# Marion Bay TAS01.03.03

**Regional Setting**

This compartment extends from Cape Bernier to Cape Frederick Henry.

It receives refracted south-westerly swells, as well as more direct south-easterly Tasman Sea swells. The shoreline is is exposed to seas generated by extra-tropical cyclones (East Coast Lows) and also experiences micro tides.

The dominant regional processes influencing coastal geomorphology in this region are the humid warm to cool temperate climate, micro-tides, south-easterly Tasman Sea swells, easterly seas, dominantly quartz (terrigenous) sediments with northerly longshore transport in the northern part, and the El Nino Southern Oscillation (driving beach erosion/accretion cycles, cyclone frequency).

Regional hazards or processes driving large scale rapid coastal changes include: East Coast Lows (extra-tropical cyclones), mid-latitude cyclones (depressions), and storm surges (<1m).

**Justification of sensitivity**

Mid to south Marion Beach may begin receding in the medium term (sensitivity 4). However, its northern part and all of Two Mile Beach are likely late responders (sensitivity 3). Hard rock shores are mainly resilient, but increased slumping is likely on Hellfire Bluff.

The sand forming the two major sandy beach and dune barriers in this compartment (Marion Beach in Marion Bay; Two Mile Beach in North Bay) was probably reworked from sand that was derived from increased catchment erosion under glacial climatic conditions, distributed across the continental shelf by rivers and wind action during glacial low sea stands, then reworked shore-wards by wave action during post-glacial marine transgressions. There is probably episodic cross-shore and alongshore sand transport in response to erosion during storm events, followed by

swell-driven recovery at these beaches. However, there is unlikely to be significant alongshore leakage of sand into or out of their deep embayments, nor is there significant transport of sand via active transgressive dunes, except at the southern tip of Long Spit. There is no significant sand supply from rivers to the coast today, and sediment mobility modelling (Harris & Heap 2014) suggests there is likely to be only minor ongoing gains of sand from the continental shelf today.

Davies (1959) interpreted the Marion Beach barrier as having originally prograded from north to south. A continuing, dominant, southerly littoral drift of sand, along at least the middle to southern parts of Marion Beach, is indicated by the southwards deflection of Bream Creek's mouth across the beach and the southerly extension of Long Spit, so that the tidal channel entrance of Blackman Bay is forced hard against its southern rocky shore (this pattern is likely due, at least in part, to refraction of swells around Forestier Peninsula and Cape Frederick Henry). A large flood-tide delta inside Blackman Bay has evidently been a major sink for sand from Marion Beach in the past but is essentially full today. Although no data on beach behaviour at Marion Beach over recent decades is currently available, it is likely that with a stable sand budget and swell-driven beach recovery after erosion events, the beach is not yet showing a progressive recessional response to sea-level rise. However, ongoing sea-level rise will create additional accommodation space for sand in the flood-tide delta area within Blackman Bay, which may, therefore, become a more active sink for sand drifting southwards down the beach in the medium term future, and so result in the onset of beach recession. Thus, at least the middle to southern parts of Marion Beach are likely to be medium-term responders to sea-level rise in terms of shoreline recession (Sensitivity 4). Although, the more northerly and wider parts of Marion Beach (including several shorter wide beaches between small rocky headlands at the northern end of the embayment) are likely to be exposed to less net southerly littoral drift, and may be later responders to sea-level rise (sensitivity 3).

Although there is also no beach behaviour information at present for Two Mile Beach, its location in a well-enclosed embayment unlikely to be significantly gaining or losing (and the lack of a significant potential sand sink) suggest that swell-driven recovery from erosion events is likely to keep this beach in equilibrium for some time, making it a probable late responder to sea-level rise (sensitivity 3).

Hard rocky headlands between Two Mile Beach and Marion Bay may exhibit sporadic rock falls but will be largely resilient to sea-level rise for the foreseeable

future.  However, the very steep and high dolerite slopes of Hellfire Bluff, at the northern end of Marion Bay, exhibit abundant morphological evidence of past coastal slumps and may show an increased frequency of slumping and land-sliding with increasing sea-levels and higher wave attack.

Much of the shoreline within Blackman Bay is gently sloping, resilient hard rock. However, soft sediment sections are present; and with no swell to drive shoreline recovery after erosion events, these may show early increased shoreline recession in response to rising sea-levels, depending on the degree of exposure to long wind-wave fetches across Blackman Bay.

**Other comments**

There is little infrastructure close behind much of the shoreline in this compartment. However, roads and residences are potentially susceptible to inundation and shoreline erosion along parts of the north shore of Blackmans Bay and near the Bream Creek estuary behind Marion Beach.

Saltmarshes are an important feature of north Blackman Bay behind Marion Beach and Long Spit.

Most shorelines in this compartment have little susceptibility to inundation owing to sloping or cliffed rocky shores and substantial foredunes backing most beaches. However, low-lying areas on the north shore of Blackman Bay and along the estuary of Bream Creek (extending behind the Marion Beach foredune) are susceptible to co-incident storm surge and river flooding.

**Confidence in sources**

Medium confidence: Davies (1959) provided an early interpretation of the geomorphic development of Marion Beach and Long Spit, but otherwise there has been little published geomorphic study of this compartment. Likely coastal behaviour in response to sea-level rise has been interpreted from available geological, topographic and geomorphic information.

**Additional information (links and references)**

No recent detailed coastal geomorphic or hazard studies are available for this compartment, However, pertinent topographic and geological data at several scales is available. The following references have been cited above:

Davies, JL 1959, 'Sea level change and shoreline development in south-eastern Tasmania', *Papers and Proceedings of the Royal Society of Tasmania*, vol. 93, pp. 89-95.

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.

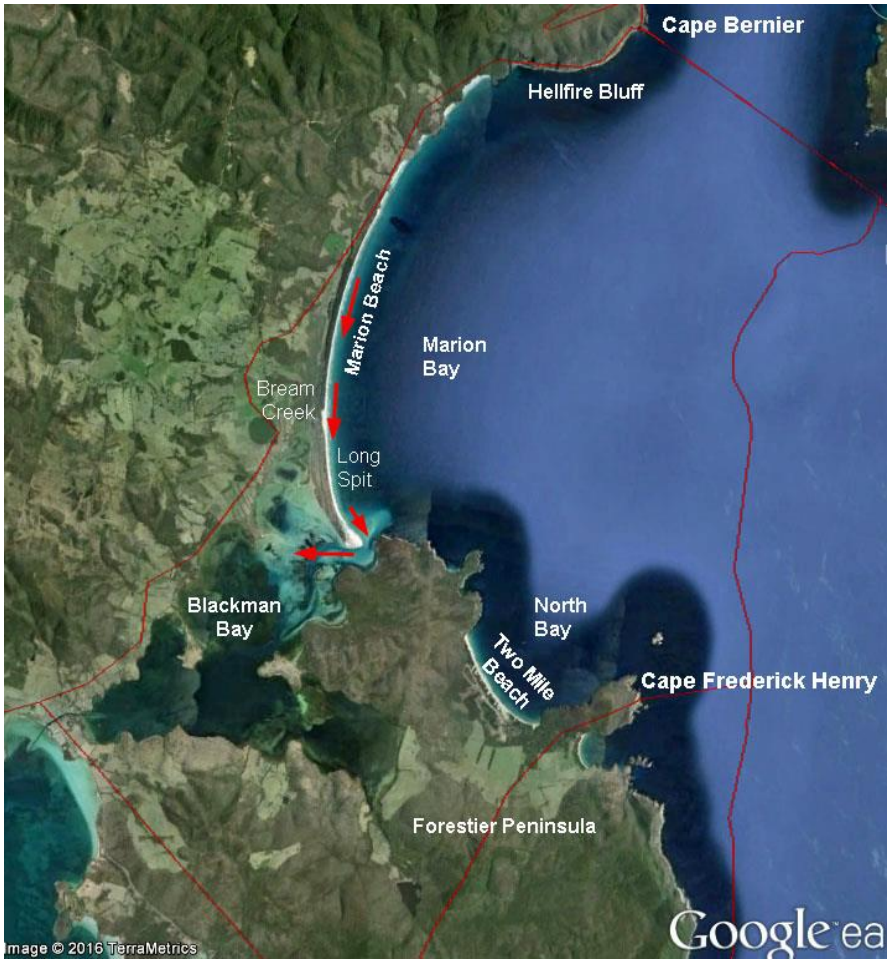


***Figure 1:*** *Compartment TAS01.03.03 Marion Bay. Red arrows indicate inferred dominant sand transport pathway into the flood-tide delta inside the permanent tidal entrance to Blackman Bay. Although this sand sink is currently probably nearly full and sand is re-distributed back to Marion Beach by tidal and wave-driven currents, sea-level rise will create additional sand accommodation space in Blackman Bay, resulting in increasing permanent net loss of sand from Marion Beach into the flood-tide delta.*