Hydrological Summary
for the United Kingdom

February 2008

General

The UK rainfall total for February was close to the long term average but regional contrasts were exceptional: much of western Scotland was very wet whilst most of southern Britain was notably dry, and very sunny. Rainfall patterns have been erratic through the winter but with the a few exceptions (e.g. Stithians in Cornwall) reservoir stocks are modestly above the early March average, and around 3% above average for England & Wales as a whole. In Scotland, rivers were in spate early and late in the month. To the south however, flows were in recession for much of February and runoff totals were generally below average. Over longer timespans accumulated runoff totals are generally above average. Soil moisture deficits began to develop in parts of the English Lowlands in February and groundwater replenishment was very limited in most major aquifers. Nonetheless, groundwater levels in a clear majority of index wells and boreholes remain in, or above, the normal seasonal range. Entering the spring, the overall water resources outlook is good. Rainfall in early March will be particularly influential in determining the seasonal cessation of the 2007/08 groundwater recharge season.

Rainfall

Synoptic patterns across southern Britain during February were dominated by anticyclonic conditions; most rain-bearing frontal systems followed relatively northerly tracks bringing damaging gales and substantial precipitation to western Scotland in particular. Correspondingly, there was a marked exaggeration in the NW/SE rainfall gradient across the country in February. Daily rainfalls exceeding 50mm were common in western Scotland, particularly late in the month (Kinlochewe reported 76mm, 68mm and 58mm on the 21st, 23rd, and 26th respectively); significant snow accumulations were reported on high ground. By contrast, parts of southern and eastern England experienced some lengthy dry spells; parts of central southern England reported 18 or more days with no more than a trace of rain from the 6th. Correspondingly, February rainfall totals were below 50% of average over wide areas whilst some upland catchments in western Britain reported over 130% with totals exceeding 200% in parts of the western Highlands. Winter (Dec-Feb) precipitation totals were modestly below average in some southern regions but Scotland added a further very wet winter to an exceptional recent cluster (7 of the wettest 8 in a series from 1914 have occurred in the last 20 years). Long term accumulated rainfall totals are also outstanding: provisional data suggest that the Sept 2006 - Feb 2008 period is the wettest 18-month sequence on record for Scotland.

River Flows

Following the notable late-January high flows, recessions became established in most UK rivers, particularly after the first week. These continued through the month in some eastern catchments (e.g. the Lud) and end-of-February flows were notably depressed in a number of, mostly small, responsive catchments (e.g. the Kenwyn and the Medway). At the same time, high spates characterised many rivers in northern Britain; previous late-February maximum daily flows were exceeded in a few Highland rivers (e.g. the Ness and Nevis). These notable flows contributed to well above average February runoff totals – the 4th highest in a 38-yr record for the Ness – throughout most of Scotland. In southern Britain, high baseflows (reflecting the lagged response to the heavy January rainfall) maintained healthy flows in many rivers draining permeable catchments but, generally, runoff totals across England & Wales were below average; notably so in parts of Cornwall. Winter runoff totals were within, or above, the normal range across most of the country, and substantially above average in many Scottish catchments – the Tweed (at Norham) exceeded its previous Dec-Feb maximum in a series from 1960.

Groundwater

February rainfall totals were well below average across almost all major aquifer outcrop areas and, with modest soil moisture deficits beginning to build in the English Lowlands, infiltration was generally meagre for the month as a whole (less than 30% of average across parts of the Thames basin). Many groundwater level hydrographs testify to the remarkably volatile recharge patterns over the last 12 months – with very wide departures from the seasonal norm. However, the net effect of the erratic replenishment patterns (and the benefit of heavy January infiltration) has been to leave groundwater levels in most index wells and boreholes within, or above, the late winter average. Chalk levels remain seasonally high in many northern and western outcrops and relatively close to the late winter average in the South. The dry February is reflected in the recent brisk recessions in some responsive aquifers (e.g. the Cotswolds and in the Chalk in Northern Ireland) but levels remain typical for the late winter. Apart from Bussels in the South-West, near-average levels also characterise many Permo-Triassic sandstones outcrops and late-winter levels in some of the very-slow responding boreholes in the Midlands (e.g. Weeford Flats) are above average entering the spring for the first time since 2003.

Centre for Ecology & Hydrology
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British Geological Survey
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Rainfall . . . Rainfall . . .

Rainfall accumulations and return period estimates

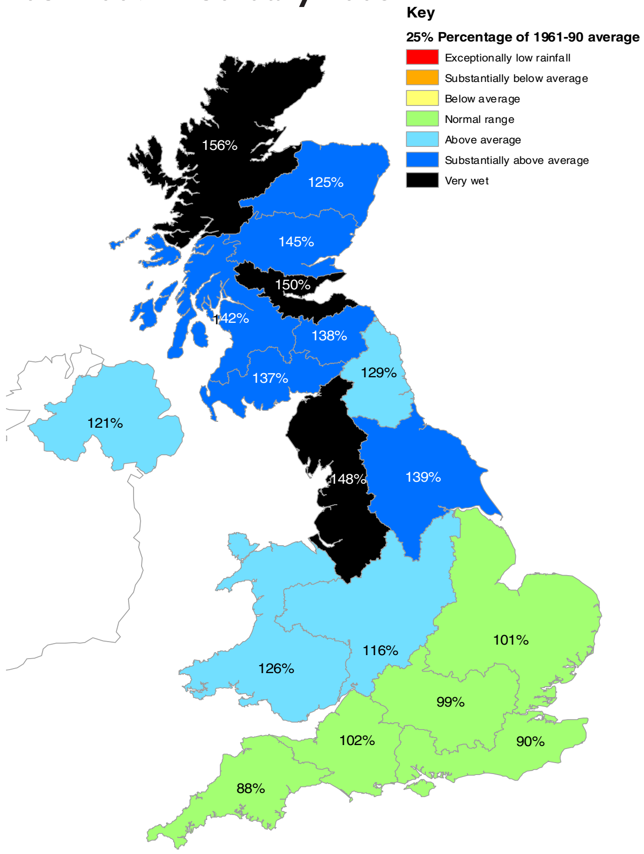
Area	Rainfall	Feb 2008	Dec 07- Feb 08	RP	Aug 07- Feb 08	RP	Mar 07- Feb 08	RP	Sep 06- Feb 08	RP
England & Wales	**mm**	**44**	**292**		**522**		**992**		**1636**	
	%	**68**	**117**	**2-5**	**90**	**2-5**	**110**	**2-5**	**116**	**10-20**
North West	mm	77	480		816		1352		2245	
	%	98	148	15-25	101	2-5	111	5-10	117	30-50
Northumbrian	mm	42	291		493		891		1441	
	%	71	129	5-10	90	2-5	103	2-5	108	2-5
Severn Trent	mm	37	237		410		918		1441	
	%	67	116	2-5	86	5-10	120	5-15	123	20-30
Yorkshire	mm	45	306		499		962		1517	
	%	78	139	5-10	96	2-5	115	5-10	118	10-20
Anglian	mm	21	146		320		691		1059	
	%	54	101	2-5	89	2-5	114	5-10	117	5-10
Thames	mm	23	181		387		779		1309	
	%	49	99	2-5	90	2-5	111	2-5	122	5-15
Southern	mm	26	197		415		783		1350	
	%	48	90	2-5	81	5-10	100	<2	109	2-5
Wessex	mm	36	256		496		930		1574	
	%	54	102	2-5	89	2-5	109	2-5	117	5-10
South West	mm	50	336		613		1175		2065	
	%	49	88	2-5	76	10-20	99	2-5	108	2-5
Welsh	mm	77	506		822		1444		2470	
	%	77	126	2-5	91	2-5	107	2-5	115	5-10
Scotland	**mm**	**167**	**598**		**1090**		**1656**		**2876**	
	%	**158**	**144**	**20-30**	**110**	**5-10**	**113**	**10-20**	**122**	**>200**
Highland	mm	258	780		1434		2103		3617	
	%	204	156	20-30	121	10-20	121	20-35	129	>200
North East	mm	74	337		694		1165		1855	
	%	107	125	5-10	105	2-5	113	5-15	116	35-50
Tay	mm	131	550		899		1437		2587	
	%	133	145	10-20	104	2-5	111	5-10	126	>200
Forth	mm	104	472		824		1281		2306	
	%	127	150	15-25	108	2-5	112	5-10	128	>200
Tweed	mm	65	371		643		1109		1857	
	%	93	138	10-20	100	<2	111	5-10	119	60-90
Solway	mm	115	555		970		1503		2655	
	%	113	137	10-20	100	<2	105	2-5	116	35-50
Clyde	mm	194	706		1259		1869		3375	
	%	157	142	10-20	105	2-5	107	2-5	120	80-120
Northern Ireland	**mm**	**60**	**371**		**682**		**1143**		**1889**	
	%	**74**	**121**	**5-10**	**94**	**2-5**	**104**	**2-5**	**109**	**5-15**

% = percentage of 1961-90 average *RP = Return period*

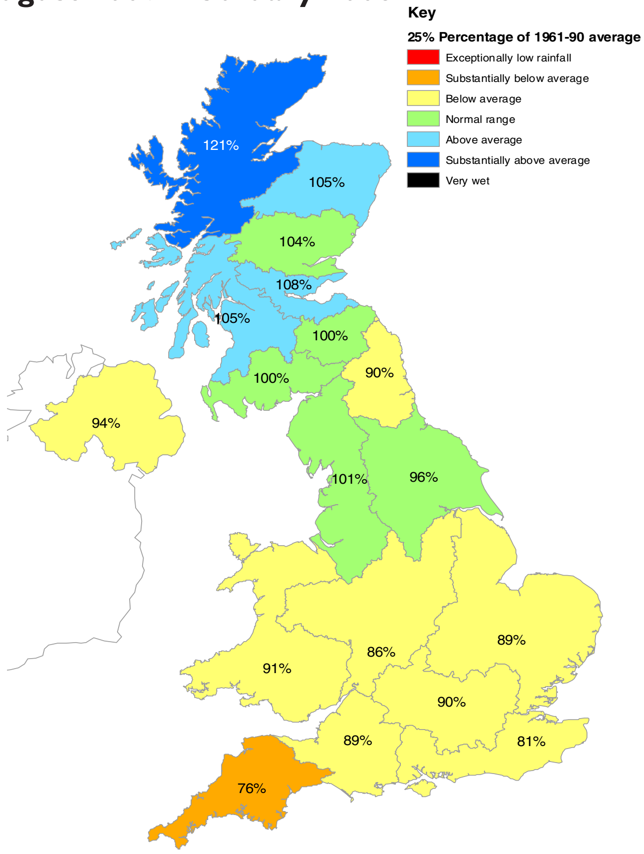
Important note: Figures in the above table may be quoted provided their source is acknowledged (see page 12). Where appropriate, specific mention must be made of the uncertainties associated with the return period estimates. The RP estimates are based on data provided by the Met Office and derived following the method described in: Tabony, R. C. 1977, *The variability of long duration rainfall over Great Britain*. Met Office Scientific Paper no. 37. The estimates reflect climatic variability since 1913 and assume a stable climate. 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 September 2007 are provisional.

Rainfall . . . Rainfall . . .

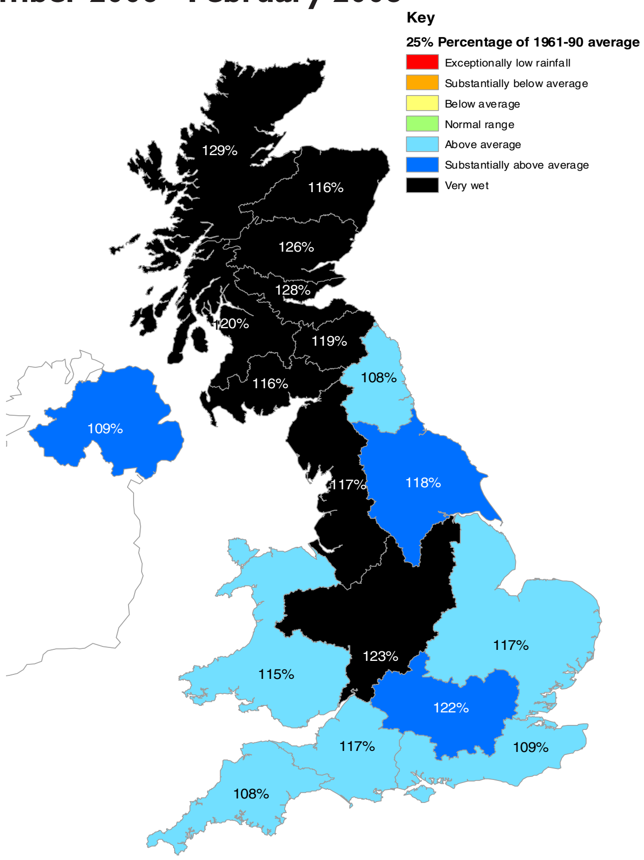
Rainfall
December 2007 - February 2008



Rainfall
August 2007- February 2008



Rainfall
September 2006 - February 2008



Met Office
Spring 2008 forecast

Forecast issued 26 February 2008

Temperature

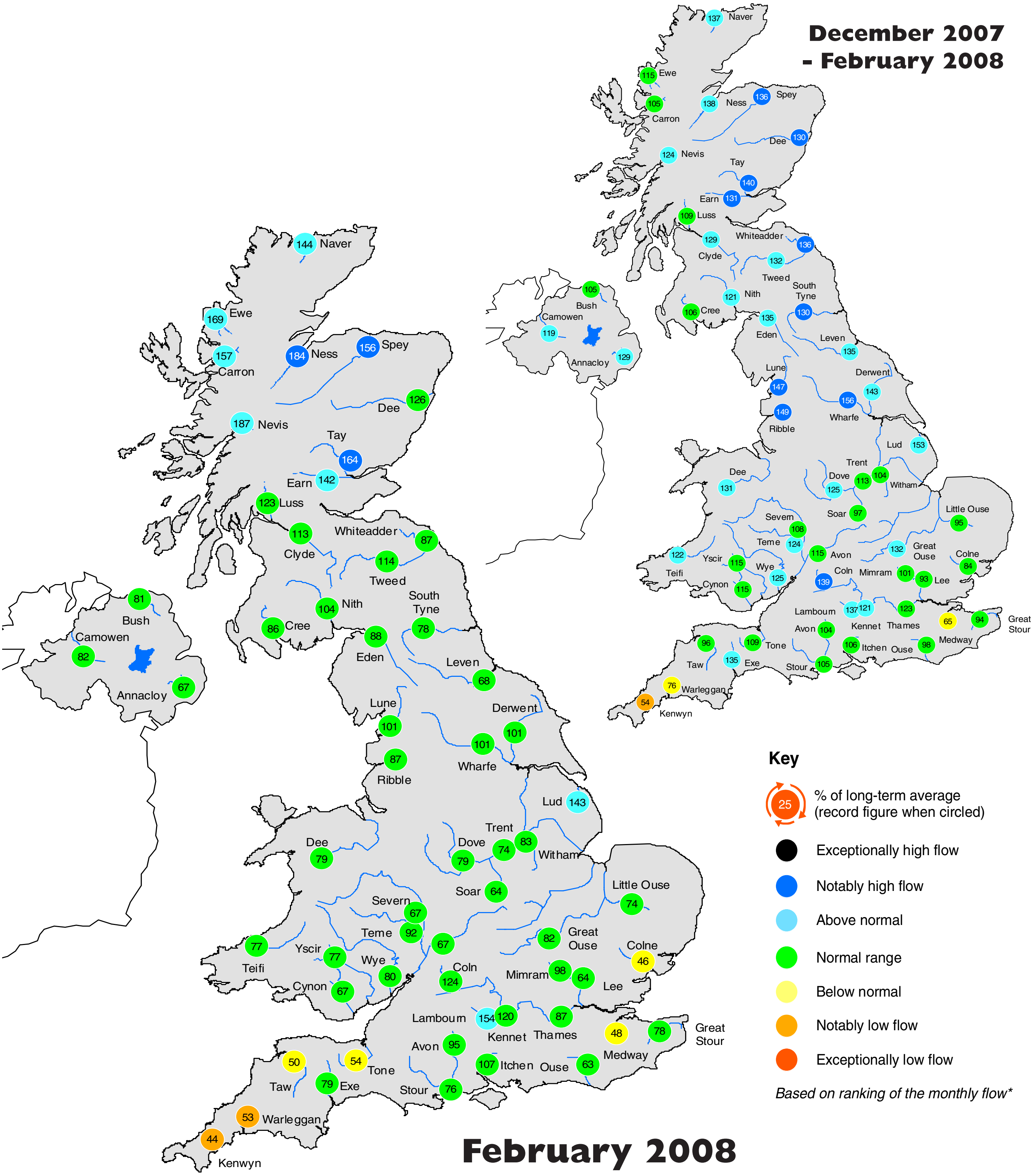
Mean temperatures for the season as a whole are more likely to be either average or above average over much of the European region, including the UK. Spells of below-average temperatures are likely, particularly in the early part of spring in north-west Europe and, for the UK, spring is likely to be cooler than last year.

Precipitation

For much of north-west Europe, including the UK, precipitation is more likely to be either average or below average than above average.

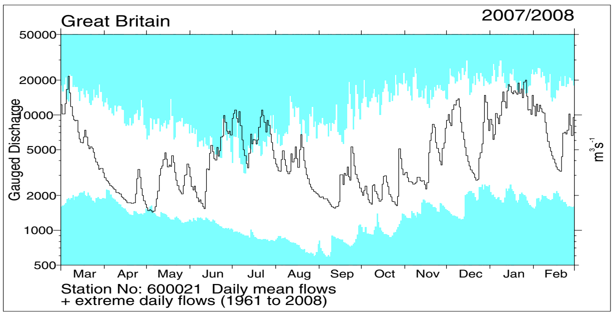
An update to the spring forecast will be issued at 10 a.m. on 27 March 2008.
The first outlook to summer will be issued on 3 April 2008.
For further details please visit:
http://www.metoffice.gov.uk/weather/seasonal/spring2008/index.html

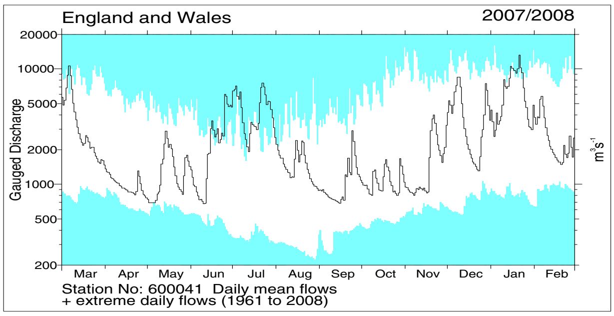
River flow . . . River flow . . .

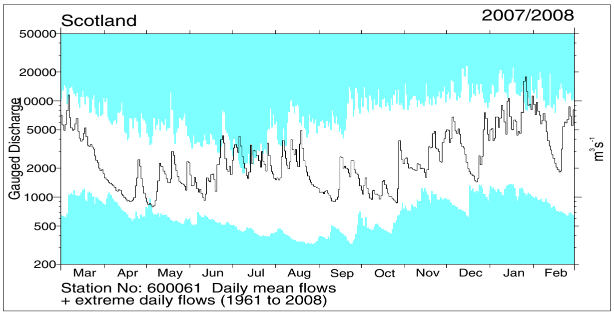


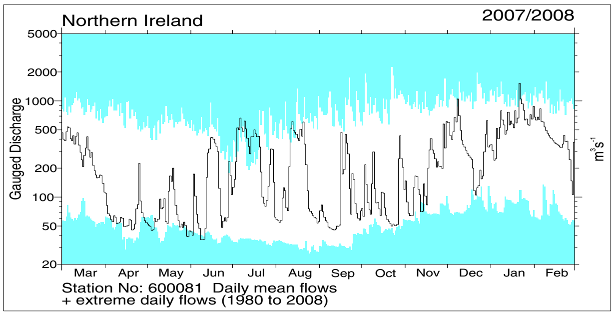
River flows

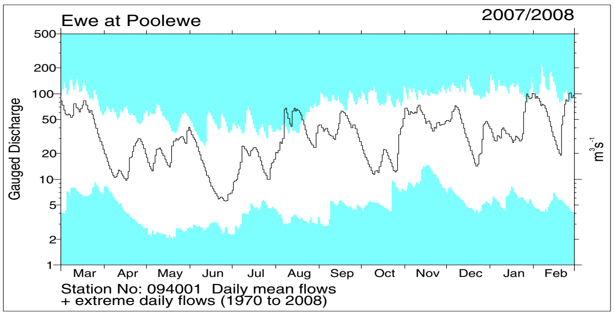
*Comparisons based on percentage flows alone can be misleading. A given percentage flow can represent extreme drought conditions in permeable catchments where flow patterns are relatively stable but be well within the normal range in impermeable catchments where the natural variation in flows is much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

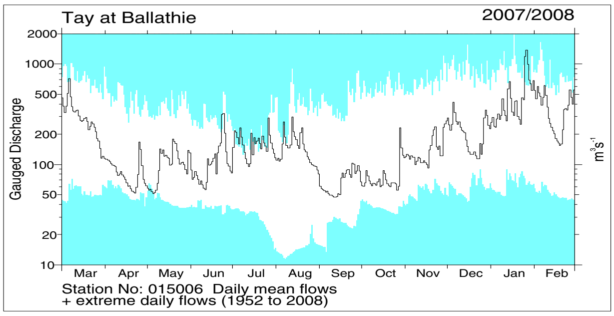


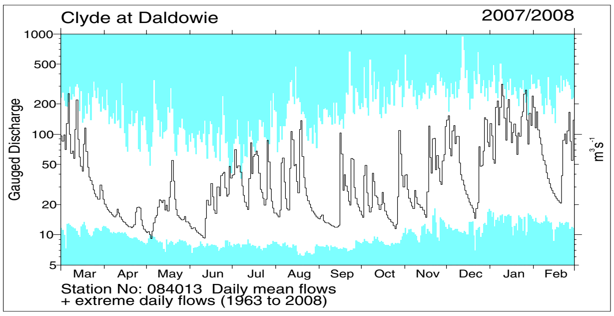


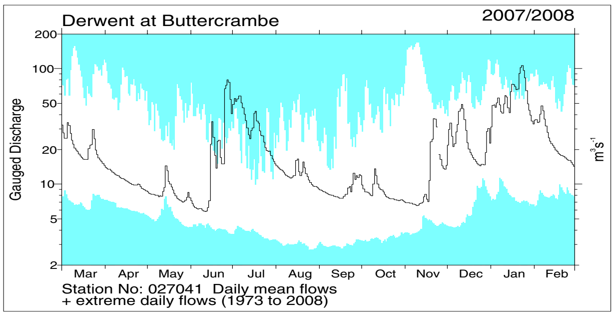


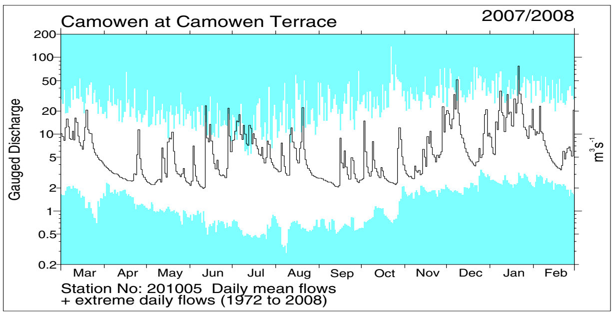


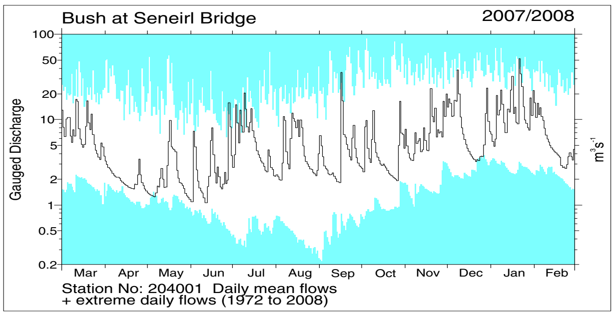








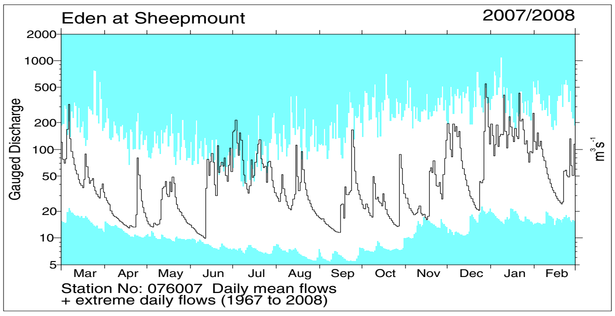


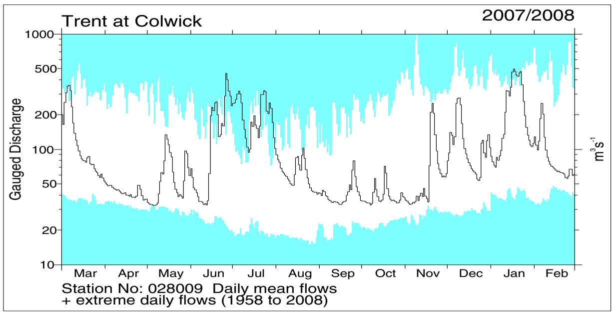


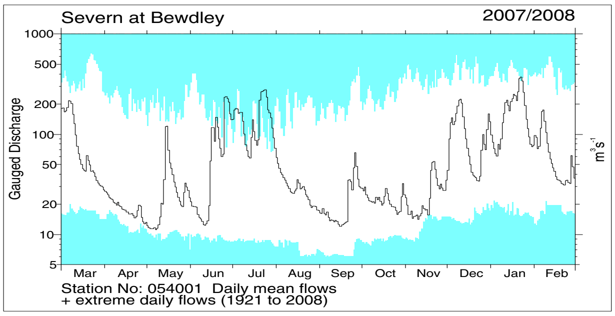
River flow hydrographs

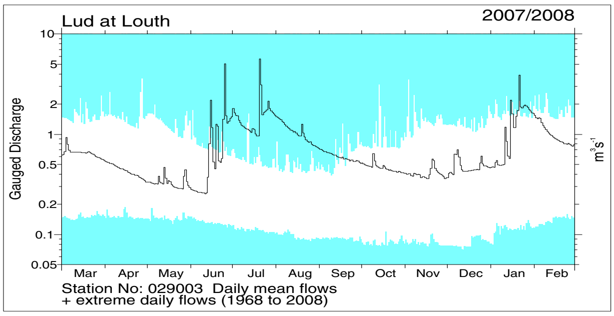
The river flow hydrographs show the daily mean flows together with the maximum and minimum daily flows prior to March 2007 (shown by the shaded areas). Daily flows falling outside the maximum/minimum range are indicated where the bold trace enters the shaded areas.

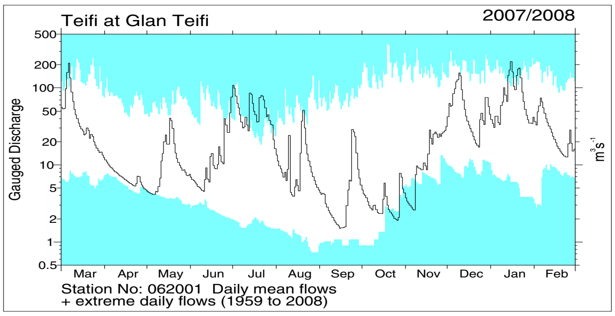
River flow . . . River flow . . .

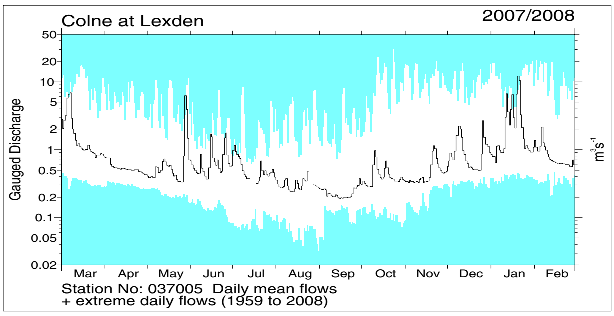


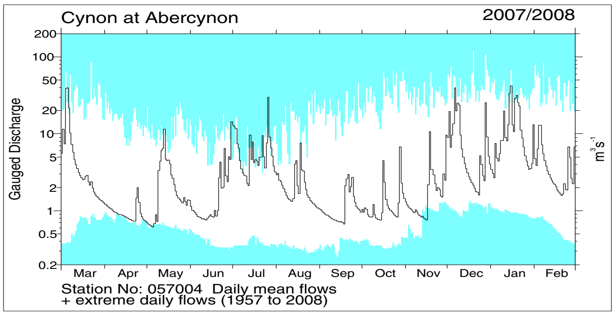


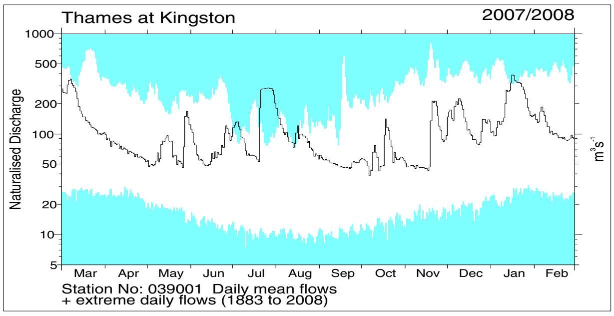


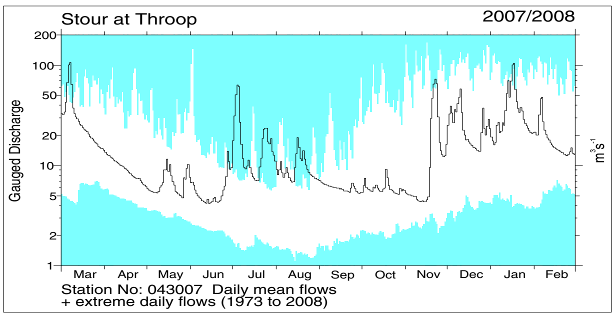


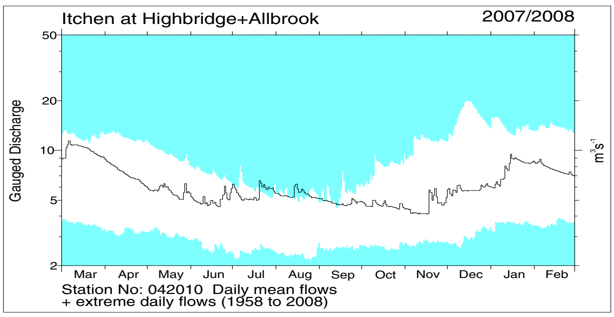












Notable runoff accumulations (a) December 2007 - February 2008, (b) March 2007 - February 2008

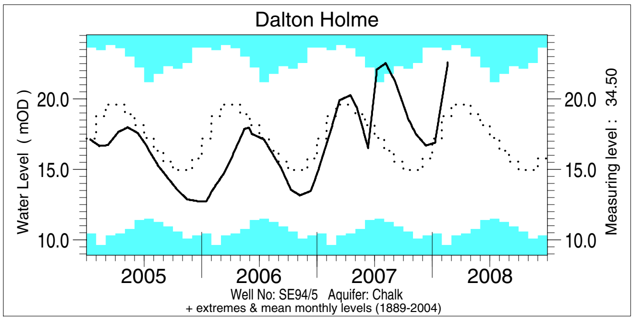
	River	%lta	Rank
a)	Dee (Park)	130	35/36
	Tyne (Spilmersford)	160	41/43
	Tweed (Norham)	139	48/48
	Whiteadder	136	36/39
	Wharfe	156	50/53
	Kenwyn	54	4/40
	Ribble	149	45/48
	Lune	147	43/46

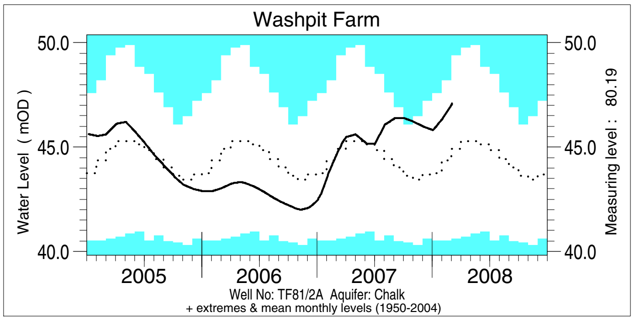
	River	%lta	Rank
b)	Ness	124	32/35
	Dover Beck	190	32/32
	Lud	171	39/39
	Witham	159	47/48
	Bedford Ouse	164	73/75
	Thames (nat)	142	116/125
	Kennet	135	44/46

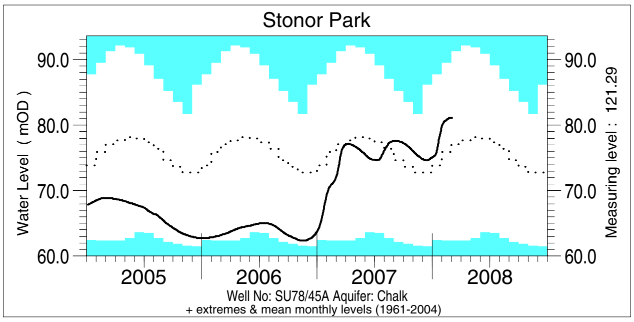
River	%lta	Rank
Lambourn	149	44/45
Coln	166	43/44
Avon (Evesham)	159	70/71
Teme	152	36/37
Ewe	121	33/37
Naver	124	29/30

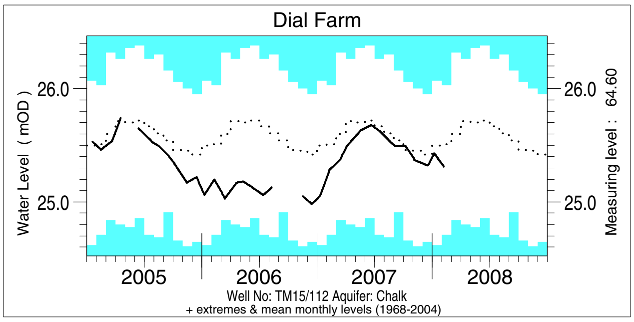
lta = long term average
Rank 1 = lowest on record

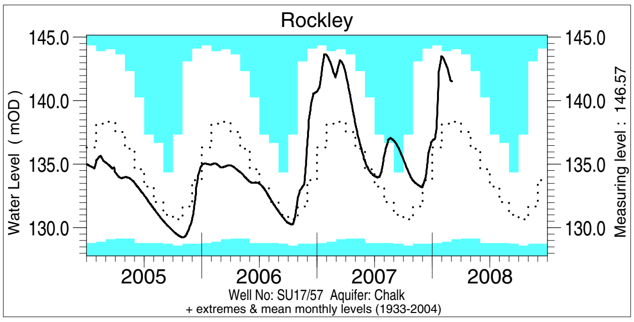
Groundwater . . . Groundwater

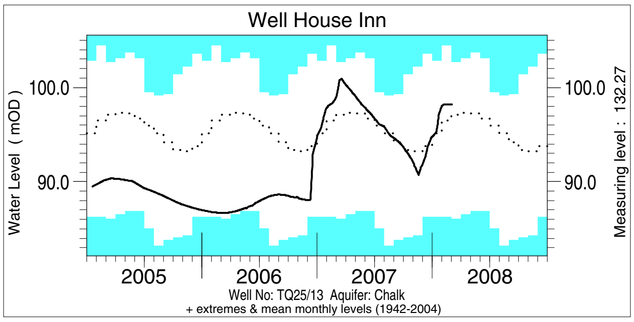


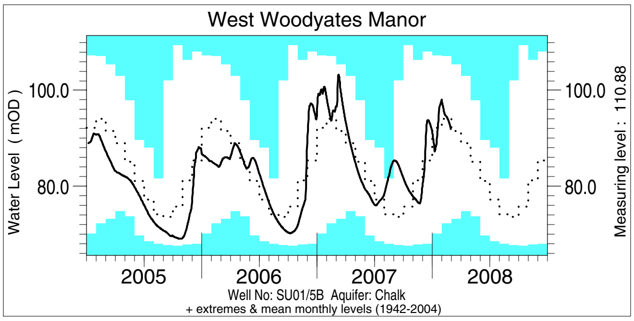


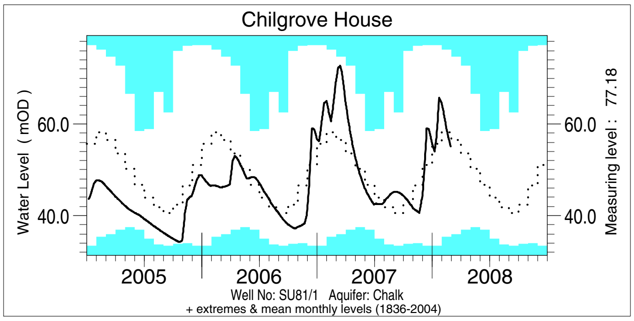


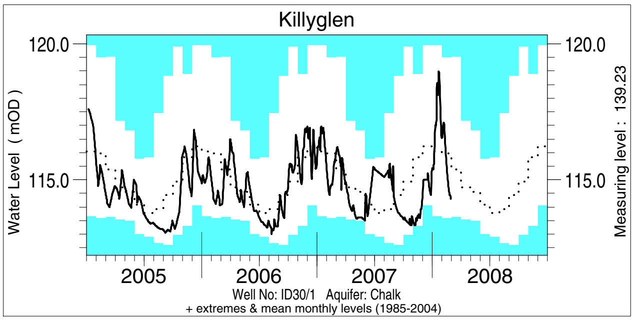


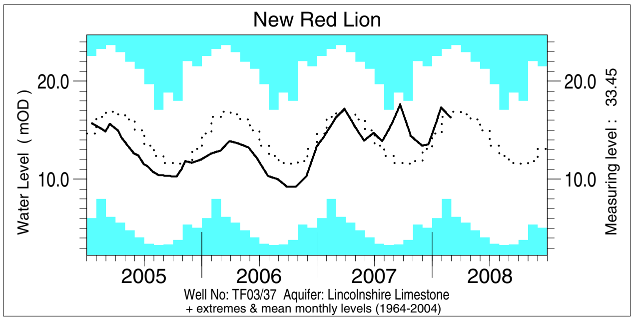






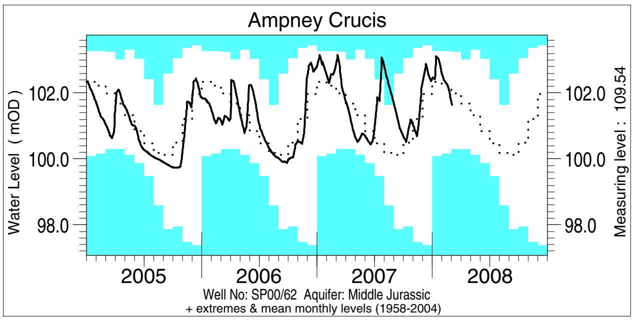


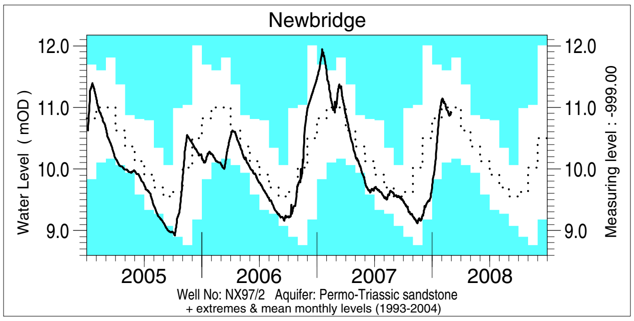


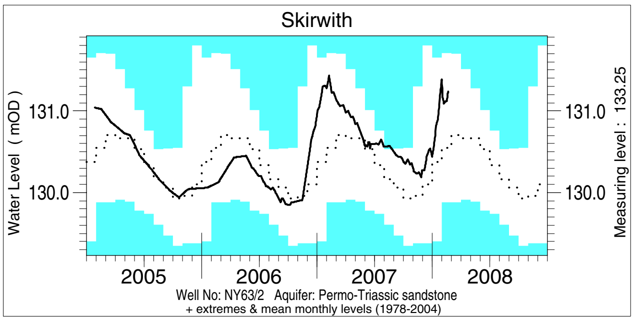


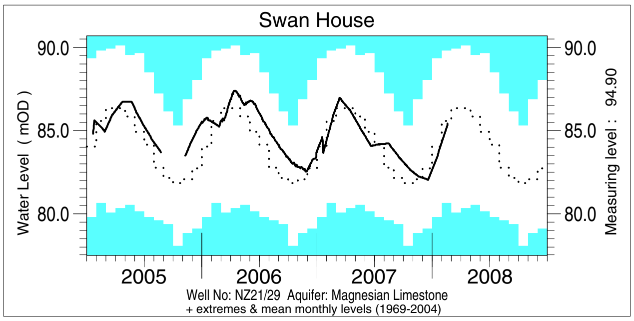
Groundwater levels normally rise and fall with the seasons, reaching a peak in the spring following replenishment through the winter (when evaporation losses are low and soil moist). They decline through the summer and early autumn. This seasonal variation is much reduced when the aquifer is confined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

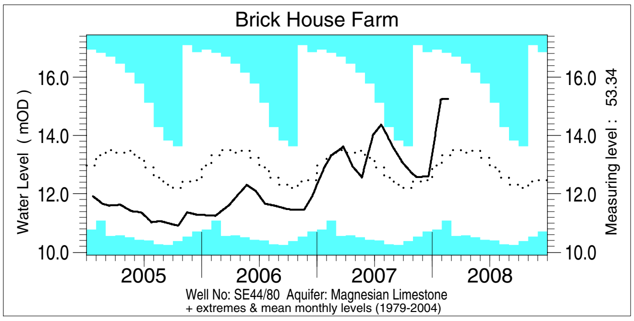
Groundwater . . . Groundwater

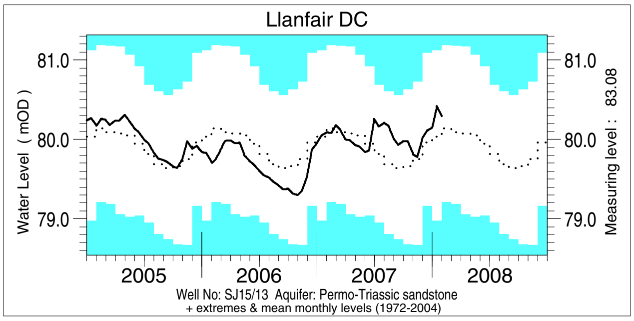


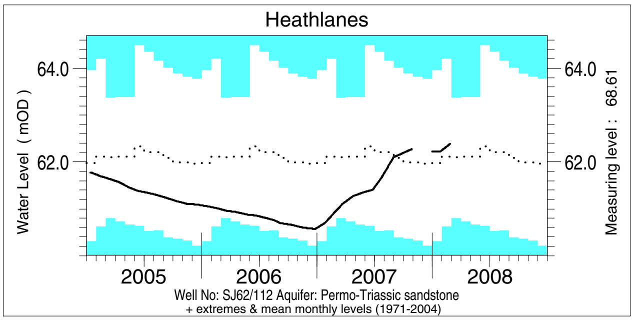


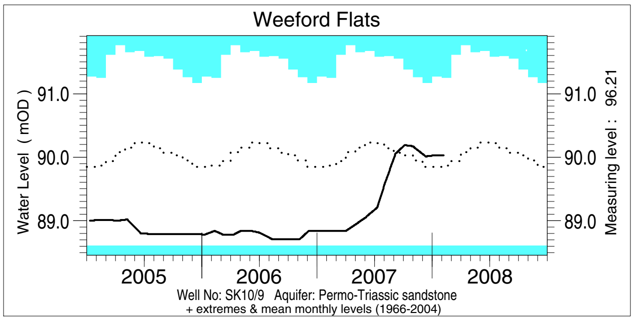


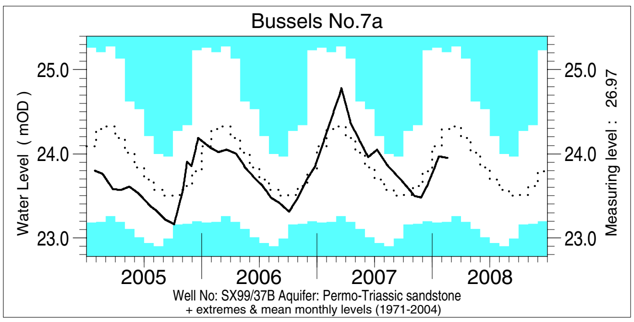


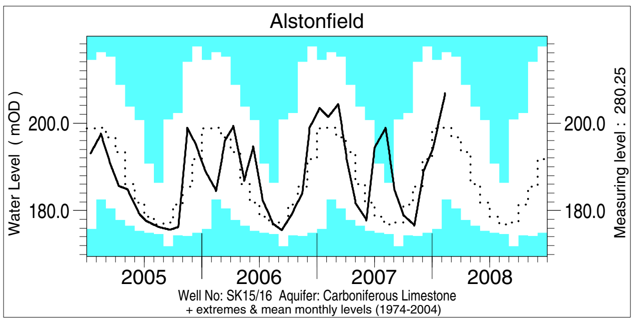












Groundwater levels February / March 2008

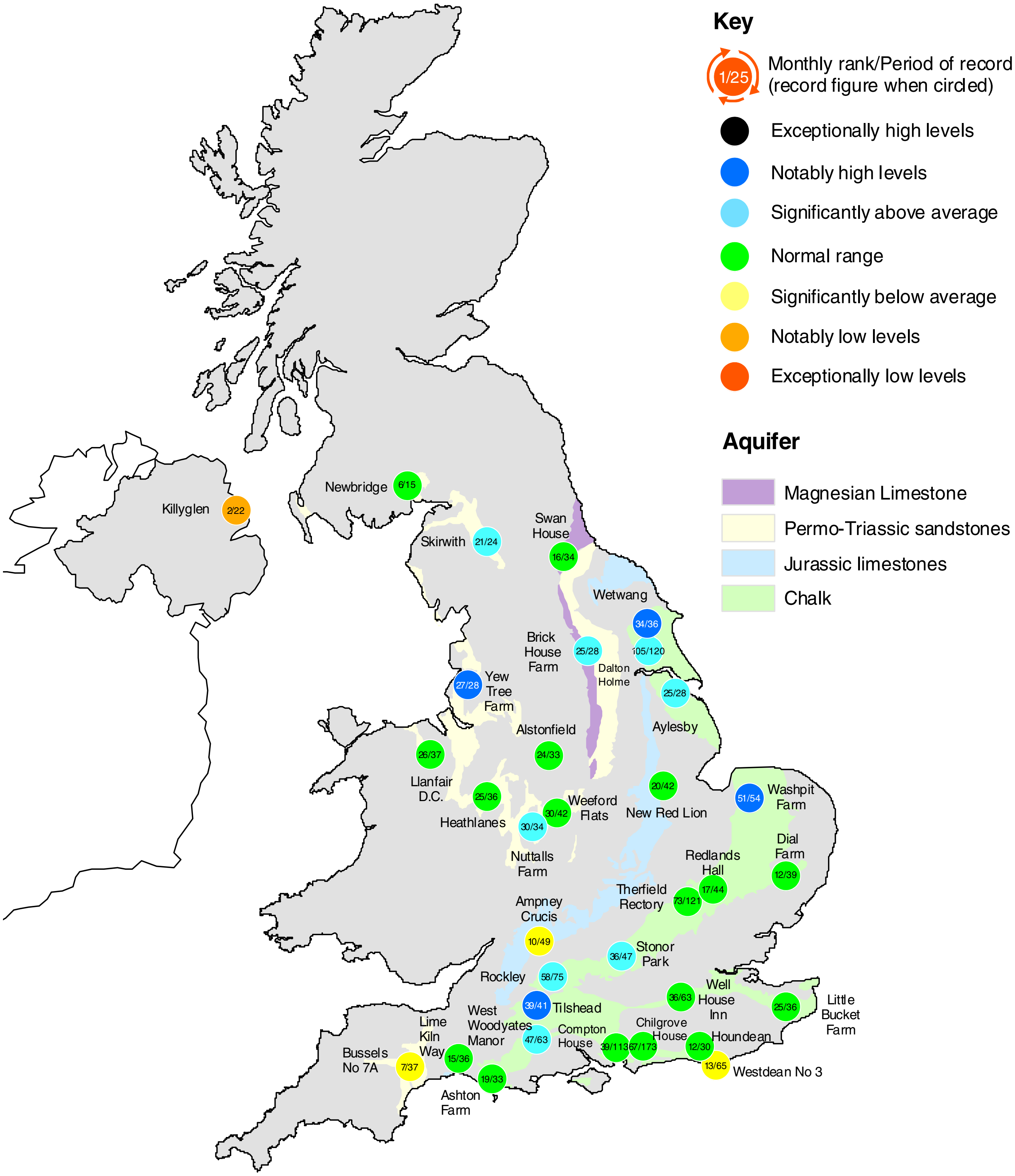
Borehole	Level	Date	Mar. av.
Dalton Holme	22.60	19/02	18.66
Washpit Farm	47.09	04/03	44.38
Stonor Park	81.12	03/03	75.41
Dial Farm	25.31	07/02	25.49
Rockley	141.52	03/03	138.29
Well House Inn	98.20	03/03	96.26
West Woodyates	91.93	29/02	93.14

Borehole	Level	Date	Mar. av.
Chilgrove House	55.04	28/02	57.56
Killyglen	114.31	29/02	115.61
New Red Lion	16.27	28/02	16.40
Ampney Crucis	101.64	03/03	102.21
Newbridge	10.92	01/03	10.94
Skirwith	131.24	21/02	130.63
Swan House	85.40	19/02	85.47

Borehole	Level	Date	Mar. av.
Brick House Farm	15.25	21/02	13.18
Llanfair DC	80.29	01/02	80.05
Heathlanes	62.39	26/02	61.98
Weeford Flats	90.03	06/02	89.65
Bussels No.7a	23.95	19/02	24.31
Alstonfield	206.83	11/02	198.65

Levels in metres above Ordnance Datum

Groundwater . . .Groundwater



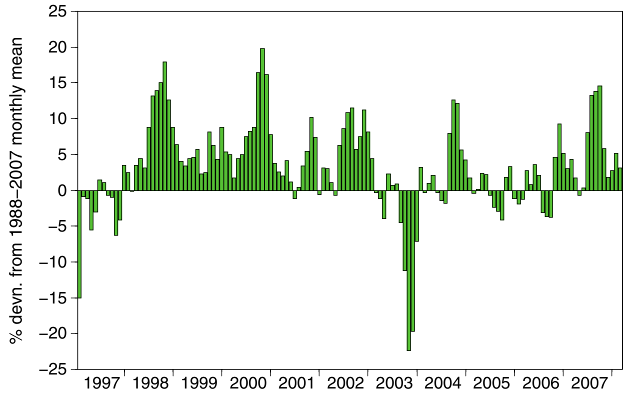
Groundwater levels - February 2008

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. They need to be interpreted with caution especially when groundwater levels are changing rapidly or when comparing wells with very different periods of record. Rankings may be omitted where they are considered misleading.

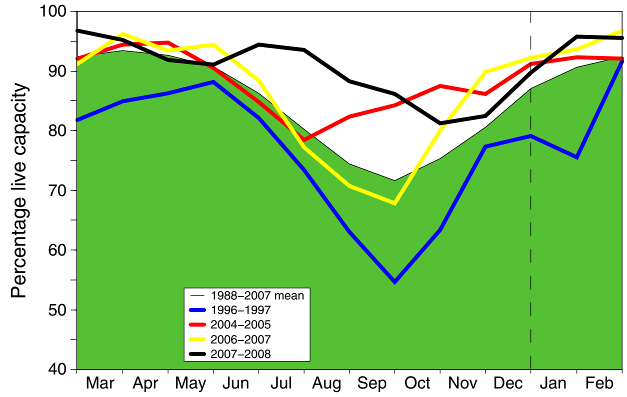
Notes: i. The outcrop areas are coloured according to British Geological Survey conventions.
ii. Recent levels for Houndean Bottom are under review.

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)	2008 Jan	Feb	Mar	Mar Anom.	Min. Mar	Year* of min.	2007 Mar	Diff 08-07
North West	N Command Zone	•	124929	87	100	**96**	3	78	1996	98	-2
	Vyrnwy		55146	99	100	**100**	6	59	1996	100	0
Northumbrian	Teesdale	•	87936	100	97	**91**	0	72	1996	97	-6
	Kielder		(199175)	(73)	(97)	**(92)**	-1	(81)	1993	(94)	-2
Severn Trent	Clywedog		44922	85	88	**92**	2	77	1996	96	-4
	Derwent Valley	•	39525	94	100	**98**	3	46	1996	100	-2
Yorkshire	Washburn	•	22035	89	98	**98**	6	53	1996	98	0
	Bradford supply	•	41407	99	100	**100**	6	53	1996	100	0
Anglian	Grafham		(55490)	(95)	(92)	**(88)**	0	(72)	1997	(95)	-7
	Rutland		(116580)	(89)	(95)	**(95)**	7	(71)	1992	(96)	-1
Thames	London	•	202406	89	90	**97**	5	83	1988	96	1
	Farmoor	•	13822	81	83	**100**	7	64	1991	97	3
Southern	Bewl		28170	74	89	**91**	6	50	2006	100	-9
	Ardingly		4685	92	100	**100**	3	77	2006	100	0
Wessex	Clatworthy		5364	100	100	**99**	2	82	1992	100	-1
	Bristol WW	•	(38666)	(94)	(99)	**(98)**	7	(65)	1992	(98)	0
South West	Colliford		28540	78	83	**85**	1	57	1997	75	10
	Roadford		34500	88	92	**91**	8	35	1996	88	3
	Wimbleball		21320	98	100	**99**	5	72	1996	100	-1
	Stithians		5205	56	76	**82**	-10	45	1992	100	-18
Welsh	Celyn and Brenig	•	131155	97	99	**100**	3	69	1996	100	0
	Brianne		62140	100	100	**99**	1	92	2004	97	2
	Big Five	•	69762	92	95	**97**	1	85	1988	99	-2
	Elan Valley	•	99106	99	99	**99**	1	88	1993	100	-1
Scotland(E)	Edinburgh/Mid Lothian	•	97639	85	100	**100**	6	73	1999	100	0
	East Lothian	•	10206	100	100	**100**	1	91	1990	100	0
Scotland(W)	Loch Katrine	•	111363	75	98	**99**	4	86	2005	100	-1
	Daer		22412	100	100	**99**	0	94	2004	98	1
	Loch Thom	•	11840	80	96	**96**	-3	90	2004	98	-2
Northern Ireland	Total+	•	67270	82	94	**90**	19	81	2004	90	0
	Silent Valley	•	20634	83	99	**93**	10	57	2002	97	-4

() 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 1988-2006 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.

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 and Hydrology Wallingford (formerly the Institute of Hydrology - IH) and the British Geological Survey (BGS). Financial support for the production of the monthly Hydrological Summaries is provided by the Department for Environment, Food and Rural Affairs (Defra), the Environment Agency (EA), the Scottish Environment Protection Agency (SEPA), the Rivers Agency (RA) in Northern Ireland, and the Office of Water Services (OFWAT).

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 Department of the Environment (NI). 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 the Northern Ireland Water Service.

The National River Flow Archive (maintained by CEH Wallingford) and the National Groundwater Level Archive (maintained by BGS) provide the historical perspective within which to examine contemporary hydrological conditions.

Rainfall

Most rainfall data are provided by the Met Office (see opposite). To allow better spatial differentiation the rainfall data for Britain are presented for the regional divisions of the precursor organisations of the EA and SEPA. Following the discontinuation of the Met Office's CARP system in July 1998, the areal rainfall figures have been derived using several procedures, including initial estimates based on MORECS*. Recent figures have been produced by the Met Office, National Climate Information Centre (NCIC), using a technique similar to CARP. A significant number of additional monthly raingauge totals are provided by the EA and SEPA to help derive the contemporary regional rainfalls. Revised monthly national and regional rainfall totals for the post-1960 period (together with revised 1961-90 averages) were made available by the Met Office in 2004; these have been adopted by the NHMP. As with all regional figures based on limited raingauge networks the monthly tables and accumulations (and the return periods associated with them) should be regarded as a guide only.

NATURAL ENVIRONMENT RESEARCH COUNCIL

*MORECS is the generic name for the Met Office services involving the routine calculation of evaporation and soil moisture throughout Great Britain.

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

Subscription

Subscription to the Hydrological Summaries costs £48 per year. Orders should be addressed to:

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Selected text and maps are available on the WWW at
http://www.nerc-wallingford.ac.uk/ih/nrfa/index.htm
Navigate via Water Watch

03/08