

UK Hydrological Bulletin: November 2016 – January 2017

For much of the country the November 2016–January 2017 period provided an extreme contrast with the extensive and protracted flooding a year earlier. Some floodplain inundations did occur in late November but, generally, the last three months have been characterised by modest rainfall, seasonally high soil moisture deficits and correspondingly delayed recoveries in river flows, reservoir stocks and groundwater levels. By late January runoff rates were seasonally depressed over wide areas, with particularly low river flows across southern England. Water resources in most parts of the UK are resilient to single dry winters and most reservoir stocks remain well above drought minima but a wet late winter and early spring is needed to replenish stocks and trigger a belated recovery in groundwater levels – particularly in the south.

or the UK as a whole the November rainfall was close to average but very unevenly distributed in both a spatial and temporal context. Scotland registered around 70% of average —contributing to its driest October–November since 1962 — whilst England reported appreciably above average rainfall, the bulk being associated with the passage of Storm Angus (on the 20th) and a second deep low pressure system in its wake. In Devon, rainfall accumulations of 96 mm in 48 hrs were recorded in Exeter whilst Dunkeswell registered 107mm in 72 hrs. By the 22nd, flood warnings were extensive across England, south Wales and extending into southern Scotland. However, this wet interlude failed to herald a general recovery in runoff (and recharge) rates across the country). Steep river flow recessions became established in the fourth week and end-of-November outflows from England as a whole were substantially below average for the time of year (Fig 1).

In relation to groundwater resources the picture was more complex. Whilst aquifer recharge through the autumn had generally been modest, the residual benefits of successive wet winters meant that ground-water levels in most index wells and boreholes remained within the normal range at month-end.

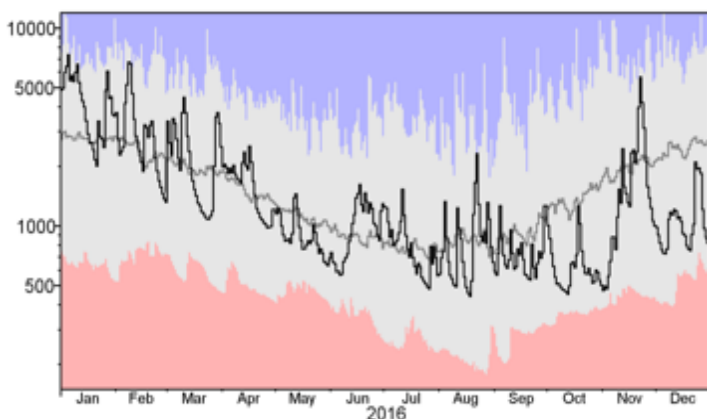


Fig 1 Daily outflows from England (black trace) together with the long term daily average (grey trace), daily max. (blue envelope) and min. (pink envelope). Units m^3s^{-1}

December was notably mild particularly in northern areas and, much of Scotland aside, it was a largely dry month with particularly arid conditions experienced across southern England where many catchments registered less than a third of their monthly average rainfall; in London some localities reported monthly totals of only 10 mm. River flows were correspondingly depressed. A substantial proportion of rivers across southern England, including the Taw (Devon), Stour (Dorset) and Medway (Kent) reported new December runoff minima and total outflows from England were close to the lowest on record for the end of the year (in a series from 1961 — see Fig 1). Correspondingly, reservoir stocks were mostly well below average and, for England and Wales as a whole, end-of-year stocks were the lowest since 2003 (Fig 2) albeit well above the minima registered in 1989 and 1995.

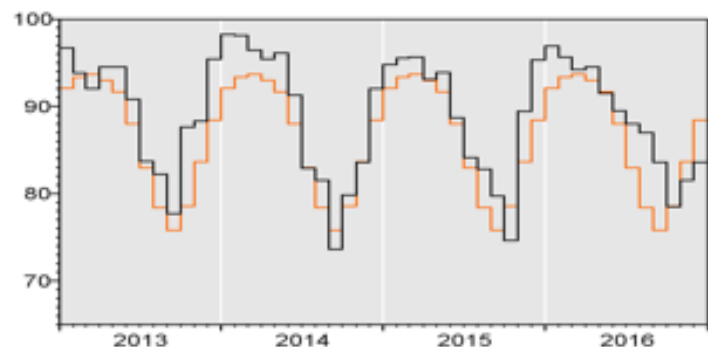


Fig 2 Estimated overall reservoir stocks for England & Wales (% of capacity); the black trace shows the end of month stocks, the orange trace is the long term average

Particularly low late-December stocks were reported for Wimbleball reservoir (Somerset) and the, much smaller, Ardingly reservoir (West Sussex); stocks were also depleted in many farm reservoirs. With seasonally high soil moisture deficits across most aquifer outcrop areas, groundwater recharge was also very restricted during December. As a result, groundwater levels in most fast-responding aquifer units were notably low at year

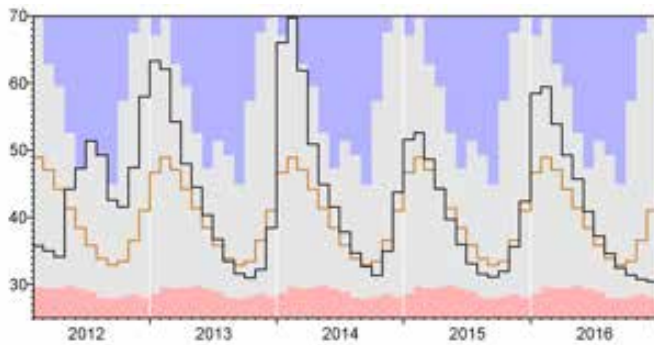


Fig 3 Monthly groundwater levels at Compton House (black trace) together with the long term monthly average (orange trace), monthly max. (blue envelope) and min. (pink envelope)

end. For the Compton House well in West Sussex the depressed December levels (Fig 3) would be expected, on average, only once every 10–15 years.

The first half of January was mild and unsettled, with cyclonic conditions predominating. Western and northern Scotland was particularly wet with significant snow accumulations on high ground. There was significant rainfall in southern England also.

On the 13th the passage of a deep low pressure system triggered a tidal surge along England's east coast and brought heavy rainfall to many parts of the country. A daily rainfall total of 41.2 mm was recorded at Bournemouth and fluvial flood alerts were in operation in a few responsive southern rivers (including the Tamar and Wey). After the 17th however, high pressure dominated synoptic patterns across most of the UK, accompanied by very low temperatures and meagre precipitation — largely restricted to fog-drip in some southern, central and eastern areas. With soil moisture deficits across the English Lowlands in early January being more typical of May, a general recovery in runoff and recharge rates was still awaited and flows in many groundwater-fed streams (e.g. the Itchen and Lambourn) have changed little since those reported in the late summer of 2016. Some drought stress may be anticipated if rainfall through the late winter and early spring remains appreciably below average.

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26/1/2017