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METEOROLOGICAL OFFICE

British Rainfall 1968

THE ONE HUNDRED AND EIGHTH ANNUAL VOLUME

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Introduction

No important changes in the presentation of data have been introduced with this volume of *British Rainfall*. Much of the information appears in the form of self-explanatory tables, diagrams and maps, and this has enabled the introductory texts in the various sections to be reduced to a minimum.

Although rainfall data are published in millimetres, most records are still maintained in inches. The change to maintaining records in metric rather than British units is gathering momentum and very few records will be maintained in inches after the early 1970s. Conversions to millimetres (1 inch=25.4 millimetres) are effected by computer in processing the data for publication. The monthly totals published are the metric equivalents of the monthly totals in inches and so are not necessarily the sums of the daily values converted to millimetres. Likewise, the annual totals

in millimetres are not necessarily the sums of the twelve monthly totals published. This system of conversion preserves the accuracy of the original monthly and annual totals. Any minor difficulties it produces will not affect many volumes. The river flow measurement stations are included in their appropriate places in the General Table of rainfall (Part I), and are indicated by the abbreviation 'R.F.M.Sta.'. Where available, the 1916-50 average annual areal rainfalls over the areas draining down to the R.F.M. stations are given.

In order to publish as much useful data as possible, marginally incomplete records have been completed by estimation of the missing data and the estimated values are included in brackets. In the General Table, stations with up to three estimated totals of monthly rainfall in the year are included.

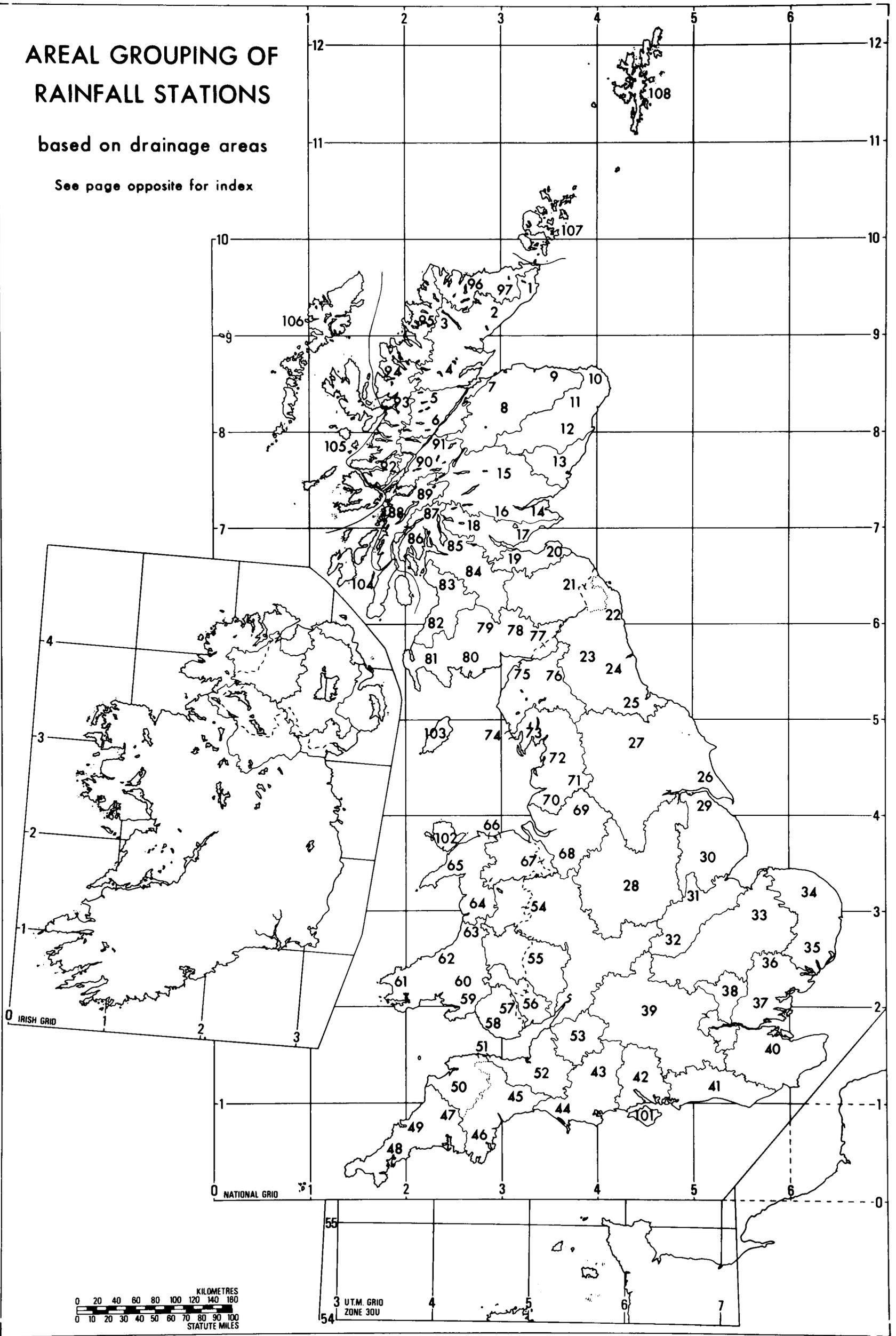
BRITISH RAINFALL 1968

Part I General table of rainfall

AREAL GROUPING OF RAINFALL STATIONS

based on drainage areas

See page opposite for index



INDEX TO AREAL GROUPING OF RAINFALL STATIONS

Area	Hydro-metric area	Page	Area	Hydro-metric area	Page
England and Wales			Scotland		
<i>River authority area</i>			<i>River purification board area</i>		
Northumbrian	22-25	7	Solway	77-81	72
Yorkshire Ouse and Hull	26, 27	9	Ayrshire	82, 83	73
Trent	28	15	Clyde	84-87	74
Lincolnshire	29, 30	20	<i>Hydrometric area grouping</i>		
Welland and Nene	31, 32	22	Kintyre and south-western islands	104	77
Great Ouse	33	23	Add, Awe and Etive	88, 89	78
East Suffolk and Norfolk	34, 35	25	Lochy and Linnhe	90, 91	78
Essex	36, 37	27	Shiel, Alsh and Maree	92-94	79
<i>Conservancy area or London area</i>			Inner and Outer Hebrides	105, 106	79
Lee	38	30	Laxford	95	80
London, left bank	39	31	Naver and Thurso	96, 97	80
Thames	39	31	Orkney and Shetland Islands	107, 108	81
London, right bank	39	36	Wick Water to Conon	1-4	81
<i>River authority area</i>			Beaully and Ness	5, 6	82
Kent	40	37	<i>River purification board area</i>		
Sussex	41	39	Banff, Moray and Nairn	7-9	83
Hampshire	42	41	Dee and Don	10-12	85
Isle of Wight	101	42	North and South Esk	13	85
Avon and Dorset	43, 44	42	Tay	14-16	86
Devon, south	45, 46	44	Forth	17, 18	88
Cornwall	47-49	46	Lothians	19, 20	90
Devon, north	50, 51D	48	Tweed	21	91
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Bristol Avon	53	51	<i>Drainage area grouping</i>		
Severn	54	52	Foyle and north-western streams	—	94
Wye	55	55	Lough Foyle, east	—	94
Usk	56	57	Bann and Lough Neagh	—	95
Glamorgan	57, 58	58	Bush and north-eastern streams	—	96
South West Wales	59-63	59	Lagan and eastern streams	—	96
Gwynedd	64-66G, 102	61	Newry and south-eastern streams	—	97
Dee and Clwyd	66D, 67	62	Erne and western streams	—	97
Mersey and Weaver	68, 69	64	Channel Islands		
Lancashire	70-74L	67	Alderney		99
Cumberland	74C-76	70	Guernsey		99
Isle of Man	103	71	Sark		99
			Jersey		99

Notes: Part of hydrometric area 21 (Tweed) and part of hydrometric area 77 (Esk) are in England but stations within these parts are listed with appropriate stations in Scotland so as to be grouped within the natural drainage areas to which they belong. These stations are Linhope, Lilburn Tower, Middleton Hall, Mindrum, Goldsleugh, Hethpool, Pallinsburn, Etal R.F.M.

station and Berwick-on-Tweed under area 21 (Tweed), and Longtown under area 77 (Esk).

The National Grid reference system is used for locating rainfall stations in Great Britain, the Irish Grid for stations in Northern Ireland, and the Universal Transverse Mercator (Zone 30U) for stations in the Channel Islands.

GENERAL TABLE, SCOTLAND

Station	Grid reference	Altitude m	Av. 1916- 1950 mm	Rainfall in millimetres													Highest recorded fall in a day	
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	mm	date
TWEED—(contd)																		
Horseupcleugh... ..	NT 36 665586	282	...	46	67	62	71	103	37	145	37	86	96	72	103	925	46	15 Jul
<i>Dye (Whiteadder)</i>																		
<i>Watchwater (Dye)</i>																		
Watchwater Res. R.F.M. Sta. Area 10.7 km ²	NT 36 664566	252	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
<i>Whiteadder (Tweed)</i>																		
Whitcheater	NT 36 721589	255	856	46	79	65	81	104	48	129	41	81	94	68	107	941	43	15 Jul
Manderston House	NT 36 809547	108	791	32	71	47	60	98	55	109	25	72	100	55	77	801	32	31 Oct
Marchmont House	NT 36 743484	152	779	32	70	61	66	94	57	109	33	89	88	64	76	839	27	7 Feb
Kimmerghame House	NT 36 815513	76	747	25	(63)	44	69	87	52	107	24	75	105	49	92	792	...	...
Duns Castle	NT 36 775538	137	791	32	58	47	67	99	58	107	32	82	91	51	69	793	30	31 Oct
<i>Whiteadder (Tweed)</i>																		
Chirnside	NT 36 875566	126	...	29	68	38	76	92	56	93	27	68	97	61	76	781	...	...
<i>Tweed</i>																		
Berwick-on-Tweed	NU 46 002528	23	592	24	31	35	46	79	52	79	25	68	67	35	59	599	25	22 Jun

BRITISH RAINFALL 1968

Station	Grid reference	Altitude m	Av. 1916- 1950 mm	Rainfall in millimetres													Highest recorded fall in a day	
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	mm	date
ERNE—(contd)																		
<i>Claddagh (Erne)</i>																		
Moher	IH 23 217302	59	...	155	39	92	72	77	114	21	91	162	186	117	155	1281	63	31 Oct
<i>Arney (Erne)</i>																		
Ballintempo Forest	IH 23 054413	119	...	148	39	97	66	66	88	24	80	163	225	107	121	1224	...	...
Marble Arch P. Sta.	IH 23 124356	87	...	130	41	106	76	67	93	16	70	168	195	141	170	1273	51	31 Oct
Florence Court, New site	IH 23 175344	84	1235	141	50	84	69	86	124	17	67	193	191	143	172	1339	63	31 Oct
Florencecourt Primary School	IH 23 186352	62	...	137	46	80	66	74	112	18	61	175	179	113	158	1217	60	31 Oct
<i>Erne</i>																		
Castle Coole	IH 23 259430	62	...	126	31	(73)	61	67	103	22	(68)	124	153	91	(110)	1029	...	...
Bellanaleck W.Wks... ..	IH 23 244390	28	...	130	37	78	65	61	99	22	65	142	(135)	(89)	(115)	1038	...	...
Bellevue	IH 23 253410	61	1007	119	29	64	56	67	99	25	65	127	133	80	110	975	49	31 Oct
<i>Sillees (Erne)</i>																		
Lough Navar Forest	IH 23 062546	148	...	191	41	124	76	94	107	41	91	203	213	98	129	1408	75	31 Oct
Belmore Forest	IH 23 121438	114	...	199	37	128	62	82	119	27	(82)	192	185	123	138	1373	...	...
<i>Erne</i>																		
Portora Royal School	IH 23 224448	75	...	140	32	90	63	73	110	33	75	152	149	84	110	1112	...	...
Portora Sluice	IH 23 222453	46	...	139	33	93	66	72	112	29	81	146	150	87	111	1120	...	...
Breagh Bridge	IH 23 265475	103	...	128	30	73	53	69	110	25	61	132	147	89	99	1016	55	31 Oct
<i>Ballinamallard (Erne)</i>																		
Ballinamallard S.Wks	IH 23 261528	53	...	133	35	81	60	65	109	22	60	130	164	93	102	1055	60	31 Oct
Irvinestown Police Sta.	IH 23 236582	90	1037	137	41	86	61	54	95	28	70	175	165	83	101	1098	62	31 Oct
Irvinestown P. Sta.	IH 23 230583	85	...	148	41	96	58	64	97	20	68	185	190	100	104	1171	72	31 Oct
<i>Erne</i>																		
Castle Archdale Forest No.1	IH 23 189593	66	1040	155	43	101	63	62	100	32	65	177	178	90	111	1177	66	31 Oct
Castle Archdale Forest No.2	IH 23 189593	66	...	152	42	100	62	60	100	32	65	177	174	85	105	1156	63	31 Oct
<i>Kesh (Erne)</i>																		
Kesh Forest	IH 23 181664	82	...	173	33	100	61	72	95	36	85	206	219	95	110	1287	59	31 Oct
<i>Erne</i>																		
Roscor	IG 13 971551	143	1225	172	39	100	75	77	81	46	131	209	189	78	119	1316	56	31 Oct
Belleek	IG 13 940590	47	1229	147	39	82	71	81	78	39	88	175	158	67	104	1129	43	31 Oct
Belleek Police Sta.	IG 13 939591	50	...	155	41	96	76	81	77	38	88	180	171	67	110	1178	46	31 Oct

GENERAL TABLE, THE CHANNEL ISLANDS

Station	Grid reference	Altitude m	Av. 1916-1950 mm	Rainfall in millimetres													Highest recorded fall in a day	
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	mm	date

The Channel Islands

ALDERNEY AREA, 8.03 SQUARE KILOMETRES

Alderney Airport | WA555 564065 | 88 | ... | 70 | 101 | 23 | 49 | 66 | 52 | 29 | 36 | 101 | 115 | 36 | 88 | 765 | 33 | 13 Feb

GUERNSEY AREA, 63.7 SQUARE KILOMETRES

Guernsey, L'Ancrese	WV554 337829	5	...	84	114	24	72	64	51	27	38	117	108	22	110	831	32	11 Oct
Les Quartiers	WV554 323804	12	802	86	108	23	82	71	52	31	41	117	100	25	113	848	34	11 Oct
Haut Nez	WV554 311762	107	878	88	84	23	80	63	58	31	44	109	109	37	116	842	39	11 Oct
Guernsey Airport	WV554 294759	104	862	93	90	23	92	72	57	26	44	118	113	37	119	885	43	11 Oct
Kings Mills	WV554 292787	14	...	84	95	21	93	66	55	30	41	115	99	28	109	836	35	11 Oct

SARK AREA, 5.44 SQUARE KILOMETRES

JERSEY AREA, 116 SQUARE KILOMETRES

St Ouen, La Brecquette... ..	WV554 558542	17	823	79	96	24	50	56	65	51	29	139	116	44	84	835	59	15 Sep
St Brelade, La Sergente... ..	WV554 566486	58	818	74	85	18	44	59	62	48	31	123	121	40	71	775	31	11 Oct
Val de la Mere... ..	WV554 576517	23	...	74	90	22	47	57	61	44	33	107	117	33	78	762	27	13 Feb
St Ouen's Manor	WV554 583530	79	805	86	97	25	45	59	60	43	33	122	125	32	84	812	36	15 Sep
Jersey Airport	WV554 587508	83	833	84	91	22	45	60	60	45	33	104	122	33	86	785	28	11 Oct
St Peters Rectory, St Peters... ..	WV554 595515	86	...	80	96	23	45	61	62	43	34	116	126	31	85	802	30	11 Oct
Beaumont Marsh	WV554 616499	5	...	86	107	27	45	(67)	62	(48)	(28)	107	121	33	85	817	29	13 Feb
Handois Res.	WV554 631536	76	959	97	102	31	49	67	67	48	31	116	141	29	97	875	28	13 Feb
Millbrook Res... ..	WV554 631507	16	871	89	100	29	45	61	63	48	29	115	121	27	94	821	24	11 Oct
Augres Filtration Sta.	WV554 649516	84	...	95	95	29	44	59	67	52	33	114	118	29	95	831	27	10 Jul
Trinity	WV554 659539	104	912	100	97	29	49	67	67	50	33	117	126	27	99	862	33	11 Oct
St Helier	WV554 651483	9	765	82	97	22	40	51	54	56	28	97	99	24	79	730	27	11 Oct
St Louis Observatory	WV554 660493	55	847	93	100	27	44	58	61	57	30	103	107	27	86	794	30	11 Oct
Grands Vaux Res.	WV554 664507	18	...	92	102	30	45	60	65	55	32	109	113	28	89	820	26	8 Jan
St Saviour, Petit Menage	WV554 662481	9	844	88	96	24	42	53	56	53	33	91	104	27	83	749	28	11 Oct

BRITISH RAINFALL 1968

**Part II Summary tables,
maps and graphs
with discussion**

1 MAIN CHARACTERISTICS OF THE YEAR

General Summary

Total rainfall over England and Wales for 1968, though marginally less than that for 1967, was again substantially greater than average and on this occasion for the fourth consecutive year.

The year began cold with snowfall over most of Great Britain during the first fortnight and again during early February. An outstanding feature of the weather during 1968 was the contrast between the mainly fine, dry summer in north-west regions of Britain and the dull, wet summer over south-east England, the east Midlands and East Anglia. June was a particularly wet month over England and Wales; over the West-country more than twice the average rainfall was recorded, with over three times the average near Totnes and along the south coast as far as Arundel. In contrast to this, it was exceptionally dry over much of central and southern Scotland where rainfall was less than half average. There was similar contrast in July but the marked deficiency was in Northern Ireland with large areas in the west and south having less than 25 per cent of the average.

The year 1968 was also remarkable for the number of widespread, heavy thunderstorms. Three outstanding rainfall occasions—26/27 March over north-west Scotland, 10 July over south-west England to Lincolnshire, and 14/15 September over south-east England and East Anglia—have been selected for a special article by A. Bleasdale in Part III of this volume.

August was generally dry with less than average rainfall over all countries of the United Kingdom but this deficiency was more than outweighed in September, the wettest over England and Wales since 1918. Areas surrounding the northern Irish Sea had particularly wet weather on 31 October and 1 November. At Tollymore Park, Northern Ireland, 158.9 mm was recorded on 31 October with a further 80.9 mm on 1 November. There were heavy falls of snow in northern districts of Britain on 16 December and by the 24th snow had spread to give most parts of the country a white Christmas.

Notes on conditions month by month

January. Cold and cyclonic during the first fortnight, then generally anticyclonic with pressure high to the south and west of the British Isles.

February. A cold month. Unsettled at first but generally anticyclonic and dry from about the 14th.

March. Continuing anticyclonic until the 12th, then unsettled from the 14th to 24th over England and Wales and to the 28th over Scotland.

April. Cold northerly winds with snow during the first week, then dry and anticyclonic until the 14th. Mainly cyclonic thereafter with periods of rain and some thunderstorms.

May. Cold at first and generally cyclonic especially in southern half of Britain and east Scotland. Scattered thunderstorms during the first week.

June. Isolated and occasionally severe thunderstorms on the 2nd and 3rd; 82.8 mm fell in 140 minutes at Prickwillow, Cambridgeshire on the 3rd. It was extremely wet over England and Wales from the 18th to 28th.

July. Generally cyclonic and wet over Britain. Very hot weather from the 1st to 3rd with widespread, heavy thunderstorms; West Baldwin Reservoir, Isle of Man recorded 148.1 mm on the 2nd. Further thundery periods over England and Wales from the 9th to 15th and over Essex on the 31st.

August. Mainly anticyclonic and dry in the west and north and wet and unsettled in the south-east until the 11th. More generally cyclonic with periods of rain until the 21st then mostly dry anticyclonic weather till the end of the month.

September. Wet and cyclonic with heavy rain over most of Great Britain from the 5th to 23rd.

October. Unusually mild. Mainly cyclonic and wet from the 8th to 13th and the 27th to 31st. Otherwise, cyclonic activity confined mainly to northern districts during first half of month, and to western districts during second half.

November. Cold and anticyclonic except for heavy rain over areas surrounding the northern Irish Sea on the 1st and over south-west Scotland on the 21st.

December. Generally dull and anticyclonic until the 14th but with rain in extreme south-west England on the 9th and over Northern Ireland and north-west Scotland on the 12th. Cold and cyclonic for the remainder of the month.

Note: Details of heavy falls on individual occasions are given in Sections 5 and 6.

TABLE 1

Estimated areal rainfall, monthly, annual and seasonal, for parts of the United Kingdom

A Averages for 1916-50 in millimetres

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Winter half-year Oct.-Mar.	Summer half-year Apr.-Sept.	Area* km ²
England	83	60	52	57	59	52	75	75	69	83	88	79	832	444	388	130 297
Wales	149	105	85	82	86	79	106	116	114	148	145	142	1357	774	583	20 756
England and Wales	92	66	57	60	63	55	79	81	76	92	95	88	904	490	414	151 053
Scotland	154	106	89	88	87	87	114	122	128	158	143	143	1419	793	626	78 734
Great Britain	112	80	68	70	72	66	92	95	93	114	113	106	1081	592	489	229 787
Northern Ireland	109	76	66	67	72	71	96	102	96	111	104	111	1081	577	504	14 133
Isle of Man	140	87	79	73	79	77	86	105	115	141	132	136	1250	715	535	572

* Values derived from: London, Central Office of Information. *Britain—an official handbook*, 1964. London, HMSO, 1964.

B Values for 1968 in millimetres

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Winter half-year Oct. 1967- Mar. 1968	Summer half-year Apr.-Sept. 1968	Seasonal year Oct. 1967- Sept. 1968
England	70	45	52	62	70	82	99	64	141	86	65	74	911	453	518	971
Wales	160	53	112	91	104	113	120	76	168	144	97	113	1351	878	672	1550
England and Wales	82	46	60	66	75	86	102	66	145	94	69	80	971	510	540	1050
Scotland	137	72	147	71	110	70	109	66	121	201	85	84	1272	854	547	1401
Great Britain	101	55	90	68	87	81	104	66	136	131	75	81	1074	629	542	1171
Northern Ireland	127	39	83	59	78	77	39	74	136	144	99	87	1042	607	463	1070
Isle of Man	167	56	99	76	97	78	157	76	215	234	123	125	1503	746	699	1445

C Values for 1968, percentage of annual average, 1916-50

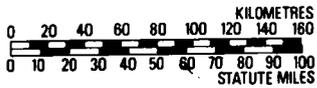
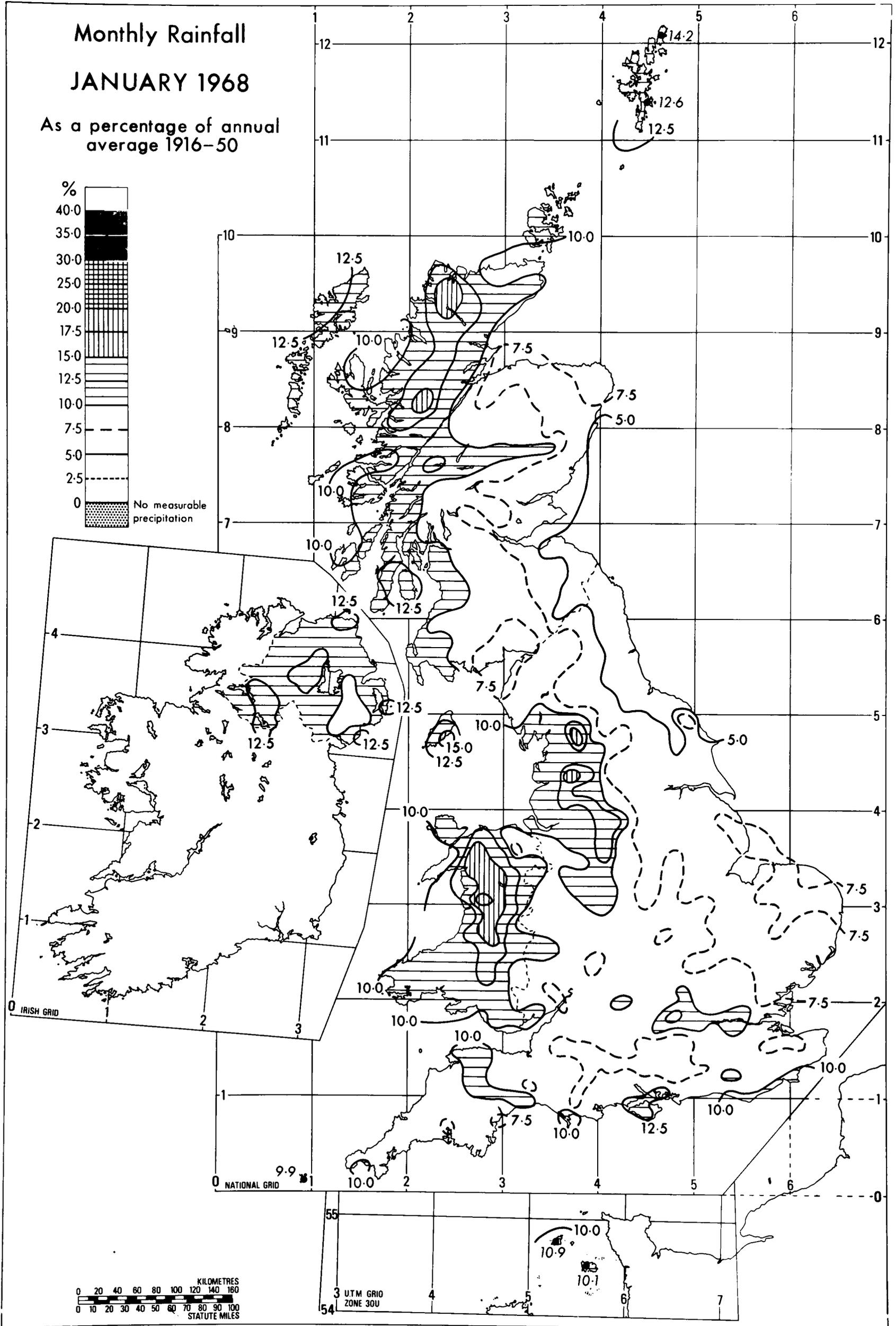
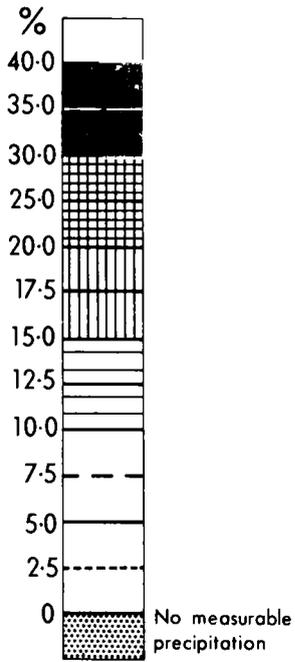
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Winter half-year Oct. 1967- Mar. 1968	Summer half-year Apr.-Sept. 1968	Seasonal year Oct. 1967- Sept. 1968
England	8.4	5.4	6.2	7.5	8.4	9.9	11.9	7.7	16.9	10.3	7.8	8.9	109	54	62	116
Wales	11.8	3.9	8.3	6.7	7.7	8.3	8.8	5.6	12.4	10.6	7.1	8.4	99	65	50	115
England and Wales	9.1	5.1	6.6	7.3	8.3	9.6	11.3	7.3	16.0	10.4	7.7	8.8	107	56	60	116
Scotland	9.7	5.1	10.3	5.0	7.8	4.9	7.7	4.6	8.5	14.1	6.0	5.9	90	60	39	99
Great Britain	9.3	5.1	8.3	6.3	8.1	7.5	9.7	6.1	12.6	12.1	6.9	7.5	99	58	50	108
Northern Ireland	11.7	3.6	7.7	5.5	7.2	7.1	3.6	6.8	12.6	13.3	9.2	8.1	96	56	43	99
Isle of Man	13.4	4.5	7.9	6.1	7.8	6.2	12.6	6.1	17.2	18.7	9.8	10.0	120	60	56	116

MONTHLY, ANNUAL AND SEASONAL RAINFALL

Monthly Rainfall

JANUARY 1968

As a percentage of annual average 1916-50

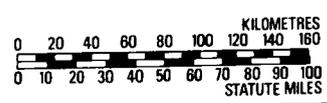
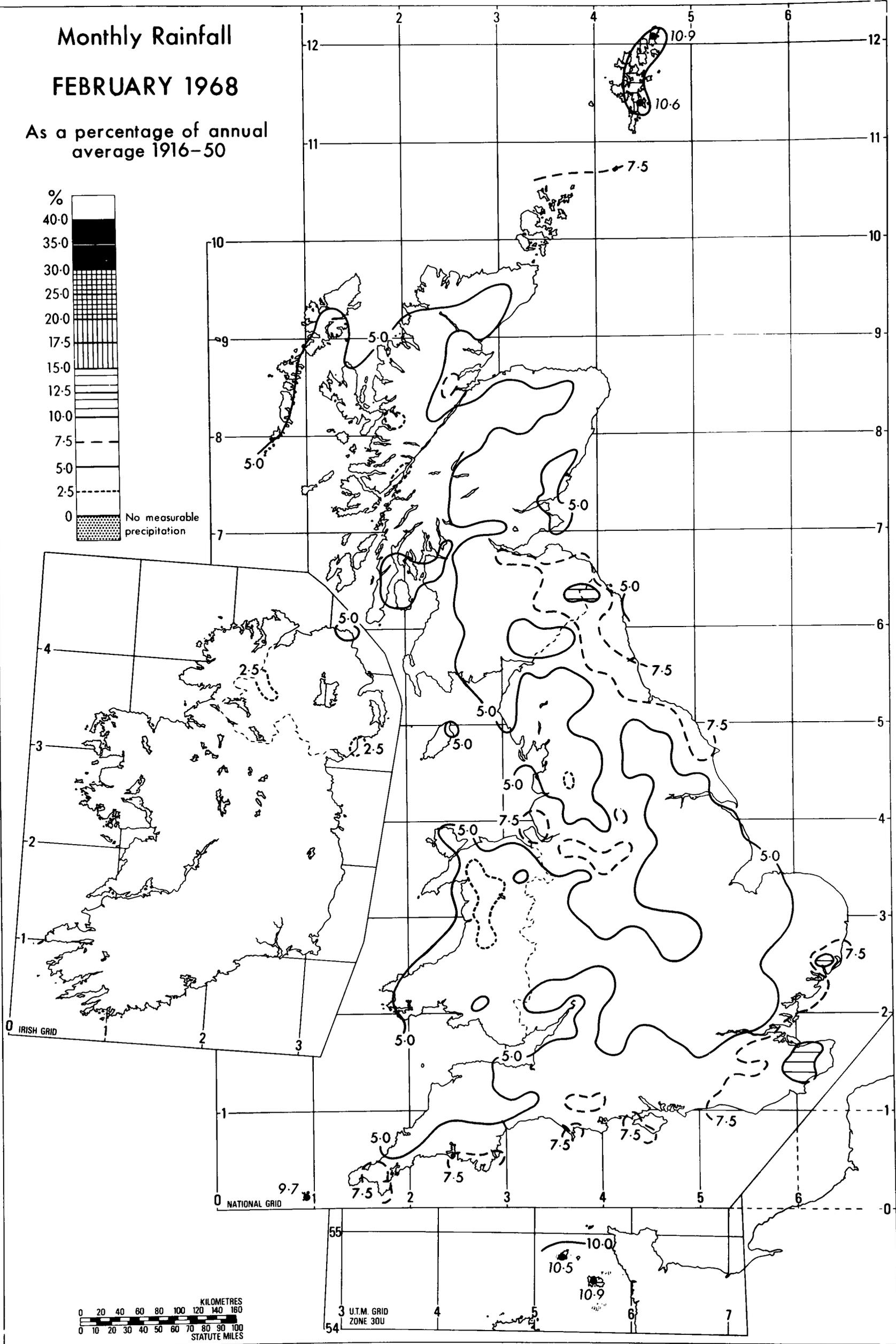
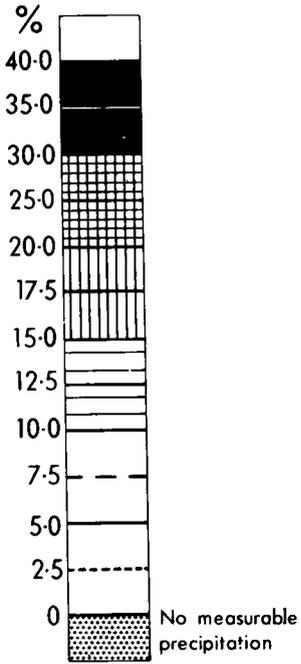


Met 0 Karte D.0/7448

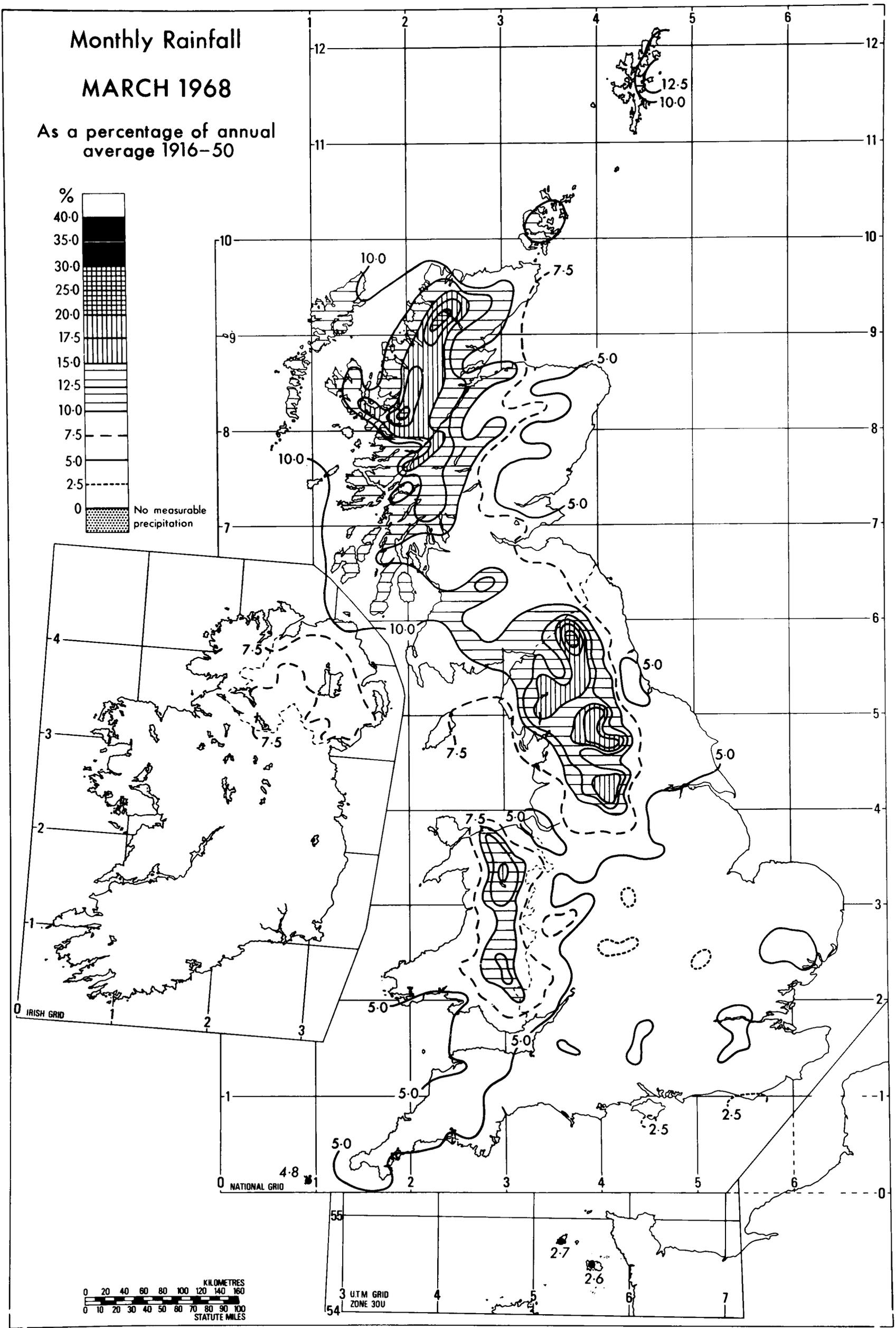
Monthly Rainfall

FEBRUARY 1968

As a percentage of annual average 1916-50



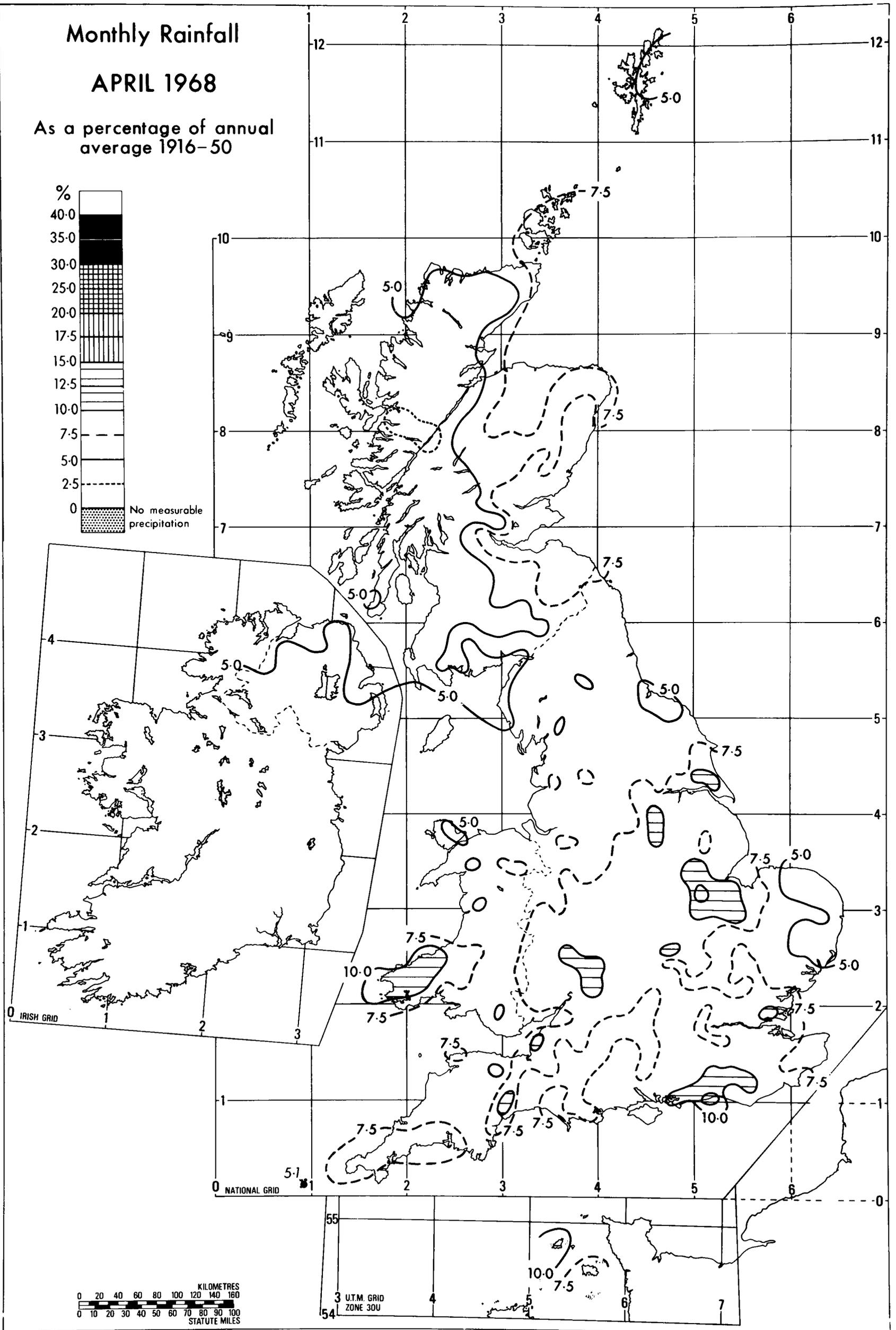
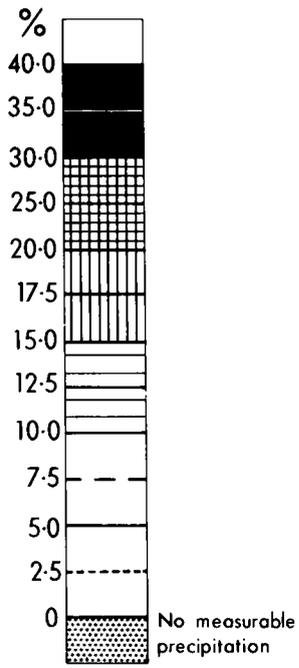
Met O. Carto 00/744



Monthly Rainfall

APRIL 1968

As a percentage of annual average 1916-50



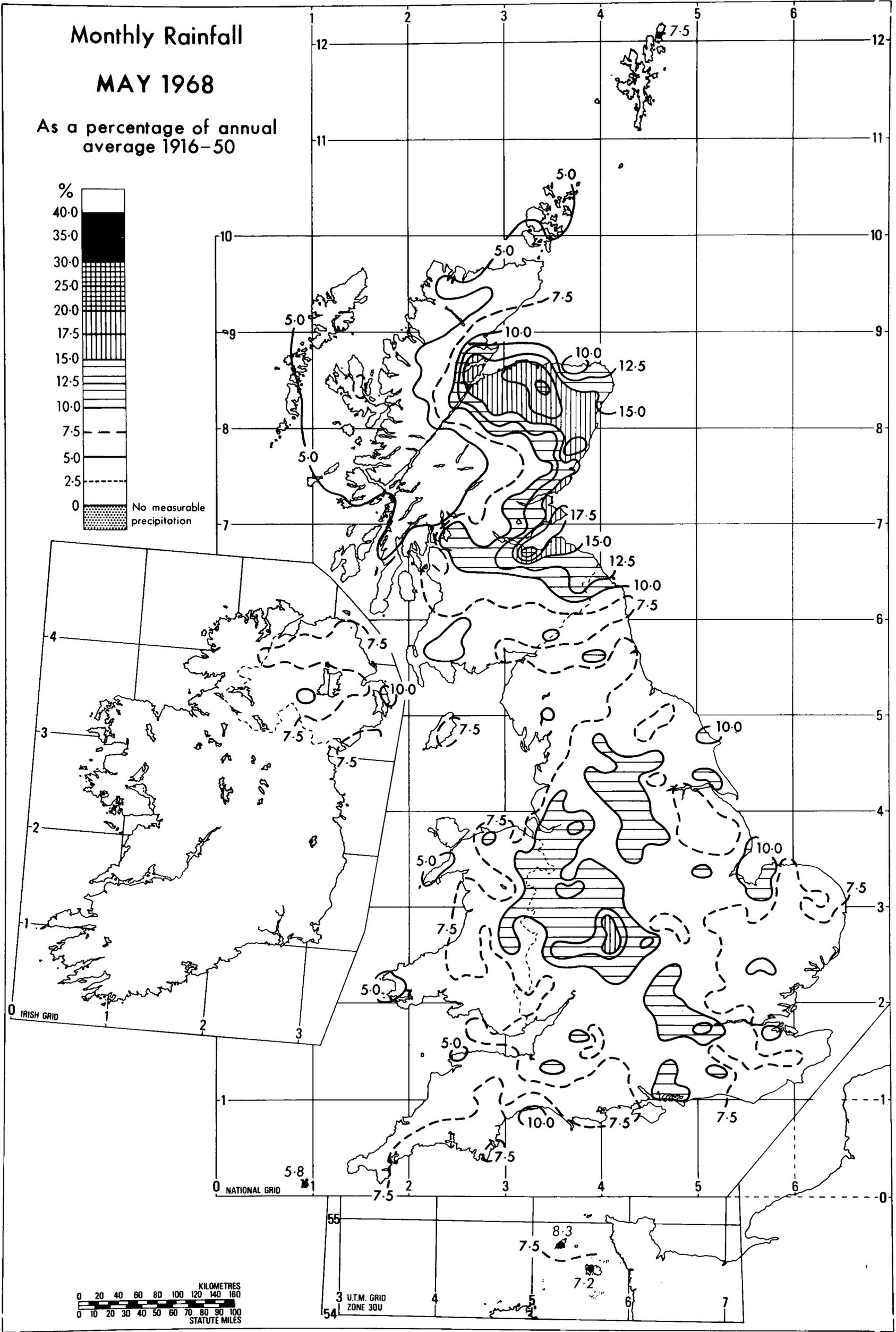
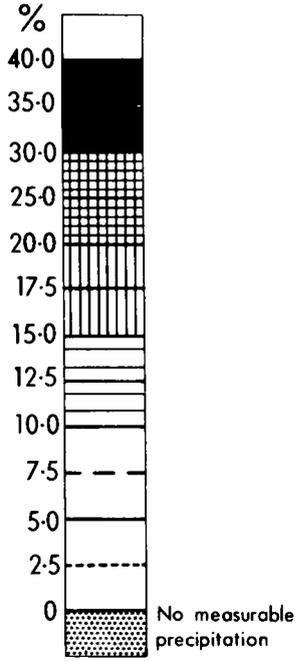
Met O. Carto. D.O. 744/81

MONTHLY, ANNUAL AND SEASONAL RAINFALL

Monthly Rainfall

MAY 1968

As a percentage of annual average 1916-50

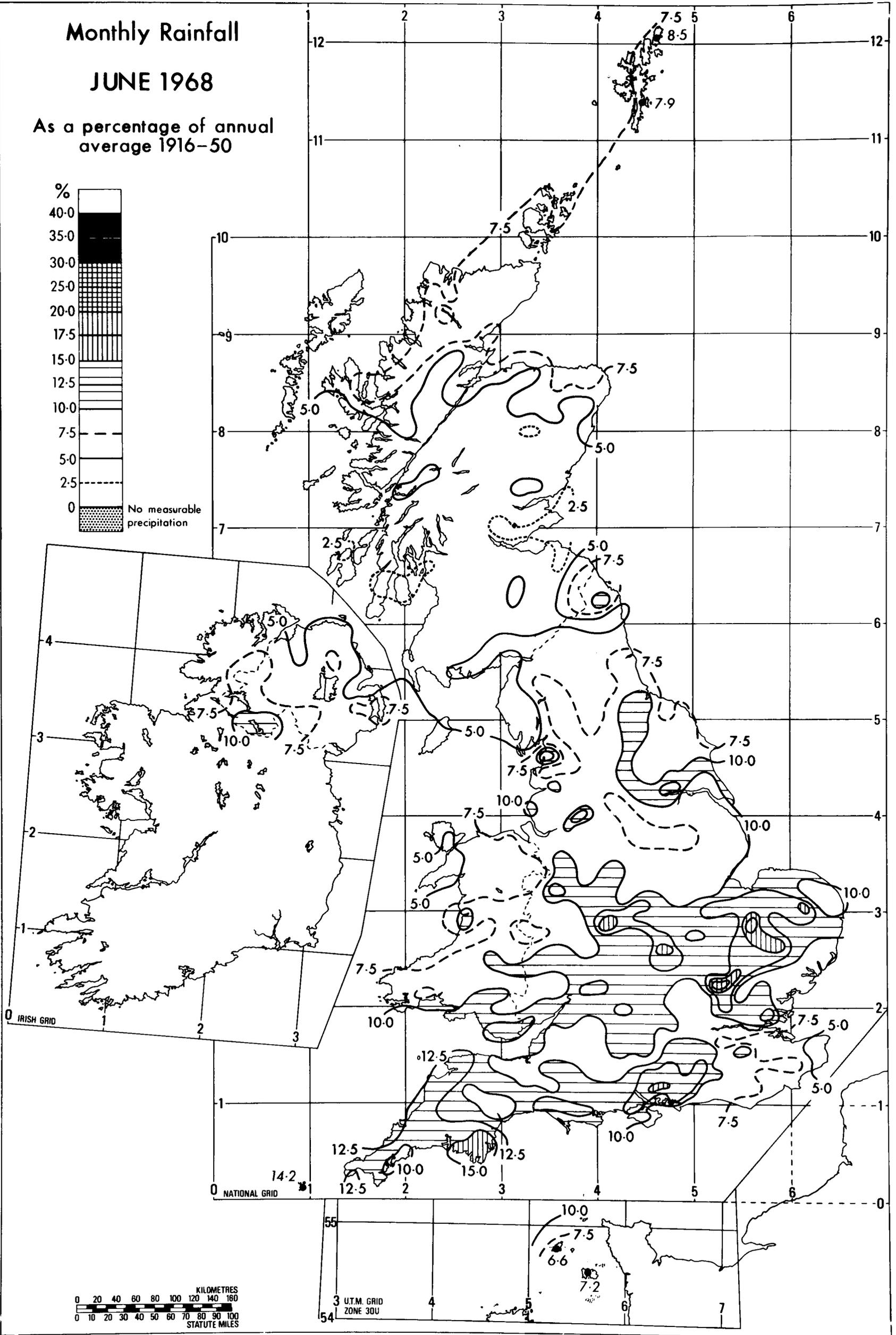
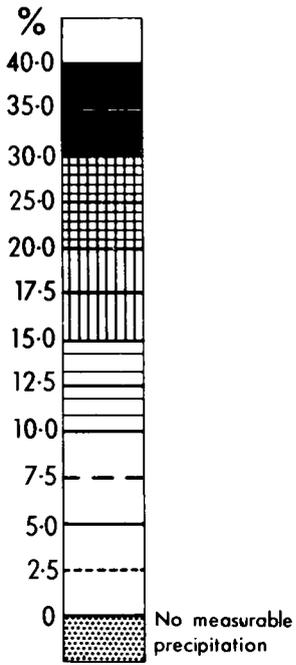


Met O. Carto. 6/0/44

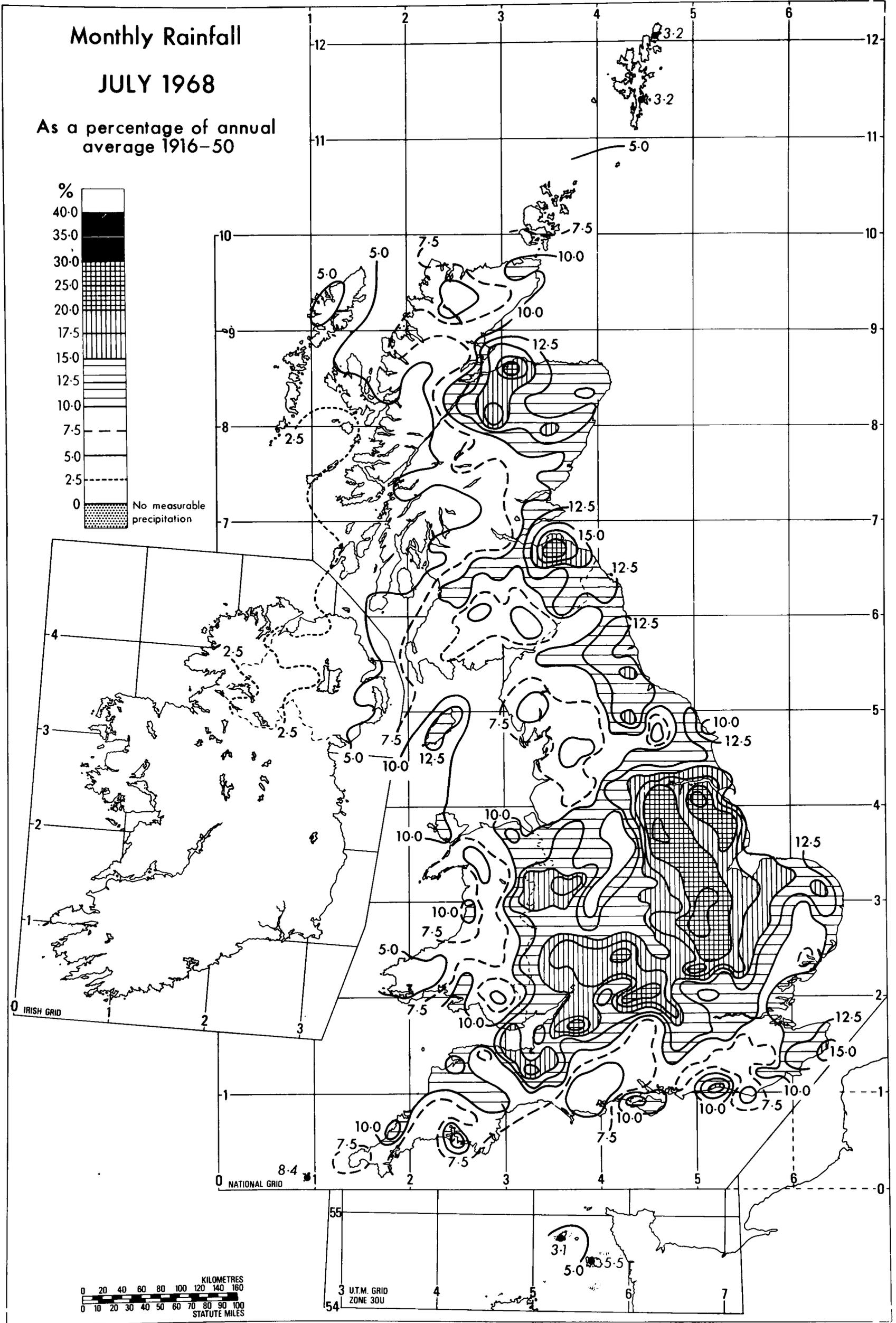
Monthly Rainfall

JUNE 1968

As a percentage of annual average 1916-50



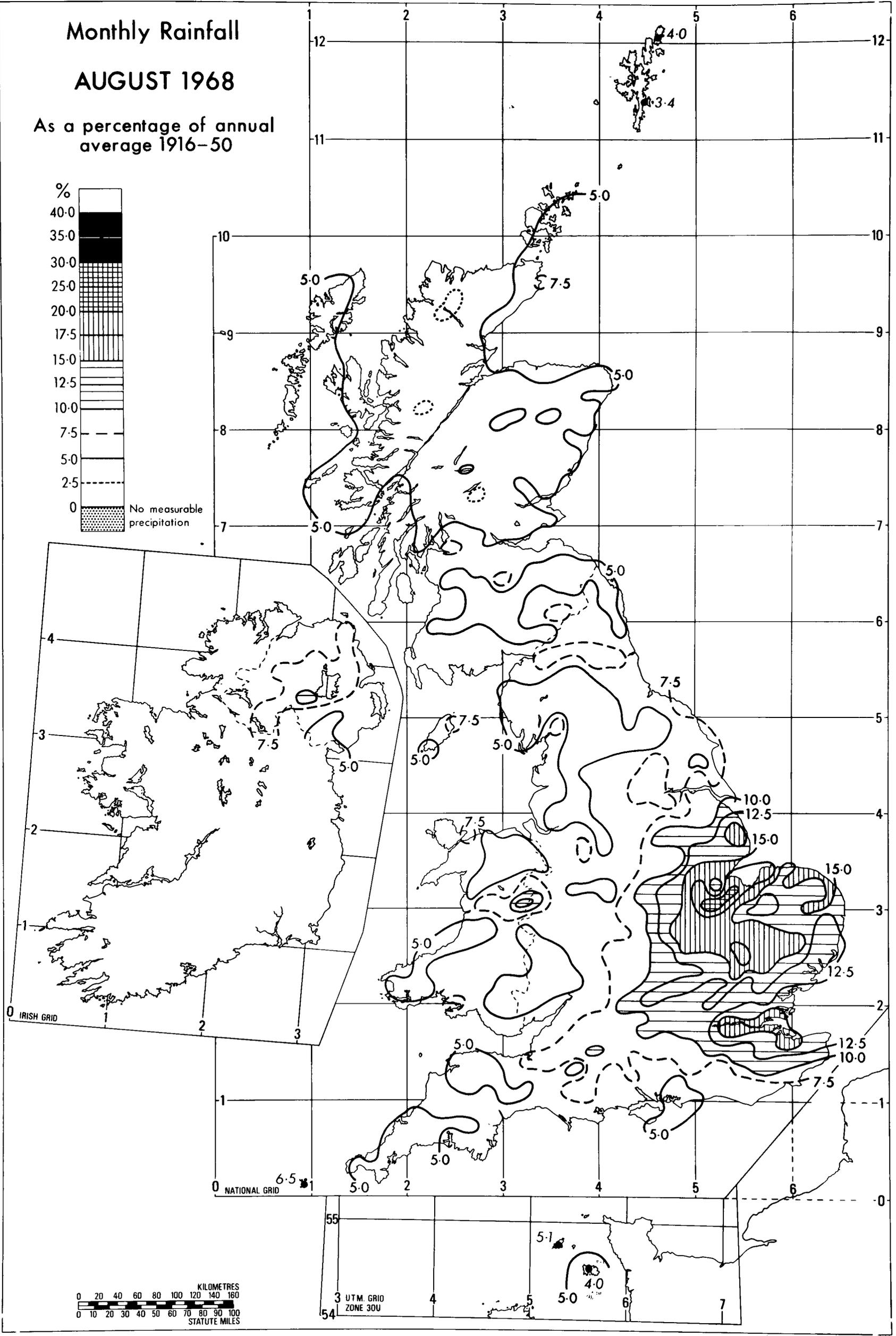
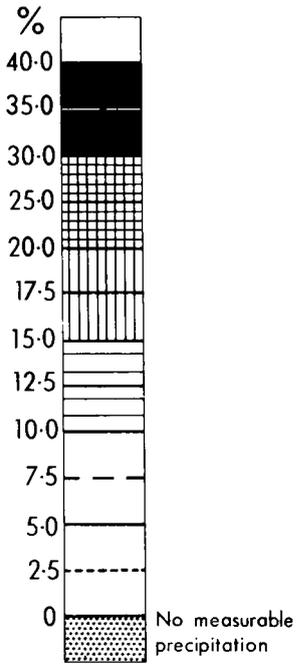
Met O Carto 21.0/444



Monthly Rainfall

AUGUST 1968

As a percentage of annual average 1916-50

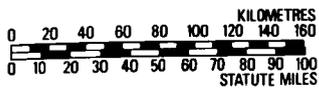
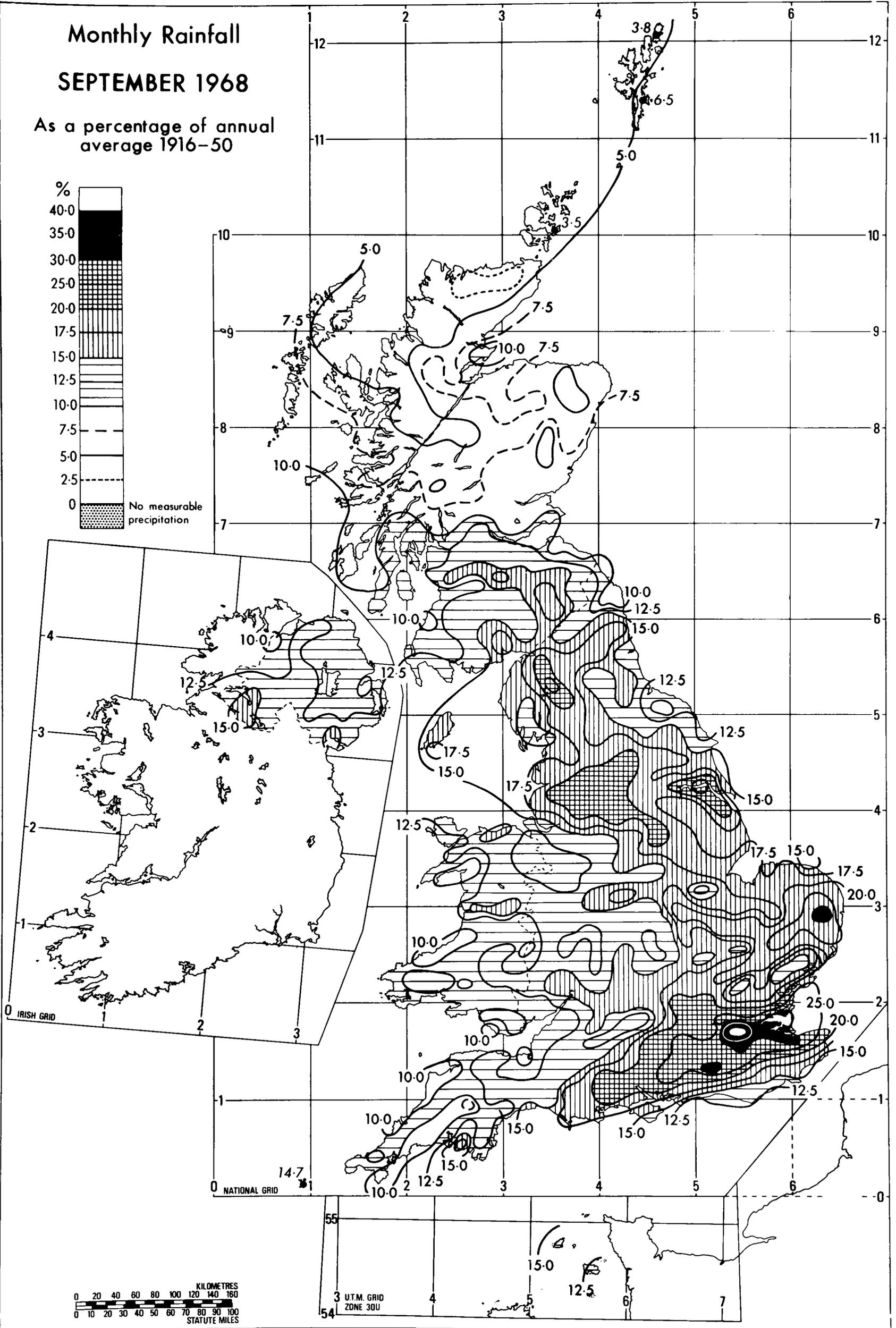
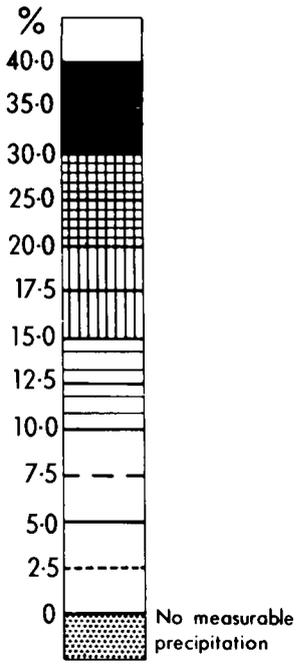


Met O. Carto. D.O. 7/44 (2)

Monthly Rainfall

SEPTEMBER 1968

As a percentage of annual average 1916-50

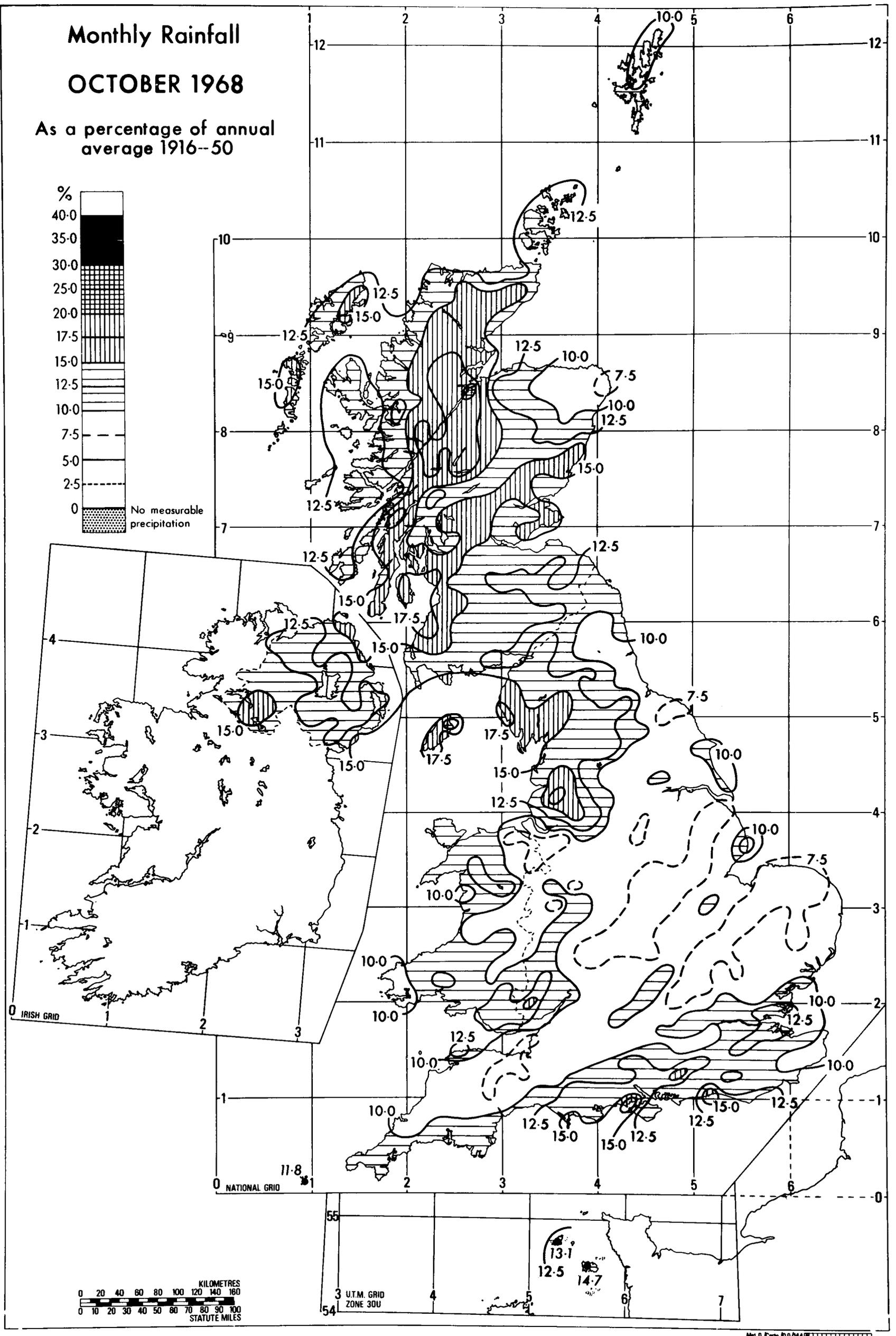
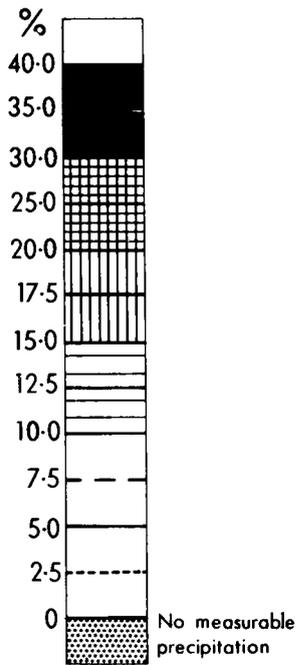


Met O Carto R 0/144

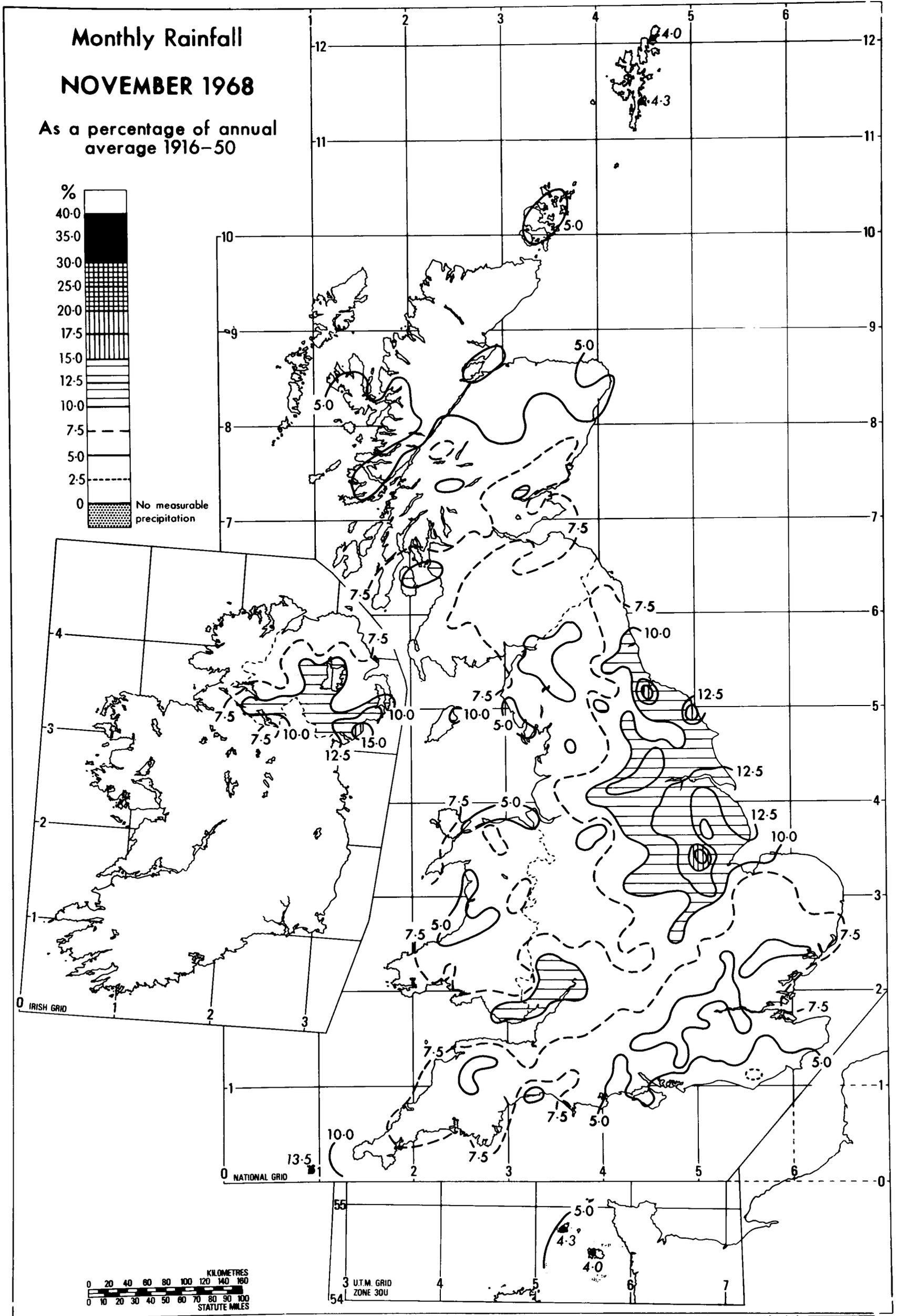
Monthly Rainfall

OCTOBER 1968

As a percentage of annual average 1916-50



Met. O. Chart No. 44

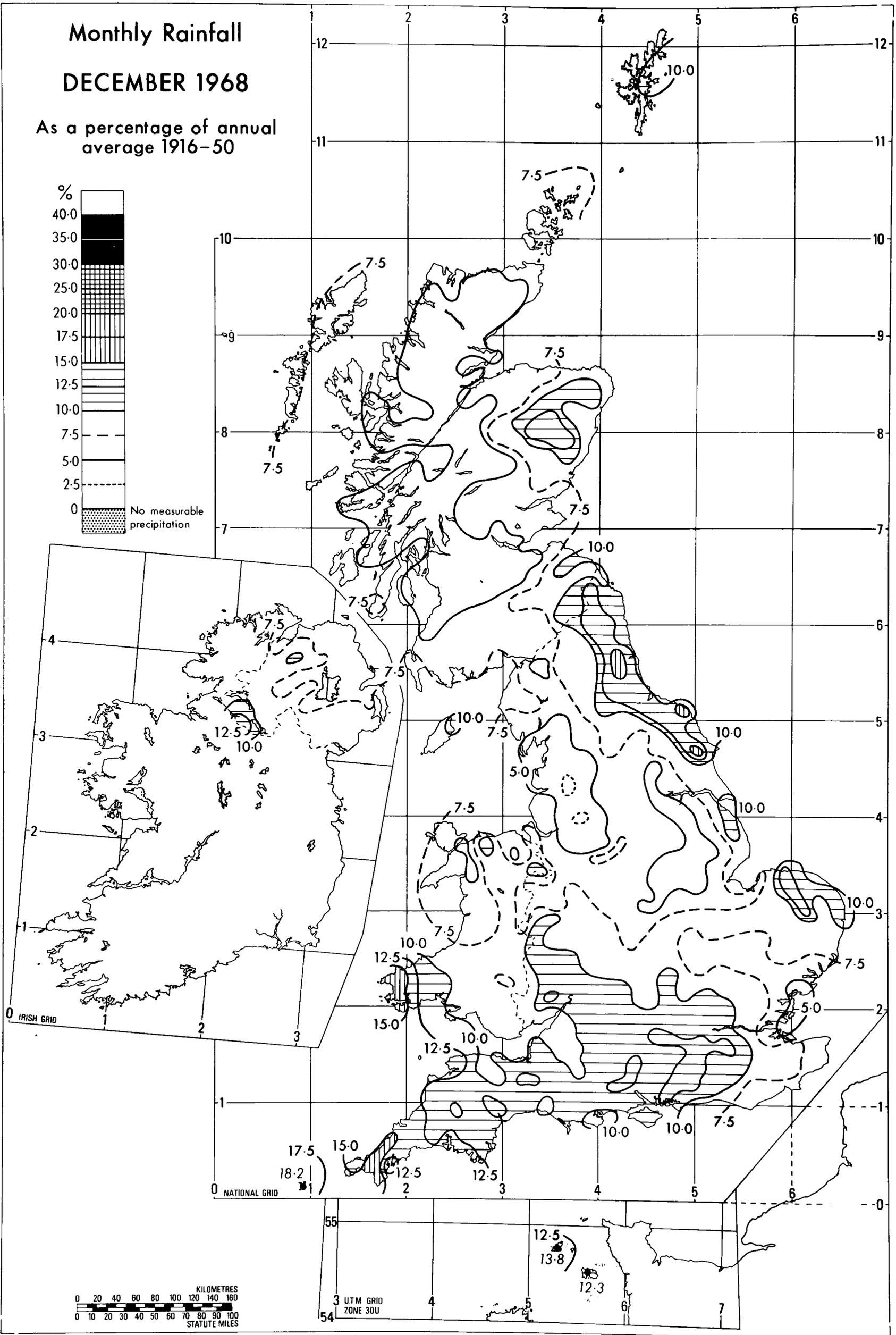
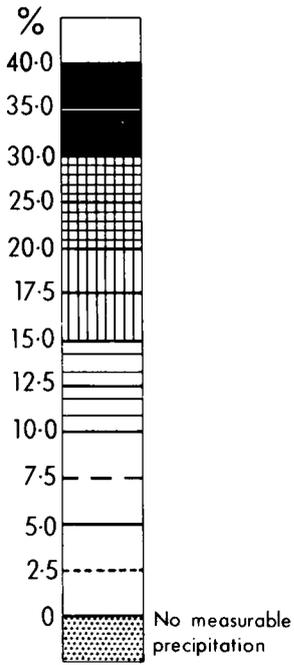


Met. O. Rep. No. 44

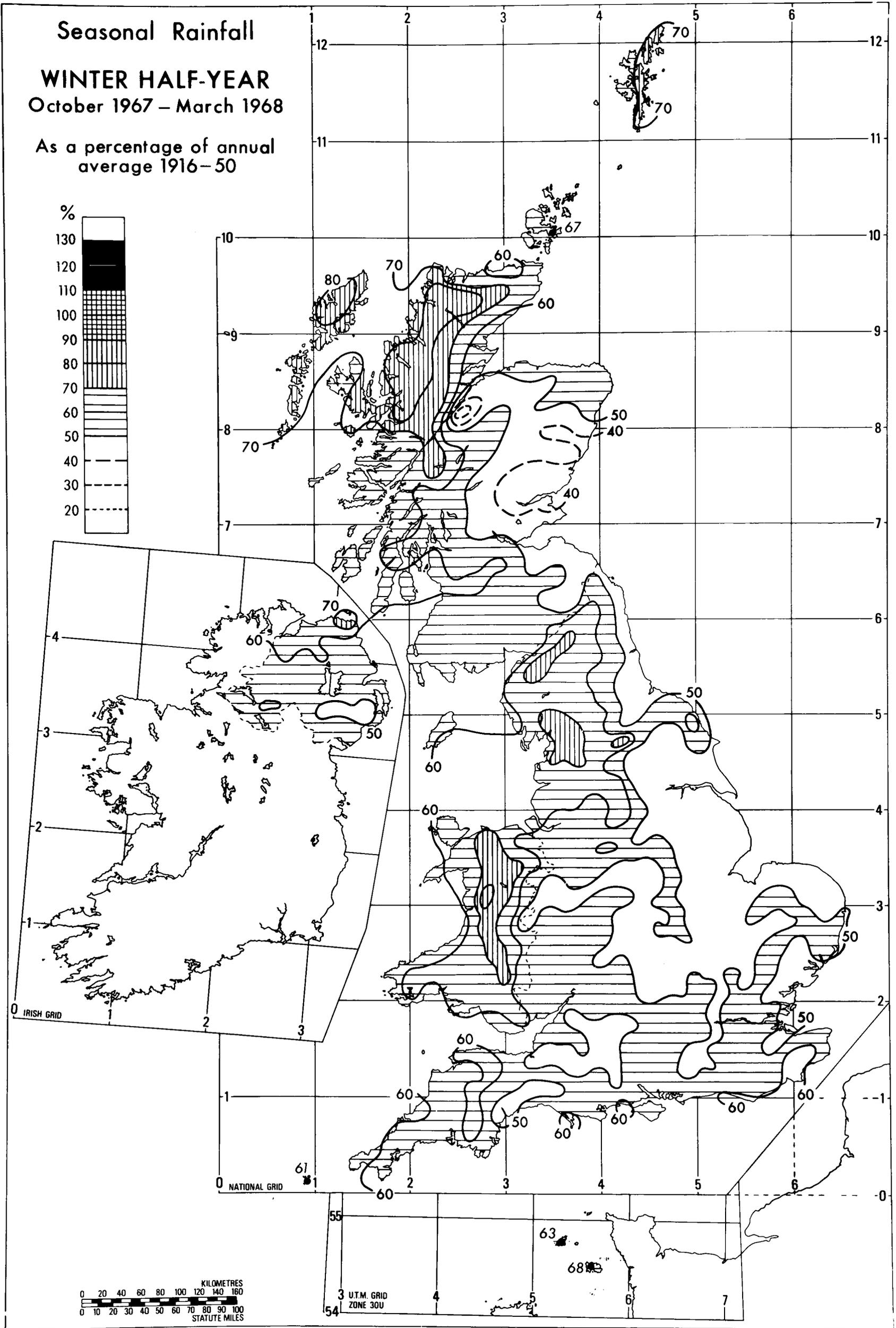
Monthly Rainfall

DECEMBER 1968

As a percentage of annual average 1916-50



Met O. Carto. D.O. 744 (8)

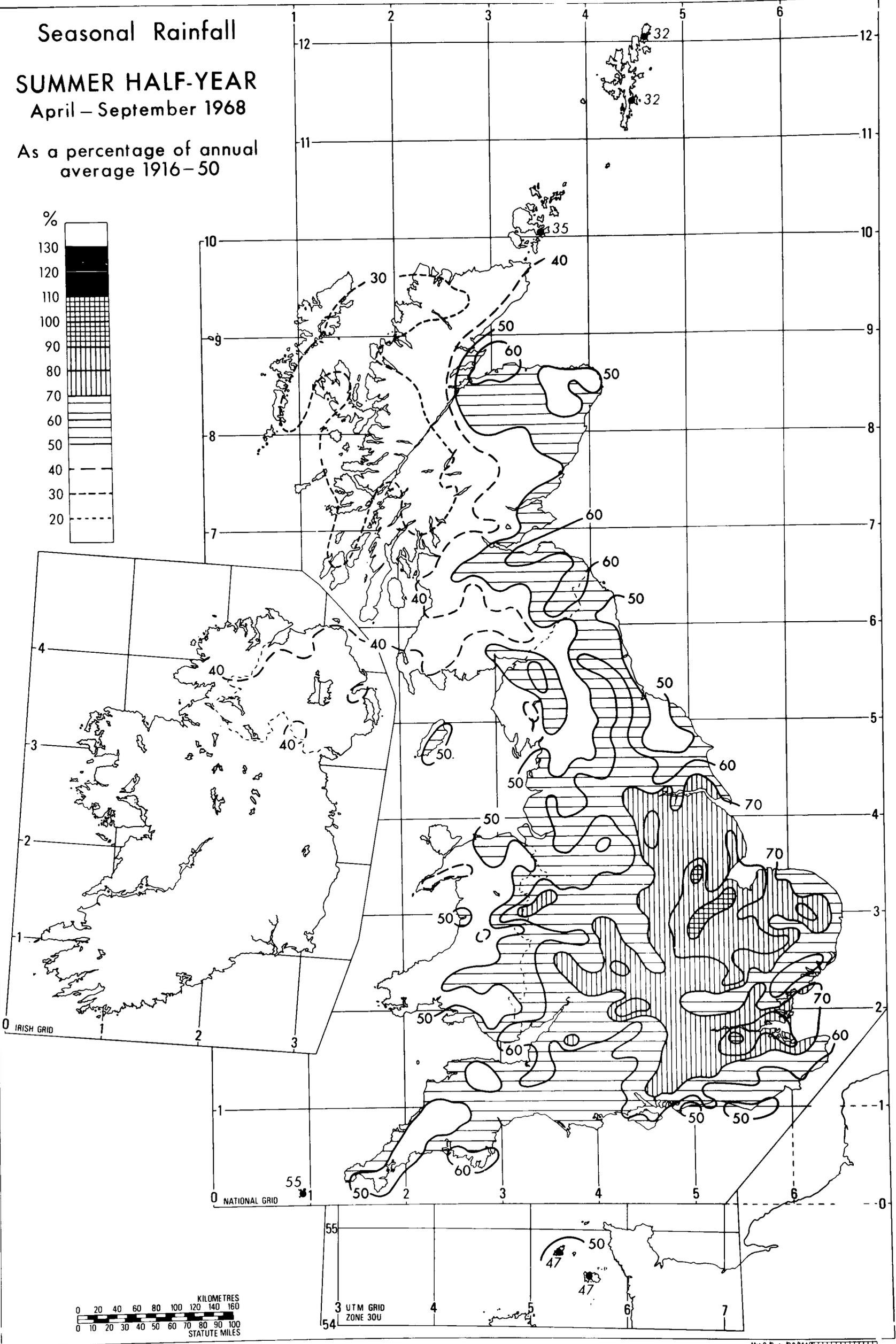
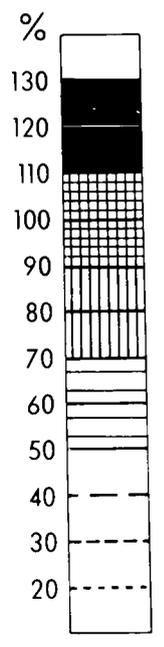


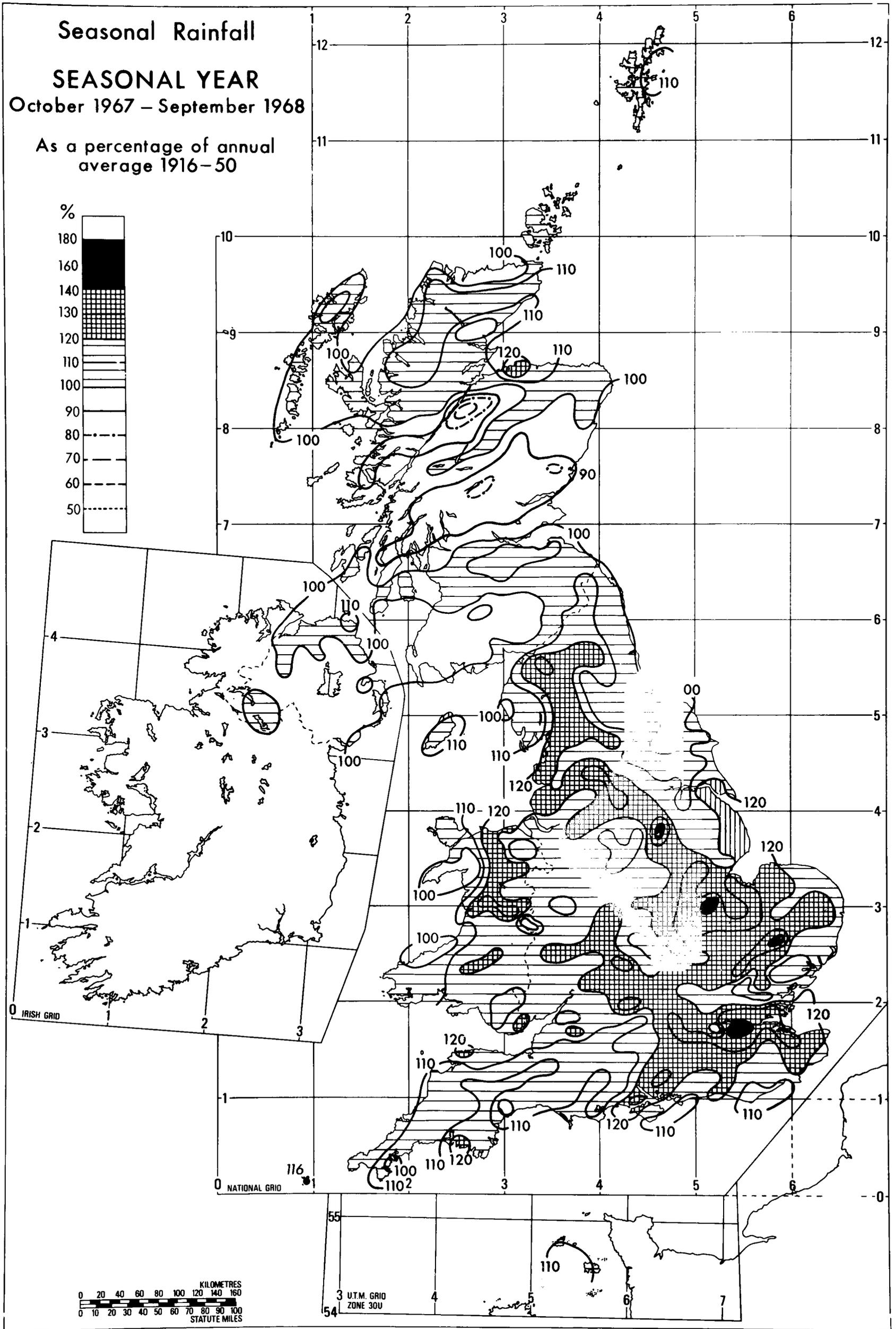
Seasonal Rainfall

SUMMER HALF-YEAR

April – September 1968

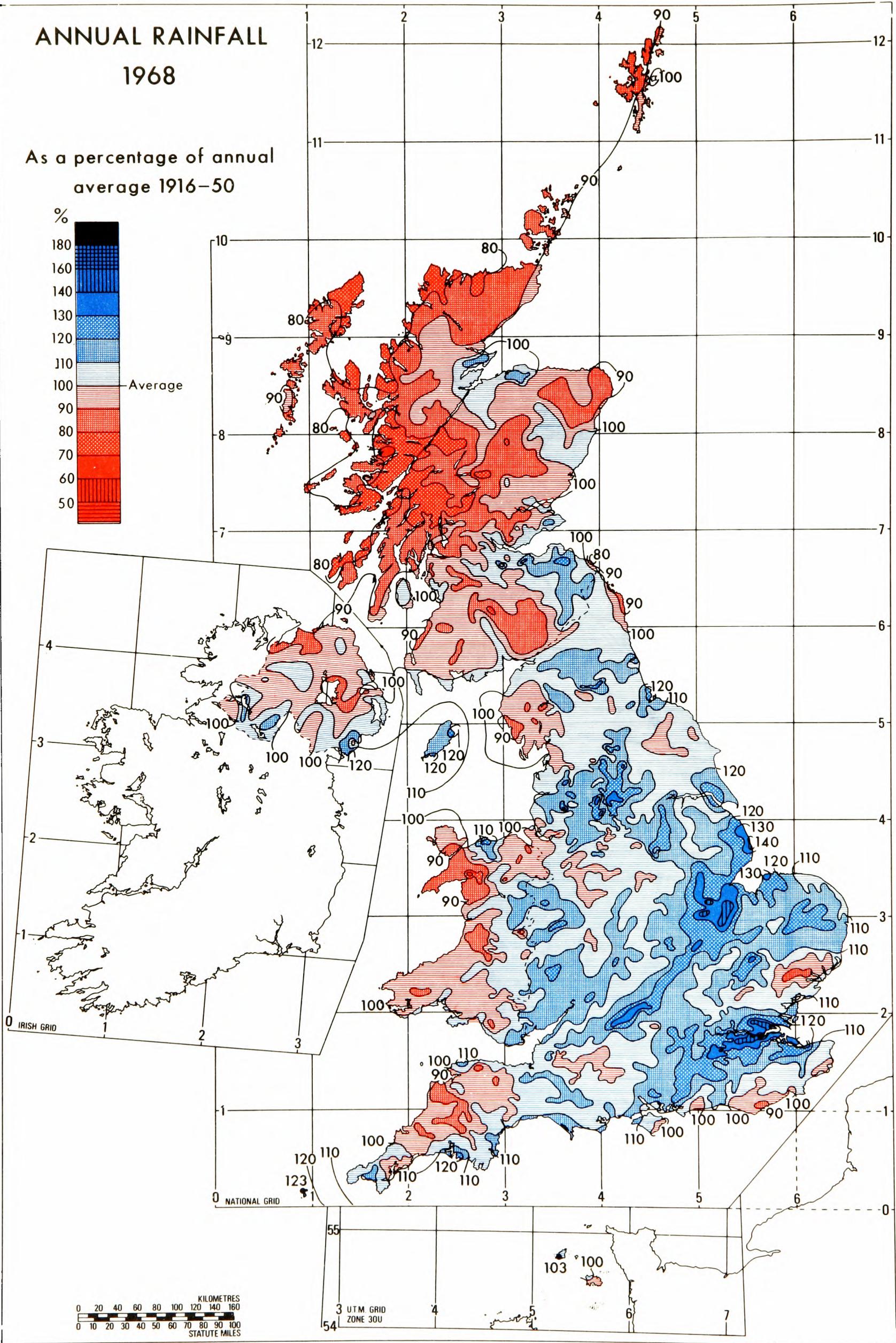
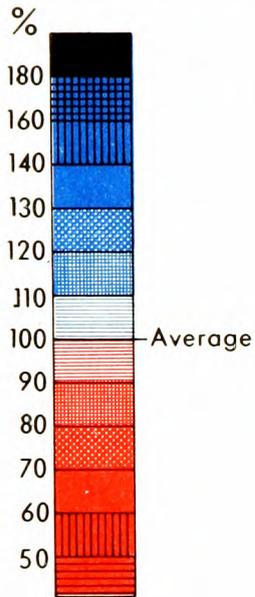
As a percentage of annual average 1916–50





ANNUAL RAINFALL 1968

As a percentage of annual average 1916-50



Met. Office, 1968, 1969

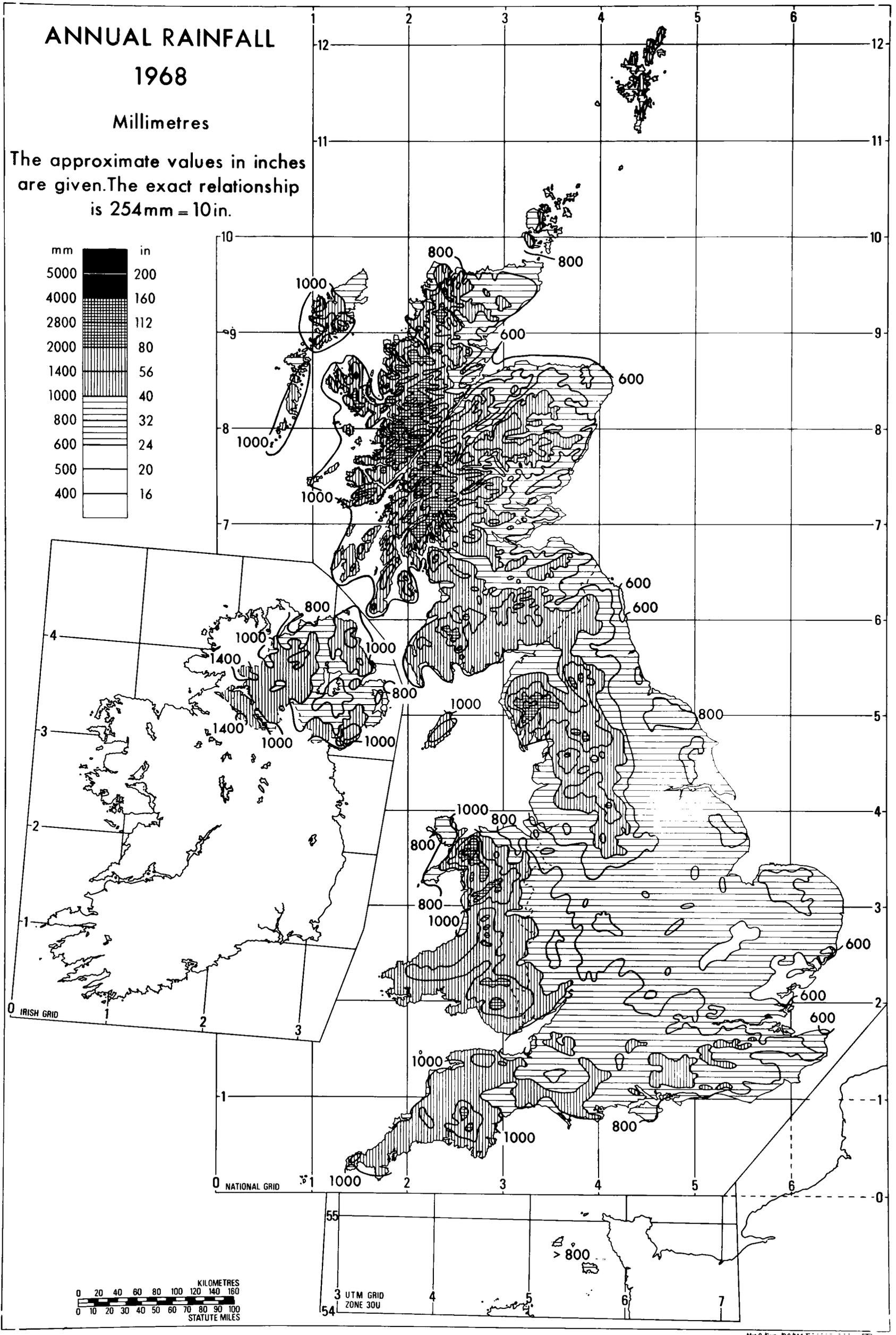
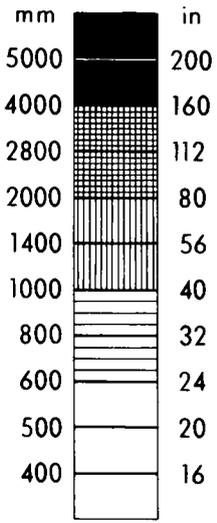
MONTHLY, ANNUAL AND SEASONAL RAINFALL

ANNUAL RAINFALL

1968

Millimetres

The approximate values in inches are given. The exact relationship is 254mm = 10in.



Met O. Carte D.O. 144

3 SPELLS OF RAINFALL DEFICIENCY AND EXCESS

The reasons why tabulations of occurrences of droughts and dry spells, or wet spells and rain spells based, prior to 1961, on a set of arbitrary criteria are considered unsatisfactory have been discussed in *British Rainfall* 1961. Accordingly, a method was introduced for examining spells of rainfall deficiency and excess without dependence on fixed or arbitrary definitions.

For any station, cumulative amounts of rainfall at intervals throughout the year are first expressed as percentages of average annual rainfall, and then as departures from the percentage amounts which would accumulate at a uniform rate corresponding to the average. The results may be conveniently plotted at five-day intervals (pentads) as in the graphs which follow. Beside each graph are included relevant details of rainfall during the year.

Approximately horizontal sections in these graphs correspond to rainfall at more or less the average rate for the station. Significantly descending sections represent rainfall deficiency spells, with a limiting slope corresponding to no rain at all. Ascending sections, for which there is no accurately assignable limiting slope, represent periods of excess; during thundery spells, particularly in areas with low average rainfall, the rise from one point to the next may be very steep. The zero line is arbitrary and a new start may be made at any point in the year by an appropriate zero shift without any change in the shape of the curve. Graphs for successive years may be joined together by simply joining the curves, with any appropriate adjustments of zero lines.

Used either singly or, if required, in combination, graphs of this type can help to overcome very largely some of the disadvantages of working constantly with the conventional divisions of the year into months and seasons. Though it is convenient and in some ways necessary to use these divisions, far more often than not it turns out that there is a meteorologically arbitrary element about the point of separation of one such period from another. In arranging the material given in the table and maps of Section 2, in particular, it is almost impossible to avoid imputing to individual months and seasons quite separate meteorological identities which in fact they rarely possess. The graphs provide a useful way of showing how the characteristics dominant at the end of one month or season often run on into the next. A sufficient body of data analysed on these lines would indicate when decisive changes most frequently occur, and would probably help, for instance, to determine whether there is any specially advantageous month to be chosen as the beginning of that 'seasonal year' which would be most meaningful in relation to rainfall and perhaps also evaporation and other elements in the hydrological cycle.

In fact the most serious weakness of this form of presentation is that it refers to percentage rainfall in isolation. This is convenient for studies restricted to rainfall alone as it reduces to a common basis the

stations with low average rainfall and those with high average rainfall. For some purposes concerned with actual quantities of water, rather than variations relative to average, it would be better to express rainfall in absolute measure and adopt some form of combined presentation with other elements, notably evaporation.

A minor objection to this form of presentation is that when there is any degree of regular seasonal variation of rainfall underlying more random irregularities, the graph for any individual year should be taken in conjunction with the corresponding curve for average rainfall through the year. The average curve will certainly be very much flatter than the separate graphs for almost all individual years, but will not usually offer a really close approximation to a horizontal straight line. The preparation of average curves has been undertaken and a small selection was published in the *British Rainfall Supplement* 1961-1965. A larger selection is given here with data for 1968.

As for previous years, the data for 1968 are set out in Table 3A with the pentad numbers in the first column arranged for ready reference in Table 3B. The corresponding graphs for these stations are given in the same order on pages 133 to 140. Heading the details given on the right-hand side of each graph is the station name followed on the next line by the appropriate river authority and the drainage area. Some of the details give information additional to that shown in Table 3A and in the graphs themselves since the rainfall amounts for individual days within the pentads have been taken into consideration, where appropriate, to determine the full extent in days of any spell worthy of note.

Next, with each of the graphs for 1968, there is shown the corresponding graph for *average* rainfall (1916-50) calculated by pentads throughout the year. Most of these graphs fall into one of two classes which may be rather simply described, though there are one or two transitional cases which do not fall definitely into either class:

(a) In the drier parts of the country, on the eastern side of Britain, seasonal variation of rainfall is not very marked, even on the average, and one of the summer months, typically July or August, is likely to be the wettest month of the year. (This rather flat seasonal variation is often completely swamped by erratic variations in individual years.) On the average there is a slight build-up of 1 or 2 per cent excess in the first 7 or 8 pentads of the year. From some point during the first half of February onwards there is a more or less steady development of rainfall deficiency (compared with a uniform average rate throughout the year), and this eventually reaches a total deficiency of up to 8 per cent of average annual rainfall by about pentad 37 or 38 (beginning of July). Thereafter, for the rest of the year, slight excess of rainfall makes good this deficiency. The total seasonal range from greatest excess of average rainfall to greatest deficiency does not reach as much as 10 per

cent of average annual rainfall and is usually about 6 to 9 per cent.

(b) In the wetter parts of the country, especially the mountainous areas in the west and north, there is a much more pronounced seasonal variation of average rainfall, which may not be completely swamped by erratic variations in individual years. The build-up of excess rainfall (compared with a uniform average rate) in the early part of the year is larger, yielding an excess which by the first half of February may reach 5 per cent of average annual rainfall. The development of rainfall deficiency from then onwards goes on much longer, since in these areas July and August though on the average wet, are by no means the wettest months of the year; there is a late summer and autumn increase to a winter maximum. The total deficiency which of course is *relative* to a much larger average annual rainfall, may exceed 8 per cent or even 10 per cent by early autumn, after

which it is made good by a pronounced excess for the rest of the year. The total seasonal *range* of average excess and deficiency, measured from a uniform average rate, is usually about 10 to 14 per cent of average annual rainfall.

For some purposes it may be useful to compare the excess and deficiency curves for individual years with these corresponding curves for *average* rainfall, instead of with the horizontal base line, which represents a strictly uniform rate of average rainfall throughout the year. The degree of usefulness must of course depend on the stability of average seasonal distribution of rainfall, which in the drier parts of the country is poor. In the wetter parts of the country departure from 'expectation' rather than from the uniform average rate will certainly have a more definite meaning.

SPELLS OF RAINFALL DEFICIENCY AND EXCESS

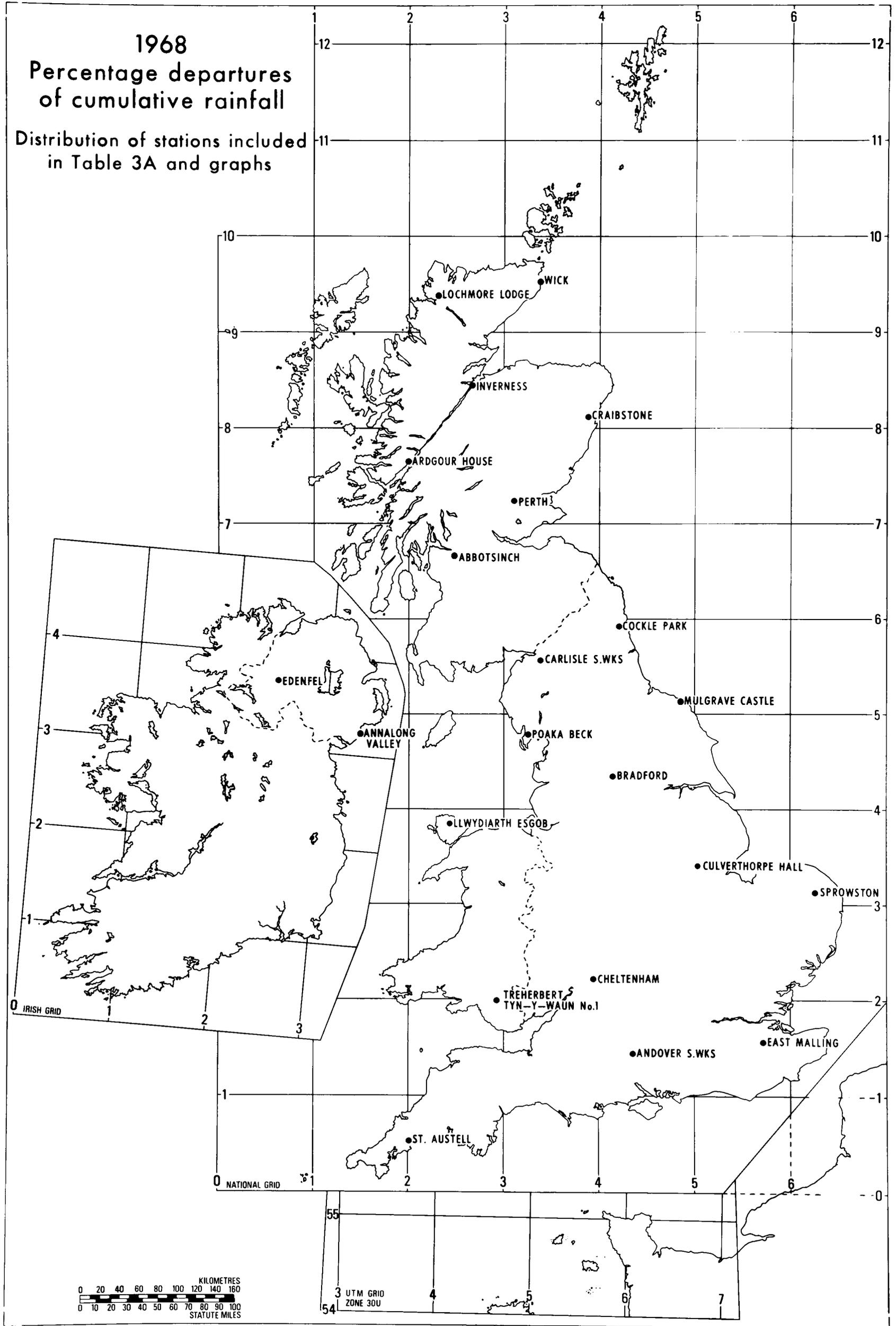


TABLE 3B

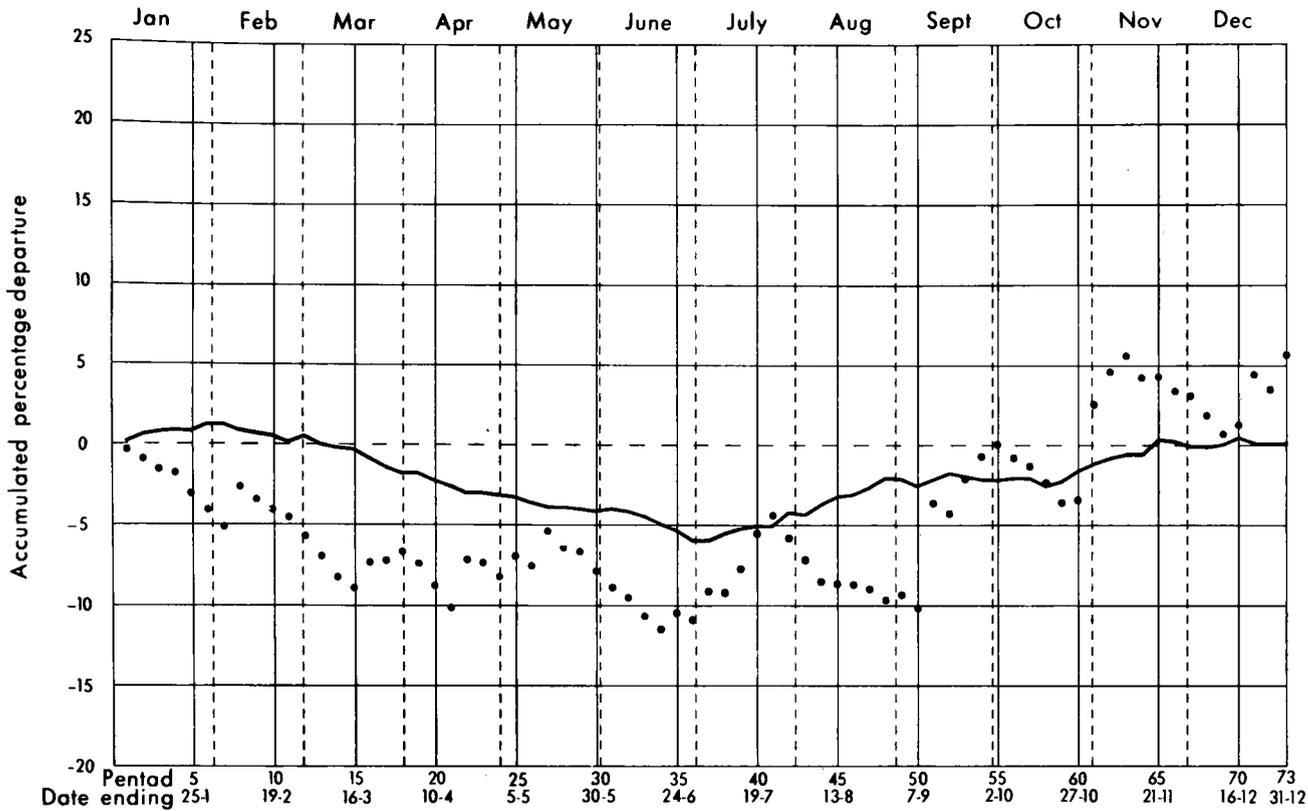
The calendar year divided into 73 five-day groups, or pentads

Date	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Date
1			12					43			61	67	1
2		7				31	37		49	55			2
3	1			19	25								3
4			13								62	68	4
5									50	56			5
6								44					6
7		8				32	38						7
8	2			20	26								8
9			14								63	69	9
10									51	57			10
11								45					11
12		9				33	39						12
13	3			21	27								13
14			15								64	70	14
15									52	58			15
16								46					16
17		10				34	40						17
18	4			22	28								18
19			16								65	71	19
20									53	59			20
21								47					21
22		11				35	41						22
23	5			23	29								23
24			17								66	72	24
25									54	60			25
26								48					26
27		12				36	42						27
28	6			24	30								28
29		φ	18								67	73	29
30		×				37	43		55	61			30
31	7	×		×	31	×		49	×		×		31

φ In a leap year 29 February is counted as 28 February, i.e. the total rainfall is credited to the 28th.

SPELLS OF RAINFALL DEFICIENCY AND EXCESS

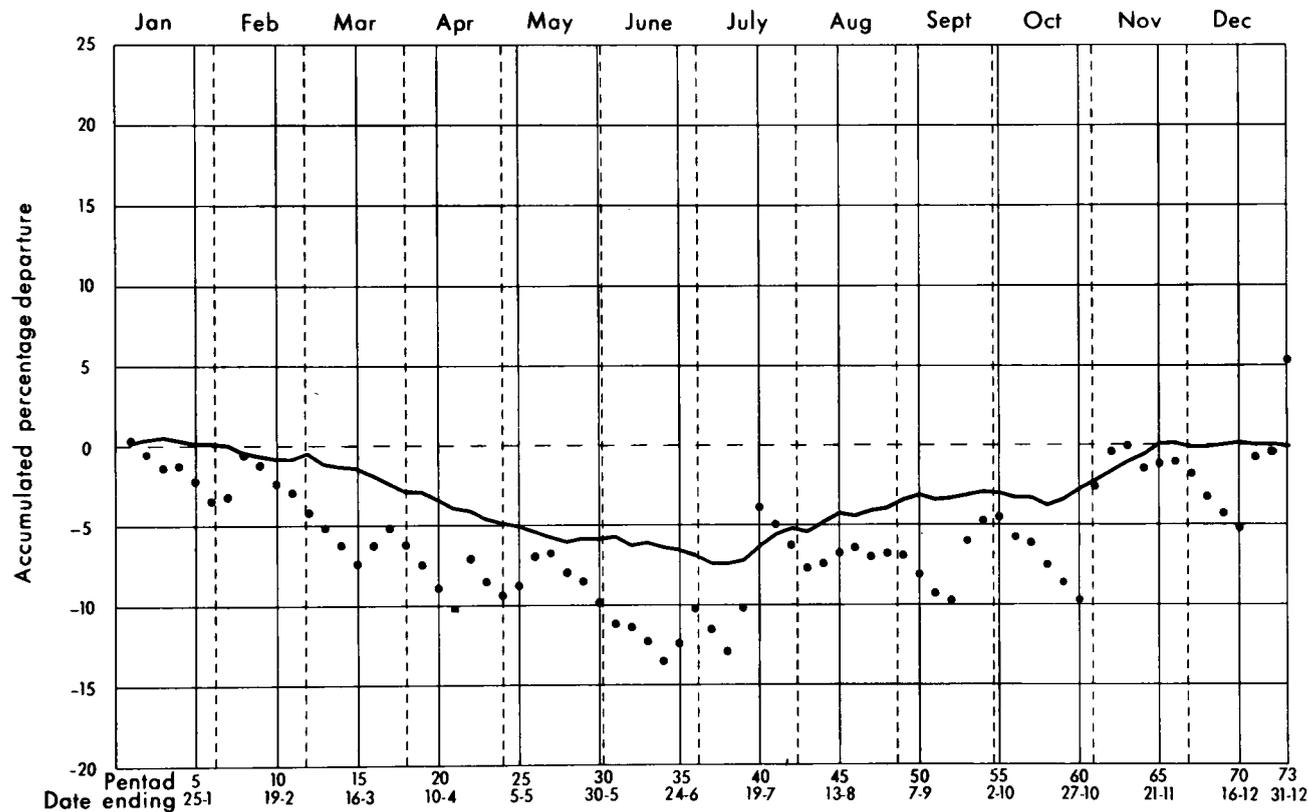
Graphs for stations in Table 3A



Cockle Park

Northumbrian, Coastal
A.a.r. 730 mm

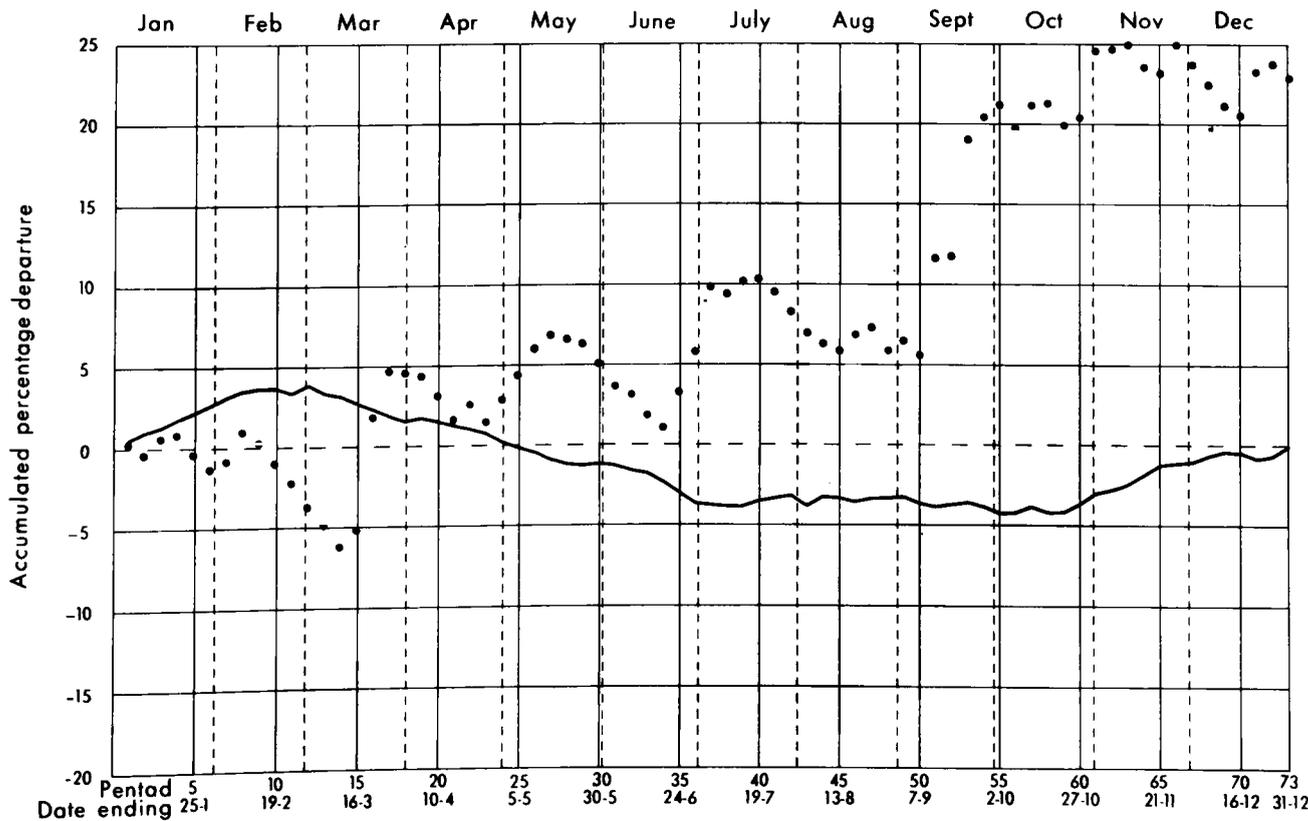
No rain 19 days from 24/7 to 11/8
1.1 mm 14 days from 2/4 to 15/4
3.0 mm 16 days from 11/10 to 26/10
3.8 mm 20 days from 23/2 to 13/3



Mulgrave Castle

Yorkshire Ouse and Hull, Coastal
A.a.r. 735 mm

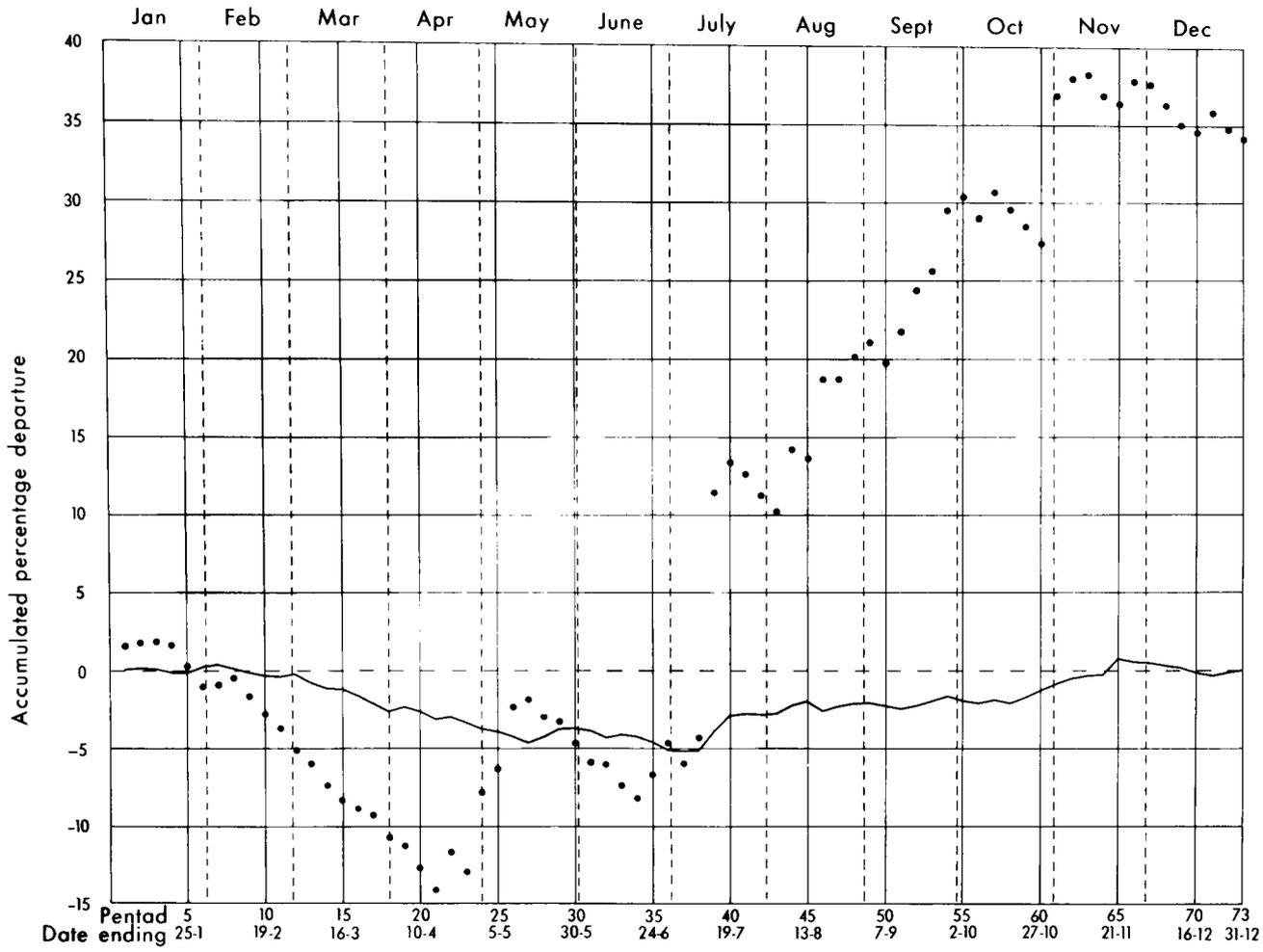
No rain 14 days from 21/2 to 5/3
2.1 mm 15 days from 1/12 to 15/12
2.4 mm 15 days from 12/10 to 26/10
2.7 mm 22 days from 25/3 to 15/4



Bradford

Yorkshire Ouse and Hull, Clayton (Aire)
A.a.r. 853 mm

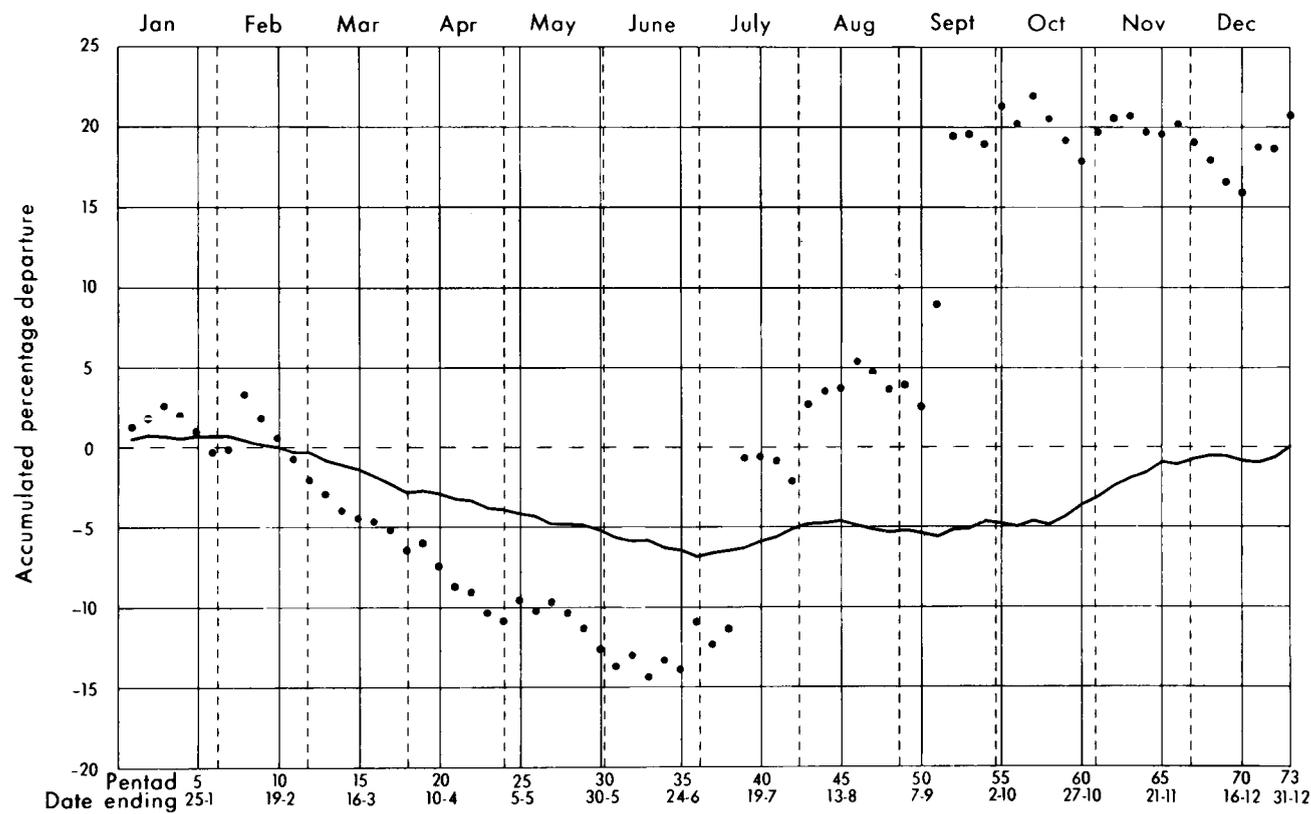
No rain 12 days from 20/8 to 31/8
2.4 mm 15 days from 29/11 to 13/12
4.1 mm 28 days from 14/2 to 12/3



Culverthorpe Hall

Lincolnshire, South Forty Foot
(Witham)
A.a.r. 604 mm

No rain 13 days from 3/4 to 15/4
1.8 mm 16 days from 19/1 to 3/2
1.8 mm 15 days from 30/11 to 14/12
2.3 mm 19 days from 23/2 to 12/3
103.9 mm 5 days from 10/7 to 14/7

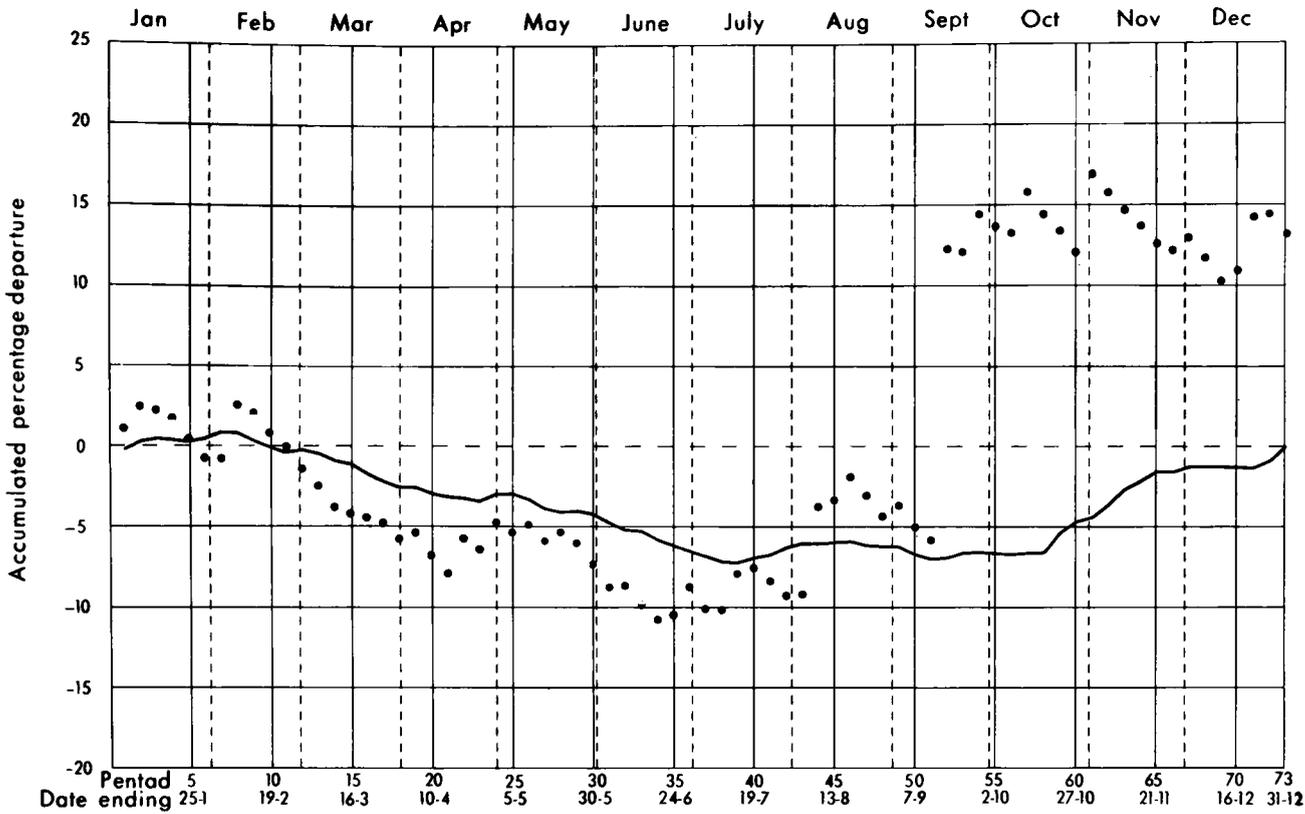


Sprowston

East Suffolk and Norfolk, Bure
(Yare)
A.a.r. 645 mm

No rain 15 days from 13/10 to 27/10
1.1 mm 23 days from 10/2 to 4/3
76.0 mm 2 days from 15/9 to 16/9

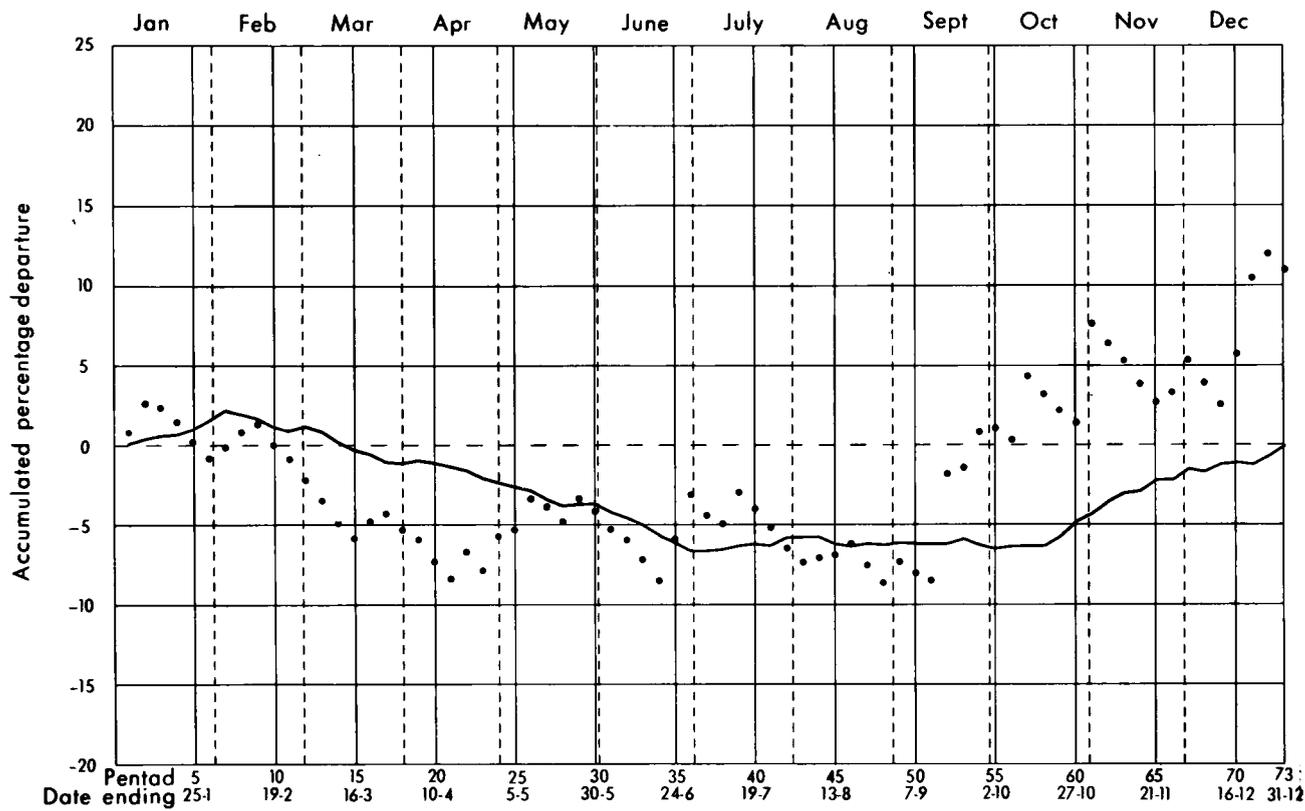
SPELLS OF RAINFALL DEFICIENCY AND EXCESS



East Malling

Kent, Medway
A.a.r. 682 mm

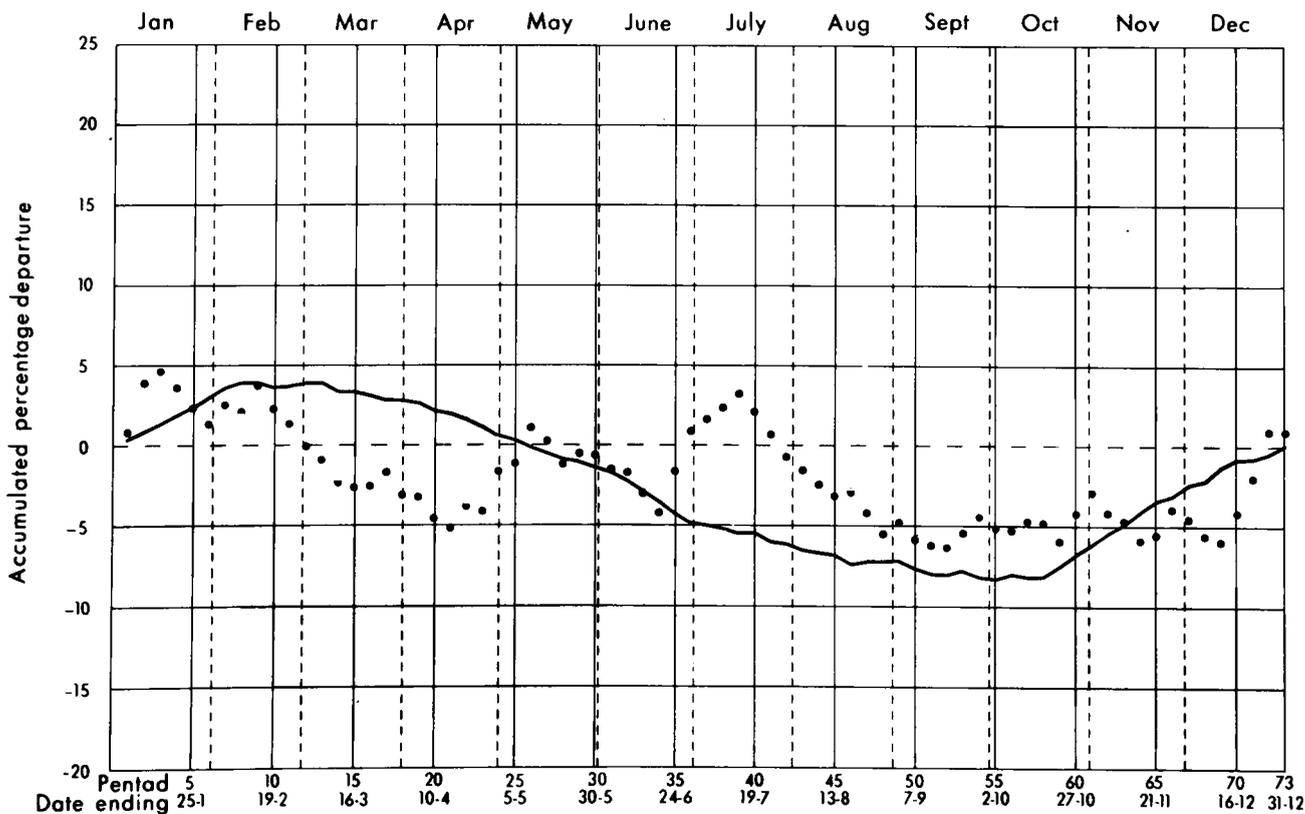
1.1 mm 15 days from 30/11 to 14/12
7.0 mm 28 days from 14/2 to 12/3
128.5 mm 3 days from 13/9 to 15/9



Andover S. Wks

Hampshire, Anton (Test)
A.a.r. 750 mm

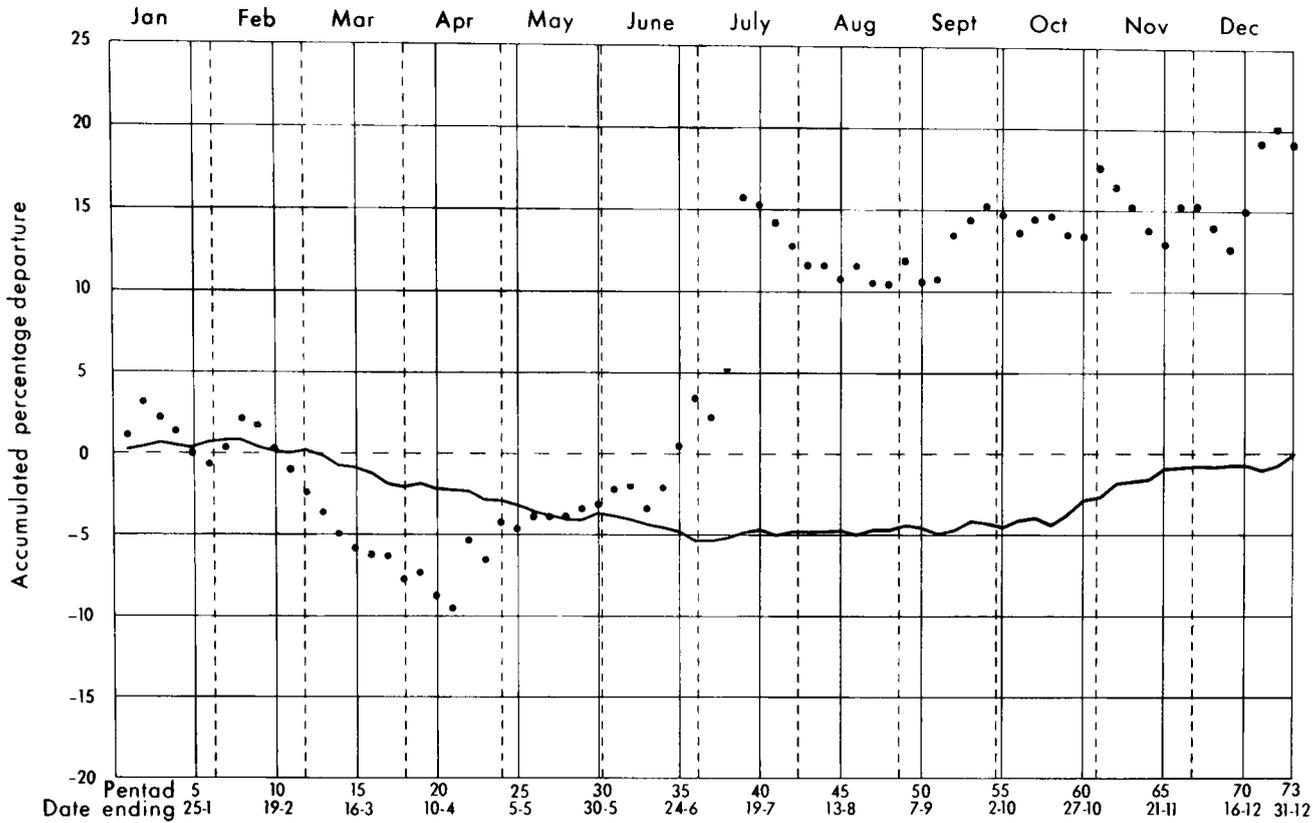
0.5 mm 14 days from 1/12 to 14/12
4.6 mm 28 days from 14/2 to 12/3



St Austell

Cornwall, Coastal
A.a.r. 1232 mm

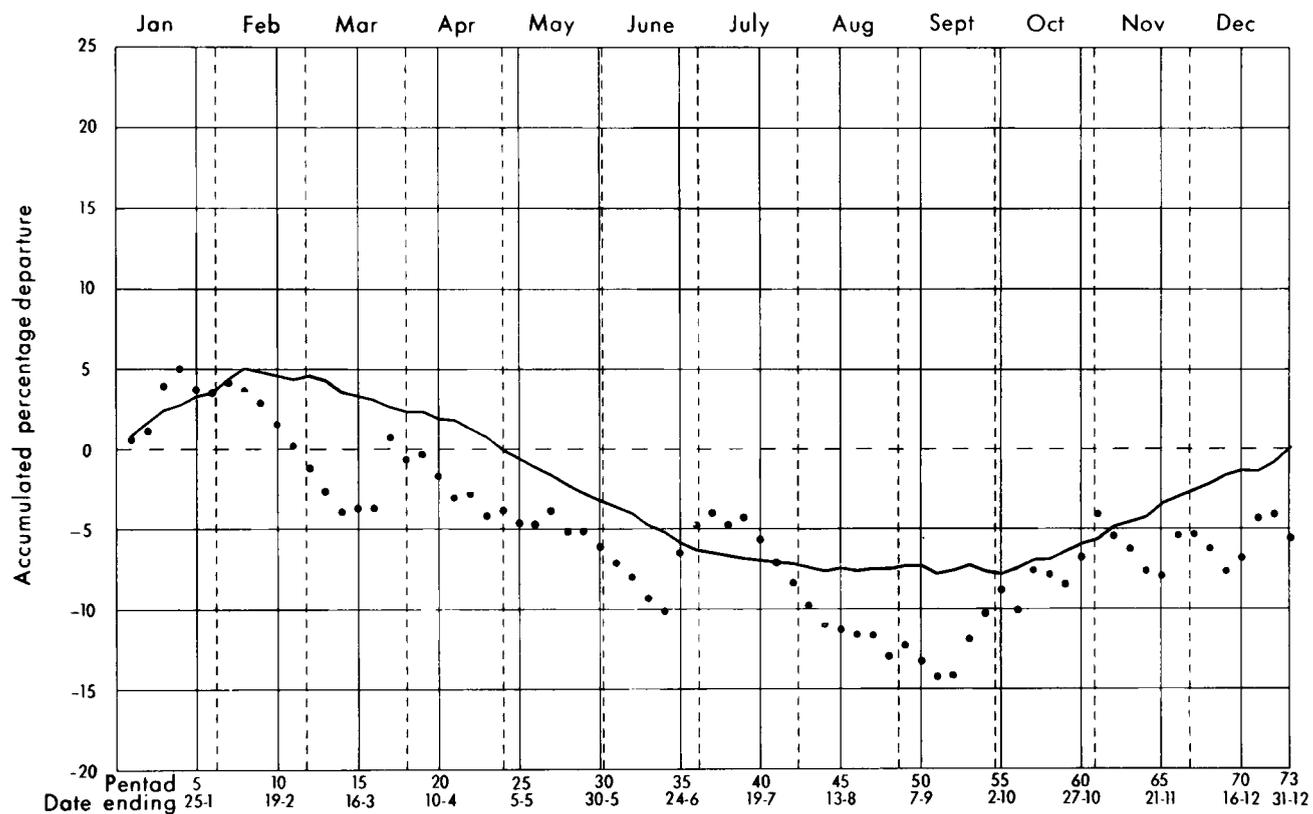
No rain 16 days from 16/7 to 31/7
11.5 mm 28 days from 15/2 to 13/3



Cheltenham

Severn, Chelt (Severn)
A.a.r. 668 mm

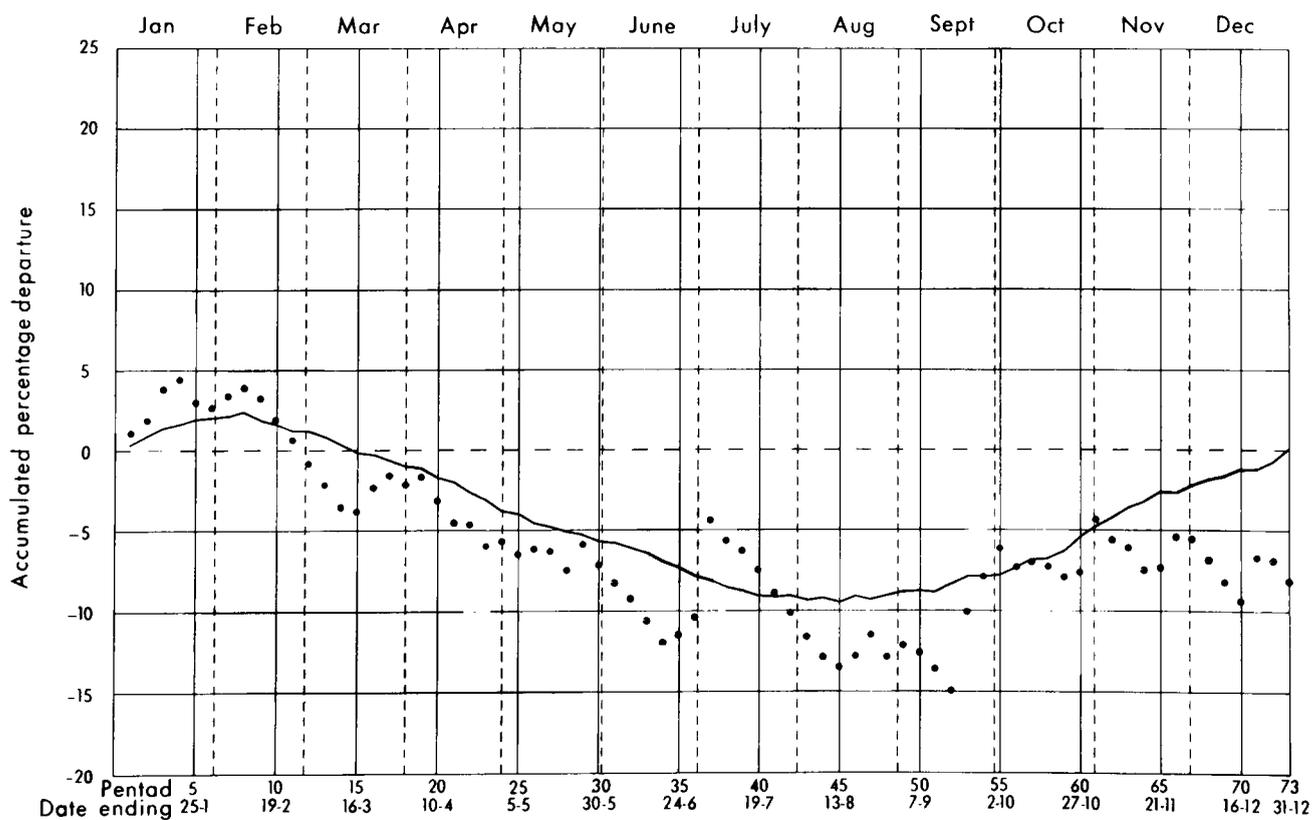
No rain 14 days from 1/12 to 14/12
1.6 mm 27 days from 15/2 to 13/3
2.6 mm 20 days from 17/7 to 5/8
101.6 mm 4 days from 7/7 to 10/7



Treherbert, Tyn-y-Waun No. 1

Glamorgan, Rhondda (Taff)
A.a.r. 2377

No rain 23 days from 14/7 to 5/8
0.3 mm 27 days from 15/2 to 12/3
138.2 mm 4 days from 13/1 to 16/1
139.6 mm 4 days from 27/10 to 30/10
175.3 mm 6 days from 21/6 to 26/6
197.1 mm 10 days from 19/9 to 28/9

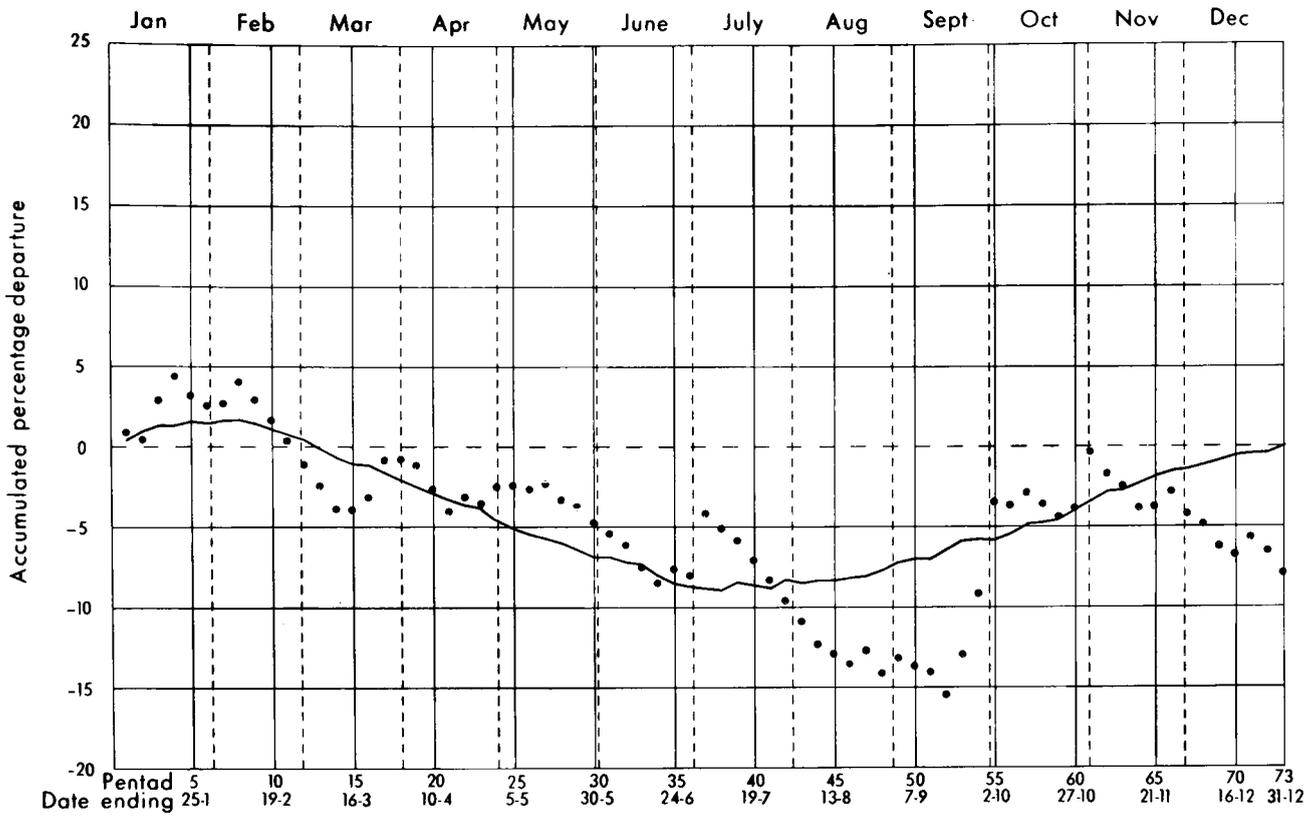


Llwydiarth Esgob

Gwynedd, Coastal
A.a.r. 1024 mm

1.0 mm 25 days from 17/2 to 12/3
1.6 mm 15 days from 29/11 to 13/12
12.1 mm 40 days from 3/7 to 11/8

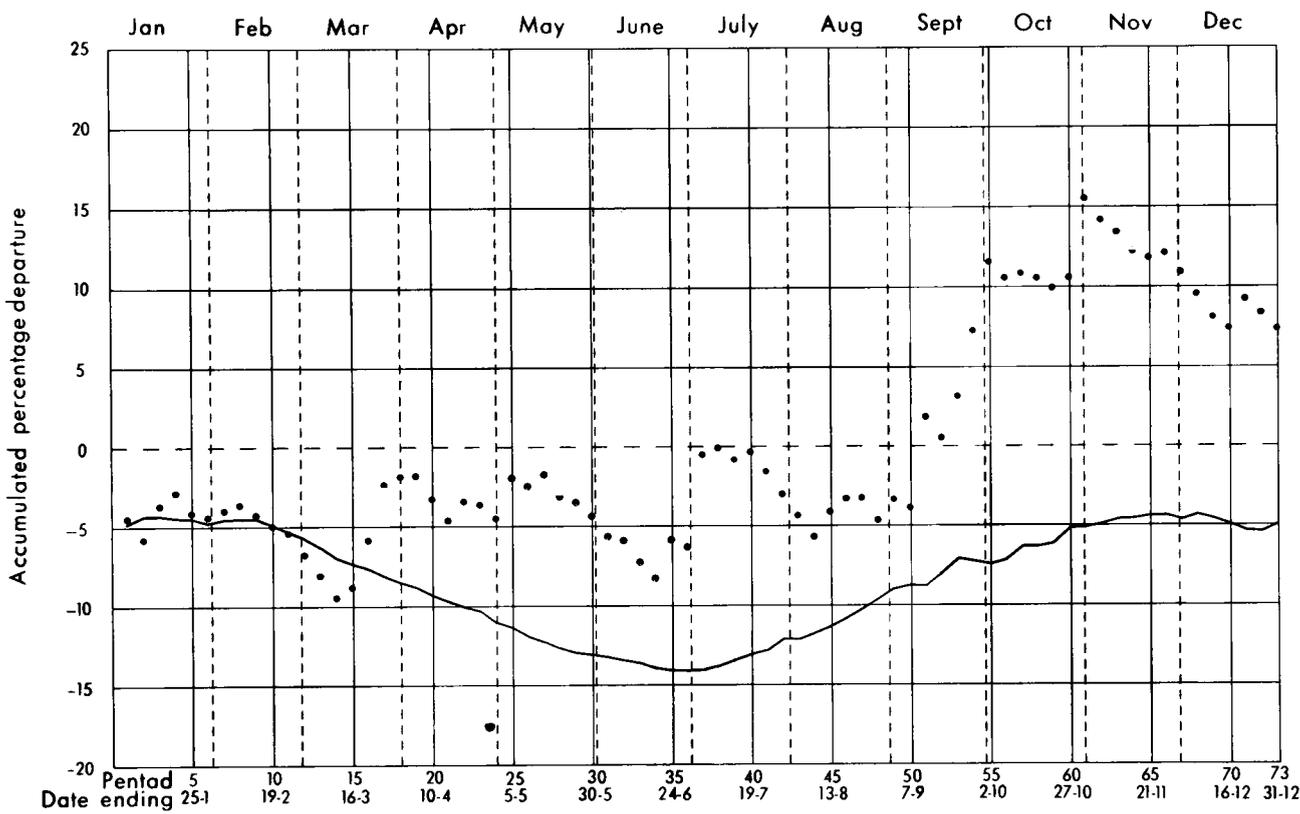
SPELLS OF RAINFALL DEFICIENCY AND EXCESS



Poaka Beck

Lancashire, Coastal
A.a.r. 1339 mm

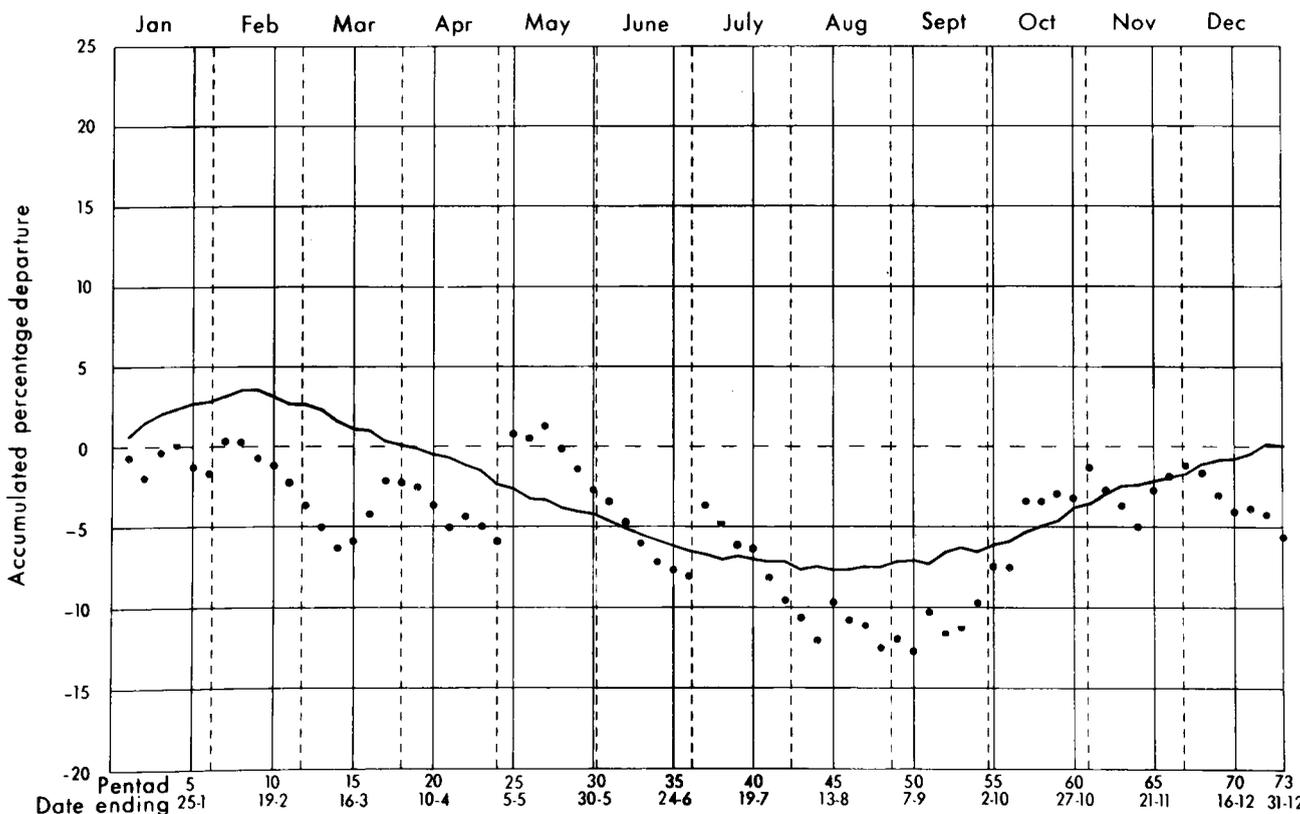
2.1 mm 29 days from 13/2 to 12/3
4.3 mm 30 days from 12/7 to 11/8
88.9 mm 3 days from 1/10 to 3/10



Carlisle S. Wks

Cumberland, Eden
A.a.r. 795 mm

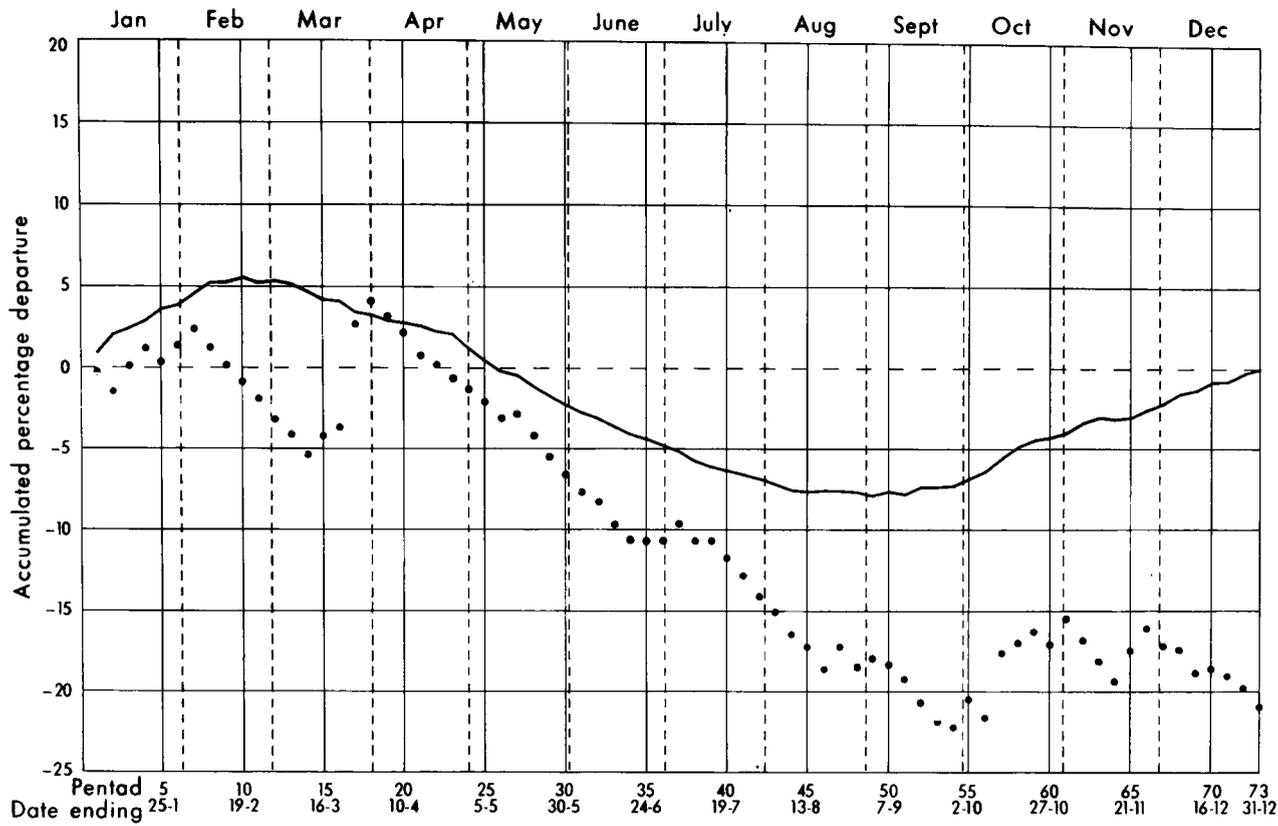
No rain 22 days from 21/7 to 11/8
No rain 17 days from 28/11 to 14/12
0.3 mm 19 days from 21/2 to 11/3



Abbotsinch

Clyde, Black Cart (Clyde)
A.a.r. 1035 mm

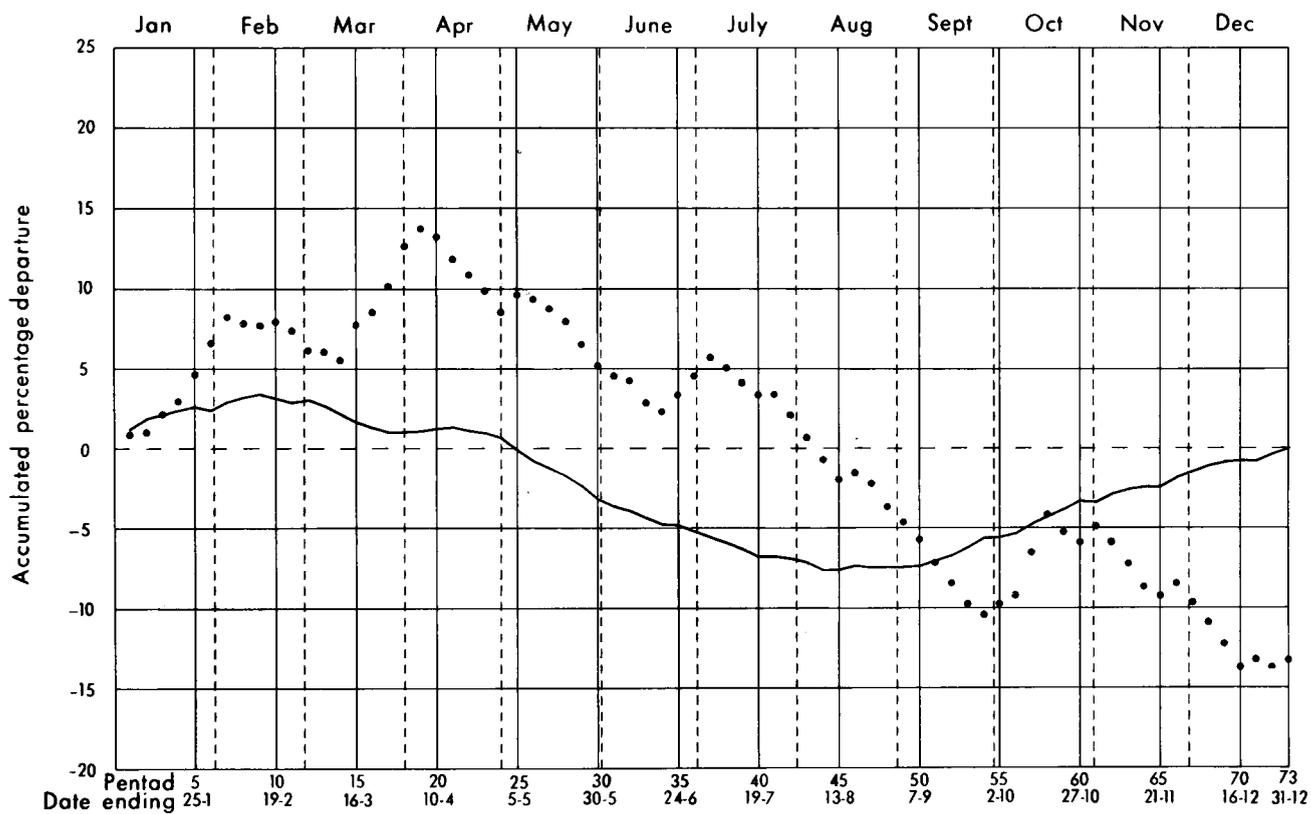
1.3 mm 16 days from 3/6 to 18/6
2.0 mm 20 days from 21/2 to 11/3
3.2 mm 22 days from 21/7 to 11/8



Ardour House

Lochy and Linnhe, Coastal
A.a.r. 2505 mm

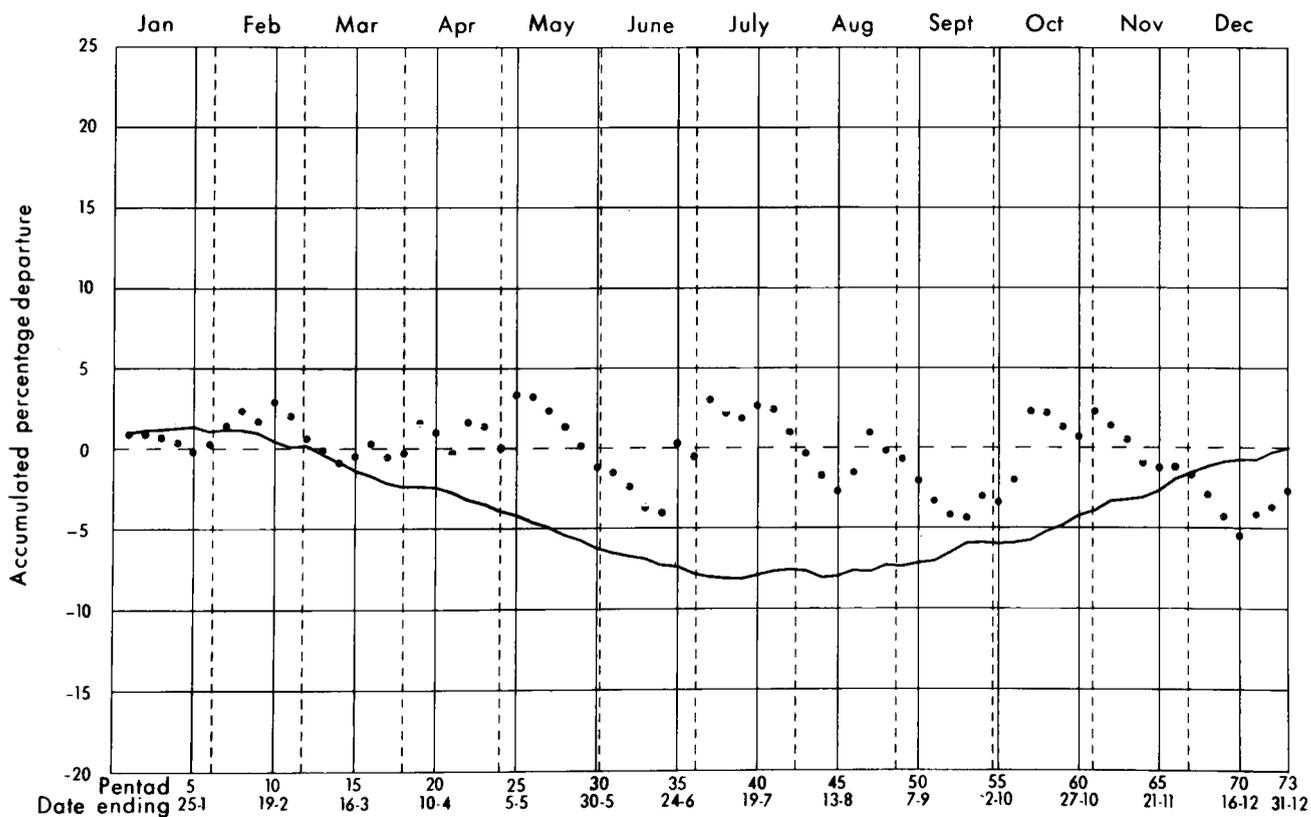
3.8 mm 18 days from 1/11 to 18/11
123.6 mm 6 days from 13/1 to 18/1
218.5 mm 2 days from 26/3 to 27/3
225.6 mm 11 days from 9/10 to 19/10



Lochmore Lodge

Laxford, Laxford
A.a.r. 1933 mm

1.8 mm 16 days from 4/11 to 19/11
2.7 mm 21 days from 24/7 to 13/8
2.8 mm 19 days from 6/9 to 24/9
116.6 mm 5 days from 26/3 to 30/3

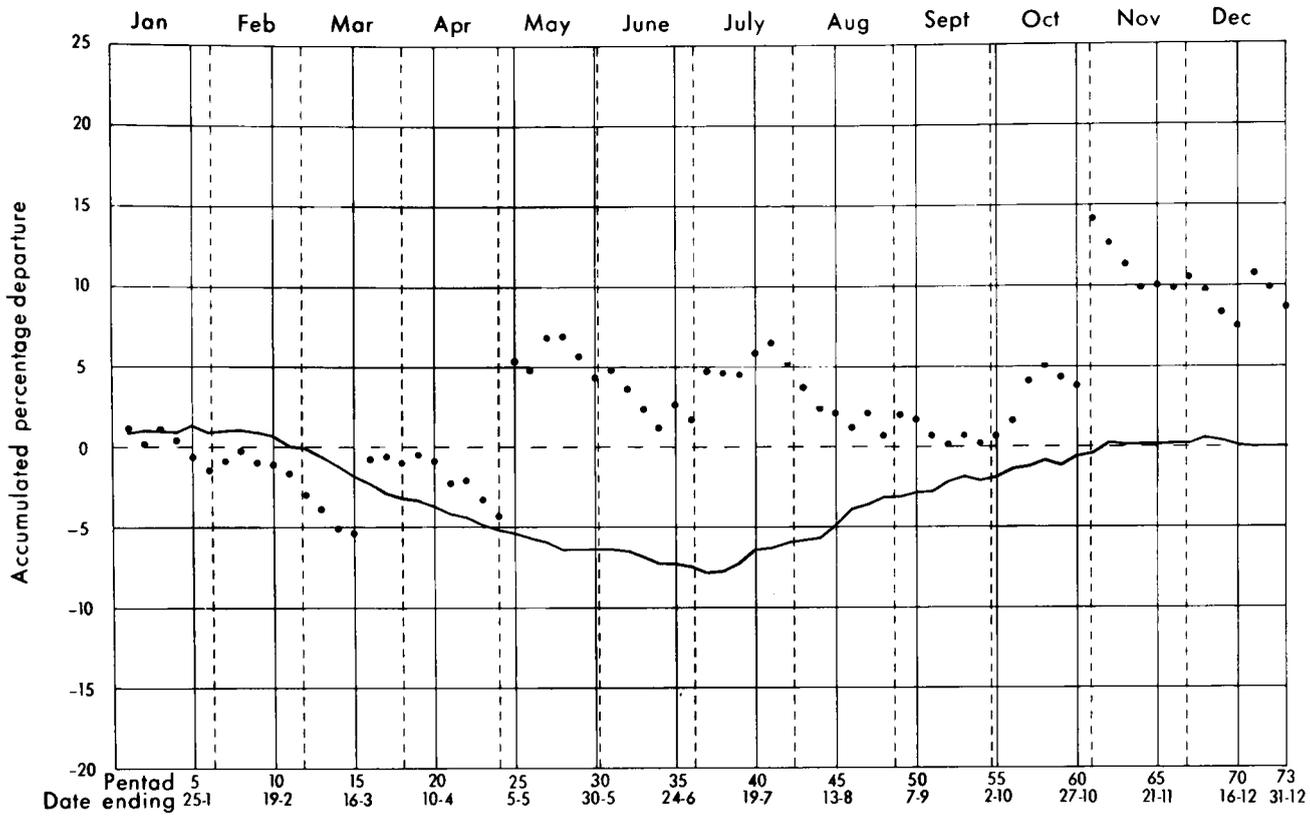


Wick

Wick Water to Conon, Wick
A.a.r. 761 mm

0.1 mm 17 days from 23/7 to 8/8
1.4 mm 15 days from 1/12 to 15/12

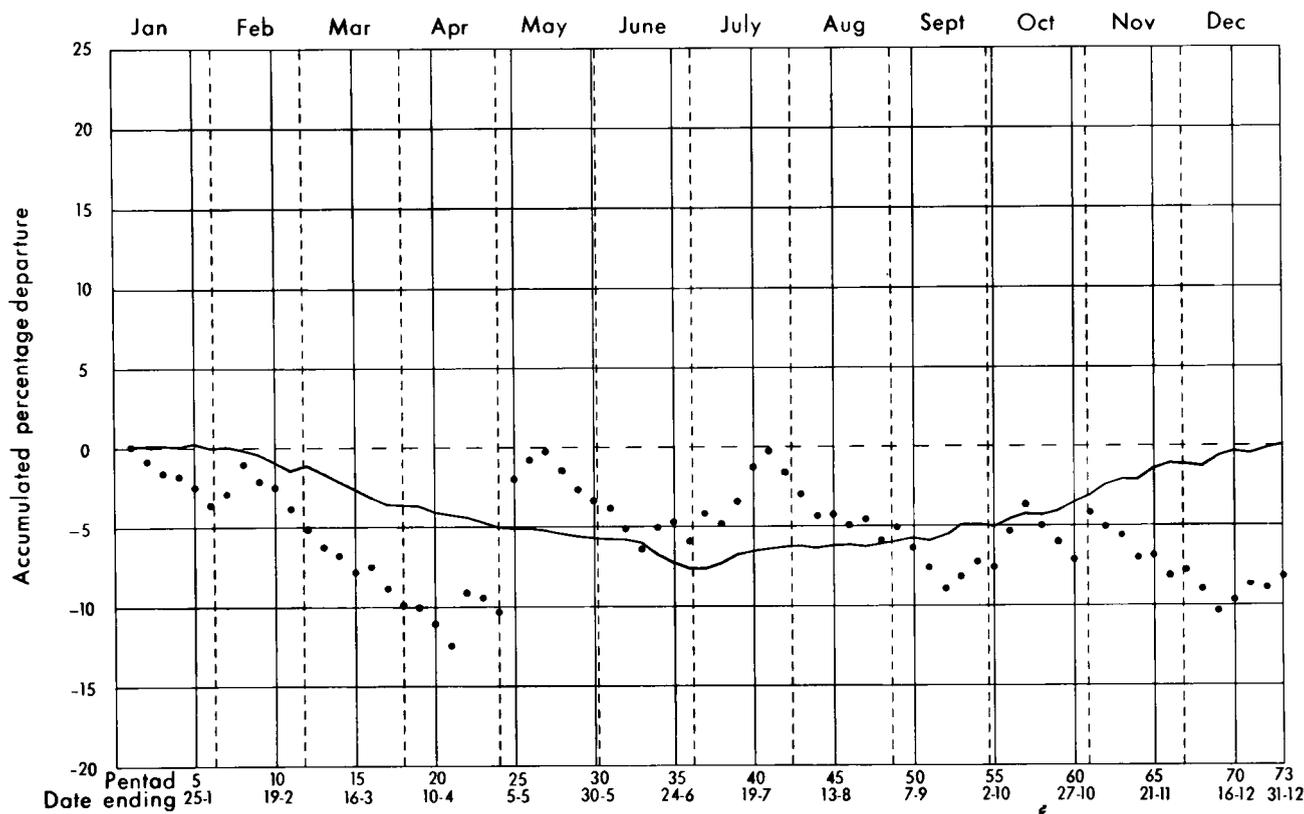
SPELLS OF RAINFALL DEFICIENCY AND EXCESS



Inverness

Beauly and Ness, Ness
A.a.r. 660 mm

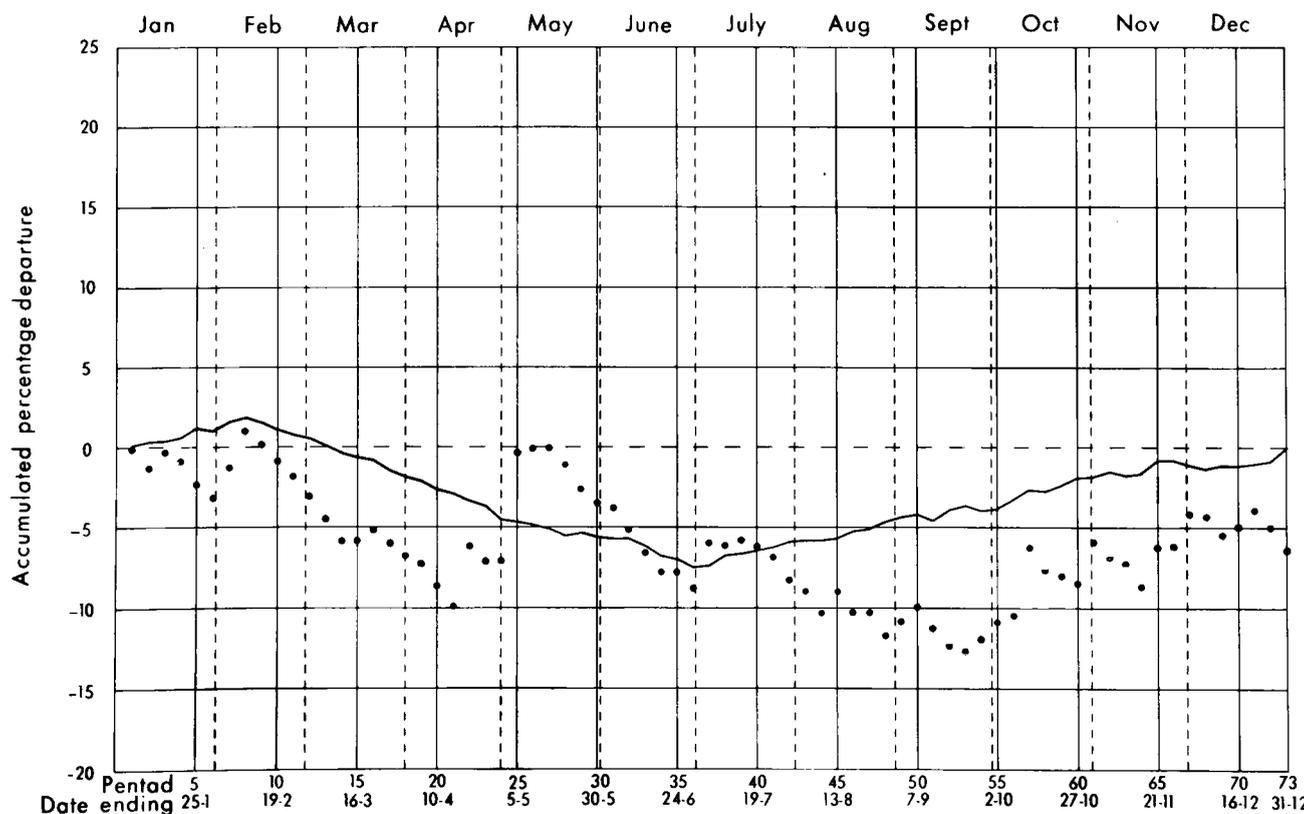
No rain 20 days from 23/7 to 11/8
No rain 18 days from 2/11 to 19/11
1.5 mm 15 days from 4/6 to 18/6



Craibstone

Dee and Don, Don
A.a.r. 861 mm

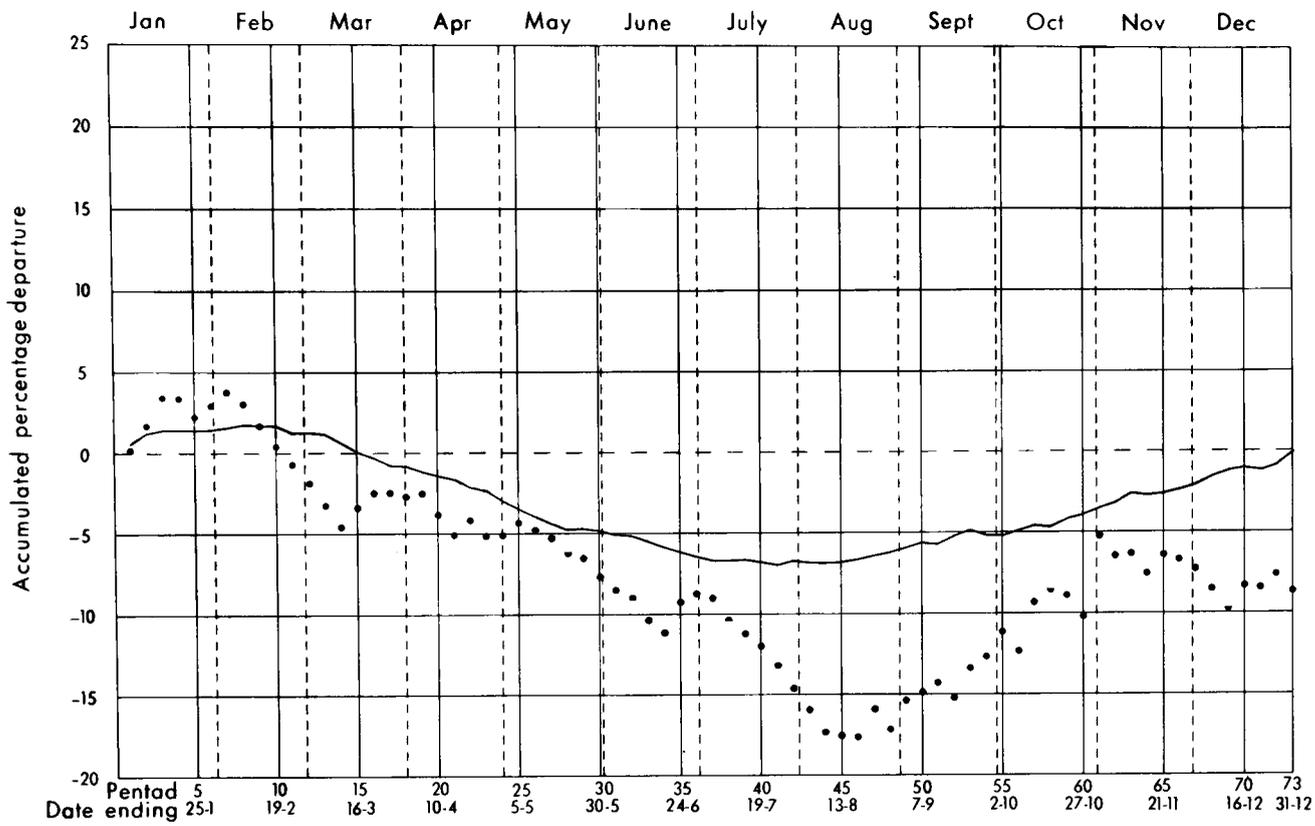
0.6 mm 18 days from 23/7 to 9/8
1.9 mm 16 days from 3/9 to 18/9
2.9 mm 18 days from 20/2 to 8/3
80.0 mm 3 days from 3/5 to 5/5



Perth

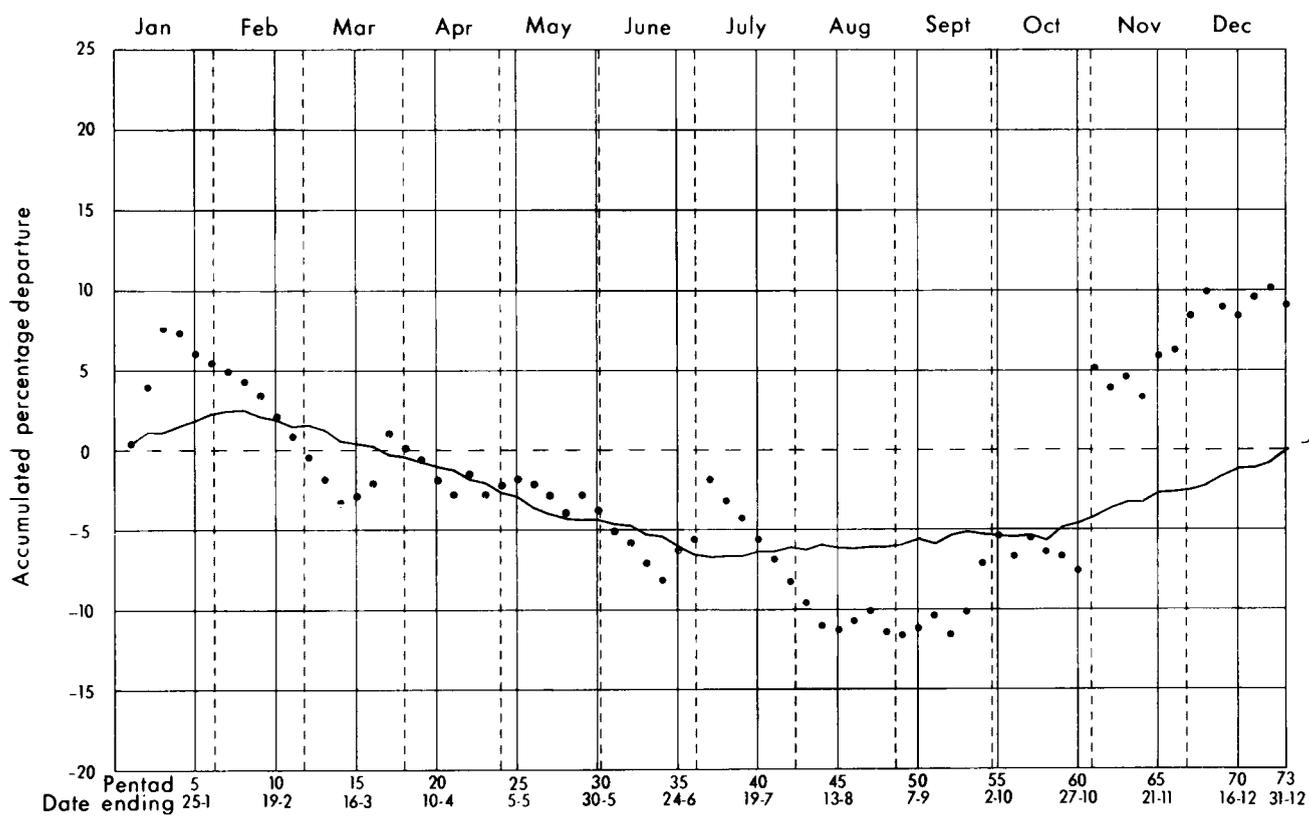
Tay, Tay
A.a.r. 780 mm

No rain 15 days from 4/6 to 18/6
No rain 13 days from 3/4 to 15/4
0.3 mm 21 days from 24/2 to 15/3



Edenfel
Foyle and north-western streams,
Drumragh (Foyle)
A.a.r. 1087 mm

0.8 mm 20 days from 23/7 to 11/8
8.1 mm 33 days from 10/2 to 13/3



Annalong Valley

Newry and south-eastern streams,
Coastal
A.a.r. 1228 mm

2.4 mm 28 days from 14/2 to 12/3
6.2 mm 38 days from 4/7 to 10/8
172.8 mm 4 days from 29/10 to 1/11

4 FREQUENCY DISTRIBUTIONS OF DAILY AMOUNTS OF RAIN

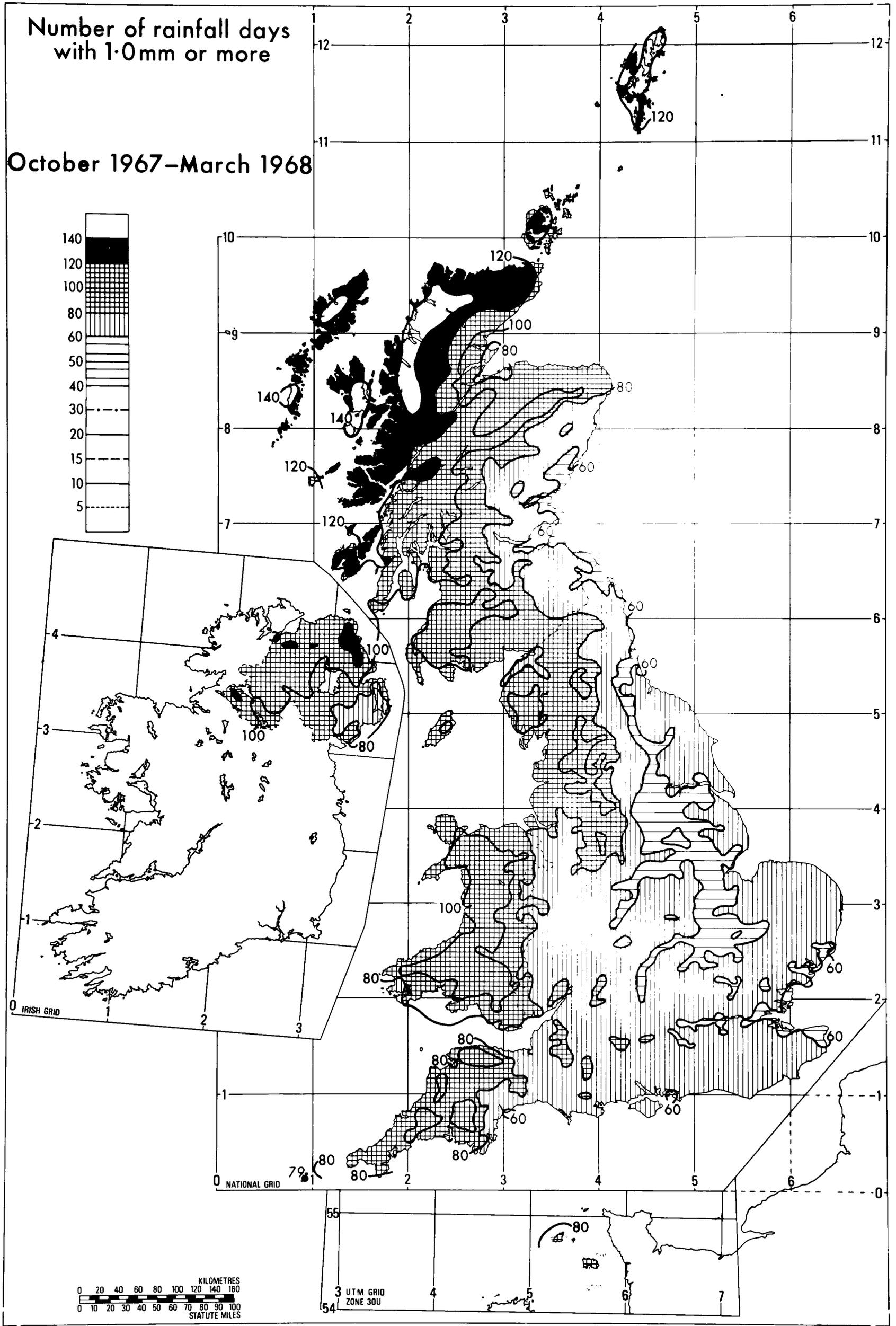
Table 4 gives seven-point frequency distributions of daily amounts for the two seasonal six-month periods and for the calendar year. Nine maps are also provided, giving isopleths of the number of rainfall days with 1.0 millimetre or more for the periods mentioned and similarly for the values 2.5 millimetres or more and 10.0 millimetres or more. The stations listed in Table 4 are a selection of the many stations used in compiling the data for the maps.

As 0.25 millimetre is relatively small, the values for this threshold are more haphazard than for those of the larger amounts. This is mainly due to the difficulties of observing small amounts of rain within narrow percentage limits and partly due to purely meteorological reasons. For these reasons it has never been considered really satisfactory to try to map

frequencies for those days with 0.25 millimetre or more. However, with the reservations mentioned the 0.25-millimetre threshold has been included in Table 4.

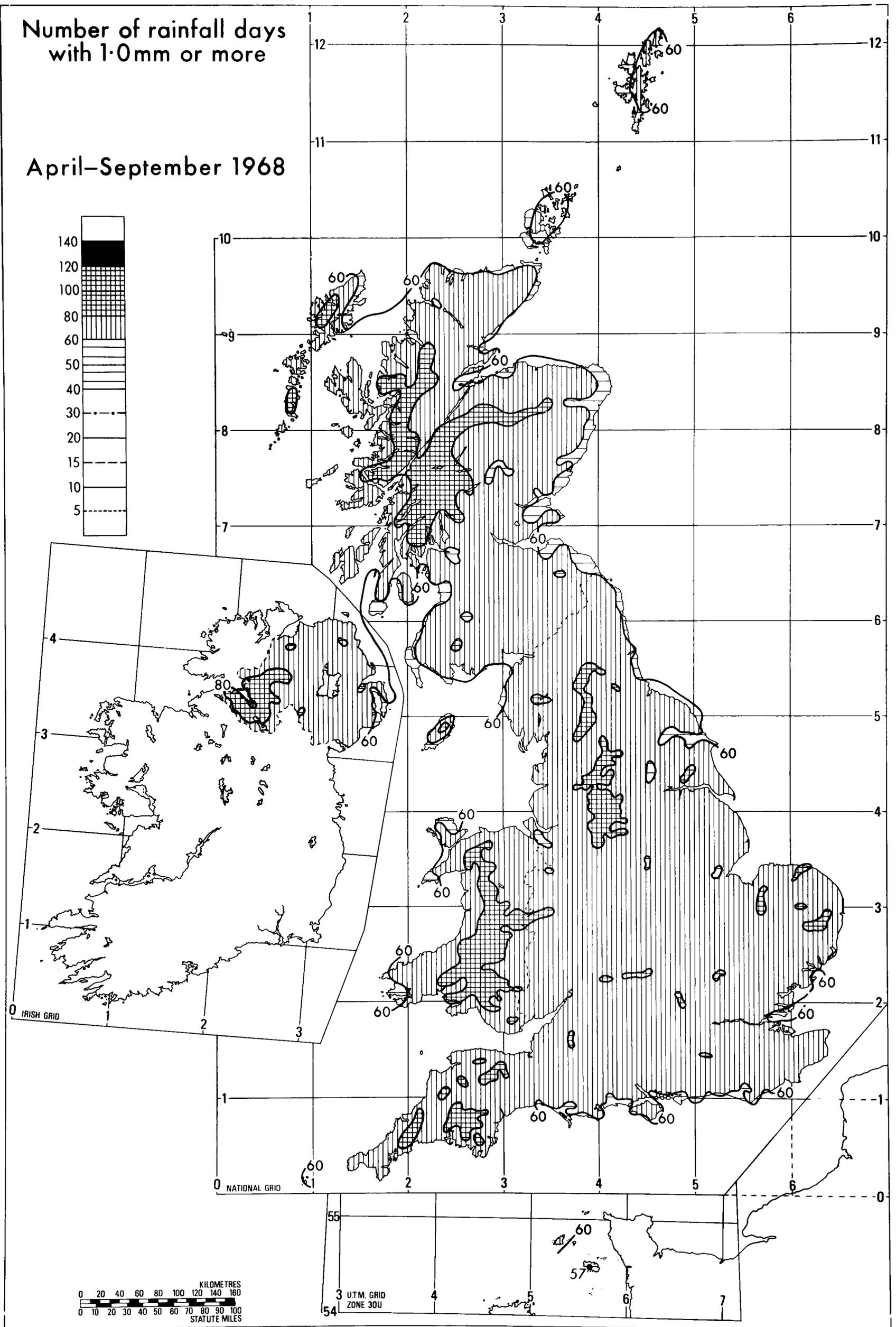
Whilst the majority of stations observe rainfall in the inch unit, the threshold of 0.25 mm is adopted as the metric equivalent of 0.01 inch for which data were published in past years; but where stations already record in the metric unit, a threshold value of 0.2 mm is used, and it is this threshold that will become the metric standard in *British Rainfall*, as it is in the *Monthly Weather Report*. The editions of *British Rainfall* for the years 1966 and 1967 unfortunately used a computerized threshold of 0.3 mm for the few stations recording in the metric unit in those years.

FREQUENCY DISTRIBUTIONS OF DAILY AMOUNTS OF RAIN

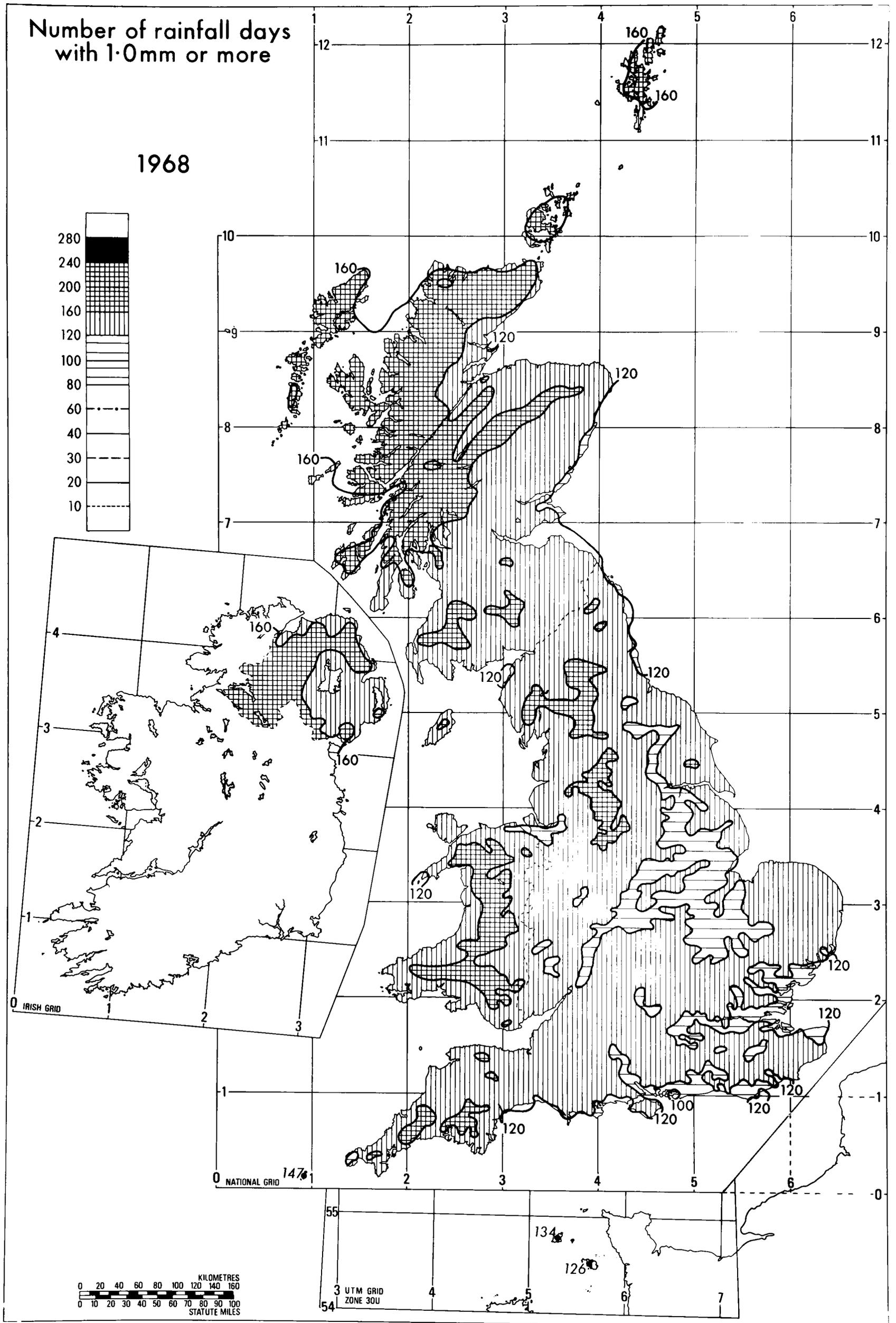


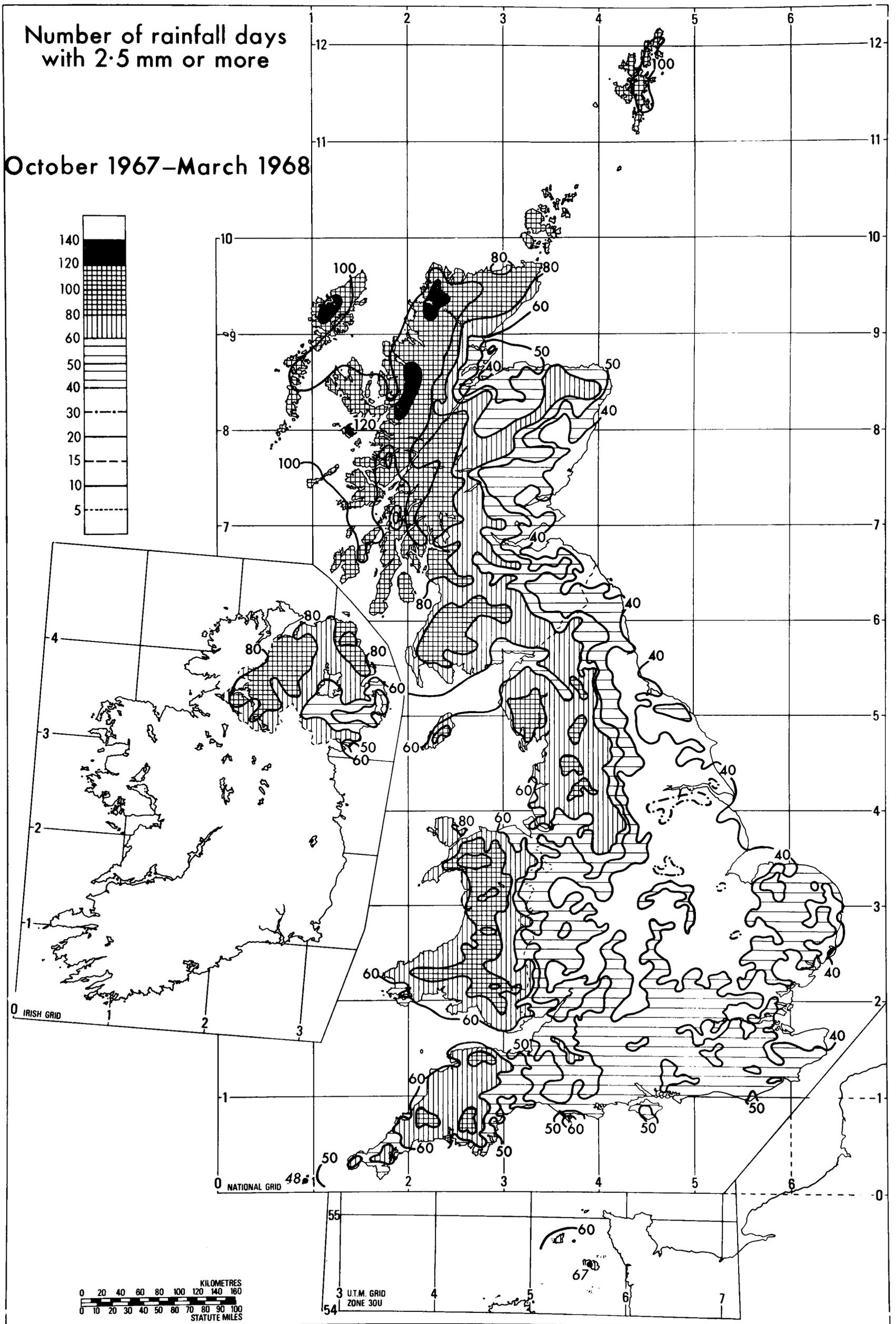
Number of rainfall days
with 1.0mm or more

April-September 1968



FREQUENCY DISTRIBUTIONS OF DAILY AMOUNTS OF RAIN

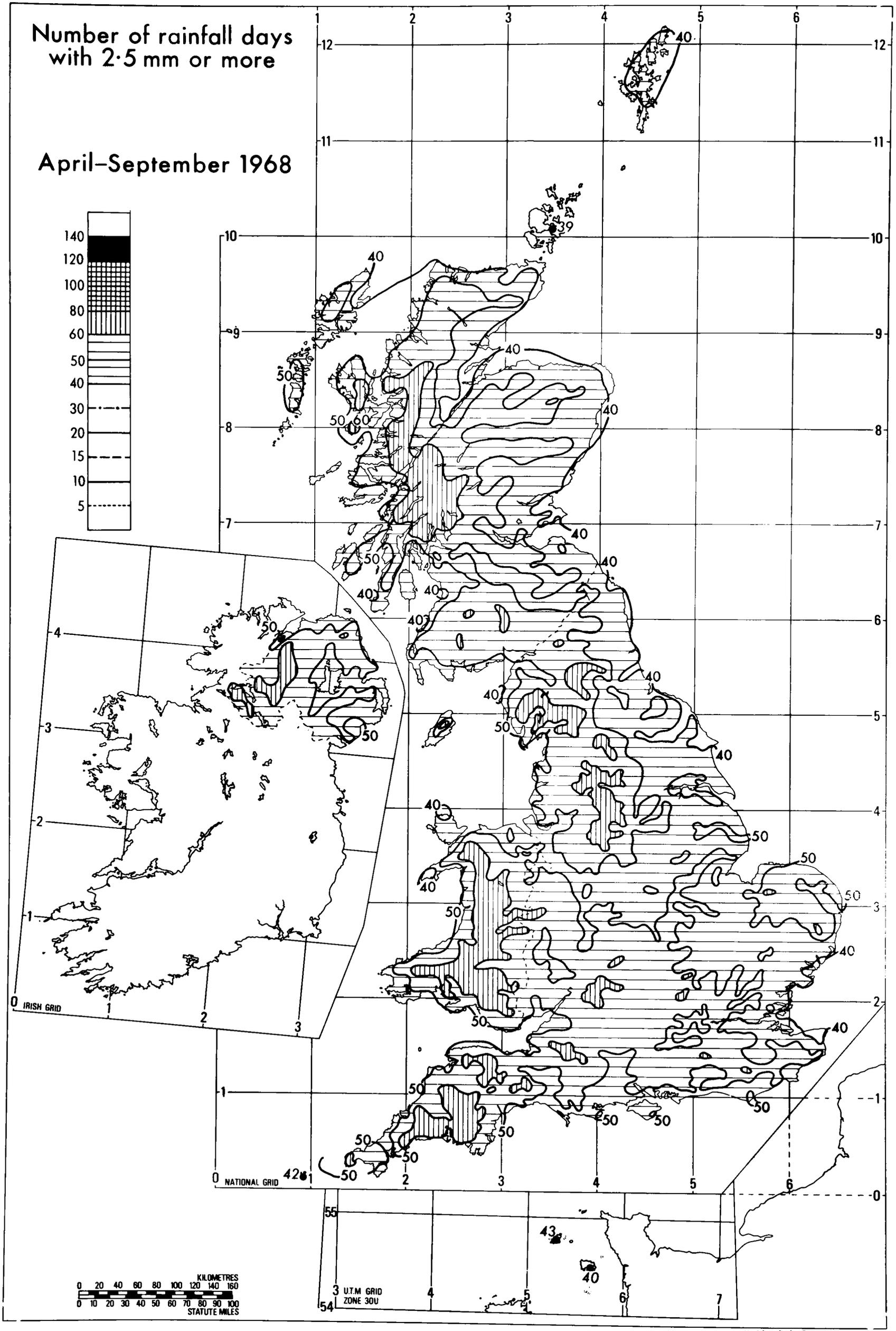
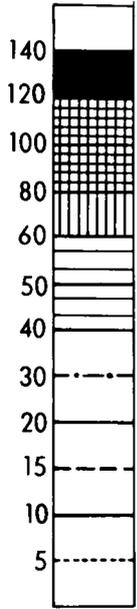


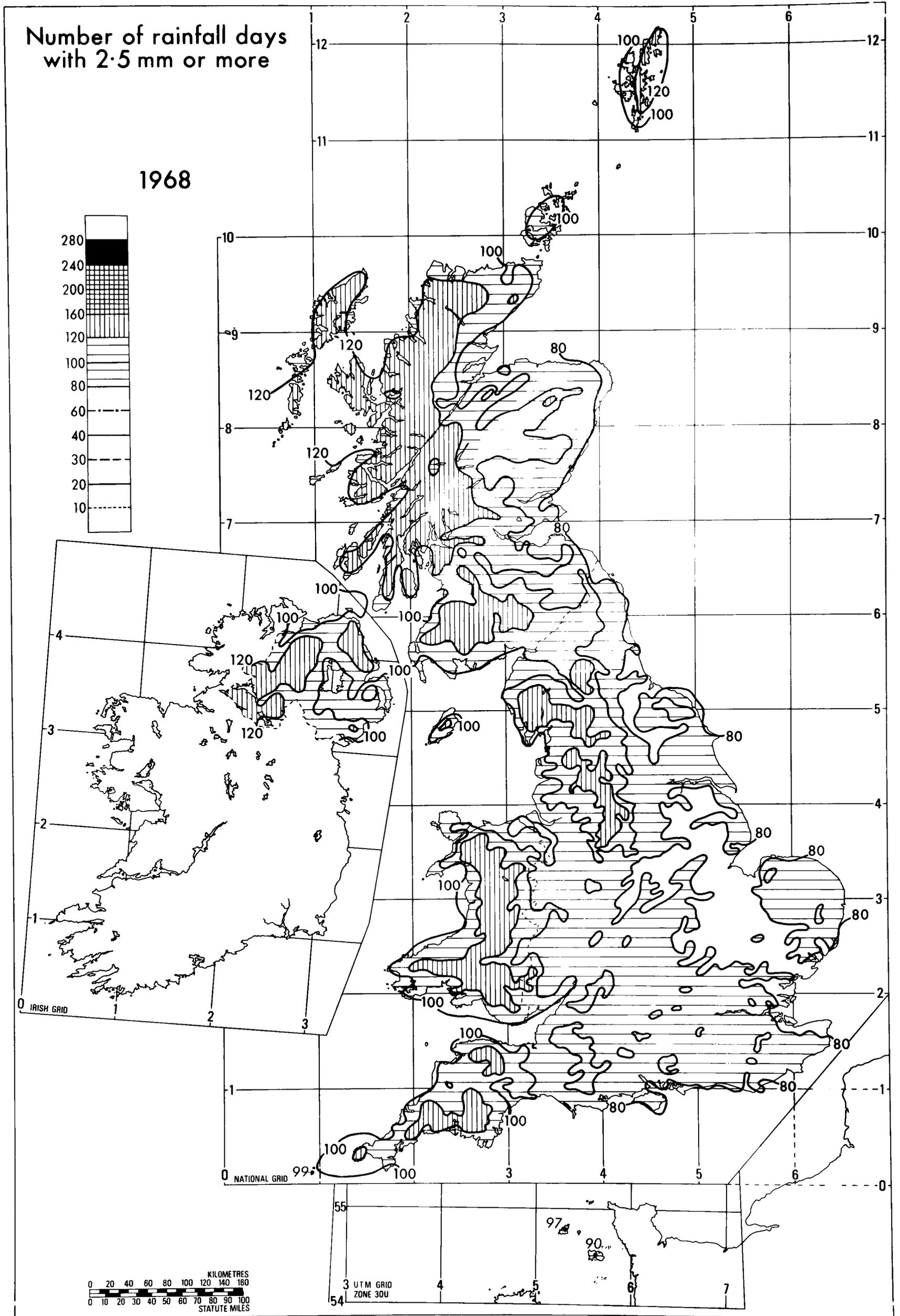


FREQUENCY DISTRIBUTIONS OF DAILY AMOUNTS OF RAIN

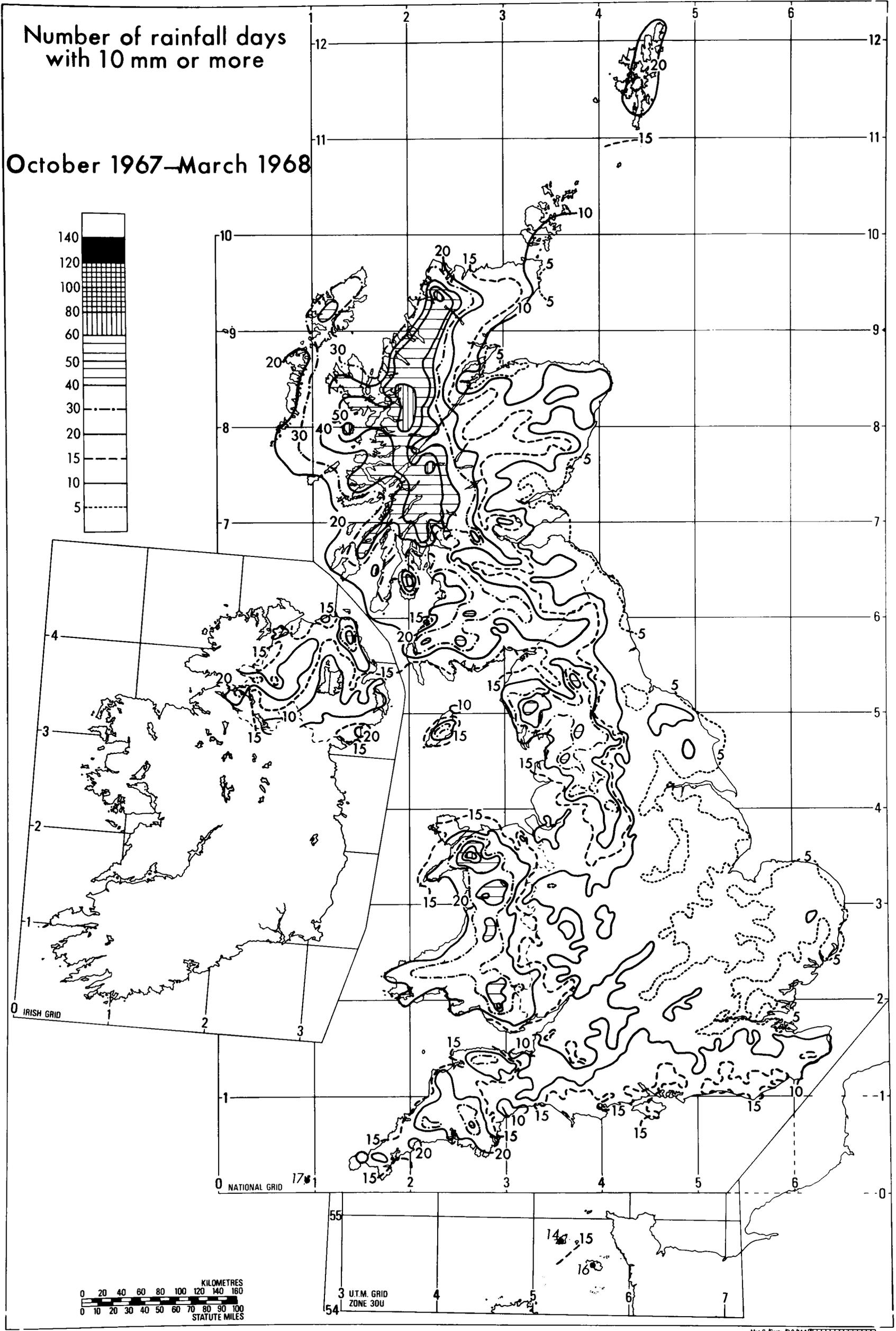
Number of rainfall days
with 2.5 mm or more

April-September 1968



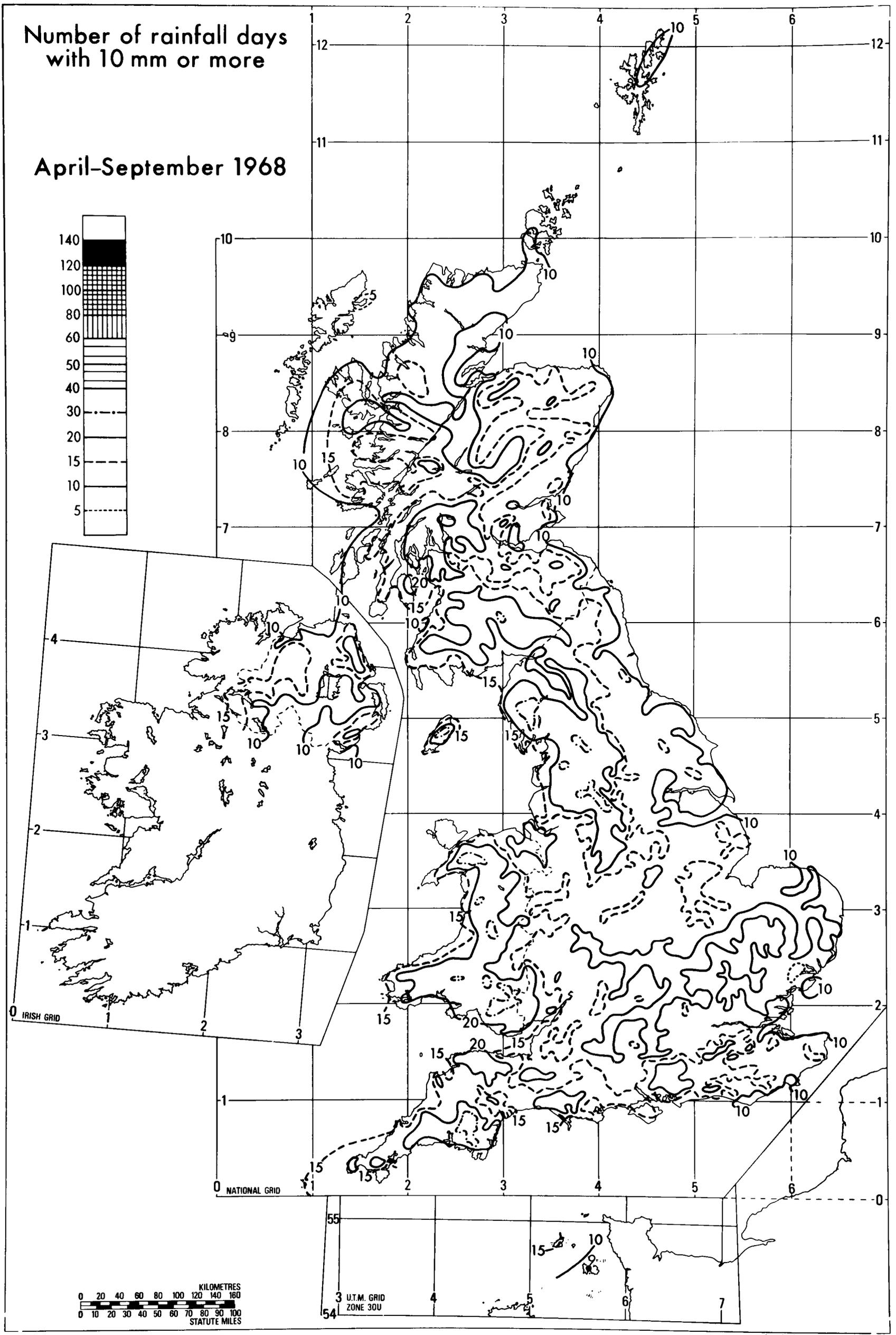


FREQUENCY DISTRIBUTIONS OF DAILY AMOUNTS OF RAIN

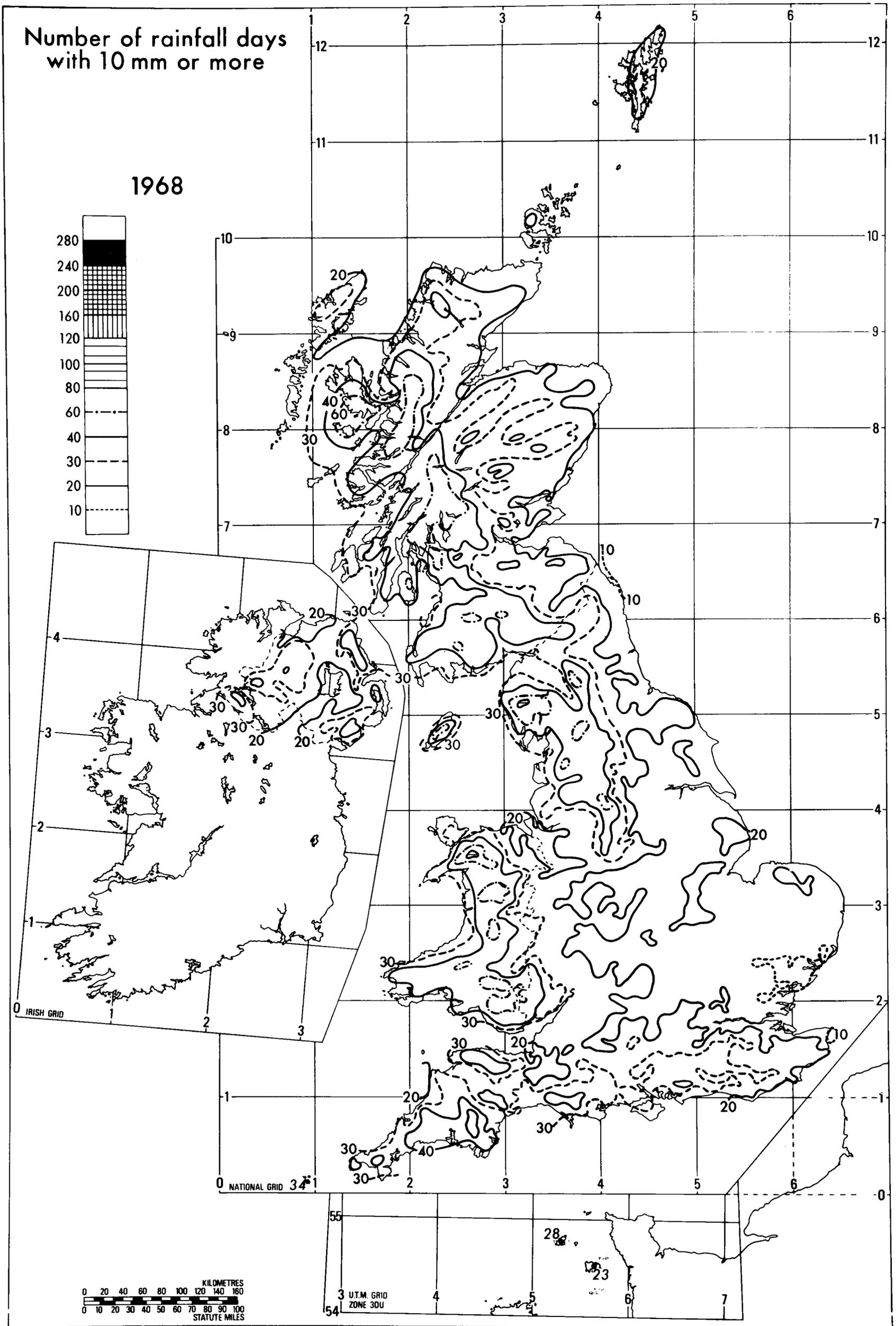


Number of rainfall days
with 10 mm or more

April-September 1968



FREQUENCY DISTRIBUTIONS OF DAILY AMOUNTS OF RAIN



5 HEAVY FALLS ON RAINFALL DAYS

The systematic tabulation each year of outstanding daily falls dates back to *British Rainfall* 1864, and the present title has been in use since the volume for 1895. However, with the new presentation of *British Rainfall*, 1961 edition, it was decided that summary tables dealing with several years' data would be more appropriately included in the *British Rainfall* supplements.

Adjustments to criteria for inclusion in this section of *British Rainfall* publications were made in 1919 and again in 1961. With effect from the 1962 edition it was considered desirable to modify the criteria so that all falls of 50 millimetres or more and at least 4 per cent of the annual average rainfall are published in the chronicle. In addition to this, all falls of 100 millimetres or more are included, irrespective of the percentage value.

An attempt has been made to introduce a means of characterizing rainfall types on the occasions listed in the chronicle by means of brief notes covering in regular order some or all of the following:

predominant wind direction, strength;
type of rainfall given under the headings: depression (rainfall near centre), frontal, orographic, thundery;
type of front: warm, cold, occlusion;
direction of movement of front, depression or frontal wave.

The broad distinctions between the various types of rainfall can be gauged by considering the falls in relation to locality and season, bearing in mind that orographic rainfall is generally characterized by large amounts but percentage values are not very high and often range from 2 to 5. On the other hand, rainfall of a thundery type has typical percentage values much closer to and sometimes exceeding 10. There is always the likelihood, however, of a combination of the different types of rainfall with the consequent difficulty of deciding objectively the predominant type.

Maps showing the areal distributions of rainfall for 12 occasions selected from the chronicle follow Table 5.

HEAVY FALLS ON RAINFALL DAYS

TABLE 5 (continued)

Chronicle of heavy falls on rainfall days

	<i>mm</i>	<i>%</i>	<i>mm</i>	<i>%</i>	
Blockley	105.9	12.9	Hope Mansell	72.7	8.7
Blockley, Greenway Res.	107.9	12.9	Carwendy, Tomlinsfield Farm	54.1	7.2
Shipton-on-Stour	102.1	15.2	Much Birch	62.4	9.0
Luddington	72.1	12.3	Coleford, Marions Lodge	72.6	8.4
Stratford-on-Avon	69.3	11.4	The Mynde	52.3	7.1
Lower Bittell Res.	57.1	7.3	Kentchurch Court	51.1	6.2
Brockhill P. Sta.	53.3	7.1	Monmouth, Cornwall House	51.3	6.5
Studley College	56.1	8.4	Tregare, West House	57.6	6.7
Alcester, The Pleck	64.0	9.7	St Dial's Farm	57.6	7.1
Alcester, Council Office	68.6	10.6	Redbrook P. Sta.	62.2	6.6
Henley-in-Arden P. Sta.	57.9	8.3	Chepstow, Bethdour	67.1	7.1
Wroxall	54.2	7.6	Shirenewton Filters	78.0	7.5
Bretforton Manor	78.2	11.9	Sudbrook	88.4	10.6
Evesham, High Street	66.3	10.7	<i>Usk</i>		
Bengeworth	68.3	11.1	Llanvaches	78.7	7.6
Abbey Road P. Sta.	74.9	12.1	Redwick	88.7	10.1
Sudeley Castle	122.0	16.2	Nash	74.0	8.4
Stanway House	101.6	14.3	Llanover	51.8	4.9
Hampton Park S. Wks	73.2	11.9	R.O.F. Glas Coed	66.5	6.5
Pershore	59.2	9.0	Usk	63.5	6.3
Pershore, College of Horticulture	63.2	9.7	Crumbland Plantation	56.9	5.5
Bradley Green	50.5	7.3	Sluvad Treatment Wks	60.5	5.3
Crowle	58.0	8.5	Cwmbran No. 1	57.7	4.4
Worcester	60.2	8.8	Caerleon, The Croft	61.5	5.7
Overbury Court	68.1	10.4	Ynys-y-fro Farm	67.1	5.9
Hewletts Res.	71.9	10.0	Newport, Frobisher Road	75.0	7.6
Cheltenham Cemetery	68.1	9.6	Blackwood	58.2	4.2
Forthampton Court	80.0	11.7	Rogerstone Golf Club	61.7	5.1
Dowdeswell Res.	66.5	8.7	Newport	61.0	6.0
Cheltenham, Sandford Mead	54.6	7.9	St Mellons	53.1	5.2
Cheltenham	73.4	11.0	<i>Glamorgan</i>		
Witcombe Res.	66.8	9.0	Trethomas	55.9	4.1
Gloucester	88.3	12.4	Cardiff	54.9	5.1
Bosbury	58.4	8.2	Llanishen Res.	60.2	5.7
Putley, The Sladd	65.0	9.1	Cardiff, Heath Filters	58.7	5.3
Much Marcle, Hall Court	57.1	8.0	Cardiff, Roath Park	63.5	5.8
Upton Bishop	65.0	9.0	Rhiwbina Res.	53.1	4.2
Bromsberrow Heath P. Sta.	67.6	9.3	St Fagans Castle	59.7	4.9
Eastnor, Bronsil House	73.3	10.3	Penarth, Alexandra Park	73.9	7.9
Staunton	72.6	10.2	Penarth Cemetery	72.4	7.8
Ford House	79.0	10.7	Lower Penarth	53.3	5.8
Taynton	84.1	11.1	Rhoose	52.6	5.7
Harescombe Grange	62.2	7.6			
Hempsted	88.4	12.1	13 July		
Miserden Park	55.6	5.9	Winds E to SE light; frontal, thundery; depression almost stationary south of Ireland with occlusion moving north-east over England.		
Chalford	57.4	6.0	<i>East Suffolk and Norfolk</i>		
Chalford W. Wks	58.4	6.6	Coltishall	74.7	11.4
Pitchcombe	59.4	7.1	<i>Sussex</i>		
Minchinhampton, Rectory Cottage	61.0	6.9	Jayes Park	58.9	7.1
Stonehouse	65.3	8.8			
Whitminster	74.2	9.5	14 July		
Mitcheldean, Beeches Walk	89.9	10.7	Winds variable light becoming NE moderate; depression, frontal, thundery; depression south of Ireland with occlusion moving north-east over England.		
Whitemead Park	85.1	9.2	<i>Yorkshire Ouse and Hull</i>		
Lydney, Recreation Ground	81.5	9.2	Crowhole Res.	61.5	7.8
<i>Wye</i>			Bolsover	62.0	8.3
Dunswater Farm	56.7	7.4	Wath Wood Res.	52.1	8.4
Holme Lacy, Bower Farm	60.8	9.4	<i>Trent</i>		
Tenbury Wells, Old School	56.3	7.8	Derby, Brayfield Road	50.0	7.2
Preston Wynne	54.9	8.5	Blackwell S. Wks	63.8	8.8
Lugwardine, Good Rest	51.3	8.2	South Wingfield	64.3	7.8
Bredenbury Court	65.3	8.6	Ambergate Res.	68.3	7.8
Heath Farm, Bromyard	61.0	8.6	Gainsborough Grammar School	52.5	8.4
Down House	69.8	9.8	Misterton S. Wks	59.1	10.0
Bishops Frome School	56.5	7.8	Sutton-in-Ashfield S. Wks	63.2	8.6
Stoke Lacy	55.9	7.4	Mansfield	61.0	8.7
Sollers Hope	69.3	9.7	Edwinstowe	70.9	11.1
Perrystone Court	71.6	9.6	Boughton P. Sta.	59.7	9.5
Ross-on-Wye	65.0	9.2	Warsop	52.1	8.9
Alton Court P. Sta.	59.9	8.5	Budby P. Sta.	50.1	8.1
Walford, Hill Court	63.2	8.5	Whaley Well	53.6	8.2
			Carburton P. Sta.	57.7	9.1
			Wiseton	54.5	9.3

TABLE 5 (continued)

Chronicle of heavy falls on rainfall days

	mm	%
Ranskill S. Wks	56.2	9.6
Carlton-in-Lindrick	52.1	8.4
Finningley	54.3	9.6
Austerfield P. Sta.	57.1	9.8
Gringley-on-the-Hill	54.4	8.5
Snow Sewer P. Sta.	51.1	8.9
Ravensfleet P. Sta.	50.3	8.4
Tickhill, Dadsley Road	58.4	9.5
Rossington Colliery	55.9	9.1
Balby S. Wks	55.9	9.4
Rossington Bridge P. Sta.	56.6	9.5
Candy Farm P. Sta.	52.6	9.0
Finningley P. Sta.	50.0	8.6
Doncaster, Runnymede Road	51.3	8.4
Nutwell P. Sta.	55.6	9.3
Lindholme	55.9	9.4
<i>Lincolnshire</i>		
Scawby Hall	56.9	8.8
Brigg Sugar Factory	50.8	8.3
Heckington	59.2	9.9
<i>East Suffolk and Norfolk</i>		
Holme-next-Sea	63.0	11.2
<i>Severn</i>		
Llanfylllyn P. Sta.	99.8	8.5
Llanyblodwel	69.8	7.7
Oswestry	51.8	5.7
Mount Res.	61.7	6.7
Oswestry, Yorkfields Depot	59.7	6.8
<i>Dee and Clwyd</i>		
Denbigh Hospital	51.6	6.1
15 July		
Winds NW moderate; frontal, orographic, thundery; depression over central North Sea with trough extending over northern England.		
<i>Cumberland</i>		
Renwick	61.2	6.2
31 July		
Winds variable light becoming NE; depression, thundery; complex area of low pressure over north-west France with unstable airstream over area.		
<i>Essex</i>		
Dagenham, Salvage Depot	56.1	10.5
Valentines Park	51.3	8.9
Seven Kings Park	69.1	12.0
Loxford Park	54.6	9.1
Barking P. Sta.	57.1	10.0
Goodmayes Park	76.2	13.1
<i>Thames</i>		
Wargrave, Piggott School	57.9	9.5
Henley on Thames	55.1	8.2
Henley on Thames, Longlands	50.8	7.6
5 August		
Winds variable light becoming NE; thundery; unstable airstream.		
<i>Ayrshire</i>		
Collenan Res.	59.7	6.1
8 August		
Winds NE light becoming N moderate, thundery; unstable airstream.		
<i>Lincolnshire</i>		
Sutton St James	50.0	9.3
13 August		
Winds variable light becoming N to NE moderate; depression, frontal, thundery; depression over Scotland moving south-east into North Sea with associated occlusion moving south over area.		
<i>Northumbrian</i>		
Blindburn	51.0	4.5
Widehaugh Nursery	53.1	7.9

	mm	%
<i>Forth</i>		
Forrestburn Res.	53.3	4.6
Cockleroi Res.	54.1	6.0
<i>Tweed</i>		
Edgerston Tofts	59.2	5.9
19 August		
Wind SE light to moderate becoming SSW moderate to strong; frontal, orographic, warm front and also following cold front with minor wave moving east.		
<i>Gwynedd</i>		
Oakeley Quarry	140.5	4.8
Llechwedd Quarry	115.6	4.1
Bryn Gwynant	116.8	3.7
<i>Lancashire</i>		
Grindleton, Pinewood Cottage	53.3	4.7
<i>Northern Ireland</i>		
Dungannon Park	54.0	5.3
23 August		
Winds variable light; frontal; almost stationary front over area.		
<i>Severn</i>		
Garthmyl Hall	58.2	6.7
5 September		
Winds SE moderate becoming SW; frontal; occlusion moving east.		
<i>Northern Ireland</i>		
Spelga Dam	64.5	4.1
Foffany Res.	61.3	4.0
11 September		
Winds variable light; depression, frontal, thundery; minor depression east of the Wash with almost stationary front over north-east England.		
<i>Yorkshire Ouse and Hull</i>		
Little Weighton	59.2	8.7
Hull	70.4	10.9
Springhead	60.2	9.3
North Cave	51.0	7.4
Carperby	55.2	5.4
Horse House	64.6	5.1
Low Houses	51.1	5.0
Somerside	57.4	5.5
Hawsett	58.9	6.0
Bagwith Brae	61.2	6.2
Drovers Inn	68.1	6.9
Harper Hill	53.8	5.5
Ripon S. Wks	63.7	8.8
Busker Beck	61.0	4.2
Raygill House	71.1	6.1
Ramsgill	57.4	5.1
Pateley Bridge	70.5	6.6
Swarcliffe Hall	62.5	6.8
Birstwith Hall	72.4	7.7
Ten Acres Res.	50.3	5.7
Irongatebridge Res.	67.8	8.3
Harlow Hill Res.	65.8	8.3
Harrogate	70.6	8.9
Long Marston	50.2	7.2
High House	53.1	4.5
Lane Head	56.1	5.3
Askham Bryan	62.5	9.5
<i>Welland and Nene</i>		
Bingham Lodge Farm	51.8	9.0
<i>Great Ouse</i>		
Sandringham House	87.4	12.7
<i>East Suffolk and Norfolk</i>		
Wenhaston	50.1	8.1
12 September		
Winds variable light; depression, frontal, thundery; minor depression east of Yorkshire with front almost stationary over Yorkshire and south-west Scotland.		
<i>Northumbrian</i>		
Alwinton	53.0	5.3
Swindon	51.0	5.7

HEAVY FALLS ON RAINFALL DAYS

TABLE 5 (continued)

Chronicle of heavy falls on rainfall days

	<i>mm</i>	<i>%</i>	<i>mm</i>	<i>%</i>	
Longhorsely	69.4	9.1	Eltham, High Street	66.8	10.9
Cockle Park	57.4	7.9	Deptford W. Wks	58.4	9.9
Harwood	57.7	6.2	Deptford P. Sta.	56.4	9.8
Low Byrness	91.2	8.3	Greenwich, Maritime Museum	53.1	9.3
Barrasford	52.3	7.0	<i>Kent</i>		
<i>Yorkshire Ouse and Hull</i>			Cross Ness	97.5	18.3
Craggs Lane Farm	72.4	9.6	Erith S. Wks	72.4	12.9
<i>Tweed</i>			Westwood P. Sta.	70.1	8.6
Stow	66.3	7.2	Westerham	75.4	9.2
Galashiels	54.4	6.9	Westerham Hill P. Sta.	65.3	7.6
Carolside	63.0	8.4	Sundridge P. Sta.	84.6	11.1
Hawick S. Wks	51.1	6.2	Chevening Gardens	80.0	9.7
Wauchope	66.0	7.3	Sevenoaks, Oak Lane	83.8	10.2
Spital Tower	61.0	7.7	Cramptons Road P. Sta.	59.4	8.0
Edgerston Tofts	90.7	9.0	Kemsing P. Sta.	58.4	7.8
13 September			Stone Street	78.7	9.5
Wind SE light becoming E moderate; depression, frontal, thundery; deepening depression off south-west England with associated trough moving north over area.			Highfield	51.1	6.6
<i>Devon, south</i>			Orpington W. Wks	53.8	7.6
Topsham, Red Rock	62.2	7.6	Orpington, Priory Gardens	53.3	7.6
Ide	50.7	5.7	Danson Park	63.5	10.3
Kenton	52.3	5.5	Dartford, Christchurch Road	57.7	9.5
Mamhead	54.3	5.7	Dartford S. Wks	61.7	10.8
Dawlish, Beach House	54.9	6.3	Duckyls	71.1	7.9
14 September			Weir Wood Res.	74.2	8.8
Winds NNE light to moderate; depression, frontal, thundery; depression off south-west England moving slowly south with cold front almost stationary along south coast of England.			Ashurstwood S. Wks	73.9	8.6
<i>Essex</i>			Falconhurst	86.4	10.6
Downham P. Sta.	81.3	13.7	Saints Hill	70.6	9.6
South Hanningfield Res.	54.1	9.3	Tunbridge Wells, Ridgemereton	65.5	8.3
Purleigh	78.7	14.3	Great Bounds Res.	87.1	11.7
Basildon S. Wks	89.7	16.0	Limpsfield and Oxted S. Wks	101.6	13.3
Wickford	99.1	17.7	Felbridge S. Wks	69.8	8.6
Battlesbridge	67.3	11.9	Lingfield S. Wks	88.6	11.7
Rayleigh, Alanbank	76.2	13.0	South Park Farm	50.0	6.7
Vange P. Sta.	62.7	11.8	South Godstone S. Wks	65.3	8.6
Stanford le Hope S. Wks	62.2	11.7	Paines Hill	74.9	9.4
Marsh Farm S. Wks	83.3	16.1	Edenbridge P. Sta.	94.5	12.9
Upminster, Howard Road	64.5	11.6	Penshurst Place	93.2	12.7
Orsett Hall	57.7	10.2	Tonbridge P. Sta.	79.2	11.1
Stifford P. Sta.	85.1	16.0	Hildenborough	106.2	14.8
Rainham, Recreation Ground	58.4	10.5	Northern S. Wks	77.0	10.3
Upminster, Roxburgh Avenue	60.5	10.9	Borough Green P. Sta.	88.4	12.0
Clayhall Park	55.9	9.2	Hadlow College	113.0	16.2
Barking P. Sta.	53.3	9.4	Hadlow S. Wks	114.3	16.4
<i>London, left bank</i>			Pembury W. Wks	72.4	9.8
Isle of Dogs	66.8	12.0	Yalding	97.5	15.2
<i>Thames</i>			Staplehurst S. Wks	53.8	8.8
Inkpen	59.9	7.0	East Farleigh Lock	80.8	12.1
Newbury S. Wks	57.9	7.9	Barming W. Wks	82.5	12.3
Kingsclere	67.1	7.7	Langley	76.2	10.7
Cowley	54.9	8.5	Maidstone, College Road	88.4	13.3
Selbourne, Temple Manor	56.6	5.8	Thurnham P. Sta.	80.0	10.8
Broadfield	93.5	10.9	Hockers Lane P. Sta.	69.8	9.8
Gatwick	77.4	10.1	Maidstone, Mill Street	82.8	12.2
Crawley, The Beeches	64.8	7.9	Maidstone, Brenchley Gardens	80.0	11.8
Tinsley S. Wks	75.7	10.2	Allington Lock	53.8	8.3
Burstow S. Wks	79.8	10.5	Forstal P. Sta.	50.0	7.7
<i>London, right bank</i>			East Malling	82.0	12.0
Woldingham W. Wks	57.1	6.8	Trottscliffe P. Sta.	52.8	7.3
Streatham Hill Res.	53.6	8.9	West Malling	83.3	12.2
Brockwell Park	56.6	9.5	Woodmans Wood	50.8	7.4
Nunhead Res.	58.2	10.1	Nashenden P. Sta.	57.9	8.6
Telegraph Hill	51.3	8.0	Lodge Hill	56.4	9.7
Bromley	61.0	9.6	Gillingham	58.2	9.5
Beckenham, Foxgrove Road	54.4	8.6	Newnham P. Sta.	52.8	7.9
Penge, Recreation Ground	50.8	7.8	Faversham S. Wks	54.4	8.6
			Herne Bay	50.8	8.8
			<i>Sussex</i>		
			Balcombe W. Wks	67.3	7.6
			Wakehurst Place	68.3	7.5
			Lullings	57.1	6.0
			Horsham, Pondtail	71.6	9.2
			Horsham S. Wks	80.8	10.8
			Rusper	71.1	8.6
			Chiddingfold	76.2	9.2
			Blackdown Beacon	50.0	5.6
			Kirdford, Pound Common	79.2	10.6
			Liss, Kippences	54.6	5.9

TABLE 5 (continued)

Chronicle of heavy falls on rainfall days

	<i>mm</i>	<i>%</i>		<i>mm</i>	<i>%</i>
Petersfield, Town Hall	51.8	5.5	Gissing	90.9	13.9
Fyning	69.3	8.1	Brome	100.6	15.5
Midhurst	58.7	6.8	Gislingham	67.3	10.5
Fernhurst	74.4	8.4	Brockford, Buses Farm	56.4	8.8
Lavington House	59.7	6.3	Occold	58.4	8.9
Petworth Park	66.5	7.5	Stradbroke	57.0	8.8
Petworth, Barlavington	62.7	6.4	Bush Wood House	82.5	12.8
Sutton, The Croft	51.8	5.5	Wingfield	81.0	12.5
West Dean Park	63.5	6.7	St Margaret, South Elmham	81.3	12.5
Chilgrove House	57.1	6.2	Starston	87.6	13.5
Compton	65.5	6.8	Ditchingham	85.6	13.1
<i>Hampshire</i>			Woodton	91.4	13.3
Ditcham Park	54.6	5.4	Barsham	87.4	13.7
Leydene	57.7	5.7	Hopton	88.4	14.5
Upper Swanmore	51.1	5.9	Lound P. Sta.	83.8	13.7
Hoe P. Sta.	66.8	8.0	Fritton Warren	90.9	14.2
<i>Avon and Dorset</i>			Wolterton Park	50.3	7.0
Peters Finger S. Wks	52.1	6.7	Sprowston	67.6	10.5
<i>Devon, north</i>			Horning P. Sta.	59.4	9.5
Torrige Vale S. Wks	59.9	5.4	Burlingham	88.1	14.0
15 September			Hickling	56.6	8.8
Winds NE light to moderate but strong to gale in the north; frontal, thundery; depression in Bay of Biscay with associated occlusion moving slowly NE over England.			Ormesby St Michael	78.7	12.3
<i>Great Ouse</i>			Gorleston	77.0	12.7
Baldock, William Road P. Sta.	63.5	10.5	Lowestoft	72.1	12.0
Hitchin, Knightswood	54.6	8.1	Ilketshall St Lawrence	68.6	10.6
Hitchin W. Wks	58.4	9.1	Sotterley Hall	71.6	11.3
Letchworth	52.8	9.2	Benacre P. Sta.	68.6	12.0
Wendens Ambo	92.5	15.2	Threadbare Hall	56.4	9.1
Saffron Walden, County High School	65.3	11.0	Chediston	50.8	7.9
Chesterford Park	86.5	14.4	Wenhaston	54.9	8.9
Audley End	75.7	12.9	Southwold, St James Green	51.6	8.8
Odsey	60.2	10.2	Southwold	51.3	8.7
Royston	56.9	10.1	Helmingham Hall	55.4	8.7
Fowlmere P. Sta.	59.9	10.3	Kenton	52.1	8.2
Fulbourn	66.0	12.1	Charsfield	55.9	8.9
Southfields	60.7	10.3	Swilland	66.3	10.1
Stetchworth Park	72.4	12.2	New Bells Farm	56.6	9.0
Newmarket S. Wks	63.2	10.6	Wattisham	54.6	9.1
Rushbrooke P. Sta.	98.6	15.9	Cousins Hill	55.9	8.5
Bury St Edmunds, Abbey Gardens	83.1	13.6	Elmsett	51.1	8.9
Bury St Edmunds, Corporation Depot	83.6	13.2	<i>Essex</i>		
Bury St Edmunds, Sugar Factory	76.5	12.1	Wrattling Common	75.5	11.4
Troston Hall	87.6	14.5	Burrough Green	71.1	11.4
Broom's Barn	72.1	10.8	Great Bradley Hall	84.6	13.6
Lidgate	74.0	11.7	Little Wrattling	79.5	13.4
Thurston	98.0	15.9	Nosterfield End	74.2	11.7
Barton Lodge	82.5	13.3	Haverhill W. Wks	78.5	12.5
Elvedon Hall	65.3	10.7	Haverhill S. Wks	68.6	11.1
Kilverstone Hall	69.3	11.5	Boblow	55.6	8.6
Thetford W. Wks	53.3	8.5	Stradishall	77.8	12.3
<i>East Suffolk and Norfolk</i>			Clopton Hall	76.5	11.7
Great Yarmouth, Churchill Road	71.1	11.7	Hawkedon	78.2	12.0
Runhall	58.4	8.6	Boxted Hall	50.8	8.4
Browick Hall	85.6	12.7	Chadacre	52.3	8.6
Morley Hall	83.8	12.5	Felsham	50.0	8.0
Morley St Botolph	59.2	8.7	Cockfield	54.9	8.9
Swardeston	61.7	9.5	Chelsworth, Old Hall	52.3	8.8
Old Lakenham	71.9	11.1	Clacton Secondary School	67.1	12.1
Wacton Hall	108.2	15.8	Clacton-on-Sea	66.5	12.2
Lundy Green	87.4	13.5	Leewick Farm, St Osyth	54.4	10.1
Flordon Common	80.8	12.6	Wells' Ayley	68.3	11.3
Norwich W. Wks	55.4	8.5	Radwinter	57.9	9.3
Norwich Cemetery	64.3	9.9	Southminster Hall	71.4	12.9
Thorpe Hamlet	78.7	12.2	Burnham, Laboratory	57.1	10.9
Surlingham	85.1	13.1	Prittlewell S. Wks	80.8	14.7
Bergh Hapton	86.6	12.9	Eastwood, Progress Road	74.4	13.2
Cantley	101.6	15.8	Potton Island	69.8	12.4
Raveningham Hall	87.9	13.6	Shoeburyness	77.1	14.9
Bressingham Hall	83.3	12.8	Thorpe Bay	81.0	15.2
Thrandeston	105.9	16.3	Southend	79.5	14.8
			Southend W. Wks	79.0	14.7
			Canvey Island P. Sta.	110.7	19.8
			Vange P. Sta.	64.3	12.1
			Stanford le Hope S. Wks	66.3	12.4
			Marsh Farm S. Wks	118.1	22.8
			Orsett Hall	50.8	9.0
			Stifford P. Sta.	115.8	21.7

TABLE 5 (continued)

Chronicle of heavy falls on rainfall days

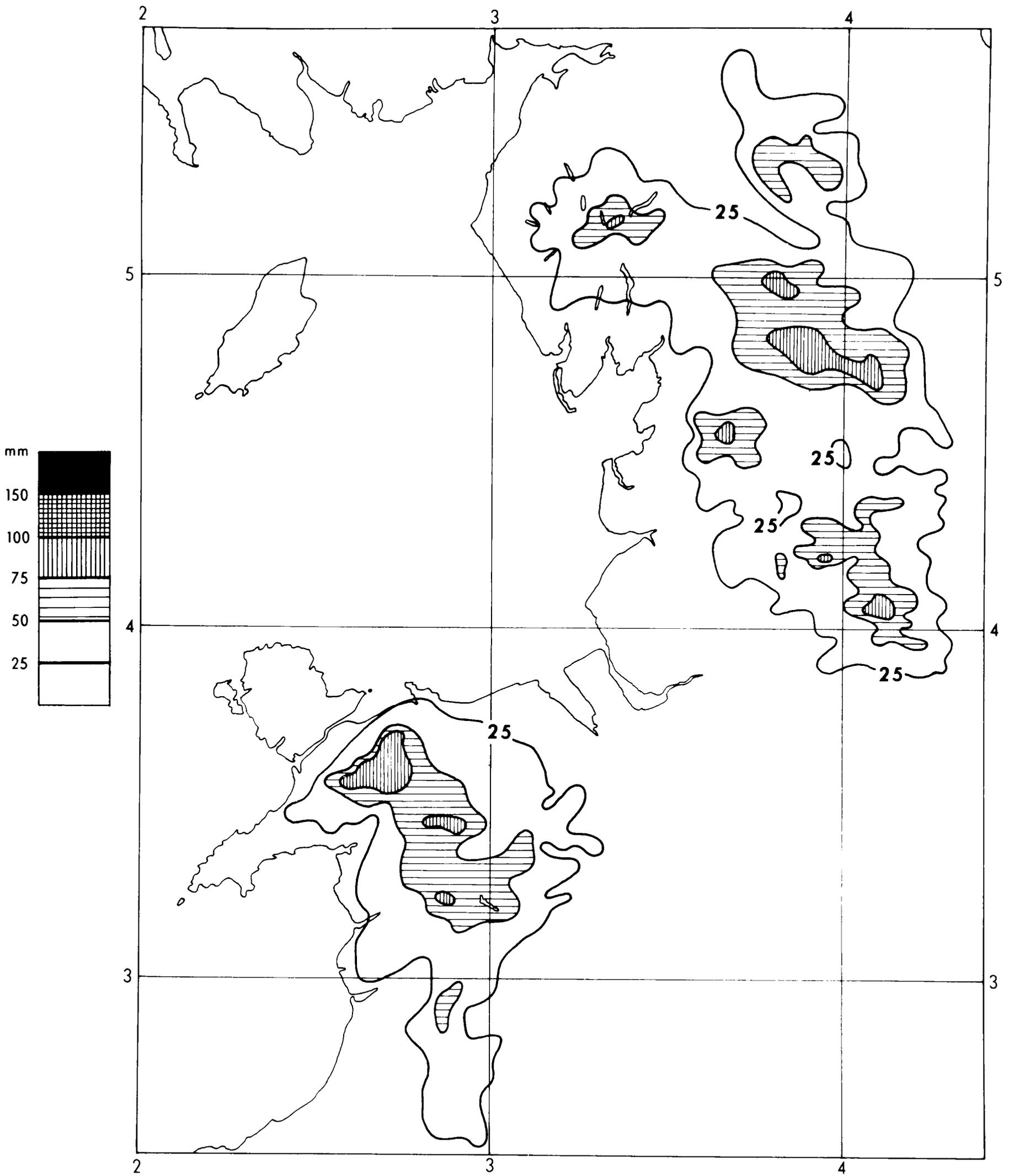
	<i>mm</i>	<i>%</i>		<i>mm</i>	<i>%</i>
Cowpe Res.	77.5	5.2	Altham S. Wks	73.7	6.9
Cloughbottom	79.2	6.1	Hoddlesden	93.2	6.6
Greenfold Res. No. 1	66.3	4.7	Daisy Green	89.4	6.9
Rawtenstall Cemetery	73.9	5.5	Pickup Bank	93.7	7.2
Holden Wood No. 2	102.1	7.2	Guide Res.	90.4	8.1
Helmshore	87.9	5.7	Blackburn, Witton	78.0	7.0
Scout Moor No. 3	90.2	6.3	Salmesbury, Smithfold S. Wks	67.1	6.9
New Hall Filter Sta.	79.2	6.2	Preston, West Cliff	61.0	6.5
Elton Res.	60.0	5.7	Haighton Res.	65.8	6.4
Bury S. Wks	55.1	5.3	Preston, Moor Park	71.6	7.1
Upper Chelburn	71.1	5.6	23 September		
Lower Chelburn	74.9	5.7	Winds SW light to moderate becoming NW; frontal, orographic, thundery; unstable airstream over British Isles with weakening trough over northern England.		
Blackstone Edge	77.2	6.1	<i>Yorkshire Ouse and Hull</i>		
Broadhead	69.6	5.5	Calf Lee	54.9	4.3
Hollingworth Lake	66.8	5.6	Warland Res.	54.4	4.1
Brushes Clough	62.2	4.9	Ramsden Res.	56.6	4.2
Cold Greave	66.3	5.3	Gorpley Res.	64.5	4.4
Kitcliffe	65.0	5.2	Whiteholme	50.8	4.0
Newhey S. Wks	61.0	5.3	Byron Edge	54.9	4.1
Watergrove Res.	68.6	4.8	Rishworth Moor Lodge No. 2	54.6	4.3
Hamer Pasture Res.	69.8	5.5	Rishworth Moor Lodge No. 1	54.1	4.4
Spring Mill Res.	72.9	5.2	Ringstone Res.	55.9	4.5
Rochdale	65.5	5.7	Redbrook Res.	69.9	5.3
Whitefield Park	65.3	5.5	Ramsden	66.0	4.5
Entwistle	94.0	6.6	Holmbridge, Digley Cottages	56.9	4.3
Wayoh	95.0	6.7	Harden	67.3	4.8
Turton Tower	88.9	6.4	Cat Clough	53.8	4.3
Delph	85.1	5.7	<i>Mersey and Weaver</i>		
Springs	95.8	6.4	Ox Hey	59.4	4.6
Bolton	69.6	5.5	Broadhead Noddle	66.8	4.8
Heaton Res.	57.1	4.8	Yeoman Hey	83.1	6.3
Ringley S. Wks	55.9	5.1	Cloughbottom	62.2	4.8
Prestwich S. Wks	50.8	4.8	Scout Moor No. 3	59.9	4.2
Royton S. Wks	57.4	5.1	New Hall Filter Sta.	58.7	4.6
Trub S. Wks	62.5	5.6	Hollingworth Lake	54.4	4.6
Heaton Park	57.9	5.4	Cold Greave	53.3	4.2
Strinesdale	61.0	5.4	Kitcliffe	56.4	4.5
Oldham, Glodwick	68.1	6.1	Hamer Pasture Res.	71.6	5.6
Oldham, Alexandra Park	73.7	6.7	Spring Mill Res.	69.3	4.9
Knott Hill Res.	67.1	6.3	Strinesdale	50.0	4.4
Weaste S. Wks	50.8	5.7	<i>Lancashire</i>		
<i>Lancashire</i>			Cant Clough, North	52.8	4.1
Crossens P. Sta.	62.2	7.3	Burnley Road Res.	53.3	4.3
Southport	58.4	6.9	1 October		
Lower Rivington Res.	57.9	5.5	Winds SW moderate; frontal; cold front moving south over northern England followed by a warm front moving east over area.		
Worthington W. Wks	53.6	5.3	<i>Mersey and Weaver</i>		
Wigan, Mesnes Park	52.3	5.6	Springs	73.9	4.9
Billinge W. Wks	51.3	5.1	Bolton	50.8	4.0
Stones House	63.2	5.5	Swinton S. Wks	50.8	5.3
Common Bank S. Wks	50.8	5.3	<i>Lancashire</i>		
Barnoldswick	54.6	4.7	Longridge, District Bank House	53.3	4.8
Chatburn	63.5	5.6	Jackhouse Res.	53.8	4.5
Grindleton, Pinewood Cottage	80.0	7.0	Stonyhurst	56.4	4.7
Clitheroe	78.2	7.0	Cowley Brook	62.2	5.1
Dunsop House No. 1	67.3	4.0	Longridge	52.8	4.8
Longridge, District Bank House	83.6	7.5	Ribchester Institution	54.4	4.8
Habergham Eaves	80.3	6.8	Earnsdale Res.	62.5	4.7
Swinden Upper	78.0	6.3	Sunnyhurst Hey Res.	61.0	4.7
Swinden Lower	76.5	6.3	Abbeystead Gardens	57.4	4.3
Cant Clough, South	91.4	6.8	Poaka Beck	57.4	4.3
Cant Clough, North	93.5	7.3	Lanthwaite	92.7	6.4
Burnley	73.9	6.3	<i>Cumberland</i>		
Ogden Res.	87.4	6.1	Ennerdale	80.5	4.5
Buttock	95.5	6.3	Summergrove	55.9	4.4
Swinden S. Wks	71.1	6.3	Seathwaite Farm	104.1	3.1
Foulridge, Lower Res.	71.5	5.9	Threlkeld	69.1	4.2
Barrowford Res.	70.2	5.9	Loweswater	80.8	4.3
Nelson	73.7	6.5	Cockermouth Moor Res.	54.6	4.7
Coldwell Res. No. 3	84.3	6.3	Dean	53.6	4.4
Coldwell Res. No. 2	84.3	6.7	<i>Ayrshire</i>		
Nelson S. Wks	54.4	4.7	Middleton Filters	55.9	4.2
Padiham Park	79.5	7.1			

TABLE 5 (continued)

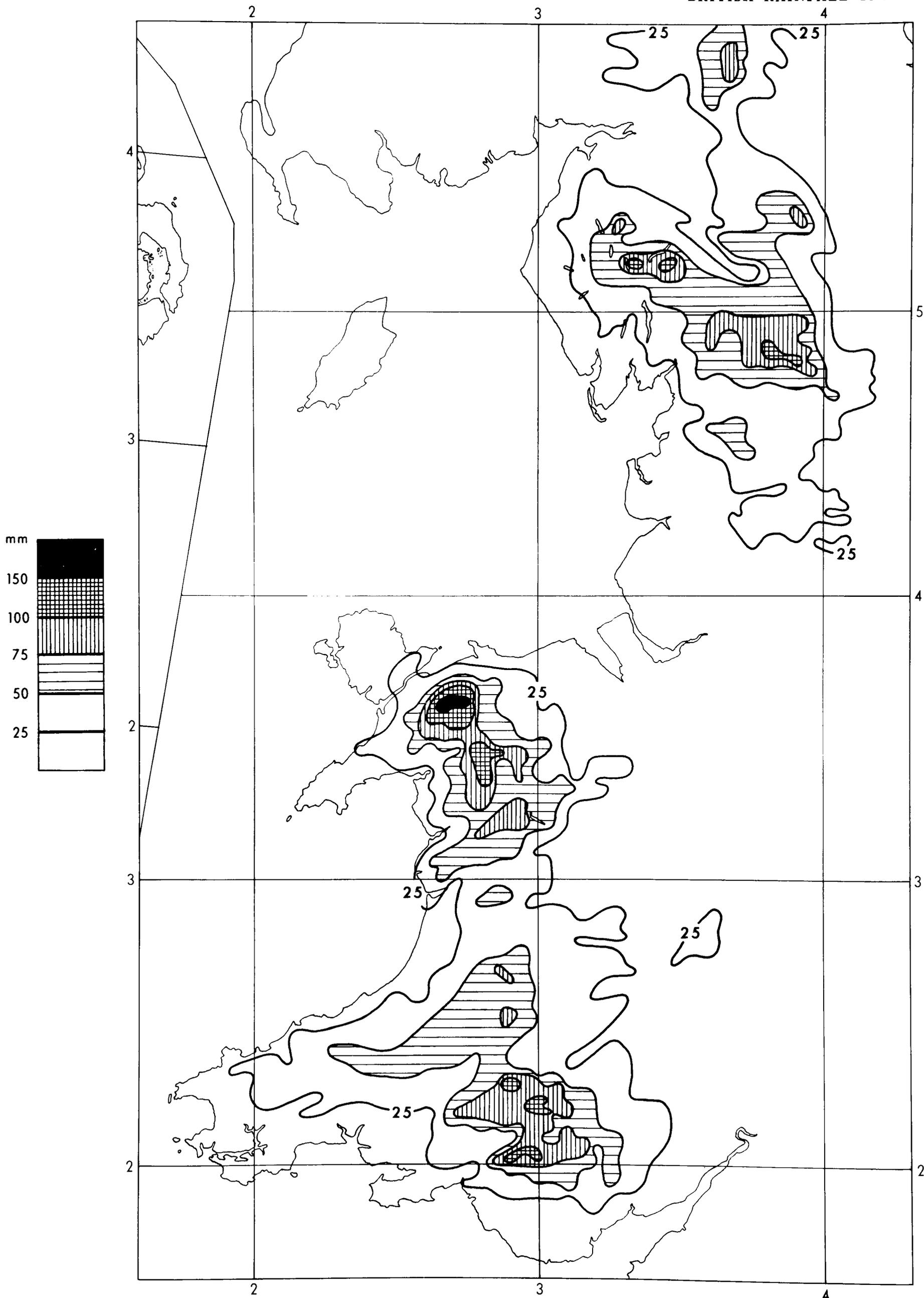
Chronicle of heavy falls on rainfall days

	<i>mm</i>	<i>%</i>		<i>mm</i>	<i>%</i>
Ballysallagh Res.	50.2	4.9	Kilroot	58.5	5.4
Helen's Bay	57.1	6.3	Woodburn, North	54.7	4.4
Conlig Res.	55.3	5.9	Woodburn, South	54.6	4.8
Ballywatticock	55.1	6.2	Castlewellan Forest	60.5	5.3
Tullyhubbert P. Sta.	64.6	6.9	Foffany Res.	75.4	4.9
Comber Cemetery	64.2	7.0	Tollymore Park	80.9	6.4
Ballycloghan	59.9	6.2	Newcastle, Slievenamaddy Avenue	60.0	4.7
Castlewellan Forest	97.2	8.6	Annalong Valley	52.4	4.3
Murlough	54.4	5.1	Silent Valley W. Wks	82.4	6.1
Tollymore Park	158.9	12.5	21 November		
Newcastle, Slievenamaddy Avenue	115.0	9.1	Winds S to SSW light to moderate becoming SW light; frontal; cold front with minor wave moving slowly south-east.		
Glasdrumman	77.0	6.6	<i>Ayrshire</i>		
Annalong Valley	103.6	8.4	Dalry Filters	59.9	4.3
Silent Valley W. Wks	54.4	4.1	<i>Clyde</i>		
Mourne Park Forest	72.8	6.2	Knockdow	64.8	4.1
Kilkeel	56.3	6.5	Rothsay	57.1	4.0
Bessbrook	53.3	5.2	<i>Kintyre and south-western islands</i>		
Bessbrook No. 2	52.5	5.0	Kildonan	58.5	4.6
Big Dog Forest	76.3	7.1	Dougarie Lodge	59.2	4.8
Garrison, Lake Hotel Site	69.2	5.5	12 December		
Clabby W. Wks	65.6	6.1	Winds S moderate to strong becoming variable light; frontal; cold front moving east becoming stationary over Northern Ireland.		
Moher	63.5	5.3	<i>Northern Ireland</i>		
Marble Arch P. Sta.	50.8	4.0	Florence Court	59.8	4.9
Florence Court	63.4	5.2	Florencecourt Primary School	57.0	4.7
Florencecourt Primary School	60.1	4.9	17 December		
Lough Navar Forest	75.0	6.1	Winds SE light to moderate depression; thundery; depression west of Wales moving slowly south.		
Breagh Bridge	54.8	5.2	<i>Sussex</i>		
Ballinamallard S. Wks	60.1	5.8	Petersfield Res.	52.8	5.9
Irvinestown Police Sta.	62.1	6.0	Petersfield, Town Hall	51.1	5.4
Irvinestown P. Sta.	71.6	6.9	18 December		
Castle Archdale Forest No. 1	66.0	6.3	Winds NE moderate becoming light; thundery; unstable air-stream.		
Castle Archdale Forest No. 2	62.8	6.0	<i>Northumbrian</i>		
Kesh Forest	58.5	5.1	Hisehope Res.	55.9	6.2
Roscor	55.7	4.5	Low Wadsworth S. Wks	70.6	10.2
1 November			Lanchester	53.2	7.1
Winds NE moderate to strong but SE light over England at first; depression, frontal, thundery; complex depression southern Ireland to North Sea with almost stationary front lying over Northern Ireland and northern England.			Crookhall S. Wks	54.9	7.1
<i>Northumbrian</i>			24 December		
Hurworth Burn Res.	51.1	7.7	Winds variable light; depression, frontal; stationary warm front with wave depression moving south-east over area.		
Kildale Hall	50.4	5.4	<i>Cornwall</i>		
<i>Lincolnshire</i>			Pyeworthy Rectory	54.9	5.2
Cranwell	53.3	8.9	Ditchen	50.0	4.6
Culverthorpe Hall	51.6	8.5	Camelford, Roughtor View	63.0	4.2
<i>Northern Ireland</i>			<i>Devon, north</i>		
Spelga Dam	70.5	4.5	Burrington	54.6	5.5
Seagahan Filters	54.6	5.5	Ash Mill	52.1	4.3
Quolie Res.	67.9	4.8	Yarnscombe, Bucks Mill	50.5	5.4
Broughshane Filters	82.5	6.8	Swimbridge	52.0	4.6
Lowtown	84.2	6.5	<i>South West Wales</i>		
Lough Fea W. Wks	61.6	4.8	Milford Haven, Conservancy Board	54.6	5.6
Skerry Hill, North	78.5	4.7	Dale Fort	52.6	5.3
Ballybraddin Forest	56.5	4.5			

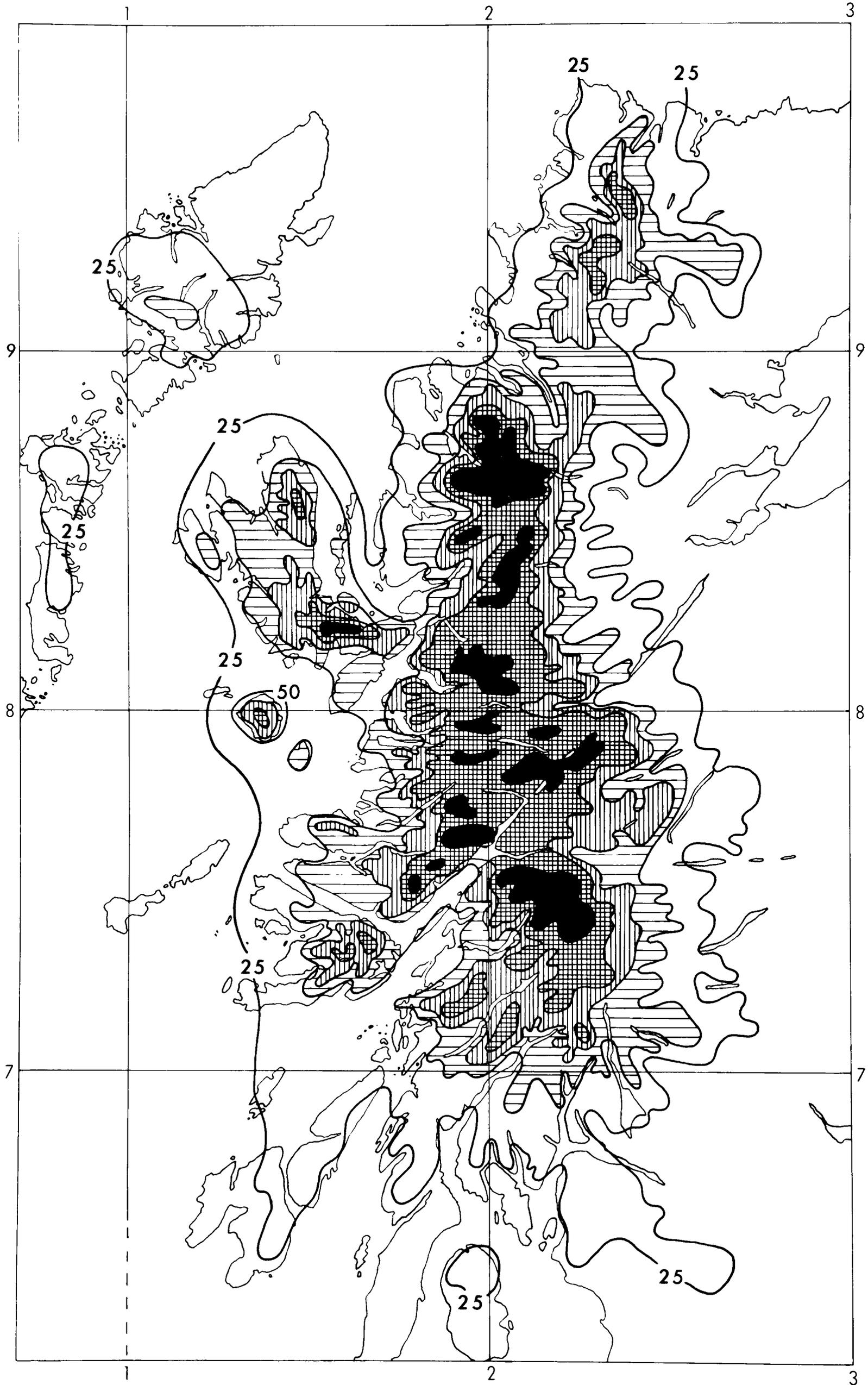
HEAVY FALLS ON RAINFALL DAYS



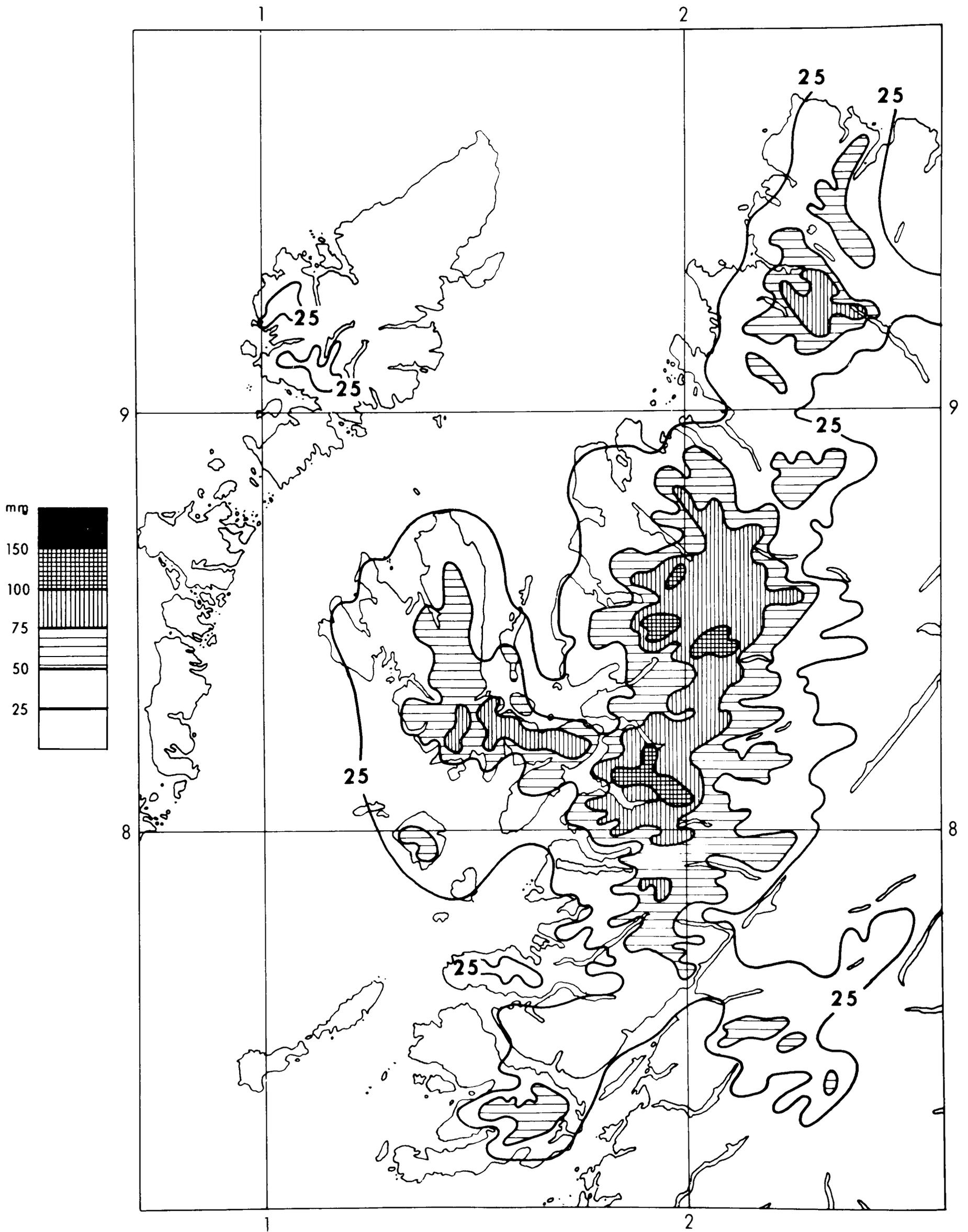
Rainfall (mm) for the 24 hours beginning 09 GMT, 19 March 1968: North Wales to north-west England



HEAVY FALLS ON RAINFALL DAYS

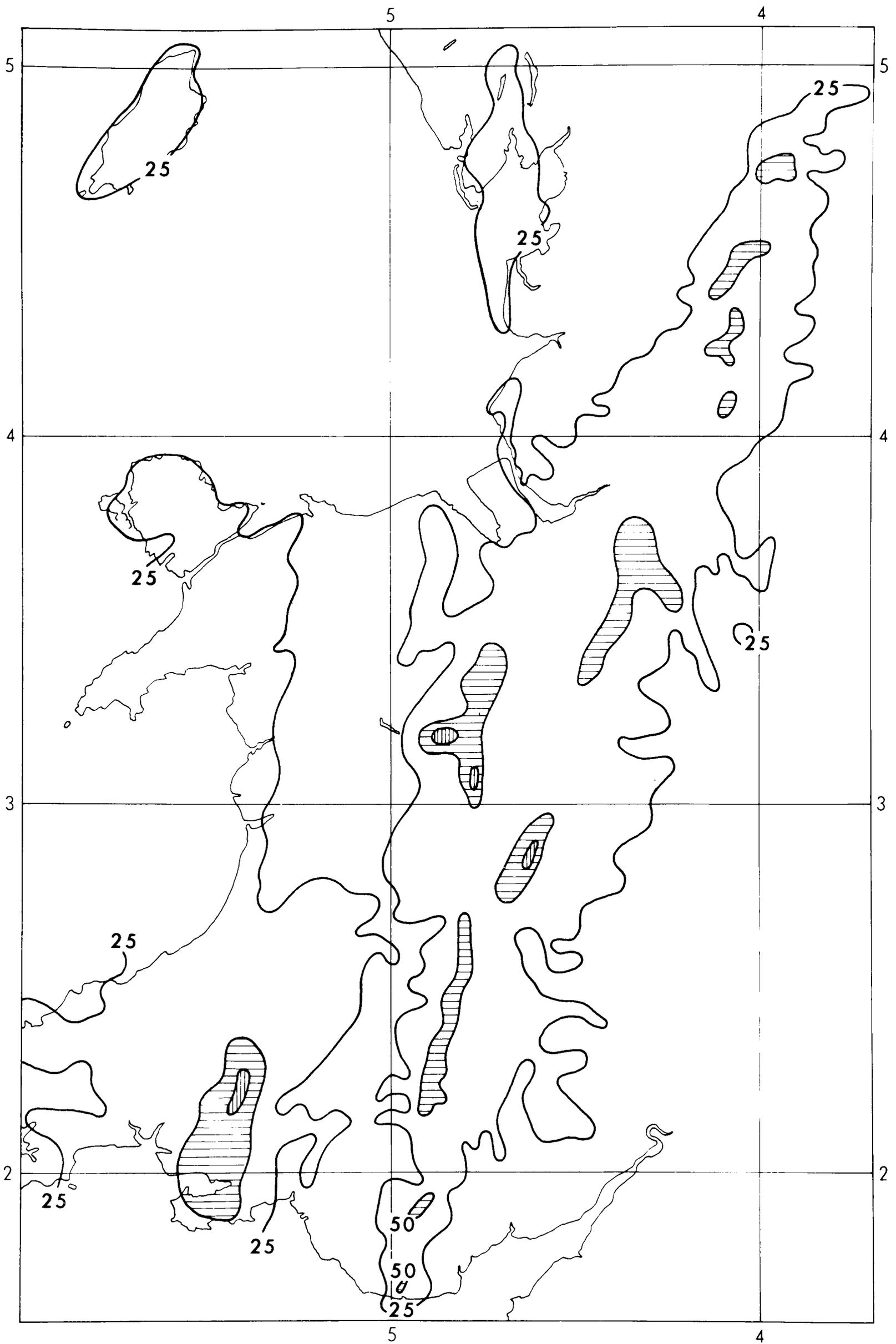


Rainfall (mm) for the 24 hours beginning 09 GMT, 26 March 1968: central and north-west Scotland 177

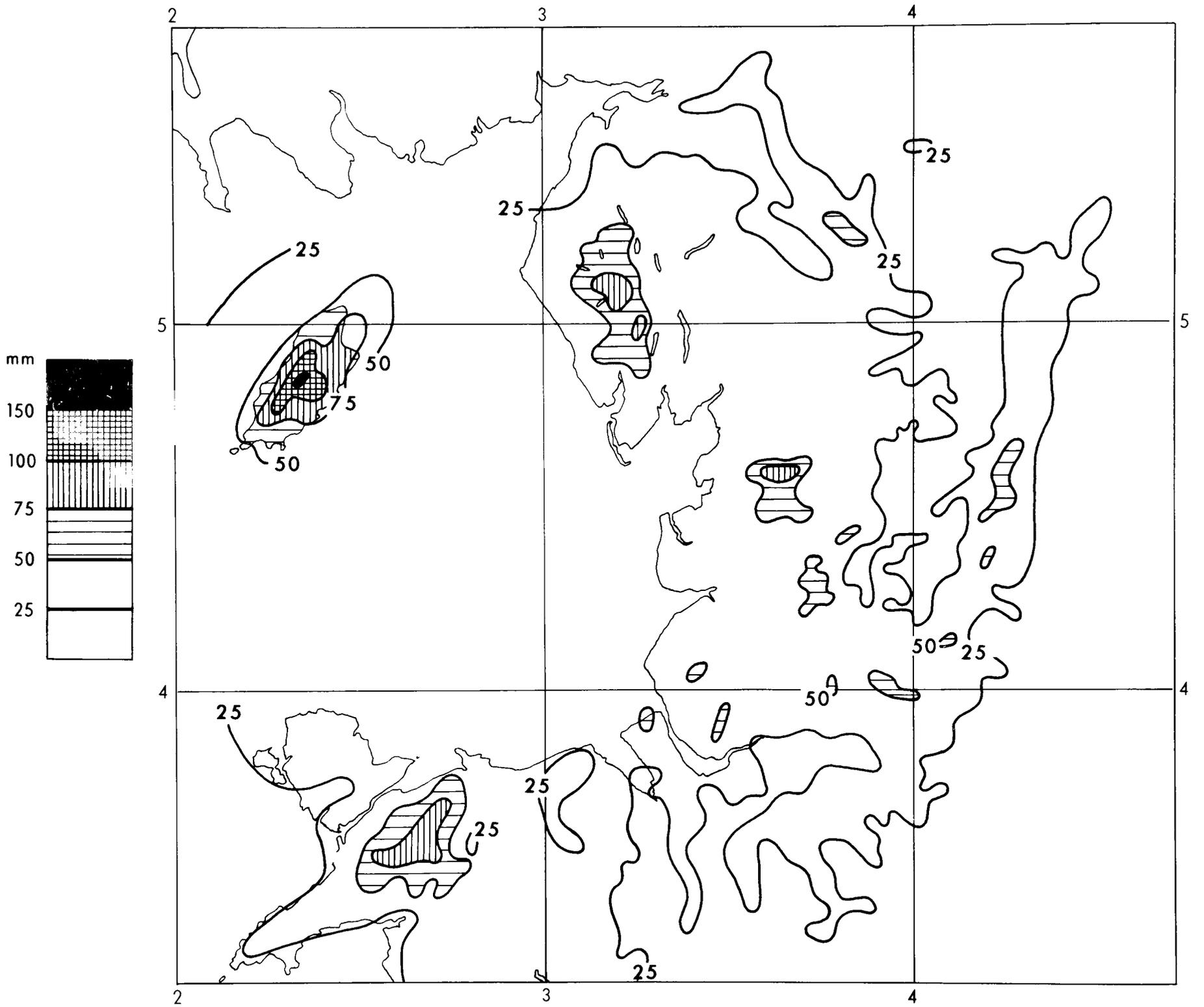


Rainfall (mm) for the 24 hours beginning 09 GMT, 27 March 1968: north-west Scotland

HEAVY FALLS ON RAINFALL DAYS

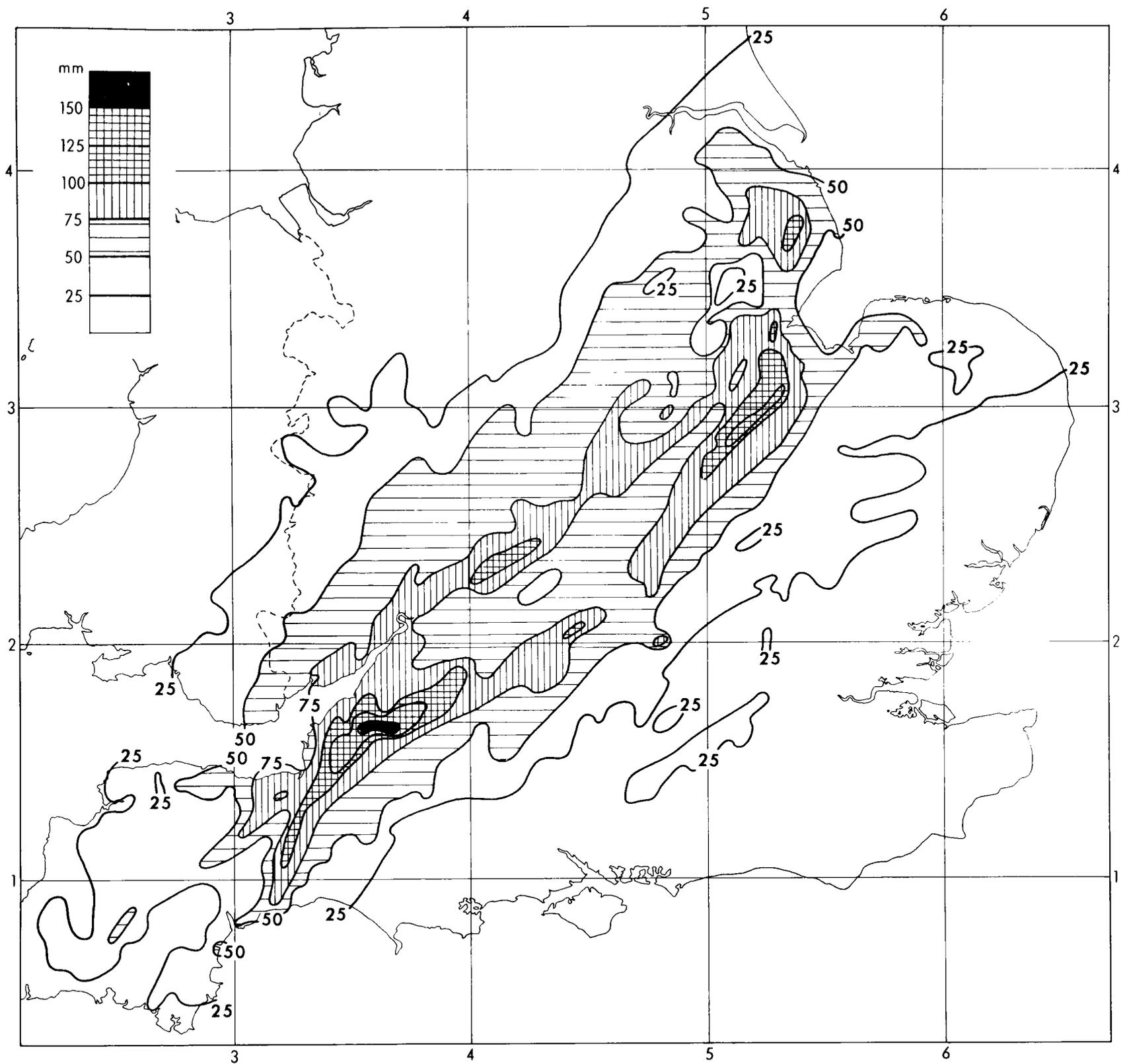


Rainfall (mm) for the 24 hours beginning 09 GMT, 1 July 1968: Isle of Man, Wales to north-west England

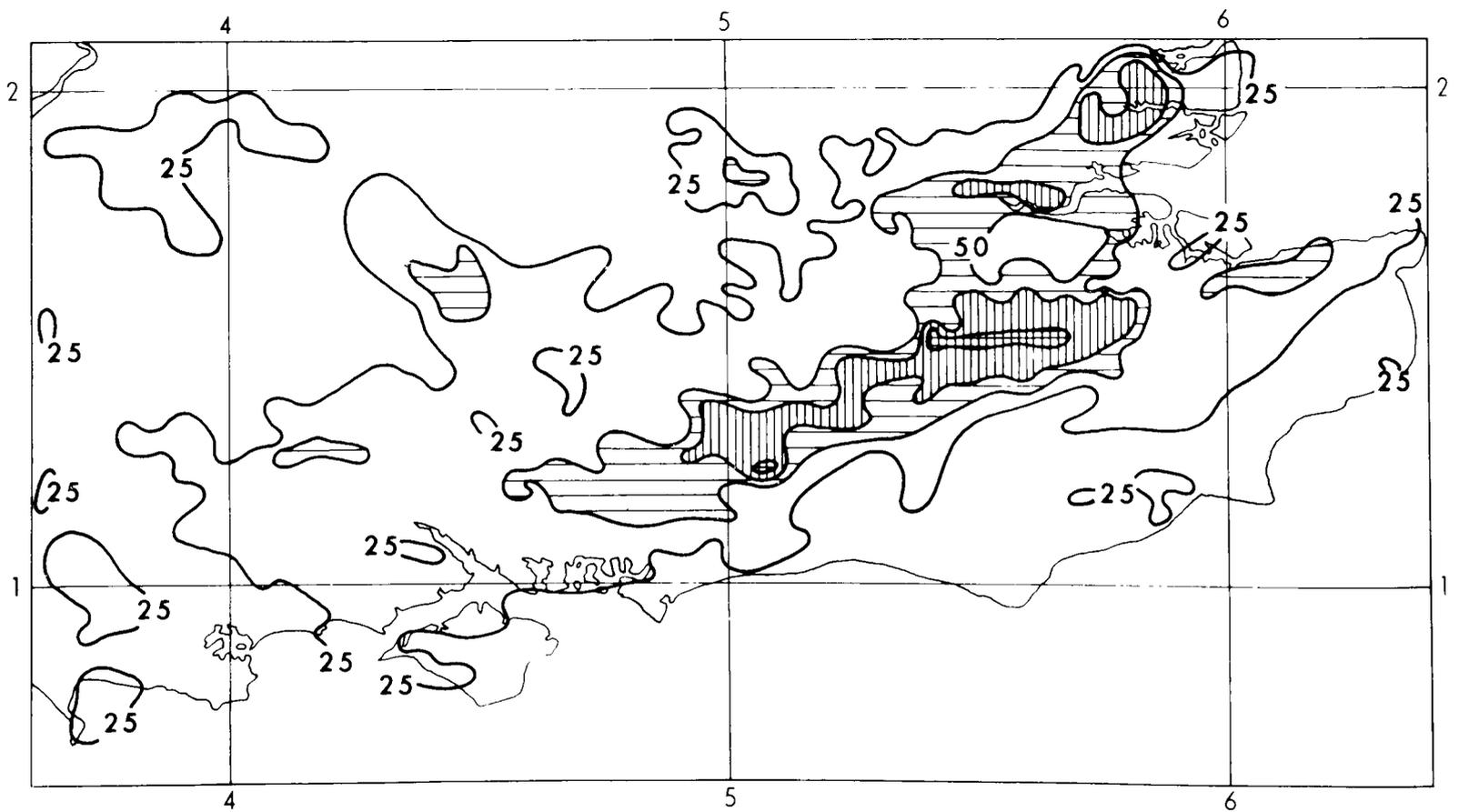
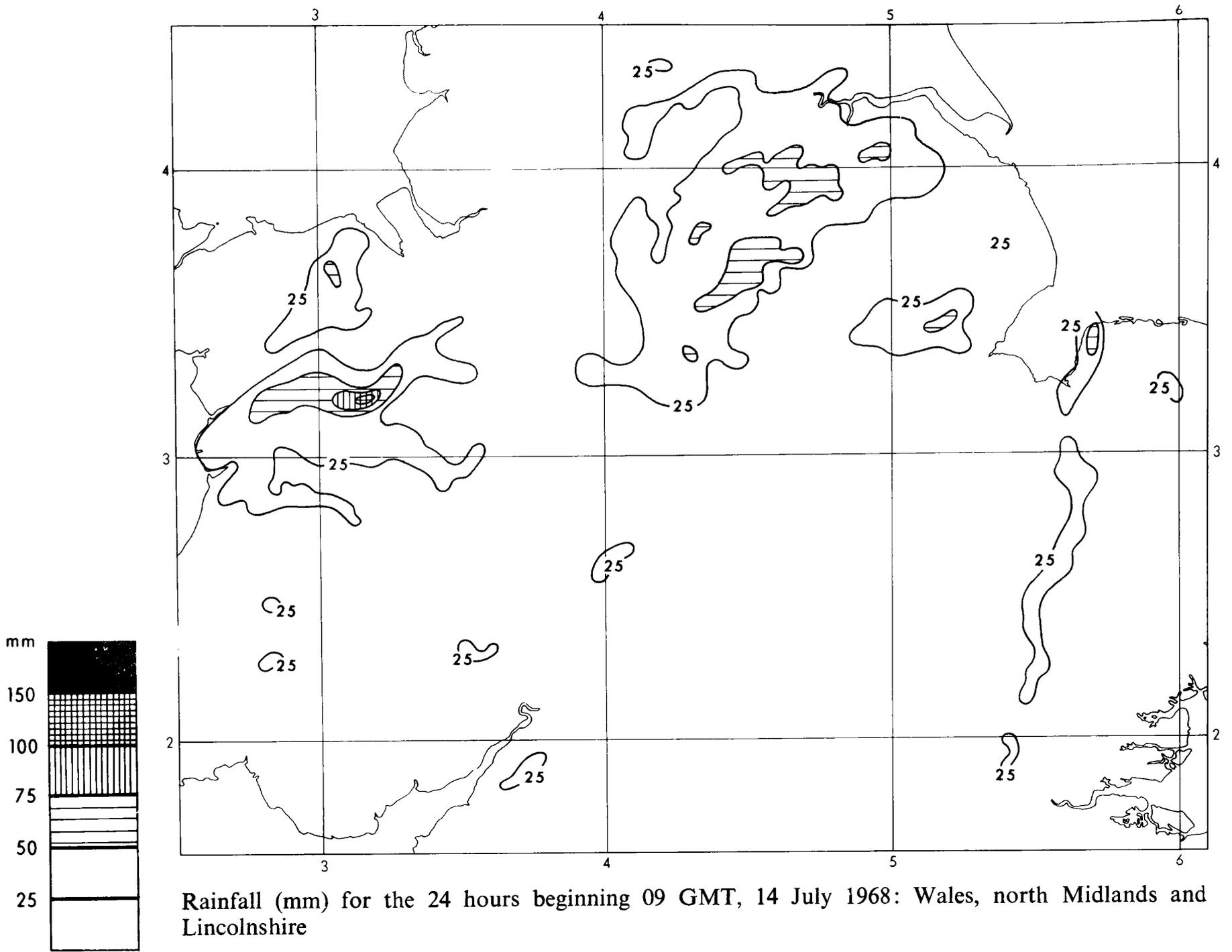


Rainfall (mm) for the 24 hours beginning 09 GMT, 2 July 1968: Isle of Man, North Wales and north-west England

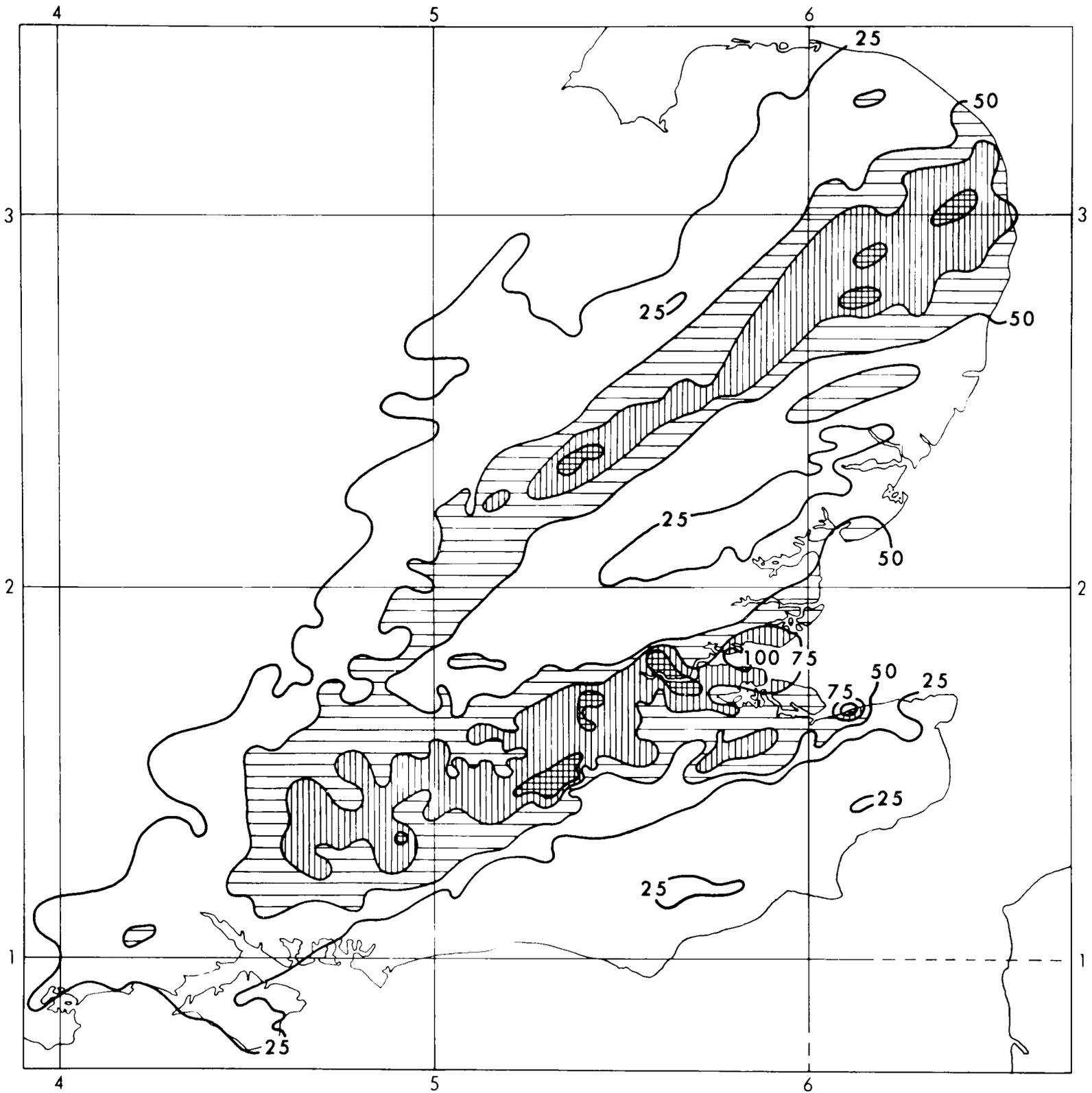
HEAVY FALLS ON RAINFALL DAYS



Rainfall (mm) for the 24 hours beginning 09 GMT, 10 July 1968: south-west England to East Anglia and Lincolnshire



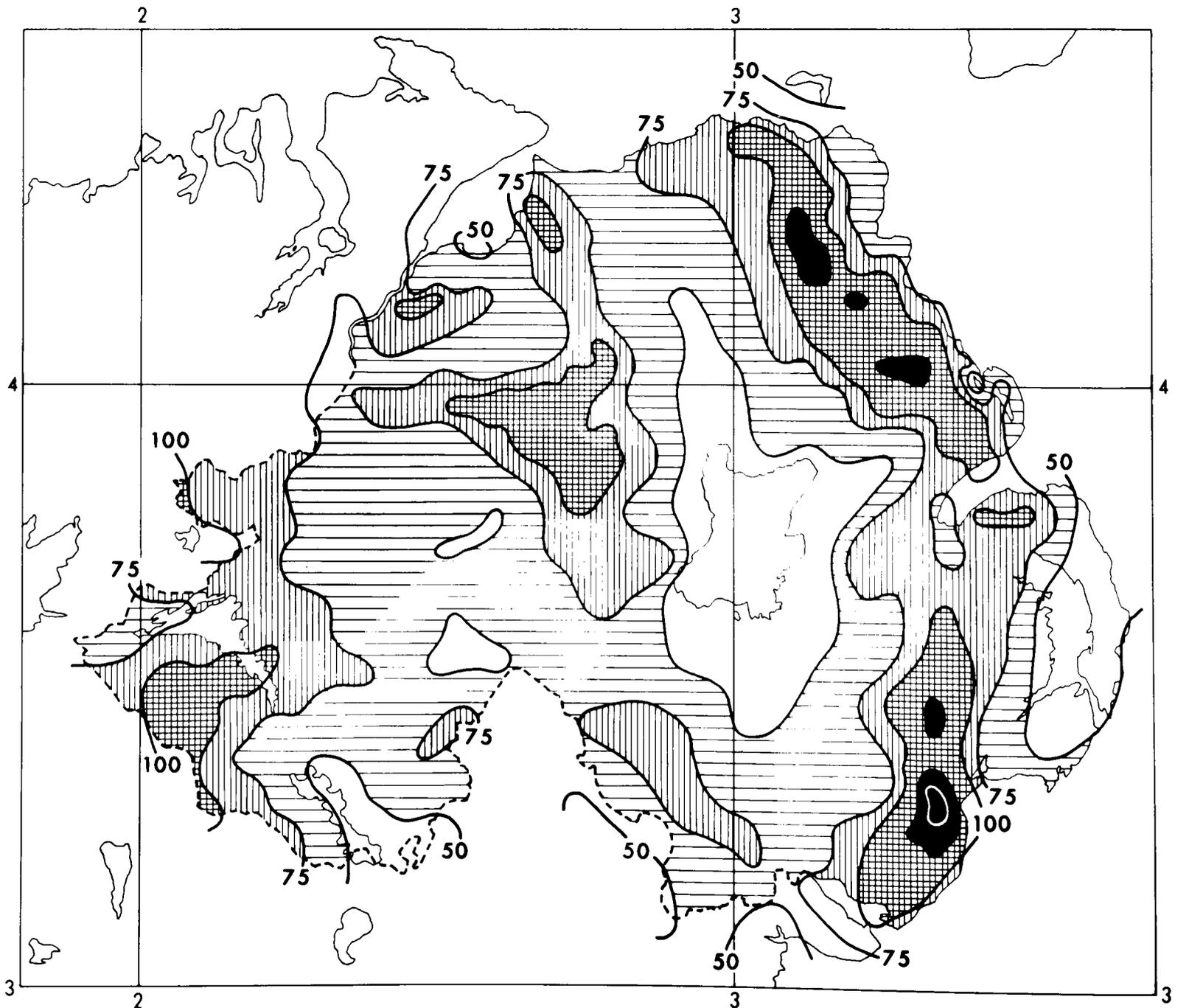
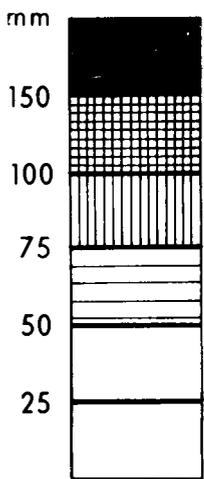
HEAVY FALLS ON RAINFALL DAYS



Rainfall (mm) for the 24 hours beginning 09 GMT, 15 September 1968: south-east England and East Anglia



Rainfall (mm) for the 24 hours beginning 09 GMT, 20 September 1968: North Wales and northern England



Rainfall (mm) for the 48 hours beginning 09 GMT, 31 October 1968: Northern Ireland

6 HEAVY FALLS IN SHORT PERIODS

A basis of classification of heavy falls in short periods (ranging from a few minutes to a number of hours) was developed for this country by E. G. Bilham and published in an article 'Classification of heavy falls of rain in short periods' in *British Rainfall* 1935. The current position regarding the frequency analysis of intense falls of this type has been discussed in an article by D. J. Holland in Part III of *British Rainfall* 1961.

Details of intense falls on particular dates are obtained either from recording rain-gauges or from appropriate multiple readings of standard non-recording gauges particularly those intended primarily for daily observations.

Table 6A gives the numbers of days in which specified amounts of rain fell in specified times without reference to the dates on which they occurred. Table 6B

gives the dates with details of known falls in less than 24 hours which have at least reached the category of 'noteworthy'. Falls are credited to the calendar day and not to the 'rainfall day' as is the case in Section 5. Readings from non-recording rain-gauges are referred to in the table as 'eye observations'. To augment these eye observations, similar information from recording rain-gauges is listed under 'autographic records'. The occasions are summarized under the broad categories 'noteworthy' (N), 'remarkable' (R) and 'very rare' (VR) in accordance with the Bilham classification. The information is listed in ascending order according to duration of fall.

Table 6C is supplementary to Table 6B and lists falls where times of commencement are not known. The few occasions where there is doubt with regard either to the magnitude or the duration of the fall are indicated by the letter 'c'.

TABLE 6A

Frequency distributions of intense falls

Number of days with the threshold values reached within the specified durations

Area and station	5 mm within			10 mm within				15 mm within					20 mm within					25 mm within				
	5 min	10 min	15 min	5 min	15 min	30 min	1 hour	15 min	30 min	1 hour	2 hours	4 hours	30 min	1 hour	2 hours	4 hours	8 hours	1 hour	2 hours	4 hours	8 hours	16 hours
<i>Northumbrian</i>																						
Acklington	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
<i>Yorkshire Ouse and Hull</i>																						
Leconfield	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
Leeming	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	2	2	1	1	1	1	1
York, Heslington	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
<i>Trent</i>																						
Keele	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Elmdon	0	0	3	0	0	0	2	0	0	0	2	4	0	0	0	1	1	0	0	1	1	1
Watnall	1	1	2	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	2
Finningley	1	2	3	0	2	2	3	0	1	i	1	2	0	0	0	1	2	0	0	1	2	2
<i>Lincolnshire</i>																						
Manby	1	3	3	0	1	1	3	0	0	1	2	3	0	0	1	1	2	0	1	1	1	4
Waddington	0	0	1	0	0	0	1	0	0	0	1	2	0	0	1	2	2	0	0	1	2	2
Cranwell	0	0	1	0	0	1	4	0	0	1	4	6	0	0	3	5	6	0	0	3	3	4
<i>Great Ouse</i>																						
Mildenhall	4	5	9	0	2	2	4	0	1	2	4	4	0	0	2	2	2	0	0	1	1	2
Monks Wood	0	1	2	0	0	1	3	0	0	1	3	3	0	0	2	3	3	0	1	3	3	3
<i>East Suffolk and Norfolk</i>																						
West Raynham	0	0	3	0	0	0	1	0	0	0	1	2	0	0	0	0	2	0	0	0	2	3
<i>Essex</i>																						
Shoeburyness	1	2	4	0	2	2	3	0	2	2	2	2	1	1	1	1	1	1	1	1	1	1
<i>London, left bank</i>																						
Kensington Palace	0	1	2	0	0	0	2	0	0	0	1	3	0	0	0	1	3	0	0	1	1	3
Heathrow	1	5	6	0	1	2	3	0	0	0	2	6	0	0	0	0	3	0	0	0	1	2
<i>Thames</i>																						
Benson	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1
Bracknell	3	3	3	0	0	0	2	0	0	1	1	3	0	0	1	1	4	0	0	1	2	3

TABLE 6A (continued)

Frequency distributions of intense falls

Number of days with the threshold values reached within the specified durations

Area and station	5 mm within			10 mm within				15 mm within					20 mm within					25 mm within					
	5 min	10 min	15 min	5 min	15 min	30 min	1 hour	15 min	30 min	1 hour	2 hours	4 hours	30 min	1 hour	2 hours	4 hours	8 hours	1 hour	2 hours	4 hours	8 hours	16 hours	
<i>Kent</i>																							
Canterbury	2	4	5	0	2	4	6	0	2	3	3	4	0	1	2	3	3	0	0	1	2	2	
Scots Float	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	
Manston	1	1	2	0	0	1	3	0	0	0	1	2	0	0	0	1	2	0	0	0	0	2	
<i>Sussex</i>																							
Thorney Island	1	2	2	0	0	1	3	0	0	1	2	4	0	0	2	2	3	0	0	1	2	3	
<i>Avon and Dorset</i>																							
Boscombe Down	0	0	2	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	2	
Porton	0	1	1	0	0	1	1	0	0	0	0	2	0	0	0	1	1	0	0	0	0	2	
Hurn	0	1	2	0	0	0	3	0	0	0	0	2	0	0	0	0	3	0	0	0	0	3	
Larkhill	1	2	2	0	0	2	2	0	0	1	2	2	0	1	2	2	2	0	1	1	1	2	
<i>Devon, south</i>																							
Exeter	3	3	5	0	2	3	4	2	2	2	2	3	1	1	2	3	4	0	0	1	1	3	
<i>Cornwall</i>																							
Mount Batten	2	7	8	0	2	3	6	1	2	3	5	6	0	1	2	3	6	0	0	1	1	6	
St Mawgan	1	1	2	0	0	1	2	0	1	1	1	4	0	1	1	2	2	0	0	0	0	1	
<i>Devon, north</i>																							
Chivenor	2	3	5	0	0	1	4	0	0	0	3	6	0	0	0	4	5	0	0	3	4	5	
<i>Bristol Avon</i>																							
Filton	0	1	3	0	0	0	1	0	0	1	1	1	0	0	1	1	1	0	1	1	1	1	
<i>Severn</i>																							
Caersws	0	1	2	0	0	0	2	0	0	0	1	4	0	0	0	1	1	0	0	0	0	1	
Shawbury	4	4	6	0	0	4	4	0	0	1	3	5	0	0	1	2	3	0	0	0	0	2	
<i>Glamorgan</i>																							
Rhose	1	4	4	0	1	3	4	0	2	3	4	6	0	2	3	4	5	1	1	3	4	5	
<i>South West Wales</i>																							
Aberporth	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	3	
Aberystwyth	0	1	1	0	0	0	1	0	0	0	0	2	0	0	0	2	5	0	0	0	0	5	
<i>Gwynedd</i>																							
Valley	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	
<i>Mersey and Weaver</i>																							
Ringway	1	1	1	0	1	1	2	1	1	1	1	2	0	0	1	1	2	0	0	1	2	2	
Speke	1	1	2	0	1	2	4	1	1	2	4	4	1	1	1	2	6	1	1	1	2	4	
<i>Lancashire</i>																							
Squires Gate	2	3	3	0	0	2	2	0	0	1	1	5	0	0	0	1	4	0	0	0	0	4	
<i>Cumberland</i>																							
Spadeadam	0	3	3	0	0	0	3	0	0	0	3	4	0	0	1	3	4	0	0	2	3	4	
Carlisle	0	2	3	0	0	0	0	0	0	0	1	3	0	0	0	0	1	0	0	0	0	1	
<i>Isle of Man</i>																							
Ronaldsway	0	1	1	0	0	1	2	0	0	1	3	6	0	1	1	3	5	0	0	2	3	5	
<i>Solway</i>																							
Eskdalemuir	0	3	3	0	0	1	3	0	0	0	2	10	0	0	0	3	6	0	0	0	0	10	
West Freugh	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	1	3	0	0	0	0	5	
<i>Ayrshire</i>																							
Prestwick	0	1	1	0	0	0	1	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	
<i>Clyde</i>																							
Abbotsinch	0	1	2	0	1	1	1	0	0	0	0	4	0	0	0	0	4	0	0	0	0	4	
Sloy	0	1	2	0	0	0	2	0	0	0	4	12	0	0	1	8	14	0	1	3	8	16	
<i>Kintyre and south-western islands</i>																							
Machrihanish	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2	0	0	0	0	4	
<i>Shiel, Alsh and Maree</i>																							
Kinlochewe	1	1	1	0	0	1	2	0	0	0	2	7	0	0	0	5	8	0	0	1	5	7	
<i>Inner and Outer Hebrides</i>																							
Tiree	0	1	2	0	0	0	0	0	0	0	0	4	0	0	0	0	3	0	0	0	0	2	
Isle of Rhum	0	1	1	0	0	1	5	0	0	1	6	17	0	0	1	5	15	0	0	3	8	14	
Stornoway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Benbecula	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	

HEAVY FALLS IN SHORT PERIODS

TABLE 6A (continued)

Frequency distributions of intense falls

Number of days with the threshold values reached within the specified durations

Area and station	5 mm within			10 mm within				15 mm within				20 mm within					25 mm within					
	5 min	10 min	15 min	5 min	15 min	30 min	1 hour	15 min	30 min	1 hour	2 hours	4 hours	30 min	1 hour	2 hours	4 hours	8 hours	1 hour	2 hours	4 hours	8 hours	16 hours
<i>Naver and Thurso</i> Mullardoch Dam	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	1	8	0	0	0	5	9
<i>Orkney and Shetland islands</i> Lerwick	0	1	1	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	1
Kirkwall	0	0	1	0	0	0	2	0	0	0	0	2	0	0	0	0	2	0	0	0	2	2
<i>Wick Water to Conon</i> Wick	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	1
Cassley	0	0	0	0	0	0	2	0	0	0	4	7	0	0	3	4	5	0	0	4	5	6
<i>Beaully and Ness</i> Dalcross	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	3	0	0	0	1	3
<i>Banff, Moray and Nairn</i> Kinloss	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
<i>Dee and Don</i> Dyce	0	2	3	0	0	0	2	0	0	0	0	4	0	0	0	1	3	0	0	0	0	2
<i>North and South Esk</i> Turnhouse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
<i>Tay</i> Whitburn	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	4
Leuchars	0	0	1	0	0	0	0	0	0	0	0	3	0	0	0	1	3	0	0	0	2	4
<i>Forth</i> Stronachlachar	0	1	4	0	0	1	4	0	0	0	2	12	0	0	0	5	15	0	0	2	8	16
Cumbernauld	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	3
<i>Lothians</i> Haddington	0	1	2	0	0	1	1	0	0	1	1	3	0	0	0	0	2	0	0	0	0	2
<i>Foyle and north-western streams</i> Creggan Res. No. 2	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	2	0	0	0	1	2
Baronscourt Forest	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	3	0	0	0	2	2
<i>Lough Foyle, east</i> Ballykelly	0	1	1	0	1	1	1	0	1	1	1	1	0	0	0	0	2	0	0	0	0	1
<i>Bann and Lough Neagh</i> Loughgall	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	2
Aldergrove	0	1	1	0	0	1	1	0	0	0	1	1	0	0	0	1	1	0	0	1	1	1
Portadown S. Wks	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Armagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	2
Lurgan Cemetery	0	0	1	0	0	0	1	0	0	0	1	2	0	0	0	0	2	0	0	0	0	2
Toomebridge	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
Coleraine, The Cutts	0	1	2	0	0	1	1	0	0	1	1	2	0	0	1	1	3	0	0	0	1	2
Huntly S. Wks	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	1
Knockmany Forest	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	0	0	0	1	5
Derrynoyd Forest	0	1	3	0	0	1	2	0	0	1	2	7	0	0	1	3	6	0	0	0	4	5
Pomeroy Forest	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	2
<i>Bush and north-eastern streams</i> Ballypatrick Forest	0	0	0	0	0	0	1	0	0	0	1	3	0	0	0	1	4	0	0	0	2	6
Parkmore Forest	0	0	2	0	0	0	1	0	0	0	0	5	0	0	0	1	9	0	0	0	3	9
<i>Lagan and eastern streams</i> Belfast, Malone	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	1	2	0	0	1	2	3
Hare Island	0	0	0	0	0	1	1	0	0	0	1	6	0	0	0	0	5	0	0	0	2	3
Timpany	0	0	2	0	0	0	0	0	0	0	0	3	0	0	0	0	3	0	0	0	0	1
<i>Newry and south-eastern streams</i> Newry Urban S. Wks	0	0	1	0	0	1	2	0	0	0	1	3	0	0	0	1	6	0	0	0	1	3
Tollymore Park	0	1	2	0	0	1	3	0	1	1	4	12	0	1	2	7	12	0	1	4	8	11
<i>Erne and western streams</i> Castle Archdale Forest	0	1	1	0	0	0	1	0	0	0	1	4	0	0	0	2	6	0	0	1	3	6
Portora Sluice	0	1	1	0	0	0	4	0	0	0	2	6	0	0	0	2	4	0	0	1	3	5

TABLE 6B

Heavy falls in short periods

Area	Station	Date	Amount mm	Began GMT	Duration h min	Rate mm/h	Category
	(a) EYE OBSERVATIONS						
Yorkshire Ouse and Hull	Harrogate	2 July	10.7	1045	3	214.0	N
Mersey and Weaver	Greenfield S. Wks	2 July	16.3	0900	5	195.6	N
Mersey and Weaver	Saddleworth	2 July	16.5	1000	6	165.0	N
Northumbrian	Elton	2 July	14.0	1038	8	105.0	N
Yorkshire Ouse and Hull	Bowling Cemetery	2 July	25.4	0930	8	190.5	R
Thames	Oxford	10 July	14.0	2030	8	105.0	N
Devon, south	Exeter	2 July	15.0	1036	9	99.6	N
Mersey and Weaver	Warrington	1 July	17.0	1715	10	102.0	N
Yorkshire Ouse and Hull	Huddersfield, Oakes	1 July	20.8	1255	10	124.8	N
Yorkshire Ouse and Hull	Huddersfield, Oakes	2 July	28.3	0910	10	169.8	R
Mersey and Weaver	Cholmondeley	1 July	26.9	1615	10	161.4	R
Mersey and Weaver	Arnfield Res.	2 July	28.7	0945	10	172.2	R
Mersey and Weaver	Ringway	1 July	15.0	1230	10	90.0	N
Mersey and Weaver	Widnes, Laboratory	1 July	21.3	1600	12	106.5	N
Mersey and Weaver	Kinder Filters	2 July	17.0	1015	12	85.0	N
Yorkshire Ouse and Hull	Leeming	2 July	34.1	1017	13	157.2	R
Yorkshire Ouse and Hull	Penkrige	28 June	21.3	1415	15	85.2	N
Northumbrian	West Hartlepool W. Wks	2 July	26.7	1145	15	106.8	R
Mersey and Weaver	Greenfield S. Wks	1 July	24.4	1235	15	97.6	N
Northumbrian	Alwinton	17 Aug.	26.9	1330	15	107.6	R
Yorkshire Ouse and Hull	Halifax, Stannary	2 July	26.7	1003	16	99.6	R
Severn	Onslow	28 June	40.6	1415	20	121.8	R
Somerset	Castle of Comfort Inn	10 July	19.1	1300	20	57.3	N
London, right bank	Eltham, South End	14 Aug.	22.9	1310	20	68.7	N
Cornwall	Horrabridge	14 Oct.	18.5	1250	20	55.5	N
Devon, south	Exeter	21 Apr.	20.0	0209	25	48.0	N
Severn	Hawkstone Park	3 June	35.0	0915	30	70.0	R
Yorkshire Ouse and Hull	Skipton Town Hall	1 July	31.2	1815	30	62.4	R
Wye	Monmouth, Cornwall House	2 July	25.4	0715	30	50.8	N
Severn	Hempsted	10 July	21.8	1000	30	43.6	N
Somerset	Clavelshay	14 Sept.	25.7	0815	30	51.4	N
Northumbrian	Hurworth Burn Res.	2 July	21.8	1150	40	32.7	N
Thames	Broadmoor	3 June	40.9	1700	40	61.3	R
Somerset	Bagborough	21 Apr.	29.6	0315	40	44.4	N
Devon, south	Woodgate Farm	21 Apr.	30.0	0315	45	40.0	N
Somerset	Huish Episcopi	27 May	31.7	1430	45	42.2	N
Dee and Clwyd	Llanarmon, Dyffryn Ceiriog	3 June	36.0	1800	45	48.0	R
Glamorgan	Rhymney Bridge Res.	1 July	24.4	1000	45	32.5	N
East Suffolk and Norfolk	Coltishall	13 July	51.0	1732	54	57.0	R
Somerset	Monksilver	23 Apr.	29.5	1305	1 00	29.5	N
Somerset	Sampford Arundel	21 Apr.	29.5	0245	1 00	29.5	N
Somerset	Brendon Hill	23 Apr.	32.8	1330	1 00	32.8	N
Hampshire	Four Marks	3 June	36.0	1605	1 00	36.0	N
Thames	Chadlington	3 June	26.2	0800	1 00	26.2	N
Lee	Bishop's Stortford, Castle Mound	14 July	34.0	1000	1 00	34.0	N
Somerset	Shepton Mallet, Whitstone School	10 July	38.1	2100	1 00	38.1	R
Trent	Sutton-in-Ashfield S. Wks	14 July	30.0	1345	1 00	30.0	N
Lincolnshire	Heckington	10 July	44.5	1415	1 00	44.5	R
Somerset	Spaxton	10 July	26.7	1240	1 05	24.6	N
Devon, south	Ide	14 Sept.	50.7	0540	1 05	46.8	R
Wye	Stoke Lacy	25 May	34.5	2140	1 10	29.5	N
Sussex	Ferring	11 July	60.2	0400	1 10	51.6	VR
Severn	Gloucester	9 July	40.8	0723	1 17	31.7	R
Yorkshire Ouse and Hull	Craggs Lane Farm	12 Sept.	72.4	0640	1 20	54.3	VR
Lee	Broomin Green	3 June	61.0	1545	1 30	40.7	R
Essex	Wickford	14 Sept.	69.0	1530	1 30	46.0	VR
Mersey and Weaver	Brushes Clough	2 Sept.	33.0	1630	1 30	22.0	N
Mersey and Weaver	Cold Greave	2 Sept.	31.5	1630	1 30	21.0	N
Severn	Llanfair Caereinion S. Wks	28 June	48.3	1325	1 45	27.6	R
Somerset	Leigh Holt	10 July	44.5	0845	1 45	25.4	N
Ayrshire	Collenan Res.	5 Aug.	59.7	1615	1 45	34.1	R
Sussex	Falmer	10 July	43.2	0340	1 56	22.3	N
Sussex	Hove, Goldstone Bottom	10 July	63.5	0340	1 56	32.8	R
Sussex	Shoreham W. Wks	10 July	58.2	0340	1 56	30.1	R
Bristol Avon	Lyneham	10 July	44.5	1938	2 00	22.3	N
Somerset	West Newton Farm	10 July	76.2	1800	2 00	38.1	VR
Isle of Wight	Totland Bay	9 July	50.8	1530	2 00	25.4	R
Thames	Kingsclere	14 Sept.	33.8	1130	2 00	16.9	N
Avon and Dorset	Dorchester, Alfred Road	14 June	33.8	1730	2 00	16.9	N
Essex	Barking P. Sta.	31 July	54.1	1500	2 03	26.3	R
Great Ouse	Prickwillow	3 June	82.8	1610	2 20	35.5	VR
Kent	Woodman's Farm	10 July	40.1	0500	2 30	16.0	N
Devon, south	Feniton Court	10 July	40.6	1800	3 00	13.5	N
Somerset	Clavelshay	10 July	78.5	1900	3 30	22.4	R
Weland and Nene	Marholm	10 July	104.9	2200	9 00	11.7	R
Somerset	Cossington	10 July	101.6	1400	10 00	10.2	R
Severn	Gloucester	10 July	127.8	0600	15 00	8.5	VR
East Suffolk and Norfolk	Wacton Hall	15 Sept.	108.2	1300	16 00	6.8	R
Great Ouse	Souldrop	10 July	94.2	0600	20 00	4.7	R
	(b) AUTOGRAPHIC RECORDS						
Usk	St Mellons	2 July	19.3	1127	7	165.0	N
Cornwall	Launceston, Western Road	2 July	21.6	0039	9	144.0	R
Devon, south	Stoodleigh Court	1 July	16.5	1038	10	99.0	N
Severn	Tredegar	1 July	22.9	1042	12	114.5	N
Northumbrian	Darlington W. Wks	2 July	15.2	1117	13	70.2	N
Bristol Avon	Long Ashton	10 July	20.3	1907	18	67.2	N
Mersey and Weaver	Widnes, Corporation Depot	1 July	18.5	1715	20	55.5	N

HEAVY FALLS IN SHORT PERIODS

TABLE 6B (continued)

Heavy falls in short periods

Area	Station	Date	Amount mm	Began GMT	Duration h mm	Rate mm/h	Category
Severn	Oswestry, Yorkfields Depot	1 July	21.3	1618	25	51.1	N
Bristol Avon	Stoke Bottom	10 July	20.0	2150	29	41.4	N
Severn	Oswestry, Yorkfields Depot	14 July	24.6	1512	32	46.1	N
Somerset	Minehead, Recreation Ground	1 July	25.7	0900	35	44.0	N
Sussex	Mile Oak	10 July	60.2	0432	40	90.3	VR
Bristol Avon	Sherborne	10 July	25.9	2320	40	38.9	N
Devon, south	Goosemoor	1 July	23.1	1100	40	34.7	N
Essex	Purleigh	14 Sept.	56.9	1541	42	81.0	VR
Yorkshire Ouse and Hull	Pudsey S. Wks	2 July	34.3	1030	45	45.7	R
Glamorgan	St Mary Church	1 July	29.0	1133	48	36.2	N
Lincolnshire	Kirton E.H.S.	10 July	25.9	0300	1 00	25.9	N
Essex	Basildon S. Wks	14 Sept.	55.9	1530	1 00	55.9	R
Sussex	Patcham W. Wks	10 July	64.3	0400	1 30	42.8	VR
Bristol Avon	Hardenhuish Res.	10 July	47.0	2005	2 00	23.5	R
Kent	West Malling	15 Sept.	53.0	0630	2 00	26.5	R
Thames	Gatwick	15 Sept.	47.9	0500	2 00	23.9	R
Bristol Avon	Long Ashton	10 July	84.3	1800	5 00	16.8	R
Somerset	Northmoor P. Sta	10 July	102.6	1900	5 00	20.5	VR

N Noteworthy R Remarkable VR Very rare

TABLE 6C

Heavy falls in short periods. Supplementary list

Area	Station	Date	Amount mm	Duration h mm	Category
Yorkshire Ouse and Hull	Bowling Cemetery	3 July	15.2	5	N
Yorkshire Ouse and Hull	Leeming	2 July	35.7	9	VR
Yorkshire Ouse and Hull	Pateley Bridge	2 July	27.5	10	R
Wye	Evancoyd	2 July	18.3	14	N
Northumbrian	Durham	2 July	18.3	14	N
East Suffolk and Norfolk	Great Yarmouth, Churchill Road	28 June	36.6	15	R
Yorkshire Ouse and Hull	Bradford	2 July	20.3	15	N
Wye	Glasbury	2 July	31.7	20	R
Northumbrian	Worsall Hall	2 July	21.6	20	N
Thames	Peaslake	14 Sept.	21.8	25	N
Severn	Sidway Hall Farm	3 July	22.9	c 30	N
Severn	Acton Scott	2 July	25.4	30	N
Northumbrian	Darlington, South Park	2 July	23.1	40	N
East Suffolk and Norfolk	Surlingham	10 July	25.4	45	N
Avon and Dorset	Shillingstone	21 Sept.	24.6	55	N
Dee and Clwyd	Ruabon	1 July	53.0	1 00	R
Sussex	Worthing	10 July	c 50.8	1 00	R
Welland and Nene	Oakham, Stamford Road	11 Sept.	36.0	1 00	N
Wye	Evancoyd	1 July	31.7	1 15	N
South West Wales	Pembrey	31 July	41.4	1 20	R
Trent	Great Wyrley	14 Sept.	39.6	c 1 30	N
Avon and Dorset	Wimborne, Clevedon Lodge	15 Sept.	31.2	1 30	N
Glamorgan	St Mary Church	1 July	35.6	2 00	N
Great Ouse	Lark P. Sta.	2 June	88.9	2 00	VR
Devon, north	Roborough	10 July	41.9	3 00	N
Lincolnshire	Spalding, Marsh Road	10 July	93.5	7 30	R
Thames	Oxford	10 July	87.9	c 18 00	R
Severn	Hempsted	10 July	117.6	c 24 00	R

N Noteworthy R Remarkable VR Very rare

'c' against a value indicates that it is doubtful.

7 EVAPORATION AND PERCOLATION

This section brings together groups of data having a bearing on the subsequent history of water that reaches the earth's surface as precipitation. These data, derived from measurements of evaporation, percolation and drainage, were discussed in *British Rainfall* 1951 and 1952, particular attention being drawn to the nature of the instruments used and to the limitations of the measurements made. Further, in Part III of *British Rainfall* 1961, various aspects concerning evaporation were treated comprehensively in a group of papers by D. J. Holland.

Table 7A gives evaporation data from standard tanks. Any value which is prefixed by the negative sign indicates probable condensation. In this edition, annual averages for the period 1956 to 1965 have been given for those stations which have complete data for these 10 years. Also, averages for stations with complete data for less than 10 but at least 5 years are included

and the number of years of complete data is shown in brackets alongside the values concerned. As the averages are over a short period they should be used with caution and checked, where possible, against calculated estimates of potential evaporation.

In Table 7B the data from 12 percolation gauges are from four stations whilst in Table 7C the data from 5 drainage gauges are from two stations. Both the tables include appropriate rainfall values and also details concerning the gauges in use.

Severe weather in the winter months may cause some of the evaporation tanks and the percolation and drainage gauges to be frozen. The number of days for which data are available is indicated in brackets beside the monthly value concerned. Totals for the year are totals of the available data and are included because they have some comparative value.

TABLE 7A

Evaporation from standard tanks (values in millimetres)

Station	Harlow Hill Res.	Cawood	Lower Laithe Res.	Ardley Res. (Upper)	Upper Linacre Filters	Frankley
Altitude	167 m	6 m	236 m	120 m	159 m	187 m
Grid ref.	SE44 289542	SE44 561366	SE44 015367	SE44 287248	SK43 338726	SP42 005803
January	10 (18 days)	-1 (14 days)	6 (16 days)	5	6 (19 days)	13
February	3 (1 day)	2 (7 days)	1 (2 days)	6	5 (17 days)	12
March	38 (27 days)	24 (28 days)	20 (25 days)	21	27	37
April	46 (26 days)	66	47 (24 days)	45	48	52
May	44	54	67	44	44	62
June	90	101	83	84	84	79
July	47 (25 days)	65	59	53	64	89
August	21 (18 days)	58	63	59	60	70
September	33	46	36	31	33	48
October	21	28	26	20	17	28
November	13	12	13 (28 days)	11	13	11
December	3	-10 (20 days)	-1 (14 days)	6	5 (21 days)	3
Year	369	445	419	385	405	504
Annual average	443 (9 years)	457 (5 years)	372 (7 years)	423	458	

Station	Revesby Res.	Lound P. Sta.	Ormesby St Michael	Farmoor	Wallingford	Rothamsted
Altitude	38 m	10 m	7 m	63 m	48 m	128 m
Grid ref.	TF53 303634	TG63 501008	TG63 468152	SP42 452064	SU41 618898	TL52 132134
January		0 (17 days)	*20 (18 days)	9	3	3
February		0 (26 days)	*42	22	9	7
March	38	6 (30 days)	40	46	36	44
April	67	26	48	61	54	62
May	63	43	56	62	58	62
June	81	71	70	94	84	84
July	76	66	74	84	81	89
August	60	55	69	76	65	67
September	37	36 (27 days)	37	47	44	48 (29 days)
October	15	4	16	26	21	25
November	4	†	*40	23	8	16
December		†	*17 (21 days)		8	4
Year					471	512
Annual average		471	404			530

* These values appear to be high

† Defective gauge

EVAPORATION AND PERCOLATION

TABLE 7A (continued)

Evaporation from standard tanks (values in millimetres)

Station	Kempton W. Wks.	Kew	Weir Wood	Otterbourne W. Wks.	Everton (Efford)	Rosewarne
Altitude	12 m	5 m	69 m	34 m	16 m	76 m
Grid ref.	TQ51 111710	TQ51 171757	TQ51 406354	SU41 469233	SZ40 303937	SW10 643412
January	0	5 (24 days)	-1 (22 days)	0 (22 days)		18
February	12	11 (19 days)	3 (22 days)	12 (19 days)		22
March	43	45	37	31 (29 days)	19	39
April	56	55	50	46	65	61
May	66	71	73 (30 days)	50	90	70
June	83	81	74	65	105	86
July	99	93	88	83	138	98
August	55	61	63	51	79	80
September	54	46	42	33 (29 days)	83	62
October	36	24	5	18		28
November	15	14 (29 days)	26	13		20
December	4	6 (20 days)	-1 (24 days)	4		26
Year	522	513	460			610
Annual average	583 (8 years)	589	451	487		647 (5 years)

Station	Barrow Gurney Res.	Lake Vyrnwy	Wellesbourne	Stocks No. 10	Stocks No. 21D
Altitude	84 m	303 m	47 m	201 m	192 m
Grid ref.	ST31 537679	SJ33 016192	SP42 271565	SD34 719550	SD34 717548
January	13 (26 days)	30	5 (26 days)	4 (17 days)	5 (16 days)
February	4 (16 days)	11	10 (22 days)	1 (3 days)	2 (2 days)
March	41	31	43	(39)(25 days)	31 (27 days)
April	59	47	51	(66)(25 days)	61 (25 days)
May	60	50	47	55	48
June	98	77	103	95	91
July	102	71	68	75	68
August	71	66	65	84	70
September	44	49	46	(61)	51
October	20	24	21	31	26
November	12	17	13	19 (25 days)	21 (25 days)
December	6 (22 days)	19	-1 (25 days)	3 (16 days)	3 (15 days)
Year	530	491	470	533	477
Annual average	570 (9 years)	418	523 (9 years)	547	460

TABLE 7B

Rainfall, percolation and inferred evaporation (values in millimetres)

Station	Fulbourn (Camsb.)		Lound P. Sta. (Suffolk)			Rothamsted (Herts.)		Farlington Res. (Hants)			
Grid ref.	TL52 539549		TG63 501008			TL52 132134		SU41 679060			
Gauge size	4.05 m ²		38-cm diameter			4.05 m ²		91-cm diameter			
Core	Bare soil on chalk	Turfed soil on chalk	Turfed soil	Turfed soil	Gravel	Bare soil	Bare soil	Chalk marl under 31 cm top soil and turf		Sand under 15 cm top soil and turf	Chalk under
Depth (cm)	91	91	28	91	91	51	152	70	91	91	91
January	43	47	58	60	65	66	67	72	70	70	67
February	16	20	40	27	34	18	20	41	37	39	40
March	1	1	7	4	1	0	0	0	1	26	3
April	0	0	1	3	1	21	19	58	71	4	8
May	0	0	1	1	5	23	23	28	28	27	3
June	28	0	4	0	5	14	12	8	9	2	1
July	79	76	3	1	19	46	46	16	19	10	9
August	87	90	8	9	23	30	29	0	0	0	0
September	70	63	71	90	99	88	53	55	49	36	41
October	17	18	31	29	34	28	26	59	53	51	55
November	24	28	49	40	43	35	33	19	19	23	24
December	38	40	29	34	39	72	64	89	88	90	90
Year	402	384	301	297	367	441	391	446	443	382	388
Inferred evaporation	306	324	376	380	310	335	385	417	420	481	475
	708		677			776		863			339
											524

EVAPORATION AND PERCOLATION

TABLE 7C

Rainfall, drainage observations and inferred evaporation (values in millimetres)

Station	Lake Vyrnwy (Montgomeryshire)				Prescot (Lancs.)	
Grid ref.	SJ33 016192				SJ33 473936	
Gauge size	Seepage gauge 40-cm diameter		Percolation gauge 46-cm equivalent diameter		Seepage gauge 40-cm diameter	
Core	No. 1 Bare soil	No. 2 Turfed soil	No. 3 No. 4 Turfed soil on chalk		Turfed soil	
Depth (cm)	23	23	23	23	28	
	Rainfall				Rainfall	
January	279	(243)	197	241	217	107
February	53	54	32	48	52	59
March	236	158	(100)	216	214	57
April	95	88	56	63	62	66
May	122	87	80	90	90	84
June	110	65	57	55	56	79
July	125	98	92	94	94	103
August	98	48	51	35	38	46
September	243	197	178	185	187	169
October	224	210	204	204	205	107
November	111	100	97	102	103	65
December	143	137	105	116	109	46
Year	1839	1485	1249	1451	1427	988
Inferred evaporation		354	590	388	412	330

8 POTENTIAL EVAPOTRANSPIRATION

The estimates of potential evapotranspiration supplied in Table 8 were calculated by using the Penman formula. This formula, since its first publication,¹ has received wide acclaim as one of the most soundly based methods of calculating evaporation by the use of readily available meteorological data.

The merit of Penman's method lies in the combination of two of the classical approaches to the calculation of evaporation, i.e. the energy-budget and the aerodynamic, which thereby eliminates the requirement in either approach for the temperature of the surface from which evaporation is taking place; a quantity which is rarely measured on a routine basis and is usually difficult to obtain.

Although the formula has a sound physical basis a good deal of empiricism is also inherent, particularly in the derivation of values for incoming and outgoing radiation in the energy-budget component. Much of this empiricism can be eliminated if measured amounts of global radiation or net radiation are available but these are quantities which are obtainable for very few stations in the United Kingdom. Over the years since the first publication of the formula, the empirical constants in the basic equations have been changed from time to time and when values derived from the formula are quoted it is important to state precisely what constants have been used.

The version of the formula used in the derivation of the values in the table is, with one important amendment, that published by Penman.² The calculations are carried out by computer and relate to evapotranspiration from a vegetated surface, the albedo of which is taken to be 0.25. This albedo is generally considered representative of grass, most agricultural crops in most phases of their development and deciduous woodlands in leaf (but not conifers); it is not appropriate to an open water surface and the values in the table cannot be considered representative of such a surface.

The formula is:

$$E = \frac{\Delta H + \gamma E_a}{\Delta + \gamma},$$

where Δ is the slope of the saturation vapour pressure curve at air temperature and γ is the hygrometric constant, taken as 0.49, temperature being in degrees Celsius and vapour pressure in millimetres of mercury.*

* Conversions compatible with SI units are as follows: 1 mmHg = 1.333 mb; 1 cal = 4.1868 J; 1 mile/day = 1.609 km/day; 1 mm of water evaporated/day = 2.858 mW/cm.

H is given by the equation

$$H = 0.75R_a \left(0.18 + 0.55 \frac{n}{N} \right) - 0.95\sigma T_a^4 \left(0.10 + 0.90 \frac{n}{N} \right) (0.56 - 0.092\sqrt{e_d}).$$

Here, R_a is the amount of short-wave radiation reaching the outside of the earth's atmosphere expressed in millimetres of water evaporated per day (the simple latent heat conversion is 59 cal/cm² = 1 mm water evaporated), n/N is the ratio of observed hours of sunshine to possible hours, σT_a^4 is the theoretical black-body radiation in equivalent millimetres per day at mean air temperature T_a (expressed in kelvins) and e_d is actual vapour pressure (mmHg) at T_a . The coefficient 0.95 is the important amendment referred to earlier and is intended to allow for vegetation not radiating as a perfect black body, following Budyko.³

E_a is given by the equation

$$E_a = 0.35 (e_a - e_d) \left(1 + \frac{U_2}{100} \right),$$

where e_a is the saturation vapour pressure at the mean air temperature T_a , and e_d is the actual vapour pressure (mmHg) and U_2 is the run of wind in miles per day.

The data required for the calculation of evapotranspiration in the form adopted in the programme are: sunshine (actual hours per month), air temperature (°C) and vapour pressure (mmHg), run of wind (derived from a frequency table of ranges of speeds), and latitude and time of year (for the calculation of R_a and N).

All the values in Table 8 are based on meteorological elements measured four times a day (03, 09, 15 and 21 GMT), averaged to give a mean value for the month. Values are also calculated but not published for stations which measure the required meteorological elements less frequently than four times a day and even for stations which measure once a day only at 09 GMT.

References

1. PENMAN, H. L.; Natural evaporation from open water, bare soil and grass. *Proc R Soc, London, A*, **193**, 1948, pp. 120–145.
2. PENMAN, H. L.; Woburn irrigation, 1951–59. I. Purpose, design and weather. *J Agric Sci, Cambridge*, **58**, 1962, pp. 343–348.
3. BUDYKO, M. I.; The heat balance of the earth's surface. Leningrad, Gidrometeoizdat, 1956. (Translation available—Washington, U.S. Weather Bureau, 1958.)

POTENTIAL EVAPOTRANSPIRATION

TABLE 8

Calculated potential evapotranspiration (values in millimetres)

Station	Grid reference	Altitude metres	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Acklington	NU 46 225007	42	7	8	41	47	56	90	65	56	33	22	17	6	448
Tynemouth	NZ 45 374694	27	14	17	47	51	62	106	73	57	40	25	22	13	528
Leconfield	TA 54 026438	7	11	8	41	51	65	89	67	62	38	19	10	0	461
Huddersfield, Oakes	SE 44 113177	232	5	7	37	51	58	94	67	63	36	18	6	0	441
Elmdon	SP 42 170835	97	14	12	55	59	67	98	81	72	51	26	8	2	543
Watnall	SK 43 503456	112	6	8	40	55	60	88	70	68	40	19	4	2	460
Finningley	SK 43 658995	10	9	8	49	59	67	98	70	71	41	21	7	2	501
Binbrook	TF 53 196958	114	7	10	54	62	65	85	74	66	45	21	10	0	498
Manby	TF 53 391869	17	6	10	50	59	68	83	77	62	43	19	10	0	488
Waddington	SK 43 984650	68	8	10	49	63	71	81	71	69	43	21	4	0	490
Wittering	TF 53 048032	80	9	11	50	56	71	92	93	70	46	24	8	2	532
Cardington	TL 52 083466	23	9	11	53	59	68	91	80	65	49	24	7	0	516
Wyton	TL 52 284745	43	7	11	51	58	71	88	77	67	47	23	5	2	508
Mildenhall	TL 52 683778	5	8	12	49	60	72	91	83	66	48	23	6	2	519
West Raynham	TF 53 847245	73	5	10	47	59	65	87	81	59	48	22	7	1	491
Coltishall	TG 63 262229	17	7	14	56	60	69	84	77	63	48	23	11	4	516
Gorleston	TG 63 534037	1	7	22	53	52	72	86	87	63	54	27	23	10	556
Wattisham	TM 62 026514	89	5	10	50	61	74	89	88	68	48	22	6	1	523
Stansted	TL 52 551226	101	5	10	44	56	68	86	77	63	42	19	3	0	473
Walton on Naze	TM 62 259225	5	6	14	38	54	77	89	93	68	52	24	14	7	534
Heathrow	TQ 51 077768	25	9	16	51	66	84	107	100	74	53	26	10	4	600
Little Rissington	SP 42 209191	225	5	8	44	56	68	93	83	67	44	18	3	0	489
Abingdon	SU 41 482990	64	7	11	46	58	71	98	80	72	48	24	8	2	525
South Farnborough	SU 41 867544	69	6	10	48	57	81	103	94	69	47	24	7	2	549
Gatwick	TQ 51 265407	58	4	11	40	52	74	87	81	64	40	20	5	1	479
Manston	TR 61 335666	44	8	16	45	58	74	92	91	68	53	24	12	6	546
Deal	TR 61 377536	5	6	13	39	47	63	105	81	59	48	29	17	7	516
Thorney Island	SU 41 756027	3	8	15	42	57	80	97	94	77	55	27	8	5	566
Boscombe Down	SU 41 172393	127	8	13	44	57	73	93	91	71	47	20	7	3	526
Hurn	SZ 40 116978	10	11	15	41	56	72	97	91	72	54	24	9	6	548
Exeter	SX 20 995937	32	17	13	42	49	70	87	91	67	49	22	11	4	521
Mount Batten	SX 20 492529	27	15	15	42	55	74	89	96	76	51	22	12	4	551
St Mary's, Scilly	SV 00 913121	48	19	21	41	59	78	83	99	74	52	22	19	17	584
St Mawgan	SW 10 871642	102	14	16	39	57	72	85	91	76	53	23	10	6	541
Hartland Point	SS 21 231277	91	13	13	38	52	56	81	91	73	52	27	18	16	531
Chivenor	SS 21 494347	6	16	17	43	58	76	91	94	81	58	29	13	8	585
Lynham	SU 41 012786	139	7	12	44	56	69	96	88	68	46	20	5	1	512
Filton	ST 31 598802	58	8	11	44	56	71	99	93	72	52	22	8	2	537
Shawbury	SJ 33 553220	72	9	8	40	54	66	92	81	67	43	21	6	1	488
Pershore	SO 32 973495	40	7	7	44	57	78	103	89	71	51	23	6	2	538
Gloucester	SO 32 851177	27	8	11	44	57	70	99	85	72	46	23	7	2	523
Mumbles Head	SS 21 626871	36	20	26	47	56	77	92	99	87	69	27	20	10	630
Rhose	ST 31 060670	67	9	14	39	52	67	95	95	78	53	24	12	3	542
Aberporth	SN 22 247516	115	15	19	41	60	70	90	89	76	52	24	16	10	561
Valley	SH 23 310758	10	18	14	42	57	73	99	95	84	57	25	14	12	589
Ringway	SJ 33 818850	76	8	11	36	63	76	103	85	86	51	25	11	2	555
Speke	SJ 33 415839	23	10	10	44	63	72	99	84	80	49	24	10	4	550
Squires Gate	SD 34 316317	10	6	9	34	57	76	103	87	77	45	21	8	5	527
Carlisle	NY 35 384603	26	7	6	34	54	67	95	74	69	36	19	9	0	470
Ronaldsway	SC 24 279688	17	17	18	44	53	74	97	93	80	46	26	25	16	589
Point of Ayre	NX 25 467043	9	13	11	35	55	69	95	83	79	43	27	23	18	550
Eskdalemuir	NT 34 235026	242	5	4	30	43	59	85	64	58	32	15	6	0	402
Mull of Galloway	NX 25 157304	78	15	17	42	61	75	94	81	77	47	31	31	18	590
Prestwick	NS 26 369261	16	5	5	29	55	70	91	81	72	38	19	8	1	471
Renfrew	NS 26 480667	5	5	7	33	52	70	95	75	68	36	18	11	4	473
Rhuvaal	NR 16 426792	20	13	12	24	55	73	86	74	65	35	27	23	20	506
Tiree	NL 07 999446	9	11	13	30	52	75	83	80	73	39	22	31	26	536
Stornoway	NB 19 465332	3	3	5	22	38	68	76	72	65	41	14	14	8	425
Benbecula	NF 08 784556	5	11	7	29	49	71	92	81	78	44	25	27	12	528
Cape Wrath	NC 29 259747	112	6	10	29	42	71	77	67	66	44	26	18	20	476
Lerwick	HU 411 453397	82	6	6	22	36	59	66	67	51	29	15	19	13	388
Kirkwall	HY 310 483076	26	9	9	31	39	62	66	68	57	35	18	16	17	426
Wick	ND 39 366523	36	6	10	31	38	60	72	65	57	32	19	45	15	450
Kinloss	NJ 38 069625	5	12	7	36	55	67	86	69	68	38	23	11	7	479
Dyce	NJ 38 873125	58	6	7	39	44	58	86	61	59	34	16	15	9	436
Leuchars	NO 37 468208	11	5	8	37	46	56	86	68	66	36	17	15	4	442
Turnhouse	NT 36 159739	35	8	7	40	45	61	87	69	68	36	20	11	3	454
Ballykelly	IC 24 624238	1	9	10	34	39	69	86	78	69	36	19	16	8	473
Aldergrove	IJ 33 147798	69	5	6	29	52	63	85	77	65	37	18	11	2	450

BRITISH RAINFALL 1968

Part III Special articles

1 POTENTIAL EVAPOTRANSPIRATION DATA, 1968

by F. H. W. Green, M.Sc.

Irrigated lysimeter observations have been made at a number of locations in the British Isles for several years. The observational techniques and the use of the observations to determine evapotranspiration were discussed in *British Rainfall* 1958, the first volume of this publication to include evapotranspiration data. Further, D. J. Holland discussed potential evapotranspiration observations at some length in Part III of *British Rainfall* 1961.

When observational difficulties have led to short gaps in the monthly returns, values for the gaps have been interpolated and the total evapotranspiration for the month has been placed in brackets in Table 1A.

Commencing with *British Rainfall* 1959–60, potential water deficit (PWD) and potential water surplus (PWS) have been assessed by wet and dry periods (i.e. periods when rainfall (R) exceeds potential evapotranspiration (PE) and when PE exceeds R) of 5 days or more. These figures are ecologically and hydrologically more realistic than figures for the calendar months.

The data for 1968 are presented in the same form as for previous years.

Some stations which have appeared in the tables in previous years and which operated in 1968 are not included in this year's tables because the observations were incomplete or unsatisfactory for various reasons.

These are as follows: Woodwalton Fen, Happendon Station, Wallingford, and Wellesbourne. The following stations reappear in the tables: Isle of Rhum, Stilligarry, Tregaron (Ty-Coed), and Grendon Underwood.

Important features of 1968 included the considerably above-average rainfall over many parts of south-east and central southern England and the unusually low rainfalls over much of west and north Britain. The west and north of Scotland were remarkably sunny; Stenness had the highest measured total of PE.

There is general consistency, in that neighbouring stations show sufficient similarity to enable generalized isopleths of PE and PWD to be drawn. Partial exceptions were (a) Sutton Bonington, with unexpectedly high figures, possibly due to the 'oasis effect',* (b) Edgbaston, slightly higher than expected, possibly due to an urban oasis effect, (c) High Mowthorpe, which showed the usual tendency of chalk upland areas to have a high PE, again probably due to the oasis effect. In contrast to High Mowthorpe, Overton Down for the first time showed little sign of this effect and it was not evident at Wye Down.

Data for the Irish stations are included, as before, by the courtesy of the Irish Meteorological Service and the Irish Agricultural Institute. They show the same features as the north-west of Britain, but the higher PE rates at Kinsealy are difficult to explain.

* See article in Section 1, Part III, *British Rainfall* 1962.

POTENTIAL EVAPOTRANSPIRATION DATA, 1968

TABLE 1A

Potential evapotranspiration and rainfall (all values in millimetres)

PE=Potential evapotranspiration, R=Rainfall, PWD=Potential water deficit, PWS=Potential water surplus

		Achna-goichan	Cwm Dyli	Glenlatterach	Harris	Inverpolly	Isle of Rhum	Killie-chonate	Kin-lochewe
January	PE	(5)	(5)	5	(3)	(3)	8	—	(0)
	R	89	510	58	125	145	288	196	221
	PWD	0	0	3	—	0	0	—	0
	PWS	84	505	56	—	142	280	—	221
February	PE	(5)	(8)	8	5	10	(9)	—	(2)
	R	43	99	46	79	66	119	56	63
	PWD	(3)	5	3	—	2	2	—	0
	PWS	41	96	41	—	58	112	—	61
March	PE	(20)	18	23	10	15	(15)	—	(5)
	R	102	353	61	140	175	274	191	493
	PWD	2	5	3	—	0	0	—	0
	PWS	84	340	41	—	160	259	—	488
April	PE	(25)	41	30	23	(23)	20	33	20
	R	71	127	58	43	66	91	43	61
	PWD	23	10	13	—	13	3	13	13
	PWS	69	96	41	—	56	74	23	54
May	PE	46	53	46	36	36	43	48	35
	R	91	188	155	74	43	84	69	88
	PWD	23	10	20	—	23	23	20	18
	PWS	68	145	129	—	30	64	41	71
June	PE	86	91	94	41	64	71	53	61
	R	33	175	48	61	69	114	66	119
	PWD	58	36	58	—	15	25	18	23
	PWS	5	120	12	—	20	68	31	81
July	PE	53	79	61	43	53	53	43	58
	R	175	152	170	33	104	56	107	94
	PWD	18	28	18	—	38	23	0	23
	PWS	140	101	127	—	89	26	64	59
August	PE	74	51	66	46	64	35	36	66
	R	53	269	46	63	46	150	59	61
	PWD	36	31	33	—	41	17	10	41
	PWS	15	249	13	—	23	132	33	36
September	PE	48	36	36	51	38	13	18	36
	R	69	384	61	124	41	201	74	79
	PWD	20	5	13	—	23	5	5	18
	PWS	41	353	38	—	26	193	61	61
October	PE	33	43	23	33	13	(15)	—	(20)
	R	140	371	96	155	168	312	340	335
	PWD	7	5	8	—	2	3	—	5
	PWS	114	333	81	—	157	300	—	320
November	PE	20	33	18	20	13	—	—	15
	R	41	211	33	61	58	150	124	84
	PWD	15	13	10	—	8	—	—	7
	PWS	36	191	25	—	53	—	—	76
December	PE	15	(18)	13	(13)	10	—	—	10
	R	81	168	64	94	63	178	102	71
	PWD	10	2	5	—	3	—	—	3
	PWS	76	152	56	—	56	—	—	64
April to September inclusive	PE	332	351	333	240	278	235	231	276
	R	492	1295	538	398	369	696	418	502
	PWD	178	120	155	—	153	96	66	136
	PWS	338	1064	360	—	244	557	253	362
Year	PE	430	476	423	(324)	342	—	—	(328)
	R	988	3007	896	1052	1044	2017	1427	1769
	PWD	215	150	187	—	168	—	—	151
	PWS	773	2681	660	—	870	—	—	1592

Notes: The rainfall amount in those individual months when PE exceeds R is shown in *italics*. Values in brackets are interpolated.

TABLE 1A (continued)

		Lossie- mouth	Monks' Wood	Moor House	Morden Bog	Overton Down	Prabost	Rannoch Rly. Sta.	Stenness
January	PE	(5)	13	—	3	(10)	18	(10)	23
	R	51	41	206	84	94	188	170	112
	PWD	0	3	—	0	—	0	0	0
	PWS	46	31	—	81	—	170	160	89
February	PE	(8)	13	—	8	10	15	(15)	20
	R	53	23	147	79	38	63	(25)	58
	PWD	3	8	—	3	—	5	—	3
	PWS	48	18	—	74	—	53	—	41
March	PE	(18)	58	—	28	15	18	(15)	38
	R	46	15	305	28	36	264	188	104
	PWD	3	56	—	10	—	0	0	0
	PWS	31	13	—	10	—	246	173	66
April	PE	(41)	61	33	30	18	43	(28)	51
	R	53	35	109	53	71	43	53	86
	PWD	26	46	15	20	—	20	5	23
	PWS	38	20	91	43	—	20	30	58
May	PE	(58)	51	41	33	46	58	(43)	76
	R	79	46	125	64	63	91	295	53
	PWD	20	28	20	10	—	20	25	51
	PWS	41	23	104	41	—	53	277	28
June	PE	86	63	(79)	56	99	64	91	91
	R	56	48	125	117	94	89	104	76
	PWD	53	38	38	5	—	23	28	28
	PWS	23	23	84	66	—	48	41	13
July	PE	(86)	66	(35)	76	(97)	56	76	104
	R	117	147	132	38	102	74	99	56
	PWD	20	33	15	53	—	33	30	66
	PWS	51	114	112	15	—	51	53	18
August	PE	74	48	51	84	81	(64)	102	99
	R	33	86	58	56	81	(84)	91	46
	PWD	48	23	26	33	—	(36)	51	66
	PWS	7	61	33	5	—	(56)	40	13
September	PE	51	43	25	28	41	(35)	53	58
	R	41	94	285	130	145	104	96	30
	PWD	20	20	2	0	—	15	13	38
	PWS	10	71	262	102	—	84	56	10
October	PE	38	13	5	5	18	(8)	—	28
	R	81	41	241	114	94	193	—	140
	PWD	10	8	—	0	—	0	—	0
	PWS	53	36	—	109	—	185	—	112
November	PE	18	3	(3)	2	20	15	—	38
	R	28	41	102	53	61	84	—	66
	PWD	13	0	—	0	—	7	—	13
	PWS	23	38	—	51	—	76	—	41
December	PE	5	(0)	—	(0)	(13)	8	—	23
	R	25	43	145	107	109	94	—	61
	PWD	3	0	—	0	—	3	—	5
	PWS	23	43	—	107	—	89	—	43
April to September inclusive	PE	396	332	264	307	382	320	393	479
	R	379	456	834	458	556	485	738	347
	PWD	187	188	116	121	—	147	152	272
	PWS	170	312	686	272	—	312	497	140
Year	PE	488	432	—	353	468	402	—	649
	R	663	660	1980	923	988	1371	—	888
	PWD	219	263	—	134	—	162	—	293
	PWS	394	491	—	704	—	1131	—	532

POTENTIAL EVAPOTRANSPIRATION DATA, 1968

TABLE 1A (continued)

		Stilli- garry	Strachan Kerloch Moor	Tregaron, Ty-Coed	White- hillocks	Wye Down	Yarner Wood	Alice Holt Lodge	Cawood
January	PE	—	8	2	(5)	0	5	0	8
	R	163	41	165	102	48	102	56	38
	PWD	—	5	0	0	0	2	—	3
	PWS	—	38	163	97	48	99	—	33
February	PE	—	23	3	(5)	10	13	13	10
	R	86	86	36	61	76	79	43	33
	PWD	—	8	0	2	5	10	—	2
	PWS	—	71	33	58	71	76	—	25
March	PE	—	18	10	18	41	33	10	25
	R	58	36	96	64	23	69	28	38
	PWD	—	5	3	2	23	23	—	18
	PWS	—	23	89	48	5	59	—	31
April	PE	(56)	31	30	25	56	33	51	41
	R	58	79	91	96	46	96	69	48
	PWD	18	10	13	13	28	13	—	23
	PWS	20	58	74	84	18	76	—	30
May	PE	61	51	38	41	68	43	51	46
	R	71	185	104	125	48	119	84	66
	PWD	31	18	8	18	28	20	—	23
	PWS	44	152	74	102	8	96	—	43
June	PE	74	56	58	(66)	81	56	69	79
	R	64	38	99	30	56	142	81	51
	PWD	25	33	23	46	33	15	—	43
	PWS	15	15	64	10	8	101	—	15
July	PE	63	63	66	48	76	56	119	51
	R	63	124	102	127	107	79	99	61
	PWD	28	10	28	7	25	36	—	25
	PWS	28	71	64	86	56	59	—	35
August	PE	71	61	56	53	71	(51)	81	56
	R	66	38	59	56	89	51	71	53
	PWD	30	41	25	33	23	33	—	36
	PWS	25	18	28	36	41	33	—	33
September	PE	51	33	25	23	53	(13)	—	33
	R	117	63	147	147	132	203	193	112
	PWD	28	18	2	10	20	3	—	18
	PWS	94	48	124	134	99	193	—	97
October	PE	51	35	10	8	28	—	—	13
	R	180	142	109	157	66	163	94	76
	PWD	5	5	3	3	8	—	—	5
	PWS	134	112	102	152	46	—	—	68
November	PE	51	25	10	5	15	—	—	5
	R	76	63	53	89	66	86	63	84
	PWD	23	5	5	0	8	—	—	0
	PWS	48	43	48	84	59	—	—	79
December	PE	31	18	5	(0)	5	—	—	0
	R	130	145	104	112	61	170	99	23
	PWD	0	10	3	0	2	—	—	0
	PWS	99	137	102	112	58	—	—	23
April to September inclusive	PE	(376)	295	273	256	405	252	—	306
	R	439	527	602	581	478	690	597	391
	PWD	160	130	99	127	157	120	—	168
	PWS	223	362	428	452	230	558	—	253
Year	PE	—	422	313	297	504	—	—	367
	R	1132	1040	1165	1166	818	1359	980	683
	PWD	—	168	113	134	203	—	—	196
	PWS	—	786	965	1003	517	—	—	512

TABLE 1A (continued)

		Crawford- john	Edgbaston	Grendon Under- wood	High Mow- thorpe	Mount St Bernard Abbey	Stocks No. 21D	Sutton Bonington	Westlands Farm
January	PE	(0)	5	—	—	(5)	(3)	8	0
	R	94	74	53	—	58	196	46	36
	PWD	0	0	—	—	0	0	0	0
	PWS	94	69	—	—	53	193	38	36
February	PE	(2)	13	—	—	10	(10)	13	5
	R	53	41	69	—	43	48	30	30
	PWD	0	10	—	—	5	5	8	0
	PWS	51	38	—	—	38	43	25	25
March	PE	(18)	38	—	—	25	(40)	46	28
	R	(92)	23	25	—	20	226	20	26
	PWD	5	20	—	—	15	10	26	15
	PWS	79	5	—	—	10	196	0	13
April	PE	35	58	46	53	41	46	66	48
	R	53	76	53	51	58	114	51	40
	PWD	15	33	18	—	23	18	41	18
	PWS	33	51	25	—	40	86	26	10
May	PE	58	56	61	53	43	46	71	48
	R	96	122	69	66	71	119	53	94
	PWD	18	13	18	—	10	13	36	23
	PWS	56	79	26	—	38	86	18	69
June	PE	89	74	91	89	66	56	109	71
	R	48	132	68	51	71	114	48	58
	PWD	48	23	51	—	28	28	81	41
	PWS	7	81	28	—	33	86	20	28
July	PE	61	84	81	71	61	56	94	64
	R	79	104	122	86	114	74	114	89
	PWD	20	59	43	—	31	25	66	41
	PWS	38	79	84	—	84	43	86	66
August	PE	76	53	76	53	56	58	94	56
	R	33	48	81	43	84	58	79	53
	PWD	53	25	15	—	23	48	56	26
	PWS	10	20	20	—	51	48	41	23
September	PE	33	41	66	56	38	23	56	41
	R	122	104	112	122	124	254	81	74
	PWD	8	8	10	—	5	0	13	10
	PWS	97	71	56	—	91	231	38	43
October	PE	10	23	—	—	18	18	25	26
	R	129	53	58	—	48	223	38	56
	PWD	0	10	—	—	5	3	18	13
	PWS	119	40	—	—	35	208	31	43
November	PE	5	15	—	—	13	13	13	13
	R	66	51	61	—	84	79	69	84
	PWD	0	2	—	—	3	5	2	3
	PWS	61	38	—	—	74	71	58	74
December	PE	0	8	—	—	5	(18)	10	5
	R	51	61	63	—	43	59	28	51
	PWD	0	5	—	—	0	5	5	0
	PWS	51	58	—	—	38	46	23	46
April to September inclusive	PE	352	366	421	375	305	285	490	328
	R	431	586	505	419	522	733	426	408
	PWD	162	161	155	—	120	132	293	159
	PWS	241	381	239	—	337	580	229	239
Year	PE	387	468	—	—	381	387	605	405
	R	916	889	834	—	818	1564	657	691
	PWD	167	208	—	—	148	160	352	190
	PWS	696	629	—	—	585	1337	404	476

POTENTIAL EVAPOTRANSPIRATION DATA, 1968

TABLE 1B
Stations in the Republic of Ireland

		Ballinamore Co. Leitrim	Glenamoy Co. Mayo	Johnstown Castle Co. Wexford	Kinsealy Co. Dublin	Valentia Co. Kerry
January	PE	8	8	6	20	10
	R	189	176	115	95	141
	PWD	0	0	3	8	—
	PWS	181	168	112	83	—
February	PE	5	13	17	33	22
	R	32	45	41	16	82
	PWD	3	3	10	20	—
	PWS	30	35	34	3	—
March	PE	28	28	40	47	21
	R	92	127	47	35	85
	PWD	8	5	20	35	—
	PWS	72	104	27	23	—
April	PE	50	31	63	64	49
	R	58	72	70	57	137
	PWD	20	8	36	40	—
	PWS	28	49	43	33	—
May	PE	53	76	73	66	61
	R	56	72	51	44	71
	PWD	31	32	42	22	—
	PWS	34	28	20	0	—
June	PE	78	94	84	100	90
	R	117	76	41	50	79
	PWD	25	28	51	65	—
	PWS	64	10	8	15	—
July	PE	84	82	107	98	80
	R	22	32	54	14	34
	PWD	62	58	71	84	—
	PWS	0	8	18	0	—
August	PE	126	81	107	109	86
	R	107	98	75	74	108
	PWD	75	51	52	66	—
	PWS	56	68	20	31	—
September	PE	58	61	35	57	42
	R	159	142	133	100	183
	PWD	13	13	5	3	—
	PWS	114	94	103	46	—
October	PE	36	38	30	55	29
	R	202	180	112	54	136
	PWD	8	5	8	18	—
	PWS	174	147	90	17	—
November	PE	23	15	8	27	15
	R	108	118	148	64	234
	PWD	8	8	2	10	—
	PWS	93	111	142	47	—
December	PE	20	2	2	35	12
	R	126	137	126	106	209
	PWD	8	0	0	8	—
	PWS	114	135	124	79	—
April to September inclusive	PE	449	425	469	494	408
	R	519	492	424	339	612
	PWD	226	190	257	280	—
	PWS	296	257	212	125	—
Year	PE	569	529	572	711	518
	R	1268	1275	1013	709	1499
	PWD	261	211	300	379	—
	PWS	960	957	741	377	—

TABLE 2

Station information

Station	Authority	Grid reference	Height a.o.d. metres
(1) Nature Conservancy and allied stations			
Achnagoichan	Nature Conservancy	NH 913082	305
Cwm Dyli	Superintendent Power Station, CEGB	SH 654542	95
Glenlatterach	Filter Station Superintendent, North-east of Scotland Water Board	NJ 200545	183
Harris	Nature Conservancy	NM 337957	15
Inverpolly	Nature Conservancy	NC 073134	14
Isle of Rhum	Nature Conservancy	NM 402996	5
Killiechonate	T. Hill, British Aluminium Company	NN 243813	85
Kinlochewe	Nature Conservancy	NH 024630	25
Lossiemouth	Senior Met. Officer, RN Air Station*	NJ 214698	5
Monks' Wood	Nature Conservancy	TL 202797	40
Moor House	Nature Conservancy	NY 758328	564
Morden Bog	Nature Conservancy	SY 914916	15
Overton Down	Nature Conservancy	SU 129707	232
Prabost	Mr and Mrs R. M. Murray	NG 418501	67
Rannoch Railway Sta.	J. Michie	NN 423575	297
Stenness	P. K. I. Leith	HY 298112	23
Stilligarry	Nature Conservancy	NF 770387	5
Strachan, Kerloch Moor	Nature Conservancy	NO 700903	145
Tregaron, Ty-Coed	Nature Conservancy	SN 686617	183
Whitehillocks	I. Moir, East of Scotland Water Board	NO 449797	258
Wye Down	Nature Conservancy	TR 077455	168
Yarner Wood	Nature Conservancy	SX 785782	198
(2) Other stations			
Alice Holt Lodge	Forestry Commission	SU 804429	115
Cawood	Experimental Husbandry Farm	SE 561366	6
Crawfordjohn	Clyde River Purification Board	NS 879240	274
Egdbaston	A. L. Kelly, for the Trent River Authority	SP 046864	163
Grendon Underwood	Institute of Hydrology	SP 677216	67
High Mowthorpe	Experimental Husbandry Farm, for Hull University	SE 888688	175
Mount St Bernard Abbey	Father Augustine, for the Trent River Authority	SK 459158	189
Stocks No. 21D	Fylde Water Board	SD 717548	192
Sutton Bonington	Agricultural College, Nottingham University, for the Trent River Authority	SK 503262	48
Westlands Farm	Department of Geography, Hull University	TA 181411	12

2 SNOW SURVEY OF GREAT BRITAIN

Season 1967-68

Most of the basic material for this report has been obtained, as in previous years, from observers who have provided, month by month, daily records of snowfall and snow-cover within sight of their stations. Although some of these observers are associated with stations which submit rainfall or other climatological data to the Meteorological Office, in making these snow reports the observers act as personal volunteers. The records from this network of stations have been augmented by data extracted from the monthly returns of official stations manned by Meteorological Office staff and from the returns of other climatological stations. Without the willing co-operation of all those responsible for voluntary observations, this report could not have been written.

Two major changes have been made in the present report. The table giving temperature and precipitation data for the season has been discontinued since full details are available in the *Monthly Weather Report* of the Meteorological Office, and a new table (Table 3) has been introduced giving daily depths of snow at selected stations.

The special network of stations contributing observations has been enlarged and the presentation of these data in the main table (Table 1) is now arranged according to climatological districts as in the *Monthly Weather Report*. These climatological districts are shown on Figure 1, the key map showing the positions of the snow survey stations and the county boundaries.

For simplicity, the names of officially known stations (sometimes amended or amplified to indicate better their geographical location) have been used, whenever possible, in the main table and the details quoted relate to these stations. However, it must be remembered that observations are regarded as being made in the vicinity of these stations.

Observations are usually in the form of number of days of snowfall (snow, or rain or drizzle and snow) occurring during the day, number of days with snow covering more than half the ground (usually at 09 GMT), depth of snow (usually at 09 GMT) in centimetres (cm), and whenever possible a note of snow-cover at various altitudes in the surrounding hills, heights in metres (m).

Number of days with snow falling during the season

At altitudes of about 300 m or above, snow fell on about 80 days in the Cairngorms (it was reported on 129 days locally near Braemar), on 60-70 days in the North-west Highlands, and on 40-50 days in the Southern Uplands, the northern Pennines and in North Wales. At lower levels it was reported on 20-30 days in the Lake District, South Wales, on Dartmoor and on the north Yorkshire Moors. From sea level to 100 m, snow fell on 30-40 days over most of Scotland, up to 30 days locally along the east coast

and in East Anglia but on only 10-20 days in south-west Scotland and elsewhere over most of England and Wales.

Number of days with snow lying during the season

The seasonal duration of snow-cover for 12 areas in the mountainous regions of Great Britain, is summarized in Table 2. The diagrams in Figure 2 illustrate the distribution of snow-cover relative to height in these areas. The heights quoted for the various mountain ranges are the heights of the highest peaks visible from the observing stations. It was found necessary in a few cases to supplement these reports with data from other stations in the same area, but the names of these additional stations have not been included in the table.

At altitudes of 300 m and above, snow lay on 70-80 days in the Cairngorms (on 96 days locally near Braemar), on 60-70 days in the North-west Highlands, and on about 50 days in parts of the Southern Uplands and the Pennines. At lower levels it lay on 20-30 days in the Lake District, North Wales and on Dartmoor. From sea level to 100 m it lay on 10-15 days over most of the country with local increases up to 20 days along parts of the east coast, north of the Wash.

Comparison of snowfall with that of previous seasons

Table 3 gives the depth of snow reported lying at each of 10 selected stations during each day of the season under review. These 10 selected stations in the U.K., at altitudes of between 125 m and 400 m, have been used (with occasional changes in stations) for seasonal comparisons since the Survey of 1946-47. The data for the 10 stations give, for the present season, a mean of 32 days with snow lying at 09 GMT. This is 19 days more than the previous season 1966-67 and three days more than the average number of days for the 22 seasons since 1946-47. There were six seasons with greater number of days with snow lying since 1946-47; namely, 1950-55 to 1955-56 inclusive, except for 1953-54, and 1962-63.

Notes on the weather of individual months

Although not strictly relevant to the snow season of 1967-68, it is interesting to note that snow persisted in parts of the Cairngorms throughout the summer of 1967. The observer at Derry Lodge (Aberdeenshire) reported that early in July there was about 30 per cent snow-cover from about 920 m upwards, while deep snow fields were still visible at levels down to about 760 m with patches of snow lying as low as 610 m. Even by the end of July, snow was still lying in large patches above about 660 m. During August this snow persisted on east-facing slopes down to about 760 m and despite the fact that September was locally a dry month with above-average temperatures, large areas of snow still persisted and were reported by the Derry Lodge observer down to levels of about 910 m.

The Derry Lodge observer said that snow lying at such low levels in such area and depth was quite exceptional. Usually by the end of July, snow only lay in small patches above about 1220 m, except for the snow trap in Garth Corrie. The conditions in 1967 were all the more remarkable as they followed one of the mildest and most snow-free winters on record. The snow was practically all spring snow. None of the local residents could recall snow lying so extensively throughout the summer.

October, 1967

The month was wet with stormy periods. Temperatures were generally above average in England and Wales, but below average in Scotland and Northern Ireland. On the 17th a deep depression moved north-eastwards across the Midlands and was followed by a cold northerly airstream bringing showers and thunderstorms to all districts of the country. Snow was reported as far south as Manchester and there was a report of snow-cover to a depth of 13 cm at Moor House (556 m) on the high ground in Westmorland.

Snow was reported on 4 days on the highest ground of the Cairngorms but fell on only 1–2 days on the lower slopes. More than 2 days of snow was exceptional for most of the country and there were only small amounts south of a line Bardsey Island to the Wash. Ground was snow-covered on still fewer occasions and except for the highest regions in Westmorland, did not lie at any time during the month in England and Wales.

November, 1967

It was a generally cold month, the coldest periods being during the first week, around the 17th and from about the 24th to 27th. Snow fell at most places over Great Britain during the latter half of the first week, on the 16th and from the 25th until the 28th. Ground was snow-covered in parts of Wales on the 26th and in parts of northern England on the 27th.

Snow and sleet* fell in many northern districts on the 1st and 2nd as a deep depression moved eastwards across the British Isles, and also from the 4th until the 7th in the northerly airstream behind the depression. Ground became snow-covered to a depth of 1 cm at Chagford, south Devon, on the 4th. On the 16th frontal rain from the Atlantic was preceded by snow in western Scotland but the snow did not lie. Snow also preceded periods of frontal rain from the Atlantic during an unsettled spell from the 24th to 27th.

Snow fell on 10–14 days in the Cairngorms around Braemar, but generally in Scotland there were only 2–4 days of snow. The Pennines, the Peak District and North Wales had 1–3 days of snow, but over most of England and Wales snow was reported on only one day. Among some local exceptions was Dartmoor with 6 days of snowfall. Most places had only 1 day

* The term sleet is commonly used in this country to describe precipitation of snow and rain (or drizzle) together, or of snow melting as it falls, but it has no agreed international meaning.

with snow lying at 09 GMT, but Great Dun Fell was snow-covered on 10 days, and the Cairngorms on 17 days.

December, 1967

December temperatures were generally below the average, deficits being greater in the north and east than in the south and west. There were two main cold periods, one of about a week, centred around the 9th and another from about the 15th until the 20th. Snow fell over much of the country from the 6th to 11th, during the third week and again towards the end of the month. Ground was snow-covered in many districts from the 7th to 12th and snow, drifting in gale force winds, blocked many roads.

On the 5th a belt of rain preceded by snow moved slowly southwards over the country. The rain was associated with a complex depression over the Baltic, and at that time pressure was high from Greenland to Portugal. This pattern maintained a cold northerly airstream with snow at times over the whole of the British Isles. Small polar depressions moving south in the airstream brought moderate falls of snow to western districts on the 7th and 8th. On the 9th snow lay some 60 cm deep in parts of Wales, 30 cm in parts of north Devon and Somerset and 25 cm in the west Midlands. A rapid thaw on the 12th cleared all the snow except on the highest ground. On the 15th a further outbreak of northerly winds from high latitudes occurred behind a depression moving across the Norwegian Sea to Scandinavia; there were snow showers in Scotland followed on the 17th by longer periods of snow which spread to all parts of England during the night. Early on the 18th snow lay 3 cm deep in parts of central Wales and the Midlands. There were wintry showers on the 28th, 29th and 31st. Snow fell on 16–17 days in the Cairngorms, 13–15 days in the North-west Highlands, 8–12 days in North Wales, 6–9 days in the Southern Uplands and Dartmoor and on 4–6 days in the Pennines and the Lake District. Ground was snow-covered on 10–15 days in the Cairngorms, 9–12 days in the North-west Highlands, 16–20 days in the Southern Uplands and in North Wales, and on 4–5 days in Dartmoor.

January, 1968

Mean temperature was a little above the average in most districts except northern Scotland and south-east England. It was mainly below the average until the 12th except on 2 or 3 warmer days in southern England during the first week. There was a cold spell from about the 7th until 11th when day temperatures were near or below freezing point over much of the country. On the 1st and 2nd, rain or snow occurred with the passage of a trough of low pressure across the country. A depression following the trough brought heavy snow to the extreme north of Scotland on the 3rd. Behind the depression a north-westerly airstream brought frequent snow showers to the east and north. Milder air spread to southern England on the 4th and 5th, but elsewhere weather remained cold with snow at times. On the 6th and again on the night of the 8th/9th small depressions moved south-eastwards

across Cornwall into France; these were followed by snow which was particularly heavy in parts of the Midlands and western Wales on the 9th where it lay some 30 cm or so deep over a wide area. The next three days were dry and cold generally, though there were scattered snow showers in the east and north.

Snow fell on 15–20 days in the Cairngorms and North-west Highlands, on 8–11 days in the Southern Uplands, the Pennines, the Peak district, North Wales and the north Yorkshire Moors and on 5–8 days in the Lake District and on Dartmoor. Ground was snow-covered on 15–20 days in the Cairngorms, on 11–13 days in the Southern Uplands and the Pennines and on 6–9 days in the Lake District, North Wales and the Peak District.

February, 1968

February was a very cold month. The coldest periods were around the 3rd, 8th, 17th and 22nd. Snow fell every day at one place or another until the 27th, the snowiest periods being around the 4th and 22nd.

On the 1st, a trough of low pressure moved south-eastwards across the country and north-westerly winds behind it brought widespread snow showers to Scotland on the 1st and snow showers to all parts of Great Britain on the 2nd and 3rd. Snowfall was particularly heavy on the 4th as another trough, associated with a rapidly deepening depression near Iceland, moved across the country. Snow drifting in gale force winds blocked many roads in Scotland where level snow accumulated to a depth of 15 cm even on lower grounds. Parts of northern England were under 5–10 cm of snow. Falls of over 30 cm in the Midlands on the 6th caused considerable dislocation of traffic. From the 7th until 11th snow was mainly confined to Scotland, but on the 12th a frontal trough, associated with a complex depression near the Azores, moved north-eastwards across the country bringing rain to southern districts and sleet or snow to the Midlands and the north. There were further snow showers in the north during the next 3 days associated with the passage of minor troughs across the country, but from the 16th to 20th an anticyclone covered southern England and snow showers were again mainly confined to Scotland. The anticyclone moved away south-eastwards and rain and snow spread across southern England on the 21st and 22nd. From the 23rd to 27th, a very cold easterly airstream prevailed with isolated snow showers. Snow fell on 15–20 days in the Cairngorms, on 14–18 days in the North-west Highlands, the Southern Uplands and the Pennines, and on 9–12 days in the Lake and Peak Districts and in North Wales. Ground was snow-covered on 26–29 days in the Cairngorms, the North-west Highlands, the Southern Uplands and the Pennines, and on 13–17 days in the Lake and Peak Districts and in North Wales.

March, 1968

Mean temperature during March was about average in the west but above average in eastern districts. In

southern England the month began cold but there was an unusually warm spell between the 25th and 29th. In Scotland, day temperatures were below average from about the 14th to 22nd.

On the 6th snow showers spread from Scotland to the remainder of Great Britain as a depression deepened in the southern Baltic and winds over the British Isles veered from north-west to north-east. The showers continued throughout the night and for much of the following day. After about a week of relatively mild weather, winds again became north-westerly over most of the country behind a depression moving southwards from the Shetlands to Denmark. Snow showers spread to all districts in this airstream and there were also scattered thunderstorms accompanied by hail. On the 17th a deep depression skirted the north coast of Scotland and widespread gales, occasionally reaching storm force, were accompanied by snow, hail and scattered thunderstorms. Snow accumulated to a depth of 15 cm over much of Scotland, even over lower ground, and snowdrifts blocked many roads. Snow fell on 16–20 days in the Cairngorms, on 11–15 days in the North-west Highlands, on 8–12 days in the Southern Uplands and the Pennines, and on 4–7 days in the Lake District, North Wales and on Dartmoor. Ground was snow-covered on 28–29 days in the Cairngorms, on 18–19 days in the Pennines, on 12–15 days in the North-west Highlands and on 2–5 days in the Lake District.

April, 1968

The first two weeks of April were very cold with hard night frosts, but temperature was well above average for most of the remainder of the month. Snowfall was mainly confined to the first week in England and Wales and to the first 10 days in Scotland.

On the 1st, a depression moved eastwards across southern England giving widespread rain and some snow in northern Scotland. This depression became slow moving in the northern North Sea on the 2nd, and northerly winds associated with it brought a sharp fall of temperature and snow showers to most of Britain. At Ross-on-Wye, Herefordshire, the snowfall was estimated to have been the heaviest there for April since 1922. Sleet was reported in the Channel Islands. Northerly winds and snow showers continued until the 5th as the depression, now over southern Scandinavia, deepened and then moved slowly northwards. During this time, snow accumulated to depths of 20 cm at Glenferness (Nairn) and about 10 cm at Market Harborough (Leicestershire). Although there was a general rise of pressure on the 6th, light falls of snow continued in many eastern districts as a weak trough of low pressure moved southwards from Scotland; the trough cleared southern England about mid morning on the 7th. During the next 2 days an anticyclone covered most of Britain but troughs moving around it to the north brought snow to the extreme north of Scotland.

Snow fell on 8–10 days in the Cairngorms, on 6–7 days in the North-west Highlands, and on 4–5 days in the

Southern Uplands, over much of Lancashire and North Wales and in many east coast areas from the Scottish border to north Norfolk. Most other districts had 2–3 days of snow during the month, except the south coastal districts of England which had only 1 or 2 days. Parts of the Cairngorms were snow-covered on 14 days, but the snow did not lie over much of south-east and central southern England.

May, 1968

In spite of a warm spell during the last few days mean temperature over the month as a whole was considerably below the average in all districts. Snow or sleet fell on a few days in Scotland and northern England, mainly during the first half of the month.

During the first 4 days of the month a complex area of low pressure extended north-eastwards across the British Isles to Scandinavia. Weather was generally cold and unsettled with light northerly winds and scattered thunderstorms. Troughs of low pressure moved southwards in the airstream on the 2nd, and behind these troughs unstable air from high latitudes brought snow showers to northern Scotland. By the 3rd, the snow showers had extended as far south as East Anglia. These showers continued daily in parts of northern Scotland until the 22nd, but in southern England weather became temporarily milder on the 7th and 8th due to the passage of a deep depression from west of Ireland to the Bay of Biscay, and again on the 13th when warm, moist air spread around the northern side of an anticyclone. During the last week, however, the showers were only over the high ground of the Cairngorms.

Snowfall was reported on 19 days near Braemar but in the Cairngorms generally and in the North-west Highlands it fell on 6–8 days. The Southern Uplands had 4–5 days of snow, but over England and Wales snow fell on only 1 or 2 days and 3 days locally in the northern Pennines and the extreme north of England.

Snowfall at individual stations

Table 1 gives, where possible, four values for each month of the snow season, and for the season as a whole, for 159 stations. These values are the number of days with snow falling at the station, the number of days with snow lying at the station, the greatest depth (in centimetres) of undrifted snow lying at the station and the first date when this depth was attained.

The values are arranged in a set pattern as in the following example:

10	6
5	8

This means that snow occurred at the station on 10 days during the month and that half or more of the ground in the immediate neighbourhood was snow-covered on 6 days, that 5 cm was the greatest depth of accumulated and undrifted snow observed and that this depth was first measured on the 8th.

Incomplete or missing data are denoted by asterisks (*). The entry Tr means that the snow depth was too small to measure; in general it will have been less than 0.5 cm.

SNOW SURVEY OF GREAT BRITAIN

TABLE 1

Number of days with snow falling and snow lying, and maximum depth in centimetres, with date, during the month/season, for stations listed under districts and counties

Station, height and grid reference	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Season
DISTRICT O—SCOTLAND, NORTH									
<i>Shetland</i>									
Mossy Hill 229 m	0 0	* *	10 6	7 12	9 14	10 10	4 10	2 2	* *
HU411 396203	—	* *	5 8	8 4	15 16	3 31	15 1	3 7	* *
Ollaberry 226 m	2 3	3 2	18 14	16 20	18 22	10 12	8 9	7 0	82 82
HU411 333836	1 17	1 12	8 8	10 3	18 3	5 18	13 7	—	18 3/2
<i>Orkney</i>									
Stenness 23 m	4 0	2 0	11 6	12 7	8 9	4 0	7 8	0 0	48 30
HY310 298112	—	—	10 10	10 7	10 19	—	18 2	—	10 10/12
<i>Sutherland</i>									
Cassley 99 m	1 1	2 0	10 5	10 13	14 16	9 5	8 7	4 2	58 49
NC29 396232	3 19	—	8 10	15 7	8 3	3 17	10 5	* *	* *
Uppat 67 m	2 0	2 0	8 8	6 6	5 5	3 3	6 6	1 0	33 28
NC29 870025	—	—	15 30	3 6	4 1	3 16	3 2	—	15 30/12
<i>Ross and Cromarty</i>									
Blackbridge 210 m	* *	3 3	10 11	20 19	16 16	14 9	2 6	0 0	* *
NH28 374710	* *	4 6	5 31	5 1	6 16	3 17	* *	—	* *
Fairburn 152 m	2 2	2 0	5 9	3 15	9 26	8 11	5 7	0 0	34 70
NH28 455528	* *	—	8 31	17 3	10 20	25 22	10 4	—	* *
Glackour 20 m	1 0	1 1	10 8	7 12	8 5	7 3	7 6	5 1	46 36
NH28 191820	—	1 26	8 6	12 7	8 3	3 22	5 3	1 7	12 7/1
Inverpolly 14 m	1 0	0 0	9 5	7 7	6 4	6 1	* *	1 0	* *
NC29 074134	—	—	10 10	8 7	8 3	Tr 22	* *	—	* *
Kinlochewe 23 m	2 0	4 0	9 8	8 7	6 8	3 0	7 6	1 0	40 29
NH28 024630	—	—	23 10	1 3	8 16	—	8 2	—	23 10/12
Muir of Ord 46 m	1 0	1 0	7 7	7 13	11 15	6 4	6 5	0 0	39 44
NH28 527500	—	—	11 31	19 4	6 3	13 22	9 3	—	19 4/1
Knockanrock 244 m	4 1	5 2	11 12	9 14	15 23	12 8	8 9	6 0	70 69
NC29 187087	3 18	* *	20 10	28 7	10 5	5 21	33 6	—	* *
Bridgend 122 m	1 0	2 1	14 9	5 11	10 14	9 4	7 7	6 2	54 48
NH28 323551	—	6 26	20 7	19 4	10 3	14 22	17 3	5 4	20 7/12
Orrin 221 m	2 2	2 1	9 7	7 8	15 29	13 15	7 9	6 7	61 78
NH28 401504	6 19	4 29	11 30	13 3	30 6	34 3	32 5	6 3	34 3/3
<i>Inverness-shire</i>									
Achnagoichan 305 m	1 0	6 1	10 10	14 16	19 28	10 9	8 10	12 2	80 76
NH28 913082	—	* *	13 31	18 4	13 7	* *	23 4	* *	* *
Auchterawe 30 m	2 2	1 1	8 9	6 12	13 14	5 3	6 4	0 0	41 45
NH28 355085	1 17	1 26	11 8	8 1	5 16	2 17	8 4	—	11 8/12
Cluanie 219 m	10 2	0 0	9 8	4 11	15 21	3 2	6 4	0 0	47 48
NH28 183100	—	—	10 7	10 3	17 5	1 18	10 3	—	17 5/2
Dalwhinnie 362 m	2 1	1 1	16 15	11 15	15 29	10 14	5 8	4 4	64 87
NN27 634841	1 18	3 26	10 31	9 31	19 23	10 18	11 3	3 4	19 23/2
Deanie 128 m	1 1	2 0	4 11	5 13	14 17	11 8	7 7	4 0	48 57
NH28 294388	* *	—	10 8	23 3	10 16	3 15	14 3	—	* *
Ft William (Br. Al.) 23 m	0 0	0 0	5 6	6 4	6 6	7 2	7 3	0 0	31 21
NN27 130751	—	—	4 31	1 4	6 5	Tr 15	10 3	—	10 3/4
Fersit 259 m	1 1	1 1	8 10	4 15	10 29	4 4	4 6	1 1	33 67
NN27 351782	1 18	1 26	15 31	23 1	18 4	8 15	25 4	3 13	25 4/4
Glenshero Lodge 268 m	1 2	5 2	13 14	9 13	13 29	12 7	6 7	2 0	61 74
NN27 562929	1 17	3 25	13 30	15 3	13 5	10 1	18 3	—	18 3/4
Isle of Rhum 5 m	1 0	0 0	7 4	5 1	7 8	5 1	5 3	0 0	30 17
NM17 402996	—	—	3 9	1 4	3 5	Tr 24	Tr 2	—	3 9/12
Morar 16 m	* *	0 0	4 3	0 0	4 4	0 0	4 4	0 0	* *
NM17 688922	* *	—	8 8	—	5 5	—	10 3	—	* *
Mullardoch 245 m	1 2	1 1	13 13	4 13	14 29	5 12	6 9	1 1	45 80
NH28 223310	* *	1 26	24 8	20 4	19 6	10 1	24 4	4 4	* *
Quoich 201 m	2 0	1 0	9 8	6 12	15 18	2 1	6 4	0 0	41 43
NH28 067022	—	—	11 8	9 4	17 5	2 18	10 3	—	17 5/2
DISTRICT 1—SCOTLAND, EAST									
<i>Nairn</i>									
Glenferness 213 m	1 0	1 0	12 12	16 17	* *	8 18	7 8	7 14	* *
NH28 937430	—	—	8 30	20 6	* *	10 22	20 3	* *	* *
<i>Banffshire</i>									
Drummuir 189 m	1 0	2 0	11 10	11 15	14 21	7 1	7 7	3 0	56 54
NJ38 372441	—	—	13 10	10 7	8 16	8 22	11 7	—	13 10 12
<i>Aberdeenshire</i>									
Derry Lodge 427 m	14 2	10 1	17 13	21 22	22 29	16 19	10 7	19 3	129 96
NO37 036932	10 19	5 26	15 31	15 7	74 24	19 19	56 7	8 4	74 24 2

TABLE 1 (continued)

Station, height and grid reference		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Season	
<i>Perthshire</i>											
Ardtnaig	130 m	1 0	1 0	5 0	10 13	11 13	5 3	5 3	1 0	39	32
NN27 702394		—	—	—	8 3	15 6	3 22	1 3	—	15	6/2
Blair Castle	137 m	* *	1 1	5 5	5 14	9 22	3 5	3 2	0 0	*	*
NN27 864658		* *	4 26	18 31	25 3	15 23	5 16	10 2	—	*	*
Brig o' Turk	84 m	0 0	1 1	2 2	6 12	7 15	4 2	3 3	0 0	23	35
NN27 537063		—	1 27	6 31	5 2	8 24	1 17	5 3	—	8	24/2
Couligartan	49 m	0 0	0 0	1 1	5 12	6 10	3 3	3 4	0 0	18	30
NN27 454 007		—	—	4 31	6 3	6 20	3 17	18 3	—	18	3/4
Glengyle	122 m	2 1	1 1	5 5	8 15	11 17	4 9	3 6	0 0	34	54
NN27 388133		1 18	3 26	8 31	6 3	6 6	3 17	6 1	—	8	31/12
Lednock	347 m	1 1	1 1	* *	* *	7 29	5 13	3 5	3 0	*	*
NN27 729287		1 19	1 27	* *	* *	36 7	10 18	11 3	—	*	*
Loch Vennachar	84 m	0 0	1 1	1 1	6 13	6 7	2 2	4 4	0 0	20	28
NN27 598063		—	1 27	1 31	5 2	8 6	3 22	5 3	—	8	6/2
Lubreoch	312 m	8 0	9 0	11 8	9 13	9 29	11 16	* *	* *	*	*
NN27 457417		—	—	6 31	13 4	32 7	8 14	* *	* *	*	*
Rannoch	204 m	0 0	3 1	8 6	13 14	9 22	6 6	5 5	* *	*	*
NN27 531582		—	3 27	5 31	8 1	8 7	7 15	4 3	* *	*	*
<i>Midlothian</i>											
Cramond	26 m	0 0	0 0	3 3	5 2	14 8	4 1	5 2	2 0	33	16
NT36 180758		—	—	2 9	1 1	3 3	3 17	8 3	—	8	3/4
<i>East Lothian</i>											
Hungry Snout	218 m	1 0	2 1	6 3	7 13	17 23	7 5	6 7	3 0	49	52
NT36 665633		—	1 27	5 9	2 5	8 6	5 18	15 3	—	15	3/4
Hopes	247 m	0 0	3 0	8 2	8 12	14 16	6 2	6 7	5 2	50	41
NT36 551622		—	—	6 9	2 9	15 22	5 16	15 2	* *	*	*
<i>Peeblesshire</i>											
Broughton	226 m	0 0	1 0	3 3	3 0	12 13	6 3	2 1	2 0	29	20
NT36 123296		—	—	4 10	—	9 7	13 17	1 4	—	13	17/3
<i>Roxburghshire</i>											
Sourhope	274 m	0 0	2 0	3 3	5 2	16 14	5 1	6 1	0 0	37	21
NT36 843203		—	—	10 10	3 7	8 9	5 17	3 4	—	10	10/12
DISTRICT 6a—SCOTLAND, WEST											
<i>Argyll</i>											
Dalness	73 m	11 0	6 1	8 5	10 0	* *	14 1	3 0	11 0	*	*
NN27 169512		—	1 27	10 31	—	* *	3 15	—	—	*	*
Inverawe	23 m	* *	0 0	6 5	5 0	8 4	13 3	5 2	* *	*	*
NN27 021316		* *	—	1 7	—	2 3	* *	7 2	* *	*	*
Rhuvaal	20 m	0 0	0 0	3 0	4 0	5 1	5 0	2 1	0 0	19	2
NR16 426792		—	—	—	—	1 5	—	1 2	—	1	5/2
<i>Stirlingshire</i>											
Loch Arklet	146 m	1 1	1 1	3 2	8 14	10 9	7 3	3 5	0 0	33	35
NN27 376096		* *	* *	5 31	5 3	8 21	1 17	18 3	—	*	*
Stronachlachar	117 m	1 0	2 0	7 2	10 13	10 12	8 4	3 3	1 0	42	34
NN27 401103		—	—	8 31	4 3	8 5	3 17	6 3	—	8	31/12
<i>Renfrewshire</i>											
South Moorhouse	249 m	0 0	0 0	3 3	3 3	9 9	5 5	3 3	1 1	24	24
NS26 529508		—	—	2 30	1 8	15 4	20 17	* *	* *	*	*
<i>Lanarkshire</i>											
Leadhills	387 m	1 0	2 0	5 3	11 13	11 29	8 13	5 3	4 1	47	62
NS26 888153		—	—	3 10	8 2	25 6	15 18	3 2	3 6	25	6/2
Lowther Hill	723 m	1 2	1 1	5 7	8 14	12 29	11 16	5 3	* *	*	*
NS26 890107		5 17	3 2	13 31	51 9	76 5	43 17	3 2	* *	*	*
<i>Ayrshire</i>											
Mauchline	172 m	3 0	0 0	5 2	3 3	7 3	5 4	* *	* *	*	*
NS26 494 283		—	—	* *	* *	* *	* *	* *	* *	*	*
<i>Dumfriesshire</i>											
Eskdalemuir	242 m	1 0	3 1	11 3	13 12	18 28	11 7	6 0	3 0	66	51
NT36 235026		—	4 27	1 10	10 13	19 21	10 1	—	—	19	21/2
<i>Kirkcudbrightshire</i>											
Forrest Lodge (Dalry)	152 m	0 0	0 0	2 2	7 5	5 13	5 5	2 0	0 0	21	25
NX25 555866		—	—	5 31	10 8	18 5	8 21	—	—	18	5/2
DISTRICT 6b—ISLE OF MAN											
Maughold Head	70 m	0 0	0 0	5 2	0 0	0 0	0 0	1 0	0 0	6	2
SC24 498914		—	—	9 9	—	—	—	—	—	9	9/12
Port St Mary	8 m	2 0	0 0	5 3	7 0	7 0	4 0	5 0	0 0	30	3
SC24 209671		—	—	8 9	—	—	—	—	—	8	9/12
Snaefell	614 m	* *	* *	5 5	8 13	* *	* *	* *	* *	*	*
SC24 397880		* *	* *	6 8	3 11	* *	* *	* *	* *	*	*

SNOW SURVEY OF GREAT BRITAIN

TABLE 1 (continued)

Station, height and grid reference		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Season
DISTRICT 2—ENGLAND, NORTH EAST										
<i>Northumberland</i>										
Burradon	67 m	0 0	0 0	5 3	7 8	10 6	4 0	3 1	0 0	29 18
NZ45 269721		—	—	7 11	3 13	9 4	—	1 4	—	9 4/2
Catcleugh	250 m	1 0	3 1	4 3	8 2	13 21	5 8	4 0	2 0	40 35
NT36 748032		—	1 27	10 11	6 2	14 8	10 17	—	—	14 8/2
Gosforth	52 m	0 0	0 0	9 4	7 7	14 9	6 0	3 0	1 0	40 20
NZ45 240680		—	—	3 9	3 13	5 5	—	—	—	5 5/2
Newton-by-the-Sea	15 m	0 0	0 0	3 3	4 1	7 5	1 1	4 0	0 0	19 10
NU46 235255		—	—	4 9	1 13	4 3	* *	—	—	* *
<i>Yorkshire, North Riding</i>										
Osmotherley	147 m	0 0	0 0	7 5	8 8	10 6	6 1	4 1	0 0	35 21
SE44 458967		—	—	15 10	8 6	8 5	1 21	Tr 2	—	15 10/12
Moorland Cottage (Sedbergh)	343 m	2 0	3 1	14 8	12 10	18 29	13 11	6 6	2 1	70 66
SD34 807923		—	* *	* *	* *	* *	* *	* *	* *	* *
<i>Yorkshire, East Riding</i>										
High Mowthorpe	175 m	0 0	1 0	5 4	8 7	14 13	3 0	2 0	0 0	33 24
SE44 886685		—	—	12 10	5 12	10 6	—	—	—	12 10/12
Riccall	5 m	0 0	0 0	2 3	5 6	3 4	0 0	0 0	0 0	10 13
SE44 608373		—	—	1 9	1 13	2 5	—	—	—	2 5/2
Sledmere	121 m	0 0	1 0	6 0	5 0	9 0	8 0	4 0	0 0	33 0
SE44 933648		—	—	—	—	—	—	—	—	—
South Bullock	3 m	0 0	0 0	6 6	7 7	6 5	3 3	1 1	0 0	23 22
TA54 053426		—	—	4 10	6 12	3 4	* *	1 3	—	* *
Sunk Island	3 m	0 0	0 0	2 1	2 2	0 0	0 0	0 0	0 0	4 3
TA54 266189		—	—	4 9	8 9	—	—	—	—	8 9/1
<i>Lincolnshire</i>										
Kirton-in-Lindsey	25 m	0 0	0 0	1 1	2 2	0 0	0 0	1 0	0 0	4 3
SK43 934990		—	—	4 9	1 11	—	—	—	—	4 9/12
Revesby	38 m	0 0	0 0	3 8	4 8	5 3	1 0	3 0	0 0	16 19
TF53 303634		—	—	* *	3 11	4 6	—	—	—	* *
Southrey	6 m	0 0	0 0	4 4	2 2	3 0	1 0	2 0	0 0	12 6
TF53 140664		—	—	8 10	1 9	—	—	—	—	8 10/12
DISTRICT 3—ENGLAND, EAST										
<i>Norfolk</i>										
Marham	23 m	0 0	0 0	5 2	9 5	11 0	3 0	3 0	0 0	31 7
TF53 726094		—	—	13 11	15 13	—	—	—	—	15 13/1
<i>Suffolk</i>										
Benacre	3 m	0 0	0 0	7 1	7 4	7 0	1 0	2 1	0 0	24 6
TM62 536845		—	—	1 7	10 12	—	—	5 3	—	10 12/1
Melton	9 m	0 0	0 0	3 2	5 7	4 1	1 1	2 1	0 0	15 12
TM62 281506		—	—	2 10	4 11	1 7	* *	3 2	—	* *
Wattisham	89 m	0 0	1 0	8 3	10 7	12 1	2 0	3 1	0 0	36 12
TM62 026514		—	—	1 10	3 9	1 8	—	1 3	—	3 9/1
Wingfield	49 m	0 0	0 0	4 3	6 3	3 1	2 0	0 0	0 0	15 7
TM62 235782		—	—	3 10	4 10	* *	—	—	—	* *
<i>Cambridgeshire</i>										
Cambridge	26 m	0 0	0 0	3 3	7 8	0 0	0 0	2 0	0 0	12 11
TL52 434604		—	—	5 10	4 9	—	—	—	—	5 10/12
<i>Hertfordshire</i>										
Garston	78 m	0 0	1 0	6 5	8 6	3 0	3 0	5 1	0 0	26 12
TL52 123017		—	—	3 10	8 9	—	—	Tr 2	—	8 9/1
<i>Essex</i>										
Layer-de-la-Haye	44 m	0 0	0 0	3 2	7 2	4 0	0 0	1 1	0 0	15 5
TL52 965196		—	—	5 10	4 9	—	—	3 2	—	5 10/12
Rayleigh	73 m	0 0	0 0	3 1	7 7	4 1	1 0	2 1	0 0	17 10
TQ51 805910		—	—	1 10	10 9	1 8	—	3 3	—	10 9/1
Southend	27 m	0 0	0 0	5 2	5 5	2 1	2 0	2 0	0 0	16 8
TQ51 876852		—	—	Tr 7	1 9	1 8	—	—	—	1 9/1
DISTRICT 4—MIDLAND COUNTIES										
<i>Yorkshire, West Riding</i>										
Chelker	223 m	0 0	0 0	7 4	2 8	9 10	3 1	3 2	1 0	25 25
SE44 051517		—	—	3 9	5 8	15 7	5 21	5 3	—	15 7/2
Grenoside	171 m	1 0	0 0	6 3	7 7	10 9	6 1	6 0	0 0	36 20
SK43 336935		—	—	3 10	6 1	13 6	5 21	—	—	13 6/2
Hall Broom	320 m	1 0	0 0	6 2	7 13	13 13	7 2	5 1	0 0	39 31
SK43 267891		—	—	5 31	9 3	13 6	4 21	3 6	—	13 6/2
Litton	250 m	0 0	2 1	5 5	8 9	10 16	5 4	4 4	1 1	35 40
SD34 908741		—	1 27	1 9	4 13	15 6	8 21	5 3	1 8	15 6/2

TABLE 1 (continued)

Station, height and grid reference	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Season
<i>Yorkshire, West Riding (continued)</i>									
Redmires 338 m	0 0	0 0	4 3	5 9	6 11	4 2	0 0	0 0	19 25
SK43 262857	—	—	4 31	12 2	22 6	3 20	—	—	22 6/2
Ribblehead 312 m	0 0	1 1	1 1	* *	* *	1 1	0 0	0 0	* *
SD34 766789	—	1 27	3 31	* *	* *	5 20	—	—	* *
Strinesdale 240 m	0 0	0 0	1 0	9 3	8 4	2 0	2 0	0 0	22 7
SD34 957067	—	—	—	10 3	23 7	—	—	—	23 7/2
Thornton Moor 363 m	0 0	0 0	3 3	5 5	7 7	4 2	3 3	1 1	23 21
SE44 051334	—	—	7 31	7 1	1 4	1 16	3 2	1 7	7 31/12
<i>Derbyshire</i>									
Ambergate 197 m	0 0	0 0	4 2	1 2	2 1	1 1	3 0	0 0	11 6
SK43 349527	—	—	1 31	3 9	5 5	1 20	—	—	5 5/2
Bamford 155 m	0 0	0 0	4 1	8 6	4 4	2 1	1 0	0 0	19 12
SK43 202829	—	—	1 10	5 3	5 6	1 21	—	—	5 3/1
Littleover 71 m	1 0	0 0	6 6	7 9	6 2	5 0	4 2	0 0	29 19
SK43 334339	—	—	1 31	13 9	1 6	—	Tr 3	—	13 9/1
Howden 258 m	1 0	4 0	8 5	9 8	13 17	8 3	5 4	0 0	48 37
SK43 168924	—	—	8 10	10 9	23 6	1 7	1 3	—	23 6/2
<i>Leicestershire</i>									
Countesthorpe 91 m	0 0	0 0	6 3	7 7	6 0	0 0	2 2	0 0	21 12
SP42 591969	—	—	3 10	5 9	—	—	3 2	—	5 9/1
Market Harborough 96 m	0 0	0 0	4 2	7 5	7 2	0 0	2 2	0 0	20 11
SP42 732879	—	—	5 10	8 13	1 7	—	11 3	—	11 3/4
Stanford 112 m	0 0	0 0	6 8	6 9	8 3	3 0	4 2	0 0	27 22
SP42 596804	—	—	4 7	5 12	1 5	—	2 2	—	5 12/1
<i>Northamptonshire</i>									
Etton 11 m	0 0	0 0	1 1	3 3	2 0	0 0	2 2	0 0	8 6
TF53 142048	—	—	6 9	8 8	—	—	3 3	—	8 8/1
<i>Oxfordshire</i>									
Heythrop 183 m	0 0	0 0	7 6	8 8	5 3	1 0	2 2	0 0	23 19
SP42 363265	—	—	9 8	28 9	1 6	—	1 2	—	28 9/1
Hinksey 101 m	0 0	0 0	4 7	7 9	4 0	2 0	1 1	0 0	18 17
SP42 509031	—	—	6 8	10 9	—	—	3 2	—	10 9/1
<i>Buckinghamshire</i>									
Little Chalfont 130 m	0 0	1 0	8 7	10 11	6 0	4 0	2 0	0 0	31 18
SU41 988968	—	—	9 10	27 9	—	—	—	—	27 9/1
<i>Staffordshire</i>									
Hednesford 235 m	0 0	0 0	4 7	2 6	3 8	0 0	0 0	0 0	9 21
SK43 123017	—	—	6 8	23 9	33 6	—	—	—	33 6/2
West Bromwich 134 m	0 0	0 0	6 7	5 6	10 8	0 0	4 3	0 0	25 24
SP42 018934	—	—	6 7	8 8	10 5	—	1 1	—	10 5/2
<i>Worcestershire</i>									
Martley 53 m	0 0	0 0	6 5	4 6	4 5	0 0	0 0	0 0	14 16
SO32 743598	—	—	15 9	27 9	3 6	—	—	—	27 9/1
<i>Herefordshire</i>									
Longtown 172 m	0 0	0 0	5 4	5 7	7 3	4 0	2 3	0 0	23 17
SO32 322291	—	—	23 9	25 9	3 6	—	13 2	—	25 9/1
<i>Gloucestershire</i>									
Baunton 121 m	0 0	0 0	4 2	4 2	4 2	0 0	3 0	0 0	17 6
SP42 019047	—	—	13 8	20 9	3 5	—	—	—	20 9/1
DISTRICT 5—ENGLAND, SOUTH EAST									
<i>Greater London</i>									
Charlton Park 46 m	0 0	0 0	* *	4 5	2 0	1 0	2 1	0 0	* *
TQ51 433745	—	—	* *	15 9	—	—	1 3	—	* *
Eastcote 53 m	0 0	0 0	5 5	7 8	2 0	3 0	2 0	0 0	19 13
TQ51 110881	—	—	10 10	17 9	—	—	—	—	17 9/1
East Barnet 70 m	0 0	0 0	4 4	10 6	2 0	1 0	0 0	0 0	17 10
TQ51 262968	—	—	5 8	19 8	—	—	—	—	19 8/1
<i>Surrey</i>									
Camberley 66 m	0 0	0 0	6 6	7 8	5 0	1 0	2 0	0 0	21 14
SU41 867600	—	—	3 10	5 13	—	—	—	—	5 13/1
<i>Kent</i>									
Biddenden 52 m	0 0	0 0	6 5	7 5	6 3	3 0	2 0	0 0	24 13
TQ51 850362	—	—	4 10	18 9	* *	—	—	—	* *
Lyminge 182 m	* *	* *	* *	3 2	6 1	4 0	2 0	0 0	* *
TR61 138405	* *	* *	* *	15 8	3 6	—	—	—	* *
Penshurst Place 40 m	0 0	0 0	6 1	* *	6 0	3 0	3 0	0 0	* *
TQ51 528440	—	—	1 9	* *	—	—	—	—	* *
<i>Sussex</i>									
Washington 23 m	0 0	0 0	6 6	6 5	7 0	1 0	2 0	0 0	22 11
TQ51 118135	—	—	10 9	3 9	—	—	—	—	10 9/12

SNOW SURVEY OF GREAT BRITAIN

TABLE 1 (continued)

Station, height and grid reference		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Season	
DISTRICT 7a—ENGLAND, NORTH WEST											
<i>Cumberland</i>											
Alston	314 m	1 1	2 0	7 5	7 9	14 28	8 6	4 1	2 2	45 52	
NY35 718463		* *	—	7 9	4 6	19 8	3 15	1 3	* *	* *	
Ashy Croft	229 m	0 0	1 1	5 4	4 5	5 3	2 3	0 0	0 0	17 16	
NY35 567769		—	* *	3 9	1 4	4 16	3 21	—	—	* *	
Dale Head	189 m	0 0	0 0	3 3	5 7	5 21	2 2	2 1	1 0	18 34	
NY35 313175		—	—	1 9	8 9	18 6	3 21	1 2	—	18 6/2	
Ennerdale	117 m	0 0	1 0	6 0	8 0	9 11	2 1	1 0	0 0	27 12	
NY35 085153		—	—	—	—	8 5	1 20	—	—	8 5/2	
Geltsdale	229 m	1 1	3 0	7 3	7 2	18 7	11 2	6 1	2 0	55 16	
NY35 575537		* *	—	1 11	4 6	5 5	3 15	2 3	—	* *	
Lanthwaite	44 m	0 0	0 0	2 0	8 3	5 1	2 0	3 0	0 0	20 4	
SD34 165851		—	—	—	4 13	3 6	—	—	—	4 13/1	
<i>Westmorland</i>											
Patterdale	159 m	2 0	0 0	2 2	4 4	10 10	2 2	1 1	0 0	21 19	
NY35 400144		—	—	* *	5 9	8 4	2 21	1 2	—	* *	
Hawes Water	213 m	0 0	0 0	2 2	5 0	7 15	3 5	1 0	0 0	18 22	
NY35 503159		—	—	1 11	—	20 6	6 21	—	—	20 6/2	
Langdales	113 m	0 0	4 1	5 1	8 9	12 17	7 2	2 2	0 0	38 32	
NY35 315058		—	3 27	1 11	6 9	19 6	8 21	1 3	—	19 6/2	
<i>Lancashire</i>											
Belmont	247 m	1 0	2 0	7 7	9 9	7 15	7 2	5 4	1 0	39 37	
SD34 692142		—	—	4 9	10 12	22 6	4 20	4 2	—	22 6/2	
Bacup	404 m	2 1	3 1	6 6	9 10	11 21	8 4	* *	1 0	* *	
SD34 847198		3 18	* *	5 31	* *	24 7	3 21	* *	—	* *	
High Nibthwaite	54 m	0 0	0 0	4 1	6 6	6 7	3 1	3 0	0 0	22 15	
SD34 294898		—	—	* *	5 13	5 5	1 21	—	—	* *	
Nelson	152 m	0 0	0 0	4 7	6 7	9 8	* *	* *	* *	* *	
SD34 865373		—	—	5 31	8 13	11 6	* *	* *	* *	* *	
<i>Cheshire</i>											
Northwich	14 m	0 0	0 0	3 1	6 4	6 11	0 0	4 2	0 0	19 18	
SJ33 656729		—	—	1 8	3 13	13 5	—	1 2	—	13 5/2	
DISTRICT 7b—NORTH WALES											
<i>Flintshire</i>											
Mount Pleasant (Mold)	153 m	0 0	2 0	7 4	3 5	5 9	4 0	4 0	0 0	25 18	
SJ33 256663		—	—	15 8	20 9	10 6	—	—	—	20 9/1	
<i>Denbighshire</i>											
Alwen	335 m	0 0	3 2	12 8	11 9	12 13	7 3	4 4	0 0	49 39	
SH23 956528		—	3 7	29 9	14 9	5 7	1 15	7 3	—	29 9/12	
Bwlch Tunnel	277 m	0 0	1 2	7 8	4 6	7 10	3 2	4 4	0 0	26 32	
SJ33 164580		—	10 25	28 8	15 10	8 5	1 20	3 1	—	28 8/12	
Cae Llwyd	280 m	0 0	1 1	4 4	3 3	5 5	1 1	0 0	0 0	14 14	
SJ33 269 482		—	1 24	8 8	8 8	3 4	1 21	—	—	8 9/12	
Clawdd Newydd	300 m	2 0	2 1	8 10	7 6	8 3	6 0	4 4	0 0	37 24	
SJ33 078521		—	3 26	28 10	10 9	5 6	—	5 3	—	28 10/12	
<i>Caernarvonshire</i>											
Bryn Gwynant	95 m	0 0	1 0	8 8	7 7	9 6	3 0	5 4	0 0	33 25	
SH23 642513		—	—	53 9	8 9	6 6	—	3 3	—	53 9/12	
Capel Curig	198 m	0 0	1 1	5 3	2 6	6 8	1 1	5 3	0 0	20 22	
SH23 717577		—	* *	58 9	21 9	4 6	* *	7 3	—	* *	
<i>Merioneth</i>											
Blaenau Ffestiniog	229 m	0 0	0 0	6 3	* *	4 3	4 0	3 3	0 0	* *	
SH23 701458		—	—	41 8	* *	6 6	—	5 3	—	* *	
Dolgellau	27 m	0 0	0 0	6 7	2 6	4 4	2 0	3 3	0 0	17 20	
SH23 732177		—	—	23 9	4 9	3 7	—	3 2	—	23 9/12	
DISTRICT 8a—SOUTH WALES											
<i>Cardiganshire</i>											
Aberporth	133 m	0 0	0 0	4 1	5 0	6 0	0 0	4 1	0 0	19 2	
SN22 242521		—	—	8 9	—	—	—	3 2	—	8 9/12	
Trawscoed	61 m	0 0	0 0	4 4	0 0	2 0	0 0	0 0	0 0	6 4	
SN22 674736		—	—	20 9	—	—	—	—	—	20 9/12	
<i>Radnorshire</i>											
Evancoyd	227 m	0 0	0 0	5 7	5 9	3 8	1 1	3 3	0 0	17 28	
SO32 261630		—	—	36 9	37 9	7 6	1 7	5 2	—	37 9/1	
Llandrindod Wells	235 m	0 0	0 0	7 4	8 8	4 6	2 0	3 3	0 0	24 21	
SO32 061605		—	—	25 9	20 9	7 6	—	5 2	—	25 9/12	

TABLE 1 (continued)

Station, height and grid reference		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Season
<i>Brecknockshire</i>										
Tairbull	201 m	0 0	5 0	5 3	4 5	6 2	4 0	2 2	1 0	27 12
SN22 978262		—	—	20 9	5 9	1 3	—	18 2	—	20 9/12
Llangynidr	418 m	0 0	1 1	6 4	4 4	6 5	2 2	4 4	0 0	23 20
SO32 155139		—	2 26	18 10	15 9	13 5	* *	13 2	—	* *
<i>Glamorgan</i>										
Maesteg	168 m	0 0	0 0	4 3	3 3	1 1	0 0	3 1	0 0	11 8
SS21 847913		—	—	13 9	3 8	5 5	—	3 2	—	13 9/12
Merthyr Tydfil	235 m	0 0	0 0	8 6	8 7	7 8	4 0	4 3	0 0	31 24
SO32 048071		—	—	25 9	9 10	4 3	—	8 2	—	25 9/12
Swansea	10 m	0 0	0 0	5 4	3 0	2 0	1 0	3 2	0 0	14 6
SS21 642923		—	—	7 9	—	—	—	* *	—	* *
DISTRICT 8b—ENGLAND, SOUTH WEST										
<i>Somerset</i>										
Bath	118 m	0 0	0 0	3 4	6 7	7 1	0 0	3 2	0 0	19 14
ST31 751638		—	—	7 8	5 6	2 6	—	3 2	—	7 8/12
Hawkrige	314 m	0 0	4 1	4 5	5 1	5 5	2 1	3 3	0 0	23 16
SS21 877327		—	Tr 4	30 9	Tr 7	8 6	1 21	Tr 2	—	30 9/12
Street	5 m	0 0	0 0	4 4	0 0	0 0	0 0	0 0	0 0	4 4
ST31 481373		—	—	1 2	—	—	—	—	—	1 2/12
<i>Dorset</i>										
Dorchester	69 m	* *	* *	* *	3 0	3 1	1 0	2 0	0 0	* *
SY30 693899		* *	* *	* *	—	* *	—	—	—	* *
Stoke Abbott	107 m	0 0	0 0	3 4	2 0	4 1	0 0	3 0	0 0	12 5
ST31 455004		—	—	15 9	—	* *	—	—	—	* *
<i>Devon</i>										
Chagford	381 m	0 0	3 3	5 6	6 6	6 13	3 3	3 4	0 0	26 35
SX20 661866		—	1 4	15 8	* *	10 6	* *	8 3	—	* *
Burrator	230 m	0 0	1 1	4 4	0 0	5 4	0 0	1 1	0 0	11 10
SX20 553680		—	1 26	15 9	—	5 6	—	10 3	—	15 9/12
Challacombe	256 m	0 0	0 0	2 4	5 0	4 2	2 0	0 0	0 0	13 6
SS21 692411		—	—	20 8	—	* *	—	—	—	* *
Chivenor	6 m	0 0	0 0	4 1	0 0	4 0	0 0	3 1	0 0	11 2
SS21 494347		—	—	1 9	—	—	—	—	—	1 9/12
North Hessary Tor	427 m	0 0	6 1	9 2	8 0	11 6	10 1	5 2	0 0	49 12
SX20 585735		—	8 26	15 9	—	15 9	1 21	8 3	—	15 9/12
Plymouth	61 m	0 0	0 0	5 4	2 1	4 1	0 0	2 1	0 0	13 7
SX20 465573		—	—	3 9	1 12	Tr 6	—	1 3	—	3 9/12
Yalland	264 m	1 0	1 0	6 4	3 0	8 3	5 0	2 1	0 0	26 8
SX20 690628		—	—	10 9	—	4 9	—	5 3	—	10 9/12
<i>Cornwall</i>										
Liskeard	140 m	0 0	0 0	2 4	1 1	0 0	0 0	3 1	0 0	6 6
SX20 257642		—	—	7 9	1 12	—	—	3 4	—	7 9/12
St Mawgan	103 m	0 0	0 0	2 0	2 0	3 0	0 0	3 0	0 0	10 0
SW10 871642		—	—	—	—	—	—	—	—	—

SNOW SURVEY OF GREAT BRITAIN

TABLE 2

Number of days with snow lying in the British mountains, 1967-68

(a) Near summit. (b) At about 762 metres (2500 feet). (c) At station level.

		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Season
A'Chailleach (1108 m)	<i>a</i>	15	18	18	22	29	29	15	21	167
Station: Glackour (20 m)	<i>b</i>	12	11	17	20	29	23	13	16	142
Ross & Cromarty	<i>c</i>	0	1	8	12	5	3	6	1	36
Cairngorms (1309 m)	<i>a</i>	21	28	29	26	29	31	30	31	225
Station: Achnagoichan (305 m)	<i>b</i>	13	28	21	24	29	31	30	27	203
Inverness-shire	<i>c</i>	0	1	10	16	28	9	10	2	76
Creag Meagaidh (1128 m)	<i>a</i>	22	26	27	31	29	31	30	30	226
Station: Fersit (259 m)	<i>b</i>	13	14	18	25	29	26	16	12	153
Inverness-shire	<i>c</i>	1	1	10	15	29	4	6	1	67
Ben Vane (916 m)	<i>a</i>	4	5	16	23	24	25	15	10	122
Station: Loch Arklet (146 m)	<i>b</i>	1	3	15	23	24	25	14	7	112
Stirlingshire	<i>c</i>	1	1	2	14	9	3	5	0	35
Ben More (Mull) (966 m)	<i>a</i>	4	4	8	15	29	19	10	6	95
Station: Rhuvaal (20 m)	<i>b</i>	2	3	8	15	29	17	10	6	90
Argyll	<i>c</i>	0	0	0	0	1	0	1	0	2
Kells Range (813 m)	<i>a</i>	2	3	15	13	29	17	4	4	87
Station: Forrest Lodge (Dalry) (152 m)	<i>b</i>	2	3	15	13	29	17	4	4	87
Kirkcudbrightshire	<i>c</i>	0	0	2	5	13	5	0	0	25
Cheviot Hills (816 m)	<i>a</i>	3	6	10	14	27	22	6	0	88
Station: Newton-by-the-Sea (15 m)	<i>b</i>	3	6	10	14	27	22	6	0	88
Northumberland	<i>c</i>	0	0	3	1	5	1	0	0	10
Cross Fell (893 m)	<i>a</i>	5	17	27	24	29	31	30	28	189
Station: Alston (314 m)	<i>b</i>	5	17	27	24	29	31	30	28	189
Cumberland	<i>c</i>	1	0	5	9	28	6	1	2	52
Helvellyn (950 m)	<i>a</i>	2	9	13	13	29	9	5	0	80
Station: Patterdale (159 m)	<i>b</i>	2	7	2	13	29	9	5	0	67
Westmorland	<i>c</i>	0	0	2	4	10	2	1	0	19
Snowdonia (1085 m)	<i>a</i>	2	11	18	13	28	22	14	0	108
Station: Capel Curig (198 m)	<i>b</i>	2	5	9	13	28	15	13	0	85
Caernarvonshire	<i>c</i>	0	1	3	6	8	1	3	0	22
Cader Idris (892 m)	<i>a</i>	1	4	16	13	29	14	13	2	92
Station: Dolgellau (27 m)	<i>b</i>	1	4	16	13	29	14	13	2	92
Merioneth	<i>c</i>	0	0	7	6	4	0	3	0	20
Brecon Beacons (886 m)	<i>a</i>	0	8	13	25	29	29	16	3	123
Station: Tairbull (201 m)	<i>b</i>	0	8	13	25	29	29	16	3	123
Brecknockshire	<i>c</i>	0	0	3	5	2	0	2	0	12

TABLE 3

Daily depth of snow at selected stations (values in centimetres)

December 1967										Day	January 1968									
Fort Augustus	Achnagoichan	West Linton	Eskdalemuir	Huddersfield Oakes	Buxton	Luton	Little Rissington	Newton Abbot	Llandrindod Wells		Fort Augustus	Achnagoichan	West Linton	Eskdalemuir	Huddersfield Oakes	Buxton	Luton	Little Rissington	Newton Abbot	Llandrindod Wells
										1	8	13	5		5	↑	3	6		
										2	5	13	8	7	6	↑				
										3		13	5	8	5	↑				
										4	5	18	5	6		↑				
3	8									5	5		5			↑				3
10		3								6			5	6		↑				
10							17	3	10	7			6	6		↑		7		
10	1	5					10	8	25	8			6	6		↑		4		
10			1	2		5	7	8	20	9	3		6	6	10	↑		26		20
3		8	1	2			5	8	20	10			5	5	10	↑		19		20
			1					8	15	11			6	6	10	↑		19		18
										12			6	6	8	↑		15		15
										13			10	7		↑		18		15
	1									14			3			↑				
										15			3			↑				
										16						↑				
										17			3			↑				
										18						↑				
										19						↑				
										20						↑				
										21						↑				
										22						↑				
										23						↑				
										24						↑				
										25						↑				
										26						↑				
										27						↑				
										28						↑				
										29						↑				
										30						↑				
	13		1	8						31						↑				

Note: Depths of snow too small to measure are not mentioned.

No snow depths were reported from these stations during October 1967, from the 23rd to the 31st March 1968, from the 9th to the 30th April 1968 and during May 1968. The only snow depth reported during November 1967 was 4 cm at Eskdalemuir on the 27th.

SNOW SURVEY OF GREAT BRITAIN

TABLE 3 (continued)

February 1968										Day	March 1968									
Fort Augustus	Achnagoichan	West Linton	Eskdalemuir	Huddersfield Oakes	Buxton	Luton	Little Rissington	Newton Abbot	Llandrindod Wells		Fort Augustus	Achnagoichan	West Linton	Eskdalemuir	Huddersfield Oakes	Buxton	Luton	Little Rissington	Newton Abbot	Llandrindod Wells
			2							1										
3			2							2										
3			2	1	10		1			3			10							
					13					4			10							
	10		12	1	8					5										
	13	5	14	16	33		7			6										
	↕	5	14	14	38		2			7										
	↕	5	15	8	36		1			8										
	↕		14	7	33					9										
	↕		12	4	28					10										
	↕		11		20					11										
	↕	3	10		18					12										
	↕		11		10				3	13										
	↕		9		8					14										
	↕		9		8					15			10							
	↕		7		8					16										
3	↕		12		8					17										
3	↕	3	10		8					18		13	10							
	↕		7		5					19		15	5							
	↕		14							20										
	↕	5	19							21										
	↕	8	14	2	3					22				2						
	↕	8	13		5					23										
	↕	8	15							24										
	↕	5	13							25										
	↕		13							26										
	↕		12							27										
	↕		12							28										
	↕		11							29										
										30										
										31										

April 1968										
										1
	8						2			2
	15	8		2	3		1			3
	23	5					1			4
	23			2						5
	23									6
	10									7
	10									8

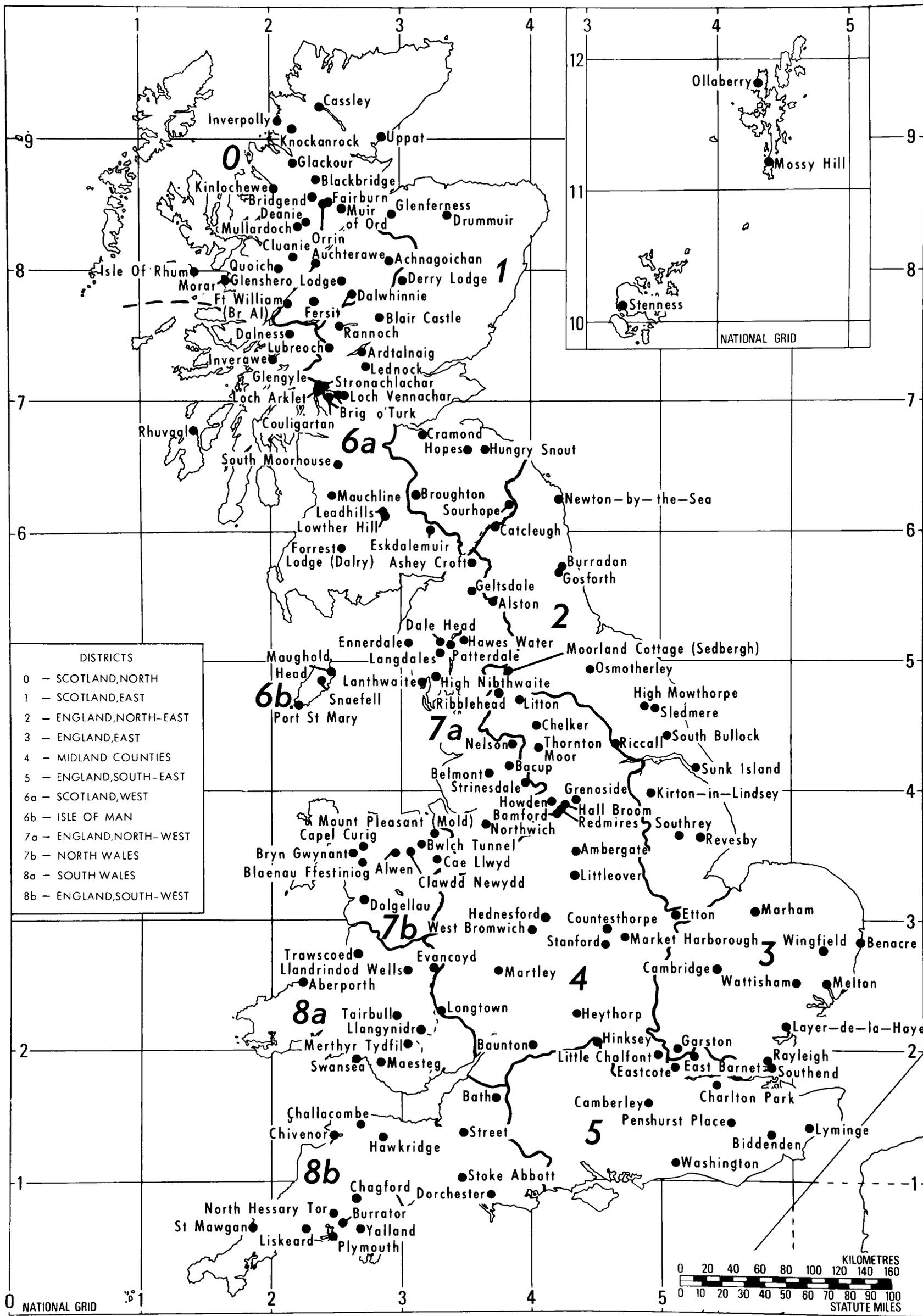


FIGURE 1. Positions of snow-survey stations.

DISTRIBUTION OF SNOW COVER 1967-68

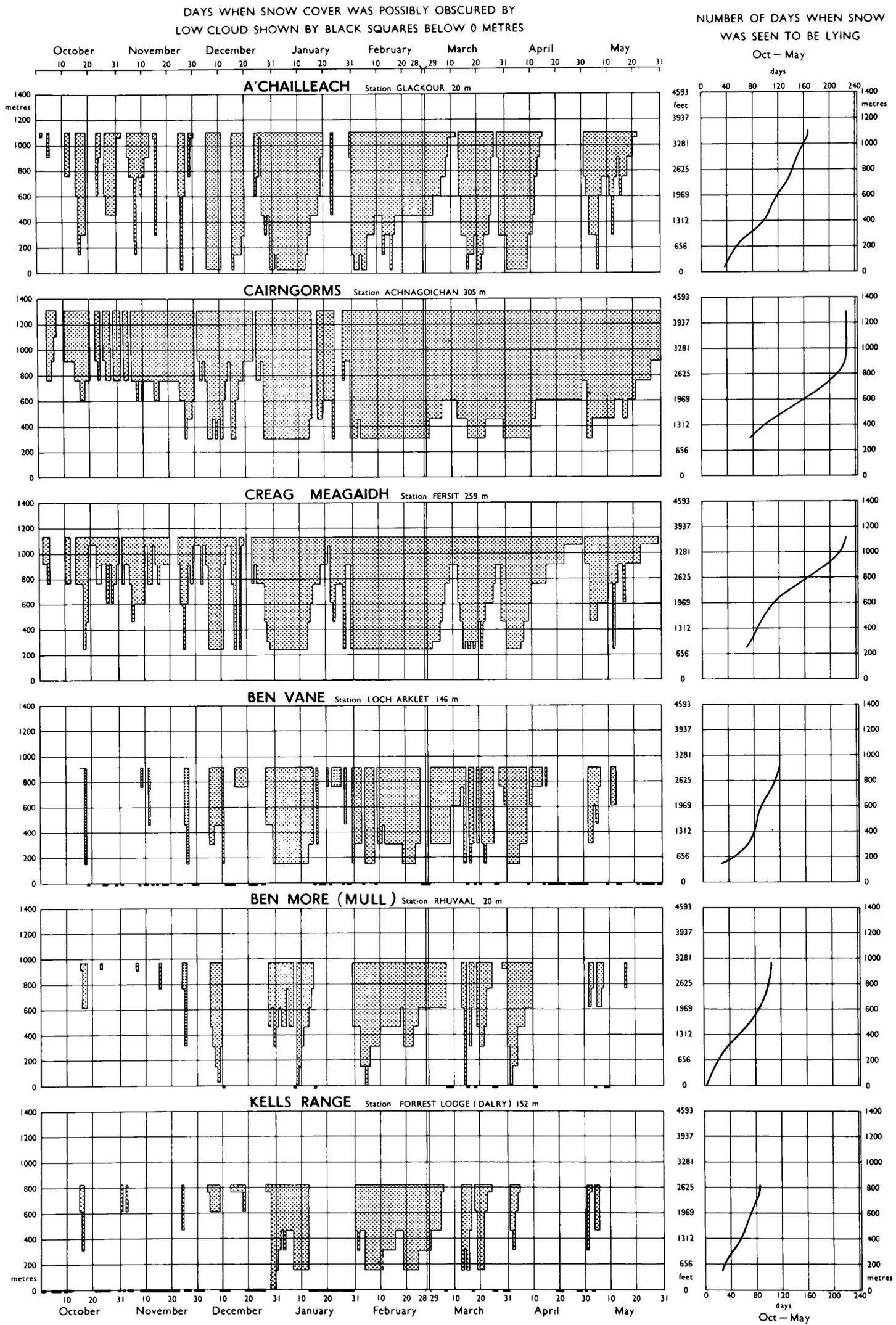


FIGURE 2. Distribution of snow cover in British mountains 1967-68.

DISTRIBUTION OF SNOW COVER 1967-68 (cont'd)

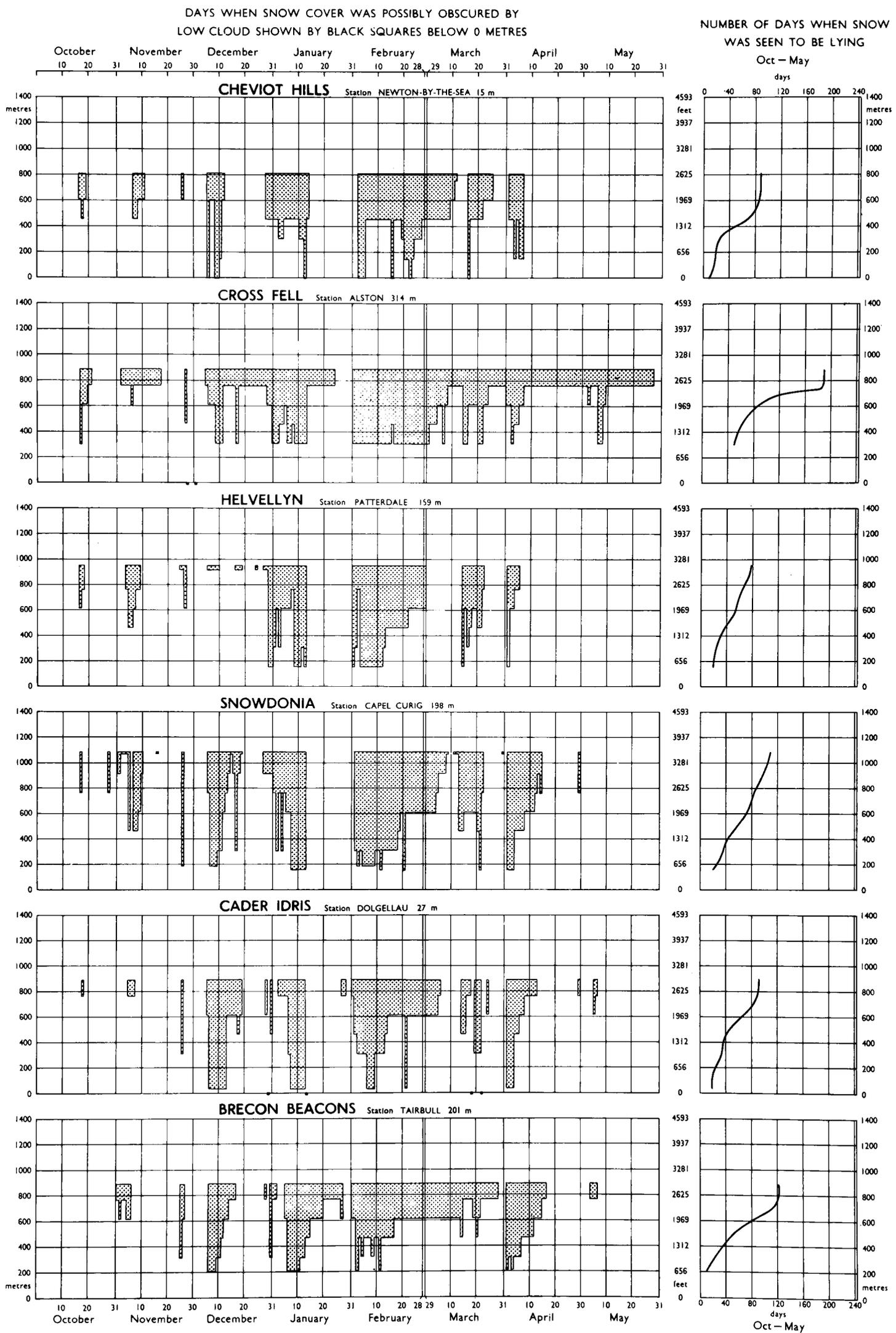


FIGURE 2. (continued)

3 THE YEAR 1968: AN OUTSTANDING ONE FOR MULTIPLE EVENTS WITH EXCEPTIONALLY HEAVY AND WIDESPREAD RAINFALL

by A. Bleasdale, B.A., B.Sc.

The special status of 1968

During 1968 there were three major rainfall events, over very big areas in different parts of Britain, with exceptionally large one-day or two-day falls (expressed in rainfall-day measurements, i.e. 09–09 GMT). The depth–area magnitudes (see (c) in ‘Conditional factors’ below, and Tables 1 and 2 later) were such that each event by itself would have given the year an important place, on one criterion or another, in any comparative list (for the U.K.) of widespread heavy falls, either for this century or for the whole period of systematic rainfall observing. With three events, actually within six months, from the end of March to mid September, the year can almost certainly be regarded as unique during more than 100 years of well-documented rainfall history, and probably, had we the data, for much further back.

Conditional factors

Any slight doubts or caution which must remain about the phrasing of this distinction for 1968 derive from three factors:

(a) ‘Systematic rainfall observing’ or ‘well-documented rainfall history’ started in the U.K. with the work of G. J. Symons, who first provided, with data for 1860 and 1861, the sound foundations (Mill¹) that remain, extended and consolidated, to this day. But of course there has been a steady increase in the number of rainfall stations contributing data, from about 500 in the first two years, to about 3500 at the time of the founder’s death in 1900, and to nearly 7000 in 1970. For the earliest decades the basis of comparison may be not quite good enough, whilst the necessary element of guesswork in any attempted comparisons increases very rapidly in retrospect before 1860.

(b) The daily rainfall data which are available have not yet been thoroughly analysed in a strictly uniform manner (in the light of what is said in (c) below) for the whole period. A completely standardized analysis is not likely to be carried out until the great bulk of relevant data becomes available in a computer medium, a state of affairs which is still far from being achieved. The very appreciable progress towards this end which has been made in recent years has tended towards a concentration on the longest homogeneous daily data series, representing as it were, at least on a moderately effective scale, a set of ‘vertical’ probes into the great mass of accumulated past data. What is needed for the type of analysis now suggested is the complementary conversion to a computer medium, in sufficient number, of the relevant ‘horizontal’ layers, including all the data available in any one layer, even from the very short-period stations of that time.*

(c) The need for a unified and standardized form of analysis, in preference to the series of subjectively-governed and slightly-varying analyses which have been done from time to time in the past, arises from the great natural variability of rainfall and the complexity of definition, for comparative purposes, of exceptional rainfall events. It is necessary to take into account, simultaneously, the *largest local falls* measured (and perhaps estimated) at the ‘centres’ of rainfall activity; the estimated *surface areas covered* by falls exceeding a number of selected threshold values; and the *durations* of the falls (in general continuous, or only slightly interrupted) which contributed to the rainfall distributions in space under investigation, and characterized the occasions as individual rainfall events. All three magnitudes vary greatly (and separately) from one event to another, so that the comparisons must be made on at least a trivariate basis (*depth–area–duration*), even without taking into account the geographical locations of the most interesting events, and the very varied shapes in spatial distribution, with their importance in relation to ground contour and water disposal patterns. Without the standardized multivariate approach, which has not yet superseded (or sufficiently complemented) the *ad hoc* analyses of the past, it is always tempting, in the investigation of any one event, to concentrate on the one or two aspects which are most outstanding. With this procedure it is possible, for almost any number of exceptional events, to demonstrate that each in its own way may be legitimately regarded as unique.

Comparative data

Keeping in mind all necessary caution, it is doubtful whether in any other calendar year, or twelve-month period, within the series of decades which can be studied, there have been even two known events of depth–area–duration magnitudes comparable with those of the three in 1968. A few of the notable particulars are tabulated and discussed below.

Tables 2 and 3, appended, give fuller information for these dates in 1968, in comparison with similar material for about 20 other outstanding rainfall events, from 1891 onwards, which have previously been analysed. Tables 2 and 3 were originally assembled in this form, from several sources, by

* It is becoming customary to refer to archives already in these two different forms, one station all years, and one time unit all stations, as the climatological and synoptic formats. With computer tapes it is virtually necessary to have both forms, for different purposes. The use of magnetic disc packs introduces greater flexibility, without diminishing the initial effort needed to get all relevant data in computer media.

TABLE 1

The major rainfall events of 1968

Event	Date and duration	Location	Largest measured fall, M mm	Estimated areas, A (km ²) with falls exceeding selected thresholds		
				150 mm	100 mm	75 mm
1	26–27/3/68, D_2	West and north-west Scotland	>250	6 800	12 500	(?)
2	10/7/68, D_1	Devon to south and central Lincolnshire	>170	83	2 250	11 500
3	14–15/9/68, D_2, D_c	South-east England	>200	575	6 250	12 500

Note: Duration, D_1 is one rainfall day, D_2 two rainfall days and D_c largely within one civil day.

Grindley,^{2, 3} and published in British units. They are here given for the first time entirely in metric units, with an addition for 1969 in Table 3, also provided by Grindley.⁴ The threshold values for dates before 1968 were originally in inches and have been converted by the approximate equivalent 1 in = 25 mm (1.6 per cent low); the area entries were all originally in square miles and the equivalents in square kilometres have all been rounded off to avoid conveying a spurious impression of accuracy, which may be no better than 5 per cent or so. The smaller numbers have been rounded to the nearest integer by the usual conventions. For the larger, a slight bias towards rounding down was introduced, and if a third significant figure is given it is always 5. With this procedure in conjunction with the inch-to-millimetre conversion, the converted values must be in general a little on the conservative side, but probably by no more than 2 or 3 per cent and with negligible effect on the validity of comparisons.

Supplementary remarks on possible additional data

The lists of Tables 2 and 3 are probably not complete, even for the period covered, in relation to those precise specifications of the criteria which might reasonably be suggested for deciding on inclusion of events. Also, for 1860 to 1890 there are very probably a few additional examples which could be cautiously included, given time to prepare very careful areal estimates for the three decades of relatively sparse but steadily increasing data. Nevertheless the table probably gives most of the educible occasions which could be useful, in one way or another, for comparisons with the three events of 1968, notable as these were in their different most remarkable characteristics. It is mainly in this context that references are made in the present discussion to what is actually known; but see also Bleasdale^{5, 6} for an alternative method of listing heavy rainfall occasions—although a very poor alternative for areal rainfall comparisons, this information is much fuller for all known occasions up to 1966 with rainfall-day measurements of 5 in (127 mm) or more, and provides useful further references.

An attempt has been made to bring out a few additional events which might be comparable, on multiple criteria related to the range of Table 1, with those of 1968. The effort could not be by any means exhaustive, but also was not successful.

Notation

To systematize the comments on the three separate events of 1968 a sub-paragraph notation, already introduced in Tables 1, 2 and 3 and used in discussion below, is now defined:

- M refers to the *maximum* measured falls.
 $A.150$ refers to the estimated *areas* with falls exceeding the 150-mm threshold, and similarly for other thresholds.
 D refers to the *durations* of the falls, in either a general or a more precisely specified sense, with D_1, D_2 for durations within one or two consecutive rainfall days, and D_c for durations within a civil day, or very largely so.
 L refers to additional discussion of geographical *location*, mainly for events 2 and 3.

Event 1, 26–27/3/68

M The D_2 total at Kinlochewe was 253 mm and three other measured totals exceeded 220 mm. Falls of more than 200 mm qualifying as D_1 have been measured on four occasions in the U.K., with Martinstown, Dorset, 18/7/55, 279 mm, as the largest (Bleasdale⁷). They are nevertheless very exceptional as D_2 .

$A.150$ } The areas for the 150-mm and 100-mm thresholds are not known, from any previous data analyses and summaries under D_2 , to have been exceeded. There were fairly near approaches (nearly 75 and 90 per cent respectively) for 16–17/12/66, also in west and north-west Scotland.
 $A.100$ }

$A.75$ The areas for the 75-mm threshold have not yet been estimated for event 1 or for 16–17/12/66. For event 1 the area must exceed any other yet known for D_2 , with that for 16–17/12/66 almost certainly coming next.

D The total duration of the rainfall on 26–27/3/68 (D_2) was probably about 36 hours, including a period of about 6 hours, roughly in the middle, with a very small contribution to the total amounts. This much is known for a few stations with rain recorders, but details of possible variations elsewhere are not known.

Event 2, 10/7/68

M The station at which the maximum of 173 mm (D_1) was measured was an automatic climatological station at Chew Stoke, within an experimental area maintained by the Bristol Avon River Authority; reports from the station were not regularly sent to the Meteorological Office at that time. Among the first reports received from regularly reporting stations the largest were in the range 140–145 mm, and the mapped distribution supported the Chew Stoke value; six other observations in the range 140–160 mm became known later, and one or two of these seemed somewhat anomalous (see *A.150* below). There have been rather more than 20 occasions with authenticated D_1 measurements in the U.K. exceeding the Chew Stoke value, starting with one in 1863 (Bleasdale⁵). About 60 per cent of these exceptional D_1 events were located in the mountainous west and north of Britain, at places with very high average annual rainfall.

A.150 The area for the 150-mm threshold was an estimate based on a smoothed mapping of the distribution, largely using the gradients of the rainfall field indicated by values approaching 150 mm. It is unlikely to have been significantly exaggerated; in fact, of the four measurements exceeding 150 mm two indicated intricate irregularities in the shape of the 150-mm area, which suggests either that they could be doubted, or (equally perhaps) that the area may have been rather larger. As given, it has been exceeded at least five times, under D_1 , and on three of these occasions definitely with firmer evidence; the most notable was 26/8/1912 in Norfolk when the 1968 *A.150* (D_1) was exceeded by a factor of more than eight.

A.100 Before 1969, the area for the 100-mm threshold had been known to have been exceeded, for D_1 , only during the great Norfolk storm, and then only by a little over 20 per cent. (The 1969 *A.100*(D_1) is therefore of special interest.)

A.75 Again before 1969, the area for the 75-mm threshold was not known to have been approached, for D_1 , by any value much over 50 per cent; the nearest approach was on 11/10/1916, with the largest falls over Glenquoich; the Norfolk storm approach for D_1 was only about 45 per cent, though nearly 80 per cent for D_c ; see the *Summary* below. (The 1969 *A.75*(D_1) surpassed all others known, but not so remarkably as the *A.100*(D_1).

D,L The duration of the heaviest rainfall on 10/7/68 (D_1) was very variable. In the south-west it was about 5 hours, starting in the early evening, but preceded by local showers or thunderstorms, some heavy and some well

before the main fall began; as the main rainfall area travelled towards south and central Lincolnshire, the preceding local falls continued; the duration increased, eventually to about 9 hours starting soon after midnight (same rainfall day, civil day 11/7/68); and totals irregularly decreased (*A.150* was entirely near Bristol and Bath; *A.100* included at least seven separate areas, one near Peterborough with a measurement exceeding 140 mm, and another in Lindsey with a largest measurement of 111 mm).

Event 3, 14–15/9/68

M The largest measured D_2 falls (two of just over 200 mm in Essex at Tilbury and Stifford, and another in Sussex north of Petworth) have been matched or exceeded on at least eight occasions with authentic D_1 , but only in a few of these with any large accompanying heavy rainfall areas; see also *D, L* below and the *Summary* of the three events which follows.

A.150 The area for the 150-mm threshold has been exceeded, under D_2 , at least three times in addition to 26–27/3/68 (event 1).

A.100 The area for the 100-mm threshold has been exceeded, under D_2 , at least once, 16–17/12/66, in addition to 26–27/3/68 (event 1).

A.75 The area for the 75-mm threshold, under D_2 , was certainly exceeded on 26–27/3/68 (event 1) and very probably on 16–17/12/66.

D, L It is known that almost all the rain fell within 24 hours on the civil day (not rainfall day) 15/9/68 (D_c). With 50 mm or more total fall as the criterion, the area covered was almost entirely south and east of a line from Cromer through Cambridge and Newbury to Bournemouth. (Further discussion of *D, L* in the *Summary* below.)

Summary of the most notable characteristics

Event 1, 26–27/3/68, D_2 , was particularly outstanding for areal coverage, for all criteria from *A.250* down to *A.75* at least; not so much for *M* and *D*, taken together, though still exceptional in that respect for this location (*L*) or any other in the U.K.

Up to the time at which it occurred, event 2, 10/7/68, D_1 , was particularly outstanding for *A.75* and *A.50* and gave the nearest known approach for *A.100* (D_1) to the great Norfolk storm of 1912. With *D*, 5 to 9 hours, compared with the much longer durations at any one place for the Norfolk storm, this is all the more remarkable; *M* and *D* also, taken together, were certainly very exceptional. (The remarkable parallel, little more than a year later, except on the one hand for the greater maximum falls on 10/7/68, and on the other for the quite exceptional *A.100*(D_1) of 28/7/69, is very striking. The *D* of 28/7/69 were however appreciably longer; typically about 18 hours in the south-west, where the heaviest falls occurred.)

Event 3, 14–15/9/68, D_2 , provided the nearest known rival, though not a close approach, to event 1, 26–27/3/68, and to 16–17/12/66, especially in terms of $A.100$ and $A.75$ for D_2 . This is remarkable enough in itself in view of L . With the known details of D brought in, event 3 may be thought of very largely as D_c , civil day 15/9/68. If this is done comparisons with the Norfolk storm must be made in the equivalent way, since nearly all the rain, summarized in Table 2 under the D_2 heading, fell on the civil day 26/8/1912 (Mill^{8, 9}).

Event 3 is then surpassed by the Norfolk storm for $A.125(D_c)$ and upwards, but has the greater values from $A.100$ downwards and especially for $A.75(D_c)$.

(For $A.75(D_1)$, as noted above, event 2 is outstanding, and in fact still surpasses the Norfolk storm and approaches event 3, with these two D_c brought in for joint D_1 and D_c comparison. For $A.50(D_1)$ event 2 stands quite alone amongst all known 24-hour events, D_1 , D_c , or other; and on this criterion, as well as $A.150$, it still surpasses the 1969 event.)

The detailed comparisons on these lines can become very complicated and indeed tedious (as shown especially by the attempt to include brief notes on 28/7/1969 without departing from main concentration on 1968), but in summary it can be said that for event 3, considered as very largely a 24-hour fall (D_c , 15/9/68), the only known near rival was the great Norfolk storm of 1912, with the word 'near' referring both to multiple depth-area criteria and to geographical location. For the latter, a convenient specification of south-east England is a radius of about 200 km from the coast at the narrowest part of the Strait of Dover (from which it is just over 500 km in a north-westerly direct line to Gretna). Within this area, 26/8/1912 and 15/9/68 (both D_c) are quite remarkably outstanding.

The areas of heaviest rainfall, greater than 100 mm, for event 2, 10/7/68, only just encroached, near Peterborough, on south-east England so defined. Apart from some irregularities, the main track of this travelling rainfall system approximated to a tangent to the 200-km arc. Very interestingly, the event of 28/7/69, in addition to providing close parallels in the A criteria, almost repeated some of the elements of this pattern, in its elongation from the south-west peninsula to north-eastern England (with a slightly more northerly orientation). Maximum measured falls were smaller, and durations greater, as already noted; in addition, the areal coverage was much wider in the direction across the north-easterly track. A map of the distribution and other information will be given in *British Rainfall 1969*.

Attention is drawn to the predominant summer half-year incidence of the occasions listed in Tables 2 and 3. The relationship between the seasonal incidence and geographical location of the heaviest daily measurements of rainfall (in effect more than 125 mm, regardless of areal coverage) is dealt with more fully by Bleasdale.^{5, 6} But in these two tables it is to be noticed

from the geographical locations that only about a quarter of the events could be affected by pronounced orographical influences, and that these few include all but one of the winter half-year (October to March) occasions. The characteristics of the small sample represented by Tables 2 and 3 are in harmony with conclusions derived from a much more numerous body of data.

It is tempting also to consider, very cautiously, the events summarized in Tables 2 and 3 as part of a time series:

Period	Number of years	Number of events
1900 and before	?	2+
1901–1910	10	0
1911–1931	21	12
1932–1947	16	0
1948–1969	22	10
1970	?	?

Undoubtedly there is a need for the more comprehensive and standardized analysis which has been suggested, coupled with a classification of associated weather types, before the possible implications of this summary can be firmed up; and probably even then a need for some decades of supplementary data, before any apparent fluctuations in the frequencies of outstanding rainfall events of this kind can be really soundly linked with developing studies of climatic change (briefly referred to by Bleasdale;⁶ discussion of recent and probably still current decline of the middle latitudes westerlies, and likely connections with exceptionally heavy falls of rain, by Weiss and Lamb¹⁰). Meanwhile, there is no doubt whatever, from scrutiny of other data summaries, that the two periods with zero entries in the final column of the above short table, represent genuine lulls in the occurrence of widespread heavy rainfall of the kind discussed.

Maps of the rainfall distributions and notes on the weather types

It is not the purpose of this article to offer a full treatment of the meteorological causes of the major rainfall events of 1968. The major objective is to establish and describe the special status, to date, of 1968. But some notes indicating the important differences (and perhaps a hint of one element of similarity) between the three events are relevant to topics which have been touched on.

The rainfall distributions for the five separate days, 26/3/68, 27/3/68, 10/7/68, 14/9/68 and 15/9/68 are shown in the maps on pages 175–184 in Section 5 of Part II. Maps showing the distribution of rainfall for the three separate events of 1968 are shown in chronological order as Figures 1, 2 and 3 in this article. The events are the two consecutive rainfall days 26–27/3/68 and also 14–15/9/68 and the single rainfall day 10/7/68.

At 06 GMT on 26/3/68 the centre of a large and deep depression, which had approached from the south-west, had become almost stationary off south-west to west Iceland, and began slowly to fill up. A subsidiary centre had begun to develop over the north coast of Iceland by 12 GMT on 27/3/68 and subsequently

separated, with slight deepening as it moved north-east. The frontal system associated with the main depression extended southwards to 40°N and beyond, and at 06 GMT on 26/3/68 the arc of the occlusion and warm front, extending roughly north to south, was approaching the British Isles across 10°W as a chord, with rain beginning in the north-west of County Mayo. Rain subsequently spread over the whole of Scotland, by about midday, continuing, especially in the mountains of the west and north-west, within the mild south-westerly airstream behind the warm front. Wave developments on the trailing cold front delayed its southward movement across Scotland and it was not until the early hours of 28/3/68 that the heavy rainfall in the west and north-west finally ceased; there had been a period of much lighter rain, within the warm air, when a large wave, with a small and short-lived separate centre off south-east Iceland, temporarily carried the frontal system clear of the north coast of the Scottish mainland. (In the series of weather charts at six-hourly intervals, published in the *Daily Weather Report*, this interlude is best shown on the chart for 12 GMT, 27/3/68.) The orographical character of the rainfall distribution (Figure 1) was very pronounced. Each of the two rainfall days, though especially the first, produced substantial maxima in the measured amounts of rain (more than 150 mm and more than 100 mm respectively). The very extended duration, which resulted in the large two-day totals, may be divided into three phases: rainfall in advance of the warm front; rainfall continuing over the western mountains within the warm air (the line of the front at the surface was almost parallel to the north-south trend of the west-east water-parting or main ridge—passage of the front at the surface delayed?); rainfall along the cold front, which trailed and developed waves after the main centre had become stationary. Thus very probably two out of the three phases were associated with delaying or stationary factors in the meteorological developments, combined with the orographic effects.

On 9/7/68 a small and shallow depression developed within a relatively low pressure area over the Iberian peninsula and neighbouring parts of the Atlantic, with Mediterranean air to the south of its frontal system.^{11, 12} By 12 GMT on 10/7/68 the centre was over Brest with the warm front moving north across the entire length of the south coast of England. The centre moved across Devon to East Anglia and into the North Sea by 06 GMT on 11/7/68. During this period it deepened rather rapidly and became quite vigorous over the southern North Sea with gale force north-easterlies north and north-west of the centre. The line of the surface warm front (and subsequently occlusion) progressed rather slowly and was at no time further north than a line extending from the Severn to the Wash and beyond; it probably remained for the most part some 30 to 40 km south of this line. The heaviest rain of 10/7/68 occurred ahead of the warm front and in thunderstorms near or slightly north of the centre, with surface winds mainly north-easterly. The centre itself travelled with moderate speed across country; the rather slow changes in the

alignment of the front at the surface, separating the Mediterranean air from the north-easterly air stream to the north, had some of the elements of an almost stationary system.

In the early hours of 14/9/68 a rather shallow but deepening depression was centred near the mouth of the English Channel, with the occlusion of a frontal system swinging round it and beginning to cross France. The centre had moved slightly south-west by 18 GMT and thereafter moved south over the Bay of Biscay, and after 12 GMT on 15/9/68 eastwards over France. The main front crossed France rather quickly, and whilst it produced rain the totals were not exceptionally large. But after becoming aligned west-east across southern England the front had become almost stationary by 18 GMT, 14/9/68, and remained so until 06 GMT or later, 15/9/68. Thereafter it rotated slowly to a south-west to north-east alignment, crossing the Thames estuary, but not London. The largest accumulations of rain extended from Hampshire through Sussex and Kent, more or less along the line of the front whilst stationary, and into Essex when it was taking up the new alignment. (The front later crossed London, in the early hours of 16/9/68, with much reduced activity.)

Floods

All three of the major rainfall events of 1968 caused extensive flooding within the river basins which bore their impact, though the first occurrence in March attracted least general attention. Whilst it was serious enough in some respects, no large and densely populated centres lie within the area covered by the heaviest rain. Moreover it is relevant to observe that the drainage patterns which have evolved in the mountains of Scotland have become, through natural necessity, more suitably adapted for large-scale water disposal than those in the areas which suffered most in July and September. In this connection, it will be noticed for 10/7/68 and 14–15/9/68 that each event made its distinctive mark on the map of annual rainfall over the U.K. for 1968, expressed in percentages of average annual rainfall (page 124), whilst the event of 26–27/3/68 left no such sign. Great damage was caused in July and in September, as reported immediately in the Press, and later in more comprehensive and technical accounts, prepared by the river authority engineers directly involved, from which some information has been drawn for this article. The Greater London Council and other local authority engineers were also deeply concerned. New impetus was given to the furtherance of flood alleviation schemes and flood warning systems, including those already in being and under continuous development, whilst 1968 made its own decisive contribution towards the establishment, at the Institute of Hydrology and the Meteorological Office, of complementary and closely collaborating flood studies teams, with an advanced three-year programme of special research.

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TABLE 2

Estimated areas covered by heavy rainfall of duration within 2 consecutive rainfall days, D_2

Date	Location of main centre(s) of heaviest rain, L	Estimated areas, A , (km ²), with falls exceeding selected thresholds (mm)									
		250	225	200	175	150	125	100	75	50	25
24–25/8/1891	Lake District	5	47	125	270	590	1 050	1 850			
23–24/6/1911	Eastern Britain and North Wales							270	6 550	27 500	-
25–26/8/1912	Norfolk (D_c)			47	670	1 800	2 700	5 000	8 950	19 000	69 000
29–30/9/1912	South-east England (Kent, Sussex)							465	6 700	23 000	
7–8/5/1914	South of Moray Firth							700	3 450	13 000	
25–26/9/1915	North-east of Inverness				57	240	930	2 100	6 500	15 000	
6–7/8/1922	Central England						450	3 200	9 400	29 500	
16–17/12/1966	West and north-west Scotland	41		1 350		5 050		11 000			
26–27/3/1968	West and north-west Scotland	700		2 700		6 800		12 500			
14–15/9/1968	South-east England (D_c)			13	88	575	2 350	6 250	12 500	22 500	

Note: Duration D_c is largely within one civil day.

TABLE 3

Estimated areas covered by heavy rainfall of duration within 1 rainfall day, D_1

Date	Location of main centre(s) of heaviest rain, L	Estimated areas, A , (km ²), with falls exceeding selected thresholds (mm)									
		250	225	200	175	150	125	100	75	50	25
30/12/1900	Somerset to Warwickshire								3 100	17 000	69 000
26/8/1912	Norfolk				54	695	1 850	2 750	5 200	9 900	32 500
7/7/1916	Perthshire							75	2 200	11 500	40 500
11/10/1916	Glenquoich			26	105	530	1 050	1 800	6 000	13 000	
28/6/1917	Somerset (Bruton)		5	34	75	220	745	2 100	5 000	11 500	
18/8/1924	Somerset (Cannington)		3	7	12	17	25	33	70	120	
5/10/1929	South-west England and South Wales							190	4 250	18 500	
27/5/1931	South Wales							270	830	1 750	
12/8/1948	Tweed Valley					21	335	2 050		7 500	
15/8/1952	Exmoor			44		110		400			
18/7/1955	Dorset	36	73	125	215	345	505	820			
5/9/1958	Kent and East Anglia							26	390	1 850	4 650
16/10/1967	Midlands and north England							150	2 100	16 500	100 000
10/7/1968	Devon to Lindsey					83	535	2 250	11 500	32 000	66 500
28/7/1969	Cornwall and South Wales to East Riding						620	5 250	12 500	22 000	74 000

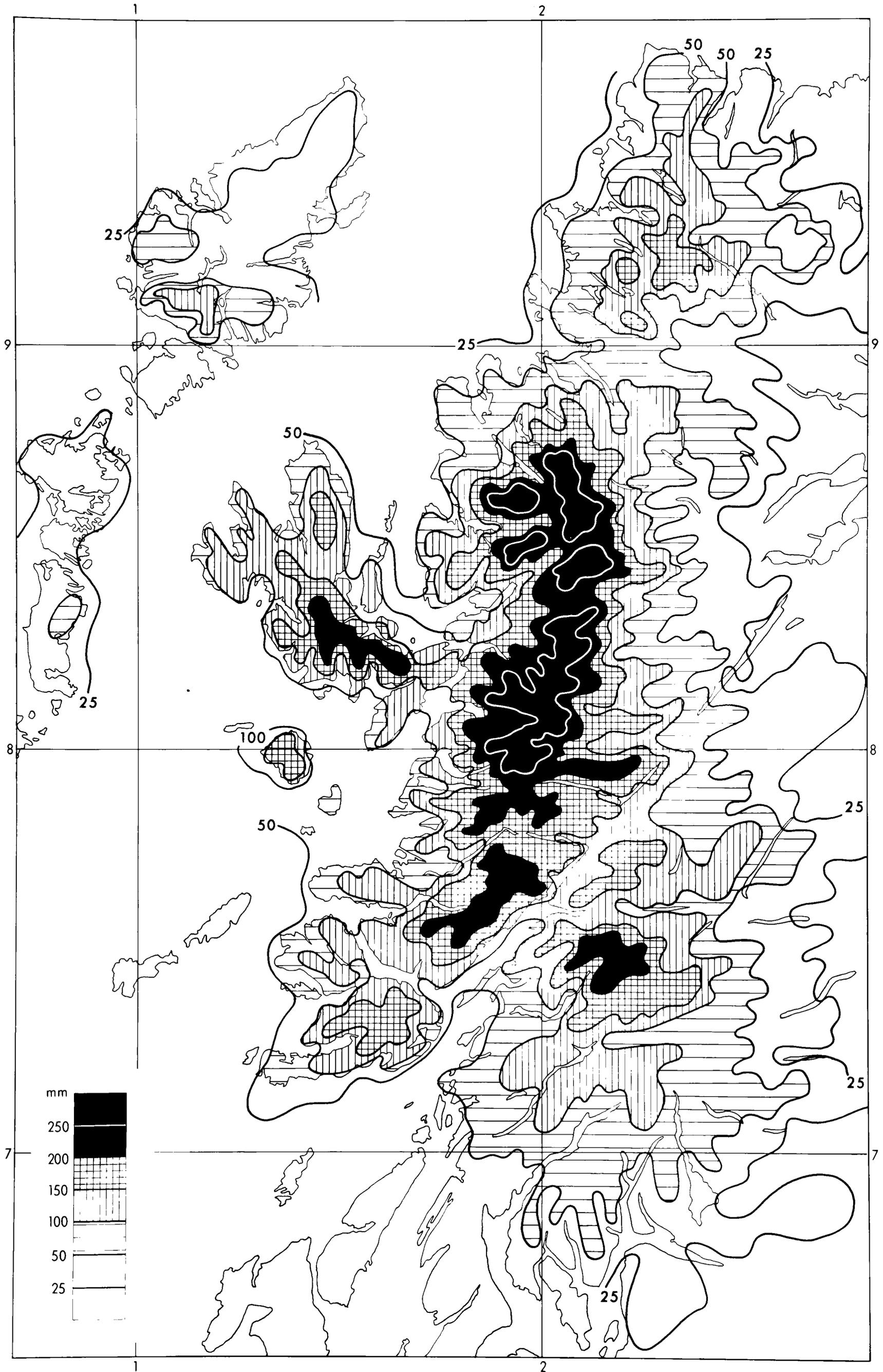


Figure 1—Rainfall (mm) for the 48 hours beginning 09 GMT, 26 March 1968: north-west Scotland

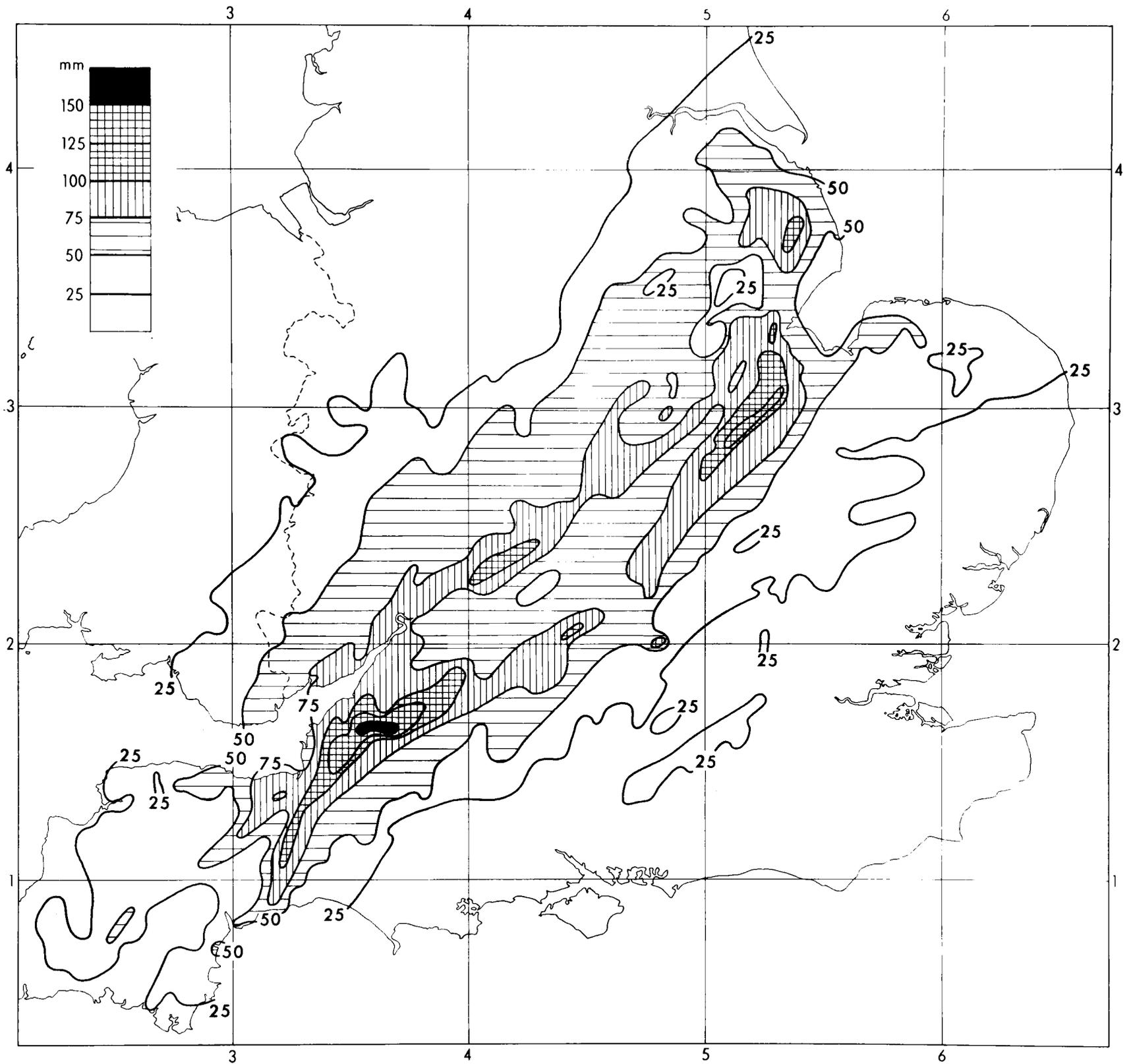


Figure 2—Rainfall (mm) for the 24 hours beginning 09 GMT, 10 July 1968: south-west England to East Anglia and Lincolnshire

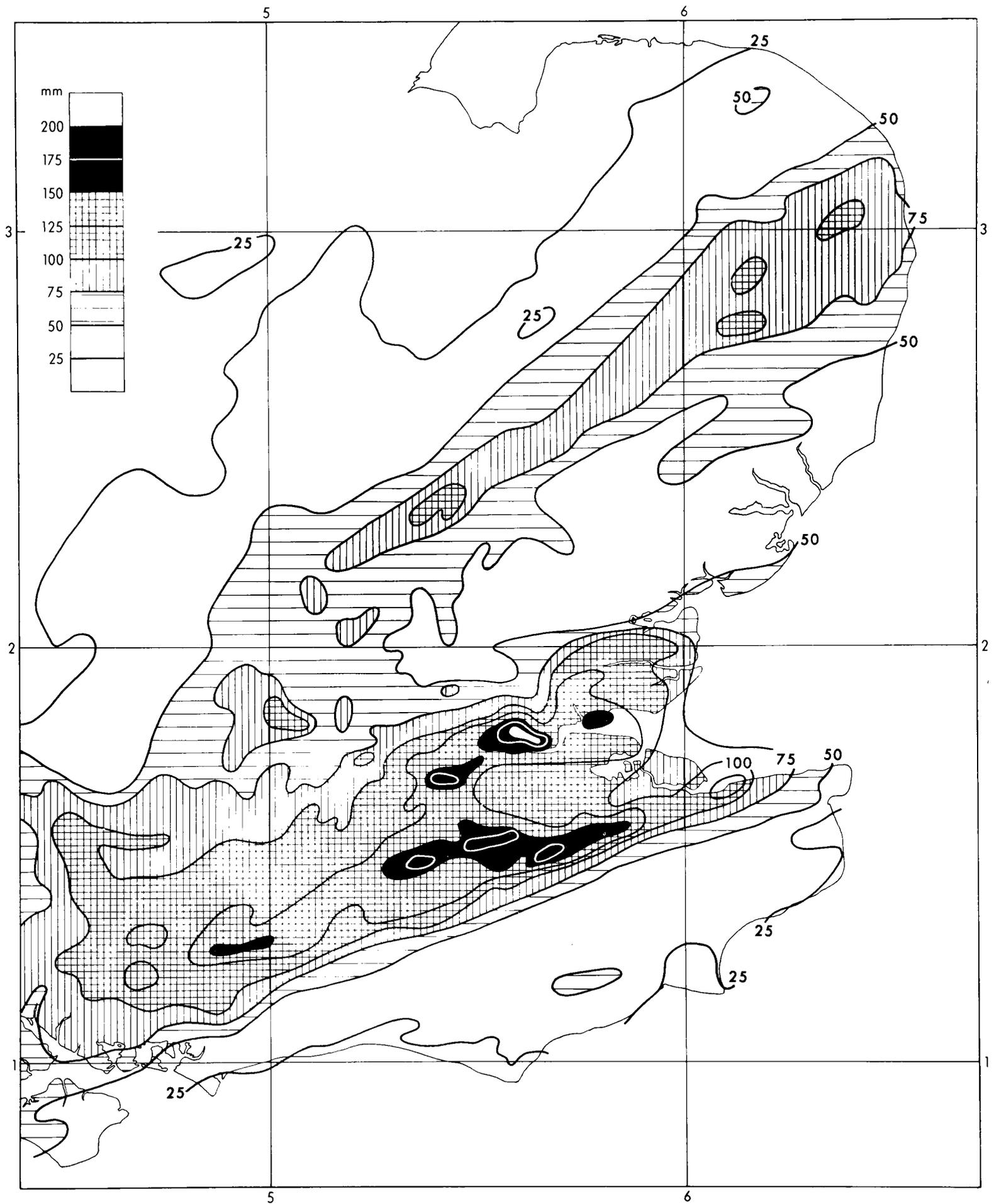


Figure 3—Rainfall (mm) for the 48 hours beginning 09 GMT, 14 September 1968: south-east England and East Anglia