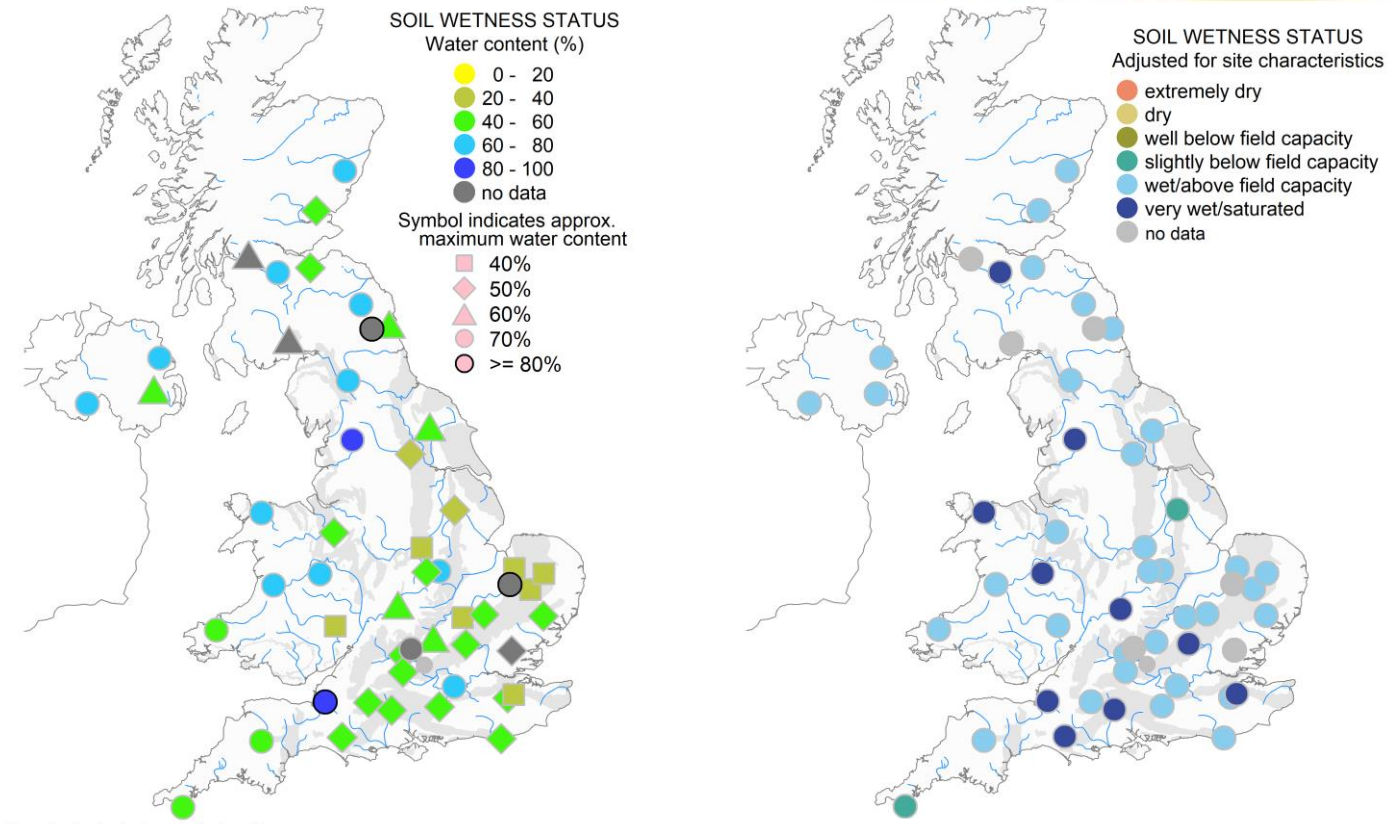
COSMOS-UK | soil moisture

Issued on 13 February 2025



Soil moisture on 31 January 2025 (see back page for explanatory comments).

At the end of January, wet soil moisture conditions were maintained across much of the UK. Most sites are within the typical seasonal range, though some sites are becoming very wet.

January 2025 brought typical winter weather, including rain and snow, and Storm Éowyn was one of the strongest windstorms for over a decade. Provisional data indicate rainfall was below the long-term average (79%) over the UK, largely due to drier conditions in more northerly regions. Southern England experienced around 125% of its long-term average rainfall, whereas Scotland experienced just 51% of its average for this time of year. It was the 5th sunniest January on record, though temperatures were ~0.9°C cooler than usual.

Soil moisture levels across the COSMOS-UK network fluctuated throughout the month, but most sites were within their expected ranges for the time of year. Higher soil moisture levels were seen in relation to the regional variations in precipitation. Several sites in Southern England were much wetter than usual after experiencing more rainfall than northerly regions (e.g., Cardington, Moreton Morrell, Rothamsted). Conversely, several sites experienced drier-than-usual conditions halfway through the month (e.g., Bunny Park, North Wyke, Riseholme), but mostly, they were within their normal range.

Overall, reasonably damp and cool conditions helped maintain soil moisture levels from the previous month, with some regional variations due to precipitation patterns.

Network news

Sheepdrove farm and the Lizard were visited in January to recover some missing anemometer data and replace a rain gauge. Cardington was decommissioned on 11th February.

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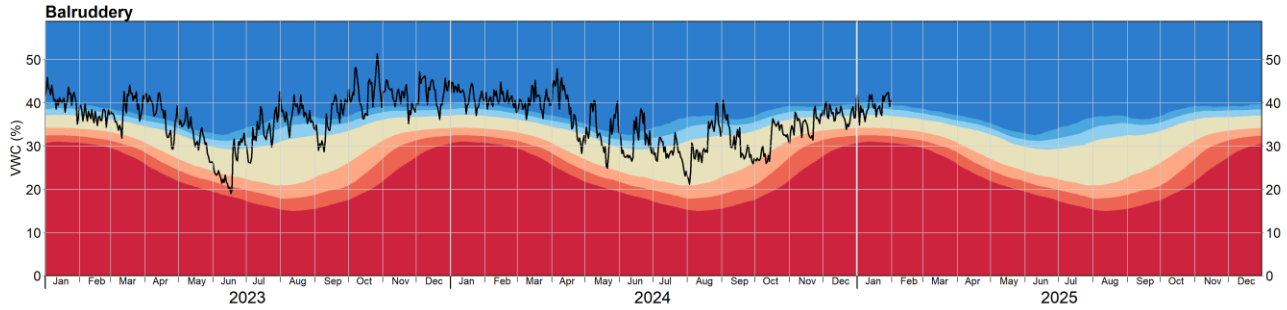

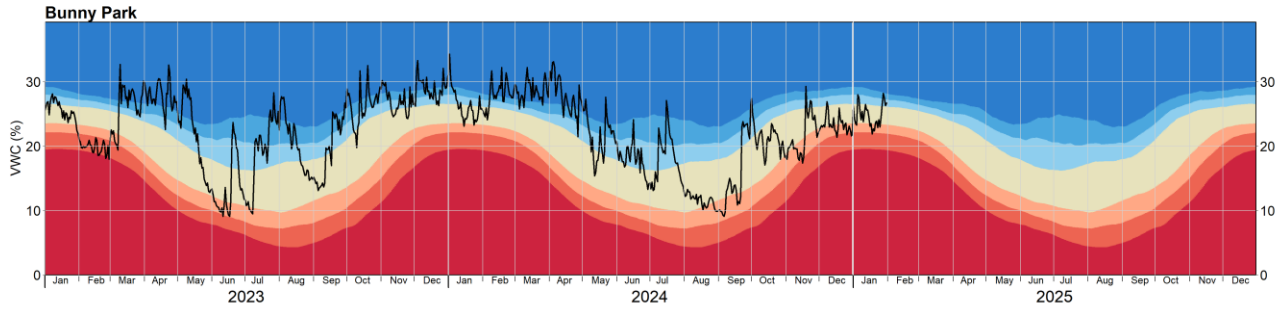

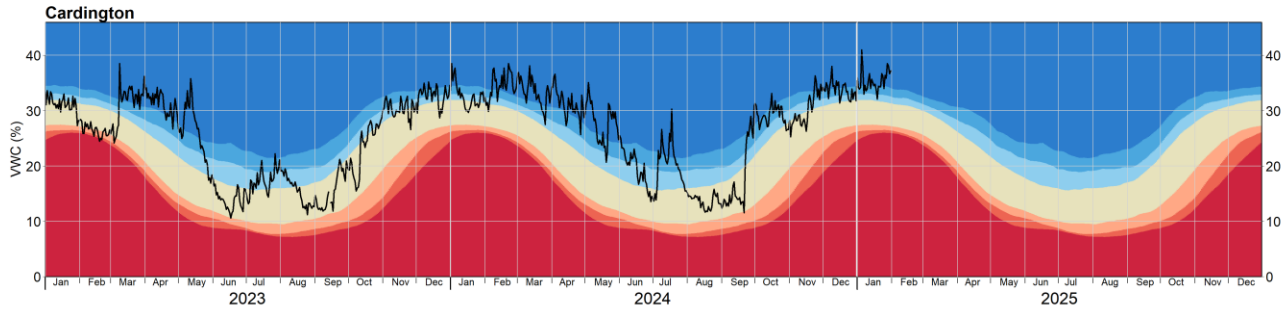

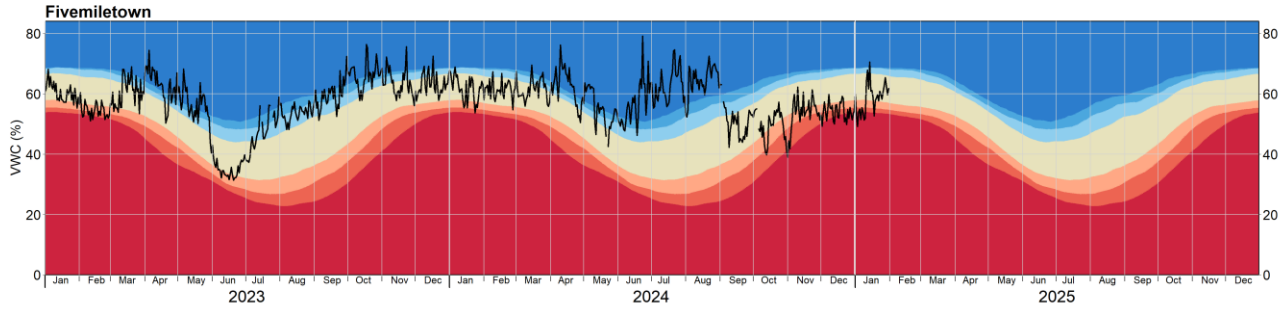

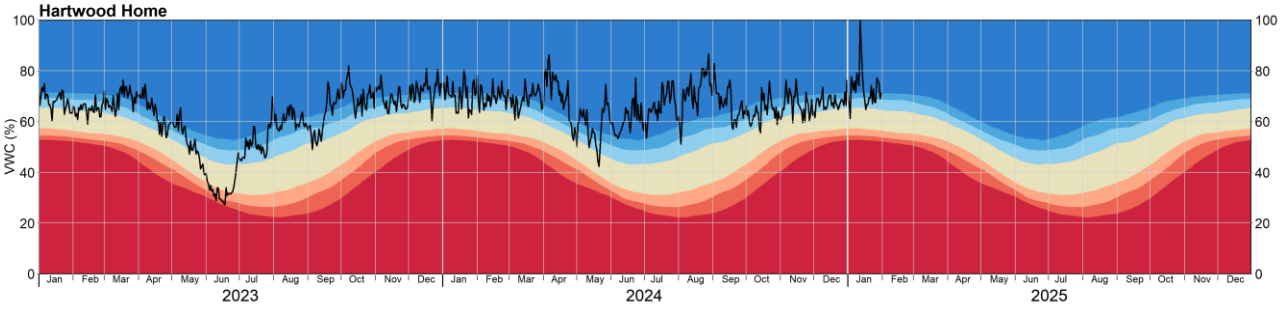

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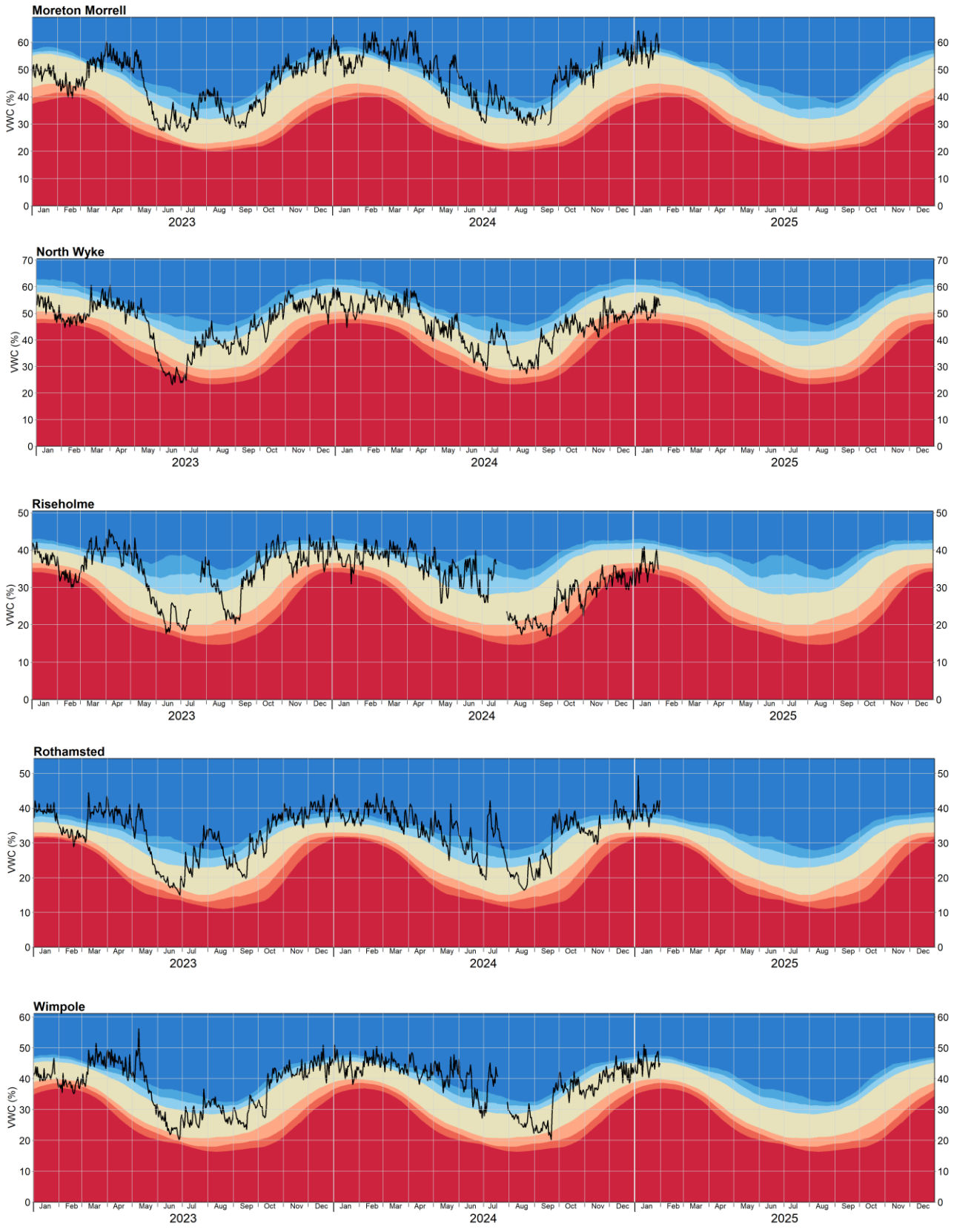

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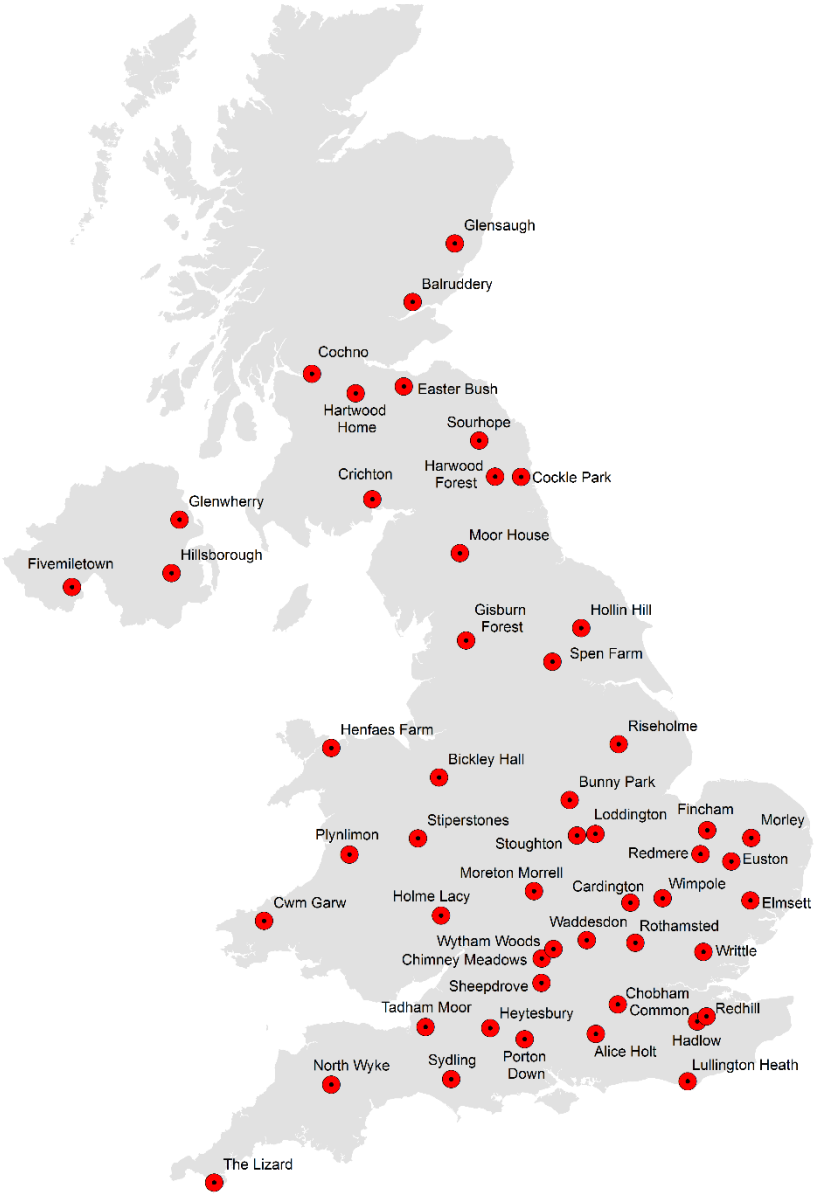

About the maps on page 1: The maps show daily mean soil moisture on the last day of the month. Colours indicate wetness as in the legends.

The map on the left shows wetness as the volumetric water content (VWC) of the soil which is constrained by soil type, i.e. some soils are able to hold more water than others as indicated by the shape of the symbol.

The map on the right presents soil wetness adjusted for site specific characteristics, i.e. taking account of the possible range of soil wetness at each site. Field capacity (FC) is a key point in this range. When soil moisture is below FC soil moisture is said to be in deficit, i.e. there is a (positive) soil moisture deficit (SMD).

Grey shaded areas on these two maps represent principal aquifers.

About the graphs on pages 2 and 3: The black line shows VWC. The coloured bands indicate how VWC compares to historical variability for the site and time of year.

- exceptionally dry
- notably dry
- drier than normal
- normal
- wetter than normal
- notably wet
- exceptionally wet

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 the field capacity. Field capacity is a measure of how much water the soil can hold against gravity and is strongly dependent on the soil type. Soils are expected to be around field capacity after being wetted to above field capacity and the excess water (e.g. from macropores) has drained away under gravity, which can take several days after heavy rain, to reach a near steady state. 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/Y006208/1 as part of the UKCEH NC-UK programme delivering National Capability.

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