Geospatial Analysis of Cetacean Distribution and Habitat Utilization Related to Prey Density and Sea Surface Temperature off the Long Island, New York Coastline

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A better understanding of cetacean populations in the Long Island coastal waters is greatly needed as environmental management issues emerge for licensing of offshore wind turbines. Data were provided by CRESLI for the years 1989-1995, 1997-2000, and 2009-2015 and were analyzed geospatially using ESRI®'s ArcMap Version 10.3 and spatial statistics tools for cetacean count, sea-surface temperature, prey density, and observation of calves over time. Transcribed into Excel from data sheets based upon ship-board observations, the data were added to ArcMap as X-Y data. Geographic distributions were analyzed using spatial statistics tools to explore the data and identify patterns using the average nearest neighbor and Ripley's K-function. Multivariate statistics included grouping, optimized hot spot, and regression analyses. The results suggest that cetacean clusters shift annually, and that both cetacean counts and prey density by location are clustered. Calves are associated with high prey density hot spots. Some clusters of cetaceans are more influenced by sea-surface temperature, while others are more influenced by prey density and sea-surface temperature combined within the study location and are likely associated with warm core eddies. Over 260 cetaceans have been observed utilizing the habitat within the offshore wind turbine construction area off of Block Island. A comparison of annual migratory routes for the Northern Right, Fin, Humpback, and Common Minke whales overlap with cetacean utilization within this study area and therefore, warrants support for the need to expand the Georges Bank Humpback and Right Whale Marine Sanctuary southward to the coastal NY waters to protect these cetaceans for future generations.

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