

SUMMARY The outlook for October is for normal to above normal river flows for most of the UK. In parts of East Anglia and Kent, river flows are likely to be normal to below normal. Elsewhere, in Scotland, flows are likely to be above normal, and exceptionally so in some cases. For groundwater, normal to above normal levels are expected across the country. For October–December, the outlook is for normal to above normal river flows and groundwater levels across the UK, although some below normal river flows may persist in East Anglia.

Rainfall:

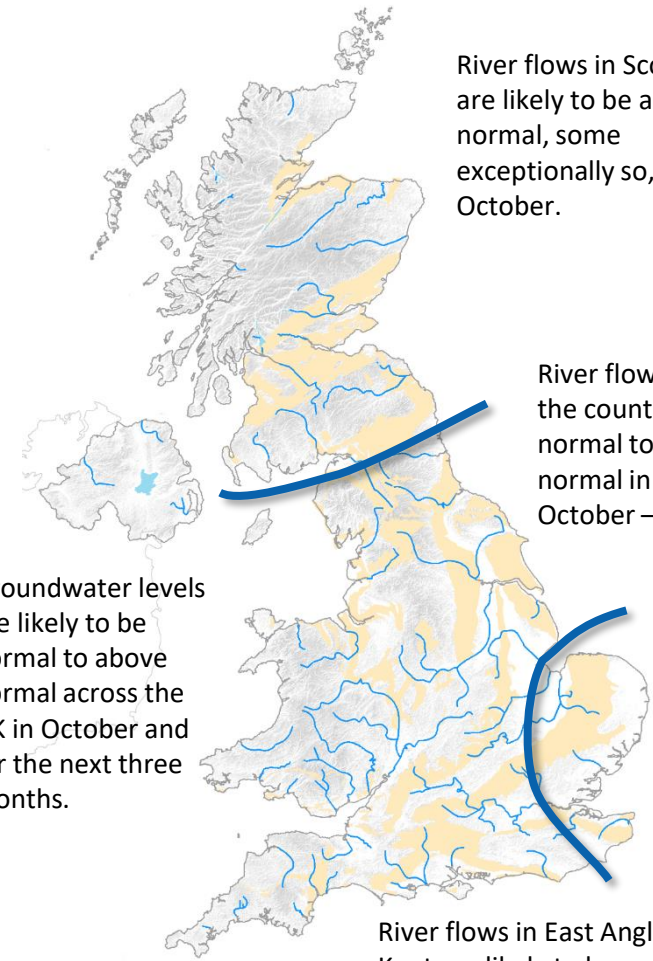
September rainfall was above average across the UK with 131% of average registered. Some areas, including Northern Ireland, south-west England, north-west England and central Scotland received more than 1.5x the expected rainfall, and in isolated areas more than double. Elsewhere, notably on the Kent, Essex and Suffolk coast, rainfall was below average. The forecast (issued by the Met Office on 25.09.2023) shows that for October there is a slight increase in the chance of drier than expected conditions, and for the October–December period there is a slightly higher than normal chance for wetter than average conditions. Over the one-month period, there is likely to be a decrease in storminess compared to normal. In the first weekend of October, Scotland saw some exceptionally wet conditions.

River flows:

River flows in September were normal or above normal across much of the country, exceptionally so in western areas where many catchments saw notably high flows (e.g. in Wales, north-west England, southern England). In northern Scotland, river flows were normal, and in East Anglia and Kent, river flows were normal to below normal. The outlook for October is generally for normal to above normal flows across the country, however in Scotland flows are likely to be above normal and, in some cases, exceptionally so. Below normal flows are expected to persist in East Anglia and Kent. The outlook for the October–December period is similar, although normal to above normal flows are expected across the country.

Groundwater:

Groundwater levels in September were mainly normal or above normal across the country, except for northern Scotland and East Anglia, where groundwater levels were below normal and, in some cases, notably so. Although the signal is quite mixed over the one and three-month period, groundwater levels for October and October–December are likely to be in the normal to above normal range for the country as a whole.



River flows in Scotland are likely to be above normal, some exceptionally so, during October.

River flows for most of the country will be normal to above normal in October and October – December.

Groundwater levels are likely to be normal to above normal across the UK in October and for the next three months.

River flows in East Anglia and Kent are likely to be normal to below normal in October.

Shaded areas show principal aquifers

The UK Hydrological Outlook provides an outlook for the water situation for the United Kingdom over the next three months and beyond. For guidance on how to interpret the outlook, a wider range of information, and a full description of underpinning methods, please visit the website: www.hydoutuk.net

About the UK Hydrological Outlook:

This document presents an outlook for the UK water situation for the next 1-3 months and beyond, using observational datasets, meteorological forecasts and a suite of hydrological modelling tools. The outlook is produced in a collaboration between the UK Centre for Ecology & Hydrology (UKCEH), British Geological Survey (BGS), the Met Office, the Environment Agency (EA), Natural Resources Wales (NRW), the Scottish Environment Protection Agency (SEPA), and for Northern Ireland, the Department for Infrastructure – Rivers (DfIR).

Data and Models:

The UK Hydrological Outlook depends on the active cooperation of many data suppliers. This cooperation is gratefully acknowledged. Historic river flow and groundwater data are sourced from the UK National River Flow Archive and the National Groundwater Level Archive. Contemporary data are provided by the EA, SEPA, NRW and DfIR. These data are used to initialise hydrological models, and to provide outlook information based on statistical analysis of historical analogues.

Climate forecasts are produced by the Met Office. Hydrological modelling is undertaken by UKCEH using the Grid-to-Grid and GR6J hydrological models. Hydrogeological modelling uses the Aquimod model run by BGS.

Supporting documentation is available from the Outlooks website:

<https://www.hydotuk.net/about/methods>

Presentation:

The language used in the summary presented overleaf generally places flows and groundwater levels into just three classes, i.e. below normal, normal, and above normal. However, the underpinning methods use as many as seven classes as defined in the graphic to the right, i.e. the summary uses a simpler classification than some of the methods. On those occasions when it is appropriate to provide greater discrimination at the extremes the terminology and definitions of the seven class scheme will be adopted.

| | Percentile range of historic values for relevant month |
|-------------------------|--|
| Exceptionally high flow | > 95 |
| Notably high flow | 87-95 |
| Above normal | 72-87 |
| Normal range | 28-72 |
| Below normal | 13-28 |
| Notably low flow | 5-13 |
| Exceptionally low flow | < 5 |

Disclaimer and liability:

The Hydrological Outlook partnership aims to ensure that all Content provided is accurate and consistent with its current scientific understanding. However, the science which underlies hydrological and hydrogeological forecasts and climate projections is constantly evolving. Therefore any element of the Content which involves a forecast or a prediction should not be relied upon as though it were a statement of fact. To the fullest extent permitted by applicable law, the Hydrological Outlook Partnership excludes all warranties or representations (express or implied) in respect of the Content.

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From April 2018 the UK Hydrological Outlook is supported by the Natural Environment Research Council funded [UK-SCAPE](#) and [Hydro-JULES](#) Programmes.

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Further information:

For more detailed information about the UK Hydrological Outlook, and the derivation of the maps, plots and interpretation provided in this outlook, please visit the UK Hydrological Outlook website.

The website features a host of other background information, including a wider range of sources of information which are used in the preparation of this Outlook.

Contact:

UK Hydrological Outlooks, UK Centre for Ecology & Hydrology, Wallingford, Oxfordshire, OX10 8BB
t: 01491 692371 e: <https://hydotuk.net/contact>

Reference for the UK Hydrological Outlook:

UK Hydrological Outlook, 10 October 2023, UK Centre for Ecology and Hydrology, Oxfordshire UK, Online, <https://www.hydotuk.net/latest-outlook/>

Other Sources of Information:

The UK Hydrological Outlook should be used alongside other sources of up-to-date information on the current water resources status and flood risk.

Environment Agency Water Situation Reports: provides summary of water resources status on a monthly and weekly basis for England:

<https://www.gov.uk/government/collections/water-situation-reports-for-england>

Flood warnings are continually updated, and should be consulted for an up-to-date and localised assessment of flood risk:

Environment Agency: <https://flood-warning-information.service.gov.uk/map>

Natural Resources Wales: <https://flood-warning.naturalresources.wales/>

Scottish Environment Protection Agency: <https://www.sepa.org.uk/flooding.aspx>

Hydrological Summary for the UK: provides summary of current water resources status for the UK:

<https://nfa.ceh.ac.uk/monthly-hydrological-summary-uk>

UK Met Office forecasts for the UK: <https://www.metoffice.gov.uk/#?tab=regionalForecast>

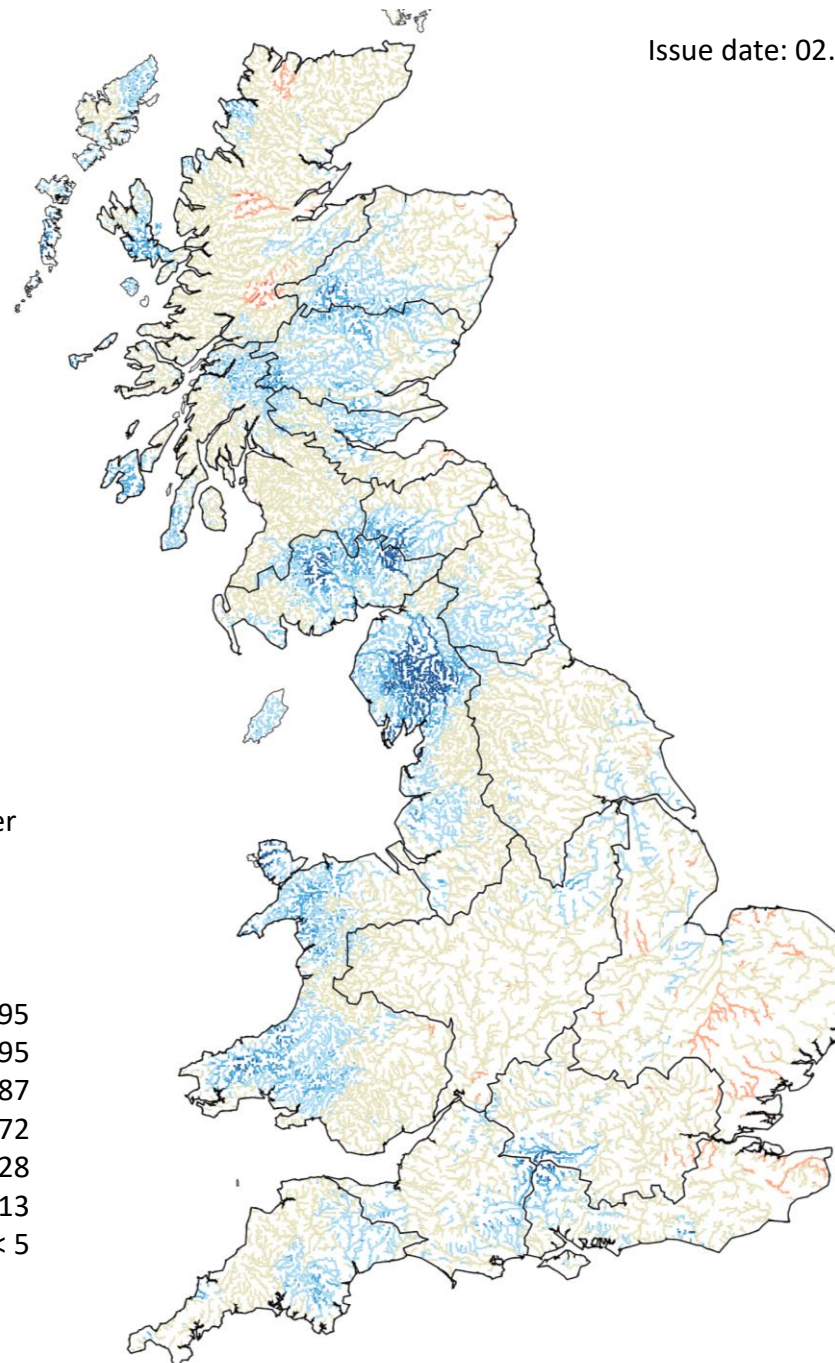
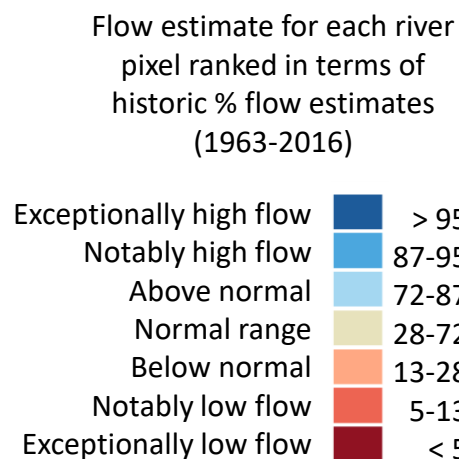
UK Water Resources Portal: monitor the UK hydrological situation in near real-time including rainfall, river flow, groundwater and soil moisture from COSMOS-UK:

<https://eip.ceh.ac.uk/hydrology/water-resources/>

This map shows the simulated monthly mean flow across Great Britain for last month, ranked in terms of 54 years of historical flow estimates (1963 – 2016).

These flows are produced by the 1km resolution Grid-to-Grid (G2G) hydrological model, which is run up to the end of each calendar month using observed rainfall and MORECS potential evaporation as input.

Note that the G2G model provides estimates of natural flows.



Current Daily Simulated Subsurface Water Storage Conditions

Based on subsurface water storage estimated for 30 September 2023

Issue date: 02.10.2023

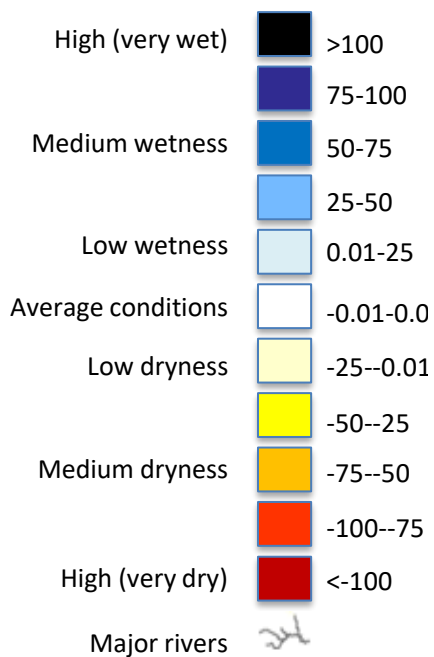
These maps are based on Grid-to-Grid (G2G) hydrological model simulated subsurface water storage, expressed as an anomaly from the historical monthly mean. To highlight areas that are particularly wet or dry, the storage anomaly is presented here using a colour scale highlighting water storage relative to historical extremes. The maps below show the “relative wetness” which combines maps previously shown separately as the “relative wetness” and “relative dryness”.

These maps do not provide a forecast and are not maps of soil moisture. Instead they indicate areas which are particularly wet or dry. Rainfall in areas with high positive relative wetness could result in flooding in the coming days/weeks. Areas of negative relative wetness provide an indication of locations which are particularly dry, and little or no rain in these areas could potentially lead to (or prolong) a drought.

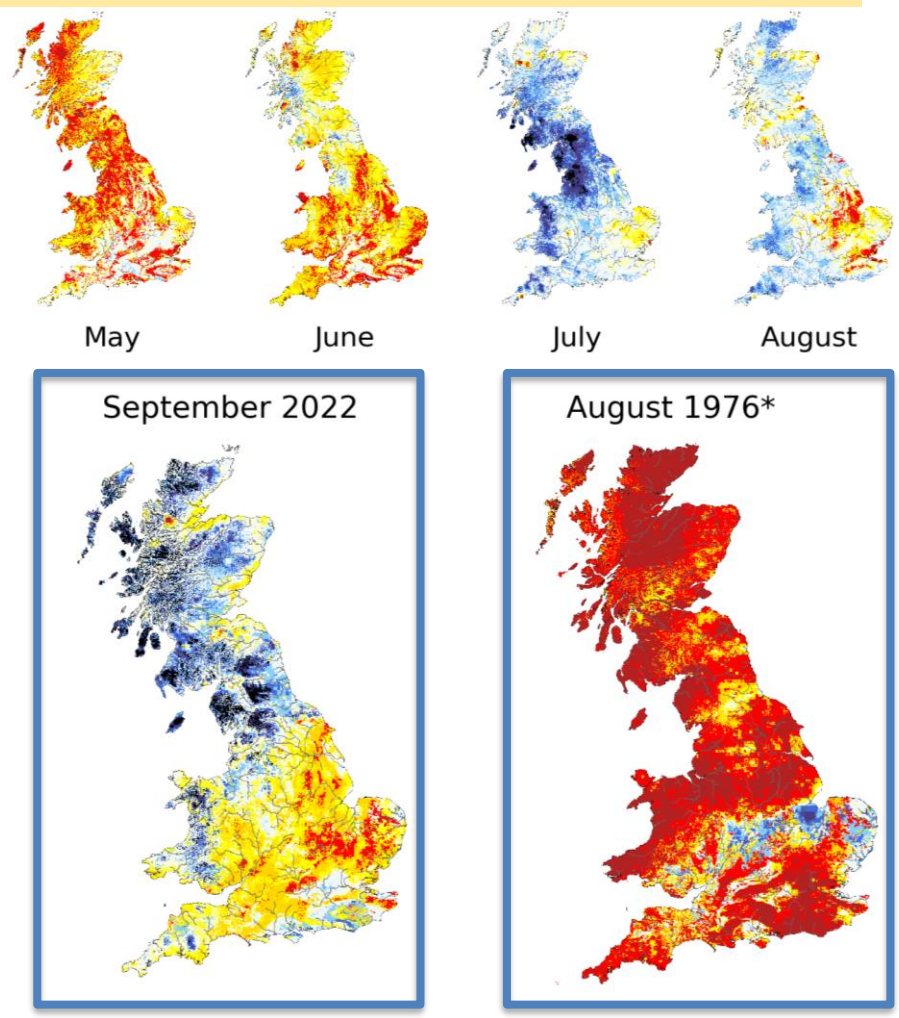
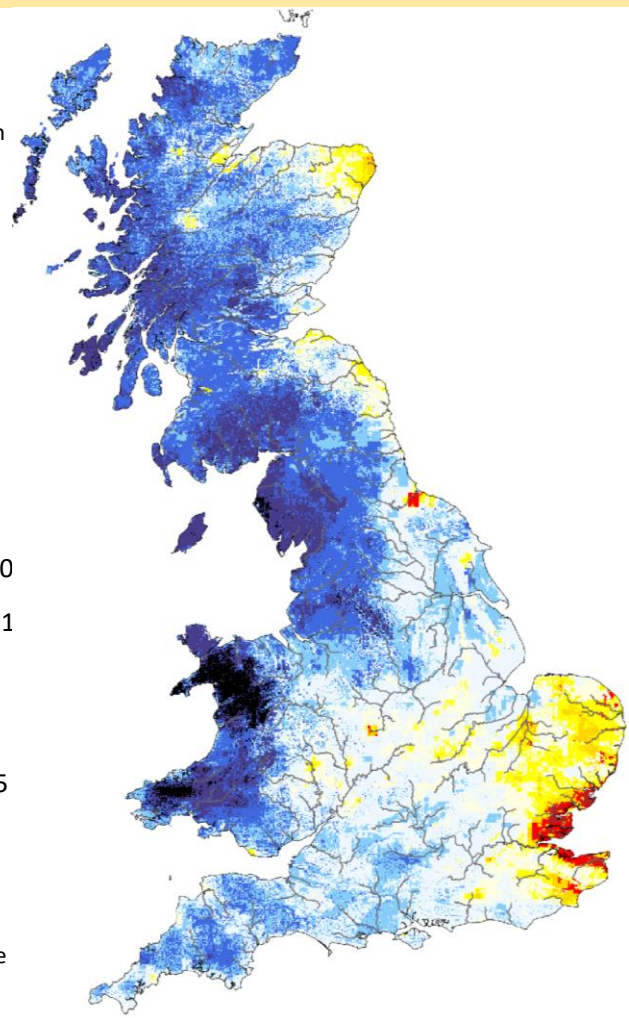
SUMMARY: Subsurface water stores over most of Great Britain are now higher (wetter) than is typical for the time of year, particularly along the western coast. There are some regions of notably low (dry) stores, especially in the south-east or England and eastern Scotland.

Relative wetness

Water storage anomaly as a % of maximum (positive wetness) or minimum (negative wetness) storage anomaly (zero indicates average value)



Labels refer to estimated storage final day of named month



*Example month displaying extreme negative wetness

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Current Daily Simulated SOIL MOISTURE Conditions

Based on soil moisture estimated for 30 September 2023

Issue date: 02.10.2023

These maps are based on Grid-to-Grid (G2G) hydrological model simulated soil moisture, expressed as an anomaly from the historical monthly mean. To highlight areas that are particularly wet or dry, the soil moisture anomaly is presented here using a colour scale highlighting soil moisture relative to historical extremes. The maps below show the “relative wetness” which combines maps previously shown separately as the “relative wetness” and “relative dryness”.

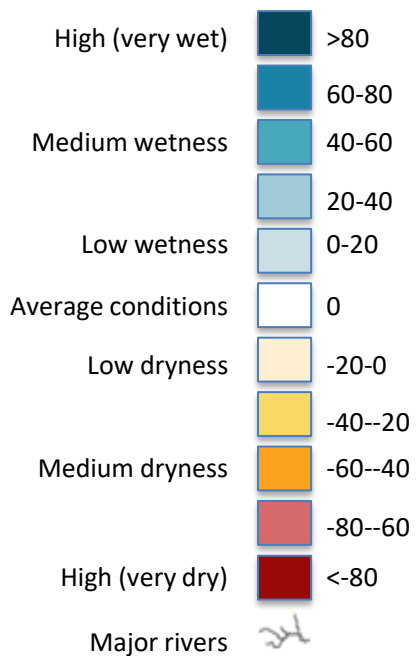
These maps do not provide a forecast. These maps are prototype representations of model estimates of soil moisture, which are currently under development.

Soil moisture will often look similar to total storage (shown on the previous slide), since total storage comprises both soil moisture and storage in the saturated zone.

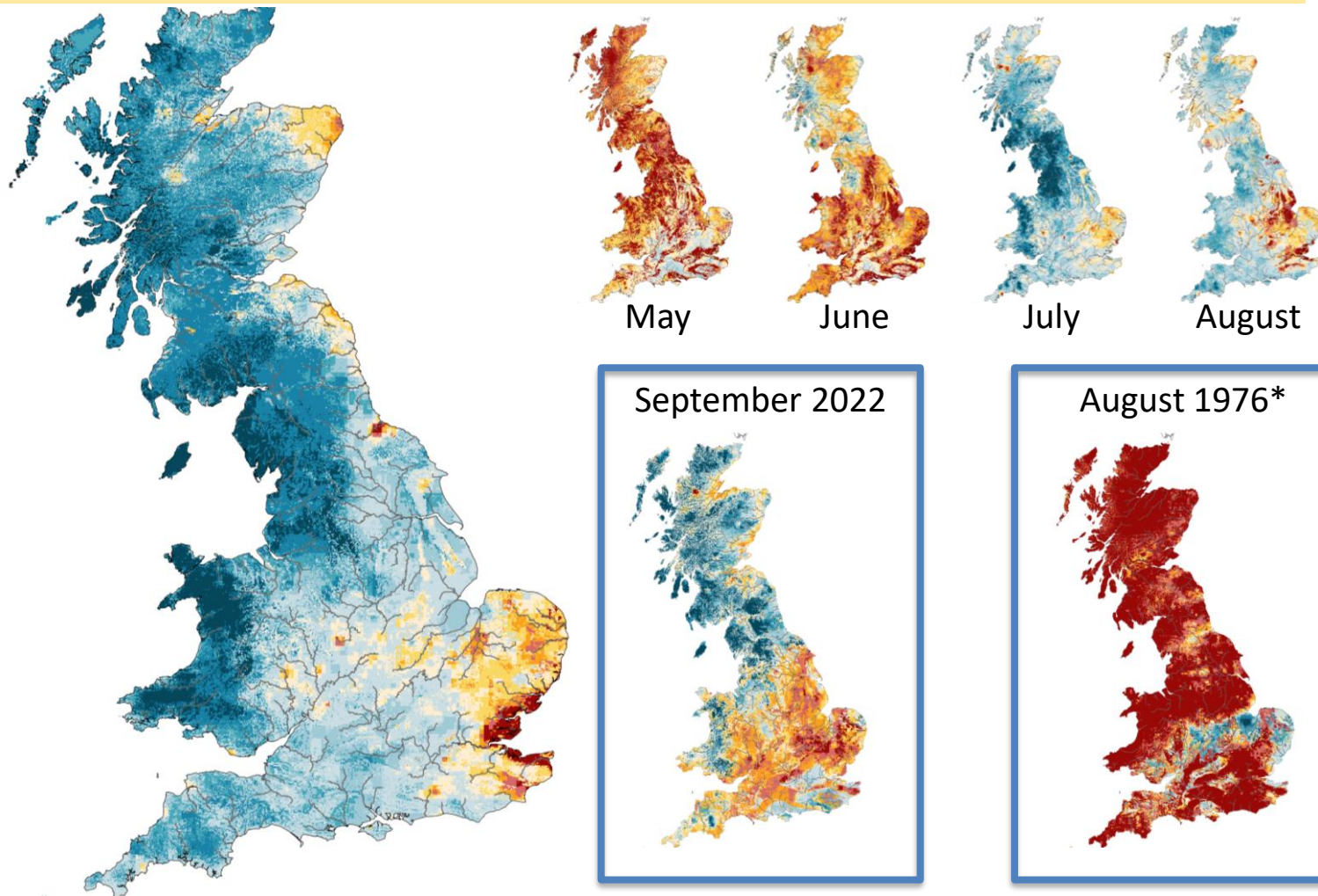
SUMMARY: Soil moisture levels have increased over the last month and are now higher (wetter) than is typical for this time of year across western parts of Great Britain. In some areas along the east coast, especially the south-east of England and the east of Scotland, soil moisture levels are low (dry).

Relative soil wetness

Soil moisture anomaly as a % of maximum (positive wetness) or minimum (negative wetness) moisture anomaly (zero indicates average value)



Labels refer to estimated soil moisture on final day of named month



*Example month displaying extreme negative wetness

The Hydrological Outlook UK provides an outlook for the water situation for the UK over the next three months and beyond. For guidance on how to interpret the outlook, a wider range of information, and a full description of underpinning methods, please visit the website: www.hyoutuk.net

Return Period of Rainfall Required to Overcome Dry Conditions

Period: October 2023 - March 2024

Issue date: 02.10.2023

These maps show the return period of the rainfall required to overcome dry conditions simulated using the Grid-to-Grid (G2G) hydrological model. The maps are coloured according to the return period of accumulated rainfall required to overcome the estimated current subsurface water storage deficit over the next few months.

These maps do not provide a drought forecast. Instead they indicate the return period of rainfall required to overcome the dry conditions for the following 6 months based on current conditions.

SUMMARY: There are few areas of the country with a subsurface water storage deficit, and no region requires unusually high rainfall (with a >5-year return period) to replenish these deficits.

SCOTLAND

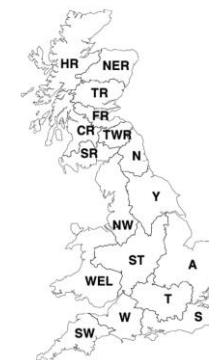
- HR Highlands Region
- NER North East Region
- TR Tay Region
- FR Forth Region
- CR Clyde Region
- TWR Tweed Region
- SR Solway Region

ENGLAND

- N Northumbria
- NW North West
- Y Yorkshire
- ST Severn Trent
- A Anglian
- T Thames
- S Southern
- W Wessex
- SW South West

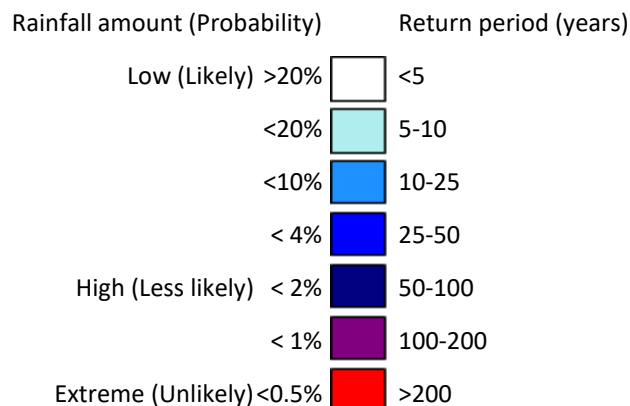
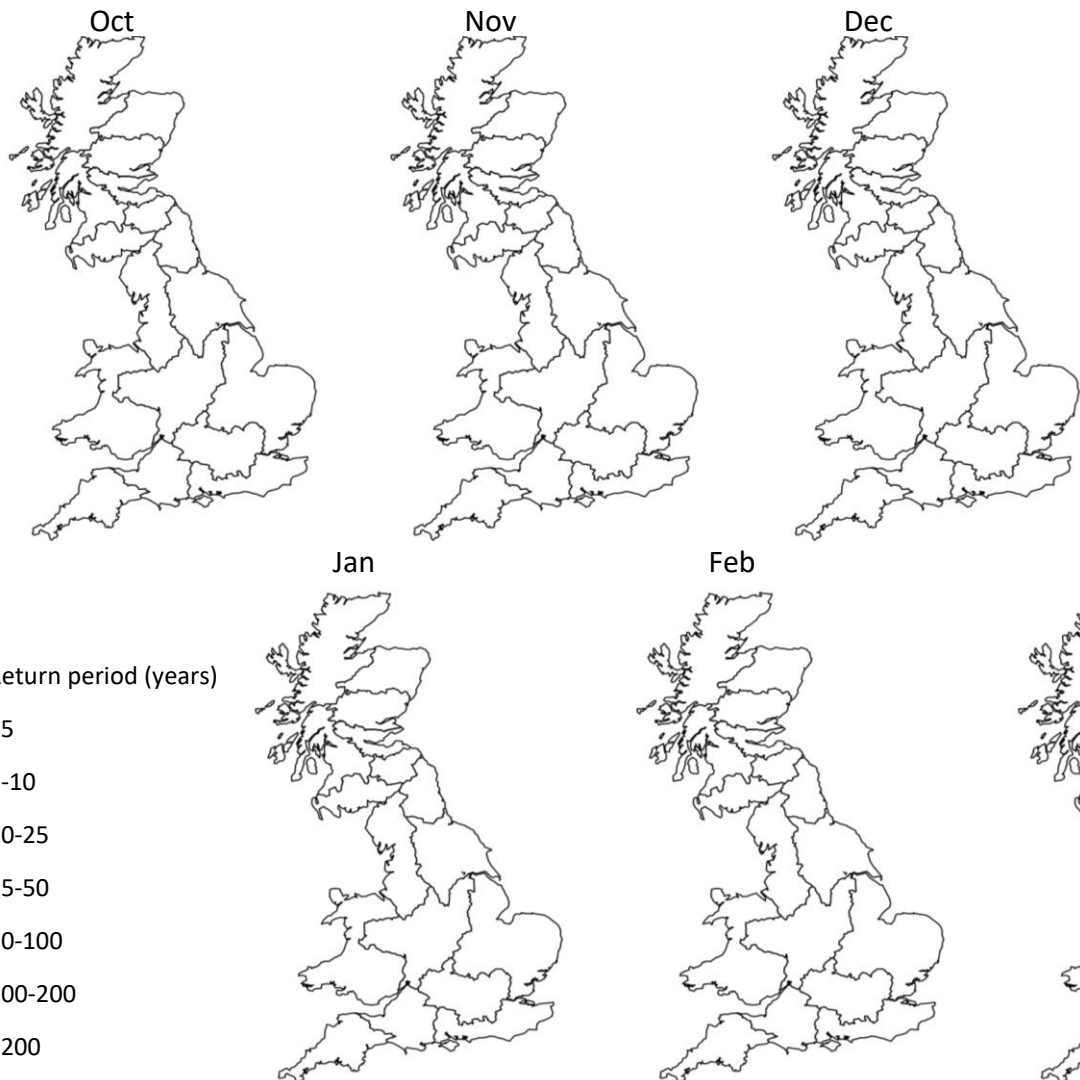
WALES

- WEL Welsh



NORTHERN IRELAND

This method cannot currently be used in Northern Ireland



Estimate of Additional Rainfall Required to Overcome Dry Conditions

Based on subsurface water storage estimated for 30 September 2023

Issue date: 02.10.2023

These maps show the Grid-to-Grid (G2G) hydrological model simulated subsurface water storage, expressed as an anomaly from the historical monthly mean (1981-2010), presented on a 1km grid and as regional means.

Subsurface storage deficits, i.e. where the subsurface water storage anomaly is less than zero, are highlighted by the red/pink colours.

The subsurface storage deficit (mm) can be interpreted as an estimate of additional rainfall that would be required in future months to overcome dry conditions (i.e. rainfall in addition to what is expected on average). Regional mean values of additional rainfall required are provided in the table below.

Regional estimate of additional rainfall required (mm)

SCOTLAND

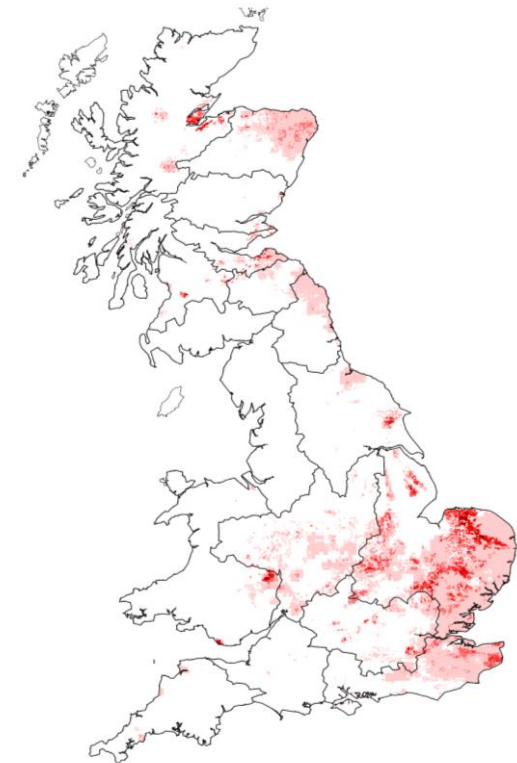
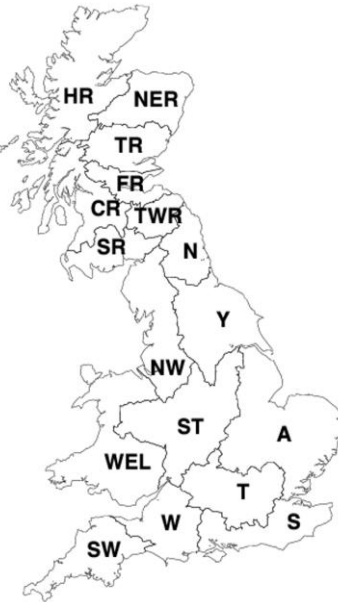
- 0 HR Highlands Region
- 0 NER North East Region
- 0 TR Tay Region
- 0 FR Forth Region
- 0 CR Clyde Region
- 0 TWR Tweed Region
- 0 SR Solway Region

ENGLAND

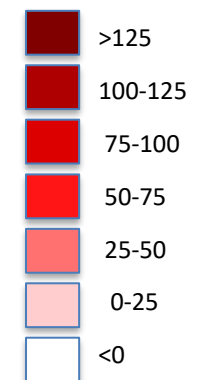
- 0 N Northumbria
- 0 NW North West
- 0 Y Yorkshire
- 0 ST Severn Trent
- 9 A Anglian
- 0 T Thames
- 0 W Wessex
- 0 S Southern
- 0 SW South West

WALES

- 0 WEL Welsh



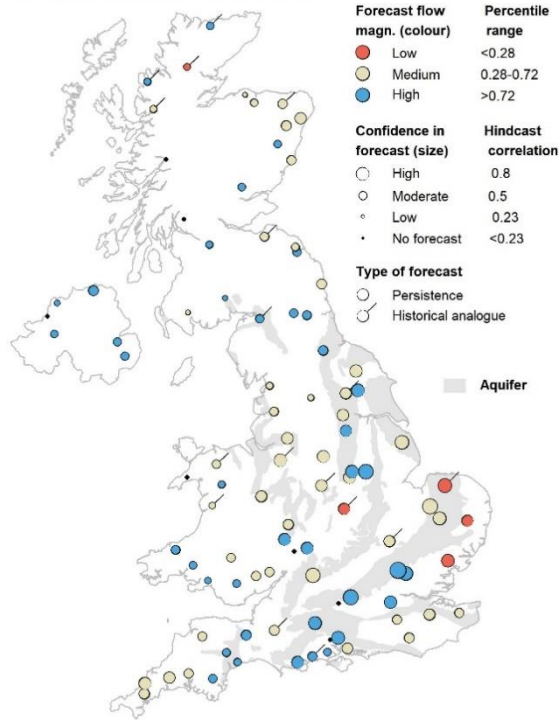
Water storage deficit (anomaly; mm)



SUMMARY:

The October and October – December outlook indicate a mixture of normal to above normal flows across the country. A few isolated below normal flows are expected in East Anglia.

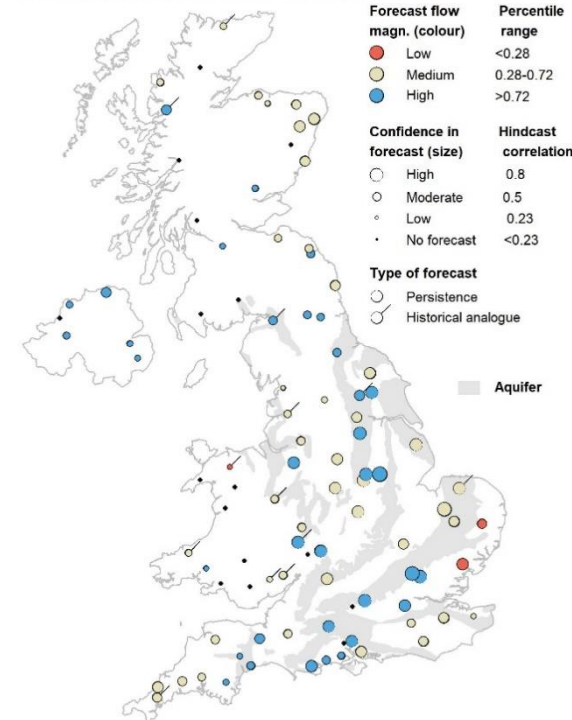
River flow outlook for Oct 2023



1-month flow outlook

Outlooks from hydrological analogues are based on a comparison of river flow during recent months with flows during the same months in previous years at a set of approximately 90 sites from across the UK. These sites are depicted on the two maps. Years with observed flows that most closely resemble current conditions are identified as the best analogues and the outlook is based on extrapolating from current conditions based on these analogues.

River flow outlook for Oct - Dec 2023



3-month flow outlook

It is, however, often the case that a simpler forecast based on the persistence of river flow provides a better forecast than provided by analogy. This is particularly true for slowly responding catchments associated with aquifer outcrops.

Both methods are considered at each site and the forecast from the method with the higher confidence is presented. A simple classification of flows is used (high, medium and low) as indicated by the colours of the dots, with the confidence

of the forecast being represented by the size of the dot. A tag on the dot indicates which method has been used in each instance.

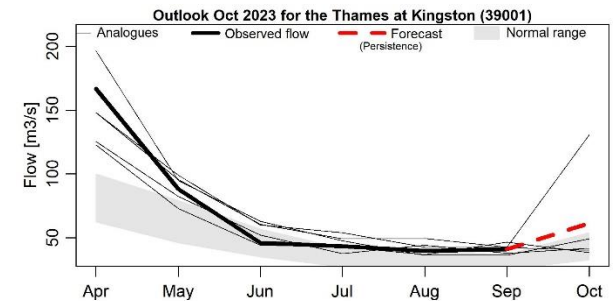
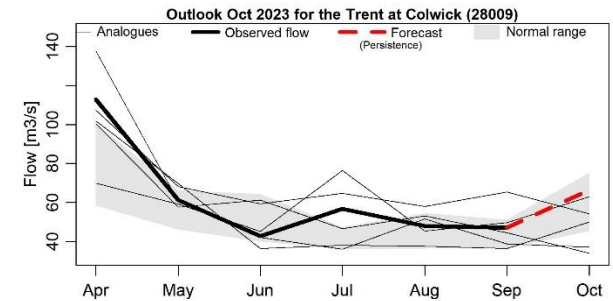
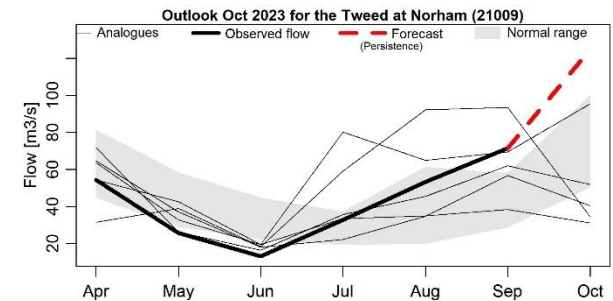
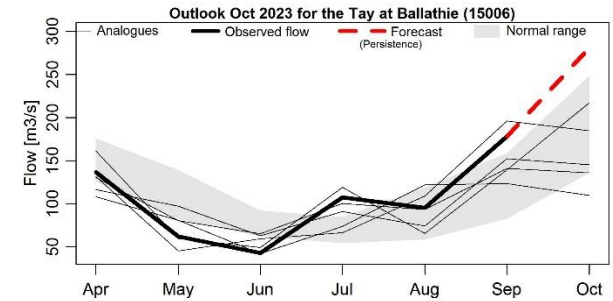
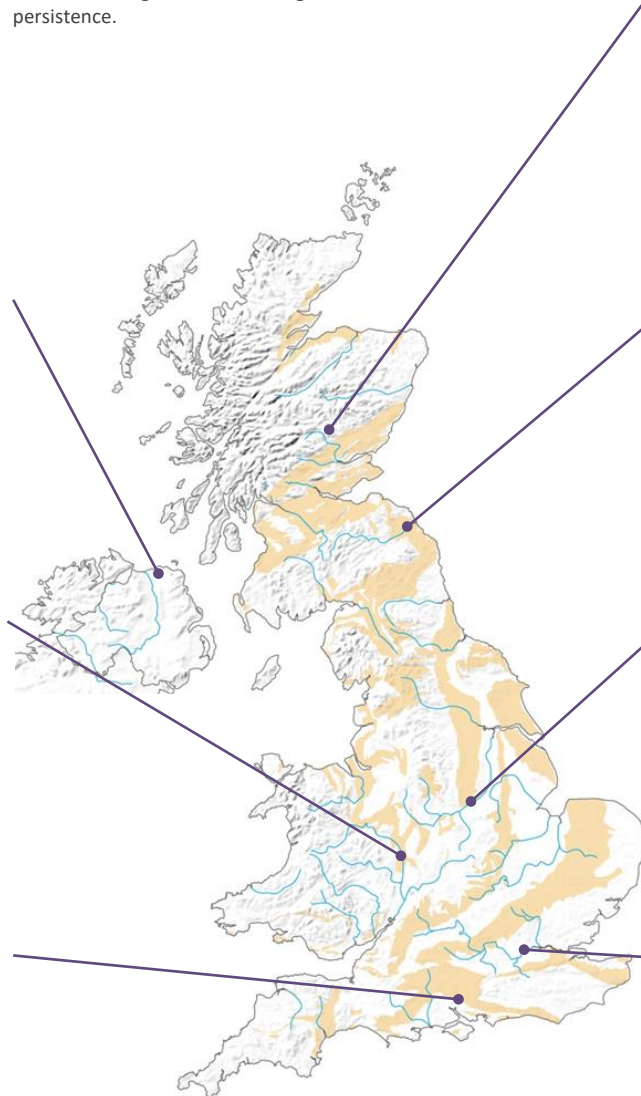
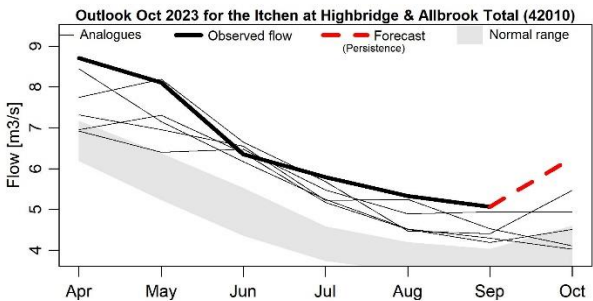
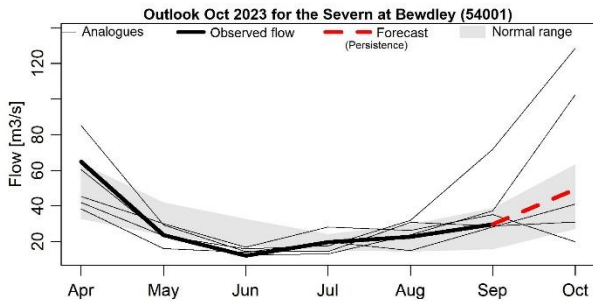
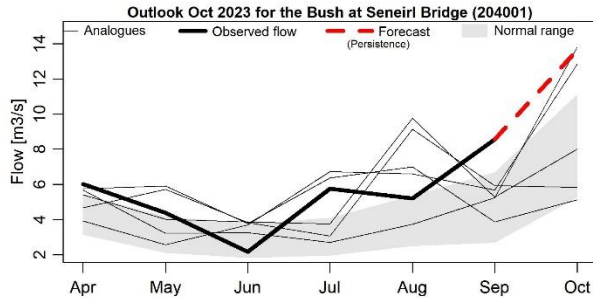
Period: October 2023

Issued on 05.10.2023 using data to the end of September 2023

These figures provide insight into the hydrological analogue methodology for a set of sites from across the UK.

In each of the time series graphs the bold black line represents the observed flow during the past six months. The grey band indicates the normal flow range (the normal band includes 44%

of observed flows in each month). The selected analogues are shown as thin lines and the trajectories that flows took in the following month are also shown. The forecast is shown as the dashed red line, and in each plot it states whether this has come from the analogues or has been generated on the basis of persistence.



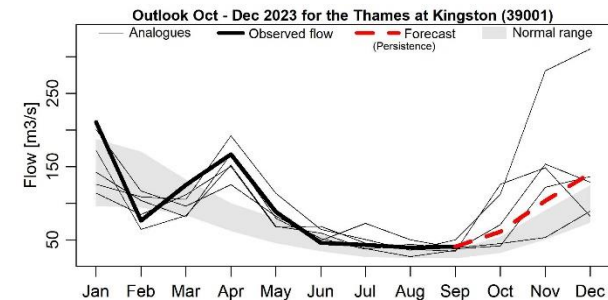
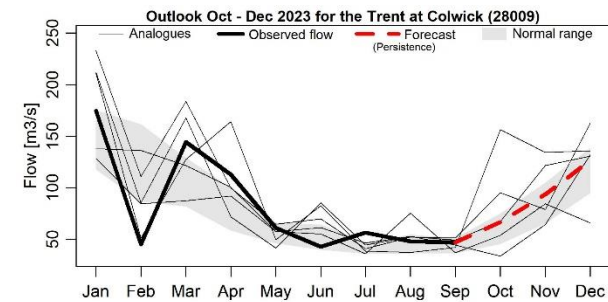
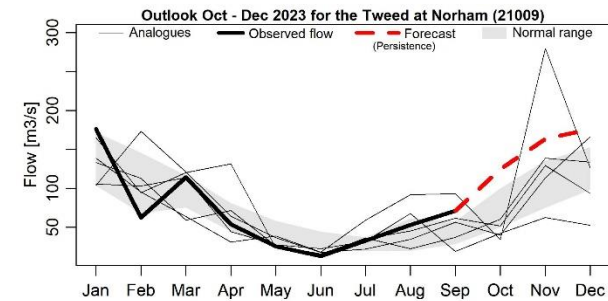
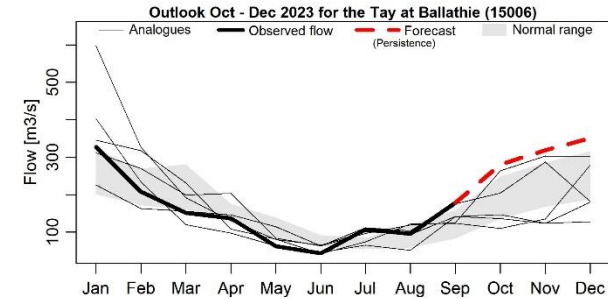
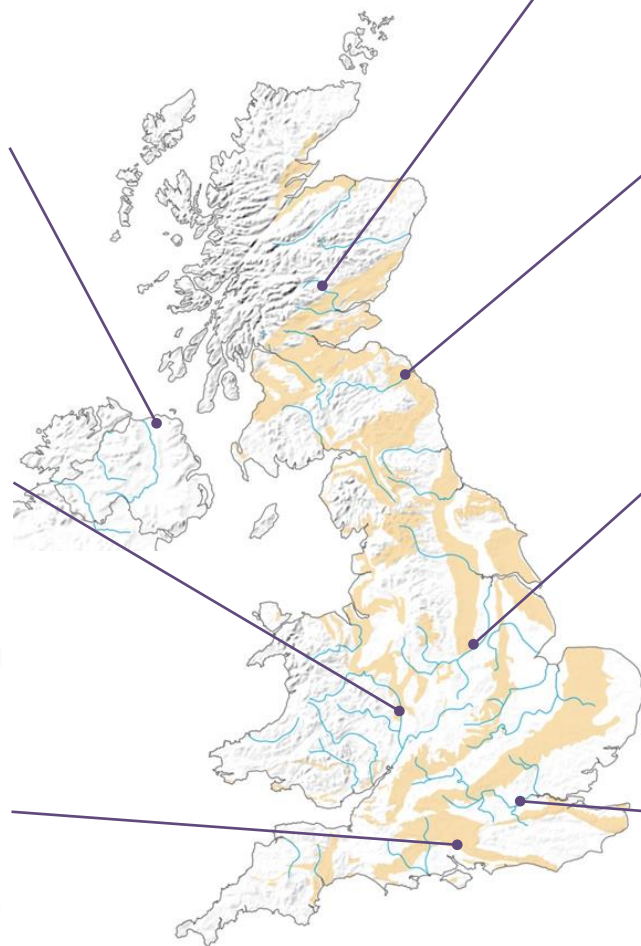
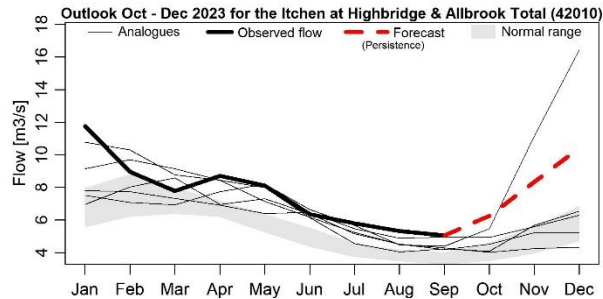
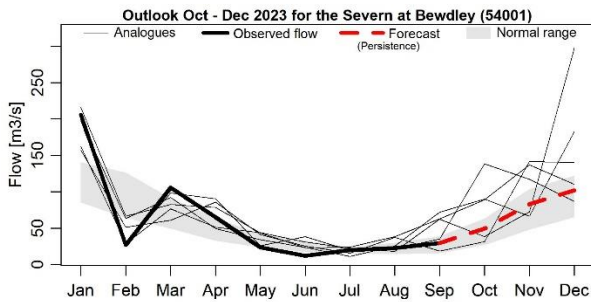
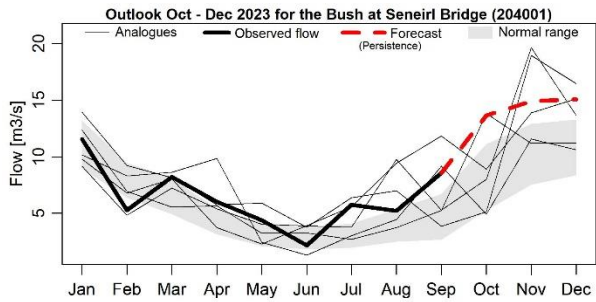
Period: October 2023 – December 2023

Issued on 05.10.2023 using data to the end of September 2023

These figures provide insight into the hydrological analogue methodology for a set of sites from across the UK.

In each of the time series graphs the bold black line represents the observed flow during the past nine months. The grey band indicates the normal flow range (the normal band includes 44%

of observed flows in each month). The selected analogues are shown as thin lines and the trajectories that flows took in the following three months are also shown. The forecast is shown as the dashed red line, and in each plot it states whether this has come from the analogues or has been generated on the basis of persistence.

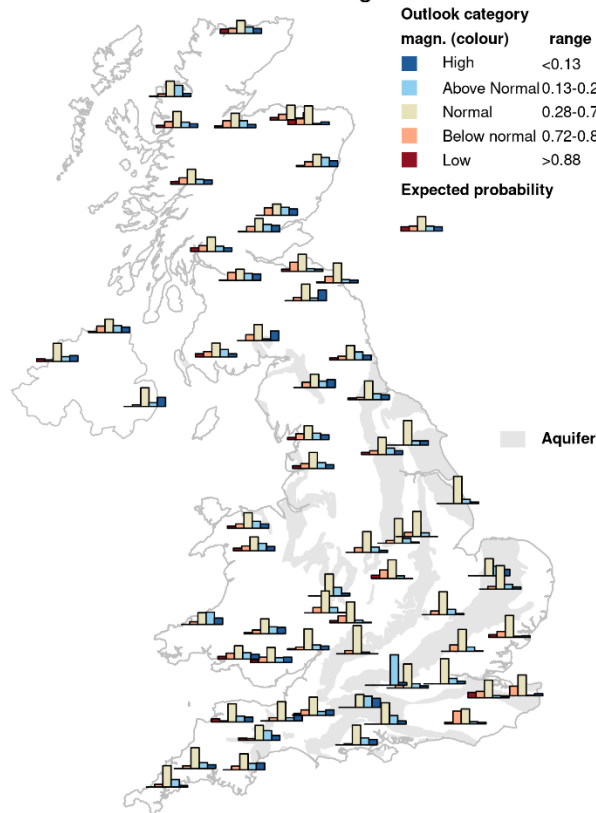


Period: October 2023 – March 2024

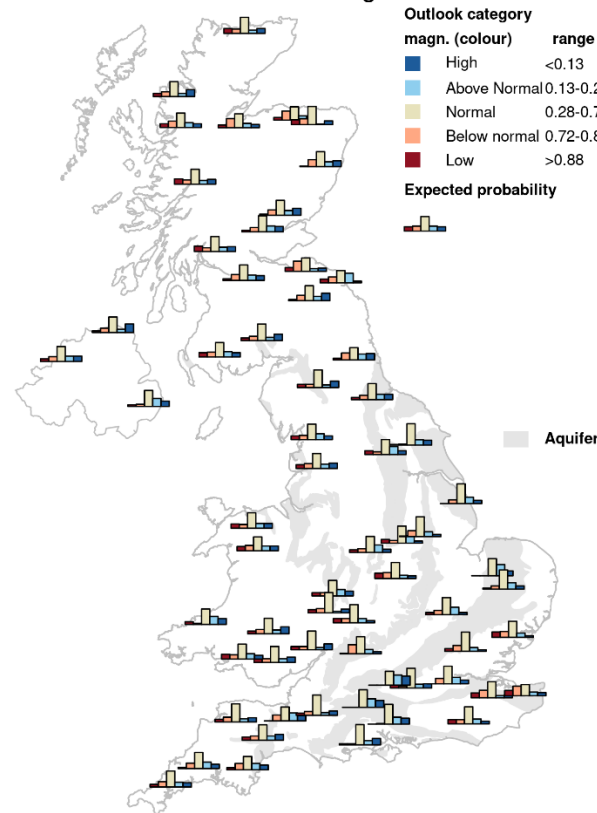
Issued on 03.10.2023 using data to the end of September 2023

The outlook for October indicates that flows are likely to be generally normal across the UK, with the exception of a few catchments in southern England that are likely to be normal to above normal. The October-December outlook shows that this pattern is likely to persist of the coming few months.

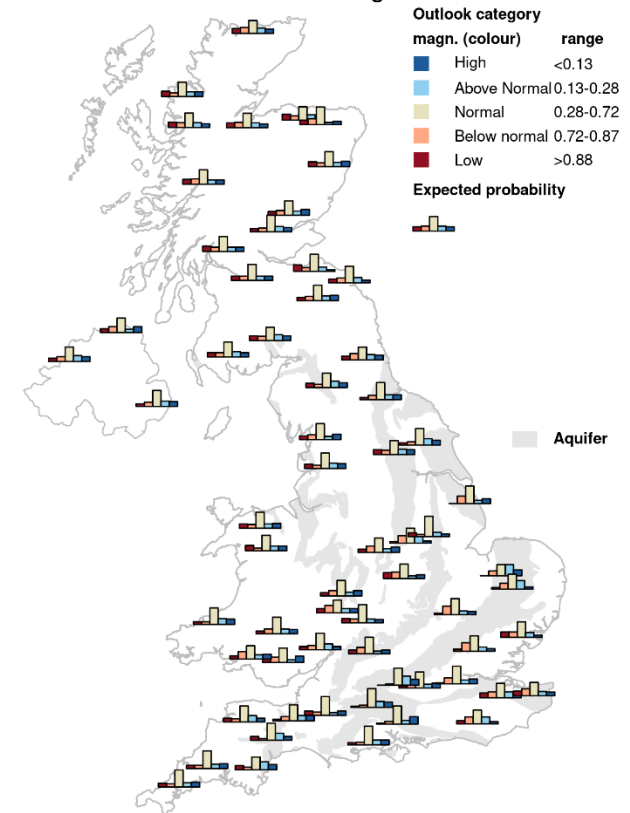
1-month river flow outlook starting Oct 2023



3-month river flow outlook starting Oct 2023



6-month river flow outlook starting Oct 2023



This outlook is based on monthly ensembles of historical sequences of observed climate (rainfall and potential evapotranspiration) that form input to a hydrological model. The outputs are probabilistic simulations of the average river flow over the forecast period (1 to 12 months ahead), at each location. The simulations are generated by the GR6J conceptual rainfall-runoff model from INRAE (France) calibrated on observed or naturalised flows.

The bar plot maps show the outlook distribution for 1, 3 and 6-month period for 64 catchments across England and Wales. Each bar plot represents the probabilistic distribution of the simulated river flow compared to the historical river flow, for the same n-month period. The probabilities fall within five categories, classified as: low, below normal, normal, above normal and high.

This outlook is based entirely on historical sequences and therefore does not contain any knowledge of the state of the atmosphere and ocean. It is hence possible that some of the historical sequences used might be inconsistent with current large-scale atmospheric conditions and would therefore be unlikely to occur in the next few months.

Please note that *Outlooks based on modelled flow from historical climate* from October 2023 onwards were generated using GR6J model, whereas until September 2023, they were produced using GR4J model. For more details, please see the section on River flow from historical climate at this link: <https://hydoutuk.net/about/methods/river-flows>



This outlook is based on monthly ensembles of historical sequences of observed climate (rainfall and potential evapotranspiration) that form input to a hydrological model. The outputs are probabilistic simulations of the average river flow over the forecast period (1 to 12 months ahead), at each location. The simulations are generated by the GR6J conceptual rainfall-runoff model from INRAE (France) calibrated on observed or naturalised flows.

The stack diagrams show the variation over time of the outlook distribution for a number of individual catchments. Each graph represents variation over time of the number of simulated river flows, in each month ensemble, that fall within each of seven categories: exceptionally low, notably low, below normal, normal, above normal, notably high and exceptionally high. The categories represent cumulative flow conditions, e.g. For 3-month, the simulated total 3-month flow compared to the historical 3-month flow distribution. The monthly variations can be compared to the long-term average distribution of river flows (shown as columns on

the right of each timeline graph).

This outlook is based entirely on historical sequences and therefore does not contain any knowledge of the state of the atmosphere and ocean. It is hence possible that some of the historical sequences used might be inconsistent with current large-scale atmospheric conditions and would therefore be unlikely to occur in the next few months.

Outlook based on Modelled Flow from Rainfall Forecasts

Period: October 2023 - December 2023

Issued on 02.10.2023 using data to the end of September

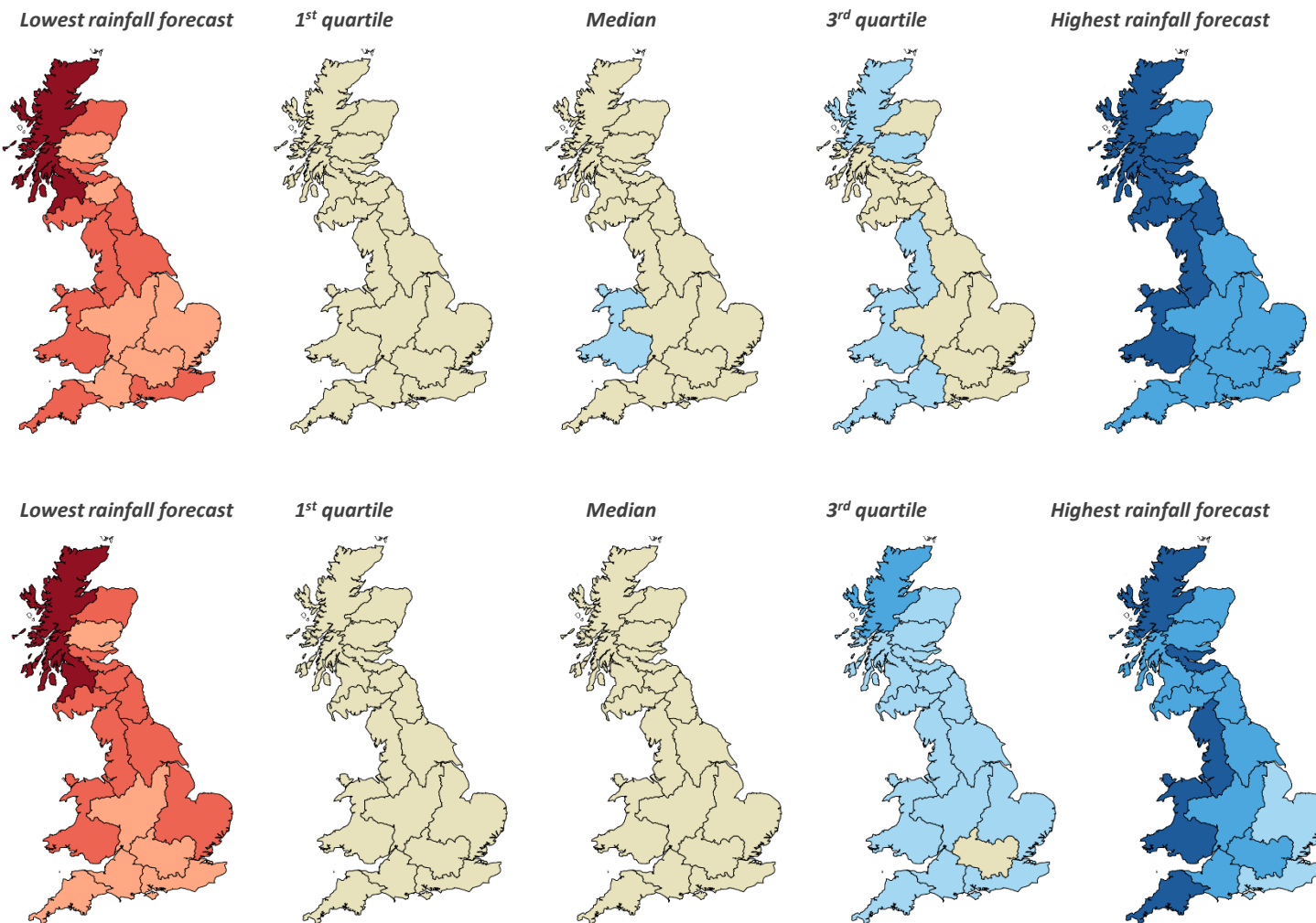
SUMMARY: During October, river flows over Great Britain are likely to be in the *Normal range*, with flows in regions along the west coast of England, Wales, and the Highlands and Tay regions likely to be in the *Normal range to Above Normal*.

Over the next 3 months river flows across Great Britain are likely to be in the *Normal range to Above normal*. The Highlands may experience flows in the *Normal range to Notably high flow*.

These forecasts are produced by using five members of the Met Office rainfall forecast ensemble as input to a water balance hydrological model to provide the five estimates of river flows shown on the left for one month and three months ahead.

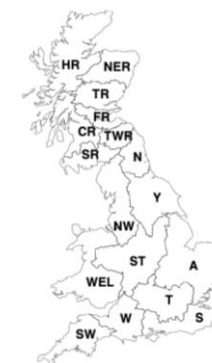
Regional forecast monthly-mean river flows are derived from the average of 1km river flow estimates within each region and ranked in terms of 54 years of historical flow estimates (1963 – 2016).

The five maps illustrate the wide range of possible flows and while there is a 50% chance of flows between the 1st and 3rd quartiles, actual flows may be more extreme than the flows derived using the highest or lowest rainfall forecasts.



| Key | Percentile range of historic values for relevant month |
|-------------------------|--|
| Exceptionally high flow | > 95 |
| Notably high flow | 87-95 |
| Above normal | 72-87 |
| Normal range | 28-72 |
| Below normal | 13-28 |
| Notably low flow | 5-13 |
| Exceptionally low flow | < 5 |

- SCOTLAND**
- HR Highlands Region
 - NER North East Region
 - TR Tay Region
 - FR Forth Region
 - CR Clyde Region
 - TWR Tweed Region
 - SR Solway Region
- ENGLAND**
- N Northumbria
 - NW North West
 - Y Yorkshire
 - ST Severn Trent
 - A Anglian
 - T Thames
 - S Southern
 - W Wessex
 - SW South West
- WALES**
- WEL Welsh



NORTHERN IRELAND
This method cannot currently be used in Northern Ireland

The regional maps illustrating the regional river flows for five members of the Met Office ensemble of rainfall forecasts give some indication of the range of possible river flows in the coming months. As noted previously, the actual flows could be more extreme than the flows generated by either the lowest or highest members of the rainfall ensemble.

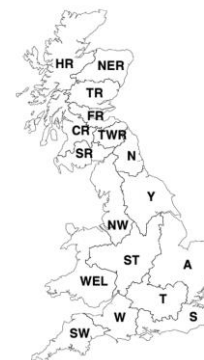
The bar charts (below) give further insight into the range of river flow forecasts by considering all members of the forecast rainfall ensemble. The regional bar charts show the percentage of ensemble forecasts falling in each of the flow categories as generated by the monthly-resolution water-balance model. As before results are averaged by region then ranked in terms of 54 years of historical regional flow estimates (1963 – 2016).

SUMMARY: During October, river flows over Great Britain are likely to be in the *Normal range*, with flows in regions along the east coast of England, Wales, and the Highlands and Tay regions likely to be in the *Normal range to Above Normal*.

Over the next 3 months river flows across Great Britain are likely to be in the *Normal range to Above normal*. The Highlands may experience flows in the *Normal range to Notably high flow*.

SCOTLAND

- HR Highlands Region
- NER North East Region
- TR Tay Region
- FR Forth Region
- CR Clyde Region
- TWR Tweed Region
- SR Solway Region



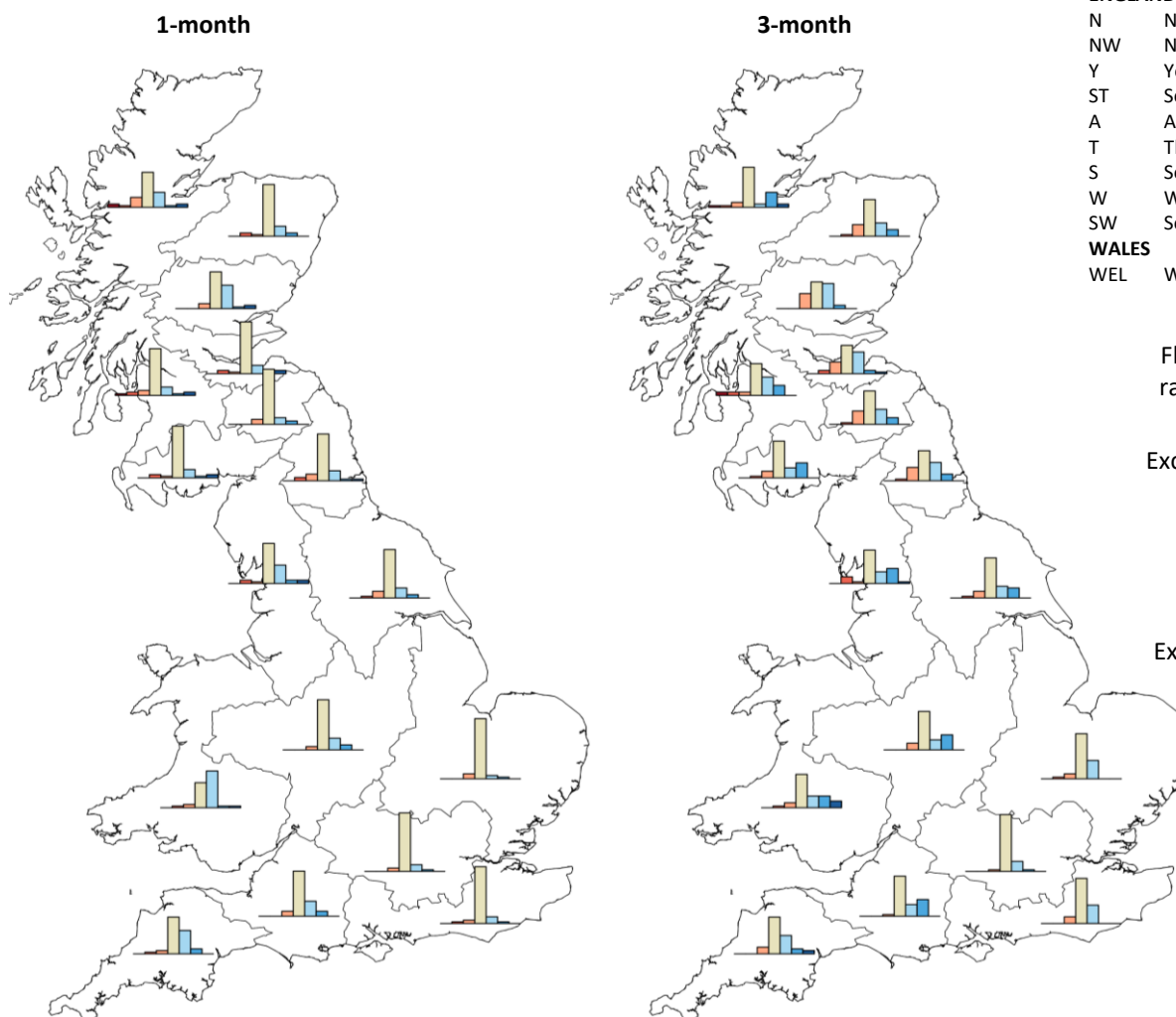
ENGLAND

- N Northumbria
- NW North West
- Y Yorkshire
- ST Severn Trent
- A Anglian
- T Thames
- S Southern
- W Wessex
- SW South West

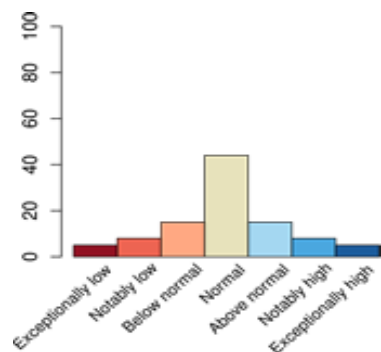
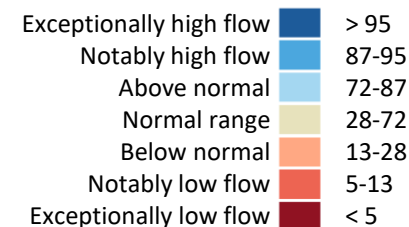
WALES

- WEL Welsh

NORTHERN IRELAND
This method cannot currently be used in Northern Ireland



Flow estimate for each river pixel ranked in terms of historic % flow estimates (1963-2016)



Outlook based on Modelled Flow from Rainfall Forecasts

Period: October 2023 - December 2023

Issue date: 02.10.2023

The maps illustrating the regional river flows for five members of the Met Office ensemble of rainfall forecasts give some indication of the range of possible river flows in the coming months. As noted previously, the actual flows could be more extreme than the flows generated by either the lowest or highest members of the rainfall ensemble.

The tables below give further insight into the range of river flow forecasts by considering all members of the forecast rainfall ensemble. The numbers in the tables are the percentage of ensemble forecasts falling in each of the flow categories as generated by the monthly-resolution water-balance model. As before results are averaged by region then ranked in terms of 54 years of historical regional flow estimates (1963 – 2016).

SUMMARY: During October, river flows over Great Britain are likely to be in the *Normal range*, with flows in regions along the east coast of England, Wales, and the Highlands and Tay regions likely to be in the *Normal range to Above Normal*.

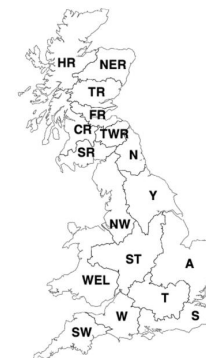
Over the next 3 months river flows across Great Britain are likely to be in the *Normal range to Above normal*. The Highlands may experience flows in the *Normal range to Notably high flow*.

SCOTLAND

- HR Highlands Region
- NER North East Region
- TR Tay Region
- FR Forth Region
- CR Clyde Region
- TWR Tweed Region
- SR Solway Region

ENGLAND

- N Northumbria
- NW North West
- Y Yorkshire
- ST Severn Trent
- A Anglian
- T Thames
- S Southern
- W Wessex
- SW South West
- WALES**
- WEL Welsh



NORTHERN IRELAND

This method cannot currently be used in Northern Ireland

| 1-month ahead | A | NW | N | ST | SW | S | T | WEL | W | Y | CR | FR | HR | NER | SR | TR | TWR |
|-------------------------|----|----|----|----|----|----|----|-----|----|----|----|----|----|-----|----|----|-----|
| Exceptionally high flow | 0 | 5 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 5 | 5 | 5 | 0 | 5 | 5 | 0 |
| Notably high | 2 | 5 | 2 | 7 | 7 | 2 | 2 | 2 | 7 | 5 | 2 | 2 | 2 | 5 | 2 | 2 | 5 |
| Above normal | 5 | 26 | 14 | 17 | 33 | 10 | 10 | 52 | 21 | 14 | 12 | 12 | 21 | 14 | 12 | 33 | 10 |
| Normal range | 86 | 57 | 67 | 71 | 52 | 81 | 83 | 36 | 64 | 69 | 67 | 74 | 50 | 74 | 74 | 52 | 79 |
| Below normal | 7 | 2 | 10 | 5 | 5 | 5 | 5 | 5 | 7 | 10 | 7 | 2 | 14 | 2 | 2 | 7 | 7 |
| Notably low | 0 | 5 | 5 | 0 | 2 | 2 | 0 | 2 | 0 | 2 | 5 | 5 | 2 | 5 | 5 | 0 | 0 |
| Exceptionally low flow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 5 | 0 | 0 | 0 | 0 |

| 3-month ahead | A | NW | N | ST | SW | S | T | WEL | W | Y | CR | FR | HR | NER | SR | TR | TWR |
|-------------------------|----|----|----|----|----|----|----|-----|----|----|----|----|----|-----|----|----|-----|
| Exceptionally high flow | 0 | 2 | 0 | 0 | 5 | 0 | 0 | 10 | 0 | 0 | 0 | 2 | 5 | 0 | 0 | 0 | 0 |
| Notably high | 0 | 21 | 10 | 21 | 7 | 0 | 2 | 17 | 24 | 14 | 14 | 5 | 21 | 10 | 21 | 5 | 10 |
| Above normal | 26 | 17 | 26 | 14 | 26 | 26 | 14 | 17 | 17 | 17 | 26 | 31 | 5 | 19 | 14 | 36 | 21 |
| Normal range | 64 | 48 | 43 | 55 | 52 | 64 | 81 | 48 | 57 | 57 | 45 | 40 | 57 | 52 | 52 | 38 | 48 |
| Below normal | 7 | 2 | 19 | 10 | 10 | 10 | 2 | 7 | 2 | 10 | 5 | 17 | 7 | 17 | 10 | 21 | 19 |
| Notably low | 2 | 10 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 5 | 5 | 2 | 2 | 2 | 0 | 2 |
| Exceptionally low flow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 2 | 0 | 0 | 0 | 0 |

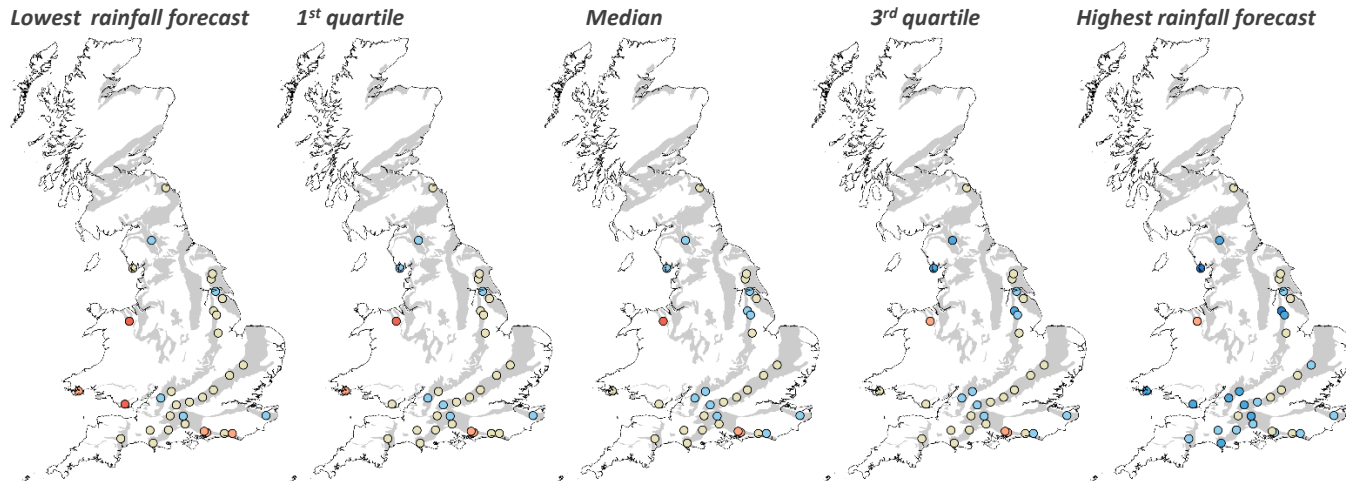
Period: October 2023 – December 2023

Issued on 09.10.2023 using data to the end of September

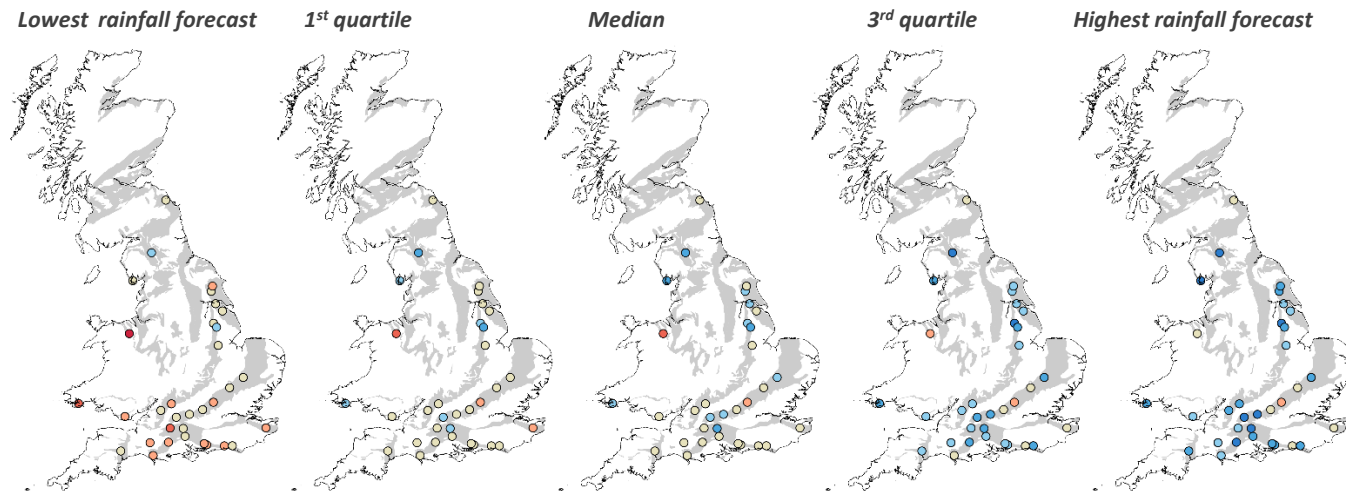
Under median rainfall conditions, groundwater levels are forecast to be normal to above normal at most sites over the next month, except for Chilgrove House and Compton in the South Downs Chalk and Llanfair DC in the Permo-Triassic sandstone where levels are expected to be below normal and notably low respectively. The three month forecasts are similar but with a general shift to somewhat higher levels for the time of year. Levels in the South Downs Chalk are likely to recover to the normal range under the median rainfall scenario. The Permo-Triassic Sandstones of the north-west are forecast to have notably high levels under this scenario.

These forecasts are produced by running five members of the Met Office ensemble climate forecast through groundwater models of observation borehole hydrographs at 42 sites across the country. The sites are distributed across the principal aquifers.

Based on the distribution of observed historical groundwater levels in a given month, seven categories have been derived for each site: very low, low, below normal, normal, above normal, high, and very high. The forecast groundwater level is assigned to one of these seven categories depending on where it falls within the distribution of the historically observed values.

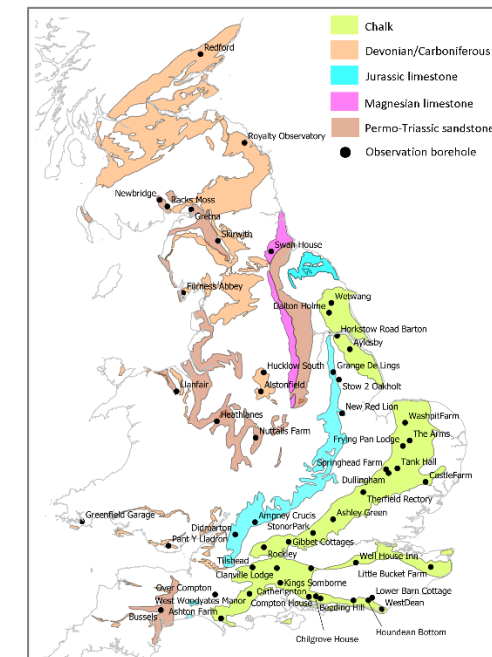


1-month outlook



3-month outlook

| Key | Percentile range of historic observed values for relevant month |
|---------------------------|---|
| Exceptionally high levels | > 95 |
| Notably high levels | 87-95 |
| Above normal | 72-87 |
| Normal | 28-72 |
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| Notably low levels | 5-13 |
| Exceptionally low levels | < 5 |



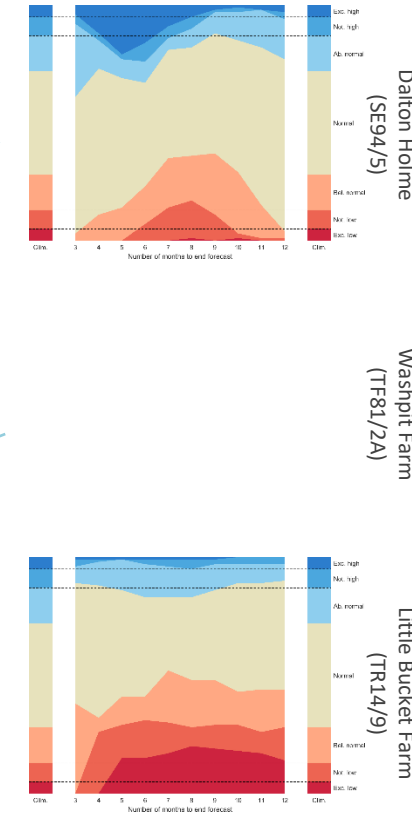
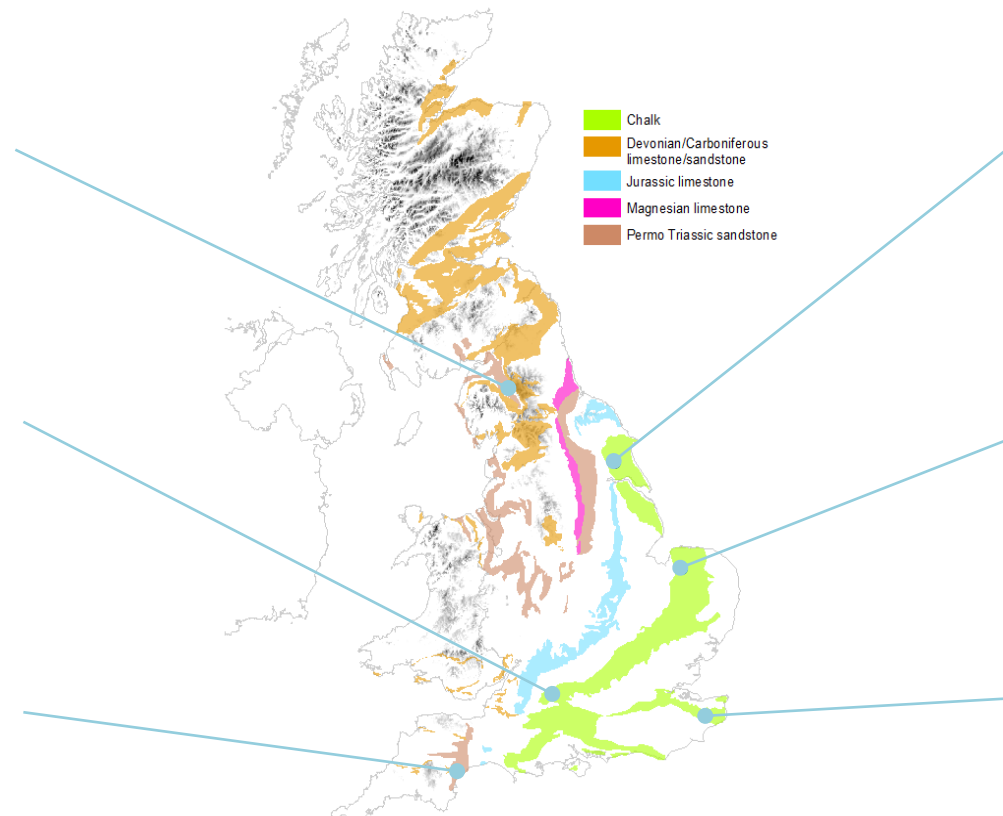
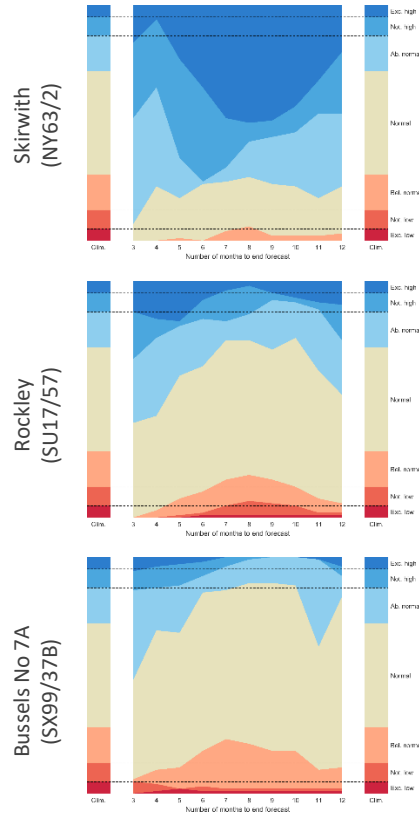
The Hydrological Outlook UK provides an outlook for the water situation for the UK over the next three months and beyond. For guidance on how to interpret the outlook, a wider range of information, and a full description of underpinning methods, please visit the website: www.hyoutuk.net

Outlook based on modelled groundwater from historical climate

Period: October 2023 – September 2024

Issued on 09.10.2023 using data to the end of September

Levels at Skirwith in the Permo-Triassic Sandstones are forecast to be above normal to exceptionally high over the next 12 months. In the Chalk at Rockley and the Permo-Triassic Sandstones at Bussels No 7A, above normal conditions in next 3-4 months give way to more normal conditions over the spring/summer period, with above normal conditions potentially recurring after that time. At Dalton Holme and Little Bucket Farm in the Chalk predominantly normal levels are anticipated, with possibly somewhat lower than normal levels through the summer months. Data from Washpit Farm appear anomalous and have not been included.



This outlook is based on monthly ensembles of historical sequences of observed climate (rainfall and potential evapotranspiration) that form input to hydrological models. The outputs are probabilistic simulations of the average groundwater level over the forecast horizon (3 to 12 months ahead), at each location.

that fall within each the seven categories: exceptionally low, notably low, below normal, normal, above normal, notably high and exceptionally high. The monthly variations can be compared to the long-term average distribution of levels, which are shown as columns on the left and right of each graph.

the atmosphere and ocean. It is hence possible that some of the historical sequences used might be inconsistent with current large-scale atmospheric conditions and would therefore be unlikely to occur in the next few months.

The graphs show variation over time of the number of simulated groundwater levels in each monthly ensemble,

This outlook is based entirely on historical sequences and therefore does not contain any knowledge of the state of