

New perspectives on Carboniferous sedimentation, volcanism, intrusion and tectonic activity: western Cobequid Highlands, northern mainland Nova Scotia, Canada

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New bedrock mapping in the western Cobequid Highlands of Nova Scotia has revealed a complex Carboniferous geological history. The new mapping indicates that the western Highlands are almost exclusively comprised of Carboniferous sedimentary, plutonic, and volcanic rocks. The supracrustal rocks have been subdivided into four tectonostratigraphic assemblages. The oldest and largest assemblage consists of interbedded orthoquartzite, slate, and phyllite. This assemblage dominates the southern flank of the Highlands, outcropping in a narrow belt approximately 2–4 by 40 km long from Advocate to Diligent River. It is bound to the north by the Kirkhill Fault and to the south by the Cobequid Fault. Structurally this assemblage is characterized by a pervasive bedding parallel cleavage and regional polyphase folding. North of the Kirkhill Fault, between New Yarmouth and Allen Hill a second clastic-dominated assemblage consists of conglomerate, sandstone, siltstone, mudstone, calcareous mudstone, and vesicular basalt. Previous maps grouped this assemblage with the orthoquartzite, slate, and phyllite assemblage to the south. The conglomerate facies of this assemblage locally contains significant amounts of orthoquartzite clasts and abundant alkali-feldspar granite and related detritus, the latter closely resembling Carboniferous granites exposed throughout the Cobequid Highlands. This assemblage has been affected by two prominent phases of folding, but lacks significant cleavage development. The third lithological assemblage is exclusively volcanic in origin. Near Squally Point vesicular basalt flows and sills are intercalated with quartz and k-feldspar-phyric rhyolite flows and sills. Where examined, this assemblage does not display evidence of significant regional deformation. The fourth and youngest Carboniferous assemblage is comprised of polymictic pebble to cobble conglomerate and associated sandstone. This assemblage dips gently to the north and unconformably overlies the Highlands along its northern flank; however, the conglomerate does occur along its southern flank, south the Kirkhill Fault. This assemblage is considered to be part of the Late Carboniferous Cumberland Basin. A large body of alkali-feldspar granite and lesser diorite, yet to be fully examined, dominates the area between Eatonville, New Yarmouth, and Cape Chignecto. North of the Kirkhill Fault and extending east from the New Yarmouth area, similar granitic rocks are strongly foliated to mylonitic over a strike length of 20 km. To explain the field relationships between the various Carboniferous units of the western Cobequid Highlands requires a close spatial and temporal relationship between sedimentation and igneous and tectonic activity. These new data should be incorporated into Carboniferous basin development models.