Salinity is an important variable in Florida Bay

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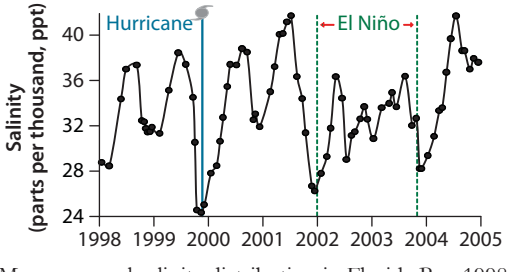
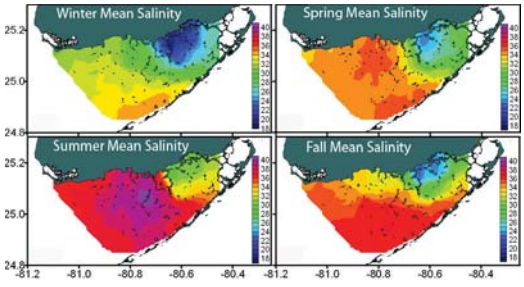
Salinity is a measurement of the concentration of salts dissolved in water. Normal seawater has a concentration of about 36 parts per thousand (ppt) total salts. When freshwater (i.e., 0 ppt) mixes with seawater in estuaries, salinity is reduced (i.e., estuarine conditions). Salinity can be used as a conservative tracer of freshwater runoff because unlike nutrients and other water quality parameters, salinity is not affected by biological processes. When evaporation exceeds rainfall or freshwater inflow, salinity can reach very high levels (i.e., more than 40 ppt), termed "hypersalinity events".

In south Florida, there is marked seasonal variation in rainfall and evaporation. When rainfall and runoff is less than evaporation, the salinity increases and reaches a maximum in early summer (June – July). Salinity decreases rapidly during the rainy months (September – December). Meteorological phenomenon, such as El Niño and tropical cyclones (i.e., hurricanes), dampen or increase, respectively, the typical annual variation in salinities.

Because of restricted circulation in Florida Bay, salinity variation is very pronounced. Florida Bay becomes hypersaline in early summer and estuarine in early winter. It is not uncommon to observe both hypersaline and estuarine conditions at different locations at the same time during intervals between



Mean seasonal salinity distribution in Florida Bay, 1998 – 2005.



Mean seasonal salinities in Florida Bay, 1998 – 2005 (red indicates higher salinities, blue lower salinities).

those two extremes. The large salinity variations are ecologically damaging. Organisms that live in salty environments must actively regulate their interior body chemistry (i.e., osmoregulation) and have a physiological optimum of salinity, as well as minimums and maximums beyond which the organism will struggle to survive. Organisms that live in such areas either adapt to the wide fluctuations of salinity, flee when conditions become unfavorable, or die. Effects of salinity are mediated by the mobility of an organism. Sessile organisms, such as sponges, corals, and seagrasses, cannot move and are susceptible to stress and death due to unfavorable salinity conditions. Mobile organisms, such as fish, turtles, and marine mammals, can avoid localized harmful salinity conditions but may be susceptible to more widespread detrimental salinity conditions.

Historical water manipulation activities in south Florida have severely reduced the flow of freshwater into Florida Bay and changed the ecosystem from a predominantly estuarine condition, with a diverse seagrass community, to a more marine system, dominated almost exclusively by turtle grass. Managing water flows to reduce the severity and frequency of hypersalinity events in Florida Bay is one of the primary goals of the Comprehensive Everglades Restoration Plan.