HYDROLOGICAL SUMMARY FOR GREAT BRITAIN - JANUARY 1991

Data for this review have been provided principally by the regional divisions of the National Rivers Authority (NRA) in England and Wales, the River Purification Boards in Scotland (RPBs) and by the Meteorological Office. The recent areal rainfall figures are derived from a restricted network of raingauges (particularly in Scotland) and a significant proportion of the river flow data may be subject to review.

For a full appreciation of the water resources implications, the data provided in this hydrological review should be considered alongside assessments of the current reservoir storage and water demand situations in each region. Diagrams depicting reservoir storage supplied by South West Water are presented in the Hydrological Summary and similar information from Welsh Water and other regions was used in compiling the report; it is envisaged that a more comprehensive coverage will be provided in future editions.

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

Summary

The latest in a series of wet interludes, which have punctuated a long term rainfall deficiency embracing eastern and southern Britain, ended around mid-January. The very unsettled episode, which commenced around the third week of December, resulted in spate conditions in many rivers, healthy replenishments to most reservoirs and a termination in groundwater level recessions in most regions away from the English lowlands. Subsequently, the return of dry conditions served to emphasise the limited time now available (before evaporation rates accelerate in the spring) for infiltration to generate the desired recovery in groundwater levels throughout much of eastern England.

The hydrological contrasts between the more maritime and more continental regions of Great Britain are now very stark. In eastern England - parts of East Anglia in particular - only a modest improvement in the water resources outlook may be identified over the last six weeks. The very high soil moisture deficits which typified the early winter served to limit the effectiveness of the December/January precipitation and little or no appreciable aquifer recharge has yet been reported for some eastern parts of the Chalk aquifer. In such areas groundwater levels are extremely low - typically close to or below the minimum on record for the winter. This reflects both the paucity of recharge in the 1990/91 winter thus far and the limited rainfall over East Anglia and a number of other lowland districts since the summer of 1988. Despite the near average rainfall since the beginning of October 1990, a notable drought over the 30-month timeframe embraces much of East Anglia and extends into adjacent regions.

Sustained rainfall through into the late spring will be essential to restore groundwater levels to within the normal range by the early summer of 1991. The significant snowfalls in early February will, in the event of a gentle thaw, be beneficial. A repetition of the dry, warm conditions experienced over the March-May period last year, however, would result in substantial hydrological and water resources stress throughout much of eastern and some parts of southern England.

Rainfall

January was a month of two halves. A sequence of vigorous depressions brought wet and boisterous conditions to most of the British Isles over the initial two weeks. Subsequently, a persistent anticyclone initially centred over the German Bight produced a sustained spell of dry but cloudy weather.

For England and Wales and for Scotland, the January rainfall total was very close to the 1941-70 average. Regional variations were moderate but in parts of Suffolk and Cambridgeshire rainfall was only around half of the 1941-70 average; north-eastern Scotland was dry also. Winter rainfall thus far, from the beginning of October, has been well within the normal range; a little below average throughout much of southern Britain and above average in the west and north.

A strong regional dimension to the drought is revealed in the rainfall accumulations over the last eleven months (Table 2). For England and Wales, the March-January rainfall total is the lowest since the 1933/34 drought but the most severe rainfall deficiencies (in percentage terms) are confined to the English lowlands - the Thames and Anglian regions especially. For the Thames Valley the eleven-month rainfall is the lowest in a record from 1883, with the exception of 1921/22. If, however, accumulations for ***any*** eleven month periods are considered, the March-January period becomes notably less outstanding; over the eleven months ending in August 1976 an accumulated rainfall total of below 300 mm was recorded.

The exceptionally persistent, if somewhat episodic, nature of the current rainfall deficiency is evident from the notable return periods associated with the 30-month rainfall totals in eastern and southern England. In some districts - especially in East Anglia - rainfall has been appreciably above average in only three months since the summer of 1988. The very unusual duration of the drought has been a major factor contributing to the extremely low groundwater levels in eastern districts (see below). A measure of the very large spatial variations in rainfall patterns may be gained by comparing the 30-month rainfall totals for south-eastern Britain with those for Scotland, especially western regions, where the winters of 1988/89 and 1989/90 were extraordinarily wet.

Evaporation and Soil Moisture Deficits

After a sequence of mild Januarys, 1991 saw a colder than average start to the year especially in northern England. Sunshine amounts were high however particularly early in January and potential evaporation (PE) totals were close to the 1961-85 average. Over the 12 months ending with January, MORECS PE totals (typically in the range 550-750 mm) are the highest, or close to the highest on record throughout most of England and Wales. Over much of western Britain actual evaporation (AE) totals are also unprecedented but in the English lowlands the mitigating influence of high SMDs resulted in 12-month (February-January) AE totals lower than any in the MORECS series with the exception of the remarkably low minima established in 1976/77.

Soils throughout western and northern Britain were at field capacity entering 1991 and the remaining deficits in the English lowlands declined briskly in early January but then remained relatively stable until month-end when significant deficits were largely confined to a zone stretching from Hertfordshire to the Fens.

The high moisture content of the soils - normal at this time of year - will allow a substantial proportion of the February precipitation to contribute to river runoff or aquifer recharge.

Runoff

The within-month flow range during January was relatively large in most regions. Away from the English lowlands, many rivers were in spate early in the year with some minor flooding reported from Scotland - notably high flows were reported from rivers draining the Southern

Uplands. By the second week, flood alerts extended into Wales and parts of the Midlands - particularly the Severn and Soar valleys. Subsequently, recessions became well established in all areas. Nonetheless, runoff totals for January were close to, or above, average throughout most of western and northern Britain. Notable increases in runoff rates were recorded in the Wessex, Severn-Trent and Yorkshire NRA regions. In runoff terms a relatively sharp transition occurs in a south-easterly direction. Towards the eastern seaboard flows in rivers supported principally from groundwater remain very low.

The four and eleven month accumulations (Table 3) provide a useful indication of the continuing severity of the hydrological drought in parts of southern and eastern Britain. Runoff accumulations since the beginning of October 1990 are modest over wide areas and for the March-January period are amongst the lowest on record for the Derwent, Lud, Witham and Colne (the Trent also). The ranking associated with the total runoff from August 1988 testifies to the persistence of the drought in parts of eastern and southern Britain - see, for instance, the runoff accumulations for the Dee, Lud and the Itchen. Table 3 also serves to illustrate the remarkable spatial variations in runoff rates which have characterised the last year couple of years. The 30-month accumulation for the Tay is unprecedented; abundant runoff typifies many Scottish catchments - especially rivers draining from the western Highlands.

Precipitation in January, following the very wet conditions in the latter half of December, resulted in healthy replenishment to most upland reservoirs. Many major reservoirs in the South-West, Wales and Severn-Trent were close to capacity by mid-month or seeking to draw down for flood mitigation purposes and a considerable improvement in reservoir stocks occurred in Wessex. Although January runoff in the Thames remained below average for the ninth successive month, exceptionally heavy abstraction rates over the last six weeks have substantially increased stocks in pumped storage reservoirs. A general slackening in the improvement of reservoir stocks characterised the latter half of January and continued into February as freezing conditions produced a further decline in runoff.

Groundwater

The heavy rainfall at the beginning of the year generally put a belated end to the groundwater level recessions. Improvements in groundwater resources since mid-December have been notable in some western aquifers; the outlook in the Wessex Chalk, for instance, being considerably better than 6-8 weeks ago. A healthy recovery was also registered at the Dalton Holme borehole (Humberside) where levels have been exceptionally depressed since the autumn of 1988. Water-tables everywhere appear to be rising; exceptions include the Holt (north of London) where the fall has levelled off, and Therfield Rectory, where there is a known lag between rainfall and level rise of two to three months. Two sites, Ampney Crucis in the Jurassic Oolites of the Cotswolds, and Westdean in the Chalk of the South Coast, have shown a prompt response to the general lack of late January rainfall with a modest drop in levels in the latter part of the month.

Despite the impact of recent infiltration, water-tables still remain generally well below the seasonal mean, especially in East Anglia where levels in the Washpit Farm borehole are below any previously monitored in a 40-year record. Groundwater levels at Little Brocklesby and Fairfields (in the Chalk) and the New Red Lion borehole (in the Lincolnshire Limestone) though rising, are also extremely depressed. Further south, the Rockley, Compton, and Little Bucket levels remain well below the seasonal mean but a brisk recovery is reported for boreholes in the Chalk of the Wessex NRA area (e.g. Ashton Farm).

In eastern and some southern areas, near to 150% of average precipitation will still be required through February and March to restore groundwater levels to near-average early April levels. A spring rainfall of below-average proportions, similar to that experienced in both 1989 and 1990, may be expected to result in an early start to the summer recession, and potentially a comparable shortfall in groundwater resources by the autumn.

Institute of Hydrology / British Geological Survey 13 February 1991

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

		Jan 1990	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 1991
England and Wales	mm	133	142	23	38	25	72	35	45	50	100	65	97	86
	%	154	219	39	66	37	118	47	50	60	120	67	108	100
NRA REGIONS														
North West	mm	197	193	45	57	49	99	58	68	81	164	68	142	95
	%	176	238	63	74	60	119	56	54	66	139	56	118	84
Northumbria	mm	112	135	32	25	51	69	40	53	53	106	61	109	68
	%	140	205	62	45	80	113	52	52	66	141	65	145	85
Severn Trent	mm	106	109	18	30	19	63	27	37	47	93	52	92	72
	%	154	206	35	58	30	113	42	46	70	143	66	131	105
Yorkshire	mm	118	112	23	25	29	83	32	46	39	92	55	121	72
	%	153	175	43	45	48	143	46	51	54	133	62	163	94
Anglia	mm	52	75	15	34	16	45	21	31	32	51	52	48	43
	%	101	179	38	85	34	92	37	48	62	98	84	91	83
Thames	mm	92	114	12	35	7	47	17	35	34	59	34	65	77
	%	148	242	26	76	13	90	28	50	55	91	47	99	124
Southern	mm	121	136	6	48	10	61	13	33	38	105	59	63	94
	%	159	237	12	100	18	122	22	45	54	135	63	77	123
Wessex	mm	124	158	14	35	12	62	31	41	48	87	52	74	108
	%	147	268	24	65	18	115	50	50	61	106	54	83	128
South West	mm	195	238	25	46	25	99	61	59	68	126	107	112	137
	%	151	264	30	65	30	152	73	58	65	112	80	83	106
Welsh	mm	240	215	37	48	34	98	53	65	85	149	109	152	139
	%	176	224	43	56	37	120	56	55	68	116	76	105	102
Scotland	mm	250	294	247	96	54	128	75	119	147	211	101	184	135
	%	182	283	268	107	59	139	67	92	107	142	71	108	99
RIVER PURIFICATION BOARDS														
Highland	mm	293	365	409	136	54	140	95	157	230	220	144	221	180
	%	179	274	359	119	52	127	75	106	146	118	85	113	110
North-East	mm	108	149	87	45	49	110	47	79	85	138	94	88	72
	%	119	201	140	74	64	157	51	74	98	142	91	86	79
Tay	mm	239	287	178	61	44	128	39	74	67	187	65	140	132
	%	203	288	217	81	46	154	38	63	58	153	55	104	112
Forth	mm	222	222	142	55	39	125	51	81	65	185	57	131	106
	%	224	288	206	81	46	167	52	70	60	175	53	120	107
Tweed	mm	167	178	52	31	46	106	54	61	68	159	52	114	98
	%	180	258	90	51	61	156	61	54	73	181	50	127	105
Solway	mm	254	285	94	72	76	121	75	105	81	216	79	208	143
	%	181	306	103	82	83	134	68	82	54	150	54	138	102
Clyde	mm	316	341	295	127	57	138	95	149	173	297	90	190	148
	%	196	302	281	123	59	134	73	105	99	162	54	102	92

Note: January figures for England and Wales for 1991 are based upon MORECS figures supplied by the Meteorological Office
Scottish RPB data for December 1990 and January 1991 are estimated from the isohyetal map of December and January rainfall in the MORECS bulletins.

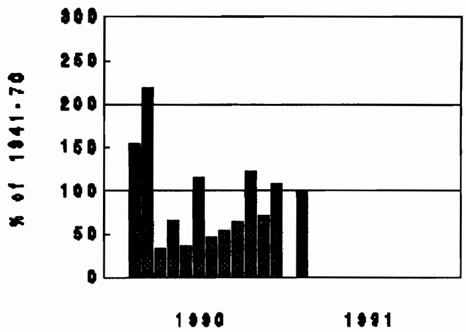
TABLE 2 RAINFALL RETURN PERIOD ESTIMATES

		OCT 90 - JAN 91	Est Return Period, years	MAR 90 - JAN 91	Est Return Period, years	MAY 89 - JAN 91	Est Return Period, years	AUG 88 - JAN 91	Est Return Period, years
England and	mm	347		635		1415		2058	
Wales	% LTA	97	2-5	75	30-40	86	10-15	87	15-20
NRA REGIONS									
North West	mm	469		926		1942		2952	
	% LTA	99	<2	81	10-15	88	5-10	94	2-5
Northumbria	mm	344		667		1284		1883	
	% LTA	106	2-5	82	10	81	20-30	83	40-50
Severn Trent	mm	309		550		1234		1739	
	% LTA	109	2-5	76	15-25	89	5-10	88	10
Yorkshire	mm	340		617		1259		1843	
	% LTA	110	2-5	80	10-15	84	10-20	86	15-20
Anglia	mm	194		388		866		1245	
	% LTA	89	2-5	68	60-80	79	25-35	80	60-80
Thames	mm	235		422		1033		1482	
	% LTA	89	2-5	64	90-110	81	10-20	82	30-40
Southern	mm	321		530		1198		1681	
	% LTA	97	2-5	72	25-35	84	10	82	30-40
Wessex	mm	321		564		1352		1941	
	% LTA	91	2-5	70	30-40	86	5-10	86	10-15
South West	mm	482		865		1994		2870	
	% LTA	94	2-5	78	10-20	93	2-5	92	5
Welsh	mm	549		969		2205		3226	
	% LTA	99	<2	78	15-20	92	2-5	93	2-5
Scotland	mm	631		1497		2843		4278	
	% LTA	108	2-5	113	5-10	110	5-10	115	50-70
RIVER PURIFICATION BOARDS									
Highland	mm	765		1986		3653		5522	
	% LTA	107	2-5	125	40-60	118	40-50	124	>>200
North-East	mm	392		894		1601		2345	
	% LTA	100	<2	94	2-5	87	10-15	89	10-15
Tay	mm	524		1115		2267		3479	
	% LTA	106	2-5	96	2-5	100	<2	108	5-10
Forth	mm	479		1037		2051		3074	
	% LTA	114	2-5	100	<2	102	2-5	107	5
Tweed	mm	423		841		1639		2362	
	% LTA	113	2-5	90	2-5	90	2-5	91	5-10
Solway	mm	646		1270		2533		3849	
	% LTA	111	2-5	95	2-5	98	2-5	104	2-5
Clyde	mm	725		1759		3411		5129	
	% LTA	104	2-5	113	5-10	113	10-15	118	80-100

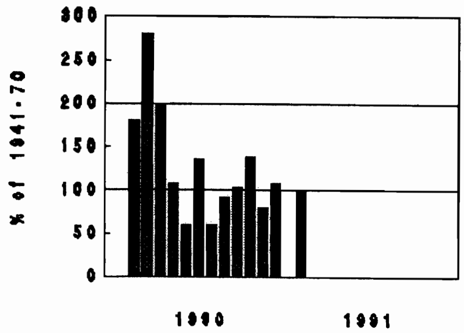
Return period assessments are based on tables provided by the Meteorological Office*. These assume a start in a specified month; return periods for a start in any month may be expected to be an order of magnitude less. "Wet" return periods underlined.
The tables reflect rainfall totals over the period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

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

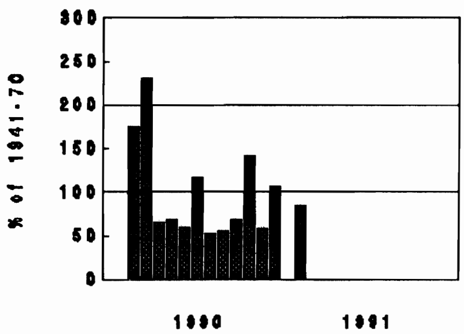
FIGURE 1. MONTHLY RAINFALL FOR 1990-1991 AS A PERCENTAGE OF THE 1941-1970 AVERAGE FOR ENGLAND AND WALES, SCOTLAND, AND THE NRA REGIONS



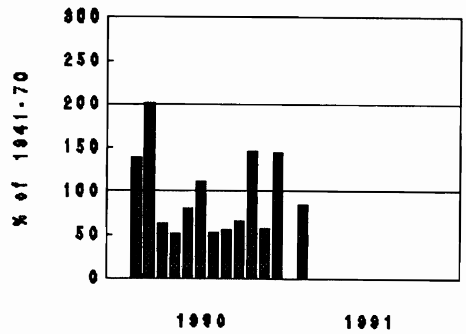
England and Wales



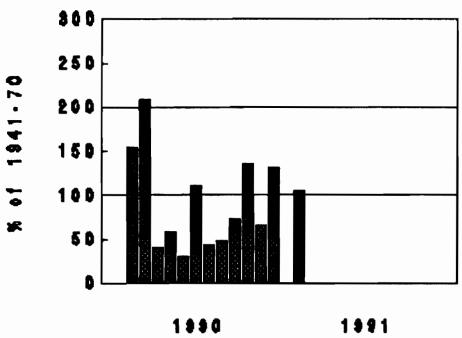
Scotland



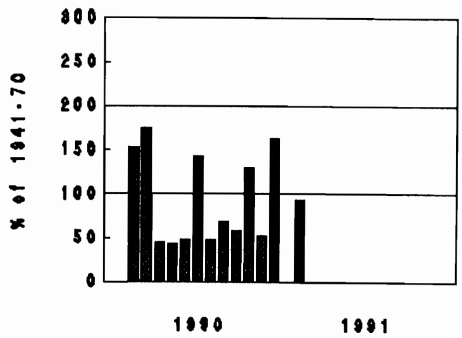
North West NRA Region



Northumbrian NRA Region

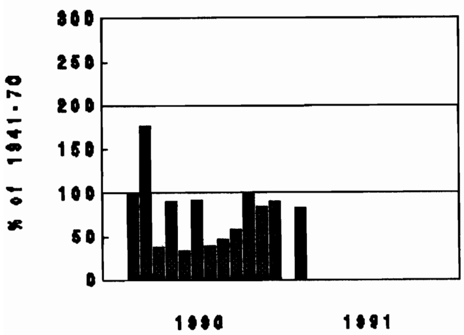


Severn-Trent NRA Region

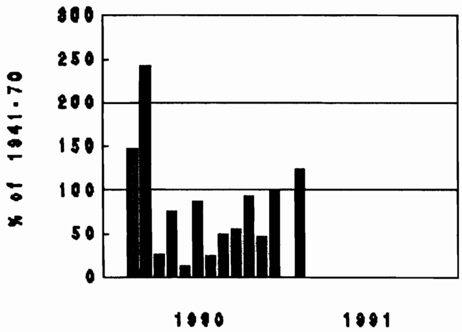


Yorkshire NRA Region

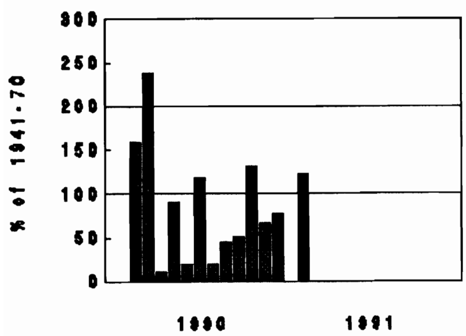
FIGURE 1 (continued)



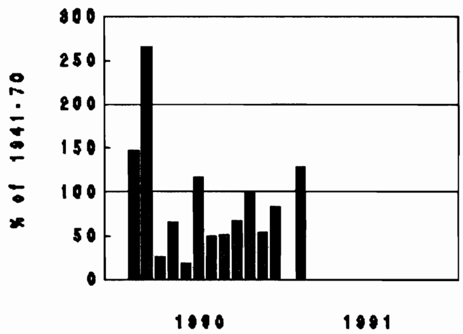
Anglian NRA Region



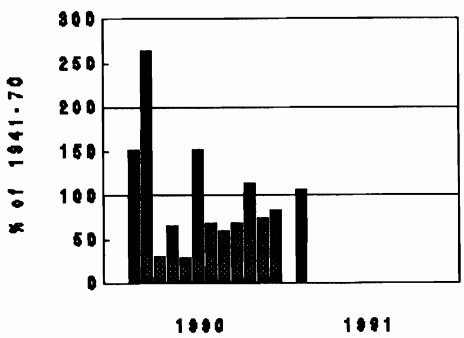
Thames NRA Region



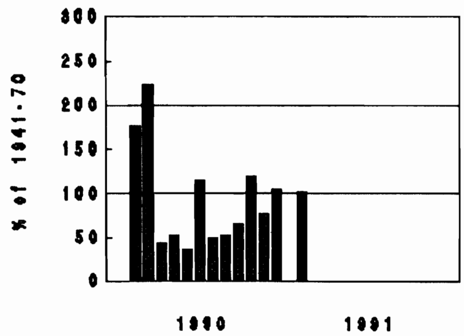
Southern NRA Region



Wessex NRA Region

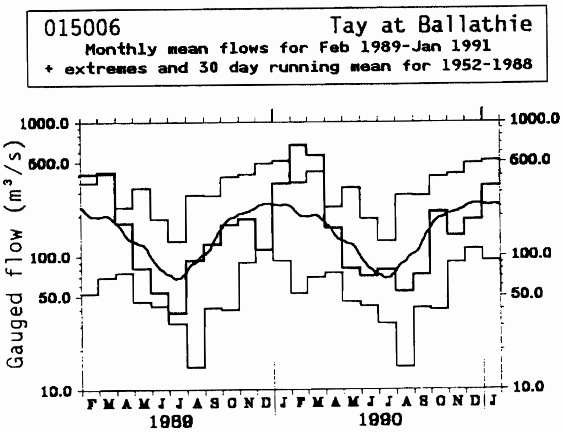


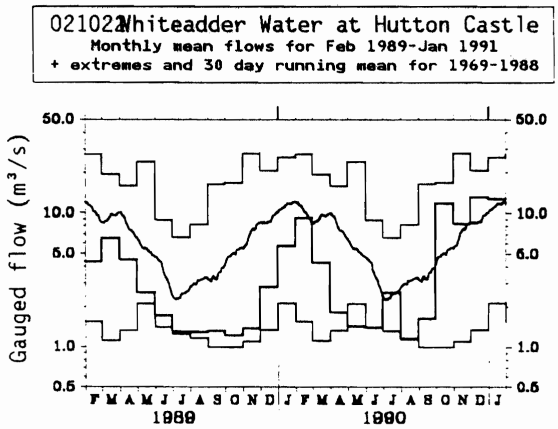
South West NRA Region

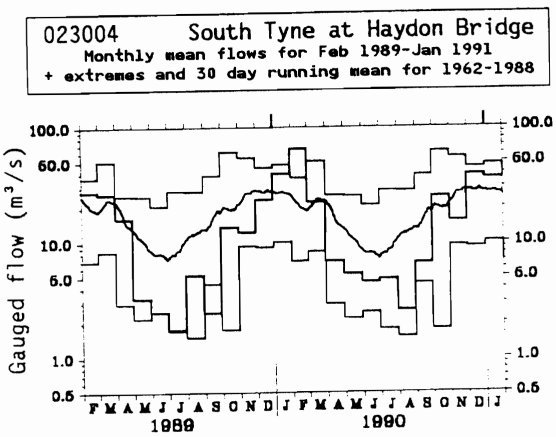


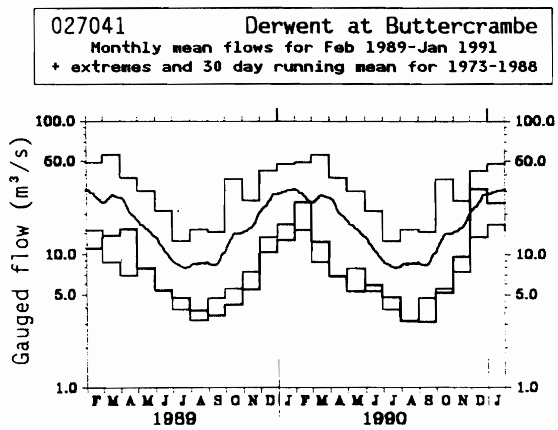
Welsh NRA Region

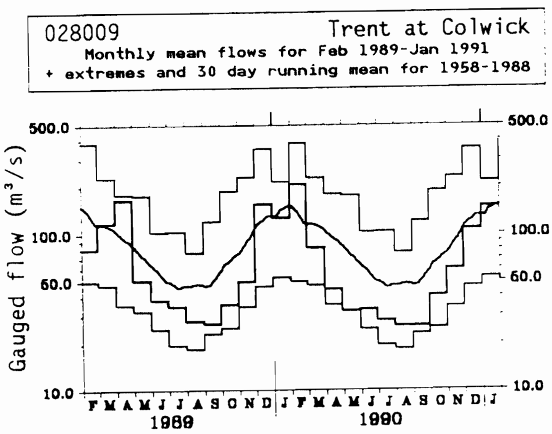
FIGURE 2 MONTHLY RIVER FLOW HYDROGRAPHS

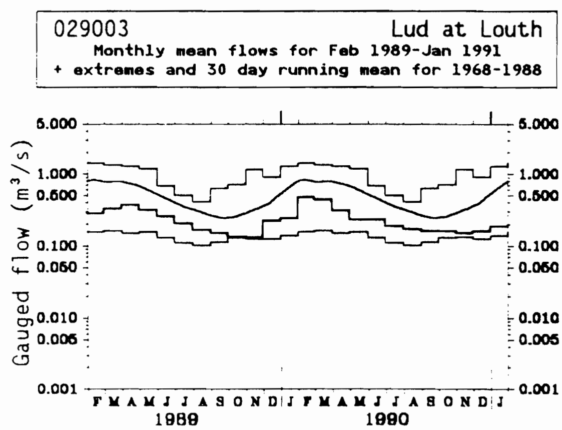


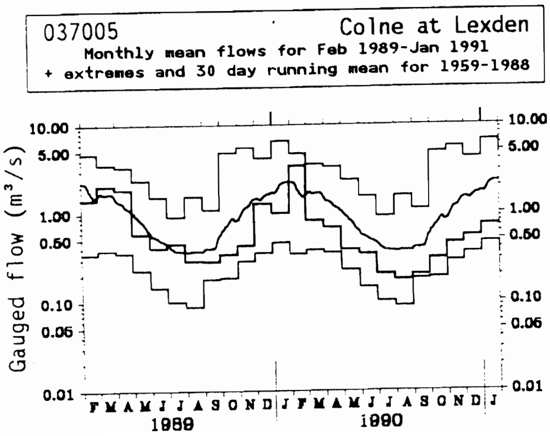


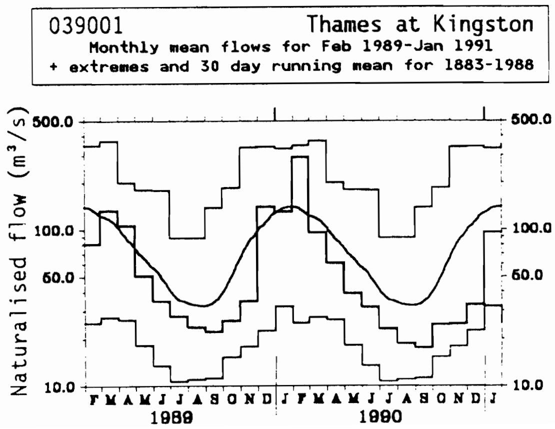




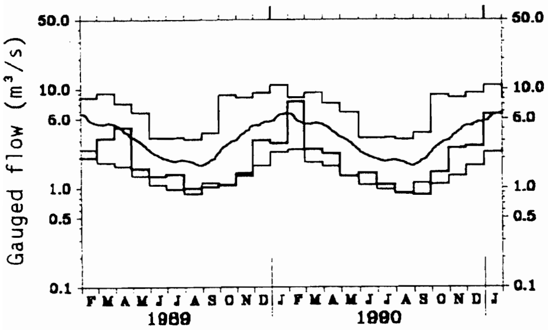




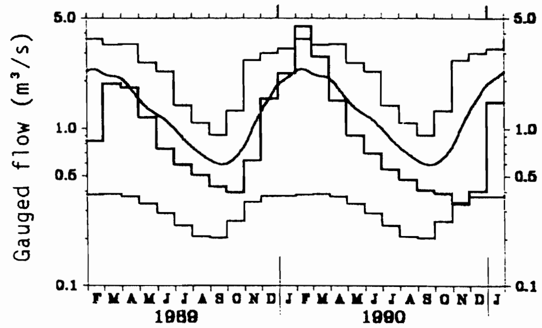




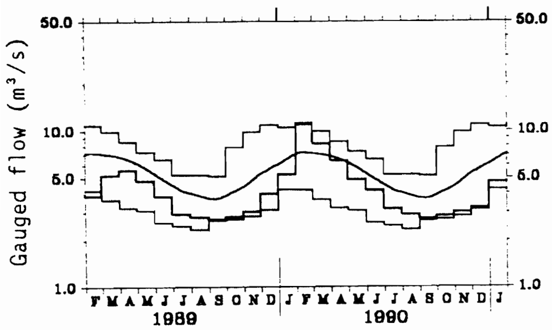
040011 Great Stour at Horton
Monthly mean flows for Feb 1989-Jan 1991
+ extremes and 30 day running mean for 1964-1988



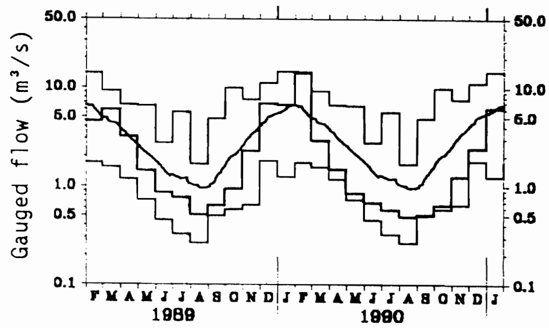
039020 Coln at Bibury
Monthly mean flows for Feb 1989-Jan 1991
+ extremes and 30 day running mean for 1963-1988



042010 Itchen at Highbridge+Allbrook
Monthly mean flows for Feb 1989-Jan 1991
+ extremes and 30 day running mean for 1958-1988



052005 Tone at Bishops Hull
Monthly mean flows for Feb 1989-Jan 1991
+ extremes and 30 day running mean for 1961-1988



054001 Severn at Bewdley
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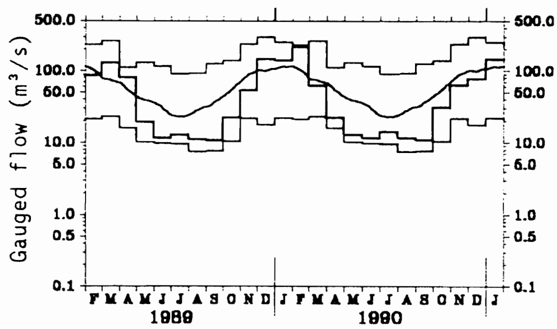

057004 Cynon at Abercynon
Monthly mean flows for Feb 1989-Jan 1991
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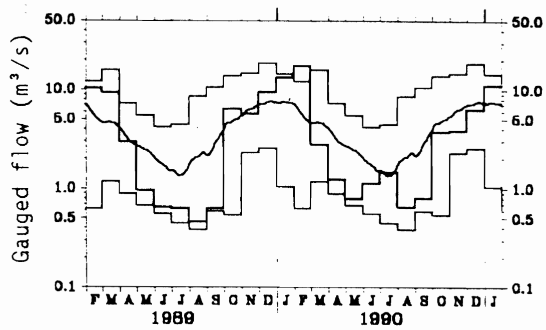

076007 Eden at Sheepmount
Monthly mean flows for Feb 1989-Jan 1991
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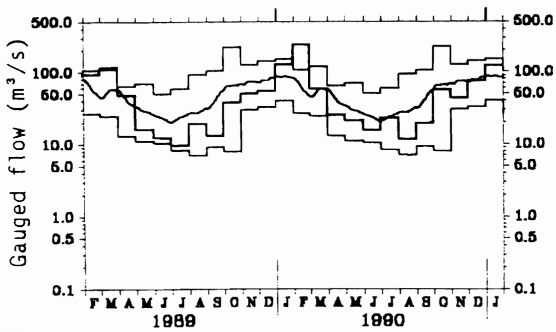


084013 Clyde at Daldowie
Monthly mean flows for Feb 1989-Jan 1991
+ extremes and 30 day running mean for 1963-1988

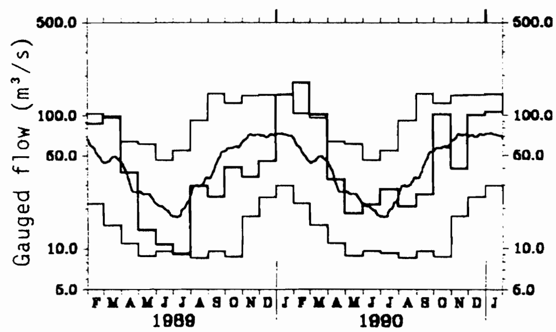
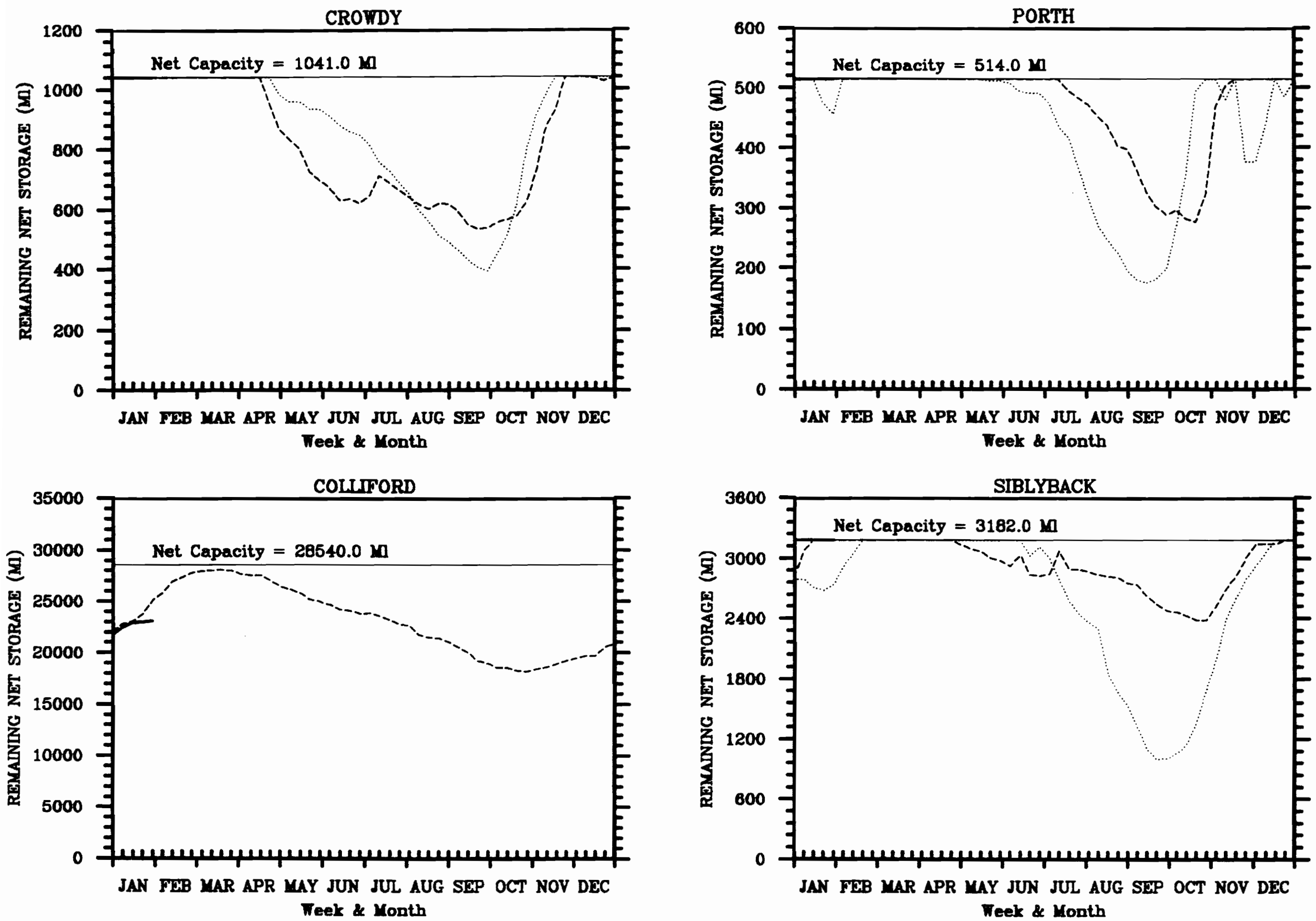


TABLE 3 RUNOFF AS MM. AND AS A PERCENTAGE OF THE PERIOD OF RECORD AVERAGE WITH SELECTED PERIODS RANKED IN THE RECORD

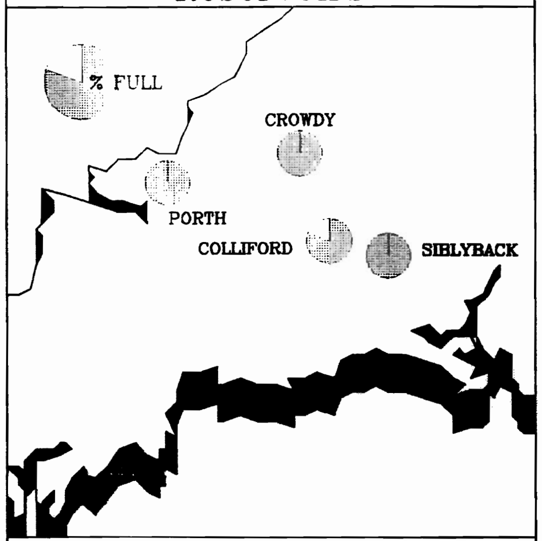
River/ Station name	Aug 1990	Sep	Oct	Nov	Dec	Jan 1991		10/90 to 1/91		3/90 to 1/91		5/89 to 1/91		8/88 to 1/91	
	mm %LT	mm %LT	mm %LT	mm %LT	mm %LT	mm %LT	rank /yrs	mm %LT	rank /yrs	mm %LT	rank /yrs	mm %LT	rank /yrs	mm %LT	rank /yrs
Dee at	18	23	78	61	69	83	11	290	6	557	3	1046	1	1690	1
Park	55	54	97	82	77	91	/19	86	/18	79	/18	78	/17	84	/16
Tay at	31	41	124	80	108	193	33	505	19	1126	32	2172	31	3583	36
Ballathie	60	58	111	67	76	137	/39	98	/39	112	/38	113	/37	124	/36
Whiteadder Water at	6	8	62	43	70	67	14	242	19	317	9	463	5	712	4
Hutton Castle	37	50	235	116	157	111	/22	142	/22	92	/21	71	/20	71	/19
South Tyne at	9	23	87	52	137	127	23	404	22	590	7	1165	7	1757	5
Haydon Bridge	22	44	126	57	142	133	/29	114	/29	86	/27	89	/25	88	/23
Derwent at	5	5	9	16	52	41	7	117	5	186	2	321	1	509	1
Buttercrambe	36	38	39	64	128	84	/18	87	/18	64	/17	58	/16	59	/15
Trent at	9	9	14	21	38	53	21	126	11	222	3	481	4	728	4
Colwick	53	53	59	68	85	105	/33	85	/33	71	/32	80	/31	81	/30
Lud at	8	8	8	7	8	9	2	32	2	114	1	222	1	356	1
Louth	58	70	65	47	40	29	/23	42	/23	50	/22	53	/21	57	/21
Witham at	3	3	5	5	7	19	10	37	9	91	2	213	8	303	4
Claypole Mill	42	48	58	41	37	74	/32	57	/32	57	/31	72	/31	68	/30
Bedford Ouse at	3	3	8	5	6	18	15	37	8	84	8	295	18	473	19
Bedford	58	60	79	25	21	50	/59	39	/58	46	/58	84	/57	87	/56
Colne at	2	2	3	5	6	8	5	22	5	53	2	144	4	250	4
Lexden	49	47	35	40	35	34	/32	37	/32	45	/31	65	/30	74	/29
Mimram at	6	5	5	5	5	7	4	22	2	84	5	172	5	265	8
Panshanger Park	67	62	60	57	49	60	/39	58	/38	74	/38	80	/37	86	/36
Thames at	5	5	7	6	9	26	32	48	13	123	11	325	28	479	16
Kingston (natr.)	57	56	52	28	30	70	/109	47	/108	58	/108	80	/107	78	/106
Blackwater at	9	9	12	12	19	35	16	78	6	178	7	430	13	628	11
Swallowfield	78	68	61	49	62	99	/39	71	/39	76	/38	96	/37	94	/36
Coln at	12	10	10	8	10	37	7	65	5	247	3	552	7	753	5
Bibury	71	70	61	33	25	73	/28	50	/28	73	/27	86	/26	78	/25
Great Stour at	7	6	11	19	21	43	17	94	7	172	3	335	3	489	2
Horton	51	43	53	71	61	104	/27	77	/26	65	/24	67	/23	65	/21
Itchen at	21	20	21	22	24	35	6	102	2	339	4	650	4	912	1
Highbridge+Allbrook	74	76	69	64	57	72	/33	66	/33	82	/32	83	/31	80	/30
Stour at	5	5	8	10	19	59	8	97	3	205	3	578	6	808	1
Throop Mill	47	42	37	32	34	99	/19	58	/18	63	/18	90	/17	82	/16
Piddle at	9	8	12	13	16	35	6	76	5	244	4	548	5	756	2
Baggs Mill	57	52	58	44	38	67	/27	54	/27	71	/26	84	/24	76	/22
Exe at	10	10	44	90	111	160	26	405	15	542	6	1216	9	1884	6
Thorverton	35	25	58	94	83	123	/35	93	/35	75	/34	86	/34	87	/33
Tone at	6	7	8	16	32	82	16	139	6	237	2	682	8	1006	4
Bishops Hull	48	45	29	38	47	103	/30	65	/30	59	/30	87	/29	84	/28
Severn at	7	6	19	37	48	91	55	195	27	285	5	667	19	1038	19
Bewdley	40	27	56	69	77	129	/70	89	/70	72	/69	87	/69	89	/68
Wye at	88	121	252	234	291	226	18	1003	19	1618	7	3407	8	5244	9
Cefn Brwyn	61	73	121	93	104	93	/37	101	/37	85	/33	92	/28	97	/25
Cynon at	16	19	94	94	158	280	26	626	13	846	5	2189	13	3266	15
Abercynon	32	28	77	61	83	150	/33	95	/33	76	/31	100	/29	99	/27
Dee at	36	66	222	198	277	175	7	873	9	1271	4	2778	5	4450	6
New Inn	38	48	111	81	112	74	/22	94	/22	77	/21	87	/20	92	/20
Lune at	12	36	142	73	93	146	14	454	7	733	2	1693	3	2841	7
Caton	17	41	116	54	61	101	/29	81	/27	71	/27	84	/25	95	/23
Clyde at	29	35	143	54	141	150	23	487	24	833	23	1545	22	2353	23
Daldowie	71	60	177	56	147	147	/28	127	/28	121	/27	116	/26	117	/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

FIGURE 3 EAST CORNWALL RESERVOIR LEVELS FOR 1991 AND HISTORIC DROUGHTS



Fowey District Reservoirs



RESERVOIR SITUATION AT
04/02/91
WEEK NO 5

SOUTH WEST WATER

	NET CAPACITY (Ml)	CURRENT YEAR 1991 (Ml)	CURRENT YEAR 1991 % Full	HISTORIC AND DROUGHT YEARS 1976 (Ml)	HISTORIC AND DROUGHT YEARS 1976 % Full	HISTORIC AND DROUGHT YEARS 1990 (Ml)	HISTORIC AND DROUGHT YEARS 1990 % Full
WEEK NO 5							
COLLIFORD	28540.0	23110	81	N/A	N/A	25118	88
CROWDY	1041.0	1041	100	1041	100	1041	100
PORTH	514.0	514	100	455	89	514	100
SIBLYBACK	3182.0	3182	100	2736	86	3182	100

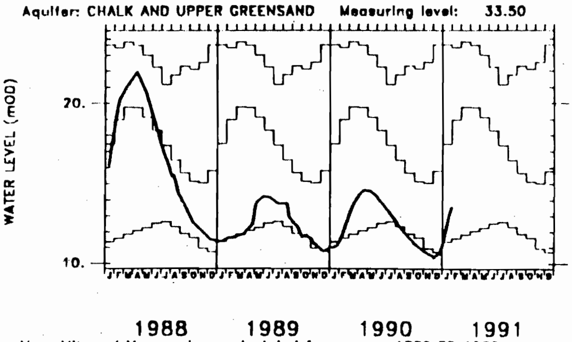
.... 1976 Drawdown   -------- 1990 Drawdown   ——— 1991 Drawdown

(shaded) Indicates a Drought year

FIGURE 4 GROUNDWATER HYDROGRAPHS

Site name: DALTON HOLME

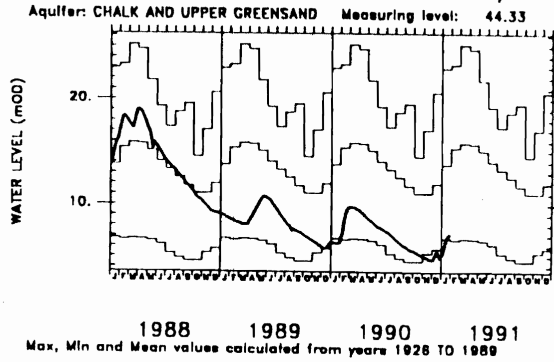
National grid reference: SE 9651 4530 Well number: SE94/5
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 33.50



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

Site name: LITTLE BROCKLESBY

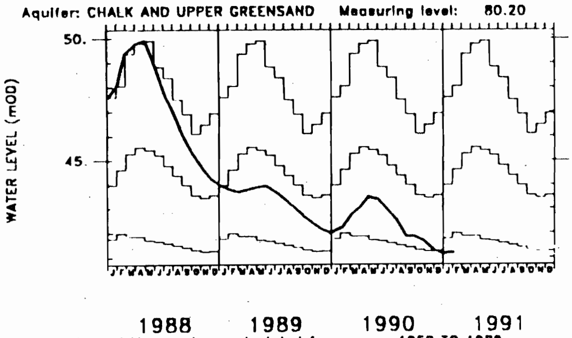
National grid reference: TA 1371 0888 Well number: TA10/40
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 44.33



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

Site name: WASHPIT FARM

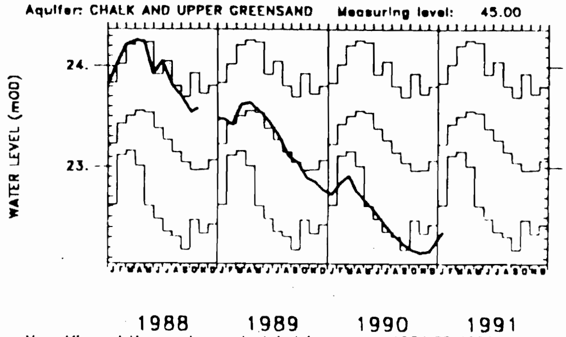
National grid reference: TF 8138 1960 Well number: TF81/2
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 80.20



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

Site name: FAIRFIELDS

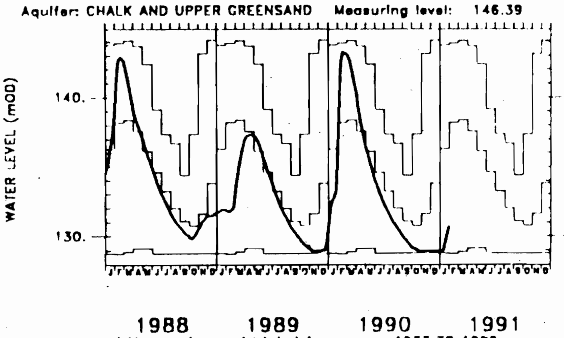
National grid reference: TM 2461 6109 Well number: TM26/46
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 45.00



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

Site name: ROCKLEY

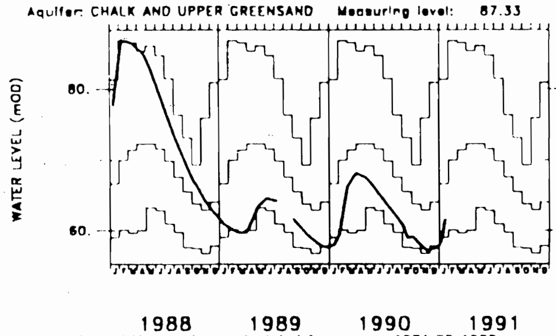
National grid reference: SU 1655 7174 Well number: SU17/57
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 146.39



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

Site name: LITTLE BUCKET FARM,WALTHAM

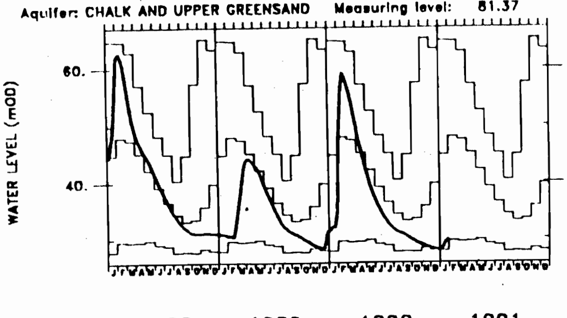
National grid reference: TR 1225 4690 Well number: TR14/9
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 87.33



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

Site name: COMPTON HOUSE

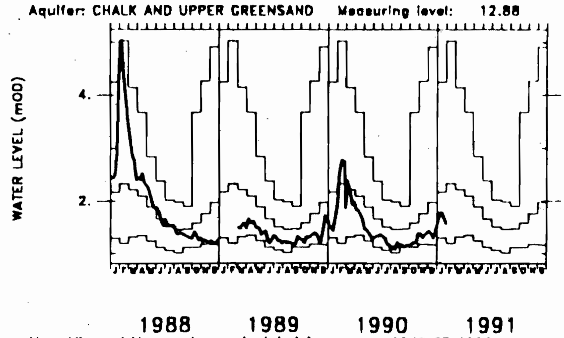
National grid reference: SU 7755 1490 Well number: SU71/23
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 81.37



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

Site name: WEST DEAN NO.3

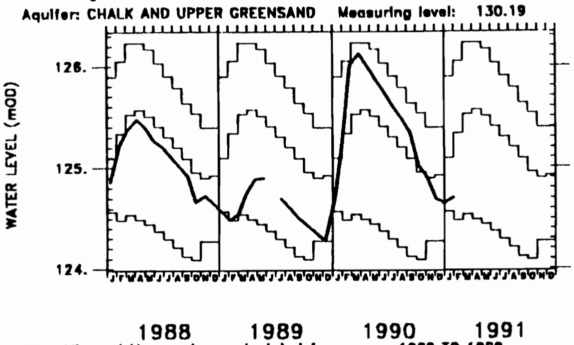
National grid reference: TV 5290 9920 Well number: TV59/7C
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 12.88



Max, Min and Mean values calculated from years 1940 TO 1989

Site name: LIME KILN WAY

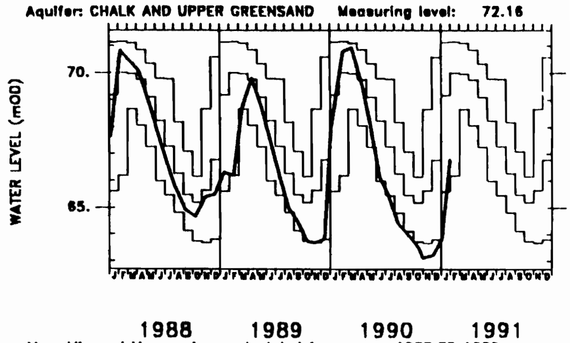
National grid reference: ST 3763 0667 Well number: ST30/7
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 130.19



Max, Min and Mean values calculated from years 1969 TO 1989

Site name: ASHTON FARM

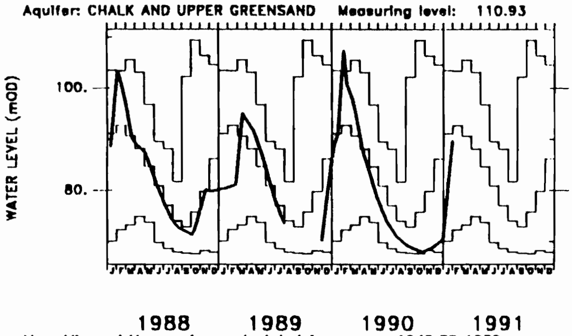
National grid reference: SY 6620 8810 Well number: SY68/34
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 72.16



Max, Min and Mean values calculated from years 1977 TO 1989

Site name: WEST WOODYATES MANOR

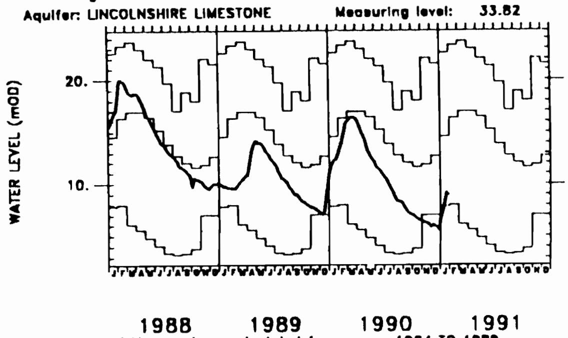
National grid reference: SU 0160 1960 Well number: SU01/58
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 110.93



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

Site name: NEW RED LION

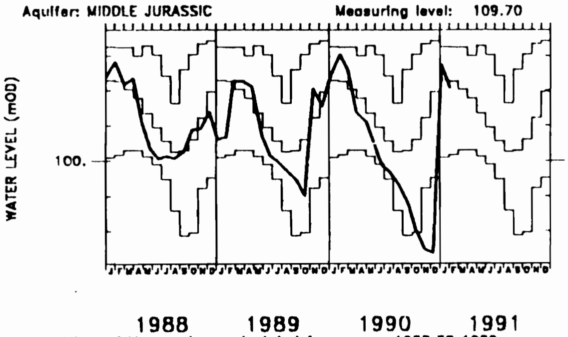
National grid reference: TF 0885 3034 Well number: TF03/37
Aquifer: LINCOLNSHIRE LIMESTONE Measuring level: 33.82



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

Site name: AMPNEY CRUCIS

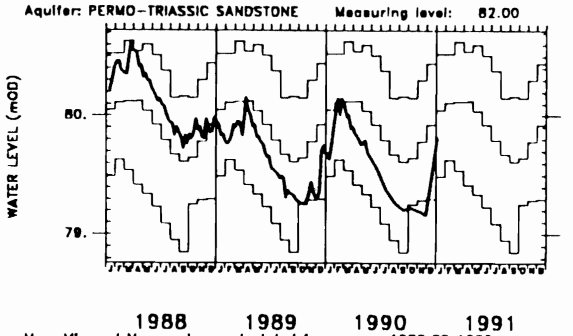
National grid reference: SP 0595 0190 Well number: SP00/62
Aquifer: MIDDLE JURASSIC Measuring level: 109.70



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

Site name: LLANFAIR DC

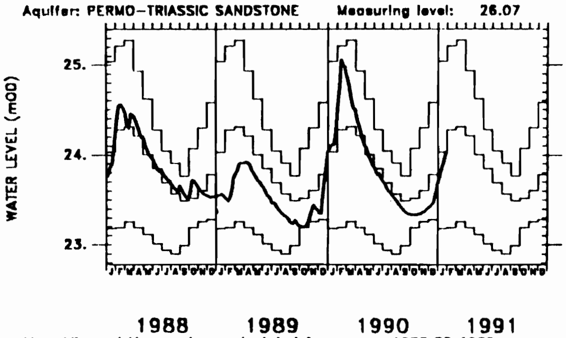
National grid reference: SJ 1374 5556 Well number: SJ15/15
Aquifer: PERMO-TRIASSIC SANDSTONE Measuring level: 82.00



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

Site name: BUSSELS NO.7A

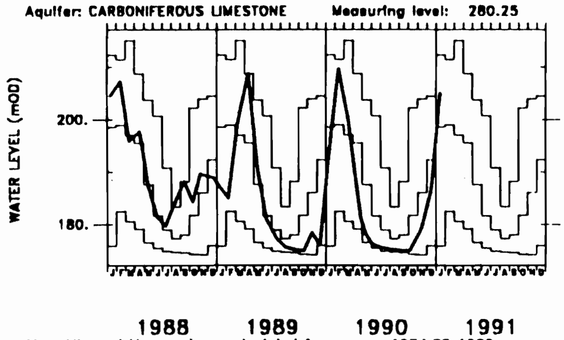
National grid reference: SX 9528 9872 Well number: SX99/37B
Aquifer: PERMO-TRIASSIC SANDSTONE Measuring level: 26.07



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

Site name: ALSTONFIELD

National grid reference: SK 1292 5547 Well number: SK15/16
Aquifer: CARBONIFEROUS LIMESTONE Measuring level: 280.25



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

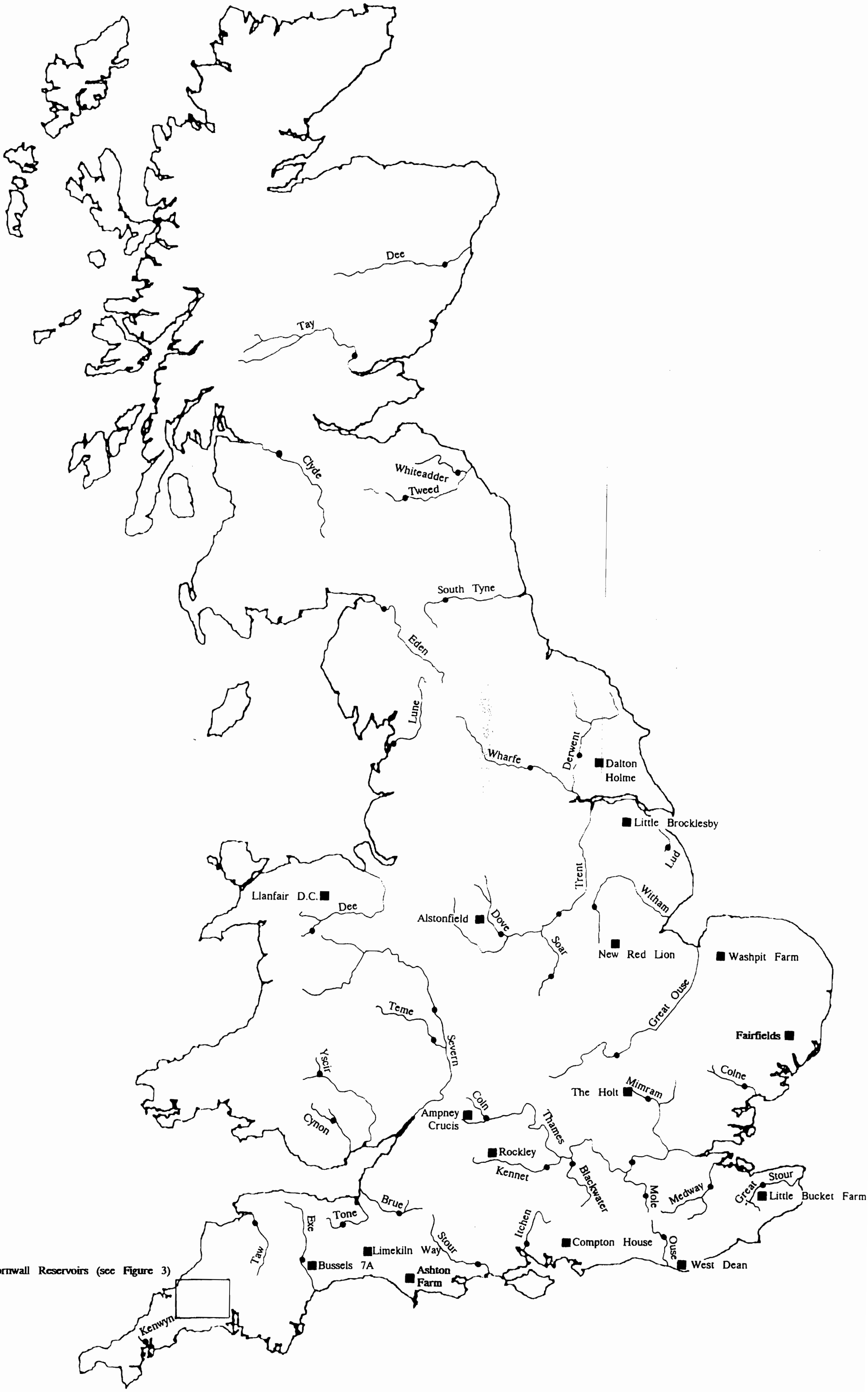
TABLE 4 A COMPARISON OF DECEMBER GROUNDWATER LEVELS: 1991 AND 1976

Borehole	Aquifer	First year of record	Av. Jan level	Jan 1976 Day	Jan 1976 level	Jan 1991 Day	Jan 1991 level	No. of years of record with Jan levels ≤ 1991	Lowest recorded level before 1991 for any month
Dalton Holme	C & U.G.	1889	17.41	31	13.00	31	13.51	17	10.34
L. Brocklesby	"	1926	13.61	13	7.10	29	7.11	3	4.56
Washpit Farm	"	1950	43.86	01	43.50	02	41.16	0	41.24
The Holt	"	1964	86.98	29	87.02	02	85.58	2	83.90
Fairfields	"	1974	23.19	27	23.28	09	22.35	0	22.15
Rockley	"	1933	136.12	dry	128.78	27	130.26	9	128.78 dry
L. Bucket Farm	"	1971	66.17	07	66.62	22	61.51	6	56.77
Compton House	"	1894	44.74	29	30.38	29	29.69	3	27.64
West Dean	"	1940	2.15	30	1.70	18	1.66	14	1.01
Limekiln Way	"	1969	125.08	15	124.72	31	124.70	3	124.09
Ashton Farm	"	1977	68.62	08	64.82	04	63.80	0	63.10
West Woodyates	"	1942	90.81	01	72.06	02	70.30	1	67.62
New Red Lion	L.L.	1964	14.46	30	8.52	28	8.95	2	3.29
Ampney Crucis	M.J.	1958	102.31	18	100.35	08	102.72	27	97.38
Llanfair Dc	PTS	1972	80.03	01	79.49	07	79.81	6	78.85
Bussels 7A	PTS	1972	24.04	27	23.22	31	24.03	13	22.90
Alstonfield	C.B.	1974	198.31	29	186.51	17	205.08	14	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



East Cornwall Reservoirs (see Figure 3)