Hydrological Summary
for the United Kingdom

June 2008

General

The UK rainfall total for June was appreciably above average but, in contrast to May, southern Britain was relatively dry whilst very unsettled conditions afflicted northern areas, from mid-month especially – terminating some notable dry spells. The change in synoptic patterns was particularly welcome in Northern Ireland where mid-month river flows were very depressed and stocks in some reservoirs (e.g. Silent Valley) were approaching the long term June minimum. A cryptosporidium outbreak at Pitsford Reservoir (Northants) triggered local water use restrictions but overall reservoir stocks for England & Wales remain above average (for the 12th successive month). Stithians, in Cornwall, was the only index reservoir registering a deficiency of more than 5% below the early July average. Flood alerts were relatively common (for the early summer) and some localised flooding was reported. However, soil moisture deficits increased briskly in most major aquifer outcrop areas and further infiltration to major aquifers is now very unlikely. June groundwater levels were generally close to, or above, the early summer average (with a few notable exceptions) and, reinforced by the notably wet start to July, the overall water resources outlook for the remainder of the summer is very healthy.

Rainfall

The dominant synoptic patterns during June were broadly a reversal of those experienced in May. Following a wet start to the month (parts of the upper Thames basin reporting around 60mm on the 2/3rd), most frontal systems followed tracks relatively remote from southern England. Correspondingly, June rainfall totals were below average in much of southern England, falling below 50% in a few localities (e.g. north Kent, Isle of Wight). By contrast, northern Britain reported well above average monthly rainfall. This rainfall was concentrated in the latter half of the month bringing to an end some notable dry periods in Northern Ireland and the Western Isles (where only 3mm of rain was recorded over an eight week period on the Isle of Eigg). June rainfall exceeded 160% of the 1961-90 monthly average in many parts of Cumbria and south east Scotland, while heavy and prolonged rainfall on the 26th in particular resulted in many properties being flooded in and around Greater Manchester and north east Wales. Despite the end-of-month rainfall, total rainfall for April-June in Northern Ireland remained substantially below (63%) the 1961-90 (April-June) average. However, totals for all other regions were within normal range or above for the year thus far. This is true of almost all regional 12-month accumulations also.

River flows

Runoff patterns during June were spatially and temporally very variable with localised flooding contrasting with some exceptionally low flows in some northern rivers. Notable summer spates were widely reported both at the beginning and towards the end of the month. Rivers across much of southern Britain registered unusually high June flows from 2nd-7th, with seasonally high baseflows being a contributory factor for many. Flash floods hit parts of Berkshire and Oxfordshire (e.g. Witney) on the 3rd, the same day that the Test, Itchen (both in Hampshire) and Winterbourne (Berkshire) registered their highest June flows on record. A severe flood warning was issued for the Great Ouse in Northamptonshire and Buckinghamshire on the 3rd; three days later (on the 7th) the river downstream at Bedford registered its highest June flow in a series from 1961. Dramatic flow recoveries were a feature of rivers to the north from around the 22nd : the Welsh Dee (at New Inn) approached its highest recorded June flow on the 26th, having experienced some of its lowest flows for the month just a few days earlier, from the 11th -14th. Indeed, very depressed flows typified many responsive north west rivers for much of the month. In Northern Ireland, rivers eclipsing previous minimum flows (for June) included the Faughan and Annacloy, and, in the Western Isles, dwindling stream flows even interrupted whisky production (e.g. on Islay). June runoff totals were characterised by wide departures from the monthly average. Period-of-record maxima were approached in some southern spring-fed rivers (e.g. the Kennet and Dorset Stour); June runoff for the Thames (at Kingston) ranked fifth highest in a 126-year record dating from 1883. In contrast, runoff totals were well below average in several responsive northern rivers (e.g. the Ness and Ewe, plus many in Northern Ireland). Estimated outflows from Northern Ireland were the lowest on record for June but long-term (6 months or more) runoff accumulations are very healthy across almost all of Great Britain.

Groundwater

Rainfall across much of the Chalk and Permo-Triassic outcrops was below average in June and with soil moisture deficits generally within the normal early summer range (but spatially very variable), infiltration was modest and localised (e.g. in parts of the Cotswolds). The 2007/08 recharge season appears now to have terminated in most major aquifer outcrop areas. Recharge patterns throughout the season have been erratic with some index well hydrographs showing uncharacteristic recessions. Generally however the delayed impact of significant spring recharge (and the preceding wet winter) has ensured groundwater levels in June were mostly well within the normal summer range. In the Chalk, levels were close to, or above, the June average across much the greater part of the outcrop – this is directly reflected in seasonally high spring outflows – with notably high levels being recorded at West Woodyates Manor, Compton House and Chilgrove House in southern England. However, at Killyglen, in Northern Ireland, levels were depressed after the remarkably low spring/early summer rainfall. June groundwater levels in the majority of index wells penetrating the limestone aquifers were typical of the early summer. Significantly more spatial variability is evident in the Permo-Triassic sandstones: whilst groundwater levels are normal across parts of the Midlands and the South West, notably low levels were reported for Newbridge (Dumfries and Galloway).

Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Rainfall . . . Rainfall . . .

Rainfall accumulations and return period estimates

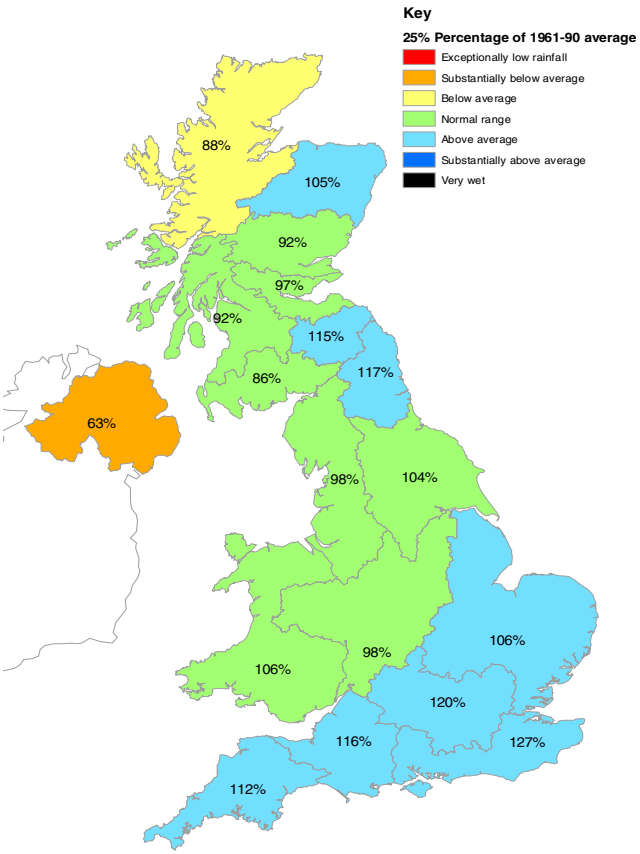
Area	Rainfall	June 2008	Apr 08- Jun 08	RP	Jan 08- Jun 08	RP	Oct 07- Jun 08	RP	Jul 07- Jun 08	RP
England & Wales	**mm**	**64**	**202**		**493**		**713**		**957**	
	%	**100**	**108**	**2-5**	**119**	**10-20**	**104**	**2-5**	**106**	**2-5**
North West	mm	**110**	224		647		971		1310	
	%	**134**	98	2-5	124	15-25	108	2-5	108	2-5
Northumbrian	mm	**91**	213		498		691		898	
	%	**146**	117	2-5	125	15-25	108	2-5	104	2-5
Severn Trent	mm	**45**	172		414		588		818	
	%	**76**	98	2-5	114	5-10	102	2-5	106	2-5
Yorkshire	mm	**77**	189		495		682		889	
	%	**124**	104	2-5	128	20-30	109	2-5	106	2-5
Anglian	mm	**47**	156		332		467		640	
	%	**90**	106	2-5	118	5-10	104	2-5	106	2-5
Thames	mm	**53**	195		401		588		791	
	%	**96**	120	5-10	121	5-15	110	2-5	113	2-5
Southern	mm	**38**	204		433		622		821	
	%	**70**	127	5-10	120	5-15	102	2-5	105	2-5
Wessex	mm	**47**	201		470		710		936	
	%	**82**	116	2-5	118	5-15	108	2-5	110	2-5
South West	mm	**50**	239		559		854		1132	
	%	**71**	112	2-5	101	2-5	91	2-5	95	2-5
Welsh	mm	**87**	262		736		1060		1423	
	%	**107**	106	2-5	122	5-15	102	2-5	106	2-5
Scotland	**mm**	**111**	**234**		**859**		**1259**		**1631**	
	%	**129**	**93**	**2-5**	**134**	**30-50**	**113**	**10-20**	**111**	**10-20**
Highland	mm	**118**	253		1076		1600		2055	
	%	**119**	88	2-5	143	30-40	120	15-25	118	20-30
North East	mm	**87**	222		570		845		1151	
	%	**126**	105	2-5	123	40-60	110	5-10	112	5-15
Tay	mm	**95**	213		790		1080		1381	
	%	**124**	92	2-5	134	20-30	110	5-10	107	2-5
Forth	mm	**94**	205		691		970		1275	
	%	**131**	97	2-5	136	20-30	113	5-10	111	5-10
Tweed	mm	**105**	231		599		829		1106	
	%	**155**	115	2-5	132	25-40	111	5-10	110	5-10
Solway	mm	**114**	217		782		1146		1482	
	%	**135**	86	2-5	125	20-30	106	2-5	103	2-5
Clyde	mm	**129**	258		1007		1472		1863	
	%	**133**	92	2-5	135	20-30	112	5-10	106	2-5
Northern Ireland	**mm**	**72**	**134**		**525**		**781**		**1074**	
	%	**98**	**63**	**10-20**	**105**	**2-5**	**94**	**2-5**	**98**	**2-5**

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

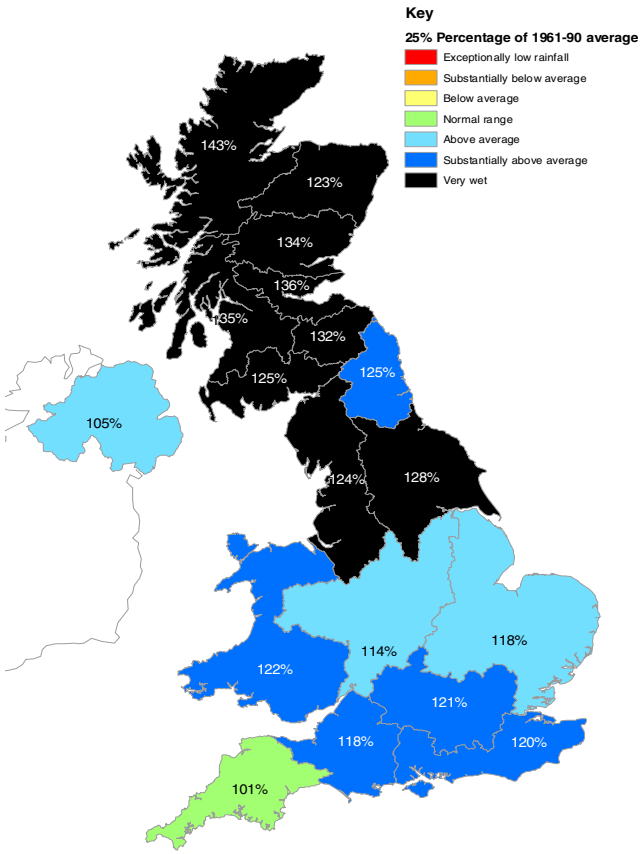
Important note: Figures in the above table may be quoted provided their source is acknowledged (see page 12). Where appropriate, specific mention must be made of the uncertainties associated with the return period estimates. The RP estimates are based on data provided by the Met Office and derived following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

Rainfall . . . Rainfall . . .

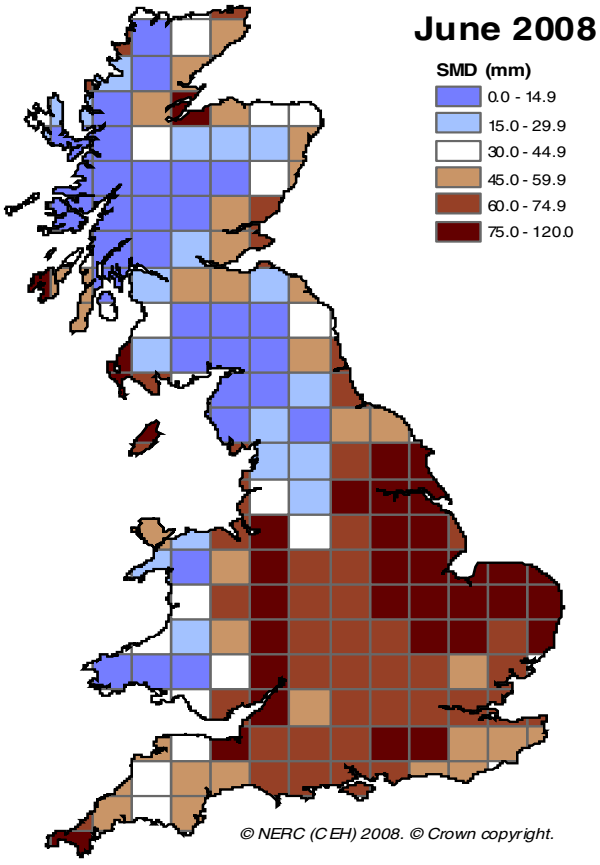
April - June 2008



January- June 2008



MORECS Soil Moisture Deficit



Met Office Summer 2008 forecast

Forecast for Summer 2008 updated 25 June 2008

European forecast: Temperature and rainfall

For north-west Europe, an enhanced risk of more unsettled spells than usual with average or above-average rainfall is predicted. In contrast, rainfall is more likely to be below average over much of southern and eastern Europe. Mean temperatures are more likely to be above 1971-2000 averages over much of Europe, with the highest probabilities of warmer than average over south eastern regions.

UK forecast:

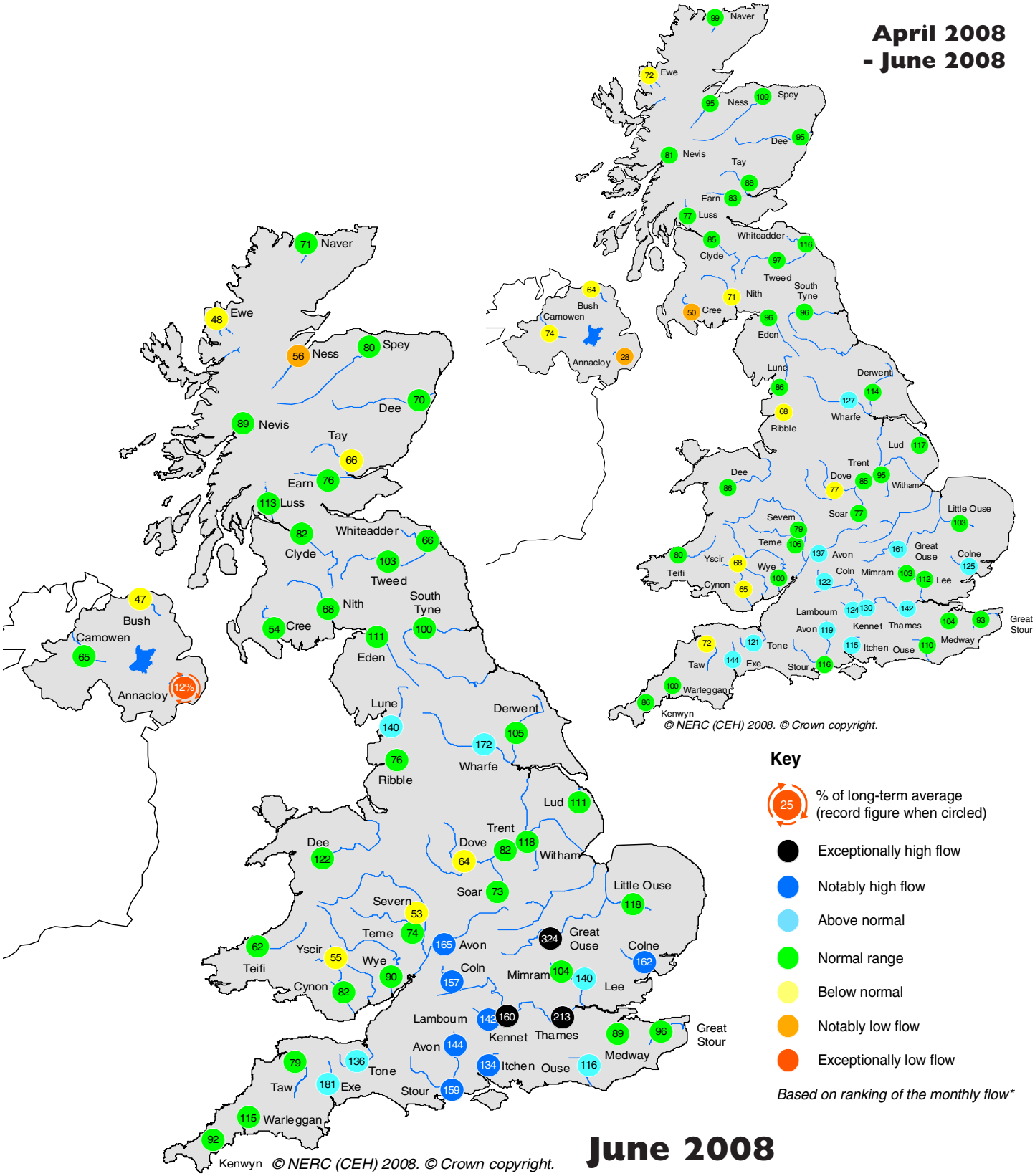
Temperature: There is an enhanced chance of more frequent cloudy and cool spells compared to recent summers prior to 2007. Nevertheless, mean temperatures are more likely to be above the 1971-2000 average.

Precipitation: Forecasting methods favour above-average or near-average rainfall for the remainder of the summer period.

The summer forecast will be next updated on 30 July 2008. For further details please visit:

http://www.metoffice.gov.uk/weather/seasonal/summer2008/uk.index.html

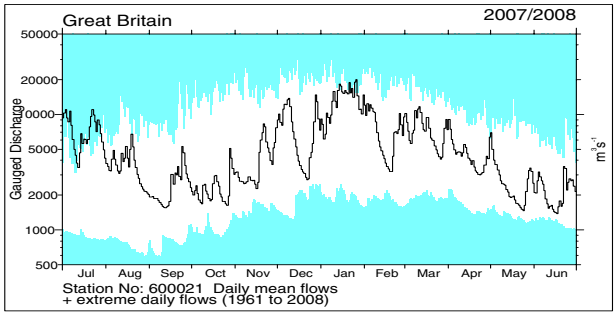
River flow . . . River flow . . .

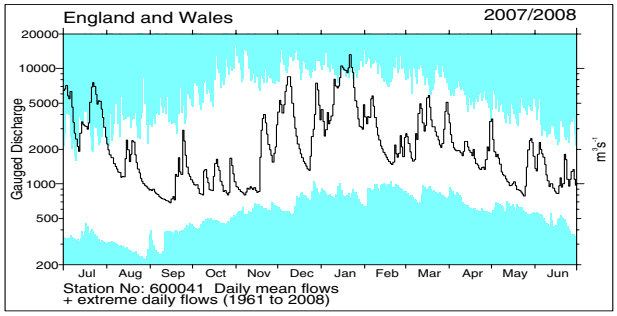


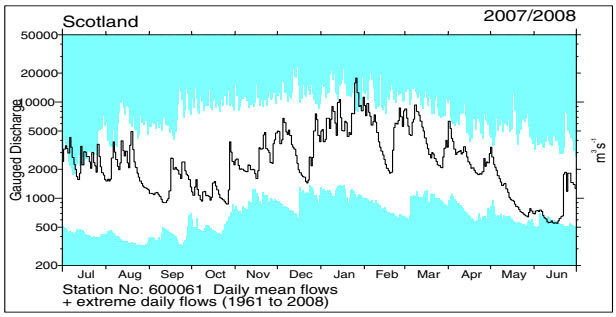
River flows

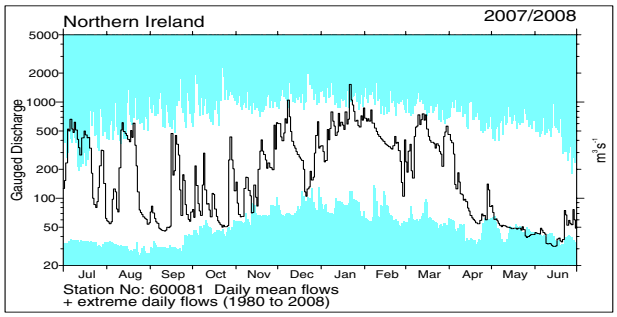
*Comparisons based on percentage flows alone can be misleading. A given percentage flow can represent extreme drought conditions in permeable catchments where flow patterns are relatively stable but be well within the normal range in impermeable catchments where the natural variation in flows is much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

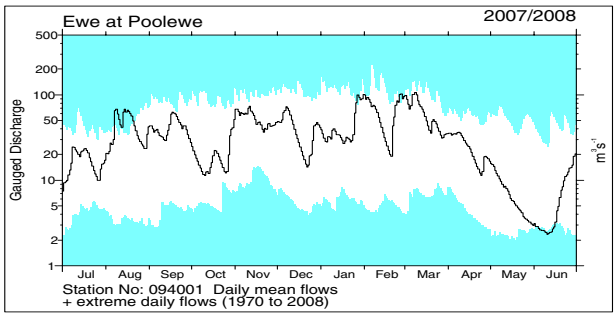
River flow . . . River flow . . .

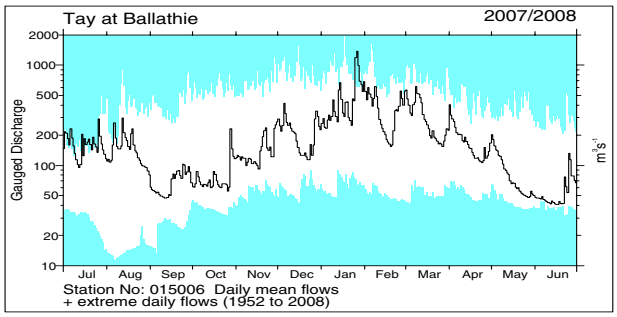


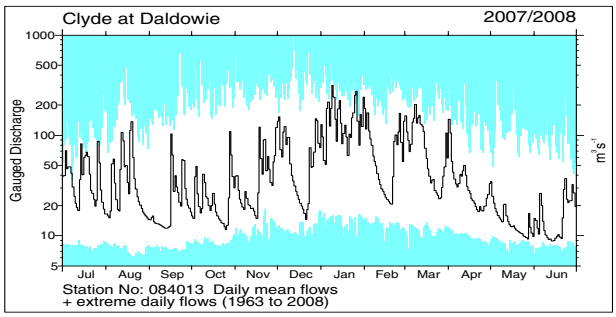


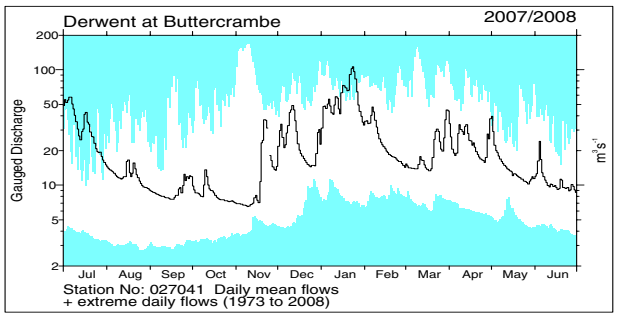


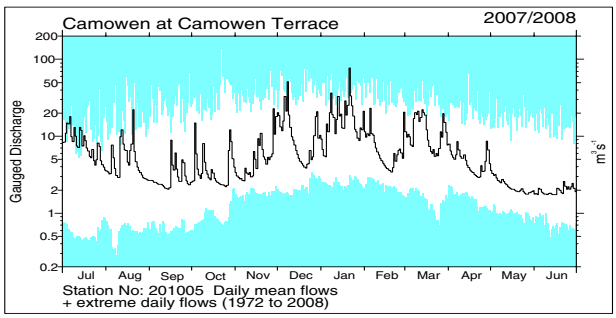


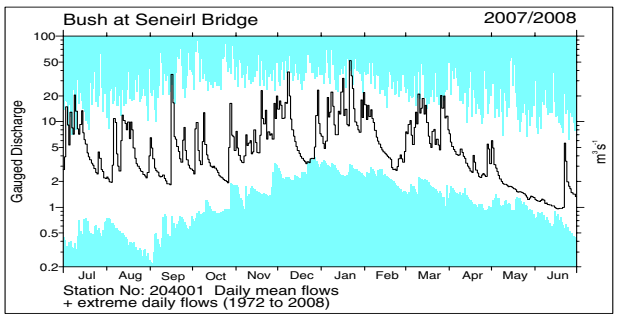








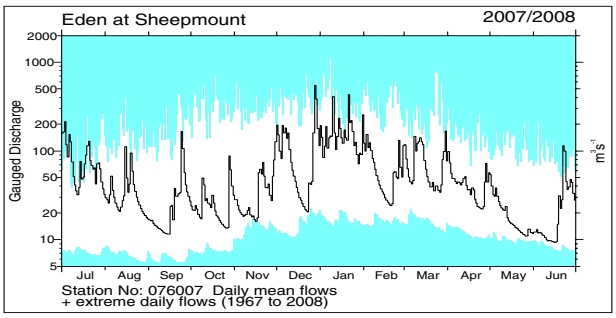


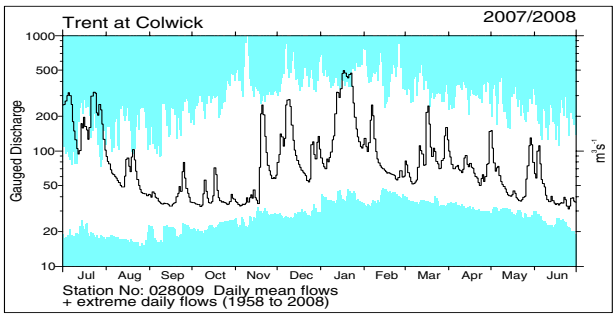


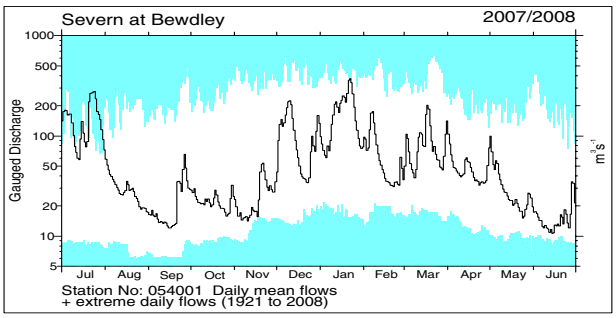
River flow hydrographs

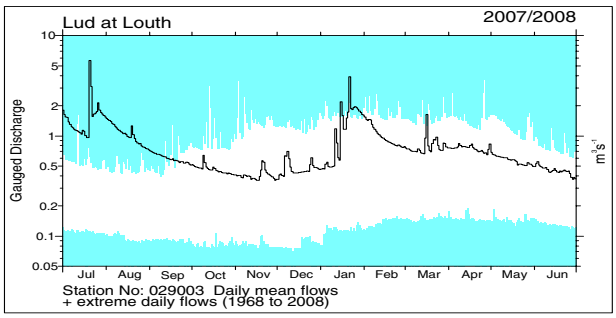
The river flow hydrographs show the daily mean flows together with the maximum and minimum daily flows prior to July 2007 (shown by the shaded areas). Daily flows falling outside the maximum/minimum range are indicated where the bold trace enters the shaded areas.

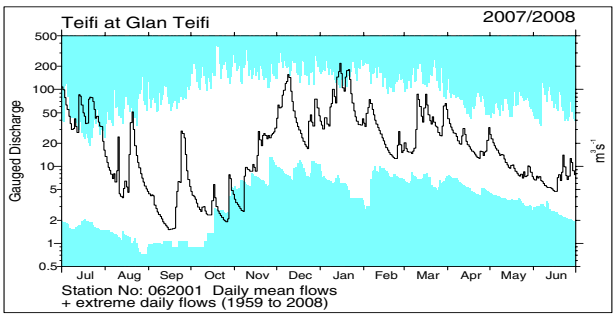
River flow . . . River flow . . .

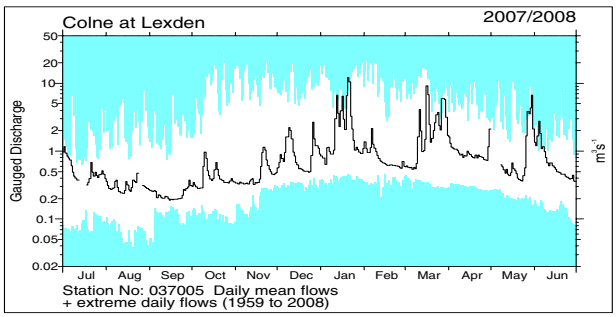


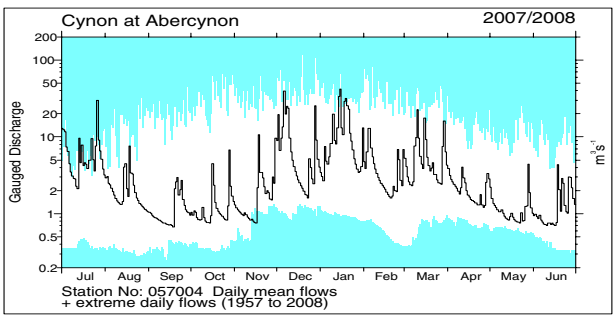


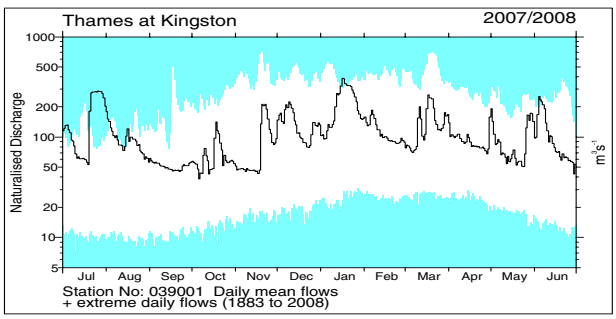


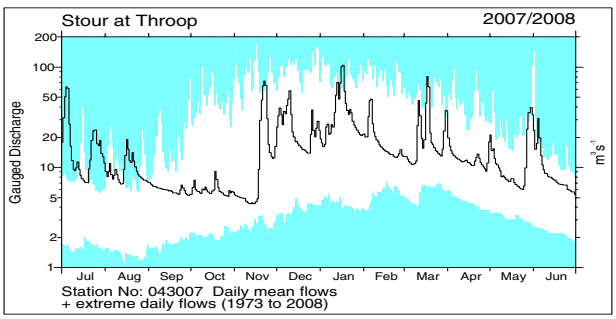


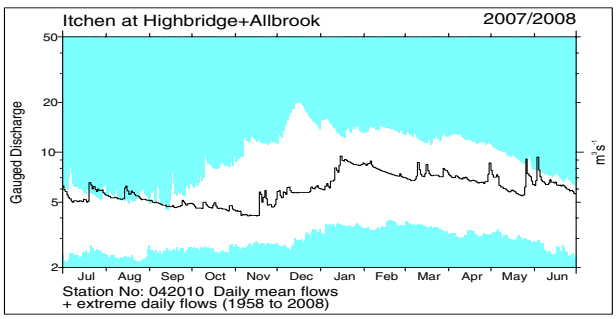












Notable runoff accumulations (a) April-June 2008, (b) January - June 2008, (c) July 2007- June 2008

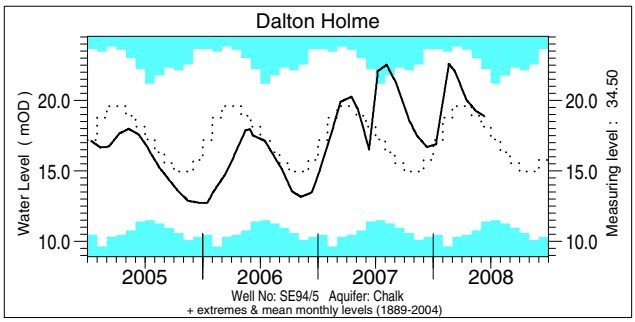
	River	%lta	Rank
a)	Lymington	167	47/48
	Cree	50	5/45
	Mourne	50	3/26
	Faughan	50	3/32
	L Bann	41	1/28
	Lagan	38	3/36
	Annacloy	28	3/29

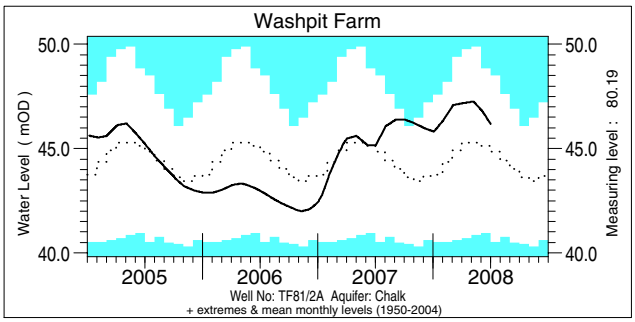
	River	%lta	Rank
b)	Ness	135	34/36
	Tyne (Spilmersford)	149	43/44
	Tweed (Norham)	134	49/49
	Wharfe	156	53/53
	Exe	136	51/52
	Clyde (Blairston)	147	47/48
	Naver	134	29/31

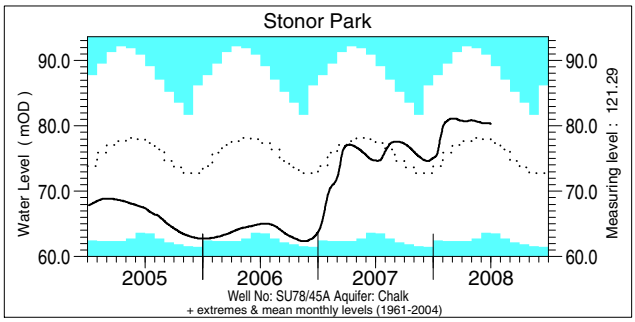
	River	%lta	Rank
c)	Dover Beck	163	31/32
	Lud	178	38/39
	Lambourn	147	44/45
	Coln	162	43/44
	Kenwyn	67	3/39
	Teme	138	35/38

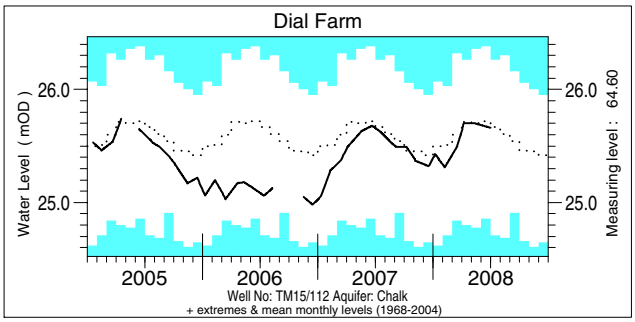
lta = long term average
Rank 1 = lowest on record

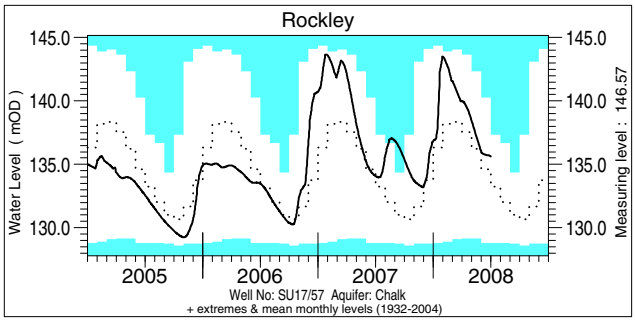
Groundwater . . . Groundwater

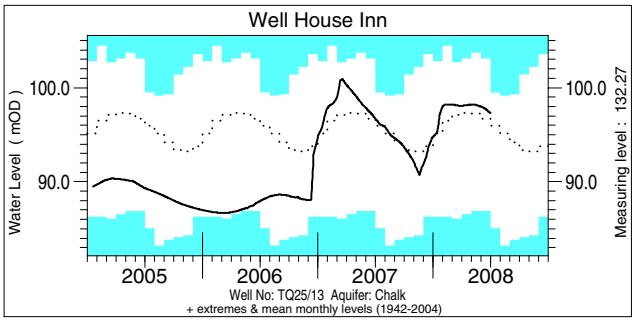


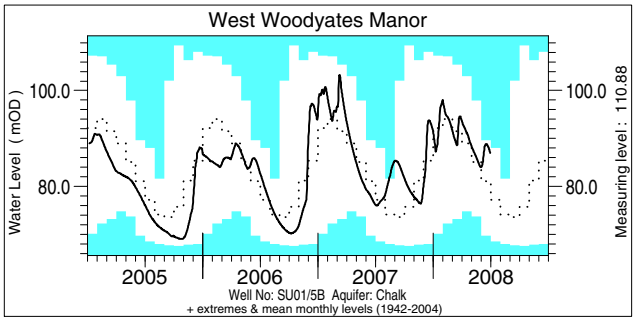


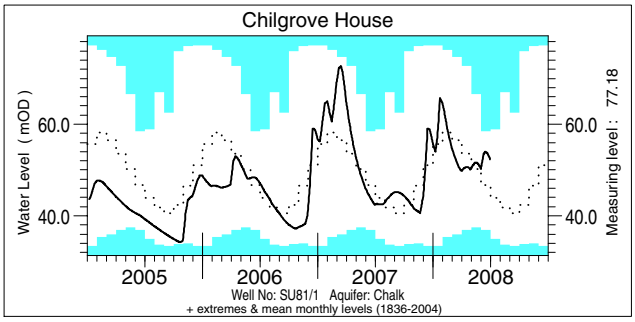


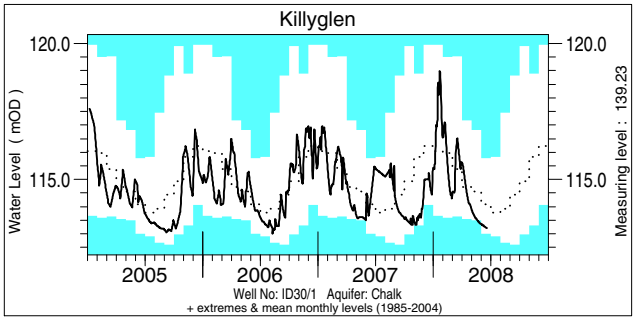


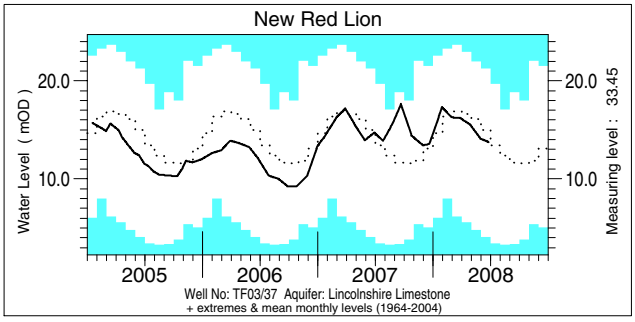






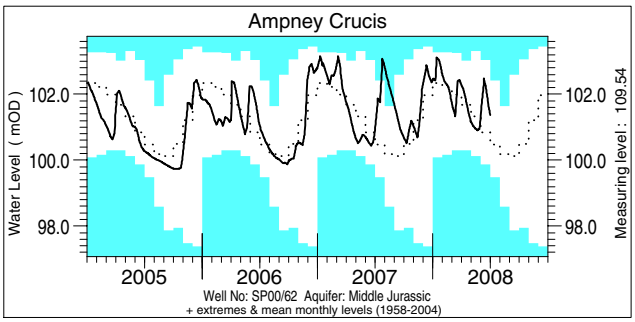


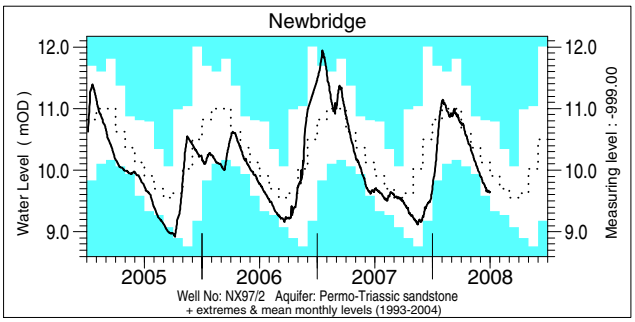


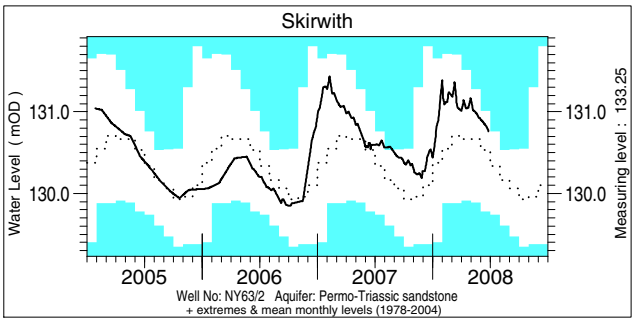


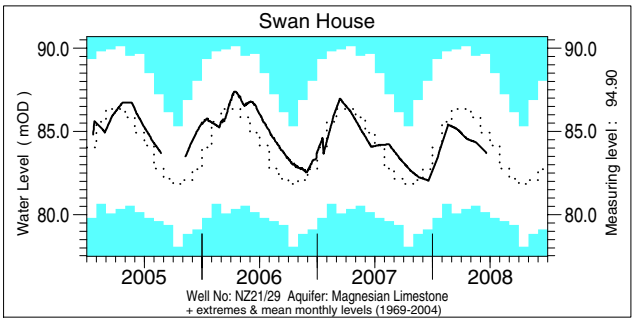
Groundwater levels normally rise and fall with the seasons, reaching a peak in the spring following replenishment through the winter (when evaporation losses are low and soil moist). They decline through the summer and early autumn. This seasonal variation is much reduced when the aquifer is confined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

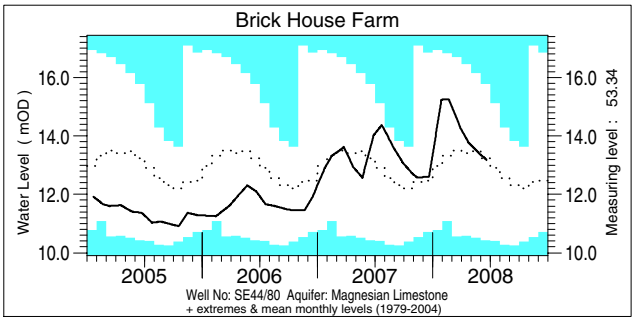
Groundwater . . . Groundwater

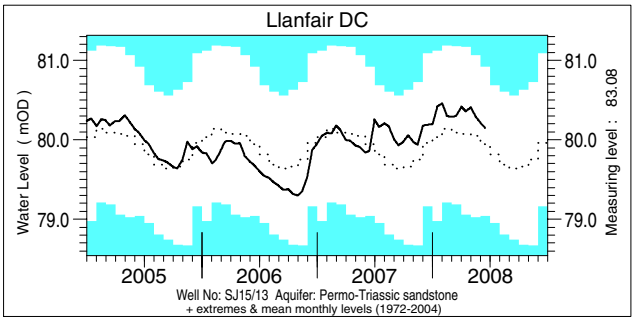


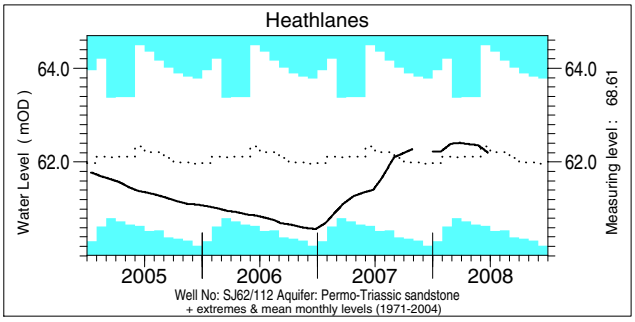


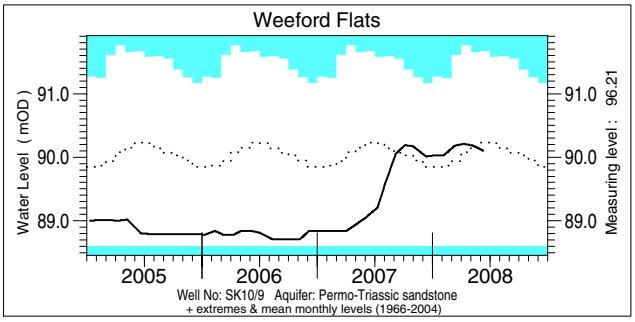


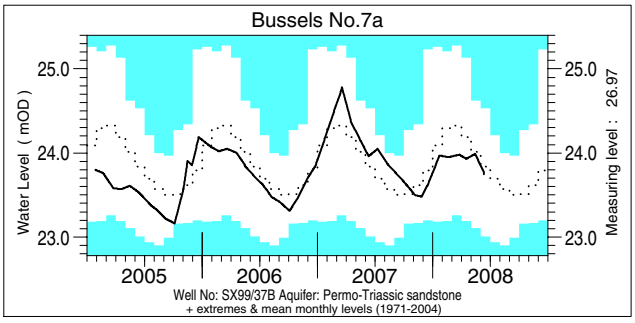


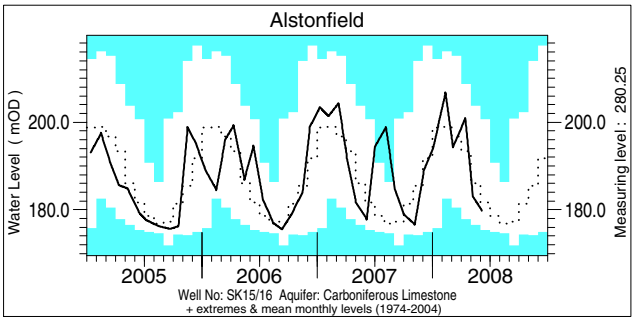










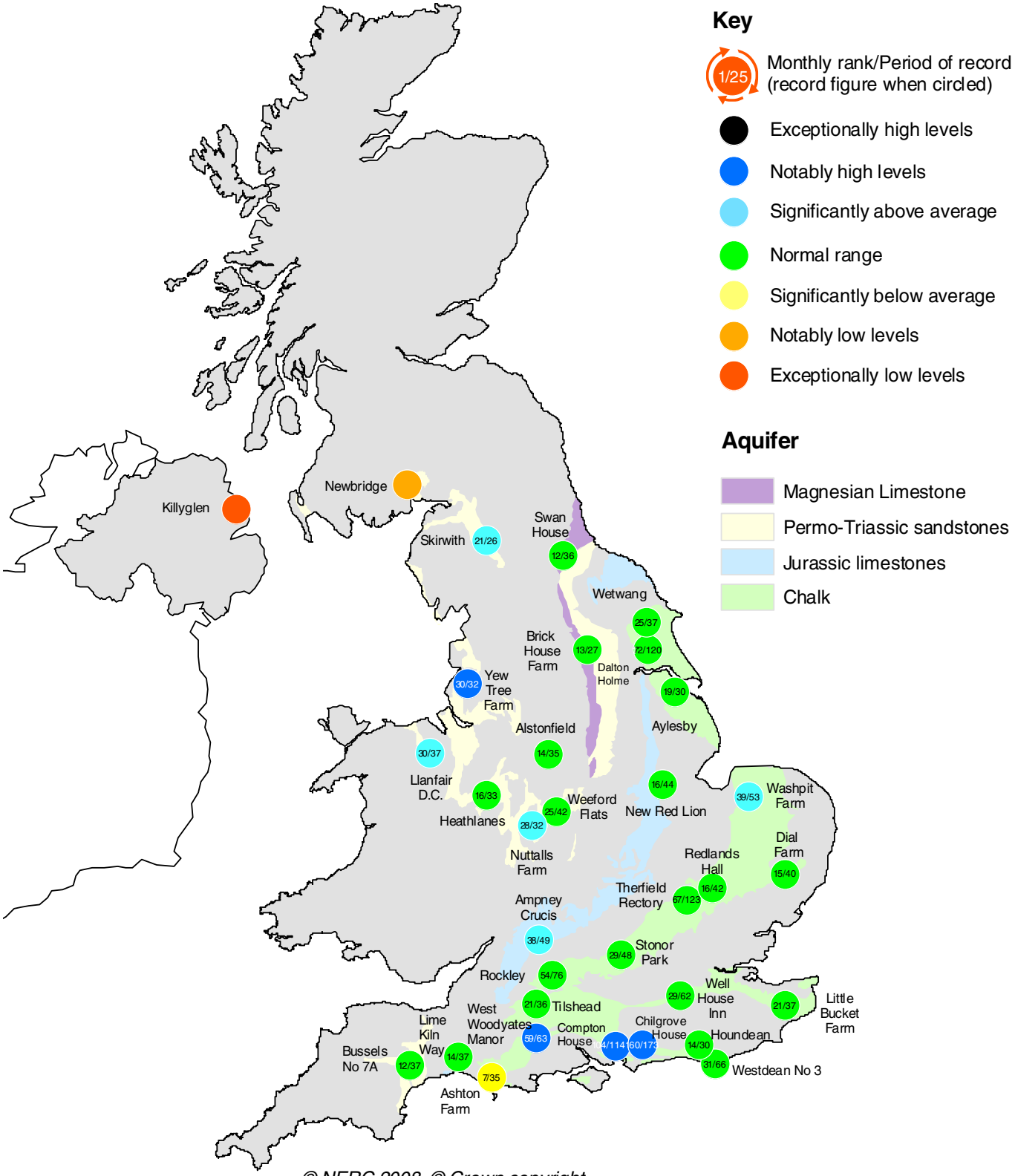


Groundwater levels June / July 2008

Borehole	Level	Date	Jun. av.	Borehole	Level	Date	Jun. av.	Borehole	Level	Date	Jun. av.
Dalton Holme	18.88	10/06	18.11	Chilgrove House	52.35	30/06	46.00	Brick House Farm	13.18	20/06	13.13
Washpit Farm	46.16	02/07	45.17	Killyglen (NI)	113.22	19/06	113.99	Llanfair DC	80.15	15/06	79.87
Stonor Park	80.35	01/07	77.65	New Red Lion	13.74	25/06	14.54	Heathlanes	62.20	24/06	62.19
Dial Farm	25.66	01/07	25.69	Ampney Crucis	101.36	01/07	100.85	Weeford Flats	90.10	09/06	89.94
Rockley	135.62	01/07	134.57	Newbridge	9.65	01/07	10.04	Bussels No.7a	23.75	12/06	23.86
Well House Inn	97.29	01/07	96.43	Skirwith	130.76	26/06	130.49	Alstonfield	179.73	05/06	181.71
West Woodyates	86.91	30/06	80.93	Swan House	83.68	19/06	84.46				

Levels in metres above Ordnance Datum

Groundwater . . .Groundwater



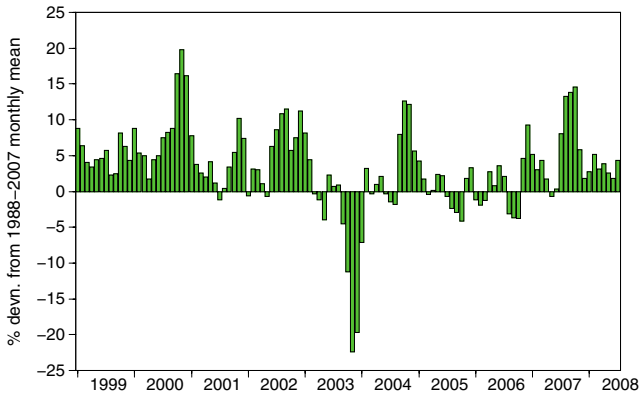
Groundwater levels - June 2008

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.

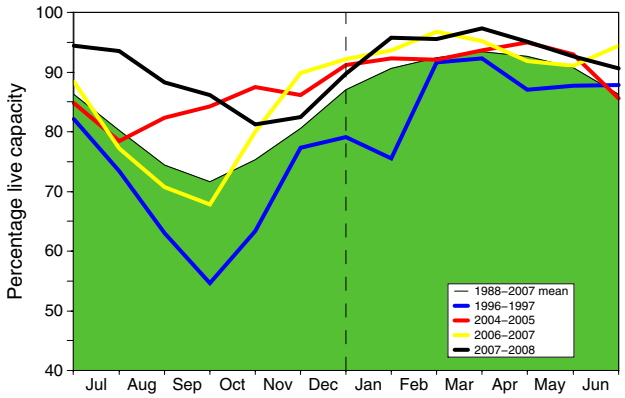
Notes:
i. The outcrop areas are coloured according to British Geological Survey conventions.
ii. Recent levels for Houndean Bottom are under review.
iii. Llanfair DC levels are under review.

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 May	2008 Jun	2008 Jul	Jul Anom.	Min. Jul	Year* of min.	2007 Jul	Diff 08-07
North West	N Command Zone	• 124929	91	79	**74**	2	58	1995	82	-8
	Vyrnwy	55146	99	90	**89**	6	65	1990	94	-5
Northumbrian	Teesdale	• 87936	97	87	**88**	9	58	1989	98	-10
	Kielder	(199175)	(93)	(92)	**(94)**	4	(71)	1989	(96)	-2
Severn Trent	Clywedog	44922	100	100	**100**	7	72	1989	100	0
	Derwent Valley	• 39525	99	92	**84**	3	53	1996	100	-16
Yorkshire	Washburn	• 22035	96	88	**85**	4	63	1995	99	-14
	Bradford supply	• 41407	96	89	**85**	6	54	1995	96	-11
Anglian	Grafham	(55490)	(96)	(96)	**(95)**	3	(70)	1997	(97)	-2
	Rutland	(116580)	(93)	(93)	**(91)**	3	(75)	1997	(97)	-6
Thames	London	• 202828	90	98	**96**	5	85	1990	89	7
	Farmoor	• 13822	96	93	**95**	-3	94	1995	97	-2
Southern	Bewl	28170	98	99	**95**	13	52	1990	85	10
	Ardingly	4685	100	100	**99**	4	82	2005	100	-1
Wessex	Clatworthy	5364	94	90	**99**	17	61	1995	78	21
	Bristol WW	• (38666)	(96)	(89)	**(87)**	5	(64)	1990	(98)	-11
South West	Colliford	28540	91	93	**92**	12	51	1997	79	13
	Roadford	34500	93	90	**88**	7	49	1996	96	-8
	Wimbleball	21320	99	100	**96**	11	63	1992	96	0
	Stithians	5205	88	80	**72**	-7	53	1990	87	-15
Welsh	Celyn and Brenig	• 131155	100	99	**96**	2	77	1996	99	-3
	Brianne	62140	100	96	**89**	-4	76	1995	97	-8
	Big Five	• 69762	96	90	**90**	6	61	1989	96	-6
	Elan Valley	• 99106	99	94	**89**	0	75	1989	100	-11
Scotland(E)	Edinburgh/Mid Lothian	• 97639	99	93	**89**	4	54	1998	86	3
	East Lothian	• 10206	100	100	**99**	6	81	1992	100	-1
Scotland(W)	Loch Katrine	• 111363	90	74	**68**	-14	61	2001	72	-4
	Daer	22412	97	85	**80**	-3	62	1994	88	-8
	Loch Thom	• 11840	91	88	**81**	-4	69	2000	72	9
Northern Ireland	Total+	• 67270	83	69	**61**	-23	61	2008	83	-22
	Silent Valley	• 20634	82	66	**58**	-20	54	1995	92	-34

() 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

The monthly rainfall figures are provided by the Met Office (National Climate Information Centre) and are Crown Copyright and may not be passed on to, or published by, any unauthorised person or organisation.

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

The Met Office
FitzRoy Road
Exeter
Devon
EX1 3PB

Tel.: 0870 900 0100 Fax: 0870 900 5050
E-mail: enquiries@metoffice.com

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
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

07/08