
Trends in sedimentation and erosion at the mouth of the Petitcodiac River, Bay of Fundy, as inferred from sub-bottom profiles

KARL E. BUTLER¹, E. JANE SIMMONS¹, MURRAY K. GINGRAS², GARY BUGDEN³, AND PETER G. SIMPKIN⁴

1. *Department of Geology, University of New Brunswick, P.O.*

Box 4400, Fredericton, NB, E3B 5A3 <kbutler@unb.ca> ¶

2. *Department of Earth and Atmospheric Sciences, 1-26 Earth*

Sciences Building, University of Alberta, Edmonton, AB,

T6G 2E3 <mgingras@ualberta.ca> ¶ 3. *Fisheries and*

Oceans Canada, Bedford Institute of Oceanography,

P.O. Box 1006, Dartmouth, NS, B2Y 4A2 <BugdenG@

mar.dfo-mpo.gc.ca> ¶ 4. *IKB Technologies Limited,*

1220 Hammonds Plains Road, Bedford, NS,

B4B 1B4 <psimpkin@seistec.ca>

In August, 2003, an acoustic sub-bottom profiling survey was carried out at the mouth of the Petitcodiac River on the Bay of Fundy, New Brunswick. The objectives were to determine the depositional styles and internal architectures of modern deposits forming in the sediment-laden waters of that macrotidal estuary where the tidal range is approximately 14 m. Depths of penetration for the high resolution IKB Seistec profiler were very limited by the presence of shallow gas over most parts of the intertidal flats surveyed along the river's edge, but exceeded 10 m where gas was not present in the shallow sediment, particularly along the outer edges of the mud flats. The profiler was able to resolve fine layering (as thin as approximately 20 cm), apparent slumps, and other internal architecture within deposits considered to be point bars. The profiles also show a very weak but clear reflector lying above and sub-parallel to the river bottom within the channel thalweg, which we have interpreted to be a layer of fluid-mud up to 40 cm thick.

Water level data from a temporary Environment Canada tide gauge that was operating near the mouth of the river during the time of survey enabled us to reference all of the profiles to the Geodetic datum (mean sea level). As a result, we have been able to produce bathymetric maps that can be compared to (recently digitized) bathymetry data that were collected by the Canadian Hydrographic Service in 1965 – two years prior to the completion of a causeway crossing the Petitcodiac River at Moncton. The presence of a bedrock knoll on the riverbed that was detected by both surveys allows us to confirm that we have treated the datums for the two data sets correctly.

The 1965–2003 bathymetry comparison reveals that the Calhoun Flats region, located at the mouth of the Petitcodiac River adjacent to the village of Hopewell Cape, exhibits areas of net deposition (up to ≈7 m) as well as a well-defined area of net erosion (up to ≈2 m). This differs from bathymetry comparisons that have been completed (by others) along several transects located upstream of the river mouth, which show that the river channel has been aggrading since installation of the causeway at Moncton. The zone of net erosion at Calhoun Flats therefore represents the most proximal source of net sediment supply that has been discovered to date in an

effort to determine where sediment has been removed from the floor of the Bay of Fundy and transported into the Petitcodiac (estuary) system.