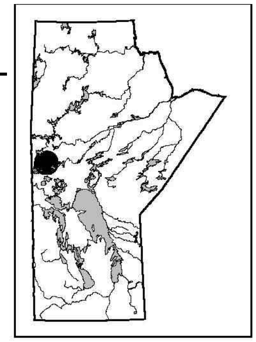
GS-5 MINERAL DEPOSIT STUDIES IN THE FLIN FLON-SNOW LAKE AREA

by G.H. Gale



Gale, G.H. 2001: Mineral deposit studies in the Flin Flon-Snow Lake area; *in* Report of Activities 2001, Manitoba Industry, Trade and Mines, Manitoba Geological Survey, p. 40-44.

Activities this year have been focused on completion of reports and maps relating to the Baker Patton project, ongoing studies of the New Britannia mine, and utilization of rare-earth elements (REE) as exploration tools for precious and base-metal deposits.

The 1:10 000 scale colour geological map of the Baker Patton Complex (BPC) has been completed. An accompanying geological report is in draft form and will be released as an open file in 2002. A separate report detailing the geochemistry of the Baker Patton area is in preparation, with most of the diagrams currently in draft format. Preliminary results of the geochemical study include the determination that these rocks are not of calc-alkaline affinity, as originally perceived (Bailes and Syme, 1989), but are transitional between tholeiitic and calc-alkaline affinities. This is important, as it indicates that these rocks have the potential to contain major volcanogenic massive-sulphide (VMS)–type deposits. This is based on the observation that host rocks for the Kuroko, Mt. Windsor and other massive-sulphide deposits have rare-earth values that plot in this transitional field (Lentz, 1998).

Major- and trace-element data have been used to effectively delineate the major zones of alteration present in the BPC. Alkali metasomatism is extensive in the BPC and includes seawater-rock alteration, hydrothermal activity associated with VMS-type mineralization, and calcium addition related to late brittle deformation (Fig. GS-5-1). Unfortunately alkali metasomatism does not provide a reliable indicator of VMS-type alteration. However, potassium alteration (Fig. GS-5-2) does appear to be predominantly associated with VMS-type mineralization. In addition, plots of alkali molar ratios (Fig. GS-5-3) illustrate the sites of intensely altered rocks, as portrayed by the presence of chlorite as an alteration phase. Figure GS-5-4, total Cu+Zn, shows elevated metal values in some intensely altered zones. The detailed mapping and geochemical data permit a re-evaluation of previous drill information and the delineation of new exploration targets in the BPC.

Frequent underground examinations of the New Britannia gold deposit at Snow Lake have been undertaken to document the geological setting of the deposit and characterize the nature and genesis of the mineralization. The mineralization and alteration associated with this deposit appear to predate regional deformation. To date, all faults recognized in the underground workings postdate deposition of the original mineralization, and structures such as the Howe Sound Fault have been shown to deform the mineralization. In addition, old level plans have been digitized in order to permit three-dimensional modelling of the geology.

Ongoing studies of drill core from the Snow Lake area indicate that REE data can be used to discriminate between barren sulphide mineralization not related to VMS deposits and metal-poor sulphide mineralization that is related to VMS deposits. The REE data can also assist in establishing vectors to VMS-type hydrothermal vent sites. Co-operative studies are being undertaken with several exploration companies to apply these REE techniques in the search for economic mineralization. Preliminary studies are being undertaken to investigate the applicability of REE data in the search for sediment-hosted exhalative-type precious-metal deposits.

REFERENCES

Bailes, A.H., and Syme. E.C. 1989: Geology of the Flin Flon–White Lake area; Manitoba Energy and Mines, Geological Services, Geological Report GR87-1, 313 p.

Lentz, D.R. 1998: Petrogenetic evolution of felsic volcanic sequences associated with Phanerozoic volcanic-hosted massive sulphide systems: the role of extensional geodynamics; Ore Geology Reviews, v. 12, p. 289–327.

Madeisky, H.E. 1995: Quantitative analyses of hydrothermal alteration: applications in lithogeochemical exploration; Pacific Northwest Mining and Metals Conference, The Society for Mining, Metallurgy and Exploration and the Association of Exploration Geochemists (HEMAC Exploration Ltd., P.O.Box 848, Station A, Vancouver, BC), short course notes, 234 p.

Madeisky, H.E., and Stanley, C.R. 1993: Lithogeochemical exploration for metasomatic zones associated with volcanic-hosted massive sulphide deposits using Pearce element ratio analyses; International Geology Review, v. 35, p. 1121–1148.

Stanley, C.R. and Madeisky, H.E. 1994: Lithogeochemical exploration for metasomatic zones associated with hydrothermal ore deposits using Pearce element ratio analyses; *in* Alteration and Alteration Processes Associated with Ore-Forming Systems, (ed.) D.R. Lentz; Geological Association of Canada, Short Course Notes, v. 11, p. 193–211.

Feldspar

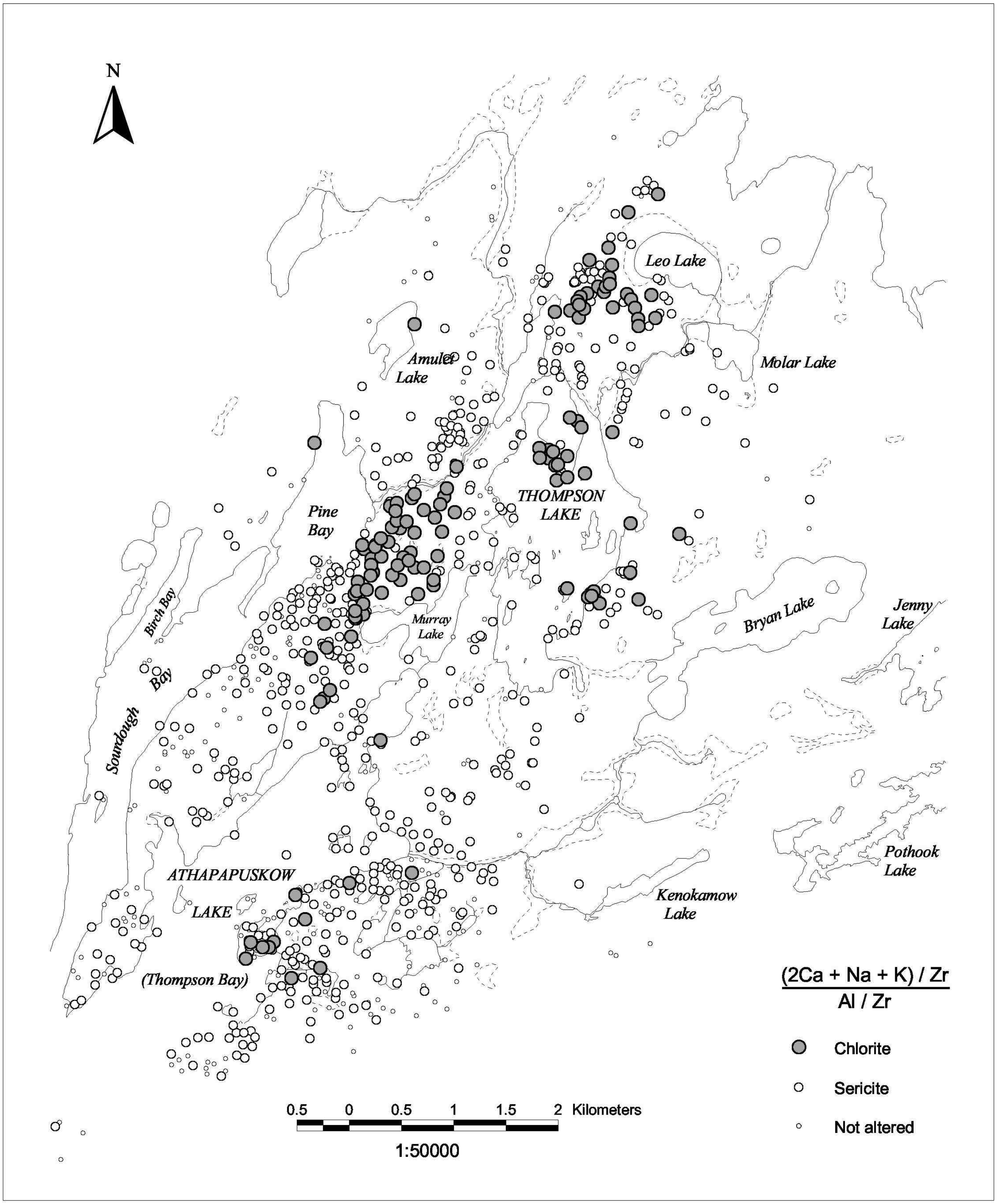


Figure GS-5-1: Alteration intensity for the Baker Patton Complex depicted by molar chlorite and sericite based on the ratio [(2Ca+Na+K)/Zr])/(Al/Zr), after Madeisky and Stanley (1993). Ratios near or >1 commonly indicate nonaltered rocks.

Potassium

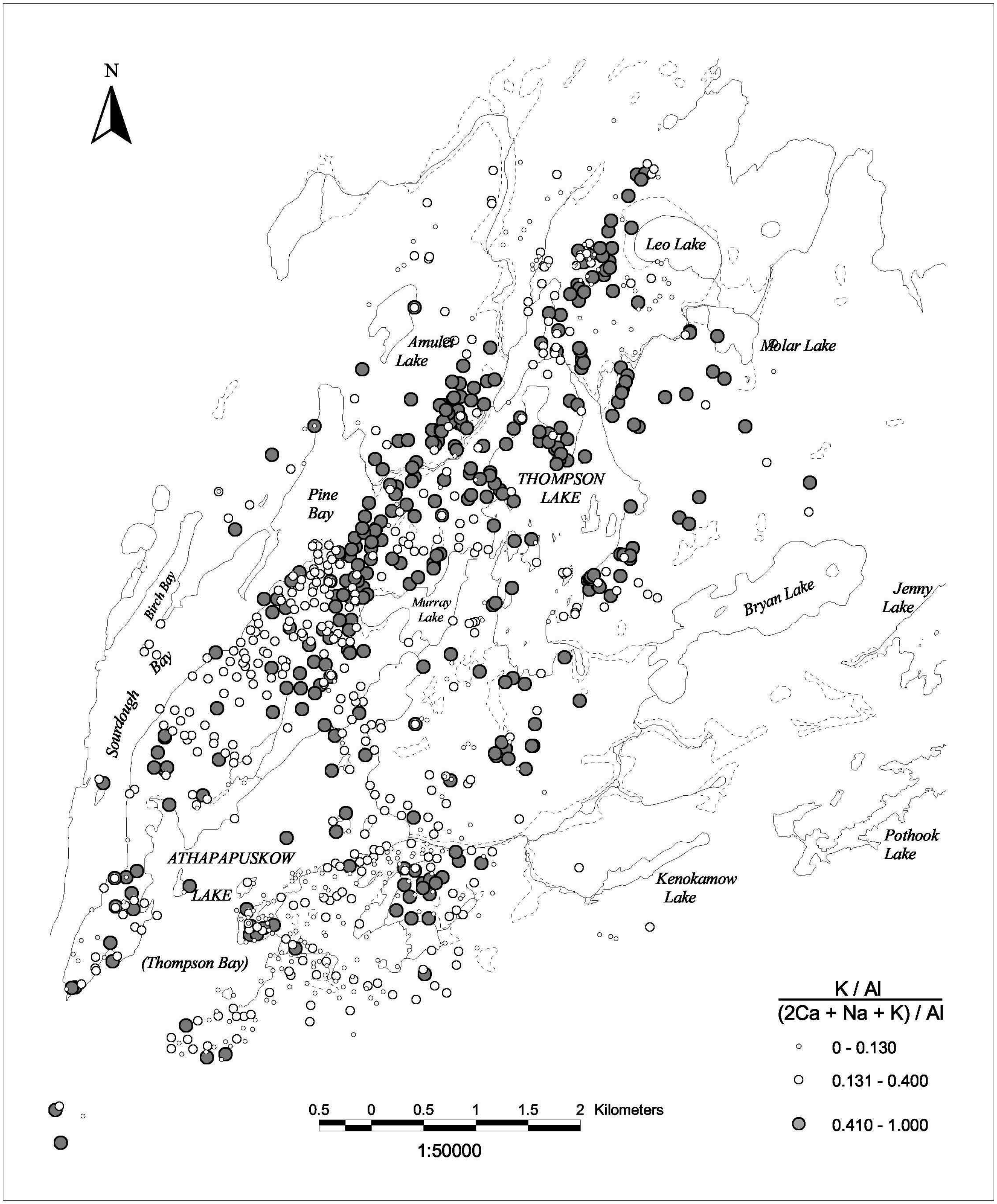


Figure GS-5-2: Potassium Number diagram for the Baker Patton Complex. This is a molar ratio (K/Al)/[(2Ca+Na+K)/Al] that portrays the extent of potassium metasomatism (after Stanley and Madeisky, 1994).

Alkali

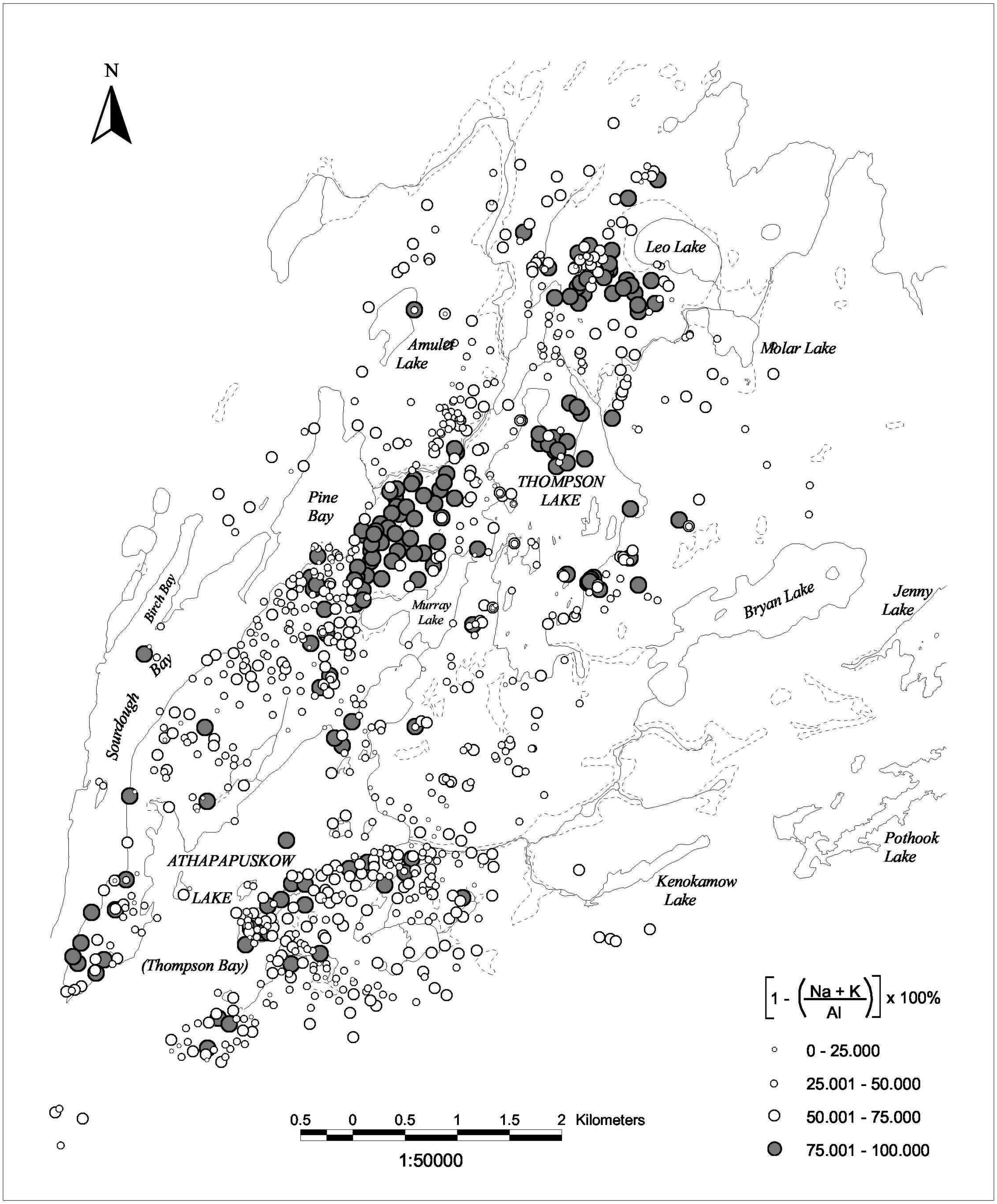


*Figure GS-5-3: Alkali alteration index for the Baker Patton Complex, based on molar ratios [1-(Na+K)/Al]*100. This diagram helps to negate the effects of Ca metasomatism in felsic rocks (after Madeisky, 1995).*

Cu + Zn (ppm)

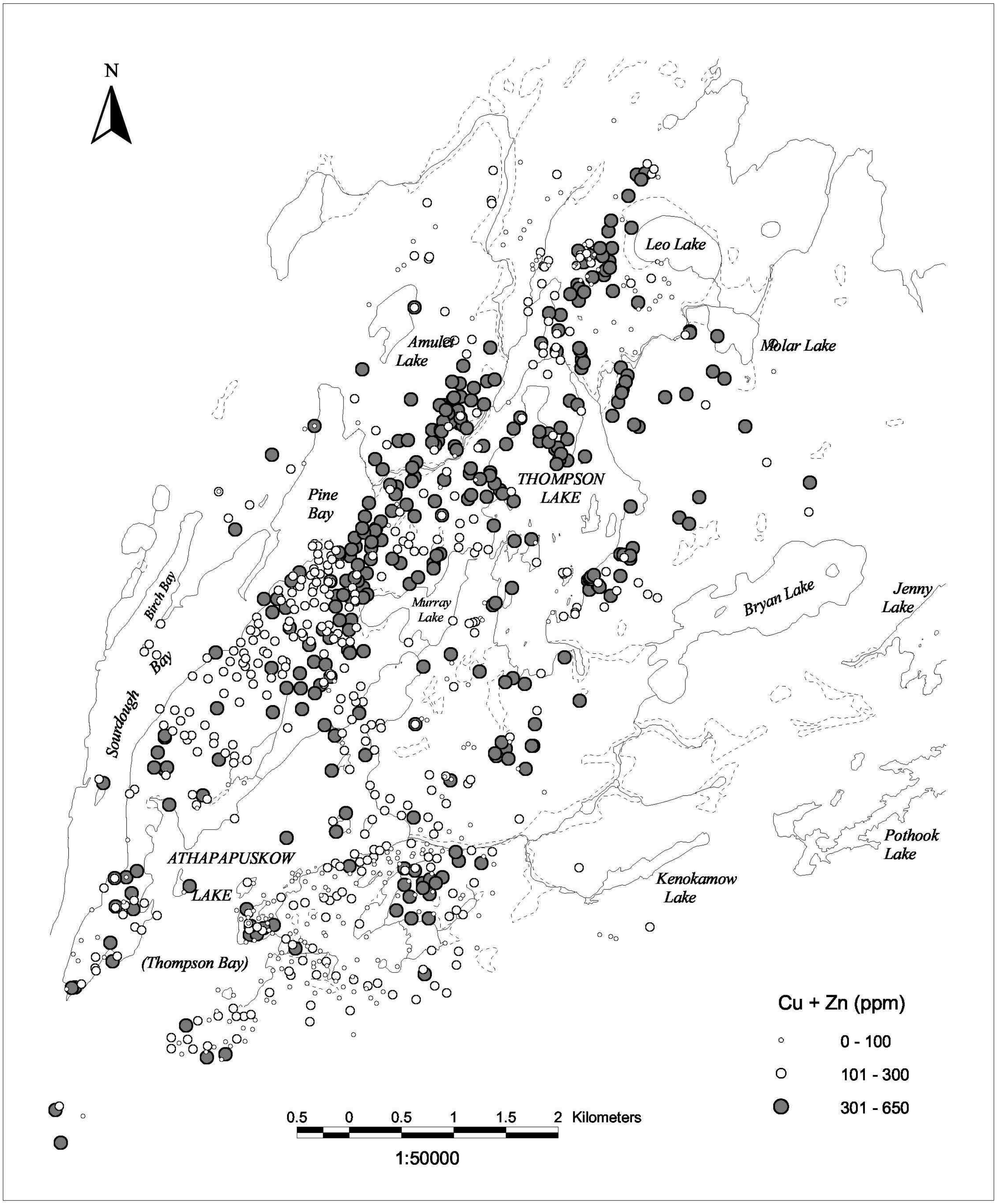


Figure GS-5-4: Total Cu+Zn for rocks of the Baker Patton Complex.