Hydrological Summary for the United Kingdom

January 2025

General

January was characterised by a dry period mid-month that was bookended by unsettled conditions with frontal systems bringing wind, snow and heavy rain. Notably, storm 'Éowyn', the strongest windstorm to affect the UK in a decade, contributed to unsettled conditions. Rainfall totals were below average for the UK, but this concealed a strong spatial gradient. River flows were above normal in England and Wales and below normal in Scotland and Northern Ireland. Groundwater levels across the UK were generally normal to above normal, although exceptionally high conditions were present across multiple aquifers. Reservoir stocks increased in most impoundments and remained above average at the national scale, with only minor deficits at Daer, Kielder Water and Celyn & Brenig. The current Outlook suggests normal to above normal flows persisting at some catchments in southern England in February and normal to above normal flows and groundwater levels in the north and west over the next three months, maintaining an elevated risk of flooding.

Rainfall

The unsettled conditions in December continued at the start of January. There were widespread transport disruptions, and several hundred properties were flooded in northwest England on New Year's Day. From the 4th-6th, low pressure brought snowfall with depths of 10-20cm for northern England and Scotland and heavy rainfall across England and Wales. Central and southeast England received 64% of the average January rainfall in the first week, with road closures and surface water flooding in Essex and Berkshire. A transition to high pressure brought cold, relatively settled weather over the next two weeks apart from outbreaks of heavy rain in northwest England and Scotland from the 12th-13th (e.g. 94mm at Seathwaite, Cumbria). Unsettled conditions returned on the 23rd with storm 'Éowyn', the strongest windstorm for Northern Ireland since 1998, bringing high winds and the first red warning for wind in 2025 for Northern Ireland and Scotland. Gusts of >70mph were widely recorded and up to a million homes lost power with widespread reports of damage to properties. Heavy rain associated with the storm affected western UK from the 23rd-24th with some notable 2-day rainfall totals (e.g. 82.4mm at Achnagart, Highland). Storm 'Herminia' (26th-27th), although less severe, brought further rainfall for southwest England with reports of road and property flooding in Somerset. Total rainfall for the UK was below average (79%) but there was a strong spatial gradient. Northern Ireland and Scotland saw below average rainfall with the Highland, Tay, Clyde and Forth regions all receiving less than half their January average. Conversely, above average rainfall was recorded in England (112%) and the Wessex, Southern and South West regions received >130% of average. The winter so far (December-January) has seen >150% of average rainfall for parts of northern England but Northern Ireland and large areas of Scotland have received less than three-quarters. The five months from September-January was the eighth wettest for the Severn region but among the top ten driest for Northern Ireland and many Scottish regions (all in records from 1890).

River Flows

River flows began the month above average, except for Northern Ireland where flows were in the normal range. More than 200 flood alerts and flood warnings were in force on New Year's Day across northern England and Scotland. The fourth highest peak flow of any month was registered at the Dyfi on the 1st (in a series from 1962). Flows across Scotland and Northern Ireland declined thereafter but rose further in England and Wales in response to rainfall on the 5th-6th. Many catchments in England registered their top three highest January peak flow maxima over this period. Rainfall on 12th-13th prompted a recovery of flows in northern England and Scotland without reaching notable magnitudes. Recessions continued for most Scottish catchments until month end. River flows across southern England, however, peaked again following storm 'Éowyn' on the 26th-28th. The Lymington recorded its fourth highest peak flow of any month in a series from 1960 on the 26th while the Brue and Stour recorded their second highest January peak flows on the 26th and 28th respectively (both in series of >50 years). Mean January flows showed a strong spatial gradient. Below normal to notably low flows were registered in Northern Ireland and western Scotland (e.g. the Nevis, which recorded its fifth lowest January mean flow in a series from 1983). In central and southern England, January mean flows were above normal to notably high and many rivers recorded more than 130% of their January average. The Brue recorded its second highest January mean flow on record (in a series from 1965). This spatial contrast was further emphasized over the five-month period of September-January. The highest September-January flows on record were recorded for the Weaver and Brue (both in series of at least 60 years), while the Mourne and Clyde recorded their third and fourth lowest on record (in a series from 1958 and 1982 respectively). Correspondingly, September-January outflows for the English Lowlands was the sixth highest since 1961, whilst Northern Ireland saw its fifth lowest outflows since 1980.

Soil Moisture and Groundwater

Soil moisture levels at COSMOS-UK sites were much higher in southern England than sites in the north but most sites were within their normal range. Groundwater levels in the Chalk generally increased over January. Levels in Dorset and Wiltshire increased to above normal and notably high conditions. At Killyglen, levels fell, before increasing significantly from exceptionally low to normal conditions. Levels in the Jurassic Limestones fluctuated but have increased over January, moving to exceptionally high at Ampney Crucis and notably high at New Red Lion. Levels in the Magenisan Limestone have increased since December, but conditions were more normal in January compared to last month. Levels in the Carboniferous Limestone typically increased, transitioning from below normal to normal at Greenfield Garage. Levels in the Permo-Triassic Sandstones were variable throughout the UK. In North Wales and Shropshire, levels increased, and conditions remained exceptionally high, such as at Weir Farm where a new record high for January was recorded (in a series from 1982). In Northern England and Scotland, levels fluctuated but remained normal to above normal. Exceptionally high levels in the Upper Greensand at Lime Kiln Way persisted and further increased. In the Fell Sandstone at Royal Observatory, levels decreased slightly but remained above normal. At Easter Lathrisk, in the Devonian Sandstone, levels rose steadily to normal conditions.

National Hydrological Monitoring Programme
UK Centre for Ecology & Hydrology
BGS British Geological Survey

Rainfall . . . Rainfall . . .

Met Office

Rainfall accumulations and return period estimates

Percentages are from the 1991-2020 average.

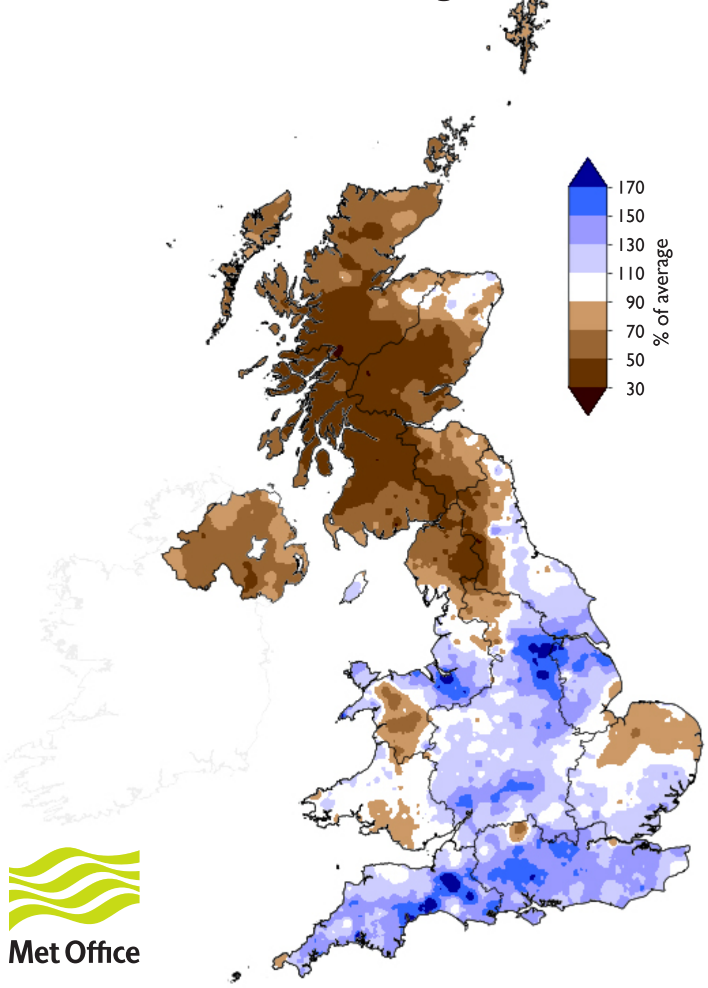
Region	Rainfall	Jan 2025	Dec24 – Jan25	RP	Sep24 – Jan25	RP	May24 – Jan25	RP	Feb24 – Jan25	RP
United Kingdom	mm	**96**	235		536		860		1219	
	%	**79**	95	2-5	92	2-5	95	2-5	105	5-10
England	mm	**93**	175		475		718		1028	
	%	**112**	101	2-5	112	5-10	105	2-5	119	20-30
Scotland	mm	**90**	322		607		1062		1473	
	%	**51**	92	2-5	75	5-10	88	2-5	94	2-5
Wales	mm	**147**	334		749		1085		1585	
	%	**95**	102	2-5	99	2-5	95	2-5	109	5-10
Northern Ireland	mm	**76**	160		399		711		1029	
	%	**66**	68	8-12	71	15-25	79	10-20	89	2-5
England & Wales	mm	**100**	197		512		768		1104	
	%	**108**	101	2-5	109	5-10	103	2-5	117	15-25
North West	mm	**100**	273		614		1041		1444	
	%	**79**	101	2-5	95	2-5	103	2-5	114	10-20
Northumbria	mm	**61**	151		385		666		917	
	%	**73**	86	2-5	90	2-5	93	2-5	101	2-5
Severn-Trent	mm	**83**	174		482		696		988	
	%	**116**	114	2-5	128	10-20	110	5-10	124	30-50
Yorkshire	mm	**82**	189		430		664		936	
	%	**103**	112	2-5	105	2-5	98	2-5	108	5-10
Anglian	mm	**57**	113		322		510		721	
	%	**108**	104	2-5	113	2-5	102	2-5	115	5-10
Thames	mm	**91**	141		462		671		962	
	%	**127**	97	2-5	130	10-15	117	5-10	133	30-50
Southern	mm	**118**	174		497		690		1021	
	%	**135**	97	2-5	115	5-10	106	2-5	125	15-25
Wessex	mm	**129**	182		587		833		1201	
	%	**136**	94	2-5	127	10-15	117	5-10	133	50-80
South West	mm	**182**	263		695		975		1496	
	%	**131**	92	2-5	106	2-5	100	2-5	120	20-30
Welsh	mm	**145**	320		736		1060		1549	
	%	**98**	103	2-5	101	2-5	97	2-5	111	5-10
Highland	mm	**109**	463		824		1327		1767	
	%	**49**	107	2-5	85	2-5	94	2-5	95	2-5
North East	mm	**70**	234		447		765		1080	
	%	**69**	117	5-10	86	2-5	91	2-5	102	2-5
Tay	mm	**70**	238		445		815		1189	
	%	**42**	76	2-5	63	30-50	76	10-20	85	2-5
Forth	mm	**66**	196		389		784		1150	
	%	**48**	73	2-5	63	20-35	81	2-5	93	2-5
Tweed	mm	**64**	157		359		730		1049	
	%	**59**	70	2-5	68	10-20	86	2-5	97	2-5
Solway	mm	**91**	249		510		1033		1504	
	%	**54**	72	2-5	63	20-30	85	2-5	96	2-5
Clyde	mm	**95**	335		625		1189		1678	
	%	**44**	78	2-5	64	15-25	82	2-5	89	2-5

% = percentage of 1991-2020 average *RP = Return period*

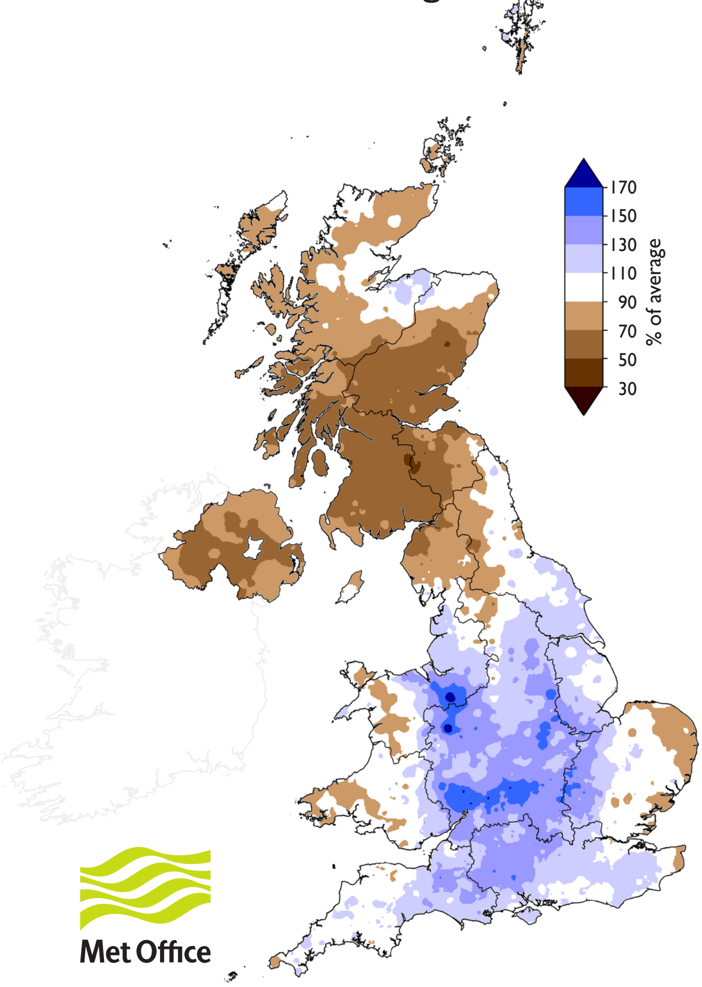
Important note: Figures in the above table may be quoted provided their source is acknowledged. Where appropriate, specific mention must be made of the uncertainties associated with the return period estimates. The RP estimates are based on data provided by the Met Office and reflect climatic variability since 1890; they also assume a stable climate. The quoted RPs relate to the specific timespans only; for the same timespans, but beginning in any month the RPs would be substantially shorter. The timespans featured do not purport to represent the critical periods for any particular water resource management zone. For hydrological or water resources assessments of drought severity, river flows and/or groundwater levels normally provide a better guide than return periods based on regional rainfall totals. Note that precipitation totals in winter months may be underestimated due to snowfall undercatch. All monthly rainfall totals since January 2023 are provisional. Source: Data from HadUK-Grid dataset at 1km resolution v1.2.0.0.

Rainfall . . . Rainfall . . .

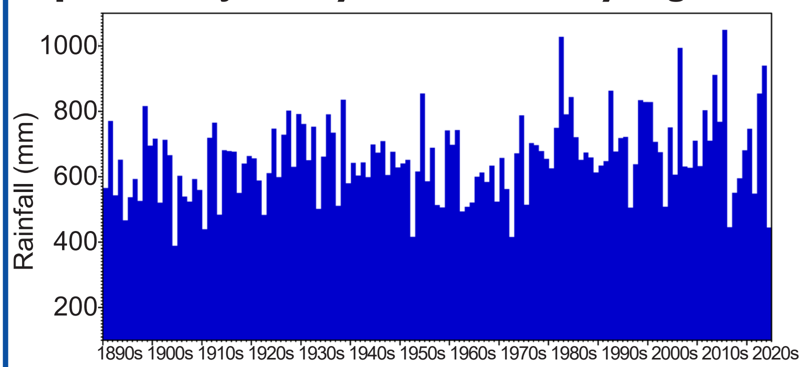
January 2025 rainfall as % of 1991-2020 average



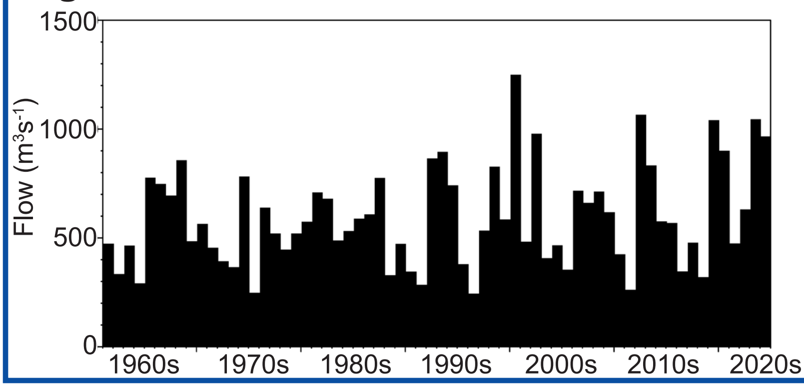
September 2024 - January 2025 rainfall as % of 1991-2020 average



September-January rainfall for Tay region



September-January outflows for the English Lowlands



UK Hydrological Outlook

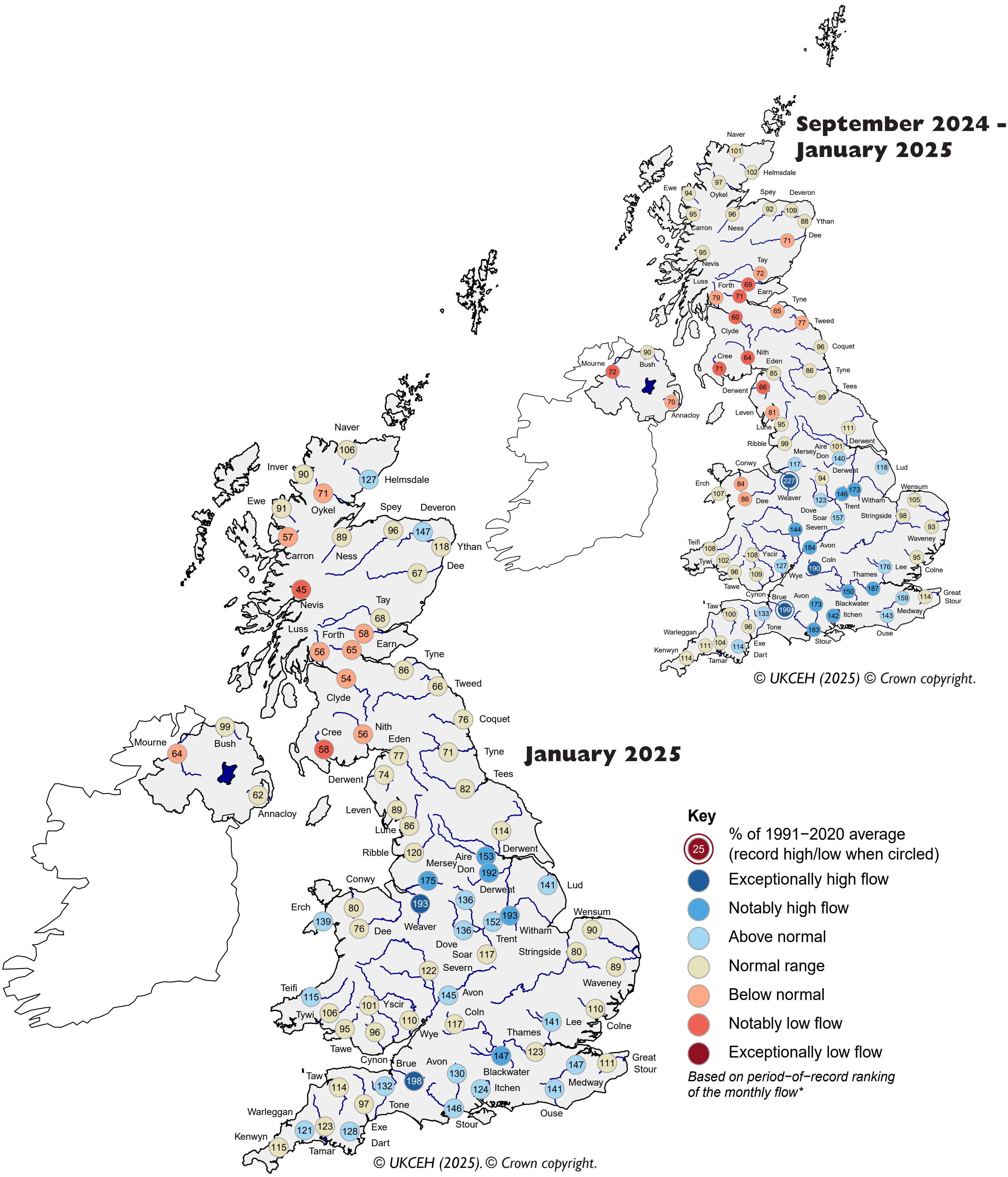
The Hydrological Outlook provides an insight into future hydrological conditions across the UK. Specifically it describes likely trajectories for river flows and groundwater levels on a monthly basis, with particular focus on the next three months.

The complete version of the Hydrological Outlook UK can be found at: www.hydoutuk.net/latest-outlook/

Period: **from February 2025**
Issued: **11.02.2025**
using data to the end of January 2025

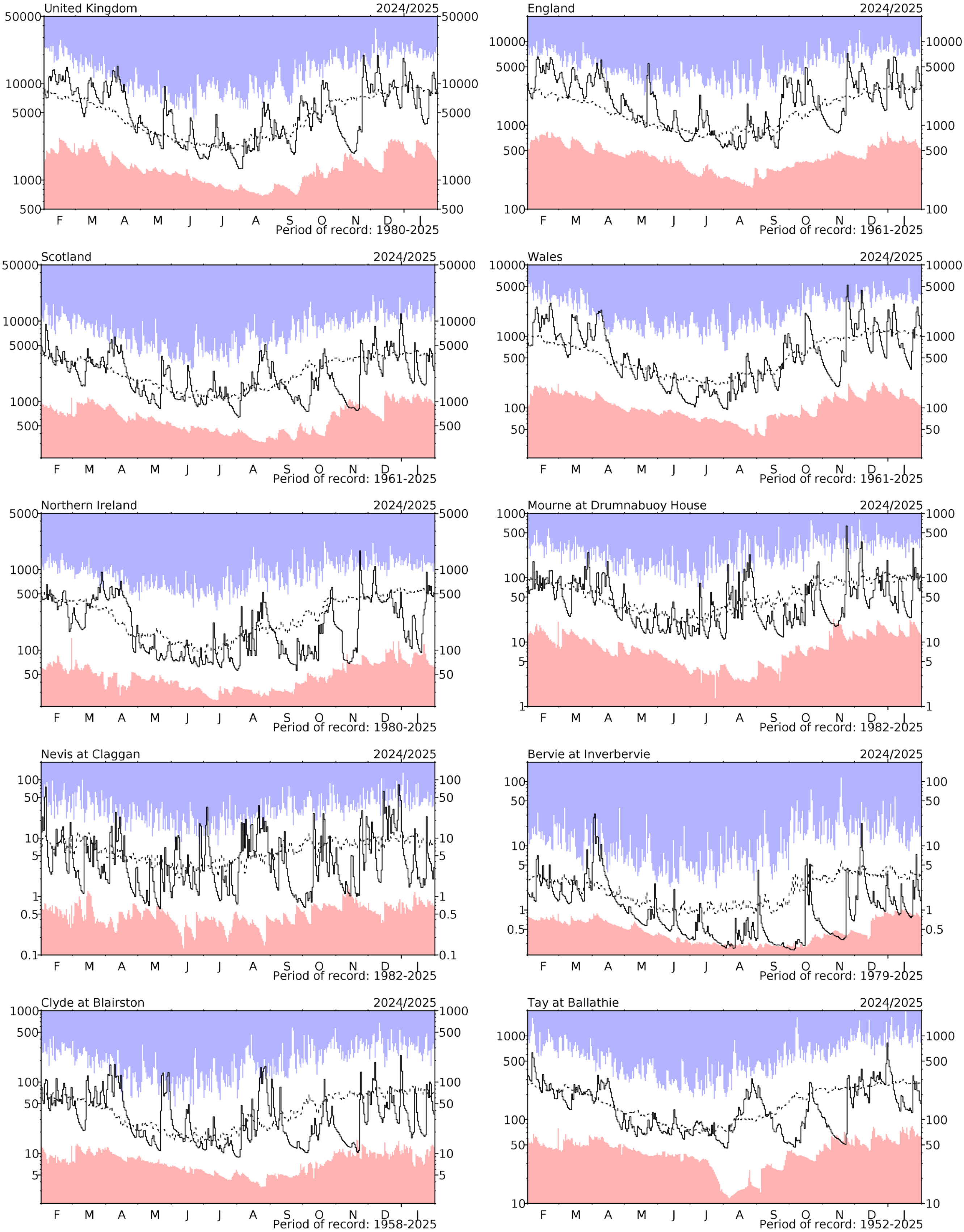
The river flow outlook for February and February-April is similar: normal to above normal flows are most likely in northwestern areas and normal flows are the most likely outcome elsewhere, although normal flows are likely to persist in parts of southern England. Similarly for groundwater, both the February and February-April outlook suggest normal to above normal levels are expected at the national scale, with above normal levels likely to persist in parts of the southern Chalk aquifer.

River flow . . . River flow . . .



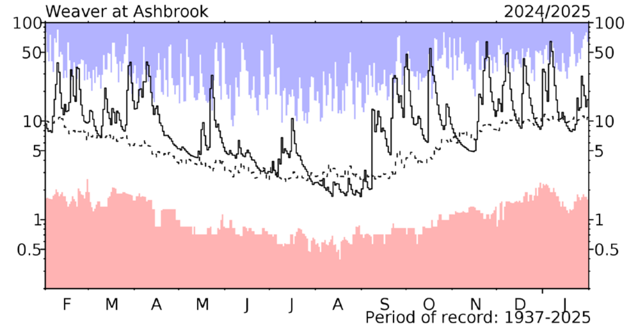
River flows

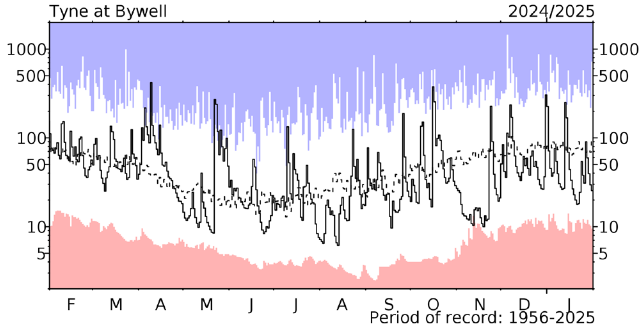
*Comparisons based on percentage flows alone can be misleading. A given percentage flow can represent extreme drought conditions in permeable catchments where flow patterns are relatively stable but be well within the normal range in impermeable catchments where the natural variation in flows is much greater. The categories of the spots are based on the full period-of-record data whereas the percentages are based on the 1991-2020 averaging period for consistency between rainfall and river flows. Percentages may be omitted where flows are under review.

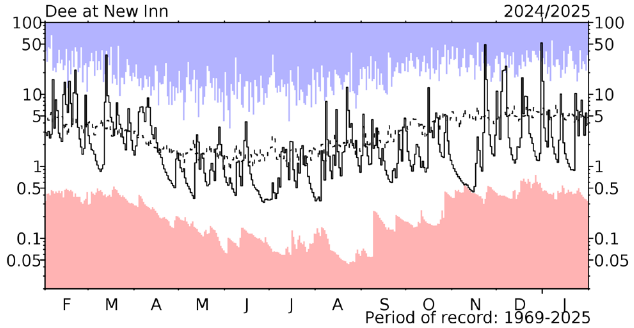


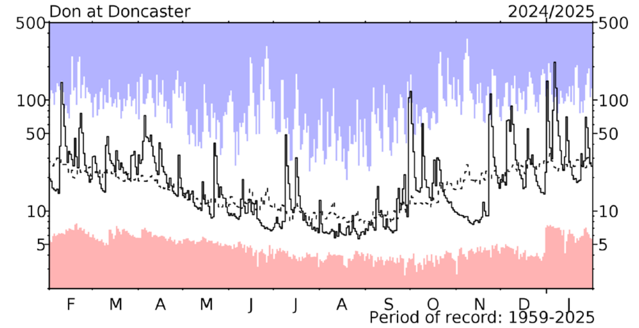
River flow hydrographs

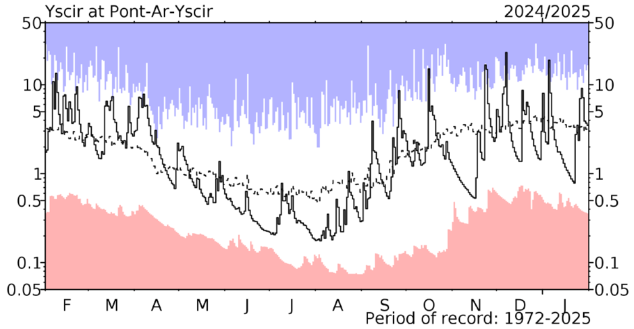
*The river flow hydrographs show the daily mean flows (measured in m^3s^{-1}) together with the maximum and minimum daily flows prior to January 2024 (shown by the shaded areas). Daily flows falling outside the maximum/minimum range are indicated where the bold trace enters the shaded areas. The dashed line represents the period-of-record average daily flow.

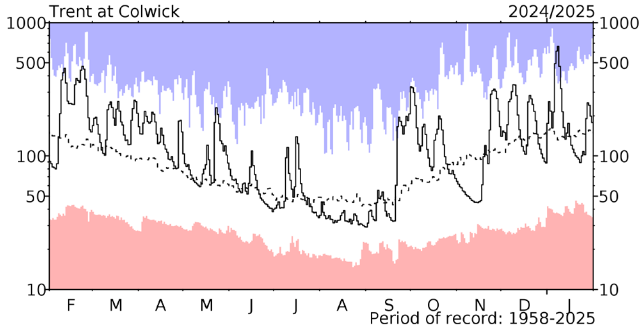

Weaver at Ashbrook
2024/2025
Period of record: 1937-2025

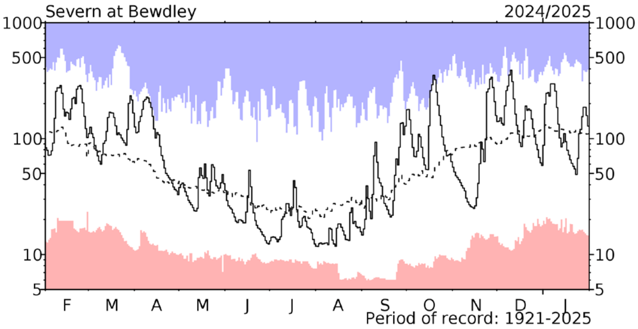

Tyne at Bywell
2024/2025
Period of record: 1956-2025

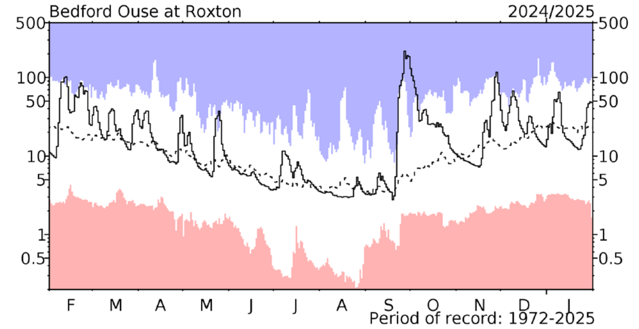

Dee at New Inn
2024/2025
Period of record: 1969-2025

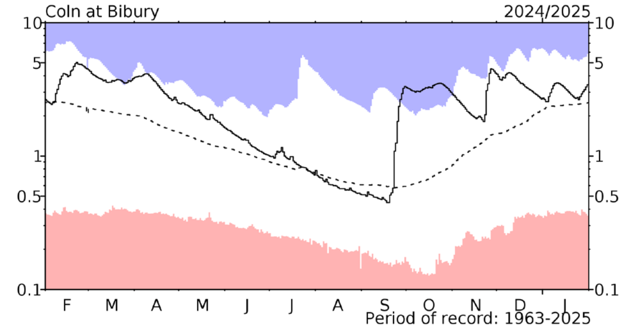

Don at Doncaster
2024/2025
Period of record: 1959-2025

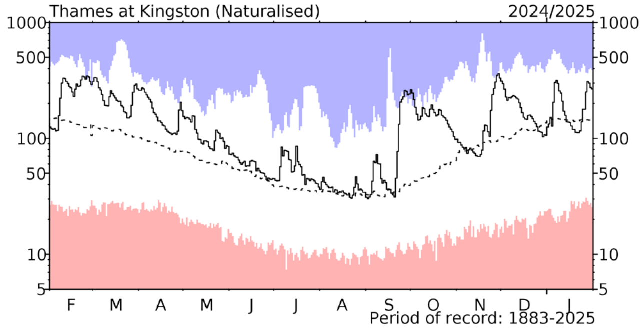

Yscir at Pont-Ar-Yscir
2024/2025
Period of record: 1972-2025

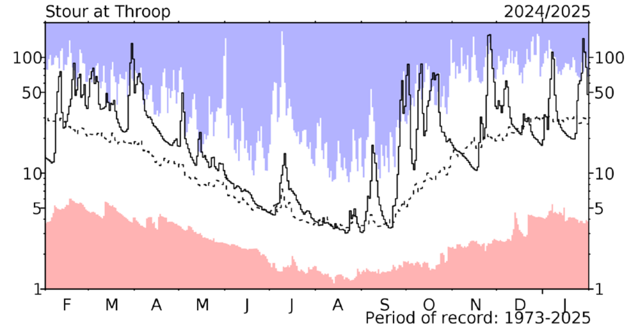

Trent at Colwick
2024/2025
Period of record: 1958-2025

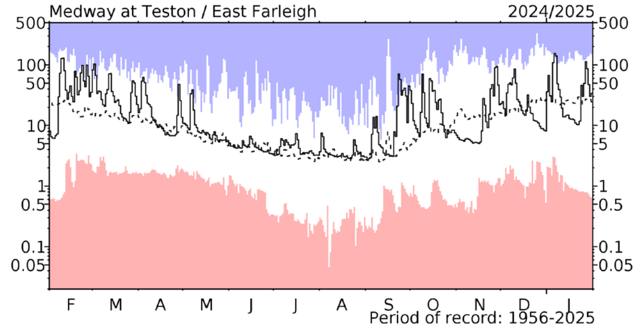

Severn at Bewdley
2024/2025
Period of record: 1921-2025


Bedford Ouse at Roxton
2024/2025
Period of record: 1972-2025

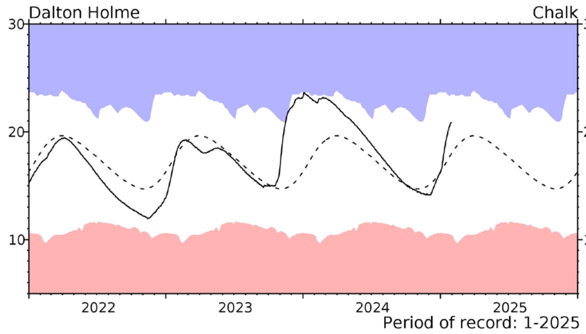

Coln at Bibury
2024/2025
Period of record: 1963-2025

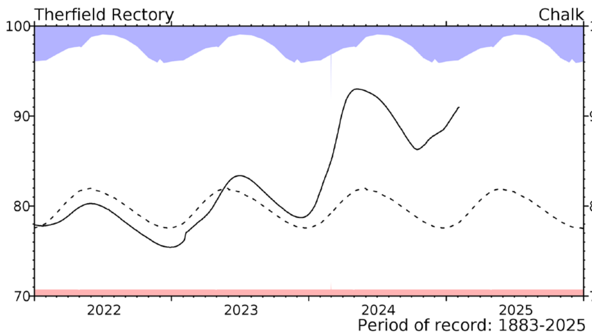

Thames at Kingston (Naturalised)
2024/2025
Period of record: 1883-2025

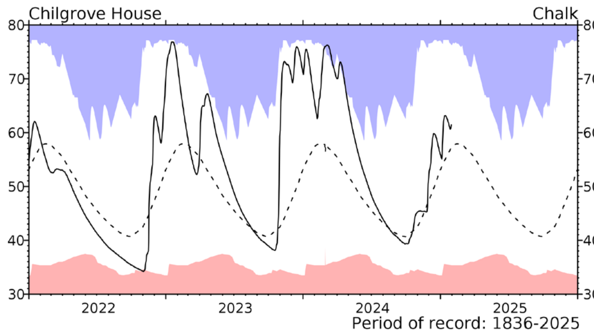

Stour at Throop
2024/2025
Period of record: 1973-2025

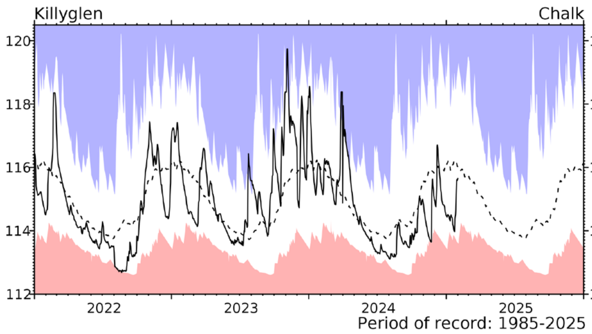

Medway at Teston / East Farleigh
2024/2025
Period of record: 1956-2025

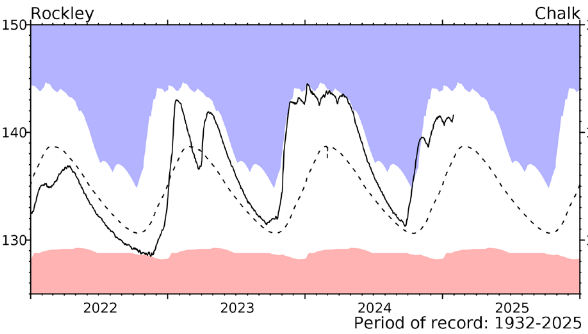
Groundwater . . . Groundwater

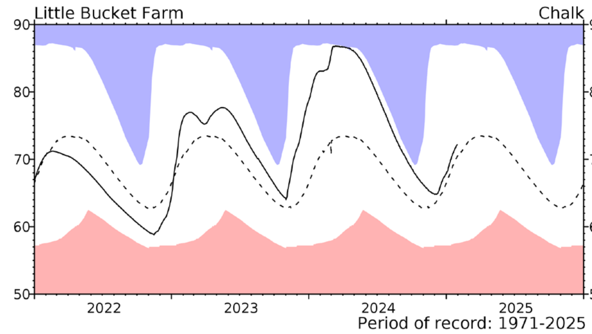


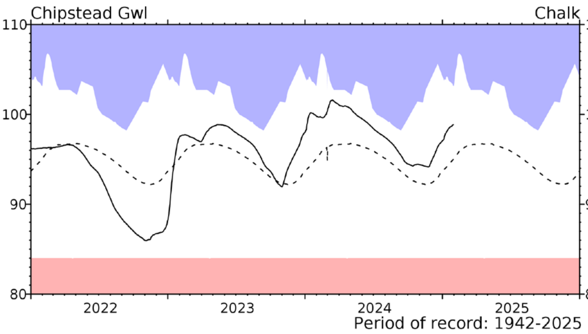


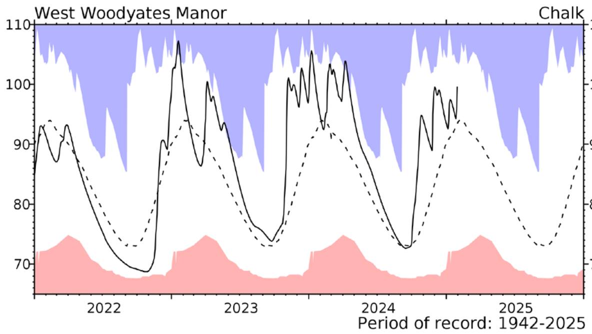


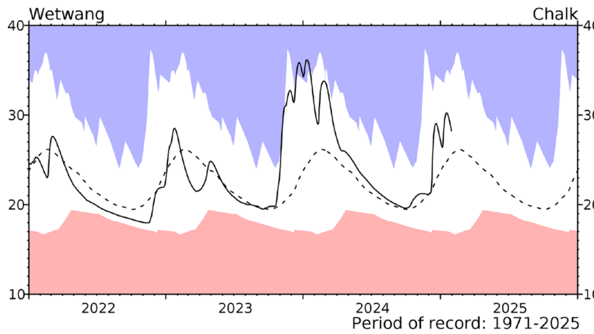


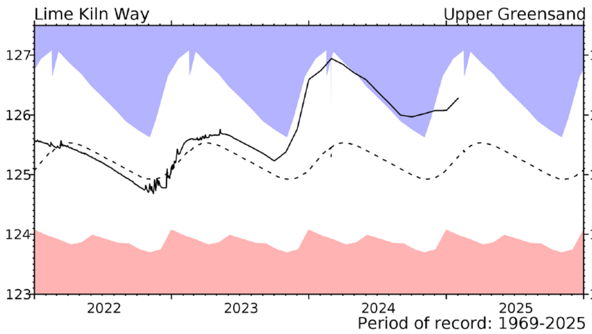






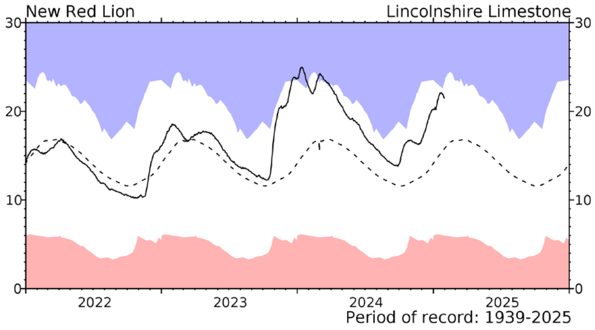


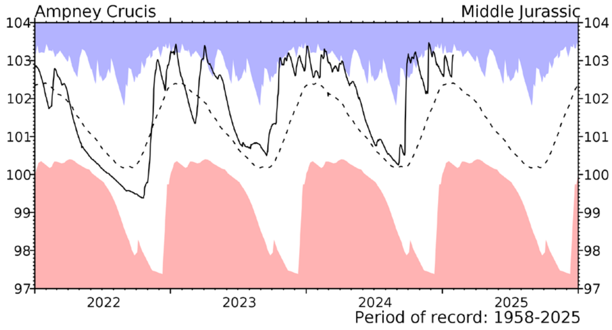


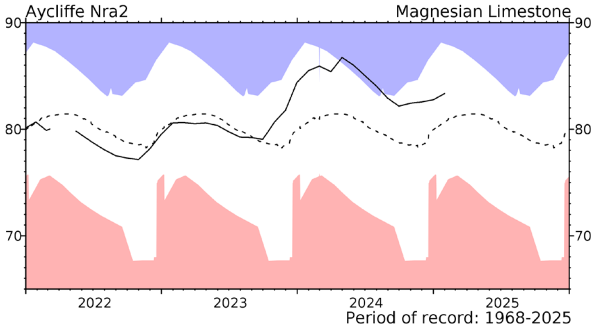


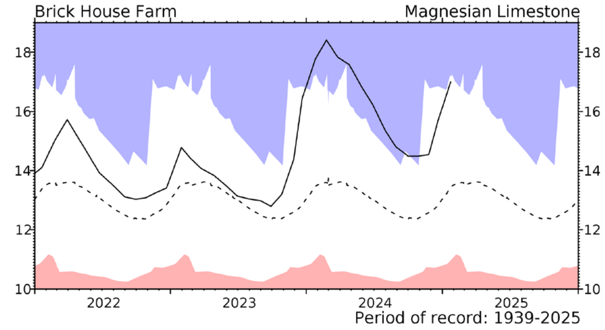
Groundwater levels (measured in metres above ordnance datum) normally rise and fall with the seasons, reaching a peak in the spring following replenishment through the winter (when evaporation losses are low and soil moist). They decline through the summer and early autumn. This seasonal variation is much reduced when the aquifer is confined below overlying impermeable strata. The monthly mean and the highest and lowest levels recorded for each month are calculated with data from the start of the record to the end of 2021. Note that most groundwater levels are not measured continuously and, for some index wells, the greater frequency of contemporary measurements may, in itself, contribute to an increased range of variation.

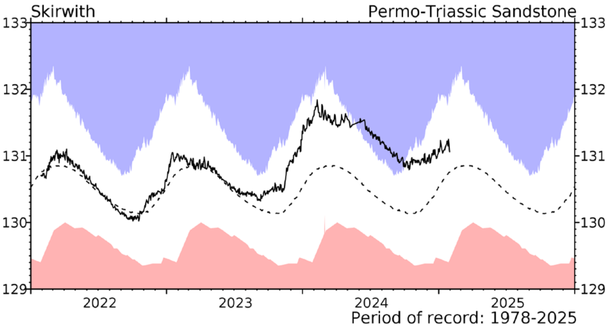
Groundwater . . . Groundwater

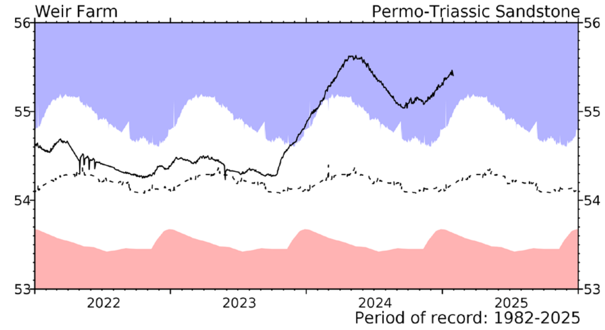


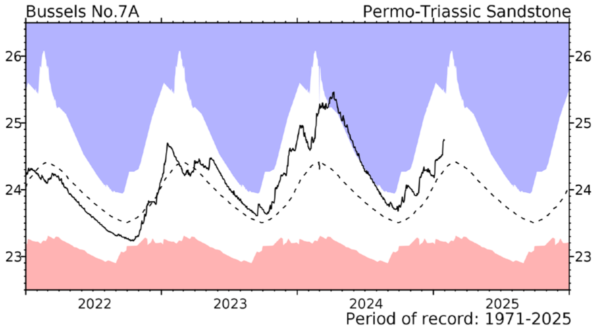


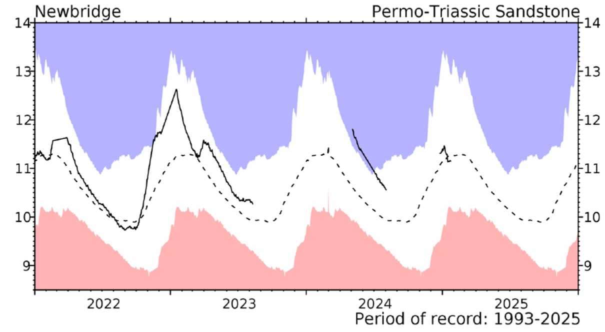


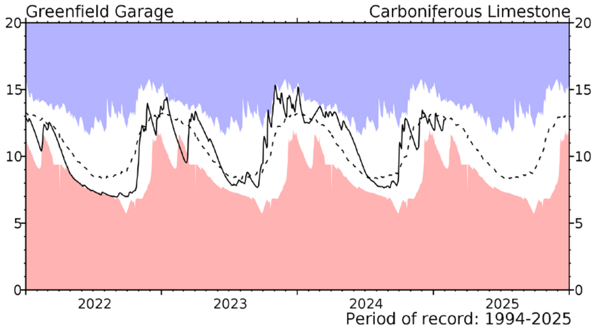


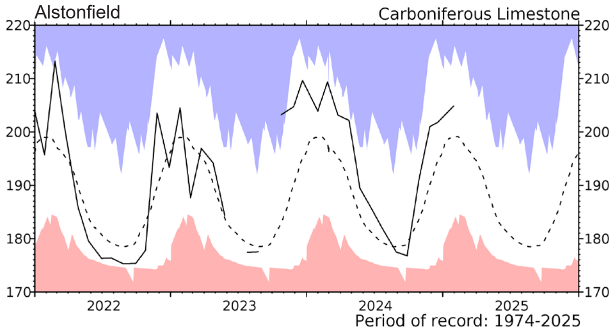


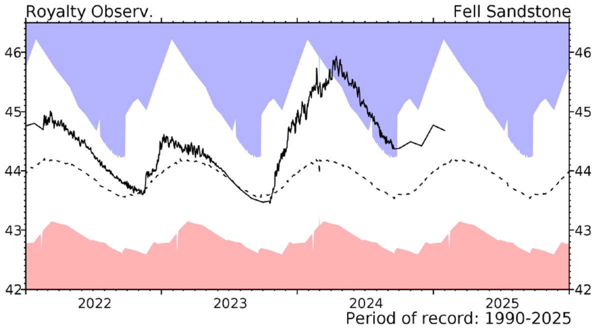


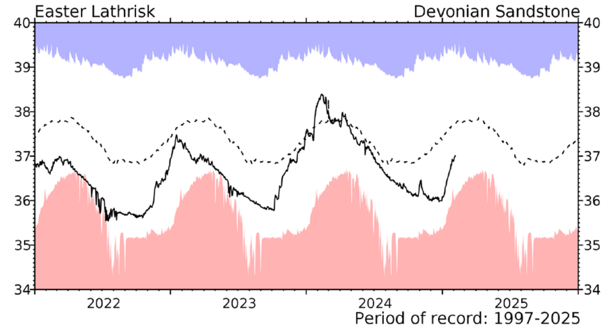


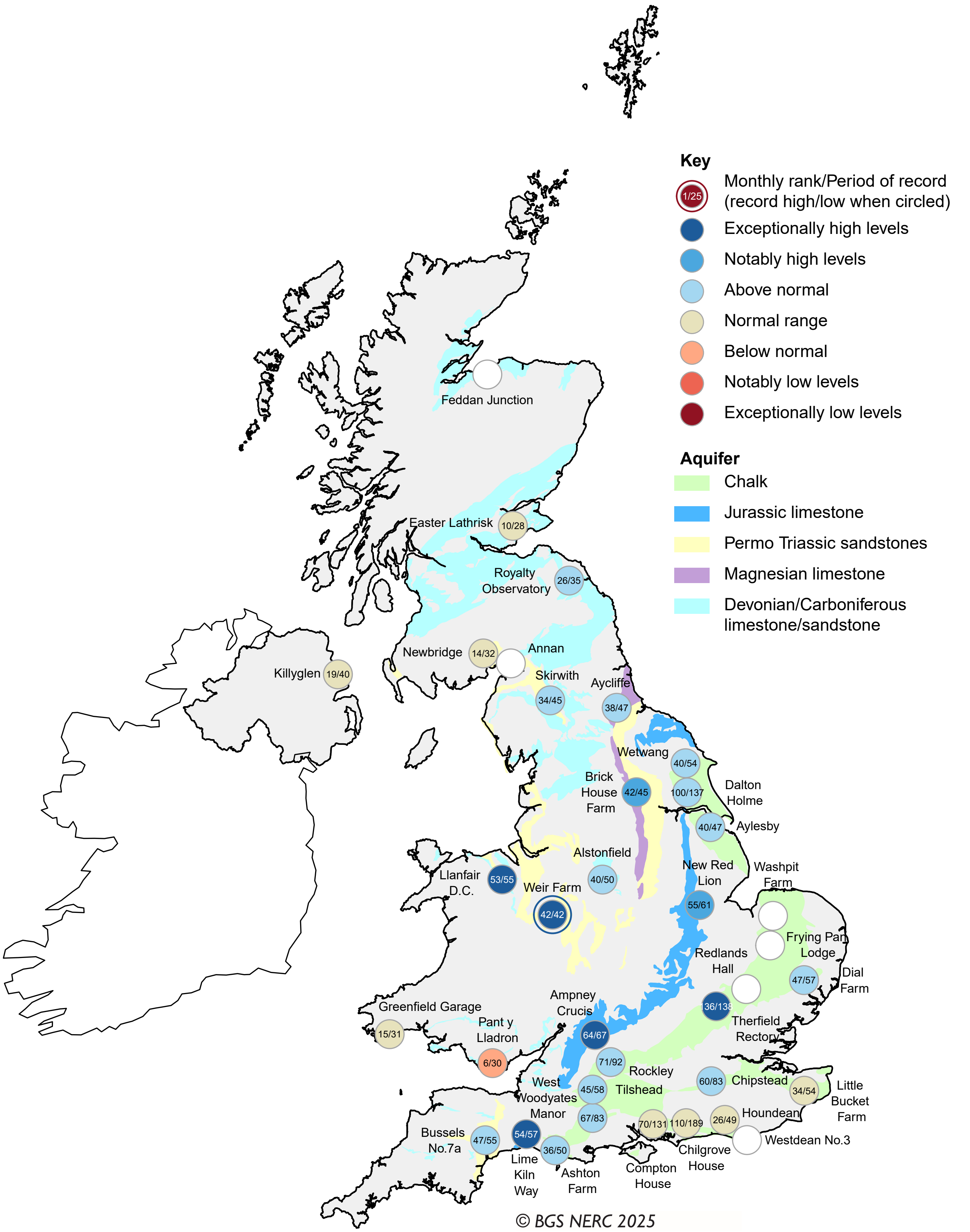










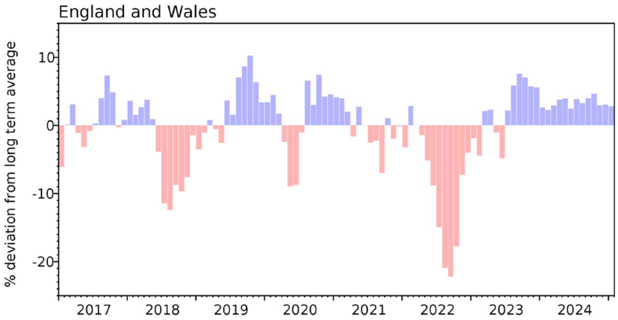


Groundwater levels - January 2025

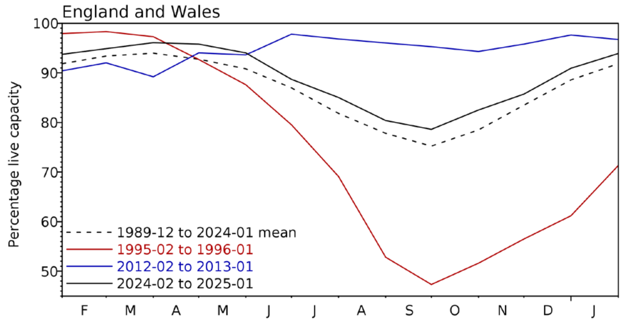
The calculation of ranking has been modified from that used in summaries published prior to October 2012. It is now based on a comparison between the most recent level and levels for the same date during previous years of record. Where appropriate, levels for earlier years may have been interpolated. The rankings are designed as a qualitative indicator, and ranks at extreme levels, and when levels are changing rapidly, need to be interpreted with caution.

Reservoirs . . . Reservoirs . . .

Guide to the variation in overall reservoir stocks for England and Wales



Comparison between overall reservoir stocks for England and Wales in recent years



Percentage live capacity of selected reservoirs at end of month

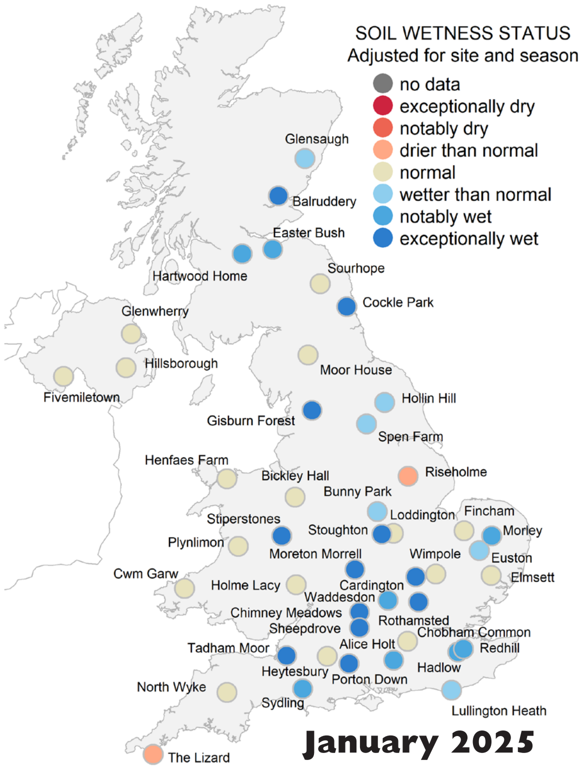
Area	Reservoir		Capacity (Ml)	2024 Nov	2024 Dec	2025 Jan	Jan Anom.	Min Jan	Year* of min	2024 Jan	Diff 25-24
North West	N Command Zone	•	124929	79	85	88	-4	63	1996	99	-12
	Vyrnwy		55146	92	98	97	3	45	1996	100	-3
Northumbrian	Teesdale	•	87936	99	100	98	5	51	1996	100	-2
	Kielder		(199175)	85	89	88	-5	82	2019	98	-10
Severn-Trent	Clywedog		49936	90	86	93	4	62	1996	92	1
	Derwent Valley	•	46692	78	95	99	4	15	1996	96	3
Yorkshire	Washburn	•	23373	82	92	97	7	34	1996	94	3
	Bradford Supply	•	40942	84	92	100	6	33	1996	100	0
Anglian	Grafham		(55490)	88	91	94	9	67	1998	77	17
	Rutland		(116580)	90	92	100	12	68	1997	90	10
Thames	London	•	202828	84	95	95	4	70	1997	92	3
	Farmoor	•	13822	90	97	92	0	72	2001	92	0
Southern	Bewl		31000	63	68	88	6	37	2006	66	22
	Ardingly		4685	100	100	100	7	41	2012	100	0
Wessex	Clatworthy		5662	100	100	100	4	62	1989	100	0
	Bristol	•	(38666)	89	93	99	11	58	1992	99	0
South West	Colliford		28540	76	79	85	2	47	2023	78	6
	Roadford		34500	93	95	100	17	30	1996	89	11
	Wimbleball		21320	78	87	96	5	58	2017	100	-4
	Stithians		4967	67	75	91	1	38	1992	100	-9
Welsh	Celyn & Brenig	•	131155	80	82	84	-10	61	1996	84	0
	Brianne		62140	100	100	100	2	84	1997	100	0
	Big Five	•	69762	81	86	98	4	67	1997	99	-1
	Elan Valley	•	99106	90	100	100	3	73	1996	100	0
Scotland(E)	Edinburgh/Mid-Lothian	•	97223	90	93	93	-2	72	1999	99	-6
	East Lothian	•	9317	100	96	100	1	68	1990	100	0
Scotland(W)	Loch Katrine	•	110326	91	100	100	6	85	2000	100	0
	Daer		22494	91	84	92	-5	87	2024	87	5
	Loch Thom		10721	90	100	100	2	90	2020	99	1
Northern Ireland	Total+	•	56800	90	90	92	-1	74	2017	100	-8
	Silent Valley	•	20634	99	94	95	5	46	2002	100	-5

( ) figures in parentheses relate to gross storage • denotes reservoir groups *last occurrence

+ excludes Lough Neagh

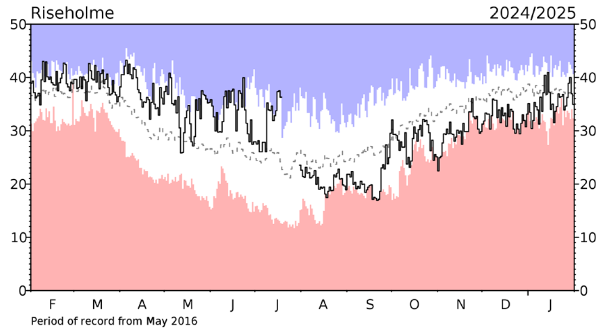
Details of the individual reservoirs in each of the groupings listed above are available on request. The percentages given in the Average and Minimum storage columns relate to the 1988-2012 period except for West of Scotland and Northern Ireland where data commence in the mid-1990s. In some gravity-fed reservoirs (e.g. Clywedog) stocks are kept below capacity during the winter to provide scope for flood attenuation purposes. Monthly figures may be artificially low due to routine maintenance or turbidity effects in feeder rivers.

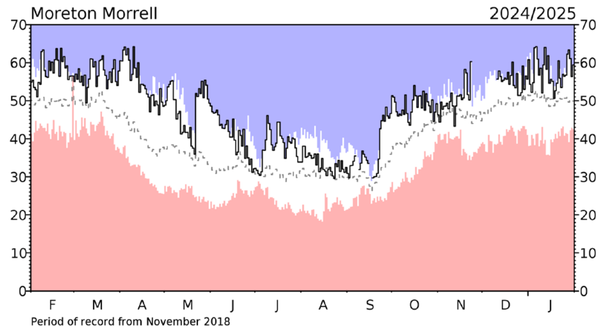
Soil Moisture . . . Soil Moisture

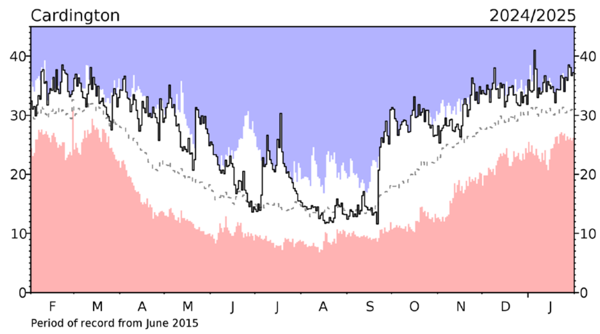


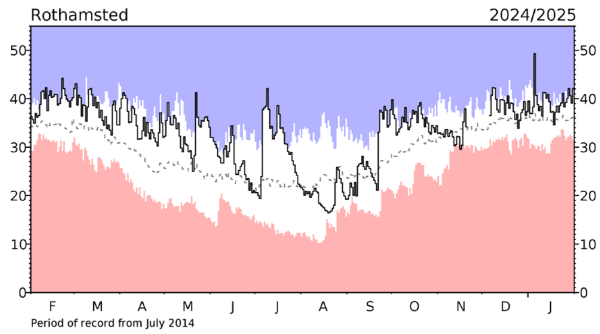
Soil moisture levels across the COSMOS-UK network fluctuated throughout the month, but most sites were within their expected ranges for the time of year. Higher soil moisture levels were seen in relation to the regional variations in precipitation. Several sites in Southern England were much wetter than 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.

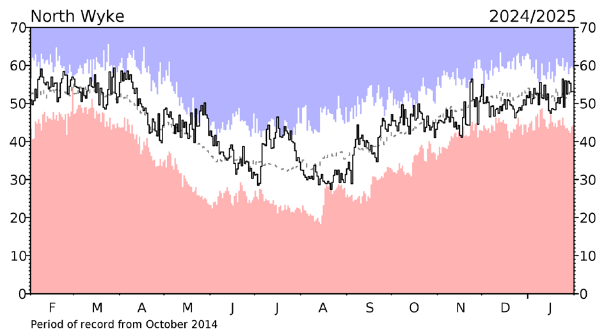
Overall, reasonably damp and cool conditions helped maintain soil moisture levels from the previous month, with some regional variations due to precipitation patterns.











Soil moisture data

These data are from UKCEH's COSMOS-UK network. The time series graphs show volumetric water content as a percentage in black together with the maximum and minimum daily values for the period-of-record of the sites. The dashed line represents the period-of-record mean VWC. For more information visit cosmos.ceh.ac.uk.

NHMP

The National Hydrological Monitoring Programme (NHMP) was started in 1988 and is undertaken jointly by the UK Centre for Ecology & Hydrology (UKCEH) and the British Geological Survey (BGS). The NHMP aims to provide an authoritative voice on hydrological conditions throughout the UK, to place them in a historical context and, over time, identify and interpret any emerging hydrological trends. Hydrological analysis and interpretation within the Programme is based on the data holdings of the National River Flow Archive (NRFA; maintained by UKCEH) and National Groundwater Level Archive (NGLA; maintained by BGS), including rainfall, river flows, borehole levels, and reservoir stocks.

The Hydrological Summary is supported by the Natural Environment Research Council award number NE/Y006208/1 as part of the NC-UK programme delivering National Capability.

Data Sources

The NHMP depends on the active cooperation of many data suppliers. This cooperation is gratefully acknowledged. A location map of all sites used in the Hydrological Summary can be found on the NHMP website. River flow and groundwater level data are provided by the Environment Agency (EA), Natural Resources Wales - Cyfoeth Naturiol Cymru (NRW), the Scottish Environment Protection Agency (SEPA) and, for Northern Ireland, the Department for Infrastructure - Rivers and the Northern Ireland Environment Agency. In all cases the data are subject to revision following validation (high flow and low flow data in particular may be subject to significant revision).

Details of reservoir stocks are provided by the Water Service Companies, the EA, Scottish Water and Northern Ireland Water.

The Hydrological Summary and other NHMP outputs may also refer to and/or map soil moisture data for the UK. These data are provided by the Meteorological Office Rainfall and Evaporation Calculation System (MORECS). MORECS provides estimates of monthly soil moisture deficit in the form of averages over 40 x 40 km grid squares over Great Britain and Northern Ireland. The monthly time series of data extends back to 1961.

Rainfall data are provided by the Met Office. To allow better spatial differentiation the rainfall data for Britain are presented for the regional divisions of the precursor organisations of the EA, NRW and SEPA. The areal rainfall figures have been produced by the Met Office National Climate Information Centre (NCIC), and are based on the HadUK-Grid 1km resolution gridded data from rain gauges. The majority of the full rain gauge network across the UK is operated by the EA, NRW, SEPA and Northern Ireland Water; supplementary rain gauges are operated by the Met Office. The Met Office NCIC monthly rainfall series extend back to 1836 and form the official source of UK areal rainfall statistics which have been adopted by the NHMP. The gridding technique used is described in Hollis, 2019 available at https://doi.org/10.1002/gdj3.78

Long-term averages are based on the period 1991-2020 and are derived from the monthly areal series.

The regional figures for the current month in the hydrological summaries are based on a limited rain gauge network so these (and the associated return periods) should be regarded as a guide only.

The monthly rainfall figures are provided by the Met Office NCIC and are Crown Copyright and may not be passed on to, or published by, any unauthorised person or organisation. These are provisional totals calculated from a sub set of Met Office registered gauges and will be subject to change once data from the complete network of Met Office registered gauges has been quality assured and gridded within the annual process of updating the HadUK-Grid dataset.

For further details on rainfall or MORECS data, please contact the Met Office:

Tel: 0370 900 0100
Email: enquiries@metoffice.gov.uk

Enquiries

Enquiries should be directed to the NHMP:

Tel: 01491 692599
Email: nhmp@ceh.ac.uk

A full catalogue of past Hydrological Summaries can be accessed and downloaded at:

http://nrfa.ceh.ac.uk/monthly-hydrological-summary-uk