3. DESCRIPTION OF THE AREA

Fringing reefs occur intermittently along the mainland coast north of Cairns, but are best developed north of Mossman. This study concentrates on the area from the mouth of the Daintree River to Donovan Point (Figs.2,3) where the coastline consists of a series of rocky headlands separating sandy beaches. There are two main bays : Trinity Bay which is bordered by an extensive coastal plain constructed by the Daintree and Mossman Rivers, and further north, Alexandra Bay which has only a narrow coastal plain deposited by local creeks. Rocky headlands extend eastwards for 1 km from the trend of the coast, and represent high energy situations compared to the bays.

The coastal hinterland is composed of deformed Silurian-Devonian lithic sandstones intruded by Permian granites, and the coastal ranges rise up to 1374m in height (Bureau of Mineral Resources,1962). The land is covered with dense tropical rainforest which extends down to high tide level. Apart from cleared farmland on the Daintree floodplain, and minor cleared holdings inland of Alexandra Bay, the region is in a natural state.

The offshore area can be divided into an inner shelf (to 20m water depth), a flatter middle shelf (20-40m water depth) and a mid-shelf reef tract some 15km offshore. There are two small bedrock islands in the southern part of the area, Snapper Island and the Low Islets.

The climate is wet tropical. The following data are taken from the summary by the Bureau of Meteorology (1971). Average annual rainfall exceeds 3750 mm at Cape Tribulation, and decreases to the north and south, being only 2000 mm at Port Douglas. Average annual rainfall of 2000-3750 mm is typical for the Daintree River catchment, and rainfall is well distributed throughout the year. Average annual evaporation is of the order of 1250 mm. The mean annual temperature is 24° C, the average maximum 28° C and the average minimum 21° C.

Regional oceanographic conditions are described by Pickard and others (1977). Prevailing winds along the coast are northeasterly to southeasterly. "*In autumn the frequency and constancy of the southeasterlies gradually increase until by May; they blow on more than 80% of days with an average speed of 12 to 15 knots*" (Bureau of Meteorology, 1971, p.57). Despite a relatively continuous tract of midshelf reefs, the prevailing SE weather blows obliquely up the inner-mid shelf, causing the common formation of waves 1-2m high. Consequently the coastline is subjected to relatively high-energy conditions.

Fringing Reefs

Mainland fringing reefs in the area occur in three different situations : steep, rocky shores, distributary mouth bars and beach shoals (Fig.3). The reefs along rocky shores are narrow and of limited extent. However, reefs developed on coastal sediment bodies such as distributary mouth bars and beaches are up to 300m wide and extend for 1-3km along the shoreline. Typically these shorelines comprise an inner sandy beach and an outer reefal area (Fig.4). The inner beach is a swash zone backed by a beach ridge supporting thick rainforest. To seaward is a sandflat, commonly with mobile intertidal bars up to 0.5m high which extend several tens of metres along the shore. Scattered dead coral microatolls and heads are common on the sandflat, either exposed or shallowly buried.

At Myall Beach the fringing reef lies seaward of the sandflat and consists of three parts: 1) a dead, emergent reef top, 2) a living reef crest and upper slope, and 3) a sediment covered lower slope which passes onto the inner shelf (Fig.4). The emergent reef forms an irregular, raised, wave resistant pavement at approximately -0.5 to -1.0m (AHD), incised by gutters up to 1m deep. This subfossil reef consists of branching and head corals heavily encrusted and cemented together by coralline

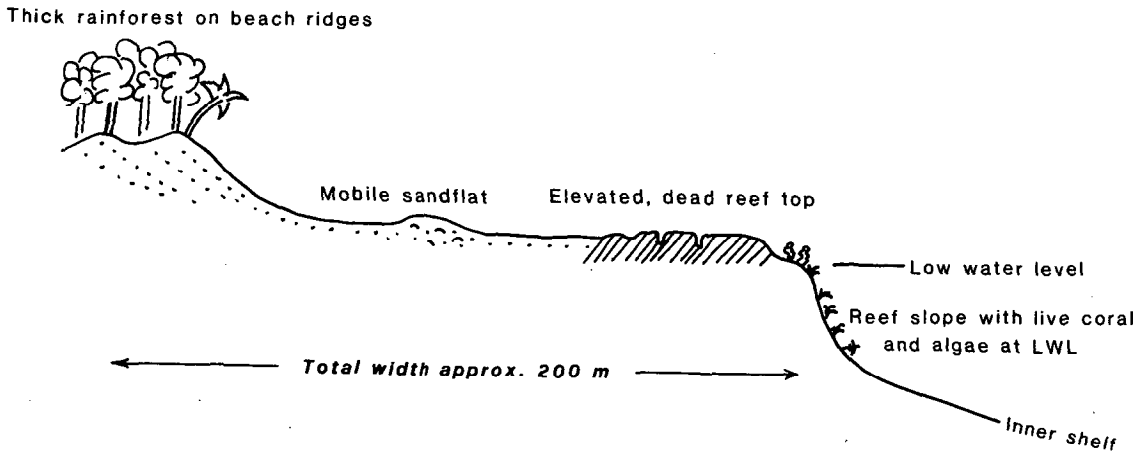

Figure 4. *Schematic profile across a typical fringing reef.*

algae, barnacles and oysters. Living corals only occur seaward and below the dead reef top, along a steep, indented outer margin approximately 3m high, with deep gutters between patch reefs and individual coral columns. The upper limit of live coral growth has been levelled at ca -1.40m (AHD). SCUBA observations (N.M.Mockett, *pers. comm.*) show the lower slope, seaward of this cliff, consists of sandy substrate with scattered coral heads up to 0.5m high, coral rubble, seagrasses and taller columns close to the reef margin. Coral growth extends about 50m seaward of the reef edge, down to ca 6m below AHD at Cape Tribulation, and up to ca 10m elsewhere along the coast. This depth range is shallow compared to the mid-shelf reefs only 15km offshore, where coral growth extends down to 30-40m (J.E.N. Veron, *pers.comm.*). Sediments of the lower slope become increasingly muddy seawards where they merge with those of the inner shelf.

The waters over the reef and seaward of the reef margin are commonly very brown due to suspended muddy sediment. Even following the prevailing light to moderate winds, SCUBA divers report difficulty seeing more than 10m underwater in depths less than 10m. These observations, and the shallow depth limit of coral growth (ca 6m), indicate that corals are growing in perennially turbid water on both the reef flat and reef slope.

Inner Shelf

The inner shelf can be considered in two parts (Fig.5). South of Noah Head, there is a wide sandy platform with its outer edge at 8-10m water depth. The platform widens southward and, except where it is incised by the Penguin channel, merges with the shallow fill of Trinity Bay. North of Noah Head the inner shelf slope is steeper, the sand platform is narrow and forms the toe of the fringing reefs. Side-scan sonar surveys show the substrate is even, without obvious bedforms and with promontories of the irregular reef edge jutting seawards. Seaward of the inner shelf lies the mid-shelf, a relatively flat plain surfaced by relict sediments.

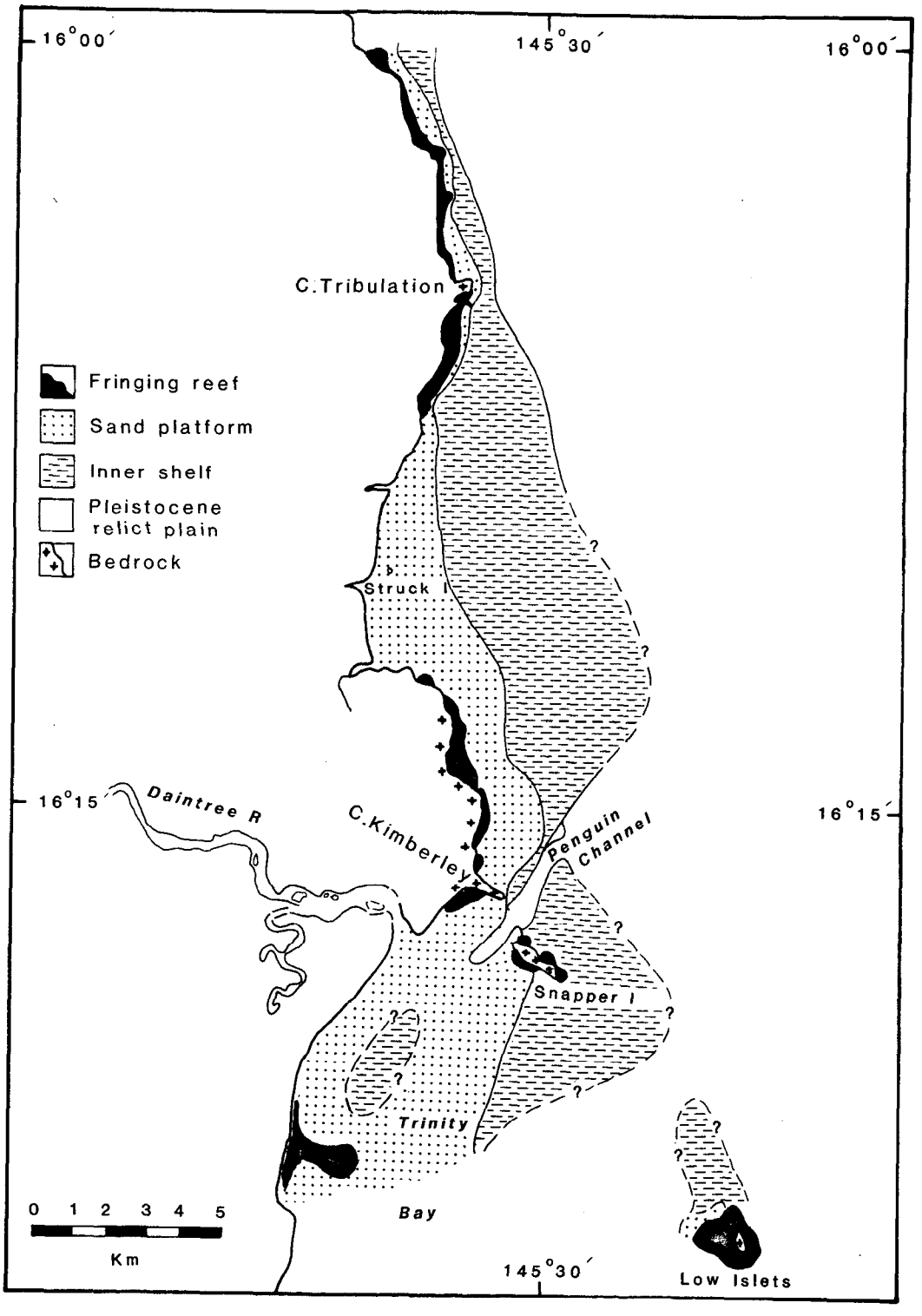

Figure 5. *Offshore physiography and sedimentary facies.*