DEPARTMENT OF
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BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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A REVIEW OF THE GEOLOGY AND GEOPHYSICS OF THE AREA AROUND MELLISH, FREDERICK, KENN AND WRECK REEFS, AND CATO ISLAND

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FOREWORD

Reviews have been made of the geology and geophysics of most of Australia's other island territories, and other records in this series by the same author are -

Record No. 1976/12	Lord Howe Rise and Norfolk Ridge
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SUMMARY

Mellish Reef, Frederick Reef, Kenn Reef, Wreck Reef, and Cato Island lie along a northerly-trending line in the central Coral Sea. They are composed of coral and probably have volcanic basalt cores. The areas surrounding them have sediment covers of less than 500 m in thickness. Their prospectivity for petroleum or minerals is very poor.

INTRODUCTION

Mellish Reef, Frederick Reef, Kenn Reef, Wreck Reef (Bird Island), and Cato Island are five emergent seamounts which lie along a northerly-trending line east of Queensland (Fig. 1). Mellish Reef, the northernmost, lies about 1000 km east of the Queensland Coast; Cato Island, the southernmost, lies approximately 450 km offshore.

INVESTIGATIONS

Little geological or geophysical work has been carried out on the reefs and islands. Krause (1967) briefly mentioned the possible origin of these features. The general area surrounding the reefs was surveyed in 1971 during the BMR Continental Margin Survey. Data from the survey in this area are still being analysed (Terril, 1975a).

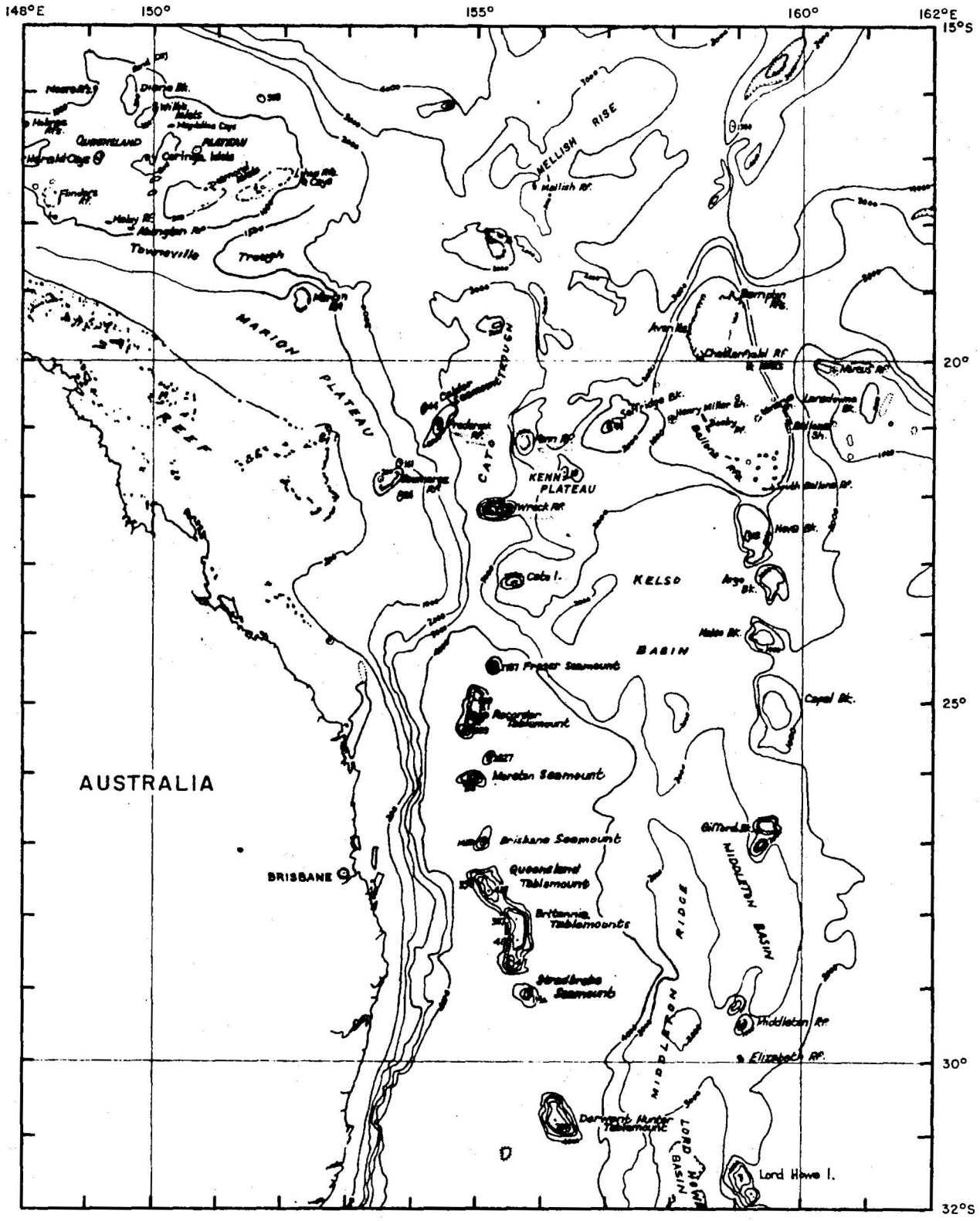
MORPHOLOGY

The reefs and islands rise steeply from depths of around 3000 metres. Kenn Reef, Wreck Reef, and Cato Island lie on the eastern margin of the Cato Trough and Frederick Island is situated on the western margin of the trough at the foot of the slope from the Marion Plateau. Mellish Reef lies north of the Cato Trough on the southwestern end of the northeasterly-trending Mellish Rise.

GEOLOGY AND GEOPHYSICS

Reflection seismic profiles indicate only small sedimentary thicknesses, generally less than 250 m, on the flanks of the reefs. Isolated basins within the Kenn Plateau and Mellish Rise contain slightly thicker sections. On the Kenn Plateau several small basins with over 1 km of sediments were observed on the BMR seismic sections and around the Mellish Rise up to 500 m of sediment occur (Terril, 1975b). A regional Eocene/Oligocene unconformity that was encountered during drilling on leg 21 of the Deep Sea Drilling Project (Burns, Andrews et al., 1973) can be correlated with a horizon observed in seismic profiles over the Cato Trough. This reflector, according to Terril (1975b), abuts unconformably against basement on the nearby Marion Plateau and the Kenn Plateau, and this has been interpreted to indicate emergence of these areas in the Eocene.

FIG. 1

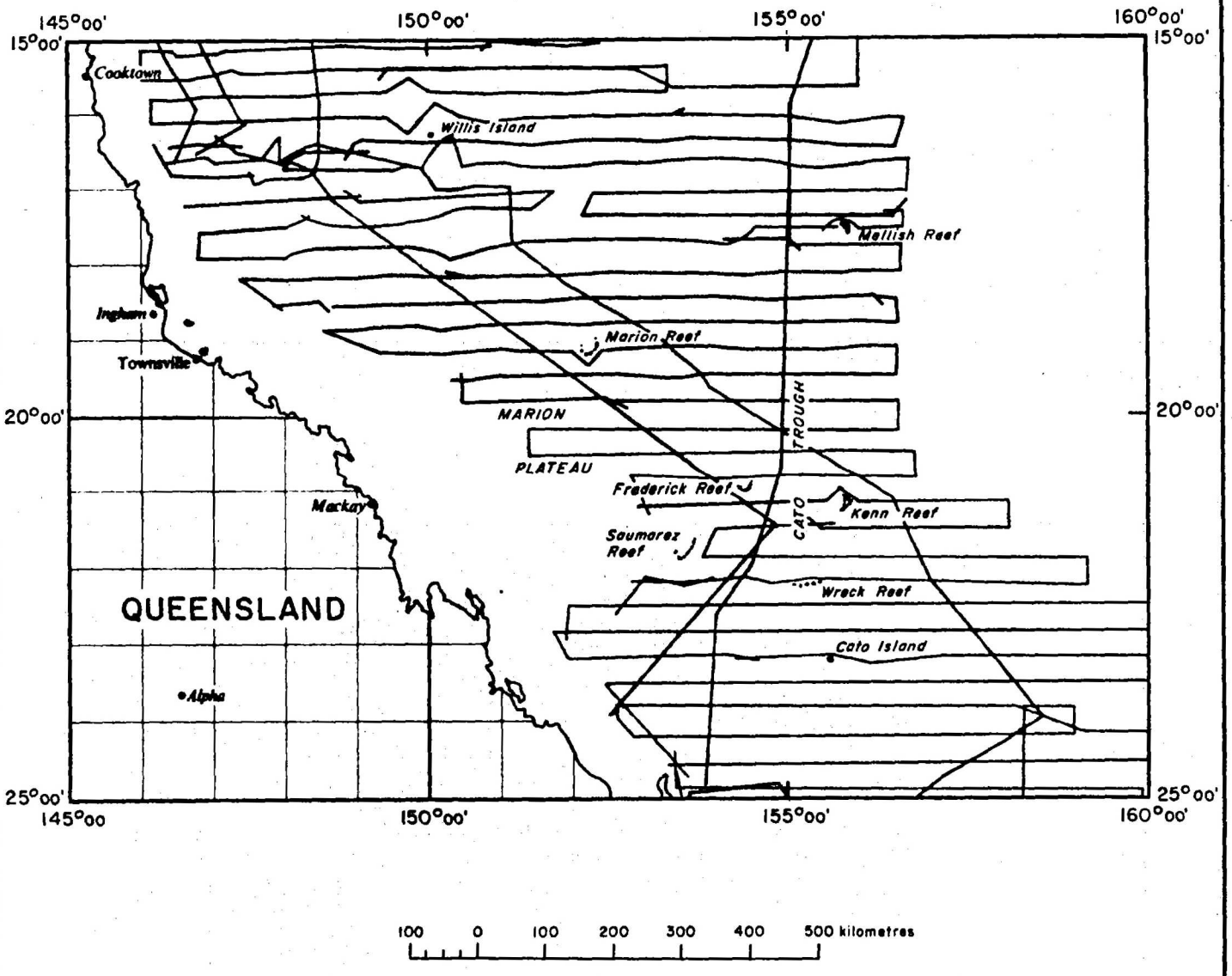


LOCALITY AND BATHYMETRY

(Detail of General Bathymetric Chart of the Oceans. Sheet A III,

Hydrographic Office R.A.N. Sydney, Australia, 1975)

FIG. 2



BMR MULTISENSOR TRAVERSE LINES OVER THE CATO TROUGH AREA

The Cato Trough contains over 1.5 km of sediment in its northern part, but the sediments become thinner towards the south. The crust underneath the Cato Trough has been interpreted to be oceanic because the trough is more than 3 km deep (Terril, 1975a). No gravity modelling and refraction have been done at this stage and without support from these this interpretation remains tenuous. Basement under the Mellish Rise appears to have been both faulted and intruded.

The reefs and islands are all composed of coral growth or coral-derived sands. Their general alignment with the guyots in the Tasman Sea and the presence of magnetic anomalies over them suggest a volcanic origin for the cores of the reefs. The guyots in the Tasman Sea are probably mid-Tertiary (Slater & Goodwin, 1973) and consists of alkaline olivine basalts. Their origin is still debated but they appear to have originated along linear fissures or, as Vogt & Conolly (1971) postulated, by the movement of the Australian plate over a fixed magma source in the mantle.

PROSPECTIVITY

None of the reefs or islands are prospective for minerals as they are made up of coral reefs and coral-derived calcareous debris. The submerged areas around the reefs are very poor prospects for petroleum because of the lack of sufficient sediments. No phosphate deposits of any significance have been found in the area of the reefs.

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