

# Effects of Phosphorous Limitation on Consumer Stoichiometry and Food Web Structure

Riki Bonnema, Florida International University

Research Mentor: James Fourqurean

## Goals

- Determine effects of phosphorous availability on consumer stoichiometry and food chain length
- Determine effect of phosphorous availability on prey availability
- Determine if a shift in food web dependence on different primary sources (primary producers vs detritus) occurs along phosphorous gradient



Figure 1. Florida Bay is a shallow embayment with a gradient in phosphorous availability, where phosphorous limitation increases as you move from the south western portion of the bay to the northeastern portion.

## Research Methodology

- Measure C:P in primary resources, prey and consumers across the bay
- Collect samples for stomach content and stable isotope analysis to compare food chain length and diet of consumers
- Collect samples for future amino acid compound specific isotope analysis (AA-CSIA) to measure food sources and trophic position by looking at difference in  $\delta^{15}\text{N}$  values of "source" and "trophic" amino acids.



Figure 2. Sites along the phosphorous gradient in Florida Bay that will be sampled.



photo courtesy of George Brinkman, Guelph, Ontario, Canada.



Photo courtesy of Dean Kimberely, Atlanta, GA.

Figure 3 and 4. Target consumer species. Left: *Cynoscion nebulosus*, as high-level, mobile consumer, and right: *Opsanus beta*, as more intermediate-level, residential consumer.

## Expected Results

- Expect to see a decrease in C:P variance as you move up trophic levels
- Expect to see a significant shift in diet along the phosphorous gradient measured by  $\delta^{13}\text{C}$  values and gut analysis
- Expect to see longer food chain length, measured by  $\delta^{15}\text{N}$  values, in less phosphorous limited sites

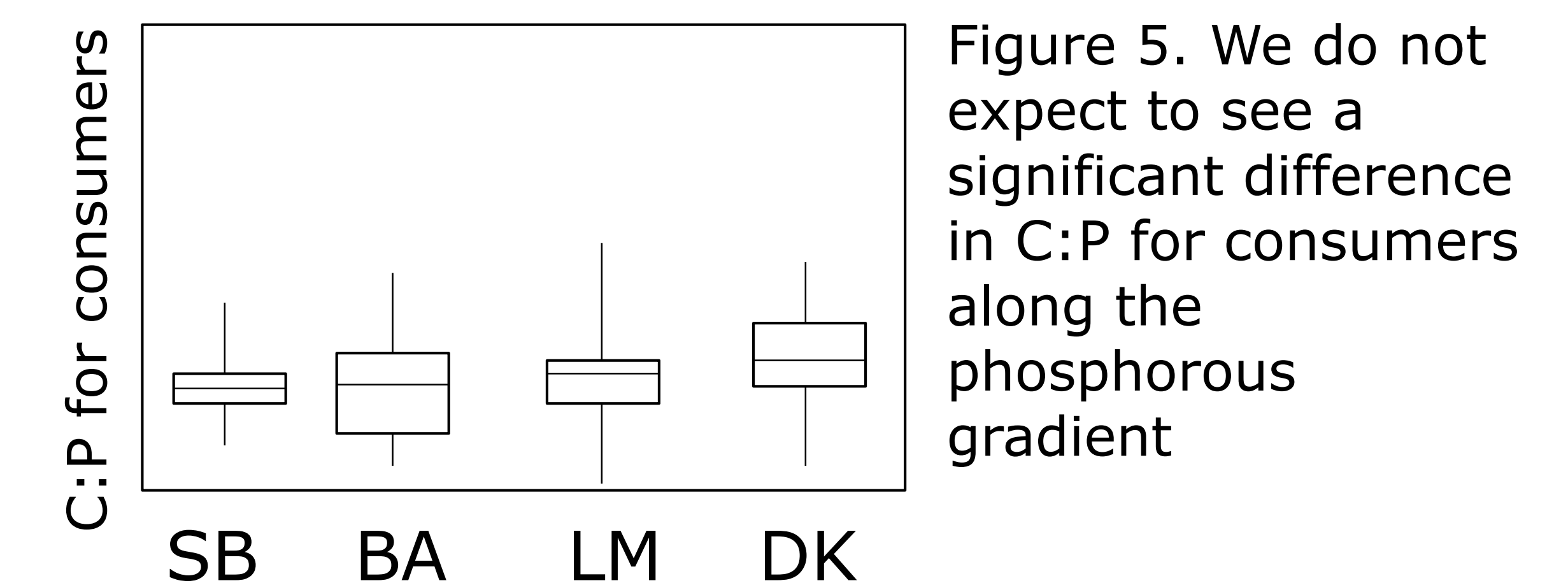


Figure 5. We do not expect to see a significant difference in C:P for consumers along the phosphorous gradient

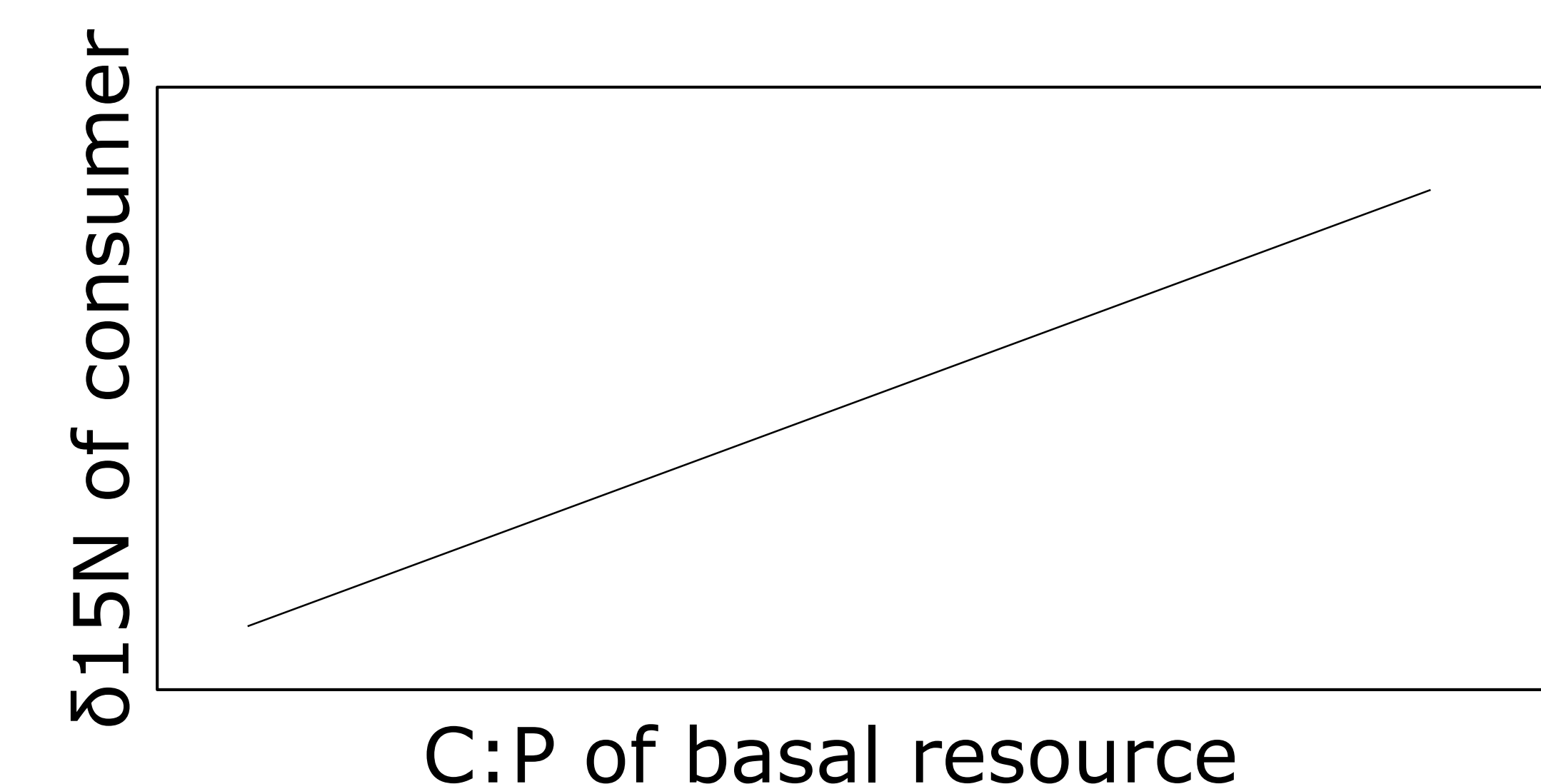


Figure 6. We expect to see a positive linear relationship between phosphorous limitation and food chain length because carbon is not expected to be limiting in Florida Bay.



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ebonn008@fiu.edu

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