INTRODUCTION

This study was undertaken to assess the water quality between the Barron River / Trinity Inlet and Green Island. This transect was chosen for a combination of reasons. Green Island has a long history of anthropogenic influence through tourism and has been subjected to two outbreaks of the crown of thorns starfish, *Acanthaster planci* within the last thirty years (Baxter, 1990). Therefore it has been a centre of attention for research efforts in a number of fields for a considerable time now.

More recently, interest has also developed in terrestrial inputs to the Great Barrier Reef Lagoon via river run-off which has the potential to carry with it residues of agricultural fertilizers containing nitrogen and phosphorus. As corals are sensitive to nutrient levels (Kinsey and Davies, 1979; Smith *et al.*,1981), the aim of this investigation was to obtain baseline water quality data for nutrients along the transect as well as monitoring any periodic impacts from the river discharge and point source impacts from the sewage outfall at Green Island.

Sampling

Duration

Sampling was conducted over a twenty-month period from September 1988 to April 1990 during which thirteen sampling trips were undertaken on the following dates: 16/9/88, 26/11/88, 4/3/89, 1/6/89, 4/6/89, 10/7/89, 10/8/89, 15/9/89, 30/10/89, 20/11/89, 16/12/89, 12/2/90, 6/4/90.

Sampling was initially carried out with the aid of Queensland National Parks and Wildlife Service aboard one of their boats. However, problems developed regarding the time required for the sampling and accommodating this within scheduled QNPWS field operations. From July 1989, sampling was conducted aboard a privately chartered vessel, the "M.V. Tropic Seas". This led to a change in the sampling site for the Barron River estuary as detailed below.

Procedures

Water samples were collected using a 2 dm^3 Van Dorn water sampler. For the nutrient analyses, sampled water was dispensed directly from the sampler into sterile plastic "Whirl-pak" bags which were immediately stored on dry ice in an esky. These samples were generally frozen within thirty minutes of collection. They remained stored in this manner during transportation back to Townsville, where upon arrival they were placed in a freezer at -20°C until analyzed.

Samples for Chlorophyll *a* and Suspended Solids analyses were collected in 500 cm^3 screw-top plastic bottles and filtered upon returning to land. The filters were frozen until analyzed. Samples for Total Organic Carbon analyses (conducted at the Australian Institute of Marine Science) were transferred to teflon lined screw-cap glass storage tubes containing 100 l of A.R. concentrated HCl. These were kept refrigerated until analyzed. Samples for Mercury (Hg) analyses were stored in 50 cm^3 screw-top plastic bottles containing 2.5 cm^3 of A.R. concentrated nitric acid and 0.5 cm^3 of 5% w/v A.R. potassium dichromate solution as preservatives.

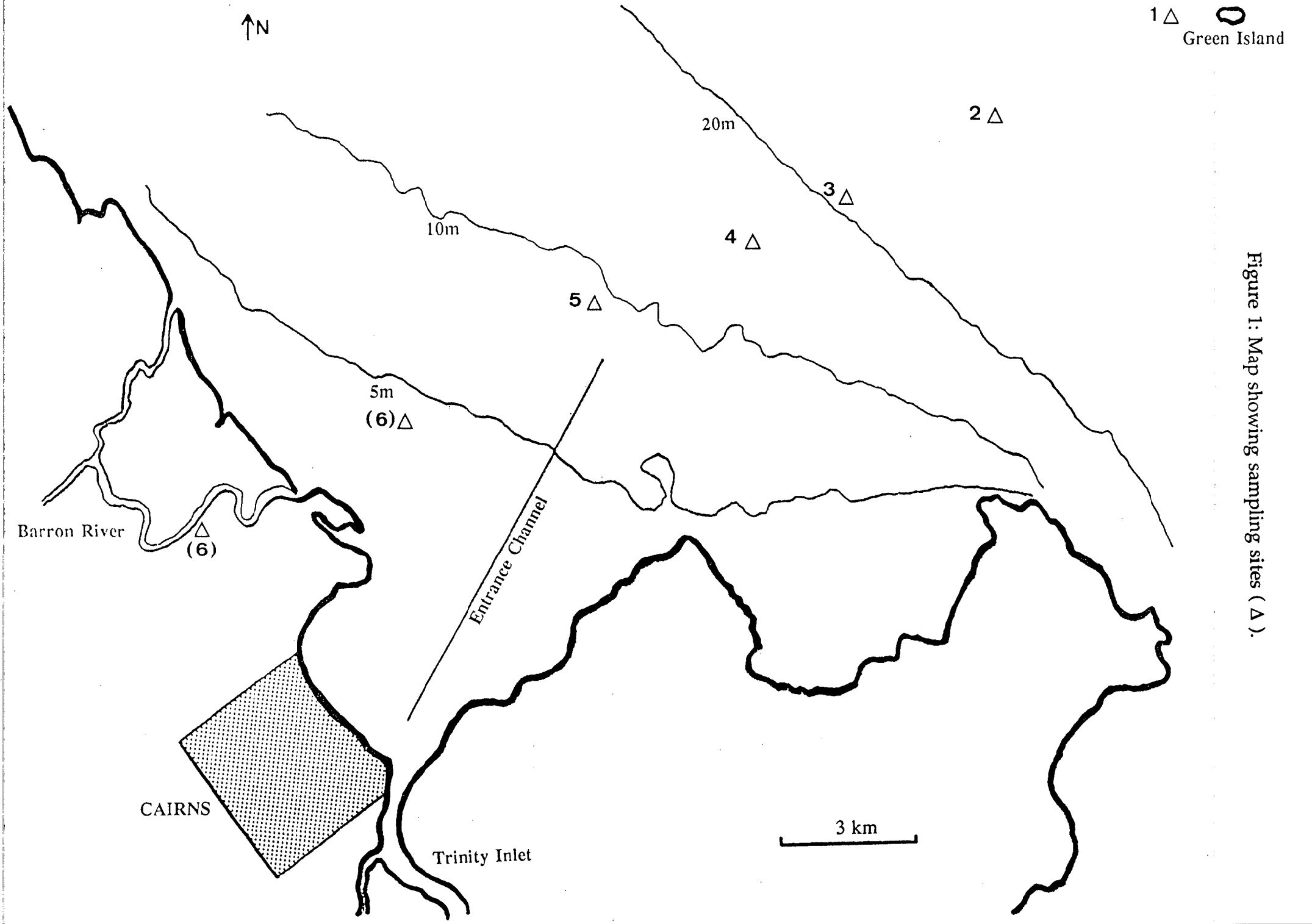

Figure 1: Map showing sampling sites (Δ).

Figure 2: Sampling Site .1. at Green Island.

Variables Measured

Nutrients:

- Nitrate (NO_3)
- Nitrite (NO_2)
- Ammonium (NH_4)
- Phosphate (PO_4)
- Total Phosphorus (TP)
- Total Organic Carbon (TOC)

Biological Parameters:

- Chlorophyll *a* (Chl *a*)

Physico-Chemical Parameters:

- Salinity
- Temperature
- Dissolved Oxygen (DO)
- Secchi Disc Visibility
- Suspended Solids (SS)

Metals:

- Mercury (Hg)

Analytical Methods

In the field, Secchi Disc visibility readings were taken, and from September 1989 dissolved oxygen and temperature measurements were recorded using a TPS oxygen meter. Salinity was determined via conductance measurements made with a Metrohm Conductometer in the laboratory. For Suspended Solids, 1 dm^3 of sample was filtered through a pre-weighed Whatman GF/C filter paper. These were later dried and then re-weighed.

With the exception of TOC, all the nutrient analyses were conducted manually using standard wet chemical methods (Grasshoff, 1983).