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Atlantic cod (*Gadus morhua*) vertebrae from archaeological sites were used to study the history of the Atlantic cod population in the time period of 1500-1950. Specifically, we examine the genetic structure at the cytochrome B (cytB) and Pantophysin I (PanI) loci, using coalescence modelling to estimate population size and fluctuations. Additionally, we record age and estimate growth from otoliths and finally examine possible niche shifts using stable isotopes (δ15N and δ13C values). We see significant reduction in genetic variation over time and large scale fluctuations in population size. Most importantly our model supports a severe bottleneck coinciding with the onsets of “little ice age” following a population expansion during the previous warmer period. In concordance with previous research we find low effective population size in modern time. There are also large shifts in stable isotope values over time. Importantly, the shifts in isotope values coincide with our population size model and we conclude that both population size changes and shifts in stable isotope values are at least partly linked to known marine temperature fluctuations e.g. the cold periods of the “little ice age”. Our results indicate large temperature related ecological shifts of the Atlantic cod population in historical times and highlight the importance of understanding resource fluctuations when interpreting human economy and persistence of societies relying heavily on fishing or hunting.

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