

An Interdepartmental Study at Carters Beach (NTS 20P/15), Queens County, to Assess Coastal Stability and Develop a Pilot Coastal Ecosystem Classification

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One of the stated goals of the *Coastal Management Framework* – the guide to how the Government of Nova Scotia will work toward coastal ocean management – is addressing coastal issues through collaboration and integrated approaches. The Geological Services Division of Department of Natural Resources and the department's Wildlife Division have expertise in two disparate but fundamentally related fields, both of which underpin coastal ecosystem science. Ecosystems (Wildlife Division) are classified and mapped based on vegetation composition and structure, but their distribution is largely determined by soils, underlying geological materials and geomorphic landforms (Geological Services Division). Changes in ecosystem diversity and distribution often reflect shifts in bedrock and geomorphic structure (e.g. sand dunes vs. gravel barrier beaches vs. exposed bedrock). In addition, geomorphic processes are among the most important factors affecting coastal ecosystem initiation and persistence. The potential for scientific synergies between these two areas of study and the call for collaboration in the Coastal Management Strategy were the impetus for an inter-division study at Carters Beach.

Carters Beach is a sandy beach and dune system west of Liverpool near the town of Port Mouton (Fig. 1). This area has a number of features that make it amenable to a pilot study to assess ecosystem change and test a Coastal Ecosystem Classification System. The study focused on a 75 ha parcel of provincial Crown land on the Atlantic Coast of Nova Scotia. Carters Beach includes 29 ha protected in 1984 under the provincial *Beaches Act*, and 46 ha more recently purchased by the Crown in 2008.

In *The State of Nova Scotia's Coast Report* (2009), Sandy Shores and Sand Dunes are classified as a highly sensitive ecosystem, representing 0.6% of the coastal zone of the province. Their sensitivity results in part from their easily erodible nature. This sensitivity may increase because of forecasted rises in sea level and the potential for increased storm events (Forbes *et al.*, 2004). A data gap in the mapping and spatial modelling of ecosystem change is identified in the report: change analysis can be determined by comparison of archival aerial photographs and geological records preserved in sections. The sensitivity of a beach and dune environment can be estimated by understanding sources of sediment and active processes.

The Wildlife Division recognizes that new ecological protocols for defining, describing and mapping the coastal zone need to be developed and tested. It has responded by working with other agencies to develop a Coastal Ecosystem Classification System. The system will be adaptable to address multiple scales of application. Outputs of the classification will provide an ecological framework for climate change risk management and improve Nova Scotia's ability to effectively monitor coastal biodiversity. Information emerging from this initiative will also help resource planners and managers, land owners and other public interest groups to identify and understand patterns of coastal ecosystem diversity, geography and vulnerability and to better link provincial geological and ecological monitoring efforts.

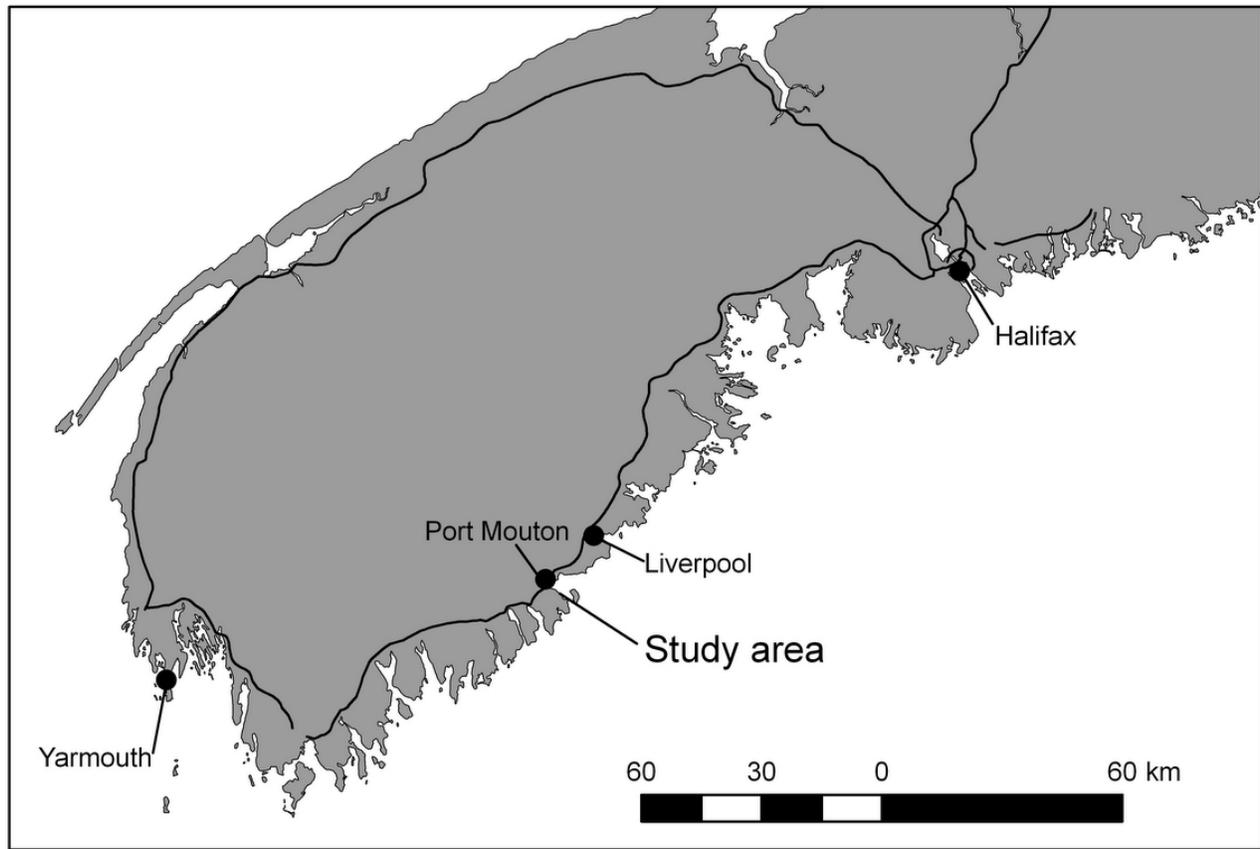


Figure 1. Map of southwestern Nova Scotia showing the location of the Carters Beach study area.

The Geological Services Division has been working toward protocols for coastal hazards and erosion in its Environmental Geology Program for several years. Initial work focused on the Northumberland Shore at Tidnish (Finck, 2007), leading to development of coastal hazard maps for St. Margarets Bay (Finck, 2009) and on-site assessments at Blue Beach (Kings County), Malagawatch (Inverness County) and Lockeport (Queens County) (Finck, personal communication). A pilot study in Antigonish integrating project staff in the division (groundwater, surficial geology, bedrock geology and geohazards such as karst, coastal erosion and flooding) was initiated in 2008 (DeMont, 2009; Utting and Gallacher, 2009; DeMont *et al.*, 2010). Information from the coastal hazards work will be used by planners, land owners

and, depending on the area, agencies responsible for infrastructure such as roads, bridges, and culverts.

A planned Open File Report will summarize the coordinated effort from Carters Beach including (1) an assessment of the stability of the beach and examination of geomorphic features to aid in assessment of the area's ecological environments, and (2) a pilot study to develop a terrestrial Coastal Ecosystem Classification. Because this report will be a collaborative effort between the two divisions and will be a combined report, it will streamline access to information on this area for interested parties. This collaborative effort may provide a template for future projects, especially those that relate to sensitive coastlines and ecosystems.

References

- DeMont, G. J. 2009: A pilot project to assess climate change risk and land-use planning in central Antigonish County; *in* Mineral Resources Branch, Report of Activities 2008; Nova Scotia Department of Natural Resources, Report ME 2009-1, p. 9-13.
- DeMont, G. J., Utting, D. J., Finck, P. W. and Broughm, T. 2010: Surficial geology mapping + geohazard identification + coastal zone mapping = better land-use planning in central Antigonish County; *in* Mineral Resources Branch, Report of Activities 2009; Nova Scotia Department of Natural Resources, Report ME 2010-1, p. 11-21.
- Finck, P. W. 2007: Geological observations relating to coastal erosion along the Tidnish – Amherst Shore area of Nova Scotia; *in* Mineral Resources Branch, Report of Activities 2006; Nova Scotia Department of Natural Resources, Report ME 2007-1, p. 33-48.
- Finck, P. W. 2009: Coastal hazard assessment mapping in St. Margarets Bay (NTS 21A/09 and 11D/12), Nova Scotia; *in* Mineral Resources Branch, Report of Activities 2008; Nova Scotia Department of Natural Resources, Report ME 2009-1, p. 15.
- Forbes, D. L., Parkes, G. S., Manson, G. K. and Ketch, L. A. 2004: Storms and shoreline retreat in the southern Gulf of St. Lawrence; *Marine Geology*, v. 210, p. 169-204.
- Utting, D. J. and Gallacher, A. F. 2009: Coastal environments and erosion in southwest St. Georges Bay, Antigonish County; *in* Mineral Resources Branch, Report of Activities 2008; Nova Scotia Department of Natural Resources, Report ME 2009-1, p. 139-149.