

Historical Trends in Epiphytal Ostracodes from Florida Bay: Implications for Seagrass and Macro-benthic Algal Variability

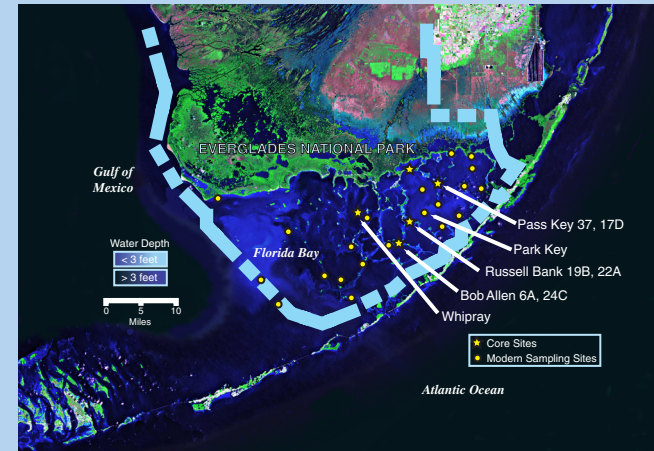
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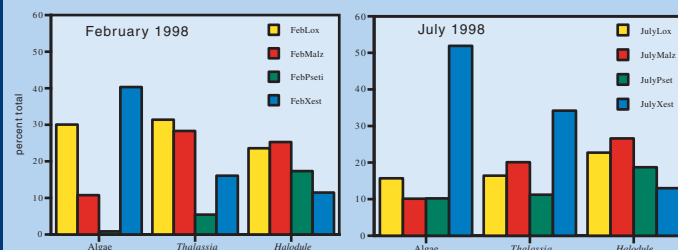
Abstract

We investigated living and fossil epiphytal ostracodes from central and eastern Florida Bay to determine historical trends in seagrass and macro-benthic algal habitats during the past century. Living assemblages collected in February and July, 1998 from 15 sites throughout Florida Bay revealed that *Loxocochna matagordensis* and *Malzella floridana* are the dominant species living on *Thalassia* and that *Xestoleberis* spp. is the most abundant ostracode group living on *Syringodium* and marine algae such as *Chondria*. *Peratocytheridea setipunctata* is a species that is common on muddy substrates and on *Halodule*.

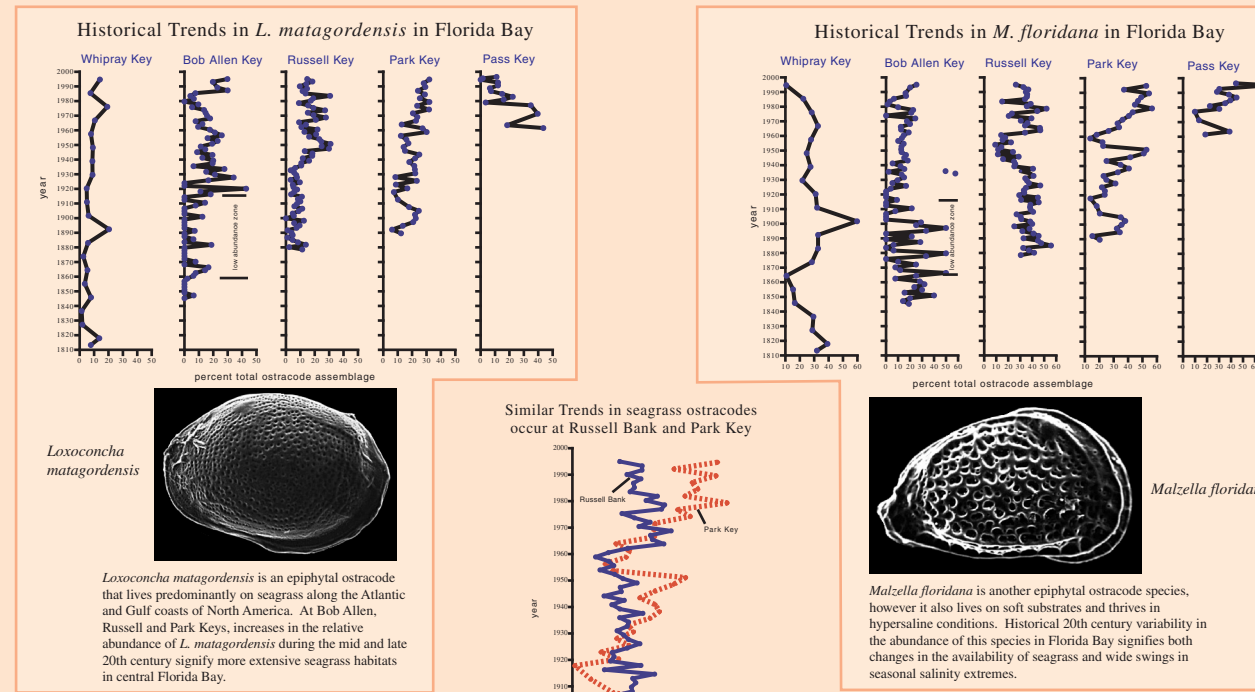
Historical trends in epiphytal ostracodes were reconstructed from radiometrically-dated sediment cores from Whipray mudbank, Russell Banks, Bob Allen mudbank, Pass and Park Keys. There have been frequent changes in the relative frequencies of *L. matagordensis*, *M. floridana*, and *Xestoleberis* over the past century. Prior to the mid-20th century, seagrass- and algal-dwelling ostracode species were relatively rare at our sites central and eastern Florida Bay. Ostracode assemblages living between about 1900 and 1940 were characterized by moderate to large proportions (10->60%) of *Peratocytheridea setipunctata* when *Thalassia* and macro-benthic algal species were significantly less common than during the later half of the 20th century. Beginning about 1930, and continuing until 1950, *P. setipunctata* populations experienced significant declines while *L. matagordensis* and *Xestoleberis* increased progressively from 0 - 10 % to > 25 - 40 %, depending on the site. This long-term faunal shift in central Florida Bay suggests that there has been a much greater abundance and/or density of subaquatic vegetation over the past 50 years compared to the prior half century. Since 1950, our sites in central and eastern Florida Bay have experienced high amplitude swings in the proportion of seagrass and macro-benthic algal-dwelling species suggesting subaquatic vegetation has been extremely dynamic both spatially and temporally over decadal timescales. Some of these oscillations, such as the decline in *L. matagordensis*, *Xestoleberis*, and *M. floridana* during the 1970s and early 1980s, appear to be synchronous across the study area and may represent large-scale dieoffs.



Relative Abundance of Four Ostracodes living on Florida Bay Marine Algae, *Thalassia*, and *Halodule*



Epiphytal and Macro-benthic Algal Ostracode Species become more Abundant during the 20th Century

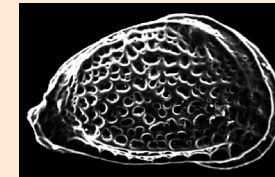
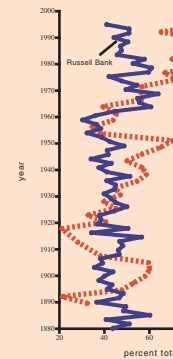


Loxocochna matagordensis



Loxocochna matagordensis is an epiphytal ostracode that lives predominantly on seagrass along the Atlantic and Gulf coasts of North America. At Bob Allen, Russell and Park Keys, increases in the relative abundance of *L. matagordensis* during the mid and late 20th century signify more extensive seagrass habitats in central Florida Bay.

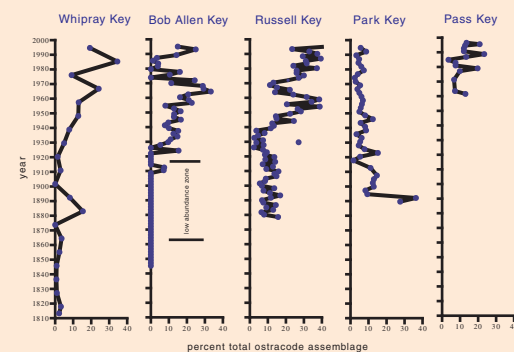
Similar Trends in seagrass ostracodes occur at Russell Bank and Park Key



Malzella floridana

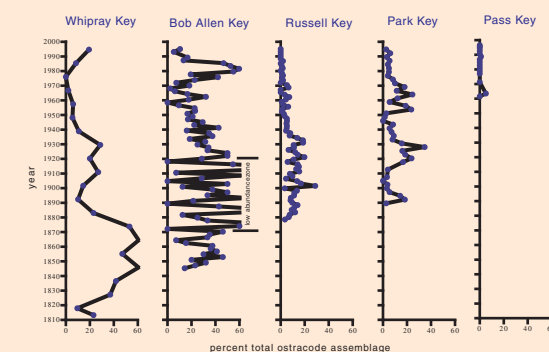
Malzella floridana is another epiphytal ostracode species, however it also lives on soft substrates and thrives in hypersaline conditions. Historical 20th century variability in the abundance of this species in Florida Bay signifies both changes in the availability of seagrass and wide swings in seasonal salinity extremes.

Historical Trends in *Xestoleberis* in Florida Bay



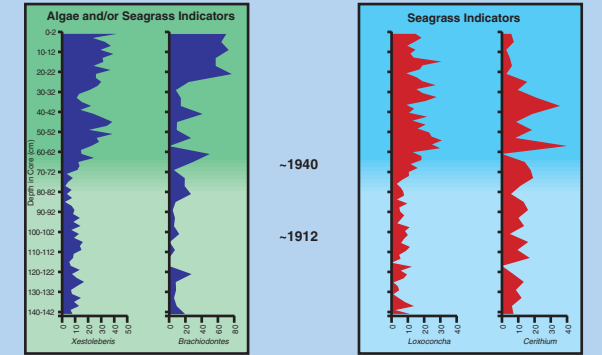
Many species of the genus *Xestoleberis* inhabit macro-benthic algal habitats. With the exception of Park Key where *Xestoleberis* abundance remains steady, all cores exhibit increases in the abundance of *Xestoleberis* during the 20th century, indicating greater macro-benthic algae in central Florida Bay.

Historical Trends in *P. setipunctata* in Florida Bay

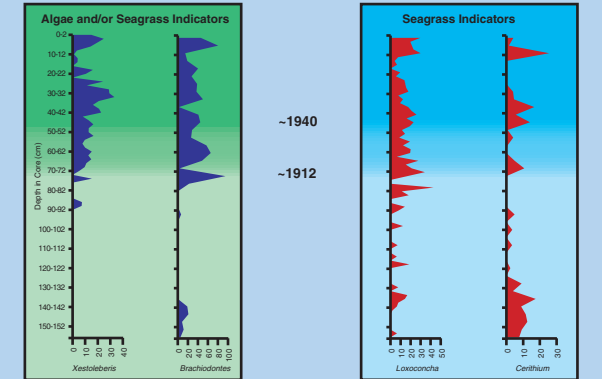


Peratocytheridea setipunctata is a species that inhabits sandy and muddy substrates usually devoid of subaquatic vegetation in meso- and polyhaline salinities. During the 20th century, declines in the abundance of *P. setipunctata* in all five cores parallel the increases in epiphytal species.

Comparison of Ostracode and Mollusc Algae/Seagrass indicators at Russell Bank



Comparison of Ostracode and Mollusc Algae/Seagrass indicators at Bob Allen Key



Conclusions

1. Our ecological studies confirm that certain species live mainly as epiphytes on modern Florida Bay subaquatic vegetation.
2. Trends in relative frequencies of epiphytal species' reveal significant interdecadal variability in central and eastern Florida Bay.
3. During the mid-20th century there was a decline in the sediment- and *Halodule*-dwelling *P. setipunctata* coincident with the rise in species (*L. matagordensis*, *M. floridana* and *Xestoleberis* spp.) that inhabit *Thalassia* and macro-benthic algae.
4. There was also a broad decline (seagrass dieoff?) in seagrass and algal-dwelling ostracodes species during the late 1970s and 1980s.
5. Changes in regional climate and rainfall during the mid-20th century, perhaps exacerbated in places by the effects of canal building on freshwater flow, account for most observed temporal trends in Florida Bay epiphytal species.
6. In the context of ecosystem restoration and observed seagrass dieoffs, central and eastern Florida Bay had sparse seagrass and macro-benthic algal "meadows" during the 19th and early 20th centuries, extensive vegetation during the mid-20th century, and diminished vegetation during the 1970s and 1980s. Defining the natural or "healthy" state of Florida Bay as a restoration target is itself an "unnatural" enterprise.