Fleurieu TAS03.01.01

Regional Setting

This compartment extends from Woolnorth Point to North Point.

These sandy barriers receive refracted south-west swell around Woolnorth Point.

The compartment has a meso-tidal range of 2.01-2.80 m (springs) measured by Donaldson, Sharples and Anders (2012), and strong tidal currents, partly channelized on intertidal flats behind barriers

The dominant regional processes influencing coastal geomorphology in this region are the Mediterranean to humid cool-temperate climate, micro-tides, high energy south-westerly swells, westerly seas, carbonate sediments, interrupted swell-driven longshore transport, and the Southern Annular Mode (driving dominant south-westerly swells and storms).

Regional hazards or processes driving large scale rapid coastal changes include: mid-latitude cyclones (depressions), storm surges and shelf waves.

Justification of sensitivity

The swell-exposed sand barriers are rated 3, as they are likely to be gaining sand and are probably late responders to sea-level rise. A higher rating of 5 is given to the swell-sheltered sandy shores behind barriers; these are losing sand and are probably already responding to sea-level rise.

The sandy barriers are largely composed of sand reworked onshore from the Bass Strait plains during interglacial marine transgressions and high sea stands. However, the sheltered intertidal sand flats are comprised of eroding Pleistocene terrestrial sand deposits which are actively losing sand to the Bass Strait via strong channelized tidal currents (progressive annual to decadal sand movement down a large tidal channel west of Robbins Island was demonstrated by Mount et al. (2010)

using Landsat imagery time series). Modelling suggests shelf sands may be actively leaking around Woolnorth Point and onshore to the sandy barriers (Harris & Heap 2014). Thus, the outer swell-exposed barrier beaches are likely gaining sand whilst the sheltered sandy shores are losing sand. There is negligible sand supply from rivers.

The swell-sheltered sandy and saltmarsh shores are actively receding in many areas and have been doing so progressively for several decades (Prahalad et al. 2015), whereas the swell-exposed, sandy barrier beaches are continuing to recover from erosion events and are not showing progressive recession trends as yet (Mount et al. 2010).

Progressive sea-level rise commensurate with global sea-level rise rates has been measured at Burnie tide gauge 90 km to the east, and both mean and maximum wind speeds measured at Cape Grim weather station (15 km to the west) have increased significantly since the 1980s (Mount et al. (2010), Prahalad et al. (2015).

Sea-level rise and stronger wind-generated local seas associated with the changing climate are probably both significantly responsible for observed progressive shoreline erosion and recession in the swell-sheltered areas, and are likely to exacerbate recession and sand loss in those areas in future. In contrast, the swell-exposed sandy beaches are likely continuing to gain sand, and may be slow to show a response to sea-level rise.

Other comments

Low-profile sandy plains behind swell-sheltered sandy and saltmarsh shores are susceptible to inundation as well as erosion; artificial levees have been constructed to prevent inundation but these need regular maintenance and have been breached in places by erosion.

There are few human assets at risk on the sandy barriers. However, extensive areas of farmland (cattle-grazing) are susceptible to both recession and inundation behind the swell-sheltered saltmarsh shores.

The Hunter and Three Hummock Island shores within this compartment are mostly resilient hard rocky shores with sandy pocket beaches backed by bedrock; the latter are susceptible to beach loss with sea-level rise, but rising bedrock slopes limit the potential for shoreline recession.

Confidence in sources

High confidence: Based on detailed studies.

Additional information

Donaldson, P, Sharples, C & Anders, RJ 2012, The tidal characteristics and shallow-marine seagrass sedimentology of Robbins Passage and Boullanger Bay, far northwest Tasmania, Blue Wren Group, School of Geography and Environmental Studies, University of Tasmania.

Harris, PT & Heap, A 2014, 'Geomorphology and Holocene Sedimentology of the Tasmanian Continental Margin', in KD Corbett, PG Quilty & CR Calver (eds), Geological Evolution of Tasmania, Geological Society of Australia (Tasmania Division), pp. 530-539.

Mount, R, Prahalad, V, Sharples, C, Tilden, J, Morrison, B, Lacey, M, Ellison, J, Helman, M & Newton, J 2010, Circular Head Region Coastal Foreshore Habitats: Sea Level Rise Vulnerability Assessment, Blue Wren Group, School of Geography and Environmental Studies, University of Tasmania, Hobart.

Prahalad, V, Sharples, C, Kirkpatrick, J & Mount, R 2015, 'Is wind-wave fetch exposure related to soft shoreline change in swell-sheltered situations with low terrestrial sediment input?', Journal of Coastal Conservation, vol. 19, no. 23-33, p. .

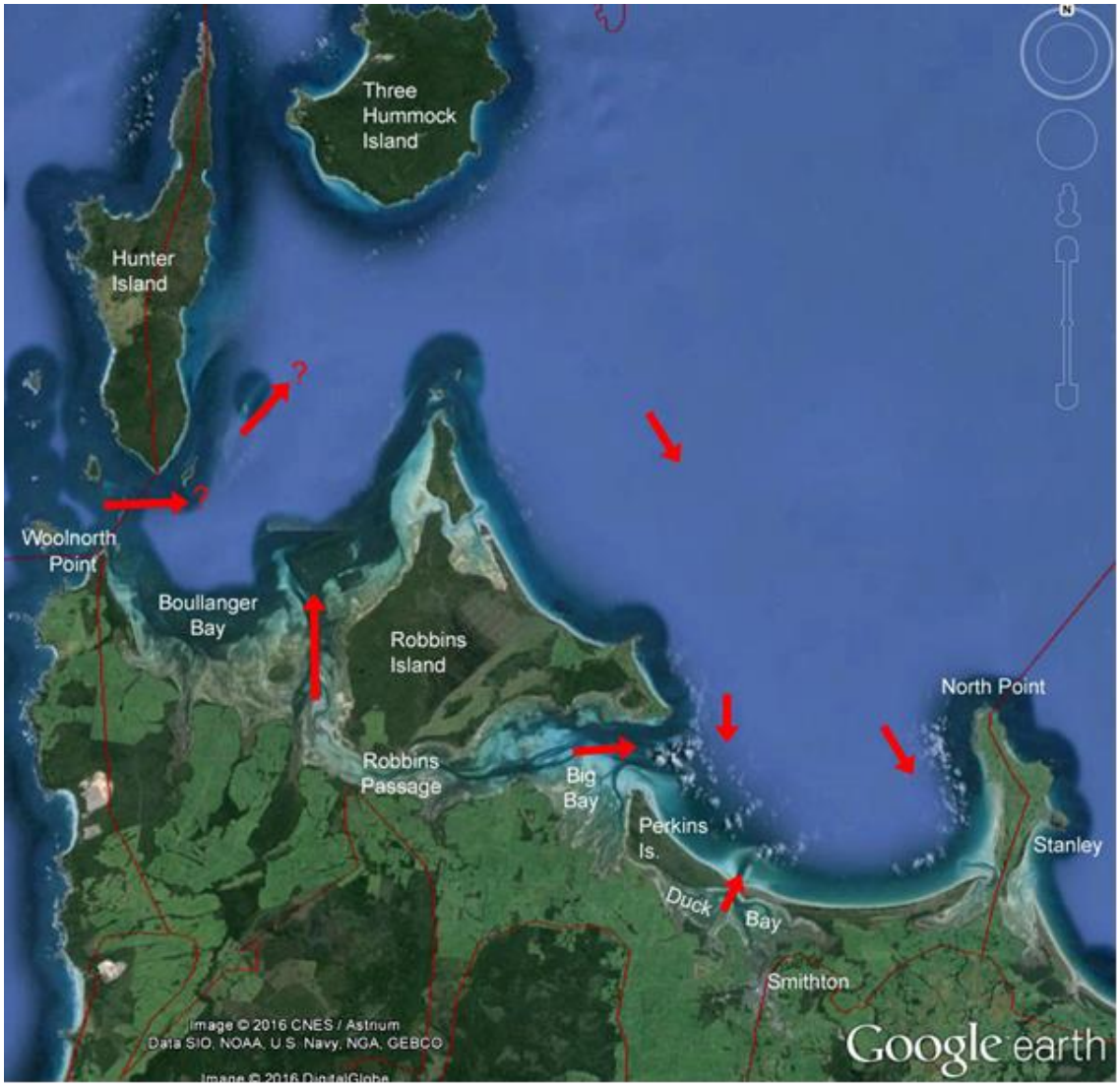

Figure 1: *Compartment TAS01.04.01 Fleurieu. Red lines indicate the secondary compartment boundaries. Red arrows indicate major sand transport directions with relative arrow sizes roughly indicative of relative sand transport volumes.*

Figure 2: *Strong ongoing recovery of foredunes is visible on the swell-exposed Perkins Island beach. A former erosion scarp is just visible behind the recovered dune face. Photo by C. Sharples.*

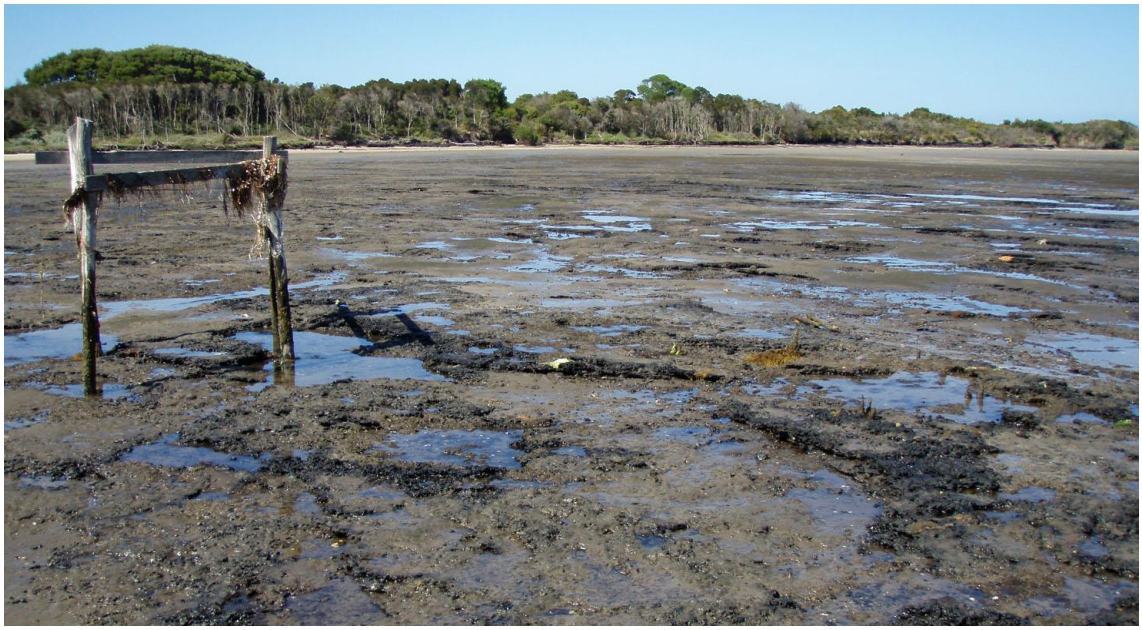

Figure 3: *Dated Pleistocene freshwater peat deposits are widely exposed across the intertidal sand flats of Boullanger Bay, and are indicative of a sand-losing erosional environment rather than a depositional environment. Photo by C. Sharples.*