UK Hydrological Bulletin: November 2013 – January 2014

Notwithstanding the wet October, the moderate rainfall deficiencies which had built up through 2013 increased over the latter half of November and into December. Subsequently however a succession of very deep Atlantic low pressure systems, carried on a particularly vigorous Jet Stream, heralded an remarkably stormy episode which lasted throughout most of January. Catchments across the great majority of the country were saturated by mid-December and, with very few dry interludes, runoff rates climbed steeply.

The full gamut of flood manifestations – pluvial, fluvial, tidal and groundwater – were widely experienced over the following seven weeks. Tidal flood risk was exacerbated by high winds and exceptional low atmospheric pressure, and floodplain inundations were both extensive and very persistent across much of the country. Groundwater level recoveries (in most responsive aquifers) were notably steep and the exceptional baseflow contributed to outflows at the national scale remaining close to the highest on record. The floodplain inundations caused major disruption to transport and agriculture and severe difficulties for some low-lying hamlets (most notably in the Somerset Levels). However, given the overall volume of runoff, the amount of property flooding at the national scale was relatively modest; a tribute to the general effectiveness of flood defences.

Early November was generally mild and cyclonic with river flows close to, or above, bankfull in many parts of the country from northern Scotland to Cornwall. Subsequently, high pressure became dominant and provisional data indicate that the UK registered its second driest November in the last 20 years. Northern Ireland was particularly dry and many catchments in eastern Scotland recorded their second lowest January-November rainfall since 1996. Across most of the UK the sustained late-autumn river flow recessions resulted in seasonally low flows entering December. In Northern Ireland, daily mean flows in the Lagan fell marginally below previous minima for the time of year and, across much of eastern and southern England, winterbournes remained dry.

Plate 1 *The Thames at Wallingford 8/1/14*
Photo: Katie Muchan

After a quiet start, December was a tempestuous month. In the first week, eastern and southern England experienced their highest storm surge since the extensive tidal flooding in January 1953; the damage was trivial by comparison to that major disaster but substantial evacuations were needed (e.g. in Boston, Lincolnshire) and the ingress of seawater damaged a number of wetlands (e.g. Blakeney, Norfolk). High tidal levels continued to contribute to coastal and estuarine inundations well into 2014. Scotland recorded it wettest December on record with some raingauges recording >10 mm every day from the 12th to the 28th, and similarly exceptional rainfall characterised much of southern England. On the 23rd/24th, an extremely intense depression (a remarkable 936.8 mb was recorded at Stornoway in the Western Isles) brought notable rainfall totals to much of the country; Postbridge on Dartmoor recorded a 24-hr total of 156 mm. The persistence of the rainfall was also exceptional. Correspondingly, runoff and recharge rates again climbed steeply; a number of rivers in the South East (e.g. the Mole) recorded their highest flows since the extreme September 1968 flood and dramatic groundwater level recoveries were reported from a number of the more responsive aquifers (e.g. the southern Chalk).

Intense Atlantic cyclones continued to stream across the UK in January, resulting in very notable rainfall accumulations. The Centre for Ecology & Hydrology's Met. Station at Wallingford recorded its wettest six-week sequence in a series from 1962. A combination of low pressure, high tides and abundant runoff from the land resulted in particular threat to coastal districts (e.g. in Dorset) and during the first week most UK rivers were exercising a natural right

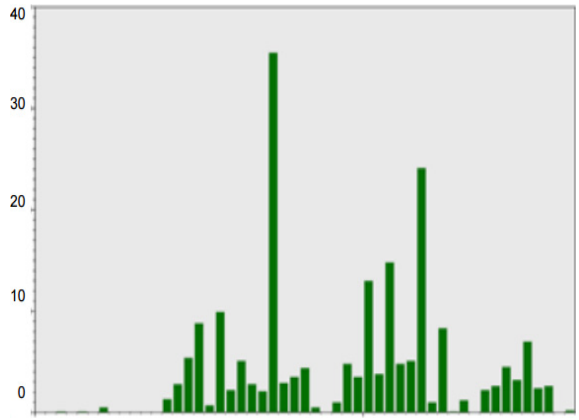

Fig 1 *Daily rainfall totals (mm) at Wallingford Dec 2013 – Jan 2014*

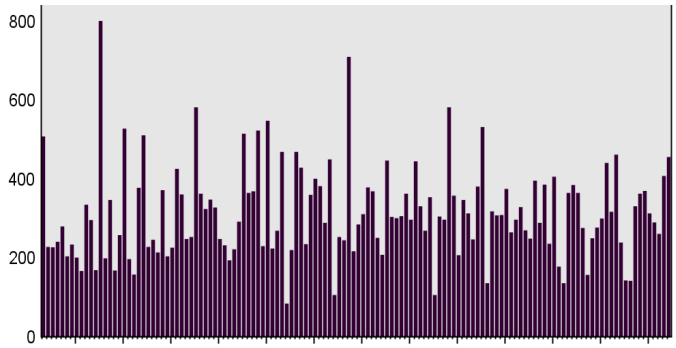

Fig 2 *Water-year daily gauged (m3s-1) maxima for the Thames at Kingston 1883-2014*

to spill over their floodplains (see Plate 1) – a useful reminder for some. By the 4th, there were more than 100 extant Flood Warnings, and >200 Alerts, affecting most of the country's river network. As the month progressed, rivers remained in spate but flood risk focussed more on the larger river basins, in the South East particularly – where, also, instances of groundwater flooding were becoming increasingly common. The Thames (at Kingston), peaked on the 6th with a daily flow similar to those recorded in January 2003 and November 2000, but higher flows have registered in around 15 earlier flood events in a series from 1883 (see Figure 2). Some parallels may be recognised with runoff patterns in early 1937 and 1915 but, by the 20th January, daily mean flows had remained above 250 m3s-1 for longer than in any other flood episode. Correspondingly, across much of the country it was the persistence of the flooding (fluvial, tidal and groundwater), and the attendant impacts on society, that characterised this very exceptional episode rather than the extreme nature of the peak flows.

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