

Reach 9 – Ogden Point to Presqu'ile Provincial Park



Local Conditions

- Reach Length = approximately 16.4 km.
- Ogden Point to Presqu'ile Provincial Park is the final littoral sub-cell that was once part of a large littoral cell that extended from East Point Park in Scarborough to Presqu'ile Provincial Park (Reinders, 1988).
- The eroding bluff shoreline east of Ogden Point features shoestring development along the bluff crest.
- The central portion of the reach is primarily agricultural lands and natural areas.
- The shoestring development begins again in Popham Bay and extends to the northwest boundary of the Provincial Park.
- The Provincial Park is a major sediment sink as evident by the successive beach ridges that have formed over time and now connected to Gull Island.

Eroding Bluff Shoreline, Victoria Beach

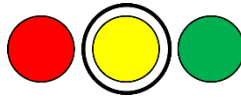


Presqu'ile Beach, Presqu'ile Prov. Park

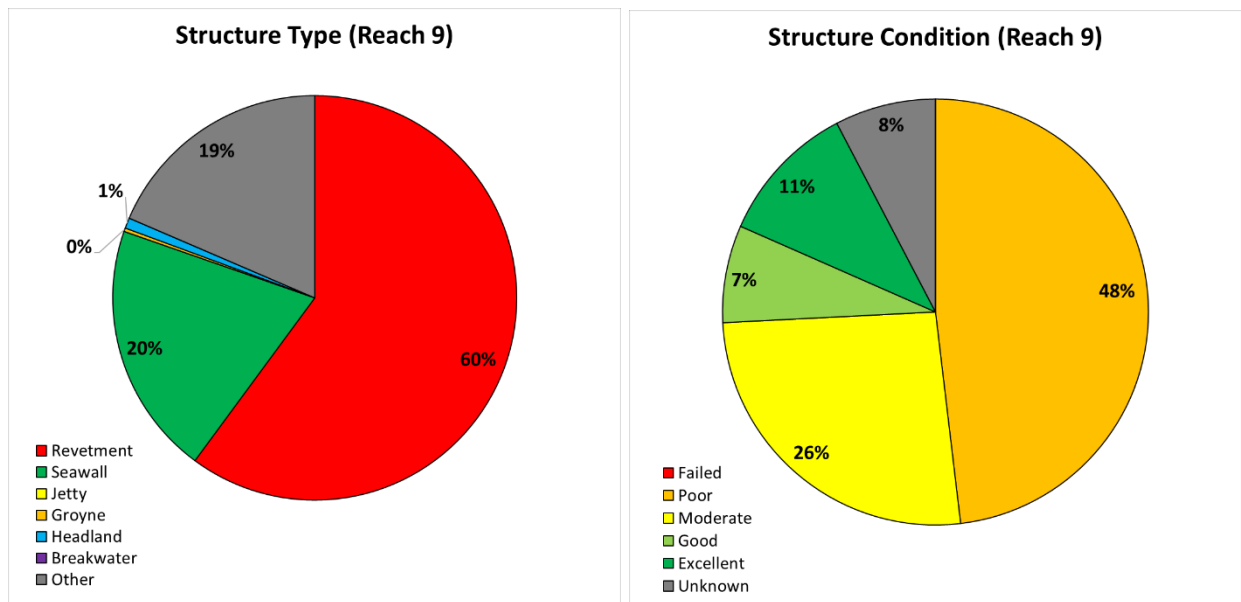


Shoreline Structures

- Reach 9 is 18% armoured, 82% natural.
- Shore protection is sporadic throughout the reach and limited to private property infrastructure. Most structures are boulder revetments or concrete rubble revetments and concrete seawalls, most of which are ad-hoc and in poor condition.
- Significant variability in armoured vs. natural shoreline, level of design, type of shore protection and structure condition exists throughout the reach.
- A great deal of flanking exists throughout the region where an unprotected property has continued to erode adjacent to a protected or partially protected property.
- Shore protection throughout Popham Bay is particularly vulnerable to being overtopped due to the bedrock shelves that are prevalent in the nearshore and the extremely low land elevation.
- Tolerance for additional shoreline armouring (low/**medium**/high):



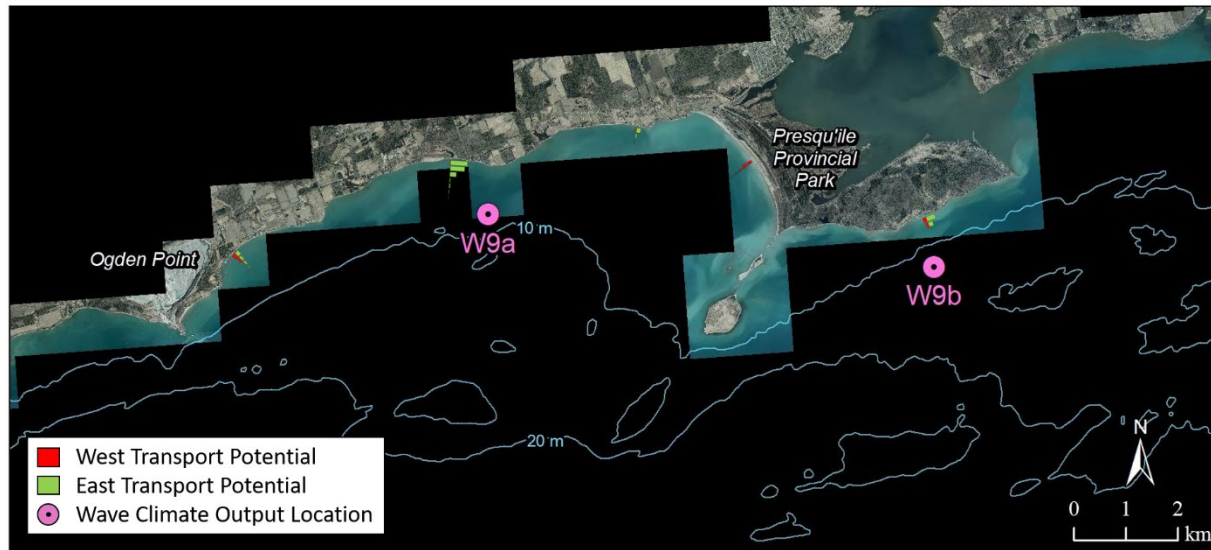
- Sample statistics (for armoured portion of shoreline):



Sediment Supply and Longshore Sediment Transport

- Longshore sediment transport is predominantly from west to east in Reach 9 with a net transport potential of 30,000 to 50,000 m³/year.
- Sediment transport is especially limited at the west end of the reach in the Victoria Beach region, where the net transport potential is virtually zero. This region appears to feature a sediment sink offshore, however the shoreline itself is highly erosive.
- East of Victoria Beach sediment transport occurs from west to east, but the actual transport is likely significantly lower than the potential transport for the region due to a lack of sediment supply.

- The primary depositional area for the reach is Presqu'ile Beach, which historically received much of the west to east transport along the entire project shoreline before the shoreline became fragmented into several sub-cells due to human development.
- The Popham Bay shoreline immediately west of Presqu'ile Beach is characterized by shallow bedrock shelves, which typically only house cobble and shingle beaches comprised of eroded bedrock material. Smaller silts and sands appear to typically move further offshore until they are deposited at Presqu'ile Beach.



Summary of Natural Hazards

- 100-year Erosion Rate (Stable Slope not included):

| Start (lat, long) | End (lat, long) | 100-year Erosion Rate (m/year) | Bluff Crest or Waterline |
|----------------------|--------------------|-----------------------------------|-----------------------------|
| 43.9758, -77.8767 | 43.9776, -77.8774 | 0.33 | Bluff Crest |
| 43.9837, -77.8673 | 43.986, -77.8674 | 0.33 | Bluff Crest |
| 43.9876, -77.8658 | 43.9927, -77.8534 | 0.33 | Bluff Crest |
| 43.9927, -77.8534 | 44.0043, -77.811 | 0.36 | Waterline |
| 44.0038, -77.8063 | 44.0028, -77.7974 | 0.17 | Bluff Crest |
| 44.0028, -77.7974 | 44.006, -77.7892 | 0.36 | Waterline |

- 100-year Flood Level and Flood Hazard Limit (including wave uprush):

| Start (lat, long) | End (lat, long) | 100-year Flood Level (m IGLD85') | Flood Hazard (m IGLD85') |
|----------------------|--------------------|-------------------------------------|-----------------------------|
| 43.9756, -77.8765 | 43.9935, -77.8505 | +76.03 | +77.81 |
| 43.9935, -77.8505 | 43.9946, -77.8421 | +76.03 | +77.43 |
| 43.9946, -77.8421 | 43.9970, -77.8408 | +76.03 | +78.00 |
| 43.9970, -77.8408 | 44.0027, -77.8015 | +76.03 | +77.91 |
| 44.0027, -77.8015 | 44.0060, -77.7892 | +76.03 | +78.00 |
| 44.0060, -77.7892 | 44.0090, -77.7761 | +76.03 | +77.91 |
| 44.0090, -77.7761 | 44.0107, -77.7513 | +76.03 | +77.43 |
| 44.0107, -77.7513 | 43.9884, -77.7334 | +76.03 | +77.81 |
| 43.9884, -77.7334 | 43.9978, -77.6755 | +76.03 | +77.43 |

- Dynamic Beach(es):

| Start (lat, long) | End (lat, long) | 100-year Erosion Rate (m/year) or Stable | Dynamic Beach Name |
|----------------------|--------------------|---|-----------------------------------|
| 43.9776, -77.8774 | 43.9837, -77.8673 | Stable | Ogden Point East |
| 43.986, -77.8674 | 43.9876, -77.8658 | 0.36 | Victoria Beach West |
| 44.0043, -77.811 | 44.0042, -77.809 | 0.36 | Beach Drive West |
| 44.0042, -77.809 | 44.0038, -77.8063 | 0.36 | Beach Drive West |
| 44.006, -77.7892 | 44.0086, -77.7812 | 0.36 | Beach Drive East Barrier Beach |
| 44.0086, -77.7812 | 44.0107, -77.751 | 0.17 | Popham Bay |
| 44.0107, -77.751 | 43.9884, -77.7334 | Stable | Presqu'ile Beach |

- Wave climate ~1 km offshore, west portion (output location W9a):

| ARI (years) | Depth (m) | Hs (m) | DIR (deg) | Tp (s) |
|-------------|-----------|--------|-----------|--------|
| 5 | 9.5 | 3.82 | 211 | 10.5 |
| 10 | 9.5 | 3.89 | 212 | 10.5 |
| 25 | 9.5 | 3.96 | 212 | 10.5 |
| 50 | 9.5 | 4.00 | 212 | 10.5 |
| 100 | 9.5 | 4.02 | 212 | 10.5 |

- Wave climate ~1 km offshore, east portion (output location W9b):

| ARI (years) | Depth (m) | Hs (m) | DIR (deg) | Tp (s) |
|-------------|-----------|--------|-----------|--------|
| 5 | 15.8 | 4.23 | 222 | 10.5 |
| 10 | 15.8 | 4.41 | 222 | 10.5 |
| 25 | 15.8 | 4.61 | 222 | 10.5 |
| 50 | 15.8 | 4.73 | 222 | 10.5 |
| 100 | 15.8 | 4.81 | 222 | 10.5 |

Infrastructure and Ecosystem Threats

- Victoria Beach: erosion threat is high.
- Popham Bay: select waterfront properties susceptible to shoreline erosion and flooding.
- Lakehurst Street: high flood vulnerability due to low land elevations.

Shoreline Management Recommendations

- Victoria Beach: community scale erosion mitigation or a managed retreat approach (vacant land landward).
- Popham Bay Dynamic Beach: avoid shore perpendicular structures that will impede longshore sediment transport. If protection is constructed, it should be placed at the toe of the bank and placed on native bedrock (not cobble substrate). Flood hazard mitigation strategies such as floodproofing should also be implemented for low lying properties.
- Lakehurst Street: consider artificial dune construction to provide nature-based flood mitigation.

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