

The jellyfish buffet: jellyfish enhance seabird foraging opportunities by concentrating prey

Nobuhiko N. Sato ¹, Nobuo Kokubun ^{1,2}, Takashi Yamamoto ^{2,3}, Yutaka Watanuki ³

Alexander S. Kitaysky ⁴ and Akinori Takahashi ^{1,2}

¹ Department of Polar Science, SOKENDAI (The Graduate University for Advanced Studies), Tokyo, Japan

² National Institute of Polar Research, Tokyo, Japan

³ Graduate School of Fisheries Sciences, Hokkaido University, Hokkaido, Japan

⁴ Department of Biology and Wildlife, Institute of Arctic Biology, University of Alaska Fairbanks, USA

The rapid increase in jellyfish biomass and its impact on marine ecosystems is of great concern for the world's oceans. Jellyfish are generally thought to have indirect negative impacts on higher trophic level predators, through changes in lower trophic pathways. However, high densities of jellyfish in the water column may affect the foraging behaviour of marine predators more directly, and the effects may not always be negative. Here, we present novel observations of a diving seabird, the thick-billed murre, feeding on fish aggregating among the long tentacles of large jellyfish, by using small video loggers attached to the birds. We show that the birds encountered large jellyfish, *Chrysaora melanaster*, during most of their dives, commonly fed on fish associated with jellyfish (Figure 1), and appeared to specifically target jellyfish with a high number of fish aggregating in their tentacles, suggesting the use of jellyfish may provide significant energetic benefits to foraging murre. We conclude that jellyfish provide feeding opportunities for diving seabirds by concentrating forage fish, and that the impacts of jellyfish on marine ecosystems are more complex than previously anticipated and may be beneficial to seabirds.



Figure 1. Young age fish were aggregated among tentacles of a large jellyfish.