Shippagan Gully Conservation Offsetting Project

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TransCoastal Adaptations
Centre for Nature-Based Solutions

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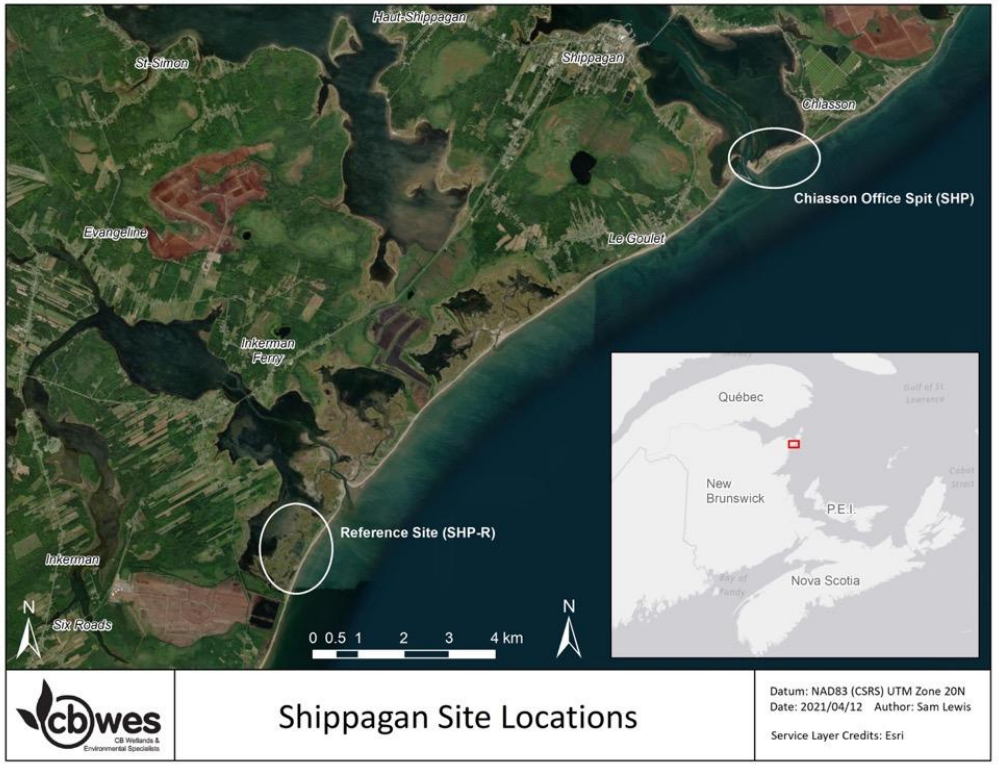
Chiasson Office Spit

- Lamèque Island, Acadian Peninsula, NB
- Long history of human use and alteration
- Historical lighthouse
- Archaeological resources
- Piping plover critical habitat
- Migratory shore birds
- Wooly beach heather



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Piping Plovers (Jijuikate'j; *Charadrius melodus melodus)*

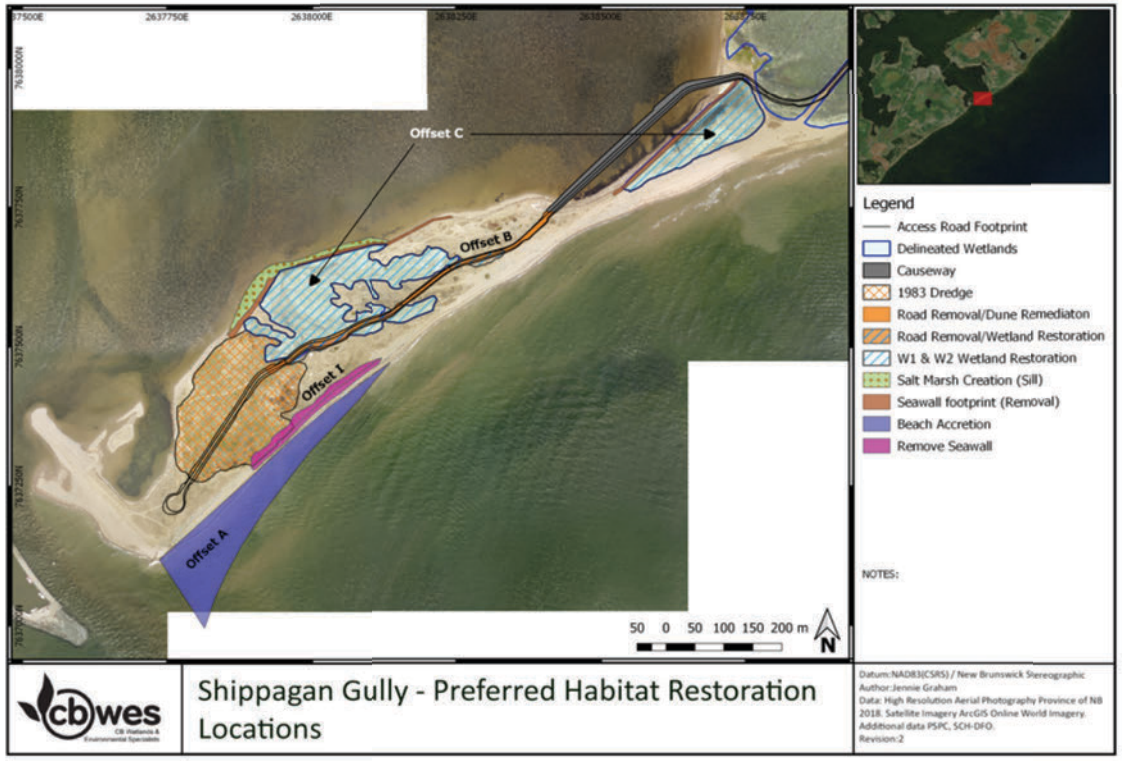
- Provincially and federally endangered
- Critical habitat metrics
  - Low sloping beaches
  - Wide backshore
  - Sand with cobble and shell
  - Overwash fans
- Barrier islands and spits

Photos: Lewnanny Richardson, Nature NB

Conservation Offsetting

- Shippagan Gully Dredging and Breakwater Construction Project
- Holistic approach
- 48,000 m^2 @ 2:1 minimum ratio

Offset	Offset Function	Description	Predicted Area (m^2)	Measured Area (m^2)
A	Accreting Beach	Beach accreted up-drift of breakwater as a result of trapping of coastal sediments by the structure via littoral drift from DS1.	30,000	27,222
B	Access Road Removal	Road removal and restoration of roadbed (dune and wetland habitat).	6,300	---
D	Old Dredge Removal	1980s fill removal for sill construction – restoration of dune and beach, re-establishment of natural beach-dune profile and sediment transport processes.	---	3,858
C1	Wetland 1 (W1) Salt Marsh Restoration	Removal of seawall (Shippagan Bay shoreline) and exclusion of ORV traffic to improve vegetation health, soil stability, water quality/nutrient export of W1 (see WESP (Dillon Consulting Ltd., 2018a)). Marginal increase in footprint on Bay edge due to removal of seawalls and associated materials, and on dune boundary due to inclusion of areas not delineated in currently landscape but expected to flood at HHWLT following access road removal.	35,100	29,651
C2	Wetland 2 (W2) Salt Marsh Restoration	Removal of seawall (bordering Bay side of DUC property) and exclusion of ORV traffic to improve vegetation health, soil stability, and water quality/nutrient export of W2 as per WESP. Increase in footprint due to seawall removal.	15,900	21,339
C3	W1 Salt Marsh Creation (Living Shoreline)	Extension of W1 to LLWMT and stabilisation of marsh toe using living shoreline techniques (constructed marsh with sill) and material from current dredging, 2017 spoil, or Salt Marsh Creation (Contingent Offset D).	4,400	7,186
I	Beach and Dune Restoration	Remove old seawalls and rock in the backshore area of the beach accretion zone (adjacent to 1983 dredge spoil), widen beach to 20 m at 2% slope, restore dune toe. This would create Piping Plover habitat while re-establishing the natural beach-dune profile and sediment transport processes that maintain those habitats. Temporary erosion risk mitigation measures may need to be investigated.	5,300	7,802
Total Offsets			97,000	97,059



Nature-based Solutions

- **Nature-based Solutions (NbS) are defined by IUCN as "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits"**

- Sand Engine
- Created marsh with stone sill
- Beneficial reuse of dredge material
- Restoration actions – dune, infrastructure removal

Sand Engine Construction 2020/21

- 200 m breakwater
- 158,817 m^3 of dredge material at DS1

Photos: CBWES Inc.

Offset Construction Spring 2023

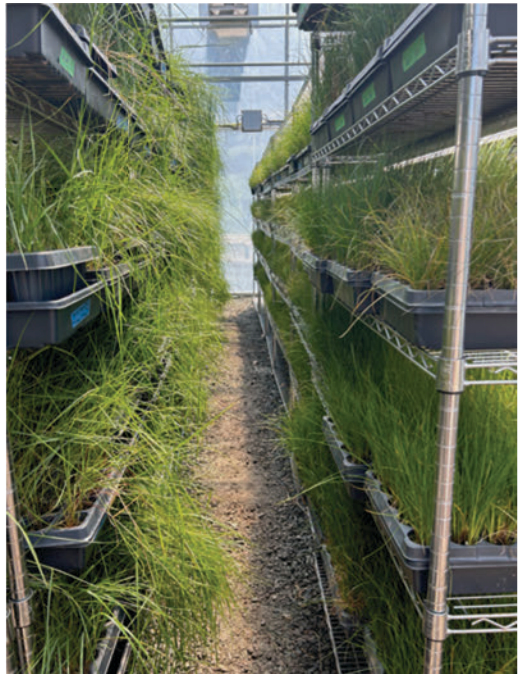
- Seawall removal
- 1983 dredge reshaping
- Marsh construction

Photos: CBWES Inc.

Offset Construction continued

- Marsh planting June 2023
- Road softening October 2023

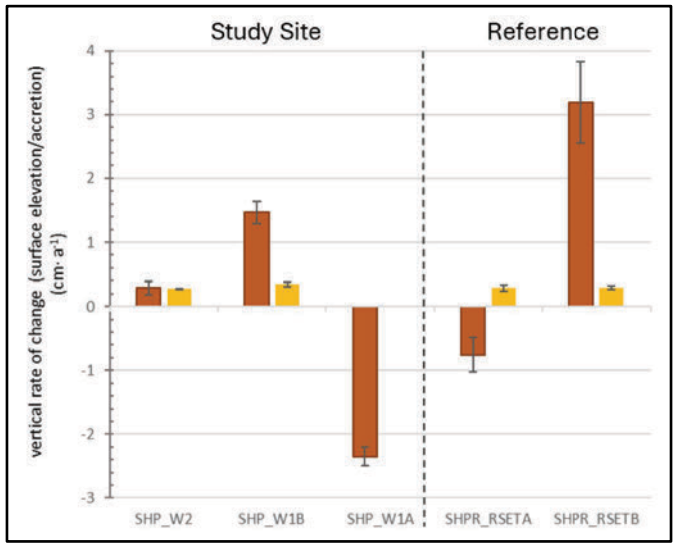
RISING TIDE NURSERY

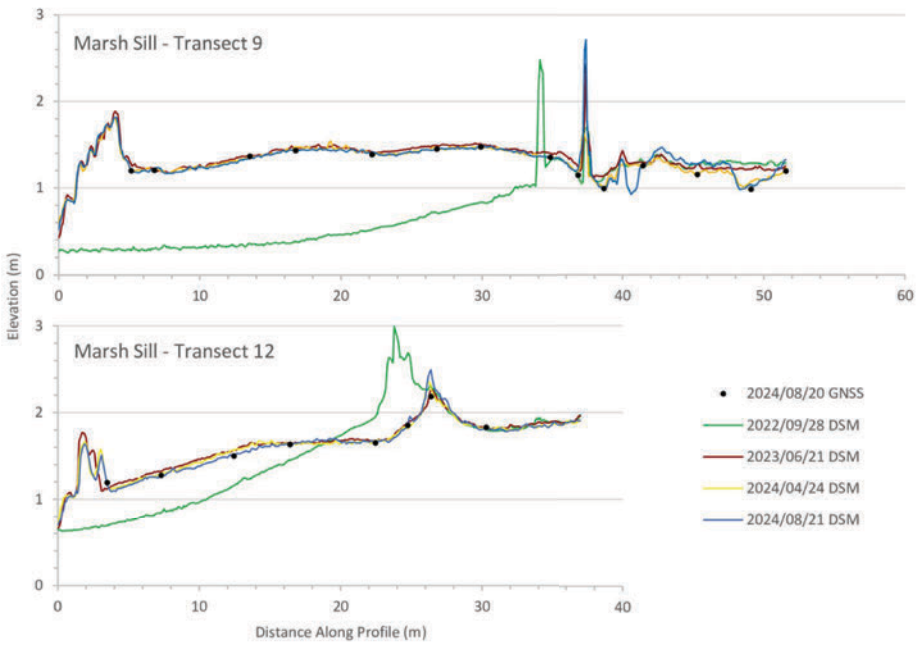


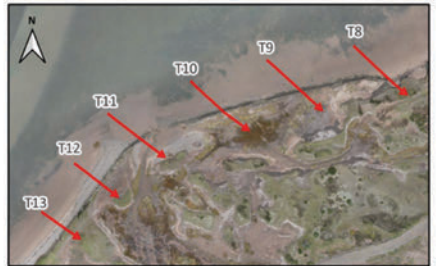
Photos: CBWES Inc.

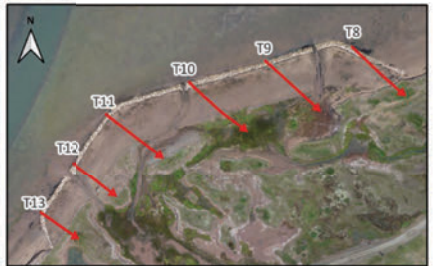
Monitoring 2020 - 2024

- Constructed marsh platform relatively stable
- Improved health in wetland 1
- New plants spreading in year 2



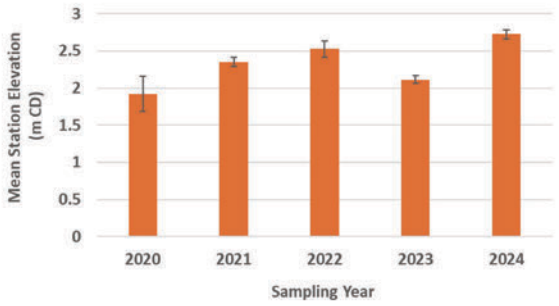


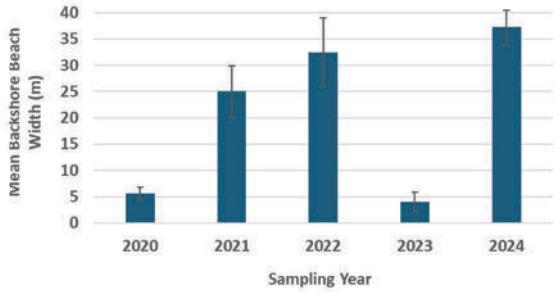


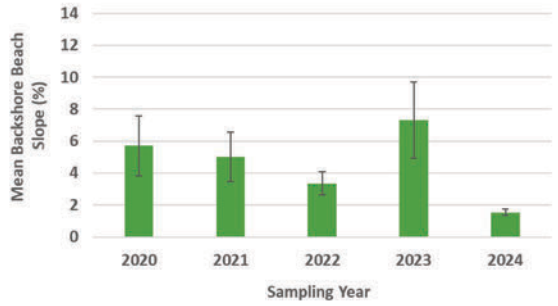


Monitoring 2020 - 2024

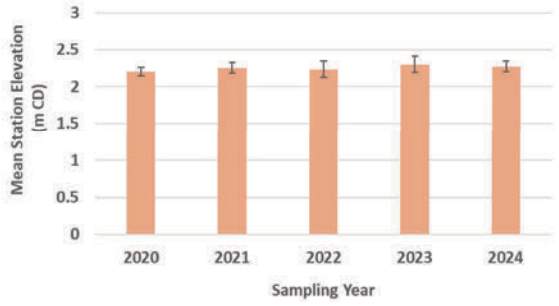
SHP

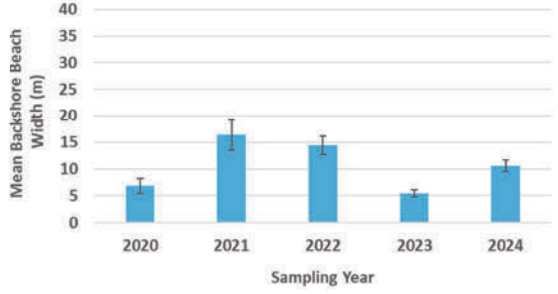


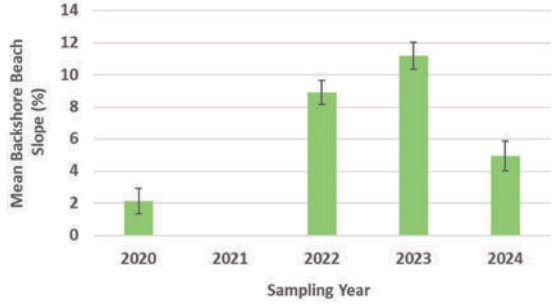


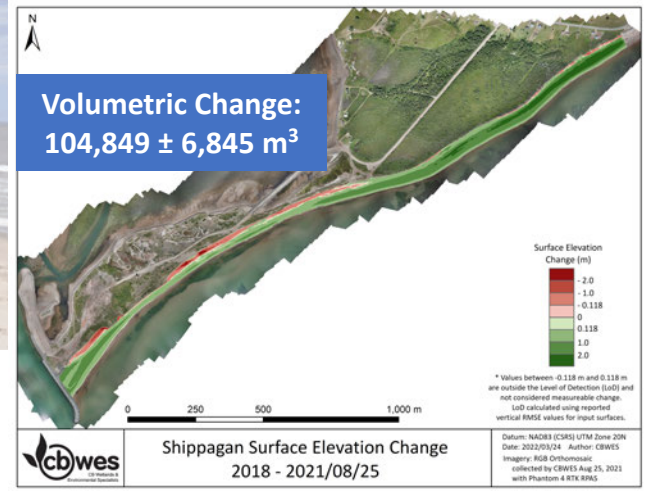


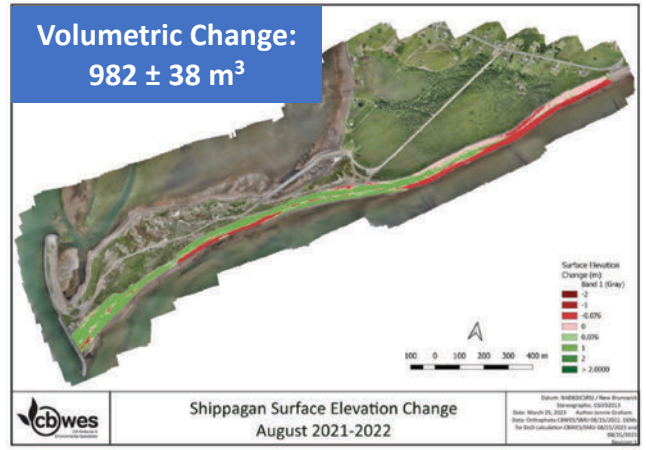
SHP-R

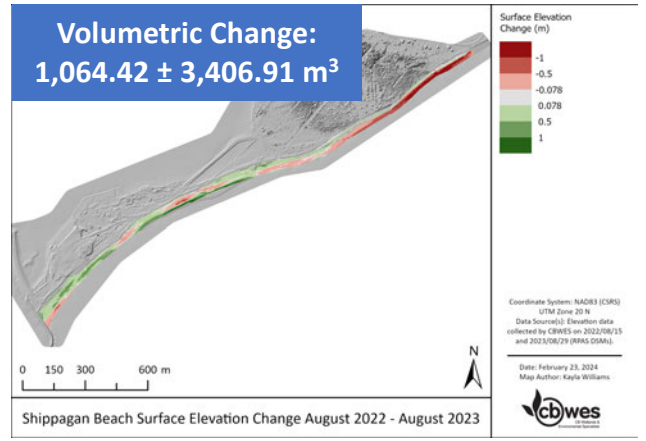












Photos: CBWES Inc.

Plovers making history!

- 2022: Two pairs of plovers = 4 fledged chicks
- Monitoring drone flight over nesting plovers
- 2023: One pair nested, 2 fledged chicks
- 2024: One pair nested, 2 fledged chicks


Lewnanny Richardson, Nature NB


Lewnanny Richardson, Nature NB


Lewnanny Richardson, Nature NB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What we've learned

- If you build it they will come
- Staggered construction can result in habitat disruptions
- Open lines of communication between organizations
- Multi-disciplinary team
- Funding and responsibility for community engagement
- Interaction between people and restoration

E. Baker, Saint Mary's University/CBWES

Thank you to all the partners and contributors who made this project possible!

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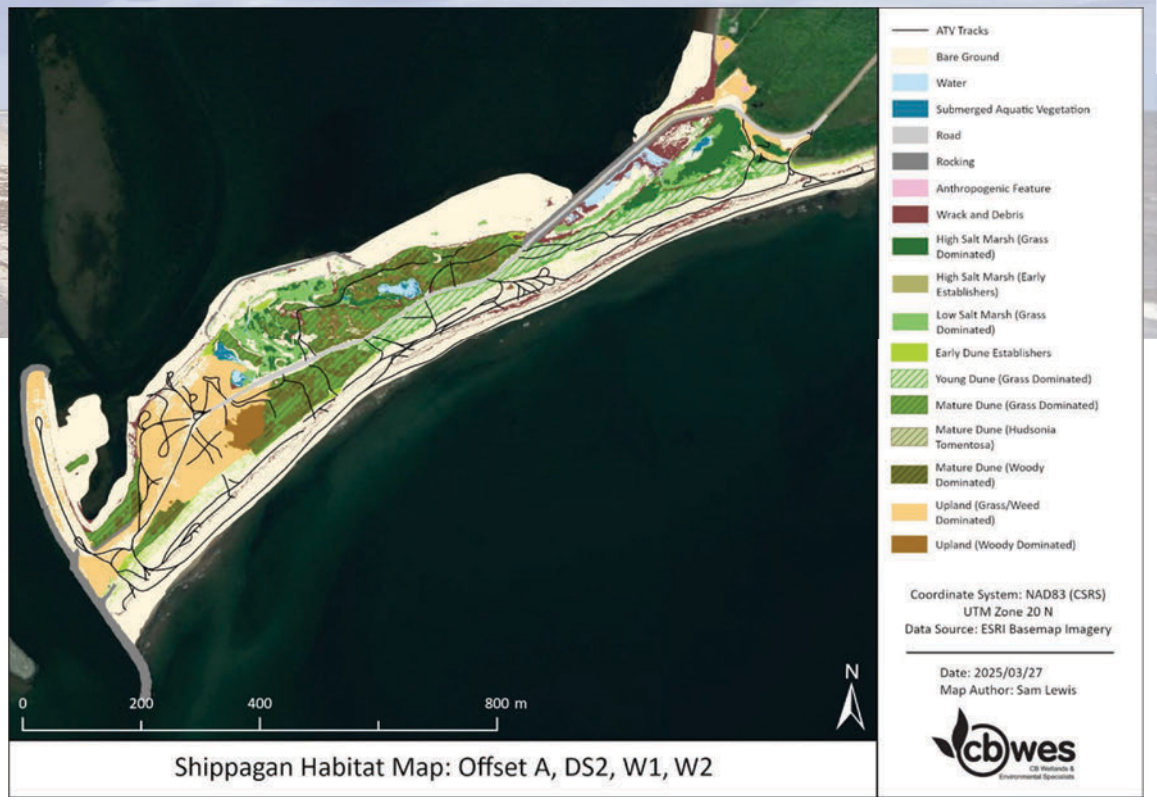
Monitoring 2020 - 2024

- 17 habitat cover classes in 2024
- Hydrology of W1 and W2
  - Impaired 2020-2022
  - Restored in the spring of 2023
- Benthic invertebrate taxa
  - Sampling in 2021 and 2024: 56 taxa found across both years
  - Decline in worm taxa in 2024
- Human use
  - 2020-2024: 58% – 95% moderate to high-risk activities
  - 2023: One Piping Plover nest likely destroyed by ORV



Shippagan Habitat Map: Offset A, DS2, W1, W2

Chiasson Office Spit Report Card			
Indicator	**Condition**		
	Poor	**Fair**	**Very Good**
Threats			
Motorized Vehicles	4.5		
Off Leash Dogs		0.2	
Beachgoer Intensity			1.1
Nests Lost to Human Use	2		
Stewardship			
Respect for Leashing	22%		
Piping Plovers			
Piping Plover Pair Presence			1
Piping Plover Productivity		1.6	

Photos: CBWES Inc.

Expanded Monitoring Program

- Partnership with Saint Mary's University and TransCoastal Adaptations
- 5-year program
  - Tie the physical offsets together
  - Understanding response to interventions
  - Inform adaptive management and future projects
- HQP - two Masters and one PhD
- National Research Council (NRC)

https://hobolink.com/p/834e8224149bd60814e382c355cce265

Post-construction Monitoring

Fundamental Objectives	Site Objectives	Measurable Attributes
Piping Plover Habitat	Create and restore suitable plover habitat	Beach, backshore and dune slope and width, vegetation coverage, vegetation density, and sediment composition that match recommendations (Maslo et al., 2011; EC, 2019)
	Habitat connectivity	Sparsely (<10% coverage) vegetated corridors between different habitat types
Ecological Health and Function	Restore natural tidal regime/hydrology	Tidal range, hydroperiod, inundation frequency, salinity
	Restore Sediment dynamics	Positive change in beach, dune, and marsh surface elevation. Decreased beach, foredune and back shore slope. Increased beach width. Natural processes (storm disturbance/overwash).
	Improve water quality	Salinity, temperature, pH, dissolved oxygen consistent with reference site
Maintain Biological Diversity	Maintain natural vegetation communities	% cover by species, halophytic abundance, comparison with reference site
	Benthic invertebrates Piping Plover presence Shorebirds	Benthic community composition, relative abundance by species, Piping Plover and shorebird surveys
	Optimize primary production of native vegetation	Species composition, height, density

- Geospatial
- Bathymetry
- Critical habitat attributes
- Avian surveys (Nature NB)
- Soils and sediments
- Hydrology
- Vegetation
- Water quality
- Human use
- Benthic invertebrates
- Wetland function (WESP-AC)
- Wetland delineation
- Winter conditions

Environment and Climate Change Canada (ECCC). (2019). Recovery Strategy and Action Plan for the Piping Plover (*Charadrius melodus melodus*) in Canada (Draft). *Species at Risk Act* Recovery Strategy Series. Environment and Climate Change Canada, Ottawa.

Maslo B. (2010). Evidence-based recommendations for Atlantic coast piping plover (*Charadrius melodus*) conservation and habitat restoration (Doctor of Philosophy Thesis). New Brunswick Rutgers, the State University of New Jersey. New Brunswick, New Jersey, USA.

Baie de Pokemouche Reference Site

- Successful plover nests from 2020 to 2024


Lewnanny Richardson, Nature NB


Lewnanny Richardson, Nature NB


Lewnanny Richardson, Nature NB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