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Reservoir Analogues for Ephemeral Fluvial, Lacustrine Delta and Terminal Splay Successions—Examples from the Lake Eyre Basin, Central Australia

Ephemeral fluvial, lacustrine delta and terminal splay successions are important reservoirs in many non-marine basins (eg. Triassic of the North Sea and Algeria; Pliocene of the Caspian Sea). Statistics regarding reservoir scale, geometry and interconnectivity can be derived from modern depositional analogues, such as the typically ephemeral inland rivers of the Lake Eyre basin, Central Australia.

Lake Eyre receives sediment from several large rivers (Cooper Creek, Diamantina-Warburton-Kalaweerina, Macumba, Neales, Umbum and Frome). These are characterised by variable discharge events. Major lake fillings are rare and flood events especially down the western rivers (Neales and Umbum) are typically out-of-phase with the lake level.

Studies of the Neales and Umbum deltas show they are fluvial-dominated, intercalated with terminal splays, and are incised into a much larger Pleistocene low-gradient fan. These rivers flow through incised, straight axial channel belts containing a coarse-grained sandy meandering fluvial channel that bifurcates into well developed distributary channels up to 5m deep. Distributaries are narrow, elongate sandy crevasse splay channels that feed terminal splays on the lower delta plain. They comprise fining-upward (<1m thick), medium to fine-grained sand, with parallel lamination and climbing ripples. On the floodplain numerous shadow bars form downstream of vegetation and hummocks up to 1m high, and 5m radius containing pseudo-hummocky cross-stratification are common. Sandy mouthbars, developed when lake levels were high, form a thin but extensive delta front prograding across transgressive lacustrine prodelta clay.

These reservoir analogues may be useful for developing reservoir models in comparable ancient fluvial-lacustrine basins.