Time series of gelatinous zooplankton in Chesapeake Bay, USA: Environmental controls and interspecific interactions

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Two species of gelatinous zooplankton, the Ctenophore *Mnemiopsis leidyi* and the Scyphozoan medusae *Chrysaora quinquecirrha*, are important components of the Chesapeake Bay estuarine food web, and seasonally become the dominant predators of crustacean zooplankton. We utilized two time-series datasets to analyze seasonal and interannual variations in jellyfish abundance in the Chesapeake Bay and determine how their populations respond to physical and biological factors. The datasets used include the Chesapeake Bay Program, which sampled mesozooplankton abundance in Chesapeake Bay from 1984-2002, and the Virginia Institute of Marine Science's Juvenile Fish and Blue Crab Trawl Survey, which recorded scyphozoan jellyfish as bycatch from 1999-2012. *C. quinquecirrha* populations were significantly controlled by temperature and salinity, with high medusa biomass occurring over a wider range of temperatures (20-31°C) and salinities (10-24) than previously reported. *C. quinquecirrha* are important predators of *M. leidyi*, and, when they co-occur, exhibit considerable top-down control on *M. leidyi* populations. In the summer months, this has a cascading effect down the food web, as total zooplankton dry weight, copepod abundance, and cladocera abundance were strongly and negatively correlated with *M. leidyi* biomass. Annual *C. quinquecirrha* abundance anomalies were strongly positively correlated with SST anomalies, and distribution within the Chesapeake and its tributaries was regulated by salinity. Further warming of this estuary as predicted could significantly affect *C. quinquecirrha* abundance, with quantifiable effects cascading down the food web.