

Seagrass Disturbances in Great Lameshur Bay, St. John

By Lisa Muehlstein

Seagrass habitats are extremely important components of coastal ecosystems; they stabilize bottom sediments and improve water clarity, exhibit high rates of productivity, and provide shelter and nursery grounds for many commercially important species. Seagrasses also serve as a direct food source for a number of different animals, most notably the green sea turtle (Dawes 1981, Zieman 1982). The seagrass communities in the Virgin Islands are subjected to many stresses, including pollution, development, recreational boating, disease and storms.

Great Lameshur Bay, St. John, has been the site of a multi-faceted seagrass study over the past three years, including the documentation of disturbances and the establishment of a long-term ecological study. This bay is within Virgin Islands National Park and Biosphere Reserve and receives less pressure from recreational use and development than other areas of the park. However, the seagrass community has been stressed significantly over the last three years.

Bluegreen Algal Overgrowth

In 1989, an unusual bluegreen algal overgrowth appeared in the bay following a tropical storm. In May, the overgrowth covered approximately one-third of the seagrass community and extended over the fringing reef along the western edge of the bay. In some areas, this bluegreen mat was 20-30 cm deep. A decrease in the vigor of the seagrass plants was apparent in these areas. Leaves were pale and senescing, apparently from lack of light and a decrease in available oxygen. The alga was tentatively identified as a species of *Schizothrix*. The cause of the overgrowth remains unknown. The tropical storm may have caused a flushing of the fringing mangrove system, releasing high

levels of nutrients into the bay and stimulating the algal bloom. Hurricane Hugo wiped out the bluegreen algae, along with the overgrown seagrasses.

Hurricane Damage

During Hurricane Hugo, dislodged coral heads, tree trunks and other debris were carried into the seagrass bed by storm waves, leaving behind severely damaged plants. In many areas, seagrass plants were almost completely buried. In Great Lameshur, the seagrass bed was extensively damaged, with large blowouts reaching a maximum of 20 m by 20 m and up to 1 m deep. Several blowouts were marked after the storm to document recovery and succession within the seagrass bed. Measurements were taken on a quarterly basis to record areal change of the blowouts. Recovery of seagrasses could take several years partly because of extensive damage to the terminal meristems of the rhizomes (Fuss and Kelly 1969, Tomlinson 1974). Similar blowouts took 5 to 15 years to recover (Patriquin 1975). It took up to six months following the storm for sediments to begin to fill in the extensive pits. Fifteen months following the storm calcareous green algae including *Penicillus* spp. and *Halimeda* spp. began to colonize the bottom of the blowouts. This colonization may be the initial successional stage within a seagrass bed (Zieman 1982). However, the size of the blowouts actually increased as damaged seagrass plants continued to die back. Eighteen months after the storm, some new growth and colonization by manatee grass, (*Syringodium filiforme*) and turtlegrass, (*Thalassia testudinum*) was apparent. The size of the blowouts appeared to be stable, and no increase in area was observed. Twenty months after the storm, the blowouts appeared to be diminishing in size, reflecting more colonization by turtlegrass. Full recovery of the blowouts is likely to take several more years.

Disease

Disease is another stress affecting turtlegrass in Great Lameshur Bay. A pathogenic species of *Labyrinthula* has been isolated from turtlegrass in this bay as well as other bays around St. John, St. Thomas, and St. Croix. In laboratory tests conducted according to Muehlstein et al. (1988), the isolates of *Labyrinthula* have been conclusively demonstrated to be a pathogen of turtlegrass. Although no major disease-related declines have been documented in Great Lameshur or other local bays, the stress of disease is present and represents a threat to the habitat. Both temperate and tropical seagrass habitats have suffered major declines from disease over the last 10 years (Short et al. 1987, Muehlstein et al. 1988, Robblee et al. 1991).

Long-term Monitoring

In an effort to document the current status of the seagrass habitat and the effects of disturbance, a long-term monitoring project has been established in Great Lameshur Bay. Three 250 m permanent transects have been installed for the collection of basic ecological data. Measurements of seagrass density, community structure, and seagrass productivity have been taken at quarterly intervals for the last two years. Preliminary analysis indicates an unstable community structure with fluctuating populations of macroalgae, dominated by *Penicillus* spp. and varying densities of manatee grass and turtlegrass. Productivity is low in comparison to other areas. The instability of the community may reflect the level of disturbance over the last several years. It is extremely important to maintain a monitoring program, not only to document changes within the system but also to provide a solid data base for future resource management decisions.

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