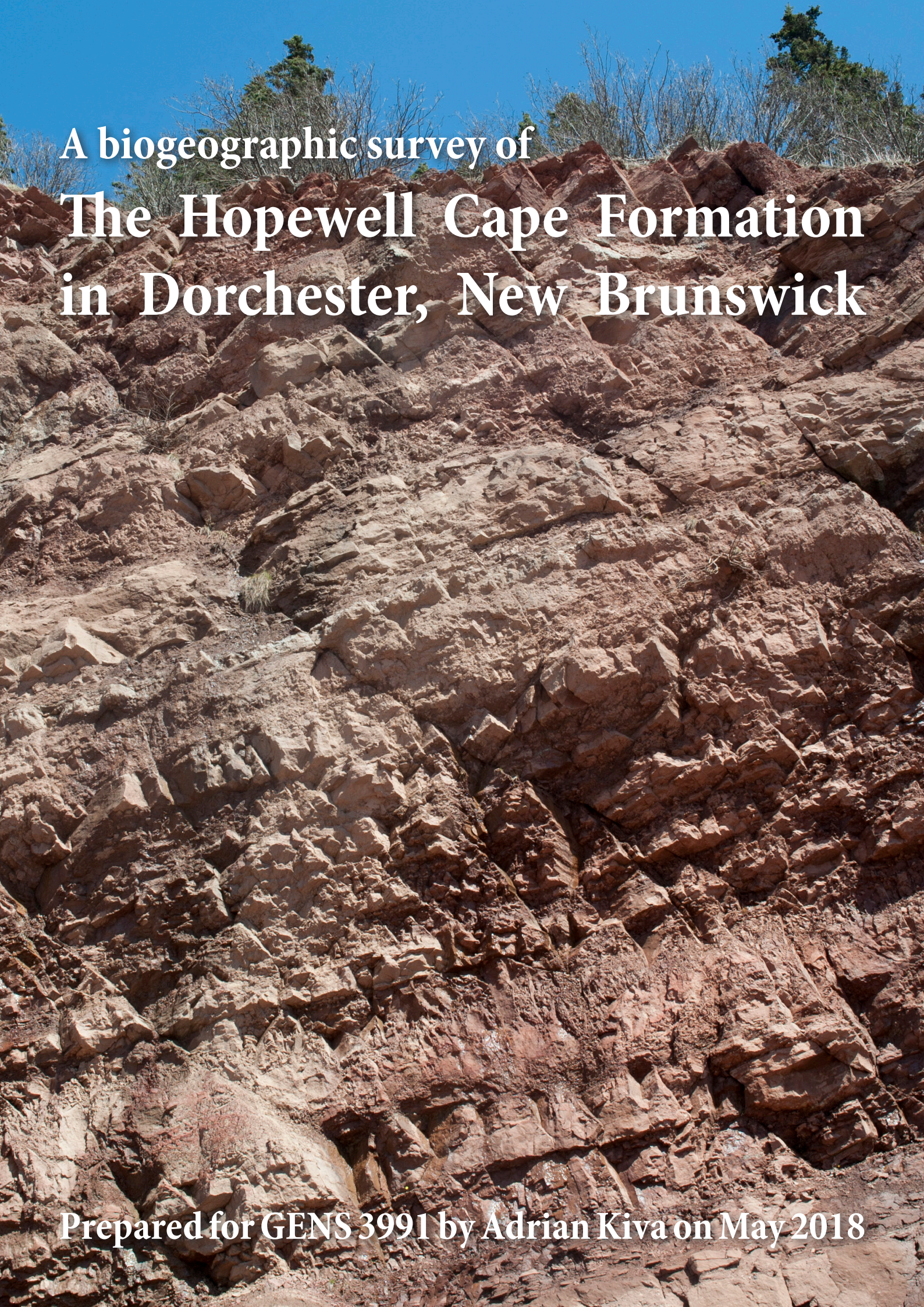


A biogeographic survey of

The Hopewell Cape Formation in Dorchester, New Brunswick

Prepared for GENS 3991 by Adrian Kiva on May 2018

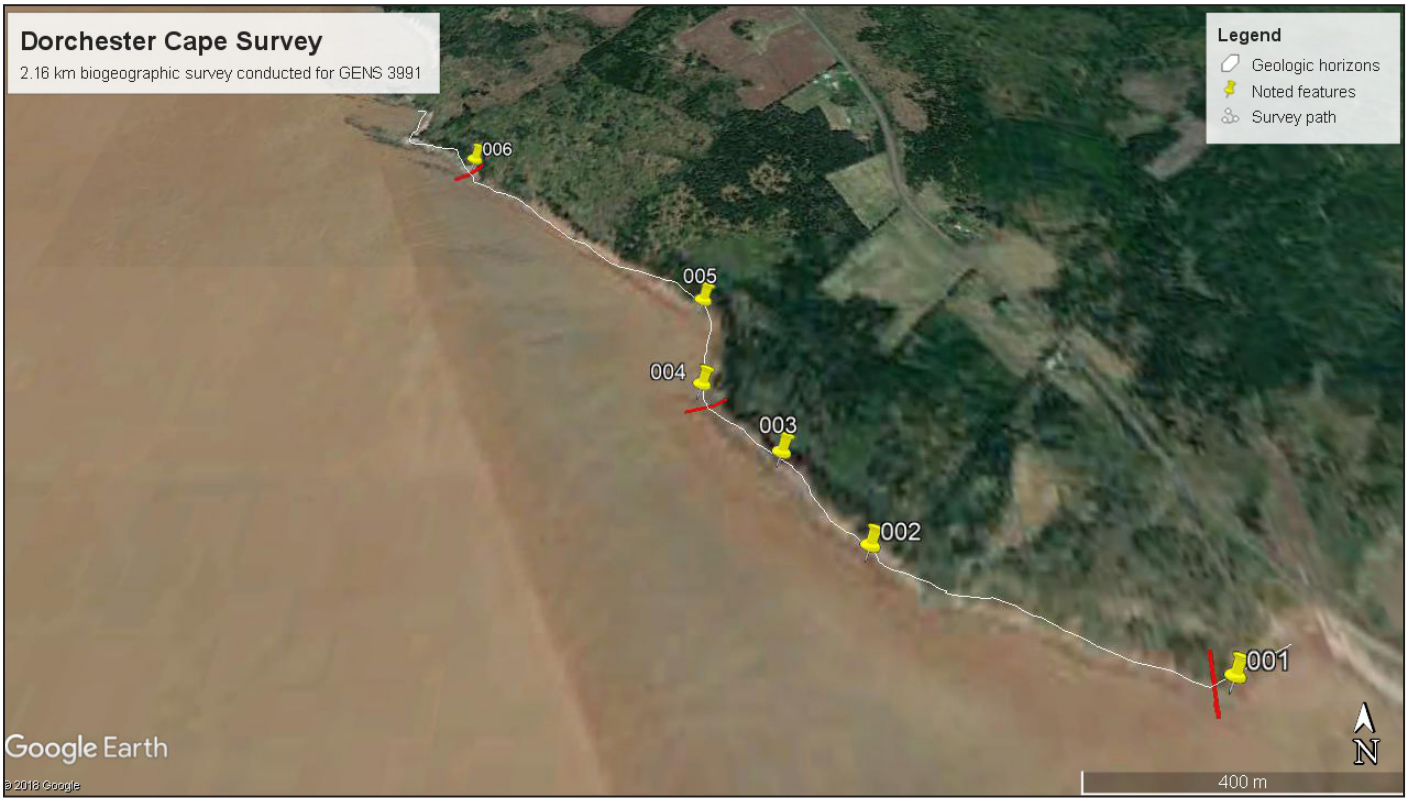


Figure 1: A reference map detailing the survey path and noted Features around which the discussion will be centered. The three red lines indicate important horizons in the cliff face.

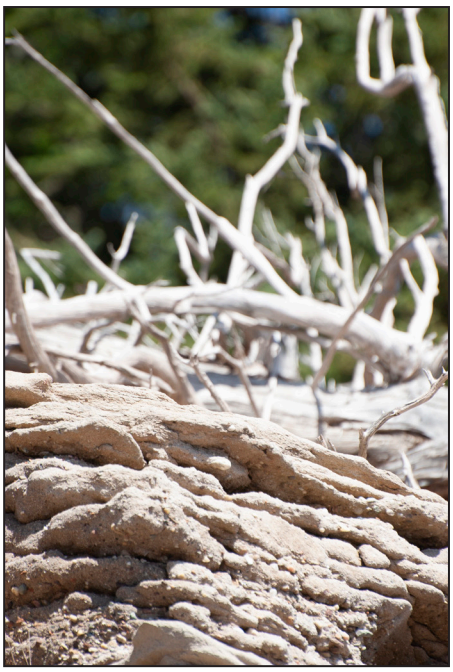
The edges of Hopewell Cape

This survey covers 2.16 kilometres of the intertidal landscape on the coast of Dorchester, New Brunswick, beginning at the meeting of the Maringouin and Hopewell Cape formations and ending when the Hopewell Cape formation meets the Boss Point formation.

Located in a northern branch of the Chignecto Bay, the Dorchester Cape is subject to the semidiurnal megatidal flow that characterizes the Bay of Fundy. The intertidal zone therefore becomes a large and important part of the biogeographic landscape. The climate is warm and temperate, with average annual rainfall of 806 mm, which precipitates throughout the year, while the average annual temperature is 9.7 °C (source: climate-data.org).

Figure 2: A south-east view of the Dorchester Cape, which students surveyed on May 2018.





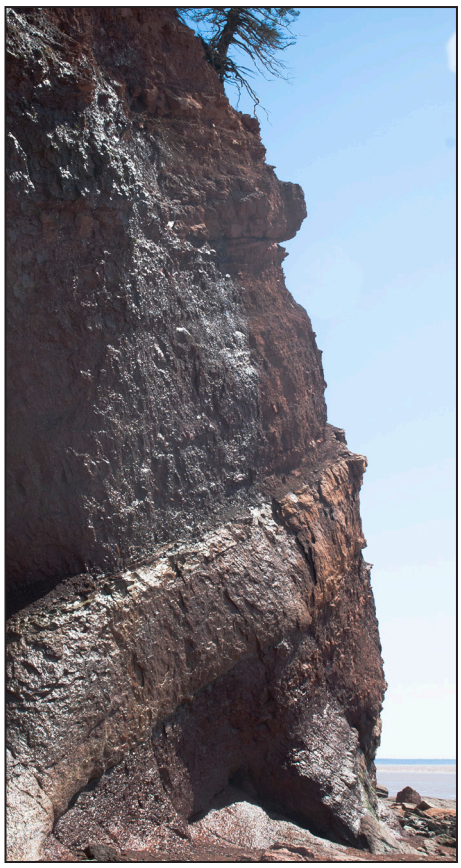
Figures 3.1, 3.2 & 3.3: The unique biogeographic characteristics of the Cape create a habitable environment for a wide range of flora.

The Cape is generally characterized by a sandy intertidal substrate of varying grain size and muddiness. The cliff faces are steep sedimentary rock, deposited during the Maritime Basin formation which began 90 mya. The two sub-basins surveyed in our analysis are the Mabou and Cumberland groups, though the Cumberland group is only touched on at the end of the survey.

The characteristic of the area most relevant to this survey is this exposed sedimentary rock whose layers lie at an angle to the substrate, revealing the geologic depositional history all along the surface of the coast in a manner similar to the UNESCO-heritage Joggins Fossil cliffs.

The survey begins at the horizon between the Maringouin and Hopewell Cape formations, illustrated on the map by the southernmost red demarcation, at the first noted Feature (*001*). The demarcation is clearly visible to the eye, as the coastal line transitions from grey to red lithofacies.

Figure 4: The Maringouin and Hopewell Cape Formations at 45.838232°N 64.520421°W.



Figures 5.1 & 5.2: This section of the Hopewell Cape Formation stands at a height of 22.7 m, measured indirectly from shore length and viewing angle (*Feature 002*, 45.840105°N 64.526299°W).

The Hopewell Cape Formation extends for an approximate 800 metres, and is composed mostly of red lithofacies with trough cross-bedding and some extrabasinal clast. Cliff height is an important feature throughout the Cape, and can indicate rock hardness and wind characteristics. At *Feature 002*, a higher cliff is observed. Here, it is likely that the harder layer resulted in differential erosion that caused the corner shown (figure 5.2). Also to note: the heavy horizontal bedding. The higher cliff shelters the underlying coast by creating a wind shadow, forcing the wind coming in from the Bay of Fundy to curve above the coastline.

Figure 6: Although composed mostly of hard lithofacies, the Hopewell Cape Formation exhibits distinctive calcrete nodules along its length. These deposits are formed from fine muds that have been cemented together. It is likely that this calcrete formed from marine deposits (*Feature 003*, 45.84164°N 64.527828°W).

Figure 7: A view to the south-east, indicating the beginning of the Dorchester Cape Member.

The second horizon indicated on the reference map occurs at 45.842976°N, 64.529381°W. This is the beginning of the Dorchester Cape Member, a subsection of the Hopewell Cape Formation. It is clearly demarcated by the absence of extrabasinal clast. Additionally, the Dorchester Cape is composed of softer sedimentary deposits, which is evidenced by the increased presence of intertidal and supratidal flora on and above the cliff face.

The Dorchester Cape Member extends for an approximate 1000 metres, before the final major horizon of this survey, noted by the northernmost horizon line on the map. This is the dividing line between the Mabou and Cumberland Groups described earlier, and the beginning of the Boss Point formation.

It is likely that the absence of iron deposits is responsible for the colour change here, as oxidized iron produces the red colour previously noted. This is the Pennsylvanian/Mississippi Divide.

Figure 8: At 45.844632°N 64.52936°W, which lies within the Dorchester Cape Member, a large rooted horizon is visible on the cliff face, evidence of the softer rock. (*Feature 004*).

Figure 9.1, 9.2 & 9.3: At the horizon line of the Boss Point Formation (45.848386°N 64.53506°W), we see sedimentary rock that has been lost to time, as sediment covers layers that rapidly eroded, disappearing from the formation (*Feature 005*).

The Boss Point Formation is strikingly distinct from the Mabou Group. The rough surfaced, well-layered lithofacies give way to grey sandstone and congolomerate, hewn about in a less clearly-defined structure. The rock is softer and terrestrial plant growth reaches closer to the intertidal zone than before. Additionally, large driftwood collections overtop the broken cliff, likely storm residue from high Spring tides.

Figure 10: The Boss Point Formation presents a much shallower cliff and a more terrestrial ecosystem.