

Evaluating trophic segregation between sympatric otariid species, South American fur seals and South American sea lions, in the productive upwelling Humboldt Current System

Cárdenas-Alayza, Susana

PhD Student, Joint program between Universidad Peruana Cayetano Heredia, Peru and Université de Montpellier, France.

Email: susana.cardenas.a@upch.pe

Phone: +51 999931218

SUMMARY REPORT

In the productive upwelling system of the Humboldt Current in Peru coexist sympatric otariid species, with similar ecological requirements: South American fur seals (*Arctocephalus australis*) and South American sea lions (*Otaria byronia*). The analysis of trophic linkages and niche overlap is possible with isotopic signatures ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$), permitting to understand trophic segregation/overlap between co-occurring species. We hypothesize that coexistence of sympatric pinniped species in this upwelling ecosystem is possible by the segregation of trophic niches that avoid interspecific exclusion. To answer this hypothesis, I am using different methods in my PhD research is to describe the trophic niches of sympatric otariid species and evaluate intraspecific and interspecific niche differentiation in the marine environment of the HCS: resource partitioning in hard parts analysis recovered in scats, spatial segregation during feeding trips and isotopic niche analysis using vibrissae. The Society for Marine Mammalogy Grant-in-Aid funds were requested to support the study aims related to stable isotopes analysis. This section aims to (i) construct and compare the isotopic niches from $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values from vibrissae samples collected from otariids and (ii) link these values to potential prey items in the Humboldt Current ecosystem. Funding has permitted to collect, prepare, export and conduct isotopic analysis on 143 prey species samples. We collected and analyzed 1-14 replicates from 16 prey species from local artisanal fishing ports in south Peru (Pisco and Marcona). Prey muscle tissues were dehydrated, pulverized and packaged in tin capsules for stable isotope analysis in Smithsonian Institution. As preliminary results, standard ellipses of a subset of the otariid $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values from vibrissae are shown (Fig 1) and values of 12 prey items (species with replicates >10) are plotted along with otariid values (Fig. 2). Statistical analysis is currently underway and will be included in a doctoral thesis and scientific publications that address the beforementioned research question, alongside animal

tracking and oceanographic information as better understand the mechanisms of coexistence of the two sympatric otariid species in the Humboldt Current ecosystem.

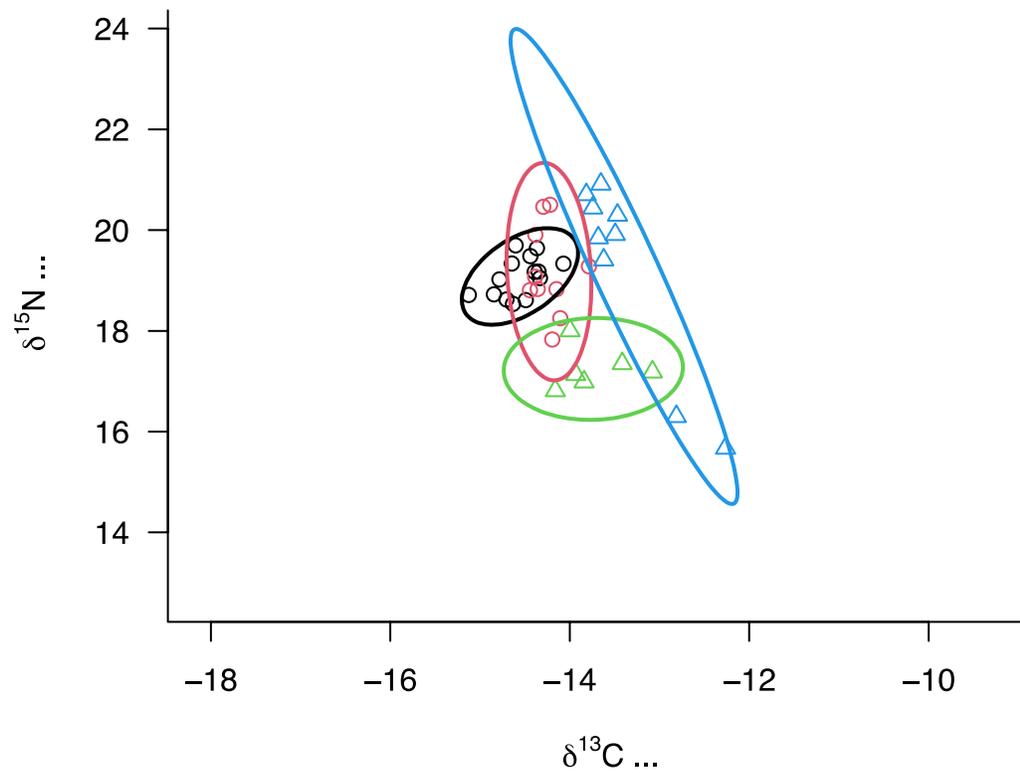


Figure 1. Biplot of mean isotopic values for $\delta^{13}\text{C}$ (x-axis) and $\delta^{15}\text{N}$ (y-axis) with standard ellipses (95% CI) for *A. australis* females (black), *A. australis* males (red), *O. byronia* females (green) and *O. byronia* males (blue).

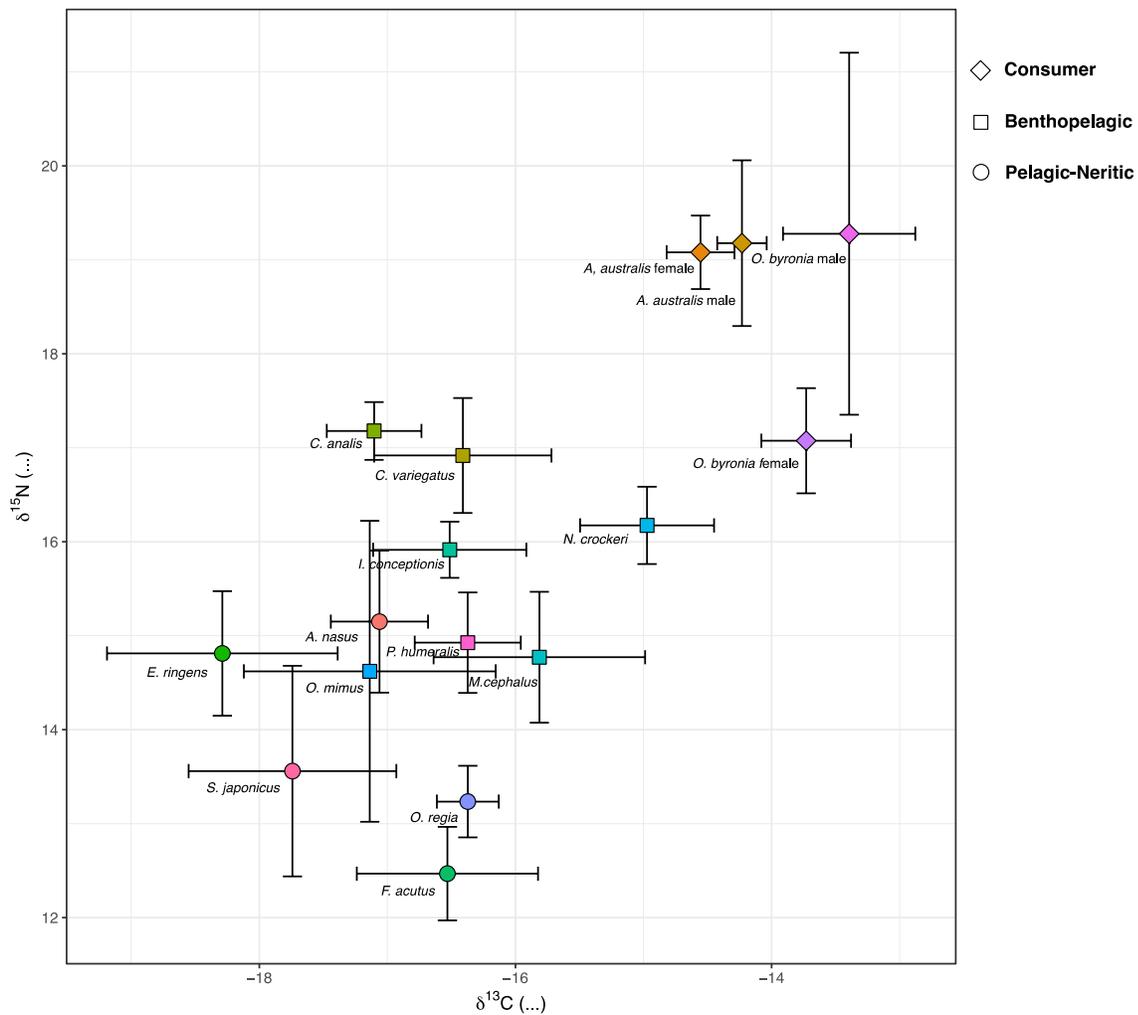


Figure 2. Biplot of the isotopic signatures for $\delta^{13}\text{C}$ (x-axis) and $\delta^{15}\text{N}$ (y-axis) of five Pelagic-Neritic species and seven Benthopelagic species collected as part of this grant, plotted with isotopic signatures of the vibrissae from otriids, *A. australis* and *O. byronia*.

Acknowledgements:

Prey sample collection and otriid vibrissae was possible thanks to Punta San Juan Program, CSA-UPCH and Chicago Zoological Society. Sample preparation and stable isotope analysis was possible in support of Dr. Amy Hirons Laboratory at Nova Southeastern University.