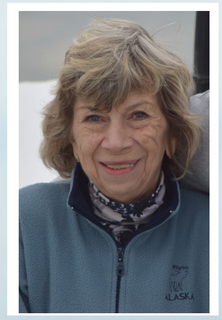
Diet, prey fields, and interactions of pelagic fishes in the Pacific Arctic

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In the Pacific Arctic, unprecedented increases in temperature and decreases in sea ice have shifted system phenology, species distribution, and ecosystem interactions. Understanding distribution, available prey fields, and competition among pelagic fish species in this region is critical to assess persistence and competitive dynamics and transformation of Arctic food webs.

An Integrated Ecosystem Research Program launched by the North Pacific Research Board collected substantial numbers of Arctic sand lance, Arctic cod, and juvenile walleye pollock throughout the Chukchi Sea for diet analyses.



Pelagic forage fishes – Arctic sand lance (*Ammodytes hexapterus,* left), walleye pollock (*Gadus Chalcogrammus*, middle), and Arctic cod (*Boreogadus saida*, right).

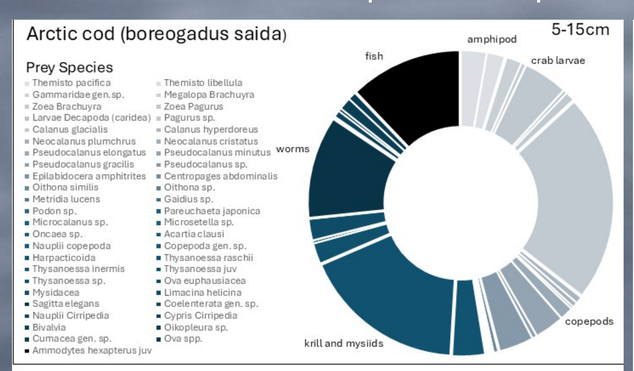
Stomachs of Arctic cod (N=2326), Arctic sand lance (N=729) and walleye pollock (N=516) were collected at 64 stations and processed to determine diet composition

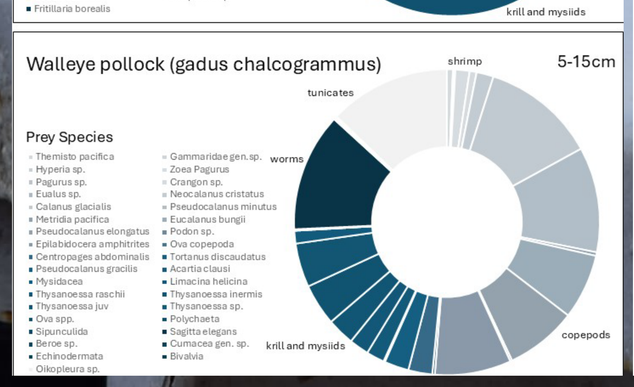


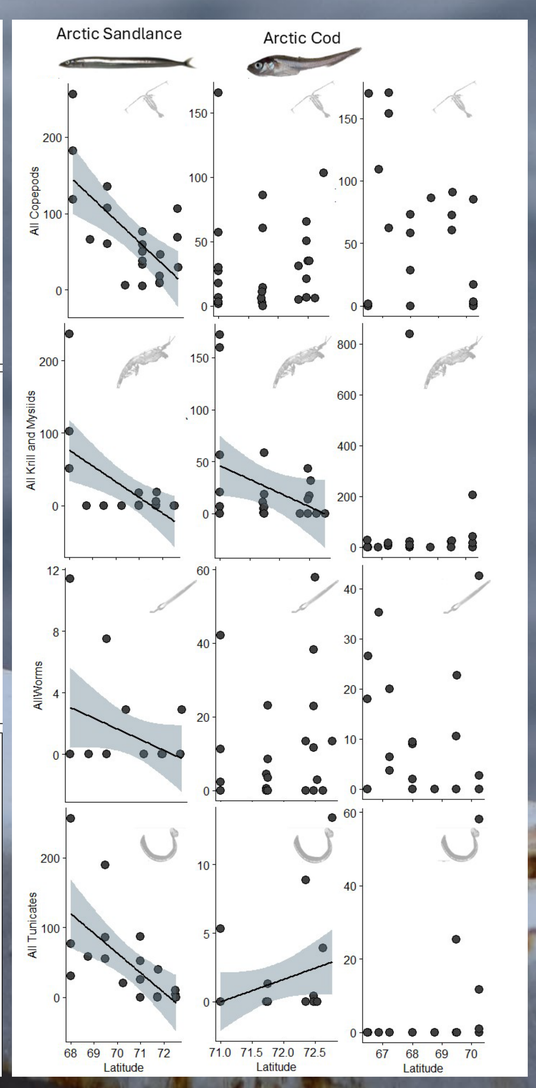


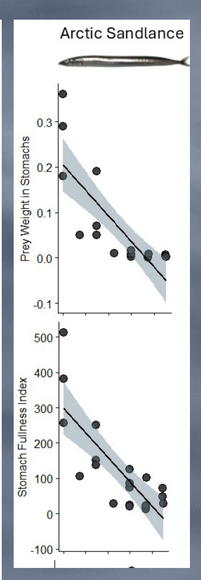


ANOSIM metrics suggest high diet overlap in all three species, with Arctic cod and walleye pollock most similar. The most prevalent zooplankton taxa were present in the diets of all. nMDS revealed the importance of physical correlates, including temperature and latitude. Arctic sand lance predominantly differed as a function of a nearshore-offshore axis. Arctic cod was distinguished according to latitude, occupying higher latitudes and colder temperatures. Latitudinal trends were noted in prey fields – Arctic cod consumed species not present in other diets.

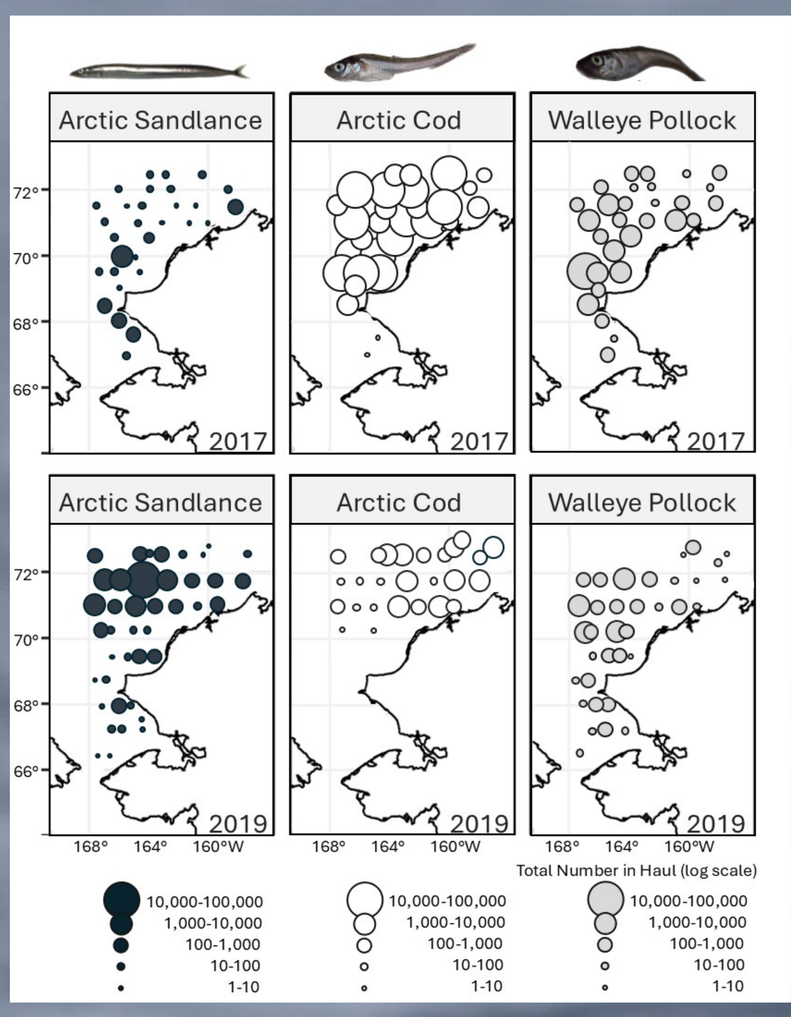








Attributes of foraging success (prey weight, stomach fullness, empty stomachs) correlated with latitude, with positive effects in the north for Arctic cod and positive effects in the south for sand lance and pollock.



Differences in temperature regimes between years suggest substantial northward shifts in all three species in warmer years.

Predation of Arctic cod on Arctic sand lance occurred in the north.

