UNIVERSITY of PRINCE EDWARD ISLAND

people • excellence • impact

Impacts of Climate Change on Prince Edward Island

*Brydon, 2013

Dr. Adam Fenech

Presentation to PEI Land Matters Advisory Committee

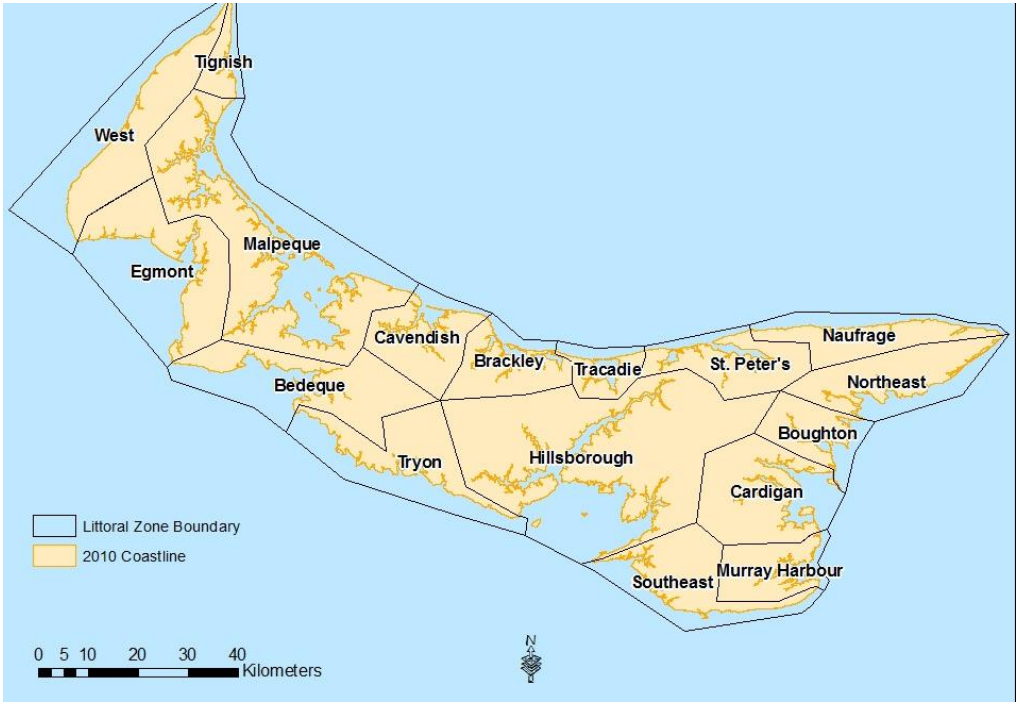
19 January 2021

PEI is at the Frontline of Climate Change Impacts and Adaptation!

PEI: A Living Laboratory!

PEI`s Coastal Zones

- 3,295 kilometers of coastline on Prince Edward Island*



*2010 coastline study

PEI Sensitive to Coastal Erosion

- PEI made of Sand and Sandstone

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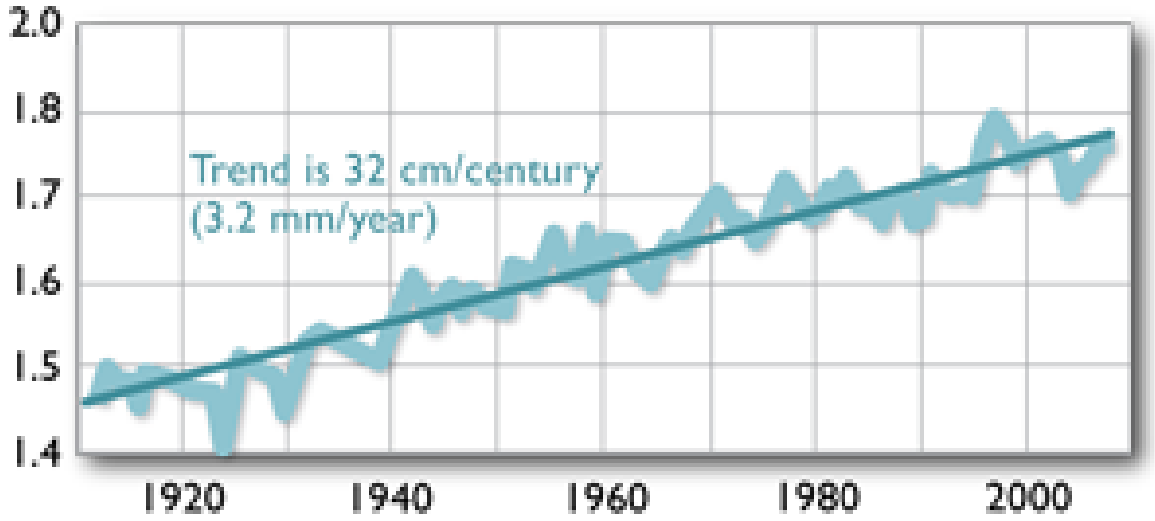
- PEI made of Sand and Sandstone
- Sea Level Rise



PEI Sensitive to Coastal Erosion

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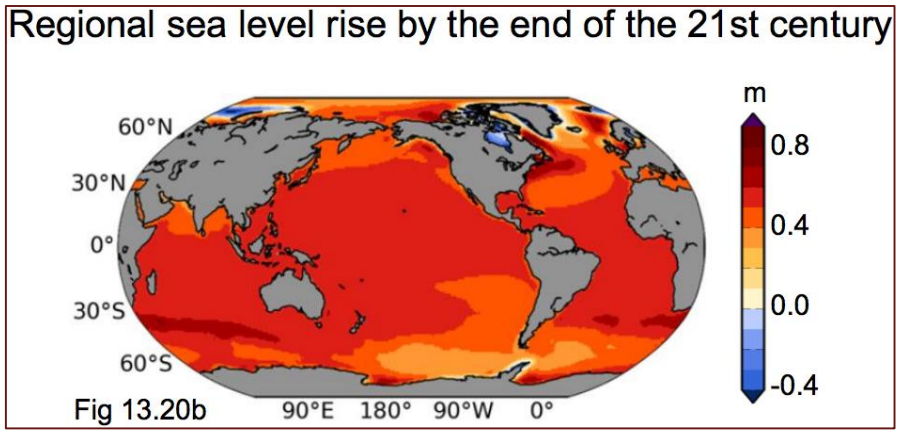
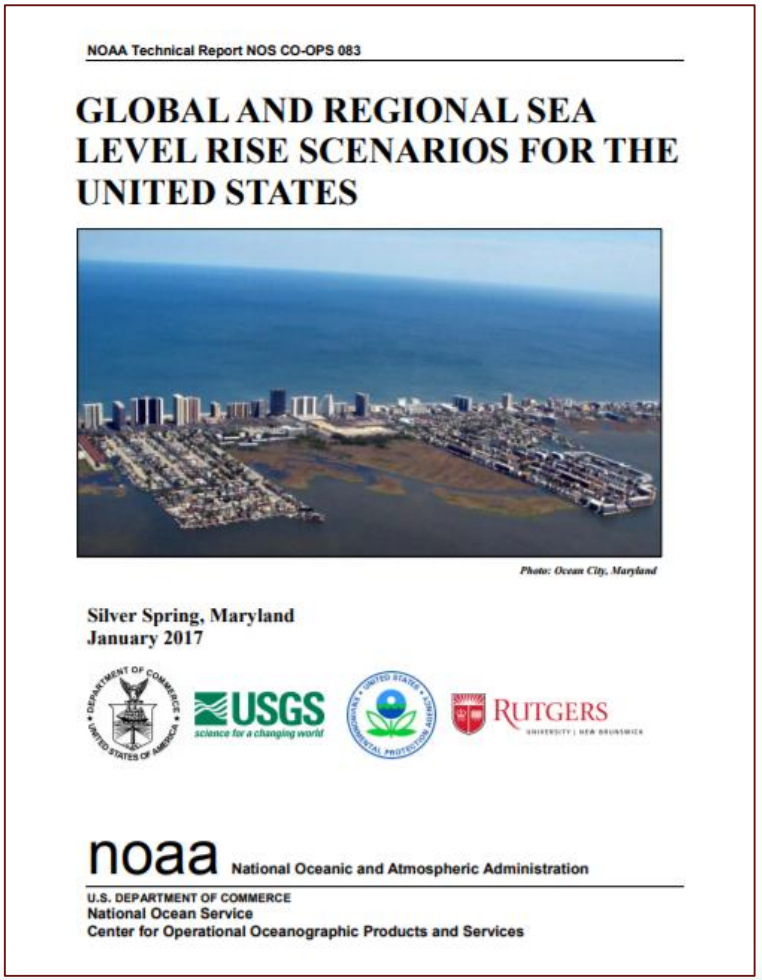


Source: IPCC, 2013

PEI Sensitive to Coastal Erosion

- PEI made of Sand and Sandstone
- Sea Level Rise

"The projections and results presented in several peer-reviewed publications provide evidence to support a physically plausible GMSL rise **in the range of 2.0 meters (m) to 2.7 m**"


NOAA Technical Report NOS CO-OPS 083

GLOBAL AND REGIONAL SEA LEVEL RISE SCENARIOS FOR THE UNITED STATES

Photo: Ocean City, Maryland

Silver Spring, Maryland
January 2017

USGS science for a changing world

RUTGERS

noaa National Oceanic and Atmospheric Administration

U.S. DEPARTMENT OF COMMERCE
National Ocean Service
Center for Operational Oceanographic Products and Services

Scary Thought

"The rate of sea level rise is currently doubling every seven years, and if it were to continue in this manner, we would have 205 feet of sea level rise by 2095"

"And while I don't think we are going to get that much water by the end of the century, I do think we have to take seriously the possibility that we could have something like 15 feet (5 metres) by then."

Harold Wanless, Chair, Department of Geology, University of Miami Florida, USA

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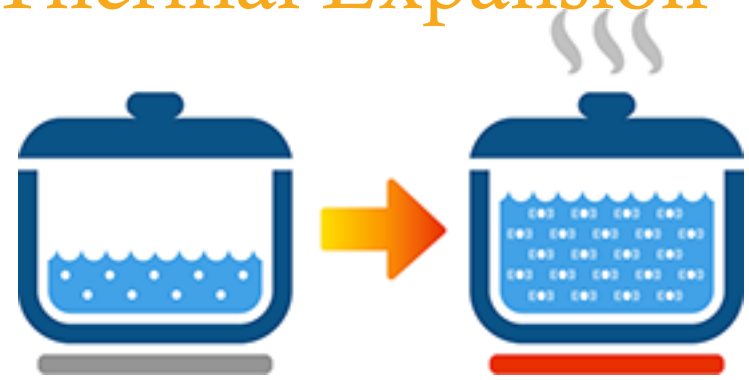
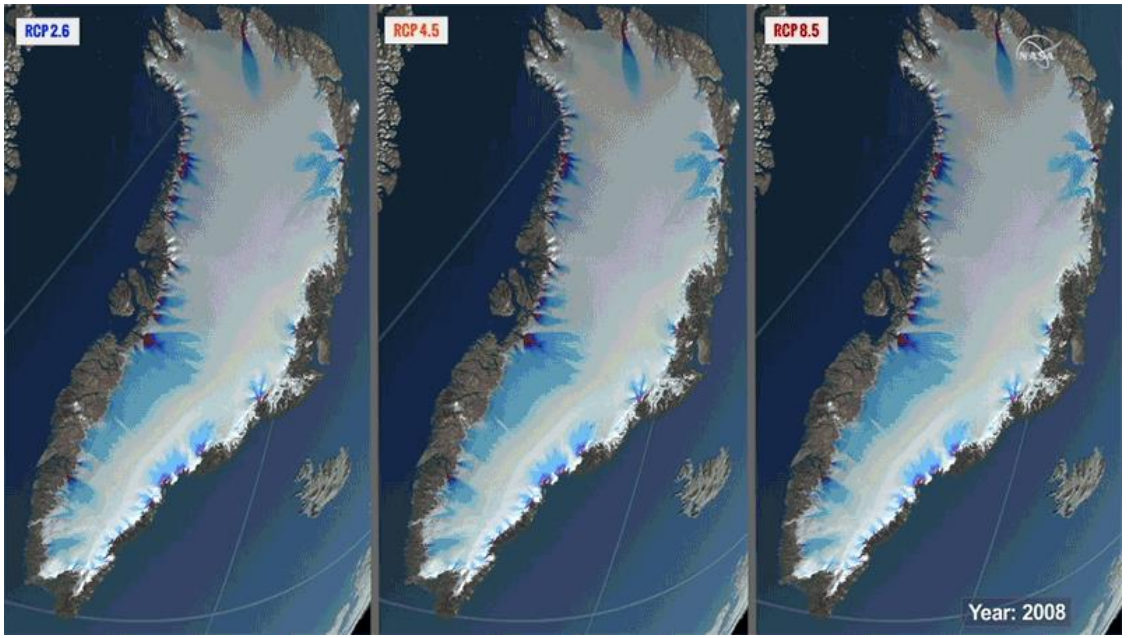
Thermal Expansion



Earth's oceans are taking in more than 90% of the heat from global warming!

PEI Sensitive to Coastal Erosion

- PEI made of Sand and Sandstone
- Sea Level Rise



PEI Sensitive to Coastal Erosion

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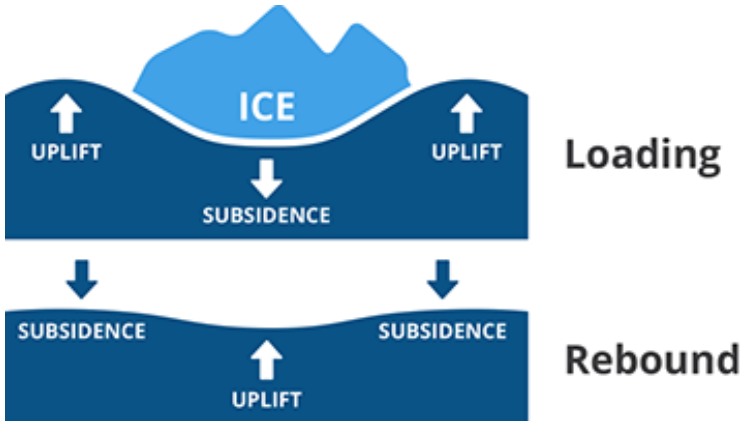
PEI Sensitive to Coastal Erosion

- PEI made of Sand and Sandstone
- Sea Level Rise
- Land Falling

(-10 to -20 cm per century)



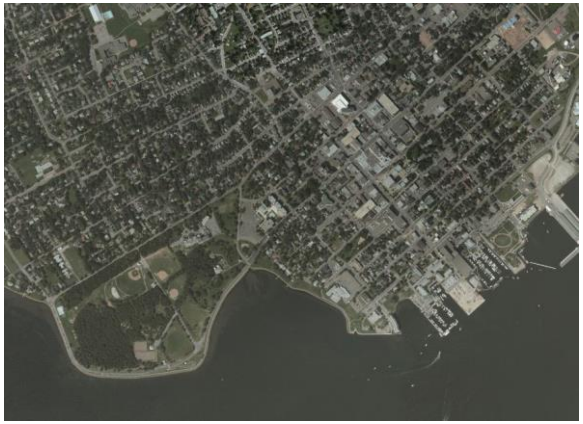
PEI Sensitive to Coastal Erosion

- PEI made of Sand and Sandstone
- Sea Level Rise
- Land Falling

  (-10 to -20 cm per century)
- Changing winter ice cover

PEI's Coastal Erosion

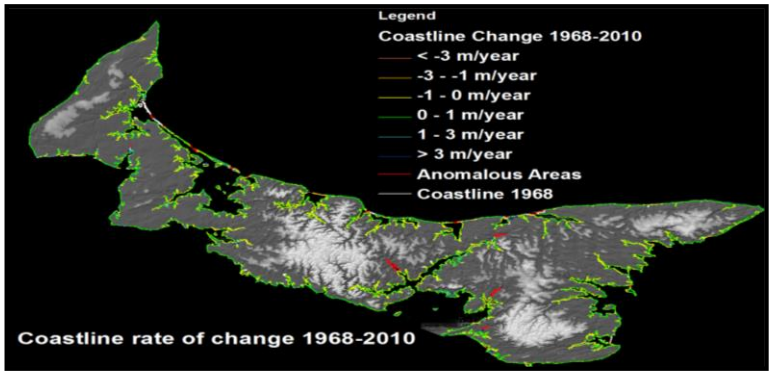
1968



2010

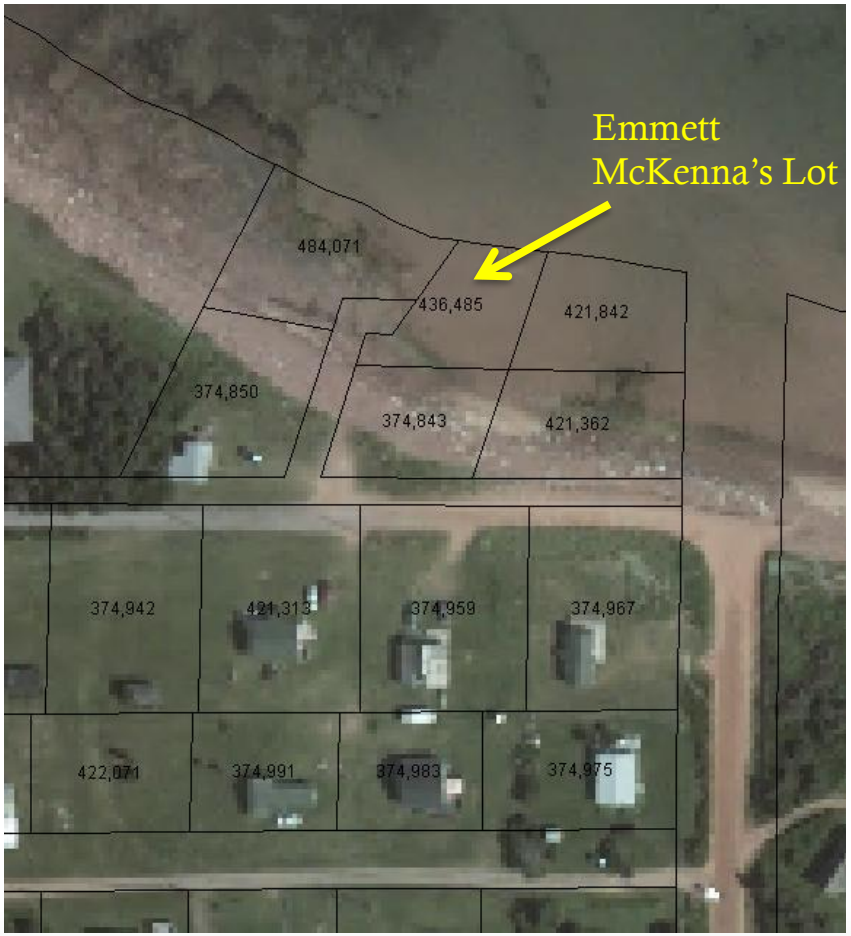
- average rate of coastline change measured for every metre of the entire island from **1968 to 2010** is **28 cm/year**

  (Webster and Brydon, 2012)



Coastal Erosion Example

- Pigot's Point, Savage Harbour
- McKenna's purchase Lot in 1959
- At the time there was a large sand dune, 50 feet high on the shore side of their cottage
- Over 200 metres of bank have been lost to the sea in this area since 1962



Time Span	Land Area Lost	Land Area Gained	Net Loss/Gain
1968-2010	35.21 km^2	14.54 km^2	-20.67 km^2

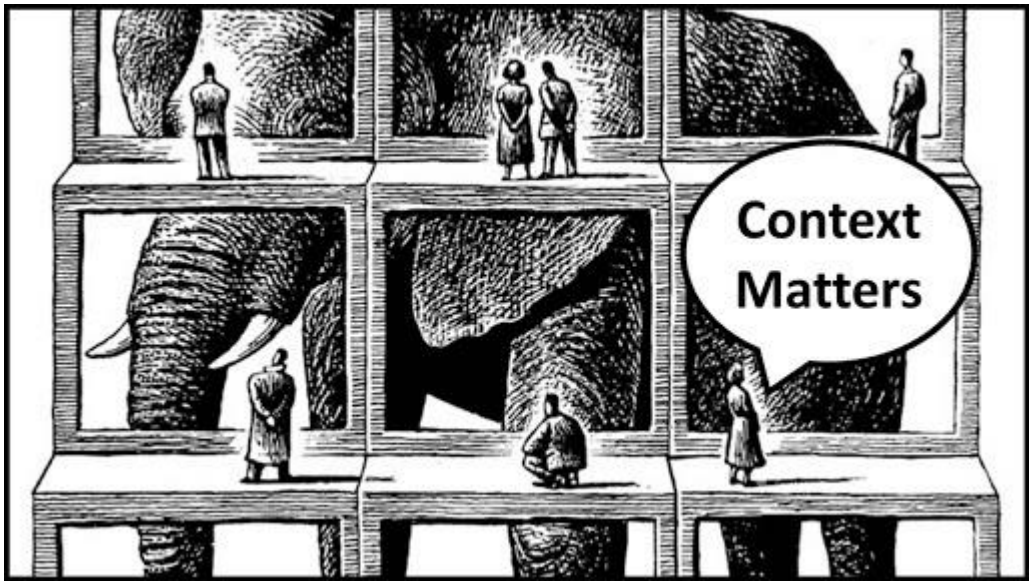
Our Province is Shrinking!

Land area lost and gained 1968-2010 for each littoral zone

	1968-2010			
	Area Gained (km^2)	Area Lost (km^2)	Net (km^2)	Net % of zone area
Bedeque	0.560	1.860	-1.300	0.28
Boughton	0.450	0.450	0.000	0
Brackley	0.930	1.100	-0.170	0.08
Cardigan	0.430	1.020	-0.590	0.16
Cavendish	0.670	0.620	0.050	0.02
Egmont	0.460	4.010	-3.550	0.97
Hillsborough	1.670	8.630	-6.960	0.59
Malpeque	4.120	8.180	-4.060	0.57
Murray Harbour	0.270	0.830	-0.560	0.30
Naufrage	0.170	0.590	-0.420	0.19
Northeast	0.550	0.880	-0.330	0.11
Southeast	0.390	1.610	-1.220	0.46
St. Peter's	1.810	1.590	0.220	0.09
Tignish	0.160	0.720	-0.560	0.81
Tracadie	0.880	0.580	0.300	0.35
Tryon	0.770	1.230	-0.460	0.16
West	0.250	1.310	-1.060	0.30
Total	**14.540**	**35.210**	**-20.670**	**0.37**

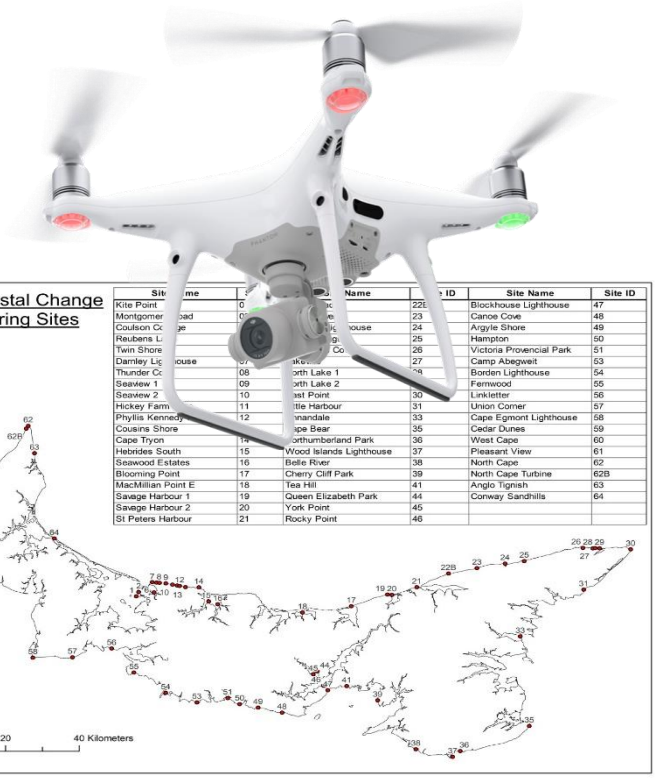

Littoral Zones of PEI
(as defined by Coldwater Consulting Inc. in 2011)
Tignish
West
Malpeque
Egmont
Cavendish
Brackley
Tracadie
St. Peter's
Naufrage
Northeast
Bedeque
Boughton
Hillsborough
Tryon
Cardigan
Murray Harbour
Southeast
Littoral Zone Boundary
2010 Coastline
0 5 10 20 30 40
Kilometers
N

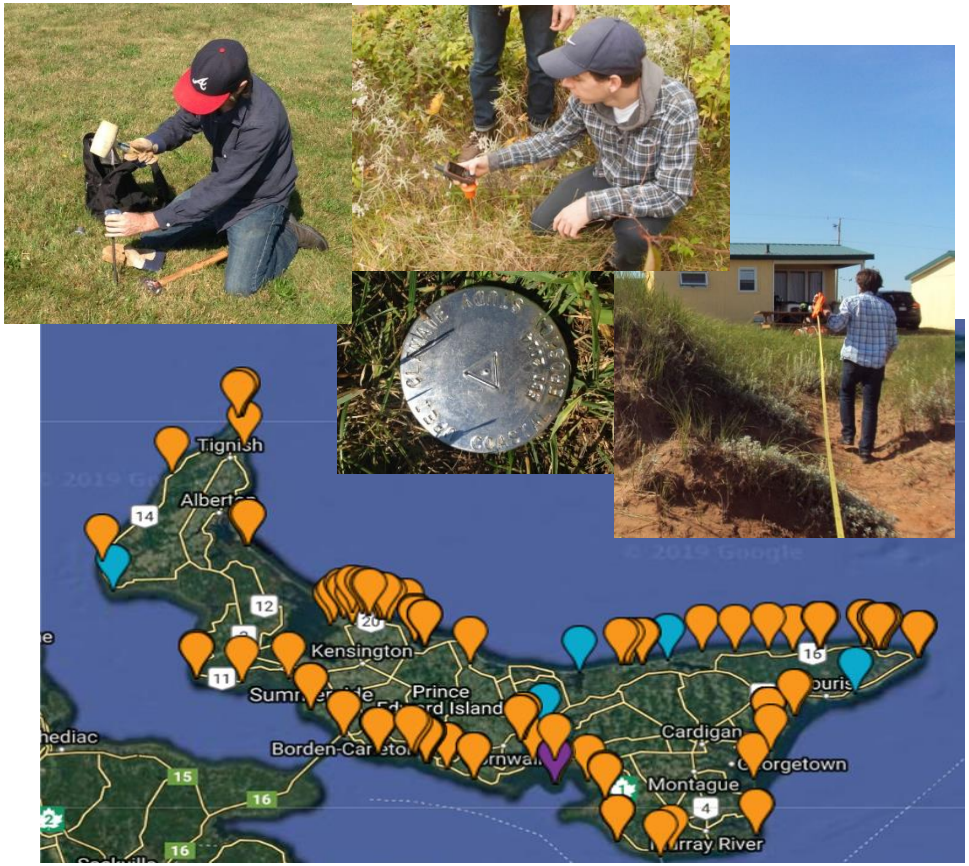
Some Context



At these rates of erosion, Prince Edward Island will disappear completely in ~11,350 years

UPEI Climate Lab surveying annual change





2015-16	2016-17	2017-18	2018-19	2019-2020
Naufrage – 1.85 m	Kite Point - 5.16 m	North Cape P8E - 5.05 m	Cousins Shore - 5.14 m	Howe Point K4C - 9.1 m
Savage Harbour – 1.2 m	Belle River C - 4.6 m	Conway Sandhills 2B - 4.7 m	Cable Head - 3.7 m	Canoe Cove Q14B - 9.07 m
	Belle River B - 4.11 m	Cable Head - 3.05 m	East Point B - 2.9 m	Kite Point - 4.96 m
	Cousins Shore - 2.9 m	Annandale - 1.7 m	Argyle Shore Q15B - 2.41 m	North Cape P8A - 4.4 m
	Cape Egmont - 2.88 m	Belle River C - 1.7 m	Conway Sandhills P1A - 2.3 m	North Cape P8C - 2.9 m
	Belle River A - 2.23 m	Panmure Island - 1.45 m	North Cape P8D - 2.15 m	Belle River C1 - 2.3 m
	Savage Harbour - 2 m	Argyle Shore Q15A - 1.43 m	Conway Sandhills 2B - 2.05 m	Annandale K3A - 2.22 m
	Seaview Q12A - 1.8 m	Victoria Prov Park - 1.27 m	North Lake D - 1.7 m	North Cape P8E - 2 m
	North Cape P8E - 1.32 m	Union Corner Prov Park - 1.05 m	Rock Barra B - 1.1 m	Linkletter Prov Park - 1.3 m
	Conway Sandhills 2B - 1.15 m		North Cape P8E - 1.05 m	Seaview KN 11 - 1.2
	Union Corner Prov Park - 1.13 m			Stanley Bridge - 1.1 m

*preliminary results

19. Savage Harbour 1 - Coastal Monitoring 2016 - 2019

Coastlines

- Coastline 2019
- Coastline 2018
- Coastline 2017
- Coastline 2016

Rate of Change (m/year)

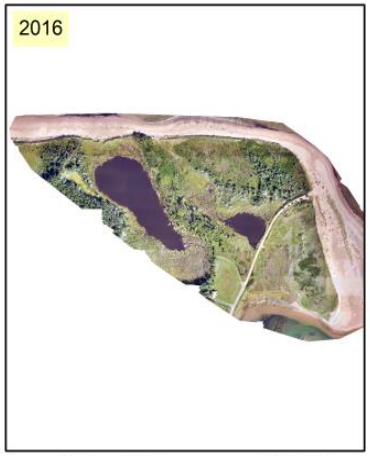
- < -1.50
- -1.50 - (-1.00)
- -1.00 - (-0.25)
- -0.25 - 0.00
- 0.00 - 0.25
- 0.25 - 1.00
- 1.00 - 1.50
- > 1.50

Site: 19. Savage Harbour 1
Shore Type: Sand Dune
Rate of Change (m/year)
2016 - 2019: -1.22

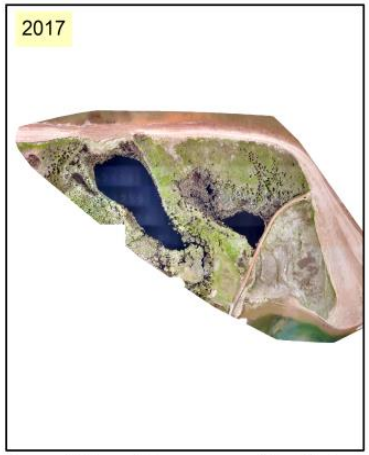
2016 - 2017: -2.63
2017 - 2018: -0.07
2018 - 2019: -4.29
Net Shoreline Movement(m)
2016 - 2019: -4.05
Measurements: 528
2019 Site Length(m): 1193.2

0 80 160 320 Meters

WGS 1984 UTM Zone 20N



0 145 290 580 Meters



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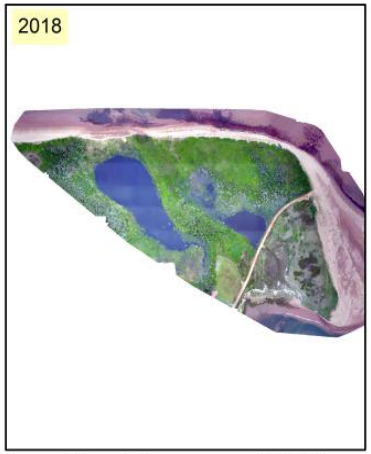
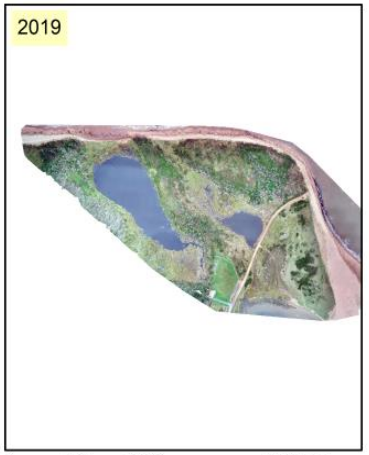


0 140 280 560 Meters



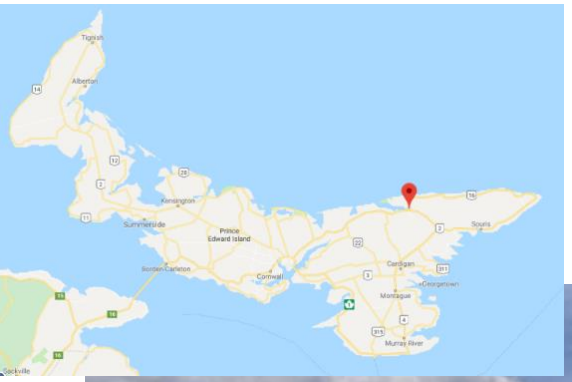
0 145 290 580 Meters

Substantial	Type	Isolated	Type	Minimal	Type	No Change	Type
17 Blooming Point	Sand Dune	01 Kite Point	Bluff	02 Montgomery Road	Cliff	05 Reuben's Lane	Cliff
18 MacMillan Point	Cliff	06 Twin Shores	Cliff	04 Coulson Cottage	Cliff	08 Thunder Cove	Cliff
19 Savage Harbour 1	Sand Dune	07 Darnley Lighthouse	Cliff	09 Seaview 1	Cliff	16 Seawood Estates	Cliff
21 St. Peter's Lighthouse	Sand Dune	10 Seaview 2	Cliff	13 Cousins Shore	Cliff	26 Campbell's Cove	Cliff
25 Clear Springs	Cliff	11 Hickey Farm Lane	Cliff	22b Cable Head	Cliff	46 Rocky Point	Cliff
31 Little Harbour	Sand Dune	12 Phyllis Kennedy Rd	Cliff	27 Lakeville	Cliff	47 Blockhouse Lighthouse	Cliff
38 Belle River	Sand Dune	14 Cape Tryon	Cliff	28 North Lake 1	Cliff	54 Borden Lighthouse	Cliff
41 Tea Hill	Low Plain	15 Hebrides	Cliff	29 North Lake 2	Cliff	62 North Cape	Cliff
49 Argyle Shore	Cliff	20 Savage Harbour 2	Cliff	48 Canoe Cove	Cliff	62b North Cape Turbine	Cliff
59 Cedar Dunes	Sand Dune	23 Goose River	Cliff	50 Hampton	Cliff		
64 Conway Sandhills	Sand Dune	24 Naufrage Lighthouse	Cliff	55 Fernwood	Bluff		
		30 East Point	Cliff	57 Union Corner	Bluff		
		33 Annandale	Cliff	58 Cape Egmont	Cliff		
		35 Cape Bear	Cliff	60 West Cape	Cliff		
		36 Northumberland Park	Cliff				
		37 Wood Islands Lighthouse	Cliff				
		39 Cherrycliff Park	Cliff				
		44 Queen Elizabeth Park	Low Plain				
		45 York Point	Cliff				
		51 Victoria Provincial Park	Cliff				
		53 Camp Abegweit	Cliff				
		56 Linkletter	Low Plain				
		61 Pleasant View	Cliff				
		63 Anglo Tignish	Cliff				

Canadian Centre for Climate Change and Adaptation

World leader in understanding and adapting to the climate change impacts on economies and ecologies.

Applying leading technologies such as drones, big data analytics, and virtual reality to the climate change challenge.



impact

Takeaways from the UPEI Climate Lab

1. Coastal Erosion is a significant issue for Prince Edward Island, and its importance will increase over time.

2. Preventing or mitigating coastal erosion should be a priority for the *Planning Act and/or the Lands Protection Act.*

3. Some preferred actions are revisiting set-back regulations for building coastal infrastructure, or supporting best approaches for protecting PEI's fragile coastlines.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