Hydrological Summary

for the United Kingdom

January 2015

General
January exhibited a wide range of wintry weather, albeit separated into two distinct periods. The month began with intense stormy conditions driven by a vigorous jet stream, which brought strong winds and heavy rainfall particularly to western parts of the UK. These conditions gave way to a much colder second half of January, with most parts of the country affected by combinations of snow, hail, sleet, rain and icy conditions. This wide range of severe weather caused significant disruption to transport networks, caused school closures and left many homes without power. With the exception of parts of north-eastern and central England, the majority of the UK received above average rainfall in January. Conditions were particularly wet in northern and western Scotland which received more than 150% of long-term average rainfall over wide areas, continuing a pattern of wet weather that has affected the region for much of the winter half-year (Oct-Mar) thus far. The range of river flows exhibited in January largely followed the distribution of rainfall, with above normal flows in northern and western areas of the UK, and below normal flows characterising some eastern areas of both England and Scotland. Water levels in the index groundwater boreholes were in the normal range or above for the time of year, and England & Wales reservoir stocks were marginally above average. As such, the water resource situation at the national scale remained healthy entering the late winter and early spring.

Rainfall
The dominant westerly airflow in January drove a sequence of depressions across the UK. The year began in a wet manner, with 81mm recorded in the 24 hours to 9pm on the 1st at Tyndrum (Perthshire). On the 8th, heavy rain brought flash flooding to southern England (e.g. Shoreham, West Sussex), the start of a succession of intense low pressure systems that traversed the UK from 8th–15th. More than 80,000 homes in Scotland were without power on the 9th, and 77mm of rain was recorded both on the 12th at Achnagart (Highlands) and on the 14th at Cluanie Inn (Wester Ross). The 14th/15th witnessed major transport disruption in Scotland due to snow (e.g. 30cm at Aviemore, Inverness-shire), surface water flooding in southern England (e.g. Dorchester, Dorset), and lightning damage in south Wales. From mid-month the jet stream moved south, and snowy conditions penetrated further south across higher ground; Buxton (Derbyshire) recorded 30cm of snow on the 29th. On this date, there were more than 400 school closures and Manchester airport suspended all flights for the morning. Overall for January, much of the UK experienced above average rainfall. More than twice the long-term average rainfall fell over the Shetland Islands, ranking January as the wettest month on record (since 1910) by a wide margin. The drier exceptions were the East Midlands and the east coast of England; large parts of Yorkshire and Lincolnshire received less than 70% of the long-term average (17mm was recorded at Waddington, Lincolnshire). Over the winter (Dec-Feb) and winter half-year (Oct-Mar) so far, Scotland has been particularly wet, with more than 130% of average rainfall over large areas across both timeframes. The Shetland Islands and Orkney Islands both witnessed one of their wettest two-month periods on record (from 1910), and require only around half of the average February rainfall to set new records for winter (Dec-Feb).

River flows
Across most of the UK, river flows generally increased from late December through the first half of January, driven by the succession of low pressure systems crossing the UK. Flows peaked mid-month in the majority of rivers, and flood warnings were enacted from 8th–16th in most regions with the exception of eastern England. Nevertheless, peak flows were generally unremarkable except for the Wallington (Hampshire) and Faughan (Northern Ireland) which both registered peak flows amongst the highest on record for January. Thereafter, over the second half of January, lower temperatures and more precipitation falling as snow led to the establishment of steep recessions in some areas of the UK. National outflows largely followed this same pattern, a reflection of the widespread occurrence of increasing flows until mid-month followed by steep recessions. For the month overall, river flows were generally above normal in northern and western areas of the UK, notably so in northern and southern Scotland and parts of northern England. Exceptionally high monthly average flows were registered on the Clyde and in the west of Northern Ireland, where the Faughan and Mourne established new records for January. Below normal January average flows were confined to small pockets of north-east Scotland and north-east England, where the Derwent was notably low with less than half of the long-term average flow. Over the winter half-year thus far, notably above normal flows have been registered in Northern Ireland and catchments draining central and southern Scotland, with above normal flows also prevalent across the south-eastern corner of England.

Groundwater
Soil moisture deficits in January were near zero across the UK. Levels in the Chalk rose across the country, by more than 10m at Tilshead, Compton House and Chilgrove House. Levels finally rose at Stonor Park (Chilterns), Therfield Rectory (Herfordshire) and Dial Farm (East Anglia), the last of the Chalk boreholes to end their protracted recessions. The exception to this was Wetwang (Yorkshire) where levels fell slightly, reflecting below average rainfall. In the Jurassic and Magnesian limestones, levels were in the normal range, but fell slightly at Swan House (Durham) in the drier north-east of England. In the Permo-Triassic sandstones, levels rose at all of the index sites and were at or above average winter levels. Levels remained notably high at Nuttalls Farm (Midlands) and became exceptionally high at Newbridge (south-west Scotland). Levels at Lime Kiln Way in the Upper Greensand of south-west England also rose and remained notably high. A similar response was observed in the Lower Greensand aquifer of west Surrey. In the flashy Carboniferous Limestone, levels rose overall in both Derbyshire and south Wales.

Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

British Geological Survey
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Rainfall . . . Rainfall . . .

Met Office

Rainfall accumulations and return period estimates

Percentages are from the 1971-2000 average.

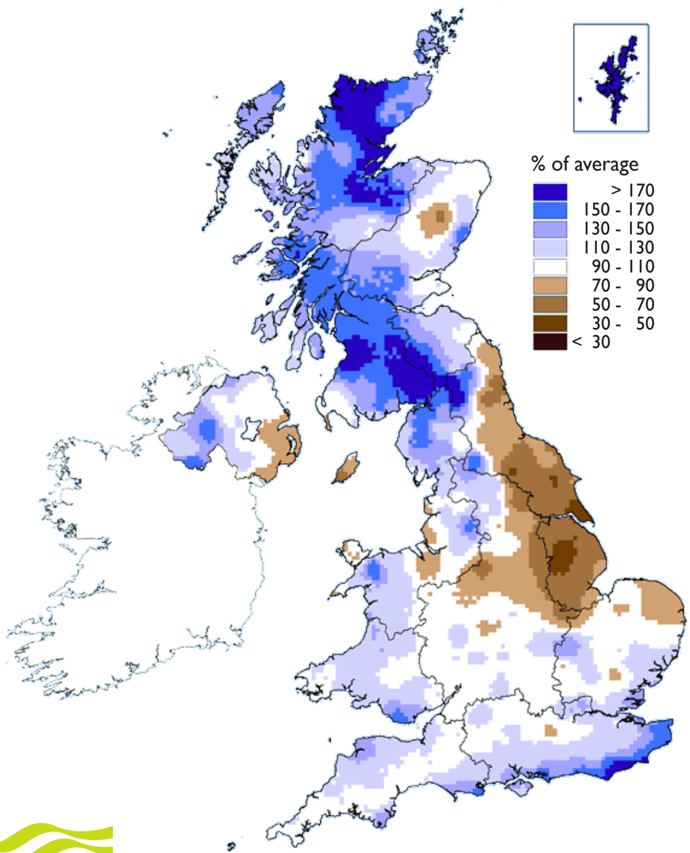
Area	Rainfall	Jan 2015	Dec14 – Jan15	RP	Oct14 – Jan15	RP	May14 – Jan15	RP	Feb14 – Jan15	RP
United	mm	**153**	283		565		945		1262	
Kingdom	%	**131**	121	5-10	123	10-20	113	2-5	117	15-25
England	mm	**91**	164		376		692		918	
	%	**110**	97	2-5	114	2-5	110	2-5	114	2-5
Scotland	mm	**252**	469		848		1330		1779	
	%	**152**	145	25-40	133	60-90	120	10-20	124	50-80
Wales	mm	**187**	343		669		1074		1475	
	%	**122**	110	2-5	110	2-5	102	2-5	109	2-5
Northern	mm	**133**	263		569		936		1237	
Ireland	%	**111**	113	2-5	125	25-40	109	2-5	112	8-12
England &	mm	**104**	188		416		745		995	
Wales	%	**113**	100	2-5	113	2-5	108	2-5	113	2-5
North West	mm	**158**	310		590		969		1289	
	%	**131**	124	5-10	119	5-10	106	2-5	111	2-5
Northumbrian	mm	**92**	161		355		666		891	
	%	**112**	97	2-5	110	2-5	105	2-5	109	2-5
Severn-Trent	mm	**71**	144		321		637		835	
	%	**96**	95	2-5	111	2-5	109	2-5	111	2-5
Yorkshire	mm	**76**	155		335		682		879	
	%	**93**	92	2-5	105	2-5	110	2-5	110	2-5
Anglian	mm	**49**	100		259		568		679	
	%	**92**	91	2-5	117	2-5	121	5-10	114	2-5
Thames	mm	**75**	123		331		607		820	
	%	**109**	89	2-5	122	2-5	112	2-5	119	5-10
Southern	mm	**111**	171		438		707		973	
	%	**135**	102	2-5	132	5-10	117	2-5	127	8-12
Wessex	mm	**107**	167		420		721		1016	
	%	**116**	88	2-5	117	2-5	109	2-5	119	5-10
South West	mm	**160**	250		553		897		1298	
	%	**114**	87	2-5	103	2-5	97	2-5	109	2-5
Welsh	mm	**177**	321		638		1036		1425	
	%	**121**	108	2-5	110	2-5	102	2-5	109	2-5
Highland	mm	**321**	614		1024		1605		2120	
	%	**160**	155	25-40	131	25-40	122	10-20	123	25-40
North East	mm	**122**	210		535		986		1211	
	%	**125**	113	2-5	140	15-25	134	15-25	128	15-25
Tay	mm	**203**	347		720		1143		1567	
	%	**129**	118	2-5	129	10-20	118	5-10	124	20-35
Forth	mm	**188**	341		611		960		1328	
	%	**148**	137	10-20	127	15-25	110	2-5	118	10-15
Tweed	mm	**159**	282		542		892		1222	
	%	**158**	139	10-20	139	25-40	121	5-10	130	20-30
Solway	mm	**244**	455		883		1284		1786	
	%	**157**	146	20-35	144	70-100	119	5-10	128	50-80
Clyde	mm	**316**	600		1028		1531		2104	
	%	**157**	153	30-50	134	40-60	114	5-10	122	20-35

% = percentage of 1971-2000 average *RP = Return period*

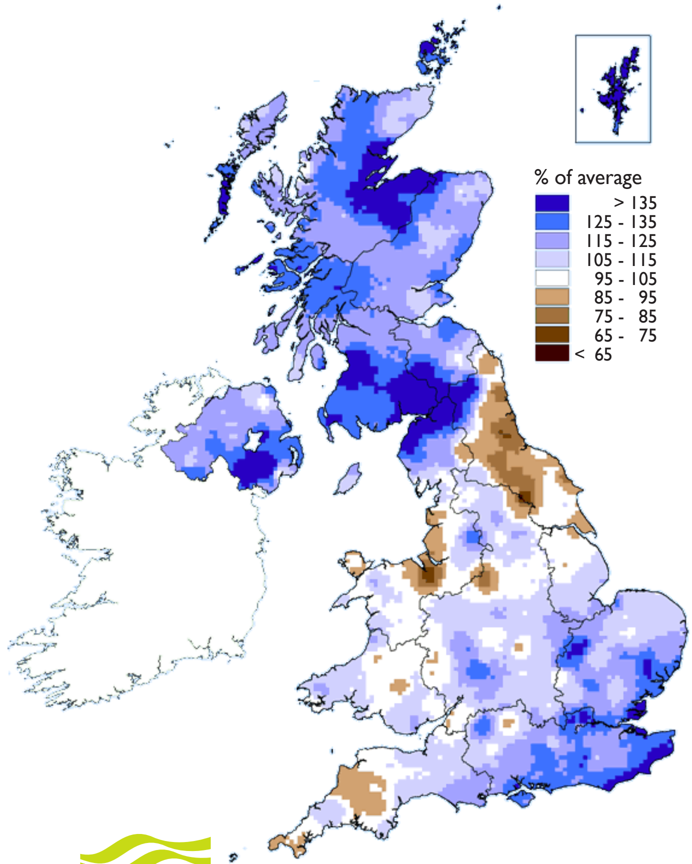
Important note: Figures in the above table may be quoted provided their source is acknowledged (see page 12). Where appropriate, specific mention must be made of the uncertainties associated with the return period estimates. The RP estimates are based on data provided by the Met Office and reflect climatic 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 from August 2014 (inclusive) are provisional.

Rainfall . . . Rainfall . . .

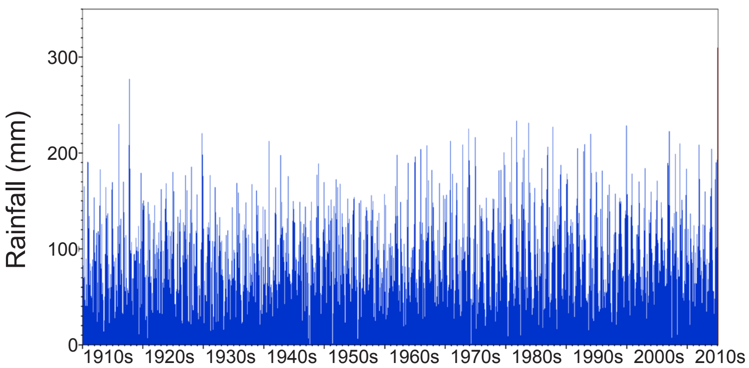
January 2015 rainfall as % of 1971-2000 average



October 2014 - January 2015 rainfall as % of 1971-2000 average

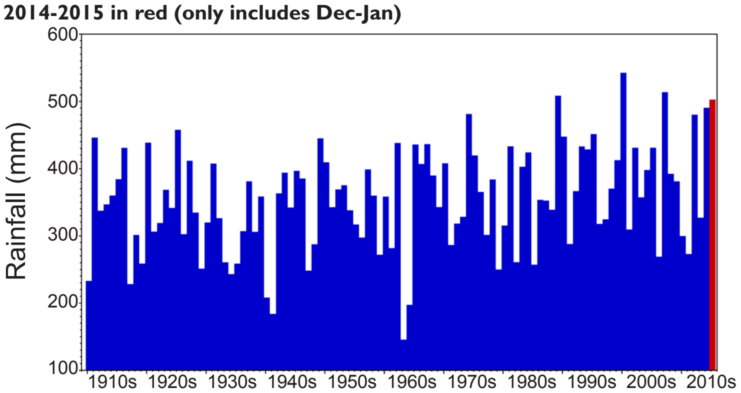


Monthly rainfall for the Shetland Islands



Winter (Dec-Feb) rainfall for the Shetland Islands

2014-2015 in red (only includes Dec-Jan)



Met Office

Met Office 3-month outlook Updated: January 2015

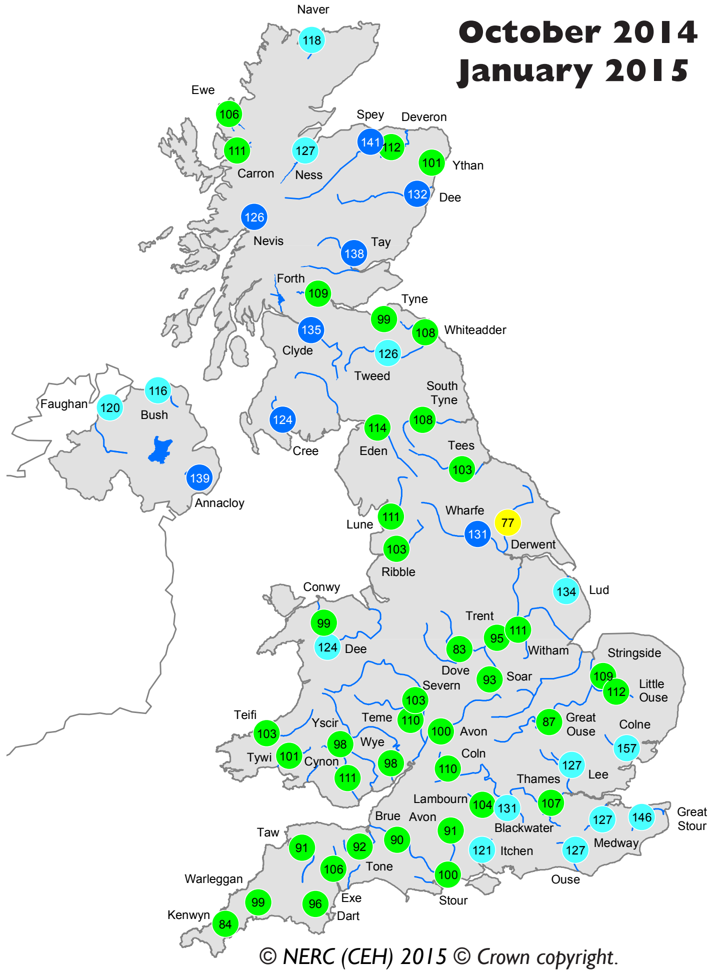
For February-March-April, predictability is low and the forecast does not differ significantly from climatology, with above-average and below-average precipitation equally probable. The probability that UK precipitation for February-March-April will fall either into the driest or wettest of our five categories is around 20% (the 1981-2010 probability for each of these categories is 20%).

The complete version of the 3-month outlook may be found at: http://www.metoffice.gov.uk/publicsector/contingency-planners
This outlook is updated towards the end of each calendar month.

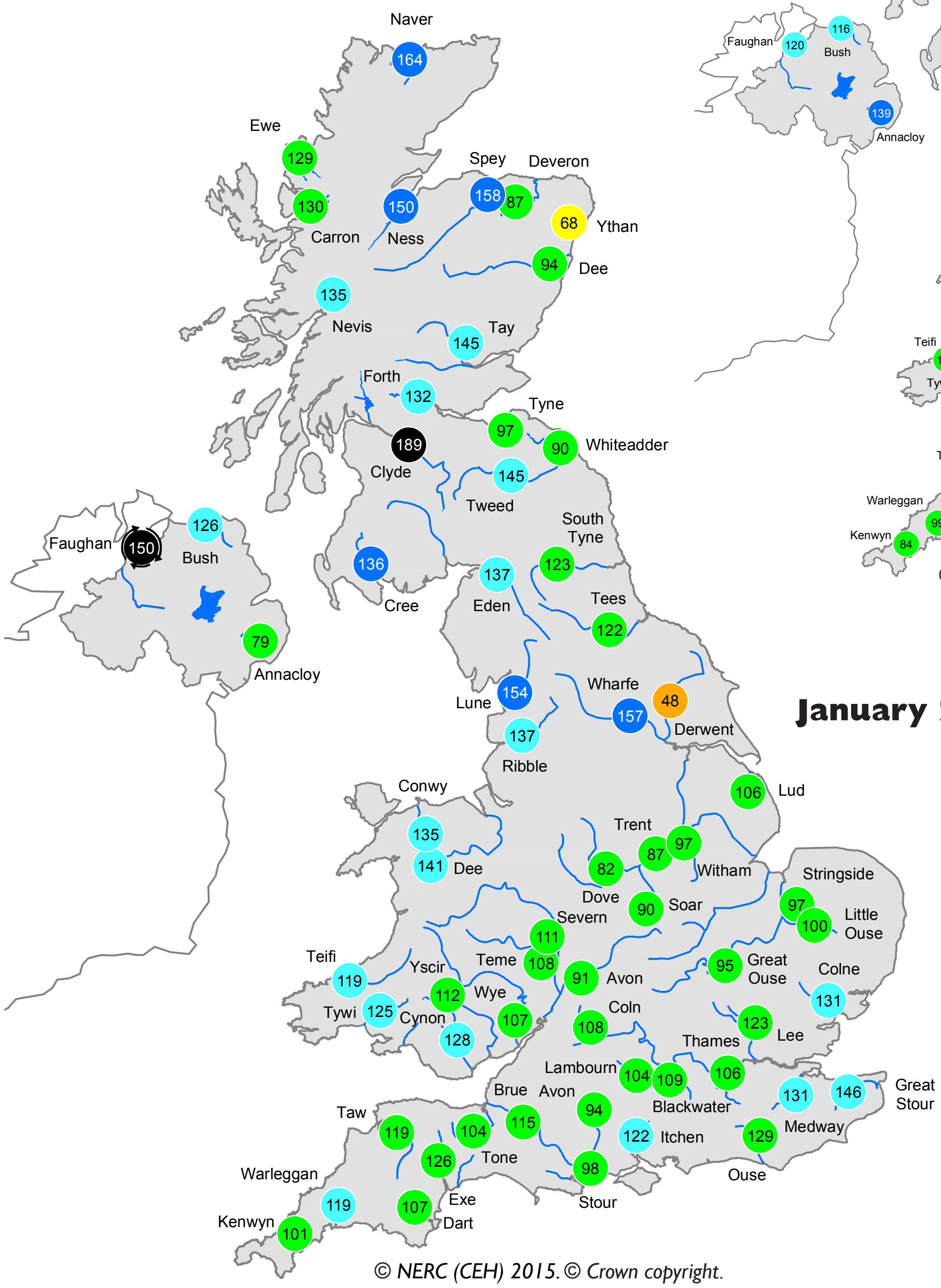
The latest shorter-range forecasts, covering the upcoming 30 days, can be accessed via: http://www.metoffice.gov.uk/weather/uk/uk_forecast_weather.html
These forecasts are updated very frequently.

River flow . . . River flow . . .

October 2014 - January 2015



January 2015



Key

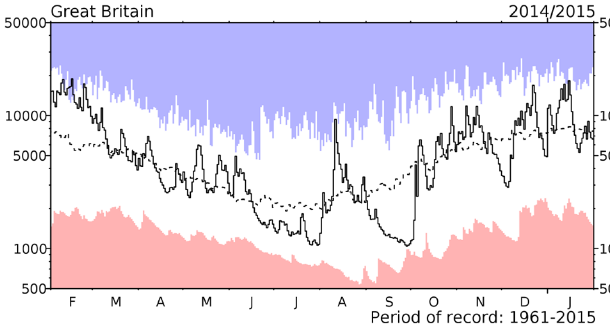
- 25 — % of long-term average (record figure when circled)
- Exceptionally high flow
- Notably high flow
- Above normal
- Normal range
- Below normal
- Notably low flow
- Exceptionally low flow

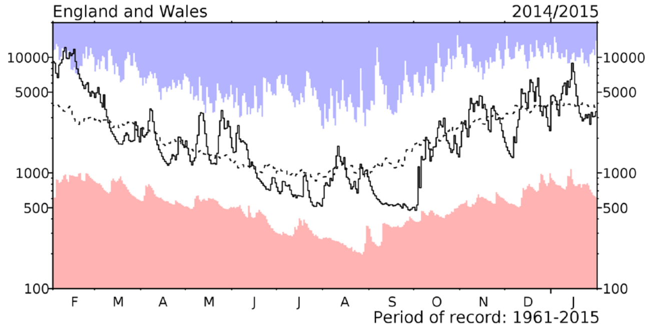
*Based on ranking of the monthly flow**

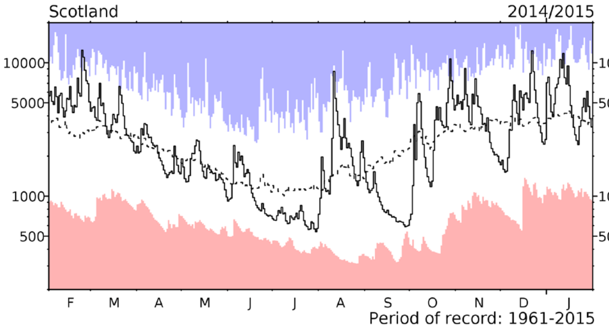
River flows

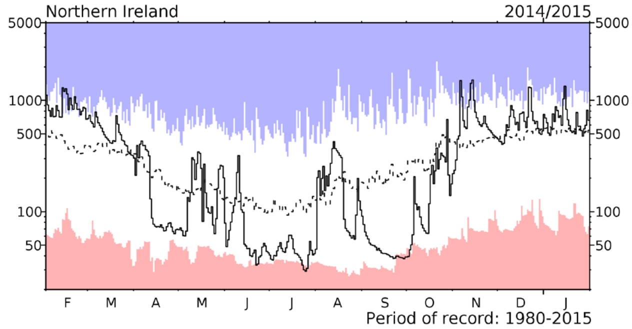
*Comparisons based on percentage flows alone can be misleading. A given percentage flow can represent extreme drought conditions in permeable catchments where flow patterns are relatively stable but be well within the normal range in impermeable catchments where the natural variation in flows is much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

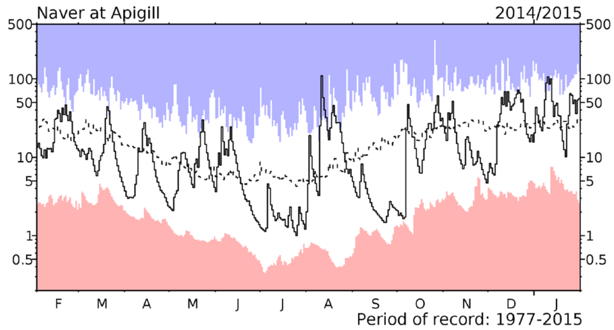
River flow . . . River flow . . .

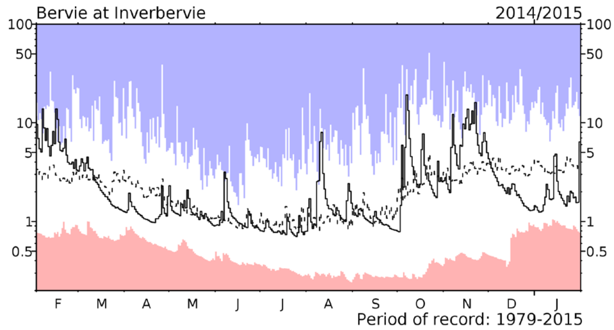


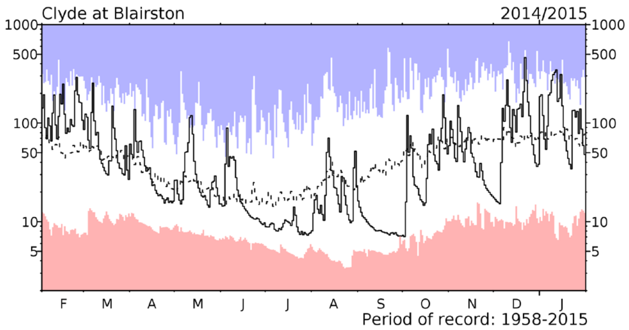


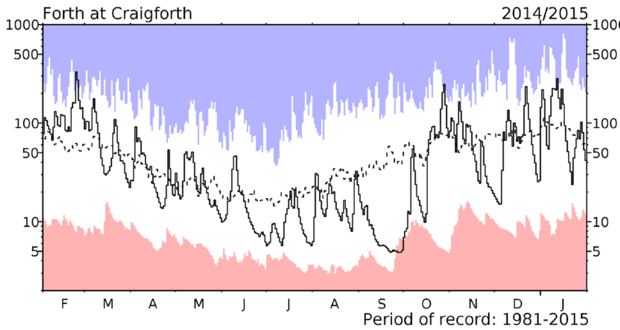


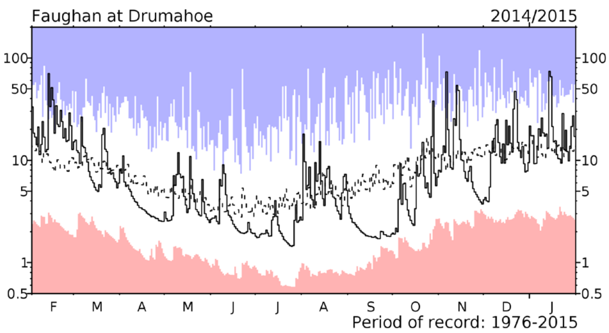


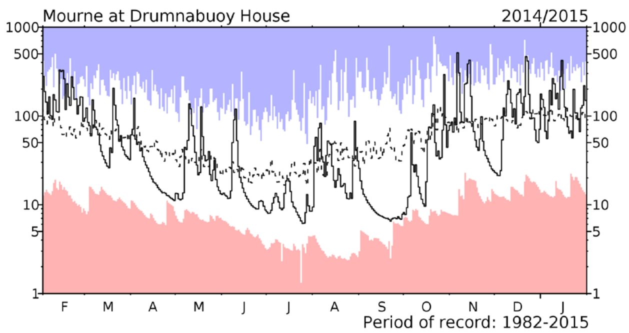










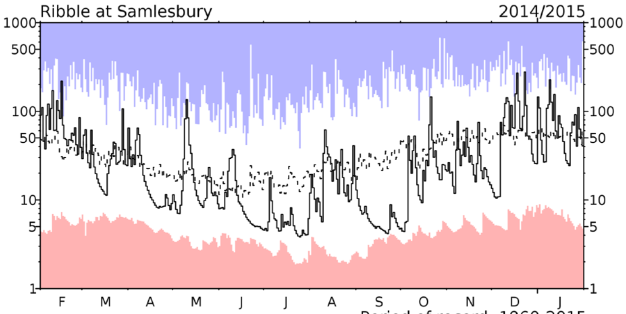


River flow hydrographs

The river flow hydrographs show the daily mean flows together with the maximum and minimum daily flows prior to February 2014 (shown by the shaded areas). Daily flows falling outside the maximum/minimum range are indicated where the bold trace enters the shaded areas. Mean daily flows are shown as the dashed line.

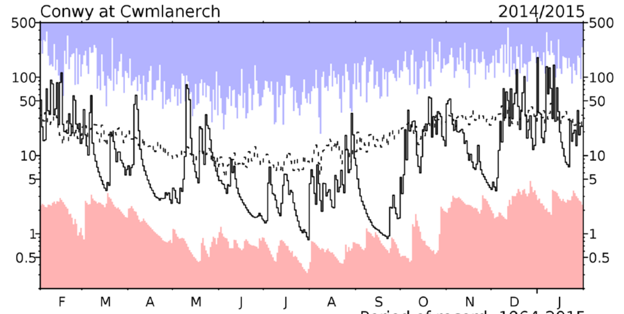
River flow . . . River flow . . .

Ribble at Samlesbury 2014/2015



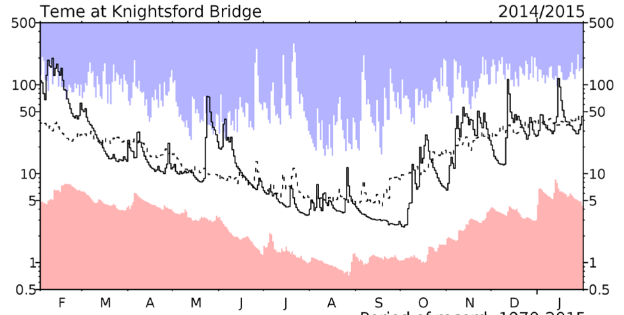
Period of record: 1960-2015

Conwy at Cwmlanerch 2014/2015



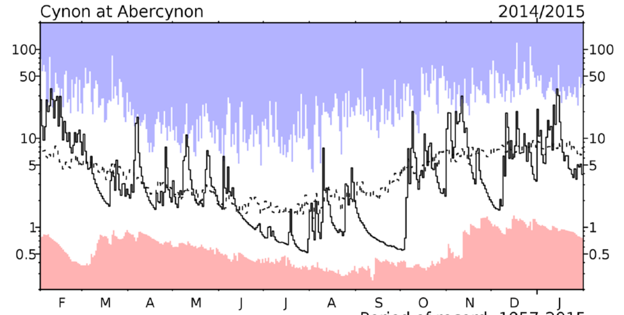
Period of record: 1964-2015

Teme at Knightsford Bridge 2014/2015



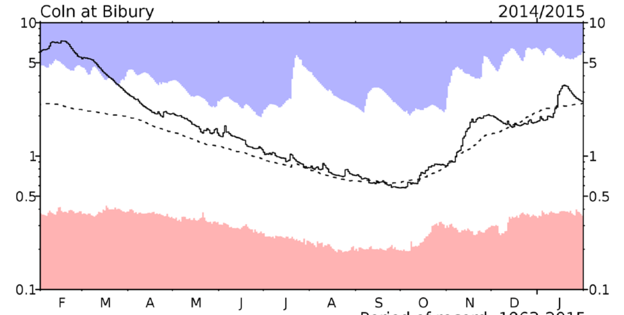
Period of record: 1970-2015

Cynon at Abercynon 2014/2015



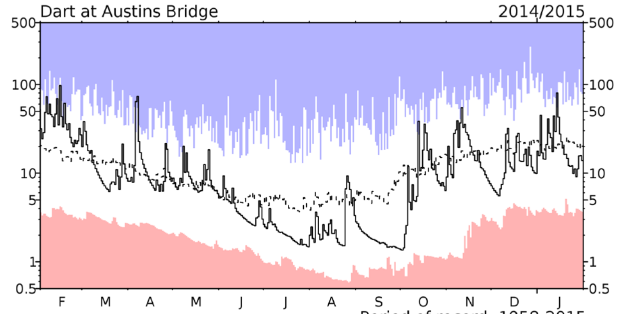
Period of record: 1957-2015

Coln at Bibury 2014/2015



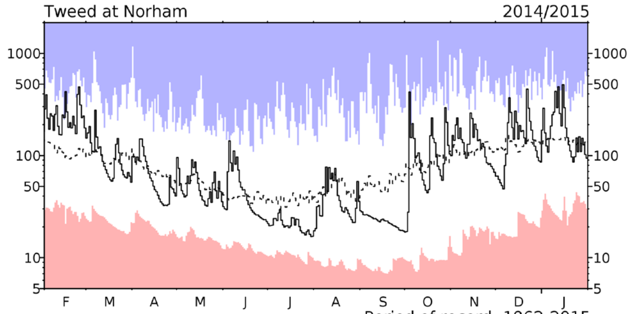
Period of record: 1963-2015

Dart at Austins Bridge 2014/2015



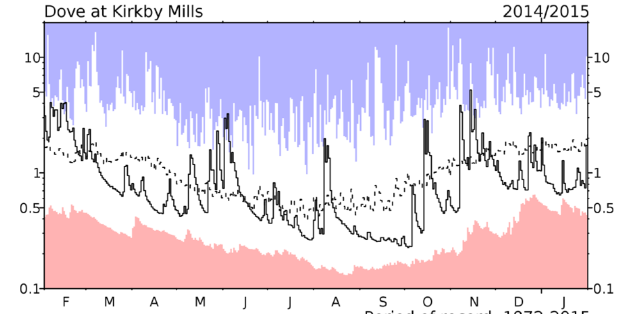
Period of record: 1958-2015

Tweed at Norham 2014/2015



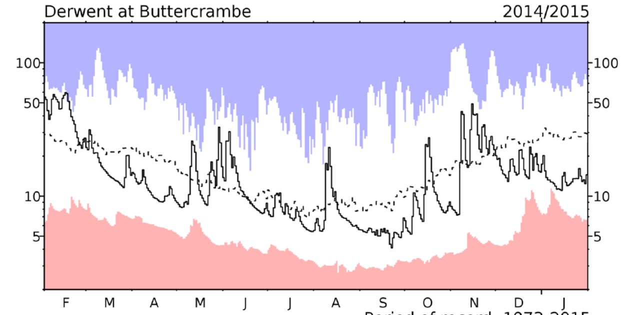
Period of record: 1962-2015

Dove at Kirkby Mills 2014/2015



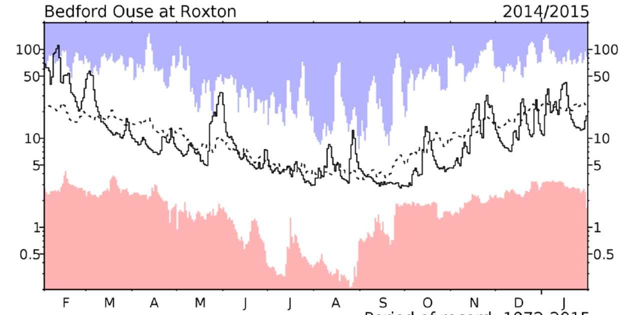
Period of record: 1972-2015

Derwent at Buttercrambe 2014/2015



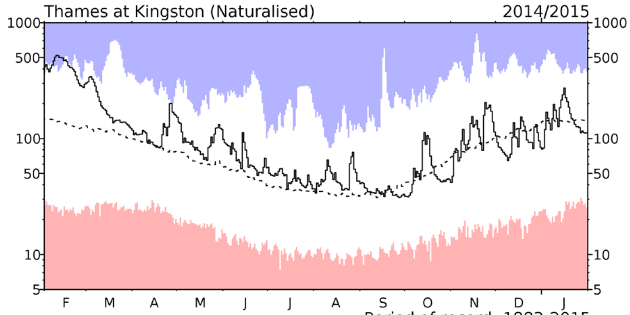
Period of record: 1973-2015

Bedford Ouse at Roxton 2014/2015



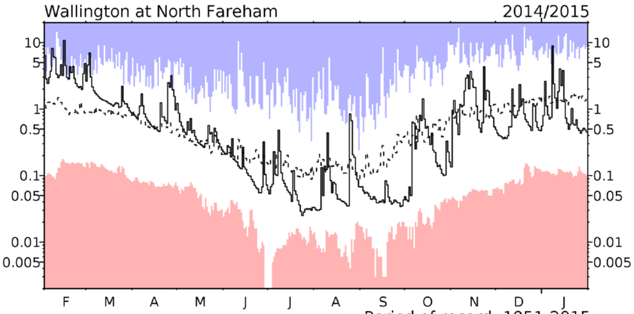
Period of record: 1972-2015

Thames at Kingston (Naturalised) 2014/2015



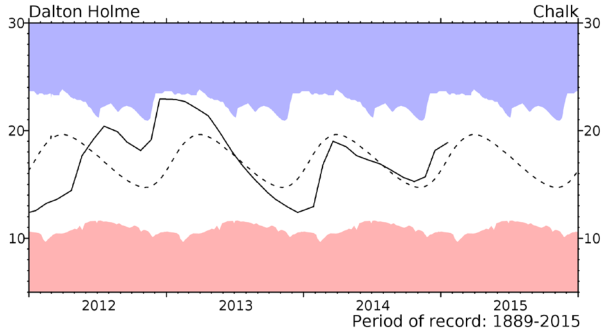
Period of record: 1883-2015

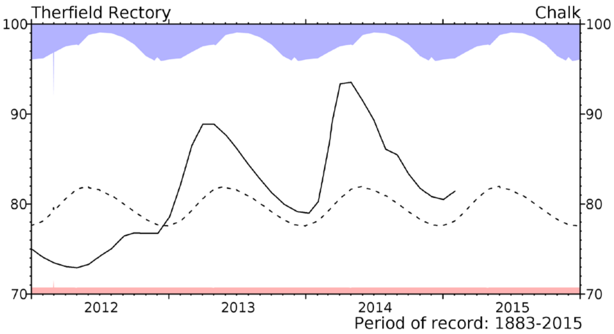
Wallington at North Fareham 2014/2015

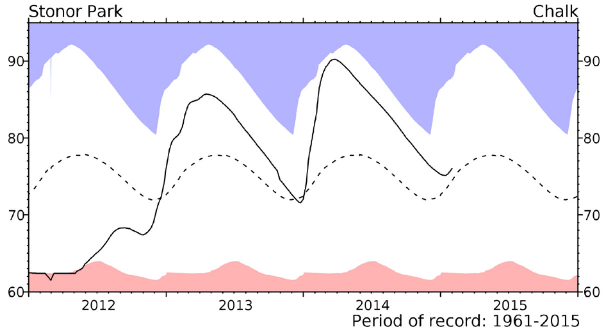


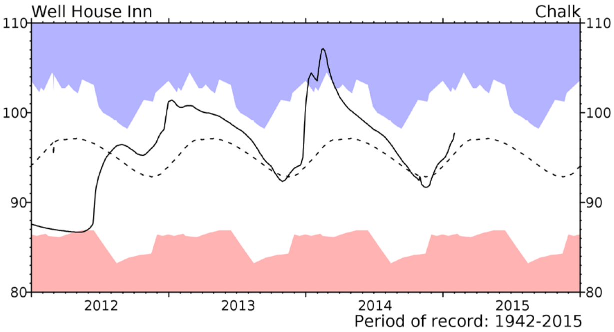
Period of record: 1951-2015

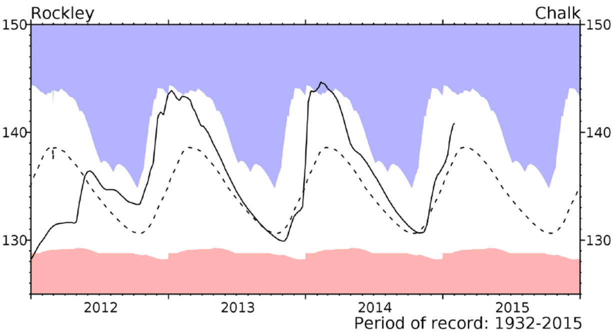
Groundwater . . . Groundwater

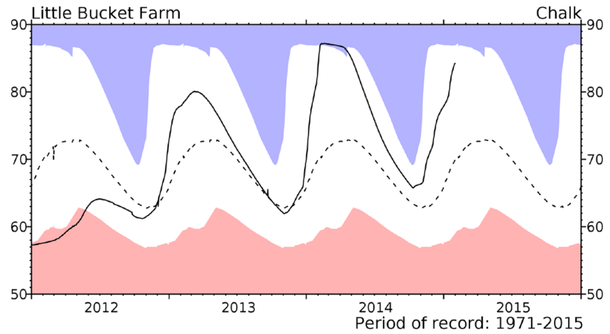


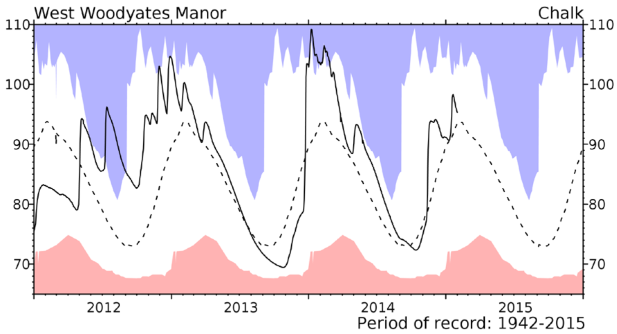


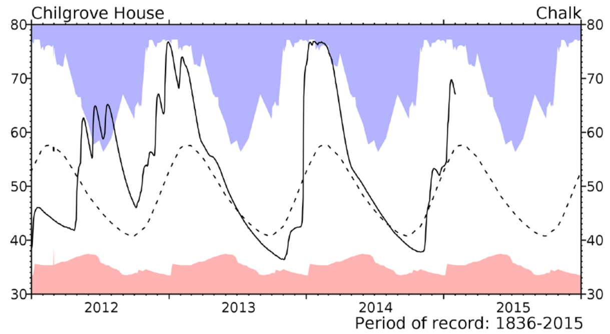


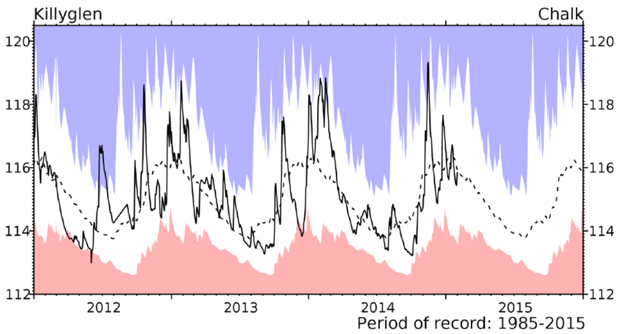


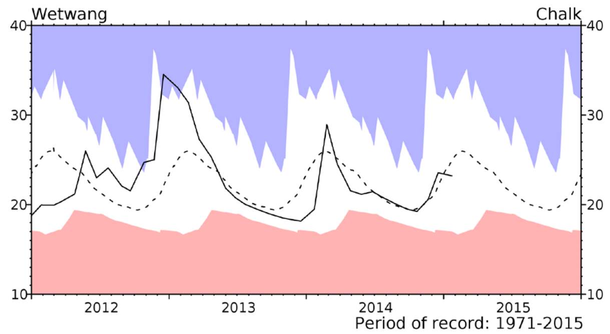






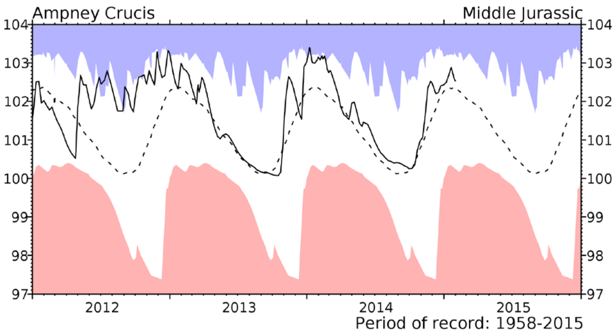


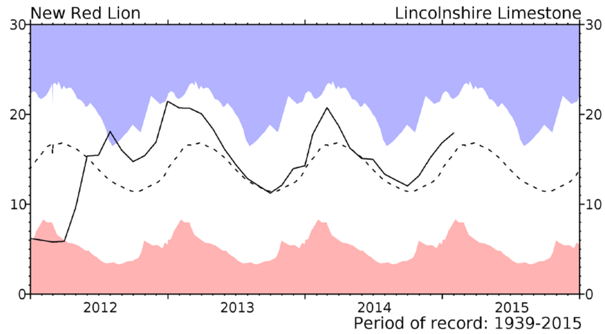


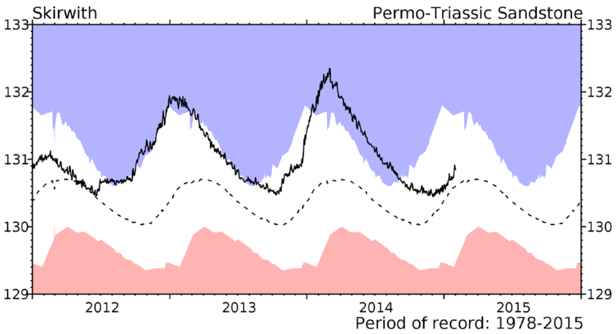


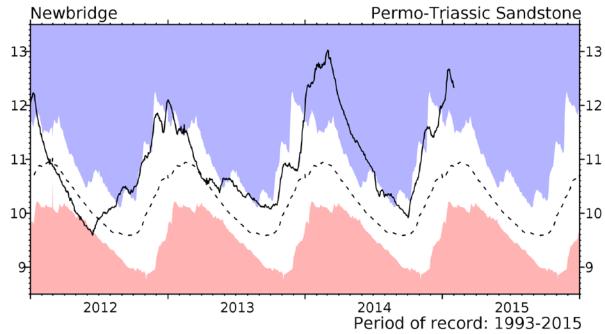
Groundwater levels normally rise and fall with the seasons, reaching a peak in the spring following replenishment through the winter (when evaporation losses are low and soil moist). They decline through the summer and early autumn. This seasonal variation is much reduced when the aquifer is confined 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. The latest recorded levels are listed overleaf.

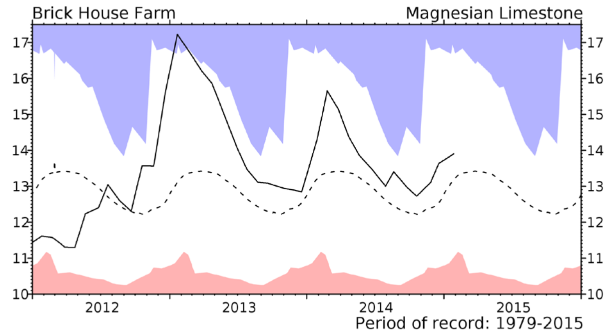
Groundwater ... Groundwater

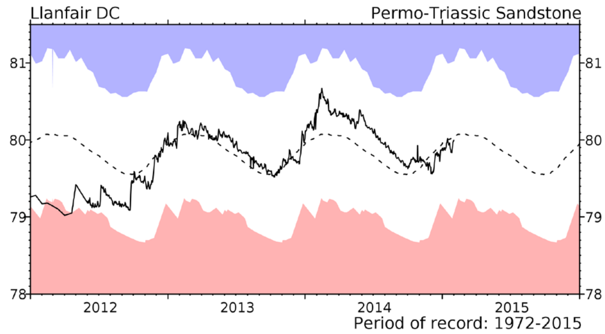


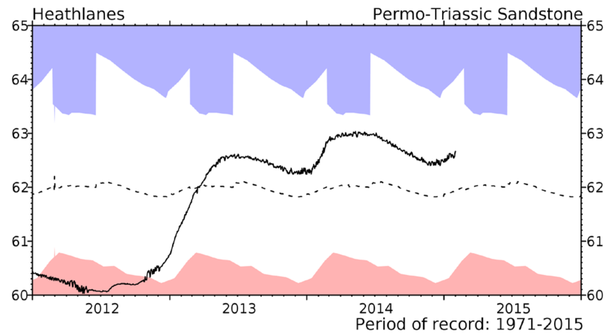


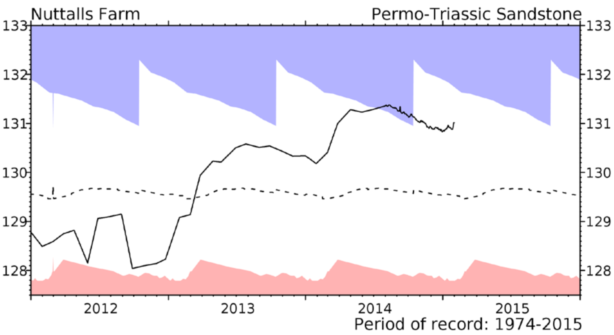


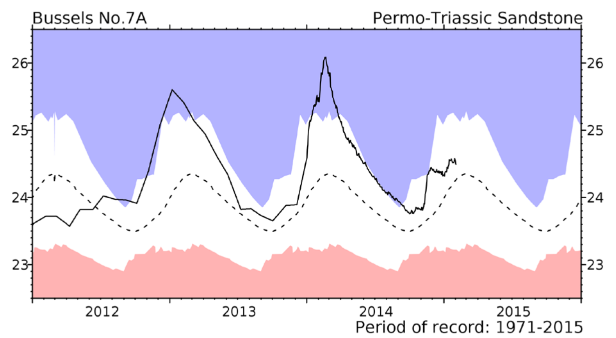


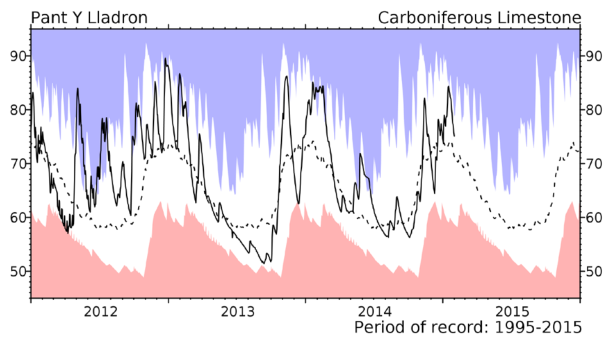










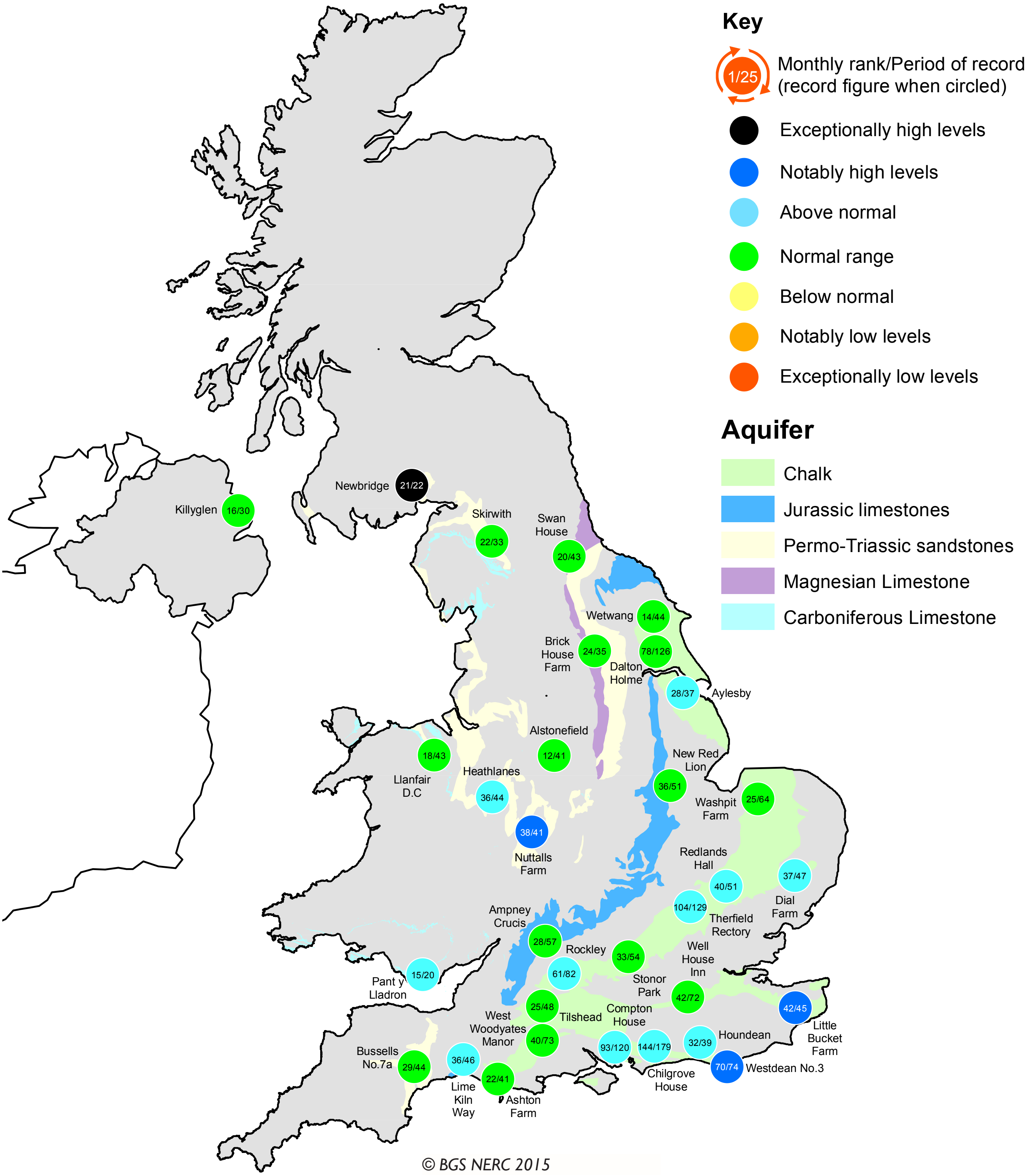


Groundwater levels January / February 2015

Borehole	Level	Date	Jan av.	Borehole	Level	Date	Jan av.	Borehole	Level	Date	Jan av.
Dalton Holme	18.88	19/01	17.14	Chilgrove House	66.89	31/01	56.37	Brick House Farm	13.90	27/01	13.09
Therfield Rectory	81.43	02/02	77.67	Killyglen (NI)	115.84	31/01	116.24	Llanfair DC	80.00	31/01	79.97
Stonor Park	76.04	31/01	73.30	Wetwang	23.19	23/01	24.24	Heathlanes	62.66	31/01	61.85
Tilshead	94.55	31/01	91.33	Ampney Crucis	102.53	31/01	102.36	Nuttalls Farm	131.01	31/01	129.53
Rockley	140.80	31/01	136.44	New Red Lion	17.91	31/01	14.95	Bussels No.7a	24.49	02/02	24.17
Well House Inn	97.69	31/01	94.99	Skirwith	130.81	31/01	130.62	Alstonefield	195.32	27/01	198.89
West Woodyates	95.31	31/01	91.82	Newbridge	12.33	31/01	10.95				

Levels in metres above Ordnance Datum

Groundwater . . . Groundwater

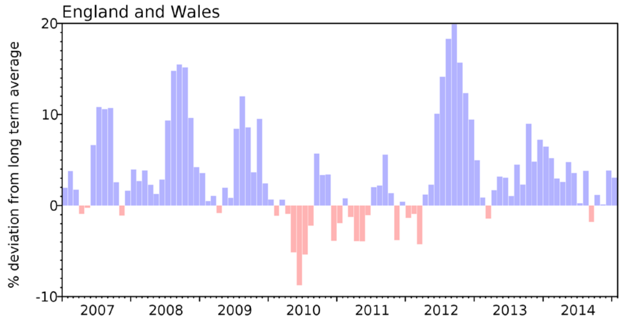


Groundwater levels - January 2015

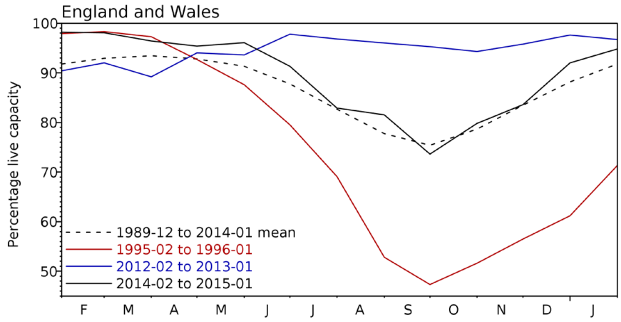
The calculation of ranking has been modified from that used in summaries published prior to October 2012. It is now based on a comparison between the most recent level and levels for the same date during previous years of record. Where appropriate, levels for earlier years may have been interpolated. 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)	2014 Nov	2014 Dec	2015 Jan	Jan Anom.	Min Jan	Year* of min	2014 Jan	Diff 15-14
North West	N Command Zone	•	124929	74	93	98	5	63	1996	100	-2
	Vyrnwy		55146	74	99	94	1	45	1996	100	-6
Northumbrian	Teesdale	•	87936	88	99	99	6	51	1996	100	-1
	Kielder		(199175)	95	98	94	1	85	1989	97	-3
Severn-Trent	Clywedog		44922	86	86	93	5	62	1996	92	1
	Derwent Valley	•	39525	66	96	100	5	15	1996	101	-1
Yorkshire	Washburn	•	22035	67	87	87	-4	34	1996	98	-11
	Bradford Supply	•	41407	84	96	99	5	33	1996	100	-1
Anglian	Grafham		(55490)	66	70	76	-10	67	1998	93	-17
	Rutland		(116580)	82	83	95	9	68	1997	95	0
Thames	London	•	202828	88	94	96	5	70	1997	96	-1
	Farmoor	•	13822	69	89	96	5	72	2001	100	-4
Southern	Bewl		28170	71	73	85	3	37	2006	100	-15
	Ardingly		4685	100	100	100	8	41	2012	100	0
Wessex	Clatworthy		5364	84	100	100	4	62	1989	100	0
	Bristol	•	(38666)	75	84	95	9	58	1992	100	-5
South West	Colliford		28540	76	79	87	3	52	1997	98	-11
	Roadford		34500	78	82	91	10	30	1996	100	-9
	Wimbleball		21320	75	83	100	9	59	1997	100	0
	Stithians		4967	52	57	75	-13	38	1992	100	-25
Welsh	Celyn & Brenig	•	131155	81	96	94	-1	61	1996	100	-6
	Brianne		62140	93	98	98	0	84	1997	100	-2
	Big Five	•	69762	86	93	97	3	67	1997	100	-3
	Elan Valley	•	99106	99	100	100	3	73	1996	100	0
Scotland(E)	Edinburgh/Mid-Lothian	•	97639	79	83	91	-3	72	1999	100	-9
	East Lothian	•	10206	99	100	100	2	68	1990	100	0
Scotland(W)	Loch Katrine	•	111363	90	96	95	2	85	2000	95	0
	Daer		22412	99	99	98	0	90	2013	98	0
	Loch Thom	•	11840	100	100	100	2	90	2004	100	0
Northern Ireland	Total+	•	56800	93	92	92	0	75	2002	93	-2
	Silent Valley	•	20634	97	85	95	7	46	2002	100	-5

( ) 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

National Hydrological Monitoring Programme

The National Hydrological Monitoring Programme (NHMP) was instigated in 1988 and is undertaken jointly by the Centre for Ecology & Hydrology (CEH) and the British Geological Survey (BGS) – both are component bodies of the Natural Environment Research Council (NERC). The National River Flow Archive (maintained by CEH) and the National Groundwater Level Archive (maintained by BGS) provide the historical perspective within which to examine contemporary hydrological conditions.

Data Sources

River flow and groundwater level data are provided by the Environment Agency (EA), Natural Resources Wales - Cyfoeth Naturiol Cymru, the Scottish Environment Protection Agency (SEPA) and, for Northern Ireland, the Rivers Agency 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).

Reservoir level information is provided by the Water Service Companies, the EA, Scottish Water and Northern Ireland Water.

Most rainfall data are provided by the Met Office (address opposite).

To allow better spatial differentiation the monthly rainfall data for Britain are presented for the regional divisions of the precursor organisations of the EA and SEPA.

The monthly, and n-month, rainfall figures have been produced by the Met Office, National Climate Information Centre (NCIC) and are based on gridded data from raingauges. They include a significant number of monthly raingauge totals provided by the EA and SEPA. The Met Office NCIC monthly rainfall series extends back to 1910 and forms 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/Monthly_gridded_datasets_UK.pdf

The regional figures for the current month are based on limited raingauge networks so these (and the return periods associated with them) should be regarded as a guide only.

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

From time to time the Hydrological Summary may also refer to evaporation and soil moisture figures. These are obtained from MORECS, the Met Office services involving the routine calculation of evaporation and soil moisture throughout the UK.

For further details please contact:

The Met Office
FitzRoy Road
Exeter
Devon
EX1 3PB

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

The National Hydrological Monitoring Programme depends on the active cooperation of many data suppliers. This cooperation is gratefully acknowledged.

Enquiries

Enquiries should be addressed to:

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A full catalogue of past Hydrological Summaries can be accessed and downloaded at: http://www.ceh.ac.uk/data/nrfa/nhmp/nhmp.html

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