2016-02 LRep
Status: Open
28 January, 2016

Prepared for:
Joan Ropiha

Erosion Assessment for Happy Jacks Boat Harbour, Mahia Peninsula

Dear Joan

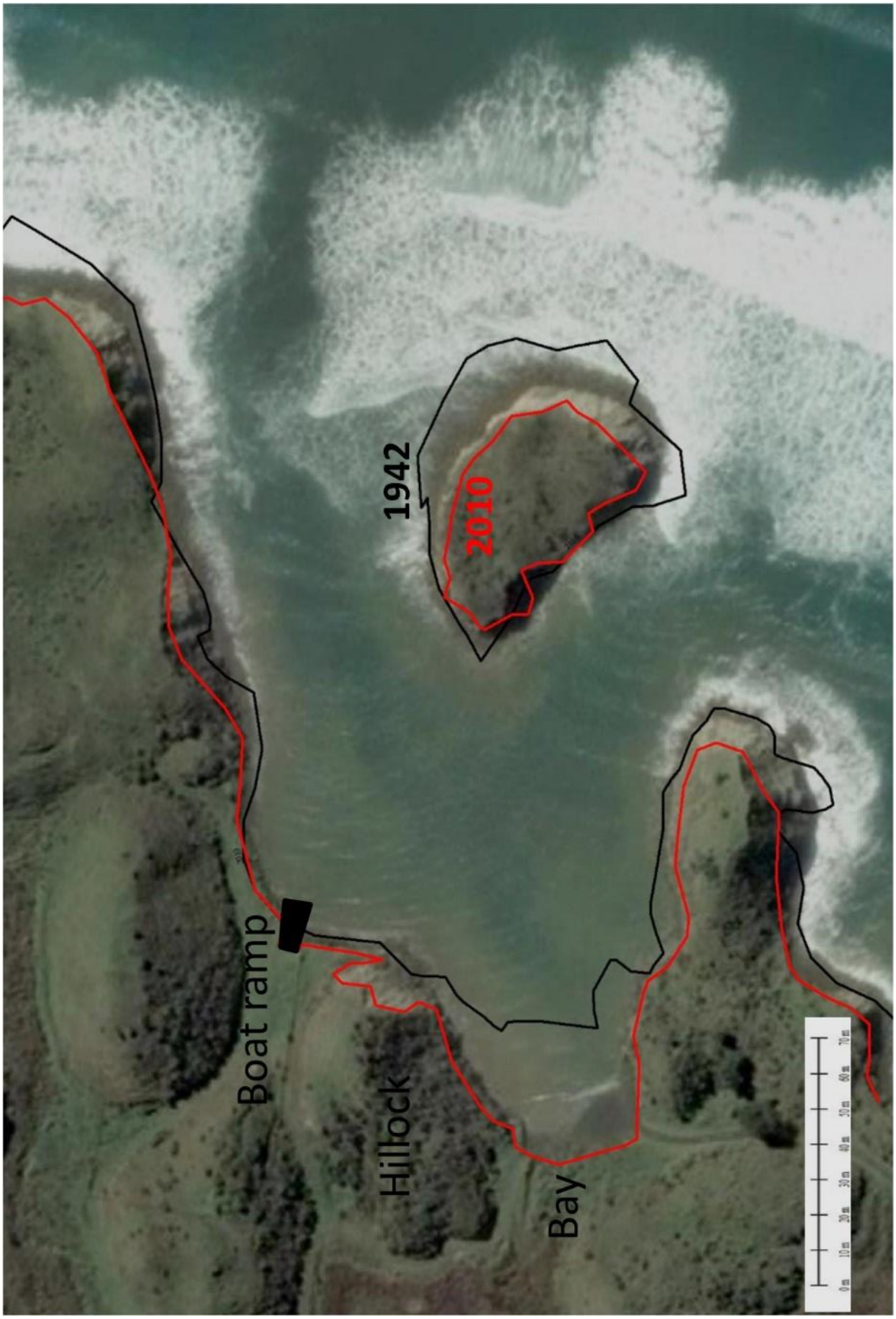
You have asked me to comment on background erosion within Happy Jacks Harbour in light of my prior involvement with the Mexted consent process at Mahanga.

The figure below depicts the 1942 (earliest) and 2010 (most recent) aerial photo-based shorelines (as defined by the vegetation front). A scale is included so you can measure the erosion that has occurred over 68 years at different locations. These shorelines are overlaid upon the 2007 aerial as this photo happened to be taken at higher tide and under higher wave conditions; the waves can be observed deforming (crests bending and reducing in size) within the inlet as they interact with the shorelines and seabed morphology. Also marked on the figure is the site of the new boat ramp, a nearby hillock which I presume to be the site of cultural significance, and a bay to the immediate south which has experienced the greatest erosion within the inlet. Note the effects of cyclone Pam in 2015 is not included in the analysis.

The results show erosion on the exposed side of the island, is up to 20 m (~0.3 m/yr) which is similar to the open coast. The inlet itself is characterised by erosion, however, rates vary considerably. Of note is shoreline stability immediately north of the boat ramp and low erosion value (3 m) immediately south - these values may be related to rock placements. Values then increase to 40 m or 0.6 m/yr on average in the bay. It appears that the shoreline in the vicinity of the boat ramp is in equilibrium with the incoming wave energy but, as evidenced by the increase in erosion, balance is quickly lost beyond this point.

A consequence of this result is that any structure or seabed modification that acts to increase wave transmission beyond the boat ramp could potentially increase the erosion rate toward and within the bay. A specific investigation would be required to assess whether or not this has occurred, or whether it may occur in the future under climate change and long-term erosion scenarios.

When addressing the area's future management, long-term erosion must to be incorporated. The island that protects the inlet is eroding at about 0.3 m/yr and will be largely consumed within 100 years - sooner if climate change predictions eventuate (e.g. sea-level rise, and storm frequency and magnitude increase). Then, only a reef will remain and while this will still provide some wave dissipation and consequent shoreline protection, the level of wave energy driving shoreline erosion will be higher than at


1942
2010
Boat ramp
Hillock
Bay

present. Indeed, increasing rates of inlet shoreline erosion can be expected throughout the process of island diminution. The most effective way to protect (prolong the existence of) cultural sites is the strategic placement of rock/stone and its ongoing maintenance and adjustment to changing environmental conditions.

Given the special nature of this coastal location, now could be an opportune time to develop a long-term land-use strategy for the area.

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Dr Roger Shand
Senior Coastal Scientist