

UK Hydrological Bulletin: August 2014 – October 2014

The August-October period in 2014 witnessed very notable contrasts in synoptic patterns with correspondingly large temporal variations in rainfall totals. An interesting feature was the contribution of hurricane remnants to the vigorous weather conditions – and associated flooding – in August and October. Northern Scotland recorded its wettest August in a series from 1910 whilst September was the driest for the UK as a whole in the same timeframe. Correspondingly, runoff rates exhibited an unusually large range for the time of year. In Scotland flood alerts were widespread during the second week of August and both fluvial and tidal alerts were common through the latter half of October.

By contrast, the UK's driest September on record (in a series from 2010) was associated with high evaporative demands, steep increases in soil moisture deficits and extended river flow recessions. The latter leading to a notable shrinkage in many headwater drainage networks by month end. Reservoir stocks also declined steeply but any local concerns regarding the water resources outlook were greatly moderated by a sequence of active frontal systems which triggered a generally sustained recovery in runoff rates through October. In many areas seasonal groundwater level recoveries were also initiated – typically from early autumn levels within, or above, the normal range for the time of year.

August was the first month to register below average temperatures in 2014. It was also notably wet with parts of north east and south east Britain registering around twice the average rainfall, spatial variations were, however, considerable. The sustained rainfall reversed the normal seasonal increase in soil moisture deficits, and triggered rapid river flow increases in many responsive catchments. During the second week, the remnant of Hurricane Bertha resulted in exceptional rainfall totals especially in northern areas. Over the 24 hours to 0900 GMT on the 10th, 132.6 mm of rain was recorded on Fair Isle (Northern Isles) and >100 mm was reported from the headwaters of the Dulnain catchment in the Scottish Highlands. Flood warnings were very widespread across Scotland and, in Elgin, 200

homes were evacuated as fears grew that the River Lossie would burst its banks. The Spey, Ewe and Naver were among many rivers in northern Scotland to establish new August runoff maxima and notable summer spates also occurred in England & Wales. Generally however pluvial flooding was the greater hazard across southern Britain – causing significant transport disruption. The wet August ensured that the summer rainfall for Great Britain exceeded the preceding average for the seventh time in the last eight years but, as yet, there is little evidence of any compelling long term trend (Figure 1).

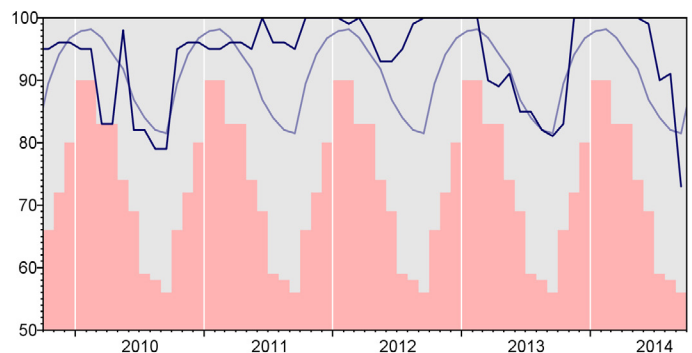


Fig 2 Monthly reservoir stocks (% of capacity) for Loch Thom together with the monthly average (grey trace) and the long term minimum (pink envelope)

Early September witnessed a dramatic change in weather patterns as the persistence of high pressure diverted almost all Atlantic depressions away for the UK. Monthly rainfall totals fell below 20% of average across many western, central and southern areas and, Northern Ireland registered its driest September on record. The lack of rainfall triggered very steep river flow recessions leaving flows during the final week close to seasonal minima in many responsive catchments; lengthy stretches of headwater streams were dry (e.g. in the Lake District). Total outflows from Great Britain closely approached the lowest on record for the time of year and steep declines were also registered in many reservoir stocks. A group of reservoirs in north-west England fell to their lowest level for more than a decade (but still considerably

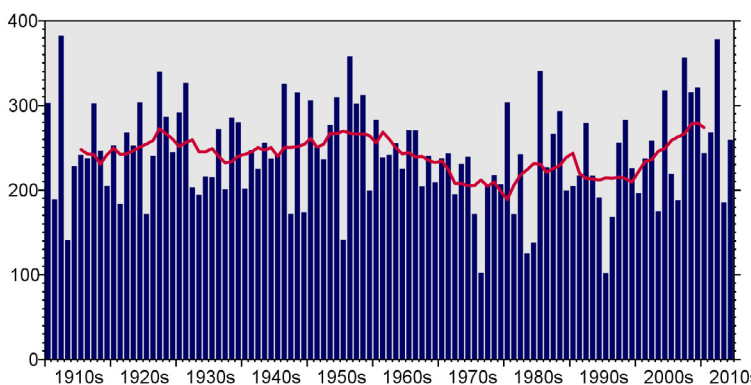


Fig 1 Summer (Jun-Aug) rainfall totals (mm) for Great Britain (with 10-yr running mean)

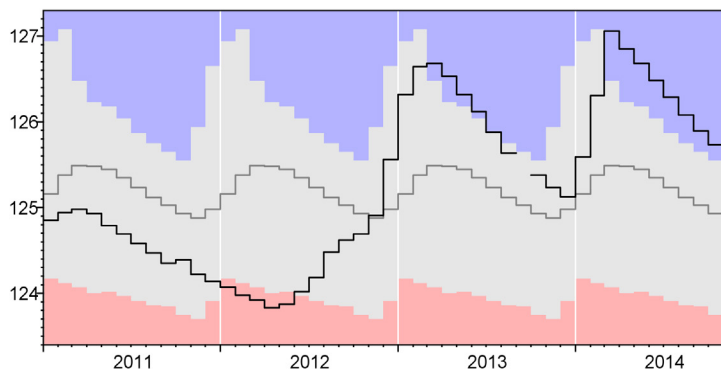


Fig 2 Monthly mean groundwater levels (with long term mean, max. and min.) for the Lime Kiln Way Well in the Upper Greensand of Somerset

above the drought minima of 1984 and 1995) and, in Scotland, Loch Thom registered its largest single month decline in a 21-year record (Figure 2). Whilst groundwater levels fell rapidly through September in some responsive aquifers, the legacy of the record 2013/14 winter rainfall meant that early autumn groundwater levels were generally above average and still exceptionally high in the slowest-responding outcrop areas. In the Upper Greensand of Somerset the Lime Kiln Way levels eclipsed the previous monthly maximum for the seventh successive month (Figure 3).

Contrary to the normal seasonal pattern, the high early autumn temperatures saw soil moisture deficits increase considerably and, entering October, there was some concern that the seasonal recovery in

runoff and recharge could be substantially delayed. Fortunately, the protracted arid spell was broken early in the month as a sequence of vigorous frontal systems crossed much of the UK. Gales were common in the west and north with tidal flooding alerts operating in many coastal areas. By the 7th, there were fluvial alerts in Scotland (e.g. on the Tay) and for a few responsive rivers in South East England. A week later sustained rainfall – Hampstead reported 57mm in 24 hrs – triggered a further spate of flood alerts – mostly in England; the flood risk was locally exacerbated by intense convective downpours and transport disruption was again extensive (e.g. in London on the 14th). Rainfall over the five days beginning on the 12th was particularly transformative – soils approached saturation and spate conditions, already common in northern catchments, extended to many responsive catchments across southern Britain. Further flood alerts (fluvial and tidal) were associated with the passage of the remnant of Hurricane Gonzola on the 21st and, approaching month-end, seasonal flow recoveries were generally awaited only in some streams fed primarily by groundwater (e.g. in the Chilterns).

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