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Stable isotope analysis as a tool to investigate foraging and group dynamics in bottlenose dolphins

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INTRODUCTION

- Bottlenose dolphins are social animals with a network of relationships and varied foraging techniques.[1]
- Stable isotopes of carbon and nitrogen ($\delta^{13}C$ and $\delta^{15}N$) can be used as indicators of foraging patterns, as they are assimilated through the diet and can vary with trophic level and location.[2]
- The dolphins in Cedar Key Florida have shown differentiations in foraging behavior on an individual and a group level.[3,4] Analyzing the stable isotopes in these dolphins can allow us to better understand any potential impact specialized behaviors may have in obtaining prey.

METHODS

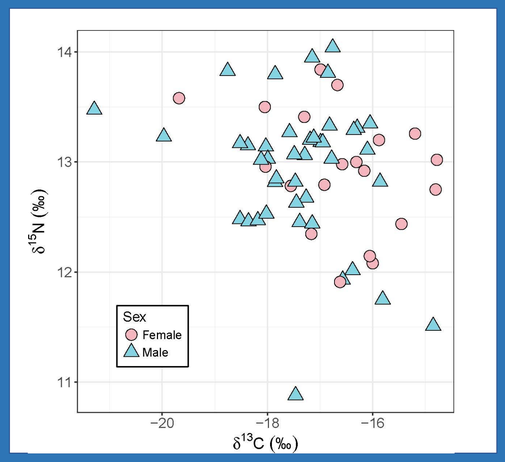
- Skin biopsies were collected from 63 dolphins in Cedar Key Florida between the months of Apr-Aug 2010 and stored frozen until analysis.
- The epidermis was homogenized before drying at 60°C for 24-48 hours.
- Dried samples were lipid extracted before stable isotope analysis, completed with an accelerated solvent extractor (ASE300) using petroleum ether.
- Samples weighing 0.55-0.65 mg were analyzed at the UF Light Stable Isotope Mass Spectrometry Lab.
- Dolphins were classified by sex and whether they were seen using specialized foraging behaviors, which included driver-barrier feeding, bottom grubbing, and kerplunking.
- SocProg 2.9 was used for network and association pattern analyses.

Female dolphins had **lower carbon isotope values** than males.

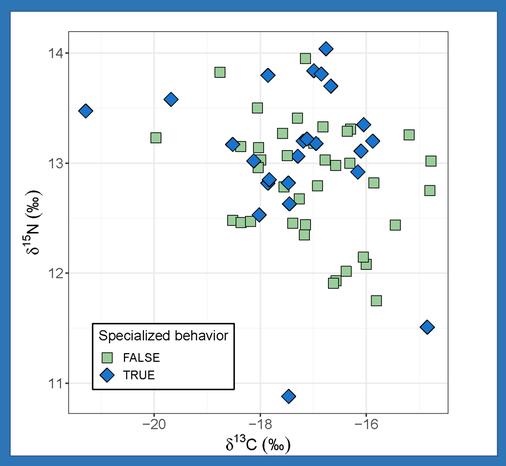
Nitrogen isotope values **did not differ** significantly with sex.

2 sample t-test:
$\delta^{13}C$ male mean -17.5
$\delta^{13}C$ female mean -16.6
p-value = 0.008

$\delta^{15}N$ p-value = 0.21



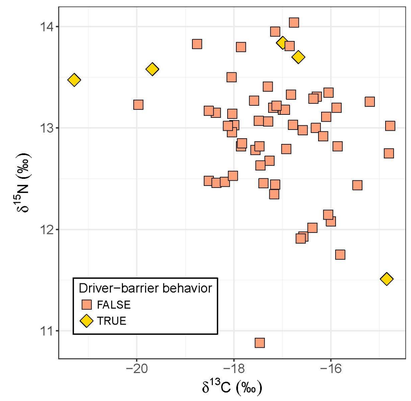
We **did not find differences** in isotope values by **foraging technique**.



2 sample t-test:
$\delta^{15}N$ p-value = 0.2092
$\delta^{13}C$ p-value = 0.2909

RESULTS

- The sample size of dolphins using the driver-barrier technique is small but opens the possibility for future study of driver-barrier and $\delta^{15}N$ values, as the five individuals with the behavior fell on the extremes of the $\delta^{15}N$ range.



- Sex, carbon isotope values, nitrogen isotope values or clustering based on isotopic values were not found to be a significant predictor of association patterns.

DISCUSSION

- A previous study found differences in the isotope ranges of males and females and suggested that female dolphins have more varied use of resources compared to males.[5]
- Previous network analysis[1] has indicated that dolphins do not have preferential associations while foraging, and these results reinforce that finding.
- Preferential associations between dolphins and specialized foraging behaviors did not influence dietary patterns.

Take a picture of the QR code to get the poster

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