HYDROLOGICAL SUMMARY FOR GREAT BRITAIN - DECEMBER 1990

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. Reservoir storage data - supplied by South West Water - are presented in the Hydrological Summary and similar information from 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

It is a measure of the unusual weather patterns during 1990, that the occurrence of average rainfall over most regions in December provided an atypical conclusion to a year in which the recorded rates of runoff and recharge have been extended in many areas. Temporal changes in hydrological conditions have been very large and were matched by remarkable spatial variations in rainfall and evaporation patterns. The most severe drought since 1976 afflicted much of lowland England in the summer and autumn, whilst Scotland experienced its wettest year on record.

The regional nature of the hydrological drought was further accentuated in December. The most severe rainfall deficiencies (at month-end) were found in the Thames NRA region with drought conditions extending into the Wessex, Anglian and Southern regions. In water resources terms, these deficiencies were reinforced by the associated very dry soil conditions (for the time of year) which served to further delay recoveries in runoff and recharge rates.

The increasingly unsettled conditions from mid-December, which have continued into 1991, served effectively to terminate a declining drought in western, and parts of northern, England. Many rivers were in spate early in 1991 and very healthy improvements in reservoir stocks occurred around the turn of the year; major reservoirs in the west and north are now close to, or at, capacity.

Whilst a definite amelioration in the drought could also be detected in the lowlands, large rainfall deficiencies remain in parts of central southern and eastern England where river flow increases, reservoir replenishment and, particularly, groundwater level recoveries were patchy and modest through December - though considerably brisker in early January.

By the second week of January, the water resources outlook had improved markedly in most regions. With soil moisture deficits virtually eliminated in almost all areas, an acceleration in recovery rates may be anticipated. However, the extremely depressed water-table levels registered in December throughout large areas of the major aquifers (especially towards the eastern seaboard) and the below average storages in eastern, and some southern, reservoirs imply that substantially above average rainfall will still be required through into the spring to restore groundwater resources to their typical March/April level.

Rainfall

Anticyclonic conditions provided a dry start to December but following widespread blizzard conditions around the 9th, weather patterns became increasingly unsettled with the passage of active depressions becoming particularly frequent from the beginning of the Christmas holiday.

Rainfall totals for December were close to the average in all regions but some significant local variability could be identified. Parts of Humberside, for instance, registered around twice the average whereas a few districts along the Sussex coast recorded only a little over half of the 1941-70 mean.

Despite a general easing of the drought through December, the ten-month rainfall total (March-December) for England and Wales was equivalent to that registered during the notable 1933 drought and only in 1921 has a lower total been recorded since 1788. Some districts in central southern England recorded their tenth successive month of below average rainfall in December and very large rainfall deficiencies (at the end of 1990) characterised the Anglian, Southern, Thames (especially) and Wessex NRA regions with drought conditions extending into neighbouring regions. For the Thames catchment, lower 10-month rainfall totals (for any start month) have been recorded only during the droughts of 1921, 1929 and 1976.

Away from the English lowlands only modest droughts could be recognised over the March-December period. For the year as a whole rainfall totals were well within the normal range, albeit commonly below average, in all regions but not all localities - some districts in central southern England had their second driest year (after 1921) in over 100 years. By contrast the extremely high rainfall totals for Scotland are unprecedented with extraordinary totals typifying western areas.

Over the period December 23rd - January 10th, many regions of Britain have experienced at least some rainfall almost every day - parts of East Anglia being an exception. By the 11th January, most regional rainfall totals were approaching the monthly average and this latest in a series of wet episodes which, in the lowlands, have punctuated a long term rainfall deficiency will give added impetus to the much delayed recoveries in runoff and recharge.

Evaporation and Soil Moisture Deficit

Temperature variations through December were considerable in most regions but overall, December was the coldest month over Britain for almost four years. However, abundant sunshine and windy conditions enabled calculated (MORECS) potential evaporation (PE) and actual evaporation (AE) totals to exceed the December average in all regions; losses were particularly notable in lowland England.

Provisional data indicate that, for 1990 as a whole, PE totals for much of southern Britain eclipsed the record figures established the previous year. Conversely, calculated AE losses (for grass) for 1990 - inhibited for an extended period by high soil moisture deficits - were the lowest in many areas since 1976. In the wetter west and north, however, AE losses, as in 1989, were somewhat greater than the 1961-88 mean.

Soil moisture deficits (SMDs), confined largely to the English lowlands at the end of November, declined briskly through December. By year-end field capacity had been reached, or closely approached, in all areas apart from the Thames Valley (extending into Essex and north Kent) and northwards into the East Midlands, Cambridgeshire and Lincolnshire; in these districts some significant deficits remain.

The rapid decay in SMD's in late December/early January has allowed infiltration to re-commence in almost all aquifer outcrop areas - the benefit in terms of rising water-tables will become more evident over the ensuing weeks.

Runoff

River flows for rivers in western and northern Britain were generally well within the normal range in December and several flood events were reported from Scotland, with spate conditions extending throughout much of western Britain and part of the Midlands in early January.

In runoff terms, a sharp transition occurs approaching the English lowlands where the unseasonally high early winter SMDs delayed any appreciable recovery until around the turn of the year. For some eastern rivers, reliant primarily on baseflow, a substantial upturn in flows is still awaited. In such catchments 1990 was the third successive year when monthly runoff totals through the autumn/early winter remained relatively stable through a period when an increase is normally evident. These rivers aside, the increasing hydrological effectiveness of the precipitation from mid-December produced a runoff transformation (extending into January) reminiscent of, but less dramatic than, that witnessed in December 1989. On the Thames, for instance, river flows during the first three weeks of December were the lowest since 1947. A brisk increase began on Christmas Day and by the 10th January daily flows had reached the average for the month. Less impressive, but still notable increases were registered in other southern rivers. Examples include the Kennet, Hampshire Avon and the Piddle (Dorset); however, notwithstanding the pick-up late in the month, on these rivers, the December runoff totals were amongst the lowest on record at their principal gauging stations.

Accumulated runoff totals - especially in the 5-9 month timeframes - remain very depressed. Many southern and eastern catchments recorded almost unprecedented 'n' month totals, exceeded only by accumulations during the 1976 drought. In most areas, the extraordinarily abundant nature of runoff in February 1990 ensures that annual totals are less outstanding, although well below average in the lowlands. Generally, the drought remains most severe in those catchments where the long-term runoff accumulations (extending across the 1989/90 winter) are among the lowest on record - examples include the Rivers Lud and Great Stour. The contrast with rivers flowing from the major drainage divide in Scotland is extreme; both the Tay and the Clyde recorded their highest annual runoff totals (in records of more than 30 years) in 1990.

Away from the lowlands, gravity-fed reservoirs benefited substantially from the recent wet episode. In western and northern Britain the heavy snow around the 8-10 December heralded a period of particularly healthy replenishment. Even very large impoundments registered sharp increases in storage. Vrynwy and Celyn (Wales) and the Derwent Valley system (Derbyshire), for instance, reported storage changes of about 25 per cent over the fortnight ending on the 3rd January - when the reservoir systems were at or close to capacity. In parts of Wessex, the South-East and East Anglia, improvements were more modest and storages generally are below, to well below, average for the turn of the year.

Groundwater

The December rainfall tended to be concentrated in the latter part of the month and, as a consequence, water levels in most index boreholes continued to fall at least until the year-end. By late-December groundwater levels were extremely low throughout large parts of the major aquifers - at six of the 16 index sites, new December minima were reported - four of these represented absolute minima for the periods of record.

Because of variations in rainfall, soil moisture and aquifer properties, December levels present a rather inconsistent picture. In the south-west, at the Bussels site, a moderate rise was recorded, whilst at Limekiln Way levels were still falling in December. Along the coast, Compton House was still falling (although there has been a small rise at the nearby Chilgrove site), whereas levels were rising at West Dean. In Kent, there has been a small rise at Little Bucket Farm, as there has at Fairfields in East Anglia. There are no late-December data for Washpit Farm. Further north, at Dalton Holme, there is at last a slight but definite rise.

Inland, the patchy nature of the recovery is also evident. The Alstonfield site has risen quite sharply and is approaching the seasonal norm. At the New Red Lion site, December levels indicate a further fall, as they did also at the Holt (no late December data available). Rockley remains dry.

Some exceptional increases in level have been reported in fissured aquifers which respond quickly to rainfall. The groundwater level on December 10th at Ampney Crucis (in the Oolites of the Cotswolds) was 97.4 metres aOD, the lowest in a 32-year record. On 8th January 1991, the level had risen to 102.7 metres aOD, a rise of 5.3 metres. The mean annual rise is only of the order of 3.1 metres. Other wells in the Oolites have shown equally dramatic changes with individual rises exceeding 30 metres. One of the reasons for this is that the aquifer outcrop is rarely covered by any significant thickness of drift and rainfall readily infiltrates into the fissured limestones. Soil moisture deficits are thus much less influential in limiting percolation than in most eastern aquifers. However, unless the rainfall is sustained, the groundwater levels may fall with almost equal rapidity.

The slowness of the upturns throughout the eastern aquifers (the Chalk especially) is due mainly to two factors. The first is the presence of soil moisture deficits which, until extinguished, limit or prevent infiltration. The second factor is that at many sites, groundwater levels lag behind the rainfall. This lag - a result of the time required for water to percolate down to the water-table - varies from a week to more than three months, although the latter is unusual. When groundwater levels are particularly low, the lag time tends to increase.

With groundwater levels over wide areas below the early winter average by amounts greater than the mean annual fluctuation, the prospects of restoring the water-table to normal late spring levels remain poor. For some eastern and southern areas, near to 150% of average precipitation will be required through January until April. The temporal distribution will also be important; the benefits of even exceptionally heavy winter rainfall will be seriously diminished if, as in 1990, a very dry episode in March and April leads to an early, and steep, resumption in groundwater level recessions.

Institute of Hydrology / British Geological Survey

14 January 1991

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

		Nov 1989	Dec	Jan 1990	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
England and	mm	61	134	133	142	23	38	25	72	35	45	50	100	70	97
Wales	%	63	149	154	219	39	66	37	118	47	50	60	120	72	108
NRA REGIONS															
North West	mm	84	100	197	193	45	57	49	99	58	68	81	164	72	142
	%	69	83	176	238	63	74	60	119	56	54	66	139	60	118
Northumbria	mm	35	75	112	135	32	25	51	69	40	53	53	106	54	109
	%	37	100	140	205	62	45	80	113	52	52	66	141	57	145
Severn Trent	mm	52	135	106	109	18	30	19	63	27	37	47	93	52	92
	%	66	193	154	206	35	58	30	113	42	46	70	143	66	131
Yorkshire	mm	45	98	118	112	23	25	29	83	32	46	39	92	47	121
	%	51	132	153	175	43	45	48	143	46	51	54	133	53	163
Anglia	mm	36	98	52	75	15	34	16	45	21	31	32	51	53	48
	%	58	185	101	179	38	85	34	92	37	48	62	98	85	91
Thames	mm	37	141	92	114	12	35	7	47	17	35	34	59	34	65
	%	51	214	148	242	26	76	13	90	28	50	55	91	47	99
Southern	mm	50	142	121	136	6	48	10	61	13	33	38	105	63	63
	%	53	175	159	237	12	100	18	122	22	45	54	135	67	77
Wessex	mm	58	165	124	158	14	35	12	62	31	41	48	87	52	74
	%	60	183	147	268	24	65	18	115	50	50	61	106	54	83
South West	mm	100	196	195	238	25	46	25	99	61	59	68	126	100	112
	%	75	145	151	264	30	65	30	152	73	58	65	112	75	83
Welsh	mm	109	199	240	215	37	48	34	98	53	65	85	149	110	152
	%	76	137	176	224	43	56	37	120	56	55	68	116	77	105
Scotland	mm	60	96	250	294	247	96	54	128	83	119	147	211	113	169
	%	42	62	182	283	268	107	59	139	74	92	107	142	80	108
RIVER PURIFICATION BOARDS															
Highland	mm	79	109	293	365	409	136	54	140	95	157	230	220	144	221
	%	47	56	179	274	359	119	52	127	75	106	146	118	85	113
North-East	mm	29	54	108	149	87	45	49	110	47	79	85	138	94	88
	%	28	53	119	201	140	74	64	157	51	74	98	142	91	86
Tay	mm	51	86	239	287	178	61	44	128	39	74	67	187	65	140
	%	43	64	203	288	217	81	46	154	38	63	58	153	55	104
Forth	mm	39	79	222	222	142	55	39	125	51	81	65	185	57	131
	%	36	72	224	288	206	81	46	167	52	70	60	175	53	120
Tweed	mm	30	78	167	178	52	31	46	106	54	61	68	159	52	114
	%	29	87	180	258	90	51	61	156	61	54	73	181	50	127
Solway	mm	59	119	254	285	94	72	76	121	75	105	81	216	79	208
	%	41	79	181	306	103	82	83	134	68	82	54	150	54	138
Clyde	mm	73	107	316	341	295	127	57	138	95	149	173	297	90	190
	%	44	58	196	302	281	123	59	134	73	105	99	162	54	102

Note: December figures for England and Wales for 1990 are based upon MORECS figures supplied by the Meteorological Office
Scottish RPB data for December 1990 are estimated from the isohyetal map of December rainfall in the MORECS bulletin. The Scottish national value was provided by the London Weather Centre.

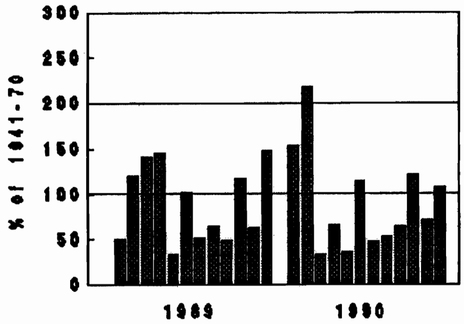
TABLE 2 RAINFALL RETURN PERIOD ESTIMATES

		OCT - DEC 90	Est Return Period, years	MAR - DEC 90	Est Return Period, years	JAN - DEC 90	Est Return Period, years	MAY 89 - DEC 90	Est Return Period, years
England and Wales	mm	267		555		830		1335	
	% LTA	99	<2	73	35-45	91	2-5	86	10-15
NRA REGIONS									
North West	mm	378		835		1225		1851	
	% LTA	105	2-5	82	5-10	101	<2	88	5-10
Northumbria	mm	269		592		839		1209	
	% LTA	110	2-5	81	10	95	2-5	80	35-45
Severn Trent	mm	237		478		693		1162	
	% LTA	111	2-5	73	20-30	90	2-5	88	5-10
Yorkshire	mm	260		537		767		1179	
	% LTA	112	2-5	78	10-20	92	2-5	83	10-20
Anglia	mm	152		346		473		824	
	% LTA	91	2-5	67	30-40	78	10-20	79	35-45
Thames	mm	158		345		551		956	
	% LTA	78	2-5	58	200-250	78	10-20	79	20-30
Southern	mm	231		440		697		1108	
	% LTA	91	2-5	67	40-50	88	2-5	82	10-20
Wessex	mm	213		456		738		1244	
	% LTA	79	2-5	63	40-50	85	5-10	84	10
South West	mm	338		721		1154		1850	
	% LTA	89	2-5	74	20	97	2-5	92	2-5
Welsh	mm	410		830		1285		2066	
	% LTA	98	2-5	75	20	96	2-5	91	5
Scotland	mm	493		1367		1911		2713	
	% LTA	110	2-5	115	10	134	>>200	111	10
RIVER PURIFICATION BOARDS									
Highland	mm	585		1806		2464		3473	
	% LTA	106	2-5	127	50-70	143	>>200	119	50-60
North-East	mm	320		822		1079		1529	
	% LTA	106	2-5	96	2-5	105	2-5	87	10-15
Tay	mm	392		983		1509		2135	
	% LTA	105	2-5	94	2-5	120	10-20	100	<2
Forth	mm	373		931		1375		1945	
	% LTA	115	2-5	99	<2	123	30-40	101	<2
Tweed	mm	325		743		1088		1541	
	% LTA	115	2-5	88	5	108	2-5	89	5-10
Solway	mm	503		1127		1666		2390	
	% LTA	114	2-5	95	2-5	117	10-15	98	2-5
Clyde	mm	577		1611		2268		3263	
	% LTA	108	2-5	116	5-10	136	>200	115	15-20

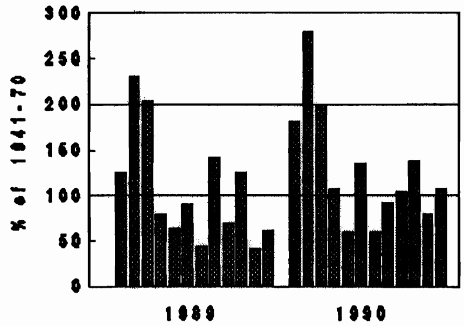
Return period assessments are based on tables provided by the Meteorological Office*. These assume a start in a specified month; return periods for a start in any month may be expected to be an order of magnitude less. "Wet" return periods underlined.
The tables reflect rainfall totals over the period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

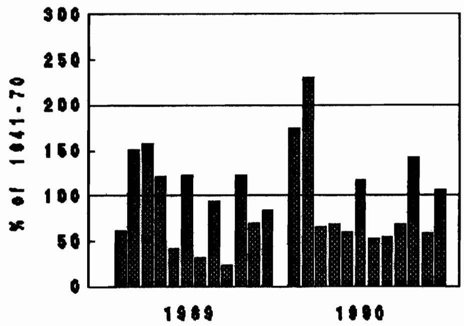
FIGURE 1. MONTHLY RAINFALL FOR 1989-1990 AS A PERCENTAGE OF THE 1941-1970 AVERAGE FOR ENGLAND AND WALES, SCOTLAND, AND THE NRA REGIONS



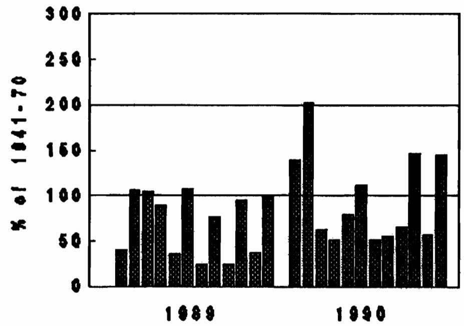
England and Wales



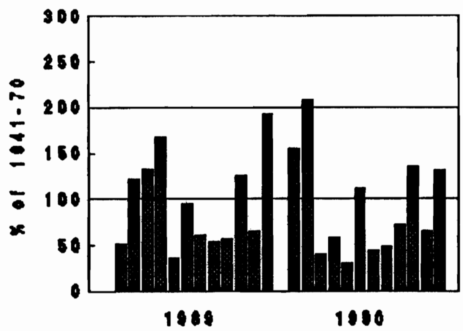
Scotland



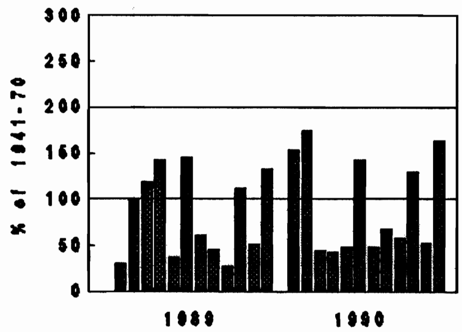
North West NRA Region



Northumbrian NRA Region

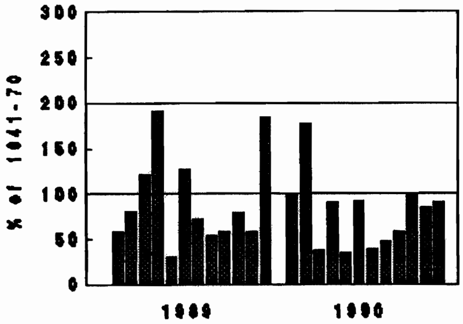


Severn-Trent NRA Region

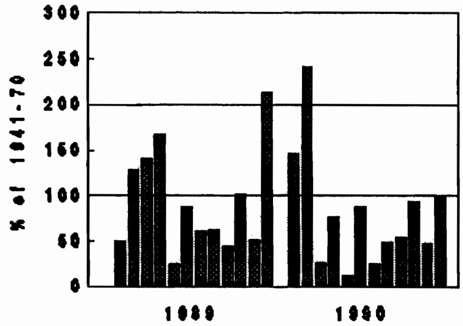


Yorkshire NRA Region

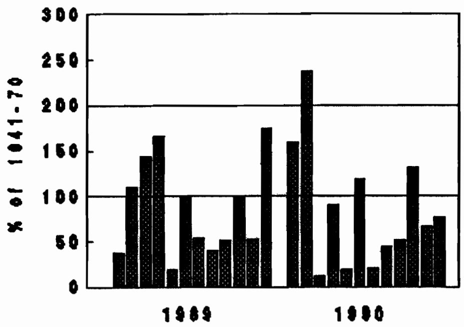
FIGURE 1 (continued)



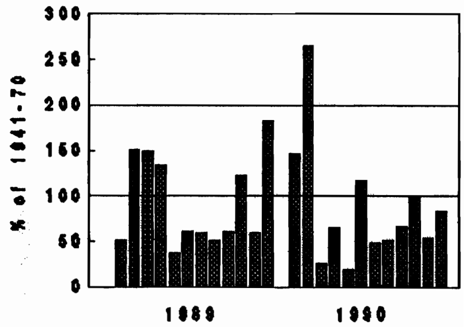
Anglian NRA Region



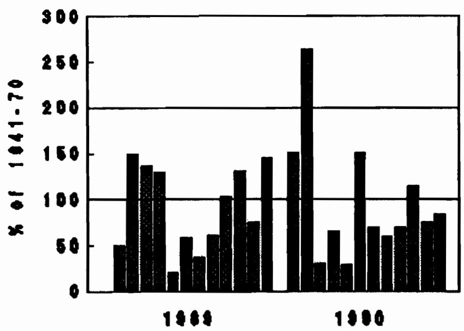
Thames NRA Region



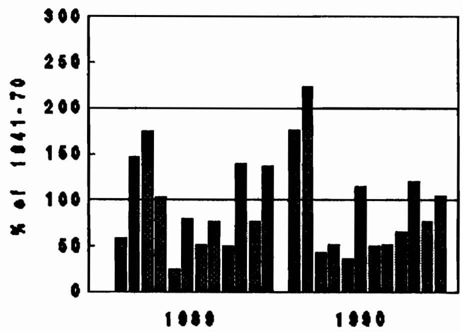
Southern NRA Region



Wessex NRA Region

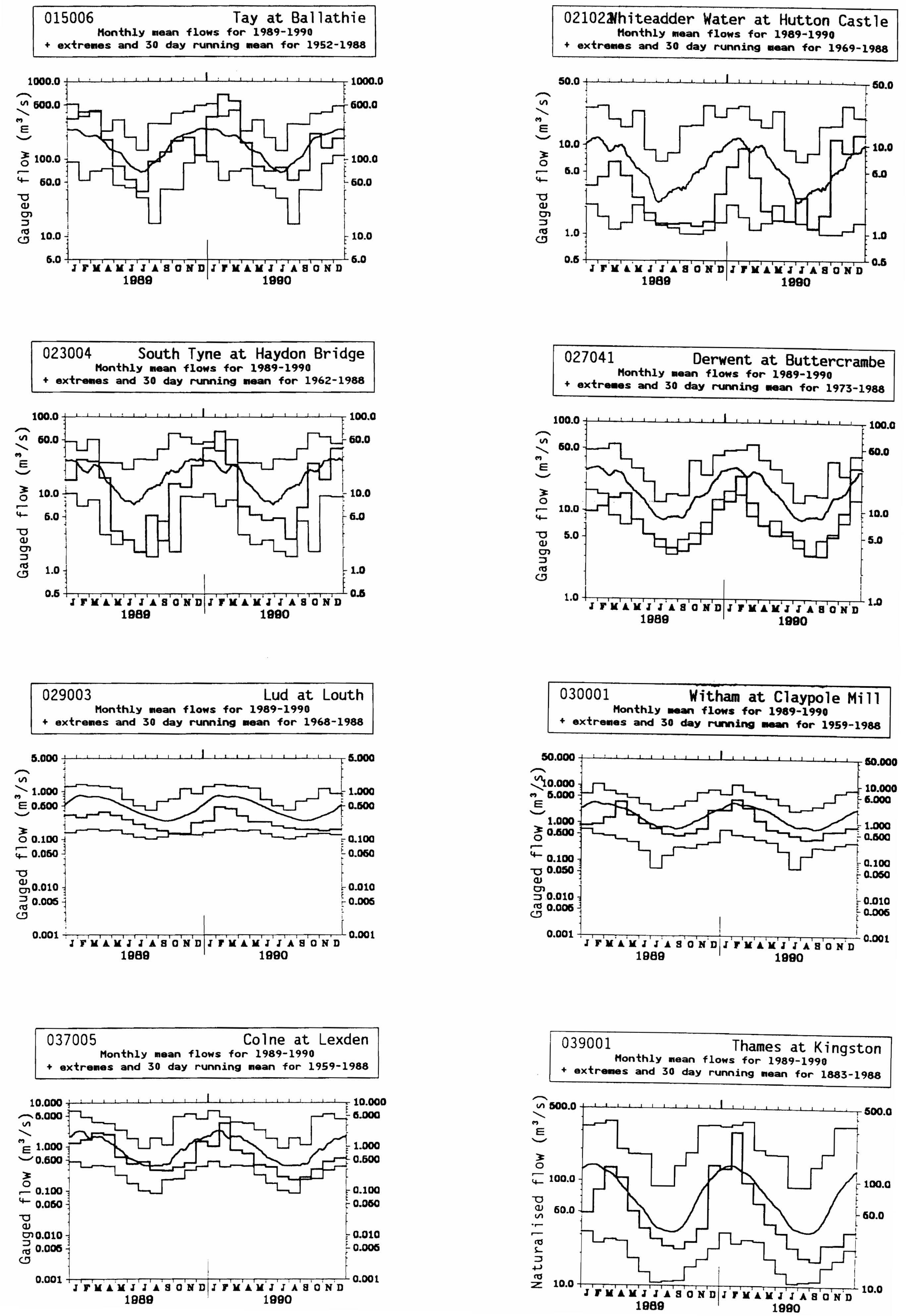


South West NRA Region

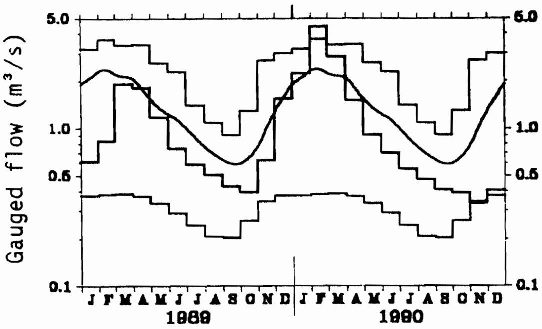


Welsh NRA Region

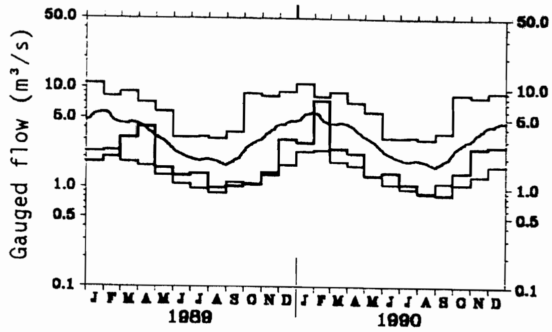
FIGURE 2 MONTHLY RIVER FLOW HYDROGRAPHS



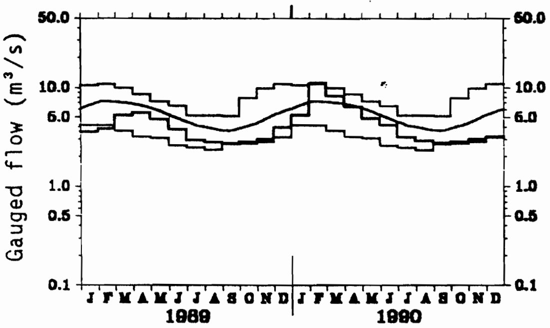
039020 Coln at Bibury
Monthly mean flows for 1989-1990
+ extremes and 30 day running mean for 1963-1988



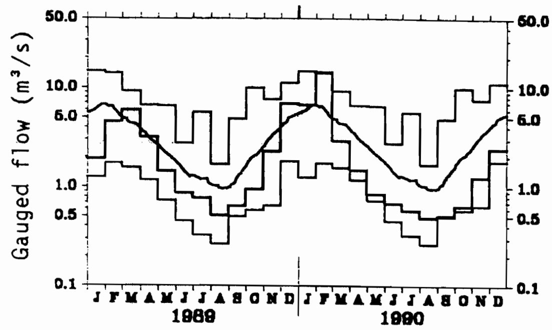
040011 Great Stour at Horton
Monthly mean flows for 1989-1990
+ extremes and 30 day running mean for 1964-1988



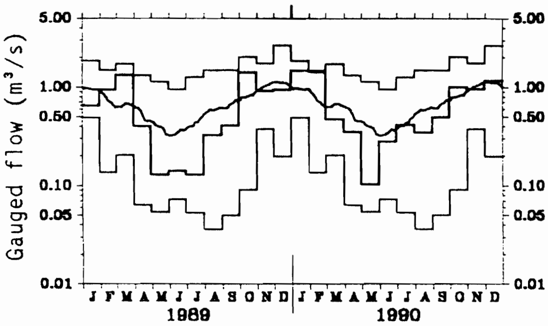
042010 Itchen at Highbridge+Allbrook
Monthly mean flows for 1989-1990
+ extremes and 30 day running mean for 1958-1988



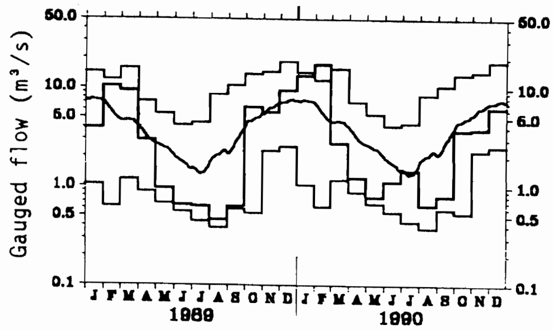
052005 Tone at Bishops Hull
Monthly mean flows for 1989-1990
+ extremes and 30 day running mean for 1961-1988



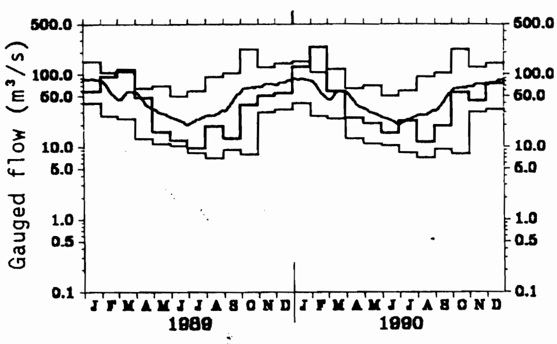
055008 Wye at Cefn Brwyn
Monthly mean flows for 1989-1990
+ extremes and 30 day running mean for 1951-1988



057004 Cynon at Abercynon
Monthly mean flows for 1989-1990
+ extremes and 30 day running mean for 1957-1988



076007 Eden at Sheepmount
Monthly mean flows for 1989-1990
+ extremes and 30 day running mean for 1967-1988



084013 Clyde at Daldowie
Monthly mean flows for 1989-1990
+ extremes and 30 day running mean for 1963-1988

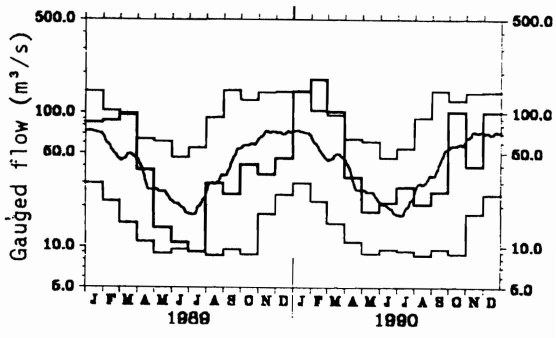


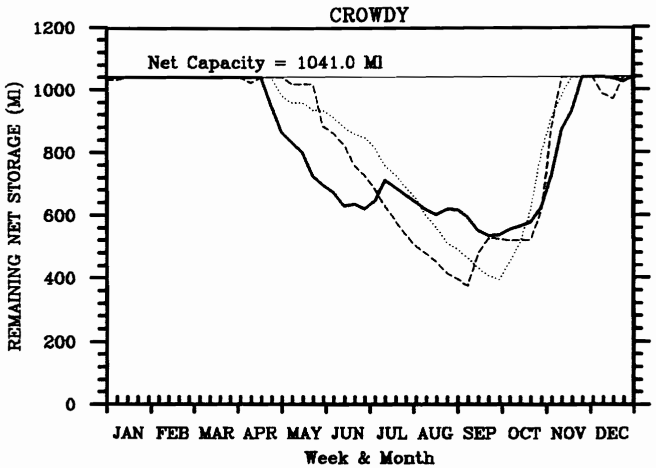
TABLE 3 RUNOFF AS MM AND AS A PERCENTAGE OF THE PERIOD OF RECORD AVERAGE WITH SELECTED PERIODS RANKED IN THE RECORD

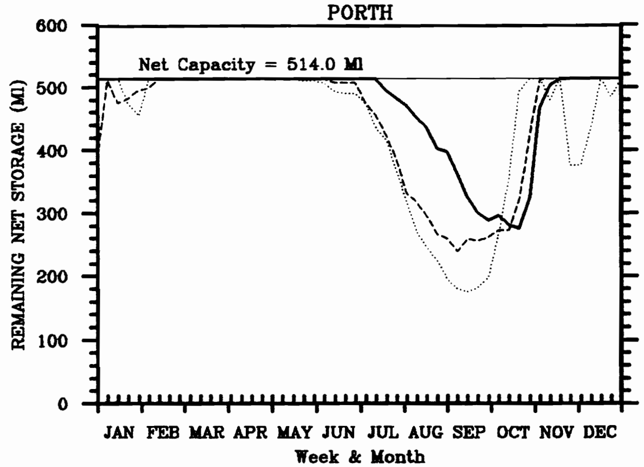
River/ Station name	Jul 1990	Aug	Sep	Oct	Nov	Dec 1990		10/90 to 12/90		3/90 to 12/90		1/90 to 12/90		5/89 to 12/90	
	mm %LT	mm %LT	mm %LT	mm %LT	mm %LT	mm %LT	rank /yrs	mm %LT	rank /yrs	mm %LT	rank /yrs	mm %LT	rank /yrs	mm %LT	rank /yrs
Dee at	37	18	23	78	61	69	7	207	6	475	4	719	7	963	1
Park	134	55	54	97	82	77	/19	84	/18	77	/18	92	/18	77	/17
Tay at	46	31	41	124	80	108	14	312	13	933	26	1488	38	1980	31
Ballathie	116	60	58	111	67	76	/39	84	/39	108	/38	133	/38	111	/37
Whiteadder Water at	14	6	8	62	43	70	19	175	19	250	7	325	6	396	4
Hutton Castle	109	37	50	235	116	157	/22	158	/22	87	/21	82	/21	66	/20
South Tyne at	17	9	23	87	52	137	23	277	17	462	6	810	18	1037	4
Haydon Bridge	58	22	44	126	57	142	/29	108	/29	79	/27	108	/27	86	/25
Derwent at	8	5	5	9	16	52	14	76	7	145	2	204	2	280	1
Buttercrambe	60	36	38	39	64	128	/18	87	/18	59	/17	61	/17	55	/16
Trent at	10	9	9	14	21										
Colwick	62	53	53	59	68										
Lud at	9	8	8	8	7	8	2	23	3	105	3	138	4	213	1
Louth	54	58	70	65	47	40	/23	49	/23	53	/22	52	/22	55	/21
Witham at	4	3	3	5	5	7	6	18	9	73	4	126	7	194	8
Claypole Mill	56	42	48	58	41	37	/32	46	/32	54	/31	68	/31	71	/31
Bedford Ouse at	4	3	3	8	5	6	9	19	10	66	7	174	20	277	21
Bedford	67	58	60	79	25	21	/58	32	/58	45	/58	80	/58	88	/57
Colne at	2	2	2	3	5	6	4	14	4	45	2	91	3	136	4
Lexden	47	49	47	35	40	35	/32	38	/32	47	/31	66	/31	68	/30
Mimram at	7	6	5	5	5	5	2	15	2	78	5	103	6	165	6
Panshanger Park	72	67	62	60	57	49	/39	57	/38	75	/38	82	/38	81	/37
Thames at	6	5	5	7	6	9	6	22	5	98	9	204	31	300	30
Kingston (natr.)	63	57	56	52	28	30	/108	34	/108	55	/108	83	/108	81	/107
Blackwater at	10	9	9	12	12	19	7	43	4	143	7	262	19	396	15
Swallowfield	87	78	68	61	49	62	/39	59	/39	73	/38	100	/38	96	/37
Coln at	14	12	10	10	8	10	3	28	3	210	3	366	8	515	6
Bibury	66	71	70	61	33	25	/28	35	/28	73	/27	93	/27	88	/26
Great Stour at	8	7	6	11	19	21	4	51	7	129	1	202	3	292	2
Horton	56	51	43	53	71	61	/26	62	/26	58	/24	68	/24	63	/23
Itchen at	23	21	20	21	22	24	2	67	2	304	5	418	7	615	5
Highbridge+Allbrook	75	74	76	69	64	57	/33	63	/33	83	/32	90	/32	84	/31
Stour at	6	5	5	8	10	19	2	37	2	146	2	368	10	518	6
Throop Mill	53	47	42	37	32	34	/18	35	/18	55	/18	96	/18	89	/17
Piddle at	13	9	8	12	13	16	3	41	3	209	3	371	9	513	6
Baggs Mill	72	57	52	58	44	38	/28	45	/28	72	/27	92	/26	85	/25
Tone at	8	6	7	8	16	32	5	56	3	154	1	412	7	600	6
Bishops Hull	51	48	45	29	38	47	/30	42	/30	48	/30	87	/29	85	/29
Severn at	9	7	6	19	37										
Bewdley	63	40	27	56	69										
Wye at	105	88	121	252	234	291	24	777	21	1392	6	2085	18	3181	9
Cefn Brwyn	96	61	73	121	93	104	/38	105	/38	85	/34	101	/33	92	/29
Cynon at	37	16	19	94	94	158	16	346	8	566	3	1290	15	1910	12
Abercynon	109	32	28	77	61	83	/33	75	/33	62	/31	103	/31	97	/29
Dee at	59	36	66	222	198	277	15	697	11	1095	5	1828	11	2603	5
New Inn	87	38	48	111	81	112	/22	101	/22	78	/21	100	/21	88	/20
Lune at	68	12	36	142	73	93	9	308	7	587	2	1152	12	1547	5
Caton	132	17	41	116	54	61	/28	76	/28	67	/28	103	/28	84	/26
Clyde at	39	29	35	143	54	141	25	337	22	683	22	1107	27	1396	22
Daldowie	146	71	60	177	56	147	/28	123	/28	118	/27	146	/27	114	/26

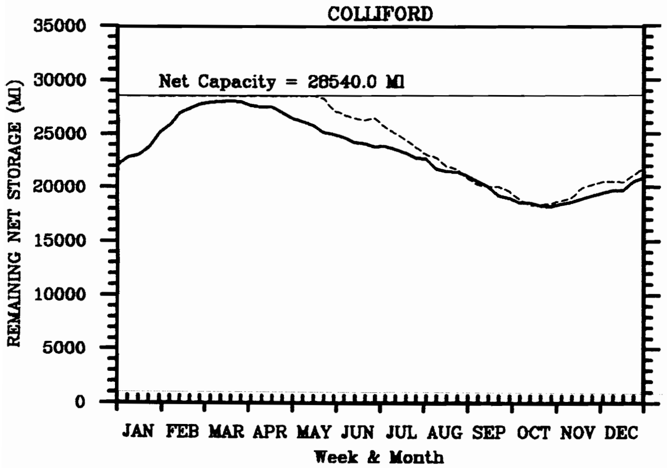
Notes (i) Values based on gauged flow data unless flagged (natr.), when naturalised data have been used.
(ii) Values are ranked so that lowest runoff as rank 1;
(iii) %LT means percentage of long term average from the start of the record to 1989. For the long periods (at the right of this table), the end date for the long term is 1990.

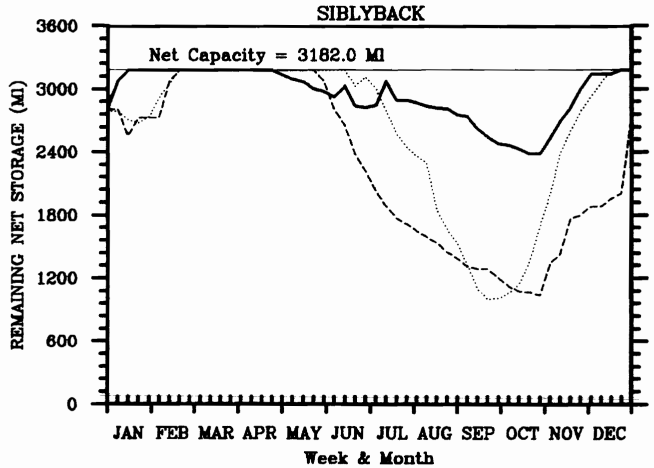
Severn Trent data unavailable due to mainframe computer problem.

FIGURE 3 EAST CORNWALL RESERVOIR LEVELS FOR 1990 AND HISTORIC DROUGHTS







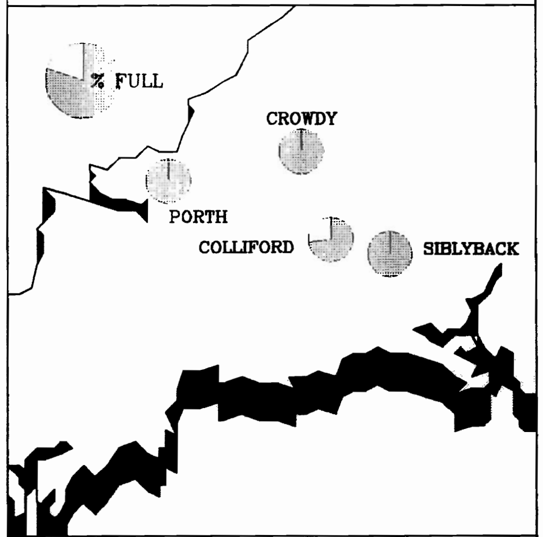


	NET CAPACITY (Ml)	WEEK NO 52 CURRENT YEAR 1990 (Ml)	1990 % Full	HISTORIC DROUGHT YEARS 1976 (Ml)	1976 % Full	1989 (Ml)	1989 % Full
COLLIFORD	28540.0	20884	73	N/A	N/A	21793	76
CROWDY	1041.0	1041	100	1041	100	1041	100
PORTH	514.0	514	100	514	100	514	100
SIBLYBACK	3182.0	3182	100	3182	100	2808	88

.... 1976 Drawdown   -------- 1989 Drawdown   ——— 1990 Drawdown

Indicates a Drought year

Fowey District Reservoirs



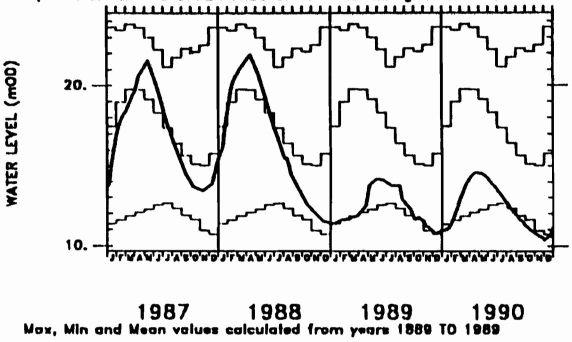
RESERVOIR SITUATION AT
31/12/90
WEEK NO 52

SOUTH WEST WATER

FIGURE 4 GROUNDWATER HYDROGRAPHS

Site name: DALTON HOLME

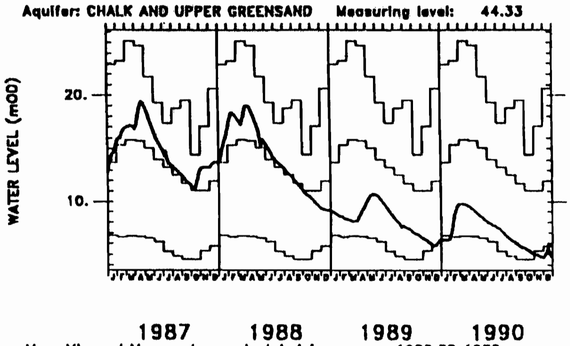
National grid reference: SE 9651 4530 Well number: SE94/5
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 33.50



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

Site name: LITTLE BROCKLESBY

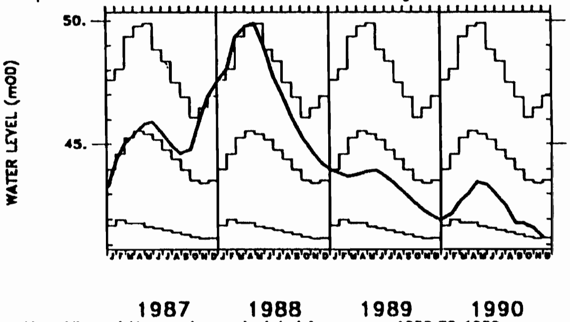
National grid reference: TA 1371 0888 Well number: TA10/40
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 44.33



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

Site name: WASHPIT FARM

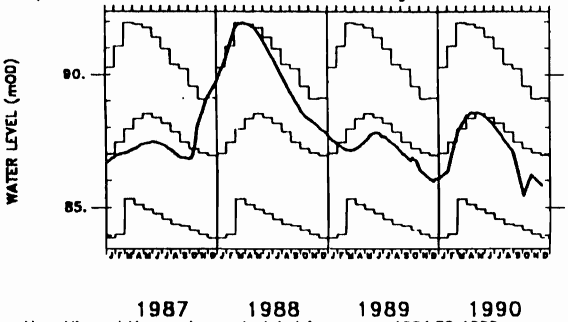
National grid reference: TF 8138 1960 Well number: TF81/2
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 80.20



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

Site name: THE HOLT

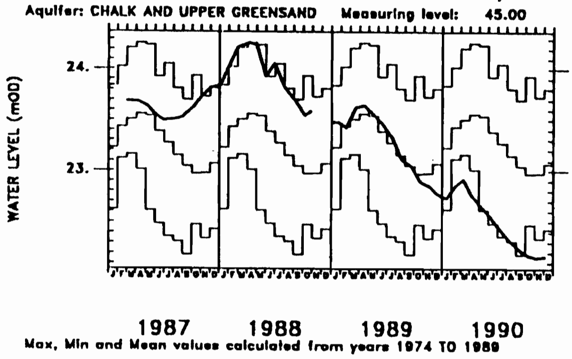
National grid reference: TL 1692 1965 Well number: TL11/9
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 140.21



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

Site name: FAIRFIELDS

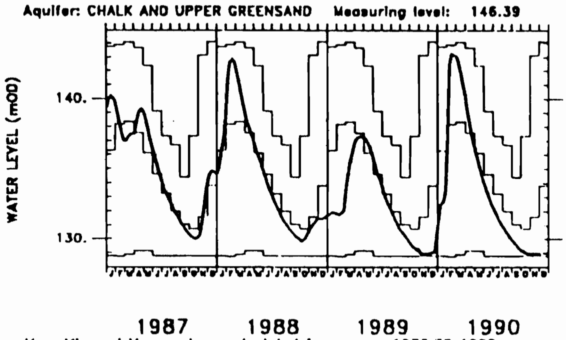
National grid reference: TM 2461 6109 Well number: TM26/46
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 45.00



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

Site name: ROCKLEY

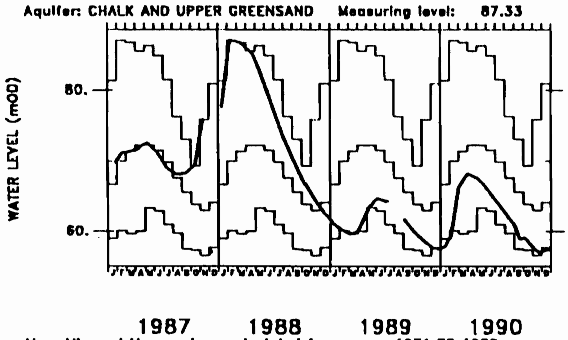
National grid reference: SU 1655 7174 Well number: SU17/57
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 146.39



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

Site name: LITTLE BUCKET FARM,WALTHAM

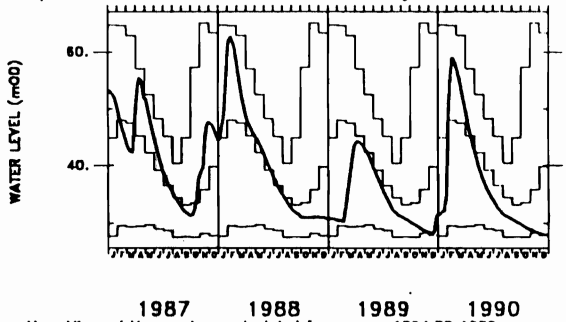
National grid reference: TR 1225 4690 Well number: TR14/9
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 87.33



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

Site name: COMPTON HOUSE

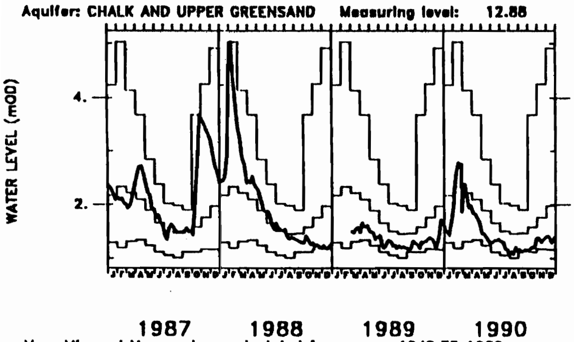
National grid reference: SU 7755 1490 Well number: SU71/23
Aquifer: CHALK AND UPPER GREENSAND Measuring level: 81.37



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

Site name: WEST DEAN NO.3

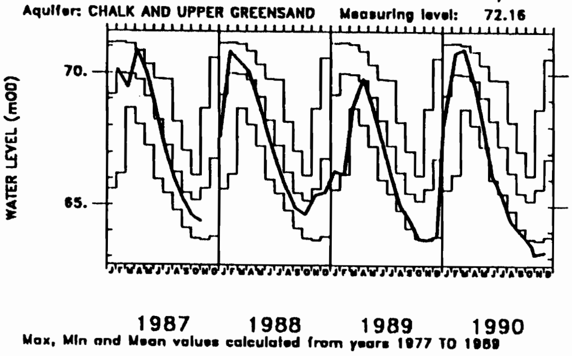
National grid reference: TV 5290 9920 **Well number:** TV59/7C
Aquifer: CHALK AND UPPER GREENSAND **Measuring level:** 12.88



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

Site name: ASHTON FARM

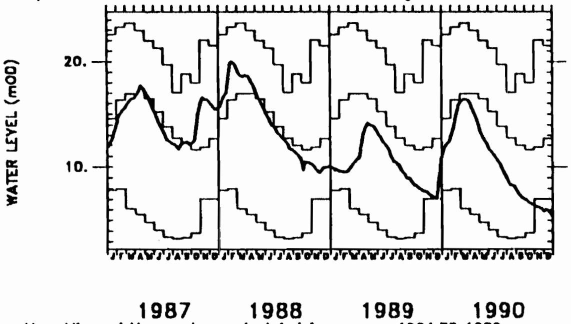
National grid reference: SY 6620 8810 **Well number:** SY68/34
Aquifer: CHALK AND UPPER GREENSAND **Measuring level:** 72.16



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

Site name: NEW RED LION

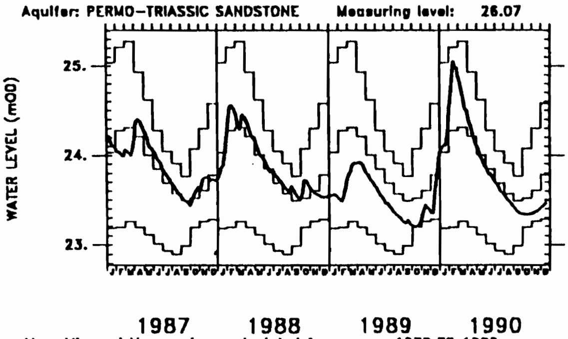
National grid reference: TF 0885 3034 **Well number:** TF03/37
Aquifer: LINCOLNSHIRE LIMESTONE **Measuring level:** 33.82



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

Site name: BUSSELS NO.7A

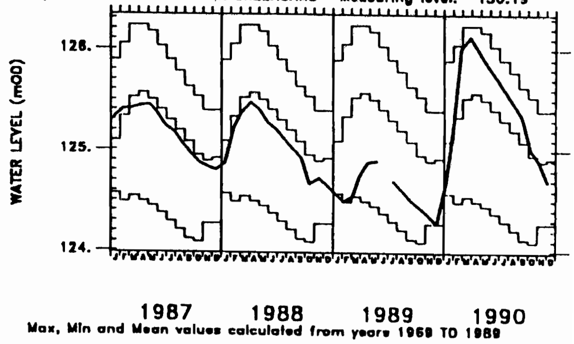
National grid reference: SX 9528 9872 **Well number:** SX99/37B
Aquifer: PERMO-TRIASSIC SANDSTONE **Measuring level:** 26.07



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

Site name: LIME KILN WAY

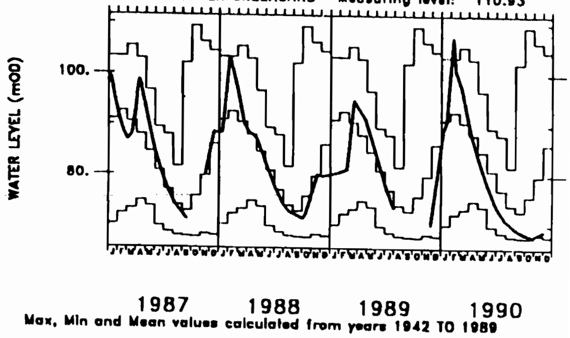
National grid reference: ST 3763 0667 **Well number:** ST30/7
Aquifer: CHALK AND UPPER GREENSAND **Measuring level:** 130.19



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

Site name: WEST WOODYATES MANOR

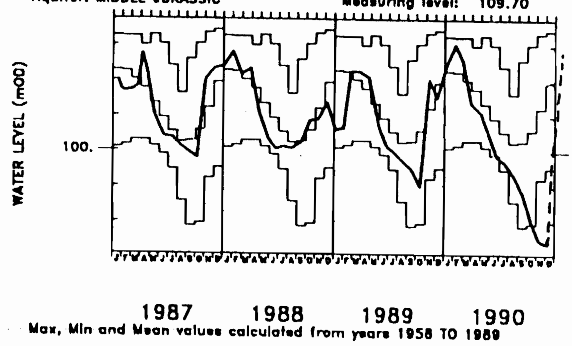
National grid reference: SU 0160 1960 **Well number:** SU01/58
Aquifer: CHALK AND UPPER GREENSAND **Measuring level:** 110.93



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

Site name: AMPNEY CRUCIS

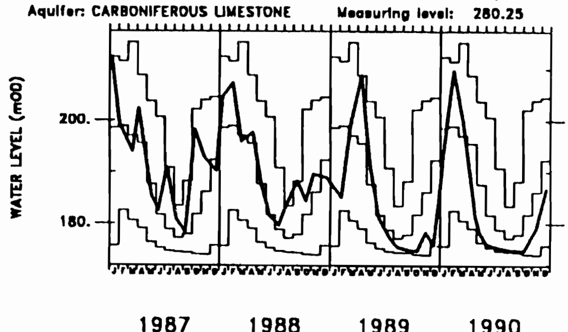
National grid reference: SP 0595 0190 **Well number:** SP00/62
Aquifer: MIDDLE JURASSIC **Measuring level:** 109.70



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

Site name: 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: 1990 AND 1976

Borehole	Aquifer	First year of record	Av. Dec level	Dec 1976		Dec 1990		No. of years of record with Dec levels ≤ 1990	Lowest recorded level before 1990 for any month
				Day	level	Day	level		
Dalton Holme	C & U.G.	1889	15.74	25	16.43	31	10.98	1	10.73
L. Brocklesby	"	1926	11.99	24	7.79	27	4.86	0	4.56
Washpit Farm	"	1950	43.48	01	42.20	04	41.31	1	41.24
The Holt	"	1964	86.89	03	84.16	06	85.81	3	83.90
Fairfields	"	1974	23.07	21	23.13	06	22.16	0	22.18
Rockley	"	1933	133.73	26	133.85	31	dry	5	dry
L. Bucket Farm	"	1971	64.05	01	63.71	31	57.63	0	56.77
Compton House	"	1894	39.65	31	50.12	28	27.96	1	27.64
West Dean	"	1940	1.97	31	2.51	28	1.39	15	1.01
Limekiln Way	"	1969	124.91	31	124.96	05	124.69	6	124.09
Ashton Farm	"	1977	66.88	21	70.50	11	63.20	0	63.23
West Woodyates	"	1942	85.82	27	100.17	03	68.90	1	67.62
New Red Lion	L.L.	1964	12.70	31	13.85	31	5.49	0	3.29
Ampney Crucis	M.J.	1958	101.97	26	102.83	10	97.38	0	97.86
Bussels 7A	PTS	1972	23.74	28	24.58	19	23.46	7	22.90
Alstonfield	C.B.	1974	192.33	29	184.31	18	186.64	5	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