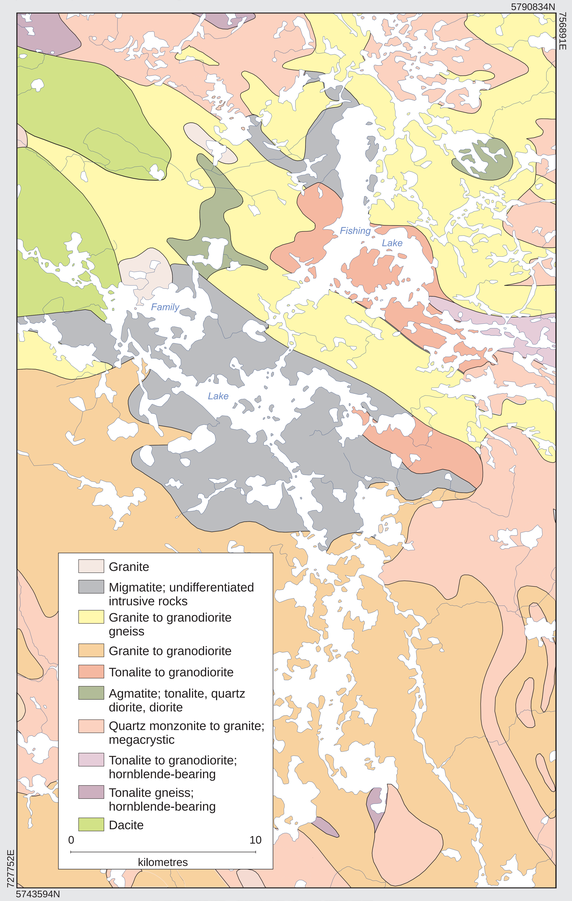
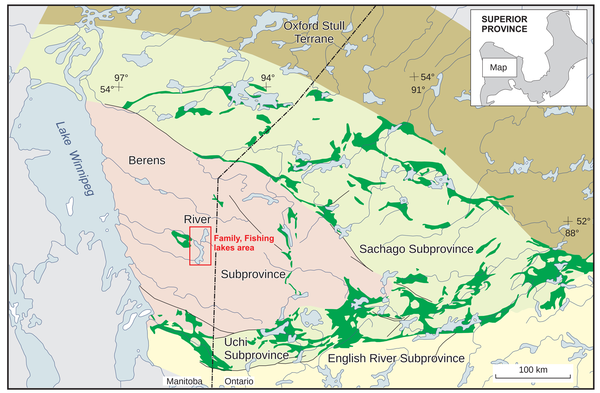
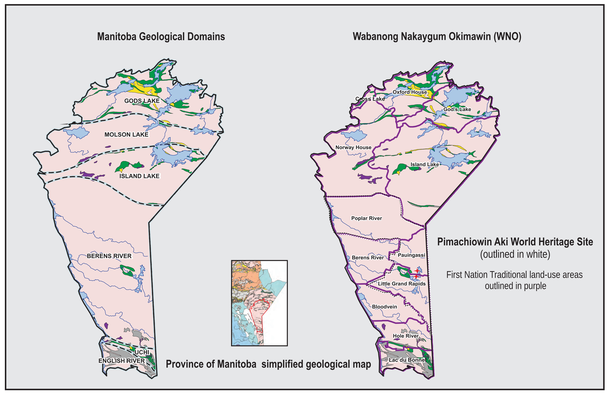
2010 Geological Mapping in the Fishing-Family lakes area Pauingassi and Little Grand Rapids First Nations Traditional land use area

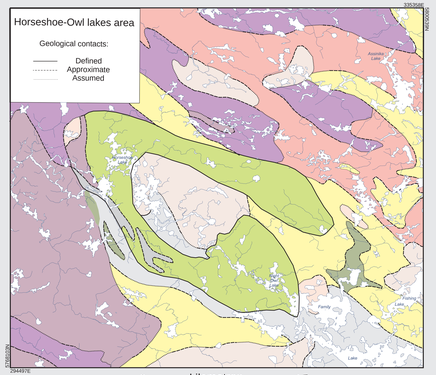
Manitoba

The goal of our work was to re-examine the rocks at Family and Fishing lakes, which were last described over forty years ago (Ermanovics, 1969, 1970). We collected samples to study their chemical composition and age. Most of the rocks are different types of granites to which we can now give their proper modern names and apply these to the geological map (below). The map shows where you can find these rocks. The area is part of the Berens River Subprovince (to right) of the Canadian Shield, the most ancient core of North America. The updated map will become part of the newest digital geological maps of Manitoba. In addition, we can compare the rocks of the Family and Fishing lakes area to similar adjacent rocks in Ontario, where their origins deep in the ancient (Archean) Earth and in long-extinct volcanos is better known.









The western termination of the volcanic rocks at Horseshoe Lake was investigated and no shear zones nor alteration nor veining was observed. These rocks and related intrusions, see 1) below have a slight potential for a mineral deposit and have not been systematically mapped.

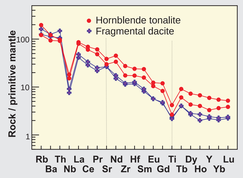
Not all granitic and volcanic rocks are alike in the Family and Fishing lakes area

Some are older than others. And there is evidence from their appearance in the field and from chemical analyses that there are four groups. These groups have crystallized from melts that formed at different depths and by different processes. They are from oldest to youngest:

1) Dacite, gabbro to diorite and granodiorite (calcalkaline); Pacific ring of fire types - like Mount St. Helens, melt formed at 100 km down with water from sunken ocean floor (by subduction).
2) Tonalite-granodiorite (TTG); formed by melt at the base of the Earth's crust (35 km) and below - typical of very ancient rocks.
3) Granite-granodiorite (potassium rich); melting of the lower to middle crust.
4) Late quartz monzonite (sanukitoid); deep melts contaminated by crust.

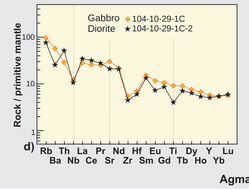
1)

Fragmental dacite




Hornblende tonalite

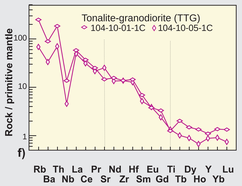

Diorite




Agmatite,includes tonalite, quartz diorite, diorite

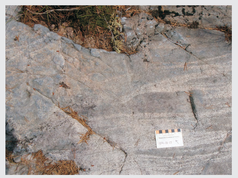
2)

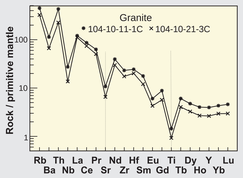

Tonalite gneiss




Tonalite to granodiorite

3)

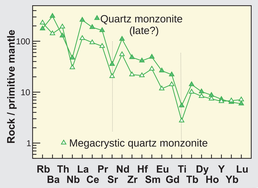

Granite to granodiorite gneiss



Granite

4)

Megacrystic quartz monzonite



Geochemistry

Different amounts of important elements produces a chemical signature. The chemistry found in rock samples from the Family and Fishing lakes area are compared to the chemistry in rocks below the crust (in the mantle that makes up most of the Earth). Plots from the lighter to heaver elements form typical patterns (below) like chemical fingerprints of the different groups.

Plate tectonics

Preliminary outcrop observations combined with the geochemical analyses indicate that all the rocks formed in a continental environment. The sets of different compositions suggest a transition from a continental volcanic arc environment, through to collision with another continental block that evolved into a period of mountain building and subsequent erosion. Isotopic ages are needed to provide a time frame for this evolution which we know from the adjacent rocks in Ontario to be about 2.7 billion years ago.

Remapping Geologists

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