

## **Anthropocene and Holocene aeolian reactivation of the Willandra Lakes lunette dunes, semi-arid southeastern Australia**

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The Willandra Lakes in semi-arid Australia provide some of the most continuous combined palaeoenvironmental and archaeological records on the continent. These are best preserved within the transverse shoreline (lunette) dunes on their downwind margins. The focus of most studies in this region has been on the late Pleistocene ritual burials of Australia's first people. Following final lake retreat c. 15 ka, the lunettes periodically reactivated in response to local climatic conditions, experiencing erosion, aeolian redeposition and alluvial sheetwash. The general paucity of Holocene data has contributed to a perception that people largely abandoned the area in favour of the perennial Murray and Darling Rivers to the south and west. Our study reconstructs geomorphological conditions and patterns of human mobility in adjacent Lakes Mungo and Durthong over the last c. 15 ka, including the most recent 150 years since Europeans established pastoralism in the region. Our data show that Indigenous people did not abandon the area as previously assumed, but developed effective strategies for responding to the changed environmental conditions. Final lake retreat transitioned into a phase of aeolian accumulation c. 15–12 ka, indicating locally dry conditions. Subsequent aeolian reactivation peaked during arid phases in the early Holocene and twice in the most recent 1000 years prior to European settlement in the area. Alluvial sheetwash was deposited onto lake floors during the mid-Holocene, and again in the early decades of European settlement, when wetter conditions than persist today encouraged pastoral expansion. Aeolian reactivation, likely driven by European pastoral activities, has increased in the most recent 150 years. Our study underscores the necessity of integrating geomorphological and archaeological investigations over landscape scales in order to optimise our understanding of interactions between people and their environment through time.

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