

SECTION REVIEW 2014

Overview

The Geochemistry, Geophysics and Terrain Sciences Section covers a range of geoscience, including aggregate resource assessments; till- and lake-sediment geochemical surveys; surficial geological and ice-flow mapping; geophysical 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 13.



Sampling of till and lake sediment (and water) constitutes an important component of the survey's activities.



In March, Jennifer Kelly replaced Krista Hawco as a Mineral Laboratory Chemist.

Quaternary Mapping



Denise Brushett conducted surficial geological mapping and till geochemistry sampling in the Eastern Pond and Miquel's Lake areas (NTS map areas 2D/11 and 2D/12) in the second year of a multiyear field program in south-central Newfoundland. The main field objectives were to collect samples for a regional till-geochemical survey, complete surficial mapping and reconstruct the glacial history of the area to support mineral-exploration activities. Through a combination of road-, ATV-, and

helicopter-supported field work, 608 samples were collected from the C- or BC-horizons of hand dug pits. Eleven previously unrecorded striation sites were recorded and indicate that the area has a complicated ice-flow history, and was affected by multiple ice-flow directions ranging from the northeast to the south. The lithology of clasts retrieved from diamictons will also provide an indication of provenance.

Helicopter-supported till geochemistry sampling, and surficial geological mapping were also conducted in the St. Alban's and Cold Spring Pond areas (NTS map areas 2M/13 and 12A/01). A bulk-till sampling project was also conducted in this area. Eight bulk till samples were collected to follow up on chromium and nickel anomalies found in lake-sediment data, and to better delineate and characterize a ribbon-shaped dispersal train in the area.

Before going on maternity leave, **Jennifer Organ** completed a comprehensive synthesis of the till geochemistry of the Red Indian Lake Basin (Open File 012A/1562).

John McConnell will release a comprehensive open file report this fall, summarizing the results of a three-year geochemical survey over seven areas in southern Newfoundland. The report provides summary statistics of the geochemical data, correlation analysis of selected data, histograms, cumulative frequency plots, sample-location maps and symbol maps showing the distribution of most elements and other measured variables for sediment and soil samples. The symbols are overlain on maps showing drainage features and detailed-scale geology. Geochemical and field data for about 1100 stream-sediment, 950 soil and 235 rock samples are included in the report.



The study demonstrates that stream-sediment and soil sampling are effective methods of delineating most known granophile (tin, tungsten and molybdenum) mineral occurrences in these areas. As well, several areas with anomalous stream-sediment and soil samples have been identified which suggest the presence of presently unrecognized mineralization.

As well as providing advice and assistance to the mining and prospecting community, **Steve Amor** has been investigating the potential of merging lake-sediment data from Labrador and the adjacent regions of Quebec, compiling a comprehensive directory of untested lake-sediment anomalies in Newfoundland and Labrador, and streamlining the quality-assurance process for geochemical analyses. He also planned and supervised the lake-sampling program conducted by **Jerry Ricketts** in Labrador. This involved the collection of about 600 sediment and water samples on NTS map areas 13A/03, 13A/06, 13A/11 and part of 13A/14, and completes the detailed coverage, commenced in 2006, of a large area of southeastern Labrador whose geology suggests it to have enhanced mineral potential.



Earlier this year, Steve released an open file report (LAB/1625) showing that the relative proportions of clastic and organic material in lake sediments exert a major influence on the content of many elements, but that the effects of this phenomenon can be compensated so that geological features become more apparent.

Geophysics

Gerry Kilfoil continued to provide geophysical guidance to the mineral industry, as well as assuring that new geophysical data submitted to the department meet the required standards and formats. **Robyn Constantine** has provided technical assistance by standardizing data formats and generating images from recently released results of airborne geophysical surveys flown as part of mineral exploration programs.



The index of airborne surveys, available through the on-line Geoscience Atlas, has been updated at intervals to include recent releases of airborne data flown by mineral exploration companies. When the new version of the Geoscience Atlas was released earlier this year, the geophysical content on the Atlas was significantly upgraded with the addition of high resolution images derived from large government-sponsored surveys from various parts of our Province. We strive to improve the presentation and organization of this information within the Atlas menus. During the past year, we have also digitally captured the results of several older surveys from archived paper maps, as well as data listings not previously georegistered.

Aggregates



The overall objective of the granular-aggregate assessment projects (**Jerry Ricketts**, Project Geologist) is to locate, map and sample all sand, gravel and sandy-till deposits that may be suitable as granular-aggregate resources for use by the construction industry. Results of this project will help road builders, contractors, consultants, and others to determine sources and quality of material available in a given area, and the distance to transport these materials to a specific job site. In 2014, work was mostly office-based, to continue updating aggregate maps from blue-line to digital maps. To date, 214 maps have been digitized, and ten remain to be updated. These are expected to be finished by April, 2015.

Environmental Geology



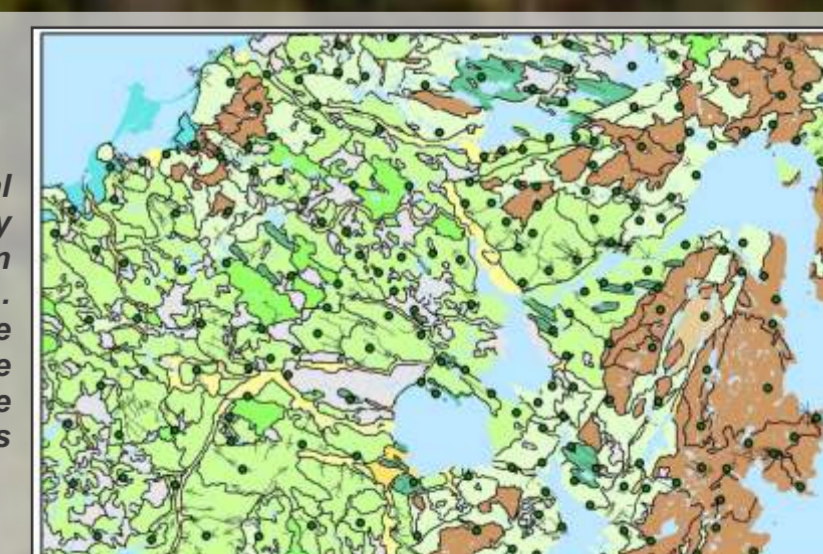
Melanie Irvine continued working in coastal areas in Newfoundland and southern Labrador as part of the Coastal Monitoring Program. There are 110 monitoring sites in the province, of which 48 were monitored in 2014. In the summer of 2014, new sites were established at Witless Bay, Shoal Point, Boswarlos, Norris Point and Wreckhouse. Coastal areas are dynamic, with rates of shoreline change varying between sites from a few centimetres to over a metre or more per year. Areas with rapid rates of short-term erosion include Sandbanks Provincial Park, J.T. Cheeseman Provincial Park, Point au Mal, Holyrood Pond, and Point Verde. Unconsolidated coastal areas are eroding due to waves, ground water, surface run-off, wind and rising sea levels. Severe storms, coinciding with high tides, have resulted in substantial erosion over a short period.



Digital Data

David Taylor continued to coordinate the integration of digital data with the on-line Geoscience Atlas. Two new 1:50 000 digital surficial geology maps have been added to the Geoscience Atlas on the Survey's website, bringing the total to 107 for the island of Newfoundland and 38 for Labrador. New striation data collected during the 2014 field season is currently being edited and will be added to the striation dataset. Work continues on updating the Carbon-14 database with completion expected in 2015. Two new till-geochemistry open files (Fogo Island and Red Indian Lake Basin) have been released with data being added to the online dataset, bringing the total number of records to 16,804. Similar updates, to include the most recent data, have been made to the aggregate resources and surficial landform datasets.

Regional till-geochemistry sites overlain on surficial geology. All data are available from the survey's online Geoscience Atlas



Laboratory Services

The Geochemical Laboratory of the Department of Natural Resources is mandated with the task of performing all analytical requirements of the Geological Survey. The Geochemical Laboratory is located in the Howley Building, Higgins Line, St. John's. It consists of four staff: the Laboratory Director (**Chris Finch**) and Mineral Laboratory Chemists **Jennifer Kelly**, **Rosauro Roldan** and **Lisa Connors**.

The laboratory carries out analysis for approximately 65 elements with an annual production of over 200 000 determinations. Most of the analyses for trace and major elements are carried out using Inductively Coupled Plasma-Emission Spectrometry (ICP-ES) and Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). Other selective methods for LOI, FeO, Fluoride, Conductivity and pH are also used.

This past year has seen the implementation of a fully automated Mettler Toledo ion meter. This provides automated determination and data capture of pH, conductivity, ferrous iron and fluoride measurements.

