

DIMENSIONS AND MORPHOLOGY

The published dimensions of Green Island reef [Fig.2.1] are as variable as the cay dimensions outlined in the previous chapter. Kuchler (1978) determined its longest axis to be 4.6km and its shortest 2.8km, while the Beach Protection Authority (1989) described the reef as approximately 4km along its longest axis and 2km along its shortest axis.

Following the system of Maxwell (1968), Green Island reef was classified by Fisk *et al.* (1988) as a ring platform reef. Both the Green Island Management Committee (1980) and Australian Littoral Society (1982) described the reef as a 1200ha lagoonal platform reef. The former did not cite a reference for this information, while the latter gave its source as the Great Barrier Reef Gazetteer (a database prepared by the Geography Department of James Cook University for the Great Barrier Reef Marine Park Authority). However, it is currently listed in the Great Barrier Reef Gazetteer (and in Australian Littoral Society, 1990) as a planar reef with an area of 7.1km² (only 710ha). This variation between editions of the Gazetteer may reflect a change in definition of the reef boundary (e.g. the exclusion of the eastern shoal area), or it may be indicative of mathematical or typographical errors.

The Green Island Management Committee (1980) gives the cay's position as the extreme north-west corner of a reef flat composed almost entirely of dead coral, with a shallow and indistinct lagoon lying to the north of the cay. Fisk *et al.* (1988) describe the north-west corner as a shallow shelf area with large patch reefs and sand. The northern reef slope is described by Fisk *et al.* (1988) as a gently sloping shelf 200-400m wide with scattered coral patches.

There are some discrepancies in the literature regarding locations of some of the morphological elements of the Green Island reef flat. Steers (1929) describes a belt of 'negro-heads' - 'masses of coral cast up onto the reef flats by waves' - on the flat just to the north-west of the cay. However, the Green Island Management Committee (1980) refers to 'nigger heads' on the reef crest to the south-west of the cay, while Nash (1985) notes the presence of a boulder zone there. Unless there has been a substantial redistribution of these coral boulders since 1928, it would appear Steers was slightly disorientated.

I initially suspected a typographical error, but Steers later refers to 'the north-western sides, from which direction heavy weather often comes'. Personal observations indicate the more recent reports are certainly descriptive of the current location of the boulder zone.

In another contradiction, Nash (1985) identifies the reef slope as most steep on the south-western reef face, with ill-defined edges on all other faces shelving-off gradually over some distance, while Bradbury *et al.* (1987) describe the reef slope as 'steep to the north-west but more gradual around the remainder of the perimeter'. This conflict in description may have come about through differing interpretations of the 'shallow (less than 4m deep) shelf extending from the boulder zone to the edge of the drop-off' described by Nash (1985) for the south-western edge. Alternatively, the description by Bradbury *et al.* (1987) may be the result of another typographical error or another example of muddled orientation (see Chapter 4). Fisk *et al.* (1988) note the presence along the southern reef slope of a 'shallow, narrow shelf, 3-4m deep and up to 50m across, which then grades more steeply to a 10-12m deep sandy floor'.

Kuchler (1978) gave a detailed description of the reef's physiography. From the most recent aerial photographs available, it appears this description is still valid. Zonation was most clear on the eastern and southern windward sides of the reef where the reef edge, algal rim and reef flat were readily discernible. In these regions, the reef edge had a spur-and-groove structure and a steep reef slope, while the junction between the algal rim and the coral zone of the reef flat tended to be obscured by a zone of coral rubble. The windward flat was clearly divisible into coral and sand zones [Fig.2.1], with the latter more extensive than on the leeward flat. Similarly, the zone of coral rubble to windward did not extend to leeward. The reef flat was generally at or near tidal datum, except to the north-west where there was a downslope dip (Kuchler, 1978).

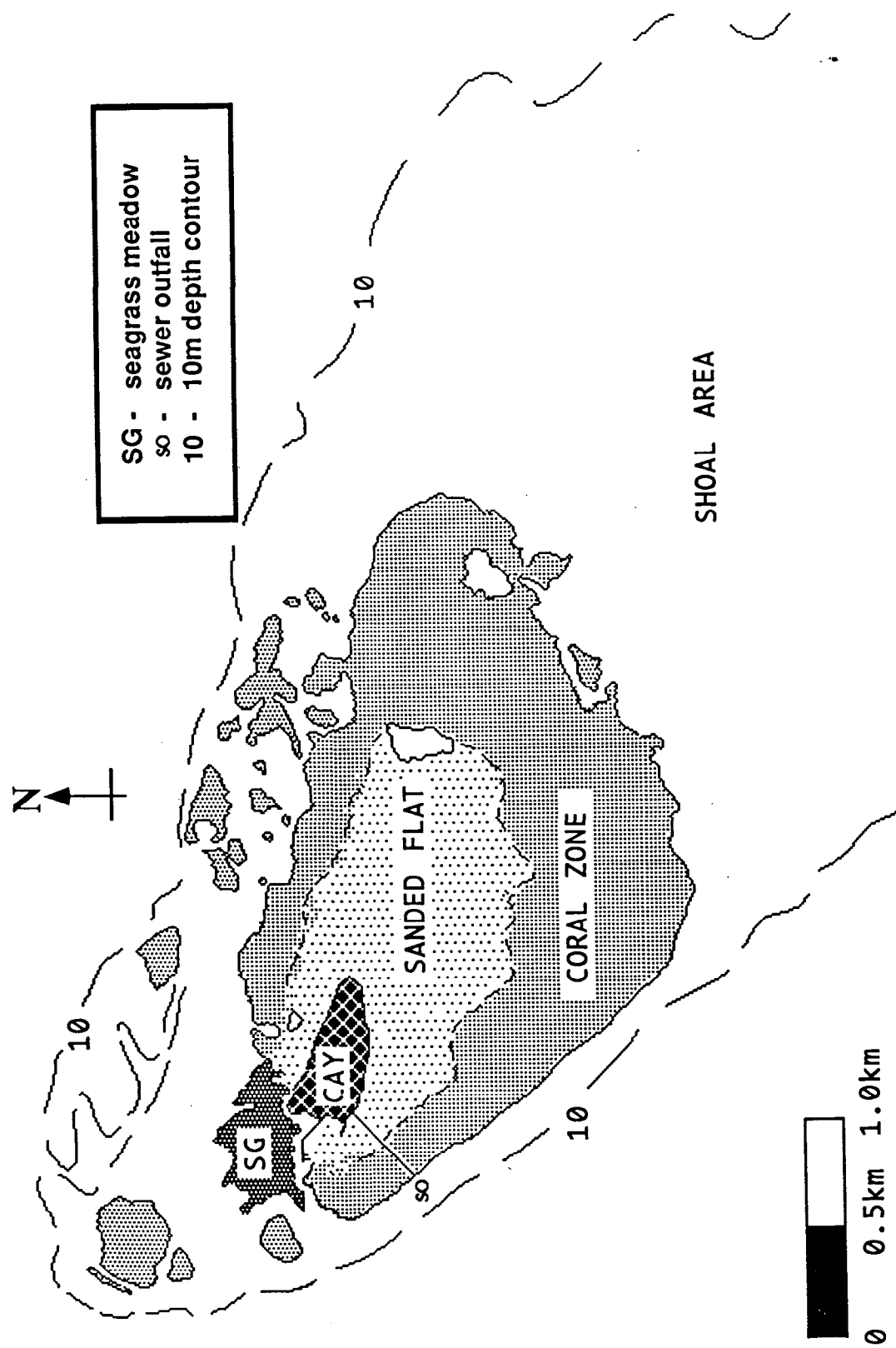


Figure 2.1 Green Island reef, showing general morphological features

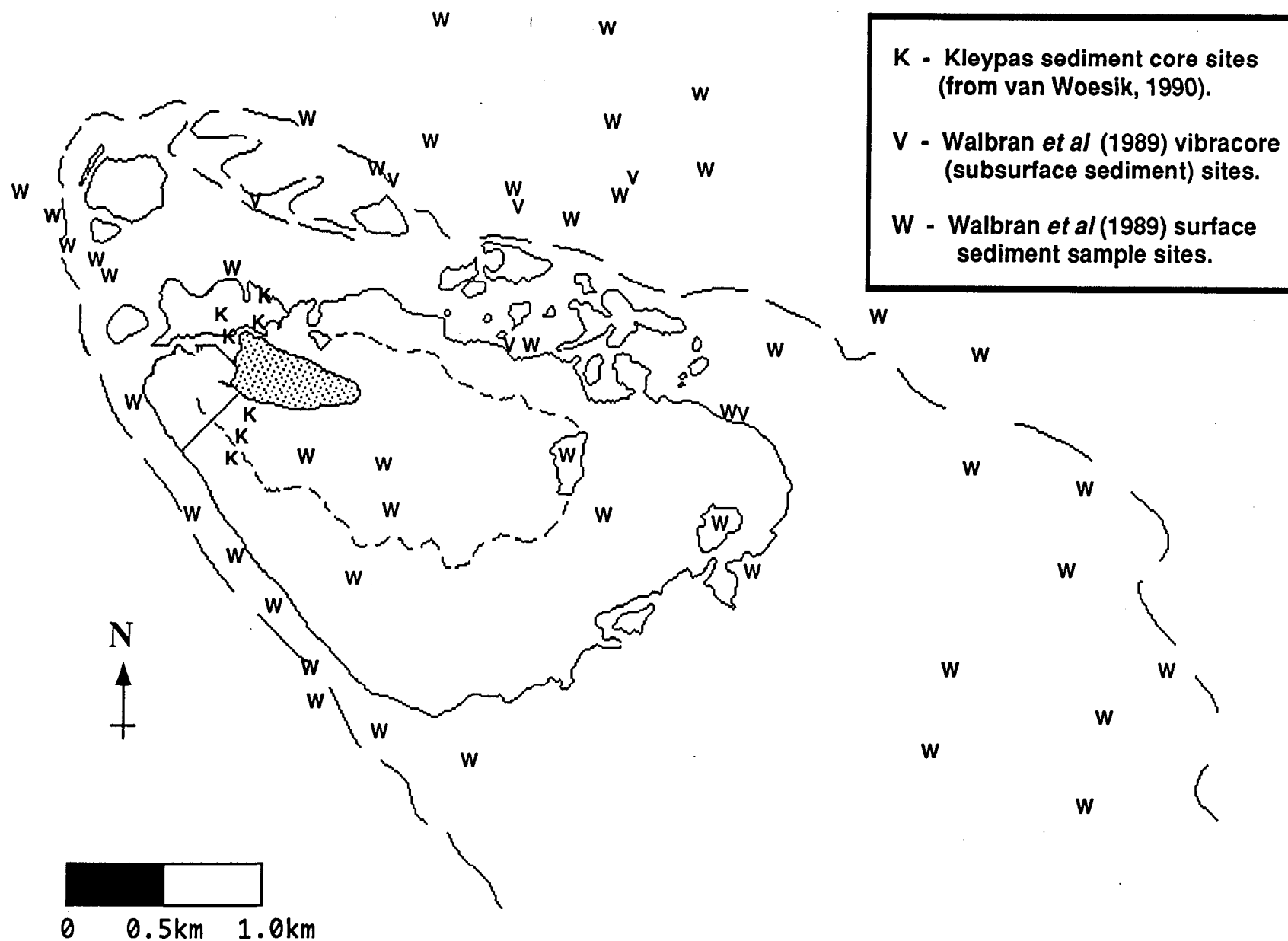


Figure 2.2 Location of sediment sample sites

Fisk *et al.* (1988) note the presence of a double reef front along the south-east face of the reef leading to an extensive shoal area approximately 3km long and 3km wide. The shoal area is described by Fisk *et al.* (1988) as consisting of large numbers of unconsolidated rubble mounds, with the area surrounded by a ring of more consolidated patches associated with large *Porites* colonies. It is not clear whether this area was included in the published estimates of reef area previously mentioned.

SEDIMENTS

Grab samples of surface sediments at 46 sites around Green Island reef and cores of the sub-surface sediments at six sites off the northern edge of the reef flat were taken in January 1986 by Walbran *et al.* (1989) [Fig.2.2]. These were analysed only for *A. planci* fragments and no further analyses of the samples or cores were anticipated (Walbran, pers. comm.).

As part of the Green Island Reef Multidisciplinary Study (Baxter, 1988), J. Kleypas of James Cook University used push cores to examine the sediments within the seagrass beds adjacent to the cay [Fig.2.2]. The sediments were found to be thoroughly mixed by the abundant burrowing shrimp *Callinassa*, and no sedimentary structure or horizons were evident. Samples taken to the south-west of the cay had coarser sediments with less silt than those from the north-west. Cores from the northernmost transect had a noticeably stronger hydrogen sulphide odour than the others (Baxter, 1988).

RESOURCE PROTECTION

In 1932, the Cairns Town Council granted a licence for the removal of coral from within a one mile radius of low water mark around Green Island (Green Island Management Committee, 1980; Australian Littoral Society, 1990). The coral was used as a source of lime for the canfields of the adjacent mainland (Jones, 1976). The foreshore and reef within the same area were protected by the Queensland Fish and Oyster Acts in 1937, although the licence to remove coral was not revoked until 1945 (Green Island Management Committee, 1980; Australian Littoral Society, 1990).

An area of 3000ha, extending from high water mark to 1.6km beyond the outer edge of Green Island reef, was declared a Marine National Park by the Queensland Government in February 1974 (Green Island Management Committee, 1980; Claringbould *et al.*, 1984). In 1975, management of the Park was assumed by the Queensland Fisheries Service (Green Island Management Committee, 1980; Cornelius, 1982).

Provisions applying to the Park included:

- no removal of or interference with any material, whether living or dead.
- line fishing prohibited in the jetty area and the area known as 'Patches' [area B5: Fig.3.1].
- spearfishing prohibited.
- no deposition of rubbish.

(Cornelius, 1982)

Despite these regulations, spearfishing and use by shell collectors was still heavy in 1978 (Australian Littoral Society, 1990).

The Cairns Section of the Great Barrier Reef Marine Park was declared in 1981, with Green Island reef zoned in November 1983, within the Cairns Zoning Plan, as a Marine National Park 'B' with a Marine National Park Buffer Zone extending 500m out from the reef edge. The reef edge of Green Island reef is considered at present to be the shallowest edge of the reef flat and therefore does not extend to the eastern shoal area (comment on draft of this review).

Prohibited within the Marine National Park 'B' are:

- fishing (defined as the taking of fish, echinoderms, crustaceans or molluscs).
- collecting (the taking of any animal, plant or marine product declared in the regulations made under the Great Barrier Reef Marine Park Act).

The Marine National Park 'B' and Marine National Park Buffer Zone may only be entered for:

- recreational activities other than fishing or collecting (aside from trolling for pelagic species within the Buffer Zone, which is permitted).
- navigation and operation of vessels with gross tonnage less than 500 tonnes.
- construction, conduct and servicing of navigational aids.
- operation of aircraft at altitudes above 500ft or within an aircraft landing area.
- the removal of wrecked, stranded, sunk or abandoned vessels (ships, boats, rafts, pontoons or any other thing capable of carrying persons or goods through or on water, but not including hovercraft).

Permits from the Great Barrier Reef Marine Park Authority are required within the Marine National Park 'B' and Marine National Park Buffer Zone for:

- research.
- construction and conduct of underwater observatories, mooring facilities for boats and aircraft landing areas.
- provision of tourist or educational facilities and programs.
- navigation and operation of tourist cruise ships (gross tonnage exceeding 500 tonnes).
- operation of aircraft on the water surface and at an altitude of less than 500ft above the water, other than within an aircraft landing area.
- use of hovercraft.
- harbour works, beach protection works or other works.
- discharge of wastes from fixed structures.

(Great Barrier Reef Marine Park Authority, 1983)

In 1979, the Marine National Park declared around Green Island reef by the Queensland Government in 1974 was amalgamated into the Cairns Marine Park, also declared by the Queensland Government. Zones adopted for the Cairns Marine Park were complementary to the zones of the Cairns Section of the Great Barrier Reef Marine Park and therefore carried similar conditions. (Department of Environment and Conservation, 1989).

The Zoning Plan for the Cairns Section of the Great Barrier Reef Marine Park is currently under review, with proposed zoning of Green Island as Marine National Park (Great Barrier Reef Marine Park Authority, 1989). As such, it is anticipated that zoning conditions for Green Island reef will not change significantly (D. Briggs, G.B.R.M.P.A., pers. comm.).