



TROPHIC FOOD WEB DYNAMICS ACROSS A MANGROVE/UPLAND ECOTONE

Erin Kiskaddon

Department of Integrative Biology
University of South Florida, Tampa FL

Contact : ekiskaddon@gmail.com

Florida Mangrove Ecotone



Mixed Mangroves



Saltmarsh



Upland Forest

Natural habitat connectivity



Most Florida Mangrove Habitat Connectivity

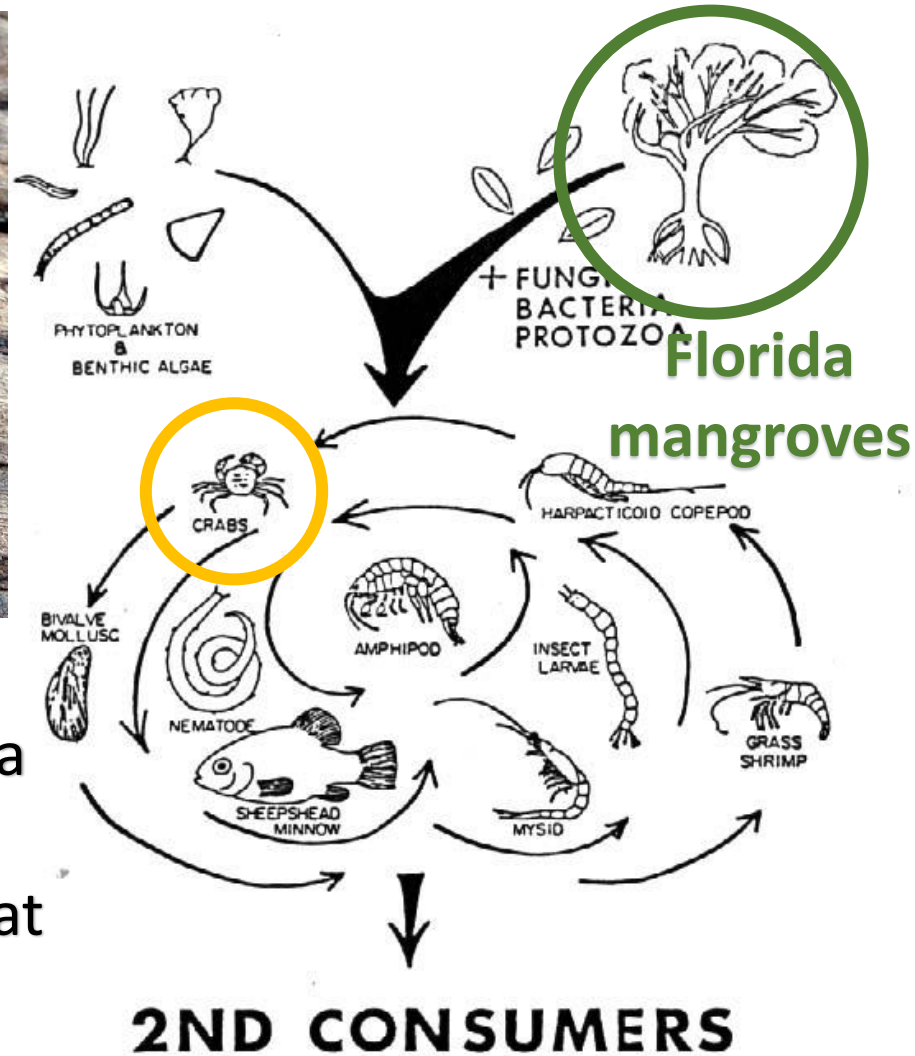
Armases cinereum (Family: Sesarmidae)

MANGROVE, SALTMARSH, UPLAND FOREST



- Wide-ranging
- Highly abundant in Florida
- See ↑abundance and ↑ size in upland forest habitat

WHY?

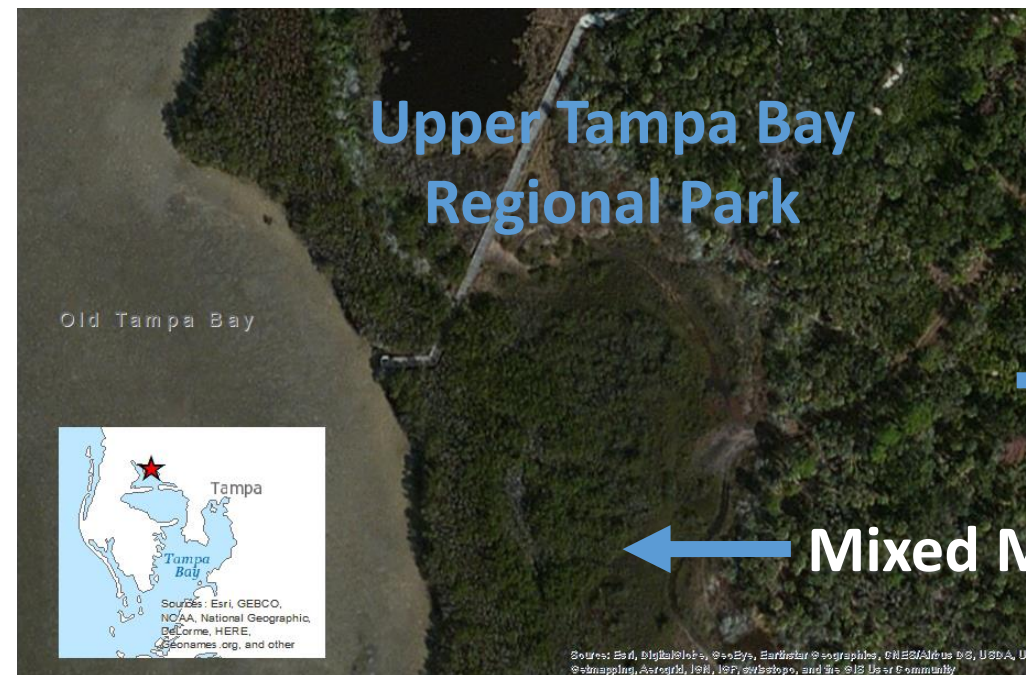


From Odum 1970



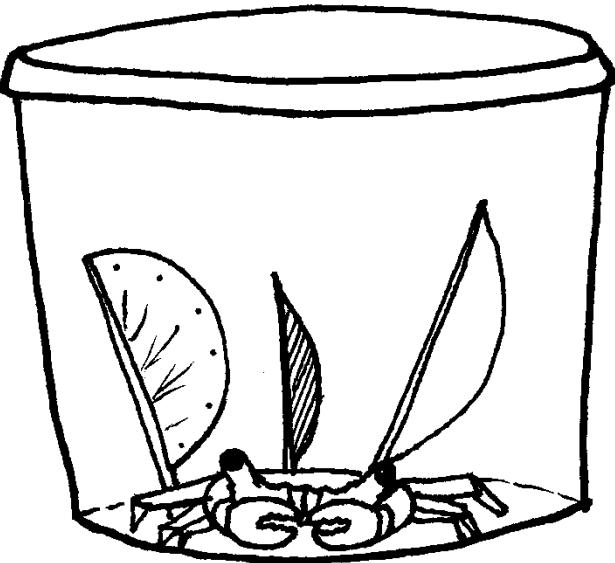
Goal: Investigate feeding patterns of *Armases cinereum* across a mangrove/upland forest ecotone

- 2 Laboratory Feeding Experiments
- Stable Isotope Analysis



0 25 50 100 Meters

Mangrove Herbivory: Preference for Mangrove Species and Level of Decomposition

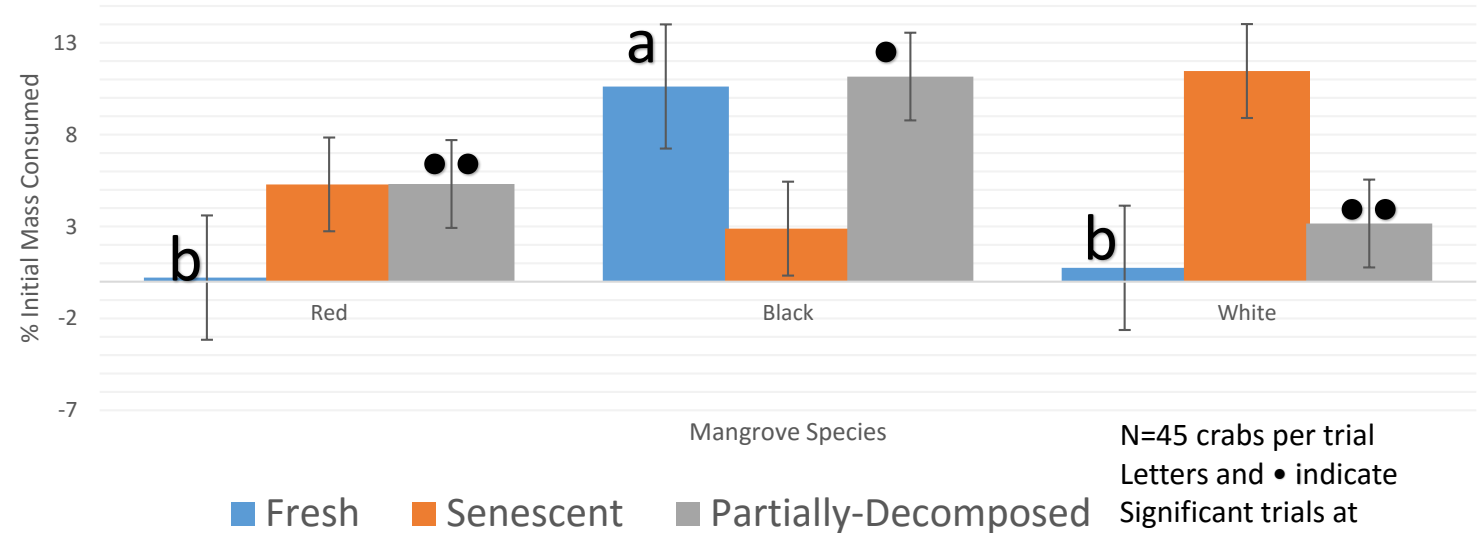


- 3 Choices Simultaneously: ½ leaf of each *Laguncularia racemosa*, *Avicennia germinans*, *Rhizophora mangle*
- 1 level of decomposition per trial: Fresh, Senescent, Partially Decomposed

RESULTS:



Average Consumption by *Armases* for Each Mangrove Species by Trial Type



N=45 crabs per trial
 Letters and • indicate
 Significant trials at
 $\alpha = 0.05$

Multi-Choice Experiment: Preference for Common Mangrove/Upland Ecotone Prey

- Choice between 5 plant food items and 1 animal prey common at study site, UTBRP

Common cricket *Iva*

(*Gryllus* spp.)



<http://www.exotic-pets.co.uk/silent-brown-crickets.html>

(*Iva frutescens*)



©2008 Will Cook

Borrichia

(*Borrichia frutescens*)



Photo: Sam Fraser-Smith

Grass

(*Stenotaphrum secundatum*)



<http://orig.alexandria.org/flora/entry/scientificname=stenotaphrum+secundatum>

Fern

(*Nephrolepis biserrata*)



<http://regionalconservation.org/lrca/database/plants/antPage.asp?TXCODE=Nephfise>

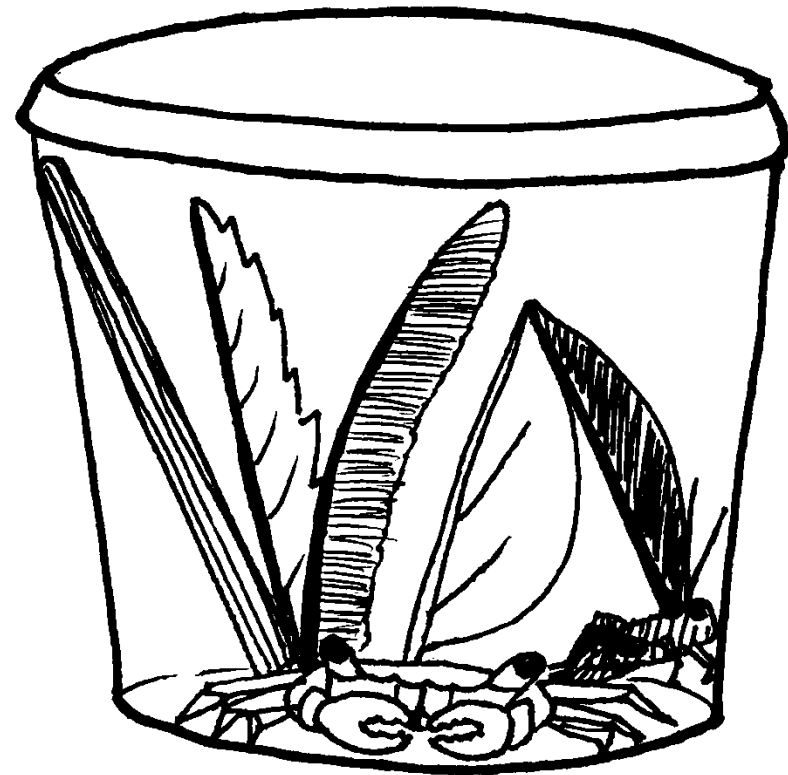


Black Mangrove

Partially-Decomposed

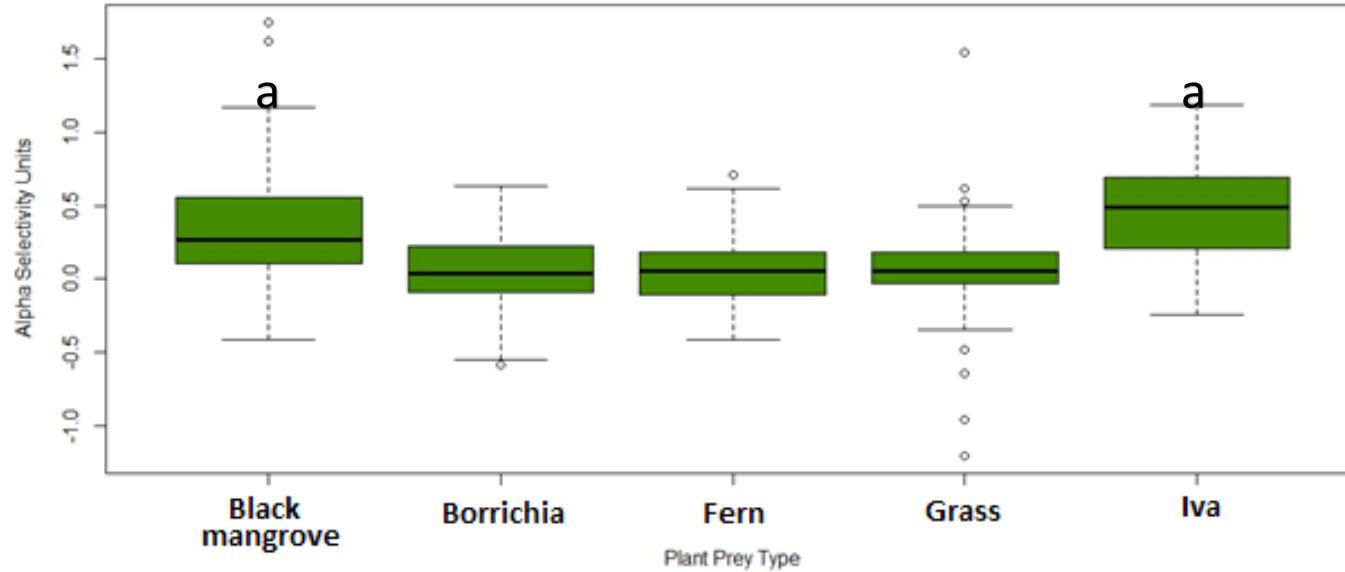
(from previous experiment)

(*Avicennia germinans*)

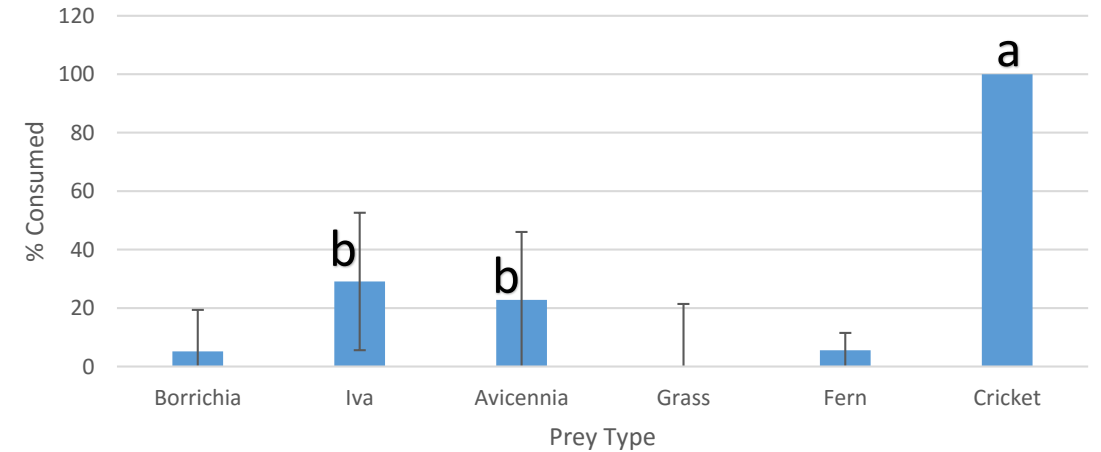


Results:

Manly-Chesson Alpha Values for Plant Prey Items Consumed by *Armases* in Multiple-Choice Feeding Assay



Proportion of Initial Mass Consumed



Rank by Electivity Index:

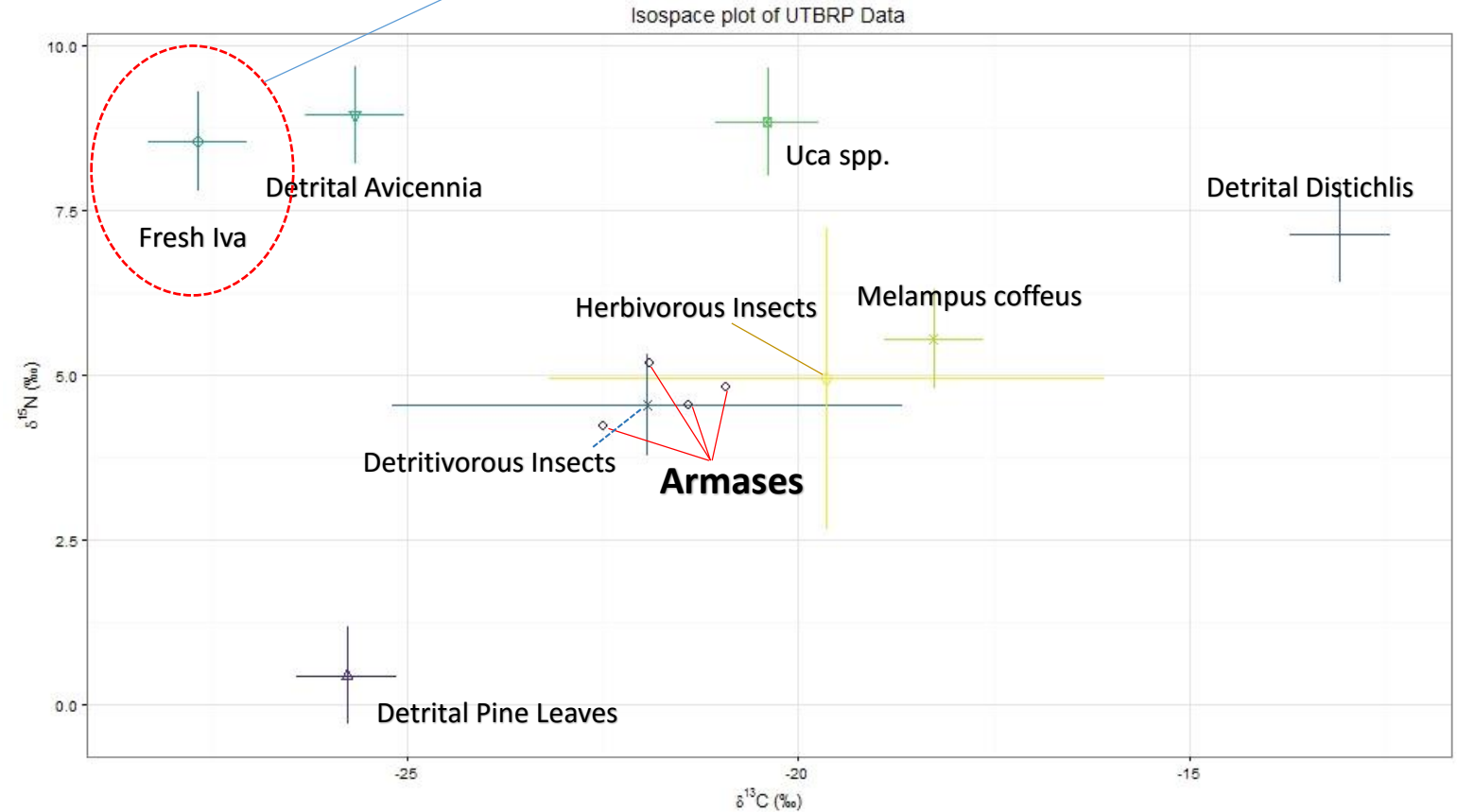
1. Cricket*
2. Iva
3. Black Mangrove
4. Borrichia
5. Fern
6. Grass



Exploring Feeding via Stable Isotope Analysis

- Goal: Confirm the laboratory-observed selectivity behavior with stable-isotope analysis
- Analysis of observed $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ ratios using `simmr` (R software package)

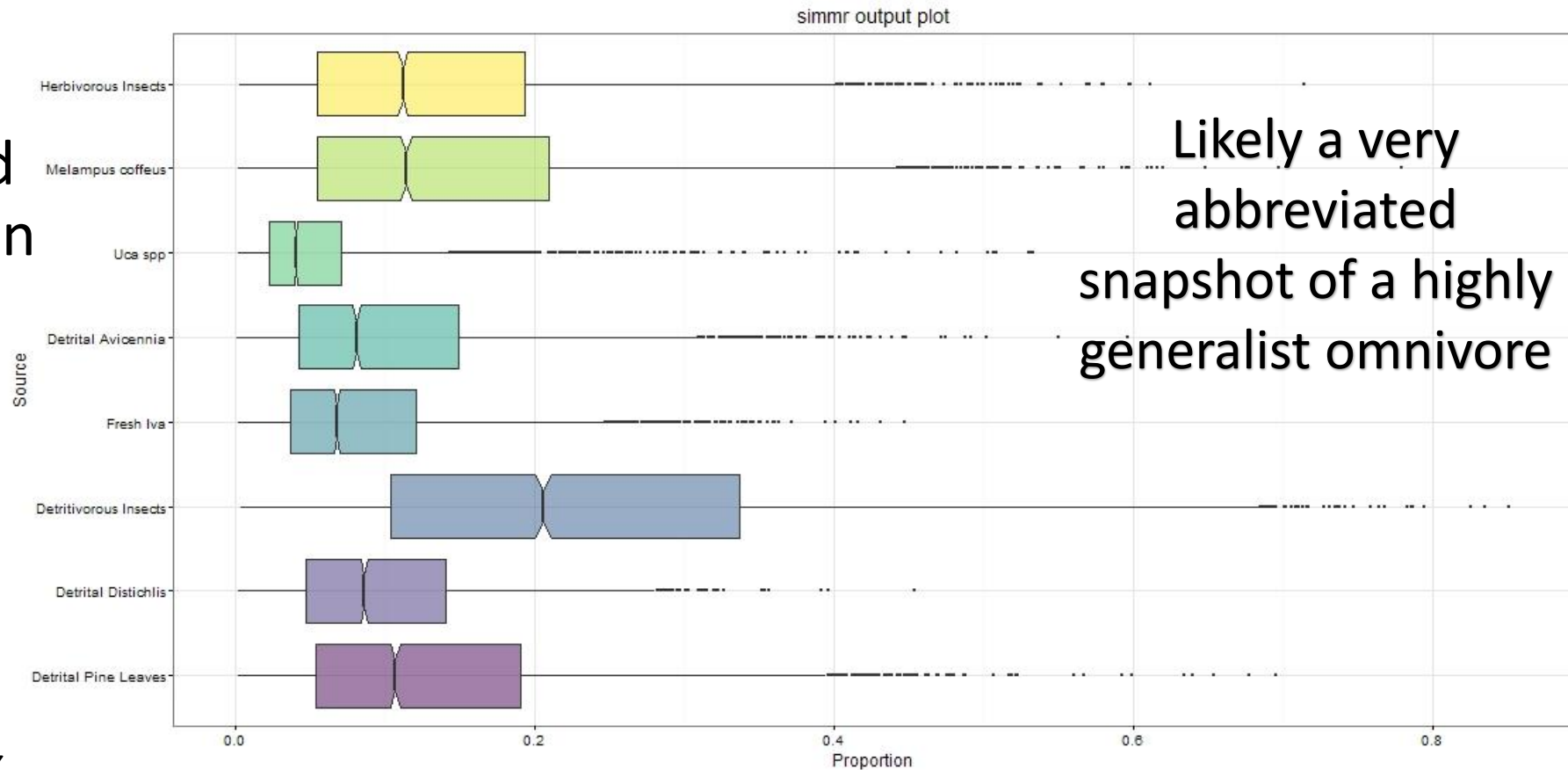
↑ $\delta^{15}\text{N}$ due to insect contamination? Use of N-rich fertilizers at site?



Potential sources selected based on previous experiments, literature, and direct observation of *Armases cinereum* in the field. Some potential sources omitted due to mixing model restrictions.

Simmr Mixing Model Results

- Animal prey preference in lab and greatest proportion in diet of crabs at ecotone
- Contributions from both upland and mangrove detritus
- Iva and Detrital Avicennia both <15% of diet



Conclusions

1. *Armases* shows preferences for partially-decomposed Black Mangrove leaves when provided mangrove leaves
2. *Armases* displayed strong selectivity for animal prey, yet among plant foods consumed we observed preference for Iva and Black Mangrove
3. Stable isotope analysis revealed small % diet contribution of Iva and Black Mangrove
 - Possibly due to overlapping signatures, contamination by leaf-boring insects, or Nitrogen contamination by locally-applied fertilizers

Ongoing Work:

- Does the presence of adjacent upland forest influence the trophic position of *Armases cinereum* in Tampa Bay?
- Does presence of upland forest influence reproductive output, size, and gender ratios of *Armases cinereum* populations?



Acknowledgements

- Bell Lab, USF Tampa
 - Susan Bell (advisor)
 - Kiley Chernicky (undergraduate)
 - Shannon Grogan
 - Derrick Hudson
 - Stephen Hesterberg
- USF Stable Isotope Lab
 - Jessica Wilson
- Volunteers
 - Cristina Blanco
 - Mary Kate O'Donnell
- Friends and Family
- Funding Sources
 - St. Petersburg Audubon Society
 - USF Department of Integrative Biology
 - Fern Garden Club of Odessa

