
Using Benthic Foraminifera to Understand Seagrass Abundance, Salinity, and Sea-Level Variation in Florida Bay

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ABSTRACT

Benthic foraminifera are used as a proxy for seagrass abundance and salinity variation over the past 150 years, and sea-level fluctuation through the late Holocene. The study area is Florida Bay, part of Everglades National Park. Current efforts to restore the park and surrounding ecosystems to an original state are being guided by investigations of the natural range of ecosystem variability, the purpose of this study.

Eight cores collected from four locations across Florida Bay were examined. Ages of sediments were determined with ²¹⁰Pb for the last 100-150 years, and ¹⁴C for older samples. Benthic foraminifera >63 µm were identified from 180 samples. There are three basic approaches: (1) The percent abundance of seagrass-associated foraminifera is used to reconstruct historic fluctuations of seagrass abundance. (2) To study salinity change, the alternation between brackish (0-18 ppt) and marine (18-40 ppt) species is documented. (3) Sea-level change is interpreted from the variability in nearshore, lake, mudbank, and mangrove faunas associated with different water depths.

Preliminary results show the following: (1) Concurrent with a large seagrass die-off in the late 1980s – early 1990s, all cores show decreases in the percent of seagrass-associated benthic foraminifera, as well as foraminifera in general, and increases after 1995. (2) All cores show decreasing salinity in the 1970s and increasing salinity in the 1980s, possibly related to a multi-year drought. Before 1900, there were large variations in salinity between decades. In the 1900s, changes were more gradual and may be related to the construction of the Flagler Railroad, hurricanes, and canal construction. (3) The dominance and rapid decline of a mangrove fauna about 4000 years ago reflect the entry of seawater into Florida Bay. Further analysis is needed to identify trends and relate them to seagrass and salinity variations.