Individual Specialization in a Generalist Apex Predator: The Leopard Seal

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December 16, 2024

Abstract

1. Apex predators are typically considered dietary generalists; often masking individual variability. However, individual specialization—consistent differences in diet and foraging strategies among individuals— is common in apex predators. In some species, only a few specialized individuals can significantly impact prey populations. 2. Leopard seals (Hydrurga leptonyx) are apex predators important to the structure and function of the Southern Ocean ecosystem. Leopard seals are broadly described as generalists, but little is known about their trophic ecology at the population or individual level. 3. We analyzed δ13C and δ15N profiles in whiskers (n=46) from 34 leopard seals from an important aggregation in the Western Antarctic Peninsula to assess population and individual trophic variation. We also evaluated individual consistency across years using repeat samples from 7 seals collected over 2-10 years. We compared population and individual isotopic niche space and explored drivers of intraspecific variation in leopard seal trophic ecology. 4. We find that leopard seals have a broad trophic niche (range: 6.96-15.21level. However, most individuals are specialists, with only a few generalists. Furthermore, individual seals specialize at different trophic levels, resulting in niche partitioning. Most variation in trophic ecology is driven by individual specialization, but sex and mass also contribute. We also find that some seals specialize over time, consistently foraging at the same trophic level, while others switch trophic levels within and between years. 5. Long-term specialization by only a few leopard seals has likely contributed to the decline of a significant local mesopredator colony; the Antarctic fur seal. Our findings show the importance of examining individual specialization in leopard seals across their range to understand their impact on other prey populations. More broadly, this approach should be applied to other apex predator populations, as a few specialists can significantly impact ecosystems.

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