Habitat Response Due to Seagrass Die-off in Western Florida Bay

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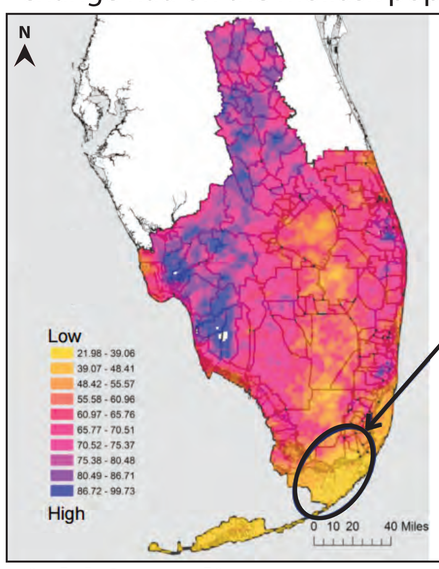
Introduction:

Florida Bay, the shallow expanse of water between the Florida mainland and the Florida Keys, experienced a massive seagrass die-off in the fall of 1987 (Robblee et al. 1991). The rapid death of *Thalassia testudinum* and all of the subsequent effects (turbid water, algal blooms, impaired fisheries) greatly changed the Florida Bay ecosystem (Fourqurean and Robblee 1999). At the time of this die-off, there was no ongoing coordinated research program in Florida Bay, so there is little information on the effect this environmental change had on the mollusk population in the affected areas.



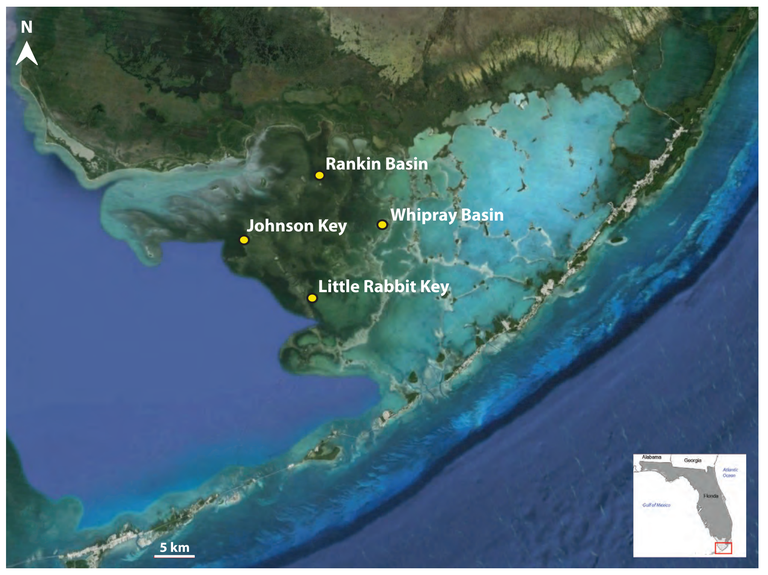
Total Rainfall from May 2014-August 2015

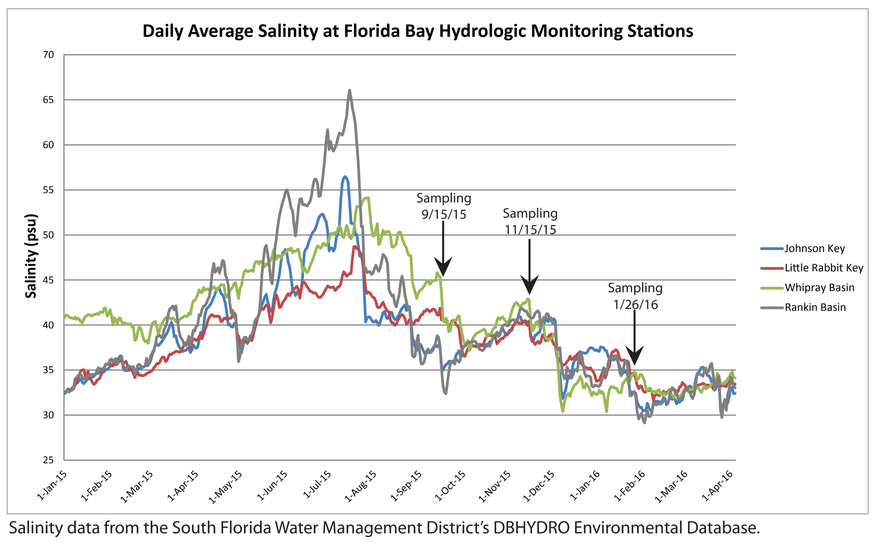
Taylor Slough and Florida Bay received the lowest amounts of rainfall compared to the rest of the South Florida Water Management District

Image from Fred Sklar of South Florida Water Management District

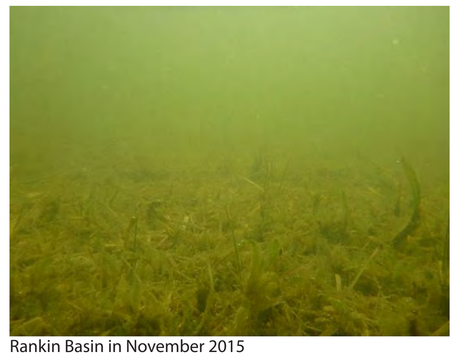
Today, Florida Bay is experiencing the effects of another major seagrass die-off that began in late summer of 2015. The lack of fresh water in South Florida led to increased salinity in Florida Bay as high as 65 psu.

Importance of Seagrass Beds: Over 70% of Florida's commercial and recreational fisheries spend part of their lives in estuaries. Florida Bay plays a significant role in the life stages of numerous marine species including the pink shrimp, spiny lobster, and snook. The current die-off could affect the health of Western Florida Bay and impact future fisheries.

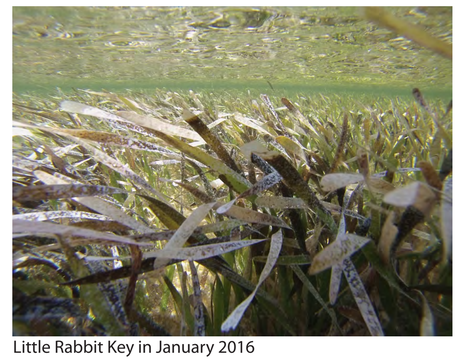




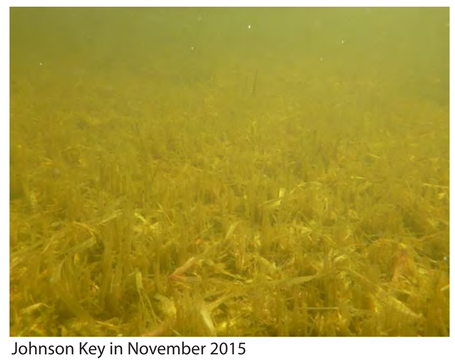
Salinity data from the South Florida Water Management District's DBHYDRO Environmental Database.



Rankin Basin in November 2015



Little Rabbit Key in January 2016

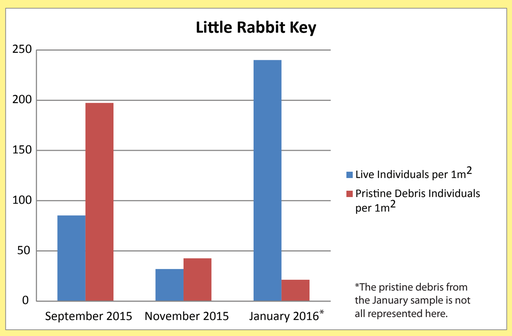


Johnson Key in November 2015

Whipray Basin in March 2016

Field Sampling: Starting in September 2015, we began to monitor the water quality, seagrass condition, and mollusk species diversity and abundance in three main areas of concern: Rankin Basin, Johnson Key Basin, and east of Little Rabbit Key. In January 2016, we also began monitoring Whipray Basin. We are collecting samples approximately every 8 weeks to assess the number and species of live mollusks and what appear to be very recently dead mollusks.

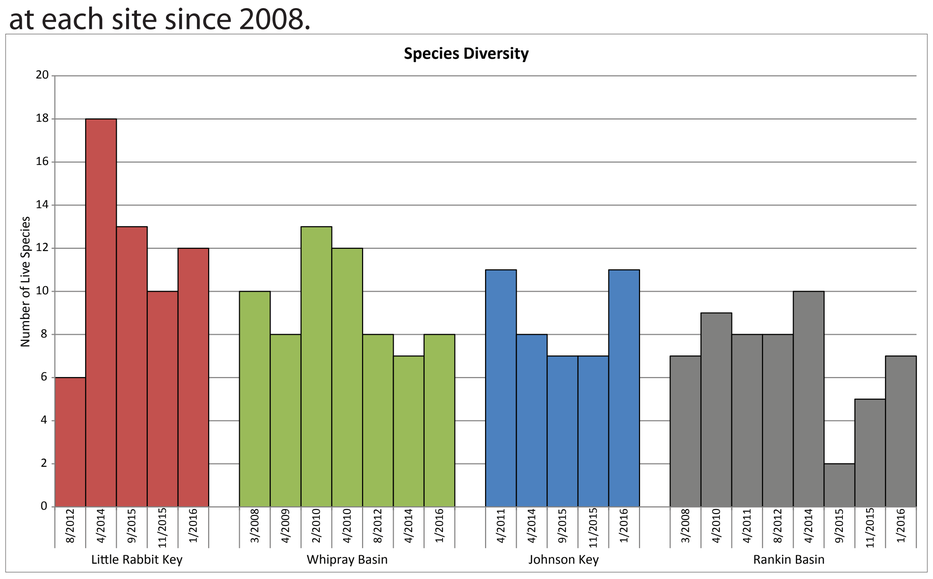
Vegetation Samples: The following graphs display the number of live and recently dead mollusks collected from vegetation samples at each site. In November 2015, we collected the least amount of live and pristine debris at all three sites. By January 2016, the live mollusk population appears to be rebounding.



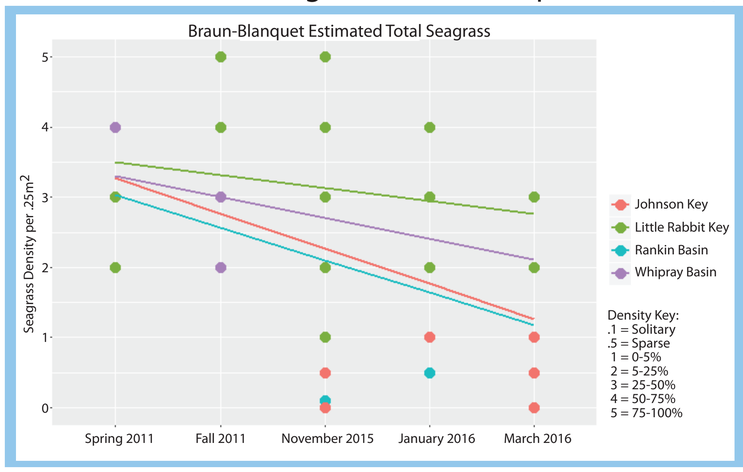
Application: The seagrass die-off event of 1987 marked the beginning of more focused research and restoration projects. As part of this effort, the USGS began to collect cores in the mid-1990s to examine the history of the ecosystem. The molluscan faunal assemblages from a core taken at a documented die-off site in Rankin Basin in 2001 indicate an increase in the amplitude of salinity fluxes prior to the 1987 seagrass die-off and an overall decrease in molluscan abundance and species diversity post die-off (Murray et al. 2010). By capturing real time habitat response data from this current seagrass die-off event, past undocumented seagrass die-off events could be better recognized in Florida bay cores.

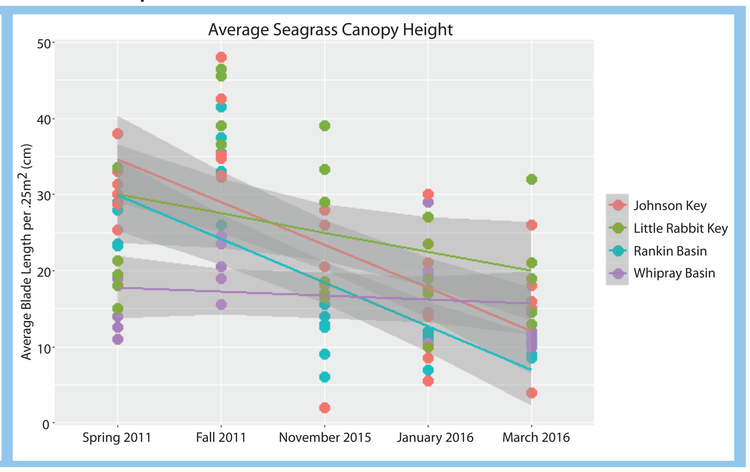
Healthy *Thalassia testudinum* bed

The graph below displays number of live mollusk species collected at each site since 2008.



In conjunction with the mollusk sampling, seagrass assessments were performed in order to determine the species of seagrass, coverage estimates, and overall health using the Braun-Blanquet method (Braun-Blanquet 1932).





Current State: Each basin is at a different phase in the die-off sequence. By the end of 2015, Rankin Basin was exhibiting signs of complete die-off while Johnson Key was moderate to patchy and Little Rabbit Key was still relatively healthy.

As of March 2016:

- Rankin Basin is mostly bare bottom. Floating seagrass mats and benthic detritus are no longer present. There is an increase in faunal activity as well as an improvement in water clarity.
- Johnson Key has numerous patches of healthy *Thalassia*. There does not appear to be any new vegetation growth, but there seems to be an increase in gastropods.
- Little Rabbit Key continues to look healthy. Water clarity is very high and invertebrates are numerous.
- Whipray Basin has patchy, but dense areas of seagrass. There are no signs of die-off, water clarity is decent, and several invertebrate species were observed.

We will continue to monitor the habitat response at the sites over time and apply that information to previous records including Florida Bay cores.

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