HYDROLOGICAL SUMMARY FOR GREAT BRITAIN APRIL 1990

Data for this review 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. The recent areal rainfall figures are derived from a restricted network of raingauges and a significant proportion of the river flow data is of a provisional nature.

For a fuller appreciation of the water resources implications, this hydrological review should be considered alongside assessments of the current reservoir storage and water demand situations in each region.

Summary

The episodic nature of weather patterns over Great Britain has been associated with large fluctuations in rainfall amounts during the last couple of years and this has continued into 1990. Following the widespread flooding experienced in February a dry spell has extended to 10-12 weeks in most regions away from north-western Britain. Over this period exceptionally warm and sunny conditions have prevailed. Consequently evaporation rates have been considerably above average and soil moisture deficits were at unseasonably high levels by early May. In a few eastern localities, where "rain-shadow" effects have been influential over a long period, a moderate to severe drought has become re-established.

Rainfall totals for the period beginning on 1st October 1989 are close to, or above, average in all regions (but not in all districts) and substantially greater than those recorded over the corresponding period in 1988/89. In water resources terms, however, the distribution of precipitation through the winter half-year can be almost as important as the actual amount. In 1989, heavy spring rainfall resulted in a belated but very valuable boost to severely depleted water resources. This year, much of the extraordinarily sustained rainfall in February ran off directly because reservoirs - at least in western areas - were already close to capacity.

Steep declines in runoff and recharge rates have obtained since the remarkable conditions of early February. Generally, river flows were well below average in April. However, only in eastern catchments and especially those rivers heavily dependent upon baseflow have accumulated runoff totals reached exceptionally low levels. Groundwater levels are mostly within the normal seasonal range but, again, substantial west-to-east contrasts are evident with some boreholes in Kent, East Anglia and eastern Yorkshire showing only modest recoveries from the remarkably low levels recorded in late-1989.

With little hydrologically effective rainfall since February, the seasonal decline in runoff and recharge rates and the drawdown of reservoirs became established much earlier than in a more typical year. A continuation of warm, dry conditions into the summer may be expected to result in notably low river flows. In addition, if the seasonal upturn in recharge rates is significantly delayed in the autumn, very depressed groundwater levels could obtain over wide areas. Currently, the water resources outlook is most fragile in eastern districts, where, even in a normal year, runoff and recharge totals are very modest and where the depletion of resources through the 1989 drought left a number of localities particularly vulnerable to below average rainfall in the 89/90 winter.

Rainfall

April was a relatively dry month in most areas with above average rainfall restricted to the north-western and south-eastern extremities of Britain. Parts of central and north-eastern England received well below half their mean April rainfall and the remarkable clustering of dry months in some coastal districts of Northumbria and eastern Scotland continued.

Provisional data indicate that England and Wales experienced its third driest March and April period this century, following the wettest winter (Dec-Feb) since 1914/15. Large areas have registered below average rainfall for 17, or more, months in the last 26. Along the eastern seaboard a few localities

have recorded above-average rainfall in only three or four months since March 1988. Nonetheless, ***on a regional basis*** the abundant winter rainfall has ensured that no significant drought can yet be recognised in an intermediate timeframe (3-9 months) and longer term rainfall deficiencies are severe only in the Northumbrian NRA region.

Although February rainfall for Scotland was only a little above average the January-April total is remarkable; it easily eclipsed the record (established only last year) in a general rainfall series which begins in 1869. Principally, this reflects the inordinate rainfall experienced in western Scotland. However, such has been the exaggeration in the normal west to east rainfall gradient that a few eastern localities - for instance around the estuaries of the Don and the Tweed - are gripped by a notable meteorological drought.

The persistence of rain-shadow effects has been less marked in England but they remain an important causative factor in respect of the long-term rainfall deficiencies to be found in Northumbria, eastern Yorkshire and parts of East Anglia and Kent.

Evaporation and soil moisture deficits

Despite a few cold interludes, April was another warm and exceptionally sunny month. The relatively high rates of potential evaporation which were a feature of the 1989/90 winter continued in April and soil moisture deficits increased briskly through the month, especially after the Easter period. By month-end deficits in excess of 50 mm typified most southern, central and eastern (particularly north-eastern) areas of Britain. In Scotland, deficits increased rapidly eastwards with the maximum value for Britain (>100 mm) registered around St. Abb's Head, the latest in a remarkable sequence for this area.

For the first four months of 1990 computed potential evaporation totals in the MORECS bulletins have been well above average, typically by 20-40% in southern and eastern regions. Actual evaporation loses have been similarly enhanced; only in the last few weeks have they been significantly inhibited by increasing SMDs. Provisional figures suggest that in southern and eastern Britain evaporation losses since the beginning of October have been higher than for any corresponding period in the last 25 years.

The high evaporation rates have been an important factor influencing the rapid decline in runoff and groundwater recharge rates. With significant SMDs in most regions where groundwater is a major supply source, the scope for further infiltration before the autumn is very limited and probably unlikely.

Runoff

Monthly mean flows for April were well below average in all regions, with the exception of north-west Scotland. Typically, the April runoff total was the lowest since 1984 in northern Britain and the lowest since 1976 in southern Britain. For a few catchments, notably that of the Derbyshire Derwent, new April minima were established. Some measure of the steepness of the flow recessions over the last couple of months is provided by the April mean flow on the River Dee (North East RPB), which fell below the previous minimum in an 18-year record; the February 1990 runoff had established a new maximum for the month. An extremely limited snowmelt contribution, combined with the lack of rainfall, resulted in depressed runoff rates throughout most of eastern Scotland. Still within the NERPB, the Don at Haughton registered a new April minimum mean flow and the Deveron recorded its lowest April runoff since 1961.

Exceptionally low April runoff also characterised a number of high baseflow rivers in eastern England, especially in parts of Yorkshire and Northumbria. April runoff for the River Greta, which drains to the Tees, was comparable with the minimum in a 30-year record; runoff for the Yorkshire Derwent was only 30% of the April average and monthly mean flows have now been below average for each of the last 19 months, the longest such sequence since 1962-65. Accumulated runoff totals in such catchments are amongst the lowest on record for periods exceeding about 8-10 months. In a similar timeframe some catchments in the Scottish Highlands, especially those draining to the west, have recorded inordinately ***high*** runoff totals. Generally, however, accumulated runoff totals elsewhere in

Britain are substantially - but not remarkably - below average. In the 12 and 18 month timeframes, which embrace the most severe drought sequences in the 1988-90 period, combined runoff totals rarely approach the historical minima.

Groundwater

With the low rainfall of March and April, groundwater levels have receded from the maxima reached following the heavy February precipitation (Figure 3); only at the Washpit Farm site has the down-turn yet to appear, and is likely to be imminent. Little significant infiltration may be expected until October 1990 at the earliest. With the onset of the down-turns on the well hydrographs, it is possible to make an approximate estimate of the amount of recharge to the aquifers of England and Wales for the winter of 1989-90. Details for the indicator sites are given in Table 4.

TABLE 4. The recharge for the winter of 1989-90 as calculated from the rise in groundwater levels and the mean annual ranges for certain indicator sites.

Site	Approximate rise in groundwater, m.	Mean annual range, m.	Percentage of mean annual recharge
Dalton Holme	3.7	7.1	52
Little Brocklesby	4.0	7.6	53
New Red Lion	9.3	9.2	101
Washpit Farm	1.6	2.9	55
Little Bucket Farm	10.6	11.4	93
Compton	31.8	21.8	146
Rockley	14.6	10.9	134
Bussels No. 7	1.9	1.2	158

Even on the basis of the very limited network of featured boreholes the deterioration in the storage situation from west to east is evident. In eastern areas and some other districts subject to rain-shadow influences, other factors have also contributed to the concern regarding the outlook: the 1989/90 winter recovery in storage has been generated from a very low base and, often, there has been limited spatial coherence to the amounts of recharge in recent months. In parts of north Kent, for instance, the water-table recovery has been substantially less encouraging than at the Little Bucket site (Figure 3). Of general relevance has been the very early onset of notably steep seasonal recessions; this has produced a rapid decrease in overall groundwater storage since late-February.

By early-May, groundwater levels in the Chalk of eastern England were for the most part substantially below the seasonal mean (Dalton Holme, Little Brocklesby and Washpit Farm). Despite near average recharge, the level at Little Bucket Farm remains below the seasonal mean. Since the groundwater levels reflect the amount of groundwater in storage, the situation in the Chalk outcrops of eastern England appears fragile; should the summer of 1990 be dry, and groundwater is pumped to supplement dwindling surface supplies, and if the onset of the winter recharge is again delayed until the end of December, the situation would be potentially serious.

TABLE 1 1989/90 RAINFALL AS A PERCENTAGE OF THE 1941-70 AVERAGE

		Mar 1989	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 1990	Feb	Mar	Apr
England and	mm	92	83	20	55	38	58	41	98	61	133	116	141	20	38
Wales	%	156	143	30	90	52	65	49	118	63	147	135	217	34	66
NRA REGIONS															
North West	mm	144	87	37	82	33	116	29	146	84	103	178	187	39	52
	%	200	113	45	99	32	93	24	124	69	86	159	231	55	68
Northumbrian	mm	63	58	22	51	19	77	20	71	35	61	110	132	30	28
	%	121	105	34	84	25	76	25	95	37	81	138	200	46	51
Severn Trent	mm	66	91	25	53	40	44	38	82	52	126	113	110	19	30
	%	127	175	39	95	62	54	57	126	66	181	164	207	37	58
Yorkshire	mm	78	78	19	69	43	41	20	77	45	93	106	112	23	24
	%	147	138	31	119	61	46	28	112	51	126	138	175	43	42
Anglia	mm	49	75	14	56	41	35	30	41	35	95	52	74	16	36
	%	123	188	30	114	72	55	58	79	56	180	100	177	40	36
Thames	mm	66	79	14	39	37	44	28	66	38	134	86	114	12	35
	%	143	172	25	75	62	63	45	103	52	203	139	242	26	76
Southern	mm	76	81	5	41	28	29	37	79	49	137	110	135	5	44
	%	146	169	9	82	54	40	52	101	52	169	145	238	10	91
Wessex	mm	90	77	21	32	37	43	49	101	59	174	124	157	17	35
	%	155	143	31	59	60	52	62	123	61	193	147	265	33	64
South West	mm	126	87	12	40	31	62	107	148	100	192	181	236	25	47
	%	150	123	14	62	37	61	103	131	75	142	140	262	29	65
Welsh	mm	165	98	25	67	48	91	62	179	100	189	211	214	36	46
	%	190	114	27	82	51	76	50	139	73	130	155	223	41	53
Scotland	mm	188	63	54	76	49	184	96	187	61	95	218	268	183	97
	%	204	70	59	83	44	143	70	126	43	61	159	258	199	108
RIVER PURIFICATION BOARDS															
Highland	mm	233	60	68	90	66	222	118	252	83	107	290	364	382	148
	%	204	53	66	82	52	150	75	135	49	55	177	274	335	130
North-East	mm	83	54	59	57	25	84	57	87	30	61	100	145	96	51
	%	134	89	77	81	27	78	66	90	29	60	110	195	155	84
Tay	mm	173	45	42	58	31	140	84	135	53	87	230	249	160	62
	%	211	60	44	70	30	119	73	111	45	65	195	270	195	83
Forth	mm	151	44	36	64	27	142	69	112	38	78	210	221	121	50
	%	219	65	43	85	28	122	64	106	35	72	212	287	175	74
Tweed	mm	105	48	43	51	23	114	47	67	30	72	158	180	59	47
	%	181	79	57	75	27	100	51	76	29	80	170	260	102	77
Solway	mm	195	87	35	71	43	177	78	146	58	117	270	282	100	50
	%	214	99	38	79	39	136	52	101	40	77	193	303	110	57
Clyde	mm	229	82	46	90	64	249	120	240	74	107	320	343	221	144
	%	218	80	47	87	49	175	69	131	44	58	199	304	210	140

Note: January, March and April figures for E and W for 1990 are based upon MORECS figures supplied by the Meteorological Office

Scottish RPB data for April 1990 are estimated from the isohyetal map of April rainfall in the MORECS bulletin.

TABLE 2 RAINFALL RETURN PERIOD ESTIMATES

		JAN - APR 90	Est Return Period, years	OCT 89 - APR 90	Est Return Period, years	MAY 88 - APR 90	Est Return Period, years	NOV 88 - APR 90	Est Return Period, years
England and	mm	331		607		835		1240	
Wales	% LTA	124	5-10	113	2-5	92	2-5	91	2-5
NRA REGIONS									
North West	mm	457		772		1086		1721	
	% LTA	134	10-20	110	2-5	89	2-5	96	2-5
Northumbrian	mm	301		482		657		1021	
	% LTA	119	2-5	97	2-5	75	20-50	78	40-60
Severn Trent	mm	272		533		732		1061	
	% LTA	120	2-5	121	5-10	95	2-5	92	5-10
Yorkshire	mm	265		487		672		1027	
	% LTA	106	2-5	101	<2	81	5-10	82	10-20
Anglia	mm	178		353		525		772	
	% LTA	102	<2	104	<2	86	5-10	86	5-10
Thames	mm	201		484		645		931	
	% LTA	123	5-10	120	5-10	92	2-5	89	5
Southern	mm	295		555		699		1006	
	% LTA	126	5-10	114	2-5	88	2-5	84	10
Wessex	mm	332		669		848		1207	
	% LTA	130	5-10	128	10-20	98	2-5	92	2-5
South West	mm	488		918		1180		1718	
	% LTA	131	5-10	121	5-10	99	2	94	2-5
Welsh	mm	506		959		1272		1915	
	% LTA	125	5-10	117	5-10	95	2-5	94	2-5
Scotland	mm	820		1125		1622		2566	
	% LTA	194	>>200	129	40-60	113	5-10	119	50-100
RIVER PURIFICATION BOARDS									
Highland	mm	1201		1643		2207		3189	
	% LTA	229	>>200	153	>>200	128	80-120	114	10-20
North-East	mm	386		564		846		1265	
	% LTA	134	10-20	96	2-5	83	10-20	78	80-120
Tay	mm	732		1007		1362		2111	
	% LTA	200	>>200	136	20-50	109	2-5	106	2-5
Forth	mm	624		852		1190		1834	
	% LTA	199	>>200	134	40-60	107	2-5	105	2-5
Tweed	mm	446		615		893		1340	
	% LTA	159	50-100	109	2-5	89	5	86	10
Solway	mm	679		1000		1404		2204	
	% LTA	165	200-500	117	5-10	99	2-5	97	2-5
Clyde	mm	1093		1514		2083		3194	
	% LTA	227	>>200	149	>200	125	40-60	119	20-50

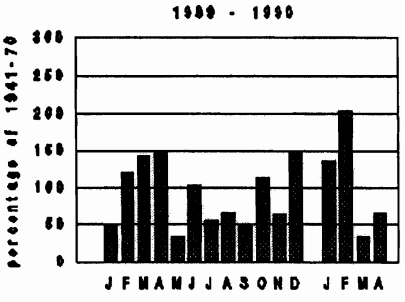
Return period assessments are based on tables provided by the Meteorological Office*. These assume a start in a specified month; return periods for a start in any month may be expected to be an order of magnitude less. "Wet" return periods underlined.

The tables reflect rainfall totals over the period 1911-70 only and the estimate assumes a sensibly stable climate.

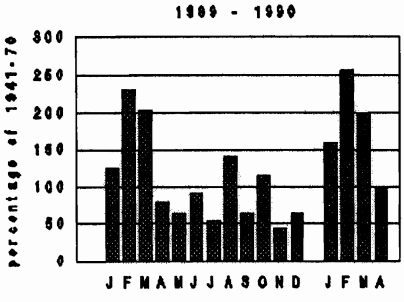
The April 1990 RPB values are estimated from the isopleth map within the April summary published in the Met. Office's MORECS bulletin.

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

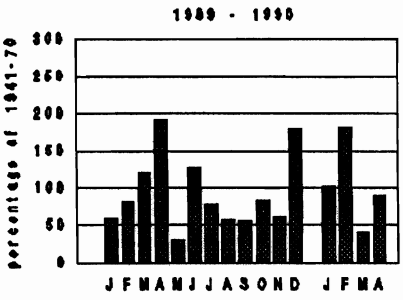
FIGURE 1. MONTHLY RAINFALL FOR 1989 – 1990 AS A PERCENTAGE OF THE 1941 – 1970 AVERAGE FOR ENGLAND AND WALES, SCOTLAND, AND THE NRA REGIONS



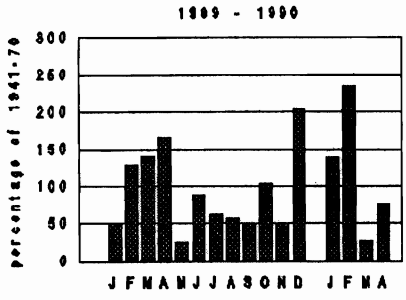
England and Wales



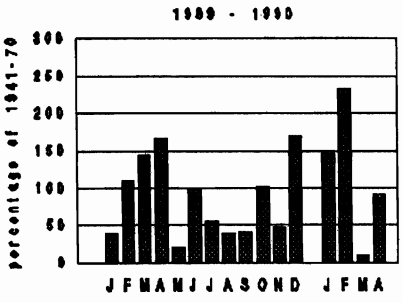
Scotland



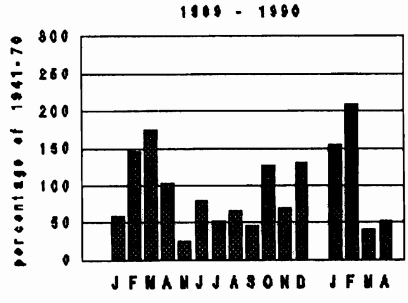
Anglian NRA Region



Thames NRA Region

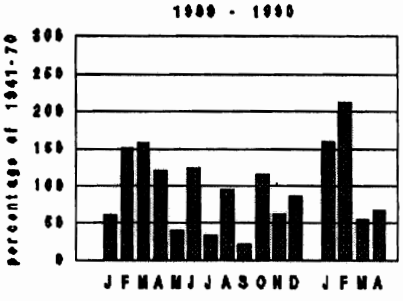


Southern NRA Region

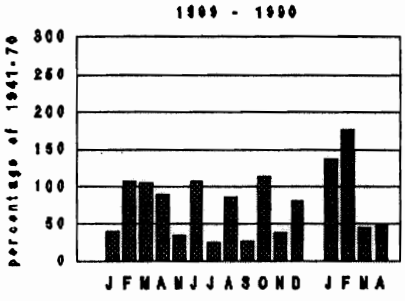


Wessex NRA Region

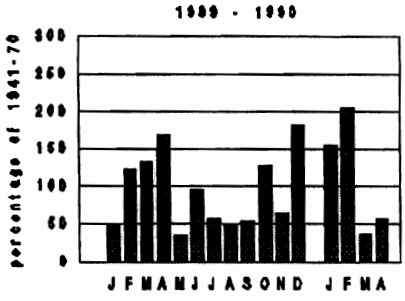
FIGURE 1 (continued)



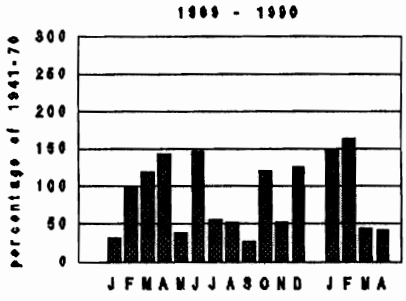
North West NRA Region



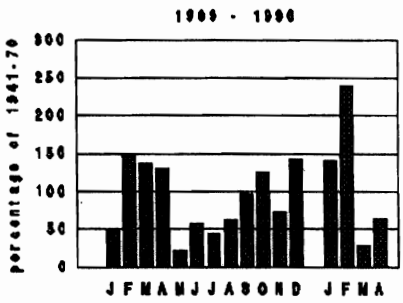
Northumbrian NRA Region



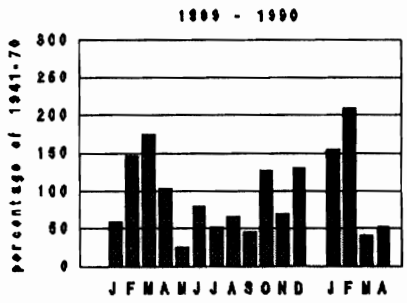
Severn-Trent NRA Region



Yorkshire NRA Region



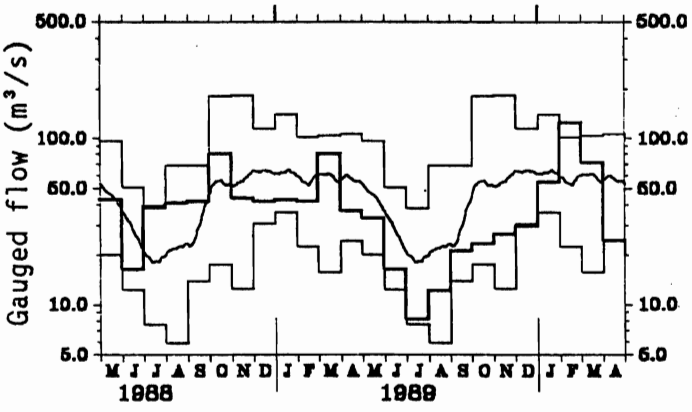
South West NRA Region



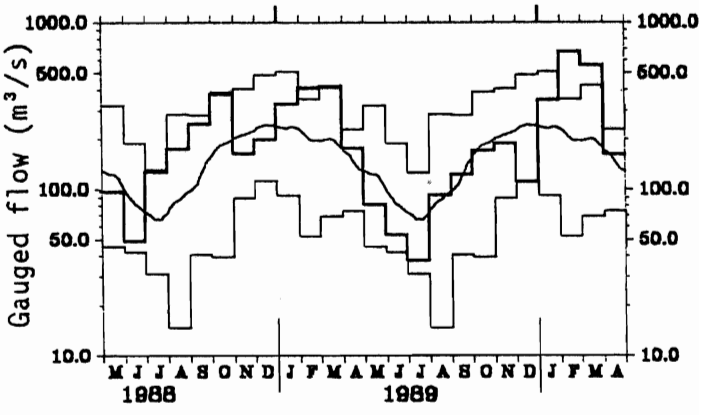
Welsh NRA Region

FIGURE 2 MONTHLY RIVER FLOW HYDROGRAPHS

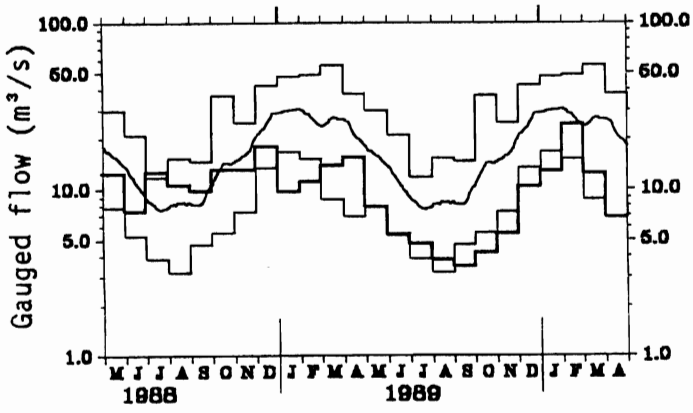
012002 Dee at Park
Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1972-1987



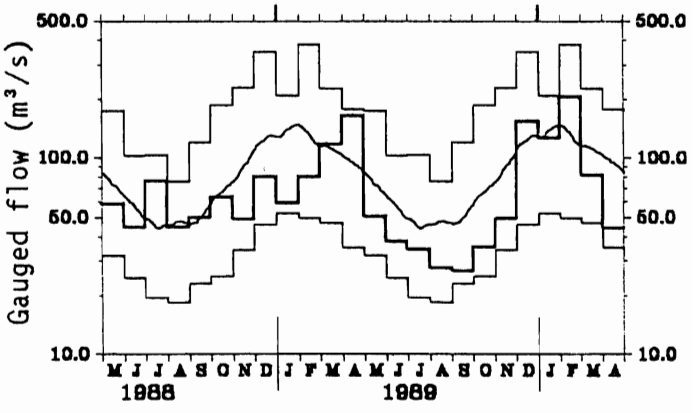
015006 Tay at Ballathie
Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1952-1987



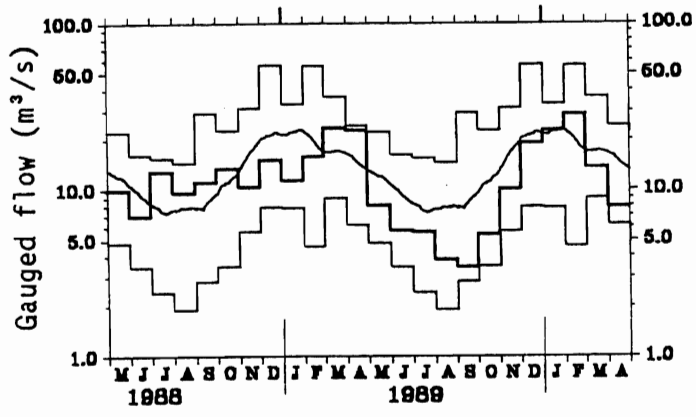
027041 Derwent at Buttercrambe
Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1973-1987



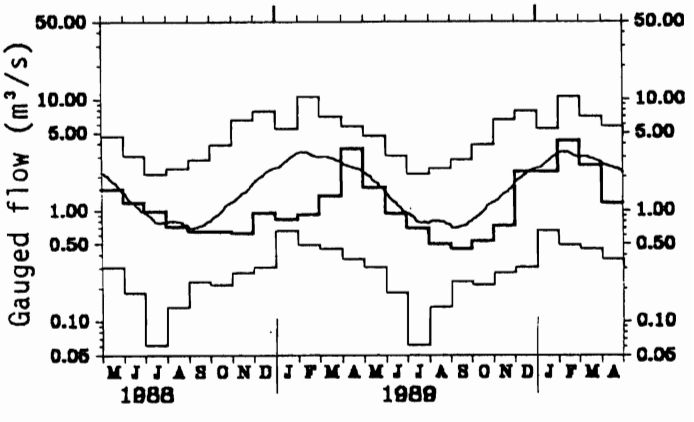
028009 Trent at Colwick
Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1958-1987



028018 Dove at Marston on Dove
Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1961-1987

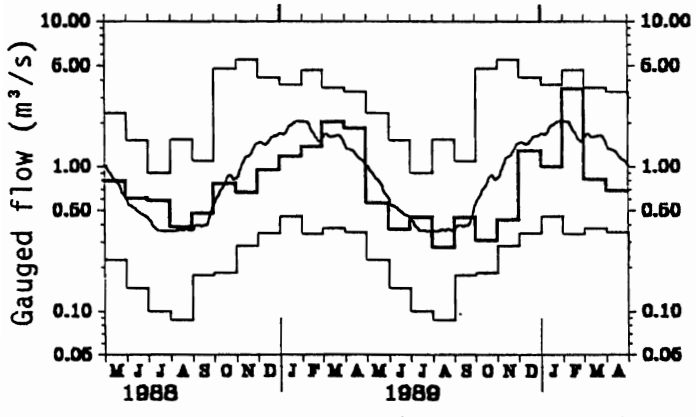


030001 Witham at Claypole Mill
Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1959-1987



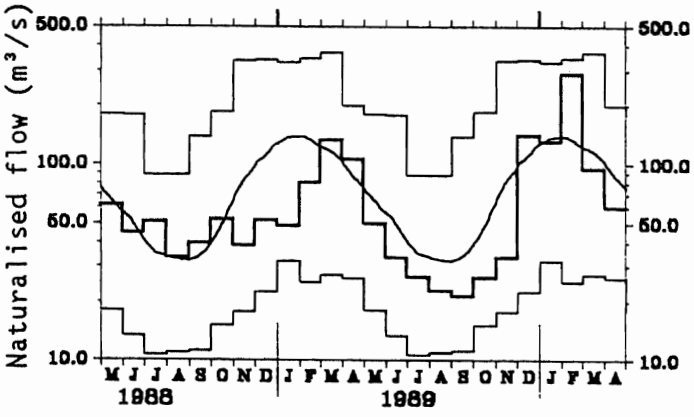
037005 Colne at Lexden

Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1959-1987



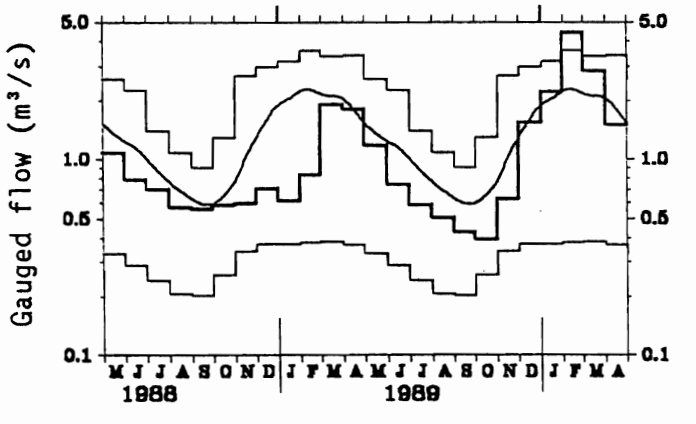
039001 Thames at Kingston

Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1883-1987



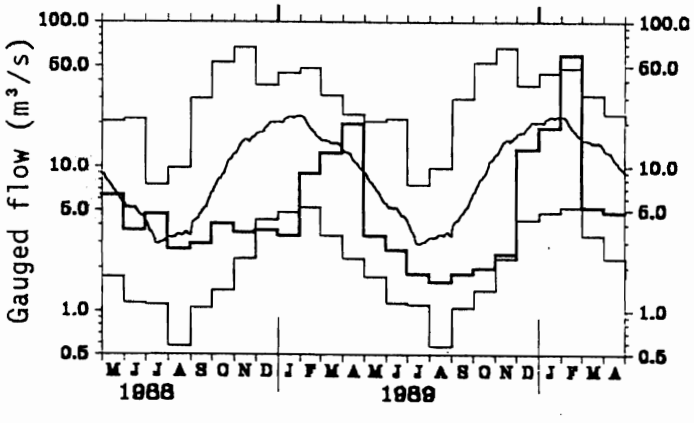
039020 Coln at Bibury

Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1963-1987



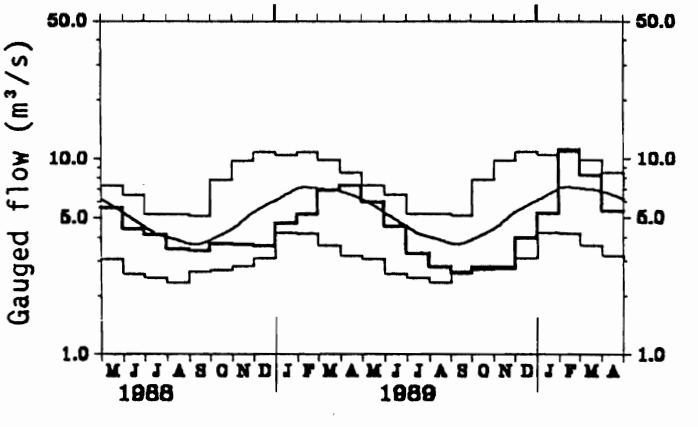
040003 Medway at Teston

Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1956-1987



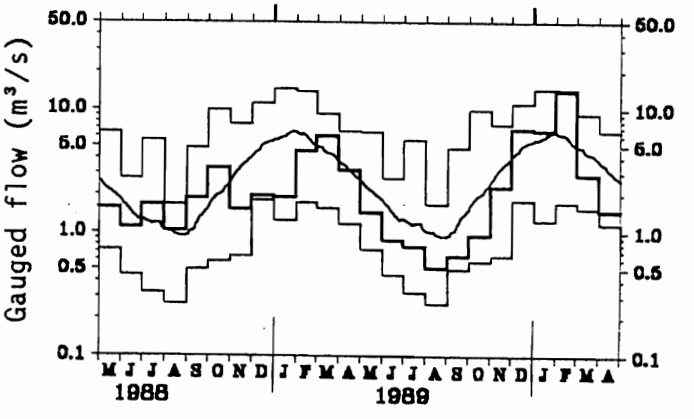
042010 Itchen at Highbridge+Allbrook

Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1958-1987



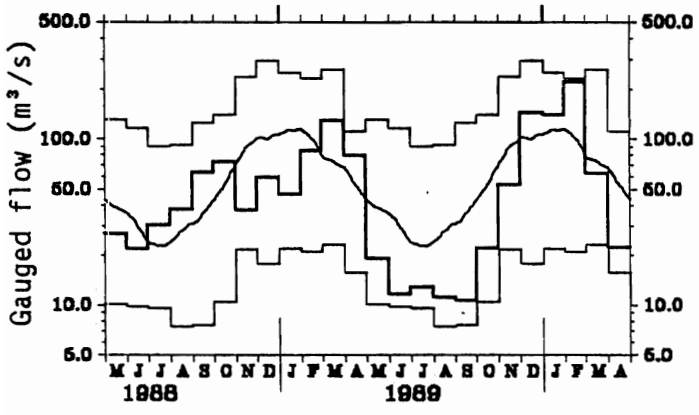
052005 Tone at Bishops Hull

Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1961-1987



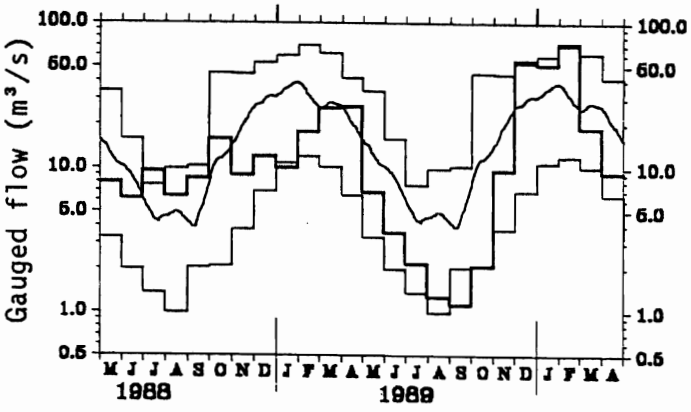
054001 Severn at Bewdley

Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1921-1987



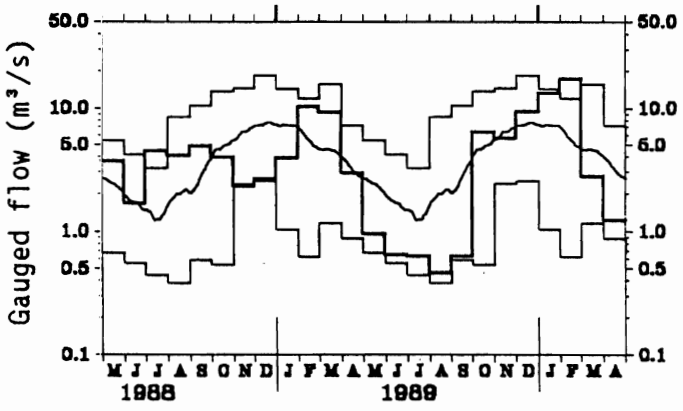
054029 Teme at Knightsford Bridge

Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1970-1987



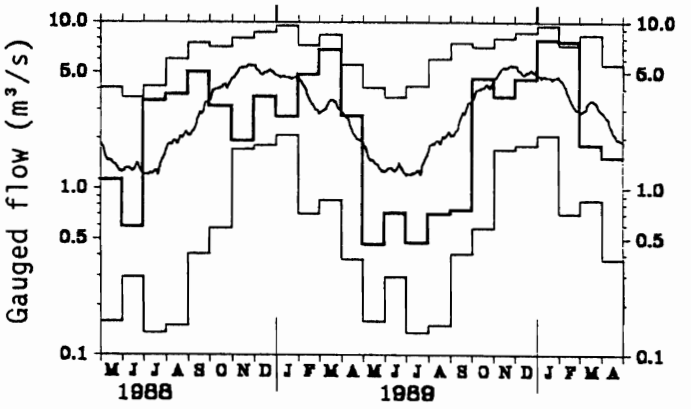
057004 Cynon at Abercynon

Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1957-1987



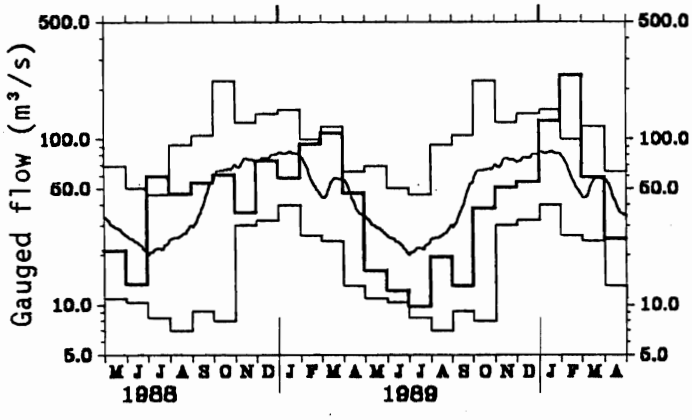
067018 Dee at New Inn

Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1969-1987



076007 Eden at Sheepmount

Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1967-1987



084005 Clyde at Blairston

Monthly mean flows for May 1988-Apr 1990
+ extremes and 30 day running mean for 1958-1987

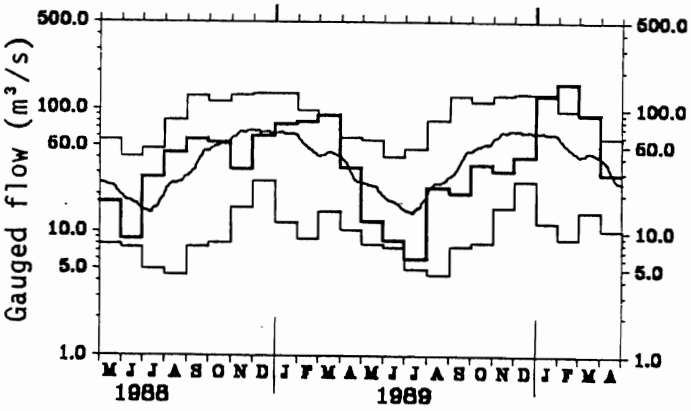


TABLE 3 RUNOFF AS MM. AND AS A PERCENTAGE OF THE PERIOD OF RECORD AVERAGE WITH SELECTED PERIODS RANKED IN THE RECORD

River/ Station name	Oct 1989	Nov	Dec	Jan 1990	Feb	Mar	Apr 1990	Apr rank	10/89 to 4/90	rank	5/89 to 4/90	rank	11/88 to 4/90	rank
	mm %LT	mm %LT	mm %LT	mm %LT	mm %LT	mm %LT	mm %LT	/yrs	mm %LT	/yrs	mm %LT	/yrs	mm %LT	/yrs
Dee at Park	34 41	37 48	43 47	79 85	165 236	103 115	34 42	1 /18	495 84	3 /17	626 78	2 /17	1034 80	2 /17
Tay at Ballathie	99 89	106 88	65 45	201 144	353 331	324 275	91 110	24 /38	1239 147	38 /38	1461 130	35 /37	2414 131	37 /37
Tweed at Boleside	32 44	35 40	60 64	175 177	245 345	105 137	26 51	3 /29	677 121	28 /29	785 105	17 /28	1289 105	13 /28
Wharfe at Flint Mill Weir	49 76	39 49	65 67	126 128	142 192	59 79	20 37	5 /35	499 92	12 /35	567 78	3 /34	1008 84	7 /34
Derwent at Buttercrambe	7 29	9 35	18 43	22 43	37 86	21 45	11 32	1 /17	124 49	1 /17	167 49	1 /16	300 52	1 /16
Trent at Colwick	13 54	17 55	55 125	45 88	66 152	29 71	15 47	3 /32	241 91	12 /32	304 84	8 /31	495 82	6 /31
Dove at Marston on Dove	16 47	29 60	59 91	68 98	78 142	41 76	23 54	3 /29	313 86	6 /29	392 79	4 /27	684 82	4 /27
Lud at Louth	9 72	8 53	12 59	12 38	21 57	21 55	15 44	3 /22	97 54	3 /22	153 58	4 /21	243 56	2 /21
Witham at Claypole Mill	5 57	6 49	20 105	20 76	34 126	23 86	10 48	4 /31	117 84	14 /31	154 83	14 /31	226 71	6 /30
Colne at Lexden	3 34	5 39	14 82	11 46	35 193	9 48	7 52	6 /31	86 77	8 /31	109 78	6 /30	196 81	6 /30
Mimram at Panshanger Park	6 71	6 68	10 98	10 85	15 127	15 112	12 94	17 /38	74 96	17 /37	114 90	12 /37	175 90	9 /36
Thames at Kingston (natr.)	7 52	9 41	38 126	35 94	70 212	25 80	16 71	30 /108	200 106	64 /107	241 98	52 /107	361 86	35 /106
Coln at Bibury	10 61	15 60	39 98	56 107	100 184	71 132	36 83	8 /27	327 115	19 /27	412 104	16 /26	571 86	6 /26
Mole at Kinnersley Manor	15 38	15 34	81 123	64 85	153 317	21 42	22 67	7 /17	372 101	10 /15	441 97	9 /15	688 87	1 /13
Medway at Teston	4 21	5 16	28 69	39 78	115 309	11 35	10 45	4 /32	212 93	15 /29	236 85	10 /26	343 71	2 /25
Itchen at Highbridge+Allbrook	21 68	20 57	29 68	39 79	74 150	61 117	39 83	4 /32	283 93	12 /32	423 91	8 /31	650 88	7 /31
Stour at Throop Mill	8 35	15 46	74 134	66 106	154 271	46 89	22 63	4 /18	387 120	13 /17	439 111	10 /17	626 90	5 /16
Tone at Bishops Hull	13 47	29 68	91 136	88 108	170 233	38 66	19 48	3 /30	448 115	23 /29	503 105	18 /29	747 89	7 /28
Brue at Lovington	6 20	16 37	98 144	77 108	125 213	26 51	12 40	3 /26	361 101	15 /25	398 90	7 /25	647 85	3 /25
Severn at Bewdley	14 41	32 59	89 143	86 120	123 215	39 85	13 41	8 /70	397 111	48 /69	437 97	32 /69	701 90	20 /68
Teme at Knightsford Bridge	4 19	17 50	100 188	93 138	118 221	34 66	16 46	4 /21	381 121	19 /20	408 108	14 /20	586 88	2 /19
Yscir at Pontaryscir	90 97	125 101	210 140	225 152	228 225	65 59	31 52	4 /18	974 119	17 /17	1031 104	9 /17	1619 95	5 /16
Cynon at Abercynon	160 132	139 90	238 126	331 175	393 308	70 60	30 39	5 /32	1360 137	32 /32	1444 114	24 /30	2200 104	16 /30
Dee at New Inn	228 114	171 69	226 91	388 161	344 217	90 51	73 71	8 /21	1520 110	16 /21	1671 92	8 /20	2763 92	6 /20
Lune at Caton	116 95	109 81	81 52	266 182	298 332	77 80	43 58	6 /28	990 119	23 /26	1080 95	13 /26	1856 101	13 /24
Eden at Sheepmount	44 57	57 67	64 71	149 147	253 392	68 104	28 60	5 /20	664 124	17 /19	746 108	12 /18	1219 107	10 /17
Clyde at Blairston	55 68	47 48	64 62	200 196	227 319	143 202	45 99	16 /32	782 135	31 /32	890 116	25 /31	1451 115	25 /31

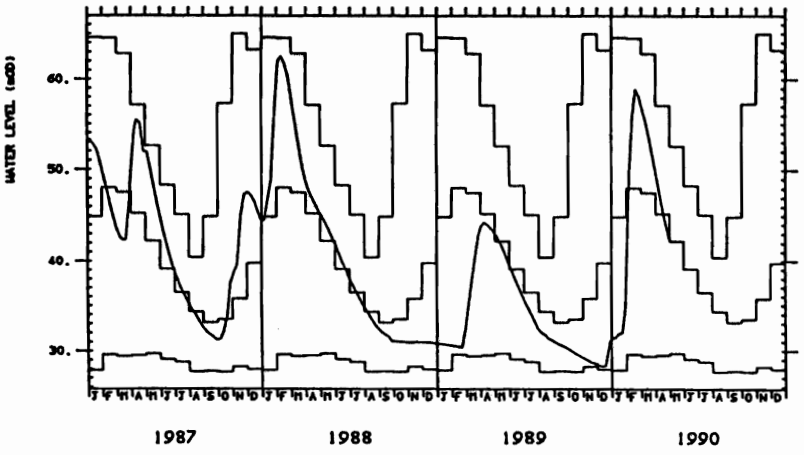
Notes (i) Values based on gauged flow data unless flagged (natr.), when naturalised data have been used.
(ii) Values are ranked so that lowest runoff as rank 1;
(iii) %LT means percentage of long term average from the start of the record to 1988. For the long periods (at the right of this table), the end date for the long term is 1990.

FIGURE 3 GROUNDWATER HYDROGRAPHS

Site name: COMPTON HOUSE

National grid reference: SU 7755 1490 Well number: SU71/23

Aquifer: CHALK AND UPPER GREENSAND Measuring level: 81.37

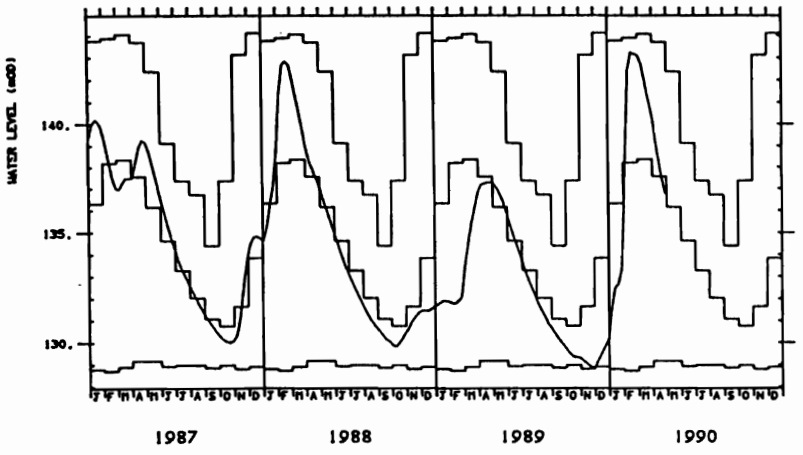


Max, Min and Mean values calculated from years 1894 TO 1989

Site name: ROCKLEY

National grid reference: SU 1655 7174 Well number: SU17/57

Aquifer: CHALK AND UPPER GREENSAND Measuring level: 146.39

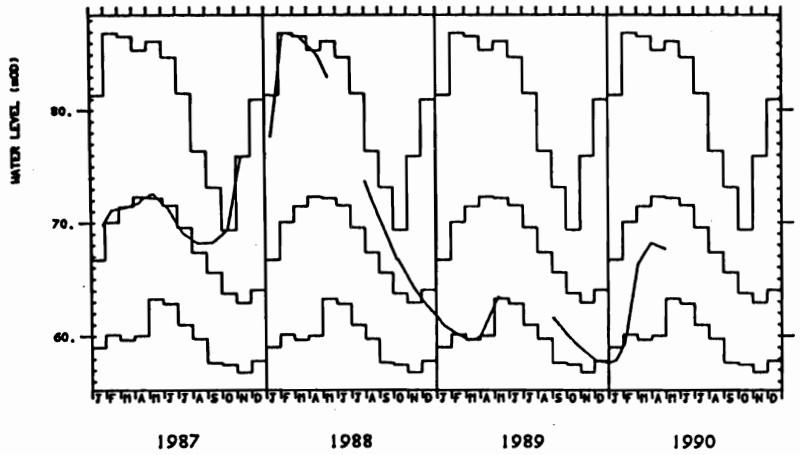


Max, Min and Mean values calculated from years 1894 TO 1989

Site name: LITTLE BUCKET FARM,WALTHAM

National grid reference: TR 1225 4690 Well number: TR14/9

Aquifer: CHALK AND UPPER GREENSAND Measuring level: 87.33



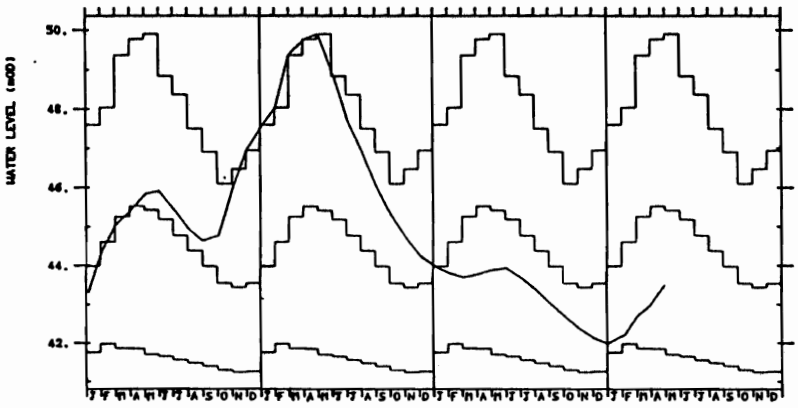
Max, Min and Mean values calculated from years 1971 TO 1989

A break in the data line indicates a recording interval of greater than 8 weeks

Site name: WASHPIT FARM

National grid reference: TF 8138 1960 Well number: TF81/2

Aquifer: CHALK AND UPPER GREENSAND Measuring level: 80.20

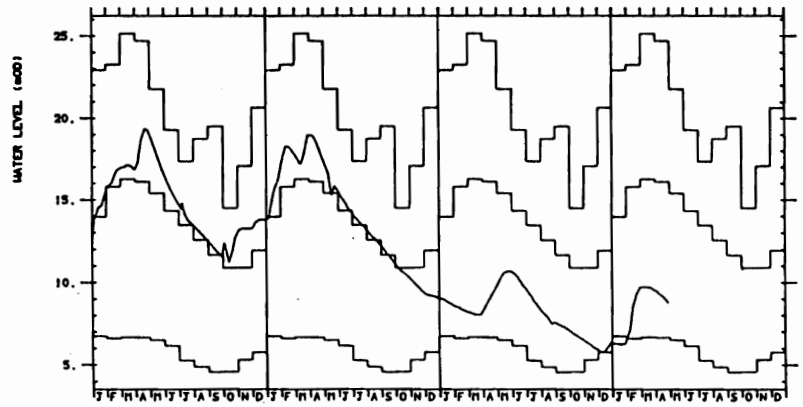


Max, Min and Mean values calculated from years 1950 TO 1989

Site name: LITTLE BROCKLESBY

National grid reference: TA 1371 0888 Well number: TA10/40

Aquifer: CHALK AND UPPER GREENSAND Measuring level: 44.33

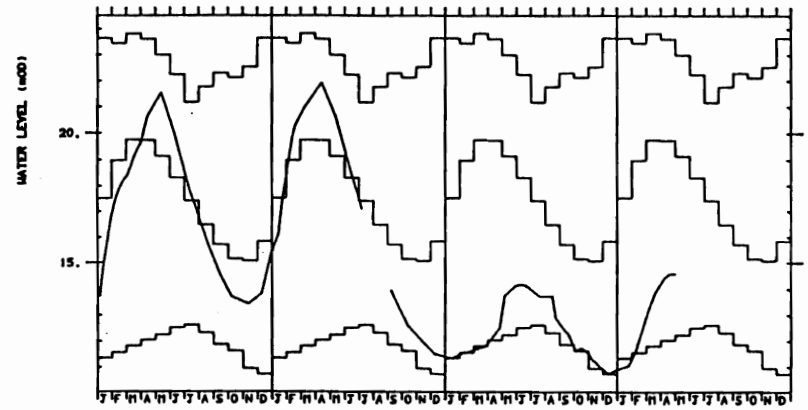


Max, Min and Mean values calculated from years 1926 TO 1989

Site name: DALTON HOLME

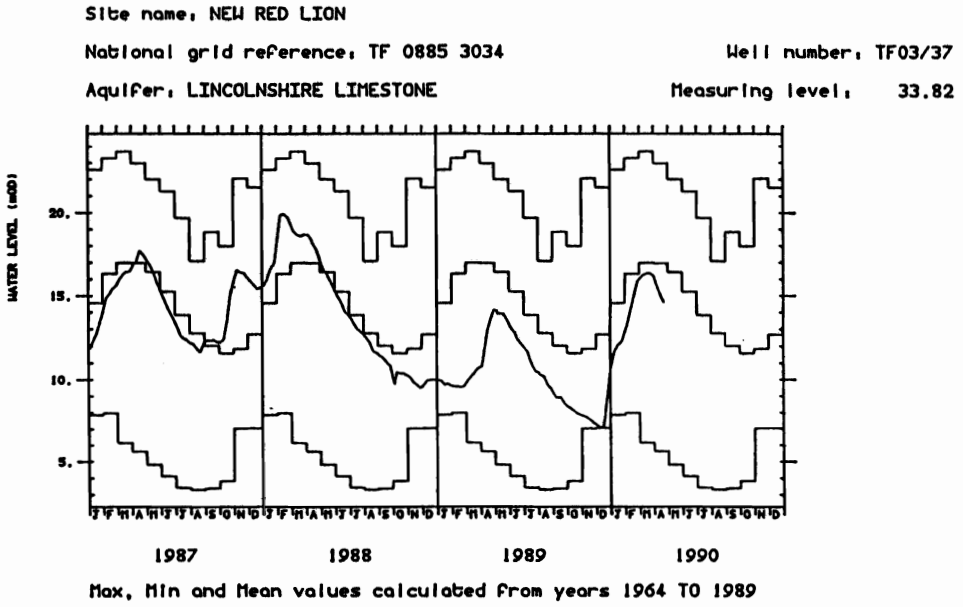
National grid reference: SE 9651 4530 Well number: SE94/5

Aquifer: CHALK AND UPPER GREENSAND Measuring level: 33.50



Max, Min and Mean values calculated from years 1889 TO 1989

A break in the data line indicates a recording interval of greater than 8 weeks



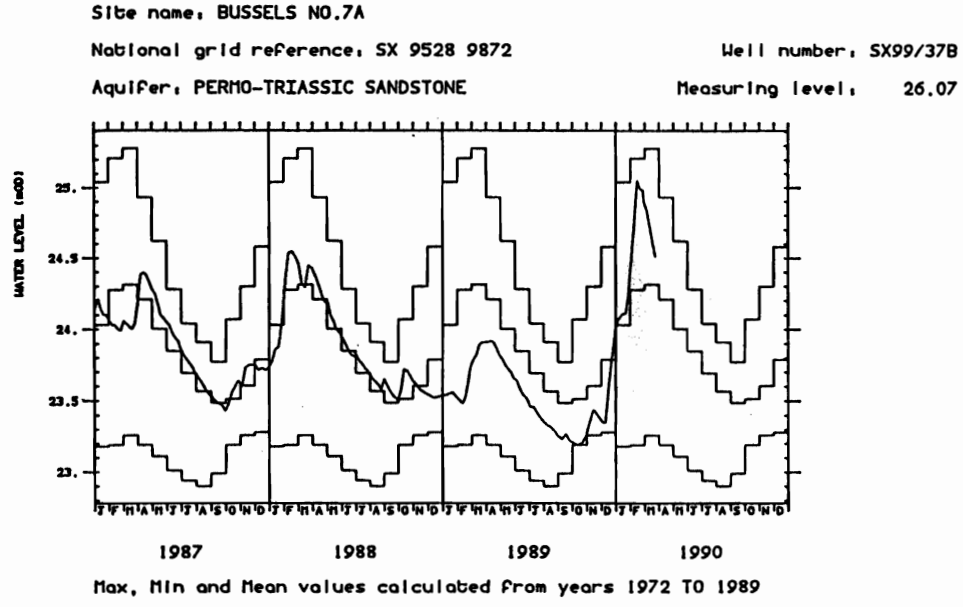


FIGURE 4 LOCATION MAP OF GROUNDWATER INDEX WELLS