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 Site U1460. Bathymetric data are derived from the Geoscience Australia Australian bathymetry and topography grid, June 2009. The positions of multichannel seismic profiles are shown. Red circles = locations of preexisting industry wells.

Figure F3. Multichannel seismic profile across Site U1460. Top of green shading = inferred base of the Pliocene–Pleistocene. SP = shotpoint.

Figure F4. Lithostratigraphic summary, Site U1460. NGR: red = Hole U1460A, blue = Hole U1460B. Smear slide data for bioclast residuals (bioclast residual = bioclast total − [total foraminifer + total sponge spicules], sponge spicules, and dolomite are from Hole U1460A. Unit boundaries: red bars = hardgrounds, brown bars = mass-wasting deposits. See Figures **F6** and **F7** in the Expedition 356 methods chapter (Gallagher et al., 2017a) for lithology, boundary, and structure keys. cps = counts per second.

Figure F5. Smear slide summary, Hole U1460A. Black dots (left) = locations of smear slide samples. See Figure **F7** in the Expedition 356 methods chapter (Gallagher et al., 2017a) for lithology key.

Figure F6. Smear slide photomicrograph from Subunit Ia (23.11 m CSF-A; 356-U1460A-6F-2, 71 cm; plane-polarized light [PPL]) showing the dominant fossil assemblage (slightly altered shell fragments from mollusks) and foraminifers, which are common in the sand and coarse silt fraction. Calcite overgrowth is present on some grains.

Figure F7. Hardgrounds at the top of Subunits Ib (left: 44.94 m CSF-A) and Ic (right: 174.55 m CSF-A), Site U1460.

Figure F8. Smear slide photomicrograph from Subunit Ib (70.11 m CSF-A; 356-U1460A-16F-2, 71 cm; PPL) showing siliceous sponge spicules up to 200 µm in diameter. Planktonic and benthic foraminifers are the dominant sand- and coarse silt–sized components; there is a glauconitized foraminifer in the center of the image. The light brown fine fraction is a mixture of carbonate micrite and clay minerals.

Figure F9. Smear slide photomicrograph from a hardground, Subunit Ic (178.21 m CSF-A; 356-U1460B-39F-1, 71 cm; PPL). Left center shows a heavily altered grain with an enigmatic thick, fibrous bright green glauconitic overgrowth. Lower part shows a biserial benthic foraminifer. The fine fraction is grayish green, likely due to fine-grained glauconite in the fine silt- and clay-sized sediment.

Figure F10. Thin section photomicrograph of hardground at the top of Subunit Ic (174.53 m CSF-A; 356-U1460A-38F-3, 2–27 cm) showing skeletal packstone with recrystallized bioclasts (e.g., center left: planktonic foraminiferal tests; lower center: cross-section of an echinoderm spine) cemented by microcrystalline cement. Some foraminiferal tests are filled with greenish glauconite and opaque framboidal pyrite (e.g., foraminifer chambers on the left), and isopachous radial fibrous cement overgrowths can occur on interior and exterior surfaces of foraminifers. Left: PPL. Right: cross-polarized light (XPL) (pore space appears black).

Figure F11. Unit II mass-wasting deposits, Site U1460. A. Sharp, inclined contact separating unlithified homogeneous cream packstone from glauconite-rich packstone with sand (252.70–253.0 m CSF-A). A glauconite concretion lies above this contact. B. Light gray fine sand–sized packstone containing pebble- and gravel-sized lithic clasts (254.78–255.18 m CSF-A) that are angular and poorly sorted. A change from beige to light greenish gray marks the contact between the mass-wasting deposit and the surrounding matrix. C. Sharp, subhorizontal contact separating unlithified homogeneous brown packstone below from glauconite-rich sandy gray packstone with foraminifers above (252.80–253.10 m CSF-A). D. Mixed lithology with inclined, isoclinal, and recumbent folds with colors ranging between light greenish gray, light brown, and cream (259.44–259.73 m CSF-A). Mud clasts a few millimeters to centimeters in diameter are scattered throughout the section. E. Inclined layers and floating clasts identified by color differences characterize this deposit (263.60–263.80 m CSF-A).

Figure F12. Smear slide photomicrograph from a packstone interbedded with mass-wasting deposits in Unit II (286.28 m CSF-A; 356-U1460A-62F-2, 71 cm). Fine to medium crystalline euhedral dolomite is present in the silt-sized fraction. Fossils are less common and dominated by benthic foraminifers showing overgrowth of calcite and dolomite. The light greenish-gray fine fraction (fine silt and clay) is composed of clay minerals and carbonate micrite.

Figure F13. Thin section images of packstone interbedded with mass-wasting deposits within Unit II (279.40 m CSF-A; 356-U1460A-61F-1, 0–4 cm). Skeletal packstone with abundant planktonic and subordinant benthic foraminifers in a micritic matrix. Opaque iron sulfides (black) are abundant (left image). Left: PPL. Right: XPL (pore space appears black).

Figure F14. PPL and scanning electron microscope photomicrographs of calcareous nannofossils, Site U1460. A. *Pseudoemiliania lacunosa*. B. *Reticulofenestra asanoi*. C. *Gephyrocapsa omega*. D. *Discoaster brouweri*. E. *Discoaster surculus*. F. *Discoaster asymmetricus*. G. *Reticulofenestra pseudoumbilicus*. H. *Gephyrocapsa caribbeanica*. I. *Reticulofenestra asanoi*.

Figure F15. Planktonic foraminifer abundance, Site U1460. 0 = barren, 1 = very rare, 2 = rare, 3 = few, 4 = common, 5 = abundant (see **Biostratigraphy and micropaleontology** in the Expedition 356 methods chapter [Gallagher et al., 2017a] for definitions).

Figure F16. Dominant benthic foraminiferal species and assemblages in Hole U1460A with paleodepth based on planktonic/benthic ratio (%P) and bathymetric zone interpretation. Assemblage bathymetric zones were smoothed to generate a synthesis, resulting in slight differences from hole summary data. For raw bathymetric zonation see Table **T8**. This figure is available in an **oversized format**.

Figure F17. Benthic foraminifer diversity (number of species) and benthic percentage of total foraminifers, Site U1460.

Figure F18. Sponge spicules (356-U1460A-13F-CC).

Figure F19. Hydrocarbons in headspace gases, Site U1460.

Figure F20. Alkalinity, pH, and salinity, Site U1460.

Figure F21. Major constituent interstitial water geochemistry (bromide, calcium, chloride, magnesium, sulfate, potassium, sodium, phosphate, and ammonium), Site U1460.

Figure F22. Minor element interstitial water geochemistry (boron, barium, iron, lithium, strontium, and silicon), Site U1460.

Figure F23. Bulk sediment geochemistry (calcium carbonate, TOC, and TN), Site U1460.

Figure F24. AF demagnetization results from archive-half core sections at 6 depths, Hole U1460A. Orthogonal projections (Zijderveld diagram), equal area projections, and demagnetization behavior plots show NRM data measured after each demagnetization treatment. Equal area projection: solid squares = positive inclination, open squares = negative inclination, black =

chosen for PCA. Orthogonal projection (Zijderveld diagram): solid squares = declination data with x- and y-axes corresponding to four cardinal directions, open squares = inclination data with y-axis corresponding to up–down and x-axis corresponding to north–south. PCA: horizontal = declination (D), vertical = inclination (I), MAD = maximum angular deviation. (Continued on next page.)

Figure F24 (continued).

Figure F25. AF demagnetization results for discrete samples from 4 depths, Hole U1460A. Orthogonal projections (Zijderveld diagram), equal area projections, and demagnetization behavior plots show NRM data measured after each demagnetization treatment. Equal area projection: solid squares = positive inclination, open squares = negative inclination, black = chosen for PCA. Horizontal = declination (D), vertical = inclination (I), MAD = maximum angular deviation.

Figure F26. IRM acquisition curves for four discrete samples (356-U1460A-3F-1, 4F-3, 62F, and 28F).

Figure F27. CLG analysis of IRM curve of one discrete sample (356-U1460A-4F-3, 58–60 cm).

Figure F28. IRM acquisition curves for four discrete samples (356-U1460A-16F-2, 4F-3, 62F, and 28F) plotted with their respective backfield curves. Inset shows an enlarged view of the negative x-axis, showing the coercivity of remanence estimation for each sample.

Figure F29. Magnetostratigraphic data set, Hole U1460A. Magnetic inclination and intensity from archive-half AF demagnetization measurements after background and tray correction with polarity interval correlations (black = normal, white = reversed, gray = unidentified).

Figure F30. WRMSL MS, SHMSL MSP, and NGR results, Site U1460. Red lines correspond to 50-point moving averages of each MS data set.

Figure F31. The effect of changing the number of MSP measurements taken at each position on the SHMSL, Site U1460. With one measurement, MSP data were impossible to correlate or interpret. With three measurements, data quality increased dramatically, but measuring time per section was increased to ~7 min. A setting of two measurements can be considered a compromise between data quality and measuring time.

Figure F32. P-wave velocity (dots = WRMSL, red squares = discrete samples), penetrometer, and shear strength results, Site U1460.

Figure F33. Bulk density (dots = GRA, red squares = MAD), grain density, and porosity, Site U1460.

Figure F34. Color reflectance ratios (L*, a*, and b*, see **Physical properties** in the Expedition 356 methods chapter [Gallagher et al., 2017a] for definition), Site U1460.

Figure F35. A. In situ temperatures measured with the APCT-3, Hole U1460B. B. Thermal conductivity (k) measured on Hole U1460A (green) and U1460B (red) cores with standard deviation between individual measurements on the same sample indicated by the width of the symbol. C. Depth vs. thermal resistance (Ω). D. Thermal resistance vs. temperature (T) (Bullard plot).

Figure F36. Temperature as a function of time (blue lines) in the coring shoe using the APCT-3. In situ temperature record, Cores (A) 356-U1460B-12F and (B) 28F. Horizontal red lines = extrapolated ambient temperatures.

Figure F37. Suggested intervals for continuous sampling, Holes U1460A and U1460B. See Figure **F7** in the Expedition 356 methods chapter (Gallagher et al., 2017a) for lithology key. Green bars = preferred hole for sampling (Hole U1460A, Hole U1460B, or either hole), gray (marked d) = disturbed sediments associated with drilling at the hardground just shallower than 300 m CSF-A.

Figure F38. Hole U1460A summary showing core recovery, graphic lithology, age, and biostratigraphic data plotted against NGR and color reflectance b*. Age-depth model was produced from biostratigraphic datums (open circles = planktonic foraminifers, solid circles = calcareous nannofossils) (see **Biostratigraphy and micropaleontology**). Sedimentation rates are calculated separately for calcareous nannofossils (green) and planktonic foraminifers (blue) where the datums diverge. See Figure **F7** in the Expedition 356 methods chapter (Gallagher et al., 2017a) for lithology key. BF = benthic foraminifer, PF = planktonic foraminifer, NN = calcareous nannofossil. IS = inner shelf, MS = middle shelf, OS = outer shelf, UB = upper bathyal.

Figure F39. Hole U1460B summary showing core recovery, graphic lithology, age, and biostratigraphic data plotted against NGR and color reflectance b*. Age-depth model was produced from biostratigraphic datums (open circles = planktonic foraminifers, solid circles = calcareous nannofossils). Biostratigraphy was only performed on samples from Cores 65F–68F (outside gray shading) (see **Biostratigraphy and micropaleontology**). Sedimentation rates are calculated separately for calcareous nannofossils (green) and planktonic foraminifers (blue). See Figure **F7** in the Expedition 356 methods chapter (Gallagher et al., 2017a) for lithology key.

Figure F40. Site U1460 summary showing core recovery, lithostratigraphic units, age, magnetostratigraphy, biostratigraphy, and NGR for each hole. For Hole U1460B, there are only limited biostratigraphic (Cores 65F–68F) and no magnetostratigraphic analyses, so the age-depth model for both holes are presented as a synthesis, which results in an inconsistency in planktonic foraminiferal datums and associated sedimentation rates at ~280–300 m CSF-A. Note the different sedimentation rates for planktonic foraminiferal (blue) and calcareous nannofossil (green) datums. Open circles = depth for *D. altispira* in Holes U1460A (upper point at 279.36 m CSF-A) and U1460B (lower point at 298.92 m CSF-A) (see **Biostratigraphy and micropaleontology**). See Figure **F7** in the Expedition 356 methods chapter (Gallagher et al., 2017a) for lithology key. Benthic foraminiferal assemblages were smoothed to generate this synthesis, resulting in slight differences from data presented in hole summaries.