3-3. Feeding Habits and Trophic Interaction (Oral-20)

Zooplankton Species Composition, Abundance and Biomass on the Southeastern Bering Sea Shelf during Summer: the Potential Role of Water Column Stability in Structuring the Zooplankton Community and Influencing the Survival of Planktivorous Fishes

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The southeastern Bering Sea sustains one of the largest fisheries in the nation, as well as wildlife resources supporting valuable tourist and subsistence economies. The fish and wildlife populations in turn are sustained by a complex food web linking primary producers to apex predators through the zooplankton community. Recent shifts in climate toward warmer conditions may threaten these resources by altering trophic relationships in the ecosystem on the southeastern Bering Sea shelf. We examined the zooplankton community on the middle shelf of the southeastern Bering Sea in summer of 1999 and 2004 for any significant differences in species composition, abundance or biomass by region and year. Between August 1999 and August 2004, the summer zooplankton community of the middle shelf shifted from large to small species. Significant declines were observed in the biomass of large scyphozoans (*Chrysaora melanaster*), large copepods (*Calanus marshallae*), arrow worms (*Sagitta elegans*) and euphausiids (*Thysanoessa raschii, T. inermis*) between 1999 and 2004. In contrast, significantly higher densities of the small copepods (*Pseudocalanus* spp., *Oithon similis*) and small hydromedusae were observed in 2004 relative to 1999. The shift in the zooplankton community was accompanied by a three fold increase in water column stability in 2004 relative to 1999, primarily due to warmer water above the thermocline, with a mean temperature of 7.3^{o}C in 1999 and 12.6^{o}C in 2004. The elevated water column stability and warmer conditions may have influenced the zooplankton composition by lowering summer primary production and altering the metabolism of the planktonic invertebrates, thus selecting for species more tolerant of a warm environment supported by recycled nutrients. Stomach analysis of zero-class pollock from the middle shelf indicated a dietary shift from large to small copepods in 1999 relative to 2004. Winter survival of zero-age pollock was higher by six times in 1999 relative to 2004. This research suggests that if climate on the Bering Sea shelf continues to warm, the zooplankton community may shift from large to small taxa, thus altering energy transfer to commercial fish species, and potentially impacting the fisheries and the economies they support.