

Coastal Science and the Future of Long Point Sand Spit

August 5, 2026



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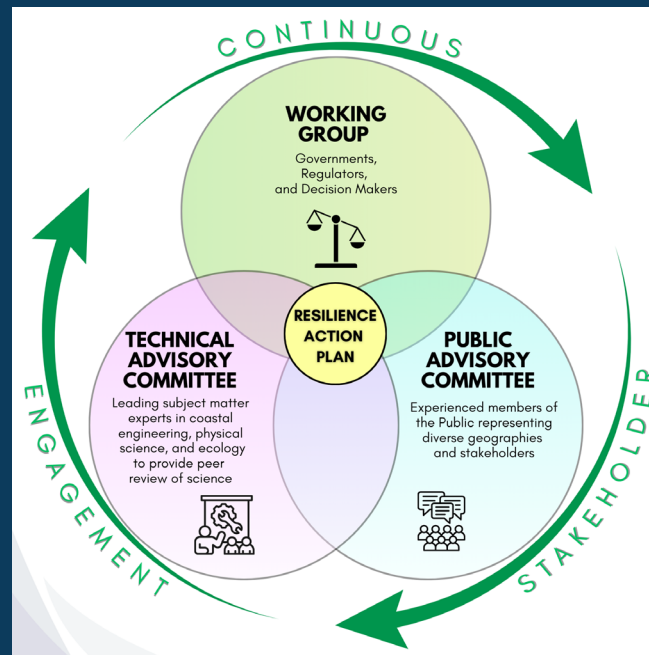
LONG POINT
BIOSPHERE
REGION

Presentation

- Project overview (www.northshoreresilience)
- Evolution of Long Point sand spit
- Sediment Budget and Numerical Modelling
- Phase 2 Scope and Pursuit of Funding



NORTH SHORE RESILIENCE PROJECT OVERVIEW



Littoral Cell from Port Glasgow to Long Point

Littoral Cell

A region of coast that defines the supply of sand and pebbles, the direction it moves along the coast, and the area of deposition (accumulation).

Divergent Node

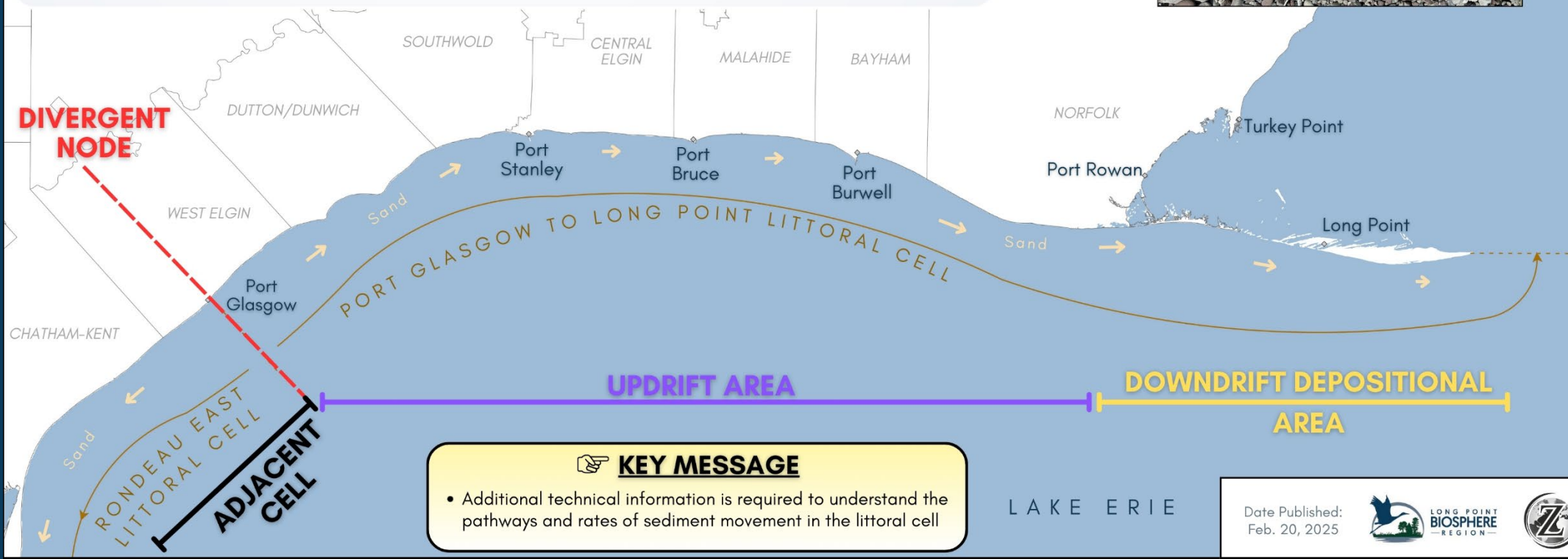
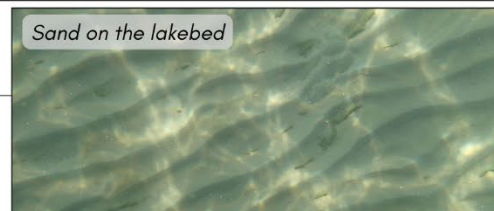
A boundary between two adjacent cells, where sediment moves in opposite directions

Updrift Area

The portion of a littoral cell that features a natural background erosion rate and generates sediment from erosion and river inputs

Downdrift Depositional Area

The stable or accreting area of the cell due to a positive supply of sediment from the updrift area.



KEY MESSAGE

- Additional technical information is required to understand the pathways and rates of sediment movement in the littoral cell

LAKE ERIE

Date Published:
Feb. 20, 2025



Objectives of Project

01

Develop Technical and Scientific Knowledge

Collect physical data and develop a sediment budget and transport model to determine how and where sand and pebbles move in the nearshore of the coast between Port Glasgow and Long Point.



02

Complete Dune Restoration Projects

From 2024 to 2027 we will build coastal resilience through dune restoration. Sand dunes form at the back of beaches when sand is trapped by beachgrass and other native plants. Healthy dunes create a barrier against natural coastal hazards, such as flooding and erosion, and improve habitat.



03

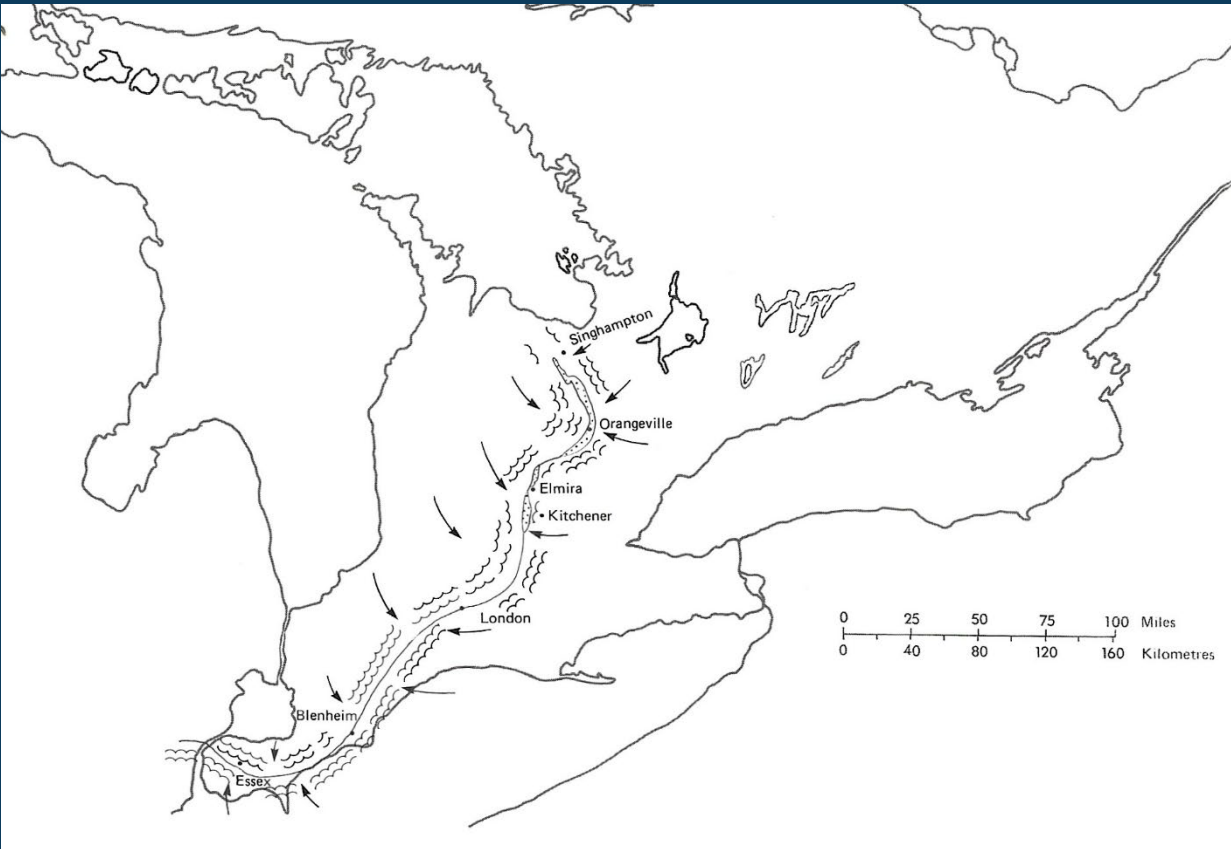
Produce a Resilience Action Plan

Develop a Resilience Plan that integrates the four dimensions of a resilient coast: social, economic, environmental, and physical processes. The technical and scientific work completed will inform the management options developed to build resilience along the coast. The Action Plan will be co-developed by the Working Group, the Public Advisory Committee, community members at large and reviewed by the Technical Advisory Committee.

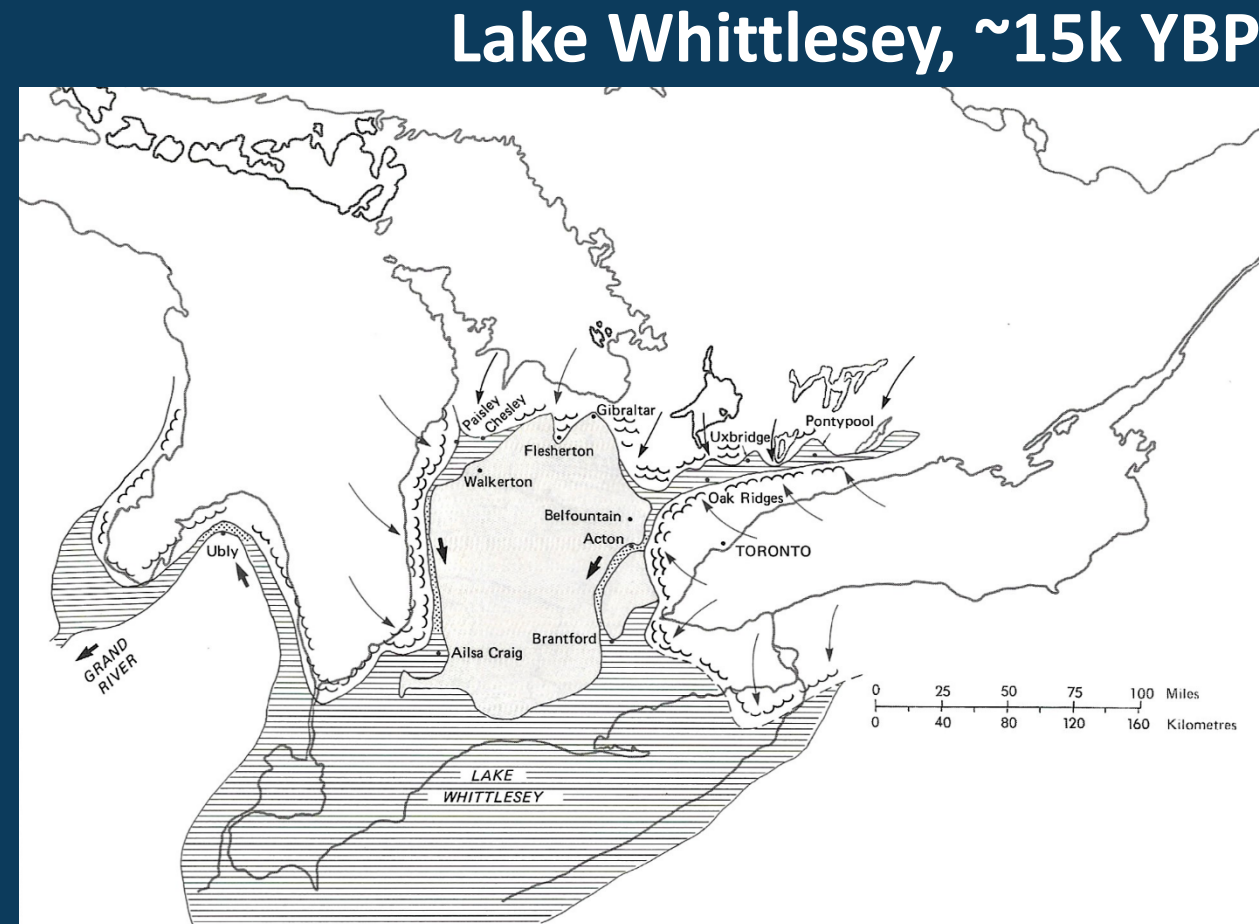
EVOLUTION OF LONG POINT SAND SPIT



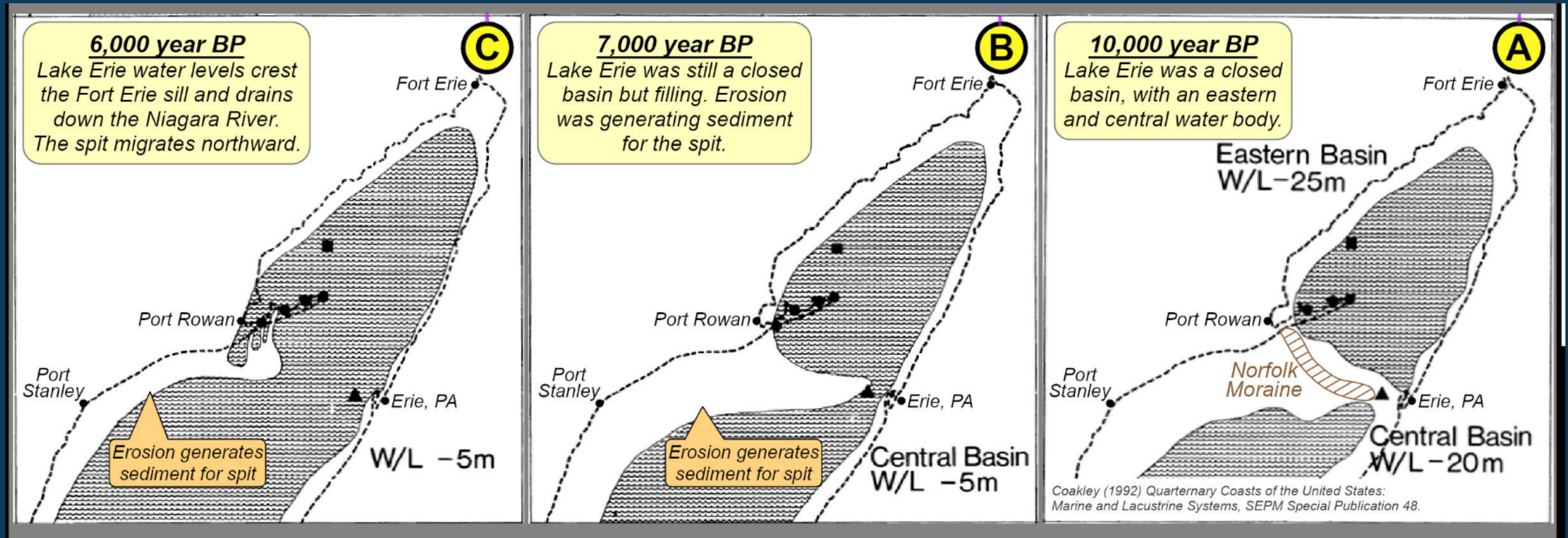
Recession of the Wisconsin Glacier in Southern Ontario (Chapman & Putnam, 1984)



Early Retreat (~20k YBP)

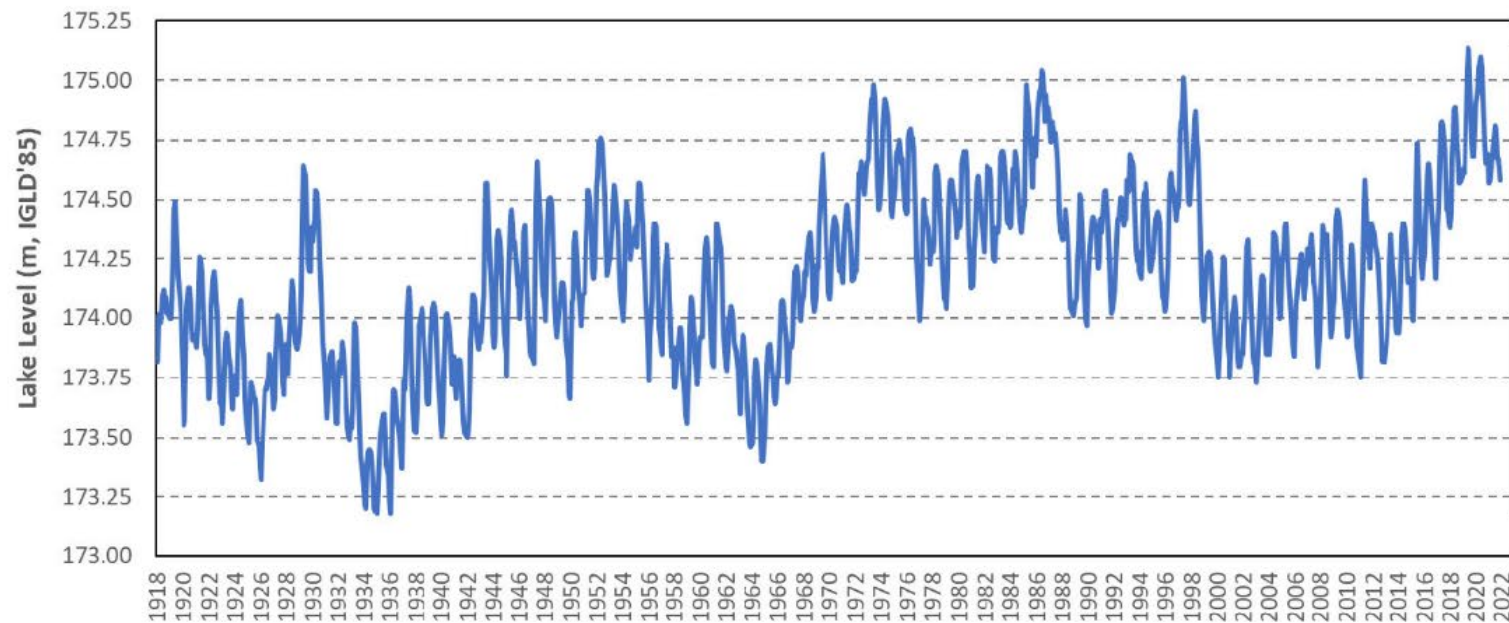


10,000 YBP Lake Erie Starts To Fill with Water



Modern Lake Erie Water Levels

Water Levels Since 1918



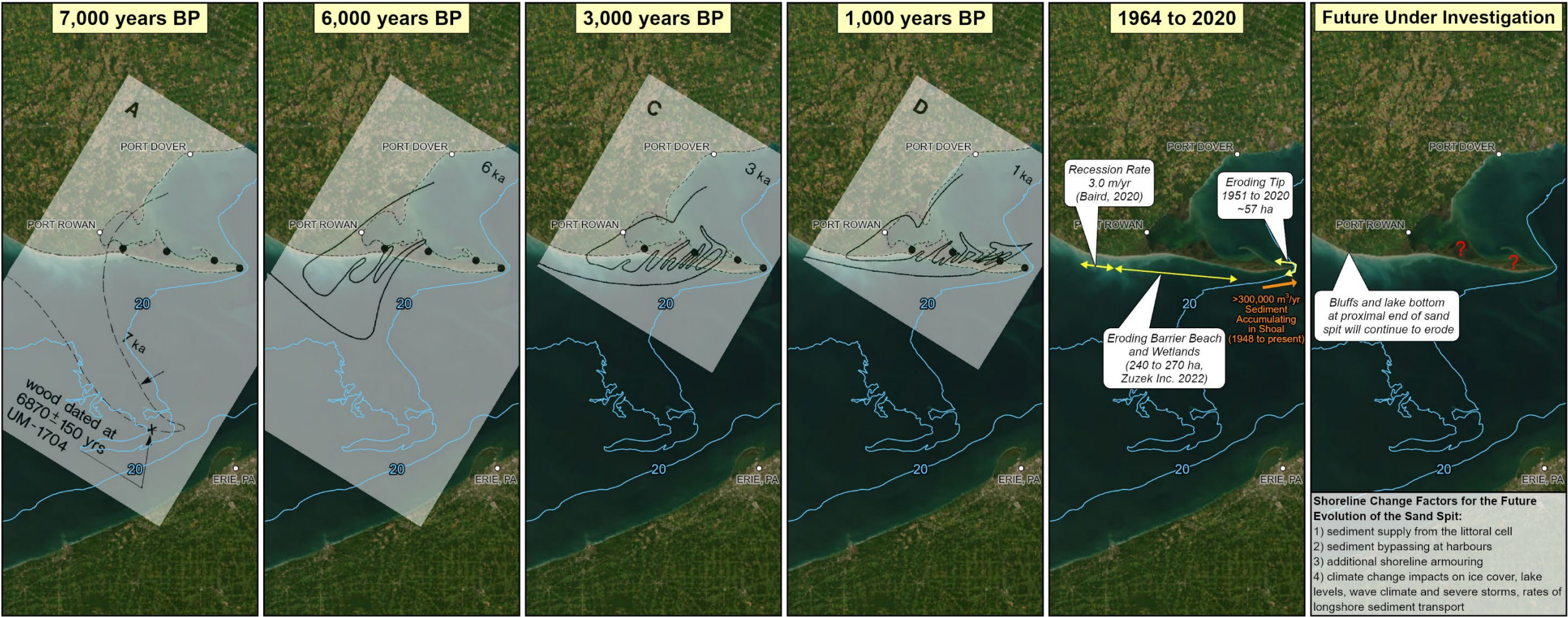
Since 1918, water levels have fluctuated between ~173.5 and ~175.2 m (IGLD'85)

The water level graph (left) is an extension of the historical water levels (right).

Early Evolution of the Long Point Sand Spit



7,000 Years Ago to Present



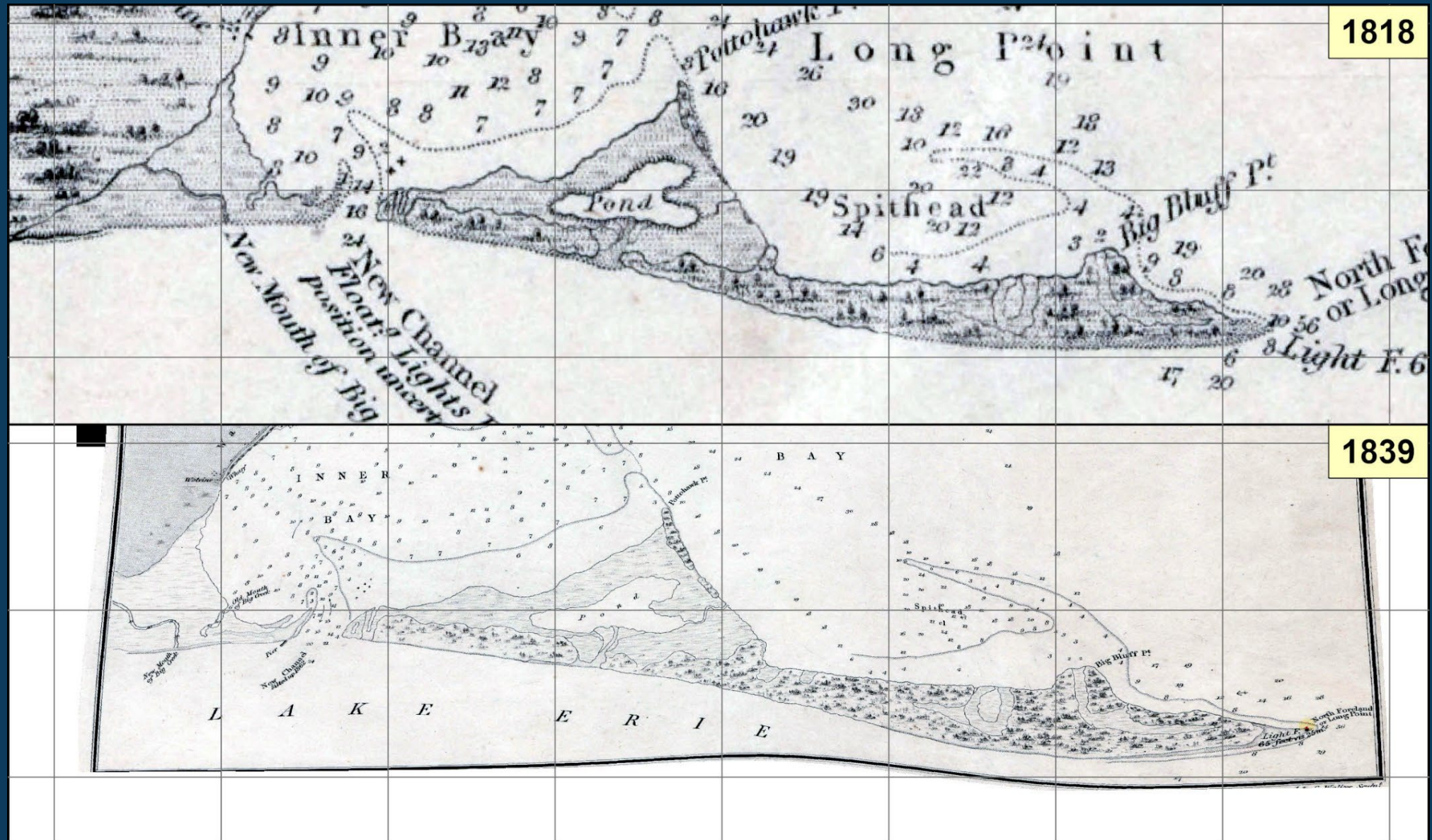
Formation, Evolution, and Future of the Long Point Sand Spit

Source of Holocene Shorelines:
Coakley (1992) Quaternary Coasts of the United States:
Marine and Lacustrine Systems, SEPM Special Publication 48.

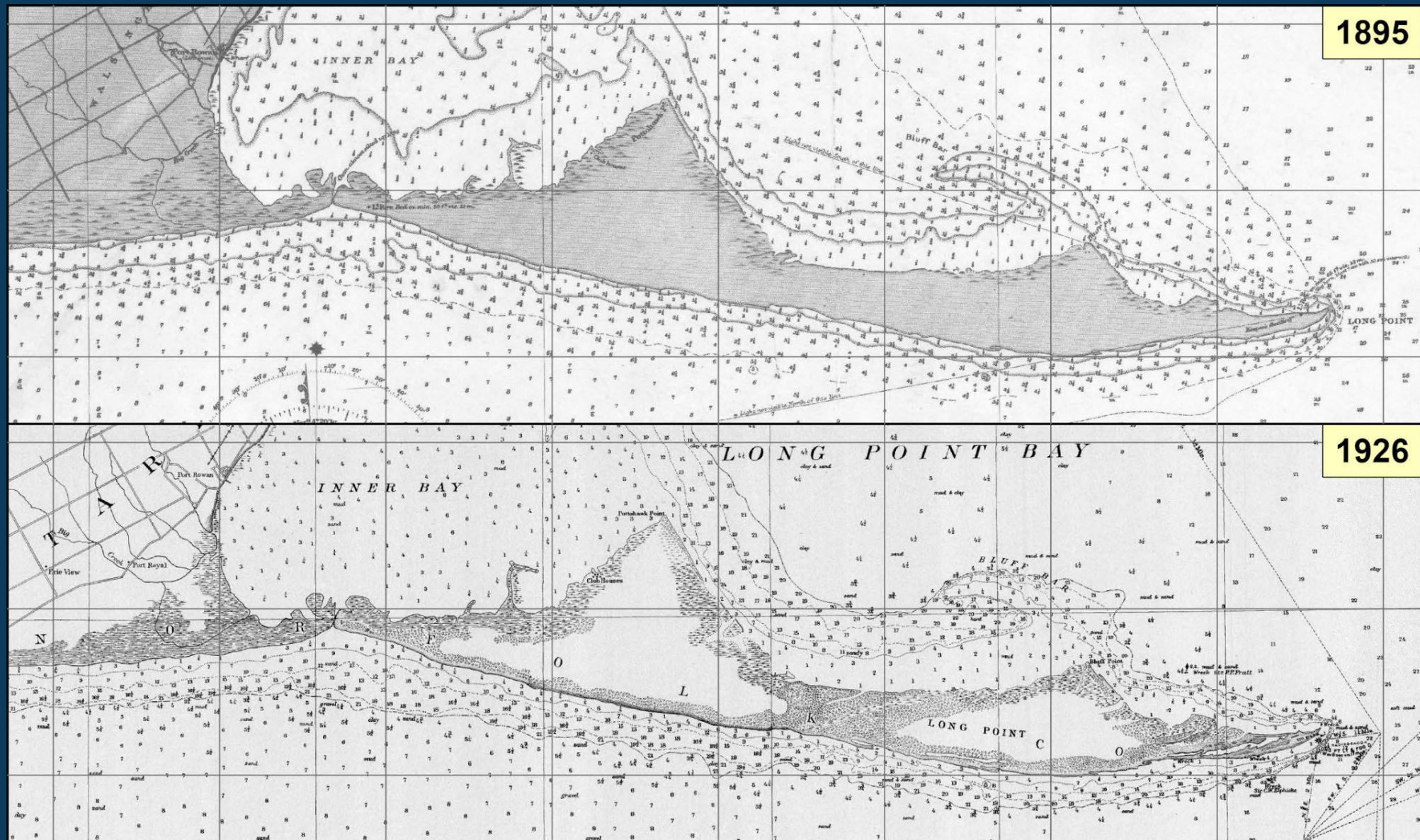
0 10 20
km

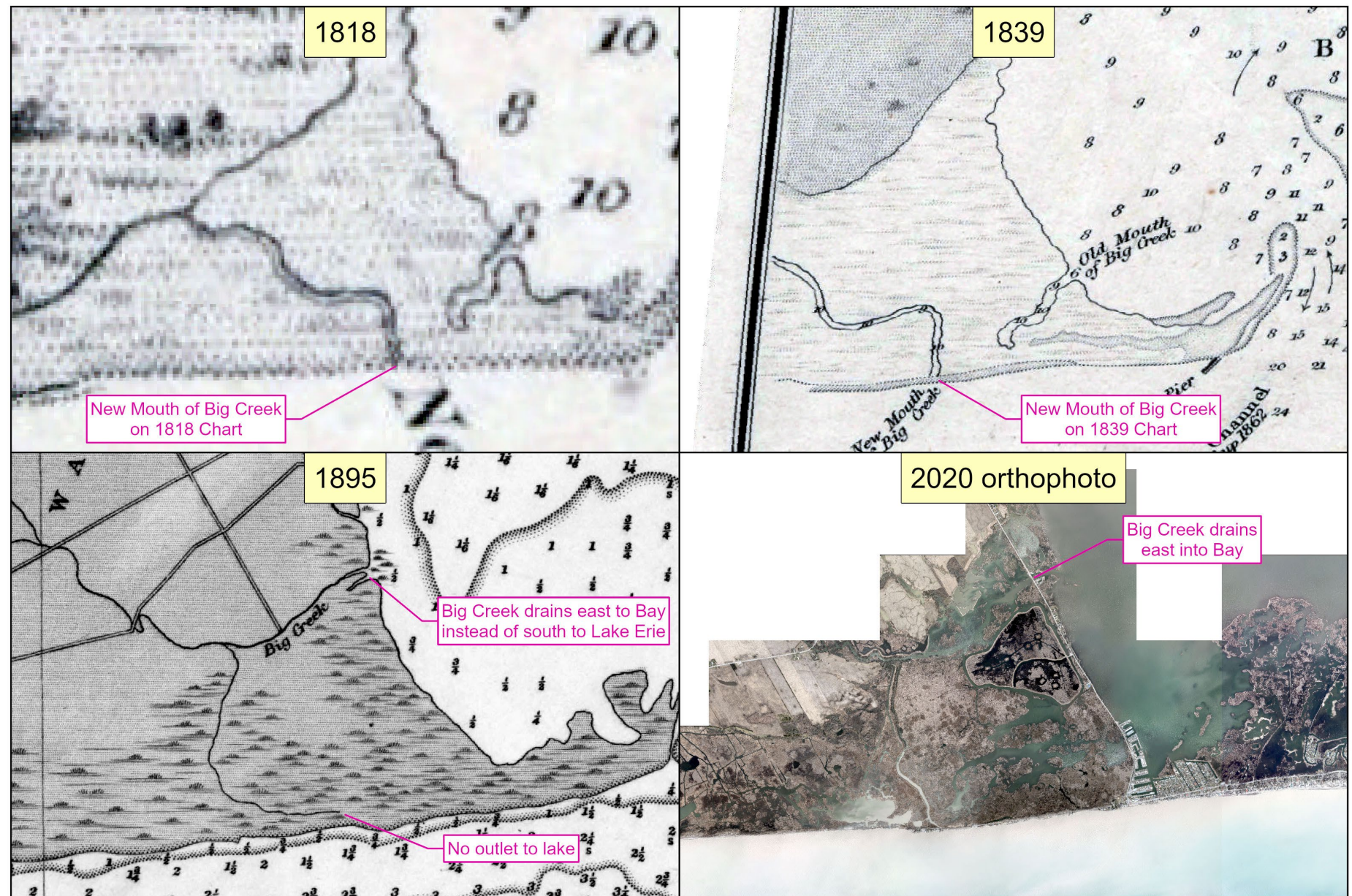


1818 and 1839 Nautical Charts



1895 to 1926 – Old Cut Closes





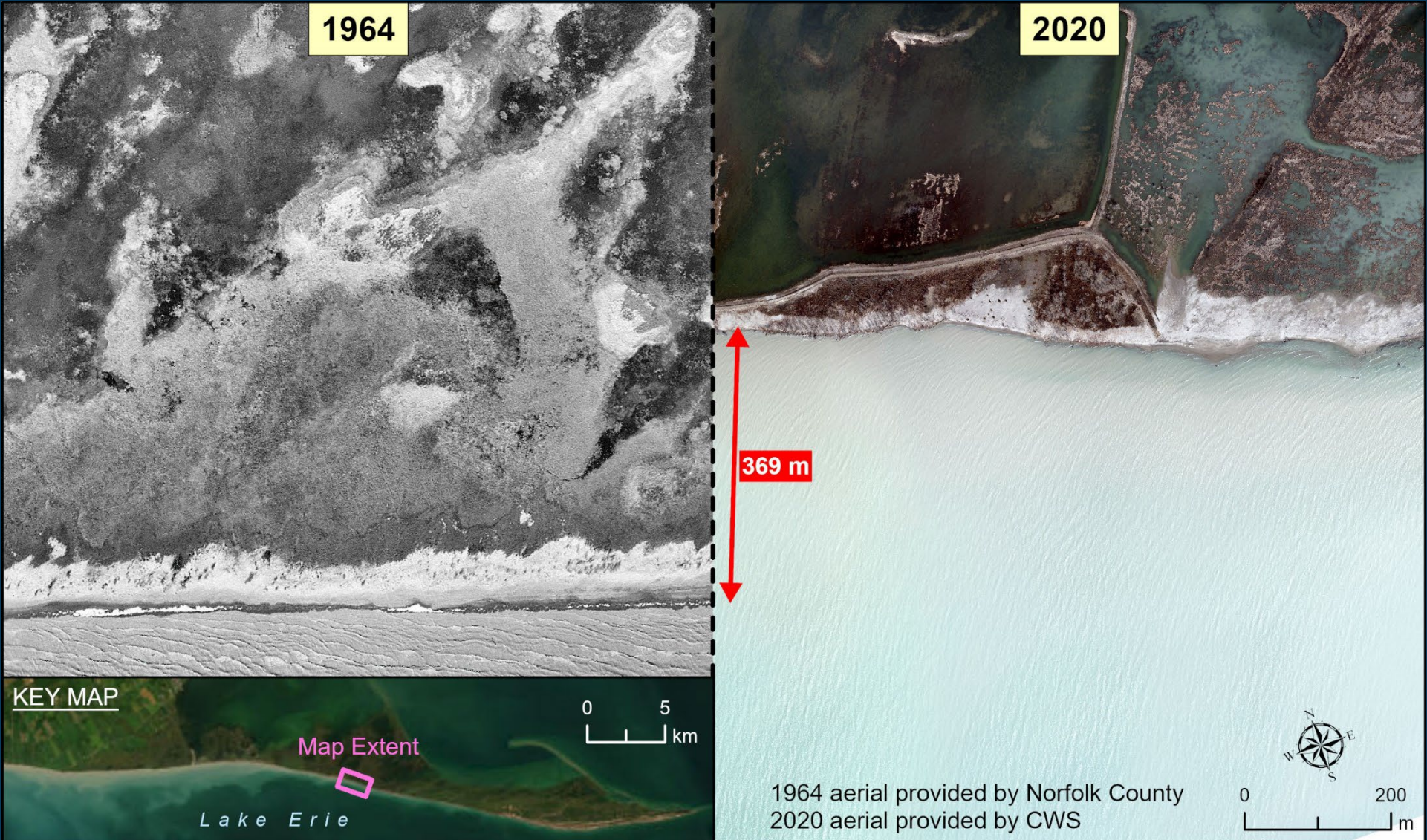
Today, Most of the Spit Is Eroding. Why?



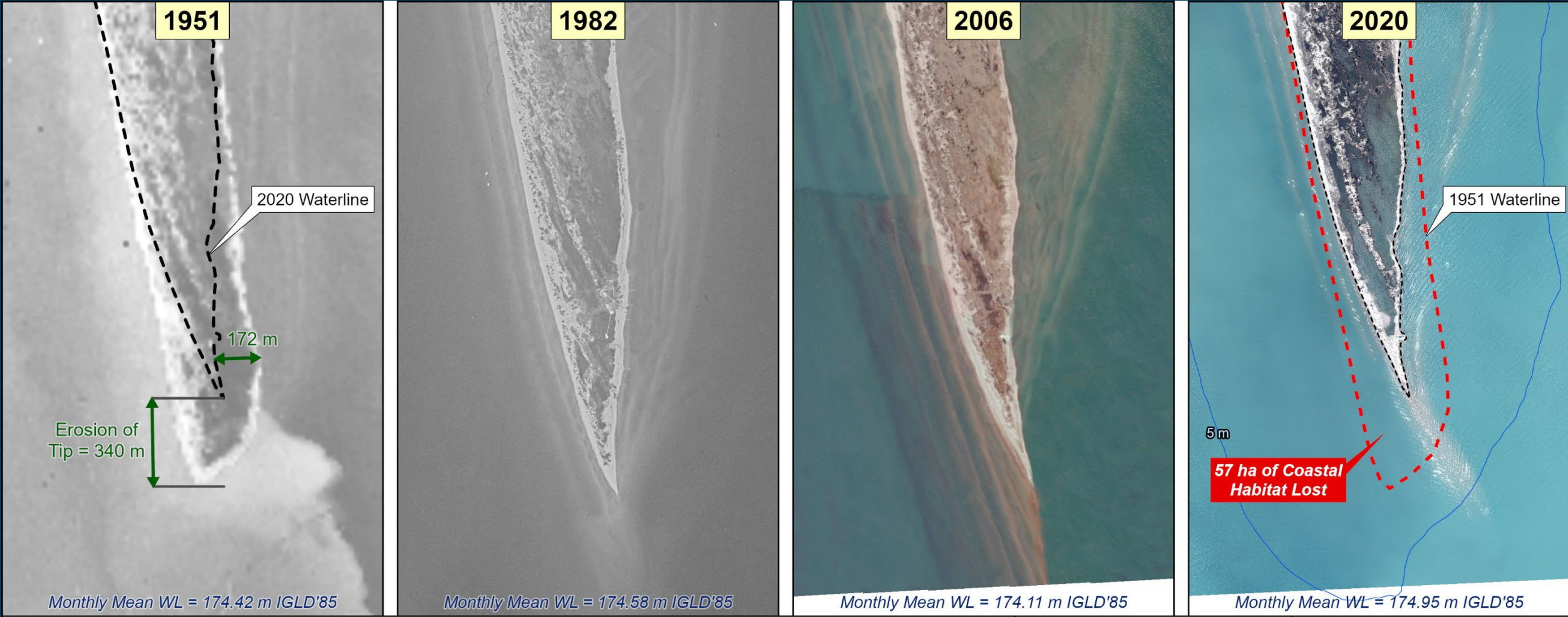
Hahn Unit 1964 to 2020



Long Point Company from 1964 to 2020



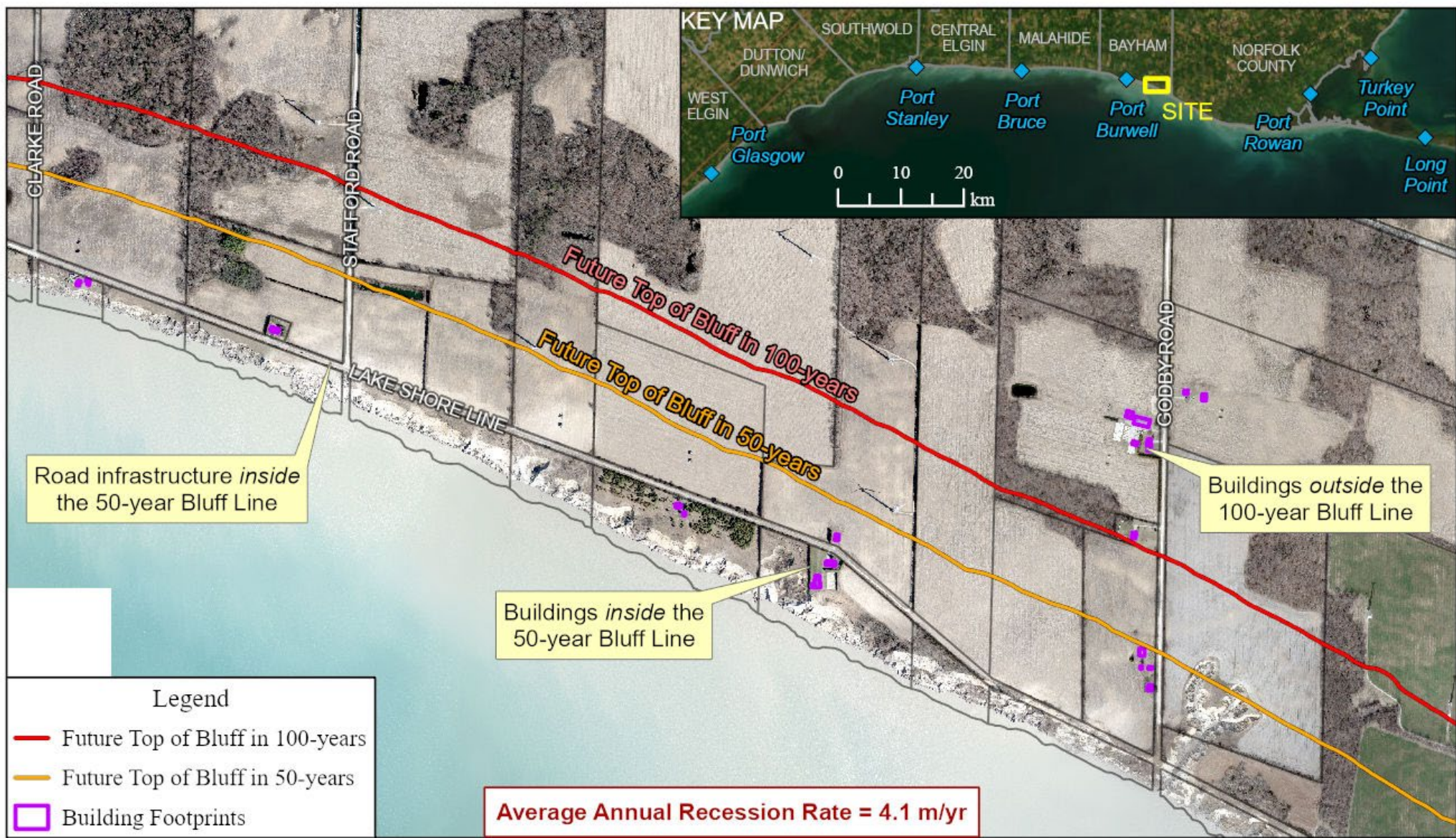
Evolution of the Tip from 1951 to 2020



Evolution of the Tip at Long Point 1951 to 2020

Sources:
1951 air photo obtained from National Air Photo Library.
1982 satellite image obtained from USGS.
2006 SWOOP air photo obtained from Ontario GeoHub.
2020 air photo provided by CWS.

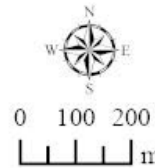


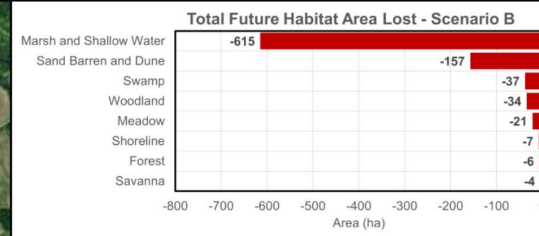
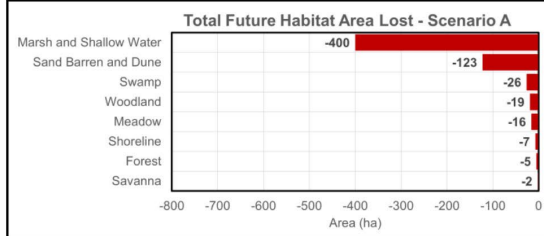


Estimated 50- and 100-year Top of Bluff Lines
Based on Historical Recession Rates

North Shore Resilience Study

Map Imagery: 2020 SWOOP (Ontario GeoHub)



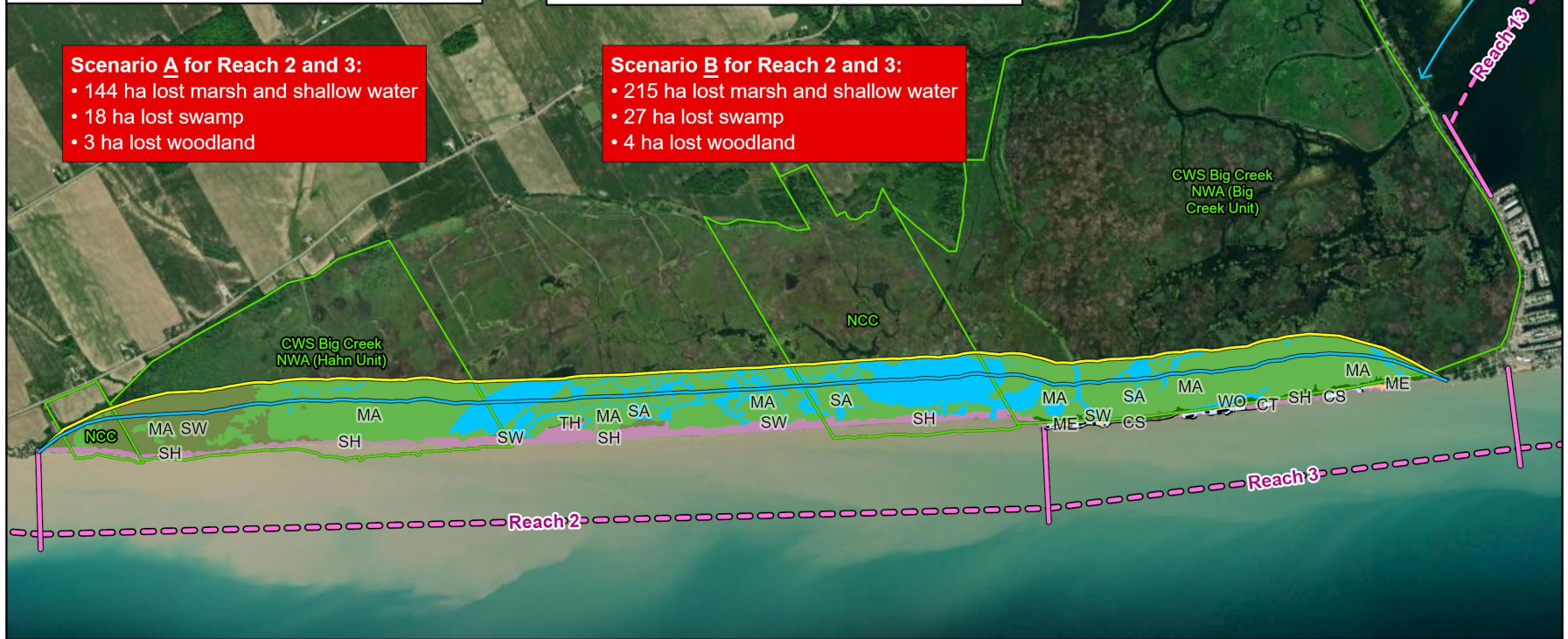


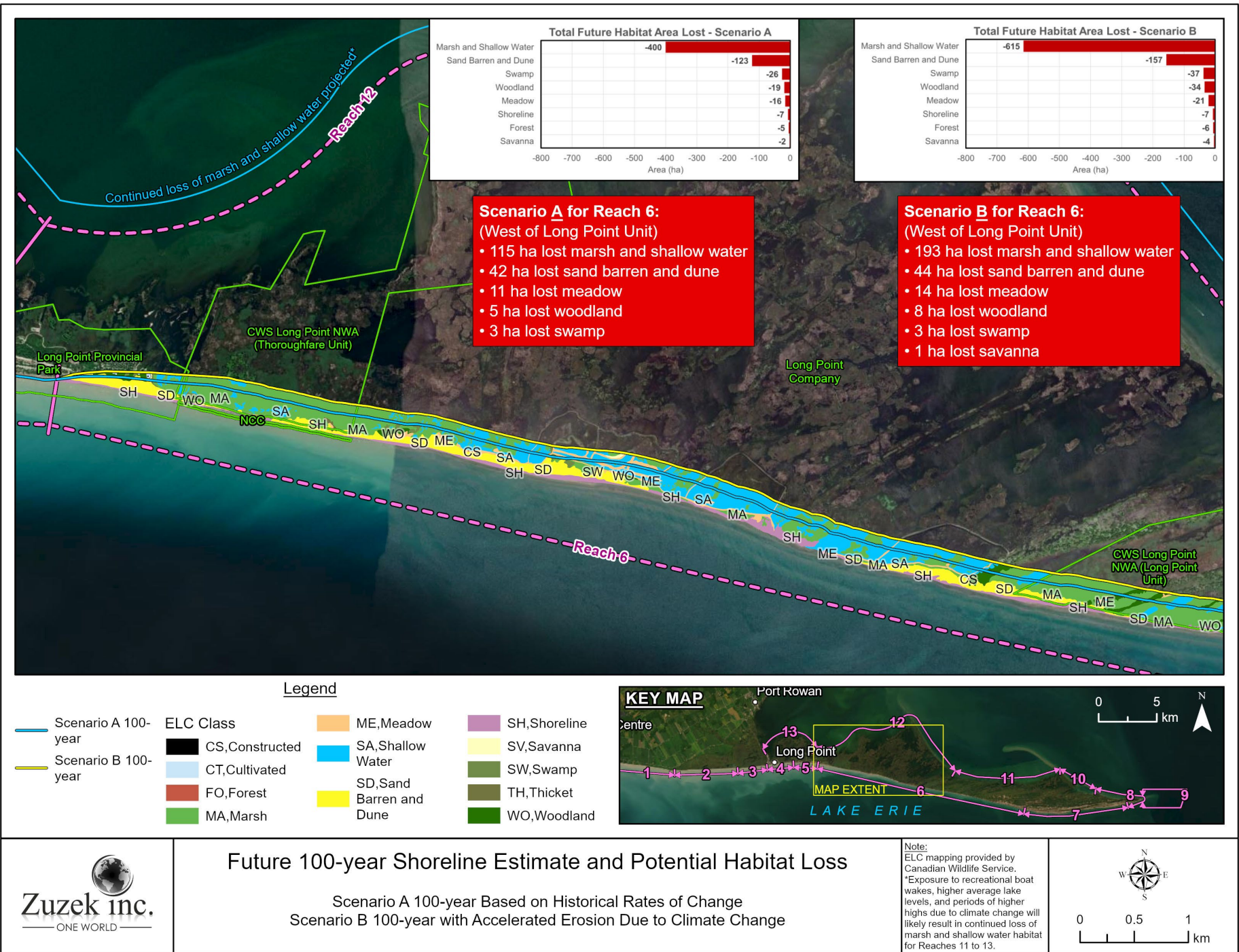
Scenario A for Reach 2 and 3:

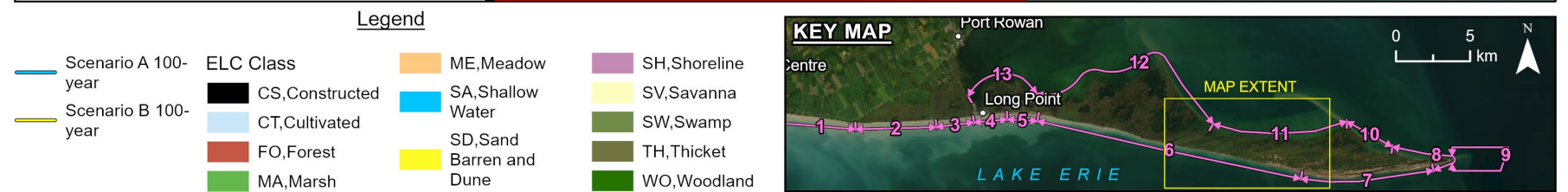
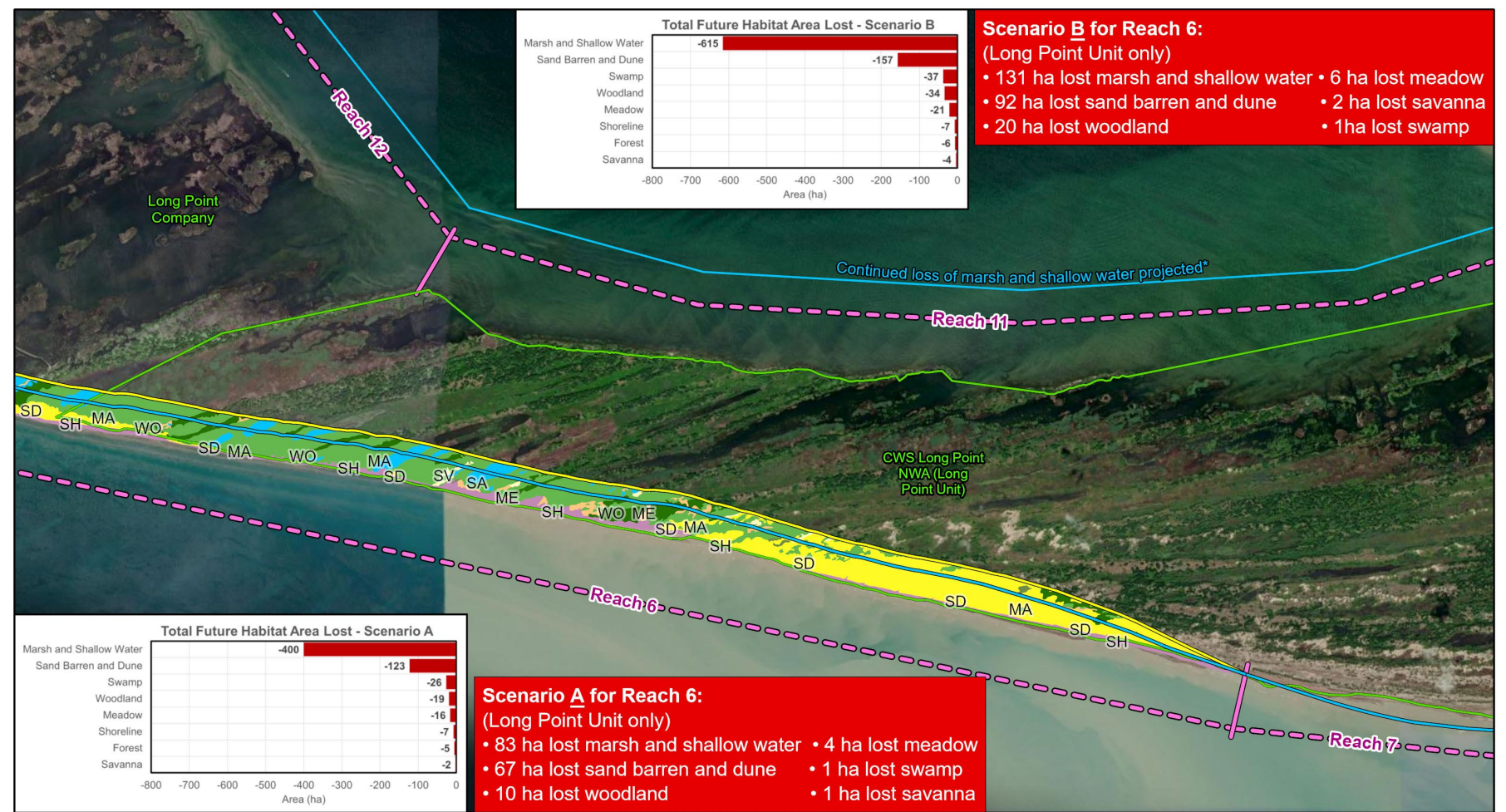
- 144 ha lost marsh and shallow water
- 18 ha lost swamp
- 3 ha lost woodland

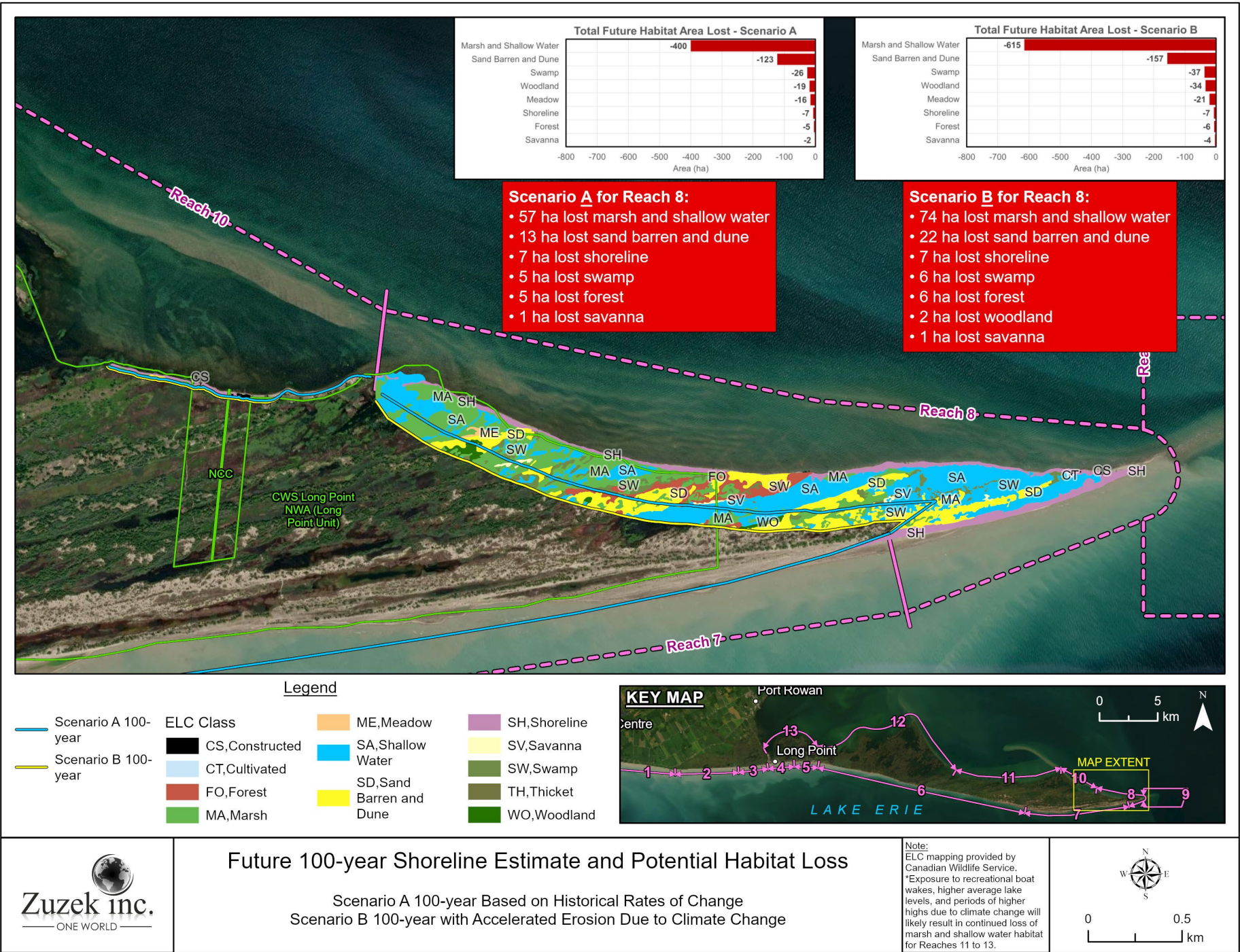
Scenario B for Reach 2 and 3:

- 215 ha lost marsh and shallow water
- 27 ha lost swamp
- 4 ha lost woodland

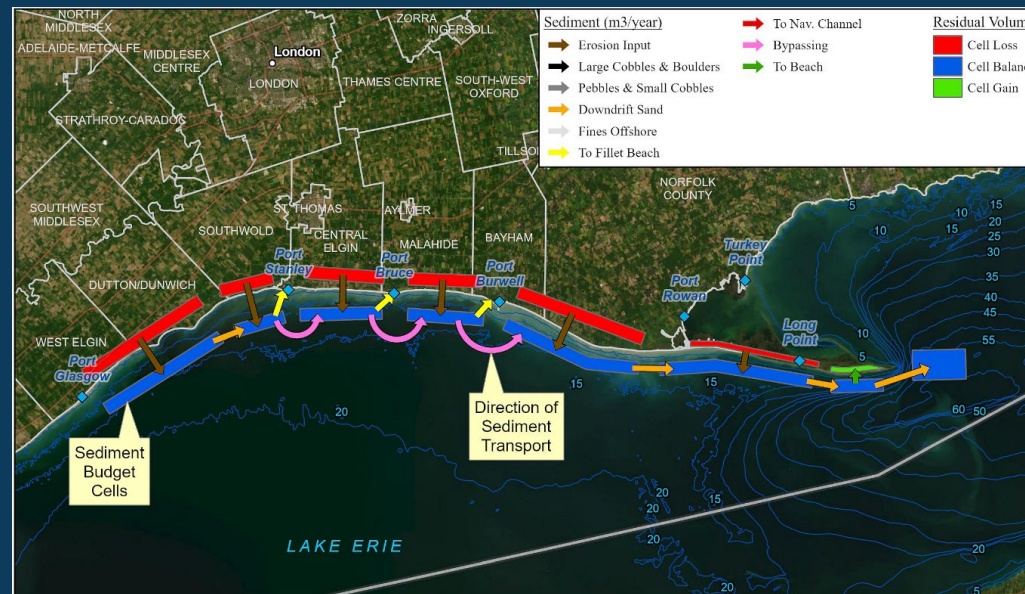








SEDIMENT BUDGET AND NUMERICAL MODELLING TO UNDERSTAND SEDIMENT DYNAMICS

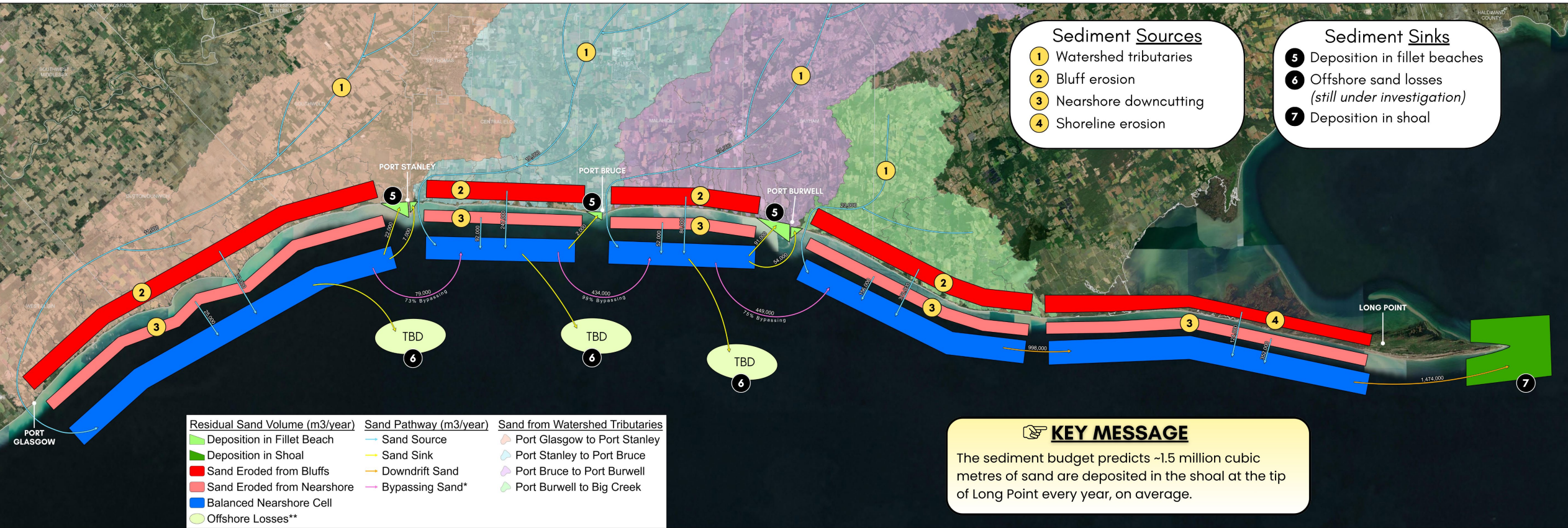


Littoral Cell

Sediment Budget:

The sediment budget quantifies all the sediment sources, transport pathways for sand, and depositional sinks within the boundaries of the Port Glasgow to Long Point littoral cell. When the sediment sources equal the sediment sinks, the budget balances, and there is confidence in the sediment pathways.

The sediment budget calculations below quantify the sediment sources, transport pathways, and sinks for the Port Glasgow to Long Point littoral cell.

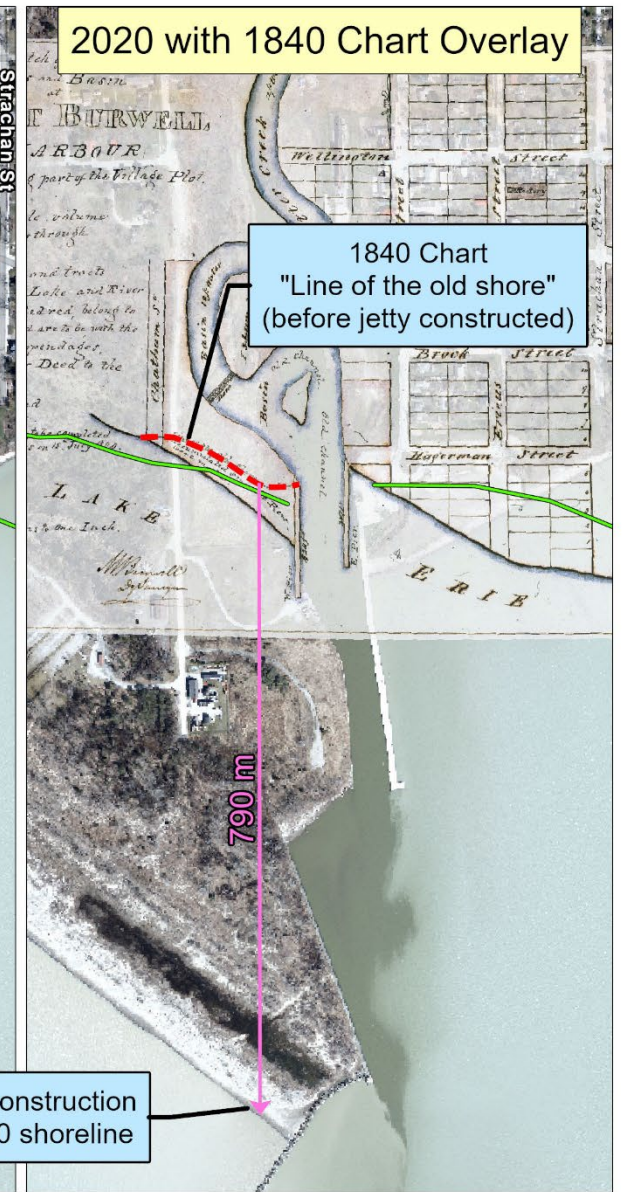


Rogers Centre in Toronto has as approximately volume of 1.6 million cubic metres with the roof closed.



Sediment Budget Notes:
 *The amount of sand naturally bypassing the harbours is still under investigation with the numerical modelling tools.
 **Sediment losses at the harbours due to offshore currents is being investigated with the numerical modelling tools.

1840 to 2020 at Port Burwell



1840 Chart
"Line of the old shore"
(before jetty constructed)

790m from pre-construction
shoreline to 2020 shoreline

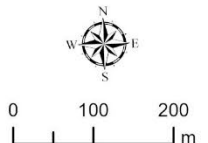


1840 Chart at Port Burwell

--- 1840 Chart Shoreline

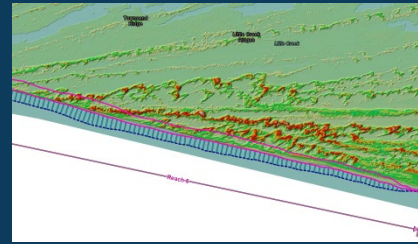
— 1909 Chart shoreline

Notes:
2020 SWOOP imagery from
Elgin County GIS Web Service

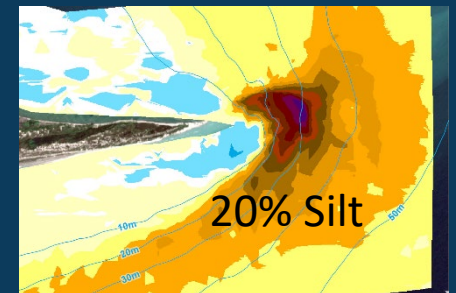
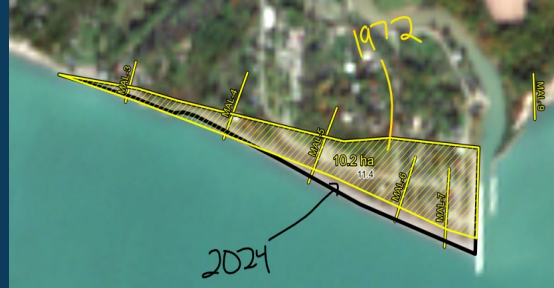


Sand Sources and Sinks in Littoral Cell

- Sources: tributaries, gullies, eroding bluffs and nearshore, Long Point erosion
 - 1,650,000 m³/yr

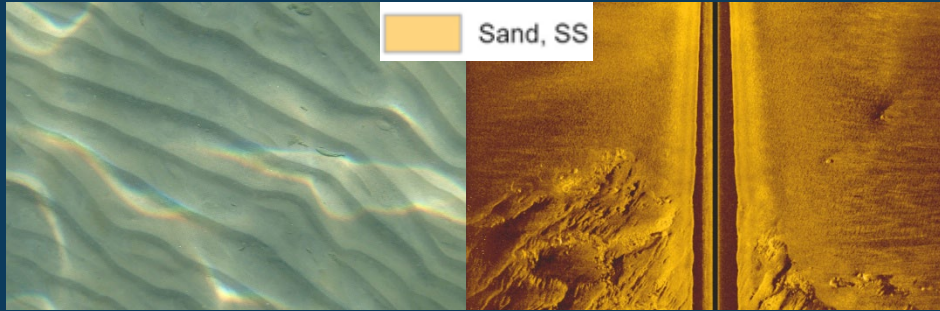


- Sinks: harbour fillet beaches and shoal at tip of Long Point
 - 1,540,000 m³/yr (does not include modelling offshore losses)

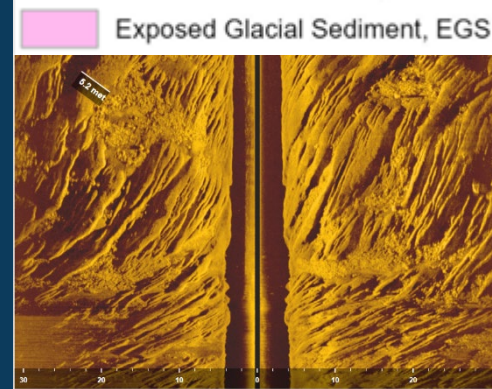


Examples of Lake Bottom Substrate Types

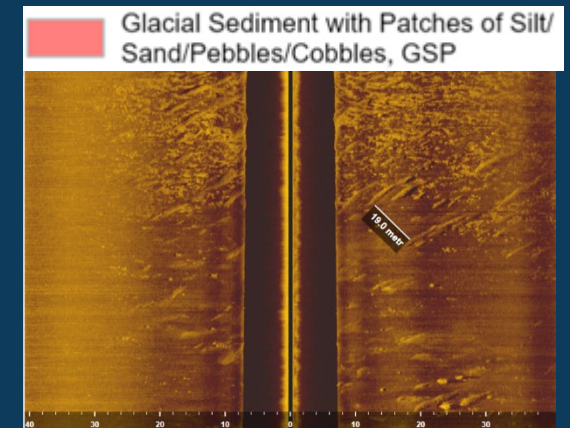
- Sand (SS)



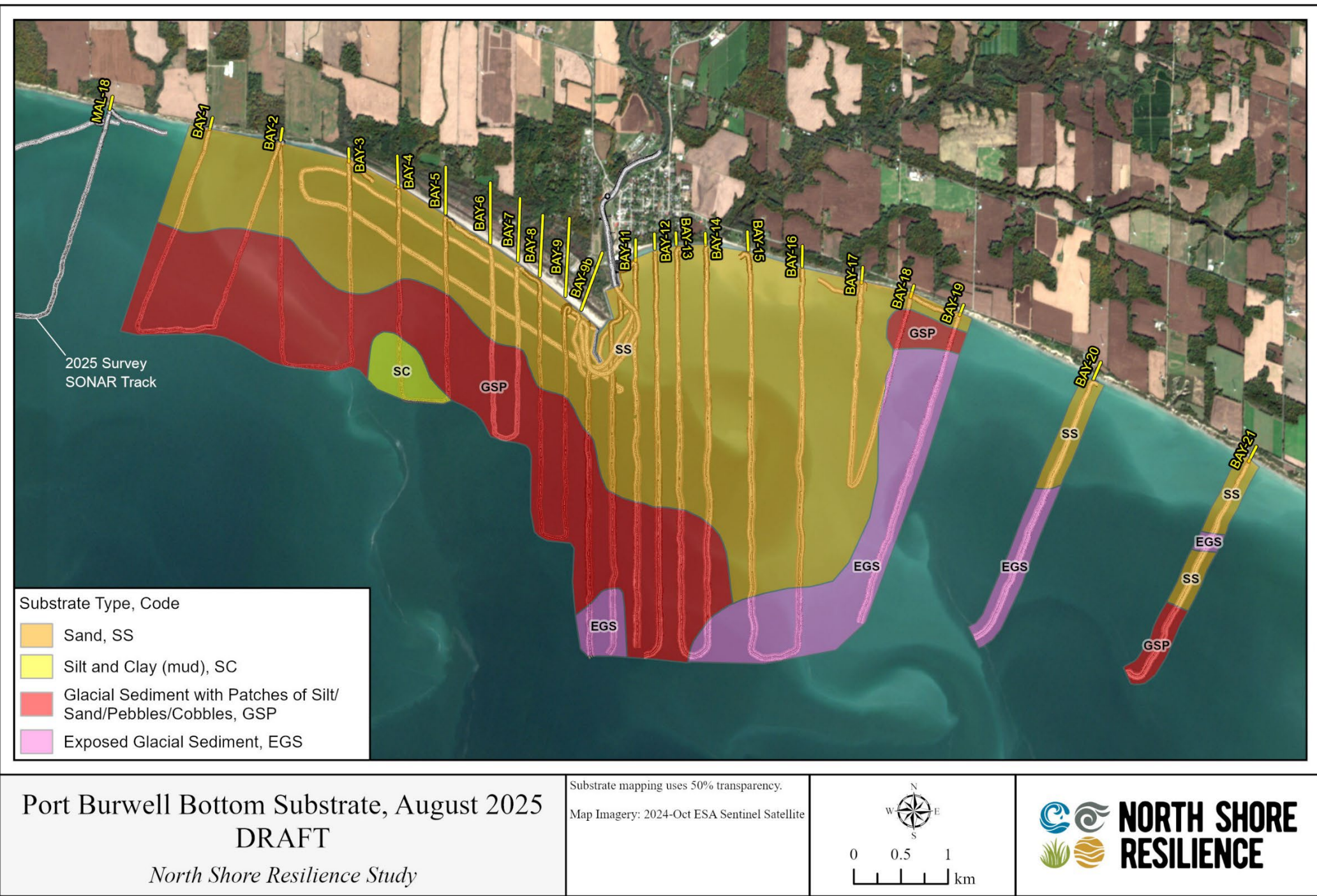
- Exposed Glacial Sediment (EGS)

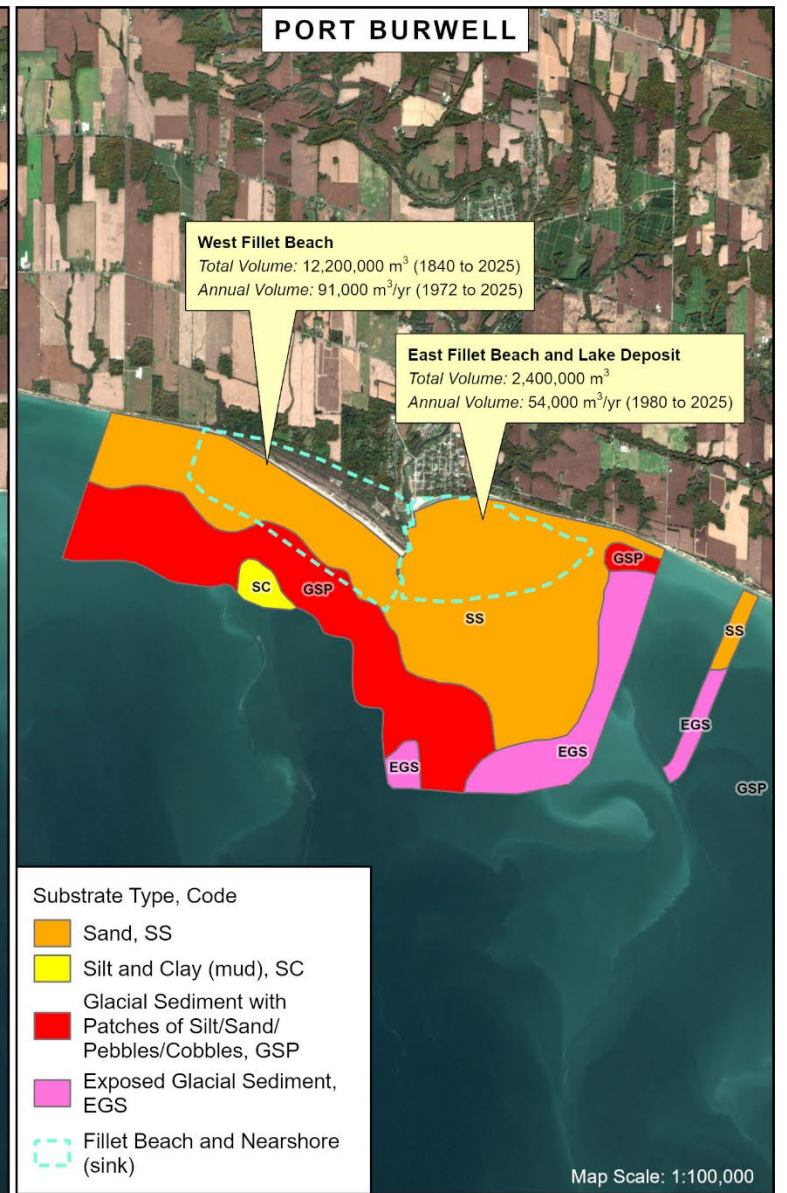
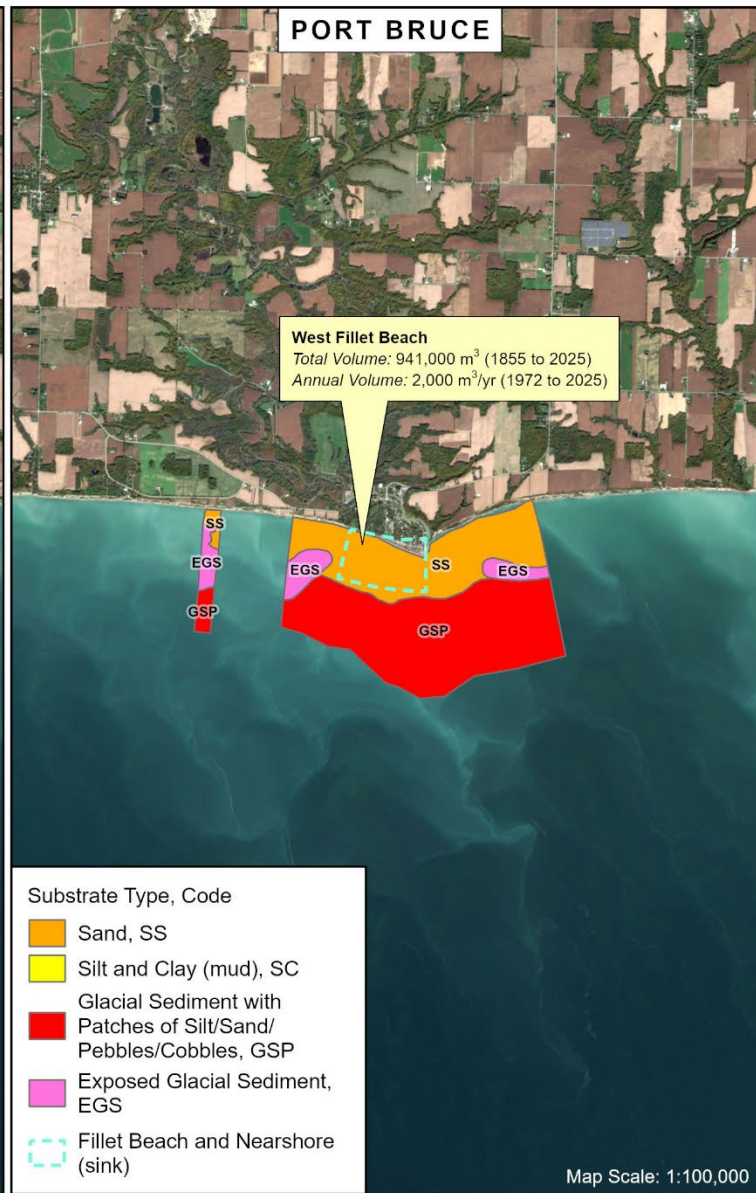
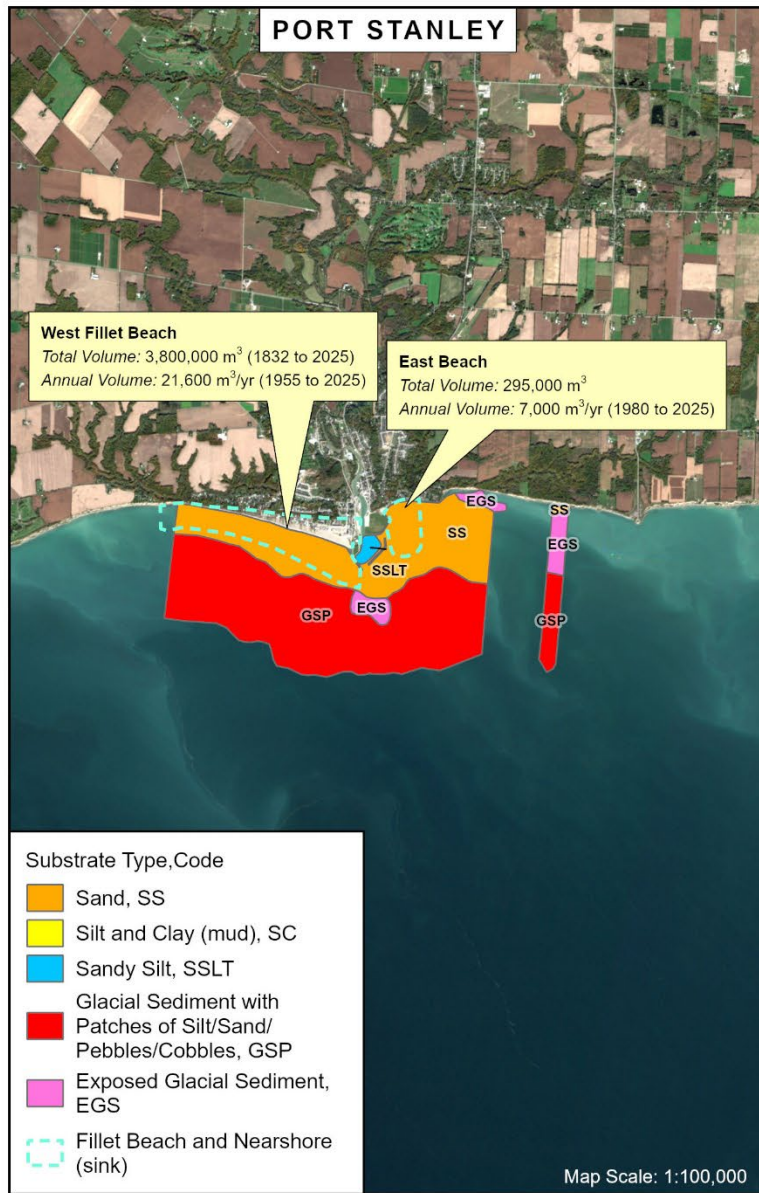


- Glacial sediment with patches of silt, sand, pebbles, and cobbles (GSP):



Port Burwell Bottom Type



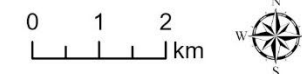


Bottom Substrate at Port Stanley, Port Bruce and Port Burwell August-September 2025

North Shore Resilience Study

Map Notes:

Map Imagery: 2024-Oct ESA Sentinel Satellite

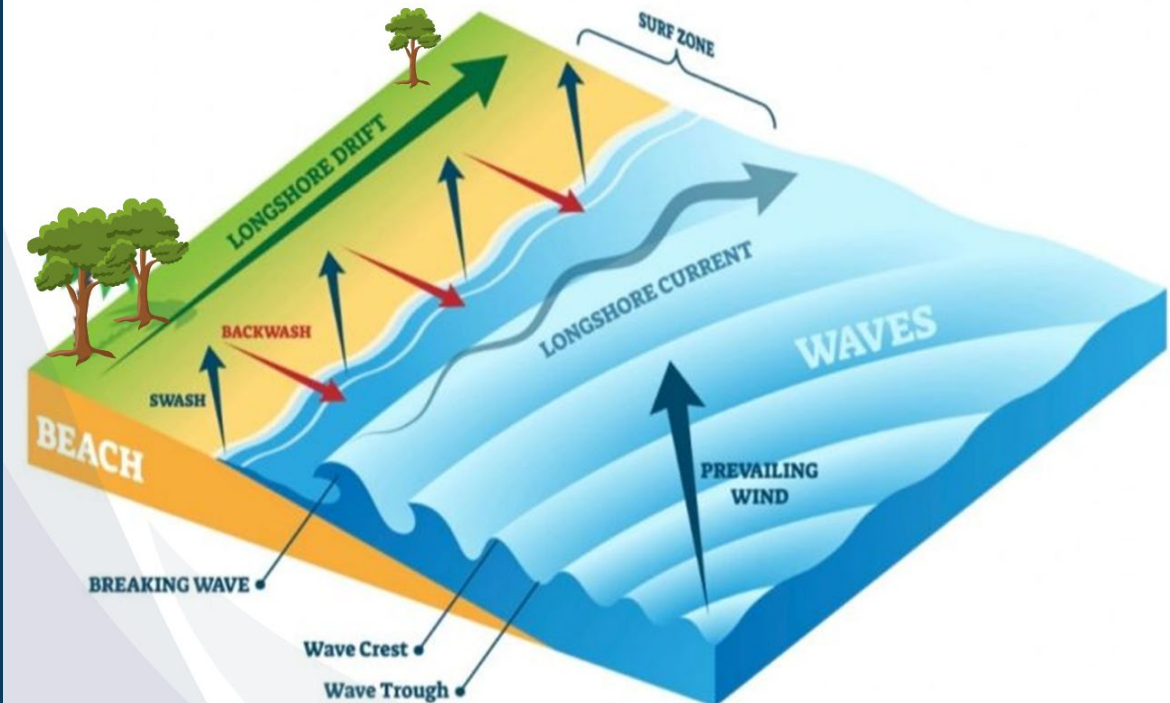


Longshore Sediment Transport Moves Sand to East

**Satellite Image of Sediment
Moving Along Coast**



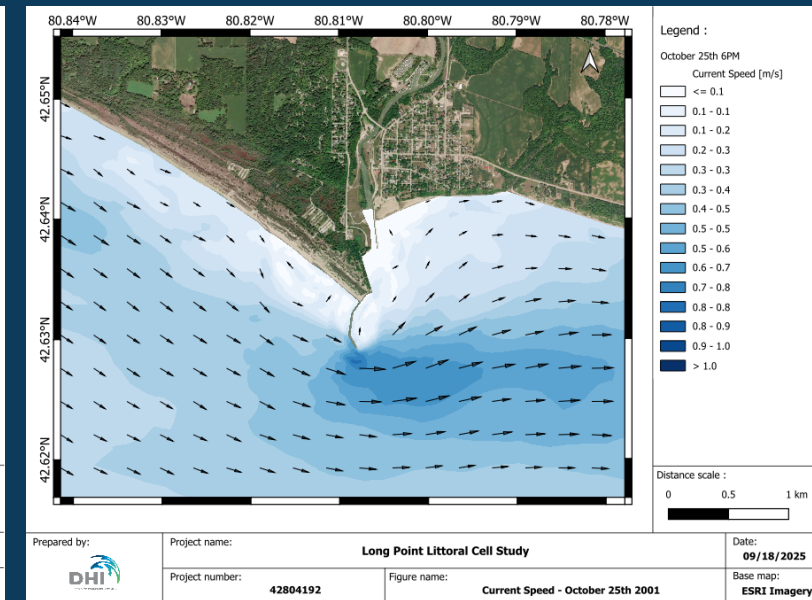
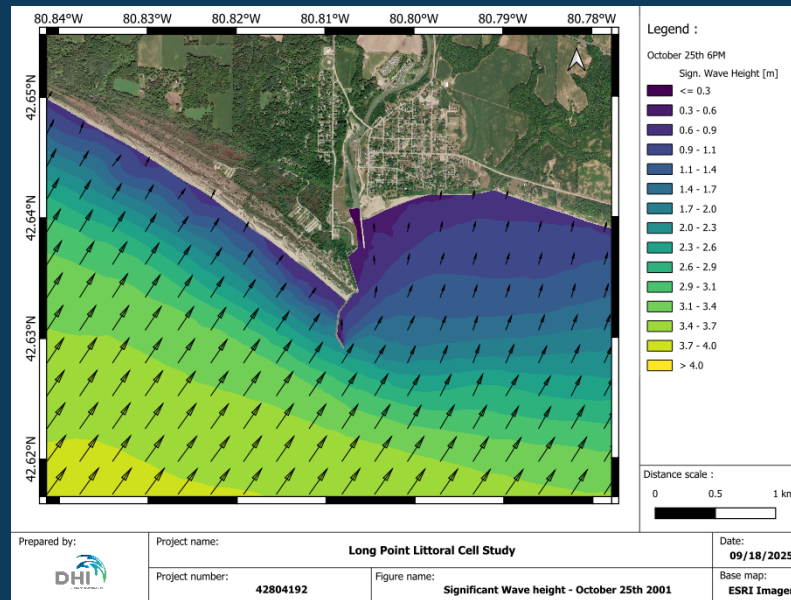
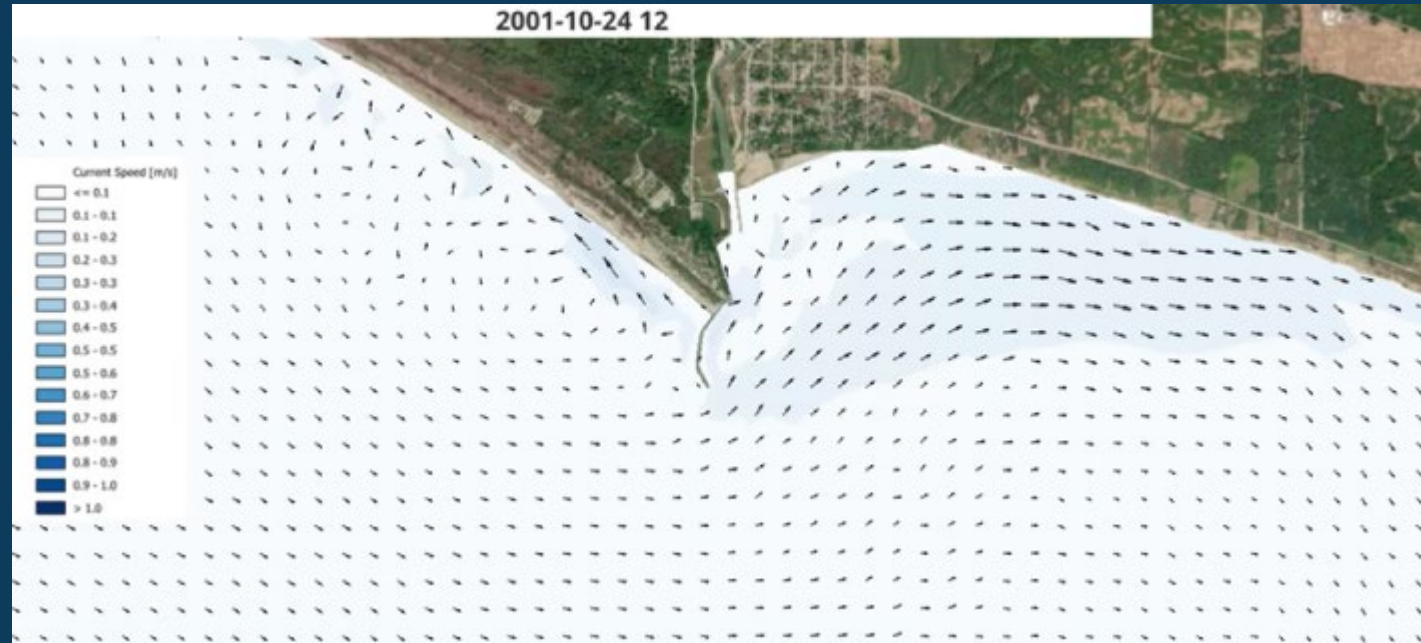
**Conceptual Diagram of Sand
Transport by Waves and Currents**

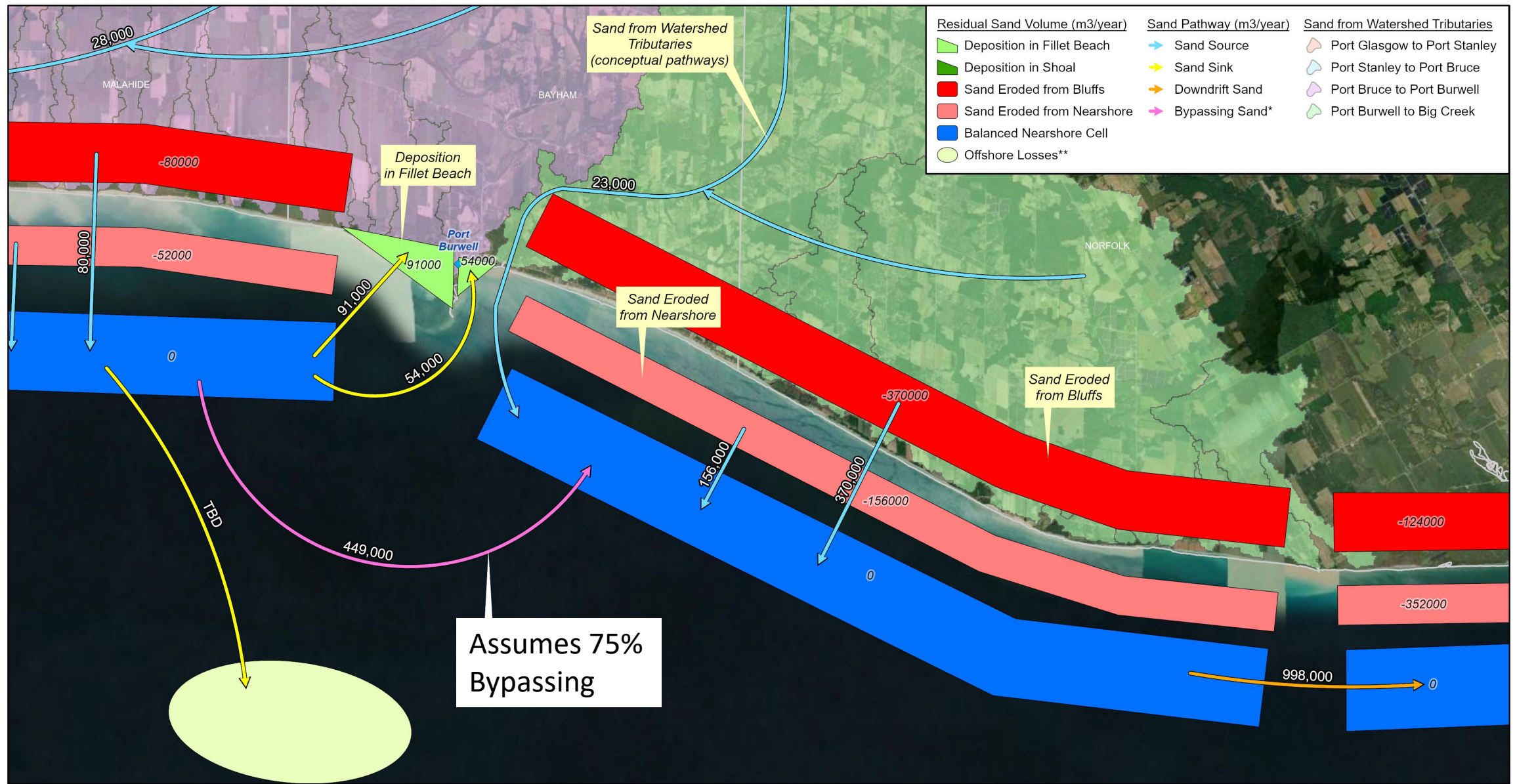


HD-SW Coupled Simulation

High-resolution
coupled Spectral
Wave and
Hydrodynamic 2D
model

Simulations
completed from
2017 to 2020 (4-
years)



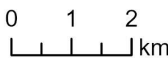


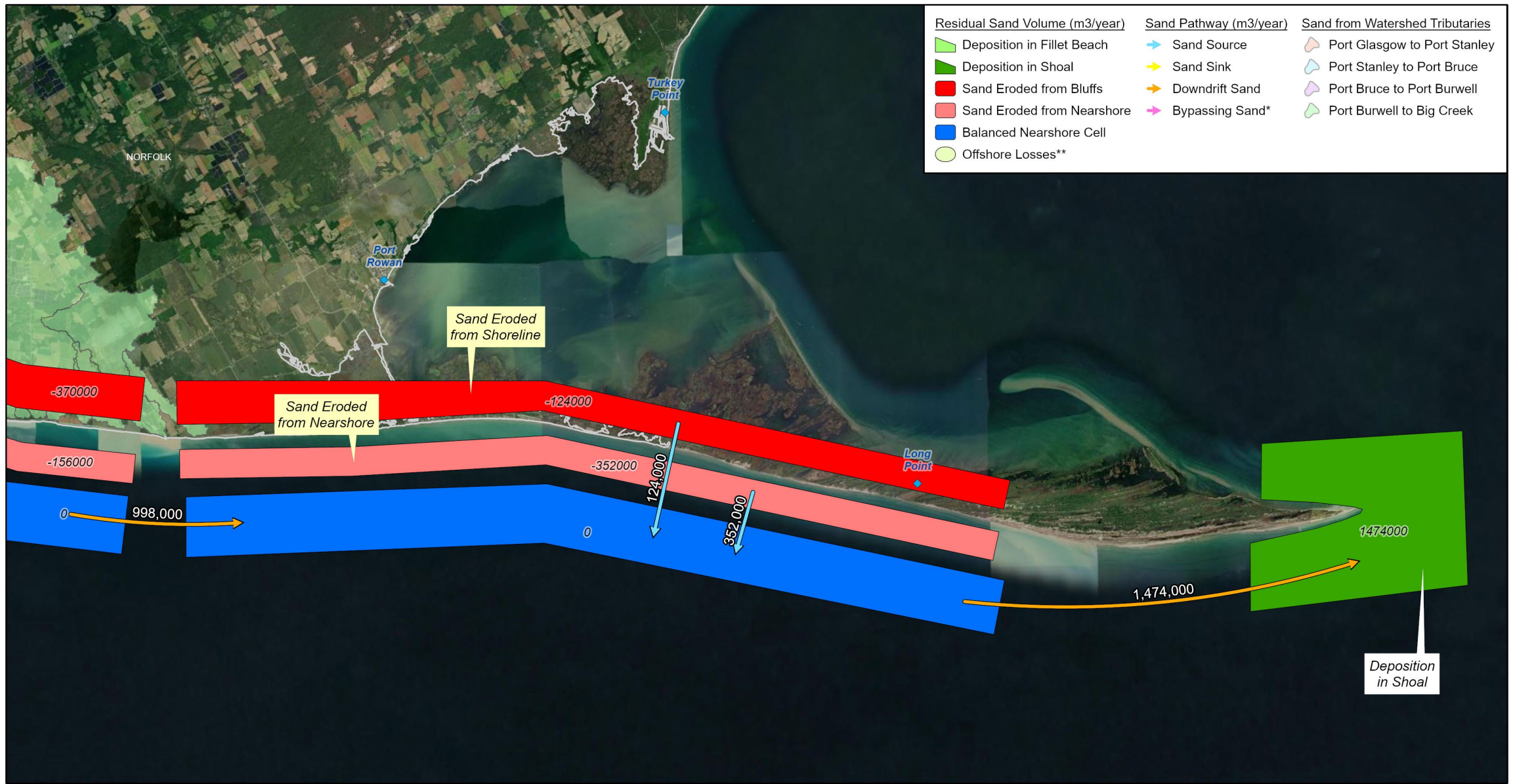
Preliminary Sediment Budget: Port Burwell (Recent Past, Last ~50 Years)

DRAFT

North Shore Resilience Study

Notes:
 *Draft bypassing volume assumes 100 % bypassing (numerical modelling in-progress). Rate to be refined.
 **Offshore losses to be assessed with numerical modelling (in-progress).
 Background - Esri World Imagery Basemap





Preliminary Sediment Budget: Long Point (Recent Past, Last ~50 Years)

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0 1 2 3
km



DRAFT

North Shore Resilience Study

Sediment Budget

Key Findings

- Sediment budget balances, which allows us to draw conclusions on sediment sources, pathways, and sinks
- Erosion is a natural processes in the bluff region that has been occurring for 1,000s of years
- Harbours disrupt the natural flow of sand and pebbles along the coast/cell
- ~60-70% of the erosion at Long Point can be attributed to the sediment deficit created by the updrift harbours

Long Point Beaches

- Periods of high lake levels and storms will continue to erode the beach and dunes, driving erosion and overwash processes.
- Reduced winter ice-cover increases exposure to winter storms and increases beach and dune erosion. More foredune restoration is needed to build resilience
- Ice-free winters will accelerate the transport of sand into the shoal at the tip.

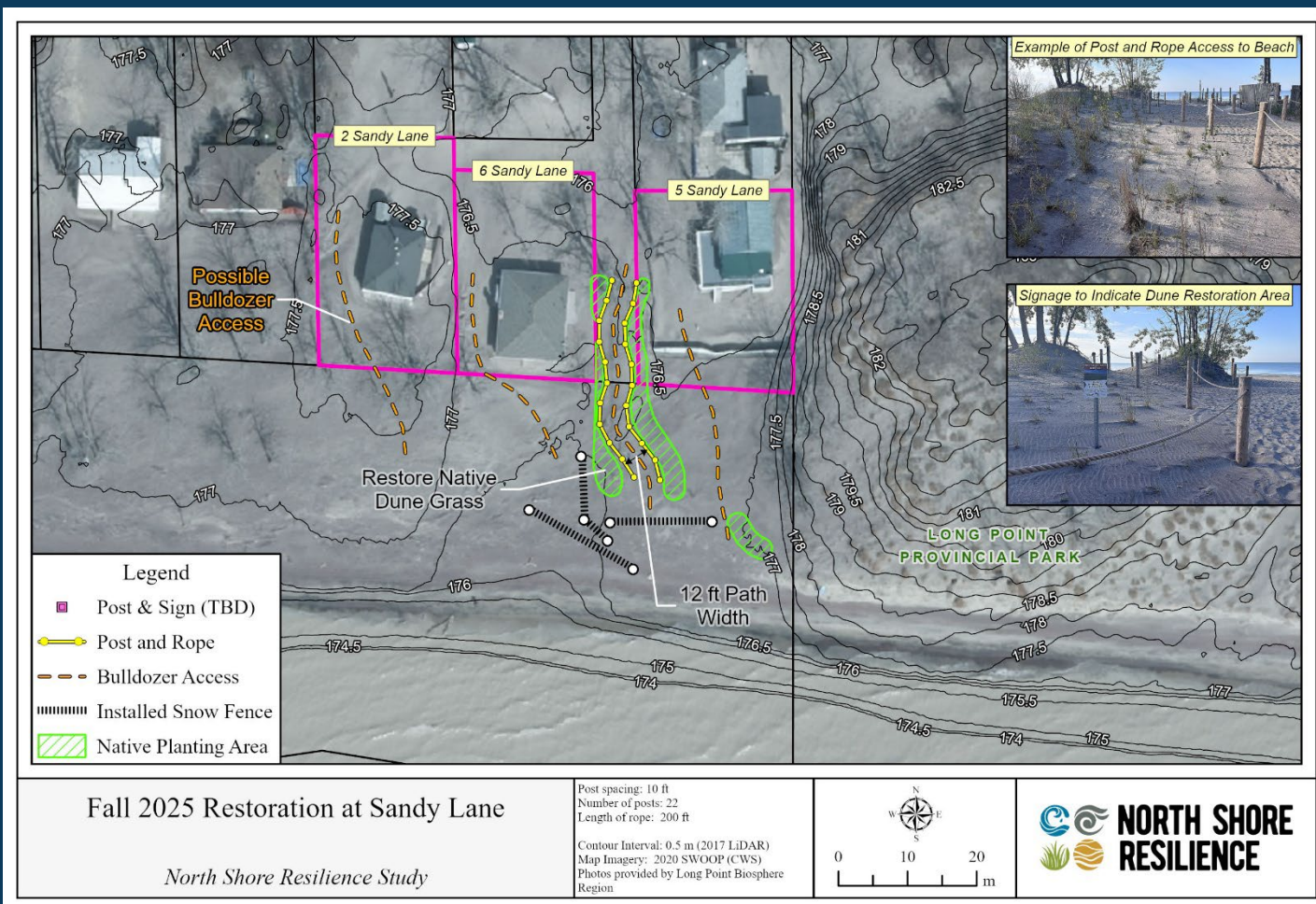
PHASE 2 SCOPE AND PURSUIT OF FUNDING

Continue Dune Restoration



Restoration Type	Number of Sites Restored	Length of Beach Restored (m)
Private Land	21	418.7
Municipal Beach Access Improvement	3	43.7
Total	24	462.4

Beach Access: Sandy Lane



Small Portable Dredge Plants

- Plant can dredge to 23 feet below surface. Operated by 2 people
- Self propelled in the lake (right), can be transported on a flat bed on land (left)

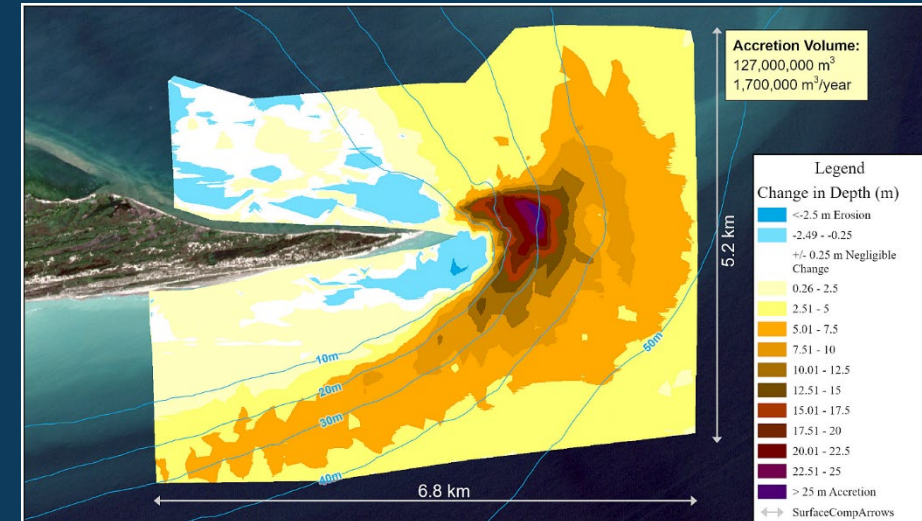


- Town of Cobourg pump sediment from navigation channel to east side to build a public beach



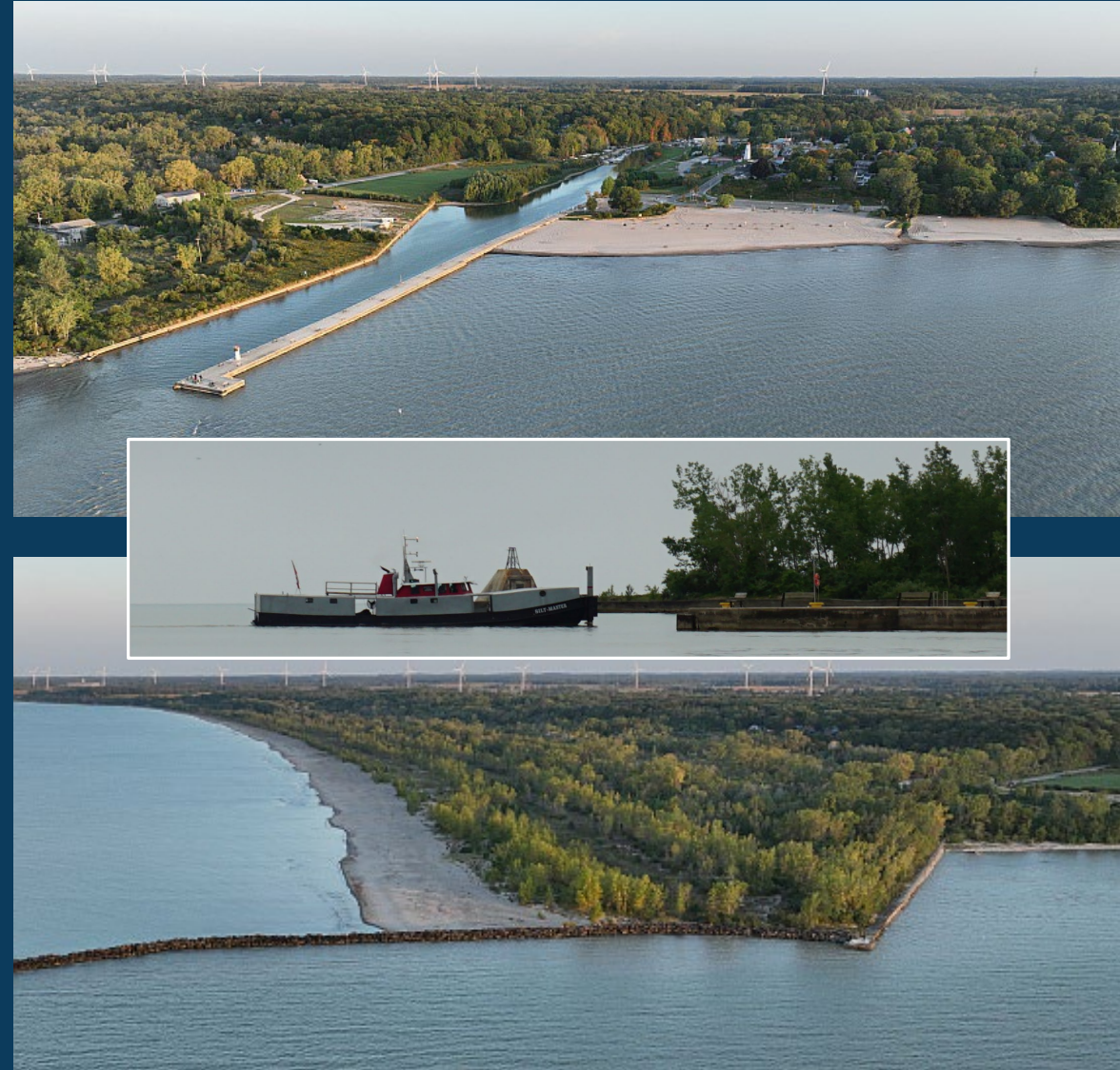
Sand Mining and Beach Nourishment Projects

- Explore linkages with navigation channel sedimentation management and bypassing strategies
- Explore in-lake deposits, such as Port Burwell navigation channel and the shoal at the tip of the Long Point Sand Spit



Port Burwell Sediment Management and Bypassing Strategy

- Navigation Channel Maintenance Strategy (maintain safe depths)
- Sediment bypassing options
- Review of Municipal Infrastructure
- Beach Management Plans for east and west side



Cove Road and Hastings

- Leverage study findings to evaluate erosion vulnerability
- Evaluate long-term sustainable management alternatives



Sand Spit from Cove Road To Causeway

- Multiple land owners (private, NCC, CWS, Conservation Authority, Norfolk County)
- Build Partnership for “Cove Road to Causeway Barrier Beach Restoration Strategy”



Securing Funding for Phase 2 is in Progress

- Wawanesa Insurance (received)
- Definity Insurance (applied)
- McLean Foundation (applied)
- Other Foundations and Insurance Agencies (in-progress)
- Municipal Partners (Norfolk County and Elgin County)
- Federal application Fall 2026

Questions and Discussion

