

# Predicting the effect of local and global environmental change on shorebirds: a case study on the Exe estuary, U.K.

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We used an individual-based model to assess site quality and to predict the effect of local (i.e. disturbance from a cycle path) and global (i.e. climate change) environmental change on the survival of six species of overwintering shorebirds on the Exe estuary, U.K. We also compare site quality on the Exe estuary with three other estuary Special Protection Areas (SPAs) and compare our predictions for the effects of climate change with predictions made for another southern U.K. estuary, Poole Harbour. Prey biomass densities in the Exe estuary were high for all six shorebirds, being as high as or higher than those found on other estuary SPAs. Simulations of increased levels of disturbance from a proposed cycle path along the side of the estuary predicted that disturbance of upper mudflat areas was unlikely to affect shorebird survival but that increased disturbance of nearby fields would reduce curlew survival. Shorebirds on the Exe estuary were far less seriously affected than those in Poole Harbour by reductions in mean daily temperatures, loss of terrestrial habitats and simulated sea-level rise. We conclude that the Exe estuary is a high quality estuary and that the shorebird populations modelled were less susceptible to climate change than those in Poole Harbour.