Hydrological Summary
for the United Kingdom

February 2006

General

Weather conditions varied greatly throughout February but high pressure again dominated synoptic patterns. The corresponding meagre precipitation contributed to the driest winter (Dec-Feb) since 1964 for the UK as a whole. The drought eased marginally during February in parts of the South East but rainfall deficiencies increased appreciably elsewhere. Nonetheless, overall reservoir stocks (for England and Wales) remain within 2% of the early March average, but seasonally depressed stocks characterise a number of southern reservoirs (including Bewl, Ardingly and Colliford) – and the area subject to water use restrictions has increased. February river flows were very substantially below average throughout the country, and depressed in many spring-fed streams where flows are more typical of the late summer, but the impact of two successive notably dry winters is most evident in the exceptionally low groundwater levels in a number of major aquifers, parts of the Chalk particularly. Overall groundwater resources are healthier than in early 1992 and 1997 but the water resources outlook is fragile in parts of the English Lowlands. Accelerating evaporation losses may be expected to curtail the 2005/06 recharge season during the next 6-8 weeks (in those areas where the drought is most severe), emphasising the pivotal importance of rainfall through the early spring period.

Rainfall

The notable dry spell over the latter half of January continued into February as the Thames catchment, for example, registered only 2mm of rainfall over the first 10 days. Thereafter, weather patterns were much more unsettled with substantial rainfall in the most drought-affected areas on the 20th (Hastings: 31.2mm), and an Arctic airflow brought substantial – and disruptive – snowfall to many areas (Aberdeenshire especially) late in the month. However, away from the South East, February rainfall totals were mostly well below average – and <50% in parts of Scotland and Northern Ireland. The latter reported its lowest (provisionally) winter rainfall since 1934 and Dec-Feb rainfall deficiencies were large in all regions of the UK – parts of the Midlands and the Forth basin were particularly dry. In southern Britain, the 2005/06 winter drought extends a long term rainfall deficiency stretching back to October the 2004. For England and Wales, the succeeding 16-month period is the driest (in this timeframe) for 42 years. More importantly in relation to the drought's water resources and environmental impacts, most of the English Lowlands registered a 2nd successive notably dry winter. The combined Nov-Feb rainfall deficiencies are the lowest for successive winters since 1932-34 in much of central and south eastern England. This lack of winter rainfall is the primary cause of the current drought stress.

River Flow

Exceptionally low winter flows characterised most of the UK during the first half of February. The Soar, Mole and Annacloy (Northern Ireland) were among an appreciable number of index rivers registering new early February minimum daily flows; this was true of total outflows from E&W also. Recessions were then arrested, with some moderate spates in mid-month; field drains also ran healthily – a rare circumstance in eastern areas this winter. The spates were of greatest significance in responsive catchments in the most drought afflicted region, e.g. in the Mole and Gt Stour on the 20th – when several Flood Alerts were called in Sussex and Kent. Runoff recoveries were much more muted in permeable catchments but generally sufficient to increase flows above seasonal drought minima. February runoff totals were well below average throughout much of the greater part of the UK, and <50% in most of southern Britain (NI also); but most exceeded February 1997. An exception was the Mimram which reported its 2nd lowest February flow in a 54-yr record. In many impermeable catchments winter (Dec-Feb) runoff was depressed, the lowest on record for the Yscir and the Forth, but the important regional dimension to the drought is best captured by longer term runoff accumulations. The Soar, Medway, Sussex Ouse, Dorset Stour and Kenwyn (each with >30-yr records) all established new 16-month minima (for sequences ending in February).

Groundwater

February precipitation (snow was important in a few outcrop areas) patterns favoured parts of the eastern Chalk and, with receptive soil conditions, the February infiltration exceeded that for the Nov-Jan period in a few areas. Generally however, infiltration was well below the monthly average and insufficient to generate substantial – and very belated – seasonal recoveries in groundwater levels. Barely discernible increases are detectable in, for instance, parts of the Cambridgeshire Chalk or in some outcrops in the North Downs. Although overall storage in the Chalk is considerably above that of the late winter in both 1992 and 1997, groundwater levels remain close to long term minima in some index wells and boreholes (e.g. Stonor). Levels in most limestone aquifers remain well below average but above drought mimima; Alstonfield (in the Carboniferous Limestone) is an exception following a steep decline through the late winter. Below average levels characterise most Permo-Triassic sandstones outcrops but the degree of depression reflects spatial variations in both infiltration patterns and the responsiveness of individual sandstone units. In the Midlands, a minor recovery was recorded at Weeford Flats which had been dry since June 2005 but Morris Dancers reported its 2nd lowest February level in a record from 1969. With the exception of a few areas (e.g. parts of Lincolnshire) soil conditions remain conducive to further recharge; rainfall until late April is likely to be very influential in determining the intensity and extent of drought conditions in the coming summer.

Centre for Ecology & Hydrology
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Rainfall . . . Rainfall . . .

Rainfall accumulations and return period estimates

Area	Rainfall	Feb 2006	Dec 05-Feb 06	RP	Nov 05-Feb 06	RP	Mar 05-Feb 06	RP	Nov 04-Feb 06	RP
England & Wales	**mm**	**55**	**156**		**243**		**790**		**1030**	
	%	**85**	**62**	**10-20**	**71**	**5-15**	**87**	**5-10**	**83**	**10-20**
North West	mm	**68**	200		323		1036		1455	
	%	**85**	62	10-20	72	5-15	85	5-10	87	5-10
Northumbrian	mm	**55**	146		240		846		1108	
	%	**93**	65	10-20	77	5-10	98	2-5	94	2-5
Severn Trent	mm	**40**	113		182		671		844	
	%	**72**	55	20-30	66	10-20	87	5-10	81	10-20
Yorkshire	mm	**54**	130		214		731		949	
	%	**93**	59	10-20	71	5-15	88	5-10	83	10-20
Anglian	mm	**39**	90		129		526		665	
	%	**103**	62	10-20	64	10-20	87	5-10	82	10-20
Thames	mm	**42**	122		174		566		705	
	%	**91**	66	5-10	70	5-10	81	5-15	74	30-45
Southern	mm	**63**	155		204		636		800	
	%	**116**	71	5-10	67	5-15	81	5-15	73	30-45
Wessex	mm	**53**	163		237		747		939	
	%	**81**	65	5-10	71	5-10	87	2-5	79	10-20
South West	mm	**75**	253		391		1070		1385	
	%	**73**	66	5-15	77	5-10	90	2-5	81	10-20
Welsh	mm	**74**	246		406		1187		1589	
	%	**73**	61	10-20	75	5-10	88	2-5	84	10-20
Scotland	**mm**	**80**	**283**		**454**		**1414**		**2078**	
	%	**76**	**68**	**10-20**	**79**	**5-10**	**96**	**2-5**	**102**	**2-5**
Highland	mm	**101**	354		596		1747		2692	
	%	**80**	71	10-20	85	2-5	100	<2	110	5-10
North East	mm	**55**	179		326		965		1344	
	%	**79**	66	10-20	87	2-5	94	2-5	96	2-5
Tay	mm	**61**	233		382		1214		1704	
	%	**62**	62	10-20	76	5-10	94	2-5	95	2-5
Forth	mm	**51**	186		286		1066		1522	
	%	**62**	59	20-35	66	15-25	93	2-5	97	2-5
Tweed	mm	**63**	174		269		957		1270	
	%	**89**	65	10-20	74	5-15	95	2-5	93	2-5
Solway	mm	**74**	263		395		1297		1820	
	%	**73**	65	10-20	72	5-15	90	2-5	92	2-5
Clyde	mm	**88**	340		494		1616		2393	
	%	**71**	68	10-20	72	10-20	92	2-5	98	2-5
Northern Ireland	**mm**	**43**	**198**		**277**		**958**		**1322**	
	%	**54**	**64**	**10-20**	**67**	**10-20**	**87**	**5-15**	**87**	**5-10**

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

The monthly rainfall figures[*] provided by the Met Office (National Climate Information Centre) are Crown Copyright and may not be passed on to, or published by, any unauthorised person or organisation. **All monthly totals since October 2005 are provisional (see page 12).** 1961-2003 regional monthly totals were revised by the Met Office in 2004. Most of the return period estimates are based on tables provided by the Met Office (see Tabony, R. C., 1977, *The variability of long duration rainfall over Great Britain*, Scientific Paper No. 37) and relate to the specified span of months only (return periods may be up to an order of magnitude less if n-month periods beginning in any month are considered); RP estimates for Northern Ireland are based on the tables for north-west England. The tables reflect rainfall over the period 1911-70 and assume a stable climate. Artifacts, in the Scottish rainfall series in particular, can exaggerate the relative wetness of the recent past. [*]See page 12.

Rainfall . . . Rainfall . . .

Key

00% Percentage of 1961-90 average

Very wet

Substantially above average

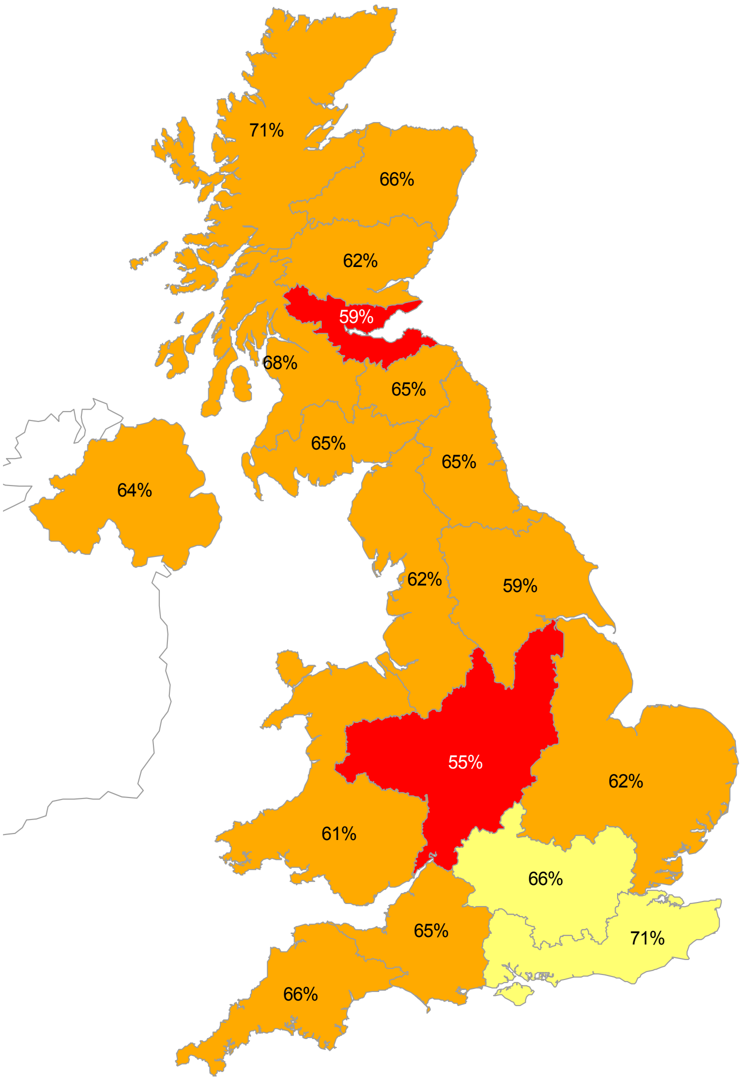
Above average

Normal range

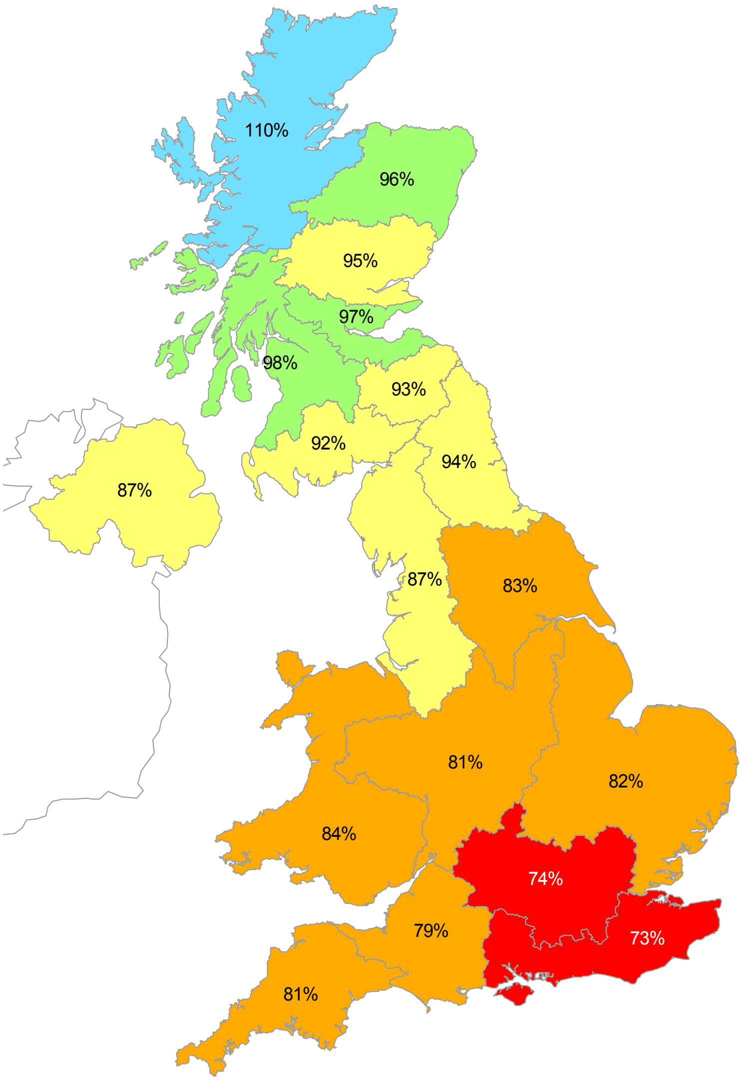
Below average

Substantially below average

Exceptionally low rainfall



December 2005 - February 2006



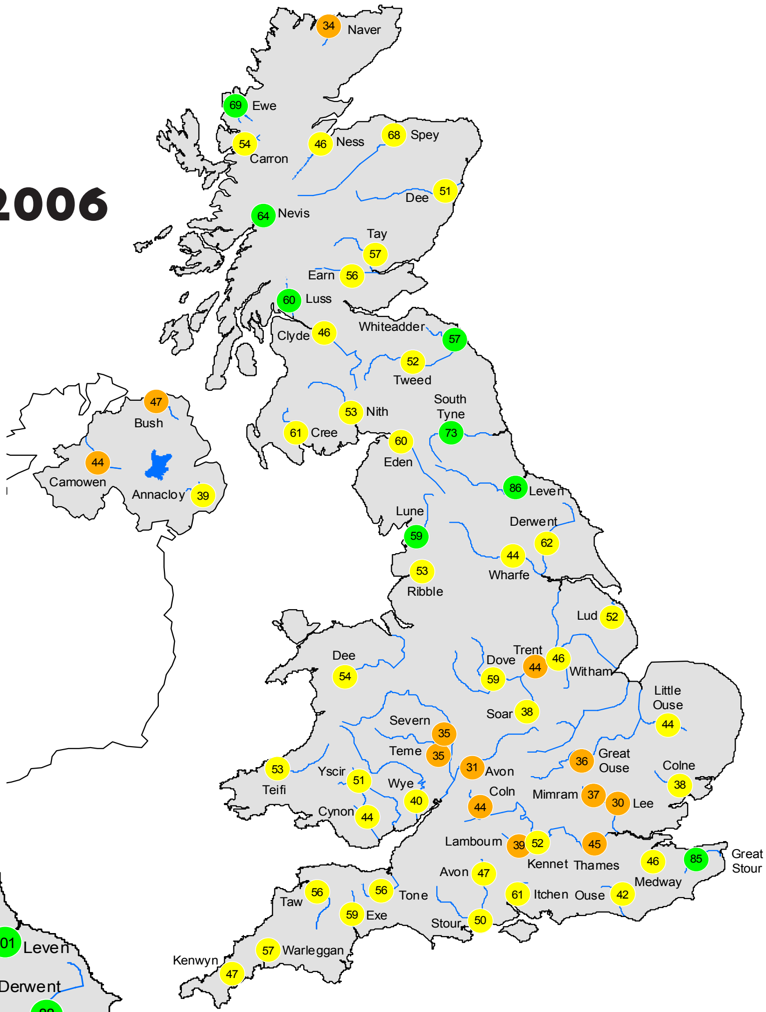
November 2004 - February 2006

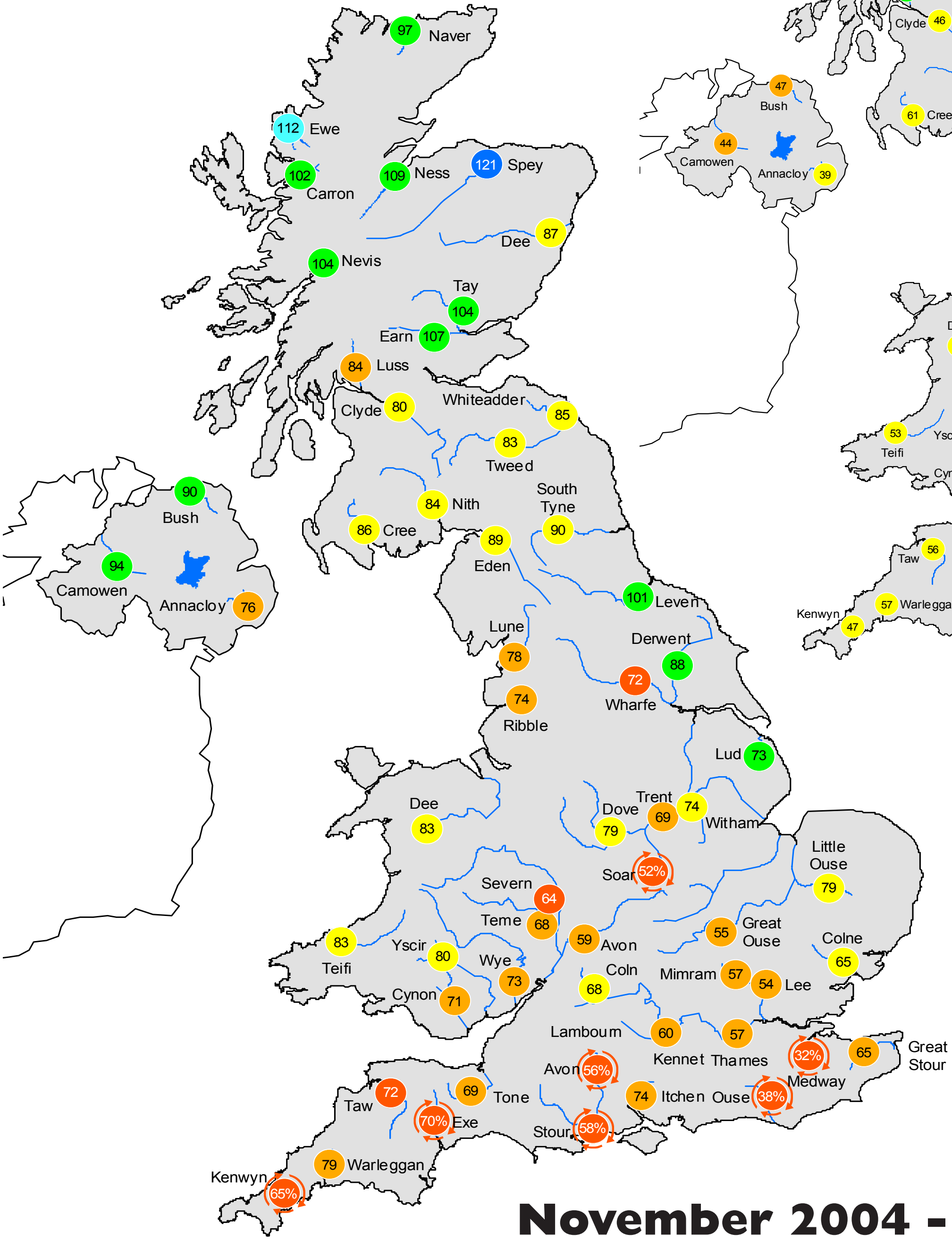
Rainfall accumulation maps

Many parts of the UK recorded their driest, or second driest, winter (Dec-Feb) for over 40 years; rainfall deficiencies exceeded 35% for much of the country. Nationwide, the rainfall deficiencies since October 2004 are less notable but the current drought stress reflects the drought's distinct regional focus (in the South East) in this timeframe. The 16-month rainfall total for the Thames region is the lowest since 1932-34.

River flow . . . River flow . . .

February 2006





Key

25 — % of long-term average (record figure when circled)

- Exceptionally high flow
- Notably high flow
- Above normal
- Normal range
- Below normal
- Notably low flow
- Exceptionally low flow

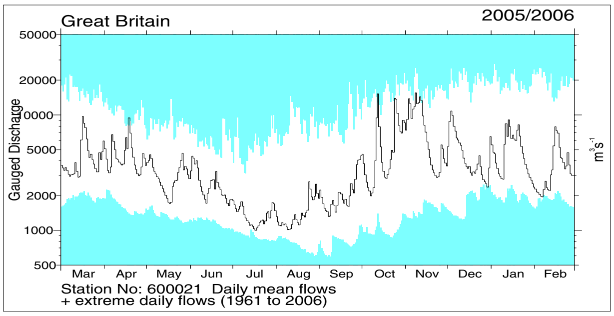
*Based on ranking of the monthly flow**

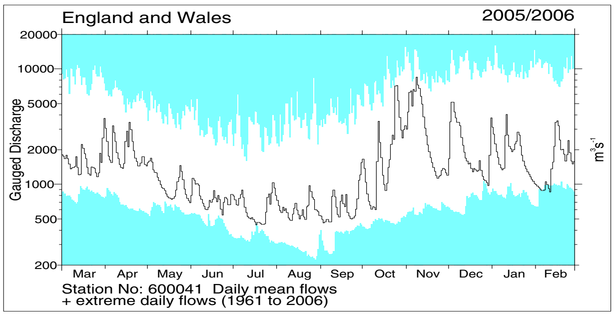
November 2004 - February 2006

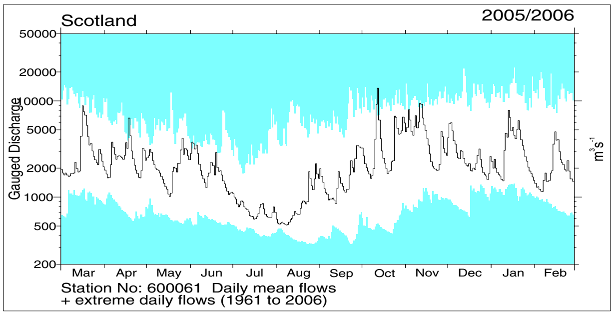
River flows

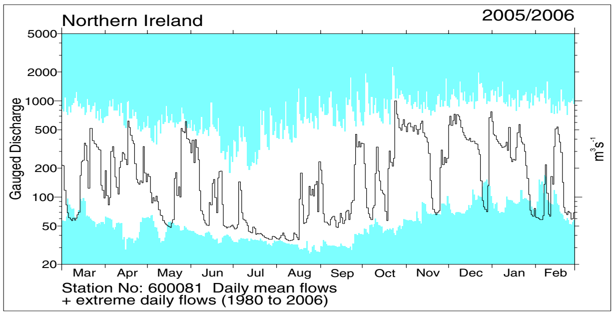
*Comparisons based on percentage flows alone can be misleading. A given percentage flow can represent extreme drought conditions in permeable catchments where flow patterns are relatively stable but be well within the normal range in impermeable catchments where the natural variation in flows is much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

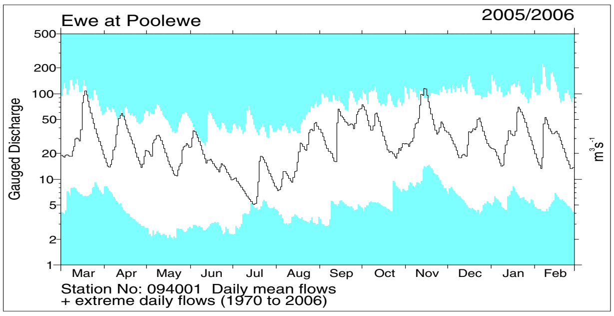
River flow . . . River flow . . .

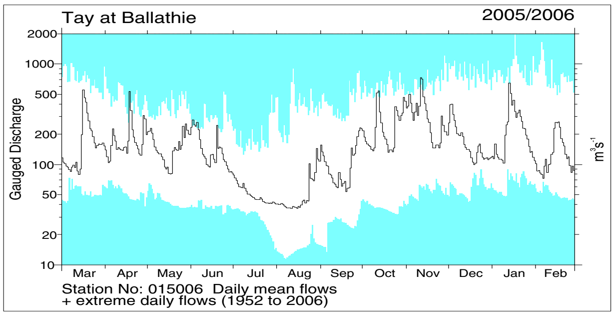


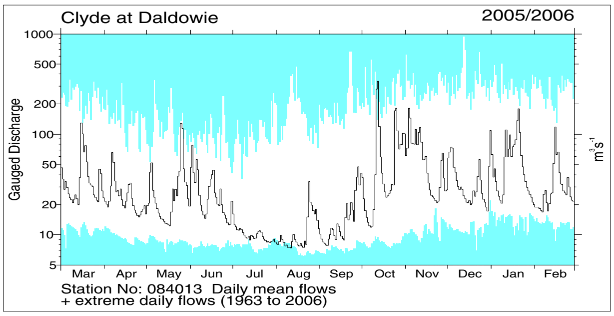


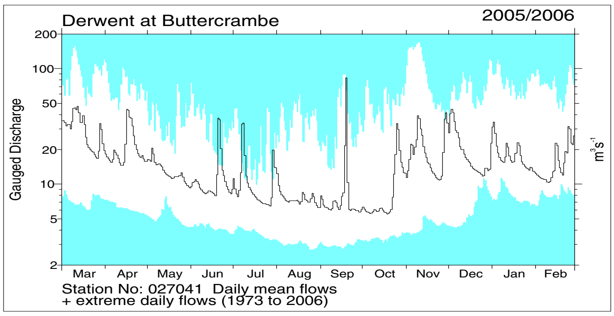


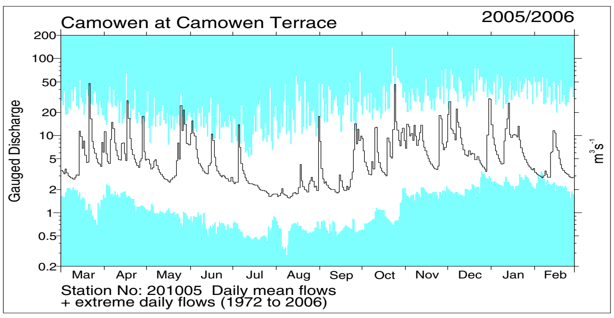


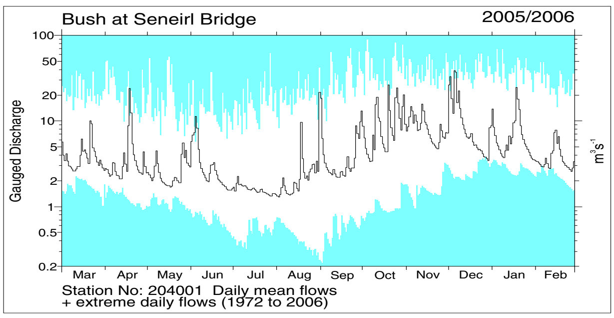








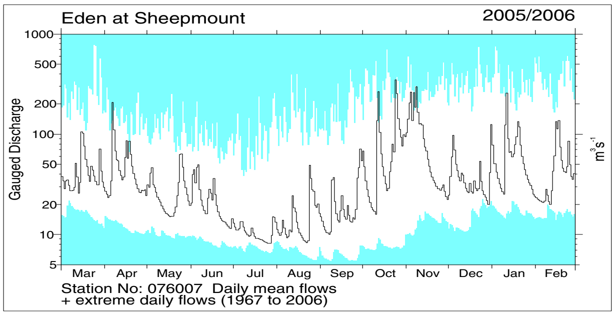


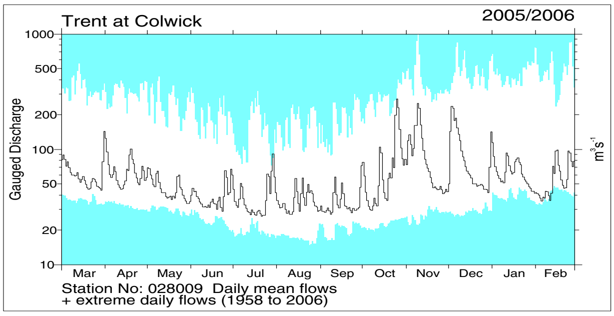


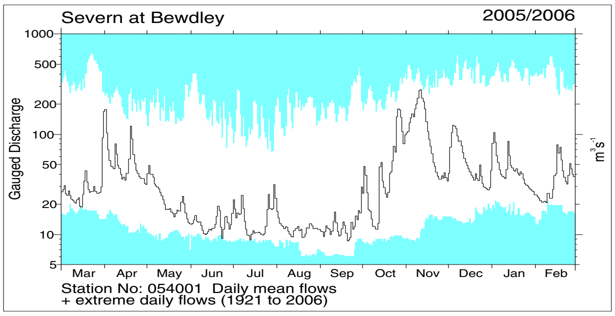
River flow hydrographs

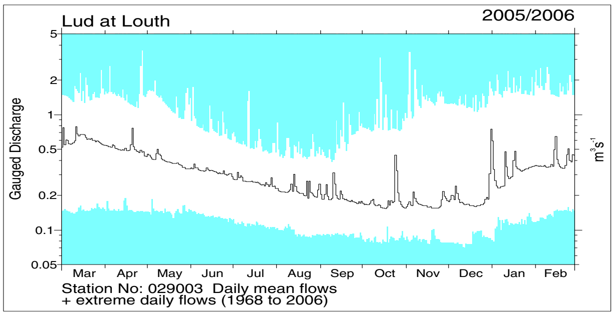
The river flow hydrographs show the daily mean flows together with the maximum and minimum daily flows prior to March 2005 (shown by the shaded areas). Daily flows falling outside the maximum/minimum range are indicated where the bold trace enters the shaded areas.

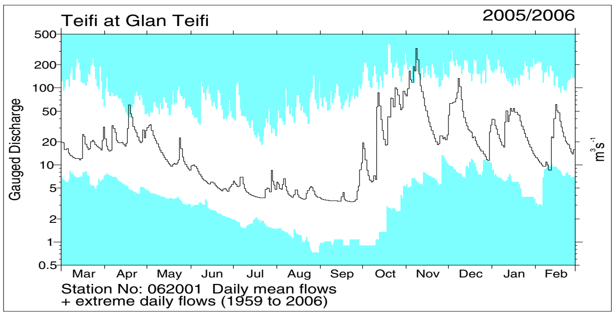
River flow . . . River flow . . .

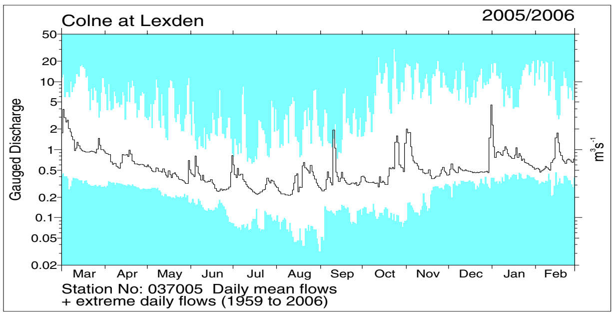


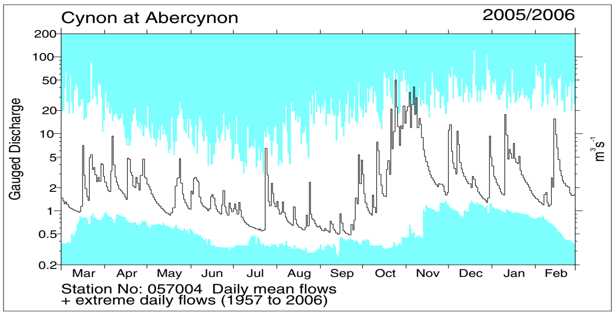


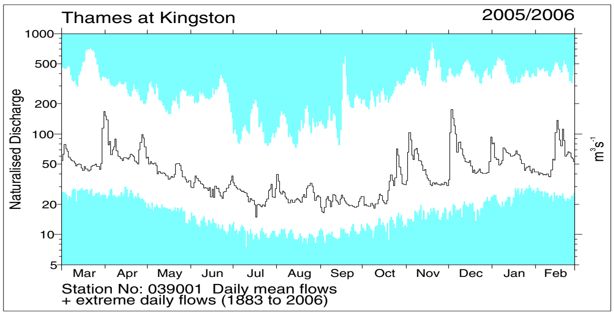


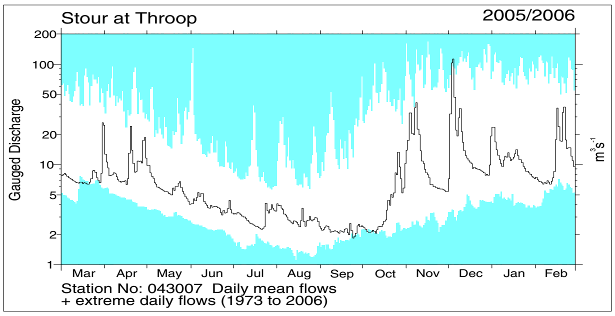


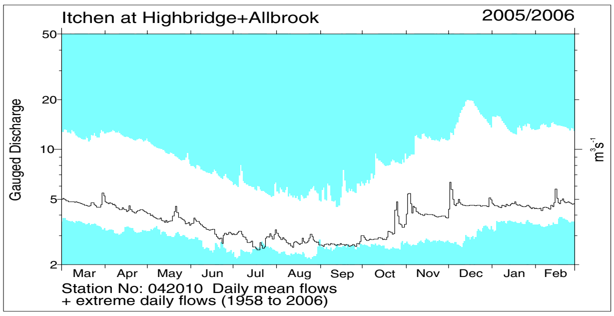












Notable runoff accumulations (a) December 2005- February 2006, (b) November 2004 - February 2006

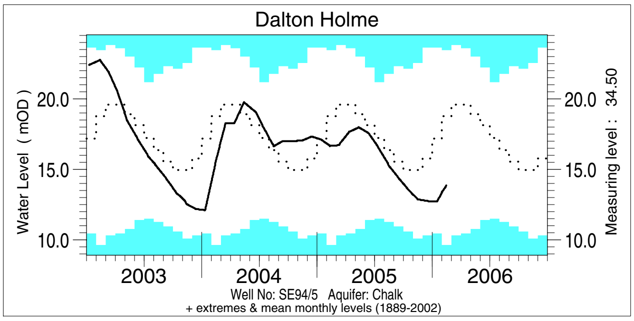
	River	%lta	Rank
a)	Forth	47	1/25
	Mimram	42	2/53
	Ouse (Gold Bridge)	30	1/44
	Wallington	36	2/53
	Severn	44	4/85
	Yscir	53	1/33
	Eden	60	2/39
	Clyde (Daldowie)	56	2/43
	Naver	47	1/29
	Faughan	59	1/30

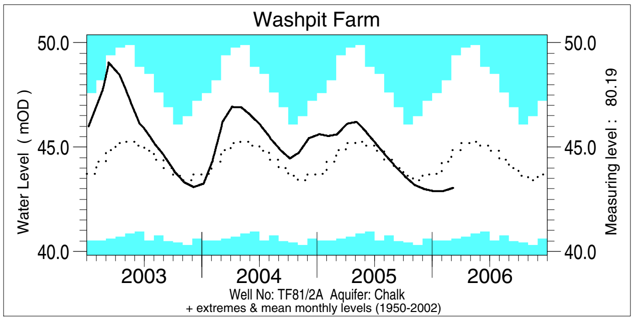
	River	%lta	Rank
b)	Spey (Boat o'Brig)	121	50/53
	Wharfe	72	2/50
	Soar	52	1/34
	Mole	55	1/29
	Medway	32	1/42
	Test	64	1/47
	Avon (Amesbury)	56	1/40

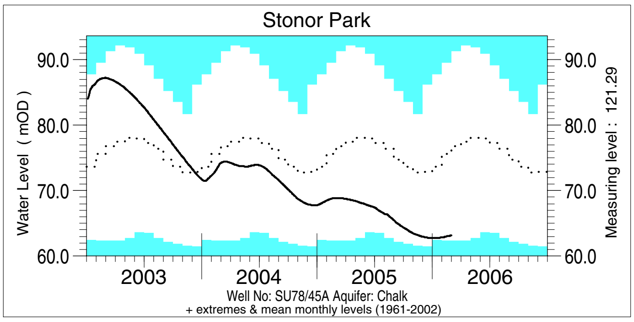
River	%lta	Rank
Stour (Throop)	58	1/32
Piddle	60	1/40
Exe	70	1/49
Warleggan	79	2/36
Kenwyn	65	1/37
Luss	84	2/25
L Bann	73	1/25

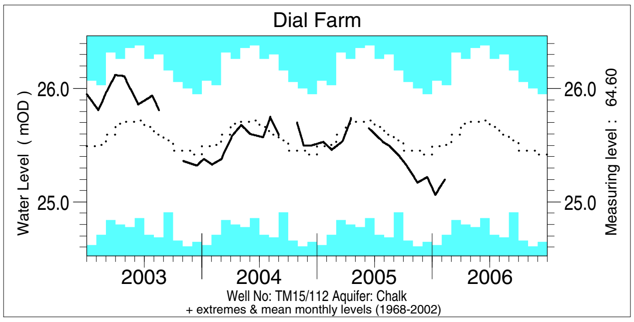
lta = long term average
Rank 1 = lowest on record

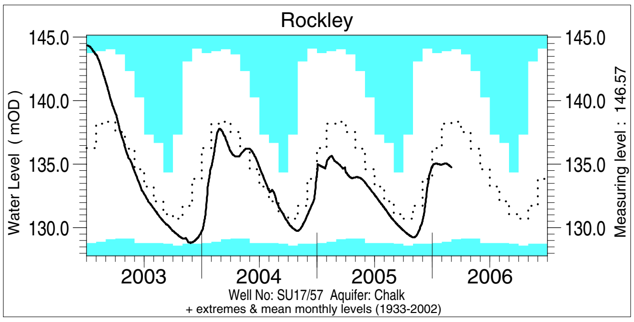
Groundwater . . . Groundwater

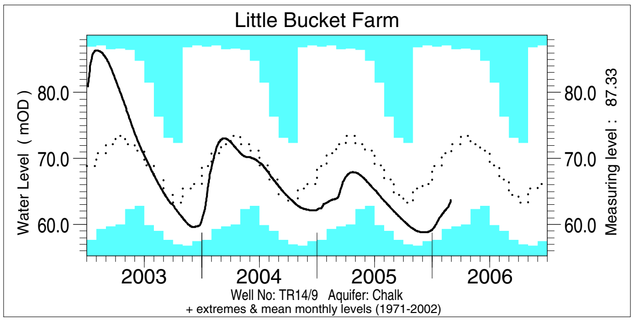


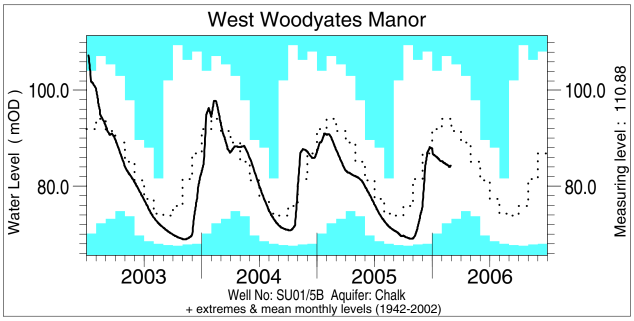


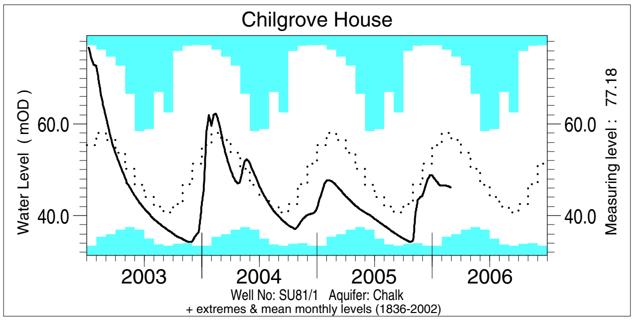


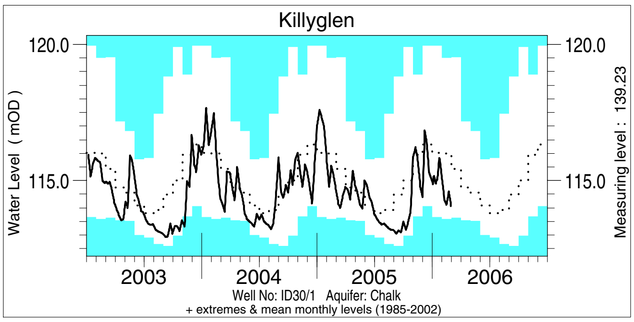


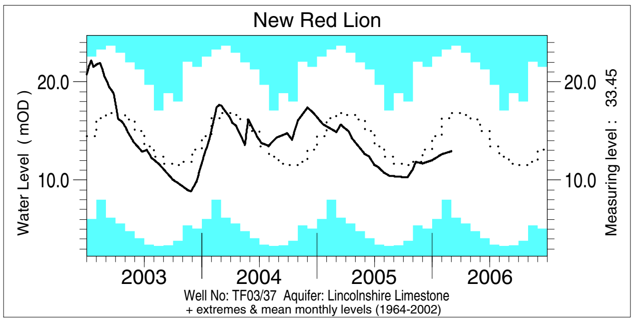




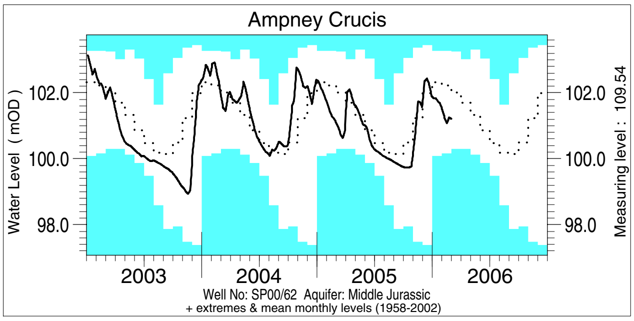


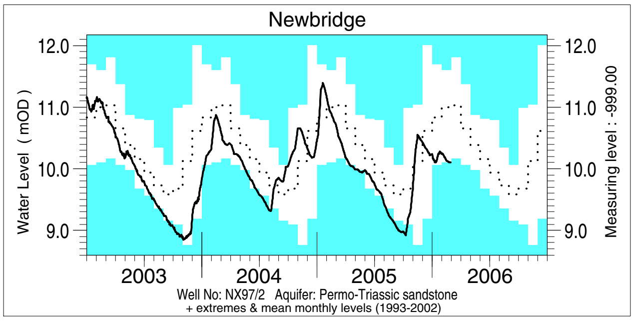


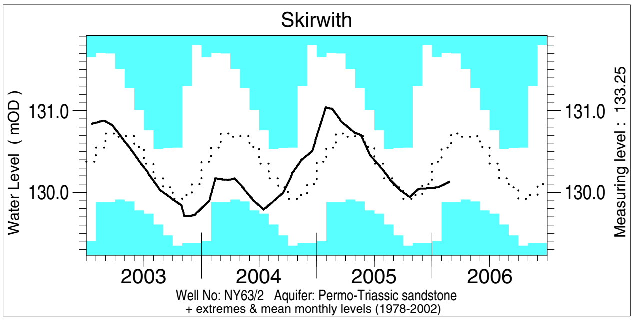


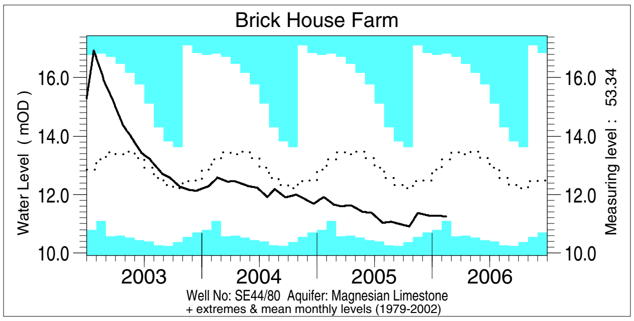


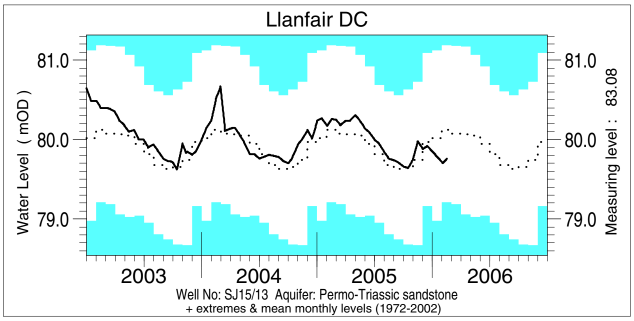
Groundwater levels normally rise and fall with the seasons, reaching a peak in the spring following replenishment through the winter (when evaporation losses are low and soil moist). They decline through the summer and early autumn. This seasonal variation is much reduced when the aquifer is confined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

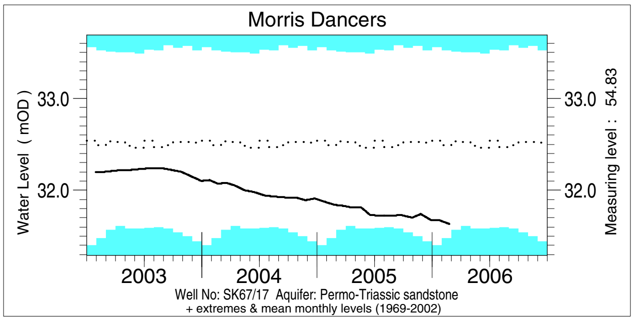


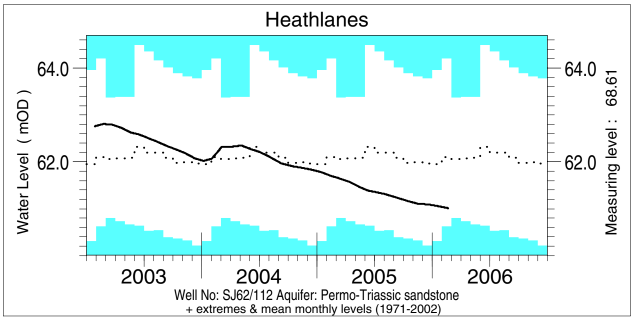


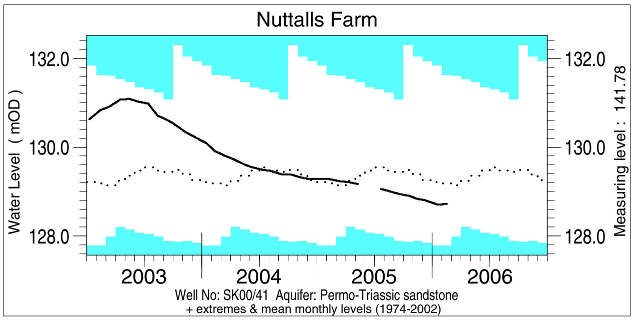


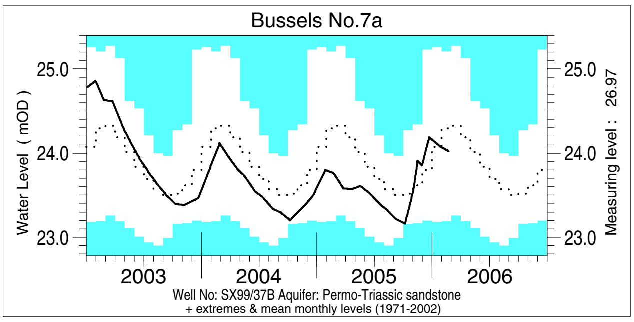


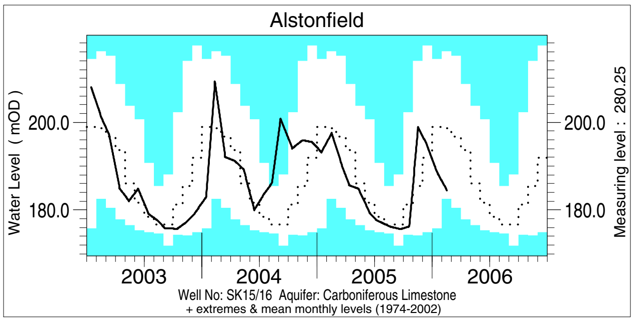










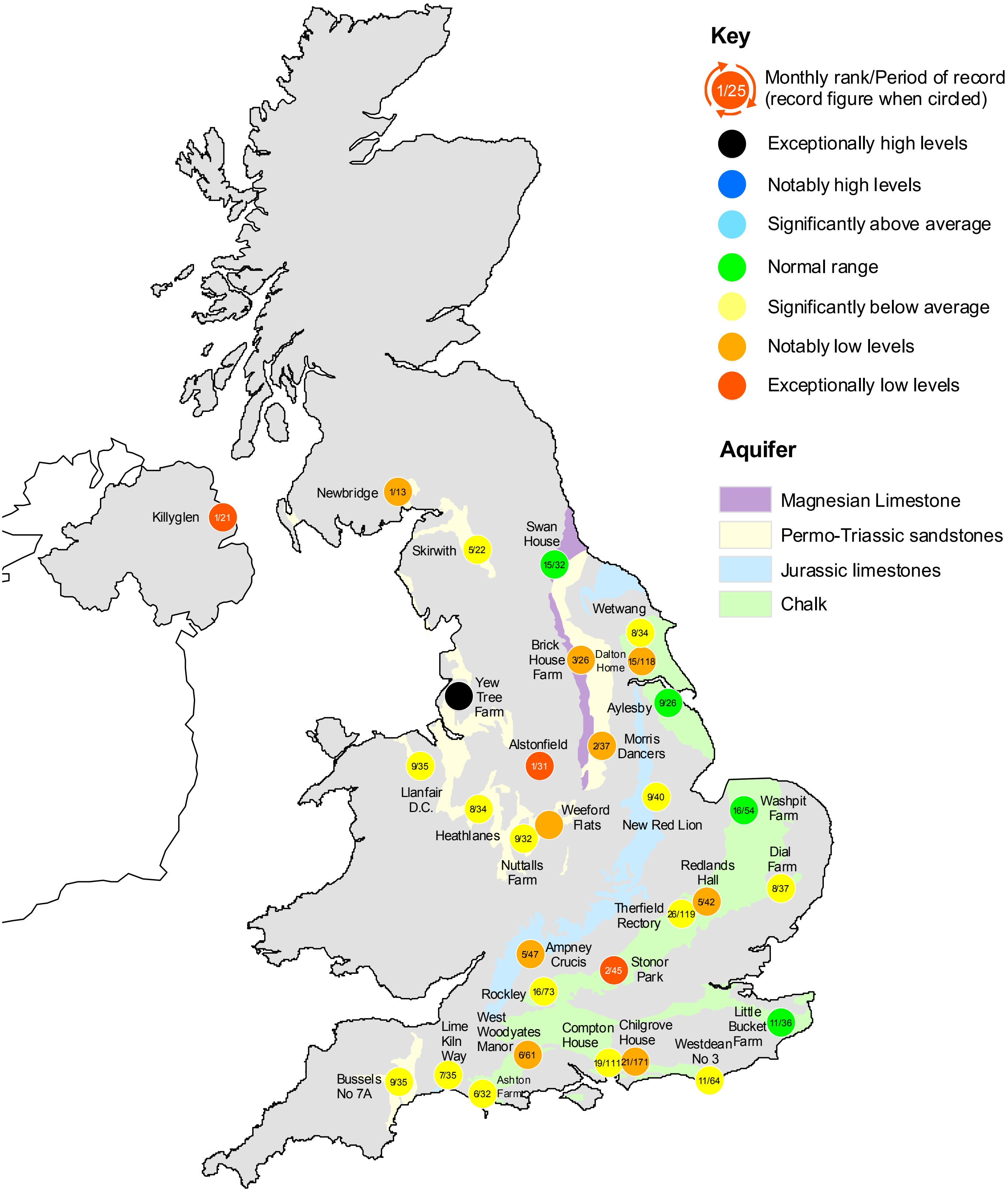


Groundwater levels February / March 2006

Borehole	Level	Date	Feb. av.	Borehole	Level	Date	Feb. av.	Borehole	Level	Date	Feb. av.
Dalton Holme	13.85	13/02	18.70	Chilgrove House	46.10	28/02	57.59	Llanfair DC	79.76	15/02	80.06
Washpit Farm	43.05	08/03	44.42	Killyglen	114.07	28/02	115.71	Morris Dancers	31.63	24/02	32.36
Stonor Park	63.16	01/03	75.79	New Red Lion	12.93	02/03	16.41	Heathlanes	61.01	20/02	62.04
Dial Farm	25.20	09/02	25.51	Ampney Crucis	101.21	01/03	102.22	Nuttalls Farm	128.72	15/02	129.47
Rockley	134.77	01/03	138.28	Newbridge	10.10	28/02	10.99	Bussels No.7a	24.02	22/02	24.31
Little Bucket Farm	63.65	28/02	70.45	Skirwith	130.13	24/02	130.62	Alstonfield	184.51	15/02	199.03
West Woodyates	84.31	28/02	93.24	Brick House Farm	11.25	13/02	13.25				

Levels in metres above Ordnance Datum

Groundwater . . .Groundwater



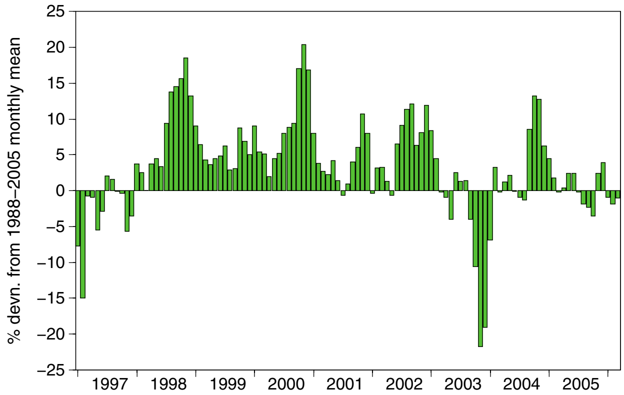
Groundwater levels - February 2006

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.

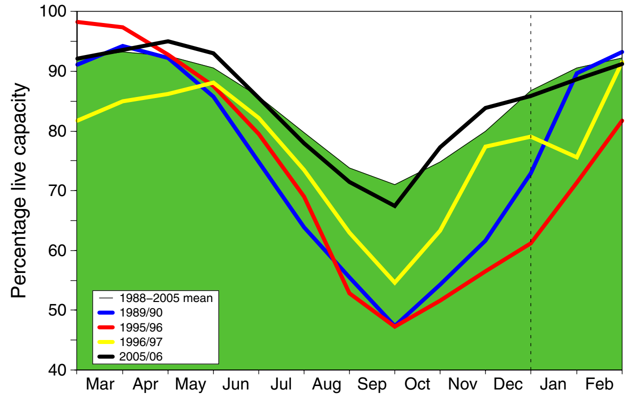
Notes: i. The outcrop areas are coloured according to British Geological Survey conventions.
ii. Yew Tree Farm levels are now received quarterly.

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.

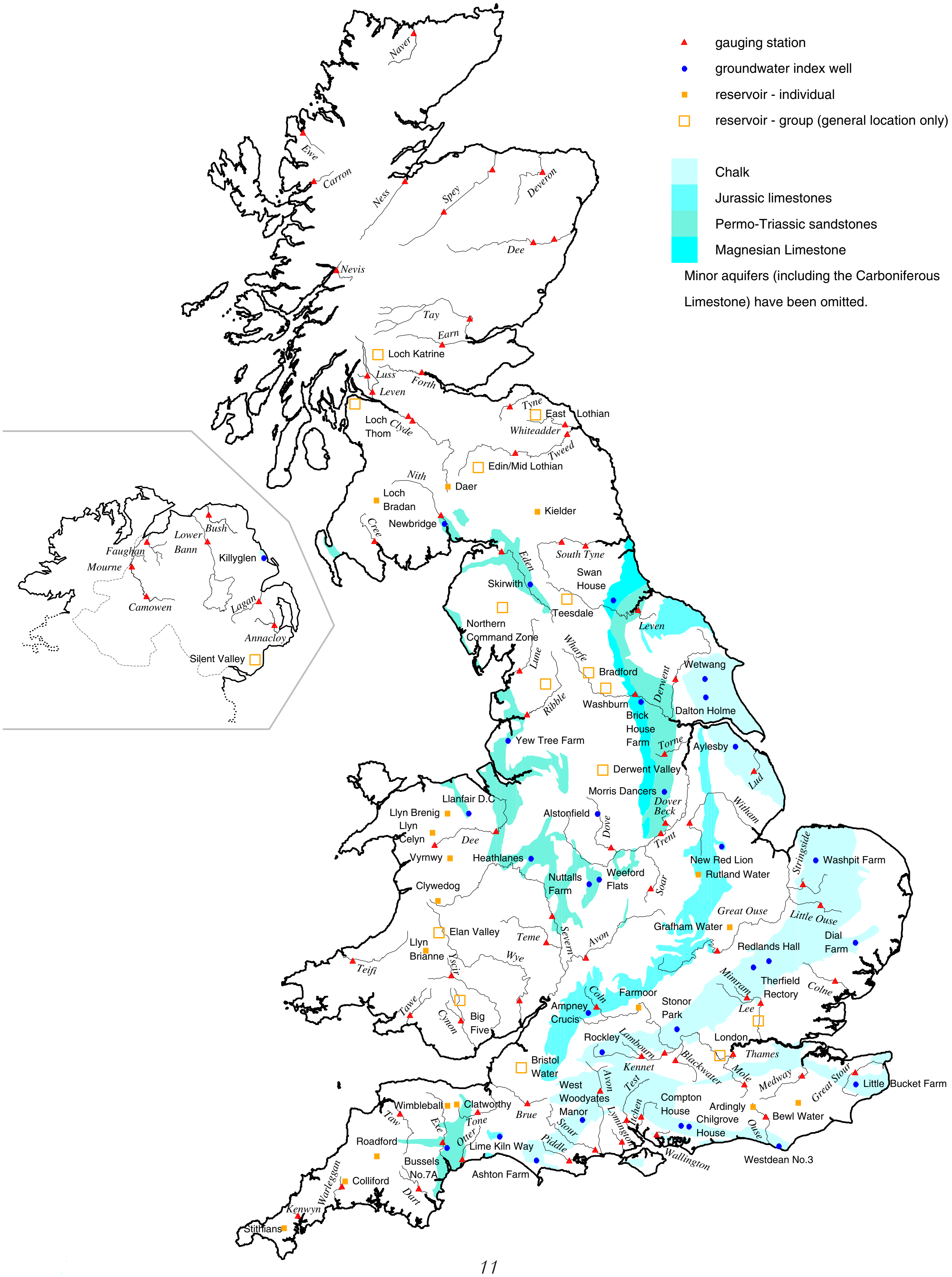
Percentage live capacity of selected reservoirs at start of month

Area	Reservoir	Capacity (Ml)	2005 Nov	2006 Dec	Jan	Feb	Mar	Avg. Mar	Min. Mar	Year* of min.
North West	N Command Zone	• 124929	74	90	82	89	**90**	93	78	1996
	Vyrnwy	55146	82	88	85	91	**90**	94	59	1996
Northumbrian	Teesdale	• 87936	85	91	93	94	**100**	90	72	1996
	Kielder	(199175)	(98)	(91)	(92)	(93)	**(92)**	(93)	(81)	1993
Severn Trent	Clywedog	44922	82	82	86	87	**88**	90	77	1996
	Derwent Valley	• 39525	75	86	92	93	**98**	94	46	1996
Yorkshire	Washburn	• 22035	69	79	92	85	**89**	92	53	1996
	Bradford supply	• 41407	65	80	81	82	**83**	94	53	1996
Anglian	Grafham	(55490)	(79)	(81)	(79)	(85)	**(89)**	(87)	(72)	1997
	Rutland	(116580)	(73)	(73)	(72)	(80)	**(83)**	(88)	(71)	1992
Thames	London	• 202406	65	80	87	92	**98**	91	83	1988
	Farmoor	• 13822	100	99	98	93	**99**	93	64	1991
Southern	Bewl	28170	39	36	34	37	**50**	86	50	2006
	Ardingly	4685	44	50	57	65	**77**	98	77	2006
Wessex	Clatworthy	5364	55	92	99	100	**100**	97	82	1992
	Bristol WW	• (38666)	(47)	(59)	(71)	(76)	**(81)**	(92)	(65)	1992
South West	Colliford	28540	46	51	56	60	**62**	85	57	1997
	Roadford	34500	57	63	68	69	**71**	83	35	1996
	Wimbleball	21320	62	73	77	84	**95**	94	72	1996
	Stithians	5205	43	64	74	83	**88**	92	45	1992
Welsh	Celyn and Brenig	• 131155	87	95	94	96	**98**	97	69	1996
	Brianne	62140	99	92	97	95	**95**	98	92	2004
	Big Five	• 69762	75	87	97	97	**97**	95	85	1988
	Elan Valley	• 99106	83	98	100	98	**98**	98	88	1993
Scotland(E)	Edinburgh/Mid Lothian	• 97639	80	94	93	95	**94**	94	73	1999
	East Lothian	• 10206	72	93	93	100	**99**	99	91	1990
Scotland(W)	Loch Katrine	• 111363	95	88	82	94	**95**	95	86	2005
	Daer	22412	100	98	97	100	**99**	99	94	2004
	Loch Thom	• 11840	87	100	100	100	**100**	99	90	2004
Northern Ireland	Total+	• 67270	80	85	92	90	**88**	89	81	2004
	Silent Valley	• 20634	82	92	99	94	**90**	82	57	2002

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

Details of the individual reservoirs in each of the groupings listed above are available on request. The featured reservoirs may not be representative of the storage conditions across each region; this can be particularly important during droughts. The storage figures relate to the 1988-2006 period only (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.

*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:

Hydrological Summaries
National Water Archive
CEH Wallingford
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Crowmarsh Gifford
Wallingford
Oxfordshire
OX10 8BB

Tel.: 01491 838800
Fax: 01491 692424
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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

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