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DNR Geologists Lead Prospectors on a Fall Field Trip

The Nova Scotia Prospectors Association held its annual fall field trip on September 17 and 18, 2016, and visited several sites of interest in southwest Nova Scotia. Former DNR geologist George O'Reilly led the trip, with help from Ron Mills, Denise Brushett and Geoff Baldwin of the Geoscience and Mines Branch.

After meeting near Exit 11 on Highway 103, and with beautiful weather in hand, the first site visited on Saturday morning was the nearby Blockhouse Gold District, where exploration by the famous Walter Prest took place. Prest's landmark study conducted in 1896 (see p. 5) was a textbook glacial exploration play and provided a blueprint for modern exploration in glaciated terrain. The site will soon see new exploration, but on this day the group of 25 prospectors did a bit of nugget rock-hounding and a few collected panning material. A short drive into Queens County led to a spectacular exposure of andalusites in pegmatite at Western Head, sandwiched between clear blue skies and a dark blue ocean. After a stunning oceanfront lunch (see photo below), the group took to the roads to see other migmatitic textures related to pegmatite emplacement at Summerville and finally beryl in pegmatite at Hunts Point before retiring for the day.

Sunday provided a bit of cloud cover and cooler temperatures as the group left for the morning's first site visit to a quarry in Waterloo where an interesting exposure of Moser's Island Formation exhibits high-grade manganese close to the Goldenville-Halifax Transition Zone. Next, the group moved on to several sites near Westfield, including the River Zone, where a progressively leucocratic-altered granite and



Lunch time on Day 1 of the Prospectors Association field trip was spent at Western Head, Queens County.

contact-altered host have provided high-grade gold assays, and where spectacular silver (some specimens over 170 g Ag/t) has been found in a remarkable vein system that has seen little exploration. The Jumbo vein was also visited, where gold assays greater than 30 g Au/t in high-grade sites have been reported. This site provided historical perspective as the centre of one of the largest stock scams of its day. With weather closing in, the group descended on Caledonia and hiked to old trench sites on the cassiterite- and scheelite-bearing veins that provided one of the best exploration targets of the 1970s (see *The Geological Record*, v. 2, no. 2, p. 5).

A provident Mother Nature held off her rain until the dying minutes of the field trip, but the skies opened as the prospectors said their good byes and thanked the four DNR-sponsored field trip leaders for their effort and experience.

Ron Mills

Cumberland Municipality to Study Geothermal Resource

Historical underground coal-mine workings in the Springhill area extend to a vertical depth of 1320 m. Today, they contain millions of cubic metres of water that, due to the natural increase in temperature with depth, could be warmed to 25°C. That's a huge potential thermal energy resource for the local economy.

So far only the relatively shallow part of the resource has been tapped, where water temperatures are between 12 and 14°C. In September 2016, the Municipality of Cumberland issued a request for proposals for two studies that will help to characterize the resource and evaluate its potential at depth. The studies will consist of (1) a Geographic Information System (GIS) study to validate earlier work that mapped the extent of the underground workings and (2) a three-hole drilling program into the deeper sections of the mine workings. The program was recommended by the Verschuren Centre for Sustainability in Energy and the Environment at Cape Breton University.

Patrick Whiteway



Touquoy Update: Gold mine development by Atlantic Mining NS Corp. (formerly DDV Gold Ltd.) is moving ahead at the Touquoy deposit, 110 km northeast of Halifax, as seen in this photo (above) taken on September 21, 2016. Visible in the foreground is the 'mini pit' that was mined in the late 1980s, as well as various haulage roads and temporary mine offices. In the background is the cleared site where Atlantic Mining is constructing a mineral-processing facility designed to annually recover 84,000 ounces of gold from 2 million tonnes of ore. The tailings management facility will be situated just out of the view of this photo to the right. DNR holds a reclamation security for the site, which will increase in stages, commensurate with the level of disturbance. The photo is used with the permission of Atlantic Gold Corporation.

Thirty Years After

The summer of 1986 was a milestone in survey work for the former Department of Mines and Energy (now DNR's Geoscience and Mines Branch). At the time, the province was creating the database for a geochemical atlas, and information for northern Nova Scotia was local and unreliable. It was decided to survey the entire Avalon portion of Nova Scotia, using consistent methods, over the 1986 and 1987 field seasons. The southern half of the province had been sampled for lake sediments, but it was decided that stream sediments would be the medium in northern Nova Scotia due to a lack of lakes. With a budget of \$600,000, workers on the project collected over 3,500 bulk stream sediment samples, analyzed the samples for over 30 elements, and conducted water analyses, field determinations of media and visual inspections.

Samples came from roadsides, deep bush, farms, around villages, national parks, islands and some protected ground. Survey teams mostly employed trucks, but sometimes found themselves hiking for days down raging highland streams. They used helicopters, ATVs and even utilized a large Winnebago motor home as a mobile field camp.

When data from the project were released, there was a staking rush that resulted in over 800 claims staked, over \$1.5M of immediate exploration expenditures and many millions more afterward. The Inco-Scominex Highlands project alone, discovered as a result of the new stream sediment data, saw expenditures of about \$2.5M and remains today under constant exploration as one of the province's best gold exploration assets.

One can argue, however, that the greatest assets this survey produced were the people themselves. DNR employed a group of young, inexperienced geology students, 12 in the first year and 10 the next. They grew up fast, collecting material for analysis in some of Nova Scotia's harshest terrain. Some went on to have great careers in geology. Regrettably, project leader Paul Lombard died at age 39. Others went on to become teachers, pilots, lawyers, and to work in corporate life, run businesses and become entrepreneurs. One went to the Olympics. Most raised families with tender hands. All have been great contributors to our society, none forgetting the days when they were thrown into a learning experience that changed most of them forever.

Ron Mills



Field crew on the grounds of Ben Eoin in 1987. Back row (L to R) pilot Mason Watt, Dan MacPherson, Eric Myketyn, Andy MacDonald, Paul Lombard, Debbra Wilkinson, Kathy Hattie. Middle row Ron Mills (kneeling), Tom MacNeil, Joey Pelham, Pam James, Gord Dixon (kneeling). Front row Steve Sampson, Karen Kaiser, Cathy Lewis.

“Keeper of the Cliffs” Don Reid Awarded the Order of Nova Scotia

In September, the 2016 recipients of the Order of Nova Scotia were announced. The list included a respected Mi'kmaq Elder and a Nobel Prize winner. The list also included a longtime friend of the Nova Scotia geoscience community, Mr. Don Reid.

I have known Don Reid since we worked together on a farm crew at Nappan in 1975. He and my dad, who was the senior Research Scientist at the Nappan Experimental Farm, had a deep respect for one another, and it was that bond that first connected us. Neither of us knew then how deeply entwined our lives would become. Nor did I know then that Don had a passion for fossils, an ability that surpassed most newly minted Ph.D.s, and that we would spend countless days on the cliffs of Joggins and afterward in his kitchen with tea looking at specimens through his binocular microscope. With Don, I would learn more about the fossil record of Joggins than I ever could in all the publications available to me.

Don is the son of a coal miner. He had to leave school at a young age to work at the mines when his dad was injured. His collection of fossil life at Joggins is rivalled only by that of Sir William Dawson, which is divided between the Redpath Museum at McGill and the Natural History Museum in London. He proudly owns the title “Keeper of the Cliffs,” and made the selfless act of giving his life’s collection to the new Joggins Fossil Centre to support what would be its successful bid to become a UNESCO World Heritage Site. At 94, Don still puts on his knapsack and walks the beach below the cliffs that he loves, knowing that each day, he will cast eyes on life from the Coal Age.

The full citation for Don Reid can be found here: <http://novascotia.ca/iga/2016recipients.asp>. The awards were presented at Province House on October 12.

John Calder



Fifty-first Annual Gem and Mineral Show in Parrsboro

On the weekend of August 19-21, 2016, the Fundy Shore was buzzing with visitors for the 51st Annual Gem and Mineral Show. The Geoscience and Mines Branch was among more than 30 exhibitors in Parrsboro’s Lion’s Arena, where over 4000 attendees walked through the exhibits of spectacular gems, minerals, jewelry and metalwork. DNR staff members Ron Mills and Diane Webber, along with three summer students, showcased native Nova Scotia rocks and minerals, and provided specimen identification and geoscience expertise to hobbyists and collectors of all ages. DNR geologist John Calder led field trips to West Bay and Partridge Island, while retired DNR geologist Howard Donohoe led a field trip to Five Islands.

Enthusiasts enjoyed a full weekend of demonstrations, field trips, workshops and geological events. People learned how to pan for gold, make jewelry and much more. Many enjoyed the guided Jurassic Dinosaur Tour along the coast where fossils from Canada’s oldest dinosaurs are located. The Fundy coastline provided a spectacular setting and some stunning sunsets.

The Gem Show is truly a provincial treasure, so mark it in your calendar now for August in 2017!

Diane Webber



DNR display at the 2016 Gem Show.

So Long and Thanks for the Experience

This past summer, I worked as a student assistant with DNR’s Geoscience and Mines Branch, where I helped to map the Cobequid Highlands. We traversed safely through the forest collecting data and samples, and prepared and analyzed samples for geochemistry. My supervisor willingly shared his technical expertise and encouraged me to ask questions. This helped me to improve my knowledge of structural geology, igneous petrology, geochemistry and sampling strategies.

The support of my supervisor and my experience with the Government of Nova Scotia helped me to secure a full-time position with the Saskatchewan Geological Survey, starting in January. I would like to express my gratitude to DNR, and my supervisor Dr. Trevor MacHattie, for an excellent summer employment experience.

Samantha Van De Kerckhove

From the Mineral Inventory Files

Walter Henry Prest: a Nova Scotia Prospecting Pioneer

Nova Scotia has produced geologists and prospectors of international acclaim, including the likes of Sir William Dawson, President of McGill University, his son George Dawson, first Director of the Geological Survey of Canada, Robert Henderson, co-discoverer of the Klondike, and Edmund Horne, discoverer of the Rouyn-Noranda base-metal deposits and founder of Noranda Inc. There is another native son who belongs on the list: Walter Henry Prest. Prest was born in Spry Harbour in 1856 and died in Halifax in 1920. Like many scientists of his day, Prest wore several hats: he was a prospector, surficial geologist and botanist, all stemming from his love of the outdoors. He authored several books and pamphlets, but it is his innovative work on prospecting for gold in glaciated terrains for which he deserves most acclaim, especially a study he carried out at Blockhouse, Lunenburg County, in 1896.

Blockhouse was a small gold producer (1,788 oz. reported) with an interesting history. Very rich Au-bearing drift was discovered near Blockhouse in 1894 (Fig. 1). Over the following 12 years several prospecting attempts failed to determine the Au source. These used the conventional wisdom that the province's Au-bearing veins are interbedded and oriented east-west, so one simply trenches north from a location of Au-bearing drift to find the source veins. This clearly was not working at Blockhouse and, in fact, one N-S trench was dug just over 1 m from what was eventually discovered by Prest to be the source of the Au at Blockhouse, a N-striking quartz fissure vein.

William Prest, because of his good reputation, was contracted in 1896 to take over the search. The first thing he did was study the character of the Au-bearing quartz boulders, concluding that their source was a fissure vein. He then established the direction of glacial transport to be toward the southeast and laid out two lines of three timbered pits

to bedrock (shown in the area of the B on Fig. 1). He then panned the till profile in the pits and found five of the six had Au-bearing drift and, importantly, the rich drift occurred in the top third of the profiles. Continuing up-ice (northwest) he dug three more pits across strike of the ice-flow direction, and in these found that two contained Au and the other was barren. This, together with the distribution of Au in the first six pits, established the width of the "Au plume" in the glacial till (Fig. 1). Continuing toward the northwest with more pits, he followed the Au plume and also determined it was descending down through the till profile until it finally reached the till bedrock interface some 200 m NW of where his prospecting program began. In short order the source of the Au-bearing quartz was found, a rich Au-bearing shoot along a N-trending quartz fissure vein. In recognition of Prest, the vein was named the Prest Fissure Vein and became the district's most prolific Au producer.

Prest documented his systematic drift prospecting approach in the *Journal of the Nova Scotia Institute of Science* in 1896. For this Prest may be deserving of global acclaim as some years ago now retired DNR surficial geologist Ralph Stea carried out a literature search and determined that the Prest paper may be the first published documentation of a drift prospecting program. Prest again summarized this study in his book *Gold Fields of Nova Scotia, a Prospectors Handbook* published by the Industrial Publishing Co. Ltd., Halifax, in 1915. A must-read for any serious prospector, especially those in Nova Scotia, this book is rare but is readily available online free of charge as a PDF via a simple Google search. One can tell by Prest's comments and writing style that he was a colourful individual, quick to denigrate "greenhorns," but clearly a strong advocate of the mining industry in Nova Scotia. We could use a few more like him.

G. A. O'Reilly

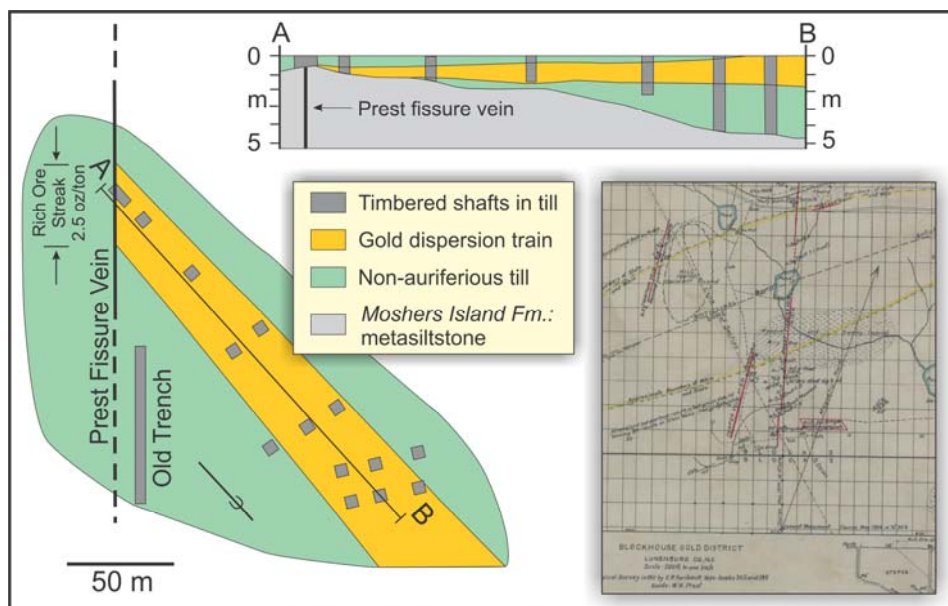


Figure 1. Diagram of a drift-prospecting program carried out by W. H. Prest in Blockhouse in 1896. Inset map is E. R. Faribault's 1911 map of the Blockhouse Gold District.

Targeted Geoscience Initiative: Phase 5

The Targeted Geoscience Initiative (TGI) is a collaborative program of the Geological Survey of Canada (GSC) that provides industry with new geoscience knowledge and innovative techniques for more effective targeting of buried mineral deposits. The objectives of TGI Phase 5 are (1) to characterize key post-orogenic porphyry-style ore occurrences and their enveloping hydrothermal systems through novel analytical approaches and (2) to resolve how those metallogenic events fit within the tectonic framework and determine the fundamental characteristics for a predictive model of ore distribution.

The Nova Scotia aspect of this study is primarily focused on Cape Breton Island, where the 2016-2017 project year will be used to identify timing constraints for various igneous suites. To date, several samples have been obtained for $^{40}\text{Ar}/^{39}\text{Ar}$ and U-Pb ages and Sm-Nd isotopic determination. These results will be critical for graduate student projects that will begin in the summer of 2017. Samples were also collected from the Eastern Highlands shear zone for microstructural analysis to help direct future field investigations into the evolution and timing of this shear zone.

A study is also beginning in southern Nova Scotia to better constrain the emplacement history of the South Mountain Batholith and attempt to determine the date of formation of the East Kemptville Sn deposit. The East Kemptville deposit, and other mineral occurrences in the batholith, are believed to be broadly coeval with post-orogenic porphyry-style deposits in New Brunswick, Cape Breton Island and Newfoundland, but the current data quality is insufficient to determine potential correlations.

TGI5 will involve collaborative studies with DNR, Acadia University, Cape Breton University, Laurentian University, and the University of British Columbia – Okanagan.

Submitted by Chris White and Dawn Kellett (GSC)

Before and After at Springhill

The photos below illustrate how exploration is a temporary use of the land. From February to May 2016, Springhill Coal Mining Ltd. extracted a 7000-tonne sample of coal from three seams at a site near Springhill (top photo). That work was done under authority of a Special Licence issued by DNR. On August 16, 2016, DNR inspected the site after reclamation work neared completion (bottom photo). The coal sample was burned by Nova Scotia Power at its electric generating plant in Trenton. Results of that test burn will assist Springhill Coal Mining Ltd. to assess the economic viability of extracting more coal from the site. Should it prove to be economically viable, application to DNR for a Special Lease and approval from Nova Scotia Environment of an Environmental Assessment Report will be required.

Patrick Whiteway



The Global Geopark Wave

In September, more than 700 delegates from more than 40 countries gathered in Torquay, England, for the seventh International UNESCO Conference on Global Geoparks.

Global Geoparks, now a full-blown UNESCO program, is an international phenomenon, and one that is unlike any other that I've experienced in my nearly 40 year career. I was fortunate to be able to attend the Torquay conference, funded by the Canadian National Committee on Geoparks, to make a presentation on the growth of geoparks in Canada. It was also a golden opportunity to share with an international audience the collaboration between traditional geoscientific interpretation and that of the Mi'kmaw legends in the aspiring Fundy Cliffs Geopark along the Parrsboro shore.

Currently, there are 120 Global Geoparks in 33 different countries. These are concentrated in Europe and Asia, but are rapidly expanding in the Americas and Africa. Canada has two UNESCO Global Geoparks, at Stonehammer (St. John area), NB, and Tumbler Ridge, BC, and we hope that a third – Percé, in the Gaspésie of Québec – will soon join their company. Ten other sites across Canada are working away as aspiring geoparks, including the Fundy Cliffs of Nova Scotia.

The Global Geopark community harbours little competitiveness or suspicion that is the back story of many scientific meetings – the conference is all about sharing success strategies and challenges, and perhaps most of all is about networking between geoparks. To that end, seeds have been sown with Irish, Moroccan, and in particular Chinese geoparks that may see meaningful partnerships with Nova Scotia. It is hard to come away from a Global Geoparks conference without feeling good about humanity and how geology can make a difference – not a bad thing in these times.

John Calder



This photo of kames (glacial sand and gravel deposits) shaping the fall colours of blueberry bushes was taken near Lakelands, in the Parrsboro Gap. Although the Fundy's spectacular rock cliffs attract the most attention, the region's glacial geology is equally compelling.

Special Note

E-mail Notification

If you would like to receive an e-mail notice (with hot links) when new maps, digital products and publications are released, or when a new issue of *The Geological Record* is released, please send your e-mail address to DNR.Library.List@novascotia.ca.

Dates to Remember

October 27-29, 2016

Atlantic Universities Geoscience Conference, Acadia University, Wolfville, NS. For more information please visit <https://scienceatlantic.ca/ocs/index.php/auge/auge2016>.

November 2-5, 2016

Mineral Resources Review, Delta St. John's Hotel and Convention Centre, St. John's, NL. For more information please visit <http://www.nr.gov.nl.ca/nr/mines/mineral.html>.

November 6-8, 2016

Exploration, Mining and Petroleum in New Brunswick Conference, Fredericton Convention Centre, Fredericton, NB. For more information please visit http://www2.gnb.ca/content/gnb/en/departments/energy/conference/Conf_home.html.

January 23-26, 2017

AME British Columbia Exploration Roundup, Canada Place, Vancouver, BC. For more information please visit the web site: roundup.amebc.ca.

February 10-11, 2017

Atlantic Geoscience Society 2017 Colloquium and Annual General Meeting, Fredericton Inn, Fredericton, NB. For more information please visit the web site: <http://ags.earthsciences.dal.ca/ags.php>.