Hydrological Summary

for the United Kingdom

General

April was generally an unsettled month with some notably cold episodes, appreciable snowfall, and substantial regional variations in precipitation totals. Significant replenishment, particularly around the month-end, ensured that (Northern Ireland aside) the great majority of major reservoirs were close to capacity in early May when estimated overall stocks for England & Wales were the highest for seven years (for early May). April river flows were generally well within the normal seasonal range and accumulated runoff totals, over a range of durations, are mostly above average. Accelerating evaporative demands triggered the development of appreciable soil moisture deficits but a wet end to the month ensured that they were mostly below the late April average. Aquifer replenishment was modest and groundwater levels are now generally in recession – and in most areas close to, or above, typical late-spring levels. The seasonal decline in runoff and recharge rates is likely to become firmly established in May but the general water resources outlook for the summer remains very healthy.

April 2008

Rainfall

Active low pressure systems brought significant rainfall early and, particularly, late in the month but, in between, weather conditions were dictated largely by airflows from a northerly quadrant. These produced seasonally low temperatures and showery conditions with a wide variety of precipitation types; on the 6th significant snowfall extended into southern England; a total of 6cm was recorded at Wallingford (Oxon) with nearly twice this in parts of southern England. Nonetheless, most storms yielded only modest precipitation totals until a south-westerly airflow introduced milder, wetter conditions around the 25th; rainfall totals of 10-25mm were recorded over wide areas on the 29/30th. This wet interlude helped April rainfall totals to exceed the monthly average across most of Great Britain. Parts of the Cairngorms and the North East reported >200% but, by contrast, many western catchments (e.g. in the South West and Lancashire) registered totals in the 80-100% range. On a provisional basis, Northern Ireland recorded its 3rd driest April in the last 20 years (albeit significantly wetter than 2007). With the exception of the South-West (Cornwall particularly), accumulated rainfall totals for the year thus far are considerably above average for all regions, and exceptional in Scotland – which registered its 2nd highest Jan-Apr rainfall in a series from 1914.

River flow

River flows generally remained well within the normal range throughout April and most index rivers exhibited broadly similar flow patterns: sustained recessions after the late-March spates followed by modest (and brief) recoveries at month end. These flow increases were more notable in many impermeable catchments (e.g. the Mole, and the Wallington in Hampshire) and postponed the onset of the seasonal recessions in many spring-fed streams and rivers. April runoff totals were within the normal range for a remarkably high proportion of index rivers across the UK. However, in much of northern and eastern Scotland, snowmelt contributed to well above average April runoff totals; the Ness reported its 3rd highest April mean flow in a 35-yr series. By contrast, modest April flows characterised many western catchments; the Annacloy (NI) registered <50% of the April average and, in Cornwall, runoff in the Kenwyn was below average for the 8th successive month. The South-West excepted, runoff totals for the year thus far are above average across the great majority of the country, notably so in northern Britain where the Naver, Tweed (at Norham) and Wharfe each recorded new Jan-Apr runoff maxima. The legacy of the extraordinary summer runoff in 2007 helps ensure that most 12-month runoff totals also exceed the average.

Groundwater

Despite the unsettled conditions, soil moisture deficits began to build through April – particularly in some central Chalk outcrops where rainfall totals were below average – but were reversed by the notable wet spell over the final few days. As a result, soils were wetter than average in almost all areas at month-end. As is normally the case in April, infiltration was patchy and, apart from the slowest-responding aquifer units, groundwater levels were generally in brisk recession. Correspondingly, the ranking of the groundwater levels needs to be treated with caution – being very sensitive to the date(s) on which levels were registered at individual index boreholes. The dryness of the recent past in Northern Ireland is reflected in the relatively depressed April levels for the Chalk but, in E&W, groundwater levels remain well within the normal range, and in most cases above the late spring average. Typical late-spring levels also characterise most limestone and Permo-Triassic sandstones outcrops. Aquifer outflows via springs and seepages have broadly balanced recharge over the last three months in some areas resulting in unusually level hydrographs (e.g. Well House and Stonor in the Chalk, Bussels in the PT sandstones). The scope for further late-spring infiltration was appreciably reduced by the warm dry spell in early May but most summer recessions are likely to track close to, or above, the seasonal average.

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

Rainfall accumulations and return period estimates

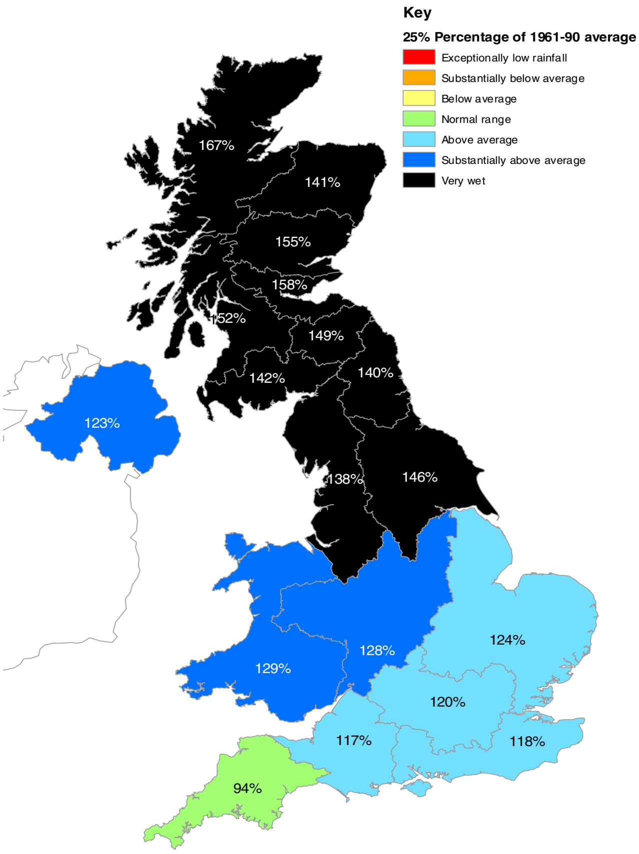
Area	Rainfall	Apr 2008	Mar 08- Apr 08	RP	Jan 08- Apr 08	RP	Oct 07- Apr 08	RP	May 07- Apr08	RP
England & Wales	**mm**	**71**	**172**		**363**		**585**		**1088**	
	%	**118**	**129**	**5-10**	**126**	**10-20**	**104**	**2-5**	**120**	**10-20**
North West	mm	**81**	194		504		831		1430	
	%	**114**	116	5-10	138	50-80	111	5-10	117	10-20
Northumbrian	mm	**98**	184		382		581		1017	
	%	**171**	143	10-20	140	70-100	112	2-5	117	5-15
Severn Trent	mm	**71**	153		312		488		1005	
	%	**126**	130	5-10	128	10-20	106	2-5	131	35-50
Yorkshire	mm	**81**	168		387		574		1075	
	%	**135**	131	5-15	146	70-100	114	2-5	129	25-40
Anglian	mm	**50**	127		226		364		776	
	%	**106**	136	5-10	124	5-10	105	2-5	129	10-20
Thames	mm	**58**	145		264		455		870	
	%	**115**	135	5-10	120	5-10	108	2-5	124	5-15
Southern	mm	**69**	163		298		489		889	
	%	**132**	141	5-15	118	2-5	98	2-5	113	2-5
Wessex	mm	**58**	166		327		558		1020	
	%	**108**	133	5-10	117	2-5	103	2-5	119	5-10
South West	mm	**68**	192		388		670		1253	
	%	**97**	113	2-5	94	2-5	84	2-5	105	2-5
Welsh	mm	**91**	243		565		904		1560	
	%	**110**	127	5-10	129	5-15	103	2-5	116	5-10
Scotland	**mm**	**97**	**268**		**722**		**1125**		**1734**	
	%	**120**	**128**	**10-20**	**154**	**70-100**	**119**	**15-25**	**118**	**40-60**
Highland	mm	**113**	343		935		1472		2185	
	%	**121**	136	10-20	167	50-80	129	25-40	126	60-90
North East	mm	**107**	206		455		731		1268	
	%	**157**	137	20-30	141	>100	117	10-20	123	50-80
Tay	mm	**86**	216		663		957		1494	
	%	**126**	119	5-10	155	60-90	116	5-10	116	10-20
Forth	mm	**84**	192		570		842		1356	
	%	**136**	120	5-10	158	70-100	119	5-15	118	10-20
Tweed	mm	**99**	201		467		700		1218	
	%	**163**	141	10-20	149	>100	116	5-10	121	20-35
Solway	mm	**76**	241		641		1001		1589	
	%	**97**	122	5-10	142	70-100	111	5-10	111	5-15
Clyde	mm	**93**	305		843		1305		1948	
	%	**105**	127	5-10	152	40-60	116	5-15	111	5-15
Northern Ireland	**mm**	**44**	**181**		**435**		**696**		**1209**	
	%	**66**	**115**	**5-10**	**123**	**5-15**	**101**	**2-5**	**110**	**5-10**

% = 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 October 2007 are provisional.

Rainfall . . . Rainfall . . .

January - April 2008



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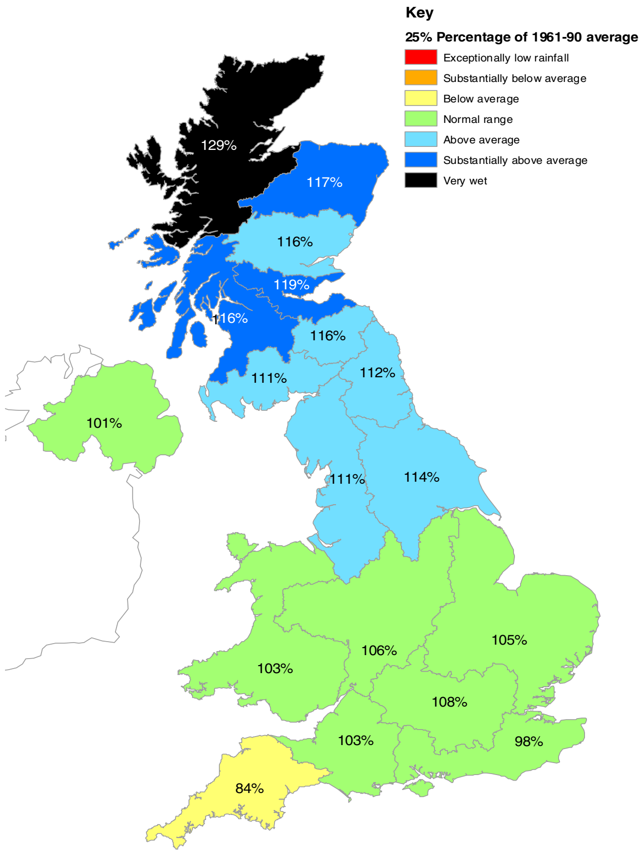

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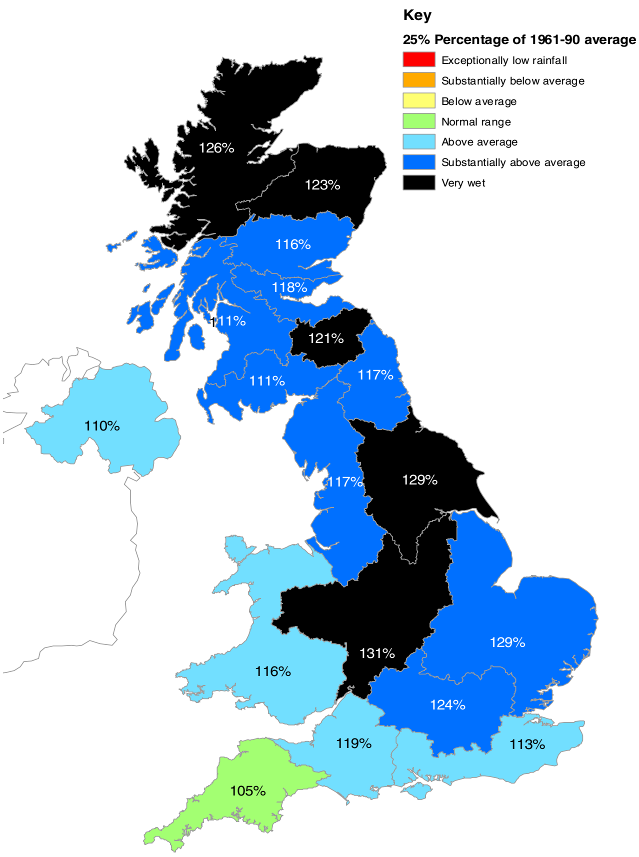
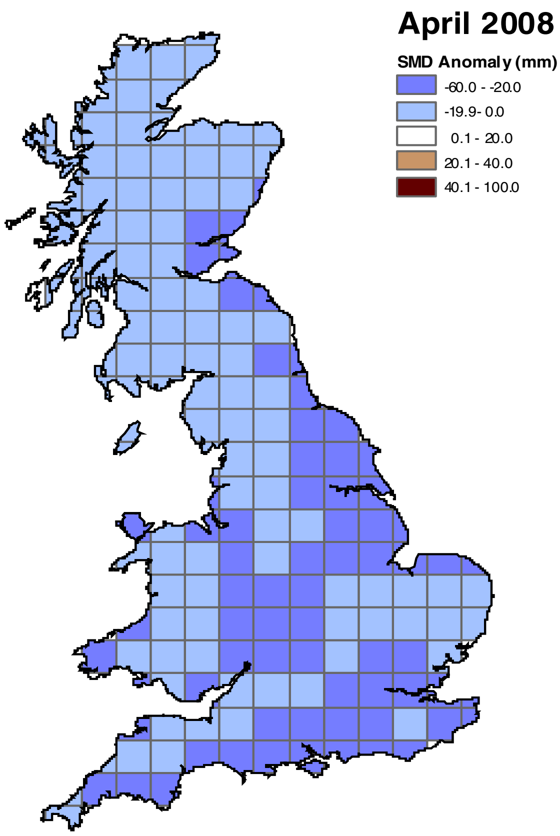
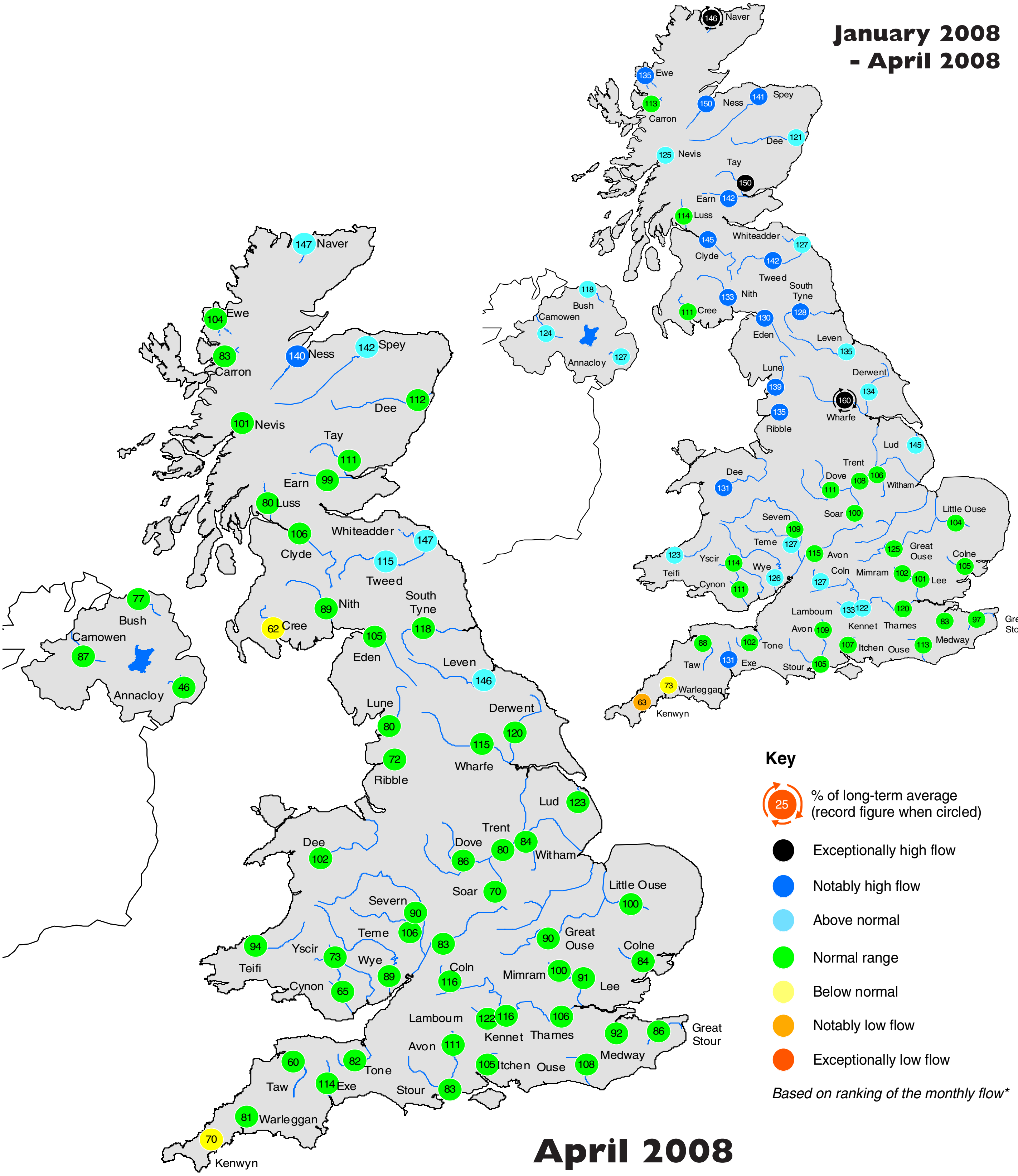


MORECS Soil Moisture Deficit Anomalies



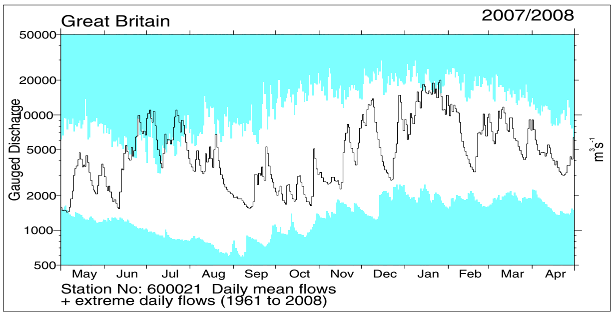
River flow . . . River flow . . .

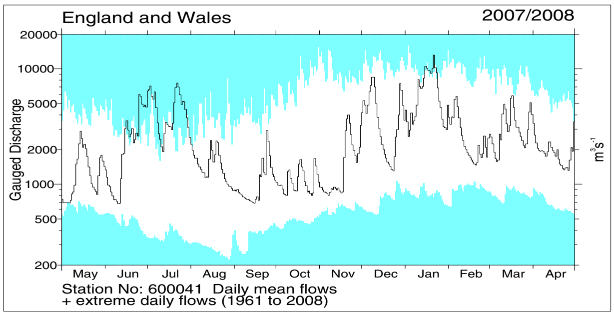


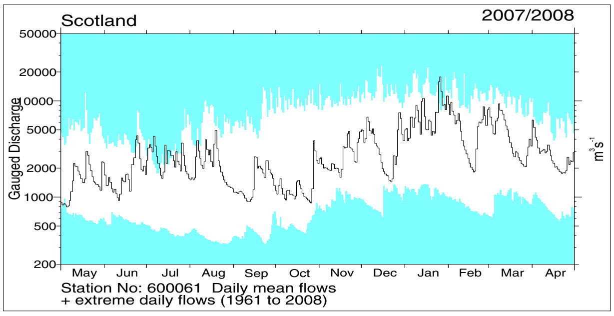
River flows

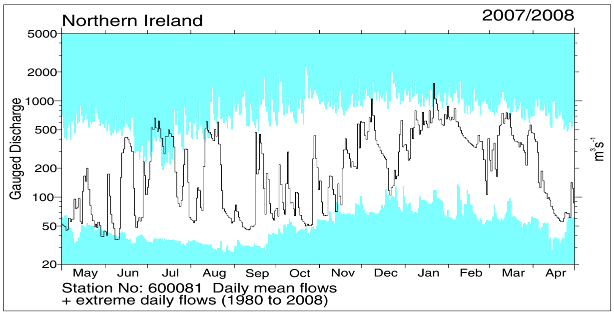
*Comparisons based on percentage flows alone can be misleading. A given percentage flow can represent extreme drought conditions in permeable catchments where flow patterns are relatively stable but be well within the normal range in impermeable catchments where the natural variation in flows is much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

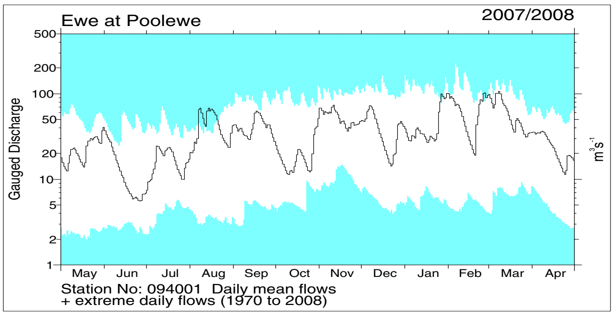
River flow . . . River flow . . .

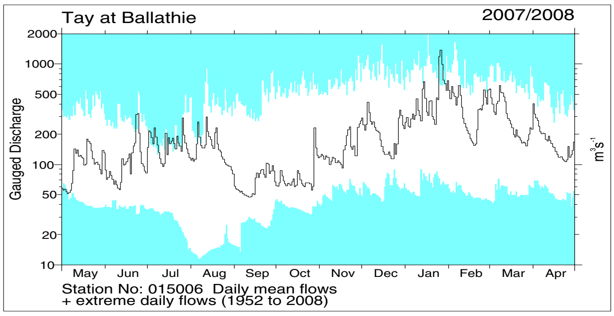


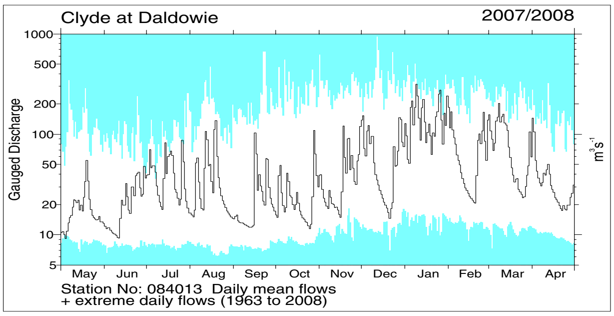


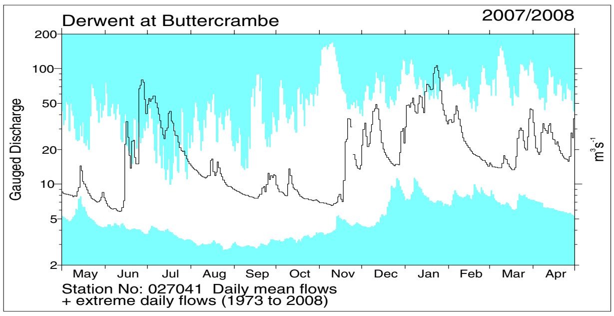


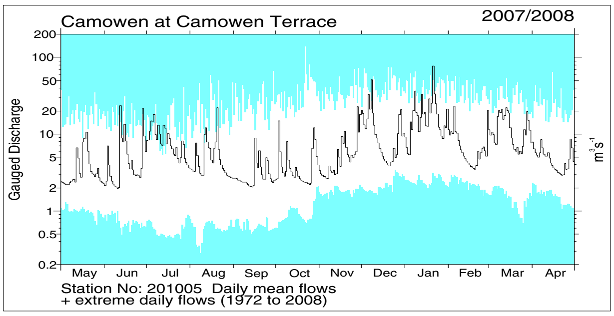


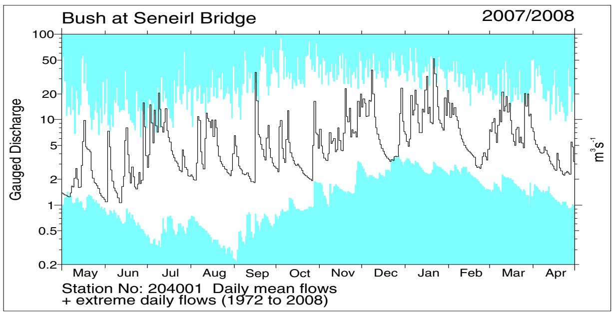








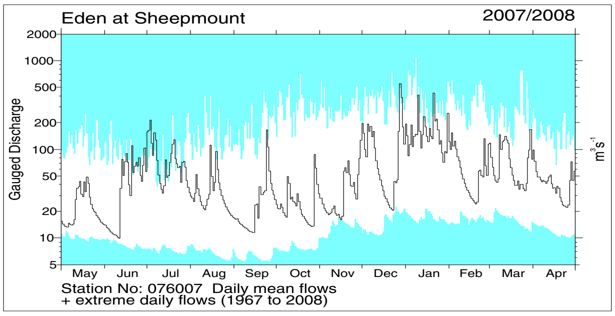


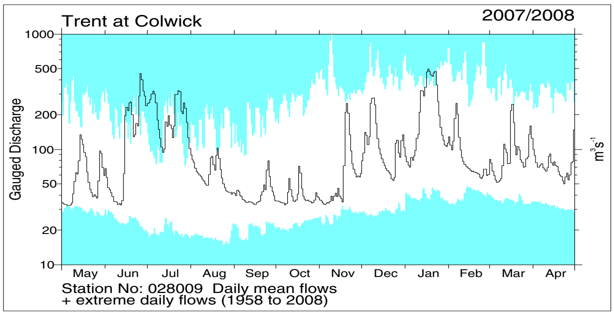


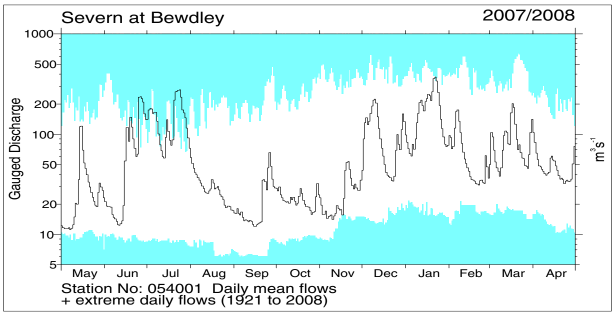
River flow hydrographs

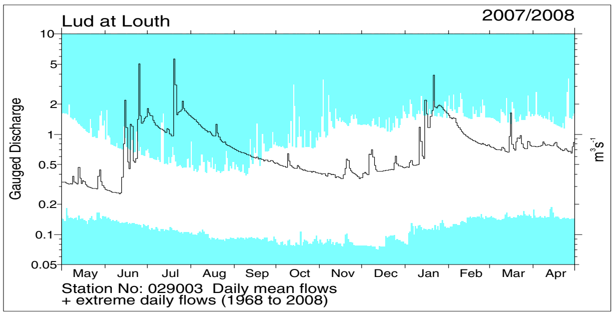
The river flow hydrographs show the daily mean flows together with the maximum and minimum daily flows prior to May 2007 (shown by the shaded areas). Daily flows falling outside the maximum/minimum range are indicated where the bold trace enters the shaded areas.

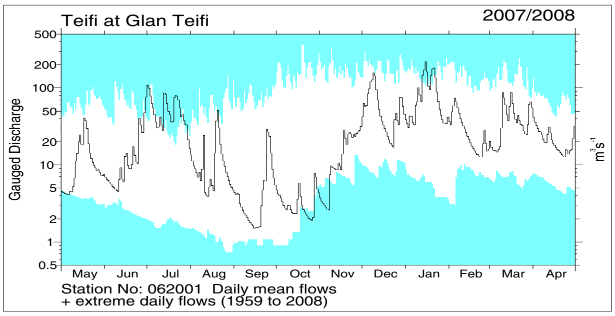
River flow . . . River flow . . .

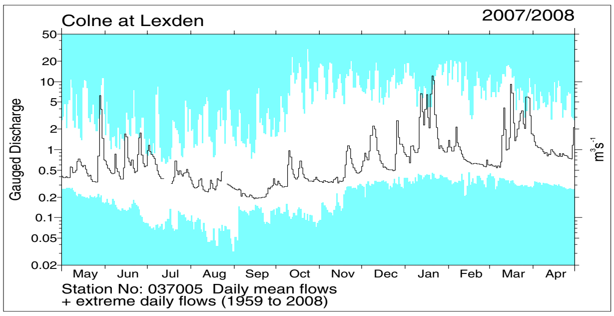


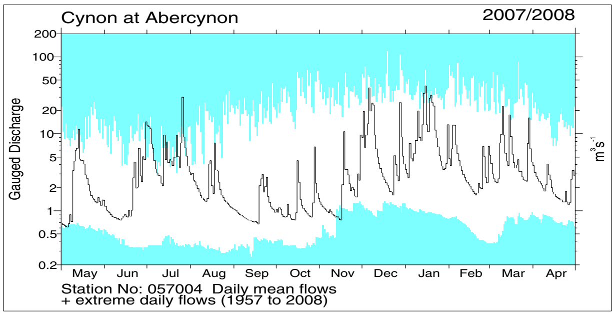


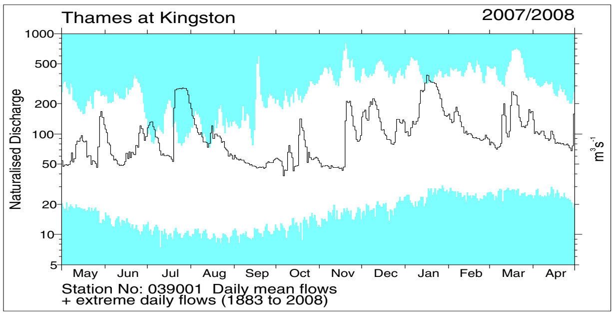


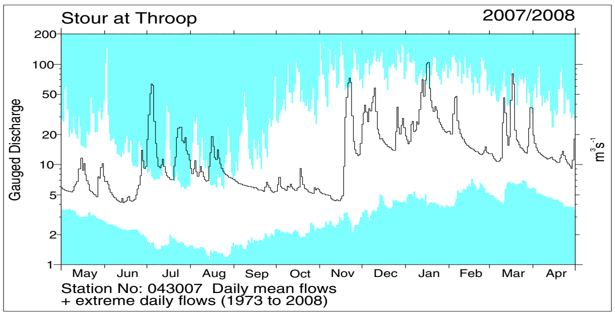


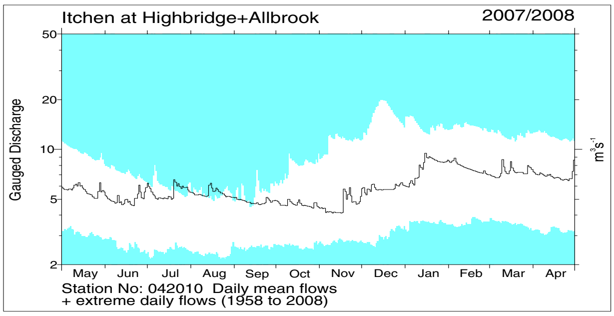










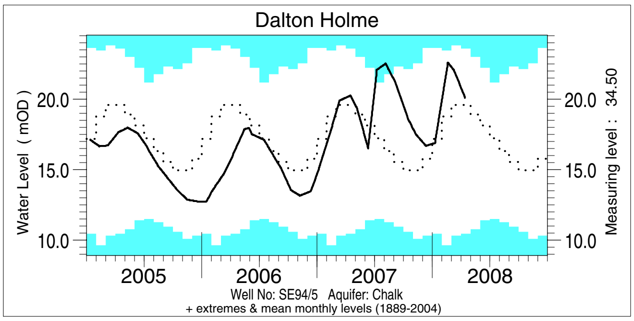


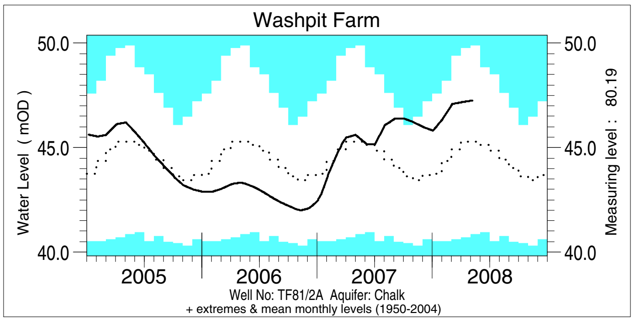
Notable runoff accumulations (a) January - April 2008, (b) May 2007- April 2008

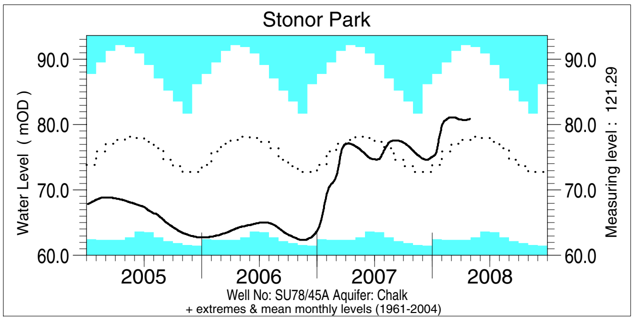
	River	%lta	Rank
a)	Ness	150	34/36
	Spey (Boat of Garten)	148	53/56
	Tay	150	55/56
	Tyne (Spilmersford)	162	44/44
	Tweed (Norham)	143	49/49
	Wharfe	160	53/53
	Exe	131	50/52
	Dee (New Inn)	131	36/39
a)	Clyde (Blairston)	161	47/48
	Naver	146	31/31
	Annacloy	127	26/29
b)	S Tyne	124	42/44
	Dover Beck	187	32/32
	Lud	181	38/39
b)	Lambourn	144	44/45
	Coln	159	43/44
	Kenwyn	68	4/39
	Avon (Evesham)	153	68/71
	Teme	153	37/38
	Ribble	122	44/48
	Ewe	123	34/37

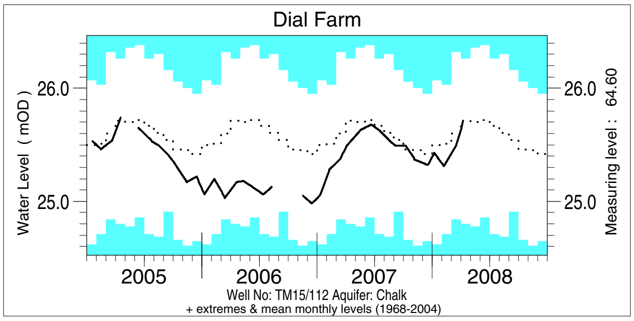
lta = long term average
Rank 1 = lowest on record

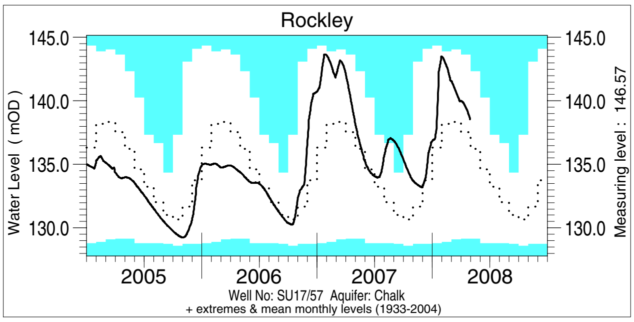
Groundwater . . . Groundwater

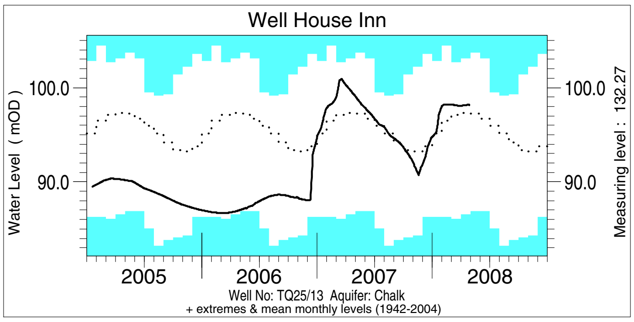


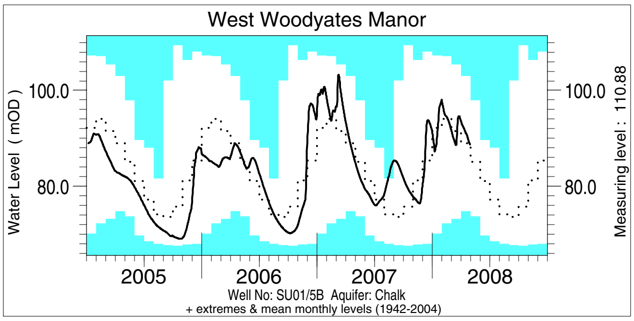


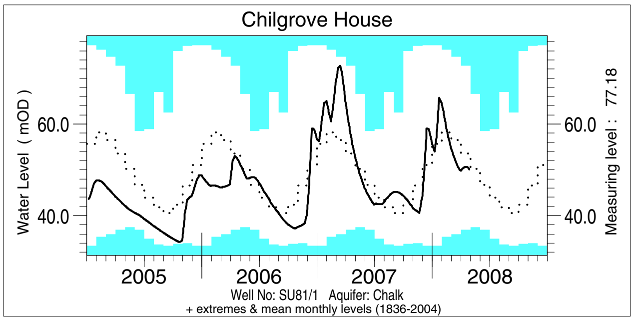


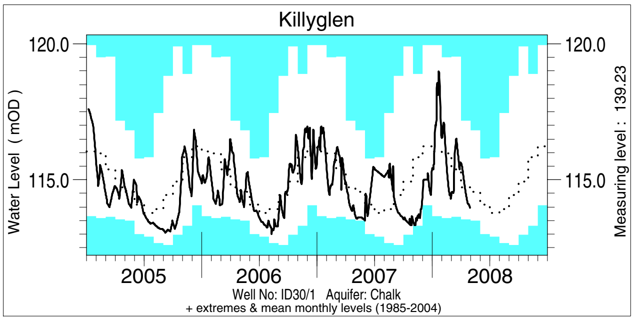


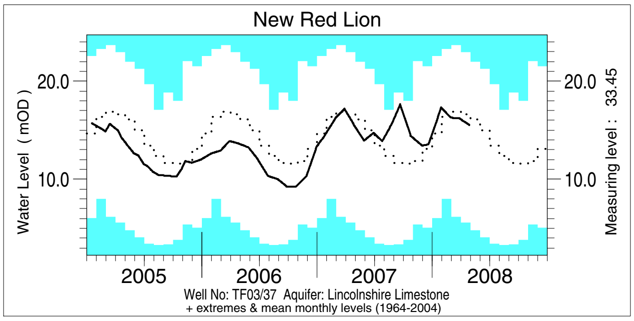






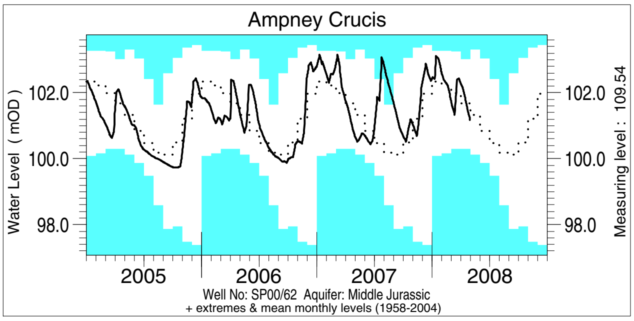


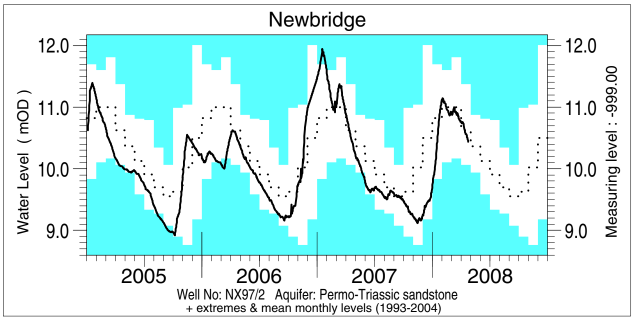


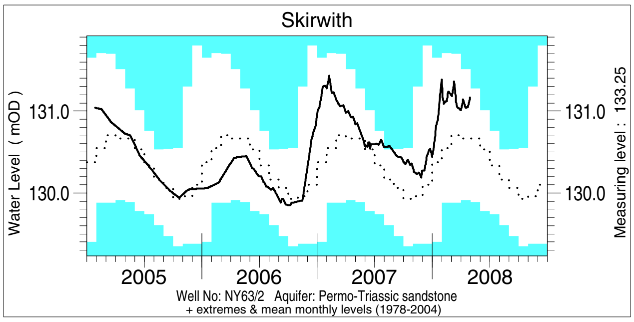


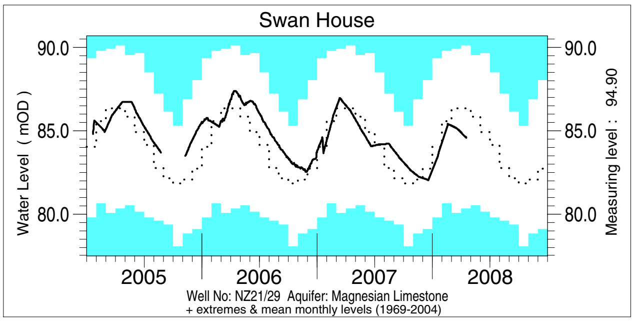
Groundwater levels normally rise and fall with the seasons, reaching a peak in the spring following replenishment through the winter (when evaporation losses are low and soil moist). They decline through the summer and early autumn. This seasonal variation is much reduced when the aquifer is confined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

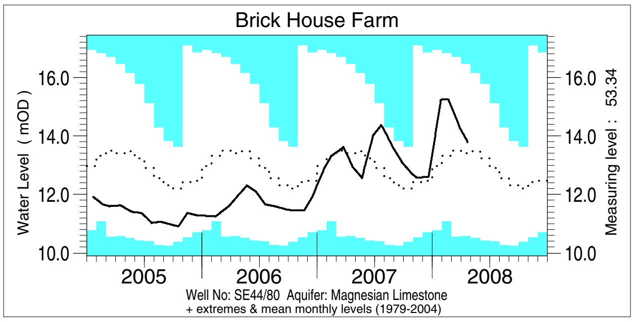
Groundwater . . . Groundwater

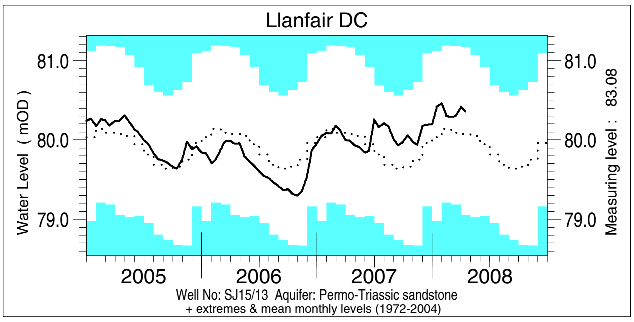


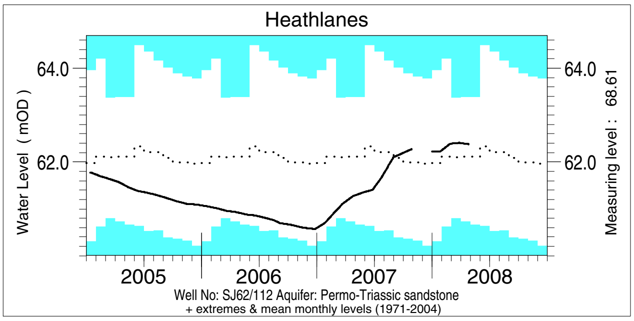


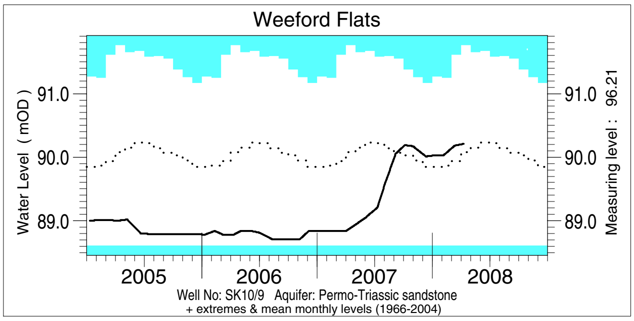


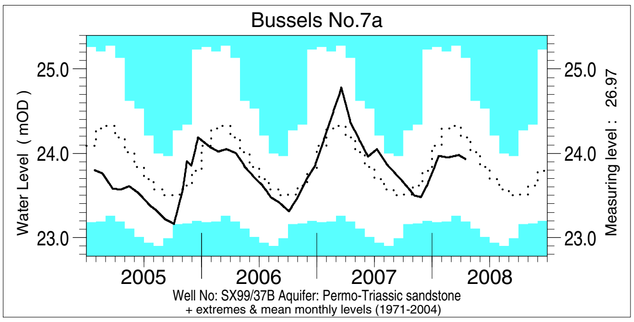


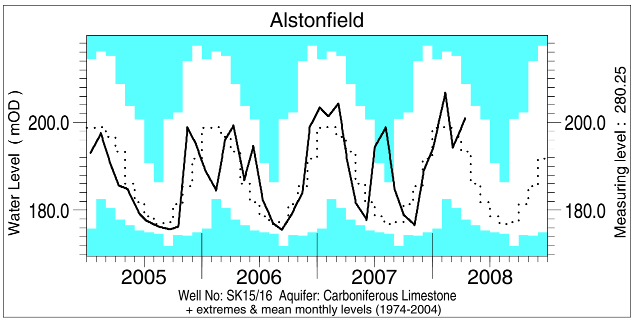








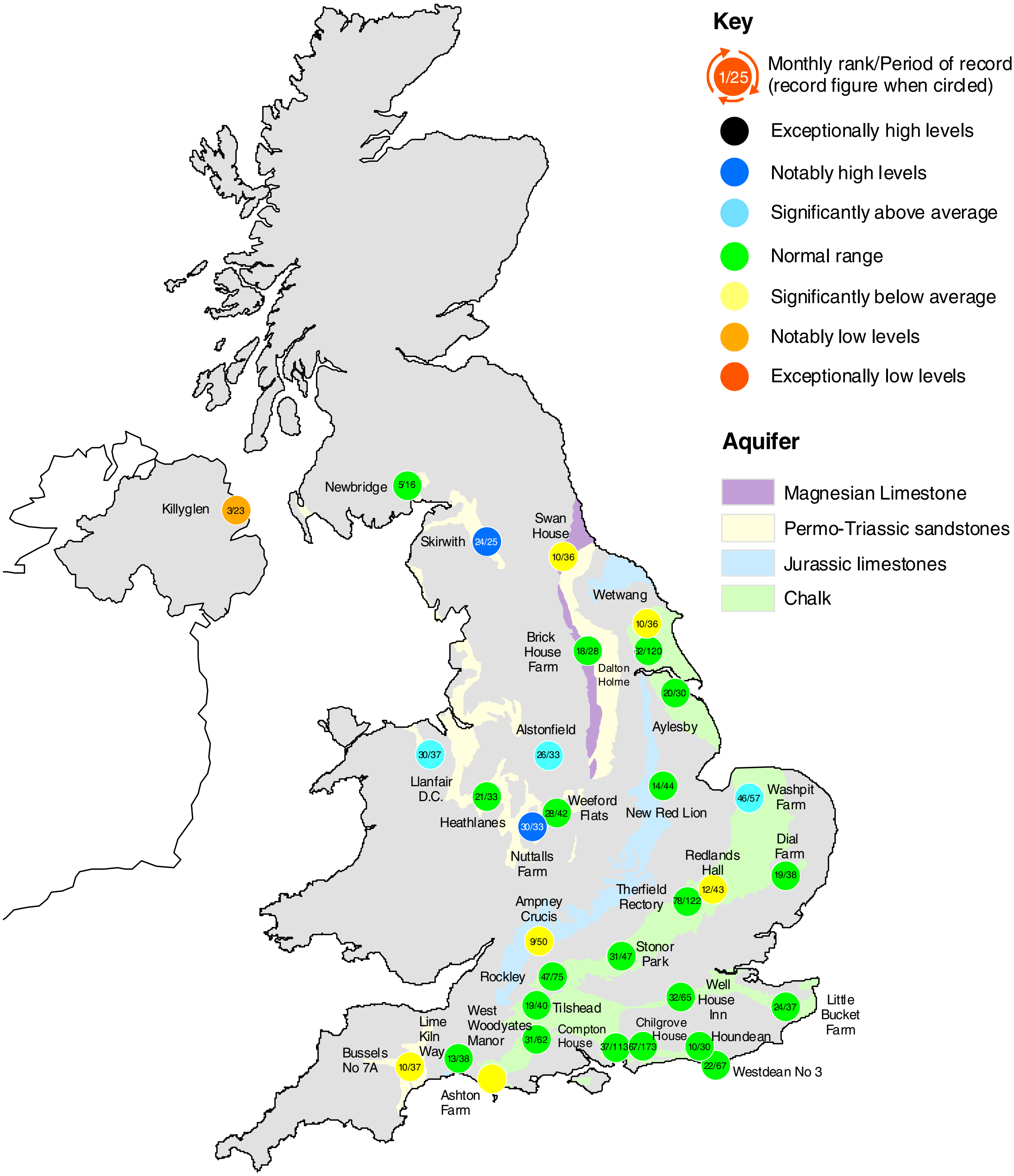




Groundwater levels April / May 2008

Borehole	Level	Date	Apr. av.	Borehole	Level	Date	Apr. av.	Borehole	Level	Date	Apr. av.
Dalton Holme	20.08	14/04	19.48	Chilgrove House	50.10	28/04	52.26	Brick House Farm	13.79	22/04	13.32
Washpit Farm	47.26	08/05	45.39	Killyglen (NI)	113.98	30/04	114.93	Llanfair DC	80.36	15/04	80.05
Stonor Park	80.88	30/04	77.41	New Red Lion	15.52	28/04	16.36	Heathlanes	62.38	26/04	62.03
Dial Farm	25.70	07/04	25.67	Ampney Crucis	101.18	30/04	101.71	Weeford Flats	90.21	09/04	89.85
Rockley	138.54	30/04	137.52	Newbridge	10.44	24/04	10.56	Bussels No.7a	23.93	16/04	24.17
Well House Inn	98.16	28/04	97.11	Skirwith	131.17	30/04	130.63	Alstonfield	201.01	14/04	193.09
West Woodyates	88.64	30/04	88.38	Swan House	84.55	18/04	85.71				

Levels in metres above Ordnance Datum



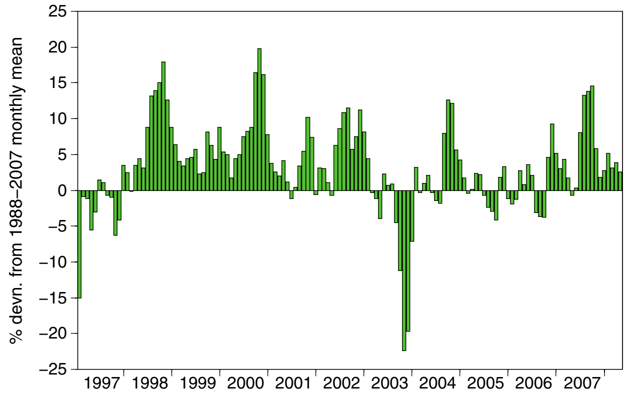
Groundwater levels - April 2008

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.

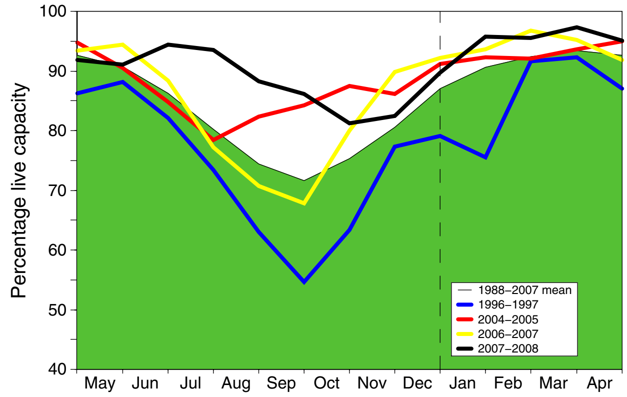
Notes: i. The outcrop areas are coloured according to British Geological Survey conventions.
ii. Recent levels for Houndean Bottom are under review.
iii. Llanfair DC levels are under review.

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.

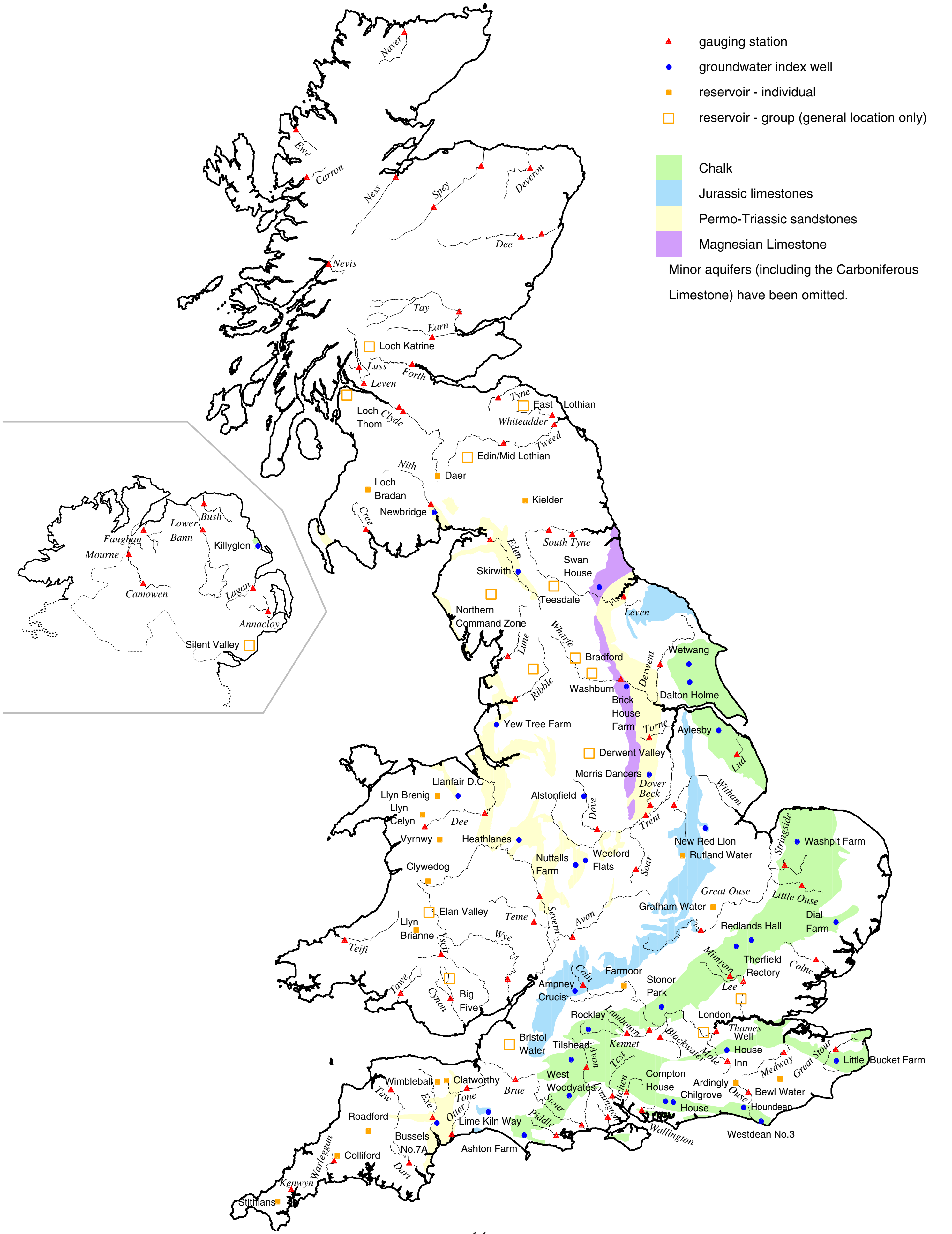
Percentage live capacity of selected reservoirs at start of month

Area	Reservoir	Capacity (Ml)	2008 Mar	Apr	May	May Anom.	Min. May	Year* of min.	2007 May	Diff 08-07
North West	N Command Zone	• 124929	96	98	**91**	2	74	2003	88	3
	Vyrnwy	55146	100	100	**99**	6	70	1996	88	11
Northumbrian	Teesdale	• 87936	91	100	**97**	6	74	2003	85	12
	Kielder	(199175)	(92)	(92)	**(93)**	2	(85)	1990	(89)	4
Severn Trent	Clywedog	44922	92	100	**100**	4	85	1988	98	2
	Derwent Valley	• 39525	98	100	**99**	6	54	1996	84	15
Yorkshire	Washburn	• 22035	98	99	**96**	6	76	1996	84	12
	Bradford supply	• 41407	100	100	**96**	5	60	1996	85	11
Anglian	Grafham	(55490)	(88)	(90)	**(96)**	3	(73)	1997	(97)	-1
	Rutland	(116580)	(95)	(96)	**(93)**	1	(72)	1997	(94)	-1
Thames	London	• 202828	97	97	**90**	-4	86	1990	100	-10
	Farmoor	• 13822	100	98	**96**	-1	81	2000	100	-4
Southern	Bewl	28170	91	100	**98**	9	63	1990	91	7
	Ardingly	4685	100	94	**100**	0	98	2005	100	0
Wessex	Clatworthy	5364	99	100	**94**	1	81	1990	85	9
	Bristol WW	• (38666)	(98)	(98)	**(96)**	3	(85)	2005	(90)	6
South West	Colliford	28540	85	91	**91**	6	56	1997	77	14
	Roadford	34500	91	95	**93**	9	41	1996	89	4
	Wimbleball	21320	99	100	**99**	5	79	1992	94	5
	Stithians	5205	82	93	**88**	-2	65	1992	90	-2
Welsh	Celyn and Brenig	• 131155	100	100	**100**	3	75	1996	96	4
	Brianne	62140	99	100	**100**	3	86	1997	89	11
	Big Five	• 69762	97	99	**96**	3	85	1997	89	7
	Elan Valley	• 99106	99	100	**99**	2	87	2003	97	2
Scotland(E)	Edinburgh/Mid Lothian	• 97639	100	100	**99**	7	62	1998	92	7
	East Lothian	• 10206	100	100	**100**	2	89	1992	97	3
Scotland(W)	Loch Katrine	• 111363	99	93	**90**	-3	83	2001	84	6
	Daer	22412	99	99	**97**	1	89	2003	87	10
	Loch Thom	• 11840	96	96	**91**	-4	88	2003	90	1
Northern Ireland	Total+	• 67270	90	90	**83**	13	77	2007	77	6
	Silent Valley	• 20634	93	93	**82**	0	58	2000	79	3

() 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

05/08