

# Potential Niche Overlap between the Spotted Turtle (*Clemmys guttata*) and Other Turtle Species

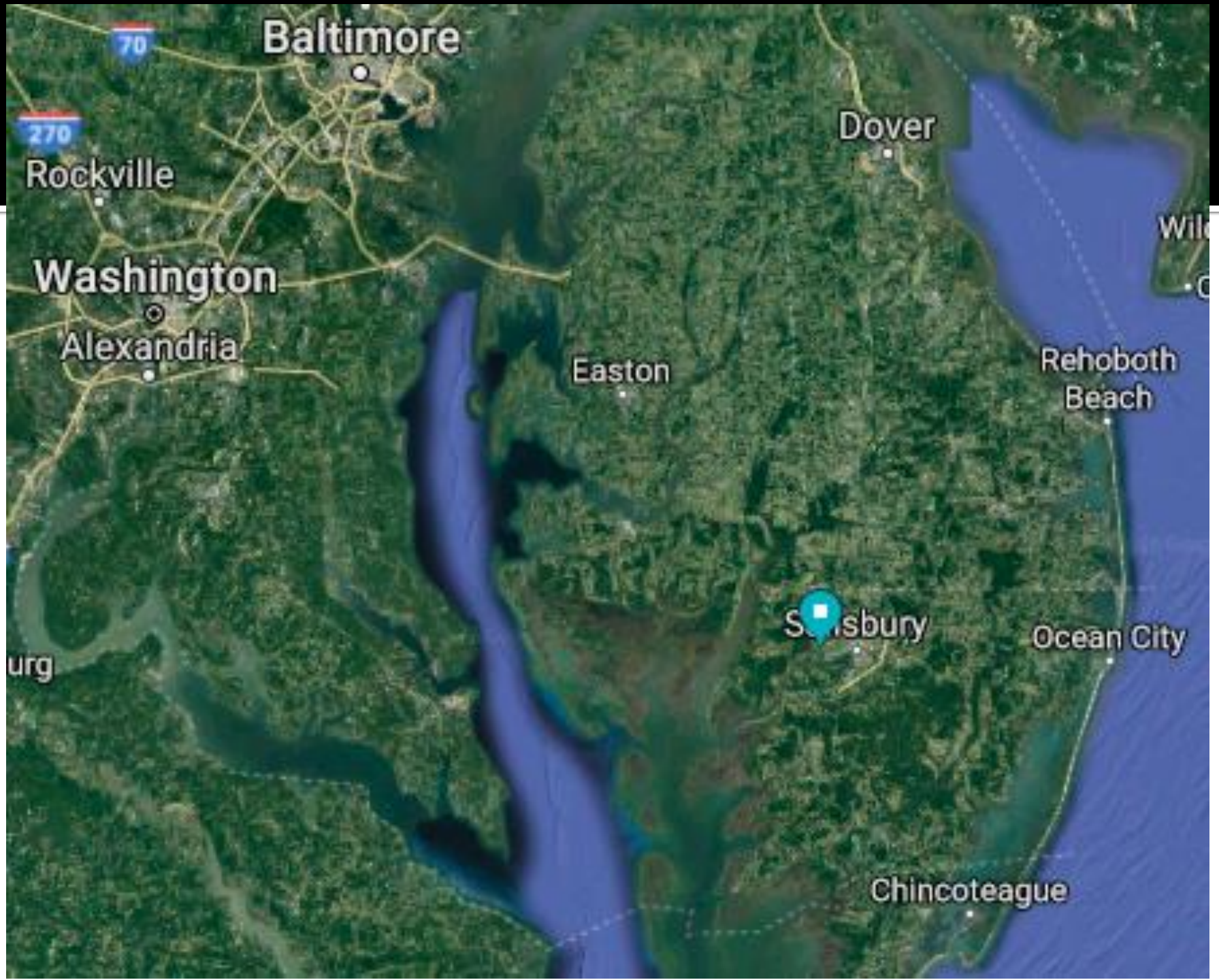


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# Goals

- Which environmental factors affect numbers of *Clemmys guttata* and other turtles in ponds?
  - Salinity, DO, pH, pond area, pond depth, canopy cover
- Are interspecific interactions (i.e., competition) among turtle species on the Delmarva Peninsula affecting spotted turtle abundances?
  - Path analysis – potential direct and indirect effects within the turtle community
  - Stable isotopes – diet overlap



Baltimore

Dover

Rockville

Washington

Alexandria

Easton

Rehoboth  
Beach

Salisbury

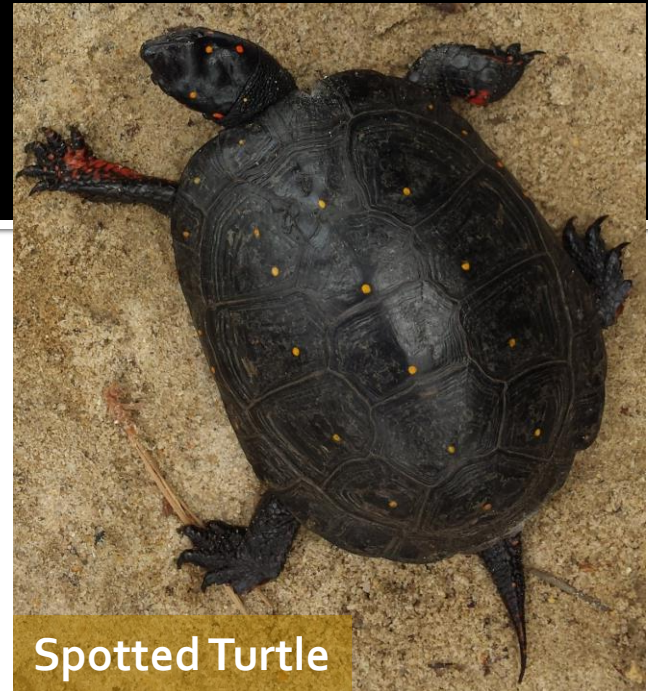
Ocean City

Chincoteague

urg



# The community



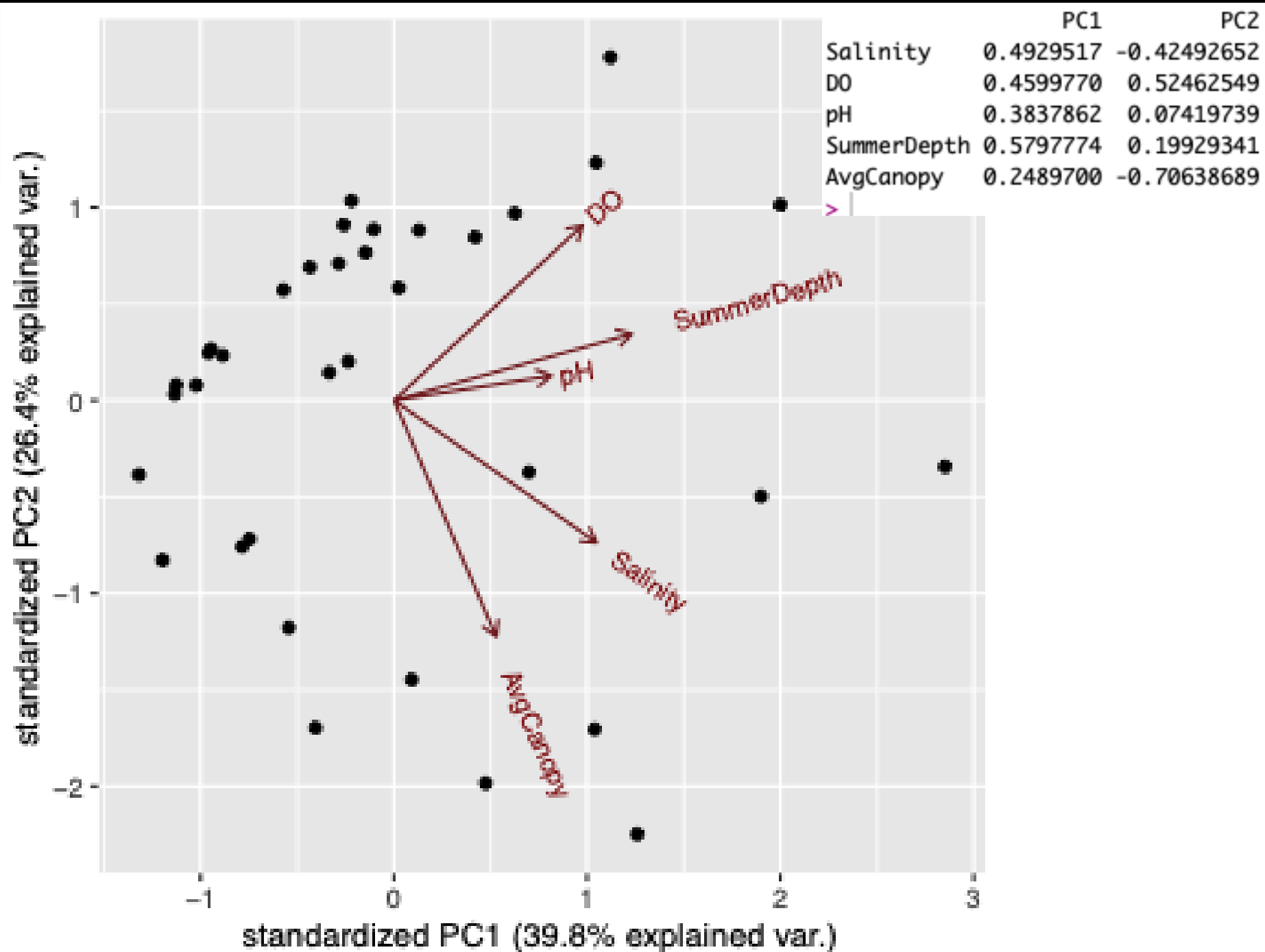




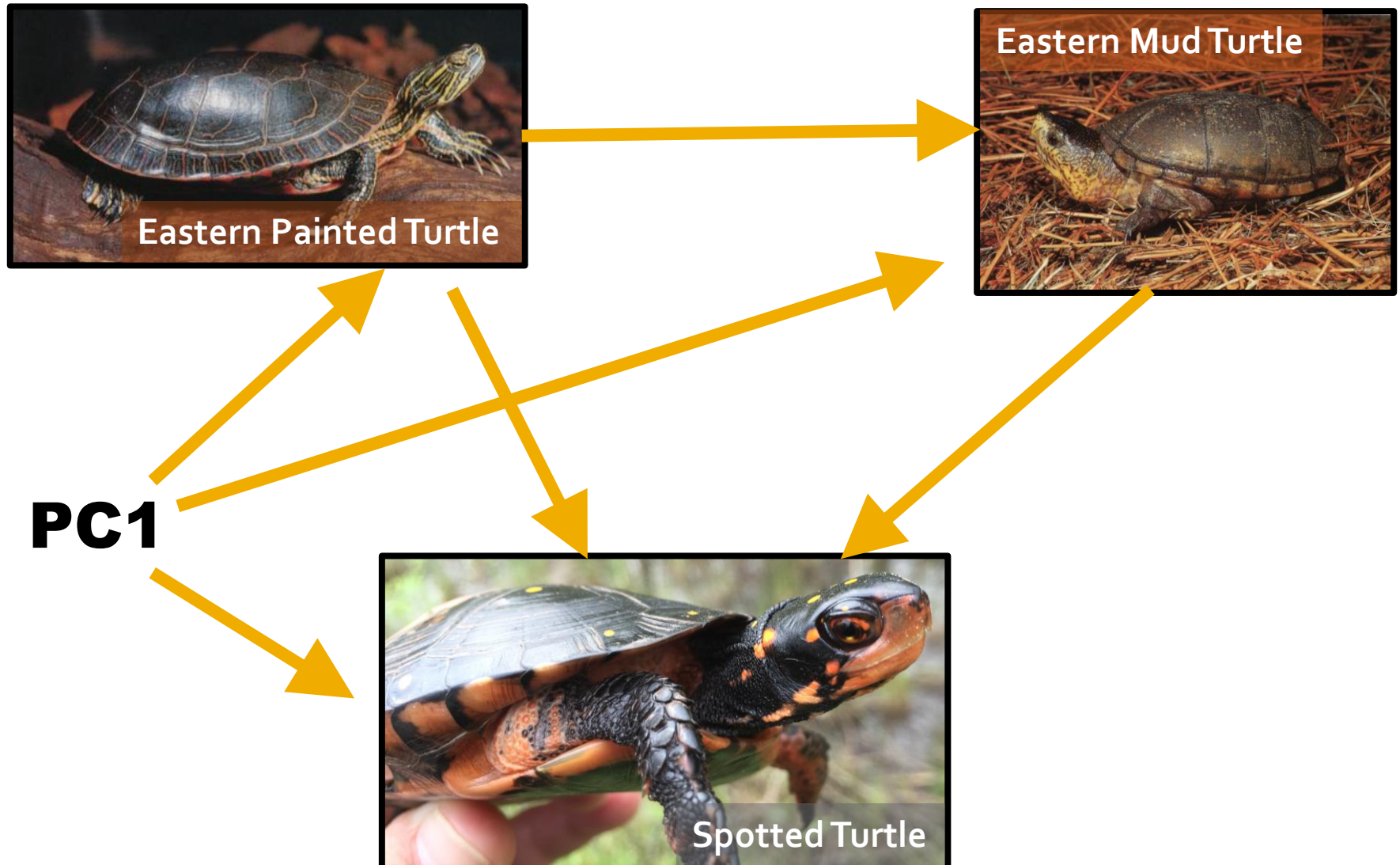


# Path Analysis



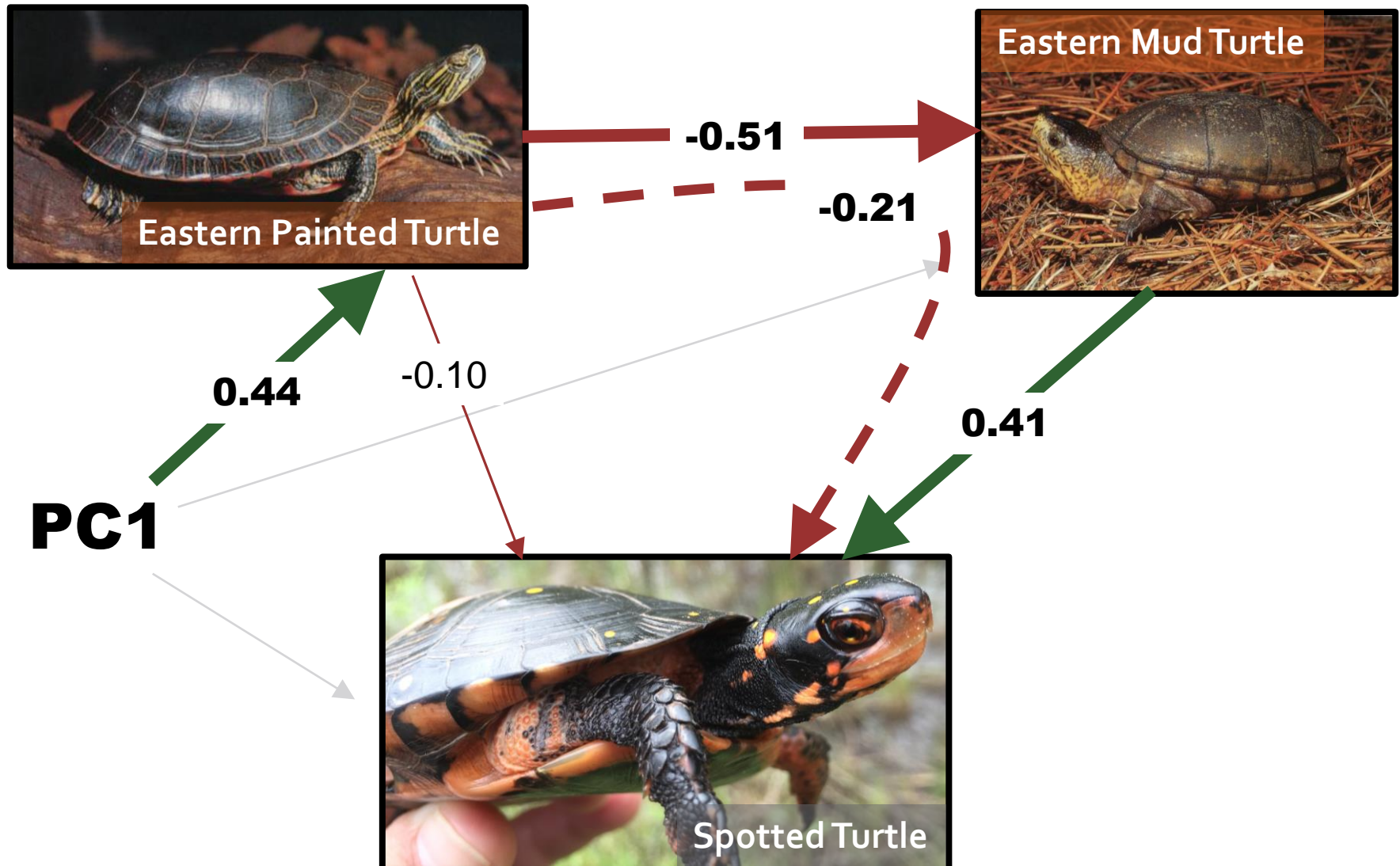


# Path Analysis





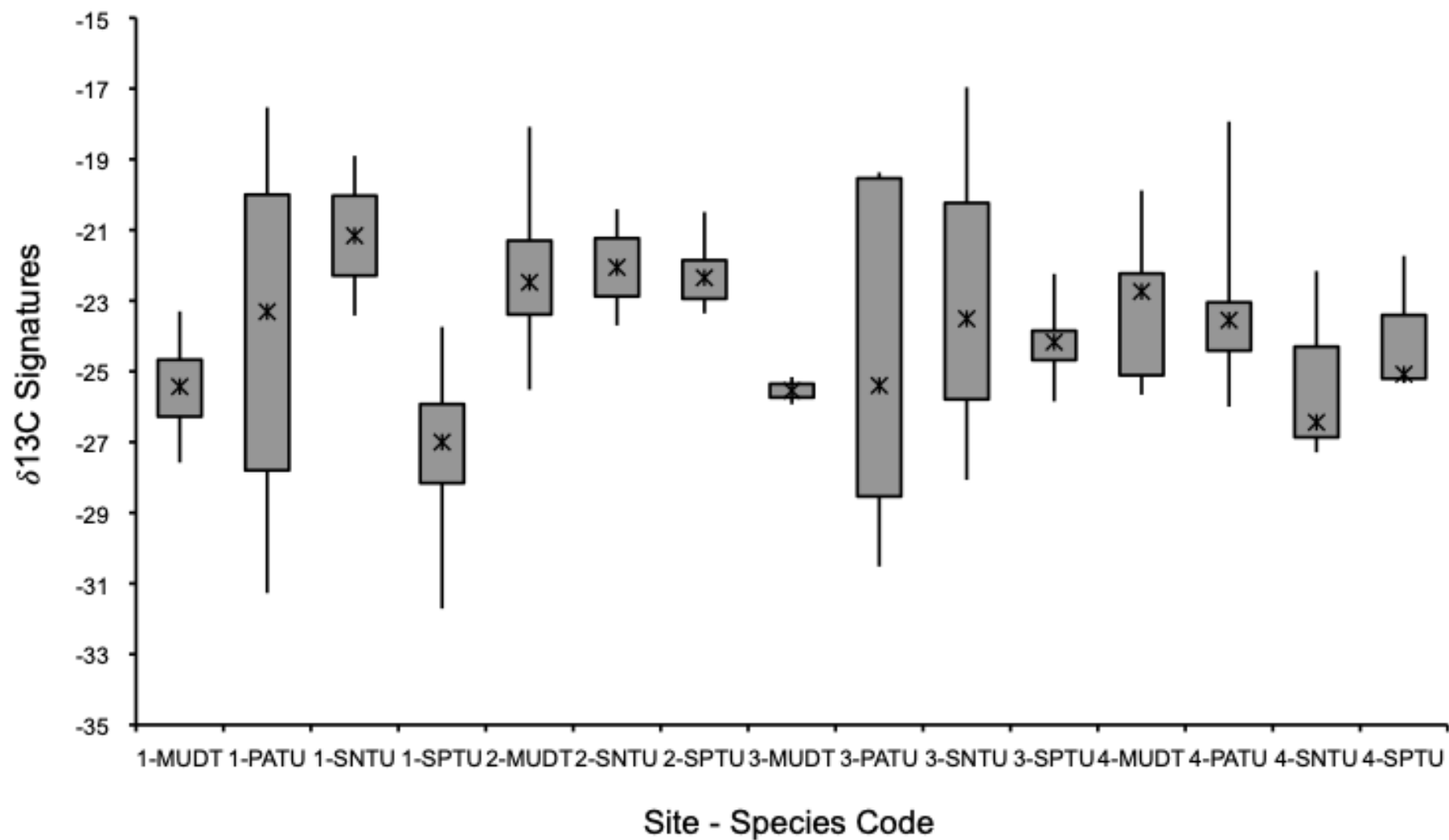
# Path Analysis



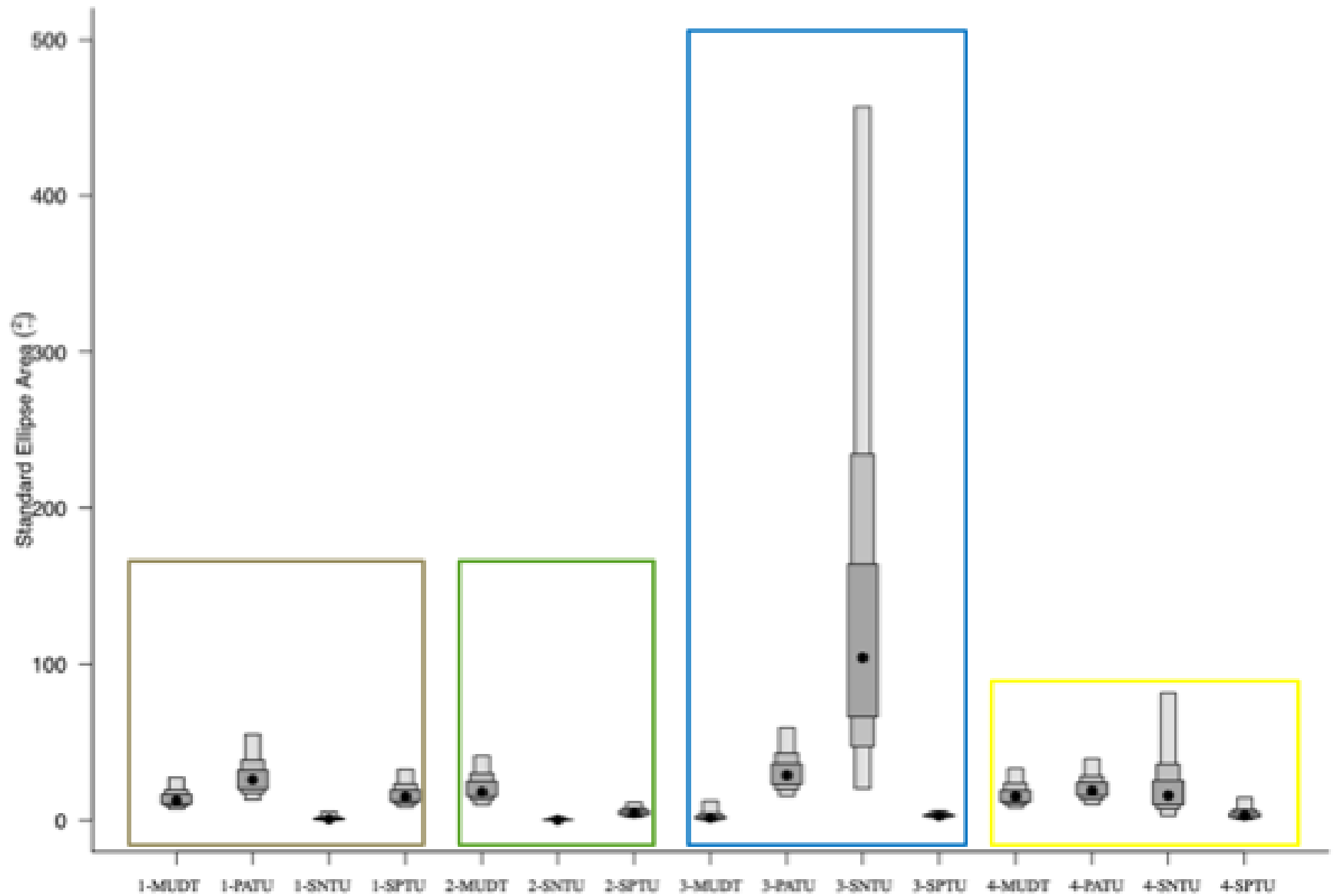
# Stable Isotope Analysis

- ▶ Nail clippings [*C. guttata* ( $n=31$ ), *C. picta* ( $n=29$ ), *C. serpentina* ( $n=10$ ) and *K. subrubrum* ( $n=30$ )]
- ▶ Sent to University of Maryland Center for Environmental Science (UMCES)
- ▶ Analyzed Carbon and Nitrogen Isotope ratios
  - ▶  $\delta^{13}\text{C}$  reflects dietary composition past 12 months
  - ▶  $\delta^{15}\text{N}$  reflects diet past 6 months and trophic level
- ▶ SIBER plots (Stable Isotope Bayesian Ellipses)



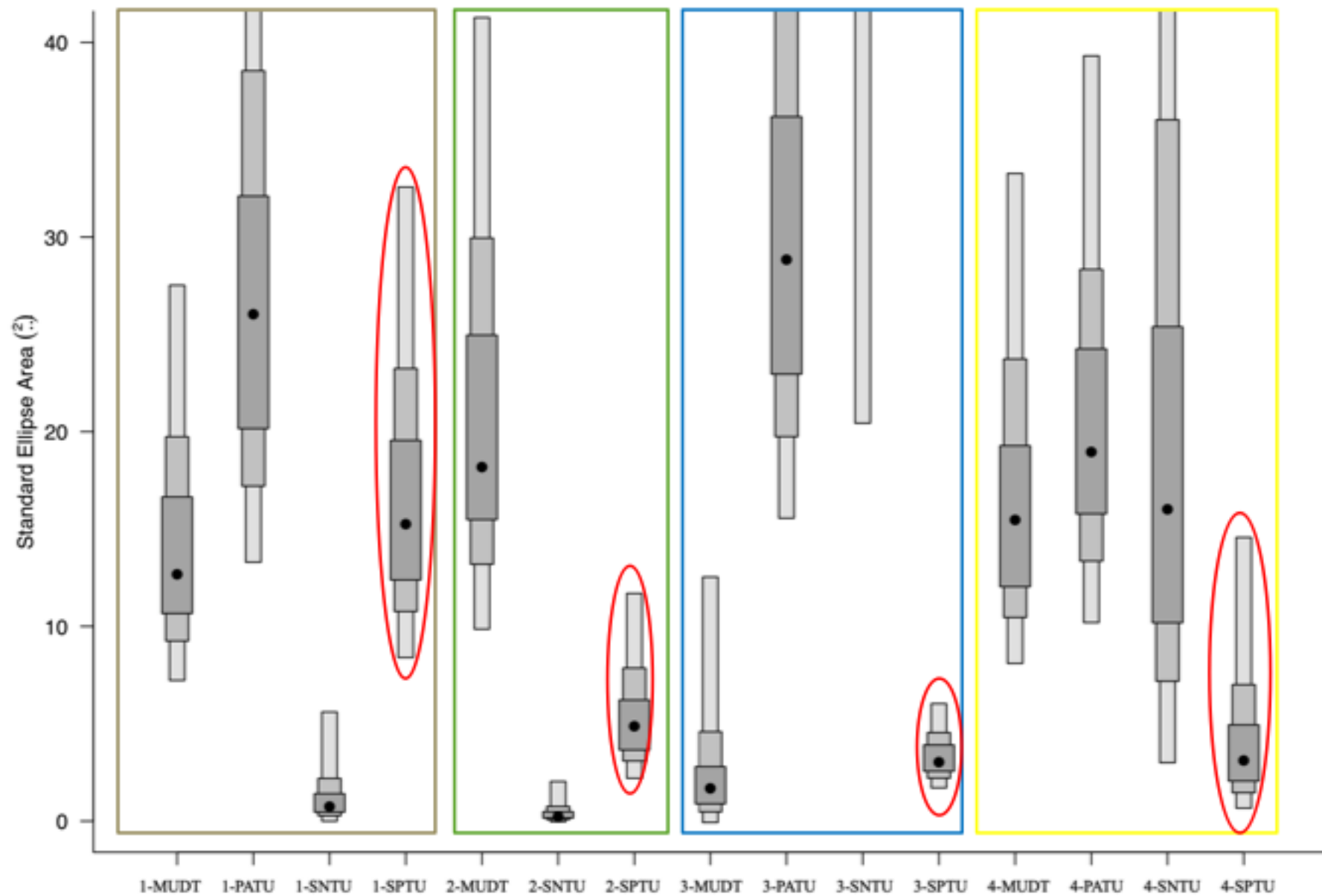


SIBER ellipses on each group





SIBER ellipses on each group



# Summary

- Both the habitat and dietary niches of the turtle species overlapped
- Path analysis: **painted turtles** appear to have a **negative indirect effect on spotted turtles** mediated by mud turtles
- Effective conservation strategies may entail preserving habitats with conditions that spotted turtles prefer (low dissolved  $O_2$  and pH, and greater canopy cover)



# Acknowledgements

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- Site selection/permissions:
  - Scott Smith (MD DNR)
  - Nate Nazdrowicz (DE DNREC)
  - Rob Gano, Matt Whitbeck, and Jack Kumer
- Funding from SU & RCN grant



# Results: Habitat Parameters

	Salinity (ppt)	Dissolved O <sub>2</sub> (mg/L)	pH	Canopy Cover (% closed canopy)	Summer Pond Depth (m)	Pond Area (Km <sup>2</sup> )
Spotted Turtle ( <i>Clemmys guttata</i> )	N.S.	—	—	+	+	N.S.
Eastern Mud Turtle ( <i>Kinosternon subrubrum</i> )	N.S.	N.S.	N.S.	+	—	+
Painted Turtle ( <i>Chrysemys picta</i> )	N.S.	+	+	N.S.	+	N.S.
Snapping Turtle ( <i>Chelydra serpentina</i> )	N.S.	N.S.	N.S.	+	N.S.	N.S.

# Results: Habitat Overlap

- ▶ Abundance of mud turtles (*K. subrubrum*) [ $B = -0.030$ ] and painted turtles (*C. picta*) [ $B = -0.014$ ] significantly affected the abundance of spotted turtles at the pond level.
- ▶ Site and Total trap nights also had an effect

Tests of Model Effects			
Parameters	Type III		
	Wald Chi-Square	df	Sig.
Site	91.952	4	<0.001
Mud turtle abundance	7.316	1	0.007
Painted turtle abundance	8.466	1	0.004
Snapping turtle abundance	0.372	1	0.542
Total Trap Nights	102.339	1	<0.001