The copepods Calanus finmarchicus and C. helgolandicus co-exist in the North Sea, but their spatial distribution and phenology are very different. Long-term changes in their distributions seem to occur due to climate change resulting in a northward extension of C. helgolandicus and a decline of C. finmarchicus in this region. The aim of this study is to use life-stage structured models of the two Calanus species embedded in a 3D coupled hydrodynamic-biogeochemical model to investigate how the biogeography of C. finmarchicus and C. helgolandicus is modified by changes in ± 2°C sea water temperatures, overwintering and oceanic inflow in the North Sea. Life-stage structured models are validated against CPR data and vertical distributions north of the Dogger Bank in the North Sea for the reference year 2005. The model shows that 1) ± 2°C changes from the current level mainly influence the seasonal patterns and not the relative occurrence of the two species, 2) changes due to oceanic inflow mainly appeared in the northern and southern part of the North Sea connected to the NE Atlantic and not in the central part and 3) the abundance of Calanus species were very sensitive to the degree of overwintering within the North Sea because it allows them to utilize the spring bloom more efficiently and independently of the timing and amount of oceanic inflow. The combination of lower temperatures, higher overwintering and oceanic inflow simulating the situation in the 1960s largely favoured C. finmarchicus and their relative contribution to Calanus spp. increased from 40% in the reference year to 72%. The +2°C scenario suggest that in a warmer future, C. finmarchicus is likely to decline and C. helgolandicus abundance will probably continue to increase in some areas.