

Soil moisture on 30 June 2023 (see back page for explanatory comments).

### Notes on period to 01 July 2023

**After a month of record high temperatures, the soil moisture index is below field capacity for the majority of sites across the UK, with particularly dry soils in the south of the country.**

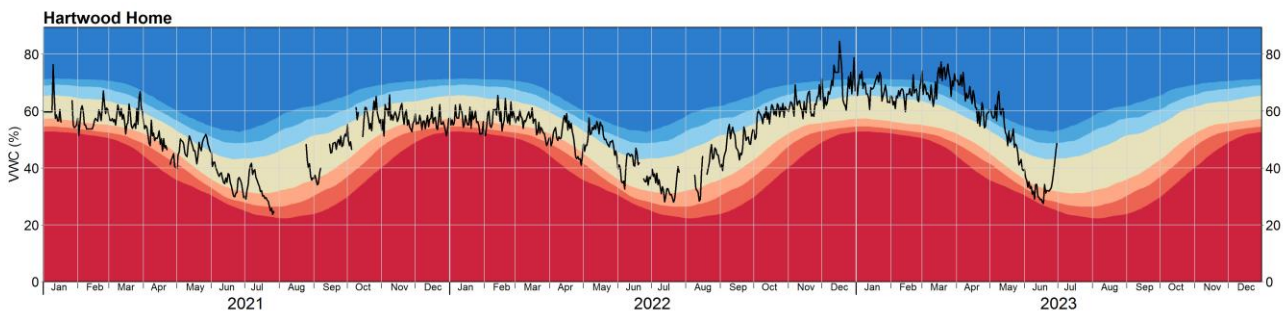
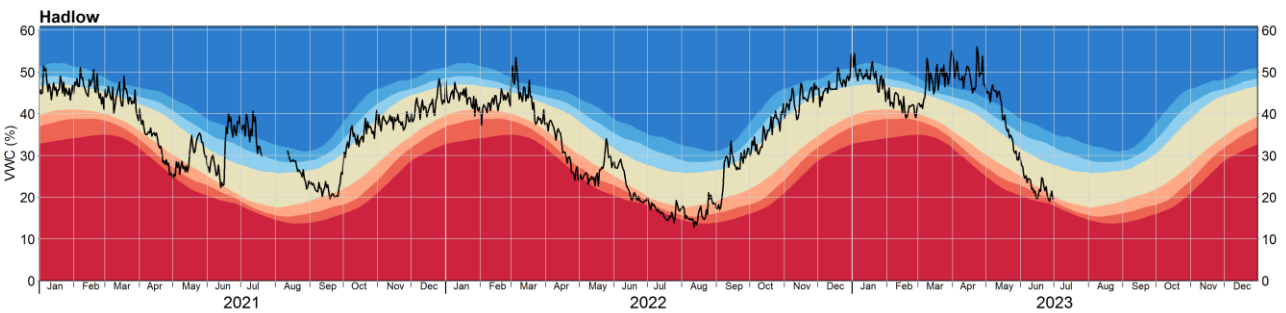
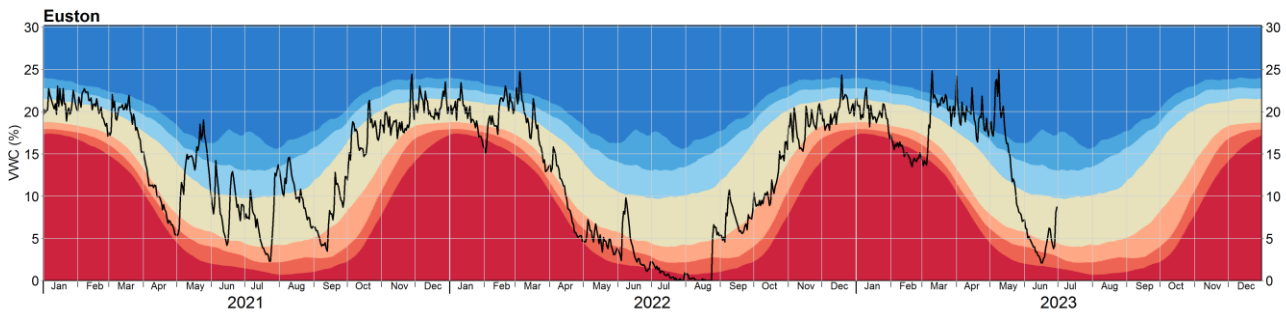
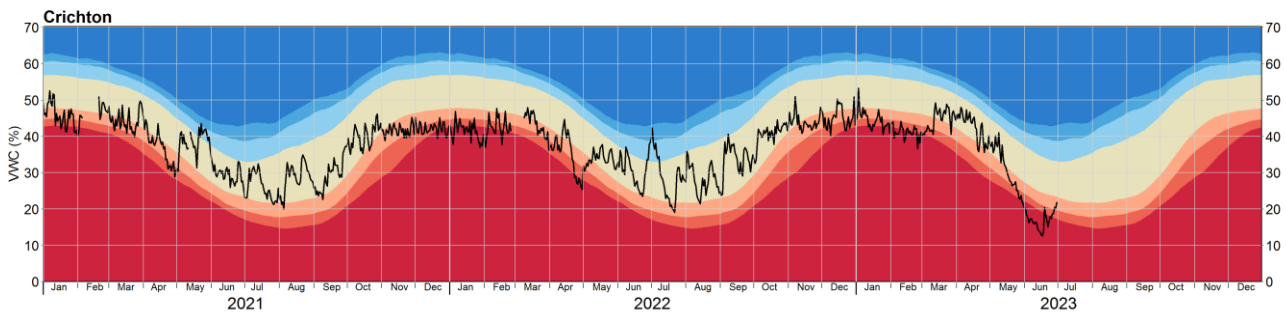
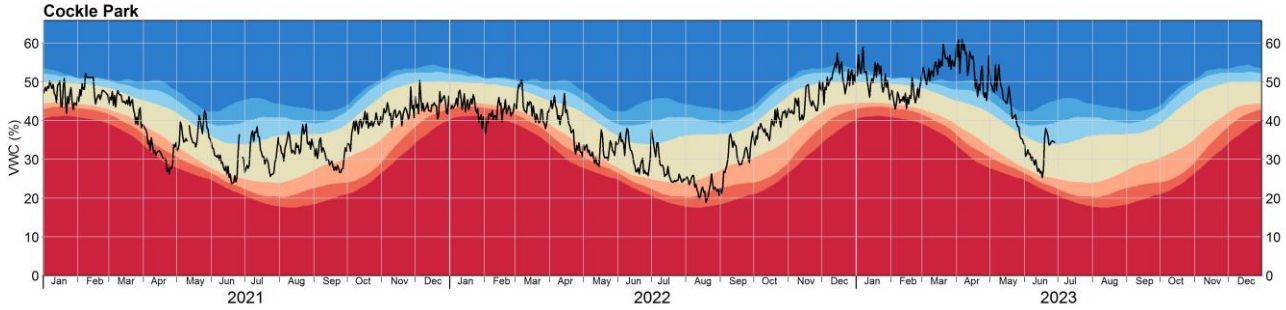
Provisional data indicate that the first half of June was exceptionally dry across the UK, with precipitation well below the long-term average. Precipitation increased in the second half of the month but stayed below average, particularly in Southern England and Eastern Scotland. This was the hottest June on record for the UK, with exceptionally high temperatures of 2.5°C above average for the UK as a whole and up to 3°C above average for Northern Ireland.

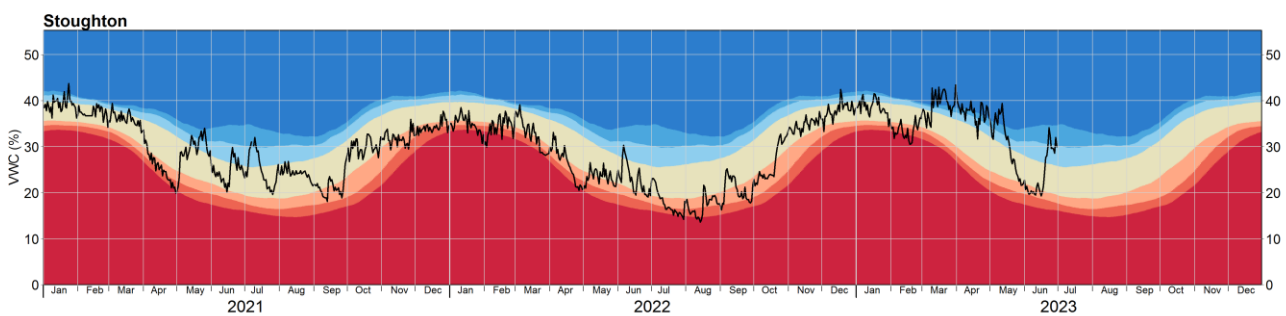
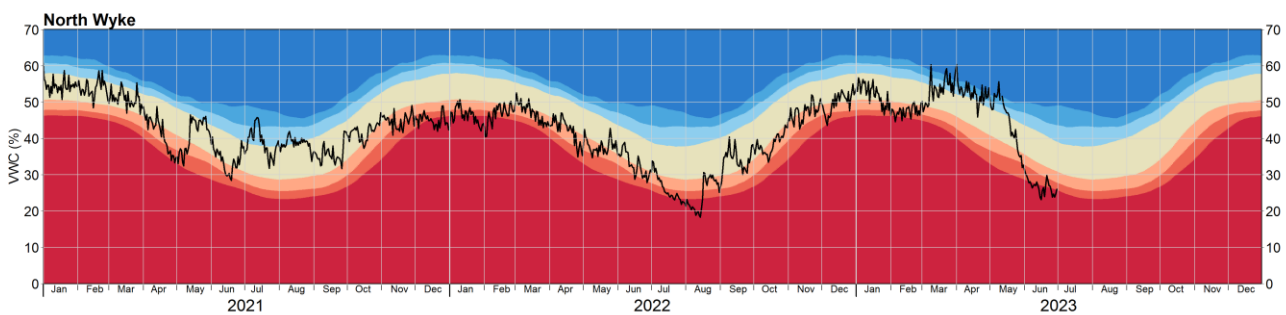
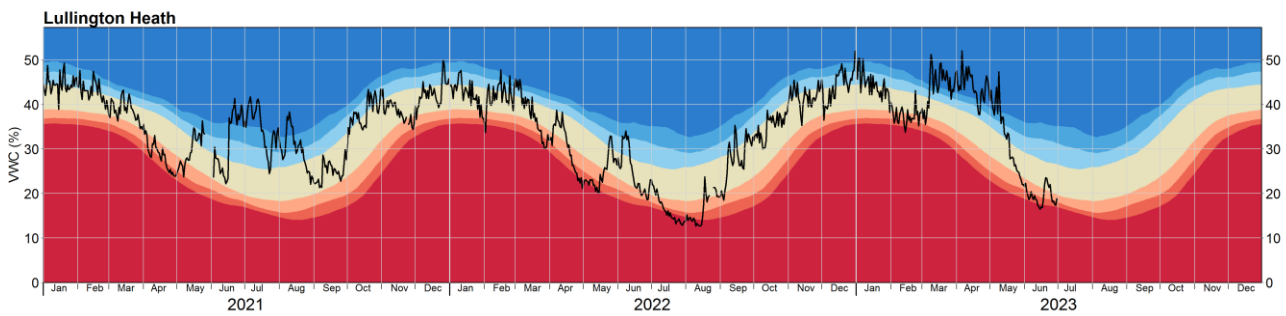
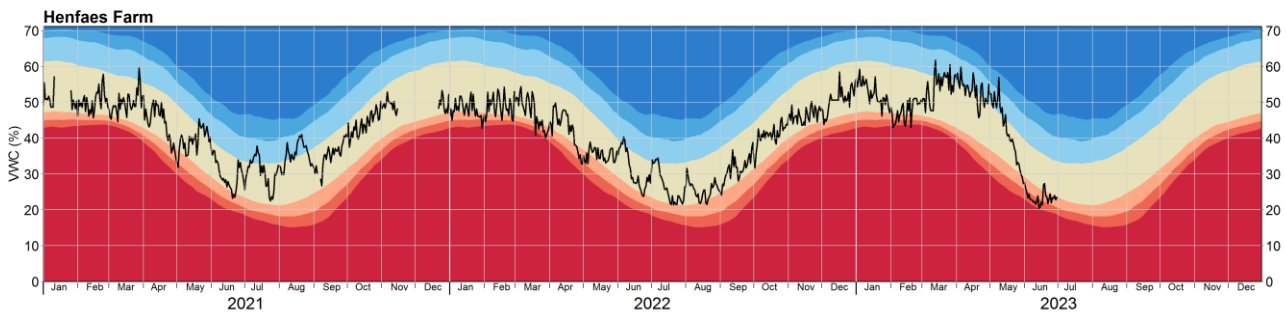
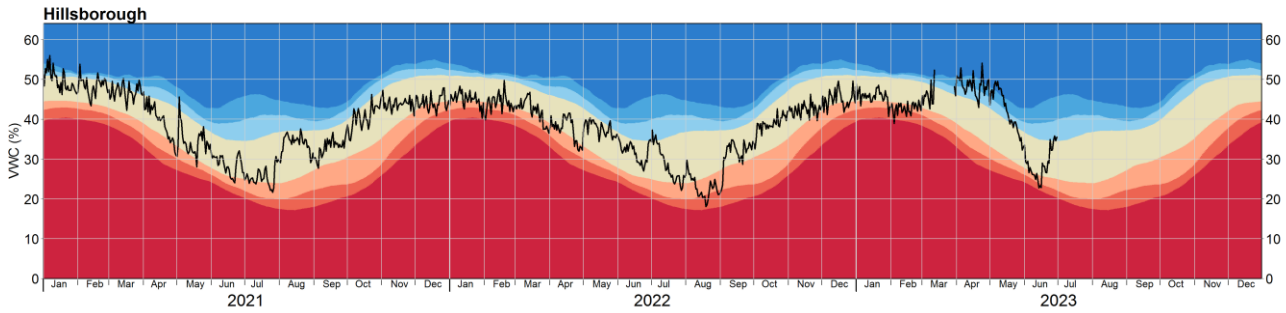
The lack of precipitation in early June led to very low soil moisture levels at most COSMOS-UK sites by the middle of the month. The second half of June gave a mixed picture, with increased rainfall raising soil moisture levels at some sites such as Hartwood in Scotland, Hillsborough in Northern Ireland, Euston in Eastern England and Stoughton in the Midlands. At other sites, however, soil levels remained very dry through to the end of the month, particularly in Southern Scotland (eg. Crichton and Sourhope), Southwest England (eg. North Wyke) and Henfaes in Wales.

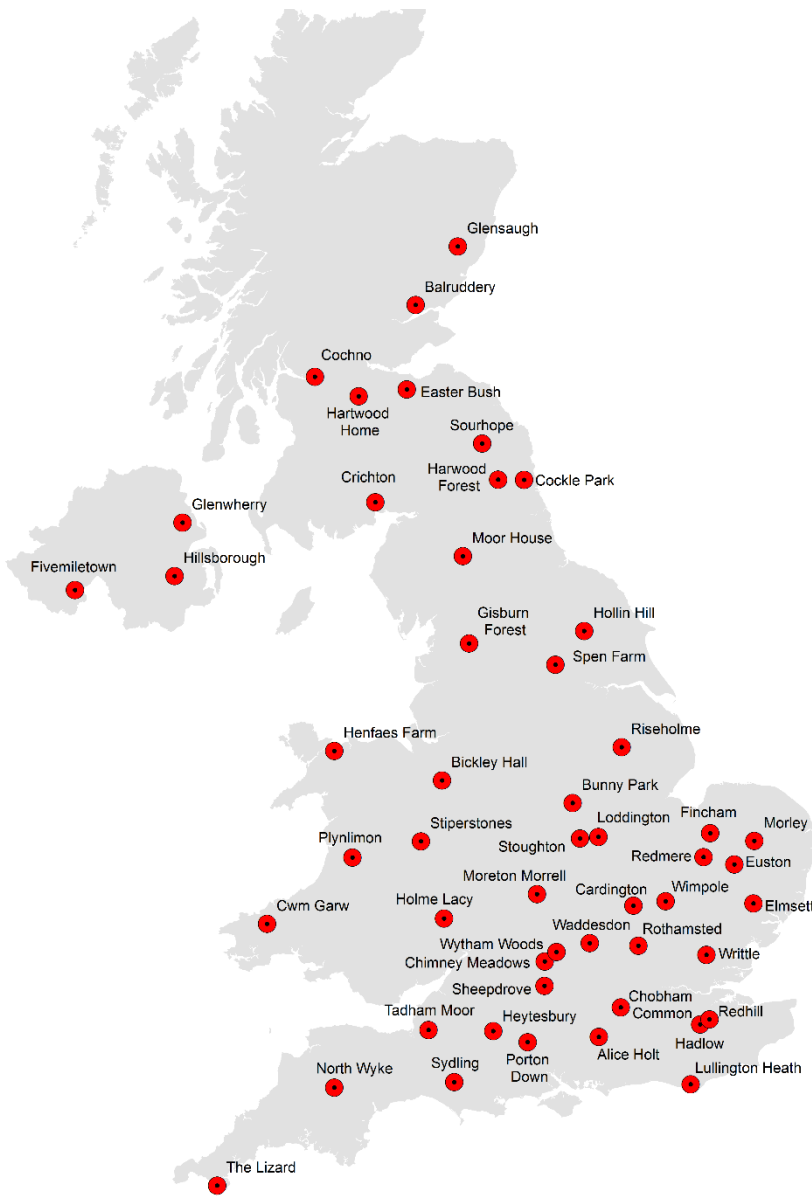
Overall, soil moisture levels tended to reach their lowest point of the year so far around the middle of June. Since then, moisture levels have either remained low or started to rise again following an increase in rainfall.

### Network News

The second round of annual planned preventative maintenance visits by our contractor is now underway. A second Cosmic-Ray Neutron sensor has been temporarily installed at Waddesdon for data comparison.







**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/R016429/1 as part of the UK-SCAPE programme delivering National Capability.

