

Hooray for El Niño!?

Do climate changes alter the diet of Hawaiian monk seals?

Mandy A. Wong¹, Charles L. Littnan², Andrew W. Trites¹

(1) Marine Mammal Research Unit, Fisheries Centre, and Department of Zoology, University of British Columbia, Vancouver, BC, Canada

(2) Hawaiian Monk Seal Research Program, NOAA Fisheries, Honolulu, HI, USA

Email: m.wong@fisheries.ubc.ca

Objectives

1. Determine the diet of the endangered Hawaiian monk seal at French Frigate Shoals
2. Assess the effect of climate changes associated with El Niño-Southern Oscillation events on the diet of Hawaiian monk seals

Hawaiian monk seals have a diverse diet

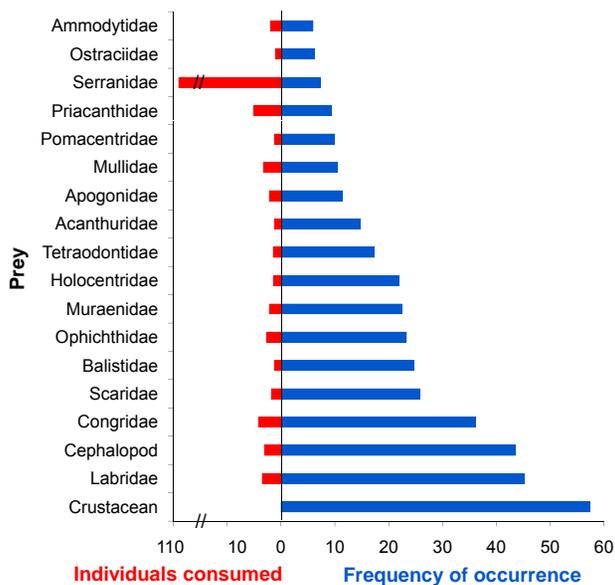


Figure 2. The number of individuals consumed and frequency of occurrence for prey occurring in $\geq 5\%$ of samples ($n=432$) at French Frigate Shoals from 1998 to 2007.

Introduction

- French Frigate Shoals supports the largest subpopulation and exhibits the greatest rate of population decline
- Pup size and survival increase after El Niño events^{1,2}, which are associated with cooler sea surface temperatures in Hawaii
- Changing oceanographic conditions may affect the diet or foraging efficiency of pregnant females

Methods

- Classify years as La Niña, neutral, or El Niño based on sea surface temperature anomalies³ during the gestation period
- Identify key hard remains from scat samples (Fig. 1) collected from 1998 to 2007, encompassing two La Niña and four El Niño events of varying intensities
- Determine the number of individuals (fish and cephalopods)

Results

- Prey included crustaceans, cephalopods, and 31 families of fish (mainly benthic, engyenthic, and benthopelagic; Fig. 2)
- The number of individuals consumed varied widely
- There was no difference in the diet diversity or number of individuals consumed among El Niño, La Niña, and neutral years (Fig. 3)

Future work

- Compare characteristics of main prey types (i.e. depth profiles, evasion guild, activity pattern)
- Examine other dietary factors that may be affected by climate changes, such as diet composition, prey size, prey quality, or relative importance of prey



Figure 1. Example of prey remains recovered from Hawaiian monk seal scat samples.

The diversity and number of prey consumed are not affected by El Niño and La Niña events

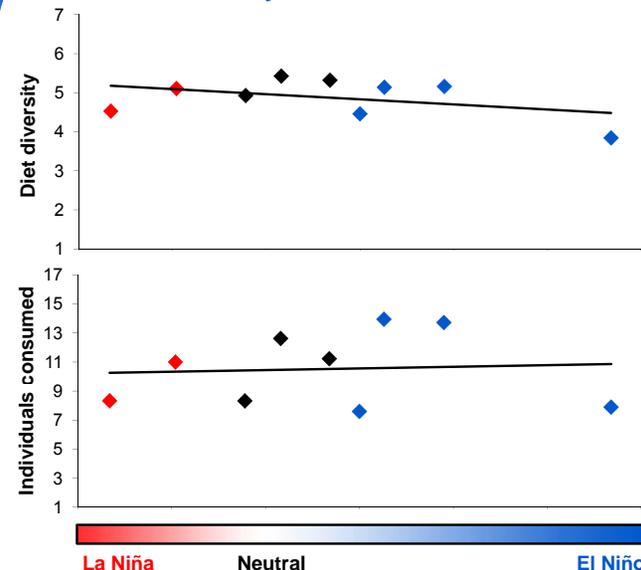


Figure 3. The diet diversity and number of individuals consumed for varying intensities of El Niño and La Niña events from 1998 to 2007. The colour bar indicates the relative strength of the event.

Conclusions

1. Hawaiian monk seals forage opportunistically, primarily on reefs or in the benthos
2. Climate changes associated with El Niño events do not affect the diversity or number of individuals consumed by Hawaiian monk seals

References

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²Baker, J.D., J.J. Polovina, and E.A. Howell. 2007. Marine Ecology Progress Series 346:277-283
³Climate Prediction Center. http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ensoyears.shtml. Accessed Sept 24, 2009.

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