## DISCUSSION

The Daintree River flood event of March 1996 was probably the cause of the almost total coral mortality first noticed on the shallow reef slope of the entire south face of Snapper Island in October 1996. The strongly depth limited mortality, with an abrupt lower limit at just over three metres depth, is typical of flood plume affects on reef corals (van Woesik et al. 1996). The coral had been dead for some time with much of it covered in algal turf suggesting that the March 1996 estimate of time of death is reasonable.

Although the 1996–97 wet season had been underway for about a month at the time the quantitative survey was made in January 1997 there had been no flood events recorded in the Daintree River during that period (A.M. Ayling personal observations). There were also no flood events between the time of the first surveys in January1995 and the March 1996 deluge. On several casual visits during late 1995 and early 1996 the reef appeared healthy around both sides of Snapper Island. The evidence strongly suggests that the coral mortality recorded between January 1995 and January 1997 was all due to the severe flood that occurred in March 1996.

The freshwater of the flood plume had killed all corals on the outer reef flat, all the acroporids down to over three metres depth, and at least 70% of other coral groups down to this depth. There had been some acroporid death down to almost four metres depth but few colonies of other groups had been affected below three metres. As has been found previously (van Woesik et al. 1996) it seemed that acroporids were the species of corals most susceptible to extended freshwater inundation. Poritids, and some faviids such as *Goniastrea* were the most resistant of the corals in this location. Small patches of some of the massive poritid colonies had survived even in shallow water, and a few colonies were largely unaffected. Soft coral cover at all locations was similar during both surveys. Although the presence of bare calcareous bases indicated that some large *Sinularia* colonies had been killed in shallow water on the reef edge, soft corals were apparently much more resistant to the freshwater than the hard corals.

Although the flood plume completely surrounded Snapper Island, coral mortality on the north face was only minor, with only some staghorn acroporid colonies in shallow water affected. The pool of relatively clear water on the northern lee side of the island, evident in the aerial photos of the plume, apparently protected the corals on this face from the effects of the flood. The work of Wolanski et al. (1996) suggests that when a current flows past a reef or island there will be an upwelling of deeper water on the lee side. In this case it seems that there was an upwelling of almost normal salinity seawater from beneath the freshwater plume on the lee side of Snapper Island. This was sufficient, over the several days that the flood lasted to maintain the health of the majority of corals on the north face of the island.

The extent of influence of the flood plume is not known, but there was no coral mortality on the reef around Black Rocks five kilometres north of Snapper Island. This is the closest reef formation to Snapper Island and suggests that the freshwater influence from this flood event only affected Snapper Island.

Many large coral colonies were present at all the sites visited around Snapper Island during the 1995 survey (Ayling and Ayling 1995). The south face in particular was a very attractive reef and supported a variety of large coral colonies, including *Porites* massive up to three metres in diameter, *Acropora* staghorn, bottlebrush, corymbose plate and tabulate species, *Goniopora, Pachyseris rugosa,* many faviids, merulinids and pectiniids. Particularly noteworthy were a colony of *Acropora nobilis* about 30 x 20 metres, many tabulate *Acropora* over three metres in diameter, and a *Goniopora* colony 15 x 10 metres. This suggests that it has been 50–100 years since the last flood event of similar severity affected this reef. It is possible that flood plumes

of similar magnitude have occurred over that period but have flowed to the south and not affected Snapper Island. However, the normal wind direction during heavy rain episodes is south-east, as lots of moisture off the sea is necessary to fuel the rainfall, and in such conditions the plume would flow to the north as was observed in this case.

The shallow reef slope on the south side of Snapper Island has been completely destroyed by this flood episode. This was the most diverse, and one of the most attractive, of the 17 fringing reefs we surveyed in 1995 (Ayling and Ayling 1995). Rather than being entirely acroporid dominated other, more slow-growing groups such as poritids, were important on this reef. Full recovery of the reef to the pre-flood condition will probably take the best part of a century, although it can be expected that fast-growing acroporids will reach high cover values within 15–20 years. Given the widespread belief that fringing reefs close to disturbed catchments are stressed and less able to cope with disturbance, it will be instructive to follow the recovery of this reef.