UK Hydrological Bulletin: August – October 2018

The August-October period in 2018 served to underline how rainfall patterns, geology and soil moisture conditions across the UK can interplay to make for large regional and more local contrasts in runoff rates. Record low minimum summer (June–August) runoff totals for some rivers in eastern Scotland and depressed late-September reservoir stocks in parts of northern and south-west England contrasted with extreme flood events during October, in Wales particularly, and abundant runoff in western Scotland. In much of eastern, central and southern England a more general contrast could be identified between continuing low flows in many impermeable catchments but healthier runoff rates where groundwater levels — which generally remained with the normal early autumn range — ensured substantial low flow support. Under such circumstances generalisations carry little conviction but, in most areas, the drought conditions of the late summer have abated, reservoirs stocks are recovering and, in much of the country, mid-October saw the focus of hydrological concern switch to the risk of flooding.

After the warmest and third driest May–July for the UK in a series from 1910, soil moisture deficits entering August were the highest, for the time of year, since late July 1989. Correspondingly, the drought's impact on agriculture — the wine harvest aside — was a major concern and in many rivers draining impermeable catchments a combination of low flows, depleted oxygen levels and high water temperatures caused considerable ecological stress with local fish fatalities (e.g. in the Mole) and salmon

waiting in estuaries for spates to trigger movement upstream.

Above average August rainfall in south-east Britain was particularly welcome and, generally, rainfall totals were in the normal range. Nonetheless, the May–August rainfall for the UK was the second lowest since 1984 and drought conditions remained extensive (Fig. 1). In many western catchments, (e.g. the Conwy in Wales and Mourne in Northern Ireland) runoff rates recovered considerably through August but, by contrast, flows continued to decline in eastern Scotland. The rivers Deveron and Whiteadder registered their lowest June–August runoff in records of thirty-seven and thirty-nine years respectively. Overall reservoir stocks for England & Wales continued to decline and were the lowest for late August since 1996 with stocks in the Derwent Valley group down to 40% of capacity.

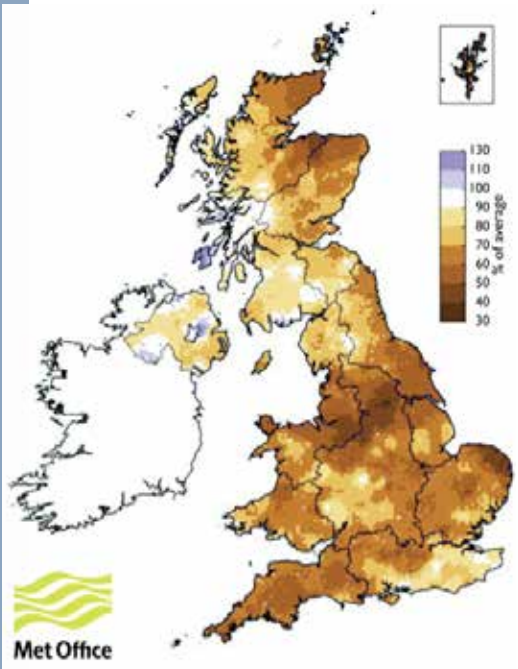

Fig 1 September 2018 rainfall as a percentage of the 1981–2010 average

Temperatures generally remained above average during September but regional contrasts in rainfall were substantial — north-west Scotland was wet whilst rainfall deficiencies increased in Northern Ireland and much of southern and eastern England. In other areas runoff rates increased substantially after the first week, with high spate conditions particularly in parts of Wales and northern Scotland on the 20/21st. These contributed to the highest September runoff in a 35-year series for the river Nevis. In the headwaters of the Derbyshire Derwent levels in the Howden Reservoir increased by 5.5 metres on the 20th following 50 mm of rainfall in 24 hours. By contrast, depressed flows were recorded in Northern Ireland, in the Annacloy particularly, and in a number of rivers draining to the North Sea. By contrast, flows in many groundwater-fed streams in the English Lowlands (e.g. the Lambourn and Coln) continued to benefit from relatively healthy groundwater support (see Fig. 2) a consequence of the abundant recharge in March and April. Notwithstanding some local recoveries, overall reservoir stocks for England & Wales remained at their lowest since late-2003 around month-end (Fig. 3); Clatworthy and Roadford reservoirs (south-west England) and Washburn (Yorkshire) remained over 20% below average for the time of year.

After a dry start, cyclonic weather patterns became dominant from the second week of October, initially across northern and western Britain. Sustained rainfall in northern

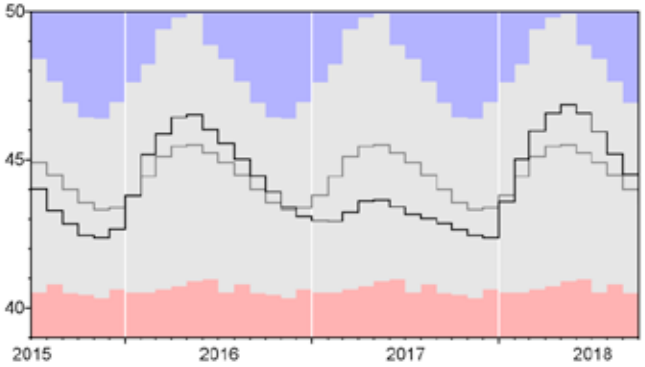

Fig 2

Monthly groundwater levels in the Chalk at Washpit Farm (Norfolk). The blue and pink envelopes are the period-of-record max. and min. Levels and the grey trace represents the long term monthly averages.

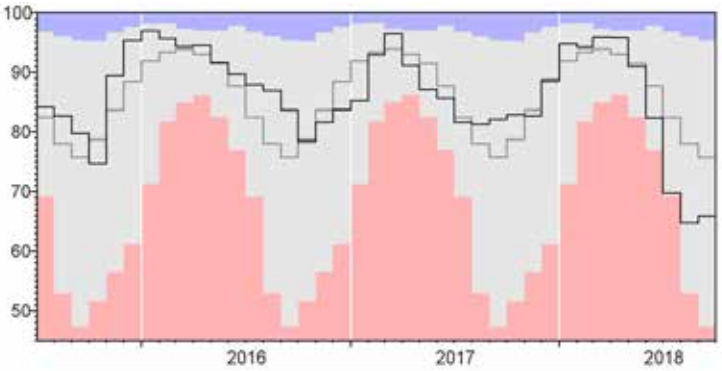

Fig. 3 Month-end reservoir stocks for England & Wales as a percentage of capacity. The blue and pink envelopes are the period-of-record max. and min. Levels and the grey trace represents the long term monthly averages.

Scotland — Achnagart recorded 117 mm in 24 hrs on the 8/9th — triggered widespread spate conditions but this wet episode was clearly eclipsed during the subsequent slow passage of storm Callum. Rainfall accumulations were exceptional: in the Brecon Beacons a 218mm 48-hour total was recorded at Libanus and totals in excess of 100 mm were reported from north Wales and the Lake District. Correspondingly, flood alerts were common, flooding was extensive and transport disruption — locally exacerbated by landslides — was severe; in South Wales, the rail track near Mountain Ash was submerged necessitating the evacuation of 30 passengers. Callum's impact across the English Lowlands was substantially more muted, generally limited to moderate spates on responsive and/or urban streams but recessions continued in most spring-fed rivers where the seasonal recovery in most aquifers has yet to commence. The water resources outlook is very dependent on late autumn and early winter rainfall.

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25/10/18