Experiment: The Effect of Eelgrass on surrounding water pH

SUMMARY Determine the effect of eelgrass on the pH of seawater in tanks.

MATERIALS

- Eelgrass, sediment (MDIBL will provide)
- 3 tanks
- seawater

BACKGROUND

This experiment is based on a study done by The Community Environmental Health Lab with students participating in the NextGen Young Environmental Leaders Program in the summer of 2012. They monitored pH and associated water quality values at sites across Upper Frenchman Bay on a monthly basis, and the influence of biological systems on seawater chemistry was examined by analyzing the interaction of eelgrass, *Zostera marina*, on pH in tanks.

Seawater chemistry, including variables like acidity, salinity and temperature, directly influences the characteristics of marine ecosystems including their vitality and resilience. pH values represent acidity by quantifying the number of hydrogen ions, H^+, in a sample on a logarithmic scale from zero to fourteen with decreasing values indicating increased acidity. Seawater has an average pH of 8.1, compared to 7.0 for deionized water. However, this seawater average does not capture the wide variation of pH resulting from such changes in temperature, depth, biotic processes and dissolved CO_2 levels.

Seagrass systems have been recently identified as large 'Blue Carbon' sinks and provide countless other ecosystem services. Seagrasses may also play a large role in mitigating ocean acidification as photosynthesis removes CO_2. Studies have found significant increases of water column pH over dense seagrass meadows during peak photosynthetic periods in tropical regions. Frenchman Bay has the potential to become a significant 'Blue Carbon' sink and mitigating factor of ocean acidification because the region's sub-tidal mudflats are suitable habitat for eelgrass.

EXPERIMENT:

Set up three 5-gallon tanks of eelgrass and sediment: one with no eelgrass, just mud, andother with 10 eelgrass shoots, and another with 20 eelgrass shoots. Make sure all tanks are exposed to the same amount of sunlight, or that they all have tank lights that are on for the same amount of time each day. Measure temperature and pH every two days for a week.

CEHL & NextGen's results:

Density of eelgrass was found to have a strong effect on pH levels when isolated in the tank experiment. Although there was no statistically significant difference in pH among the tanks, NextGen students found a consistent trend of decreased pH with no plants and the highest pH value associated with increased density, 20 shoots. The average difference between the pH of the tank with no Zostera shoots and that with twenty shoots, was 0.256 pH points. How did yours differ?