

Figure F1. Map of the northwest shelf showing major basins and location of modern and “fossil” reefs. Stars = Expedition 356 sites, green circles = Deep Sea Drilling Project/Ocean Drilling Program sites and other core locations referred to in text, yellow circles = industry well locations (Angel = Angel-1, G2/6/7 = Goodwyn-2, Goodwyn-6, Goodwyn-7, A1 = Austin-1, M/MN1 = Maitland/Maitland North-1, TR1 = West Tryal Rocks-1). WA = Western Australia, NT = Northern Territory, SA = South Australia, QLD = Queensland, NSW = New South Wales).

Figure F2. Bathymetric map showing the seafloor around Sites U1458 and U1459. Bathymetric data are derived from the Geoscience Australia Australian bathymetry and topography grid, June 2009. The positions of multichannel seismic profiles are shown. The Houtman Abrolhos reef complex is the most southerly reef system in the Indian Ocean. Red circles = locations of preexisting industry wells.

Figure F3. Multichannel seismic profile across Sites U1458 and U1459. Top of green shading = intended depth of penetration and is of Eocene age. SP = shotpoint.

Figure F4. Photomicrograph showing a representative section of the mudline smear slide taken in Hole U1458A under transmitted light. Image width is ~4 mm. Image shows the high amount of micrite with silt-sized spicules of sponges and tunicates. Benthic foraminifers are also present, although they are relatively rare.

Figure F5. SEM photomicrograph, mudline (356-U1458A-1H-1). A. Recent-Pleistocene placoliths and calcareous sponge spicules. B. Close-up (see inset in A) of *Gephyrocapsa oceanica* (top) and *Emiliania huxleyi* (center and right).

Figure F6. Color reflectance ratios (L^* , a^* , and b^* , see [Physical properties](#) in the Expedition 356 methods chapter [Gallagher et al., 2017] for definition), Special Task Multisensor Logger (STMSL) (red) and WRMSL (black) MS, Section Half Multisensor Logger (SHMSL) point magnetic susceptibility (MSP), and NGR results, Site U1458. cps = counts per second.

Figure F7. GRA bulk density (red = STMSL, black = WRMSL, open square = MAD), P -wave velocity, grain density, and porosity, Site U1458.