

Southwestern end of the St. Martins–Stewart Mountain high-strain zone: Big Salmon River–St. Martins area, southern New Brunswick, Canada

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The St. Martins-Stewart Mountain high-strain zone divides the Avalonian Caledonia Highlands, into a southeastern segment, where predominantly volcanic rocks of the upper Coldbrook Group overlie volcanic and sedimentary rocks of the older Broad River Group (both Ediacaran) and plutonic rocks of the Point Wolfe River suite (and related plutons); and a northwestern segment comprised of lower and upper Coldbrook Group volcanic and sedimentary rocks intruded by the contemporaneous Bonnell Brook and related plutons. The high-strain zone reaches the southern coast of New Brunswick between Little Salmon River and St. Martins with a series of southerly splays. Associated with the Ediacaran units in this area are enclaves of Cambrian Saint John Group, and a volcanic unit (Fairfield rhyolite) with a poorly constrained Devonian age.

Construction of the Fundy Coast Parkway has created extensive new outcrop in this problematic area, and detailed mapping and structural analysis show that tectonic enclaves of Saint John Group are intercalated with Coldbrook Group rhyolite and mafic rocks and minor sedimentary rocks. Both the Ratcliffe Brook and Glen Falls formations are present, and above them, in ascending order: (1) grey-green siltstone, sandstone and shale, with minor purplish-grey mudstone; and (2) grey to black mudstone and siltstone. These last two units may correlate with the Hanford Brook and Silver Falls formations, respectively. One problematic unit contains rhyolite intercalated with grey-green siltstone-shale and red-brown siltstone-sandstone. The contact is deformed but not completely transposed. The age of the rhyolite is unknown and dating will permit assignment either to the Cambrian Saint John Group or the Ediacaran Coldbrook Group.

New radiometric dating has resolved one problem: the age of the Fairfield rhyolite – now shown to be ca. 620 Ma and most probably a wedge of Broad River Group between splays of the main shear zone. Another new radiometric age from a faulted block of mafic volcanic rocks along the coast, previously considered to be Coldbrook Group (Hosford Brook Formation) or Broad River Group (Hayward Brook Formation), or Devonian-Carboniferous Lorneville Group, at ca. 695 Ma is more problematic with no obvious correlatives in the area.

All the rocks through this area previously assigned to the “Seeley Beach Formation” of the Coldbrook Group, with the exception of the one problematic unit, are units of the Cambrian Saint John Group. The original relationship with Neoproterozoic rocks was an unconformity. Geometry of the tectonic enclaves is complex, but suggests partial entrainment into a right-lateral strike-slip duplex.