



INCREASE IN AVERAGES OF SUNSHINE IN CENTRAL LONDON

by

I. Jenkins, B.Sc.

Introduction

Values for Central London of monthly sunshine in hours per day and percentage of long term normals are kept in London Weather Centre and are used to answer enquiries from the Public.

It has been noticed over recent years that the sunshine in winter months was almost invariably above the long term normals published<sup>(1)</sup> for Kingsway. This study was therefore made to see if this fact was valid over a longer period.

Other Authors<sup>(2)(3)</sup> have discussed the decrease of fog at London (Heathrow) Airport and have associated this with the decrease in pollution<sup>(4)</sup> in the London area. The frequency of thick and dense fogs in Central London has also been compared with the frequency of fogs at London (Heathrow) Airport<sup>(5)</sup> and this paper shows a marked decrease of dense fog at Kingsway over the years 1955 to 1962 compared with the period 1947 to 1954. However, no study has been made of the increase in the duration of bright sunshine which might be expected to complement the decrease in the frequency of the occurrence of fogs.

This paper shows a probable effect of the Clean Air Act 1956 and the City of London (Various Powers) Act of 1954 on the duration of bright sunshine in Central London.

Choice of Stations

An increase of sunshine, if any, due to the Clean Air Act should be greater in large built-up areas and smaller in rural districts. Thus in a comparison of the percentage increase of sunshine over the last ten years with the long term normals, we would expect to find an increase in the centre of a city, a slight increase in the suburbs and little or no increase in nearby rural areas if the Clean Air Act was affecting the duration of sunshine.

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For this study, London Weather Centre was used as the city centre, Kew Observatory as the suburban site and the Royal Horticultural Society's gardens at Wisley as the rural site. Kew Observatory is 9 miles westsouthwest and Wisley about 21 miles southwest of Central London. Although London Weather Centre moved to High Holborn, W.C.1. in January 1965, the new office is within  $\frac{1}{4}$  mile of the old site at Kingsway so that a comparison with the 30 year normals of sunshine at Kingsway is still valid.

The values of duration of sunshine given for the three sites in the Monthly Weather Report were used for this study.

Increase in Sunshine during Winter Months

The average monthly sunshine during the years 1958-67 was calculated for each month as a percentage of the monthly normals for the period 1931-60 for London Weather Centre, Kew Observatory and Wisley. These percentages are given in Table I and shown graphically in Figure I.

TABLE I  
AVERAGE MONTHLY SUNSHINE DURING  
PERIOD 1958-67 AS A PERCENTAGE OF THE AVERAGE FOR 1931-60

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
London Weather Centre	155	116	117	87	105	103	101	102	115	126	140	173
Kew Observatory	120	94	105	83	101	99	98	96	107	113	114	118
Wisley	102	92	99	84	103	99	98	99	110	114	109	104

It can be seen that the greatest increase in sunshine at London Weather Centre has occurred in the months September to March while the summer months only small variations. The low values in April are common to all three stations and are not peculiar to London Weather Centre.

The reason for the fall in Wisley readings in November and December is not readily understood but may be due to fogs forming in rural areas while at the city centre, being slightly warmer due to the heat island effect <sup>(6)</sup>, any fogs which did form would not be as dense.

If the percentages for the three stations are converted to mean hours per day, the values shown in Table II occur. It can be seen from these values that the sunshine for London Weather Centre is very similar to Wisley's although not quite as high as for Kew.

TABLE II  
MEAN SUNSHINE IN HOURS PER DAY AT LONDON WEATHER CENTRE,  
KEW OBSERVATORY AND WISLEY DURING PERIOD 1958-67.

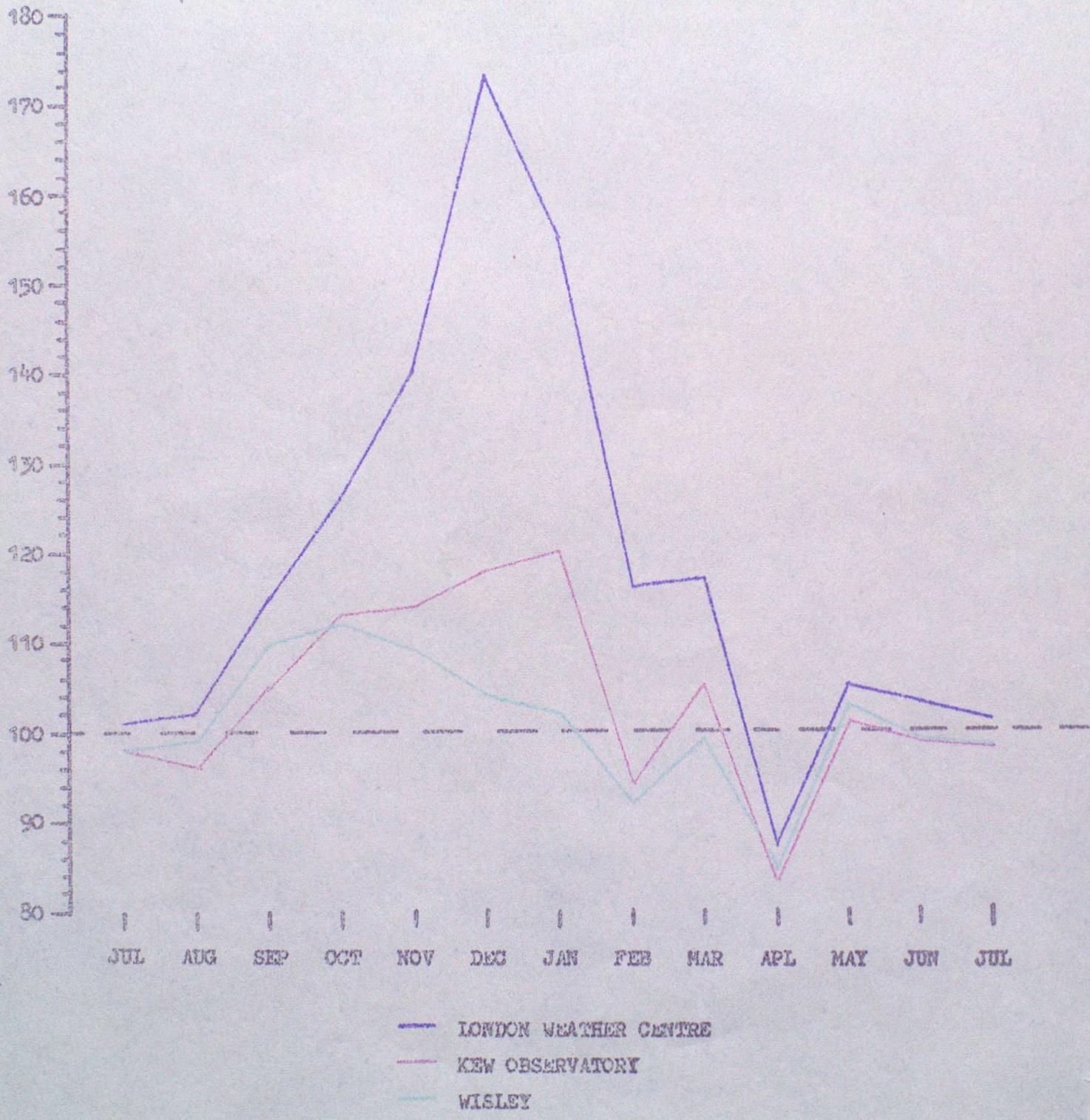
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
London Weather Centre	1.53	2.05	3.65	4.16	6.27	6.92	6.11	5.78	5.07	3.57	1.93	1.47
Kew Observatory	1.78	2.12	3.82	4.43	6.46	7.04	6.26	5.82	5.08	3.56	2.02	1.51
Wisley	1.52	2.04	3.65	4.43	6.37	6.89	6.13	5.60	4.97	3.50	1.86	1.29

Conclusion

The reduction in the amount of smoke in Central London since 1958 appears to have increased the duration of sunshine by about 50% during the months November to January and Central London now seems to have as much sunshine as Wisley during these months.

FIGURE 1. AVERAGE MONTHLY SUNSHINE AT LONDON WEATHER CENTRE, KEW OBSERVATORY AND WISLEY DURING THE PERIOD 1958 - 67 AS A PERCENTAGE OF THE AVERAGE FOR 1931 - 60.

PERCENTAGE OF  
1931 - 60 AVERAGE.



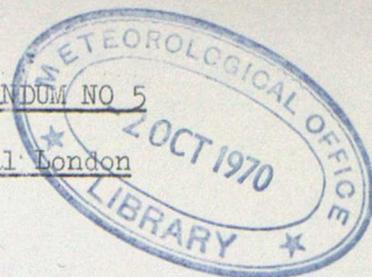
References

1. Averages of Bright Sunshine for Great Britain and Northern Ireland. 1931-60. (Met.O.743). London. HMSO.
2. EVANS, D. C. A second report on fog at London Airport. Met. Mag., London, 86, 1957, p 333.
3. WIGGETT, P. J. The year to year variation of the frequency of fog at London (Heathrow) Airport. Met. Mag., London, 93, 1964, p 305.
4. Department of Scientific and Industrial Research, Warren Spring Laboratory, Report for 1963, London, HMSO, 1964, p 3.
5. BRAZELL, J. H. Frequency of dense and thick fog in Central London as compared with frequency in Outer London. Met. Mag., London, 93, 1964, p 129.
6. CHANDLER, T. J. The Climate of London. Hutchinson 1965. p 147.

"This paper may be quoted in an open bibliography".

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DUPLICATE ALSO

In London Weather Centre Memorandum No 5 (1) it was shown that there was a large percentage increase in bright sunshine during the months November to January at London Weather Centre in the ten years 1958 to 1967 when compared with the 1931 to 1960 average (2). During the same ten years there was a smaller percentage increase at Kew Observatory and only a small change at the Royal Horticultural Society's Gardens at Wisley.

In the present paper the average duration of bright sunshine in mean hours per day during Winter (December to February) were extracted for these three stations and Rothamsted (Table 1)

TABLE 1. Average daily duration of bright sunshine in Winter (December to February) at London Weather Centre (LWC), Kew Observatory (KEW), Wisley (WIS) and Rothamsted (ROT).

Winter containing January of	Mean hours per day					Mean hours per day			
	LWC	KEW	WIS	ROT		LWC	KEW	WIS	ROT
19									
30	1.34	1.69	1.72	2.03	50	1.29	1.61	1.87	1.68
31	1.05	1.51	1.41	1.79	51	1.06	1.63	1.66	1.48
32	1.02	1.26	1.23	1.75	52	1.74	2.28	2.34	2.38
33	1.43	1.80	1.85	2.54	53	1.26	1.69	1.59	1.83
34	1.17	1.57	1.65	2.16	54	1.12	1.73	1.56	1.73
35	0.92	1.38	1.27	1.31	55	1.46	1.84	1.77	1.83
36	1.02	1.53	1.53	1.96	56	1.13	1.65	1.48	1.93
37	1.19	1.89	1.82	1.87	57	1.31	1.52	1.42	1.57
38	1.12	1.56	1.38	1.53	58	1.23	1.56	1.38	1.77
39	1.68	2.22	2.22	2.19	59	1.60	1.91	1.63	1.99
40	0.72	1.12	1.20	1.68	60	1.64	1.78	1.56	1.68
41	0.91	1.29	1.24	1.60	61	1.63	1.87	1.50	1.64
42	0.51	1.17	1.19	1.43	62	2.05	2.09	1.78	2.30
43	1.27	1.94	1.94	1.91	63	1.88	2.09	1.94	2.38
44	0.97	1.33	1.39	1.67	64	1.38	1.59	1.47	1.55
45	0.96	1.51	1.53	2.04	65	1.62	1.64	1.51	1.69
46	1.16	1.79	1.96	2.16	66	1.36	1.42	1.27	1.31
47	0.73	1.38	1.51	1.98	67	1.99	2.07	1.96	1.86
48	1.10	1.55	1.55	1.70	68	1.79	1.84	1.76	1.59
49	1.55	2.29	2.67	2.46	69	1.56	1.54	1.36	1.41
					70	1.75	1.83	1.62	1.73

FG 2A

The ten year running means of bright sunshine were then calculated and plotted on the last year of the period, the year being defined as that in which the January occurred (Figure I). The 1931-60 averages were also plotted on the right hand side of the graph.

All four places showed an increase in duration of bright sunshine from the late 1940's until the early 1950's but thereafter London Weather Centre values continued to rise at a roughly similar rate while Kew Observatory values showed only a slight increase. At Wisley there was a decrease until the decade ending 1962 and from then on there were only small fluctuations but at Rothamsted the decrease ceased in the ten year period ending 1959 and there was a further decrease from the period ending 1963 until that ending in 1970.

The differences, in mean minutes per day, of the ten year running means between London Weather Centre and Kew Observatory, Wisley and Rothamsted were then plotted (Figure II). The difference again being plotted on the last year of the period.

This shows that between the periods ending 1943 and 1956 there was on an average of 30 to 33 minutes less of bright sunshine each day in central London than at Kew Observatory but since then the difference has steadily decreased until it is now only 6 minutes a day.

When London Weather Centre and Wisley are compared the daily deficit in central London increased from about 25 minutes in the decade ending 1939 to around 40 minutes in the period ending 1951 but since then the difference has decreased and after the period ending 1966 it has been sunnier at London Weather Centre than at Wisley.

In the comparison between London Weather Centre and Rothamsted the deficit rises from around 45 a day in the ten year periods ending in the early 1940's to about 50 minutes a day in the decade ending 1949. A decrease then set in and the deficit has decreased to around 3 minutes a day in the ten years ending 1969 and 1970.

The time of the beginning of the decrease in the deficit between London Weather Centre and Kew Observatory supports the theory that this change is due to the Clean Air Act but the commencement of the decrease between the differences between London Weather Centre and Wisley and London Weather Centre and Rothamsted occur too early to be associated with the Act.

References.

- 1) Jenkins I. Increase in Averages of Sunshine in Central London.  
London Weather Centre Memorandum No 5.
- 2) Averages of Bright Sunshine for Great Britain and Northern Ireland.  
1931-60 (Met.O.743) London H.M.S.O.

September 1970.

**FIGURE 1.** Trend of Winter Sunshine  
 (December to February) at London Weather  
 Centre, Kew Observatory, Wisley and  
 Rothamsted. (Ten-year running means  
 plotted on last year of period).

