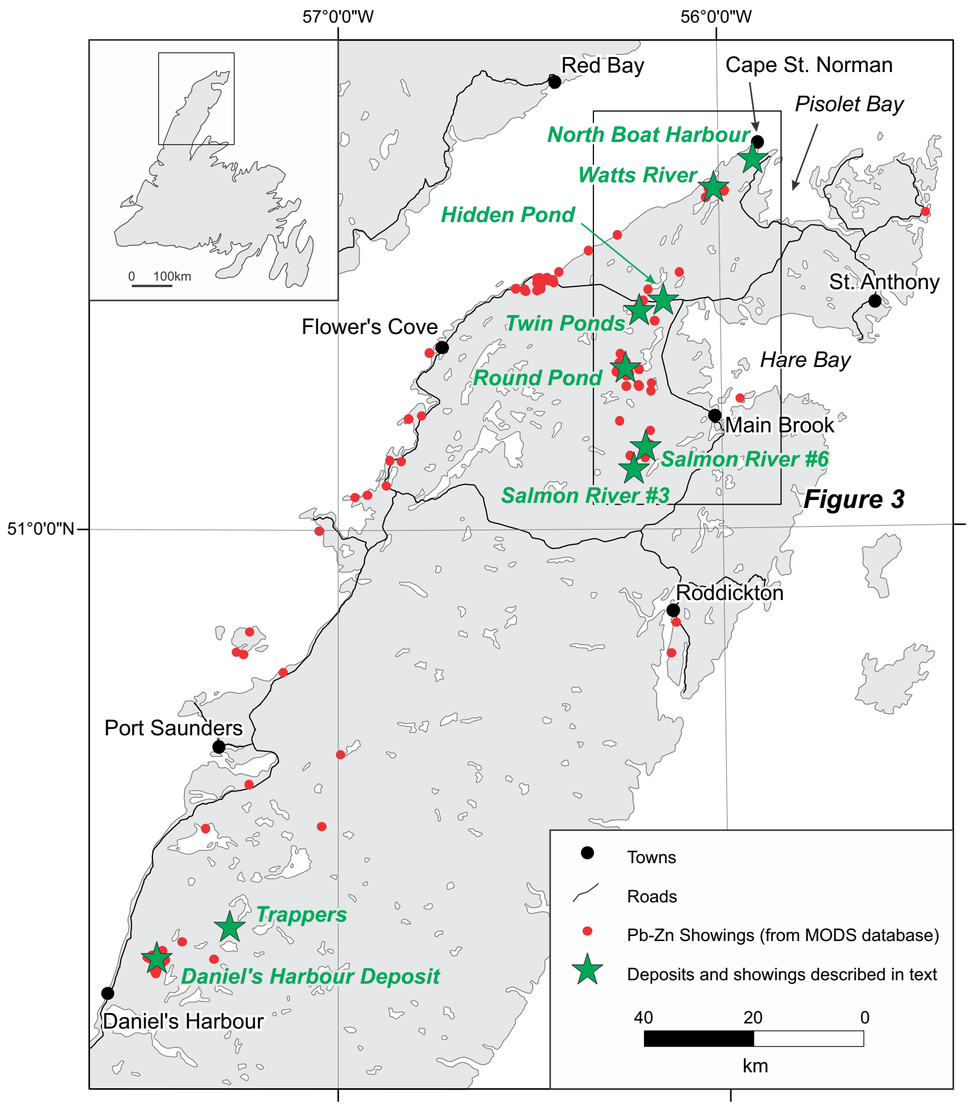
PROJECTS RELATED TO ZINC

Newfoundland Labrador
Natural Resources

James Conliffe



Map of the Great Northern Peninsula and southeastern Labrador, showing main towns, location of known Zn occurrences and deposits (taken from MODS database).

In 2017, work continued on a project investigating the genesis of carbonate hosted Zn (± Pb) occurrences in western Newfoundland. Previous exploration activity from the 1950's to 1990's led to the discovery of numerous Zn occurrences. However, with the exception of the former Newfoundland Zinc Mine near Daniels Harbour (~7 Mt @ 7.8% Zn mined between 1975 and 1990), none of these occurrences have been considered economic. This makes western Newfoundland somewhat unusual, as similar Mississippi Valley Type deposits elsewhere in the world typically form extensive districts consisting of several, to as many as 400, individual deposits. This project aims to develop a genetic model for Zn-Pb mineralization in western Newfoundland and to determine the future exploration potential of this region.

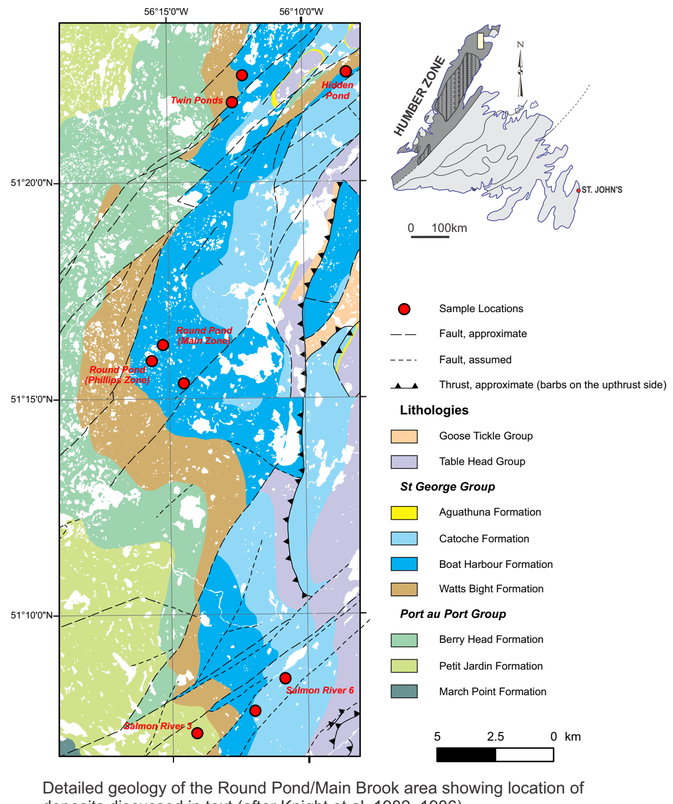
Mineralized boulder from former Newfoundland Zinc Mine, Daniels Harbour, with layers of brown sphalerite and weakly mineralized pseudobreccia

Collapse breccia at Round Pond Deposit, with fragments of dolostone cemented by sphalerite and dolomite

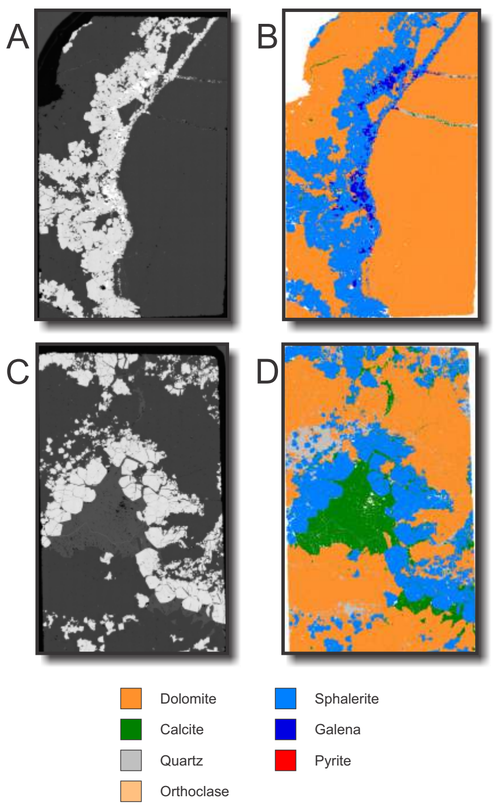
Mineralized boulder from Salmon River 6 Prospect, with red sphalerite associated with calcite and later yellow sphalerite associated with black quartz

A recently completed B.Sc. (Hons.) thesis by Robert King at Memorial University focused on the nature and origin of zinc mineralization at a number of carbonate hosted Zn occurrences on the Great Northern Peninsula, including the Round Pond Deposit (grab samples up to 24.5 wt. % Zn), the Salmon River Prospect (grab samples up to 20 wt. % Zn) and the Twin Ponds Prospect (grab samples up to 12 wt. % Zn). Two styles of Zn-mineralization have been recorded from the studied occurrences: crackle breccia, a type of collapse breccia and; pseudobreccias, formed by the selective replacement of fabrics in the host rocks.

Detailed petrographic, geochemical and isotopic studies were used to determine the chemistry of the mineralizing fluid, the origin of the fluid and metals, and the timing of mineralization. These data indicate that mineralization occurred after deposition and subsequent deformation of the host rock during the Taconic and Acadian orogenies. Metal-bearing fluids would have migrated along regional structures, and mixed with sulphate-bearing fluids or organic matter in the host dolostones, with ore precipitation controlled by thermochemical sulphate reduction.



Detailed geology of the Round Pond/Main Brook area showing location of deposits discussed in text (after Knight et al. 1982, 1986)



Backscatter electron (BSE) and Mineral Liberation Analysis (MLA) images of mineralized samples from the Round Pond (A and B) and Salmon River (C and D) deposits

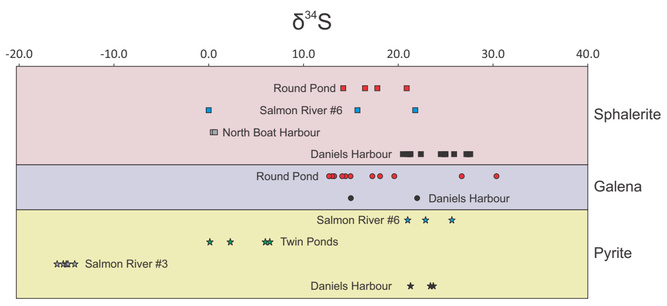
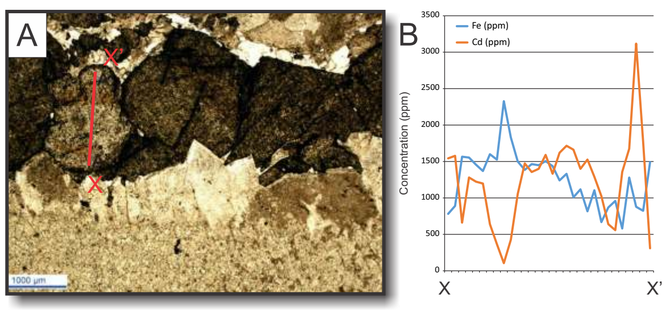
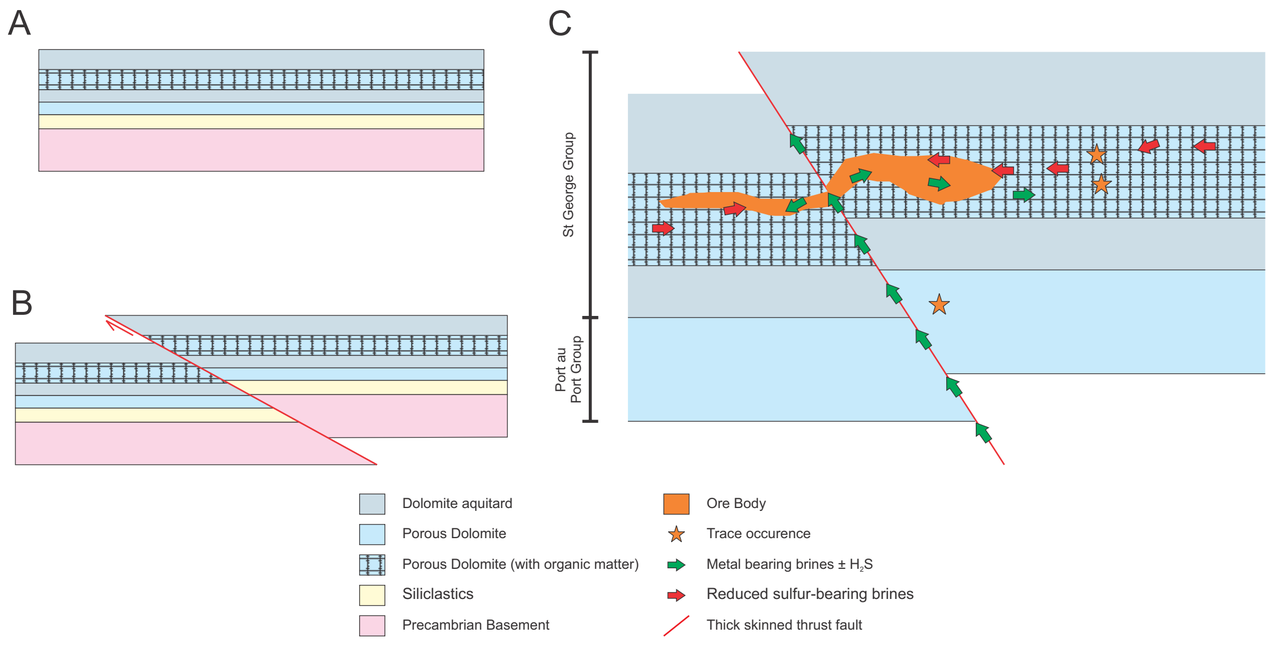


Diagram of $\delta^{34}S$ values in galena, sphalerite and pyrite from select Zn occurrences on the Great Northern Peninsula. Also included is data from the Daniels Harbour deposit (from Lane, 1990).



A) Photomicrograph of sphalerite lining a fracture at the Round Pond Deposit, with EMPA traverse marked in red (X to X'). B) Concentration of Fe and Cd (ppm) in sphalerite along EMPA traverse X to X'



Schematic genetic model for Zn-Pb mineral deposits on the Great Northern Peninsula. A) Deposition of platform sediments on continental margin. B) Thrusting during Taconic and Acadian orogenies. C) Migration of metal bearing brines along thrust faults, and mixing with sulphate-bearing brines (or organic matter) at site of ore deposition in porous dolostones