Hydrological Summary

for the United Kingdom

April 2015

General

April was dominated by anticyclonic conditions and was, for most of the UK, largely dry, warm and sunny; the sunniest April on record (from 1929) for the UK. The fine spring weather was bookended by cool and unsettled spells in the first and final weeks, and north-western areas experienced a stormy interlude mid-month. Overall however, April was warmer than average and saw some very warm spells. With climbing evapotranspiration rates, and much of southern Britain receiving little appreciable rainfall, soil moisture deficits (SMDs) increased markedly above the late April average. Correspondingly, river flows and groundwater recessions were mostly sustained through the month and April flows and levels were below the seasonal average in some localities, although a majority of index catchments and boreholes remained within the normal range. Whilst April rainfall totals were not exceptionally low, rainfall deficiencies over the last three months were more noteworthy. Despite the dry late-winter and spring so far, the water resources outlook for the summer remains favourable at the national scale, with stocks in most reservoirs close to (or above) average, and groundwater levels in the normal range across the majority of the Chalk aquifer. As evapotranspiration increases over the coming summer months, the prospect for further replenishment of water resources diminishes. This implies a likely continuation of moderately depressed runoff rates in some catchments, and increases the chance of notably low groundwater levels in late summer and autumn, particularly in parts of south-west and north-east England.

Rainfall

The first few days of April were unsettled, but high pressure became established in the first week. Between the 5th and the 11th it was sunny and dry across the UK, and very warm for early April as subtropical air was drawn across the country. A brief unsettled spell ensued mid-month, with a low pressure system bringing heavy frontal rainfall to north-western areas (with 65mm at Achnagart, Wester Ross, on the 13th/14th). The south remained much drier (many areas receiving <1mm between the 5th and the 24th) and the warmth persisted, with 25.6°C recorded at Faversham on the 15th. High pressure held sway over most of the UK thereafter, heralding another dry, sunny (though less warm) spell for most of the country. The last week was cold and wet, with heavy rainfall in northern regions and snow over the Scottish hills; these unsettled conditions continued into early May. Overall, the April rainfall was near-average for Scotland and below average elsewhere, with Northern Ireland receiving 84% of average and England & Wales receiving 47% of average. The Southern, South West and Severn Trent regions received less than 40% but it was even drier in some localities: parts of the Welsh borders, the south-west peninsula, north-east England and the far south-east received below 30%. Moderate February-April rainfall deficiencies can be seen in all regions away from the upland north-west, with notable deficiencies (<65% of average) in south-western Britain and parts of eastern England. While not exceptional in records from 1910, deficiencies are among the lowest since 1976 (for this three-month period) for most regions of the English Lowlands. Across most of England the accumulated rainfall since December was also moderately below-average, notably so in Wessex and coastal districts of north-eastern Britain.

River flows

Flows in most index rivers were moderately above average in the first few days of April, as a result of the unsettled spell extending from late March. As anticyclonic conditions prevailed, recessions became established and typically continued through the month in catchments in southern Britain. In some responsive northern catchments seasonal recessions were interrupted mid-month, with heavy rain in western Scotland prompting localised flood alerts around the 13th, although spates were modest and incursions into the high flow envelope were rare. Flows in northern Britain and Northern Ireland generally began to climb in the last few days of April, steeply in some responsive catchments (e.g. the Mourne and the Deveron). Monthly runoff totals were normal or below-normal across the UK, with the exception of the Bush (Northern Ireland) and the Ness (northern Scotland). Correspondingly, national outflows for April were below average, substantially so for England & Wales, although not exceptionally so in the context of recent Aprils. Below-normal totals were mostly concentrated in southern England, eastern Scotland, Wales and parts of eastern England, with some notably low runoff in some areas; less than half of the typical runoff for April was observed in some catchments, with the Ythan registering its third lowest April runoff in a record from 1983. Modest runoff deficiencies since February can be recognised in the same areas of the country, as well as in the south-east of Northern Ireland. The Yorkshire Derwent and the Whiteadder (south-east Scotland) saw their third lowest runoff accumulation for this timeframe in records from 1974 and 1965 respectively. In contrast, above-average accumulations can be seen in the north coast of Northern Ireland and north-west Scotland; notably high runoff accumulations can be traced back before the autumn in Scotland.

Groundwater

With little rainfall and some very warm weather, SMDs climbed steeply through April and, by month end, were substantially above average across the main aquifer areas (SMDs were double the typical end-of-April magnitude across the Chalk outcrop). Consequently, levels fell at index wells throughout the country, with a few exceptions (the slowly-responding Chalk at Therfield Rectory and Dial Farm in eastern England, the Permo-Triassic sandstones at Nuttalls Farm and the Carboniferous Limestone at Alstonefield in the Midlands). In the Chalk, levels were generally still within the normal range but below average for the time of year in Yorkshire, Northern Ireland and Dorset-Wiltshire, whilst they remained above average in the eastern part of the North Downs and upper Lee valley of Hertfordshire. However, compared with the exceptionally high groundwater levels in the Chalk in April 2014, when groundwater flooding was still present in some areas, they are now up to 4m lower across southern England (and over 6m and 12m lower at Therfield Rectory and Stonor Park, respectively). In the fast responding Jurassic and Magnesian limestones, levels remained average or below and in the slow responding Permo-Triassic sandstones they were average or above (still exceptionally high at Newbridge, an area receiving above-average autumn and winter rainfall, and Nuttalls Farm). Groundwater levels in the Lower Greensand of south-east England remained above average. With the modest rise in level at Alstonefield, Carboniferous Limestone levels were in the normal range in both Derbyshire and south Wales. As little recharge is anticipated from now until the autumn, the current picture is likely to persist unless substantial late spring or summer rainfall is received.

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.

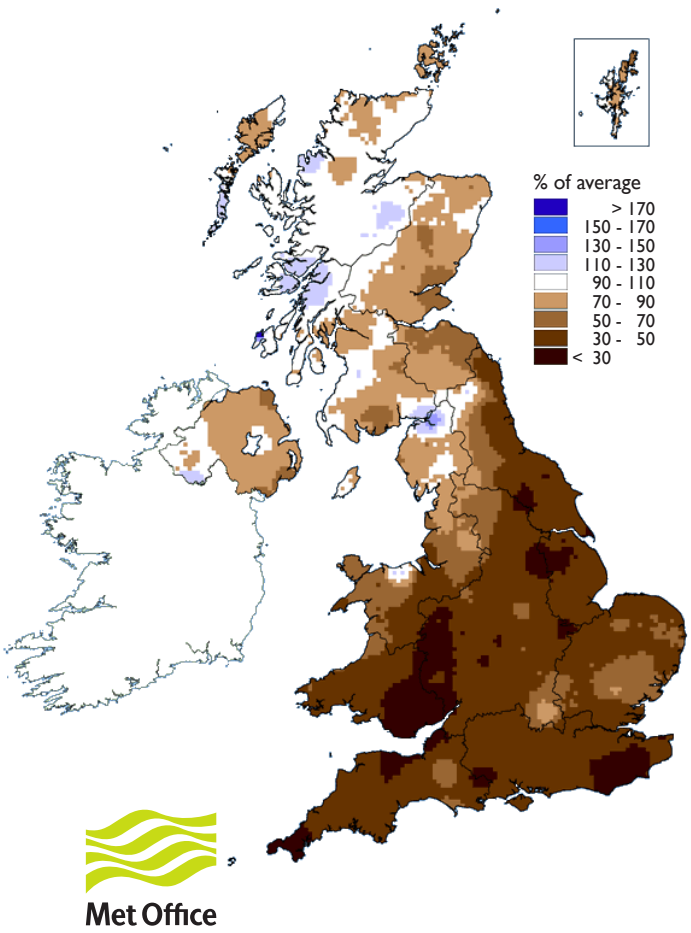
Area	Rainfall	Apr 2015	Feb15 – Apr15	RP	Nov14 – Apr15	RP	Aug14 – Apr15	RP	May14 – Apr15	RP
United Kingdom	mm	**46**	221		631		951		1170	
	%	**70**	91	2-5	107	2-5	108	2-5	109	2-5
England	mm	**26**	128		398		624		818	
	%	**48**	71	5-10	93	2-5	97	2-5	101	2-5
Scotland	mm	**80**	373		982		1461		1714	
	%	**99**	113	5-10	121	15-25	122	30-50	119	20-35
Wales	mm	**36**	222		720		1057		1303	
	%	**45**	73	5-10	94	2-5	94	2-5	96	2-5
Northern Ireland	mm	**59**	234		690		969		1189	
	%	**84**	93	2-5	116	15-25	109	5-10	108	2-5
England & Wales	mm	**28**	141		443		684		885	
	%	**47**	72	5-10	93	2-5	96	2-5	100	2-5
North West	mm	**54**	239		656		983		1202	
	%	**80**	95	2-5	105	2-5	104	2-5	103	2-5
Northumbrian	mm	**37**	143		398		610		802	
	%	**62**	76	2-5	92	2-5	94	2-5	98	2-5
Severn-Trent	mm	**21**	116		355		553		759	
	%	**38**	69	5-10	91	2-5	94	2-5	101	2-5
Yorkshire	mm	**27**	126		369		581		798	
	%	**46**	69	5-10	86	2-5	92	2-5	99	2-5
Anglian	mm	**20**	84		266		456		654	
	%	**45**	65	5-10	90	2-5	101	2-5	110	2-5
Thames	mm	**24**	101		328		527		695	
	%	**47**	66	5-10	92	2-5	98	2-5	100	2-5
Southern	mm	**18**	108		424		666		815	
	%	**35**	66	5-10	102	2-5	107	2-5	106	2-5
Wessex	mm	**22**	117		408		642		821	
	%	**39**	61	5-10	87	2-5	92	2-5	96	2-5
South West	mm	**26**	184		607		896		1092	
	%	**36**	67	5-10	88	2-5	90	2-5	92	2-5
Welsh	mm	**34**	211		684		1011		1252	
	%	**44**	72	5-10	93	2-5	93	2-5	96	2-5
Highland	mm	**100**	485		1214		1838		2113	
	%	**107**	120	5-10	121	10-20	126	30-50	123	20-35
North East	mm	**64**	174		530		939		1146	
	%	**100**	84	2-5	108	2-5	125	10-20	121	5-10
Tay	mm	**62**	290		831		1224		1461	
	%	**92**	99	2-5	116	5-10	117	8-12	116	5-10
Forth	mm	**53**	270		695		998		1206	
	%	**84**	106	2-5	112	5-10	108	2-5	107	2-5
Tweed	mm	**48**	207		593		916		1118	
	%	**80**	98	2-5	117	5-10	122	8-12	118	5-10
Solway	mm	**71**	349		970		1380		1631	
	%	**88**	111	2-5	125	30-50	120	20-35	117	10-20
Clyde	mm	**93**	474		1245		1716		2029	
	%	**102**	120	5-10	128	25-40	118	15-25	117	15-25

% = 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 January 2015 (inclusive) are provisional.

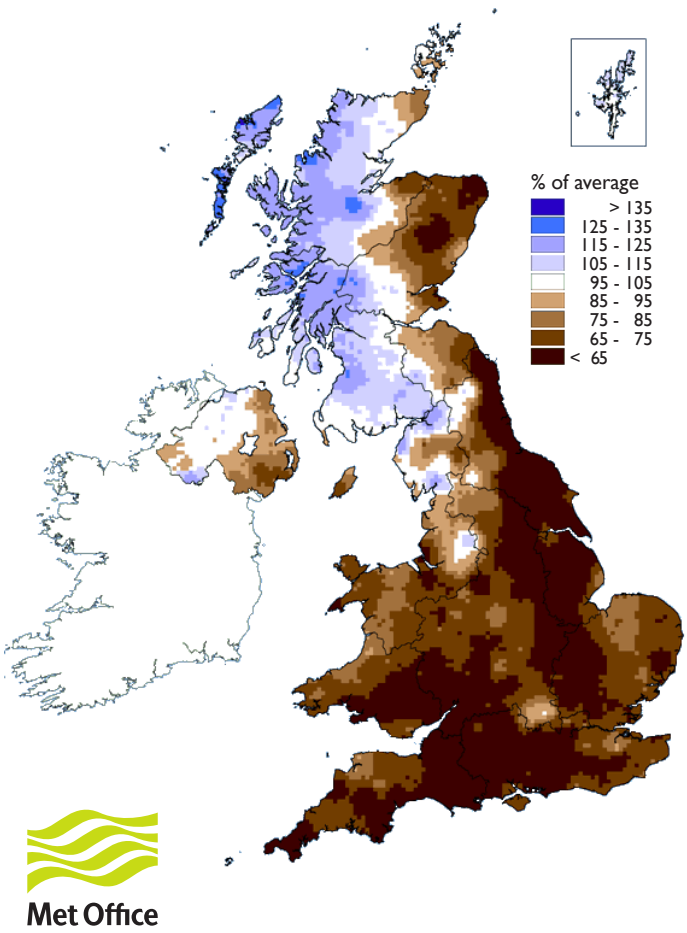
Rainfall . . . Rainfall . . .

April 2015 rainfall
as % of 1971-2000 average



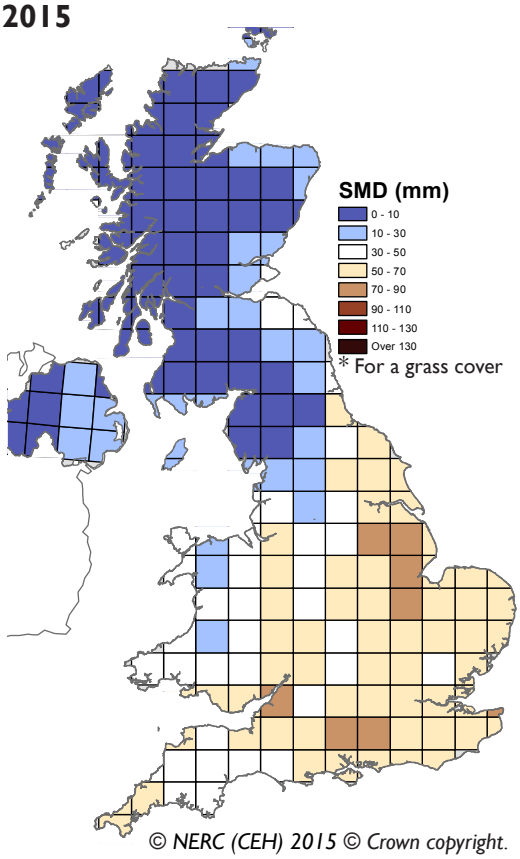
Met Office

February 2015 - April 2015 rainfall
as % of 1971-2000 average



Met Office

MORECS Soil Moisture Deficits*
April 2015



Met Office

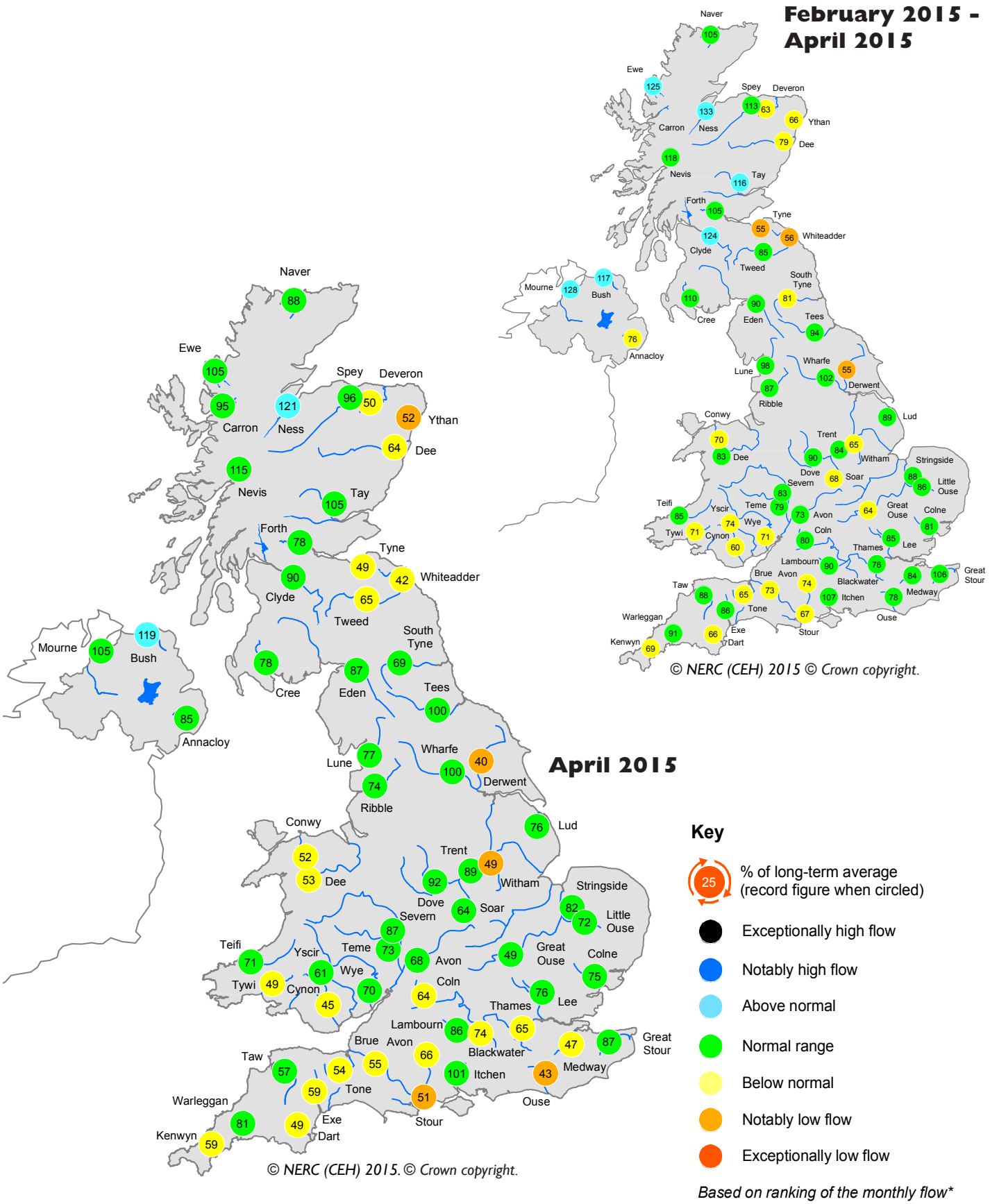
Met Office
3-month outlook
Updated: April 2015

Latest predictions for UK precipitation favour a slight shift towards above-average rainfall for May-June-July as a whole. The probability that UK precipitation for May-June-July will fall into the driest of our five categories is around 20% and the probability that it will fall into the wettest of our five categories is 25% (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.

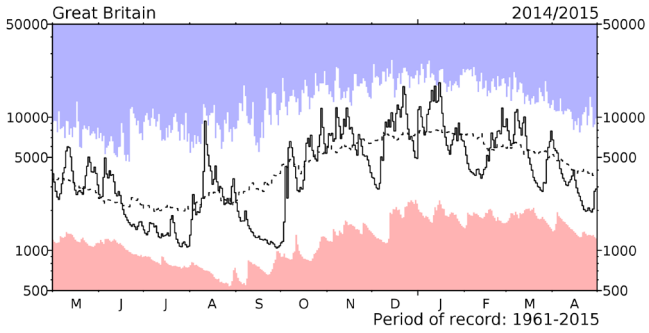
River flow . . . River flow . . .

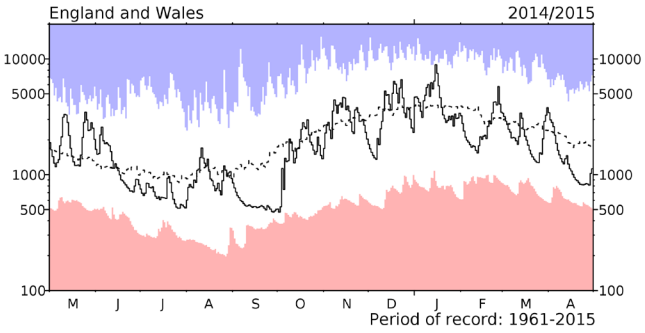


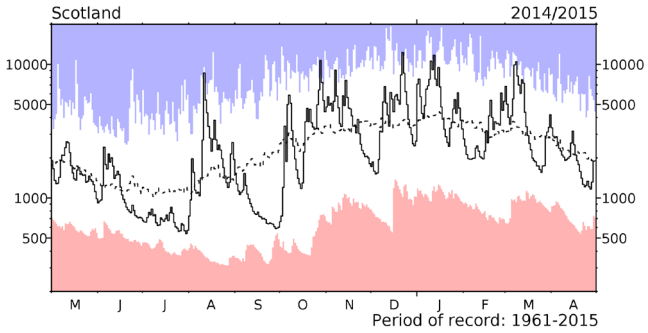
River flows

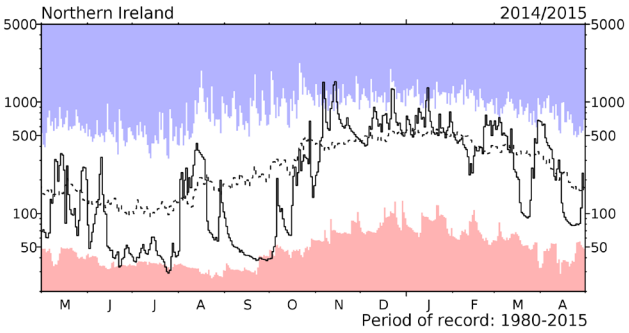
*Comparisons based on percentage flows alone can be misleading. A given percentage flow can represent extreme drought conditions in permeable catchments where flow patterns are relatively stable but be well within the normal range in impermeable catchments where the natural variation in flows is much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

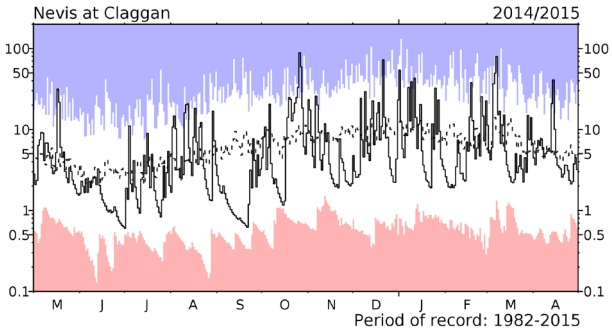
River flow . . . River flow . . .

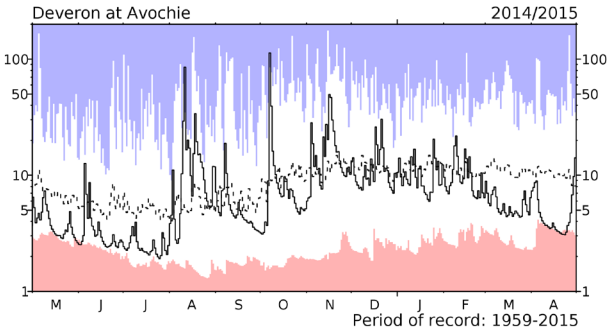


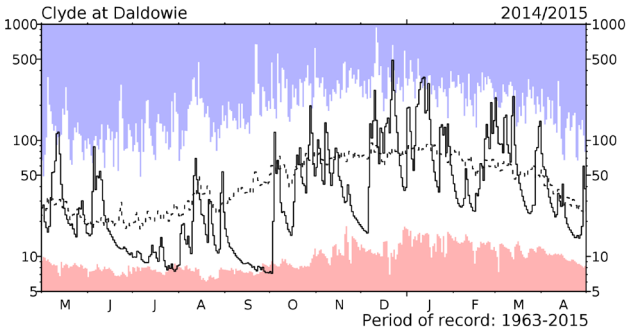


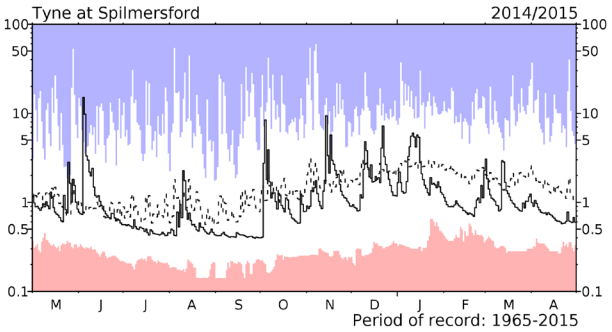


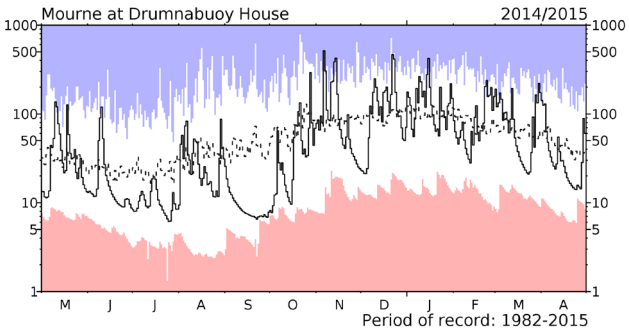


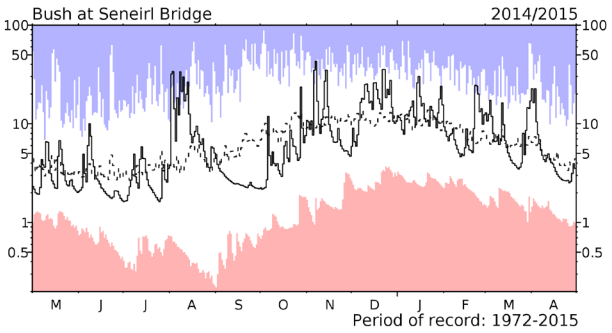








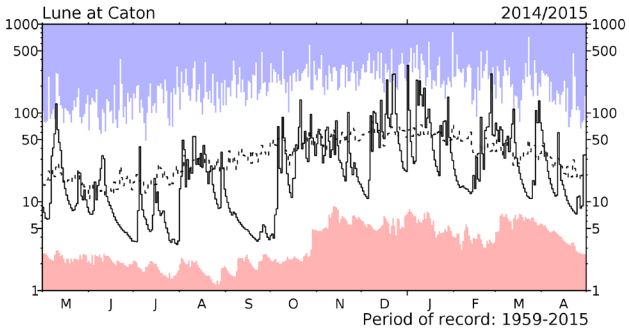


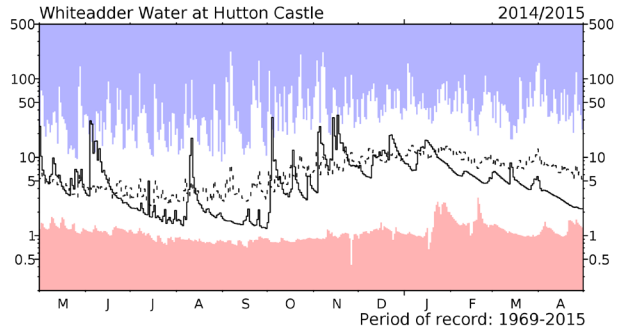


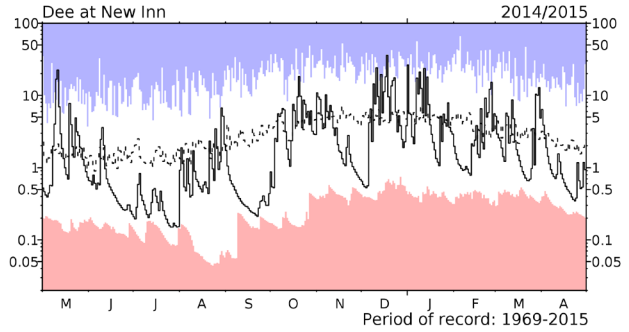
River flow hydrographs

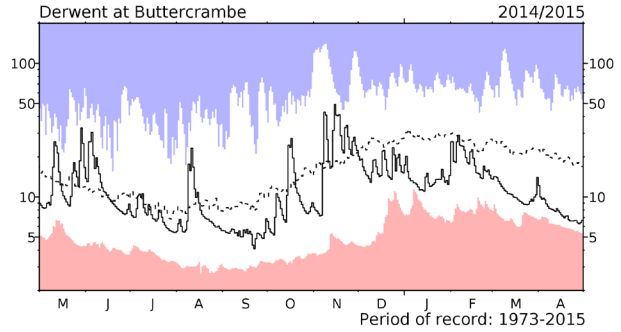
The river flow hydrographs show the daily mean flows together with the maximum and minimum daily flows prior to May 2014 (shown by the shaded areas). Daily flows falling outside the maximum/minimum range are indicated where the bold trace enters the shaded areas. Mean daily flows are shown as the dashed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

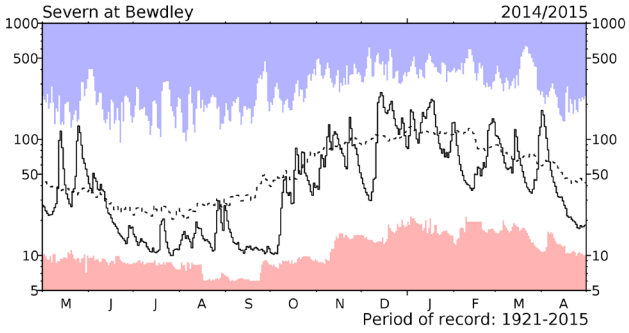
River flow . . . River flow . . .

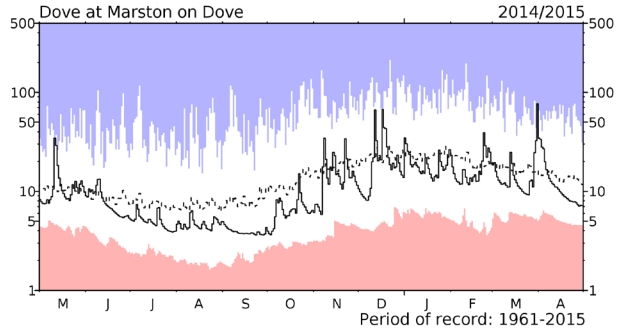


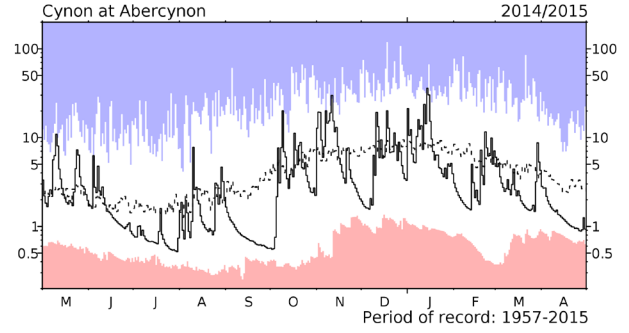


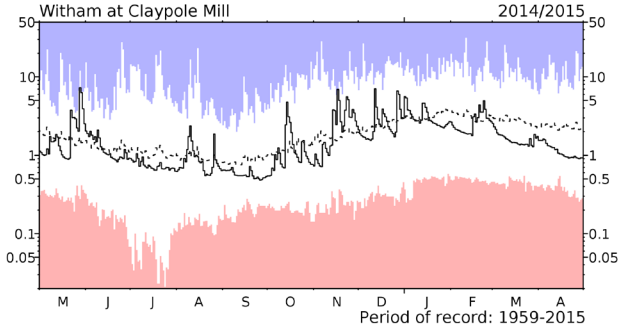


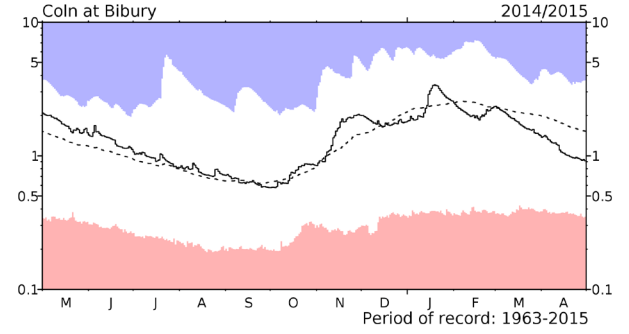


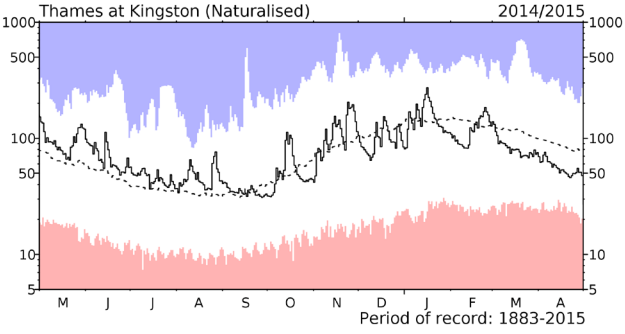


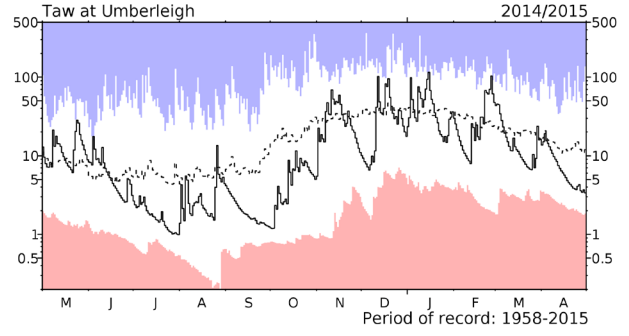


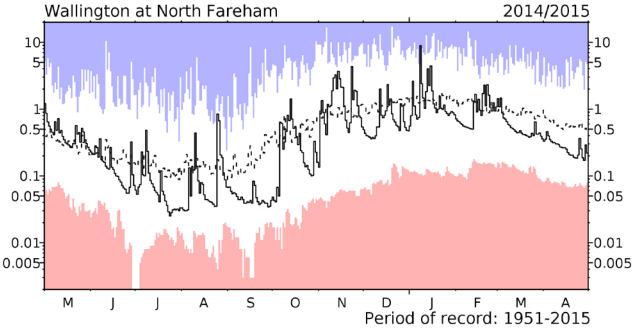




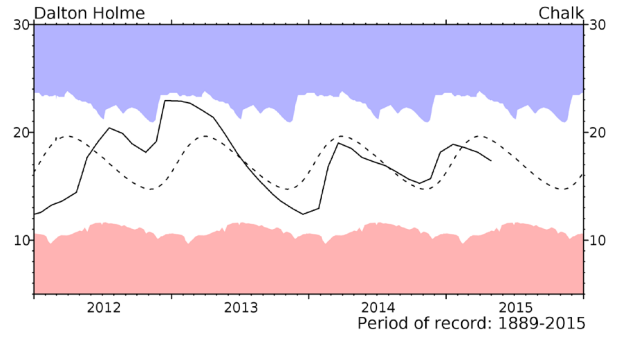


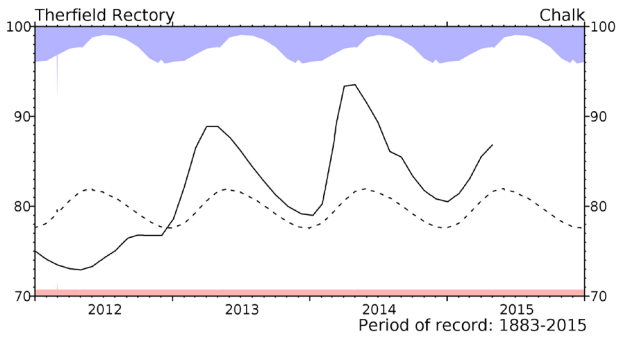


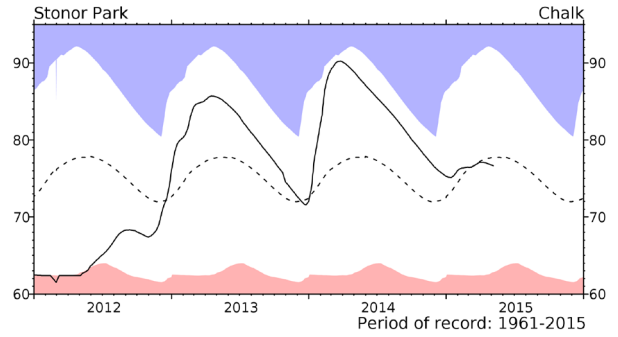


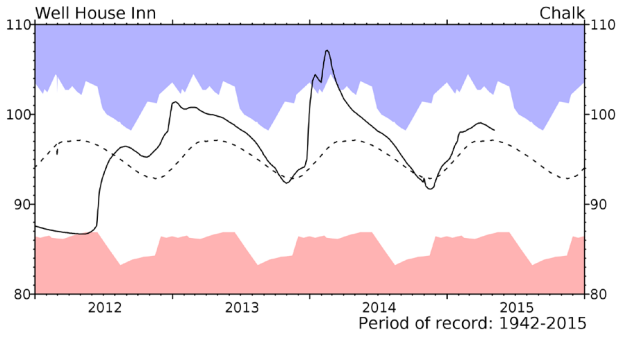


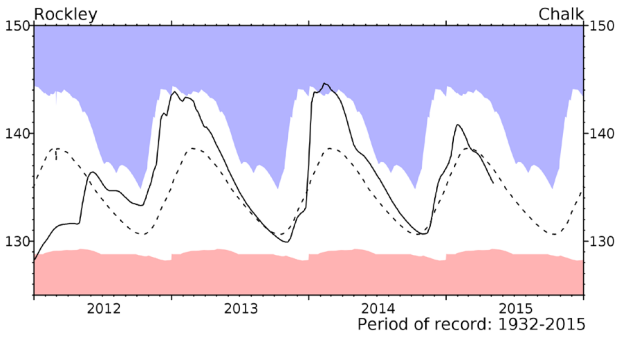
Groundwater…Groundwater

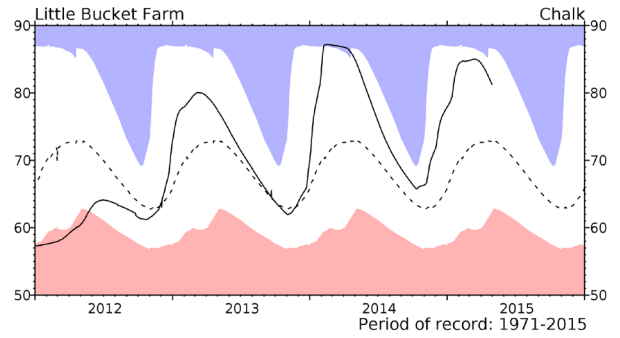


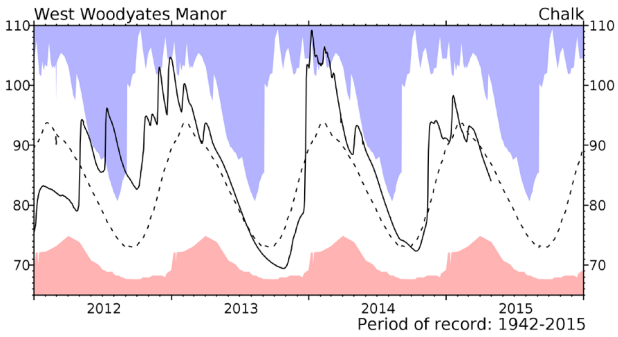


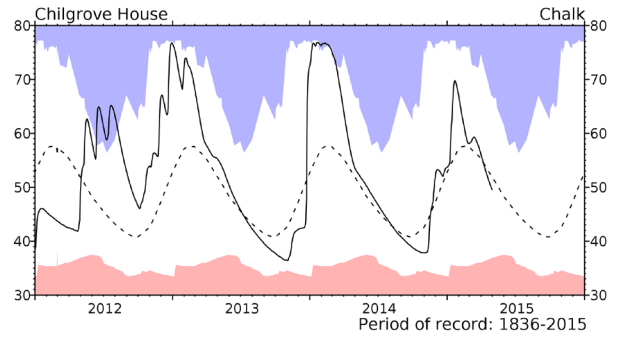


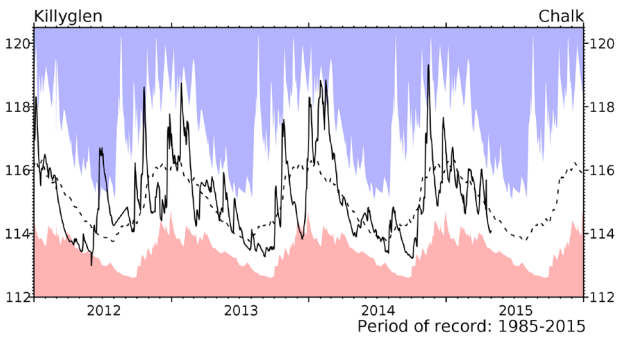


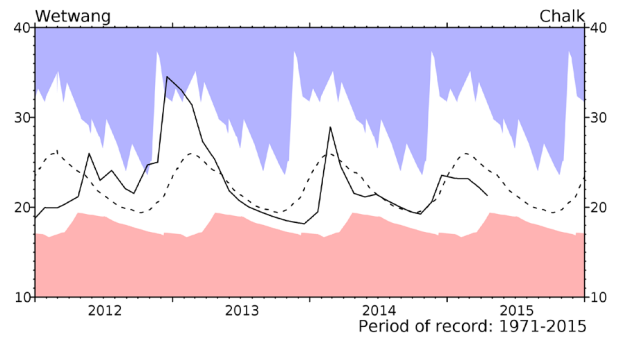






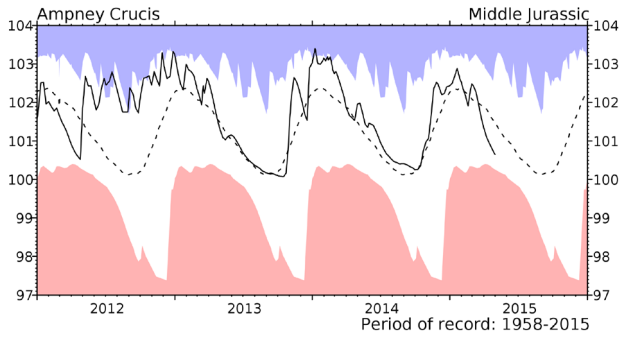


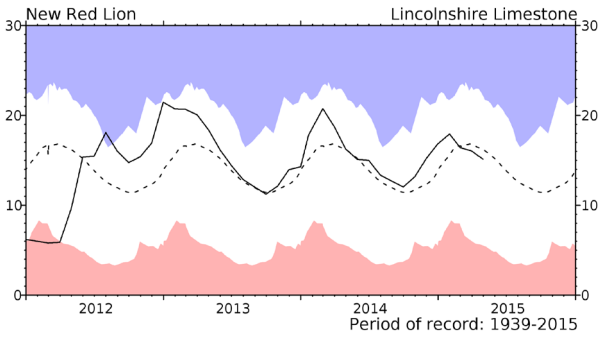


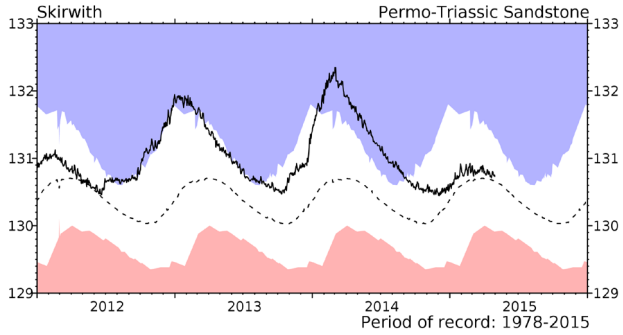


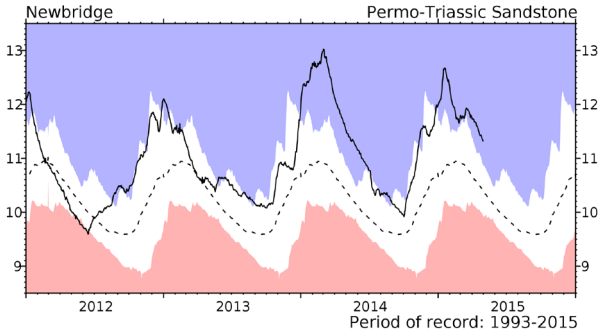
Groundwater levels normally rise and fall with the seasons, reaching a peak in the spring following replenishment through the winter (when evaporation losses are low and soil moist). They decline through the summer and early autumn. This seasonal variation is much reduced when the aquifer is confined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

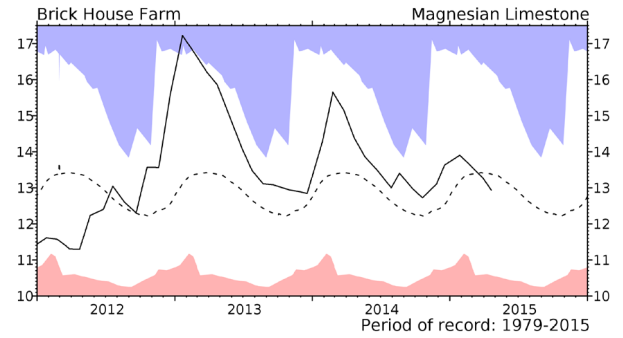
Groundwater ... Groundwater

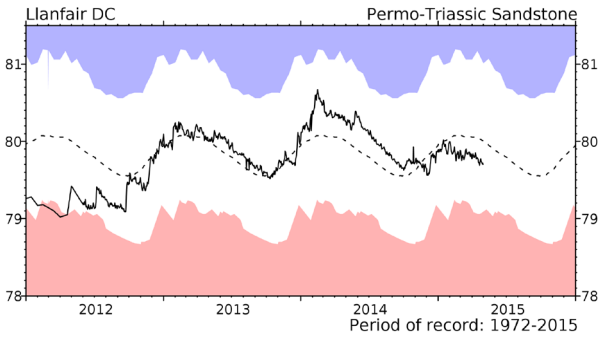


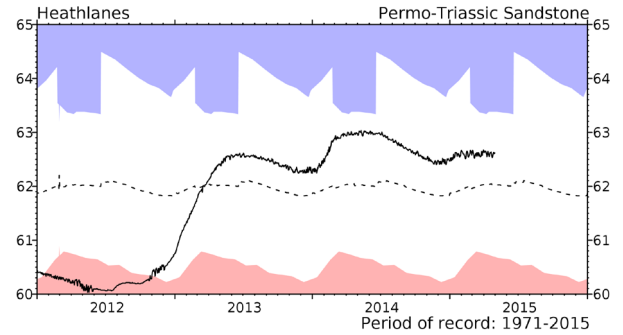


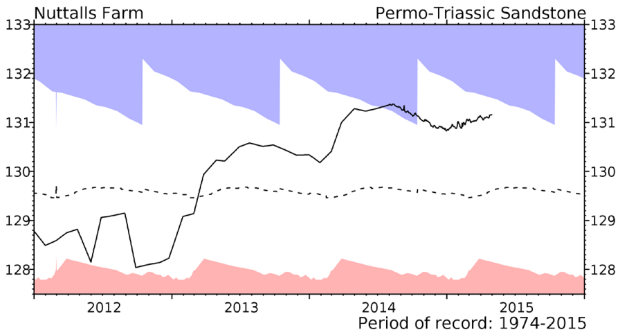


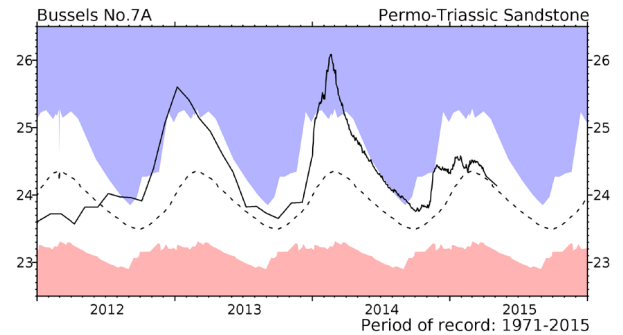


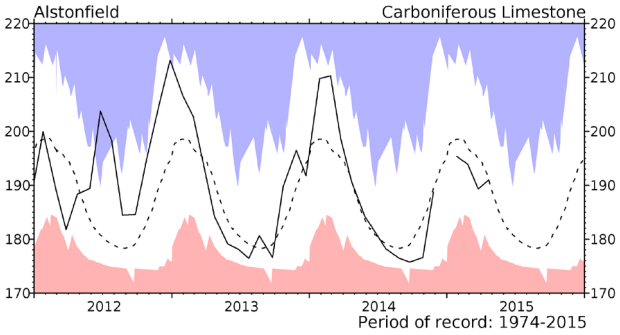








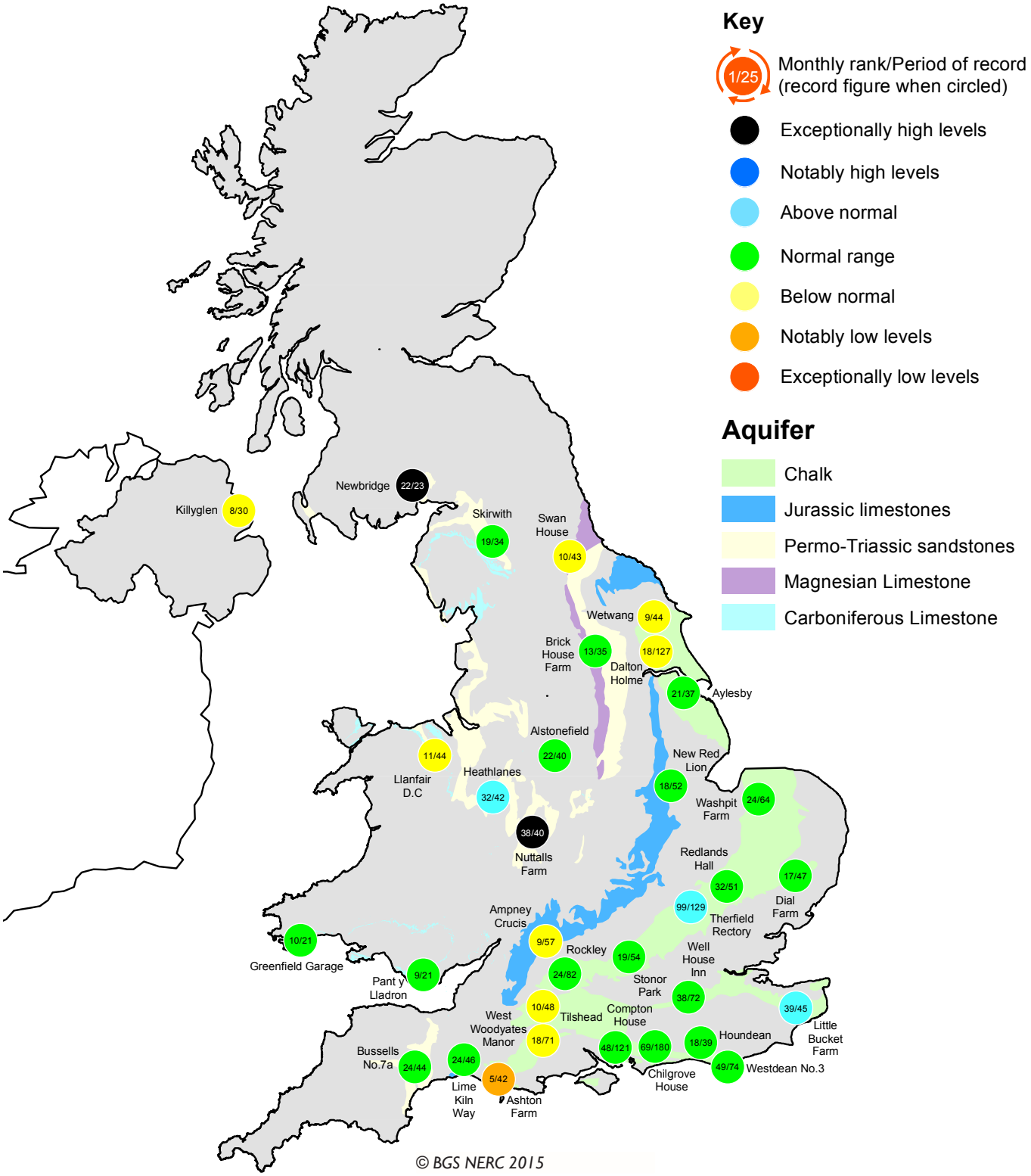




Groundwater levels April / May2015

Borehole	Level	Date	Apr av.	Borehole	Level	Date	Apr av.	Borehole	Level	Date	Apr av.
Dalton Holme	17.35	30/04	19.47	Chilgrove House	49.48	30/04	52.30	Brick House Farm	12.93	21/04	13.41
Therfield Rectory	86.81	01/05	80.75	Killyglen (NI)	114.09	30/04	114.86	Llanfair DC	79.70	30/04	80.03
Stonor Park	76.66	06/05	77.59	Wetwang	21.31	17/04	23.93	Heathlanes	62.62	30/04	62.00
Tilshead	88.14	30/04	92.49	Ampney Crucis	100.65	01/05	101.68	Nuttalls Farm	131.16	30/04	129.58
Rockley	135.39	06/05	137.53	New Red Lion	15.10	30/04	16.19	Bussells No.7a	24.14	05/05	24.20
Well House Inn	98.23	06/05	97.13	Skirwith	130.71	30/04	130.74	Alstonefield	190.97	22/04	192.15
West Woodyates	84.03	30/04	88.37	Newbridge	11.32	30/04	10.58				

Levels in metres above Ordnance Datum

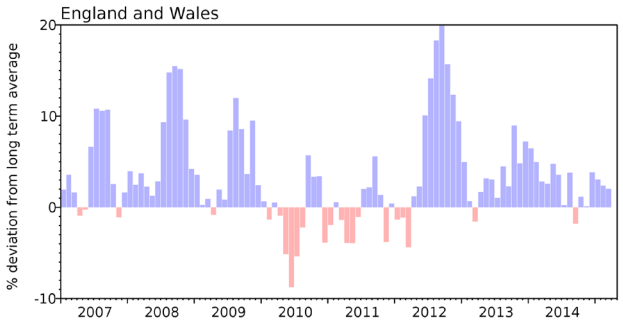


Groundwater levels - April 2015

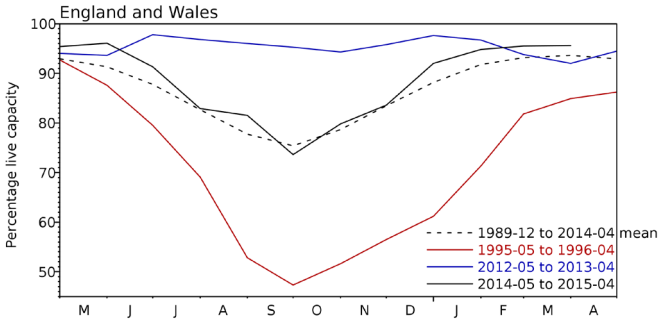
The calculation of ranking has been modified from that used in summaries published prior to October 2012. It is now based on a comparison between the most recent level and levels for the same date during previous years of record. Where appropriate, levels for earlier years may have been interpolated. 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)	2015 Feb	2015 Mar	2015 Apr	Apr Anom.	Min Apr	Year* of min	2014 Apr	Diff 15-14
North West	N Command Zone	•	124929	94	96	88	0	65	1984	88	0
	Vyrnwy		55146	92	100	94	2	70	1996	96	-2
Northumbrian	Teesdale	•	87936	100	95	92	0	74	2003	93	-2
	Kielder		(199175)	96	91	92	1	85	1990	93	-1
Severn-Trent	Clywedog		44922	96	99	99	2	85	1988	99	0
	Derwent Valley	•	39525	100	101	94	2	54	1996	89	5
Yorkshire	Washburn	•	22035	86	95	82	-8	76	1996	85	-3
	Bradford Supply	•	41407	100	98	94	3	60	1996	93	1
Anglian	Grafham		(55490)	83	92	95	1	73	1997	96	-1
	Rutland		(116580)	95	96	95	3	72	1997	96	-1
Thames	London	•	202828	93	92	92	-3	86	1990	97	-6
	Farmoor	•	13822	93	99	96	-1	81	2000	96	1
Southern	Bewl		28170	90	92	92	2	60	2012	100	-9
	Ardingly		4685	100	100	100	1	69	2012	100	0
Wessex	Clatworthy		5364	100	100	89	-4	81	1990	94	-5
	Bristol[++]	•									
South West	Colliford		28540	91	93	92	4	56	1997	100	-9
	Roadford		34500	95	95	93	8	41	1996	96	-3
	Wimbleball		21320	100	100	96	1	79	1992	99	-3
	Stithians		4967	84	88	84	-7	65	1992	100	-16
Welsh	Celyn & Brenig	•	131155	97	99	99	1	75	1996	100	-1
	Brianne		62140	100	98	96	-1	86	1997	100	-4
	Big Five	•	69762	98	98	91	-2	85	2011	97	-6
	Elan Valley	•	99106	100	99	93	-3	83	2011	97	-4
Scotland(E)	Edinburgh/Mid-Lothian	•	97639	92	95	92	-1	62	1998	97	-5
	East Lothian	•	10206	99	99	98	0	89	1992	99	-1
Scotland(W)	Loch Katrine	•	111363	98	90	88	-3	80	2010	91	-3
	Daer		22412	100	100	89	-6	78	2013	86	3
	Loch Thom	•	11840	100	100	100	6	83	2010	100	0
Northern Ireland	Total[+]	•	56800	93	94	89	2	77	2007	87	2
	Silent Valley	•	20634	97	100	90	7	58	2000	92	-2

( ) figures in parentheses relate to gross storage

• denotes reservoir groups

*last occurrence

[+] excludes Lough Neagh

[++] April 2015 excluding Bristol - no data available

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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Centre for Ecology & Hydrology
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Crowmarsh Gifford
Wallingford
Oxfordshire
OX10 8BB

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

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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iii. Met Office rainfall data. © Crown copyright.

05/2015