How's the Water?

Have you ever lathered on the sunscreen, packed your towel, and trekked to the beach, only to find a warning posted? For Florida's millions of resident and visiting beach goers, healthy beaches are not taken for granted. Continuous monitoring under the Healthy Beaches sampling program means that researchers collect and analyze water samples at specific locations every two weeks. In Pinellas County, fourteen sites are monitored. So what are scientists looking for and how do they determine if it's safe to swim?

Water samples are analyzed to measure levels of indicator bacteria, specifically *Enterococcus* species and Fecal Coliform. Both are microorganisms that are found in the intestines of animals, including humans, and come from any or all of the following: pets, wildlife, human sewage, or storm water runoff. High concentrations in the marine environment indicate the possibility that pathogens may be present. In order to avoid disease, infections, gastrointestinal illnesses, and rashes, beaches are closed and warnings are posted when levels of these bacteria exceed safe limits.

The Pinellas County Health Department oversees the Healthy Beaches Program for the entire state of Florida and works closely with other partners including the Tampa Bay Estuary Program, the University of South Florida's College of Marine Science and College of Public Health, the Southwest Florida Water Management District and the Center for Marine Conservation. The overall goal is to make the State's beaches healthy and safe.

To accomplish this goal, a variety of scientific research methods are used: field work is conducted to collect water samples, laboratory analysis is necessary to identify and count microorganisms, and genetic research is needed to understand the life cycles and viability of the pathogens. On a broader scale, researchers are creating models that are capable of predicting where and when water quality might be sub-optimal for swimmers. Ocean observing systems such as the Coastal Ocean Monitoring and Prediction System (COMPS), run by the Ocean Circulation Group at the University of South Florida, are becoming important tools for tracking unsafe water.

Sensors on COMPS buoys that are of interest to the Healthy Beaches Program include Acoustic Doppler Current Profilers (ADCP) which provide real-time data on the speed and direction of ocean currents, meteorological packages that provide data on wind speed and direction, and air and sea surface temperature, and Microcat data which provide temperature and salinity profiles of the water column. Mathematical models created from these data allow researchers to predict how and where contaminated water will be transported, and to determine if the prevalent environmental conditions (e.g. temperature and salinity) will enhance the growth of pathogens or contribute to their demise. Once there is a better understanding of the relationship between the life cycles of the organisms

and their viability in the marine environment, the potential for remediation of pathogens in marine waters will be greatly enhanced and people can enjoy healthier, safer beaches.