

New insights into the evolution of the Barrow Delta from a multi-disciplinary interpretation of the Birdrong Sequence

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The Early Cretaceous Birdrong Sequence (*S. tabulata* - *P. burgeri*) represents the final episode of coarse clastic sedimentation across the Barrow Sub-Basin prior to transgression and the deposition of the Mardie Greensand - the 'last gasp' of the Barrow Delta. A multi-disciplinary study of the Birdrong has been undertaken in the East Spar, Woollybutt, and John Brookes fields of the northern Barrow Delta complex, Northern Carnarvon Basin. This integrated approach has utilised wireline, sedimentologic, ichnologic and biostratigraphic data to produce a sequence stratigraphic interpretation revealing new insight into the evolution of the Barrow Delta.

Detailed palynological data were collected and analysed within the HMP (2004) zonation scheme for the North West Shelf. Quantitative and qualitative variations within palynological suites allowed identification of key assemblages signifying particular depositional environments and key stratal horizons. Combined palynological and sedimentological data reveal several strong facies relationships between specific taxa and interpreted depositional environment; a key example is the relationship between *Gagiella* and brackish water environments. This integrated approach has enabled the depositional setting of the uppermost sandstone-dominated strata of the Barrow Group to be described in more detail than previously. These interpretations have been expanded spatially through sequence stratigraphic correlation of well data, and integration with 3D seismic. The resultant depositional model for the northern Barrow Delta will utilise modern analogues to quantify regional-scale geometry and understand implications for remaining hydrocarbon prospectivity. It is proposed that variations in palynological content may prove useful as a predictive tool in delimiting the extent of reservoir sequences.