

An Investigation into the Possible Relationship between Killer Whale Predation and the Continuing Decline of the Steller Sea Lion Population



POLLOCK CONSERVATION
COOPERATIVE RESEARCH CENTER
Project Synopsis



Prey's-eye view of a killer whale.
CREDIT: DAVID ELLIFRIT, NGOS

FUNDING SUMMARY

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2001-2002

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\$27,142

A stellar debate: Are killer whales eating Steller sea lions?

Over the years, numerous hypotheses have been proposed to explain the dramatic decline of Steller sea lions in the Bering Sea and Gulf of Alaska. Most hypotheses have been ruled out or lack convincing evidence. Recently, some researchers have suggested that killer whale predation on sea lions may be slowing their recovery.

WHY IS PCCRC INTERESTED?

Alaska commercial groundfish fishermen have been operating under state and federal restrictions aimed at protecting Steller sea lions, and remain interested in determining the natural factors affecting sea lion mortality and recovery in the Bering Sea and Gulf of Alaska.

WHAT SCIENTISTS DID

Researchers used biopsy darts to collect shallow-depth tissue and blubber samples from killer whales in Prince William Sound during the summer in 1994 and 1995. Tissue biopsies of killer whales were taken in summer 2001 in waters around Steller sea lion rookeries and major haulouts along the central Alaska coastline from Resurrection Bay to Seguam Pass.

In all, 17 tissue biopsies were obtained from 11 different groups of whales including 11 suspected resident whales from six groups, four suspected transient whales from four groups and two suspected offshore animals from one group. A small amount of skin and underlying blubber were collected and frozen for stable isotope and fatty acid analysis.

Full-depth skin and blubber samples were obtained from fresh-dead adult killer whales as they became available. Researchers assessed the gross lipid and water

OBJECTIVES

Describe the characteristics of killer whale blubber and skin, with the goal of further understanding the feeding ecology of this species, and in particular how killer whales might impact Steller sea lions.

Assess the stable isotope signatures of killer whale skin samples to determine the trophic level at which killer whales are feeding.

Analyze killer whale blubber samples using fatty acid signature analysis to determine whether killer whales are feeding on Steller sea lions.

BOTTOM LINE

Resident killer whales are fish eaters, and transient killer whales prey on marine mammals. For transient whales, Steller sea lions could account for between seven and thirteen percent of their diet and sea otters could account for between seven and twenty percent of their diet.

content of each sample, and lipid class and fatty acid composition was analyzed.

WHAT SCIENTISTS LEARNED

Stable isotope analysis of skin samples revealed different feeding habits for the different ecotypes (fish eating vs. mammal eating) of killer whales found in the region.

Prince William Sound (PWS) resident whales fed exclusively on fish, a finding consistent with

long-term observational data. PWS transient whales consumed predominantly marine mammals, preying primarily on Dall's porpoises, but also harbor porpoises, northern fur seals, harbor seals, Steller sea lions, sea otters, and river otters. A subset of PWS transient whales preferred harbor porpoises, followed by harbor seals, sea otters, and Steller sea lions.

Resident killer whales of the Aleutian Islands specialized on fish, but with regional variability. Analysis of Aleutian offshore whales provided some insights into the biology of this poorly known ecotype. These offshore killer whales have been described as moving huge distances from the Bering Sea to central and southern California and this makes interpretations of potential diets for this ecotype very difficult. Due to the complexities of annual movements for this ecotype, a lack of data on appropriate isotopic signatures, and the small sample size, we feel that while this ecotype is clearly different from residents and transients, and no assessment of diet can be made at this time.

FURTHER STUDY

Estimates of diet are still in development and suggest future lines of investigation, especially with regard to the offshore killer whale ecotype.



Dall's porpoises are favored prey of transient killer whales in Prince William Sound. CREDIT: THOMAS KLINE, PWSSC