Hydrological Summary

for the United Kingdom

May 2014

General

May was a changeable month – a warm, summery interlude aside, it was generally unsettled, often dull and a wet month for much of the UK. There were marked spatial variations in rainfall; some of the highest rainfall anomalies were in eastern England, moderating deficiencies that had developed earlier in the spring. In contrast, north-east Scotland received below average rainfall, continuing the dry spell that has persisted through the spring. Rainfall was occasionally intense, leading to numerous flood alerts. Localised surface water flooding occurred but peak river flows were rarely outside the normal range for May. Substantial rainfall (concentrated towards the end of the month) caused notably low end of May soil moisture deficits (SMDs) in most areas, implying a heightened sensitivity to heavy rainfall in the early summer. Despite heavy rainfall at the end of the month, groundwater levels continued to fall with a few exceptions. Provisionally, it was the third warmest spring on record for the UK (from 1910), but rainfall totals were moderately above average and near-normal spring river flows were characteristic of much of the UK. With river flows and groundwater levels in the normal range or above (significantly so in areas where the wet winter of 2013/14 is still exerting an influence) and above average stocks in most reservoirs, the water resources situation for the summer and early autumn is favourable. However, ongoing rainfall deficiencies in north-east Scotland could presage low summer river flows in this area.

Rainfall

The first week of May was predominantly anticyclonic, but a strong south-westerly flow became established from the 6th, bringing a week of wet and windy weather to most areas. High pressure from the 14th heralded a settled spell with warm and sunny conditions across most of the UK, particularly in the south-east where the fine weather continued until the 20th. Thereafter, low pressure dominated and the rest of the month was mostly cloudy and notably wet, with some heavy rainfall in southern Britain between the 22nd and the 27th which brought flash flooding to some urban areas (e.g. in south Wales on the 22nd and Norwich on the 27th). May rainfall was significantly above average at the national scale (>160% of the average for England & Wales), with over twice the average May rainfall received across a wide area encompassing much of East Anglia (it was the third wettest May for Anglian region, in a series from 1910), the east Midlands and Yorkshire; parts of western Scotland also received more than 200%. In contrast, rainfall was below average across much of north-east Scotland (with less than 75% of the long-term average in some inland areas). Across most regions, rainfall totals for the spring were moderately above average, although Northern Ireland received near-average rainfall and north-east Scotland had its driest spring since 1984. Notable longer-term accumulations primarily reflect the exceptional winter of 2013/14.

River flows

In a majority of responsive index catchments, river flows were tracking near or below the seasonal average in early May, although in southern Britain flows were higher following the late April rainfall. Spates occurred following rainfall in the second week (particularly in northern and western areas) and in the last week of May, where brisk increases in flow were registered across the Midlands and eastern England. Peak flows were modest and remained largely within the normal range for May. However, runoff totals for May were significantly above average in a majority of index catchments, with notably high totals registered in north-east England, parts of Wales and central southern England. May outflows for England & Wales were, correspondingly, above average, while outflows from Northern Ireland were typical for May. Outflows from Scotland were marginally below average, reflecting a balance between higher runoff from southern and western catchments and the drier north-east. For several index catchments in the north-east, it was the third consecutive month with below average runoff; the Deveron registered its second lowest spring runoff total in a record from 1960. Elsewhere, accumulated runoff totals for spring were mostly within the normal range, but with notably high totals in some central Scottish catchments and in central southern England (particularly in groundwater-fed catchments, including the highest spring runoff on record for the Lambourn in a record from 1963). The elevated spring runoff in central southern England partly reflects a residual influence of the exceptionally wet winter.

Groundwater

Although May was warm, it was also very wet across most of the country, so SMDs decreased, contrary to the usual seasonal trend. SMDs at the end of May were the lowest since the early 1980s across much of central England (the fourth lowest on record for Yorkshire, in a record from 1961). Chalk water levels generally fell during May but remained within the normal range or above, with exceptionally high levels at Stonor Park (Chilterns). However, in Yorkshire levels remained below average, and local rises in levels were recorded in Northern Ireland and parts of Lincolnshire and Suffolk. Two Environment Agency groundwater flood alerts were still extant for the Alresford area of north Hampshire at the end of May; despite falling water levels, cellars were still being flooded (the alerts have since been removed). In the Permo-Triassic sandstones, despite falls, water levels remained above previous monthly maxima in the north-west (for the fifth consecutive month) and were also very high in the south-west. Levels elsewhere were above average and rose in north Wales. In the Upper Greensand of south-west England, at Lime Kiln Way, levels fell slightly but remained above the previous monthly maximum for the fourth consecutive month. In the Magnesian Limestone, water levels in the indicator boreholes were notably high in the north. In the other limestone aquifers, levels returned to the normal range, except at Pant y Lladron where they were exceptionally high with a rise of 5m recorded across the 24th-25th May in response to rainfall.

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.

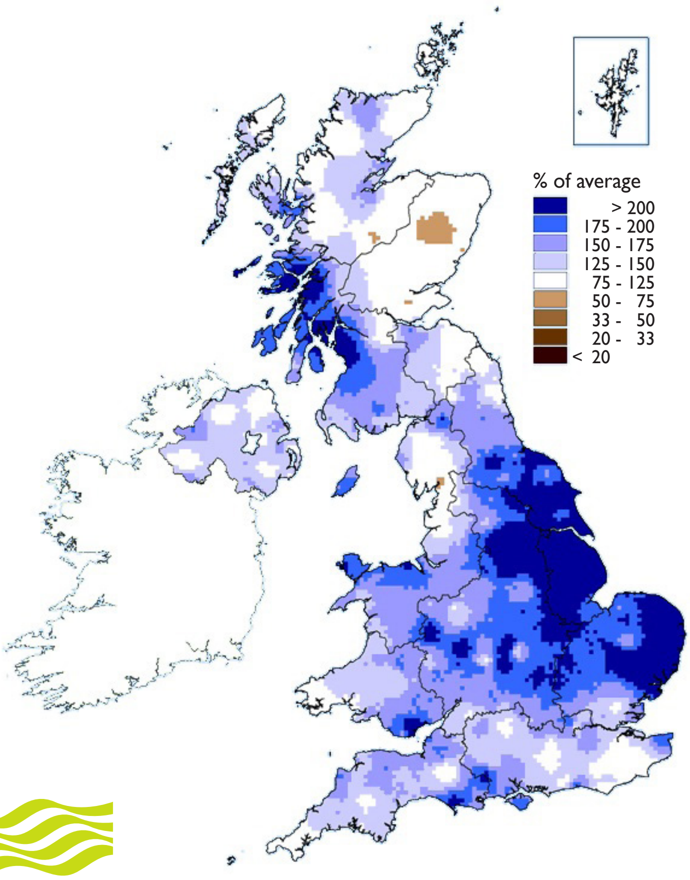
Area	Rainfall	May 2014	Mar14 – May14	RP	Dec13 – May14	RP	Sep13 – May14	RP	Jun13 – May14	RP
United	mm	**100**	251		790		1116		1302	
Kingdom	%	**158**	113	5-10	146	>>100	130	>>100	121	25-40
England	mm	**94**	198		596		853		1003	
	%	**171**	113	2-5	148	>100	135	40-60	124	10-15
Scotland	mm	**105**	334		1064		1487		1719	
	%	**145**	117	5-10	147	>100	127	>100	119	20-30
Wales	mm	**126**	289		1017		1431		1664	
	%	**166**	107	2-5	147	>100	130	40-60	122	10-20
Northern	mm	**91**	216		702		994		1208	
Ireland	%	**133**	93	2-5	127	50-80	114	30-50	109	5-10
England &	mm	**98**	211		654		933		1094	
Wales	%	**170**	112	2-5	148	>100	134	50-80	123	10-15
North West	mm	**94**	240		764		1105		1376	
	%	**141**	103	2-5	134	40-60	121	10-20	118	5-10
Northumbrian	mm	**93**	216		566		816		1007	
	%	**160**	116	5-10	137	50-80	129	20-30	122	5-10
Severn-Trent	mm	**100**	193		527		765		929	
	%	**186**	115	2-5	141	40-60	133	20-30	123	8-12
Yorkshire	mm	**114**	212		535		755		922	
	%	**208**	117	5-10	132	15-25	121	5-10	115	2-5
Anglian	mm	**96**	142		359		548		658	
	%	**209**	103	2-5	127	8-12	122	5-10	110	2-5
Thames	mm	**82**	179		602		824		923	
	%	**155**	114	2-5	175	>>100	153	>100	133	20-30
Southern	mm	**68**	185		725		1007		1098	
	%	**138**	115	2-5	190	>>100	163	>100	142	40-60
Wessex	mm	**90**	229		769		1045		1156	
	%	**160**	126	5-10	175	>>100	153	>100	135	30-50
South West	mm	**98**	276		952		1365		1532	
	%	**143**	117	2-5	152	>100	140	80-120	128	15-25
Welsh	mm	**123**	281		985		1389		1615	
	%	**165**	107	2-5	148	>100	131	50-80	123	10-20
Highland	mm	**114**	395		1195		1708		1960	
	%	**146**	118	2-5	136	20-35	120	15-25	114	8-12
North East	mm	**60**	172		617		863		1044	
	%	**96**	84	2-5	135	30-50	116	5-10	110	2-5
Tay	mm	**76**	277		1059		1396		1573	
	%	**105**	107	2-5	161	>100	135	>100	125	15-25
Forth	mm	**87**	295		851		1167		1348	
	%	**131**	128	8-12	149	>100	129	>100	119	10-20
Tweed	mm	**88**	270		776		1044		1233	
	%	**135**	131	8-12	162	>>100	140	>100	130	20-30
Solway	mm	**122**	338		1137		1573		1830	
	%	**162**	122	5-10	162	>>100	140	>>100	131	>100
Clyde	mm	**154**	433		1347		1869		2149	
	%	**195**	131	10-15	156	>>100	133	>100	124	30-50

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

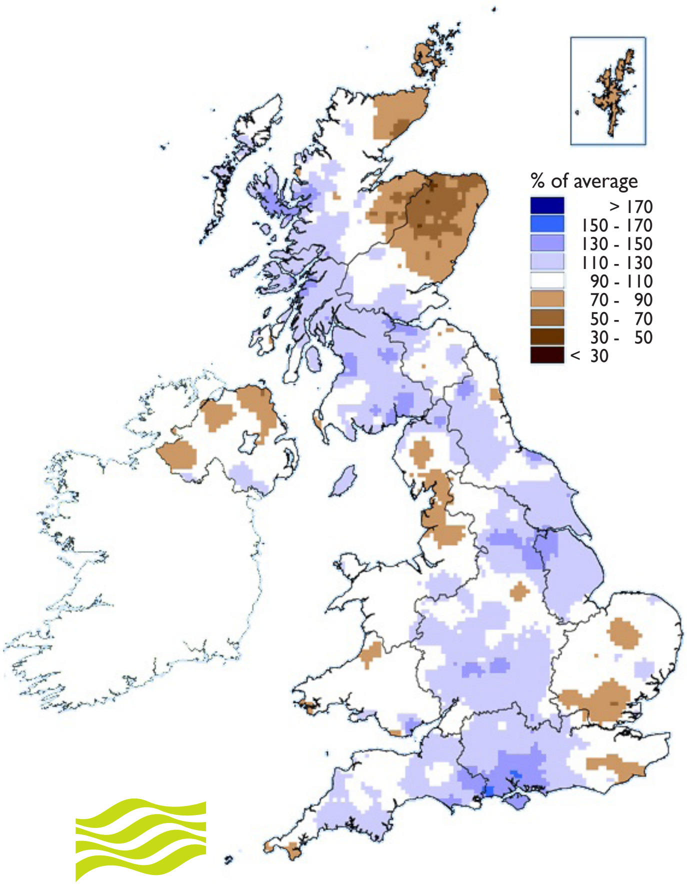
Important note: Figures in the above table may be quoted provided their source is acknowledged (see page 12). Where appropriate, specific mention must be made of the uncertainties associated with the return period estimates. The RP estimates are based on data provided by the Met Office and reflect climatic 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 December 2013 (inclusive) are provisional.

Rainfall . . . Rainfall . . .

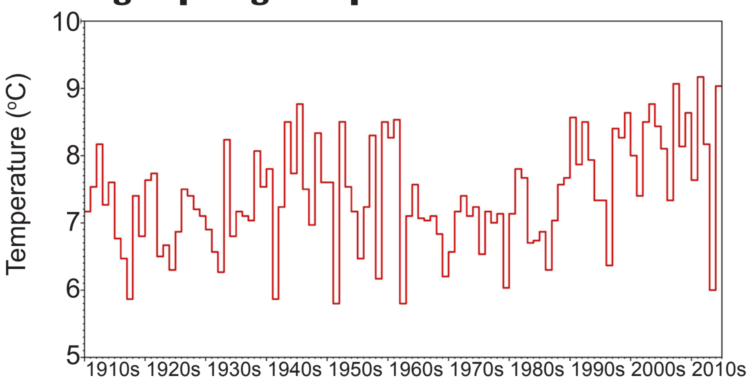
May 2014 rainfall as % of 1971-2000 average



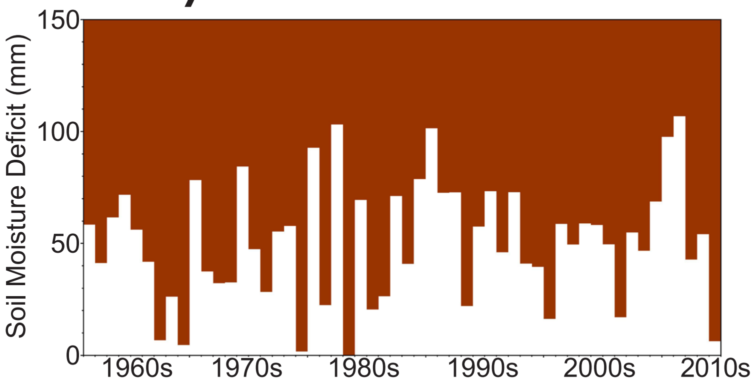
March 2014 - May 2014 rainfall as % of 1971-2000 average



Average spring temperatures for the UK



End of May SMDs for Yorkshire



Met Office 3-month outlook Updated: May 2014

Latest predictions for UK precipitation favour near- or above-average precipitation for June; the forecast for June-July-August as a whole is close to climatology.

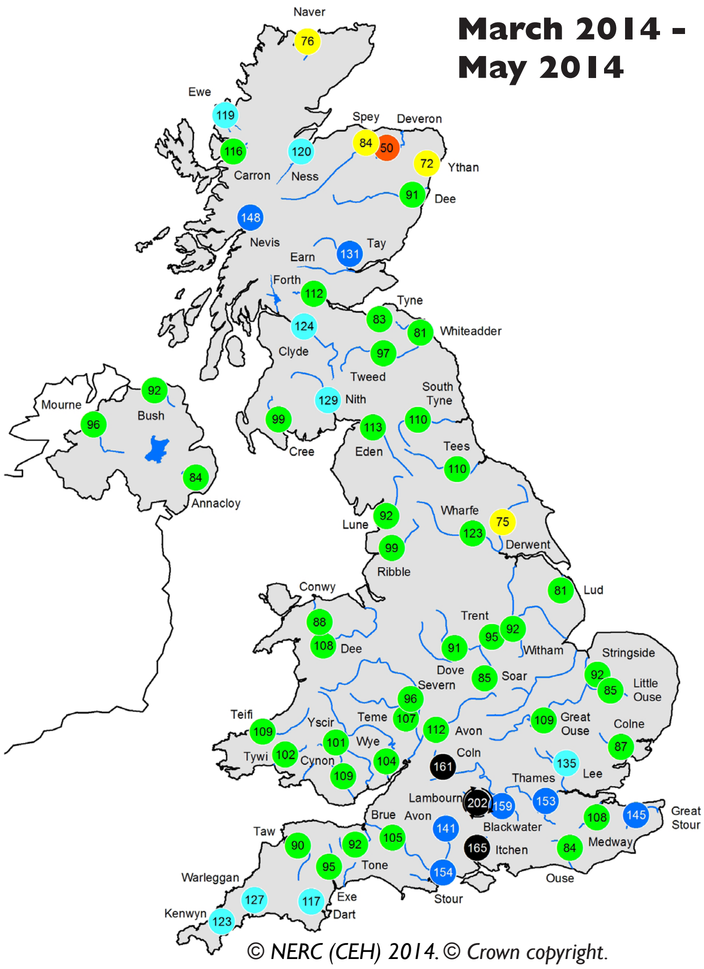
The probability that UK precipitation for June-July-August will fall into the driest of our five categories is close to 15% and the probability that it will fall into the wettest category is around 20% (the 1981-2010 probability for each of these categories is 20%).

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.

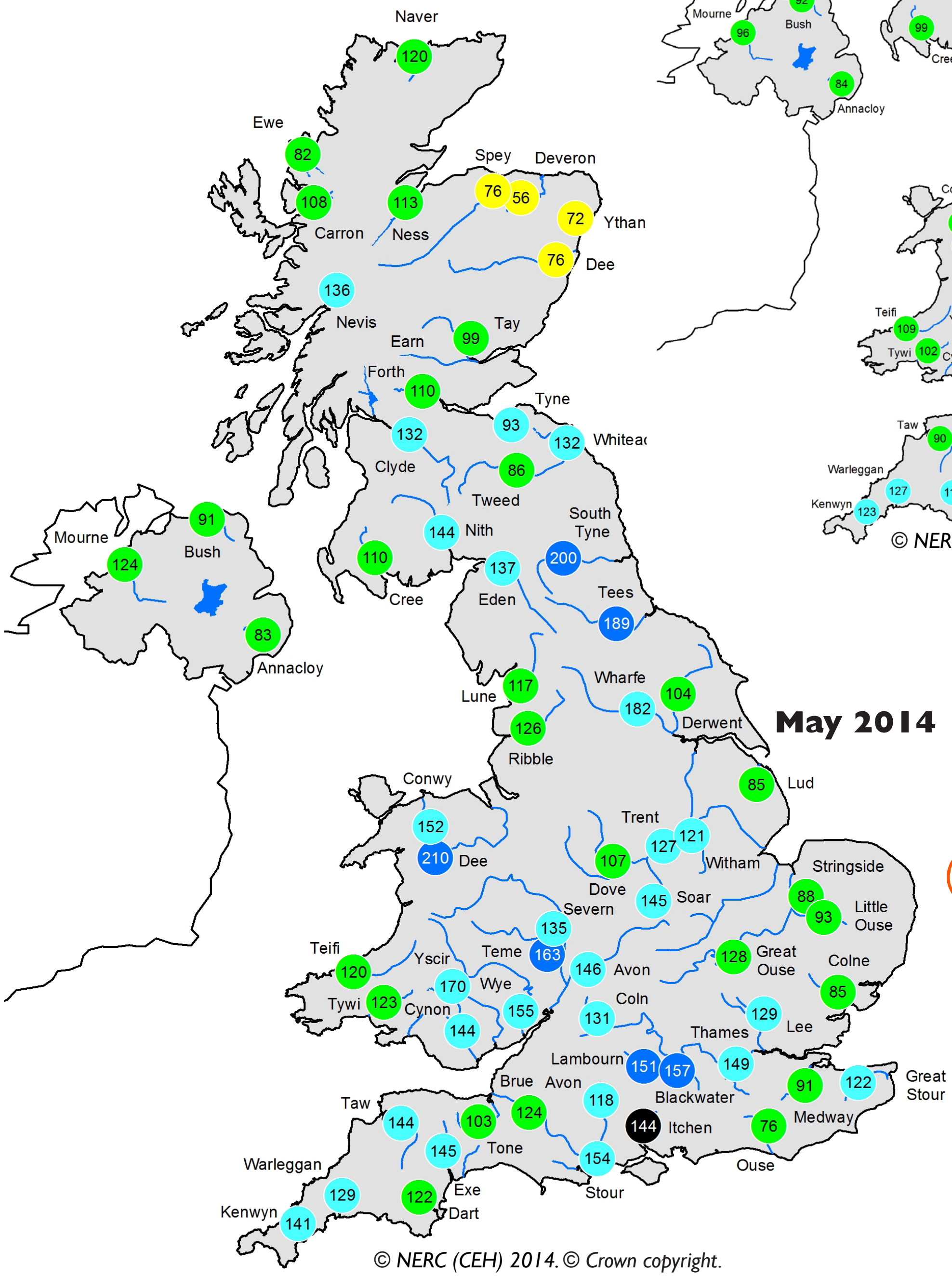
The latest shorter-range forecasts, covering the upcoming 30 days, can be accessed via:
http://www.metoffice.gov.uk/weather/uk/uk_forecast_weather.html
These forecasts are updated very frequently.

River flow . . . River flow . . .

March 2014 - May 2014



May 2014



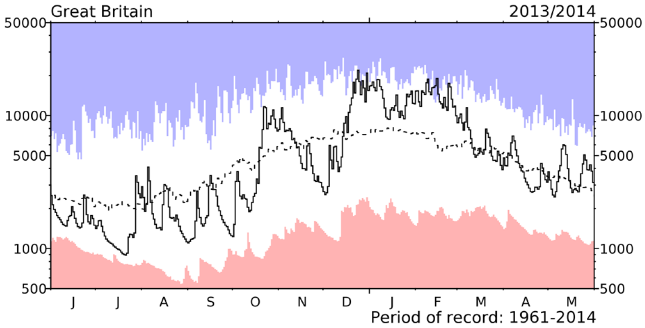
Key

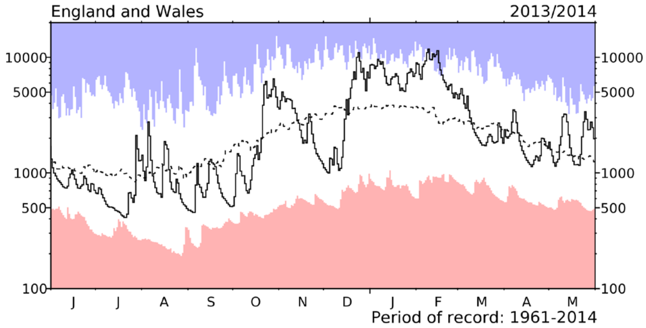
- 25 % of long-term average (record figure when circled)
- Exceptionally high flow
- Notably high flow
- Above normal
- Normal range
- Below normal
- Notably low flow
- Exceptionally low flow

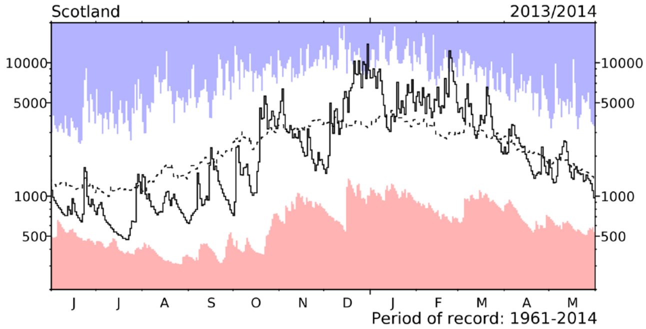
*Based on ranking of the monthly flow**

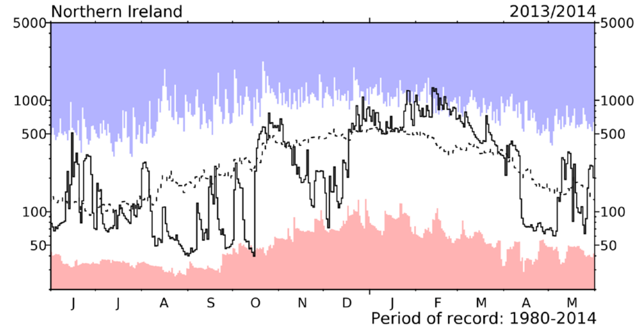
River flows

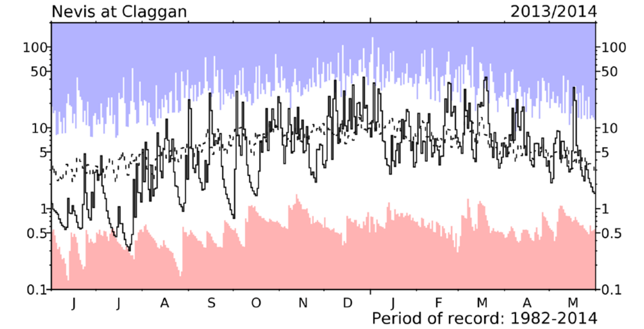
*Comparisons based on percentage flows alone can be misleading. A given percentage flow can represent extreme drought conditions in permeable catchments where flow patterns are relatively stable but be well within the normal range in impermeable catchments where the natural variation in flows is much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

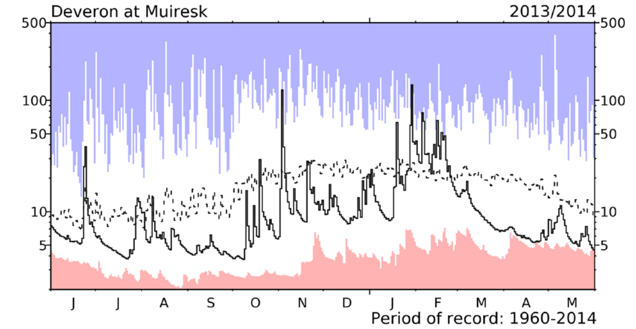


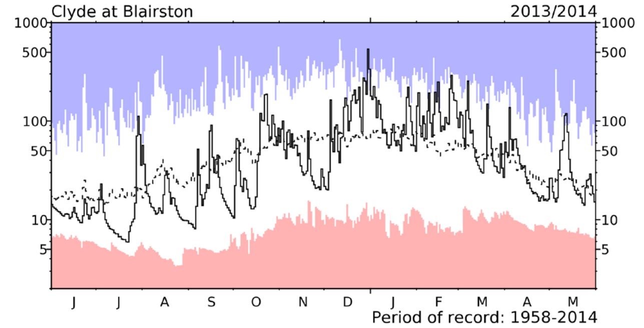


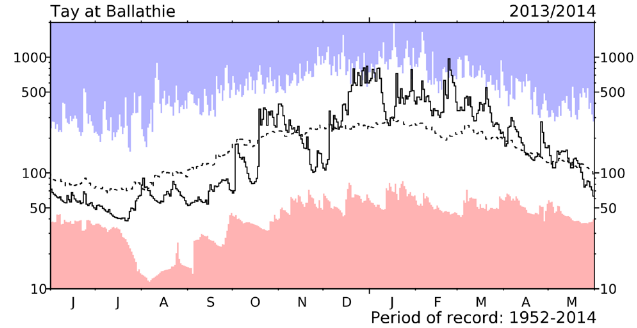


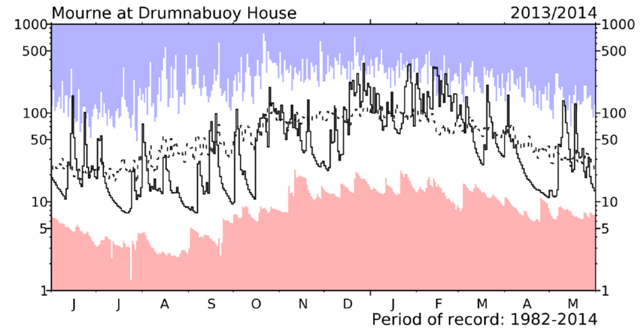


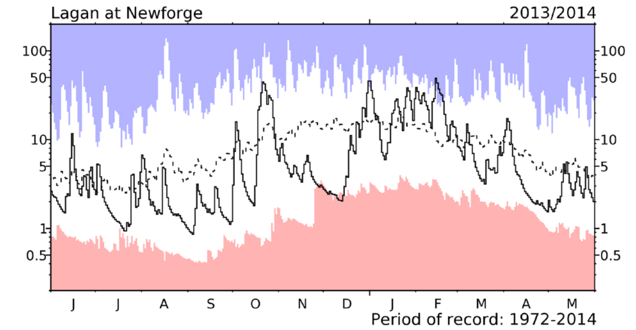






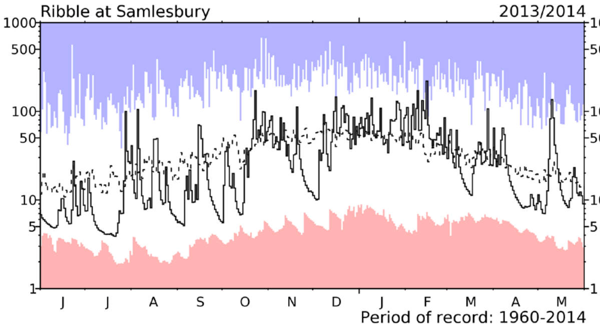


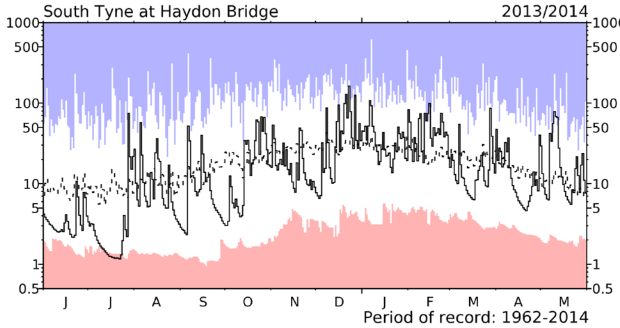


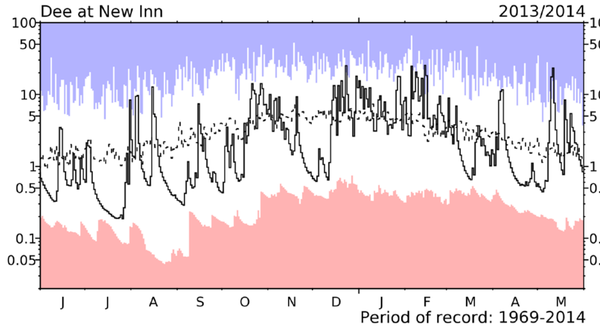


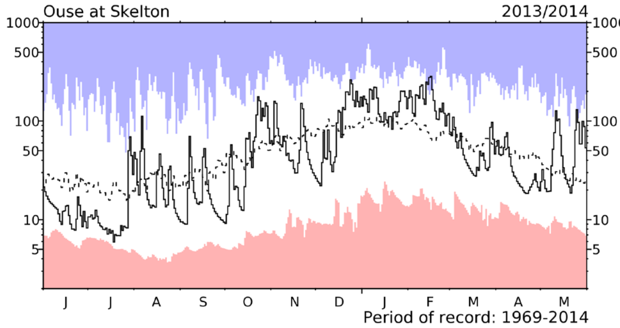
River flow hydrographs

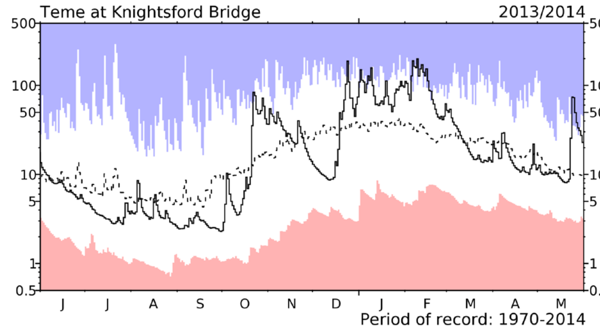
The river flow hydrographs show the daily mean flows together with the maximum and minimum daily flows prior to June 2013 (shown by the shaded areas). Daily flows falling outside the maximum/minimum range are indicated where the bold trace enters the shaded areas. Mean daily flows are shown as the dashed line.

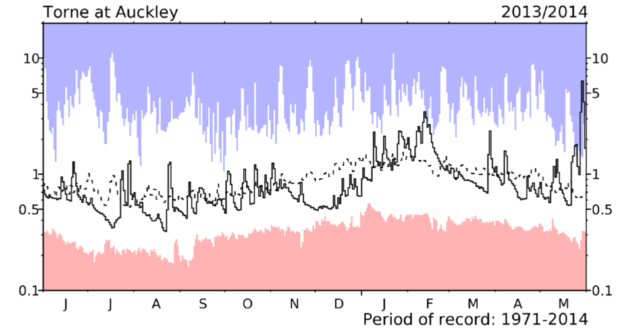

Ribble at Samlesbury
2013/2014
Period of record: 1960-2014

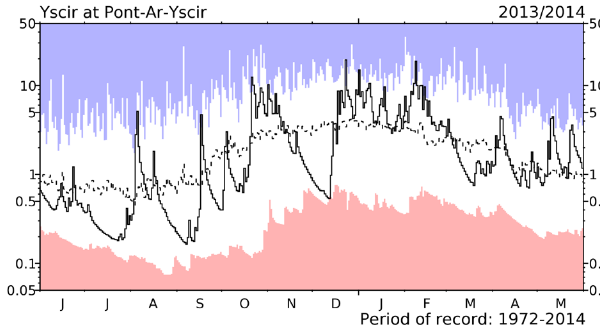

South Tyne at Haydon Bridge
2013/2014
Period of record: 1962-2014

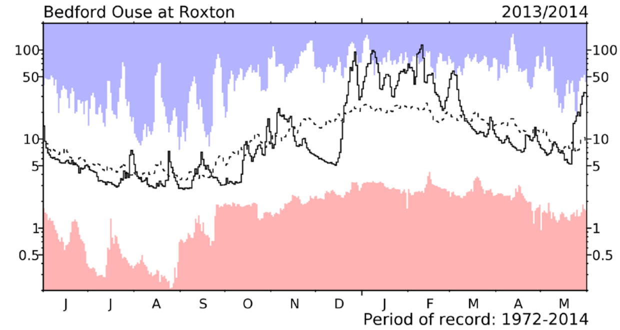

Dee at New Inn
2013/2014
Period of record: 1969-2014

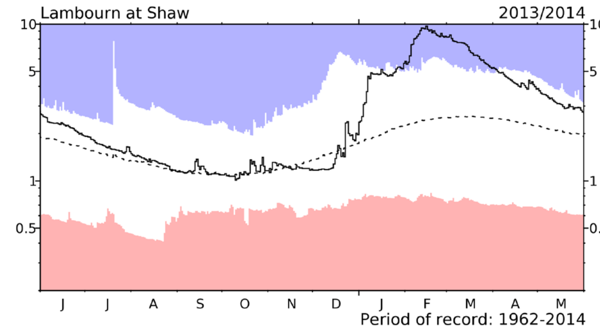

Ouse at Skelton
2013/2014
Period of record: 1969-2014

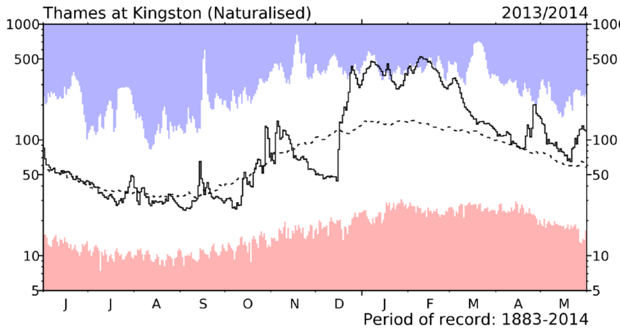

Teme at Knightsford Bridge
2013/2014
Period of record: 1970-2014

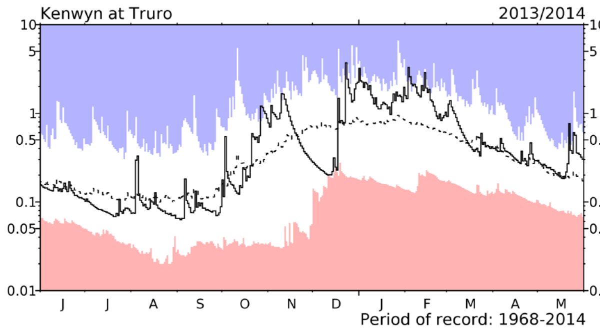

Torne at Auckley
2013/2014
Period of record: 1971-2014

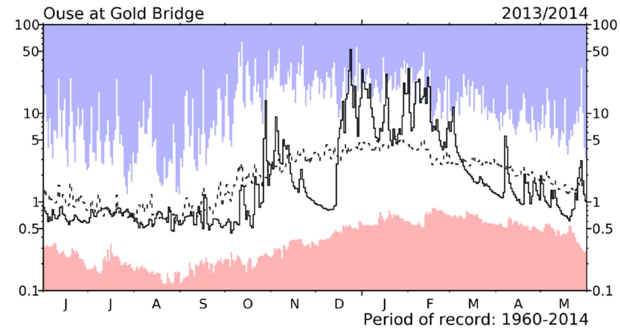

Yscir at Pont-Ar-Yscir
2013/2014
Period of record: 1972-2014


Bedford Ouse at Roxton
2013/2014
Period of record: 1972-2014

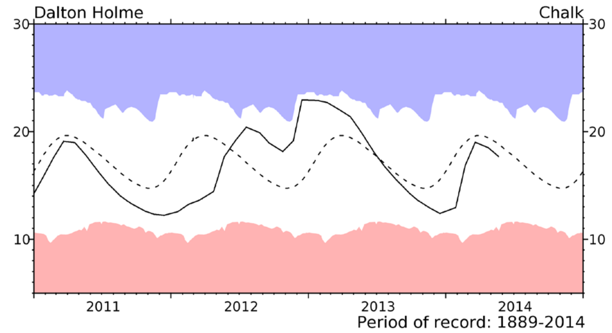

Lambourn at Shaw
2013/2014
Period of record: 1962-2014

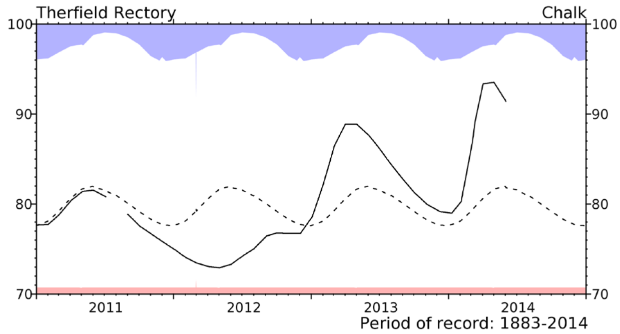

Thames at Kingston (Naturalised)
2013/2014
Period of record: 1883-2014

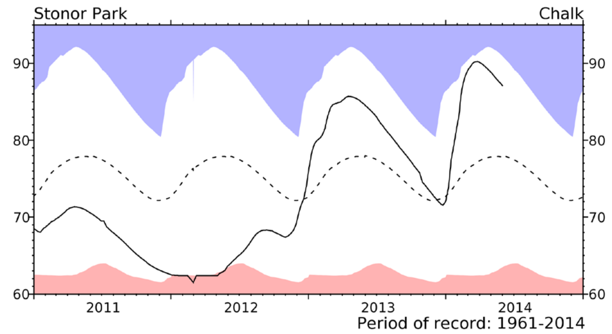

Kenwyn at Truro
2013/2014
Period of record: 1968-2014

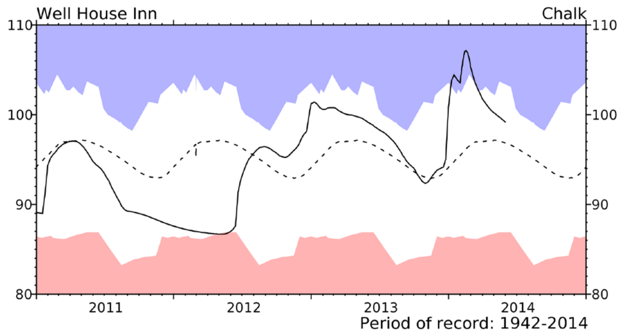

Ouse at Gold Bridge
2013/2014
Period of record: 1960-2014

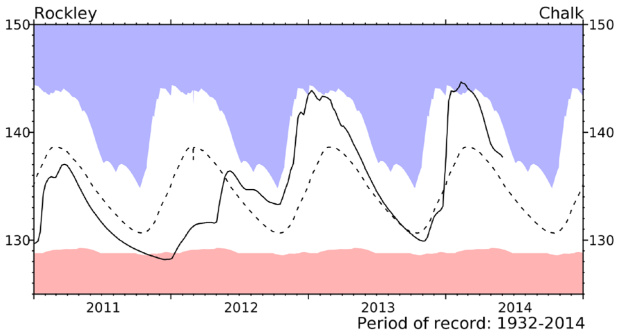
Groundwater…Groundwater

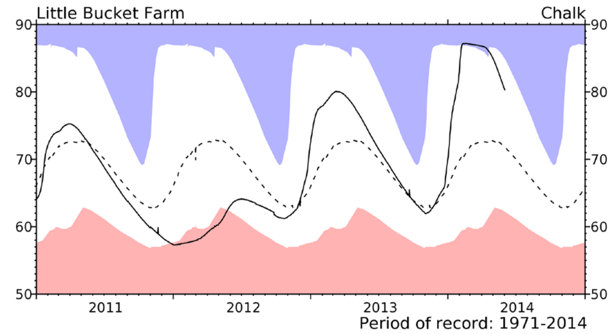


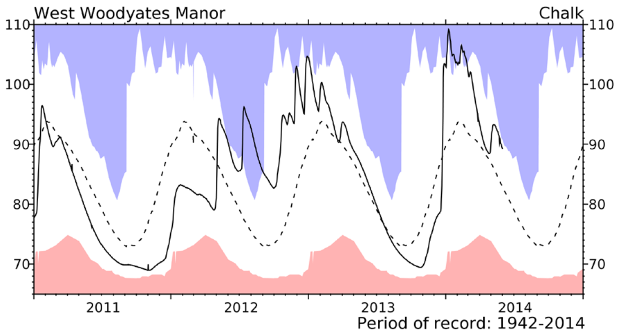


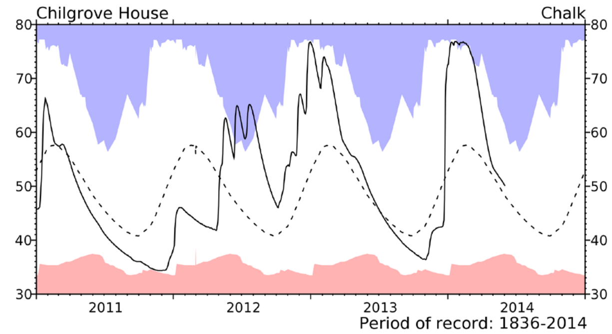


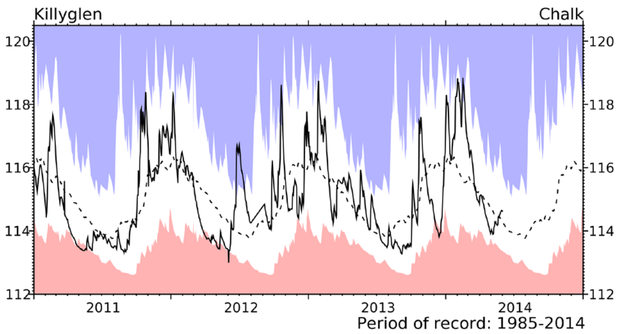


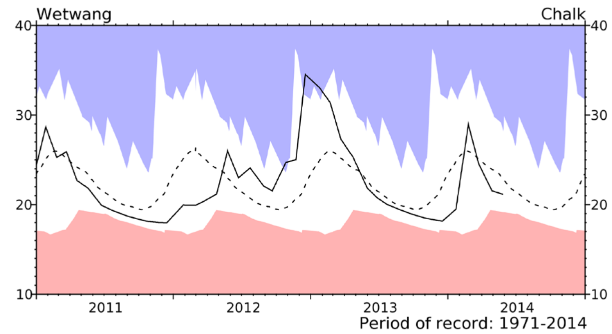






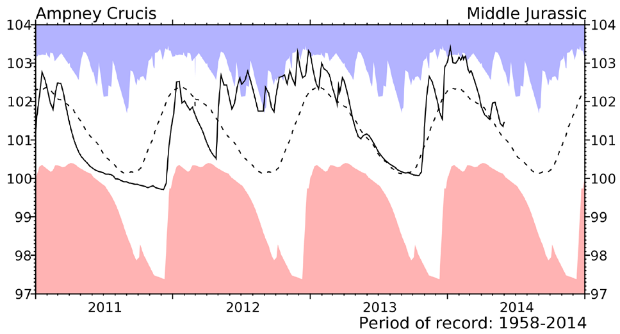


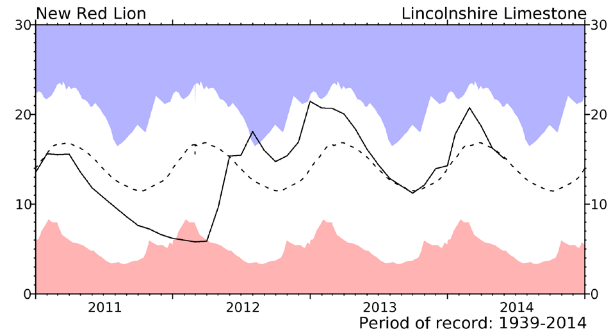


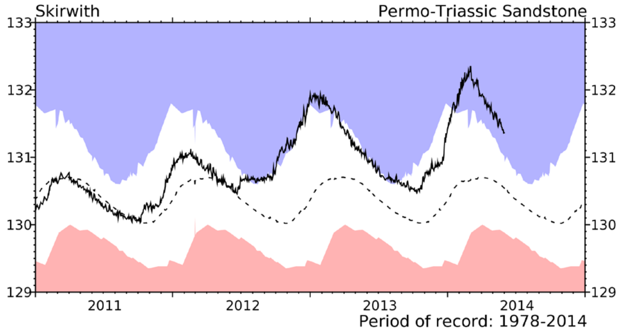


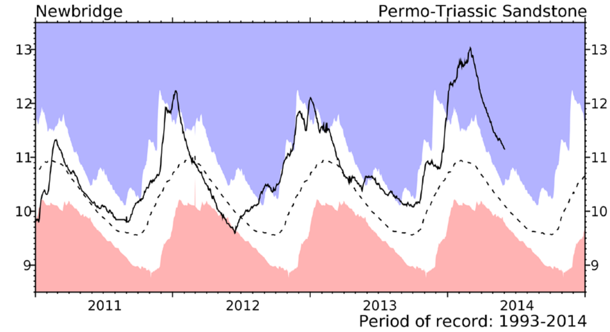
Groundwater levels normally rise and fall with the seasons, reaching a peak in the spring following replenishment through the winter (when evaporation losses are low and soil moist). They decline through the summer and early autumn. This seasonal variation is much reduced when the aquifer is confined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

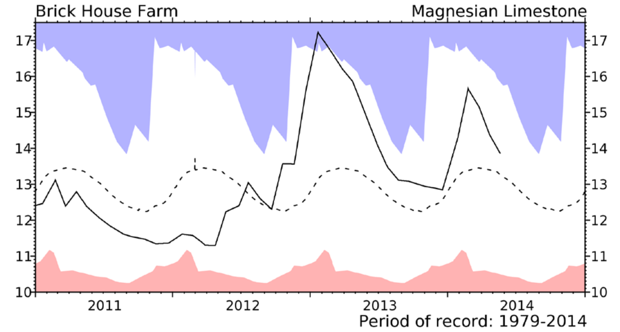
Groundwater... Groundwater

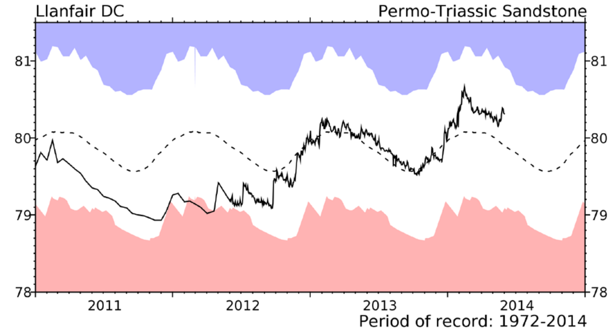


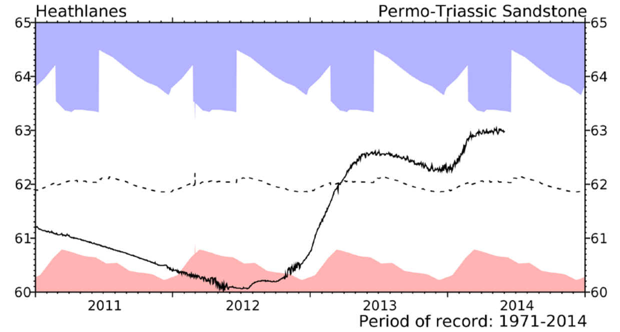


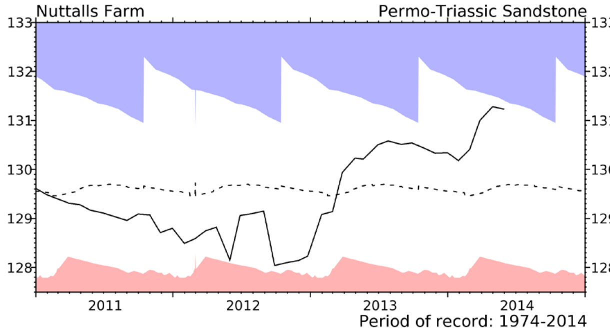


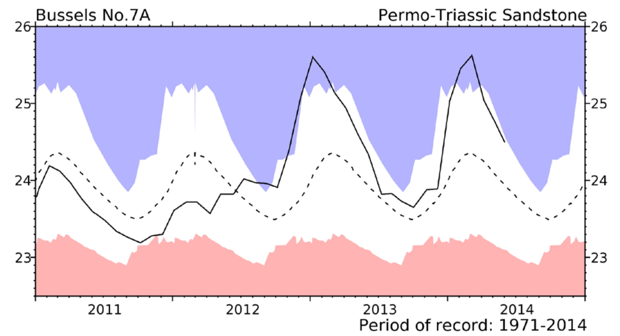


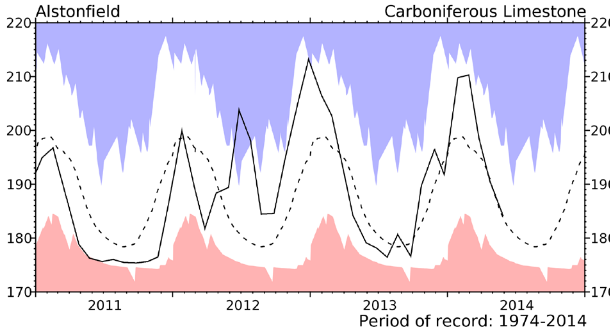










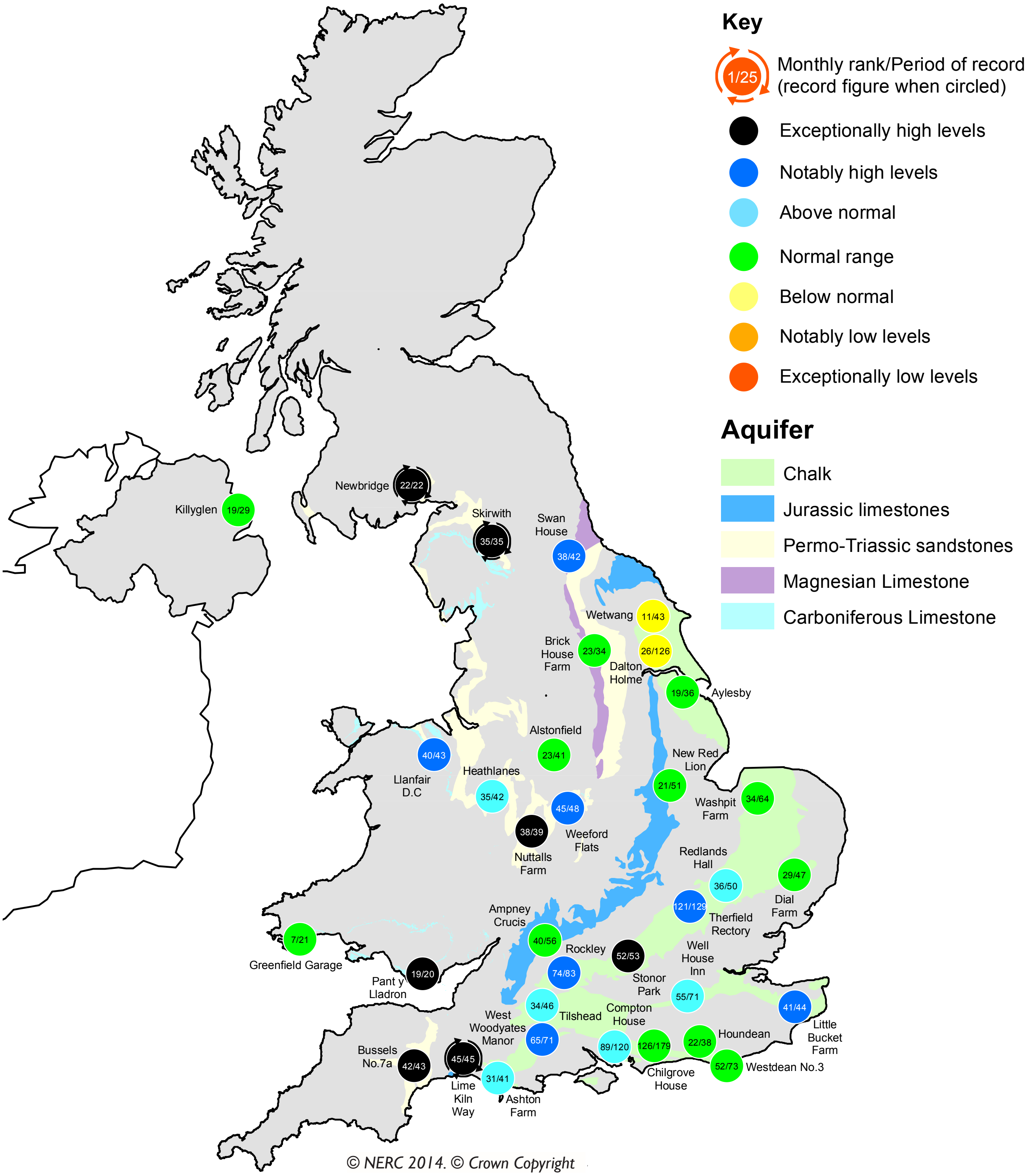


Groundwater levels May / June 2014

Borehole	Level	Date	May av.	Borehole	Level	Date	May av.	Borehole	Level	Date	May av.
Dalton Holme	17.68	21/05	18.94	Chilgrove House	50.05	01/06	49.04	Brick House Farm	13.86	20/05	13.32
Therfield Rectory	91.40	02/06	81.65	Killyglen (NI)	114.62	31/05	114.42	Llanfair DC	80.31	31/05	79.95
Stonor Park	87.09	31/05	77.77	Wetwang	21.13	27/05	23.45	Heathlanes	62.97	31/05	61.98
Tilshead	91.19	31/05	89.96	Ampney Crucis	101.46	31/05	101.24	Nuttalls Farm	131.23	30/05	129.61
Rockley	137.73	31/05	136.17	New Red Lion	15.08	31/05	15.63	Bussels No.7a	24.50	01/06	24.01
Well House Inn	99.17	31/05	96.95	Skirwith	131.37	31/05	130.63	Alstonfield	184.19	28/05	185.81
West Woodyates	89.33	31/05	84.67	Newbridge	11.15	01/06	10.25				

Levels in metres above Ordnance Datum

Groundwater...Groundwater

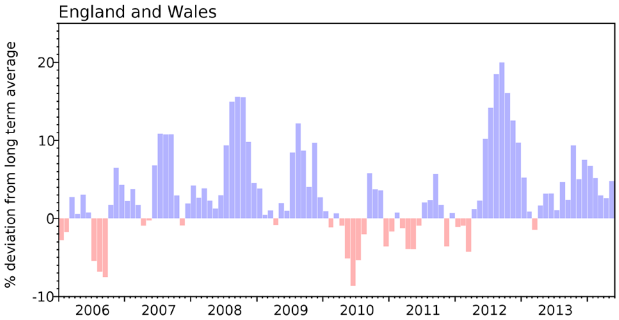


Groundwater levels - May 2014

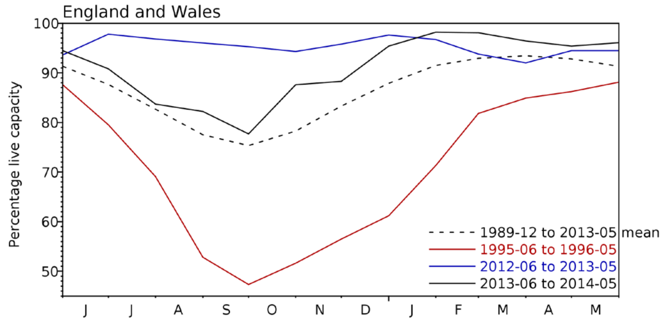
The calculation of ranking has been modified from that used in summaries published prior to October 2012. It is now based on a comparison between the most recent level and levels for the same date during previous years of record. Where appropriate, levels for earlier years may have been interpolated. 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 Mar	2014 Apr	2014 May	May Anom.	Min May	Year* of min	2013 May	Diff 14-13
North West	N Command Zone	•	124929	93	88	79	-2	50	1984	83	-4
	Vyrnwy		55146	99	96	100	12	69	1984	98	2
Northumbrian	Teesdale	•	87936	100	93	93	6	64	1991	95	-2
	Kielder		(199175)	93	93	99	7	85	1989	92	7
Severn-Trent	Clywedog		44922	96	99	99	2	83	1989	99	0
	Derwent Valley	•	39525	94	89	94	6	56	1996	85	9
Yorkshire	Washburn	•	22035	92	85	86	-1	72	1990	91	-6
	Bradford Supply	•	41407	100	93	98	12	70	1996	91	7
Anglian	Grafham		(55490)	95	96	96	2	72	1997	96	0
	Rutland		(116580)	96	96	97	5	75	1997	95	2
Thames	London	•	202828	95	97	98	4	83	1990	97	1
	Farmoor	•	13822	99	96	98	1	90	2002	97	1
Southern	Bewl		28170	100	100	99	11	57	1990	99	0
	Ardingly**		4685	100	100	100	1	89	2012	100	0
Wessex	Clatworthy		5364	98	94	100	14	67	1990	85	15
	Bristol	•	(38666)	99	99	99	11	70	1990	90	9
South West	Colliford		28540	100	100	100	15	52	1997	97	3
	Roadford		34500	97	96	95	12	48	1996	88	7
	Wimbleball		21320	99	99	99	8	74	2011	94	5
	Stithians		4967	100	100	95	9	66	1990	86	9
Welsh	Celyn & Brenig	•	131155	100	100	100	2	82	1996	100	-1
	Brianne		62140	97	100	100	4	84	2011	100	0
	Big Five	•	69762	98	97	98	8	70	1990	96	2
	Elan Valley	•	99106	98	97	99	5	81	2011	100	-1
Scotland(E)	Edinburgh/Mid-Lothian	•	97639	99	97	96	5	52	1998	96	0
	East Lothian	•	10206	100	99	98	1	84	1990	100	-2
Scotland(W)	Loch Katrine	•	111363	92	91	94	7	66	2001	92	2
	Daer		22412	94	86	90	-1	70	1994	77	13
	Loch Thom	•	11840	100	100	100	9	74	2001	91	9
Northern	Total+	•	56800	92	87	87	3	69	2008	95	-8
Ireland	Silent Valley	•	20634	96	92	91	10	56	2000	96	-5

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

** the monthly record of Ardingly reservoir stocks is under review.

+ excludes Lough Neagh

Details of the individual reservoirs in each o 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

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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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