SUMMARY

The outlook for November is for normal to below normal river flows in south-east England; flows elsewhere are most likely to be within the normal range. November groundwater levels are likely to be below normal in southern and eastern England. Over the three-month timeframe, the outlook for river flows is similar to the one-month outlook, but normal to below normal levels are likely for aquifers in the south-east.

Rainfall:

In October, above average rainfall occurred across most of the UK, exceptionally so in parts of Northern Ireland. Below average rainfall was limited to northern Scotland and parts of south-west and eastern England.

The rainfall outlook (issued by the Met Office on 31.10.2022) for November suggests an equal likelihood of dry or wet weather. For the November-January timeframe, there is a slightly increased likelihood of dry weather.

River flows:

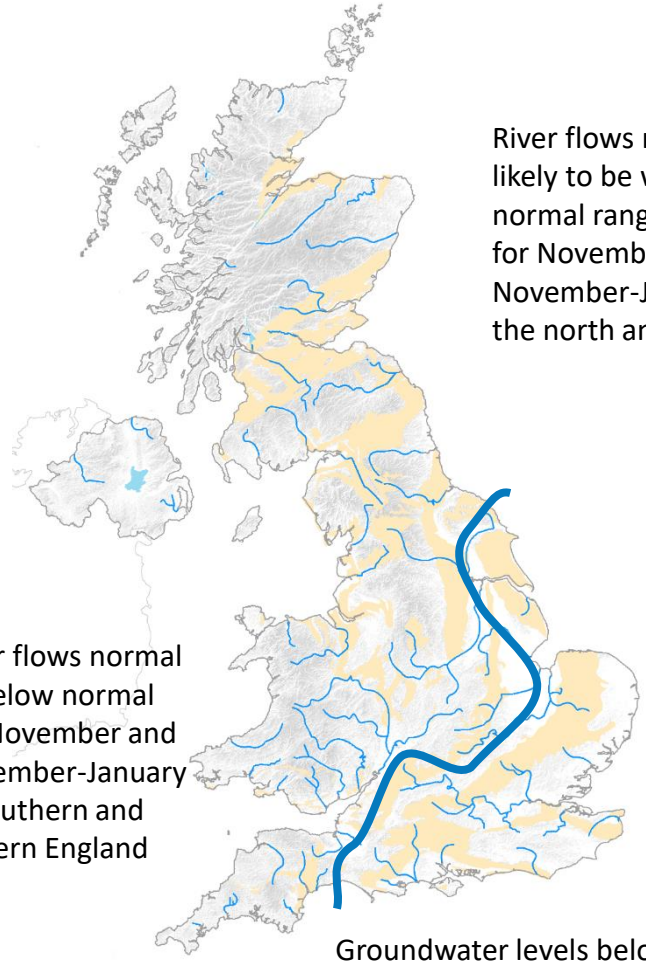
In October, river flows were normal to below normal across most of England and Wales, though notably or exceptionally low only in a few catchments. Flows were above normal in parts of western Scotland and north-west England.

The one-month outlook suggests that normal to below normal river flows are likely in catchments of the English Lowlands. The outlook for the November-January timeframe is similar to the one-month outlook. Over both timeframes, there is confidence in the continuation of low flows in some slowly-responding catchments in the south-east.

Groundwater:

Groundwater levels in October were below normal across most of southern and eastern England. Levels were notably or exceptionally low in the southern Chalk.

The one-month outlook is for below normal levels for the Chalk aquifers of south-eastern England, with more variation further north and west. The three-month outlook suggests a return to levels within the normal range for the southern Chalk, although below normal levels are likely for the slower-responding eastern Chalk.



River flows most likely to be within the normal range for November and November-January in the north and west

River flows normal to below normal for November and November-January in southern and eastern England

Groundwater levels below normal for November in southern and eastern areas

Shaded areas show principal aquifers

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.hydoutuk.net

About the 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 and 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 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, PDM and CLASSIC hydrological models and by the EA using CATCHMOD. Hydrogeological modelling uses the R-groundwater model run by BGS and CATCHMOD run by the EA. Supporting documentation is available from the Outlooks website:
https://www.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 Hydrological Outlook partnership aims to ensure that all Content provided is accurate and consistent with its current scientific understanding. However, the science which underlies hydrological and hydrogeological forecasts and climate projections is constantly evolving. Therefore any element of the Content which involves a forecast or a prediction should not be relied upon as though it were a statement of fact. To the fullest extent permitted by applicable law, the Hydrological Outlook Partnership excludes all warranties or representations (express or implied) in respect of the Content.

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

Copyright:

Further information:

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

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

Contact:

Hydrological Outlooks UK, UK Centre for Ecology & Hydrology, Wallingford, Oxfordshire, OX10 8BB
t: 01491 692371 e: enquiries@hydoutuk.net

Reference for the Hydrological Outlook:

Hydrological Outlook UK, 2022, November, UK Centre for Ecology and Hydrology, Oxfordshire UK, Online,
https://www.hydoutuk.net/latest-outlook/

Other Sources of Information:

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

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

UK Water Resources Portal: monitor the UK hydrological situation in near real-time including rainfall, river flow, groundwater and soil moisture from COSMOS-UK:
https://eip.ceh.ac.uk/hydrology/water-resources/

UK Centre for Ecology & Hydrology

Monthly mean river flows simulated by the Grid-to-Grid hydrological model

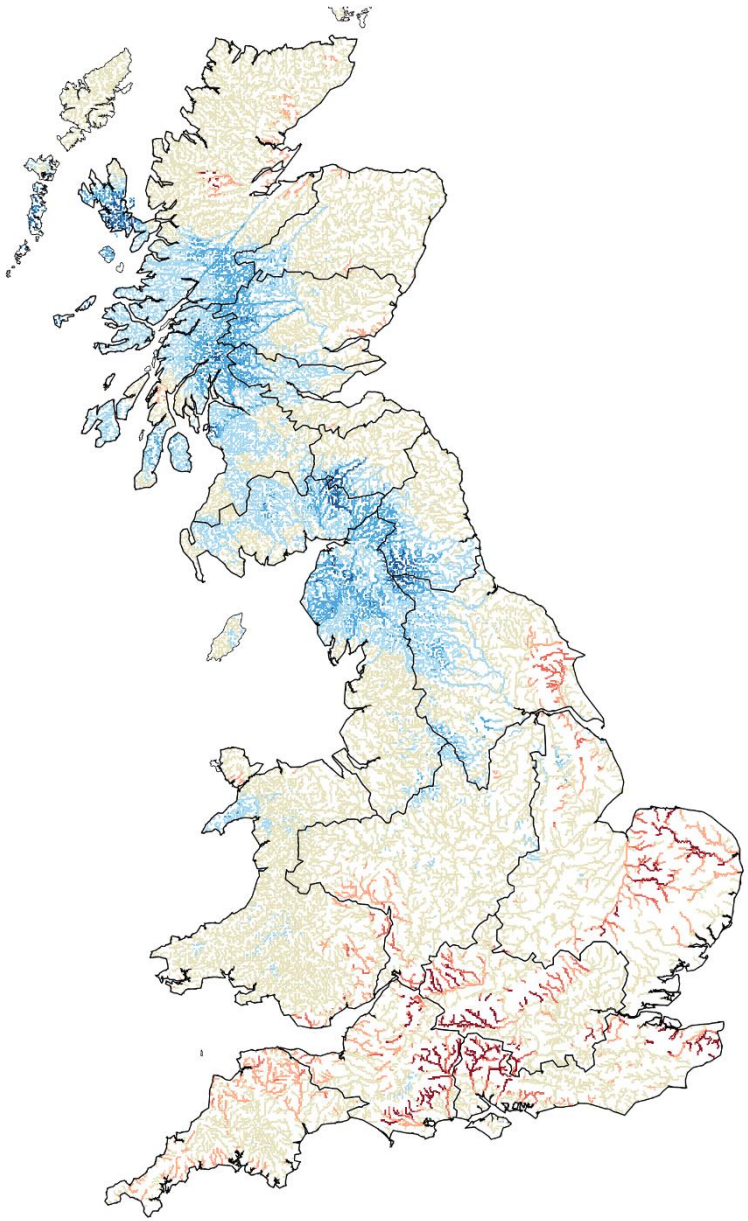
Period: October 2022

Issue date: 03.11.2022

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

OUTLOOK BASED ON CURRENT CONDITIONS

November 2022

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UK Centre for Ecology & Hydrology

Current Daily Simulated Subsurface Water Storage Conditions

Based on subsurface water storage estimated for 31st October 2022

Issue date: 03.11.2022

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

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

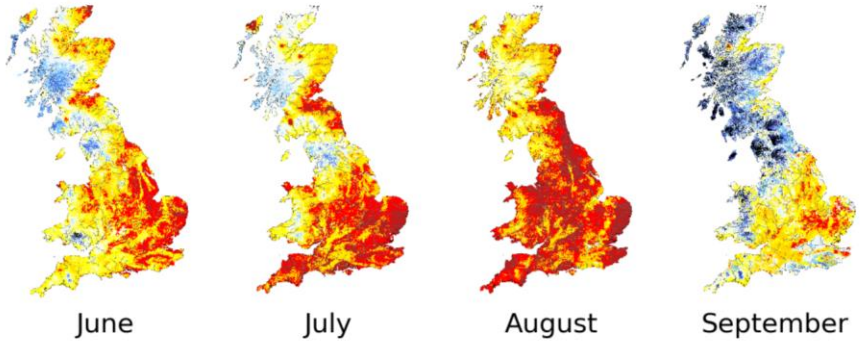
SUMMARY: At the end of October subsurface water levels were higher (wetter) than normal across most of northern England, southern and central Scotland and Wales. Across south east England and north west Scotland subsurface water levels were mostly lower (drier) than normal, with some pockets of higher subsurface water levels.

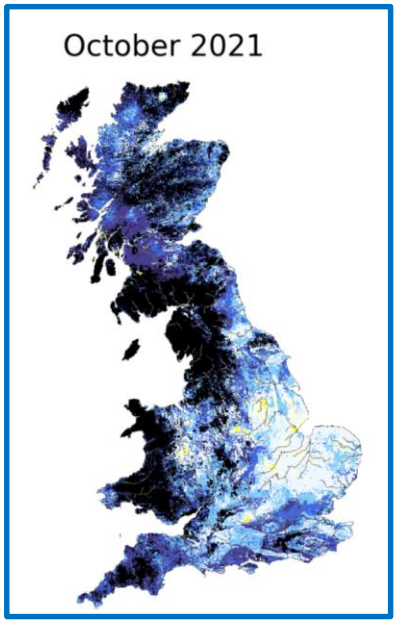
Relative wetness

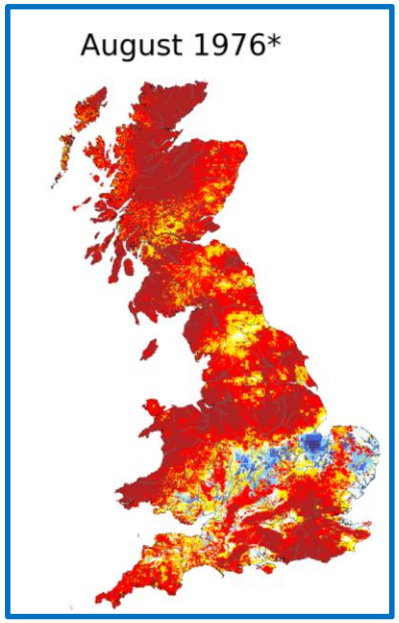
Water storage anomaly as a % of maximum (positive wetness) or minimum (negative wetness) storage anomaly (zero indicates average value)

High (very wet)	>100
	75 - 100
Medium wetness	50 - 75
	25 - 50
Low wetness	0.01 - 25
Average conditions	-0.01 - 0.01
Low dryness	-25 - - 0.01
	-50 - -25
Medium dryness	-75 - -50
	-100 - -75
High (very dry)	< -100
Main rivers	

Labels refer to estimated storage on *final day* of named month







*Example month displaying extreme negative wetness

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OUTLOOK BASED ON CURRENT CONDITIONS

November 2022

UK Centre for Ecology & Hydrology

Return Period of Rainfall Required to Overcome Dry Conditions

Period: November 2022 – April 2023

Issue date: 03.11.2022

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

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

SUMMARY: During November regions in southern and eastern England would require rainfall with a return period of between 5 and 10 years to overcome the dry conditions. Other regions of the UK will not require particularly unusual rainfall (<5 year return periods) to return to average conditions for the time of year.

All regions of Great Britain will not require particularly unusual rainfall (<5 year return periods) to return to average conditions by the end of March.

Nov

Dec

Jan

Feb

Mar

Apr

Rainfall amount / Probability			*Return period (years)*
Low (this rain is likely to occur)	> 20%		< 5
	< 20%		5 - 10
	< 10%		10 - 25
	< 4%		25 - 50
High (less likely)	< 2%		50 - 100
	< 1%		100 - 200
Extreme (unlikely but still possible)	< 0.5%		> 200

SCOTLAND

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

ENGLAND

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

WALES

WEL	Welsh

NORTHERN IRELAND

This method cannot currently be used in Northern Ireland

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OUTLOOK BASED ON CURRENT CONDITIONS

November 2022

UK Centre for Ecology & Hydrology

Estimate of Additional Rainfall Required to Overcome Dry Conditions

Based on subsurface water storage estimated for 31st October 2022

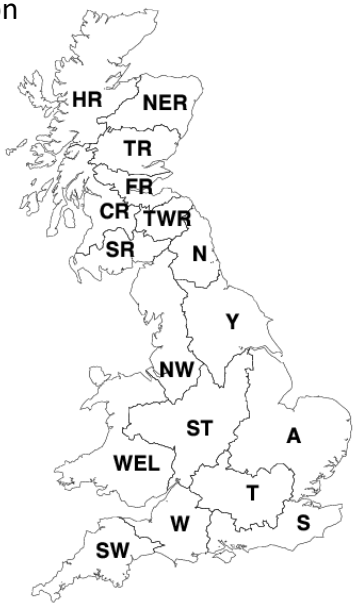
Issue date: 03.11.2022

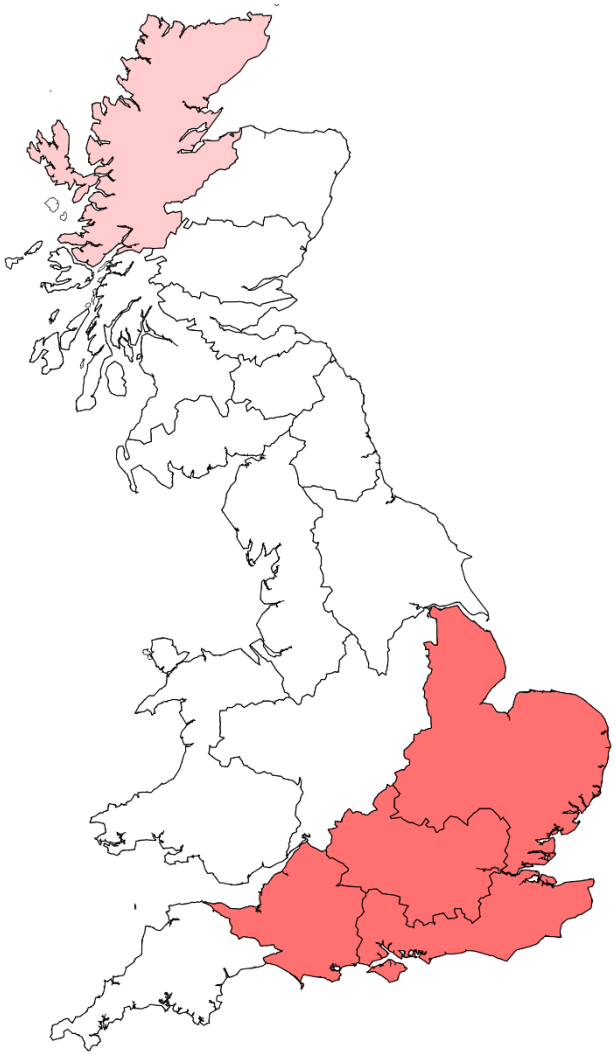
These maps show the Grid-to-Grid (G2G) hydrological model simulated subsurface water storage, expressed as an anomaly from the historical monthly mean (1981-2010), presented on a 1km grid and as regional means.
Subsurface storage deficits, i.e. where the subsurface water storage anomaly is less than zero, **are highlighted by the red/pink colours**.

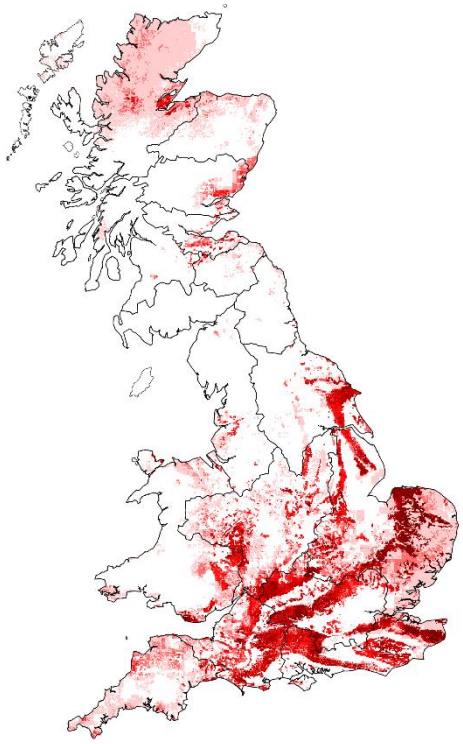
The **subsurface storage deficit (mm)** can be interpreted as an estimate of additional rainfall that would be required in future months to overcome dry conditions (i.e. rainfall in addition to what is expected on average). Regional mean values of additional rainfall required are provided in the table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

Regional estimate of additional rainfall required (mm)

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







Water storage deficit (anomaly, mm)

- >125
- 100-125
- 75-100
- 50-75
- 25-50
- 0.1-25
- ≤0

OUTLOOK BASED ON CURRENT CONDITIONS

November 2022

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UK Centre for Ecology & Hydrology

Outlook based on hydrological persistence and analogy

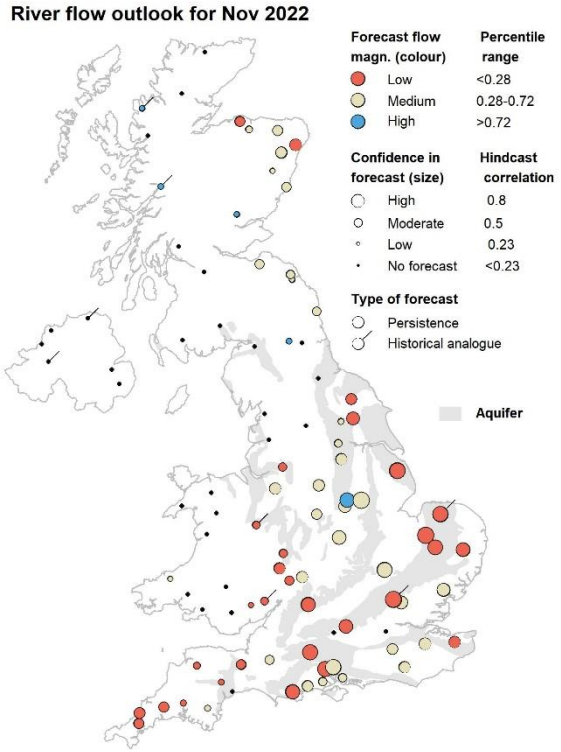
Overview

Period: November 2022 – January 2023

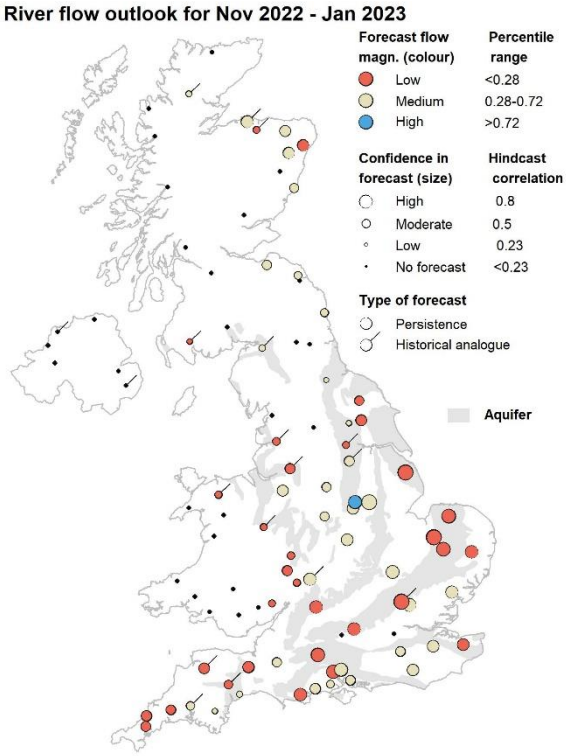
Issued on 04.11.2022 using data to the end of October 2022

SUMMARY:

The outlook for November and for November to January is for normal to below normal flows accross most of England, and mostly normal flows for North Western Scotland. Note that there are very few forecasts available for Wales and no forecasts for Northern Ireland.



1-month flow outlook



3-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.

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.

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UK Centre for Ecology & Hydrology

Outlook based on hydrological persistence and analogy

Site-based: 1 month outlook

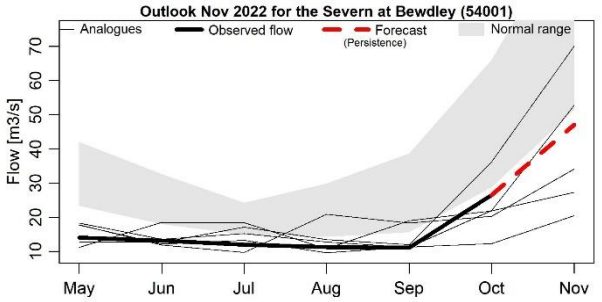
Period: November 2022

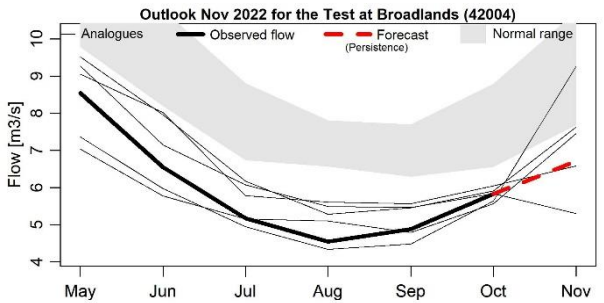
Issued on 04.11.2022 using data to the end of October 2022

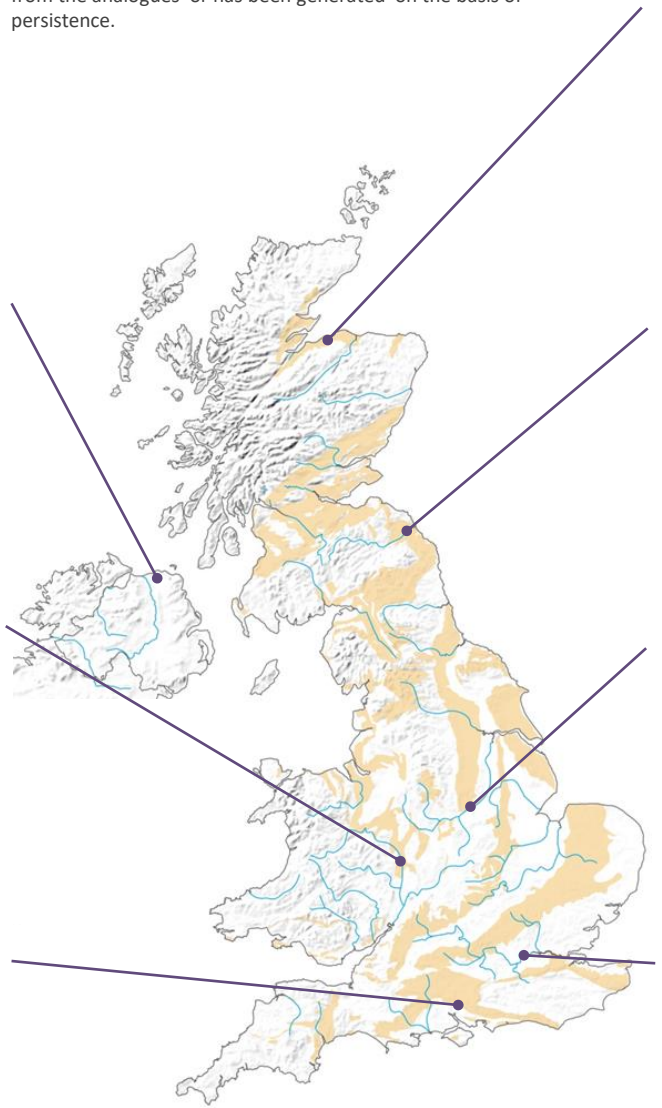
These figures provide insight into the hydrological analogue methodology for a set of sites from across the UK.

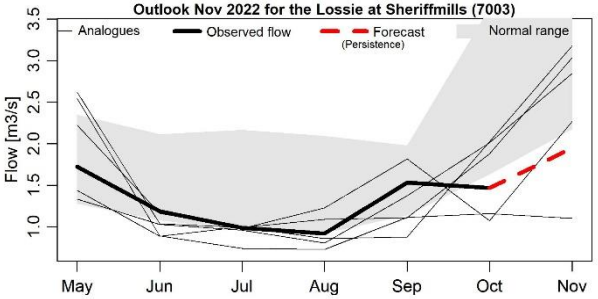
In each of the time series graphs the bold black line represents the observed flow during the past six months. The grey band indicates the normal flow range (the normal band includes 44% of observed flows in each month). The selected analogues are shown as thin lines and the trajectories that flows took 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.

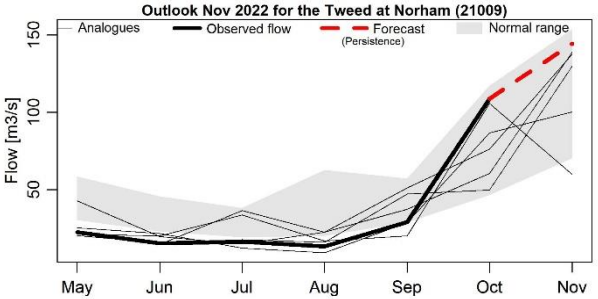
No forecast available

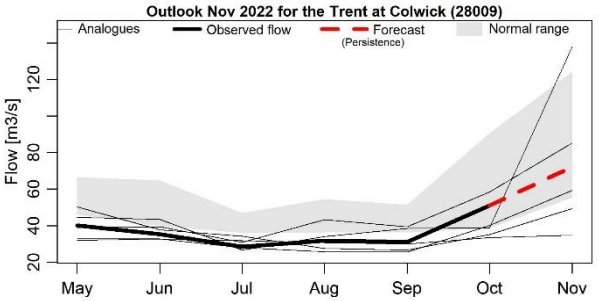












No forecast available

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RIVER FLOW ANALOGY

November 2022

UK Centre for Ecology & Hydrology

Outlook based on hydrological persistence and analogy

Site-based: 3 month outlook

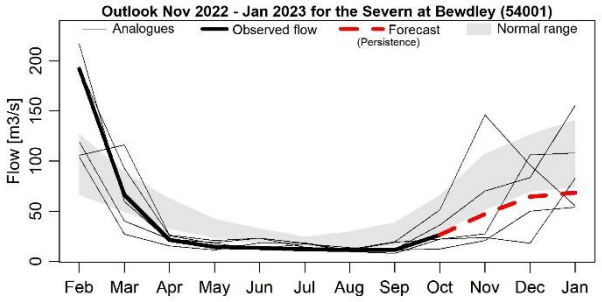
Period: November 2022 – January 2023

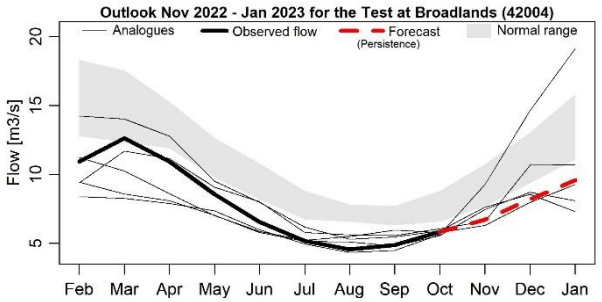
Issued on 04.11.2022 using data to the end of October 2022

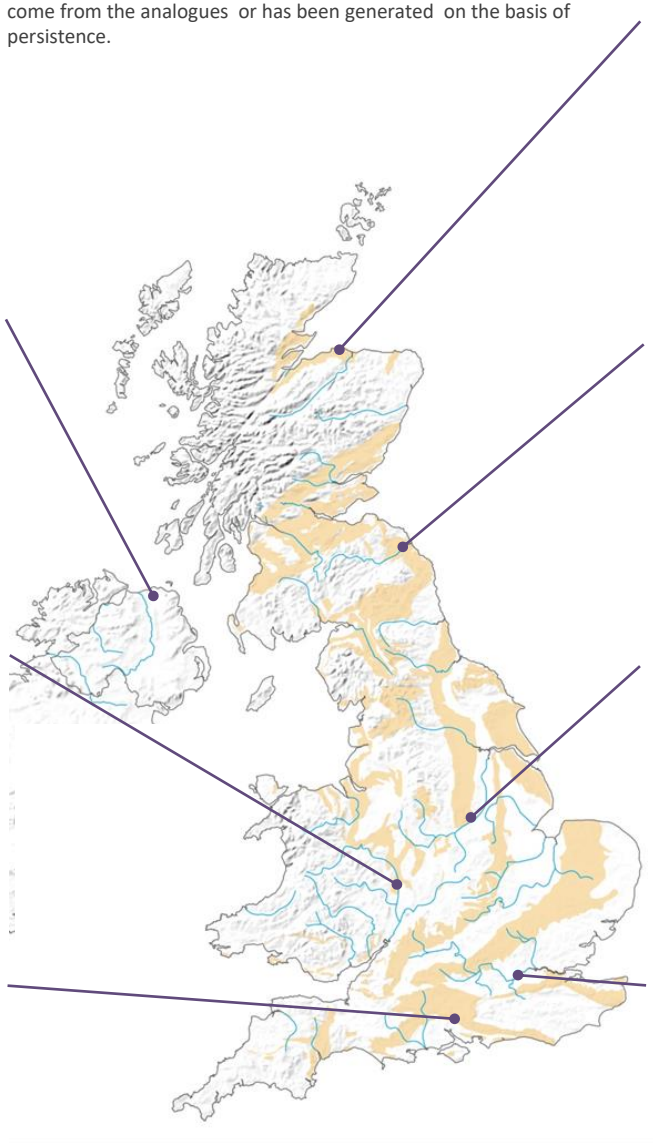
These figures provide insight into the hydrological analogue methodology for a set of sites from across the UK.

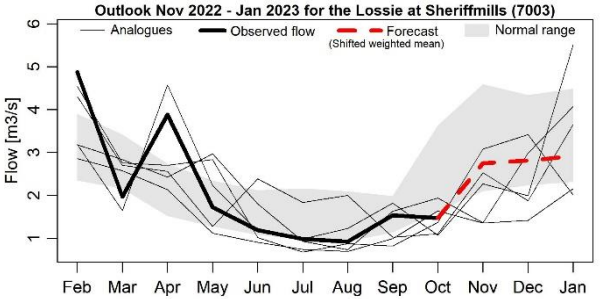
In each of the time series graphs the bold black line represents the observed flow during the past nine months. The grey band indicates the normal flow range (the normal band includes 44% of observed flows in each month). The selected analogues are shown as thin lines and the trajectories that flows 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.

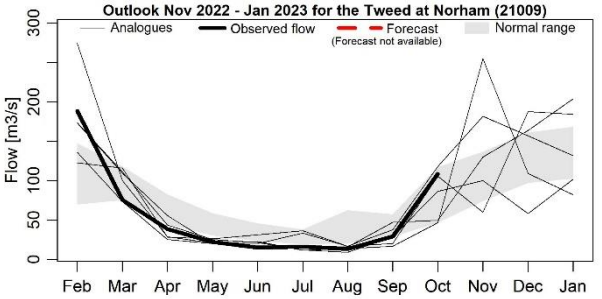
No forecast available

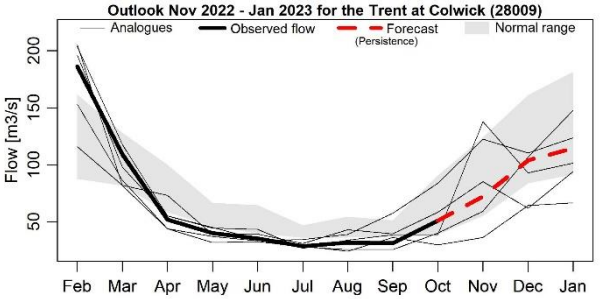












No forecast available

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RIVER FLOW ANALOGY

November 2022

UK Centre for Ecology & Hydrology

British Geological Survey

Environment Agency

Outlook based on modelled flow from historical climate

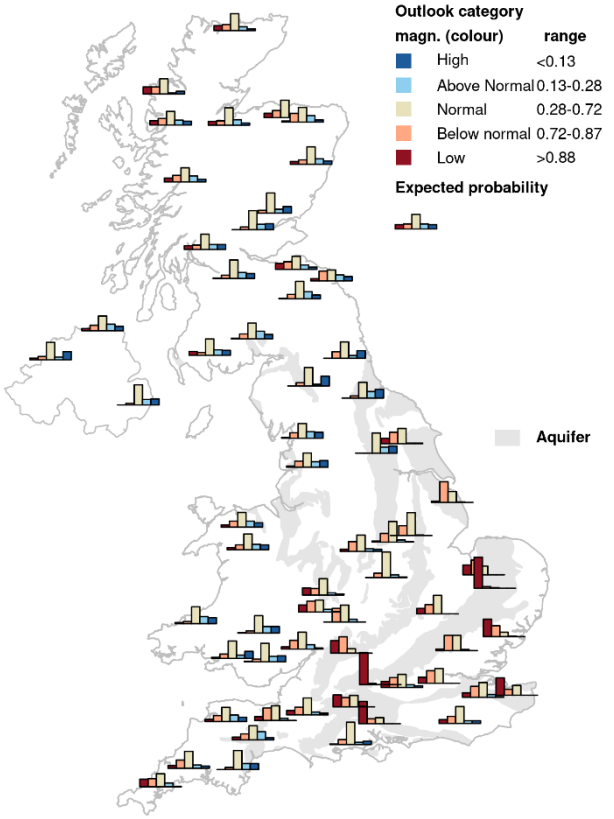
Overview

Period: November 2022 – April 2023

Issued on 03.11.2022 using data to the end of October 2022

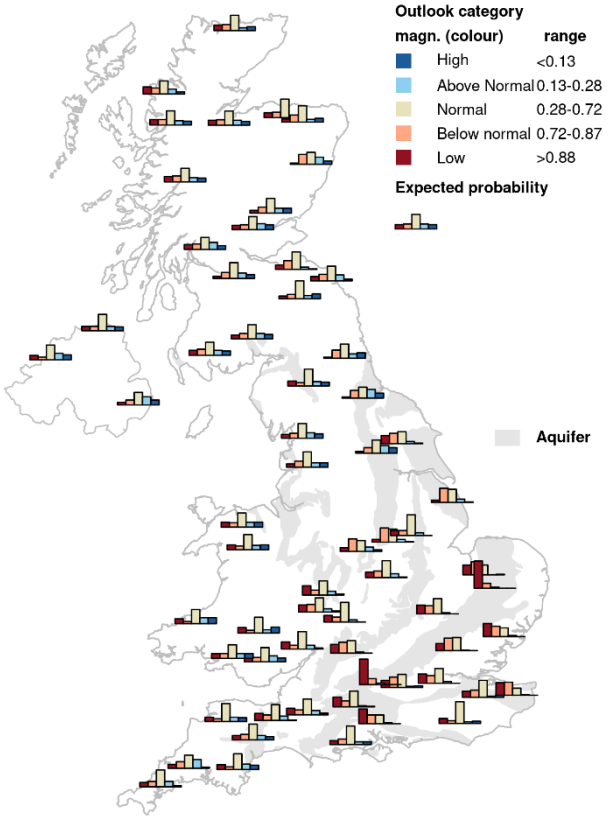
The outlook for November indicates that flows are most likely to be normal to below normal for south eastern England, normal to above normal for most of northern England, and normal for the rest of the UK. The November-December-January outlook indicates that this pattern is likely to persist for the UK over the next 3 months.

1-month river flow outlook starting Nov 2022



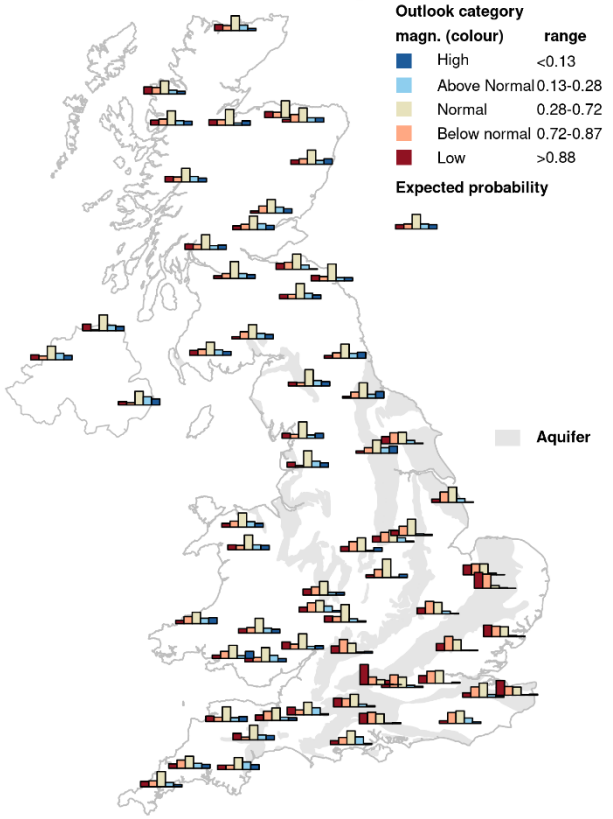
This outlook is based on monthly ensembles of historical sequences of observed climate (rainfall and potential evapotranspiration) that form input to a hydrological model. The outputs are probabilistic simulations of the average river flow over the forecast period (1 to 12 months ahead), at each location. The simulations are generated by the GR4J conceptual rainfall-runoff model from IRSTEA (France) calibrated on observed or naturalised flows.

3-month river flow outlook starting Nov 2022



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.

6-month river flow outlook starting Nov 2022



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.

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RIVER FLOW FROM HISTORICAL CLIMATE

November 2022

UK Centre for Ecology & Hydrology

British Geological Survey

Environment Agency

Outlook based on modelled flow from historical climate

Overview

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 GR4J conceptual rainfall-runoff model from IRSTEA (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.

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RIVER FLOW FROM HISTORICAL CLIMATE

November 2022

UK Centre for Ecology & Hydrology

Outlook Based on Modelled Flow from Rainfall Forecasts

Period: November 2022 – January 2023

Issued on 03.11.2022 using data to the end of September

SUMMARY: During November river flows are most likely to be in the *Normal range*. River flows in south east areas of England and north west Scotland are more likely to be in the *Normal range* to below while in Wales, northern England and the east of Scotland river flows are more likely to be in the *Normal range* to above.

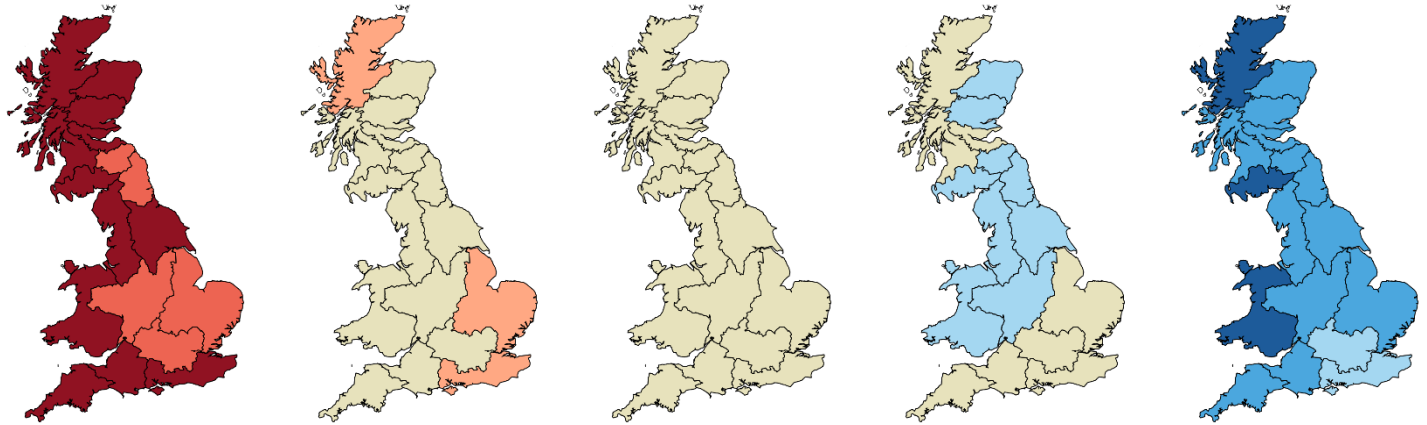
Over the next 3 months river flows are likely to be in the *Normal range*.

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

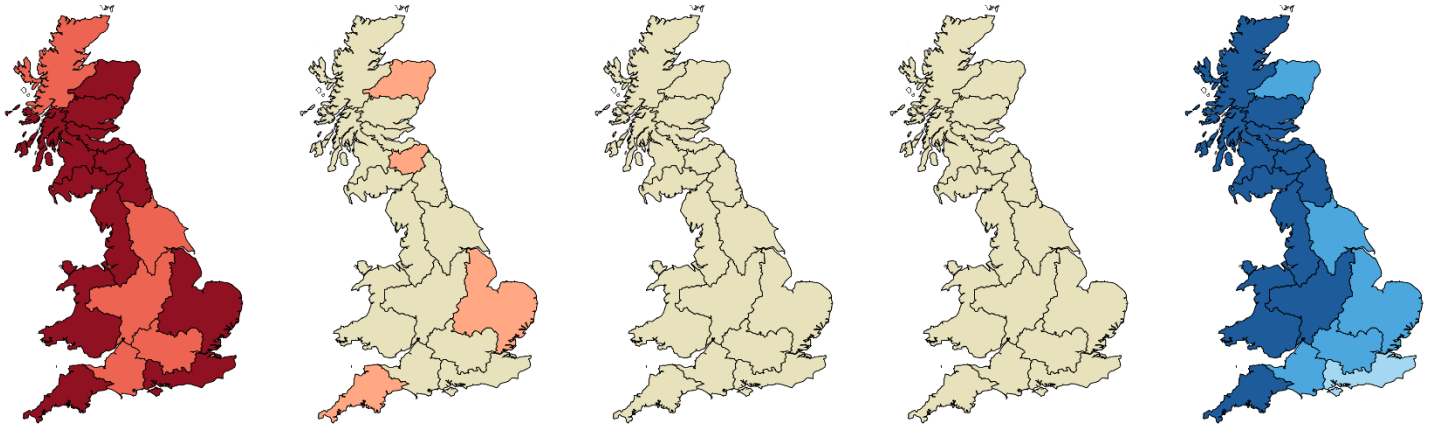
Regional forecast monthly-mean river flows are derived from the average of 1km river flow estimates within each region and ranked in terms of 54 years of historical flow estimates (1963 – 2016).

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

Lowest rainfall forecast | *1st quartile* | *Median* | *3rd quartile* | *Highest rainfall forecast*



Lowest rainfall forecast | *1st quartile* | *Median* | *3rd quartile* | *Highest rainfall forecast*



Key

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

SCOTLAND

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

ENGLAND

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

WALES

WEL	Welsh

NORTHERN IRELAND

This method cannot currently be used in Northern Ireland

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RIVER FLOW FROM RAINFALL FORECASTS

November 2022

UK Centre for Ecology & Hydrology

Outlook Based on Modelled Flow from Rainfall Forecasts

Period: November 2022 – January 2023 Issue date: 03.11.2022

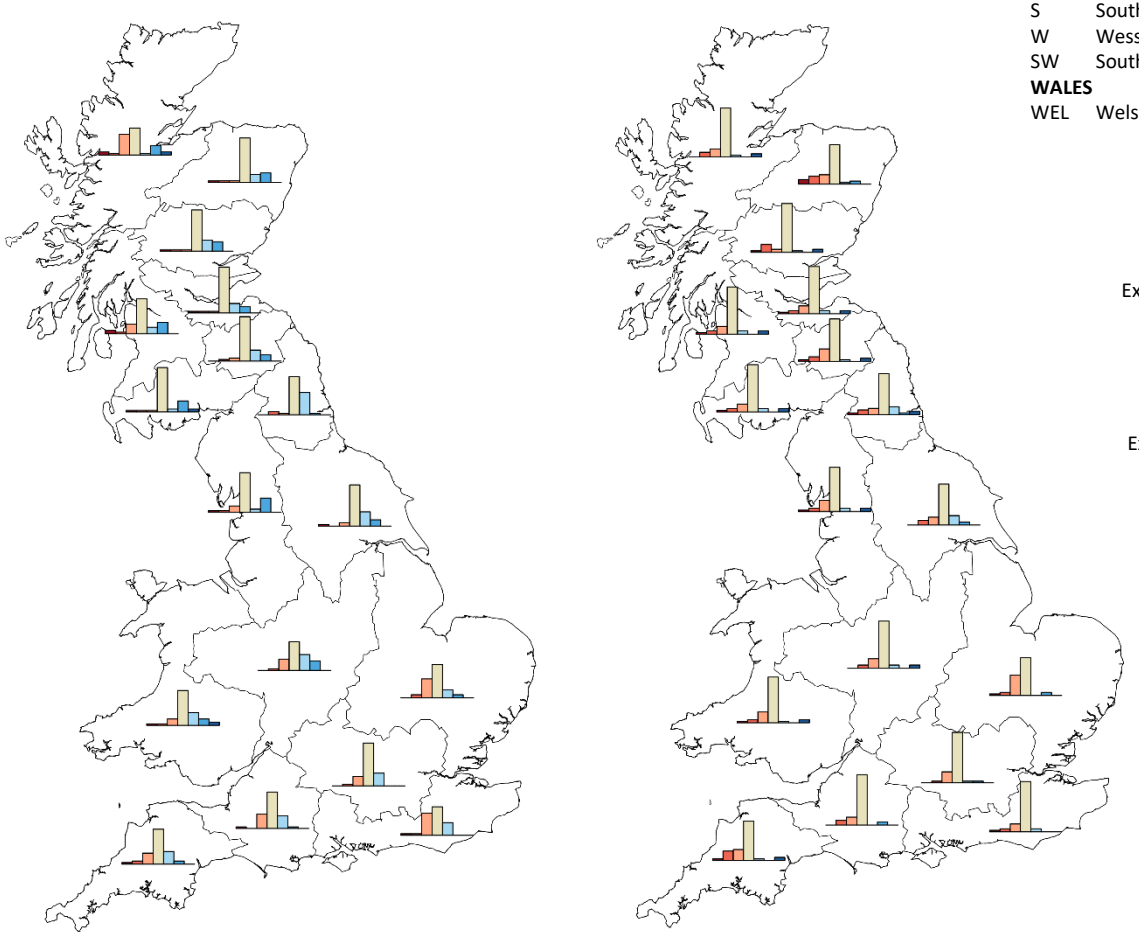
The regional maps illustrating the regional river flows for five members of the Met Office ensemble of rainfall forecasts give some indication of the range of possible river flows in the coming months. As noted previously, the actual flows could be more extreme than the flows generated by either the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

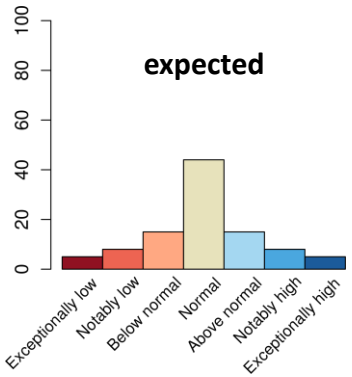
The bar charts (below) give further insight into the range of river flow forecasts by considering all members of the forecast rainfall ensemble. The regional bar charts show the percentage of ensemble forecasts falling in each of the flow categories as generated by the monthly-resolution water-balance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

SUMMARY: During November river flows are most likely to be in the *Normal range*. River flows in south east areas of England and north west Scotland are more likely to be in the *Normal range* to below while in Wales, northern England and the east of Scotland river flows are more likely to be in the *Normal range* to above.

Over the next 3 months river flows in are likely to be in the *Normal range*

1-month *3-month*





SCOTLAND

HR	Highlands Region
NER	North East Region
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CR	Clyde Region
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ENGLAND

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

WALES

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Percentile range of historic values for relevant month

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November 2022

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

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

SUMMARY: During November river flows are most likely to be in the *Normal range*. River flows in south east areas of England and north west Scotland are more likely to be in the *Normal range* to below while in Wales, northern England and the east of Scotland river flows are more likely to be in the *Normal range* to above.

Over the next 3 months river flows are likely to be in the *Normal range.*

SCOTLAND

HR	Highlands Region
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N	Northumbria
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T	Thames
S	Southern
W	Wessex
SW	South West

WALES

WEL	Welsh

NORTHERN IRELAND
This method cannot currently be used in Northern Ireland

1-month ahead	A	NW	N	ST	SW	S	T	Welsh	W	Y	CR	FR	HR	NER	SR	TR	TWR
Exceptionally high flow	0	0	0	0	0	0	0	5	0	0	0	0	5	0	5	0	0
Notably high flow	5	21	2	14	5	0	0	10	2	10	17	10	14	14	17	14	10
Above normal	12	5	33	24	19	19	19	19	19	21	10	14	2	12	5	17	17
Normal range	50	60	57	43	52	43	64	52	55	62	52	69	40	67	67	62	67
Below normal	29	10	2	17	17	33	14	10	21	5	14	2	31	2	2	2	5
Notably low flow	5	2	5	2	5	2	2	2	0	0	2	2	2	2	2	2	2
Exceptionally low flow	0	2	0	0	2	2	0	2	2	2	5	2	5	2	2	2	0

3-months ahead	A	NW	N	ST	SW	S	T	Welsh	W	Y	CR	FR	HR	NER	SR	TR	TWR
Exceptionally high flow	0	5	5	5	5	0	0	5	0	0	5	5	5	0	5	5	5
Notably high flow	5	0	2	0	0	0	2	0	5	5	0	0	0	5	0	0	0
Above normal	0	5	12	5	2	5	2	2	0	14	5	5	2	2	5	2	2
Normal range	57	67	62	71	60	76	76	69	76	62	71	71	74	60	71	74	64
Below normal	31	17	10	14	17	12	17	17	12	12	12	12	12	14	12	5	19
Notably low flow	5	5	7	5	14	5	2	5	7	7	5	5	7	12	5	12	7
Exceptionally low flow	2	2	2	0	2	2	0	2	0	0	2	2	0	7	2	2	2

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British Geological Survey

Outlook based on modelled groundwater level & climate forecast

Overview

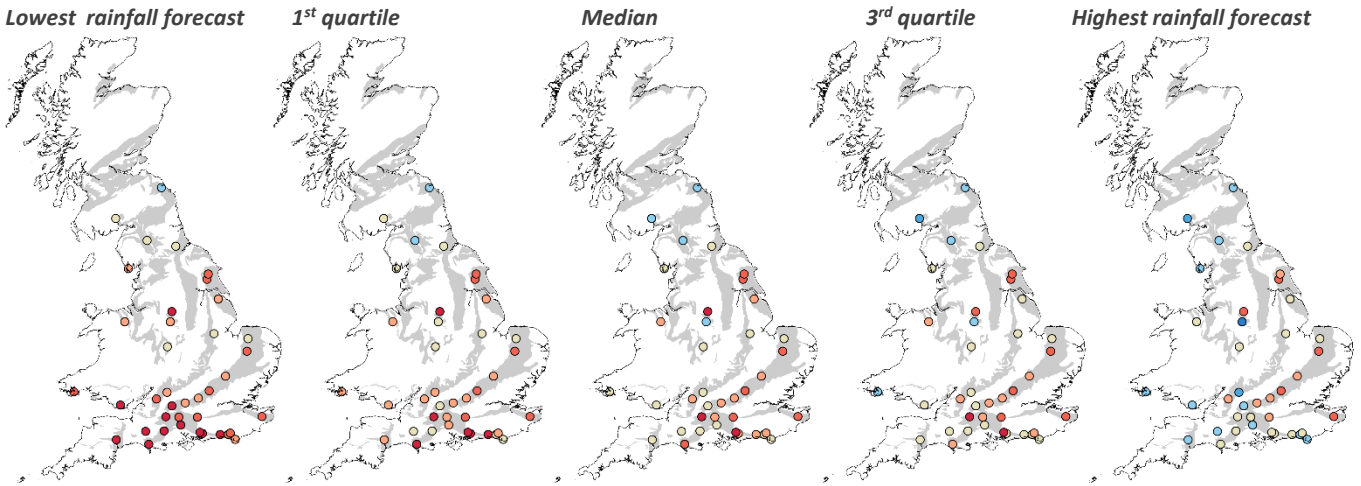
Period: November 2022 – January 2023

Issued on 06.11.2022 using data to the end of October

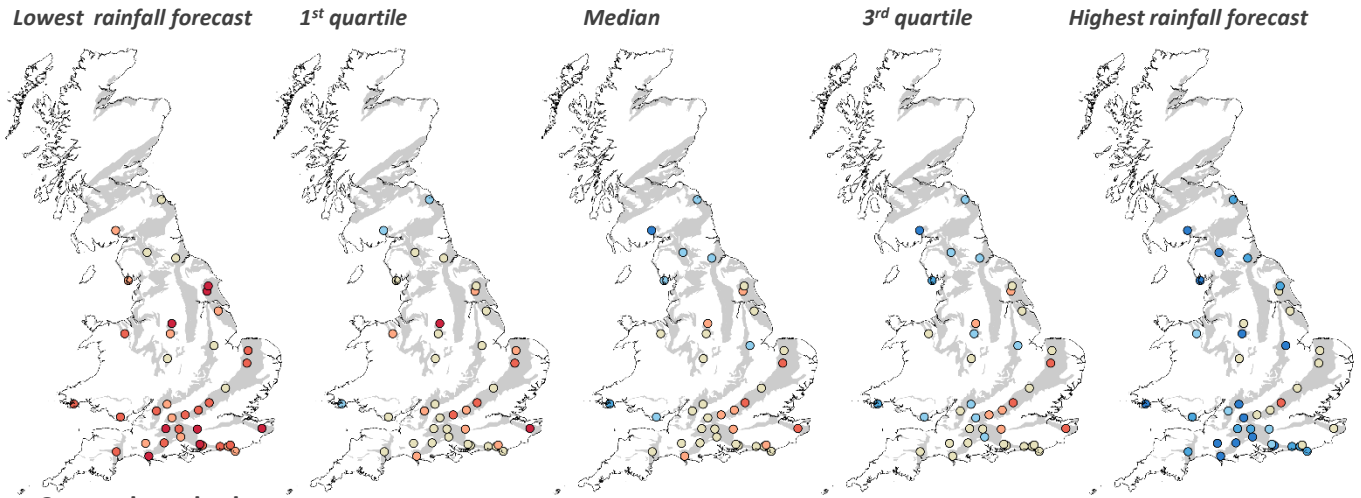
Over the next month, normal to below normal groundwater levels are forecast across most of England and Wales in all but the highest rainfall forecast. Levels in Scotland and the far north of England are mainly forecast to be normal and above normal over November. With median rainfall or above the situation is forecast to improve over 3 months, with levels expected to return to the normal range in responsive aquifers, although low levels are likely to persist in slowly responding Chalk aquifers. Note there are a reduced number of modelled sites due to IT issues in Scotland.

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.

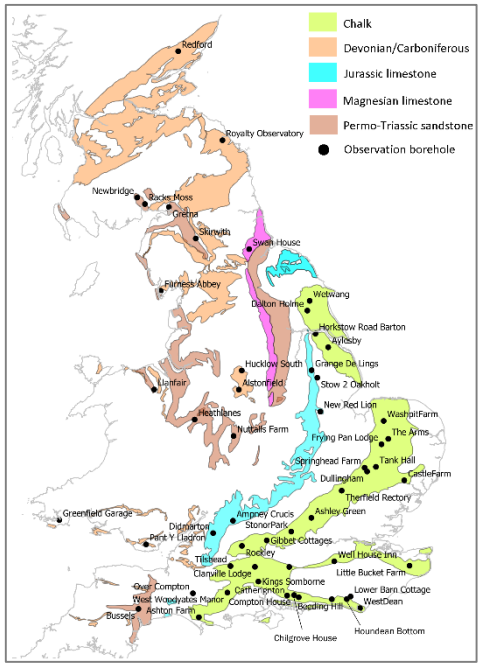


1-month outlook



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



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UK Centre for Ecology & Hydrology

British Geological Survey

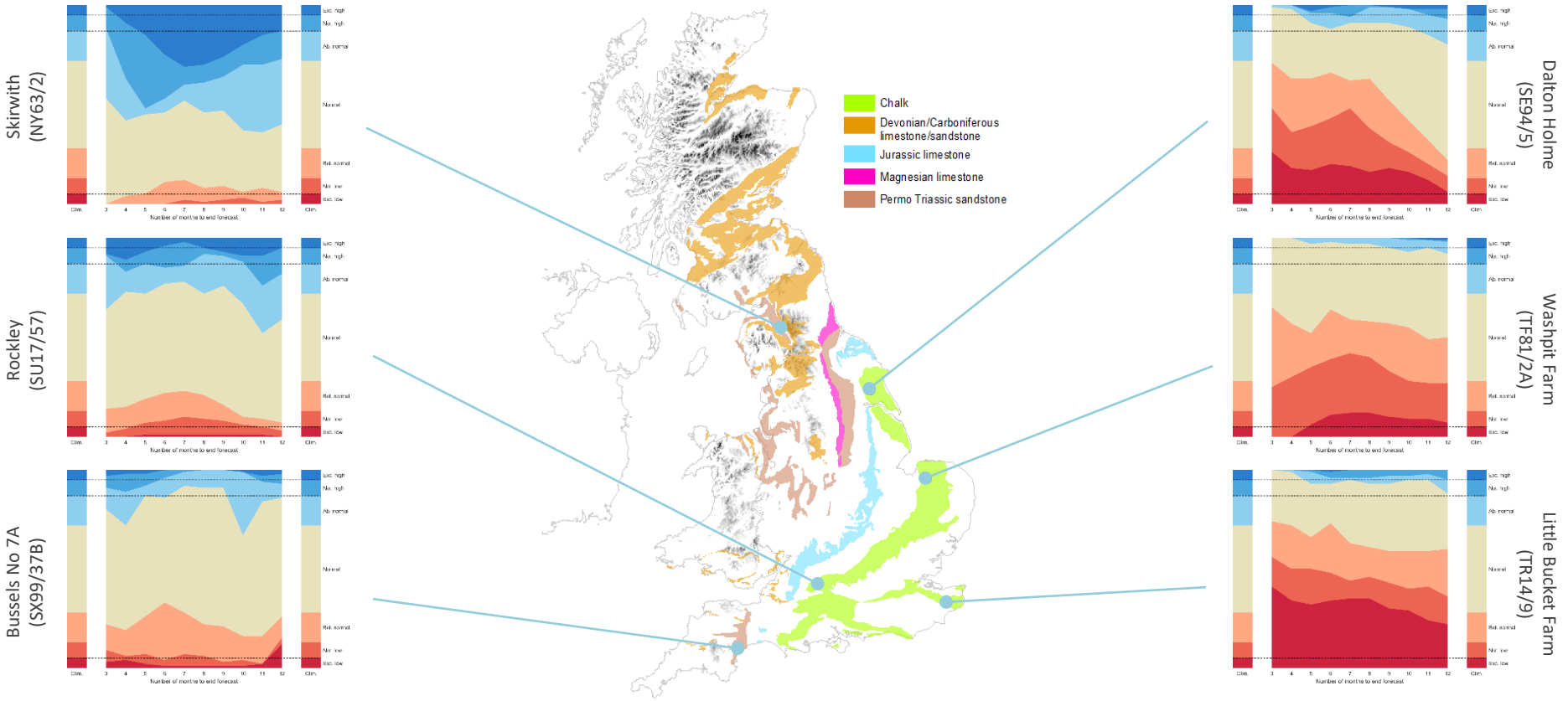
Environment Agency

Outlook based on modelled groundwater from historical climate

Period: November 2022 – January 2023

Issued on 06.11.2022 using data to the end of October

In the Permo-Triassic Sandstones at Skirwith, normal to above normal groundwater levels are expected to prevail over the next 12 months, while at Bussels No 7A water levels are forecast to remain in the normal range. Levels in the Chalk are predicted to remain below normal for the next 8 months at Dalton Holme, and for the next 12 months at Washpit Farm and Little Bucket Farm. Normal levels are anticipated to prevail at Rockley.



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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.

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