UK Hydrological Bulletin: May – July 2016

Rainfall totals, river flows, soil moisture patterns and groundwater levels were notable for their exceptional spatial variability, relative to the long term average, over the May to July period. At the national scale however, monthly rainfall and runoff were generally well within the normal range but flood events were unusually common (for the summer) in June and steep flow recessions characterised many rivers during July. This was particularly true of eastern and southern catchments where soil moisture deficits increased rapidly with corresponding agricultural stress. Fortunately, the residual benefits of the exceptional rainfall over the November 2015 – January 2016 period ensured that reservoir stocks and groundwater resources remained in the normal summer range across much the greater part of the entire country.

Rainfall in May was very close to the 1971–2000 average for the UK as a whole but a notably dry spell, from the 2nd-to the 18th, in northern England and widespread thundery interludes during the month contributed to large spatial variability in monthly catchment rainfall anomalies. Some coastal areas of eastern Scotland registered less than 30% of the monthly average whilst rainfall across much of the Bristol Avon catchment exceeded 150% of the average. Skye also registered a notably high May total largely due to heavy frontal rainfall early in the month (a 24-hour total of 81 mm was recorded on the 1st). Around the end of the month convective storms were common across the English Lowlands – at Wattisham (Suffolk) a 54 mm storm total was recorded on the 31st and flood alerts were triggered for a number of responsive streams and rivers in East Anglia and the London area. With the exception of a few of the slowest responding aquifer units, groundwater levels declined through May but generally remained above the average for the time of year — notably so in some Permo-Triassic sandstones outcrop areas (e.g. in south west Scotland — see Fig 1).

Notwithstanding the unexceptional May rainfall the November–May accumulation exceeded the previous maximum for the UK by a considerable margin but the sustained river flow recessions during the month resulted in a spring (March–May) runoff total a little below the long term average.

Heatwave conditions in the first week of June saw evaporation demands increase and a continuing decline in river flows. Runoff from GB approached the lowest on record for the time of year during the first week (see Fig 2), thereafter however synoptic patterns became very cyclonic with a continuing risk of thunderstorms. Some notable storm totals were recorded: hourly totals of >30mm were reported from London on the 7th and Wallingford registered a 33 mm total in thirty minutes on the 16th. This exceptionally unsettled episode triggered a rapid, but spatially very uneven, recovery in runoff rates across most of southern and eastern Britain. Flows in many streams and rivers draining impermeable catch ments increased smartly and flood alerts became increasingly common and by the fourth week were very extensive (for the summer). New maximum June runoff totals were establishede.g. for the Colne (Essex) and Little Ouse (Cambridgeshire) and surface flooding was very disruptive in many areas from north-west England to London where rail services at Clapham Junction were badly affected and a number of schools closed.

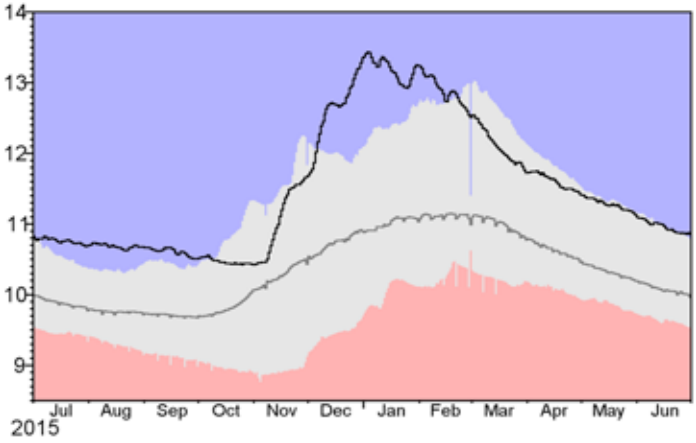

Fig 1 *Groundwater levels (black trace) in the Permo-Triassic sandstones at Newbridge (SW Scotland). The grey trace is the long term daily average and the blue and red envelopes indicate the pre-2016 maxima and minima.*

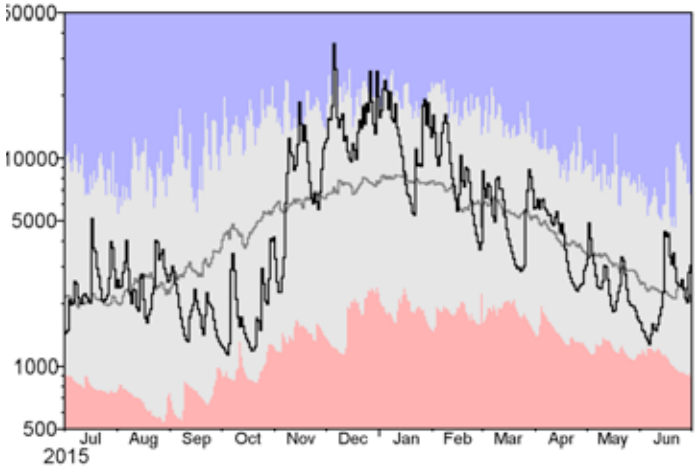

Fig 2 *2015/16 daily outflows ($m^3 s^{-1}$)from Great Britain (black trace). The grey trace is the long term daily average and the blue and red envelopes indicate the pre-2016 maxima and minima.*

The unsettled weather patterns continued into July, particularly in western areas where sustained rainfall on the 8th triggered widespread spates and flood alerts (e.g. on the Glaslyn in Snowdonia where a 119 mm three-day rainfall total was recorded at Capel Curig). Very humid conditions were accompanied by widespread thundery activity with further surface flooding and notable summer spates. On the 15th intense downpours forced the abandonment of the Farnborough Air Show and flood alerts were in operation on many urban water courses (e.g. in London and Swindon).

Synoptic patterns then changed decisively heralding a prolonged hot dry episode in much of central, southern and eastern Britain. Temperatures climbed to 35°C in a few localities on the 18/19th and accumulated rainfall totals over the first 24 days of July were very meagre: Yeovil reporting 1 mm and St Catherine's Point (Isle of Wight) 2 mm. Irrigation demands increased as the landscape across large parts of the country took on an increasingly arid complexion. Fortunately, overall reservoir stocks for England and Wales were appreciably above the mid-summer average in early July (Fig. 3) with no major impoundments registering more than 10% below average. In addition, groundwater levels in most major aquifers remained close to, or above, average for the time of year.

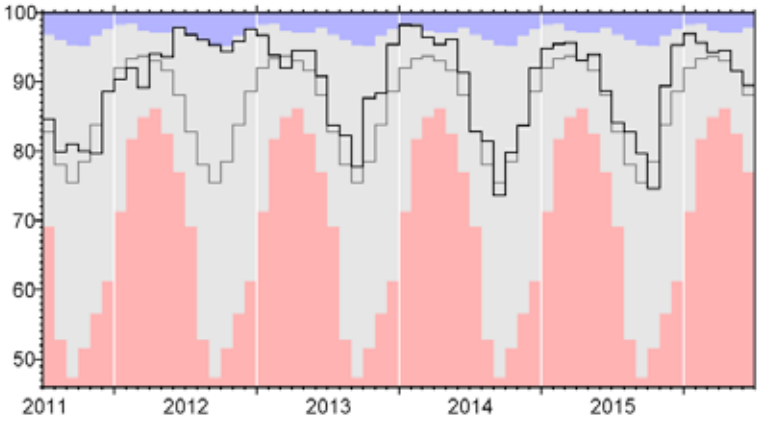

Fig 3 *Estimated monthly reservoir stocks for England and Wales (black trace). The grey trace is the long term monthly aver age and the blue and red envelopes indicate the pre-2016 maxima and minima.*

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26/7/2016