Nairn: Dune resilience and adaptation

April ‘23 to March ‘24 | £83,000 | Highland Council

The Fishertown dunes to the east (right) of the mouth at Nairn are narrow and erosional. ©DynamicCoast (2023)

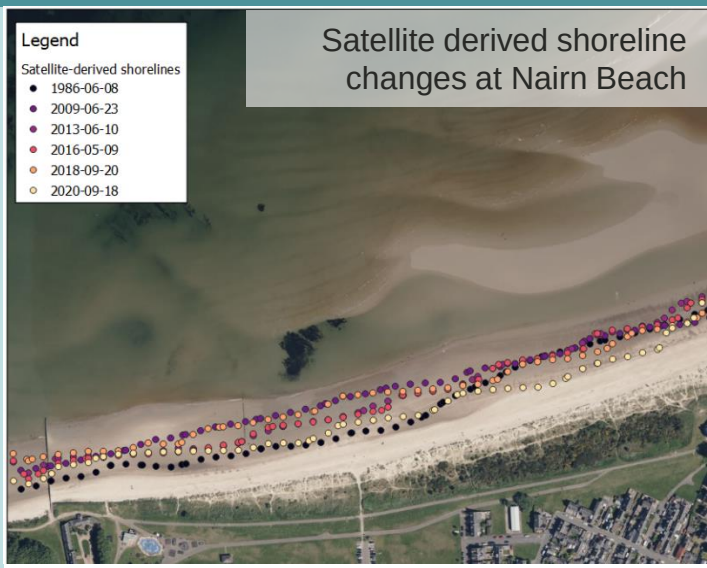
Overview:

Our project aims to better understand the beach and dunes at Nairn, and improve the natural protective function that they provide to the Fishertown area of the town. Climate change is expected to increase the risks from erosion and flooding in these areas. We’re developing a Dynamic Adaptive Pathway, allowing us to understand the level of protection provided by the dunes, the opportunities to enhance these, and the long-term adaptation that may be required.

What we are hoping to learn:

Our new approaches use recent satellite images and drone surveys to track changes to the dunes and update our understanding of the protection they offer.

This informs new coastal change and flood modelling to identify future risks, allowing us to develop Dynamic Adaptive Pathways to manage issues and ensure we become resilient in the future. We’ll be working closely with the community to explore and develop these plans.



Satellite derived shoreline changes at Nairn Beach

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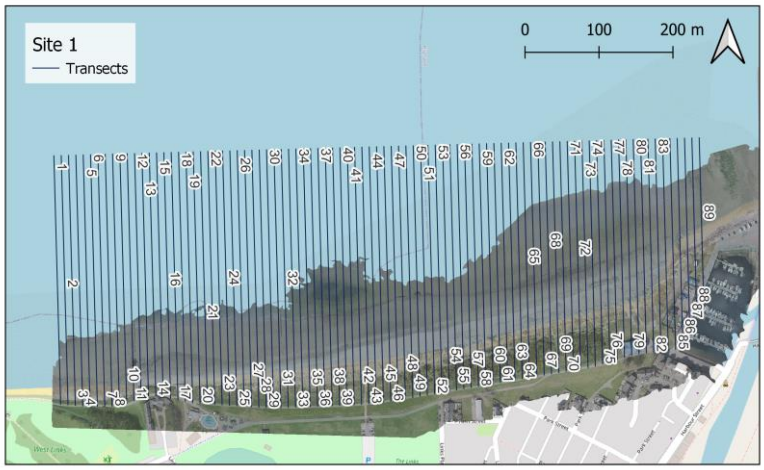
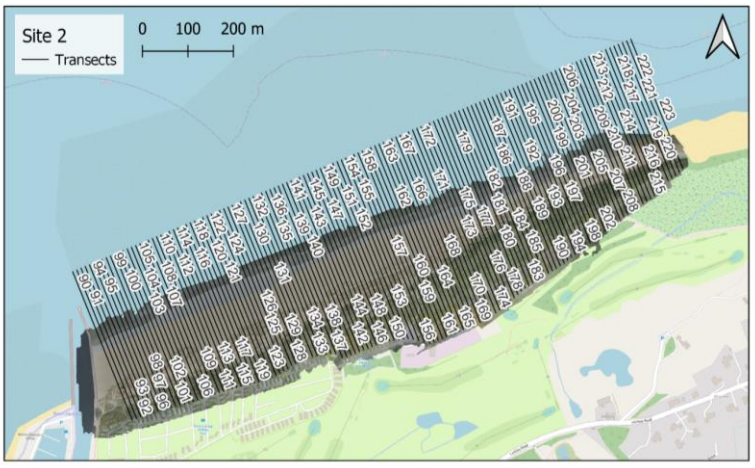




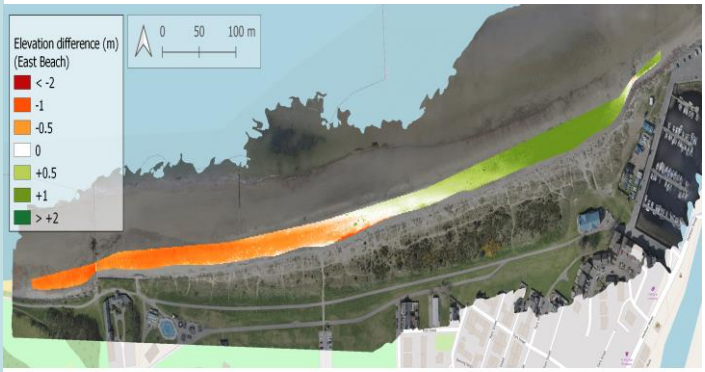
Overview: Our project aims to better understand the beach and dunes at Nairn and improve the natural protective function that they provide to the Fishertown area of the town. We’re developing a Dynamic Adaptive Pathway, allowing us to understand the level of protection provided by the dunes, the opportunities to enhance these, and the long-term adaptation that may be required.

What we are learning (Mid Point Update):

To determine the baseline condition of the dune and beach system LiDAR and topographic data has been used. This analysis has shown that for both the west and east beach erosion and accretion is occurring.

Historic shoreline position was also determined using satellite and aerial imagery (earth observation). Using this data for the east beach it picked up the evolution of the bar at Cubin Sands and the beach accretion. The data was not as successful in picking up the erosion and accretion of the west beach

A vegetation survey has also been undertaken



#dunes #nairn #pathway

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The narrow dunes protect Fishertown, but they are narrow and erosional. ©DynamicCoast (2023)

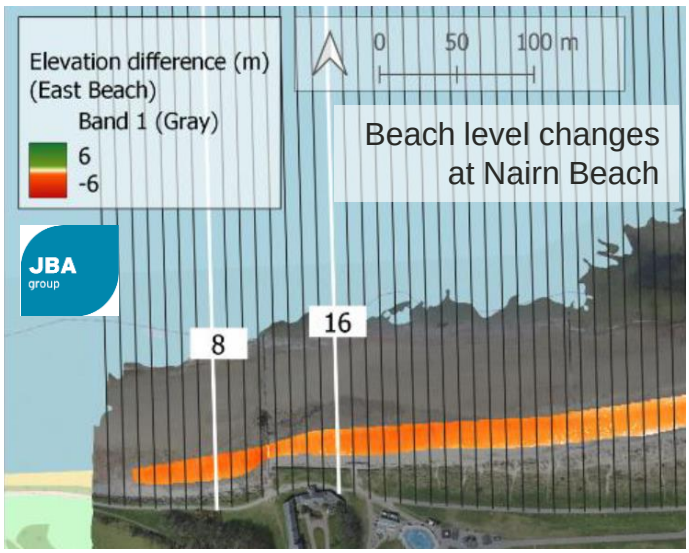
Overview:

Our project aims to better understand the beach and dunes at Nairn, and improve the natural protective function that they provide to the Fishertown area of the town. Climate change is expected to increase the risks from erosion and flooding in these areas.

We’re using new technology to develop a ‘coastal resilience index’ (CRI) of the dunes to help develop Dynamic Adaptive Pathways for Nairn, to keep the community safe.

What we are hoping to learn:

We are using recent satellite images and drone surveys to track changes to the dunes and update the Dynamic Coast analysis, to understand the protection the dunes offer. Understanding recent change helps us develop a range of Adaptive Pathways to manage issues, we can switch between to ensure we remain resilient in the future. We’ll be working closely with the community to explore and develop these plans.



Beach level changes at Nairn Beach

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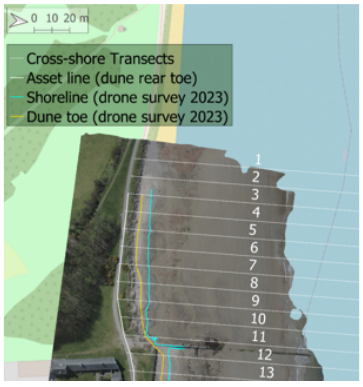
Overview:

The project used historic satellite imagery, current digital drone surveys and on the ground assessments to develop a Coastal Resilience Index tool. The CRI tool is a useful tool to determine current coast resilience, the severity of ongoing changes to the coast and feeds into the Adaptive Pathways approach.

Reference Map



CRI Input | Veg $_0$ cover | Present day percentage cover of the dune vegetation

Variables

Veg$_0$ cover = Present day percentage cover of the dune vegetation [CAN BE UPDATE HERE]

User Guide - input update

1. Insert a new measure or hypothetical Veg$_0$ cover under "Space to record changes through time" on the next available column. Include the date.
2. Do not update the "Data used for CRI calculation" column. As new data is inputted as described on step 1., the new data get overwritten and used in the CRI calculation. Where data is existing data will continue to be used

Good to know

It is not required to insert new data for all transects

Percentage vegetation cover is based on dune coverage ,i.e. from landward toe to seaward toe

Note: the data below were estimated from satellite imagery. Thus, it would be good to validate the 2022 (latest record, assumed to be similar to present conditions, 2024) with a survey f consistency.

Interpolate selected range

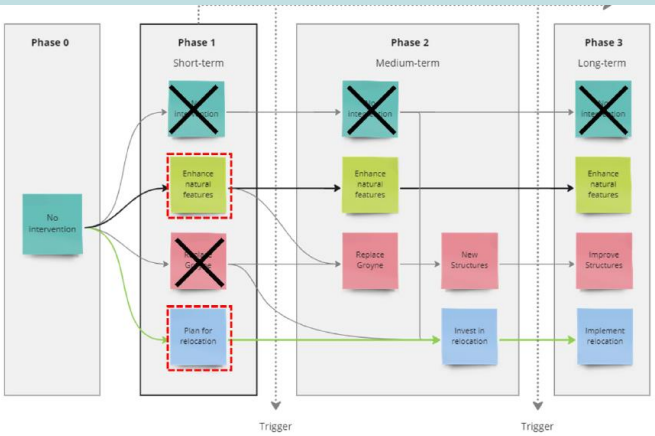
User input cell
Auto calculated cell

Location			Data used for *CRI* calculation Veg$_0$ cover (%)	Space to record changes through time Veg$_0$ cover *(%)*								
Site Location		Transect ID	*2023*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*		
	West of Groyne	8	32	44	35	39	40	53	32			
		9	35	45	35	41	37	52	35			
		10	32	39	27	37	33	42	32			
		11	39	45	30	35	35	46	39			
		12	36	43	25	28	29	44	36			
		13	44	59	42	49	35	58	44			
		14	45	57	46	58	39	57	45			

What we are learning:

CRI

The CRI tool breaks down the coastal resilience into five key components, allowing identification of the most vulnerable sections of coastline to be identified and the impacts of changes to the coastline to be assessed (actual and hypothetical).



Dynamic Adaptive Pathways

The DAP identifies opportunities in coastal management to mitigate future coastal erosion. These opportunities vary from large scale interventions to those that can be promoted by local interest groups.

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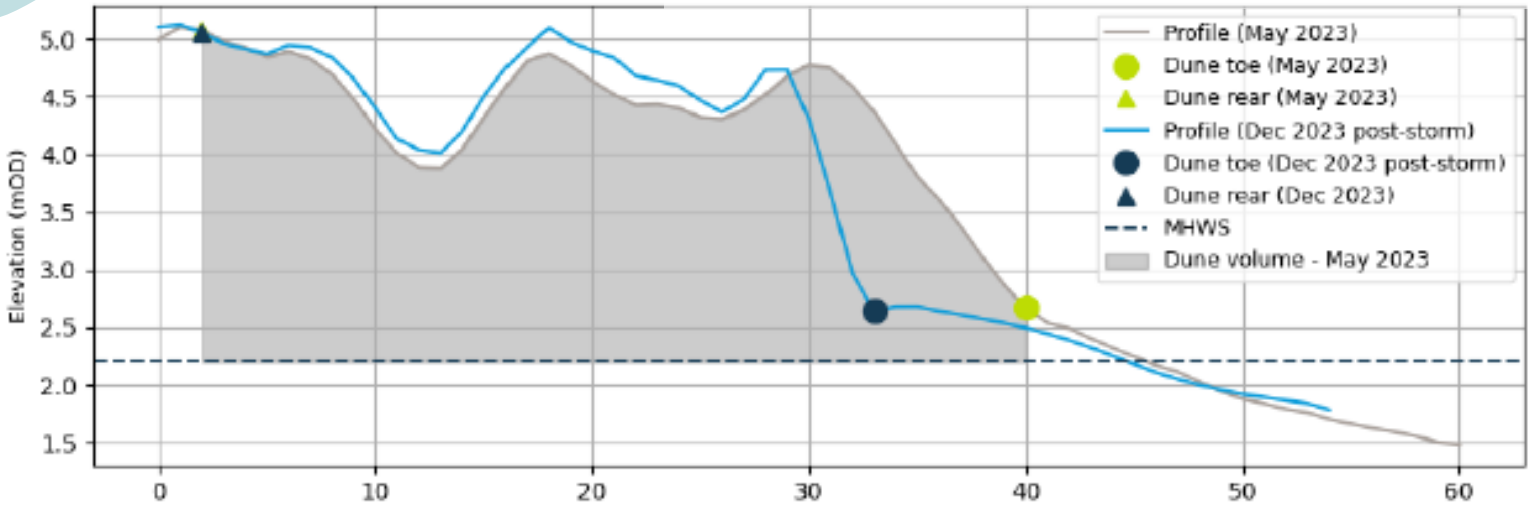
Storm Babet impact on dune toe recorded through CRI tool.



What we are learning:

Post Storm Impacts

Using the newly developed CRI tool, impacts of Storm Babet (Oct 2023) were monitored and assessed. The tool quantified the dune erosion and any areas of accretion, identifying no change in band of resilience.

Community Engagement

A **CoastSnap** citizen science station has been set up at Nairn Central Beach which will provide monitoring of beach condition as well as increasing community awareness of the coastal issues at Nairn through engagement. Additionally, community groups are considering what they can do in response to the Dynamic Adaptive Pathway.

Our new CoastSnap station

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#3 Final 2024