

## Abstract

Eight stations in Discovery Bay, on the north coast of Jamaica (Lat. 18° 28'00N; Long. 077° 24'30W), were sampled each representing different influences on the seagrass bed in the bay (almost exclusively *Thalassia testudinum*) in order to identify areas of stress within the bay. 'Stress' was here defined as those factors having potential deleterious effects on the system, and was used interchangeably with pollution. The varying influences affecting the studied *Thalassia testudinum* sites include (1) proximity to the bay entrance; (2) proximity to a bauxite shipping facility; (3) proximity to fishing beaches; (4) proximity to Discovery Bay Marine Laboratory and (5) high nutrient waters from underground springs, mangroves and perennial springs. Biological parameters of *Thalassia testudinum* such as standing crop, leaf production, blade turnover rate and time, shoot density, leaf area, total biomass and biomass of individual parts, as well as sea urchin density were measured. Light intensity, water column nutrient concentrations, as well as, temperature, salinity, dissolved oxygen, redox potential and pH were the physicochemical parameters measured. Stressed areas in the bay were identified as indicated by the growth and distribution of *Thalassia* at the various sites. The most disturbed site was found about 15m from northwestern coastline of the bay, where nutrient levels were the highest as this site was influenced by fresh water from an underground spring. *Halimeda* spp. had outcompeted *Thalassia* at this site and only one individual sea urchin (*Tripneustes venticosus*) was found here after eighteen (18) months of sampling. Significantly lower ( $p < 0.05$ ) *Thalassia*

shoot densities and biomass were measured here, and there appeared to be increased leaf extension in response to elevated nutrients. The thin layer of loose sediment found at this site may also explain the very low below-ground biomass found here. A second *Thalassia* bed under stressed condition is located within 90m from the bauxite shipping facility. Low shoot densities characterize this bed, as well as low standing crop, leaf production rates and biomass, and shorter leaves. No direct cause and effect relationship could be established for this station. A third site situated between the marine lab and Columbus Park, a tourist attraction, was exposed to high nutrient waters, and high turbidity, perhaps due to outflow from the popular sewage disposal system along the coast, 'soak-away' pits. Apart from the sign of an upcoming algal population, the *Thalassia* bed at this site appeared not to have responded negatively to these effects just yet, however, it is a bed under potential threat. In contrast, *Thalassia* beds adjacent to the mangrove forest appeared to be the most lush. *Thalassia testudinum* shoot density, standing crop and leaf production appeared to be the most sensitive parameters, among those measured, to changes in the environment in Discovery Bay with total biomass being important in identifying those beds that have undergone long-term stress conditions. In comparison to other locations in the Caribbean where *Thalassia testudinum* growth parameters were measured, along with associated eutrophication status, Discovery Bay was classified as being mesotrophic in nature. In many cases, nutrient additions in Discovery Bay are from both natural processes and anthropogenic origins.