Sedimentology, Stratigraphy and Provenance of the Upper Cretaceous Nanaimo Group, Denman and Hornby Islands, British Columbia

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Denman and Hornby islands in British Columbia represent the northernmost occurrence of the upper two-thirds of the Nanaimo Group, a Turonian to Maastrichtian-aged sedimentary package deposited in the Late Cretaceous Nanaimo Basin. Over two kilometres of sedimentary strata are exposed in the study area, consisting of conformable and laterally intertonguing successions with sandstone-conglomerate dominated units separated by mudstone and fine-grained sandstone assemblages. These represent the uppermost six formations of the Nanaimo Group. From lowest these are; the upper part of the Cedar District Formation, the De Courcy, Northumberland, Geoffrey and Spray formations, and the lower part of the Gabriola Formation.

The succession exposed on Denman and Hornby islands occurs as a structural homocline with beds dipping gently to the northeast (average 8°). There is no geologic evidence to suggest the existence of major structural features such as large-scale faults and folds. Minor fractures and faults show a weak trend to the northeast and northwest. The few minor faults show normal sense of movement with offset no greater than ten metres.

This northern occurrence of the Nanaimo Group can be correlated with southern occurrences based on overall consistencies between lithostratigraphy, depositional environments, biostratigraphy and provenance data. As a result, this study supports the contention that the entire Nanaimo Group was deposited within a single basin.

The Nanaimo Group in the study area is interpreted to have been deposited in relatively deep water with sediment gravity flows as the main sediment transport mechanism. Multiple coalescing submarine fans are considered the predominant depositional setting. These fans can be described as sand-rich with elements of gravel-rich systems and fed by submarine canyon point sources cross-cutting a narrow, adjacent shelf. The Coast Belt, situated to the east and the San Juan terranes of the Cascades situated to the southeast are speculated to be the predominant source areas for this succession.