

SECTION REVIEW 2016

Overview

The Geochemistry, Geophysics and Terrain Sciences Section draws on a range of geoscience, including aggregate resource assessments; till, and lake-sediment and lake-water geochemical surveys; surficial geological and ice-flow mapping; geophysical surveys, compilations and interpretation; environmental initiatives, including geological hazard mapping and coastal erosion monitoring; and laboratory services including geochemical and particle-size analyses. The section currently has a staff of 11, with a new geologist expected to join us shortly.



As part of the Survey's ongoing regional surficial mapping and sampling program, **Heather Campbell** and **Jennifer Organ**, assisted by **Dave Taylor** and **Robyn Constantine**, carried out fieldwork in central

Newfoundland. Road access is limited over much of the area, and a helicopter was used to collect samples at 75% of the sites. The remainder were collected using truck and ATV. Analyses of these samples are expected to be released in 2017.



Preliminary observations indicate areas of hummocky terrain, punctuated by minor bedrock areas and areas of till veneer and bog, sandy tills derived from granitic, and siltier till derived from metasediments, volcanic rocks and ultramafics. Winnowed and eroded remnants of moraine ridges, glacial fluvial deposits and boulders are present in the west, while till veneer, thicker till blanket and rock cover predominate in the east. Striation measurements and large scale landforms are consistent with a southeastward ice flow, with a few measurements indicating flow to the south. Sulphide mineralization was observed in some till clasts.



Heather also had the opportunity to participate in the GEM2 Hudson-Ungava Core Zone project with the Geological Survey of Canada in western Labrador. The aim of the project was to understand ice-flow patterns of the Labrador ice centre, characterize glacial landscapes and determine glacial dispersal and sediment transport and deposition north of the Smallwood reservoir. The work represented the third and final year of work in this project and focused on the southwestern portion of the Woods Lake 1:250,000 NTS map sheet.

The northwest of the study area is dominated by till veneer and exposed rock. The lowlands in the south-central portion are dominated by wetland and washed till. Much of the southwestern portion has been eroded by water; and channels incised in bedrock are also present in the northwest and east. The southern portion (including the Smallwood Reservoir) was washed by water from a glacial lake (informally named 'Glacial Lake Low') up to a height of approximately 8 m above the current level of the reservoir. Depositional glacial landforms are extensive; with large eskers and esker complexes leading into the Smallwood Reservoir; and rogen moraine on the western portion of the survey area.



In April, Jennifer and Heather took part in a research cruise along the south coast of Newfoundland, at the invitation of Ulster University's Paul Dunlop. This was focused on collecting new data on submarine moraine systems at the mouths of fjords, as part of the Newfoundland Ice Sheet Shelf (NISS) project.

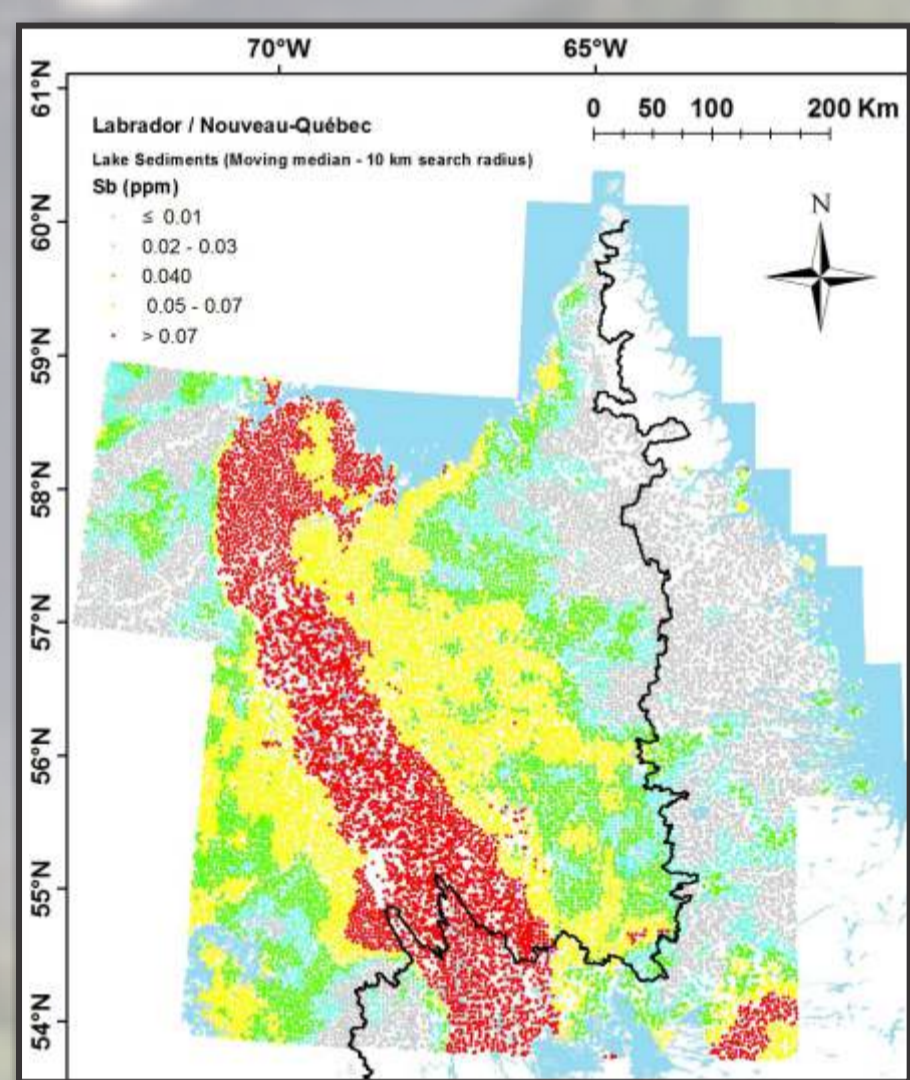
The project is a collaboration of researchers from Ulster University (UU), the Marine Institute of Ireland (MII), Memorial University of Newfoundland (MUN) and the Geological Survey of Newfoundland and Labrador (GSNL), funded under the MII 2016 'Ship Time' Program.

The work comprised the collection of sediment cores, using a vibrocorer, and gravity corer, from known glacial moraine locations, as well as mapping fjord mouths using multibeam and seismic surveys to locate other glacial moraines.



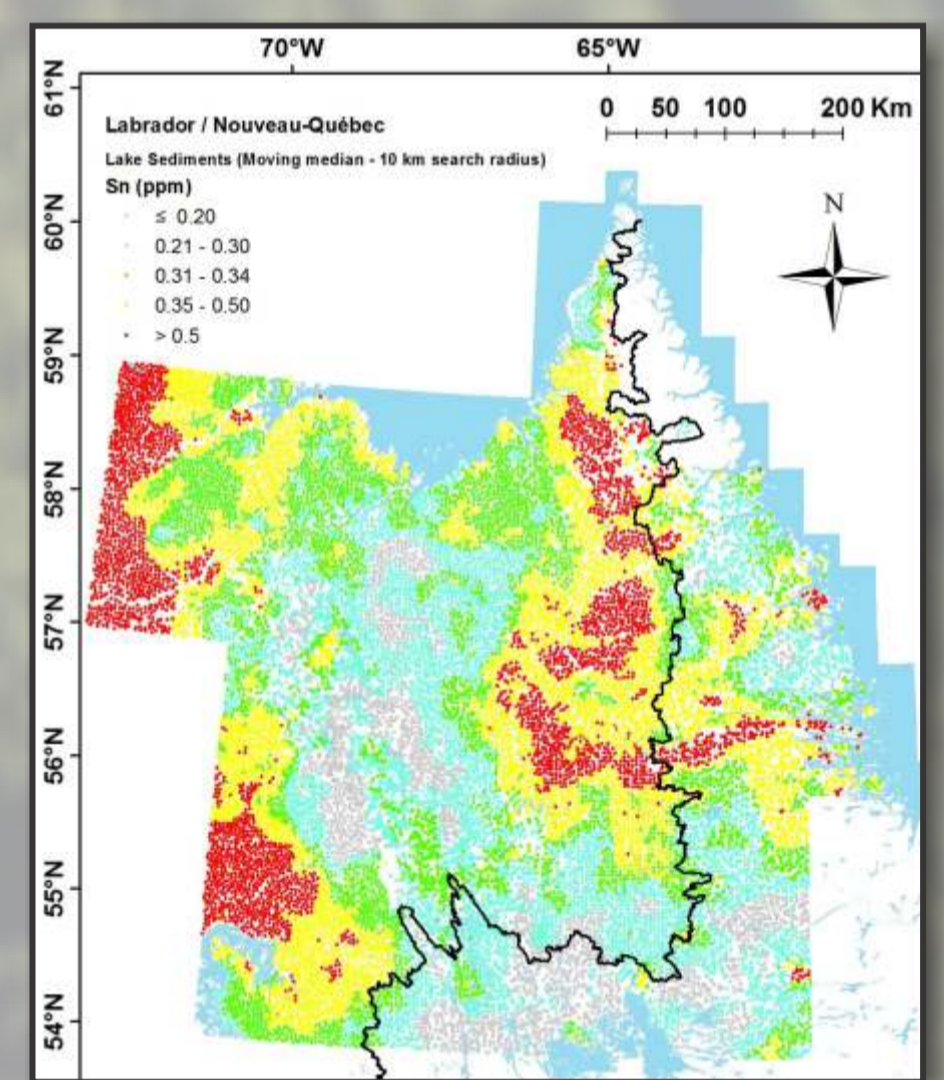
Quaternary Studies

Regional Geochemistry

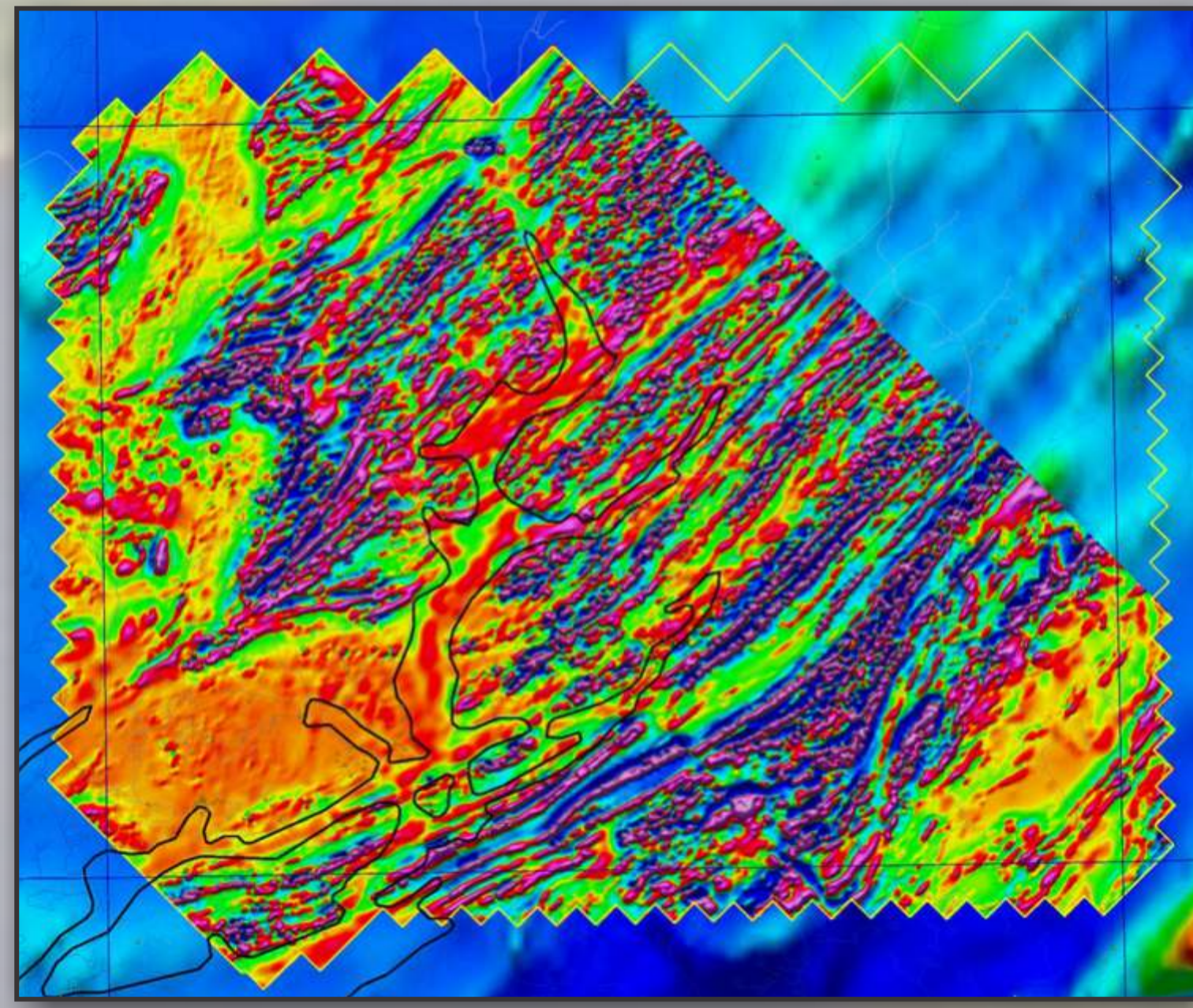


Steve Amor has been working on the compilation of lake-sediment data from western Labrador and the adjacent region of Québec. The Geological Survey of Canada (GSC) has re-analyzed 5,510 samples from the former region by the same method as that applied to samples from the latter, and this has enabled the two datasets to be combined, and for regional maps to be combined without discontinuity issues. These will be published as a joint open-file release between the GSNL, the GSC and SIGÉOM (Québec).

Preliminary maps show the very distinct Sb signature over the Labrador Trough (on the left), and the previously undocumented Sn signature (on the right) in the dispersion train from the Strange Lake / Lac Brisson REE/RM deposit. Steve has also provided advice to prospectors and exploration companies on the effective use of geochemical methods and in the interpretation of their results.

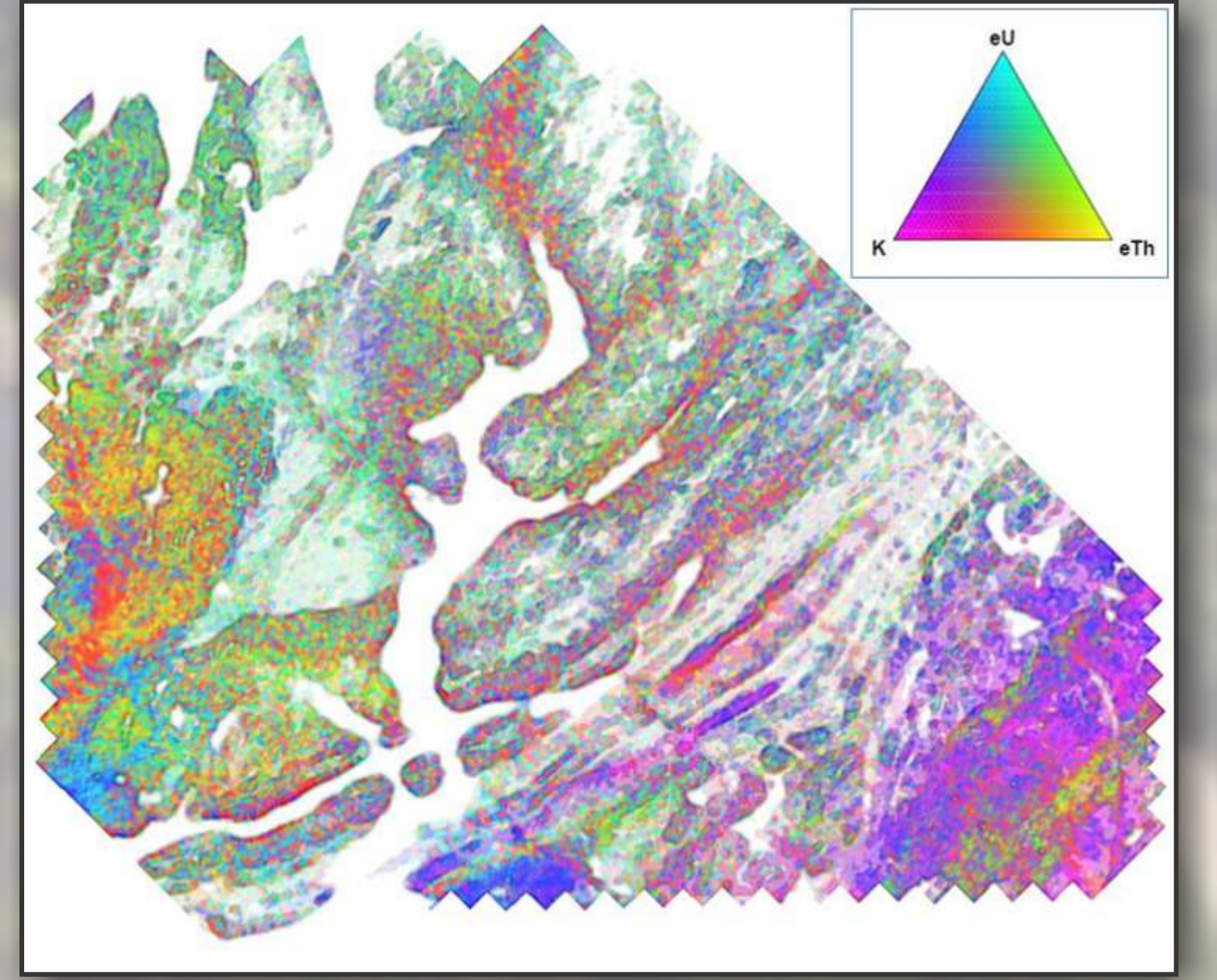


Geophysics



Gerry Kilfoil and **Robyn Constantine** have continued to reprocess geophysical data from surveys flown by the private sector, to yield standardized, high-quality imagery and map products. During the past year, the results of several older surveys from archived paper maps and data listings have been digitally captured. An index of airborne surveys, available through the on-line Geoscience Atlas, has been maintained and updated as data become available. As in previous years, geophysical guidance has been provided to prospectors and mineral exploration companies upon request. As well, newly acquired geophysical data are quality-assured to meet specified standards and formats.

A combined airborne magnetic gradiometer and radiometric survey of the St. Alban's map area was flown in late 2015. The results were released in April as digital Open File NFLD/3272. The map to the left shows the first vertical derivative of the magnetic field recorded during the survey (bright colours), superimposed on a lower-resolution magnetic background from an earlier regional survey (mostly blue colours). Note the area with a strong NE-SW linear fabric in the central part of the survey, over



layered volcanic and metasedimentary rocks of the Baie d'Espoir Group. The map to the right is a ternary image generated from gamma-ray spectrometric measurements, which represents the 3 radio-element concentrations (U, Th & K) as varying intensities of 3 primary colours. On this map, areas having a specific colour tone can often be correlated with specific rock types.

Environmental Geology



Melanie Irvine continued to work on the Geological Survey's coastal monitoring program, observing and recording rates of coastal erosion and changes in beach profiles. Using a drone, or an Unmanned Aerial Vehicle (UAV), cliff and beach areas were surveyed, and multiple images recorded for processing, resulting in a level of detail and high-resolution imagery unavailable in previous surveys. This new method allows for the production of 3D models that show the stratigraphy of exposures; processes causing erosion; access to sensitive areas such as sand dunes or unstable cliffs; and the rapid collection of a large quantity of data. With future data acquired in this way, the erosion rates of the cliffs and volumetric changes of beaches will be determined and information integrated with previous datasets.

Melanie has continued to provide advice to stakeholders on issues relating to coastal erosion, flooding, climate change, landscape hazards and land-use planning. She presented a talk on the coastal monitoring activities of the survey and led a study tour (attended by a wide variety of experts including land use planners, geographers, engineers, geologists and local politicians), focusing on coastal erosion in the Avalon peninsula as part of the COINAtlantic Climate Change Forum.



Digital Data

David Taylor continued to coordinate the integration of digital data with the on-line Geoscience Atlas. One new surficial geology map (Sheffield Lake) is nearing completion, bringing the total to 111 surficial maps for the Island of Newfoundland and 38 for Labrador. New striation data collected during the 2016 field season are currently being edited and will be added to the striation dataset. Updates to the till geochemistry dataset include new data for the Miguels Lake area, and areas south and west of Jeddore Lake, Bay d'Espoir region. Similar updates, to include the most recent data, have been made to the surficial landform dataset. A new initiative, started in 2015 to scan and rectify approximately 2000 1:15,840 scale peatland inventory maps for the island of Newfoundland, continues. Approximately 1500 maps have been scanned and rectified.

Laboratory

The Geochemical Laboratory, staffed by Director **Chris Finch** and chemists **Rey Roldan**, **Lisa Walsh** and **Jennifer Kelly** is mandated with the task of performing all analytical requirements of the Geological Survey. A pilot study of water analysis for the town of Torbay initiated by the Department of Environment and Conservation to monitor the quality of well water in that community was completed last winter. As a result of this study, the program is to be expanded to provide this service to residents of the province. The final approval and roll-out are pending.

2016 PROJECTS NEWFOUNDLAND & LABRADOR

