

Hulme, P.J.; Jackson, C.R.; Atkins, J.K.; Hughes, A.G.; Mansour, M.M.; Seymour, K.J.; Wilson, K.J.. 2012 A rapid model for estimating the depletion in river flows due to groundwater abstraction. In: Shepley, M.G., (ed.) *Groundwater resources modelling : a case study from the UK*. London, UK, Geological Society of London, 289-302. (Geological Society Special Publication, 364).

The Environment Agency of England and Wales uses its calibrated regional models to estimate the reduction in river flows resulting from proposed groundwater abstractions. Where there is no regional model, analytical equations can produce quick initial estimates of river flow depletion. However, users often want more confidence in their estimates by representing more faithfully their understanding of the real river-aquifer system. This paper shows that, when using a numerical model designed to predict river flow depletion, it is important to include adjacent catchments and intermittent streams and less important to include river elevations and variations in transmissivity with groundwater head. Recharge does not usually need to be included unless part of the river becomes disconnected or dry. Therefore, for rivers where stream length is constant and transmissivity variations are small, it is valid to use a 'no-recharge' depletion model, which can be built quickly (within a month). A case study on the River Leith in NW England illustrates the use of such a model to assess the ecological impact of two groundwater abstraction licences under the European Union Habitats Directive.