Hydrological summary *for the United Kingdom*

May 2002

General

May was a very mixed bag in weather terms - a brief heatwave occurred in mid-month but longer autumnal interludes were more typical as low pressure dominated synoptic patterns across most of the UK. A series of Atlantic frontal systems brought substantial rainfall to western and northern catchments especially. Spate conditions – with localised flooding – characterised many western rivers. The associated notably high May runoff totals contributed to a seasonally unusual increase in reservoir stocks through May. Entering June, overall reservoir stocks for England and Wales were the highest on record (for the time of year); stocks in most major impoundments exceeded 90% of capacity. In a few areas, groundwater levels also increased, and late spring levels in index wells and boreholes were close to, or above, average throughout most of the UK – and well above in parts of the Midlands and North West. The water resources outlook for the summer is healthy.

Rainfall

In most regions May was a very unsettled month with relatively few dry days away from sheltered north-eastern areas of Britain. Many localities experienced a wide variety of precipitation types – rain, sleet, snow hail and fog - and several very wet interludes. Folkestone reported a 24 hr rainfall total of 30 mm on 13/14th whilst Dawlish and Milford Haven registered 51 mm and 48 mm respectively on 16/17th, - totals in excess of 50 mm were also recorded in parts of Northern Ireland (County Down). Showers and thunderstorms combined to produce large spatial variations in monthly rainfall totals. For the month as a whole, much of north-eastern Britain was relatively dry, rainfall fell below 50% of average adjacent to the Moray Firth. A few parts of central southern England were also relatively dry; in contrast the Upper Mole catchment registered its second wettest May in 82 years, and most exposed western hills had a notably wet month (rainfall >200 % in parts of the Lake District, Dartmoor and the Scottish Highlands). Provisional data indicate that all regions of the UK recorded above average May rainfall and, nationally, it was the second wettest May since 1986. Northern Ireland is experiencing a notably wet phase; the Jan-May rainfall total is the highest in a series from 1900. Parts of eastern England have had a relatively dry spring but longer term regional accumulations are generally well within the normal range.

River flows

Many rivers recorded a very wide range of flows during May. As usual, flow variability was muted in groundwater-fed lowland rivers where gentle recessions were, in some areas, punctuated by short-lived spates. Significant May spates were reported from some responsive lowland catchments (e.g. the Mole) and notable high flows were common in western and northern catchments - at the beginning of month (e.g. on the Camowen in Northern Ireland) and, especially, during the third week when the Dart, Teifi and Yscir were amongst a number of rivers establishing new maximum flow rates for May. On the Teifi, daily flows remained above pre-2000 late May daily maxima for around 10 days and flows in the Tay – which were close to the seasonal minima in April - increased dramatically in mid May, the peak on the 24th was the 3rd highest, for the month, on record. Some local, mostly urban, flooding was reported (e.g. in Swansea and Belfast). May runoff totals were depressed in parts of the North-East – the Leven reported its lowest May mean flow since 1960. However, throughout most of the UK runoff totals were among the upper quartile for May and unprecedented for some western rivers (including the Dart, Tawe and Teifi). Spring (March-May) runoff totals are mostly well within the normal range, albeit appreciably below average in many impermeable eastern catchments; the same general picture emerges for runoff accumulations over the last six months.

Groundwater

May rainfall was well above average across most aquifer outcrop areas in southern Britain. This resulted in an unusual late-spring decline in soil moisture deficits; by early June soils in many areas were substantially wetter than in mid April. As a consequence, modest recharge (although notable for the late spring) occurred in some areas e.g. the North Downs. Small increases in groundwater levels were noted in some responsive aquifer units (e.g. the Jurassic Limestone and Essex Gravels). However, as usual in May, there was little change in the broad groundwater resources picture. Levels in the Chalk were generally close to the seasonal norm in the western and northern outcrops but still well above average in the east – a situation that has been maintained since late 1999. May levels in index wells and boreholes in the limestone aquifers were mostly very close to the late-spring average. This was also true of the more responsive Permo-Triassic sandstones units (e.g. in the South-West) but, to the north, levels in many outcrop areas remain close to, or above, pre-2000 maxima. The modest early summer soil moisture deficits indicate that, in the absence of unusually low summer rainfall, an early seasonal onset of infiltration may be expected in most outcrop areas during the autumn.

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Rainfall . . . Rainfall . . .

Rainfall accumulations and return period estimates

Area	Rainfall	May 2002	Mar02-May02	RP	Dec01-May02	RP	Sep01-May02	RP	Jun01-May02	RP
England & Wales	**mm**	**81**	**179**		**421**		**702**		**905**	
	%	**125**	**90**	**2-5**	**93**	**2-5**	**99**	**2-5**	**99**	**2-5**
North West	mm	122	266		689		1070		1289	
	%	163	110	2-5	122	5-10	115	5-10	107	2-5
Northumbrian	mm	67	160		442		698		889	
	%	109	85	2-5	107	2-5	108	2-5	104	2-5
Severn Trent	mm	72	153		358		578		752	
	%	123	87	2-5	95	2-5	100	<2	100	<2
Yorkshire	mm	65	146		371		623		797	
	%	109	78	2-5	91	2-5	99	2-5	97	2-5
Anglian	mm	57	124		248		461		641	
	%	119	88	2-5	88	2-5	104	2-5	107	2-5
Thames	mm	80	167		347		568		731	
	%	143	103	2-5	102	2-5	108	2-5	106	2-5
Southern	mm	89	173		379		639		787	
	%	164	102	2-5	98	2-5	103	2-5	101	2-5
Wessex	mm	99	205		440		666		836	
	%	163	111	2-5	103	2-5	100	<2	100	<2
South West	mm	139	279		649		940		1123	
	%	193	116	2-5	105	2-5	99	2-5	96	2-5
Welsh	mm	140	298		746		1154		1411	
	%	171	111	2-5	113	2-5	109	2-5	107	2-5
Scotland	**mm**	**106**	**319**		**864**		**1298**		**1586**	
	%	**123**	**111**	**2-5**	**125**	**15-25**	**114**	**5-10**	**110**	**5-10**
Highland	mm	96	367		1060		1608		1940	
	%	104	106	2-5	124	10-20	112	5-10	110	5-10
North East	mm	73	179		485		793		1023	
	%	106	86	2-5	104	2-5	106	2-5	105	2-5
Tay	mm	133	314		799		1167		1425	
	%	160	124	5-10	129	10-20	118	5-10	116	5-10
Forth	mm	103	273		670		971		1218	
	%	139	120	5-10	125	10-20	111	2-5	110	2-5
Tweed	mm	76	202		556		823		1051	
	%	107	98	2-5	119	5-10	111	2-5	108	2-5
Solway	mm	151	350		880		1292		1558	
	%	178	125	5-10	129	10-20	114	5-10	110	2-5
Clyde	mm	136	408		1048		1545		1915	
	%	150	127	5-10	130	20-30	114	5-10	113	5-10
Northern Ireland	**mm**	**133**	**300**		**663**		**887**		**1110**	
	%	**187**	**134**	**5-15**	**128**	**10-20**	**107**	**2-5**	**105**	**2-5**

RP = Return period

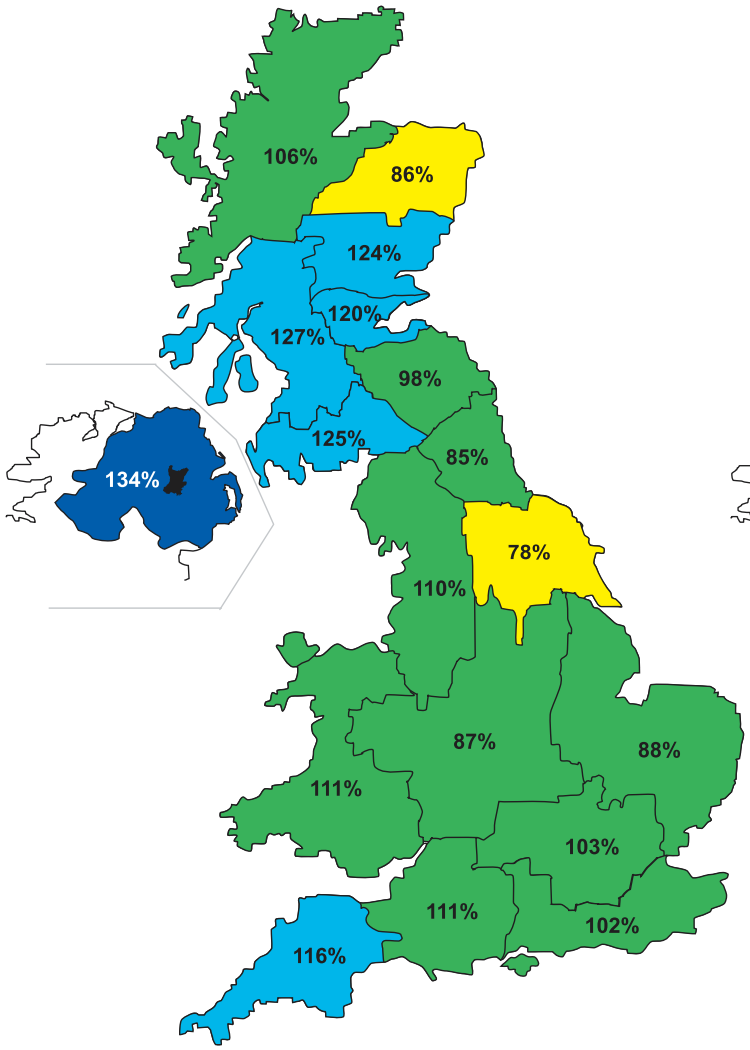
 All monthly totals since December 1998 are provisional (see page 12). The figures for England & Wales are derived by the Hadley Centre and are updates of the homogenised series developed by the Climate Research Unit; the other national figures are derived from different raingauge networks to those used to derive the CRU data series. The return period estimates are based on tables provided by the Meteorological 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.

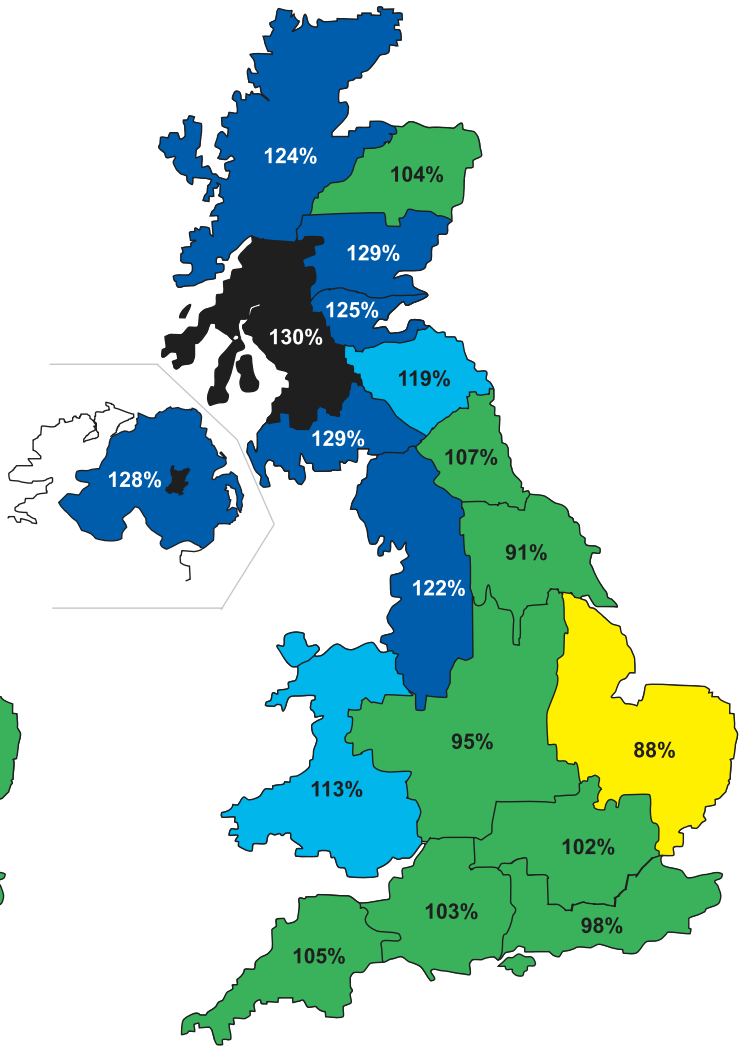
Rainfall . . . Rainfall . . .

Key

00%	Percentage of 1961-90 average
	Very wet
	Substantially above average
	Above average
	Normal range
	Below average
	Substantially below average
	Exceptionally low rainfall



March 2002 - May 2002

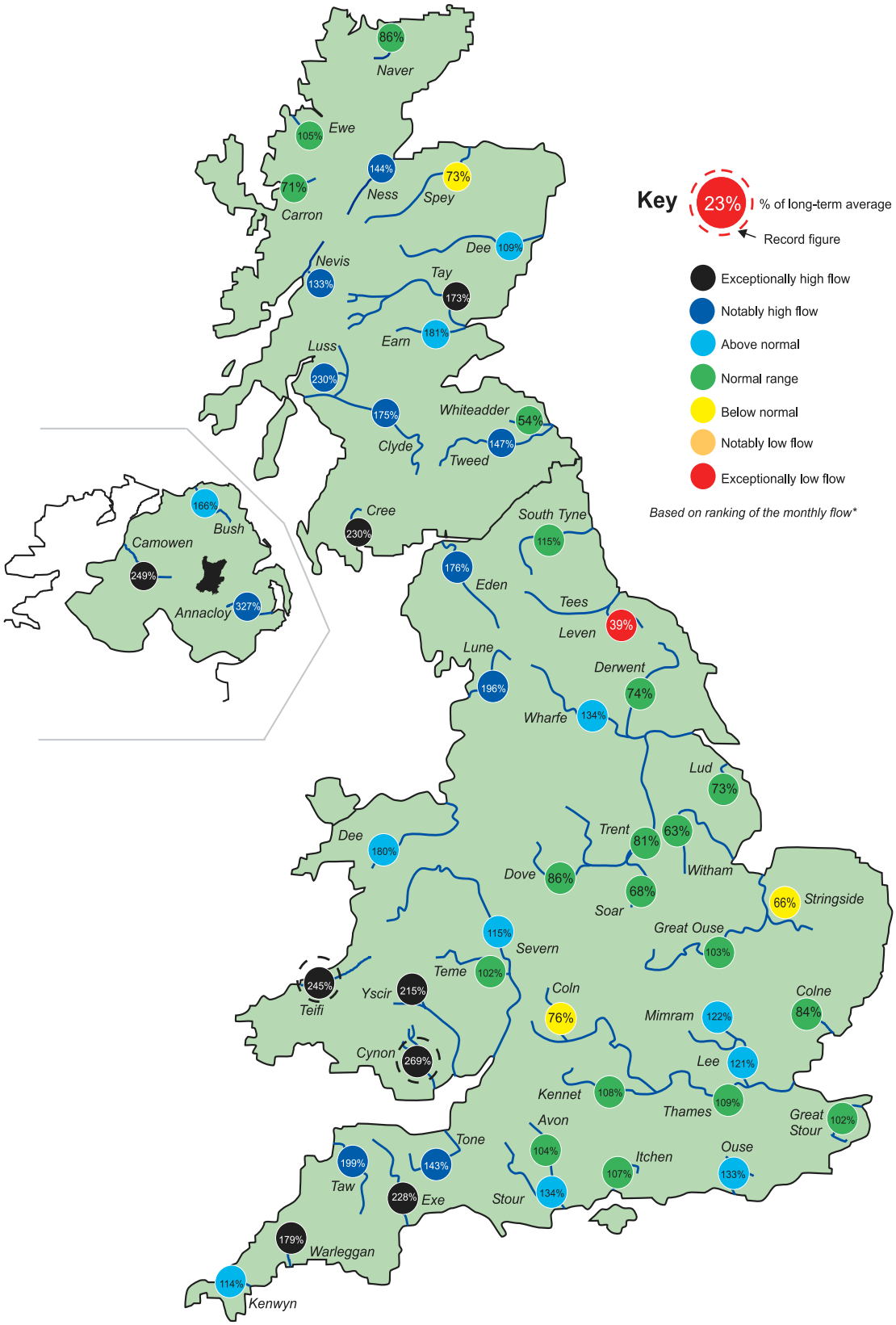


December 2001 - May 2002

Rainfall accumulation maps

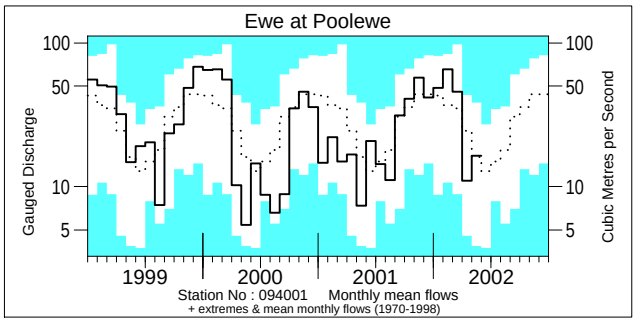
For the UK as a whole, spring (March-May) rainfall was very close to the 1961-90 average, there were, however, modest rainfall deficienies across large parts of central and eastern England. In the six-month timeframe, most regional rainfall totals are well within the normal range but Scotland was wet - adding to a recent cluster of notably high rainfall totals over this timespan. Provisionally, Dec 2001 - May 2002 ranks 11th wettest in a series from 1869, but there have been seven wetter such periods since 1988.

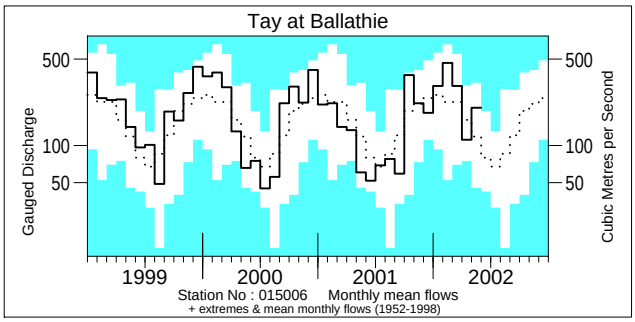
River flow . . . River flow . . .

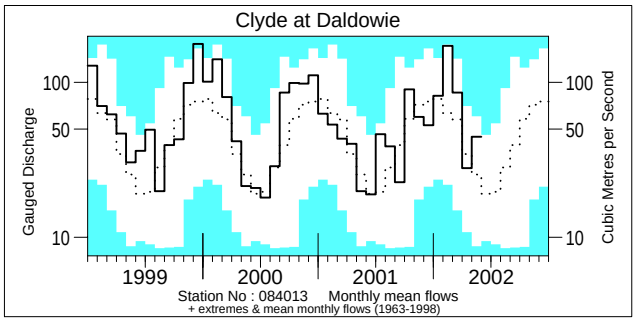


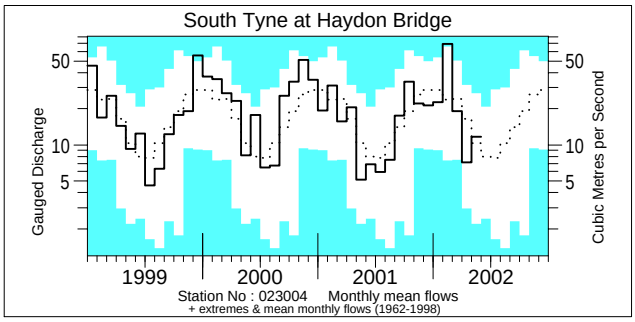
River flows - May 2002

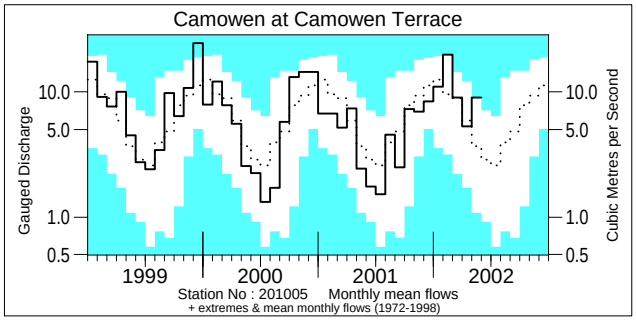
*Comparisons based on percentage flows alone can be misleading. A given percentage flow can represent extreme drought conditions in permeable catchments where flow patterns are relatively stable but be well within the normal range in impermeable catchments where the natural variation in flows is much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

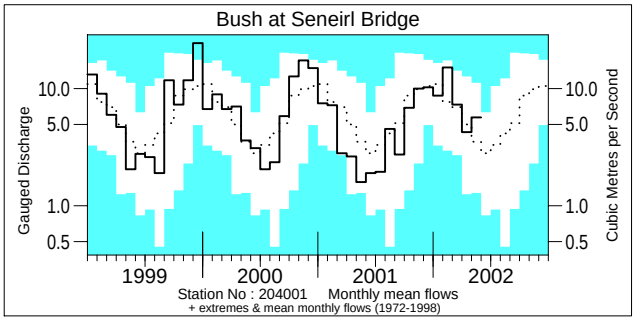


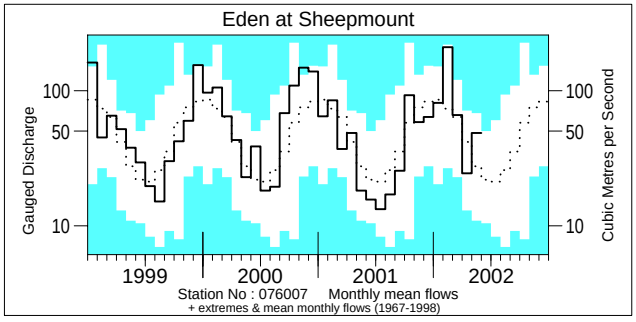


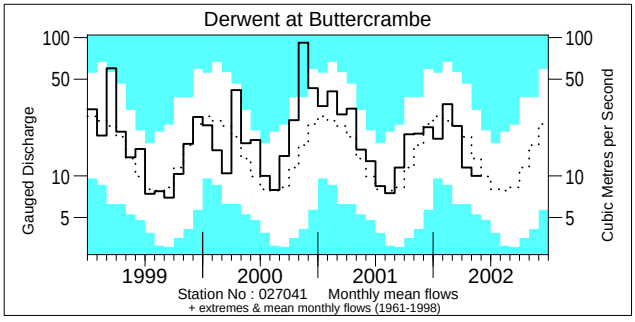


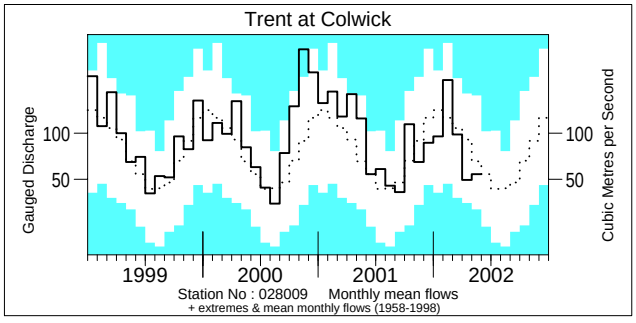


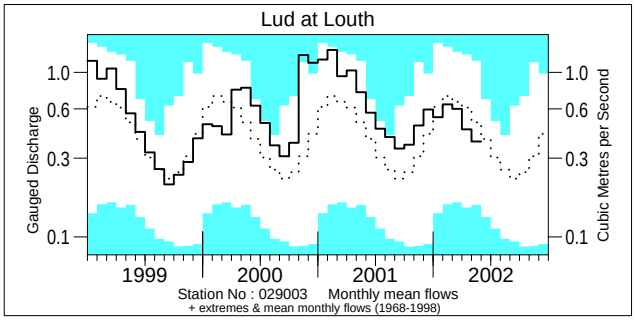








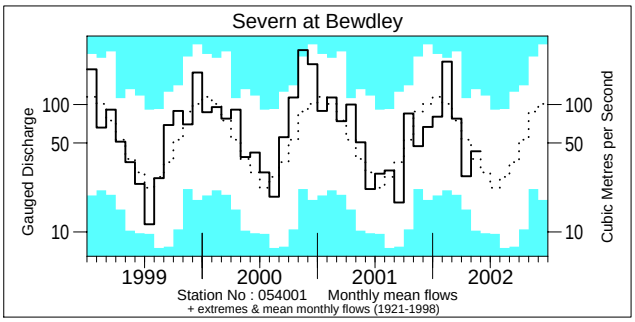


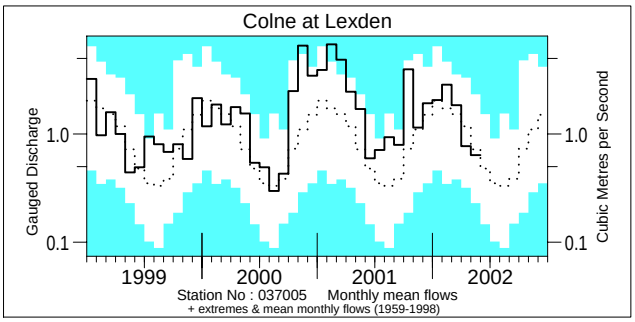


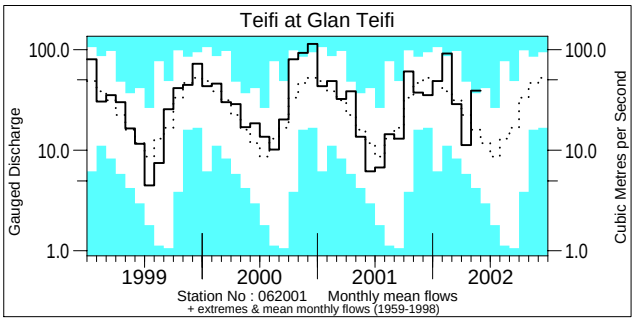
Monthly river flow hydrographs

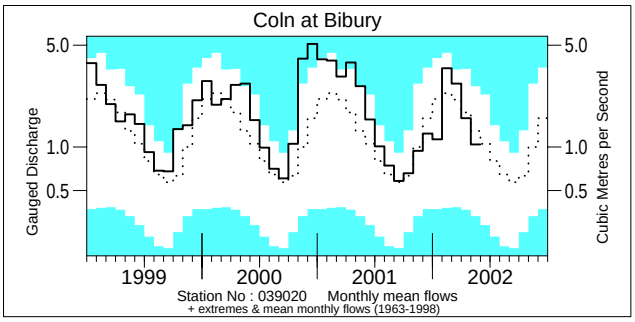
The river flow hydrographs show the monthly mean flow (bold trace), the long term average monthly flow (dotted trace) and the maximum and minimum flow prior to 1999 (shown by the shaded areas). Monthly flows falling outside the maximum/ minimum range are indicated where the bold trace enters the shaded areas.

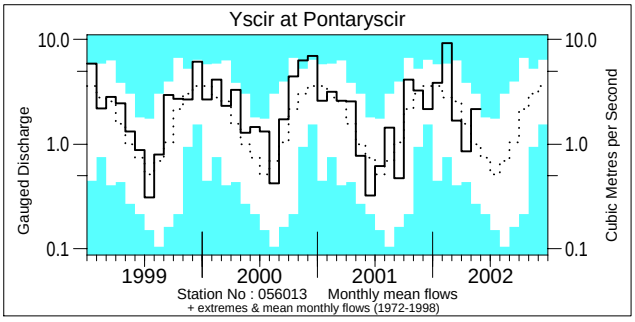
River flow . . . River flow . . .

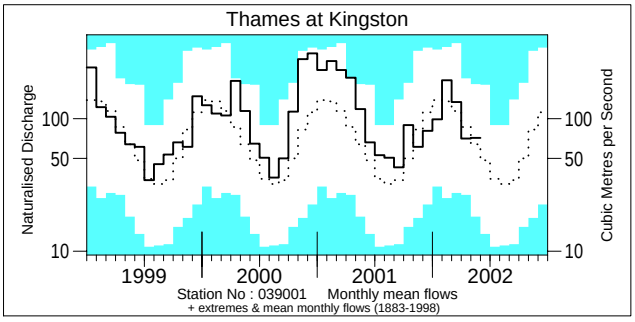


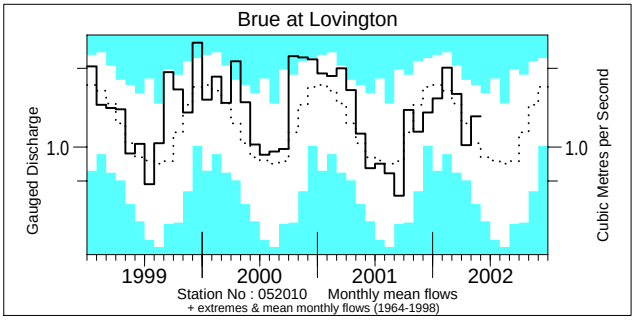


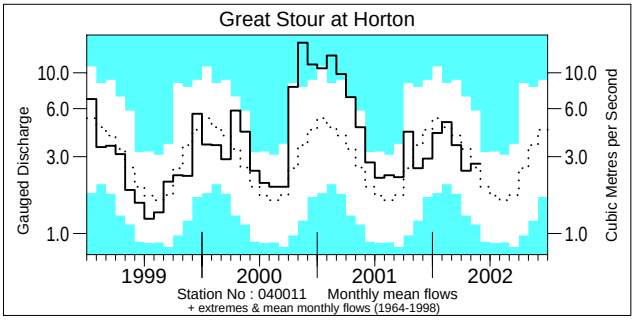


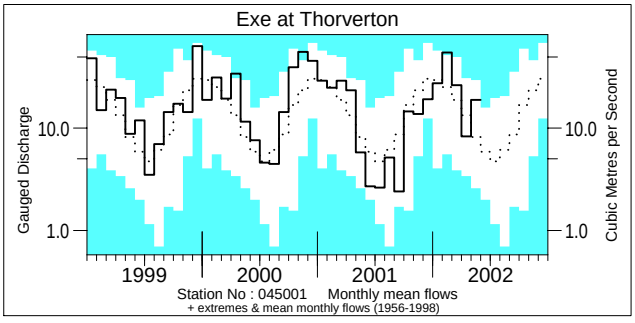


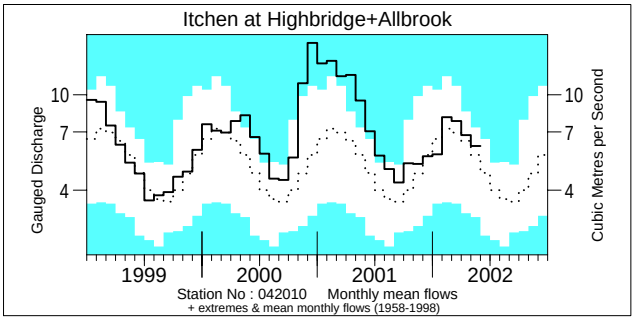












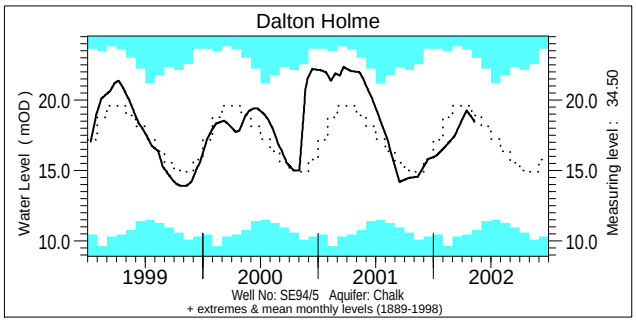
Notable runoff accumulations (a) March 2002 - May 2002, (b) December 2001 - May 2002

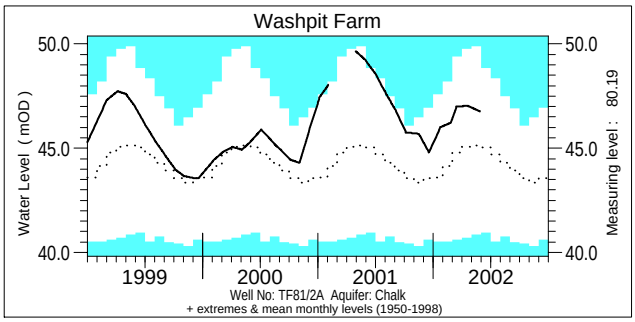
	River	%lta	Rank
a)	Yorks. Leven	43	4/43
	Soar	57	5/31
	Mole	127	22/28
	Dart	129	38/44
	Clyde	133	35/39
	Carron	79	6/24
	Camowen	126	24/29
	Annacloy	139	21/23

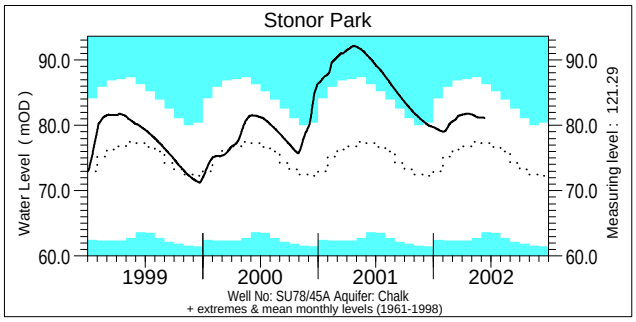
	River	%lta	Rank
b)	Torne	63	6/30
	Mimram	130	42/49
	Dorset Stour	83	7/29
	Yscir	123	26/29
	Cynon	135	41/44
	Welsh Dee	121	28/33
	Lune	125	36/40
	Eden	125	31/35
	Nith	118	39/45
	Cree	118	34/39
	Leven(Glasgow)	129	35/39
	Naver	124	22/25
	Bush	113	25/30

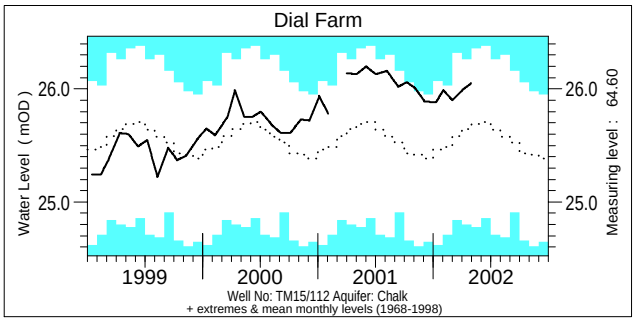
lta = long term average
Rank 1 = lowest on record

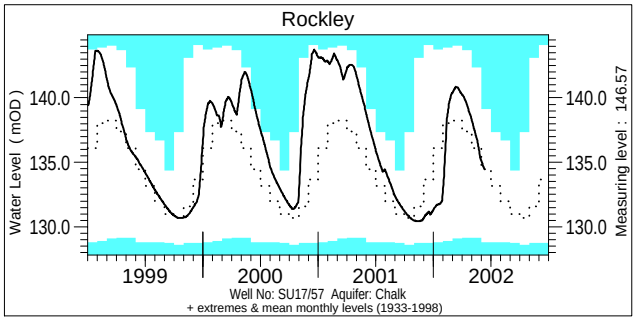
Groundwater…Groundwater

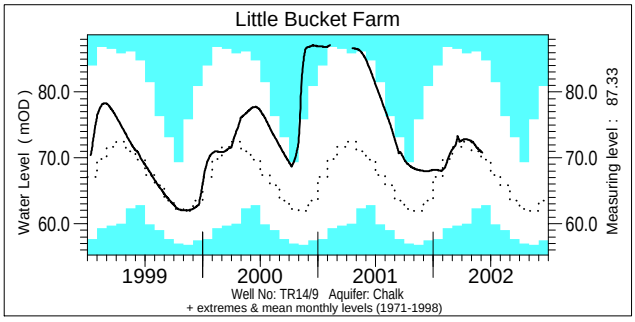


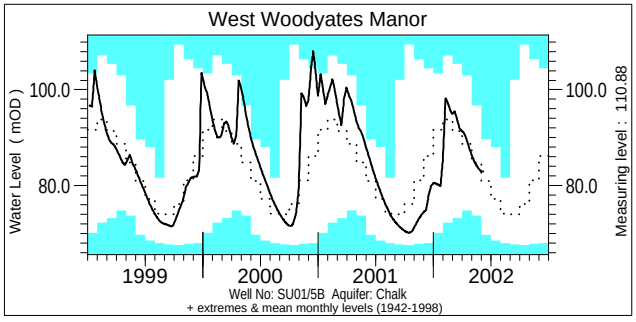


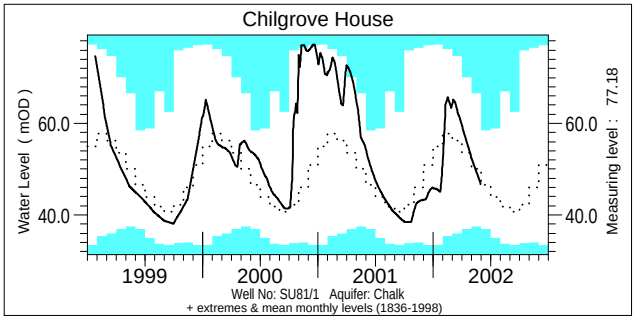


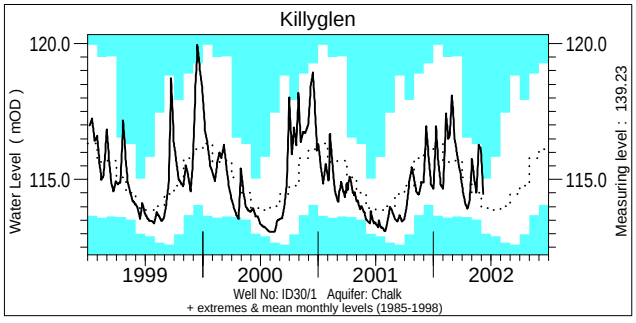


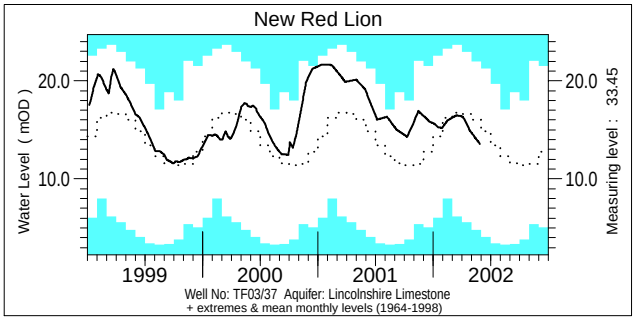






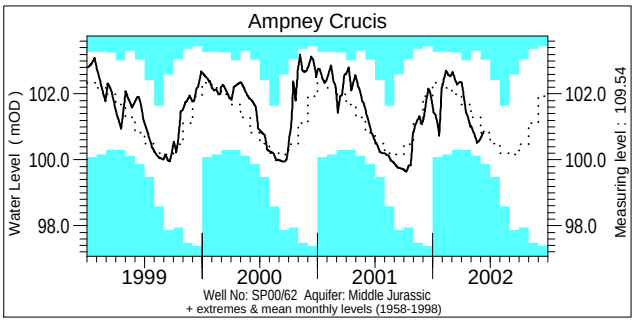


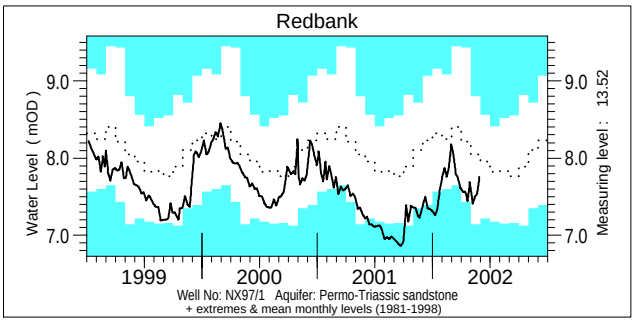


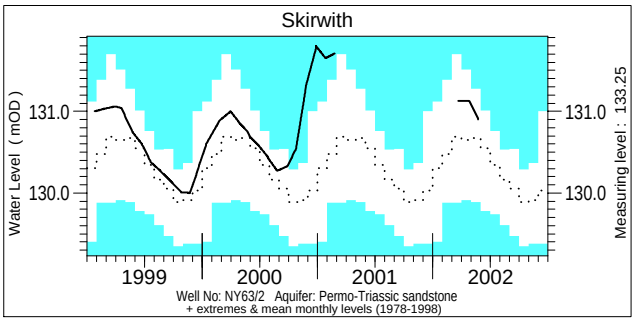


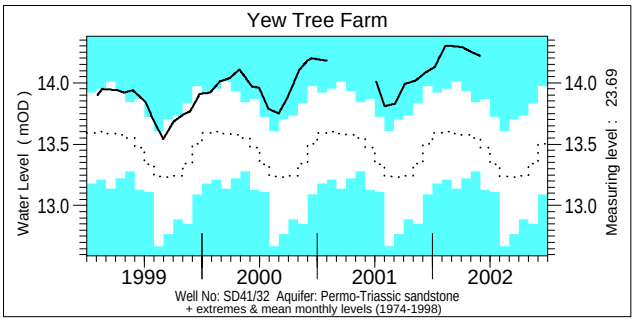
Groundwater levels normally rise and fall with the seasons, reaching a peak in the spring following replenishment through the winter (when evaporation losses are low and soil moist). They decline through the summer and early autumn. This seasonal variation is much reduced when the aquifer is confined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

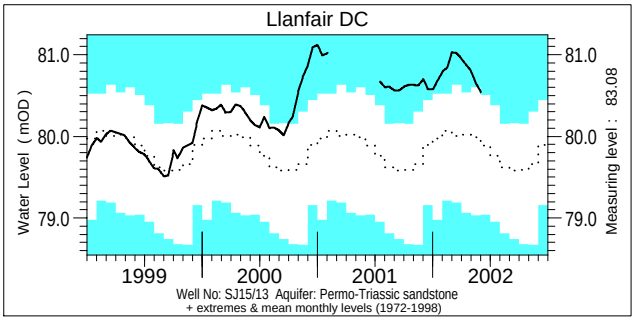
Groundwater . . . Groundwater

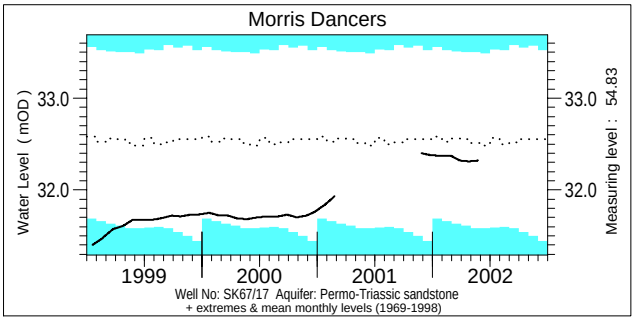


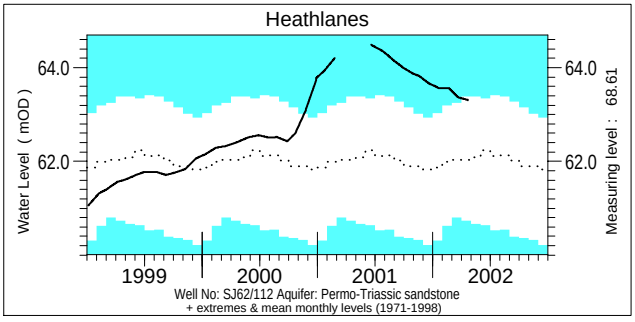


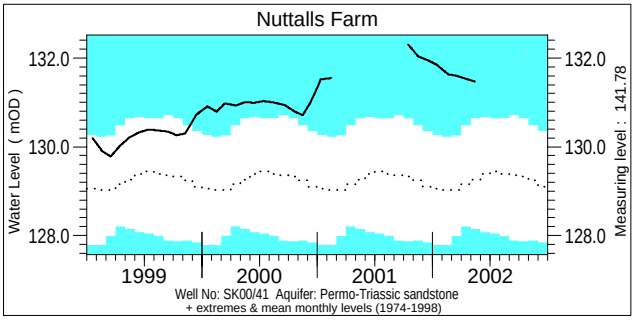


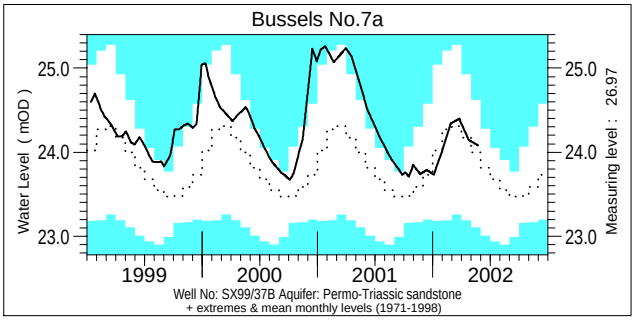


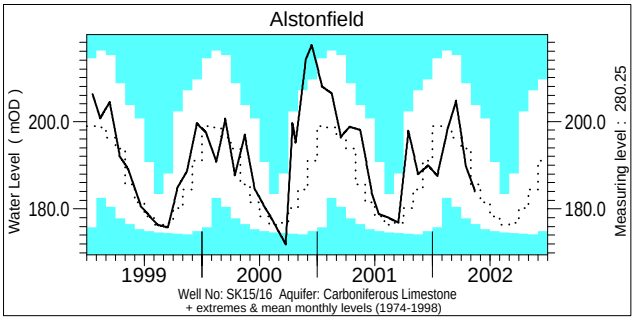












Groundwater levels May 2002 / June 2002

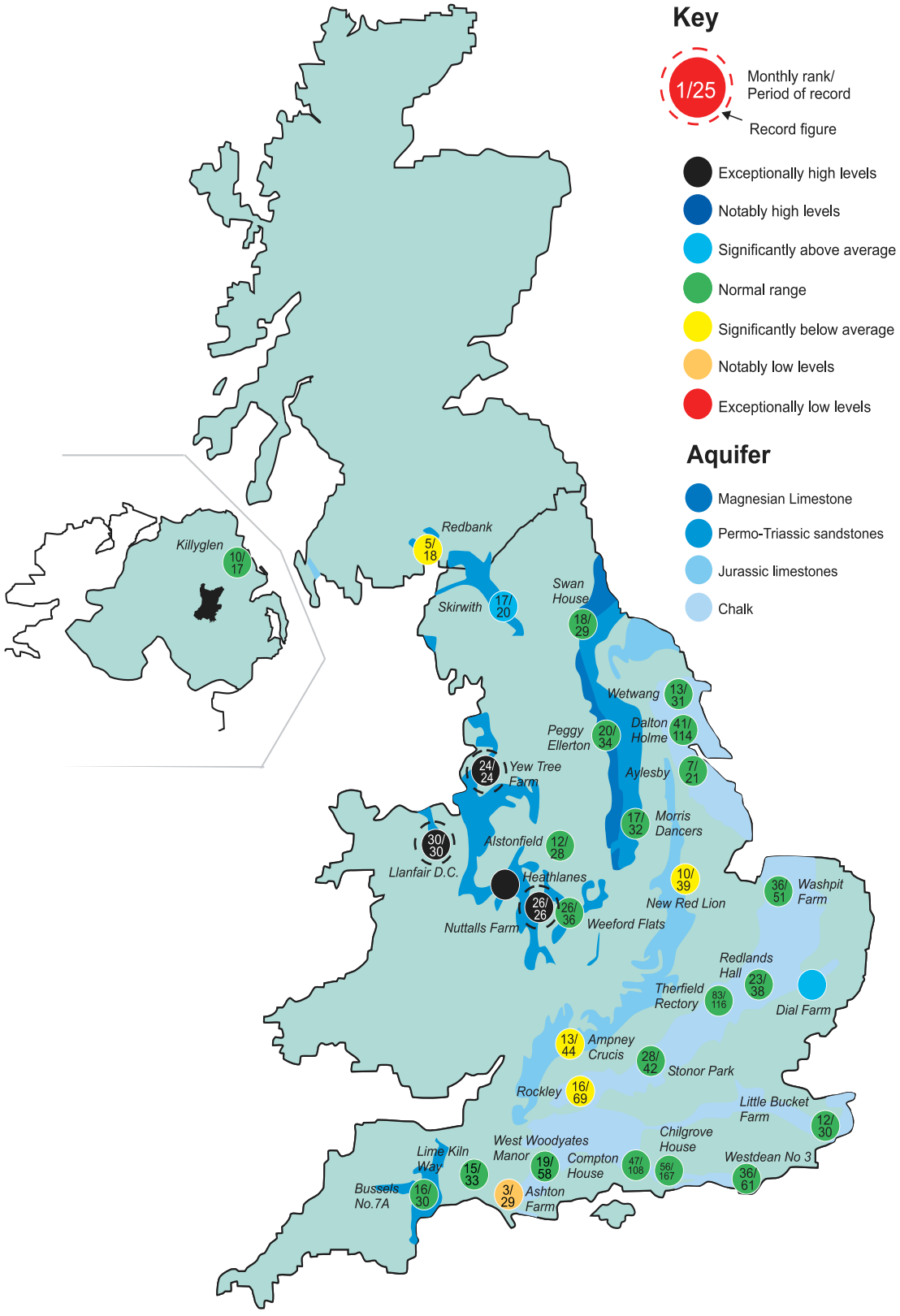
Borehole	Level	Date	May. av.
Dalton Holme	18.47	10/05	18.96
Washpit Farm	46.76	28/05	45.40
Stonor Park	81.14	10/06	78.34
Dial Farm	26.05	30/04	25.71
Rockley	134.46	10/06	136.23
Little Bucket Farm	70.78	04/06	72.51
West Woodyates	82.91	07/06	84.69

Borehole	Level	Date	May. av.
Chilgrove House	46.67	30/05	49.02
Killyglen	114.46	06/06	114.48
New Red Lion	13.58	27/05	16.09
Ampney Crucis	100.86	10/06	101.29
Redbank	7.76	28/05	8.03
Skirwith	130.90	24/05	130.59
Yew Tree Farm	14.22	30/05	13.58

Borehole	Level	Date	May. av.
Llanfair DC	80.54	01/06	79.89
Morris Dancers	32.32	24/05	32.38
Heathlanes	63.31	22/04	62.08
Nuttalls Farm	131.47	14/05	129.49
Bussels No.7a	24.08	23/05	24.01
Alstonfield	184.04	14/05	187.03

Levels in metres above Ordnance Datum

Groundwater . . . Groundwater



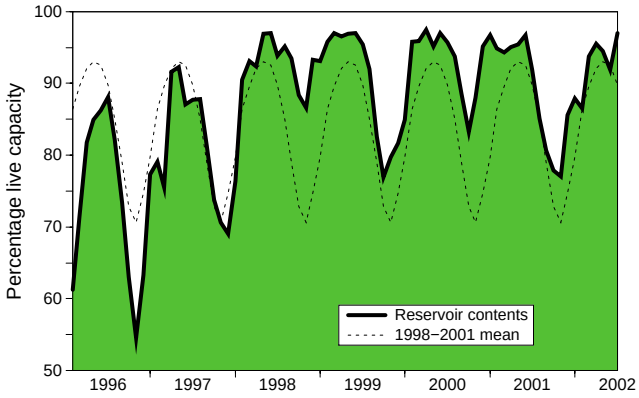
Groundwater levels - May 2002

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.

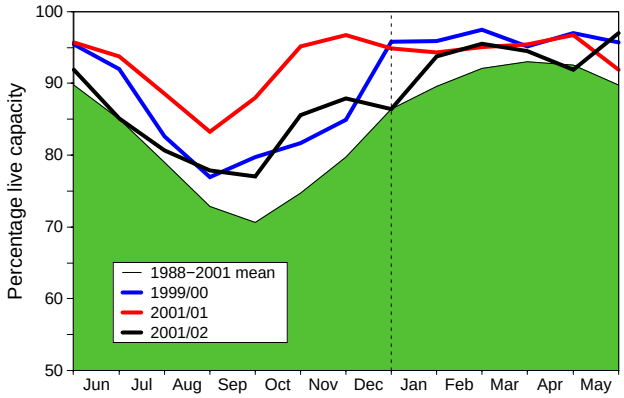
(Note: Redbank is affected by groundwater abstraction)

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.

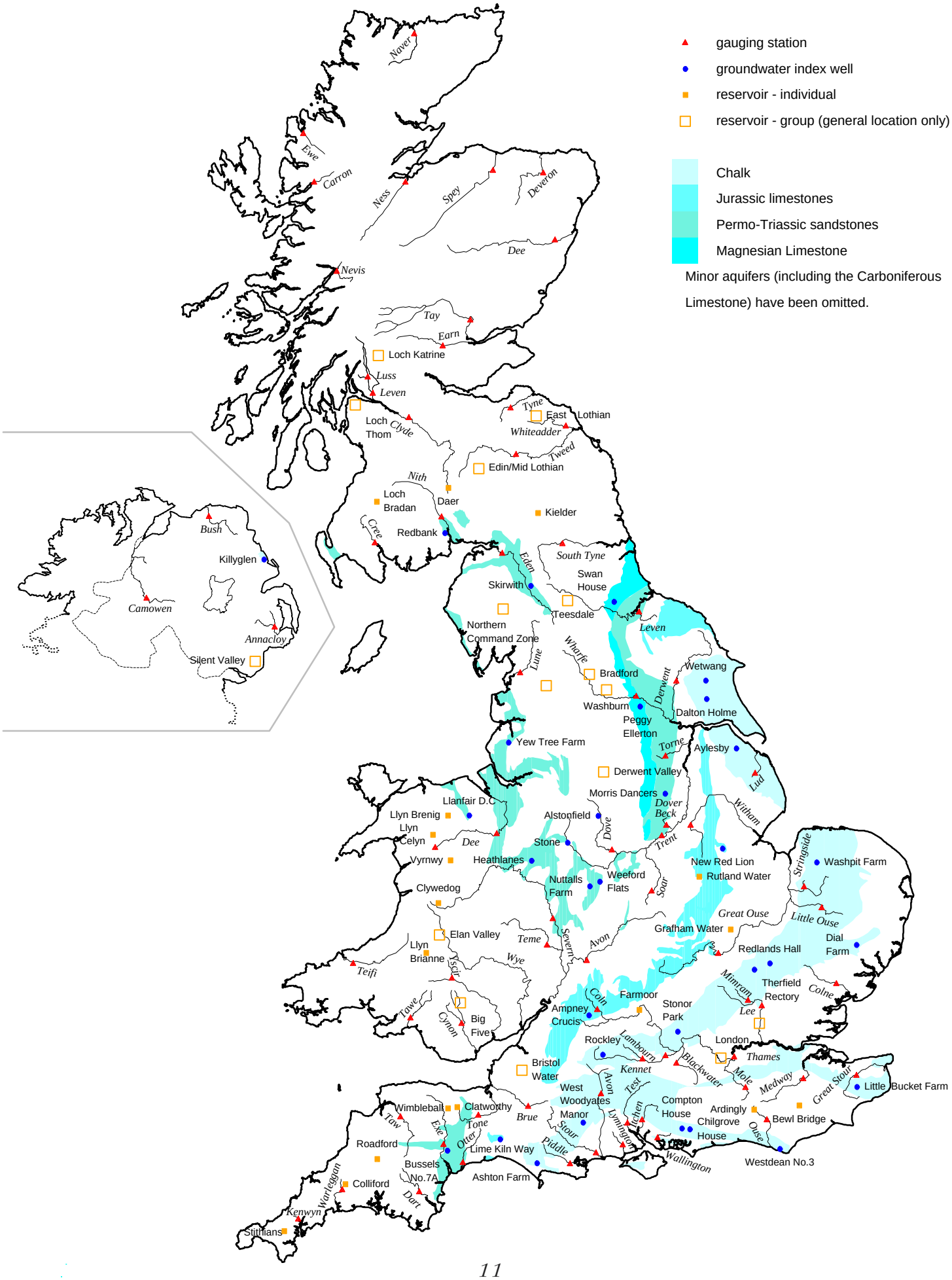
Percentage live capacity of selected reservoirs at start of month

Area	Reservoir	Capacity (Ml)	2002 Jan	Feb	Mar	Apr	May	Jun	Min. Jun	Year* of min
North West	N Command Zone	• 124929	84	100	100	97	89	100	72	1991
	Vyrnwy	55146	88	100	100	100	94	99	72	1990
Northumbrian	Teesdale	• 87936	84	99	100	97	89	98	64	1991
	Kielder	(199175)	(89)	(100)	(96)	(92)	(91)	(98)	85	1989
Severn Trent	Clywedog	44922	87	96	100	94	98	99	83	1989
	Derwent Valley	• 39525	100	100	100	98	88	85	56	1996
Yorkshire	Washburn	• 22035	91	95	97	91	85	91	72	1990
	Bradford supply	• 41407	90	99	100	96	84	95	70	1996
Anglian	Grafham	(55490)	(88)	(87)	(87)	(89)	(91)	(94)	72	1997
	Rutland	(116580)	(82)	(84)	(89)	(92)	(94)	(95)	75	1997
Thames	London	• 202340	86	87	88	92	93	97	83	1990
	Farmoor	• 13830	77	79	88	87	95	90	90	2002
Southern	Bewl	28170	75	90	97	98	95	95	57	1990
	Ardingly	4685	86	100	100	100	100	100	96	1990
Wessex	Clatworthy	5364	84	97	100	100	89	100	67	1990
	Bristol WW	• (38666)	(61)	(70)	(99)	(98)	(93)	(95)	70	1990
South West	Colliford	28540	64	72	78	82	81	84	52	1997
	Roadford	34500	72	84	94	94	91	94	48	1996
	Wimbleball	21320	58	76	100	100	97	100	76	1992
	Stithians	5205	33	49	78	88	85	86	66	1990
Welsh	Celyn and Brenig	• 131155	94	100	100	98	99	100	82	1996
	Brianne	62140	94	100	98	97	89	100	85	1995
	Big Five	• 69762	93	99	97	94	90	98	70	1990
	Elan Valley	• 99106	99	100	100	97	93	100	85	1990
East of Scotland	Edinburgh/Mid Lothian	• 97639	89	92	100	98	94	99	52	1998
	East Lothian	• 10206	100	100	100	100	100	96	84	1990
West of Scotland	Loch Katrine	• 111363	88	99	100	99	95	100	66	2001
	Daer	22412	97	100	100	100	99	100	70	1994
	Loch Thom	• 11840	93	100	100	98	95	100	74	2001
Northern Ireland	Silent Valley	• 20634	39	46	57	59	65	81	56	2000

() figures in parentheses relate to gross storage • denotes reservoir groups * 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 minimum storage figures relate to the 1988-2002 period only (except for West of Scotland and Northern Ireland where data commence in 1994 and 1993 respectively). 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 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 regional divisions of the EA (England and Wales) and SEPA (Scotland), data for Northern Ireland are provided by 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, the West of Scotland and East of Scotland Water Authorities, 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 (address 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. An initiative is underway with The Met Office to provide more accurate areal figures and, since October 1999, to include more raingauges in the analysis. A significant number of additional monthly rainfall totals are currently being provided by the Environment Agencies; over the coming months further monthly raingauge totals will be included for selected regions. Until the access to these additional data has stabilised the regional figures (and the return periods associated with them) should be regarded as a guide only.

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

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RG12 2SY
Tel.: 01344 856849
Fax: 01344 854906

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
Maclean Building
Crowmarsh Gifford
Wallingford
Oxfordshire
OX10 8BB
Tel.: 01491 838800
Fax: 01491 692424

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

NATURAL ENVIRONMENT RESEARCH COUNCIL

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