Hydrological Summary

for the United Kingdom

May 2012

General

May was fairly typical in terms of rainfall and temperatures for the month as a whole, but saw a marked contrast between the cool, unsettled weather which characterised the first three weeks and the hot, dry conditions which followed. As in April, prolonged frontal rainfall was associated with widespread spates, and flood alerts were common during the first half of the month. The rainfall accumulated since early April has greatly reduced the areal extent of drought conditions. Parts of the Midlands, Yorkshire and the Southwest were downgraded from official drought status, and some closed parts of Grand Union canal were reopened to navigation. The substantial rainfall since March and attendant runoff response have contributed to a generally favourable water resources outlook for summer 2012, with an increase in reservoir levels leading to England & Wales stocks 3% above average entering June; importantly, stocks have increased substantially at Bewl and Ardingly and are now less than 10% below average. The unusual extension of the recharge season into the early summer has also prompted a welcome recovery in groundwater resources, although the effect of the previous dry winters continues to manifest itself in locally depressed groundwater levels. The warm temperatures of the latter part of the month signalled an apparent cessation of further recovery but, with exceptional rainfall already received in early June and an outlook broadly favouring wetter conditions, diminishing soil moisture deficits may allow opportunity for further infiltration and a more widespread recovery in groundwater resources.

Rainfall

May began very wet, with a continuation of the exceptionally unsettled weather which characterised April. Vigorous depressions brought sustained rainfall (e.g. on the 8th – 10th across much of the UK, particularly northern England and the Scottish borders; on the 13th/14th in northwest Britain, with 88mm in 12h at Kinlochewe on the 13th). From the 22nd onwards, warm, sunny and stable conditions prevailed over much of the UK and, with the exception of localised, occasionally thundery, showers the rest of the month was dry. Rainfall for May as a whole was around average for England & Wales and above average in Scotland (although spatially variable, with over 150% in parts of the Highlands contrasting with <60% in parts of the Western Isles and Caithness), whilst Northern Ireland was relatively dry. May was very wet in the Scottish borders and north east England: in Northumbria and Yorkshire, 2-month rainfall accumulations over April and May were >180% of average. The changeable May conditions bring to a close a very mixed spring, which in totality saw above average rainfall for most of England, and >120% in drought affected areas of the southeast. This has significantly moderated rainfall deficiencies in lowland England over the 12 – 14 month timeframe, although notable deficiencies persist over longer timescales, particularly for Midlands region: over the Oct 2010 – May 2012 timeframe, the west Midlands and Welsh borders have received below 65% of average rainfall, and it is the second driest such period for Midlands in a record from 1910.

River flows

Many index rivers in southern England were in full spate entering May, with over 150 flood alerts across England and Wales; outflows for England & Wales as a whole were the highest on record (since 1961) for early May. With catchments saturated, rapid runoff responses to frontal rainfall led to notable May peak flows in northern Britain in the second week, with further widespread flood warnings. Following the change in synoptic conditions after the third week, recessions became re-established in the majority of index catchments. New May maxima were registered at 14 index rivers (the peak on the Exe was 70% higher than the previous May maximum in a record from 1956), whilst the Thames saw its second highest May flow in a record from 1883. Mean flows for May were in the normal range or below average across much of Scotland and Northern Ireland, but well above average across most of England and Wales, with some record May runoff totals (including for the Bedford Ouse, in a record from 1933). The delayed response to the exceptional April rainfall has brought many groundwater-fed rivers back into the normal range, with particularly marked recoveries in some catchments: the Coln registered its second lowest April mean flow, followed by its fifth highest May flow, in a record from 1963. However, flows were below average in the Mimram and notably low in the Lambourn, although some recovery is evident in both cases. Whilst current river flows across the index catchment network are largely healthy, substantial long-term runoff deficiencies can still be traced back to early 2010.

Groundwater

By the end of April, soil moisture deficits (smds) were eliminated across most outcrop areas – an unusual occurrence for the time of year – although rising evapotranspiration during the warm, stable conditions in late May caused smds to re-establish and return to around average levels by month end. Groundwater levels normally decline through May, but this year the spring rainfall has interrupted or reversed groundwater level recessions in many outcrop areas. Notable recent rises have been recorded for the South Downs and Hampshire area, with levels rising by more than 10m during May at Compton and Chilgrove, and over 9 m at West Woodyates where they approached the May maximum. However, more muted responses typify most of the aquifer, and very low levels (a record minimum in the case of Lime Kiln Way) occurred in some index boreholes in the North Downs, Dorset and parts of the Chilterns. Limestone boreholes show mixed responses, partly reflecting aquifer heterogeneity and differing measurement times, with average or higher levels in the Jurassic (with a rise of over 5m at New Red Lion) and Carboniferous, and below average levels at both Magnesian limestone sites despite notable recent increases. Levels continued to fall across most of the slow-responding Permo-Triassic sandstones – with record May minima being recorded at Heathlanes and Newbridge. The focus of the groundwater drought is clearly now localised, on parts of the Chalk and the Permo-Triassic sandstone. The latter will take many months to respond to the recent rainfall, but further early summer recoveries in parts of the Chalk are likely due to recharge currently in the unsaturated zone.

Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Rainfall . . . Rainfall . . .

Rainfall accumulations and return period estimates

Percentages are from the 1971-2000 average.

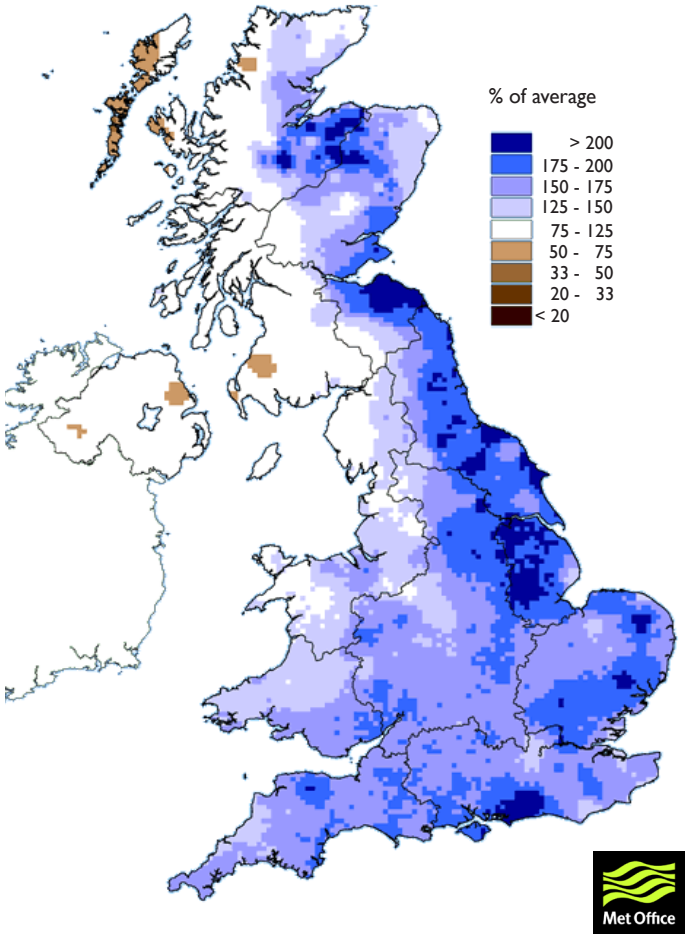
Area	Rainfall	May 2012	Apr12 - May12	RP	Apr11 - May12	RP	Oct10 - May12	RP	May10 - May12	RP
United Kingdom	mm	**67**	193		1300		1839		2236	
	%	**106**	149	15-25	107	2-5	99	2-5	100	2-5
England	mm	**52**	187		840		1216		1519	
	%	**96**	169	30-50	90	5-10	88	8-12	90	8-12
Scotland	mm	**90**	205		2023		2809		3321	
	%	**123**	134	5-10	127	>100	113	20-30	113	15-25
Wales	mm	**77**	238		1427		2049		2561	
	%	**102**	152	8-12	93	2-5	86	8-12	91	5-10
Northern Ireland	mm	**58**	125		1339		1878		2330	
	%	**85**	90	2-5	107	2-5	99	2-5	102	2-5
England & Wales	mm	**56**	194		921		1331		1662	
	%	**97**	166	25-40	91	5-10	87	8-12	90	8-12
North West	mm	**76**	179		1428		2040		2504	
	%	**114**	134	2-5	109	2-5	102	2-5	103	2-5
Northumbria	mm	**81**	216		966		1466		1788	
	%	**138**	184	30-50	102	2-5	104	2-5	104	2-5
Midlands	mm	**47**	181		713		1005		1294	
	%	**88**	167	15-25	82	10-15	79	50-70	82	25-40
Yorkshire	mm	**61**	209		878		1282		1565	
	%	**111**	185	40-60	95	2-5	93	2-5	93	5-10
Anglian	mm	**45**	163		582		823		1094	
	%	**99**	178	25-40	84	5-10	82	15-25	87	8-12
Thames	mm	**40**	174		674		966		1211	
	%	**75**	167	20-30	84	5-10	82	10-20	83	10-20
Southern	mm	**47**	179		730		1136		1379	
	%	**95**	176	25-40	83	5-10	85	10-15	85	10-15
Wessex	mm	**42**	195		850		1220		1484	
	%	**74**	174	20-30	87	5-10	82	10-15	83	15-25
South West	mm	**45**	235		1183		1728		2116	
	%	**66**	168	20-35	88	5-10	82	10-20	85	10-20
Welsh	mm	**76**	234		1368		1959		2458	
	%	**102**	153	10-15	93	2-5	86	10-15	90	5-10
Highland	mm	**109**	224		2491		3322		3902	
	%	**139**	131	2-5	132	>100	112	10-20	111	10-15
North East	mm	**62**	237		1239		1810		2285	
	%	**99**	187	60-90	115	2-5	113	5-10	116	5-10
Tay	mm	**89**	228		1753		2534		3009	
	%	**122**	162	10-15	124	20-35	115	15-25	115	20-30
Forth	mm	**90**	199		1541		2263		2680	
	%	**136**	155	10-15	122	15-25	117	15-25	115	10-20
Tweed	mm	**94**	208		1285		1889		2245	
	%	**143**	166	15-25	119	5-10	116	10-20	114	5-10
Solway	mm	**85**	165		1923		2767		3257	
	%	**112**	106	2-5	123	50-80	114	20-30	113	10-20
Clyde	mm	**90**	178		2515		3480		4046	
	%	**114**	105	2-5	132	>100	117	20-35	114	15-25

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

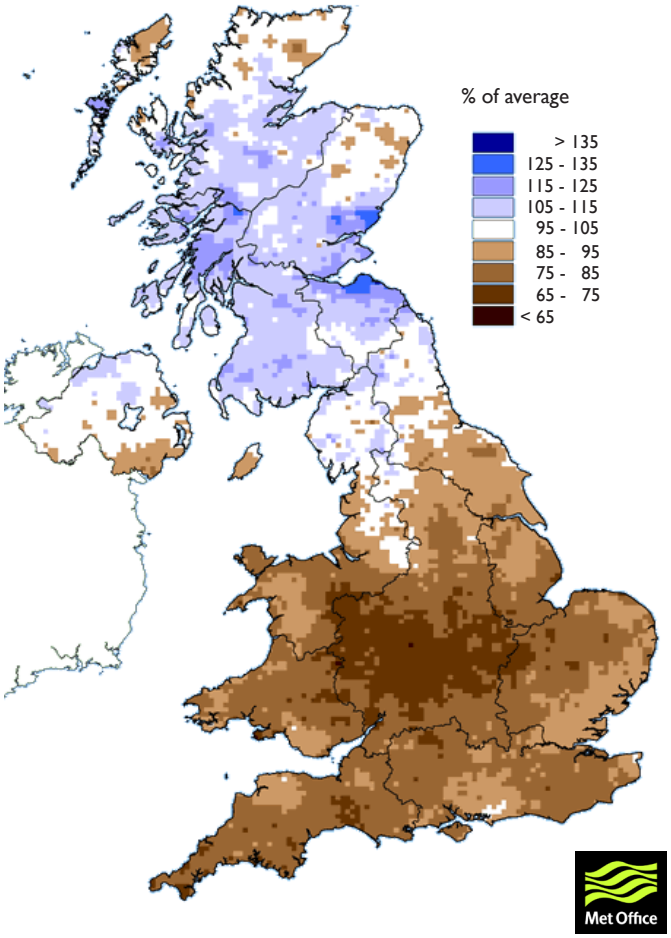
Important note: Figures in the above table may be quoted provided their source is acknowledged (see page 12). Where appropriate, specific mention must be made of the uncertainties associated with the return period estimates. The RP estimates are based on data provided by the Met Office and reflect climatic 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. All monthly rainfall totals since December 2011 are provisional.

Rainfall . . . Rainfall . . .

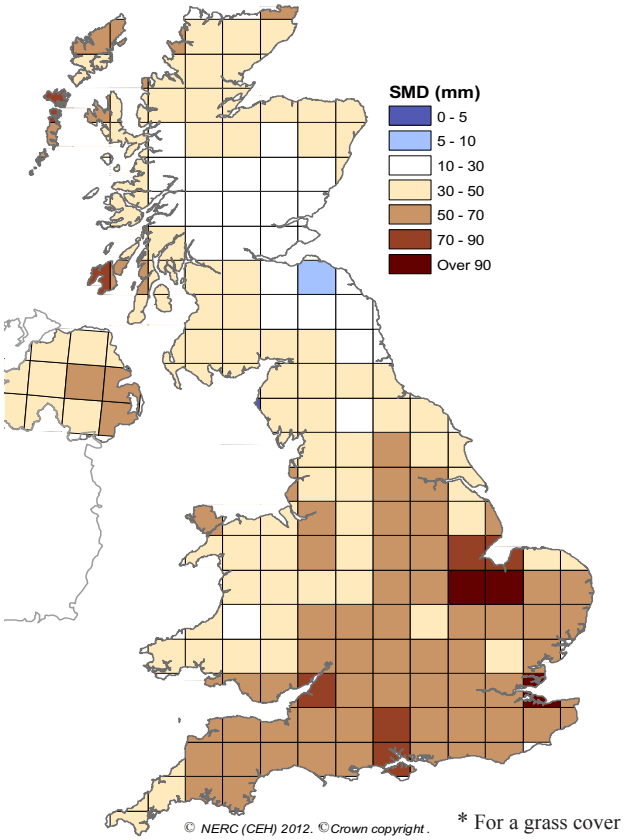
April 2012 - May 2012 rainfall as % of 1971-2000 average



October 2010 - May 2012 rainfall as % of 1971-2000 average



MORECS Soil Moisture Deficits* May 2012



* For a grass cover

Met Office 3-month outlook

Updated: June 2012

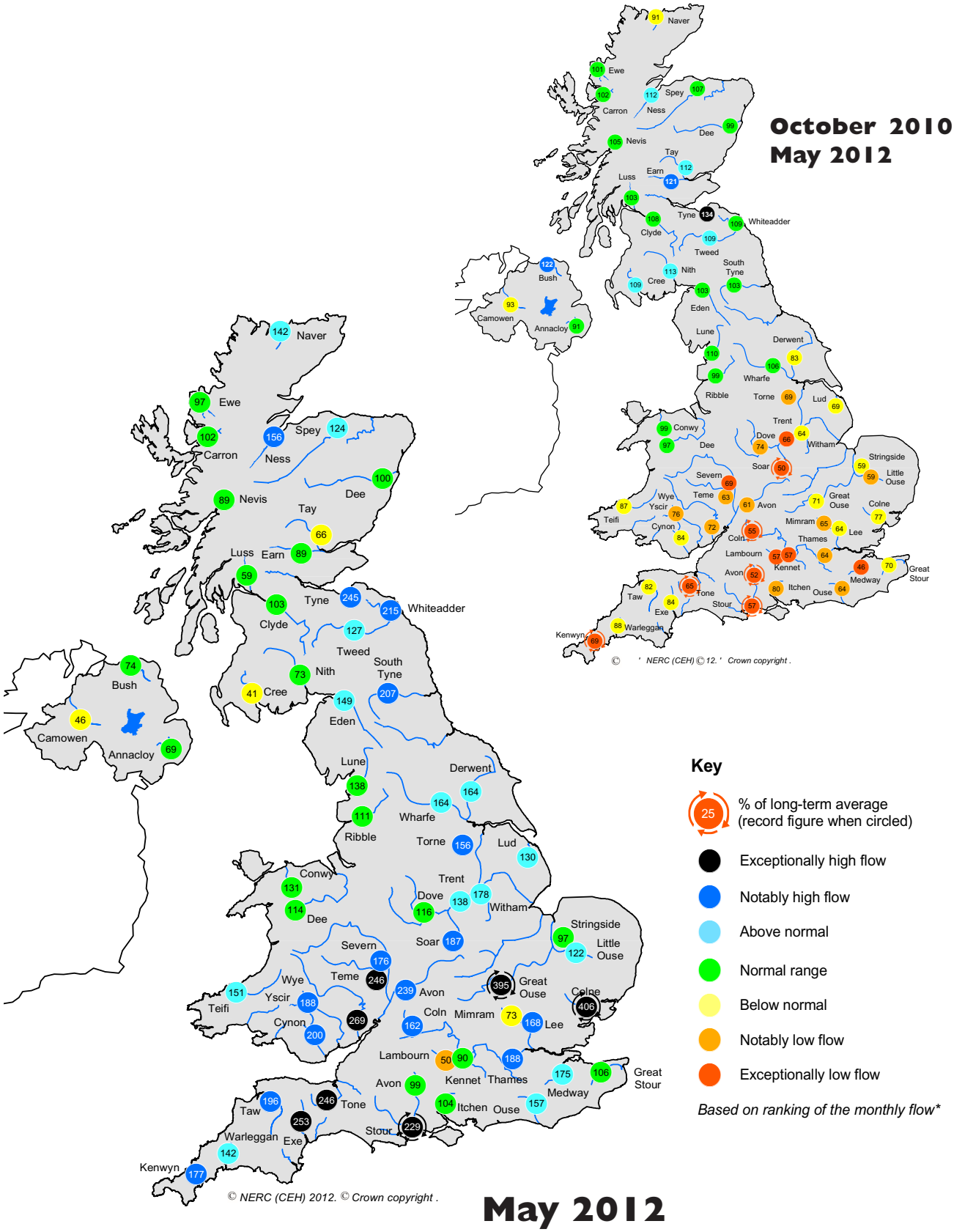
For UK average rainfall, the forecast for this summer is very uncertain, due to a lack of strong driving factors. Although there is a somewhat elevated chance, relative to climatology, of the summer being wet, it looks unlikely that there will be extreme wet conditions (as occurred in the summer of 2007). The probability of very dry conditions remains close to climatology.

The probability that the UK average rainfall for June – July – August will fall into the driest of our five categories is around 20%, while the probability that it will fall into the wettest of our five categories is 25 – 30% (the 1971 – 2000 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.

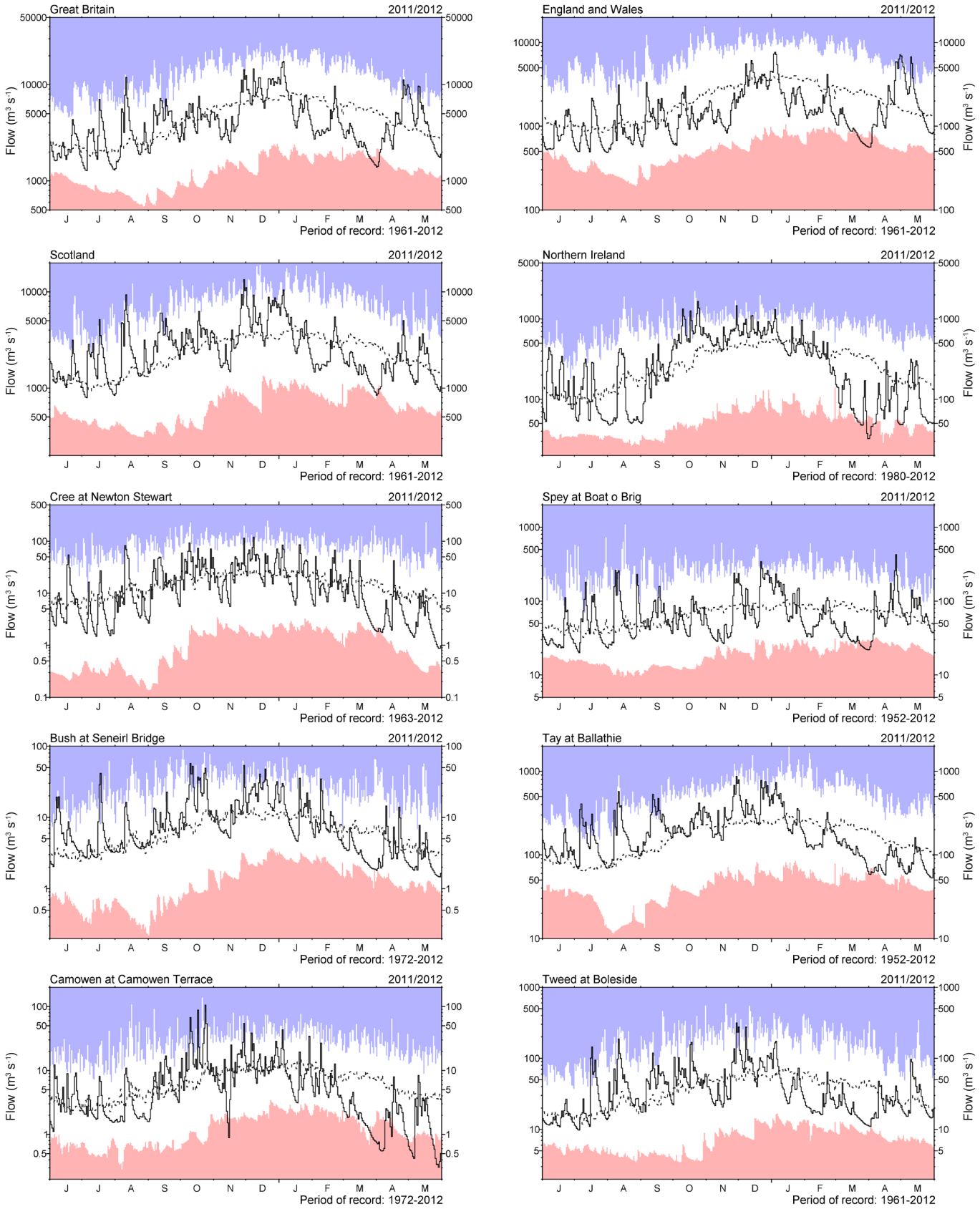
River flow . . . River flow . . .



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.

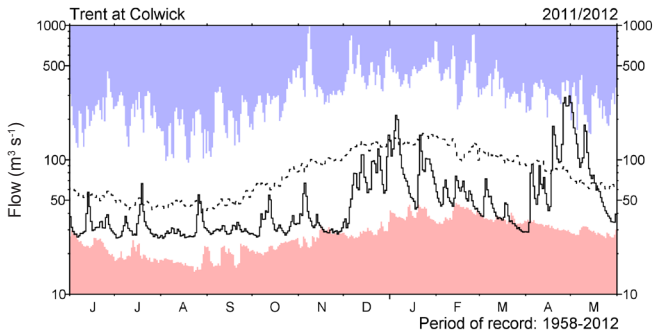
River flow . . . River flow . . .

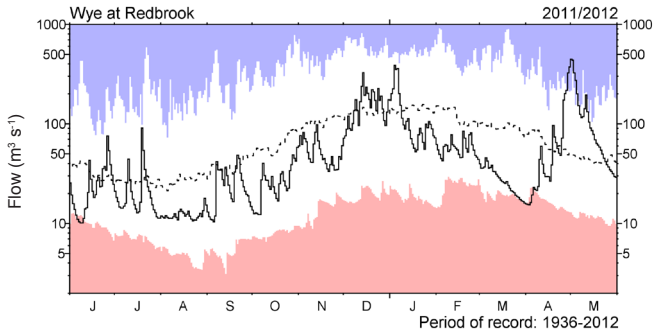


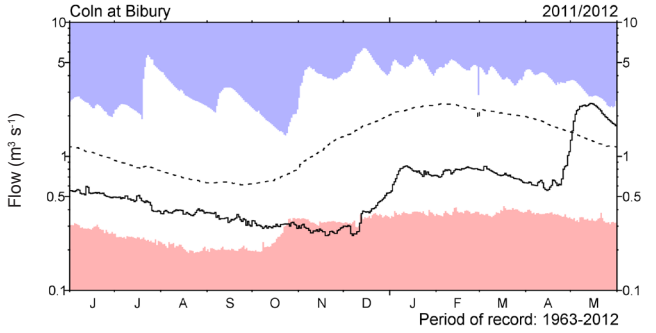
River flow hydrographs

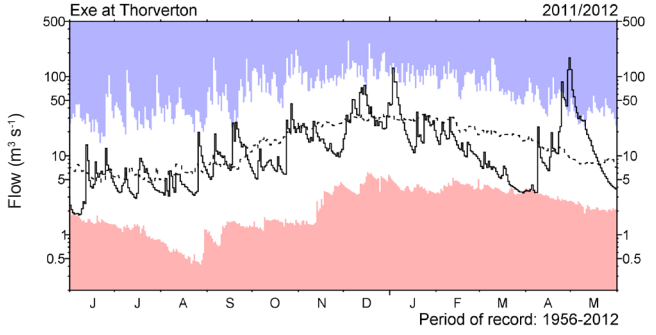
The river flow hydrographs show the daily mean flows together with the maximum and minimum daily flows prior to June 2011 (shown by the shaded areas). Daily flows falling outside the maximum/minimum range are indicated where the bold trace enters the shaded areas. Mean daily flows are shown as the dashed line.

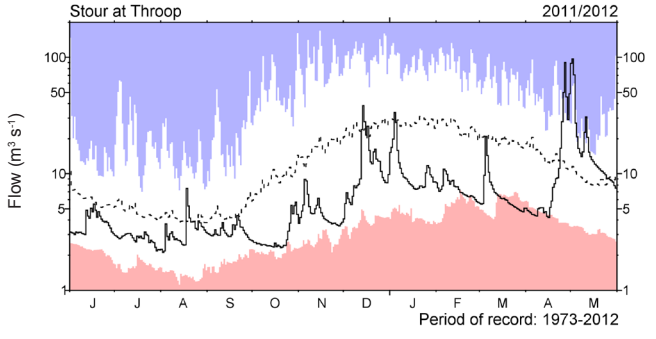
River flow . . .



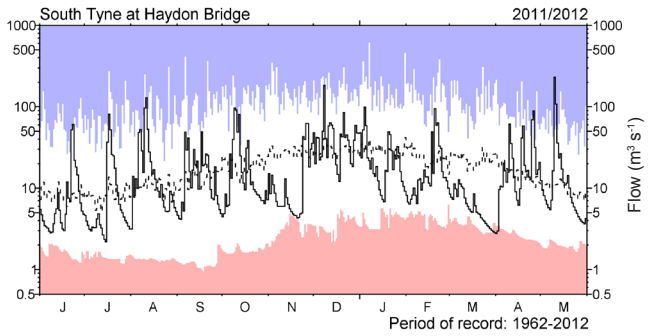


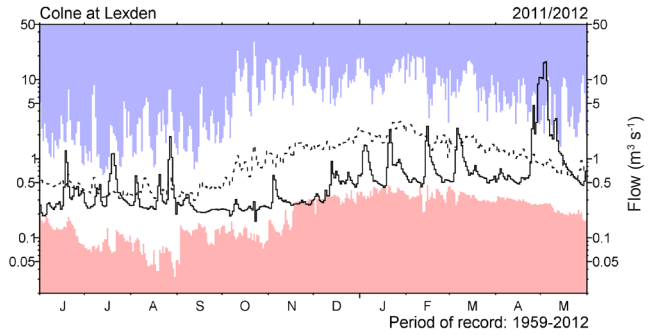


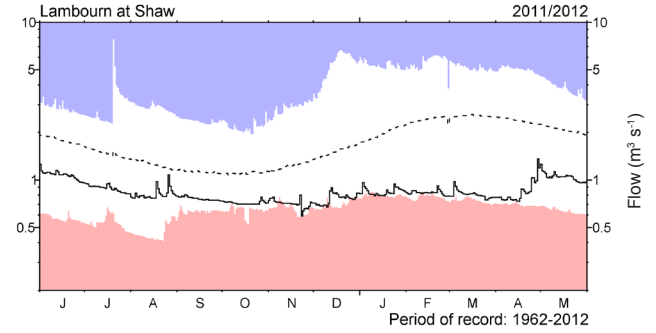


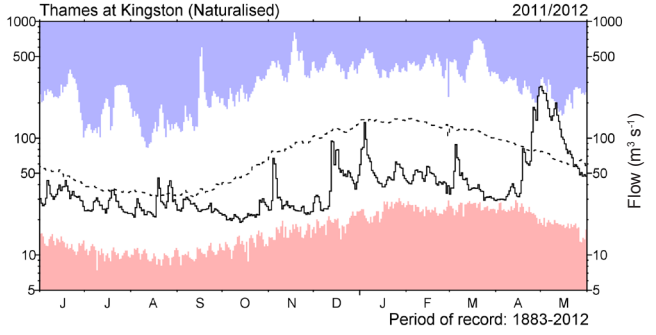


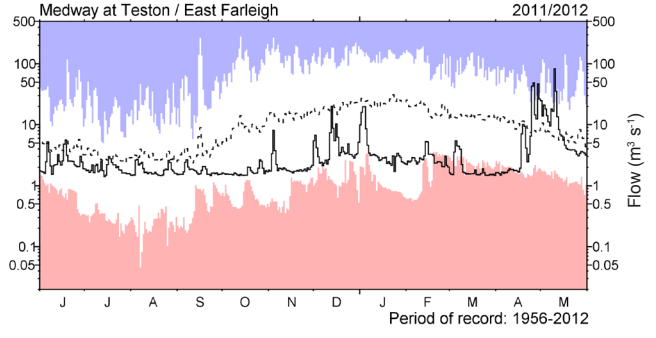
River flow . . .











Notable runoff accumulations (a) April 2012 - May 2012, (b) April 2011 - May 2012

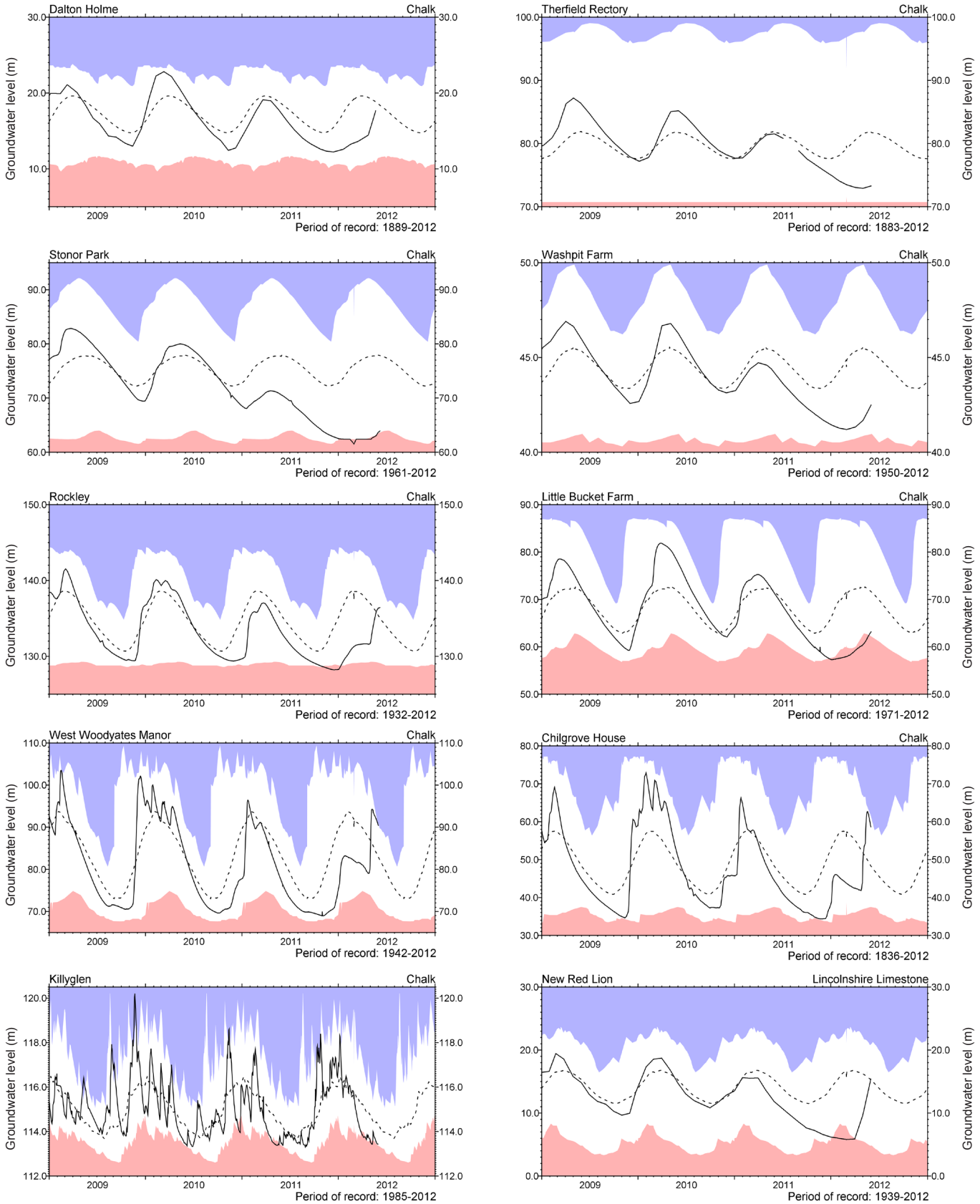
	River	%lta	Rank
a)	Lossie	188	47/49
	Tyne (Spilmersford)	215	47/48
	Colne	238	52/53
	Mole	218	38/39
	Lymington	239	51/52
	Exe	213	56/56
	Dart	163	53/54
	Camowen	40	2/40

	River	%lta	Rank
b)	Ness	135	39/39
	Earn	132	63/64
	Little Ouse	45	1/41
	Kennet	54	2/50
	Lambourn	52	2/49
	Coln	49	2/48
	Pang	43	2/43
	Medway	35	1/48

	River	%lta	Rank
b)	Great Stour	58	2/47
	Test	64	2/52
	Avon (Amesbury)	49	1/47
	Stour	56	2/39
	Piddle	57	2/47
	Kenwyn	65	2/43
	Nevis	125	28/29
	Mourne	125	29/29
	Bush	137	37/37

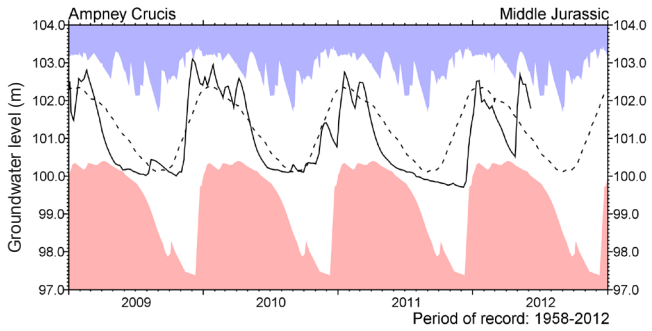
lta = long term average; Rank 1 = lowest on record

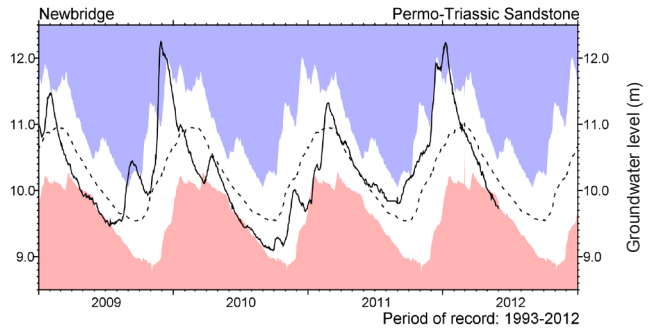
Groundwater . . . Groundwater

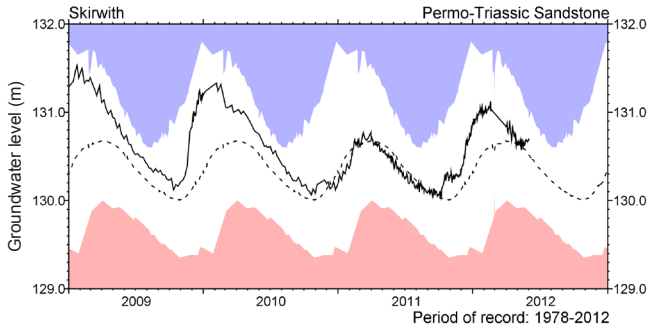


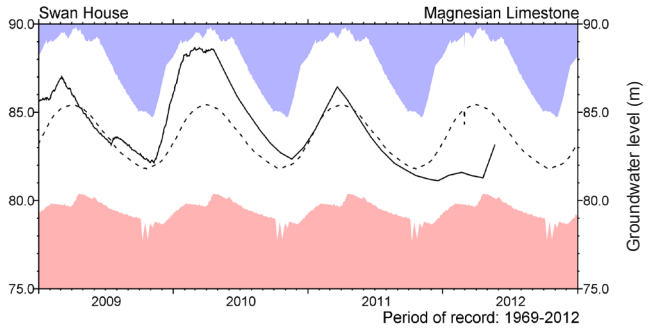
Groundwater levels normally rise and fall with the seasons, reaching a peak in the spring following replenishment through the winter (when evaporation losses are low and soil moist). They decline through the summer and early autumn. This seasonal variation is much reduced when the aquifer is confined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

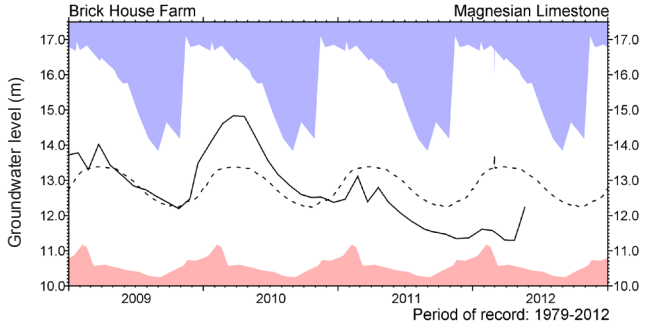
Groundwater . . . Groundwater

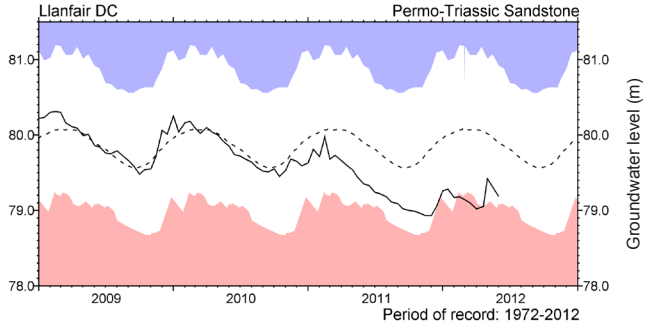


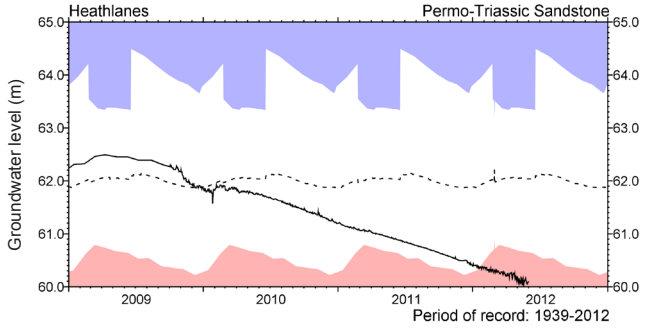


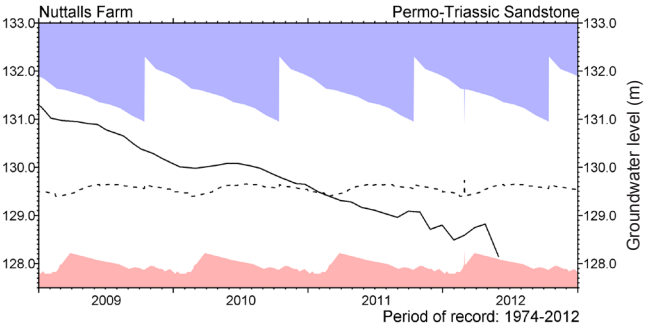


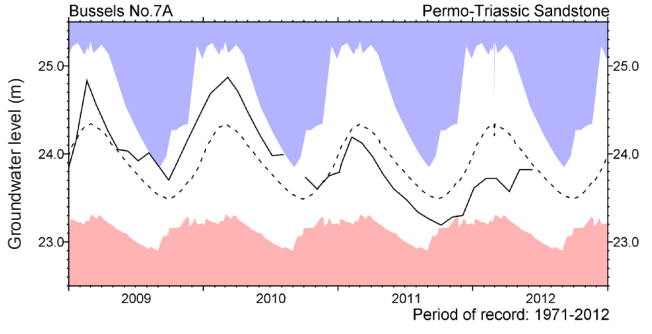


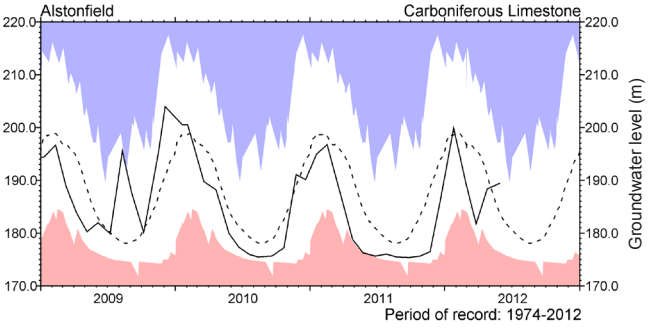










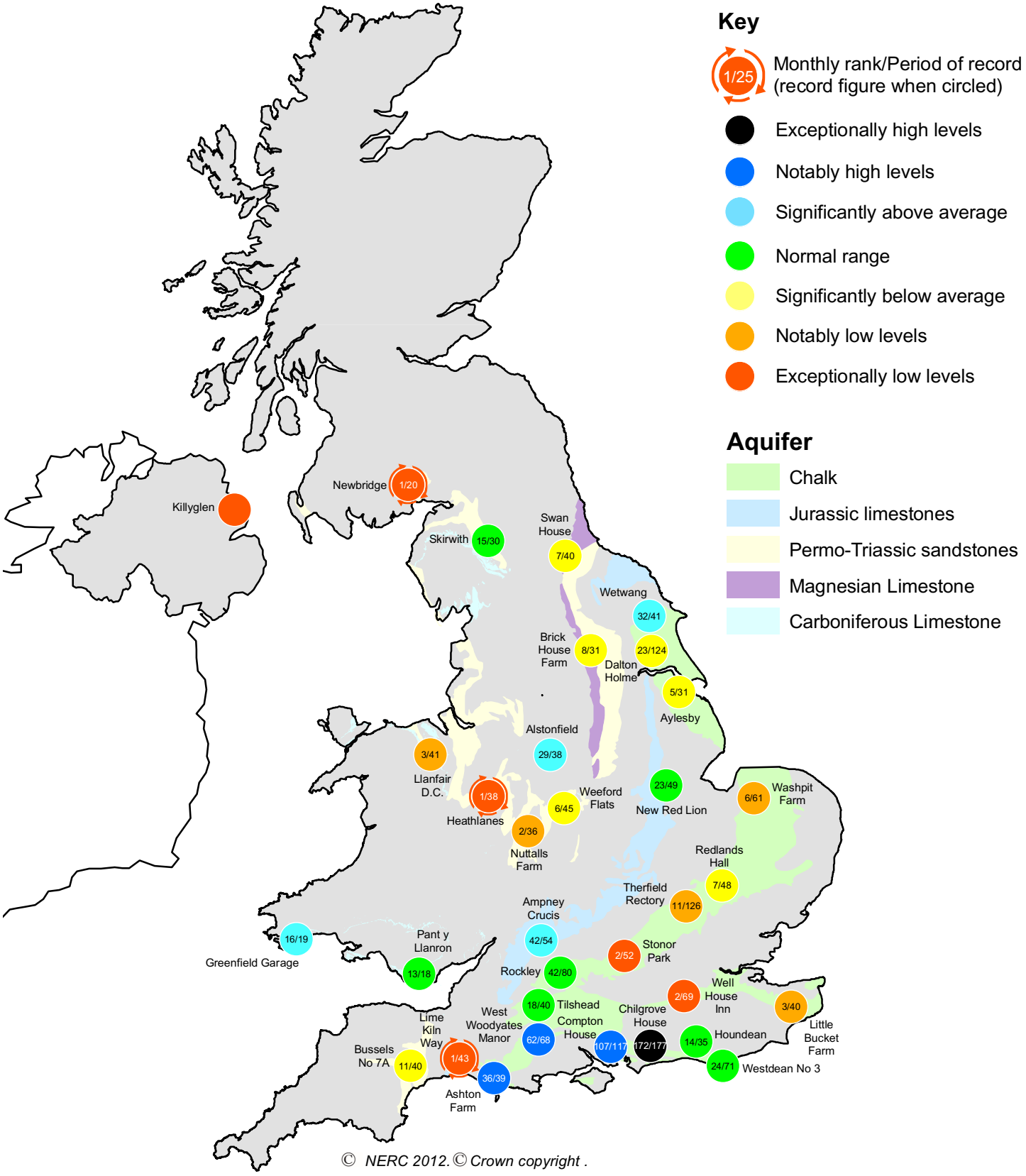


Groundwater levels May / June 2012

Borehole	Level	Date	May av.	Borehole	Level	Date	May av.	Borehole	Level	Date	May av.
Dalton Holme	17.64	21/05	18.95	Chilgrove House	58.45	31/05	48.97	Brick House Farm	12.23	21/05	13.29
Therfield Rectory	73.28	01/06	81.66	Killyglen (NI)	113.43	30/05	114.42	Llanfair DC	79.19	31/05	79.97
Stonor Park	63.92	06/06	77.92	New Red Lion	15.35	31/05	15.62	Heathlanes	60.09	31/05	62.01
Tilshead	89.44	31/05	90.01	Ampney Crucis	101.80	06/06	101.22	Nuttalls Farm	128.15	31/05	129.63
Rockley	136.41	06/06	136.17	Newbridge	9.73	31/05	10.25	Bussels No.7a	23.82	10/06	24.00
Well House Inn	87.17	06/06	97.06	Skirwith	130.69	01/06	130.61	Alstonfield	189.38	28/05	185.89
West Woodyates	90.42	31/05	84.52	Swan House	83.14	21/05	84.95				

Levels in metres above Ordnance Datum

Groundwater . . .Groundwater



Groundwater levels - May 2012

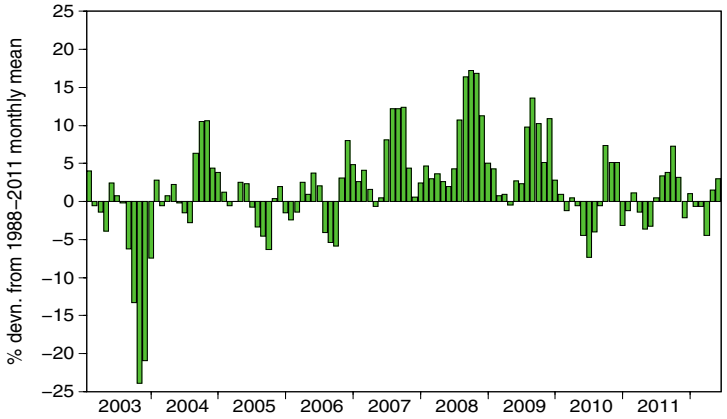
The rankings are based on a comparison between the average level in the featured month (but often only single readings are available) and the average level in each corresponding month on record. Rankings need to be interpreted with caution; where the latest monthly mean values are based on one or two level measurements only, their recording dates can be very influential, particularly during periods of relatively rapid change. Rankings may be omitted where they are considered misleading.

Notes: i. The outcrop areas are coloured according to British Geological Survey conventions.

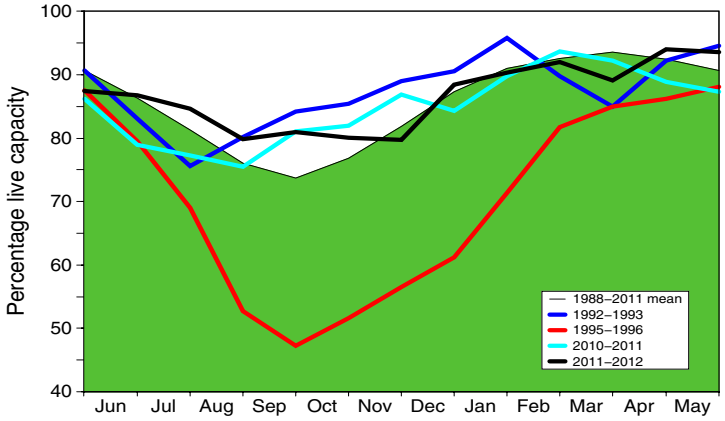
ii. Yew Tree Farm levels are now received quarterly.

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



These plots are based on the England and Wales figures listed below.

Percentage live capacity of selected reservoirs at start of month

Area	Reservoir		Capacity (Ml)	2012 Apr	May	Jun	Jun Anom.	Min Jun	Year* of min	2011 Jun	Diff 12-11
North West	N Command Zone	•	124929	84	83	**80**	-3	66	2010	90	-10
	Vyrnwy		55146	91	100	**94**	5	72	1990	83	11
Northumbrian	Teesdale	•	87936	92	100	**90**	4	64	1991	95	-5
	Kielder		(199175)	88	91	**93**	1	85	1989	93	0
Severn Trent	Clywedog		44922	99	99	**100**	3	83	1989	97	3
	Derwent Valley	•	39525	90	99	**96**	9	56	1996	69	27
Yorkshire	Washburn	•	22035	96	100	**94**	7	72	1990	74	20
	Bradford supply	•	41407	90	98	**92**	6	70	1996	80	12
Anglian	Grafham		(55490)	96	96	**95**	1	72	1997	91	4
	Rutland		(116580)	73	85	**95**	4	75	1997	85	10
Thames	London	•	202828	97	98	**98**	5	83	1990	93	5
	Farmoor	•	13822	100	97	**99**	2	90	2002	100	-1
Southern	Bewl		28170	49	60	**79**	-8	57	1990	83	-4
	Ardingly*		4685	51	69	**89**	-10	89	2012	92	-3
Wessex	Clatworthy		5364	92	100	**96**	10	67	1990	75	21
	Bristol WW	•	(38666)	80	91	**96**	8	70	1990	78	18
South West	Colliford		28540	75	79	**80**	-5	52	1997	74	6
	Roadford		34500	81	85	**85**	1	48	1996	68	17
	Wimbleball		21320	97	100	**99**	8	74	2011	74	25
	Stithians		4967	87	90	**93**	7	66	1990	80	13
Welsh	Celyn and Brenig	•	131155	98	100	**100**	2	82	1996	96	4
	Brianne		62140	91	100	**98**	3	84	2011	84	14
	Big Five	•	69762	93	100	**96**	7	70	1990	79	17
	Elan Valley	•	99106	93	100	**95**	1	81	2011	81	14
Scotland(E)	Edinburgh/Mid Lothian	•	97639	96	95	**94**	4	52	1998	94	0
	East Lothian	•	10206	95	100	**100**	3	84	1990	99	1
Scotland(W)	Loch Katrine	•	111363	94	89	**80**	-7	66	2001	92	-12
	Daer		22412	100	100	**98**	7	70	1994	99	-1
	Loch Thom	•	11840	100	97	**93**	2	74	2001	95	-2
Northern Ireland	Total+	•	56920	86	84	**82**	-3	69	2008	80	2
	Silent Valley	•	20634	84	80	**76**	-4	56	2000	75	1

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

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 1988-2011 period except for West of Scotland and Northern Ireland where data commence in the mid-1990's. In some gravity-fed reservoirs (e.g. Clywedog) stocks are kept below capacity during the winter to provide scope for flood attenuation purposes.

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

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. 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, the Environment Agency Wales, the Scottish Environment Protection Agency and, for Northern Ireland, the Rivers Agency and the Northern Ireland Environment Agency. In all cases the data are subject to revision following validation (flood and drought 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 Fax: 0870 900 5050
E-mail: enquiries@metoffice.com

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

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Selected text and maps are available on the WWW at http://www.ceh.ac.uk/data/nrfa/nhmp/nhmp.html
Navigate via Hydrological Summary for the UK.

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