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Dynamic Coast – Scotland's National Coastal Change Assessment

Site Summary

Culbin (including Nairn) (Site 33)

Disclaimer

The evidence presented within the National Coastal Change Assessment (NCCA) must not be used for property level of scale investigations. Given the precision of the underlying data (including house location and roads etc.) the NCCA cannot be used to infer precise extents or timings of future erosion.

The likelihood of erosion occurring is difficult to predict given the probabilistic nature of storm events and their impact. The average erosion rates used in NCCA contain very slow periods of limited change followed by large adjustments during storms. Together with other local uncertainties, not captured by the national level data used in NCCA, detailed local assessments are unreliable unless supported by supplementary detailed investigations.

The NCCA has used broad patterns to infer indicative regional and national level assessments to inform policy and guide follow-up investigations. Use of these data beyond national or regional levels is not advised and the Scottish Government cannot be held responsible for misuse of the data.

Culbin (including Nairn) (Site 33)

Historic Change: The beaches and sand dunes at Culbin stretch between the mouth of the River Findhorn and Nairn, its inland dunes and beach ridges covering an area of 5,000 hectares. Whilst much of the dunes were stabilised after the First World War and now contain extensive pine plantations, the beaches are some of the most spectacular in Scotland and are our most dynamic beaches. The gravel ridges which underlie and form the foundation to the dunes at Culbin started to form about six thousand years ago from sediments sourced from the Rivers Findhorn, Lossie and Spey bypassing the then island which is now Burghead (Hansom, 2003). More recently Burghead acts as a partial barrier to sediment moving along the coast from the Lossie and Spey catchments. However, the longstanding erosion which has occurred within Burghead Bay extends across the mouth of the Findhorn and affects the most easterly 3km of Culbin Sands. Between 1906 and 1976 over 100m of dunes were lost along the left (west) bank of the River Findhorn as it enters the sea (1.4 m/yr) (Figure 3.1). Further west the beach has retreated some 80m in the intervening 70 years (1.1 m/yr). The sediments released from the high cliffed dunes moves westwards along with coarser gravels to form a spectacular array of re-curved ridges (Figure **3.2**).

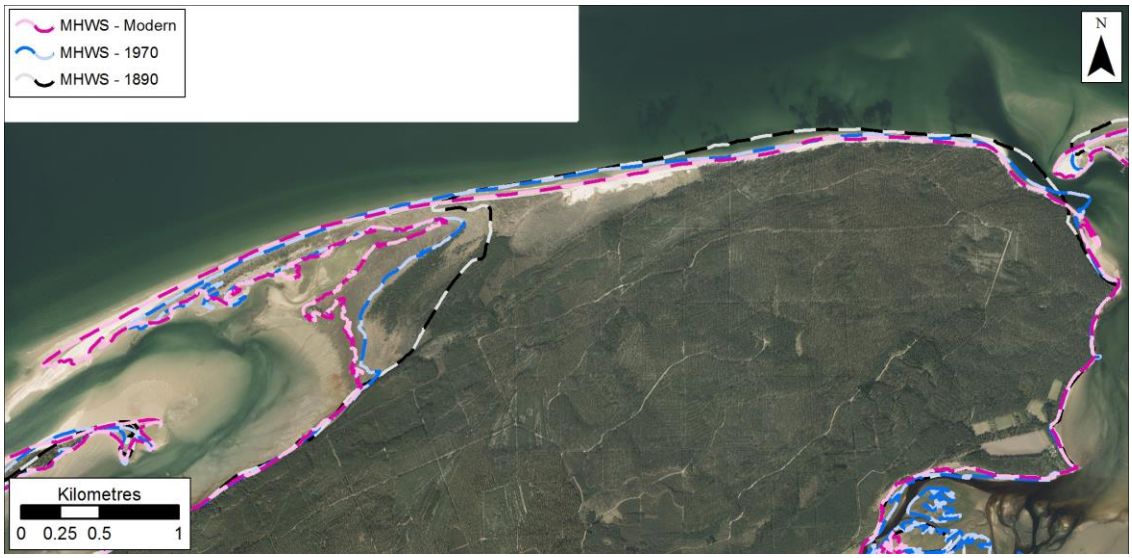

Figure 3.1: MHWS position in 1890, 1970s, and Modern datasets at Culbin Sands. Getmapping are our current providers of Scotland-wide digital aerial imagery© Getmapping plc.

The tip of the eastern recurve (the Buckie Loch Spit) has extended westwards 2 km between 1904 and 1976 (28 m/yr). Since 1976 the OS MHWS line has seen little update even though the spit extends another 600m up to 2011 (17 m/yr). The remnant features of older ridges form the central spit. Its eastern part is more sheltered and has been subject to much less adjustment since 1904. The western section however, has seen substantial losses, which have fuelled equally impressive gains to the west. 600 m of losses occurred between 1904 and 1976 at the eastern end of the Flying Bar which led to 870 m of gains, extending the gravels towards Nairn (25 m/yr). Since 1976 there have been comparable losses (740 m, 21 m/yr) and gains (780 m, 22 m/yr) at the eastern and western ends of the Flying Bar, respectively (Figure **3.2**).

Culbin Forest contains a Scheduled Monument for its anti-landing obstacles and makes up part of the Moray and Nairn Coast Special Protection Area and Culbin Sands Site of Special Scientific Interest.

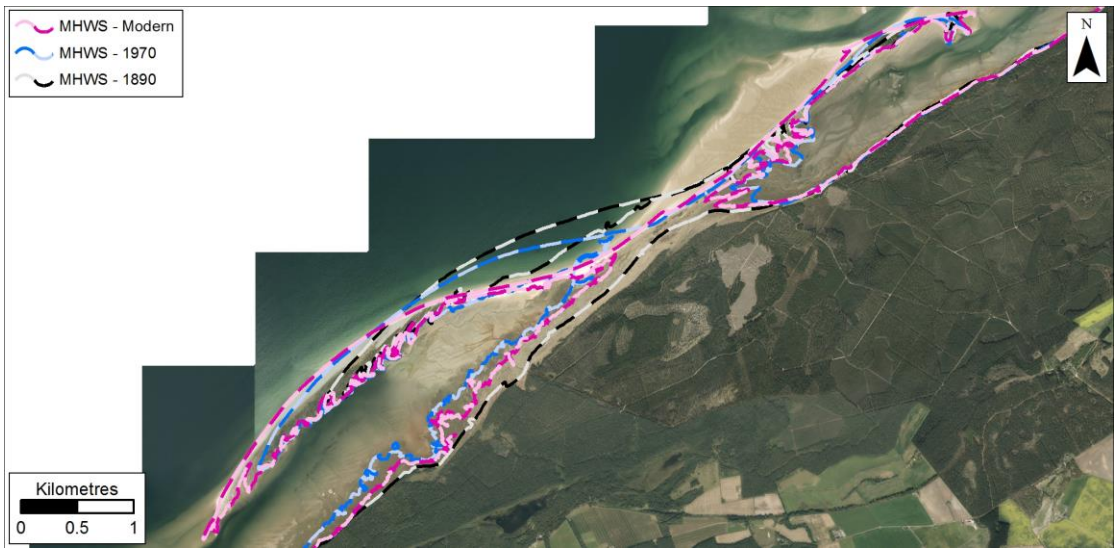

Figure 3.2: MHWS position in 1890, 1970s, and Modern datasets at Culbin Sands. Getmapping are our current providers of Scotland-wide digital aerial imagery© Getmapping plc.

Future Vulnerability: The Vulnerability Assessment projects the past erosion rate (since the 1970s) into the future to 2050 and 2100. For Culbin Sands and Forest this continues the well documented past changes, namely the erosion of high dunes along the eastern part of the site will continue to fuel accretion and spit extension within the Buckie Loch Spit and Flying Bar (Figure 3.3). Whilst the sheltered shorelines in the lee of the recurves may experience some accretion this is expected to be short-lived until the eastern end of the bar passes over them.

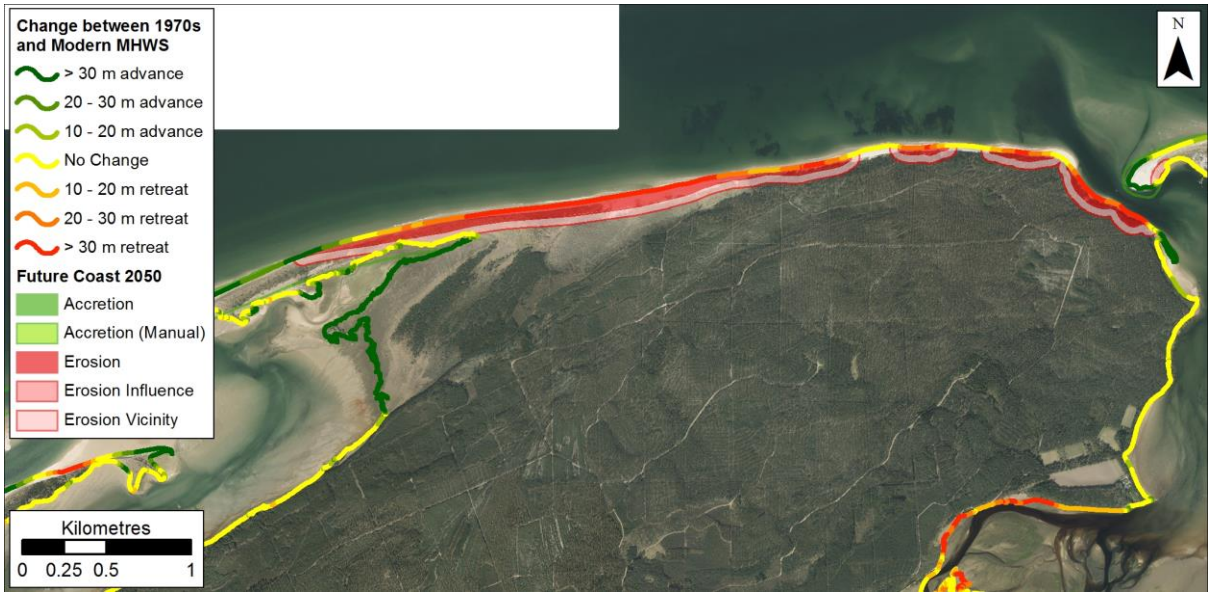

Figure 3.3: Possible future coastline position in 2050 based on rates between 1970 and Modern MHWS data at Culbin Sands. Getmapping are our current providers of Scotland-wide digital aerial imagery© Getmapping plc.

Alongside the forestry plantation, there are cultural and natural heritage interests, but very few built structures. Whilst the loss of forestry has been mitigated through pre-emptive harvesting in erosional areas, the negative consequences of erosion and accretion are limited within the dunes and forestry. It is more likely that the sedimentation off Nairn (Figure **3.4**) will present more of a concern for the existing pleasure-craft navigation (already tidally limited) and for flood risk as the lower reaches of the River Nairn become ever shallower. Given the rapid westerly movement of the Flying Bar (22 m/yr) and the fact it extends below tide level may mean that it is off Nairn within a decade or so. Whilst this may be 'Scotland's SandMotor' it may present safety issues as have been reported with the Dutch Sand Motor (link). This also results in the 'sea views' Nairn current enjoys changing in the coming years (Nairn is behind the bar in 113 yrs and out again in 272 yrs).

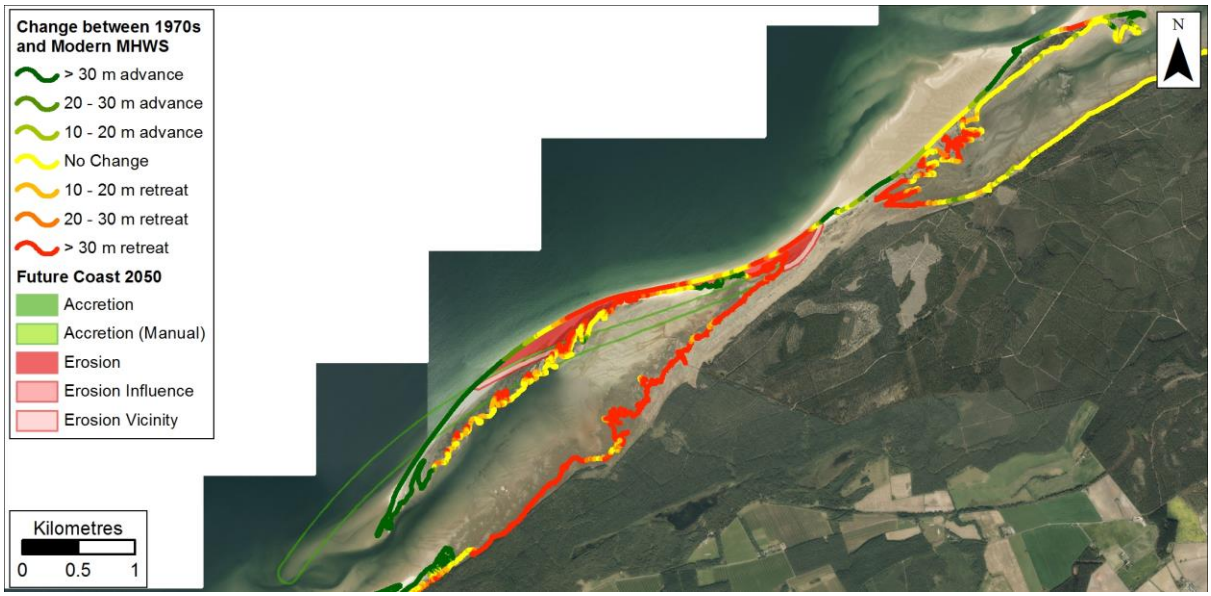

Figure 3.4: Possible future coastline position in 2050 based on rates between 1970 and Modern MHWS data at Culbin Sands. Getmapping are our current providers of Scotland-wide digital aerial imagery© Getmapping plc.

References

This is an extract from:

Hansom, J.D., Rennie, A.F., and Fitton, J.M. (2017) Dynamic Coast - National Coastal Change Assessment: Cell 3 - Cairnbulg Point to Duncansby Head, CRW2014/2.

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