Hydrological Summary for Great Britain

APRIL 1995

Rainfall

April was a dry, warm and relatively sunny month throughout most of Britain. Diurnal temperature variations were commonly very marked; mild and cool conditions also alternated over longer periods. Overall however, weather conditions were conducive to relatively high evaporation losses in most regions. The weather was largely dictated by the strength and location of a high pressure cell which developed early in April; its subsequent movement bringing contrasting airstreams across the British Isles. Winds from the north-eastern sector helped produce above average rainfall along the coastal lowlands of eastern Scotland - a relatively rare occurrence in the recent past. Northern Scotland aside however, regional rainfall totals were well below average, notably so in southern Britain where many lowland areas registered only around a third of normal rainfall. As elsewhere, the great majority of this was attributable to an unsettled spell between April 21 and 25th. This period is bracketed by two notably dry sequences, each extending to more than 15 days in some districts and the 7-week rainfall totals from mid-March are exceptionally low over wide areas. By contrast, accumulated rainfall totals remain substantially above average over the year thus far - notably so in most of northern Scotland - and over a range of lengthier timespans.

River Flow

Like much of March, flow patterns in April were characterised by extended recessions in most catchments. A few modest spates were recorded around the 22nd but, by early May, rapidly drying soils had greatly diminished the risk of flooding - in the lowlands especially. The limited rainfall and accelerating evaporation losses were reflected in the April runoff totals; catchment geology also exerted an obvious influence on flow rates. Runoff declined through April on the Hampshire Test but, nonetheless, the mean flow was the highest for nearly 30 years. Very healthy monthly runoff totals also typified most other Chalk catchments although daily flows had commonly fallen below average by early May. In impermeable catchments runoff rates have declined far more steeply following the winter spates. Many rivers with headwaters in the west and north (northern Scotland excepted) registered April runoff totals towards the low end of the normal range. The contrast with flow conditions earlier in the year is dramatic, reinforcing the recent tendency for seasonal variability in runoff rates to be accentuated. A notable illustration is provided by the Trent where the January mean was the highest (for the month) in a 38-year series; the April mean was the fourth lowest. Despite such volatility, flows are generally well above those recorded during recent drought years and accumulated runoff totals - across a broad range of timeframes - are greatly above average in most catchments.

Groundwater

The steep rise in soil moisture deficits in early April (and again in early May when SMDs were substantially above average in most of the English lowlands) confirmed the cessation of substantial recharge, to most lowland aquifers at least, for 1994/95. Above average rainfall in April in parts of north-eastern Britain arrived too late to significantly augment groundwater resources in a few minor (but locally important) aquifers. Elsewhere, the seasonal decline in water-tables generally commenced at high, to very high, levels. Except in the deepest Chalk wells, (e.g. Therfield - where the annual maximum normally occurs in the late spring) and parts of the confined Permo-Triassic sandstones, recent groundwater level recessions have been steep, especially in the more responsive fissured aquifers. The full impact of the fall in groundwater levels is not captured in those boreholes with levels recorded in the first half of April (see Table 5). Resources generally remain well above, or close to, the normal range in the Chalk but, by early May, were a little below average in some of the older aquifers. Overall groundwater resources are expected to remain healthy - relative to the seasonal mean - but the 1995/96 recovery may need to be generated from a relatively low base if, as happened in 1990, low rainfall, high temperatures and parched soils conspire to delay the onset of recharge until very late in the year.

General

Reservoir contents declined briskly through April - and more rapidly in some areas as the early May heatwave developed. Stocks in a few small impoundments are being carefully monitored but in the larger, strategically important reservoirs, stocks remain healthy as does the general resources outlook. However, peaks in demand, typically associated with heavy garden watering, may stress local distribution systems. If the present dry spell heralds a summer with substantially below average rainfall, some low flow difficulties may also be encountered. These may be most pervalent where irrigation demands are met from rivers having little or no baseflow component.

Institute of Hydrology

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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. Figure 3 is based on weather data collected by the Institute of Hydrology at Wallingford and Balquhidder (Central Region, Scotland). Reservoir contents information has been supplied by the Water Services Companies, the NRA or, in Scotland, the Lothian and Strathclyde Regional Councils. The most recent areal rainfall figures are derived from a restricted network of raingauges and a proportion of the river flow data is of a provisional nature.

A map (Figure 4) is provided to assist in the location of the principal monitoring sites.

Financial support towards the production of the Hydrological Summaries is given by the Department of the Environment and the National Rivers Authority.

The Hydrological Summaries are available on annual subscription at a current cost of £48 per year - enquiries should be directed to the National Water Archive Office at the address below. No charge is made to those organisations providing data for the Summaries.

* For reasons of consistency and to provide greater spatial discrimination, the original ten regional divisions of the NRA have been retained for use in the Hydrological Summaries.

MORECS

Most of the recent monthly regional rainfall data featured in the Hydrological Summaries are MORECS assessments. MORECS is the generic name for The Meteorological Office services involving the calculation of evaporation and soil moisture routinely for Great Britain. Products include a weekly issue of maps and tables of potential and actual evaporation, soil moisture deficits, effective rainfall and the hydrometeorological variables used to calculate them. The data are used to provide values for 40 km squares - or larger areas - and various sets of maps and tables are available according to user requirements. Options include a day-by-day retrospective calculation of soil moisture at any of 4000 rain-gauge sites.

Further information about MORECS services may be obtained from: The Meteorological Office, Sutton House, London Road, Bracknell, RG12 2SY

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TABLE 1 1994/95 RAINFALL AS A PERCENTAGE OF THE 1961-90 AVERAGE

Note: The monthly rainfall figures are the copyright of The Meteorological Office.
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		Apr 1994	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 1995	Feb	Mar	Apr
England and Wales	mm	74	62	36	47	72	106	95	84	139	157	111	64	27
	%	123	97	55	76	95	138	112	93	148	178	176	89	46
NRA REGIONS														
North West	mm	107	35	70	70	103	113	113	124	204	210	148	108	36
	%	151	47	86	82	96	98	88	101	165	174	190	114	50
Northumbrian	mm	63	26	39	41	81	77	71	95	124	123	107	73	41
	%	113	42	65	63	100	105	93	110	153	146	181	104	74
Severn Trent	mm	57	54	24	44	56	127	66	74	115	128	88	49	21
	%	104	92	41	83	84	198	103	104	149	183	163	80	38
Yorkshire	mm	61	46	28	53	58	101	72	89	121	125	100	62	29
	%	103	77	47	90	78	149	99	111	146	158	172	91	48
Anglian	mm	51	51	25	41	57	89	69	32	58	98	62	49	17
	%	111	106	49	84	104	182	135	55	105	196	168	104	38
Thames	mm	57	79	25	21	50	74	84	53	90	136	83	51	18
	%	114	141	45	43	86	125	135	82	129	213	184	90	36
Southern	mm	77	91	39	29	68	90	119	68	123	163	112	58	18
	%	145	169	72	60	119	130	149	80	150	204	207	93	34
Wessex	mm	62	92	24	34	68	99	113	98	139	179	111	48	31
	%	117	151	42	65	103	138	143	118	149	206	171	68	59
South West	mm	94	99	32	49	103	131	140	127	213	230	163	84	40
	%	136	138	46	71	123	141	121	102	153	167	161	84	58
Welsh	mm	116	69	57	68	94	134	137	133	240	235	181	82	37
	%	145	84	72	88	93	117	100	94	157	164	187	77	46
Scotland	mm	133	29	110	67	101	103	109	150	240	225	205	192	56
	%	175	34	128	71	86	73	70	99	159	149	201	154	74
RIVER PURIFICATION BOARDS														
Highland	mm	185	36	148	62	112	153	117	162	297	293	271	262	82
	%	203	39	151	58	88	89	59	80	151	156	213	162	90
North East	mm	77	16	55	40	47	89	82	85	90	136	83	82	63
	%	128	23	83	55	54	102	85	86	97	137	128	105	105
Tay	mm	96	22	89	47	81	56	113	151	197	184	188	128	32
	%	155	27	122	61	86	49	87	125	155	128	198	117	52
Forth	mm	84	21	75	59	80	56	90	127	203	150	167	121	30
	%	142	28	109	79	85	51	78	113	185	127	211	129	51
Tweed	mm	72	19	52	46	71	57	74	120	171	127	109	95	35
	%	126	27	80	63	81	64	78	129	184	127	163	120	61
Solway	mm	124	29	79	106	121	76	116	177	243	219	175	200	36
	%	161	34	94	118	102	53	74	123	164	140	173	171	47
Clyde	mm	149	38	143	97	142	98	129	186	312	258	248	251	47
	%	177	42	154	89	106	55	67	103	174	137	210	171	56

Note: The monthly rainfall figures for the NRA regions for March and April correspond to the MORECS areal assessments derived by the Meteorological Office. In northern England these initial assessments may have a particularly wide error band associated with them. The figures for the RPB regions for March and April 1995 were derived by IH in collaboration with the RPBs. The provisional figures for England and Wales and for Scotland are derived using a different raingauge network. Regional areal rainfall figures are regularly updated (normally one or two months in arrears) using figures derived from a far denser raingauge network.

TABLE 2 RAINFALL RETURN PERIOD ESTIMATES

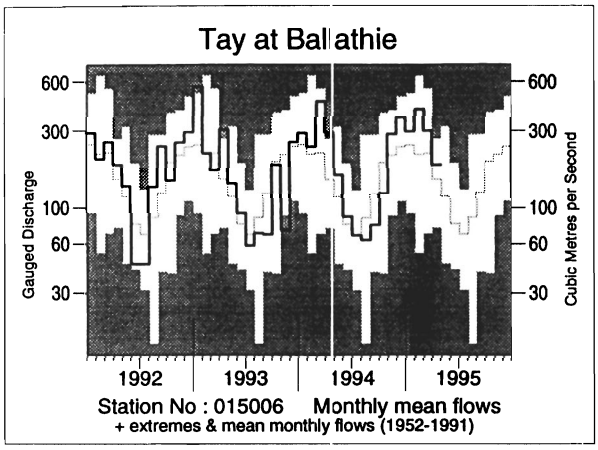
		Mar 95-Apr 95		Jan 95-Apr 95		May 94-Apr 95		Apr 93-Apr 95	
		Est Return Period, years		Est Return Period, years		Est Return Period, years		Est Return Period, years	
England and Wales	mm	91		359		1000		2203	
	% LTA	69	5-10	127	5-10	112	5-10	119	40-60
NRA REGIONS									
North West	mm	144		502		1334		2783	
	% LTA	87	2-5	137	10-20	111	2-5	112	5-10
Northumbria	mm	114		344		898		2039	
	% LTA	91	2-5	128	5-10	105	2-5	116	10-20
Severn Trent	mm	70		286		846		1873	
	% LTA	60	5-10	119	2-5	112	2-5	120	30-45
Yorkshire	mm	90		315		883		1969	
	% LTA	71	5-10	120	2-5	108	2-5	116	10-20
Anglian	mm	66		226		648		1507	
	% LTA	71	2-5	126	5-10	109	2-5	122	40-60
Thames	mm	69		288		764		1683	
	% LTA	65	5-10	134	5-10	111	2-5	118	10-20
Southern	mm	76		351		978		2073	
	% LTA	66	5-10	141	10-20	126	15-25	129	120-170
Wessex	mm	79		369		1036		2200	
	% LTA	64	5-10	134	5-10	124	10-20	127	110-150
South West	mm	124		517		1411		3150	
	% LTA	74	2-5	127	5-10	120	10-15	130	>200
Welsh	mm	119		535		1467		3197	
	% LTA	64	5-10	125	5-10	112	5-10	118	25-40
Scotland	mm	248		678		1587		3274	
	% LTA	123	5-10	149	150-250	110	5-10	111	10-20
RIVER PURIFICATION BOARDS									
Highland	mm	344		908		1995		3866	
	% LTA	136	5-15	160	>200	113	5-10	107	5-10
North East	mm	145		364		868		2096	
	% LTA	105	2-5	121	5-10	89	5-10	105	2-5
Tay	mm	160		532		1288		2876	
	% LTA	94	2-5	130	5-15	105	2-5	114	10-20
Forth	mm	151		468		1179		2605	
	% LTA	99	2-5	134	10-20	106	2-5	114	15-25
Tweed	mm	130		366		976		2285	
	% LTA	96	2-5	121	5-10	101	2-5	114	10-20
Solway	mm	236		630		1577		3288	
	% LTA	122	2-5	140	20-35	111	5-10	113	10-15
Clyde	mm	298		804		1949		3920	
	% LTA	129	5-10	149	80-120	115	5-10	113	10-20

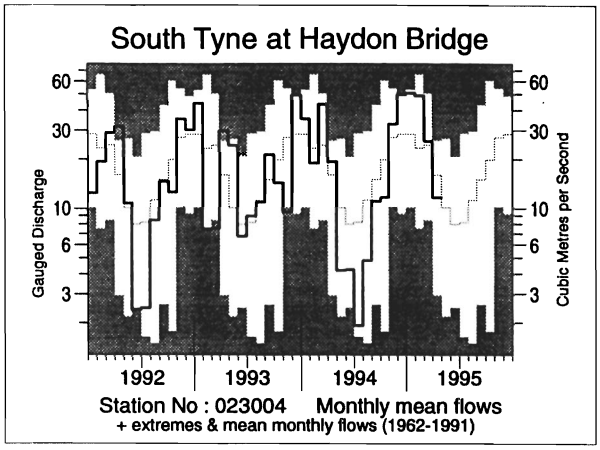
LTA refers to the period 1961-90.

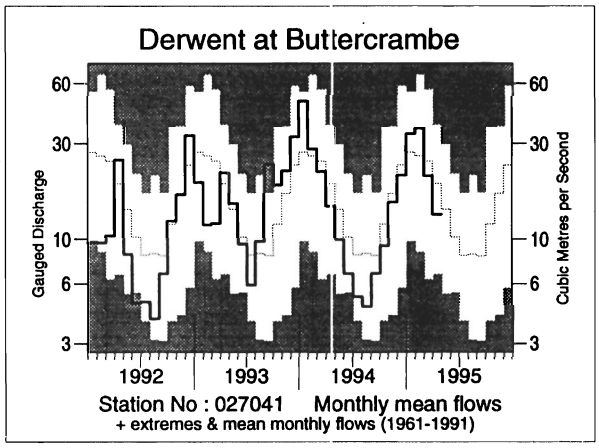
Return period assessments are based on tables provided by the Meteorological Office*. The tables reflect rainfall totals over the period 1911-70 only and the estimate assumes a sensibly stable climate. They assume a start in a specified month; return periods for a start in any month may be expected to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

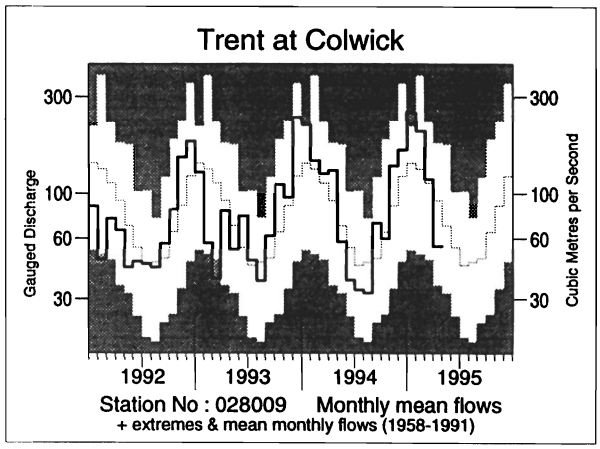
* Tabony, R.C., 1977, The Variability of long duration rainfall over Great Britain, Scientific Paper No. 37, Meteorological Office.

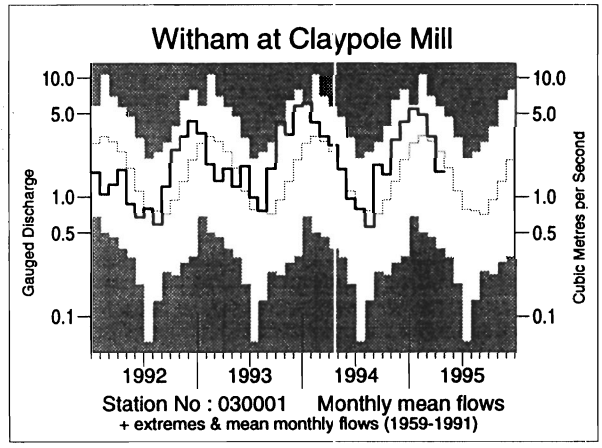
FIGURE 1 MONTHLY RIVER FLOW HYDROGRAPHS

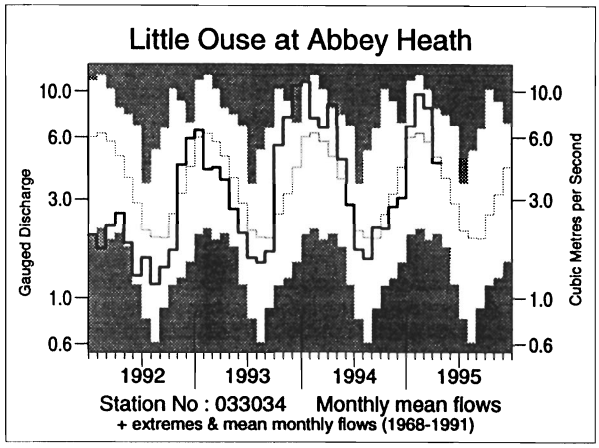


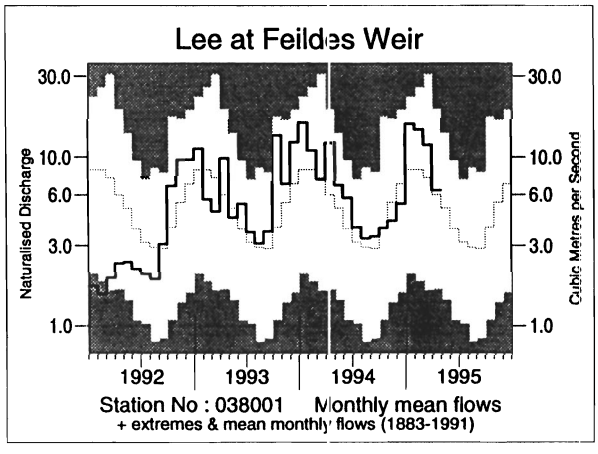


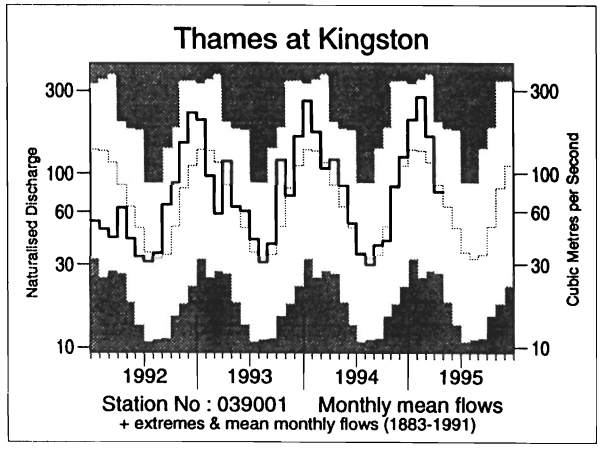


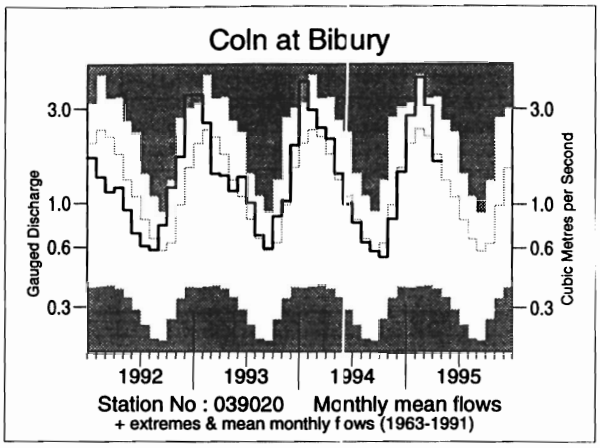


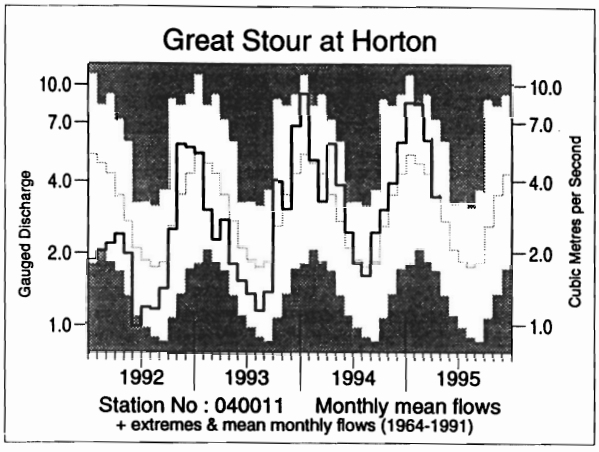


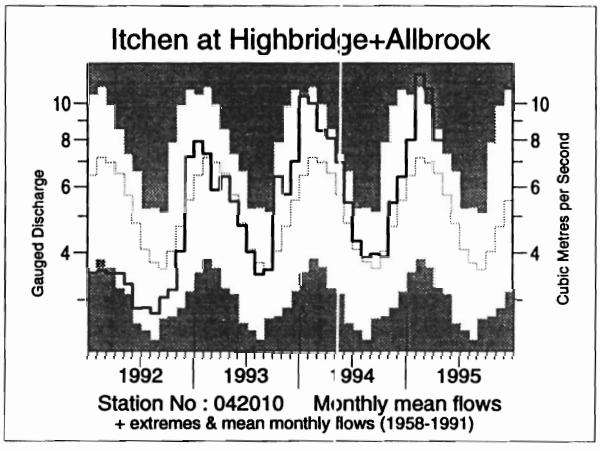


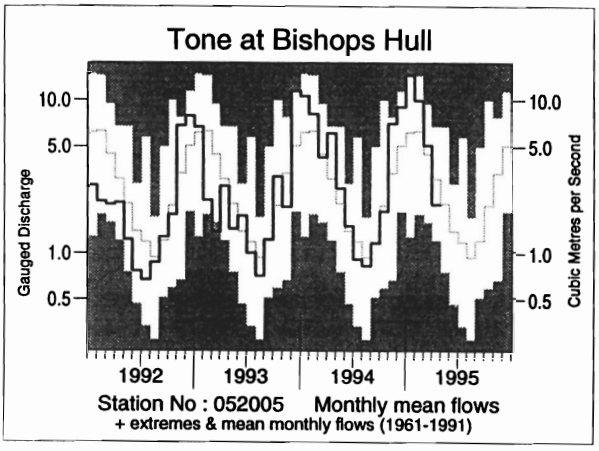


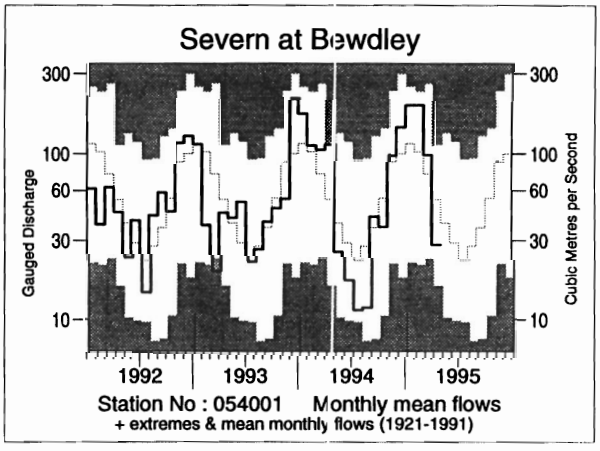


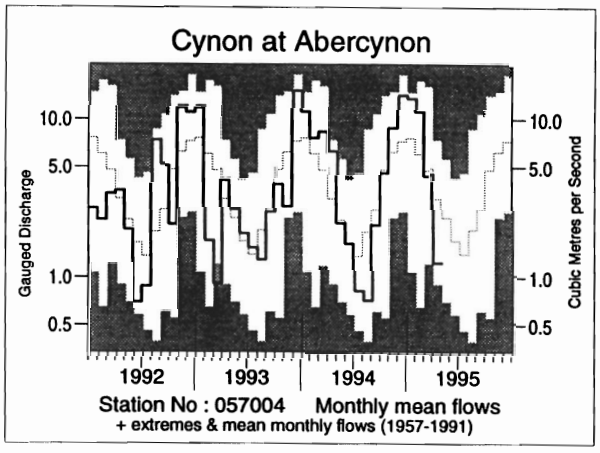

Coln at Bibury
Gauged Discharge
Cubic Metres per Second
3.0
1.0
0.6
0.3
1992
1993
1994
1995
Station No : 039020 Monthly mean flows
+ extremes & mean monthly f ows (1963-1991)

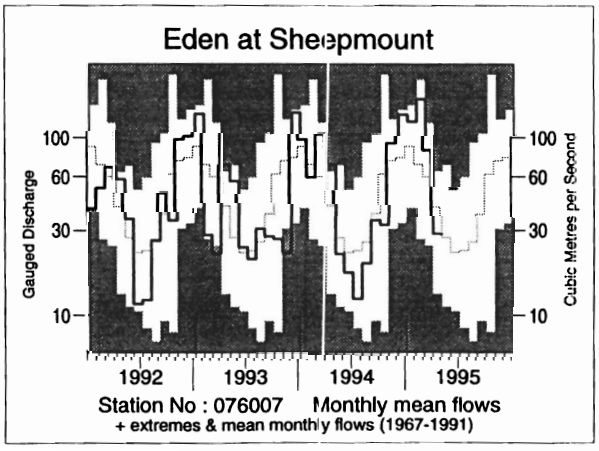

Great Stour at Horton
Gauged Discharge
Cubic Metres per Second
10.0
7.0
4.0
2.0
1.0
1992
1993
1994
1995
Station No : 040011 Monthly mean flows
+ extremes & mean monthly flows (1964-1991)


Itchen at Highbridge+Allbrook
Gauged Discharge
Cubic Metres per Second
10
8
6
4
1992
1993
1994
1995
Station No : 042010 Monthly mean flows
+ extremes & mean monthly flows (1958-1991)


Tone at Bishops Hull
Gauged Discharge
Cubic Metres per Second
10.0
5.0
1.0
0.5
1992
1993
1994
1995
Station No : 052005 Monthly mean flows
+ extremes & mean monthly flows (1961-1991)


Severn at Bewdley
Gauged Discharge
Cubic Metres per Second
300
100
60
30
10
1992
1993
1994
1995
Station No : 054001 Monthly mean flows
+ extremes & mean monthly flows (1921-1991)


Cynon at Abercynon
Gauged Discharge
Cubic Metres per Second
10.0
5.0
1.0
0.5
1992
1993
1994
1995
Station No : 057004 Monthly mean flows
+ extremes & mean monthly flows (1957-1991)


Eden at Sheepmount
Gauged Discharge
Cubic Metres per Second
100
60
30
10
1992
1993
1994
1995
Station No : 076007 Monthly mean flows
+ extremes & mean monthly flows (1967-1991)

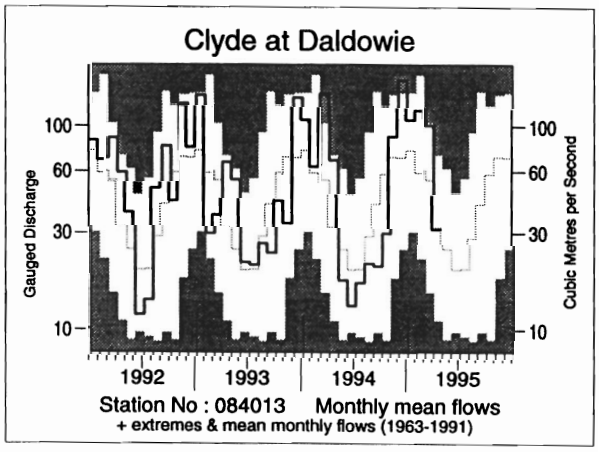

Clyde at Daldowie
Gauged Discharge
Cubic Metres per Second
100
60
30
10
1992
1993
1994
1995
Station No : 084013 Monthly mean flows
+ extremes & mean monthly flows (1963-1991)

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	Dec 1994	Jan	Feb	Mar	Apr 1995		1/95 to 4/95		10/94 to 4/95		5/94 to 4/95		9/92 to 4/95	
	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	71 83	81 88	98 136	84 91	67 85	9 /23	330 97	11 /23	528 89	6 /22	657 83	3 /22	2283 103	12 /20
Tay at Ballathie	212 150	174 117	217 190	176 138	105 120	34 /43	673 138	39 /43	1120 130	40 /43	1386 121	37 /42	3918 122	39 /40
Tweed at Boleside	214 218	162 154	160 209	133 168	36 67	8 /35	492 151	34 /35	853 145	34 /34	967 126	32 /34	2688 125	32 /32
Whiteadder Water at Hutton Castle	39 82	43 73	47 101	24 49	19 49	5 /26	133 69	5 /26	208 69	5 /26	251 64	5 /25	1086 98	10 /24
South Tyne at Haydon Bridge	179 172	181 179	158 215	92 108	40 69	11 /33	471 145	33 /33	805 136	33 /33	897 114	24 /31	2460 109	23 /27
Wharfe at Flint Mill Weir	136 137	163 166	152 203	91 121	26 47	10 /40	432 140	40 /40	728 132	38 /40	833 115	31 /39	2228 109	29 /37
Derwent at Buttercrambe	35 87	57 127	55 142	35 87	22 69	9 /34	168 108	20 /34	244 100	18 /34	299 92	15 /33	932 102	17 /31
Trent at Colwick	59 129	91 184	66 158	42 108	19 60	4 /37	218 132	33 /37	346 130	34 /37	428 120	29 /36	1171 119	33 /34
Lud at Louth	18 89	38 133	45 139	44 130	25 84	11 /27	151 118	18 /27	196 112	17 /27	294 117	18 /26	812 120	18 /25
Witham at Claypole Mill	38 192	49 196	40 156	28 113	14 69	13 /36	132 134	29 /36	209 148	29 /36	261 140	30 /36	753 146	33 /34
Little Ouse at Abbey Heath	12 67	26 116	33 159	32 151	17 95	14 /28	108 127	20 /27	138 111	18 /27	188 109	20 /27	559 121	22 /25
Mimram at Panshanger Park	11 112	15 128	19 165	24 181	19 152	38 /43	76 152	39 /43	108 140	38 /42	180 143	41 /42	468 140	40 /40
Lee at Feildes Weir (natr.)	14 75	41 189	34 174	31 157	16 106	69 /109	121 158	99 /109	155 131	84 /109	214 131	86 /108	618 138	97 /104
Thames at Kingston (natr.)	34 111	55 149	67 204	44 143	20 91	53 /113	187 150	103 /113	254 134	91 /112	317 129	92 /112	916 133	105 /110
Coln at Bibury	36 90	69 133	97 182	77 146	40 94	13 /32	282 138	32 /32	352 123	27 /32	462 116	23 /31	1351 124	28 /29
Great Stour at Horton	45 131	65 165	58 178	46 143	25 100	17 /30	195 146	27 /30	293 135	25 /29	385 131	26 /29	937 116	20 /25
Itchen at Highbridge+Allbrook	47 114	60 125	80 167	81 160	57 124	34 /37	278 141	36 /37	394 130	33 /37	574 124	34 /36	1462 118	32 /34
Stour at Throop Mill	73 127	120 202	122 216	70 142	26 75	6 /23	338 160	23 /23	500 151	20 /22	572 143	21 /22	1551 138	20 /20
Exe at Thorverton	200 148	239 185	171 169	101 122	29 52	8 /39	540 142	38 /39	986 143	37 /39	1106 132	37 /39	2990 126	37 /37
Taw at Umberleigh	181 152	208 180	145 174	85 129	21 48	7 /37	460 144	36 /37	848 142	35 /37	926 132	33 /36	2627 132	34 /34
Tone at Bishops Hull	118 170	189 240	117 164	66 118	26 69	9 /35	398 159	34 /34	629 160	33 /34	719 150	34 /34	1773 131	32 /32
Severn at Bewdley	89 141	121 171	109 192	61 132	17 54	15 /75	308 148	73 /74	478 134	67 /74	544 120	61 /74	1489 116	63 /72
Teme at Knightsford Bridge	88 158	118 183	83 165	53 112	10 32	1 /26	264 133	23 /25	411 133	24 /25	448 122	23 /25	1201 116	22 /23
Cynon at Abercynon	351 182	334 173	257 192	111 94	29 38	5 /37	731 136	33 /37	1417 140	37 /37	1603 125	32 /35	4420 122	31 /31
Dee at New Inn	447 175	390 165	292 181	144 82	38 36	5 /26	864 123	22 /26	1688 121	24 /26	1994 110	19 /25	5401 106	18 /24
Eden at Sheepmount	157 166	143 138	172 238	99 144	32 67	7 /25	446 147	24 /25	746 135	23 /24	867 124	22 /23	2262 116	17 /19
Clyde at Daldowie	233 227	152 137	152 203	139 183	43 92	15 /32	486 152	30 /32	882 146	32 /32	1004 126	30 /31	2853 127	29 /29
Carron at New Kelso	420 122	383 120	445 205	289 102	188 137	12 /17	1305 132	14 /17	2084 111	13 /16	2625 101	9 /16	7267 99	6 /14
Ewe at Poolewe	336 121	379 140	369 197	274 137	222 160	23 /25	1244 151	23 /25	2010 126	23 /24	2510 116	21 /24	6834 111	17 /22

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 is rank 1.
(iii) %LT means percentage of long term average from the start of the record to 1992. For the long periods (at the right of this table), the end date for the long term is 1995.

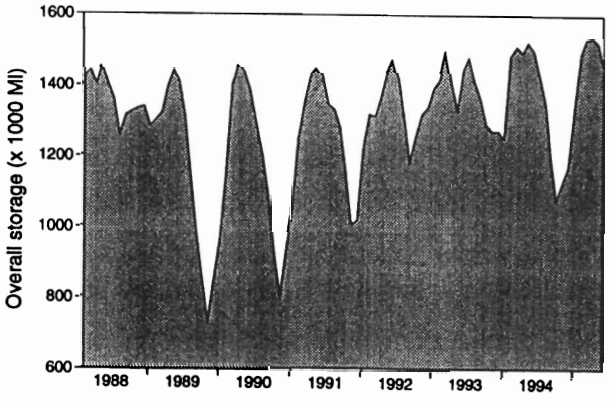
TABLE 4 START-MONTH RESERVOIR STORAGES UP TO MAY 1995

Area	Reservoir (R)/ Group (G)		Capacity • (Ml)	1994 Dec	1995 Jan	Feb	Mar	Apr	May	1994 May
North West	N.Command Zone[1]	(G)	133375	67	91	100	100	99	86	97
	Vyrnwy	(R)	55146	83	100	99	100	97	89	94
Northumbria	Teesdale[2]	(G)	87936	80	97	100	100	99	95	99
	Kielder	(R)	199175*	91*	100*	100*	100*	97*	89*	93*
Severn-Trent	Clywedog	(R)	44922	83	100	100	94	97	96	96
	Derwent Valley[3]	(G)	39525	89	100	100	100	100	97	97
Yorkshire	Washburn[4]	(G)	22035	73	92	100	100	98	88	94
	Bradford supply[5]	(G)	41407	74	88	99	99	98	89	96
Anglian	Grafham	(R)	58707	95	93	92	93	95	96	96
	Rutland	(R)	130061	93	95	96	95	91	87	96
Thames	London[6]	(G)	207569	89	92	94	95	97	95	89
	Farmoor [7]	(G)	13843	96	95	95	96	97	97	98
Southern	Bewl	(R)	28170	85	89	96	99	99	97	100
	Ardingly	(R)	4685	90	93	100	100	100	100	100
Wessex	Clatworthy	(R)	5364	100	100	100	100	100	85	99
	Bristol W [8]	(G)	38666*	71*	88*	99*	99*	99*	94*	98*
South West	Colliford	(R)	28540	75	81	90	96	97	93	100
	Roadford[9]	(R)	34500	69	79	91	97	96	92	97
	Wimbleball[10]	(R)	21320	80	100	100	100	100	95	99
	Stithians	(R)	5205	66	77	100	100	96	86	96
Welsh	Celyn + Brenig	(G)	131155	86	100	100	100	100	100	99
	Brianne	(R)	62140	99	100	100	100	100	97	100
	Big Five[11]	(G)	69762	83	92	97	100	99	86	97
	Elan Valley[12]	(G)	99106	99	100	100	100	95	99	99
Lothian	Edin./Mid Lothian[13]	(G)	97639	85	95	99	100	99	98	98
	East Lothian[14]	(G)	10206	70	91	98	100	100	100	99
Strathclyde	Loch Katrine	(G)	111363	95	98	97	99	100	92	100
	Daer	(R)	22412	99	100	100	100	96	91	97
	Loch Thom	(G)	11840	94	99	100	100	100	92	96

• Live or usable capacity (unless indicated otherwise) * Gross storage/ercentage of gross storage

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. Roadford began filling in November 1989.
10. Shared between South West (river regulation for abstraction) and Wessex (direct supply).
11. Usk, Talybont, Llandegfedd (pumped stroage), Taf Fechan, Taf Fawr.
12. Claerwen, Caban Coch, Pen-y-garreg and Craig Goch.
13. Megget, Talla, Fruid, Gladhouse, Torduff, Clubbiedean, Glencorse,Loganlea and Morton (upper and lower).
14. Thorters, Donolly, Stobshiel, Lammerloch, Hopes and Whiteadder

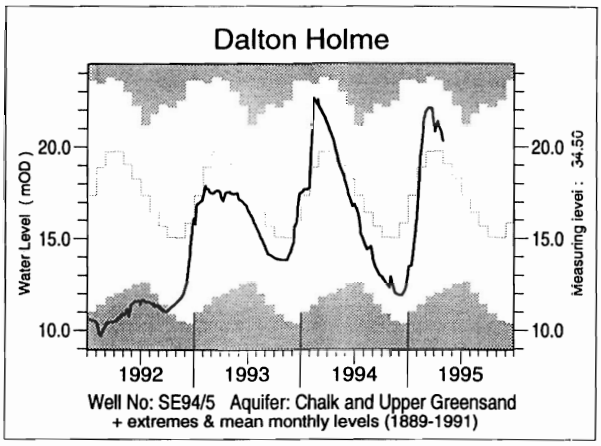
A GUIDE TO THE VARIATION IN OVERALL RESERVOIR STOCKS FOR ENGLAND AND WALES

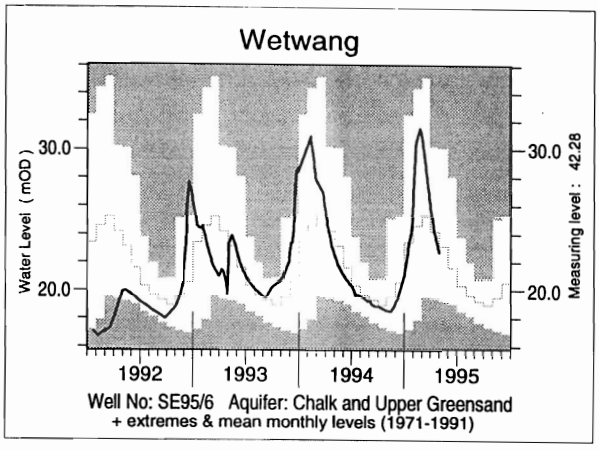


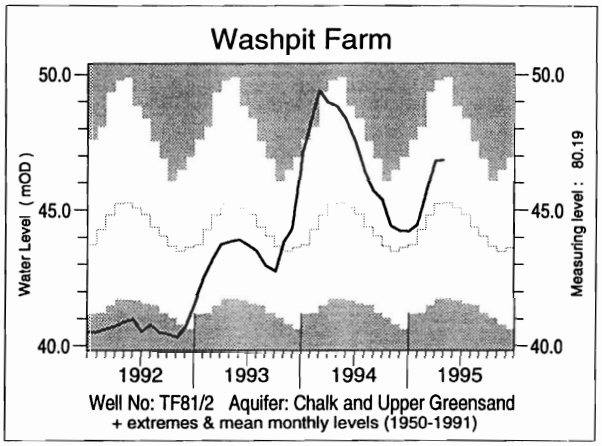
This plot is based on the reservoirs featured in Table 4 only.

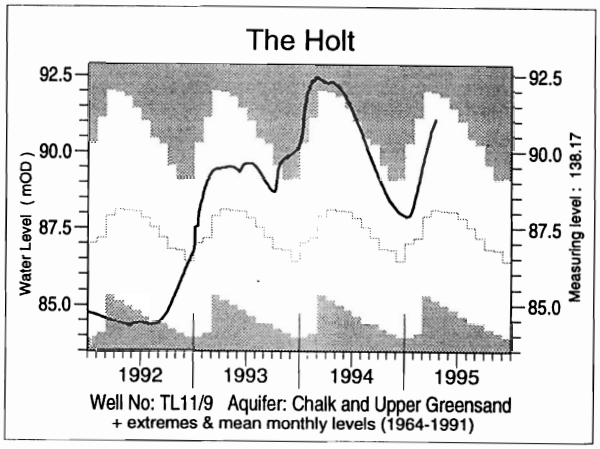
Note: Variations in storage depend on the balance between inputs (from catchment rainfall and any pumping) and outputs (to supply, compensation flow, HEP, amenity). There will be additional losses due to evaporation, especially in the summer months. Operational strategies for making the most efficient 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.

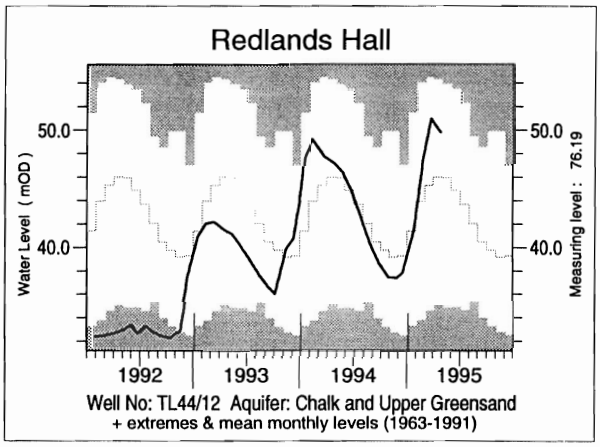
FIGURE 2 GROUNDWATER LEVEL HYDROGRAPHS

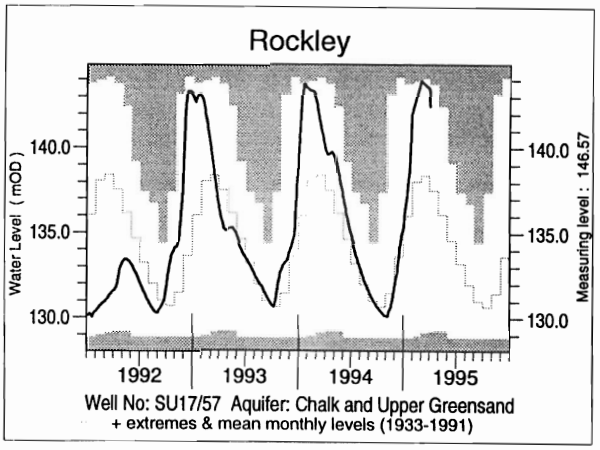


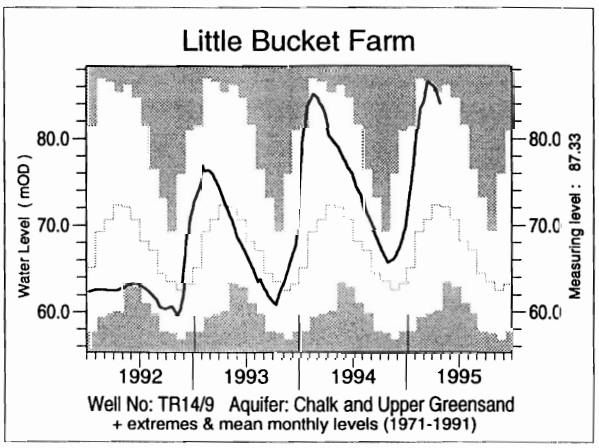


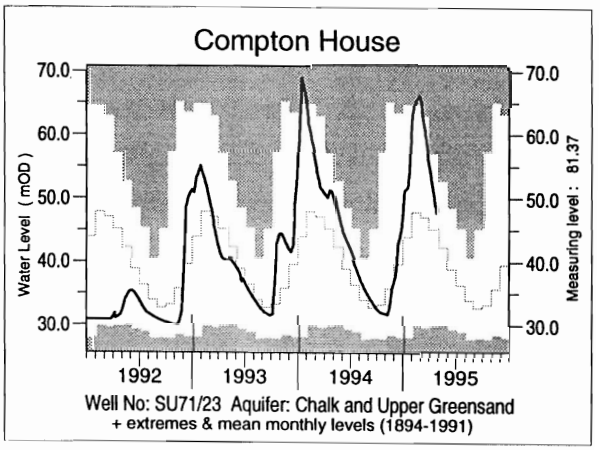


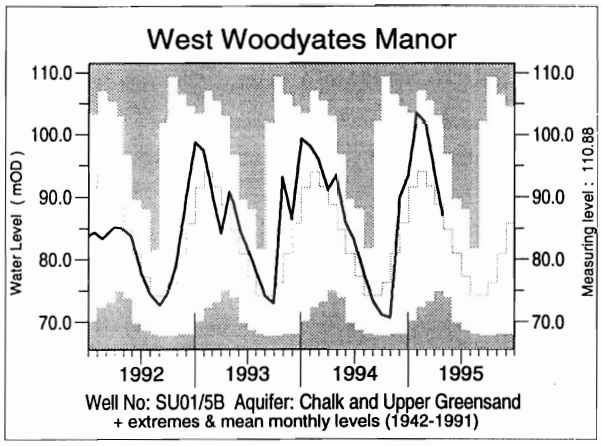


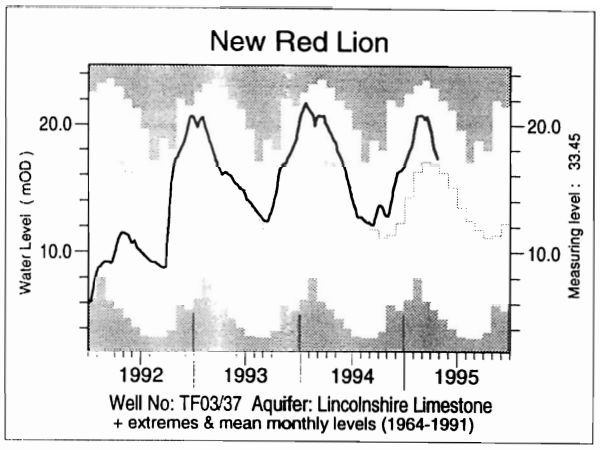


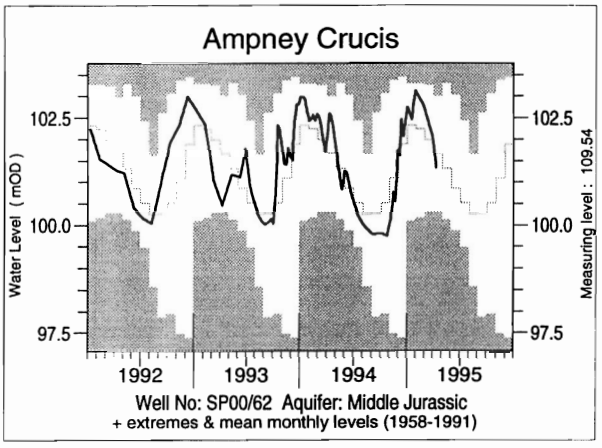


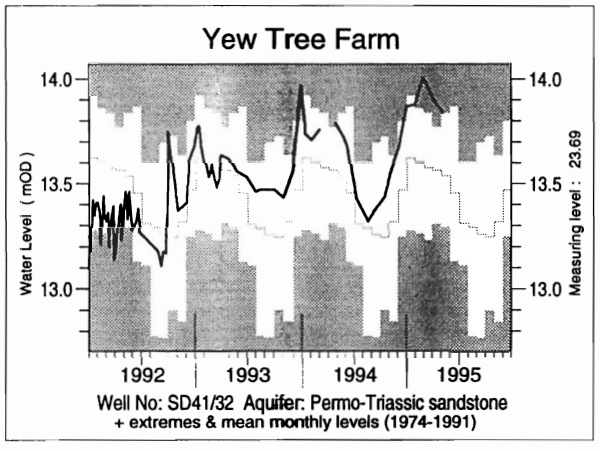


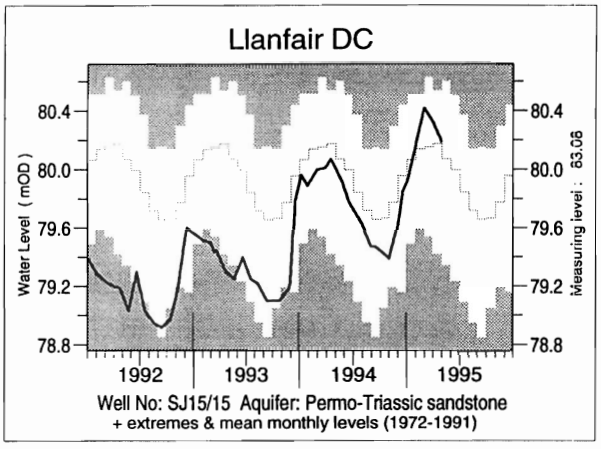


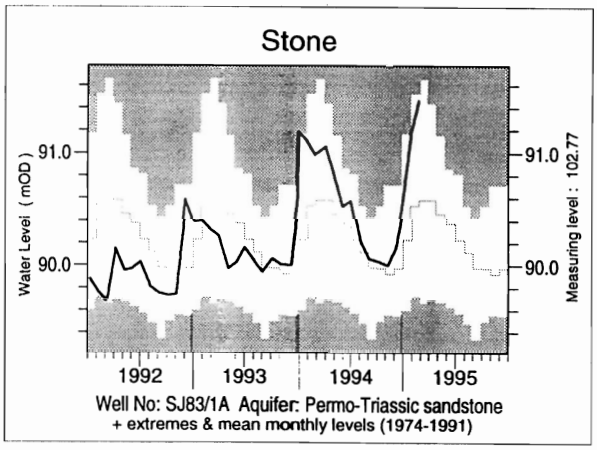

West Woodyates Manor
Water Level (mOD)
110.0
100.0
90.0
80.0
70.0
Measuring level : 110.88
1992
1993
1994
1995
Well No: SU01/5B Aquifer: Chalk and Upper Greensand
+ extremes & mean monthly levels (1942-1991)

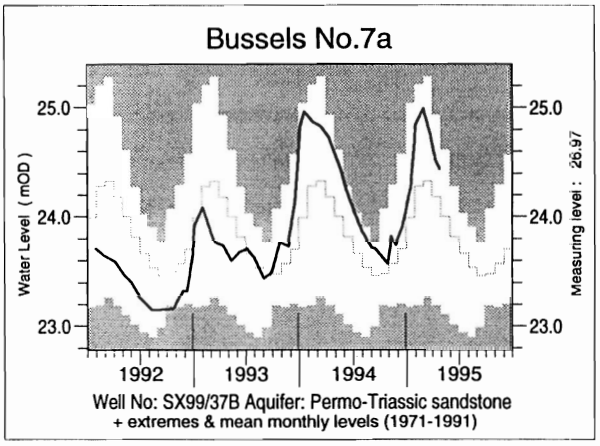

New Red Lion
Water Level (mOD)
20.0
10.0
Measuring level : 33.45
1992
1993
1994
1995
Well No: TF03/37 Aquifer: Lincolnshire Limestone
+ extremes & mean monthly levels (1964-1991)


Ampney Crucis
Water Level (mOD)
102.5
100.0
97.5
Measuring level : 109.54
1992
1993
1994
1995
Well No: SP00/62 Aquifer: Middle Jurassic
+ extremes & mean monthly levels (1958-1991)


Yew Tree Farm
Water Level (mOD)
14.0
13.5
13.0
Measuring level : 23.69
1992
1993
1994
1995
Well No: SD41/32 Aquifer: Permo-Triassic sandstone
+ extremes & mean monthly levels (1974-1991)


Llanfair DC
Water Level (mOD)
80.4
80.0
79.6
79.2
78.8
Measuring level : 83.06
1992
1993
1994
1995
Well No: SJ15/15 Aquifer: Permo-Triassic sandstone
+ extremes & mean monthly levels (1972-1991)


Stone
Water Level (mOD)
91.0
90.0
Measuring level : 102.77
1992
1993
1994
1995
Well No: SJ83/1A Aquifer: Permo-Triassic sandstone
+ extremes & mean monthly levels (1974-1991)


Bussels No.7a
Water Level (mOD)
25.0
24.0
23.0
Measuring level : 26.97
1992
1993
1994
1995
Well No: SX99/37B Aquifer: Permo-Triassic sandstone
+ extremes & mean monthly levels (1971-1991)

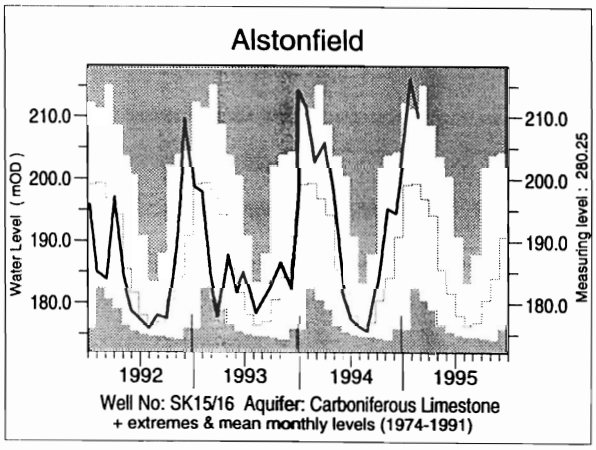

Alstonfield
Water Level (mOD)
210.0
200.0
190.0
180.0
Measuring level : 280.25
1992
1993
1994
1995
Well No: SK15/16 Aquifer: Carboniferous Limestone
+ extremes & mean monthly levels (1974-1991)

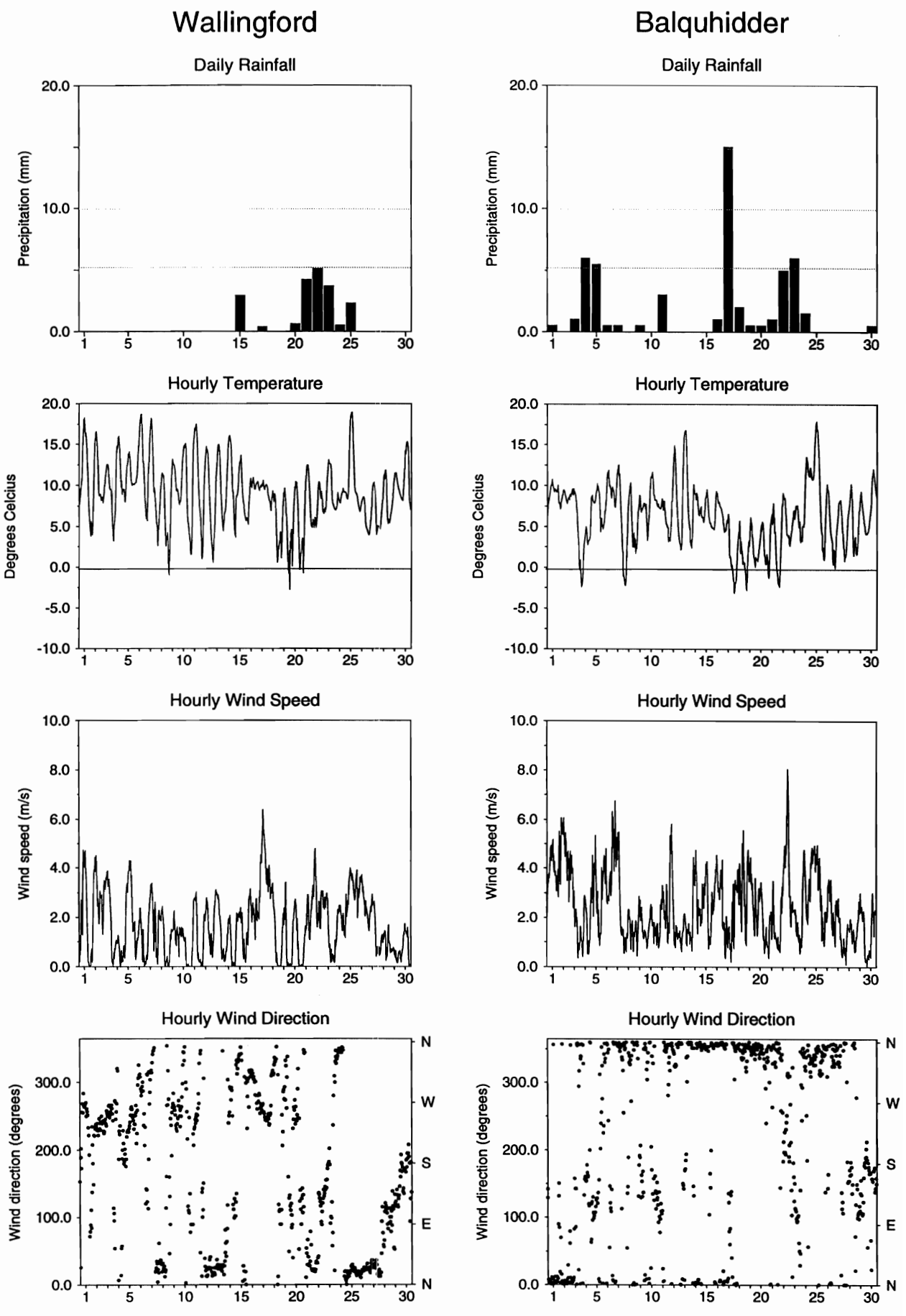
TABLE 5 A COMPARISON OF APRIL GROUNDWATER LEVELS: 1994 AND 1995

Site	Aquifer	Records commence	Minimum Apr	Average Apr	Maximum Apr	April 1994		Apr/May 1995	
			<1995	<1995	<1995	day	level	day	level
Dalton Holme	C & UGS	1889	10.46	19.71	23.60	22/04	20.33	01/05	20.32
Wetwang	C & UGS	1971	18.42	23.88	30.17	22/04	23.15	01/05	22.69
Washpit Farm	C & UGS	1950	40.71	45.25	49.77	no	levels	01/05	46.83
The Holt	C & UGS	1964	84.35	88.20	92.26	24/04	92.26	16/04	91.04
Therfield Rectory	C & UGS	1883	dry <71.6	80.43	97.51	06/04	87.46	07/05	88.12
Redlands Hall	C & UGS	1964	32.85	45.14	54.32	28/04	47.17	27/04	49.78
Rockley	C & UGS	1933	129.16	137.47	143.68	24/04	139.78	02/04	142.46
Little Bucket Farm	C & UGS	1971	60.02	71.77	85.37	11/04	80.42	26/04	83.98
Compton House	C & UGS	1984	29.50	44.13	57.10	26/04	51.06	27/04	47.65
Chilgrove House	C & UGS	1836	36.88	52.64	70.09	26/04	61.24	27/04	55.15
Westdean No.3	C & UGS	1940	1.34	2.08	3.68	29/04	2.41	28/04	2.49
Lime Kiln Way	C & UGS	1969	124.00	125.45	126.23	20/04	125.91	18/04	126.23
Ashton Farm	C & UGS	1974	65.01	69.41	71.20	22/04	70.32	28/04	68.97
West Woodyates Manor	C & UGS	1942	74.86	88.29	103.00	29/04	93.43	28/04	87.02
Killyglen (NI)	C & UGS	1985	114.21	115.34	116.45	25/04	114.65	19/04	114.11
New Red Lion	LLst	1964	5.61	16.66	22.97	28/04	18.77	27/04	17.34
Ampney Crucis	Mid Jur	1958	100.29	101.73	103.01	24/04	102.20	10/04	101.33
Yew Tree Farm	PTS	1973	12.52	13.55	13.79	27/04	13.79	09/05	13.84
Llanfair D.C	PTS	1972	79.19	80.02	80.54	15/04	80.07	30/04	80.19
Morris Dancers	PTS	1969	31.82	32.48	33.50	08/04	32.26	19/04	32.55
Weeford Flats	PTS	1966	dry <88.61	89.95	91.76	05/04	89.71	03/04	90.71
Stone	PTS	1974	89.69	90.59	91.44	07/04	91.06	07/04	91.45
Skirwith	PTS	1978	130.17	130.62	131.01	27/04	130.93	03/04	131.49
Redbank	PTS	1981	8.22	8.50	9.43	29/04	8.57	03/05	7.22
Bussels No.7A	PTS	1972	23.19	24.15	24.93	14/04	24.72	27/04	24.44
Rushyford NE	MgLst	1967	65.40	72.67	76.84	28/04	76.71	05/04	76.66
Peggy Ellerton	MgLst	1968	31.46	34.47	37.39	22/04	33.84	12/04	34.81
Alstonfield	CLst	1974	177.83	194.58	208.75	05/04	205.85	01/04	199.39

groundwater levels are in metres above Ordnance Datum

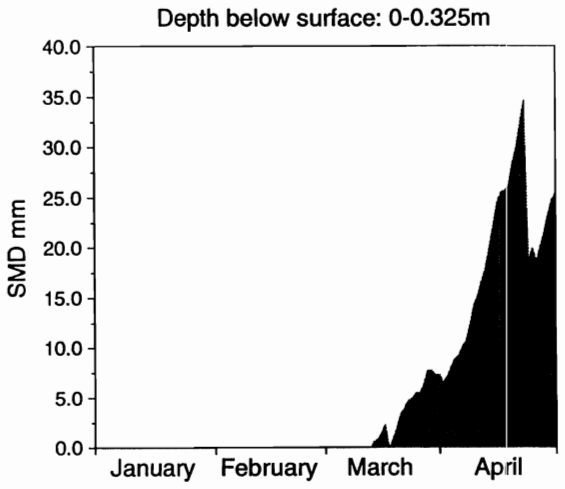
C & UGS	Chalk and Upper Greensand	Mid Jur	Middle Jurassic limestones
LLst	Lincolnshire Limestone	MgLst	Magnesian Limestone
PTS	Permo-Triassic sandstones	CLst	Carboniferous Limestone

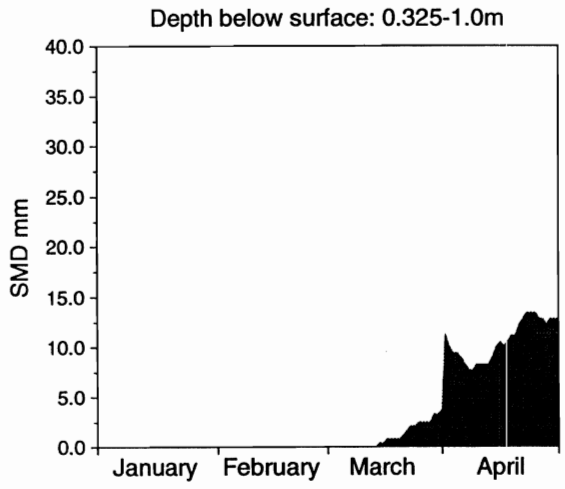
FIGURE 3 METEOROLOGICAL SUMMARY - APRIL 1995

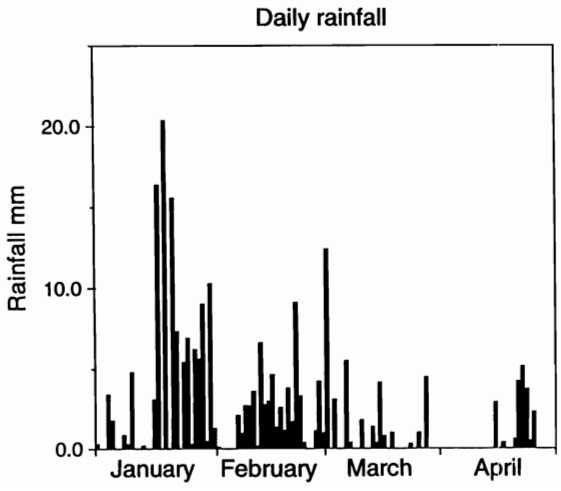


Altitude of sites : Wallingford 48m; Balquhidder (Kirkton Glen) 300m.

FIGURE 3a. WALLINGFORD SMD DATA 1995.







Note

Soil moisture deficit is defined as the amount by which the water stored in the soil is below the quantity held at field capacity. The data presented here are calculated from readings taken at the two automatic soil water stations (ASWSs) at Wallingford. They employ capacitance soil water sensors installed at depths of 5, 15 and 50 cm. Figure 3a shows deficits calculated from one of the stations for the depth ranges 0 - 0.325 m and 0.325 - 1.00 m at 0100 GMT on each day; slight discontinuities in the SMD trace can occur when switching between the ASWSs. The data presented give a good representative picture of soil moisture variations - avoiding the short term changes that can be dominant close to the surface.

Daily rainfall for the Wallingford meteorological station from Figure 3 is repeated here for comparison.

FIGURE 4 LOCATION MAP OF GAUGING STATIONS AND GROUNDWATER INDEX WELLS