

# Provenance of Sedimentary Rocks of the Seal Lake Group

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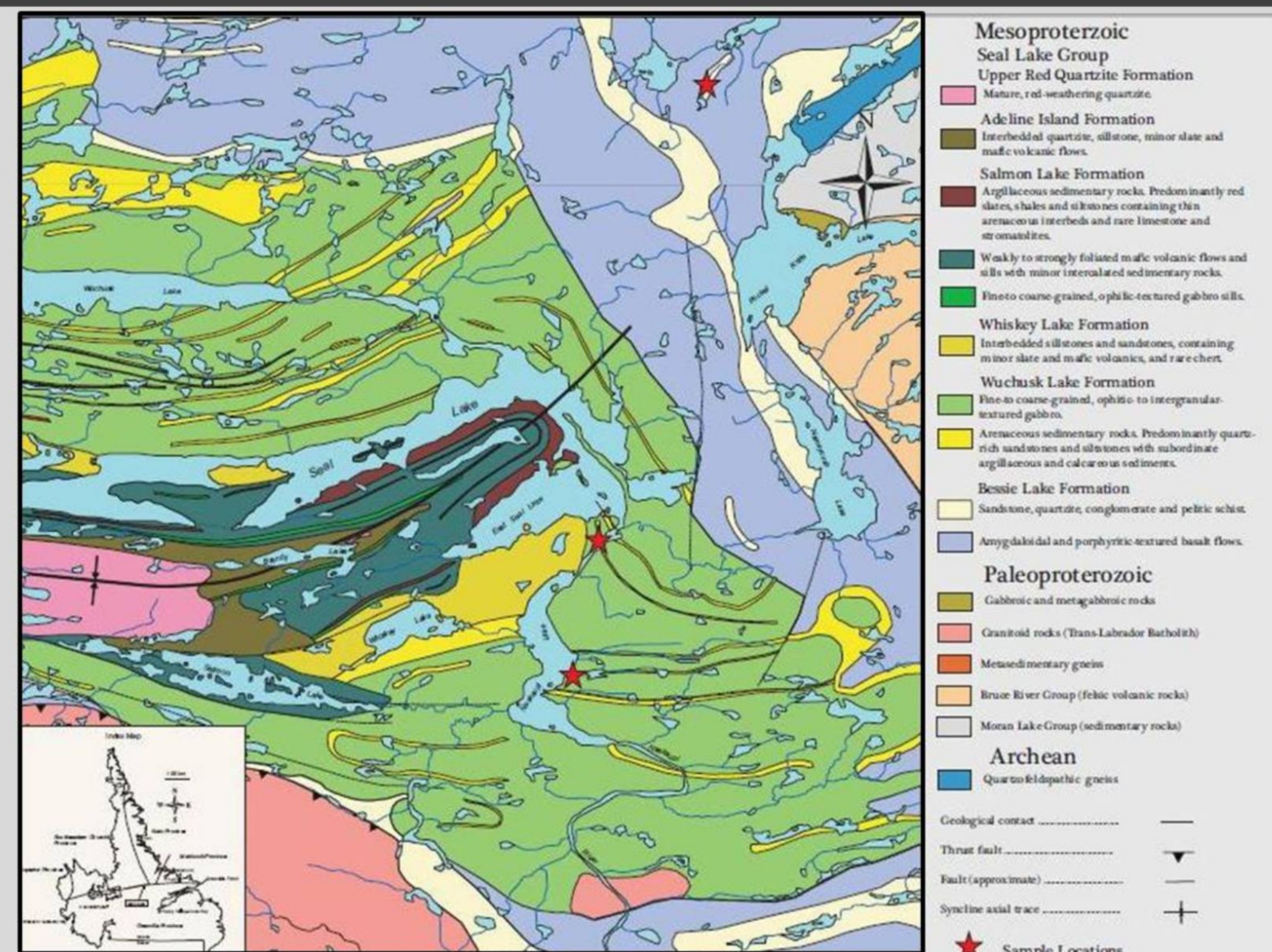
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## Introduction

The Seal Lake Group is located in central Labrador, close to the Grenville Front in the Grenville Province. Radiometric dating indicates a Mesoproterozoic age. It is comprised of argillaceous and arenaceous metasedimentary rocks, basalt flows and was intruded by gabbro sills that were then all folded into an east-trending syncline (Brummer and Mann, 1961).

The BSc Honours project of M. Reardon involves the study of provenance of the sedimentary rocks which are found in a number of the formations of the Seal Lake Group. The methodology is focussed on using the age of detrital zircons to identify potential sedimentary sources.

Samples were taken from the Bessie, Wuchusk and Whiskey Lake Formations. The accompanying preliminary map is of the Seal Group and is centred around East Seal Lake, it shows the locations of the samples collected by M. Reardon during the summer of 2009.



## Geology

The Bessie Lake Formation is the oldest formation of the Seal Lake group since it overlies the basement rocks. The formation comprises of pink to red weathering arenaceous and conglomeratic sediments which are intercalated with vesicular and amygdaloidal basalts (Brummer and Mann, 1961; van Nostrand., 2009). Plates A and B.

The Wuchusk Lake Formation overlies the Bessie Lake formation and is characterized by shales, argillites and fine grained quartzites that have been intruded by diabase sills (Brummer and Mann, 1961). Upward facing crossbedding was seen in one outcrop as mentioned by van Nostrand (2009). Plates C and D.

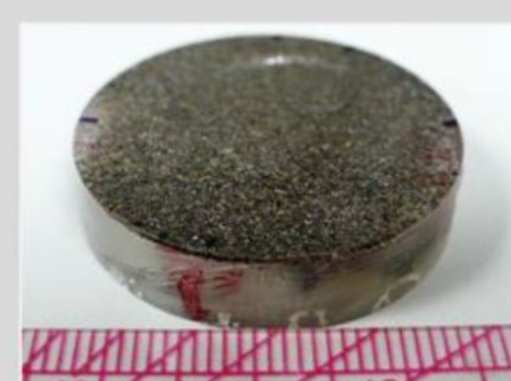
The Whiskey Lake Formation is characterized by thin interbedded layers of shales, slates, red siltstones and quartz rich sandstones. The texture of this formation might be expected to contain fewer detrital zircons than the others, because it was derived from more clay-rich sources.

## Methods

For the analysis of this project thin sections from the three samples collected will be prepared for petrographic study. Detrital zircons will be separated from the samples for dating purposes. The samples will be disaggregated, the heavy minerals will be separated using the Wilfley table and then put through heavy liquid separation to concentrate the zircons. The zircons will then be picked out and mounted, followed by imaging them on the SEM for morphology and zoning. They will then be dated by LA-ICPMS using the U-Pb method.



Heavy liquids to obtain heavy fraction (density > 2.8)



Mount detrital heavy mineral grains for analysis

At right is shown an example polished mount (25mm diameter) of heavy minerals used for imaging by scanning electron microscopy (SEM)

## Preliminary Conclusions

The main purpose of this study is to determine the source of sediments based on the age distribution of detrital zircons and constrain the age of deposition based on the age of the youngest detrital zircon. Most models propose that the Seal Lake Group formed adjacent to rocks of the 1.65 Ma Trans Labrador Batholith (TLB) and was thrust over the TLB (Brummer and Mann, 1961) during the Grenville collision. If this is the case, we would expect that a significant population of detrital zircons with ages of 1.65 Ga. If instead the Seal Lake Group overlies basement significantly older or younger than the TLB, we would expect most detrital zircons to have ages other than 1.65 Ga.

## 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.
- Knight, I. (1972) The Geology of the Arkose Lake area, north of Seal Lake, Labrador, Canada. Unpublished M.Sc. thesis. Memorial University, St. John's, Newfoundland, 210 pages.
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