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Abstract number–59 Improvements in catchment scale modelling for assessing nitrate reduction

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Present trends in regulation of nitrate (N) loads to coastal areas, is a change from uniform towards spatially differentiated and targeted regulation, where N-mitigation measures are implemented in areas with low natural removal of nitrate, and the effect of the measures thus is most effective. This concept is appealing, but requires that natural removal of nitrate can be determined with sufficient accuracy at a scale relevant to regulation. To support this, integrated large-scale models are required, which can be used at the regional/national scale relevant for policy and decision making, while at the same time being able to account for the small scale natural variability.

Taking the first step towards a more cost-effective regulation based on a spatially differentiated

approach, a Danish National Nitrogen Model has been developed and used to prioritise the use of mitigation measures as part of the implementation of the EU Water Framework Directive (WFD) in Denmark. In recent years, several research projects have focused on advancing our understanding on nitrate transport and reduction further by identifying the controlling processes, their spatial variability and quantify their importance through detailed field studies and model simulations. The present paper build upon these findings with a focus on upscaling the process understanding to catchment scale models. Primary transport pathways considered are 1) artificially drainage, whereby nitrate is transported directly to the surface water system with limited reduction. For this alternative drain representations and calibration strategies are analyses, 2) the source-sink functioning of riparian lowlands, where the complex interaction between flow paths and reducing compounds control the reduction potential, and a new upscaling approach for quantifying the reduction are developed and tested, and 3) transport and N reduction below the redox interface, separating the oxic and anoxic parts of the subsurface, where a new method for constructing a national map of the interface and its associated uncertainty has been developed.