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Geometry and Architecture of the Neales Delta, Ephemeral Terminal Splay System, as an Example of the Complexity of Flooding Event Expressions in Dryland Fluvial and Lacustrine Sedimentation

The modern Neales River terminal splay complex has been used for the base model to illustrate the key stratigraphic implications of the flood events matrix.

Ephemeral flood waters flow through an incised, straight axial channel belt containing a coarse-grained sandy meandering fluvial channel. The river bifurcates into several straight distributary channels typically 1 – 5m deep with many branches formed by active sandy crevasse splay channels. Splay lobes (<1m thick) dominate the lower delta plain and comprise medium to fine-grained sand, with parallel lamination, pseudo-hummocky cross-stratification, and climbing ripples. Extensive, thin (W/T ratios >1000), sandy mouthbars form the delta front, amalgamating to form a broad apron, prograding across dark brown or bluish transgressive lacustrine prodelta clay. Underlying the modern deltas is an older amalgamated, coarse-grained sandsheet.

The Neales Delta and other rivers terminating into Lake Eyre are subject to highly variable and unrelated discharge events as a result of extensive and spatially dispersed catchments. The intrinsic disconnect between individual river catchment flood cycles and the Lake Eyre gross fill level introduce a range of flood event expressions, within the architecture of deltaic successions which are conceptually illustrated by the flood events matrix and have been identified during field studies.