MODELS TO ASSIST THE CONTROL OF WATER LEVELS IN MANAGED WETLANDS

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Prediction of the effects of water management requires the use of models to identify the fluxes of water. A model has been developed based on drainage theory, called DITCH, which assesses the fluxes between ditches and the surrounding fields. This model estimates both drainage and sub-irrigation, and can be implemented for a variety of soil configurations (simple uniform soil models, layered models, and soils with increasing permeability with depth). The model predicts the position of the water table in the centre of the field, but can be extended to give an approximate estimate of the depth to water table throughout the field using an analysis due to Childs & Youngs.

This model has been used for a number of sites in the Norfolk Broads, The Somerset Levels, the north Kent Marshes and the River Ray catchment, including a variety of soil and climate conditions.

The use of the model to examine the effect of multiple drainage options is illustrated by examining, first the importance of ditch spacings on the efficiency of water table control. This demonstrates that effective water table management for wetland maintenance and recreation requires the maintenance of the network of ditches to replace the “lost” natural channels, rather than the simple removal of drainage systems. Secondly, the model has been used to identify the in-field effects of ditch level regimes. It shown that the degree of control afforded by ditch regimes varies with the nature of the soil, highly conductive peaty deposits respond well to ditch level management; whereas impermeable marine and alluvial clays require management of surface water to maintain wet status. Thirdly it has been used to illuminate the mosaic of water levels within a whole catchment.