Natural Resources

Geology Matters 2014

Bedrock Mapping in the Cobequid Highlands, Nova Scotia **Trevor G. MacHattie and Chris E. White** Nova Scotia Dept. of Natural Resources, 1701 Hollis Street, PO Box 869, Halifax, Nova Scotia B3J 2T9

Experts on the ground

Opportunities on the ground

Geoscience and Mines Branch



In 2012, 1:10 000 scale bedrock mapping was initiated in the eastern Cobequid Highlands of Nova Scotia by the Department of Natural Resources (stations - blue circles; Map 1). This initiative was spurred by the discovery of a unique Rare Earth Element (REE) prospect, identification of new epithermal gold (Au) occurrences and a renewed interest in iron oxide-copper-gold (IOCG) exploration along the southern flank of the highlands.

In 2014, 1:10 000 scale mapping of the highlands continued westward, comprising the southern portion of the Springhill (NTS 21/H09) and northern portion of the Parrsboro (NTS 21/H08) 1:50 000 map areas, respectively (stations - green circles; Map 1).

Stratified geological units recognized in the highlands during the 2014 mapping include: (1) Neoproterozoic volcanic and volcaniclastic rocks of the Dalhousie Mountain Formation; (2) minor fault-bound sections of mafic volcanic rocks of the Folly River Formation; (3) Silurian siliciclastic sedimentary rocks; (4) Late Devonian to Early Carboniferous volcanic rocks of the Fountain Lake Group; and (5) Late Devonian to Early Carboniferous siliciclatics of the Horton Group.

Intrusive rocks include: (1) minor Neoproterozoic diorite, granodiorite and granite; and (2) voluminous Late Devonian to Early Carboniferous diorite and alkali-feldspar granite.

The Dalhousie Mountain Formation dominates the Neoproterozoic rocks exposed in the 2014 map area and includes two distinctive facies. The majority of the formation is fine grained, intermediate to felsic crystal lithic tuff and well-laminated tuff (volcanic ash; see Image 1). T more proximal facies includes volcanic/subvolcanic and associated volcaniclastic rocks ranging in composition from basalt to dacite and rhyolite (Images 2 and 3). Along the southern flank of the highlands, several thin (< 250 m wide) tectonic slices of the Folly River Formation mafic volcanic and volcanicclastic rocks are exposed.

Silurian rocks include fine sandstone and siltstone. These siliciclastic rocks characteristically display well-preserved sedimentary structures, locally intense bioturbation and fossil preservation, and commonly contain detrital muscovite.

Late Devonian to Early Carboniferous volcanic rocks of the Fountain Lake Group are exclusively bi-modal (basalt-rholite). Rhyolite dominates in the 2014 map area and three principal facies are recognized: (1) aphyric flow banded and folded lava flows (Image 4); (2) k-spar +/- quartz phyric lava flows and associated subvolcanic intrusives; and (3) pyroclastic rocks (ignimbrites) containing variable amounts of crystal and lithic fragments (Image 5) and lithophase (Image 6). Locally intense silica-sericite alteration has affected many of the lithophase-rich pyroclastics (Image 7). Basaltic volcanic rocks are predominantly vesicular, with massive fine-grained interiors (Image 8).

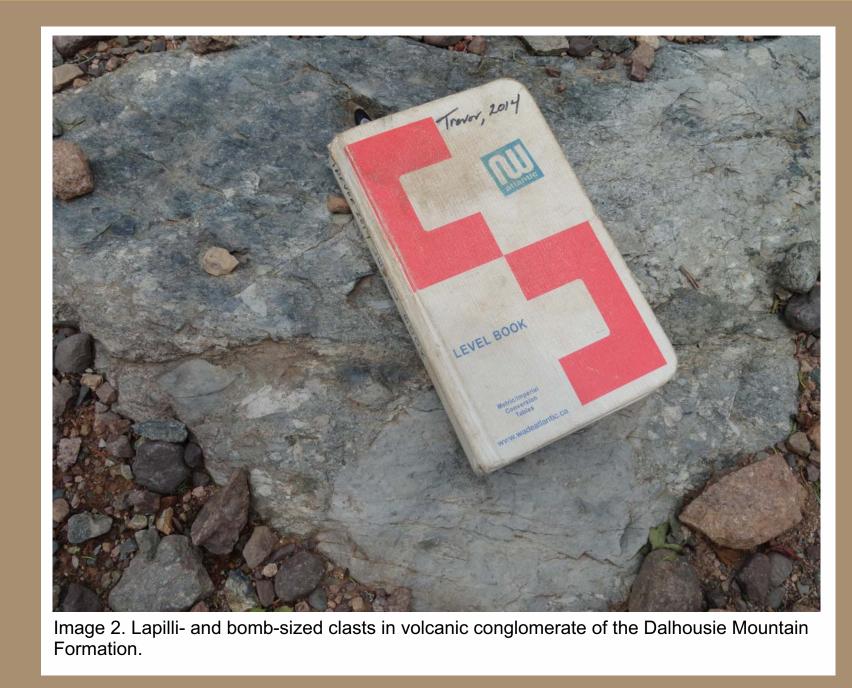
Late Devonian to Early Carboniferous siliciclastic rocks of the Horton Group include two principal facies in the 2014 map area. These include a fine sandstone/silstone dominated sequence (Image 9) and an orthoquartzite/quartz arenite dominated sequence with lesser interbedded siltstone (Image 10).

Although poorly exposed, Late Devonian to Early Carboniferous intrusive rocks constitute the majority of the highlands exposed in the southern portion of the Springhill (NTS 21/H09) map area. Gabbro/diorite and lesser co-eval alkali-feldspar granite are intruded by late diorite dykes (Image 11). To the south, along the northern flank of the Cobequid-Chedabucto Fault Zone (CCFZ), several Late Devonian to Early Carboniferous alkli-feldspar dominated granite bodes outcrop. These plutons also contain lesser co-eval diorite.

The northern margin of the highlands in the 2014 map area is unconformably overlain by Late Carboniferous polymictic pebble to cobble conglomerate (Image 12). The southern margin is defined by the CCCZ and south of this zone Late Carboniferous siltstone and sandstone of the Parrsboro Formation

Geological Mapping and Resource Assessment





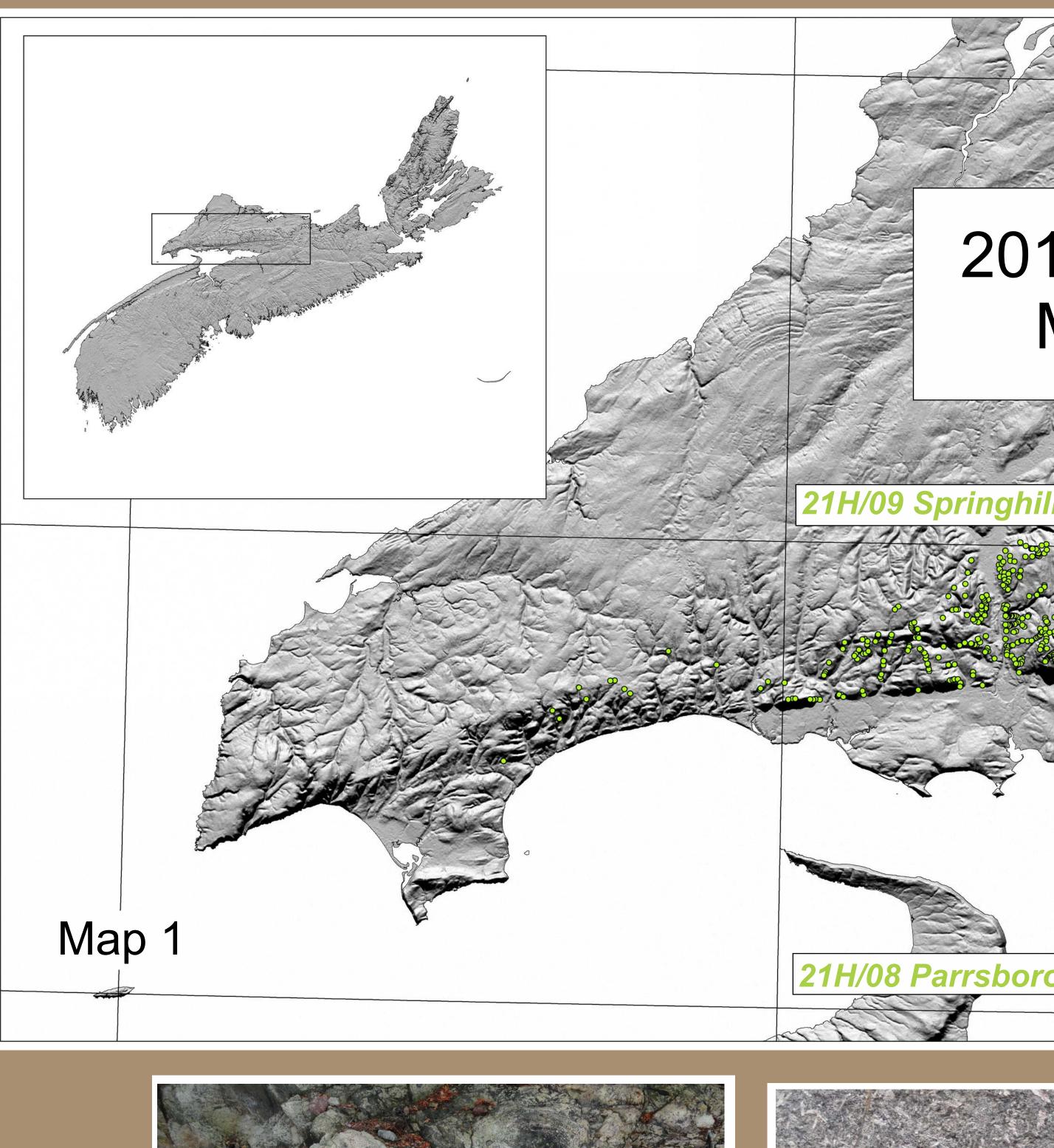


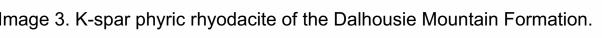


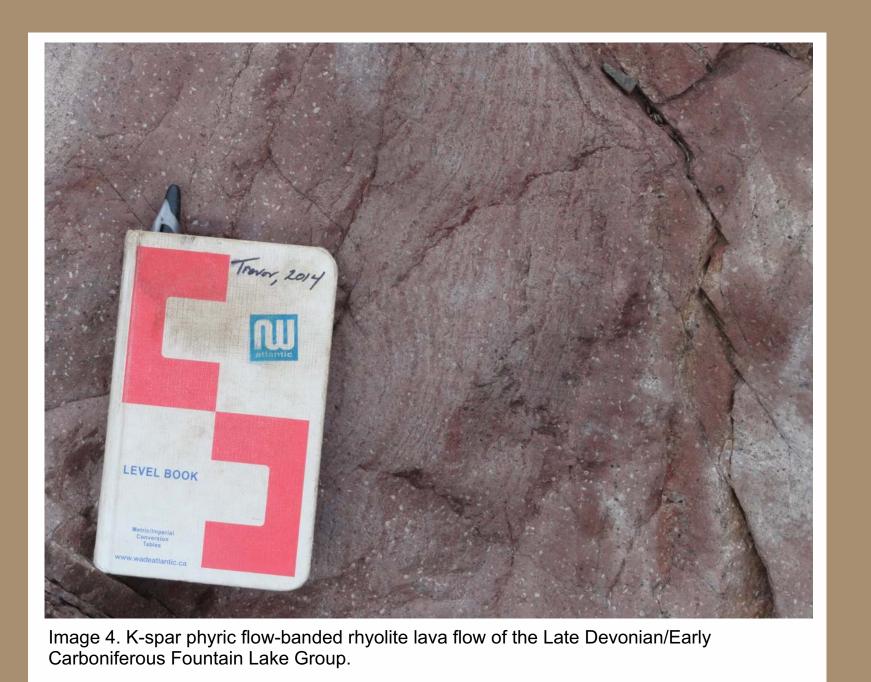
Image 7. Silica-sericite alteration in lithophase-rich zone in felsic pyroclastic flow (ignimbrite) of the Late Devonian/Early Carboniferous Fountain Lake Group.



mage 8. Massive basalt of the Late Devonian/Early Carboniferous Fountain Lake Grout









2014 Bedrock Mapping

2012-2013 Bedrock Mapping

siltstone/shale of Late Devonian/Early Carboniferous Horton Group.



Image 10. Cross-bedded quartz-arenite of Late Devonian/Early Carboniferous Horton



