

---

**Comparison of the spatial and temporal  
patterns of change in salt marshes of the  
Avon and Cornwallis river estuaries**

---

JILLIAN BAMBRICK AND DANIKA VAN PROOSDIJ  
*Department of Geography, Saint Mary's University, 923 Robie St.,  
Halifax, NS, B3H 3C3 <jillian.bambrick@smu.ca>*

Salt marshes and mudflats are dynamic systems that will respond to even slight changes in their surrounding environment. This would include changes in shoreline topography, main tidal channel position, wave action, water levels, ice and coastal development. These changes can be quantified by analyzing the spatial extent of salt marsh vegetation over time, identifying progradational or erosional sequences. Documenting and analyzing these sequences through a GIS over a decadal temporal scale can be used to evaluate the relative sensitivity and resilience of these systems to change. In addition, it is the first step in isolating the relative significance of variables driving those changes.

Both the Avon River (Windsor) and the Cornwallis River (Kingsport) enter the Minas Basin in an estuarine setting, where tidal action creates, and exposes, the salt marsh environment. These areas are exposed to macrotidal conditions, high suspended sediment concentrations, strong seasonality, and human development which will influence overall marsh evolution. The purpose of the research presented in this poster is to compare the spatial and temporal patterns of change in salt marsh habitat between the Avon and Cornwallis River

estuaries. It forms a component of a larger research project examining the ecomorphodynamics of intertidal ecosystems in the Upper Bay of Fundy.

Historical aerial photographs of the areas (1944 to 2003) were assessed for research suitability based on tidal level (low vs. high tide) and photos taken at high tide (e.g., entire marsh not visible) were excluded from the analysis. Unfortunately this resulted in gaps within the temporal record and even spatial gaps within a particular year. In addition, flight lines often were not flown within the same year in adjoining counties which limited comparison between study areas. The remaining air photos were scanned and rectified against digital 1:10 000 planimetric map sheets using ArcGIS 9.1. Variations in aircraft position were accounted for by using a second-order polynomial transformation in ArcGIS 9.1 during the rectification process. A custom AML for Arc/Info Desktop was used to mosaic the photos, resulting in an image with a ground resolution of one meter. Salt marsh habitats (incorporating both high and low marsh) were outlined using on-screen digitizing procedures in ArcView 9.1 and marsh area calculated. The resultant polygons were compared on a decadal scale, and change quantified using the geoprocessing capabilities within ArcGIS. These data were normalized for each estuary as a percentage of change between each year and over the entire time period. These data are currently being analyzed. By comparing the values gained for each estuary, the system stability can be evaluated, and potential reasons for the spatial and temporal patterns of change can be explored. These data can be used to show what has changed, where these changes have occurred, how much has changed, and examine the relative sensitivity of marshes within the Southern Bight of the Minas Basin. Only after these baselines have been generated can research hypotheses on factors controlling changes in salt marsh habitat be explored in a systematic and non-biased manner.