

**SUMMARY** The outlook for September is for river flows to be normal to above normal across northern and western parts of the UK, as well as in parts of the southeast. Across the northeast and central England, flows are likely to be normal to below normal. Over the autumn period above normal to high river flows are expected over the northwest. Groundwater levels are likely to be normal to above normal across the UK for September to November.

**Rainfall:**

Rainfall in August showed a strong northwest to southeast gradient with western Scotland and northwest England receiving over 170 percent of average. Western Wales and most of Northern Ireland also saw above average rainfall. The remainder of eastern and southern parts of the UK experienced below average rainfall, as little as 30 percent in some places. The outlook (issued by the Met Office on the 27<sup>th</sup> August) indicates the chance of a wet September is similar to normal, though Autumn as a whole (Sept to Nov) is more likely than usual to be wet (1.8 times the normal chance). Northern parts of the UK are expected to have the greatest chances of being wetter than normal.

**River flows:**

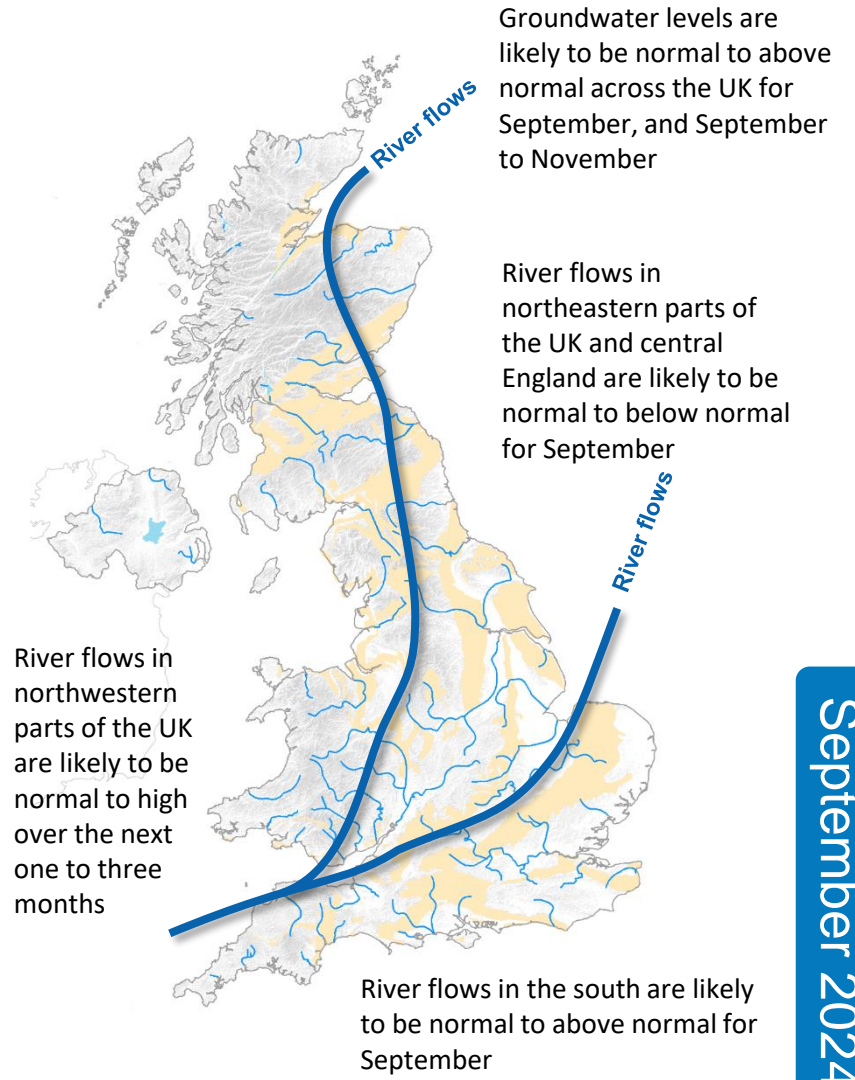
River flows for August reflected the rainfall pattern, with exceptionally high and some record-breaking high flows seen in the northwest. Above normal river flows persisted in parts of the southeast despite the dry August. Elsewhere, river flows were normal or below normal.

The outlook is for this pattern to continue, with normal to high river flows expected across the northwest over the next three months, as well as above normal flows in groundwater dominated catchments of the southeast in September. Across northeastern and central England flows are likely to be normal to below normal for September.

**Groundwater:**

Groundwater levels for August were normal to above normal, with exceptionally high levels recorded in some parts of northern England. Low groundwater levels were recorded in South Wales.

The outlook is for groundwater levels to remain normal to above normal across the majority of the UK for September and the Autumn period. Levels in the Carboniferous Limestone of south Wales are uncertain and could remain below normal depending on the aquifer response to early September rainfall.



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](http://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 AquilMod model run by BGS.

Supporting documentation is available from the Outlooks website:

<https://hydoutuk.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 UK 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 UK Hydrological Outlook Partnership excludes all warranties or representations (express or implied) in respect of the Content.

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The UK Hydrological Outlook is supported by the Natural Environment Research Council funded NC-UK (NE/Y006208/1) and [Hydro-JULES](#) (NE/S017380/1) 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. Dynamic access to many of the outputs of the UK Hydrological Portal are available on the [UK Hydrological Outlooks Portal](#).

## Contact:

UK Hydrological Outlooks, UK Centre for Ecology & Hydrology, Wallingford, Oxfordshire, OX10 8BB  
 t: 01491 838800 e: <https://hydoutuk.net/contact>

## Reference for the UK Hydrological Outlook:

UK Hydrological Outlook, 10 September 2024, UK Centre for Ecology & Hydrology, Oxfordshire UK, Online, <https://www.hydoutuk.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/>

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/>

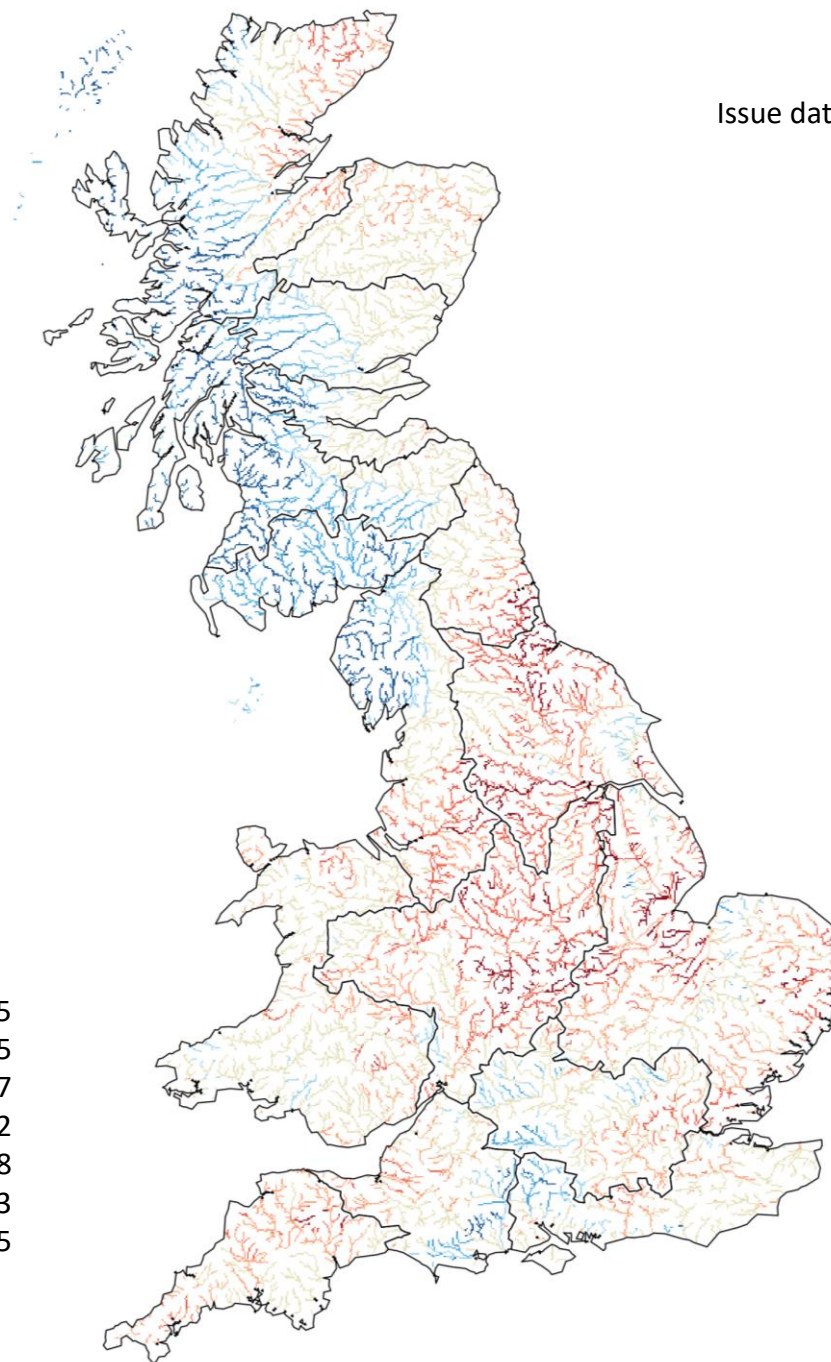
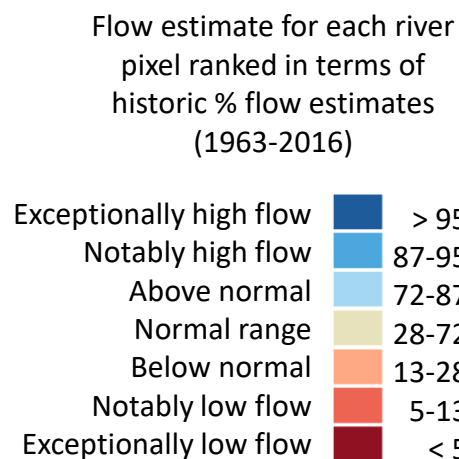
## August's mean river flows simulated by the Grid-to-Grid hydrological model

Issue date: 03.09.2024

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.



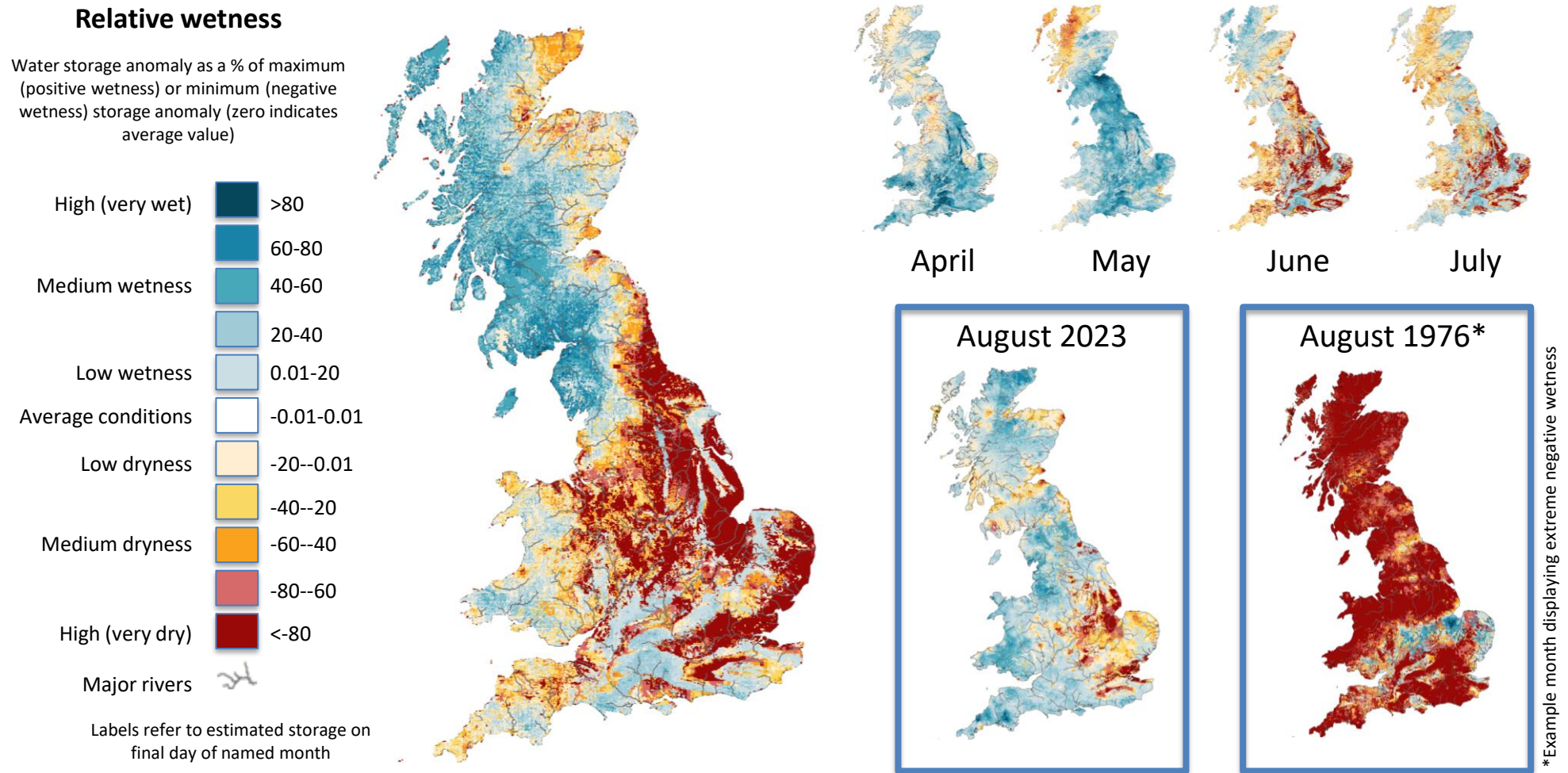
# Current Daily Simulated Subsurface Water Storage Conditions

Based on subsurface water storage estimated for 31 August 2024

Issue date: 03.09.2024

These maps are based on Grid-to-Grid (G2G) hydrological model simulated subsurface water storage (water in the soil and groundwater), expressed as an anomaly from the historical monthly mean. To highlight areas that are particularly wet or dry, the storage anomaly is presented relative to historical extremes. Rainfall in WET areas with high positive relative wetness could result in flooding in the coming days/weeks. Areas of negative relative wetness indicate locations which are particularly DRY, and little or no rain in these areas could potentially lead to (or prolong) a drought. Maps of soil moisture only are available on the next page.

**SUMMARY:** Subsurface water storage is low across most of eastern and southern England, except some deeper stores which are slightly wetter than average. Scotland, particularly the west coast, has generally wetter than average conditions.



# Current Daily Simulated Soil Moisture Conditions

Based on soil moisture estimated for 31 August 2024

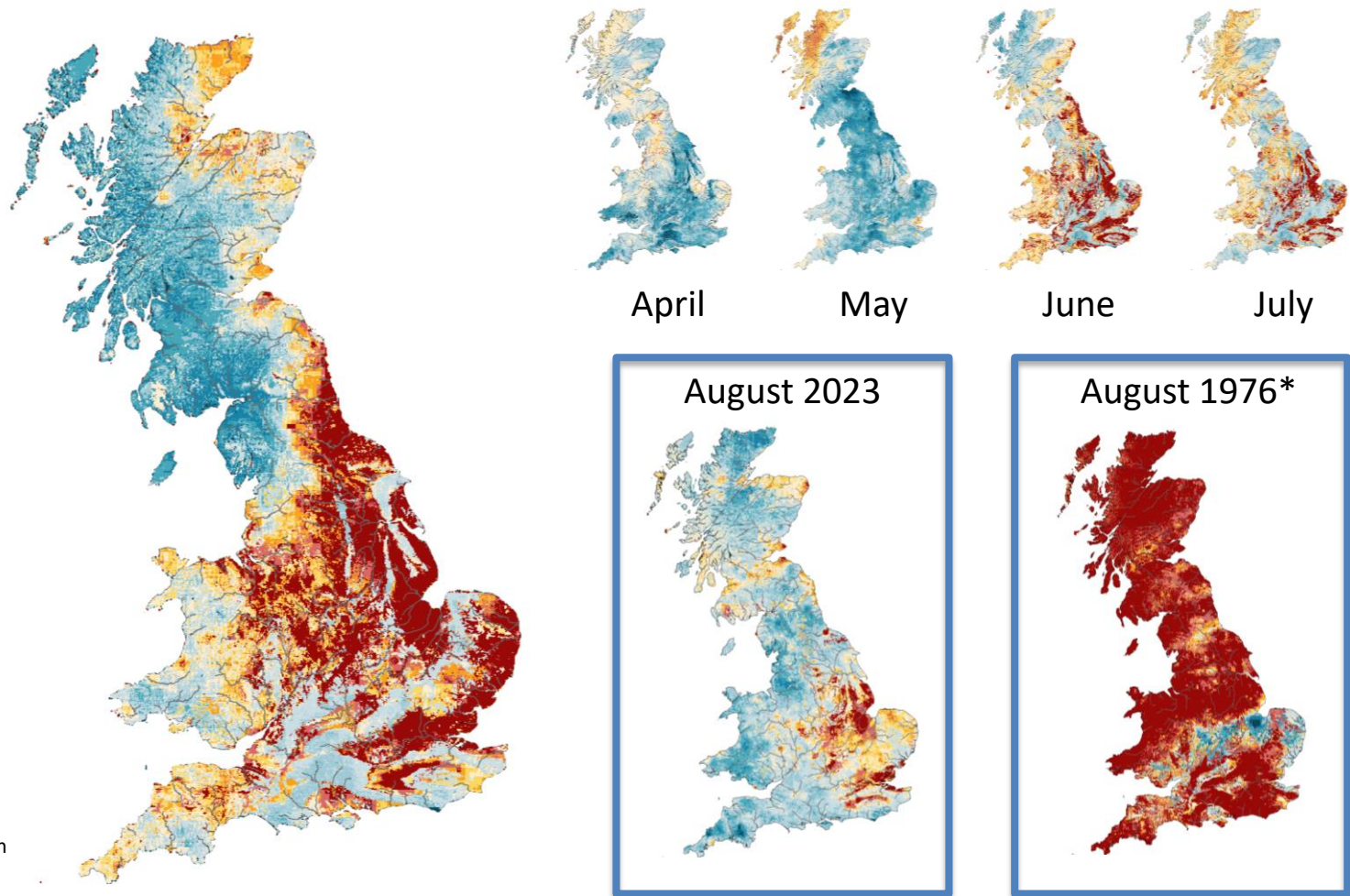
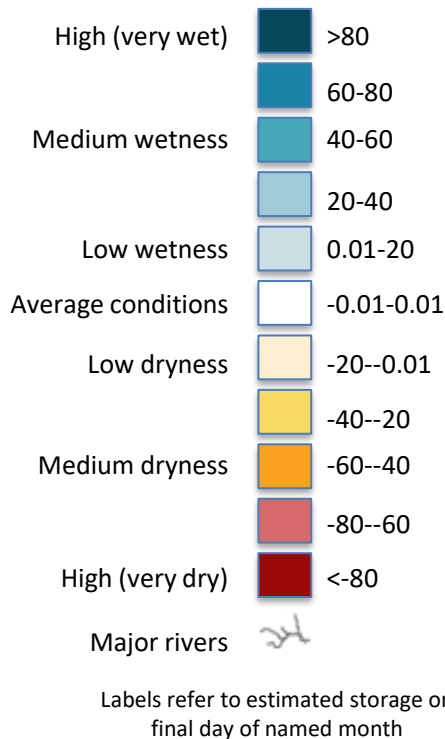
Issue date: 03.09.2024

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 relative to historical extremes. These maps are not a forecast; rather an indication of current conditions. 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 water stores are low across most of eastern and southern England, except some deeper stores which are slightly wetter than average. Scotland, particularly the west coast, has generally wetter than average conditions.

## Relative wetness

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



\*Example month displaying extreme negative wetness

September 2024

CURRENT CONDITIONS

# Estimate of Additional Rainfall Required to Overcome Dry Conditions

Based on subsurface water storage estimated for 31 August 2024

Issue date: 03.09.2024

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 in red/pink.

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

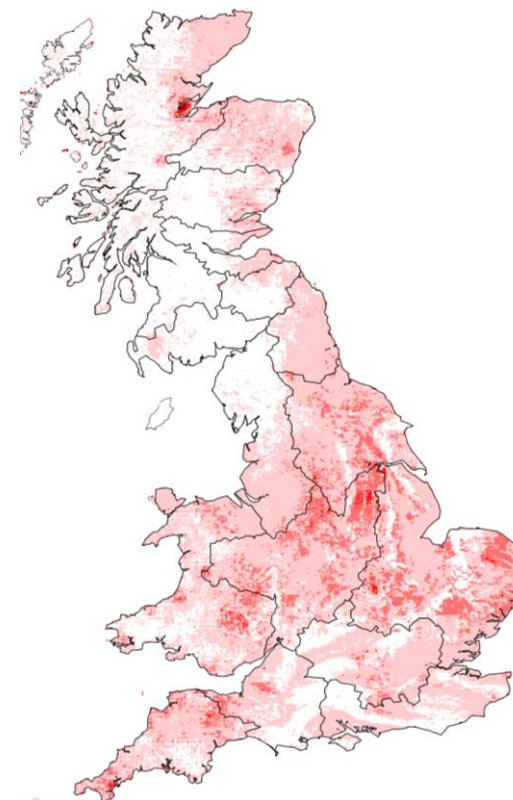
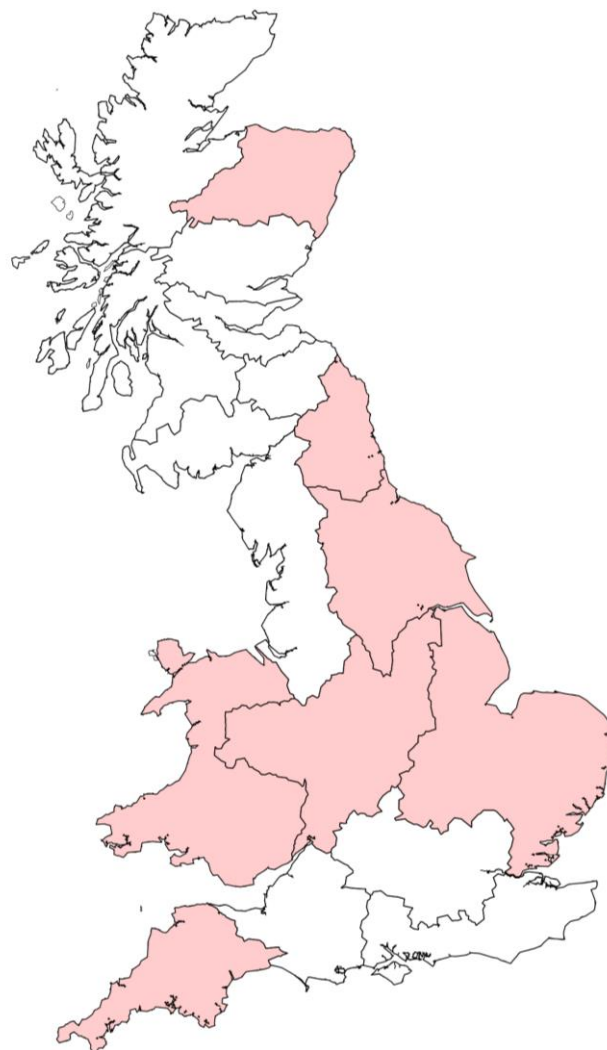
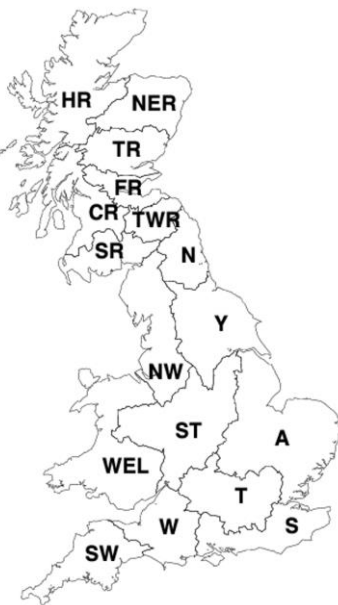
- 0 HR Highlands Region
- 0 NER North East Region
- 0 TR Tay Region
- 0 FR Forth Region
- 0 CR Clyde Region
- 0 TWR Tweed Region
- 0 SR Solway Region

### ENGLAND

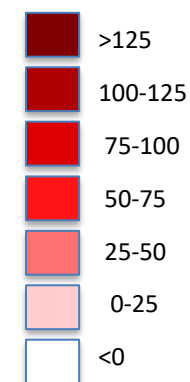
- 7 N Northumbria
- 0 NW North West
- 11 Y Yorkshire
- 14 ST Severn Trent
- 10 A Anglian
- 0 T Thames
- 0 W Wessex
- 0 S Southern
- 9 SW South West

### WALES

- 3 WEL Welsh



Water storage deficit (anomaly; mm)



# Return Period of Rainfall Required to Overcome Dry Conditions

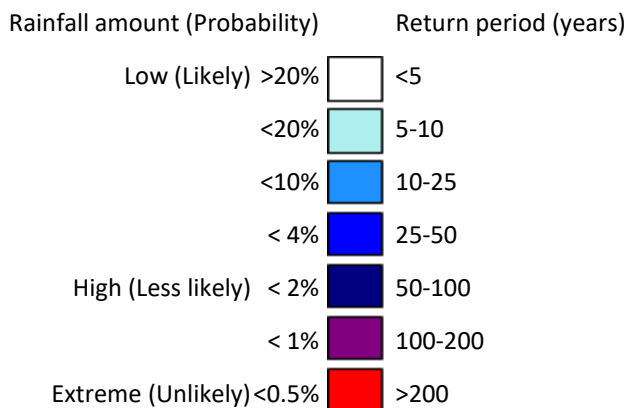
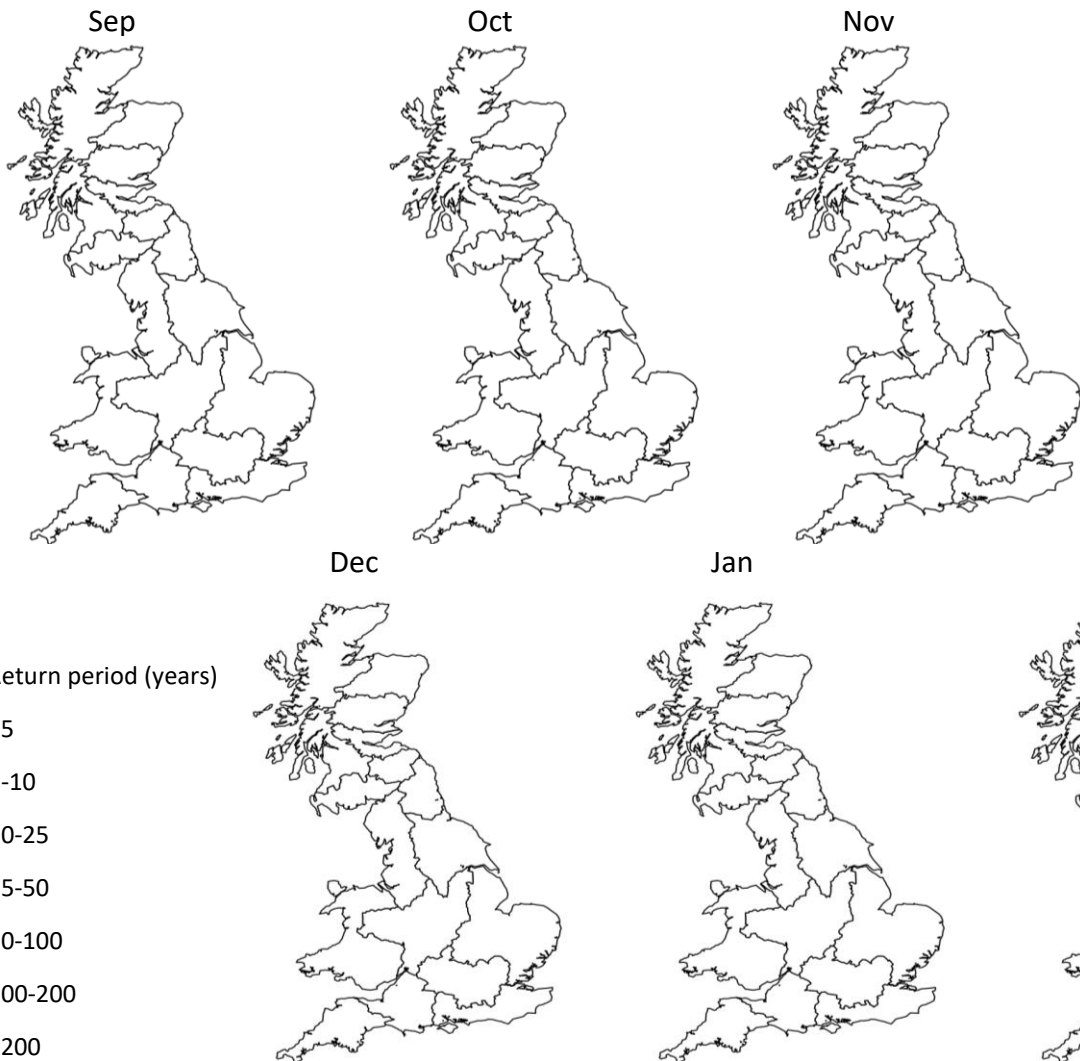
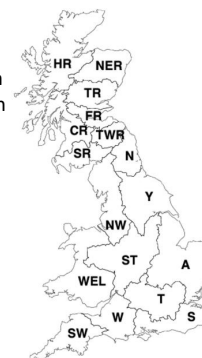
Period: September 2024 - February 2025

Issue date: 03.09.2024

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 one to six months (areas with no storage deficit will always be white). These maps do not provide a drought forecast; instead they indicate whether particularly heavy rainfall would be required to return to normal conditions for the time of year.

**SUMMARY:** All regions should return to typical conditions for the time of year with normal rainfall.

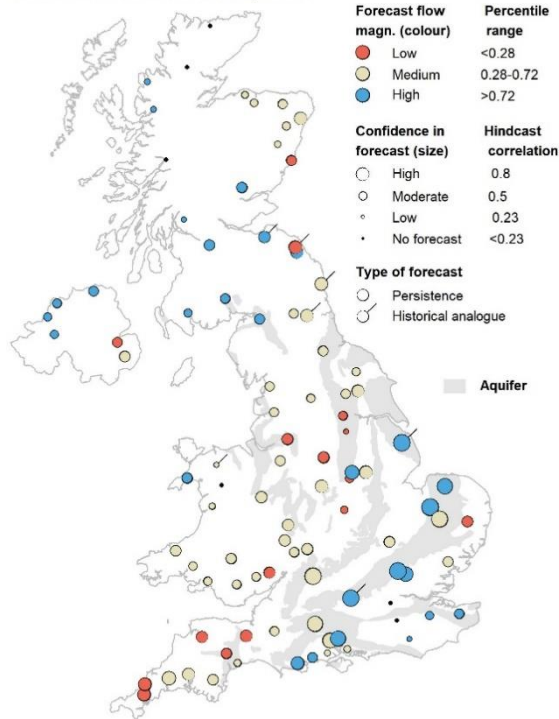
- SCOTLAND**  
 HR Highlands Region  
 NER North East Region  
 TR Tay Region  
 FR Forth Region  
 CR Clyde Region  
 TWR Tweed Region  
 SR Solway Region
- ENGLAND**  
 N Northumbria  
 NW North West  
 Y Yorkshire  
 ST Severn Trent  
 A Anglian  
 T Thames  
 S Southern  
 W Wessex  
 SW South West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



**SUMMARY:**

The September and September – November outlooks are mixed. They both indicate that river flows in south-west England, the Midlands and eastern Scotland are likely to be normal to below normal. Elsewhere, river flows in Northern Ireland, western Scotland and south-east England are likely to be normal to above normal. River flows in Wales are likely to be in the normal range.

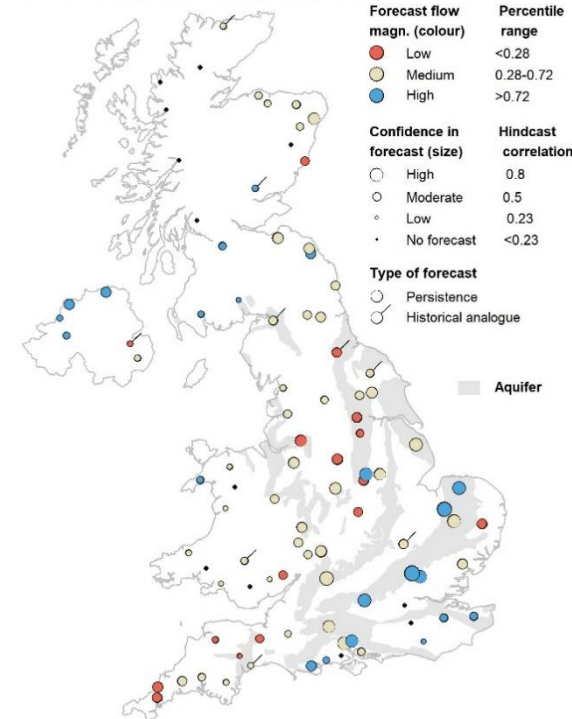
River flow outlook for Sep 2024



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 Sep - Nov 2024



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.

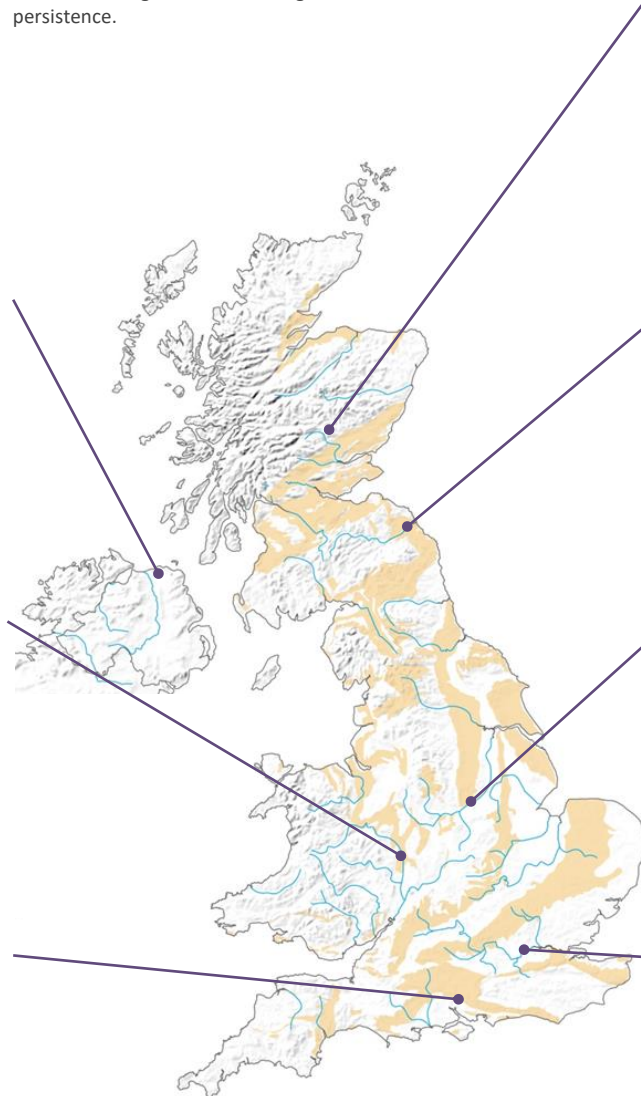
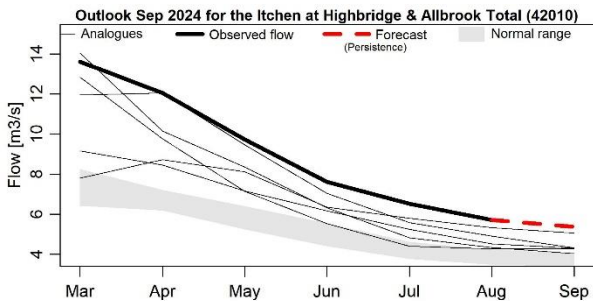
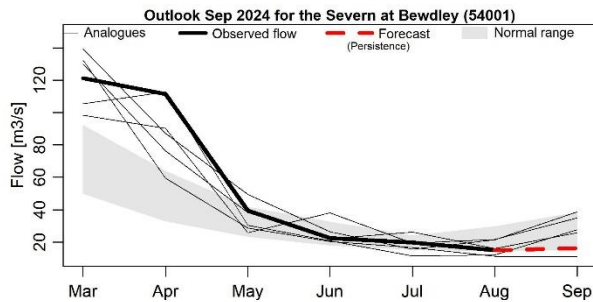
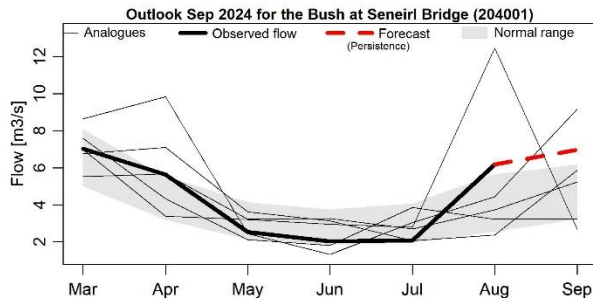


Period: September 2024

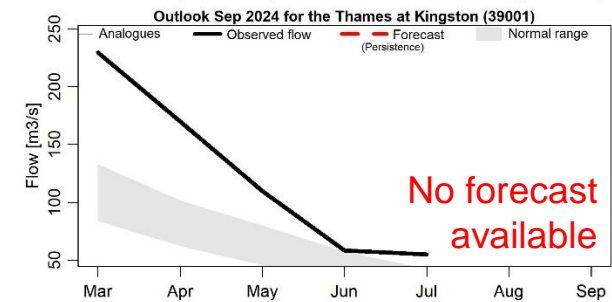
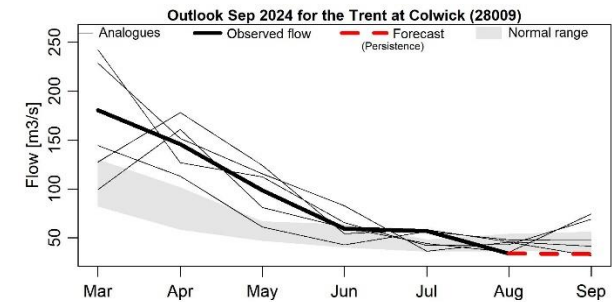
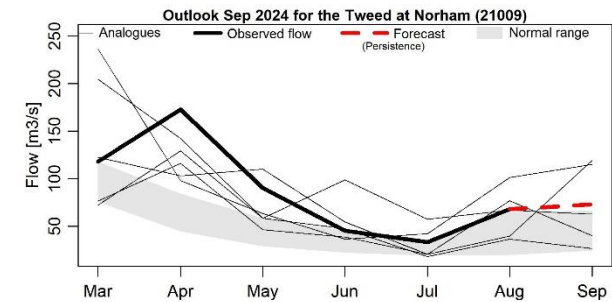
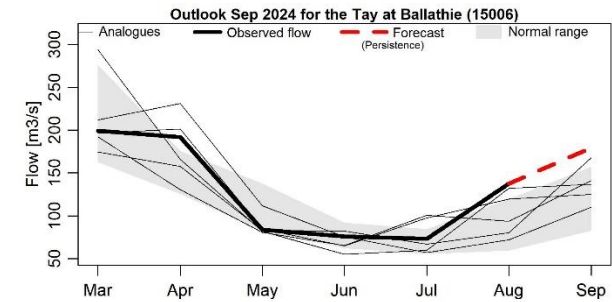
These figures provide insight into the hydrological analogue methodology for a set of sites from across the UK.

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.



Issued on 09.09.2024 using data to the end of August 2024



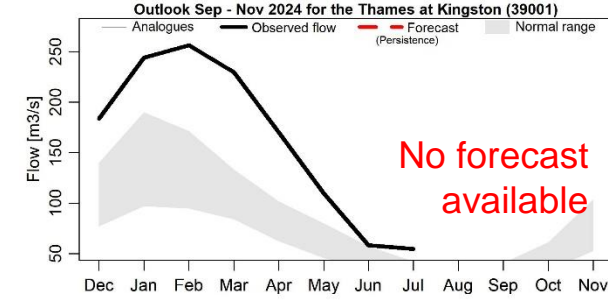
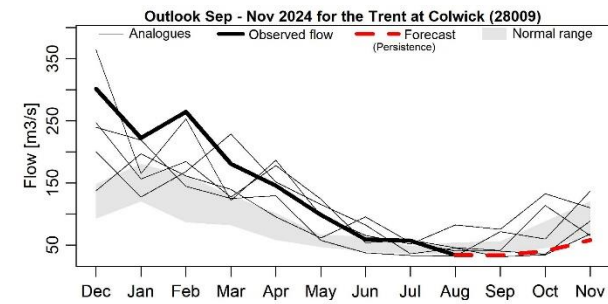
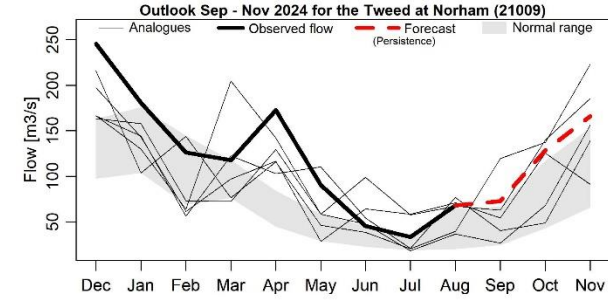
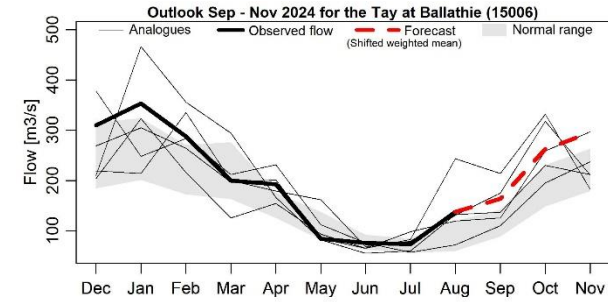
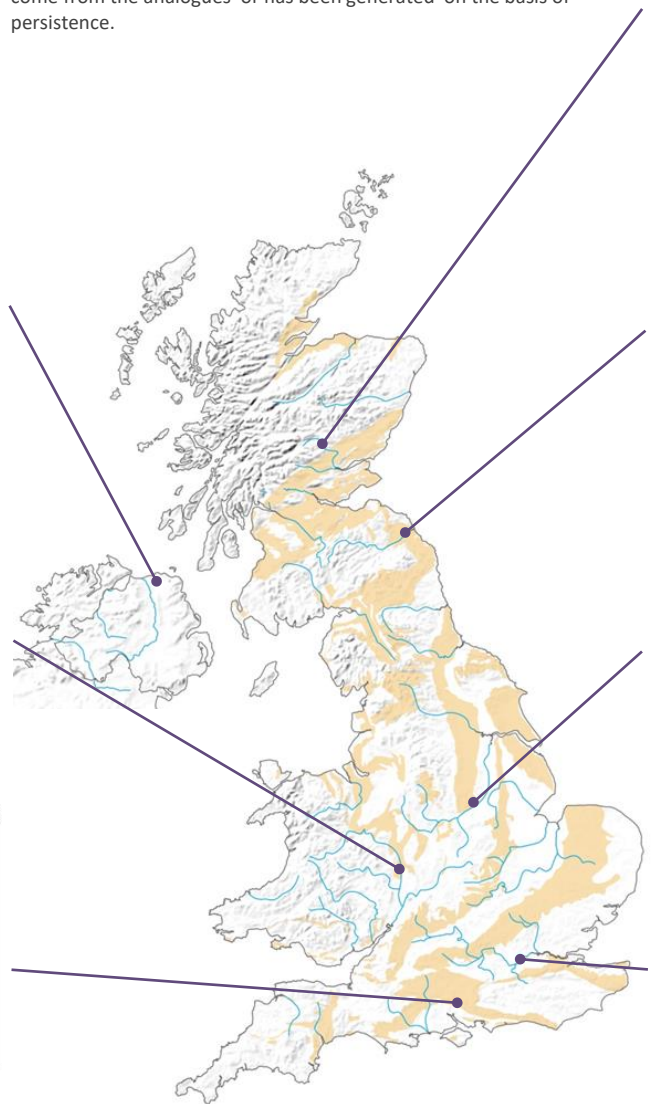
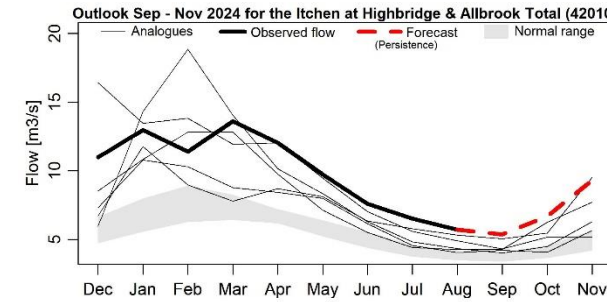
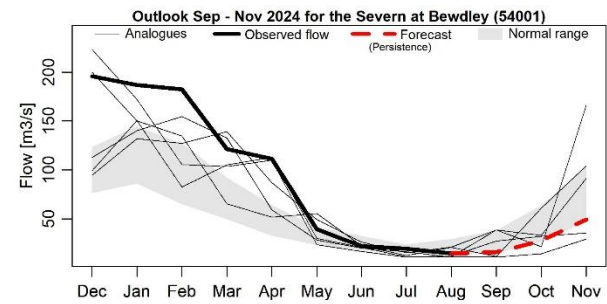
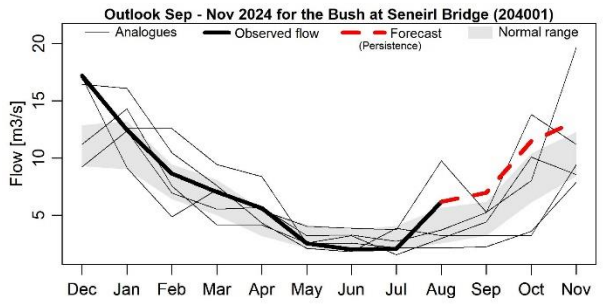
Period: September 2024 – November 2024

Issued on 09.09.2024 using data to the end of August 2024

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: September 2024 – February 2025

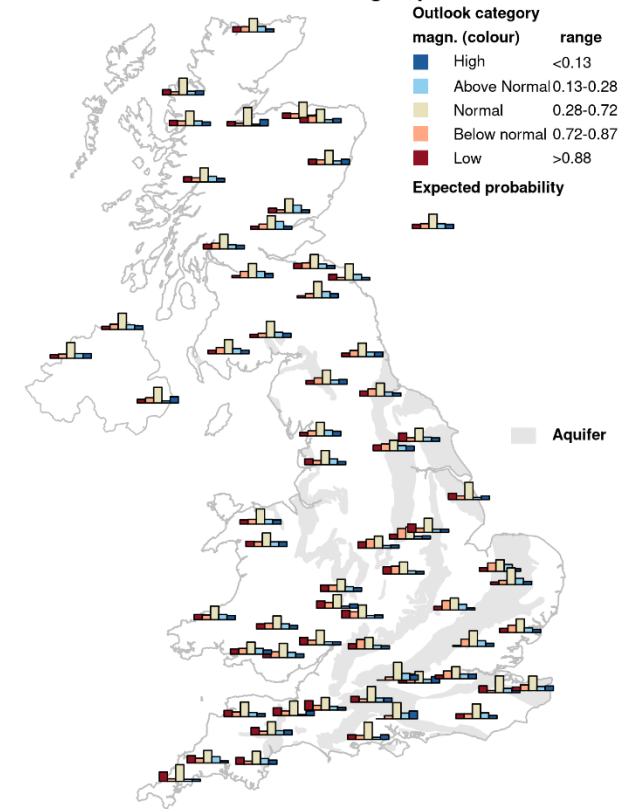
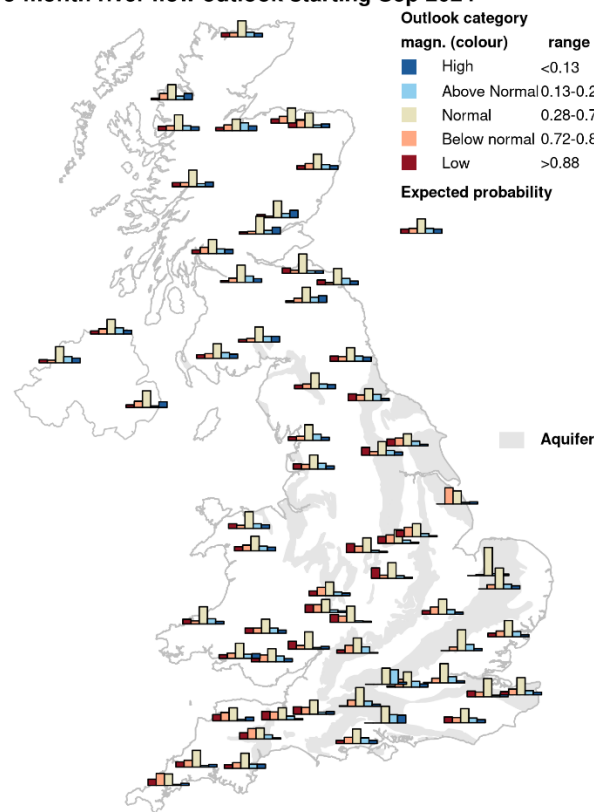
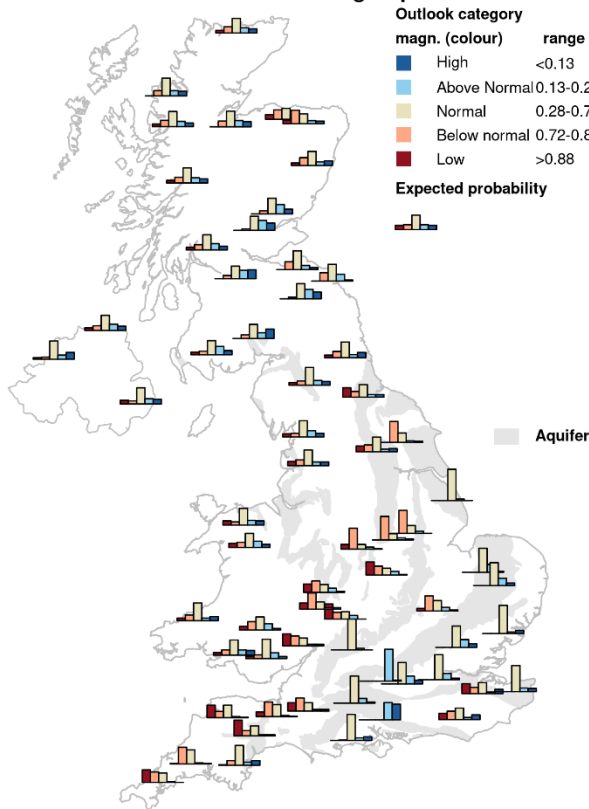
Issued on 03.09.2024 using data to the end of August 2024

The outlook for September indicates that flows are likely to be normal for most of the UK. River flows at catchments in southwest England and the west Midlands are likely to be normal to below normal and some catchments in central southern England are likely to have above normal to high flows. The September to November outlook shows that this pattern is likely to persist over the coming few months, with flows returning to normal for some catchments in the south.

### 1-month river flow outlook starting Sep 2024

### 3-month river flow outlook starting Sep 2024

### 6-month river flow outlook starting Sep 2024

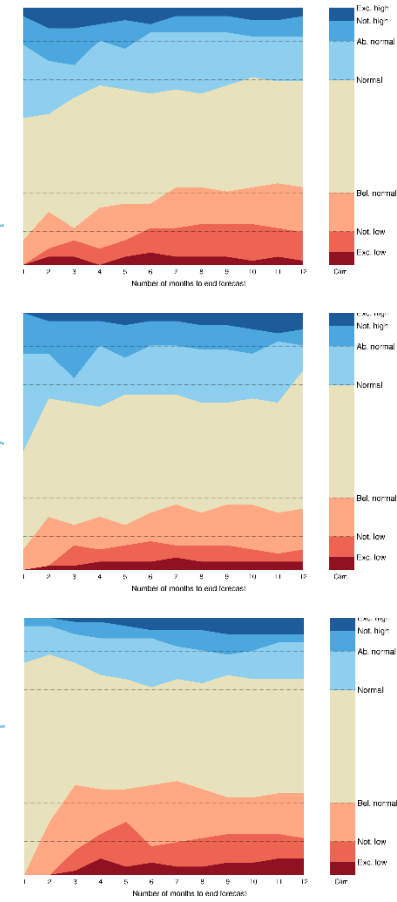
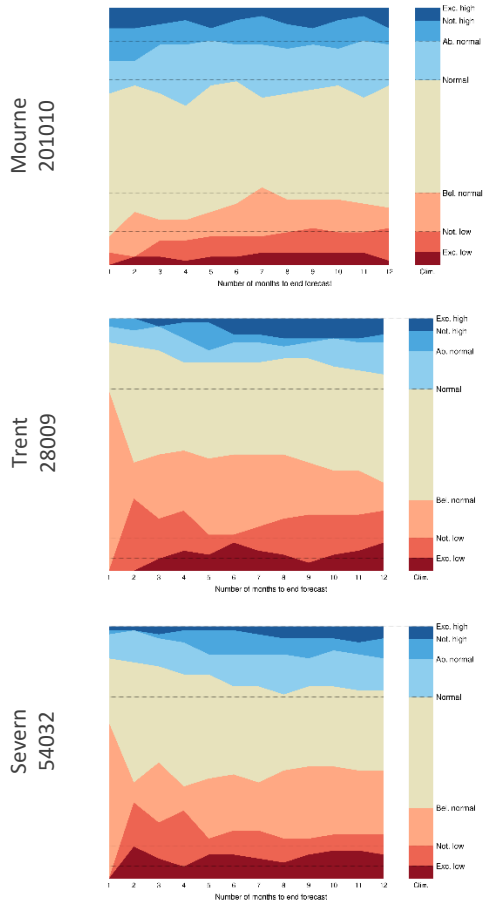


This outlook is based on monthly ensembles of historical sequences of observed climate (rainfall and potential evapotranspiration) that form input to a hydrological model. The outputs are probabilistic simulations of the average river flow over the forecast period (1 to 12 months ahead), at each location. 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).

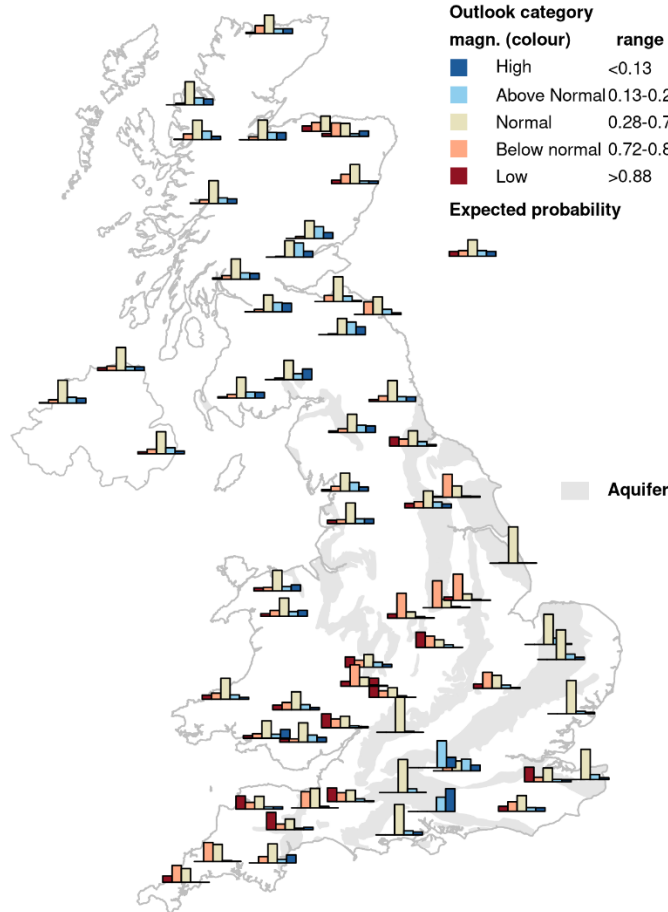
This outlook is based entirely on historical sequences and therefore does not contain any knowledge of the state of the atmosphere and ocean. It is hence possible that some of the historical sequences used might be inconsistent with current large-scale atmospheric conditions and would therefore be unlikely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

The outlook for September indicates that flows are likely to be normal across most of the UK. River flows at some catchments in southwest England and the west Midlands are likely to be below normal and some catchments in central southern England are likely to be above normal. The September-November outlook indicates a slight shift towards more normal to above normal flows across the UK.

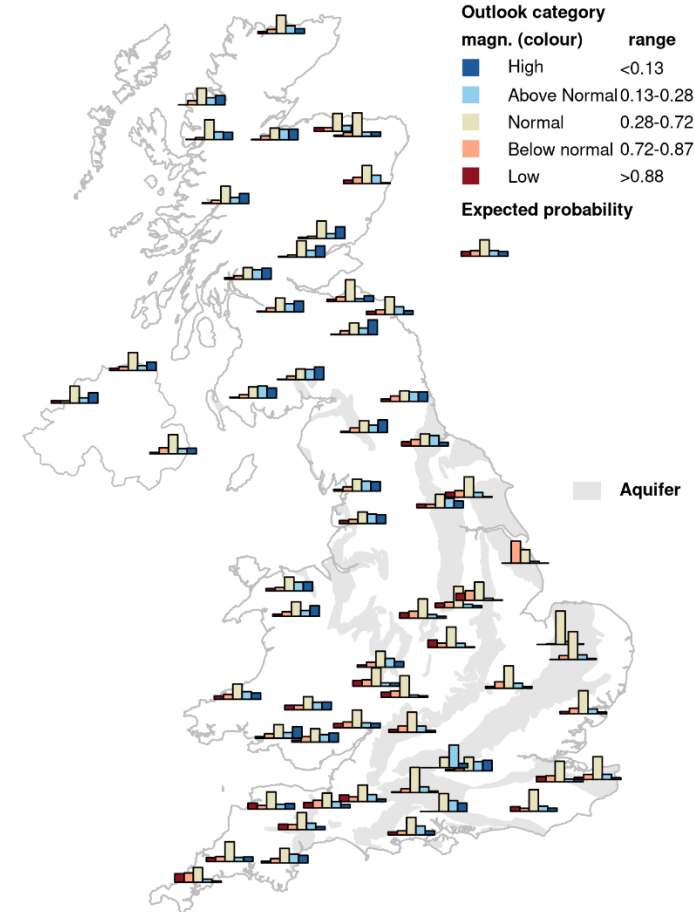
The historical weather analogues method uses Met Office predictions of average weather 1 and 3 months ahead to provide inputs to a hydrological model. Like the ESP method, observed rainfall and temperature data from past years are used to drive the predictions, however, the analogue method constrains the selection of past rainfall using the weather conditions in the meteorological forecasts (which are summarised for this forecast in the Met Office likelihood of impacts blocks underneath the maps). For each member of the Met Office forecast ensemble, the 10 analogues that best match the predicted average weather pattern (surface pressure map) over the forecast period are selected. Precipitation and temperature sequences constructed from the selected analogue scenarios are corrected to account for historic trends and used as inputs to hydrological models. Here, the GR6J model is run using these inputs, creating an ensemble of hydrological forecasts.

The outputs shown in the maps are the likelihoods of different outcomes for the average river flow over the one-month and three-month forecast periods at each location. The outlooks maps show the distribution for 64 catchments across the United Kingdom. Each bar plot represents the likelihood 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. The expected climatological probability of ensemble members in each of these categories is shown under the legend.

## 1-month river flow outlook starting Sep 2024



## 3-month river flow outlook starting Sep 2024



### Met Office 1-month likelihood of precipitation impact



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### Met Office 3-month likelihood of precipitation impact

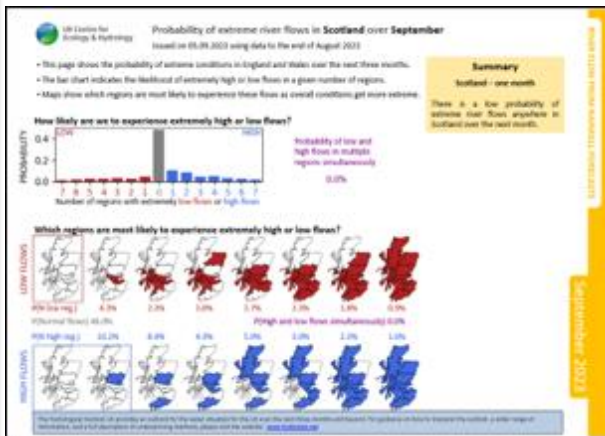


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## Forecasts of river flows using Met Office rainfall forecasts

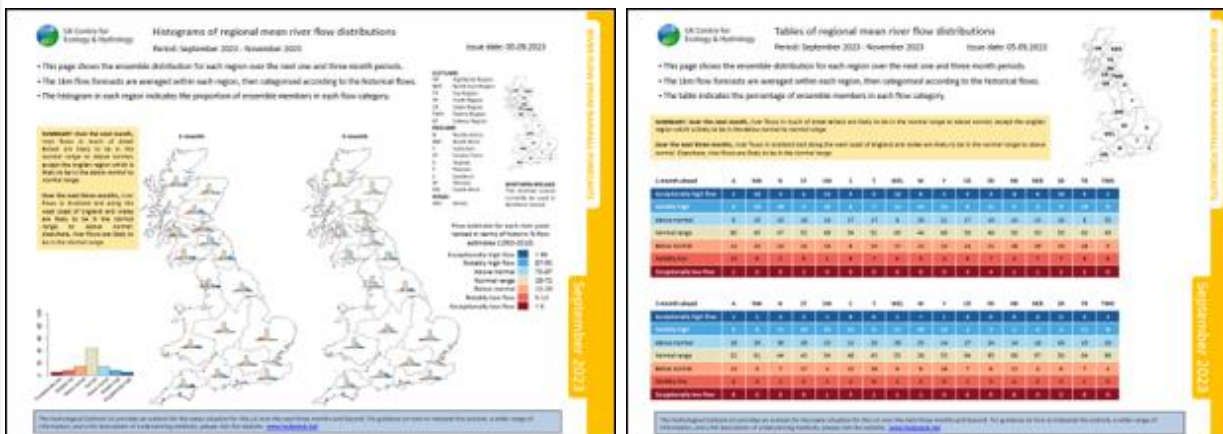
- These (yellow edged) pages summarise river flow forecasts produced by the UKCEH Water Balance Model.
- This model uses an ensemble of rainfall forecasts provided by the Met Office and a hydrological model to forecast river flows for the next one- and three-months ahead.
- A detailed description of these forecast products can be found on the final page, and a full technical description is given in the documentation available via the Hydrological Outlook website.
- Additional forecast products are available on the Hydrological Outlook Portal, via the website.

### Probability of extreme river flows



- Use these pages if you are interested in extreme conditions across multiple regions.
- These pages summarise the risk of extremely high or low flows being observed across GB.
- The four pages show the risk for **Scotland** and for **England & Wales** over the next one and three months.
- The slides indicate the **probability of widespread extreme conditions** and which regions are most likely to experience extremely high or low flows.

### Regional mean river flow distributions



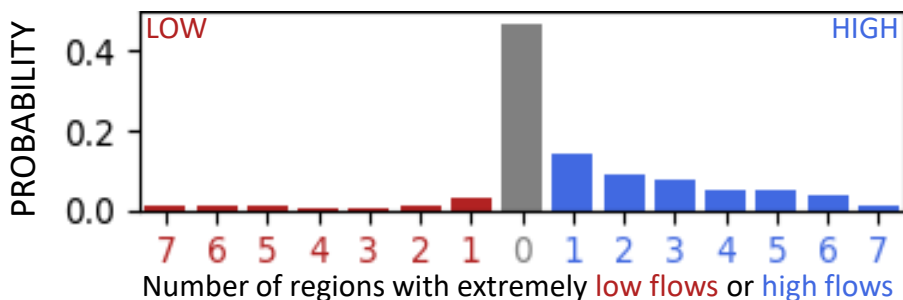
This page shows the **probability of extreme conditions in Scotland** over the next month. The bar chart indicates the likelihood of extremely high or low flows in a given number of regions. Maps show which regions are most likely to experience these flows as overall conditions get more extreme.

## Summary

### Scotland – one month

Extreme flows are unlikely to occur in Scotland during September. However, if they occur, high flows are likely to be localised to southern and central eastern Scotland.

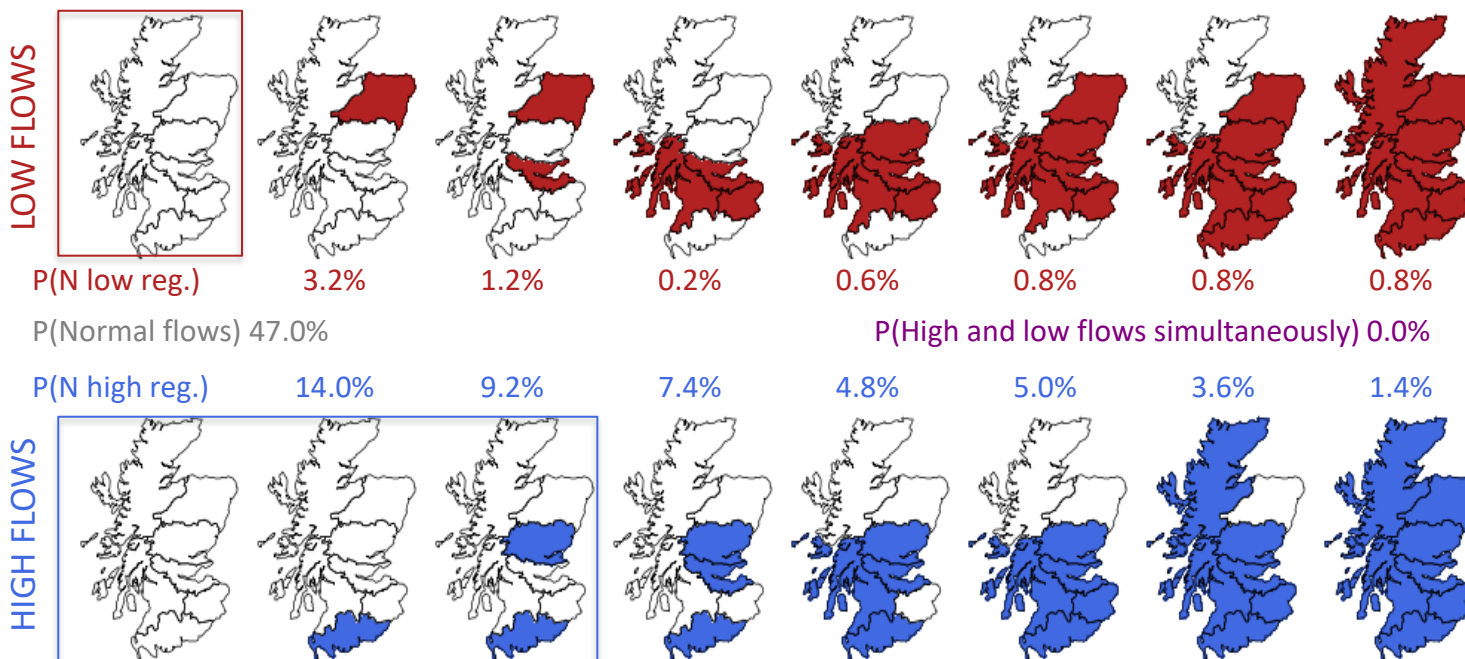
### How likely are we to experience extremely low or high flows?



Probability of low and high flows in multiple regions simultaneously

0.0%

### Which regions are most likely to experience extremely low or high flows?



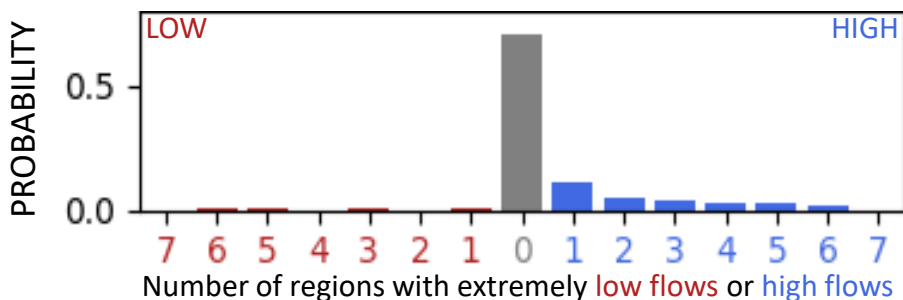
This page shows the **probability of extreme conditions in Scotland** over the next three months. The bar chart indicates the likelihood of extremely high or low flows in a given number of regions. Maps show which regions are most likely to experience these flows as overall conditions get more extreme.

## Summary

### Scotland – three months

Extreme flows are unlikely to occur in Scotland during September to November.

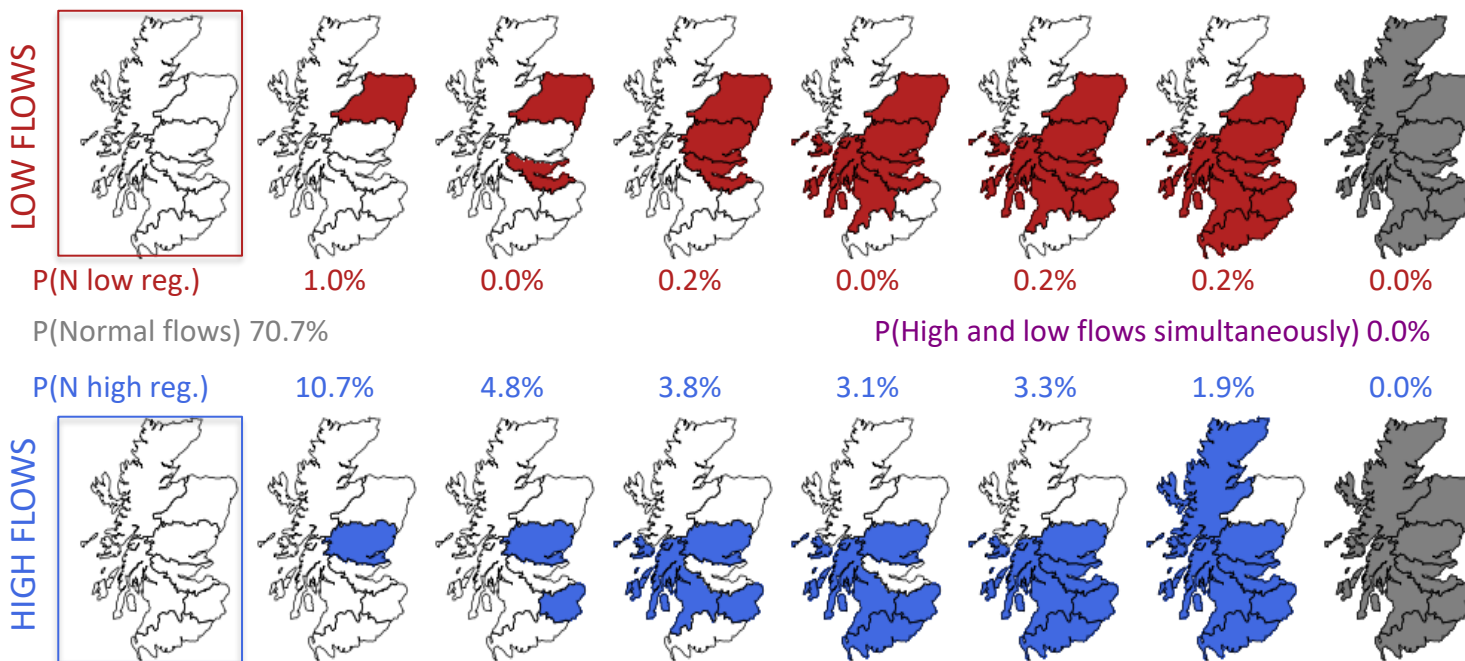
### How likely are we to experience extremely low or high flows?



Probability of low and high flows in multiple regions simultaneously

0.0%

### Which regions are most likely to experience extremely low or high flows?





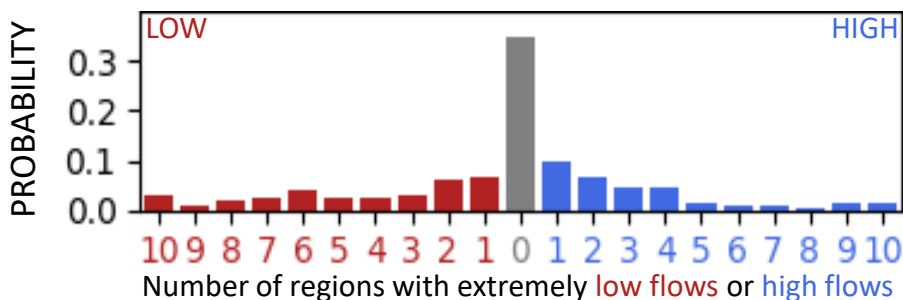
This page shows the **probability of extreme conditions in England and Wales** over the next month. The bar chart indicates the likelihood of extremely high or low flows in a given number of regions. Maps show which regions are most likely to experience these flows as overall conditions get more extreme.

## Summary

### England and Wales – one month

Extreme flows are unlikely to occur in England and Wales during September. However, if they occur, high flows are likely to be in northwest England. Conversely, if extreme low flows occur, they are likely to be eastern England.

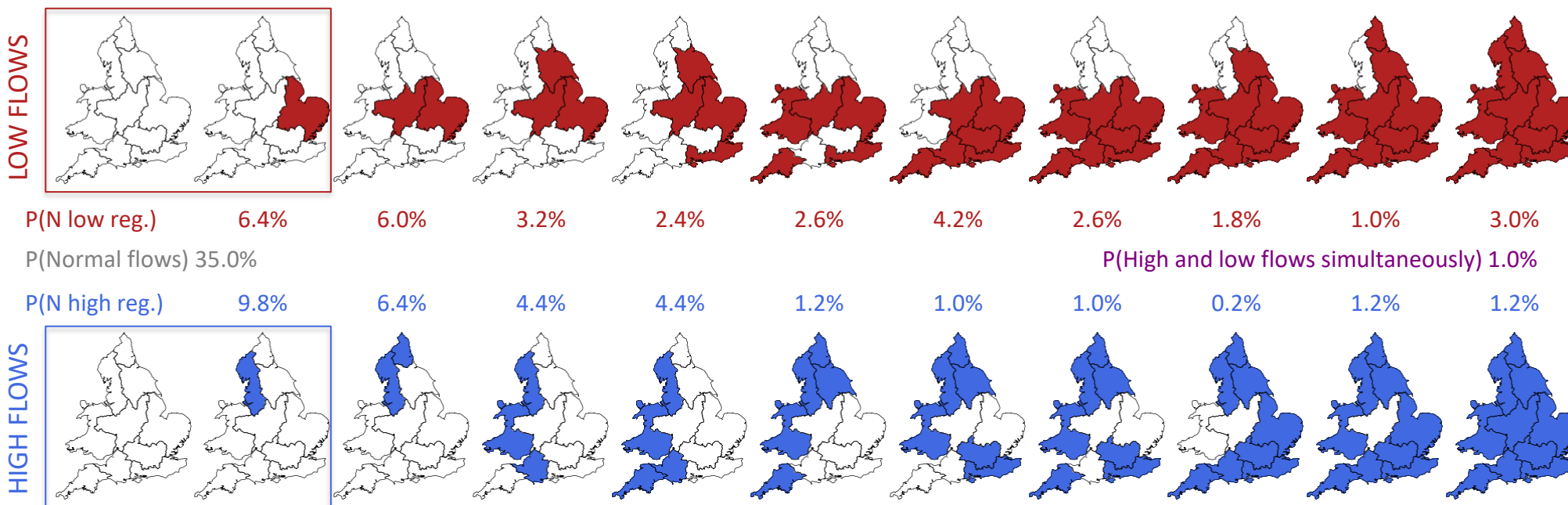
## How likely are we to experience extremely low or high flows?



Probability of low and high flows in multiple regions simultaneously

1.0%

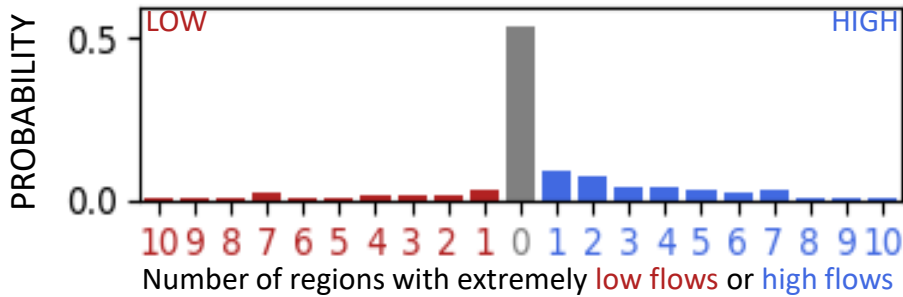
## Which regions are most likely to experience extremely low or high flows?



This page shows the **probability of extreme conditions in England and Wales** over the next three months. The bar chart indicates the likelihood of extremely high or low flows in a given number of regions. Maps show which regions are most likely to experience these flows as overall conditions get more extreme.

**Summary**  
**England and Wales – three months**  
 Extreme flows are unlikely to occur in England and Wales during September to November. However, if they occur, high flows are likely to be in southern England.

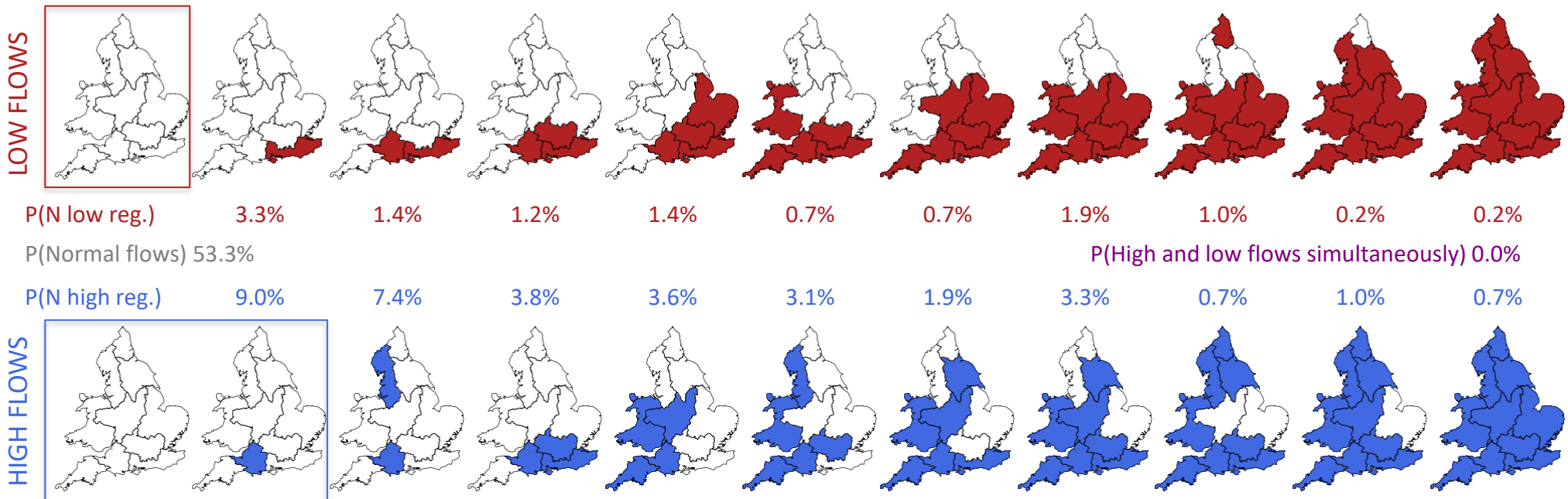
## How likely are we to experience extremely low or high flows?



Probability of low and high flows in multiple regions simultaneously

0.0%

## Which regions are most likely to experience extremely low or high flows?



# Histograms of GB regional mean river flow distributions

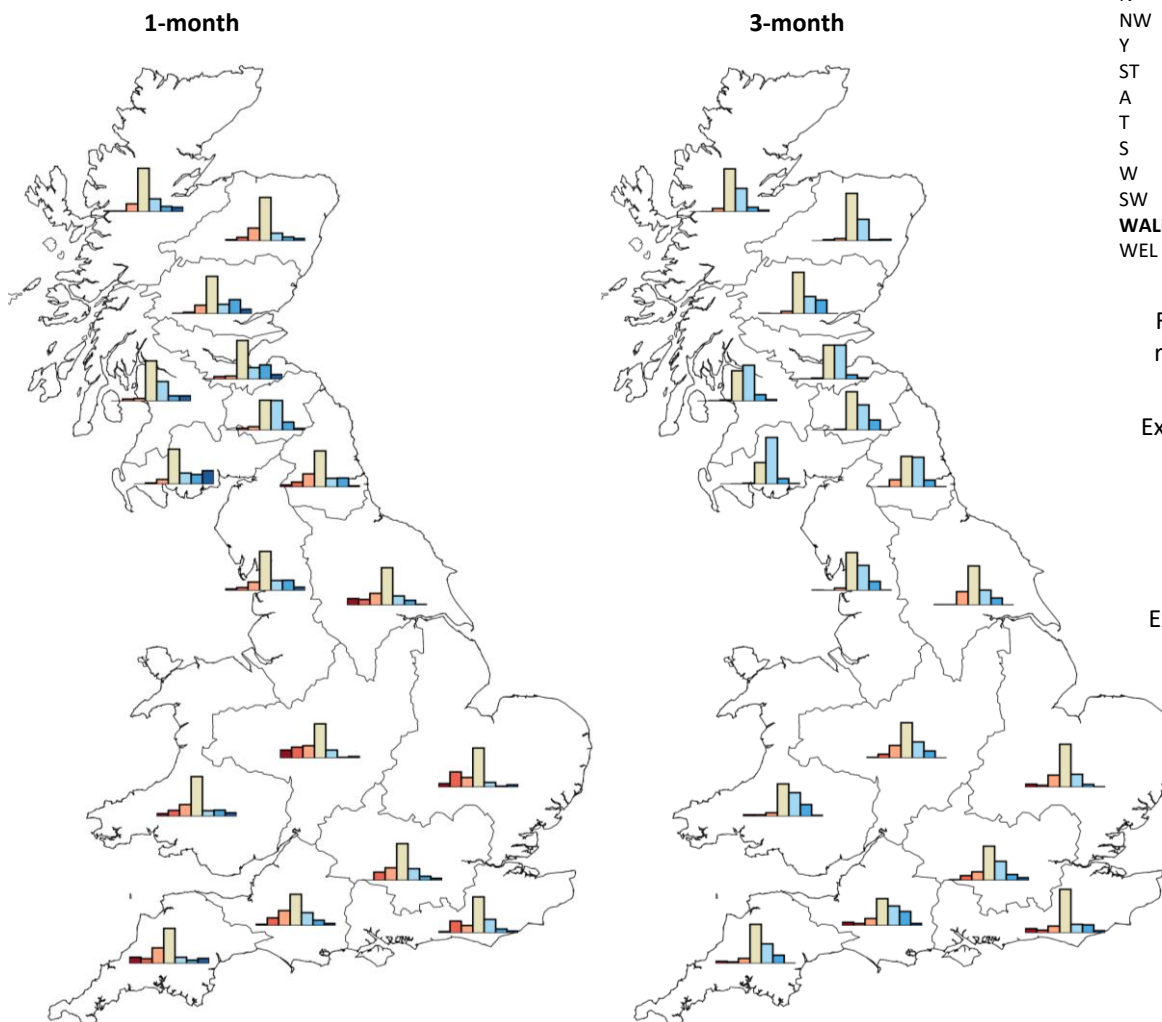
Period: September 2024 - November 2024

Issue date: 03.09.2024

- This page shows the **ensemble flow distribution for each region** over the next 1- and 3-month periods.
- The 1km flow forecasts are averaged within each region, then categorised according to the historical flows.
- The histogram in each region indicates the proportion of ensemble members in each flow category.

**SUMMARY:** Over the next month, river flows are likely to be in the *normal range* over most of Great Britain, with flows in southern Scotland likely to be in the *normal range* to *above normal*.

Over the next three months, river flows are likely to be in the *normal range* to above normal over most of Great Britain.



## SCOTLAND

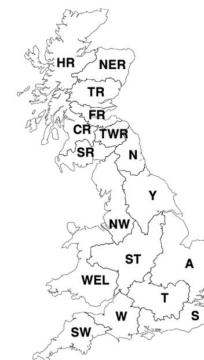
- HR Highlands Region
- NER North East Region
- TR Tay Region
- FR Forth Region
- CR Clyde Region
- TWR Tweed Region
- SR Solway Region

## ENGLAND

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

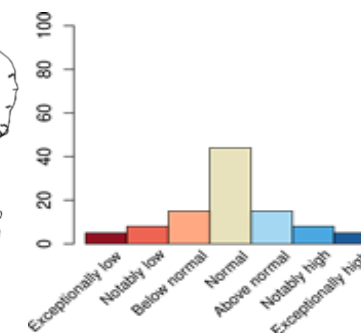
## WALES

- WEL Welsh



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

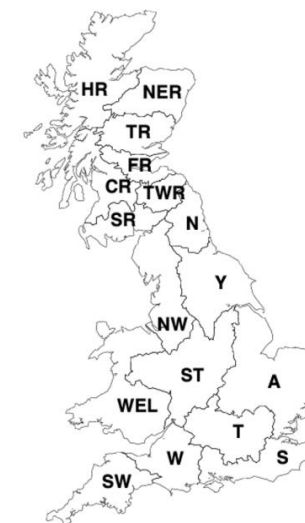
Exceptionally high flow	> 95
Notably high flow	87-95
Above normal	72-87
Normal range	28-72
Below normal	13-28
Notably low flow	5-13
Exceptionally low flow	< 5



# Tables of GB regional mean river flow distributions

Period: September 2024 - November 2024

Issue date: 03.09.2024



- This page shows **the ensemble flow distribution for each region** over the next 1- and 3-month periods.
- The 1km flow forecasts are averaged within each region, then categorised according to the historical flows.
- The table indicates the percentage of ensemble members in each flow category.

**SUMMARY:** Over the next month, river flows are likely to be in the *normal range* over most of Great Britain, with flows in southern Scotland likely to be in the *normal range to above normal*.

Over the next three months river flows are likely to be in the *normal range* to above normal over most of Great Britain.

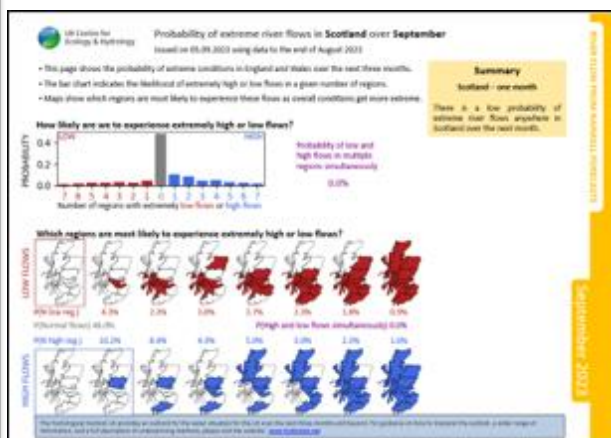
1-month ahead	A	NW	N	ST	SW	S	T	WEL	W	Y	CR	FR	HR	NER	SR	TR	TWR
Exceptionally high flow	3	5	2	2	7	2	3	5	3	1	7	6	6	3	18	6	3
Notably high	1	14	12	1	4	5	6	8	7	6	7	19	7	5	13	18	11
Above normal	6	13	12	11	8	18	15	8	17	12	26	16	17	10	15	12	39
Normal range	51	51	47	45	46	47	48	52	41	49	53	51	57	57	46	49	39
Below normal	13	11	18	16	20	10	17	16	20	15	4	5	11	17	6	11	5
Notably low	20	4	7	14	6	16	11	8	10	7	3	4	1	5	2	2	3
Exceptionally low flow	5	2	3	11	8	2	0	4	2	9	0	0	1	2	0	1	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	1	1	0	0	3	4	1	3	0	2	2	2	2	1	0	1
Notably high	4	12	9	9	11	11	8	16	19	10	9	6	6	2	7	18	14
Above normal	17	33	39	21	26	11	25	31	26	20	47	45	31	29	61	23	33
Normal range	56	50	40	46	51	57	45	43	36	51	40	45	56	62	29	54	51
Below normal	16	3	10	17	7	9	11	5	10	18	2	2	4	3	1	3	1
Notably low	2	0	1	5	2	4	6	2	3	1	0	0	0	2	0	0	0
Exceptionally low flow	4	1	0	1	3	6	1	2	4	0	0	0	0	0	0	0	0

## Forecasts of river flows using Met Office rainfall forecasts

- The data on these (yellow-bordered) pages are based on approximately 400 rainfall scenarios provided by the Met Office, which are used as inputs to a water balance hydrological model.
- River flow forecasts for every 1km grid cell are ranked according to the historical flow estimates and aggregated within each region.
- A full description of this method and these summary products is given in the technical documentation available via the Hydrological Outlook website.

### Probability of extreme river flows



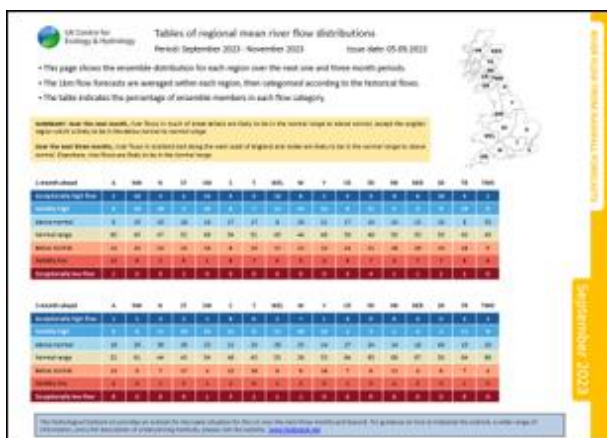
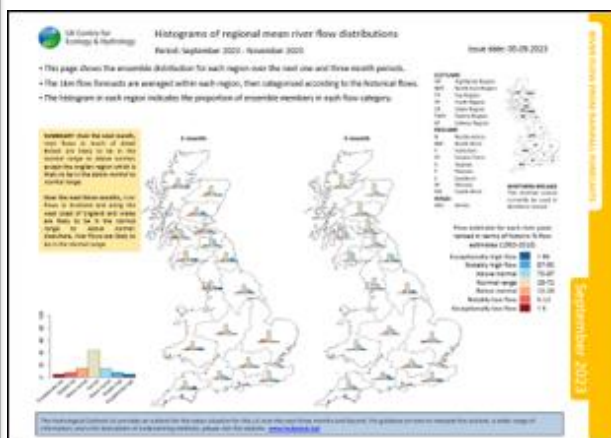
Extreme river flows are defined as those which rank in the lowest or highest 13% of historical flow estimates (1963 - 2016). This definition encompasses the 'Notably' and 'Exceptionally' high/low flow bands used elsewhere in the Outlook.

The bar chart shows the probability of a given number of regions experiencing extremely high/low flows, where scenarios showing both extremely high and extremely low flows in different regions simultaneously excluded. These probabilities are also shown beneath the maps.

Shaded regions on each map are those most likely to experience extreme flows from the set of scenarios with at least a given number of regions experiencing such flows. If shown, grey maps indicate scenarios not observed in the ensemble.

The box drawn around some maps spans the central 50% probability interval, excluding scenarios where extremely high/low flows are observed simultaneously. If these excluded cases constitute a significant probability, details are given in the yellow box.

### Regional mean river flow distributions



The maps illustrate the ensemble distribution of regional mean river flows. The historical distribution is shown at bottom-left, and allows deviations from the normal distribution to be determined by comparing the forecast distribution to the historical distribution. A summary is given in the yellow box.

The table gives access to the data shown in the histograms. The numbers in the tables are the percentage of ensemble forecasts falling in each of the flow categories. As before results are averaged by region then ranked in terms of 54 years of historical regional flow estimates (1963 – 2016).

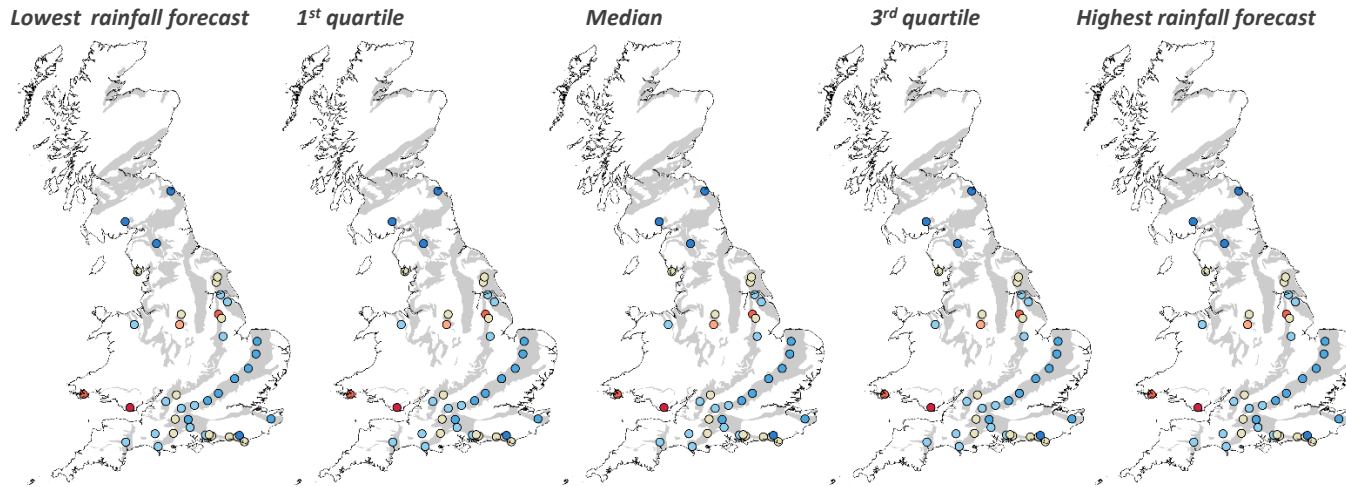
Period: September 2024 – November 2024

Issued on 07.09.2024 using data to the end of August.

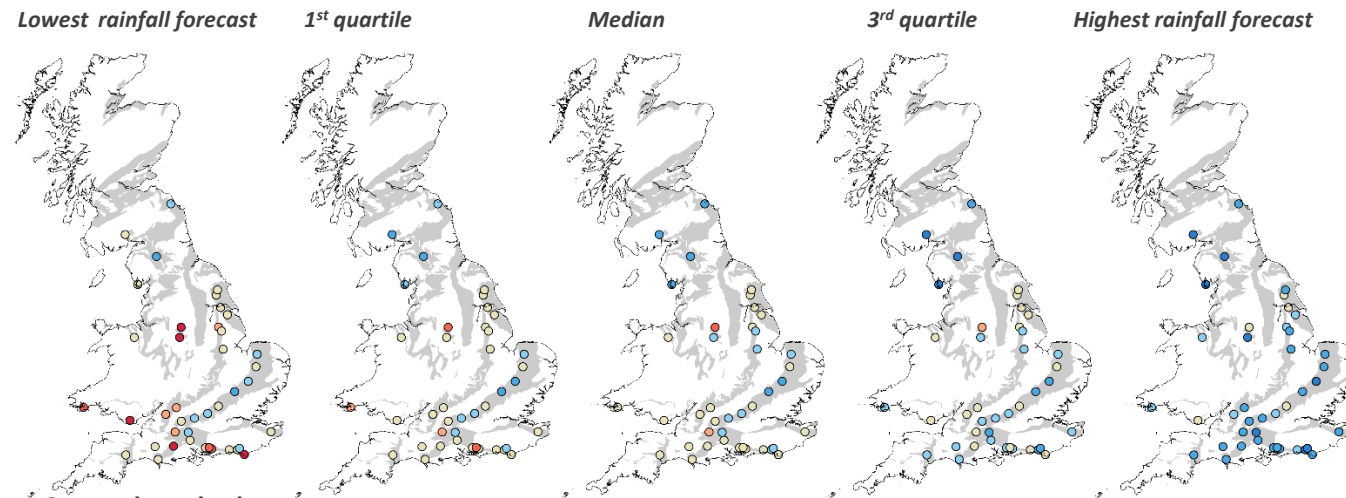
Under median rainfall conditions, groundwater levels over the next month are forecast to remain above normal to notably high across much of the UK. However, in parts of central England and south Wales, below normal to exceptionally low levels for this time of year are forecast. The median 3-month outlook forecasts groundwater levels to transition closer to normal by November. However, groundwater levels in the Permo-Triassic Sandstones and slower responding regions of the Chalk aquifers are expected to remain above normal to notably high.

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.

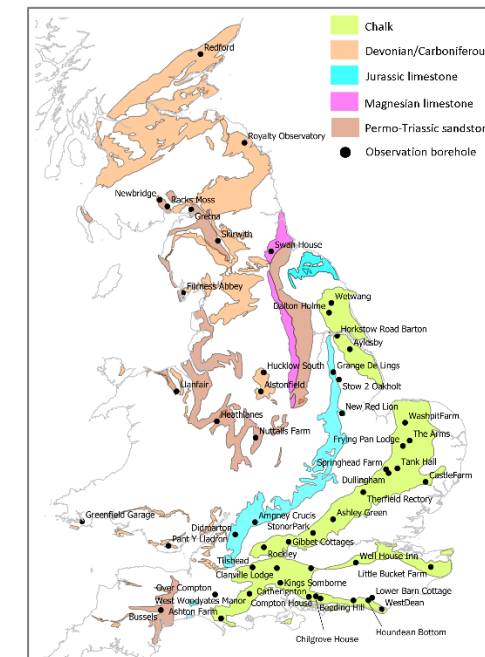


1-month outlook



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
Below normal	12-28
Notably low levels	5-13
Exceptionally low levels	< 5



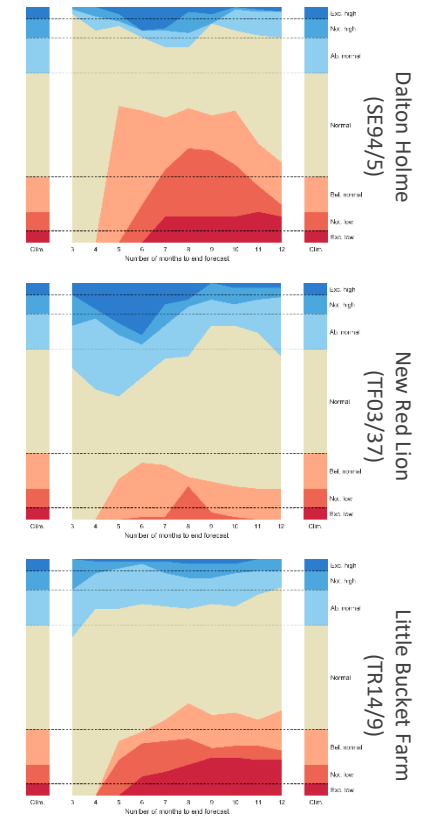
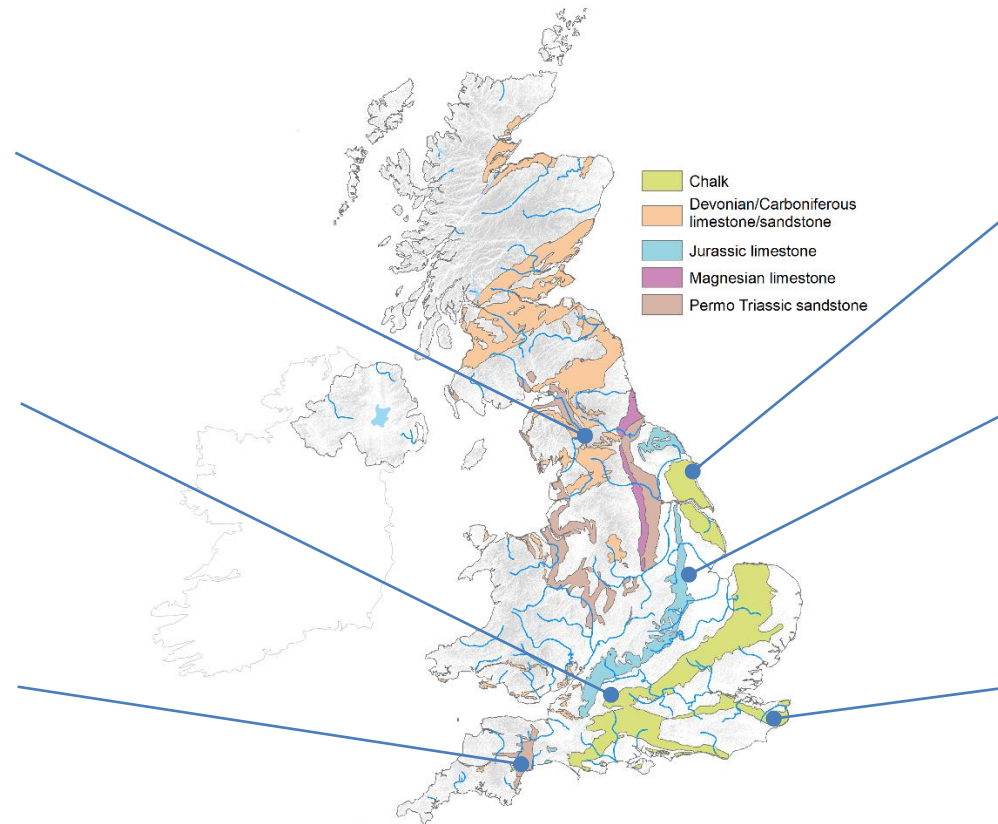
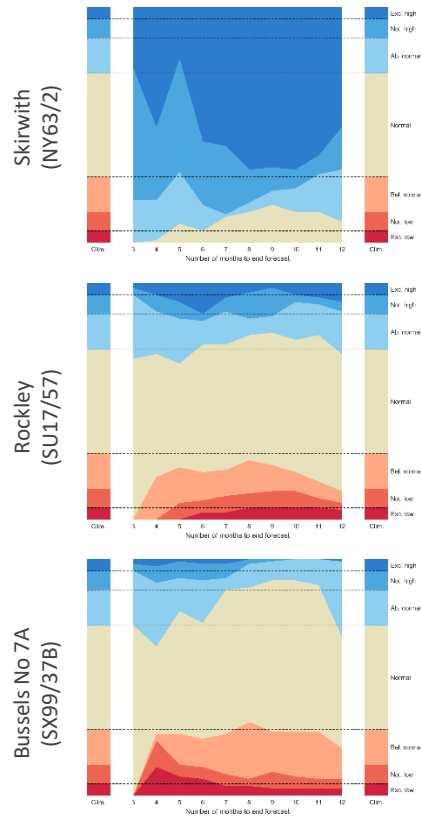
The Hydrological Outlook UK provides an outlook for the water situation for the UK over the next three months and beyond. For guidance on how to interpret the outlook, a wider range of information, and a full description of underpinning methods, please visit the website: [www.hyoutuk.net](http://www.hyoutuk.net)

# Outlook based on modelled groundwater from historical climate

Period: September 2024 – August 2025

Issued on 07.09.2024 using data to the end of August.

Groundwater levels at Skirwith in the Permo-Triassic Sandstones are forecast to remain at exceptionally to notably high levels for the next 12 months. In the Chalk at Dalton Holme, Little Bucket Farm and Rockley, Jurassic Limestones at New Red Lion and the Permo-Triassic Sandstones at Bussels No 7A, groundwater levels are likely to persist or transition to normal conditions are likely to continue over the next 4 months.



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.

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

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.

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.