

Coastal Monitoring in Newfoundland and Labrador

Why Monitor Coasts?

Over 90% of the population of the province lives near the coast. Coastal areas are always changing, and these changes can impact people. Coastal erosion, mass movement and flooding can potentially result in economic damage to infrastructure, loss of property and injury.



Coastal erosion is occurring in CBS, resulting in the closure of this trail.

How Do We Monitor Coasts?

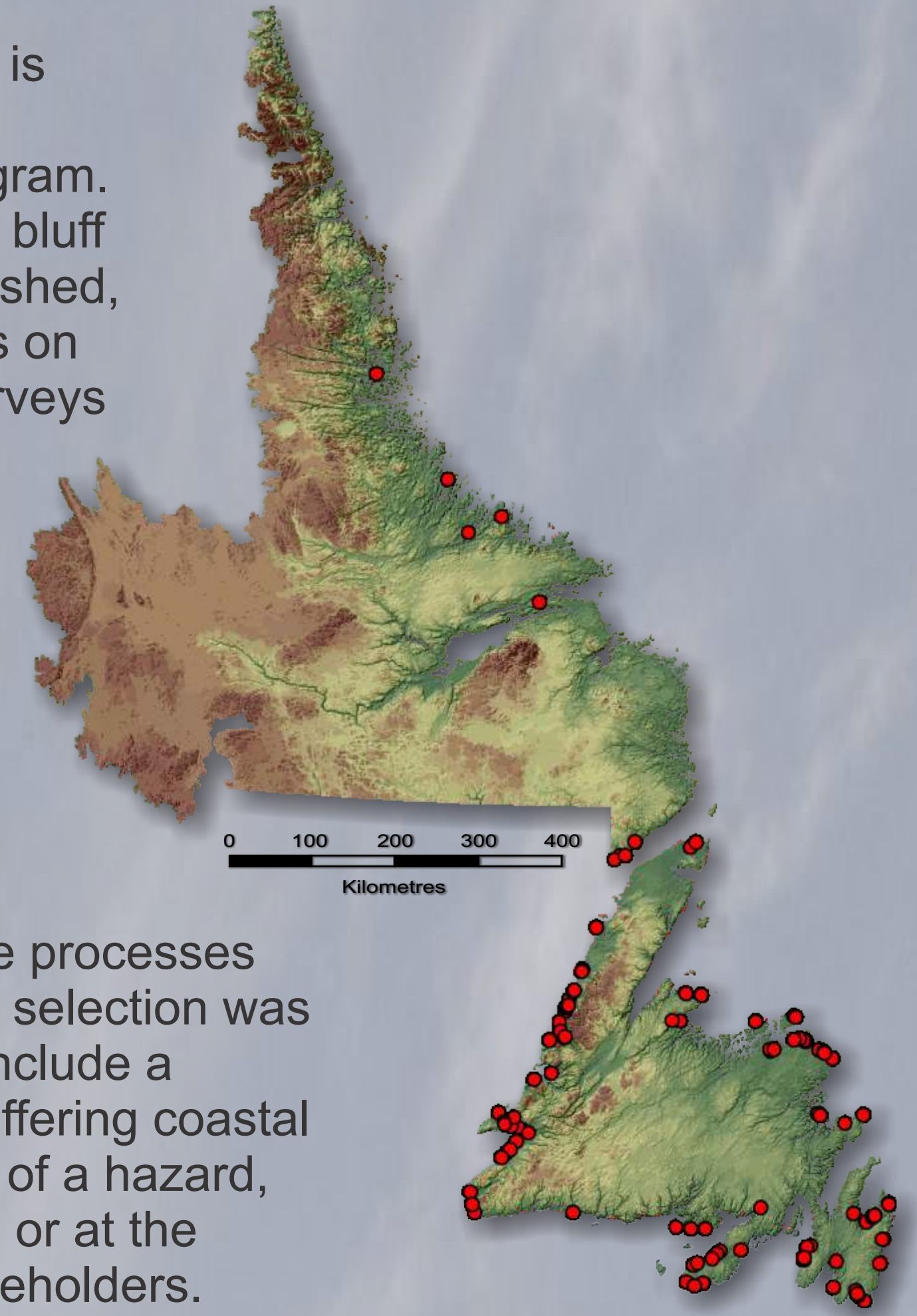


RTK equipment has three main components: a base station (yellow tripod), radio link (silver tripod) and roving GPS receivers (held by researcher). The base station is set up over a survey benchmark. The base station sends its reference position to the roving receiver through the radio, allowing for the position of the rover to be corrected in real time.

Studies of coastal sites involve topographic surveys using RTK (Real Time Kinematics) equipment that collects very precise location data. Key coastal features such as the top and base of cliffs, beach crests, and beach transects are surveyed. Data are imported into a GIS and analysis performed.

Coastal Monitoring Program

The Geological Survey is conducting a long-term coastal monitoring program. Over 110 beach and/or bluff sites have been established, as shown by red circles on the map. Repetitive surveys of the sites using RTK will allow for an assessment of rates of shoreline change, the effects on the coastal environment, an identification of areas at risk from coastal hazards and an understanding of the processes leading to change. Site selection was based on the need to include a representation of the differing coastal environment, evidence of a hazard, availability of prior data or at the specific request of stakeholders.



How are Areas Changing?



The beach at Placentia, on the Avalon Peninsula, is a pebble-cobble beach ridge, forming an arc 1.2 km long, and the area can be affected by southwesterly storms. In the fall of 2013 a storm surge occurred close to a high tide. The storm surge resulted in extensive damage to the board walk which ran along the beach, causing significant sediment to be moved, and for the back of the beach to migrate landwards, potentially up to 1.6m.



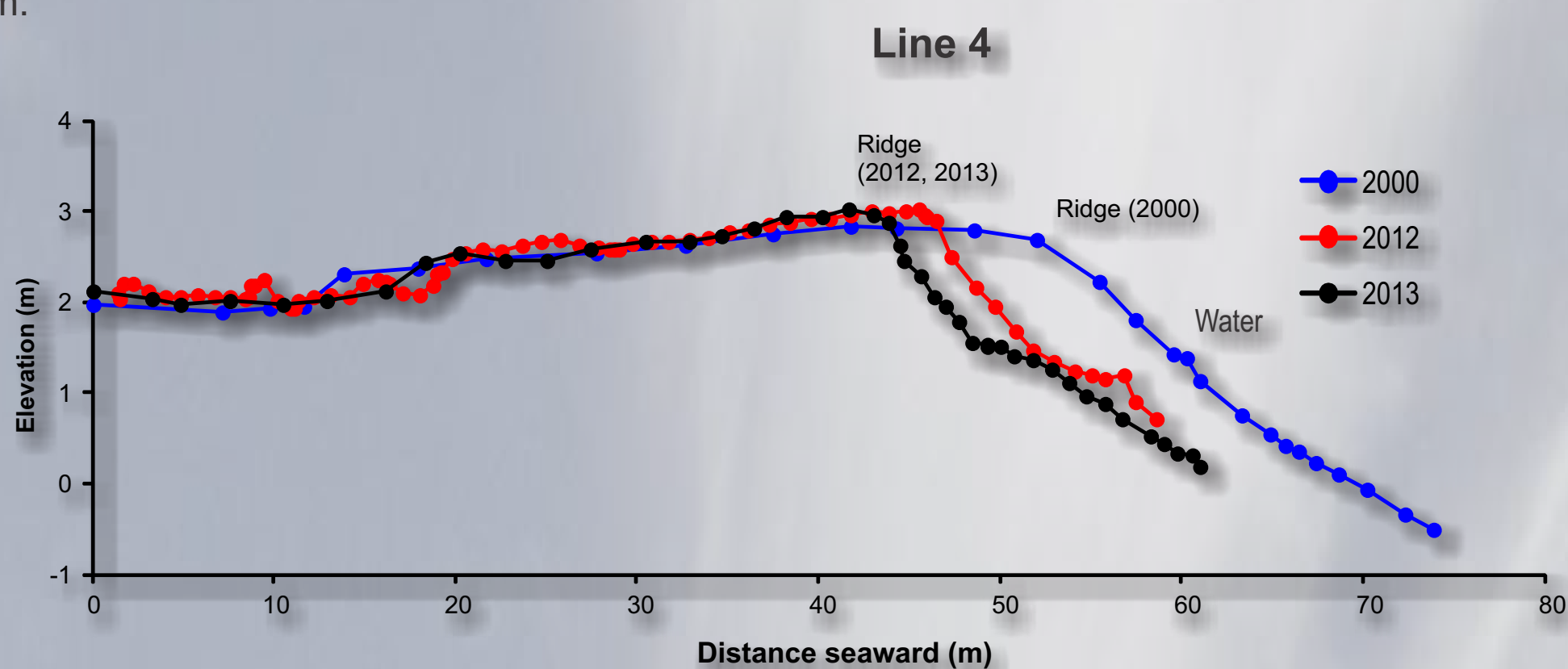
The sandy coastline at JT Cheeseman Provincial Park in southwestern Newfoundland is experiencing rapid erosion. Between 2013 and 2014, a section of the foredune eroded at an average rate of **9.22 metres** a year, exposing an old railway bed.



The Forteau monitoring site, in southern Labrador, is a sandy beach. Since 2012, portions of the sandy banks are experiencing erosion at an average rate of **57 cm/a**, with erosion rates of up to **119 cm/a**. Erosion is visible, as suggested by the overhanging turf mats and slumps.



The unconsolidated bluffs at Parsons Pond, on the west coast of Newfoundland, are eroding, likely from surface and ground water creating gullies in the permeable sandy-silty cliffs. Between 2013 and 2014, the bluff experienced erosion at an average rate of **70 cm/a**, with a maximum rate of over **3 m/a**.



The Stephenville beach site is on the north shore of St. George's Bay. The beach is around 5 km long and 1 km wide, and the sediment is well-rounded, flat gravel with some sand at the northwestern end. Sediment is being supplied by the eroding glacial-fluvial bluffs to the west. RTK surveying was conducted at four beach transects at the Stephenville site. At Line 4, the most westerly transect, the beach ridge migrated landwards since 2000, and the beach face was steeper in recent surveys.

Point Verde in Placentia Bay is a gravel and sand peninsula with a 15 to 20 m high cliff, fronted by a 20 to 30 m wide beach consisting of rounded boulders, cobbles and pebbles. Erosion is visible on the cliff, as seen by the overhanging grass at the top of the cliff, and gullies on the cliff face. Between 1993 and 2014, the entire peninsula eroded at an average rate of **44.42 cm/a**, ranging from **66 cm/a** to **16 cm/a**.



The Holyrood Pond study area, on the southern Avalon, includes 25 to 35 m high bluffs. The bluffs are susceptible to erosion; the cliff face is not vegetated, and composed of permeable gravel and sand beds overlying till. Surface run-off is causing gullying on the cliff face, and waves are removing sediment from the base of the cliff. Between 1998 and 2013, the cliff edge eroded at an average rate of **59 cm/a**, ranging from **19 to 100 cm/a**.



The bluffs near Bayview Heights Road in Kippens, western Newfoundland, are unconsolidated and composed of sand, gravel and silty-clay. The cliffs are 19-25 m above sea level and partly vegetated with grass. Between 1993 and 2013, the cliff top experienced erosion at an average of **9 cm/a**, with rates up to **21 cm/a**.