



Evaluating Sources of Nutrients and Enterococci in Biscayne Bay, Florida:

Connections and Management Implications



Figure 1. EPA Sample sites in central and north Biscayne Bay

The Environmental Protection Agency has awarded a research team led by the Miami Waterkeeper and Florida International University (FIU) to study the levels of fecal indicator bacteria (FIB) and nutrients in Biscayne Bay, Florida. This project seeks to understand the influence that canal discharge and land-based sources of pollution have on the Bay.

Parameters that will be analyzed include FIB enterococci, three types of nitrogen, and two types of phosphorus. Microbial source tracking (MST) will be applied to high bacteria level samples to understand the types of bacteria present. Isotope analysis will aid in determining the sources of dissolved nitrate in the water, sediment, and algae, whether wastewater or agricultural. Recorded environmental conditions will include air and water temperature, wind, dissolved oxygen, chlorophyll-a, turbidity, and salinity.

The study will begin in the middle of May 2021, and sample at 22 sites throughout central and northern Biscayne Bay for one year (Figure 1). Some questions that the team aims to answer through the study are:

1. Can this combined approach help to determine the sources of FIB and nutrients in Biscayne Bay?
2. Do FIB and nutrients share the same sources in Biscayne Bay?
3. Do fertilizer ordinances alter nutrient levels in Biscayne Bay?
4. Can effective, science-based management for nutrient and FIB sources be developed for Biscayne Bay?

Partners involved in the study include Dr. Tiffany Troxler and Dr. Piero Gardinali from FIU, Dr. Peter Swart from the University of Miami (UM), Sean Ahearn from Beta Analytic, and Dr. Maribeth Gidley from UM's Cooperative Institute for Marine and Atmospheric Studies.

Figure 2. Results of a pilot study of nitrate isotopes in Biscayne Bay performed by Beta Analytic. Cross plot showing potential sources of nitrate modified from Kendall et al., 2007 and Hastings et al., 2013. The enriched $\delta^{15}\text{N}$ values suggest nitrate formed from N nitrified in soils and/or manure and sewage while the depleted $\delta^{18}\text{O}$ values suggest a nitrate that likely formed in an aqueous solution (Kendall et al., 1998)

