

UK Hydrological Bulletin: November 2012 – January 2013

Across most of the UK, late 2012 and early 2013 weather patterns were very cyclonic with exceptional rainfall totals in many areas. Water resources remained notably healthy but flooding was common and widespread and many runoff records were eclipsed; a remarkable contrast with the arid conditions experienced early in 2012.

Through much of early November high pressure dominated synoptic patterns, a rare circumstance in the context of the previous seven months, but on the 19th the passage of a very vigorous frontal system heralded an exceptionally unsettled interlude. Rainfall totals over 8–10 days were greater than the monthly average in many parts of England & Wales, with accumulated totals exceeding 180 mm in Snowdonia and Dartmoor. Flash flooding incidents were common (e.g. in western Scotland) and landslips disrupted a number of important transport links (e.g. the A83). This very wet episode ensured that November rainfall totals were markedly above average in a broad swath from Northumbria through the Midlands to south Devon (a recurring feature of rainfall patterns since the spring). By contrast, much of northeast Scotland was relatively dry and Northern Ireland reported its 2nd driest November in the last 20 years.

With catchments close to saturation, river flows responded rapidly to the November deluges — floodplain inundations were both frequent and extensive across much of the country. Notable flood events were common (e.g. on the 19th at Dunblane and Aberfoyle in Scotland and the 27th when two modern estates were inundated at St. Asaph and Ruthin in north Wales). Flood warnings extended across much of the UK and very extensive areas of agricultural land were under water. With most major rivers in high spate, runoff from England & Wales was outstanding during the fourth week – exceeding the

previous maximum in a series from 1961 – see Figure 1. Correspondingly, reservoir stocks were exceptionally healthy for the late autumn although water quality issues did limit the replenishment to a number of lowland pumped-storage reservoirs (e.g. Grafham).

After declining through the early autumn, groundwater levels generally rose steeply through November and at month-end new seasonal maximum levels were registered in some northern index wells and across substantial parts of the southern Chalk outcrop. Such exceptional levels, reflected in heavy outflows from many high-level springs, before the onset of the winter implied a considerably enhanced risk of localised groundwater flooding in vulnerable areas (e.g. south Dorset, Hants and Berkshire) which is likely to extend through much of the recharge season.

After a damp start to December, the weather across much of Britain was cool and relatively dry until the 14th when many areas recorded rainfall totals of 20–30 mm heralding a further remarkably wet episode which lasted into early January. Cumulative rainfall totals for the five days beginning on the 20th were particularly impressive: Stoneyford in north east Scotland reported a three-day total of 169 mm and many areas exceeded the December average in this timeframe. With catchments again saturated, the runoff response was truly exceptional. Flood warnings extended across much of the UK; the Environment Agency reported 570 properties flooded over the latter half of the month. Particular severe

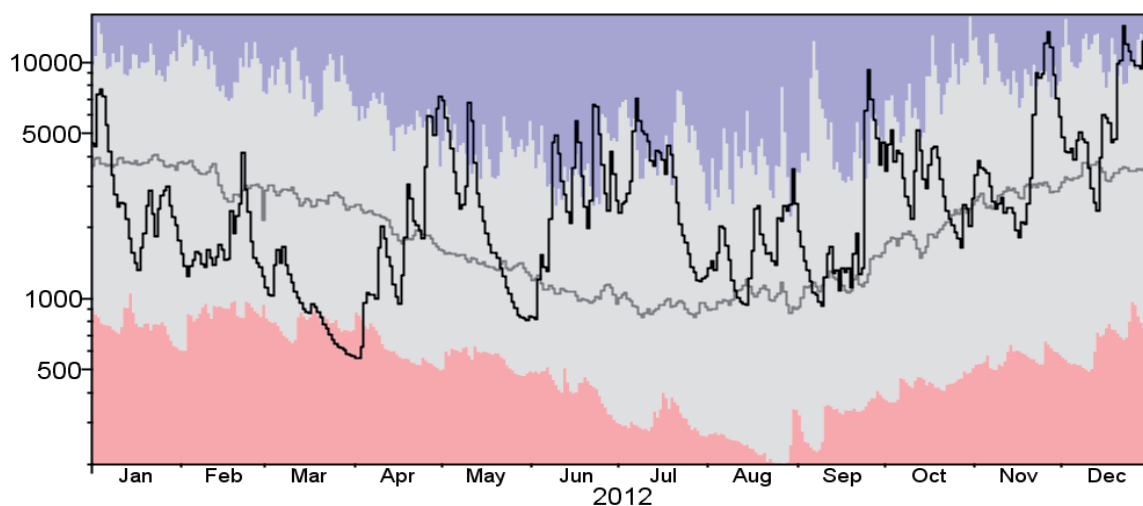


Fig 1 2012 daily outflows from England & Wales with daily max., min., and mean (based on the 1961–2011 record)



River Thames at Sonning 25/12/12

flooding was experienced in some areas (e.g. at Braunton in Devon and Stonehaven, Aberdeenshire) and incidents of pluvial, fluvial and groundwater flooding were widely reported. The associated extensive transport disruption was locally aggravated by landslips — on the 26th the British Geological Survey issued a rare Landslide and Rockfall warning for the South West.

By year-end, the Somerset Levels had been flooded for over a month and, generally, floodplain inundations were of a remarkable spatial extent (see photo). This directly reflects the truly exceptional runoff: based on provisional data, estimated outflows over the 20–31st December from England & Wales were the highest for any 12-day sequence in a series from 1961, with the singular exception of late October–early November 2000.

Estimated outflows from England & Wales in mid-March 1947 (when snowmelt made a major contribution to the most extensive flooding in the century) suggest the late December 2012 runoff was exceeded by a substantial margin but other examples in the historical record must be very rare. Unsurprisingly, given the outstanding rainfall since the early spring, both surface and groundwater resources were exceptionally healthy entering 2013.

With most catchments extremely vulnerable to further rainfall, it was fortunate that high pressure during much of early January held further Atlantic frontal systems at bay, allowing runoff rates to decline from their outstanding late-2012 levels. Temperatures declined sharply in mid-month heralding a notably cold interlude with substantial snowfall extending across most of the country — particularly around the 18–19th when snow accumulations exceeded 30 mm in many upland areas (e.g. in the Brecon Beacons and the Cairngorms). With the arctic conditions continuing, thousands of schools closed during the third week and transport disruption was both extensive and persistent. On the 25/26th, a westerly airflow introduced much milder conditions — with substantial precipitation as it abutted against a cold continental airmass. Flooding was reported in south Wales and, as the warm front progressed east, a general thaw was initiated. By the 27/28th, a combination of factors — significant rainfall, snowmelt, exceptional groundwater outflows, and spring tides — resulted in flood warnings once more extending across much of the country and a further sequence of exceptional daily outflows from Great Britain.

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