

# Intraspecific Comparison of California Sea Lion Diet

*(Zalophus californianus)*

## Assessed Using Fecal and Stable Isotope Analyses

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Differences in phenotype, physiological limitations, physical capabilities, experience, and biological requirements among conspecifics of aquatic mammals likely result in differences in their diet. The diet of juvenile and adult female California sea lions (*Zalophus californianus*) at San Miguel Island, California was estimated and compared using fecal and stable isotope analyses to determine differences by age.

Fecal samples were collected during 2002-2006 and prey remains were identified. Stable nitrogen ( $\delta^{15}\text{N}$ ) and carbon ( $\delta^{13}\text{C}$ ) isotope values were determined from plasma and fur obtained from yearlings, 2- to 3-year-old juveniles, and adult females ( $\geq 4$  years old) during 2005 and 2006.

Juveniles ate more than 15 prey taxa, whereas adult females consumed more than 33 taxa. Relative importance of prey was determined using percent frequency of occurrence (%FO). Northern anchovy, Pacific sardine, Pacific hake, rockfishes, and market squid were the most frequently occurring (%FO > 10%) prey in the feces of both juvenile and adult female sea lions, although their importance varied between age groups and among years. Most of these species are epipelagic, schooling species that even young individuals were physiologically or morphologically capable of exploiting. Only yearlings had significantly different  $\delta^{15}\text{N}$  isotope values than older conspecifics, indicating that older juveniles were feeding at a similar trophic level and in similar habitats as adult females.

Differences between yearlings and older conspecifics reflected the transition from dependency to foraging independently in the aquatic environment. Whereas each method had biases, combining the two provided a better understanding of the diet of California Sea Lions and intraspecific differences.

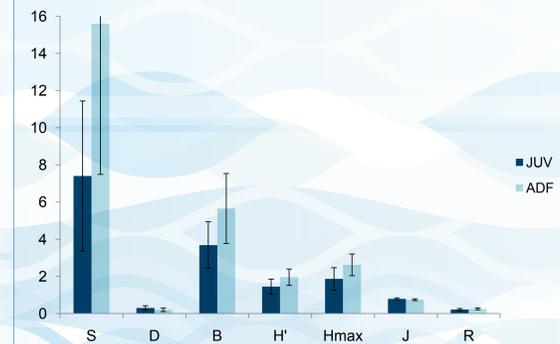
Reference: Orr, A.J., G.R. VanBlaricom, R.L. DeLong, V.H. Cruz-Escalona, and S.D. Newsome. 2011. Intraspecific comparison of diet of California sea lions (*Zalophus californianus*) assessed using fecal and stable isotope analyses. *Canadian Journal of Zoology* 89:109-122.

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### time scale

Fecal sample: 1 to 3 days  
 Plasma: weeks to month  
 Fur: period of tissue formation, up to several months

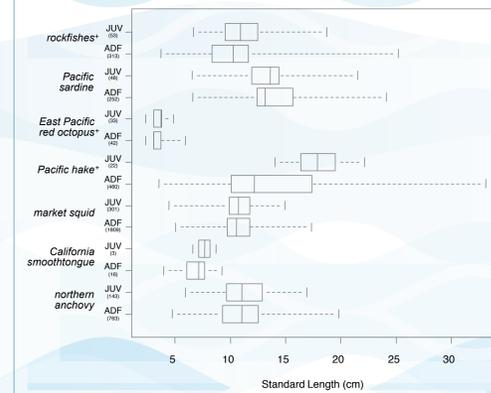
Mean total variation of prey array indices calculated from fecal samples of juvenile (n = 178) and adult female (n = 296) California sea lions.



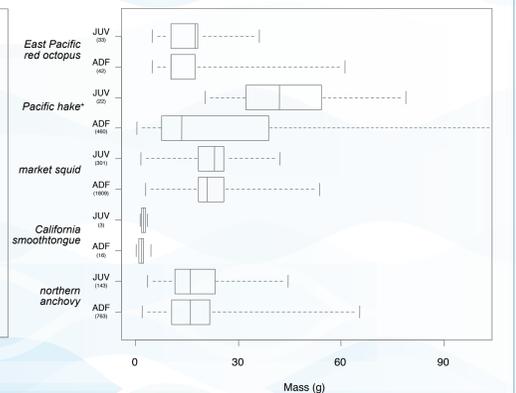
Juveniles were 1-3 years old. Error bars indicate SD. Indices include species richness (S), Simpson's diversity index (D), Levin's measure of niche breadth (B), Shannon-Wiener diversity index (H'), prey evenness (J), and specialization (R).

In general, both age classes consumed a variety of prey, but relatively few species composed the majority of their diet during a given time period. Adult females had a more diverse diet than juveniles.

Estimated Standard Length



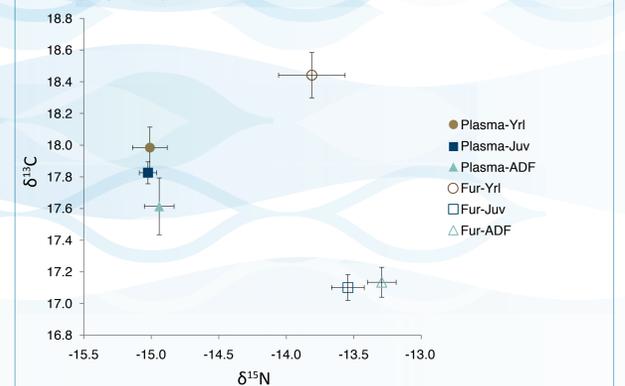
Estimated Mass



Range, first, median, and third quartiles of estimated standard lengths and mass of prey identified from fish otoliths or cephalopod beaks (n) recovered from fecal samples of juvenile (JUUV) and adult female (ADF) California sea lions. Juveniles were 1-3 years old. Plus signs indicate significant difference. Maximum mass for Pacific hake was 260 g.

In general, both age classes ate similar sized prey, although adult females consumed individuals over a greater size range.

Relationship between stable nitrogen ( $\delta^{15}\text{N}$ ) and carbon ( $\delta^{13}\text{C}$ ) isotope ratios of plasma and fur collected from yearling (YRL), juvenile (2-3 year olds; JUUV), and adult female ( $\geq 4$  year old) sea lions. Error bars indicate SE.



Yearling fur  $\delta^{15}\text{N}$  values reflected their pre-weaned diet. As young individuals mature, their diet approaches that of adults in that they feed at similar trophic levels and in similar habitats.

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