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Climate-driven fluctuation of a wild bird population over the past half millennium

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Mechanisms underlying climate-driven changes in ecosystem structure and function are poorly understood because hardly any ecological records start before the recent warming phase. We analyse an exceptional 100-year record of the great tit population (Parus major) and habitat phenology in Switzerland, and model climate-driven population fluctuations since AD 1500. Additional to high plasticity of the system, we find a significant influence of the large-scale atmospheric circulation (North-Atlantic Oscillation) on fitness-relevant life history traits and population dynamics. The multidecadal circulation impact resulted in low fecundity and population minima during the ‘Maunder Minimum’ (1650-1720) and the Little Ice Age Type Event I (1810-1850), whereas the warming since 1975 is related with the highest productivity since 1500 and an unprecedented increase of the population.