Hydrological Summary
for the United Kingdom

January 2008

General

January was a mostly mild, very windy and notably wet month. Provisional data suggest that it was, marginally, the wettest January since 1928 for the UK as a whole. A series of vigorous Atlantic frontal systems maintained catchments in a saturated state. Flood risk remained high throughout the greater part of January as many rivers were in sustained spate; January runoff totals exceeded long term maxima for a significant minority of index gauging stations. Notably however, there were few major flood events. Inflows to most major reservoirs were abundant, in Scotland especially, and despite some drawdown to moderate flood risk (e.g. in Wales), overall reservoir stocks increased appreciably. Early February stocks for E&W were the highest (for the time of year) since 2000 and only Stithians, in Cornwall, was (marginally) >10% below capacity. After a sequence of months with modest groundwater replenishment, recharge rates in January were notably high and groundwater levels in most index wells exceed the seasonal average – notably so in some areas. The general water resources outlook is very healthy, but in the event of a wet late winter, there will be a continuing fluvial flood risk (with low possibility of localised groundwater flooding in a few vulnerable areas).

Rainfall

The beginning and end of the month apart, synoptic patterns during January were dominantly cyclonic - with a sequence of vigorous frontal systems bringing sustained rainfall, and often damaging gales, across most of the country. Notable rainfall totals were common: Tyndrum reported 88mm on the 8/9th whilst Capel Curig registered a similar total in 24 hrs and Inveruglas reported >50mm on the 8th, 24th & 25th. Snow accumulations were significant from early in the month: on the 4th a (latterly) rare avalanche warning was issued for Helvellyn and substantial snow depth characterised much of the Cairngorms by late in the second week. Orographic enhancement is evident in the precipitation totals for January with parts of North Wales, the Pennines and Scottish Highlands registering more than twice the January average. Northern Ireland eclipsed its previous maximum January rainfall in a series from 1914 and, whilst a few areas (e.g. Cornwall and south Devon) reported below average rainfall, Great Britain registered it the wettest January for 80 years. More remarkably, at the national scale, January was the wettest month since December 1929. In much of the English Lowlands January was the first month with above average rainfall since last July, and for much of Scotland since August. The net result of dramatic seasonal contrasts in rainfall patterns over the last 12 months is that rainfall accumulations are appreciably above average in all regions.

River flows

Most rivers were in spate in late December and, after brief respite, January was characterised by sustained high flows with notable peaks in mid-month (in much of southern Britain and Northern Ireland) and in the final week (in northern Britain); snowmelt contributing significantly to runoff rates in many upland catchments. Rivers registering new maximum January flows were widely distributed (from the Mole, at Kinnersley Manor, on the 15th to the Leven on the 21st. Flood warnings were very widespread over this period – and again later in Scotland where many rivers, including the Ness, Tay, Forth and Ewe remained close to, or above, previous late January maximum daily flows. With the exception of a few southern catchments, in Cornwall particularly, January runoff totals were above average, exceptionally so in a broad swathe from Yorkshire to the lower Clyde basin, where many new maximum January runoff totals were established. For the Wharfe, the January runoff was the highest for *any* month in a series from 1955. Such exceptional runoff contributed to the 2nd highest (after Feb 1990) monthly outflow, on record for Great Britain – in a series from 1961. Significantly however, severe flooding was largely avoided – a tribute both to the natural drainage capability of our rivers (and floodplains) and the flood mitigation measures in place across the country. Despite the dry autumn of 2007, accumulated runoff totals in the 6-12 month timespan are very healthy in almost all regions.

Groundwater

January rainfall totals across most major aquifer outcrop areas were in the 120-200% range. With soils close to saturation entering 2008 in almost all western and central aquifers, infiltration through January was abundant and, following sustained mid-month precipitation, the 2007/08 recharge season was initiated in even the most easterly aquifer units. The impact of this major pulse of winter recharge will not have registered on the hydrograph traces of those index wells and boreholes which reported early in January. At the responsive Rockley well (in the western Chalk), levels had risen around 10 metres over the four weeks to early February, and currently stand close to the long term maxima. Brisk groundwater level increase also typified other Chalk and limestone wells (e.g. Brick House Farm in the Magnesian Limestone of N Yorkshire) but elsewhere recoveries were more modest – generally a reflection of the significant recharge volumes remaining in the unsaturated zone. After a year of exceptionally erratic recharge patterns, January groundwater levels were well above average in a broad zone from Dorset to Lincolnshire (extending eastwards to Norfolk). Elsewhere groundwater levels are mostly in the normal range. Spring outflows increased markedly over the month in many areas and, by late January, a number of high level springs were maintaining substantial outflows (e.g. in Hampshire). Correspondingly, the return of anticyclonic conditions in early Feb, and the associated marked reduction in infiltration rates, was particularly welcome – moderating the local risk of groundwater flooding.

Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

British Geological Survey
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Rainfall . . . Rainfall . . .

Met Office

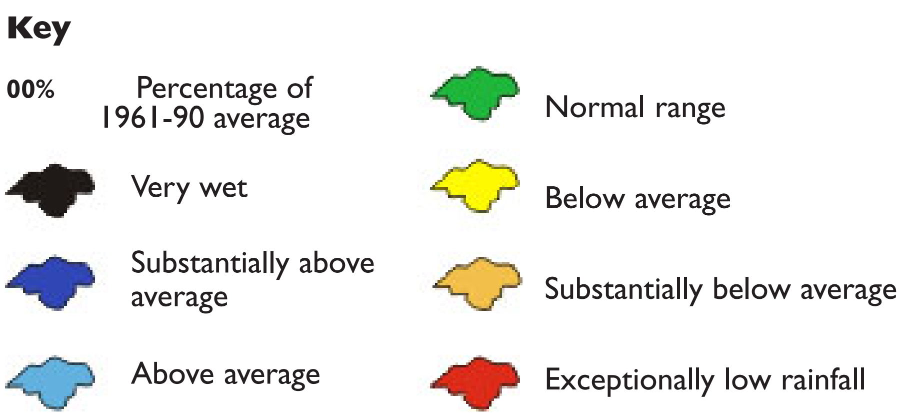
Rainfall accumulations and return period estimates

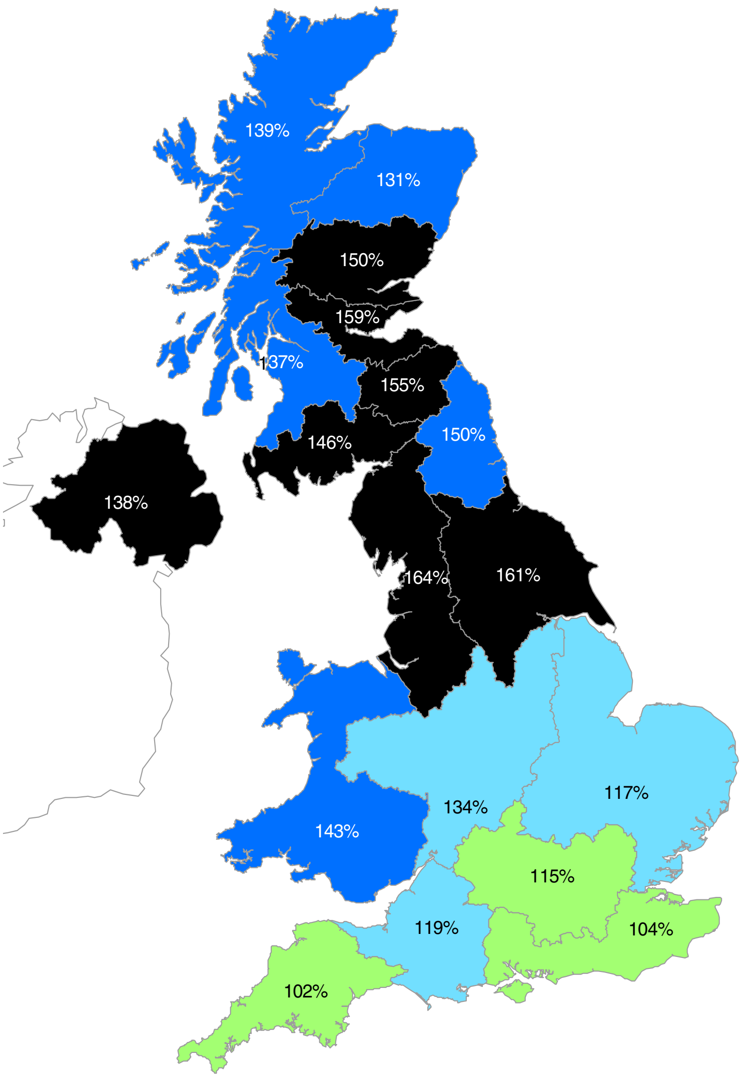
Area	Rainfall	Jan 2008	Dec 07- Jan 08	RP	Aug 07- Jan 08	RP	May 07- Jan 08	RP	Feb 07- Jan 08	RP
England & Wales	**mm**	**148**	**248**		**480**		**875**		**1051**	
	%	**164**	**134**	**5-10**	**93**	**2-5**	**124**	**10-20**	**116**	**5-15**
North West	mm	**233**	402		744		1166		1370	
	%	**195**	164	50-80	103	2-5	120	10-20	113	5-10
Northumbrian	mm	**156**	249		460		800		935	
	%	**186**	150	10-20	94	2-5	118	5-10	108	2-5
Severn Trent	mm	**122**	200		375		818		970	
	%	**171**	134	5-10	89	2-5	137	40-60	126	30-50
Yorkshire	mm	**174**	261		452		863		997	
	%	**219**	161	15-25	97	2-5	133	20-35	119	10-20
Anglian	mm	**79**	125		299		628		733	
	%	**154**	117	2-5	93	2-5	133	20-30	121	5-15
Thames	mm	**96**	158		366		705		849	
	%	**146**	115	2-5	95	2-5	129	5-15	121	5-10
Southern	mm	**109**	171		391		702		868	
	%	**134**	104	2-5	85	2-5	114	2-5	111	2-5
Wessex	mm	**126**	220		457		820		1001	
	%	**140**	119	2-5	93	2-5	124	5-10	117	5-10
South West	mm	**145**	286		561		1007		1324	
	%	**104**	102	2-5	80	5-10	109	2-5	111	2-5
Welsh	mm	**244**	429		748		1243		1511	
	%	**170**	143	5-15	93	2-5	118	5-10	112	2-5
Scotland	**mm**	**287**	**431**		**922**		**1294**		**1620**	
	%	**185**	**139**	**10-20**	**104**	**2-5**	**112**	**5-15**	**110**	**5-15**
Highland	mm	**334**	522		1178		1582		1989	
	%	**185**	139	5-10	111	5-10	116	10-20	114	10-20
North East	mm	**175**	263		621		988		1200	
	%	**170**	131	10-20	105	2-5	122	20-30	117	20-30
Tay	mm	**315**	419		768		1149		1452	
	%	**216**	150	20-30	101	2-5	114	5-10	113	5-10
Forth	mm	**274**	369		715		1053		1294	
	%	**232**	159	20-35	105	2-5	117	5-10	113	5-10
Tweed	mm	**200**	306		577		953		1130	
	%	**199**	155	30-45	100	2-5	121	10-20	113	5-10
Solway	mm	**285**	440		855		1228		1518	
	%	**188**	146	15-25	98	2-5	108	2-5	106	2-5
Clyde	mm	**343**	512		1057		1430		1812	
	%	**182**	137	5-10	98	2-5	103	2-5	103	2-5
Northern Ireland	**mm**	**194**	**311**		**623**		**973**		**1170**	
	%	**167**	**138**	**20-30**	**97**	**2-5**	**113**	**5-10**	**107**	**2-5**

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

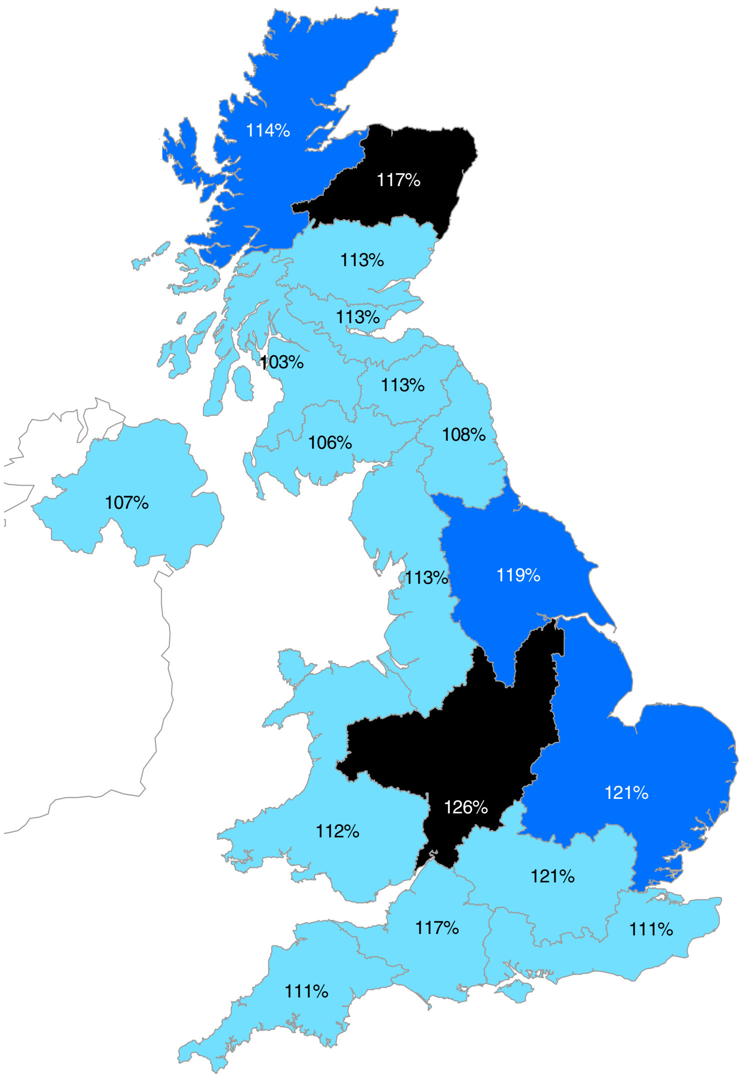
Important note: Figures in the above table may be quoted provided their source is acknowledged (see page 12). Where appropriate, specific mention must be made of the uncertainties associated with the return period estimates. The RP estimates are based on data provided by the Met Office and derived following 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 August 2007 are provisional.

Rainfall . . . Rainfall . . .





December 2007 - January 2008

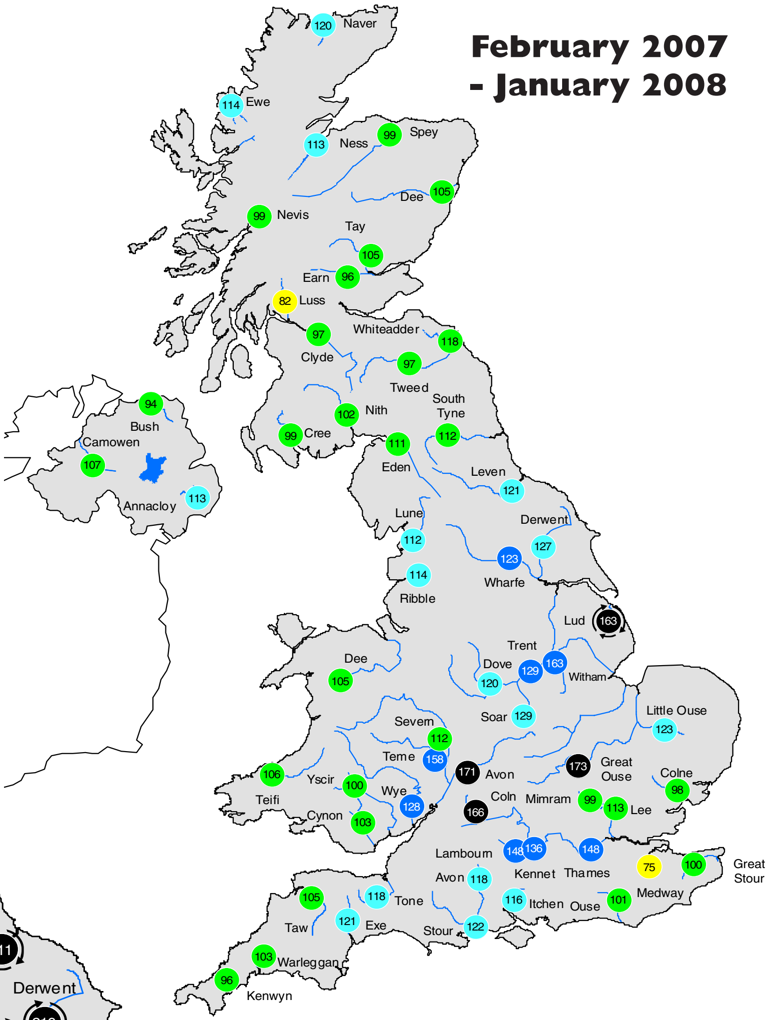


February 2007 - January 2008

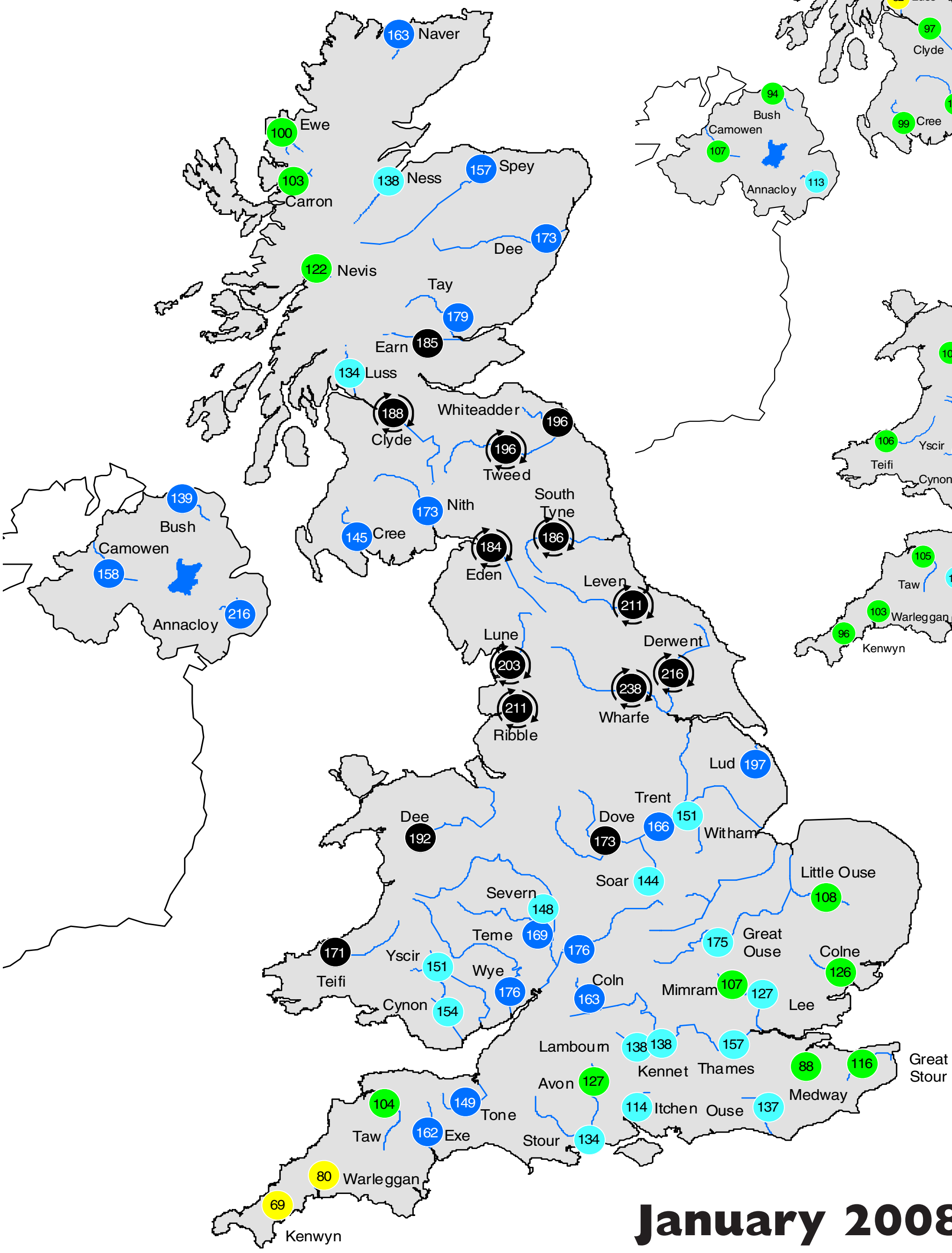
Rainfall accumulation map

Primarily as a consequence of the wet January, two-month rainfall accumulations are well above average in almost all regions; nationally, the Dec-Jan rainfall is the 5th highest since 1929/30 - but 2006/07 was wetter. Similarly, the 12-month (Feb-Jan) rainfall total was higher in 2006/07 but 2007/08 still ranks in the wettest ten in a series from 1914.

River flow . . . River flow . . .



February 2007 - January 2008



January 2008

Key

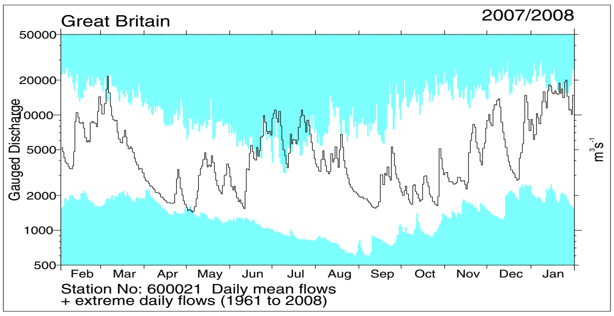
- % of long-term average (record figure when circled)
- Exceptionally high flow
- Notably high flow
- Above normal
- Normal range
- Below normal
- Notably low flow
- Exceptionally low flow

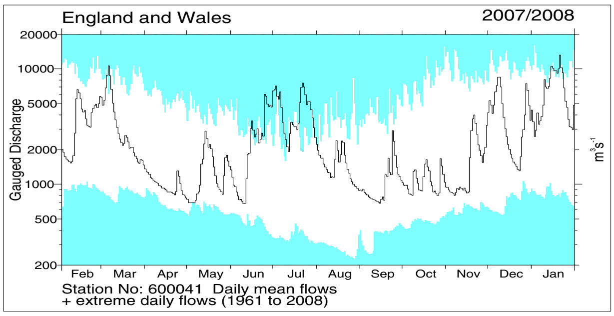
*Based on ranking of the monthly flow**

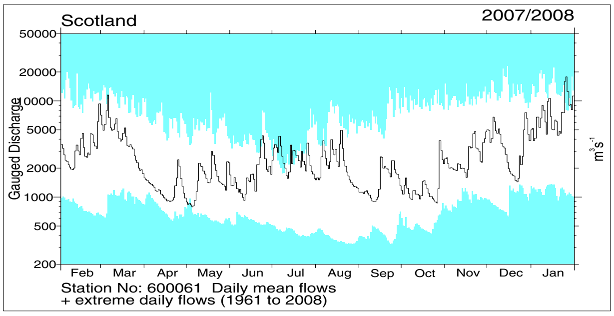
River flows

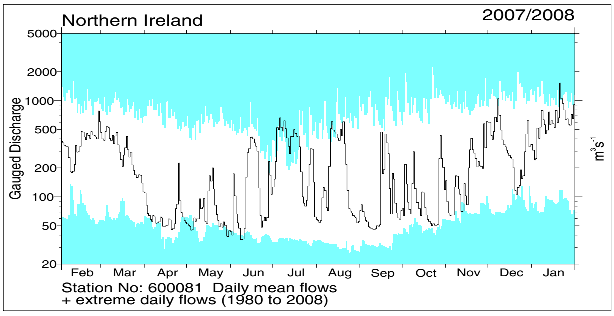
*Comparisons based on percentage flows alone can be misleading. A given percentage flow can represent extreme drought conditions in permeable catchments where flow patterns are relatively stable but be well within the normal range in impermeable catchments where the natural variation in flows is much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

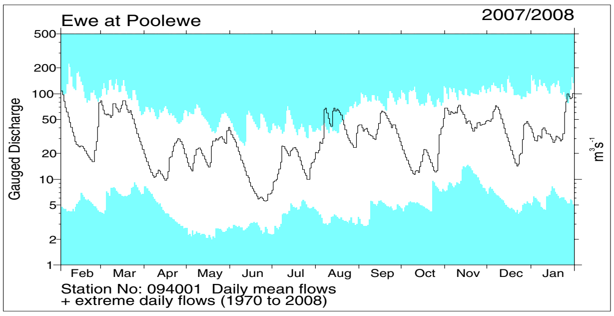
River flow . . . River flow . . .

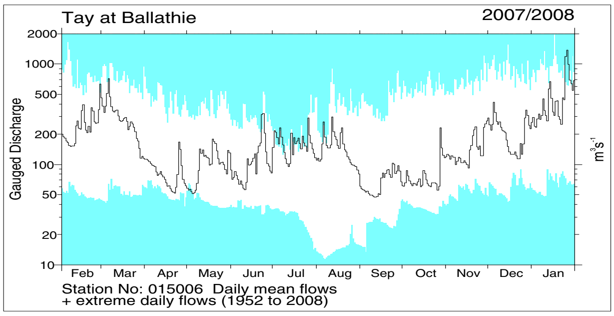


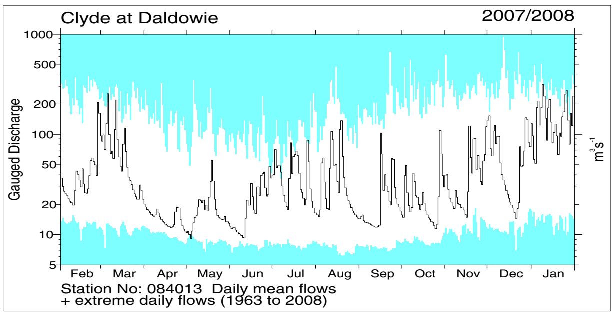


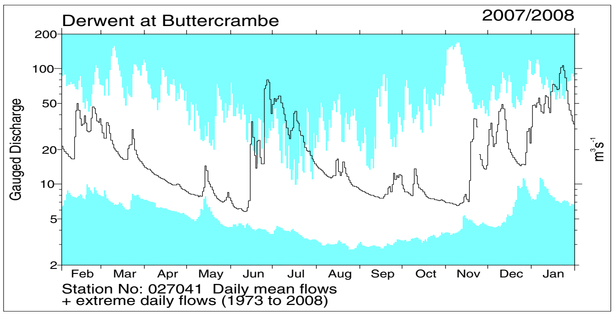


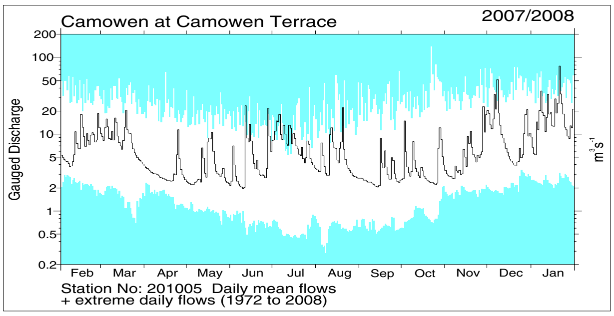


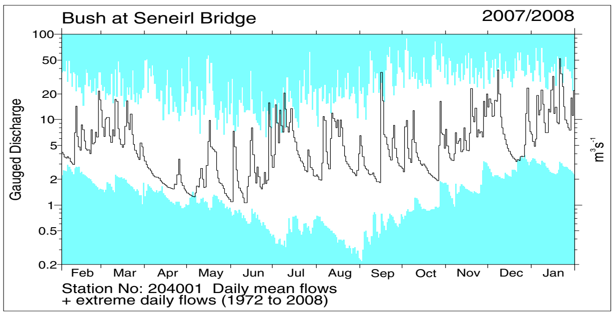








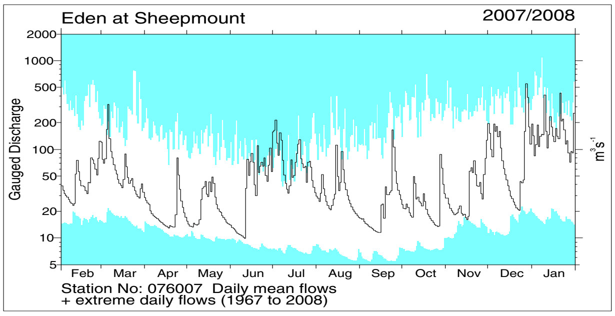


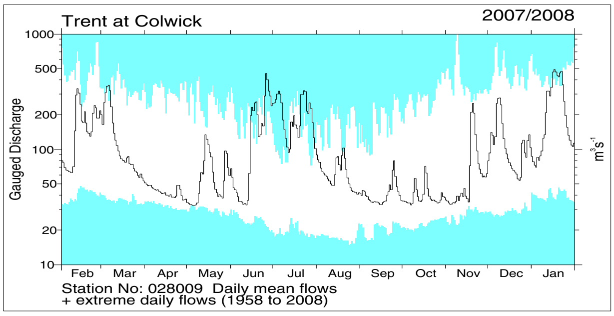


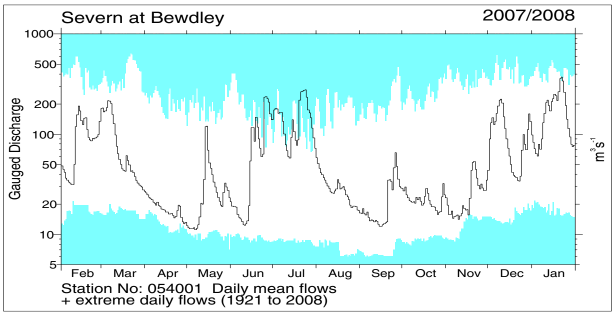
River flow hydrographs

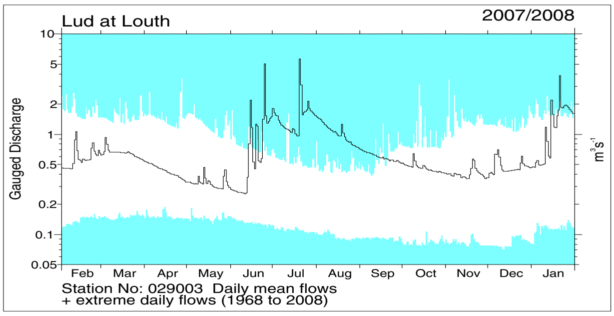
The river flow hydrographs show the daily mean flows together with the maximum and minimum daily flows prior to February 2007 (shown by the shaded areas). Daily flows falling outside the maximum/minimum range are indicated where the bold trace enters the shaded areas.

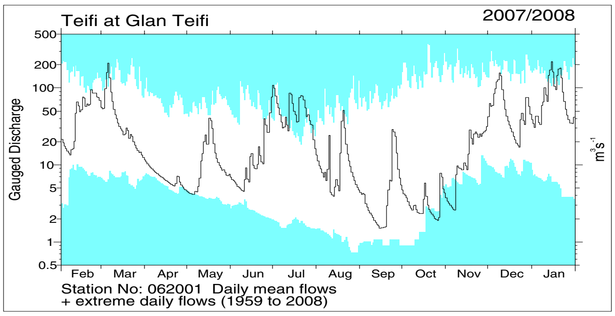
River flow . . . River flow . . .

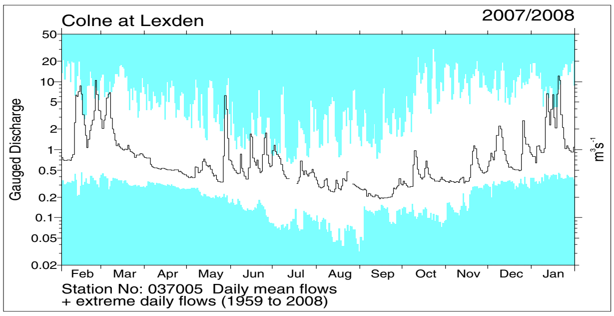


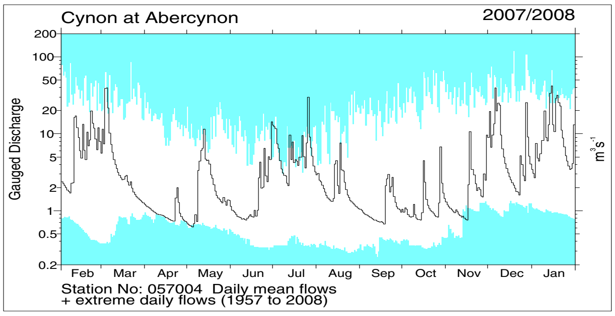


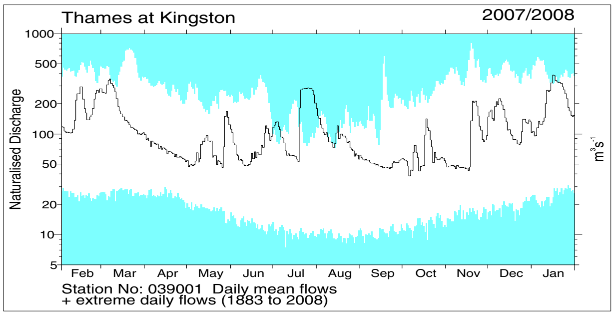


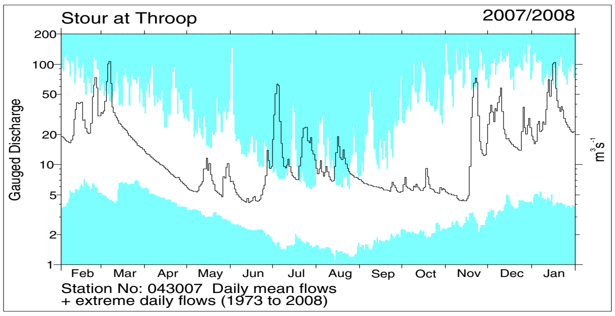


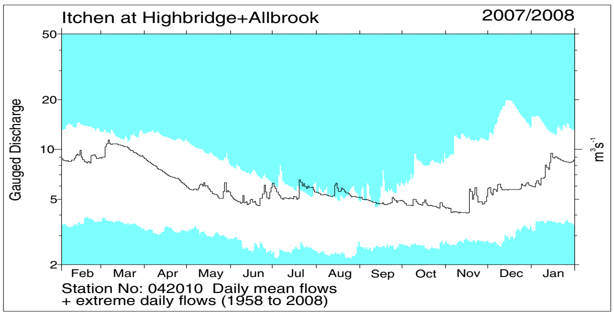










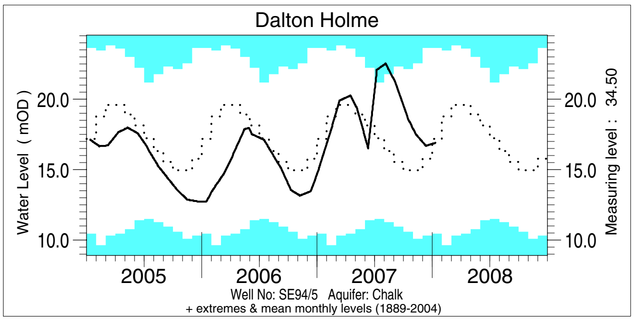


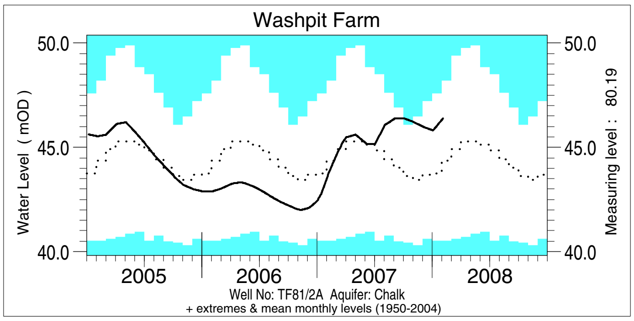
Notable runoff accumulations (a) December 2007 - January 2008, (b) February 2007 - January 2008

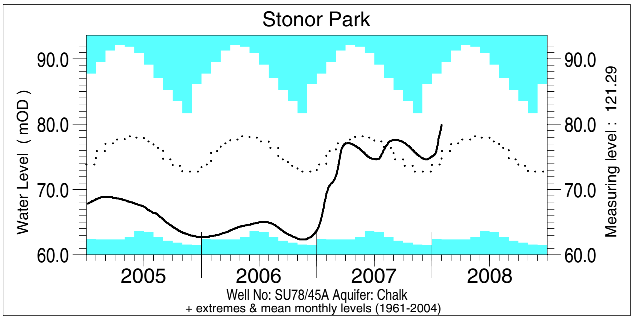
	River	%lta	Rank	River	%lta	Rank		River	%lta	Rank
a)	Dee (Park)	132	35/36	Ribble	170	48/48	b)	Dover Beck	197	31/31
	Tyne (Spilmersford)	187	42/43	Lune	164	45/46		Lud	163	39/39
	Tweed (Norham)	149	46/48	Eden	153	39/41		Bedford Ouse	173	74/75
	S Tyne	150	43/46	Camowen	131	32/35		Coln	166	43/44
	Wharfe	177	53/53	Lagan	140	33/35		Avon (Evesham)	171	70/71
	Derwent	162	45/47	Annacloy	149	27/29		Teme	158	36/37
	Dove	144	44/47					Luss	82	5/29
	Torne	161	33/36					L Bann	80	4/27

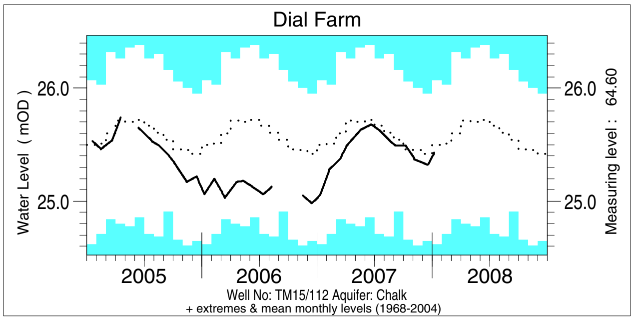
lta = long term average
Rank 1 = lowest on record

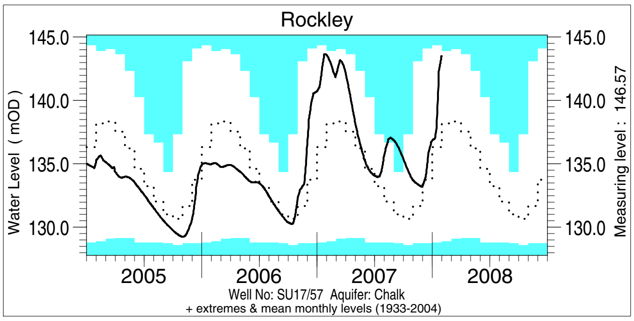
Groundwater . . . Groundwater

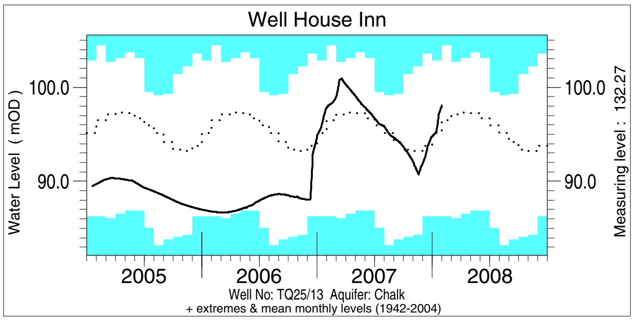


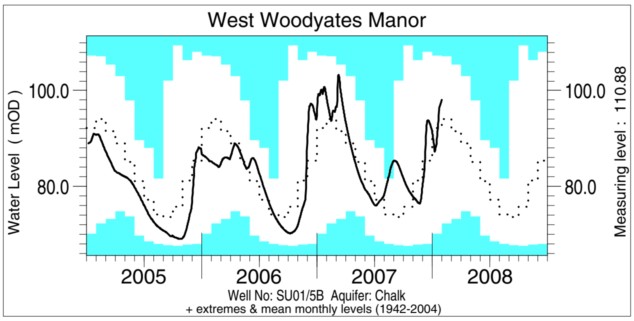


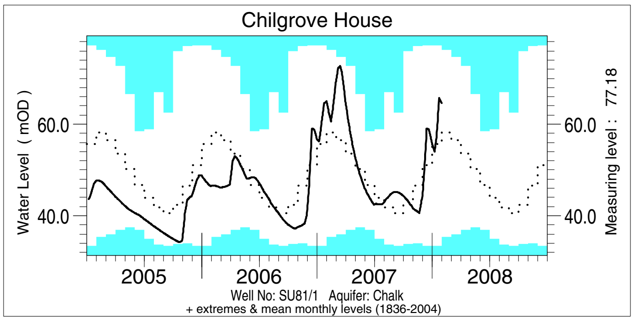


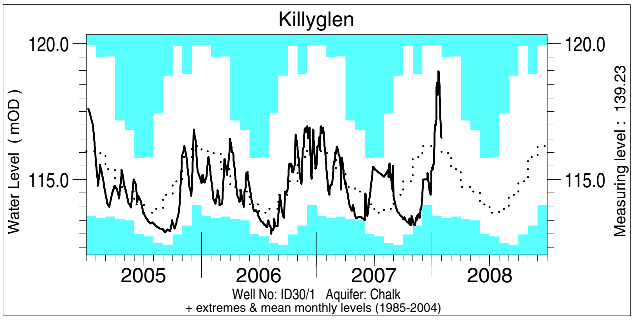


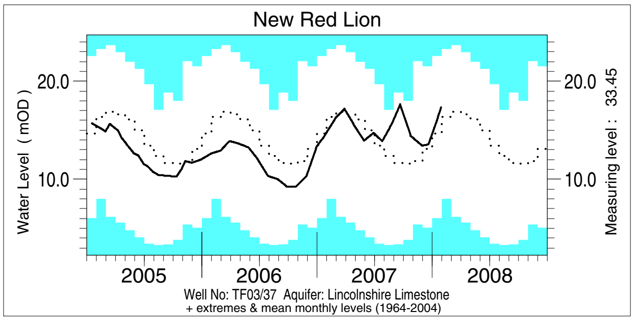






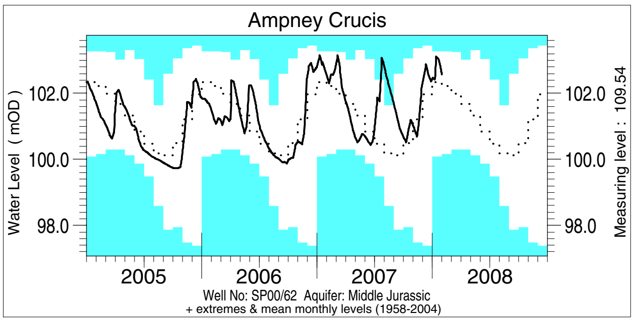


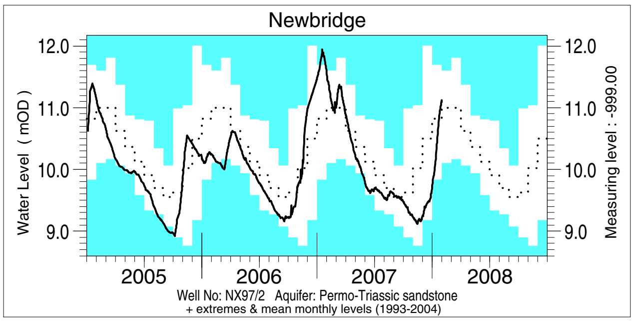


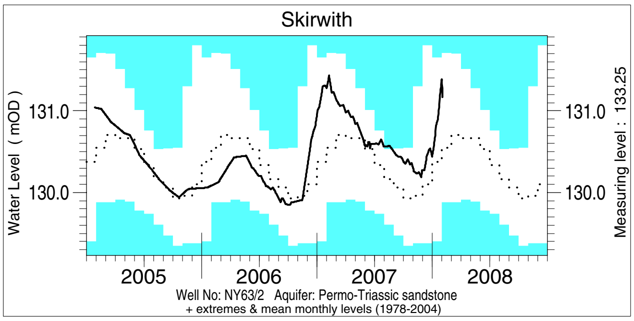


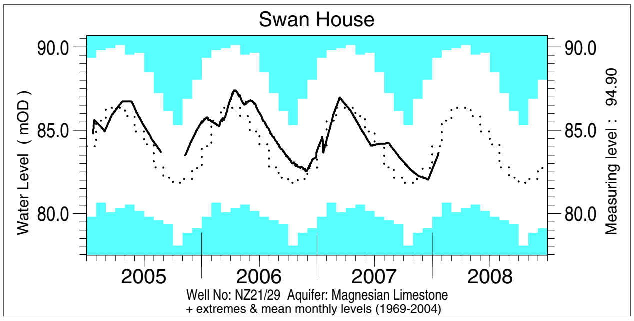
Groundwater levels normally rise and fall with the seasons, reaching a peak in the spring following replenishment through the winter (when evaporation losses are low and soil moist). They decline through the summer and early autumn. This seasonal variation is much reduced when the aquifer is confined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

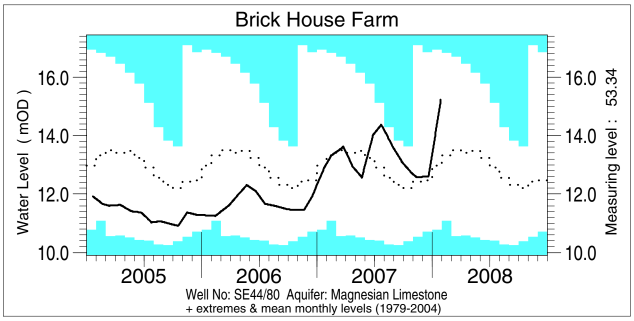
Groundwater . . . Groundwater

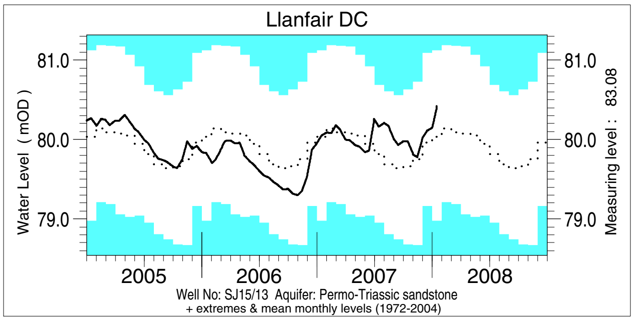


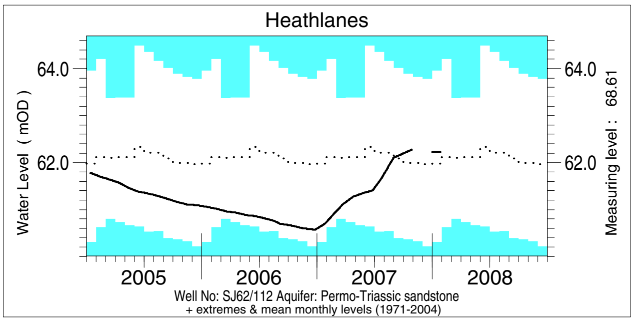


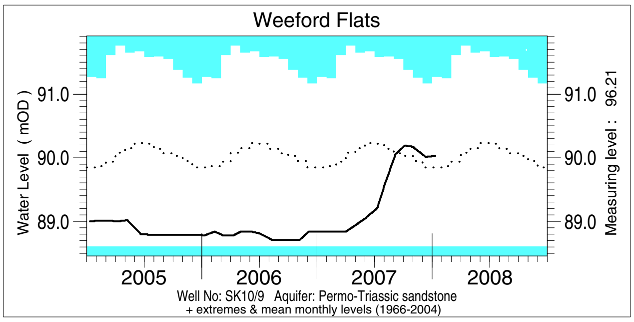


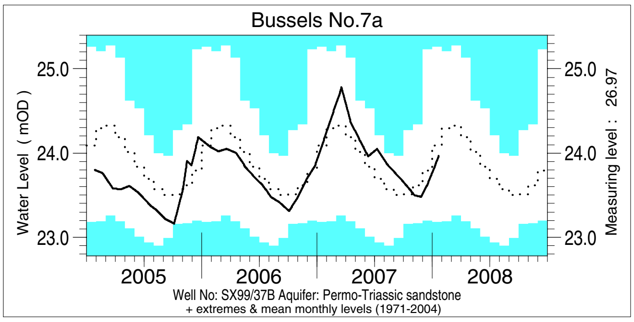


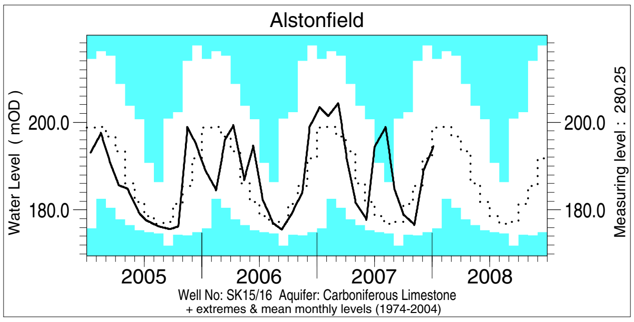








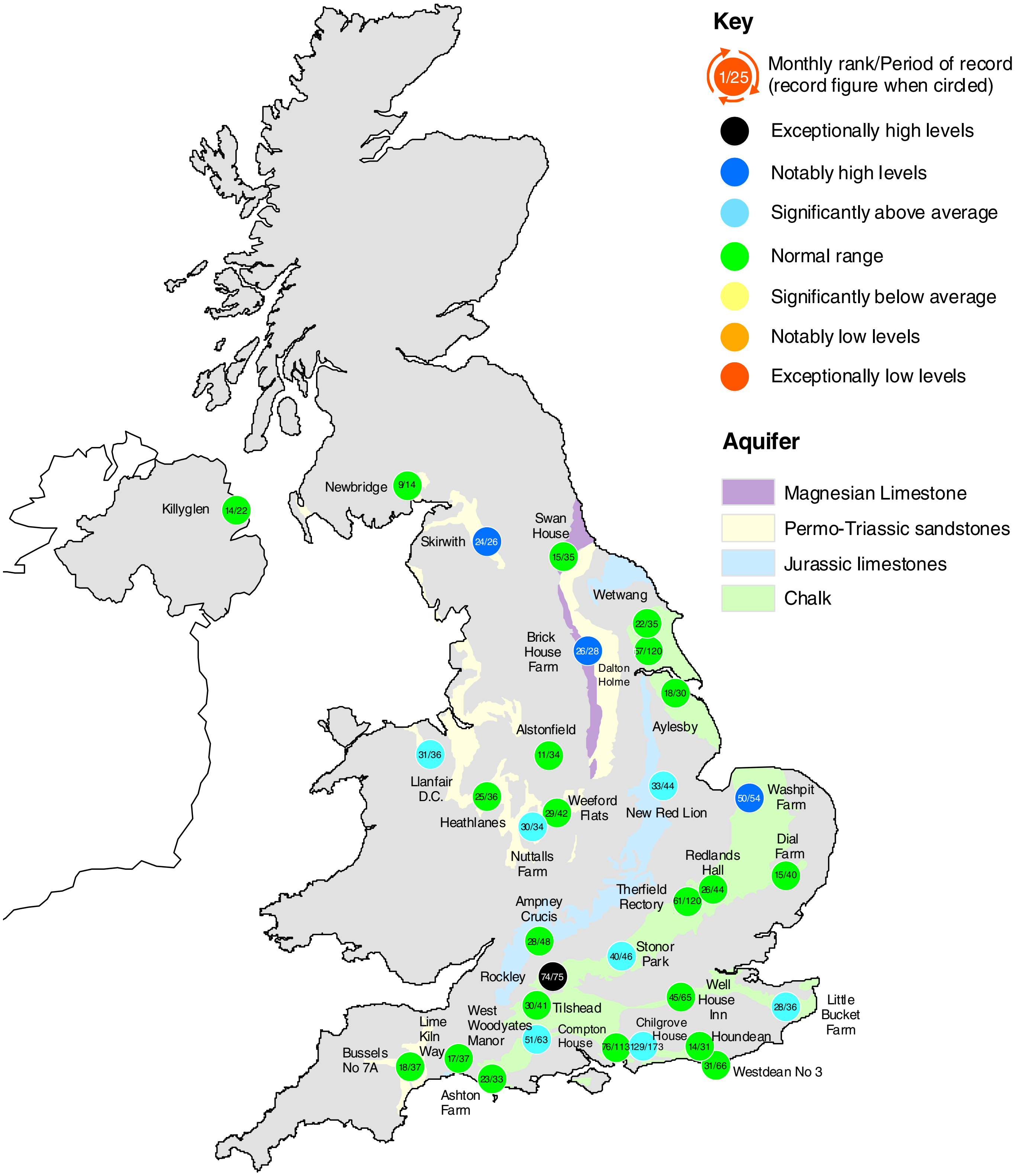




Groundwater levels January / February 2008

Borehole	Level	Date	Jan. av.	Borehole	Level	Date	Jan. av.	Borehole	Level	Date	Jan. av.
Dalton Holme	16.90	10/01	17.14	Chilgrove House	64.58	31/01	56.15	Brick House Farm	15.24	28/01	12.83
Washpit Farm	46.39	04/02	43.76	Killyglen	116.54	31/01	116.17	Llanfair DC	80.42	15/01	79.97
Stonor Park	79.90	01/02	73.27	New Red Lion	17.33	29/01	14.80	Heathlanes	62.23	28/01	61.90
Dial Farm	25.43	07/01	25.48	Ampney Crucis	102.58	01/02	102.33	Weeford Flats	90.03	10/01	89.62
Rockley	143.51	01/02	136.34	Newbridge	11.09	01/02	10.80	Bussels No.7a	23.97	22/01	24.12
Well House Inn	98.04	01/02	94.92	Skirwith	131.17	03/02	130.46	Alstonfield	194.46	04/01	198.64
West Woodyates	98.05	31/01	91.67	Swan House	83.66	21/01	84.28				

Levels in metres above Ordnance Datum



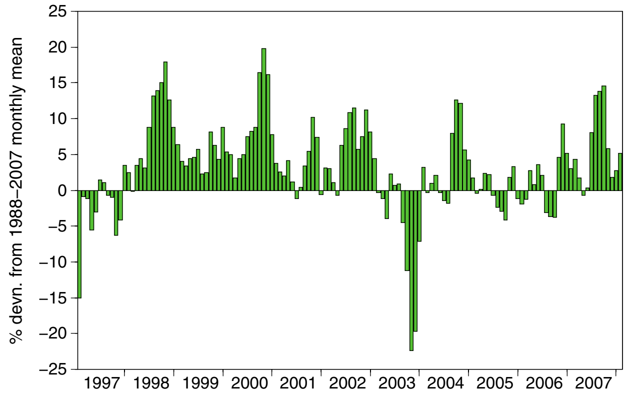
Groundwater levels - January 2008

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.

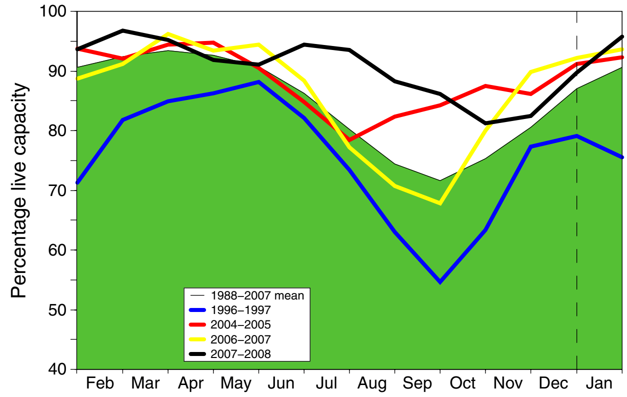
Notes: i. The outcrop areas are coloured according to British Geological Survey conventions.
ii. Recent levels for Houndean Bottom are under review.

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.

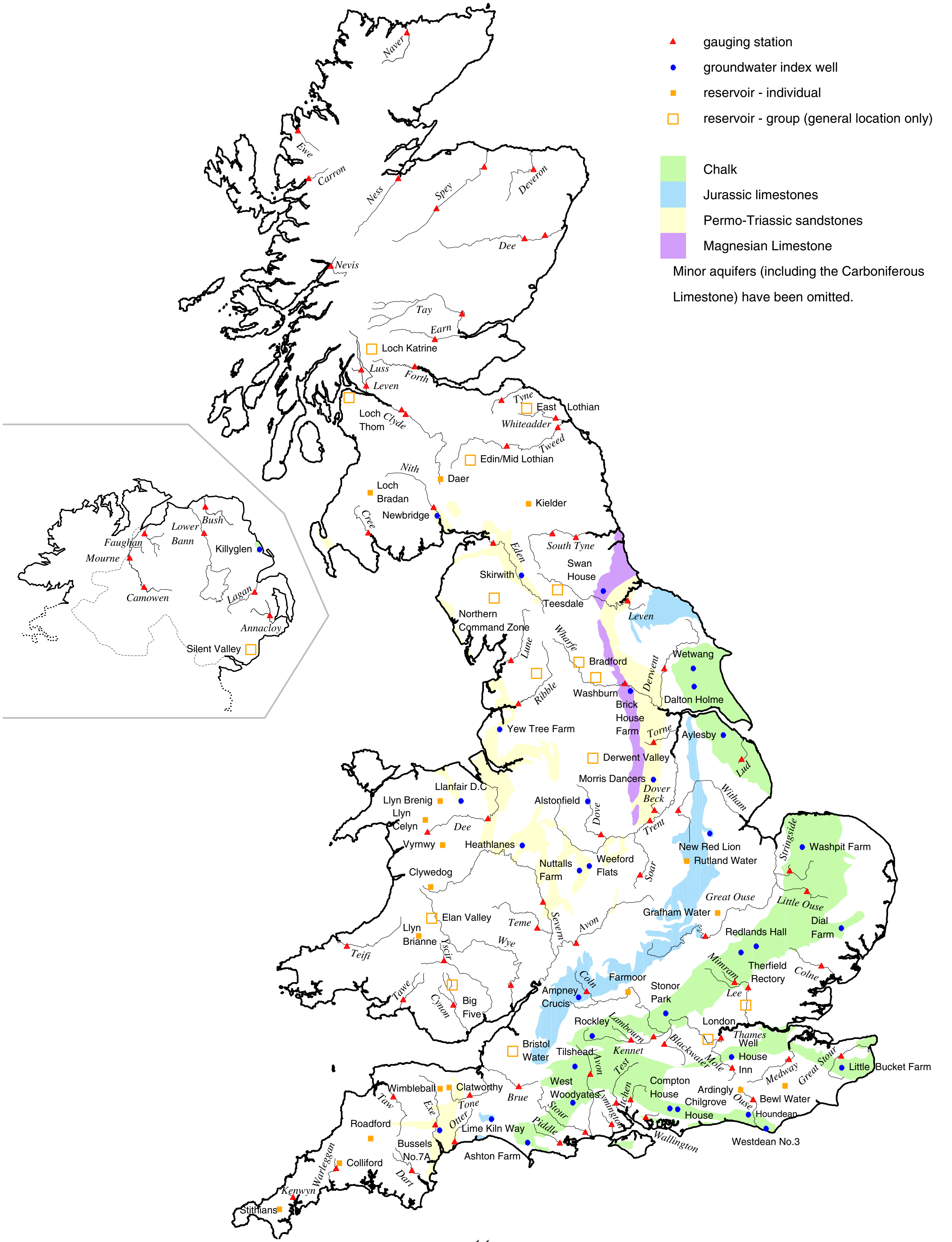
Percentage live capacity of selected reservoirs at start of month

Area	Reservoir	Capacity (Ml)	2007 Dec	2008 Jan	Feb	Feb Anom.	Min. Feb	Year* of min.	2007 Feb	Diff 08-07
North West	N Command Zone	• 124929	73	87	**100**	8	63	1996	96	4
	Vyrnwy	55146	83	99	**100**	9	45	1996	93	7
Northumbrian	Teesdale	• 87936	95	100	**97**	6	51	1996	86	11
	Kielder	(199175)	(55)	(73)	**(97)**	4	(85)	1989	(91)	6
Severn Trent	Clywedog	44922	87	85	**88**	1	62	1996	90	-2
	Derwent Valley	• 39525	86	94	**100**	6	15	1996	100	0
Yorkshire	Washburn	• 22035	76	89	**98**	9	34	1996	96	2
	Bradford supply	• 41407	89	99	**100**	8	33	1996	98	2
Anglian	Grafham	(55490)	(93)	(95)	**(92)**	6	(67)	1998	(93)	-1
	Rutland	(116580)	(84)	(89)	**(95)**	10	(68)	1997	(94)	1
Thames	London	• 202406	89	89	**90**	0	70	1997	95	-5
	Farmoor	• 13822	87	81	**83**	-9	72	2001	95	-12
Southern	Bewl	28170	66	74	**89**	8	37	2006	100	-11
	Ardingly	4685	75	92	**100**	7	65	2006	100	0
Wessex	Clatworthy	5364	68	100	**100**	5	62	1989	100	0
	Bristol WW	• (38666)	(79)	(94)	**(99)**	15	(58)	1992	(97)	2
South West	Colliford	28540	73	78	**83**	2	52	1997	61	22
	Roadford	34500	84	88	**92**	12	30	1996	78	14
	Wimbleball	21320	83	98	**100**	11	59	1997	100	0
	Stithians	5205	52	56	**76**	-11	38	1992	85	-9
Welsh	Celyn and Brenig	• 131155	95	97	**99**	4	61	1996	98	1
	Brianne	62140	96	100	**100**	2	84	1997	97	3
	Big Five	• 69762	79	92	**95**	2	67	1997	97	-2
	Elan Valley	• 99106	100	99	**99**	2	73	1996	97	2
Scotland(E)	Edinburgh/Mid Lothian	• 97639	79	85	**100**	7	72	1999	100	0
	East Lothian	• 10206	100	100	**100**	3	68	1990	100	0
Scotland(W)	Loch Katrine	• 111363	65	75	**98**	5	85	2000	94	4
	Daer	22412	98	100	**100**	1	91	1997	98	2
	Loch Thom	• 11840	74	80	**96**	-2	90	2004	94	2
Northern Ireland	Total+	• 67270	76	82	**94**	23	75	2002	89	5
	Silent Valley	• 20634	76	83	**99**	15	46	2002	91	8

() 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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E-mail: nwamail@ceh.ac.uk

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

02/08