Hydrological Summary
for the United Kingdom

January 2022

General

January was a sunny and exceptionally dry month, the seventh driest January for England & Wales in a series from 1910. The UK recorded half of the 1991-2020 average rainfall, and substantial parts of south-east England received less than a third of average; it was the second driest January in Anglian region. The month began with the warmest New Year's Day on record and January was particularly mild in the Scottish Highlands, the second highest January mean temperature in a series from 1910. After drier than average weather over the last three months (particularly in the south), soil moisture was generally slightly below field capacity and deficits persisted in eastern England centred on The Wash. River flows were below normal across most of the UK, between half and two thirds of their average, and notably low in some catchments draining the Scottish Borders. Groundwater levels remained predominantly within the normal range, with the exception of notably low levels in the Carboniferous Limestone of south Wales. Reservoir stocks were broadly as expected for the time of year, marginally below average at the national scale though with some more notable shortfalls at reservoirs in northern England (e.g. Northern Command Zone, Kielder). Despite the predominance of dry weather over the November-January timeframe, reservoir stocks and groundwater levels are relatively healthy, and plentiful rainfall over the first half of February has also helped to strengthen the water resources situation towards the onset of spring.

Rainfall

January began with a spell of unsettled weather, with showery and frontal rainfall predominating, though generally not yielding high rainfall totals. Early January conditions were decidedly wintry; snow accumulations included 12cm at Tulloch Bridge (Inverness-shire) on the 4th and 11cm at Loch Glascarnoch (Ross & Cromarty) on the 5th-8th. Snowfall led to travel disruption and deteriorating driving conditions in Scotland more generally (and also over the Pennines and Peak District). After 65mm of rainfall was recorded on the 8th at Honister Pass (Cumbria), high pressure built mid-month and persisted, inhibiting the traverse of any cyclonic systems until two named storms at month-end. Storms 'Malik' (29th) and 'Corrie' (30th/31st) were more notable for their high winds leading to disruption of transport networks and power supplies rather than noteworthy rainfall totals, though 58mm was recorded at Cassley (Sutherland) on the 28th. Rainfall totals for January overall were below average; only north-west Scotland recorded above average rainfall. Southern and eastern Scotland and most regions of Northern Ireland and England received less than 50% of average rainfall, with substantial parts of eastern Scotland and the English Lowlands recording less than a third of average. It was the third, fourth and sixth driest January in the Northumbrian, Tweed and Thames regions, respectively, in series from 1910. Dry conditions (less than 70% of average) also occurred throughout much of the UK over the last three months (November-January). A swathe of southern England received less than half the average over this timeframe, amongst the six driest in series from 1910 for Wessex, Southern and Thames regions.

River flows

Unsettled weather in early January triggered moderate flow responses in most catchments across the UK, but for the most part these could rarely be considered particularly high flows for the time of year. Thereafter, recessions were established in responsive and less responsive catchments alike, although in the latter recessions were less steep and related to dry weather over more protracted timeframes. By month-end, flows eclipsed daily minima in parts of north-east England (e.g. Tweed, South Tyne) and Northern Ireland (e.g. Lagan, Annacloy). For the Lagan, these month-end daily flows were amongst the lowest recorded in a winter month (December-February) in a 50-year series. There was a slight uptick in daily flows towards month-end in some northern and western catchments, but rarely returning to average flows. The substantial spatial footprint of catchments with river flows in recession was represented by the national outflows, which in January were in recession throughout the month. Overall, mean river flows in January were below normal or lower in most catchments away from north-west Scotland, north-west England and the East Midlands. Even in these regions, flows were often substantially below average and nationally, flows in only four catchments exceeded 80% of average (Nevis, Lud, Stringside and Itchen). Flows were less than half the average on the Annacloy, English Tyne, Soar, Waveney, Colne and Medway, and were notably low on the Scottish Dee, Cree, Nith, English Tyne and Erch. Mean river flows in many catchments over the last three months (November-January) were between 60% and 80% of average. Below normal flows characterised substantial parts of Wales, Northern Ireland, south-west England, and central and southern Scotland, with notably low flows on the Earn, Forth, Luss, Nith, Yscir and Cynon.

Groundwater*

Soils generally dried in January given the lack of rainfall inputs, resulting in soils that were notably or exceptionally dry for the time of year. Groundwater levels in the Chalk generally rose and remained in the normal range. However, levels at Therfield Rectory, Stonor Park and Dial Farm continued to recede and at Killyglen levels fell initially but started to recover later in the month. Levels in several boreholes in the southern Chalk (West Woodyates Manor, Ashton Farm, Compton, Chilgrove and Houndean) and Yorkshire (Wetwang) rose overall but receded in the latter part of the month. Levels at Tilshead and Dial Farm ended the month below normal, and levels at Washpit Farm and Frying Pan Lodge were above normal. In the Jurassic limestones, levels rose at New Red Lion and remained in the normal range, but fell to below average at Ampney Crucis. Levels rose in the Magnesian Limestone and remained average or above. Levels fell in the responsive Carboniferous Limestone, to average for the time of year at Alstonfield and to notably low in south Wales. Levels fell in the north Wales and Midlands Permo-Triassic sandstones but rose in the south-west at Bussels No.7a; they remained within the normal range, apart from at Weir Farm where they were above average. Levels fell in the Upper Greensand at Lime Kiln Way into the normal range but rose in the Fell Sandstone at Royalty Observatory and ended the month above average.

**Note that due to issues with data access, no data are available for Scotland.*

National Hydrological Monitoring Programme | UK Centre for Ecology & Hydrology | British Geological Survey

Rainfall . . . Rainfall . . .

Met Office

Rainfall accumulations and return period estimates

Percentages are from the 1991-2020 average.

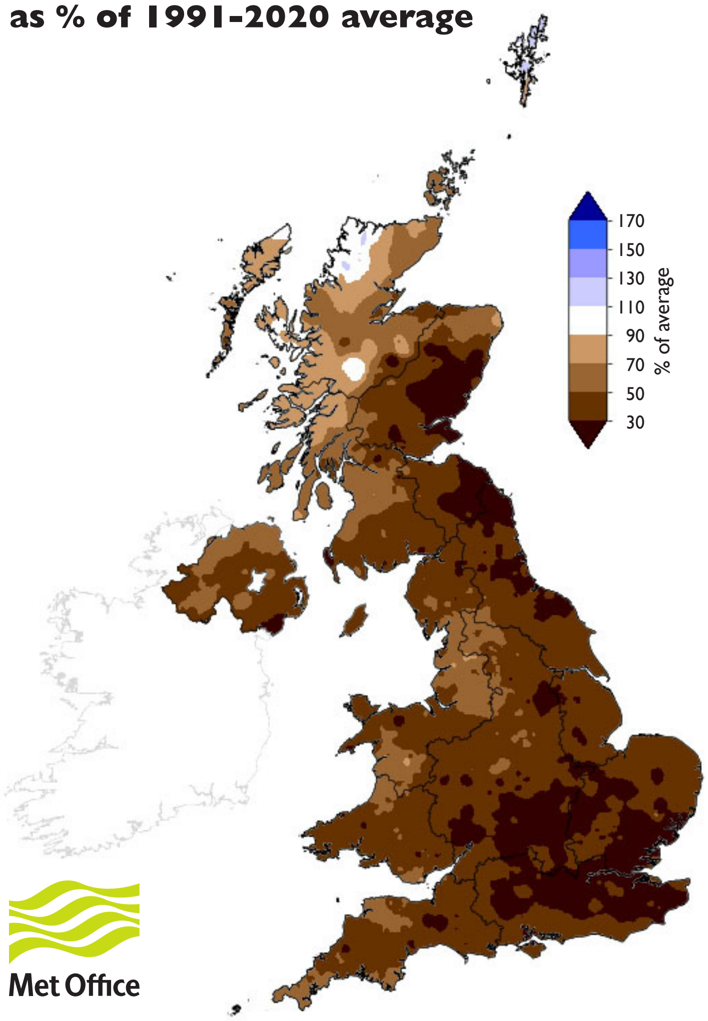
Region	Rainfall	Jan 2022	Nov21– Jan22		Aug21 – Jan22		May21 – Jan22		Feb21 – Jan22	
				RP		*RP*		*RP*		*RP*
United	mm	**61**	251		558		793		1000	
Kingdom	%	**51**	68	10-20	83	5-10	88	2-5	87	2-5
England	mm	**32**	159		389		627		761	
	%	**38**	60	15-25	79	5-10	92	2-5	89	2-5
Scotland	mm	**110**	384		792		1007		1319	
	%	**62**	75	2-5	86	2-5	84	2-5	85	2-5
Wales	mm	**69**	322		723		1045		1313	
	%	**45**	66	8-12	84	2-5	93	2-5	92	2-5
Northern	mm	**53**	259		578		777		983	
Ireland	%	**47**	73	10-15	88	2-5	86	5-10	85	5-10
England &	mm	**37**	182		435		684		836	
Wales	%	**40**	62	10-20	80	5-10	92	2-5	89	2-5
North West	mm	**61**	288		675		928		1197	
	%	**49**	72	5-10	91	2-5	93	2-5	95	2-5
Northumbria	mm	**26**	187		407		603		781	
	%	**32**	70	5-10	80	5-10	85	5-10	87	2-5
Severn-Trent	mm	**29**	151		349		573		689	
	%	**40**	66	8-12	80	5-10	91	2-5	87	5-10
Yorkshire	mm	**33**	165		375		614		764	
	%	**42**	64	10-20	78	5-10	91	2-5	89	2-5
Anglian	mm	**17**	109		253		443		527	
	%	**31**	64	10-15	73	8-12	88	2-5	84	5-10
Thames	mm	**20**	102		312		553		643	
	%	**28**	46	20-35	76	5-10	97	2-5	89	2-5
Southern	mm	**27**	125		359		622		716	
	%	**31**	45	20-30	73	5-10	96	2-5	88	2-5
Wessex	mm	**34**	137		392		646		773	
	%	**36**	46	20-30	74	5-10	91	2-5	86	2-5
South West	mm	**65**	257		602		954		1133	
	%	**47**	60	10-20	81	5-10	98	2-5	91	2-5
Welsh	mm	**64**	301		691		1009		1264	
	%	**43**	65	10-15	84	2-5	93	2-5	92	2-5
Highland	mm	**172**	528		953		1171		1536	
	%	**79**	85	2-5	87	2-5	84	2-5	83	2-5
North East	mm	**45**	225		525		781		964	
	%	**45**	72	8-12	87	2-5	95	2-5	92	2-5
Tay	mm	**62**	265		624		902		1209	
	%	**38**	58	20-35	77	5-10	84	2-5	88	2-5
Forth	mm	**56**	230		592		807		1059	
	%	**41**	59	15-25	83	2-5	84	2-5	86	2-5
Tweed	mm	**36**	204		533		733		959	
	%	**33**	62	10-20	86	2-5	87	2-5	89	2-5
Solway	mm	**70**	319		812		1009		1336	
	%	**42**	63	10-15	89	2-5	84	2-5	86	2-5
Clyde	mm	**134**	441		928		1114		1489	
	%	**62**	71	5-10	83	2-5	77	5-10	79	5-10

% = percentage of 1991-2020 average *RP = Return period*

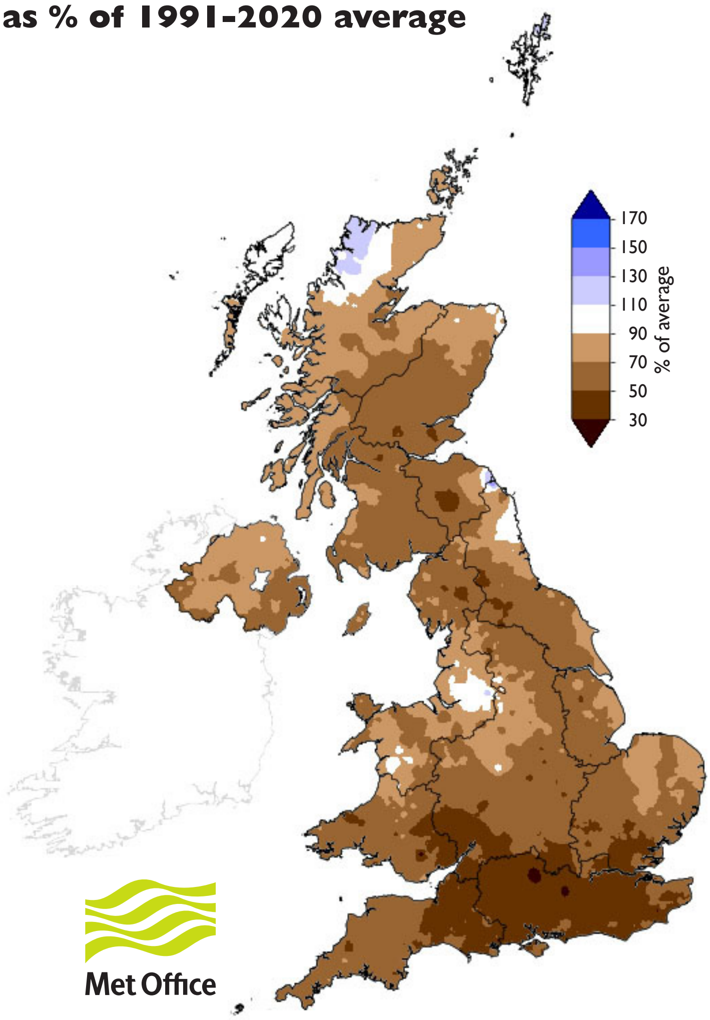
Important note: Figures in the above table may be quoted provided their source is acknowledged (see page 12). Where appropriate, specific mention must be made of the uncertainties associated with the return period estimates. The RP estimates are based on data provided by the Met Office and reflect climatic 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 . . .

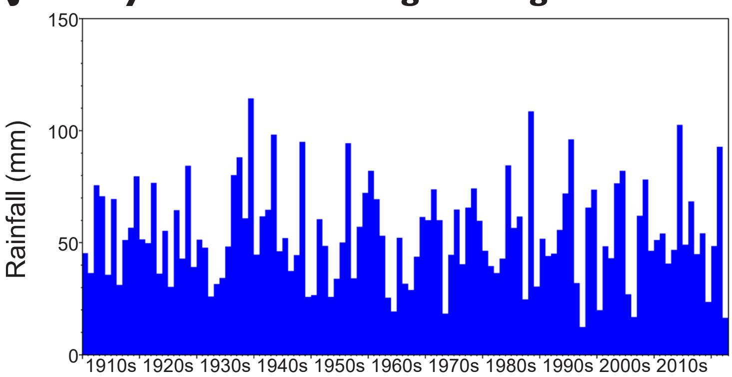
January 2022 rainfall as % of 1991-2020 average



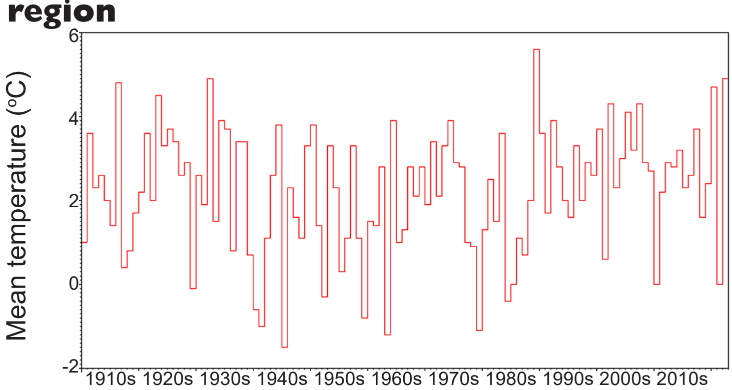
November 2021 - January 2022 rainfall as % of 1991-2020 average



January rainfall for Anglian region



January mean temperature for Highland region



UK Hydrological Outlook

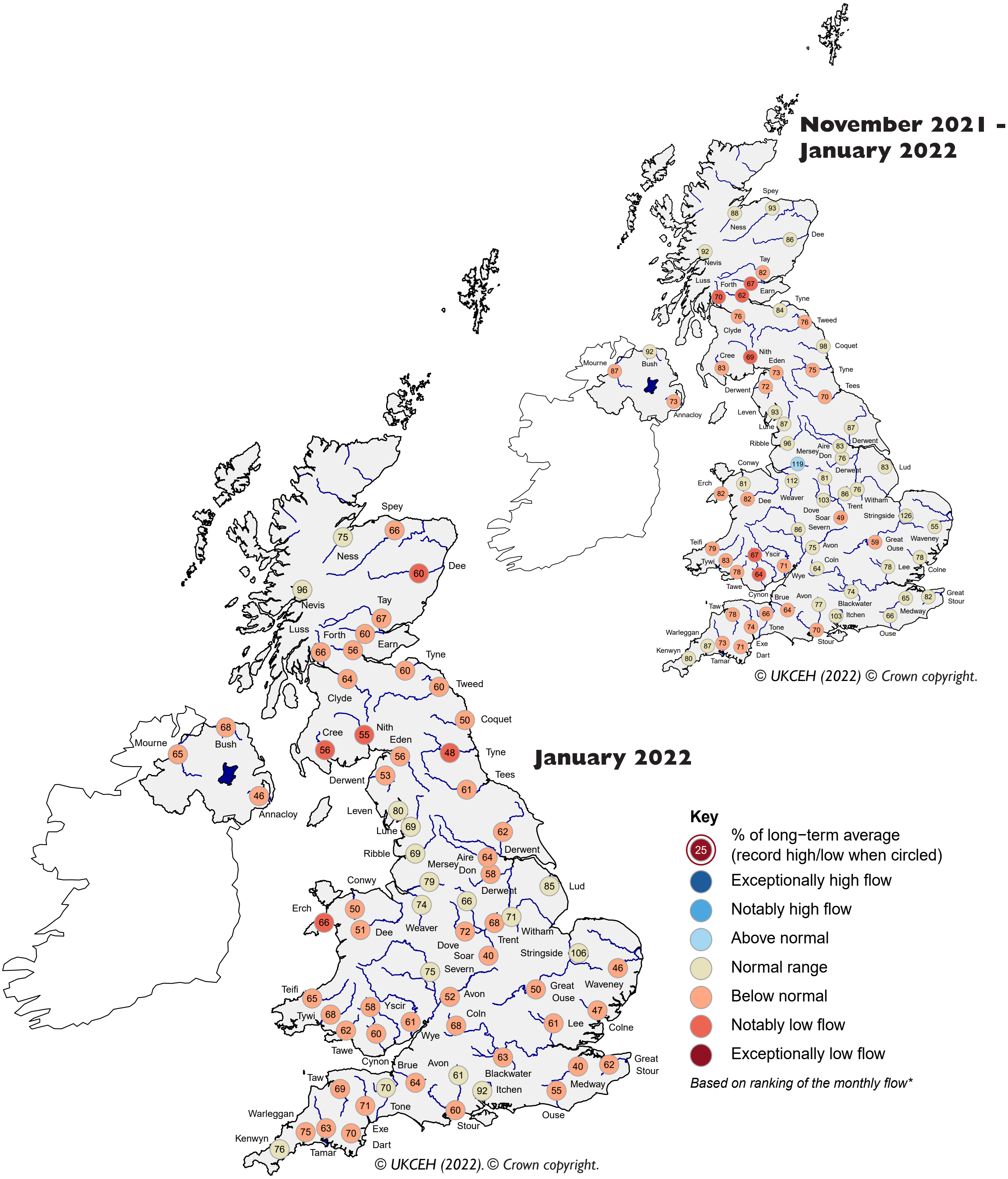
The Hydrological Outlook provides an insight into future hydrological conditions across the UK. Specifically it describes likely trajectories for river flows and groundwater levels on a monthly basis, with particular focus on the next three months.

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

Period: **from February 2022**
Issued: **09.02.2022**
using data to the end of January 2022

Following the dry January, the Outlook for February is for normal to below normal flows and groundwater levels across much of the country, with a few localised exceptions. The three month outlook is similar, but for river flows there is an increasing tendency for more normal conditions rather than below, whereas for groundwater there is an increasing chance of below normal levels in some areas.

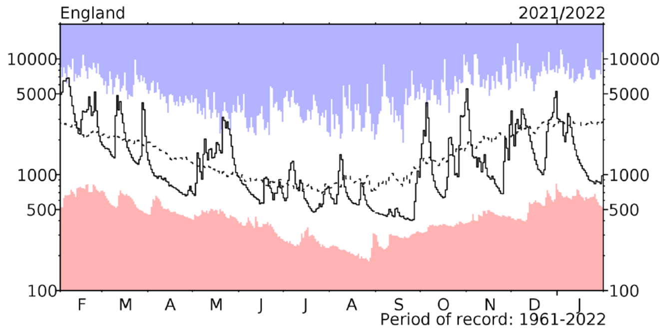
River flow . . . River flow . . .

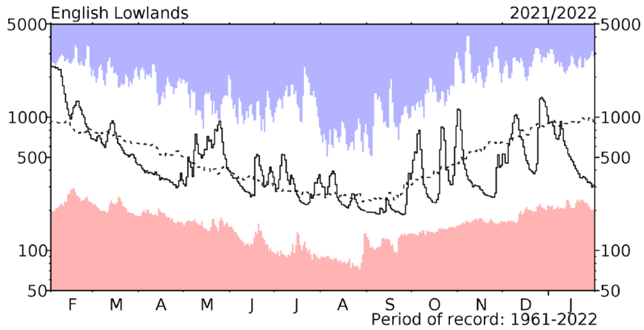


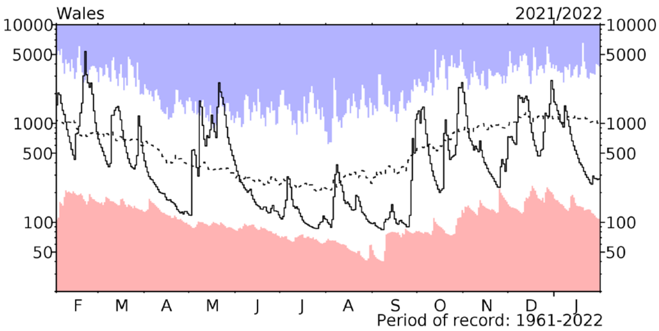
River flows

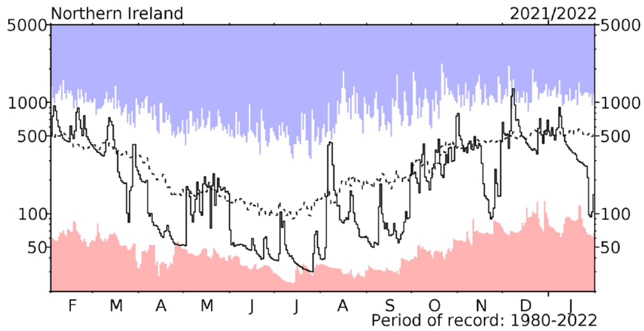
*Comparisons based on percentage flows alone can be misleading. A given percentage flow can represent extreme drought conditions in permeable catchments where flow patterns are relatively stable but be well within the normal range in impermeable catchments where the natural variation in flows is much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

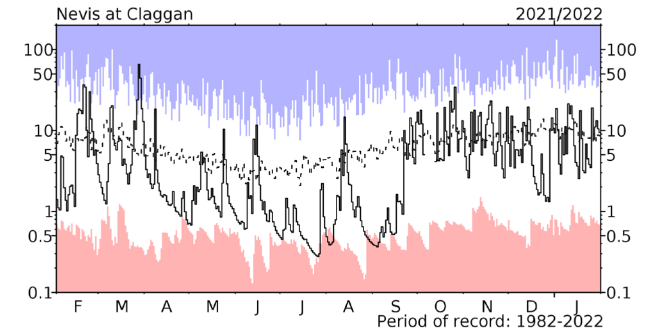
River flow . . . River flow . . .

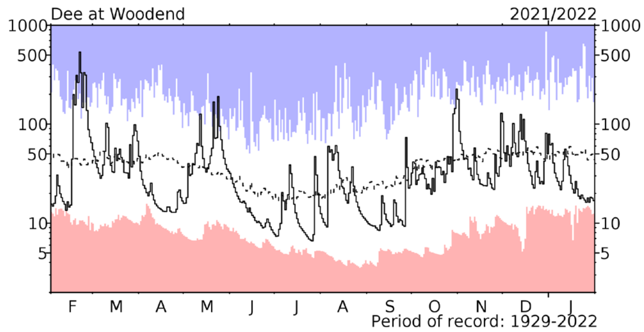


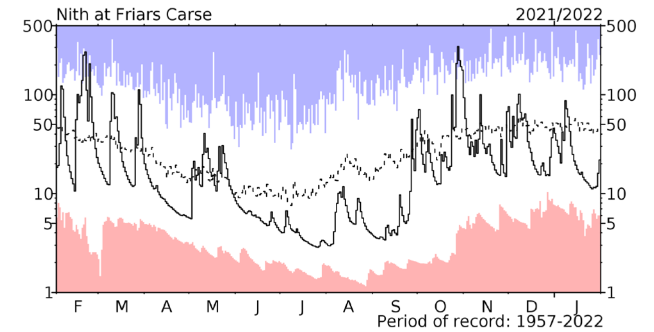


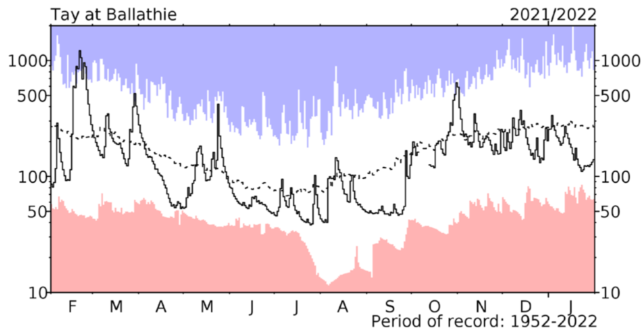


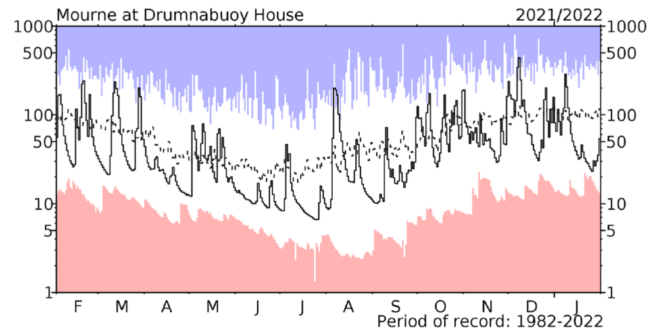


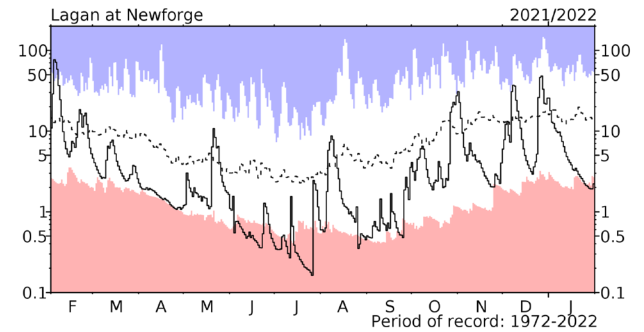








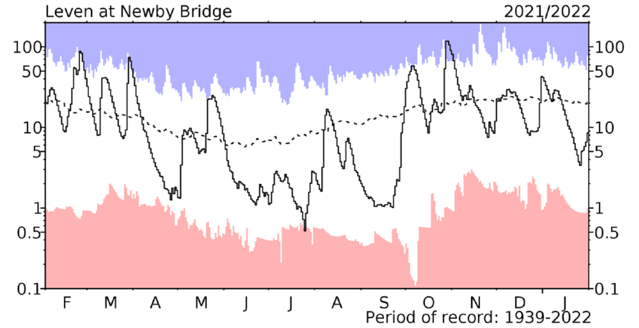


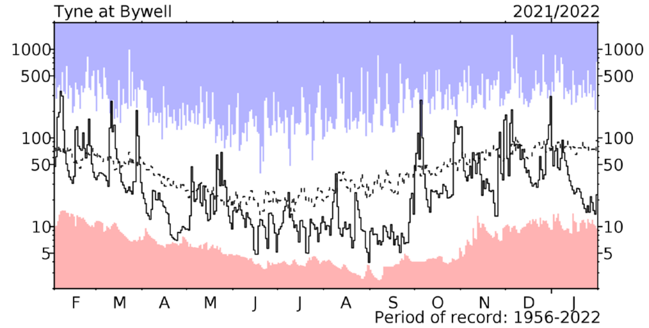


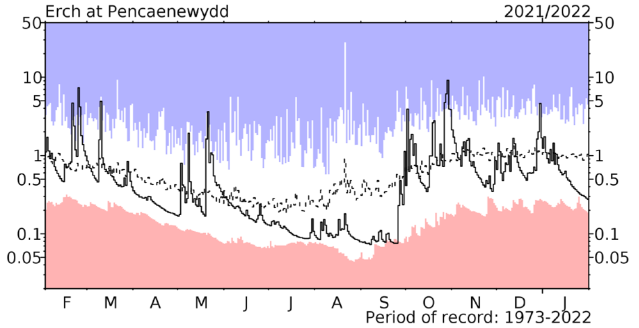
River flow hydrographs

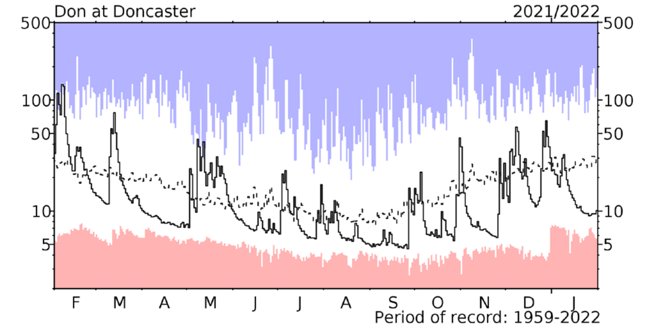
*The river flow hydrographs show the daily mean flows (measured in m^3s^{-1}) together with the maximum and minimum daily flows prior to February 2021 (shown by the shaded areas). Daily flows falling outside the maximum/minimum range are indicated where the bold trace enters the shaded areas. The dashed line represents the period-of-record average daily flow.

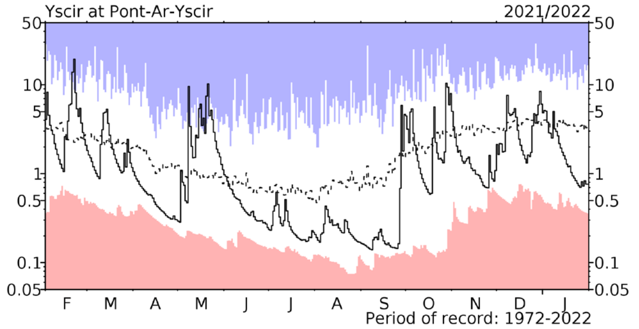
River flow . . . River flow . . .

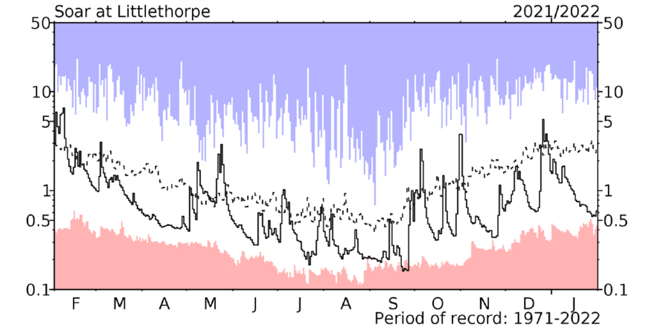


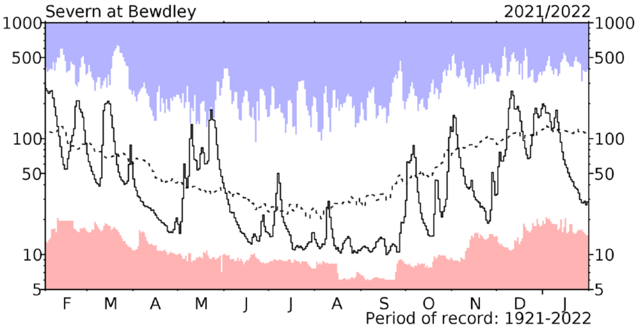


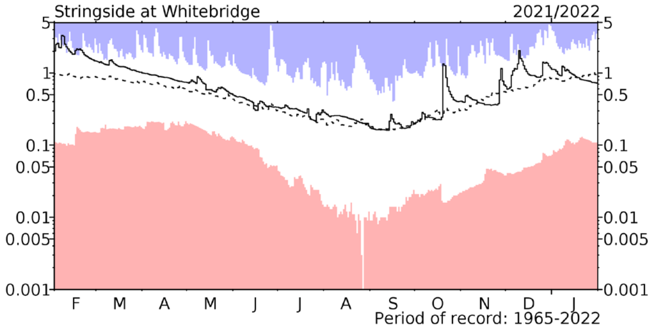


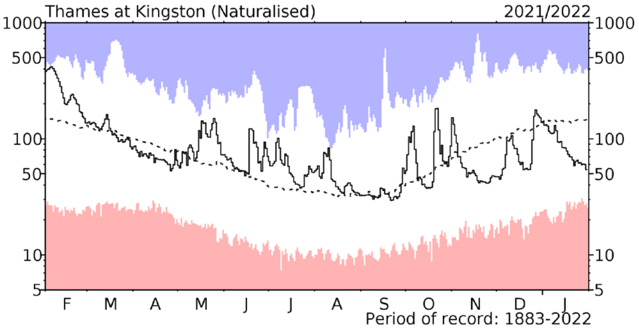


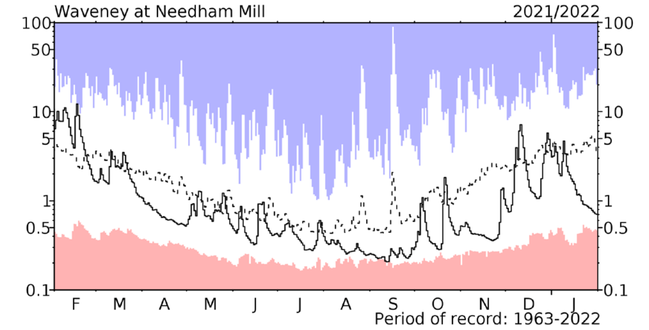


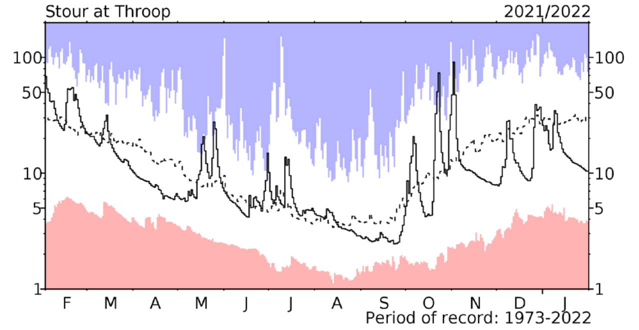


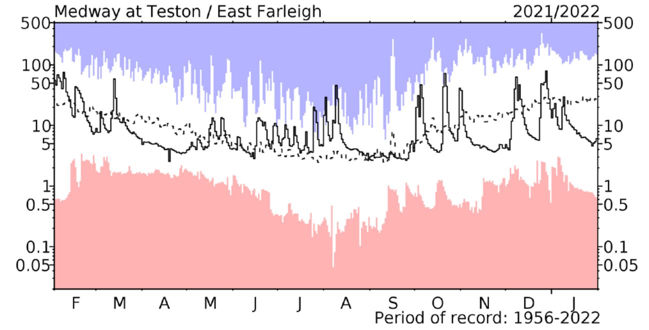




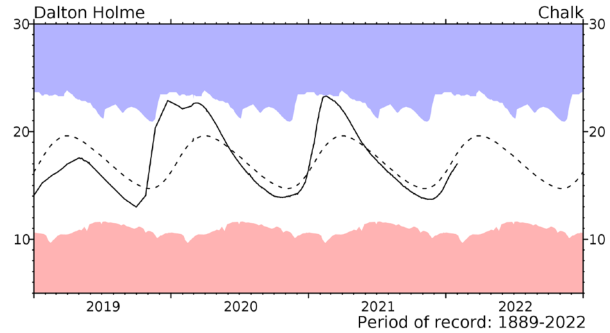


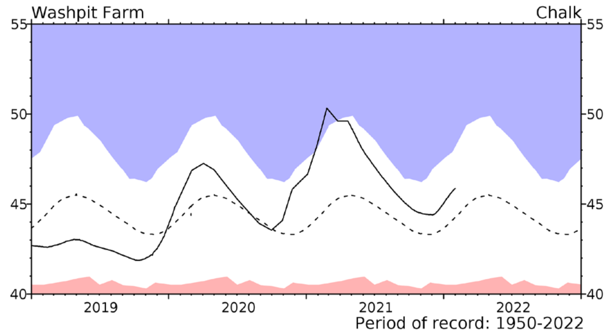


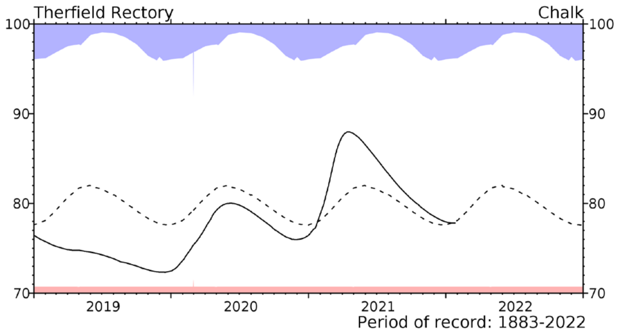


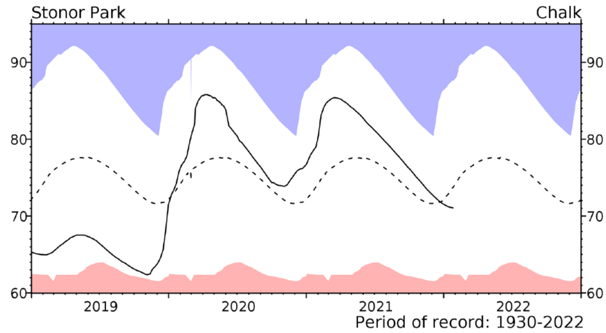


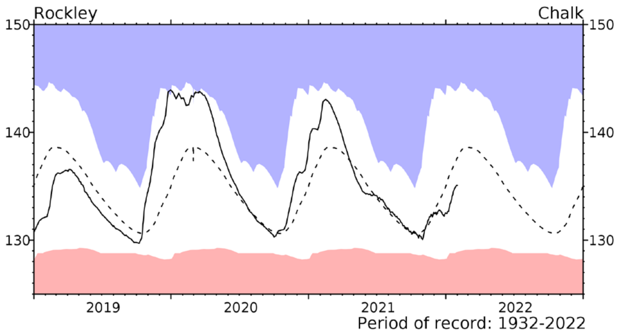
Groundwater . . . Groundwater

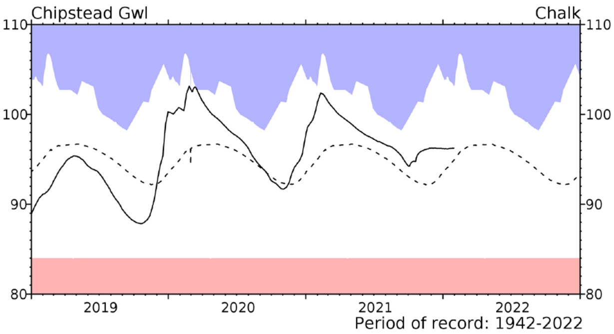


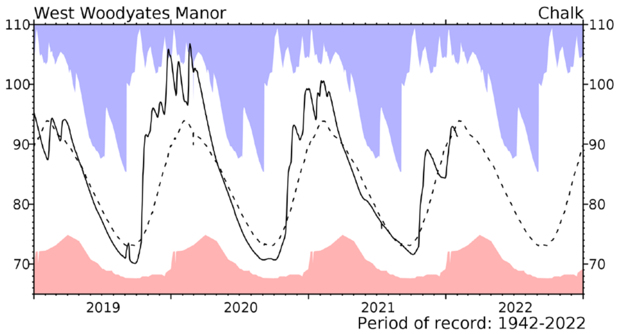


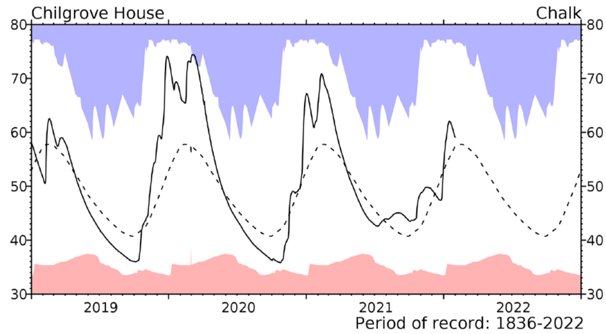


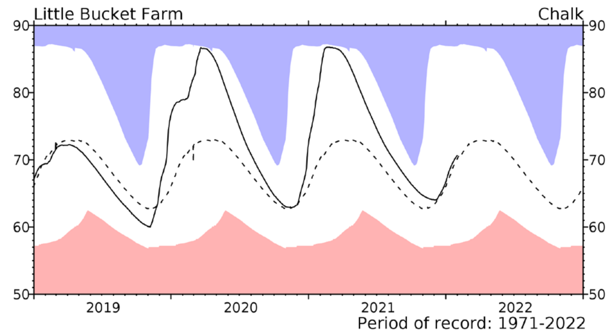


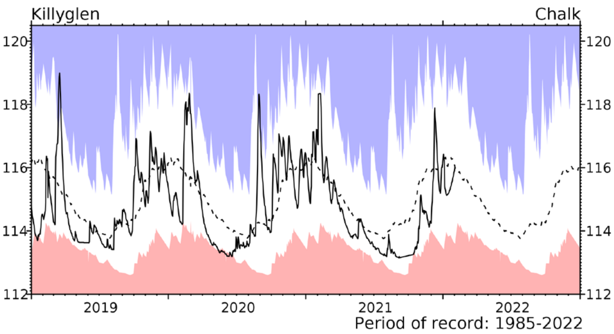




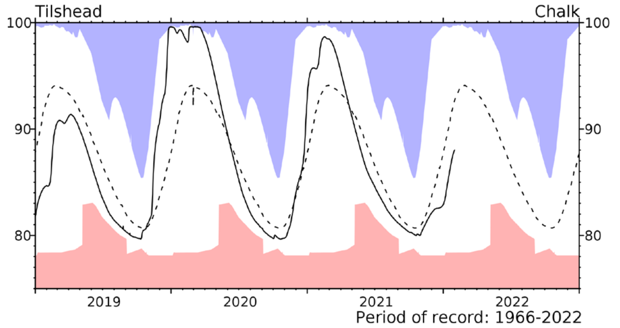


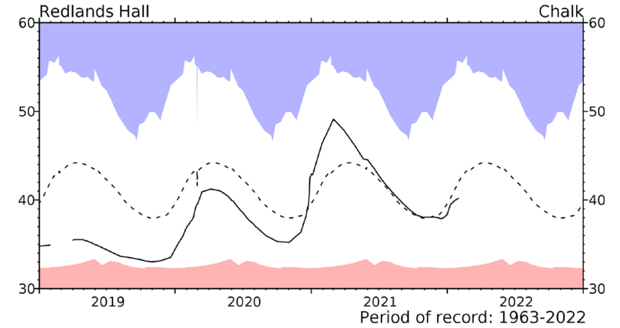


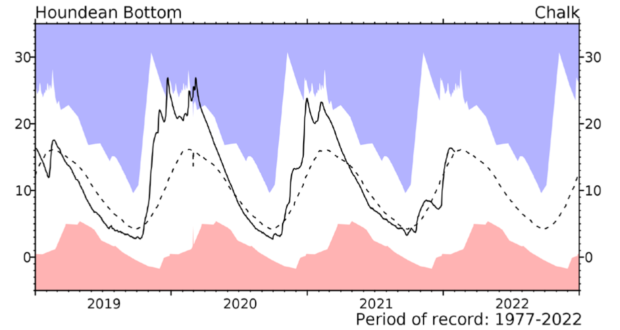


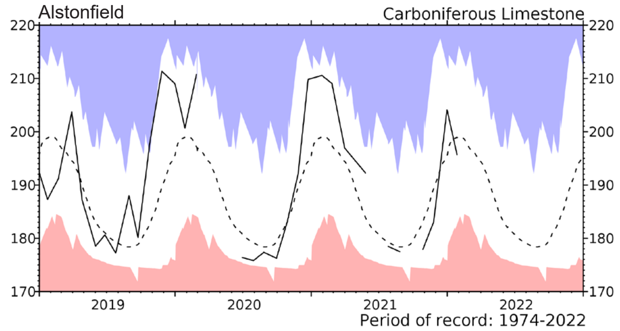


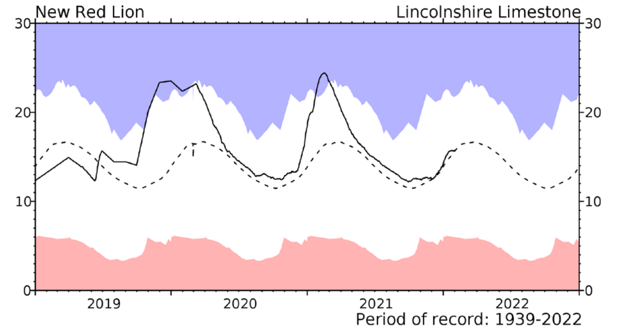
Groundwater levels (measured in metres above ordnance datum) normally rise and fall with the seasons, reaching a peak in the spring following replenishment through the winter (when evaporation losses are low and soil moist). They decline through the summer and early autumn. This seasonal variation is 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 calculated with data from the start of the record to the end of 2018. 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.

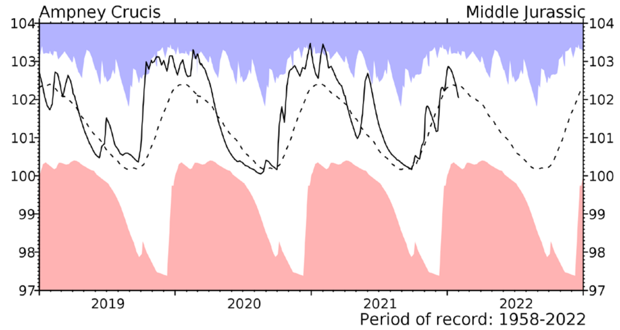

Tilshead
Chalk
2019
2020
2021
2022
Period of record: 1966-2022

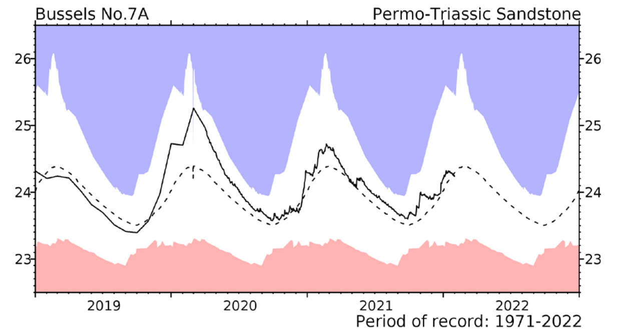

Redlands Hall
Chalk
2019
2020
2021
2022
Period of record: 1963-2022

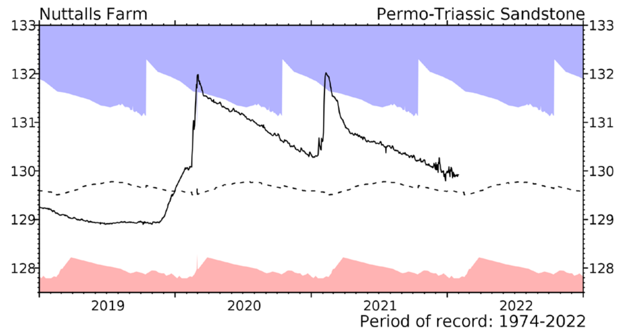

Houndean Bottom
Chalk
2019
2020
2021
2022
Period of record: 1977-2022

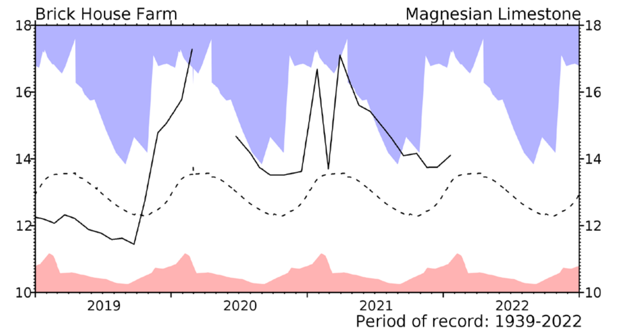

Alstonfield
Carboniferous Limestone
2019
2020
2021
2022
Period of record: 1974-2022

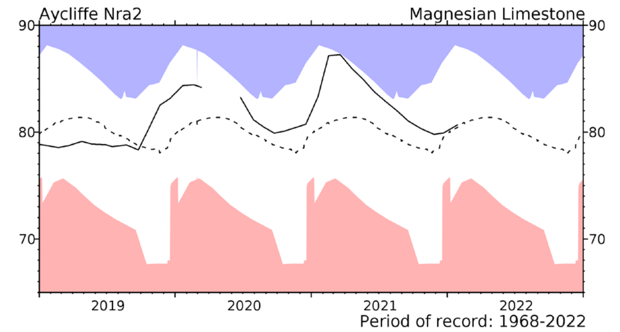

New Red Lion
Lincolnshire Limestone
2019
2020
2021
2022
Period of record: 1939-2022

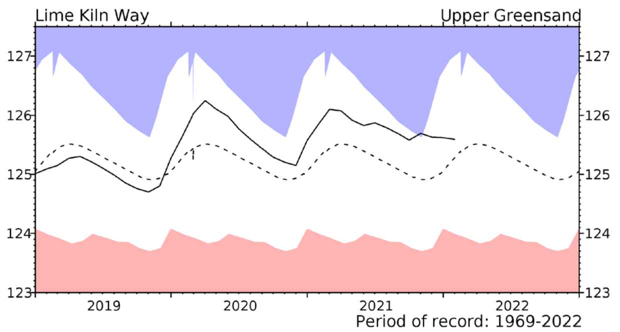

Ampney Crucis
Middle Jurassic
2019
2020
2021
2022
Period of record: 1958-2022

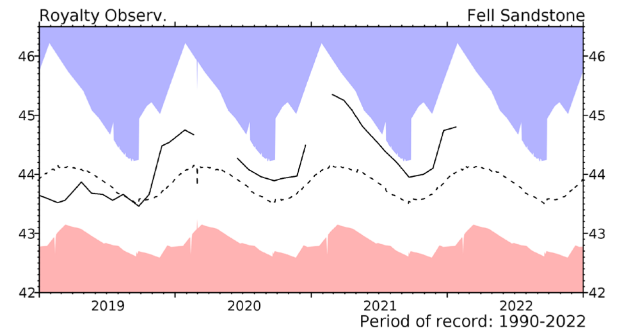

Bussels No.7A
Permo-Triassic Sandstone
2019
2020
2021
2022
Period of record: 1971-2022


Nuttalls Farm
Permo-Triassic Sandstone
2019
2020
2021
2022
Period of record: 1974-2022


Brick House Farm
Magnesian Limestone
2019
2020
2021
2022
Period of record: 1939-2022


Aycliffe Nra2
Magnesian Limestone
2019
2020
2021
2022
Period of record: 1968-2022


Lime Kiln Way
Upper Greensand
2019
2020
2021
2022
Period of record: 1969-2022


Royalty Observ.
Fell Sandstone
2019
2020
2021
2022
Period of record: 1990-2022

Groundwater...Groundwater

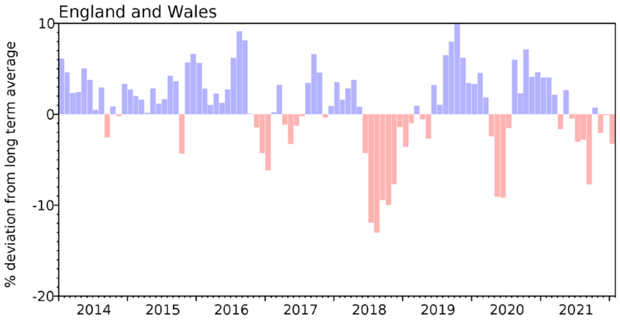
Groundwater levels - January 2022

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.

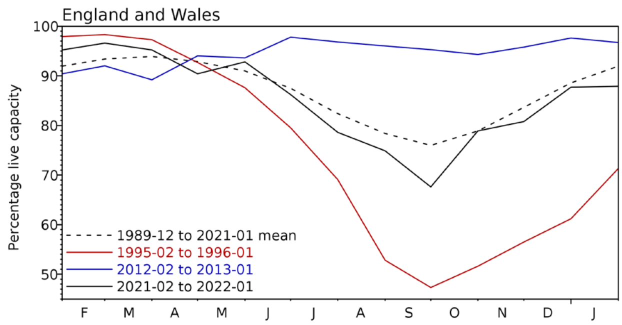
Note that due to issues with data access, no data are available for Scotland.

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

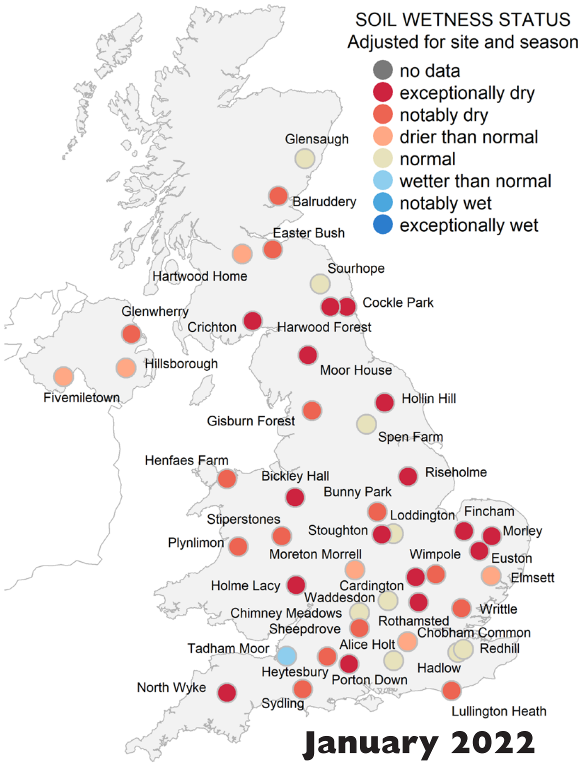
Area	Reservoir		Capacity (Ml)	2021 Nov	2021 Dec	2022 Jan	Jan Anom.	Min Jan	Year* of min	2021 Jan	Diff 22-21
North West	N Command Zone	•	124929	76	78	80	-12	63	1996	96	-16
	Vyrnwy		55146	82	96	88	-5	45	1996	98	-10
Northumbrian	Teesdale	•	87936	75	83	86	-7	51	1996	95	-9
	Kielder		(199175)	85	87	84	-10	82	2019	92	-8
Severn-Trent	Clywedog		49936	88	89	90	1	62	1996	94	-4
	Derwent Valley	•	46692	63	99	89	-6	15	1996	99	-10
Yorkshire	Washburn	•	23373	76	88	81	-9	34	1996	96	-15
	Bradford Supply	•	40942	68	87	89	-5	33	1996	100	-11
Anglian	Grafham		(55490)	94	90	94	8	67	1998	83	10
	Rutland		(116580)	76	77	83	-4	68	1997	93	-11
Thames	London	•	202828	82	85	94	2	70	1997	94	-1
	Farmoor	•	13822	93	91	94	3	72	2001	89	6
Southern	Bewl		31000	72	76	79	-3	37	2006	88	-9
	Ardingly		4685	100	100	100	8	41	2012	100	0
Wessex	Clatworthy		5662	85	91	100	4	62	1989	100	0
	Bristol	•	(38666)	72	75	81	-6	58	1992	99	-18
South West	Colliford		28540	65	72	75	-9	52	1997	87	-12
	Roadford		34500	89	96	98	15	30	1996	99	-1
	Wimbleball		21320	76	86	94	3	58	2017	100	-7
	Stithians		4967	62	71	81	-9	38	1992	100	-19
Welsh	Celyn & Brenig	•	131155	85	98	87	-9	61	1996	100	-13
	Brianne		62140	97	99	94	-4	84	1997	100	-6
	Big Five	•	69762	80	90	93	0	67	1997	99	-6
	Elan Valley	•	99106	81	100	96	-1	73	1996	96	0
Scotland(E)	Edinburgh/Mid-Lothian	•	97223	88	89	87	-7	72	1999	99	-12
	East Lothian	•	9317	100	100	100	2	68	1990	100	0
Scotland(W)	Loch Katrine	•	110326	92	96	94	0	85	2000	99	-5
	Daer		22494	100	100	91	-7	90	2013	100	-9
	Loch Thom		10721	83	100	100	3	90	2020	93	7
Northern Ireland	Total+	•	56800	74	89	88	-5	74	2017	100	-12
	Silent Valley	•	20634	65	89	87	-2	46	2002	100	-13

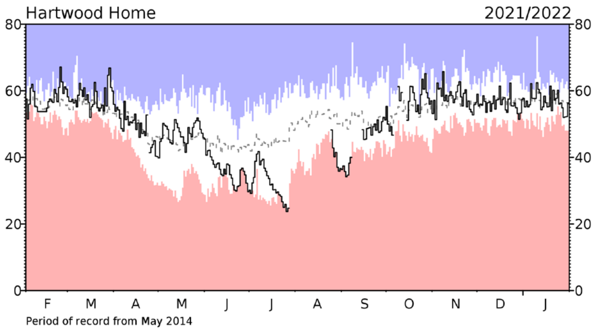
( ) figures in parentheses relate to gross storage • denotes reservoir groups *last occurrence

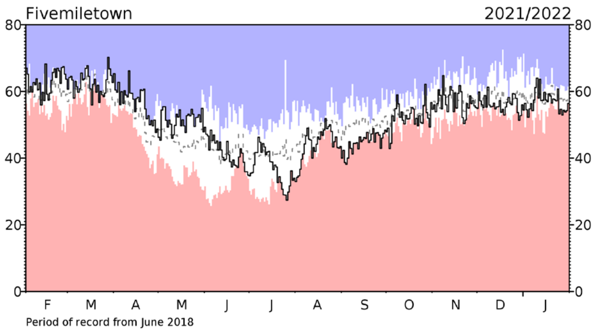
+ excludes Lough Neagh

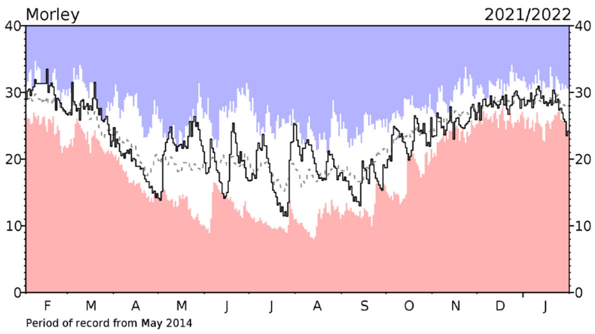
Details of the individual reservoirs in each of the groupings listed above are available on request. The percentages given in the Average and Minimum storage columns relate to the 1988-2012 period except for West of Scotland and Northern Ireland where data commence in the mid-1990s. In some gravity-fed 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.

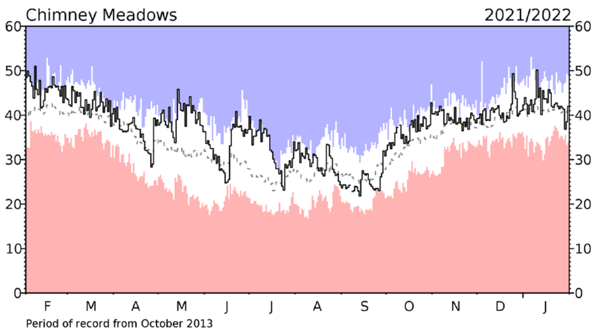
Soil Moisture . . . Soil Moisture

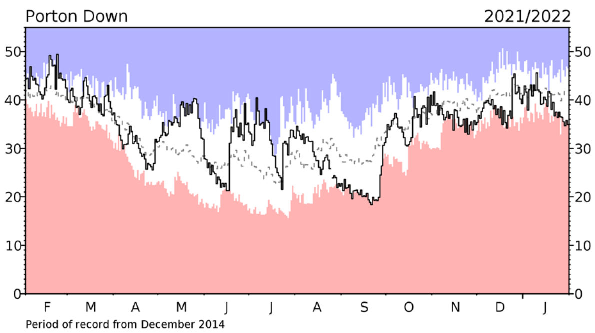












At the end of January soil moisture was drier than normal for the time of year.

In January soil moisture is expected to be close to, or above, field capacity. It is unusual for soil moisture to be below field capacity, due to generally lower evaporation at this time of year. However, at the end of January most sites were slightly below field capacity and unusually dry compared to normal for the time of year.

At many sites soils dried steadily through January (e.g. Morley and Porton Down).

Some sites received rainfall at the very end of the month. At sites that began January with somewhat wetter soils, this rainfall resulted in soil moisture increasing but only to normal levels for the time of year (e.g. Chimney Meadows). At sites in Scotland and Northern Ireland, where soils were drier than normal at the beginning of January, this rainfall increased soil moisture although soils remain drier than normal for the time of year (e.g. Fivemiletown and Hartwood Home).

Soil moisture data

These data are from UKCEH's COSMOS-UK network. The time series graphs show volumetric water content as a percentage in black together with the maximum and minimum daily values for the period-of-record of the sites. The dashed line represents the period-of-record mean VWC. For more information visit cosmos.ceh.ac.uk.

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 https://doi.org/10.1002/joc.1161

Long-term averages are based on the period 1991-2020 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.

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