Hydrological Summary for Great Britain

JUNE 1993

Rainfall

June was a month of contrasts. Over large parts of Britain modest heatwave conditions early and late in the month bracketed a period of extremely unsettled weather. Rainfall around mid-month was substantial in most areas; generally heavy frontal rainfall was experienced in the West whilst humid air moving north from France triggered many convective storms in the South and East. Violent storm episodes were not restricted to the lowlands however. Llandudno recorded 127 mm in three hours on the 10th (the associated return period is well in excess of 1000 years). Almost as remarkable was a 125 mm downpour at North Weald in Essex - this event featured a ferocious burst of 76 mm in 45 minutes. A few further falls of around 100 mm or more in less than six hours - again extremely rare - were recorded at, for example, Culdrose in Cornwall. The exceptionally intense downpours caused flash floods and widespread, if short-lived, transport disruption in southern Britain. In the West, extremely wet conditions persisted for around a week and some exceptional 4-5 day rainfall totals were registered. Despite very large spatial variability in rainfall amounts, regional rainfall totals for June were mostly close to the long term average, although parts of Wales and the South-West were decidedly wet and northern England was relatively dry, as were some eastern localities which escaped the thunderstorms. Generally rainfall for the year thus far is well within the normal range and, in the twelve-month timeframe totals are above average in all regions, albeit marginally in much of England and Wales. Rather distant echoes of the drought appear in the very long term regional rainfall accumulations for the English lowlands.

River Flows

Discharge rates in most rivers displayed an unusual volatility in June with spate conditions in mid-month in a number of small catchments followed by very steep recessions. On a number of occasions during the first fortnight torrential rain often exceeded the infiltration capacity of the only moderately dry soils and steep increases in flow occurred. On the 2nd, the Silk Stream in North London registered its highest June Flow on record but flooding was much more extensive on the 10th when the Cripsey Brook (Essex) established a new maximum flow and some severe, but localised, urban flooding affected parts of the South West (e.g. at Helston and Bideford) and Wales (Llandudno). Although spate conditions were common the very uneven pattern of much of the rainfall caused the floods to be attenuated by the time the index gauging stations were reached. Despite the large range in daily flow rates, June runoff totals were mostly close to the average. Exceptions included the River Kenwyn (Cornwall) which recorded its highest June flow on record and the Severn which registered its second highest June runoff since 1955. Throughout much of the English lowlands flows in spring-fed rivers remained a little below average but, commonly, the early summer runoff rates were the highest for five years.

Groundwater

Aquifer recharge is normally minimal in June. This year very localised replenishment occurred to the Chalk and more substantial recharge to the Permo-Triassic (and superficial) aquifers to the west. Throughout the Chalk, levels are now well within the normal range and, typically, very close to the early summer average. In parts of the region where the drought achieved its greatest severity (mostly in East Anglia) levels remain appreciably below average but commonly at their highest for the summer since 1988. Generalisations are more difficult to apply to the Permo-Triassic sandstones but a much belated recovery is recognisable in several western index boreholes.

General

In some lowland areas a three-week dry spell, ending around July 8th, triggered significant increases in water demand (especially for garden watering and irrigation purposes) which produced local stress on some distribution systems. Overall water resources remain healthy, however, with reservoir and groundwater stocks at their highest for the early summer for at least four years; a notable contrast to a year ago.

Institute of Hydrology

British Geological Survey

Data for this report have been provided principally by the regional divisions of the National Rivers Authority* in England and Wales, the River Purification Boards in Scotland and by the Meteorological Office. Reservoir contents information has been supplied by the Water Services Companies, the NRA or, in Scotland, the Lothians Regional Council. The most recent areal rainfall figures are derived from a restricted network of raingauges (particularly in Scotland) and a proportion of the river flow data is of a provisional nature.

A map (Figure 3) is provided to assist in the location of the principal monitoring sites.

* For reasons of consistency the original ten regional divisions of the NRA have been retained for use in the Hydrological Summaries.

13 June 1993

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TABLE 1 1992/93 RAINFALL AS A PERCENTAGE OF THE 1941-70 AVERAGE

		June	July	Aug	Sept	Oct	Nov	Dec	Jan 1993	Feb	Mar	Apr	May	June
England and Wales	mm	38	83	129	92	84	138	77	98	15	27	96	86	77
	%	62	114	143	111	101	142	86	114	23	46	166	129	126
NRA REGIONS														
North West	mm	30	79	151	110	121	172	118	152	22	32	116	131	62
	%	36	77	121	89	103	142	98	136	27	44	151	160	75
Northumbria	mm	19	63	99	95	81	100	71	108	17	28	120	118	46
	%	31	82	98	120	108	106	95	135	26	54	218	184	75
Severn-Trent	mm	54	88	120	74	71	113	61	81	10	15	78	84	64
	%	96	135	148	110	109	143	87	117	19	29	150	131	114
Yorkshire	mm	33	81	99	95	77	102	71	84	22	14	102	82	53
	%	57	116	110	132	112	115	96	109	34	26	182	134	91
Anglian	mm	34	89	83	86	73	83	41	57	17	17	71	52	52
	%	69	156	130	165	140	134	77	110	40	43	178	111	105
Thames	mm	39	78	107	93	73	117	58	85	6	23	83	61	54
	%	75	130	153	150	114	160	88	137	13	50	180	109	104
Southern	mm	26	75	104	70	86	141	76	94	9	30	91	58	56
	%	52	127	143	99	110	150	94	124	16	58	190	105	112
Wessex	mm	50	64	129	85	52	152	86	117	7	43	82	62	69
	%	93	103	157	108	63	157	96	139	12	74	152	91	128
South West	mm%	23	83	174	93	96	216	122	171	22	33	98	131	127
		35	99	173	89	85	161	90	133	24	39	138	156	195
Welsh	mm	51	93	222	114	102	214	145	197	23	34	107	124	104
	%	62	98	187	91	79	150	100	145	24	39	124	136	126
Scotland	mm	40	91	221	177	123	212	140	291	67	91	128	132	101
	%	43	81	171	129	83	149	90	212	64	99	142	145	110
RIVER PURIFICATION BOARDS														
Highland	mm	46	95	255	214	155	280	239	358	86	151	86	93	123
	%	42	75	172	135	83	166	122	218	65	132	75	90	111
North-East	mm	52	47	132	107	110	93	78	152	41	55	68	109	69
	%	74	51	123	123	113	90	76	167	55	89	111	142	99
Tay	mm	31	77	201	160	70	163	113	319	32	113	135	132	83
	%	37	75	170	139	57	137	84	270	35	138	180	139	100
Forth	mm	25	74	183	166	66	153	84	247	42	88	108	119	86
	%	33	75	158	154	62	140	77	249	55	128	159	142	115
Tweed	mm	27	61	157	118	77	135	82	158	21	41	124	130	64
	%	40	69	138	127	88	130	91	170	30	71	203	159	94
Solway	mm	30	101	215	155	116	203	133	207	13	103	163	139	74
	%	33	92	165	103	81	140	88	148	14	113	185	164	82
Clyde	mm	39	123	278	205	133	255	165	339	18	161	158	119	94
	%	38	95	196	117	73	153	89	211	16	153	153	151	91

Note: The most recent monthly rainfall figures correspond to the MORECS areal assessments derived by the Meteorological Office; the provisional figures for England and Wales and for Scotland are derived using a different raingauge network. The updating of MORECS data by Met. Office provisional and final values from October 1992 onwards has resulted in considerable changes in the monthly rainfall totals and the rainfall accumulations featured in Table 2.

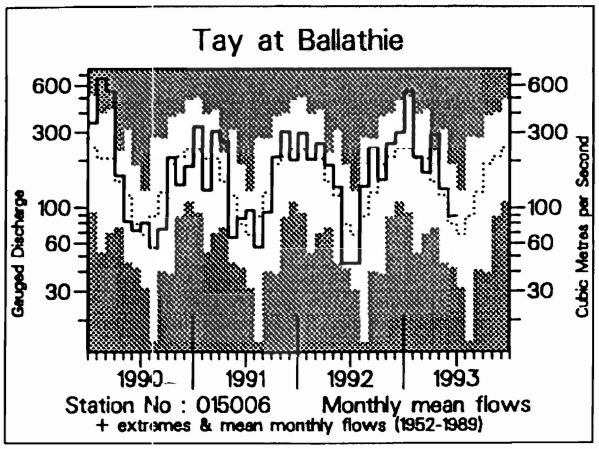
TABLE 2 RAINFALL RETURN PERIOD ESTIMATES

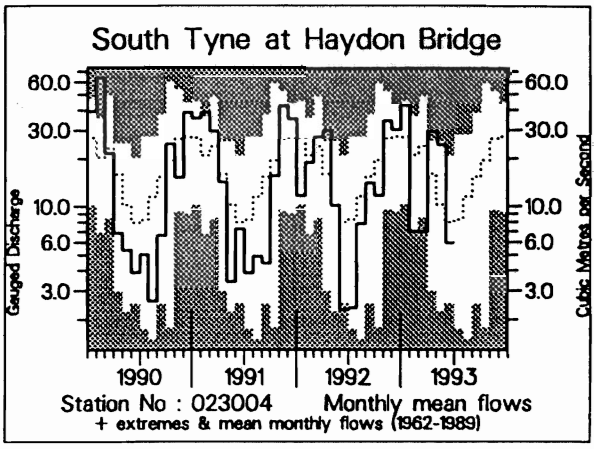
		Jan-Jun93		Jul92-Jun93		Mar90-Jun93		Aug88-Jun93	
		Est Return Period, years		Est Return Period, years		Est Return Period, years		Est Return Period, years	
England and Wales	mm%	399		1002		2695		4021	
	LTA	101	2-5	110	2-5	90	5-15	91	10-20
NRA REGIONS									
North West	mm%	515		1266		3730		5654	
	LTA	102	2-5	104	2-5	94	2-5	96	2-5
Northumbria	mm	437		946		2708		3804	
	% LTA	116	5	108	2-5	94	2-5	89	15-30
Severn-Trent	mm	332		859		2297		3408	
	% LTA	96	2-5	111	2-5	90	5-15	91	10-20
Yorkshire	mm	357		882		2415		3539	
	% LTA	97	2-5	106	2-5	89	10-20	88	25-40
Anglian	mm	266		721		1786		2572	
	% LTA	98	2-5	118	5-15	89	10-20	87	30-60
Thames	mm	312		838		2056		3033	
	% LTA	101	2-5	119	5-10	89	5-15	89	15-30
Southern	mm	338		890		2284		3354	
	% LTA	100	2-5	112	2-5	88	10-20	87	25-45
Wessex	mm	380		948		2455		3750	
	% LTA	101	2-5	109	2-5	86	10-20	89	15-25
South West	mm	582		1366		3541		5448	
	% LTA	111	2-5	114	5-10	91	5-10	94	5-10
Welsh	mm	589		1479		4041		6191	
	% LTA	102	2-5	111	2-5	93	5-10	95	2-5
Scotland	mm	810		1774		5369		8021	
	% LTA	134	60-90	124	60-90	115	130-170	115	>>200
RIVER PURIFICATION BOARDS									
Highland	mm	897		2135		6687		10137	
	% LTA	122	10-15	124	40-60	119	>>200	121	>>200
North-East	mm	494		1061		3204		4587	
	% LTA	114	2-5	104	2-5	96	2-5	92	5-15
Tay	mm	814		1598		4442		6671	
	% LTA	149	140-180	127	30-60	108	5-10	109	10-20
Forth	mm	690		1416		4023		5952	
	% LTA	146	130-170	127	30-65	110	10-20	110	15-35
Tweed	mm	538		1168		3361		4758	
	% LTA	127	10-20	117	5-15	103	2-5	98	2-5
Solway	mm	699		1622		4873		7289	
	% LTA	118	5-10	114	5-10	105	2-5	105	5
Clyde	mm	889		2048		6457		9669	
	% LTA	130	25-40	123	30-50	120	>200	120	>>200

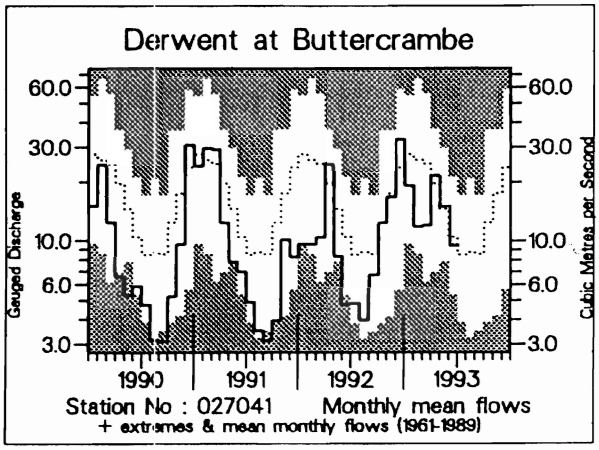
Return period assessments are based on tables provided by the Meteorological Office*. The tables reflect rainfall totals over the period 1911-70 only and the estimate assumes a sensibly stable climate. They assume a start in a specified month; return periods for a start in any month may be expected to be an order of magnitude less - for the longest durations the return period estimates converge. "Wet" return periods underlined.

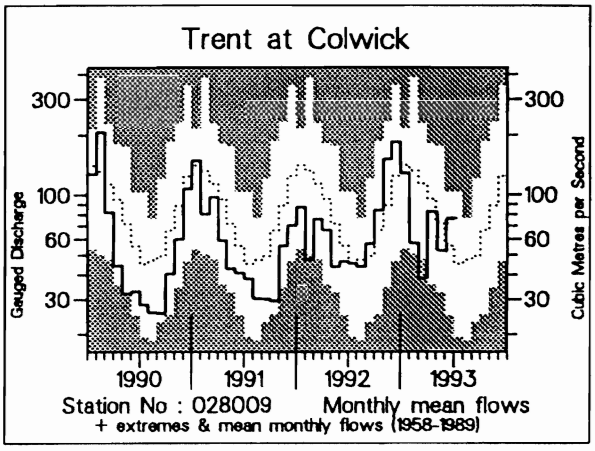
* Tabony, R.C., 1977, The Variability of long duration rainfall over Great Britain, Scientific Paper No. 37, Meteorological Office.

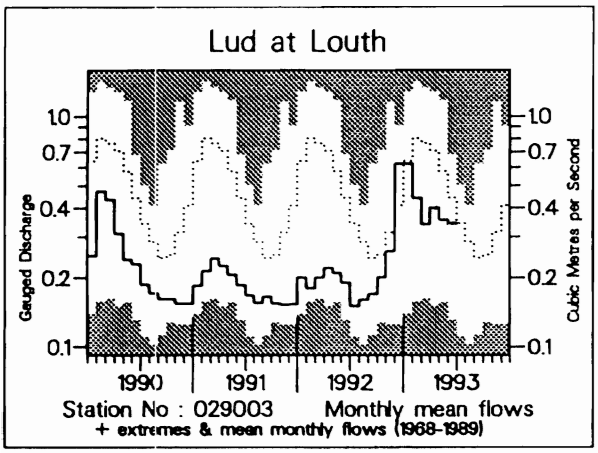
FIGURE 1 MONTHLY RIVER FLOW HYDROGRAPHS

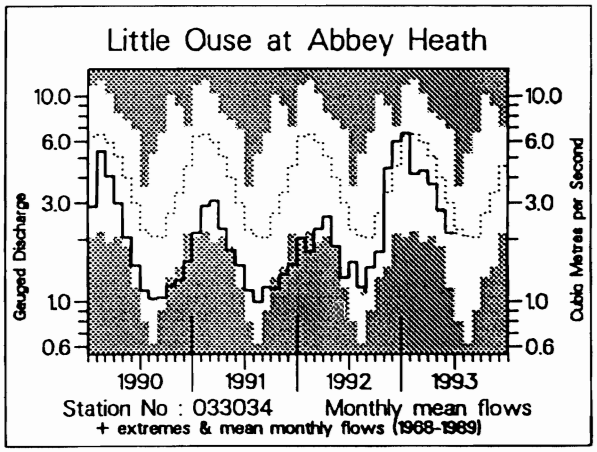


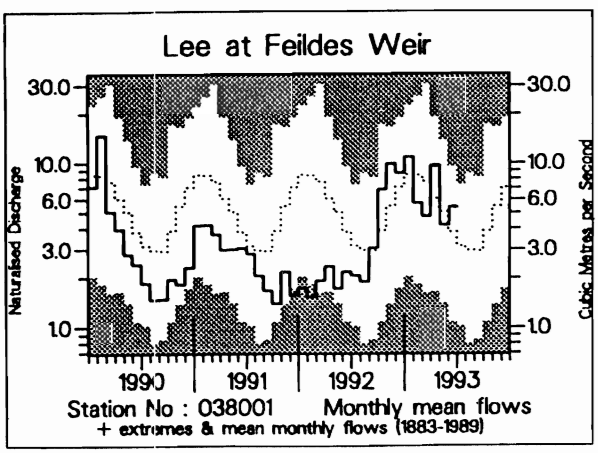


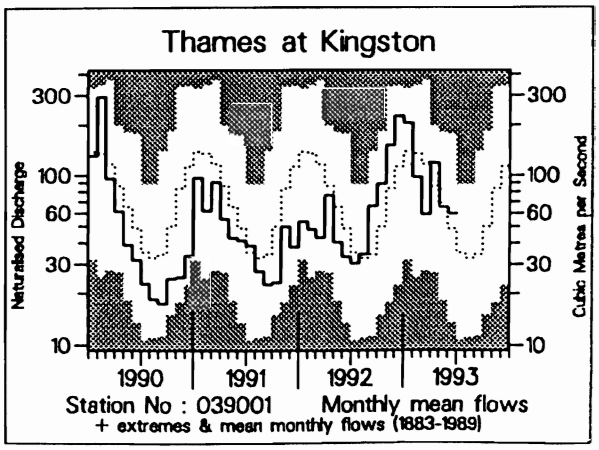


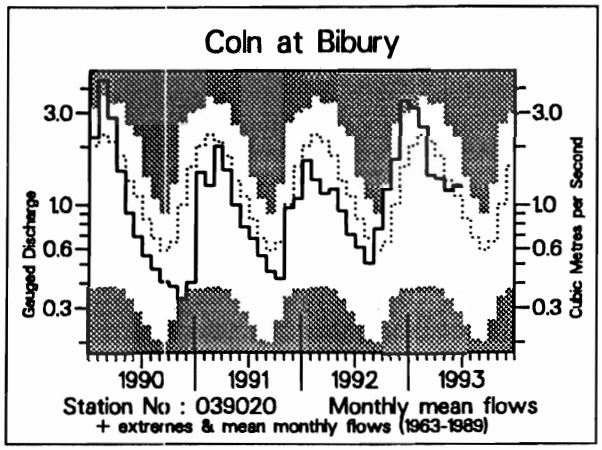


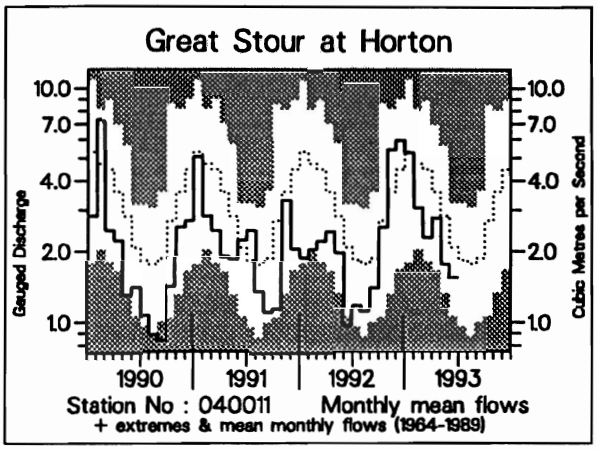


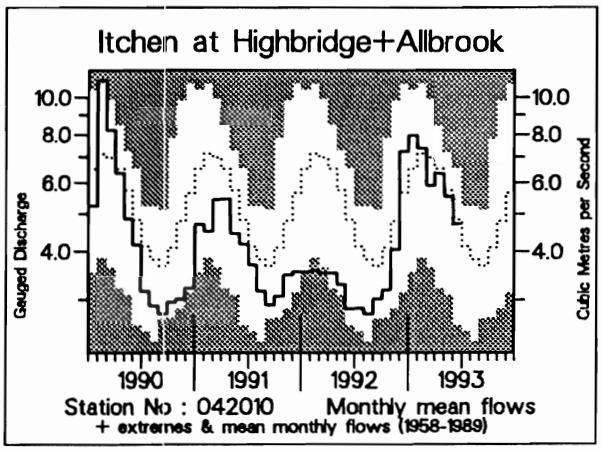


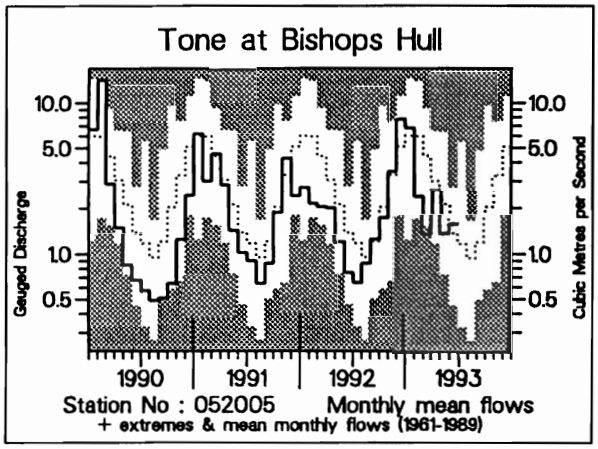


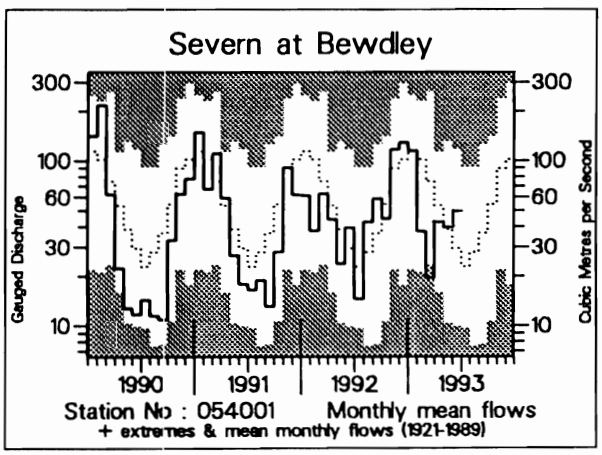


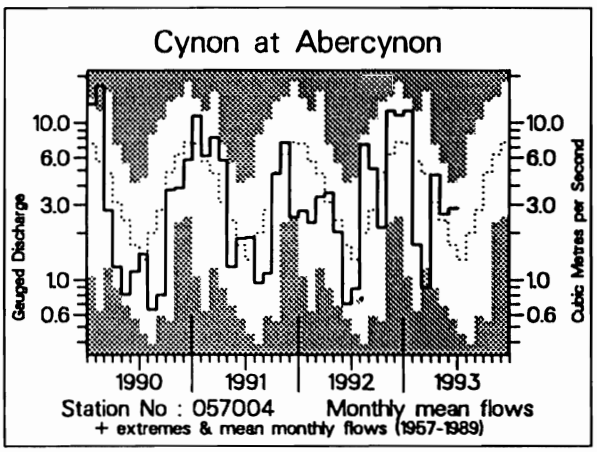

Coln at Bibury
Gauged Discharge
Cubic Metres per Second
3.0
1.0
0.6
0.3
1990
1991
1992
1993
Station No : 039020 Monthly mean flows
+ extremes & mean monthly flows (1963-1989)

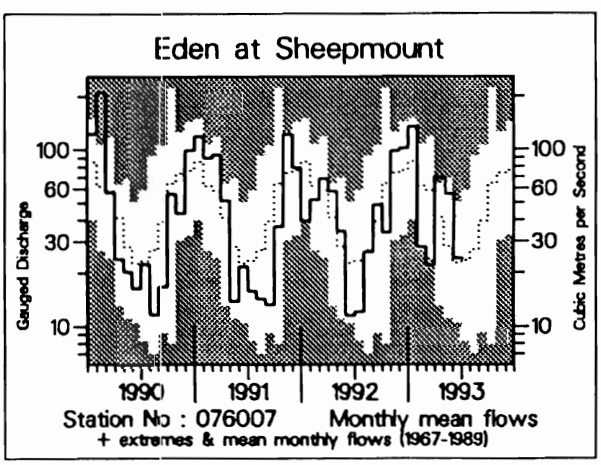

Great Stour at Horton
Gauged Discharge
Cubic Metres per Second
10.0
7.0
4.0
2.0
1.0
1990
1991
1992
1993
Station No : 040011 Monthly mean flows
+ extremes & mean monthly flows (1964-1989)


Itchen at Highbridge+Allbrook
Gauged Discharge
Cubic Metres per Second
10.0
8.0
6.0
4.0
1990
1991
1992
1993
Station No : 042010 Monthly mean flows
+ extremes & mean monthly flows (1958-1989)


Tone at Bishops Hull
Gauged Discharge
Cubic Metres per Second
10.0
5.0
1.0
0.5
1990
1991
1992
1993
Station No : 052005 Monthly mean flows
+ extremes & mean monthly flows (1961-1989)


Severn at Bewdley
Gauged Discharge
Cubic Metres per Second
300
100
60
30
10
1990
1991
1992
1993
Station No : 054001 Monthly mean flows
+ extremes & mean monthly flows (1921-1989)


Cynon at Abercynon
Gauged Discharge
Cubic Metres per Second
10.0
6.0
3.0
1.0
0.6
1990
1991
1992
1993
Station No : 057004 Monthly mean flows
+ extremes & mean monthly flows (1957-1989)


Eden at Sheepmount
Gauged Discharge
Cubic Metres per Second
100
60
30
10
1990
1991
1992
1993
Station No : 076007 Monthly mean flows
+ extremes & mean monthly flows (1967-1989)

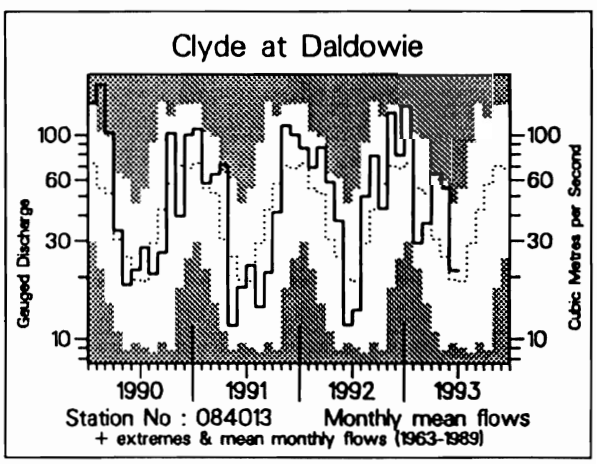

Clyde at Daldowie
Gauged Discharge
Cubic Metres per Second
100
60
30
10
1990
1991
1992
1993
Station No : 084013 Monthly mean flows
+ extremes & mean monthly flows (1963-1989)

TABLE 3 RUNOFF AS MM. AND AS A PERCENTAGE OF THE PERIOD OF RECORD AVERAGE WITH SELECTED PERIODS RANKED IN THE RECORD

River/ Station name	Feb 1993	Mar	Apr	May	Jun 1993		1/93 to 6/93		7/92 to 6/93		5/90 to 6/93		11/88 to 6/93	
	mm %LT	mm %LT	mm %LT	mm %LT	mm %LT	rank /yrs	mm %LT	rank /yrs	mm %LT	rank /yrs	mm %LT	rank /yrs	mm %LT	rank /yrs
Dee at Park	75 104	66 71	97 124	87 142	33 90	12 /21	512 118	19 /21	853 108	15 /20	2295 93	6 /18	3329 88	2 /17
Tay at Ballathie	111 97	97 76	168 196	80 116	50 112	29 /41	833 141	40 /41	1493 131	37 /40	3902 111	31 /38	6308 118	36 /37
Whiteadder Water at Hutton Castle	20 42	14 28	50 131	63 241	22 132	20 /24	223 94	9 /24	387 99	11 /23	1156 94	8 /21	1501 78	5 /20
South Tyne at Haydon Bridge	22 30	24 28	101 182	84 241	20 76	12 /31	404 108	19 /31	753 99	16 /29	2283 96	11 /25	3394 93	5 /23
Wharfe at Flint Mill Weir	27 36	20 26	60 110	63 169	27 110	23 /38	328 90	14 /38	656 91	12 /37	1933 87	5 /35	2967 86	2 /34
Derwent at Buttercrambe	18 46	20 49	35 112	25 107	15 91	18 /32	146 75	8 /32	276 85	9 /31	737 72	3 /29	1040 65	1 /28
Trent at Colwick	18 43	14 35	29 91	19 77	27 144	30 /35	152 74	4 /35	350 99	19 /34	855 77	3 /32	1350 79	2 /31
Lud at Louth	19 58	17 50	19 62	17 66	16 82	10 /25	118 69	8 /25	193 79	8 /24	**424** **54**	**2** **/22**	**659** **54**	**1** **/21**
Witham at Claypole Mill	37 143	13 51	15 73	11 72	11 115	25 /35	119 98	18 /34	232 128	24 /34	451 79	8 /32	679 76	4 /30
Little Ouse at Abbey Heath	14 66	16 75	14 79	10 70	8 77	10 /26	88 82	7 /25	149 89	9 /25	312 60	2 /23	524 65	1 /21
Colne at Lexden	9 50	8 45	11 85	6 70	6 113	27 /34	68 80	9 /34	155 114	27 /33	284 69	3 /31	481 74	1 /30
Lee at Feildes Weir (natr.)	13 66	12 62	24 161	11 86	13 138	93 /108	101 103	65 /107	183 113	71 /106	335 66	8 /102	567 73	10 /99
Thames at Kingston (natr.)	24 73	16 52	31 138	17 98	16 127	87 /111	158 104	61 /111	317 129	92 /110	604 79	18 /108	968 81	13 /106
Coln at Bibury	58 110	36 68	34 80	29 89	30 115	20 /30	266 103	12 /30	471 121	25 /29	1046 85	8 /27	1617 85	4 /26
Great Stour at Horton	21 64	18 55	21 82	14 67	12 79	7 /28	126 76	6 /27	261 90	10 /26	652 72	3 /22	962 69	1 /18
Itchen at Highbridge+Allbrook	49 102	44 86	46 100	41 98	34 100	16 /35	272 102	16 /35	442 97	13 /34	1142 79	2 /32	1743 80	1 /31
Piddle at Baggs Mill	53 92	35 63	38 90	29 92	23 100	15 /30	266 102	16 /29	438 110	19 /28	1042 83	5 /24	1607 82	3 /21
Kenwyn at Truro	35 36	20 26	31 70	50 186	81 447	25 /25	348 93	12 /25	732 119	21 /24	1688 89	3 /22	2714 89	1 /21
Tone at Bishops Hull	29 40	18 32	34 89	19 71	22 128	25 /33	211 74	6 /32	417 90	11 /32	1044 72	1 /30	1790 77	1 /28
Severn at Bewdley	21 37	12 26	26 82	25 107	30 172	68 /73	184 75	11 /72	430 96	36 /72	1135 82	8 /70	1833 85	4 /68
Cynon at Abercynon	38 28	23 19	114 148	67 115	69 173	31 /35	610 98	17 /35	1564 124	31 /33	3685 95	13 /29	5885 99	14 /27
Dee at New Inn	30 18	36 20	138 130	139 211	88 153	19 /24	706 87	8 /24	1708 96	12 /24	4865 88	4 /21	7632 89	1 /20
Eden at Sheepmount	30 40	26 37	79 168	66 205	27 109	16 /23	385 110	16 /23	753 110	15 /21	2147 102	10 /17	3326 102	7 /14
Clyde at Daldowie	37 49	52 68	89 199	76 218	29 111	21 /30	479 129	28 /30	1021 131	28 /29	2873 120	27 /27	4338 119	26 /26
Carron at New Kelso	268 126	255 90	94 67	61 61	85 117	10 /15	1242 110	11 /15	2986 115	13 /14	8519 107	9 /12	13690 113	10 /10

Notes:
(i) Values based on gauged flow data unless flagged (natr.), when naturalised data have been used.
(ii) Values are ranked so that lowest runoff as rank 1.
(iii) %LT means percentage of long term average from 1900 or start of record if later to 1992. For the long periods (at the right of this table), the end date for the long term is 1993.

TABLE 4 START-MONTH RESERVOIR STORAGES UP TO JULY 1993

Area	Reservoir (R)/ Group (G)		Capacity● (Ml)	1993 Feb	Mar	Apr	May	June	July	1992 July
North West	Northern Command Zone[1]	(G)	133375	98	84	77	91	92	77	66
	Vyrnwy	(R)	55146	86	87	78	87	94	89	89
Northumbria	Teesdale[2]	(G)	87936	98	91	83	95	96	80	68
	Kielder	(R)	199175*	90*	81*	81*	91*	96*	91	86*
Severn-Trent	Clywedog	(R)	44922	96	87	87	95	100	96	93
	Derwent Valley[3]	(G)	39525	99	91	73	81	90	93	79
Yorkshire	Washburn[4]	(G)	22035	99	92	83	91	94	81	85
	Bradford supply[5]	(G)	41407	100	89	76	83	91	80	76
Anglian	Grafham	(R)	58707	96	93	92	93	95	95	95
	Rutland	(R)	130061	93	93	88	94	93	96	81
Thames	London[6]	(G)	206232	96	93	91	95	96	94	86
	Farmoor [7]	(G)	13843	92	96	95	99	98	98	98
Southern	Bewl	(R)	28170	91	91	91	97	96	91	71
	Ardingly	(R)	4685	100	100	100	100	100	99	100
Wessex	Clatworthy	(R)	5364*	100	94	83	86	86	91	65
	Bristol WW [8]	(G)	38666*	97*	93*	85*	89*	84*	76*	71*
South West	Colliford	(R)	28540	88	88	83	83	84	87	71
	Roadford	(R)	34500	92	83	80	78	78	82	83
	Wimbleball[9]	(R)	21320	100	99	91	92	89	89	63
	Stithians	(R)	5205	100	98	88	83	91	99	61
Welsh	Celyn + Brenig	(G)	131155	100	96	90	95	99	100	99
	Brianne	(R)	62140	100	96	90	99	100	98	88
	Big Five[10]	(G)	69762	99	91	78	89	92	89	77
	Elan Valley[11]	(G)	99106	100	88	89	98	100	97	91
Lothian	Edinburgh/Mid Lothian	(G)	97639	100	95	93	99	99	96	87
	West Lothian	(G)	5613	99	91	92	100	99	99	60
	East Lothian	(G)	10206	100	99	97	100	100	99	81

● Live or usable capacity (unless indicated otherwise)

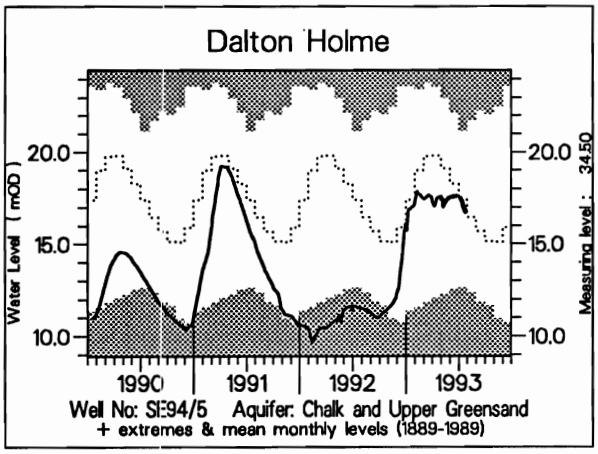
* Gross storage/percentage of gross storage

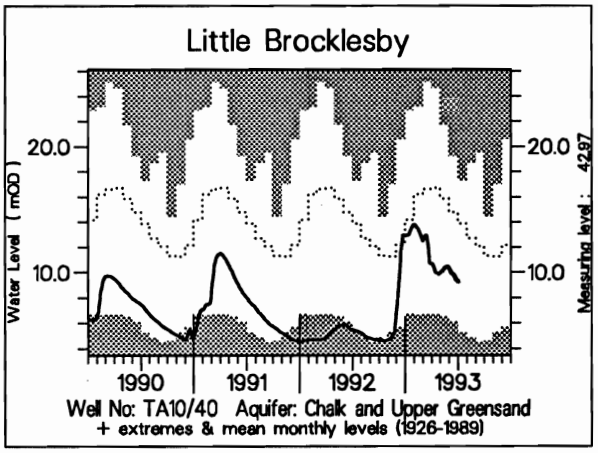
† Intake closure for engineering works caused storage to be lower than it would have been otherwise

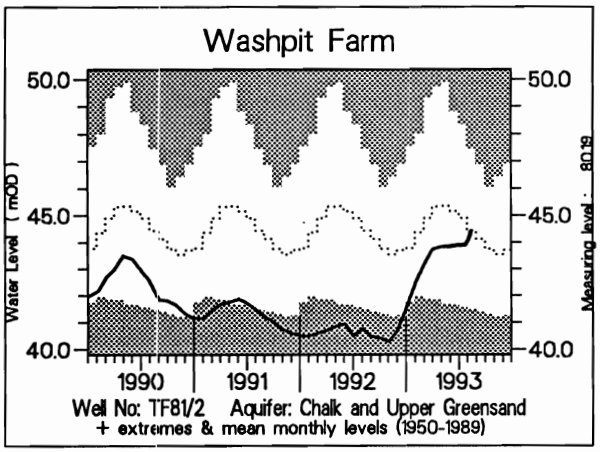
1. Includes Haweswater, Thirlmere, Stocks and Barnacre.
2. Cow Green, Selset, Grassholme, Balderhead, Blackton and Hury.
3. Howden, Derwent and Ladybower.
4. Swinsty, Fewston, Thruscross and Eccup.
5. The Nidd/Barden group (Scar House, Angram, Upper Barden, Lower Barden and Chelker) plus Grimwith.
6. Lower Thames (includes Queen Mother, Wraysbury, Queen Mary, King George VI and Queen Elizabeth II) and Lee Valley (includes King George and William Girling) groups - pumped storages.
7. Farmoor 1 and 2 - pumped storages.
8. Blagdon, Chew Valley and others.
9. Shared between South West (river regulation for abstraction) and Wessex (direct supply).
10. Usk, Talybont, Llandegfedd (pumped storage), Taf Fechan, Taf Fawr.
11. Claerwen, Caban Coch, Pen y Garreg and Craig Goch.

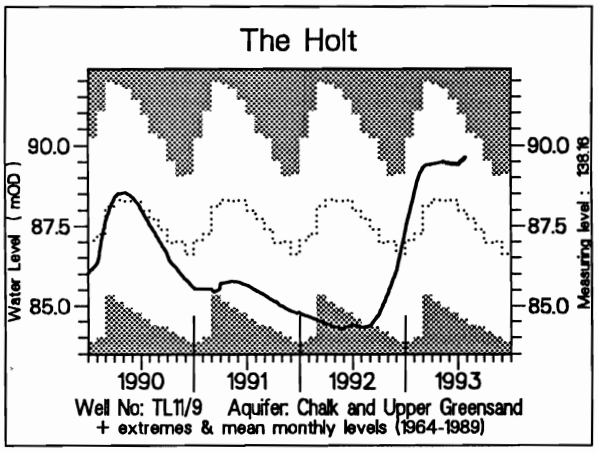
Note: Variations in storage depend on the balance between inputs (from catchment rainfall and any pumping) and outputs (to supply, compensation flow, HEP, amenity). There will be additional losses due to evaporation, especially in the summer months. Operational strategies for making the most efficient use of water stocks will further affect reservoir storages. Table 4 provides a link between the hydrological conditions described elsewhere in the report and the water resources situation.

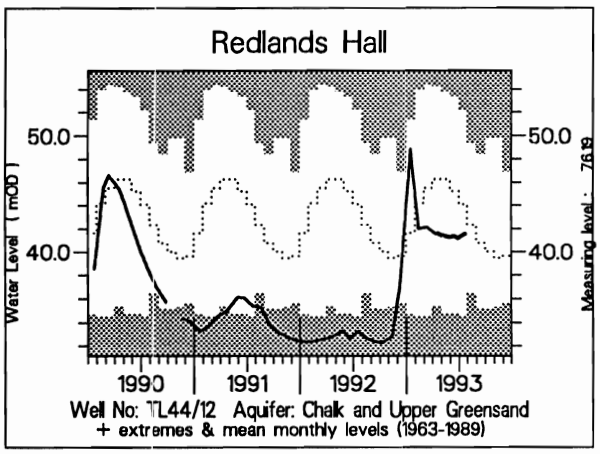
FIGURE 2 GROUNDWATER LEVEL HYDROGRAPHS

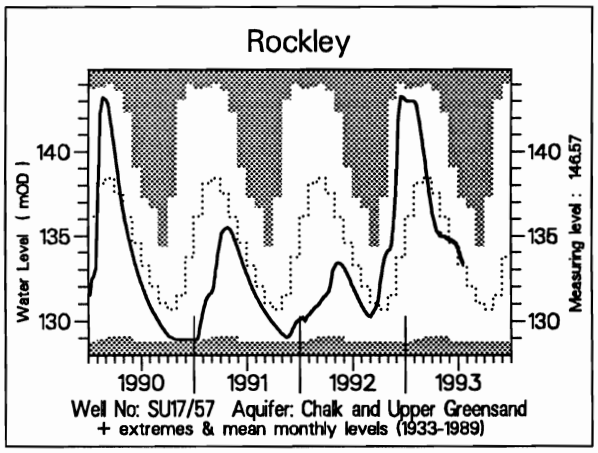


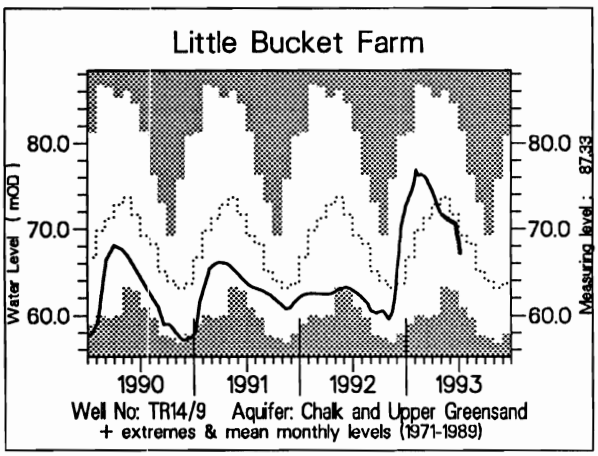


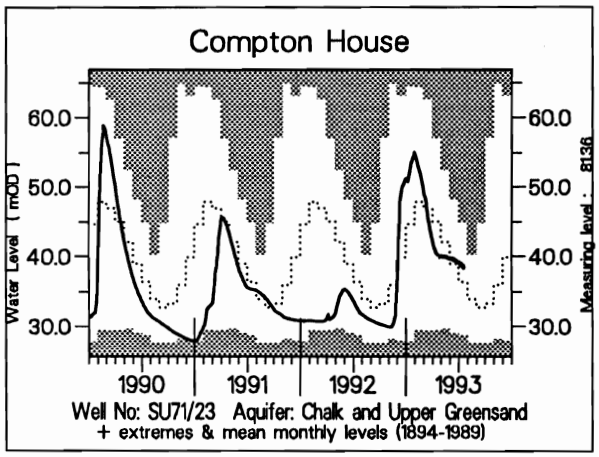


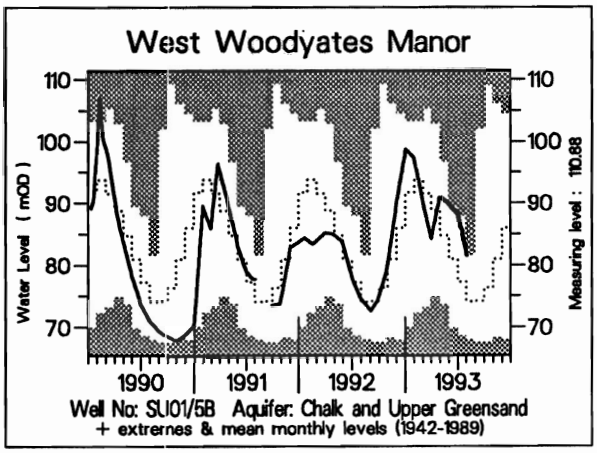


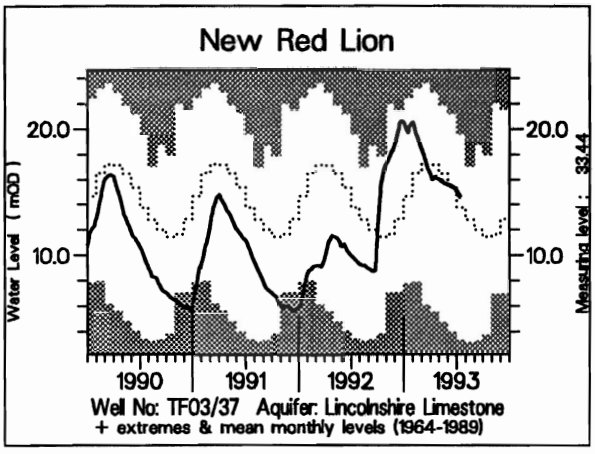


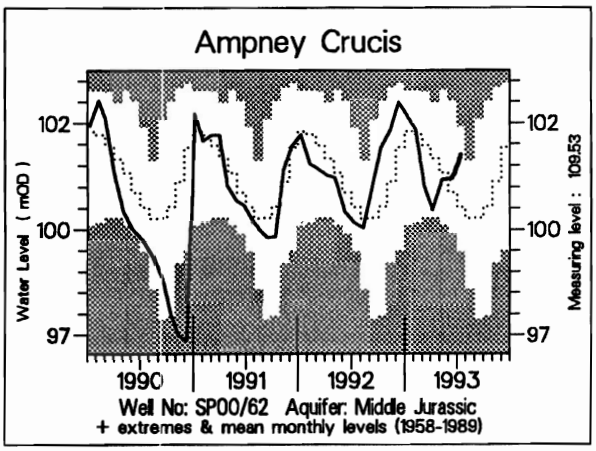


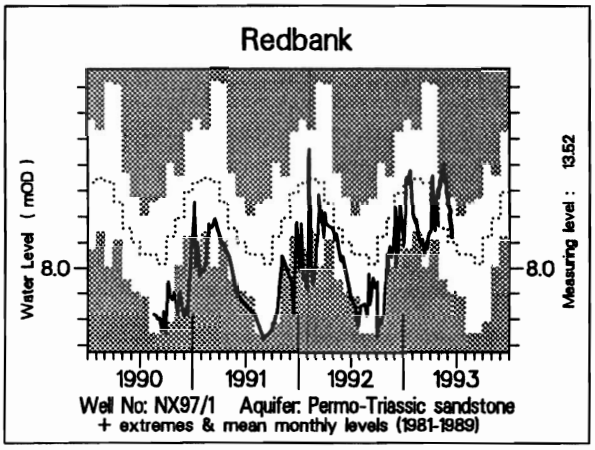


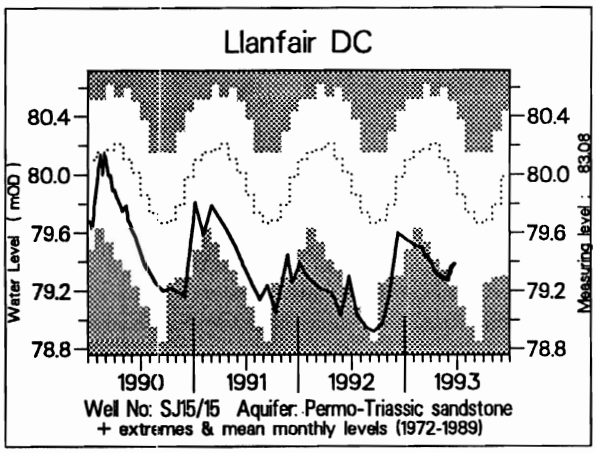


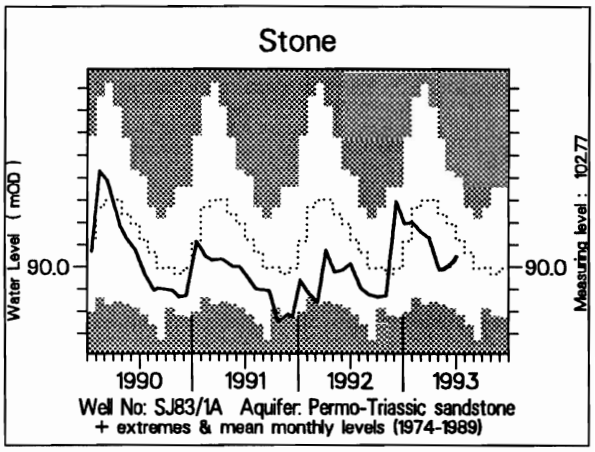

West Woodyates Manor
Water Level (mOD)
Measuring level : 110.88
1990
1991
1992
1993
Well No: SU01/5B Aquifer: Chalk and Upper Greensand
+ extremes & mean monthly levels (1942-1989)

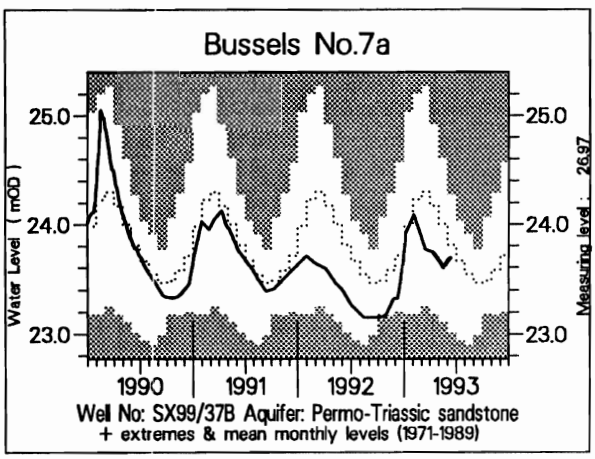

New Red Lion
Water Level (mOD)
Measuring level : 33.44
1990
1991
1992
1993
Well No: TF03/37 Aquifer: Lincolnshire Limestone
+ extremes & mean monthly levels (1964-1989)


Ampney Crucis
Water Level (mOD)
Measuring level : 109.53
1990
1991
1992
1993
Well No: SP00/62 Aquifer: Middle Jurassic
+ extremes & mean monthly levels (1958-1989)


Redbank
Water Level (mOD)
Measuring level : 13.52
1990
1991
1992
1993
Well No: NX97/1 Aquifer: Permo-Triassic sandstone
+ extremes & mean monthly levels (1981-1989)


Llanfair DC
Water Level (mOD)
Measuring level : 83.08
1990
1991
1992
1993
Well No: SJ15/15 Aquifer: Permo-Triassic sandstone
+ extremes & mean monthly levels (1972-1989)


Stone
Water Level (mOD)
Measuring level : 102.77
1990
1991
1992
1993
Well No: SJ83/1A Aquifer: Permo-Triassic sandstone
+ extremes & mean monthly levels (1974-1989)


Bussels No.7a
Water Level (mOD)
Measuring level : 26.97
1990
1991
1992
1993
Well No: SX99/37B Aquifer: Permo-Triassic sandstone
+ extremes & mean monthly levels (1971-1989)

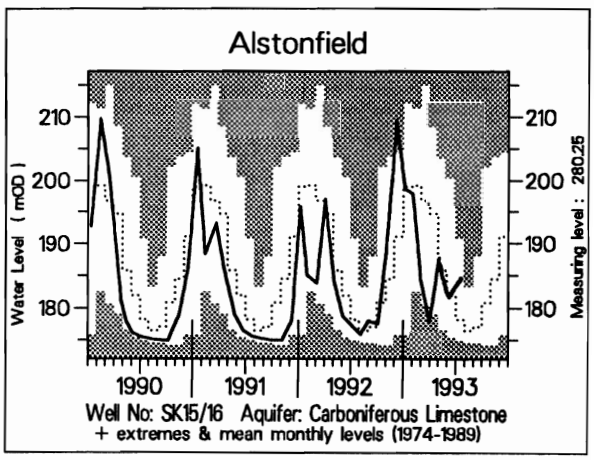

Alstonfield
Water Level (mOD)
Measuring level : 280.25
1990
1991
1992
1993
Well No: SK15/16 Aquifer: Carboniferous Limestone
+ extremes & mean monthly levels (1974-1989)

TABLE 5 A COMPARISON OF JUNE GROUNDWATER LEVELS: 1992 AND 1993

Site	Aquifer	Records commence	Average June level	June 1992		June/July 1993		No of years June level <1993	Least pre-1993 level
				day	level	day	level		any month
Wetwang	C & UGS	1971	22.29	30/06	19.15	29/06	21.33	4	16.66
Dalton Holme	C & UGS	1889	18.31	30/06	11.40	29/06	16.79	>10	9.64
Little Brocklesby	C & UGS	1926	13.68	23/06	5.57	21/06	9.54	6	4.53
Washpit Farm	C & UGS	1950	45.20	04/06	40.96	05/07	44.24	>10	40.30
The Holt	C & UGS	1964	88.11	01/06	84.33	04/07	89.58	>10	83.90
Therfield Rectory	C & UGS	1883	82.01	14/06	71.95	01/07	79.91	>10	dry <71.6
Redlands Hall	C & UGS	1964	44.24	19/06	32.64	11/06	40.16	6	32.29
Rockley	C & UGS	1933	134.53	28/06	132.18	04/07	133.53	>10	dry <128.9
Little Bucket Farm	C & UGS	1971	70.55	22/06	63.12	18/06	67.70	7	56.77
Compton House	C & UGS	1894	39.00	25/06	34.27	16/06	37.99	>10	27.64
Chilgrove House	C & UGS	1836	46.89	16/06	42.94	16/06	46.25	>10	33.46
West Dean No 3	C & UGS	1940	1.65	26/06	1.43	25/06	1.69	>10	1.01
Lime Kiln Way	C & UGS	1969	125.33	16/06	123.97	15/06	124.34	1	123.70
Ashton Farm	C & UGS	1974	67.75	07/06	67.80	28/06	66.67	4	63.10
West Woodyates	C & UGS	1942	80.79	01/06	83.20	28/06	82.23	>10	67.62
New Red Lion	LLst	1964	14.83	22/06	10.22	17/06	14.91	>10	3.29
Ampney Crucis	Mid Jur	1958	100.93	08/06	100.42	02/07	101.52	>10	97.38
Yew Tree Farm	PTS	1973	13.55	25/06	13.27	29/06	13.53	6	8.43
Llanfair DC	PTS	1972	79.92	22/06	79.30	22/06	79.40	3	78.85
Morris Dancers	PTS	1969	32.51	08/06	31.95	08/06	31.89	0	30.87
Stone	PTS	1974	90.40	04/06	89.97	02/07	90.16	6	89.34
Skirwith	PTS	1978	130.45	30/06	130.06	28/06	130.34	3	129.44
Redbank	PTS	1981	8.13	02/06	8.09	30/06	8.21	7	7.45
Bussels 7A	PTS	1972	23.81	30/06	23.27	10/06	23.68	6	22.90
Rushyford NE	MgLst	1967	72.13	30/06	74.73	08/06	75.63	6	64.77
Peggy Ellerton	MgLst	1968	34.77	08/06	31.68	07/06	31.79	2	31.10
Alstonfield	CLst	1974	181.61	04/06	178.81	02/07	185.06	>10	174.22

groundwater levels are in metres above Ordnance Datum

C & UGS	Chalk and Upper Greensand	Mid Jur	Middle Jurassic limestones
LLst	Lincolnshire Limestone	MgLst	Magnesian Limestone
PTS	Permo-Triassic sandstones	CLst	Carboniferous Limestone

FIGURE 3 LOCATION MAP OF GAUGING STATIONS AND GROUNDWATER INDEX WELLS