Hydrological Summary for the United Kingdom

January 2020

General

January was generally a mild month, punctuated by wintery and windy weather in the middle and end of the month, including storm 'Brendan' on the 13th. It was the sixth warmest January for the UK since 1884, with much of the country recording temperatures more than 1.5°C above average. Although rainfall for the UK was near average overall, it was below average across most of the country with the exception of western Scotland and parts of central and eastern England where it was above average. River flows were generally in the normal range, with some catchments in western Scotland, and southern and eastern England registering above normal to notably high flows, whilst in eastern Scotland and Northern Ireland flows were below normal to notably low. Soils were generally wetter than average, with the exception of regions in eastern England and Scotland where soils remained drier than average. Groundwater levels were normal to notably high in most boreholes; levels fell in almost half of the boreholes, while others rose in a delayed response to the late 2019 rainfall. Reservoir stocks for England & Wales were healthy, with stocks in almost all reservoirs above average despite a decrease in stocks relative to average. As such, the outlook for water resources is healthy. However, storms in early February have caused significant flooding in northern England and forecasts for further unsettled weather and saturated soils means there is an enhanced risk of flooding.

Rainfall

Although anticyclonic conditions dominated much of January, frontal systems affected western Scotland throughout the month, and much of the UK mid-month and at month-end. From the 7th conditions became more unsettled, with 138mm registered at Alltdearg House (Skye), and further heavy rainfall on the 11th (97mm at Achnagart, Inverness-shire) caused localised flooding and transport disruption in Newcastle and parts of Scotland. Wet and windy weather on the 14th (42mm at Libanus, Powys) caused further travel disruption and power outages in Scotland, Northern Ireland, Wales and south-east England. After a more settled period from the 18th-25th unsettled weather returned. On the 28th (15cm snow was recorded at Tulloch Bridge, Inverness-shire) and 29th snow in northern and western Britain brought travel disruption and road closures (following a landslip on the A83, Argyll and Bute). Although the UK received near average rainfall for January, this masks spatial contrasts – 59% of average was recorded in Northern Ireland and 89% of average in England & Wales, with Northumbrian and Yorkshire regions registering around two thirds of average. Less than half the average rainfall was received in eastern Scotland, parts of Northern Ireland and north-east England, with less than 30% on the eastern tip of Aberdeenshire. In contrast, above average rainfall was registered across western Scotland. Areas over higher ground here received more than 150% of average and it was the tenth wettest January for the Highlands region in a series from 1910. For the winter half-year so far (October-January), above average rainfall was registered across much of England, with regions across central and southern England receiving more than 120% of average over this period.

River flows

In the majority of catchments flows increased steadily from the start of January and peaked mid-month. In some catchments in Scotland, Northern Ireland and southern England new daily flow maxima were established between the 11th-17th, and on the 15th the Stringside and Piddle recorded their fifth highest January peak flows (in records of over 50 years). Recessions were then established before further flow responses at month-end; most catchments ended January with above average flows. Across Great Britain, January mean flows were generally in the normal range, with above normal to notably high flows in parts of Scotland and southern and eastern England. The Itchen recorded its fifth highest January mean flow (in a series from 1959). Flows were below normal to notably low in eastern Scotland, Northern Ireland and some catchments in northern England. Flows were around half the January average on the Tweed, Annacloy, Deveron and Bush, the latter two registered the fourth and sixth lowest January mean flows respectively, in records exceeding 45 years. For the winter half-year so far (October-January), flows were normal to exceptionally high across England and Wales. New records for this period were established on the Don, Lud and Warwickshire Avon where flows approached or exceeded 250% of average as well as the Witham which exceeded three times the average. Many of the catchments in central England with exceptionally high flows registered their second or third highest mean flows for this period (e.g. the Trent and Wye in records exceeding 60 years). Over the same time period, mean outflows from England for were the third highest in a series from 1961.

Groundwater

Soil moisture deficits were near-zero across the UK, and in almost all regions soils became wetter in January. Groundwater levels fell in the more responsive areas of the Chalk as a result of the relatively dry January following the exceptionally high levels of December, and ranged from normal to notably high (e.g. at Chilgrove House). The fall was pronounced in the northern Chalk, e.g. at Wetwang levels fell from exceptionally high to normal. There were twelve groundwater flood alerts in place at the end of January, mainly in Wiltshire and Hampshire. Sewage systems and roads were reportedly affected, and some properties were pumping to avoid flooding. Levels in the Chilterns and East Anglia, which are slower to respond to rainfall, continued to rise and all but Dial Farm moved to a higher category. Therfield Rectory and Redlands Hall became below normal. In the Jurassic limestones levels fell, although New Red Lion recorded a record high for the fourth consecutive month, and Ampney Crucis returned to normal. Levels rose in the Magnesian Limestone, but dropped to notably high. Levels fell overall in the Carboniferous Limestone. Groundwater levels in the Permo-Triassic Sandstones rose or were stable, and apart from Weir Farm were normal to above normal. In the Upper Greensand and Fell Sandstone, levels rose slightly and were above normal and notably high, respectively.

UK Centre for Ecology & Hydrology

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Rainfall . . . Rainfall . . .

Rainfall accumulations and return period estimates

Percentages are from the 1981-2010 average.

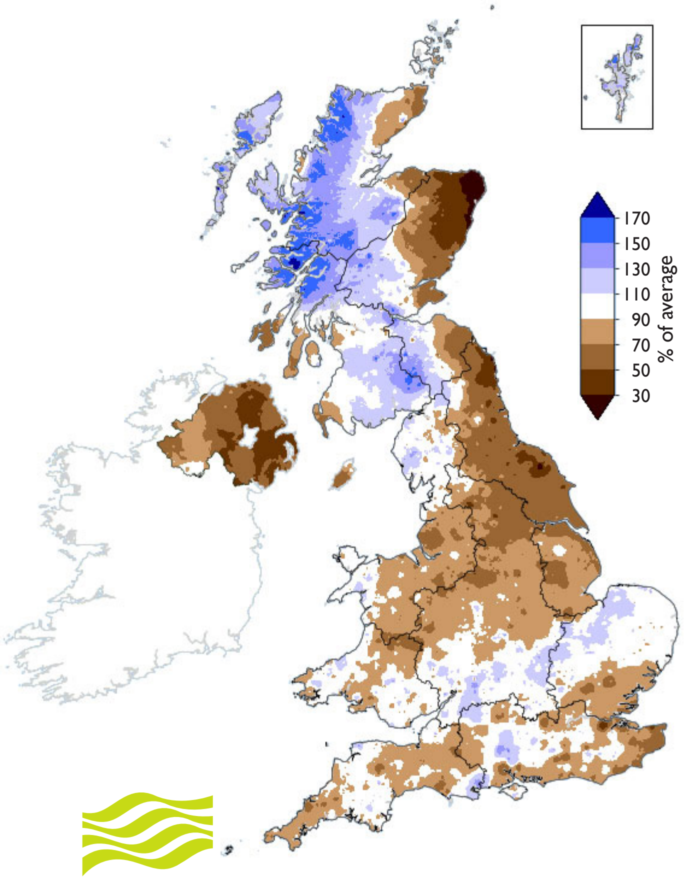
Region	Rainfall	Jan 2020	Dec19 – Jan20		Oct19 – Jan20		Aug19 – Jan20		Feb19 – Jan20	
				RP		*RP*		*RP*		*RP*
United Kingdom	mm	**122**	261		517		776		1298	
	%	**102**	109	2-5	107	5-10	117	10-20	115	30-50
England	mm	**71**	174		415		605		1002	
	%	**87**	103	2-5	120	5-10	125	10-20	118	10-20
Scotland	mm	**210**	402		658		1012		1701	
	%	**120**	120	5-10	99	2-5	111	8-12	112	20-30
Wales	mm	**143**	323		694		1019		1666	
	%	**94**	102	2-5	108	2-5	119	8-12	117	10-20
Northern Ireland	mm	**68**	177		406		676		1246	
	%	**59**	76	5-10	87	2-5	103	2-5	109	8-12
England & Wales	mm	**81**	195		453		661		1093	
	%	**89**	103	2-5	117	5-10	124	10-20	118	15-25
North West	mm	**118**	260		497		856		1495	
	%	**95**	100	2-5	94	2-5	117	5-10	122	25-40
Northumbria	mm	**58**	116		347		589		1060	
	%	**70**	68	5-10	101	2-5	120	5-10	121	20-35
Severn-Trent	mm	**60**	144		393		577		1002	
	%	**84**	96	2-5	129	10-15	133	20-30	128	80-120
Yorkshire	mm	**54**	129		407		604		1021	
	%	**66**	77	2-5	122	5-10	128	10-15	121	15-25
Anglian	mm	**49**	123		304		419		708	
	%	**92**	115	2-5	132	10-15	124	5-10	113	5-10
Thames	mm	**65**	168		370		496		799	
	%	**95**	121	2-5	127	5-10	122	5-10	111	2-5
Southern	mm	**71**	204		444		572		888	
	%	**86**	120	2-5	124	5-10	120	5-10	111	2-5
Wessex	mm	**84**	222		477		662		1016	
	%	**92**	117	2-5	123	5-10	128	8-12	115	5-10
South West	mm	**123**	305		696		960		1424	
	%	**91**	109	2-5	124	8-12	131	15-25	116	8-12
Welsh	mm	**138**	312		675		986		1612	
	%	**95**	103	2-5	110	2-5	120	8-12	118	15-25
Highland	mm	**294**	524		781		1166		1944	
	%	**135**	126	8-12	96	2-5	106	5-10	107	5-10
North East	mm	**77**	171		423		645		1175	
	%	**79**	89	2-5	101	2-5	110	2-5	116	10-15
Tay	mm	**170**	338		597		897		1514	
	%	**105**	113	2-5	101	2-5	112	5-10	113	10-20
Forth	mm	**154**	303		540		836		1403	
	%	**113**	117	5-10	106	5-10	118	10-20	117	30-50
Tweed	mm	**117**	209		434		719		1261	
	%	**110**	99	2-5	102	2-5	122	10-20	123	40-60
Solway	mm	**184**	358		623		1070		1793	
	%	**115**	110	2-5	95	2-5	119	10-20	120	50-80
Clyde	mm	**248**	521		808		1260		2053	
	%	**118**	128	8-12	101	2-5	114	10-15	113	15-25

% = percentage of 1981-2010 average *RP = Return period*

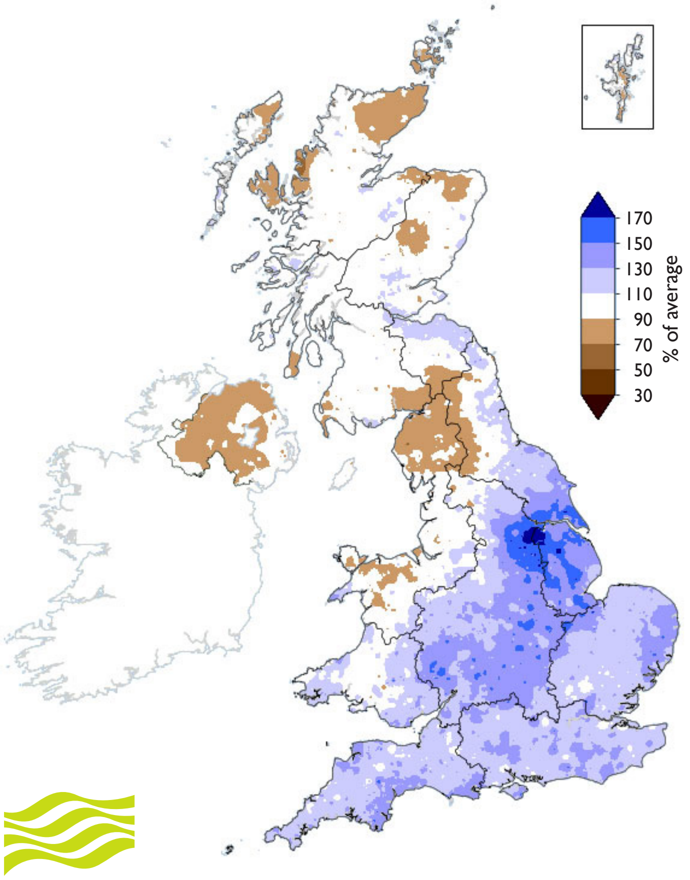
Important note: Figures in the above table may be quoted provided their source is acknowledged (see page 12). Where appropriate, specific mention must be made of the uncertainties associated with the return period estimates. The RP estimates are based on data provided by the Met Office and reflect climatic variability since 1910; they also assume a stable climate. The quoted RPs relate to the specific timespans only; for the same timespans, but beginning in any month the RPs would be substantially shorter. The timespans featured do not purport to represent the critical periods for any particular water resource management zone. For hydrological or water resources assessments of drought severity, river flows and/or groundwater levels normally provide a better guide than return periods based on regional rainfall totals. Note that precipitation totals in winter months may be underestimated due to snowfall undercatch. All monthly rainfall totals since January 2018 are provisional.

Rainfall . . . Rainfall . . .

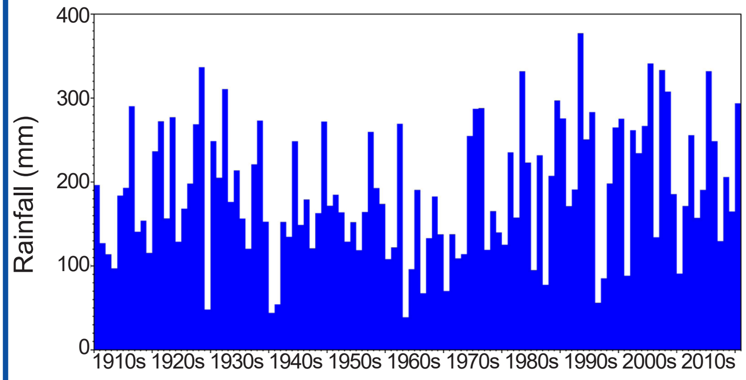
**January 2020 rainfall
as % of 1981-2010 average**



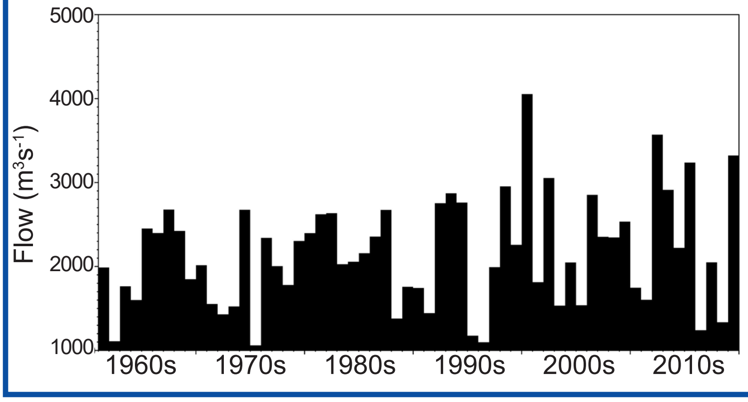
**October 2019 - January 2020 rainfall
as % of 1981-2010 average**



January rainfall totals for the Highland region



October - January average outflows for England



Hydrological Outlook UK

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

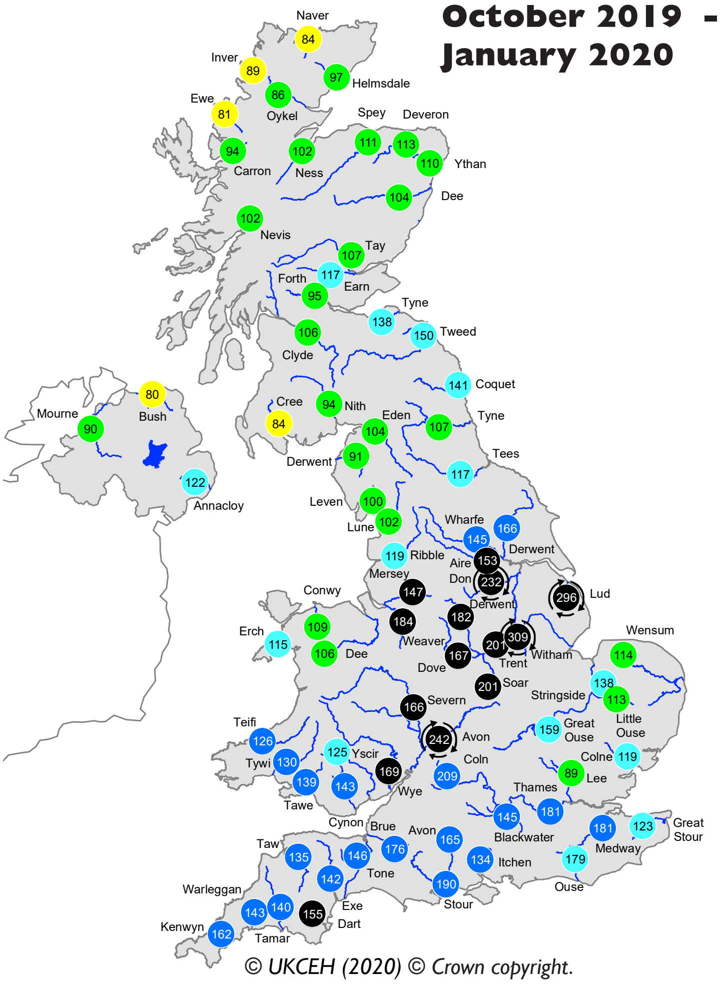
The complete version of the Hydrological Outlook UK can be found at: www.hydoutuk.net/latest-outlook/

Period: **from February 2020**
Issued: **10.02.2020**
using data to the end of January 2020

River flows and groundwater levels are likely to be normal to above normal during February, and in the three months to April, throughout the UK.

River flow . . . River flow . . .

October 2019 - January 2020



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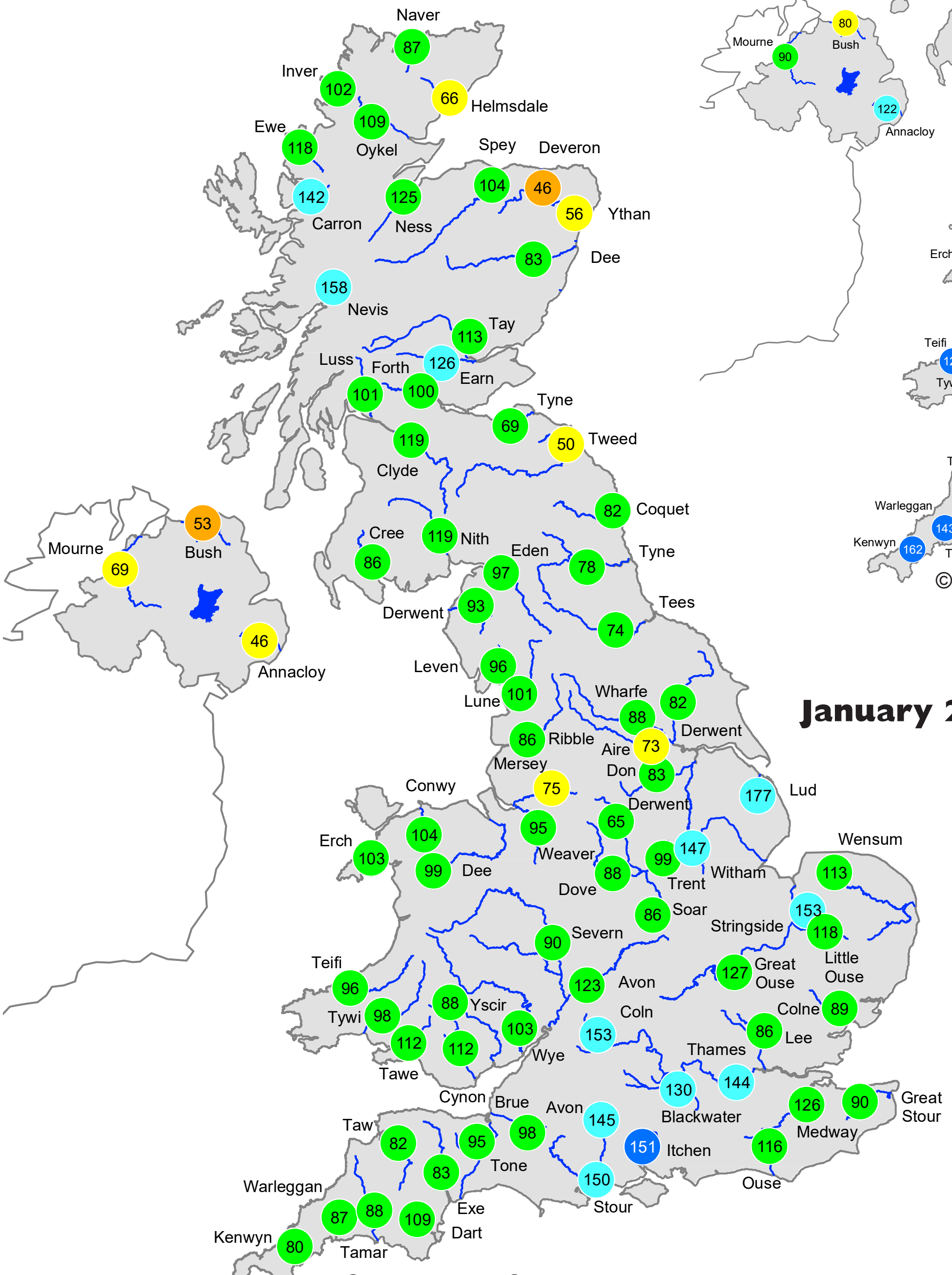
January 2020



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Key

25 % of long-term average (record figure when circled)

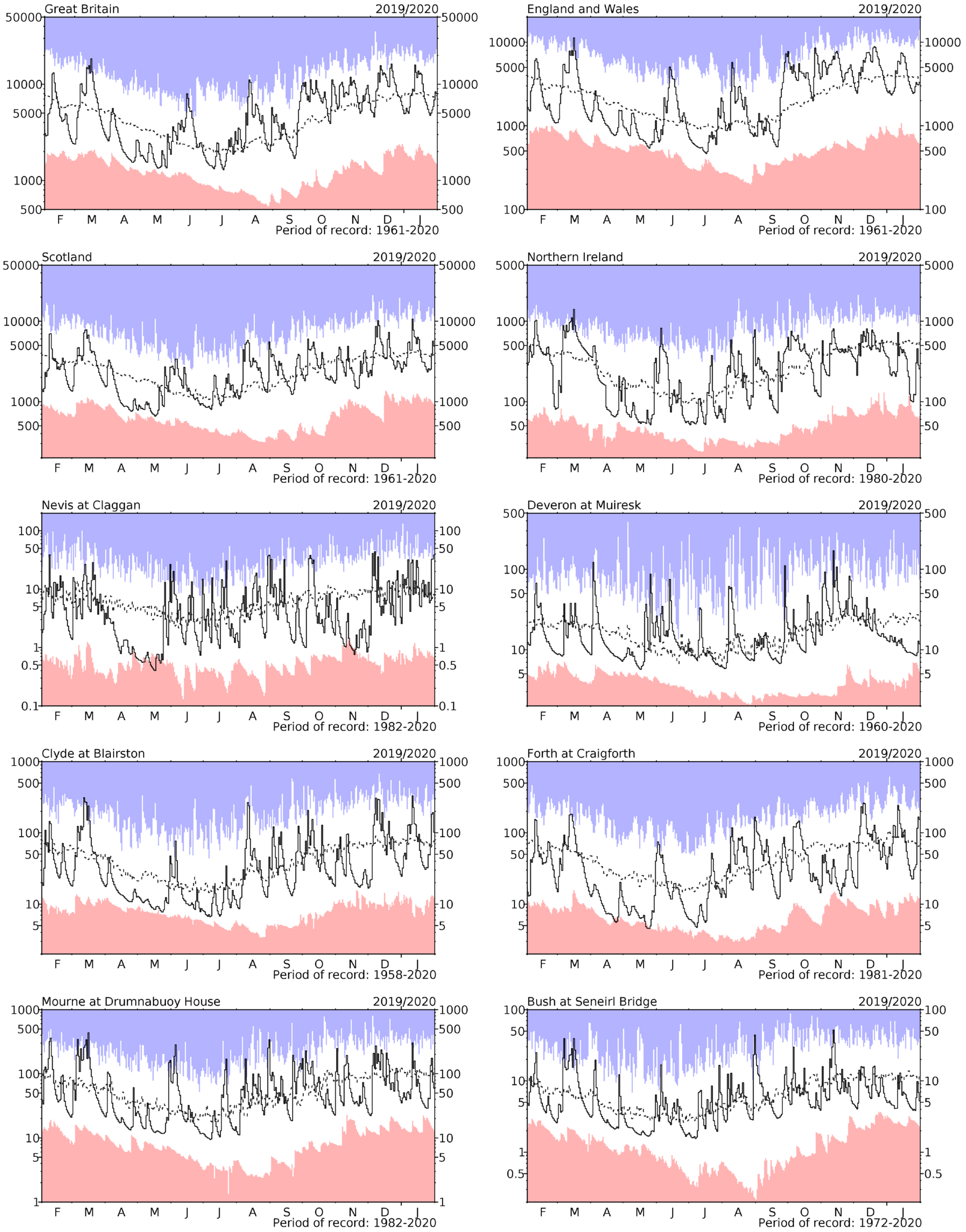
- ● Exceptionally high flow
- ● Notably high flow
- ● Above normal
- ● Normal range
- ● Below normal
- ● Notably low flow
- ● Exceptionally low flow

*Based on ranking of the monthly flow**

River flows

*Comparisons based on percentage flows alone can be misleading. A given percentage flow can represent extreme drought conditions in permeable catchments where flow patterns are relatively stable but be well within the normal range in impermeable catchments where the natural variation in flows is much greater. Note: the averaging period on which these percentages are based is 1981-2010. Percentages may be omitted where flows are under review.

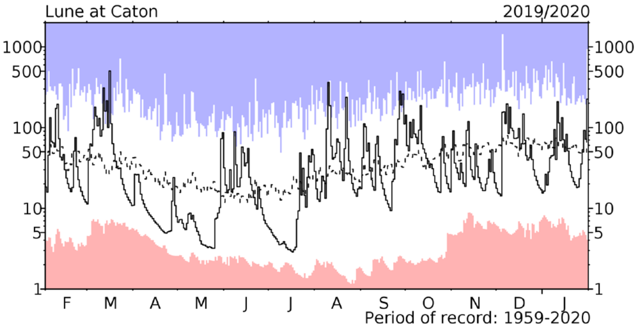
River flow . . . River flow . . .

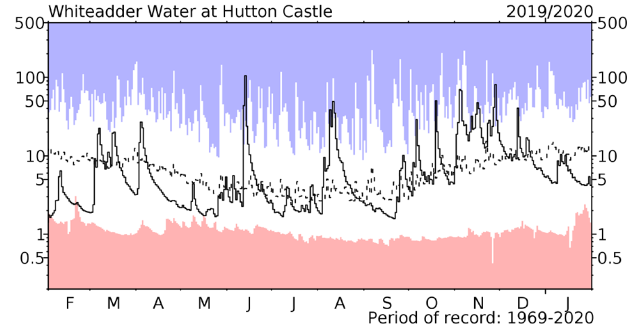


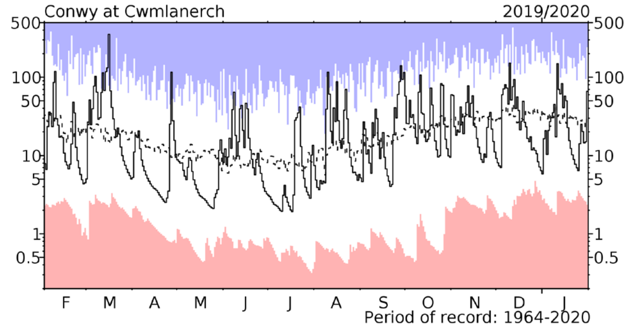
River flow hydrographs

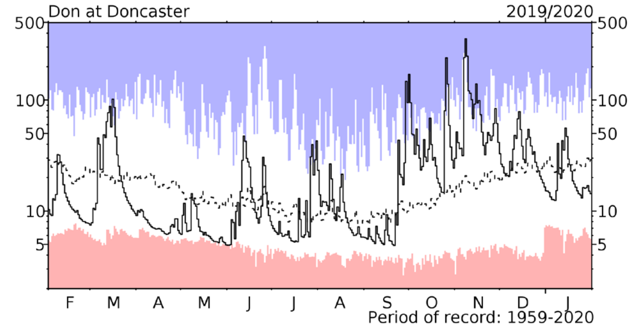
*The river flow hydrographs show the daily mean flows (measured in m^3s^{-1}) together with the maximum and minimum daily flows prior to February 2019 (shown by the shaded areas). Daily flows falling outside the maximum/minimum range are indicated where the bold trace enters the shaded areas. The dashed line represents the period-of-record average daily flow.

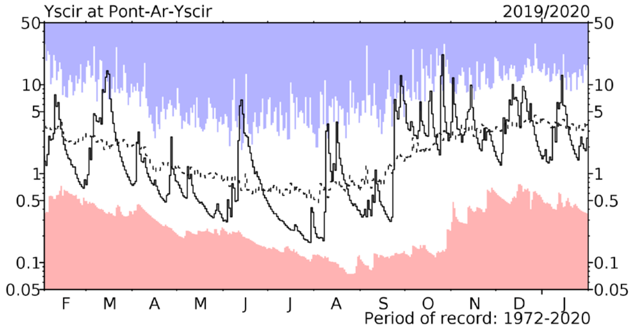
River flow . . . River flow . . .

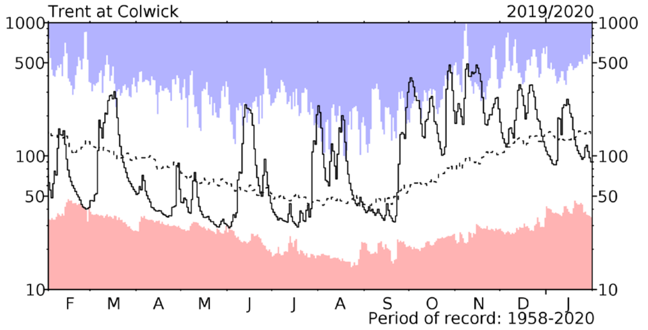


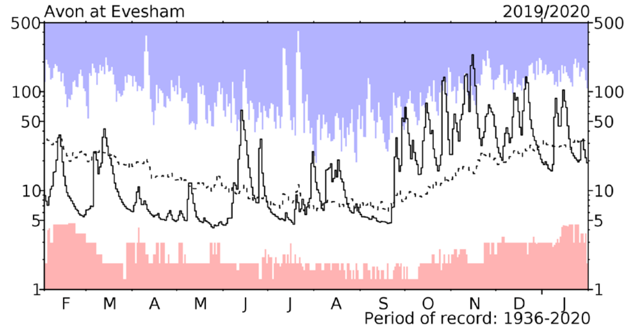


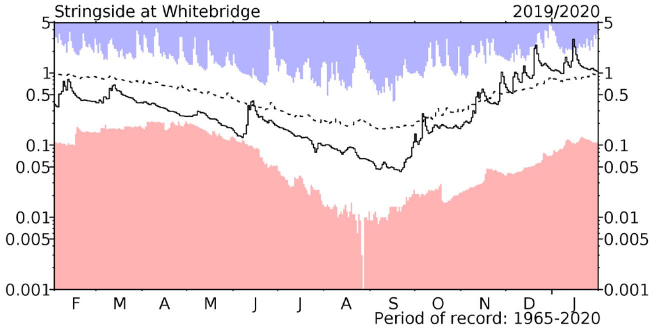


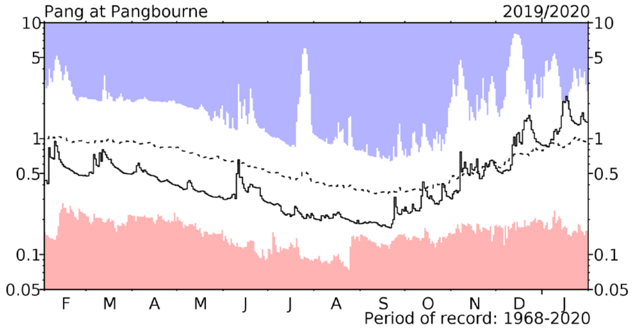


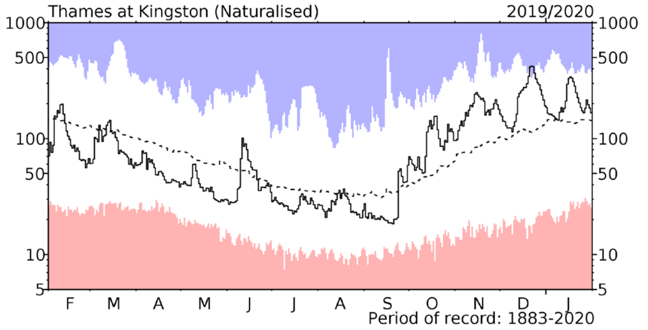


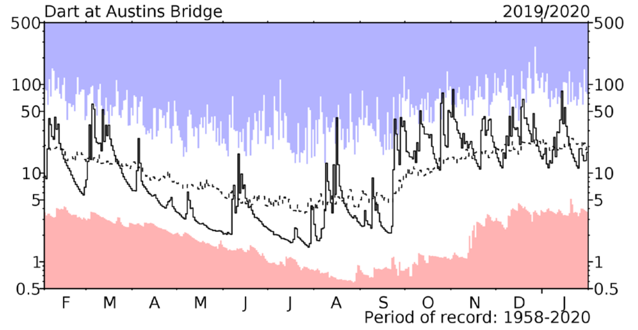


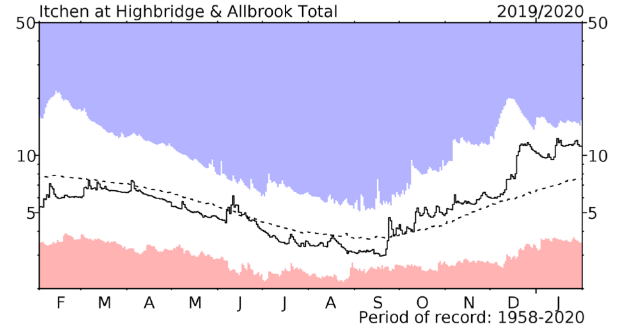




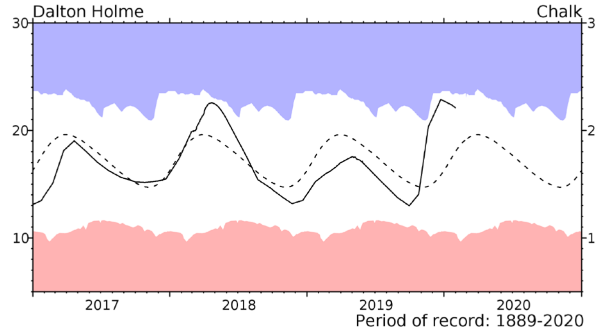


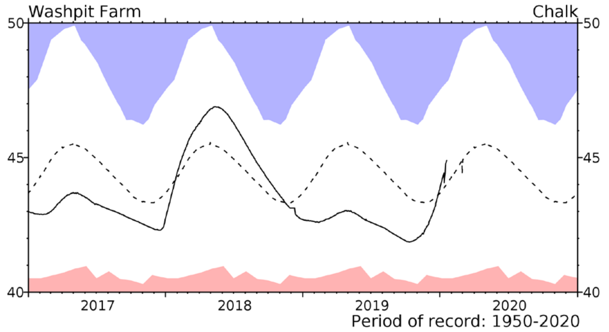


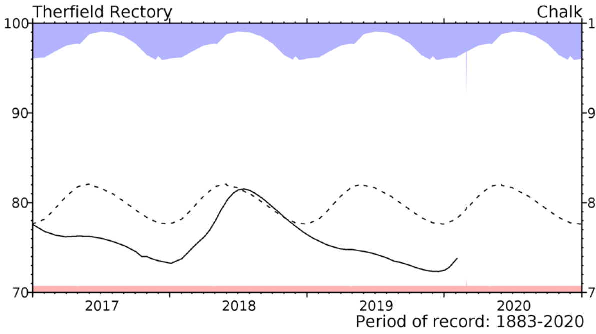


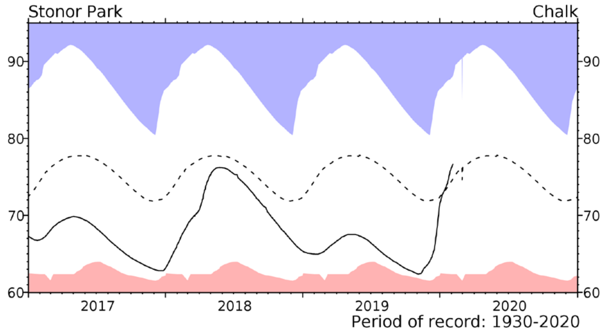


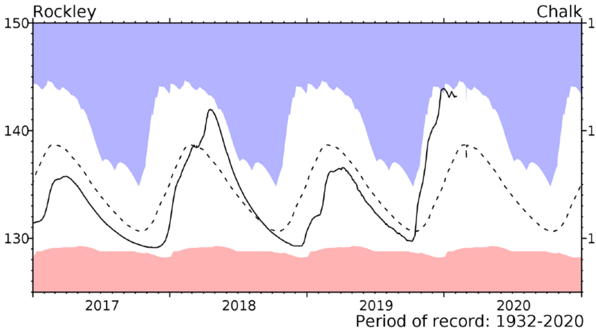
Groundwater . . . Groundwater

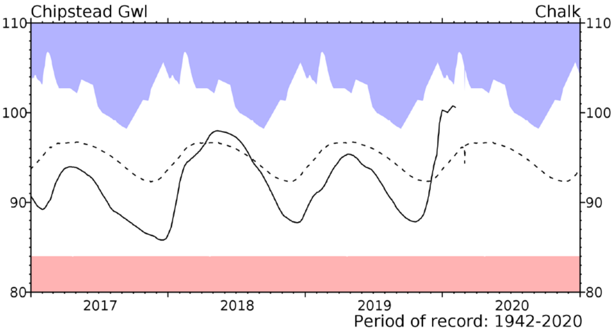


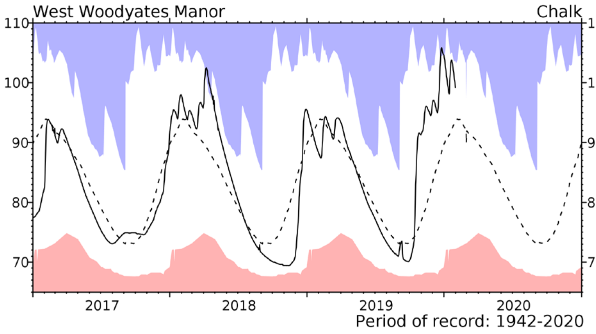


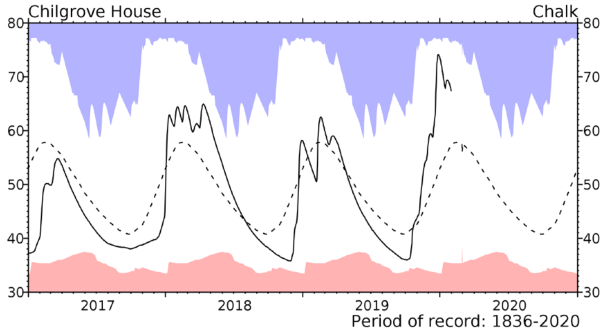


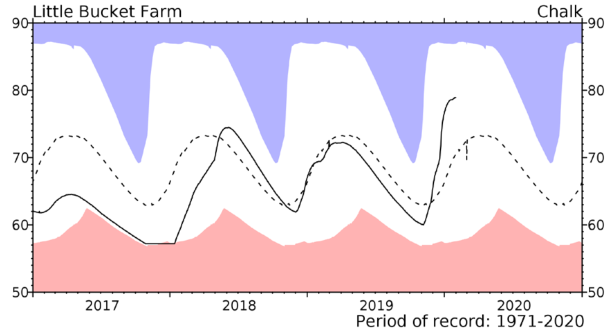


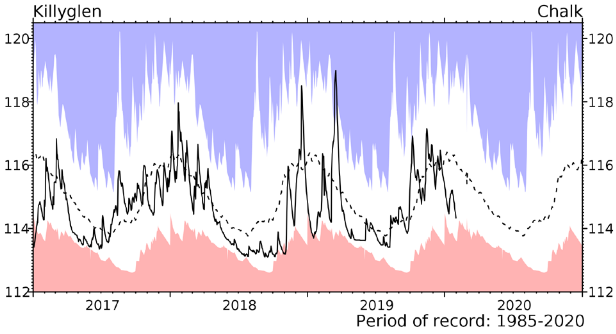






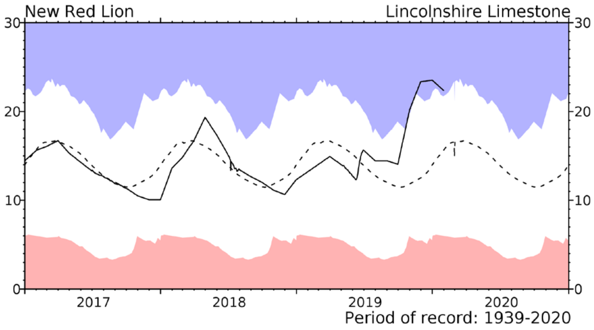


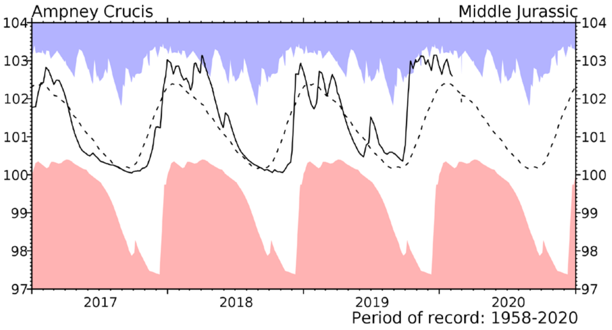


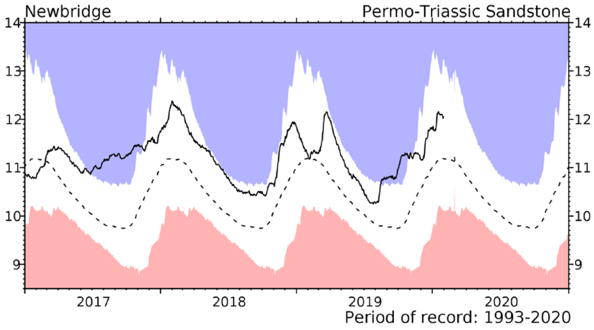


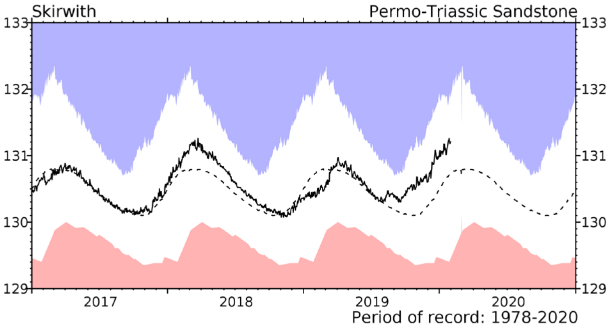
Groundwater levels (measured in metres above ordnance datum) normally rise and fall with the seasons, reaching a peak in the spring following replenishment through the winter (when evaporation losses are low and soil moist). They decline through the summer and early autumn. This seasonal variation is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

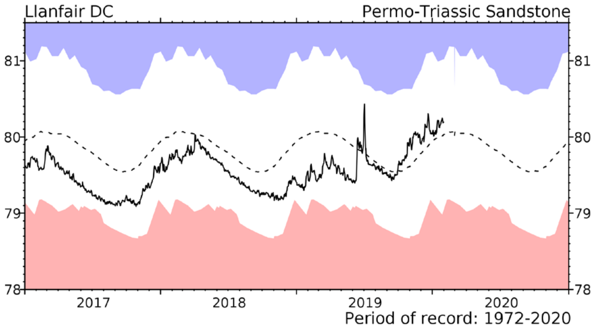
Groundwater… Groundwater

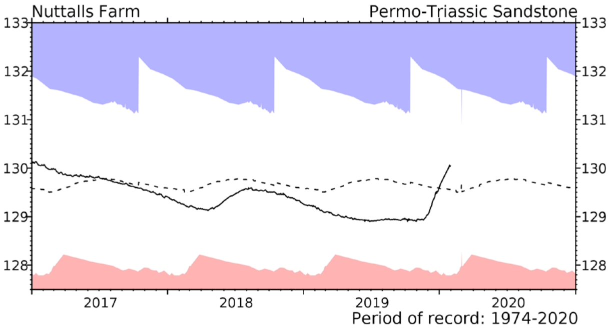


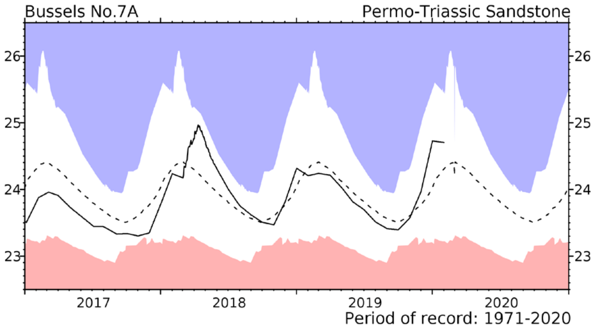


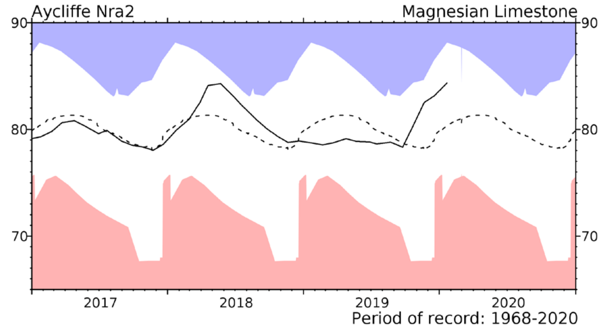


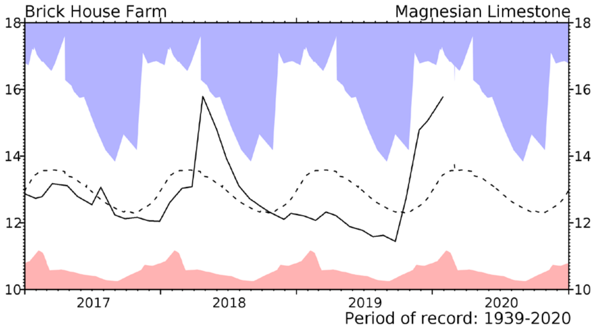


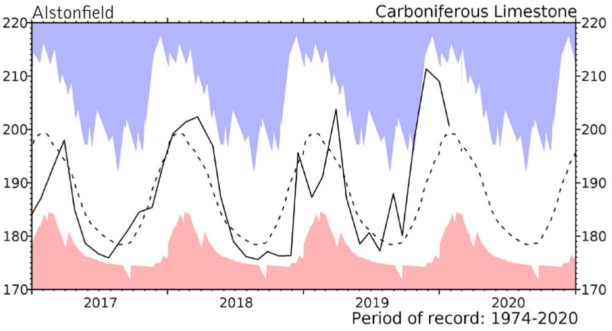


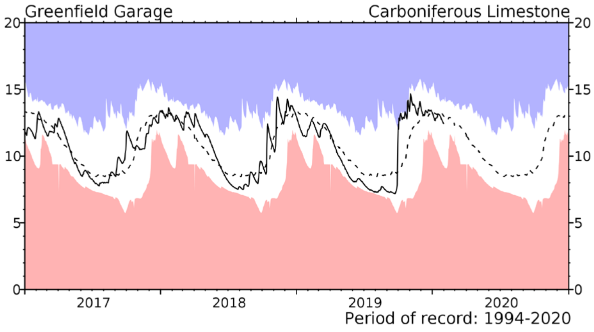


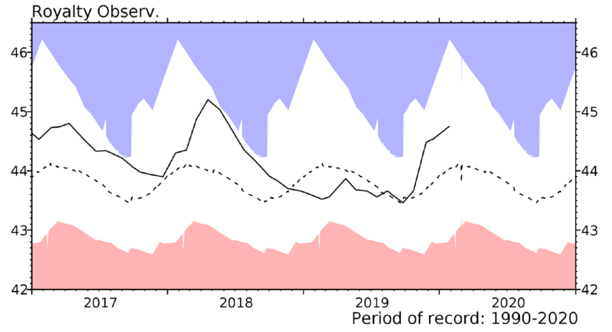




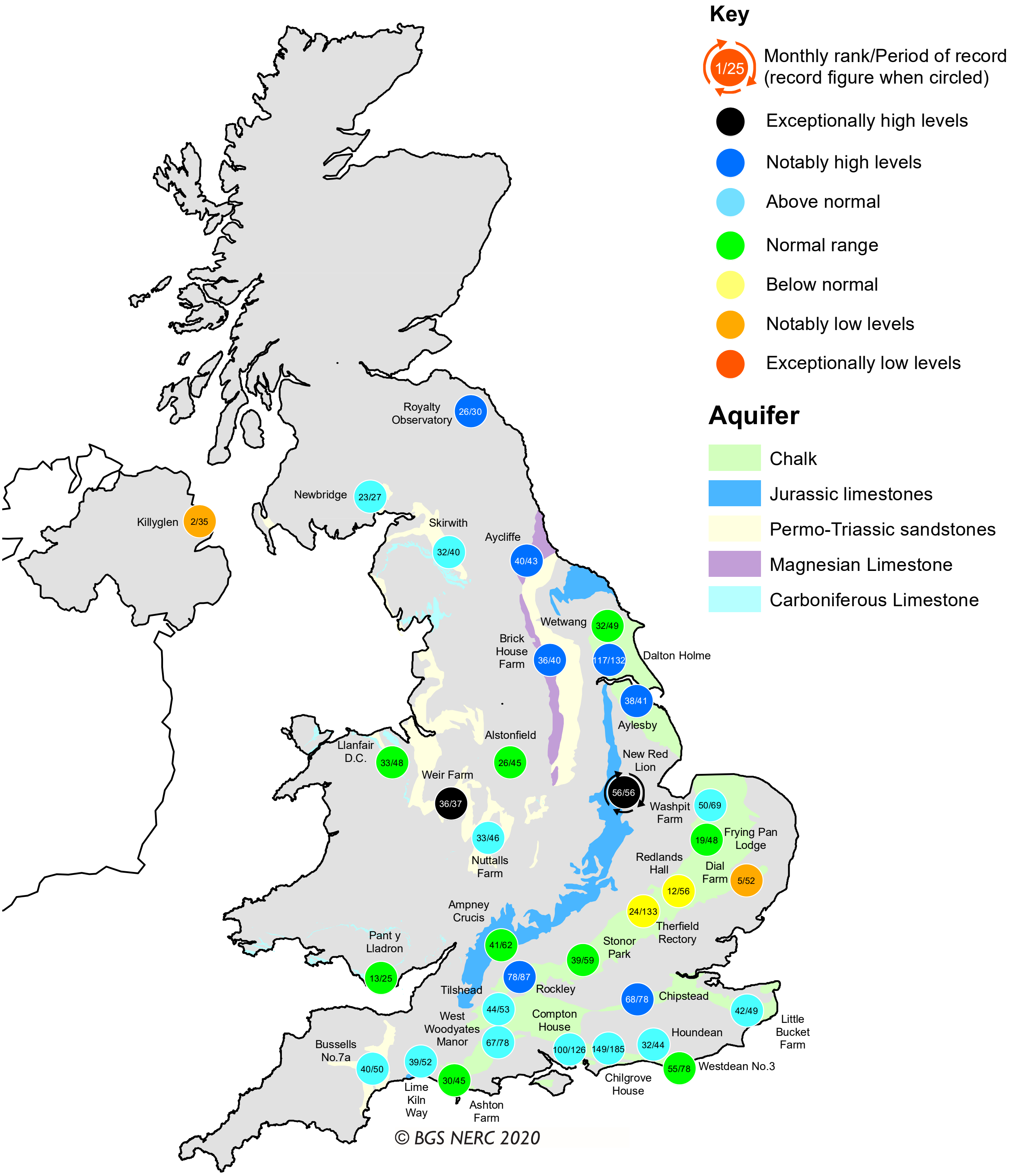








Groundwater…Groundwater



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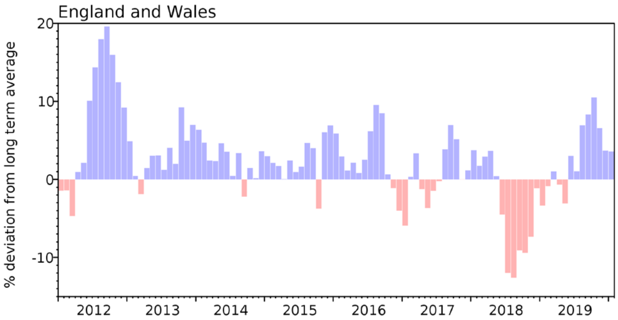
Groundwater levels - January 2020

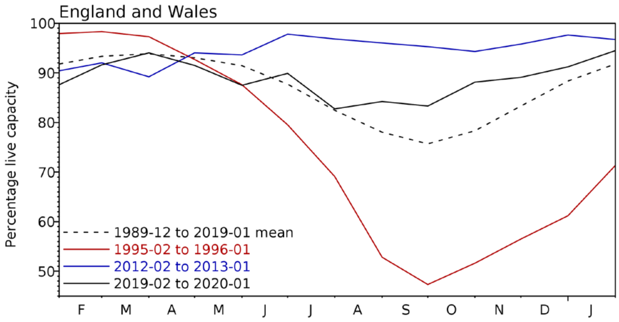
The calculation of ranking has been modified from that used in summaries published prior to October 2012. It is now based on a comparison between the most recent level and levels for the same date during previous years of record. Where appropriate, levels for earlier years may have been interpolated.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

Reservoirs . . . Reservoirs . . .

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



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



Percentage live capacity of selected reservoirs at end of month

Area	Reservoir		Capacity (Ml)	2019 Nov	2019 Dec	2020 Jan	Jan Anom.	Min Jan	Year* of min	2019 Jan	Diff 20-19
North West	N Command Zone	•	124929	74	85	98	7	63	1996	84	14
	Vyrnwy		55146	96	95	100	7	45	1996	89	11
Northumbrian	Teesdale	•	87936	100	99	99	6	51	1996	98	1
	Kielder		(199175)	81	84	91	-2	82	2019	82	9
Severn-Trent	Clywedog		49936	86	88	93	4	62	1996	94	-1
	Derwent Valley	•	46692	100	99	100	5	15	1996	78	22
Yorkshire	Washburn	•	23373	92	91	91	1	34	1996	87	4
	Bradford Supply	•	40942	100	100	100	7	33	1996	74	26
Anglian	Grafham		(55490)	88	88	86	1	67	1998	72	14
	Rutland		(116580)	96	96	96	10	68	1997	82	14
Thames	London	•	202828	92	91	91	0	70	1997	94	-2
	Farmoor	•	13822	95	99	97	6	72	2001	97	0
Southern	Bewl		31000	85	89	93	12	37	2006	95	-2
	Ardingly		4685	100	100	100	8	41	2012	75	25
Wessex	Clatworthy		5662	100	100	100	5	62	1989	95	5
	Bristol	•	(38666)	99	99	98	11	58	1992	80	18
South West	Colliford		28540	68	75	81	-3	52	1997	78	3
	Roadford		34500	66	75	82	0	30	1996	68	14
	Wimbleball		21320	100	100	100	10	58	2017	83	17
	Stithians		4967	100	100	100	11	38	1992	100	0
Welsh	Celyn & Brenig	•	131155	84	89	93	-3	61	1996	89	4
	Brianne		62140	99	100	99	1	84	1997	99	0
	Big Five	•	69762	86	88	98	5	67	1997	94	4
	Elan Valley	•	99106	99	99	98	1	73	1996	99	-1
Scotland(E)	Edinburgh/Mid-Lothian	•	97223	90	94	99	5	72	1999	90	9
	East Lothian	•	9317	100	100	100	2	68	1990	98	2
Scotland(W)	Loch Katrine	•	110326	95	100	100	7	85	2000	95	5
	Daer		22494	97	100	100	2	90	2013	96	5
	Loch Thom		10721	89	91	90	-8	90	2020	99	-9
Northern Ireland	Total+	•	56800	99	100	96	5	74	2017	93	3
	Silent Valley	•	20634	99	100	94	5	46	2002	95	-1

( ) figures in parentheses relate to gross storage

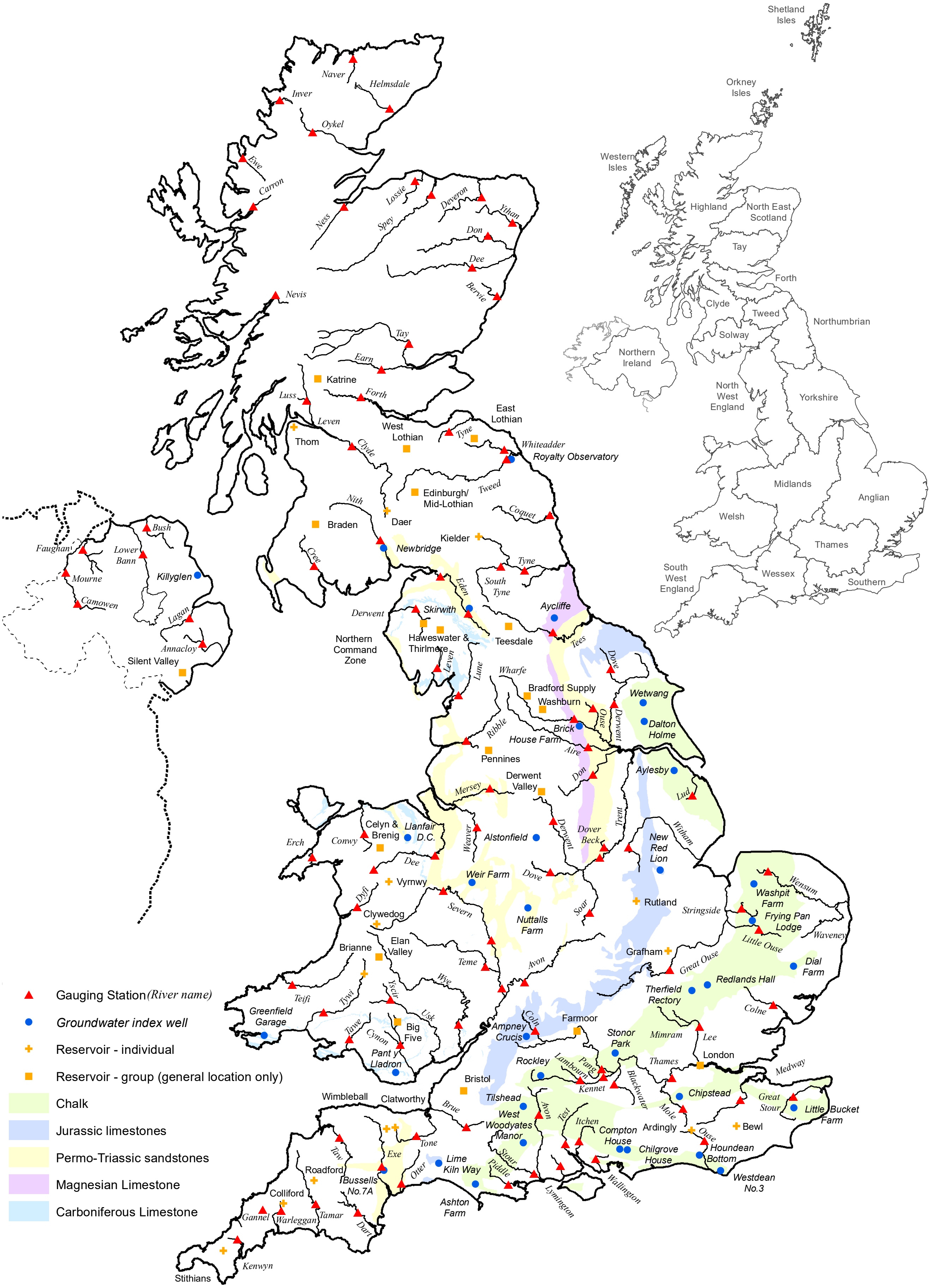
• denotes reservoir groups

*last occurrence

+ excludes Lough Neagh

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

Location map . . . Location map



NHMP

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

The Hydrological Summary is supported by the Natural Environment Research Council award number NE/R016429/1 as part of the UK-SCAPE programme delivering National Capability.

Data Sources

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

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

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

Rainfall data are provided by the Met Office. To allow better spatial differentiation the rainfall data for Britain are presented for the regional divisions of the precursor organisations of the EA, NRW and SEPA. The areal rainfall figures have been produced by the Met Office National Climate Information Centre (NCIC), and are based on 5km resolution gridded data from rain gauges. The majority of the full rain gauge network across the UK is operated by the EA, NRW, SEPA and Northern Ireland Water; supplementary rain gauges are operated by the Met Office. The Met Office NCIC monthly rainfall series extend back to 1910 and form the official source of UK areal rainfall statistics which have been adopted by the NHMP. The gridding technique used is described in Perry MC and Hollis DM (2005) available at http://www.metoffice.gov.uk/climate/uk/about/methods

Long-term averages are based on the period 1981-2010 and are derived from the monthly areal series.

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

The monthly rainfall figures are provided by the Met Office NCIC and are Crown Copyright and may not be passed on to, or published by, any unauthorised person or organisation.

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

Tel: 0870 900 0100
Email: enquiries@metoffice.gov.uk

Enquiries

Enquiries should be directed to the NHMP:

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

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

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

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