3. SAMPLING PROCEDURES

Water samples (2-10) were collected with Niskin bottles through the full depth of the water column or upper 300 metres. The bottles were acid cleaned (1% v/v HCl) prior to the cruise and stored with leftover sample water in them between stations. CTD (conductivity/temperature/ depth) casts were made at eleven of the first thirteen stations with a Neil Brown SCTD. During the period, the performance of the instrument deteriorated. Salinity and temperature profiles from the CTD were calibrated against reversing thermometers and discrete salinity samples. Difficulties with the CTD primarily lay with the pressure (depth) sensor. CTD-derived depth estimates for salinity and temperature data at shelf stations are likely within one to two metres of the true depth. Given the weak vertical gradients observed, this should not be a problem for interpretation. At the two deeper stations (SHL02, SHL13), salinity and temperature data from below 25 metres is not used. After station SHL13, in situ temperatures were measured with reversing thermometers. Surface and near-bottom salinity samples were collected at most stations. Salinities were determined ashore with a Plessy 6230N salinometer calibrated against IAPSO standard seawater.

Subsurface irradiance profiles were measured at twenty-four (24) stations with a Biospherical QSP-200 underwater scalar (4 π) irradiance sensor. Surface irradiance was measured concurrently using a QSR-240 reference sensor (figures 3-5). The underwater sensor was lowered in one to five meter steps, with surface and subsurface irradiance being measured at each sampling depth. The instrument readings were digitised electronically and captured on a microcomputer. To the extent possible, readings were not taken while clouds obscured the sun.

Water column zooplankton stocks were sampled with duplicate bottom-to-surface vertical net tows at most stations. The net (0.5 m diameter, 73 µm mesh) was equipped with a Rigosha flow meter to estimate the volume of water filtered. Zooplankton samples collected in individual net tows were split once with a Folsom splitter. One split was filtered onto a disk of 73 µm nylon mesh and frozen in a petrie dish. The other split was preserved with formalin for archiving and later examination if warranted.

Following water sampling at most shelf stations, triplicate sediment samples were collected with a van Veen grab. The grab collected to a depth of ca. 10 cm over an area of 0.1 m^2.

Shortly after collection, subsamples of seawater for dissolved nutrient analyses were drawn from each Niskin bottle into an acid-soaked plastic syringe. The water was then immediately filtered through a Minisart N cellulose acetate filter cartridge (0.45 µm pore diameter) directly into acid-washed, sample-rinsed screw-capped polyethylene test tubes and plastic scintillation vials (in duplicate for each tube type). One cartridge could usually be used for an entire station without significant clogging. Approximately 10 ml of each seawater subsample was pre-filtered through the cartridge before filling the sample containers. The filled sample tubes were then immediately frozen for analysis ashore. Care was taken not to over-fill sample tubes/vials, or to tip tubes/vials while frozen or freezing.

Duplicate 100 ml subsamples were filtered onto 25 mm diameter Whatman GF/F filters for chlorophyll determinations (Parsons et al. 1984). At primary production stations, additional 100 ml subsamples were filtered onto polycarbonate membrane filters (Nuclepore 25 mm diameter - 2 µm and 10 µm pore diameter) to assess the contribution of pico- (< 2 µm fraction) and nano- (2-10 µm) phytoplankton to community biomass and productivity. After filtration, the filters were folded and deep-frozen in aluminium foil packets.

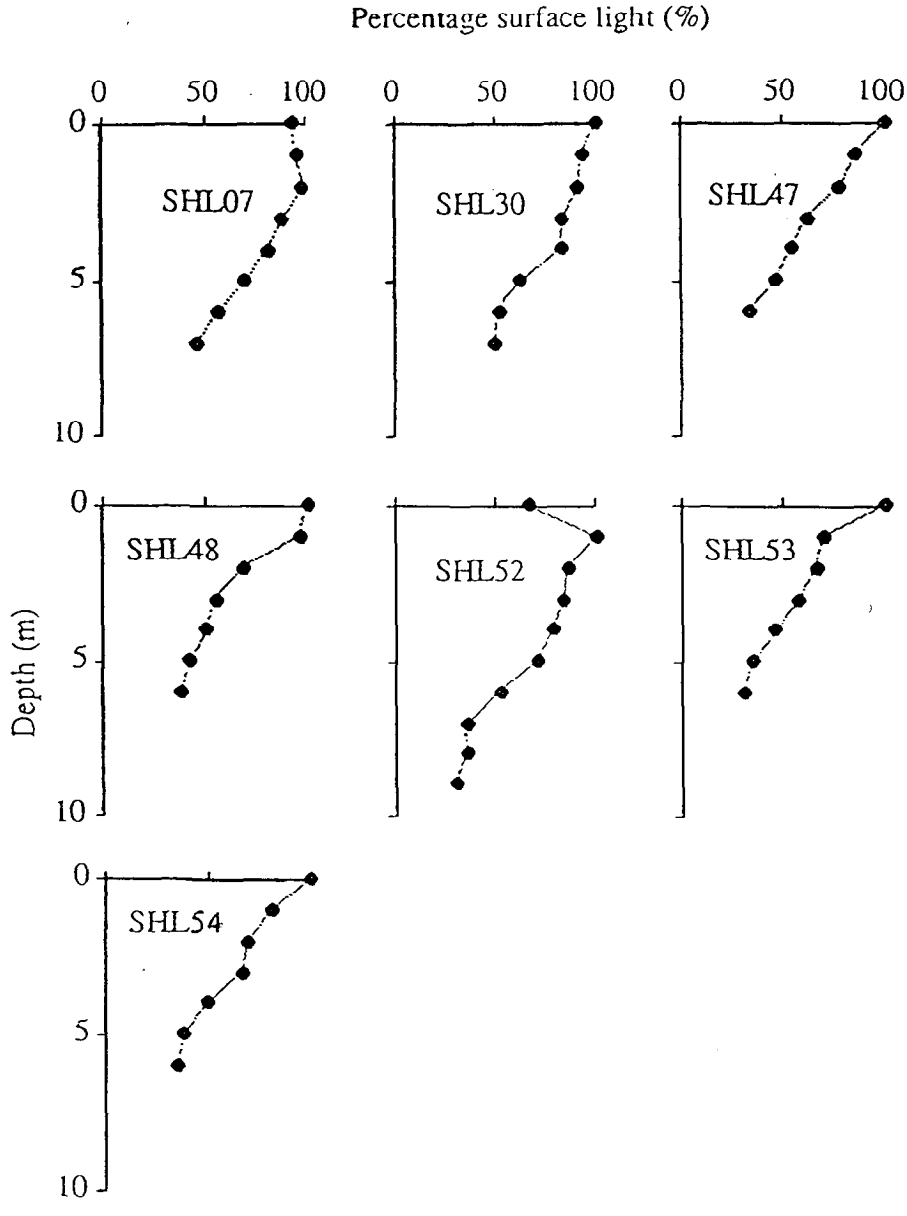

Figure 3. Light profiles for near-shore stations, < 10 m depth

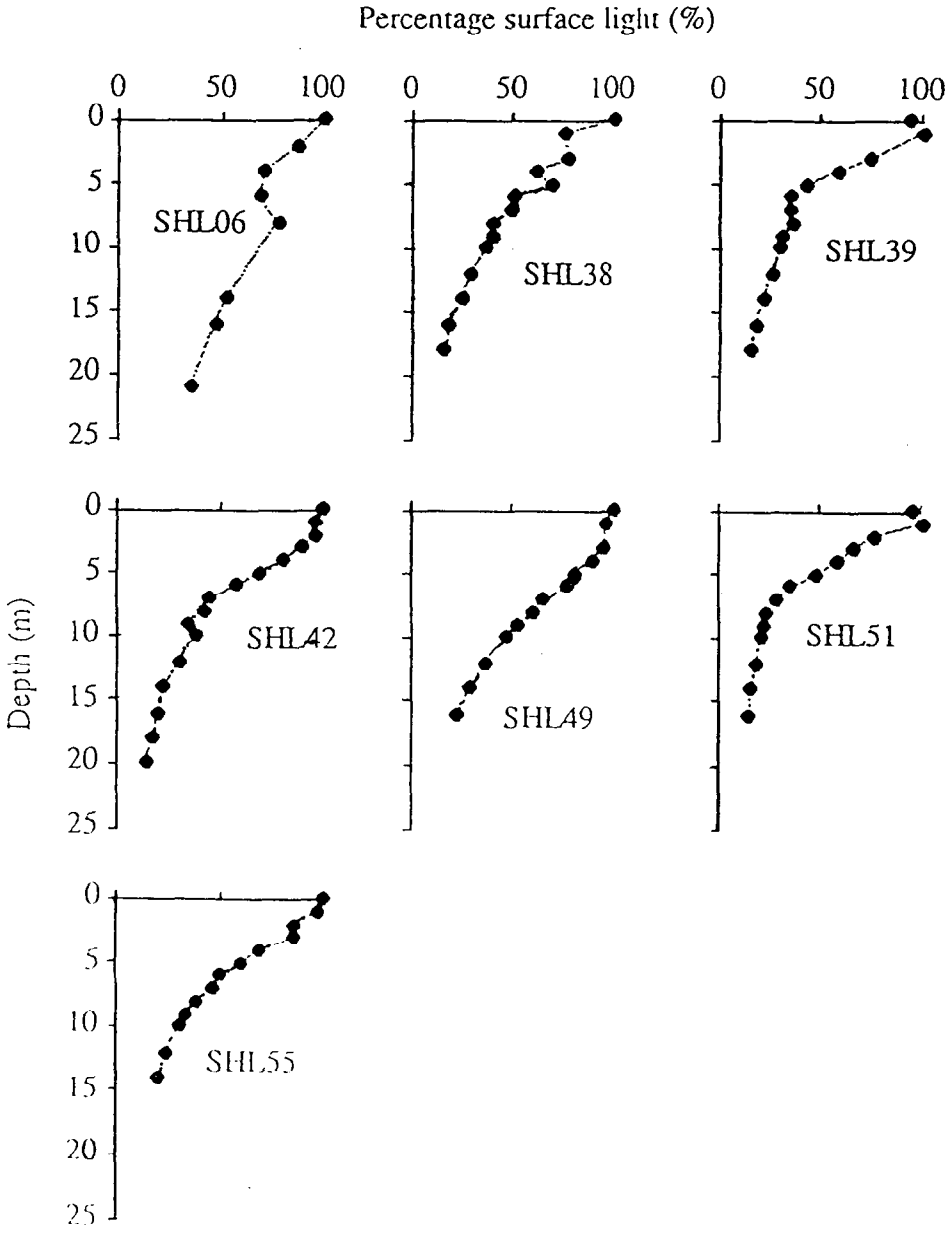

Figure 4. Light profiles for mid-shelf stations, 10-25 m depth

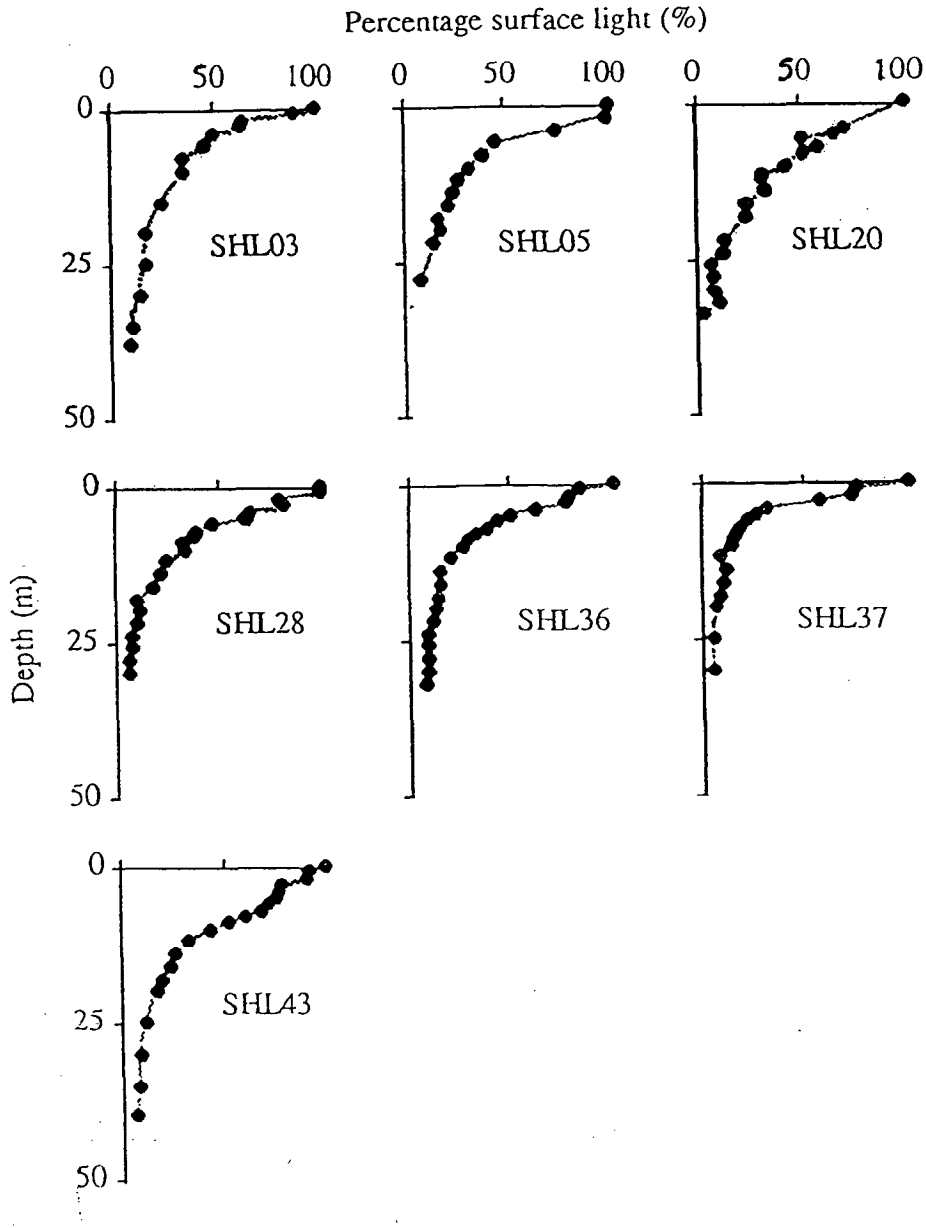

Figure 5. Light profiles for mid-shelf stations, 25-50 m depth

Duplicate 1 litre subsamples were filtered onto pre-weighed Nuclepore filters (47 mm diameter, 0.4 μm pore diameter) for suspended solids determinations. Absorption of water within the filters and filtered material was minimal. Filters were not rinsed with distilled water to avoid osmotic shock to cells caught on the filters. The filters were stored in pre-combusted glass scintillation vials at room temperature.

Duplicate 250 ml subsamples were filtered onto pre-combusted (400°C overnight) Whatman GF/F filters (25 mm diameter - nominal operational pore diameter 0.4 μm) for particulate nitrogen (PON) and particulate phosphorus (POP) determinations. The filters were folded, wrapped in pre-combusted foil and deep-frozen.

Duplicate 10 ml subsamples of bulk sediment were taken from one grab at each station for determination of sediment nitrogen and phosphorus. Care was taken in the subsampling to collect 'representative' subsamples of the dominant size fractions of sediment, avoiding obvious macrofauna, living macroalgae and chunks of coral rubble. The subsamples were placed in pre-combusted glass scintillation vials and frozen. Duplicated 200 ml subsamples of sediment were taken for grain-size analysis. The grain size subsamples were fixed with 10 ml of formalin.