

UK Hydrological Bulletin: January – July 2011

The National Hydrological Monitoring Programme is undertaken jointly by the Centre for Ecology & Hydrology and the British Geological Survey. The NHMP monitors hydrological conditions and water resources status throughout the UK. This is the first of a regular series of Bulletins based on the monthly Hydrological summaries for the UK.

Thus far, 2011 has been an exceptional year in hydrometeorological terms. During the third week of January sustained frontal rainfall, together with a significant snowmelt contribution in northern Britain, generated notably high runoff rates, with widespread flood alerts. However, synoptic patterns changed decisively in mid-February, heralding a prolonged period when most rain-bearing Atlantic frontal systems followed tracks away from the British Isles.

England & Wales recorded its driest March since 1961 and April was the warmest in the 352-year Central England Temperature series. Hydrologically, the most evident impact of the developing drought conditions was on river flows in responsive catchments. New minimum April runoff totals were recorded for rivers in the Midlands and the South West and estimated outflows from Great Britain as a whole fell below previous late-April and early May minima (see Fig. 1). This implies a major, and seasonally early, contraction in the stream network and a substantial (albeit temporary) loss of aquatic habitat.

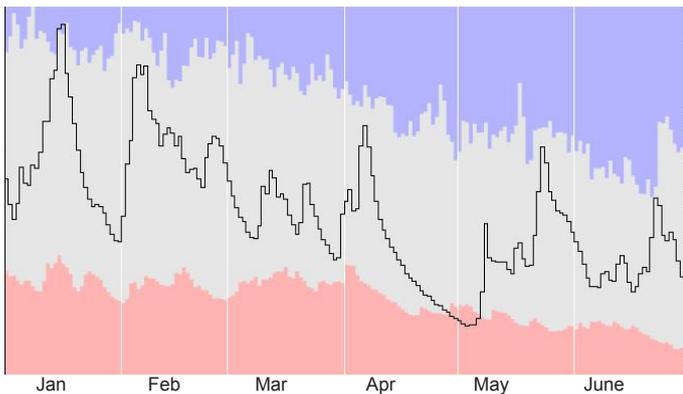


Fig. 1 Estimated daily outflows from Gt. Britain (the envelopes show por max and min)

May saw an extreme accentuation in the usual north-west to south-east rainfall gradient across the country. Scotland reported its highest May rainfall in a series from 1910 whilst a substantial proportion of eastern England registered <20% of the average. In parts of Kent only 4 mm were recorded — a dramatic contrast to north-west Scotland where some localities reported May totals two orders of magnitude greater. The remarkable May rainfall patterns served to decrease the spatial extent of drought conditions but increased their intensity in eastern,

central and southern Britain where rainfall deficiencies could be traced back to December 2009.

The combination of record temperatures and low rainfall produced an outstandingly arid spring across much of southern Britain, England particularly (see Fig. 2 above). In some eastern areas, end-of-May soil moisture deficits were the highest on record (Fig. 3) confirming the severity of the agricultural drought and triggering concern for crop yields, cereals in particular. The risk of forest and heathland fires had also increased markedly.

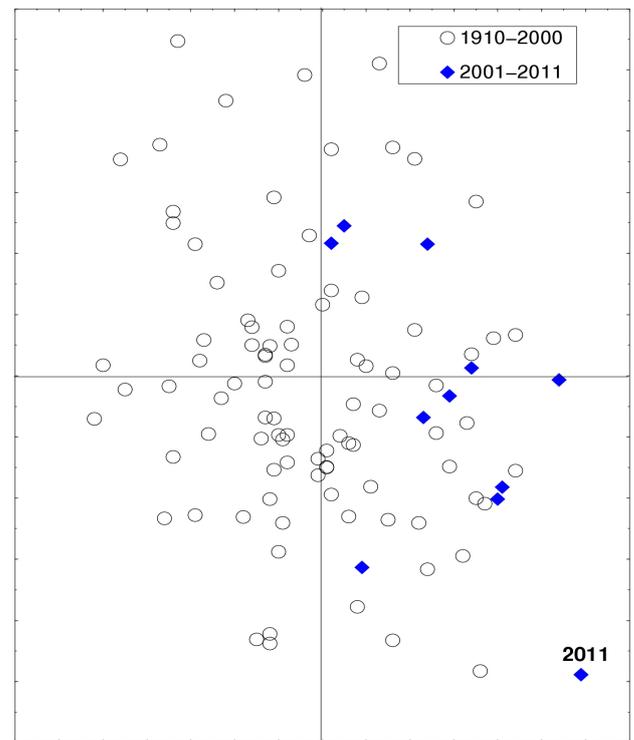


Fig 2 Spring rainfall and temperature anomalies for England, 1910–2011 (Data source: Met Office)

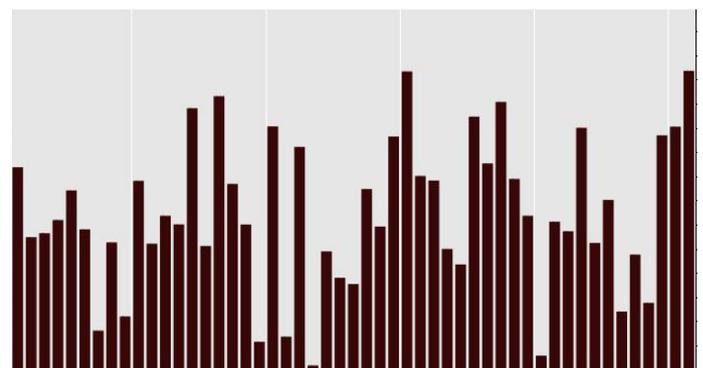


Fig 3 End-of-May soil moisture deficits for the English Lowlands (Data source: MORECS – for a grass cover)

At the national scale, June was a relatively wet month with unsettled conditions continuing well into July. The welcome rainfall arrested the steep decline in rivers flows and early-July reservoir stocks for England & Wales as a whole were marginally above average around month-end. Nonetheless, runoff over the March–June period was still the lowest for England since the intense drought of 1976 and stocks in many central and southern gravity-fed reservoirs remained seasonally depressed. After very meagre replenishment through the spring, groundwater levels were also notably low in many index wells and boreholes across the English Lowlands.

Aided by considerable inter-connectivity of supply sources, UK water resources are generally resilient to even exceptional within-year rainfall deficiencies. However, with soil moisture deficits in early July still well above average in many eastern and central areas, the seasonal recovery in runoff and recharge rates may be considerably delayed. In such circumstances, the autumn and winter rainfall will be especially influential in determining the water resources outlook for 2011.

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