ABSTRACT

The phytoplankton community and water quality were examined in the Kingston Harbour. Monthly sampling was conducted at 24 stations throughout the Harbour between December, 1993 and February 1995. The objectives were, to characterize the phytoplankton community and examine the forcing functions determining spatial distribution, to determine the present status of the water quality in the Harbour and to compare both with previous studies done in the Harbour. A number of phytoplankton indices along with various chemical and physical parameters were employed to achieve the aforementioned objectives.

The Harbour was found to be more eutrophic than was described 20 years earlier with higher phytoplankton biomass, maximum value of 17.7 mg m^{-3}, 4 times greater than Grahame (1977), and abundance, maximum value of $110x10^6$ cells l^{-1}. Higher labile Nitrate and Phosphate concentrations were seen as well, maximum values of 14.5 µMol. and 4.05 µMol. respectively. Water quality was consistently the worst in the Upper Basin, along the northern shore of the Harbour, between Gordon Cay and Newport West, and just outside Hunts Bay, the effect of which decreased with increasing distance from these areas. Surface waters in the Harbour were always well oxygenated. However, Oxygen deficiency was a regular feature in deeper waters in the Upper Basin and less frequently in the Inner Harbour. Waters in

the Outer Harbour were always well oxygenated at all depths. Light extinction coefficients were higher in the Upper Basin and Inner Harbour than the Outer harbour while light penetration was consistently poorest at Hunts Bay outflow.

The distribution and size of the phytoplankton community in the Harbour appears to be determined by physical factors such as rainfall, nutrient loading and less frequently by light availability (which was influenced by algal and non-algal turbidity). Zooplankton grazing appears to exercise some control over phytoplankton numbers in the Harbour, the effect which was evident only in the nanoplankton size fraction. The mixing dynamics between the Outer Harbour and oceanic waters influences the phytoplankton community in the Outer Harbour. High background labile nutrient levels, particularly Nitrate + Nitrite, over the sampling period resulted in consistently high phytoplankton biomass in the Upper Basin and Inner Harbour.

The surface water layers in the Upper Basin and the Inner Harbour were defined by the phytoplankton community as one zone and the Outer Harbour defined as a separate zone. This varies from Grahame (1977) who had indicated that there were two main phytoplankton communities (not including Hunts Bay) which were the Upper Basin community and the Inner and Outer Harbour community. This also

differs from the zoning by Wade (1976) and Goodbody (1970) which suggested the three zones, Upper Basin, Inner Harbour and Outer Harbour based on the topography of the particular areas. Phytoplankton in deeper layers described the three zones.