

## **Barrachois evolution in the Bras d'Or Lakes under past, present, and future sea-level rise**

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'Barrachois' is an Atlantic Canadian term describing coastal ponds and lagoons that are fully or partially separated from the open sea by a barrier beach. More than 10% of the Bras d'Or Lakes shoreline in Cape Breton Island, Nova Scotia, consists of barrachois, some of which have been developed into harbours, roads and recreational areas. Little is known regarding the age and stability of the barrachois, particularly under future storm conditions (unknown) and relative sea-level rise (~0.7–1.4 m above present levels by 2100). Multi-beam bathymetry data collected from deeper parts of the Bras d'Or Lakes by the Geological Survey of Canada revealed similar coastal landforms (when relative sea level was 7–24 m lower than present, ~3000–6350 years ago) that have since drowned, likely due to rapid sea-level rise and local bathymetry. Modern barriers may either be overstepped (drowned), eroded, or migrate landward under future sea-level rise, storminess and sediment supply conditions. Increased effort and expense will be necessary to maintain coastal defenses and other structures. The study aims to develop a basic understanding of the age of the barrachois, the nature of the sediments underlying them, and their stability (i.e., how quickly they evolve from growing or stable phases to landward-migrating or submerging phases). To date, 25 line kilometres of sidescan and high resolution (low penetration) echo-sounder profiler data were collected across three barrachois in East Bay and West Bay of the Bras d'Or Lakes, including: Irish Vale, Campbell, and Amaguadees ponds. Preliminary results indicate that all of the ponds, which were up to 12 m deep, have some organic mud fill in their centres and sandy-gravelly margins. The largest, Amaguadees Pond, has several metres of mud and a preserved stratigraphy, including unconformities. Bioherms, shallow methane, and buried channels and overwash were also observed. This information will provide the basis for mapping, further interpretation, targeted sediment coring, and long-term reconstruction of the paleoenvironmental and relative sea-level history of the ponds/lagoons.