

# CHAPTER 16

## Part 1 of 3

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The coastline near Lower Darnley, Prince Edward Island, consists of alternating headlands of Permian sandstone and sandy beaches backed by cliffs and dunes. RON GARNETT / AIRSCAPES.CA.

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A drumlin island at the mouth of Chezzetcook Inlet on Nova Scotia's Eastern Shore illustrates the vulnerability of these landforms to erosion from the sea, which moves sediment to adjoining spits, beaches, and nearby bays. This 1989 aerial photo shows a spit to the left and a barrier beach to the right (the latter connecting to the mainland and formerly to Miseners Island) trailing from the drumlin. DON FORBES.

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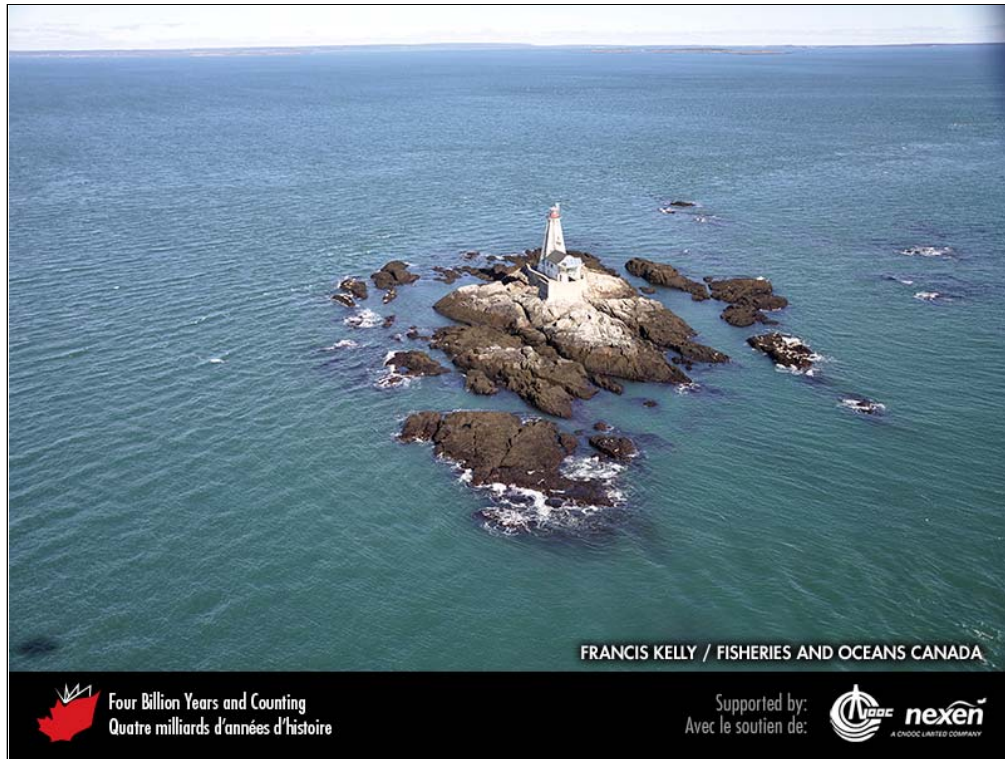


Long Beach, Pacific Rim National Park Reserve of Canada, Vancouver Island, British Columbia. T. W. HALL, COPYRIGHT PARKS CANADA.

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Gannet Rock, a shoal off Grand Manan Island, New Brunswick. FRANCIS KELLY, COURTESY OF FISHERIES AND OCEANS CANADA.

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Steep rock walls dominate Tingin Fiord, eastern Baffin Island, Nunavut. DON FORBES.

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This cliff along the tundra shoreline at Stokes Point, Yukon, exposes massive ground ice (permafrost). Although waves undercut and erode such cliffs, warming sea temperatures are also thought to play a significant role. DON FORBES.

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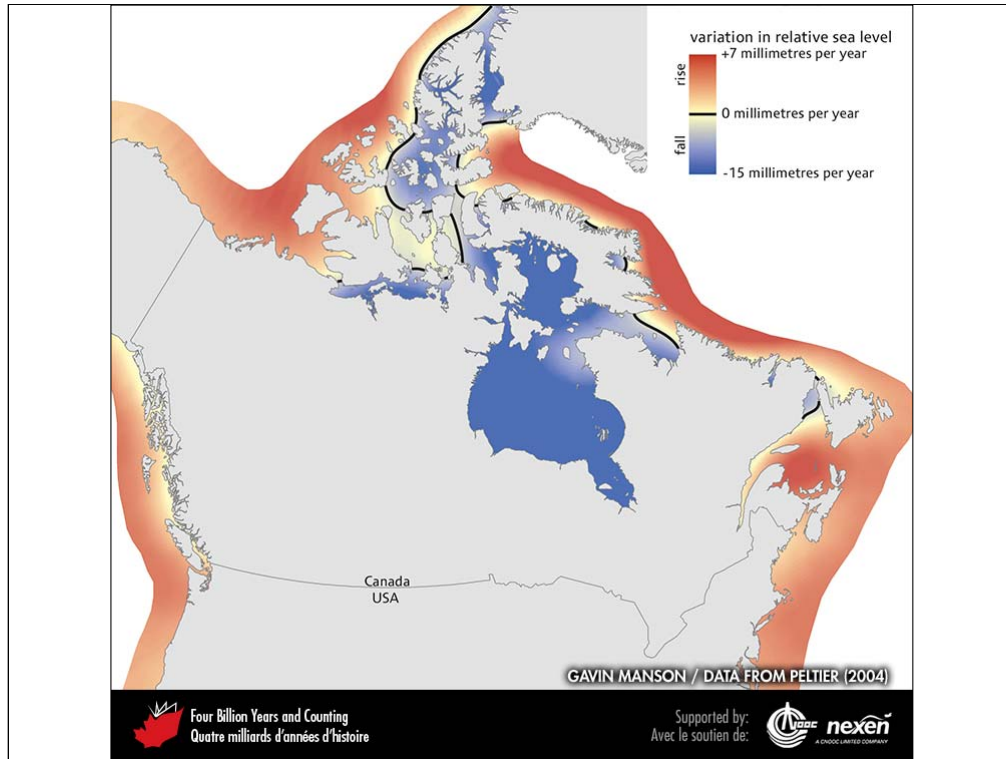


Melting of ice wedges and collapse of undercut blocks contributes to rapid coastal retreat along some Arctic coasts, as here at Kay Point, Yukon. DON FORBES.

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Patterns of relative sea-level rise and fall in coastal and marine areas around northern North America. In this part of the world, relative sea-level rise or fall is controlled mostly by rise and fall of the underlying crust rather than by global sea-level changes. DATA FROM PELTIER (2004); FIGURE COMPILED BY GAVIN MANSON .

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A raised beach is a former beach that is higher than today's shoreline because of a fall in relative sea level. At Squally Point, near Apple River, Nova Scotia, sand and gravel deposited on a Holocene beach sit atop cliffs of Devonian and Carboniferous volcanic rocks. Soon after the ice retreated in this area, sea level was about 30 metres higher than at present, but fell rapidly with isostatic rebound to below today's level, leaving this beach high and dry. Today, sea level in the area is slowly rising. RALPH STEA.

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# CHAPTER 16

## Part 2 of 3

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The backdrop for the village of Trout River, Newfoundland, includes beach terraces (the flat, ledge-like area in front of the hills) that indicate higher sea levels in the past. MICHAEL BURZYNSKI.

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Raised beach ridges, Wapusk National Park of Canada, Manitoba. N. ROSING, COPYRIGHT PARKS CANADA.

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This World War II observation tower (now demolished) near Economy, Nova Scotia, has been undermined by the tides and waves of the Bay of Fundy. BOB TAYLOR .

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Pileups of sea ice are created in winter when currents push the thin sea ice onshore, as here at Saint-Simeon, Gaspé Peninsula, Quebec. CHRISTIAN FRASER.

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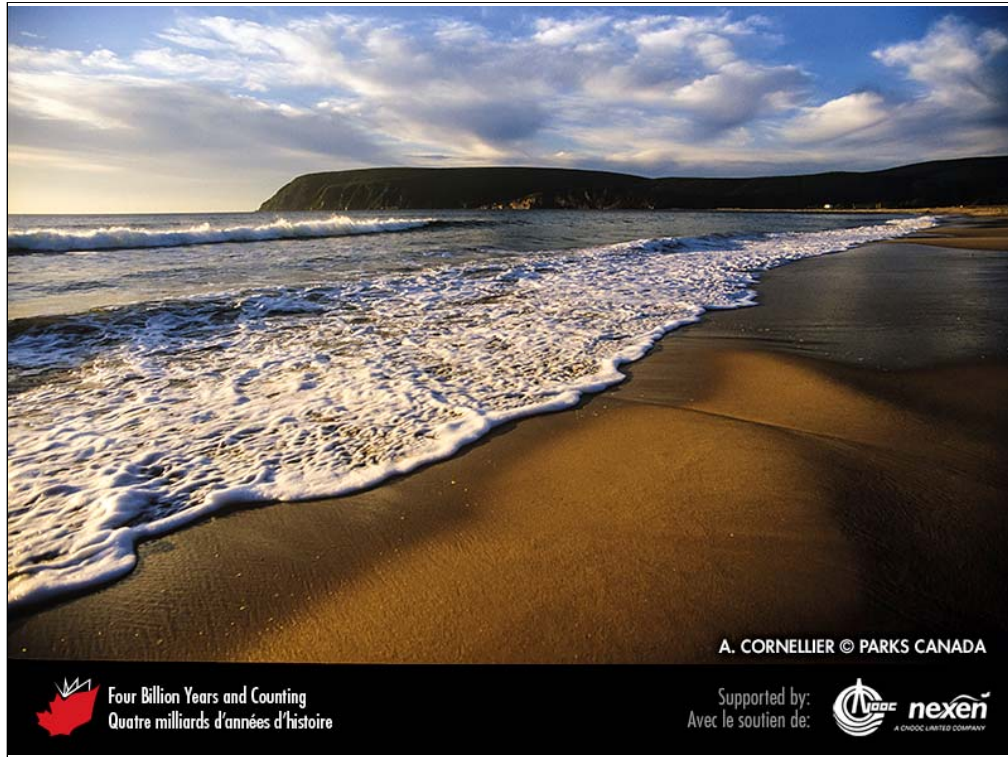


The features forming this repeating pattern of regular small embayments and protrusions or “horns” are known as beach cusps. These are common and result from the interaction of shoaling waves with beach materials. This example is from the Magdalen Islands, Quebec. PHILIP GILES.

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Waves surge onto the shore at Ingonish Beach, Cape Breton Highlands National Park of Canada, Nova Scotia. A. CORNELIER, COPYRIGHT PARKS CANADA.

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Melmerby Beach, Nova Scotia, an example of a baymouth barrier beach formed by a spit extending to meet the opposite side of the bay: this creates a lagoon on the landward side. RON GARNETT / AIRSCAPES.CA.

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A barrier island, such as this one at Conway Narrows, Prince Edward Island, is similar to a baymouth barrier except that it is separated from the mainland by tidal channels. RON GARNETT / AIRSCAPES.CA.

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A mainly granite boulder beach at Kejimikujik National Park of Canada Seaside, Nova Scotia. The boulders are derived from local Devonian granite. ROB FENSOME.

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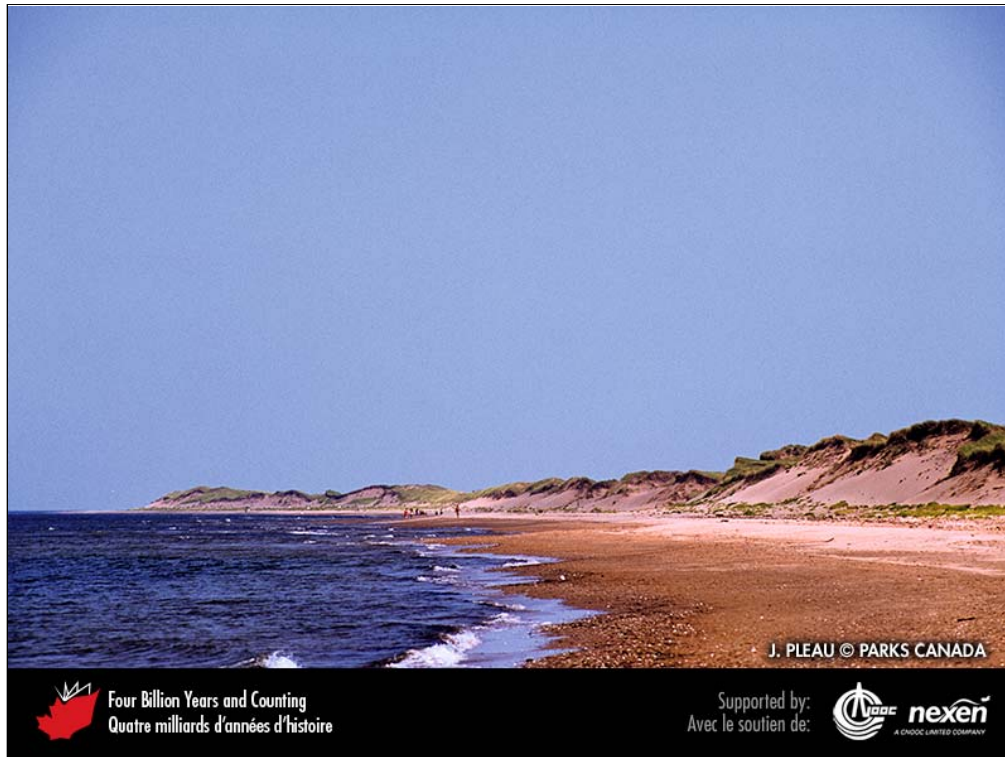
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## Part 3 of 3

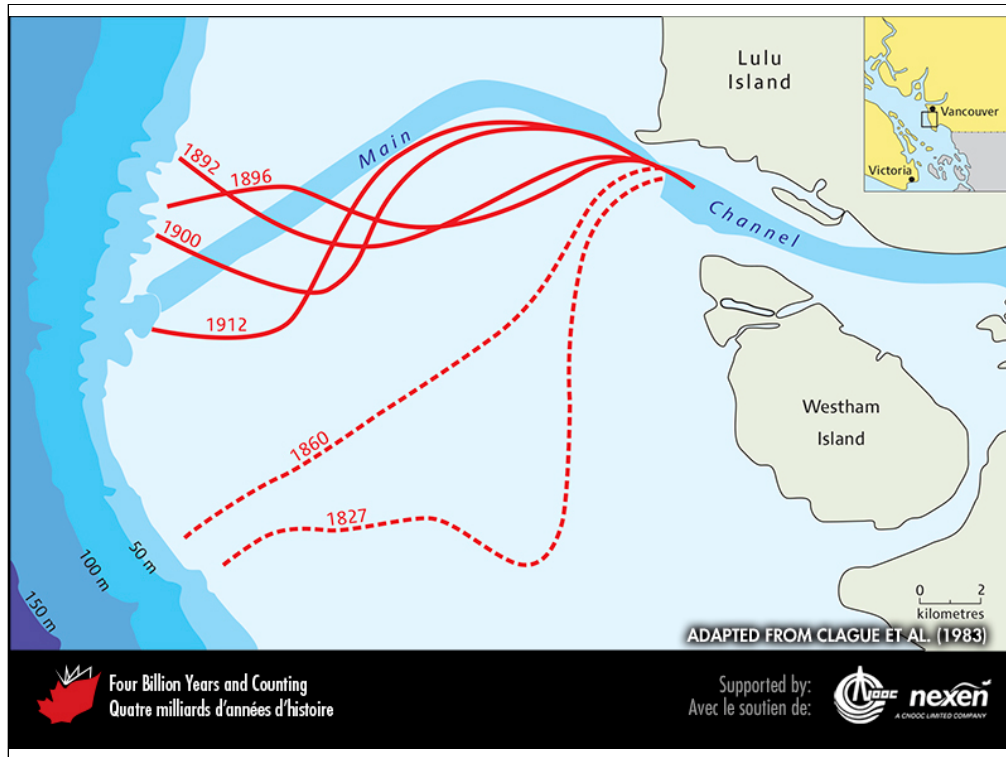
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Coastline with sand dunes, Greenwich Dunes, Prince Edward Island National Park of Canada, Prince Edward Island. J. PLEAU, COPYRIGHT PARKS CANADA.

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Changes in the Main Channel of the Fraser Delta from 1827 to 1912. Since 1912, advanced engineering has stabilized the Main Channel in the position shown. ADAPTED FROM CLAGUE ET AL. (1983).

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Satellite image of the Mackenzie Delta and adjacent parts of the Northwest Territories and Yukon. The second largest Arctic delta, the Mackenzie covers more than 12,000 square kilometres and has almost 50,000 lakes. The outer part of the delta forms a low floodplain north of the treeline. Its channels are bounded by low levees and its front, facing the Beaufort Sea, is largely retreating as coastal erosion currently outpaces sediment supply across much of the delta. LANDSAT.

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Tidal marsh on the Fraser Delta south of Vancouver, British Columbia. REPRODUCED WITH THE PERMISSION OF NATURAL RESOURCES CANADA 2013, COURTESY OF THE GEOLOGICAL SURVEY OF CANADA.

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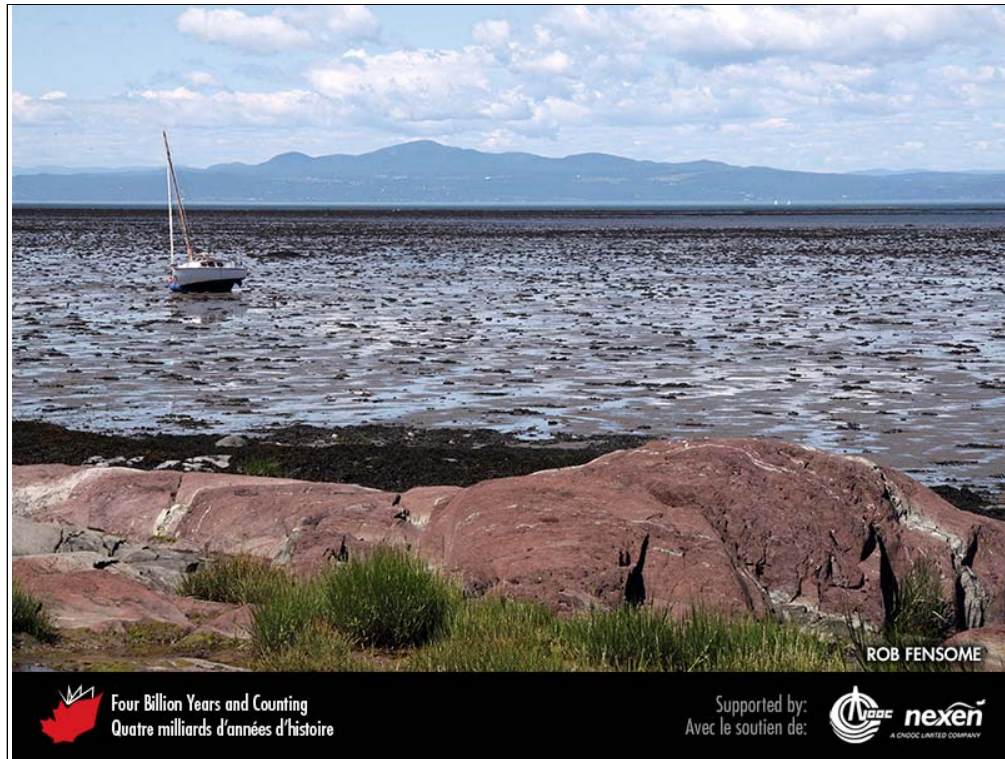
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Peel Channel on the Mackenzie Delta, with Mount Gifford (or Red Mountain) in the distance. LARRY LANE.

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The St. Lawrence Estuary at Kamouraska, Quebec, is still tidal at this location. That we have a St. Lawrence Estuary rather than a St. Lawrence delta is in part due to the sediment-trapping capacity of the Great Lakes. ROB FENSOME.

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Fishing boats at low tide, Hampton, Nova Scotia. The large tidal range is evident from the height of the wharf and the changes in colour on its wall. PHILIP GILES.

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Tidal mud and marshes, Shepody Bay on the Bay of Fundy, New Brunswick. RON GARNETT / AIRSCAPES.CA.

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Rock used to armour shorelines against water or ice erosion is known as riprap. The riprap in this example has been introduced to protect summer cottages at Evangeline Beach, Nova Scotia. ROB FENSOME.

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Erosion by waves and currents is not restricted to the sea coast. This spit at Limestone Point, Manitoba, is on the northwestern shore of Lake Winnipeg. RON GARNETT / AIRSCAPES.CA.

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