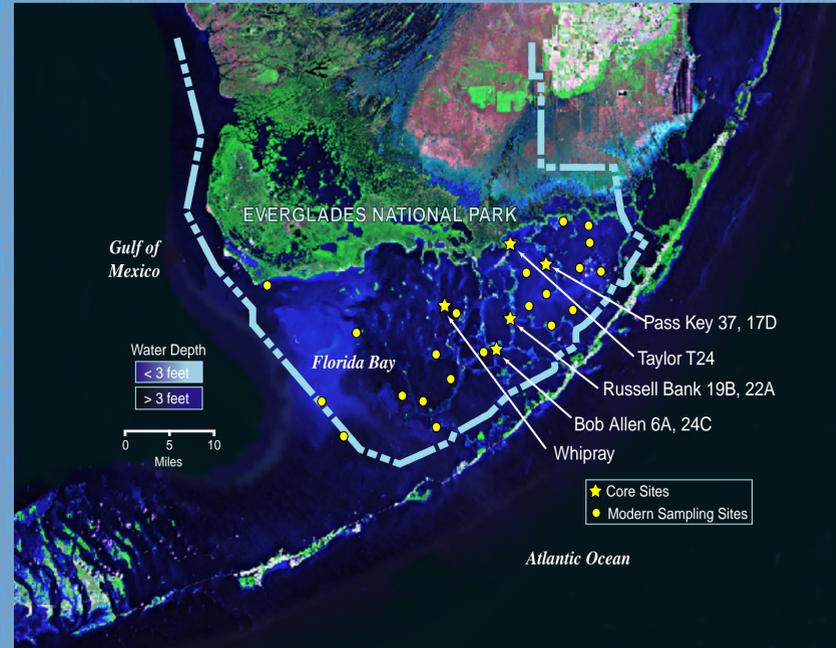


The issue of changing rates and patterns of salinity in Florida Bay is central to the question of restoration of the South Florida Ecosystem. It is critical to...

- 1) established pre-development rates and patterns of salinity change, and
- 2) to decouple natural components of change from human-induced changes during this century.

The USGS Ecosystem History Projects, using multi-disciplinary and multi-proxy methods, have identified the long-term patterns of salinity change in seven cores taken at four sites in the central and eastern portions of Florida Bay.



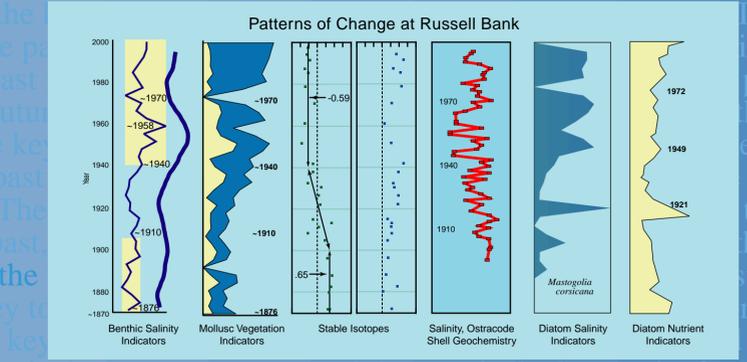
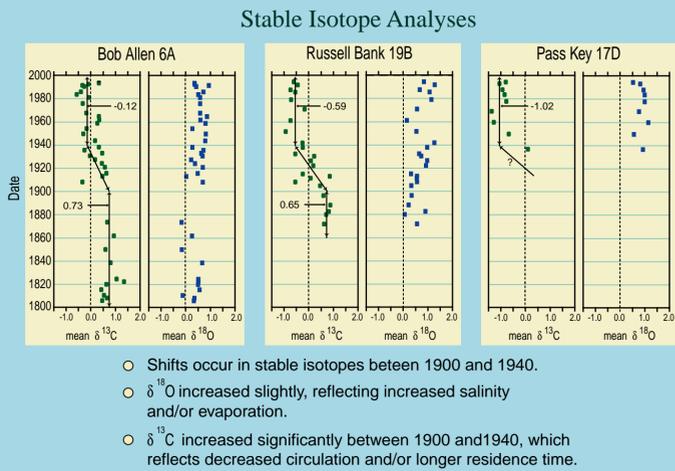
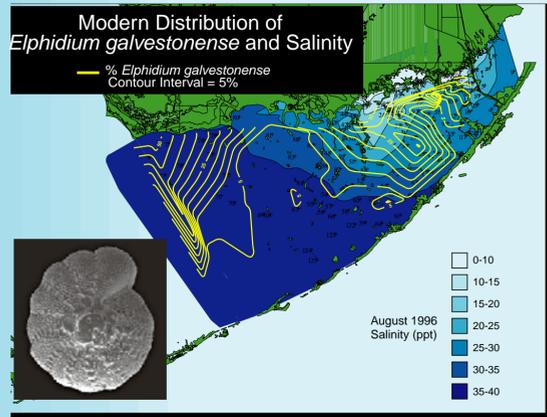
Paleoecological and Geochemical Analyses Done:

Paleoecological:

- Mollusks
 - Benthic forams
 - Ostracodes
 - Diatoms
 - Pollen
- Percent abundance and diversity of these taxa provide information on downcore salinity, substrate, productivity, and nutrient availability, based on modern proxies.

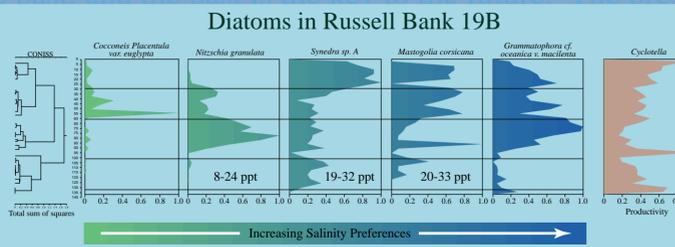
Geochemical:

- Radioactive Isotopes: ^{210}Pb , ^7Be , ^{137}Cs , and ^{226}Ra provide downcore age models and rates of sedimentation
- Stable Isotopes: $\delta^{13}\text{C}$, $\delta^{18}\text{O}$ - provide information on salinity, evaporation, residence time, and sources of water
- Nutrient Chemistry: C, P, N indicates nutrient input and availability

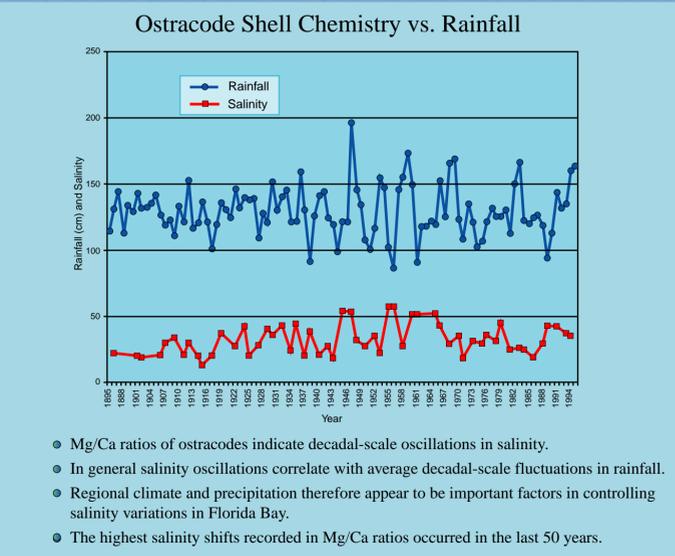


Conclusions:

- Salinity has fluctuated naturally over time, and periods of higher salinity occurred prior to significant human alteration of the environment.
- Beginning around 1900, stable isotopic ratios and biotic data show a shift toward higher salinities.
- Stable isotopes indicate increased evaporation, increased residence time, and decreased circulation.
- Around 1940, a clearly different pattern emerges of increased frequency and amplitude of fluctuation based on the biotic indicators.



- Fluctuations in salinity have occurred during the last 100 years.
- Periods of high salinity did occur prior to 1920.
- Diatom assemblages underwent significant change around 1920. Pre-1920 diatom assemblage is very different from post-1920 assemblage.
- Diatom indicators show significant changes in salinity after approximately 1972.



Relevance to Restoration Efforts:

Debate over natural versus human-induced changes in the South Florida Ecosystem continues, even as restoration begins. It is critical that these questions be answered, because it is neither economically feasible nor sustainable to attempt to "fix" changes due to natural causes.

Our data present compelling evidence of historical changes in Florida Bay, due to both human-induced and natural causes. Natural systems operate on the scale of decades, centuries and millennia. To focus on data recorded only in the last few decades is misguided and will waste restoration funds. It is imperative that management agencies heed the results of long-term data analyses in order to focus restoration efforts on the component of change due to human activity.

If Change is...

Human Induced

Natural Change

then Restoration Efforts to correct the problem will...

- be cost effective
- be sustainable
- not be economically feasible
- not be sustainable

