



## Regional Geology of the Perth Basin

### Figure captions

- Figure 1** Map showing the location and extent of the Perth Basin, the distribution of petroleum exploration wells, oil and gas fields and basin bathymetry.
- Figure 2** Map showing petroleum production facilities, petroleum fields and pipeline infrastructure in the Perth Basin.
- Figure 3** Structural elements map for the Perth Basin showing depocentre age and major faults (modified from Bradshaw et al, 2003).
- Figure 4** Stratigraphic chart for the northern Perth Basin showing lithostratigraphy, basin phases and hydrocarbon occurrences. Modified after Jones et al (2013) and Mory et al (2015). Geologic Time Scale after Ogg et al (2016).
- Figure 5** Regional geological transect through the northern Perth Basin (modified from Norvick, 2004).
- Figure 6** Stratigraphic chart for the southern Perth Basin showing lithostratigraphy, basin phases and hydrocarbon occurrences. Modified after Jones et al (2013) and Mory et al (2015). Geologic Time Scale after Ogg et al (2016).
- Figure 7** Tectonostratigraphic chart for the northern Houtman Sub-basin. Basin phases, seismic sequences, interpreted lithostratigraphy, key regional events and potential petroleum systems elements are based on mapping and interpretation of seismic survey GA-349 and regional stratigraphy of the Houtman Sub-basin. Also shown are the NW Shelf Supersequences (updated from Smith et al, 2015) and short-term relative sea-level curve (modified from Haq and Schutter, 2008; and Hardenbol et al, 1998). Geologic Time Scale after Ogg et al (2016).
- Figure 8** Interpreted seismic lines from survey GA-349 in the northern Houtman Sub-basin: **a)** GA-349/1011; **b)** GA-349/1031; and **c)** GA-349/1023. Sequence ages and interpreted Perth Basin lithostratigraphic equivalents are shown in Figure 7. Location of the lines is shown in Figure 11.
- Figure 9** Regional seismic lines through the Perth Basin: **a)** seismic line GA 349/1024 through the northern Houtman Sub-basin; **b)** composite seismic transect (portions of seismic lines GA 310/31, Plum 92-87r, Plum 92-41 and Plum 92-41r) through the Abrolhos, Houtman and Zeewyck sub-basins; and **c)** composite seismic transect (seismic lines PV91-40r and V82A-67r) through the northern Vlaming Sub-basin. Locations of lines are shown in Figure 11.
- Figure 10** Plate reconstruction model for the southwest margin Continent-Ocean Boundary at **(a)** 140 Ma, **(b)** 130 Ma, **(c)** 120 Ma, and **(d)** 110 Ma, showing timing and evolution of breakup across the margin (modified from Hall et al, 2013). B: Batavia Knoll; CAP: Cuvier Abyssal Plain; EP: Exmouth Plateau; G: Gulden Draak Knoll; GB: Gascoyne Block; H: Houtman Sub-basin NP: Naturaliste Plateau; PAP: Perth Abyssal Plain; V: Vlaming Sub-basin; WM: Western Mentelle Sub-basin; WP: Wallaby Plateau; Z: Zeewyck Sub-basin; ZP: Zenith Plateau.
- Figure 11** Structural elements map for the Perth Basin showing the location of petroleum wells and regional cross-sections shown in Figure 8 and Figure 9.
- Figure 12** Map of the Perth Basin showing current petroleum licences and operators.
- Figure 13** Map showing selected hydrocarbon discoveries and occurrences coloured by age of source rock, as interpreted from geochemical evidence in the northern Perth Basin (after Jones et al, 2011).

- Figure 14** Source rock characteristics (TOC vs HI) by formation based on wells in the Abrolhos and southern Houtman Sub-basin (modified from Jones et al, 2011).
- Figure 15** Burial history models for two Houtman Sub-basin pseudo-wells, calibrated with corrected temperature, maturity (Ro, FMM) and AFTA data from wells in adjacent areas. a) Pseudo-well 1030-0 located on the basin margin, calibrated with well data from the Abrolhos Sub-basin. b) Pseudo-well 1030-2 located over the deepest part of the northern Houtman Sub-basin, calibrated with well data from the southern Houtman Sub-basin (modified from Hall et al, 2017).
- Figure 16** Petroleum systems modelling results for potential Hovea Member source rock in the NH-TR1 Kockatea Shale equivalent: a) gross NH-TR1 seismic sequence thickness; b) maturity of Hovea Member; c) cumulative oil expelled from the Hovea Member; and d) cumulative gas expelled from the Hovea Member (modified from Hall et al, 2017).
- Figure 17** Conceptual play diagram for the northern Houtman sub-basin showing a range of possible structural and stratigraphic plays at different stratigraphic levels.
- Figure 18** Map showing marine reserves, marine parks, multiple use zones, ecological features in the Perth Basin.