Abstract

Bioluminescent bays and lagoons are unique natural environments and popular tourist attractions. However, the bioluminescence in many of these water bodies has declined, principally due to anthropogenic activities. In the Caribbean, the bioluminescence in these bays and lagoons is mostly produced by the dinoflagellate Pyrodinium bahamense var. bahamense. Laguna Grande is one of the three year-round bioluminescent water bodies in Puerto Rico that are known to remain but P. bahamense var. bahamense density fluctuations have not been studied. In this study we describe water quality parameters and density fluctuations of the most common dinoflagellates in Laguna Grande, P. bahamense var. bahamense and Ceratium furca, over a three-year period. For this, three sampling stations were established in Laguna Grande from which water samples were collected in triplicate and analyzed for temperature, phosphates, nitrates, salinity, water transparency, fluorescence, and dinoflagellate densities, at the water surface and at 2m depth, from May 2003 to May 2006. The results showed a density fluctuation pattern for P. bahamense var. bahamense, where higher densities were observed mainly from April to September, and lower densities from October to February. Density fluctuations of C. furca were more erratic and a repetitive pattern was not observed. Densities of P. bahamense var. bahamense ranged from 0.48 to 90 978 cells/L and densities of C. furca ranged from 0 to 11 200 cells/L. The mean population density throughout the sampling period was significantly higher in P. bahamense var. bahamense (mean=18 958.5 cells/L) than in C. furca (mean=2 601.9 cells/L). Population densities of P. bahamense var. bahamense were negatively correlated with C. furca densities during the first year of sampling; however, they were positively correlated during the third year. Non-significant differences between surface and 2m depth samples were observed for temperature, phosphates, nitrates, salinity, fluorescence, and densities of P. bahamense var. bahamense and C. furca, suggesting a vertically mixed water column. Water transparency was positively correlated with salinity and negatively correlated with fluorescence. Fluorescence was negatively correlated with salinity. The mean population densities of P. bahamense var. bahamense and C. furca observed in this study were within the range of previous reports in other bioluminescent water bodies in Puerto Rico and Florida, USA. In order to conserve the continuous P. bahamense var. bahamense populations in Laguna Grande, as well as its bioluminescence, it is recommended to maintain the existing water flow levels in the 1.5km long inlet/outlet channel; to maintain unpolluted water quality parameters within the bay, the hydrographical basin and adjacent waters, and to preserve mangrove communities within the basin and adjacent areas. Results of this study may

Keywords
Pyrodinium bahamense, Ceratium furca, Laguna Grande, Puerto Rico, bioluminescence, bioluminescent lagoons.