

1. INTRODUCTION

Fringing reefs in the Great Barrier Reef are generally attached to offshore islands, except in the northern region where they are attached to the mainland. The southernmost mainland fringing reefs grow in the Daintree-Mossman area, midway between Cooktown and Cairns (Fig.1). A well-developed series of mainland reefs near Cape Tribulation has a rich coral fauna, containing some 140 species within 50 genera (Veron, *pers. comm.*, **Appendix I**). These reefs occur on an exposed, tropical coastline, close to a major river mouth, and adjacent to a hinterland with heavy, perennial rainfall. Consequently the reefal carbonates are accumulating at Cape Tribulation in an area of high terrigenous influx.

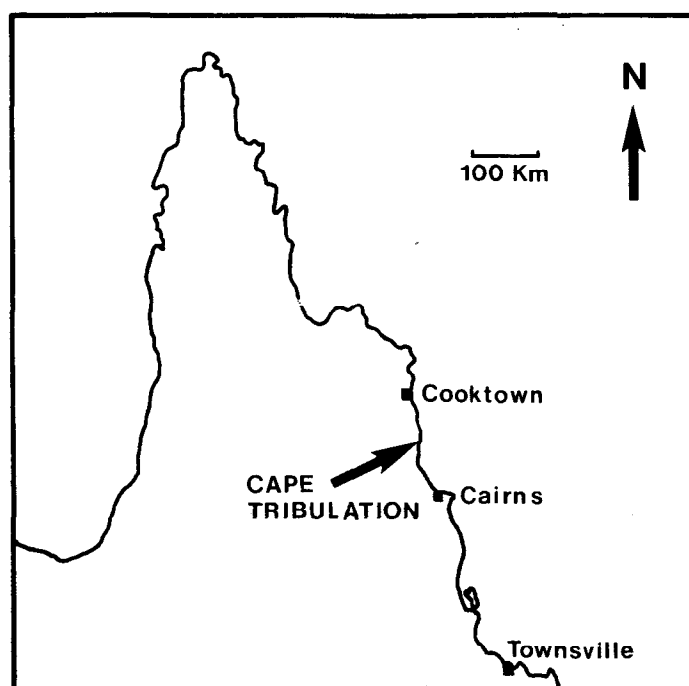


Figure 1. Location map of the Cape Tribulation area.

Coral growth is generally inhibited by high turbidity, whether from terrigenous influx or from resuspension of muddy bottom sediment. Turbidity affects corals in several ways (Bak, 1978):

- Suspended sediment depresses light levels, lowering symbiotic algal activity and hence calcification rates
- Sediment blankets cause coral suffocation
- Energy used in sediment removal saps polyp vitality
- Suspended sediment has unfavourable effects on plankton food sources
- Suspended and soft sediment cover prevents successful settlement of planulae
- Fresh water associated with riverine sediment influx can cause osmotic problems for coral polyps

The effects of siltation on corals and coral communities are reviewed in **Appendix II**. Individual corals may tolerate intermittent turbidity, but not chronic turbidity, particularly siltation. Increasing sedimentation rates cause progressive disruption and impoverishment of a healthy coral community, marked by :

- Decreased coral cover
- Decreased species richness
- Decreased coral growth rates
- Reduced recruitment and coral death
- Invasion by opportunistic species, and prolific growth of algae.

While there are no data published on the sedimentation rates on the Cape Tribulation reefs, field observations indicate the corals are growing in unusually muddy conditions and thus may require special management considerations. Further any abnormal increase in siltation (Anon,1985) could threaten their survival.

In fact, there are virtually no data on the turbidity tolerances of Australian corals, and most published work refers to Caribbean situations. Consequently we do not know whether the coral communities at Cape Tribulation are well within their tolerance limits, or whether only slight increases in turbidity will cause drastic changes to the communities.

This study documents the sedimentologic setting of the Cape Tribulation reefs, and the resulting stratigraphy, and considers the factors controlling development of this reef type.

2. METHODS

The study is based on both offshore and onshore data. A three-day cruise in May 1985 recovered 133 line km of shallow seismic (ORE 3.5Khz profiler) and sidescan sonar records, and nine vibracores (Fig.2). All depths noted on seismic profiles assume a sound velocity in seawater of 1500m/s. A four day land trip allowed mapping of the coastal region, recovery of surface sediment samples and the drilling of six auger holes using a trailer-mounted Jacro drilling rig hired from the Australian Institute of Marine Science. Auger samples were recovered by spiralling the bit into the substrate, and then withdrawing the drill string, so that the sample was not disturbed by travelling up the auger flights. We are confident sample depths are accurate to within 0.5m. All heights are referred to Australian Height Datum (AHD), which approximates mean sea level.

Textural analysis of sediments consisted of wet-sieving through 2mm and 63 micron sieves to separate gravel, sand and mud fractions. The gravel and sand fractions were examined under binocular microscope, and the mud fraction was split. One split was dissolved in 10% HCl to determine acid soluble (i.e. approximate carbonate) content, and the other used for X-ray diffraction analysis to determine clay mineralogy.

The clay fractions were suction-filtered onto Whatman GF/C glass fibre filters which were dried and glued to glass slides. X-ray diffraction analyses were done on a Rigaku D-Max 500 diffractometer using the following settings : Cu Ka target at 40Kv and 20ma with curved crystal graphite monochromator; scan at 0.5 degree/min over 45.0-1.3 degrees 2θ , count rate 100/s, time constant 5s, chart speed 5mm/min. Two runs were performed for each sample : air dried and after saturation for 48 hours with ethylene glycol.

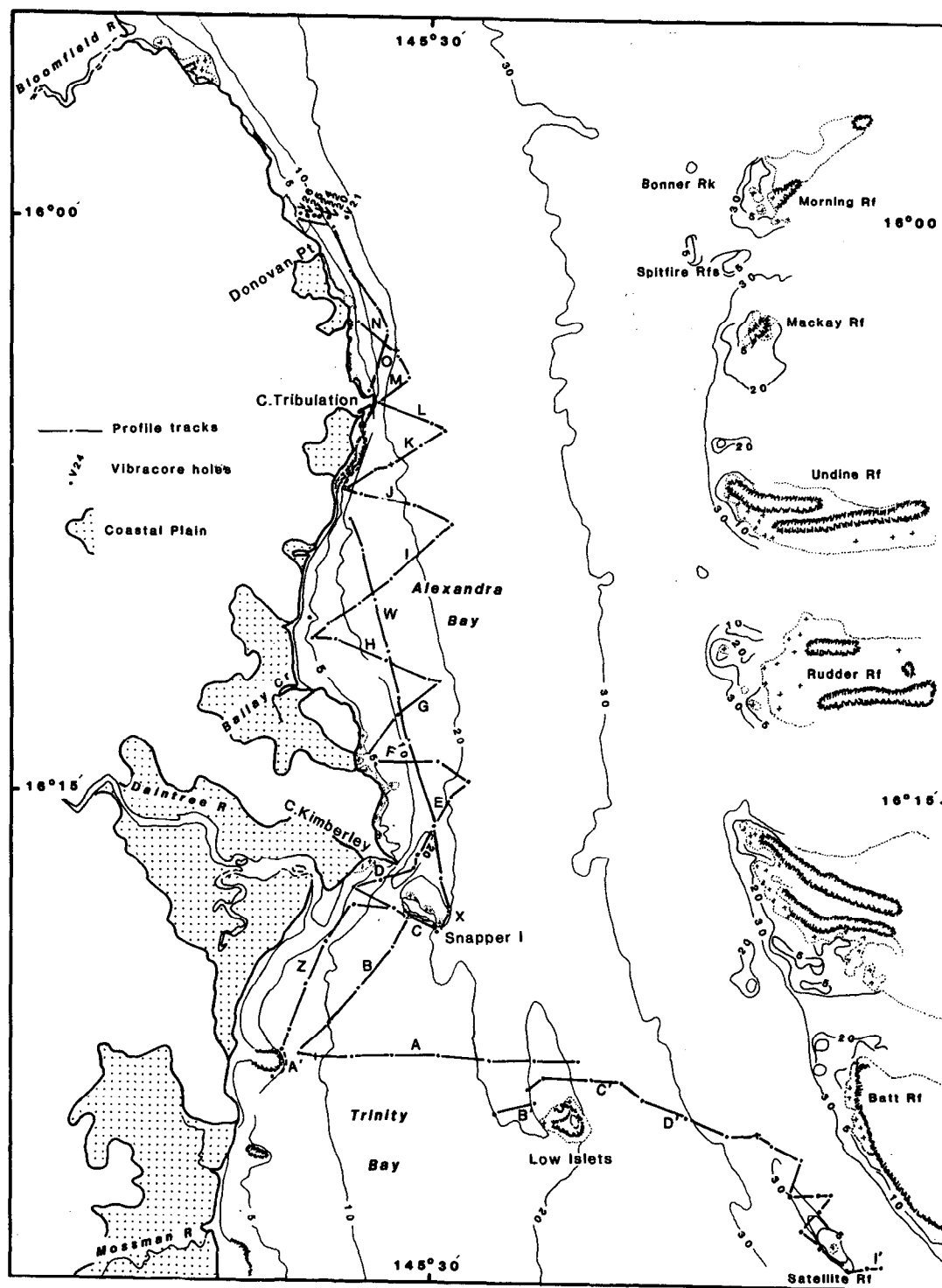


Figure 2. Map of Cape Tribulation area showing localities mentioned in text, bathymetry and profile tracks.

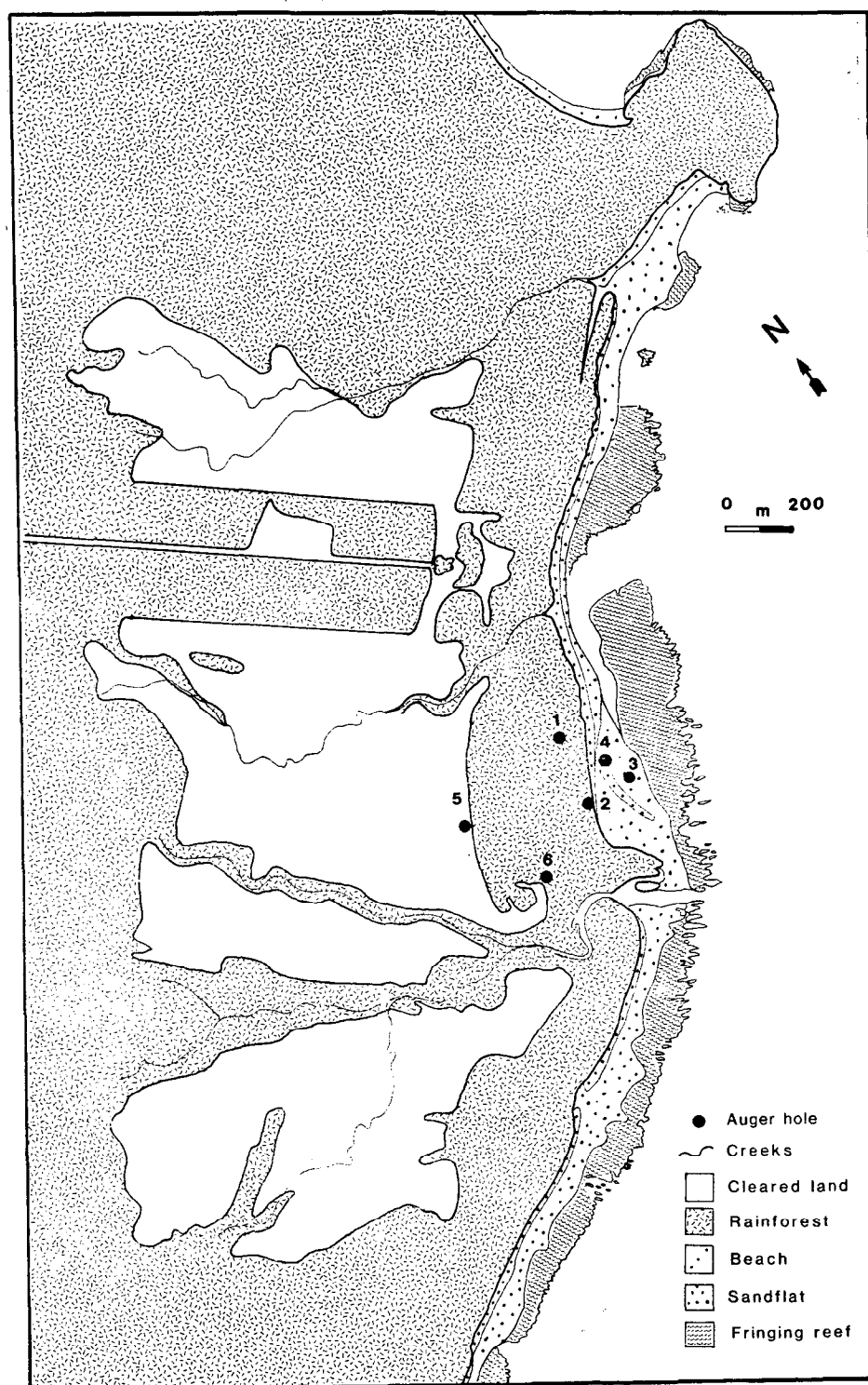


Figure 3. Map of coastal area south of Cape Tribulation, showing extent of mainland fringing reefs and location of onshore Jacro auger sites.