# Seagrass-Associated Mollusk Assemblages along a Nutrient Gradient in the Big Bend Region of Florida, Gulf of Mexico

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## Introduction:

Seagrasses provide a broad suite of ecosystem services of both ecological and economic value, but have been vanishing worldwide at alarming rates and are expected to decline further from the effects of global climate change. Because seagrasses do not fossilize well, it is difficult to examine their long-term responses to past environmental changes and develop informed forecasting models for how they might respond to future environmental change. We therefore evaluate the use of mollusk assemblages as a proxy for seagrass beds in the Gulf of Mexico to assess seagrass response to historic environmental conditions.

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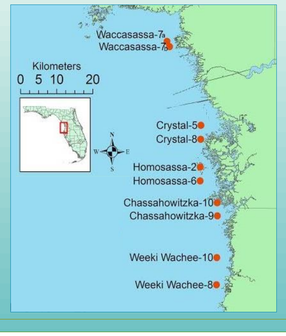
Some of the many animals that utilize Florida seagrass beds. Clockwise from left: A small representation of the diverse epifaunal community found on seagrass blades – shown here is a bay scallop and snail species; an endangered West Indian manatee gliding over a seagrass bed; the scallop fishery is a vital economic driver in the Gulf Coast – scallops are found predominately in seagrass beds; and a green sea turtle indulging in some seagrass.




## The Study Location:

- A conspicuous nutrient gradient characterizes the study area – phosphorus delivery to coastal waters increases from south to north
- This region is one of the best remaining examples of seagrass habitats worldwide – good for establishing a baseline
- Well-established water quality and seagrass abundance monitoring sites

## Methods:

- Cores were taken through seagrass beds using a corer with 205 $cm^3$ volume
- Material screenwashed through a 1-mm sieve
- Modern mollusk separated by species and counted to obtain a diversity index
- Water quality and seagrass abundance were captured by partnering researchers.

**References:**

1) "*Lucinisca*" Dall 1901 (clam)". Fossil Works: Gateway to the Paleobiology Database.
2) Tunnel et al. 2010 *Encyclopedia of Texas Seashells*. College Station, TX: Texas A&M University Press.

**Acknowledgements:**
The authors wish to thank Morgan Edwards and Sky Notestein from the Frazer Lab for assistance with data collection and John Slapcinsky (FLMNH) for help with shell identification.

## Preliminary Results:

| Class | Order | Superfamily | Family | Genus | Species | Trophic Level | Tiering | Max Size (mm) | CH_S9 C1 Aug13 | CH_S9 C2 Aug13 | CH_S10 C2 Aug13 | CH_S10 C3 Aug13 | CR_S5 C3 Aug13 | CR_S8 C3 Aug13 | HM_S2 C1 Aug13 | HM_S2 C2 Aug13 | HM_S6 C2 Aug13 | HM_S6 C3 Aug13 | WA_S7a C1_3 Aug13 | WA_S7b C1_3 Aug13 | WW_S8 C3 Aug13 | WW_S9 C2 Jun14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gastropoda | Heterobranchia | Philinoidea | Cylichnidae | Acteocina | candei | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Bivalvia | Veneroida | Tellinoidea | Tellinidae | Angulus | c.f. texanus | 5,6 | 1 | 0 | 33 | 6 | 1 | 28 | 0 | 1 | 0 | 0 | 0 | 1 | 4 | 0 | 12 | 208 |
| Bivalvia | Veneroida | Tellinoidea | Tellinidae | Angulus | sp. 1 | 5,6 | 1 | 0 | 0 | 8 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Bivalvia | Veneroida | Tellinoidea | Tellinidae | Angulus | tampaensis | 5,6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 63 |
| Bivalvia | Veneroida | Lucinoidea | Lucinidae | Anodontia | alba | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Bivalvia | Veneroida | Veneroidea | Veneridae | Anomalocardia | cuneimaris | 5 | 1 | 0 | 1 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 64 | 11 |
| Bivalvia | Arcoida | Arcoidea | Noetiidae | Arcopsis | adamsi | 5 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gastropoda | Vetigastropoda | Trochoidea | Liotiidae | Arene | sp. | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bivalvia | Ostreoida | Pectinoidea | Pectinidae | Argopecten | sp. 1 | 5 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |

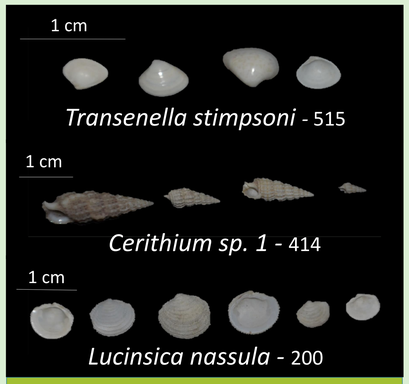
**Trophic level key:** 1 = predator; 2 = scavenger; 3 = algivore; 4 = microp/epiphyte grazer; 5 = filter/suspension feeder; 6 = deposit feeder; 7 = detrivore
**Tiering key:** 1 = infaunal; 2 = epifaunal

First nine rows of current dataset, with site names in alphabetical order. CH = Chassahowtizka, CR = Crystal River, HM = Homasassa, WA = Wacasassa, and WW = Weeki Wachee. Specimens were identified to the lowest taxonomic level possible. Tiering refers to where an animal physically inhabits the system – infaunal or epifaunal.

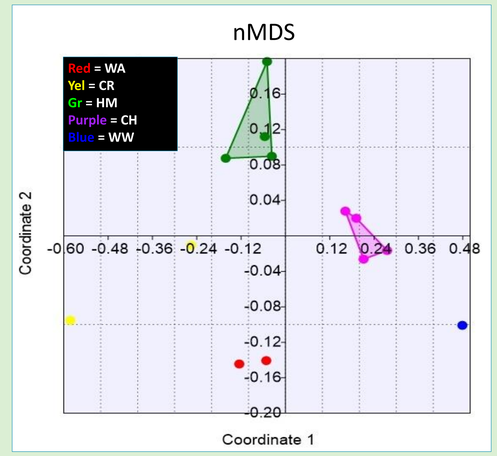
## Species Found:

73 species in 50 genera (and counting):

*Acteocina candei*
*Angulus c.f. texanus*
*Angulus sp.*
*Anugulus tampaensis*
*Anodontia alba*
*Anomalocardia cuneimaris*
*Arcidae sp.*
*Arcopsis adamsi*
*Arene sp.*
*Argopecten sp.*
*Astryris lunata*
*Bittiolum varium*
*Boonea impressa*
*Brachidontes exustus*
*Brachidontes domingensis*
*Bulla striata*
*Buscotypus plagesus*
*Carditamera floridana*
*Cerethium c.f. atratum*
*Cerethium sp.*
*Chione elevata*
*Codakia orbicularis*
*Conus sp.*
*Costoanachis semiplicata*
*Crassostrea virginica*
*Crepidula convexa*
*Crepidula depressa*
*Crepidula spp*
*Eulithium affine*
*Eurytellina angulosa*
*Fasciolaria lilium*
*Gastropoda spp*
*Ischadium recurvum*
*Janthina globosa*
*Kurtziella c.f. limonitella*
*Laevicardium mortoni*
*Longchaeus crenulatus*
*Lucinidae sp.*
*Lucinisca nassula*
*Macoma sp.*
*Marginalla sp.*
*Melongea corona*
*Modulus modulus*
*Mytilus exustus*
*Nassarius c.f. vibex*
*Nassarius polyganatus*
*Olivella c.f. mutica*
*Olivella sp.*
*Ostreidae sp.*
*Parastarte triquetra*
*Pectinidae sp.*
*Petaloconchus varians*
*Pilsybrspria leucocyma*
*Prunum apicina*
*Pteria colymbus*
*Pteriidae sp.*
*Rubellatomea diomedea*
*Schwwarziella catesbyana*
*Tagelus pleibius*
*Transenella stimpsoni*
*Turbo castanea*
*Turridae spp*
*Urosalpinx perrugata*
*Vermetus sp.*




The three most common species found across the study sites and their abundance – *Transennella stimpsoni*, a *Cerithium sp.*, and *Lucinsica nassula*. Cerithids are detritovores common to seagrass beds[1]. *Transennella stimpsoni,* Stimpson's transennella, and *Lucinisca nassula*, the woven lucine, are shallow water bivalves. Lucinids are generally found in shallow mud or sand flats in areas of low nutrients[2].




Non-metric multidimensional scaling using Bray-Curtis index of species abundances across sites. Different river systems do seem to group together, but more data will be necessary to fully elucidate what is going on here. Distance metric used: Bray-Curtis. Stress = 0.068.

## Future Research:

When complete, the proxy developed can be used to assess paleontological records of seagrass beds from the recent past. Having this information will help conservationists and land managers learn how this ecosystem responded to certain stressors in the absence of anthropogenic stresses and help establish a historic range of variation for seagrasses in this area.

**We hope to assess:**

- How are species abundances and distribution related to environmental characteristics of the sties?
- Is there a clear gradient in molluscan death assemblages between sites that follows the productivity gradient in the study area?
- Are there other determining factors in mollusk assemblages for this region?