P2014-07

Bras d'Or Lake Barachois
Evolution, Stability and Environmental Significance

Program:	Environmental Geology
Project Manager:	Brian Fisher
Project Leader:	Chantel Nixon
Participants:	Bruce Hatcher (Cape Breton University), Lynn Baechler (Collaborative Environmental Planning Initiative; CEPI), Fred Baechler (CEPI), Shelley Porter (Unama'ki Institute of Natural Resources; UINR), Bill English (DNR), Lisa Young (UINR), Keith Christmas (UINR), summer student.

Funding Partner(s):

Project Area

Various barachois (coastal ponds/lagoons) around Bras d'Or Lake

Rationale

By documenting the occurrence, status, age, and paleoenvironmental significance of barachois ponds/lagoons around the shores of the Bras d'Or Lakes, the following questions may be answered:
1. What are the long-term effects of anthropogenic interference in a barachois with respect to shoreline growth/erosion?
2. If the beach barriers that contain the barachois (lagoons and ponds) are eroded, developed/altered, or drowned, how will this affect the ecology of Bras d'Or Lake?
3. What are the anticipated effects of rising sea level and future storms on the barrachois with respect to barrier growth, stability and erosion?

Time Frame

October, 2013 – September, 2014

Objectives:

- Determine the age of the barachois in the Bras d'Or Lakes
- Characterize the timing and nature of barachois evolution
- Document past environmental changes in the barachois systems
- Predict future impacts of accelerating rates of relative sea-level rise and potentially increased storminess on the barachois

Methodology:

- Collect grab samples of surface sediments along transects through three barachois ponds/lagoons and document grain size, organic matter content, and modern species assemblages of microfauna (foraminifera and thecamoebians). This information will later be used as a modern analogue in paleoenvironmental interpretation.
- Use shallow seismic and side-scan sonar to map bottom sediments (including the bathymetry of the pond or lagoon) and determine the best place in the barachois to extract a sediment core.
- Extract sediment cores (using a percussion coring system) from the selected barachois and document up-core changes in grain size, organic matter, microfossils (foraminifera, thecamoebians), and chemical composition (XRF) to reconstruct paleoenvironmental change.
- Radiocarbon date organic matter in sediment cores to establish the age of the barachois ponds and the timing of their evolution, including: formation, collapse, significant salinity changes, barrier breaching during large storms, and response to sea-level rise. Pb-210 and Cs-137 analysis of sediments may aid in establishing core chronologies if radiocarbon dateable material is scarce.
- Conduct aerial photograph analysis, historical research, and interviews with long-term residents near the study ponds to aid in interpretation of sediment cores.

Previous Outputs:

"Rapid assessments" have been completed on >100 barrachois ponds by 2 summer students working for DNR, Coxheath. These assessments will be used for ecosystem classification.

Other researchers are presently working on describing bottom sediments, determining freshwater inflow and outflow from the ponds, and characterizing the hydraulic connection (groundwater) between the ponds and the Bras d'Or Lake. A nutrient budget will eventually be calculated, land use and land use history in the contributing watersheds determined, and flora and fauna (marine and terrestrial in and around the pond) documented. This work will ultimately lead to an understanding on the importance of barachois ponds to the overall productivity (i.e., the generation of biomass in an ecosystem, and a key indicator of ecosystem health) of Bras d'Or Lake.

Shallow seismic and sidescan sonar data collected (October, 2013).

Seven percussion cores ranging from ~1-3 m long were collected from three barachois (Campbells, Irish Vale and Amaguadees; March, 2014).

Talk presented on progress to date at the Atlantic Geoscience Society Colloquium (Wolfville, 7-9, February, 2014): *Barachois evolution in the Bras d'Or Lakes under past, present and future sea-level rise*.

Annual Work Plan:

Planned Outputs:

Report, public presentation

Human Resource Requirements:

Name	**Brief Explanation**	**Time Period**	**Time** (wks / FTE)
2013-2014			
Chantel Nixon	Fieldwork: seismic and sidescan surveys + surface sampling	Oct., 2013 & ??	6 days
Chantel Nixon + field assistant(s)	Fieldwork (coring)	Jan. or Feb., 2014	7 days
Chantel Nixon	Data analysis, lab work, report writing	Feb. – Mar 2014	2 weeks
2014-2015			
Chantel Nixon	Data analysis, lab work, report writing	Mar - Sept	6 weeks
Student	Lab work, any outstanding fieldwork	May - Aug	3 weeks
GIS Resources	NA		

Budget Requirements:

Item	**Forecast**	**Cost Centre**
Radiocarbon, Pb-210, and Cs-137 dating	≤ $3500 (2014)	160045 – 651100
Lab supplies (slides, chemicals, petri dishes, squirt bottles, microscope(?))	$300 (2014)	160045 – 763100
Total	$3800	160043