

SUMMARY The outlook for February is for normal to above normal flows, and normal to exceptionally high groundwater levels to be seen across northern and eastern parts of the UK. Flows in south-western Britain and Northern Ireland are likely to be normal to below normal for February. This pattern is likely to persist for river flows over the next three months, whilst groundwater levels are likely to recess to be normal to above normal, with some normal to below normal exceptions.

Rainfall:

January rainfall was close to normal for the UK, though it was unevenly distributed. Above average rainfall was seen across northern England, northern Wales and north-eastern Scotland, whilst below average rain fell in western Scotland, Northern Ireland, and central and southern England. The forecast (issued by the Met Office on 29.01.2024) shows an increase in the likelihood of a dry February (1.5 times the normal chance), though the likelihood of a wet 3-month period is close to normal.

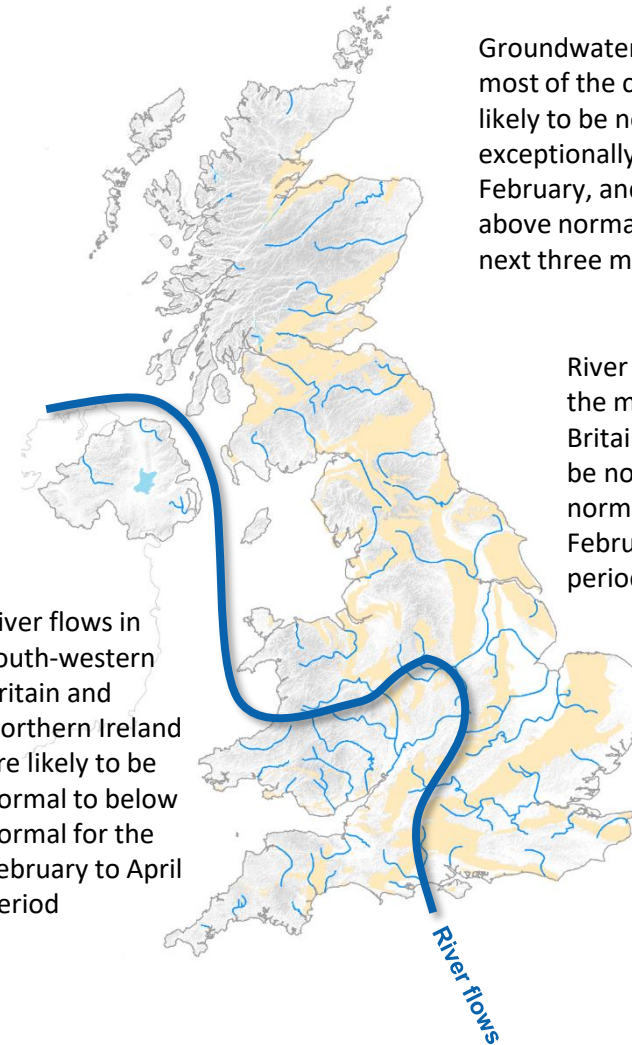
River flows:

River flows in January were generally normal to exceptionally high, with normal flows focussed across western parts of the UK and highest flows across the east and central southern England. These conditions show a reduction from the previous month. The outlook for February and the next three months is for river flows in south-western Britain and Northern Ireland to be normal to below normal. Flows elsewhere across Great Britain are likely to be normal to above normal over the next one-to-three months, with above normal flows most likely in eastern Scotland, north-east England and the chalk-driven catchments of the south downs and East Anglia.

Groundwater:

Groundwater levels in January were also normal to exceptionally high, with record high levels recorded in Brick House Farm and Aylesby in northern England. Normal groundwater levels were recorded in southern England, Scotland and Northern Ireland.

The outlook for February is for normal to exceptionally high groundwater levels to persist, with the possibility of below normal levels in the East Midlands. Over February to April as a whole, groundwater levels are likely to recess to normal to above normal across the UK, with the continuation of normal to below normal levels in the boreholes of the East Midlands.



Groundwater levels for most of the country are likely to be normal to exceptionally high for February, and normal to above normal over the next three months

River flows across the majority of Great Britain are likely to be normal to above normal for the February to April period.

River flows in south-western Britain and Northern Ireland are likely to be normal to below normal for the February to April period

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 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:

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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. 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 April 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:

- i. Environment Agency: <https://flood-warning-information.service.gov.uk/map>
- ii. Natural Resources Wales: <https://flood-warning.naturalresources.wales/>
- iii. 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://nra.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/>

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

Issue date: 05.02.2024

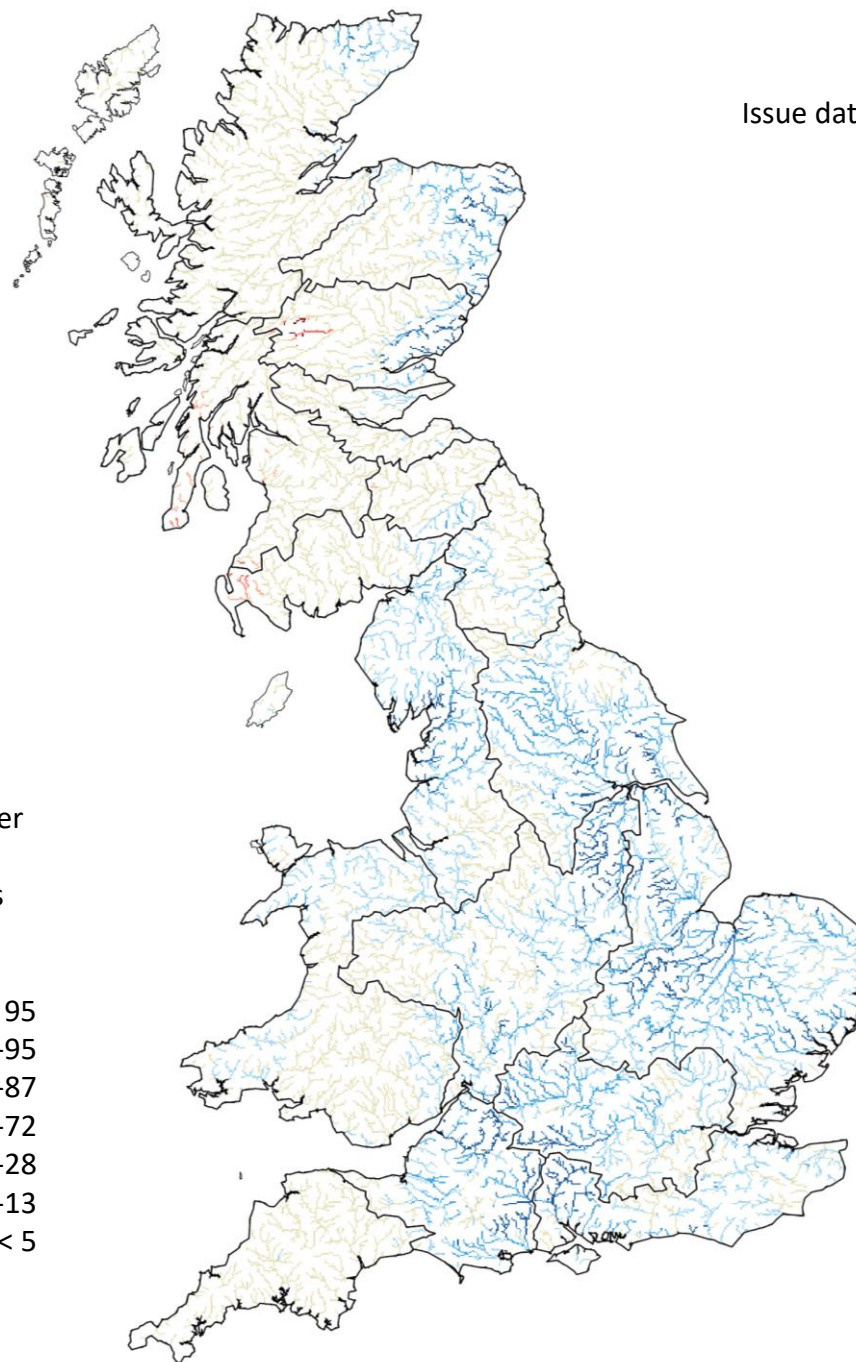
This map shows the simulated monthly mean flow across Great Britain for last month, ranked in terms of 54 years of historical flow estimates (1963 – 2016).

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.

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



Current Daily Simulated Subsurface Water Storage Conditions

Based on subsurface water storage estimated for 31 January 2024

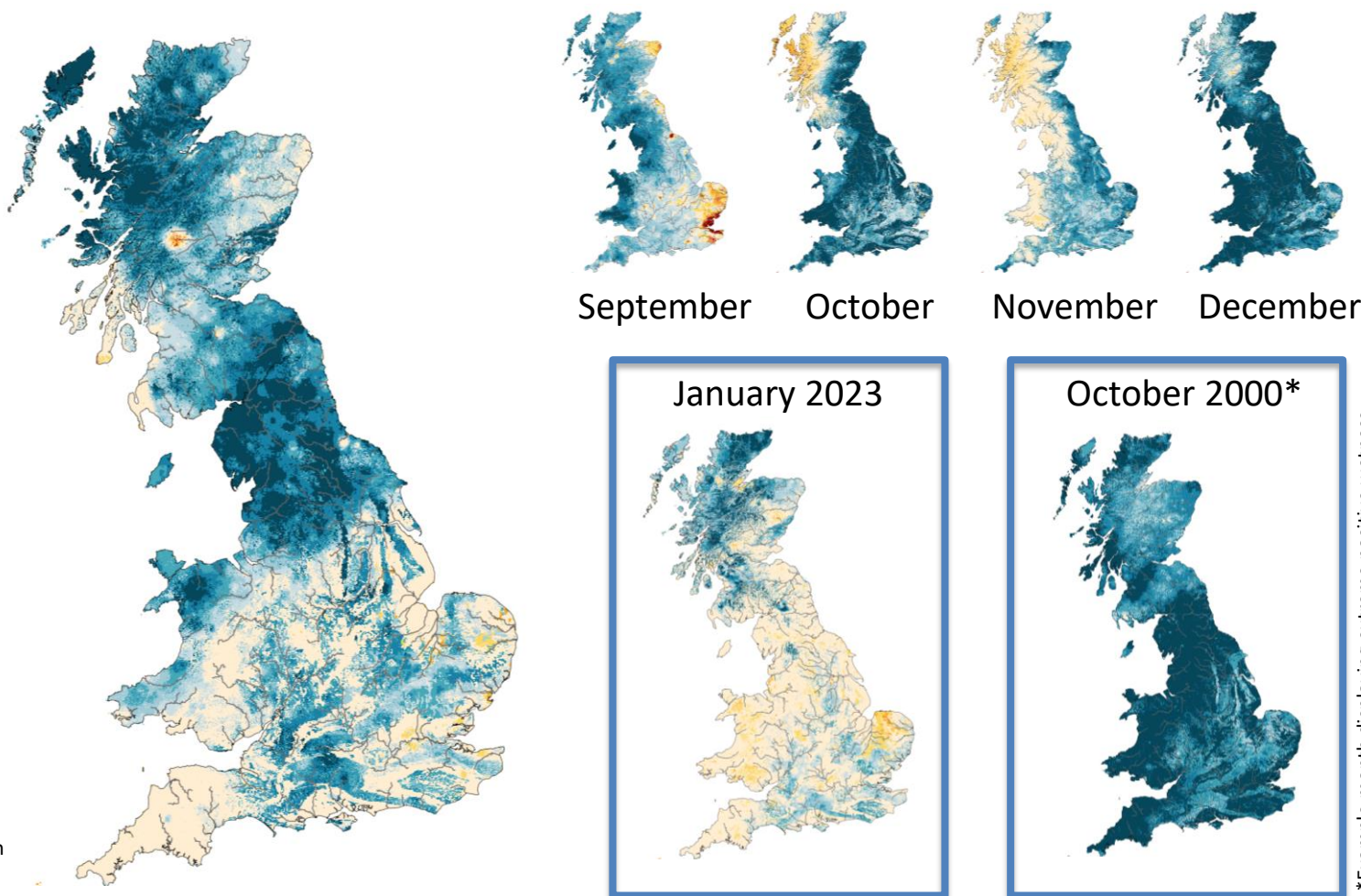
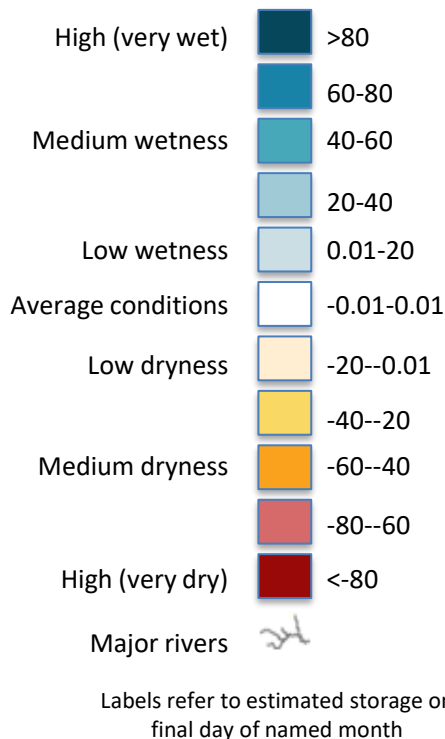
Issue date: 05.02.2024

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 stores remain high (very wet) in the North of England and Scotland. Elsewhere, stores have dropped over January and are now either typical or slightly wetter than usual for the time of year.

Relative wetness

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



February 2024

CURRENT CONDITIONS

Current Daily Simulated Soil Moisture Conditions

Based on soil moisture estimated for 31 January 2024

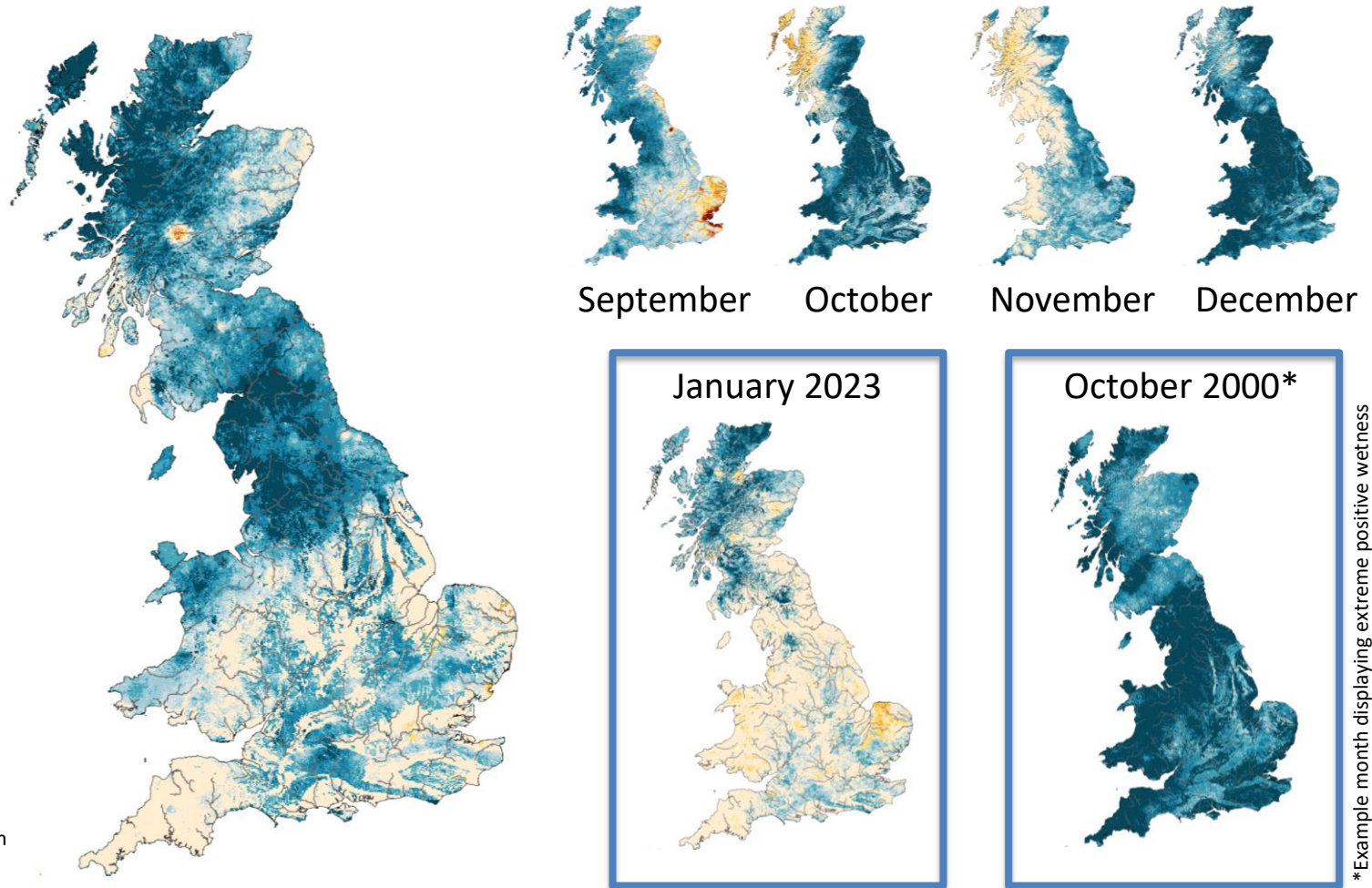
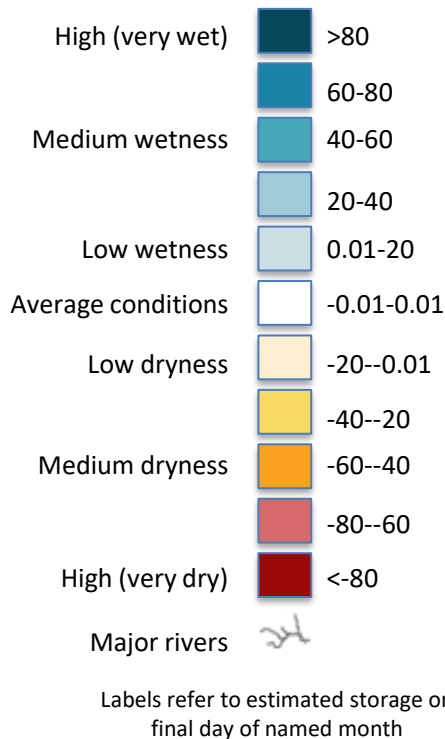
Issue date: 05.02.2024

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 moisture stores remain high (very wet) in the North of England and Scotland. Elsewhere, stores have dropped over January and are now either typical or slightly wetter than usual for the time of year.

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 positive wetness

February 2024

CURRENT CONDITIONS

Estimate of Additional Rainfall Required to Overcome Dry Conditions

Based on subsurface water storage estimated for 31 January 2024

Issue date: 05.02.2024

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

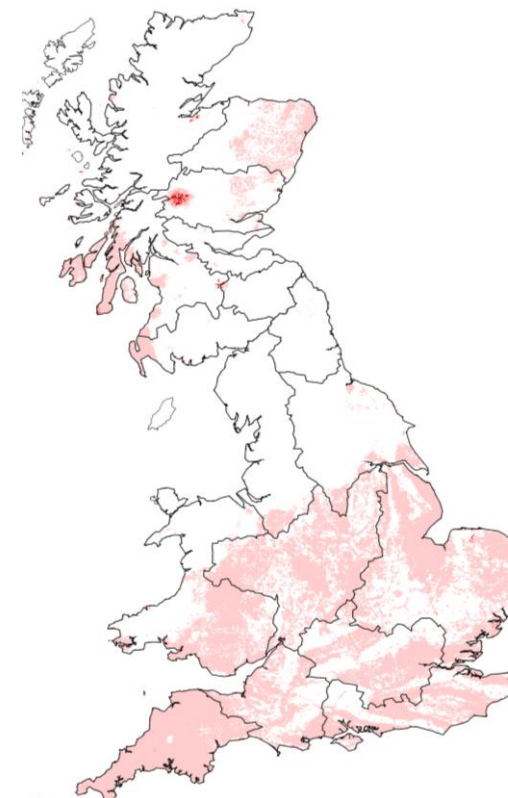
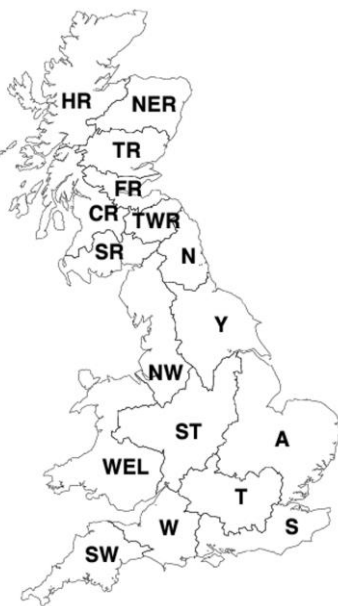
- 0 HR Highlands Region
- 0 NER North East Region
- 0 TR Tay Region
- 0 FR Forth Region
- 0 CR Clyde Region
- 0 TWR Tweed Region
- 0 SR Solway Region

ENGLAND

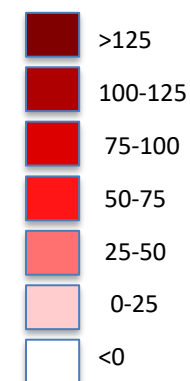
- 0 N Northumbria
- 0 NW North West
- 0 Y Yorkshire
- 0 ST Severn Trent
- 0 A Anglian
- 0 T Thames
- 0 W Wessex
- 0 S Southern
- 8 SW South West

WALES

- 0 WEL Welsh



Water storage deficit (anomaly; mm)



Return Period of Rainfall Required to Overcome Dry Conditions

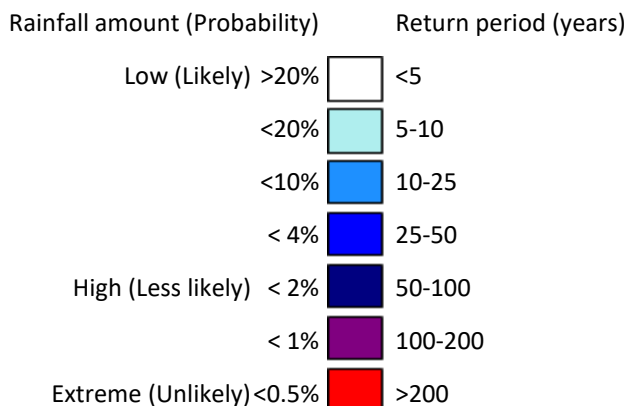
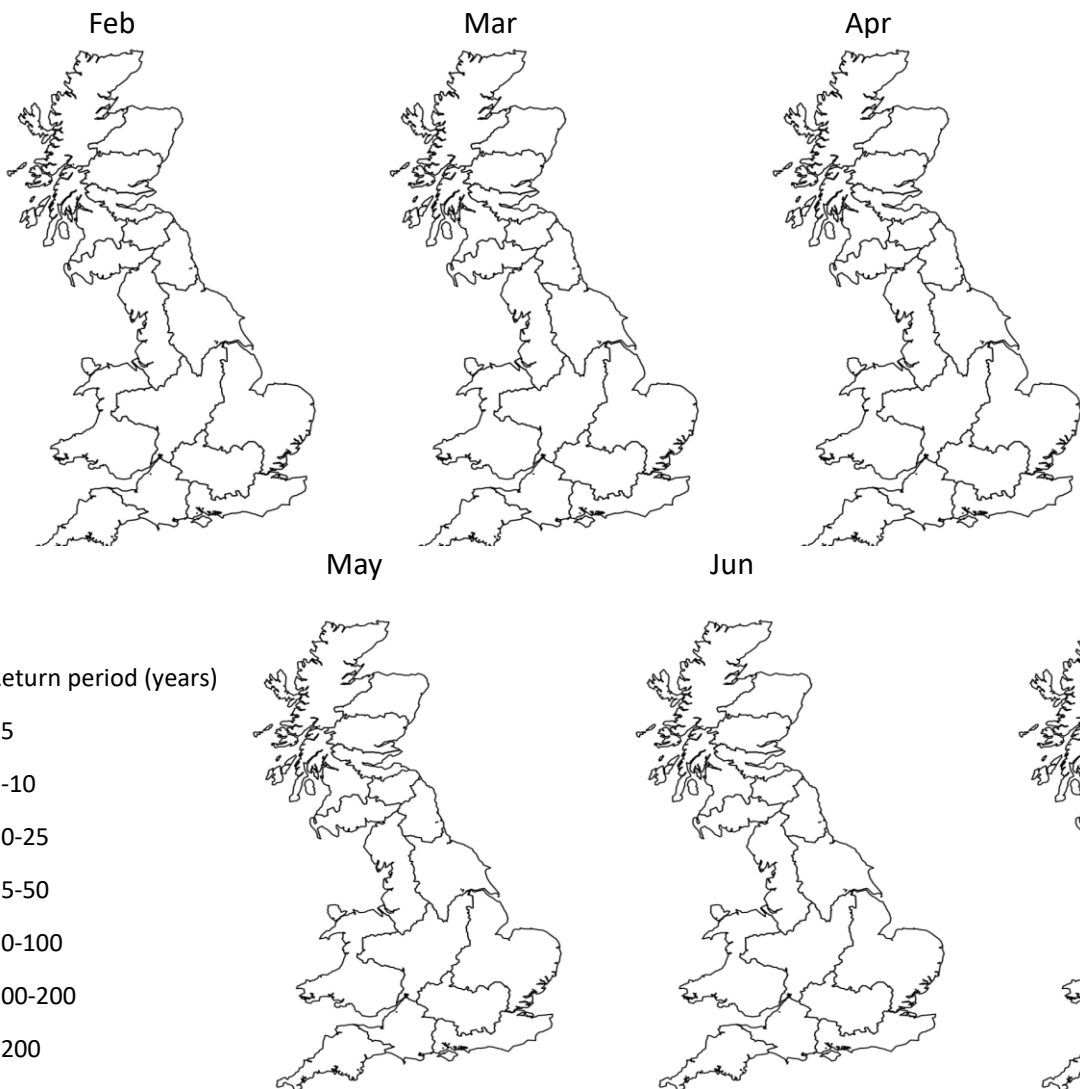
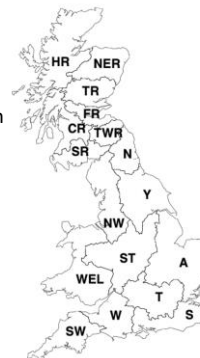
Period: February 2024 - July 2024

Issue date: 05.02.2024

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: Only the South West region currently has a storage deficit, but this will not require unusually high rainfall (>5-year return period) to replenish.

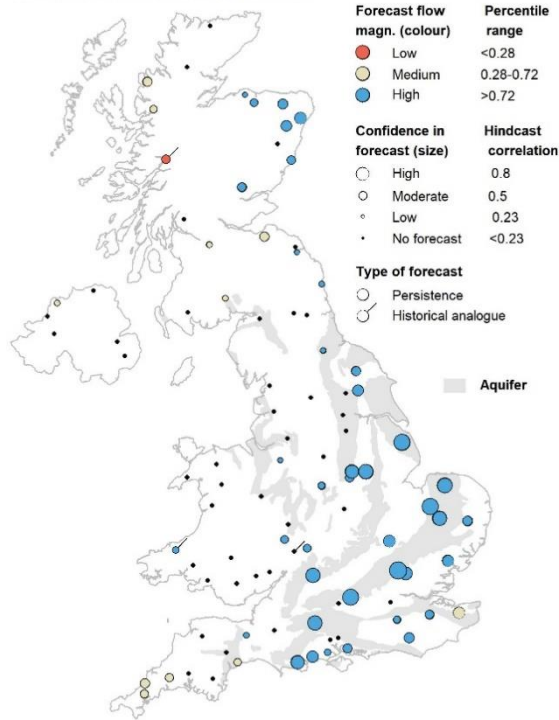
- SCOTLAND**
 HR Highlands Region
 NER North East Region
 TR Tay Region
 FR Forth Region
 CR Clyde Region
 TWR Tweed Region
 SR Solway Region
- ENGLAND**
 N Northumbria
 NW North West
 Y Yorkshire
 ST Severn Trent
 A Anglian
 T Thames
 S Southern
 W Wessex
 SW South West
- WALES**
 WEL Welsh



SUMMARY:

The February and February - April outlook indicate river flows across the country are most likely to be above normal, with a few catchments more likely to be within the normal range. Note that the confidence of the forecasts in north-western areas is low.

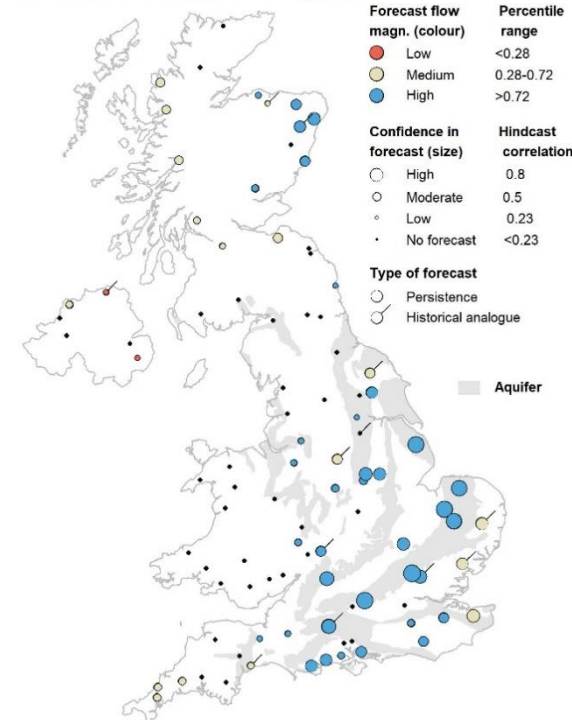
River flow outlook for Feb 2024



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 Feb - Apr 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.

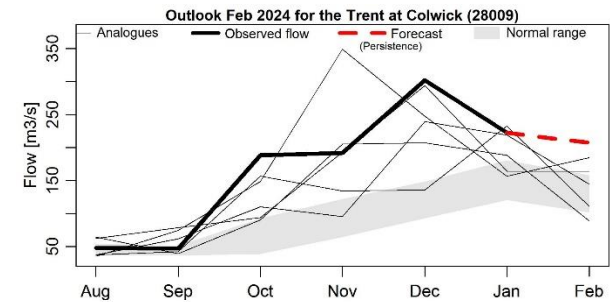
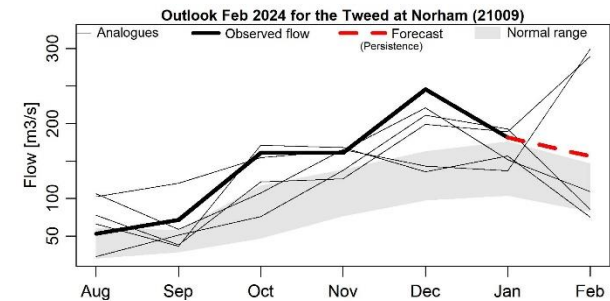
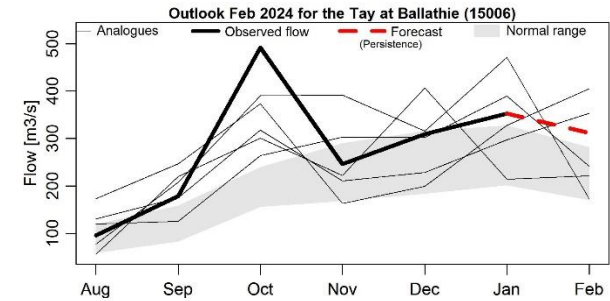
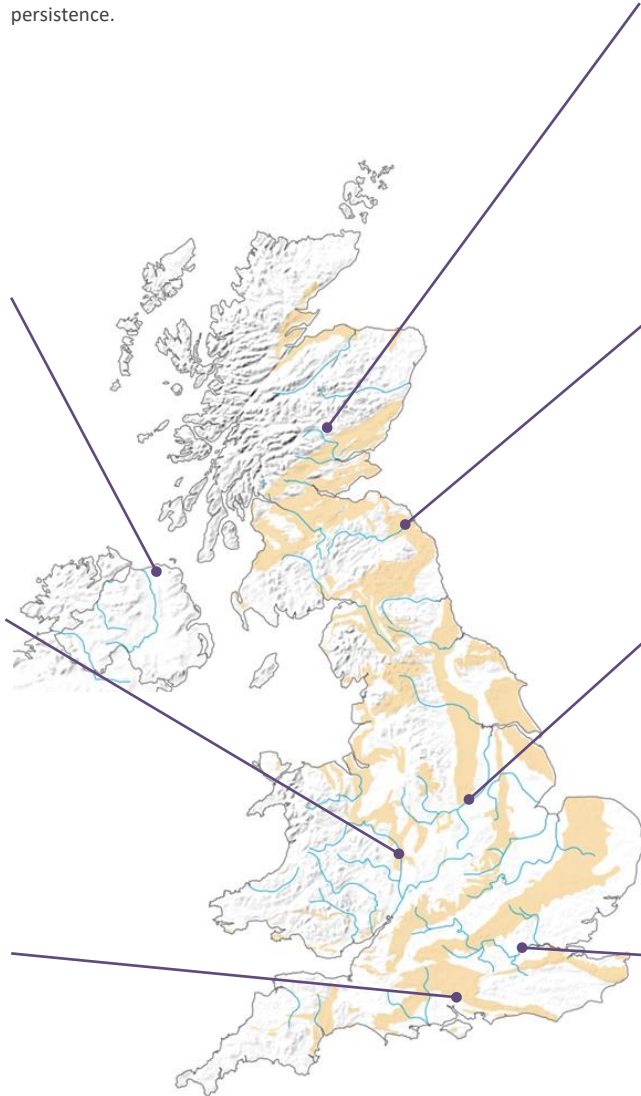
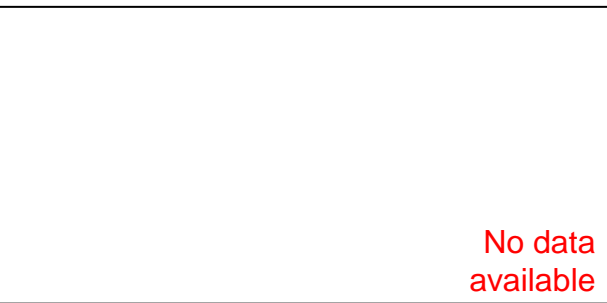
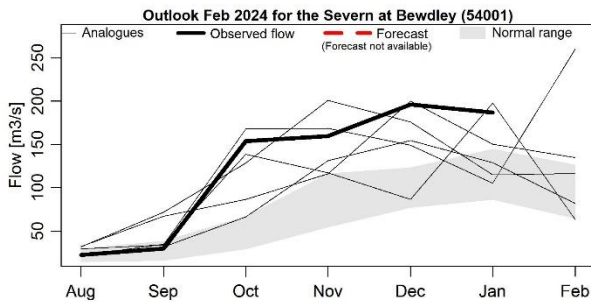
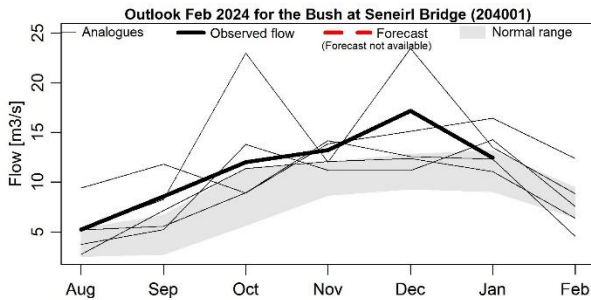
Period: February 2024

Issued on 07.02.2024 using data to the end of January 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.



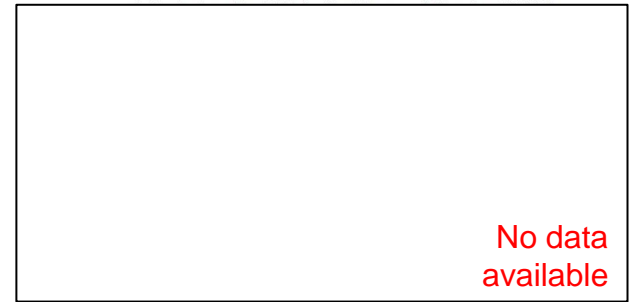
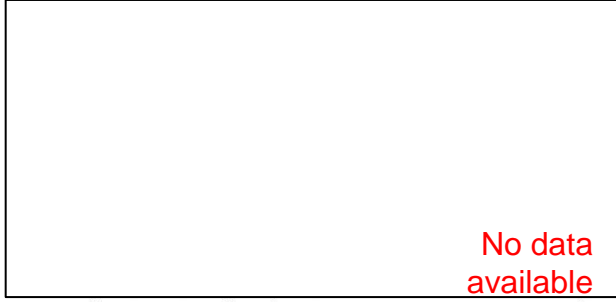
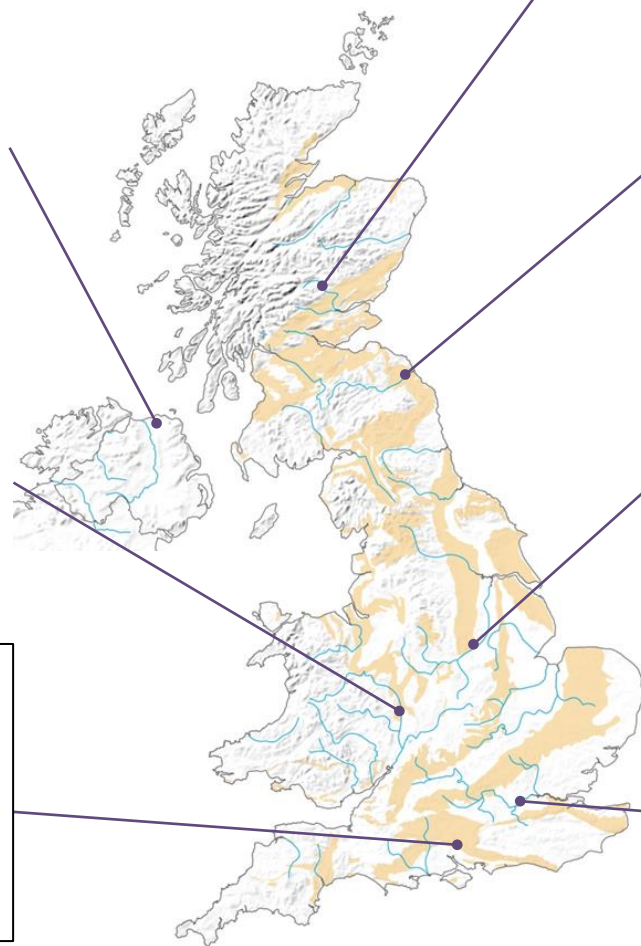
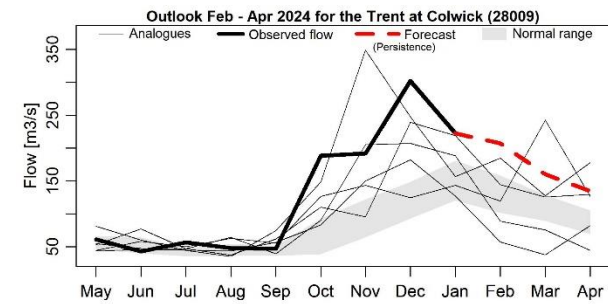
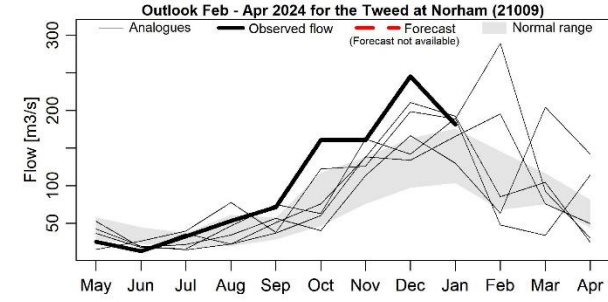
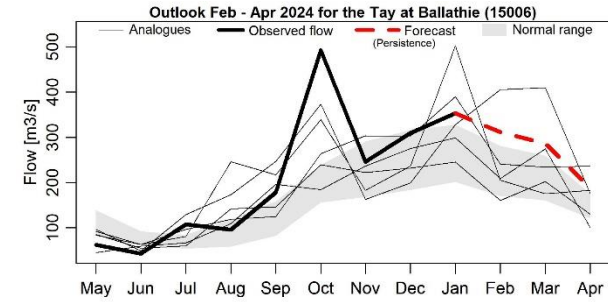
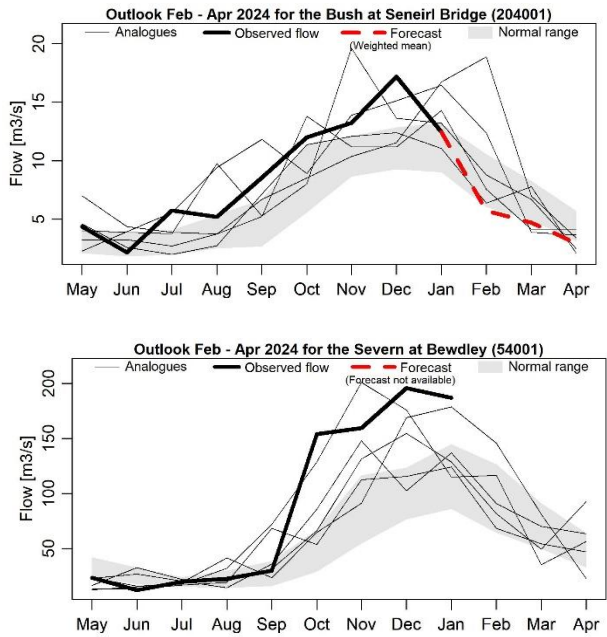
Period: February 2024 – April 2024

Issued on 07.02.2024 using data to the end of January 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: February 2024 – July 2024

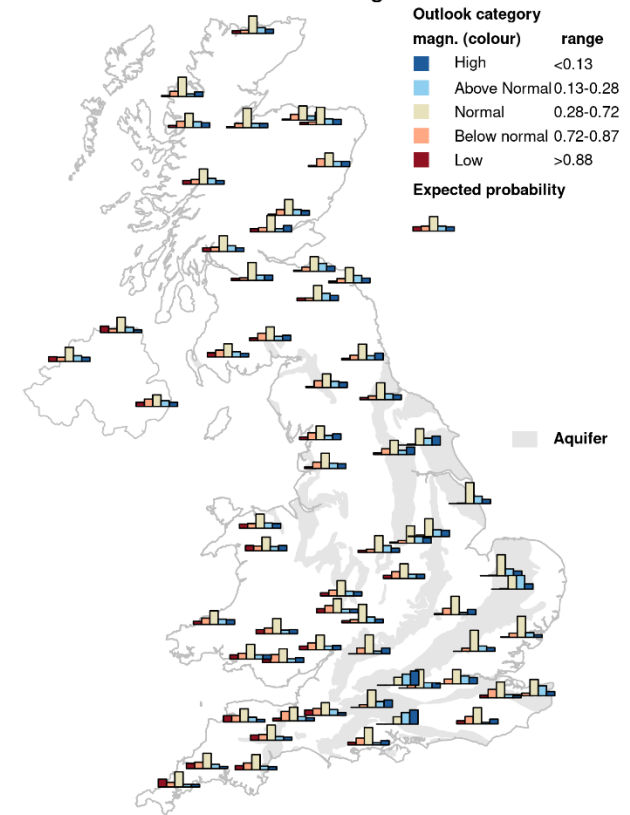
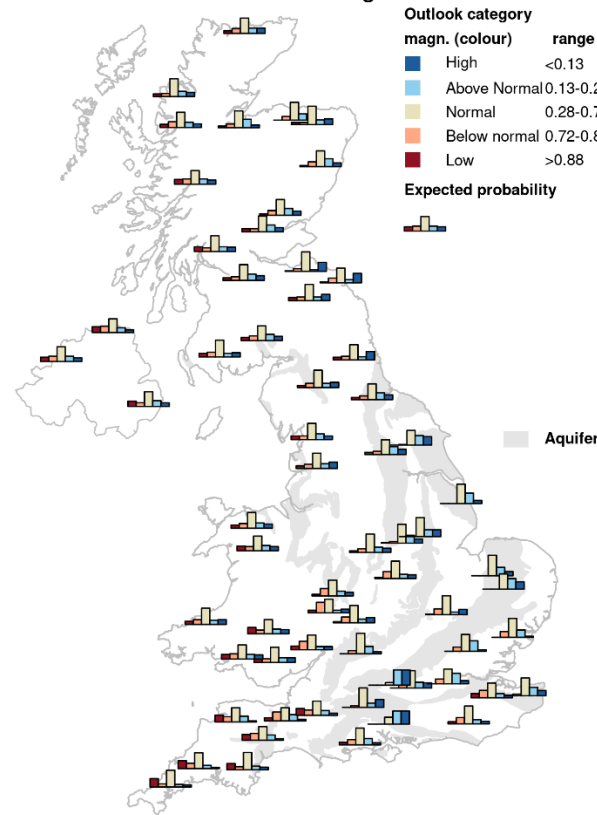
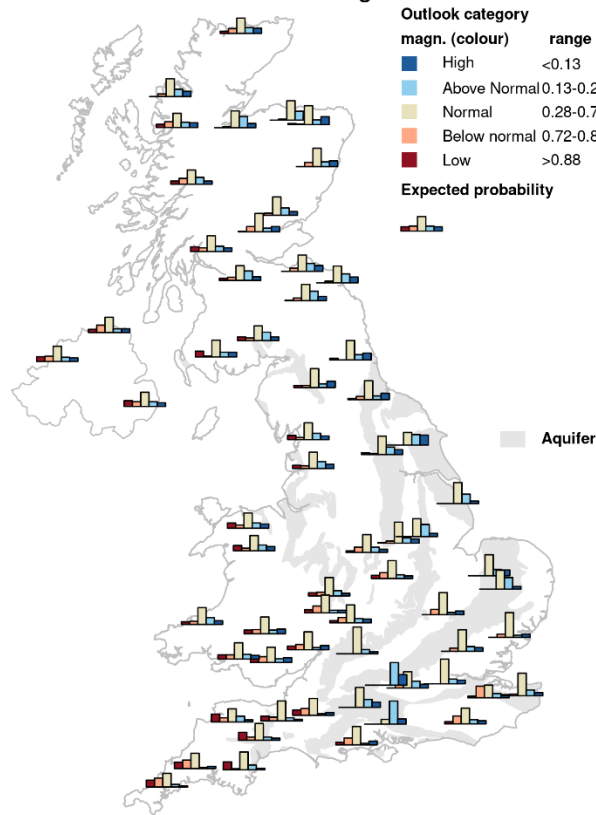
Issued on 02.02.2024 using data to the end of January 2024

The outlook for February indicates that flows are likely to be within the normal range across much of the UK. Some catchments in the south and east of England are likely to be above normal, and south western England is likely to see normal to below normal flows. The February-April outlook shows that this pattern is likely to persist over the coming few months.

1-month river flow outlook starting Feb 2024

3-month river flow outlook starting Feb 2024

6-month river flow outlook starting Feb 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.

Outlook based on modelled flow using historical weather analogues

Period: February 2024 – April 2024

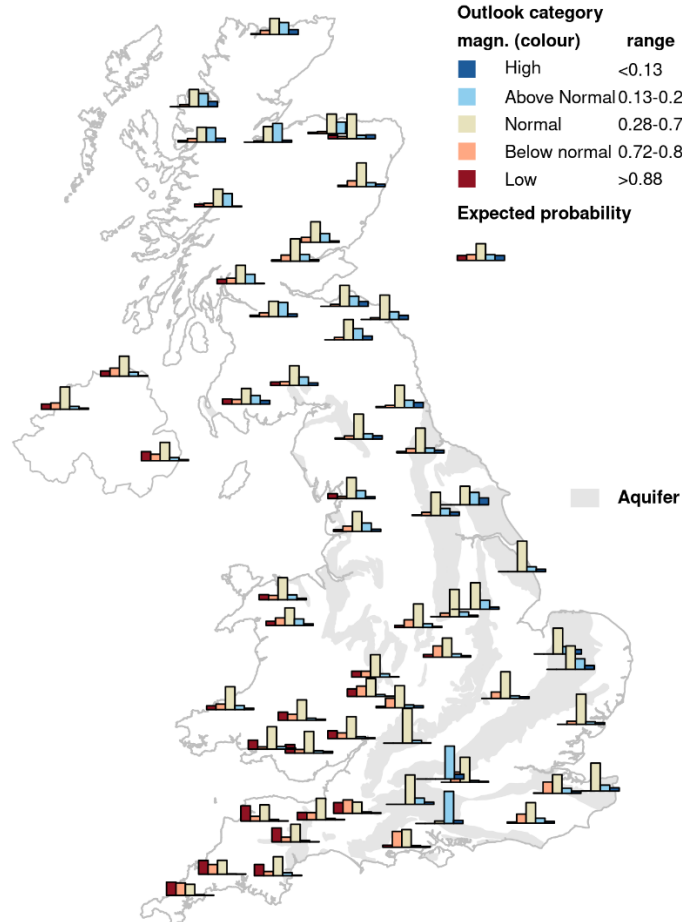
Issued on 02.02.2024 using data to the end of January 2024

The outlook for February indicates that flows are likely to be within the normal range for central and eastern parts of the UK. Flows are likely to be normal to above normal across western and northern Scotland. In south western England and southern Wales flows are likely to be normal to below normal. The February- April outlook indicates that this broad pattern is likely to persist, with the exception of Scotland where flows are likely to be in the normal range.

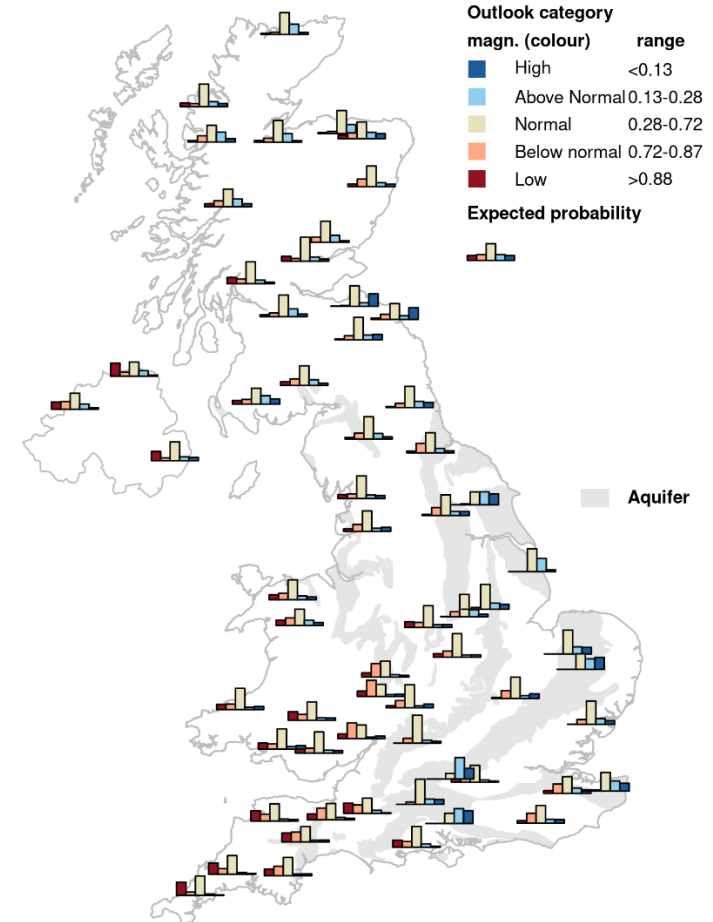
The historical weather analogues method uses Met Office predictions of average weather 1 and 3 months ahead to provide inputs to a hydrological model. Like the ESP method, observed rainfall and temperature data from past years are used to drive the predictions, however, the analogue method constrains 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 Feb 2024



3-month river flow outlook starting Feb 2024



Met Office 1-month likelihood of precipitation impact



Met Office 3-month likelihood of precipitation impact



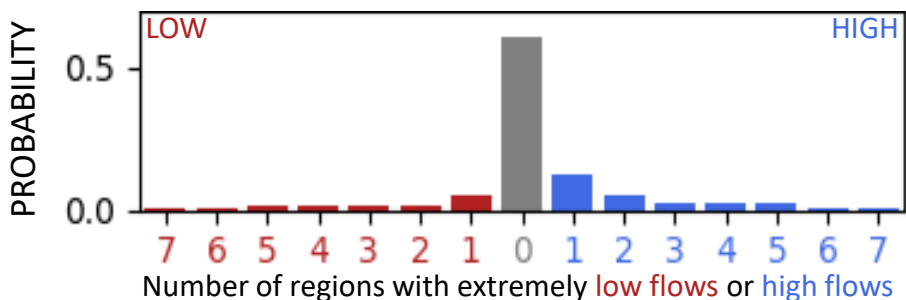
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This page shows the **probability of extreme conditions in Scotland** over the next month. The bar chart indicates the likelihood of extremely high or low flows in a given number of regions. Maps show which regions are most likely to experience these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

Summary
Scotland – one month
 Extremely high or low flows are not likely to be experienced in Scotland over the next month.

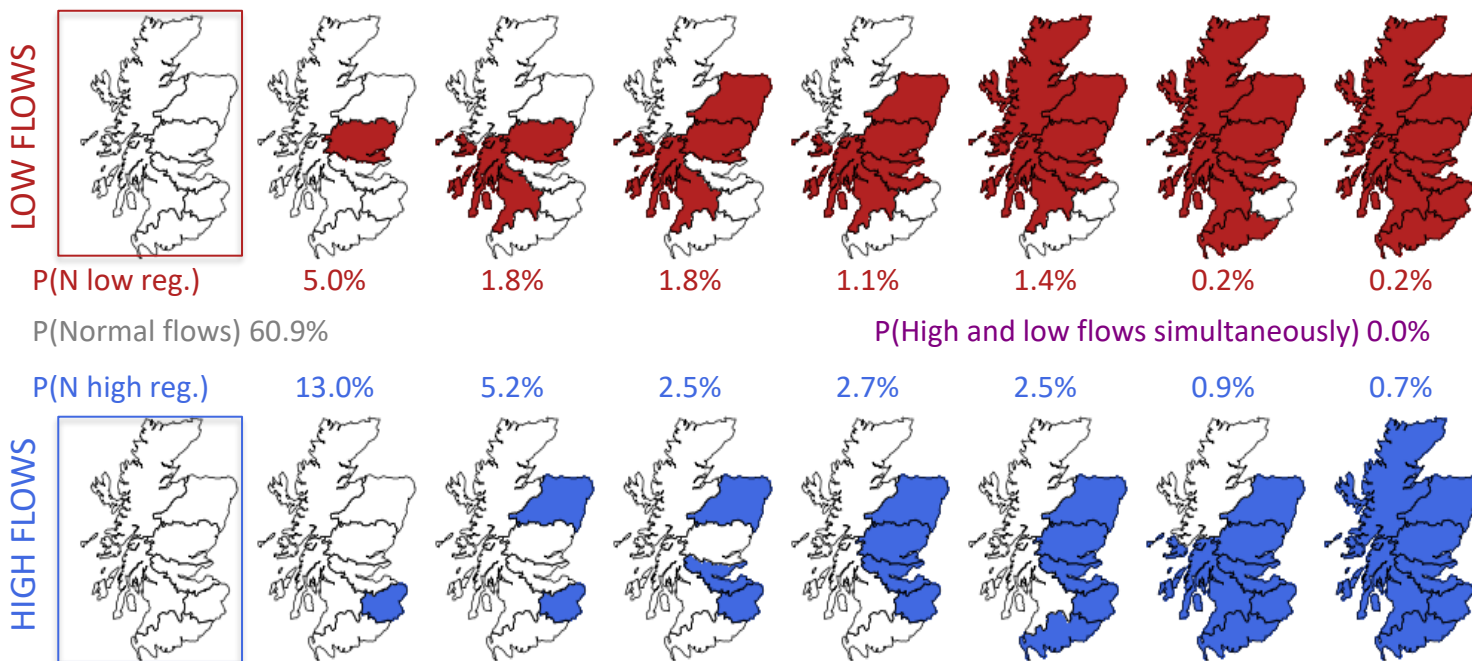
How likely are we to experience extremely low or high flows?



Probability of low and high flows in multiple regions simultaneously

0.0%

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



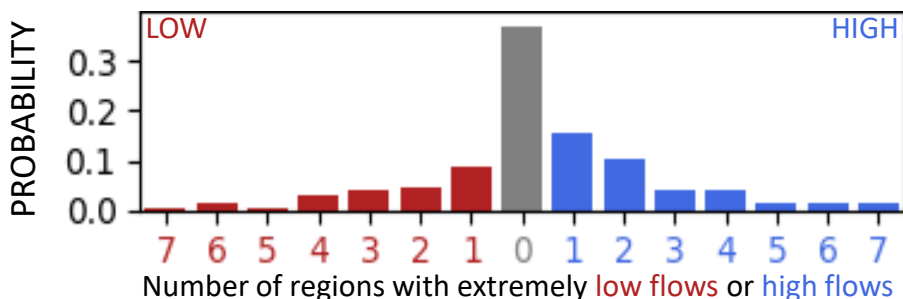
This page shows the **probability of extreme conditions in Scotland** over the next three months. The bar chart indicates the likelihood of extremely high or low flows in a given number of regions. Maps show which regions are most likely to experience these flows as overall conditions get more extreme.

Summary

Scotland – three months

Extremely high and low flows are not likely to be experienced in Scotland over the next three months. Extremely high flows are more probable than low flows and are more likely in the east.

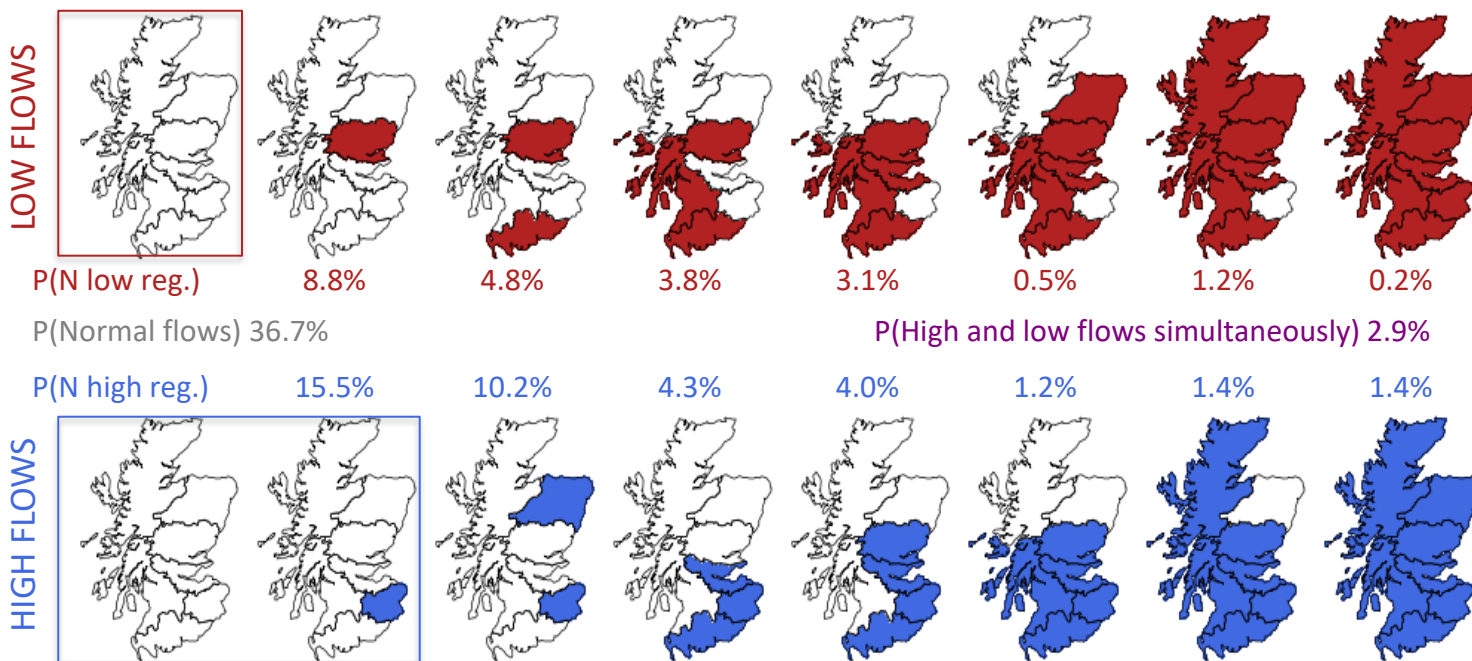
How likely are we to experience extremely low or high flows?



Probability of low and high flows in multiple regions simultaneously

2.9%

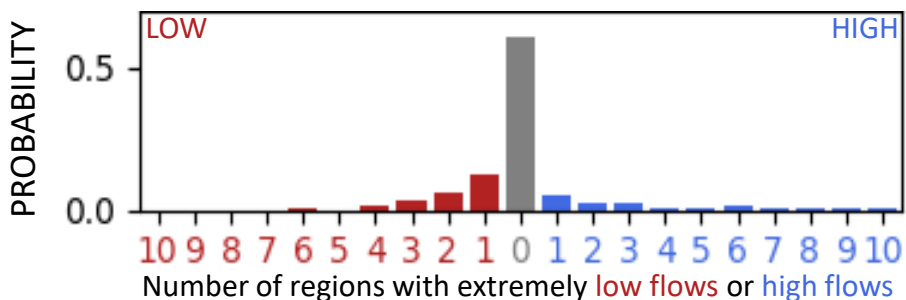
Which regions are most likely to experience extremely low or high flows?



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.

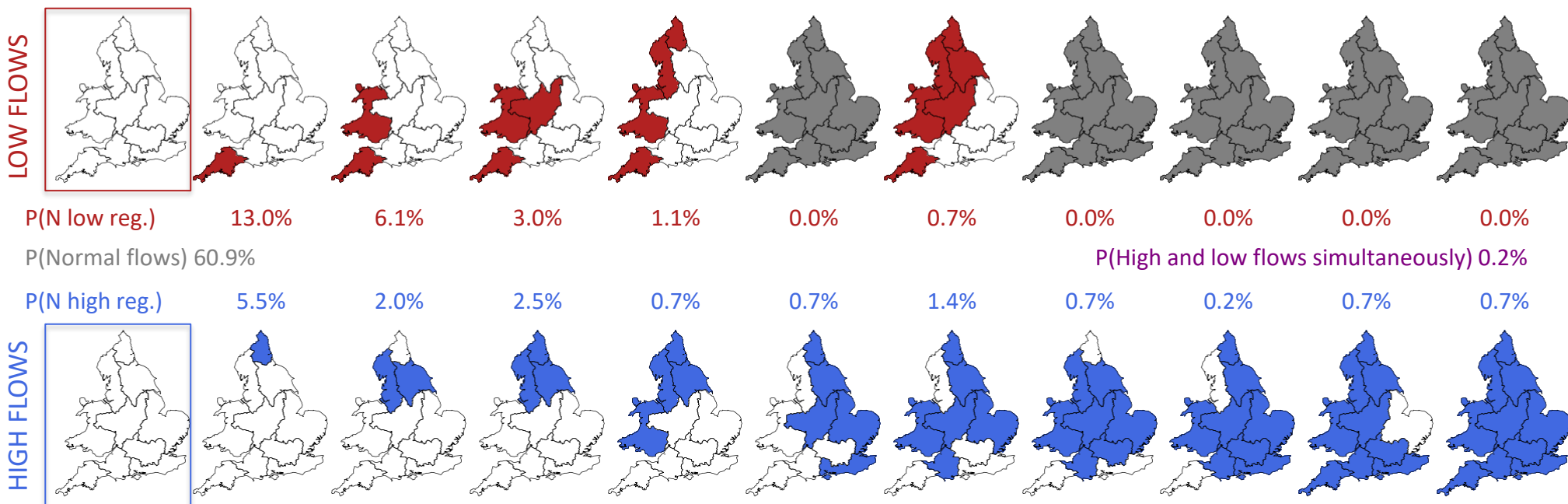
Summary
England and Wales – one month
 Extremely high or low flows are not likely to be experienced in England and Wales over the next month.

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



Probability of low and high flows in multiple regions simultaneously
 0.2%

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



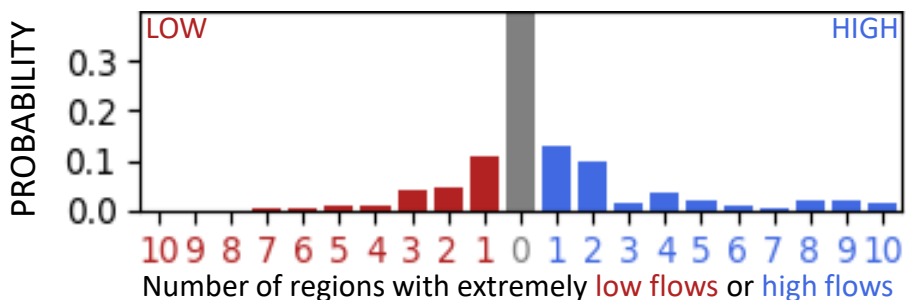
This page shows the **probability of extreme conditions in England and Wales** over the next three months. The bar chart indicates the likelihood of extremely high or low flows in a given number of regions. Maps show which regions are most likely to experience these flows as overall conditions get more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

Summary

England and Wales – three months

Extremely high and low flows are not likely to be experienced in England and Wales over the next three months. If they occur, high flows are more likely in the northeast, and low flows in the southwest.

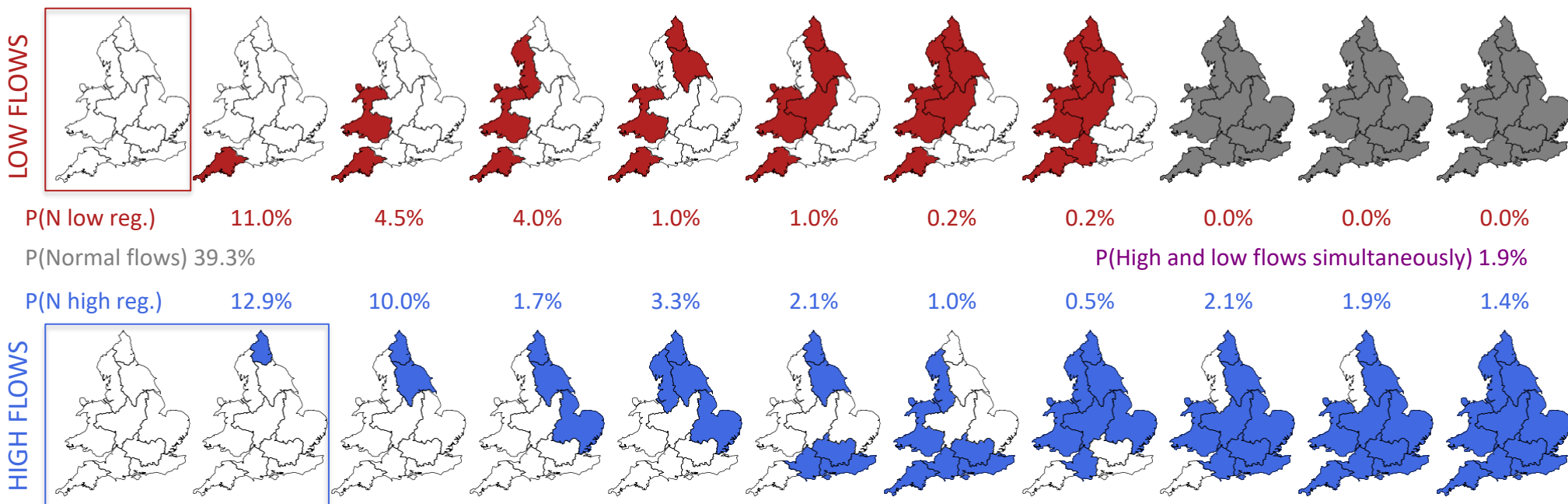
How likely are we to experience extremely low or high flows?



Probability of low and high flows in multiple regions simultaneously

1.9%

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



Histograms of GB regional mean river flow distributions

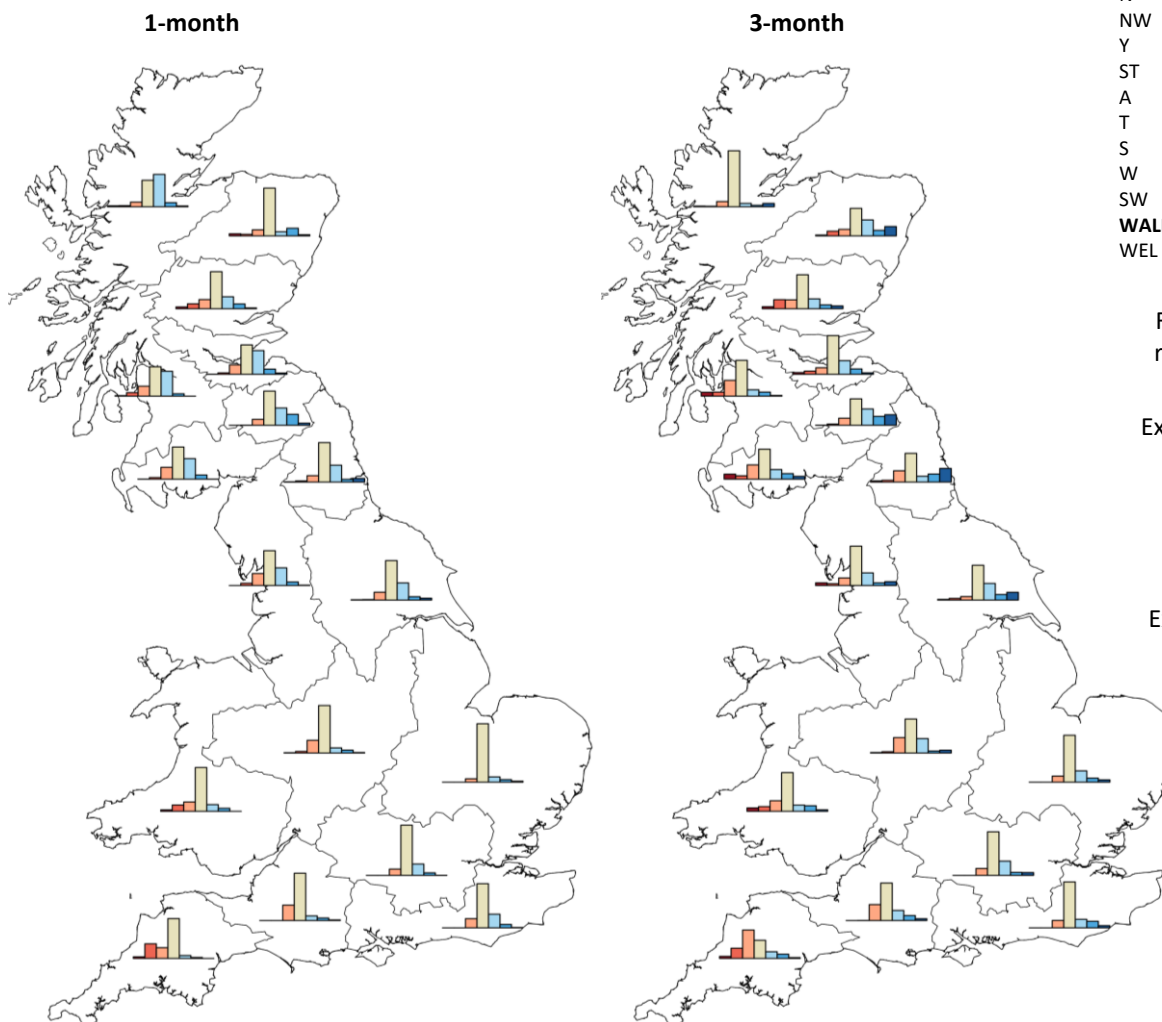
Period: February 2024 - April 2024

Issue date: 05.02.2024

- 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 across Great Britain are likely to be in the *normal range*. Parts of Scotland, especially the Highlands, may experience *above normal* flows, while the South West of England could have *below normal* to *notably low* flows.

Over the next three months, river flows across Great Britain are likely to be in the *normal range*. Eastern parts of Scotland may experience *above normal* to *notably high* flows, while the South West of England is likely to have *below normal* flows.



SCOTLAND

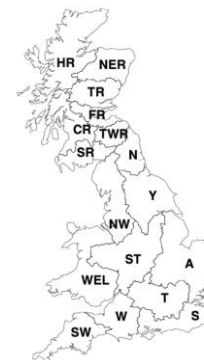
- HR Highlands Region
- NER North East Region
- TR Tay Region
- FR Forth Region
- CR Clyde Region
- TWR Tweed Region
- SR Solway Region

ENGLAND

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

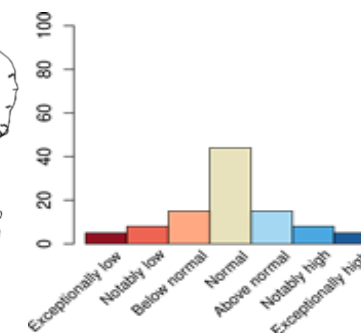
WALES

- 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: February 2024 - April 2024

Issue date: 05.02.2024

- 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 across Great Britain are likely to be in the *normal range*. Parts of Scotland, especially the Highlands, may experience *above normal* flows, while the South West of England could have *below normal* to *notably low* flows.

Over the next three months, river flows across Great Britain are likely to be in the *normal range*. Eastern parts of Scotland may experience *above normal* to *notably high* flows, while the South West of England is likely to have *below normal* flows.

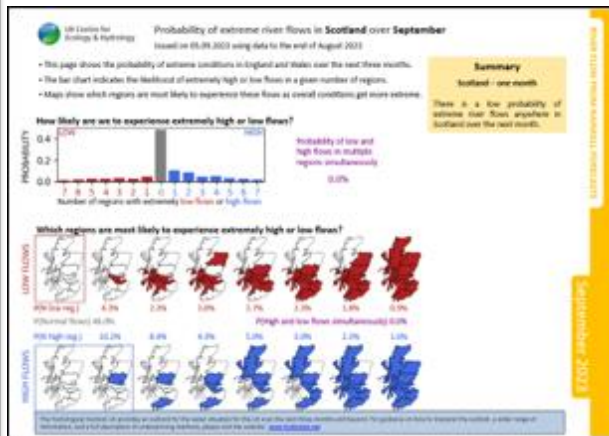
1-month ahead	A	NW	N	ST	SW	S	T	WEL	W	Y	CR	FR	HR	NER	SR	TR	TWR
Exceptionally high flow	1	0	5	1	0	0	0	0	1	3	0	2	1	2	0	1	3
Notably high	4	5	4	4	1	5	4	4	4	5	3	7	6	11	6	7	16
Above normal	8	25	24	7	4	19	16	10	7	24	35	34	46	6	29	17	24
Normal range	83	49	56	67	56	62	71	62	67	56	42	42	38	68	46	52	48
Below normal	5	17	9	18	15	13	9	13	22	11	14	13	7	9	17	13	8
Notably low	0	3	2	2	21	0	0	9	0	1	5	2	2	2	2	7	0
Exceptionally low flow	0	0	0	0	2	0	0	2	0	0	1	0	1	3	0	2	0

3-month ahead	A	NW	N	ST	SW	S	T	WEL	W	Y	CR	FR	HR	NER	SR	TR	TWR
Exceptionally high flow	3	6	19	4	1	3	4	2	3	11	1	2	5	13	4	4	15
Notably high	6	4	11	3	6	9	4	8	7	8	6	8	2	8	8	6	13
Above normal	16	18	8	20	10	12	20	9	14	24	9	19	5	23	14	14	23
Normal range	66	56	41	48	26	65	62	55	53	49	51	55	79	39	42	48	37
Below normal	9	11	16	22	40	10	10	15	23	5	22	9	7	9	20	13	10
Notably low	0	3	3	2	14	0	0	7	0	2	6	4	1	7	5	13	2
Exceptionally low flow	0	4	2	1	3	0	0	5	0	1	6	2	1	1	7	3	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



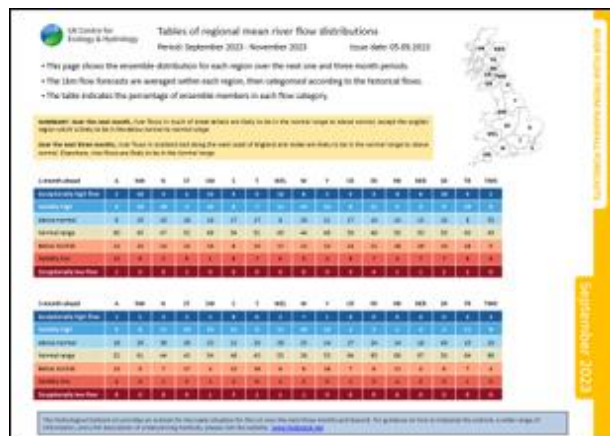
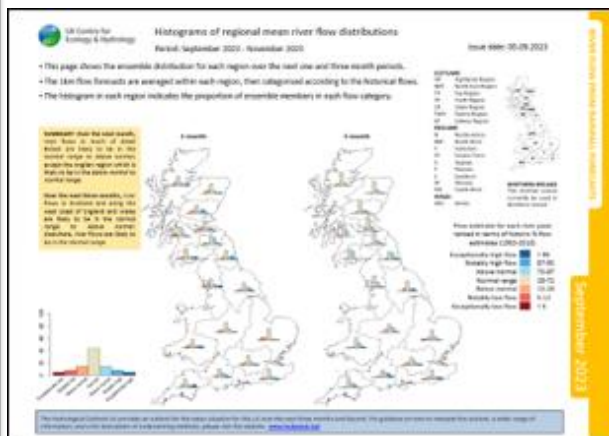
Extreme river flows are defined as those which rank in the lowest or highest 13% of historical flow estimates (1963 - 2016). This definition encompasses the 'Notably' and 'Exceptionally' high/low flow bands used elsewhere in the Outlook.

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 summary 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).

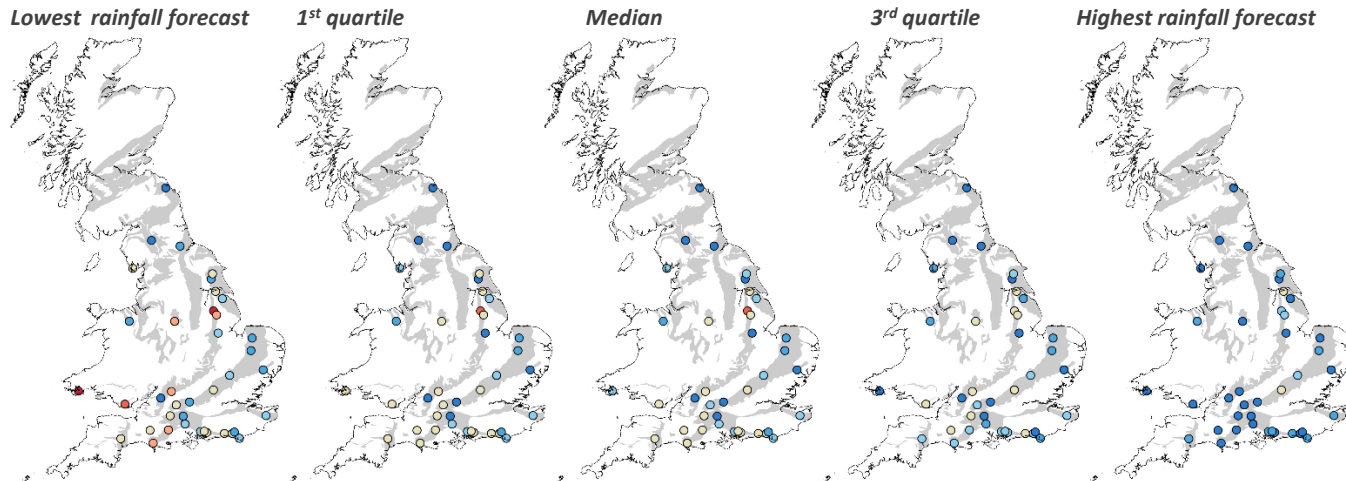
Period: February 2024 – April 2024

Issued on 06.02.2024 using data to the end of January

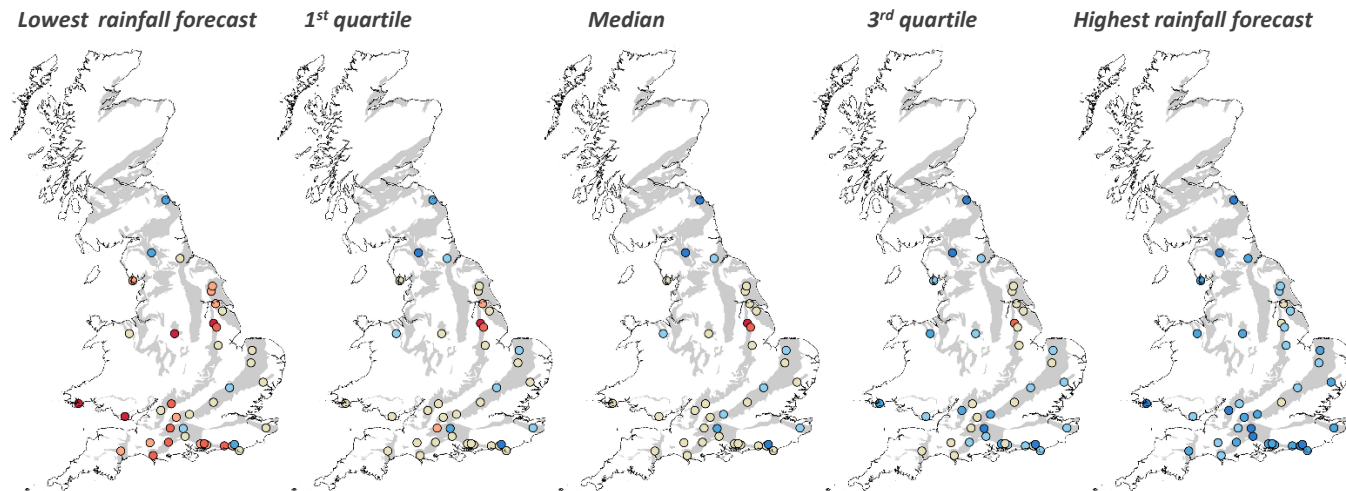
Under median rainfall conditions, groundwater levels are forecast to range from normal to exceptionally high across Chalk aquifers across the UK over the next month. In the Jurassic limestones and Permo-Triassic Sandstones the levels forecast show a similar trend, but with some notably to exceptionally low levels forecast in the East Midlands. The three month forecasts show levels declining across the UK, particularly in the Chalk aquifers where levels are expected to be mostly normal to above normal. Levels in the Jurassic limestones are expected to range from normal to exceptionally low, while levels in the Permo-Triassic Sandstones are expected to remain similar.

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.

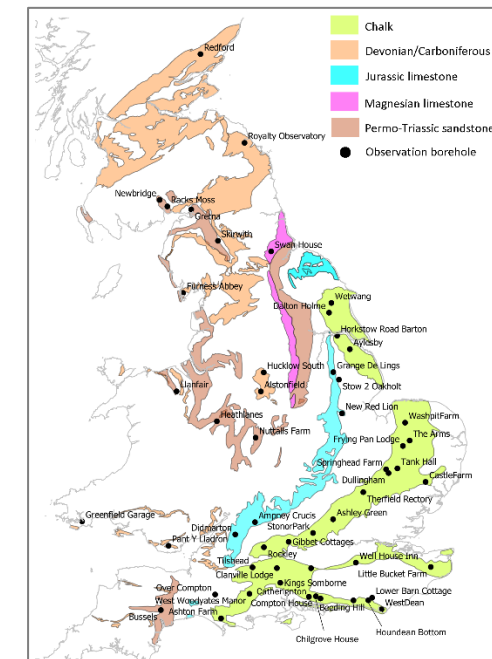


1-month outlook



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

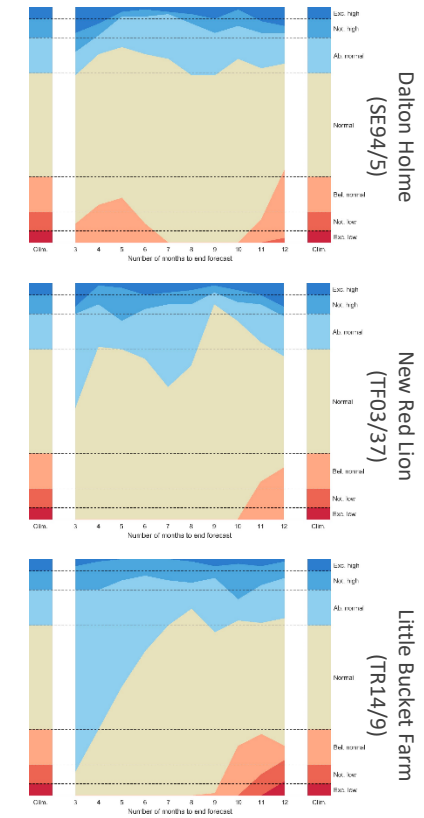
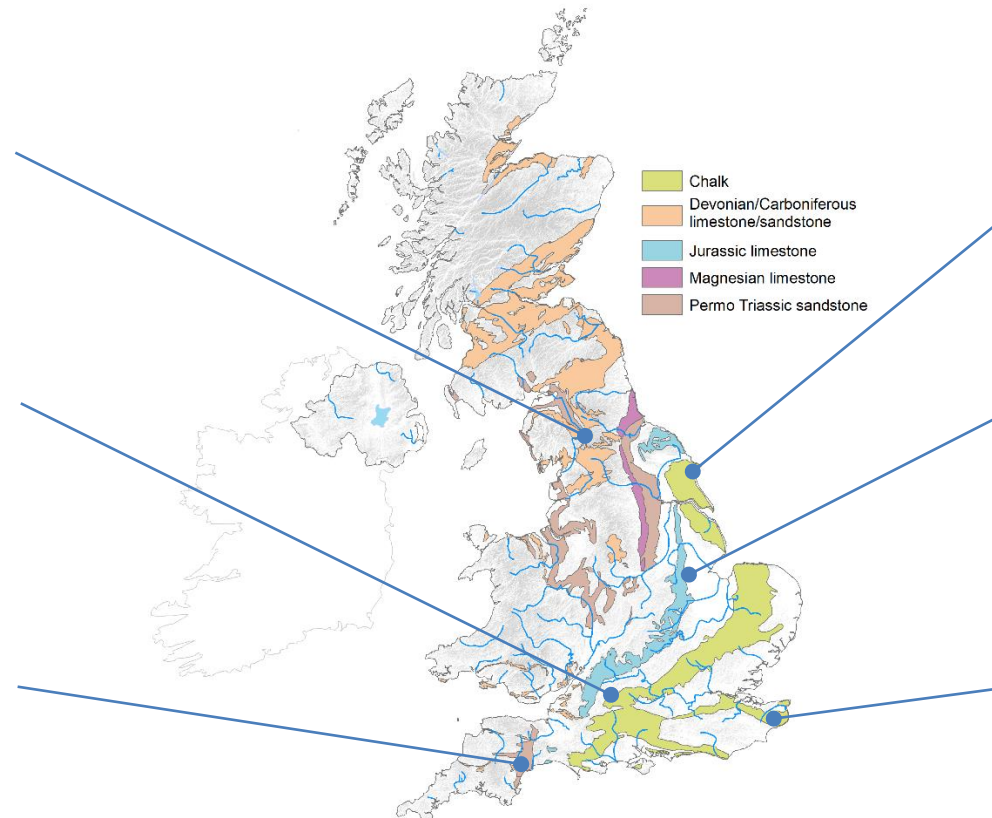
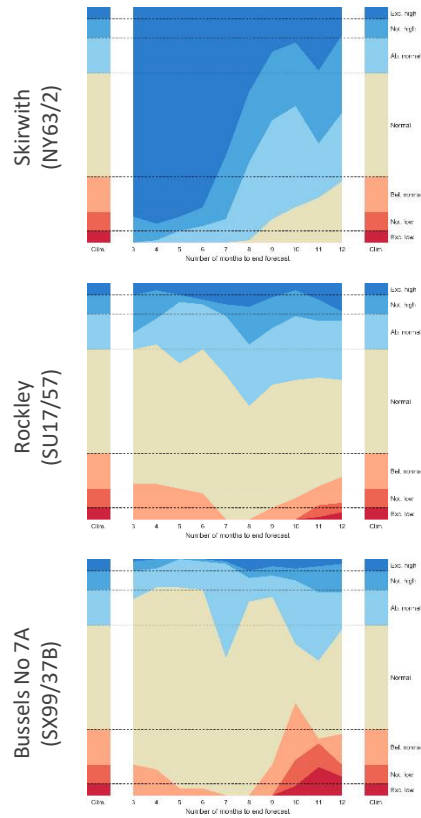


Outlook based on modelled groundwater from historical climate

Period: February 2024 – January 2025

Issued on 06.02.2024 using data to the end of January

Groundwater levels at Skirwith in the Permo-Triassic Sandstones are forecast to be exceptionally high over the next 6 months, before returning towards notably high and above normal conditions throughout the following 6 months. In the Chalk at Rockley and the Permo-Triassic Sandstones at Bussels No 7A, normal conditions are expected to transition slightly towards more above normal levels across the next 12 months. At New Red Lion and Little Bucket Farm in the Chalk, above normal conditions are likely to persist for the next 3 and 5 months respectively, before giving way to more normal conditions. At Dalton Holme normal conditions are expected to persist for the next 12 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.

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

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.hydotuk.net