Foraging ecology and nursery habitat use of brown stingrays, *Dasyatis lata*

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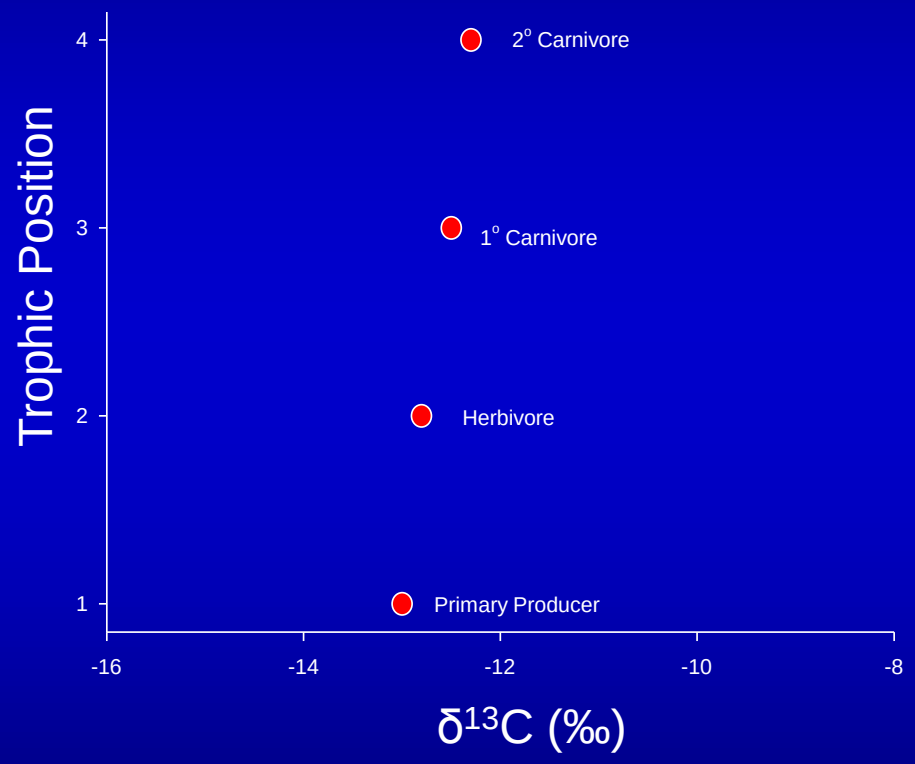
Bays and Estuaries

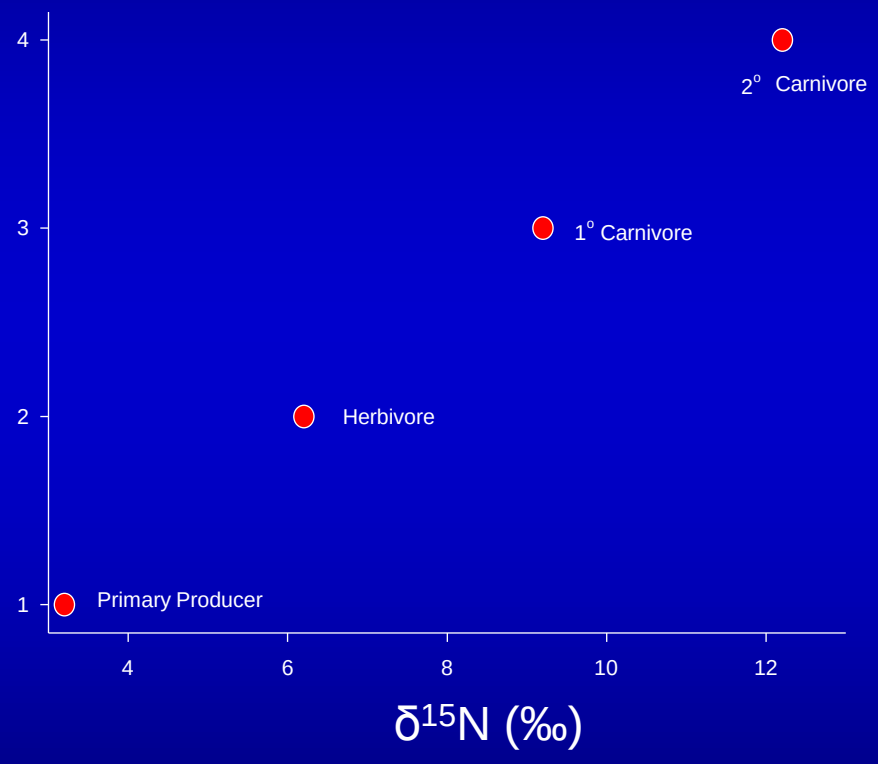
- Important component of the life history of many elasmobranch species
  - Aggregation areas for mating
  - Sites of parturition
- Nursery areas
  - Potential long term habitat use
  - Increased prey abundance
  - Decreased predation risk
  - Increased juvenile survival
  - May lead to regulation of prey resources
- Highly susceptible to anthropogenic impacts

Foraging Ecology

- Stomach Contents
  - Snapshot of diet
  - Differential digestion rates
  - Uncertainty in estimates of trophic positions
- Bulk Tissue Stable Isotopes
  - Time integrated values of assimilated prey
  - Spatial and temporal variability

Bulk Stable Isotopes





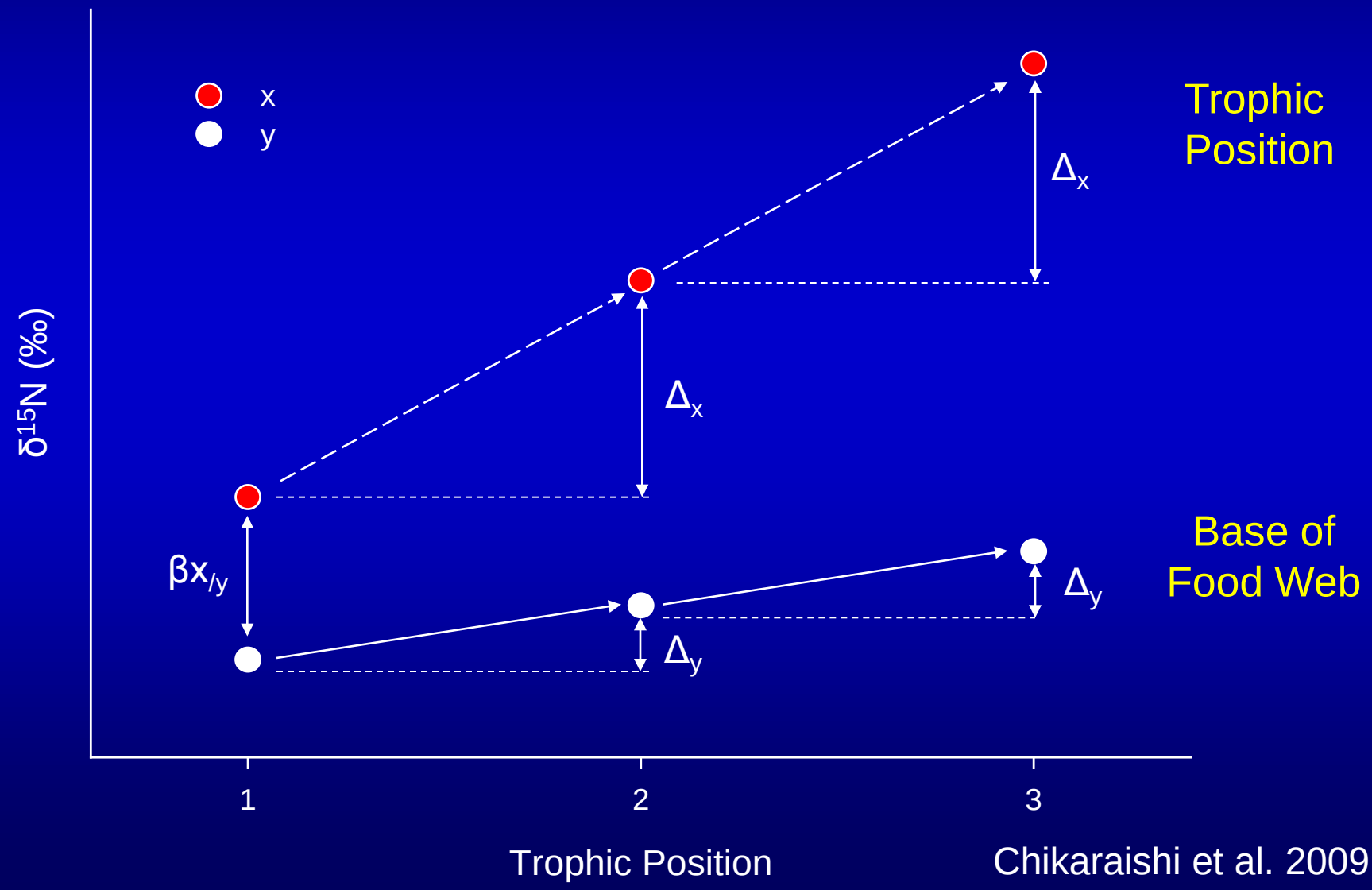
Base of Food Web

Trophic Position

Foraging Ecology

- Stomach Contents
  - Snapshot of diet
  - Differential digestion rates
  - Uncertainty in estimates of trophic positions
- Bulk Tissue Stable Isotopes
  - Spatial and temporal variability
- Compound-specific nitrogen isotopic analysis of individual amino acids

Nitrogen Isotopic Analysis of Amino Acids



Chikaraishi et al. 2009

Dasyatis lata

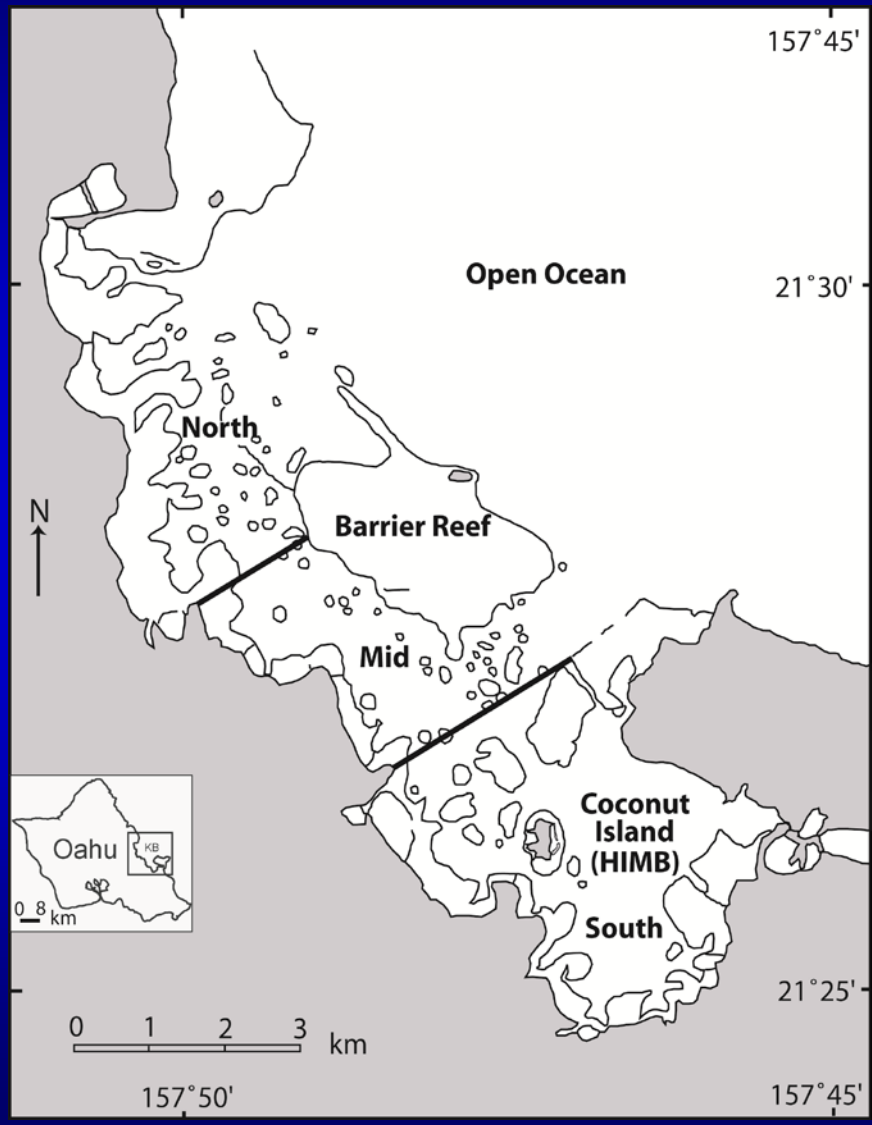
- Large benthic predator endemic to Hawai‘i
  - Up to 5 ft. wide and > 200 lbs
- Abundant in estuaries and coastal waters
  - Depths up to 300 m
  - Nursery habitat?
- Ecological Impacts unknown
  - Very limited data available on even basic biology

Research Questions

- What are the feeding habits of brown stingrays?
- Do their feeding habits change through ontogeny?
- Do they use bays as nursery habitats?
- Does analysis of individual amino acids accurately reflect the trophic position of brown stingrays?

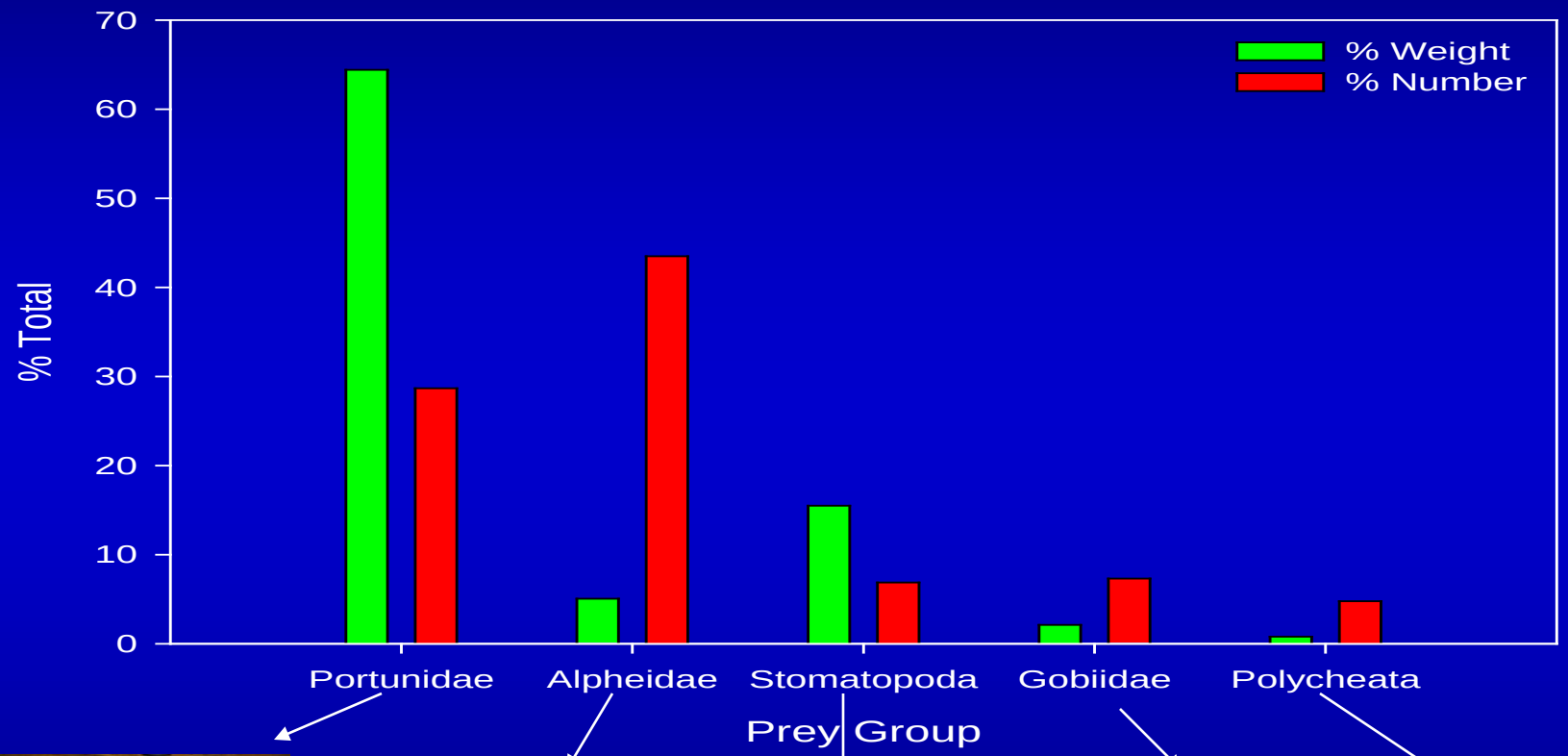
Methods

- Kāneʻohe Bay, Oʻahu
- Stomach Content Analysis
  - Prey composition and contribution (% number and % weight) to diet
- Stable Isotope Analysis
  - Bulk Tissue
  - Compound-specific nitrogen isotopic analysis of individual amino acids
- 3 size classes
  - Small (<55 cm DW)
  - Medium (55 – 70 cm DW)
  - Large (70-95 cm DW)



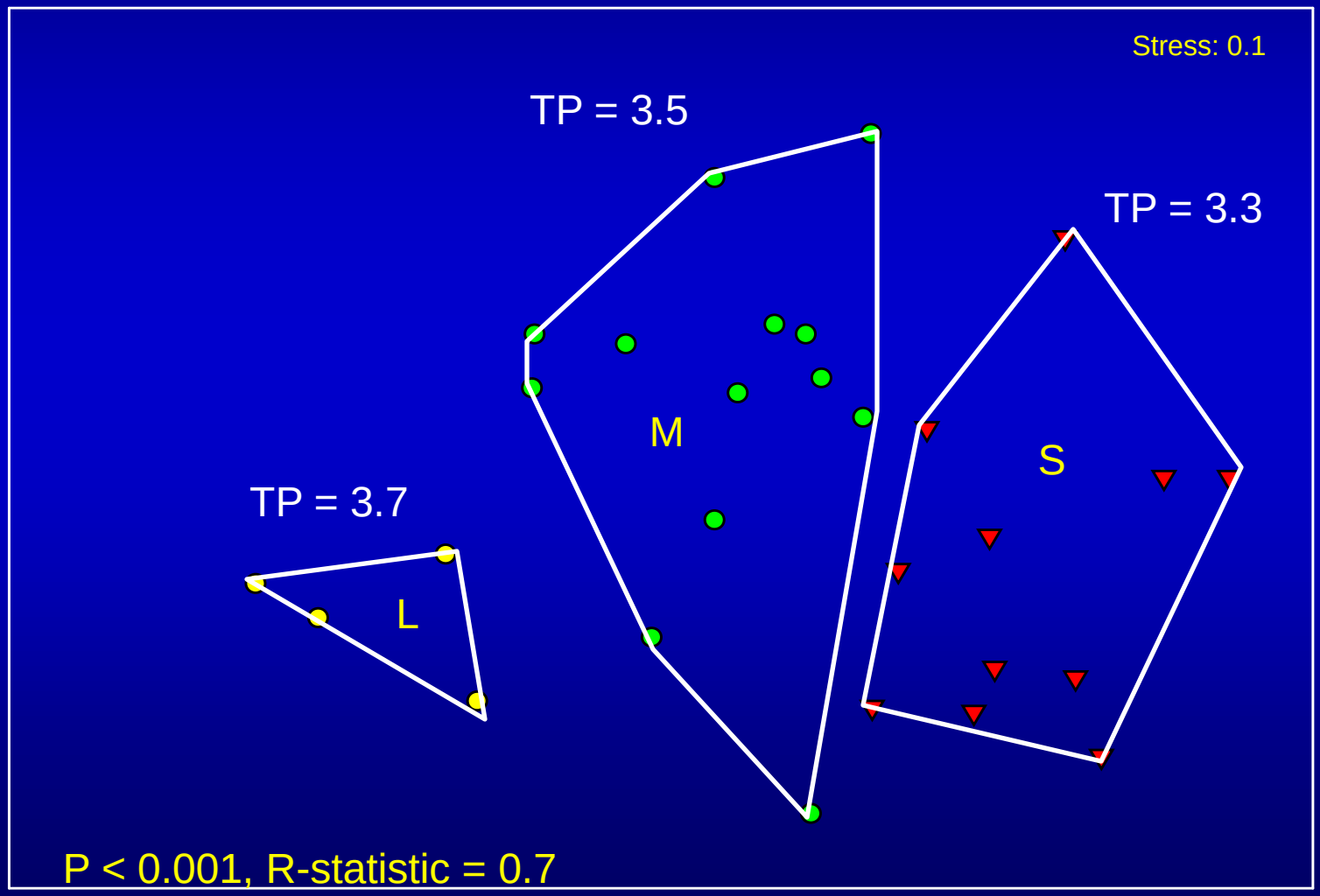
Results

Diet Composition



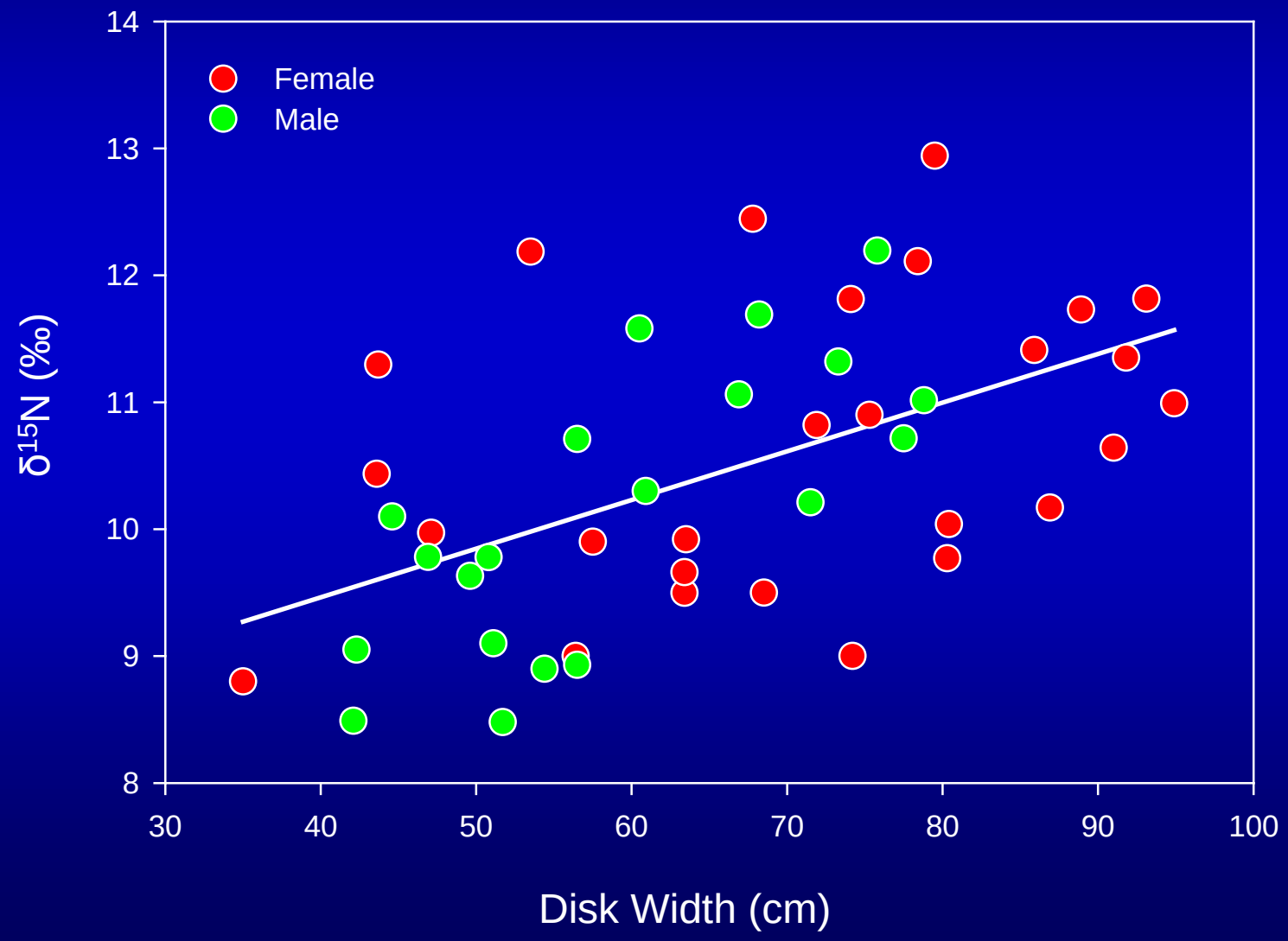
Results

Ontogenetic Changes - Diet



Results

Ontogenetic Changes – Diet



Trophic position:

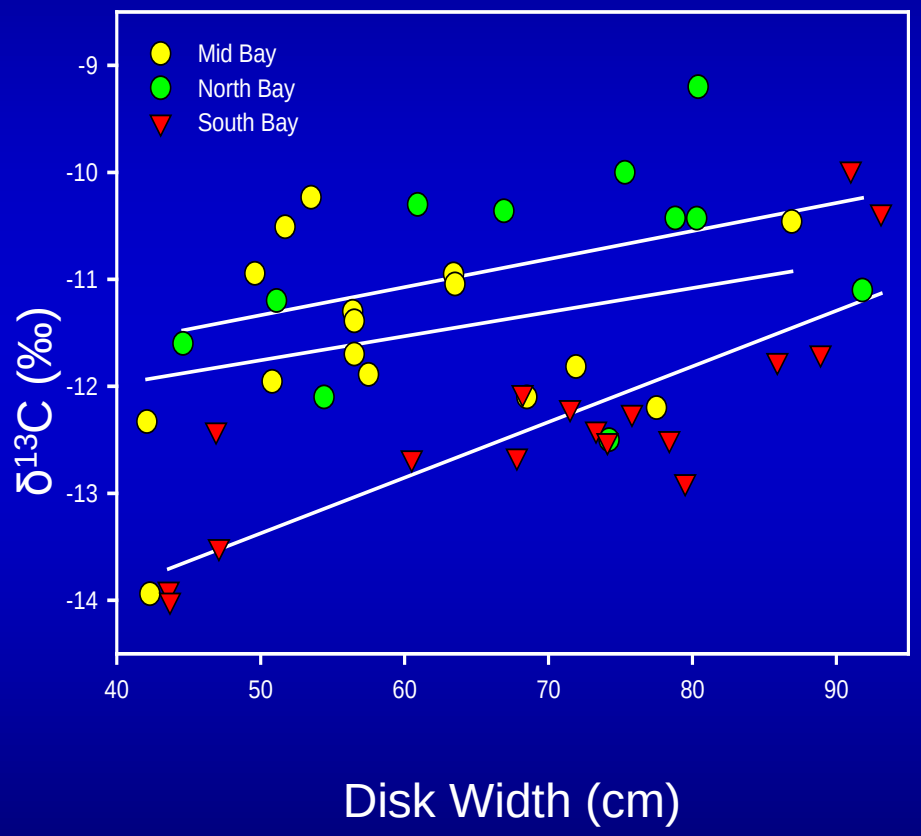
Small = 3.3

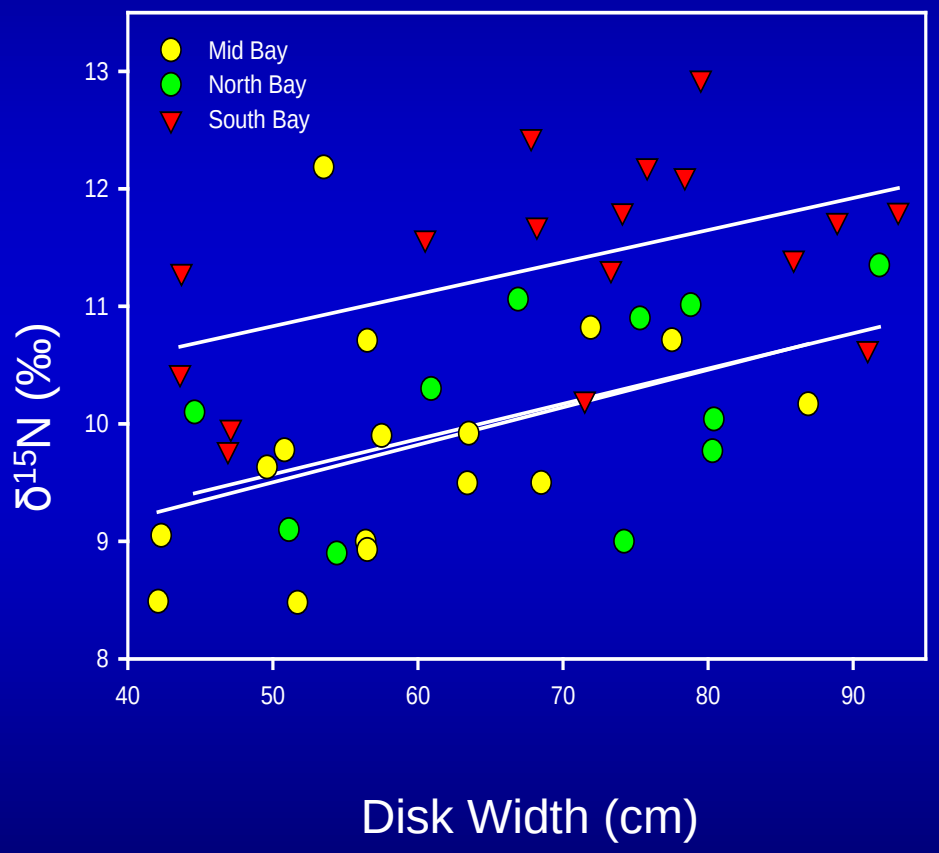
Med = 3.5

Large = 3.6

Results

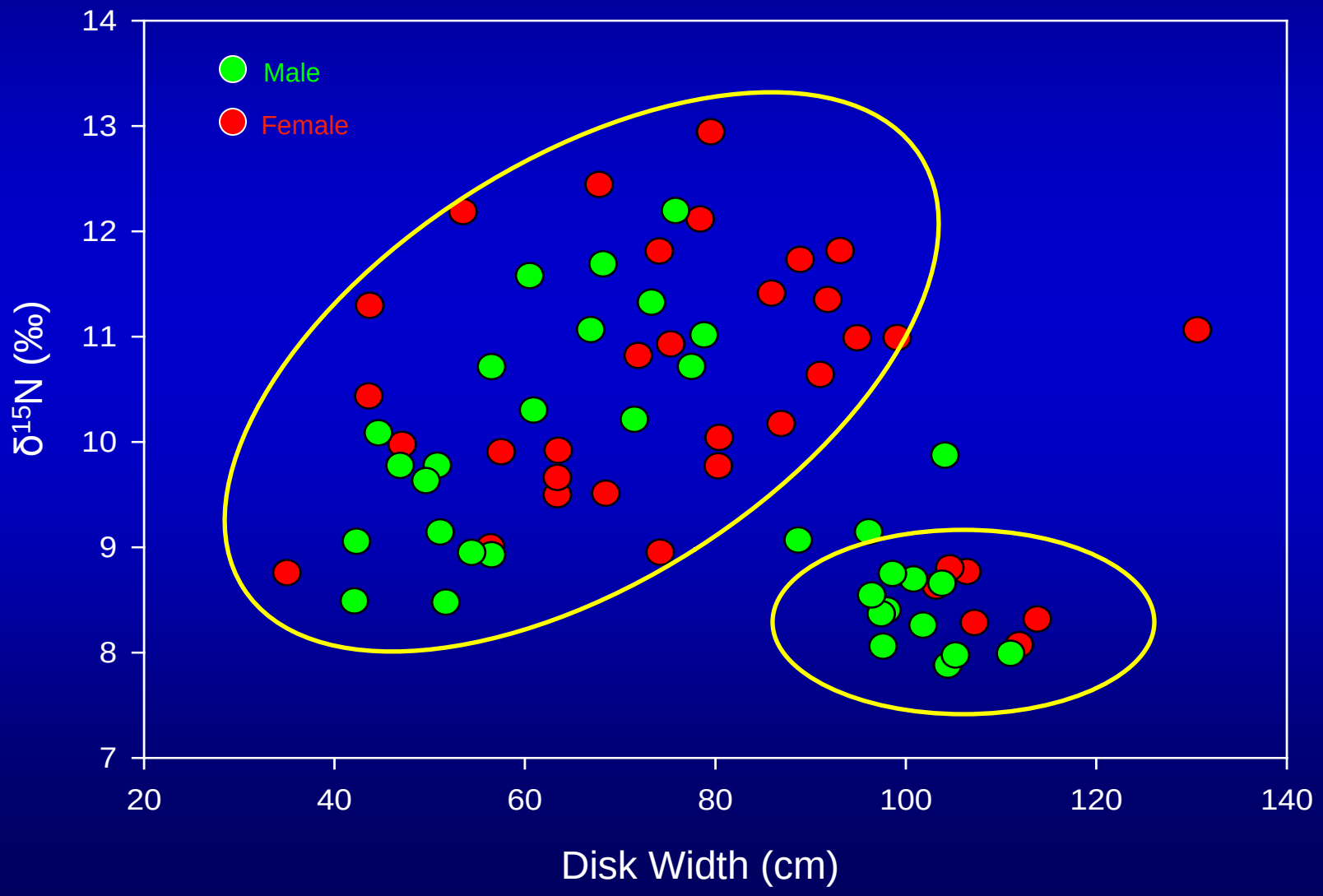
Ontogenetic Changes - Habitat





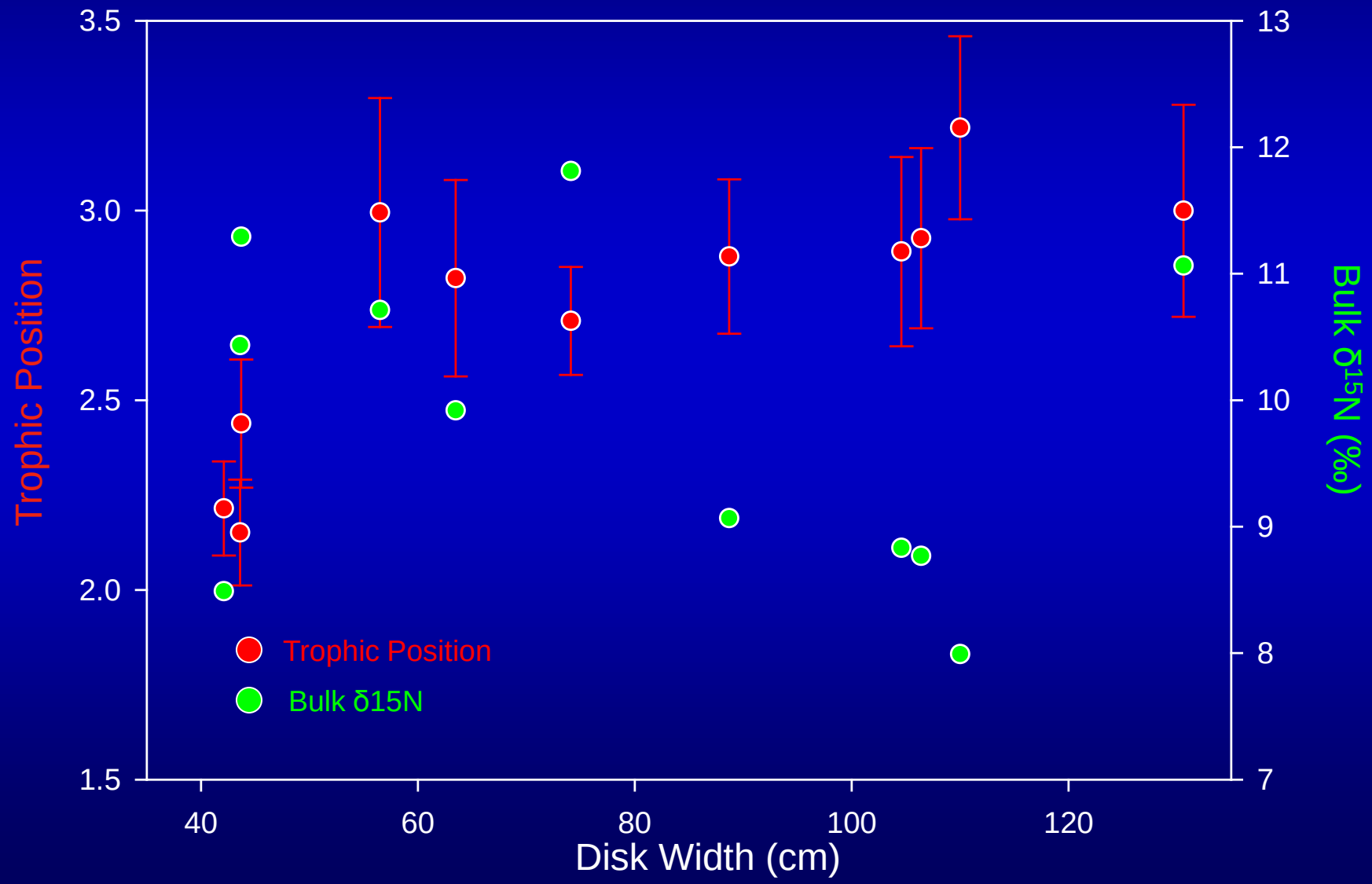
Results

Ontogenetic Changes - Habitat



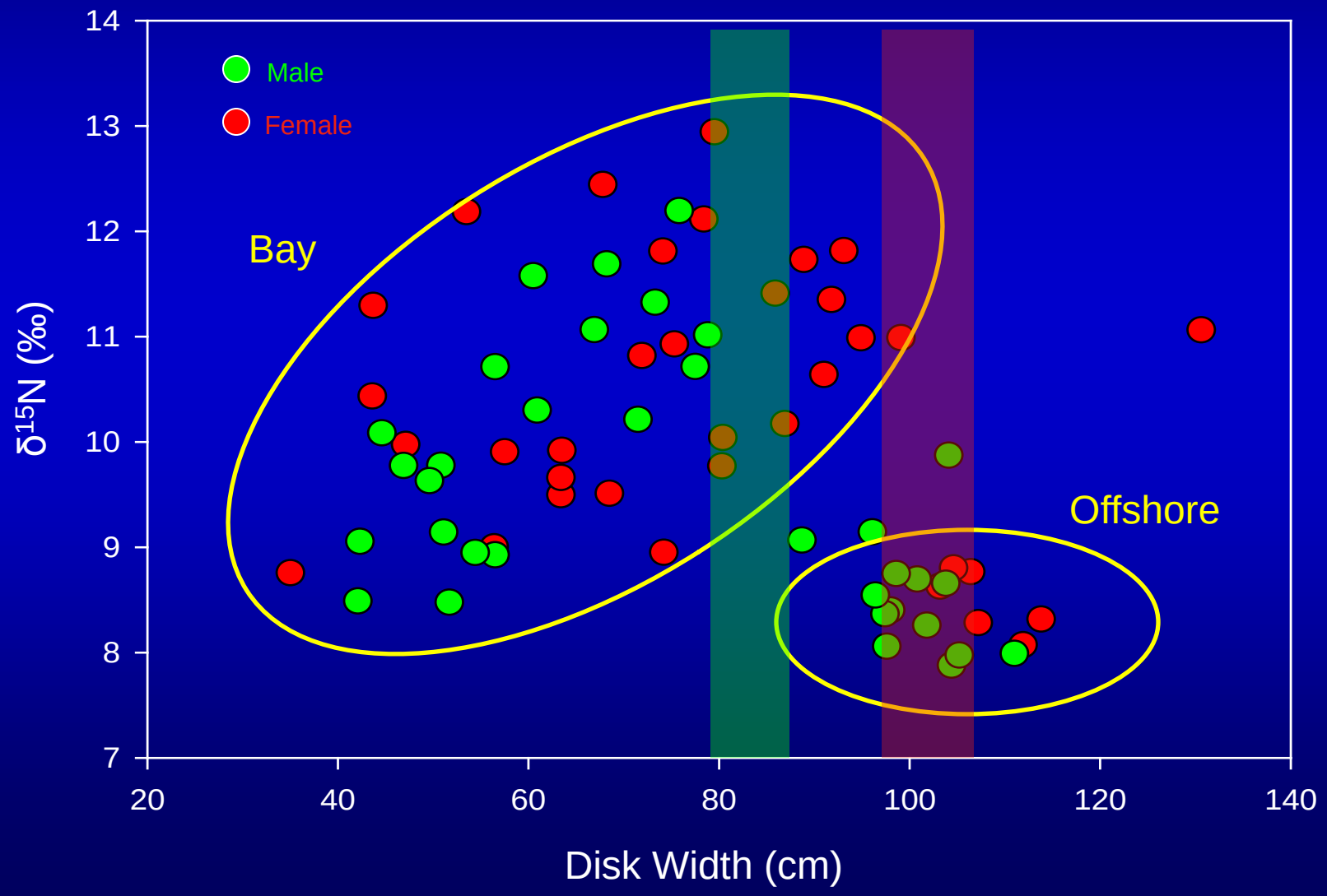
Results

Amino Acid Analysis



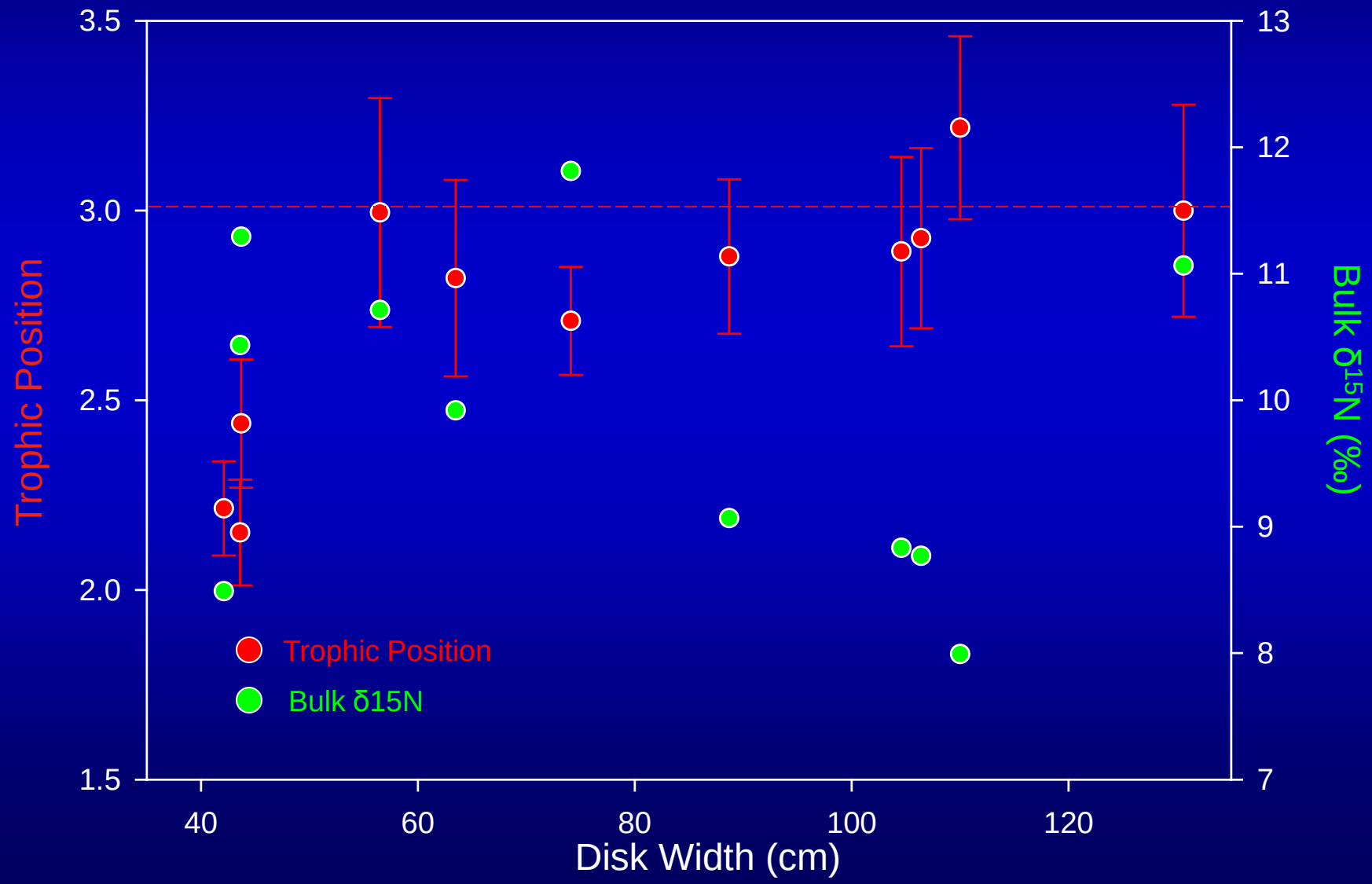
Results

Ontogenetic Changes - Habitat



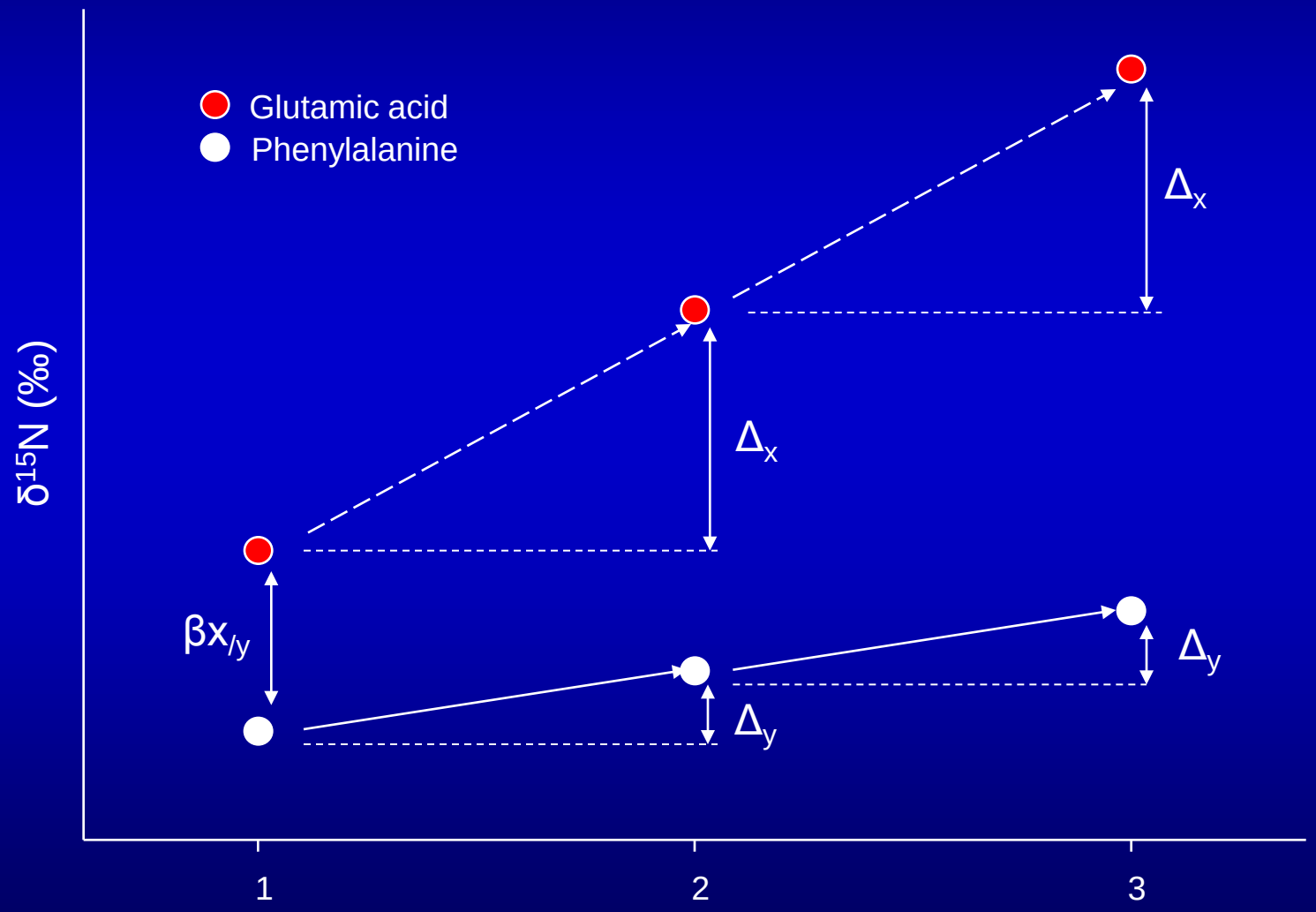
Results

Amino Acid Analysis



$$TP_{Glu/Phe} = (\delta^{15}N_{Glu} - \delta^{15}N_{Phe} - 3.4‰)/7.6 + 1$$

New TEF = 4.8‰



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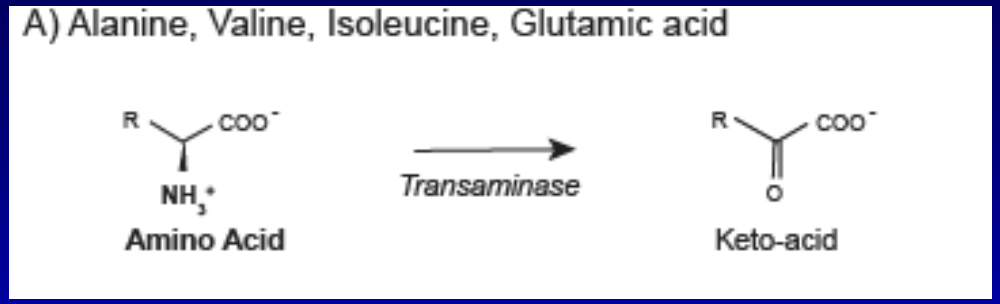
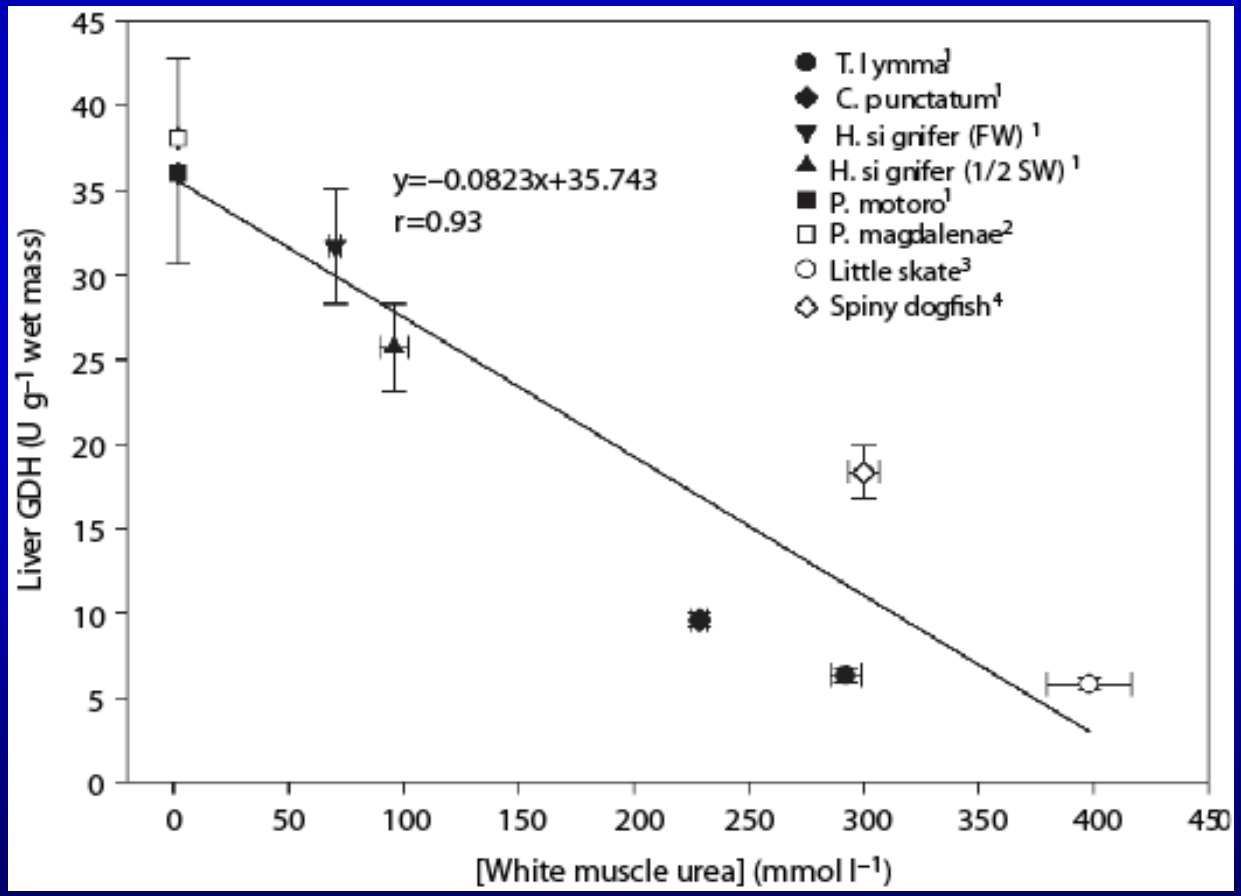


Chikaraishi et al. 2007



Speers-Roesch et al. 2006

Conclusions

- Generalist predator
- Shift in diet from shrimp dominated to crab dominated with growth
- Kāneʻohe Bay is an important nursery habitat for brown stingrays
  - Utilize sub-regions within the bay for extended periods of time
  - Remain in bay until sexually mature, then shift to offshore habitat
- Amino acid analysis accurately represented relative trophic position
  - TEF used to calculate absolute TP in previous studies requires adjustment for elasmobranchs

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