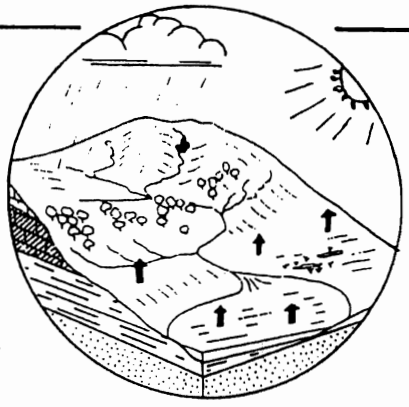
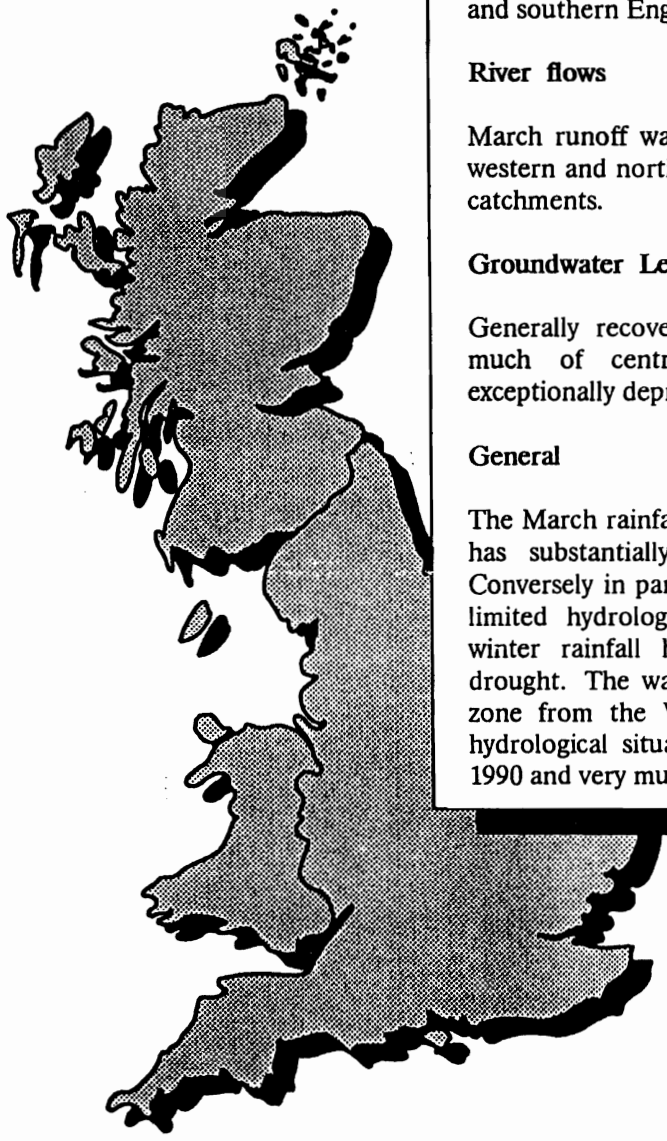
Hydrological Summary for Great Britain





MARCH 1991

Rainfall

The monthly total for GB exceeded 120% of the 1941-70 mean. Regional variations were large - parts of eastern and southern England recorded less than 70%.

River flows

March runoff was average or above throughout most of western and northern Britain but very low in some eastern catchments.

Groundwater Levels

Generally recoveries are well underway in western and much of central England but water-tables remain exceptionally depressed in parts of the eastern lowlands.

General

The March rainfall - and precipitation through the winter - has substantially reduced the drought's areal extent. Conversely in parts of East Anglia and the South East the limited hydrological effectiveness of the below average winter rainfall has intensified a remarkably prolonged drought. The water resources outlook is very fragile in a zone from the Wash to Kent. Generally, however, the hydrological situation is more encouraging than in April 1990 and very much more so than in April 1976.

Institute of Hydrology

British Geological Survey

HYDROLOGICAL SUMMARY FOR GREAT BRITAIN - MARCH 1991

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 for England and Wales has been supplied by the Water Services Companies. The recent areal rainfall figures are derived from a restricted network of rain gauges (particularly in Scotland) and a proportion of the river flow data is of a provisional nature.

A map (Figure 5) is provided to assist in the location of the principal monitoring sites.

Rainfall

A succession of frontal systems on a westerly airstream brought widespread rainfall to all regions early in March. Unsettled conditions continued until around the 22nd but rainfall in the English lowlands was often patchy and intermittent. Subsequently, an anticyclone centred over Scandinavia resulted in a spell of predominantly dry weather lasting until month-end.

March rainfall for Great Britain as a whole was well above average with totals exceeding 150% of the 1941-70 mean in some northern and western areas. However, rainfall in parts of eastern England was less than 70% and the normal west-to-east rainfall gradient was again accentuated. This has been a recurring theme of rainfall patterns - for up to three years in some areas - and the major cause of the current wide regional differences in water resources outlook.

Regional rainfall totals for 1991 thus far, and for the winter half-year (October-March), are well within the normal range, albeit somewhat below average in the English lowlands. In Scotland longer term accumulations in the west and north are indicative of an exceptionally wet period stretching back to 1987. Conversely, in southern Britain, notable long-term rainfall deficiencies over periods up to three years may be recognised (see Table 2). It is the regional shortfalls of around 20% over these timeframes in the lowlands which are a principal cause of the current low runoff and recharge rates (see below). Some districts in East Anglia have registered above average rainfall in only three or four months since the spring of 1988.

For England and Wales as a whole, the 13 months ending in March was the third driest (for that period) this century and accumulated totals over 23 and 32 months are also very modest (Table 2). Significantly, the largest long-term deficiencies broadly coincide with those regions or districts where 1990/91 winter rainfall has been appreciably below average. For the Thames Valley, the 13 and 32 month rainfall accumulations (to March) are unprecedented in a 107-year record. Substantial droughts now exist throughout large parts of the Anglian and Thames regions with more moderate deficiencies in neighbouring areas. Particularly intense drought conditions may be recognised in a zone extending from Kent to Lincolnshire; throughout much of this area October-March rainfall has been below average for the third successive winter.

Evaporation and Soil Moisture Deficits (SMDs)

Following three colder than average months, March was milder but evaporation rates, thus far, for 1991 have been lower than in 1989 and 1990. Accumulated potential evaporation (PE) and actual evaporation (AE) losses remain notable. For the twelve months ending with March, PE totals - in the lowlands particularly - were amongst the highest on record; by contrast AE losses in eastern and southern areas (where SMDs remained high for long periods) were very modest, typically the lowest on record (1961-90) with the exception of 1975/76.

Soils remained close to field capacity in all regions through the greater part of March but, in the last week, small SMDs became established in southern Britain. If these build appreciably through April (as is likely), the prospects for further significant recharge as evaporation rates accelerate will be poor. Thus, rainfall amounts over the next four to six weeks will exert a significant influence over the intensity of the hydrological drought through the coming summer.

Runoff

River flows in March showed significant variation through the month with recessions well established over the final fortnight. Monthly runoff totals were, however, above average in much of northern and western Britain and amongst the highest on record in rivers such as the Dee (Grampian Region), the Kenwyn (Cornwall) and the Eden. Generally, mean flows in March were higher than in 1990 and substantially in excess of those recorded during historical droughts. Figures presented in Table 2 illustrate that on a countrywide basis, no meaningful comparison - in terms of extent and severity - can be made with the 1976 drought.

As with rainfall, a notable reinforcement of the normal NW-SE runoff gradient is also readily apparent with exceptionally low, late winter discharge rates characterising many catchments in the lowlands of England. Even here, flows generally remain well above historical minima. However, a zone of very depressed runoff may be identified in rivers and streams, dependent principally on groundwater, stretching from Kent to Lincolnshire. Flows in spring-fed streams in parts of Cambridgeshire and west Norfolk, for instance, are extremely low - reflecting the effects of limited recharge (see below) over the last three winters.

A comparison of the recent runoff totals with longer term accumulations is presented in Table 3. It provides evidence both of the limited extent of the current hydrological drought - the last couple of months have seen notable ameliorations in Wessex and Yorkshire - and the persistence of low flows in parts of the lowlands. Flows on the Stour (Kent), Mimram and Lud provide a useful index of the current runoff deficiency; for the Lud, monthly mean flows have remained below average since October 1988. The large area of the lowlands where winter runoff is less than 60% of the average (in notable contrast to the rainfall picture) testifies to the limited hydrological effectiveness of the precipitation since last October. The extraordinary persistence of the drought is evident from the 32-month accumulations; runoff deficiencies in many catchments (extending beyond the eastern lowlands) are unprecedented in this timeframe.

Reservoir replenishment was healthy in England and Wales, especially early in the month. In almost all regions of the north and west most major impoundments were at, or close to, capacity at month-end; some flood drawdown releases were required in Wales. In the English lowlands surface water storage varied considerably; the pumped storage reservoirs in the Thames/Lee system were almost full but elsewhere, in the Anglian region particularly, stocks were below 80% of capacity.

Note: A table of reservoir contents for a selection of impoundments in England and Wales will be included in the April, and future, editions of the Hydrological Summaries.

Groundwater

Substantial increases in groundwater levels occurred in March throughout the greater part of most major aquifers. However, only moderate recoveries have yet occurred in much of the Chalk of East Anglia and the South-East. In a zone stretching from the Wash to East Sussex and Kent water-tables are at, or close to, the lowest on record.

In the Anglian region, levels at Redlands Hall, Fairfields and Washpit Farm, although rising, remain at, or below, the minimum on record. Without appreciable further recharge (unlikely in the absence of a very wet April), groundwater recessions are likely to resemble those of 1973 - generally the most severe period of groundwater depletion in East Anglia for 40 or more years. In those districts where abstraction rates have increased substantially in the interim, rather steeper recessions may be anticipated with the liklehood of unprecedentd levels by the autumn. The water-table remains similarly depressed at the Holt (in the headwaters of the Lee system) and recoveries are very muted in the Chilterns and patchy in parts of Kent and Sussex.

In the Chalk of eastern Yorkshire and Lincolnshire, where the drought of 1990 was particularly severe, the situation is much improved. The groundwater levels at Dalton Holme have risen fast and are now approaching the seasonal mean. At Little Brocklesby, south of the Humber, the groundwater level is still rising and, although well below the seasonal mean, stands now at a higher level than it did at any time in 1989 or 1990. Even if little further recharge takes place, the 1991 recessions will start at their highest levels since 1988. Parts of Kent (where considerable spatial variation in groundwater recoveries is evident) present a similar picture. The groundwater level at the Little Bucket Farm site is rising and approaching the maximum recorded in 1990; the water-table is already above the highest 1989 level. If no further recharge takes place, levels by the end of the summer of 1991 should be about the same as at the end of the same period in 1990.

Healthy recoveries have also been recorded in the Chalk of Wessex, parts of central England and in the Lincolnshire Limestone (see New Red Lion). In the Chalk of southern England, the groundwater levels at Compton House and West Woodyates Manor have already attained mean or slightly above mean values. Further inland, the levels at the Rockley site are rising towards the mean seasonal value. At Ampney Crucis (Middle Jurassic) the groundwater level has reached the seasonal norm. In the West Country, the level at the Bussels site is a little below the seasonal norm, but is still rising. At the Llanfair DC site in the Trias of North Wales and at the Rusheyford site in the Magnesium Limestone of Northumbria, groundwater levels are rising fast. Rising levels also characterise the sites in Northern Ireland at Killyglen and Dunmurry.

In summary, over most of the country, the groundwater resources replenishment for the winter months of 1990-91 is likely to be a little below the mean values, and certainly much better than they were at the same point in 1990. However, as a consequence of very limited winter recharge, and the extremely low base from which recoveries required to be generated, there remains serious concern for the resources in the Chalk from the Wash to the Thames, and, to a rather lesser degree, for the Chalk of Kent.

Institute of Hydrology / British Geological Survey **12 April 1991**

TABLE 1 1990/91 RAINFALL AS A PERCENTAGE OF THE 1941-70 AVERAGE

		Mar 1990	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 1991	Feb	Mar 1991
England and	mm	23	38	25	72	35	45	50	100	65	97	86	55	73
Wales	%	39	66	37	118	47	50	60	120	67	108	100	84	124
NRA REGIONS														
North West	mm	45	57	49	99	58	68	81	164	68	142	95	95	117
	%	63	74	60	119	56	54	66	139	56	118	84	117	162
Northumbria	mm	32	25	51	69	40	53	53	106	61	109	68	92	99
	%	62	45	80	113	52	52	66	141	65	145	85	140	190
Severn Trent	mm	18	30	19	63	27	37	47	93	52	92	72	45	57
	%	35	58	30	113	42	46	70	143	66	131	105	84	109
Yorkshire	mm	23	25	29	83	32	46	39	92	55	121	72	78	67
	%	43	45	48	143	46	51	54	133	62	163	94	123	127
Anglia	mm	15	34	16	45	21	31	32	51	52	48	43	40	30
	%	38	85	34	92	37	48	62	98	84	91	83	96	75
Thames	mm	12	35	7	47	17	35	34	59	34	65	77	36	45
	%	26	76	13	90	28	50	55	91	47	99	124	77	97
Southern	mm	6	48	10	61	13	33	38	105	59	63	94	37	50
	%	12	100	18	122	22	45	54	135	63	77	123	65	97
Wessex	mm	14	35	12	62	31	41	48	87	52	74	108	37	77
	%	24	65	18	115	50	50	61	106	54	83	128	63	133
South West	mm	25	46	25	99	61	59	68	126	107	112	137	71	120
	%	30	65	30	152	73	58	65	112	80	83	106	79	143
Welsh	mm	37	48	34	98	53	65	85	149	109	152	139	84	117
	%	43	56	37	120	56	55	68	116	76	105	102	87	124
Scotland	mm	247	96	54	128	75	119	147	211	101	184	135	102	128
	%	268	107	59	139	67	92	107	142	71	108	99	98	139
RIVER PURIFICATION BOARDS														
Highland	mm	409	136	54	140	95	157	230	220	144	221	180	100	160
	%	359	119	52	127	75	106	146	118	85	113	110	75	140
North-East	mm	87	45	49	110	47	79	85	138	94	88	72	93	78
	%	140	74	64	157	51	74	98	142	91	86	79	126	126
Tay	mm	178	61	44	128	39	74	67	187	65	140	132	124	131
	%	217	81	46	154	38	63	58	153	55	104	112	135	160
Forth	mm	142	55	39	125	51	81	65	185	57	131	106	112	93
	%	206	81	46	167	52	70	60	175	53	120	107	145	135
Tweed	mm	52	31	46	106	54	61	68	159	52	114	98	117	81
	%	90	51	61	156	61	54	73	181	50	127	105	170	140
Solway	mm	94	72	76	121	75	105	81	216	79	208	143	112	137
	%	103	82	83	134	68	82	54	150	54	138	102	120	151
Clyde	mm	295	127	57	138	95	149	173	297	90	190	148	102	137
	%	281	123	59	134	73	105	99	162	54	102	92	90	130

Note: The recent monthly rainfall figures are based are based upon MORECS data supplied by the Meteorological Office. Earlier areal figures are derived from a far denser raingauge network.
Scottish RPB data for March 1991 were estimated from the monthly isohyetal map provided with the MORECS bulletins.

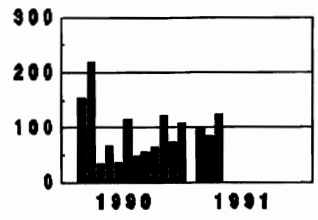
TABLE 2 RAINFALL RETURN PERIOD ESTIMATES

		OCT 90 - MAR 91 Est Return Period, years		MAR 90 - MAR 91 Est Return Period, years		MAY 89 - MAR 91 Est Return Period, years		AUG 88 - MAR 91 Est Return Period, years	
England and	mm	475		763		1543		2186	
Wales	% LTA	99	2	79	15-25	87	5-15	88	10-20
NRA REGIONS									
North West	mm	680		1137		2153		3163	
	% LTA	109	2-5	88	5-10	91	5-10	96	2-5
Northumbria	mm	535		858		1475		2074	
	% LTA	121	5-10	92	2-5	87	5-15	87	10-20
Severn Trent	mm	412		652		1336		1841	
	% LTA	106	2-5	79	10-20	89	5-10	88	5-15
Yorkshire	mm	486		763		1405		1989	
	% LTA	114	2-5	86	5-10	87	5-15	88	5-15
Anglia	mm	265		459		937		1316	
	% LTA	88	2-5	71	50-80	79	40-60	80	60-90
Thames	mm	316		503		1114		1563	
	% LTA	88	2-5	67	80-120	82	15-25	82	25-45
Southern	mm	408		617		1285		1768	
	% LTA	93	2-5	73	25-45	83	10-20	81	30-50
Wessex	mm	436		679		1467		2056	
	% LTA	93	2-5	73	25-45	87	5-10	87	5-15
South West	mm	673		1056		2185		3061	
	% LTA	98	2-5	83	5-10	94	2-5	93	2-5
Welsh	mm	750		1170		2406		3427	
	% LTA	102	2-5	82	5-15	93	2-5	94	2-5
Scotland	mm	860		1726		3072		4507	
	% LTA	110	2-5	113	5-15	111	10-20	115	80-120
RIVER PURIFICATION BOARDS									
Highland	mm	1033		2224		3891		5760	
	% LTA	104	2-5	121	30-40	117	40-60	122	>>200
North-East	mm	532		1034		1741		2485	
	% LTA	102	2-5	95	2-5	88	5-15	90	5-15
Tay	mm	772		1368		2515		3727	
	% LTA	116	5-10	102	2-5	103	2-5	109	5-10
Forth	mm	676		1234		2248		3271	
	% LTA	119	5-10	104	2-5	104	2-5	108	5-10
Tweed	mm	650		1068		1866		2589	
	% LTA	129	15-30	101	2-5	96	2-5	95	2-5
Solway	mm	869		1497		2756		4072	
	% LTA	114	2-5	98	2-5	100	<2	105	2-5
Clyde	mm	1016		2050		3702		5420	
	% LTA	111	2-5	116	10-20	115	15-25	119	100-200

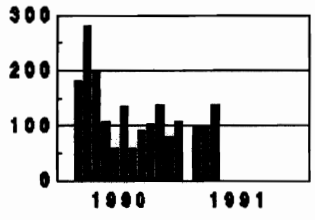
Return period assessments are based on tables provided by the Meteorological Office*. These assume a start in a given month; return periods for a start in any month will be very substantially lower. "Wet" return periods underlined.
The tables reflect rainfall totals over the period 1911-70 only and the estimate assumes a sensibly stable climate.
The March 1991 RPB values are estimated from the isopleth map within the March summary published in the Met. Office's MORECS bulletin. March figures for England and Wales are based on MORECS figures.

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

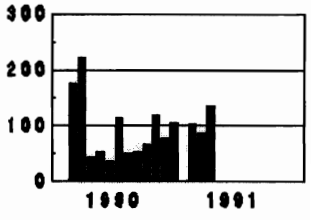
FIGURE 1. MONTHLY RAINFALL FOR 1990-1991 AS A PERCENTAGE OF THE 1941-1970 AVERAGE



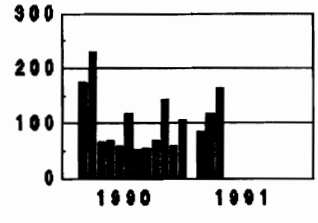
England and Wales



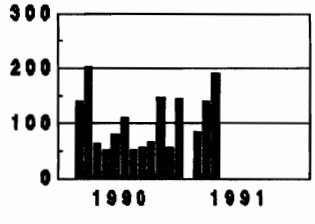
Scotland



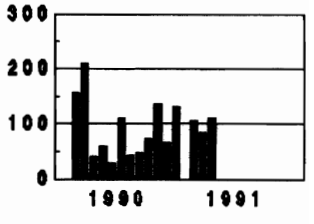
Welsh Region



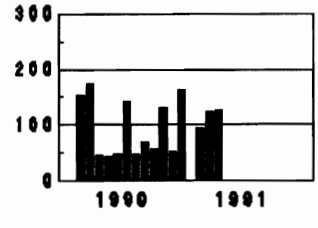
North West Region



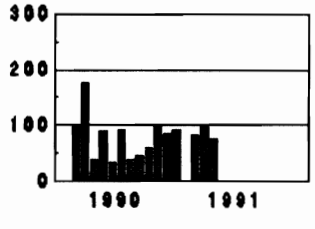
Northumbria Region



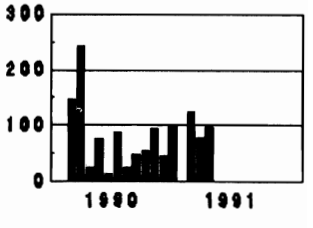
Severn-Trent Region



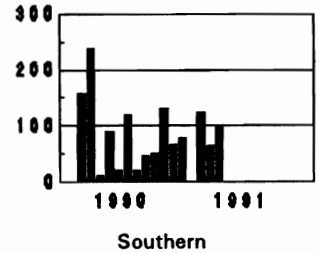
Yorkshire Region



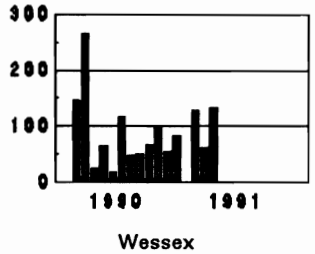
Anglian Region



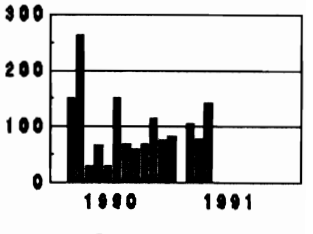
Thames Region



Southern Region

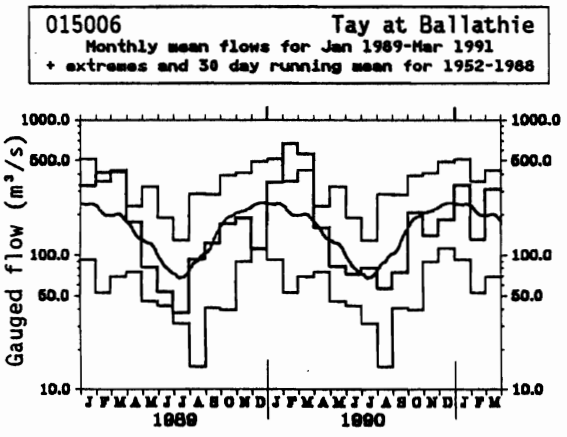


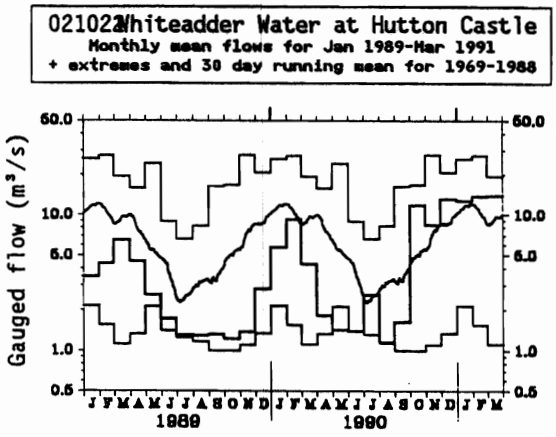
Wessex Region

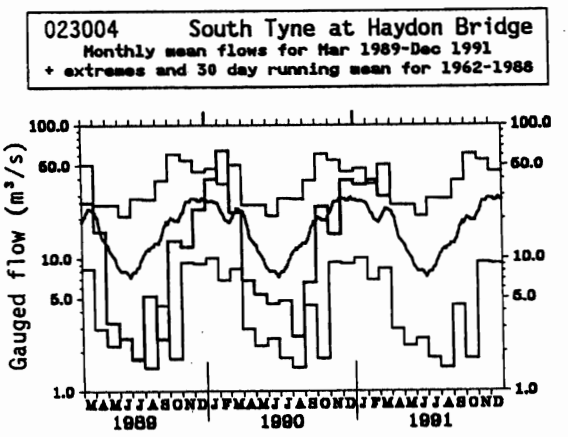


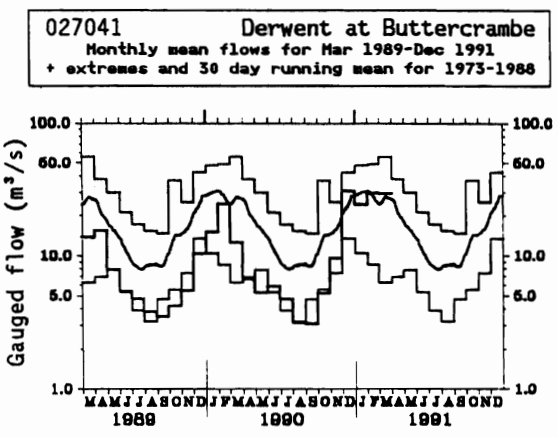
South West Region

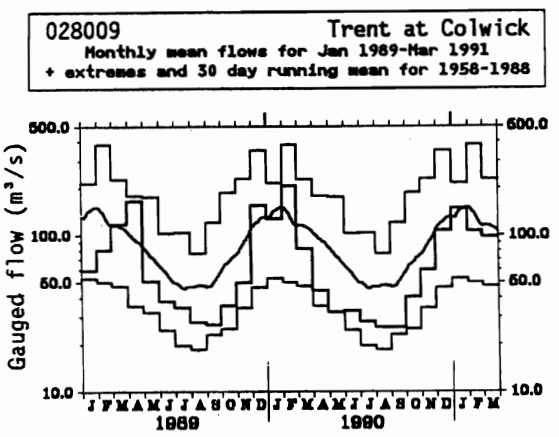
FIGURE 2 MONTHLY RIVER FLOW HYDROGRAPHS

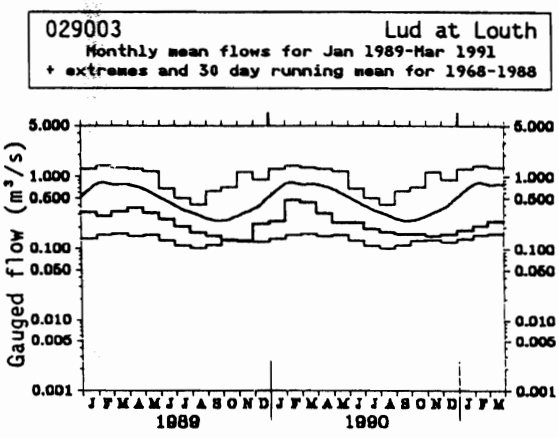


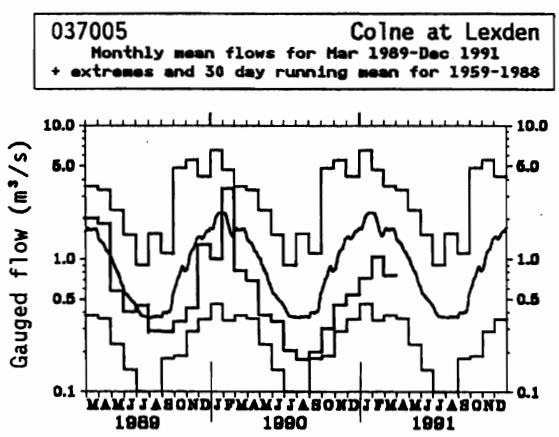


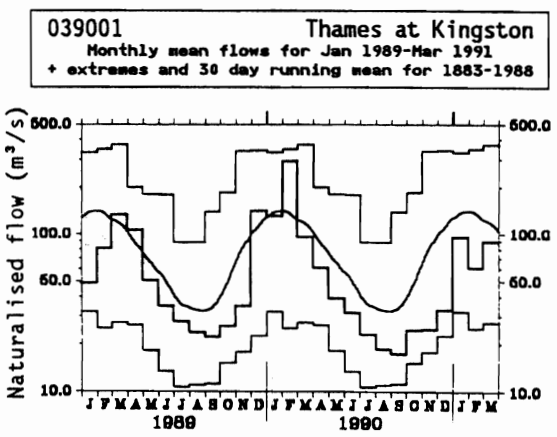






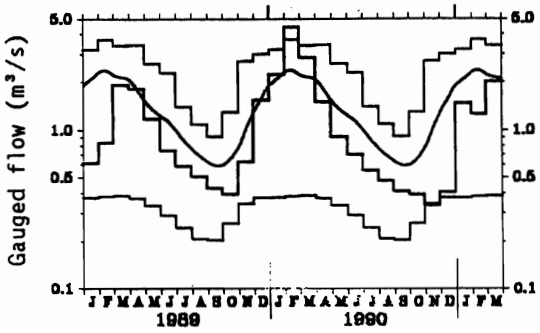






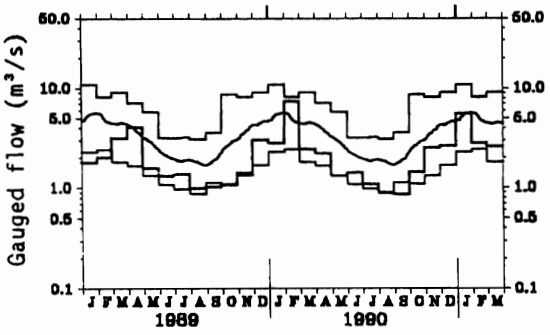
039020 Coln at Bibury

Monthly mean flows for Jan 1989-Mar 1991
+ extremes and 30 day running mean for 1963-1988



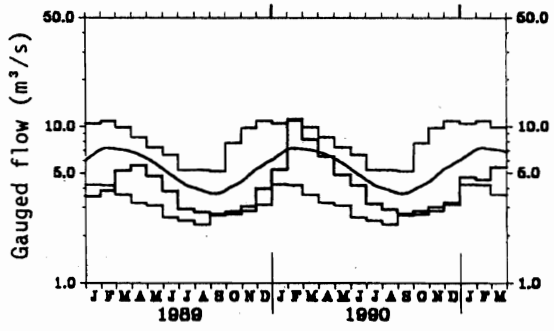
040011 Great Stour at Horton

Monthly mean flows for Jan 1989-Mar 1991
+ extremes and 30 day running mean for 1964-1988



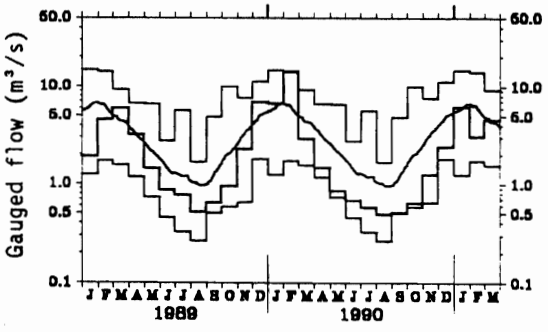
042010 Itchen at Highbridge+Allbrook

Monthly mean flows for Jan 1989-Mar 1991
+ extremes and 30 day running mean for 1958-1988



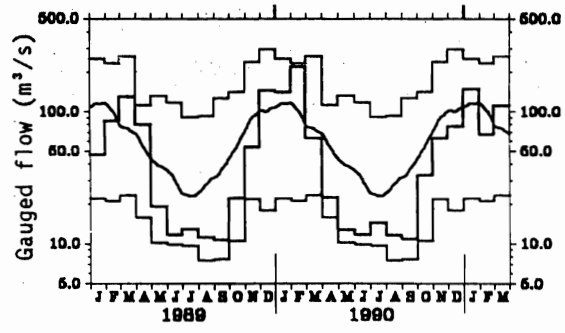
052005 Tone at Bishops Hull

Monthly mean flows for Jan 1989-Mar 1991
+ extremes and 30 day running mean for 1961-1988



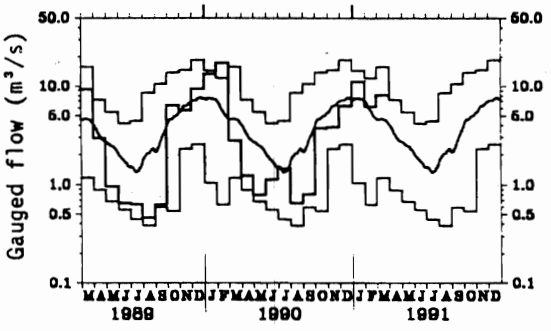
054001 Severn at Bewdley

Monthly mean flows for Jan 1989-Mar 1991
+ extremes and 30 day running mean for 1921-1988



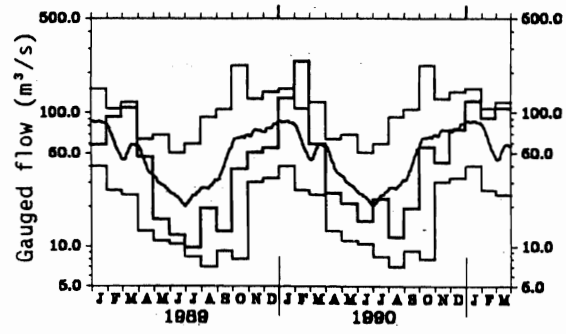
057004 Cynon at Abercynon

Monthly mean flows for Mar 1989-Dec 1991
+ extremes and 30 day running mean for 1957-1988



076007 Eden at Sheepmount

Monthly mean flows for Jan 1989-Mar 1991
+ extremes and 30 day running mean for 1967-1988



084013 Clyde at Daldowie

Monthly mean flows for Jan 1989-Mar 1991
+ extremes and 30 day running mean for 1963-1988

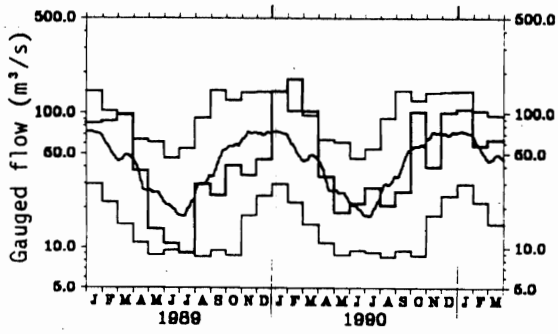
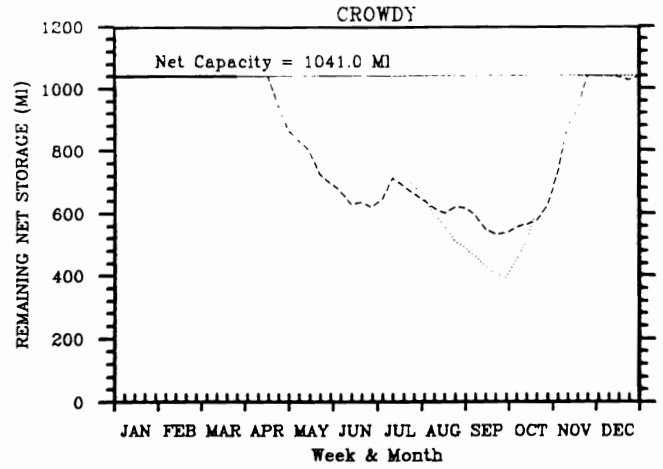
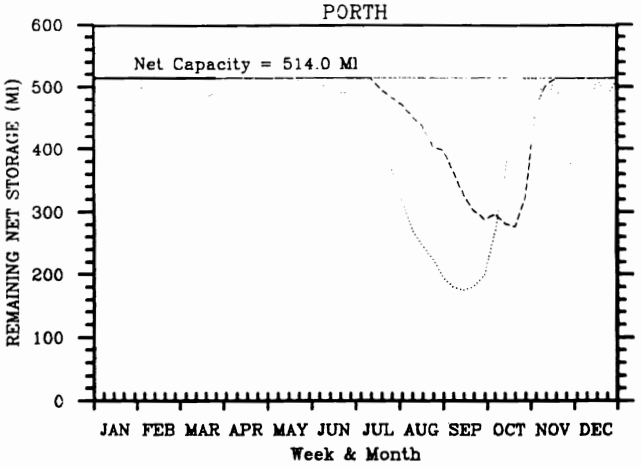


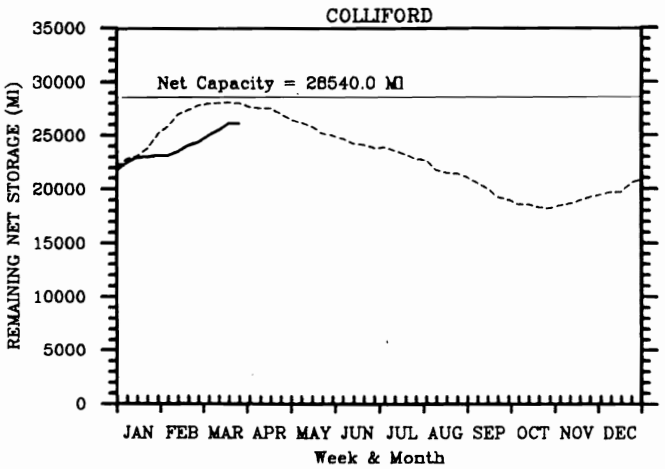
TABLE 3 RUNOFF AS MM. AND AS A PERCENTAGE OF THE PERIOD OF RECORD AVERAGE WITH SELECTED PERIODS RANKED IN THE RECORD

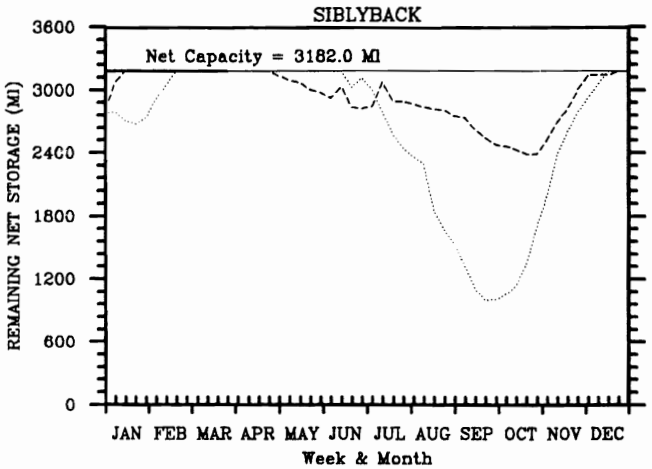
River/ Station name	Jan 1991	Feb	Mar 1991		Mar 1976		10/90 to 3/91		3/90 to 3/91		5/89 to 3/91		8/88 to 3/91	
	mm %LT	mm %LT	mm %LT	rank /yrs	mm %LT	rank /yrs	mm %LT	rank /yrs	mm %LT	rank /yrs	mm %LT	rank /yrs	mm %LT	rank /yrs
Dee at	83	59	149	17	62	4	498	10	766	5	1254	2	1898	2
Park	92	79	162	/19	136	/19	97	/18	87	/18	83	/17	86	/16
Tay at	193	69	180	34	112	18	750	17	1371	28	2413	32	3824	35
Ballathie	135	60	142	/39	108	/39	99	/39	110	/38	111	/37	122	/36
Whiteadder Water at	67	65	74	18	43	10	382	21	456	11	602	6	851	5
Hutton Castle	114	134	149	/22	108	/22	141	/22	102	/21	80	/20	77	/19
South Tyne at	127	125	105	23	41	3	633	27	819	11	1394	10	1986	5
Haydon Bridge	130	172	125	/29	54	/29	123	/29	97	/27	94	/25	92	/23
Derwent at	41	45	49	23	15	2	212	15	280	5	419	2	607	1
Buttercrambe	89	113	120	/30	41	/30	98	/30	75	/29	66	/28	66	/27
Trent at	53	34	35	14	17	1	195	10	291	2	550	4	797	2
Colwick	106	78	87	/33	47	/33	84	/33	73	/32	80	/31	81	/30
Lud at	9	9	12	2	8	1	52	2	135	1	243	1	377	1
Louth	30	26	33	/23	25	/23	36	/23	46	/22	50	/21	54	/21
Witham at	19	19	21	14	4	1	77	8	132	5	253	6	343	5
Claypole Mill	74	71	80	/32	18	/32	66	/32	62	/31	72	/31	69	/30
Bedford Ouse at	18	12	24	26	4	2	73	9	121	7	332	16	509	15
Bedford	50	35	76	/59	13	/59	46	/58	49	/58	80	/57	83	/56
Colne at	8	10	8	5	5	2	41	4	72	2	163	2	269	3
Lexden	35	54	43	/32	27	/32	43	/32	46	/31	63	/30	71	/29
Mimram at	7	6	6	4	6	2	34	2	97	4	184	4	277	7
Panshanger Park	60	51	45	/39	44	/39	55	/38	70	/38	77	/37	83	/36
Thames at	26	15	24	40	9	2	87	13	162	8	364	21	518	16
Kingston (natr.)	70	45	77	109	29	/109	52	/108	59	/108	78	/107	76	/106
Blackwater at	35	21	29	20	14	2	128	7	228	6	480	14	678	11
Swallowfield	98	71	98	/39	53	/39	76	/39	78	/38	95	/37	93	/36
Coln at	37	29	50	11	10	1	144	4	326	6	631	4	832	4
Bibury	72	53	92	/28	19	/28	61	/28	73	/27	84	/26	78	/25
Great Stour at	43	20	20	4	15	2	134	4	212	1	375	1	529	1
Horton	106	58	59	/27	42	/27	70	/26	64	/24	66	/23	64	/21
Itchen at	35	30	40	6	27	1	172	2	410	2	720	2	982	1
Highbridge+Allbrook	73	61	77	/33	51	/33	68	/33	80	/32	82	/31	80	/30
Stour at	59	26	58	13	21	2	180	3	289	2	662	5	892	1
Throop Mill	99	43	112	/19	54	/19	64	/18	66	/18	88	/17	81	/16
Piddle at	35	29	53	14	16	1	157	3	326	3	629	2	838	1
Baggs Mill	67	49	93	/28	29	/28	61	/27	71	/26	82	/24	75	/22
Exe at	160	71	106	27	57	10	580	15	718	6	1391	8	2060	6
Thorverton	123	67	125	/35	80	/35	93	/35	79	/34	87	/34	87	/33
Tone at	82	37	60	20	30	5	236	4	334	2	779	5	1103	3
Bishops Hull	103	49	104	/31	58	/31	68	/30	63	/30	85	/29	83	/28
Severn at	91	37	68	59	25	11	302	28	391	10	774	18	1144	18
Bewdley	128	64	147	/70	57	/70	93	/70	79	/69	89	/69	90	/68
Wye at	226	196	171	24	114	8	1369	21	1984	8	3773	9	5610	10
Cefn Brwyn	92	113	97	/37	83	/37	102	/36	88	/32	93	/27	97	/24
Cynon at	280	140	204	28	80	14	969	21	1189	9	2533	18	3610	15
Abercynon	147	101	172	/33	93	/33	106	/33	86	/31	103	/29	101	/27
Lune at	146	183	135	22	61	8	771	15	1050	5	2010	8	3159	12
Caton	98	183	136	/29	75	/29	102	/27	85	/27	91	/25	99	/23
Clyde at	150	73	89	18	57	11	649	24	996	22	1709	21	2517	21
Daldowie	142	96	119	/28	110	/28	122	/28	118	/27	115	/26	116	/25

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 the start of the record to 1989. For the long periods (at the right of this table), the end date for the long term is 1990.





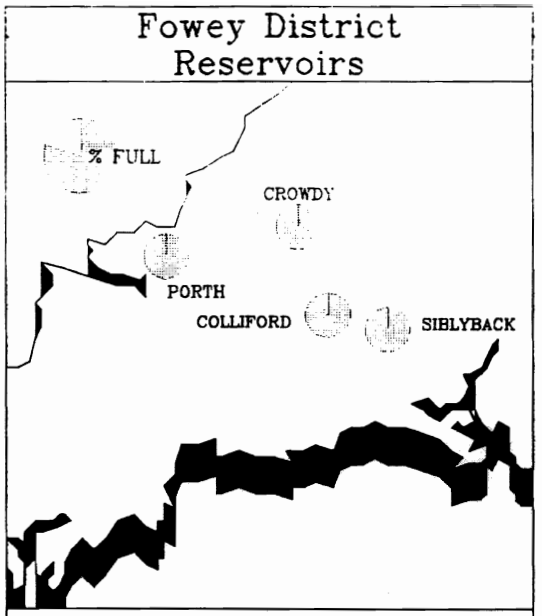




		WEEK NO 13					
	NET CAPACITY (Ml)	CURRENT YEAR 1991		HISTORIC AND DROUGHT YEARS 1976		1990	
		(Ml)	% Full	(Ml)	% Full	(Ml)	% Full
COLLIFORD	28540.0	26120	92	N/A	N/A	28012	98
CROWDY	1041.0	1041	100	1041	100	1041	100
PORTH	514.0	514	100	514	100	514	100
SIBLYBACK	3182.0	3182	100	3182	100	3182	100

1976 Drawdown -------- 1990 Drawdown ——— 1991 Drawdown

Indicates a Drought year



RESERVOIR SITUATION AT
01/04/91
WEEK NO 13

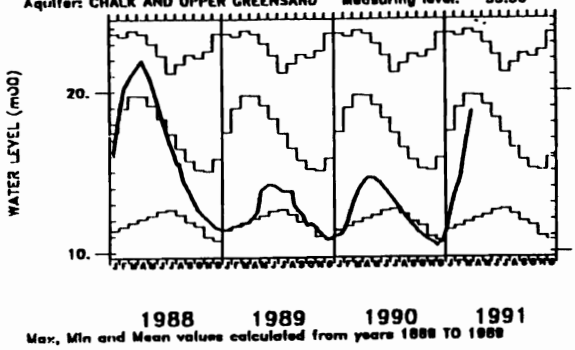
SOUTH WEST WATER

FIGURE 3 EAST CORNWALL RESERVOIR LEVELS FOR 1991 AND HISTORIC DROUGHTS

FIGURE 4 GROUNDWATER HYDROGRAPHS

Site name: DALTON HOLME

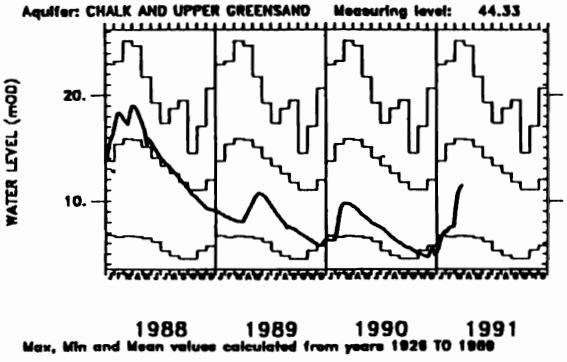
National grid reference: SE 9651 4530 Well number: SE94/5
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 33.50



Max, Min and Mean values calculated from years 1988 TO 1989

Site name: LITTLE BROCKLESBY

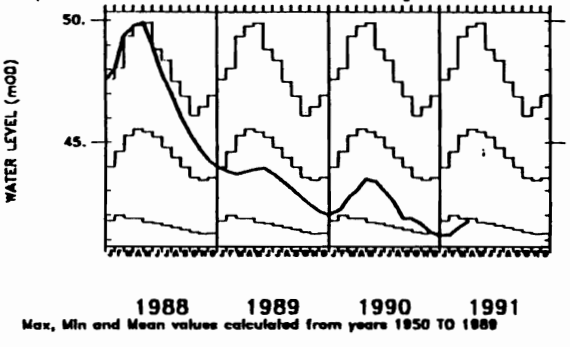
National grid reference: TA 1371 0688 Well number: TA10/40
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 44.33



Max, Min and Mean values calculated from years 1928 TO 1989

Site name: WASHPIT FARM

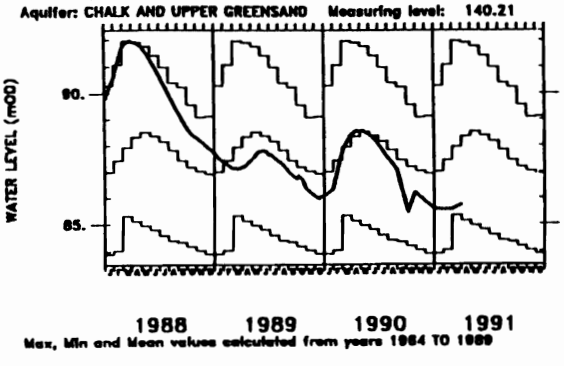
National grid reference: TF 8138 1960 Well number: TF81/2
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 80.20



Max, Min and Mean values calculated from years 1950 TO 1989

Site name: THE HOLT

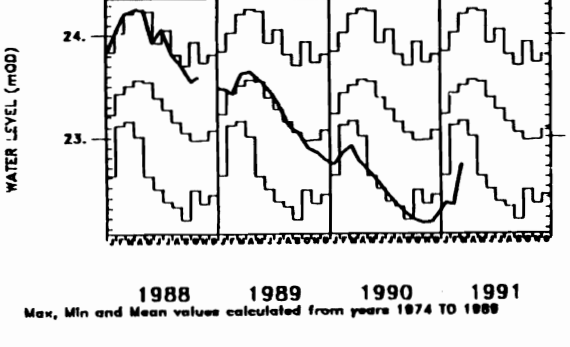
National grid reference: TL 1692 1965 Well number: TL11/9
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 140.21



Max, Min and Mean values calculated from years 1964 TO 1989

Site name: FAIRFIELDS

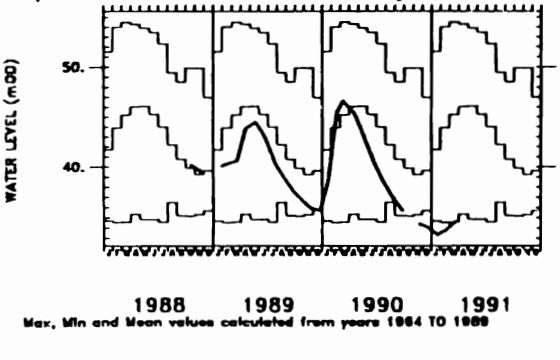
National grid reference: TM 2461 6109 Well number: TM26/46
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 45.00



Max, Min and Mean values calculated from years 1974 TO 1989

Site name: REDLANDS HALL,ICKLETON

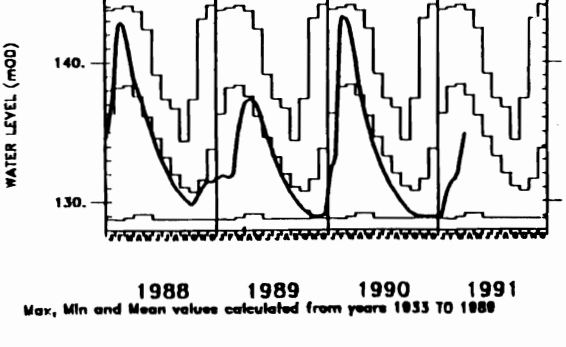
National grid reference: TL 4522 4182 Well number: TL44/12
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 76.19



Max, Min and Mean values calculated from years 1964 TO 1989

Site name: ROCKLEY

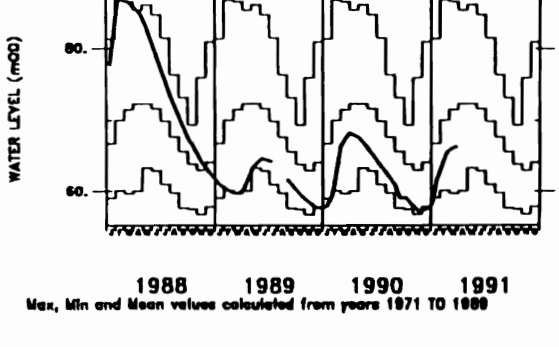
National grid reference: SU 1655 7174 Well number: SU17/57
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 146.39



Max, Min and Mean values calculated from years 1933 TO 1989

Site name: LITTLE BUCKET FARM,WALTHAM

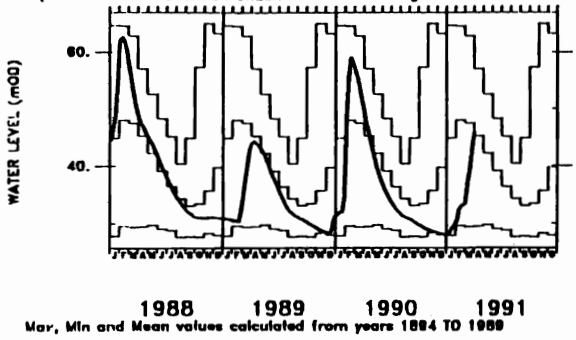
National grid reference: TR 1225 4690 Well number: TR14/9
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 67.33



Max, Min and Mean values calculated from years 1971 TO 1989

Site name: COMPTON HOUSE

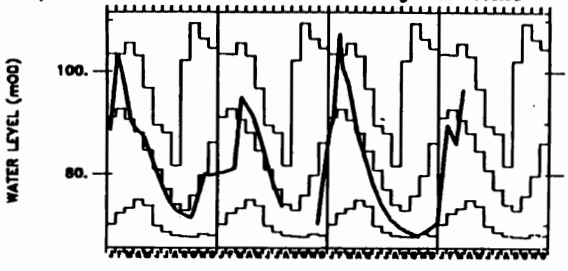
National grid reference: SU 7755 1490 Well number: SU71/23
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 81.37



Max, Min and Mean values calculated from years 1984 TO 1989

Site name: WEST WOODYATES MANOR

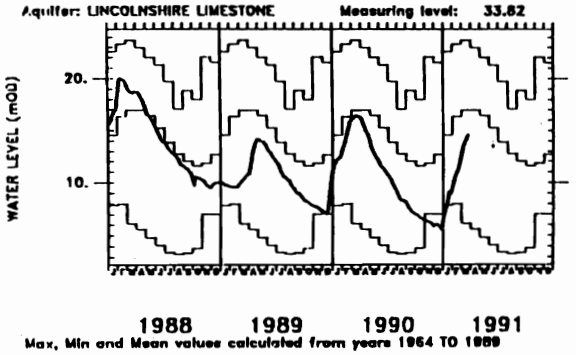
National grid reference: SU 0160 1980 Well number: SU01/58
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 110.93



Max, Min and Mean values calculated from years 1942 TO 1989

Site name: NEW RED LION

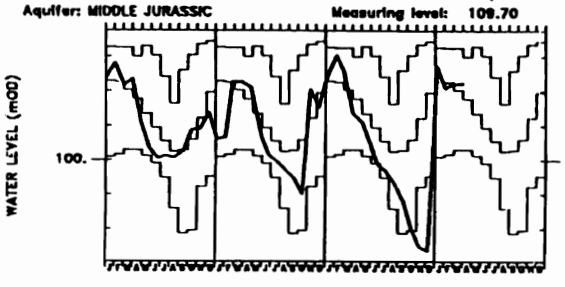
National grid reference: TF 0885 3034 Well number: TF03/37
Aquifer: LINCOLNSHIRE LIMESTONE Measuring level: 33.82



Max, Min and Mean values calculated from years 1964 TO 1989

Site name: AMPNEY CRUCIS

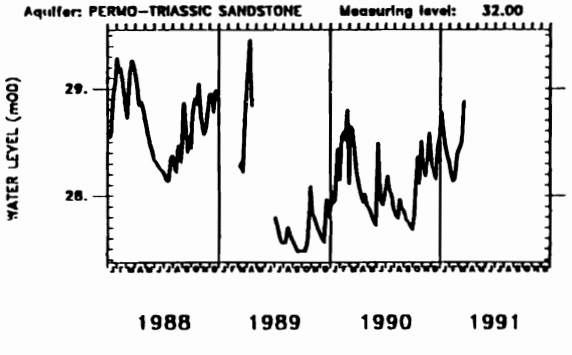
National grid reference: SP 0585 0190 Well number: SP00/62
Aquifer: MIDDLE JURASSIC Measuring level: 109.70



Max, Min and Mean values calculated from years 1958 TO 1989

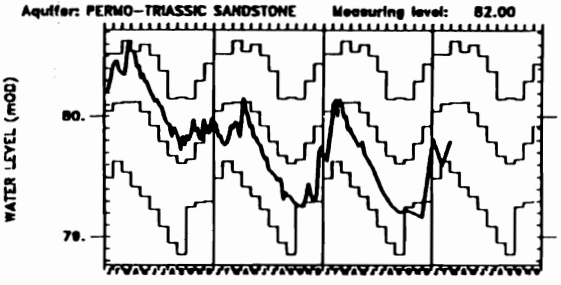
Site name: DUNMURRY

National grid reference: IJ 2910 6940 Well number: IJ26/1
Aquifer: PERMO-TRIASSIC SANDSTONE Measuring level: 32.00



Site name: LLANFAIR DC

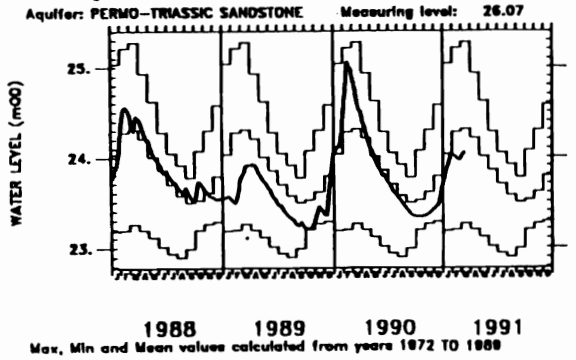
National grid reference: SJ 1374 5556 Well number: SJ15/15
Aquifer: PERMO-TRIASSIC SANDSTONE Measuring level: 82.00



Max, Min and Mean values calculated from years 1972 TO 1989

Site name: BUSSELS NO.7A

National grid reference: SX 9528 9872 Well number: SX99/378
Aquifer: PERMO-TRIASSIC SANDSTONE Measuring level: 26.07



Max, Min and Mean values calculated from years 1972 TO 1989

Site name: RUSHYFORD NORTH EAST,GREAT CHILTON

National grid reference: NZ 2675 2898 Well number: NZ22/22
Aquifer: MAGNESIAN LIMESTONE Measuring level: 92.53

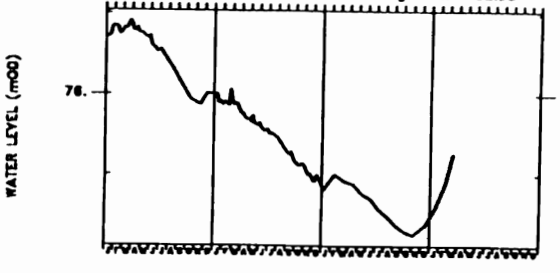


TABLE 4 A COMPARISON OF FEBRUARY GROUNDWATER LEVELS: 1991 AND 1976

Borehole	Aquifer	First year of record	Av. March level	March/April 1976		March/April 1991		Years of record with Mar levels ≤1991	Pre-1991 monthly minimum
				Day	level	Day	level		
Dalton Holme	C & U.G.	1889	19.69	27	14.30	28	18.67	20	10.34
L. Brocklesby	"	1926	15.73	11	6.98	26	11.41	3	4.56
Washpit Farm	"	1950	45.11	01	42.80	04	41.71	0	41.24
The Holt	"	1964	87.90	25	86.37	04	85.71	1	83.90
Fairfields	"	1974	23.46	23	23.16	12	22.72	0	22.15
Redlands Farm	"	1964	45.25	01	38.70	25	34.59	1	34.04
Rockley	"	1933	138.34	28	128.95	24	134.80	4	128.78 dry
L. Bucket Farm	"	1971	71.21	03	66.31	27	66.18	6	56.77
Compton House	"	1894	47.51	25	30.12	26	42.48	4	27.64
Limekiln Way	"	1969	125.54	15	124.54	27	124.77	2	124.09
Ashton Farm	"	1977	69.67	01	65.01	04	71.20	2	63.10
West Woodyates	"	1942	90.72	01	73.18	25	96.40	8	67.62
New Red Lion	L.L.	1964	16.96	23	6.14	25	14.53	4	3.29
Ampney Crucis	M.J.	1958	102.04	28	100.37	04	102.22	13	97.38
Dunmurry	PTS	1985	28.59	-	-	22	28.87	6	27.47
Llanfair Dc	PTS	1972	80.11	01	79.54	05	79.79	0	78.85
Bussels 7A	PTS	1972	24.33	30	23.19	13	24.04	4	22.90
Rushford NE	Mag 1st	1967	72.04	30	65.80	18	75.25	14	64.77
Alstonfield	C.B.	1974	197.27	25	180.54	23	193.19	3	174.22

Groundwater levels are in metres above Ordnance Datum

C & U.G. Chalk and Upper Greensand;
L.L. Lincolnshire Limestone
PTS Permo-Triassic Sandstones
M.J. Middle Jurassic Limestone
C.B. Carboniferous Limestone

FIGURE 5 LOCATION MAP OF GAUGING STATIONS AND GROUNDWATER INDEX WELLS