

## The Shoalhaven Estuary: past, present and future dynamics of a mature wave-dominated system in southeast Australia

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The Shoalhaven River drains a catchment of ~7,000 km<sup>2</sup> in southern New South Wales, forming a barrier estuary at its mouth. Coring and radiocarbon dating across the plains provide insights into the progressive infill of the estuarine basin over the past 7,000 years, and several prominent paleochannels are evidence of successive channel locations during that time. Airborne LiDAR reveals a series of prograded beach ridges to the north, and OSL dating and sedimentological analysis of these reinforces the significance of the supply of sand from the river. Shoaling at the entrance thwarted navigation into the river mouth, and a local land-owner constructed Berrys Canal in 1823 that links the Shoalhaven River to the adjacent smaller Crookhaven River. Bank erosion along this artificial channel continues to widen it, and the river now exits primarily through the Crookhaven Heads, but opens intermittently during flood events at Shoalhaven Heads. The low-lying plains flanking the estuary are subject to periodic inundation during high runoff events and storm surges. Hydrodynamic modelling demonstrates their vulnerability and forecasts altered hydrodynamic conditions, including reactivation of palaeochannels, as a consequence of higher sea level in future. Palaeoenvironmental reconstructions indicate that this system is representative of a mature stage of barrier estuary development along this coast. It has been modified, both through the construction of a dam upstream, and through the partial diversion of the channel near its mouth. Future management of the entrance, and the adjacent beaches, needs to be informed by an understanding of the sediment budget, recognising sources, transport pathways and sinks, as well as the perturbations in these dynamics.

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