Risk, Blame, and Expertise:

The Meteorological Office and extreme weather in post-war Britain

A thesis submitted to the University of Manchester for the degree of Doctor of Philosophy in the Faculty of Life Sciences

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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ABC</td>
<td>Associated British Corporation Television Ltd</td>
</tr>
<tr>
<td>ADMO</td>
<td>Assistant Director of the Meteorological Office</td>
</tr>
<tr>
<td>BBC</td>
<td>British Broadcasting Corporation</td>
</tr>
<tr>
<td>CEB</td>
<td>Central Electricity Board</td>
</tr>
<tr>
<td>CFO</td>
<td>Central Forecasting Office</td>
</tr>
<tr>
<td>DMO</td>
<td>Director of the Meteorological Office</td>
</tr>
<tr>
<td>DDMO</td>
<td>Deputy Director of the Meteorological Office</td>
</tr>
<tr>
<td>DSIR</td>
<td>Department of Scientific and Industrial Research</td>
</tr>
<tr>
<td>DUS</td>
<td>Departmental Under-Secretary</td>
</tr>
<tr>
<td>GPO</td>
<td>General Post Office</td>
</tr>
<tr>
<td>HQ</td>
<td>headquarters</td>
</tr>
<tr>
<td>IMO</td>
<td>International Meteorological Organization</td>
</tr>
<tr>
<td>ITV</td>
<td>Independent Television</td>
</tr>
<tr>
<td>LTI</td>
<td>Liverpool Tidal Institute</td>
</tr>
<tr>
<td>LFO</td>
<td>London Forecasting Office</td>
</tr>
<tr>
<td>LWC</td>
<td>London Weather Centre</td>
</tr>
<tr>
<td>MAF</td>
<td>Ministry for Agriculture and Fishing</td>
</tr>
<tr>
<td>MHLG</td>
<td>Ministry of Housing and Local Government</td>
</tr>
<tr>
<td>MO</td>
<td>Meteorological Office</td>
</tr>
<tr>
<td>MoFP</td>
<td>Ministry of Fuel and Power</td>
</tr>
<tr>
<td>NCB</td>
<td>National Coal Board</td>
</tr>
<tr>
<td>NMS</td>
<td>National Meteorological Service</td>
</tr>
<tr>
<td>NWP</td>
<td>Numerical Weather Prediction</td>
</tr>
<tr>
<td>PDDMO</td>
<td>Principal Deputy Director of the Meteorological Office</td>
</tr>
<tr>
<td>RAF</td>
<td>Royal Air Force</td>
</tr>
<tr>
<td>RMetS</td>
<td>Royal Meteorological Society</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>USWB</td>
<td>United States Weather Bureau</td>
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<tr>
<td>WMO</td>
<td>World Meteorological Organization</td>
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Abstract

Abstract for a thesis submitted in September 2012 to the University of Manchester for the degree of Doctor of Philosophy, by Alexander Hall titled “Risk, Blame, and Expertise: The Meteorological Office and extreme weather in post-war Britain.”

This thesis explores the post-war history of the British Meteorological Office (MO), which saw the development of public weather services and a more prominent profile for the organisation in British public life. Situated within a post-war growth in the scientific civil service and the government’s use of science in policy making, the emergence of MO extreme weather warnings and forecasts afforded the organisation an authoritative expert position. Part of meteorology’s twentieth century professionalisation, the services developed through the application of advances in meteorological practice and technologies, significantly altered the organisation’s public profile and status as a scientific expert body.

By considering these developments the thesis illuminates how, as the MO increasingly presented forecasts and warnings to all sectors of British society, they became managers of the risks posed by extreme weather. Through exploring these historical developments at the MO, we see a broader narrative emerge on how the communication of risk by scientific experts interacts with public expectations and manifestations of blame. Central to the narrative presented is the role of extreme weather events themselves in affecting response, policy developments, new MO warning services, and the manifestation of blame.
Declaration

No portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.
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Acknowledgements

I would like to thank my supervisory team of James Sumner and Simone Turchetti. Given that they came to the project when it was already underway, their guidance, patience, and of course expertise in helping me realise my vision for this thesis has been brilliant. Great thanks go to all within my department at the Centre for the History of Science, Technology, and Medicine who have given me feedback on seminars, ideas, and drafts. In particular I would like thank Vladimir Jankovic for several years ago planting the seed in a young undergraduate’s head, that postgraduate study in the history of the environmental sciences might be a fruitful endeavour.

I would also like to extend thanks to all those other academics that have supported my research, whether by inviting me to seminars, asking me probing questions at conferences, or giving me their time to listen to my formative ideas. Mention should be given to all those involved with the Cultural Space of Climate Network, in particular Georgina Endfield whose support is greatly appreciated.

Thanks are extended to all of the archives I have visited, in particular the National Meteorological Library and Archive at the Met Office, where the staff, especially Mark Beswick, have gone the extra mile to support my research. Thank you to the Economic and Social Research Council for the financial support of my thesis.

And finally a huge thank-you to Jessica for her proof reading skills, unwavering support, and above all her ability to repeatedly renew my passion for this subject over all the late nights and edits.
Chapter One

Introduction

If we want a good environmental policy in future, we’ll have to have a disaster. It's like safety on public transport. The only way humans will act is if there's been an accident.

Sir John Houghton, Director-General of the UK Meteorological Office, 1983-1991 (Speaking in 1995)\(^1\)

“Earlier on today apparently a woman rang the BBC and said she heard that there’s a hurricane on the way,” said Britain’s best-known weatherman, Michael Fish, on an October evening in 1987. “Well, if you’re watching don’t worry – there isn’t.” Then the hurricane struck. Eighteen people died, and losses mounted into the billions. Michael Fish should have been hanged.


Ask any British person what they recollect of the Great Storm of 1987, and it is more than likely that their response will include mention of the Meteorological Office (MO) and BBC television forecaster, Michael Fish. The severe storm, which struck the south of the UK on October 15\(^{th}\)-16\(^{th}\), 1987, causing widespread fatalities, disruption, and damages running into the billions, was not, as Fish correctly stated, a hurricane. Yet, rather than for its severity and the destruction it caused, it is more commonly remembered for Fish’s infamous forecast and the lack of clear issuance of severe weather warnings by the MO.

The 1987 storm, its aftermath, and subsequent cultural memory present a late twentieth-century snapshot of the British public’s expectations surrounding extreme weather, and its

\(^1\) *The Sunday Telegraph*, September 10\(^{th}\), 1995
relationship with the expert scientific organisation communicating on its risks, the Meteorological Office.

This thesis explores the post-war history of MO extreme weather warnings, forecasts, and public weather services. Developed through the application of advances in meteorological practice and technologies, these services significantly altered the organisation’s public profile and status as a scientific expert body. Through analysis of primary documentation produced by the MO and other government departments, I chart the formation and deployment of post-war public weather services and extreme weather warnings. By considering these developments I illuminate how, as the MO increasingly presented forecasts and warnings to all sectors of British society, they became managers of the risks posed by extreme weather. Through exploring these historical developments at the MO, we see a broader narrative emerge on how the communication of risk by scientific experts interacts with public expectations and manifestations of blame.

Throughout the post-war period, the development of forecasts and warning systems was catalysed by social and economic turmoil brought on by the extremes of the very weather the MO sought to predict. It is the stochastic phenomenon of disasters, the outliers of meteorological forecasts, which carry the biggest risks to both lives and property and have presented the MO with the greatest challenges of forecasting, public communication, and risk management. By investigating institutional change at the MO alongside extreme weather events which punctuated and catalysed the development of the organisation’s services I present a changing picture of the department’s role in British society in the post-war period, 1945-1963. By exploring the case studies of several key extreme weather events during the timeframe I am able to capture and historicise the changing public and political expectations of the weather services over several decades. The Great Storm of 1987 highlighted how much British society had become reliant on MO forecasts in the post-
war period. The details of the storm and its aftermath are now briefly introduced, highlighting the MO’s role in British extreme weather events of which this thesis charts the development.

1.1 Blame the experts: The Great Storm of 1987

With gusts recorded of over 120mph and sustained wind speeds of over 80mph, the extratropical cyclone that battered the south-east of the UK as the nation slept on October 15th-16th, 1987, was the most powerful storm to hit the region since the Great Storm of 1703. In the UK alone, the storm accounted directly for 19 deaths, the destruction of approximately 15 million trees, power cuts to millions, and insured damages of a then global record, £1.4 billion. As the afflicted regions struggled to cope with the destruction and disruption caused by the storm, the media were quick to question the MO’s role in forecasting the severity of the weather system. The following day on the BBC one o’clock news, newsreader Michael Buerk questioned the rather dishevelled-looking forecaster, Ian McCaskill, live from the BBC Weather Centre, over the MO’s lack of clear warning for the storm. The BBC Weather Centre, where McCaskill had been on duty since 8pm the previous evening, is a joint venture based at the BBC where the broadcast meteorologists, who are all MO staff, are based. It is a typical example of the type of collaborative public weather service provision now familiar to the MO. McCaskill attempted to explain the MO’s position, but was given short shrift by the incensed Buerk. In the following days, the national newspapers took no time in joining in the blame of meteorological experts for events, leading with headlines such as “Met men fail to predict ‘worst recorded storm’” and “Why didn’t they warn us?”

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3 House of Commons Debate, 21st October 1987, vol. 120 cc729-42
4 The Telegraph, October 17th, 1987, 1 and The Daily Mirror, October 17th, 1987, 1
In the melee that followed, many unsubstantiated claims and counter claims were aired, and pressure was piled on the TV forecasters by the press and public, with one newspaper even calling for the resignation of the MO Director-General, Dr John Houghton.\(^5\) Many criticisms, such as those objecting to how late the public warning had been issued and the fact that the London Fire Brigade had to pay for warning services, stemmed from a lack of understanding of MO procedure. On Monday evening, as criticism of the MO continued to build, Houghton gave a press conference to explain the forecast problems and address many of the media’s claims.

The MO had actually been giving warning of severe weather for October 15\(^{th}\)-16\(^{th}\) since four days earlier. Official Gale Warnings for the English Channel were issued early on the 15\(^{th}\), and all TV and radio public broadcasts that day warned of strong winds. However, because the two different computer models operated by the MO produced equivocal forecasts, no warnings were issued for inland gales. Due to the already saturated ground conditions, most TV bulletins placed more emphasis on the rain on the 15\(^{th}\), rather than the strong winds. Specific warnings for civil agencies, such as British Rail and the London Fire Brigade, were issued throughout the late hours of October 15\(^{th}\), and an emergency warning was issued to the public via radio at 1:20am on the 16\(^{th}\). In tempering criticisms of how late this public warning came, Houghton highlighted that under the established emergency warning system, public warnings were only to be issued within three hours of severe weather, and once it was almost certain to occur.\(^6\)

The Ministry of Defence, under which the MO then operated, announced an internal inquiry into the forecasting of the storm.\(^7\) In the interests of transparency, the inquiry was verified by two external assessors, and its findings were published in a shortened format in

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\(^5\) *The Sun*, October 19\(^{th}\), 1987


\(^7\) House of Commons Debate, 21\(^{st}\) October 1987, vol. 120 cc729-42
the MO’s official publication, the *Meteorological Magazine*. The inquiry called for revision of the content and style of TV presentations, and a complete review of how the MO dealt with the press and the media, yet it determined Michael Fish’s use of the term ‘hurricane’ (Figure 1.1) to be merely “unfortunate.” Along with the comments of his colleague Bill Giles, who had facetiously stated that it would be a bit breezy in the English Channel during the evening bulletin, the inquiry considered such language to be “part of the style of delivery of the forecasts, aimed at making them more interesting rather than a dry repetition of the facts.”

Figure 1.1: Michael Fish giving his infamous forecast on October 15th, 1987

*Source: YouTube, “BBC weather blooper by Michael Fish storm of 1987” ©BBC Weather*

Despite the inquiry’s absolution of the TV forecasters, and subsequent efforts by Fish and other MO staff to clarify events, Fish’s broadcast went on to become emblematic for the MO’s failure to clearly predict the storm. Simon LeVay’s account of the storm, which opens with the provocative quotation at the beginning of this introduction, is detailed in its consideration of the facts, yet it exudes a real anger at the MO, Michael Fish, and in particular their handling of the post-storm media furore. Through popular science books

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Houghton et al. (1988) 140
such as LeVay’s, *When Science Goes Wrong*, and continued reference to Fish’s blunder in the media, the broadcast has become a prominent component of the cultural memory of the disaster, and an infamous exemplar of a failure in science communication. The status of the broadcast in the cultural memory of British extreme weather events was recently confirmed, and perhaps cemented further, when a clip of Fish’s forecast featured in the opening ceremony of the London 2012 Summer Olympics.

The case of the Great Storm of 1987 illuminates many interesting characteristics of the MO’s position in British society, and raises many issues about their role in, and responsibility for, the public communication of the risks presented by extreme weather. It highlights the extent to which, by 1987, British society relied upon the MO for timely information on predicted extremes of the weather. Although the Great Storm of 1987 and the resulting public scrutiny of the MO is an extreme example of the organisation’s late twentieth-century relationship with the British media and public, it is by no means a unique event. Through widespread flooding in 2007 and the cold winters of 2009-10 and 2012, the MO has occupied a prominent position as a scientific expert body and communicator of risk in extreme weather events in British society. The organisation’s position as a prominent disseminator of science communications, and the challenges this position brings for a government-funded body that aims to remain objective and scientific, were recently acknowledged in a parliamentary inquiry into MO public weather services. The inquiry, conducted by the House of Commons Science and Technology Committee, stated that an accurate forecast is of little use if it is not communicated well and understood by the customer. The Met Office should work with broadcasters to improve communication. In particular, the inherent uncertainty in longer-term forecasts should be clearly explained.

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9 See for example *The Observer*, “Met Office warned ministers months ago about flooding,” July 22nd, 2007, and *BBC News Online*, “Severe weather continues to grip the UK and cause havoc,” January 6th, 2010
and we are keen to see broadcasters make greater use of probabilistic information in their weather forecasts.\textsuperscript{10}

The call to make greater use of probabilistic information implies the reversal of a general tendency in policy which, as this thesis will chart, dates back to some of the earliest development of weather forecasts on British radio and television. In the following chapters I will show that many of the areas the inquiry considered, including probability, improved communication, and comprehensibility, have been ongoing issues for the MO since it began to develop its public weather forecasts and warnings in the post-war years.

The MO officials who developed public weather services and warning systems in this period had not foreseen the emergence of the type of institutional blame the organisation was to face in the aftermath of the 1987 storm. Yet, as we shall see, the emergence of blame was not simply the result of the MO not considering the problem of risk communication in creating these public services, but rather because those involved did not understand fully the complexity of the relationships between public risk perceptions and the manifestation of blame.

To better understand the thesis’s framing of primary material, I introduce a conceptual framework of risk and blame (1.3), which reviews the relevant extant literature on risk, blame, and scientific expertise, that I use as a means to analyse the historical development of the MO’s public weather service provision. However, first I introduce and review historiographies of twentieth century meteorology, in which the events this thesis charts are situated.

\textsuperscript{10} House of Commons Science and Technology Committee (2012) 3
1.2 Histories of Twentieth Century Meteorology

Of the limited number of histories of the field which address the twentieth century, historians Frederik Nebeker (1995) and Kristine Harper (2008) provide perhaps the most detailed broad narratives of the discipline’s evolution. Both texts offer an examination of meteorology’s international development in the period, which provide crucial historical context for the extreme weather case studies I analyse in the upcoming chapters. Whilst both focus on the development of meteorology in becoming a numerical, physics based, computational science, it is Harper’s narrative of professionalisation predominantly focused on the years 1939-1955, that most informs this thesis. Rather than solely focussing on the scientific progression of the discipline, Harper explores the relationship between initial theoretical research, technological developments, and actual applications. This process is important to consider when studying a national meteorological service, such as the MO, which creates applied services based on its own research and development.

The most written-about period of twentieth century meteorology is the Second World War. Historical work on the war years often centres on technological developments made under the duress of war, such as radar, or meteorology’s role in successful Allied landings, especially those on D-day. Earlier histories of D-day operations popularised a dominant American role, but more recent work by, amongst others, historian of science and technology James Fleming (2004), has added a more international dimension to the story. Fleming’s history of the D-day operations, along with Nebeker’s and Harper’s treatment of wartime meteorology, introduce the important individuals, including Captain James Stagg of the MO (see 2.6), and their successes that carried a growing confidence in forecasting

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11 Atlas (Ed.) (1990)  
12 Cornford (1994)  
13 For a UK account see Ogden (2001). For accounts which originally popularised the D-day forecasts as being largely US triumphs see Krick and Fleming (1954) 179-184 and Hughes (1970) 89-91
ability into the post-war years. The dominance of the Second World War in twentieth-century histories of meteorology shows us the importance of this period in catalysing the development of the discipline. Such dominance, however, means that other areas of meteorology’s recent history may have been overlooked. This thesis attempts to address this oversight by analysing how the MO took wartime meteorological successes and technologies and applied them across British society.

Fleming’s *Fixing the Sky* details how much of the discipline’s confidence in its forecasting capability, created by wartime successes, transferred into the rhetoric of those pursuing weather and climate modification in the post-war years. Largely American in its focus, Fleming’s history of weather and climate modification highlights the overstatement and overconfidence in meteorological capability from high-profile scientists, such as meteorologist Irving Krick and chemist Irving Langmuir. Whilst the projects Fleming examines as “pathological science” are on a scale far beyond post-war MO public weather services, the tangled motives, political and social influences, and recurring hubris his narrative presents are clearly echoed throughout my thesis. Fleming takes an analytical approach that directly links the historical subject matter to current public policy issues. This method has informed my approach to tracing blame manifestation back to antecedent decisions that may have occurred decades earlier. As the cases Fleming presents shift from the pre-war period to the Cold War, and from regional weather control to global climate engineering, the projects he describes rely increasingly on numerical prediction, computer modelling, and satellite surveillance.

Paul Edwards’ *A Vast Machine* (2010) provides perhaps the most comprehensive history of meteorology’s use of computing and modelling technologies. While largely focussing on climatology, Edwards’ decision to ignore common demarcations between climatology, weather forecasting, and theoretical meteorology, means operational weather predictions,
often marginalised in meteorological literature are included in his historical narrative on
the globalisation of the discipline. Edwards’ analytical perspective, which presents a history
of systems and networks rather than one of individuals, has been an important guide for
this thesis, as there is a danger with a study that focuses largely on one organisation (in my
case, the MO) to treat it in isolation from other meteorological services with which it
interacts.

All of the works introduced thus far, focus on either the US or global context, with only
occasional reference to other meteorologically-advanced nations, such as Sweden, the UK,
and Germany. Few studies focus explicitly on the twentieth century development of
meteorology in the UK, a story which is largely dominated by the MO. A series of occasional
papers by the History Special Interest Group of the Royal Meteorological Society (RMetS),
largely written by retired meteorologists, introduce case studies on UK topics ranging from
the history of the British Rainfall Organisation to the MO in the Second World War. 14
Occasional articles, largely based on reminiscences, appear in the RMetS monthly magazine,
Weather, and the MO’s now-discontinued publication, the Meteorological Magazine. 15
RMetS Fellow and scholar of maritime studies, Malcolm Walker, presents a History of the
Meteorological Office (2012) that relies on the archival records held at the National
Meteorological Library and Archives. Walker’s history, which builds on a previous PhD
thesis by Jim Burton, presents a comprehensive institutional account of the MO, from its
foundation to its current operations. Surprisingly, for a government organisation whose
annual turnover is now approaching £200 million, and which faces the type of public
scrutiny presented in the case of the 1987 storm, no other histories of the organisation, its
services, or its role in British society exist.

14 Pedgley (2002) and Audric (2000). The Royal Meteorological Society is the professional and
learned society for weather and climate in the UK. It was established in 1850, and received Royal
Charter in 1866.
15 For example see Hunt (2007)
The various histories discussed in this section engage many issues this thesis examines: professionalisation, globalisation, technological innovation, and a numerical shift in the discipline. Yet rarely do these narratives adequately consider the public’s response to these developments. Further, none of the above studies give explicit consideration to the manifestation, management, or communication of risk in weather prediction. The remainder of this literature review introduces key scholarship in the areas of risk, blame, and expertise on which my study’s analysis of the MO and extreme weather largely relies. Theoretical concepts are, where relevant, connected with studies on extreme weather, disaster, meteorology, science communication, and the media.

1.3 Risk and Blame: A Conceptual Framework

Today, from hedge funds to colour-coded terrorist threats, risk as a concept, both positive and negative, permeates all levels of society. Risk, its perception, and its calculation are seemingly inherent to the ongoing functioning of complex modern communities. Since the early twentieth century and the work of physicist Anders K. Ångström, meteorologists have explored the problems that arise when taking complex calculations and predictions and relaying them to the public as simplified advice or binary warnings.\(^\text{16}\) Once a system is in place which aims to calculate the risk from a certain meteorological hazard, then the public’s perception of this risk is altered. This alteration, influenced further by knowledge of attempts to mitigate the threat, means that public expectations of response, should the hazard manifest, are raised. The consequence is often the allocation of blame. We knew about the hazard, we had calculated the risk, we had attempted to reduce the size of the risk, but still disruption was caused when the weather occurred: it must be someone’s fault!

In his widely cited book *Risk Society*, German sociologist Ulrich Beck declares that through a process he calls “reflexive modernism,” society is shifting from a classical industrial mode

\(^{16}\) See Liljas and Murphy (1994)
toward a new form centred on risk. Beck argues this shift occurs where and when a society has significantly reduced “genuine material need,” or abject poverty, through technological productivity and other legal and welfare-state regulations, and that the shift is dependent upon a new scale of hazards being unleashed by the growing productive forces of modernisation itself. When Beck published these ideas, the majority of Western European countries had indeed fulfilled both of these criteria and could be deemed to be societies largely defined by risk. Beck’s World at Risk (2009) expands on these ideas and places his risk society within a global context. This expansion resonates with meteorology’s development as an increasingly hemispheric and global discipline. Further, Beck argues that “the distinction between risk and cultural perception of risk is becoming blurred.” A blurring of distinction between the scientific understanding of risk in meteorology and cultural perceptions of weather and climate has started to be explored in interdisciplinary scholarship, most notably in Weather, Local Knowledge and Everyday Life, edited by Vladimir Jankovic and Christina Barboza (2009), and Weather, Climate, Culture, edited by Susanne Strauss and Benjamin Orlove (2003). This blurring of distinction had important ramifications for the MO, as officials learnt the importance of communication in influencing cultural perceptions of risk.

Whilst Beck provides contemporary examples to back up his theoretical claims, his writing, and that of many other sociologists studying risk, does not provide detailed historical evidence of how such a situation might have come about. Historian Jean-Baptiste Fressoz (2007) uses the criteria from Beck’s Risk Society to show that elements of the picture he describes existed before the twentieth century. Through the overlooked work of lawyer and philosopher Eugène Huzar, Fressoz introduces several examples from 19th-century

18 Beck (1992) 19
20 Beck (2009) 11
France which show that technological risk and institutionalised expertise were already in existence in this industrial society. Perhaps most illuminating of Huzar’s ideas, as introduced by Fressoz, is the assertion that science will never be able to anticipate the far-reaching consequences of powerful technologies.

Early conceptions of risk are also found in accounts such as actuary Charles Trennery’s *The Origin and Early History of Insurance* (1926), which explores early precursors of financial instruments in the classical period and later medieval societies.\(^{21}\) Popular sociological accounts of risk, such as Anthony Giddens’ *Runaway World* (2002), suggest that such early examples of risk management were based largely upon superstition and tradition.\(^{22}\) Such narratives distinguish between earlier conceptions of risk and the more recent modern version Beck invokes. As sociologist David Garland summarises the point: “What distinguishes modern society from its predecessors is not the attempt to master risk, and colonise the future, but the invention and widespread adoption of rational, systematic methods for formally and effectively doing so.”\(^{23}\)

As Garland and the philosopher of science Ian Hacking (2003) show, the emergence in industrialising nations during the seventeenth and eighteenth centuries of (purportedly) rational, systematic methods of risk management, relied upon the development of probability theory and statistics.\(^{24}\) As several authors have charted, through these devices, calculating risk was extended from a rational discussion of possible outcomes, to an increasingly repeatable scientific method.\(^{25}\) Anthony Giddens (1990) links this modern realignment of risk’s definition to broader enlightenment changes that attempted to imbue

\(^{21}\) Trennery (2008) 5-13 and 41
\(^{23}\) Garland (2003) 72
\(^{24}\) Garland (2003) and Hacking (2003) 27
the chaotic uncertainties of fate, nature, and Acts of God with human agency.\textsuperscript{26} We can see this realignment throughout the coming chapters. As the MO produced increasingly accurate predictions and widely disseminated them in extreme weather situations, much of the chaotic uncertainty, and the responsibility that went with it, was transferred from nature and God to forecasters at the MO.

Financial historian Peter Bernstein’s \textit{Against the Gods} (1996) provides a history of risk from its earliest known appearances, through its enlightenment rationalisation, and into its twentieth-century proliferation. He details how economists, most notably Frank Knight and John Maynard Keynes, took up the study of risk, decoupling it from uncertainty. As geographer John Adams (1995) paraphrasing, Knight stated: “if you don’t know for sure what will happen, but you know the odds, that’s \textit{risk}, and if you don’t even know the odds, that’s \textit{uncertainty}.”\textsuperscript{27} Both Adams’ and Bernstein’s discussions of Keynes and Knight remind us that other studies of risk, including most of the sociological texts mentioned above, have considered it a neutral term, denoting the probability of something happening, combined with the magnitude of associated losses or gains. The public and press, however, often interpret its definition more loosely.\textsuperscript{28} Such variation in how different sectors of society not only define the word risk, but also perceive it, is central to this thesis.

The importance of cultural perceptions of risk in decision making is strikingly highlighted in a 1974 article by psychologists Amos Tversky and Daniel Kahneman, who showed that humans have a tendency to miscalculate probability when faced with simple financial choices.\textsuperscript{29} Their study helped develop theory on many heuristic biases, which attempt to highlight the often counterintuitive way humans actually act in many everyday risk

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{26} Giddens (1990) 30, see also Reddy (1996) 237
\item \textsuperscript{27} Adams (1995) 25. Original wording can be found in Knight (1971) 20
\item \textsuperscript{28} Bernstein (1996) 222
\item \textsuperscript{29} Tversky and Kahneman (1974)
\end{itemize}
\end{footnotesize}
decisions. Alan Irwin's STS study on science-public relations highlights a link between public perception of risks and public decision-making via a “deficit” model of public understanding. Such a model assumes public ignorance of the scientific aspects and risks of many technical issues. Irwin adds that in addition to public ignorance, this gap in knowledge between scientists and the public is also contributed to by policy which relies too heavily on scientific opinion.  

Science studies sociologist Brian Wynne has written extensively on the problems that arise by sociological analysis which presupposes an ‘expert’ versus ‘lay public’ dichotomy. His case study of the Cumbrian upland farmer’s plight in the wake of the Chernobyl disaster’s radioactive fallout, which meant bans were imposed on livestock movement and slaughter, has become a classic example of an episode that lacked public dialogue, and failed to account for local knowledge when applying scientific theory. 

Echoing Eugène Huzar’s writing from over a century earlier, Wynne states that science often has unanticipated consequences, and concludes that the two spheres need to operate with more dialogue and reflexivity to avoid public fear and mistrust. All of these studies consider an increased dialogue between experts and the public to be a wholly positive development. However, as we shall see from events at the MO after the introduction of new public weather services, whilst such dialogue may reduce fear and mistrust, the trust it brings may itself have unexpected consequences, with future blame being cast toward scientists.

A differing interpretation of the gap between public decisions and scientific expertise, as reviewed and expanded on by environmental sociologist William Freudenburg (1993), states that conflicts are not based around irrationality or ignorance. Instead, he argues that the public applies an economic rationale which focuses on the utility a new technology may

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30 Irwin (1995) 3-5
31 Wynne (1992)
32 Lash, Szerszynski and Wynne (1996) 73-78
provide and compensation for any reductions in utility that may be a by-product of its adoption. In this thesis, we will see that such a focus on utility, by both the public and scientific experts at the MO, resulted in the responsibility for the costs arising from extreme weather events often unfairly being assigned to erroneous forecasts (for example see 5.4.2). In a study on public participation in planning, Carissa Schively (2007) explores the phenomena of LULUs (locally unwanted land use) and NIMBYs (not in my back yard), prevalent concepts based on this utilitarian perception of risk, which have emerged over the last twenty to thirty years. Schively argues that more links are needed between policy and the sociological and psychological reasoning behind public risk decisions that lead to NIMBY attitudes. Although discussion of NIMBYs may not directly translate to extreme weather, the concept that risk perception is a utilitarian extraction made purely on economic rationale has clear repercussions: consider the decision to build manufacturing plants on cheap floodplain land, or in decisions for the wealthy to build luxurious property on coastlines vulnerable to storms and flooding. As we see in this thesis, it is with these sociological aspects that MO services must interact to ensure that the public heed the true risks posed by the extremes of British weather.

Paul Slovic’s “Perception of Risk” (1987) attempts to show the scientific elite that the public’s risk perception is not an irrational case of availability heuristics, public deficits, or purely an economic rationale, but rather that the public’s definition and criteria of risk significantly diverges from a scientific one. Experts in a specific field usually define the size of the risk by fatalities or injuries, or, more commonly for UK weather extremes, levels of disruption and costs. Of the factors which Slovic highlights that the general public often

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33 Freudenburg (1993) 911
34 The Oxford English Dictionary references the earliest use of NIMBY to 1980, whilst the term LULU is attributed to a 1981 article by urban planning professor Frank Popper titled, Siting LULUs. However the concepts that both terms encapsulate can be traced to some of the earliest industrial – environmental conflicts of the nineteenth century, for example see Rivto (2009).
rank risks based upon, the unknown element and uncontrollability of hazards are of consequence for this thesis.\textsuperscript{35} We can trace how, as the MO expanded public weather services, more prominent discussion of extreme weather across British society reduced the unknown aspect of the risks posed. Further, we see that the public’s perception of the controllability of the hazard was skewed by the MO’s ability to predict the hazard.

Consideration of gaps between expert knowledge and public decision-making has been a recurring theme of interest for those involved with public weather services at the MO. Despite meteorologists Erik Liljas and Allan Murphy (1994) showing that Anders Ångström was considering issues on the effectiveness of weather warnings in 1919, academic study of the issues surrounding how to communicate subjectivity and uncertainty in forecasts has been sporadic. In \textit{The Uncertainty Business} (1986), John Maunder, Assistant Director of the New Zealand Meteorological Service, presents a detailed study of the importance of applied weather and climatological information to a nation’s economy. Throughout the book, Maunder considers how risk is to be communicated to different sectors of society via forecasts, but as his focus is largely on climatology and economics, he gives only passing consideration to the importance of the medium and language used to impart such information.\textsuperscript{36} This thesis addresses these shortcomings by exploring in detail how decisions made by the MO and other involved organisations on the method of weather communications affected the public’s reliance on such services.

In \textit{Prediction: Science, Decision Making, and the Future of Nature} contributing authors investigate the challenges which face not only meteorologists, but all earth scientists who attempt to predict the future of natural processes. In this volume, meteorological policy expert William Hooke and public policy scholar Roger Pielke Jr. explore weather

\textsuperscript{35} Slovic (1987) 284-85
\textsuperscript{36} Maunder (1986) 70-75
forecasting’s predictive skill and its ability to provide user benefits. They highlight the pitfalls of presuming a linear relationship between a prediction, its communication, and the end user’s actions. Describing how the three processes act in parallel with significant interrelation and feedback, the account of the case of US meteorology fits within Murdock et al.’s broader field of mediated risk communication (Figure 1.1). We see evidence of a non-linear relationship between forecasts and public reaction throughout this thesis in the unexpected public responses that repeatedly emerged as the MO introduced new public services.  

Since its inception in 1994, the RMetS journal, *Meteorological Applications*, has added considerably to work on forecast communication, tools, and presentation – aspects of the discipline which are often taken for granted – most notably in a 2010 special edition on “Communicating weather information and impacts.” Contributors examine a broad array of topics relevant to this thesis, including the public response to severe weather warnings, the public consideration of weather forecast uncertainty, and the development of TV weather broadcasts. An article by psychologists Susan Joslyn and Sonia Savelli investigates how end users interpret different aspects of uncertainty in forecasts. Most worryingly for practitioners, the study notes a bias of users to expect extreme weather to be more moderate than forecasted. Detailed interdisciplinary studies, such as those presented by this volume, have begun to shape an understanding of how risk perception of meteorological conditions leads to blame of inaccurate or incorrect forecasts.

The magnitude of loss associated with the risks presented by extreme weather means that clear communication of forecasts by meteorologists is imperative. As we shall see throughout this thesis, extreme weather disasters in post-war Britain punctuated, catalysed,

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37 Sarewitz, Pielke, and Byerly (2000) Chapter 4
38 Burt (2010) 125
39 Joslyn and Savelli (2010) 188-190
and influenced greatly the MO’s public weather services and risk communication, and we now turn to an examination of scholars who have analysed the relationship between risk and disaster. One of the earliest authors to give disaster a historical dimension was political scientist Michael Barkun (1977). Barkun’s coverage of a flood that was caused by coal company neglect in West Virginia shows an early academic insight into the societal shift in perceiving natural disasters as simply Acts of God.\(^40\) Barkun states that the distinction between a routine hazard and disaster is culturally bounded.\(^41\) Building on these ideas, environmental historian Greg Bankoff (2004) describes disasters as both processes set within recent temporal parameters, and non-sequential events which punctuate a time period, often having more in common with the last time such a collapse occurred.\(^42\) Anthropologist Anthony Oliver-Smith states that this dichotomy demands a theoretical approach which is capable of encompassing the web of relations that link society (the organization and relations among individual groups), environment (the network of linkages with the physical world in which people and groups are both constituting and constituted), and culture (the values, norms, beliefs, attitudes, knowledge that pertain to the organization and those relations).\(^43\)

Ted Steinberg’s *Acts of God* (2000) incorporates ideas on risk perception and blame through a chronological narrative of US disasters which progresses thematically through the twentieth century. By focusing on the decisions government and planning officials make prior to extreme weather events that amplify the effects of a catastrophe, Steinberg considers how expertise affects such events.\(^44\) Through exploration of the manifestation of

\(^{40}\) Barkun (1977) 225  
\(^{41}\) Barkun (1977) 228  
\(^{43}\) Quarantelli (*ed.*) (1998) 186  
\(^{44}\) Steinberg (2000)
blame in afflicted communities, Steinberg investigates risk in events where many of the contemporary actors involved did not speak in such terms. He not only imparts a human component to many natural catastrophes, but further shows how those in positions of power have repeatedly promoted the view of these events as ‘natural’ in a bid to deflect blame and justify their (lack of) preparation and response to such hazards. Steinberg’s dissection of historical US disasters, which have previously been considered simply unavoidable natural events, informs my consideration of UK extreme weather events as catastrophes that combine complexly interwoven physical, political, economic, and social conditions. Occasionally Steinberg’s broad narrative lacks detail, something this thesis avoids, for a UK context, by focusing on a shorter time-period and tracking changes in the societal positioning of extreme weather through one organisation’s interaction with disaster and the public.

Despite the breadth of disaster studies that explore sociological dimensions, scholars have tended to focus on the most extreme and destructive phenomena, overlooking smaller-scale disasters or extreme weather events: for this reason, within modern disaster discourses there is a lack of in-depth coverage of the UK’s unique experiences. As Gordon Manley, a pioneering British climatologist once remarked: “Over a large part of the British Isles the more impressive extremes of our winter weather occur with somewhat dangerous rarity.” In addition to the rarity of extremes, the weather patterns the British Isles encounter are highly varied and unpredictable. These peculiarities, combined with a high level of development and infrastructure, make the UK a particularly interesting case study for an approach framed through the terminology of risk and blame.

Anthropologist Mary Douglas was the first author to explicitly connect the study of risk and blame. In her collection of essays Risk and Blame (1992) she explored the links between...
calculated risks, risk perception, and subsequent manifestations of blame.\textsuperscript{46} Although studies on blame following disaster predated her work, Douglas, in connecting post-event blame to pre-catastrophe risk perceptions, significantly influenced contemporary study of risk and blame across nearly all academic fields. Douglas’ “Cultural Theory of risk”, first developed in conjunction with political scientist Aaron Wildavsky (1983), rather than stressing economic and cognitive influences on risk perception, focuses on the social function that individual perceptions of societal dangers collectively serve.\textsuperscript{47} Whilst this thesis considers and incorporates aspects of all the presented theories on risk perception—heuristics, public deficits, economic rationale, and Slovic’s divergent criteria— it is Cultural Theory which provides this thesis with the framework to connect blame back to antecedent risk communication and perceptions. The MO was not destined to become the victim of institutional blame: rather, decisions on how it would communicate risk through public forecasts and warnings led to the position seen in the aftermath of the 1987 storm.

The earliest sociological work on blame in disaster was driven by military-funded research carried out by the American National Opinion Research Center from 1950-54, where a team led by Enrico Quarantelli began to consider the social dimensions of disaster.\textsuperscript{48} One of Quarantelli’s colleagues, sociologist Rue Bucher, produced a seminal paper, “Blame and Hostility in Disaster,” in 1957, which used data collected from three successive plane crashes in Elizabeth, New Jersey. Bucher grouped the differing opinions of those interviewed, highlighting examples of people who felt it was an accident and accidents happen, and those who felt that three similar crashes at the same airport in a short space of time were unacceptable. She found that people were more willing to apportion blame to

\textsuperscript{46} Douglas (1992) 3-22
\textsuperscript{47} Douglas (1992)
\textsuperscript{48} Quarantelli (1987) 288-290
a corporation or government than to an individual, such as a pilot. In this thesis, we will see blame cast toward the MO and other government departments, and yet the case of TV forecasts, presented in Chapter Five, diverges from Bucher’s findings: once the forecast had a meteorological expert on screen, the public were quicker to blame this individual directly. The case shows the increased trust viewers gave the forecast when it was delivered by an expert, highlighting the importance of risk perception which early studies, such as Bucher’s, did not incorporate.

In 1963, along with fellow sociologists Russell Dynes and Eugene Haas, Quarantelli founded the Disaster Research Center at the University of Ohio. In Scapegoats, Villains and Disasters (1967), Quarantelli and Thomas Drabek argues that apportioning blame is “not only a standard response, but well in harmony with the moral framework of American society... by traditional Western legal and theological definitions.” However, much like Bucher’s earlier paper, the article restricts discussion of blame to technological or anthropogenic hazards, considering that “in present day Western society, probably no person will be assigned direct responsibility for destruction caused by tornadoes, floods, and hurricanes. Damage and deaths from such events can be conventionally accounted for in non-personal and naturalistic terms.” As we shall see in Chapter Two, the blame cast during the winter of 1947 shows that even prior to the time of Quarantelli and Drabek’s writing, the public’s demarcation between naturally caused disasters and anthropogenic elements was not always clearly drawn.

Studies on blame-assigning in disasters have progressed from this position to encompass the idea that a disaster, whether technological or natural, is an event that is a socially constructed problem. As sociologists Jean Blocker and Darren Sherkat (1992) argue,

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49 Bucher (1957)  
50 Drabek and Quarantelli (1967) 146  
51 Drabek and Quarantelli (1967) 148
assigning accountability and blame only in technological events fails to acknowledge that the scale of a disaster triggered by natural hazards is largely determined by human factors.\textsuperscript{52} Much modern academic discourse now considers natural disasters as simply failures between vulnerable people and vulnerable environments.\textsuperscript{53} Historian of science Vladimir Jankovic (2006) provides a historiography of this shift in ideas of responsibility and blame in societies throughout the last millennium. He charts the transition from God-fearing beliefs to the litigious society of today, arguing that blame arises because disasters do not affect socio-economic groups equally. This echoes Douglas’ work, which argues that once disasters are decoupled from the mysticism of “the discourse of religious faith,” the disparity of different societal groups is publicly highlighted and blame-casting will occur.\textsuperscript{54} The extreme weather events presented in this thesis show how the portrayal and framing of a disaster by different sectors of society influences the allocation of blame. Freudenburg urges us to progress beyond a homogenous treatment of blame in disaster by applying the term “recreancy,” which he defines as “a retrogression or failure to follow through on a duty or trust,” to catastrophe situations. Freudenburg introduces this term in an attempt to find a word that is more precise than “institutional failure,” which can neutrally highlight cases where a person or institution in a position of trust has failed to fulfil their obligations. He adds that the term should help separate such cases from more personal casting of blame which looks to vilify individuals or institutions.\textsuperscript{55} The idea becomes a useful distinction when trying to separate raw emotional blame from a more calculated review of events such as the Pitt Review, which was commissioned after the UK flooding of 2007, and adopted a “lessons to be learned” stance, as is increasingly

\textsuperscript{52} Blocker and Sherkat (1992) 155
\textsuperscript{53} For example see Wijkman and Timberlake (1984) 10-17
\textsuperscript{54} Douglas (1992) 26
\textsuperscript{55} Freudenburg (1993) 916-917
common. Chapter Four of this thesis examines one such inquiry commissioned by the government after a catastrophic flood in 1953, exploring how it served to temper and mediate blame.

Rather than adopting Freudenburg’s term recreancy, this thesis goes beyond a homogenous treatment of blame by exploring the different types of blame cast by actors in each of the case studies presented. By defining blame broadly as finding fault with or accusing of a responsibility for a negative event, I explore its different manifestations through the use of qualifying terms such as institutional, political, and personal. Evident through Douglas’ work, such a broad definition of blame allows us to consider cases where one individual may have simultaneously cast blame toward another individual, an organisation, and an entity such as God. By the post-war period the MO were well acquainted with blame cast by politicians, academics, the media, and more recently the public. Whilst such instances usually addressed the institution as a whole they often had political and personal elements (see 3.2), ranging in their vehemence from the jocular to the judicial.

Blame allocation in naturally triggered disasters, when addressed commonly results in policy change, investment in mitigation initiatives, and, in some very serious cases, changes of governing structure or personnel. The ability of disaster events to trigger subsequent policy changes has been investigated by scholars at the Flood Hazard Research Centre at Middlesex University. This thesis reinforces their findings, which show that throughout the twentieth century, flooding episodes in the UK have acted as a catalyst for policy changes. As we see in Chapters Two and Four, we can consider such catastrophic events as providing

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56 Pitt (2007) - The interim report’s is sub-titled, Learning lessons from the 2007 floods.
57 Penning-Rowsell et al. (2006) and Johnson et al. (2005)
policy windows, which, through the immediacy of the devastation they cause, act to capture the attention of political and policy streams, enabling change.\textsuperscript{58}

There is little scholarly literature which explicitly explores blame in meteorological contexts. More extensive attention has been given to forecast verification and accuracy, suggesting that blame is often considered an expected, and perhaps justified, consequence of an inaccurate forecast. Much of this study has focused on the economics of inaccurate forecasts, influenced by John Maunder’s work.\textsuperscript{59} Economic Value of Weather and Climate Forecasts, edited by Richard Katz and Allan Murphy, gives detailed empirical insight into the heavy economic reliance governments, businesses, and the public all now place on weather forecasting products.\textsuperscript{60} Whilst this book helps to develop an understanding of meteorology’s central role in society through its interactions with government, businesses, and the economy, it does so in a statistical and mathematical manner, which allows little room for a narrative of the more complex human responses to weather forecasts and warnings.

One of the few meteorologically-focussed studies to explicitly consider blame manifestation is Renzo Taddei’s paper, “The politics of uncertainty and the fate of forecasters” (2009). Building on Douglas’ idea that we may expect to see collective emotional responses in situations where risk and danger are evoked, Taddei considers the case of weather forecasters in Brazil.\textsuperscript{61} Taddei explores how forecasters communicate uncertainty in climate forecasting, and concludes that social uses of climate-related uncertainties offer us special insight into how human societies deal with uncertainty and

\textsuperscript{58} Kingdon (1995)
\textsuperscript{59} Maunder (1970) and Maunder (1986)
\textsuperscript{60} Katz and Murphy (ed.) (1997)
\textsuperscript{61} See Douglas’ Forensic Theory of Danger, first developed in Douglas and Wildavsky (1983) and expanded on in Douglas (1992) Chapter 1
blame.62 This case study of meteorological practice reinforces the idea, first proposed by Douglas and Wildavsky (1983), that perception and acceptance of risk have their roots in social and cultural factors, rather than solely in the public’s direct scientific knowledge.63 By making blame central to the narrative, my thesis follows such an account that connects theoretical studies of blame manifestation with specific meteorological case studies.

Further, much like the special edition of Meteorological Applications on “Communicating weather information and impacts,” by using historical events, my study goes beyond these examinations of economics and theory, which state how risk and blame should manifest in meteorological cases, and explores how it actually did manifest.

The rise of blame in disaster literature over the past fifty years has occurred alongside many improvements to technology and standards of living in the UK. As the following chapters show, the rise of mass media, especially radio and television, was of great importance to the MO, and the communication of risk and blame, in the post-war years.64 Events presented in this thesis show that the media not only reflect, but also shape, the public’s risk perception through their coverage and representation of disaster events.

1.3.1 Risk and Blame in the Mass Media

As well as providing a unit of investigation that acts as a record, reflecting public attitudes and responses after extreme weather events, the narrative and dialogue of an open mass media can itself shape societal changes around risk and blame. A special edition of the journal Risk: Health, Safety and Environment, published in 1994, was dedicated to risk in the mass media. The broad spectrum of case studies covered in this edition highlighted that the mass media not only relay risk information to the public, but they also shape the

62 Taddei (2009)
63 Douglas and Wildavsky (1983) 186-191
64 Seymour-Ure (1996) provides empirical confirmation of this rise with post-war figures on press circulation, radio listenership and television.
public’s risk perception through their choice and representation of disaster events. In this volume, analysis of print and television media by sociologists Eleanor Singer and Phyllis Endreny finds clear distinctions between blame-casting in different types of hazards (technological, natural etc...), and concludes that the media often tends “to attribute too much responsibility to individual actors, including corporations, and too little to the social and environmental constraints within which they act.”

Anthropologist Gregory Button (2002) takes up this idea in looking at how the media “re-frames” technological disaster, showing that it can shift the general public’s perception of disaster events in a relatively short space of time. He also highlights that too much emphasis is placed today on professional expertise, when in many cases local knowledge could better add to our understanding of why an event has occurred. Button states that the frames reinforced or created by the media serve to augment public perceptions of catastrophes and prevent the public from inquiring why victims are vulnerable in the first instance. Robert Stallings had previously investigated the mass media’s framing of disasters, introducing the term “coupling,” which describes the post-disaster media use of unproven hypotheses between possible “cause” and catastrophic “effect,” shaping news coverage, and in turn often leading to misplaced or disproportionate blame in public response. Stallings also states that the lower down the rung an agent is, the easier it is to assign blame, and as a result, the media look for acts that are proximate to couple with the disaster. Several other papers address how the media reports on, and interacts with, societal understandings and responses to disaster situations, further highlighting how mass

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65 Singer and Endreny (1994) 266-269
66 Button (2002)
67 Stallings (1994)
communication channels not only reflect public and political discourse, but also shape it. In Chapter Two we see the importance of the media’s role in informing the British public’s risk perceptions and in framing politicians as responsible for the winter crisis, and by the end of the thesis we can see how, across all media channels, the MO itself is a prominent influence on the framing of extreme weather events.

In the section of the edited volume *The Social Amplification of Risk* titled, “Risk signals and the mass media” authors draw together empirical case studies, such as those employed in this thesis, with the theoretical ideas presented through the interdisciplinary social amplification of risk framework (SARF). In this volume, Graham Murdock, Judith Petts, and Tom Horlick-Jones unpack the term “mass media” to consider the different roles of types of media such as tabloids, broadsheets, and television. They use the general model of the field of mediated risk communication, presented in Figure 1.2, to introduce how six major types of agents engage in a continual contest for the command of public communications and attention. The complex interaction presented is useful in helping us to understand not only the myriad of interactions that risk communications undergo in their often indirect transmission, but also how such chains can amplify the public perceptions of risk. Whilst the model presented is useful in beginning to understand how public perceptions of risk may be socially amplified, the cases presented in this thesis show that its reductionist categories and attempts to prescribe the direct channels for risk communications do not always translate to real life events.

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69 Pidgeon et al. (2003)
The media studies cited thus far are all concerned with media coverage of disasters. For the developments within thesis, we must also consider literature on the everyday representation of scientists in the media; for the public’s response in episodes of extreme weather is shown to be directly informed by their everyday relationship with experts at the MO. Whilst detailed studies of science in the media now abound, texts that attempt to historicise the relationship between these two areas, and studies that specifically give focus to meteorologists, are rare.\footnote{For general considerations of science and the mass media see Nelkin (1995) and Bucchi (2002)}

Historian Timothy Boon’s *Films of Fact* (2008) explores the development of science in documentary films and television. Boon highlights the importance of the BBC in promoting science, introduces some of the prominent scientific figures of the post-war period, and gives insight into the often educational motives of those creating TV and radio
Boon does not consider weather forecasts as they presented scientific expertise in a context which, as far as most viewers were concerned, was not ‘science’ and involved no educational agenda. Televised weather forecasts, which are discussed in this thesis, are a clear example of how the public came into contact with the products of scientific endeavours.

In response to the lack of books considering weather on television, meteorologist and journalist Robert Henson wrote *Weather on Air: a History of Broadcast Meteorology* (2010). His history of US weather broadcasting charts the development of the medium from its earliest inceptions in the 1940s to its modern day proliferation, via dedicated channels such as the Weather Channel. Whilst giving only passing consideration to how risk is communicated through weather broadcasts, Henson’s history provides this thesis with insight into how American weather broadcasting practice developed in a largely distinct fashion from that in the UK (see Chapter Five).

One of the few authors to have considered broadcast meteorologists as prominent communicators of science in the mass media is Kris Wilson, a former television director. In his 2008 paper “Television weathercasters as potentially prominent science communicators,” he reviews the limited literature on the subject and considers the potential influence of weather broadcasters, given that they are often the only source of regular scientific information some people encounter. Wilson reports a trend in the US towards TV weather forecasters not only educating the public on meteorological topics beyond the forecast, but also on climatological issues, such as global warming and other more general science-related topics. He argues that the specialist expert status the TV forecasters carry in the US makes them ideal to communicate more broadly to the public on many contentious scientific topics. From concepts such as framing and coupling, to

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71 Boon (2008) – in particular chapter 7
consideration of TV weather forecasters as communicators of science, all of the media studies presented rely on experts to translate and communicate the scientific information they present. It is to considerations of meteorological expertise and risk that this literature review now turns.

1.3.2 Risk and Meteorological Expertise

British governments have long relied on both internal and external expertise to inform policy and decisions. Spurred by the integral role of scientific research during the Second World War, the post-war period saw governments increasingly seeking advice from scientific experts. Scientific expertise informed political policy in the period via the Department of Scientific and Industrial Research, by its increased representation on departmental committees (see Chapter Five), and by the growth of the scientific civil service, in the form of organisations such as the National Physical Laboratory and the MO.

Mark Whitehead’s State, Science and the Skies (2009), a history of air pollution science and governance in the United Kingdom, has informed my consideration of state involvement in atmospheric science during the period. Whitehead attempts to establish how the socially and ecologically permissible levels of air pollution were determined in the UK. Whitehead’s coverage of the Great Smog of 1952 and the subsequent Committee on Air Pollution, which consisted of experts from industry, engineering, chemistry, the medical profession, and meteorologists, provides an insightful comparison in Chapter Four of my thesis, when investigating other more naturally-framed disasters in the period. When thinking in terms of risk perception of weather hazards, his book provides an interesting counterpoint. Because air pollution is largely invisible, the public (and policy-makers) often trust scientists’ expertise; but in extreme weather situations, the publicly acceptable level is

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often determined by the extent of disruption, rather than by criteria measurable by conventional scientific means. This distinction means risk perception and expectations in an extreme weather event are much more subjective and contentious.

Historian of science Theodore Porter (1995) explores the numerical underpinning which supports much scientific expertise, critically examining its expansion into areas of political and social spheres, such as the development of cost-benefit analysis methods. Porter concludes that to consider quantification an inherent part of scientific activity is wrong. He asserts that the growth of quantification has been driven by outside pressures, such as the strict reporting rules the US government introduced in the 1930s to standardise accounting practice, and a response by scientific disciplines to use objective and explicit methods as a strategy of impersonality. Porter’s statement that such a response is most obvious in fields that are exposed to scrutiny and bear a responsibility to the public is clearly evident for the MO and developments presented in the later chapters of this thesis.  

An interdisciplinary paper by Henry Rothstein, Michael Huber, and George Gaskell proposes a mechanism for how government management of societal risks merely transfers the risk to the institution tasked with its management. Key to this process is expertise, such as that presented by senior MO forecasters, used to quantify societal risk. In quantifying and managing such risks, experts often internalise the risk posed by previously external threats. In an industry John Maunder called the “uncertainty business,” to be a publicly recognised body of scientific expertise like the MO presents many challenges. As we have already begun to establish, in meteorology, much is reliant on the communication of forecasts and warnings, for as meteorological policy expert William Hooke and public policy scholar Roger Pielke Jr. state: “A technically skilful forecast that is miscommunicated or

73 Porter (1995) 93, 229
74 Rothstein et al. (2006)
misused can actually result in costs to society."\textsuperscript{75} Whilst these costs to society are often real, the media and public can often overstate them as they look for a scapegoat in the aftermath of a catastrophe. Such a case can be seen in the above-mentioned storm of 1987, when an earlier or clearer warning from the MO would have done little to alleviate the costs borne across society, as highlighted by the MO’s internal inquiry.\textsuperscript{76} In \textit{Authors of the Storm}, sociologist Gary Fine takes the reader behind the scenes of weather prediction, introducing the people behind the forecasts to show how weather forecasters intuitively factor key sociological elements into their predictions. By showing that the process of weather forecasting still incorporates subjective decision-making, Fine emphasises the human fallibility in a process often viewed by outsiders as a purely objective pursuit. In extreme weather situations, such decisions – how to interpret the computer forecast, whether to issue a warning or not, whether to communicate it to the entire region or just one town – are of particular importance.

Many of the studies I have addressed allude to a tendency for science and associated technologies to produce unexpected consequences. In \textit{Why Things Bite Back}, historian of technology Edward Tenner uses the term “revenge effect” to separate mere unexpected side-effects from the more ironic, unexpected consequences of implementing a new technology. Exploring revenge effects in cases as diverse as the computerised office and the medical conquest of deadly disease, Tenner shows that these effects are not produced by technology alone, but rather by its interactions with laws, regulation, and societal customs.\textsuperscript{77} In a chapter on human-made and natural environmental disasters, Tenner highlights three revenge effects brought by society’s success in dealing with floods and storms: firstly, that better predictions have encouraged a confidence which is perilous;

\textsuperscript{75} Sarewitz, Pielke, and Byerly (2000) 68
\textsuperscript{76} See the executive summary of the 1987 inquiry, \textit{The Meteorological Magazine}, \textbf{1389}:117, 97-98
\textsuperscript{77} Tenner (1997) 7
secondly, that the better weather predictions become, the more dependent the public becomes on them; and finally, the public’s tendency to indecision in acting upon a warning issued. Elements of all three of these revenge effects are examined in this thesis, and at the centre of the emergence of these effects are experts at the MO. As Tenner attempts to cover all types of disaster within one chapter, he does not expand on individual cases; this thesis, through several detailed case studies, highlights how revenge effects emerged as the MO implemented new public weather services. Further, by considering why unexpected consequences of improved public weather services emerged, and how the MO attempted to combat them, I go beyond the scope of Tenner’s account to consider how a revenge effect of a technology is mediated once it emerges.

Tenner also reminds us of two simple, but often overlooked ideas, which are vital when considering the implementation of science and technology and how it has interacted with the public. Firstly, that the impact and effects of scientific and technological developments during the twentieth century have varied greatly across different sectors of society. Secondly and most importantly, whilst an organisation such as the MO may plan the implementation of new technologies, once they are in the public realm, there will always be a contingent unknown response to their introduction. This thesis explores these public responses, often overlooked by histories of meteorology, and shows how such unexpected societal pressures influenced the development of MO public weather forecasts and warnings.

This literature review has introduced the broad spectrum of scholarly work on risk, blame, and expertise that informs my thesis. Throughout, it has highlighted the limited extent of existing work on twentieth century British meteorology, meteorological studies which consider risk and blame, and scholarship that links theoretical concepts of risk with

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78 Tenner (1997) Chapter Four
historical case studies. I now briefly introduce the subsequent chapters that make up this thesis, and address these gaps in the existing literature.

1.4 Chapter Overview

This thesis opens by introducing the winter of 1947, one of the harshest spells of cold weather in Britain in the twentieth century. Occurring at a time when British society was still reeling from the effects of the Second World War, the winter acted as a catalyst to addressing many of the challenges already facing the beleaguered nation. Fuel supply was severely affected by the cold weather, and in an attempt to avoid complete dislocation, the government introduced nationwide draconian restrictions on fuel. This chapter explores the manifestation of blame in the period, as the public and press cast accusations at the government, with the Minister for Fuel and Power, Emmanuel Shinwell, becoming a scapegoat for mismanagement of the fuel supply. Through the complex interwoven nature of the meteorological, political, and social narratives of the winter, this chapter shows how the imagining of a disaster as either anthropogenic or natural shapes the government response, public opinion, and lasting cultural memory of an event. The winter highlights the peripheral role that forecasters and the MO occupied in both political and public life in the immediate post-war years. Although the government consulted a myriad of experts in preparation for the winter and during the crisis, the involvement of the MO was limited to providing the occasional statistic on the severity of the weather.

Chapter Three introduces the operations of the MO during the period in more detail. Through the successes of wartime forecasts and the MO’s role in creating criteria for heating restriction schemes during the war, we see how, as the war ended, the MO was developing a formative role in British society as an expert scientific body beyond its more traditional bounds. In light of wartime developments and a post-war restructuring, this chapter then explains the MO’s peripheral role in the winter of 1947, and explores the ad-
hoc growth of MO specialised forecasts and warnings for government departments, public authorities, and industrial concerns. Whilst this chapter introduces us to the trajectory of the MO as a department that implemented new processes to develop services for new end users in the period, it also highlights that its position as a department of scientific experts was still developing.

In Chapter Four, we see the MO take a central role in a disaster situation. The North Sea Flood of 1953 inundated hundreds of thousands of acres of land and killed over 400 people. It highlighted the fragmentary nature of flood warning systems, defences, and government plans for disaster response. As communities struggled to repair the thousands of breaches along the coastline before the next high tides, the MO played a central role in the creation of an emergency warning system. In response to inadequacies and pressure from the public and the Opposition, the government created a departmental committee to investigate the disaster. Although the MO was not represented directly on the committee, it did feature several scientists, including a meteorologist, and MO-generated evidence and involvement influenced the committee’s report, which heavily influenced British coastal defence and flood policy. The deliberations of the committee presented in this chapter show how the MO’s role as a scientific expert body had developed since 1947, but in examining the clashes it had with other scientific experts on the committee, it becomes clear that its emergent role in such procedures was a contested one. Further, the committee’s use of scientific experts shows the development of the state’s utilitarian use of science in managing risks. The flood and the subsequent committee are imperative to our understanding of the rise of risk and blame in extreme weather events in the post-war period.

Chapter Five introduces the development of MO public weather services in the 1950s. Through the launch of meteorologist-presented televised weather forecasts in January
1954, we explore how MO staff became prominent public communicators of meteorological risks. Whilst senior MO officials saw the use of meteorologists on televised forecasts as an opportunity to promote their discipline and educate the public, the new format unexpectedly resulted in increasing blame directed specifically at the presenting forecasters when they were inaccurate. The decision to use a meteorologist to present the segment, along with decisions on the language and visual representation used, greatly affected the communication of meteorological risks to the public. MO public weather services were now affecting the British public’s perception of weather-related risks, altering public expectations, and providing risk calculations for hazards previously considered inevitable elements of life.

Chapter Six illustrates how the development of the MO’s specialised forecasts and warning systems, first introduced in Chapter Three, expanded beyond their original audience of government departments and individual organisations to serve large sectors of society. The restructuring of the organisation, the move to a centralised headquarters, and the implementation of numerical forecasts all helped to turn the MO into a public-facing organisation. The expansion of warning services, such as the coastal gale warning service developed after the North Sea Flood of 1953, saw the MO take on a central and increasingly prominent role in inter-agency services. As the MO’s more prominent role in British society emerged, debates about the responsibility for forecasts and warnings began to surface amongst the government agencies involved. Combined with decisions made in the previous chapter on mass communication of forecasts, these developments saw the MO become increasingly vulnerable to blame. In institutionalising risks previously borne across society, the MO had unwittingly become the manager of uncontrollable meteorological risks, of which it could only predict the probable occurrence.
This thesis closes by considering another severe winter that struck the UK in 1963. Although the winter was by many measures more meteorologically severe than the one in 1947, its occurrence in a less austere period, where government and civil agency management of conditions had greatly improved, meant the disruption it caused was significantly reduced. The MO played an integral role throughout the winter, and deployed specialised forecasts and warnings to thousands across the UK. Further, it maintained a high profile for the duration of the winter, giving comment and analysis in newspapers and on television. However, beyond a reading of the winter as purely a triumph for the MO’s new public profile, this chapter introduces several more subtle details, which emerged over the course of the winter, which were to be significant to the MO’s management and communication of the risks posed by extreme weather. Most notably, the public profile of the MO became increasingly corporate in its identity. Whilst a coherent corporate line may have been beneficial for the organisation in asserting its position as a body of scientific expertise, it created the danger that an individual error or overstatement of confidence could be amplified, misconstrued, and pinned to the whole organisation.

Whilst the MO this thesis leaves in 1963 had maintained much of its post-war structure and operations, it had also developed a public profile, and an accompanying level of responsibility, unrecognisable from its post-war position. The British population was more aware of the risks presented by extreme weather than had been the case in 1947, yet it had begun to reject the concept of individual or general community responsibility for acting in response to such risks, instead assigning responsibility to the scientific experts at the MO. From peripheral outsiders with advice only of use to specialist interests such as aviators, to a crucial mainstay in British society that are turned to in times of uncertainty and danger, this is a story of how officials at the Meteorological Office of the United Kingdom became experts in risk.
Chapter Two
Blame in a Post-war setting: the winter and fuel crisis of 1947

[F]ailing severe weather conditions and transport interruptions, we can see our way through the winter.

Emmanuel Shinwell, Minister for Fuel and Power, November, 1945

Starve with Strachey, Shiver with Shinwell

Popular phrase from the winter of 1947

2.1 Introduction

Just over two years after the end of the Second World War, as the UK was only just beginning to come to terms with the devastation caused by the conflict, the nation was struck by the coldest winter weather in living memory. Exploring events during the severe British winter and associated fuel crisis of early 1947, this chapter introduces risk and blame in an extreme weather context in the immediate post-war years. The chapter analyses the political, public, and civil authority narratives of the fuel crisis in the context of the severe weather, to reframe events within a narrative of risk and blame.

The post-war years in the United Kingdom were a socially dynamic period of increasing public expectations, characterised by recovery from the Second World War, the introduction of a social welfare system, and increases in disposable income. This was a time of tension between a need for economic austerity to ensure recovery from the ravages of war, and an optimism of the people who wanted prosperity and to put hardship behind them. It was into this environment of differing aspirations and realities that the events of January to March 1947 were to unfold.

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79 Ministerial Coal Committee Progress Report, November 1945. CAB 78/38
80 See 2.4
On January 23rd, 1947, the South East of England was encompassed in a thick blanket of snow; this silent inundation signalled the start of an exceptional winter period that crippled the UK until the middle of March. The extreme conditions—snow drifts of up to ten feet, little direct sunlight, and temperatures below zero degrees Celsius—coupled with austere post-war conditions, ensured that this winter would go on to be long remembered in the UK’s public consciousness. The weather disrupted nearly all normal, daily functions of British life, including the transportation of coal as colliery deliveries became stuck in frozen harbours or snowbound railway sidings. The recently nationalised coal industry had been in decline throughout the Second World War, and the huge increases in electricity and gas demand since July 1945 had meant that coal shortages had only narrowly been avoided the previous winter.

As the weather showed few signs of abating, the Minister for Fuel and Power, Emmanuel Shinwell, advised the Cabinet to extend voluntary restrictions of coal supply into a full scale program that included both industry and domestic consumers. The cuts were an attempt to avoid a complete dislocation and breakdown of energy supply. In reality, however, they caused mass unemployment, a lack of sufficient heating for households, and huge costs in lost manufacturing production. The government, and especially Shinwell, were attacked for their mismanagement of the British fuel supply; blame was cast by the public toward politicians, and by politicians towards the weather. The winter conditions acted as a catalyst for ongoing problems of fuel supply in the UK, bringing into focus situations surrounding mining, transportation, and demand for coal.

Through investigation of the events of the winter fuel crisis, contextualised within larger and longer term developments, this chapter looks into how blame manifested in post-war British society. By investigating risk perceptions, vulnerability, and blame, this chapter highlights how the manifestation of these characteristics, purported in Ulrich Beck’s *Risk*
Society to only emerge in the post-modern period, existed in post-war Britain.\textsuperscript{81} Through analysis I show that although the weather in the winter of 1947 was considered an accentuating factor, the fuel crisis remained a political issue, with the Government using Shinwell as a scapegoat to relieve pressure directed at them. By comparing the fuel crisis with food shortages during the winter, and the differing emergence of blame in this area, the importance of risk communication with the public is demonstrated.

Unlike after the Great Storm of 1987 (see 1.1), the limited role of scientific, and especially meteorological expertise, in managing the disruption, left the weather as an external, unpredictable element; a risk borne by the whole of society. The interwoven nature of all the contributing factors I present highlights the limitations of studies which draw distinction between natural and anthropogenic disaster.\textsuperscript{82} By analysing the winter of 1947 from a comprehensive perspective, this chapter presents the boundary between natural and anthropogenic disaster as a shifting, often indiscernible frontier, at which society interacts with extremes of natural processes. In the decades that followed the winter, this shifting boundary enabled the UK’s Meteorological Office (MO) to become the key scientific authority communicating the risks posed by such meteorological extremes.

\textbf{2.2 The Fuel Crisis of the winter of 1947}

In 1945, during the final throes of the Second World War, the Labour party swept to its first parliamentary majority and the incoming Prime Minister Clement Attlee presented a new future for the UK, pledging to abolish the miseries of the masses of the inter-war years.\textsuperscript{83} The end to the threat from Nazi Germany, coupled with the new government’s plans for the nationalisation of many services including the Bank of England, coal, electricity, and

\textsuperscript{81} See Beck (1992)
\textsuperscript{82} See 1.2.1
\textsuperscript{83} Shinwell (1973) 183
healthcare, resulted in an exuberant and expectant public during the summer of 1945. In contrast, the stark reality of the UK’s post-war position was that it was no longer a true global super power. Bankrupt, after the jubilation of victory had subdued for both the nation and the Labour government, a period of self imposed austerity was the actual order of the day.\textsuperscript{84}

This austere reality meant that for the average family in immediate post-war Britain, conditions were not much improved from war time. Although historically low, unemployment more than doubled in the year after the war. Further, the demilitarisation of 5 million people leaving wartime service positions, searching for their place and role in society, caused social and economic upheaval.\textsuperscript{85} Much maligned, but understood as necessary during wartime, rationing continued. Products such as bacon, meat, and cheese remaining under government control until the summer of 1954.\textsuperscript{86} In July 1946, amongst derision from the Conservative opposition and growing disquiet from working class families, bread, was rationed for the first time.\textsuperscript{87} The government justified this move by stating it would reduce the national deficit and alleviate pressure on worldwide scarcities of grain. However, for many, the new restrictions showed that peace did not automatically mean prosperity.

Opposition to the bread rationing scheme varied. The right-leaning British Housewives’ League formally lodged objections and demanded a public enquiry,\textsuperscript{88} whilst at the other end of the spectrum, many individuals, such as a housewife interviewed for BBC radio in

\textsuperscript{84} The figure of £750 million excludes supplies and services received under the USA lend lease scheme and other aid schemes such as the Canadian Mutual Aid program. House of Commons Debate, 12\textsuperscript{th} December 1945, vol. 417 cc584-5W
\textsuperscript{85} House of Commons Debate, 22\textsuperscript{nd} August 1945, vol. 413 cc649-50W 649W; House of Lords Debate, 8\textsuperscript{th} May 1946, vol. 141 cc58-114 58
\textsuperscript{86} Zweiniger-Bargielowska (2000) 34
\textsuperscript{87} Robertson (1987) 5-6 and Zweiniger-Bargielowska (2000) 83-5
\textsuperscript{88} The Times, Tuesday July 9\textsuperscript{th}, 1946, 2
London, took it in their stride: “We all get some – it’s better than waiting for the winter time and we get none – innit? I’m quite satisfied with the bread rationing.” The immense pressure placed upon those tasked with keeping the nation fed in the immediate post-war years was evident in the manner in which the Minister for Food, Sir Ben Smith, left his post in May 1946. The demands of his prodigious workload, a lack of cabinet position for the role, and differences within the Cabinet Food Committee led to Smith’s resignation. He was replaced by the junior minster John Strachey, previously Parliamentary Under-Secretary of State for Air. Strachey was quickly introduced to the pressures which had seen Smith resign, as the debate around bread rationing intensified in the build up to the scheme’s implementation in July 1946.

Despite an increase of the supply in manufactured goods after the end of the war, the supply of such items remained below pre-war levels until the end of 1948. Frustration with the seemingly slow pace of progress was amplified by the fact that many in 1946 had a disposable income for the first time. This was the result of incrementally increasing wages running at a disparity to government stabilised prices for food, fuel, and rent. With money in their pockets but no goods on the shelves to spend it on, many began to become disenchanted with the government. The disparity between inevitable increases in demand once the war finished, and the still limited supply of goods, whether due to restricted imports or home production deficits, placed increased pressure on one other crucial product: fuel.

In post-war Britain, coal accounted for approximately 90% of the entire nation’s energy supply. The coal mining industry in the UK had suffered deteriorating performance for

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89 BBC Sound Archive (1946): Bread Rationing, July 1946 – interviewed by Rae Hudson
90 The Times, Tuesday, 28th May 1946, 4; The Daily Mirror, Tuesday, 28th May 1946, 1
91 Mass Observation Archive (1947): Fuel Crisis Gains and Losses, 1; Robertson (1987) 6-7
92 Hennessey (1992) 277
most of the 1930s, but it was the war years that saw the greatest decline in production. During the war total coal output decreased by 20%, productivity dropped significantly, miner absenteeism rose, and the monetary cost of production more than doubled. Further, since the onset of war industrial and domestic demand for coal had increased substantially. The wartime government had reduced coal allocations to households in the hope of ensuring that the increased industrial activities necessary for military engagement could be met. This reduction in domestic supply saw households turn increasingly to other sources of energy. Between 1939 and 1945, electricity and gas consumption soared by 41% and 25% respectively. However, both technologies were still ultimately fuelled by coal, and thus in their attempts to “rob the household Peter to pay the industrial Paul,” the government was unsuccessful in reducing demand for coal.93

It was in the shadow of declining coal production and mounting fuel demands, guided by expert advice such as that presented by the Coal Mining: Technical Advisory Committee (known as the Reid Committee), that the Labour government of 1945 prioritised the nationalisation of the mines.94 Attlee gave the position of Minister of Fuel and Power, and therefore the job of overseeing nationalisation, to Emmanuel Shinwell. Shinwell was popular amongst the miners and unions, his own seat of Seaton being a coalfield region in the North East of England. *Time* magazine described Shinwell’s appointment as the most “portentous” of Attlee’s cabinet, characterising Shinwell himself as “ruthless, knowledgeable, fearless, (and) dour.”95 In addition to nationalisation and his other formal functions as Minister for Fuel and Power, Shinwell first had to address the dire state of coal supply and increased seasonal demand to ensure that the coming winter saw no fuel shortages.

93 Robertson (1987) 32
94 Ministry of Fuel and Power Memorandum produced for the War Cabinet on the Future of British Coal Mining, May 16th, 1945. CAB 66/65/58
95 *Time Magazine*, “Great Britain: The New Cabinet,” August 13th, 1945
In August 1945 national coal stocks lay at 12.1 million tons, 5 million tons short of what the average stock level had been mid-war in 1943.\footnote{The figure included already distributed stocks held by industry and domestic consumers. Coal Stocks August 1945 – private memo. SHINWELL 3/5, CSO (1946) Table 23} Considering that coal stocks peaked around October each year and that the previous two years had seen consumption exceed mined production, the stock figure for August 1945 was a clear indictment of the seriousness of Britain's fuel position. In March 1945, outgoing Minister for Fuel, Gwilym Lloyd George, had predicted a 4 million ton deficit. Outgoing Paymaster General, Lord Cherwell, doubled this figure, stating a predicted deficit of 8 million tons.\footnote{Minutes of the 16th Meeting of the Lord President's Committee, 21st March 1945. CAB 71/19} By mid-August it was clear to Shinwell that the deficit was likely to be much higher than 4 million tons, and by October 2\textsuperscript{nd} still using optimistic language, Shinwell revealed his predicted deficit figure of 8 million tons.\footnote{Robertson (1987) 36-7} Shinwell’s prediction, caused Attlee to form a Ministerial Committee on Coal, chaired by the Chancellor of the Exchequer, Hugh Dalton.\footnote{Different accounts refer to this committee under different names – Robertson (1987) calls it the Ministerial Coal Committee, whilst Hennessey and Arends (1983) reference it as the Coal Position for winter 1946; this chapter uses the name used by Shinwell himself in his own notes; the Ministerial Committee on Coal. All varying names refer to the committee which can be found under Public Record Office reference CAB 78/38} The committee was supported by a subordinate senior civil servant panel, the Official Coal Committee, and aimed to closely monitor the supply and distribution of coal throughout the winter of 1945-46. One of the main challenges the new committee faced was co-ordinating the increasing number of departments being drawn into the mounting fuel situation.\footnote{Ministerial Coal Committee, First Meeting, 4\textsuperscript{th} October 1945. CAB 78/38}

It was evident by the autumn of 1945 that if catastrophe was to be avoided, the Ministry of Fuel's efforts must be co-ordinated with those of the Ministry of Labour to ensure that quick recruitment of manpower was achieved, and with the Ministry of Transport, to ensure that distribution of coal was efficient and adequate. Indeed the Minister of
Transport, Alfred Barnes, in contrast to Shinwell, openly spoke about the problems facing coal distribution during the winter due to the dilapidated state of heavy freight locomotives and coal wagons.\textsuperscript{101} In a remarkably short time frame, the committee, through its inter-departmental approach and a systematic method to address every aspect of the difficulties, produced diverse solutions, from publicity campaigns to diverting low-priority coal supply to sea and road.

As early as November 1945, the committee was cautiously optimistic that the emergency measures taken were enough to avert disaster. Shinwell rather prophetically added the caveat that, “failing severe weather conditions and transport interruptions, we can see our way through the winter.”\textsuperscript{102} By April 1946 stocks were so low that they would cover the nation for just over seven weeks.\textsuperscript{103} The nation had made it through the winter of 1945-46 without disruption by only the slightest margin (Figure 2.1).

Despite these stock levels, and the fact that for certain users’ allocation of coal had not been met, Shinwell and the Ministerial Coal Committee agreed to suspend their meetings until the onset of the next coal winter at the end of October 1946.\textsuperscript{104} Whilst ministers’ minds became preoccupied with other pressing affairs, including the Coal Industry Nationalisation Bill that was progressing through parliament, many senior civil servants and parliamentary secretaries continued monitoring the coal situation. They recognised that simply reconsidering the issue at the beginning of October allowed no time to ensure that issues were addressed before the winter’s increased seasonal demand. One of the most outspoken proponents against the confident attitude that had entered ministerial minds by

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\textsuperscript{101} Robertson (1987) 36
\textsuperscript{102} Shinwell, Ministerial Coal Committee, Progress Report, November 1945. CAB 78/38
\textsuperscript{103} Stocks in April 1946 were 6.85 million tons, average weekly consumption over the winter just passed had been 0.97 million tons
\textsuperscript{104} The “coal year” ran from May to April – this was split into the “coal summer” – May to October; and the “coal winter” – November to April
the spring of 1946 was the Prime Minister’s economic advisor, Douglas Jay. From
November 1945 onwards, he wrote several memoranda and minutes to Attlee couching
the scale of the potential fuel problems in economic terms: “If no other action is taken
soon, we shall find ourselves next Autumn with virtually no exports, and an even greater
shortage of coal at home, just at the time when the National Coal Board has taken over.”105

Figure 2.1: Coal production, consumption and stock levels. (Production and consumption are weekly averages, distributed stocks as of the end of the stated period.) Right: Coal production and consumption during the fuel crisis. Source: CSO (1946) and Ashworth (1986) – Table 4.1

105 Jay (1980) 144: Minute from Jay to Attlee, 30th January 1946
Along with his civil servant cohorts, Jay attempted to keep the fuel shortage issue on the political radar throughout the coal summer of 1946. Many developments were agreed in principle, such as the employment of ex-service Poles in the mines. However, the lack of coherence and authority that the Ministerial Committee had brought the previous winter, meant progress was drawn and protracted. By the end of June 1946 stocks were 3.3 million tons below the previous year and the labour force had not increased. In a paper circulated to the Cabinet and Lord President’s committee, Shinwell stated that to ensure disaster was again averted supply had to increase by 13 million tons. However, many of Shinwell’s proposed measures were far too long term in nature than the immediacy of the present stock situation required. Jay was again weary of Shinwell’s perpetual optimism, feared stocks being depleted to the impossible level of 3-4 million tons by the end of the coal winter. Jay’s fears of “uncontrollable dislocation,” and a “predictable and avoidable disaster” addressed directly to Attlee may have ensured that the Ministerial Coal Committee, not due to reconvene until the autumn, was brought together in late July 1946. The figures presented at this meeting suggest that, irrespective of the coming winter conditions, the upcoming months would see at least some level of disruption to the public and industry, if not a complete fuel collapse.

Parliamentary debates over fuel supply had been going on since before the Labour government took office, and although efforts to prevent disruption had been made since the previous winter, Shinwell later acknowledged that “The coal crisis, so far as the public was concerned began with the great freeze-up which started in the latter part of January, 1947.” Whilst the seriousness of the fuel situation had not yet been explicitly revealed to the British public, by the onset of winter in 1946, many citizens were beginning to express

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106 Output, Recruitment and Conditions of Employment in the Coal Mining Industry, 17th June 1946. CAB 129/10
107 Shinwell (1955) 180
general frustrations about austere post-war life, caught between post-war optimism, fuelled by increases in the supply of non-food household goods, and vexation at the continued need for a wartime spirit, typified by the introduction of bread rationing. The lack of public communication about the real situation regarding fuel was to come back and haunt the government, especially Shinwell, but for now especially from the left he enjoyed stoic support. Full of hubris, a columnnist in the Daily Mirror explained, “We did not shiver last winter. We shall not shiver this winter. How dare Mr Shinwell be so successful?”

On January 1st, 1947, at a ceremony attended by dignitaries and the media, Emmanuel Shinwell presented a bound copy of the Coal Industry Nationalisation Act to the chairman of the newly formed National Coal Board (NCB), Lord Hyndley. Those involved had little time to dwell on this new era for coal mining in Britain, as since November, despite the ongoing efforts of the Ministerial Committee on Coal, total coal production was still in decline (Figure 2.1). As 1946 gave way to 1947, the mood amongst ministers changed, and many, even the eternal optimist Shinwell, were beginning to speak in terms of urgent measures and minimising disruption, rather than outright denial of fuel shortages. Increasingly, an oft quoted comment Shinwell had made in October 1946, looked like it might become his political career’s epitaph:

Everybody knows there is going to be a serious crisis in the coal industry except the Minister of Fuel and Power. I want to tell you there is not going to be a crisis in the coal

108 Frank Furedi describes the cultural frames of resilience which enabled UK society to come through the blitz and have since influenced UK disaster discourses as the “Blitz spirit.” Furedi (2007) 238

109 The Daily Mirror, Thursday, 28th November 1946 – 2

110 BBC Sound Archive (1947): National Coal Board Takes Over, January 1947

111 The Ministerial Committee on Coal had met on 16th Sept, 17th Oct, 2nd Nov 1946 and also the coal issue had been on several cabinet meeting agendas featuring heavily in meetings held on 11th & 15th Nov, 1946. SHINWELL/1/3: Submissions to Cabinet and Committees on Fuel Situation, 1st January 1946 - 7th March, 1947.
industry, if by crisis you mean that industrial organisation is going to be dislocated and that hundreds of factories are to be closed down.\textsuperscript{112}

Despite ministry attempts to present favourable figures about coal production and consumption, the problem was becoming apparent to those beyond the walls of Whitehall. As opposition MPs in parliament and newspapers began interrogating the government’s figures, the bottom line could not be ignored; electricity demand was up 38\% whilst the coal winter had been entered with 25\% less stocks than the previous winter (Figure 2.1).\textsuperscript{113}

On January 1\textsuperscript{st}, 1947, the first consumption cuts scheme was introduced after being originally proposed by officials at the Ministry of Fuel back in November. The main reason for delay with the scheme’s implementation was Shinwell’s open dislike for the original proposal. Shinwell disliked the scheme due to its complexity, and because he wanted to try and implement reductions without a public announcement, as to avoid any, “depressing political effect.”\textsuperscript{114} The Cabinet preferred Shinwell’s proposal, which simplified his officials’ original, and amongst other measures, cut deliveries to essential industry by 5\% and to non-essential ones by 10\%. Shinwell’s 5\% and 10\% figures and their proposed savings were nonsensical, as by November 1946 actual deliveries of coal to industry were already running at about 25\% below allocations.\textsuperscript{115}

In late 1946 before the scheme could be introduced, the first signs of the trouble to come emerged as regional power cuts began. Not yet boosted by the large power station construction program which was still underway, the Central Electricity Board (CEB) struggled to meet peak demands that had grown substantially since the previous winter.

\textsuperscript{112} Robertson (1987) 43: Quoted in the Daily Herald, 24\textsuperscript{th} October 1946. Shinwell was addressing a lunch of coke-oven managers when he made this statement.

\textsuperscript{113} The Times, Wednesday January 1\textsuperscript{st}, 1947, 4

\textsuperscript{114} Robertson (1987) 61

\textsuperscript{115} Ashworth (1986) 135
Looming over these early problems, primarily caused by the inadequacy of generating capacity at plants were also questions about the state of stocks and deliveries. By the end of December, power disruptions had spread beyond electricity, with cotton mills in Lancashire and factories in the Midlands having to close or rely on emergency deliveries of coal to remain open.\footnote{Robertson (1987) 61-5}

By early January 1947, the majority of industry was only receiving 70% of its coal allocations; the government knew that to avoid a complete collapse of the country’s industrial set-up, immediate action was required. The geography of the shortages was not homogenous, with the heavy industrial regions of the Midlands, the North-West, and London experiencing stocks closest to exhaustion.\footnote{Ashworth (1986) 135} On January 3\textsuperscript{rd}, 1947, Shinwell presented two alternative courses of action for the Cabinet to consider. Both entailed replacing voluntary cuts already in place with compulsory restrictions under the 1945 Supplies and Services Act. Still framing the fuel problems in terms of increased electricity demand and coal transportation difficulties, Shinwell’s memorandum sparked several replies from cabinet colleagues.\footnote{Coal and Electricity, 3\textsuperscript{rd} January 1947 (CP (47) 6); responses to this memo by Shinwell came from Barnes (CP (47) 15), Morrison (CP (47) 17), & Cripps (CP (47) 18). CAB 129/16} One of these replies came from the President of the Board of Trade, Stafford Cripps. Cripps belittled Shinwell’s latest proposal, and called for the allocations of solid fuel to all industrial firms outside iron and steel and coke ovens be cut by 40 percent, or if the Minister of Fuel and Power considers necessary 50 percent, iron and steel and coke ovens being cut by, say, 20 percent. Similarly, directions should be served on firms that their consumption of gas and electricity per month must be reduced by 40 percent, from that of the month of November instead of the present 2½ percent.\footnote{Coal and Electricity, 6\textsuperscript{th} January 1947 (CP (47) 18). CAB 129/16}
When the Cabinet met on January 7th it was Cripps who grasped hold of the crisis, with Shinwell conceding early on in proceedings that Cripps’ stringent measures were perhaps necessary. The cabinet agreed on cuts based on Cripps’ proposal. Then remarkably, given the seriousness of the situation, the implementation of the cuts was delayed for nearly two weeks. Indeed, the plans were not even publicly announced until January 13th, when Shinwell and Cripps jointly faced the media to inform the nation of the depth of the crisis. From the Cabinet meeting on 7th January, when Cripps’ measures were agreed upon, until late January, the fuel situation had once again slipped down the ministerial priority list. The relatively mild weather had reduced demand, and the herculean efforts by regional Fuel Allocation Committees to distribute their remaining stocks evenly may have facilitated some of this breathing space. However, as soon as the measures came into force on January 20th, the scale of the cuts were immediately felt throughout the UK. The iron and steel industry announced the beginning of four day workweeks in all main manufacturing locations, whilst many other industries attempted to optimise what limited fuel they had left, cutting production and employment dramatically. As the snow began to fall on January 23rd, 1947, Cripps’ reduction measures were too early in their implementation to have yet had any real impact on coal stocks. And so courtesy of the weather, what up until that point had predominantly been an industrial and provincial problem was brought directly to the government’s attention as Whitehall and London were submerged in snow.

2.3 The coldest winter since 1894

On the evening of January 23rd, 1947, the South East of the UK was silently covered in a thick, but not unprecedented, carpet of snow. Waking on the morning of Friday 24th

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120 The Times, January 14th 1947, 2
121 Robertson (1987) 78-9
January, motorists in West Sussex were mildly inconvenienced on finding the Chichester to Petworth road impassable, whilst over the weekend milkmen in Hampstead delivered their rounds by sledge. Thus, in this rather unassuming and somewhat convivial manner, began one of the UK’s harshest winter periods of the twentieth century. This episode has been remembered not only for its longevity and severity, but also for its draining physical effect on a nation still reeling in the aftermath of two world wars. It has also since become a yardstick by which subsequent winters have been gauged.

The meteorological statistics of the winter, many still UK records, reveal the intensity and severity of the period. After the initial bouts of snow which fell from 23rd to 29th January, the vast majority of mainland Britain experienced continuous snow cover until 13th March. Drifts of over ten feet were a regular sight (Figure 2.2), and many areas lay under up to two feet of snow for much of the period. These high snowfall levels were unusually coupled with extremely cold average temperatures; one measure the Central England Temperature, a monthly mean of surface air temperatures was -1.9°C for February, the coldest on record since measurement began in 1659. A biting easterly wind blew almost consistently across the country from late January until 22nd February, adding a severe wind chill to the already penetrating temperatures. And as if these conditions were not enough to break the resolve of even the most war-hardened housewife, the period was exceptionally lacking in sunlight. The observatory at Kew recorded a record setting zero hours of sunshine from February 2nd to 22nd, 1947.

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122 The MO Daily Weather Report shows maximums of 5cm at Felixstowe and Boxted on the morning of 24th January 1947, whilst the Times of 24th January anecdotally reports depths of 6 inches in parts of East Sussex. See Booth (2007) Table 1; The Times, 24th January 1947, 4; The Daily Mirror, 27th January 1947, 1

123 For information on how the Central England Temperature is determined and for a complete dataset see Manley (1974)

124 Robertson (1987) 10; Booth (2007) Table 1 & 2
Like a crippling vice causing dislocation, accentuating the already acute coal situation, the cold and snow spread northward throughout the country. The scale of the inclement weather was unprecedented in living memory; seawater in many harbours froze (Figure 2.3), while the incessant driving blizzards meant blocked roads were covered by layer upon layer of compacted snow. By February 5th, it was reported that fifty-seven loaded colliers were stranded in the ports of the North East, unable to sail south to London. Further, there were thirty colliers stuck in the Thames, unable to head north to reload. Rail transport was heavily disrupted, with one passenger service from Penzance to Paddington running nine hours behind schedule, because it repeatedly became stuck in heavy snow. Accounts of great community spirit and camaraderie in the face of the weather dominated newspaper columns up and down the country as the blitz spirit was invoked. An eyewitness talking to the BBC about how the town of Buxton, Derbyshire had been cut off due to the snow spoke

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125 Dislocation of Coal Supplies through Transport Difficulties, 5th February 1947 (CP (47) 50) CAB 129/16; Robertson (1987) 13
of an intrepid motorist picking up a girl on the roadside, who was trying to get to Stockport Infirmary for an operation. With the help of locals clearing the road, the motorist managed to get the girl to her appointment.126

As the weather prevailed beyond the end of January, it became clear that the Cabinet, which met 12 times between January 7th and the next time the fuel crisis was discussed on the February 4th, could not afford the time and intimate knowledge the situation now required. Further, there was government criticism of the level of industry specific knowledge commanded by staff at the Ministry of Fuel and Power (MoFP). On February 6th, although the NCB had no formal responsibility for coal allocation, Lord Hyndley offered ministers help in the form of a joint committee between the Ministry and the marketing department at the NCB. At the height of the crisis, this committee was to meet daily, capturing vast amounts of data from the regional coal boards, presenting these figures to the Cabinet, and dealing with individual cases where there was a dire need for more coal. This new committee relied on the experts in logistics, statistics, and coal and railway engineering of the NCB, regional coal boards, and CEB, in minimising the disruptions and ensuring that normal services were rectified as soon as possible. For example, it was experts at the NCB and CEB who worked out the programme of deliveries to build up stocks at power stations, deciding on collieries and transport routes to optimise performance.127 Although these experts were trying to limit disruption primarily caused by the weather, they used only basic weather forecasts and the MO were absent from their discussions.

127 Ashworth (1986) 136
In a Cabinet memo from February 5th, Shinwell presented the CEB’s view that: “If, owing to weather conditions, coal was not moving from the producing areas, it must be expected that by the weekend power stations in London and in South Eastern and North Western England and the Midlands would have to close down if no special action was taken.”¹²⁸ The CEB recommended the complete cut off of electrical power to all industry within the afflicted regions, and that supplies to the domestic consumer be cut off from 9am to 12 noon, and from 2pm to 4pm. Shinwell’s optimism appeared once again, as he advised in the memo that the situation should be reviewed daily, and the scheme should be halted, “until we see whether the action now being taken is sufficient to render those (further) measures unnecessary.”¹²⁹ By this point the consumption and production figures for the UK made ominous reading: for the last two weeks of February, coal consumption outstripped

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¹²⁸ Dislocation of Coal Supplies through Transport Difficulties, 5th February 1947 (CP (47) 50). CAB 129/16
¹²⁹ Dislocation of Coal Supplies through Transport Difficulties, 5th February 1947 (CP (47) 50). CAB 129/16
production by 0.28 and 0.4 million tons respectively (Figure 2.1). Granted, on average consumption had outstripped production by 0.65 million tons the previous January, but at that point, the nation had distributed stocks of 9.76 million tons against a current end of January figure of only 6.7 million tons. It was clear that if the weather did not change soon, the measures already in place would not be enough to avert a national energy crisis.

On the February 7th, temperaments within the Cabinet began to deteriorate, as belatedly, the urgency of the situation threatened to overwhelm the Cabinet, and in turn, the whole nation. Only the previous day Shinwell, and to a lesser extent Barnes, had emphasised the barriers being overcome as ships were beginning to move, and efforts were beginning to result in dividends. In a complete u-turn less than twenty-four hours later, Shinwell informed the Cabinet that, after further consideration, he had decided that the full CEB plans, which he dismissed only the day before, needed to be publicly announced and implemented for a period of three to seven days.  

Shinwell announced the program to the Commons that afternoon. If one has noted a lack of venom to proceedings on fuel thus far, then they need look no further than the record of proceedings for the House of Commons debate on Industrial Fuel Supplies of February 7th, 1947. Shinwell, and the entire Labour government, were repeatedly questioned about the coal situation from opposition ministers and their own backbenchers. Finally, after deflecting much lambasting, Shinwell announced the new cuts: “As from Monday, no electricity shall be supplied to any industrial consumer in the areas specified, and that supplies to domestic consumers shall be cut off during the hours from 9 a.m. to 12 noon and from 2 to 4 in the afternoon.”

Douglas Jay, now a Labour MP for Battersea North, tried to defend Shinwell and the cuts, but perhaps unsurprisingly, Shinwell was attacked in both the Commons and the press. As

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130 Conclusions 18 (47), 7th February 1947 (CM (47) 18). CAB 128/9
131 House of Commons Debate, 7th February 1947, vol. 432 cc2122-206
the fuel crisis exploded into parliamentary and public lives, Attlee, understood that the public image of Shinwell and his Ministry was in dire need of support. Under duress from his Private Secretary, Gorell Barnes, amongst others, he called a central cabinet committee to oversee all of the different departmental arms of the ensuing fuel crisis.

The Cabinet Fuel Committee met the following Wednesday, February 12th, 1947. Chaired by Attlee, it was an executive, authoritative body designed to make decisions without deliberation. The committee received daily digests of the information being compiled by CEB and NCB experts, via a sub-committee consisting of Cripps, Shinwell, Barnes, and Isaacs. Effectively, Attlee used the Cabinet Fuel Committee as a tool to remove all power from Shinwell and his office, whilst maintaining a united front by not firing him mid-crisis.  

Whilst the crisis, and indeed the freezing conditions, were far from over, the creation of the Fuel Committee brought an incisive edge to proceedings, and decisions were made quickly in the hope of rectifying the longer term prospects for coal supply in the UK. At the committee’s first meeting, members agreed to extend the domestic cuts from the three industrial regions to nationwide. Their second meeting heavily restricted the operations of the BBC, cutting television broadcasts and reducing radio services. The Cabinet Fuel Committee began a systematic attack on all areas of the fuel problem, not only consumption and transportation, but also production. Again this systematic attack excluded the body who could best inform about the meteorological conditions; the MO.

Historian William Ashworth argues that in its belated action, the government, through the Cabinet Fuel Committee, overreacted with its increasingly drastic cuts. With its focus largely on improving the level of stocks held by power stations, the committee may have missed the opportunity to use some of the coal saved over the weeks that followed to keep

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132 Robertson (1987) 78-9; Cabinet Fuel Committee, 12th February 1947. PREM 8/426
133 Robertson (1987) 92-3
higher value outputs, especially those for export, in ongoing, if not reduced production.\textsuperscript{134} Whilst exports would potentially provide hugely welcome American dollars, and keep an upward momentum of production, they would not supply the nation with coal. Attlee turned down an offer from President Truman to divert American coal shipments destined for continental Europe, to the UK, stating that countries like France and Germany had more pressing need for the coal to ensure not only economic, but also democratic reconstruction.\textsuperscript{135}

Indeed, by the inception of the Committee on February 12\textsuperscript{th}, 1947, coal production and consumption was beginning to rise (Figure 2.1), due to the efforts and cuts already in place, including Cripps’ measures which had been operational since January 20\textsuperscript{th}. However, it was the actions taken by the Cabinet Fuel Committee, operating from statistics and expertise from the MoFP and NCB joint committee, a working party of civil servants chaired by Hugh Gaitskell, and a sub-committee of Cripps, Shinwell, Barnes and Isaacs, that effectively prevented the country descending into a complete, prolonged breakdown of operations.\textsuperscript{136} With its multi-faceted attack on all angles of the coal problem—from reducing the size of all daily newspapers by one fifth, to implementing a large number of military vehicles to move coal using otherwise impassable roads—the Cabinet Fuel Committee began to see coal stocks recovering in an amazingly short time frame. With still little sign of change in the weather, by the end of February, coal stocks were improving and one by one the restrictions, cuts, and controls were beginning to be rescinded.

The severe dislocation may have only lasted just over a fortnight, but its effects were enormous; economically, socially, and politically, the already beleaguered nation had been

\textsuperscript{134} Ashworth (1986) 136
\textsuperscript{135} Robertson (1987) 95; Ashworth (1986) 137
\textsuperscript{136} Limited records of the Inter-departmental policy committee and operations room set up during the crisis can be found under POWE 10/426
shaken. An estimated 1.8-2 million people had been temporarily unemployed, £200 million of exports were lost, and the mismanagement of the crisis was only the beginning of a catalogue of events for the government in 1947; Dalton later calling the year Labour’s *annus horrendous*.\(^{137}\) Despite these huge loss figures there were admittedly signs that the winter had galvanised efforts, and in some areas improved production efficiencies. At the end of the week of February 22\(^{nd}\) 1947, Attlee congratulated miners as they achieved an output of just over 4 million tons (Figure 2.1). This output was better than any monthly average seen since the end of the war, and at a time when the weather was crippling both production and transportation at the pits, this was an astounding feat.\(^{138}\)

Apparent in all accounts of the winter, whether popular primary accounts or more recent academic histories, is how slow and laboured progress was, even as industrial closures began to appear in late 1946.\(^{139}\) The deliberation present in all levels of operation, from the regional coal boards to the Cabinet itself, only disintegrated once the weather brought into clear focus the situation in hand. Several scholars have written on how key UK flooding events acted as triggers or catalysts for political, policy, and social change, and the winter of 1947 performed a similar function in coalescing and reinforcing the more long term problems surrounding post-war fuel supply in the UK.\(^{140}\)

Within two weeks of the first snowfall, the Cabinet Fuel Committee was in place. Attlee’s use of an ad-hoc cabinet committee, which could accelerate proceedings and act collectively on an issue that crossed several ministerial departments, had been utilised the previous year when dealing with ongoing food shortages. In February 1946, Attlee had created a Cabinet Committee for Food Supplies, in an attempt to co-ordinate efforts to

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\(^{138}\) Robertson (1987) 96

\(^{139}\) See Robertson (1987)

\(^{140}\) See Penning-Rowsell et al. (2006); Johnson et al. (2005); and Hall (2011)
ensure no British dependents in countries like Malaya or India starved, whilst enough food was on the tables of families in the UK.\textsuperscript{141} Similarly to the limited stocks of coal that households had, prior to the winter of 1947 due to the ongoing food rationing scheme, few households had accumulated food reserves to tide them over should normal supply cease. As the prolonged winter began to bite, it was rural communities that suffered the most. In the press accounts abounded of villages completely cut off by the weather collecting together what little food they had in the hope it would see them through.\textsuperscript{142} The shortages of fuel and food accentuated by the weather cut across all class distinctions, but the disruption and discomfort caused was far from equal. Those with larger houses or friends abroad, such as biologist Charles Martin, could “close down the sitting room and live in the dining room where we can keep a stove going as we have coke,” and enjoy “glorious parcels of nutritious foodstuffs” from friends overseas.\textsuperscript{143} More directly, food production in the UK was not only severely hindered by the permanence of frozen soil throughout February, but also by the extensive flooding which accompanied the thaw in mid-March. The flooding inundated 30 out of the 40 counties of England, with the south eastern agricultural region of East Anglia being worst affected. Here, farmers, the military, and even Dutch experts in fenland management struggled to save what they could of the spring crops.\textsuperscript{144}

Historical accounts of the period often refer to the food shortages and problems surrounding fuel as being closely linked. Interestingly, accounts specifically about the

\textsuperscript{141} Minutes of the Cabinet Food Supplies Committee can be found in the PRO of the National Archives under reference CAB 134/729.

\textsuperscript{142} Robertson (1987) 15

\textsuperscript{143} Gibbs (2011) 149-50

\textsuperscript{144} See Harvest Home, Barker (1948) for a detailed account of the spring floods which followed the winter of 1947.
winter of 1947, rarely intertwine or contrast the concurrent food and fuel issues. The Minister of Food, John Strachey, like Shinwell his counterpart in the MoFP, was the target of much derision in the press, labelled “Pineapple John” after a consignment of pineapples arrived frozen solid and useless in Dundee. Throughout the winter, both Shinwell and Strachey were regularly depicted by newspaper cartoonists and satirically represented in many compromising situations. By early March, issues that had come to a head during the winter of 1947 were far from over. However, as the cold weather thawed and the huge floods prevailed, the ongoing fuel and food shortages merged back into the surfeit of other austere concerns of post-war British life.

2.4 Seeking Someone to Blame

As industrial activity declined and unemployment rose, and as the standards of household comfort and public amenity declined: as milk and mail deliveries became uncertain; as people actually passed out on the streets from the effects of the biting cold; as one by one the established certainties, large and small, from which people drew their sense of security evaporated in the face of snow, ice and frost; as even Big Ben refused to mark the passage of time in due form because his works were iced up; as adversity piled upon hardship in a seemingly endless catalogue of misfortune, people began to look for somebody to blame.

Emmanuel Shinwell increasingly found such blame being apportioned to him. Whilst the creation of the Cabinet Fuel Committee in February 1947 had effectively eroded all of Shinwell’s ministerial powers, it was not until October that Attlee quietly removed Shinwell from the MoFP. After considering various new roles for Shinwell, and with the risk of losing

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145 Compare Marr (2007) and Jay (1980), who speak of both food and fuel crises within sentences of each other to Obelkevitch and Caterrall (1994), who refer to food and fuel in separate chapters, and to Robertson (1987) who focuses almost exclusively on the fuel situation with little reference to the food shortages.


147 Robertson (1987) 21
such an experienced MP to the backbenches, Attlee settled on Shinwell’s new position as Secretary of State for War. With this move Attlee shifted the blame that the opposition and much of the public held for events of the winter just passed.\textsuperscript{148}

It may be argued that as Shinwell stayed in his position officially for months after the worst of the winter had finished, and was not dropped completely from Attlee’s government, that he avoided the direct pin of blame for the winter’s fuel crisis. However, it is clear that Attlee understood the politics of blame avoidance, and that Shinwell’s delayed departure was merely, as the Prime Minister considered it, impolitic to fire the Labour party’s strongest connection with the recently nationalised miners and their unions.\textsuperscript{149} Shinwell himself understood the role of a political scapegoat, expecting pressure and blame from the opposition and right wing media. Yet, beyond the attacks in the press and Commons, it is response from several of his colleagues, whether publicly or more privately, that affected him at a deeper level.\textsuperscript{150} Such internal criticism, came mainly from one partisan political camp within the Labour government, with Cripps, Dalton, Jay, and Gaitskell all expressing some level of blame toward Shinwell for the fuel crisis. Dalton confided in his diary as early as December 1946, that he agreed with at least half of the sentiment of the popular phrase, “Starve with Strachey and Shiver with Shinwell.”\textsuperscript{151} Gaitskell, then Shinwell’s Parliamentary Secretary, lamented the minister’s suspicious and aggressive attitude, and claimed that many in the Cabinet, including Attlee himself, disliked Shinwell.\textsuperscript{152}

Yet despite much maligning of the specific decisions Shinwell and his ministry may have made in the months before the fuel crisis, it seems even his most ardent opponents could

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\textsuperscript{148} Shinwell (1955) 186
\textsuperscript{149} Robertson (1987) 91. For more on the politics of blame avoidance see Weaver (1987)
\textsuperscript{150} Shinwell (1955) 183-4
\textsuperscript{151} Robertson (1987) 69
\textsuperscript{152} Gaitskell (1983) 28-30
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not place all responsibility with the MoFP. Even Jay, whose private memoranda to Attlee had highlighted Shinwell’s lack of urgency surrounding the fuel situation, stated: “It would have been a miracle indeed if the present Government had overcome that shortage in no more than 15 months. Therefore, I do not think the most dispassionate survey of the present serious situation need imply any reflection or blame on anyone.”\footnote{House of Commons Debate, 16th October 1946, vol. 427 cc905-1018; See Jay (1980) 149 for an example of Jay’s contempt for Shinwell’s prevailing optimism} Yet, in his autobiography written thirty years later, he is much less forgiving of Shinwell. It could simply be that the above quote made in such a public arena as the House of Commons was purely for party solidarity purposes. Or perhaps his later blame toward Shinwell was influenced by the legacy of the extreme weather.

The problems that the weather brought for the Labour government provided plenty of content for the press, especially newspapers on the right such as the Daily Express and the Daily Mail. How popular the phrase “Starve with Strachey and Shiver with Shinwell” became is open to some debate. Nearly all histories of the period refer to this as a common and popular Tory phrase, yet it only occurs once in the Hansard record, and the Daily Express, whilst often invoking its sentiment, never printed the phrase.\footnote{For reference to the phrase as popular see Hennessey (1992) 277, Marr (2007) 69, and Robertson (1987) 69. The only found use of the phrase in either the House of Commons or Lords came from Viscount Lambert on 8th May 1947. House of Lords Debate 8th May 1947, vol. 147 cc462-561} During the worst of the crisis, the Daily Express actually reduced its direct criticism of the socialist government, calling for everyone to, for now at least, pull together (see Figure 2.4). Further, there was regional variation in the use and wording of the phrase, with the Hull Daily Mail running a story titled, “Shiver for Shinwell,” on the decision of manufacturing workers to work without heating to help save coal.\footnote{The Hull Daily Mail, Tuesday, 21st January 1947, 1 – emphasis added} The Economist presented a still critical, but constructive analysis of the winter’s fuel shortages, stating that the crisis would have been no less severe had the Conservative’s been in power, and that the Labour government...
were not to blame for the low level of coal output. However, the magazine was clear to draw a distinction between inevitable coal shortages and the ensuing coal crisis, which was at its height at the time of press. The article lays the blame for the crisis firmly with the government, and directly with Shinwell, “an incubus on the government, and Mr Attlee.”

That Shinwell was blamed widely and from both sides of the political spectrum for the fuel crisis is in no question. However histories which present a rather homogenous picture of the castigation Shinwell received, fail to highlight the intricacies of people’s feelings toward Shinwell and the government’s handling of the situation.

Despite the criticism and blame placed on him by government official and the press, throughout the whole period, Shinwell received unwavering support from the miners, the NCB, and the mining regions in general. This support was typified by the Seaham Divisional Labour Party, who in October 1947, demanded reasons for Shinwell’s removal from the MoFP, with men in the region threatening to strike if he was not reinstated. Despite the harsh conditions the fuel crisis brought, many in these regions still viewed Shinwell as a

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156 The Economist, Saturday 15th February 1947, 265-7
bastion of nationalisation; the harbinger of modernisation and improved working conditions for those working in the coal mines.\textsuperscript{157}

The political cartoonist David Low repeatedly attacked the government throughout the crisis, yet the below quotation on one of his cartoons that appeared amidst the worst of the winter’s dislocation;

> When chiding Shinwell for not having produced an efficient coal supply in 16 months let us also curse those who during the last 30 years let the industry fall into decay: grasping owners, intractable miners, wasteful consumers and the evasive politicians who did not nationalise the mines 27 years ago as advised by the Sankey Commission 1919.\textsuperscript{158}

Terms like “popular” or “common” give us no insight into the actual occurrence of a phrase, imbuing a sense that not only did the media consider the sentiment true, but also that the majority of the British population concurred. When respondents to the social research organisation, \textit{Mass Observation} were asked in 1947 who was to blame for the fuel crisis, responses varied from, “everyone in the government... for trusting too much on the weather,” to, “the mineowners for not modernising the mines.” \textit{Mass Observation} records from the winter further illuminates the fact that opinion varied not only regionally and by social class, but also that people held contempt for several actors involved, including Shinwell, the miners, and the weather itself.\textsuperscript{159}

\textsuperscript{157} Letter from Seaham Divisional Labour Party to Clement Attlee, 12\textsuperscript{th} October 1947 - SHINWELL/3/5; Shinwell (1955) 188

\textsuperscript{158} \textit{The Evening Standard} (1947): The quote appears in a cartoon entitled, “Nemesis Pays Off” and is attributed to Mr Saul Wright M.P. However records show that there has never been a Member of Parliament named Saul Wright, it is likely the quote should be attributed to diplomat Sir Paul Wright who prior to nationalisation had worked as a temporary civil servant in the MoFP and at the time of the fuel crisis was working in the public relations directorate for the National Coal Board. – The Times Online, Obituary, 30\textsuperscript{th} June 2005

\textsuperscript{159} Mass Observation Archive (1947): Who are the Fuel Wasters?
It is difficult to try and ascertain to what extent the fuel crisis and levels of dislocation would have occurred if the UK had received average meteorological conditions throughout early 1947. One could conduct a detailed survey, using the overabundance of statistics which fed Attlee’s Cabinet Fuel Committee, attempting to determine the level each factor—transport, mines, weather, demand, ministers etc.—influenced the events that brought the country temporarily to its knees. However, this analysis would be limited in its ability to help one learn or understand proceedings in any more depth. For it is only in the interaction of all the involved factors, that one can begin to understand how the crisis materialised. As one left-leaning journalist noted: “How is it that the Minister of Fuel who began office with a weekly coal output of 3,386,000 tons and then increased it … to over 4,000,000 tons found himself sacked?”

Disaster studies literature is clear to state a link between levels of pre-disaster perceptions of risk and post event allocation of blame, yet most writing in the area is vague about exactly how this relationship may function, transmit, and operate. Throughout the winter people apportioned blame in varying amounts to Shinwell, the government, and also the weather. Whilst we have seen that all three contributed to events and that many individuals simultaneously blamed humans, institutions, and natural processes, we must consider how blame cast toward these agencies may have differed. The political and institutional manifestations of blame were targeted at a conscious agency who many felt had failed to fulfil its responsibilities, whilst that directed at the weather was more abstract. One area where many commentaries during the winter agreed in the apportioning of blame was with the MoFP’s mismanaged and inept public communication of the fuel situation and subsequent crisis. The US magazine *Time* summed Shinwell’s actions up thus:

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160 Cassandra (1947): Newspaper Article, “Mr Shinwell and the Press.” Unknown publication, copy in SHINWELL 5/16

“Shinwell gambled on a green winter (as had some politicians before him in comparable situations). He then made a serious political error as well as a bad bet: he kept his gamble to himself.”

By clearly maintaining an optimistic persona when addressing the House of Commons and the public, whilst using much more explicit language when engaging with the Cabinet, Shinwell failed to emphasise the potential gravity of the situation before the inclement weather catalysed the fuel supplies collapse. By doing this, Shinwell and the Cabinet internalised the risk of a fuel crisis, hedging their bets on the chances of the coming winter being mild, and demand for coal remaining manageable. Not only did a lack of public risk perception around fuel stocks in the build up to the fuel crisis lead to an increased level of blame following the winter, but it also helped perpetuate the crisis as it was occurring. As Mass Observation noted in 1947, “Being taken by surprise, as so many people were, they did not take the crisis seriously at first.”

The late and limited role in proceedings that the Government gave the public meant that when restrictions were made, many felt disconnected from the reasons behind them, and simply flouted the directives. Criticism was further exacerbated by the government’s handling of communication once the crisis and dislocation began to occur. For while it was clear the weather was a key component in fuel supply issues, the original factory closures had begun before the first snow inundation at the end of January 1947. Yet the government continued to state that all of the problems were caused by the extremity of the winter weather, when it was obvious to most UK citizens that fuel problems had preceded the first snowfall. Historian Ted Steinberg (2000) has exposed this “look what nature has done to us” position, as being a stance for policymakers and politicians which is

162 Time Magazine, “GREAT BRITAIN: Panorama by Candlelight,” Monday 24th February 1947, 2
163 Mass Observation (1947) 4
164 The Economist, Saturday 15th February 1947, 265
open to public criticism, often used in an attempt by governments to shift blame from their poor decision-making, to the weather. Individual within the government fared rather differently in their attempts to shift blame toward the weather.

The defining role of communication with the public is demonstrated by the fact that John Strachey, as Minister for Food, did not ultimately share the fate of Shinwell and remained in his post throughout the period. Although, like Shinwell, he was much maligned and attacked in the press the risks of food scarcity had long been apparent to all members of the public, through food rationing and wartime poster campaigns, and the press linked the issue to international problems that pre-dated Strachey’s appointment. Strachey and his Ministry, unlike Shinwell, maintained a public dialogue around possible future shortages, managing to continue contextualising the UK’s plight within global narratives of food production. Whilst on occasion, coal shortages were contextualised within wider scarcities across Europe, the UK had, until recently, exported large quantities of coal, and thus the prevailing attitude which most brought to the problem, was that Briton’s had an almost God given right to a steady fuel supply.

Writing in February 1947, Shinwell’s Private Personal Secretary, George Wigg stated: “That there are two crises, not one...The long term crisis arises from low coal production due to failure to modernise the pits...The immediate crisis is a transport crisis caused by the weather conditions.” Public evocations of the winter, often used as a yardstick whenever a cold spell occurs, focus on Wigg’s “immediate crisis,” placing meteorological events of the winter at their centre. Whilst often mentioning hardships faced by communities, they

165 Steinberg (2000) 174

166 See The Times, Friday, January 24th 1947, 2 for commentary on the European coal situation followed by an article on fuel shortages at factories in Manchester – despite being on the same page no connection is drawn between the two articles.

167 Letter from Wigg to Liddle, 18th February 1947. WIGG 2/2
rarely engage with fuel and food problems that pre-dated the inclement conditions.  

These weather-centric accounts form much of the cultural memory of the winter, whether one reads Wikipedia or is speaking with elderly relations.

### 2.5 Creating a cultural memory of the winter

When you reach a great age – you will be able to say when your grandchildren complain about the weather – huh – my dear boy or girl what are you grumbling about this is nothing compared to the winter of nineteen hundred and forty seven.  

The popular image of the winter as encapsulated in this quotation from an episode of the BBC radio show *Children’s Hour* broadcast at the end of the winter has begun to be redressed by recent histories, which have added increased economic, social, and political accounts to the narrative of the period. By shifting the emphasis of analysis to consider a more contextualised picture of the winter weather and fuel crisis, such histories have been more forthright in placing blame on actors, both political and expert. However, both the popular image of the harsh winter, and the revisionist history of an economic fuel shortage accentuated by the weather, fail to consider the interaction of the social, technological, and natural processes of the disaster, and therefore do not present an account that is complete.

Not only do historical accounts of the winter fail to treat it as both a contextualised process and a discrete sequential event, but they also present broader challenges about where

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168 For an example of an academic history with a meteorological emphasis see Roberts (2003) and for a popular account of the winter see the Met Office Website  
169 For recollections of the winter conditions see the comments section to Telegraph Online article from Saturday, 9th January 2010.  
170 BBC Sound Archive (1947): Children’s Hour, 25th March 1947 – Commander Stephen King Hall  
171 For general histories of the period which cover the winter see Hennessy (1992) and Kynaston (2007), for a specific account of the winter and the fuel crisis see Robertson (1987)  
172 See Robertson (1987); Hennessy (1992); Marr (2007) and Kynaston (2007)  
173 Oliver-Smith (1996) 304
boundaries between natural histories and human histories should be drawn. \textsuperscript{174} Historian Dipesh Chakrabarty (2009) explores this boundary, developing Fernand Braudel’s idea of histories which consider man’s relationship to nature. Using as evidence the case of anthropogenic climate change, he criticises humanist histories of modernity and globalization which do not take account of environmental factors. \textsuperscript{175} The varying emphasis found within contemporary, historical, and popular accounts of the winter of 1947, impinges around where to place the natural, meteorological conditions within the societal and political narratives of the winter.

The winter of 1947 occurs in a period where popular perception of the risks presented by extreme weather were shifting from the previously dominant notion of uncontrollable Acts of God, toward a more human inflected collision of societies and meteorological factors. \textsuperscript{176} Events such as the winter, where the distinction between human crises and meteorological catastrophe blurred very publicly, helped alter public expectations during extreme weather in post-war Britain. In Figure 2.5, the weather is personified as Jack Frost – removing agency from the unknown control of God and placing it within the same realm as politicians and the public. The winter of 1947 shows that blame apportioning in a natural disaster situation occurred long before academics began to make this distinction in the 1970s and 1980s. \textsuperscript{177} However, rather than clearly showing that blame occurs in natural disaster situations, even in the austere environment of post-war Britain, what this analysis has highlighted is the limitations of thinking in terms of a nature versus anthropogenic divide.

\begin{flushright}
\textsuperscript{174} Bankoff (2004) 24 \\
\textsuperscript{175} Chakrabarty (2009) 201-9 \\
\textsuperscript{176} Jankovic (2006) 40: For an overview of development in the perception of disasters during this period. \\
\textsuperscript{177} See Blocker and Sherkat (1992); and Wijkman and Timeberlake (1984)
\end{flushright}
Whilst the winter has become the yardstick by which the British have measured subsequent severe winters, if we look at meteorological statistics alone, it is unclear that the winter of 1947 is the most extreme on record, or even of the twentieth century.\textsuperscript{178} Using a winter average, the Central England Temperature record only ranks the winter as the 13\textsuperscript{th} harshest since records began in 1659. In contrast, the winter of 1962-63 (see 7.2), ranks as the 3\textsuperscript{rd} coldest since records began.\textsuperscript{179} If we consider any number of other metrics, such as snowfall, temperature maxima, or daylight hours, it is clear that whilst the winter of 1947 was extreme, it is only one of a number of such winters experienced in the UK. Contemporary accounts of the winter appearing in meteorological magazines throughout 1947-48, understood the relative severity of the winter in its climatological context.\textsuperscript{180}

However, the cultural memory of an extreme weather event is formed by much more than

\begin{itemize}
\item\textsuperscript{178} Robertson (1987) 108
\item\textsuperscript{179} Booth (2007) 68 – Table 2
\item\textsuperscript{180} See Harley in Strauss and Orlove (2003) 103-15; Manley (1974); Booth (2007); and Bleecker and Van den Harn (1947)
\end{itemize}
just the meteorological factors which cause the dislocation. The combined meteorological, economic, and cultural factors of the winter of 1947 are what place it on an elite list of severe weather events within the UK, which are still culturally relevant decades after their occurrence.  

For it is the complex interactions of our collective societies which influence how we are affected by weather, creating areas of vulnerability and the capacity to reduce impacts.

Discussion thus far has centred on three strands of events, namely the weather, the fuel crisis, and food shortages. One agent, a familiar mainstay of modern weather discourses in the UK, has remained remarkably silent throughout the narrative presented.

2.6 The Absent Weather Forecaster

Despite the successes of the MO during the war as discussed in the next chapter, by 1947, the majority of the British public’s contact with their national meteorological service (NMS) was minimal. Aside from those who depended directly on the weather for their livelihoods, such as fisherman and farmers, few had an intimate knowledge of weather forecasting, including politicians. The majority of Britons’ contact with MO weather forecasts in the period was either through the short, scripted radio bulletins read by a BBC announcer, or via daily newspapers. Both were simple interpretations of the MO’s Daily Weather Report, which was a summary of twenty four hours of weather, consisting of UK observational data from the previous afternoon/evening, a UK weather chart for that day, a European chart of the morning’s weather, and UK observational data for that morning. This was the only regular source of weather information received by politicians, senior civil servants in Whitehall, and the newspapers publishing weather information for the public. Despite all newspaper forecasts being based on this report, the content and detail of forecasts varied

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181 Harley in Strauss and Orlove (2003) 103
182 Strauss and Orlove (2003) 3
hugely across the press (Figure 2.6). Few newspapers had the technical ability or column space for a map, and limited word counts meant that the forecasts lacked regional detail. Forecasts were little more than a general approximation of expected weather conditions. The lack of detail in newspaper weather forecasts illustrates the formative level at which MO activities were presented to the general public in post-war Britain. 

<table>
<thead>
<tr>
<th>Newspaper</th>
<th>Word Count</th>
</tr>
</thead>
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<tr>
<td>The Times</td>
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<tr>
<td>Daily Express</td>
<td>45 words</td>
</tr>
<tr>
<td>Daily Herald</td>
<td>21 words</td>
</tr>
<tr>
<td>Daily Mail</td>
<td>12 words</td>
</tr>
<tr>
<td>News Chronicle</td>
<td>10 words</td>
</tr>
</tbody>
</table>

*Figure 2.6: Word count for the weather forecast in a sample of National Daily newspapers from Saturday, August 24th, 1947.
Source: “Letters to the editor,” Weather, September, 1947, 179*

Further, Daily Weather Reports from the period highlight the MO’s (in)ability to predict accurately beyond a 24-48 hour timeframe. This lack of accurate mid-term forecasting is a decisive factor in why forecasters did not appear more prominently in accounts of the winter fuel crisis. The longevity of the cold weather was a decisive factor the Cabinet did not predict when considering initial restrictions necessary to ensure coal supply would continue uninterrupted. Due to the infancy and inaccuracy of medium term weather forecasting, the government did not consult the MO to ascertain when the extreme conditions would end. Whilst the MO had clearly made huge advances during the war, and had further established its position as a key expert authority on meteorological conditions within the UK after it, by the onset of the winter of 1947, the agency, much like the

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183 See Napier-Shaw (1940) Chapter 1
184 In 1944, Douglas of the MO was adamant that there was no scientific basis for predictions beyond 48 hours, whilst Krick based within the Admiralty often ran longer timeframe predictions. See Ogden (2001) 13-16 for an insight into the different prediction time spans claimed by competing groups.
weather it attempted to predict, remained peripheral in both the public and politician’s minds. The limited gravity that opinion from the MO carried in the period is clearly illustrated by handwritten amendments that accompanied a draft of a broadcast given by Attlee in the midst of the extreme conditions in February 1947:

Would any government have been justified in taking that course at the time against the risk that we might get an exceptionally severe spell of bad weather? ... It would have been mad to have done so just on the risk of an exceptionally severe winter... then came the bad weather – the coldest winter since 1894 – with snow dislocating rail traffic and gales holding up coastwise shipping... This is the worst spell of weather for 50 years. The risk was an outside chance.

The underlined text appears in the draft with a large cross next to it, followed by further annotation saying, “Meteorological Office says it was!” Nonetheless the final broadcast had all of the above underlined parts omitted.\(^{185}\)

Whilst MO forecasters may have played little more than a peripheral role in the winter’s key events, there were other actors cast in the role of expert. This expertise, upon which Shinwell, his ministry, and the Cabinet Fuel Committee relied, came from those working for bodies such as the NCB, CEB, and regional coal boards. Advice from these statistical, transport logistics, mine engineering, and economic forecasting experts all fed into decisions politicians made throughout the winter. Shinwell considered himself to be in the hands of these experts whilst, “they were in the hands of economic factors which they could neither foresee nor control.”\(^{186}\)

Contrasting this with more recent extreme weather events within the UK, we see a shift in both the types of experts consulted, and in the public prominence of their advice. In 1947,

\(^{185}\) MS. Attlee dep. 49: Correspondence and Papers, January 15\(^{th}\), February, 1947

\(^{186}\) Shinwell (1955) 179
advice was dominated by technical and engineering professionals, largely state employed, and speaking almost exclusively to the government behind closed doors. But by the end of the twentieth century, expert voices in extreme weather events had become more diverse, with an increased emphasis on scientific professionals from both inside government and from other institutions such as universities. Further, advice from these scientific experts is no longer restricted to the corridors of Whitehall, as science communication within the public realm has proliferated across the mass media.

The increased prominence of meteorologists’ advice during UK extreme weather events in the decades following the winter of 1947 can be clearly seen in the case of the storm of October 1987 (see 1.1). The weather forecaster’s position as a central authority and expert in extreme weather events is a key development of contemporary discourse. In contemporary disaster studies, where blame is no longer merely the reserve of purely anthropogenic events, those who have predicted and then warned on the size of the risk expected, become central to the social aspects of extreme meteorological events. This pivotal position that weather forecasters now find themselves in, and its development in the post-war period, is explored and expanded throughout the rest of this thesis.

2.7 Conclusion

Using the case study of the winter of 1947, this chapter has investigated how blame manifested in a UK post-war extreme weather event. Through analysing the government’s management of the interconnected challenges the winter brought, we have seen how the extreme winter period acted as a catalyst to many of the challenges already facing the beleaguered nation. Blame for the widespread disruption throughout the winter came from politicians, the public, and the press. Assigned to varying degrees toward the government, the weather itself, the miners, and the MoFP, it was the winter’s eternal optimist, the Minister of Fuel and Power, Emmanuel Shinwell who was to receive it most.
Despite increasing coal production throughout one of the harshest spells of winter weather the UK has ever faced, Shinwell was made a scapegoat for the fuel crisis.

The pressure placed on Shinwell and his Ministry was amplified by a lack of transparent communication about the true fuel situation facing the nation prior to the winter’s worst weather. By not having an open dialogue with politicians, and most importantly, the public, Shinwell distorted the nation’s risk perception of the chances of a fuel disruption during the coming winter. The difference clear risk communication had on the situation was highlighted by the case of the Minister of Food, John Strachey. Like Shinwell, Strachey was also much maligned in the press for the mismanagement of individual food supply issues during the winter. However, the more public discussion of food shortages, which were placed in a global context, meant that public expectations surrounding food supply during the winter were more realistic, and Strachey remained in his post. As we shall see in the coming chapters, how risk in extreme weather situations is communicated to the public is a key issue which was to emerge for the MO over the coming decades.

This chapter has also shown how the weather forecaster, so central in modern extreme weather discourse, was still a peripheral figure in the post-war period. The experts involved in influencing political decisions throughout the winter of 1947 were predominantly logistical and technical. The remainder of this thesis looks at the development of MO officials as prominent weather forecasters and experts in extreme weather situations in both state (Chapters three and four), and public (Chapter five, six, and seven), spheres during the years that followed.

The winter of 1947 has developed two distinct narratives, which have been discussed as the cultural memory of the period. First are popular histories, which remember the severe weather, the hardships faced, and the camaraderie which saw communities through. Traditional in their nature, they present a collective memory of January to March 1947. The
second narrative, is that which considers the winter months as a passing element in a longer analysis of post-war hardships, especially the fuel and food shortages. In these political, economic, and social histories of the period, blame is much more clearly attributed to Shinwell and his fellow cabinet ministers. Economic historian Alex Robertson (1987) has come the closest to truly integrating these two differing cultural memories of the winter, and although he acknowledges that the two events were so intertwined that they should be seen as a single winter crisis, he still presents demarcation between weather and fuel. This distinction between meteorological events and concurrent political and social discourses, drawn by contemporary actors and academics alike, reappears throughout the following chapters. Such a demarcation restricts our ability to understand extreme weather events as consisting of concurrent meteorological conditions and social collapses.

This chapter has highlighted the limitations of studies which draw a clear distinction between anthropogenic and natural catastrophe. In the winter of 1947, the weather acted as a trigger which brought together what up until that point had been distinct, discrete problems: coal production, labour issues, coal transport, electricity generating capacity, increases in demand fuelled by domestic consumption of gas and electricity, and in demand fuelled by the need to hugely increase industrial exports. All fundamentally, but often indirectly, problems resulting from the UK’s position as it struggled to recover from six years of war. The extreme weather transcended all of the economic, social, and political issues of the time, and, as well as accentuating these to cause huge upheaval, actually galvanised politicians and the public into a renewed drive to push society forward. In the coming chapters we shall see how, as risks from extreme weather events became more

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187 Robertson (1987) vii
prominent in public and political discourses, the MO emerged as central experts, communicating on, and warning of, such dangers.
Chapter Three
The Ad-hoc Expert: The role of the Meteorological Office in the extremes of war and peace

It is an unfortunate characteristic of meteorology that its great forward strides depend on disasters.

Horace R. Byers – American Meteorology Society President, 1952-53

3.1 Introduction

The provision of warnings on extreme meteorological conditions has been a central role of the Meteorological Office’s (MO) remit from its earliest inception under the Board of Trade, through to its position today as a trading fund of the Department of Business Innovation and Skills. Yet who warnings are given to, how they are communicated, and in what types of meteorological events they are expected, has varied greatly throughout the organisation’s history. During the post-war period, the scope of the MO’s extreme weather services and warnings increased substantially. It expanded its operations from warnings for limited, specific end users such as mariners, military personnel, and civil aviation, to their current position in UK society today, where the general populace rely on the MO’s National Severe Weather Warning Service to keep them safe.

In the decade following the Second World War, as it incorporated rapidly advancing technologies being developed in meteorology, the MO underwent many changes to its operations and organisation. By analysing the structure, correspondence, and networks that the MO was operating within in the first post-war decade, this chapter illuminates how

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188 Byers (1970) 217

189 A trading fund is an executive agency or part of a government department operating with much autonomy which must use its receipts to meet its outgoings. The MO became a trading fund in 1996 and moved from the Ministry of Defence to the Department of Business Innovation and Skills in 2011.

190 The National Severe Weather Warning Service is a direct successor of the East Coast Gale Warning Service introduced in Chapter Four.
internal reforms to the organization enabled officials to transition from being peripheral figures in extreme weather situations, to central experts. This chapter begins by briefly looking at developments in meteorology and the MO during the Second World War, investigating how the pressures of war facilitated large scale change and helped develop the role the MO played in advising government departments. I then use the case of the Control of Fuel Order 1942-43, as a means of analysing one such advisory role the MO carried out for the Ministry of Fuel and Power (MoFP). The Control of Fuel Order highlights how meteorologists at the MO found their policy planning expertise extend beyond more traditional areas, such as shipping and aviation.

This chapter then considers the development and structural changes that the MO underwent in the immediate post-war years, with analysis focussed on growth figures, and the restructuring of the organisation in line with wider government changes to the Scientific Civil Service. In light of restructuring and developments during 1945-47, the chapter revisits the events of the winter crisis of 1947. Investigation of communications between the MO and government departments is extended beyond those with the MoFP. Through looking at data from MO annual reports, a trend which shows increasing numbers of forecasts and warnings being issued for government departments, public authorities, and industrial concerns is identified. The chapter shows that the increase in tailored forecasts and warnings is usually a reactive process, ad-hoc in its distribution, which is clearly catalysed by individual extreme weather events.

Finally, I explore how both the Second World War, and the winter crisis of 1947, acted as catalysts to both social and policy change in post-war Britain. The distinctive composition of the winter of 1947 as being a combined political, economic, and meteorological event is crucial to our understanding of why developments of warnings and forecasts in the subsequent years were fragmentary in their application. Before considering the MO’s
crucial expert role during the Second World War the chapter opens with a brief history of the organisation, which shows that mistrust and blame are foundational features of the weather-forecasting enterprise.

3.2 Meteorological Office operations under wartime pressure, 1939-1945

The national meteorological service of the UK, the Meteorological Office (MO) was formed in 1854, under the direction of Captain Robert Fitzroy in the Board of Trade. Founded to collate and analyse meteorological observations made onboard merchant and Royal Navy ships, the department’s original focus was ocean climatology. By September 1st, 1860, Fitzroy had persuaded his seniors in the Board of Trade and the Treasury of the value of his storm predictions, and a basic mariner’s storm warning service was begun. In 1862, the department began issuing daily guidance on future weather patterns to the public via newspapers. Wanting to clearly state that these daily guides were not predictions or prophecies, Fitzroy named them weather forecasts. By 1865, under mounting criticism for his largely speculative forecasts and in deteriorating health, Fitzroy took his own life. After his death, a review of the organisation by the mathematician and outspoken critic of Fitzroy’s methods, Francis Galton, led to the immediate ceasing of daily forecasts and the temporary suspension of storm warnings. In what was to be the first of many very public criticisms of the MO, The Times reluctantly published its last MO forecast for over ten years on May 28th, 1866.

In the following decades, the department developed organically, slowly growing in size and scope. New impetus was gained at the turn of the century when the university educated meteorologist, William Napier Shaw, was appointed Superintendent, and the department

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191 For a detailed history of the MO see Walker (2012)
began to benefit from the development of a more scientifically grounded meteorology, pioneered by physicists such as Vilhelm Bjerknes.\textsuperscript{192} After the First World War, the MO became part of the Air Ministry. Under the Air Ministry’s centralised control, funded largely by military concerns, the office grew substantially in size, and many elements at the core of its operations today came into existence.\textsuperscript{193}

During the Second World War, the MO’s forecasting role became central to the UK’s war efforts, due to the need for airspace dominance to ensure Allied victory. Developments in meteorological knowledge, especially of the upper atmosphere, saw MO predictions play a central role in the Allied landings in North Africa in 1942, in Italy in 1943, and on D-day in France, 1944.\textsuperscript{194} An MO man, Group Captain J.M. Stagg, was Chief Meteorological Officer reporting to US General Dwight D. Eisenhower. The head of an interdepartmental team consisting of members from the MO, Admiralty, and the United States Army and Air Force, Stagg advised on the weather and its effects for the proposed Operation Overlord continental invasion. Famously the team led by Stagg, who was chosen for his managerial capabilities rather than his limited forecasting ability, advised Eisenhower to delay the Normandy landings for twenty four hours. On their advice the operation was postponed, finally going ahead on June 6\textsuperscript{th}, possibly the only day during the month on which the operations could have been launched.\textsuperscript{195}

The demands of modern warfare were a catalyst for the development of meteorological knowledge and practice as the military value of weather information raised the scientific prominence of meteorology, and substantially increased government funding. Frederik Nebeker (1995) has attributed wartime progress to the fact “that many meteorologists

\textsuperscript{192} See Nebeker (1995) Chapters 3-5 for more on the early development of dynamical meteorology.
\textsuperscript{193} Ogden (2001) 16
\textsuperscript{194} Robertson (1987) 8. For a detailed account of the MO role in the D-day landings see Cornford (1994)
\textsuperscript{195} Fleming (2004) and Petterssen (2001) 198
carried out their tasks with a greater sense of urgency and a greater willingness to try new methods.”

Driven by increases in funding, staff, and urgency, the changes that the MO underwent during the Second World War affected their development, research, and ultimately, practice of numerical meteorological methods.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total MO Staff</th>
<th>Net Cash Provision (for year ending 31st March)</th>
<th>Cash Provision (per member of staff)</th>
</tr>
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<tbody>
<tr>
<td>1939</td>
<td>747</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1945</td>
<td>6,266</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1947</td>
<td>2,783</td>
<td>£1,882,000</td>
<td>£676.2487</td>
</tr>
<tr>
<td>1948</td>
<td>2,290</td>
<td>£1,680,000</td>
<td>£733.6245</td>
</tr>
<tr>
<td>1949</td>
<td>2,650</td>
<td>£1,708,000</td>
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<tr>
<td>1950</td>
<td>2,695</td>
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<td>2,601</td>
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<td>2,589</td>
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<td>3,108</td>
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*Figure 3.1: MO staff numbers and budgets in the post-war years*

*(N.B. the MO did not publish any financial figures for the period 1939-1946)*

*Source: MO Reports, 1947-1956 and Air Ministry [AHB] (1954) 560*

The number of staff employed by the MO more than doubled in size between 1919 and 1935, rising from 204 to 522. However, the interwar growth of the MO was modest when compared with the large-scale training and mobilisation of meteorologists that was undertaken by the UK and her allies during the Second World War. A wartime recruitment

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196 Nebeker (1995) 118
197 Nebeker (1995) 127
and training drive resulted in the US training 7,000-10,000 professional meteorologists, and the MO increasing staff numbers by over 100%, peaking at 6,266 at the end of hostilities in 1945 (Figure 3.1).\textsuperscript{198} The staffing numbers of the MO in this period provide an initial insight into the progress of meteorology during the inter-war and war years. This was a discipline growing in size and stature, which found war a further catalyst to its already upward trajectory.

With such large-scale recruitment, the MO required a clear and quick way of training forecasters; education routes were formalised and key meteorological textbooks were written during the period. Most notably the chair of the meteorology department at Imperial College and former MO employee Professor David Brunt’s \textit{Manual of Meteorology}, published in 1936 became a staple of the MO recruitment training process.\textsuperscript{199} Another effect of the increase in forecasters was the expansion and creation of many university meteorology departments. The US saw five university departments established in the years prior to the American entry into the war.\textsuperscript{200} In the UK during the build up to war, the meteorology department at Imperial College continued to grow under Brunt and the MO began to forge links with new universities, in particular the University of Reading.\textsuperscript{201} Once the war broke out Brunt and his colleague Albert Sheppard were seconded to the Air Ministry and established the MO training schools at Berkley Square House, London and Barnwood, Gloucester.\textsuperscript{202}

\begin{itemize}
    \item \textsuperscript{198} Harper (2008) 75-6 and Crewe (2009) 1
    \item \textsuperscript{199} Walker (2012) 256-261
    \item \textsuperscript{200} MIT, New York, UCLA, Chicago and Caltech
    \item \textsuperscript{201} Sutcliffe, rev. Burton (2004); Hoskins (2006) 3-11. It is worth noting that whilst the wartime period saw a continued growth of academic meteorology, the UK lagged behind the USA and Sweden in this process. Nearly all of the wartime recruits to the MO were trained at MO training schools.
    \item \textsuperscript{202} Air Ministry (1954) 562 and Walker (2012) 257
\end{itemize}
The period witnessed a huge expansion of meteorological observation networks, with increases globally in both the number of operational weather stations, and the use of upper atmosphere radiosondes.\textsuperscript{203} The resulting large increase in data meant that weather modelling shifted from a practice which used only surface weather models into a three-dimensional problem. To cope with these vast amounts of data, the use of punched card machines became even more widespread throughout the war, with standard tabulating machines being used to free manpower from the calculation of statistics.\textsuperscript{204} Wartime operations also meant that meteorologists were able to embrace technologies initially developed for use outside of their discipline. Most notably, meteorologists during the war adopted the use of radar to locate and map large storm systems. Meteorological research during the Second World War was driven by problems directly encountered in wartime operations, and the pressure that came with this situation resulted in many important developments. The demands presented by new, higher flying military planes alone resulted in progress in short-term forecasting and increased knowledge of cloud formation and ice crystallisation.\textsuperscript{205}

Whilst driven largely by military concerns, the professionalisation and proliferation of meteorology during the war occurred in a collaborative climate between nations such as Sweden, the US and the UK. Few of the developments made were widely disseminated outside of meteorological and military circles. Under the auspices of wartime security, many developments remained secret, public weather forecasts were removed, and only essential weather communications were maintained. The Government removed many organisations from the distribution list of the Daily Weather Report, with many that remained only receiving essential warnings in extreme circumstances. Throughout the war,

\textsuperscript{203} A radiosonde is a unit attached to a weather balloon which measures atmospheric parameters usually including pressure, altitude, temperature, humidity, and wind direction.

\textsuperscript{204} For more on the use of punched card machines within the civil service see Agar (2003)

\textsuperscript{205} Nebeker (1995) Chapter 9. For more on MO operations during the period see, Ogden (2001)
the Home Office was reduced to receiving only two copies of the Daily Weather Report, whilst the Central Electricity Board (CEB) received only forecasts and warnings to its London headquarters, rather than as previously, to its seven regional control centres.

The lack of public communication of forecasts, and the requirement for all weather information to be controlled, meant that channels of communication between ministerial departments and the MO had to be strong and clearly defined.\textsuperscript{206} The type of close collaboration this relied upon was a prevalent feature of wartime governance, from the coalition government itself to the inter-departmental committees formed to manage wartime operations. Interdepartmental methods were widely used to ensure that rapidly constructed and implemented policy would operate smoothly when introduced. Many government departments, such as the Ministry of Food, relied on embryonic professionalised networks between public authorities, academia, and other Whitehall departments, to ensure wartime efforts were maximised.\textsuperscript{207} During the war, many emergent professionalised networks were composed of experts from across different disciplines that collaboratively provided the information required for policy creation.\textsuperscript{208} One such case where the MO became an expert voice was in the creation of operative Directions, under the Control of Fuel Order (1942-3), which aimed to ensure that scarce fuel supplies were closely restricted to benefit the war effort.

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\textsuperscript{206} Air Ministry (1954) 30

\textsuperscript{207} Rhodes (1988) defines professionalised networks as those that are distinctive from other government networks for the pre-eminence of professionals in policy creation, citing the example of medical professionals’ influence on the development of the NHS.

\textsuperscript{208} Rhodes (1988) 286
3.2.1 The Meteorological Office and the Control of Fuel Order, 1942-43

We have seen that the MO was not consulted as an expert body during the winter crisis of 1947; however MO liaison with other government departments, in a form which would have been beneficial during the winter crisis, did exist during the war. Throughout 1942-43, the Deputy Director of the MO (DDMO), Ernest Gold, engaged in extensive correspondence with the MoFP to discuss meteorological factors in the restriction of fuel supplies. Formal discussion between the two agencies began in September 1942, when the MoFP wrote to the Air Ministry asking for their co-operation in the administration of a Direction they wished to make under the Control of Fuel Order. To conserve dwindling fuel supplies, the ministry wished to use the Direction to restrict the use of central heating between set dates, by “certain classes of premises.” Informal discussions with Gold had already established that setting arbitrary dates alone would not be suitable, as there were likely to be days within the period when, “the internal temperature of buildings will fall to a very low temperature.” The MO envisaged a system that would split the country into three regions: Scotland, England, north of a line drawn from the Wash to the River Mersey, and the remainder of England and Wales. After October 18th, October 25th, and November 1st respectively for each region, the restrictions on fuel supply would be lifted.

However, if before this date the MO was to predict weather conditions: with a mean day temperature ≤45°F, a maximum daylight temperature not ≥55°F, and if both these criteria were expected to persist for at least two days and were not expected to be followed immediately by a period with day temperatures of ≥55°F, then the MO, via the Air Ministry, was to notify the Regional Controllers through the MoFP and the central heating restrictions would be repealed. Initial communications between the MO and MoFP also

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209 Letter from MoFP to the Secretary of the MO, September 1st, 1942. BJ 5/119
indicate that the BBC would be the chosen instrument for publicly disseminating such announcements. Further, the MoFP stated that they would like to begin issuing guidance to those responsible for stoking central heating installations each evening, with code words which related to the next day’s predicted temperature.\textsuperscript{210}

By the end of September, following ongoing liaison between the MO and the Domestic Fuel Planning Committee, the exact conditions of a system similar to those proposed above were finalised. However, no conditions prevailed which met the criteria for a “substantial period of cold weather” before the central heating restrictions were lifted at the end of October 1942.\textsuperscript{211} In spring 1943, discussion between the MO and MoFP was renewed, as meteorologists attempted to create similar criteria that could account for the less stable spring weather, and feed into the heating restriction scheme. By April, a temporary instruction detailing when MO forecasters were to notify the MOFP on cold spells of weather had been circulated by the MO to relevant staff.\textsuperscript{212}

Records from this case indicate that not only were MO officials beginning to be called upon as experts in areas beyond their traditional scope, but also that such expert advice was more involved and technical than their previous, more traditional role of simply providing weather data and statistics. The shift of the meteorologist’s role from informant to consultant is highlighted by the MoFP’s request for the discussion between Gold and the MO to lead to the creation “of a suitable weather formula.”\textsuperscript{213} As requests from government departments and agencies moved beyond those for data alone, meteorological forecasters gradually found the gravitas they were used to holding in

\textsuperscript{210} Letter from MoFP to the Secretary of the MO, September 1\textsuperscript{st}, 1942. BJ 5/119
\textsuperscript{211} Meteorological conditions for starting up central heating installations, September 28\textsuperscript{th}, 1942. BJ 5/119
\textsuperscript{212} Bilham, E.G. MO-2. Temporary Instruction No. D 26/43: Notifications of spells of cold weather to the Ministry of Fuel, April 6\textsuperscript{th}, 1943. BJ 5/119
\textsuperscript{213} Letter from R.H. Rowse to E. Gold, February 12\textsuperscript{th}, 1943. BJ 5/119
military or aviation arenas, extending into new areas within the civil service and
government. The liaison between the MoFP and the MO was not limited to heating
restriction, and throughout the rest of the war, the MO was involved in several schemes
with the ministry.\footnote{The MO were involved directly in fog dispersal work (FIDO), the creation of specific forecasts for
industrial concerns, and in the creation of the GASCO Warnings which helped gas undertakings in
meeting abrupt variation in demands for gas resulting from weather changes. See respectively Air
Ministry (1954) 213 and BJ 5/119. For an overview of the FIDO programme see Fleming (2010) 127-
132} Dialogue and cooperation between the MoFP and the MO, which cast
the MO as experts in the prediction of extremes of temperature, was a key step for the MO
in the longer-term development of weather warnings to civilian concerns. Yet it seems that
the MoFP programme was a special case, and that MO involvement in similar schemes in
other ministerial departments was much smaller, or, more often, completely absent.

On occasion, those in the MoFP overestimated the abilities of the experts at the MO. In one
instance, an official at the MoFP asked if the MO could use data on sun-spot observations
to provide the Ministry with a likely weather trend for the following winter. The
meteorologists’ concern over being unable to provide an accurate five-day forecast to
Eisenhower for Operation Overlord, as mentioned earlier, highlights the clear disparity
between MO forecasting practice, and the communication of their capabilities to civil
servants. Yet MO staff relished their new-found position as professional experts outside of
their traditional operational circles and usually attempted to produce an adequate
response to all enquiries. In this instance, rather than explaining the limitations of forecasts
beyond forty-eight hours, the MO gave the MoFP an overview of current, usually
speculative, research predicting seasonal weather trends.\footnote{Letter from W.A Robson (MoFP) to E. Gold (DDMO), April 15\textsuperscript{th}, 1943, and response note by C.E.B Brookes, April 20\textsuperscript{th}, 1943. BJ 5/119}

More than simply highlighting how the duress of war forced collaboration between
government departments and the MO, the 1942-43 intergovernmental consultation fits
into wider narratives that highlight the war years as being key to meteorology’s twentieth century professionalisation process. New meteorological methods that attempted to define the motion of the atmosphere using mathematics, begun and developed greatly by the Bergen School of Meteorology in Norway in the 1920s had considerably altered the practice of meteorology.\textsuperscript{216} By the early 1930s the MO had substantially incorporated most developments, however even something as accepted as the terminology of fronts was not being uniformly applied across the organisation when one of the Norwegian pioneers of such work, Jacob Bjerknes, visited the MO in late 1935.\textsuperscript{217} The looming threat of war pushed the MO to ensure it uniformly adopted international best practice and invested heavily in the observational infrastructure such new methods required.\textsuperscript{218} The development of meteorologist involvement in civilian government schemes began to raise the MO’s public profile. Further, the use of the MO as consultants, rather than as weather statisticians, reflected the new approach to the science of meteorology, which was influenced by the influx of practitioners from physical and mathematical backgrounds.\textsuperscript{219}

The MO’s role in the creation of cold weather criteria for the wartime restriction of central heating scheme was during the policies planning phase. Whilst the cold weather criteria were tweaked and improved throughout the course of the system’s implementation, ultimately the MO’s input was in the pre-emptive process of managing fuel supply. This explains why, as chapter two suggests, the winter of 1947 crisis did not see the MO featuring more prominently. Here we see a clear distinction in how the MO, and other


\textsuperscript{217} Walker (2012) 259

\textsuperscript{218} The international collaboration the MO undertook throughout the war, which included the secondment of top meteorologists such as Sverre Petterssen, greatly influenced the MO’s forecasting practice. For more see Petterssen (2001) and Stagg (1971)

\textsuperscript{219} Harper (2008) 87
scientific experts, could be used by government: in pre-emptive planning which mainly consists of policy creation, and in mitigating impacts once a crisis ensues.\textsuperscript{220}

In spring 1944, in anticipation of the end of the war, MO officials began considering how operations would need to change once the country reverted back to peacetime. The resumption of services, such as the sharing of meteorological data with other countries’ national meteorological services (NMS) and the communication of weather forecasts with the public, were largely considered by officials as simply requiring the reinstatement of pre-war systems.\textsuperscript{221} Whilst on a broader, more strategic scale, senior MO staff began to consider how the organisation’s increasingly expert role in wartime efforts, both military and civilian, might translate into peacetime services and schemes.

3.3 The post-war Meteorological Office

The Second World War had afforded meteorology more money for research, new technical equipment, more observing stations, and, critically, more professional scientists. As Kristine Harper summarises:

This “critical mass” of well-trained, ambitious, and forward-looking men became meteorologists in the postwar era – a time when virtually anything seemed possible scientifically. They were ready to take the field from a small, marginalized, and sometimes scorned, scientific backwater to a discipline of importance within the sciences and the realm of public opinion.\textsuperscript{222}

\textsuperscript{220} Whilst distinct, these two areas interact, as has been highlighted in analysis of British floods by researchers at the Flood Hazard Research Centre at Middlesex University, who show that the shortcomings of mitigation strategies during a crisis catalyse policy development after a flood event. Johnson et al. (2004) 147

\textsuperscript{221} Post war Meteorological Communications: Requirements. BJ 5/199

\textsuperscript{222} Harper (2008) 89
The transition from war to peace presented the MO with many challenges: alongside the resumption of pre-war services, and the incorporation of new wartime developments, staff numbers had to be substantially reduced, and government plans for the Scientific Civil Service considered. Despite these challenges, senior staff at the MO, part of Harper’s ‘critical mass’ of meteorologists, were ready to ensure that the upward trajectory of meteorology catalysed by the war was not lost.

The MO’s wartime peak of over 6,000 staff decreased substantially after the end of hostilities. Nonetheless, it remained well above 2,000, which was a fourfold growth of the already increasing pre-war numbers (Figure 3.1). Not only was the MO growing in personnel, it was also investing more; at a rate which saw the net budget increase by over two thirds from 1947-1956. The rising cash provision per member of staff in Figure 3.1 indicates the increasing role that technological solutions – whether in field equipment, measuring instruments, or computing systems – were playing in MO activities.

By August 1945, 90% of MO staff were in military roles. The transition from a wartime operation to a peacetime footing, with an approximate halving in the number of staff, and with the majority of those remaining shifting to civilian operations, was a huge undertaking. Further, this transition had to incorporate the recommendations of a government white paper on the constitution of the Scientific Civil Service.\(^2\)\(^2\) Titled, ‘The Scientific Civil Service: Reorganisation and Recruitment during the Reconstruction Period’ the paper was the result of a government-commissioned committee investigation chaired by the Second Secretary to the Treasury, Sir Alan Barlow.\(^2\)\(^4\) It aimed to restructure the Scientific Civil Service to ensure that the government could attract the highest-calibre scientists, “in order that scientists...may play their full part in the development of the nation’s resources...and

\(^{223}\) MO Annual Report (1947) 5

\(^{224}\) Sir Alan Barlow has been highlighted as one of the six most creative individuals who left a lasting mark on the public service in the period. Chapman and Greenaway (1980) 217
The report proposed standardising the structure, salaries, and recruitment process for the various scientific civil servants working across all government departments. Historian David Edgerton has highlighted the report as a key indicator of the rising status of researchers over administrators, serving officers, and other technical branches of government. It was a formal recognition that under the aegis of war, many scientists usually employed in academia or commercial industries had contributed novel research and solutions that had led to military success. Research and expertise, which if carried over into peacetime correctly, could become a central component of Britain’s reconstruction. Another key aim of the report was to “eliminate the ‘isolationist’ tendency to which scientific work in Government Departments is apt to be a victim.” The main mechanism the committee suggested to alleviate this isolationism was the creation of an Interdepartmental Scientific Panel, consisting of representatives of all departments to ensure efficiency and co-ordination. Additionally, the panel was to ensure that liaison with external parties, such as universities, industry, and the wider public, occurred where beneficial. The MO was to have no direct representation on the Interdepartmental Scientific Panel. Instead, it was represented by two Air Ministry staff, one of whom was Scientific Advisor and former Chief Assistant at the Royal Observatory, Greenwich, Dr H.R. Hulme.

For the MO, Barlow’s proposals meant an enforced restructuring of all staff into three categories: a scientific class, an experimental class, and an assistant class. In addition to the requirements of the report, the Director of the Meteorological Office (DMO), Nelson Johnson, and the Meteorological Committee used the opportunity of the restructuring to

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225 Barlow (1945) 2
226 Edgerton (2006) 116
227 Barlow (1945) 3
228 The other Air Ministry representative was Assistant Under-Secretary of State, W.B. Foden. POWE 10/406
officially allocate new operational areas their own dedicated departments. Created in 1905 when it replaced the earlier Meteorological Council, the Meteorological Committee was responsible for the overall management of the MO. It originally consisted of the DMO, the Hydrographer of the Navy, two members nominated by the Royal Society, and one member each nominated by the Treasury, the Board of Trade, and the Board of Agriculture and Fisheries (later the MAF). Whilst on the ground, operations and output of the MO were not immediately effected by the restructuring, the juncture enabled the hierarchy of the organisation to catch up and re-align itself with operations that had morphed and grown throughout the war.

Nelson Johnson, a previous MO employee and pioneer of micrometeorology, had been appointed as DMO in 1938. During his first years in tenure, despite the demands of the war effort, he managed to reinvigorate and expand organised research within the MO through the establishment of a Meteorological Research Committee in 1941. Johnson saw research as a vital component of MO operations, integral to ensuring the MO remained at the forefront of international meteorology. In the post-war restructuring process, Johnson ensured that research would continue to be an important fixture of MO operations, allocating a Deputy Director (DDMO) to oversee a research branch consisting of three Assistant Director’s (ADMO) and four MO departments. The successful Chief Meteorological Officer for Operation Overlord, Dr James Stagg, was promoted to a newly created position of Principal Deputy Director (PDDMO), tasked with directly assisting Johnson in managing the expanding office.

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231 Walker (2012) 313
232 Appendix II, Figures 1,2, and 3
This restructuring increased the number of MO departments from 15 to 22 (Figure 3.2), allowing each to have a more concise and defined remit, and separating out into new departments developments that had been subsumed by existing ones during the war. In addition to the large expansion of research, the overhaul also gave a new emphasis to MO communications, with an ADMO being allocated to oversee the new Observations, Communications, and Forecasting Section, numbered MO-11. Each MO department was referred to in the abbreviated form MO-X. As can be seen in Appendix II the designated number for many departments changed several times throughout the period. As well as their designated number many departments changed their name and remit repeatedly throughout the post-war years. It is interesting to note that a few branches were less vulnerable to such change. Most notably the Marine branch (MO-1) was not directly altered in any of the post-war reorganisations. Due to the long history of marine services, a greater autonomy of MO-1 operations, and a clear boundary to the department’s remit it was more resilient to risk and blame than many other areas in the MO.

Appendix II shows the structure of the MO at five points throughout the period this thesis covers, each was chosen to highlight major structural reorganisations within the MO. However changes to the MO’s structure were almost continuous during this period, and were not restricted to the years presented. Also note that the timing of the major changes presented does not correlate directly with any of the extreme weather events discussed in this thesis, changes resultant from such events were more commonly on an individual service or departmental level.
MO-11 handled any communications external to the other section’s remits, and so was responsible for liaison with government departments, the BBC, and the general public.

Several already well-established and specific communication channels were left within their own departments. This meant that whilst MO-11 issued warnings of severe weather to the public, MO-1 and MO-19, Marine Meteorology and Agricultural Meteorology respectively, were responsible for warnings to their own sectors.

The post-war growth and re-structuring of the MO again aligns meteorology’s professionalisation in the twentieth century. A pattern of growth and formalisation reflected in other NMSs, such as the United States Weather Bureau (USWB), and international forums, such as the International Meteorological Organisation (IMO).

Nelson Johnson, elected President of the IMO’s Executive Council in early 1946, was a central actor in this professionalisation process, overseeing the drafting of a new constitution for the IMO’s successor; the World Meteorological Organization (WMO), an intergovernmental organisation and an official specialized agency of the UN, established in 1951. The final resolution passed at the first congress of the WMO acclaimed Johnson’s “experience, insight, skill, careful planning, and patient perseverance” in leading the international meteorological community out of the war and into the new promise of the WMO.

The post-war restructuring of the MO was due to a combination of developments in international meteorology and British post-war visions of the role of government science in

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235 See Harper (2008) Chapter 4 for more on the USWB in the post war years.
236 An extraordinary conference of directors of the IMO was held in London in February 1946 to ensure the rapid resumption of international co-operation on meteorological issues. Further conferences were held in Toronto and Washington D.C in 1947, laying the foundations for what was to become in 1951 the United Nations’ World Meteorological Organisation. For more on the transition of the IMO to the WMO see Daniel (1973) and Davies (1990)
237 Harley (1973) 257
reconstructing the beleaguered nation. Both areas were driven by a desire to ensure that new applied techniques implemented during the war, such as using radar to track rainfall and sferic techniques to locate thunderstorms, which built on the latest technologies and understanding of the upper-atmosphere being developed at the MO by research on dynamical meteorology led by Professor R.C. Sutcliffe, were captured into the post-war landscape.238

3.3.1 Absent Experts: The winter of 1947

Although in 1947 the government consulted extensively with many experts to try and ensure the optimum movement of coal through the harshest period of weather, the MO did not feature in such consultations. Whilst the MO’s medium-term forecasting capability was not sufficient in 1947 to assist government departments in predicting how long the cold spell would persist, its twenty-four hour forecasts were suitably accurate to assist with detailed logistical operations, as had been seen during Operation Overlord in June 1944.239 Given that in the depth of the fuel crisis of 1947, a joint committee of NCB and MoFP civil servants met daily to optimise coal distribution and minimise disruption, the lack of direct input from MO short-range forecasters becomes especially pertinent.

To establish how accurate these short-term weather forecasts were for the specific period of the winter crisis, comparative analysis of the weather forecasts published in the Manchester Guardian newspaper, and the actual observed weather for the period January 23rd–March 17th, 1947 has been conducted (see Appendix I). The survey shows that during the crisis, the printed forecast accurately predicted the temperature in 65% of reports, and

238 See Walker (2012) 315-320
239 Indeed the veracity of the twenty four hour forecasts is one of the few elements the international forecasting team lead by Dr Stagg seemingly agreed on when forecasting for Operation Overlord. See Ogden (2001) 15
the precipitation/cloud cover in 70% of reports. These figures for accuracy are relatively high, especially considering that the forecast in the newspaper attempted to give an overall summary for the whole north-west area of England in only a few lines of print (Figure 2.6), and that the observed data is for one specific location, Manchester, within the north-west region. However, direct input from an MO meteorologist, who could apply further regional and temporal parameters to the forecast, would have significantly increased their veracity. The level of accuracy in the Manchester Guardian forecasts highlights that the MO’s lack of involvement with the sub-committee meetings of the NCB, CEB, and regional coal boards was due to more than insufficiencies of forecasting technology alone.

When the joint committee was meeting to plan the logistical transport of coal in such a short time frame, it seems that with the benefit of hindsight, through closer liaison with MO forecasters they could have created more effective plans for coal transportation. Press releases made by the joint committee show that it considered only standard weather forecasts. Furthermore, the committee’s position that the weather was an accentuating factor on which to blame the crisis shows that its members considered the weather a natural, external, and largely unpredictable force on their planning. In communications to those working to improve coal stocks, the committee repeatedly used evocative language, such as the phrase ‘grim battle,’ evoking a camaraderie and unity familiar to all, presented as vital to defeating the crisis. The externality of the weather in the committee’s emergency planning again highlights a dual narrative of the winter crisis. The

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240 Comparison of N.W England regional forecast in the Manchester Guardian against Daily Weather Report Figures for Manchester weather station – for details see Appendix I. The survey has not been tested for statistical significance. For more details on statistical forecast verification see Murphy (1997)

241 Brier (1950) presents some of the statistical issues surrounding weather forecast verification in the period – highlighting how forecast accuracy varies largely with statistical methodology.

242 Fuel Crisis: Weather Conditions Difficult (P.R. 269) and Fuel Emergency: Easter Conditions in the Coalfield (P.R. 285). POWE 10/426

243 Fuel Emergency: Battle to move coal in grim weather conditions (P.R. 305). POWE 10/426
fuel crisis was considered an economic and political problem that was rudely catalysed by the unprecedented weather events; meteorological conditions, whilst shifting in society’s conscience, still harboured some connection to an uncontrollable, unpredictable God.

During the maelstrom of the crisis in February 1947, civil servants and the NCB, which had little prior contact with the MO, saw little reason to consult with them on issues they saw as predominantly about production and transport of fuel. The types of communication between government departments and the MO presented earlier in the case of fuel planning for the winter of 1942-43, were still very much the exception by 1947. The majority of communication between MO staff and civil servants working for ministerial departments in the period involved the MO largely as a statistical body, providing metrics, numbers, and histories that could furnish civil servant and ministerial reports, speeches, and general operations with more gravity. A relationship typified by an anonymous handwritten note addressed to a DDMO in October 1942, which simply said, “The Ministry of Fuel rang. They would like to have the temperature for a place in Northern Ireland added to the 11 or 12 temperatures they receive daily.”

If we consider such communication the predominant type through which most civil servants would have come into contact with the MO, then we begin to understand why once the crisis ensued little consideration was given to involving meteorologists. More striking perhaps, is the lack of MO involvement in the planning of the fuel strategy in preparation prior to the winter.

Given the role of the MO in civilian interdepartmental concerns, and despite the precedent from the coal winter of 1942-43, the MO was not involved in planning the winter fuel strategy for 1946-47. The Ministerial Coal Committee met regularly throughout 1946, planning the strategy for the coal winter of 1946-47. The Government, unaware of the role the MO played with the Fuel Control Order of 1942-43, did not once involve the MO in

244 Note to DDMO, 20th October, 1942. BJ 5/119
deliberations to consider how the onset of an abnormal, extreme period of cold weather, which would increase fuel demands, could be factored into plans. This was a stark contrast to 1942-43, when the coalition government’s MoFP brought the MO into several aspects of its fuel planning strategies, including direct communication around winter fuel supplies.\textsuperscript{245} The MO had further experience at being involved in interdepartmental committees in an expert capacity, not only in military areas, where it had long traditions of involvement, but increasingly in civilian operations, such as agriculture, aviation, and shipping. The increasing importance of dialogue between the MO and government departments was reflected in the representation of such departments on the Meteorological Committee when it was restructured in the autumn of 1946.\textsuperscript{246}

Despite the differing individual contexts of the episodes presented, in the transition from war to peace, from coalition to Labour government, a formative professionalised network between the ministry and the MO was lost. The government sought the involvement of the MO initially in 1942 due to the pressures of war, but in the post-war optimism of 1946, a newly elected Labour government was influenced by different pressures. To openly involve the MO in government discussions preparing for the coal winter of 1946-47, was to admit that there was a high probability that fuel restrictions and dislocations might occur. The workload the MoFP gained from the imminent nationalisation of the mines added a further distraction which possibly effected communication between the two departments. Thus, in planning the winter fuel strategy for 1946-47, government ideologies and the preservation of a fragile public optimism were placed ahead of the risk of an excessively cold period of weather occurring. The lack of MO involvement in fuel planning for the period, highlights that the formative channels for dialogue between the MO and ministries were not fixed,

\textsuperscript{245}Letter from R.H. Rowse, MoFP to E. Gold, DDMO, 7\textsuperscript{th} June, 1943. BJ 5/119

\textsuperscript{246}Under the revised constitution of the Meteorological Committee, the MoFP, the Ministry of Transport, and the Ministry of Agriculture and Fisheries, amongst others, gained representation. Constitution and Functions of the Meteorological Committee, October 1946. BJ 5/226
and that external pressures were able to override the need for meteorological input in planning decisions. Thus far, we have focussed on communications specifically between the MO and the MoFP, but to ascertain a broader picture of government department communications with the MO in the period, we must now take a broader view.

### 3.3.2 Inter-departmental Communication

After the post-war restructuring of the Meteorological Office, the majority of communication with other government bodies was through MO-11. As in the 1942-43 fuel restrictions, communication was usually initiated by the ministry or government department involved, and was often ad-hoc in nature. Other than via public weather forecasts, ministerial departments would only receive more detailed weather forecasts, warnings, historic data, or co-operation with development of individual schemes, upon formally approaching the MO. Once a formal request had been made, and a system to deal with the information the government ministry required was put in place, MO-11 would assimilate the communication into its automatic procedures. For example, in 1947, the CEB received a bespoke forecast for the London area twice a day, detailing specifics of temperature and wind direction deemed integral to their operations.\(^\text{247}\)

Let us here clarify the distinction between the main direct formats of forecast communication being used by the MO in the period, and the specific, specialised forecasts and warnings issued.\(^\text{248}\) The majority of government departments, public authorities, and industrial concerns were on a distribution list which received a basic weather forecast, namely the Daily Weather Report. Additionally, any institution could make a one-off enquiry, and in 1948, the MO headquarters alone dealt with over 20,000 enquiries from

\(^{247}\) MO Annual Report (1947) 12

\(^{248}\) Since the 1990s the WMO has made a distinction between basic and specialised services provided by a national meteorological service (NMS). See Zillman (2005) 7
public authorities, business concerns, and private industry. Such enquiries were not always requesting forecast information, with the MO often providing other meteorological expertise such as climatological information to businesses and industries seeking to minimise risks and maximise profits. These requests were largely dealt with by the relevant specific department at the MO such as MO-19 Agricultural Meteorology and MO-3 British Climatology. Whilst the MO Annual Reports from the immediate post-war years suggest that MO work in providing such expertise was increasing, its ad-hoc and often one off nature means that there is no evidence that such advice ever resulted in blame being cast directly toward the MO. When considering extreme weather situations, it is the specific specialised forecast programmes developed in liaison with the MO, such as the CEB scheme mentioned above, which are of greatest significance to the themes of this thesis.²⁴⁹

The ad-hoc nature of communication between government departments and the MO in the immediate post-war years was exacerbated by the stringent restrictions on meteorological communication which had been in place throughout the war. Although the majority of weather communications had been completely suspended during the war, those deemed vital had continued, and in certain instances, the pressures of the war had led to the creation of new specialised services. One such wartime service was the issuing of coded snow warnings to wartime logistics bodies, such as the Highway Authorities, which began in 1942. Despite its success, with many engineers wanting the service to continue, the MO decided in 1945 to withdraw snow warnings, stating that authorities could get enough information from the reintroduced BBC radio forecasts.²⁵⁰ Schemes such as this created during the war, whilst often operating purely for civilian departments, were considered

²⁴⁹ MO Annual Report (1948) 11. Public forecast communications such as those delivered via the press, the radio, and the television during the period are considered further in Chapter Five.
²⁵⁰ See AIR 2/7103
part of the war effort, and, like the MO involvement with the MoFP, were cut in the transition to an austere peacetime.

As the war ended in July 1945, secret coded warning services such as the snow warnings were discontinued, with few avenues of meteorological communications remaining operational. By 1947, only six specialised services were being provided by the MO (Figure 3.3).\footnote{This figure includes the radio forecast service AIRMET which although created with specialist groups in mind was later found to be used by a much broader cross-section of society. See Chapter 5.3} During the subsequent years, the number of specialised forecasts and warnings the MO issued to government departments, public authorities, and private industry substantially increased. The local forecasts provided especially for the Olympic games in 1948, and the deployment of warnings to the Milk Marketing Board from 1955 onwards highlight not only the growth of these services, but also the diverse areas of UK society that were increasingly becoming reliant on MO services. It reflects not only the implementation of improved forecasting techniques developed during the war, but also the ongoing shift of extreme weather events in the British social consciousness, from external Acts of God, toward a more modern, individualist risk-orientated conception that these were events that could be predicted, planned for, and mitigated against.\footnote{Lübken and Mauch (2011) 6-7}
<table>
<thead>
<tr>
<th>Year</th>
<th>Number of organisations receiving specialised forecasts/warnings</th>
<th>New Organisations(^{253})</th>
<th>Notable services provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947</td>
<td>6</td>
<td>BBC, The press, AIRMET broadcasts, Central Electricity Board, Ministry of Fuel and Power, Royal Automobile Club</td>
<td>-</td>
</tr>
</tbody>
</table>
| 1948 | 8                                                             | Railways, London Airport, Snow Warnings – County & City Surveyors and Divisional Road Engineers | • Railways – a general system of weather warnings to British Rail was introduced on January 8\(^{th}\), 1948  
• London Airport – Upper air forecast since June 5\(^{th}\), 1947 |
| 1949 | 10                                                            | Road Research Laboratory, British Electricity Authority, Gas Companies, Film Companies, Agriculture, Water Supplies, Road Engineers, Olympic Games | • Road Research Laboratory – Issue of warnings on snow drift & ice in London & Home Counties to aid DSIR research, launched Oct, 1948  
• Olympic Games – local forecasts supplied through July and August |
| 1950 | 13                                                            | Belfast Harbour Power Station, N.Scotland Hydro-Electric Board, Flood Warnings, Mines, Factories | • B.B.C – television forecasts began on 28\(^{th}\) July, 1949  
• Flood Warnings – Forecasts of conditions liable to cause flooding to Thames Conservancy Board and Yorkshire Ouse Catchment Board |
| 1951 | 17                                                            | Agriculture & horticulture, Docks & Inland Waterways, Ceremonial Occasions, Sport & Recreation, Festival of Britain | • BBC – regional radio broadcasts launched November, 1950  
• Agriculture – snow warnings were issued to National Farmers Union (NFU), for dissemination to sheep farmers |
| 1952 | 16                                                            | Ministry of Fuel & Power | • Ministry of Fuel & Power – warnings of sudden drops in barometric pressure were issued to certain collieries |
| 1953 | 16                                                            | Department of Scientific and Industrial Research, University Research Departments, | • DSIR – Upper air temps supplied daily to radio research station  
• Universities – forecasts issued in relation to experimental high altitude balloon ascents |
| 1954 | 16                                                            | - | - |
| 1955 | 19                                                            | British Fatstock Marketing Corporation, Milk Marketing Board, St Bartholomew’s Hospital | • Milk Marketing Board – warnings of adverse conditions likely to affect milk  
• St Bartholomew’s – warnings of thick and persistent fog’s in the London area |

\(^{253}\) The third column only states new and significant organisations, year on year some organisations fall off the listing in the Annual Report, it is difficult to discern whether this means the communication of forecasts/warnings with that organisation ceased or whether they were simply deemed common practice enough to not be referred to specifically in the Annual Report.

Figure 3.3: The Number and Types of specific forecast and communications being created and directly communicated by the Meteorological Office, 1947-1955.

Although the specialised forecast and warning communication channels were increasing in number and complexity, their prominence within the MO Annual Reports did not change.\textsuperscript{254} Unlike the more traditional areas, such as civil aviation and the navy, the new services (Figure 3.3) were all considered under one single heading: “Forecasts for the Public, Government Departments, the Press, etc...”\textsuperscript{255} Evident through the structure of the Annual Reports, and the realignment of MO department numbers in post-war restructuring, this inherent categorisation within the MO highlights that despite the end of hostilities during the period 1945-55, the MO maintained a prominent military focus to its service provision.\textsuperscript{256} The continuation of military focussed departments and structure—the annual report did not change format until 1956—supports David Edgerton’s thesis that, contrary to many popular histories, post-war Britain remained a warfare state long after the end of the war. However, if we contrast this longevity of military focus against the increasing number of forecasts created specifically for civil operations in the period, the picture becomes less clear.

The lack of departmental distinction given between communication, warnings, and forecasts for the public, Government Departments, the press, as well as businesses, may have been more of an organisational relic rather than a clear signal to an ongoing military emphasis. By 1947, the MO had shifted from having 90% of staff in uniform in 1945, to just over 50%. This figure continued to decline in the post-war years as the MO became a predominantly civilian entity.\textsuperscript{257} Yet this figure fails to show us how many staff were

\textsuperscript{254} See the MO Annual Reports for more details of each individual scheme listed in Figure 3.3; even communications operational in 1947, such as those with the BBC show huge development in complexity year on year through the period 1945-1955.

\textsuperscript{255} MO Annual Report (1947) 11- Similarly worded in the reports for 1948-1955

\textsuperscript{256} The post-war restructuring further separated out military operations of the MO into their own distinct departments. See Appendix II

\textsuperscript{257} This transition is reflected in the pay budgets which show pay of those in uniform drop from the £150,000 mark in 1947 to a figure between £50-60,000 per annum for the years 1949-1956. MO Annual Reports, 1947-56.
working in each MO department. Whilst their employment status may have been civilian, several departments’ operations were completely military in their designation. In the case of MO communications, we find no evidence for the traditionally presented shift from a warfare state to a welfare state. Although during the time-frame we see a marked increase in civilian operations of the MO, these do not come at the expense of its military concerns. The warfare state and welfare state are not mutually exclusive for an organisation that by 1947 had significantly grown from its pre-war size.258

The MO’s shifts between being a military, government, and quasi-governmental organisation from the time of its formation left indelible marks on its operations. The peripheral role that the MO played with many of the organisations listed in Figure 3.3, whilst ultimately driven by demand for information, was influenced by the history, or lack of history, of communication between organisations. Whilst the table clearly shows that in the years 1947-1955 the number of forecasts and warnings issued by the MO to organisations increased, this increase was far from structured and homogenous in its distribution. For example, the flood warnings which began in 1950 were only issued to the Thames Conservancy Board and the Yorkshire Ouse Catchment Board, rather than to all river Catchment Boards nationally, as only these two bodies had contacted the MO to establish such schemes. The MO produced these specialised forecasts and warnings in a reactive manner. Officials drew no distinction between services for government departments and nationalised industry, which could be considered public goods, and those for private industries and businesses, which were left for private weather services to provide in the US and other developed nations.

The post-war reactive development of warnings and forecasts for these new civilian organisations is further highlighted when we contrast them against constitutional

responsibilities which were automatically resumed in peacetime. Functions such as the Meteorological Research Committee, much like communications, were shut down during the war, but due to their place in the organisation’s constitution, were immediately reinstated in 1945. Even in areas where the partnerships between organisations were substantial, as in the case of the MoFP, we see in the archival record a lack of clarity and formal structure to procedures. Most notably, in September 1949, the MoFP gave up their newly established position on the Meteorological Committee, citing “that normal departmental channels should suffice for the submission of any suggestions or contributions which this Ministry may have to offer.” Considering that, by 1949, the MoFP was no longer directly involved in the warning systems they had originally initiated, such as those for gas undertakings, it was an ill-considered decision to forfeit the position it had only gained in 1947. This was especially true because the position gave the MoFP a direct chance to influence not only the warnings the MO gave to relevant bodies, but also the direction its research department should take.

The reforms at the MO in the post-war years were seen by senior figures as the opportunity to develop the organisation’s profile and prominence in civilian British society; there was no consideration from those involved about the potential risks that such a shift may pose. In the period from 1947-1955, MO forecasts and warnings specifically tailored for government departments, public authorities, and industrial concerns increased, but this increase lacked formal structure, and its distribution was not homogenous. Not part of policy which sought to transfer wartime developments into civilian operations, the implementation of forecasts and warnings to these bodies was an organic process in which the MO created a service in reaction to an organisation’s enquiry. Rather than being driven by a want to formalise channels of communication and make warnings mandatory,

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259 Letter from the Ministry of Fuel and Power to the Air Ministry, 12th September, 1949. AIR 2/8500
reducing the risk to operations integral to the UK’s reconstruction plans, the increase was
driven more by a general growth in the understanding of what the MO could reliably
deliver to these bodies. Further, just as the pressures of war catalysed developments in
meteorological practice, the events of 1947 initiated several key warning and forecast
channels.

3.4 Conclusion

In the years following the winter of 1947, several key forecasts and warnings were
developed, driven by failures and problems exposed during the crisis. In 1948, weather
warnings were issued to railways, and snow warnings for road engineers were reintroduced.
In 1950, flood warnings commenced, and by 1951, warnings were issued to sheep farmers
in upland regions (Figure 3.3).260 Most notably, the warnings issued to upland sheep
farmers via the NFU were created in response to the significant loss of livestock during the
winter, particularly in Wales.261 Whilst these warnings all had direct links to the
shortcomings of systems during the winter of 1947, they formed part of the wider increase
in this type of communication: a trajectory that, as we have discussed throughout this
chapter, was itself catalysed by the Second World War. Both the war and the winter can be
viewed as disasters, differing in their temporality, cause, and specifics, yet both caused
dislocation and cultural collapse, which triggered adaptation and development.262

As an anthropogenic disaster, the Second World War was the most catastrophic event of
the twentieth century. Its longevity and scope deeply affected Britain, greatly changing not

260 Snow warnings first introduced during the war in October, 1942 (Synoptic Instruction Special No.
15) were revoked in 1945 when it was considered enough information could be gathered via BBC
radio bulletins (Synoptic Instruction No. 160). AIR 2/7103

261 Jones et al. (2012)

262 The concept of disasters leading to cultural collapse which then triggers development is not a
modern one, see Carr (1932)
only government policy and politics, but also societal practices.\textsuperscript{263} Whilst the vagaries and pressures of war consistently interjected and affected all areas of British society, the winter crisis of 1947 was much more restricted in the areas it catalysed development. For example, the main policy developments initiated by the post winter flooding in March 1947 were around the defence of agricultural land and investment in agricultural drainage.\textsuperscript{264}

Furthermore, the main effect of the winter’s snow was an increased scrutiny of fuel supply policy, which in the longer term, ensured the UK diversified its supply into areas such as nuclear power generation.\textsuperscript{265} Although these policy developments were significant, they were measured in their scope and effectiveness. This restricted policy development is highlighted further by the formative flood warnings introduced to the Ouse and Thames catchments after the events of March 1947. Whilst it was clear the snow-melt floods catalysed the development of these warning systems, their limited funding, geographical distribution, and scope would go on to be tragically exposed in the North Sea Flood of 1953 (see Chapter Four). The reactive nature of the inter-departmental warning systems created due to the shortcomings in 1947, meant they were not built into any mandatory systems or national policies.

The reason why government policy developments triggered by the weather were fragmentary and limited in their nature in 1947, may again relate to the dual narratives surrounding the winter introduced in the previous chapter. For contemporary actors, the plurality of elements in this crisis positioned it in a middle ground: not a clear natural disaster, yet not a single coherent anthropogenic crisis. The reimagining of disaster as not simply natural or anthropogenic is useful to our understanding of not only the events of the

\textsuperscript{263} See Hennessey (1992) Introduction and Chapter 1
\textsuperscript{264} Penning-Rowsell (2006) 330- Table 2
\textsuperscript{265} Robertson (1987) 179
winter itself, but also the wider development of meteorology in the post-war years.\textsuperscript{266} It would take the catastrophe and breakdown caused by the North Sea Flood in 1953, clearly perceived as a natural disaster, to really extend extreme weather forecast and warning developments into national policy.

The middle ground between human and natural causes that the combination of events during the winter were situated on, whilst limiting the progress of national policy, enabled more subtle societal shifts, and established a feeling that perhaps extreme meteorological events were manageable risks, rather than unfortunate inevitabilities. In light of this, we may begin to think about the much less quantitative concept of how disaster can act as a driver for social change.\textsuperscript{267} The winter of 1947 did not change the MO’s policy or responsibilities, but it did trigger extreme weather forecasts and warning systems which continued to grow in subsequent years. This growth significantly increased the prominence of extreme weather events in the minds of those planning the post-war growth of the organisation.

Integrating the winter crisis of 1947 into the narrative of MO restructuring has highlighted that the lack of meteorologist involvement in planning for the winter and managing the fuel crisis was influenced by a multitude of factors. Rather than just being due to technological limitations and the accuracy of forecasting in the period, the loss of a formative professionalised network which had been created under the pressure of the war, combined with government ideologies and post-war optimism influenced the MO’s absence. The MO’s absence meant they did not feature in public or media blame during the fuel crisis, highlighting how the dynamics of blame cast in extreme weather events is

\textsuperscript{266} For an example of such an approach see Steinberg (2000)
\textsuperscript{267} See Carr (1932)
closely correlated with responsibility, prominence, and perceived agency or ability to mitigate effects.

Even though the post-war restructuring of the MO created a specific department charged with communicating forecasts, the nature of such forecasts and warnings, especially with non-traditional organisations such as the MoFP, was reactive and ad-hoc. The reactive nature of such specialised services for government departments, public authorities, and industrial concerns was emphasised by the number of MO schemes established due to failures during the winter of 1947. Yet these schemes, such as the flood warnings for the Ouse and Thames, were not built into formal policy, made mandatory, or implemented nationally. Despite the reactive development of many of the inter-departmental warnings, in the immediate post-war years there was a substantial increase in the number of such forecasts being issued to non-military concerns. The growth of these warning systems, whilst seemingly not systematically planned, can be situated within the wider trend of shifting from a warfare state to a welfare state.268

This chapter has shown that in the post-war years, developments in the issuing of extreme weather communications by the MO, whilst not formally planned or directed, grew substantially, but in a fragmentary manner. The specific cases referred to and analysed are indicative of wider period trends for both meteorology and the perception and expectation of risk in society. The plurality of events during the winter crisis of 1947 restricted the catalysing effect on disaster management policies. Yet this lack of clarity as to whether the crisis was a natural or anthropogenic disaster may have helped to catalyse the development of societal views of extreme meteorological events as manageable risks, rather than unfortunate inevitabilities.

Chapter Four

Expert advice in extreme weather events: The Meteorological Office and the Waverley Committee, 1953-1954

There will have to be some interpretation put on the degree of risk... You must not have everybody being warned or it becomes a case of “Wolf, wolf!” and becomes nonsensical.

Sir Donald Fergusson – Waverley Committee Member, 1953

4.1 Introduction

In the previous chapter, we saw how the Meteorological Office’s (MO) communications based on forecasts of extreme meteorological events grew in the initial post-war years. Through analysis of the North Sea flood of January 31st, 1953, and the subsequent Departmental Committee on Coastal Flooding set up to investigate the catastrophe, this chapter explores in detail how the wider trend which saw the MO issuing more warnings manifested in one key case. Unlike in 1947, when meteorologists were considered to not have any expertise which could help alleviate the unfolding catastrophe, meteorologists played an essential role throughout the events of 1953, both in the immediate aftermath of the flood, and in its longer term repercussions.

The North Sea Flood of January 31st - February 1st 1953 consisted of a storm surge and coastal flooding which were parts of a larger weather system that not only caused extensive destruction along the full length of the English east coast, but also affected Belgium and devastated the Netherlands. The event was responsible for large scale developments in warning systems, flood defences, and disaster management in all three countries. In the UK, the immediate response to the flooding was ad-hoc and largely

269 Sir Donald Fergusson, Departmental Committee on Coastal Flooding, Verbatim Script of the second meeting, 11th May 1953 - 37. MAF 135/341

community-led. The clean-up and aftermath has been placed within a narrative of resilience, with recent accounts portraying a camaraderie and an acceptance of natural flood events, indeed, the sociologist Frank Furedi uses the response to the event to argue for the decline of a “blitz spirit” no longer prevalent in contemporary British society. Yet this narrative fails to elucidate and unpack the much more detailed interactions of the natural, social, and economic spheres which collided together as the sea breached defences all along the east coast.

Due to a combination of factors in 1953, including the large scale of the floods, the high death toll, the lack of an integrated response, and subsequent political and media pressure, the Government announced the creation of a Departmental Committee on Coastal Flooding to investigate the lessons to be learned from the flooding. Comparison in this chapter with my previous analysis of the winter of 1947 demonstrates the increasing role the MO played in extreme weather events in the UK. It took the catastrophe and breakdown caused by the flood of 1953, clearly perceived as a natural disaster, to really extend extreme weather forecast and warning developments into national policy. The example of the flooding presented shows how differently an extreme weather event can be understood and dealt with by the government, the MO, and the public; highlighting the changing attitudes toward extreme weather, risk, blame, and the MO of the period.

This chapter will also address the immediate aftermath and rescue work of the flooding, the questions about preparedness it raised, and the questions the public asked of the government, which led to the creation of the departmental committee to investigate the flooding. The creation of this committee enabled the government to deal with the issues the flooding raised, whilst also internalising some of the blame being aired by the opposition and affected communities.

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271 Furedi (2007) and Baxter (2005)
I outline the government creation of an inter-departmental emergency warning system formed to operate whilst the worst of the breached sea defences were repaired. The role MO officials played in the creation of this system shows how their positioning as scientific experts had grown since the winter of 1947. The chapter then introduces the departmental committee, known after its chair as the Waverley Committee. By analysing the committee’s composition, deliberations, interim report, and final report, I highlight how the scientific expertise of the MO contested not only with political and economic considerations, but with those of other scientific experts, such as oceanographers. When sociologists such as Alan Irwin, Brian Wynne, and Craig Lash, discuss the public understanding of science, they consider scientists’ role in influencing policy, stating that political decisions often rely too heavily on such input. Yet none of these studies consider the historical development of such phenomena. The Waverley Committee presents an early case of a government inquiry, resulting in tangible policy changes, which had scientists at its core. This was an important step for the prominence of scientific experts in British society and the government’s increased reliance on scientists in informing policy over the coming decades.

The chapter now begins by introducing in detail the meteorological, geographical, economic, and social factors which interacted to cause the flooding disaster of January and February 1953.

4.2 The North Sea Flood, January 31st – February 1st, 1953

The east coast storm surge and flooding of January 31st, 1953 was the worst naturally triggered disaster in twentieth-century Britain. In the UK alone, it accounted for 440 deaths, over 160,000 acres of flooded land, 1,200 breaches of sea defences, damage to 24,000

272 Irwin (1995), Wynne (1992), and Lash et al. (1996)
properties, and the evacuation of over 32,000 citizens.\textsuperscript{273} The storm’s first casualties came with the sinking of the passenger ferry, MV Princess Victoria, as it crossed from Stranraer, Scotland, to Larne, Northern Ireland, at about 14:00 on January 31\textsuperscript{st}, 1953, resulting in 133 deaths. The storm surge hit the shore at Spurn Head, Yorkshire, at 16:00, before progressing southwards along the east coast of England, causing a further 307 deaths. Of these deaths, 216 (70\%) occurred in five main clusters: Mablethorpe and Sutton on Sea (16 dead), Hunstanton and Snettisham (65 dead), Felixstowe and Harwich (over 40 dead), Jaywick (37 dead), and Canvey Island (58 dead) (Figure 4.1).\textsuperscript{274}

Despite the significant lag time between the first landfall at Spurn Head, and communities like Canvey Island in Essex, further down the coast, who were not inundated until 01.10 on February 1\textsuperscript{st}, no direct public warnings were issued, and each community dealt with the deadly deluge independently.\textsuperscript{275} Late on the 31\textsuperscript{st} the MO issued a warning to the Thames River Board under the Thames surge warning system, established after the Thames floods of 1928, which was passed on to the BBC via the police. Anyone still awake and listening to the radio at midnight was unassumingly advised of “an exceptionally high tide in the River Thames and Medway” the following morning. The spring tide in fact combined with an extreme extratropical cyclone, producing tides two metres above forecasts, and waves of up to 4.9 metres.\textsuperscript{276}

\textsuperscript{273} See Waverley (1954) Para 22, Baxter (2005) and Steers (1953). The Netherlands were also devastatingly hit by the same weather system resulting in 1,836 deaths (Gerritson, 2005). Most British accounts of the flood give the death toll as 307, although this doesn’t include the 133 deaths caused by the sinking of the MV Princess Victoria. The true death toll is possibly larger still as it unclear whether official figures include several fishing vessels also sunk by the storm. The Times, February 17\textsuperscript{th}, 1953, 5
\textsuperscript{274} Baxter (2005) 1295
\textsuperscript{275} Hall (2011) 388
\textsuperscript{276} The Times, February 5\textsuperscript{th}, 1953, 6 and Carlsson-Hyslop (2010) 232
The central government was slow to react to the flooding, so that until Monday, February 2nd, each locality dealt independently with the unfolding situation. Much of the immediate rescue work was carried out by local authorities, communities, and military servicemen, both British and American, based in the afflicted areas. Although the flooding only directly affected a relatively small proportion of Britain and its population, the government declared it a national disaster, and in the weeks that followed, a large national outpouring

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277 Hall (2011) 388-389
of camaraderie emerged.\textsuperscript{278} The Lord Mayor of London established a National Flood and a
Tempest Distress fund that was to help those worst affected, and within a week it had
raised £125,000, and received donations of clothing, bedding, and other sundries from all
over the UK.\textsuperscript{279} The mass media, through national newspapers, BBC radio, and television
broadcasts, reinforced and augmented this national support for the stricken regions,
providing a common national narrative for the flooding. Both politicians and the media
evoked a wartime narrative of resilience, couching relief efforts in terms of a battle against
nature.\textsuperscript{280}

Despite this national narrative of resilience, there were a few, if somewhat tempered,
questions asked of both the government’s preparedness for such an event, and the official
response that followed. As early as February 3\textsuperscript{rd}, whilst flood recovery was still ongoing in
large areas of South-East England, the Deputy Leader of the Opposition, Herbert Morrison,
raised questions in the House of Commons about the Conservative government’s spending
on flood defences. In particular, he highlighted a circular issued the previous June, which
had ordered that improvements on the already dilapidated coastal defences be slowed or
halted completely due to steel shortages.\textsuperscript{281} The Home Secretary, Sir Maxwell Fyfe, and the
Speaker of the House both intervened to “prevent what is a great national disaster from
becoming a party matter.” In response, Morrison stated that when his government had
been faced with “natural visitations” in 1947, the opposition had been happy to make

\textsuperscript{278} Despite only 32,000 people out of UK population of 49 million (1951 census) being evacuated the
flood was declared a national disaster on February 2\textsuperscript{nd}, 1953. House of Commons Debate: 2\textsuperscript{nd}
February 1953, vol. 510 cc1481 and Hall (2011) 390

\textsuperscript{279} Risk Management Solutions (2003) 5, House of Commons Debate, 3\textsuperscript{rd} February 1953, vol. 510
cc1665

\textsuperscript{280} What Furedi has referred to as the re-emergence of the blitz spirit. Furedi (2007) 237-240

\textsuperscript{281} The circular Morrison was referring to had been issued by the Ministry of Housing and Local
Government on 27\textsuperscript{th} June 1952, entitled; “Economies in Local Government Services Water Supply,
Sewerage and Sewage Disposal, Private Street Works, Coast Protection, and Miscellaneous
Services.” – Circular NO. 54/52. HLG 72/2
political the winter’s events. Morrison’s contrasting of the winter of 1947 against the flooding of early 1953 is a comparison that was rarely made in both contemporaneous and subsequent accounts of the period. Again, as in chapter two, we see how the popular memory of both extreme events was created by the interactions of specific meteorological, cultural, economic, and political circumstances.

Opposition and public questioning of the authorities preparedness was most widespread in criticisms of the lack of an integrated warning system. Without directing vehement blame toward individuals or departments within the government, politicians, newspapers, and regional figures such as coroners and juries of inquests into the deaths caused by the flooding all asked questions about a lack of formal and informal warnings being issued. The government was quick in attempts to curb such criticism, Maxwell-Fyfe stating to Parliament:

> There have been criticisms in certain quarters that no adequate warning was given to the public in the areas concerned, but I would remind the House that this country has been fortunate in not having suffered any ordeal of this kind in this century, and no Government in that time has thought it necessary to organise a public warning system for this purpose.

In a clever political sleight of hand, Sir Maxwell-Fyfe went on to state that although the government absolved its responsibility for a lack of warning, it would do what previous government’s had failed to do, and make it a priority to investigate the devising of such a warning system.

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282 House of Commons Debate, 3rd February 1953, vol. 510 cc1666-8
As these criticisms were aired whilst the tragedy of events were still unfolding, it is important to remember that these enquiries remained at the periphery of both political and media coverage of the flooding. The majority of discussion in these avenues emphasised the exceptional natural forces of the storm surge, and the developing battle with the forces of nature to which the nation need unite to defeat. However peripheral, questions aired about flood defences, warning systems, and response, concerned the government enough for officials to take action.

In the cabinet committee meeting of February 17th, 1953, Maxwell-Fyfe proposed the formation of a committee “to consider what long-term measures should be taken to guard against a recurrence of flooding.” The Home Secretary was clear to state that the committee was to ensure that measures did not go too far, as this scale of event had only “occurred 3 times in 1,000 y[ea]rs.” Whilst the proposal for a committee was a direct response to both the scale of events and the questions it raised, the Home Secretary saw the use of a departmental committee as a key mediating process to place response to the disaster within the calculable realms of science, engineering, and above all, economics.

The Home Secretary announced the creation of the committee to the House on February 19th, and on April 28th, 1953, the Departmental Committee on Coastal Flooding was formally appointed under the chairmanship of the experienced civil servant John Anderson, the 1st Viscount Waverley. Considering that both a Royal Commission which had covered the subject of coastal erosion from 1906-1911, and the 1951 Advisory Council on Scientific Policy that examined the problem of coastal erosion and accretion, had resulted in no tangible political outcomes, the creation of the Waverley Committee highlights how a

285 CC (53), 12th Conclusions, Cabinet meeting held on 17th Feb 1953, minute no 7. CAB 128/26
286 CC 12(53), Notebooks, Cabinet meeting held on 17th Feb 1953, minute no 7. CAB 195/11
287 See Carlsson-Hyslop (2010) 237 for a similar reading of proceedings
disaster can act as a catalyst for public policy. The complete dislocation and collapse that the extensive flooding caused focused the public, business, and most importantly, politician’s minds on the problem of coastal defence. Before the chapter proceeds further with events of spring 1953, let us first explore Maxwell-Fyfe’s decision to create an investigatory committee in a wider context.

4.2.1 Committees in Disaster Events

To help us demarcate between the broad arrays of advisory committees, we can categorise most as fitting into one of two distinct groups:

1. **Standing committees** who have an ongoing remit and mandate, to give advice on such matters as referred to them on a generally defined subject,

2. and **ad-hoc committees**, who usually operate within a certain time frame, to carry out a specific mandate, often in response to a trigger event. Royal Commissions, departmental committees, tribunals of inquiry and public inquiries most commonly fall into this category.

Examples of both standing and ad-hoc committees were introduced in the previous chapter. The Meteorological Committee, which since 1905 has acted as a conduit between treasury funding concerns and MO operations, in its structure, representation, and ongoing mandate, is a typical example of a standing committee. The departmental committee created toward the end of the Second World War, known as the Barlow Committee,

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289 Butler and Butler (1987) 295 and Advisory Council on Scientific Policy, Coastal Flooding, note by the Joint Secretaries, 10th June 1954. CAB 124/2634


291 Air Ministry. Meteorological Committee: A Brief History of the Meteorological Office. BJ 5/226
however, existed only to produce the white paper on the Scientific Civil Service (1945), and can be considered an ad-hoc committee.

The Waverley Committee’s structure built on the precedent of a small investigatory committee that had been established after flooding on the Thames in 1928.\(^\text{292}\) The lack of inquiry or committee investigation after the flooding in March 1947, however, and the delay in the formation of a committee after the Great Smog, which caused approximately 4,000 deaths in London December 1952, shows that the creation of such an inquiry was not an automatic government response to weather-related disasters in the period.\(^\text{293}\)

The specific type of review undertaken by the government, whether departmental committee, public inquiry, or closed cabinet review, varied on a case–by-case basis. After the riverine floods which followed the winter of 1947, whilst there was no departmental inquiry, public inquiry, independent report, or Royal Commission, the government did liaise extensively with the Catchment Boards affected. The Minister of Agriculture and Fisheries presented a comprehensive memorandum based on this liaison to the cabinet, dealing with the floods and their long-term policy implications in detail.\(^\text{294}\) In reality, this memorandum differed only in its scale from reports presented by the more formal routes of inquiry listed above, yet the government came under much criticism for not adopting a more transparent, formal method of inquiry.\(^\text{295}\) An editorial opinion piece in *Nature* in August 1953, questioned the differing response to natural disaster events, contrasting the coastal flooding of 1953, the London smog of 1952, and the Lynmouth riverine flooding of 1952. It highlighted that whilst the two flood events had prompted public relief funds, the London fog disaster had not, despite its death toll being an order of magnitude greater. More

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\(^{292}\) Gibbon (1928)

\(^{293}\) Carlsson-Hyslop (2010) 233

\(^{294}\) The Floods of March-April 1947, 16\(^\text{th}\) May, 1947 (CP (47) 157). CAB 129/19

\(^{295}\) For an example of the pressure the government faced throughout the post winter flooding in 1947 see House of Commons Debate, 24\(^\text{th}\) April 1947, vol. 436 cc1344-68
interestingly, it went on to state that whilst the two larger-scale events (fog and coastal flood) had instigated ongoing investigations, the smaller, but more frequently occurring riverine flooding, had received only a local inquiry.\textsuperscript{296}

In events that are labelled as disasters, we have seen varying response mechanisms, with the exact nature of the disaster and its cultural context informing decisions politicians make. Whilst for flooding events an inquiry may not always be a foregone conclusion, in events which are perceived as being anthropogenic, such as the smog of 1952 the more prominent human agency means inquiries are commonplace.\textsuperscript{297} Thick smog’s caused by atmospheric pollution were common by the early 1950s in industrial regions of the UK. However, despite their obvious anthropogenic component, in December 1952 it was the specific meteorological conditions over London which resulted in the severity, persistence, and therefore ultimately the cost to human life of the smog.\textsuperscript{298} Just as we may re-imagine the Great Smog of 1952 as a combination of natural and anthropogenic causes, itself an extreme weather event, so too we can view the floods of 1953 as the collapse of a series of combining, interacting human and natural elements. As we saw with the case of the winter of 1947, the contemporaneous imagining and framing of events, by both the government and media, affected the outcome of what type of inquiry was to be carried out. Even within formats of investigation which have a formal structure to them, such as public inquiries, there is large variation in their delivery, as the chairmen of inquests and inquiries have

\begin{thebibliography}{99}
\bibitem{296} Nature (1953) 263
\bibitem{297} See also the case of the Aberfan colliery landslip in McLean and Johnes (2000). The disaster in the Welsh mining village of Aberfan on 21\textsuperscript{st} October, 1966 saw the collapse of a coal spoil tip engulf a school, leading to the death of 116 children and 28 adults. The report of the Tribunal of Inquiry under Lord Justice Edmund Davies found the responsibility for the disaster lay solely with the National Coal Board.
\bibitem{298} Whitehead (2009) 142-148
\end{thebibliography}
significant flexibility in how they interpret their role. Such diversity of interpretation can blur the apportioning of responsibility and does not help the recovery of those affected.299

Maxwell-Fyfe’s decision to create a Departmental Committee to investigate the floods under the joint authority of the Home Secretary, the Secretary of State for Scotland, the Minister of Housing and Local Government, and the Minister of Agriculture and Fisheries, can be seen as an attempt to balance pressures from not only the public’s questions surrounding warnings and sea defence, but also from experts such as Alfred Steers, Professor of Geography at the University of Cambridge. In early February 1953, Steers produced a report on the floods, and his recommendation for an inquiry to be conducted, found its way to the Home Secretary via the endorsement of Lord Salisbury, who, as Lord President of the Council, was head of the Nature Conservancy. The report Salisbury received from Steers was created specifically for consideration by the Nature Conservancy, however from Salisbury’s description it is likely its was similar in content to Steers paper on the floods that appeared in the Geographical Journal in September of that year.300 The creation of the committee was typical of a rise in the use of such inquiries: by 1960, over 50% of advisory committees then in existence had been created since the Second World War.301 This rise occurred alongside broader trends in the post-war period, which saw an increasing emphasis on science, its interaction with the state, and its perceived integral role in the reconstruction phase.302 Whilst this reading may be beneficial when considering the post-war period as a whole at the macro-scale, when investigating the Committee on

299 McLean and Johnes (2000) 92
300 See Steers (1953) and a letter from Salisbury to Maxwell-Fyfe (copy), 12th February 1953. CAB 124/2634
301 Smith (1969) 2 - This figure is significant as the majority of committees created by the government were standing rather than one off investigations such as the Coastal Flooding Committee.
Coastal Flooding independently, we must remember that it was not a pure faith in science as a problem solver which spurred the government’s actions. The decision to use the non-statutory ad-hoc Departmental Committee rather than a Public Inquiry, under the 1921 act, meant that the committee would have limited power to compel the attendance of witnesses, and their findings would be recommendations for individual departments to consider, rather than to receive mandatory debate in the House of Commons. Further, as we shall see from the make-up and deliberations of the committee, its creation showed a desire to marry improvements with rigorous cost-benefit analysis, underlined by the purported objectivity of scientific experts to justify the decision. The Waverley Committee was not created to find fault or apportion blame for the devastation that occurred on January 31st, 1953. The format ultimately adopted for the inquiry allowed the government to placate the public by investigating all the scientific options for flood warning, defence and response, whilst spreading responsibility for resulting recommendations or actions over several departments.

4.3 Plugging the Gaps: The Emergency Coastal Warning System

The departmental committee Maxwell-Fyfe proposed on February 19th was to look into the longer-term questions raised by events, but in the meantime, much more immediate concerns were the priority for the afflicted regions. The next spring tides were due in mid-February, and with over 1,200 breaches of sea defences along the east coast of England, the already beleaguered population was extremely vulnerable to further flooding. As soon as the water began to subside, parish councils, local authorities, and River Boards utilising policemen, locally based military personnel, and an astounding number of volunteers, began to repair the most vital of breached banks and sea defences (Figure 4.2). This

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303 Sears and Gay (2009) 16 & 21
304 Carlsson-Hyslop (2010) 237
305 Waverley (1954) 3
gargantuan effort from all involved saw approximately two thirds of the breaches repaired to high tide levels prior to the next spring tides.\footnote{306} 

Whilst regional authorities dealt with frontline repairs, the central government, under direction from the Cabinet Committee on Emergencies, moved to maximise the co-ordination of repairs, minimise suffering, and ensure the safety of citizens before the next high tides.\footnote{307} The vulnerability of those in the afflicted communities was considered to be so serious that in only its second meeting after the disaster, the Committee on Emergencies created a sub-committee to investigate the establishment of a flood warning system. The sub-committee, consisting of representatives from all concerned ministries, plus the Admiralty, MO, and the Metropolitan Police met on February 4\textsuperscript{th}, 1953. In light of the long time it had taken to create the Thames surge warning system in the wake of flooding in 1928, they decided that no permanent warning system could be created before the next spring tides on February 14\textsuperscript{th}-19\textsuperscript{th}. Instead, they focussed their efforts on devising a short-term system that could issue warnings until the mid-March spring tides, by which point a more substantial system could be developed.\footnote{308}

\footnote{306} House of Commons Debate, 11\textsuperscript{th} February 1953, vol. 511 cc416

\footnote{307} Some documentation refers to a Flood Committee it is believed to be used synonymously and interchangeably to refer to both the Ministerial Committee on Emergencies and the Official Committee on Emergencies chaired by Sir Frank Newsam. See T 227/181 for minutes of both Committees’ meetings in the immediate aftermath of the flooding.

\footnote{308} Report of the sub-committee on the setting up of flood warning systems, 6\textsuperscript{th} February 1953. AIR 2/11863
Figure 4.2: A journalist captures an army of volunteers repairing a breach of the bank of the Great Ouse at Magdalen, Norfolk
Source: Pollard, (1978) (©Walmsey and Webb)

The MO led this initiative with the creation of the emergency system, reviewing their present operations, the meteorological conditions that caused the storm, and liaising with other European national meteorological services (NMSs). Principal Deputy Director (PDDMO), Stagg, presented the resultant emergency flood warning arrangements to the home office by the on February 10th, 1953, and Maxwell-Fyfe announced them to the House the following day. At their most basic, the plans constituted:

1. The River Boards receiving, via the Ministry of Agriculture and Fisheries (MAF), reports and data from the MO on high and low tides obtained from five harbours;

2. The River Boards being responsible for interpreting this advice and advising the police if there is any threat or danger;

3. The police being responsible for then giving warnings to the public, local authorities, and public utility undertakings. Such warnings were to include, where appropriate, the posting

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309 The DMO wrote to NMSs in the Netherlands and Germany to enquire about their systems, and the Director in Chief of the Royal Netherlands Meteorological Institute visited the MO to discuss future developments. AIR 2/11863
of police or civilian watchmen at threatened points, the patrolling of villages and towns
with loudspeaker cars, and warnings to isolated houses and farms;

4. The police in coastal areas, in liaison with officers of the River Boards, were to survey
current defences to locate probable danger areas; and

5. The BBC, on the advice of the MAF, who would be informed by the responsible River
Board, was to broadcast at hourly intervals local flood and high tide warnings.310

Stagg and the MO played a central role in the creation of the sub-committee’s temporary
warning arrangements. Before these arrangements, the MO’s provision of advice or
warnings on flooding (Figure 3.3) consisted of a public service through the BBC and the
press on gale severity, warnings to Scotland Yard when conditions in the Thames Estuary
were likely to lead to an exceptionally high tide, and notification of conditions favouring
abnormally high river levels to the Ouse River Board and the Norfolk and Suffolk River
Board. It is important to note that all the measures in operation prior to the floods of 1953
placed an emphasis on the MO issuing alerts to bodies that specifically requested
information from it. The emergency warning measures operational from February 12th,
1953 extended these original isolated systems into a more contiguous, national-scale
system, answerable to the national government. The shift saw the MO beginning to move
from being a reactive organisation that issued advice or warnings to a specific body as a
helpful free service, to a proactive one that had a responsibility to warn all who may be in
danger of expected inclement conditions.

Whilst MO officials played a central role as key experts in these early flood warning
discussions, they were careful not to overstate their capabilities. Whilst a flood warning
system may have had many synergies with services the MO already delivered, they “could

310 House of Commons Debate, 11th February 1953, vol. 511 cc417-9 and AIR 2/11863
not be expected to visualise the conditions of the coast defences along every stretch of the east coast.” Thus, they envisaged working in partnership with others, such as tidal experts, over the coming months to create a more comprehensive and robust warning system.\footnote{311}

\section*{4.4 The Departmental Committee on Coastal Flooding}

Whilst the initial aid, shelter, repairs, and emergency warning system for the 1953 floods were being closely driven by the Cabinet and Treasury, the investigation into the disaster needed to be conducted independently. John Anderson, the First Viscount of Waverley, a veteran of several departmental committees, including the concurrently running Atomic Energy Project Reorganisation Committee, was appointed chair of the Coastal Flooding Committee.\footnote{312} Despite his Conservative connections, there was little debate about the suitability of Lord Waverley as chair of the committee, as he was highly regarded and had served under successive governments of both sides. He also had no specialist knowledge of coastal flooding, which would in theory ensure his neutrality to ideas presented to the committee.\footnote{313}

The rest of the committee was made up of thirteen prominent experts, all who brought to the table specialisations or experience in key areas of the investigation (Figure 4.3). It is difficult to ascertain how Maxwell-Fyfe and the Home Office decided on the final membership of the committee, but several organisations pressed to ensure their inclusion.

\footnotetext{311}{\textit{Flood Warning Sub-committee, First Meeting, Memorandum – 4\textsuperscript{th} February, 1953. AIR 2/11863}}
\footnotetext{312}{\textit{Referred to herein as the Waverley Committee, not to be confused with The Waverley Committee and subsequent Report of the Waverley Committee, known in art circles; published in 1952, and also chaired by Anderson this committee and report addressed reforms in regulation on the export of art. Wheeler-Bennett (1962) 371-3}}
\footnotetext{313}{\textit{Wheeler-Bennett (1962) vii}}
<table>
<thead>
<tr>
<th>Name:</th>
<th>Profession:</th>
<th>Relevant Position(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Right Honourable Viscount Waverley (John Anderson)</td>
<td>Civil Servant</td>
<td>Chair of several other committees including Atomic Energy Project Reorganisation Committee</td>
</tr>
<tr>
<td>Sir Donald Fergusson</td>
<td>Civil Servant</td>
<td>Former Permanent Secretary of the Ministry of Fuel and Power, and the Ministry of Agriculture and Fisheries</td>
</tr>
<tr>
<td>Sir Claude Inglis</td>
<td>Hydraulic Engineer</td>
<td>Director, Hydraulics Research Board, Department of Scientific and Industrial Research</td>
</tr>
<tr>
<td>Mr R.G. Leach</td>
<td>Accountant</td>
<td>Partner in Peat, Marwick, Mitchell and Company, former Deputy Financial Secretary of the Ministry of Food</td>
</tr>
<tr>
<td>Major Sir Basil Neven-Spence (retired) &amp; Politician</td>
<td>Military Physician</td>
<td>Lord Lieutenant of Zetland (Shetland Islands)</td>
</tr>
<tr>
<td>Professor J. Proudman</td>
<td>Oceanographer</td>
<td>Professor of Oceanography at the Liverpool Tidal Institute, University of Liverpool</td>
</tr>
<tr>
<td>Mr A.S. Quartermaine</td>
<td>Civil Engineer</td>
<td>President of the Institution of Civil Engineers, and Chief Engineer of the Great Western Railway</td>
</tr>
<tr>
<td>Lord De Ramsey (Ailwyn Edward Fellowes)</td>
<td>Hereditary Lord</td>
<td>Lord Lieutenant of Huntingdonshire</td>
</tr>
<tr>
<td>Professor J.A. Steers</td>
<td>Geographer</td>
<td>Professor of Geography at the University of Cambridge</td>
</tr>
<tr>
<td>Sir John Wrigley</td>
<td>Politician &amp; Civil Servant</td>
<td>Former Deputy-Secretary of the Ministry of Housing and Local Government</td>
</tr>
<tr>
<td>Mr T Yates *</td>
<td>Trade Unionist</td>
<td>General Secretary of the National Union of Seamen</td>
</tr>
<tr>
<td>Sir Miles Thomas *</td>
<td>Businessman</td>
<td>Chairman of the British Overseas Airways Corporation</td>
</tr>
<tr>
<td>Dr G.M.B. Dobson</td>
<td>Meteorologist</td>
<td>Reader in Meteorology at the University of Oxford</td>
</tr>
<tr>
<td>Mr R.D. Gwyther</td>
<td>Civil Engineer</td>
<td>Partner in Messrs. Coode and Partners</td>
</tr>
</tbody>
</table>

* Yates and Thomas were the only members of the Committee to not attend the majority of meetings, only attending 4 and 3 respectively of the 26 meetings held.

**Figure 4.3:** The Members of the Departmental Committee on Coastal Flooding


When consulted on the draft membership of the Waverley Committee, the Hydrographic Department was adamant that it required a tidal expert to gain legitimacy in the eyes of other scientists. The department recommended Professor Joseph Proudman, the former Director of the Liverpool Tidal Institute, and he was added to the committee. \(^{314}\) Proudman was a leading tidal and storm surge oceanographer, who was well known to many

\(^{314}\) Carlsson-Hyslop (2010) 238-239
government departments through the Liverpool Tidal Institutes involvement with the committee which investigated the flooding of the Thames in 1928. Proudman favoured a theoretical approach to surge prediction which relied on statistics, which had come under criticism, from amongst others the meteorologist Vilhelm Bjerknes, for failing to incorporate baroclinic and dynamical considerations. Lord Salisbury insisted that the inquiry also include a “competent physiographer and ecologist,” perhaps not a surprise considering he represented the Nature Conservancy, and was prompted to write to Maxwell-Fyfe by Professor Steers, a physical geographer who had written extensively on coastal erosion. The wide distribution list attached to this correspondence, followed by the addition of Steers to the departmental committee, suggests Lord Salisbury’s efforts were effective.

The final scientific expert to be added to the committee was University of Oxford meteorologist, Dr. Gordon Dobson, who was selected after three other meteorologists had turned the position down. The Joint Secretary of the Waverley Committee had clearly stated to the MO that whilst they thought it imperative for a meteorologist to be on the committee, it would not be a civil servant. Once the MO learned that it was to be Dobson on the main committee, they wrote to inform him of the progress they had made since the floods, and of their opinion that “[i]t would be desirable for the Waverley Committee to set

\[315\] Carlsson-Hyslop (2010) Chapter Five
\[316\] Carlsson-Hyslop (2010) 36
\[317\] The letter was further circulated to the Minister for Agriculture and Fisheries, the Minister of Housing and Local Government, the Lord Privy Seal, and Ben Lockspeiser at the Department of Scientific and Industrial Research. Letter from Salisbury to Maxwell-Fyfe (copy), 12th February 1953. CAB 124/2634
\[318\] The Waverley Committee had already unsuccessfully approached Sir David Brunt, Professor P.A. Sheppard, and Sir Charles Normand before opting for Dobson. Note on phone call from Joint Secretary of the Waverley Committee to J. Durward at the Meteorological Office, 26th March, 1953. AIR 2/11863
up a small panel of meteorologists and tidal experts to examine how far the flooding
problems are understood.”

The insistence that meteorological representation on the committee would not be via an
MO member of staff seems surprising, given their role in the creation of the temporary
warning system, and the likely role they would have to play in the delivery of a more
permanent coastal warning system. The inclusion of the incoming DMO, Professor Graham
Sutton (see 5.2), on the concurrently running Air Pollution Committee set up in response to
the Great Smog of 1952, shows that there was no constitutional problem with a scientific
civil servant being on a departmental committee. Whilst the position for Dobson supports
the narrative of an increasing professionalised presence of meteorologists in the period, his
inclusion at the expense of an MO meteorologist highlights how academic meteorologists
were beginning to compete with the MO’s emergent position as the default meteorological
organisation in Britain. The increase in prominence of meteorological and climatological
academics in the period can be seen across several areas: for example, throughout the
1950s, the then University of London climatologist, Gordon Manley, liaised extensively with
the Ministry of Fuel and Power (MoFP) and the MO. Despite the MO’s exclusion,
however, the Waverley Committee still had a strong scientific presence. Prior to the war,
similar inquiries, such as the investigations into the London floods of 1928, whilst having
one or two scientifically-minded members on the main committee, more often placed
scientific experts on subordinate technical sub-committees.

The terms of reference of the Waverley Committee, announced before its full membership
had been finalised, were:

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319 Letter from Johnson (D.M.O) to Dr Dobson, 6th May, 1953. AIR 2/11863
320 Gordon Manley Collection: Ms Add. 8386/17
321 Gibbon (1928)
i). to examine the causes of the recent floods and the possibilities of a recurrence in Great Britain;

ii). to consider what margin of safety for sea defences would be reasonable and practicable having regard on the one hand to the estimated risks involved and on the other to the cost of protective measures;

iii). to consider whether any further measures should be taken by a system of warning or otherwise to lessen the risk of loss of life and serious damage to property;

iv). to review the lessons to be learned from the disaster and the administrative and financial responsibilities of the various bodies concerned in providing and maintaining the sea defences and replacing them in the event of damage; and to make recommendations.\textsuperscript{322}

With the final members of the committee still to be confirmed, the committee secretaries began asking all relevant authorities for evidence for the committee to consider. When the Waverley Committee first sat on May 4\textsuperscript{th}, they already had a substantial body of evidence to address.\textsuperscript{323} From the outset, whilst Waverley said he should like to address the terms of reference in the order they were issued, he also stated that the government would like a response on term three, the warning system, before the autumn, so the system could be put in place prior to the winter.\textsuperscript{324}

At the second meeting of the committee, MO meteorologists E.G. Bilham and C.K.M. Douglas, alongside Commander Farquharson and R. Morton of the Admiralty Hydrographic

\textsuperscript{322} Waverley (1954). The terms of reference were announced in the House of Lords as early as March 5\textsuperscript{th}, 1953. House of Lords Debate, 5\textsuperscript{th} March 1953, vol. 180 cc1034

\textsuperscript{323} The secretary Maher sent all committee members fourteen papers for consideration prior to the meeting, included in these were memoranda produced by the Institution of Water Engineers and the National Union of Farmers. Letter from Maher to Committee Members, 28\textsuperscript{th} April 1953. MAF 135/341

\textsuperscript{324} Departmental Committee on Coastal Flooding, Minutes of the first meeting, 4\textsuperscript{th} May 1953. MAF 135/341
Department, gave evidence and answered questions arising from the memoranda they had submitted. At this early stage in the committee’s deliberations, each department involved in the emergency warning arrangements then in operation was clear to mark the boundaries of what its input into the system entailed, and therefore, where its responsibility to the public ended. Bilham and Douglas dominated the verbatim minutes with regard to technical advice on meteorology, with Dobson being corrected on occasion by Bilham, with his detailed knowledge of UK meteorology.325

Whilst the committee met regularly and discussed in great detail all aspects of their remit, much of the progress in terms of practical outcomes was to come from informal meetings, circulated memoranda, and technical sub-committees that occurred between main committee meetings. Of particular note is the Oceanographic Sub-Committee, formed by the main committee’s oceanographer, Proudman, which consisted of himself as chair, Dobson, Steers, and Inglis. This scientific sub-committee considered the location of tidal gauges for the warning system, and the specifics of further research that was required to improve forecasting of storm surges. In this last respect, the sub-committee met the MO’s desire to create a panel of experts. However, Proudman’s decision not to appoint an MO meteorologist to this sub-committee resulted in the complete absence of the Meteorological Office from its proposals for future research.326

On June 23rd, an informal meeting between Johnson (DMO), Peters (DDMO (Forecasting)), Dobson, and Farquharson, convened to finalise a permanent flood warning system based on the preliminary findings of the Waverley Committee. The attendees at the meeting agreed on two central tenets of the system that would subsequently be debated at length:

325 Departmental Committee on Coastal Flooding, 11th May 1953, Verbatim minutes. MAF 135/341
326 Departmental Committee on Coastal Flooding, Oceanographic Sub-committee Report: HO 325/13. The institutions recommended to carry out the required research were the Proudman founded, Liverpool Tidal Institute and the Proudman influenced, National Institute of Oceanography. See Carlsson-Hyslop (2010) 56 & 80 and Laughton et al (2010)
1. That warnings should be coordinated from the Central Forecasting Office (CFO) at Dunstable, with a hydrographer attached for the winter season 1953-54 to liaise with meteorologists.

2. That warnings issued should be labelled, due to the myriad of agencies involved, as “advice,” rather than “warnings.”

From the initial emergency warning measures, to the evidence presented to the Waverley Committee by expert witnesses, and finally, to the above meeting on the warning system, MO officials were central scientific experts informing developments. Unlike during the winter of 1947, they found themselves central to not only the planning of future policy, but also the implementation of ad-hoc systems whilst breaches were repaired.

However, the position of MO officials advising the Waverley Committee as scientific experts was contested. Whilst senior MO figures agreed on most matters with Dobson, some underlying tension between themselves and the tidal experts, notably Proudman, is apparent in proceedings. For example, when discussing a preliminary draft of the warning system, Stagg questioned the use of the term “surge,” and the presentation of surge science as the accepted explanation for the cause of the flooding. He added that although the Dutch were aware of Proudman’s work they used a different theory to explain the occurrence of floods along the coast. Despite tensions about scientific theory and omission from sub-committees, senior figures at both institutions (the MO and Liverpool

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327 Notes of meeting held 23rd June 1953 to discuss the question of establishing a flood warning system for the east coast. AIR 2/11863
328 Stagg and the MO preferred a methodology based on hydrodynamical causal physics, whilst Proudman’s work focused on statistical correlation and the calculation of residuals. See Carlsson-Hyslop (2010) 110 and 253
Tidal Institute), understood that uncertainty surrounding the theoretical knowledge of storm surges could translate into future research funding for their organisations.\textsuperscript{329}

The Waverley Committee convened twice during July 1953 in an attempt to finalise the Interim Report on a coastal flood warning system before Parliament broke for summer recess. During these meetings, the Home Office, the MAF, the MO, the Admiralty Hydrographic Department, and the River Boards Association all had chance to comment on the initial draft of the proposed warning system. As may be expected at this stage, much debate was about the finer details of the warning system, clarifying exact wording and agreeing on definitions of contested terms such as “surge”.\textsuperscript{330} Whilst much of the debate was pedantic, the semantics of an exact word used in such a report could have wide-reaching repercussions. Again, the exact responsibilities within the system were discussed, and under pressure, the MO changed their previous position, and the word “warning” replaced “advice” in the communications to be issued. Stagg justified the change thus:

> [W]e issue warnings for other things, warnings of gales, warnings of potato blight. We issue warnings to all kinds of people and this is the kind of thing we are doing almost every day, whether they are called alerts or warnings, so long as they are not executive orders. That is the only thing we distinguish between. We warn people of conditions and ultimately someone, whether it be the Chief Engineer of a river board or the Chief Constable transforms that into an executive order, to clear out or do something else, but for us it may be called a warning if it makes the thing clear.\textsuperscript{331}

\textsuperscript{329} Stagg, 6, Departmental Committee on Coastal Flooding, Verbatim Script of the sixth meeting, 13\textsuperscript{th} July, 1953. MAF 135/341

\textsuperscript{330} For more on the conflict over the definition and the use of the term surge which centred on differences of approach between dynamical oceanography and residual calculation using statistical methods see Carlsson-Hyslop (2010) Chapter 5.3

\textsuperscript{331} Departmental Committee on Flooding, Meeting 13\textsuperscript{th} July 1953. Verbatim Minutes, pg 8. MAF 135/341
Those involved from the Air Ministry, with their more militarised focus than MO staff, clearly understood the significance of such a semantic shift, and highlighted that the finalised Interim Report needed to clearly designate “the responsibility for turning such forecasts into executive form.” If the Air Ministry was to accept executive responsibility, then the Secretary of State for Air requested that the DMO be given “command status,” and have a clear directive on procedures.\(^\text{332}\)

### 4.4.1 The Interim Report: Flood Warning System, July 1953

In late July 1953, the *Interim Report of the Departmental Committee on Coastal Flooding: Flood Warning System* was circulated to the Secretary of State for the Home Department, the Secretary of State for Scotland, the Minister of Housing and Local Government, and the Minister for Agriculture and Fisheries. The report outlined the steps required for the government to have in place a permanent flood warning system along the east coast of England in time for the autumn of 1953. In summary, its key points were:

a.) the warning system should operate each winter between September 15\(^{th}\) and April 30\(^{th}\),

b.) it should initially be confined to the east coast,

c.) it should be based at the MO CFO, Dunstable, where a representative of the Hydrographic Department should be seconded for the warning period,

d.) on the basis of Harbour Masters’ reports and of meteorological information, estimates of water levels should be made at CFO,

e.) each River Board, in consultation with other interested authorities, should decide, in light of its local knowledge, the water level at which it requires information from the

\(^{332}\) Minute from Secretary of State for Air, Lord De L’Isle and Dudley to the Departmental Under-Secretary, 14\(^{th}\) July 1953. The Air Ministry had already raised concerns of this nature with Stagg as early as 6\(^{th}\) February in consideration of the emergency interim warnings. Memorandum copy to D.D.M.O. (F) from Stagg, 6\(^{th}\) February, 1953. AIR 2/11863
CFO. When this level is likely to be reached, the River Board should be informed. The message should be repeated at regular intervals, giving the latest forecasts,
f.) at the same time as the message is sent to the River Boards, it should also be sent to the County Police Forces,
g.) County Police Forces should, on receiving a message from the CFO, transmit it to local government authorities,
h.) the River Board should interpret the information in the light of local conditions and, when necessary, inform the Police that a public warning should, in the opinion of the River Board, be given,
i.) local schemes should be worked out in advance in each river board area in consultation with the Police and the local government authorities concerned.333

Owing to time constraints caused by the approach of the Parliamentary recess, the MO was not afforded a preview of the draft report before it was circulated to ministers. The committee secretary, Maher, wrote to Stagg to apologise, reassuring him that the MO’s two main points raised in debate had been met. These were the insistence that daily reports were required from the specified Harbour Masters, and that further research into surges must be undertaken to expand on current formulas for predicting water levels. The inclusion of these two criteria pushed by Stagg, Bilham, and Douglas, highlights the importance afforded to MO expertise by the Waverley Committee. In contrast, the MO’s indecision between communications being known as alerts or warnings, resulted not in their clear definition as requested in the final round of consultations, but rather with all overt references to responsibility being removed completely from the Interim Report. The CFO forecasts or warnings to be issued to the at-risk regions were rather ambiguously

333 Waverley (1953) 8-9
referred to in the report as “information,” or “messages,” and the River Boards, County Councils, and Police were referred to as responsible for local action.\textsuperscript{334}

A final notable omission from the Interim Report was the use of the BBC to broadcast warnings via the wireless radio, an avenue which had been a core part of the emergency warning system set up in the aftermath of the flooding. Opposition to the use of the BBC stemmed from concerns such as those from Committee member and civil servant, Donald Fergusson: “there will have to be some interpretation put on the degree of risk...You must not have everybody being warned or it becomes a case of ‘Wolf, wolf!’ and becomes nonsensical.”\textsuperscript{335} This sentiment prevailed: the Interim Report stated that the BBC should not be used, as it could only broadcast warnings nationally, causing “unnecessary alarm,” and such warnings were not effective at night.\textsuperscript{336} Fergusson’s words highlight an important point, as they reflect the fact that while a new role for experts was sought for risk management, communication to the wider public was yet to become an issue in the decision makers’ agenda (Chapter Six covers the development of this area further).

\subsection*{4.4.2 From Interim Report to an operational warning system}

I think the Waverley Committee proposals are acceptable; they have the merit of simplicity and of providing for elasticity in local arrangements.\textsuperscript{337}

Once the Interim Report was published and had been accepted as suitable by all involved, there was little time to be wasted in turning its recommendations into a functioning system. The simplicity and elasticity of the report, whilst ensuring the warning system could

\begin{footnotes}
\item[334] Waverley (1953) 6
\item[335] Sir Donald Fergusson, Departmental Committee on Coastal Flooding, Verbatim Script of the second meeting, 11\textsuperscript{th} May 1953 - 37. MAF 135/341
\item[336] Waverley (1953) 8
\item[337] Minute Sheet - C.H.A. Duke (MAF) note on receipt of the Interim Report, 25\textsuperscript{th} July 1953. MAF 135/284
\end{footnotes}
incorporate, also meant that many exact functions of the system were still to be defined. Coordinated by the Home Office Emergency Committee, which was to ensure that the system would be operational by September 15\textsuperscript{th}, 1953, each organisation involved in the establishment of the warning system began the process of putting in place the operational procedures it required.\textsuperscript{338} By the end of August, the departments involved had finalised their required parts of the flood warning system and issued memoranda to all relevant staff.\textsuperscript{339}

On September 15\textsuperscript{th}, 1953, with little fanfare, the first truly national-scale flood warning system in the UK tentatively began operating for its first winter season.\textsuperscript{340} The first months of operation were uneventful. The first issuance of a warning by the MO was on October 24\textsuperscript{th} and 25\textsuperscript{th}, 1953, and in this instance, no public warnings were made. However, operational lessons were learnt; in this manner the system operated throughout the winter period, smoothing out operational faults and establishing clearer chains of communication.\textsuperscript{341} Whilst those at the operational end were smoothing out technical issues, others were still clarifying where certain executive responsibilities lay. In this first operational phase, not only was the discussion over responsibility for warnings still rumbling on between departments, but questions were also raised by several involved

\textsuperscript{338} Minutes of a meeting held at the Home Office to consider the recommendations made in the Interim Report of the Waverley Committee, 14\textsuperscript{th} August 1953. MAF 222/306

\textsuperscript{339} See AIR 2/11863 for the MO’s final preparations before the system became operational and for a copy of the circular on the flood warning system issued by the Ministry of Housing and Local Government issued on August 27\textsuperscript{th}, 1953.

\textsuperscript{340} Parliament was still in recess when the system became operational, so no announcement was made to the House; the system’s launch received a minimal amount of press coverage. See The Times, September 14\textsuperscript{th} 1953, 4.

\textsuperscript{341} See AIR 2/11863 notes on initial operation, notably for October 24\textsuperscript{th} - 25\textsuperscript{th}, a letter from the Chief Constable of Essex to the MO detailing problems with communicating warnings. Further see MAF 222/306 for examples of authorities such as the County Borough of West Ham speaking to the MO and the MAF to clarify communication channels.
agencies, including the MAF, over who should pay for expenses incurred. In late November, the MO wrote to the Hydrographic Office asking to clarify some of the wording regarding responsibility in the MO Order that set out the workings of the warning system in detail. Disagreement over the clear demarcation of responsibilities between these departments was fuelled by two fears: that of the questioning that might arise if a warning was not issued in time, and the possibility of a situation where the MO could overrule the hydrographer’s advice.

During deliberations, those involved with the committee broadly fell into two camps: those who were happy that the division of labour in the system clearly demarcated where different responsibilities lay, and those who felt that a warning system should have only one responsible executor. Here, personal understandings about casting of blame in disaster events may subconsciously have played a role. While there was a limited amount of blame aired after the flooding of January 1953, since the catastrophe, British society’s perception of risk had been altered, and through the promise of a warning system, its expectations had increased (see 1.3). Interestingly, those who most vehemently wished to see a system that had the MO as the sole authority responsible for the warnings issued to River Boards and the Police, were Sutton and Stagg, both of whom had been involved in wartime meteorological operations. Their experiences in the war certainly fuelled their stance as they wished to see a clear chain of command in place.

The new warning system was considered experimental and subject to ongoing review. As well as the ongoing informal departmental communications mentioned above, review of the system was through formal channels such as the Home Office Emergency Committee.

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342 Through late August into the first operational season of the warning system several departments ask about covering the cost of operations, such as telegrams and extra staff. MAF 222/306, MT 132/17, and AIR 2/11863
which convened a meeting on January 24th, 1954, to assess the system’s success thus far. At the end of the first operational cycle on April 30th, officials believed that this review should take a more in-depth and wide-ranging format, and all departments, including the MO, put forth their suggestions. The continued development of the system through this review, and subsequent annual interrogation, changed little of the fundamental operation of the system.

As the coastal flood warning system was being implemented, the Waverley Committee still had another three of its terms of reference to consider and report upon. The committee heard oral evidence from a diverse array of witnesses during the autumn and winter of 1953, meeting at least twice a month between September 1953 and March 1954. Yet in this period, as the committee considered its other terms of reference, it received no further input from any meteorologist, other than committee member Dobson, and had no direct contact with the MO.

In early 1954, the Home Office asked the MAF and the Ministry of Housing and Local Government (MHLG) to convene a meeting to consider the report of the Oceanographic Sub-Committee; prior to this meeting, the report was circulated to all invited. When Stagg at the MO received the report, he claimed it was “the first time I had seen or heard of the Oceanographic Sub-Committee;” the tensions with Proudman, and the other tidal experts involved, rapidly escalated. In a letter to the DMO on January 27th, 1954, Stagg expressed his anger at the MO not being consulted in the creation of the sub-committee’s report.

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343 Letter from Stagg to Dobson, 14th January, 1954. AIR 2/11863
344 The M.O Orders C.13/1953, C.17/1953, C.17/1954, C.22/1954, C.1/1956, and A.7/1958 – clearly show the progression of the operational elements of the warning system in the subsequent years. Whilst new detail is added, such as a 5 stage threat level, and additional services, such as warnings for Easterly Gales the fundamentals of the system as established in 1953 do not change. AIR 2/11863
345 Evidence was heard from organisations & people as diverse as selected Borough Surveyors, the Institution of Civil Engineers, ecological experts, Government ministries, River Board Associations, the Dock and Harbour Authorities Association, the Nature Conservancy, London County Council (amongst others), and the National Farmers Union.
Stagg stressed that the failings of similar research after the floods of 1928 had been caused by the lack of a “joint affair between the meteorologist and the tidal expert.”³⁴⁶ By the time of the MAF and MHLG co-ordinated a meeting with Stagg, he had managed to temper his anger, addressing those in attendance thus:

I explained that the Meteorological Office was surprised and disappointed at the lack of reference to the Meteorological Office. It was clear that the Meteorological Office had to be in the warning system; it was also clear from...some of the items of research that there were strong if not dominant meteorological implications. And yet the Meteorological Office had not been consulted by the sub-committee in their considerations as had been the Director of the National Institute of Oceanography and the representative of the Hydrographic Department: nor had the committee recommended that the Meteorological Office be brought into the research. The research was to be done by the Liverpool Observatory and Tidal Institute and the National Institute of Oceanography. Which of these bodies were going to provide the synoptic meteorological experience needed for tackling some of the problems?³⁴⁷

Through Stagg’s persistence, it was agreed that the Waverley Committee would be informed that the MO was to be consulted in the research the sub-committee proposed. To ensure that departments were not left out of proceedings in the future, and that research was as complete and useful as possible, the MAF and MHLG proposed that there should be a small coordinating departmental committee established. When such a committee was created in July 1954, after the Waverley Committee’s main report was published, the MO was indeed invited to appoint a technical representative.³⁴⁸ In spite of Stagg’s eleventh-hour resurrection of the MO as a crucial expert organisation for future research on surge

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³⁴⁶ Letter from Stagg to Sutton (DMO), 27th January 1954. AIR 2/11863
³⁴⁷ Stagg- Notes of a meeting held at the Ministry of Agriculture and Fisheries to consider Report of the Oceanographic Sub-Committee of the Waverley Committee, 3rd February 1954. AIR 2/11863
³⁴⁸ Letter from Duke (MAF) to Johnson (DMO), 13th July 1954. AIR 2/11863
forecasting, the encounter negatively affected both the MO’s view of the Waverley Committee, and its relationship with those on the Advisory Committee on Oceanographic and Meteorological Research, which Stagg fought to ensure the MO was represented on.  

Reflecting on the committee Stagg stated:

> The trouble with the Waverley Committee throughout has been that the Meteorological Office has not been well represented: in spite of the importance of its work in the problem, it has had no one on it with any insight into synoptic meteorology or even the organisation of the office. On the other hand...the tidal people in general have had a powerful representative in Professor Proudman.  

The episode highlights that whilst senior MO figures were more central experts in review of meteorological disaster in 1953 than they had been in 1947, the space they occupied as scientific experts was fast becoming overcrowded. Not only was there an increase in academic meteorological expertise with Dobson on the Waverley Committee, but now it seemed subjects such as forecasting, which had previously been considered solely the meteorologists’ realm, were in competition with another emergent discipline, oceanography.

The MO’s challenged position in the final proceedings of the Waverley Committee was exacerbated by the ad-hoc nature of a departmental committee; the lack of formulaic practice enabled the Waverley Committee to create a sub-committee that had no mandatory requirement to liaise with all necessary stakeholders. If we compare this to the public inquiry held to investigate the sinking of the MV Princess Victoria, caused by the same weather system as the 1953 floods, we see a stark difference. The inquiry required the MO to present evidence in a judicial setting, as is standard for investigations of large scale disasters.

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349 See Carlsson-Hyslop (2010) 242-7 for in depth coverage of how the Advisory Committee on Oceanographic and Meteorological Research came into existence and the tensions between organisations involved.

350 Letter from Stagg to Sutton (DMO), 27th January 1954. AIR 2/11863
losses of life at sea. The longer history of inquiries into loss of life at sea meant that a clear procedure for such investigations existed, which consulted all of the stakeholders in an equal and public manner. 351

Oblivious to the institutional wrangling occurring between the MO and the sub-committee, the Waverley Committee continued to meet and finalise drafts of its main report. On March 22nd, 1954, it met for the 26th and final time, with members agreeing on the text of the report that was greatly to influence British flood and coastal defence policy. The penultimate section of this chapter briefly considers the key elements of the final report, and its wider implications.

4.4.3 The Report of the Departmental Committee on Coastal Flooding, May 1954

Circulated to all relevant government departments throughout April and May, the Waverley Report was published on June 3rd, 1954. Maxwell-Fyfe announced the publication to the House of Commons the same day. 352 The report detailed the specifics, both meteorological and economic, of the flood event, and explained the causes insofar as they were understood by the members of the committee. The report then went on, in detail, to discuss the committee’s findings on each of its original terms of reference, and recommended twenty-six actions. Many of these recommendations regarded sea defences, six related to physical improvements, and a further five called for research into specified sea defence mechanisms. Included in these was a recommendation

351 Ministry of Transport (Shipping) - Met. Enquiries (Princess Victoria 1953). BJ 5/274
352 House of Commons Debate, 3rd June 1954, vol. 528 cc104-SW
that, in regard to the Thames, investigations should be undertaken urgently into the
possibility of providing a suitable structure, capable of being closed, as a means of reducing
the maximum water levels higher up the river at the time of a surge.\textsuperscript{353}

This was a significant development for London’s tidal defences, and after Sir Hermann
Bondi’s influential review of its progress in 1966, it led to the construction of the Thames
Barrier, which was completed in 1982.\textsuperscript{354}

The majority of the remaining recommendations aimed at clarifying, improving, and
developing the coordination of flood defence at both a regional and national level. The
report called for all involved authorities to review their mechanisms, and made
recommendations on how future works should be funded. Only two of the
recommendations directly affected the MO: firstly, that oceanographic research should be
carried out as proposed by Proudman’s sub-committee, and secondly, that two
consultative and advisory standing committees should be established to ensure
coordination of research. The phrase, “in each case in consultation with the Meteorological
Office,” had now been added to the sub-committee’s report which appeared as Appendix B.
Clear evidence that Stagg had won his final battle to secure a place for the MO within the
British government’s expert advice structure. The committee concluded that the warning
system, as proposed by the Interim Report and as operated through the previous winter,
was adequate, subject to ongoing review. The report also reiterated many of the findings of
the Advisory Council on Scientific Policy’s consideration of coastal erosion from 1951. This
earlier report had highlighted the need for sea defence research and immediate
improvement of the most urgent areas, as well as recommended the coordination of

\textsuperscript{353} Waverley (1954) 30
\textsuperscript{354} See Horner (1980) 389-390 for more on developments which led to the construction of the
Thames Barrier
interdepartmental research.\textsuperscript{355} That the Waverley Committee’s similar recommendations resulted in tangible outcomes, unlike in 1951, is again testament to the catalysing effect that disaster events have on policy.\textsuperscript{356}

The most notable long-term effects of the Waverley Committee and its two reports have been:

- The creation of the first national scale flood warning system, which in subsequent years, developed into the Storm Tide Warning Service, the origin and basis of today’s National Severe Weather Warning Service operated by the MO.
- The reinvigoration of discussion on London’s flood vulnerability and research into tidal defences which led to the Thames Barrier being completed in 1982.
- The creation of coastal defence standards not simply determined by scientific evidence or historical water levels, but by political pressure and a cost-benefit approach.\textsuperscript{357}

We can take this last point further, for it was not just in the designation of sea defence levels that the Waverley Report used a prototype cost-benefit analysis approach; the language of the whole report was pioneering in its coupling of scientific information, political consideration, and economic realities.\textsuperscript{358} Expanding on the style and format used by the pre-war River Thames flood committee of 1928, the Waverley Report established clear avenues for scientific research, and engineered improvements in language

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\item\textsuperscript{355} Mr Jourdain, Report on the Departmental Committee on Coastal Flooding. CAB 124/2634
\item\textsuperscript{356} Johnson et al. (2005)
\item\textsuperscript{357} See Baxter (2005) 1293, McRobie et al. (2005) 1264, and Penning-Rossell (2006) 331
\item\textsuperscript{358} CBA was developed in the USA and through the Flood Control Act, 1939 became established as a principal of federal policy. In the UK it was to become enshrined in public sector expenditure control through the Plowden Committee Report, 1961. See respectively Guess and Farnham (2000) 304-308 and Colvin (1985) 44-48
\end{itemize}
\end{footnotesize}
Populated by words such as “fair,” “reasonable,” and “practicable” – mainstays of risk assessment literature that emerged in the 1970s – the report is indicative of the post-war rise in evidence-based policy-making, which saw successive governments rely on the findings of committees increasingly dominated by experts. Whilst all three areas, scientific, political, and economic, were represented on the Waverley Committee, the minutes and verbatim scripts present a heavy dominance by scientific experts such as Proudman and Steers. Yet, that the final recommendations so strongly considered the economic cost and benefits to all suggested proposals, shows that some of the less vocal members, such as the accountant Leach, were equally influential.

The MAF and other relevant government departments considered and implemented all of the recommendations the Waverley Committee made, where appropriate. Previous investigations into flood events in both 1928 and 1947 had similarly catalysed policy change, but in both of these earlier cases, the scale of such change was limited. In 1928, recommendations had all been restricted to the River Thames catchment, so for example, whilst a flood warning system had been advocated, only a rudimentary and geographically limited system was implemented. In 1947, the dominance of agricultural land being affected by the floods, and the context of post-war food shortages, meant improvements

359 See Gibbon (1928). The focus of this earlier, smaller committee and report was solely the Thames river catchment and London’s flood vulnerability. Whilst its format and language clearly influenced the Waverley Report its consideration of scientific evidence and its scientific recommendations are substantially less explicit.


361 It is difficult to ascertain if every single recommendation was directly addressed, however consideration of the major recommendations is evident through the work of the two standing committees created (The Advisory Committee on Oceanographic and Meteorological Research, and the Advisory Committee on Sea Defence Research) and subsequent legislation such as the Water Resources Act 1963, The Land Drainage Act 1961, and The Water Act 1973. Legislation can be found at the UK Law Statute Database Online.

362 Carlsson-Hyslop (2010) 223 - Shows that those at the Liverpool Tidal Institute pressed to improve this limited warning system in the years prior to the floods of 1953.
were largely confined to agricultural land defence and land drainage issues. The fact that most of the recommendations the Waverley Committee made were implemented over the following years, reinforces the idea that the scale, timing, and social context of the flood gave it an unprecedented influence as a catalyst for policy change. Compared to the case of the Great Smog of 1952 and the outcomes of the Advisory Committee on Air Pollution’s Report, whose findings were enacted almost wholesale in one piece of legislation when the Clean Air Act received Royal Assent in July 1956, we see that even the Waverley Report’s great catalysing effect had its limits. The difference in how these two committees’ findings were acted upon again highlights the influence that the imagining of a disaster as natural or anthropogenic can have on its future management. Further, of clear influence here was the expected temporal return of such catastrophic events. The Waverley Committee considered itself to be reviewing an event expected to happen less than once every 300 years, whilst thick smog in London had become an annual occurrence by the early 1950s.

In the comparative case of the Great smog of 1952 that the public and politicians pressed for a comprehensive enquiry which went on to result in the enactment of the Clean Air Act, highlights how the actors involved saw the causal risks associated with the smog as anthropogenic and ultimately addressable. It has been argued that action was taken as the smog highlighted to the government just how disruptive a polluted atmosphere could be to Britain’s socioeconomic order. If we reconsider the smog as an extreme weather event itself, incorporating it within the risk and blame framework of this thesis and contrasting it against the flood events of 1953 we can develop this understanding of the smog further.

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363 Penning-Rowsell et al. (2006) Section 4.1
364 Penning-Rowsell et al. (2006), Hall (2011), and Johnson et al. (2005)
365 Although the Advisory Committee on Air Pollution was also a departmental non-statutory ad-hoc committee the bulk of its findings were progressed into a law via a Private Members Bill. Sheail (2002) 247-249 and Whitehead (2009) 145-148
366 Whitehead (2009) 145
such light we see how the greater human agency assigned to the smog and the blame directed toward industrialists, who had by 1952 been scientifically shown to be causally responsible for the increasing incidence of smogs, allowed the government to address the risks posed by air pollution. Further rather than simply being triggered by a need to investigate the deaths caused by the pollution, the government was influenced by the smog’s crippling effect on trade, the soaring rates of crime that coincided with the lack of visibility, the length of the disruption (caused by the specific prevailing meteorological conditions), and as previously mentioned the frequency with which such episodes were now effecting London. Through the Air Pollution Committee and the subsequent Clean Air Act the risks of socioeconomic disorder, economic loss and the government’s future susceptibility to blame for deaths from air pollution were all reduced.

Given the Waverley Committee’s terms of reference to learn lessons from the disaster, and its limited judicial and statutory power as a departmental committee, it is not surprising that the assigning of blame does not feature in the report. Not once in the report, or in any of the committee’s minutes and correspondence, is mention given to the circular issued in June 1952, which halted much-needed repair and improvement to coastal defences on account of steel shortages. Given the political issue that Morrison and the Opposition had attempted to make of the circular, its omission from the Committee’s final report is understandable. Yet, its absence from all of the Committee’s deliberations highlights the political dimension of such investigatory bodies, and their potential, despite often being presented apolitically, to downplay or conceal important aspects of an investigation. The circular exemplified many of the larger issues faced by societies in their preparation against natural phenomena. Issued by the Minister for Housing and Local Government in light of the Exchequer’s call for a “sustained effort to put economy first,”

367 Waverley (1954) 3
the circular looked to reduce material outputs by halting and reducing those public works which were not urgent. The government, in not considering preparation for extreme weather in a coordinated and integrated manner, allowed coastal defence to be deemed one such venture by a ministry concerned with rectifying post-war housing shortages. Despite widespread riverine flooding in 1947, and limited coastal flooding as recently as 1949, a lack of recent catastrophic coastal storms or surges in the UK meant that an understanding of how imperative rapid repair of dilapidated sea defences was to coastal communities’ safety did not prevail.

Finally, if we compare the North Sea Flood of January 1953 to the winter of 1947, we see a remarkably different example of severe weather and disaster in post-war Britain. Whilst causing dislocation, damage, and costs on scale with, if not exceeding that of 1947, the difference in response to the two events highlights important issues about the challenges of understanding historical disaster events within their societal contexts.\(^368\) Whilst there are infinite amount of specific differences between the two events, there are some more general inferences that can be drawn. The most notable difference in why blame casting was more forthcoming in 1947 is because the event was not, and is still not, viewed simply as a natural disaster. In 1947, the multitude of social, economic, and political factors created and informed as much of the narrative of the fuel shortages as the weather itself, whereas in 1953, the immediacy and scale of the storm surge meant that it discreetly fit into an imagined definition of a natural disaster. While both events were clearly extreme in their impacts upon society, and in a meteorological sense, the flooding was seen as an uncontrollable deluge, in keeping with an older conception of natural disaster, whilst the winter weather of 1947 became merely an accentuating factor in what was predominantly a political and economic crisis. This distinction exists in spite of the fact that in the case of

\(^{368}\) Direct damages were calculated at £50 million but total economic loss from the flooding is more likely to have been around £100-200 million. Penning-Rowsell et al. (2006) 331
1953, a political decision had been made to suspend all coastal defence repairs, and that the winter of 1947 was meteorologically far beyond the parameters any modern risk calculation would encompass. Further affecting the differing levels of blame in the two cases, is the amount of public expectation and awareness of the risks prior to the events’ occurrence. In 1947, politician’s communication of the problems with coal production and fuel supply prior to the winter was poor, whilst in 1953, many communities were used to the risk their coastal location posed. Indeed just four years earlier, in March 1949, the east coast had received the worst flooding in sixty-five years, and so the risk from inundation was fresh in the conscience of many effected communities. Both events show that expert advice was increasingly a key factor in informing mitigation of, and response to, such crises, whether natural or anthropogenic. Yet, here again the ease with which the flooding of 1953 can be packaged into a single event, means that this received a full official review, whilst the problems of the winter of 1947 were subsumed into future reviews on coal supply and industry nationalisation. Probably the most significant underlying factor which has influenced the differing contemporary and modern interpretations of these events is their actual meteorological nature. Whilst this may seem implicitly obvious, it is often neglected, and is worthy of clear reference here. Flooding presents a clear disruptive juncture in people’s lives— spatially, physically and temporally. In contrast, the cold weather of 1947 is imagined as another, prolonged, inevitable blow against a society let down by politicians as it struggled to recover from the ravages of war.

369 Depending on which metric is used for the conditions of the winter of 1947, one could state it was between a 1 in 50 year, to a 1 in 200 year event. Many derivatives, re-insurance, and hedge funds systems would consider this an outside chance and thus de-value the risk. See Bernstein (1996) Chapter 18

370 Baxter (2005) 1309
4.5 Conclusion

This chapter’s analysis of the east coast flood of January 31st, 1953, and the subsequent Departmental Committee on Coastal Flooding, has enabled us to explore in detail how the wider trend which saw the MO issuing more warnings in the post-war years manifested in one central case. By contrasting the winter of 1947 with the broader MO and scientific input into the investigatory process in 1953, we see how the role of expertise in policy-making was changing significantly. Yet by also considering the physical, natural elements of the disaster in this analysis, we can understand that whilst the decision to create a departmental committee was driven by a myriad of factors, and may fit with a broader progressive trend toward British society looking toward science for answers, the framing of the event as a natural disaster allowed the government to consider issues as scientific problems, rather than simply political ones.

The Waverley Committee is an example of scientific expertise being given a prominent role in the production of a report that went on to heavily influence British coastal defence and flood policy. Yet, we have also seen that this position was not at the expense of other interests on the committee. The Government used the committee to ensure that the official response to an event that caused over 400 deaths, but the scale of which had occurred only 3 times in the last 1,000 years, was based in the calculable realm of science, and mediated by economic considerations. The use of a committee after such an extreme event was not a given in the period, and the decision to use not only a departmental committee, but one placed under the shared responsibility of four departments, helped allow direct apportioning of blame to be dissipated.

In the ad-hoc creation of the emergency flood warning system, where speed was essential due to the vulnerability of the afflicted coastline, the MO claimed a role in both the creation and the delivery of the system. This central role the meteorologists at the MO
played continued into the initial deliberations of the Waverley Committee and its creation of the Interim Report. The key position the MO also took in the coastal warning system, whilst maybe obvious given the increase of MO-created extreme weather warnings in the previous years, was crucial to the organisation’s future, as the use of larger scale, inter-departmental warning systems proliferated (see 6.5). Here we see how the use of an ad-hoc departmental committee to find a solution to contingent issues created by the “triggering” event of the North Sea Flood of 1953, had repercussions far beyond their immediate recommendations, and subsequent influence on coastal flood defence policy.

As the committee moved from questions of implementing the warning system to its other terms of reference, the MO played a part less significant than other organizations cast in the role of scientific expert bodies. The case of the Waverley Committee clearly fits the growing trend in the period, in which scientists played an increasingly important role in state affairs. This chapter has shown that there was contestation for expert status both between civil-service and academic scientists, and between the disciplines of meteorology and oceanography. The Waverley Committee was an early case of a government report on an extreme weather event resulting in tangible policy changes, which had scientists, scientific research, and an antecedent form of cost-benefit analysis at its core.

The North Sea Flood of 1953, and the subsequent Waverley Committee, are imperative to our understanding of the rise of risk and blame in extreme weather events in the post-war period. The role the MO and other scientific experts played in the committee shows the professionalisation of meteorology and the development of the state’s utilitarian use of science. The MO’s role in the government’s implementation of the warning system, and, after Stagg’s intervention, on the Advisory Committee on Oceanographic and Meteorological Research, is essential to understanding its current position as the central authority on extreme weather events in the UK.
Finally, the MO’s integral role in the 1953 flood was a decisive step in its transition towards becoming a more public-orientated organisation. As we shall see throughout the following chapters, decisions made in the aftermath of the floods, including the decision not to use the BBC to disseminate warnings, and the debates surrounding responsibility for warnings, had significant repercussions for the MO’s future risk-management profile. Unbeknown to those involved, the assertion of senior figures at the MO that the organisation was comfortable issuing warnings as long as they knew where responsibility lay, misinterpreted the important issue, which emerged in the coming years; that in managing risk perception and blame, it was much more important that those who received the warning understood where responsibility lay.
Chapter Five

Framing the Sky: The (re)birth of weather forecasting on British television, 1954

The object of all this is to ‘humanise’ the weather

Clive Rawes, BBC Presentation Editor, November 1953

5.1 Introduction

In Chapter Three, we saw how the number of weather forecasts and warning channels that the Meteorological Office (MO) communicated directly to non-military organisations increased from six, in 1947, to nineteen, by 1955. This period was characterised by large structural changes that facilitated the MO’s transition into a peacetime organisation, incorporating the significant wartime growth in both staff and expertise. Director (DMO) Nelson Johnson restructured the MO, separating out departmental operations and establishing the research arm of the office. As the number of organisations the MO created forecasts and warnings for, continued to increase, so too did the provision of general forecasts to the public. Yet many of the developments in public forecasts during the immediate post-war years, such as the radio forecast service, Airmet, were disparate and ad-hoc in their development. In September 1953, the inconsistent growth of these public services gave way to a renewed focus when Professor Graham Sutton was appointed as the new DMO. Sutton was an outspoken critic of what he saw as bias in the MO, which favoured aviation and military concerns above those of other users, and arrived at the organisation with an agenda for reform. Earlier that year, the inadequacies of MO public

\[\text{\textsuperscript{371}}\text{\textsuperscript{371}}}\text{ Handwritten note by Rawes (BBC Presentation Editor) written on memo, “Weather in Television,” from McGivern (BBC Controller of Programmes – TV) to Jacobs (BBC Director General), November 11\textsuperscript{th}, 1953. T16/245/2\]
forecast dissemination, which had been heightened by the withdrawal of the Airmet service in 1950, had been tragically highlighted by the North Sea Floods.

This chapter investigates the development of new public orientated MO services in the early 1950s. These developments were driven by the ideological utilitarian belief that a national meteorological service (NMS), funded by taxpayers, should cater to all sectors of society. The chapter focuses on the launch of a new TV weather forecast format in 1954.

First, in order to understand the trajectory that ended with qualified meteorologists presenting a teatime television weather show to the nation, this chapter examines the early experimental transmissions conducted from the BBC’s Alexandra Palace studio in the 1930s.

The introduction of the new format in 1954, although popular, triggered an unexpected level of blame, for inaccurate forecasts. The blame, directed largely toward the presenting meteorologist, can be considered a revenge effect. Building on Tenner’s argument that the better weather predictions become, the more reliant the public becomes on them, we see that key to the emergence of the revenge effect is not just the accuracy of the forecast, but also the method and language of its communication. By incorporating ideas from the Social Amplification of Risk Framework (SARF, for more see 1.3.1) we can build on Tenner’s notion of a revenge effect, exploring how in this instance the blame emerged. Proponents of the SARF have argued that when communicating risk to the public, psychological, social, institutional, and cultural processes can interact in a way that amplifies or attenuates public perceptions of the risk, and behaviour toward the hazard.372 Consideration of sociological theories such as the SARF, alongside the quick reliance the public came to have on the new TV forecasts, and the increased levels of blame placed on meteorologists by the public, helps the chapter explore how MO officials became prominent communicators of environmental risk in the UK. Through developments we begin to see how the expert faces

372 Renn (1991) 287
of meteorologists, in the new televised format, began to take over from others, such as politicians, who had served as scapegoats in previous extreme weather events (see 2.4). Simply providing accurate forecasts was only one element of the chain that resulted in a useful product for the end user. If the public was to benefit from the new TV forecasts, the prediction, communication, and user’s interpretation of them would all have to be correct. As the MO increasingly engaged in communicating probabilities to a lay audience, it discovered that a miscommunicated or misused technically skilful forecast could result in costs to both the forecaster and society.373

One of the key motivations of many of the MO meteorologists involved in the early TV projects was the opportunity to educate the public about the practice of modern meteorology. Yet, subsequent academic studies of science communication have overlooked televised weather forecasts as a form of science communication. Recent academic work, triggered by widespread climate change denial amongst US TV weathercasters, has begun to consider those presenting televised weather as prominent science communicators, exploring how televised forecasts are often the public’s only direct contact with meteorology. This research shows that TV forecasters are vital components in the shaping of public risk perception of both everyday and extreme weather events. In light of this research, this chapter explores the disconnection between what those involved in creating the new format envisaged, and what those utilising it wanted.374

In the process of codifying the weather onto synoptic charts, simplifying these forecasts onto maps suitable for broadcasting, and describing them using language the average citizen could understand, the MO had unknowingly entered into an arena of risk communication. Further, the dynamic of communicating risk through forecasts was influenced by the decision to use a meteorologist as the face of the new TV forecasts; a

374 See Wilson (2008) and Maibach et al. (2011)
choice that was at odds with the US market, where it was predominantly television announcers who presented the forecasts. This chapter demonstrates how using a knowledgable expert on screen, rather than a TV announcer, influenced viewer’s interpretation of the forecast. Beginning by considering the development of public weather forecasts in the decade after the Second World War, this chapter details the emergence of a vision, driven by the arrival of the new DMO, for the organisation to become one which was used by all sectors of British society.

5.2 Developing a new direction

Meteorology, like many other scientific disciplines, has long sought to educate the layman in at least the basics of its theories and practices. In the first half of the twentieth century, attempts at educating the general public were usually through printed books or pamphlets, written by individual meteorologists who felt obliged to disseminate their profession to wider audiences. These early attempts were generally driven by an ambition to pass on the utility one could gain from a basic understanding of the weather. In addition, in these texts, one can often detect a desire to raise the profile of the discipline, verifying meteorology’s newfound professional status. During the post-war years, as MO developments made during the war were integrated into a peacetime setting, the utility of meteorological forecasting for both specialist and general users significantly increased (Chapter Three). Through these developments came a renewed desire to educate the general public, and a realisation of the great benefit public weather services could provide many areas of everyday life. Further, the MO realised that the opportunity to speak directly to the public could allow the agency to grow and thrive, by seeing the authoritative

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375 See Bowler (2009) Chapter Seven for an introduction to late nineteenth and early twentieth century popular science literature.

376 A classic example of such as text is Weather Science for Everybody (1936), written by David Brunt whilst he was professor of meteorology at Imperial College, London.
role the MO took in a government context in Chapter Four, expanding across public areas of British society.

After fifteen years in charge, the extreme workload and stress of the position during the war years had taken its toll on the DMO Sir Nelson Johnson, and having been diagnosed with Parkinson’s disease, he retired from his position in August 1953. A sub-committee of the Meteorological Committee had been considering his replacement since earlier that year. An application from Instructor Captain P. Bracelin, Director of the Naval Weather Service, had been rejected outright because it was considered that he had made no outstanding contribution to meteorological theory. Dr. James Stagg and Professor Graham Sutton were both interviewed for the post; both had considerable connections with the MO, and had published extensively on their meteorological research. The sub-committee considered that Stagg, the wartime hero and perhaps the most widely known meteorologist then working at the MO, lacked essential qualities required of the Director: “Particularly the breadth of outlook required to foresee future demands on the Meteorological Office and the ability to direct research.” The sub-committee considered that Stagg who was by training a geophysicist and had researched terrestrial magnetism and radiation was best suited to the role of Principal Deputy Director (PDDMO). Whilst they deemed that Sutton presented the requisite breadth of outlook, the ability to direct research, considerable administrative experience, and an extensive network of contacts in both the scientific and Civil Service worlds. In April 1953, the Air Ministry announced the appointment of Sutton as Johnson’s replacement. A mathematician and meteorologist, Sutton, then a professor at the Military College of Science in Shrivenham, had previously

379 Report of a sub-committee of the Meteorological Committee presented to George Ward M.P. (Parliamentary Under-Secretary of State for Air), 24th March, 1953. Air 2/10737
380 The Times, 13th April, 1953, 6
joined the MO as a Professional Assistant in 1928. In 1929, he had been seconded to the Chemical Defence Experimental Station at Porton Down, Salisbury, where he worked under Nelson Johnson. From 1929-47, Sutton worked on various projects, in increasingly higher positions at Porton, and the Radar Research Development Establishment at Malvern producing notable research on atmospheric diffusion and boundary layer turbulence. In these roles, he developed an acute understanding of theoretical research, practical research, and their military application. By the time of his appointment in 1953, Sutton already sat on the Meteorological Committee, the Meteorological Research Committee, and the Royal Society’s research granting Gassiot Committee. Sutton started as DMO in September 1953, with a clear and forthright agenda for the organisation’s reform. One of his first actions was to circulate an informal report on his findings from a recent visit to the US Weather Bureau (USWB), in which he gave “considerable attention … to the problem of making weather information available to the general public.” Sutton’s agenda was not a huge departure from Johnson’s tenure and the ad-hoc public-orientated developments already occurring at the MO, but it gave a new impetus, ideological grounding, and consistent policy to many of the changes that had been occurring since the war. Most notably, in the report, Sutton highlighted the comprehensive system of forecast verification that the Americans used, the advantage that the geographical unity of their offices gave their staff, and the great contrast between their many and varied public weather information services and the MO’s limited services. These three areas became central tenets of Sutton’s tenure, as he set about systematically expanding the organisation’s services beyond the bounds of its traditional military and civil aviation focus.

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381 Pasquill et al. (1978) 530-535
Whilst influenced by Sutton’s extensive connections in international meteorology, it is clear that those appointing him to Director trusted that his development of the MO would be in keeping with its rich tradition and identity.\textsuperscript{384} As a former employee of the MO and a member of the Meteorological Committee since 1950, Sutton was familiar with the structure and operations of the organisation. In the years prior to his appointment, Sutton had clearly voiced his opinion on where the organisation should be heading through his position on the Meteorological Committee. In January 1952, Sutton, along with his more senior fellow Meteorological Committee academics, Sir David Brunt of the Department of Meteorology at Imperial College London, Professor Gordon Dobson of the University of Oxford, and Professor Greaves of the Royal Observatory Edinburgh, had formally stated their grievances with the current arrangements for the public dissemination of forecasts.\textsuperscript{385}

In a letter to the Under Secretary of State for the Air Ministry, they accused the Ministry of focusing MO efforts too markedly on aviation interests, and not enough on the public and other sectors such as agriculture.\textsuperscript{386} In their assertion that the MO needed to broaden its scope to disseminate its forecasts, warnings, and services to more of the British population, Sutton and his academic colleagues on the Meteorological Committee were not alone. In his presidential address to the Royal Meteorological Society in May 1951, at which the DMO Johnson was present, pioneer of radar, Sir Robert Watson-Watt, went as far as suggesting that the MO required: “A public enquiry into the best attainable organization of the State Meteorological Service in the light of the changes within itself during its thirty-year attachment to an Air Ministry.”\textsuperscript{387}

\textsuperscript{384} See notes by the sub-committee in AIR 2/10737
\textsuperscript{385} Professor Dobson chaired and Sir David Brunt sat on the sub-committee of the Meteorological Committee which selected Sutton as the new DMO. AIR 2/10737
\textsuperscript{386} Letter from Brunt, Dobson, Greaves, and Sutton to the Under Secretary of State, Air Ministry, 17\textsuperscript{th} January, 1952. AIR 2/10294
\textsuperscript{387} Watson-Watt (1951) 568. Watson-Watt had developed radar and other technologies throughout WWI and WWII. At various points he had worked under the auspices of both the MO and the Air Ministry, and so was well positioned to comment on their structure and relationship. By 1951 he
Sutton and others’ concerns over the availability of weather information to the general public were well founded, for on March 15th, 1950, the MO’s most successful public communication avenue, Airmet, had ceased to exist. Since restrictions on weather-related communication had been lifted at the end of the Second World War, the role of the MO in British society had been broadening, incorporating forecasts for new specific users and the general public. By the early 1950s, the MO was not only expanding its direct forecasting services to non-military and aviation organisations (Figure 3.3), but was beginning to consider how it could provide forecasts for all citizens of Britain. New popular educational texts now emphasised how meteorologists made the forecasts and how to interpret weather charts, as much as education on the dynamics of weather itself.388 Weather bulletins for both the specialist and non-specialist user were available on the BBC’s radio services, and since its post-war resumption the MO’s own radio service, Airmet, had been providing forecasts nationwide. Created for pilots in a 1932 joint venture between the Automobile Association and the MO, Airmet was a long-wavelength radio broadcast. With a cycling hourly programme, each broadcast began with the phrase, “This is Airmet” and went on to give the listener airfield weather reports, an outlook of the current weather, commentary by the duty forecaster, and other weather station reports, including warnings.389 Operated solely by the MO since July 1935, Airmet had proved itself to be valuable to many sectors of society beyond the pilots for whom it was originally created.390 The development of the MO’s public forecasting services like Airmet was an organic and often ad-hoc process. Whilst many MO meteorologists had begun to engage with the

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388 See Bilham (1947) – a best selling popular meteorology book of the period which dedicated whole chapters to, “the Organization of a Modern Forecasting Service,” and “the Weather Chart.” Also, the MO produced, Your Weather Service combined the technicalities of how a modern forecasting service works with a shopping list of what public services the organisation provided.

389 See Currie (2010) 253

390 Watson-Watt (1951) 552-555
general public through educational texts and generalised forecasts, such as those on BBC radio, the idea that the forecast might hold as much utility to a businessman or housewife as it did to an aviator or farmer was still formative by the early 1950s.

5.3 This was Airmet

In March 1950, a European-wide reallocation of broadcasting frequencies came into effect, under which the UK had a much restricted broadcasting range. The reduced bandwidth allocation meant that there was significant competition for allocated frequencies between UK radio broadcasters. Because of this, the Postmaster General ruled that other UK claims for bandwidth were more important than the MO’s, and Airmet was removed from the airwaves. This decision was predominantly informed by the failure of the MO and Airmet’s users to highlight early enough how much the service was actually used by more than just aviators.

Organised by the Royal Meteorological Society magazine, *Weather*, a petition in support of Airmet was presented by Geoffrey Stevens MP to Parliament in July 1951, over a year after Airmet had ceased to broadcast. The petition had over 21,000 signatories, “considerably more than originally expected,” and signatures on behalf of several organisations representing total memberships of over 350,000. Although seemingly large, these figures were small when placed against the more than eleven million BBC radio licence holders (Figure 5.2), whose popular broadcasts the MO was competing with for airwave space. A breakdown of the survey revealed that Airmet was used widely beyond its initial target audience of private aviation owners:

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391 Known as the Copenhagen Plan, the re-allocation of radio frequencies grew out of the European Broadcasting Conference held in Copenhagen in 1948. For more background on the conference and resultant plan, see Craig (1990)

392 Organisations represented included the Royal Meteorological Society, the National Farmers Union, and the Geographical Association, the decision by the petition organisers to separate these group signatories from the main list when presented to parliament was without doubt detrimental to their cause. Editorial in *Weather* Anon. (1950) 403-405 and Anon. (1951) 227
If Airmet were only Airmet one might have hesitated before writing to ‘The Times’ about it. When it is discovered to be Seamet and Washmet and Hortimet and Edumet and even Picnimet the hesitation is dissipated. And when it is demonstrated to be Fishmet and Agrimet, and indeed to be more Agrimet than Airmet, the path of duty is clear.\textsuperscript{393}

The withdrawal of the service was envisaged by all parties as only temporary, whilst the MO, the BBC, and the General Post Office negotiated to find a solution through other channels, such as frequency sharing.\textsuperscript{394} Yet, by the time of Sutton’s appointment in September 1953, no resolution had been found. Airmet was still off the air, and no other provision for the public communication of weather forecasts had been established to replace the service. The lack of an efficient channel for the dissemination of forecasts to the public had been tragically highlighted by the North Sea flooding of early 1953. Editorial comment in \textit{Weather} shortly after the flooding wasted no time in linking the lack of warning to the closure of Airmet:

\begin{quote}
Had Airmet still existed, the tale of destruction on the East Coast might have been less agonising. The sea broke through in many places but not simultaneously; the deterioration was progressive, yet those overwhelmed last of all had not realised the danger which threatened – how could they, since no one had told them! Airmet, which in normal times provides purely weather information, could have given news also of the advancing wave of destruction; those near the coast, rendered anxious by the state of the tide and the gales and seeking for news, would have listened as people do in times of uncertainty and danger, and many more would have been saved through being warned in time.\textsuperscript{395}
\end{quote}

By early 1953, the withdrawal of Airmet, the failure of communications during the North Sea Flood, and the practices of other NMSs, as experienced by Sutton during his visit to the USWB, all indicated to those at the MO that their provision of public weather forecasts and

\begin{itemize}
\item \textsuperscript{393} Watson-Watt (1951) 552. The signatories included over 2,000 sportsmen, a Nobel prize-winning physicist, and 5,898 with an agricultural background. Editorial in \textit{Weather}, Anon. (1951) 227
\item \textsuperscript{394} The sharing of a VHF frequency not used by the BBC in the daytime was discussed as one of several alternatives to Airmet throughout the early 1950s. See AIR 2/14506
\item \textsuperscript{395} Editorial in \textit{Weather}, Anon. (1953) 66
\end{itemize}
warnings was not adequate. Television forecasting was one area of public communication that was highlighted in Sutton’s report on USWB practice, as Sutton summarised:

My general impressions gained from these experiences tended to support my previous views that British weather broadcasting could be materially improved in two ways: first by allowing the forecaster to talk to the public from his workroom and second, by the introduction of weather news, and the use of simple and homely language... I propose to ask my staff to consider what can be done on these lines before approaching the B.B.C., with definite proposals.  

5.4 Weather forecasts on British television

On November 2nd, 1936, the first televised weather forecast anywhere in the world was broadcast live from Alexandra Palace in London. Much like radio forecasts, which had begun on the very first BBC broadcast in November 1922, the televised forecast was part of the inaugural transmission of the BBC public television service. The trial format consisted of a shot of a map of the UK with a man’s arm drawing weather details such as isobars on it in charcoal and Indian ink, and was discontinued after only four weeks due to “the somewhat high cost” the BBC would have to pay the MO to prepare the maps. The emphasis of these early trials was not on weather forecasting per se, but more on discussing recent weather systems and the work of MO staff. In contrast to other early television programmes, the trial broadcasts were relatively informal and conversational in style, using an explanatory educational narrative similar to that found in early educational weather books (5.2).

397 The US, seen as a market leader in weather broadcasting since the post war period, didn’t begin trialling weather on television until 1940-41. Henson (2010) 7
398 Walker (2012) 243 and 262
399 Letter from Schuster (BBC) to Corless (MO), 16th November, 1936. T16/245/1
400 Shorthand transcript of test transmission on 26th October 1936. T16/245/1
After these initial tests, there is no evidence that the MO or the BBC considered televised weather forecasts any further, and in 1939, the advent of war put a stop to both television broadcasts and the public release of weather information.\footnote{The BBC archive folder (T16/245/1) contains a couple of notes on TV weather forecasts from 1938.} In September 1946, dialogue between the two organisations on televised weather recommenced, with Johnson enthusiastic to place a forecaster in the job of providing tailored forecasts to BBC television. The BBC understood that having an MO face (or voice) attached to the forecast could be advantageous in ensuring responsibility for the forecast was clearly attributed to the MO. Indeed, the new feature could, as proposed by one BBC member of staff, "be introduced in a short talk by the Weather Clerk himself.... (and then) we can always blame him."\footnote{Internal memorandum from Robert Barr to Maurice Gorham (Director of BBC Television Services), 27th September 1946. T16/245/1}

Unaware of the level of blame MO TV forecasters would go on to receive, this somewhat throwaway remark highlights that the BBC understood that a MO meteorologist as a recognisable scientific expert, would add authority and provide a direct link for responsibility of the forecast.

Despite Johnson’s enthusiasm, in the post-war race to convert the organisation back onto a peacetime footing the development of TV forecasts was given a low priority, and it was not until nearly three years later on Sunday July 24\textsuperscript{th}, 1949, that weather forecasts returned to television. The new format was introduced by an explanatory talk given by second-in-command at the MO, Stagg. Underwhelming, the bulletin was accompanied by summaries read by a BBC announcer, and consisted of two simple stationary maps showing the UK’s earlier evening weather, as well as a forecast for the next morning’s conditions (Figure 5.1).\footnote{By comparison in 1949 the major US TV channels had dedicated weather forecast presenters who appeared on screen (see 5.4.2). Even the first test televised forecasts in 1936, with the on-screen arm which drew in the weather systems, had a moving visual element.} The static format of the forecast, squeezed in prior to the evening’s news...
programme and accompanied by the announcer’s limited script, was a significant departure from pre-war trials. Lacking in emphasis on education, it was formal, dry, and austere. The format was a televised version of the forecasts the MO had been supplying to the press, rather than the result of a collaborative creative project between the MO and the BBC to bring to television a “striking form of visual weather forecast,” as had been envisaged by both BBC and MO staff in 1936.  

There is little indication of how the public received the launch of televised weather forecasts in July 1949. In 1949, TV ownership was still at a relatively low level (Figure 5.2)

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404 BBC Internal Memorandum, “Illustrated Weather Forecasts,” from Cecil Lewis (BBC Director General) to G. Cock (BBC Director of Television), 12th August 1936. T16/245/1
and so it is likely that a lack of access may have been the key determinant of the public’s indifference to the televised forecasts.

<table>
<thead>
<tr>
<th>Year</th>
<th>Radio Licences</th>
<th>Combined Radio &amp; TV Licences</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947</td>
<td>10,713,000</td>
<td>15,000</td>
</tr>
<tr>
<td>1948</td>
<td>11,082,000</td>
<td>45,000</td>
</tr>
<tr>
<td>1950</td>
<td>11,819,000</td>
<td>344,000</td>
</tr>
<tr>
<td>1952</td>
<td>11,244,000</td>
<td>1,449,000</td>
</tr>
<tr>
<td>1954</td>
<td>10,126,000</td>
<td>3,249,000</td>
</tr>
<tr>
<td>1955</td>
<td>9,414,000</td>
<td>4,504,000</td>
</tr>
<tr>
<td>1957</td>
<td>7,496,000</td>
<td>6,966,000</td>
</tr>
<tr>
<td>1959</td>
<td>5,423,000</td>
<td>9,255,000</td>
</tr>
</tbody>
</table>

*Figure 5.2: Table showing radio and TV license ownership figures, 1947-1959*

*Source:* Adapted from Seymour-Ure (1991) Table 4.2

Whatever public opinion, it is clear that those involved in the project at the MO found the format less than adequate. In an article written to celebrate the launch of the new transmissions, Deputy Director of Forecasting at the MO, E.G. Bilham, who worked on the development of the format, somewhat apologetically detailed the technical limitations placed upon the MO by the BBC. When considering what TV system to implement for his own country, Canadian meteorologist Percy Saltzman summed up the BBC’s static format most succinctly: “You could do it like the BBC did – pre-drawn maps, current and prognostic, and a voice off-stage. Pre-drawn stuff is pretty dull and so is a voice without a body.”

During August 1949, Stagg sought to improve the “somewhat disappointing” broadcasts as far as possible within the technological confines, by ensuring the announcer’s script linked with the charts presented, and that the whole forecast connected with the previous night’s forecast where relevant. Whilst improvements to the televised forecasting service over

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405 Bilham (1954) 277-279
406 Saltzman (1954) 2
407 Meteorological Office loose minute by J.M. Stagg (PDDMO), 22nd August 1949. T16/245/1
the first two years were introduced by the MO and the BBC, they were limited to quality control measures, such as those mentioned above, and minor tweaks to the format, such as the introduction of a third weather chart for the forecast in October 1951. Despite their best efforts, MO officials were now playing a balancing game they had rarely encountered in their previously limited public engagements. The MO was no longer forecasting at a high level to specific interest groups, such as mariners or horticulturists, but instead walking the tightrope of making their televised output accessible, but not oversimplified, ever aware that “we need not treat our audience as such complete morons as only to be able to understand the words ‘fine, fair and showery’.”

Conversation about improvements between the MO and the BBC rumbled on throughout 1951, but by early 1952, it was agreed by both parties that no more could be done with the weather forecasts until the new BBC presentation studio under construction at Shepherd’s Bush was completed in March 1953.

Before this studio opened, the MO received a stark demonstration not only of the gap left by the withdrawal of Airmet and the inadequacies of its televised output, but also of all its public communications, when the North Sea floods struck in late January 1953. As discussed in the previous chapter (see 4.2), despite underestimating the magnitude of the storm, the MO correctly forecasted the movement of the weather system, and issued tidal warnings to the Thames River Board. However, the hour of issuance and protracted chain of communication meant that by the time warnings reached the public, they had been diluted to a mere footnote on the midnight radio bulletin. The inadequacies of the warning system were comprehensively reviewed by the Waverley Committee (4.4). In addition to bodies such as the MO and River Boards coming under scrutiny, the 1953 floods also made the BBC review how it would deal with the issuing of such warnings when they were received in the future: “Should there at any time be a really dramatic news flash or

408 Memorandum by G.R. Barnes (BBC Director of TV), 21st May 1951. T16/245/2
emergency warning, obviously we would interrupt programmes to make a warning.”  

The BBC did not go beyond such an assertion, and despite press criticism of the prominence they afforded MO gale warnings, the broadcaster also failed to create an emergency routine to deal with possible future events, or formal plans for using television to disseminate warnings.

5.4.1 Meteorology gets a face: The launch of meteorologist-presented TV forecasts

Due to the technological freedom the new studio BBC studio at Shepherd’s Bush would give forecasters, with its larger floor space and increased number of cameras, the MO had the opportunity to radically revamp the format of televised weather. Given that television stations in Germany, the Netherlands, Belgium, and the USA, amongst others, all had a “face” for their weather segments, the inclusion of a presenter on the BBC TV weather was only a matter of time.  

A new impetus to how quickly and in what form these changes would emerge came in March 1953, when the Director General of the BBC, Ian Jacob, lunched with Lord Brabazon (see 6.2). The lunch was arranged primarily to discuss changes proposed to radio weather forecasts, in an attempt to specialise their content for interest groups such as farmers and airmen. Yet it was a seemingly innocuous suggestion by an unnamed junior meteorologist that resonated with Jacob:

It was explained by a young but highly professional meteorologist who was in the party that a far better job could be done if the meteorologist himself were to go on air. This would be particularly true in television where we have the use of the weather map, etc. I think we should seriously consider this point.

409 Memorandum from B.C. Rawes (BBC Presentation Editor) to G.R. Barnes (BBC Director of Television), 5th February 1953. T16/245/2

410 Memorandum from Cecil McGivern (BBC TV Controller of Programmes), 7th December 1953 (T16/245/2). For more on the US context see Henson (2010) 11
Later in an internal memo, Jacob also vented his frustrations at the MO’s lack of progress with revamping the radio format, stating to his Director of Spoken Word that he believed the ultimate obstacle to the development of new weather services, both sound and vision, was the head of the MO, who was “frightened of his own shadow.” The fact that a director of another national public service judged the competency of the DMO so severely shows that by 1953, perhaps influenced by his deteriorating health, Johnson’s appetite and aptitude to implement change within the MO was waning. Whilst Johnson placed no direct barriers on the process, the workload of his staff assigned to the TV project, especially Stagg and Bilham, combined with the DMO’s lack of focus, resulted into a myriad of delays since conversations between the two organisations had recommenced in 1946.

Whilst directly catalysed by the Director General’s desire to see an on-screen meteorologist presenting the weather, and possibly influenced by the news of Johnson’s impending retirement, development of the new format was also shaped by the events of the North Sea Flood. The catastrophe had highlighted a disjuncture between the meteorologist’s scientific world and how the new mass media communicated their work to the general public. With these factors pushing it, progress on the new format moved quickly through the spring and summer of 1953. By the time Sutton officially arrived in the post of DMO in September, the first live tests trialling several forecasters from the MO had already been conducted in the new presentation studios. Present had been DDMO of Forecasting, S.P. Peters, who had been leading the project for the MO since Bilham’s retirement in May

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411 Memorandum from Ian Jacob (BBC Director General) to Director of Spoken Word, 20th March, 1953. T16/245/2
412 Hall (2011) 399
By November, of over 30 MO staff who had been for camera testing at the BBC, only three were considered good enough and placed on a final shortlist.

Other challenges included the restrictions of camera technology, and the last-minute insistence in December 1953 by the Secretary of State for the Air Ministry, that the BBC would have to reimburse the MO the pro-rata salaries of the TV forecasters. The DMO’s handling of this episode highlights the difference in importance he afforded the project in comparison to his predecessor Johnson. Sutton had already reassured the BBC that the only extra costs it would incur would be for the forecaster’s travel expenses, and whilst he understood that this issue would have to be addressed, its timing in late December could derail the planned January launch. To avoid delay, Sutton asked the Secretary of State to take the matter up directly with the Controller of Programmes at the BBC, knowing that this would buy enough time for those lower down the chain to launch the service unhindered.

Thus, on Monday January 11th, 1954, at 7.55 pm, the MO’s George Cowling presented the first ever “in vision” weather forecast on British Television. Broadcast live, and lasting for four and a half minutes, the forecast covered the previous day’s weather, corrected or explained any errors in it, covered the current day’s weather, and provided the outlook for the following day. In these early broadcasts, Cowling, or his colleague Tom Clifton, was accompanied by two weather charts attached to an easel onto which they used charcoal to draw a detailed forecast for the nation (Figure 5.3).

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413 The first screen tests had taken place on 5th August 1953. Letter from Peters (Deputy Director) to Rawes (BBC TV Presentation Editor), 27th July 1953. T16/245/2 and Meteorological Office Annual Report (1947) 39

414 Rawes (BBC TV Presentation Editor) Progress Report on Live Weather Forecast Project, 10th November 1953. T16/245/2

415 The BBC already paid the MO for the cost of producing the weather maps for their present static format. Letter from Rawes (BBC TV Presentation Editor) to Farquharson (MO Forecasting Division), 17th December 1953. T16/245/2

416 Letter from Farquharson (MO Forecasting Division) to Rawes (BBC TV Presentation Editor), 28th December 1953. T16/245/2
The BBC’s use of an on-screen forecaster was a development driven largely by two concerns. From the broadcasting agency’s perspective, it was about improving the visual aesthetics of televised weather. For the MO, however, as emphasised in an article for *Radio Times* that announced the new format, it was the opportunity to educate the general public in meteorological matters which spurred developments.

5.4.2 Public response and expectations of early televised weather forecasts

Despite the technological limitations and MO concerns over a lack of educational content, the static format of televised forecasts became one of the most popular televised programmes since its introduction in 1949. Additionally, since its introduction, TV ownership had risen substantially, and by 1954, over three million people (Figure 3.2) held a television licence, with this figure increasing at a rate in excess of one million viewers per year. Now that the TV licence-paying public was much larger, when the new format was introduced, it was more closely monitored than in 1949. A BBC audience research report,

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*Radio Times* (1954) 15

Handwritten note by Rawes (BBC TV Presentation Editor) on Progress Report from McGivern (BBC Controller Programmes, TV) to Jacobs (BBC Director General), 11th November 1953. T16/245/2
conducted shortly after the new format launched, found that 88% of the viewing panel surveyed preferred the new format over the old system. Further, the “unusual” amount of mail the BBC received about the new format was almost all positive.\textsuperscript{419} The new format also received plaudits from staff at the BBC, the MO, and even traditional MO customers such as the Royal Air Force.\textsuperscript{420}

Yet the addition of a “face” to the weather forecast caused another, more unexpected response from viewers. Almost as soon as the new format was introduced in January 1954, the BBC began to receive letters blaming the meteorologist presenters for inaccuracies in their forecasts. Whilst criticism of inaccurate forecasts was nothing new, the manner, swiftness, and volume of the blame directed specifically at Cowling and Clifton was unprecedented.\textsuperscript{421} Sutton personally responded to most of the letters, on one occasion stating:

I think that the meteorologist should be regarded more as an adviser than as a prophet...The difficulty, however, is to strike a balance between the professional chart with its mass of heiroglyphics (sic) and the extremely simplified version which will be intelligible to the average viewer.\textsuperscript{422}

The forecasters had come up against what science communication theorists were later to identify as a key weakness of the ‘deficit model’s’ dichotomous approach, in which attempting to communicate to a broad spectrum of society with varied levels of education

\begin{footnotes}{p106}
\textsuperscript{419} BBC Audience Research Report, “The Weather Forecasts,” 19\textsuperscript{th} February, 1954. Internal Memorandum from Rawes (Television Presentation Editor) to McGivern (Controller Programmes, Television), 8\textsuperscript{th} February, 1954. T16/245/2

\textsuperscript{420} Letter from Group Captain Morgan (RAF) to Sutton (DMO), 1\textsuperscript{st} February 1954. AIR 2/12924- see further correspondence in this folder and in T16/245/2 for more praise of the new format.

\textsuperscript{421} Since their earliest publicly issued forecasts the MO had faced criticism for inaccurate forecasts. For more on the controversy of their original public forecasts in the 1860s see Walker (2012) 44-71. For a more contemporaneous example of public criticism of their forecasts see the letters section of Weather from August, 1947 (and responses in subsequent editions). In this letter the author discusses the public reaction and newspaper coverage of the inaccurate V(E)-day forecast issued by the MO. May (1947) 114

\textsuperscript{422} Letter from Sutton (DMO) to Denham, 2\textsuperscript{nd} March 1954. AIR 2/12924
\end{footnotes}
would always have limited success. In developing the new format, the BBC had encouraged the MO to embrace more engaging language rather than the dull, scientific terms of established professional practice. Thus, the new faces of the weather attempted to connect directly with the viewer: in the first broadcast of the new format, George Cowling informed housewives that the windy weather would make it a good day to hang out the laundry. Whilst this language was engaging, compared to the more traditional “there is a high probability of it being windy today,” it imparted a greater sense of certainty and personal connection. The increased risks that came with the MO’s new public profile and how far the public would extend blame to the new faces of the weather were highlighted in August 1954, when the Duke of Norfolk blamed the television weather forecast for the low attendance at a charity cricket match. Speaking to the media, the Duke claimed that the previous day’s ominous, and, as it happened, erroneous forecast had resulted in 6,000 spectators attending the event rather than the predicted 20,000.

Prior to the new format’s launch, the importance of the exact wording of the forecasts had been understood by MO officials. In November 1953, Sutton had proposed putting a senior officer in charge of public services, with the duty of advising the DDMO of Forecasting on the nature, content, and wording of all information supplied to the public. It proved to be difficult for the MO team to find a balance between keeping the language engaging enough that it would appeal to a broad spectrum of viewers, whilst clearly communicating uncertainty, probability, and explaining any errors.

424 The Telegraph Online, George Cowling Obituary, 27th December, 2009
425 The Evening Standard, 2nd August 1954
426 Summary of project progress sent from Sutton (DMO) to Sandford (DUS – Air Ministry), 24th November 1953. AIR 2/10881
427 For more on the communication of scientific uncertainty and predictions see Hooke and Pielke Jr. (2000), Stewart (2000), and Katz and Murphy (1997)
Those at the MO who perhaps naively saw the new format as an opportunity, not only to disseminate their forecasts, but also to educate on basic meteorology, were surprised by cases of wanton blame-casting. If the general public was better educated about how weather systems and the forecasting process worked, then surely their perception of the risk and understanding of the fallibility of the forecast would increase. Such an instinctive view oversimplified the relationship between risk perception and blame, failing to account for the problems of information transfer that occur when communicating risk. Two articles written by J.S. Farquharson of the London Forecasting Office (MO-24) in 1954 and 1957 suggest that contemporary actors understood many of the issues subsequently discussed by academic work on risk perception, if only at a rudimentary level. Farquharson framed the issue as one of a divide between experts and laymen. In discussing the fallibility of the human memory and the problems the lay public had in actually envisioning probabilities and understanding the concept of a probability forecast, he showed that the MO staff creating public forecasts took this problem into consideration.

Mary Douglas suggests we may expect to see collective emotional responses in situations where risk and danger are evoked. Considering Douglas’ ideas in a forecasting context, professor of anthropology and communication, Renzo Taddei (2009), states that for this trigger to occur, there must be some “misrepresentation of uncertainty.” People do not cast blame if they have accepted the true probabilities of the risk. In finding a balance between comprehensively explaining all possible outcomes, and communicating a succinct coherent weather picture, the MO continued to receive blame for inaccurate weather

428 See chapter 1.2.2 on SARF and Murdock et al. (2003) 159
429 Wynne (1996) deconstructs the problem of framing science communication using such an expert-lay knowledge divide through the case study of the Cumbrian sheep farmers and the Chernobyl nuclear disaster.
430 Farquharson (1954) and Farquharson (1957)
431 Taddei (2009) 289
forecasts, such as that vented by one frustrated viewer at the lack of a frost warning that resulted in a frozen pipe.\textsuperscript{432} As meteorologists develop the range, profile, and crucially, the medium of their forecasts, they do truly become, as ethnographer Gary Fine ominously dubbed them, the \textit{Authors of the Storm}.\textsuperscript{433}

The introduction of meteorologists as the face of the BBC’s new televised weather resulted simultaneously in the creation of the format’s endearing quality, and in increasing the targeted blame that was received when forecasts were inaccurate. Emmanuel Shinwell found himself the scapegoat during the winter of 1947 (See 2.4), but now if an extreme weather event occurred, would TV’s new meteorological experts usurp the politicians as figures of blame? Repeatedly stating an objective to “humanise” the weather, those involved in the TV project did not just choose any human, such as a television announcer, for the new format. Instead, it was the face of the expert meteorologist that appeared on screen.\textsuperscript{434}

\textbf{5.4.3 The meteorologist as television personality}

From the beginning, many involved with the televised weather project at the BBC were concerned at the idea, put forward by the MO and then supported by the BBC’s Director General, of having a qualified meteorologist presenting the segment, rather than a television presenter.\textsuperscript{435} As late as November 1953, the Controller of Programmes for television was expressing his concerns about using MO meteorologists:

\begin{quote}
Whilst I felt that it was most unlikely that the Meteorological Office could produce two who could do the job well and be attractive personalities, I felt we must allow them to try...Some
\end{quote}

\begin{flushright}
\textsuperscript{432}Letter from a R.M. Roadhouse to the MO via the BBC, 15\textsuperscript{th} March, 1954. AIR 2/12924
\end{flushright}

\begin{flushright}
\textsuperscript{433}Fine (2007)
\end{flushright}

\begin{flushright}
\textsuperscript{434}Throughout the negotiations those involved such as Sutton, Rawes, and Stagg referred to a need to humanise the weather forecasts. For example see the quote by Rawes that opens this chapter.
\end{flushright}

\begin{flushright}
\textsuperscript{435}The idea of having a meteorologist present the forecast was widely held amongst meteorologists both inside and out of the MO. For example see, Extract from minutes of Meeting of Meteorological Committee held on 28\textsuperscript{th} May, 1953. AIR 2/10881
\end{flushright}
thirty Meteorological people from establishments all over Britain came to Lime Grove for tests. This thirty has been reduced to a shortlist of three...I very much doubt if the three Meteorological men in the ‘finals’ will give us two adequate personalities. If my fears prove to be correct, it will be awkward for us.  

Despite the concerns BBC officials raised, and the trouble creating a shortlist, the MO’s insistence that the forecasters should be accredited meteorologists won out. On his visit to the USWB, Sutton had witnessed a Bureau member of staff, Mr Fiddler, being interviewed (in audio only) live on air by the announcer during the televised forecast. This format, whereby the forecast was relayed live via telephone to a studio announcer, who drew the relevant information onto the studio weather map, was popular in early US TV forecasts of the 1940s, but by the early 1950s, it was being replaced by more glamorous ways of delivering the forecasts. 

In the US, the greater competition between TV stations and lesser regulation of the technology, led to a huge number of variations in the format of televised weather forecasts. In 1949 there were 69 television stations on air in the US, by 1952 this number had grown to 108, and, after the Federal Communications Commission freeze on station licensing was lifted in 1952, the figure had rocketed to 469 by 1955. Weather forecasts presented by TV personalities with minimal training in meteorology became the “primary arena for making the newscast more palatable,” and featured light-hearted elements such as puppets and cartoon characters. One of the most popular of these characters was Uncle Wethbee (Figure 5.4), who accompanied TV meteorologist Tex Antoine on New York City’s

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436 Memorandum, “Weather in Television,” from McGivern (Controller of Programmes – TV) to Jacobs (Director General), 11th November, 1953. T16/245/2


438 Henson (2010) 9-11

439 Henson (2010) 11
WNBT from 1949. Wethbee, a figure affixed to the wall behind Antoine, was dressed to reflect the day’s outlook, as a tool to put a “sugar coating on a rather dull subject.”

Figure 5.4: Contrasting styles of presenting the weather.

Top- MO meteorologist McAllen presenting from the BBC’s Broadcasting House, circa 1957.

Bottom- Tex Antoine and his puppet Uncle Wethbee on New York’s WNBT, circa 1955

Sources: Cowling (1957) 27 and Getty Images Online (©Time & Life Pictures)

Influenced by the competitive nature of US TV and the existence of a formative private weather forecasting sector, both of which were absent in 1953 Britain, the often more graphic and flamboyant US styles also built on an older tradition of US forecasting. Much like the UK, the USA had seen a huge wartime recruitment and training of meteorologists

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440 Henson (2010) 70
within the military. \(^{441}\) With thousands of meteorologists to train, and even more pilots, armed forces, and naval staff to regularly brief, educators turned to a format well-known to young males in 1940s America: the comic strip. Using comic strips and cartoons in wartime meteorological services, especially in military pre-flight briefings, proved so successful that when many of those delivering them were assimilated into civilian roles after the war and placed on TV, they simply transferred the format with them. \(^{442}\) Don Woods, a qualified meteorologist who served in the US Navy during the war, typified this transition. Woods began broadcasting on Oklahoma’s KTUL station in 1954, and introduced Gusty, a cartoon character drawn live on air who was popular until his retirement in 1989 (Figure 5.5). \(^{443}\)

![Figure 5.5: Don Woods drawing his character Gusty live on air, circa 1957.](image)

**Cartoons are to this day a feature completely absent from British televised weather forecasts.**

**Source:** Channel 8 (KTUL) Online (©WorldNow and KTUL)

In the UK, wartime meteorological training and briefing of soldiers, seamen, and pilots had rarely, if ever, employed the technique of using cartoons to impart weather information. \(^{444}\)

Despite many of those involved with the BBC TV weather project having similar

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\(^{441}\) See Harper (2008) Chapter 3

\(^{442}\) Turner (2010) Chapter 5 discusses in detail the US post-war transition of military meteorologists into prominent figures in TV weather.

\(^{443}\) Henson (2010) 72-3 and Don Woods Official Online Website

\(^{444}\) Unlike in the US all wartime meteorological training was under the control of the NMS, with all training conducted at MO training schools. For more on the training syllabuses see Air Ministry [AHB] (1954) 563-4
backgrounds to their American counterparts, such as Cowling, who had been an RAF forecaster in the war, the idea of using such gimmicks never entered consideration when planning the new BBC TV format, due to the many specific cultural and technological differences between the UK and US as outlined in this section.  

In this regard, although Sutton took many ideas from his visit to the USWB, he seems to have considered the recently defunct Airmet service a more suitable model for the more demure British television style. In negotiations with the BBC, Airmet not only gave the MO evidence that a meteorologist could communicate in language recognisable to a relatively uneducated end user, but also that an unscripted format could work. Many meteorologists, like Sir Robert Watson-Watt, found the Airmet format uniquely useful:

> Nothing else can give the user-listener even a fraction of the understanding and informed confidence inspired by this person-to-person contact. Nothing comparable could be achieved through the cool clear - because uninformed - detachment of the professional announcer.  

However, unlike Watson-Watt, through their ongoing negotiations with the General Post Office and the BBC, senior MO staff understood that the resumption of the Airmet service was very much in the balance. Thus, they referred to Airmet’s popular use of the meteorological professional’s voice to directly impart “technical expert knowledge” to progress reforms for both radio and television. This decision inadvertently impacted levels and direction of blame towards the new faces of the forecasts.

In the US, unlike with other television genres such as variety shows and detective dramas, the development of TV weather forecasts was not influenced by a pre-existing radio

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445 In an article in *The Meteorological Magazine* the ADMO of Public Services, J.S. Farquharson, considers even the use of such simple devices as arrowheads to emphasise important points, as unnecessary “gimmicks.” Farquharson (1957) 357

446 Watson-Watt (1951) 555

447 Letter from Johnson (then DMO) to Griesewood (Director of the Spoken Word – BBC), 20th July, 1953. AIR 2/10881
format. In stark contrast, the BBC’s monopoly meant that developing the new televised format in the UK was closely linked to, and influenced by, the format of the radio weather forecasts on the BBC Home Service. In early conversations between the two organisations, especially at the MO end, television was considered a simply more visual extension of current radio provision. Throughout the late 1940s and early 1950s, the development of weather provision for both radio and television were managed by the same meteorologists at the MO, and considered together in managerial meetings between the BBC and MO.

Changes to the format of the radio weather output were considered by the MO and BBC alongside the redevelopment of television output throughout 1953, with the use of a meteorologist rather than an announcer also being proposed. However, the older, more entrenched culture of radio meant the negotiation and process of redevelopment was more protracted, costly, and conservative. Because of this, despite the MO insistence that a meteorologist presenter was the best solution for both TV and radio, and despite top-level support from the BBC, when the new radio weather bulletins schedule was introduced four months late, in April 1954, it was the usual BBC announcer listeners heard.

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448 Turner (2010) 203

449 For example Peters in a 1953 memo refers to the main channels for public communication of forecasts as being radio (sound and television), telephone, and the Press. Peters, Memorandum on the Provision of Routine Forecasting Services to the General Public, 17th June 1953. AIR 2/10881

450 The idea of a meteorologist presenting the radio forecasts appears sporadically throughout the archive record. The protracted nature of any progress can clearly be seen in AIR 2/12494 where conversation rumbles on from 1954 until Sutton pulls the idea in 1956.

451 In a letter from Sutton (DMO) to Sandford (DUS – Air Ministry) dated 1st January 1954, Sutton states that at a recent lunch meeting Jacobs (BBC Director General) agreed that the best way forward for the radio format was for it to be presented directly by the MO. AIR 2/10881

452 Early conversations on the development of radio and televised formats were looking to coordinate the launch of both in early 1954. The changes implemented included two extra weather bulletins in the morning and one late at night, and the addition of regional forecasts to the midday bulletin. For more on the changes to the radio output see: Talk by DMO on Home Service to introduce changes in weather bulletins, 11th April 1954 (AIR 2/12494) and Internal Memo from Sutton (DMO) to Sandford (DUS – Air Ministry), 24th November 1953 (AIR 2/10881)
Unlike the settled, structured, and cherished BBC home service, the formative technology of television presented an arena where officials at the BBC were more open to experimentation. This experimental attitude was not just restricted to the question of who would present the new format, but also the method by which the forecast should be delivered. Throughout the substantial negotiations and TV trials of 1953, much time and consideration was given by both the MO and the BBC on how to present complex weather forecasts visually so that they could be understood by the layman.453

5.4.4 Framing the sky – the visual aspect of communicating the weather

It [television] encouraged dreams of “super-animation” techniques, borrowed from the moving-picture art, showing perhaps in one minute, how the immediately current synoptic chart had evolved – not wholly as expected – from its predecessor of six hours earlier, and in another minute how the current general situation was expected to develop into that shown in a “prebaratic” chart for six hours hence.454

Keen to improve on the basic static weather charts used since 1949, technical staff at the MO and the BBC discussed and trialled creative solutions to improve the visual element of televised forecasts. Their more creative ideas, such as the use of animated charts and magnetic strips, were decried as “silly” and “cumbersome” by higher management when viewed at trials during the autumn of 1953.455 After these trials, management at the BBC and the MO told technical staff to simplify the process down to a man sketching the

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453 An internal memo from the BBC Presentation Editor (TV) to McGivern (BBC TV Controller of Programmes) dated 10th November 1953 refers to the task of developing the format as having two aspects; the forecaster/presenter and the method. T16/245/2

454 Watson-Watt (1951a) 7

455 The idea of using magnetic strips was taken up by ITV when it launched its weather coverage in 1956; whilst the BBC only introduced magnets with the introduction of new symbols in 1975. BBC Audience Research Report, “The Weather Reports,” 14th August 1958. T16/245/5 and TV-Ark Online
weather.\textsuperscript{456} Even with this simple approach, there were many decisions still to be made.

Now that there was a presenter, should the maps be at a more complex level? What level of detail can the cameras pick up? Which elements should be printed and which should be drawn live on air?

Simplifying complex codified synoptic charts, such as those used in the Daily Weather Report (Figure 5.6), had long been a challenge for those at the MO who produced forecasts for newspapers. Initially, the technical limitations of television cameras had meant that forecasters had to create even simpler charts. Now, with the addition of a moving element and the presenter drawing live on air, the process became even more challenging. Balanced against technological limits and monetary restrictions was a desire to meet the MO’s aim for the new format, which was to educate the viewer on modern meteorological practices.\textsuperscript{457} The emphasis on describing the development of the synoptic picture, affording yesterday’s and today’s charts as much airtime as tomorrow’s weather forecast, was driven by MO educational ambitions and possibly the limitations of forecasting in the period. It may also, however, have helped to mitigate blame directed at the forecaster, since it gave him the opportunity to explain errors and correct misrepresentation of uncertainty, ensuring the trust of the viewer was not compromised by false forecasts.\textsuperscript{458}

\textsuperscript{456} Internal memo from the BBC Presentation Editor (TV) to McGivern (BBC TV Controller of Programmes) dated 10\textsuperscript{th} November, 1953 and memorandum, “Weather in Television,” from McGivern (BBC TV Controller of Programmes) to Jacobs (BBC Director General), 11\textsuperscript{th} November 1953. T16/245/2

\textsuperscript{457} For more on the cartographic development of weather maps see Monmonier (1999) Chapters 9 & 10

\textsuperscript{458} The emphasis on past weather has slowly been eroded since the format launch in 1954. In 1957, a conscious decision was made to limit the discussion of past weather restricting it to only those places where it was necessary to make the forecast intelligible. Letter from Rawes (BBC TV Presentation Editor) to Sutton (DMO), 23\textsuperscript{rd} January, 1957. T16/245/4. For more on the misrepresentation of uncertainty in meteorology see Taddei (2009) 289
Whilst the meteorological community saw the revamped format as an opportunity to communicate its science to a public audience, few outside the field, both at the time and since, have considered televised weather forecasts as science communication. Recent historians of science on television, such as Timothy Boon, do not class weather forecasts within the government’s post-war push to broadcast simple, scientific programming. In 1949, after pressure from the newly-appointed BBC General Advisory Council member, the physicist Mark Oliphant, BBC Director General Sir William Haley had appointed a sub-committee to consider broadcasts on science. The sub-committee was chaired by Sir John Anderson, whom we met in the previous chapter as Viscount Waverley, and was tasked with considering all aspects of BBC science programming on both radio and television. Many issues the committee considered, such as comprehensibility, were similar to those the MO and the BBC project team were wrestling with in 1953. Yet in 1949 no parallels were drawn between the science programming and TV forecasts and therefore the
committee considered weather bulletins beyond its remit. The absence of weather forecasts from the committee’s considerations of televised science highlights a gap between how meteorologists and those outside the profession perceived the purpose of the new TV broadcasts. For whilst the meteorologists saw the forecasts as a chance to inform and educate, the general public saw a useful product which could aid their daily lives. Former weather anchor and professor of journalism, Kris Wilson, has considered contemporary television weathercasters as science communicators. Despite the focus of his research being on the communication of climate change science in the US, his assertion that specialist TV forecasters “may be the only source of scientific information that some people encounter on a regular basis,” also rings true for those in the UK in the early 1950s. Given that Cowling and Clifton were both practicing meteorologists who wrote their own forecasts for the televised slot, and instantaneously became the most recognisable meteorologists in the country in January 1954, we should consider them both prominent science communicators.

Whilst MO staff spoke of the opportunity to “humanise” the forecast and saw the development of a new televised weather format as an integral part of a modern NMS’s responsibility to educate the general public, there were also other agendas driving the reforms. The chance to have an MO meteorologist on the televised forecasts was an opportunity to raise the profile of their discipline, and build on the organisation’s authoritative role in British society, recently boosted by their important role in the creation of the Emergency Gale Warning Service. Also, as was to be highlighted in upcoming reviews of the organisation (see 6.2) recruitment of scientific officers was becoming difficult for the growing organisation, so the opportunity to speak directly to the public and raise the

460 Wilson (2008) 73. Wilson goes on to give a comprehensive literature review of scholarly coverage of televised weather in the USA clearly highlighting how this area is neglected in academic study.
profile of meteorologists would benefit future recruitment. Finally, considering that all of Sutton’s plans for development at the MO relied upon continued growth of the organisation, and that the technologies new meteorological techniques required were increasingly costly, the development of a greater public profile and utility was vital to ensuring the MO’s continued taxpayer funding. Less tangible however, is whether the MO’s desire to increase public communication was at all driven by blame it received for ineffective forecasts and warnings, such as during the North Sea Flood of 1953. The floods were considered by both the BBC and the MO, however the impetus they added to the development of the TV forecast project was quickly lost through the delays already discussed arising from the change of the DMO and the building of the new BBC studio at Shepherd’s Bush.\textsuperscript{461}

\textbf{Figure 5.7: The Forecasting Unit in the Dome of Discovery at the Festival of Britain South Bank Site, London 1951.}
\textit{Source: National Meteorological Library and Archive ©}

Rather than the educational quality of the weather bulletins, it was the utility of the next day’s forecast that drove much of the demand from the general public. Indications of this demand began to accumulate by the beginning of the 1950s, from the realisation that Airmet was used by a much broader spectrum of society than was previously thought, to

\textsuperscript{461} See T16/245/2 and AIR 2/11863
the experience of meteorologists on the MO-run section in the Dome of Discovery at the 1951 Festival of Britain where forecasters spoke directly to over 30,000 people. The MO section included educational content on meteorology, example meteorological instruments, and a complete live forecasting unit run by MO staff (Figure 5.7). The success and feedback this exhibition received, especially the printed souvenir forecast created whilst visitors watched, not only influenced decisions when considering the new radio and TV formats, but also led to further public engagement activities. Here we see that whilst television was one of the first, and subsequently most important, public communication avenues to receive an overhaul, it represented only one strand of increasing MO public communications in the period.

5.5 Conclusion

In the early 1950s, senior figures at the MO began to redirect the focus of the organisation from traditional specific service users, such as civil aviation, toward a NMS that catered to the broader general public. The development of new public communications was catalysed by international practice, especially from the US, improvements in communication technologies like television, and the realisation, through the loss of the popular Airmet service and the success of public exhibitions, that there was a genuine demand from the public for weather information. Pressure from academic meteorologists, the Meteorological Committee, and the Royal Meteorological Society was galvanised in September 1953, when a member of all three, Dr Graham Sutton, was appointed as DMO. As part of his plans for wider reform of the MO, Sutton provided a focus and impetus to the previously ad-hoc and protracted development of public weather services.

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462 Marshall (1951)
463 Feedback received by forecasters during the Festival of Britain is mentioned by Peters in his Memorandum on the Provision of Routine Forecasting Services to the General Public, 17th June 1953 (AIR 2/10881). In 1954, many of the exhibits from the festival went on a national tour of British cities as part of the centenary activities of the MO. Hunt (2007) 143
When the MO, in partnership with the BBC, launched a new format for their televised forecasts in early 1954 which featured a MO meteorologist, they fundamentally changed the British public’s relationship with the organization. The popularity of the new format, coupled with the exponential increases in the popularity of television, significantly raised the public profile of the MO and its forecasts. All those involved with the project welcomed this increased prominence, especially senior MO figures who considered it a great opportunity to educate the public, disseminate knowledge, and raise the profile of their discipline. The end users of the forecasts were more interested in the utilitarian aspect that predicting future weather could bring to everyday life, however. Thus, in conjunction with improving forecasting capability in the years to come, the MO reduced its emphasis on education and past weather systems in TV bulletins. Another unexpected public reaction to the new level of visual communication afforded by the TV forecasts was an increase in the amount of blame cast at the MO and the presenting meteorologists if forecasts were erroneous. This blame was influenced by the visual and linguistic aspects of the bulletins, but most importantly, by the decision to have an expert rather than a TV announcer presenting the segment. Those involved with the TV project had a rudimentary understanding that the language, face, and visual aspect of the forecasts were important. Yet no one involved predicted the significance that presenting probabilistic forecasts in a deterministic language the viewer at home could relate to would have on the subsequent development of the public’s risk perception and expectations of weather forecasts in the UK.\textsuperscript{464} Given the purported educational motives of MO officials, the absence of televised weather forecasts from contemporary and subsequent debates of science communication on UK television further highlights the speed with which the revised format became about utility and usefulness for the end user.

\textsuperscript{464} See discussion on the public response to the 1987 Great Storm in the Introduction to this thesis and LeVay (2008) for an example of the expectation the public placed on weather forecasts was to change dramatically over the following decades.
The creation and subsequent proliferation of forecasts through the wide-reaching and visual format of television launched in January 1954 was a decisive moment for the MO, as it continued its expansion toward becoming a truly public-facing organisation. The opening-up of services so they would be of greater use to the public fits narratives of the international development of meteorology that highlight a broader role for NMSs in society across several prominent members of the World Meteorological Organisation (WMO). As the new format went on to become the main contact point with the MO for members of the public, its launch in 1954 was a significant event which increased the MO meteorologists’ profile as scientific experts.

In the following chapter, we explore how Sutton continued, with other senior staff at the MO, to expand public weather services in line with other restructuring initiatives, such as the move to a single headquarters for the organisation. As part of this process, we see how extreme weather warnings and forecasts, originally created for specific end users (Chapter 3), were incorporated into broader systems that catered for larger cross-sections of society and sought to warn the public of high risk events. When we consider the communication of warnings on low-probability, high-risk events, alongside the problems presented by mass communication methods, such as TV, we see in more detail how the MO’s growing status as an expert body interacted with the public’s perception of risk surrounding meteorological extremes. The development of both everyday and extreme public weather forecasting in the 1950s greatly affected British risk perceptions of extreme weather, and attitudes of blame in forecasting.

465 For general narratives on the twentieth century development of meteorology see Nebeker (1995) and Harper (2008). For more on the role of NMS’s in providing public weather services see Zillman (2005)
It is hard to gauge the cash value of the Gale Warning service alone, or, for that matter, of any services - meteorological and non-meteorological - that are partly or wholly designed to save life.

_The Daily Telegraph, Monday September 13th, 1954_

### 6.1 Introduction

In the summer of 1954, the new Director of the Meteorological Office (DMO), Graham Sutton, set forth his vision for reforms to the organisation. Driven by public demand, improvements in technology, and a changing perception of the role of a national meteorological service (NMS), his vision aimed to ensure that all people in the UK benefitted from their Meteorological Office (MO). Yet Sutton, and other senior figures at the MO, failed to foresee how the increased prominence which came with improved public services would expose the organisation to more blame in future extreme weather events.

As the MO introduced forecasts and warning which sought to rationalise and manage the risks posed by extreme weather, there was to be an unexpected _revenge effect of implementing these new technologies, in the form of public blame_. Through consideration of how forecasts and warnings developed in conjunction with the growth of public weather services, this chapter will show how the MO went beyond being a prominent scientific expert body, to become an organisation upon whose authoritative voice the public have come to rely in extreme situations.

In 1945, fewer than 10,000 members of the public rang the Meteorological Office (MO) Central Forecasting Office for advice; by 1955, over 110,000 used this service. Similarly, those contacting regional Royal Air Force (RAF) forecasting outstations by telephone, went

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466 Tenner (1996) Chapter Four
from 9,000 in 1950 to over 70,000 in 1955. As discussed in the previous chapter, the MO’s new format for televised forecasts, introduced in an attempt to meet this demand, only further fuelled the public’s increasing appetite for weather services in the second half of the decade. Sutton’s 1954 memorandum resulted in the creation of an ad-hoc committee to review the organisation of the MO. The committee’s report gave an independent gravitas to Sutton’s proposals, resulting in the progression of the plan for the new unified headquarters (HQ) at Bracknell, the restructuring of the Meteorological Committee, and most pertinently, the creation of an MO branch dedicated to public services. A myriad of new developments followed, including a telephone forecast service, regional radio broadcasts, and weather bulletins on the newly formed Independent Television network (ITV). This chapter begins by considering the growth of these public weather services, culminating in the early 1960s with the creation of high street regional weather centres across the UK. These developments were rooted in the post-war structural changes begun by the previous DMO, Nelson Johnson, and continued the transition of the MO from a government department concerned with military, aviation, and seafaring safety, to a publicly recognised body with a utility to all. This chapter demonstrates how through this shift, the MO raised its public profile further and thus cemented its position as a prominent body of scientific experts in British society.

First, the chapter considers the creation of MO public weather services in light of the World Meteorological Organization’s (WMO) standardising and internationalising processes, which began to see broadening roles for NMSs, highlighting the economic utility of their services. The shift can be seen as a signifier of meteorology’s broader twentieth century professionalisation as presented by Kristine Harper (2008) and Frederik Nebeker (1995). Such a trajectory has parallels with Ulrich Beck’s consideration of how twentieth century

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467 Report of a Committee to review the organization of the Meteorological Office – August, 1956. Para 50. AIR 2/12398
internationalisation and globalisation have interacted with the manifestation of risk in western societies. In *World at Risk* (2009), Beck considers how western societies’ staging of risks, such as those presented by natural hazards, is blurring the distinction between actual risk and the cultural perception of this risk. This chapter demonstrates how, through developments such as numerical weather prediction (NWP), risk management became of increasing importance to meteorology and the British MO. The MO’s advance toward operational NWP, catalysed in 1959 by the installation of its first electronic computer, was an important factor in confirming and raising further the MO’s position as a scientific expert body. Through the WMO and leading NMSs, a model of what a modern NMS should look like had emerged by the early 1960s. The MO was at the forefront of this vision. Through the technological capabilities afforded to the organisation by the move to a new unified headquarters at Bracknell, Berkshire in February 1961, officials ensured that the MO’s domestic and international profile would continue to increase. The development of a numerical computational basis for meteorology furthered the professionalisation of the discipline and, in turn, the MO’s emerging position as an expert body.\(^{468}\)

As the provision of public weather services broadened, and as specialised forecasts for extreme weather, introduced in chapter three, improved, the services began to coalesce. Snow and frost warnings were no longer provided just to municipal works or the Automobile Association, but now also to ski resorts in Scotland, and the aspirational members of the public who began holidaying in such locations.\(^{469}\) The final section of this chapter considers how the East Coast Gale Warning Service and riverine flood warning systems developed in the period. It explores how the MO’s central position in such systems combined with their increasing public profile to place them in a unique position of authority that became increasingly vulnerable to blame for erroneous warnings.

\(^{468}\) Porter (1995)

\(^{469}\) Peters (1955) 194
The development of inter-agency warning systems was ad-hoc and required the catalysing effect of major riverine flooding in the UK in 1960-61, and a catastrophic storm surge in Germany in 1962, to ensure progress continued. Given that the MO’s creation of the original Gale Warning Service was itself a response to the North Sea Flood of 1953 (see 4.4), the important role of disaster in the development of flood protection in the UK becomes apparent.\(^{470}\) The development of systems to protect against low probability, high risk events depend on the policy windows created by catastrophic events to secure political attention and funding for improvement.\(^{471}\) The government review of the East Coast Gale Warning Service highlighted that although the responsibility for executive action upon a warning still lay with the local police, the MO was increasingly being associated with the warnings it issued on behalf of the collaborative input of several agencies. As these warnings began to bypass the strict chain of communication the system dictated, finding their way to the public via alternative routes, we see how the MO name became attached to the alerts.

Through technological improvements, the warning systems’ veracity and scope continued to improve, yet the MO continued to be exposed to blame: as Tenner explains, “better predictions encourage a confidence that can be perilous.”\(^{472}\) Through the review and development of their warning systems, MO representatives became increasingly prominent communicators of risk in British natural hazard situations. The increased prominence led the MO to a process of regulating risk which was to have unexpected consequences. Rather than eliminating insecurities, forecasts and warnings for extreme weather events institutionalised risks from hazards that were previously considered natural and whose

\(^{470}\) See Johnson et al. (2005) for more on the catalysing effect of British flooding on disaster policy.

\(^{471}\) See Kingdon (1995) for more on the concept of policy windows.

\(^{472}\) Tenner (1996) 72
weight was borne by society. As the profile of such warning systems increased, public expectations of state protection via these systems helped to shift the conception of such meteorological extremes from Acts of God toward manageable civil emergencies.

6.2 The Committee to Review the Organisation of the Meteorological Office, 1955-56

Although MO negotiations with the BBC had been ongoing for much of 1953, Sutton understood that for a Civil Service body which was bound within a complex hierarchical structure the TV project had progressed relatively quickly. If he was going to achieve his desired large-scale changes of increasing public services, regionalising output, and centralising into one head office, Sutton recognised that he would have to engage many influential figures across government bodies as disparate as the Air Ministry, the BBC, the Treasury, and the Ministry of Works. His first step was to clearly outline his thoughts on how, why, and where reforms at the MO should occur. To this end, in July 1954, he followed up his informal report from the previous summer on the US Weather Bureau (USWB) with a memorandum on the future organisation of the MO. Sutton proposed a restructuring of the upper levels of the organisation that would clearly divide MO duties between civilian and military/aviation. He proposed having five regional offices that would enable the MO to cater for the specific needs of the civilian public in each region, whilst freeing time for services for aviation, for those based at airfields, and for research for those at other outposts. Sutton’s vision intended to facilitate many of the proposals he had first introduced in his memo on USWB practice from the previous year, and aimed to alleviate the “failure to provide the non-aviation user with easy access to the expert.”

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473 Rothstein et al. (2006)
Sutton’s 1954 memorandum claimed that MO practice was nepotistic toward its parent department the Air Ministry, and that recruitment of young meteorologists was deteriorating because career progression in the MO was not in line with other branches of the Scientific Civil Service (see 3.3). The claims of nepotism ensured that senior Air Ministry figures took the memo seriously. Furthermore, the Deputy Under-Secretary of State, Folliott Sandford, ruled out progressing MO reform by means of an internal review conducted by either Air Ministry staff or a sub-committee of the Meteorological Committee. Instead, to ensure that the review was rigorous, seen to be impartial, and taken seriously by the Treasury, he proposed that an ad-hoc departmental committee should be created, as had been done after the North Sea Flood of 1953 (4.1). 475

Five years after Robert Watson-Watt had called for a public enquiry into the organisation of the MO (see 5.2), the Committee to Review the Organisation of the Meteorological Office was created. After considering several prominent scientific figures for the role of chair, including the chemist and former MoD Chief Scientific Adviser, Sir Henry Tizard, the Air Ministry settled on John Moore-Brabazon, 1st Baron Brabazon of Tara, an aviation pioneer who had become a conservative MP in 1918 and was elevated to the House of Lords in 1942. 476 Announced on 25th April, 1955, the remainder of the committee consisted of Sir Charles Darwin, a physicist and former director of the National Physical Laboratory, aviator, Major R.H. Thornton, Deputy Under-Secretary of State for the Air Ministry, Sir Folliott Sandford, and J.R. Simpson a Treasury civil servant. 477 The committee members met sporadically throughout 1955–1956, and released the report of their findings in August, 1956. The report gave 32 individual recommendations under the broad categories of

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475 Air Ministry File Minute sheet by Sandford (DUS.I), 22nd September, 1954. AIR 2/12398
476 Rose (2004). As is the norm with departmental committees the review committee was known as, and is referred to herein as the Brabazon Committee/Report. Not to be confused with the earlier, better known, Brabazon Committee of 1942-3 which investigated the development of the British Empire’s civilian airliner market.
forecasting, research, services, staffing, organisation and grading, control and direction, and finance. None of the recommendations were particularly radical; all were ideas that had previously been aired by progressive voices such as Sutton or Watson-Watt. The report also managed to appease traditionalists, only offering mediated, conditional support for Sutton’s more progressive schemes, such as new regional MO centres. Further, whilst calling for the continued development of non-aviation services, the committee stated categorically that the MO should remain within the Air Ministry. The ad-hoc departmental committee format was used as a tool by Sutton’s seniors in the Air Ministry to investigate his proposals, temper them when necessary, and most importantly, provide them with an independent gravitas by which funds could be appropriated from the Treasury.

The report’s endorsement of the scheme to move the MO to into a new centralised HQ in Bracknell, Berkshire, gave the already discussed project an increased priority with the Treasury and the Ministry of Works (6.4). The report’s recommendation that the Meteorological Committee was restructured resulted in a smaller “non-representative” committee which only included one scientist. Importantly, the reconstituted Meteorological Committee would have a specific remit to ensure that adequate communication was maintained between the MO and all of its end users.

Implementation of the Brabazon Report realigned and streamlined the upper structure of the MO (Figure 6.1). It also resulted in the appointment of a secretarial department which

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478 Letter from Brabazon to Birch (Secretary of State for Air) – 16th June, 1956. AIR 2/12398
479 In his Future Policy memorandum Sutton had introduced his desire to establish regional MO centres that could more specifically deal with the local needs of industry and the public. See 6.4 for more. Report of a Committee to review the organization of the Meteorological Office, August, 1956. AIR 2/12398
480 Previously the Meteorological Committee had been a representative body with a guaranteed position for those from particular organisations such as the Royal Society, government departments including MAF, and British Universities. The reforms meant that members of the new committee would be selected for their personal contribution and not their representation of a particular body. Minutes of the Meteorological Committee from 18th October, 1956. AIR 2/12398 and AIR 2/12841
freed Deputy Directors (DDMOs) and Assistant Directors (ADMOs) from many administrative tasks, so they could focus on the delivery of their department’s meteorological services.\textsuperscript{481}

6.3 Re-structuring to serve the civilian

The re-organisation finalised the process, begun by Nelson Johnson, of separating the military and civilian functions of the MO. In the re-shuffle of departments, the London Forecasting Office was subsumed into the newly formed Public Services department, MO-18. Unlike the majority of departments, MO-18 did not come under the supervision of an ADMO; rather, it was controlled directly by the experienced DDMO for Central Services, S.P. Peters. This was an astute decision by Sutton. In addition to filling Brabazon’s requirement that a department should be devoted wholly to general users, by removing a layer of management, the DMO could keep a close eye on the development of public services via two of his most trusted and experienced staff: Director of Services, Stagg, and the deputy for Central Services, Peters.\textsuperscript{482} The creation of MO-18 enabled the continued development of public services, and showed the growing importance of this area of operations as the organisation became increasingly civilian-orientated.

Under the guidance of Stagg and Peters, MO-18 was involved in developing a myriad of public service improvements over the coming years. Review of both TV and radio bulletins by MO-18 continued, and where possible, improvements were made. In 1956, MO-18 officials began a process of separating out forecasts for specific end users from those for the general public. First, the shipping forecast was separated from the general user bulletin,

\textsuperscript{481} Report of a Committee to review the organization of the Meteorological Office, August, 1956. Paras 105-106 (AIR 2/12398). The changes in structure were implemented from 1\textsuperscript{st} July, 1957. House of Commons Debate, 28\textsuperscript{th} June 1957, vol. 572 cc61-SW and AIR 2/13136. For the exact structure of the MO office after the reforms see Figure Five in Appendix II

\textsuperscript{482} Report of a Committee to review the organization of the Meteorological Office – August, 1956. Para 57 (AIR 2/12398). Peters first joined the MO in 1923 and had worked in a broad range of roles until he was promoted to DDMO Forecasting in 1953 – Meteorological Magazine (1961)
and then regional forecasts were introduced to radio. Regional forecasts were also introduced to television in May 1958. Due to logistical and staffing limitations, however, the MO was unable to have a qualified meteorologist presenting the regional forecasts.\footnote{483}

This meant that after the main weather bulletin finished, viewers would see a stock caption showing the geographical limits of their region, with a BBC newsreader’s voice dictating a regional outlook prepared by the MO.\footnote{484}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure6.1.png}
\caption{Summary of the Meteorological Office organisational structure, 1945-1958. \textit{Source: Appendix II}}
\end{figure}

MO-18’s concerns at having a BBC announcer, rather than an MO meteorologist, presenting televised weather on the regional forecasts came second to worries over the development of Independent Television (ITV) from 1955 onwards. Those involved with the creation of the BBC TV weather format in 1953-54 understood that if the new TV providers created as a result of the 1954 Television Act wished to broadcast weather bulletins, there were no guarantees they would use the MO to present, or even provide, the forecasts.\footnote{485}

\footnote{483} The changes to the shipping forecast were introduced on 22\textsuperscript{nd} April, 1956. For the exact detail of all changes made to the radio bulletins see “Changes in BBC Weather Forecasts” (undated). AIR 2/11843
\footnote{484} MO Loose Minute, J.S. Farquharson (Assistant Director, Public Services), 22\textsuperscript{nd} November, 1957 and BBC Memorandum R. Greenwood (Presentation Editor TV), 23\textsuperscript{rd} April, 1958. AIR 2/12924
\footnote{485} For an introduction to the beginning of competitive television in the UK see Crisell (2002) Chapter 5

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As early as May, 1953 Nelson Johnson had been encouraged by a senior figure in the Air Ministry to get the Ministry in on the “ground floor” if sponsored TV came about.\textsuperscript{486} In reality, however, the new TV companies had little choice other than the MO to provide their forecasts, as credible private forecast companies were yet to emerge in the UK. By the mid 1950s, commercial weather services in the UK were limited to a few weather consultants, such as the Bartlett brothers, who produced forecasts largely using past weather patterns, rather than the dynamical model and computation methods employed by the MO.\textsuperscript{487} The large operational costs of modern forecasting, and the increasingly wide range of services being provided by the state service, limited the demand for commercial weather services in the UK. In contrast in the US a more market led, competitive model of weather service delivery had emerged and was accelerated in 1953 by the publication of an influential USWB report, “Weather is the Nation’s Business.”\textsuperscript{488} When ITV came into existence in 1955, the MO was approached by the first regional contractors to provide their weather content.

Although the MO may have been the only available provider, the new broadcasters’ vision of televised weather differed greatly from the more traditional, radio-influenced format developed by the MO and BBC.\textsuperscript{489} Despite the newly formed regional stations obtaining their news output through the national Independent Television News (ITN) network, each approached the MO separately to develop its regional weather content. Some bulletins, such as the Associated British Corporation’s (ABC) North of England weekend coverage,

\textsuperscript{486} MO Internal Memorandum, I.V.H Campbell (Assistant Under-Secretary E.O, Air Ministry) to Nelson Johnson (DMO), 29\textsuperscript{th} May, 1953. AIR 2/10881

\textsuperscript{487} See Bartlett and Bartlett (1949) and a video of the brothers at the British Pathé Online Archive (1947) to see the gulf between such weather consultants methods and those of the MO.

\textsuperscript{488} USWB (1953), for more on US commercial weather services see Henson (2010) Chapter 3

\textsuperscript{489} In an original proposal the weekend Midlands provider ABC mentioned the use of meteorological instruments as props, photographic imagery of weather conditions, and the use of a second character to question the presenting meteorologist. Letter from R.T. Rowson (ABC Television Ltd) to W.H. Hanson (London Forecasting Office), 8\textsuperscript{th} February, 1956. AIR 2/13147
simply consisted of an unseen announcer reading a script whilst weather charts were presented, requiring little novel input from the MO. Other providers, such as the London-based Associated-Rediffusion Ltd., wished to have their basic forecasts prepared by the MO, but would employ their own meteorologist to interpret and present the slot. This second approach caused MO officials considerable concern over the possible discredit which could be brought to their name through the “garbling” of their forecasts, not to mention the introduction of competition if independent meteorologists began preparing their own forecasts. Both were considered substantial risks, but as a public service provider, the MO had little choice but to supply the new TV stations with the information and support they requested. In the absence of other mature UK-based forecast providers, the MO remained in a position of power, and Associated-Rediffusion consulted with the MO on the appointment of its in-house meteorologist. Associated-Rediffusion also offered the MO a say in terminating the presenting meteorologist’s contract if ever he became “persona non grata” to them. This was considered a step too far, however, and over time a system developed whereby the MO advised commercial channels on the appointment of forecasters, providing them with training to ensure that they were suitably knowledgeable.

In addition to the more well-known TV and radio services, in March 1956, after seventeen years of intermittent discussion, the MO introduced a service whereby Londoners could pick up their telephones, dial W-E-A, and hear a short weather forecast for the region. Other nations, such as Germany, the USA, France, and Sweden had long had similar systems in operation, but it took the demise of Airmet in 1951 (Section 5.3), and the increasing emphasis on the public communication of forecasts within the MO, to finally

490 Note to Under Secretary of State (Air Ministry) from Assistant Under Secretary, H. T. Smith, 2nd May 1955. AIR 2/13147
491 AIR 2/13147
492 The first recorded meeting of MO staff which discussed the possibility of a telephone forecast was in January, 1939. BJ 5/47
secure the creation of the service in the UK. Following the Brabazon Report, the new
telephone weather forecast service was extended to cover other cities, regional agricultural
centres, and coastal towns from 1957 onwards.493

Due largely to concerns fuelled by practical considerations, such as staffing issues the
Brabazon Report did not categorically support Sutton’s regionalisation program. However,
as it had no ideological objection to the notion of a regionalised MO public services
structure, the report did suggest that in time, local units serving the general user should be
developed to provide forecasts that went into detail beyond the national scale.494 This
limited support for Sutton’s regionalisation program was enough to keep the idea alive.
Thus, while Sutton and other senior MO figures turned their attention to implementing the
immediate recommendations of the Brabazon report, they continued to consider the
regionalisation of public weather services as an idea that in time would become reality.

6.4 The creation of Regional Weather Centres and a centralised
headquarters, 1959-1961

Although all major interested parties who read Sutton’s proposals for regional MO centres
agreed to them in principle, Sutton’s future policy and organisation report from July, 1954
gave little detail of the project. The memo only stated that the Regional Meteorological
Offices should be set-up to serve the non-aviation user “at a convenient centre of
population, in close proximity to a BBC studio,” and whilst relying on RAF outstations for

493 The WEA telephone service had a rather staggered spread from its initial London launch in 1956,
beleaguered by financial, infrastructural, and interdepartmental pressures (the project was a
collaboration between the MO and GPO). Despite each introduced regional service being a success;
it wasn’t until 1961 that the service was operating over 16 towns/regions as the initial expansion
plans had outlined. AIR 2/14506 and MO Annual Reports 1956 and 1962
494 Report of a Committee to review the organization of the Meteorological Office, August, 1956.
Paras 52-64. AIR 2/12398
observations, should not interfere with aviation and military services. In presenting the plans to the Brabazon Committee, and at the prompting of the Meteorological Committee, Sutton produced two further memorandums on the specific details of his regional offices proposal. The first was released in November 1955, and stated that regional offices should be freely accessible to the public, with large display windows, and be located in the business district of the most densely populated city in the region. The memorandum outlined in great detail the specification of the offices, and proposed that the first should be created in London, to serve south-east England and East Anglia. Sutton suggested this could be achieved by simply transferring the London Forecasting Office to more publicly accessible premises. Upon successful demonstration of the London office’s utility for business users and the general public, Sutton suggested that Edinburgh, where, again, the MO already maintained a small department, should be next to receive a regional office. Building on the original trial offices of London and Edinburgh, Sutton proposed in his second memorandum of January 1956 that regional offices should further be established in Cardiff, Manchester, and Belfast, with each centre ideally being supported in its operations by satellite offices in smaller cities of the region. The Brabazon Report’s main problem with endorsing Sutton’s proposal for regionalisation was that there was currently a shortage of staff in the Scientific Officers Class, and that deploying such staff to regional centres would reduce their availability for research,

496 MO-24 was currently located on the top floor of Victory House, a security restricted government building in Holborn.
497 Memorandum by the DMO, “Committee to review the organisation of the Meteorological Office: Proposed Organisation of London and Scottish Regional Offices,” 11th November, 1955. AIR 2/14506
498 Sutton also proposed an extra, optional regional office for Leeds which could better support the needs of the East Midlands and North East regions. Memorandum by the DMO, “Committee to review the organisation of the Meteorological Office: Proposed General Scheme of Regional Centres and Satellites,” 12th January, 1956. AIR 20/9417
inevitably engaging them in menial administration tasks. In light of the ongoing increases in the cost of running the MO, the report was concerned with Sutton’s budget for the scheme. Sutton forecast that at the top end of the proposal with six regional offices supported by eight satellites, capital expenditure would be £42,700 and the annual running cost approximately £140,000; this was roughly 5% of the MO’s total annual budget. The report wholeheartedly supported the idea that over time, meteorological output would need to become more local in context. Yet it also favoured central headquarters’ liaison with regional industry, the delivery of regional forecasts through primarily pre-recorded channels, and a focus on short-range forecasts created centrally over any regionally located option. In advocating these methods, rather than Sutton’s regionalisation scheme, we can consider that the committee underestimated the potential that a locally placed expert could provide for regional services that went beyond basic forecasts and warnings. The improved local application a regionally based expert could add to the national forecast, accounting for topography, microclimate, and regional phenomena, had clearly been demonstrated by the veracity of forecasts for aviation provided by MO forecasters at RAF outstations. Sutton’s vision took this aviation model, which provided face to face contact with a meteorologist, and inserted it into a modern retail space to afford the general public the same level of service presently provided to aviators. However, the Air Ministry-commissioned committee considered that such a level of contact was not a necessity for the general public, and that, given the rise of routine mass national telecommunications and broadcasting, other forms of regional public forecasts should take priority.

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499 Report of a Committee to review the organization of the Meteorological Office, August, 1956. Paras 52-55. AIR 2/12398

500 In 1955-56 the total running cost for the MO was just under £3.2 million (Figure 3.1). MO Annual Report (1956) 52-53. Memorandum by the DMO, “Committee to review the organisation of the Meteorological Office: Proposed General Scheme of Regional Centres and Satellites,” 12th January, 1956. AIR 20/9417

501 Report of a Committee to review the organization of the Meteorological Office, August, 1956. Para 57-65. AIR 2/12398
After reading the Brabazon Committee’s thoughts on his regionalisation scheme in an early draft, Sutton responded through his seniors at the Air Ministry, arguing that they had placed “too much weight on forecasting.” He expounded the centres as places where both regional businesses and the public could get advice that went beyond routine forecasts, adding that the Committee’s comments gave “undue prominence to weather, whereas climate and microclimates must play an important part.” Sutton viewed the development of the centres not as in conflict with the increasing automation of services, but rather as an extension of this trend: one day, each regional centre would create its own specialised forecasts for TV, radio, and telephone. Although these views were echoed by MO staff, Sutton’s appeal to the committee fell on deaf ears, and little changed between this draft and the final report. Without anything more explicit than support in principal for regional centres at some point in the future, Sutton and other senior meteorologists at the MO initially pursued what avenues of improving their regional output they could. From regional radio and TV forecasts to the WEA telephone service, the new developments for the general public only provided basic forecasts. Specialised services for regional industries or individuals with a specific need would, for now, have to rely on phone advice from their overworked local RAF outstation, or appeal to the relevant department at the Central Forecasting Office.

502 Internal memorandum Sutton (DMO) to Sandford (DUS.I), 14th April, 1956. AIR 20/9417
503 See Staff Side responses to the draft report in AIR 2/13664
Three years passed before the London Weather Centre (LWC) opened its doors on August 31st, 1959. The premises at Princes House, Kingsway, in Holborn, contained nearly all of the features that Sutton had outlined in his initial vision, including a forecast broadcasting space, a room for interviews with enquirers from the business community, a general enquiries information desk, and large window displays containing forecast maps and weather information (Figure 6.2). What triggered the opening over three years after the Brabazon Report is not clear from the archival record. The period between the Brabazon Report’s findings and the launch of the LWC gave Sutton the crucial time he needed to build the plan into MO budgets. However, it seems the creation of the new LWC was also a fortuitous one. The London Forecasting Office (LFO) required larger premises. As the need for more space became apparent, a ground floor unit which lent itself to Sutton’s

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504 The LWC had a national as well as regional role, continuing with all of the responsibilities of the London Forecasting Office (MO-24) which it replaced. For example all national radio and BBC TV forecasts were produced here until services were progressively transferred to the BBC Weather Centre at White City, West London. See Hunt (2007). For footage released via Pathé cinema newsreels at the launch of LWC see the British Pathé Online Archive.
specification for the new publicly accessible centres became available across the street from the Office’s current location in Victory House. Further, former MO employee Roger Hunt (2007) and the RMets history group chair Malcolm Walker (2012), both link the creation of the LWC to the increasing public interest in meteorology, fuelled by both the Festival of Britain, in 1951, and a popular meteorological exhibition that toured the country as part of the International Geophysical Year (IGY) in 1958.\(^{505}\) Although the increasing number of enquiries the MO received give a proximate idea of the level of public interest in meteorology during the period, it is difficult to truly quantify changes in public understanding of meteorology. This increase in public interest for everyday MO services was linked to an increased public awareness of more theoretical ideas of meteorology as a geophysical process. Though again hard to quantify, the success of the touring exhibition in 1958, and other popular successes which came out of the IGY such as the Duke of Edinburgh’s BBC TV documentary, *Restless Sphere* first broadcast in June 1957 highlight such an increase in the public understanding of meteorology as a component of global natural processes.\(^{506}\)

As the LWC was a more publicly accessible version of the already hugely popular LFO, it came as no surprise to those involved in the project when it was an immediate success. By 1958 the LFO was receiving approximately 90,000 enquiries; within four years of the LWC opening the number of enquiries received annually was exceeding 200,000.\(^{507}\) Now that Sutton had proven that his format for a public and business orientated regional office could work, offices were opened in Glasgow in December 1959, Manchester in June 1960, and Southampton in December 1961. Retrospectively, Sutton stated that the creation of these centres had been driven by the inability of the local aviation forecasting offices to cope

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\(^{506}\) Search Restless Sphere on the BBC Archive Online to watch the popular documentary

\(^{507}\) “The Development of Public Service Activities, Communicated by the Director General.” Meteorological Committee Paper (M.C/P.52), 22\(^{nd}\) November, 1963. BJ 5/293
with the volume of public enquiries. By 1963, the MO was receiving 800,000 public enquiries a year, and with many aviation forecasting offices unable to cope, further regional weather centres were opened, eventually peaking at thirteen in the 1980s. The rapid growth in enquiries, coupled with the regional weather centres’ direct contact with the consumer, gave MO-18 insight into which sectors of society were utilising forecasts both by region and time of year. Analysis of user data enabled the MO to begin identifying ever smaller user groups, such as horticulturalists and gardeners, further tailoring services and separating commercial avenues from more generalised free public services. Reflecting the increase in consumer society in the post-war period, the MO increasingly began to refer to ‘customers’, rather than ‘users’, and to separate commercial services from those that should be provided as part of the government’s sovereign responsibility to protect its civilians. Whilst it effectively operated a monopoly on weather services during the period, by increasing its public orientated services and commercialising them where possible, to the general user, the MO became simply another organisation providing a product.

This shift of MO services can be considered as a part of wider international developments in the period, which saw the role and services of NMSs become more standardised. With the WMO providing an international forum which acted as a conduit for ideas between member NMSs, the period saw a standard model of NMS operation further defined and transposed to countries still developing their meteorological services. This

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508 Meteorological Committee Paper (M.C/P.52) and Hunt (2007) 143
510 See Hilton (2007) for more on the trajectory of consumer society since WWII and Zillman (2005) for more on NMS provision of basic and specialised services.
511 For example the WMO participated in the UN Expanded Programme of Technical Assistance for Economic Development of Underdeveloped Countries (EPTA), under which those with established NMS’s (such as the UK & USA) helped set-up, train, and develop underdeveloped countries NMS’s. See Daniel (1973) 181
professionalised model increasingly placed emphasis on two emerging roles of NMSs: firstly, a nation’s NMS should (if not already doing so) extend its operations beyond traditional areas, such as aviation and marine services, to ensure all sectors of society could benefit from its services; and secondly, the NMS should consider the economic benefits of its services, highlighting how its programmes aided the nation financially.

Dr. Georg Bell, President of the Deutscher Wetterdienst (DWD), the German NMS, championed both of these emerging ideas. In April, 1956 in an address translated and circulated to MO staff via Stagg, Bell spoke of how the German weather service directly linked to the nation’s economy. The address gave empirical cost-benefit analysis examples for each of the DWD’s operational areas: aviation, shipping, agriculture, industry and power, and health. It gave a clear economic incentive for government investment in the DWD, and strongly advocated meteorological applications that could benefit all sectors of society.512

In rationalising which services a NMS should provide against those the commercial companies should supply for customers, the US Weather Bureau (USWB) also went through a similar process of assessing the economic value of its services in the mid-1950s.513

Influenced by these developments in Germany and the US, as well as by the need to justify the continuing growth of their budget at a time of ongoing government austerity, the MO increasingly began to highlight the efficiency and utility of each service it produced.514 The MO information pamphlet, Your Weather Service, in its third edition by 1959, dedicated one of the four sections to detailing the different weather services the MO currently provided. Further, it contained an Appendix with approximate costs for such services and stated: “When a weather factor enters into some manufacturing process, or into some

512 Letter from Dr G. Bell (President – DWD) to Stagg (PDDMO) and accompanying translated transcript, 4th May, 1956. AIR 2/14506
513 USWB (1953)
514 Walker (2012) 337
special undertaking, connected, possibly, with business or sport, the trifling cost of a special forecast, or series of forecasts is often a sound investment.”

Also by 1959, the MO had begun its series of free educational leaflets, “Meteorological Services”, with *Current and Forecast Weather and Meteorological Information other than Current Weather Reports and Forecasts*. Both titles contained details of the services customers could purchase. Although these leaflets extolled the virtue and relative low cost of MO services, quantifying services that did not always have a financial outcome proved a challenge for the MO. In an extreme event, successful operation of services such as the East Coast Gale Warning Service could for many be a matter of life and death. Senior MO figures understood that a simple focus on finances overlooked this crucial aspect of the organisation, yet the rarity of flood events on the scale of 1953 meant, economic proxies of such services value would have to suffice.

By mid-1962, as data from the huge number of enquiries now being handled was accumulating, the MO managed to produce figures on the estimated economic benefits of their services. The report produced from this data showed that an extremely diverse range of customers, from public utilities to banana importers, were now reliant on MO services to save their organisations substantial costs. MO daily forecasts, tailored for specific client needs, were saving businesses anywhere from £100 to £1000 per week. Furthermore, MO extreme weather warnings (see 6.5) had helped farmers save entire crops worth thousands of pounds, and MO services for public utilities saved the Gas Council alone several million pounds per year. Such figures also justified MO, and government, investment in larger scale warning systems such as the East Coast Gale Warning Service; for whilst their life-

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515 Meteorological Office (1950) 26
saving ability may have been unquantifiable, their economic benefit was also undeniable. A rather conservative estimate by the Home Secretary had put the cost of the North Sea Flood of 1953 at £30 million;\textsuperscript{518} it seemed obvious that any service which gave advanced notification of such inundation could significantly reduce this figure in future events. Yet such simplistic interpretations, which relied on a cost-versus-benefit mindset, failed to anticipate how in reality warning systems interacted with other risk management strategies: measures such as land planning and insurance altered risk perception and public response when such events occurred.

The shift to a more public facing and economically aware model for NMSs is part of meteorology’s twentieth-century professionalisation. It was a process largely reliant on the development of technologies and meteorological practice, which attempted to move the discipline toward a more objective numerical basis for the issuance of forecasts and warnings. Toward the end of the 1950s, the extreme weather warnings and forecasts produced by the MO were increasingly reliant on processing large amounts of data in numerical form.\textsuperscript{519} The increase in this data, and the computing capacity required to analyse it, led to the MO’s introduction of operational numerical weather prediction (NWP). NWP uses mathematical models of the atmosphere and oceans to predict future weather conditions based on the currently observed situation. The approach had originally been proposed and developed in the 1920s by English mathematician and physicist Lewis Fry Richardson, but it was not until electronic computing created sufficient calculating capacity in the early 1950s that the field was truly to emerge.

\textsuperscript{518} Waverley (1954) 9
\textsuperscript{519} By 1963 the MO was processing nearly 2 million punched cards containing meteorological data per year. Meteorological Office Annual Report (1963) 43
MO involvement in electronic computing began in 1951, with Sawyer and Bushby of the Short Range Forecasting Research Branch (MO-21) leading initial research into NWP.\textsuperscript{520} During the 1950s the MO was to use the computing capacity of other institutions, such as the University of Manchester’s Ferranti Mark 1 computer. It was not until January 1959 that the MO got its first electronic computer, a Ferranti Mercury, known as Meteor.\textsuperscript{521} By this point, teams in both the US and Scandinavia had been successfully implementing real-time operational NWP for several years, with greater military backing than the MO had in the UK.\textsuperscript{522} In the winter of 1960-61, almost two years after Meteor was installed and over five years after its American and Scandinavian counterparts, the MO successfully ran a full scale real-time operational NWP forecast experiment.\textsuperscript{523} Despite evidence of reticence amongst some staff, the majority of senior staff at the MO understood the potential that electronic computers and NWP presented for the development of forecasts.\textsuperscript{524} Before the technology was even used in operational forecasts, the MO communicated to the public, via media such as weather magazines and cinema newsreels, the huge potential that electronic computers and NWP presented for weather forecasting.\textsuperscript{525}

\textsuperscript{520} Sawyer was promoted to ADMO of Forecasting Research in 1953 and in the restructuring of 1958, MO-21 was subsumed into the newly formed Dynamical Research Branch (MO-11) led by Sawyer. Met Office Annual Reports (1951-1958)

\textsuperscript{521} Walker (2012) 319, 347-349.

\textsuperscript{522} A Swedish-Norwegian collaboration led by Rossby at the Institute of Meteorology at the University of Stockholm had run a series of forecasts for the North Atlantic region three times a week beginning in December, 1954. The US Joint Numerical Weather Prediction (JNWP) Unit had begun its operational NWP forecasts in May, 1955. Edwards (2010) 129-130

\textsuperscript{523} Walker (2012) 347-349. Other countries such as Japan had also introduced operational NWP prior to the UK; see Persson (2005b)

\textsuperscript{524} Walker (2012) 348

\textsuperscript{525} For example see Persson (2005c) 381 and the British Pathé newsreel film, “British Science Makes Peaceful Strides,” from 1959 which shows how the MO is experimenting with computing and NWP.
In 1961, Meteor moved into a purpose-built space at the new MO unified HQ in Bracknell, Berkshire. The creation of a purpose-built headquarters (Figure 6.3), as recommended by the Brabazon Report, enabled the MO to install state-of-the-art meteorological technologies in a manner which anticipated the growing importance of electronic computation to meteorology. In addition to space for Meteor, and potentially larger computers in the future, the HQ featured a new Doppler storm warning radar system and an advanced Telex teleprinter system that could manage the communication of a much greater amount of information than previously. Such technological provisions in the new HQ would go on to be vital in converting pioneering UK-led theoretical research into new

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526 The move into the new HQ began in February, 1961; Meteor arrived in June, and the transition was completed on 30th September when the CFO at Dunstable closed. AIR 2/15185, Persson (2005c) 401 and Walker (2012) 351-352

527 The move to a unified headquarters had been discussed since 1949. See AIR 2/14090

528 See AIR 2/12927 for discussion on the specification of the new HQ.
operational procedures for improving MO forecasts and warnings.\textsuperscript{529} Further, the new MO headquarters played an important role in fostering the MO’s international profile as a modern and model NMS. Development of the site and building was clearly influenced by the needs of modern meteorology, and in turn, the building, as one of the first such purpose built meteorological centres, went on to influence the infrastructure of other NMSs.\textsuperscript{530} These modernisation’s to weather services and the MO’s infrastructure enabled the MO to meet the growing national demand for weather services, whilst also ensuring they remained at the forefront of international meteorology, a key component to the NMS’s prominent role in the WMO.

The development of NWP, and its deployment in operational forecasting, gave meteorology an objective numerical underpinning which furthered its acceptance as a truly professionalised scientific discipline to those outside the field. Sutton’s 1954 presidential address at the Royal Meteorological Society (RMetS), “The development of meteorology as an exact science,” was dedicated to this topic. Sutton extolled the virtues of the shift in meteorological forecasting from a qualitative to a quantitative process, and whilst stating that the atmosphere’s exact state might always be indeterminate, he was positive about the future of the scientific discipline, as strengthened by mathematics and NWP.\textsuperscript{531} The trust and expert status that comes to a scientific discipline through the purported objectivity that the use of mathematics and quantitative methods bring, as shown by historian of science Theodore Porter (1995), is manifest in both the rise of NWP and the increase of public weather services within the MO.\textsuperscript{532} The computer models being developed as part of the new NWP methods required data and observations on an

\textsuperscript{529} For example see Probert-Jones (1990) on how the MO assimilated UK research on Doppler radar systems into routine operational storm forecasting.

\textsuperscript{530} In 1963 alone 88 organized parties, including representatives from other NMS’s visited the new Bracknell Headquarters. Meteorological Office Annual Report (1963) 14

\textsuperscript{531} Sutton (1954)

increasingly large scale, which shifted the scope of observation from the regional to the hemispheric, and eventually, to the global. Although Sutton and other senior MO meteorologists acknowledged the atmosphere’s indeterminate nature and the limitations NWP would always face because of it, meteorology as a discipline was increasingly understating uncertainties, and emphasising the possibilities that electronic computation and NWP presented. For example even before NWP was being deployed in operational forecasts the MO were communicating to the public, through media such as weather magazines and cinema newsreels, the huge potential that electronic computers presented for weather forecasting.\textsuperscript{533} Although not at the fantastical level of self aggrandisement evident during the period in other areas of meteorology, such as weather and climate modification,\textsuperscript{534} overconfidence in forecasting capability did lead to a reduction in the discussion of probability, fallibility, and meteorological processes in MO public communications (see 7.2 for more).

In the period that followed the Second World War, it was not just technological innovations, such as radar and electronic computing, that made a transition from wartime innovations to peacetime meteorological practice. The development and deployment of extreme weather warning forecasts and systems was influenced by changing attitudes towards the state and the NMSs’ role in protecting civilian life and property from danger. As the ability of such systems to accurately warn communities of impending meteorological extremes improved, the expectations of the state’s responsibility to protect citizens from such civil emergencies also grew. The MO emerged not only as a body to communicate about the weather to the public, but more importantly as a state organisation to warn and protect citizens from the previously external and unpredictable extremes of the weather.

\textsuperscript{533} For example see Persson (2005c) 381 and the British Pathé newsreel film, “British Science Makes Peaceful Strides,” from 1959 which shows how the MO is experimenting with computing and NWP.

\textsuperscript{534} In attempts to ensure finance and public support weather and climate control projects during the period often resorted to wild exaggerations of their abilities. See Fleming (2010), in particular chapters six and seven.
6.5 The development of extreme weather warning systems at the MO, 1954-1963

Throughout the 1950s, the MO provision of forecasts and warnings for extreme weather events grew in both scope and distribution. In chapter three, we saw how in the first half of the decade, the MO provision of tailored forecasts and warnings for government departments, civil agencies, and industrial concerns grew steadily. In this chapter, we have seen that this trajectory continued into the second half of the 1950s through the increased focus on economic costs and benefits. Year on year comparison of figures (see Figure 3.4) is difficult, owing to a change in format of the MO annual report in 1956, but the changed focus of the new format itself provides insight into how such specialised forecasts and warnings developed in the period. The annual reports of the late 1940s and early 1950s listed bespoke services which had been created for individual organisations following direct enquiries to the MO by those organisations. As the decade progressed, such services were growing in number, but they were becoming increasingly overshadowed in the annual reports by replicable forecasts and warnings which were now being provided to numerous customers and the general public. As the accuracy of forecasts and warnings continued to improve, alongside technologies which enabled their wider distribution and dissemination, so did the possibilities of what such a warning system could do. The Waverley Report and subsequent creation of the East Coast Gale Warning Service had shown that, if executed correctly, MO extreme weather forecasts and warnings were not simply about limiting disruption and saving businesses money, but could also save lives and reduce damage. Yet without co-ordination, interaction across government agencies, and correct use of scientific expertise, such results were not a given. The rest of this chapter examines the development of the East Coast Gale Warning Service and other subsequent flood warning services after the system’s inception in 1953.
The East Coast Gale Warning Service (see 4.4.2) had been operating from the beginning of September to the end of April annually since 1953. In the initial years which followed its introduction, the system was reflexively developed to improve its accuracy and efficiency. Through research conducted by the Liverpool Tidal Institute (LTI) on behalf of the Waverley-created Advisory Committee on Oceanographic and Meteorological Research, the meteorological and hydrological formulae used to generate the forecasts for the warning service had been improved. Though both the MO and the Admiralty Hydrographer contested LTI’s use of a statistical approach to developing forecast formulae, rather than the meteorologists’ preferred method using causal theoretical physics, by 1957 LTI’s new statistical formulae were successfully trialled and operating within the warning system.535 Once this formal recommendation of the Waverley Report was carried out, though the Advisory Committee on Oceanographic and Meteorological Research continued to sit, it had no further mandate to consider specific improvements for the warning system. Therefore, other than the incremental introduction of relevant developments made by other meteorological and hydrographical research, no provision was made for future research or improvement to the forecasting apparatus of the warning system.536 Over the first years of operation, alongside the improvements to the theoretical basis for warnings, and in response to procedural experience of implementing the system, operational and communication processes between the agencies involved were improved. The chain of communication was

535 Rossiter (1959) andCarlsson-Hyslop (2010): Chapter 7 provides an in depth discussion of these developments, highlighting the tensions raised in 4.4.2 between the different scientific experts working on the project. For the accuracy of the predictions made using Rossiter’s prediction formulae see the Reports of the Flood Warning Organisation from season 1956/57 onwards.

536 In the years following the creation of its statistical formulae for storm surge prediction the Advisory Committee on Oceanographic and Meteorological Research focussed on other research as per the recommendations of the Waverley Report, often through sub-committees such as the one on Mean Sea Level. See files of their meetings beginning at MAF 135/356.
clarified by both the MAF and the MO on several occasions: a five-tier threat level was adopted, and warnings for easterly gales added to the system. By the early 1960s, ongoing reviews of the system were informal and often isolated within the individual departments and agencies involved. Despite there being several surges over three feet per season, the system had not been seriously tested since a storm surge in its first season of operation in December 1954. By 1960, the East Coast Gale Warning Service was in danger of stagnating.

Unlike the integrated coastal warning system, which provided warnings for a large swathe of the east of England, by 1960 the provision of warnings for river flooding was still fragmentary and ad-hoc, varying greatly between different river catchments. Widespread riverine flooding during the autumn and winter of 1960-61 highlighted this fragmentary coverage and also raised issues about covering the cost of such events, especially in connection to flood insurance. Catalysed by these floods, which affected over 30 counties, a conference for engineers on “Flood Warning Arrangements” was organised by the Ministry of Agriculture and Food’s (MAF) Land Drainage Division in early July 1961. Chaired by E.A.G. Johnson, Chief Engineer at the Division, the conference brought together all major parties involved in flood management, including the MO, River Boards, police, academics, and representation from both the Hydraulics Research Station and the

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537 For example, the annual Reports of the Flood Warning Organisation created by the Principal Scientific Officer in the Hydrographic Department of the Admiralty, presented to The Advisory Committee on Oceanographic and Meteorological Research, make little reference to river boards and no mention of police constabulary arrangements for disseminating warnings to the public.
538 Lamb (1991) logs only one notable North Sea winter storm in the period 1954-1960; occurring on the 21-23rd December, 1954 the storm system resulted in considerable storm surges but no significant coastal flooding. Warnings were issued to Lowestoft and the Thames Estuary. The event provided an opportunity to test the systems accuracy. See Murray and Marshall (1955)
539 During autumn and winter 1960-61 several major river catchments experienced flooding, regions worst affected were Wales, SW England, the Humber, and Lincolnshire. As floods were disparate and widespread there is little scholarly coverage of events as a whole. For more see newspapers and Hansard from the period, notably; House of Commons Debate, 15th December 1960, vol. 632 cc607-70. For more on problems of flood insurance highlighted by the events see Hall (2009) 40-52
Department of Scientific and Industrial Research (DSIR). The conference highlighted that whilst some River Boards had developed warning services in conjunction with the MO and other bodies, others had done little to move their river monitoring beyond river gauge measurements at upstream locations. The interdisciplinary forum discussed how fluvial warning systems could be developed in partnership with bodies such as the MO, and advocated a review by each River Board of their current warning systems. Another notable outcome of the conference was the decision that all River Board engineers should draw up maps of the flood risk in their region, creating one of the earliest instances in the UK of flood risk mapping, today an integral feature of floodplain management. Before much progress could be made on the resolutions of the conference, however, all flood warning systems in the UK were to receive a stark reminder of just why their efficient operation was imperative.

Similarly to the catalysing effect of the 1960-61 riverine flooding, and the policy window effect seen in 1953, the flooding which struck Germany in early 1962 triggered a review of the East Coast Gale Warning Service. The coastal inundation which devastated the German Bight on the 16th-17th February, 1962, and resulted in 340 deaths, was caused by a North Sea storm surge remarkably similar to that of 1953. Unlike in 1953, early warnings had actually been issued by the German Hydrographic Institute under the German coastal warning system, but substantial loss of both life and property, largely concentrated in the river port city of Hamburg, had still occurred. The failure of the warnings was due to a collapse in the operational and communication chains of the system: the police were reluctant to issue a false alarm, radio and televised warnings were only


541 Lamb (1991) 174 and Huster (1962) 19. Of the 340 official deaths, 93.5% (318) died in Hamburg where, over one sixth of the cities buildings were damaged.
transmitted after most people were already in bed, and many citizens who did hear the warnings were uncertain on how to act without a clear directive to evacuate.\textsuperscript{542}

With events of 1953 still alive in many people’s minds, the German disaster gained attention in both the British media and Parliament: a review of the German floods was commissioned, with the Advisory Committee on Oceanographic and Meteorological Research considering this report and other accounts of the disaster.\textsuperscript{543} In light of the specific failures of the German warning system, MAF and the Home Office began a review of how warnings issued by the MO were disseminated and communicated to the public. The review required all participating River Boards to revisit their arrangements with local constabulary, and asked for both parties to respond with their thoughts on the system’s operation.\textsuperscript{544}

The result of the review process was a set of revised operating arrangements issued in September, 1963. These new arrangements (Figure 6.4) clarified the chain of communication and introduced a more detailed wording for warnings issued by the MO. This was aimed at enabling the local police, with input from the River Boards, to be able to prepare and act upon alerts earlier than had previously been possible. The most significant change the review made to the chain of communication was to remove the River Boards from the initial warning issued by the MO, in an attempt to avoid the identified bottleneck created when warnings were sent via the Central Telegraph Offices. Now all regions would receive one of four warning statuses issued by the Duty Hydrographer at the MO, sent via the newly installed Telex teleprinter system, directly to the county police department (see Figure 6.4). The River Boards’ removal meant that local police authorities would now have

\textsuperscript{542} Der Spiegel (weekly news magazine), “Die Flut,” Issue 9, 1962
\textsuperscript{543} House of Commons Debate: 8th March 1962, vol. 655 cc569-70, MAF 135/483, and MAF 135/493
\textsuperscript{544} Letter from J. Crooks (MAF) to W. C. Roberts (Home Office), 3\textsuperscript{rd} August, 1962. Letter from W.C. Roberts (Home Office) to The Chief Constable (Flood Warning Areas Only) – undated. MAF 222/1329 and HO 322/369
to consult with their region’s Board(s) directly to add a local, riverine element to the forecast before issuing a public warning.\footnote{Report of the Storm Tide Warning Service for the 1963/4 Season, Page 1} When the new arrangements came into operation for the start of the season on September 16\textsuperscript{th}, 1963, the system was officially renamed the Storm Tide Warning Service.\footnote{The name change was to make it clear that the system only dealt with coastal flooding and not rivers. Synnott (1964) and HO 322/369}

In making these changes, which attempted to improve the efficiency of how warnings were created and disseminated, little consideration was given to the final stage of the communication chain: the issuance of a public warning. Rather, each agency in the system focussed on ensuring that it could pass on its required information quickly and accurately to the next organisation in the chain. As soon as the warning was with the police, who, it was presumed, knew how to disseminate such public alerts efficiently, the other agencies’ responsibility was largely at an end. This approach represents a case of each component of the inter-agency system seeking to minimise its own institutional risk.

The revised arrangements used new technologies, such as Bracknell’s new Telex teleprinter and automated tidal gauge readers at the harbours, to improve accuracy and reduce delays that had been identified in the system. The installation of the automated gauges also allowed the system to become more integrated within a European network, as hydrographic departments in Germany and the Netherlands could now receive instant tidal readings from along the east coast of Britain.\footnote{The distant reading tide gauge recorders, designed and manufactured by the Gas Accumulator Company, were installed first at Aberdeen and Immingham during the winter of 1962. Report of the Storm Tide Warning Service for the 1962/3 and 1963/4 Seasons and Synnott (1964) 83.}
Figure 6.4: Communication channels of the Storm Tide Warning Service, 1963 for a tide warning issued to Canvey Island. (*Teletone was a radio receiver/transmitter)

Source: Created using Reports of the Storm Tide Warning Service, MAF 222/1329, and HO 322/369
With the MO’s increased use of automated communication chains, and the recent breakdown of the German warning system, fears of technological failure grew. The hydrographic department, the MO, and MAF considered such fears well-founded, and addressed them through the introduction of back-up procedures and technological solutions, such as an alarm system to cover line failures on the new distant-reading gauges. Further, technological innovation began to allow the Storm Tide Warning Service to expand its coverage beyond its operational season. The first steps in this process began in 1963 with the design of tidal alarm equipment for Aberdeen, which would sound in a manned office if the tidal level exceeded a preset height during the system’s off-season.\footnote{548} After the revised terms had operated for a couple of weeks, a further amendment was made to remove the on-shore gale warnings, originally introduced as an improvement to the system in its initial years of operation. These warnings would now be sent directly from the MO to the relevant River Boards by telegram. Worried about its position as having ministerial responsibility for the system, the MAF also emphasised the importance of the county police formally acknowledging to the MO that all River Boards under their jurisdiction had been communicated with, stating: “We think our Minister could be seriously criticised if he had not taken every reasonable step to satisfy himself that the warnings actually reached the [River] boards.”\footnote{549}

The review process revealed that this fear of blame, expressed here by civil servants within the MAF, was one of the most widespread and common concerns across all departments involved in the system. In part, this fear was fed by a lack of knowledge within the agencies involved of what the role of others in the system was, or how the system operated from

\footnote{548} Both the line failure alarm system and the automated tidal alarm were also developed by the Gas Accumulator Company. Report of the Storm Tide Warning Service for the 1963/4 Season, Page 2
\footnote{549} Letter from D. White (MAF) to G. Quarrell (Home Office), 10\textsuperscript{th} October, 1963. HO 322/369
When the service had initially been developed, in the light of the 1953 floods, the MO had been clear in emphasising that whilst it would take responsibility for the veracity of the forecasts, its warnings were “not executive orders” (See 4.4).\textsuperscript{551} Responsibility for acting on the MO’s warning had been left with the local police, yet by 1962, the MAF’s review of the system was highlighting that the executive agency of delivering an order to evacuate was still the most contentious and potentially catastrophic component of the warning system.

The case of the Essex County Constabulary, and its vulnerable parish of Canvey Island, highlights this concern. Now that the police had to pass the warning onto the River Board, await its advice, and then finally issue a warning to the local authority and the public at large, they were concerned this could only be done two hours before any predicted high water. Further adding confusion to the process was the fact that the Essex River Board would have to be in communication with the Lee Conservancy Catchment Board to assess conditions upstream on the River Thames.\textsuperscript{552} Finally, if we consider that the police authority would often have to issue a public warning to more than one district under their jurisdiction (a complication not shown in Figure 6.4), we can understand the Chief Constable of Essex’s fears. As a solution, the Chief Constable suggested the use of Flood Wardens to speed the communication of any warnings through the community, and asked about the possibility of flood warnings being issued via TV and radio.

Despite repeatedly being raised throughout the operating life of the coastal warning system, in line with the Waverley Report’s original recommendation, the prospect of using

\textsuperscript{550} For example see the letter from E.A.G. Johnson (MAF) to E.L. Snell (Essex River Board) sent as part of the review process, 19\textsuperscript{th} November, 1962. MAF 222/1329

\textsuperscript{551} Minute from Secretary of State for Air, Lord De L’Isle and Dudley to the Departmental Under-Secretary, 14\textsuperscript{th} July, 1953. AIR 2/11863

\textsuperscript{552} Letter from J.C Nightingale (Chief Constable of Essex) to the Under Secretary of State (Home Office), 18\textsuperscript{th} July, 1963. MAF 222/1329
television or radio to disseminate warnings had always strongly been resisted. When a coastal flood warning for the Essex region had erroneously made its way onto both ITV and the BBC’s evening news broadcasts in December, 1962, the MAF moved quickly to ensure that all parties involved understood this was against government policy. Yet the MAF knew that once police had issued alerts to the myriad of local services that required them, it would often be hard to stop such warnings being passed on to the media. Therefore, the officials reluctantly decided that if it became apparent the press were going to report on an issued warning in the future, their press officer should provide the TV authorities with a carefully worded script to avoid panic or confusion. At the time, flood warnings were managed alongside other civil emergency and civil defence situations, such as worker’s strikes and nuclear threats, in a manner aimed at informing agencies as early as possible, but avoiding informing the public too prematurely, in order to avoid causing mass panic. This strict chain of communication was beginning to cause tension as public demand for information, driven by new MO public weather services, continued to grow.

When considering the limited use of TV and radio to disseminate warnings during the period, we must take into account the meteorological specifics of the UK. For example, the occurrence, intensity, and speed of UK coastal storms are substantially less than in a tropical region such as the Philippines, where radio warnings had been routinely used since 1951. Despite the meteorological specifics it is clear that the lack of formal radio or

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553 Waverley (1954) 36
554 In addition to the dissemination of warnings via TV or radio being against government policy the alert had in fact already been cancelled by the time of the broadcasts.
555 See the series of letters and minutes in MAF 222/1394 beginning 18th December, 1962 to 1st March, 1963.
556 See MAF 112/1331 and HLG 124/122. Response to flooding began to be separated from other civil emergencies in the early 1960s. For example, colour coded warnings were removed from the system in 1962 to reduce confusion with warnings issued by Civil Defence authorities. Report of the Storm Tide Warning Service for the 1963/4 Season, Page 1
557 Nones (1951)
television dissemination of weather warnings was at odds with the MO’s burgeoning relationship with the public. Adherence to a strict chain of communication, created to ensure clear executive agency and responsibility in disaster events, theoretically allowed MO officials to function as central scientific experts without incurring any added responsibility for public safety. In practice, however, as exemplified by the television forecasters, the MO was developing a familiar dialogue with the public, who turned to it for detailed advice, especially during extreme weather. The coastal warnings issued via the local constabularies gave the MO no room to expand beyond a simple warning message, and in time, as false alarms occurred, exposed the organisation to further blame.558

Perhaps in response to the failings that such a protracted chain of communication could create, especially in developing an engaged community that would act quickly once warnings were issued, instances of the public getting hold of warnings before they were supposed to continued to occur.559 In 1964, MO officials were annoyed to hear, via the BBC’s Today programme, of a retired Lieutenant Colonel’s system for disseminating their warnings via an extensive amateur radio network. In an embarrassing case of one agency of the warning system not knowing what others were doing, the MO’s enquiries revealed that Colonel Dunn’s “Radio Amateur Emergency Network” (Figure 6.5) was not only being passed the warnings by the local police constabulary, but was also being given “first priority” to receive warnings.560 In this instance, the service was allowed to continue, perhaps due to the fact that in the recent Hamburg disaster it had been amateur radio

558 False alarms occurred when warnings issued to the police were not cancelled prior to high tide, in instances when the water failed to reach the designated danger level. The principal scientific officer of the system investigated such instances and altered specific warning criteria where necessary. See Reports of the Flood Warning Organisation/Storm Tide Warning Service, 1958-1964

559 See Mileti (1995) for an introduction to the literature on the factors which effect public response to flood warnings.

operators who had stepped in to disseminate communications when other official lines of communication had failed.重要作用

Figure 6.5: Colonel Dunn’s Radio Amateur Emergency Network. Note the extent and organised nature of arrangements with the involvement of organisations such as the Red Cross, and sponsorship by the Radio Society of GB all occurring without the knowledge of those at MAF and the MO.

Source: MAF 222/1394

After the engineering conference in 1961, development of new solutions for riverine flood warnings, like the coastal warning system, progressed down an inter-agency path. One such service, which came out of discussion at the conference, was the issuance by the MO, from December 1962 onwards, of soil moisture deficit maps, created so that River Board engineers could estimate the carrying capacity of their catchments in periods of heavy rain.重要作用 Inter-agency research and dialogue was a key driver in developing new MO services.

Hoyer and Siedowski (2012)

Meteorological Office Annual Report (1963) 6
and improved warning systems, as arrangements developed beyond their initial post-war format of providing simple meteorological warnings to customers toward integrated systems which required several agencies’ input, like the Storm Tide Warning Service.

Whilst the MO’s increasing profile in inter-agency research was not restricted to warning systems, it was in this arena that they found themselves central co-ordinators once initial research transferred into an operational system. This position was typified in the development of the Storm Tide Warning Service: although expertise from hydrographers, harbour authorities, and river engineers was required, the MO’s established attributes, such as its military experience and large national communication infrastructure, meant that it became the central agency issuing warnings. Whilst, during the early 1960s, the executive decision for acting upon warnings still fell to local authorities and the police, we have seen how the MO’s more prominent public profile, increased dialogue with the public, and growing role as the central agency issuing warnings all changed the public’s perception of the risks presented by extreme weather events. Thus expectations of what the government and scientists could (and should) provide in natural disaster situations began to shift. Although early calls for such warnings to be disseminated via the mass media were resisted, as more agencies became involved in warning systems, it became harder to control such warnings reaching the public through the media. In the following decades, as media channels were more fully exploited, the fact that the MO had no executive agency for acting upon its warnings was to become less important, as the actual alert or warning

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563 The MO were represented on many inter-agency and government research projects in the period, for example the Atmospheric Pollution Research Committee and the Road Research Laboratory Joint Committee on soils. Meteorological Office Annual Report (1954) 31
564 File Minute Sheet numbers 8 & 9. Here the then DMO Johnson reflects on the logical decision to use MO machinery for operation of the system rather than creating a new ad-hoc organisation and on taking sole constitutional responsibility for the warnings issued. Also a letter from Dobson to Johnson (9th June, 1953) states how the Emergency Committee considered the MO the best option due to the combination of their meteorological knowledge and communication network. AIR 2/11863
became more prominent than any subsequent directive for action or evacuation issued by the police or local authority.

Whilst the development of MO extreme-weather warning services relied largely on advances in meteorological practice and technologies, it took widespread riverine flooding in 1960-61, and the devastating German coastal flooding of 1962, to trigger reviews of how warnings for flood risk were issued in the UK. The review of both riverine and coastal flood warning procedures highlighted the increasing inter-agency nature of such systems and the uncertainty over responsibility in such a system.

6.6 Conclusion

As public weather services continued to expand in the second half of the 1950s, so did the public’s familiarity with the MO, its services, and its forecasters. Through analysing the increasing amounts of data from enquiries that the new regional weather centres were handling, in line with other countries NMSs, the newly formed public weather service department (MO-18) was able to begin placing monetary values on the benefits such services could provide to customers and the nation as a whole. Whilst such an emphasis justified the increasing government investment in the MO, it also drew attention to just how much all sectors of UK society were becoming reliant on its forecasts and warning services. Societal reliance grew as weather services became more embedded in the everyday activities of British public and business life. Coupled with the increasing profile of MO meteorologists and forecasts, the outcome of such a reliance on MO services was a greater public expectation on MO forecasts. As increasingly larger economic costs were attached to the success of weather services the result was a larger outpouring of blame should predictions be erroneous.

Through the case studies presented in this chapter, we have seen how the MO provision of extreme weather forecasts and warnings continued to expand throughout the 1950s and
into the early 1960s. The expansion was multifaceted, largely characterised by the standardisation and broader application of existing services, the development of inter-agency systems, and wider dissemination of forecasts. Enabled by developments in meteorological practice and technologies, warning systems were affected by an increase in demand for weather services across British society. As the numerical underpinning of the discipline increased and the veracity of forecasts improved, the public’s perception and expectation of the risks posed by extreme weather began to shift. Despite the inter-agency nature of both the research and operation of new warning services, the MO emerged as the central expert authority in such situations. Its communication infrastructure, previous experience of making executive decisions, and growing public profile all influenced this emergent central role. Further, the growing reliability of meteorology as a rapidly professionalising discipline fed into the confidence of senior MO figures.

Yet with hindsight, we may consider how the system could have developed differently. From the earliest discussions in 1953 and onwards, we see reluctance by all agencies involved to be ultimately responsible for the warnings. The MO’s central scientific role seems inevitable, but the ineffectual division of executive agency and actual agency between the local police constabulary and the MO does not. Rather, for a system that began on a national scale, it would have made sense for a government ministry to take direct executive responsibility for warnings. However, as the warnings could be considered a service to save lives, property, agricultural land, and transport infrastructure, no single ministerial department was willing to take such a position. 565 Thus, despite the police remaining as the issuers of public flood warnings, in the long term it was the MO’s prominent position in creating the warnings themselves which was to expose them to more blame in extreme weather events.

565 It wasn’t until a body with such an overarching remit was created in 1996, when the Environment Agency was founded, that responsibility for issuing flood warnings was removed from the police.
We must also consider how events covered in this chapter reflect changes in the role of scientific expertise in everyday life during the period. By becoming both the most prominent communicator on meteorological topics and the central authority issuing warnings in instances of extreme meteorological conditions, the MO was increasingly vulnerable to blame. Perhaps the clearest indication of how such a shift manifested more broadly across society can be seen in how events such as floods shifted from being perceived as Acts of God only a generation or so earlier, to civil emergencies for which the public now expected state warning and protection. In institutionalising risks previously borne by society, the MO had unwittingly become the managers of uncontrollable meteorological risks, of which they could only predict the probable occurrence.

Before the changes to the coastal and river warning systems were implemented in the autumn of 1963, the UK experienced severe weather during the winter of 1962-63. Testing many of the MO’s services and highlighting their emerging position of authority during such events, it is to events of the winter and the management of disruption during the period to which the final chapter turns its focus.
Chapter Seven

Corporate Experts in Adversity:

The winter of 1962-63 and the Meteorological Office’s role

The specialist lets down the public and himself as well. In all these years since the great weather silence of the last war, little advance seems to have been made in bridging the gap between the specialist and the layman.

Ingrid Holford, meteorologist, popular author, and later TV forecaster, 1964

7.1 Introduction

This chapter explores the relationship between the Meteorological Office (MO) and the British public in the early 1960s, using the extreme weather of the winter of 1962-63 as a lens through which to view MO communication with the public. Detailing the successful deployment of MO forecasts and warnings during the period, and contrasting events with those of 1947, the chapter investigates the shift to a MO communication strategy which encouraged regular dialogue with the public and created a more recognisable and ultimately corporate, public identity. The profile of MO public communications during the winter not only increased the public’s knowledge and perception of the risk of cold weather, but also reinforced the emerging trust and reliance that the public placed in the MO’s forecasts and warnings. The profile of the institutional risk borne by the MO’s prediction of extreme weather events, which had itself been an unexpected consequence of producing such services, was now being altered by the public’s changing expectations.

Just short of sixteen years after the UK’s last extreme winter, the winter of 1962-63 saw exceptional cold, regularly punctuated with blizzards, across the country from late December, 1962 until the end of February, 1963. As in 1947, the winter left an indelible mark on the British public, joining an elite list of severe winters which are referred back to

\[566\] Holford (1964a)

\[567\] See Rothstein et al. (2006) 92 for more on the shift of risks between society and institutions.
whenever inclement winter weather visits the UK. Throughout the winter, the services and systems of government departments and agencies for managing and reducing disruption were tested to the extreme. Analysis shows that, as in 1947, a multitude of factors interacted with weather conditions to effect dislocation over the period, yet it is apparent that organised state preparation and response to the inclement conditions had changed considerably in the intervening years. The extent of MO involvement in managing disruption during the inclement conditions shows how much its services and profile had developed since its almost total exclusion from the response in 1947. During the winter, the MO communicated a record number of forecasts and warnings to both specific interests and the public in general. Warnings such as those for ice and snow on the roads had developed from their original inception, as services created for individual organisations in the post-war years, into services widely used by authorities, organisations, and businesses across the nation. Beyond its public forecasts and warnings, throughout the winter the MO maintained a high public profile through TV specials, radio bulletins, and newspaper features.

Whereas in 1947 blame for disruption was part of a wider narrative of dissatisfaction with winter conditions, blame during the winter was restricted to particular regions and isolated issues such as energy supply. Despite the large number of public weather services operating throughout the winter and the high profile maintained by the MO, little comment was made on the role of the organisation in relation to the extreme weather. The chapter shows that the Public Services (MO-18) department’s role, both in the provision of forecast services and as a commentator on events, had become standard and expected. The chapter shows how the assimilation of MO forecasts and warnings into everyday life, apparent through the winter, affected public expectations of MO forecasts.

Both meteorologists (e.g. Prior and Kendon (2011)) and the mass media (e.g. Jones (2010)) were quick to compare the recent winter of 2009-10 with events in 1947 and 1962-63.
As public weather services were becoming more widespread, so was their content becoming less visibly scientific. The pedagogical aims at the centre of early public weather service developments had now been superseded by a focus on the utility of services. This chapter considers how such a change in emphasis affected the position the MO came to occupy: a position of prominent scientific expertise that was distinctly different from those of other scientific disciplines. As non-probabilistic language was increasingly favoured, and the outputs of warnings became increasingly simplified, the problems of separating the activity of forecasting from the activity of decision making became increasingly difficult. The use of deterministic, non-probabilistic language in forecasting implicitly draws the meteorologist into a process of trying to predict how the user will respond to a forecast.\footnote{Roulston and Smith (2004)}

It is through these more subtle aspects of communication strategy and practice, employed by MO-18 during the winter, that we begin to see how MO public communications contributed to unrealistic public expectations about services. However, before exploring these areas, the chapter begins by introducing the conditions of the winter and the widely utilised MO services that operated throughout, contributing significantly to reducing disruption during the period.

### 7.2 Helping the nation through: The Meteorological Office and the winter of 1962-63

The first substantial snow of the winter fell across much of the UK on Boxing Day, December 26th, 1962. By the 27th, much of southern England lay under a foot of snow. An extreme blizzard swept across south-west England on the 29th, spreading northward into the 30th. As the new year began, drifts of up to 20 feet were reported in the south-west,
with many towns cut off by both road and rail.\textsuperscript{570} The first days of January brought more snow accompanied by strong to gale-force winds, as a trough of low pressure moved north from France. The month was generally dry, with daytime temperatures averaging around 0°C and widespread patches of freezing fog a common occurrence.\textsuperscript{571} Snow showers were frequent into February. Perhaps the worst snow of the winter occurred on the 6\textsuperscript{th}, bringing chaos to the Midlands and other regions, as in places snow fell continuously for nearly 36 hours. There were intermittent thaws across the nation throughout the coming weeks, including flooding in Devon and Cornwall, but the true end of the severe weather did not occur until the last few days of February, when daytime temperature rose to 5°C.\textsuperscript{572}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image1}
\caption{The frozen River Thames at Windsor Bridge- early 1963.\newline \textbf{Source}: PA Archive/Press Association Images}
\end{figure}

Whilst several local snowfall records were set during the winter, it is for the severe and persistent cold that the winter, known colloquially as the Big Freeze, is most notable: a Central England Temperature arithmetic mean of -0.3 °C ranks the winter as the coldest

\textsuperscript{570} Booth (1963a) 64
\textsuperscript{571} Booth (1963b) 96
\textsuperscript{572} Booth (1963c) 128
since 1740, and the third-coldest on record. The River Thames froze completely from bank to bank in several locations (Figure 7.1), and several sea harbours froze over, most notably at Herne Bay in Kent, where the ice extended for up to two miles out to sea (Figure 7.2).

The extreme cold resulted in frost penetrating to an almost unprecedented depth in the soil, resulting in farmers losing tonnes of celery, sugar beet and other winter crops. The Ministry of Agriculture and Fisheries (MAF) worked with the RAF, Army, Highways Agency, Police, and National Farmers’ Union, amongst others, to ensure farms isolated by snow had enough fodder, where possible. Through these co-ordinated efforts, which included hundreds of helicopter airlifts, the winter only claimed the lives of 50,000 sheep and 450,000 lambs, substantially less than the 1.5 million sheep and 2.5 million lambs estimated to have been lost during the winter of 1947. The army used helicopters to take food and other vital supplies to villages isolated by snow drifts. Manufacturing plants, such as the British Motor Corporation plant at Birmingham, closed due to a lack of supply of parts, and milk deliveries were severely disrupted across the nation. The supply chain was crippled by the weather. The deep penetration of frost combined with fluctuating temperatures, accentuated the freeze-thaw process resulting in severe damage to roads and concrete surfaces. As in 1947, stories of survival emerged in the media of those stranded by the extreme cold and snowy conditions. Rather embarrassingly, one such story

573 Booth (2007) 68 – Table 2. As discussed in 2.4.1 the statistics of a winter can vary largely depending on what regions are included or excluded from data sets. For a detailed analysis of the winter’s climatological record see Shellard (1968).

574 For extensive photographs of the winter see McCaskill and Hudson (2006) 73-115. For colour film of the frozen Herne Bay see the Screen Archive South East website.

575 See MAF 181/10 for details of the MAF coordinated response in Wales and surrounding regions.


577 The Daily Mirror, 2nd January, 1963, 1 and JV 7/588

578 Shellard (1968) 141 and Stephens and Mackay (1964) 194
was of the MO weathermen at Great Dun Fell weather station in Westmorland, who failed to predict their own plight and were stranded, snowbound, for four days.\textsuperscript{579}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{image7.2}
\caption{A family views the extent of the sea ice at Herne Bay, Kent – February 1963. \textit{Source: Screen Archive South East (Online)}}
\end{figure}

In comparison to 1947, the number of government departments, authorities, and other bodies involved in trying to minimise the disruption had substantially increased by 1962. Further, unlike in 1947, many of these organisations were communicating with the public on the risks posed by the inclement conditions. Throughout the winter, many specialised services, which the MO had developed in partnership with other government agencies and general customers, became vital to limiting the dislocation and disruption caused by the extreme low temperatures and heavy snowfalls. From detailed regional forecasts, taking account of snow and ice forming conditions sent to local authority transport departments, to tailored forecasts created for each of the twelve gas boards, the MO had a much more visible role in the management of the conditions than in previous extreme winters.

\textsuperscript{579} McCaskill and Hudson (2006) 86
Many of the services which had been created for specific customers in the post-war years (see Figure 3.3), which had formerly produced highly individual bespoke forecasts, had now been developed into services that could address a larger number of customers. For example, the snow and icy-road warnings, originally only communicated to the Royal Automobile Club, were distributed to 252 customers throughout the winter. A further 56 customers received weekend temperature forecasts, a service crucial for many manufacturers to ensure plant and machinery could be kept at an optimal running temperature. The number of organisations receiving snow and icy-road warnings alone is an order of magnitude larger than the total of 19 organisations which had been receiving specific forecasts or warnings covering all types of extreme weather as recently as 1955.

With the extensive flooding that accompanied the thaw at the end of the winter in 1947 in mind, the MO produced research which aimed to enable forecasters to more accurately predict the end of cold spells in London. Further, throughout the winter, the Climatological Services department, MO-3, liaised with engineers at the River Boards. Building on the partnership begun the previous winter which created soil moisture deficit maps, MO-3 developed a system to provide River Board Engineers with regular estimates of the water equivalent of snow lying within their catchments. Due to the lesser snowfall and a staggered thaw, the scale of flooding after the cold spell was in any case much smaller than in 1947; still, the MO maps were of use to many River Boards as the melt

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580 Meteorological Office Annual Report (1962) 36
581 See Figure 3.3. For more detailed information on many of the forecasting services in the period see Report on the Organisation of the Forecasting Services of the Meteorological Office, Meteorological Committee Paper (M.C./P.23), compiled by Stagg and the Services Directorate, 1959. AIR 2/14739
582 Lowndes (1963)
583 Meteorological Office Annual Report (1963) 15
brought ice-floes and localised flooding. The calculation of soil moisture deficits would go on to become a key component of groundwater hydrology and flood prediction.\footnote{For an example of soil moisture deficits importance to contemporary groundwater hydrology see Rushton (2003) Chapter Three}

The co-ordination of MO services throughout the winter benefitted greatly from the new purpose-built headquarters in Bracknell, which enabled better co-ordination between MO departments, especially across the Dynamical Research Directorate (MO-11 to 13), Central Forecasting (MO-2) and Public Services (MO-18) departments. Further, it provided state-of-the-art forecasting and communication technologies, which greatly multiplied the volume of forecasts that the MO could produce and send to other agencies and customers. Many of the improvements to forecasts and warning services had been enabled by a combination of new meteorological practice and new technologies. However, the more central role that the MO played as compared to 1947 cannot be accounted for solely by such improvements. For example, the research carried out during the winter which looked into predicting the end of cold spells in London did not rely on new meteorological techniques or technical instruments, instead using the traditional method of comparatively analysing past weather patterns.\footnote{Lowndes (1963)}

In addition to increases in the distribution of specialised forecasts, the wider proliferation and communication of public weather services at the MO, as introduced in chapter five, played a role in mitigating disruption during the winter. The now widely used forecasts disseminated via television, the press, telephone, and radio meant that the public could prepare for heavy snowfall or extreme temperature drops. Further, during a period in which the disruptions relied largely on local antecedent conditions and localised phenomena such as black ice and freezing fog, new regional services providing information in a more geographically targeted manner came into their own. As small business owners
and the public looked to minimise the weather’s effect on their daily routines, the regional automated telephone service and the newly established regional offices saw a 28% and 12% increase respectively in enquiries, compared to the previous year. Uptake of such services highlights how the MO’s profile and position of expertise during the winter was influenced not only by the improving veracity of their forecasts and warnings, but also largely by the improved dissemination and communication of these products to the public.

Since its inception in 1956 (see 6.3), the Public Services department, MO-18, had significantly developed MO communication with the public. Throughout the winter of 1962-63, not only were MO warnings being more widely disseminated than ever before, but MO staff were adding comment, opinion, analysis, and discussion to media coverage of events. Special programmes were broadcast on both radio and television, aiming to explain, contextualise, and educate the public on the wintry conditions. Also, throughout the winter the MO, both as individual meteorologists and as an organisation, engaged in a prominent dialogue with the press. No longer just the provider of forecasts for the newspapers, MO-18 began to go beyond standard press releases, often providing comment within individual articles. For example, in the third line of the front page of the Daily Mirror on January 2nd, 1963, the MO was quoted, saying, “The snowfall on Boxing Day will be child’s play compared to this.” The quotation, in an article which reported on current conditions and warned of worse snow to come, highlights the often informal and overconfident language which had begun to enter MO communications with the press. Also of interest is the newspaper’s collective attribution of the quote as, “said the Meteorological Office,” rather than giving reference to an individual meteorologist. Here we see the MO referred to as corporate person. Such a distinction is important in the organisation’s management of extreme weather risks. Studies have shown that in disaster situations, blame allocation

586 Meteorological Office Annual Report (1963) 13 & 42
587 The Daily Mirror, 2nd January 1963, 1
differs in its manifestation depending on whether it is directed at an institution or at individuals. Being referred to as a homogenous corporate entity provides an advantage when trying to argue for a limited liability, but presents risks when individuals, such as the MO’s unscripted TV forecasters, are presenting information on behalf of the whole organisation.588

The favouring of colloquial phrases and deterministic language over more scientific and probabilistic wording, first encountered with TV forecasting’s re-launch in 1954 (see 5.4.2), had continued to be problematic to senior figures in MO-18.589 In late 1962 the DMO, Graham Sutton, set up a working group tasked with reviewing the language used in public forecasts. The group’s “Report on the Language of Forecasting” was presented to the Meteorological Committee in January 1963, whilst the worst of the winter’s weather was highlighting the importance of successful communication and dissemination of forecasts.

The report’s findings were based on surveys of current forecast language, input from those presenting the forecasts, and the feedback of County Education Officers, who were consulted to ensure that the terminology used did not carry different connotations in different parts of the country. For particular problematic examples, such as shower terminology, the report looked to refine definitions and remove ambiguous phrases from MO communications. In general, in keeping with MO communications during the winter, it favoured policies which emphasised engaging the user, including a statement that viewers should be informed of the risk, however small of any dangerous or unpleasant weather expected. Yet the report placed an emphasis on style over the specific language to be used, asserting that the risk posed by lapses in concentration of the viewer, which could result in misunderstanding of the forecast, was the greatest threat posed. Whilst the majority of the


review focused on MO practice, this assertion, alongside the inclusion of user feedback, shows that the MO was beginning to understand that how the public interpret, understand, and ultimately use forecasts and warnings was a crucial factor in its success.\textsuperscript{590} By considering the risks and threats posed by the miscommunication and misinterpretation of forecasts, going beyond simply looking at the veracity of a forecast to assess its success, the report shows how far the MO’s management of the risks presented by weather to the British public had developed since 1947.

Although the MO stated that use of deterministic language was to ensure viewers understood forecasts, we must consider that senior MO figures were also driven by a need to present their discipline and department in an increasingly scientific and accurate manner. As meteorology became more numerical in its practice, the technology required called for ever greater investment. To justify this investment, meteorologists needed to be able to show results which justified the expenditure. The result was often an overstated confidence in the ability of forecasts. This trend is evident across many areas of international meteorology and climatology in the period. For example, early computer-generated NWP forecasts were of varying success, yet repeatedly their capability and potential was emphasised over their erroneous outputs and limitations.\textsuperscript{591} Pressure not only to produce accurate forecasts, but also to disseminate them widely affected the MO in early 1963. During the winter of 1962-63, US Weather Bureau (USWB) long-range forecasts, which predicted a cold spell for December, January, and February were much publicised in the British press. Questions were asked by the public and MPs as to why the USWB could publish accurate long-range forecasts from Washington, whilst the MO would not publicly

\textsuperscript{590} Report of a Working Group on the Language of Forecasts, Meteorological Committee Paper (M.C./P.45), 1\textsuperscript{st} January, 1963 and Comments by the Director General (undated). AIR 2/14739

release their 30-day forecasts. The MO and the Air Ministry responded that the USWB forecasts were only outlooks for the Northern Hemisphere, and pointed out their limited success. J.S. Sawyer, the DDMO of Dynamical Research, highlighted in the press that each national meteorological service took a different approach to long-range forecasting, and stated that the margin of success was so minimal at present that many services chose to use such forecasts for research purposes only. The following autumn, however, despite there being, by the MO’s own admission, no major breakthroughs in long-range forecasting, it began publicly issuing its own 30-day weather prospects.

The new found prominence afforded the MO during the winter saw a fresh mode of government meteorologist come to the fore, confident to discuss the weather in public-facing situations, and to take increasing responsibility for predictions and forecasts. This breed was typified by the ADMO of Central Services (MO-18), John Harding, who combined his skilled forecasting ability with a talent for clear communication of information across all levels of understanding. Harding had been with the MO since 1936, rose through the ranks despite his lack of formal qualifications, and was noted for his communication skills across several roles he held with the office. The wide application of MO extreme weather service throughout the winter highlighted that through post-war developments, which had seen the further professionalisation and expansion of the MO, the organisation’s aims to deliver services that catered for the British public across the full spectrum of society had largely been successful.

The cases presented highlight that it was not just through the creation of new services for the public that the MO developed its public profile. Rather, the key element in this

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593 The Times Science Review, Spring 1963 and The Times, May 17th, 1963, 7
594 Meteorological Office Annual Report (1963) vii
595 Ogden (2000)
transition was how these new services were communicated to the public as part of a wider strategy, led by MO-18 and meteorologists such as Harding, which focussed on developing a more reflexive dialogue with the British media and public. Many developments which occurred as part of this new communication strategy, including speaking as a corporate entity and the use of informal language would go on to inadvertently expose the MO to greater blame in future events. The new levels of dialogue with the public were a key factor in cementing the MO’s position as the expert scientific body to consult in UK extreme weather situations. The visibility of the MO beyond its published forecasts throughout the winter, through TV programming and press releases, exposed the public to more information, in theory improving further their risk perception of weather extremes in the UK (see 5.6). The public’s increased knowledge and perception of the risk of cold weather was combined with an emerging trust and reliance on the meteorologist’s forecasts. In time, this shifted the societal risk from the hazard into an institutional risk for the MO.596

Despite the MO and other government organisations’ successes, during the course of the winter, several prominent figures were to vent their dissatisfaction at the disruption caused by conditions. Choosing to place the blame with those planning the provision of vital services, rather than with the weather conditions themselves, the editor of The Times, William Haley, launched perhaps the most critical attack of the period, stating:

All who are thus shown to be incapable of serving the public in a cold spell seek to shift the blame. We would never, they tell us, foot the bill. But we meet defence commitments of astronomical size as an insurance against the dire chance of war between nations. War against the elements is more than a possibility. It is an absolute certainty.597

596 See Rothstein et al. (2006) 92 for more on the shift of risks between society and institutions
597 The Times, Wednesday, 6th February 1963, 11
Haley’s comments draw on Cold War tensions then prevalent in Britain to suggest that there should be an increased spending on government preparation for extremes of weather ahead of, or at least on a par with, national defence. Such an increase would probably result in funding for the MO. Whilst receiving increased funding was never an explicit aim of the MO’s decision to develop its public profile, we must consider that the emergence of a situation where even criticism of operations could be translated into a justification for increased funding was a welcome by-product for the MO. Haley closed his attack by calling for a survey of all the measures required to avoid dislocation in vital undertakings, if the winter’s conditions were to be repeated. No such survey was commissioned, but the House of Lords did undertake a discussion on the provision of public services during the winter which included a lengthy consideration of costs versus benefits. Peers such as Conservative politician Lord Mancroft expressed frustration when they saw at close hand other countries, such as Canada and Switzerland, dealing with such conditions without disruption or loss to their economies. Due to his familiarity with such cold locations, geographer and former Labour MP, Lord Shackleton, attempted to address some of the Lords’ concerns. However, it was left to the Minister of State for the Board of Trade, Lord Derwent, to directly answer criticisms and vouch for the government’s management of winter disruption.\(^598\) Through discussion such as this we see that the whole discourse is shifting towards establishing as a norm, that when there are problems or disruption the meteorologists and resource planners are at fault.

During the winter, as in 1947, regional power cuts were to become common, as demand for electricity and gas rose by 15 and 20 per cent respectively, and problems with the transportation of coal once more emerged.\(^599\) Again, it was not just the freezing weather which was blamed for disruption, especially in the London region: in early January, power

\(^{598}\) House of Lords Debate, 30\(^{th}\) January, 1963, vol. 246 cc389-416

\(^{599}\) Burroughs (1978) 147
cuts were exacerbated when workers at the Barking and Tilbury power stations voted to join an unofficial work-to-rule and overtime ban already in force at twelve other London power stations. As in 1947, the media and public sought explanations for the cuts, casting accusations in the direction of the Government, the Electricity Board, the Electrical Trades Union, private coal suppliers, the power station workers, and, of course, the weather. Each party sought strategically to shift accusations of blame to the other, attempting to play down or completely abolish the principle that the weather itself may be blamed. Yet the role of the weather could not be removed. In stating that the work-to-rule movement was the major factor in causing power cuts, Lord Derwent conceded that “[t]he great majority of the men gave service far in excess of what could reasonably be expected of them in conditions of great hardship caused by the extreme weather.” Despite such occasional concessions towards the weather’s role in the disruption of energy supply, blame was to remain with human elements of the situation, as the leader of the unofficial workers action, Charles Doyle, was made a scapegoat for disruption. Doyle quickly found blame pointed in his direction from all parties, with calls in the House of Lords to deport him, disciplinary action brought against him by the Electrical Trades Union, and one elderly widow taking him to court for damages. Here, in contrast to the sporadic and often unpredictable ways in which blame is apportioned to MO forecasts, we see an almost scripted blame game play out. Largely politically motivated, the blame applied to Doyle echoes similar situations of wildcat industrial action in previous years, and has many parallels with later events during the Winter of Discontent of 1978-79.

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600 The Times, Wednesday, 9th January 1963, 8 and The Times, Friday, 15th February 1963, 14
602 See The Times, 23rd February, 1952, 3 and the Daily Express, 31st October, 1959, 2 for examples of attempts to scapegoat industrial action during the period. During the Winter of Discontent in 1978-79 widespread industrial disputes and strikes combined with a severe winter to cause mass
Figure 7.3: Political cartoon from the winter which makes reference to electricity, coal, and gas disruption; the cold weather; and the culpable figures, the Prime Minister Harold Macmillan, leader of the House of Commons Iain Macleod, Chancellor of the Exchequer Reginald Maudling, and Minister of Power Richard Wood depicted frozen in ice.

Source: The Sunday Express, 27th January, 1963

Although major dislocation was avoided, the localised disruption, and the very real threat of a much wider breakdown in fuel supplies in late January 1963, enabled Emmanuel Shinwell, the 1947 Minister of Fuel and Power, to launch a sharp criticism of the current Conservative Minister, Richard Wood. Shinwell claimed his management of conditions sixteen years previously was now vindicated. Reminding the public of the dilapidated state of the infrastructure in 1947 compared to the present, he stated: “They say the coal is frozen and can’t be moved. If I had produced such a paltry excuse the Tories would have laughed me out of the House.”603 Whilst Shinwell’s outburst may have been a purely opportunistic attempt to clear his name, others including the right wing media were quick to draw comparisons between the two winters. In Figure 7.3 we see much of the imagery employed during the crisis of 1947 (compare with Figure 2.5). And the evocation by a right

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603 The Daily Express, January 24th, 1963, 1
of centre cartoonist that the Tories’ sleight-of-hand in setting up a largely natural problem as “Socialist” in origin has now come back to bite them as it seems no one has a solution.

The limited scale and regional nature of the disruption to energy supply meant that, unlike in 1947, whilst the weather’s impact on energy supply was acknowledged, blame vented toward Doyle and others involved did not form part of a wider narrative of dissatisfaction with conditions through the winter. Although wider criticism of management of the winter conditions as we have seen was aired by figures such as Haley and Lord Mancroft, response from the general public was more in keeping with Lord Shackleton’s assessment, that whilst there had been unacceptable breakdown and disruption to some individual public services, on the whole they had coped much better than in previous harsh winters, such as 1947.604

Influencing the media and public reaction to the winter was the response by the authorities that was not only more nationally coordinated, but also more visible than in previous periods of extreme weather in the UK. Although the disruption and cost caused by the winter weather was still substantial, both management and communication of the risks the extreme weather presented had greatly improved since 1947.605 Response was dominated by official inter-agency operations, such as the airlifts to farms co-ordinated by MAF, rather than ad-hoc community-led initiatives as in 1947 or the North Sea Flood of 1953.606 However, here, again, as in Chapter Two, we must consider the wider social and economic context. Undoubtedly a factor in the lack of widespread public dissatisfaction with the management of the winter’s challenges, in stark contrast to 1947, was the optimistic

604 Lord Shackleton, House of Lords Debate, 30th January, 1963- vol. 246 cc389-416. For a picture of public response see the letters section of The Times, particularly February 11th, 1963, 11
605 Whilst the winter was still ongoing, Lord Mancroft estimated the cost thus far of the winter to the nation at £130-150 million. House of Lords Debate, 30th January 1963, vol. 246 cc389-416
606 For footage of such inter-agency coordinated operations see the British Pathé online archive video, “Snowbound Animals,” 1963
economic times the winter occurred in. Further, as in previous chapters, we must account for how the framing of catastrophe affects manifestations of blame. High-profile discussion of the meteorological aspects of the winter throughout the period improved the public’s risk perception and helped ensure episodes such as the regional power cuts, whilst acknowledging the weather’s influence, remained social and political issues.

Despite the number of MO warning services which operated throughout the winter, and the organisation’s prominent role in public discussions of the extreme conditions, surprisingly little opinion of MO services enters narratives during the winter. Debates in both the House of Commons and House of Lords, whilst referring to services co-ordinated by civil agencies, both positively and negatively, did not directly single out the work of the MO. No records of the MO broadcasts transmitted on radio and television exist, and the only insight into how the organisation considered the performance of its systems throughout the winter is given in the brief coverage in the MO annual report. Such an absence leaves us using basic proxies, such as the continued growth of public weather services, to assess the utility and popularity of these services. Yet these absences themselves give us insight into how the MO’s role in British public life was developing. Whereas in 1947 the MO absence from public and media narratives of the winter was coupled with an absence from state management of disruption during the winter, as we have seen this was not the case in 1962-63. That the MO was now a key component of government attempts to minimise disruption, yet still absent from public narratives of the winter suggests that the provision of MO public forecasts and warnings, which had only begun to be widely deployed a decade earlier, had now assimilated into everyday life enough as to become unremarkable, even, during such an extreme period of weather. In addition, we may also consider how the prominence and repetition of forecasts now

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Burroughs (1978) 147
communicated via newspapers, radio, TV, and the regional weather centres served to reinforce the trust people afforded to the forecasts and further assimilated them into part of everyday life.

Let us consider the development of the MO’s profile in perhaps the most pervasive arena of MO communications during the winter: television. As introduced in section 5.4.4, the scientific expertise communicated through TV weather forecasts was largely overlooked in considering scientific output on television. By 1963, the desire to educate the public, so prevalent amongst those involved with early MO public weather communication efforts, had almost disappeared. As many of its advocates, such as the former DDMO of Forecasting, E.G. Bilham, retired, the aim to educate the public via the TV forecasts was superseded by a focus on the veracity and utility of the forecast. A shift symptomatic of the wider focus on costs versus benefits and a more corporate identity we have seen adopted by the MO throughout this and the previous chapter.

Beyond the televised forecasts, meteorology was compared to other disciplines underrepresented in televised scientific output. Scientific documentary and magazine programmes featuring scientists, such as the biologist Peter Medawar, and amateurs, such as the astronomer and science populariser Patrick Moore, were now common. Despite occasional representation on television, such as the MO broadcasts during the winter of 1962-63 or an Associated Television lecture series, *The Elements*, broadcast in 1964, no equivalent prominent TV meteorologists, whether amateur or academic, were to emerge. Rather, the household names of meteorology were the MO TV forecasters,

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608 Peter Medawar featured on as a scientific expert on the show *A Question of Science* in 1956-57 and gave the BBC Reith Lecture in 1959. Patrick Moore’s, *The Sky at Night*, which as of 2012 is still on air and presented by Moore, began in April, 1957. Boon (2008) 210-213

609 Holford (1964b)
inheritors of George Cowling’s mantle: forecasters such as Bert Foord, who would go on to present the BBC’s coverage of the Apollo space programme alongside Patrick Moore.\footnote{BBC Online (2010)}

An article in \textit{Weather} in 1964 by the meteorologist and author, Ingrid Holford, quoted at the opening of this chapter, highlighted the problems that she considered a lack of basic meteorological education in the UK were causing.\footnote{Holford (1964a). In subsequent editions of \textit{Weather}, letters in support of Holford’s call were published.} In a period when the general public now had more contact than ever before with MO meteorologists, that the leading weather magazine of the period should run an article calling for more contact between the meteorologist and the public is remarkable. Holford’s concerns highlight how the increasing emphasis on MO forecasts and warnings, as products with a utility to their clients and customers, was affecting their successful communication.

The forecasts and warnings the MO issued were now almost exclusively deterministic. Devoid of probabilities, their style hid the lengthy scientific process that led to the prediction. The lack of visibly scientific content in MO public forecasts, combined with the increasing pervasiveness of such services, was to have a deep effect on how the British public understood, interpreted, and ultimately acted upon MO forecasts and warnings.

Greater communication on weather extremes was increasing the public’s risk perception of such events, but the lack of scientific explanation in these communications was creating a public deficit in understanding. This deficit led to an overvaluation of the authority of MO forecasters and the ability of meteorology to predict the exact movement of weather systems. It would not only lead to increased levels of blame directed toward the MO, but also affect how people responded to extreme weather warnings. Meteorologists Roulston and Smith have shown how the user response to a forecast is influenced by much more than the simple veracity of the forecast, stating that only through using probabilistic
forecasts can the activity of forecasting be separated from the decision-making process of the public.\textsuperscript{612} The development of the MO extreme weather forecasts and warnings, presented in the previous chapter, and their successful deployment during the winter of 1962-63 highlight how the public were becoming reliant on these services whilst not concurrently developing an understanding of their limitations. Warnings issued by the MO were simply alerts without any executive agency for action, yet the public, the MO's customers, wanted forecasts to be unequivocal.

7.3 Conclusion

At first glance, events of the winter of 1962-63 show the successful deployment of MO public weather services, which we have charted the development of over the previous decade, during a period of extreme British weather. In contrast to the winter of 1947, as presented in chapter two, events during the winter of 1962-63 showed that the MO now had a central role in managing the disruption caused by such a period of extreme weather. However, as we look in depth at the MO’s relationship with the public through the lens of the winter, we see that the MO’s aim to improve public weather services and communication had inadvertently begun to amplify the risk of public blame to which the organisation exposed itself.

The first element highlighted which amplified the risk of blame from the public was the assimilation into everyday life of MO public weather services and warnings. MO communications on weather were now reaching most areas of British life, incrementally creating reliance in the British populace on MO-produced forecasts and warnings, which increased during periods of extreme weather. The proliferation of these services into so many sectors of society was unremarked at the time: only when and where they were to fail in the future would the true extent of the public’s reliance on them become apparent.

\textsuperscript{612} Roulston and Smith (2004) 396-397
Further, the MO’s use of personality across their services, introduced to improve the communication of their forecasts, was making the public more reliant by increasing the trust vested in MO services. Encouraging colloquial language in broadcasts, face-to-face consultations at the regional weather centres, educational programmes explaining the winter conditions, and commentary in the press were all enabling the public to identify with MO services. Yet all of these contact points, whilst personalising the forecast and broadening its dissemination, were not substantially increasing the public’s understanding of how to interpret forecasts. As part of the same process, services were becoming less visibly scientific. Unlike in other arenas, such as the detailed briefings the MO provided for aviators, probability and uncertainty had been removed from public services. The deterministic style preferred by the MO obscured the complexity and indeterminate nature of the complex science behind each forecast. This in turn affected the public’s ability to understand and therefore make their own informed judgements on forecasts or warnings. We have also seen how removing the uncertainty from forecasts to present a polished product, easily digestible to any member of the public, instilled overconfidence in the ability of meteorology to predict future weather patterns.

Finally, and perhaps most pertinent for future events, we have seen that the public profile of the MO that emerged though the winter was increasingly corporate in its identity. Operating with a large degree of autonomy from central government, the organisation was now referring to users, clients, and products and was attempting to justify its services through studies of costs and benefits. Whilst many areas of the MO remained largely unchanged in their traditions and structure, the public profile of the organisation projected by senior staff and MO-18 is unrecognisable from the organisation’s post-war public position. The network of military men and scientific civil servants which emerged out of the Second World War had now been replaced by university-educated meteorologists who were conversant in the language of business and public relations. The ability to act, speak,
and be perceived as one coherent corporate body was of great benefit to the MO in increasing its prominence and in asserting its position as a source of scientific expertise in British society. Further, it afforded the individual meteorologists making difficult decisions on forecasts and warnings some protection when errors were made. Yet when your corporation has a whole department dedicated to delivering services to the public in a personal manner, the inverse may also become a problem: one individual error or overstatement of confidence may be pinned to the whole organisation.

In the previous chapter, we saw how the MO had, by quantifying the risk posed by extreme weather, institutionalised risks previously borne by society, and thus become managers of risk. In this chapter we have seen how key decisions, on how the organisation would communicate these risks and foster a relationship with the public more broadly, would go on to have significant implications for the risk profile the MO bore. In a field where the chaotic nature of the weather would always present externalities beyond control or prediction, decisions which emphasised scientific expertise at the expense of a dialogue on the limitations of services, cemented the MO in a position with little room for manoeuvre in future extreme weather events. As a population, Britons were more aware than ever of the risks presented by extreme weather, yet they had absolved their responsibility for acting in the face of such risks to the scientific experts at the MO.
Conclusion

In 1963, the same year that the MO first assumed a central role in managing severe winter conditions, senior MO figures travelled to Geneva for the Fourth Meteorological Congress of the World Meteorological Organization (WMO). In light of the rapid progress being made in meteorology, driven by the development of high-speed computing and artificial satellites, the President of the WMO, André Viaut, sought to use the Congress to promote world cooperation among meteorological services. Soon after the Congress, the WMO launched the World Weather Watch, a programme which enabled the near-instantaneous exchange of weather information across the entire globe. Today a core element of the WMO’s programme, the World Weather Watch combines observing systems, telecommunication facilities, and centres for data-processing and forecasting. These are all operated internationally by member services to make information which is vital to modern forecasting available to national meteorological services. The programme encapsulates the shift that the discipline of meteorology underwent in the twentieth century as it became increasingly professionalised. This process of professionalisation, which incorporated new numerical and physical forecasting methods as well as new technologies such as electronic computing, enabled humans fundamentally to change their relationship with unpredictable future weather. In promoting the World Weather Watch in the US in 1964, President Lyndon Johnson captured the essence of this optimism for meteorology’s future: “By working together, on a global basis, we can take new strides towards coping with the historic enemies of storm and drought and flood.”

613 Daniel (1973) 186-187
614 WMO Online. For more on the history and development of the World Weather Watch see Daniel (1973) 190-194
615 Originally from a speech given by Johnson as a commencement address at Holy Cross College in Massachusetts in June 1964, the quote appeared in a widely circulated booklet which publicly launched the World Weather Watch in the USA. Johnson (1964) and USWB (1965)
This thesis has positioned the MO within this post-war trajectory of international meteorology. However, by framing the extreme weather events examined throughout the previous chapters through the analytical lens of risk and blame, I have sought to enrich accounts of the internationalisation of twentieth-century meteorology through a national context. Rather than presenting a clear progressive history of meteorology in the twentieth century, my thesis has highlighted how alongside the disciplines expansion and growth the changing public expectations of services were already beginning to contest the authority of meteorologists.

My account considers how developments in technology and communication affected those giving forecasts at the MO, and those receiving them throughout the UK, and the importance of the public, media, and political framing of extreme weather events as natural or anthropogenic crises, on the emergence of blame and the development of MO involvement in such events. I have charted the emergence of the MO in the post-war period as a government agency of use to all sectors of British society, and how the implementation of new forecasting practice, wider forecast dissemination, and communication using new technologies and approaches, were all vital in enabling the MO to become a scientific expert body, relied upon by both the government and the public. Yet we have also seen that in expanding its operations, deploying more forecasts and warnings, and developing a more prominent public profile, the MO inadvertently became a manager and communicator of the risks presented by extreme weather conditions.

Framing Disasters

By giving the meteorological conditions during extreme weather events a central role, I have shown how the specific characteristics of each event interacted with social and political conditions to construct a crisis or disaster. In Chapter Two, the plurality of narratives in the winter of 1947 positioned the episode, for both contemporary actors and
subsequent historians, in a middle ground: not a clear natural disaster, yet not a single, coherent, anthropogenic crisis. During the worst of the fuel crisis, the government repeatedly emphasised the meteorological extremity of conditions in an attempt to deflect blame and justify the levels of disruption the public was experiencing. In contrast, the suddenness and scale of the North Sea Flood in 1953 meant that it fitted into a consensus definition of a natural disaster, limiting the blame applied by press, public or politicians. This framing allowed the government to consider the issues it raised more as scientific challenges than as political ones, in line with a wider post-war trend of looking to science for answers to policy questions. Yet it is notable that the Waverley Committee, made up of representatives from four government departments, acted to dilute any specific blame that could have been placed on individual agencies or departments following the flood.

Experts in Risk Management and Communication

In developing its profile as an expert scientific body communicating on extreme weather across British society, the MO became increasingly vulnerable to blame; and in addressing and combating this vulnerability, the organisation increasingly had to become expert in risk management and communication. By exploring the MO’s position as an expert body in the post-war years, we have been able to understand how its growth into new areas of society, itself influenced by its meteorological expertise, afforded the organisation a new profile and level of trust across British society. Whilst such a position was actively sought by senior figures at the MO, however, they did not anticipate the responsibilities and risks that came with such authoritative expert status.

In Chapter Three, we saw how the pressures of war catalysed many developments in meteorological practice, in both military and civilian settings. The MO involvement in the Ministry of Fuel and Power’s creation of heating restrictions during the winter of 1942-43 hinted at what the future would hold for MO scientists as consultants informing policy and
business decisions. Yet the peripheral role of the MO during the winter of 1947 demonstrates that in the immediate post-war years, the application of MO expertise beyond traditional operations was still not a standard response even for government departments. Although year on year, in the post-war period, the number of specialised forecasts and warnings the MO provided continued to increase, they did so in a largely ad-hoc manner and were not built into formal policy, made mandatory, or implemented nationally. The reactive formation of many of these services, and their ad-hoc application, highlights how MO officials did not foresee the proliferation of their services across all sectors of British public life. Further, in the immediate post-war years, there was little understanding within the organisation of how such warning services might affect perceptions of risk in extreme weather situations.

The Waverley Committee was essential in reinforcing the MO’s role as government advisors, and provided the organisation with the authoritative platform to develop their public profile. Crucially through the committee’s creation of the Emergency Coastal Warning System it extended the MO’s role from planning and policy advice into actual operational risk management. The immediate need for response caused by the disaster forced the MO to work in a national, inter-agency manner. Combined with the ability to coordinate such a service due to its established communication infrastructure and military background, the warning system ensured the MO emerged as the central agency of risk communication in extreme weather situations.

Decisions made in the creation of the East Coast Gale Warning Service, which was implemented in the autumn of 1954, had important repercussions for the MO’s future management of risk. With hindsight, when considered alongside the successful introduction of meteorologists to TV forecasts only months later, the Waverley Report’s recommendation that the BBC should not be used to disseminate warnings is significant for
the development of the MO’s risk profile. The new TV format spearheaded the development of a more publicly prominent profile for the MO that fundamentally changed the British public’s relationship with the organisation.

Driven by meteorological technologies, and the ideological notion that the MO should serve all of the British taxpayers who funded its existence, the UK’s public weather services expanded in the mid-1950s. Although, in the early development of public weather services, a key aim of senior MO meteorologists had been to educate the public and promote meteorology, the public’s focus on the utilitarian aspect of the forecast quickly shifted the organisation’s emphasis. Beginning with the cost-benefit analysis approach taken by the Waverley Committee, throughout the 1950s, the MO adopted corporate language and techniques which allowed it to show the efficiency of services and justify its expansion. However, this shift also began to create a disconnection between the personal provisions being promoted through the public services department, and an organisational identity that began to look less like that of a civil agency and more like that of a corporation. Given that today the MO is a Government Trading Fund based in the Department for Business, Innovation and Skills, which in 2011-2012 made an operating profit of £9.1 million the shift toward a more corporate identity is a significant development.616

When the MO had begun the development of public forecasts and warnings in the immediate post-war years, it had only partially realised how important the communication of the forecasts, rather than just their veracity, was to their success. During the creation and further development of the East Coast Gale Warning Service, the MO debated with the other government agencies involved in the project, on the importance of the system clearly demarcating responsibilities, and where the executive agency to act upon a warning should lie. Whilst such demarcation of responsibility was an important issue, it was largely

616 MO Annual Report and Accounts, 2011/12, 14
discussed in a manner which would ensure accountability for the warning system in a political or judicial review situation. All organisations involved in this debate on responsibility for early national-scale warnings created by multiple agencies failed to understand that if warnings went wrong, the public would blame whoever they associated the system with, irrelevant of where official responsibilities lay.

As we saw in Chapter Two, through the differing degrees of blame applied to Emmanuel Shinwell and his colleague, the Minister of Food John Strachey, the extent of early risk communication is imperative in determining how the public respond to disaster. As the MO was exposed to more vehement and directed blame through their new public weather service ventures, such as the TV broadcasts, it began to appreciate the importance of such risk communication. However, the presentation of uncertainty proved a challenge for a discipline which was still, by the admission of its own practitioners, transitioning from an art to a scientific enterprise. Further, the public wanted utility out of its forecasts, and so the meteorologists, bound by time and space restrictions, began to supersede probable discussion of how and why a frontal system may develop to the public demand. Unlike in other nations such as the US, the dominance of the BBC restricted the development of other formats which incorporated probability forecasts into weather bulletins on radio and television. An article which appeared in the Hull Daily Mail in November 1949, with the headline “Don’t blame our weather experts,” encapsulates this antagonistic challenge which the MO faced. In trying to state that the public should be more forgiving of erroneous MO forecasts, the article describes the complex scientific process that goes into every MO forecast. Yet in the following years, as forecasts and warnings were increasingly dealt with as products and commodities, both by the public and the MO

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617 For an example of discussion on the discussion of meteorology into an exact science, see Sutton’s presidential address to the RMets, “The development of meteorology as an exact science” (1954)
618 The Hull Daily Mail, November 17\textsuperscript{th}, 1949, 4
themselves, the internal scientific workings that produced the end forecast were increasingly encased within a black box.

Just as the improved warnings and forecasts the MO were able to issue relied on technological progress, so too did their successful communication. The difference in detail between a forecast disseminated via small column space in a newspaper and one broadcast live into your living room being delivered by a qualified meteorologist, affected not only the methods and language the MO had to use to relate information on risks to the public, but also the level of importance, trust, and reliance that the public attached to the forecast. The wider dissemination of everyday forecasts, via both TV and the face–to–face high-street weather centres, combined with the sense of protection national scale warning systems provided, meant that the general public felt they could rely on the organisation who had become an integral part of their everyday life.

The public now expected state warning and protection in a field where the weather would always present developments beyond prediction. The MO had set out to make the public more aware of meteorology, and the dynamics of how weather developed, but the public had responded by delegating their responsibility for having to worry about the risks presented by the weather to the scientific experts at the MO.

Broader Risk Narratives and Future Study

In early conceptions of this project, my drafts referred to a rise of risk and blame through the period. Now that my research and analysis is complete, perhaps unsurprisingly, the picture which has emerged is less progressive in its trajectory, and much more complex. Perhaps, rather than thinking of a progressive movement from Beck’s pre-modern industrial society toward his post-modern notion of a risk society, the case study of the MO in the post-war years illustrates how we must think more about changing interactions, risk
perceptions, and definitions. Beck states that a shift to a risk society is not about being exposed to more hazards, but rather that society becomes increasingly orientated toward, and organised around, life’s dangers. However, this thesis has shown that although the management and communication of the risks posed by extreme weather focused the MO’s institutional responsibilities on meteorological dangers, in the process, it also enabled the general British public to pass their concerns over such risks to the MO.

As the MO emerged in British society and politics as an expert body, which, owing to new scientific developments, could forecast and calculate the risks presented by weather extremes, it did not create new risks, or cause society to focus more on the risks presented to it. Rather, it simply—and unwittingly—drew responsibility for the management and communication of such risks away from other parts of the government and society as a whole. In the process, the MO also appropriated the blame that so often followed these events.

In attempting to manage these threats, the MO significantly improved the British population’s ability to rationally understand and calculate the risks they presented. In theory, this meant that British society could improve preparation and management of these events, build resilience, and reduce vulnerability to the catastrophic potential they posed. In reality, however, this new public role for the MO resulted in increased expectations across society, as the agency of such events jumped from the realm of God and nature, to human prediction and management. Rather than improved public risk perception resulting in reduced costs when the MO forecast such events, more blame and anger was instead cast toward the hazard’s new risk managers: meteorologists. They did not invent the risk, nor did they even redefine it; by explicitly calculating and naming it, however, they gave the public what it really wanted: someone to blame.
Through this thesis’s analysis of key extreme weather events and the committees and policies that followed them, we have traced the development of the MO from an organisation that dealt closely with the military, aviators, and mariners, to a public-facing scientific organisation managing and communicating the risks posed by extreme weather to all domestic audiences. This transformation was finished long before the emergence of the explicit, widespread media and public backlash that occurred in the aftermath of the Great Storm of 1987, as mentioned in the Introduction. In investigating this backlash, the MO inquiry looked at forecasts and events in the weeks leading up to the storm. However, this thesis has shown that it is too late to consider blame when it emerges in 1987. The conditions and decisions which led to its emergence were made in the post-war years, and have been influencing public risk perceptions and percolating through society since the mid-1950s.

In highlighting the centrality of risk and blame in the MO’s transformation in the post-war period, this thesis has laid the groundwork for future studies that could connect the MO’s increasingly public profile to extreme events that occurred beyond the timeline of this study. Investigation into the MO role in the Winter of Discontent in 1978-79, primarily remembered as a non-natural episode, would give further insight into how the extremes of British weather were increasingly incorporated into the framing of anthropogenic crises and disasters. Further study into the Great Storm of 1987 would highlight just how reliant the British public had become on the MO. Particularly of interest in this event is the role of the two computer models the MO were operating that produced the equivocal forecasts, which led to the lack of a coherent early warning being issued.

As this thesis focused on the development and use of new communication technologies, future work could also analyse the ways in which the public face of the MO has been incorporated into British society, as the public became increasingly reliant on television and
the internet for news and information regarding potential natural disasters. One line of inquiry might be to establish how the Storm Tide Warning Service, which we left in the early 1960s, extended its scope to cover the whole nation and began communicating its warnings via television, as was the case by 1987.

Throughout this study, the MO was in regular communication with several other national meteorological services, most notably those in the US, the Netherlands, and Germany. Further studies on the post-war period could take a comparative approach, and situate the MO’s development of public warning services within an internationally integrated picture of how forecasting and warning systems developed across similar nations. Study such as contrasting the UK experience with the Netherlands, where greater flood defence is invested in and a flood-minded national identity exists, would highlight the importance of both regional climate and national cultures in informing the development of a nation’s public weather services.

Unfortunately, the volume of archival records which give insight into the MO’s place within this international network is limited. However, a study which kept risk and blame as an analytical tool, but combines the archival records of several agencies, such as the Hydrographic Office and River Authorities, to establish a history of how the network developed, would be of great benefit to both the historical narrative, and contemporary debates about the role of forecasts and warnings in British society. Such study would take the narrative presented beyond meteorology and explore further the manifestation of risk, and its interaction with science, government, and society in post-war Britain. In light of the long periods identified between decisions made by the MO, their implementation, and the emergence of blame, future risk and science communication studies could build on this historical approach, focussing on the interaction over time of expertise, risk management, and risk communication.
As the MO deployed more forecasts and warnings, and developed a more prominent public profile, expectations and perceptions of the risks posed by extreme weather events were altered, making the organisation more exposed and thus, despite the MO’s strengthening role in public life, more vulnerable to institutional blame from politicians, the media, and the public. However, once the MO had begun down this route, there was no turning back.

Today British society abounds with information from the MO: a national and regional forecast on each news bulletin, a comprehensive website on which I can search all aspects of the weather for my exact postal code, and an “app” which warns me of extreme weather, are all a direct response to the public’s demand for more information, and most of all, reassurance about coming weather conditions. Yet, whilst MO forecasts and warnings are now ubiquitous in everyday life, the personal and human element of communication is being removed: no longer can I pop into a high-street weather centre to discuss local weather conditions face to face with a forecaster. Further, in response to the recommendations of the recent House of Commons Science and Technology Committee inquiry, which investigated how effectively the MO is fulfilling its Public Weather Service remit, MO TV forecasts are beginning to reduce the emphasis on a deterministic outlook, embracing the presentation of uncertainty and probabilistic information. In a reflection of Sutton’s own development of MO public weather services in the mid-1950s, the inquiry looked toward the US, where the presentation of probabilistic information on television for general audiences is routine.619

Perhaps these developments indicate that the MO has now come to terms with the unexpected level of responsibility and blame which accompanied its shift to becoming an expert scientific body. And if taking such blame is unavoidable and inevitable, then the MO will try to reduce it through improving risk communications. However, it will do so in a

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619 House of Commons Science and Technology Committee (2012) 3, 28-30
corporate, scientific, and accountable manner that attempts not to expose individual forecasts, forecasters, or departments to blame. If the public expectation for accurate and timely forecasts and warnings for extreme weather in British society has gone beyond realistic expectations and limitations, then maybe the MO, as a large government agency, can absorb the outpouring of blame and anger in times of catastrophe that was formerly directed toward the heavens. Perhaps, in exchange for a position as a central scientific expert body reducing the dislocation, costs, and deaths caused by the worst of the weather, this was a risk worth taking.
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Appendix I

Comparison of Met Office forecasts against actual observed weather, 23/01/1947-17/03/1947

The tables overleaf show the comparison by date of the NW England forecast printed in the Manchester Guardian against the actual observed weather recorded in the Daily Weather Report for Manchester.

The newspaper terminology, cold, very cold etc... refer to specific temperatures in relation to the normal temperature for the time of year. Normal has been interpreted as average and so the comparison has been done using the conversion charts below which rely on 30 year Central England Temperature averages.

<table>
<thead>
<tr>
<th>Average (normal) Temperature</th>
<th>620</th>
</tr>
</thead>
<tbody>
<tr>
<td>Month</td>
<td>(°C)</td>
</tr>
<tr>
<td>January</td>
<td>3.4</td>
</tr>
<tr>
<td>February</td>
<td>3.9</td>
</tr>
<tr>
<td>March</td>
<td>5.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weather Report Terminology</th>
<th>Specific Representation (°F)</th>
<th>Actual Temp Range Predicted (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Mild</td>
<td>&gt;10° Above normal</td>
<td>January</td>
</tr>
<tr>
<td>Mild</td>
<td>3-9° above</td>
<td>January</td>
</tr>
<tr>
<td>Normal</td>
<td>2° above - 2° below normal</td>
<td>February</td>
</tr>
<tr>
<td>Rather cold</td>
<td>3-5° below</td>
<td>February</td>
</tr>
<tr>
<td>Cold</td>
<td>6-10° below</td>
<td>March</td>
</tr>
<tr>
<td>Very Cold</td>
<td>More than 10° below normal</td>
<td></td>
</tr>
</tbody>
</table>

621 Scale taken from Bilham (1954) 280
<table>
<thead>
<tr>
<th>Date</th>
<th>Forecast:</th>
<th>Actual: Daily Weather Report - Manchester</th>
<th>Accuracy:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Taken from N.W. England section of weather forecast in the Manchester Guardian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>Precipitation</td>
<td>Temperature (°F) Max Temp</td>
<td>Weather (Column 34 &amp; 35-DWR)</td>
</tr>
<tr>
<td>23/01/1947</td>
<td>Cold</td>
<td>36</td>
<td>Slight haze, cloud, slight mist</td>
</tr>
<tr>
<td>24/01/1947</td>
<td>Very Cold</td>
<td>34</td>
<td>Cloud, slight mist, slight fog, slight snow</td>
</tr>
<tr>
<td>25/01/1947</td>
<td>Cold or very cold</td>
<td>38</td>
<td>cloud, slight mist, passing showers</td>
</tr>
<tr>
<td>27/01/1947</td>
<td>Very Cold</td>
<td>33</td>
<td>Slight haze, cloud, slight mist</td>
</tr>
<tr>
<td>28/01/1947</td>
<td>Very Cold (below freezing day and night)</td>
<td>32</td>
<td>Slight haze, slight snow, passing showers</td>
</tr>
<tr>
<td>29/01/1947</td>
<td>Very Cold</td>
<td>27</td>
<td>Cloud, slight snow, slight mist, some blue sky</td>
</tr>
<tr>
<td>30/01/1947</td>
<td>Mainly fine</td>
<td>27</td>
<td>Cloud, slight mist, dust haze, partly cloudy</td>
</tr>
<tr>
<td>31/01/1947</td>
<td>Less cold than of late</td>
<td>31</td>
<td>Cloud, slight mist, snow/hail</td>
</tr>
<tr>
<td>Date</td>
<td>Temperature</td>
<td>Description</td>
<td>Temperature</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
<td>--------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>01/02/1947</td>
<td>Cold</td>
<td>Occasional snow locally</td>
<td>35</td>
</tr>
<tr>
<td>03/02/1947</td>
<td>Very cold at first but slow thaw later</td>
<td>Occasional snow or sleet changing to rain</td>
<td>35</td>
</tr>
<tr>
<td>04/02/1947</td>
<td>Cold</td>
<td>Snow or sleet on high ground, rain at lower levels</td>
<td>33</td>
</tr>
<tr>
<td>05/02/1947</td>
<td>Very Cold</td>
<td>Snow at times</td>
<td>33</td>
</tr>
<tr>
<td>06/02/1947</td>
<td>Very Cold</td>
<td>Periods of snow (especially in the East)</td>
<td>29</td>
</tr>
<tr>
<td>07/02/1947</td>
<td>Very Cold</td>
<td>Snow at times</td>
<td>25</td>
</tr>
<tr>
<td>08/02/1947</td>
<td>Local Snow</td>
<td></td>
<td>31</td>
</tr>
<tr>
<td>10/02/1947</td>
<td>Occasional snow at first</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>11/02/1947</td>
<td>Very Cold</td>
<td>Snow at times</td>
<td>30</td>
</tr>
<tr>
<td>12/02/1947</td>
<td>Local Snow</td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>13/02/1947</td>
<td>Occasional light snow</td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>Date</td>
<td>Weather Description</td>
<td>Temperature</td>
<td>Sky and Haze Description</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>-------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td>14/02/1947</td>
<td>A little less cold than of late</td>
<td>31</td>
<td>cloud, slight mist, snow</td>
</tr>
<tr>
<td>15/02/1947</td>
<td>Temperatures around freezing</td>
<td>33</td>
<td>Cloud, some blue sky, slight mist</td>
</tr>
<tr>
<td>17/02/1947</td>
<td>Very Cold</td>
<td>30</td>
<td>some blue sky, slight haze, cloud, slight mist, intermittent slight snow</td>
</tr>
<tr>
<td>18/02/1947</td>
<td>Occasional slight snow locally</td>
<td>34</td>
<td>cloud, slight haze, some blue sky</td>
</tr>
<tr>
<td>19/02/1947</td>
<td>Temperatures a little above freezing</td>
<td>33</td>
<td>Cloud, intermittent slight snow, slight mist, slight haze</td>
</tr>
<tr>
<td>20/02/1947</td>
<td>Temperatures above freezing by day</td>
<td>31</td>
<td>cloud, slight mist, intermittent slight snow, slight haze</td>
</tr>
<tr>
<td>21/02/1947</td>
<td>Very Cold</td>
<td>28</td>
<td>Cloud, snow, slight mist, fog</td>
</tr>
<tr>
<td>22/02/1947</td>
<td>Very Cold</td>
<td>31</td>
<td>cloud, passing snow showers, slight mist, some blue sky</td>
</tr>
<tr>
<td>23/02/1947</td>
<td></td>
<td>37</td>
<td>blue sky, mist, fog, slight haze</td>
</tr>
<tr>
<td>24/02/1947</td>
<td>Very cold, temperature rising above freezing by day in many places</td>
<td>37</td>
<td>blue sky, slight mist, hoar frost, dry air, slight haze</td>
</tr>
<tr>
<td>25/02/1947</td>
<td>Very Cold</td>
<td>34</td>
<td>blue sky, cloud, slight haze</td>
</tr>
<tr>
<td>Date</td>
<td>Description</td>
<td>Risk/Weather</td>
<td>Temperature</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------------------------</td>
<td>----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>26/02/1947</td>
<td>Very cold - daytime temps rising several degrees above freezing point in many areas</td>
<td>Risk of occasional snow spreading to extreme west</td>
<td>40</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27/02/1947</td>
<td>Cold - day temperature above freezing</td>
<td>Occasional snow showers</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>28/02/1947</td>
<td>Very Cold - day temps rising above freezing</td>
<td>Mainly fair but some snow showers</td>
<td>35</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>01/03/1947</td>
<td>Very Cold</td>
<td>Local Snow showers</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/03/1947</td>
<td>Cold - day temperature well above freezing</td>
<td>Mainly bright</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04/03/1947</td>
<td>Very Cold</td>
<td>Fine at first-occasional snow later</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05/03/1947</td>
<td>Very cold - becoming less cold later</td>
<td>snow, considerable falls - turning to rain later</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>06/03/1947</td>
<td>Temp near freezing</td>
<td>Periods of snow in the East</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Description</td>
<td>Condition</td>
<td>Temperature</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------------------------</td>
<td>----------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>07/03/1947</td>
<td>Day temperatures rising above freezing</td>
<td>Scattered Snow Showers</td>
<td>37</td>
</tr>
<tr>
<td>08/03/1947</td>
<td>Day temperature appreciably above freezing</td>
<td>Some showers of snow or sleet</td>
<td>37</td>
</tr>
<tr>
<td>10/03/1947</td>
<td>Very Cold</td>
<td>Fair</td>
<td>38</td>
</tr>
<tr>
<td>11/03/1947</td>
<td>Much milder than of late</td>
<td>Rain at first - scattered rain showers later</td>
<td>35</td>
</tr>
<tr>
<td>12/03/1947</td>
<td>Day temperatures rising a little above freezing</td>
<td>Local falls of snow</td>
<td>33</td>
</tr>
<tr>
<td>13/03/1947</td>
<td>Very cold - perhaps becoming milder in some districts</td>
<td>Snow perhaps turning to rain for a time</td>
<td>44</td>
</tr>
<tr>
<td>14/03/1947</td>
<td>Very Cold</td>
<td>Occasional snow</td>
<td>39</td>
</tr>
<tr>
<td>15/03/1947</td>
<td>Very Cold</td>
<td>Occasional snow later</td>
<td>35</td>
</tr>
<tr>
<td>17/03/1947</td>
<td>Temperatures a few degrees above freezing and rising</td>
<td>Local showers with snow on higher ground - rain later</td>
<td>53</td>
</tr>
</tbody>
</table>

N.B. Temperatures used from the Daily Weather Report are maximums for one specific location, whilst the forecasts in the newspaper attempt to summarise the general temperature that will be experienced over the course of the day within the region.
Appendix II

Figure 1: Pre-war structure

Adapted from Meteorological Committee Memo, M.C - 1

September, 1946 – Appendix II
Figure 2: Proposed Structure, 1946

Adapted from Meteorological Committee Memo, M.C - 1 September, 1946 – Appendix III
Figure 3: Actual 1948 Structure
Adapted from the Meteorological Office, 1948 Annual Report
Figure 4: Actual 1955 Structure
Adapted from the Meteorological Office, 1955 Annual Report
Figure 5: Actual 1958 Structure

Adapted from the Meteorological Office, 1958 Annual Report
Figure 6: Actual 1963 Structure

Adapted from the Meteorological Office, 1963 Annual Report