A Comparison of Stable Isotope Dynamics in Black Sea Bass (*Centropristis striata*) and Southern Stingrays (*Hypanus americanus*)

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Introduction

- Measuring Carbon and Nitrogen isotopes in an organism's tissues can be used to determine its trophic level (where it sits in the food chain).
- Stable Isotope analysis was originally used in marine systems for bony fish (teleosts).
- It is uncertain how long it takes for a change in diet to be reflected in the isotopic signatures of an organism's tissues.
- Currently, isotopic signatures are assumed to be the same for given trophic levels of bony fish and elasmobranchs.
- However, there are significant differences in morphological between elasmobranchs and teleost's. Elasmobranchs are cartilaginous, meaning their skeletons are made of cartilage while bony fish have a skeleton composed entirely of bone. There are also physiological differences such as the differences in their digestive physiology and associated waste production and removal as well as mechanisms to osomoregulate

Figure 1: Black sea bass tagged with Petersen disc tag for ID

Methods

Experimental Design:

- All fish were fed a diet of shrimp (benthic primary consumer and pelagic secondary consumer) for 11 weeks and then switched to an all-squid (secondary consumer) diet for 11 weeks
- Stingray muscle and plasma sampled every week (blood draw and muscle biopsy)
- Black sea bass muscle sampled every other week (muscle biopsy only)
-Stable isotopes will be separated and quantified using mass spectrometry

Sample Preparation:

- **Muscle** samples were: rinsed in deionized water ➡ stripped of all skin ➡ dried for 48 hours at 60 ºC ➡ ground into a fine powder using a mixer mill ➡ triple rinsed with deionized water ➡ weighed into tin capsules ➡ sent for analysis
- **Plasma** samples were: dried for 48 hours at 60 ºC ➡ weighed into tin capsules ➡ sent for analysis

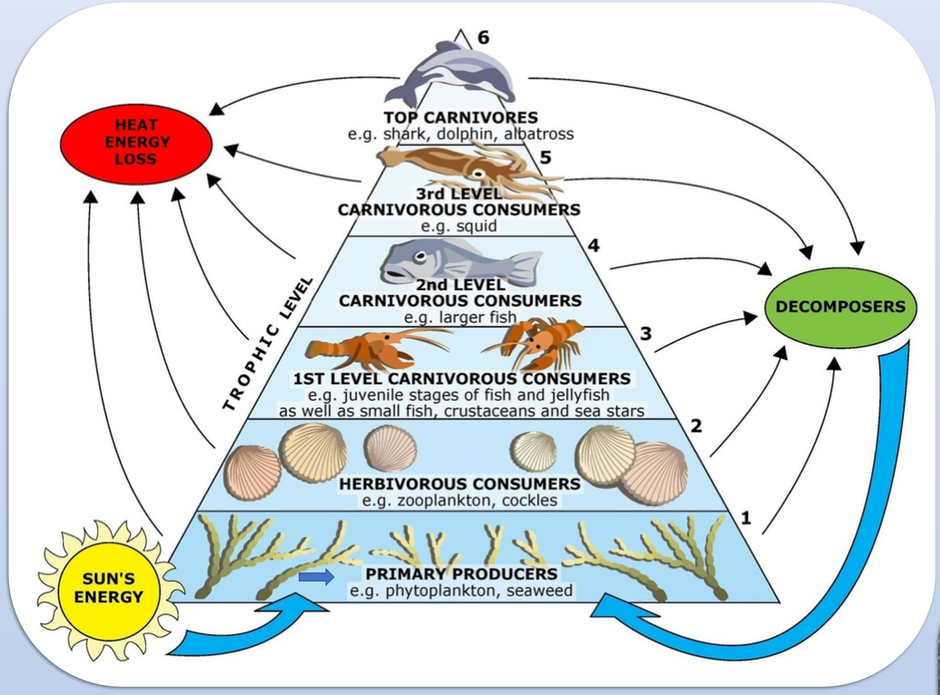

Figure 2: A depiction of the trophic levels in a marine food web. (Source: The University of Waikato Te Whare Wānanga o Waikato)

Project Relevance

- We are expecting to see differences in tissue turnover rates, as well as different diet-tissue discrimination factors between species.
  - We expect these differences because of the physiological differences between teleosts and elasmobranchs. This predicted difference would be significant as it is currently inferred that teleosts and elasmobranchs have the same isotopic signatures across trophic levels.
- Our experiment is attempting to both identify the variance in the isotopic signatures between elasmobranchs and teleosts, as well as finding out how long it will take for a diet change to be reflected in the tissues of these organisms.
  - Results from this experiment will aid in the interpretation of ecological studies, as researchers will be able to better interpret isotopic signatures of tissues by gaining insight into how long a given individual has been feeding at its reflected trophic level.

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Figure 3: Blood sample being taken from captive Southern stingray

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