At-sea mortality patterns of Monterey Bay seabirds

Abstract: Seabirds are important top level marine predators, consuming an estimated 7% of total marine primary productivity (Brooke 2004). Due to their low fecundity, population structure (where much of the world’s population may breed on a few islands), and sensitivity to direct (e.g. direct harvest and bycatch) and indirect human impacts (e.g. oil spills, habitat destruction, and introduced species), they are the most threatened group of marine species, accounting for 25% of all marine extinctions (Dulvy 2003). Seabirds are particularly vulnerable to oil spills and are the most conspicuous and severely impacted taxonomic group when oil is released into the environment (Burger and Fry 1993, Carter 2003). Although there has been considerable research focused on seabirds, our understanding of seabird population dynamics and mortality is based almost entirely from colony work on fecundity and interannual survival (Wooller et al. 1992). Almost nothing is known about factors that regulate mortality at-sea during the non-breeding season. This is problematic because the effective evaluation of oil spill impacts for any species requires a full understanding of both fecundity and sources of mortality during both the breeding and non-breeding seasons. To fill this critical gap, we propose to quantify factors associated with seabird mortality at-sea using a globally unique combination of data sets available in Monterey Bay. Specifically, we will combine two large, ten-year data sets – the BeachCOMBERS beachcast animal surveys with data from the CIMT Wind to Whales seabird and marine mammal survey program to examine the relationship between physical oceanography, biological oceanography, seabird abundance at-sea and seabird mortality patterns. The combination of data on the number of seabirds found dead on the beach with the abundance of live seabirds offshore and detailed oceanographic data related to seabird prey availability will provide an understanding of mortality patterns in the context of their offshore abundance. At smaller scales it will provide the ability to determine natural variability in seabird mortality patterns in the absence of major human perturbations such as oil spills, and at larger scales it will provide a context to evaluate the relative importance of physical and biological factors in regulating seabird mortality in the absence of a catastrophic oil spill.