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# Groundwater dependent ecosystems and nutrient enrichment: a case study of the North Shropshire Meres, United Kingdom.

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The identification of groundwater dependent ecosystems within the landscape requires a detailed, site-specific understanding of the wetland water balance to assess the importance of all the hydrological processes effecting the hydrology and ecology of a wetland site. By determining transmission pathways for nutrients, wetland hydrology may also influence water quality status, especially in catchments where anthropogenic influences are significant.

Groundwater contributions to wetlands remain one of the most difficult processes to measure or estimate. This is related to the heterogeneity of subsurface hydrogeological process and our ability to sample only a few locations within the wetland catchment. Given these limitations, we typically rely on theoretical assumptions or apply groundwater models to determine 'groundwater dependency'.

This paper presents the results of a study of groundwater contributions and water quality in a series of meres (lakes) in north Shropshire, United Kingdom. The meres are relic landscape features of the last glaciation that are of high nature conservation importance, an importance that has declined in recent decades due to nutrient enrichment and changes in hydrological management.

The paper reviews the landscape setting, hydrology, ecology and eutrophication history of the sites, and describes the development of a method for modelling groundwater contributions and the hydrology of the meres in general using a landscape-characterisation approach. Results have been used to identify the causes for ecological decline and to establish the most effective measures for the restoration of the wetland ecosystems as part of the EU Water Framework Directive.