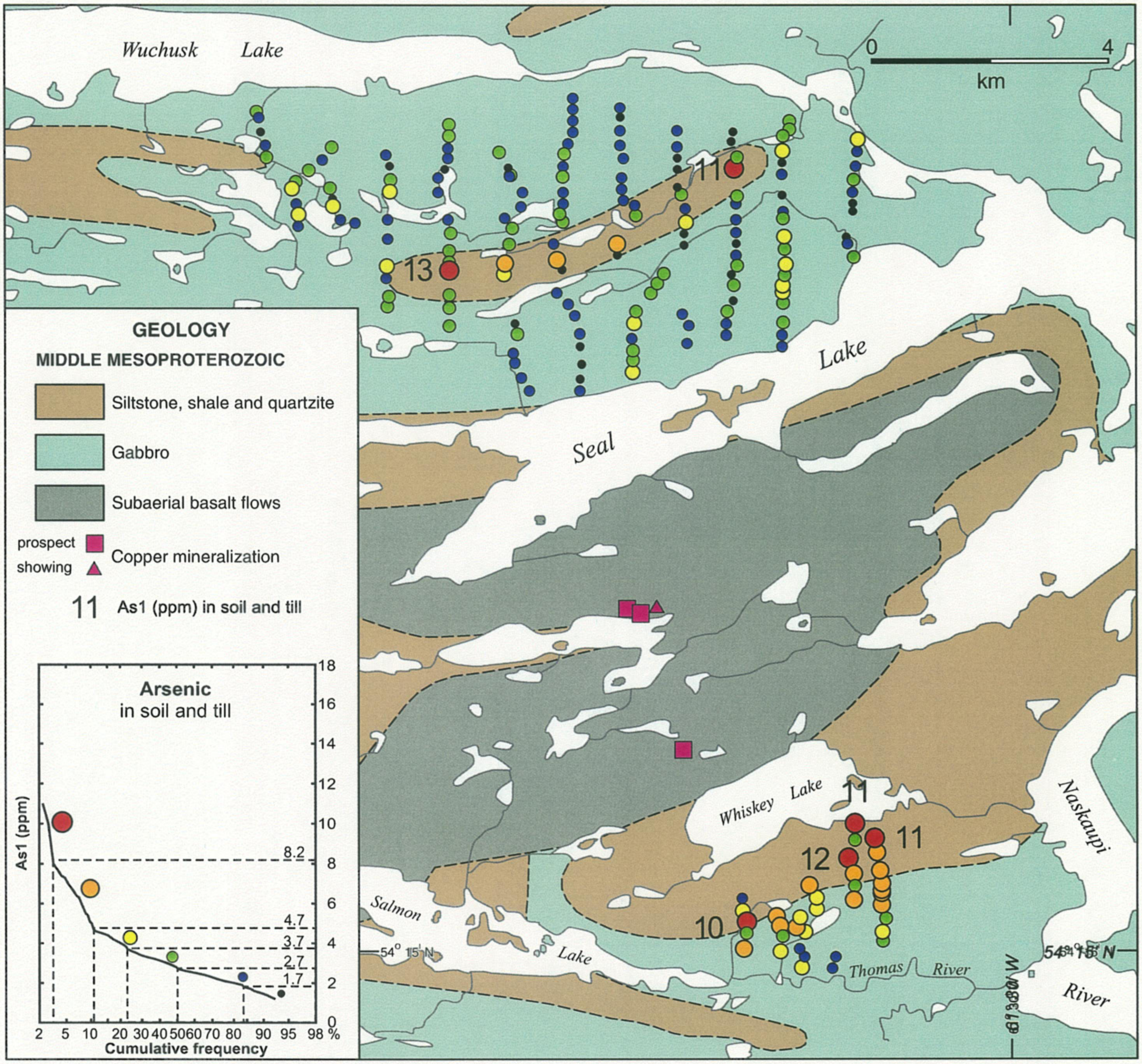


Figure 26. *Arsenic (As1) in soil and till, Seal Lake area.*

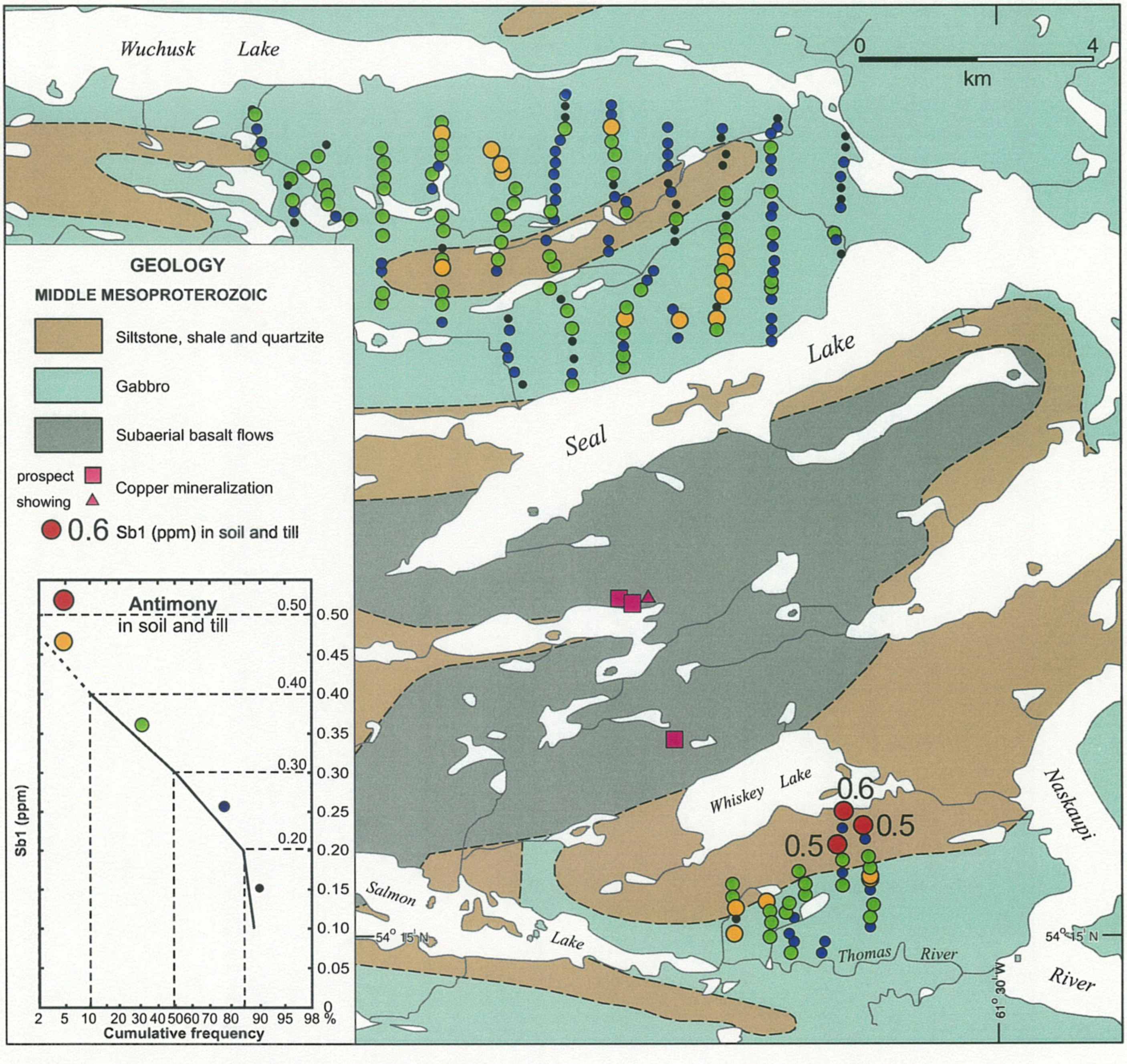


Figure 27. *Antimony (Sb1) in soil and till, Seal Lake area.*

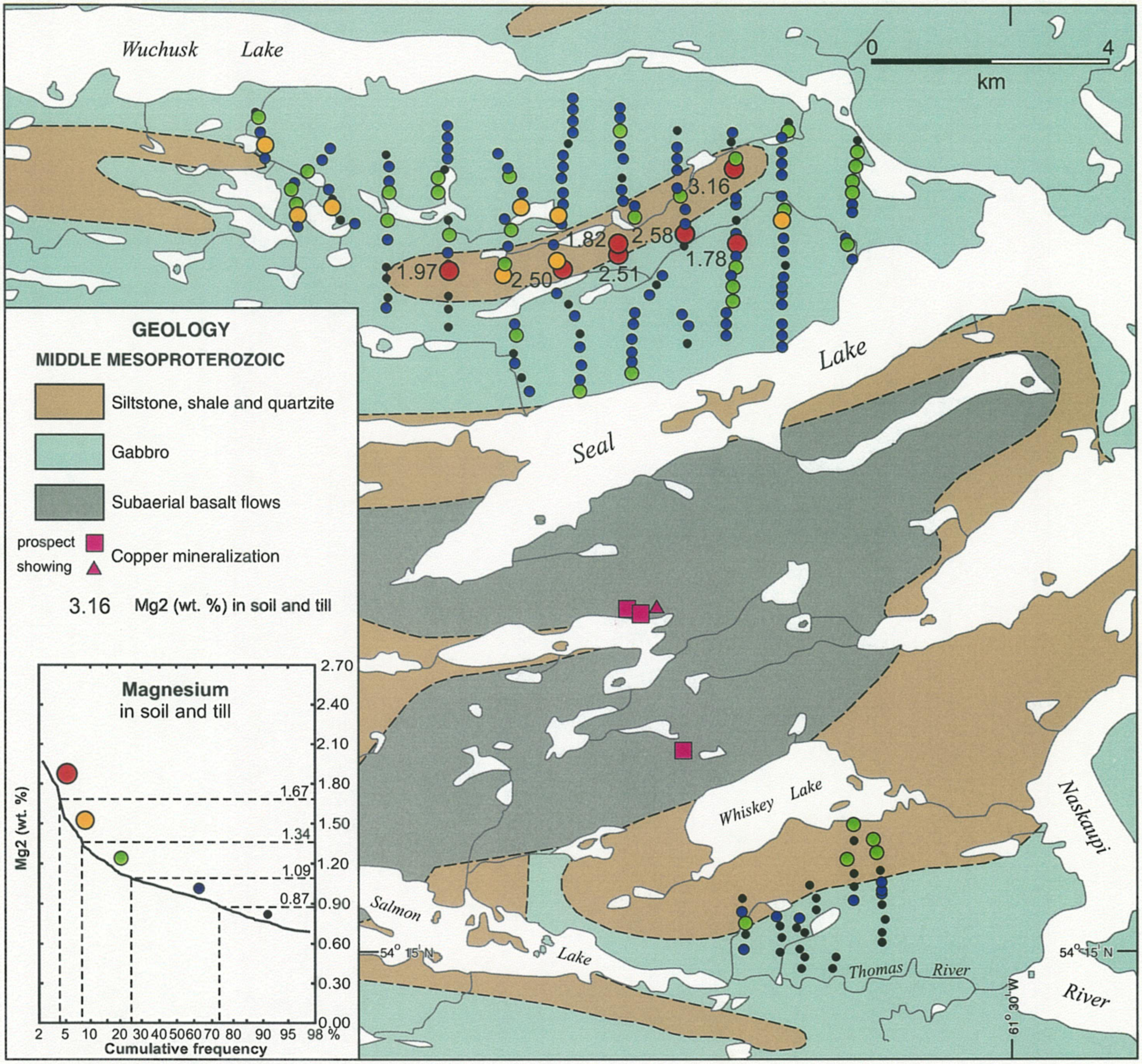


Figure 28. *Magnesium (Mg2) in soil and till, Seal Lake area.*

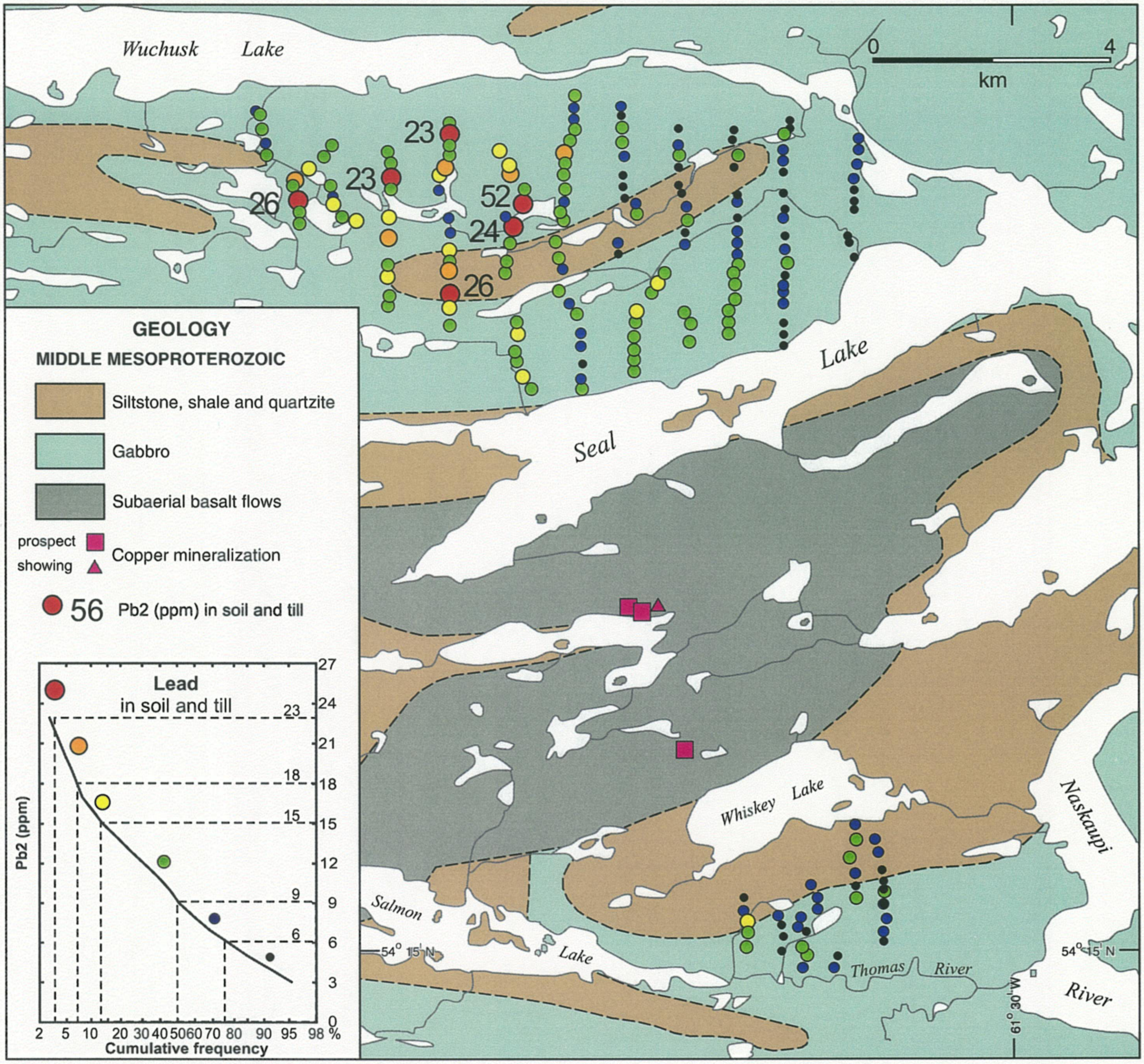


Figure 29. *Lead (Pb2) in soil and till, Seal Lake area.*

Stream-Water Chemistry, Wilson Lake Survey

The locations of numbered sample sites, geology and drainage systems are shown in Figure 30.

Conductivity. The distribution of conductivity values is shown in Figure 31. The CFP indicates several subpopulations with inflection points at 12.5, 15 and 21 μS. When data within these intervals are plotted, they reveal a central east-west trending zone of high values (>15 μS) flanked by elevated values to the south (>12.6 μS). The central core of this zone coincides approximately with the zone of high Ni values (Figure 14).

pH. The distribution of pH is shown in Figure 32. The distribution of values is fairly uniform although most of the 6 of the 10 most acidic samples (<5.88) are in the northeast. Looking in detail, all of the most conductive samples (>21 μS) and 4 of the 5 next conductive samples (15-21 μS) fall in the high to moderate pH range suggesting a more alkaline bedrock source, perhaps ultramafic.

Nickel. The distribution of Niw2 is shown in Figure 33. Only 6 samples have detectable Niw2 values. Of these, 4 correspond to sites with high conductivity values (>15 μS).

Magnesium. The distribution of Mgw1 is shown in Figure 34. The CFP has sharp breaks at about 1.0 and 1.5 ppm. The distribution pattern is very similar to that of conductivity, forming a central east-west trending zone of high values, again suggesting a possible mafic or ultramafic source.

Chromium. The distribution of Crw2 is shown in Figure 35. The CFP has a distinct inflection point at 1 ppb. The distribution pattern of samples with values >1 ppb is similar to those of Niw2 and Mgw1. For example 5 of the 6 highest Crw2 samples correspond to sites having Mgw1 values in the two highest classifications (>1.17 ppm Mgw1).

Copper. The distribution of Cuw2 is shown in Figure 36. Only 14 samples have detectable Cu. The distribution of these samples is somewhat similar to that of the high Cr samples although the 2 samples with the highest Cu content have <detection-limit levels of Cr.

Stream-Water Chemistry, Seal Lake Survey

The locations of numbered sample sites, geology and drainage systems are shown in Figure 37.

Conductivity. The distribution of conductivity values is shown in Figure 38. The CFP indicates several subpopulations with particularly sharp inflection points at 51 and 64 μS. The two intervals above these points form 2 clusters - one zone in part overlying the sedimentary unit north of Seal Lake and extending to the east and second cluster comprising most of the samples in the Thomas River area in the southern part of the figure.

pH. The distribution of pH is shown in Figure 39. In contrast to the Wilson Lake area, the pH values are considerably more alkaline and form strong patterns. Five of the most acidic samples overly the gabbro between Wuchusk Lake and the sedimentary unit to the south. One extremely acid sample (3.90), however, overlies the gabbro to the south of the sediments.

Copper. The distribution of Cuw2 is shown in Figure 40. Most of the highest values (0.8 -2.4 ppb) are in samples overlying the gabbro just north of Seal Lake, an area that also has several samples with high Cu in soil and till (Figure 23). Two high samples are

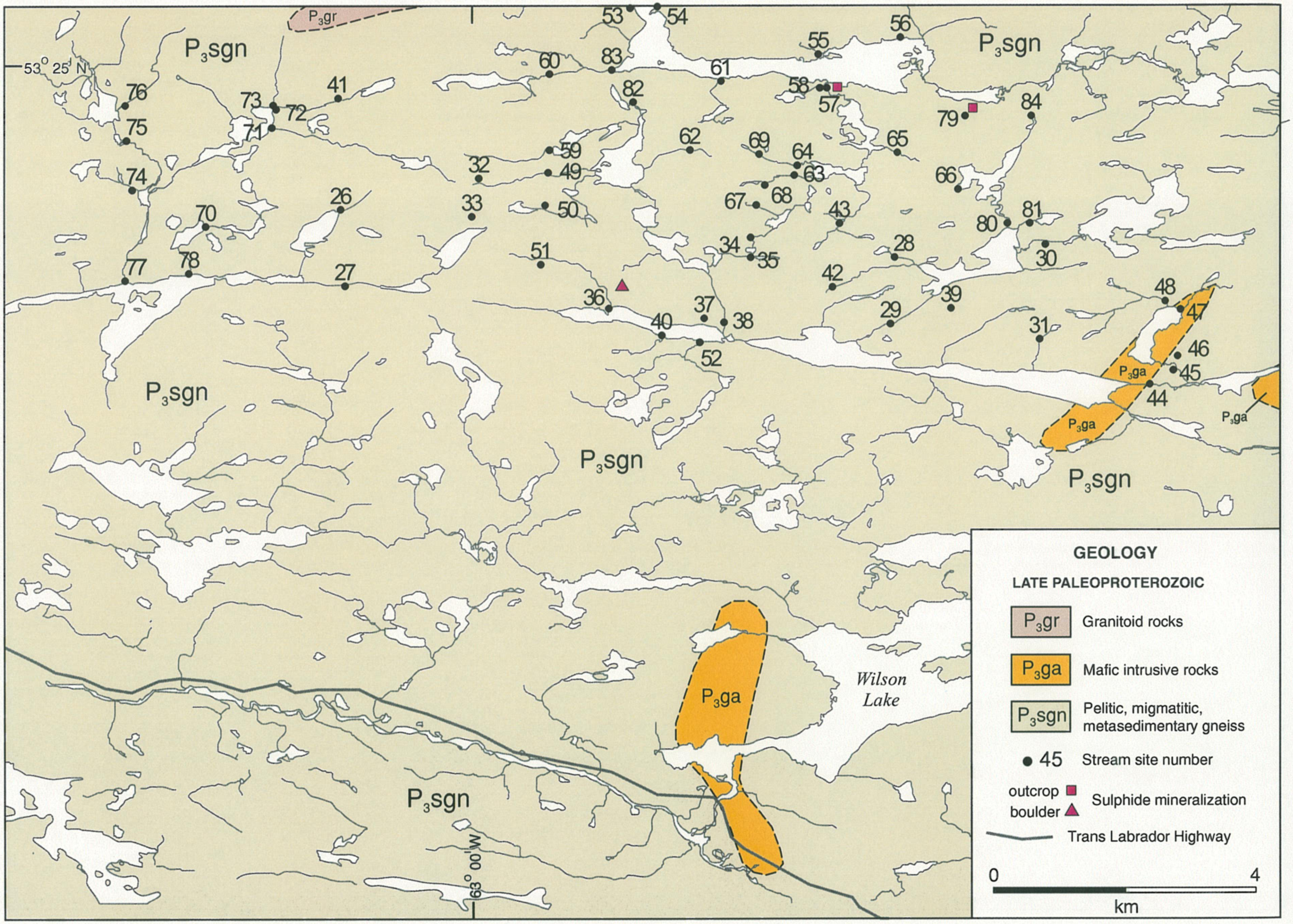


Figure 30. *Locations of stream-water samples, Wilson Lake area. (Note: to obtain full field number add 6287000)*

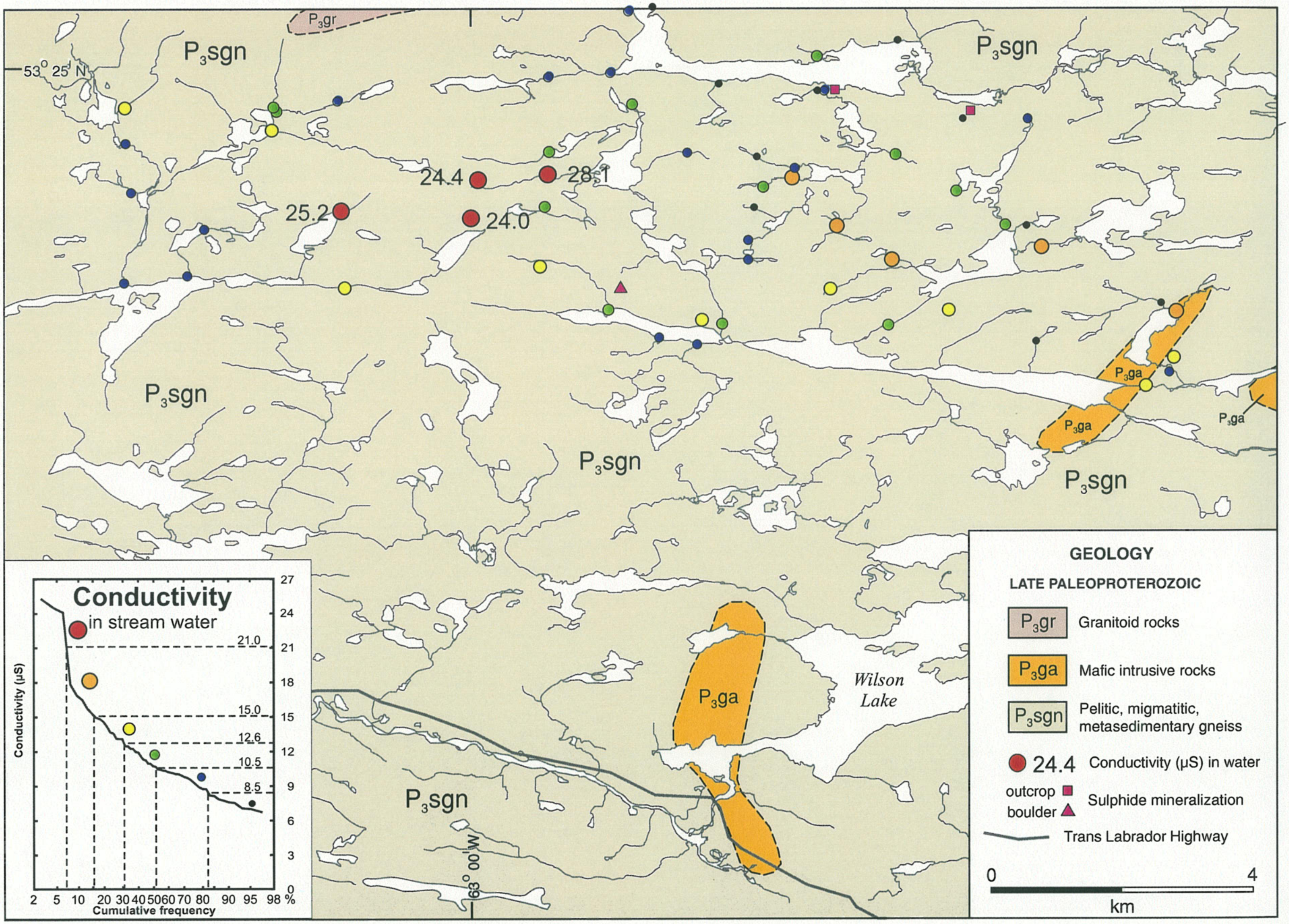


Figure 31. *Conductivity in stream water, Wilson Lake area.*

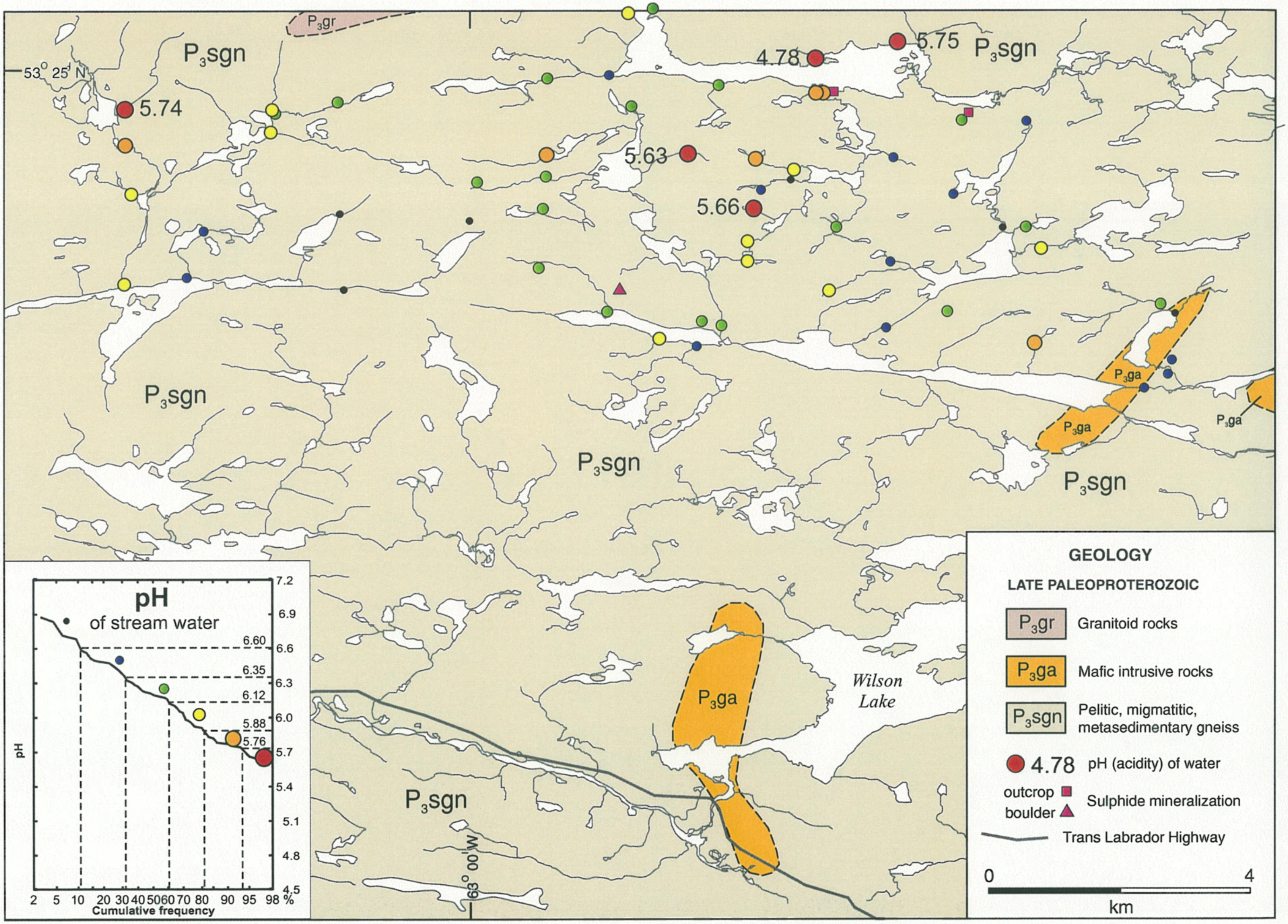


Figure 32. *pH of stream water, Wilson Lake area.*

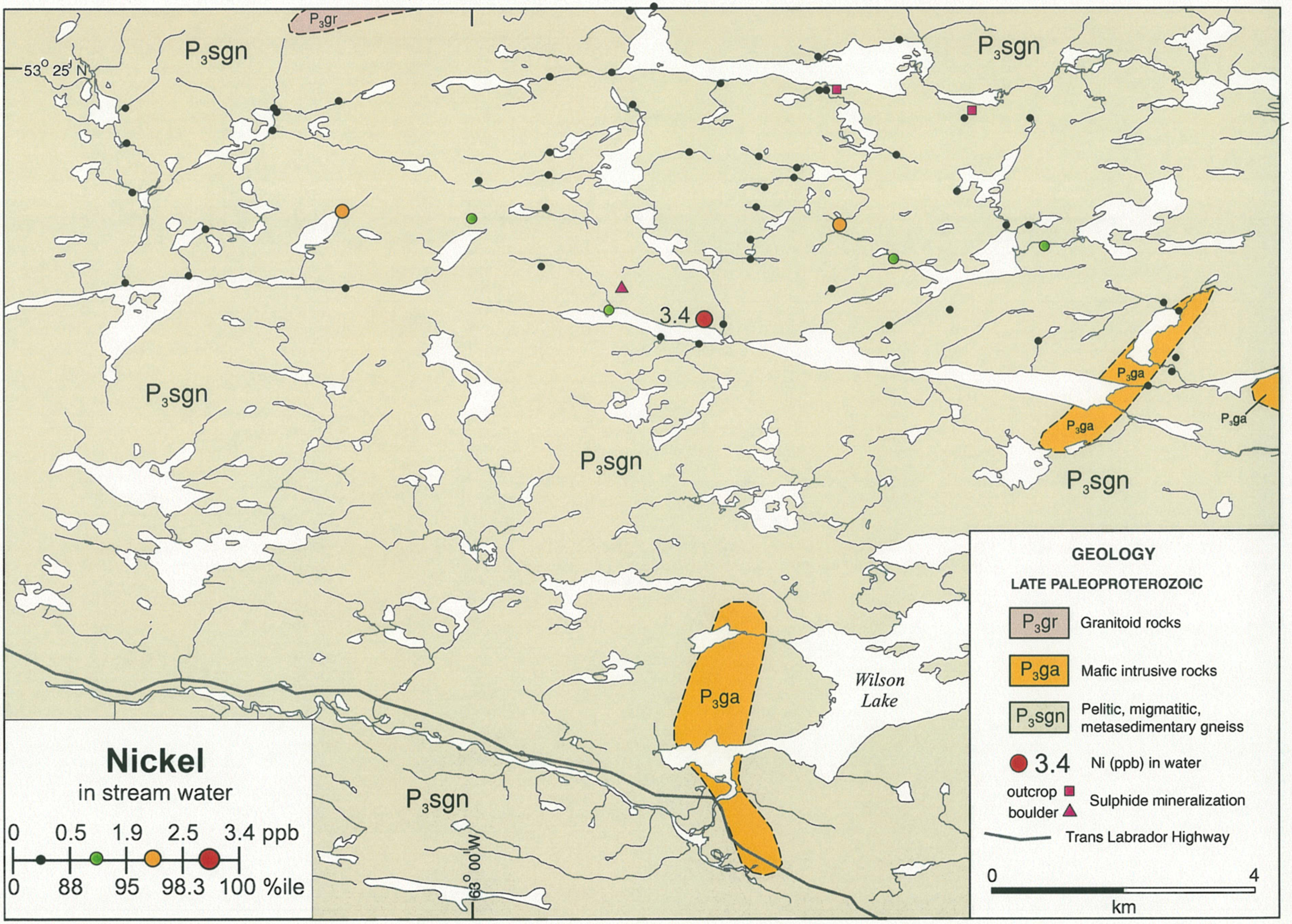


Figure 33. *Nickel in stream water, Wilson Lake area..*

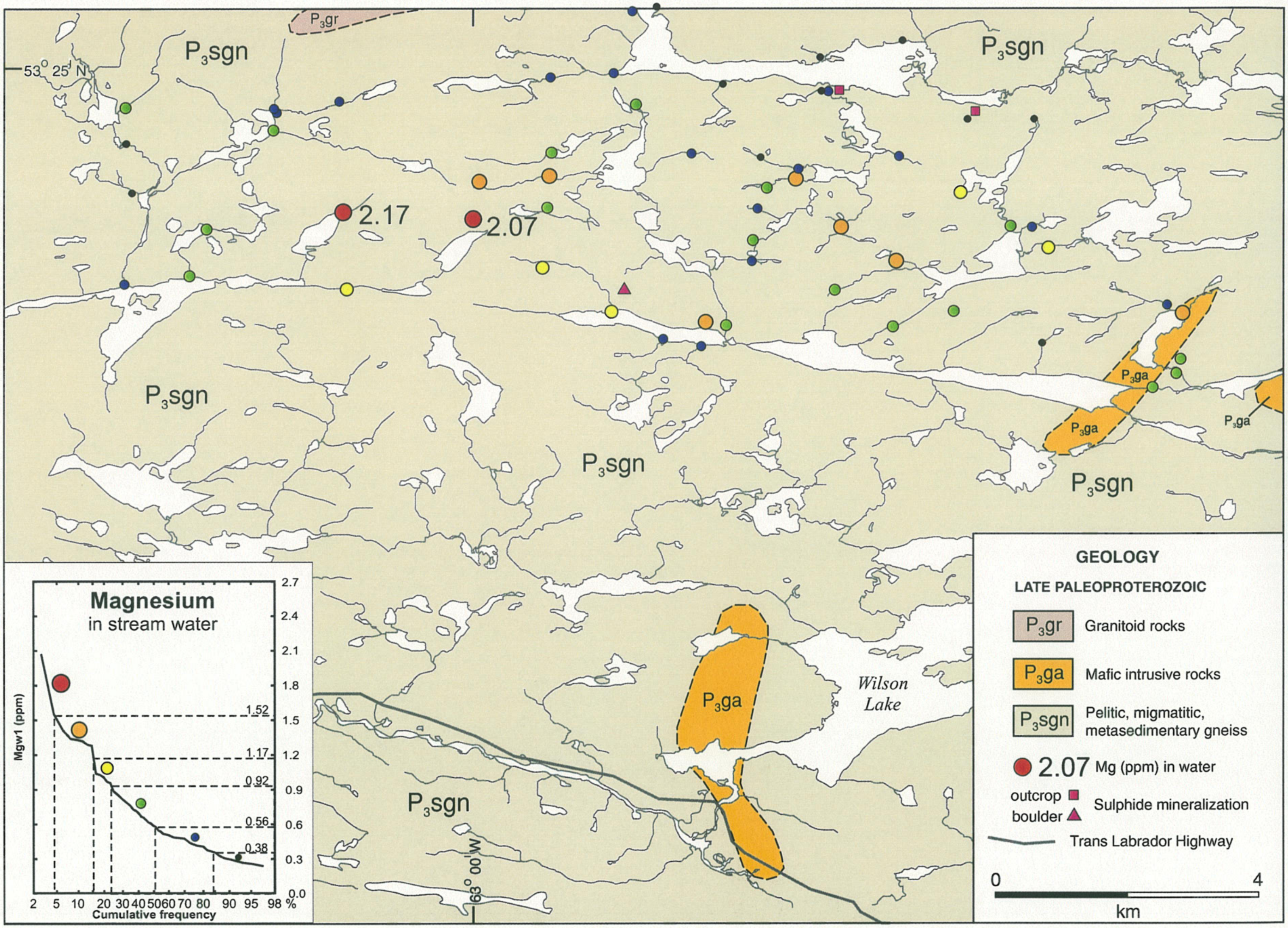


Figure 34. *Magnesium in stream water, Wilson Lake area.*

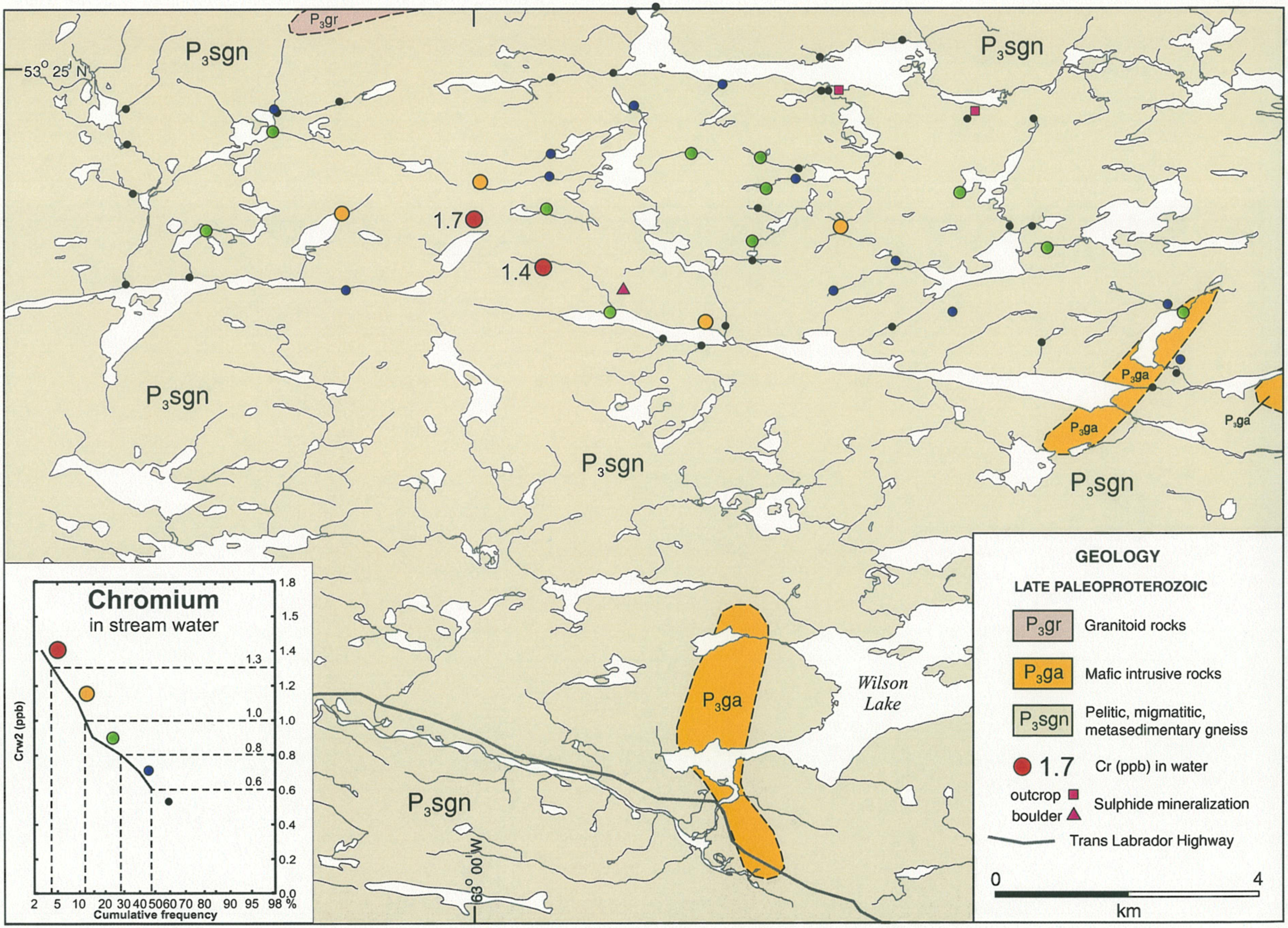


Figure 35. *Chromium in stream water, Wilson Lake area.*

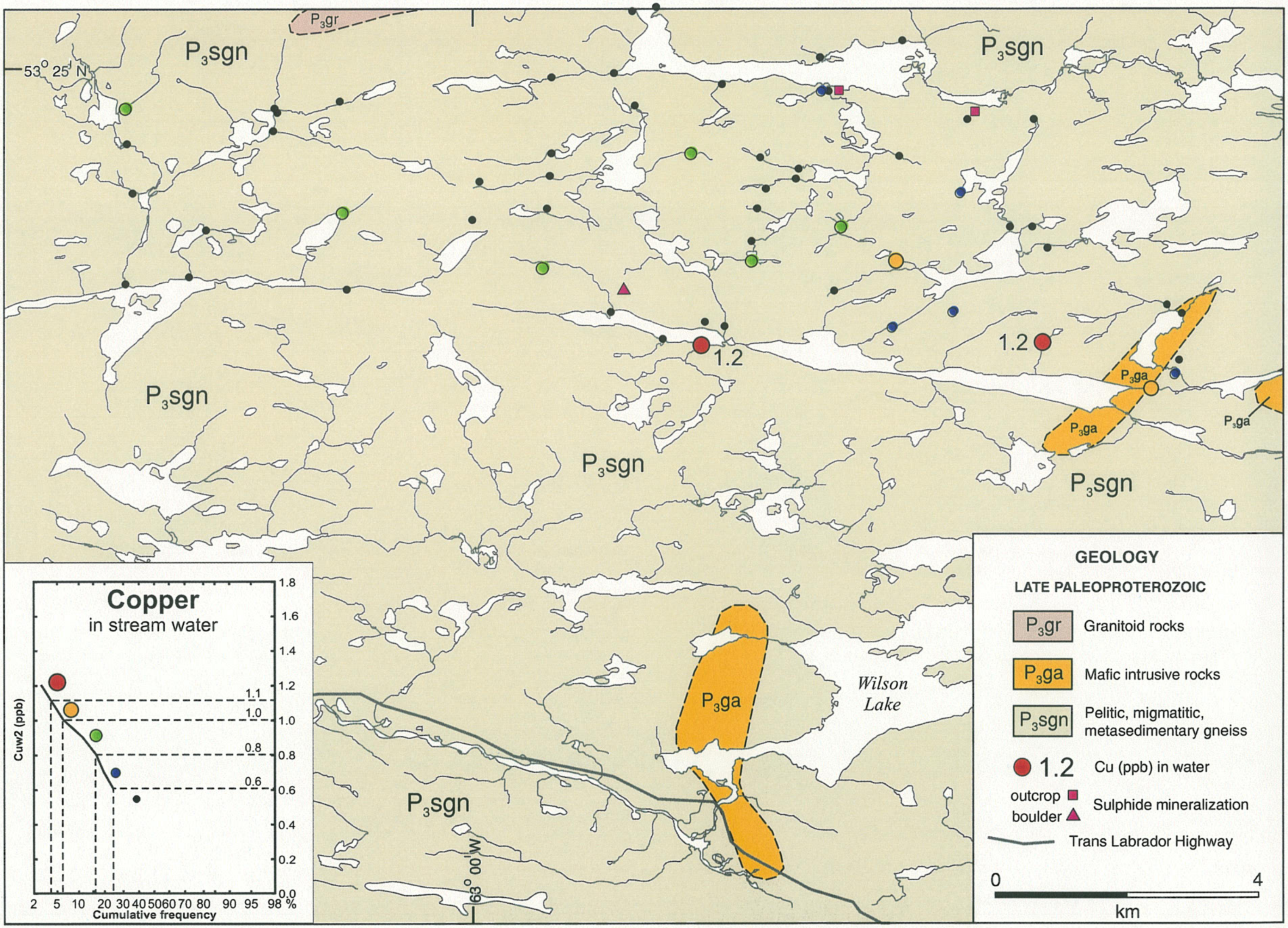


Figure 36. *Copper in stream water, Wilson Lake area.*

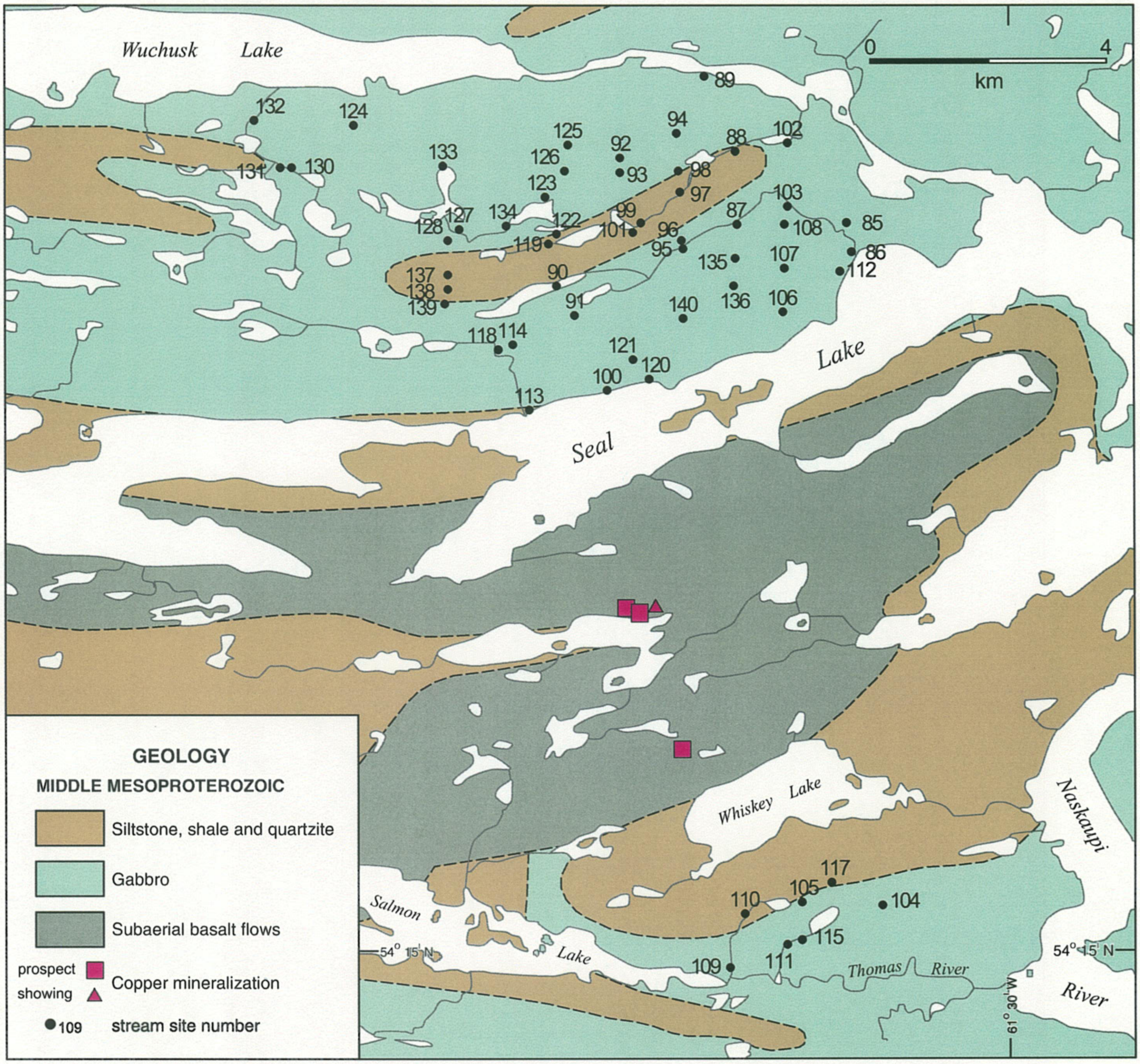


Figure 37. *Sample locations of stream-water samples, Seal Lake area.*
(Note: to obtain full field number add 6287000)

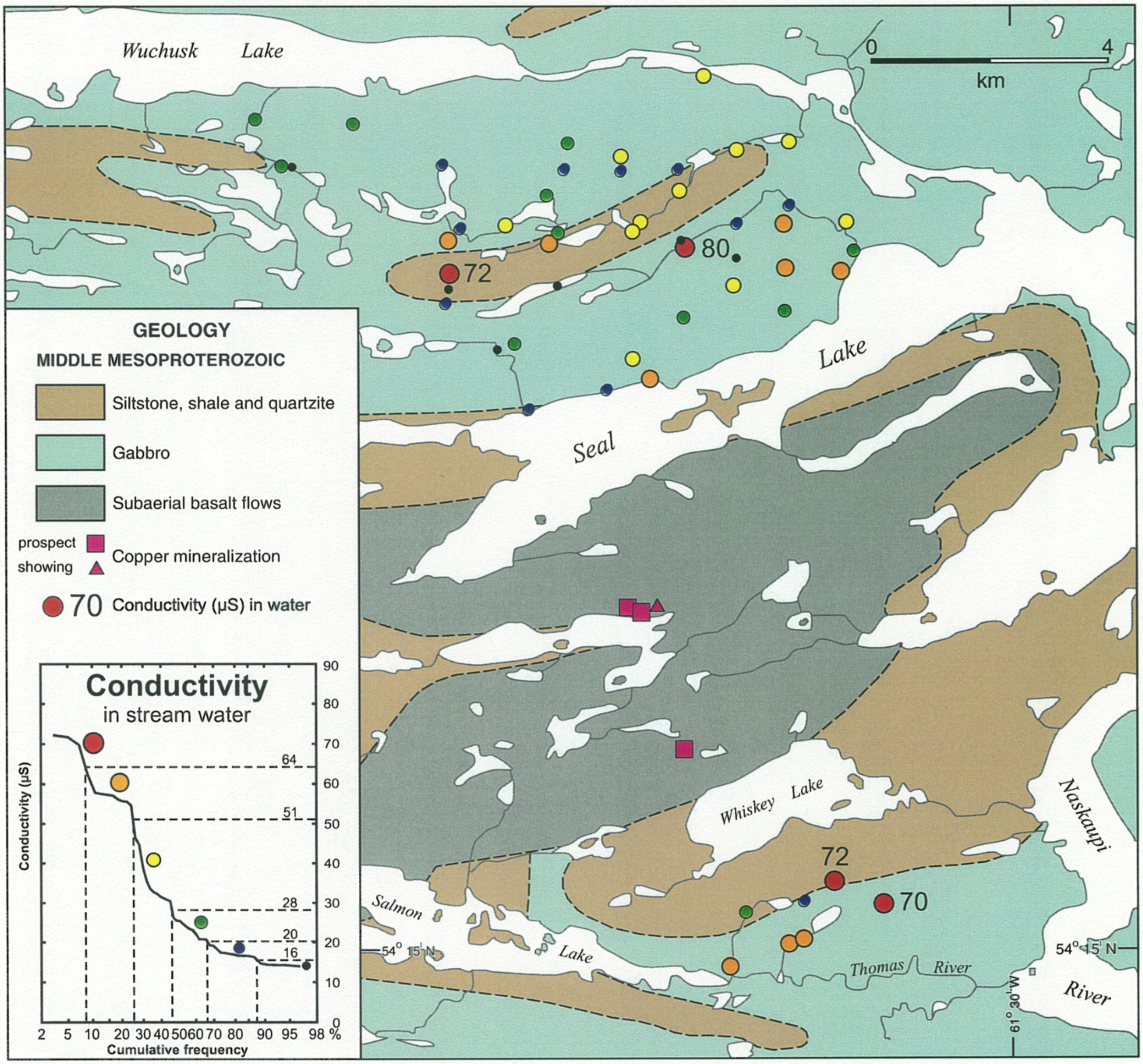


Figure 38. *Conductivity in stream water, Seal Lake area.*

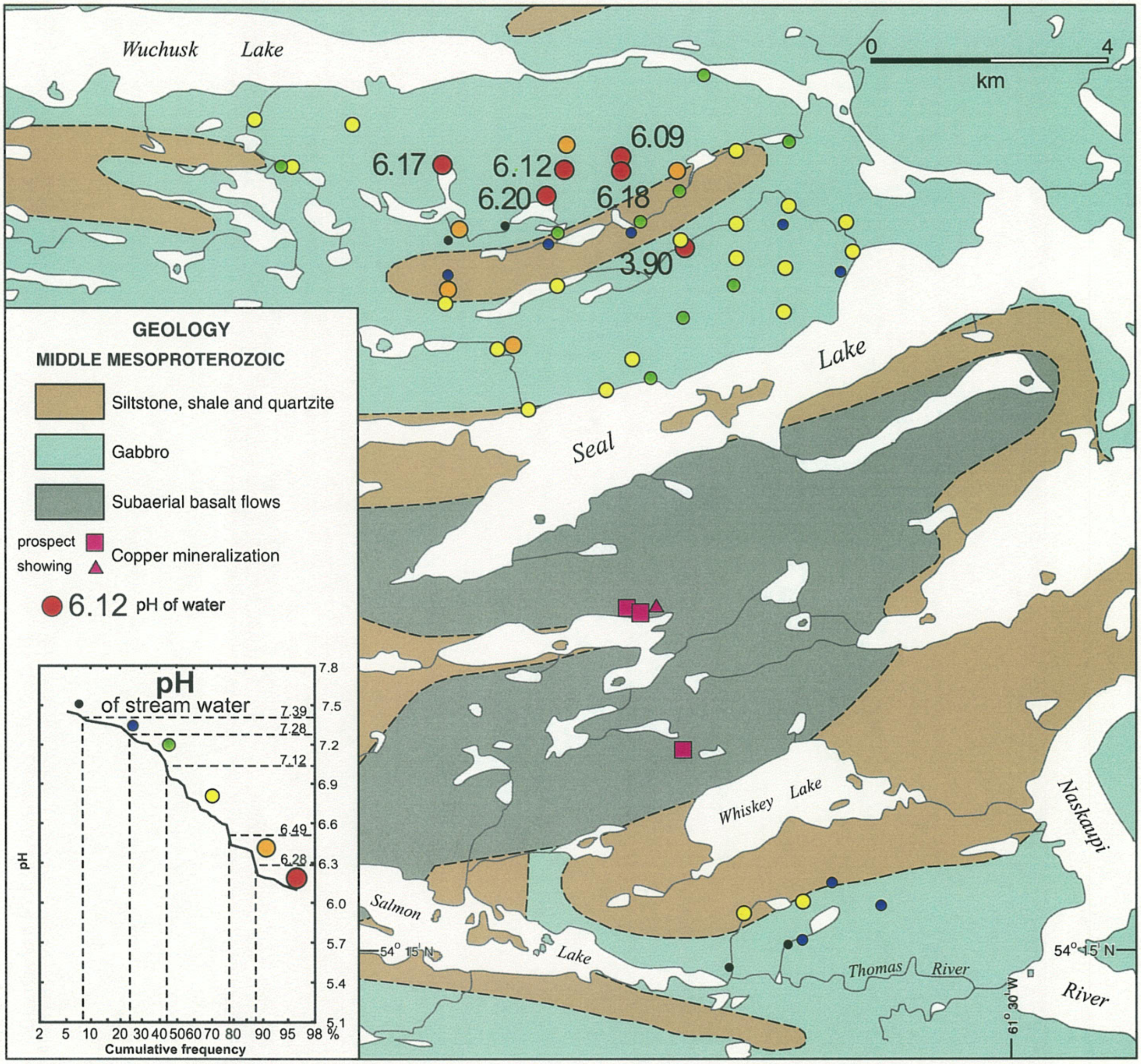


Figure 39. *pH of stream water, Seal Lake area.*

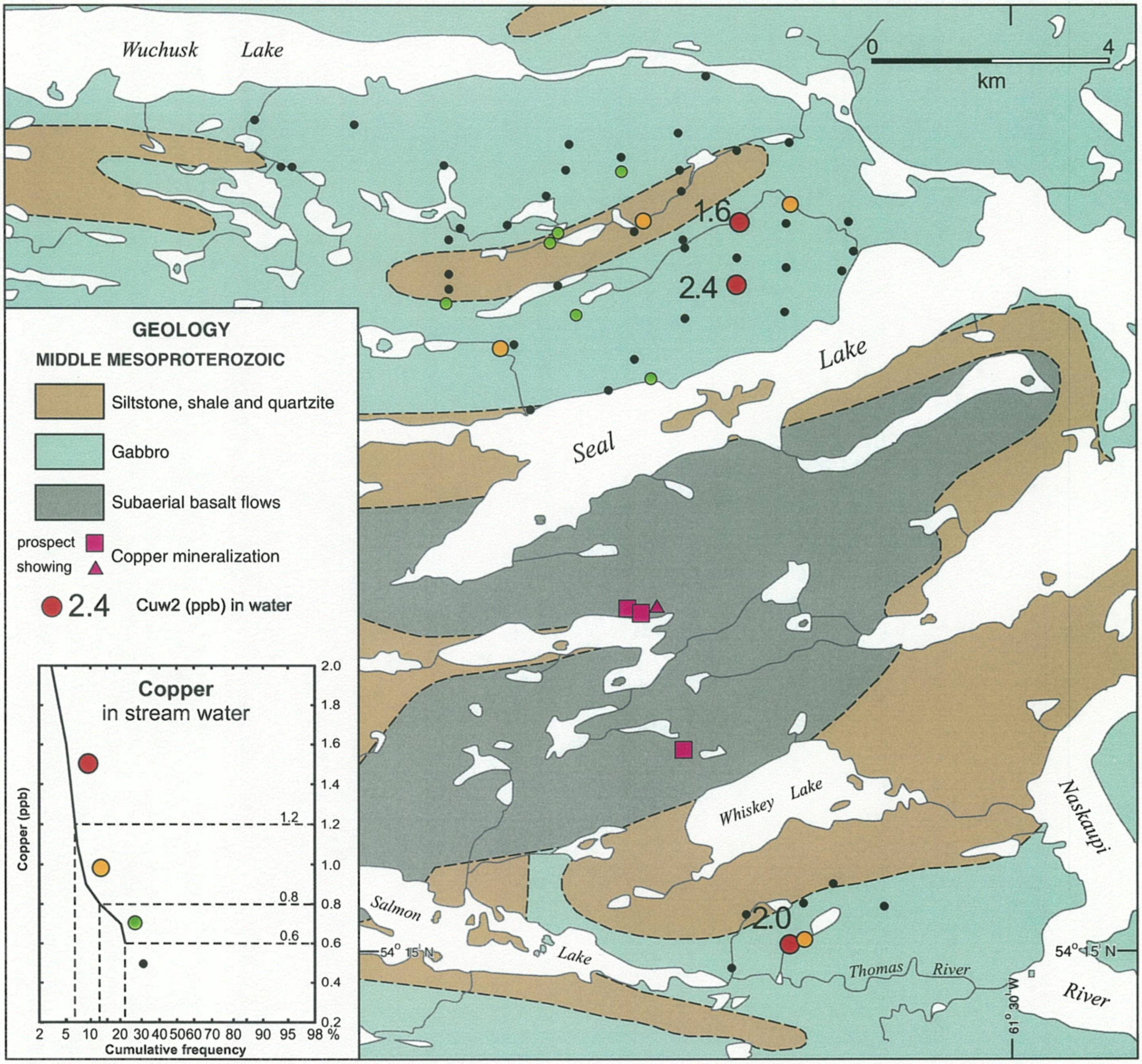


Figure 40. *Copper in stream water, Seal Lake area.*

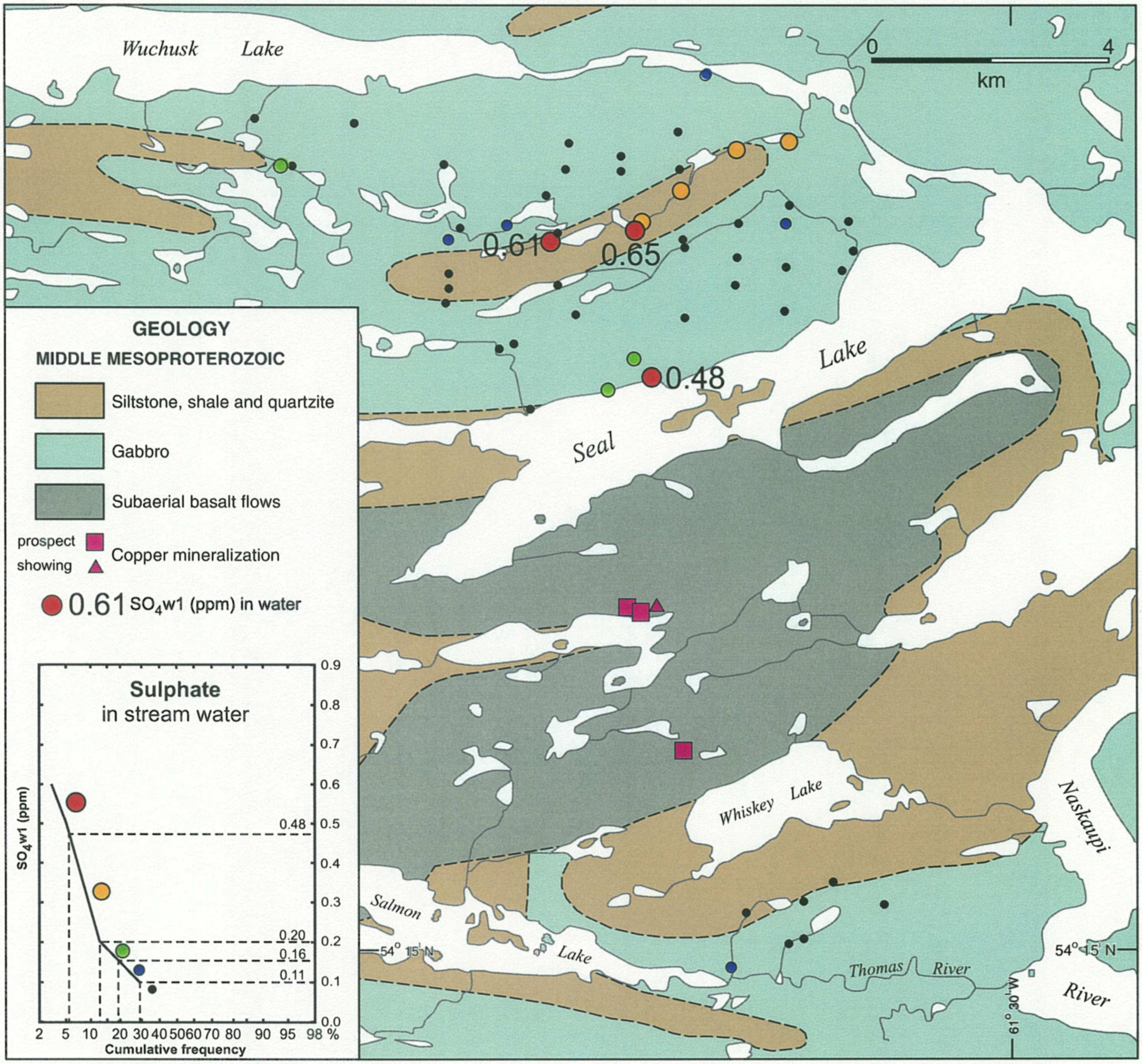


Figure 41. *Sulphate in stream water, Seal Lake area.*

also found in the stream draining a pond with extremely high Cu in lake sediment (1273 ppm, Figure 5) in the Thomas River area.

Sulphate. The distribution of SO_4w1 is shown in Figure 41. Except for one sample near the north shore of Seal Lake, all the high sulphate samples (>0.20 ppm) are from streams draining the sedimentary unit between Wuchusk and Seal Lakes. One of these samples (site #99) also has a high Cuw2 content.

CONCLUSIONS

1. On the basis of element correlation with depth and by comparison of B and C horizon analyses of site duplicates, the difference, for many elements, between concentrations in B horizon soils and C horizon tills is modest. This suggests that for these elements, results from B, B-C and C horizon samples may be compared directly. In particular, the ore-related elements Ni, Cr, Pb, Zn and As seem little affected by depth or horizon. Copper, most of the rare-earth elements and the "major" elements Ca, Na and K appear somewhat depleted in the B horizon relative to the C and results of sampling mixed populations should be evaluated carefully.

2. Oxide scavenging of base metals is not a problem for interpreting data from the Wilson Lake or Seal Lake surveys.

3. In the Wilson Lake survey, both till and stream-water geochemistry identify a strong, linear, Ni–Mg anomaly extending at least 14 km in an east-west direction, suggesting the presence of an unmapped mafic or ultramafic component of the paragneiss. The mineral potential of this feature is unknown. Two exposures of minor sulphide mineralization were discovered in the course of the survey.

4. In the Seal Lake area, a cluster of high Cu analyses from till in the central part of the main grid provides a focus for further exploration. Till results from the Thomas River grid are disappointingly low in view of the high Cu content in two small lakes within the grid, however, high values of Cu in stream water draining one of the lakes verifies the presence of a Cu anomaly. The source of these anomalies remains unknown.

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REFERENCES

Brummer, J.J. and Mann, E.L.
1961: Geology of the Seal Lake area, Labrador. Geological Society of America Bulletin, Volume 72, pages 1361-1382.

Callahan, J.E.
1980: Heavy minerals in stream sediments from Churchill Falls, Labrador - an aid in bedrock mapping. Canadian Journal of Earth Sciences, Volume17, No. 2, pages 244-253.

Friske, P.W.B., McCurdy, M.W., Gross, H., Day, C.J., Lynch, J.J. and Durham, C.C.
1993a: Regional lake sediment and water geochemical data, central Labrador (NTS 13E). Geological Survey of Canada, Open File 2474, 140 pages and 1 map.

1993b: Regional lake sediment and water geochemical data, central Labrador (NTS

13K). Geological Survey of Canada, Open File 2645, 136 pages and 1 map.

1993c: Regional lake sediment and water geochemical data, central Labrador (NTS 13L). Geological Survey of Canada, Open File 2647, 131 pages and 1 map.

Klassen, R.A. and Thompson, F.J.
1993: Glacial history, drift composition and mineral exploration, central Labrador. Geological Survey of Canada, Bulletin 435, 76 pages.

McConnell, J.W.
2000a: Geochemical mapping employing high-density lake sediment and water sampling over four prospective base-metal terranes in central Labrador (parts of NTS 13E, K, L, M and N). Newfoundland Department of Mines and Energy, Geological Survey, Open File LAB/1311, 99 pages.

2000b: Recent high-density lake sediment and water surveys in Central Labrador, *in* Current Research, Newfoundland Department of Mines and Energy, Geological Survey, Report 2000-1, pages 75-99.

Stapleton, G. and Smith, J.
2000: Mineral occurrence - mineral deposit data system (MODS). Geological Survey of Newfoundland and Labrador, http://www.geosurv.gov.nf.ca/mindep/mods.html

Thomas, A.
1993: Geology, Winokapau Lake area, Newfoundland. Map 1763A. Scale: 1:100 000. *In* Geology of the Winokapau Lake area, Grenville Province, central Labrador. Geological Survey of Canada, Paper 89-18, 86 pages, enclosure (map). GS# 013E/ 0048 (viewing only)

Thomas, A., Blomberg, P., Jackson, V. and Finn, G
2000: Bedrock geology map of the Wilson Lake area (13E/SE), Labrador. Map 2000-01. Scale: 1:100 000. Newfoundland and Labrador Department of Mines and Energy, Geological Survey, Open File 013E/0061. Computer generated. GS# 013E/0061

Wardle, R.J. (compiler)
1994: Geology of the North West River area, central Labrador, NTS 13 SW. Map 94-117. Scale: 1:500 000. Newfoundland Department of Mines and Energy, Geological Survey Branch. Computer generated. GS# LAB/1019

Wilton, D.H.C.
1996: Metallogeny of the Central Mineral Belt and adjacent Archean basement, Labrador. Geological Survey of Newfoundland and Labrador, Mineral Resource Report 8, 178 pages

Appendix 1. Soil and till data: locations and selected analyses

Field Number	UTM Zone	UTM Easting	UTM Northing	NTS	As1 ppm	Au1 ppb	Co2 ppm	Cr1 ppm	Cu2 ppm	F9 ppm	Fe2 Wt.%	Mg2 Wt.%	Ni2 ppm	Pb2 ppm	Sb1 ppm	Zn2 ppm
Wilson Lake area:																
6231520	20	498051	5916865	13E06	1.3	.5	17	220	18	381	4.18	1.62	57	8	.02	49
6231521	20	498045	5916650	13E06	.5	.5	12	110	19	409	4.13	1.14	27	9	.02	47
6231522	20	498026	5916528	13E06	1.3	.5	12	150	16	325	3.78	1.11	31	7	.02	45
6231523	20	498079	5916250	13E06	.9	.5	18	310	10	517	4.74	1.89	67	10	.02	57
6231524	20	498106	5916050	13E06	.2	1.0	19	370	19	452	4.65	2.08	90	10	.02	53
6231525	20	498100	5915850	13E06	.9	1.0	13	160	10	496	4.22	1.40	39	9	.02	48
6231526	20	497982	5915756	13E06	.2	.5	17	210	13	498	3.88	1.67	49	9	.10	56
6231527	20	497982	5915470	13E06	.2	.5	17	280	22	405	4.35	1.76	59	9	.20	49
6231528	20	499000	5915350	13E06	1.2	.5	20	340	11	455	4.68	1.93	60	11	.02	61
6231529	20	499028	5915550	13E06	.2	.5	14	190	15	375	4.43	1.33	39	10	.20	46
6231530	20	499071	5915664	13E06	.2	.5	13	200	12	425	3.86	1.37	39	10	.02	53
6231531	20	499009	5915875	13E06	.2	.5	15	240	15	396	4.33	1.51	71	10	.02	44
6231532	20	506074	5914364	13E07	.2	.5	15	340	7	404	5.69	1.37	50	11	.20	49
6231533	20	506075	5914300	13E07	.5	2.0	12	240	6	231	4.33	1.26	48	10	.40	35
6231534	20	506000	5914700	13E07	.2	.5	13	220	12	453	3.76	1.37	46	9	.02	47
6231535	20	507000	5915140	13E07	.2	.5	16	230	12	436	4.74	1.56	54	9	.20	48
6231536	20	507000	5914900	13E07	1.0	.5	14	190	10	233	4.77	1.28	36	8	.20	43
6231537	20	507000	5914700	13E07	.2	.5	14	170	13	357	4.51	1.31	39	9	.30	45
6231538	20	507000	5914550	13E07	.2	.5	14	210	11	350	4.66	1.40	45	7	.02	46
6231539	20	507000	5914550	13E07	.5	3.0	13	190	9	413	4.84	1.29	39	8	.02	44
6231540	20	506962	5914425	13E07	.9	.5	11	230	2	227	4.76	1.19	32	12	.02	38
6231541	20	498050	5917350	13E06	.7	.5	12	110	17	406	3.91	1.18	27	7	.20	46
6231542	20	498050	5917350	13E06	.8	.5	11	100	7	342	4.67	1.05	23	8	.02	43
6231543	20	498075	5917500	13E06	1.0	.5	12	130	15	393	4.11	1.14	29	9	.20	46
6231544	20	498075	5917500	13E06	.2	.5	12	230	12	397	3.49	1.49	55	6	.02	37
6231545	20	498100	5917700	13E06	.2	.5	17	180	31	476	4.34	1.51	48	9	.02	53
6231546	20	498100	5917700	13E06	.2	1.0	11	120	11	344	3.80	1.17	29	7	.02	47
6231547	20	498150	5917950	13E06	.2	.5	13	130	15	392	4.71	1.15	32	9	.20	48
6231548	20	498150	5917950	13E06	.2	.5	11	130	8	340	4.94	1.13	31	9	.10	43
6231549	20	499000	5918000	13E06	.8	.5	10	75	11	323	2.41	.96	24	8	.02	38
6231550	20	499050	5917800	13E06	.9	1.0	9	78	7	324	3.82	.85	18	9	.02	39
6231551	20	499050	5917575	13E06	.2	.5	13	140	30	424	4.22	1.23	34	8	.20	47
6231552	20	498925	5917300	13E06	.7	.5	11	100	10	337	4.38	1.03	21	9	.02	43
6231553	20	498900	5917100	13E06	.2	.5	13	120	14	354	4.94	1.14	26	14	.30	45
6231554	20	498950	5916700	13E06	.2	1.0	41	1700	3	352	7.04	5.30	255	6	.02	70
6231555	20	498825	5916500	13E06	.2	.5	15	210	15	441	4.28	1.48	61	9	.02	50
6231556	20	505207	5916372	13E07	.2	5.0	21	450	69	492	4.27	2.24	107	9	.02	56
6231557	20	505100	5916173	13E07	.2	.5	19	220	25	528	4.32	1.72	63	9	.20	57
6231558	20	505000	5916000	13E07	.2	1.0	29	860	34	691	4.46	3.47	232	9	.02	62
6231559	20	505025	5915838	13E07	1.3	2.0	25	820	18	496	4.88	2.80	152	9	.02	59
6231560	20	504998	5915637	13E07	.2	.5	17	460	16	517	4.73	1.94	79	10	.02	52
6231561	20	505089	5915363	13E07	1.2	.5	14	240	11	307	4.97	1.34	42	7	.02	44
6231562	20	505050	5915200	13E07	.2	.5	21	290	30	414	5.07	1.83	84	7	.02	50
6231563	20	505030	5915002	13E07	1.2	2.0	11	140	15	368	4.53	1.06	26	10	.02	45
6231564	20	505000	5914800	13E07	.2	.5	13	170	13	410	5.06	1.17	36	9	.02	42
6231565	20	510030	5913837	13E07	.2	.5	14	310	6	285	4.90	1.48	52	9	.02	44
6231566	20	510000	5914100	13E07	.2	.5	16	200	17	373	4.79	1.47	48	10	.02	47
6231567	20	510000	5914350	13E07	.2	.5	20	210	34	366	4.89	1.69	57	9	.20	57
6231568	20	510050	5914550	13E07	1.0	.5	19	260	14	444	5.01	1.77	60	8	.02	55
6231569	20	510076	5914700	13E07	1.0	.5	21	450	8	344	5.38	1.86	74	8	.02	52
6231570	20	510000	5915000	13E07	.8	.5	25	650	15	354	5.28	2.41	136	9	.02	53
6231571	20	510050	5915200	13E07	1.4	.5	12	270	12	379	4.16	1.27	49	6	.02	43
6231572	20	510075	5915440	13E07	.9	.5	20	440	14	399	4.88	2.13	102	8	.02	53
6231573	20	510104	5915639	13E07	1.0	.5	17	390	18	378	4.61	1.74	77	8	.02	51
6231574	20	509050	5915400	13E07	1.4	.5	30	750	16	496	5.34	3.12	213	10	.02	65
6231575	20	509189	5915283	13E07	.2	.5	25	780	59	392	5.22	2.80	166	8	.02	56
6231576	20	500100	5916900	13E07	.2	.5	14	120	16	408	4.04	1.19	27	8	.02	50
6231577	20	500150	5916700	13E07	.2	.5	8	90	2	285	2.30	.84	16	8	.02	37
6231578	20	499950	5916500	13E07	1.5	2.0	20	370	11	485	4.33	2.03	82	9	.20	51
6231579	20	499950	5916150	13E07	.8	.5	26	550	6	432	4.32	2.10	168	7	.02	60
6231580	20	509077	5914500	13E07	.2	.5	7	80	1	221	2.26	.82	14	9	.02	38
6231581	20	508000	5914875	13E07	1.4	.5	16	410	9	392	3.93	1.81	88	8	.20	44

Appendix 1. Continued

Field Number	UTM Zone	UTM Easting	UTM Northing	NTS	As1 ppm	Au1 ppb	Co2 ppm	Cr1 ppm	Cu2 ppm	F9 ppm	Fe2 Wt.%	Mg2 Wt.%	Ni2 ppm	Pb2 ppm	Sb1 ppm	Zn2 ppm
6231582	20	507900	5914675	13E07	.2	.5	8	450	1	97	3.02	.94	24	16	.20	33
6231583	20	507900	5915102	13E07	.2	.5	15	320	64	371	4.88	1.56	55	10	.02	48
6231584	20	507978	5915050	13E07	1.4	.5	9	260	1	120	2.81	1.03	28	15	.20	30
6231585	20	508061	5914850	13E07	.2	1.0	14	200	13	408	4.48	1.47	41	8	.10	51
6231586	20	508050	5914200	13E07	.2	.5	15	350	11	247	5.53	1.43	52	7	.10	44
6231587	20	500050	5915850	13E07	.2	.5	24	900	10	575	4.46	2.46	106	9	.10	63
6231588	20	503050	5915350	13E07	.2	.5	17	160	18	494	4.43	1.39	49	14	.10	48
6231589	20	503000	5915150	13E07	.2	2.0	15	330	7	380	3.73	1.74	85	10	.20	38
6231590	20	503000	5914950	13E07	.9	.5	13	390	5	410	3.45	1.34	57	10	.02	44
6231591	20	503000	5914750	13E07	.2	.5	19	460	21	484	4.30	2.17	110	10	.20	50
6231592	20	504000	5914550	13E07	.2	2.0	22	530	24	388	5.23	2.36	115	11	.20	48
6231593	20	504000	5914750	13E07	.2	2.0	21	520	13	460	4.46	2.26	130	9	.02	49
6231594	20	502000	5916575	13E07	.2	4.0	15	180	20	484	4.81	1.40	45	11	.20	46
6231595	20	502000	5916350	13E07	.2	4.0	25	990	17	554	4.74	2.61	162	11	.20	51
6231596	20	502000	5916200	13E07	.2	.5	14	140	17	439	4.25	1.22	36	9	.02	47
6231597	20	502000	5916000	13E07	1.6	.5	13	150	22	412	3.26	1.30	38	12	.02	41
6231598	20	502000	5915800	13E07	1.6	.5	19	230	15	523	3.18	1.57	70	9	.02	51
6231599	20	502000	5915600	13E07	.2	.5	17	270	20	491	4.35	1.64	63	10	.02	48
6231600	20	501010	5917050	13E07	.9	.5	20	210	13	528	3.72	1.68	57	8	.02	56
6231601	20	501050	5916900	13E07	.2	1.0	14	150	16	406	4.44	1.28	37	12	.20	44
6231602	20	501000	5916700	13E07	.2	2.0	15	250	12	464	4.57	1.54	51	10	.02	47
6231603	20	500995	5916500	13E07	.2	3.0	16	180	15	461	4.30	1.42	75	10	.40	46
6231604	20	501000	5916150	13E07	.2	2.0	22	370	12	503	4.34	2.13	91	9	.02	50
6231605	20	501025	5915950	13E07	1.0	.5	17	250	16	522	4.27	1.70	60	10	.02	49
6231606	20	501000	5915750	13E07	.9	.5	14	190	16	405	3.99	1.31	44	7	.30	46
6231607	20	500950	5915350	13E07	1.1	.5	20	930	6	538	5.24	2.15	68	10	.20	62
6231608	20	501025	5915150	13E07	1.3	.5	18	370	23	538	4.59	2.00	69	10	.20	51
6231609	20	500950	5915050	13E07	.2	.5	18	310	22	410	4.52	1.94	60	9	.02	53
6231610	20	505975	5915810	13E07	1.0	.5	21	580	16	506	4.58	2.39	125	10	.02	50
6231611	20	506040	5915642	13E07	.9	1.0	16	390	11	285	3.71	1.88	91	9	.02	42
6231612	20	506010	5915413	13E07	1.0	.5	13	280	7	285	4.74	1.33	46	8	.02	38
6231613	20	506042	5915223	13E07	.6	5.0	19	320	53	326	5.54	1.77	66	9	.20	50
6231614	20	505974	5915039	13E07	.2	.5	19	230	15	360	4.90	1.62	61	9	.02	66
6231615	20	506005	5914917	13E07	.2	.5	14	210	14	6.93	1.21	32	9	.02	48	
6231616	20	509000	5914200	13E07	.2	3.0	20	360	13	495	4.76	2.07	77	9	.02	56
6231617	20	508767	5914360	13E07	.2	3.0	14	250	1	135	3.80	1.53	40	13	.20	42
6231618	20	503984	5915984	13E07	1.5	4.0	8	440	40	238	4.42	.81	35	2	.02	28
6231619	20	504000	5915800	13E07	.2	.5	15	290	15	418	4.07	1.58	57	10	.20	46
6231620	20	504000	5915500	13E07	1.2	.5	17	250	12	291	4.98	1.51	51	9	.02	46
6231621	20	504013	5915308	13E07	1.9	.5	15	210	15	380	4.01	1.54	50	8	.02	46
6231622	20	504003	5915118	13E07	1.8	.5	10	110	9	337	3.99	1.01	23	9	.30	37
6231623	20	503980	5914904	13E07	.2	.5	12	170	12	402	4.13	1.21	37	10	.20	42
6231624	20	503980	5914800	13E07	.2	.5	15	300	8	352	4.37	1.55	83	10	.20	40
6231625	20	500022	5917950	13E07	1.5	6.0	17	150	25	554	4.31	1.55	40	8	.20	57
6231626	20	500010	5917800	13E07	1.5	.5	15	150	19	419	4.26	1.35	35	13	.02	47
6231627	20	500010	5917800	13E07	1.7	.5	16	150	12	413	4.33	1.38	36	13	.02	56
6231628	20	499999	5917595	13E07	1.9	.5	14	150	16	415	4.56	1.34	37	15	.20	46
6231629	20	499999	5917595	13E07	1.8	.5	13	170	10	319	4.21	1.24	33	15	.02	43
6231630	20	500008	5917225	13E07	1.9	.5	14	470	16	388	4.11	1.29	36	15	.02	42
6231631	20	500100	5915606	13E07	2.5	.5	21	210	31	587	4.59	2.44	114	15	.30	62
6231632	20	500000	5915350	13E07	1.2	.5	18	260	14	566	4.18	1.71	49	15	.02	62
6231633	20	500050	5915100	13E07	1.0	.5	16	480	21	429	4.49	1.75	52	14	.02	49
6231634	20	502000	5915100	13E07	1.0	.5	17	730	5	430	5.41	1.76	57	15	.30	55
6231635	20	502000	5915300	13E07	1.8	.5	21	610	6	402	6.82	2.21	133	14	.02	52
6231636	20	502000	5915500	13E07	.2	.5	20	170	3	481	7.14	2.04	65	14	.20	66
6231637	20	500000	5917400	13E07	1.3	.5	13	170	19	410	4.21	1.27	32	14	.50	45
6231638	20	500000	5917400	13E07	2.5	.5	10	180	7	334	4.30	1.10	28	14	.02	38
6231639	20	501082	5917250	13E07	1.1	.5	15	160	22	433	4.18	1.46	42	14	.20	50
6231640	20	501082	5917250	13E07	.2	.5	13	180	10	396	4.45	1.29	34	13	.02	45
6231641	20	501000	5917485	13E07	.2	4.0	14	140	13	372	4.32	1.24	31	15	.02	46
6231642	20	500974	5917713	13E07	.9	.5	13	110	18	404	4.08	1.08	25	14	.30	48
6231643	20	501025	5917960	13E07	.2	.5	15	150	16	319	5.32	1.19	28	14	.02	47
6231644	20	501070	5918205	13E07	.2	.5	13	160	8	327	4.18	1.28	39	14	.10	38

Appendix 1. Continued

Field Number	UTM Zone	UTM Easting	UTM Northing	NTS	As1 ppm	Au1 ppb	Co2 ppm	Cr1 ppm	Cu2 ppm	F9 ppm	Fe2 Wt.%	Mg2 Wt.%	Ni2 ppm	Pb2 ppm	Sb1 ppm	Zn2 ppm
6231645	20	503035	5915706	13E07	.2	.5	17	330	20	362	4.37	1.73	76	15	.02	47
6231646	20	503035	5915722	13E07	.8	.5	15	340	18	315	4.61	1.65	69	14	.02	43
6231647	20	503098	5915932	13E07	.2	.5	14	310	11	348	4.50	1.52	51	15	.02	42
6231648	20	503057	5916127	13E07	.2	.5	26	1800	11	321	5.23	3.51	252	15	.02	46
6231649	20	503073	5916363	13E07	.2	.5	18	280	40	596	4.51	1.72	71	16	.20	53
6231650	20	503100	5916500	13E07	.2	2.0	18	220	35	597	4.59	1.71	55	15	.40	61
6231651	20	503100	5916500	13E07	.2	.5	13	140	17	400	4.76	1.24	33	14	.20	45
6231652	20	503127	5916726	13E07	.2	4.0	18	240	14	382	4.91	1.63	63	14	.20	49
6231653	20	503104	5916911	13E07	.9	3.0	16	150	21	504	4.01	1.40	44	15	.40	51
6231654	20	503096	5917355	13E07	.2	.5	16	190	20	324	4.84	1.39	40	13	.02	47
6231655	20	503030	5917555	13E07	1.2	2.0	18	200	35	479	5.19	1.64	44	13	.02	61
6231656	20	503039	5917753	13E07	.6	.5	21	140	105	609	4.79	1.62	40	13	.02	68
6231657	20	503034	5917990	13E07	.2	2.0	17	180	17	398	4.03	1.47	43	14	.02	52
6231658	20	503038	5918214	13E07	.2	.5	15	140	18	425	4.18	1.33	35	14	.20	52
6231659	20	504006	5916210	13E07	.9	.5	18	300	20	567	4.66	1.90	68	15	.02	55
6231660	20	504000	5916350	13E07	.2	.5	15	160	19	471	4.51	1.39	41	15	.02	50
6231661	20	504050	5916550	13E07	1.0	.5	12	110	16	319	2.74	1.13	34	15	.02	36
6231662	20	504050	5916550	13E07	.2	.5	13	150	15	365	4.21	1.21	36	13	.20	41
6231663	20	504043	5916790	13E07	1.3	.5	14	160	100	483	4.30	1.42	39	14	.02	51
6231664	20	503997	5917037	13E07	.2	.5	18	200	24	493	4.64	1.67	52	14	.20	58
6231665	20	504011	5917205	13E07	1.6	6.0	18	180	39	506	4.65	1.55	45	13	.02	59
6231666	20	503977	5917468	13E07	.2	.5	17	170	25	465	5.43	1.46	39	13	.02	57
6231667	20	503985	5917626	13E07	.2	.5	18	180	42	533	4.82	1.63	45	13	.02	63
6231668	20	503956	5917780	13E07	.2	1.0	17	190	21	511	4.53	1.48	41	15	.20	61
6231669	20	503975	5918060	13E07	.2	.5	15	140	19	459	4.29	1.23	32	15	.02	51
6231670	20	496000	5916900	13E06	.2	.5	10	140	11	362	4.06	1.07	28	14	.20	38
6231671	20	496000	5916650	13E06	2.1	.5	24	410	13	598	5.01	2.57	106	17	.20	66
6231672	20	496000	5916500	13E06	.2	.5	15	200	17	542	4.08	1.50	44	15	.02	51
6231673	20	496000	5916300	13E06	.2	.5	13	180	11	377	4.42	1.34	39	14	.20	43
6231674	20	496000	5915900	13E06	1.1	.5	12	140	11	384	3.96	1.19	31	14	.02	44
6231675	20	496000	5915675	13E06	.2	.5	10	110	11	372	3.75	.97	22	14	.02	39
6231676	20	496000	5915475	13E06	1.0	.5	11	120	14	368	4.08	1.09	26	15	.02	42
6231677	20	497000	5915200	13E06	.2	.5	12	140	12	401	4.01	1.18	28	15	.20	51
6231678	20	497050	5915500	13E06	1.1	1.0	12	140	7	444	3.85	1.26	29	15	.02	50
6231679	20	497000	5915675	13E06	1.0	.5	15	200	7	436	4.62	1.54	34	14	.02	60
6231680	20	497000	5915850	13E06	.2	1.0	11	110	6	313	6.01	1.05	20	15	.02	43
6231681	20	497000	5916200	13E06	.2	.5	11	89	13	414	3.69	1.01	24	14	.20	43
6231682	20	497000	5916500	13E06	1.0	.5	11	130	13	412	3.95	1.14	32	14	.20	44
6231683	20	497000	5916750	13E06	.2	.5	8	250	2	132	2.63	.99	28	17	.10	26
6231684	20	497000	5916950	13E06	1.1	4.0	16	220	14	367	4.67	1.48	57	15	.02	45
6231685	20	497000	5917200	13E06	.2	.5	41	620	11	410	5.74	2.55	90	14	.02	77
6231686	20	497100	5917450	13E06	.2	.5	11	120	11	436	4.84	1.05	26	15	.20	45
6231687	20	497000	5917900	13E06	1.7	3.0	7	68	20	246	3.45	.77	12	11	.02	36
6231688	20	496050	5918100	13E06	2.1	.5	7	120	4	215	2.68	.82	20	16	.20	31
6231689	20	496050	5917800	13E06	.2	2.0	8	82	10	334	3.92	.81	17	14	.02	36
6231690	20	496000	5917550	13E06	.2	.5	11	100	4	343	4.66	.87	20	14	.20	38
6231691	20	496000	5917300	13E06	.2	.5	11	110	13	436	3.83	1.02	24	15	.20	42
6231692	20	495000	5915400	13E06	1.7	.5	19	330	6	466	10.81	1.78	55	13	.20	64
6231693	20	495000	5917950	13E06	.2	.5	10	85	9	347	3.70	.83	18	15	.30	35
6231694	20	495000	5917700	13E06	.2	.5	9	80	1	285	3.61	.88	15	17	.20	43
6231695	20	495000	5917475	13E06	.2	.5	9	120	9	229	3.47	.93	23	17	.02	35
6231696	20	495000	5917100	13E06	.2	.5	7	88	5	285	3.62	.71	15	13	.30	30
6231697	20	495000	5916900	13E06	.2	.5	13	150	14	383	3.91	1.22	32	14	.20	42
6231698	20	495100	5916450	13E06	.2	.5	14	130	1	552	5.04	1.26	28	17	.02	68
6231699	20	495150	5916200	13E06	.2	.5	7	100	2	185	2.99	.70	15	17	.02	30
6231700	20	495100	5915900	13E06	.2	.5	10	180	7	312	4.65	1.04	27	14	.20	39
6231701	20	505000	5916700	13E07	2.0	.5	31	820	21	621	5.08	3.26	183	13	.02	57
6231702	20	505000	5916450	13E07	1.3	.5	19	430	41	519	4.55	2.00	101	14	.30	51
6231703	20	505000	5917100	13E07	.2	.5	16	150	14	559	4.61	1.34	36	12	.02	56
6231704	20	505000	5917275	13E07	.2	3.0	13	130	6	302	4.53	1.11	26	13	.02	43
6231705	20	505000	5917275	13E07	.9	1.0	8	65	3	330	2.59	.85	12	12	.02	39
6231706	20	505000	5917475	13E07	1.8	.5	14	170	11	384	4.48	1.30	33	13	.02	49
6231707	20	505000	5917700	13E07	.2	.5	15	160	26	490	4.35	1.38	38	15	.20	52

Appendix 1. Continued

Field Number	UTM Zone	UTM Easting	UTM Northing	NTS	As1 ppm	Au1 ppb	Co2 ppm	Cr1 ppm	Cu2 ppm	F9 ppm	Fe2 Wt.%	Mg2 Wt.%	Ni2 ppm	Pb2 ppm	Sb1 ppm	Zn2 ppm
6231708	20	505000	5917950	13E07	.2	.5	10	110	29	358	3.79	.98	22	14	.10	38
6231709	20	507000	5916500	13E07	.2	.5	18	260	22	441	4.50	1.66	59	12	.02	53
6231710	20	507005	5916350	13E07	.2	.5	31	700	59	631	4.90	3.17	220	13	.02	63
6231711	20	506990	5916100	13E07	.8	.5	20	440	21	522	4.36	2.04	98	11	.02	50
6231712	20	507000	5915850	13E07	.2	3.0	16	290	7	475	4.20	1.68	56	14	.20	53
6231713	20	507000	5917150	13E07	1.1	.5	16	150	17	380	5.11	1.28	36	14	.02	48
6231714	20	507000	5917375	13E07	.2	.5	14	120	16	430	4.46	1.25	32	14	.20	50
6231715	20	507000	5917625	13E07	.2	.5	14	140	6	372	4.22	1.26	36	13	.20	54
6231716	20	508000	5916225	13E07	2.1	.5	18	210	19	619	4.20	1.81	59	14	.20	63
6231717	20	508000	5916425	13E07	1.7	.5	29	630	26	680	4.56	3.05	154	12	.02	61
6231718	20	508000	5916600	13E07	.2	2.0	18	240	18	567	5.12	1.66	50	13	.02	58
6231719	20	508000	5916850	13E07	1.1	.5	17	140	20	573	4.13	1.37	37	13	.30	56
6231720	20	502100	5917300	13E07	.2	3.0	10	150	9	289	3.56	1.08	25	15	.20	39
6231721	20	502050	5917500	13E07	1.2	.5	10	160	16	362	3.98	1.00	22	13	.02	40
6231722	20	508000	5917910	13E07	1.5	.5	12	93	1	474	4.04	1.13	19	15	.02	61
6231723	20	507950	5917320	13E07	1.5	.5	10	120	6	328	4.07	.91	27	14	.30	47
6231724	20	508000	5917000	13E07	.2	.5	14	140	11	496	4.37	1.28	33	14	.02	52
6231725	20	502000	5917700	13E07	.2	.5	11	130	9	367	4.38	1.02	23	14	.02	39
6231726	20	502000	5918050	13E07	1.0	.5	11	150	12	344	4.58	1.10	29	14	.20	40
6231731	20	506080	5916197	13E07	3.2	3.0	21	230	33	503	4.66	1.90	89	8	.02	63
6231732	20	506001	5916399	13E07	.2	.5	20	320	30	566	4.43	1.89	85	10	.02	62
6231733	20	506041	5916653	13E07	.2	.5	21	260	32	504	4.64	1.78	68	7	.20	56
6231734	20	506074	5916838	13E07	.2	.5	16	210	13	481	4.21	1.33	42	5	.02	48
6231735	20	506072	5917040	13E07	.2	1.0	36	380	6	709	5.94	2.63	82	1	.30	59
6231736	20	506050	5917250	13E07	.2	.5	17	160	20	569	4.58	1.52	41	9	.02	59
6231737	20	506151	5917357	13E07	.2	4.0	16	130	28	595	4.12	1.44	37	7	.02	57
6231738	20	506073	5917637	13E07	.2	.5	11	130	14	373	3.65	1.08	27	7	.20	40
6231739	20	506100	5917900	13E07	2.4	.5	14	110	12	444	4.06	1.28	28	8	.02	52
Seal Lake area:																
6231727	20	595100	6026050	13K05	4.1	.5	15	59	15	197	4.43	.77	16	7	.02	52
6231728	20	595100	6025850	13K05	2.4	.5	17	50	23	279	4.06	1.28	27	7	.02	52
6231729	20	595053	6025600	13K05	2.5	.5	16	56	11	239	4.30	1.17	23	7	.20	55
6231730	20	595000	6025350	13K05	3.1	.5	17	74	49	298	4.90	1.10	25	8	.20	53
6231740	20	595000	6025150	13K05	2.6	.5	16	44	18	318	3.65	1.19	24	2	.02	45
6231741	20	595000	6024950	13K05	.2	.5	12	42	15	235	3.36	.96	20	2	.10	39
6231742	20	595006	6024800	13K05	1.6	.5	12	41	11	324	3.05	.97	17	2	.20	41
6231743	20	594900	6024350	13K05	.2	.5	13	45	17	381	3.40	.93	18	2	.30	48
6231744	20	594925	6024235	13K05	2.0	.5	17	42	68	294	3.80	1.23	24	3	.20	47
6231745	20	595000	6024000	13K05	3.1	.5	11	50	19	382	3.36	.96	18	2	.02	50
6231746	20	593000	6024670	13K05	1.9	.5	9	41	14	166	3.31	.79	12	4	.02	39
6231747	20	593000	6024950	13K05	2.2	.5	12	50	14	258	4.38	.98	16	6	.30	50
6231748	20	593000	6025050	13K05	3.1	.5	10	42	18	321	3.76	.98	14	5	.30	45
6231749	20	592950	6025550	13K05	11.0	.5	16	64	20	813	4.60	3.16	26	2	.02	82
6231750	20	593000	6025750	13K05	3.2	.5	17	51	19	373	4.56	1.14	26	9	.02	83
6231751	20	592916	6026005	13K05	.2	3.0	9	46	8	303	2.73	.85	17	5	.02	46
6231752	20	592950	6026200	13K05	.2	.5	12	51	5	263	4.98	.98	16	3	.20	54
6231753	20	589910	6023393	13K05	1.7	.5	11	41	14	315	4.12	.95	15	10	.30	59
6231754	20	590100	6023200	13K05	2.3	.5	12	56	22	235	4.88	.85	14	6	.02	50
6231755	20	590211	6022996	13K05	2.0	.5	14	42	18	362	3.91	1.03	20	12	.30	100
6231756	20	591004	6026454	13K05	1.5	.5	13	55	5	260	4.89	1.05	18	3	.20	53
6231757	20	591000	6026225	13K05	2.6	.5	21	49	42	436	4.45	1.21	25	13	.40	77
6231758	20	591000	6025975	13K05	1.7	.5	18	48	19	341	4.27	1.03	19	11	.30	72
6231759	20	591050	6025725	13K05	2.1	.5	13	39	14	228	3.75	.96	19	6	.30	47
6231760	20	592100	6024200	13K05	.2	.5	6	30	8	144	1.87	.50	8	7	.02	28
6231761	20	592100	6024400	13K05	1.5	3.0	38	110	107	207	7.40	2.58	85	1	.02	73
6231762	20	592125	6024600	13K05	3.8	.5	18	39	24	342	3.94	1.07	23	11	.30	54
6231763	20	592125	6024850	13K05	2.3	.5	12	39	8	285	3.50	.92	16	6	.02	44
6231764	20	592050	6025075	13K05	2.7	.5	16	45	26	269	4.26	1.13	22	5	.20	53
6231765	20	592000	6025225	13K05	.2	.5	13	42	16	261	4.09	1.08	18	3	.02	46
6231766	20	592000	6025550	13K05	.2	.5	13	41	13	254	3.87	1.04	20	3	.20	49
6231767	20	592000	6025725	13K05	.2	.5	12	45	11	272	4.11	.95	18	10	.20	63
6231768	20	590300	6021700	13K05	2.4	.5	25	68	9	323	5.18	1.31	24	9	.30	80

Appendix 1. Continued

Field Number	UTM Zone	UTM Easting	UTM Northing	NTS	As1 ppm	Au1 ppb	Co2 ppm	Cr1 ppm	Cu2 ppm	F9 ppm	Fe2 Wt.%	Mg2 Wt.%	Ni2 ppm	Pb2 ppm	Sb1 ppm	Zn2 ppm
6231769	20	590300	6021900	13K05	.2	.5	16	46	19	375	3.90	1.01	21	6	.20	60
6231770	20	590320	6022150	13K05	.2	.5	14	45	12	209	3.97	.93	19	5	.10	52
6231771	20	590300	6022450	13K05	.2	3.0	15	50	29	299	3.51	.90	22	6	.10	53
6231772	20	590300	6022700	13K05	2.1	.5	11	44	14	285	3.53	.88	15	8	.30	55
6231773	20	590950	6024050	13K05	.2	.5	39	64	104	269	6.50	2.51	83	4	.20	75
6231774	20	590939	6024247	13K05	4.7	.5	31	52	71	344	5.39	1.82	42	6	.20	72
6231775	20	591263	6024730	13K05	3.0	3.0	18	45	35	373	4.21	1.33	24	9	.30	61
6231776	20	591243	6024905	13K05	2.0	8.0	13	39	28	363	3.54	.95	17	8	.20	56
6231777	20	591000	6026600	13K05	2.6	.5	12	50	16	240	3.72	.97	18	6	.20	47
6231778	20	593900	6026350	13K05	3.0	.5	10	61	8	201	5.03	.87	14	4	.10	46
6231779	20	593900	6026225	13K05	3.6	.5	17	49	57	267	3.95	1.24	26	3	.20	48
6231780	20	593800	6026100	13K05	3.4	4.0	14	53	16	288	4.35	1.02	20	9	.20	60
6231781	20	593800	6025850	13K05	4.1	.5	16	47	19	272	4.19	1.05	23	6	.30	61
6231782	20	593800	6025650	13K05	1.6	.5	12	41	21	268	3.57	.93	18	7	.20	49
6231783	20	593800	6025450	13K05	1.9	.5	14	57	8	232	4.07	1.05	20	2	.20	47
6231784	20	593800	6025100	13K05	.2	.5	11	52	13	245	3.92	.96	16	4	.30	46
6231785	20	593850	6024800	13K05	2.6	.5	13	50	11	279	4.00	1.11	21	3	.20	50
6231786	20	595483	6012157	13K05	3.4	.5	9	34	9	353	3.44	.70	11	5	.20	43
6231787	20	595480	6012327	13K05	3.9	.5	12	45	20	327	4.18	.81	14	8	.30	49
6231788	20	595552	6012546	13K05	3.4	.5	9	35	12	369	3.22	.70	10	7	.30	43
6231789	20	595500	6012810	13K05	4.3	.5	9	43	4	347	4.87	.74	10	7	.20	43
6231790	20	591025	6025400	13K05	2.5	3.0	10	43	19	264	3.40	.83	14	5	.30	48
6231791	20	591025	6025200	13K05	2.6	.5	11	46	15	242	3.76	.94	19	4	.10	50
6231792	20	591050	6025000	13K05	2.3	.5	16	48	17	240	4.02	1.02	22	4	.20	52
6231793	20	591989	6025937	13K05	2.3	.5	13	32	21	316	3.27	.90	18	6	.20	55
6231794	20	591995	6026225	13K05	1.7	.5	12	35	10	242	2.70	.87	16	5	.20	48
6231795	20	593792	6022459	13K05	2.6	.5	12	47	18	290	3.60	.91	18	4	.20	49
6231796	20	593803	6022646	13K05	2.2	.5	16	55	22	344	4.00	1.02	21	5	.20	56
6231797	20	593800	6022851	13K05	2.9	.5	13	48	20	315	3.83	.97	19	5	.20	52
6231798	20	593803	6023190	13K05	3.5	.5	15	48	25	317	3.82	1.01	21	6	.20	67
6231799	20	593798	6023400	13K05	4.2	2.0	14	48	28	377	4.16	1.06	22	6	.30	58
6231800	20	593800	6023500	13K05	4.5	.5	17	60	29	315	4.40	1.07	23	7	.30	56
6231801	20	593815	6023671	13K05	3.5	.5	12	52	9	263	4.09	.93	17	4	.20	50
6231802	20	593839	6023880	13K05	3.9	.5	11	41	25	271	4.01	.85	16	12	.20	63
6231803	20	593817	6024119	13K05	2.8	.5	13	43	11	287	4.06	.97	17	7	.20	53
6231804	20	593820	6024343	13K05	4.0	.5	14	48	27	237	3.85	1.05	21	3	.30	46
6231805	20	593804	6024670	13K05	3.6	2.0	29	62	63	364	4.86	1.54	31	6	.20	64
6231806	20	594175	6012327	13K05	4.2	.5	9	32	18	309	3.60	.76	11	4	.20	41
6231807	20	594016	6012425	13K05	5.1	.5	10	42	17	386	4.15	.83	12	6	.30	44
6231808	20	594066	6012575	13K05	4.4	.5	10	41	19	382	4.09	.89	13	6	.30	46
6231809	20	594350	6012727	13K05	4.5	.5	10	35	23	349	3.48	.77	11	7	.30	41
6231810	20	594347	6012927	13K05	4.5	.5	9	38	7	368	3.94	.83	12	8	.30	43
6231811	20	594253	6013144	13K05	6.6	.5	9	38	9	401	4.29	.80	11	7	.30	41
6231812	20	593696	6012604	13K05	6.0	.5	12	37	23	321	3.73	.98	16	5	.40	47
6231813	20	593696	6012604	13K05	4.4	.5	10	34	14	246	3.25	.78	13	6	.30	42
6231814	20	593734	6012430	13K05	5.0	.5	9	35	27	397	3.58	.84	11	5	.30	43
6231815	20	593757	6012232	13K05	3.5	.5	9	37	10	329	3.84	.76	11	5	.30	40
6231816	20	593746	6011986	13K04	4.6	.5	8	34	8	346	3.24	.70	10	4	.30	39
6231817	20	595500	6012810	13K05	7.7	.5	8	36	4	346	4.26	.72	9	5	.30	41
6231818	20	595480	6013010	13K05	8.0	.5	13	41	46	422	4.16	1.07	14	13	.40	59
6231819	20	594121	6011706	13K04	4.5	.5	9	27	15	346	3.52	.69	9	7	.30	43
6231820	20	595500	6013050	13K05	5.5	.5	12	38	10	379	4.12	.93	14	5	.40	54
6231821	20	595480	6013200	13K05	6.3	.5	12	42	8	343	4.10	.92	17	5	.30	48
6231822	20	595450	6013400	13K05	6.4	.5	10	42	8	293	3.95	.86	14	4	.30	47
6231823	20	595400	6013700	13K05	7.4	.5	16	48	20	376	4.10	1.10	22	6	.20	58
6231824	20	595350	6013925	13K05	11.0	.5	18	49	17	633	4.71	1.22	24	8	.50	72
6231825	20	595000	6014180	13K05	11.0	.5	15	49	12	496	4.86	1.25	21	8	.60	61
6231826	20	595000	6013900	13K05	3.6	.5	8	30	7	281	3.23	.69	10	10	.20	40
6231827	20	594900	6013600	13K05	12.0	.5	13	54	22	466	7.72	1.14	17	12	.50	59
6231828	20	595000	6013350	13K05	6.6	.5	10	30	28	396	3.78	.81	13	7	.30	42
6231829	20	595000	6013125	13K05	3.3	.5	10	30	10	300	3.66	.79	13	4	.20	45
6231830	20	595000	6012900	13K05	7.3	.5	9	37	6	295	4.88	.92	11	14	.30	51
6231831	20	594650	6011700	13K04	2.5	.5	9	31	7	318	3.46	.74	12	6	.20	45

Appendix 1. Continued

Field Number	UTM Zone	UTM Easting	UTM Northing	NTS	As1 ppm	Au1 ppb	Co2 ppm	Cr1 ppm	Cu2 ppm	F9 ppm	Fe2 Wt.%	Mg2 Wt.%	Ni2 ppm	Pb2 ppm	Sb1 ppm	Zn2 ppm
6231832	20	594700	6011900	13K04	1.9	.5	8	23	9	313	3.22	.63	10	4	.20	42
6231833	20	593100	6012920	13K05	2.4	.5	9	36	7	290	3.54	.79	12	5	.30	46
6231834	20	593100	6012700	13K05	4.3	.5	11	36	14	380	4.10	.97	15	7	.30	48
6231835	20	593150	6012500	13K05	10.0	.5	11	41	7	418	4.31	1.31	13	17	.40	55
6231836	20	593150	6012300	13K05	3.2	.5	9	39	10	392	3.73	.77	10	12	.02	43
6231837	20	593125	6012050	13K05	5.4	6.0	12	38	5	414	4.10	1.03	16	12	.40	67
6231838	20	594154	6011910	13K04	2.0	.5	8	32	16	290	3.36	.77	10	13	.20	47
6231839	20	594092	6012050	13K04	2.1	.5	9	32	17	362	3.55	.82	10	11	.20	47
6231840	20	589420	6021700	13K05	2.0	.5	13	44	12	250	3.47	.93	16	11	.02	54
6231841	20	589292	6021925	13K05	2.5	.5	10	49	15	245	4.20	.83	13	15	.20	50
6231842	20	589175	6022175	13K05	2.2	2.0	14	41	21	257	4.14	1.00	20	11	.20	52
6231843	20	589132	6022360	13K05	2.3	.5	11	46	12	209	4.87	.83	15	14	.20	56
6231844	20	589185	6022650	13K05	2.9	.5	19	47	28	325	4.45	1.12	24	15	.20	75
6231845	20	589156	6022847	13K05	.2	.5	15	47	40	334	4.15	1.05	22	13	.02	81
6231846	20	590175	6026788	13K05	2.1	.5	20	66	16	286	5.04	.98	18	9	.20	57
6231847	20	590175	6026588	13K05	2.0	.5	14	50	22	315	3.52	1.05	20	8	.02	52
6231848	20	590175	6026388	13K05	2.4	.5	14	51	39	287	3.74	1.04	22	8	.10	48
6231849	20	590175	6026188	13K05	1.9	.5	11	43	18	319	3.72	.94	16	10	.30	53
6231850	20	590100	6026000	13K05	2.5	.5	9	47	9	232	4.22	.72	11	14	.20	54
6231851	20	590025	6025800	13K05	2.8	.5	14	43	27	391	3.89	1.00	21	20	.20	85
6231852	20	590025	6025600	13K05	2.4	1.0	14	48	25	301	4.49	1.08	22	14	.20	60
6231853	20	590000	6025400	13K05	3.0	2.0	15	43	37	307	3.73	1.06	22	11	.20	52
6231854	20	590025	6025150	13K05	2.5	.5	13	50	19	301	4.11	.93	20	11	.20	54
6231855	20	590025	6024950	13K05	2.2	.5	13	47	15	260	3.56	.94	19	8	.20	49
6231856	20	585984	6025900	13K05	3.3	.5	14	43	33	359	3.62	1.06	18	11	.02	57
6231857	20	585834	6025700	13K05	2.6	.5	14	43	30	389	3.58	1.01	20	12	.30	62
6231858	20	585950	6025200	13K05	2.7	.5	12	36	20	321	3.44	.97	18	10	.30	61
6231859	20	586000	6025030	13K05	1.4	.5	11	40	10	245	3.61	.84	14	8	.30	52
6231860	20	591200	6022020	13K05	4.0	.5	18	58	22	361	4.54	1.18	23	10	.30	71
6231861	20	591200	6022200	13K05	3.3	1.0	15	52	25	286	4.17	1.04	20	11	.30	56
6231862	20	591200	6022380	13K05	3.2	.5	16	50	89	294	4.19	1.04	25	12	.20	60
6231863	20	591200	6022380	13K05	3.2	.5	13	47	27	238	3.96	.92	19	9	.20	52
6231864	20	589981	6023797	13K05	1.2	.5	34	70	50	212	6.81	2.50	79	6	.30	66
6231865	20	589906	6023969	13K05	7.0	.5	18	45	26	447	4.06	1.64	24	14	.30	63
6231866	20	589840	6024253	13K05	2.2	.5	12	40	14	266	3.60	.90	15	10	.20	47
6231867	20	590000	6024600	13K05	3.3	.5	12	38	19	238	4.46	.95	18	12	.20	46
6231868	20	589930	6024737	13K05	2.9	7.0	23	46	66	350	4.54	1.49	38	9	.30	67
6231869	20	584674	6026522	13K05	2.8	.5	12	42	10	276	3.89	.86	16	7	.02	49
6231870	20	584750	6026450	13K05	2.4	3.0	18	47	56	359	3.93	1.18	29	9	.30	49
6231871	20	584775	6026200	13K05	1.5	.5	14	43	30	278	3.49	.91	18	10	.20	51
6231872	20	584850	6025950	13K05	1.7	.5	22	48	42	228	3.98	1.44	46	7	.20	51
6231873	20	584850	6025750	13K05	3.3	.5	14	39	17	323	3.56	1.04	17	11	.30	48
6231874	20	585575	6025500	13K05	3.3	.5	16	47	28	425	4.25	1.15	23	15	.30	71
6231875	20	585350	6025325	13K05	3.6	.5	14	43	13	331	4.29	1.02	18	19	.30	79
6231876	20	585300	6025200	13K05	4.0	.5	17	46	35	426	4.05	1.22	26	13	.02	67
6231877	20	585375	6024950	13K05	2.4	.5	19	40	27	392	4.22	1.10	21	26	.30	89
6231878	20	585425	6024750	13K05	3.8	.5	21	44	38	389	4.47	1.52	35	14	.20	71
6231879	20	585425	6024550	13K05	2.1	.5	15	42	23	306	3.86	1.09	21	10	.10	56
6231880	20	586020	6024900	13K05	4.4	.5	20	46	40	469	4.34	1.46	25	15	.30	101
6231881	20	586148	6024671	13K05	2.1	.5	9	47	9	192	4.11	.67	11	10	.20	45
6231882	20	586400	6024600	13K05	2.1	3.0	10	35	21	260	3.12	.92	15	16	.30	57
6231883	20	586950	6023150	13K05	3.5	.5	17	47	34	345	4.07	1.08	26	14	.30	77
6231884	20	586960	6023300	13K05	3.0	.5	11	44	21	274	3.96	.85	15	11	.30	46
6231885	20	586950	6023650	13K05	2.4	.5	9	36	14	348	3.99	.76	11	17	.20	57
6231886	20	586950	6023850	13K05	3.9	.5	13	46	15	249	3.79	.87	17	14	.30	49
6231887	20	586975	6024320	13K05	2.4	.5	13	41	16	309	3.85	.90	18	19	.30	65
6231888	20	586970	6024670	13K05	1.8	.5	20	51	41	273	4.77	1.30	29	16	.30	69
6231889	20	588000	6026300	13K05	2.9	.5	12	57	26	331	4.35	1.07	16	9	.30	48
6231890	20	588000	6026100	13K05	2.9	.5	13	50	26	286	4.05	.93	17	23	.40	69
6231891	20	588000	6024650	13K05	2.4	4.0	12	38	17	199	3.49	.75	16	8	.30	42
6231892	20	588050	6024400	13K05	3.0	.5	13	48	19	234	4.69	1.11	21	7	.30	45
6231893	20	588000	6024100	13K05	3.1	.5	11	34	16	289	3.23	.93	15	15	.02	51
6231894	20	588000	6023900	13K05	2.8	.5	11	46	10	279	4.16	.88	14	14	.30	53

Appendix 1. Continued

Field Number	UTM Zone	UTM Easting	UTM Northing	NTS	As1 ppm	Au1 ppb	Co2 ppm	Cr1 ppm	Cu2 ppm	F9 ppm	Fe2 Wt.%	Mg2 Wt.%	Ni2 ppm	Pb2 ppm	Sb1 ppm	Zn2 ppm
6231895	20	588000	6023750	13K05	13.0	.5	16	40	22	462	3.79	1.97	20	20	.40	74
6231896	20	588000	6023350	13K05	3.0	.5	11	43	15	288	4.37	.70	12	26	.30	70
6231897	20	588000	6023100	13K05	3.0	.5	14	42	20	327	3.86	.86	16	17	.30	67
6231898	20	588000	6022800	13K05	3.1	.5	11	35	21	308	3.57	.76	15	13	.20	61
6231899	20	591190	6022615	13K05	2.0	.5	16	45	25	259	3.80	.97	22	11	.30	57
6231900	20	586950	6025800	13K05	1.9	.5	6	46	5	161	3.32	.49	7	12	.20	34
6231901	20	587000	6025600	13K05	1.3	.5	12	52	22	255	3.76	.98	17	11	.30	71
6231902	20	587000	6025350	13K05	3.4	.5	16	42	26	391	4.06	.96	19	23	.30	88
6231903	20	587000	6025150	13K05	4.1	.5	14	49	28	341	4.27	1.15	23	13	.30	65
6231904	20	587850	6025150	13K05	2.2	.5	18	47	34	274	4.32	1.25	44	6	.20	51
6231905	20	587850	6025400	13K05	2.5	.5	23	46	42	404	4.40	1.25	29	16	.30	83
6231906	20	587950	6025550	13K05	1.4	.5	10	35	11	300	3.59	.80	13	20	.20	79
6231907	20	588000	6025750	13K05	2.6	.5	13	43	20	381	3.95	1.05	20	13	.30	58
6231908	20	588000	6025900	13K05	2.3	.5	13	42	20	362	3.73	1.01	19	11	.30	59
6231909	20	588980	6023690	13K05	3.7	.5	22	45	23	337	4.33	1.39	30	12	.20	64
6231910	20	588990	6023900	13K05	5.5	.5	13	45	9	397	4.15	1.23	17	13	.30	54
6231911	20	589050	6024225	13K05	3.2	7.0	14	36	23	374	3.44	.96	23	14	.30	84
6231912	20	589100	6024500	13K05	3.2	.5	13	37	30	296	3.61	1.11	22	24	.30	48
6231913	20	589000	6024700	13K05	2.0	.5	11	40	27	261	2.97	.98	16	8	.30	47
6231914	20	589280	6024900	13K05	2.0	.5	21	54	35	235	4.10	1.40	33	52	.30	82
6231915	20	589305	6025140	13K05	1.7	.5	13	41	31	295	3.47	1.00	21	9	.30	49
6231916	20	589075	6025425	13K05	3.2	2.0	17	49	31	364	4.11	1.11	22	20	.40	88
6231917	20	589075	6025425	13K05	2.6	.5	11	40	15	284	3.74	.79	14	19	.20	73
6231918	20	589061	6025562	13K05	1.5	.5	14	41	44	292	3.89	1.07	25	16	.40	92
6231919	20	588875	6025820	13K05	2.7	.5	15	42	26	370	4.09	1.00	19	17	.40	76
6231920	20	591224	6022868	13K05	4.4	.5	20	55	22	233	5.07	1.01	32	12	.40	61
6231921	20	591255	6023063	13K05	2.8	.5	15	51	42	289	4.04	1.01	21	16	.30	67
6231922	20	591500	6023375	13K05	2.9	.5	13	46	22	344	4.18	.98	17	12	.30	58
6231923	20	591625	6023525	13K05	3.1	.5	8	54	8	221	5.06	.69	10	15	.20	41
6231924	20	591750	6023700	13K05	3.5	.5	13	55	38	253	4.65	1.02	20	11	.20	49
6231925	20	592085	6023030	13K05	2.5	.5	12	50	12	267	4.44	.89	16	13	.20	55
6231926	20	592180	6022825	13K05	2.5	.5	13	43	21	280	3.83	.95	19	12	.40	55
6231927	20	592170	6022525	13K05	2.5	.5	11	38	10	185	3.11	.82	16	9	.20	45
6231928	20	592850	6022850	13K05	2.5	.5	14	48	18	284	4.03	.99	19	9	.40	50
6231929	20	592850	6022650	13K05	2.3	.5	14	46	23	319	3.99	.99	19	10	.30	54
6231930	20	593000	6024450	13K05	2.5	.5	12	47	7	206	3.71	1.01	18	8	.30	47
6231931	20	593000	6024250	13K05	1.4	.5	26	54	28	189	5.37	1.78	47	8	.30	64
6231932	20	593000	6024050	13K05	1.9	.5	17	50	190	338	3.66	1.04	25	8	.40	64
6231933	20	593000	6023850	13K05	3.1	.5	17	51	38	325	4.52	1.12	21	13	.40	61
6231934	20	592925	6023700	13K05	1.2	.5	13	47	35	229	4.25	1.03	20	10	.30	53
6231935	20	592950	6023500	13K05	3.3	.5	16	59	25	417	4.97	1.19	24	12	.40	64
6231936	20	592950	6023250	13K05	1.3	1.0	15	47	26	344	3.97	1.10	23	10	.40	60
6231937	20	592850	6023050	13K05	3.2	1.0	14	49	28	369	4.20	1.07	22	10	.02	54

Appendix 2. Stream-water data: locations and selected analyses

Field Number	UTM Zone	UTM Easting	UTM Northing	NTS	Width (m)	Depth (cm)	Conduct µC	pH	Cow2 ppb	Crw2 ppb	Cuw2 ppb	Few1 ppb	Mgw1 ppm	Mnw1 ppb	Niw2 ppb	So4w1 ppm	Znw2 ppb
Wilson Lake area:																	
6287026	20	498091	5916311	13E06	1.5	30	25.20	6.87	.5	1.2	.8	18	2.17	3	2.5	.10	1.2
6287027	20	498137	5915220	13E06	3.0	50	14.88	6.71	.5	.6	.5	27	.96	1	.5	.10	.2
6287028	20	505979	5915630	13E07	1.5	30	17.75	6.49	.5	.7	1.0	158	1.41	4	1.6	.10	.2
6287029	20	505929	5914673	13E07	3.5	50	10.89	6.56	.5	.5	.7	5	.72	1	.5	.10	.2
6287030	20	508150	5915800	13E07	1.0	35	15.26	6.11	.7	.9	.5	64	1.01	1	1.9	.10	7.6
6287031	20	508061	5914450	13E07	1.0	20	7.48	5.82	.5	.5	1.2	54	.27	3	.5	.10	.6
6287032	20	500050	5916750	13E07	1.5	15	24.40	6.21	.5	1.1	.5	30	1.34	1	.5	.10	.2
6287033	20	499950	5916200	13E07	.5	10	24.00	6.68	.5	1.7	.5	54	2.07	1	1.8	.10	.2
6287034	20	503930	5915900	13E07	2.0	100	9.90	5.98	.5	.8	.5	106	.66	3	.5	.10	.2
6287035	20	503920	5915625	13E07	3.0	80	9.77	5.92	.5	.5	.9	171	.55	4	.5	.10	.2
6287036	20	501900	5914900	13E07	1.0	10	11.89	6.18	.5	.8	.5	157	.97	1	1.2	.10	.2
6287037	20	503250	5914750	13E07	.3	10	14.53	6.12	.5	1.1	.5	250	1.32	1	3.4	.10	.2
6287038	20	503550	5914700	13E07	3.0	25	11.26	6.20	.5	.5	.5	50	.62	2	.5	.10	.2
6287039	20	506800	5914900	13E07	1.0	10	14.77	6.32	.5	.7	.6	91	.78	1	.5	.10	.2
6287040	20	502650	5914500	13E07	2.0	10	10.29	5.91	.5	.5	.5	126	.44	2	.5	.10	.2
6287041	20	498050	5917900	13E06	3.0	10	10.38	6.18	.5	.5	.5	38	.42	2	.5	.10	.2
6287042	20	505100	5915200	13E07	.5	25	13.61	6.05	.5	.7	.5	232	.82	3	.5	.10	.2
6287043	20	505200	5916100	13E07	1.0	30	16.43	6.31	.5	1.2	.8	152	1.29	9	2.3	.10	.2
6287044	20	509650	5913800	13E07	3.0	20	13.05	6.58	.5	.5	1.0	26	.80	4	.5	.10	.2
6287045	20	510000	5914000	13E07	1.5	20	9.69	6.36	.5	.5	.6	21	.61	3	.5	.10	1.2
6287046	20	510050	5914200	13E07	.5	10	13.52	6.45	.5	.6	.5	65	.73	1	.5	.10	.2
6287047	20	510100	5914875	13E07	.5	10	16.81	6.68	.5	.8	.5	50	1.28	1	.5	.10	.2
6287048	20	509875	5914985	13E07	1.5	20	8.14	6.23	.5	.6	.5	79	.52	1	.5	.10	.2
6287049	20	501044	5916824	13E07	1.0	20	28.10	6.21	.5	.7	.5	43	1.55	24	.5	.14	.2
6287050	20	501004	5916366	13E07	1.0	30	12.42	6.23	.5	.8	.5	69	.89	3	.5	.10	.2
6287051	20	500925	5915522	13E07	1.5	40	13.02	6.17	.5	1.4	.9	609	1.04	11	.5	.10	.2
6287052	20	503200	5914400	13E07	2.0	20	10.14	6.43	.5	.5	1.2	53	.54	2	.5	.10	.2
6287053	20	502200	5919200	13E07	5.0	20	9.56	6.05	.5	.5	.5	87	.42	1	.5	.10	.2
6287054	20	502550	5919250	13E07	15.0	50	7.70	6.19	.5	.5	.5	18	.31	2	.5	.10	.2
6287055	20	504900	5918525	13E07	.5	10	12.20	4.78	.5	.5	.5	51	.20	3	.5	.10	.2
6287056	20	506075	5918775	13E07	1.5	20	7.03	5.75	.5	.5	.5	98	.30	2	.5	.10	.2
6287057	20	505025	5918050	13E07	5.0	20	9.11	5.83	.5	.5	.5	43	.48	3	.5	.10	.2
6287058	20	504925	5918050	13E07	.5	15	6.36	5.78	.5	.5	.6	57	.24	2	.5	.10	.2
6287059	20	501050	5917150	13E07	.5	25	11.91	5.83	.5	.7	.5	120	.58	3	.5	.10	.2
6287060	20	501050	5918250	13E07	1.5	30	10.09	6.16	.5	.5	.5	30	.48	2	.5	.10	.2
6287061	20	503500	5918150	13E07	.5	20	6.68	6.17	.5	.7	.5	62	.27	1	.5	.10	.2
6287062	20	503050	5917150	13E07	.5	20	8.69	5.63	.5	.8	.8	157	.41	3	.5	.10	.2
6287063	20	504550	5916800	13E07	.5	15	15.69	6.89	.5	.6	.5	108	1.33	4	.5	.10	.2
6287064	20	504600	5916925	13E07	.7	10	9.99	5.95	.5	.5	.5	126	.48	5	.5	.10	.2
6287065	20	506025	5917125	13E07	.3	10	11.54	6.51	.5	.5	.5	75	.51	1	.5	.10	.2
6287066	20	506900	5916600	13E07	.5	20	11.20	6.47	.5	.9	.7	144	1.03	1	.5	.10	.2
6287067	20	504000	5916375	13E07	.3	20	8.10	5.66	.5	.5	.5	200	.41	3	.5	.10	.2
6287068	20	504125	5916650	13E07	.5	25	12.18	6.47	.5	.8	.5	71	.82	1	.5	.10	.2
6287069	20	504050	5917100	13E07	.2	10	6.96	5.77	.5	.8	.5	159	.26	2	.5	.10	.2
6287070	20	496150	5916075	13E06	3.0	40	10.18	6.36	.5	.9	.5	147	.70	3	.5	.10	.2
6287071	20	497100	5917475	13E06	2.0	50	14.12	5.91	.5	.8	.5	99	.76	2	.5	.10	.2
6287072	20	497150	5917750	13E06	3.0	40	10.65	6.27	.5	.5	.5	70	.50	1	.5	.10	.2
6287073	20	497125	5917800	13E06	1.5	60	10.68	6.04	.5	.6	.5	163	.51	3	.5	.10	.2
6287074	20	495100	5916600	13E06	6.0	75	8.86	6.10	.5	.5	.5	186	.37	3	.5	.10	.2
6287075	20	495010	5917300	13E06	1.0	25	9.34	5.77	.5	.5	.5	156	.36	4	.5	.10	.2
6287076	20	495000	5917800	13E06	1.0	10	13.02	5.74	.5	.5	.9	155	.67	3	.5	.10	.2
6287077	20	495000	5915300	13E06	3.0	50	10.00	5.97	.5	.5	.5	154	.46	3	.5	.10	.2
6287078	20	495900	5915400	13E06	1.0	20	10.31	6.47	.5	.5	.5	78	.62	1	.5	.10	.2
6287079	20	507000	5917650	13E07	.4	15	7.55	6.22	.5	.5	.5	102	.33	1	.5	.10	.2
6287080	20	507600	5916100	13E07	2.0	30	12.41	6.83	.5	.5	.5	21	.82	2	.5	.10	.2
6287081	20	507930	5916115	13E07	1.5	40	7.81	6.28	.5	.5	.5	55	.48	1	.5	.10	.2
6287082	20	502250	5917850	13E07	1.5	15	10.92	6.30	.5	.7	.5	99	.59	2	.5	.10	5.9
6287083	20	501950	5918300	13E07	1.5	20	10.42	6.41	.5	.5	.5	73	.49	1	.5	.10	.2
6287084	20	507950	5917650	13E07	.3	15	8.70	6.47	.5	.5	.5	22	.38	1	.5	.10	.2

Appendix 2. Continued

Field Number	UTM Zone	UTM Easting	UTM Northing	NTS	Width (m)	Depth (cm)	Conduct µC	pH	Cow2 ppb	Crw2 ppb	Cuw2 ppb	Few1 ppb	Mgw1 ppm	Mnw1 ppb	Niw2 ppb	So4w1 ppm	Znw2 ppb
Seal Lake area:																	
6287085	20	594900	6024600	13K05	1.0	15	31.60	6.68	.5	.5	.5	64	1.17	1	.5	.10	.2
6287086	20	595000	6024100	13K05	2.0	20	24.70	6.76	.5	.5	.5	68	.76	3	.5	.10	.2
6287087	20	593020	6024570	13K05	1.0	20	17.09	6.59	.5	.5	1.6	34	.49	1	.5	.10	.2
6287088	20	593000	6025850	13K05	3.0	30	30.50	6.92	.5	.5	.5	13	.58	1	.5	.23	.2
6287089	20	592450	6027150	13K05	1.5	15	33.60	7.24	.5	.5	.5	35	.88	1	.5	.11	.2
6287090	20	589900	6023500	13K05	200.0	.	12.87	6.61	.5	.5	.5	5	.36	1	.5	.10	.2
6287091	20	590211	6022996	13K05	.7	10	.	.	.5	.7	.6	53	.36	1	.5	.10	.2
6287092	20	591000	6025750	13K05	1.0	30	39.00	6.09	.5	.5	.5	42	.77	1	.5	.10	.2
6287093	20	591000	6025490	13K05	.5	15	16.61	6.18	.5	.5	.6	51	.52	1	.5	.10	.2
6287094	20	591989	6026155	13K05	1.0	20	.	.	.5	.5	.5	23	.75	1	.5	.10	.2
6287095	20	592100	6024150	13K05	2.5	30	79.80	3.90	.5	.5	.5	20	.46	1	.5	.10	.2
6287096	20	592050	6024300	13K05	1.0	25	14.72	6.70	.5	.5	.5	15	.54	1	.5	.10	.2
6287097	20	592025	6025150	13K05	5.0	35	30.80	7.14	.5	.5	.5	18	.59	1	.5	.22	.2
6287098	20	592000	6025500	13K05	.5	20	16.96	6.41	.5	.5	.5	51	.51	3	.5	.10	.2
6287099	20	591350	6024600	13K05	5.0	15	32.30	7.20	.5	.5	.8	36	.65	1	.5	.22	.2
6287100	20	590750	6021700	13K05	1.0	10	19.31	6.78	.5	.5	.5	38	.58	1	.5	.17	.2
6287101	20	591200	6024450	13K05	2.0	20	44.80	7.35	.5	.5	.5	15	.99	1	.5	.65	.2
6287102	20	593900	6026000	13K05	3.0	30	30.80	7.22	.5	.5	.5	22	.64	1	.5	.20	.2
6287103	20	593900	6024900	13K05	3.0	30	16.63	6.93	.5	.5	.9	28	.52	1	.5	.10	.2
6287104	20	595501	6012784	13K05	1.5	30	69.80	7.33	.5	.5	.5	22	1.00	1	.5	.10	.2
6287105	20	594130	6012850	13K05	45.0	80	19.15	6.64	.5	.5	.5	56	.27	3	.5	.10	.2
6287106	20	593819	6023067	13K05	.4	10	24.00	6.58	.5	.5	.5	122	.65	1	.5	.10	.2
6287107	20	593839	6023823	13K05	1.0	40	62.30	7.07	.5	.5	.5	10	.72	1	.5	.10	.2
6287108	20	593829	6024576	13K05	.7	20	57.10	7.37	.5	.5	.5	17	.85	1	.5	.11	.2
6287109	20	592875	6011700	13K05	1.0	20	57.80	7.54	.5	.5	.5	52	.75	2	.5	.11	.2
6287110	20	593125	6012650	13K05	1.0	15	22.10	6.92	.5	.5	.5	101	.31	4	.5	.10	.2
6287111	20	593871	6012114	13K05	.8	20	55.60	7.43	.5	.5	2.0	31	.85	5	.5	.10	.2
6287112	20	594800	6023750	13K05	1.0	20	55.70	7.35	.5	.5	.5	125	1.00	3	.5	.10	.2
6287113	20	589400	6021350	13K05	1.5	30	17.37	6.88	.5	.5	.5	21	.48	1	.5	.10	.2
6287114	20	589132	6022489	13K05	.5	15	20.70	6.43	.5	.5	.5	71	.64	1	.5	.10	.2
6287115	20	594125	6012200	13K05	1.0	15	54.60	7.34	.5	.5	1.1	23	.84	4	.5	.10	.2
6287117	20	594638	6013162	13K05	.5	20	71.70	7.30	.5	.5	.5	28	.85	3	.5	.10	.2
6287118	20	588871	6022411	13K05	2.0	15	14.29	6.77	.5	.5	.8	393	.41	99	.5	.10	.2
6287119	20	589750	6024250	13K05	1.5	30	56.20	7.35	.5	.5	.7	42	1.07	4	.5	.61	.2
6287120	20	591500	6021900	13K05	1.0	15	57.30	7.27	.5	.5	.7	73	1.20	4	.5	.48	.2
6287121	20	591200	6022250	13K05	.5	15	35.60	6.88	.5	.5	.5	22	1.03	1	.5	.17	.2
6287122	20	589900	6024400	13K05	3.0	25	26.30	7.16	.5	.5	.7	15	.50	1	.5	.10	.2
6287123	20	589700	6025050	13K05	1.5	25	23.40	6.20	.5	.5	.5	65	.56	3	.5	.10	.2
6287124	20	586350	6026300	13K05	1.5	20	20.70	6.96	.5	.5	.5	49	.50	1	.5	.10	.2
6287125	20	590075	6025950	13K05	1.2	30	23.10	6.40	.5	.5	.5	112	.55	2	.5	.10	.2
6287126	20	590025	6025500	13K05	1.0	15	17.31	6.12	.5	.5	.5	129	.59	2	.5	.10	.2
6287127	20	588200	6024500	13K05	1.0	20	17.37	6.42	.5	.5	.5	69	.69	1	.5	.10	.2
6287128	20	588000	6024300	13K05	1.5	40	57.50	7.45	.5	.5	.5	31	.65	1	.5	.14	.2
6287130	20	585300	6025575	13K05	3.0	30	14.24	6.65	.5	.5	.5	37	.43	2	.5	.10	.2
6287131	20	585100	6025575	13K05	4.0	20	25.50	7.21	.5	.5	.5	5	.42	1	.5	.19	.2
6287132	20	584650	6026375	13K05	6.0	30	20.80	7.07	.5	.5	.5	20	.44	1	.5	.10	.2
6287133	20	587900	6025600	13K05	1.0	60	16.30	6.17	.5	.5	.5	101	.48	3	.5	.10	.2
6287134	20	589000	6024550	13K05	1.5	30	46.40	7.45	.5	.5	.5	40	.65	5	.5	.15	.2
6287135	20	593000	6024000	13K05	30.0	40	13.95	6.68	.5	.5	.5	40	.54	4	.5	.10	.2
6287136	20	592950	6023500	13K05	1.0	25	32.70	7.14	.5	.5	2.4	43	.66	4	.5	.10	.2
6287137	20	588000	6023700	13K05	1.2	10	72.20	7.38	.5	.5	.5	49	.44	3	.5	.10	.2
6287138	20	588000	6023450	13K05	1.0	15	14.35	6.38	.5	.5	.5	115	.43	3	.5	.10	.2
6287139	20	587950	6023200	13K05	1.0	15	16.58	6.79	.5	.5	.7	45	.56	3	.5	.10	.2
6287140	20	592075	6022950	13K05	1.0	40	25.40	7.20	.5	.5	.5	40	.51	2	.5	.10	.2