

STRATIGRAPHY AND STRUCTURE OF THE GRAND MANAN BASIN

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The Grand Manan Basin is a poorly described Early Mesozoic rift basin roughly 15 km wide by 45 km long, with its western margin a few km offshore from the eastern end of Maine. The only exposed portion is on the island of Grand Manan. This small basin is separated from the much larger Bay of Fundy Basin by a basement horst that is partly visible in The Wolves islands and eastern Grand Manan archipelago (all in New Brunswick). The spectacular Red Point Fault exposed on Grand Manan is the eastern border fault of the Grand Manan Basin, while the Fundy Fault that defines the western edge of the Fundy Basin is located by marine seismic survey maps about 20 km farther east. It is likely that faults bound the northern and western sides of the Grand Manan basin as well, but those margins and the southern end of the basin are not well located and are only inferred from the submarine floor topography and regional geophysical maps. Unlike many rift basins in eastern North America, border fault movements have left the basin strata relatively horizontal.

About 240 m of upper units of the basin rocks are exposed across western Grand Manan island. A thick cap of basalt on Grand Manan correlates well with 201 Ma Early Jurassic North Mountain basalt exposed on the western shores of Nova Scotia. Three members of the Grand Manan Basalt have been named: The lower Dark Harbour columnar member is a single flow of tholeiitic flood basalt about 110 m thick; the middle Seven Days Work member has 12 to 14 vesicular pahoehoe flows totaling about 50 m thick; and the upper Ashburton Head member is another single columnar flow more than 70 m thick with an eroded top. Up to 12 m of siltstone and sandstone are exposed beneath the Dark Harbour member along the western shoreline, which are correlated with the Blomidon Formation of Nova Scotia. Presumably, sandstone equivalent to the Wolfville Formation is also present, which likewise is the lowest stratigraphic unit in the Grand Manan Basin. That unit might be similar to arkosic sandstones exposed near the shoreline of New Brunswick to the north of Grand Manan. These Triassic sedimentary units are as yet unnamed.