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The effects of cutting aquatic vegetation on local scale hydraulics in a chalk stream.

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The Chalk streams of southern England represent Europe's most significant chalk river resource. The unique nature of the Chalk geology gives rise to distinctive flow regimes dominated by groundwater flow and the abundant growth of macrophytes has an important influence on both the structure of the instream habitat and the processes that occur. These macrophyte communities are often patchy in nature and this provides structural complexity and habitat heterogeneity within such channels through changing the local scale hydraulic conditions.

At their peak biomass, macrophytes occupy a significant proportion of the channel and as such have been extensively managed for flood-conveyance and fisheries. The management of macrophytes represents the greatest change in both local and reach scale hydraulic conditions in a given growing season. The potential ecological impact of this hydraulic change is becoming increasingly recognised by regulatory bodies such as the UK Environment Agency.

The effect at a local scale of a vegetation cut at the Centre for Ecology and Hydrology River Lambourn Observatory (Boxford, Berkshire, UK) is presented. The Observatory comprises a 600m reach of river and associated 10 hectares of water meadows residing within one of the least modified catchments in southern England. The river and its floodplain are designated as a Site of Special Scientific Interest and a Special Area of Conservation.

A 150m reach of the Lambourn at Boxford was selected for this study. The pre and post cut spatial distributions of representative macrophyte stands were surveyed using an integrated Total Station and Differential GPS system. An approximation of the 3D characteristics of macrophyte stands was gained using underwater photography. Four surveyed cross sections were established within the reach to enable more detailed pre and post cut comparisons. At each cross section, measurements using an Acoustic Doppler Velocimeter (ADV) at a frequency of 25Hz were taken at intervals of 2m to record velocities in three dimensions along with their fluctuations. At each interval, measurements were taken throughout the water depth but with closer spacing in the near bed region.

Results from the ADV measurements were analysed to determine the local change in flow velocity and turbulence at each of the four cross sections. The results are placed in a reach scale context by analysing the hydraulic parameters of stage and discharge before, during and after the vegetation cut.