ICES CM 2016/D

Ecological and management implications of climate change induced shifts in phenology of coastal fish and wildlife species in the Northeast region

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Climate change is causing species to shift their phenology, or the timing of recurring life events, in variable and complex ways. Resulting mismatches or asynchronies in food and habitat resources may impact individual fitness, population dynamics, and ecosystem function. While climate change induced shifts in phenology have been well documented in terrestrial ecosystems, particularly relative to flowering plants and migratory song birds, studies of marine organisms have been limited. This project seeks to improve our understanding of climate-induced shifts in the seasonal timing of migration, spawning or breeding, and development rates in coastal predatory and forage fishes, marine mammals, and migratory shore and seabirds through a synthesis of existing regional datasets. We conducted literature searches, which yielded hundreds of studies conducted between 1977-2015. Globally, the greatest number of studies has been conducted on marine plants, followed by seabirds and plankton. Only 3% of studies were conducted in northeast habitats and the majority (N = 8) focused on lower trophic level species; only 4 considered macro-predators (fish and seabirds). In addition, we have assembled several datasets and conducted analyses that provide case studies of shifting phenologies in several fish, invertebrate and seabird species in the Gulf of Maine and greater New England region. While climate is a likely factor influencing these shifts, the influence of other environmental and ecological stressors raise questions about how best to attribute climate change and disentangle other confounding signals. Results will help characterize the adaptive capacity and vulnerability of individual species and regional populations to changing environmental conditions, identify where potential trophic mismatches may occur, and reveal gaps in monitoring networks intended to detect such responses

Keywords: climate, phenology, migration, trophic mismatches

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