

**Soil moisture on 31 December 2020** (see back page for explanatory comments).

### Notes on period to 31 December 2020

**At the end of December soils across the UK are generally at wetness levels above what is normal for the time of year. Further heavy rainfall is likely to result in surface water flooding.**

Provisional data indicate that December was a wet month with above average rainfall across the UK and most places had few dry days. In many parts the rainfall was in excess of 150% of the long-term average. Rainfall was closest to average in Northern Ireland and western Scotland.

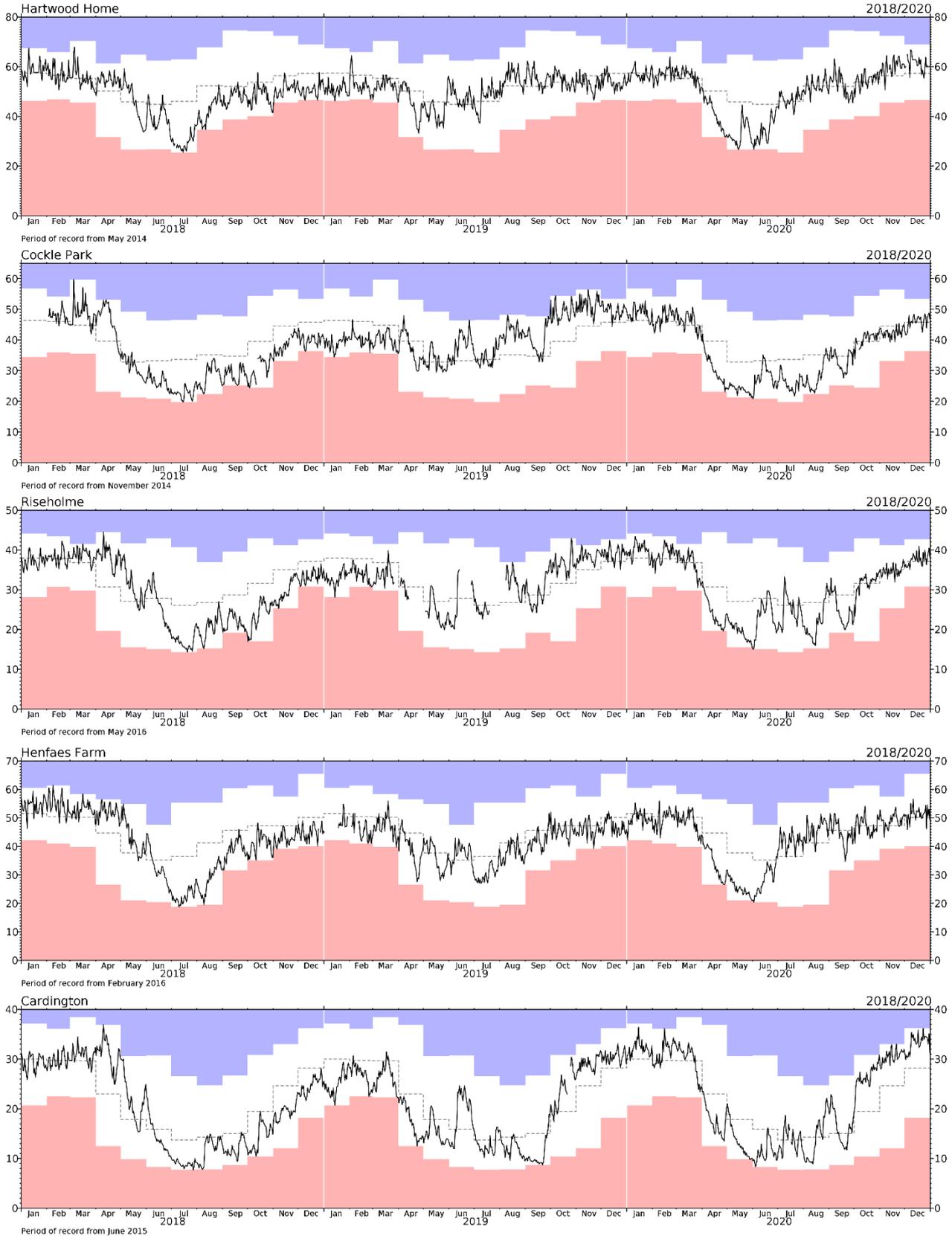
At the start of December soils were wet across most of the UK and with above average rainfall during the month, soils in all parts of the UK are at, or close to, saturation. There is very little capacity within the soil to hold more water meaning that further heavy rainfall is likely to cause surface water flooding.

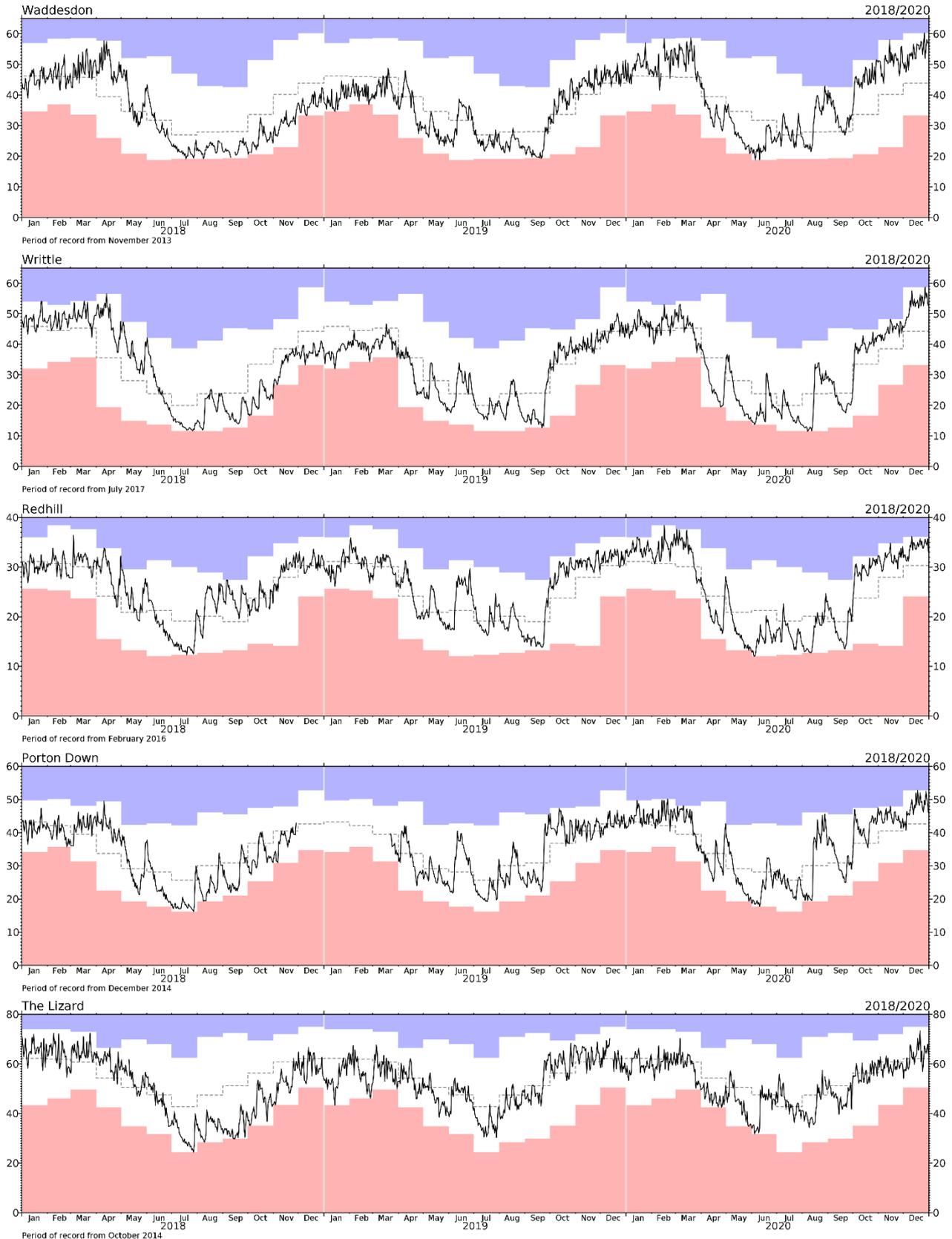
Sites to the south-east of the UK are much wetter than expected in winter (e.g. Cardington, Porton Down, Redhill, Waddesdon and Writtle). Elsewhere soils are wet but closer to what is normal for the time of year (e.g. Hartwood Home, Cockle Park, Riseholme, Henfaes and The Lizard).

Note that the COSMOS-UK records are too short to reliably estimate long-term monthly averages and departures from them; it is therefore only possible to give qualitative indications about averages and what is typical for the time of year.

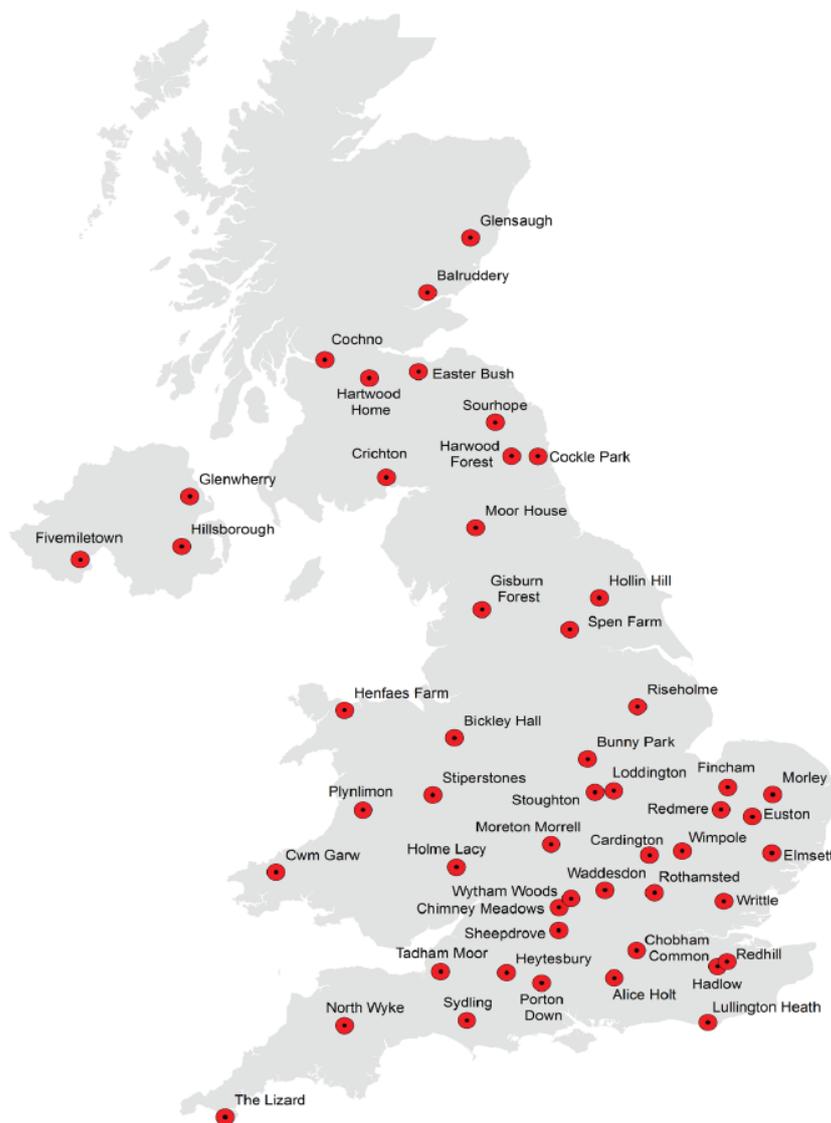
### Network News

- Telemetry faults at Cochno and Cwm Garw.
- The COSMOS-UK sites at Crichton, Moor House, Lullington and Porton Down have now been collecting data for over six years.





### COSMOS-UK site locations



**About the maps on page 1:** The maps of volumetric water content (VWC) and soil moisture index (SMI) show average daily soil moisture at the end of the month. Colours indicate wetness as in the keys. Grey symbols represent missing data.

The symbols represent groups of sites with similar soil maximum water content, i.e.



**VWC** – This is the percentage water content and reflects both capacity of the soil to store water as well as actual moisture content.

**SMI** – This is an index of soil moisture that is adjusted for the capacity of the soil to store water. A value of around 1.0 represents field capacity (FC) which is typical moisture content in late autumn and early spring. SMI will generally be lower than this in the summer and higher in the winter.

Nearby sites with the same symbol (i.e. similar rainfall and soils) should be in similar VWC and SMI classes; however neighbouring sites with different symbols (i.e. similar rainfall but different soils) can be in different VWC and SMI classes. Sites represented by circles with an outline are generally poorly draining and wet, and therefore often have VWC and SMI values different from their neighbours; data from these sites are less reliable than from other sites.

Grey shaded areas represent principal aquifers.

**About the graphs on pages 2 and 3:** These show the VWC over a three year period. The black line shows the daily soil moisture, the shaded areas show the monthly minima (pink) and maxima (blue) from the period of record, and the dashed grey line indicates the period of record monthly mean. These extremes and means are currently derived from very short records; they do nevertheless give some indication of the seasonal variability of the moisture content.

**About soil moisture:** Soil moisture varies in the short term (hours to days) with rainfall and as water drains through the soil. Longer term variation is driven by the seasonal difference between rainfall and evaporation. Thus soil moisture decreases in the summer when evaporation exceeds rainfall but increases when this is reversed. In most winters under UK conditions, soil moisture reaches a relatively constant value, known as field capacity; additional rainfall either cannot enter the already saturated soil and flows across the land surface as overland flow, or infiltrates but drains quickly through the soil.

Differences in soil type and weather patterns cause variations in soil moisture between sites including when the soil returns to field capacity in autumn/winter and when soil moisture decreases in the spring/summer.

**About COSMOS-UK:** COSMOS-UK is supported by the Natural Environment Research Council award number NE/R016429/1 as part of the UK-SCAPE programme delivering National Capability