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## **Late Cretaceous Deltas of the Bight Basin, Southern Australia: Petroleum Systems in a Frontier Basin**

Two large progradational delta systems, covering an area of up to 110,000 km<sup>2</sup>, have been recognised within the Jurassic-Cretaceous Bight Basin, offshore southern Australia. The Cenomanian White Pointer delta is a Niger-style delta characterised by a mobile substrate, extensive growth faulting and mud diapirism. The Late Santonian-Maastrichtian Hammerhead delta is a sand-rich system featuring strongly progradational stratal geometries but lacking the extensive shale deformation of the earlier system. These deltas built out into a narrow restricted seaway prior to and immediately after the commencement of slow seafloor spreading between Australia and Antarctica in the Late Santonian. This seaway would have provided an excellent environment for the development of organic-rich rocks. Although the Bight is a poorly-drilled frontier basin, indications of active petroleum systems, including SAR-detected seepage and asphaltite strandings, are present.

The marine shales of the Albian-Cenomanian Blue Whale Supersequence, the mobile substrate to the White Pointer delta, have proven source rock potential and, on geochemical evidence, have been suggested as the possible source of the asphaltites. The White Pointer Supersequence contains both marine condensed sections and coaly deposits and has good to excellent source potential for both oil and gas. The preservation potential for organic-rich rocks would have been enhanced in the high accommodation setting of the growth-fault controlled depocentres. The dominantly progradational Hammerhead Supersequence has excellent reservoir potential, with the likelihood of marine seal facies in the upper aggradational portion of the succession. The basinward thickening (up to 5000 m) geometry of the Hammerhead is the key to the loading and maturation of successively younger source rocks. The structural fabric of the White Pointer delta sets up the plumbing system for the basin. These growth faults, which sole out in the Blue Whale shales, have been reactivated several times and formed the locus for the nucleation of new faults.