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Stress testing the impacts of climate change on water quality permitting across England

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This presentation reports on the results of simulating 17 regulatory SIMCAT water quality models for England based on using the CEH Future Flows dataset. The de-biased uplifts were generated across 140 flow gauges comparing 2060-2080 with 2000-2020 for 11 ensembles, and kriged across the country to capture the gradients and apply river reach-specific uplifts in headwater and along-reach flows (for mean and 95 percentile exceedance flows). The resulting uplifts were applied using a recently developed UKWIR workbook and the statistical water quality models were simulated for a range of sanitary and chemical determinands (BOD, ammonia, dissolved oxygen, total and soluble phosphorus, nitrate, PFOS, cadmium and cypermethrin) to assess the potential change to Sewage Treatment Work permits.

Failure of target EQS and 10% deterioration of quality are analysed, computing the necessary adjustment to water quality permits to meet the water quality standards in the future. Ensemble uplifts representative of upper, lower and mid flows were used (focussing on the low flows) and their predicted annual average reduction. The sensitivity of the results to travel time, seasonality and temperature are investigated, and outputs are compared with recent process-based modelling using the EA HYPE model of England.