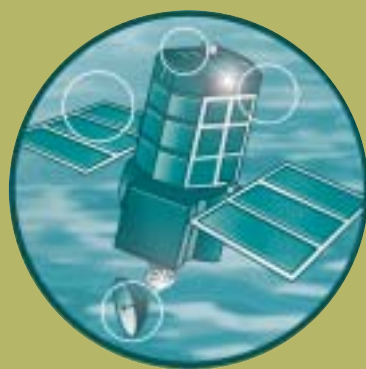# Public response to flood warning

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The Environment Agency is the leading public body protecting and improving the environment in England and Wales.

It's our job to make sure that air, land and water are looked after by everyone in today's society, so that tomorrow's generations inherit a cleaner, healthier world.

Our work includes tackling flooding and pollution incidents, reducing industry's impacts on the environment, cleaning up rivers, coastal waters and contaminated land, and improving wildlife habitats.

This report is the result of research commissioned and funded by the Environment Agency's Science Programme.

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Science at the Environment Agency

Science underpins the work of the Environment Agency. It provides an up-to-date understanding of the world about us and helps us to develop monitoring tools and techniques to manage our environment as efficiently and effectively as possible.

The work of the Environment Agency's Science Group is a key ingredient in the partnership between research, policy and operations that enables the Environment Agency to protect and restore our environment.

The science programme focuses on five main areas of activity:

- **Setting the agenda**, by identifying where strategic science can inform our evidence-based policies, advisory and regulatory roles;

- **Funding science**, by supporting programmes, projects and people in response to long-term strategic needs, medium-term policy priorities and shorter-term operational requirements;

- **Managing science**, by ensuring that our programmes and projects are fit for purpose and executed according to international scientific standards;

- **Carrying out science**, by undertaking research – either by contracting it out to research organisations and consultancies or by doing it ourselves;

- **Delivering information, advice, tools and techniques**, by making appropriate products available to our policy and operations staff.

Steve Killeen

Head of Science

Executive summary

In 2004 researchers in the Department of Sociology and Centre for Environmental Strategy at the University of Surrey were commissioned by the Environment Agency to provide a detailed understanding of the ways in which the 'at flood risk' public understand, interpret and respond to flood warnings.

The methodology for the project was divided into three distinct stages:

- Stage one involved a review of relevant literature and a secondary analysis of post event survey data collected by BMRB for the Environment Agency.

- Stage two comprised qualitative work with different groups in several flood risk areas in order to reach a detailed understanding of participants' priorities on receipt of a flood warning from the Environment Agency.

- Stage three took the form of a survey to provide quantitative data on how residents of at-risk areas intend to act in response to the three levels of flood warning and to explore what factors inform differences in warning response.

Key Findings

Secondary Analysis:

- The majority of those flooded (68%) reported that their actions were effective.

- The most significant factor in predicting the likelihood of reporting effective action is a perception of being prepared for flood.

- The reporting of effective action was significantly reduced in households experiencing flooding above floor level.

- Significant area differences were found in the reporting of effective action.

Qualitative Research:

- People who had been flooded displayed greater awareness and understanding of the Environment Agency's Flood Warning Codes than those without previous flood experience.

- Satisfaction with content and dissemination of flood warnings was generally good, particularly amongst people with prior experience of flooding. One major criticism concerned the 'general' nature of many flood warnings.

- Those who had experienced flooding used additional methods of assessing flood risk in combination with Environment Agency warnings.

- Actions taken in response to flood warning were numerous, and fell into four principle categories: seeking further information; protecting property and belongings; helping to protect people and animals; and evacuation.

- Barriers to action included individual characteristics (for example, old age, disability or physical frailty), characteristics of the home (for example single storey homes), and characteristics of the flood and/or flood warning (for example factors affecting the time before warning).

- Participants' understanding of 'effective action' focused on limiting rather than preventing damage. People focused more on belongings of sentimental value than upon expensive items.

Survey:

- The majority of respondents (77%) report that they would take action in response to all levels of flood warning; the percentage taking action increases with the severity of warning.

- 22% of the sample report that they would do nothing, or did not know what to do, at Flood Watch; this falls to 10% at Flood Warning and 6% at Severe Flood Warning.

- Taking no action at Flood Watch significantly predicts taking no action at other levels of warning.

- At Flood Watch, the most likely action predicted was to protect personal property, followed by forming an assessment of the level of risk. At Flood Warning, the most likely action remained protection of personal property but this action is now followed by preparations for evacuation. At Severe Flood Warning, the most likely action predicted was to evacuate.

- Individual differences were observed in actions taken on receipt of warning, for example: single pensioners were the most likely category to take no action at Flood Watch and home owners were significantly more likely than tenants to attempt to minimise water entry into their property.

Conclusions

Our research indicates that most of the at-risk population report an intention to act in response to flood warnings and that the majority of those flooded consider their actions to have been 'effective'. The percentage of those taking action increases steadily with the severity of warning, and the actions most likely to be taken at each warning stage are broadly appropriate. These are encouraging results for the Environment Agency. Our research also shows, however, that inaction at the earliest stage of flood warning predicts doing nothing at subsequent levels; a small proportion of the at-risk population (6%) say they would take no action at all even on receipt of a severe flood warning. Understanding the characteristics of this group and considering how best to target information and support should be a priority for the Environment Agency.

Our qualitative work found that the concept of 'effective' action in response to flood warnings is not one that is used spontaneously by the public. Whereas the Environment Agency links effectiveness with an avoidance of material damage (and loss of life), the public's interpretation is often a realistic one, concerned more with limiting than preventing damage and including actions designed to alleviate psychological as well as physical or material discomfort. In addition, we found that what might be considered appropriate action in one set of circumstances or for one household, may not be considered appropriate in another.

Recommendations

Findings from this project suggest several recommendations for the Environment Agency:

- Understanding the reasons why certain people report taking no action in response to flood warning, and considering how best to tailor information and support to these groups, should be a priority for the Environment Agency.

- Further research is recommended in order to build on an understanding of reasons for area differences in response to flood warning.

- It is recommended that the Environment Agency explores the possibility of making flood warnings more area-specific.

- If the content or dissemination of flood warnings is altered in any way, it is vital that steps are taken to ensure the following: warning content must be clear, sufficiently differentiated and convey a suitable sense of urgency; methods of dissemination are clearly and widely understood by the at-risk public.

- In future research into public response to flood warning, seek unprompted rather than prompted responses

- Adopt a uniform age stratification in all Environment Agency research in order to ensure comparability between studies

Contents

1.   Introduction

This project aims to provide a detailed understanding of the ways in which the 'at flood risk' public understand, interpret and respond to flood warnings. The research provides insights into what those at risk consider to be the most effective response on receipt of flood warning, the factors that influence the number and type of actions taken and inform participants' perceptions regarding the effectiveness of these actions. Findings are based on analyses of a range of quantitative and qualitative data from existing survey data, individual interviews, focus groups and a survey.

1.1 Background

Over recent years, there has been a move towards an integrated flood forecasting, warning and response system (FFWRS) in which the response of those at risk of flood is a vital component in the reliability of the system as a whole (Parker et al, 1994). Whereas considerable technological advances have been made in the area of flood forecasting there are, as the Environment Agency is aware, further steps to be taken in the field of flood warning and response. These were recently described as '*weak links in the communication chain*' (Penning-Rowsell et al, 2000).   For successful dissemination of warnings, the message must not only be delivered where it is needed, but it must also be recognised as significant (Handmer and Parker, 1989) and acted upon. Recent research in the field of flood warning in the UK demonstrates that warnings are all too often ignored until damage to property is imminent (e.g. Thrush et al 2005b). There remains therefore a clear need to reach a fuller understanding of how the at-risk public interprets the various levels of Environment Agency flood warning codes and at what level action is considered appropriate.

This focus on public interpretation of warnings is informed by recent work on risk communication and the public understanding of science (e.g. Irwin and Wynne, 1996). Rather than assuming that expert information (in this case flood warning) is passively received by 'the public', this approach recognises that individuals evaluate information in the light of their experience of the institutions providing it and alongside other sources of knowledge. Learning how the at-risk public make sense of flood warnings will assist in the development of a maximally accessible and effective warning dissemination system.

Information about how to act on receipt of a flood warning is sparse, particularly at the time it is most needed. Indeed, the necessity for memorable advice regarding appropriate action before, during and immediately after a flood event has been highlighted by the findings of several researchers (Thrush et al 2005b; Tapsell et al, 2002; Tapsell et al, 1999). Panic is not an uncommon reaction to an emergency situation (e.g. Thrush et al 2005b). However rather than being seen as an irrational response, panic can be interpreted as an inability to take effective action stemming from a lack of appropriate information on which to base a decision (Green, 1992). Uncertainty about what to do before and during a flood event has been reported to increase victims' levels of stress and anxiety, known to be amongst the most

troublesome and persistent problems following a flood event (Tapsell et al, 2002; Thrush et al 2005b).   Whereas a lack of knowledge hinders appropriate response and exacerbates the adverse long-term effects of flooding, being in possession of relevant information aids and improves effective action (Green, 1992), and thus helps mitigate damage from flood event at both an economic and psycho-social level. For example, recent research demonstrates that knowledge gained from prior experience of flooding facilitates and informs action on receipt of flood warning (Fielding et al 2005, Thrush et al 2005b)

Disaster research demonstrates that many victims do take some action designed to reduce damage to property and person before, during and after an event (e.g. BMRB Post event Surveys). Actions vary, however, and not all are effective (Tunstall and Parker, 1999). In order to assist the Environment Agency achieve an agreed and shared understanding of what constitutes 'effective action' for the at flood risk public, it is necessary to not only address their interpretation of flood warning codes, but also to unravel their expectations regarding behavioural response in flood emergency. In the past, assessments of effective action by organisations involved in flood alleviation have had a predominantly economic focus. However, there is a growing awareness that monetary loss is neither the sole nor the most distressing outcome for victims of flood (e.g. Tapsell et al, 2002; Thrush et al 2005b); an appreciation of what flood victims see as 'important' actions is therefore crucial.

Currently, relatively little is known about the effectiveness of the at-risk public's response to flood warning, nor about how response may differ according to social circumstance. It is widely accepted that vulnerability to disaster is influenced by demographic and socio-economic factors (e.g. Blaikie et al, 1994; Morrow, 1999; Enarson and Fordham, 2001; Cutter et al, 2000) and by physical and social resources (Green, 1992). These factors will all impact in their turn upon perceptions of risk and response to flood warning. There is also evidence to show that floods are experienced very differently by different social groups (e.g. Tunstall and Parker, 1999). While it is essential to understand how social characteristics may inform awareness of flood risk and ability to take effective action, recent research (Thrush et al 2005a) illustrates the considerable variability of experience that exists within social categories (i.e. not all older people are equally 'vulnerable').   Restricting definitions of vulnerability to objectively defined and potentially mappable quantities *fails to recognise many of the more subtle issues surrounding flood risk as perceived and experienced by affected communities*' (Brown and Damery, 2002: 413).

Engaging with public perceptions of flood warning codes and the related issue of what the at-risk public believe constitutes effective action on receipt of a warning is a highly significant move for the Environment Agency. Not only will this information play a vital role in improving the content and dissemination of flood warnings, the process also signals a willingness to engage in dialogue with the public (rather than an adherence to top-down information dissemination) and to learn from them. Such a move is vital for a successful risk-management strategy.

1.2 Project aims

The aim of this study was to provide a detailed understanding of the ways in which the 'at flood risk' public understand, interpret and respond to flood warnings.

Thus the research objectives were to:

- uncover current levels of public awareness and understanding of Environment Agency flood warning codes;
- understand the impacts of and preferences for different methods of flood warning dissemination and the reasons underlying these differences;
- establish actions taken on receipt of flood warning by victims of flood events and reasons for such actions;
- establish intended actions on receipt of flood warning by people at risk of flood but not yet flooded;
- understand what motivates and constrains specific actions (or intended actions) on receipt of flood warning;
- uncover the differential impacts of Environment Agency flood warning code levels (and/or other indicators of flood risk) on actions or intended actions;
- unravel what constitutes 'effective action' for at-risk individuals on receipt of flood warning within their social context;
- report baseline percentages of people willing to take effective action on receipt of flood warning within social context;
- quantify possible differences between likely actions taken in response to varying levels of flood warning.

A detailed understanding of public response to flood warnings is expected to be key in enabling the Environment Agency to meet the corporate target that states that, by 2007, 75% of residents in flood risk areas will take 'effective action'.

1.3 Methodology

The methodology for the project was divided into three distinct stages. Stage one involved the preparation of an accessible review of existing literature with regards to the 'at flood risk' public's actual or planned response to a flood warning. Secondary analysis of the 2001 Post event survey data was then undertaken on the subset of 456 respondents who were both flooded and who reported taking some action. Analysis focused on identifying factors that influenced whether or not respondents considered their actions to have been effective.

Stage two involved qualitative work with different groups in flood risk areas to develop a rich understanding of ways in which the at-risk public interprets and responds to flood warnings. Two complementary methodologies were employed: focus groups and in-depth interviews. Research was conducted with flood victims and people at risk but

with no prior experience of flooding in three Environment Agency Regions (North East; Thames and Southern) and in Wales. 18 Focus groups and 18 in-depth home-based interviews were carried out, yielding a total of 129 interviewees.

Stage three involved the commissioning of a survey using scenarios to explore actions taken or intended in response to flood warning; it also addressed the differential impacts of Environment Agency flood warning code levels on these actions or intended actions. The survey was administered in home-based interviews conducted with 540 members of the at-risk population across seven Environment Agency Regions and Wales.

2 Literature review

This chapter provides a brief summary of the existing literature on issues concerned with the public's response to flood warning and what they consider to be effective reactions in the face of such warning.   The purpose of the literature review was three-fold: to discover what was currently known in this field; to highlight what remained to be investigated; and to provide a foundation for the second stage of the research project by identifying topics for inclusion in focus groups and individual interviews.

2.1 Introduction

Since damage to property and personal goods is clearly identifiable and easily quantified, much of the early research and policy in the field of flood risk focused upon monetary or economic loss (see Penning-Rowsell and Green, 2000). More recently, however, there has been a growing awareness amongst the research community and those responsible for flood risk management that the effects of a flood event extend far beyond the financial losses associated with material goods or damage to property. Flood victims suffer adverse health effects that are often long-lasting and psychological problems are manifest, again often enduring for several years afterwards (e.g. Tapsell et al, 1999; Tapsell, 2000;Thrush et al 2005b; McCarthy, 2004). Loss of personal possessions, which may have little monetary worth but with immeasurable sentimental value, frequently cause long-term distress and heartbreak (e.g. Penning-Rowsell and Green, 2000; Thrush et al 2005b). Relationships within households and communities are disrupted (Tapsell et al, 2002) and the degree of damage, upheaval and distress means that, for many people, the very meaning and security associated with 'home' is disturbed (McCarthy, 2004).   Given the breadth and implication of these findings, the need for improvements in the field of flood warning and warning response is all the more urgent.

Over recent years, there has been a move towards an integrated flood forecasting, warning and response system (FFWRS) in which the response of those at risk of flood is a vital component in the reliability of the system as a whole (Parker et al, 1994). Whereas considerable technological advances have been made in the area of flood forecasting there are yet further steps to be taken in the field of flood warning and response, an area recently described as comprising '*weak links in the communication chain*' (Penning-Rowsell et al, 2000). For successful dissemination of warnings the message must not only be delivered as and where it is needed, but it must also be recognised as significant (Handmer and Parker, 1989) and must be acted upon. Recent research in the field of flood warning in the UK suggests that warnings are all too often ignored until damage to property is imminent (e.g.Thrush et al 2005b). There remains, therefore, a clear need to reach a fuller understanding of how the public interprets the various levels of Environment Agency flood warning codes and at what level of warning they consider action to be appropriate.

2.2 Flood warnings: public understanding and response

This focus on public interpretation of warnings is informed by recent work on risk communication and the public understanding of science (e.g. Pidgeon et al, 1993; Irwin and Wynne, 1996). Rather than assuming that expert information (in this case flood warning) is passively received by 'the public', this approach recognises that individuals evaluate information in the light of their experience of the institutions providing it and alongside other sources of knowledge. As Sime (1997) has commented, the public will respond to risk communication in accordance with their own knowledge, their perceptions and their frame of reference, in addition to the advice contained within the warning itself. Investigating the ways in which the at-risk public makes sense of flood warnings is therefore an important facet in developing any accessible and effective warning dissemination system.

In a recent article on disaster warning response, Drabek (1999) goes so far as to state that:

> *'the first principle in understanding disaster warning responses is to recognize explicitly that the initial response to any warning is denial'* (p.1).

Much work has been done to uncover the factors that are associated with constraining or enhancing appropriate disaster warning response amongst the general public. An examination of the large body of disaster literature, part of which is concerned specifically with flood, reveals a wide range of variables that have been found to affect the probability of public response to hazard warning. Some of these can be broadly categorised as follows: characteristics of warning messages; individual factors; and social factors.

2.2.1 Characteristics of warning messages

Characteristics of the warning message are of prime importance in facilitating or hampering response. For example, the more specific and locally relevant the information contained within a warning message, the more likely the public is to believe it and to respond accordingly (e.g. Drabek, 1969; Gruntfest, 1997; Mileti and Fitzpatrick, 1992). The presence of environmental cues also serves to heighten response likelihood (Mileti and O'Brien, 1991). Consistency of information is important for maximising the likelihood of response (e.g. Mileti and Fitzpatrick, 1992) as is the frequency with which that information is delivered (Drabek, 1969). The source of a warning has been found to impact upon both credibility and response; if the source is familiar, the recipient is more likely to believe and act upon the message (e.g. Lindell and Perry, 1987; Drabek, 1994a). A multiplicity of message channels appears to increase the probability of a response (Baron et al, 1988) whether or not those channels are official (Ketteridge and Fordham, 1998). Indeed, warning messages delivered by family or friends (Dow and Cutter, 1998), or a personalised or face-to-face warning (Cutter, 1987), have been found to increase public response to hazard. People are also more likely to understand and heed hazard warnings when they are delivered in their language of origin (Aguirre, 1991).

2.2.2 Individual factors

Whilst it is widely accepted that vulnerability to disaster is influenced by demographic and socio-economic factors, with a resulting impact upon risk perceptions and warning response (e.g. Blaikie et al, 1994; Morrow, 1999; Enarson and Fordham, 2001; Cutter et al, 2000), evidence regarding the predictive validity of many demographic variables appears to be conflicting. Studies incorporating socio-economic variables such as gender, age, race, education level, income, and work status reveal findings that are often at variance with one another. Some find useful relationships between warning response and, say, age or ethnicity (e.g. Gruntfest, 1997; Drabek and Boggs, 1968), others do not (e.g. Bateman and Edwards; 2002). What does seem clear, however, is that perceptions of risk and vulnerability have an effect upon warning response. People who perceive their resources to be insufficient are less likely to respond (e.g. Simin et al, 1996) whereas a belief that one's home is at risk increases response (Baker, 1991) as does a feeling of vulnerability with regard to the hazard in question (Griffin et al, 1998). Fear of looting, however, decreases the probability of response (Aguirre, 1991).

2.2.3 Social factors

Findings in the hazard literature reveal a number of social factors that increase warning response. These include the observation of social cues (Cutter, 1987; Bateman and Edwards, 2002) and membership of a strong social network (Gruntfest, 1997; Drabek 1994a). Being responsible for children (Carter et al. 1983; Fischer et al, 1995) or people with medical needs (Bateman and Edwards, 2002) also increases the likelihood of a response to hazard warning, as does being in the same place as other family members (Cutter, 1995). Being part of a large group at the time a warning is received is, however, found to decrease response (Dow and Cutter, 1998), although working for a large organisation has the reverse effect (Drabek, 1994b).

As one American author has commented, public response to disaster warning is '*patterned by invisible webs of constraint*' (Drabek, 1999). Although there is evidence to show that floods are experienced very differently according to social group (e.g. Tunstall and Parker, 1999), less is known about how response efficacy may differ according to social circumstance. As many authors in the field of disaster research have noted, warning response is a highly complex social process, for it is after all groups rather than individuals that process the majority of disaster warnings (see Drabek, 1999). Whilst it is essential to understand how social characteristics may inform awareness of flood risk and ability to take effective action, recent research in the field of vulnerability and flood warning illustrates the considerable variability of experience that exists within social categories. In a study conducted for the Environment Agency, researchers at the University of Surrey found that older people (a category deemed by many authors to be at particular risk with regard to flood and other natural hazard) are differentially vulnerable with regards to both their ability to respond to warning and their capacity to cope with the aftermath of flood event. Social support networks and family presence appeared to play a considerable part in shaping the reactions of older focus group participants (Thrush et al 2005b). Thus it can be seen that restricting definitions of vulnerability to objectively defined and/or potentially

mappable quantities '*fails to recognise many of the more subtle issues surrounding flood risk as perceived and experienced by affected communities'* (Brown and Damery, 2002: 413). Indeed, vulnerability may be seen as something of a red herring in this context. The findings of Thrush et al (2005b), from interviews with key informants in various parts of the UK, suggest that '*everyone is vulnerable when it comes to flood*'. What is important is enhancing our understanding of the nature of people's actions in response to flood warning from the perspective of the public themselves.

To be effective, risk communication must incorporate a detailed knowledge of the communities at risk and the needs of the various stakeholders, with communication being seen as a two-way process (see Handmer and Penning-Rowsell, 1990; Vaughan, 1995; Handmer, 2000). As Handmer (2000) states in his article addressing the issue of warning failure, '*neglecting to establish shared meaning between the different groups involved*' is one of the major reasons underlying a lack of success in this field.

2.3 The role of information in flood warning response

There does appear to be considerable support amongst the research community for the notion that information is one of the keys to facilitating public response in the face of natural hazard. Being in possession of relevant information has been shown to aid and improve effective action (Green, 1992), particularly when it is concerned with protective responses (e.g. Leik et al, 1981; Cutter, 1987). Such information can therefore be invaluable in mitigating damage from flooding at an economic and a psycho-social level. Although 'official' information in the form of risk-management communications is undoubtedly useful, a top-down approach to the problem of raising awareness is not in itself sufficient. Indeed, such information can sometimes have a counter-productive effect; the literature describes a false-alarm hypothesis whereby experience of cancelled warnings diminishes belief in and response to future warning messages (e.g. Atwood et al, 1998)

Research findings demonstrate that information gained as a result of personal involvement, whether from prior hazard experience, local knowledge, community activity or similar, does much to heighten awareness and preparedness for future events. For example, research in the field of flood event demonstrates that knowledge gained from prior experience of flooding, particularly if recent (e.g. Anderson, 1969), not only heightens reception of and belief in the warning itself (e.g. Drabek and Boggs, 1968; Gruntfest, 1997), it also facilitates and informs appropriate action on receipt of flood warning (Fielding et al 2005, Thrush et al 2005b). Australian research in the field of flood warning proposes education in the development and maintenance of local flood action plans for at-risk populations, thus involving members of the business and residential communities and raising levels of awareness (see Gissing, 2003). It is clear that an awareness of flooding is an important precursor in taking precautionary steps to mitigate against such an event (e.g.Thrush et al 2005b); in turn, being prepared for flood serves to increase response likelihood (Drabek, 1994a).

Whereas it is clear that flood-related knowledge has the capacity to mitigate damage and inform response, research findings also highlight the unfortunate fact that information that specifies *how* to act on receipt of a flood warning is sparse within the

public domain, particularly at the time it is most needed. Indeed, the necessity for memorable advice regarding appropriate action to be made available before, during and immediately after a flood event has been highlighted by the findings of several researchers (Thrush et al 2005b; Tapsell et al, 2002; Tapsell et al, 1999). This dearth of pertinent information can have far-reaching and adverse effects. For example, findings from the disaster literature and from recent UK work on flood warning and vulnerable groups demonstrate that panic is not only a common reaction in an emergency; it is one that hinders clear thought and effective action (e.g.Thrush et al 2005b). Rather than being seen as an irrational response, however, panic can be interpreted as an inability to take effective action stemming from a lack of appropriate information on which to base a decision (Green, 1992). Uncertainty of what to do before and during a flood event is reported as increasing victims' levels of stress and anxiety, outcomes that are known to be amongst the most troublesome and persistent results of flood event (Tapsell et al, 2002; Thrush et al 2005b).   A lack of relevant knowledge therefore not only constrains appropriate response, it also exacerbates the long-term adverse effects of flooding with personal, social and economic consequences.

2.4 Effective action in response to flood warning

Though there have been several studies investigating response to flooding risks in developing Asian countries (e.g. Davis and Hall, 1999; Rashid, 2000; Wong and Zhao, 2001), relatively little is currently known about the effectiveness of the at-risk public's response to flood warning in the United Kingdom, although the Flood Hazard Research Centre has research in progress in this field.

Recent flood research in the UK demonstrates that many victims do indeed take some action designed to reduce damage to property and person before, during and after an event (e.g. BMRB Post event Surveys; McCarthy, 2004; Thrush et al 2005b); however, these actions vary and not all prove to be effective (Tunstall and Parker, 1999). Where time allows and, importantly, once the reality of imminent flood is accepted (for people will rarely respond with urgency unless they accept a level of threat), response to flood warning commonly includes actions such as: moving people and animals to safety; telephoning family and friends; safeguarding vehicles, documents and valuables; moving furniture; the protection of buildings; switching off gas and electricity supplies; and the installation and operation of water pumps (e.g. Thrush et al 2005b; GeoForshungsZentrum Potsdam, 2003). However, it seems that there may be some divergence between what risk management organisations (the Environment Agency being just one example) and the general public consider to be 'effective'. As Thrush et al have shown in a study of victims of floods in the autumn of 2000, the first action for domestic pet owners was to move their animal to safety. This response took precedence over saving property or material possessions and was considered to be effective even in hindsight. Conversely, failure to save photographs or war memorabilia (even though other items of greater financial value were moved out of harm's way) was interpreted as a catastrophe.   Indeed, the very term 'effective action' has yet to be clearly defined (see Sime, 1997). Clarification in this area is best achieved though a qualitative research process rather than by the use of surveys (e.g. BMRB Post event research).

2.5 Conclusions and implications

There is a comparative dearth of research evidence on what constitutes effective action in response to flood warning. Therefore, in order to assist the Environment Agency achieve an agreed and shared understanding of what constitutes 'effective action' for the at flood risk public, it is necessary to not only address their interpretation of flood warning codes, but also to unravel their expectations regarding behavioural response in flood emergency. As mentioned above, earlier assessments of effective action by organisations involved in flood alleviation have often had a predominantly economic focus, but there is a growing awareness that monetary loss is neither the sole nor necessarily the most distressing outcome for victims of flood (e.g. Tapsell et al, 2002; Thrush et al 2005b). A fuller appreciation of what flood victims see as 'important' and 'effective' actions is therefore crucial, as is a knowledge of the reasons underlying such actions. In addition, we require a more detailed understanding of how people at risk of flooding make decisions about what is or is not appropriate in terms of disaster response (for example, whether it safer to evacuate or to remain in the home). Sime (1997) highlights the importance of people's emotional attachment to their home (*place identity*) and suggests that this is directly relevant to their warning response, contributing to a natural denial of anything that is seen as threatening this emotional sanctuary, as well as explaining a reluctance to leave it in times of danger.   Such a move is vital for a successful risk-management strategy. Investigation of all these factors will not only further our knowledge, it will also inform the second phase of this research study.

Engaging with public perceptions of warning codes and the related issue of what constitutes effective action (and why) for the at-risk public during flood warning is a highly significant move for the Environment Agency. This information will play a vital role in improving the content and dissemination of flood warnings, and the process signals a willingness to engage in dialogue with the public and to learn from them, rather than an adherence to top-down information dissemination. Recognising the importance of 'bottom-up' community-based knowledge will do much to enhance the success of current flood management strategies.

3 Secondary analysis of post event 2001 survey

3.1 Introduction

This chapter reports on a secondary analysis of the BMRB post event 2001 survey data with the objective of gaining insights into factors affecting the reporting of effective action in terms of mitigating flood damage.

Secondary analysis is concerned with the re-analysis of existing data, often adopting very different research questions from those which the original survey was designed to address. In the normal research sequence, research questions are generated based on a conceptual framework. Indicators are designed in the form of survey questions and data is collected. The analysis following this process sets out to answer the original research questions and develop the original theory. In secondary analysis, the indicators already used may not be ideal for answering the secondary analysts' research questions. A particular advantage of secondary analysis, however, is afforded by the ability to re-examine data in order to investigate social processes and influences not explored by the original primary analysis.

3.1.1 Data sets for secondary analysis

Since 1997, the Environment Agency has commissioned BMRB Social Research to conduct a programme of annual surveys with different target populations at risk of flood in order to establish public awareness of being at flood risk, the public's understanding of flood warnings operating in their area and awareness and understanding of precautions and preparations that can be taken in the event of flooding. In addition, post event surveys are administered on an *ad hoc* basis as and when a flood occurs. Their objective is to assess the efficiency of the Environment Agency's flood warning services for people who have been flooded and to measure the proportion of people taking effective action. Post event surveys were administered following flood events in January 1997, January, April and October/November 1998, December 1999, and in June and the autumn 2000.

The most recently available post-event survey (post-event 2001) was used for this secondary analysis This survey provided the most current data on a flood event for which specific responses were collected concerning the taking of effective action within the context of a wider range of flood-related issues, namely: flood awareness; advice received; severity of flooding; actions taken; and demographic factors.

The post event 2001 reports data from 1395 cases, the largest sample size of any post event survey yet conducted by BMRB. This secondary analysis is primarily concerned with analysing the subset of 456 survey respondents who were both flooded and who

reported taking some kind of action. This subset constitutes a significantly large sample size suitable for detailed analysis.

3.1.2 Data-related limitations for the secondary analysis

Certain features of the post-event 2001 data set impacted upon its use in this secondary analysis.

The sampling strategy itself carries implications. Rather than requiring samples to be taken proportionally from the actual towns and villages visited within a flood-affected area, 180 addresses from each settlement were selected, without stratification on any particular demographic factors. It is possible therefore that not all significant subgroups are represented within a particular flood area and it is important to bear this in mind when drawing conclusions from the data, especially when making direct comparisons between flooded areas.

During the secondary analysis, the selection of cases according to specific demographics (e.g. flood area and occupation) sometimes yielded only small groups of people for analysis. As the survey question on effective action was asked only of respondents who had actually suffered a flood, data from less severely flooded areas produced subgroups too small for statistical analysis. In order to address this problem, a policy of drawing comparisons only between groups of not less than 25 respondents was adopted. Whilst data from some flood areas could not be statistically analysed (i.e. Tenbury Wells, Tewkesbury, Arundel, Worcester and Gloucester), this policy meant that any relationships observed could be reported with confidence based on reasonable sample sizes.

Many questions in the 2001 survey required respondents to recall information received or actions taken. The more severely an individual is affected by a flood event, the greater the likelihood that relevant details will be remembered. Common sense suggests that people are better at recollecting events with which they were actively involved rather than those that were passively observed. It may be, therefore, that people who were severely flooded report receiving more advice and taking more action because they did receive more information and take more action than others less badly affected. Conversely, people who were not severely flooded may have been more likely to forget details of the event. Hence the observed differences between the severely flooded and not severely flooded groups with regard to numbers of actions taken may have been artificially inflated by an enhanced recall in the severely flooded group.

The above discussion focuses on problems of representation, small sample size and event recall that may affect analysis and interpretation of the data, especially as the analysis adopts statistical techniques that would normally require properly randomised data to support its conclusions. However, the techniques used here were justified in that the sole purpose of the secondary analysis was to gain useful insights into a range of possible factors that may influence flooded respondents in their decision to report their actions as effective. These insights were then used to inform later stages of the project (see Section 5).

3.1.3 Secondary analytic opportunities

The secondary analysis reported in this document extends the analysis of the original 2001 BMRB survey and affords the opportunity of investigating topics not originally addressed, namely that of effective action.

As with any secondary analysis, there are data limitations. In this survey, the single question concerning effectiveness of action followed a series of questions asking respondents what actions they took from the then current Environment Agency advisory list (see Section 3.2.6 below). Secondary analysis cannot therefore address any other actions that the at-risk public might consider effective (this topic will be discussed in Section Four of this report). In addition, this survey question elicited responses concerning the effectiveness of *overall action* rather than any one particular action.

The analysis paid particular attention to those factors measured in the survey that might affect the reporting of effectiveness with regard to overall actions taken. This allowed us to draw conclusions concerning possible influences upon respondents' perceptions regarding effective action in terms of mitigating flood damage. The following factors were investigated: advice and warnings received; flood severity; and demographic circumstances of flooded respondents.

3.2 Findings from the secondary analysis

3.2.1 Sample profile

The post event 2001 Survey collected data from 1395 respondents in the aftermath of the flooding episodes that occurred in the following areas between October and December 2000: Arundel; Bridgnorth; Gloucester; Maidstone; Malton; Newark; Nottingham; Shrewsbury; Tenbury Wells; Tewkesbury; Woodford Green; and Worcester

1257 of these responded on behalf of residential households (the remainder represented commercial organisations). Within this group of 1257 respondents, the survey addressed the topic of 'effective action' by asking a question only of people whose households and/or property were flooded <u>and</u> who recalled taking one or more of the Environment Agency recommended actions. This yielded a subset of 494 respondents. Of the householders not asked this question, 720 were unaffected by flooding in the latest episode and 43 could not definitely recall taking one or more of the EA recommended actions.

The survey question (Q73) was as follows:

'thinking about the actions you took to prepare for the flood, how effective do you think these actions were in reducing damage caused by flooding?'

Responses to this question (analysed here for householders only) split the 494 flooded householders into three groups:

- 309 respondents thought their actions overall to have been 'very effective' or 'fairly effective' in reducing damage;
- 147 respondents thought their actions overall to have been 'not very effective' or 'not at all effective' in reducing damage (in this analysis, both these responses have been combined as 'not effective');
- 38 respondents replied 'don't know' to the question on effective action.

After removing the last category from the analysis (i.e. the 'don't knows'), a sample population of 456 remained. Throughout the ensuing analysis, this category is referred to as 'flooded respondents'. 'Effective' and 'not effective' respondents were collapsed to form two sub-groups: 'those who thought their actions were effective' (n=309) and 'those who thought their actions were not effective' (n=147).

The secondary analysis addressed the following research question:

'What factors in the data correspond to an increased (or decreased) percentage of flooded respondents who reported their actions as effective?'

3.2.2 Area of flood

In order to determine whether or not there were area characteristics that might influence perceptions of effectiveness, the data were examined for possible area differences in the reporting of effective action.
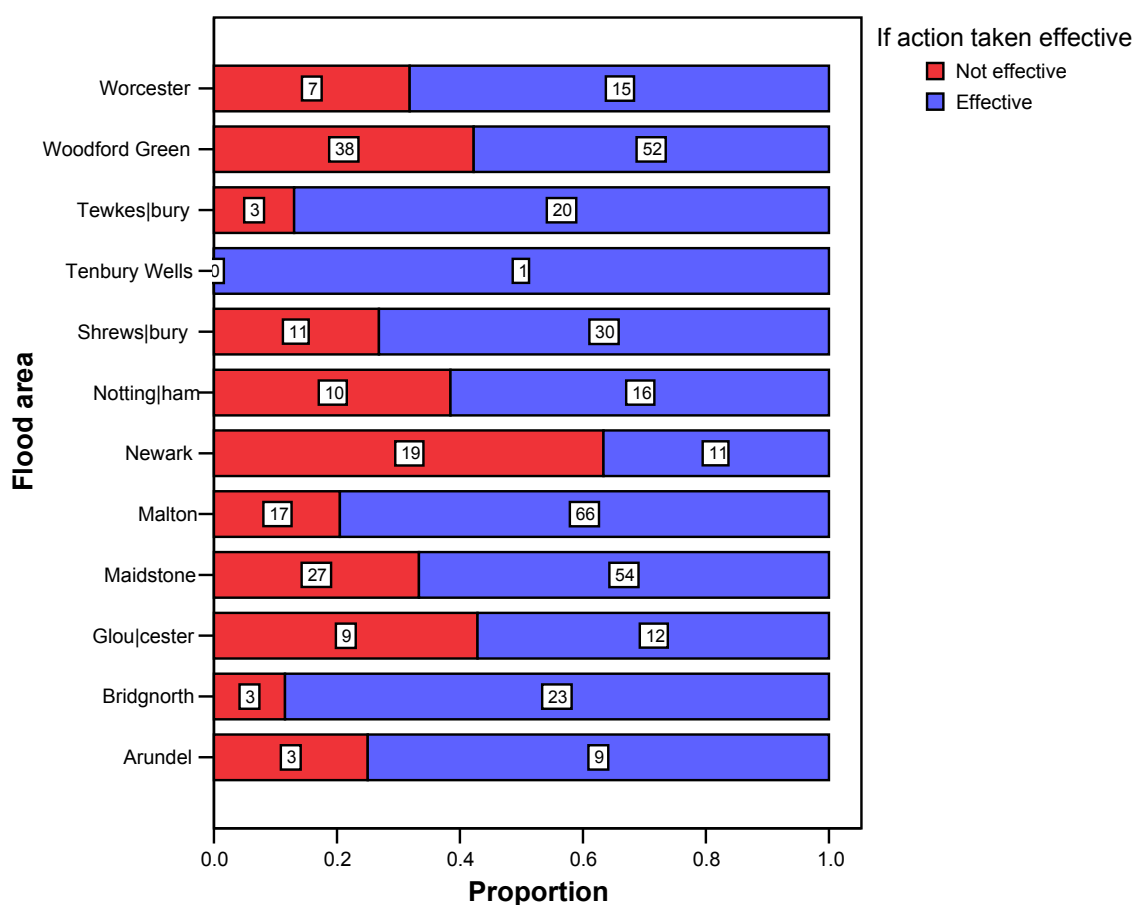
Figure 3.1 Reporting of effective action by area

Figure 3.1 charts area differences in the reporting of effective action for the floods of October 2000. Whereas most respondents in each area report their actions as effective, Newark stands out as an area where the majority did not consider their actions to be effective.

Table 3.1 presents an analysis of the percentage of flooded respondents who reported effective action within each of the flooded areas (i.e. those containing not less than 25 flooded respondents) compared with the overall average.

Table 3.1 Percentage of flooded respondents reporting effective action by flood area

Flooded area (with sample sizes of 25 or more)	Percentage of flooded respondents who reported their actions as effective		Significance of area % compared with total sample
Bridgnorth	88.5%	(23 of 26)	**
Malton	79.5%	(66 of 83)	**
Shrewsbury	73.2%	(30 of 41)	n.s.
Maidstone	66.7%	(54 of 81)	n.s.
Nottingham	61.5%	(16 of 26)	n.s.
Woodford Green	57.8%	(52 of 90)	**
Newark	36.7%	(11 of 30)	***
Overall Average	67.8%	(309 of 456)	

Source: Post event 2001
Sig   * <0.05: **<0.01: ***<0.001

As can be seen from Table 3.1, a total of 309 of the 456 flooded respondents (67.8%) reported that their actions had been effective. However there is considerable variation between the various flood areas, with significant differences seen in Bridgnorth, Malton Woodford Green and Newark. It would appear that there are certain area factors that may explain these significant variations in percentages of 'effective action' response. Examples might include not only characteristics of the flood event and local topography but also local demography, community characteristics and features of local flood awareness campaigns. These factors cannot be explored in this secondary analysis.

3.2.3 Severity of flood

In order to help explain the variability in reporting of effective action, a comparison of flood severity was undertaken by comparing percentages of flooded respondents who reported effective actions in each of the two following categories: homes flooded above floor level; and homes flooded but not above floor level.

Table 3.2 Relationship between flood severity and reporting of effective action

Was action effective	Severity of flooding	
	Not above floor level (%)	Above floor level (%)
No	29	39
Yes	71	61
Total	311	145

Significance: **<0.01
Source: Post event 2001
Table 3.2 shows that 61% of respondents with an 'above floor level' flood reported acting effectively, compared with 71% of respondents who had property floods below floor level. The reporting of effective action is significantly reduced in households experiencing severe flooding.

3.2.4 Flood preparedness: prior understanding of flood-related action

The data were examined for factors concerning the period preceding the flood events of autumn 2000 in order to investigate levels of reported effective action in relation to respondents' understanding and preparedness prior to those events. Many of the post event 2001 survey questions shed light on how well respondents understand what to do should flooding occur. Factors affecting such an understanding include previous experience of flood, and the provision of information and advice on how to respond from informed sources such as the Environment Agency. The post event 2001 survey sought information on the following topics that may be contributory in this regard:

- previous flood experience (flood events and warnings of floods);
- whether or not respondents felt they had been given enough information on what do in the event of flood;
- the clarity of such information;
- whether or not Environment Agency leaflets had been read;
- whether or not respondents remembered any of the advice received;
- whether or not they felt enough advice had been given to prepare for the flood;
- whether or not respondents understood what they were supposed to do in the event of a flood.

Table 3.3 demonstrates that for each of the survey questions reports of effective action were significantly higher amongst respondents with some awareness of what to do. Overall, the data give a strong indication that prior flood experience and the early provision of clear and informative advice are both associated with the reporting of effective action.

Table 3.3 Relationship between reporting effective action and understanding what to do in the event of a flood.

Question	Response	Percentage reporting actions as effective	Significance
Q80§ 'Understood what supposed to do?	Yes (313)	72.8%	**
	No (131)	56.5%	
Q5/Q96 Previous flood experience	Flooded before (278)	74.1%	***
	First flood (178)	57.9%	
Q94 'Received warnings before this episode?'	Yes (138)	78.3%	**
	No (311)	63.3%	
Q84 'Aware of Environment Agency Leaflet?'	Yes (152)	74.3%	*
	No (263)	64.6%	
Q79 'Given enough information about what to do?')	Yes (247)	75.7%	***
	No (201)	57.7%	
Q82 'Was information clear?'	Yes (280)	73.2%	**
	No (159)	59.1%	
Q74 'Given enough advice to prepare?'	Yes (252)	77.4%	***
	No (192)	55.7%	
Q41 'Remembered any advice when prompted?'	Yes (327)	71.9%	**
	No (129)	57.4%	
Overall average for reporting of effective action (all areas)		67.8% (309 of 456)	

Source: Post event 2001
§Q80 refers to question number 80 in the Post event 2001 survey
Significance:　　　　　* <0.05: **<0.01: ***<0.001

3.2.5 Flood preparedness and flood warnings

This section considers the reporting of effective action in relation to the extent that a household has been able to prepare for flood. Factors affecting such preparation focus primarily upon the nature and timing of flood warning.

The following question topics were raised in the survey:

- Were respondents given advance warning of impending flood?
- How many types of warning were received?
- What was the level of satisfaction with the method(s) of warning?
- How much notice was given in advance of flooding?
- Was sufficient notice given prior to the flood?
- Was sufficient notice given for effective action to be taken?
- Did respondents feel fully prepared when the flood happened?

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Table 3.4 The nature of flood warning and the reporting of effective action

Question asked	Response	Percentage of flooded respondents who reported their actions as effective	Significance
Q77 'Felt fully prepared when the flood happened?'	Yes (239)	79.1%	***
	No (208)	54.8%	
Q8 'Received a warning prior to the flooding?'	Yes (293)	71.3	*
	No (159)	60.4%	
Q19 'More than one type of warning received?'	Yes (225)	72.4%	**
	No (227)	62.6%	
Q36 'Satisfied by the method by which received flood warning?'	Yes (223)	77.6%	***
	No (72)	51.4%	
Q17 'More than 6 hours notice of the flood?'	Yes (180)	77.2%	**
	No (96)	63.5%	
Q81 'Given enough notice about flood before it happened?'	Yes (223)	78.5%	***
	No (222)	56.8%	
Q18 'Enough notice to act effectively?'	Yes (220)	77.3%	***
	No (66)	51.4%	
Overall average for reporting of effective action (all areas)		67.8% (309 of 456)	

Source: Post event 2001
Significance: * <0.05: **<0.01: ***<0.001

Table 3.4 reveals that positive responses to the questions concerning aspects of flood warning receipt and preparedness were found to be significantly associated with the reporting of actions as effective.

As in the previous section, the intention was to consider a possible explanation for area variability in the reporting of actions as effective, that is, that the reporting of effective actions was more likely in areas where respondents had timely receipt of informative warning, thus allowing time for informed actions to be taken.

The secondary analysis suggests that one factor underlying the perception of effectiveness is the provision of sufficient time in which to act on warnings received, reinforcing the overall feeling of being well prepared for flood.

3.2.6 Flood preparedness: action taken during the flood

As part of the post event 2001 survey, respondents were asked to consider a particular set of actions recommended by the Environment Agency as part of its pre-flood warning programme. These actions were:

- listen to local radio station for further information;
- telephone Floodline for further information;
- warn your neighbours;
- move valuable/personal belongings upstairs or to a safe place;
- move yourself or others in the household to a safe place;

- take warm clothing and/or food/water and/or medication with you to a safe place;
- be prepared for a loss of power (e.g. take a torch);
- block doorways/airbricks with sandbags;
- put flood boards or flood gates in place;
- switch off gas and/or electricity;
- if flooded, check gas and/or electricity before re-use;
- if flooded, boil tap water until declared safe;
- move cars to a safe place;
- listen out for warnings;
- check the Environment Agency website;

Having established which (if any) of these actions were taken, survey respondents were asked if they felt that their overall action was effective.

The following analysis looks at possible explanations for variability in the reporting of effective action based on the actions themselves. The analysis also examined whether those taking particular actions were more likely to report that their actions overall were effective.

The data allow an analysis of the following factors associated with the reporting of effective action by flooded respondents:

- the number and type of actions taken, assessed as a weighted 'activity count';
- whether action was taken in conjunction with advice to carry out that action;
- factors relating to individual action types which corresponded to increased levels of reporting of effective action by flooded respondents.

Secondary analysis explored the possibility of a relationship between the reporting of action as effective and the *number* of actions taken. The research question was as follows: *'did a raised action count (level of activity) correspond with a raised percentage of reported effective action?'*

Although the survey did not specifically address the effectiveness of individual actions, it was possible to consider this in terms of the number and type of actions reported. A weighted activity count was created for each respondent; this was represented as an 'action count' by using a weighting scheme presented in Appendix 1. Passive actions (e.g. listening to the radio) were given low weighting whereas active actions (e.g. taking warm clothing and supplies to a safe place) were given a relatively higher weighting.

For flooded respondents, overall activity increased from an average count of 11.3 for those flooded below floor level to 18.5 for those flooded above floor level, reflecting the more severe nature of the response required.

Table 3.5 The effect of flood severity on numbers of actions and the reporting of effective action

Group	Effective actions reported?	Average action count	Significance levels below p=0.05 (for 2-tail t test comparing group means of 'effective' and 'not effective')
All flooded respondents	Yes (309 of 456)	13.6	Not significant
	No (147 of 456)	14.1	
Flooded respondents not flooded above floor level	Yes (221 of 311)	11.2	Not significant
	No (90 of 311)	11.5	
Flooded respondents with an 'above floor level' flood	Yes (88 of 143)	20.4	*
	No (55 of 143)	17.3	

Source: Post event 2001
Significance: * <0.05: **<0.01: ***<0.001

The analysis presented in Table 3.5shows that there was overall no significant difference in average numbers of actions taken and the reporting of effective action. If we look at flood severity, however, significant differences are apparent. For the group flooded above floor level, there was a significant difference in average action count (from 17.3 to 20.4, p=0.048) between those who did not report actions as effective and those who did. This offers support for the suggestion that where an incident is more serious, it is those taking a greater number of actions who are more likely to report their action as effective.

The data were then examined for a possible link between perceived effectiveness and 'advised' action; were people who followed advice more likely to report their action effective than those who acted independently? The research question was *'did a raised count of advised actions correspond with a raised percentage of reported effective action in an area?'*

As survey respondents were asked which action they took from the Environment Agency's list of recommendations, and whether or not it was taken as a result of advice previously received, it was possible to uncover whether or not actions were 'advised'.

Table 3.6 Analysis comparing 'advised' action counts of groups of flooded respondents

Group	Effective actions reported?	Average advised action count	Significance
All flooded respondents	Yes (309 of 456)	7.8	Not significant
	No (147 of 456)	6.8	
Flooded respondents not flooded above floor level	Yes (221 of 311)	7.3	Not significant
	No (90 of 311)	6.6	
Flooded respondents with an 'above floor level' flood	Yes (88 of 143)	10.8	**
	No (55 of 143)	6.1	

Source: post event 2001
Significance: * <0.05: **<0.01: ***<0.001

Table 3.6 reveals one significant difference in 'advised' action counts between the three groups analysed; amongst respondents flooded above floor level, there were significant differences in the average 'advised' action count between those reporting actions as ineffective and those reporting effective action.

When comparing Tables 3.5 and 3.6 for spontaneous and 'advised' actions amongst respondents flooded above floor level, those reporting action as ineffective report approximately a third of their actions as advised (6.1 out of 17.3) whereas for those reporting actions as effective, the proportion of advised actions increases (10.8 out of 20.4). This demonstrates that when flooding to property is more severe, people taking more 'advised' actions are more likely to report their actions as effective. It is possible that the receipt of advice enables people to better able to prepare for flood by acting upon it; thus, more of their actions in response to flood warning were likely to be 'advised'.

3.2.7 Specific actions

The list of actions contained in the survey were examined with regard to the reporting of effective action.
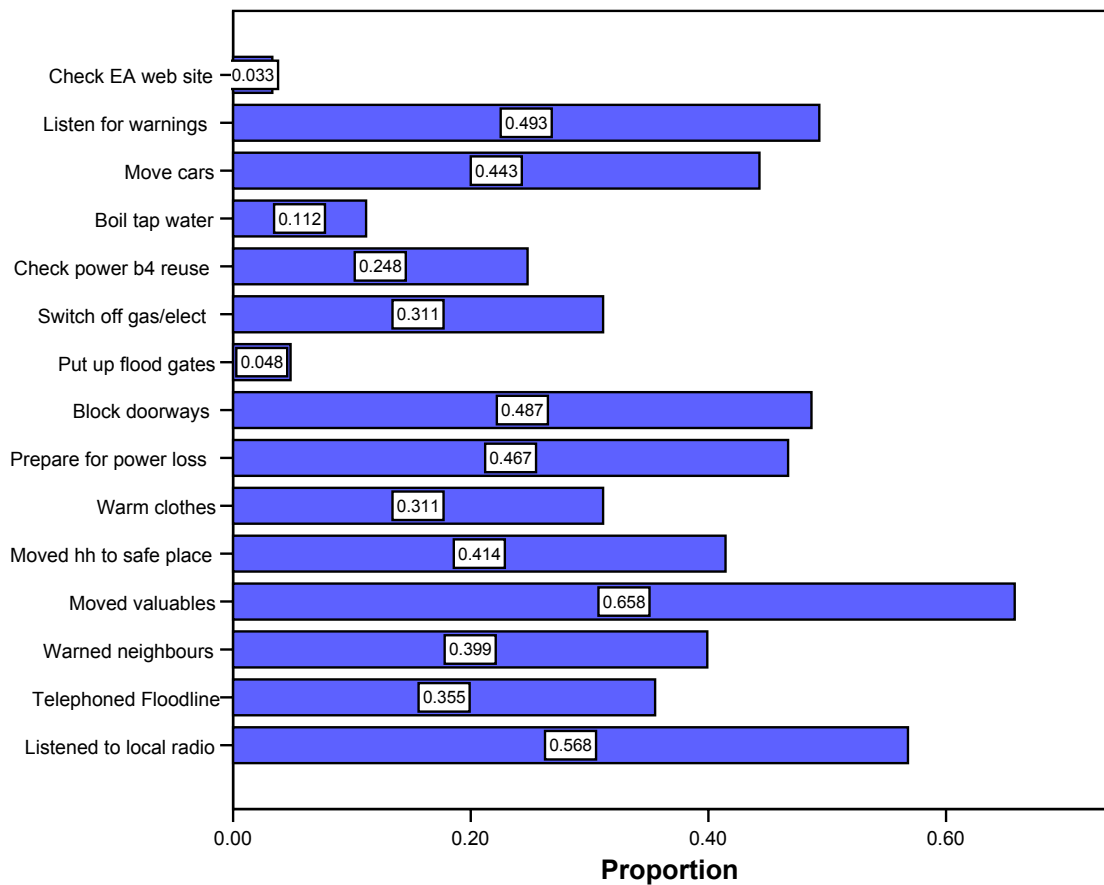
Figure 3.2 Proportion of flooded respondents reporting particular actions effective

Figure 3.2 illustrates the range of actions taken by flood victims. The three most commonly reported actions taken by flood-affected households are, in order of frequency, moving valuables, listening to local radio and listening for warnings.

Table 3.7 details the actions taken where significant differences were found between reports of overall effectiveness.

Table 3.7 Specific actions and the reporting of overall effective action in households flooded above floor level

Group	Action	Took action?	% of respondents who reported their actions as effective	Sig
All flooded respondents	Move cars	Yes (202 of 456) No (254 of 456)	73.3% (148 of 202) 63.4% (161 of 254)	*
Flooded respondents with an 'above floor level' flood	Listen out for warnings	Yes (81 of 145) No (64 of 145)	67.9% (55 of 81) 51.6% (33 of 64)	*
	Move valuables	Yes (126 of 145) No (19 of 145)	65.9% (83 of 126) 26.3% (5 of 19)	**

Source: Post event 2001
Significance: * <0.05: **<0.01: ***<0.001

All flooded respondents who moved cars to safety were significantly more likely to report effective action than those who did not (p=0.025).

For respondents experiencing a severe flood, the following additional actions were also associated with the reporting of action as effective:

- 'Listen out for warnings' (significant at p=0.045).
- 'Move valuable/personal belongings upstairs or to a safe place' (significant at p=0.001).

3.2.8 Demographic factors

The reporting of effective action was explored for any possible influence of demographic factors. The survey collected data on the following demographic variables:

- age;
- sex;
- number in house;
- occupation;
- presence of long term illness in household.

Findings reveal that gender, age and household numbers were not significant factors in the reporting of effective action. Employment status and long term illness were, however, found to be significant in this regard.

Table 3.8 Effective action related to occupation for flooded respondents

Employment status	Percentage of flooded respondents who reported their actions as effective	Significance
Looking after home	84.0% (42 of 50)	**
Working part time	75.0% (33 of 44)	Not significant.
Working full time	66.1% (117 of 177)	Not significant.
Retired	65.2% (90 of 138)	Not significant.
Overall Average	67.8% (309 of 456)	

Significance: * <0.05: **<0.01: ***<0.001
Source: Post event 2001

Table 3.8 shows that the reporting of effective action was not uniform amongst groups of respondents identified by work status. The percentage of flooded respondents who reported their actions as effective varies between 65.2% for 'retired' to 84.0% for 'looking after home'. Significantly, for the 50 respondents (49 female) described as 'looking after home', reported effectiveness was 84.0% (against an average of 67.8%).

This analysis indicates that the percentage of flooded respondents reporting their actions as effective varies with work status, suggesting that the response for a particular household may differ according to which household member completes the survey. The finding that people recorded as 'looking after home' were more likely than those in other categories to report actions as effective may be explained by the increased opportunity for such respondents to take action by virtue of their presence at home.

Table 3.9 Long-term illness and the reporting of effective action

Presence of long standing illness in household	Percentage of respondents reporting actions as effective	Significance level (for Chi square test)
Yes (108)	57.4% (62 of 108)	**
No (347)	70.9 % (246 of 347)	
Overall Average	67.8% (309 of 456)	

Source: Post event 2001
Significance: * <0.05: **<0.01: ***<0.001

Table 3.9 shows that 23.7% (108 of 455) of flooded households reported long term illness present within the household. Flooded respondents with long-term illness in the household were significantly less likely to report effective action than those without such illness (p=0.009).

3.2.9 Multivariate analysis

A logistic regression was carried out, using effective action as a binary dependant variable to determine which of the independent factors influence the likelihood of respondents reporting that the actions they have taken are effective.

Table 3.10 shows that in Model 1, which includes area only as a predictor variable, respondents in Bridgnorth and Tewkesbury were about five times more likely to report effective action than those in Woodford Green, the reference area. Malton and Shrewsbury respondents were about three times as likely, whereas Newark respondents were some 60% less likely to report effective action than those in Woodford Green.

To help explain these differences, two attitudinal variables are introduced in Model 2; whether the respondent felt prepared and whether they understood what to do. All the significant area differences disappear in Model 2 indicating that area differences can be explained by differences in preparedness and understanding. Preparedness was a vital predictor of reporting effective action, with those feeling prepared being nearly 2 and a half times more likely to do so. Understanding what to do, however, was not significant.

Model 3 sees the introduction of factors related to the flood itself: severity and previous flood knowledge. Here, counter to intuition, previous flood knowledge does not significantly increase the likelihood of reporting effective action but severity of flood is a significant factor. Those flooded above floor level were half as likely to report their actions effective. Since these respondents failed to prevent the ingress of flood waters, which was perhaps inevitable, they possibly blame themselves and the ineffectiveness of their actions.

The next model introduces the list of actions presented by the Environment Agency in the questionnaire as actions that some people have found to be effective in the event of a flood. The taking of most of the actions does not significantly affect the reporting of effective actions, although two actions are of note. People who moved their cars are twice as likely to report their actions effective while those who used the web as a means of finding information were significantly less likely to report effective action. However, it should also be noted that the introduction of flood severity in Model 3, and the individual actions to Model 4, resulted in significant areas differences in Malton and Shrewsbury which are now both around three times as likely to report effective action as the reference area, Woodford Green. This would indicate that differences in flood severity in Malton and different actions taken by respondents in Shrewsbury could account for these respondents reporting significantly higher levels of effective action.

The addition of various demographic variables such as gender, age, number in household and the presence of long term illness to the final model did not significantly affect the reporting of effective action, although these did cause the previous area difference (Malton) to disappear. This suggests that the original difference seen here compared with Woodford Green was due to demographic differences. Shrewsbury, however, remains significantly different from Woodford Green indicating that other factors, yet to be measured, are in play.

It can be seen, therefore, that overall preparedness and the severity of the flood event are the main factors influencing the reporting of overall effective action, although other factors remain important in any explanation of area differences.

Table 3.10 Logistic Regression Analysis Predicting Effective Action

		Model 1 Exp(B) 69.6% predicted	Model 2 71.2%	Model 3 71.6%	Model 4 74.4%	Model 5 74.4% predicted
Area	1.00 Woodford Green (86)					
	2.00 Bridgnorth (25)	5.32*	3.06	2.9	3.02	2.8
	3.00 Gloucester (20)	0.89	0.62	0.79	1.06	1.05
	4.00 Maidstone (78)	1.54	1.24	1.54	1.91	1.77
	5.00 Malton (78)	2.65*	2.02	2.53*	2.57*	2.61
	6.00 Newark (30)	0.42*	0.45	0.6	0.64	0.66
	7.00 Nottingham (25)	1.29	1.15	1.23	0.92	0.92
	8.00 Shrewsbury (38)	2.33*	2.07	1.87	3.18*	3.3*
	9.00 Tenbury Wells (1)	(N=1!)				
	10.00 Tewkesbury (22)	4.59*	3.09	2.76	4.75	4.95
	11.00 Arundel(11)	1.93	1.52	1.61	4.11	4.77
	12.00 Worcester (20)	1.35	1.19	1.2	2.13	2.24
If felt prepared	Yes		2.44***	2.26*	2.56**	2.57***
If understood what to do	Yes		1.42	1.36	1.49	1.43
If flood above floor level				0.51*	0.28***	0.28***
If flooded before				1.34	1.36	1.43
Actions	Listened to local radio				1.12	1.1
	Telephoned Floodline				1.20	1.21
	Warned neighbours				1.13	1.12
	Moved valuables				2.35	2.1

	Moved hh to safe place	1.33	1.25
	Warm clothes	1.00	1.08
	Prepare for power loss	0.79	0.75
	Block doorways	1.70	1.75
	Put up flood gates	0.61	0.67
	Switch off gas/elect	1.19	1.23
	Check power b4 reuse	0.97	0.88
	Boil tap water	1.34	1.24
	Move cars	1.93*	1.99*
	Listen f or warnings	1.06	1.062
	Check EA web site	0.16**	0.16**
Weighted actions	up to 7		
	8-14	0.97	1.07
	15-21	0.81	0.96
	22-28	0.31	0.38
	29+	0.89	1.02
Sex	Female		1.13
Age groups	16-34		
	35-54		1.17
	55+		0.82
Work status	Not working		1.5
Long term illness	No long term illness		1.66
Number in HH	1		
	2		1.25
	3		1.65
	4		1.04
	5+		0.76

Significance: * <0.05: **<0.01: ***<0.001

3.3 Conclusions

The secondary data analysis was designed to isolate factors measured in the survey that might have an effect upon the reporting of actions as effective by survey respondents. Significant findings from this analysis are reported below.

3.3.1 Effect of flood severity

Flood severity was found to have a significant effect whereby the reporting of effective action was significantly reduced in households experiencing severe flooding.

3.3.2 Effect of background events prior to the flood

The secondary analysis found that previous experience of floods and the receipt of information and advice from respected sources in the period before a flood could increase the percentages of flooded respondents reporting that actions taken were effective.

3.3.3 Flood warning factors

The receipt of appropriate and timely warnings in the face of imminent flood significantly raised the percentage of flooded respondents that reported their actions as effective. The underlying reasons remain unclear. It may be that warnings are more likely to be heeded where more than one type of warning is received, or that being given sufficient time to act after receiving a warning reinforces the overall feeling of being well prepared for flooding.

3.3.4 Actions taken to mitigate flood damage

Some individual actions (e.g. moving vehicles to safety) were significantly associated with the reporting of effective action by all flooded respondents, regardless of flood severity. Severity, however, seemed to have an additional influence on the reporting of effective action, especially by those taking more and different types of action. Not only did people who reported actions as effective take significantly more actions in severe flood events than those reporting actions as not effective, there was also evidence that the types of action deemed to be effective vary with flood severity. For example, 'moving valuables upstairs' was positively associated with the reporting of actions as effective amongst those flooded above floor level, but not so for those who were flooded less severely.

With regard to actions taken following a flood warning, the importance of specific advice in the reporting of effective actions is also supported by the analysis. Where flooding was above floor level, a significantly greater proportion of action was 'advised' amongst those reporting effective actions than amongst those whose actions were seen as not effective.

3.3.5 Demographic factors

The analysis suggests the reporting of action as effective may be affected by two demographic characteristics: respondents' work status and long term illness within the household.

Respondents who fell into the category 'looking after home' were significantly more likely than average to report effective action.

Respondents reporting the presence of long term illness were significantly less likely to report effective action. It may be that such households have reduced scope for effective action, or may define effectiveness in a different way from those households where long-term illness is not present.

3.3.6 Multivariate analysis

A logistic regression, modelling all significant factors in one analysis, concluded that the most significant factor in predicting the likelihood of reporting effective action is a perception of being prepared for the flood.

The finding that those suffering extreme flood situations report their actions as less effective may simply be a consequence of a logical conclusion on the part of respondents that despite all their actions, they could not prevent water from entering and damaging their property.

Thus the secondary analysis provides evidence that the *reporting* of effective action can be significantly affected by factors such as advice received, warning times and so on, irrespective of the number and type of actual actions taken. It also suggests that the amount of notice given by flood warning might affect people's ability to take effective action and it is possible that reduced (or zero) warning time might result in fewer or different actions.

4 Qualitative study

4.1 Introduction

The qualitative research study reported here formed the second stage of the project. For clarity, it is presented in five sections.   Section 4.2 states the aims and objectives of this qualitative component of the project. Section 4.3 outlines the chosen methodologies and describes the sample. Findings are presented in Section 4.4, followed by a concluding summary in Section 4.5.

This second stage of the research project was designed to develop a rich understanding of how the 'at flood risk' public understand, interpret and respond to flood warnings. Knowledge gained from the Literature Review and Secondary Analysis informed the choice of topics for the qualitative interviews described here. In their turn, the interview findings were used to inform the survey that formed the final stage of the research.

4.2 Aims and objectives of qualitative study

The aim of this qualitative study was to provide a detailed understanding of the ways in which the 'at flood risk' public understand, interpret and respond to flood warnings.

In brief, the research objectives of this qualitative component were as follows:

- to investigate current levels of public awareness and understanding of Environment Agency flood warning codes;
- to understand the impacts of and preferences for different methods of flood warning dissemination and the reasons underlying any differences in impact and preference;
- to establish actions taken on receipt of flood warning by victims of flood event and reasons for such actions;
- to establish intended actions on receipt of flood warning by people at risk of flood but not yet flooded;
- to understand what motivates and constrains specific actions (or intended actions) on receipt of flood warning;
- to examine the differential impacts of Environment Agency flood warning code levels (and/or other indicators of flood risk) on actions or intended actions;
- to examine any differential impacts of flood warning dissemination methods on actions or intended actions;
- to determine what constitutes 'effective action' for at-risk individuals on receipt of flood warning within their social context;
- to inform the large-scale survey conducted in Stage Three of the project.

4.3 Method

In order to meet these aims, qualitative research was undertaken with members of various categories of people living in areas at risk of flooding in three Environment Agency Regions and Wales. The selection of at-risk categories and locations was determined in collaboration with the Environment Agency. Data collection took place in the period between early October 2004 and January 2005.

Two complementary methods of qualitative data collection were used: focus groups and individual in-depth interviews. In both cases, the main focus of investigation was the at-risk public's *understanding* and *interpretation* of Environment Agency's flood warning codes, and how individuals *act (or intend to act)* in response to flood warnings. The rationale for using two types of interview technique was to obtain data that were as rich and diverse as possible.

Focus groups allow information to be collected from a large number of participants within a short timeframe, yielding a wide spread of responses and encouraging the discussion and development of ideas within a group setting.

Individual in-depth interviews were conducted in the interviewee's home. This method permitted us to explore areas of interest in greater detail, with a focus on flood-warning actions taking into account situational cues around the home. Previous research carried out by the University of Surrey for the Environment Agency demonstrates that respondents often use their home environment as a memory aid during discussion of prior flood-related action (Environment Agency, 2005) This could yield information that may be 'lost' in a focus group setting (Thrush et al 2005b; McCarthy, 2003). Research indicates that interviewing flood-affected people in their own homes stimulates discussion, facilitating a more detailed and realistic account of actions and priorities on receipt of a warning and affording the researcher a richer understanding of the contexts and reasons underlying action (Thrush et al 2005b; McCarthy 2004). In the case of people at risk but not previously flooded, these interviews allowed them to use their home surroundings as a cue whilst considering possible actions and priorities rather than providing decontextualised answers.

Home-based interviews also allow for other family members to be present thus facilitating a wider understanding of other views, actions and possible barriers to action within the family setting. They also permit an evaluation of those aspects of individuals' social and domestic environments that may in themselves mediate action.

4.3.1   Category and area selection

Category selection
Two principal categories of the at-risk public were the focus of investigation: people already affected by flooding and people at risk but with no prior experience of flooding. This enabled us to examine how past experience shapes people's reception and perception of warnings, as well as their preferences for different methods of delivery.

Within these two broad categories, our participants were representative of the population at risk with regard to receiving and responding to flood warnings. Particular categories of interest included: older people; parents with young children; owner

occupiers; people in rented accommodation; people with disability or limiting long-term illness; members of minority ethnic groups; and owners of commercial properties.

Area selection
As the Environment Agency is responsible for both fluvial and tidal flooding, it was important that the data collection sites should provide examples of both types of risk. They should also constitute a wide geographical and regional spread and incorporate varying types of flood (for example, fluvial flooding with long lead time, flash flood, surface water flooding).

Three Environment Agency Regions and Wales were chosen for investigation. As the sites should in their totality yield a diverse range of at-risk groups, it was necessary in some cases to visit more than one site in a given Region. Locations chosen for data collection are shown in Table 4.1.

Table 4.1 Locations chosen for data collection

Environment Agency Region	Locations	Risk of Flood from:
North East	Skinningrove; Hedon nr Hull; Scarborough	Tidal/Fluvial and Surface Water
Thames	Purley on Thames; Chertsey; Woking; Ilford; Medmenham; Hambleden	Fluvial and Surface Water
Southern	Eastbourne; Yarmouth, IoW	Tidal/Fluvial
Wales	St Asaph	Fluvial

4.3.2   The sample

The sample was drawn from residents in tidal and fluvial flood plains within the chosen locations who fell into one or more of our categories of interest. Category decisions for each area were informed by the availability of target populations within the locality.

We included residents of several different property types: old and new properties; flats; bungalows; sheltered housing; stone houses as well as brick. In order to determine whether or not there might be any differences in response between owner-occupiers and tenants, the sample also included people who rented their homes (Council and Housing Association tenants as well as private renters).

In order to access what might be termed an 'expert lay view' of effective response to flood warning, we extended our sample to include three members of Flood Action Groups (FAGs).

A total of 129 people took part in this study.

4.3.3 The focus groups

Eighteen focus groups, each lasting between one and a half and two hours, were held across the chosen locations. Recruitment was undertaken using a snow-balling method. For each location, an initial approach was made to local Environment Agency officers in order to access Flood Action Groups and similar organisations. Communication with these and other groups, including Local Authorities, Residents' and Community groups, Voluntary Services, then enabled us to recruit suitable participants from our target population. Focus groups contained between three and ten participants, each of whom was offered a small financial incentive for giving up their time.

Table 4.2 summarises the focus groups conducted in each Region.

Table 4.2: Details of focus group research categories for tidal and fluvial at-risk areas.

	Area at risk of tidal flood	Area at risk of fluvial flood
People already flooded	**North East Region** • Parents of Young Children • Owner Occupiers Tenants	**Thames Region** • Older People • Parents of Young Children • Owner Occupiers (2 groups)
People at risk but not yet flooded	**Southern Region** • Older People • Parents of Young Children • Tenants • People with Disability/Long-term Illness Commercial Owners	**Wales** • Older People • Parents of Young Children • Owner Occupiers • Tenants • People with Disability/Long-term Illness **Thames Region** Minority Ethnic Group*
Total number of Focus Groups : 18 Total number of Participants: 102		
* This group, planned for inclusion in the cell above, was found to have had no experience of flooding.		

Rather than using only the free-flowing and participant-led discussion common in focus group methodology, these group interviews began by following a specific structure in order to explore elements of public understanding and awareness with regard to flood warning codes. We drew on methods common within advertising research in order to

examine participants' unprompted and prompted awareness of the Environment Agency's flood warning codes. Using visual aids (cards showing the images and titles for each of the flood warning codes), participants' understanding of these warnings and their sequence was explored further.

Participants' actions in response to the three Environment Agency levels of flood warning were examined in detail (or, in the case of non-flooded participants, their intended or likely responses). We addressed the past actions of people with experience of flooding and asked how those might differ should a similar event recur. A particular focus of the study was the subjective meaning that is attached by members of the at-risk public to each warning code: what is it that triggers action on receipt of a flood warning; what factors might hinder or prevent action; and what constitutes 'effective action' for people at risk of flooding.

Finally, we investigated the degree of trust and satisfaction expressed by our participants with regard to flood warnings, their access to warnings (including those from sources other than the Environment Agency itself) and their preferences for various methods of warning dissemination.

A copy of the focus group topic guide appears in the Appendix 3.

With the prior permission of participants, all focus groups were audio-recorded and then transcribed in full; data were analysed using MaxQDA software.

4.3.4 In-depth interviews

Eighteen in-depth interviews took place throughout our chosen locations with respondents who were recruited through focus group or other contacts; one of these interviewees was also a Flood Action Group member. A further two interviews were conducted with FAG members from Skinningrove (North East Region) and Chertsey (Thames Region). Here again, all interviewees were offered a small financial incentive for taking part.

Interviews took place within respondents' homes in order to allow the surroundings to act as a visual prompt. As the interviews were based in the home, there were many instances where other family members were present, including spouses or partners children and older dependents. The number of people seen during this phase of the research therefore totalled twenty-seven. A summary of these interviews is given in Table 4.3.

Table 4.3: Details of in-depth interviews in tidal and fluvial at-risk areas.

	Area at Risk of Tidal Flood	Area at Risk of Fluvial Flood
People already flooded	North East Region • Older Couple • Older People x 2 • Parent of Young Child • Owner Occupier • Commercial Owner • FAG member	Thames Region • Older Couple • Owner Occupier • FAG member • Person with Disability (also FAG member) • Parents of Young Children x 2
People at risk but not yet flooded	Southern Region • Older Person • Parents of Young Children	Wales • Older Person • Parents of Young Children • Owner Occupiers x 2 • Person with Disability
Total number of Interviews : 20	Total number of Interviewees: 27	

The interview schedule contained topics for discussion rather than pre-determined questions. Conversation was intended to be free-flowing with topics raised in no fixed order, an approach that enabled interviewees to address issues in their own terms and identify areas of particular interest or importance. Interviews lasted between an hour and an hour and a half. All except one were audio-recorded and transcribed in full; permission for audio-taping was refused in one instance. Data were analysed using MaxQDA software.

4.4 Findings

This section reports the findings from our focus groups and home-based interviews. It is presented in four parts, one covering each of the principal research questions. The first addresses public understanding and awareness of Environment Agency flood warnings, their reported satisfaction and trust in such warnings, and their use of and preferences regarding alternative or additional methods of warning. The second reports on public response to flood warning in terms of actions taken, including reported barriers to action. The third part deals with effective action in response to flood warning and the fourth covers preparation against possible future flooding.

4.4.1 Public awareness and understanding of flood warnings

This area of questioning covered the four flood warning codes used by the Environment Agency: Flood Watch; Flood Warning; Severe Flood Warning; and All

Clear. Participants were first asked what they knew of these flood warnings before being prompted with cards depicting the various codes. We aimed to find answers to the following questions:

- Is the at-risk public aware of the Environment Agency's flood warning system?
- Do they receive flood warnings from the Environment Agency and, if so, by what means?
- Are flood warnings correctly interpreted?
- How does the public understand and define the various levels of warning?

4.4.1.1 Public awareness of Environment Agency flood warnings

We found marked differences in awareness and knowledge of Environment Agency flood warnings between our two principal categories of respondent: people with prior experience of flooding ('flooded') and people at risk but not yet flooded ('at-risk'). Those with previous experience of flooding were more familiar with and knowledgeable about the Environment Agency's warning system. They were far more likely to be aware of warnings, to receive them (usually via the AVM service) and to interpret them correctly; most were familiar with Floodline and many knew the quick-dial number for their own area. Almost everyone in the 'flooded' category was familiar with the flood warning codes and their meaning, many of them without the aid of prompt cards; the few exceptions included some residents of Skinningrove where a Flood Warden scheme is in operation.

Few in the 'at-risk' category appeared to have any knowledge of the Environment Agency's flood warning codes or of its warning services (Floodline; AVM etc.). Some said that they *'hadn't a clue who to contact'* in the event of a possible flood event. Even when the prompt cards were shown, many people failed to recognise any of the flood warning codes and claimed not to have seen or heard of them.   Several people appeared to have received no flood warning information from the Environment Agency, especially, though not exclusively, where they were relatively new to an area:

M: Nothing has ever been explained to me about the flood warning. The only thing I've seen is what comes up on weather forecasts on the television. (At-Risk Focus Group: Tenants; Southern Region)

During subsequent discussion regarding the meaning of the warning messages, several at-risk participants displayed considerable confusion over the various levels of warning code, especially over the differences between a Flood Watch and Flood Warning. Of the four Environment Agency codes, Flood Watch was the one most frequently misinterpreted. A few people understood this code to mean that they themselves were responsible for conveying information to the Environment Agency:

M: It could be that there's people about watching the river and warning the traffic – I don't know. (At-Risk Group: Owner Occupiers; Wales)

M: It's like a neighbourhood watch.   They are asking people to give them information about streams…or a river rising quicker than normal, and to 'phone in' (At-Risk Focus Group: Commercial Owners; Southern Region)

On the other hand, most participants, regardless of category, correctly understood the meaning of Severe Flood Warning, although only one person included threat to life in defining this code level.   Almost everyone felt that this particular warning level was 'useful' and most explanations included the need to take some form of action.

F: It is the only warning that I would take seriously ('Flooded' Focus Group: Owner Occupiers; Thames Region)

F: Oh yes, if there's a big flood warning then it's very serious and you have to take precautions (At-Risk Focus Group: Disabled People; Southern Region)

M: It's definitely wellies and sea boots on and get stuck in. ('Flooded' Focus Group: Owner Occupiers; North East Region)

It was not only people in the at-risk groups who said they would not do anything except 'be prepared' unless they received a warning of this severity; even some of the previously flooded participants said they would defer taking action until a Severe Flood Warning was in force. A few people in this latter category believed that Flood Watch and Flood Warning were given by the Environment Agency in order 'to cover themselves'. More usually, however, their reasoning was based on situational determinants (for example knowledge of their local flood conditions) rather than misunderstanding.

Although a great many participants, regardless of category, were unfamiliar with the All Clear message, its meaning was correctly understood by everyone.   Phrases such as *'revert back to normal'*, *'everything's fine'* and *'start mopping up!'* were used to define this particular code.

Few people in the 'at-risk' category were aware that the Environment Agency does not necessarily issue all three levels of warning for every impending flood event.   There was a widespread belief that one code level would follow another; accordingly, many of these people said that they would wait for a Severe Flood Warning before taking any action.

One man summarised the concerns of many of our at-risk participants, saying:

M: You've got to educate people as to what a warning is and how it's going to be put to you……we've come to this meeting but you just think of how many people who are involved who don't know anything (At-Risk Focus Group: Tenants: Southern Region)

Summary points: awareness and understanding of Environment Agency warning codes

- Marked differences were found between 'at-risk' and 'flooded' participants.
- People with flood experience tend to be familiar with Environment Agency flood warning codes, to receive them, and to interpret them correctly.
- Levels of familiarity and understanding regarding warnings were very low in the 'at-risk' category.
- There was confusion regarding the meaning of Flood Watch.
- Severe Flood Warning was understood by most participants.
- Widespread belief that warnings are issued in a series; many would wait for the most severe before responding.

4.4.1.2 Levels of satisfaction with existing flood warnings

In order to determine the level of public satisfaction with the Environment Agency flood warning system, we asked our participants the following questions:

- Were they satisfied with current Environment Agency warnings with regard to their message?
- Were they satisfied with the existing means of warning dissemination?
- What other terms or dissemination methods would they prefer?

The majority of people in the 'flooded' category, though not all, appeared relatively satisfied with the existing system, both in terms of the warning messages themselves and they way in which they were disseminated. However this was not the case with the 'at-risk' groups, where many people expressed concerns covering several aspects of current flood warning messages.

4.4.1.3 Satisfaction with flood warning messages

Criticisms were made of the messages themselves, in terms of the wording, the similarity of the three warning icons and, most importantly, the specificity/accuracy of the warning itself.

Many people felt that the warnings should indicate a greater sense of urgency, particularly the Flood Warning code. Suggested improvements for the current terminology included the addition of phrases such as 'Act Now' or 'Danger'. The need to differentiate more clearly between a Flood Watch and a Flood Warning was a common complaint.

M: I know there's always a danger if you put too much information on a sign it won't be read or it will be lost, but I think it needs to be a bit more realistic with the wording …with the Flood Warning, if it had 'imminent' on it, it would make it a little bit more real I think. (At-Risk Focus Group: Disabled People; Southern Region)

Other suggestions focused on changes to the icons, which were criticised for being unclear and insufficiently arresting. Several people said they would prefer to do without the house pictograms altogether since they were so similar as to be *'meaningless'*; many felt that the words carried the more potent message.

M: The three icons are so similar that they don't carry the weight that they should do.

M: We don't recognise symbols.   They don't always present anything into my mind, whereas words do. They don't make an impact on us ('Flooded' Focus Group: Owner Occupiers: Thames Region)

The warning triangle symbol, however, was widely understood as a danger signal and came in for universal approval. One man suggested including a pictorial figure in the house icon (along the lines of pedestrian crossing signals).

A major cause for complaint, common amongst all our participants regardless of category membership, was the specificity and accuracy of flood warnings.   The rate at which a watercourse was expected to rise was a vital piece of information for many of our participants.

M: I never do anything when I've got the [EA warning]…because it's just not accurate enough. It is the rate of rise that is important ('Flooded' Focus Group: Owner Occupiers: Thames Region)

M: I find these flood warnings useless. A complete and utter waste of time. It's like driving down the motorway and seeing signs that say fog, well you know it's foggy because you're in it. Floods don't just happen…it takes quite a long time – a period of days with prolonged rain and everybody listening to the weather forecast…walking down to the bottom of Ferry Lane and seeing the river coming up…We don't need warnings to tell us that. I can just look out of my window. ('Flooded' Focus Group: Owner Occupiers: Thames Region)

Our participants said they need to know the expected maximum height of the watercourse (or water table) and the estimated time before that occurs.

M: That is the detail, that's what I want to know, the practical, useful information. That is what forces me to do something. ('Flooded' Focus Group: Owner Occupiers: Thames Region)

In some of the areas at-risk of tidal flood, or where flooding may be exacerbated by tide conditions, several participants felt that the information given by (or perhaps available to) the Environment Agency was insufficiently accurate to be of use:

M: The AVM parameters miss the special circumstances for this locality.   They are not predictable by wind or wave or isobaric pressure ('Flooded' Interviewee: Commercial Owner: North East Region)

There were many instances where warnings were heavily criticised for being *'a bit vague'* and often *'too general'* in terms of the area under threat; it was felt that local

conditions were often ignored with the result that people were often left feeling uncertain about whether or not to react.

F: The Environment Agency have the knowledge to know specifically whether our stretch is going to flood, so I think they should be more tailored for the individual village. ('Flooded' Focus Group: Owner Occupiers: Thames Region)

F: On a day like today, they'd be ringing saying there's a Flood Warning. Well, is there? I don't think so. They ring with completely inappropriate advice for our close. It's more of a global message…I don't want to know if Guildford's getting flooded. ('Flooded' Interviewee: Owner Occupier: Thames Region)

People said they wanted to receive a warning which they knew was applicable to their own locality. Being warned inappropriately was seen as engendering a further risk of complacency in response to flood warnings. Several participants commented on the size of the area for which a warning was issued:

F: They start at Beachy Head and go to Hastings. Now we're living in Eastbourne; that seems to be a terribly wide area…if they can do the automation for Beachy Head to Hastings, why can't they be more specific for us? (At-Risk Focus Group: Owner Occupiers; Southern Region)

Only one criticism was levelled at the 'All Clear' message. Residents in certain areas, especially where floodwaters might come from more than one source, were fearful that it could lull them into a sense of false security:

F: When it says All Clear I don't think it's giving [the right message]. I think it's just at the latter end of [the flooding] because we've got to consider the amount of water that's still coming down to us. I would wait a couple of days.
F: I think you've still got to be aware…any blockages or anything; the water could have been backed up and what have you. ('Flooded' Focus Group: Parents: North East Region)

Several people felt that receiving the All Clear was important because *'until you've been told, you could think there's a flood warning for weeks'*. Many of our participants, however, said that they had never seen or heard this message even following a flood event or flood warning.

The '*old-fashioned traffic lights*' system, using colours rather than words to define the four levels of warning status, was mentioned (unprompted) by a large number of our respondents, including people with prior experience of flooding and a member of a Flood Action Group. This system was considered 'ideal' by many people for several reasons, including the fact that it is 'far more striking', it clearly defines the hierarchy of flood risk, and is easily understood by people who may have difficulties reading English. The following extract was typical of comments concerning this colour-code method:

M: If they had said a red flood warning, then that rings bells much more than severe warning does

F: The red, amber and green was the most satisfactory really. We all understand that.

M: …..you can't remember the levels but red, yellow, green means something.

F: Red is in our heads as danger, isn't it. (At-Risk Focus Group: Owner Occupiers; Southern Region)

The following comment, however, demonstrates that even a '*universally recognised warning*' can be understood in different ways:

F: Traffic light colours would really highlight at what stage you should be moving [out of your property]. Red as stop and listen, yellow as you may have to take action, and green as you've got to move. (At-Risk Focus Group: People with Disability; Southern Region)

4.4.1.4 Satisfaction with flood warning dissemination

One of the principal concerns expressed by our participants was to do with the number of warnings issued. In some cases, as in St Asaph for example, people complained that early levels of warning were not made known to the public:

M: There isn't sufficient warning with Flood Watch. We don't get phone calls saying there is a Flood Watch. If we ring up we are told but not unless we ring up. (At-Risk Focus Group: Older People; Wales)

In other cases, people complained that there were too many warnings and that, because of this perceived excess, a feeling of complacency might set in:

M: You tend not to pay attention because there's too many of them. (At-Risk Focus Group: Older People; Wales)

False alarms were generally preferred to no warning at all, and many participants expressed gratitude for the AVM service. A few people, however, said that they had opted out of the service because they were made anxious by receiving calls during the night, especially when they were considered '*unnecessary*':

F: It was horrible. You panic if you get a phone call at two o'clock in the morning and you don't know what it's for. (At-Risk Focus Group: Owner Occupiers; Southern Region)

F: The first time they 'phoned at night, I thought oh my God and got up to have a look obviously – well, what flood warning? There was no water in the road at all, not at any point…and the annoying thing is that you can't put the phone down or it will keep ringing because you haven't listened to the whole of the message. It rabbits on and on...and it isn't appropriate to what is happening out here… It's a complete pain in the you-know-what, it drove me mad.. ('Flooded' Interviewee: Owner Occupier: Thames Region)

Other complaints focused on the difficulties that were sometimes experienced when trying to gain additional information. Although access to Floodline appeared to be easy, several of our participants said that telephoning the service was particularly problematic. Many said that accessing Floodline by 'phone was unnecessarily long-winded, deterring them from calling a second time:

F: I did try ringing Floodline and it is so complicated, it is unreal…By 'phone it is just a nightmare ad I just gave up. I'm used to automated systems, I used to work at a Call Centre myself, I know all about them. But that automated system,…you've got to be sitting there with a pen and paper taking down all the details, and you've got to know exactly where you live. I know that sounds silly but I'm not from this area and I don't know… And you're supposed to take down all these numbers…not just one…you have to take down at least four. Honestly, it's absolutely ludicrous, you have to be pretty clever to do that. The next time you ring, you can just input those numbers, but it never seems to work properly. ('Flooded' Focus Group: Owner Occ; Hedon)

One other criticism concerned the flood warning literature. A man said that his newly acquired leaflet was out of date, resulting in him telephoning an incorrect number:

M: I rang and was just told I'd dialled the wrong number. I was amazed that it didn't even tell me the correct number to dial. I mean it's not very good in an emergency situation to be told the number you've got is incorrect. (At-Risk Focus Group: Commercial Owners; Southern Region)

The Minority Ethnic group raised issues about provision of Environment Agency literature in languages other than English. Even though they were living in an at-risk area, no one knew that this was available, nor how they could access it. Receiving flood warnings in their first language (Gujarati in this case) was seen as particularly important for the older generation.

4.4.1.5 Preferences and suggestions regarding methods of warning dissemination

When asked what method of warning dissemination they preferred from the Environment Agency, most people said that telephoned warnings (for example the AVM) suited them best, even though this may not be the only means of warning that they relied on. The service for mobile telephones was also useful, particularly when people were away from home.

F: It's much more instant, the telephone. (Parents: Skinningrove)

F: The automated message is fine for your initial warning ('Flooded' Interviewee: Parent: Thames Region)

Many used telephone warnings in conjunction with accessing Floodline. A majority, including those who for whom an AVM service was currently not available, said they would also utilise Floodline , warnings from the media (especially local radio), family and neighbours and/or their own observations. Only a few people said that they would not want to join the AVM scheme, or had already withdrawn from it. Some people highlighted other possible problems with telephoned warnings, including that not every

household has a telephone service; in some households the 'phone line is very often engaged for lengthy periods; non-English-speaking family members may ignore such warnings; recorded messages may cause anxiety in some cases, particularly for older people.

Additional methods of warning dissemination suggested by our participants included a tannoy or loudhailer system (something mentioned frequently, especially by older people), sirens or bells, and road signage.

M: Well ideally I'd say the old type of air raid siren is the best ('Flooded' Focus Group: Owner Occupiers; North East Region)

F: If I had that job, I'd get the biggest bloody bell I could find and I'd be in the middle of that street…people would come to their windows …it's an old-fashioned way but it would work. ('Flooded' Interviewee: Owner Occupier: North East Region)

M: A loud hailer is the fairest way because everybody would hear it in the vicinity ('Flooded' Focus Group: Owner Occupiers; North East Region)

M: The thing that would galvanise me into action would be loud-hailers in the streets (At-risk Focus Group: Disabled People: Southern Region)

M: Flood Watch signs could be placed at certain places along the road or in the lower part of the city, telling people there is a Flood Watch at the present time. (At-Risk Focus Group: Older People; Wales)

In coastal areas, participants included the use of flares and the involvement of the Coastguard service and RNLI amongst their preferred means of warning.   Both these services were considered to have a more expert and valuable knowledge that would be of great advantage to local residents (and the Environment Agency) during threat of flood.

M: These old seadogs can tell which side of the dog bowl the dog eats from – there is so much experience in the RNLI.   They should be the ones to trigger the flood warnings for sea flooding. ('Flooded' Interviewee: Commercial Owner: North East Region)

People at risk of tidal flooding also highlighted the need for the public to be alerted to high tides (that is spring tides), especially where adverse weather conditions such as low pressure or heavy breezes are likely to coincide. One man suggested that rather than sending out flood warning packs (*'bloody rubbish – half of it gets thrown away'),* the Environment Agency could produce (perhaps on an area basis) a calendar containing flood warning information incorporating relevant details of tide conditions.

In a small rural village where an AVM service was not available since flooding resulted from a high water table, residents spoke of the value of information posted by local Councillors on the Parish noticeboards. Community-led warnings were especially useful in areas such as these.

A great many people said that they wanted to have access to local (and therefore more specific) information than they considered was available from Floodline. They highlighted the need for someone who could act as a point of contact, passing on local

knowledge and; the majority of participants said they preferred personal contact to a recorded voice.   In addition to the obvious advantages of providing reassurance (especially valuable for vulnerable individuals such as frail, older people), participants felt that the information they gained from a 'real person' was often more accurate and pertinent to their situation. Sometimes this could be provided by an Environment Agency officer, sometimes by a member of another organisation (a water research institute was mentioned as an example), and sometimes by a local resident or official. Flood wardens were considered by almost everyone to be a desirable addition to the existing battery of flood warning provision.

F: To have that personal contact, and that more localised information, that is very important…especially when you're having a moment of anxiety about it ('Flooded' Interviewee: Parent: Thames Region)

M: [Floodline] to me is only just another number to phone up. I would personally prefer to have the mobile number of a local warden…more based on local knowledge. (At-Risk Interview: Owner Occupier: Wales)

Summary points: satisfaction with existing flood warning methods

- 'Flooded' groups were more satisfied than 'at-risk' groups with Environment Agency messages and dissemination methods.
- Both categories criticised message content (icons; wording).
- Warnings need to be accurate and more specific to the locality under threat.
- Many would prefer a colour-coded system ('traffic-lights').
- 'False alarms' preferable to no warning.
- Telephone access to Floodline can be problematic.
- AVM service appropriate for most participants, but not all.
- Alternative suggestions for dissemination: siren; tannoy; road signs; RNLI etc.
- Flood warden or equivalent seen as an important addition in flood warning.

4.4.1.6 Alternative methods of flood warning currently used by the at-risk public and levels of trust in different types of flood warning

We asked whether or not members of the at-risk public used any other means of warning against impending flood and, if so, what these might be. We also explored the level of trust placed in the various types of flood warning available to the at-risk public, including those issued by the Environment Agency.

- What, if any, other (non-Environment Agency) means of flood warning are used by the at-risk public?

- Are they used alone or in combination with the Environment Agency's flood warning methods?

- How much trust do they place in these various methods of flood warning (Environment Agency and non-Environment Agency)?

Our findings revealed several methods of flood warning other than those issued by the Environment Agency. A considerable number of participants used visual cues to monitor their local watercourse or other indicators of impending flood: rising river levels; 'markers' (for example brick courses in river bridges); surface water on roads, gardens, fields; or the appearance of river waters.

M: You watch the river and the surface drain water as they creep down the road, as soon as they meet, then you start moving stuff up because you've got about half an hour or an hour at the most. ('Flooded' Focus Group: Owner Occupiers: Thames Region)

F: You do notice a lot of people with their wellies on going to certain points…it's experience over the years that people know if it is [at that mark] then it's going to be problems. (At-Risk Focus Group: Older People: Wales)

F: When it looks like molten chocolate, then you think 'oh'!. (At-Risk Focus Group: Older People: Wales)

Local knowledge played an important part in interpreting conditions, especially where an area was affected by the tides:

F: When the river's high some days there's hardly anyone on the bridge…but when the weather's picking up then they're there (At-Risk Interviewee: Parent: Wales)

An observation of weather patterns and rainfall was also mentioned by many people; prolonged period of heavy rain prompted the majority of our 'flooded' participants to be alert to the danger of impending flood. Tide conditions, combined with local weather, were important warning signals for some of those living in coastal areas.

M: I have a rain gauge at home. I've been recording rainfall for a number of years and I know if there's been heavy rainfall in the last couple of days that the river's going to go up quite quickly. (At-Risk Focus Group: Older People: Wales)

M: I'm aware of always looking at the flood tables in the local paper to see how high the tides are, particularly at spring tides and March and September/October.
F: Spring tide, a gale and a sou'westerly.
(At-Risk Focus Group: Owner Occupiers: Southern Region)

Local Environment Agency officers (and occasionally Council officials) were sources of information in some cases, and local media, radio stations in particular, was highlighted by a number of participants. Weather forecasts on national TV were also mentioned. Where expert knowledge was available (i.e. a water research institute in the Thames area), some people used this as a means of flood warning.

F: Watching out on television for warnings coming through…listening to news and listening to local people, more than anything else. ('Flooded' Focus Group: Owner Occupiers: North East Region)

A reliance on others in the local community was highlighted by the majority of our participants as a commonly used means of warning. People appeared to be very vigilant particularly in bad weather and neighbours, especially those with previous flood

experience, were seen as providing a valuable early warning. Local emergency services (and local Environment Agency officers) provided an indicator too.

M: If it looked bad, then I can guarantee xxx would be round knocking on people's doors, giving people numbers and that sort of thing…they are then in a position where they are getting regular updates on the borehole, water heights and so on ('Flooded' Focus Group: Owner Occupiers: Thames Region)

M: When we see the fire brigade pumping out down here, we think 'oh'. (At-Risk Focus Group: Parents: Wales)

In some cases, participants were wholly reliant on non-Environment Agency warnings. Included here was a vulnerable older couple (one of whom was disabled) who knew nothing of the Environment Agency's warning provision, nor where they could access it. In many others, however, people received a combination of warning methods that included messages from the Environment Agency, whether direct (for example AVM) or second-hand (for example via a local flood warden).

The question of the degree of trust placed in flood warnings from the Environment Agency and from other sources was put to all our participants.   Responses varied widely along a continuum from a total reliance on Environment Agency warnings to those where little or no notice was taken of them and faith was lodged purely in information gained by other means.

M: The Environment [Agency] of course. I mean they are the people who are around us in those conditions. (At-Risk Focus Group: Older People: Wales)

F: You tend to put trust in yourself and your own observation first. I mean it's up to you – it's your house, it's your property ('Flooded' Focus Group: Owner Occupiers: Thames Region)

F: How often do they [the Environment Agency] come and check the river? We're there all the time, every day (Focus Group: Owner Occupiers: Thames Region)

A majority of people relied on a combination of warning methods, the most frequent of these being an Environment Agency warning plus their own observation of the local watercourse or similar indicator of impending flood.

F: My gut reaction goes on how the garden is doing, what the water level is ('Flooded' Interviewee: Parent: Thames Region)

M: We rely heavily on the Environment Agency [but] we don't rely one hundred percent on [them]. It's local observation. If we think those gates need shutting, we will not wait for the Environment Agency. Roughly it all comes down to common sense and the general observation of the village. (FAG Member: North East Region)

Many of our participants said they trusted *'a community set-up'* rather than a single piece of information from the Environment Agency. This community approach included access to Environment Agency information and to a body of local knowledge, often gained over many years, as well as the watchfulness of oneself and other people in the vicinity.   Where local Flood Wardens existed, they were seen as invaluable; where they did not, almost all participants said they wished they did.

M: [We need] somebody like a flood warden who could be trained up and who's got local knowledge, because that person could learn where are the vulnerable areas in my patch…and where is going to go pop. (At-Risk Interviewee: Owner Occupier: Wales)

This knowledge of local flood conditions, whether first-hand or from longer-term residents, was something that a great many people felt was most important and useful to them in times of flood risk. People spoke of watching river or water table levels, monitoring rainfall and weather conditions, looking for other signs of flooding and talking to others in the neighbourhood.

F: I much more rely on my neighbours who will ring me up when I'm at work…they say the water is across the road and I know exactly what they're talking about…and I think whoops I'd better get home quickly and watch things. I rely on them much more than the Environment Agency because if I'd acted on their flood warnings every time they 'phoned me, I might as well leave all my furniture upstairs. ('Flooded' Interviewee: Owner Occupier: Thames Region)

F: You really do have to listen to people who have spent their lives here …the older generation, the fishermen…they know the area…they've learnt to work with nature and not against it. ('Flooded' Interviewee: Owner Occupier: North East Region)

F: Ultimately, I would say [we trust] ourselves. Because whilst I'm quite happy with what the Environment Agency are doing for us, we are so vigilant so I'd have to say us. I'd definitely go for the villagers every time. ('Flooded' Focus Group: Owner Occupier; North East Region)

Summary points: alternative means of warning and public trust

- Most flood-affected participants utilised additional warning methods, often in combination with Environment Agency flood warnings.
- Most common alternatives included:
  - monitoring watercourse/tide conditions/water table and weather;
  - consultation with neighbours or local officials (accessing local knowledge).
- Trust in Environment Agency warnings varied widely from complete trust to almost nil.
- Most people placed more trust in local observation and local knowledge than in Environment Agency warnings.

4.4.2 Public response to flood warning

The at-risk public's response on receipt of flood warning was addressed by examining:

- What actions are taken by people affected by flood?
- What actions would people not yet affected by flood intend to take?
- Do Environment Agency flood warning code levels impact differentially on such actions?
- Which factors motivate or constrain actions (or intended actions)?
- What constitutes 'effective action' for at-risk individuals within their social context?

4.4.2.1 Actions taken on receipt of flood warning

Marked differences were found between 'at-risk' and 'flooded' participants in terms of speed and type of response to flood warning. People with prior experience of flood reportedly reacted more quickly, and with more knowledge of what to do to safeguard themselves and their homes, than did the non-flooded groups. With a few exceptions, they were also likely to respond at an earlier stage of warning; many in the 'at-risk' category said they would wait for a Severe Flood Warning before taking action.

At a general level, the warning responses reported by our participants can be grouped into the following categories:

- no action;
- remaining alert;
- watchful and 'prepared' to act;
- seeking further information;
- warning other people;
- seeking help from others;
- limiting the ingress of floodwaters;
- protecting home and household contents from water damage;
- moving vehicles to safety;
- safeguarding family members, pets and neighbours;
- evacuating the home.

Several participants said they would take no action at all on receiving a flood warning, at least until a Severe Flood Warning were in force. Most of them fell into the non-flooded (i.e. inexperienced) category, although there were a few previously flooded individuals who explained their inaction as resulting from a knowledge of local flood conditions.

'Being prepared' was the most common response to a Flood Watch, and something that almost everyone reported as an initial response to warning of impending flood unless local flood conditions were particularly 'flashy' (e.g. Skinningrove). This state of preparedness was interpreted as being alert to further warning, planning and being ready to take more specific avoiding action, listening to weather forecasts and being observant of local indicators such as the watercourse, water table or rainfall. Information-gathering actions were often incorporated as part of 'being prepared' and included contacting the Environment Agency or Floodline, ringing Council officials or emergency services, talking to neighbours, tuning in to local media and seeking expert advice.

In addition to alerting nearby family, friends and neighbours of possible flooding, many people said they relied on others for help, contacting them early in the response process. These included older people, disabled people, those alone and those with sole responsibility for children at the time a warning was received.

Many of our participants with previous flood experience took action to protect their properties from floodwaters, though most of them accepted that it was difficult if not impossible to prevent the ingress of water altogether. In one village, people used drain rods to clear blocked drains in the hope that the rising waters would flow away more

freely. Flood boards, air-brick covers, plastic sealant, sandbags and plastic sheeting, raised steps and garden walls, even a small bung, were included amongst the external home-protection measures mentioned. Sandbags were not considered very useful in the main, although they did appear to filter dirty water and also gave people *something to do while you're waiting'*. A few people used towels or sheets to try and prevent water from entering under doorways. Others had purchased fitted or portable pumps, many of them elaborate and expensive. Additional measures included sealing downstairs toilets and drains; one woman used an inflatable beach ball to block her loo in order to prevent sewer back-up, weighing it down with *'several volumes of the Encyclopaedia Britannica'*. The most extreme example in terms of safeguarding property a woman who *'knocked a small hole'* in the wall of her cottage so that flood waters would not cause additional damage by remaining.

Almost everyone said they would take action to minimise flood damage to the contents of their homes, especially belongings of personal rather than material value. We found that people who had already suffered the trauma of a flood event were very concerned about saving their personal belongings and items of sentimental value, particularly where treasured memorabilia had been lost or damaged. People said that these precious items (valuables such as jewellery and antiques, photographs and video film, important documents and family papers, postcard collections, wartime memorabilia etc.) would be moved to a high place. With furniture, people spoke of moving small or light items upstairs, lifting heavy pieces (including a grand piano) on to bricks or pallets, and wrapping things in waterproof sheeting.   White goods were safeguarded by many but not all; they presented a difficulty in terms of weight and bulk and several flood-experienced participants considered this effort to be *'a waste of time'*, especially as they were relatively easy to replace.

Several people talked of moving vehicles to safety, though this did not appear to be a priority for everyone. Sometimes, circumstances rendered such action inappropriate; in Hedon, for example, there was only one small area of high ground in the locality.

The safety of family members, pets and vulnerable neighbours was of particular importance to most participants and a variety of actions were reported in this regard. Children were moved upstairs, or taken elsewhere.   Pets were similarly cared for. Other people spoke of *'looking out for elderly neighbours'*, lending a helping hand and making sure that they knew what to do.

Evacuating the home was a response that was usually reserved for a Severe Flood Warning or, indeed, the arrival of floodwaters; however, certain people (an Asian group and a group of tenants) said that they would leave their homes 'immediately' a warning of whatever severity was received:

F: Personal possession is immaterial, right? Saving your life is more special. (At-Risk Focus Group: Tenants: Southern Region).

Our findings make it clear that the level of code in force at the time has an impact upon the responses of the at-risk public, with a Severe Flood Warning prompting a considerable amount of action in almost all cases. There seems to be no clearly identifiable factor that differentiates between action at the various levels; these are in many cases more to do with personal and local circumstances: flood experience; local flood conditions and so on. The following list summarises participants' actual or intended actions in response to various stages of flood warning.

Summary of reported actions in response to flood warning

All Levels:
Take no action.
Watch water levels.
Switch on radio, TV, Ceefax, for further local information.
Move personal/valuable belongings to safety.
Obtain and position sandbags.
Switch off gas and/or electricity.
Prepare and move pets to a safe place.
Contact emergency services and/or council.
Contact the Environment Agency and/or Floodline/Environment Agency website.
Leave house for a place of safety.

Flood Watch:
Prepare warm clothing, food, water and /or medication for family.
Plan further actions if flooding situation becomes more serious.
Be prepared for a loss of power (e.g. torch and batteries).
Check local weather and/or tidal conditions.
Contact friends, neighbours, family for help.
Warn friends, neighbours, family.

Flood Warning:
Plan further actions if flooding situation becomes more serious.
Check local weather and / or tidal conditions.
Contact friends, neighbours, family for help.
Warn friends, neighbours, family.
Move vehicles to safe place.
Protect property (e.g. flood boards / doors / gates, block toilet).

Severe Flood Warning:
Remain upstairs in home.
Move vehicles to safe place.
Lock / secure home.
Help others.

Summary points: actions in response to flood warning

- Marked differences exist between flooded and non-flooded respondents.
- Prior experience prompts rapid and informed response.
- Many non-flooded people take no action until Severe Flood Warning.
- Actions fall into the following categories:
    - no action;
    - being watchful and prepared;
    - information seeking;
    - warning others;
    - seeking help from others;
    - limiting ingress of floodwaters (flood boards etc.);
    - protecting home and household contents (especially personal items);
    - moving vehicles to safety;

- safeguarding family, pets and vulnerable neighbours;
- evacuating and securing the home.
- Level of flood warning code affects response: severity increases action.

4.4.2.2 Barriers to action in response to flood warning

We examined reasons underlying reported inaction and difficulties in responding to flood warning.   These factors fell into three broad categories: individual characteristics, characteristics of the home and characteristics of the flood or flood warning.

Individual characteristics

These included obvious physical limitations which prevented people from lifting and carrying or, in extreme cases, from getting themselves to a place of safety. Old age, disability or physical frailty (and advanced pregnancy) posed an especial hindrance in terms of taking appropriate action; people with impaired sight or with limited mobility said they found moving furniture or belongings extremely difficult if not impossible.

F: Well I couldn't lift anything for a start...I couldn't move the TV or the video because I can't grip. (At-Risk Focus Group: Disabled People: Wales)

For wheelchair users, there were the additional problems of manoeuvring through floodwaters:

F: You can't push wheelchairs or electric wheelchairs through water. (At-Risk Focus Group: Disabled People; Southern Region)

Where a household contained very young children, old people, those with an illness or disability, or those with a responsibility for older or frail neighbours, they too tended to be hampered in their response. People who lived alone (often older people), or those who were alone at the time of the flood, were restricted in the amount of furniture and belongings they could move, particularly for heavy items.

F: I couldn't lift anything so I wrapped my fridge freezer, put stuff on top of that and wrapped a plastic dustsheet around it all. ('Flooded' Focus Group: Parents: North East Region)

In other cases, it was not physical frailty or a dependent but a lack of concern for material goods that was given as an explanation:

F: I wouldn't move anything upstairs because they're just things aren't they.   (At-Risk Focus Group: Owner Occupier: Southern Region)

A few older participants said they would be worried about answering the telephone at night and would therefore be unlikely even to receive a flood warning, let alone take any avoiding action.   One or two others said they would be *'too panicky'* to do anything useful.

F: but would you answer your phone in the middle of the night because I wouldn't. I'd be a bit nervous ...   (At-Risk Focus Group: Tenants: Wales)

Several participants in the at-risk category cited lack of knowledge as a constraint, whether of the flood warning system itself or the type of action that was appropriate. People with flood experience displayed a greater familiarity regarding what to do, although this was not always the case:

F: Nobody comes round and tells you what to do. We don't know if you can leave electricity on. Is it safe to leave it on? ('Flooded' Interviewee: Owner Occupier: Thames Region)

Where people were sceptical regarding Environment Agency warnings, despite familiarity with the various warning codes and their meaning, they expressed a tendency to delay taking any action. In addition, where people had no previous flood experience, there was sometimes an apparent reluctance to take flood warnings seriously.

M: I guess it comes back to actually validating the need to see something, to see some evidence before I'd act (At-Risk Focus Group: Disabled People: Southern Region)

F: I haven't seen it yet so it's let's bury my head! (At-Risk Focus Group: Owner Occupiers: Southern Region)

Characteristics of the home

Single storey homes (bungalows, flats and so on) were another constraining factor in that they provided few safe places for the temporary storage of furniture and personal belongings. People in small houses were often similarly disadvantaged.

F: I live in a bungalow so I have no upstairs. I'm not very agile so I can't really get up in the loft very easily. (At-Risk Interviewee: Older Person: Southern Region)

F: We are limited to what space we've got upstairs. The bedrooms are quite small so you've already got furniture in there ('Flooded' Focus Group: Owner Occupiers: Thames Region)

Where, as is often the case for obvious reasons, a single story dwelling is occupied by a disabled person, the difficulties are compounded:

They [the Environment Agency] have these standard things about when you reach a flood warning level, move your valued possessions and furniture upstairs. What am I supposed to do? Put it on the roof? ('Flooded' Interviewee: Disabled Woman: Thames Region)

Characteristics of flood or flood warning

Action was limited in cases where there was little time between warning of impending flood and the event itself. Several people commented that moving *'the little stuff'* (personal items, books, CDs, ornaments and so on) was very time-consuming. In some cases, there was no official flood warning issued; in others, the lead-time was insufficient to allow for much action to be taken for example Skinningrove).

Summary points: barriers to action

Individual Characteristics:

- disability, frailty or old age;
- responsibility for older people, young children or people with disability or illness;
- living alone;
- anxiety or fear;
- no prior experience of flooding, especially if new to the area;
- little or no awareness or understanding of flood warnings;
- little or no knowledge regarding appropriate action;
- scepticism of flood warnings.

Characteristics of Home:

- Living in a single storey home;
- Lack of storage space.

Characteristics of Flood or Flood Warning:

- Little or no warning;
- Rapid onset of flooding.

4.4.3 Effective action in response to flood warning

Our intention was to explore what constitutes effective action in response to flood warning. Analysis of the data had three principal foci:

- What do members of the at-risk public consider is 'effective action' in response to flood warning taking account of their social context?
- How might actions taken by flood-affected people differ were a flood to recur?
- Does the at-risk public's understanding of 'effective action' differ from that of the Environment Agency?

We found that it was difficult to address this concept directly because the term was not understood by the majority of our interviewees. What we did, therefore, was to infer

their views on effective action from discussions of flood-related action and how these might differ were flooding to recur.

The Environment Agency's definition of 'effective action' is currently linked to an avoidance of flood damage and is therefore largely financial in concept.   Although our findings indicate that the at-risk public, to some extent at least, shares a similar understanding, participants did not restrict their interpretation of effectiveness to material goods. The safety and wellbeing of self, family members (including pets and livestock) and vulnerable neighbours was of paramount importance; this was extended to psychological wellbeing in many cases. We found that most participants were also more concerned with limiting rather than preventing damage.   Many people linked the notion of effective action in response to flood warning with both the preparatory and the recovery processes.

F: That's why we put the pump in because we want to minimize the damage that we go through so that we can recover within days, not months. ('Flooded' Interviewee: Parent: Thames Region)

Taking any action whatsoever in response to flood warning, even if it is only to put a few sandbags in place (something that was widely accepted as being *'more or less useless'*), was seen by most of our participants as something that made them *'feel better'*.   Responding in however small a way appears to provide a valuable psychological buffer in the face of a traumatic event.

We found that perceptions of 'effectiveness' varied according to social context. Such factors included disability or physical frailty; living in a single storey home; the presence of pets, children or vulnerable neighbours. Having home and contents insurance and one's attitude towards insurance claims, also impacted upon participants' interpretations of effectiveness.   Many people commented that having suitable insurance meant that there was no need for them to save *'material goods'*, although some were anxious to avoid making a claim and were therefore more concerned to save as much as possible.

F: Dear oh dear, wouldn't you rather save things instead of the hassle afterwards that you have with insurance companies and loss adjusters? ('Flooded' Interviewee: Owner Occupier: Thames Region)

'Effectiveness' was also determined in large part by individual attitudes towards damage to one's home and its contents. Many people, the majority of them with previous flood experience, were realistic about being unable to prevent flood damage completely, particularly in terms of keeping floodwaters out of their homes; what they were concerned with was to minimise loss, especially to personal items.   Where this realistic approach was present, our participants were more likely to consider that their actions were effective.   One older woman, for example, severely flooded on two occasions, was no longer worried about saving the furniture in her home for she no longer placed any value on it, neither emotionally nor financially.   As a result, her concern was for her own safety and for her treasured personal belongings. This viewpoint contrasted with that of a new owner occupier, a man with no flooding

experience, who had invested much time and cost in decorating and furnishing his home and who said his intention would be to *'save everything'*.

Very often it was the time available between awareness of impending flood and the event that affected people's perceptions. Having insufficient time to save one's belongings coloured people's attitudes towards effectiveness, as the following extract illustrates:

M: If we just get down to practicalities, you've got your house with all the furniture and within a set period of time you've got to move all the furniture downstairs to upstairs. It's not going to go, is it. ('Flooded' Focus Group: Owner Occupiers: Thames Region)

Responses to flood warning were often informed by previous experience and it was not always the case that what worked well in one event would do so in another:

F: We put our [furniture] up higher than the level we were flooded the first time, and still the bottom of the furniture caught it ('Flooded' Focus Group: Owner Occupiers: Thames Region)

Some people said that they would act differently should a flood recur. *'Trying to save the white goods'* was a wasted effort for many flood-affected people, something that demanded considerable physical exertion and took up valuable time. With the exception of saving oneself and one's family and pets, the single most effective action for flooded participants was the saving of sentimental items and other personal belongings. There were clear differences between people who had and had not been flooded before; where people had suffered a flood event, especially where 'precious' memorabilia had been lost, their intentions for future warning response focused on ensuring the safety of such items.

F: With hindsight I was moving all the wrong things. I'd have moved all my books and my photographs. My father had some magic lantern slides that he'd done when he was a boy and he'd hand coloured them in…they were a very, very treasured memory and they went. ('Flooded' Interviewee: Disabled Person: Thames Region).

Summary points: effective action
- Term not used *or understood* by majority of participants.
- Participants' understanding of effectiveness not far removed from that of Environment Agency.
- Definition not restricted to material goods; includes items of sentimental value.
- Includes safety and well-being of people and pets (*including* psychological well-being).
- Effective action often concerned with limiting, not preventing, damage.
- Effectiveness explicitly linked to preparatory and recovery processes.
- Perceptions vary according to social context, attitudes and flood experience.

4.4.4 Existing preparation for possible future flood event

We asked whether or not people had made any special provision against the possibility of future flood event. Their responses fell into three broad categories: making flood 'plans'; protecting buildings; and protecting furniture and personal belongings.

Participants who had already been flooded were more likely than those without such experience to have made some preparation in case of future flooding. Several people had 'flood plans', some of them very detailed. One Flood Action Group had produced a 'flood report' containing much useful advice and incorporating a 'what to do' list. Several parents said that their children too had been told exactly what to do in an emergency. Many people had already prepared a 'flood box' in line with Environment Agency advice. These contained such things as: flood-related information (including Environment Agency flood information pack and a list of relevant telephone numbers); a plastic bag for valuables; sealant for flood boards etc; candles and matches; a torch and spare batteries; a battery-operated radio; bottled water and foodstuffs such as chocolate or biscuits *'to last a couple of hours or so'*. Additional emergency supplies which people said they would collect on receiving a flood warning were: blankets and warm clothing; vacuum flask for hot drinks; boiled water and other necessities for infants; food and *'clean, fresh water'* and a mobile telephone. One woman, twice flooded, had invested in *'all the waterproof gear'* and many people said they always had Wellington boots at the ready. Others spoke of packing an *'emergency bag'* just in case of evacuation.

There were a number of other precautionary actions mentioned by our flooded participants. As far as properties were concerned, many of them had taken measures to minimise the ingress of floodwater, some of which were comprehensive and elaborate. These included: a supply of sandbags; flood boards and gates; covers for air bricks; pumping systems; non-return valves; alterations to ground level flooring, steps and so on; bricking up boilers etc; removing ground floor toilets and showers; sealing drains and sewage outlets; raising power sockets; and, in one instance, building an external flood bank. One home improvement was more to do with personal safety than protecting the property itself; an older woman who had previously been trapped in her flooded home had *'all the windows done'* in order to ensure that she could escape easily in future. Past experience was evidently a motivating and informative factor in preparedness for future flood:

M: If somebody's been flooded, they'll know exactly, they'll have all the bits to screw in front of their doorways and the putty to put round. (At-Risk Focus Group: Commercial Owners: Southern Region)

As for protecting the contents of one's home, people spoke of having bricks or trestles handy for raising furniture, plastic sheeting in which to wrap large or heavy items, and even exchanging MDF furniture for more durable items. The most common finding, however, was that almost all participants in the 'flooded' category, and indeed many of those who had not yet been flooded, kept things of personal importance out of the reach of floodwaters. People spoke of *'safeguarding memories'* , storing photographs and suchlike upstairs instead of down; keeping *'all my little treasures in little biscuit tins, so I know I could grab those in a rush and shove them upstairs'*; important papers were filed safely together *'all high up'*; kitchen cupboard contents were in boxes *'ready to lift'*; business documents (accounts and VAT returns) were kept on a high shelf; and a child

recounted how she took all her favourite toys around in a bag *'so I can just pick 'em up'*.

F: She won't have toys except in boxes or bags now, so everything can be lifted up quickly. The toys that she classes as her favourites, she never ever leaves downstairs. ('Flooded' Interviewee: Parent: North East Region).

A great many people had taken the precaution of *'safeguarding their memories'*, but a handful of flood-affected people had gone further and deliberately *'de-cluttered'* following the trauma of losing personal items.

F: I have learned not to value things like I did. I've given anything that I loved to my children now. And it's sad. I mean all the photographs, I've done them all an album and given them all one from since they were tiny. I've de-cluttered if you like. I don't want to value things any more and I don't want to be distressed any more with losing things. ('Flooded' Focus Group: Owner Occupiers: Thames Region)

Other people were more sanguine about preparing for further flooding and had made few if any advance arrangements. Unsurprisingly, it was more often those in the 'at-risk' category that fell into this camp, although a few already-flooded participants admitted to having taken little or no preventative action in their homes. Reasons for inaction were sometimes unknown, but when explanations were forthcoming they included disbelief *('it won't happen to us')*, and a reluctance to alter one's normal lifestyle:

M: Now the thing is, strangely, although we had sentimental things downstairs, they're still downstairs. Now heaven forbid if the flood happened and we weren't here because we'd lose them all. ('Flooded' Focus Group: Owner Occupiers: Thames Region)

F: I think you've still got to get on with life…you can't go around worrying what if we flood, I can't put this down in my living room. I've got just as much stuff down in my living room and I will deal with the problem as and when it happens. ('Flooded' Focus Group: Owner Occupiers: Thames Region)

Most of our participants clearly preferred to do what they could in order to save damage as well as valuable time should a flood warning be issued. In addition to the preparations mentioned above, our findings included keeping insurance cover up to date and retaining *'a mark on the wall to remind ourselves in case we ever forget'*. Other people had made an effort to inform and educate newcomers:

F: If it looks like flooding, I go and say I want to talk to you about it because these are the steps we take and I think they might help you.('Flooded' Interviewee: Parent: Thames Region)

One comment summarised many people's precautionary activities:

M: It's a case of making sure that we've thought out what are our vulnerable bits (Flooded Focus Group: Owner Occupiers: Thames Region).

Summary points: preparatory action

- 'Flooded' participants take more precautionary action than non-flooded.
- 'Flood plans' and emergency supplies prepared.
- Buildings:
  - protection against ingress of floodwaters (e.g. flood boards, pumps);
  - home alterations (e.g. raising power sockets; flooring).
- Home Contents:
  - supplies of bricks, plastic sheets etc. for protecting furniture/white goods;
  - personal belongings in containers or stored at a high level.
- Insurance cover regularly updated.
- Local flood-related knowledge passed on to newcomers.

4.5 Conclusions

The findings of this in-depth qualitative study demonstrate that the experience of being flooded renders members of the at-risk public markedly more aware, more knowledgeable and more responsive with regard to flood warnings than their non-flooded counterparts. Previously flooded participants were far more familiar with the Environment Agency's codes and warning systems than those without such experience; they were also more likely to understand them correctly, to take speedy and appropriate action and to respond at an earlier level of warning severity.   Several people in the 'at-risk' category appeared to have no knowledge of the Environment Agency's warning system, nor how to gain access to it.

An exploration of satisfaction and preferences concerning existing flood warnings revealed that whereas a majority in the 'flooded' category expressed relative satisfaction with warning codes and means of dissemination, there were criticisms from all sides concerning accuracy and specificity of warning content.   Many warnings were considered 'too vague' or applicable to too large an area to be useful.   Icons and text used on current codes were the subject of criticism; many people felt that a sense of urgency was lacking and that greater clarity was needed, particularly between Flood Watch and Flood Warning. There was still a preference for the old 'traffic-light' system of colour-coded warnings in many quarters.

Trust in Environment Agency warnings varied widely but a majority of participants, particularly those already affected by flooding, combined the use of Environment Agency warnings with additional methods; observation of visual cues and neighbourhood information were commonly cited. A high value was placed on specific knowledge of local flood conditions, something that was seen as more useful than a more general official warning.

Additional means of warning dissemination were suggested: sirens, loud-hailers and the involvement of the local community were suggested. In coastal areas, incorporating local expertise by involving members from the RNLI or Coastguard was seen as particularly important. Flood Wardens, or similar, were widely considered to be a major

benefit in terms of community flood awareness, understanding and response. Expert information received through personal contact was seen as especially helpful.

Actions in response to flood warning were numerous and fell into four principle categories: seeking further information; protecting property and belongings; helping to protect people and animals; and evacuation. Almost everyone reported that they would act to minimise damage to family members and pets, home and contents, especially personal memorabilia. Warning severity increased reported willingness to take action; whereas almost everyone said they would take action on receipt of a Severe Flood Warning, only a minority would do anything other than 'be prepared' for action at the Flood Watch stage. The state of being prepared, however, included making plans for action, information-gathering and remaining vigilant. Our finding that those without experience of flood were less likely than previously flooded individuals to take avoiding action unless a Severe Flood Warning were issued is concerning. This appeared to emanate more from an incomplete understanding rather than from apathy (although disbelief was given as an explanation by some people). Other reasons given for delaying action, particularly prevalent amongst people with prior experience of flood, included a knowledge of local conditions and a trust in observation rather than in Environment Agency code levels. Personal as well as local circumstances also played a part in determining the likelihood of action at various levels of flood warning.

Barriers to action were categorised as follows: individual characteristics (e.g. physical frailty and disability, anxiety or scepticism, lack of flood experience or awareness, living alone or being new to an area); characteristics of the home (e.g. single storey) and characteristics of flood event and flood warning (e.g. rapid onset).

Lack of flood experience, however, did not always result in a delayed response to flood warning. In two 'at-risk' focus groups there was unanimity regarding an expressed intention to evacuate at the very first hint of warning. The finding that the minority ethnic group intended to take extreme avoiding action so early in the warning procedure reflects the research literature in that cultural differences exist in people's understanding of and response to natural hazard. It is important to recognise, however, that this finding is based on data from one group of Asian people and may be more to do with the individuals themselves than with any cultural factors. Further research in this area would be useful.

Participants' understanding of effective action, though a difficult concept to address directly, proved to be not far removed from that currently held by the Environment Agency. Whereas the Environment Agency links effectiveness with an avoidance of material damage (and loss of life), the public's interpretation is often a realistic one, concerned with limiting rather than preventing damage and including actions that were designed to alleviate psychological as well as physical or material discomfort. Our participants included the safety and comfort of pets, family members and vulnerable neighbours and focused more upon belongings of sentimental value than upon expensive items. This was particularly the case with previously flooded individuals, some of whom had already lost treasured personal belongings. In addition, we found that what might be seen as appropriate action for one household, or in one set of circumstances, may not be so in another. Post-hoc assessments of 'effectiveness' were coloured by factors such as flood-severity, personal circumstances, attitudes towards material loss, and the degree to which they were prepared for a flood event.

The value placed upon memorabilia and the comfort of pets confirms findings from earlier research (Thrush et al 2005b; Tapsell et al 2002) and highlights the importance of factors that impact upon psychological well-being following flooding. Although this might initially be considered as relating to non-economic losses, and of less value than something that is easily quantified, it is important to recognise that protecting items of little monetary benefit may ultimately produce its own economic impact and is therefore far from negligible. It is now widely recognised that the psychological effects of flooding have an adverse impact upon physical health (e.g. Tapsell et al 1999; Tapsell 2000, Walker et al. 2005). By taking action that helps to maintain well-being at a psychological level, people affected by flood are thus less likely to succumb to physical ill-health and its concomitant economic impacts (for example lost working days and use of health services.).

Preparatory action had been undertaken by a large number of people, some of it very comprehensive.   We learnt of alterations to property and lifestyle, provision of flood-gates and so on. It is also clear from our findings that many people are following Environment Agency advice by having 'flood plans' and 'flood boxes' containing emergency supplies.   Many people had a plan of action for flood warning, with each member of the household knowing what had to be done. In addition to facilitating appropriate action in case of flood warning, this degree of preparedness is likely to act as a psychological buffer against the trauma of a future event.

As well as providing the Environment Agency with a rich understanding of the ways in which the at-risk public interprets and responds to flood warnings, this qualitative work informed the large-scale quantitative study that formed the final part of the research project (reported in Section 5) in terms of generating hypotheses to be tested and additional actions for inclusion in the survey.

5 The survey

5.1 Introduction

This section reports on the quantitative research study that formed the third and final stage of the 'Public Response to Flood Warning' project.

Flood warnings are issued by the Environment Agency in times of possible risk of flood with the intention of stimulating residents in affected areas to take appropriate action. This stage of the research project, based on a questionnaire survey, was designed to develop a quantitative understanding of how the 'at flood risk' public understand, interpret and respond to these flood warnings.

Section 5.2 describes the aims and objectives of this quantitative component. Section 5.3 outlines the chosen methodologies and describes the sample. Findings are presented in Section 5.4, followed by a concluding summary in Section 5.5.

5.2 Aims and objectives of the quantitative research study

The aim of this quantitative study is to further our knowledge of the ways in which the 'at flood risk' public understand, interpret and respond to flood warnings by establishing the public's awareness of local flood warnings and their knowledge of appropriate action in the event of flooding. The study also explores the at-risk public's willingness and ability to undertake such actions.

A survey of the at-risk population was designed to measure the type and quantity of actions likely to be taken at each level of flood warning. In brief, the research objectives of this quantitative component were as follows:

- to establish intended actions on receipt of flood warning by people at risk of flooding;
- to examine the differential impacts of Environment Agency flood warning code levels on actions or intended actions.

5.3 Method

Respondents were selected from areas at risk of flood in seven Environment Agency Regions and Wales.

The main focus of investigation was how individuals act (or *intend* to act) in response to flood warnings in the light of their understanding and interpretation of Environment Agency's warning codes.

The interview schedule consisted of closed questions and a scenario based exploration of respondents' intended flood action. Scenarios were used in order to try to bring a possible flood warning situation 'alive' even to those with no direct experience of receiving flood warnings or of being flooded.

The survey was administered by individual interviews in respondents' homes. This method of survey administration has the advantages of ensuring that the desired sample size is met and that all questions on the schedule are answered in full. In addition research conducted by the University of Surrey team indicates that interviewing flood-affected people at home facilitates a more detailed and realistic account of actions and priorities on receipt of a warning (Thrush et al 2005b; McCarthy 2004). In the case of people at risk but not previously flooded (i.e. the bulk of our sample), using their own surroundings as a cue allowed them to consider possible actions and priorities more fully rather than providing decontextualised answers.

5.3.1 Sample selection

For the survey to be as representative as possible of the range of conditions within the Environment Agency's remit, it was important that the sample should provide a wide geographical and regional spread.

Approximately 5000 'at-risk' addresses were provided by the Environment Agency across seven Environment Agency Regions and Wales with approximately equal numbers of respondents selected in each of the regions.

Sample addresses were selected from this list such that the interviews were randomly clustered around a number of postcodes in each region in order to optimise interviewer efficiency and cost. As the sites were intended to yield a diverse range of at risk groups, in most cases more than one postcode cluster was sampled in a given Region or Wales.
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5.3.2 Survey administration

The survey was administered to a sample of 540 residents. The numbers of interviews achieved in each Environment Agency Region are indicated in Table 5.1.

Table 5.1 Interviews by Region

Region	Interviews achieved (n)	Percentage of Total
Anglian	66	12.2
Midlands	72	13.3
Northeast	67	12.4
Northwest	60	11.1
Southern	72	13.3
Southwest,	65	12.0
Thames	70	13.0
Wales	68	12.6
Total	540	100

Fieldwork for the survey took place between 28 February and 16 April 2005. All interviews were conducted face-to-face in residents' homes. The interview length was typically 10-15 minutes.

Although no problems were encountered in recruiting interviewees, some respondents either believed their area was not at risk or were uncertain whether or not this was the case.

5.3.3 The questionnaire

Questionnaire design was informed by the earlier stages of this project (see Chapters 2, 3 and 4). Questions relating to actions were based on the current Environment Agency advisory list, augmented by findings from the qualitative research study. The questionnaire addressed actions that might be taken in response to flood warning within the context of four different scenarios. Demographic and other background information was sought with regard to the respondent, the household, the property, and previous flood experience (see Appendix 4).

Topics were addressed in fixed order, but the interview schedule allowed respondents to add further free-format information, enabling them to answer issues in their own terms and identify and elaborate upon areas of particular interest or importance. Prior to each interview, each respondent was shown a letter of Authority provided by the Environment Agency and the role of the research team in relation to the Environment Agency was explained.

A pilot study was conducted prior to fieldwork in order to provide feedback and to check for validity of question wording; the questionnaire was tested on ten households in Birmingham.

5.3.4 The scenarios

Scenarios are brief descriptions of a situation submitted to a survey population. They assist in revealing norms and rules of action and complement and enrich data obtained by more classic methods such as interviews (Bonnet, 2000). For this survey, the use of a scenario-based method allows on the exploration of likely actions in response to flood warning within the framework of the proposed situations.

Respondents were presented with three different flooding scenarios relating to the three stages of flood warning (Flood Watch, Flood Warning and Severe Flood Warning) as well as the All Clear. They were asked to imagine themselves in the scenario and suggest what, as a household, they might spontaneously do in that situation. They were then presented with the same scenarios, given a list of actions that they were told other people had taken in the past, and asked again what their response might be.

Details of the scenarios are as follows:

Flood watch scenario
It is 6.00pm in November and you are at home watching TV when you hear that a Flood Watch has been declared in your area which means that flooding is possible, and the situation could worsen.

Flood warning scenario
It is lunchtime on a Sunday in August. It has been raining all weekend and you receive an automatic telephone call from the Environment Agency telling you that a Flood Warning has been issued for your area. This means that the river is expected to overflow defences and banks and that flooding is expected, and you need to act now.

Severe flood warning scenario
It is early evening in October and has been raining for several days. All the family members are at home. You then receive an automatic telephone call from the Environment Agency telling you that a Severe Flood Warning has been issued for your area. This means that severe flooding of homes, roads and land is expected with imminent danger to life and property.

All clear scenario
Over the last few days you experienced flooding in your garden and you had expected the flood waters to enter your home. The waters have now receded and you have just received an automatic telephone call from the Environment Agency informing you that an All Clear has been declared for your area. This means that there are no flood warnings in force in your area until further notice.

5.3.5 Sample profile

This section briefly outlines the profile of the 540 survey respondents in terms of demographics, property-related factors, special needs considerations and exposure to flood risk. A broad range of households were interviewed in each of the Environment Agency's Regions and Wales, yielding a sample that is representative of the residential population in at-risk areas of England and Wales. It is notable that only one in six

(16.8%) of the responding households had any direct experience of flooding; findings should be interpreted in the light of this fact.

Demographic factors
Just over half of the respondents were female (52.4%). Two thirds (66.1%) of the total sample was aged 45 or over, nearly two thirds (64.1%) were married or living as married with the remainder recorded as separated, widowed or single. More than two in five respondents were employed (43.6%); of the remainder, nearly half (48.6%) reported themselves as being 'at home'.

The large majority (94.3%) of respondents reported themselves as 'White British' and recorded English as their first language (96.1%).

Property and household
The sample included residents of several different property types: old and new properties; houses, flats, bungalows and maisonettes. The sample also included people who rented their homes (Council and Housing Association tenants as well as private renters). Almost three quarters (73.7%) were owner-occupiers. Nearly four out of five properties (79.6%) were houses (detached, semi-detached or terraced) and the majority of interviews were conducted in older properties, with nearly two thirds (66.3%) having been built before 1970.

Nearly a quarter of the households (23.1%) were single occupier. The most typical multi-occupation households were 'Two or more adults with no dependent children' (27.2%), 'Two or more adults with dependent children' (23.3%) and 'Pensioner couple' (18.0%).

Many of the residents (10.9%) had lived in their homes for less than a year and over a quarter of households (28.1%) had been resident for over 20 years. More than one quarter of households (26.9%) contained dependent children, and over a third (38.0%) had a pensioner resident. Approximately a quarter of households (26.3%) reported the presence of someone with disability.

Prior flood experience
Of the total sample, only one in six respondents (17.0%) reported any flood experience. Of those 64 residents flooded at their current address, less than a third had been flooded above floor level and less than a third had received warning of the flood. Of those 18 residents who had been warned, ten people received a telephone warning from the Environment Agency. Prior experience was most common in Midlands Region and Wales.

5.4 Findings

This section reports findings from the survey. It focuses upon the following issues:

- the actions people say they would take in response to flood warning;
- whether or not Environment Agency warning levels impact differentially on potential actions;
- what factors motivate or constrain such actions.

The list of potential actions presented to respondents is reproduced in Table 5.2. This table also demonstrates how actions were grouped for analysis. Since certain of the actions are similar in type (i.e. 'listen for warnings' and 'listen to local radio'), it was considered a better reflection of warning response to group these similar actions together. This resulted in seven categories: six relating to potential actions; and one to 'doing nothing'. These categories have been used for all following analyses, unless otherwise indicated.

Table 5.2 Lists and categories of potential actions in response to warning, showing categories for analysis

List of potential actions	Categories
Do nothing	Do nothing
Watch water levels	Form own assessment of flood risk
Listen/watch out for warnings	
Listen to local/national radio/TV stations for further information	
Check the Environment Agency website	
Contact friends and family for help and advice	Seek advice and/or information
Contact Emergency Services (Police/Local Council)	
Contact the Environment Agency for further information (i.e. Floodline)	
Block doorways/airbricks with sandbags etc	Take steps to minimise water entry to property
Put flood boards or flood gates in place	
Block toilet	
Move valuable/personal belongings upstairs or to a safe place	Protect personal property
Move property out of reach of the flood (e.g. put furniture/appliances on bricks or empty bottom shelves)	
Move cars to a safe place	
Warn your neighbours	Help others
Help neighbourhood/community prepare for flood	
Prepare or move pets/livestock to a safe place	Prepare to evacuate/prepare and muster people/pets to safety
Keep track of family members and pets	
Take warm clothing and/or food/water/medication to a safe place	
Move yourself or others in the household to a safe place	
Be prepared to be evacuated	
Switch off gas and/or electricity	
Be prepared for a loss of power (e.g. take a torch)	
Lock/secure home	

Responses to warning scenarios in terms of intended action were sought both before and after respondents were shown the list of possible actions; this yielded findings for both unprompted and prompted actions respectively.   Results demonstrate that respondents reported a greater number of actions, and an earlier response in terms of warning level, once they had been prompted by the list of actions.   As an example, findings differ considerably when comparing unprompted and prompted answers with regard to 'doing nothing': unprompted responses show 22% inaction at Flood Watch, 10% at Flood Warning and 6% at Severe Flood Warning; these figures fall to 9%, 4% and 2% after prompting. Since the focus of interest for the Environment Agency is the public's spontaneous response to flood warning, only those findings pertaining to unprompted survey responses will be reported here.

5.4.1 Action in response to Flood Watch

Figure 5.1 shows the distribution of unprompted actions reported as likely to be taken on receipt of Flood Watch; for clarity, actions are categorised as described above.
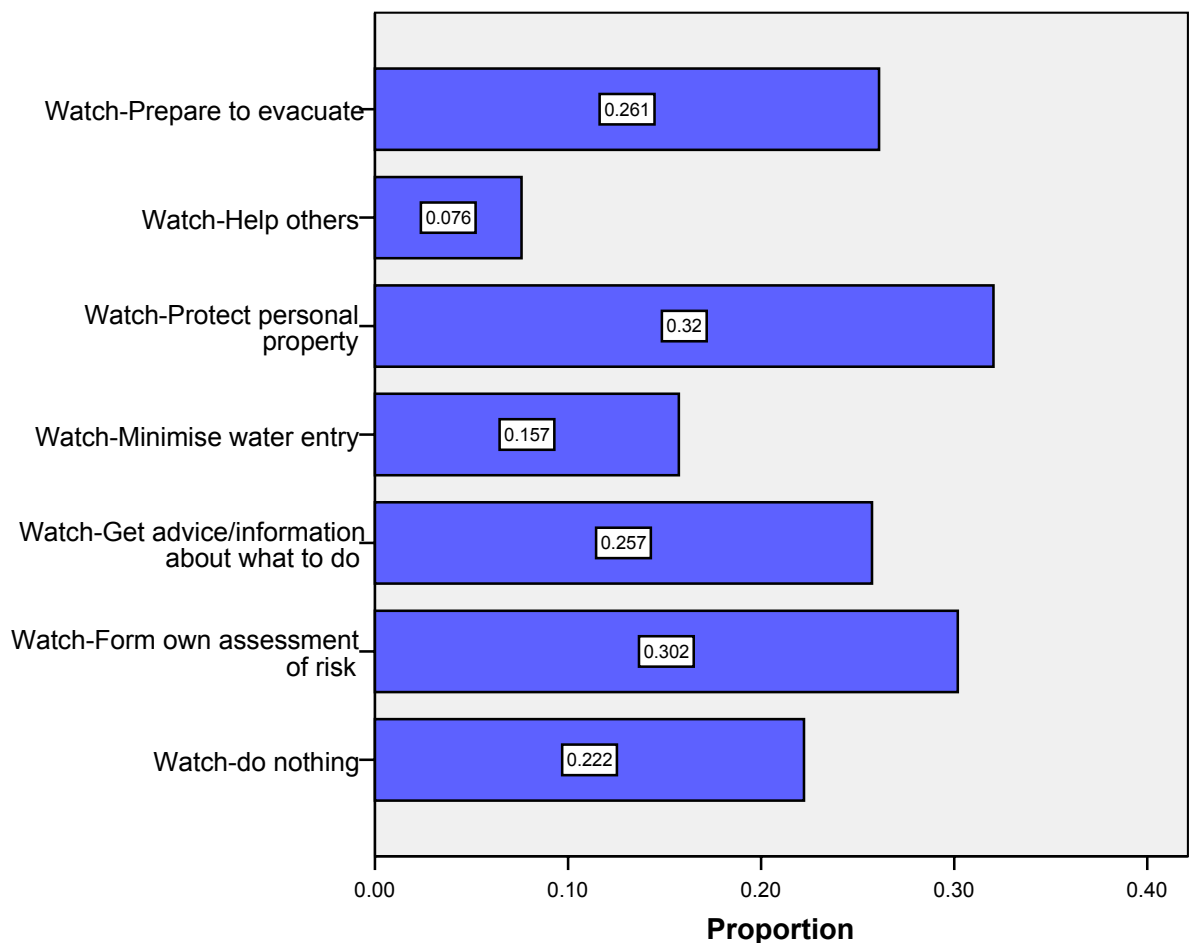

Figure 5.1 Unprompted actions (by category) at Flood Watch

The most popular category of actions was that relating to the protection of personal property (32 per cent of respondents), followed by forming one's own assessment of

the potential flood dangers (30 per cent). Many respondents suggested that they would prepare for evacuation at this level of warning; this category also included actions relating to the safety of people and animals. Twenty-two percent said that they would do nothing or didn't know what to do.

With regard to the numbers of different action categories, the majority of respondents mention only one (Table 5.3).

Table 5.3 Number of action categories at Flood Watch

Number of action categories	Percentage
None	21.5
1	39.1
2-3	35.0
4+	4.4
Total	100.0

5.4.2 Action in response to Flood Warning

Figure 5.2 demonstrates that here again, the response of most people would be to protect personal property (44 per cent) and prepare to evacuate (42 per cent). Only 10 per cent claim they would do nothing.
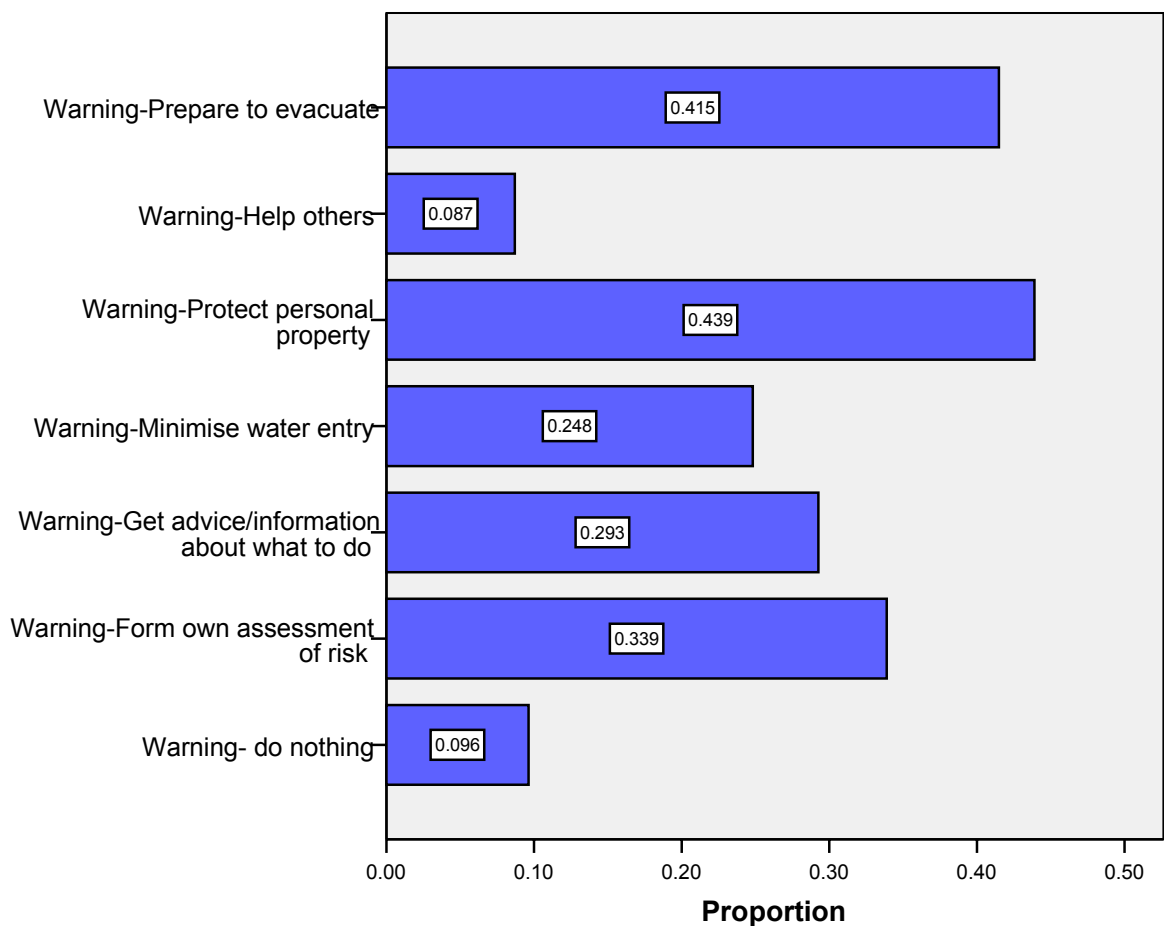

Figure 5.2 Unprompted actions (by category) at Flood Warning

As for the number of different action categories recorded, Table 5.4 shows that over 50 per cent of respondents would intend to take actions in more than two categories.

Table 5.4 Number of action categories at Flood Warning

Number of action categories	Percentage
None	9.3
1	33.0
2-3	50.7
4+	7.0
Total	100.0

5.4.3 Action in response to Severe Flood Warning

The Severe Flood Warning scenario elicited the most action despite 6 per cent of respondents still claiming they would do nothing. Now, though, the majority (63 per cent) report that they would be preparing to evacuate or safeguarding people and animals (see Figure 5.3).
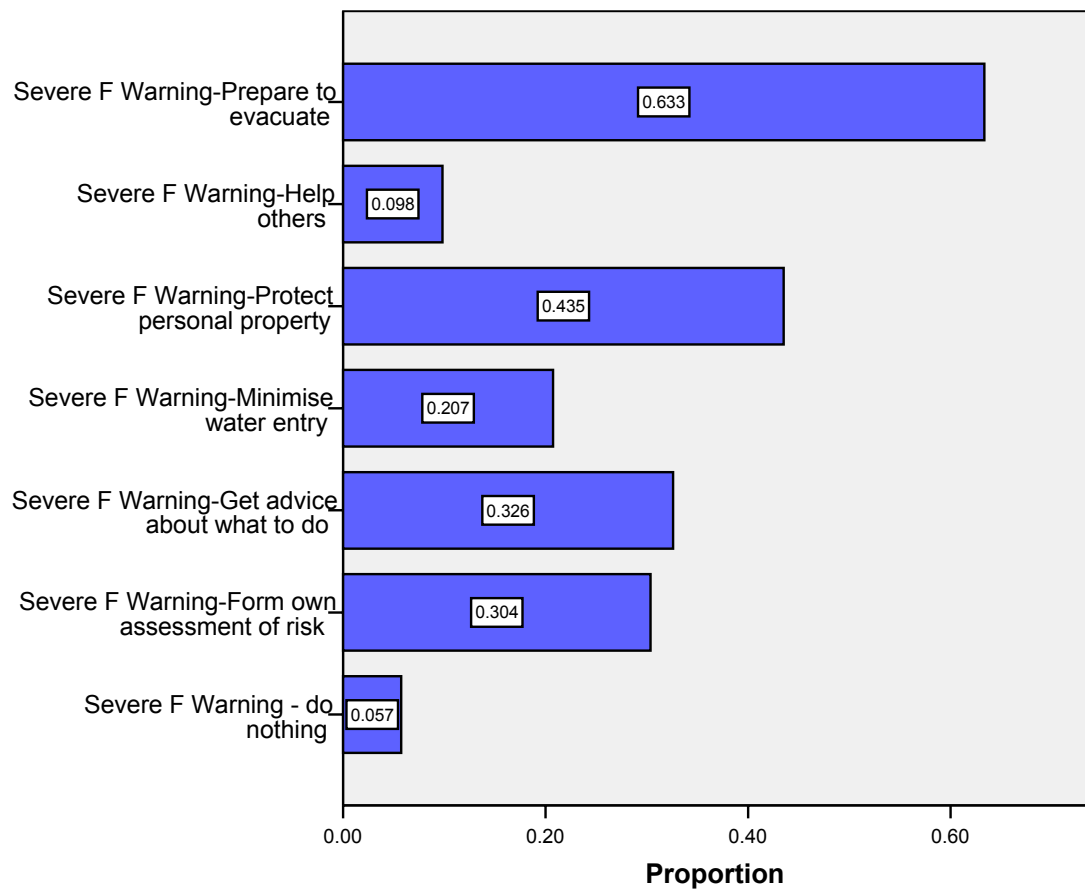
Figure 5.3 Unprompted actions (by category) following a Severe Flood Warning

Looking at the numbers of action categories intended as a response to Severe Flood Warning, Table 5.5 shows that between two and three categories of action would be taken by the majority of survey respondents.

Table 5.5 Number of action categories at Severe Flood Warning

Number of action categories	Percentage
None	5.9
1	34.1
2-3	49.6
4+	10.4
Total	100.0

5.4.4 Inaction as a response to Flood Warning

Of the total sample of 540 respondents, 22 per cent say they would do nothing, or did not know what to do, upon receiving a Flood Watch, 10 per cent at Flood Warning and 6 per cent at Severe Flood Warning.

Table 5.6 shows 77 per cent of the sample would intend to respond to all levels of warning, with 13 per cent intending to act only at Flood Warning and 4 per cent only after Severe Flood Warning (an anomalous four people say they would act at Flood Watch and Warning, yet not at Severe Flood Warning). 5 per cent say they would do nothing at all levels of warning.

Significant differences are seen between levels of male and female activity; women are more likely to do nothing at all levels of warning, or act only in response to Severe Flood Warning. Men predict that they will respond sooner in the warning sequence.

Table 5.6 Cumulative activity in response to flood warning

Activity	Male (%)	Female (%)	Overall (%)
Acts at all levels of warning	78.1	75.8	76.9
Acts at Severe Flood Warning only… *.Does not respond at earlier levels*	3.1	5.0	4.1
Acts at Flood Warning and Severe Flood Warning… *Does not respond to flood watch*	15.6	11.0	13.2
Acts at Flood Watch and Flood Warning only	0.8	0.7	0.7
Does nothing at all levels of warning…	2.3	7.5	5.0
Number of cases	(256)	(281)	(537-3 missing)

(All results are significant at p<0.05)

An examination of those doing nothing at Flood Watch (N=120/540) reveals that 41% of this group continue to 'do nothing' at Flood Warning compared with those who say they would act at Flood Watch, only 1% of whom claim inactivity at Flood Warning (p<0.000). Following a Severe Flood Warning, 23% of those who claimed to do nothing at Flood Watch claim that they still would do nothing even at Severe Flood Warning, whereas only 1% of with those who claim to act at Flood Watch claim inactivity at the Severe Flood Warning level (p < 0.000).

It is notable that 52% of people who say they would do nothing in response to a Flood Warning continue to do nothing at Severe Flood Warning. Thus doing nothing at the

earliest level of warning significantly predicts doing nothing at all subsequent warning levels.

5.4.5 Actions in response to an 'All Clear'

The 'All Clear' scenario was used only to elicit spontaneous (unprompted) actions; Figure 5.4 below demonstrates that by far the most common action was to do nothing.
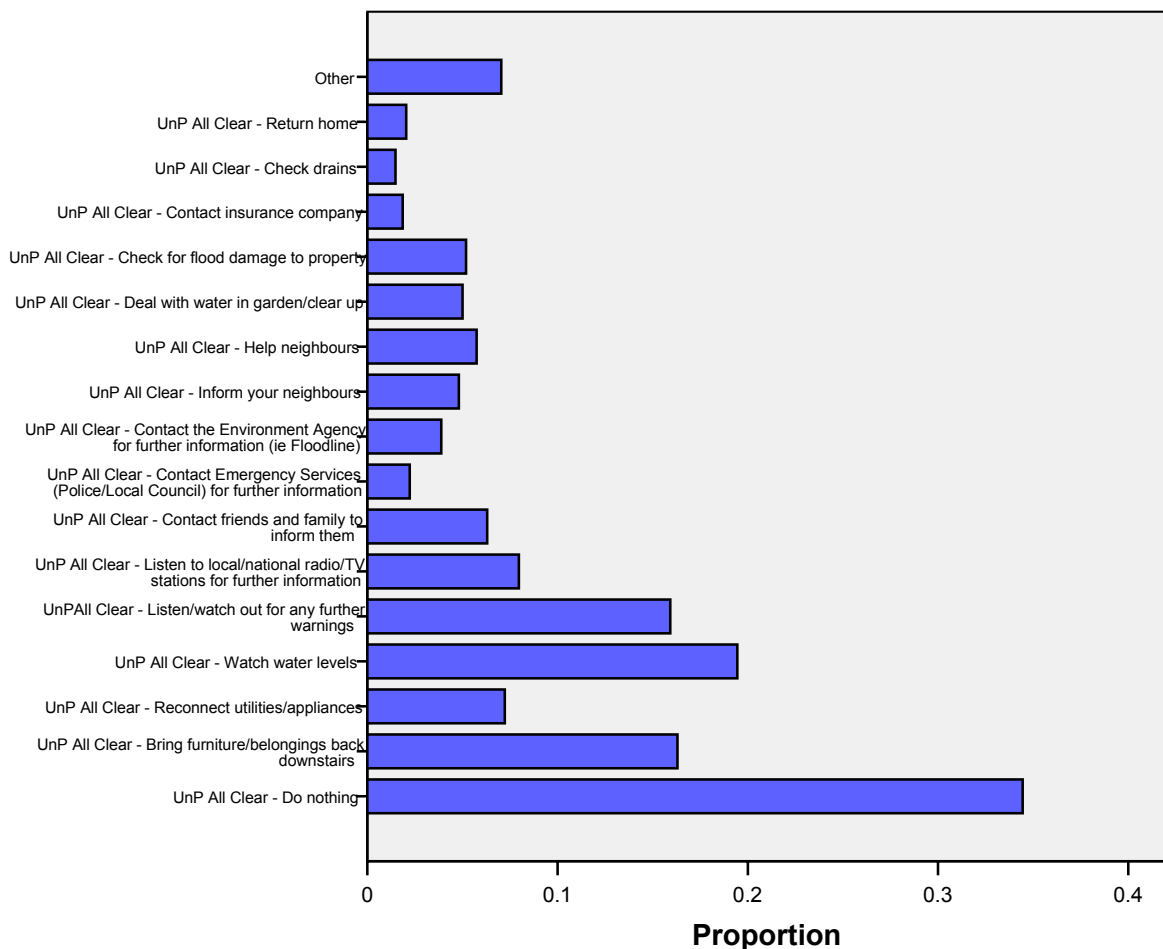

Figure 5.4 Unprompted actions (by category) following an All Clear

5.4.6 Additional actions suggested as a response to flood warning

Following each scenario, respondents were invited to suggest any other actions they or other members of their household would consider taking. Several were concerned with seeking additional information (e.g. check sea conditions, local weather forecasts etc) whilst others were precautionary (e.g. clear gutters, close commercial premises, stay awake to monitor conditions). Additional actions suggested are listed below in Table 5.7.

Table 5.7 Additional actions suggested by respondents

Action	Flood Watch	Flood Warning	Severe Flood Warning
	Number of people suggesting action		
Alert Flood Warden	1		
Check public transport		1	1
Redirect traffic/close road/check roads	1	1	1
Check emergency flood box/panic bay	4	4	2
Clear gutters/remove debris	1	1	
Check/prepare car	1		
Prepare pump			3
Check local weather forecasts	1		1
Check sea conditions	1	1	1
Contact landlord/centre manager	1	1	
Contact Water Board	1		
Read Flood Watch card	2	1	
Close commercial organisations		1	
Keep family member awake to monitor conditions		1	
Prepare inflatable dinghy		1	1
Buy a pair of Wellingtons			1
Don't know	18	9	7

5.4.7 Analysis of Action in response to flood warning by Region

This section presents analyses of flood warning response for each of the Environment Agency Regions and Wales; results refer to action categories and all findings relate to unprompted responses.

Table 5.8 details those actions intended as a response to Flood Watch. It is clear that there is considerable regional variation here. Actions connected with protecting personal property are most likely amongst respondents from Anglian, North East, Southern, and South West Regions. This compares with preparation to evacuate being the most likely in North West and Thames Regions, and assessing risk as the most likely in Wales. Respondents in Wales and Thames Region are more likely to help other people than those in other Regions. Overall, those in Thames are likely to take actions from more categories whereas the trend is for those in the North East to take actions from the fewest. Respondents in Midlands Region are most likely to do nothing in response to Flood Watch.

Table 5.8 Table of predicted action following Flood Watch by Environment Agency Region

Action	Anglian (%)	Midlands (%)	North East (%)	North West (%)	Southern (%)	South West (%)	Thames (%)	Wales (%)	Sig.
Form own assessment of risk	25.8	26.4	19.4	43.3	25.0	18.5	41.4	42.6	***
Seek advice/information	13.6	20.8	28.4	21.7	23.6	26.2	44.3	26.5	**
Minimise water entry	13.6	18.1	9.0	8.3	15.3	16.9	20.0	23.5	n.s.
Protect personal property	47.0	26.4	32.8	28.3	36.1	30.8	35.7	19.1	*
Help others	6.1		4.5	3.3	4.2	6.2	15.7	20.6	***
Prepare to evacuate	19.7	19.4	14.9	46.7	29.2	21.5	44.3	14.7	***
Do nothing	19.7	36.1	23.9	20.0	20.8	24.6	5.7	26.7	**
Mean number of action categories predicted	*1.26*	*1.11*	*1.09*	*1.52*	*1.33*	*1.20*	*2.01*	*1.47*	

Table 5.9 presents the regional variation in response to Flood Warning. Once again, differences appear but it is now those in Midlands Region as well as Wales that are most likely to form their own assessment of risk. The protection of personal property remains a priority for those in Anglian, North East and South West Regions. Southern Region respondents join those from the North West and Thames in being most likely to be making preparations for evacuation.

Table 5.9 Table of predicted action following Flood Warning by Environment Agency Region

Action	Anglian (%)	Midlands (%)	North East (%)	North West (%)	Southern (%)	South West (%)	Thames (%)	Wales (%)	Sig.
Form own assessment of risk	28.8	45.8	22.4	46.7	29.2	12.3	44.3	41.2	***
Seek advice/information	21.2	25.0	37.3	35.0	22.2	20.0	45.7	27.9	**
Minimise water entry	30.3	30.6	22.4	10.0	23.6	23.1	27.1	29.4	n.s.
Protect personal property	50.0	41.7	58.2	41.7	40.3	49.2	41.4	29.4	*
Help others	6.1	1.4	6.0	3.3	8.3	9.2	12.9	22.1	**
Prepare to evacuate	33.3	31.9	29.9	58.3	48.6	46.2	57.1	27.9	***
Do nothing	12.1	18.1	1.5	8.3	11.1	7.7	1.4	16.2	**
Mean number of action categories predicted	*1.69*	*1.76*	*1.76*	*1.95*	*1.72*	*1.60*	*2.29*	*1.78*	

Table 5.10 gives results for intended action at Severe Flood Warning; most of the sample claim preparation for evacuation as their most likely form of response. Respondents from Anglian Region remain the most likely to be concerned about protecting property whereas those in Wales are most likely to be making risk assessments and seeking further information or advice. Wales also yielded the greatest amount of intended inaction.

Table 5.10 Table of predicted actions following Severe Flood Warning by Environment Agency Region

Action	Anglian (%)	Midlands (%)	North East (%)	North West (%)	Southern (%)	South West (%)	Thames (%)	Wales (%)	Sig.
Form own assessment of risk	27.3	48.6	25.4	41.7	11.1	13.8	38.6	36.8	***
Seek advice/ information	19.7	38.9	37.3	35.0	27.8	23.1	42.9	35.3	*
Minimise water entry	22.7	23.6	14.9	6.7	19.4	24.6	27.1	25.0	n.s.
Protect personal property	50.0	43.1	59.7	40.0	43.1	44.6	37.1	30.9	*
Help others	6.1	8.3	7.5	8.3	5.6	4.6	14.3	23.5	**
Prepare to evacuate	43.9	68.1	65.7	71.7	80.6	75.4	67.1	33.8	***
Do nothing	9.1	5.6	1.5	6.7	5.6	1.5	5.7	10.3	n.s.
Mean number of action categories predicted	*1.70*	*2.31*	*2.10*	*2.03*	*1.88*	*1.86*	*2.27*	*1.85*	

Significance: *** p<0.001; **;p<0.01:*:p<0.05 n.s. = no statistical significance

5.4.8 Analysis of action in response to flood warning by household characteristics

Actions taken in response to flood warning were examined for possible variation according to household characteristics (e.g. household structure; the presence of dependent children or people with disability; tenure type). The following section explores some of these characteristics with regard to household intended response to different levels of flood warning.

Household structure

In response to the Flood Watch scenario, single pensioners were the group most likely to do nothing or seek advice (see Table 5.11). Apart from single parents, the most likely action for all other types of household was to form their own assessment of risk or to protect personal property; single parents were more likely to seek information than to protect personal property.

Table 5.11 Household structure and action following Flood Watch

Action	single pensioner (78) (%)	single adult 18-64	Pensioner couple (97) (%)	2+ adults + children (131) (%)	2+ adults no children (147) (%)	single parent (14) (%)	2+adults incl pensioner (25) (%)	All house-Holds (540) (%)	Level of Sig.
Form own assessment of risk	25.6	38.3	29.9	32.1	26.5	50.0	32.0	30.2	n.s.
Seek advice or information	29.5	25.5	28.9	27.5	19.7	35.7	24.0	25.7	n.s.
Minimise water entry	12.8	10.6	18.6	14.5	18.4	21.4	12.0	15.7	n.s.
Protect personal property	26.9	27.7	35.1	32.1	36.7	7.1	32.0	32.0	n.s.
Help others	5.1	17.0	11.3	6.1	5.4		8.0	7.6	n.s.
Prepare to evacuate	19.2	34.0	22.7	25.2	30.6	21.4	28.0	26.1	n.s.
do nothing	30.8	23.4	18.6	17.6	22.4	28.6	24.0	22.2	n.s.
Mean number of action categories predicted	**1.19**	**1.53**	**1.46**	**1.37**	**1.37**	**1.36**	**1.36**	**1.37**	

n.s. = no statistical significance

Table 5.12 displays the percentages of respondents with different household structure who say they would take action in response to the flood warning scenario. Once again, the actions taken by the majority in each category of household have been shaded. Thus single pensioners are now most likely to seek advice while pensioner couples are still most likely to protect their personal property, as are households containing adults without dependent children. At this level preparing to evacuate is an action considered by many households, though not necessarily by those who may be most vulnerable, for example, single pensioners and single parents.

Table 5.12 Household structure and action following Flood Warning

Action	Single pensioner (78) (%)	Single adult 18-64	Pensioner couple (97) (%)	2+ adults + children (131) (%)	2+ adults no children (147) (%)	single parent (14) (%)	2+adults incl pensioner (25) (%)	All house-holds (540) (%)	Level of Sig.
Form own assessment of risk	33.3	40.4	36.1	34.4	27.9	57.1	36.0	33.9	n.s.
Seek advice/information	39.7	42.6	29.9	26.0	20.4	35.7	36.0	29.3	*
Minimise water entry	15.4	14.9	30.9	23.7	29.9	28.6	24.0	24.8	n.s.
Protect personal property	34.6	42.6	50.5	44.3	46.9	35.7	36.0	43.9	n.s.
Help others	9.0	14.9	11.3	5.3	8.2	7.1	8.0	8.7	n.s.
Prepare to evacuate	34.6	44.7	44.3	46.6	37.4	28.6	48.0	41.5	n.s.
do nothing	16.7	4.3	7.2	6.9	11.6	14.3	8.0	9.6	n.s.
Mean number of action categories	**1.67**	**2.00**	**2.03**	**1.80**	**1.71**	**1.93**	**1.88**	**1.82**	

Significance:* p<0.05 n.s. = no statistical significance

Table 5.13 considers the actions predicted by different households in response to a Severe Flood Warning. Across all types of household, the most likely action is to make preparations for evacuation, a response suggested by more than half of the single pensioners and between two thirds and three quarters of all other households. The average number of action categories mentioned is two, with single pensioners and adults with dependent children intending to act in less than the average number of categories.

Table 5.13 Household structure and action following Severe Flood Warning

Action	single pensioner (78) (%)	single adult 18-64 (47) (%)	Pensioner couple (97) (%)	2+ adults + children (131) (%)	2+ adults no children (147) (%)	single parent (4) (%)	2+adults households incl pensioner (25) (%)	All house-holds (540) (%)	Level of Sig.
Form own assessment of risk	32.1	38.3	33.0	27.5	23.8	64.3	32.0	30.4	*
Seek advice or information	42.3	34.0	34.0	29.8	23.8	57.1	48.0	32.6	*
Minimise water entry	11.5	23.4	25.8	17.6	25.2	21.4	16.0	20.7	n.s.
Protect personal property	34.6	46.8	45.4	41.2	45.6	50.0	56.0	43.5	n.s
Help others	10.3	19.1	12.4	6.1	9.5		8.0	9.8	n.s
Prepare to evacuate	52.6	66.0	62.9	63.4	65.3	78.6	72.0	63.3	n.s
Do nothing	10.3	2.1	2.1	6.1	6.8	14.3		5.7	n.s
Mean number of action categories predicted	**1.83**	**2.28**	**2.13**	**1.86**	**1.93**	**2.71**	**2.32**	**2.00**	

Significance: *** p<0.001; **;p<0.01:*:p<0.05 n.s. = no statistical significance

Disability and long-term illness

The presence of disability or long-term illness in the household did not significantly affect action at any level of flood warning.

Tenure type

At all levels of warning home owners were significantly more likely than tenants to take action to reduce flood water entering their property. It was only at the highest level of warning that people in rented accommodation were as likely as owner-occupiers to protect their personal property. Table 5.14 details the results of these analyses.

Table 5.14 Action and tenure type

Actions	Does not own home (%)	Owns home (%)	Level of Sig.*
Actions at Flood Watch			
Form own assessment of risk	33.1	29.1	n.s.
Seek advice/information	28.2	24.9	n.s.
Minimise water entry	8.5	18.3	**
Protect personal property	21.8	35.7	**
Help others	5.6	8.3	n.s.
Prepare to evacuate	28.2	25.4	n.s.
do nothing	26.1	20.9	n.s.
Actions at Flood Warning			
Form own assessment of risk	33.8	33.9	n.s.
Seek advice/information	36.6	26.6	*
Minimise water entry	17.6	27.4	*
Protect personal property	33.8	47.5	**
Help others	8.5	8.8	n.s.
Prepare to evacuate	41.5	41.5	n.s.
do nothing	7.7	10.3	n.s.
Actions at Severe Flood Warning			
Form own assessment of risk	38.7	27.4	*
Get advice about what to do	40.1	29.9	*
Minimise water entry	13.4	23.4	*
Protect personal property	38.0	45.5	n.s.
Help others	12.0	9.0	n.s.
Prepare to evacuate	61.3	64.1	n.s.
do nothing	4.9	6.0	n.s.

* Significance * p<0.05:**p<0.01: ***p<0.001 n.s.= no statistical significance

Length of residence

Contrary to expectations, no differences in terms of action at Flood Watch or Flood Warning were found between people living in their home for less than one year and those resident for longer periods. At the highest level of warning, however, longer term residents were more likely than newer residents to form their own assessment of risk but less likely to help others (see Table 5.15).

Table 5.15 Action and length of residence

Action	Under a year (59) (%)	Longer than a year (481) (%)	Level of Sig.
Action at Flood Watch			
Form own assessment of risk	22.0	31.2	n.s.
Seek advice/information	25.4	25.8	n.s.
Minimise water entry	15.3	15.8	n.s.
Protect personal property	30.5	32.2	n.s.
Help others	8.5	7.5	n.s.
Prepare to evacuate	27.1	26.0	n.s.
Do nothing	30.5	21.2	n.s.
Action at Flood Warning			
Form own assessment of risk	27.1	34.7	n.s.
Get advice/information about what to do	22.0	30.1	n.s.
Minimise water entry	16.9	25.8	n.s.
Protect personal property	45.8	43.7	n.s.
Help others	13.6	8.1	n.s.
Prepare to evacuate	39.0	41.8	n.s.
Do nothing	11.9	9.4	n.s.
Action at Severe Flood Warning			
Form own assessment of risk	18.6	31.8	*
Seek advice or information	23.7	33.7	n.s.
Minimise water entry	11.9	21.8	n.s.
Protect personal property	49.2	42.8	n.s.
Help others	16.9	8.9	*
Prepare to evacuate	61.0	63.6	n.s.
Do nothing	10.2	5.2	n.s.

Significance: *** p<0.001; **;p<0.01:*:p<0.05 n.s.= no statistical significance

Previous flood experience

Seventeen per cent of the sample had prior experience of flooding, either in their current or previous home. Upon receipt of a Flood Watch, flood experience did not significantly predict action. At Flood Warning, however, those who had experience were more likely than those without to form their own assessment of flood risk and less likely to seek advice; people with experience were also more likely to help others in response to the Severe Flood Warning scenario (Table 5.16).

Table 5.16 Action and previous flood experience

Action	No previous flood experience (448) (%)	Previous flood experience (92) (%)	Level of Sig.
Watch-Form own assessment of risk	29.5	33.7	n.s.
Watch-Get advice/information about what to do	26.8	20.7	n.s.
Watch-Minimise water entry	14.5	21.7	n.s.
Watch-Protect personal property	33.5	25.0	n.s.
Watch-Help others	7.4	8.7	n.s.
Watch-Prepare to evacuate	26.8	22.8	n.s.
Watch-do nothing	22.3	21.7	n.s.
Mean number of action categories	*1.39*	*1.33*	n.s.
Warning-Form own assessment of risk	31.7	44.6	*
Warning-Get advice/information about what to do	31.0	20.7	*
Warning-Minimise water entry	25.7	20.7	n.s.
Warning-Protect personal property	44.9	39.1	n.s.
Warning-Help others	7.8	13.0	n.s.
Warning-Prepare to evacuate	41.5	41.3	n.s.
Warning- do nothing	9.4	10.9	n.s.
Mean number of action categories	*1.83*	*1.79*	n.s.
Severe F Warning-Form own assessment of risk	28.8	38.0	n.s.
Severe F Warning-Get advice about what to do	32.8	31.5	n.s.
Severe F Warning-Minimise water entry	20.3	22.8	n.s.
Severe F Warning-Protect personal property	44.4	39.1	n.s.
Severe F Warning-Help others	8.7	15.2	*
Sever F Warning - do nothing	5.8	5.4	n.s.
Mean number of action categories	*1.99*	*2.07*	n.s.

Significance: *** p<0.001; **;p<0.01:*:p<0.05 n.s. = no statistical significance

5.4.9 Analysis of action in response to flood warnings by individual characteristics of the respondent

Actions taken in response to flood warnings were also examined for any effect of individual characteristics (e.g. age; gender; etc.). The following section details results of these analyses.

Clearly it is appropriate to assess the flood warning response of individuals with specific regard to their household. Characteristics such as those discussed above are important factors in the flood warning response. It is, after all, the household (and the property) as well as the individual that is at risk from flooding. The interviewer therefore asked survey respondents to predict their households' actions on receipt of flood warnings rather than their own individual response. However, it is important to bear in mind that it is impossible to be certain that responses to the scenarios always meet the intended aims of the researchers; some of the survey data may therefore relate more to an individual's intentions than to those of the household.   For this reason, it was considered important to examine the answers of individual respondents with regard to characteristics such as gender, age and employment status.

Gender

Findings suggest that both male and female respondents generally reported an intention to take similar actions on receipt of flood warnings. Men, however, are predicted to be more likely than women to be proactive, forming their own risk-assessments and minimising water entry. Conversely, women are significantly more likely to seek advice or further information. At both Flood Warning and Severe Flood Warning, women are more likely than men to take no action (see Table 5.17).

Table 5.17 Gender and action

Action	Male (257) (%)	Female (283) (%)	Sig.
Actions at Flood Watch			
Form own assessment of risk	37.0	24.0	**
Seek advice/information	24.1	27.2	n.s.
Minimise water entry	17.1	14.5	n.s.
Protect personal property	31.5	32.5	n.s.
Help others	7.8	7.4	n.s.
Prepare to evacuate	26.1	26.1	n.s.
Do nothing	21.0	23.3	n.s.
Mean number of action categories	*1.43*	*1.31*	*n.s.*
Actions at Flood Warning			
Form own assessment of risk	40.1	28.3	**
Get advice/information about what to do	26.1	32.2	*
Minimise water entry	30.0	20.1	**
Protect personal property	45.1	42.8	n.s.
Help others	10.5	7.1	n.s.
Prepare to evacuate	42.8	40.3	n.s.
Do nothing	5.8	13.1	**
Mean number of action categories	*1.95*	*1.70*	***
Actions at Severe Flood Warning			
Form own assessment of risk	35.0	26.1	*
Get advice about what to do	31.5	33.6	n.s.
Minimise water entry	24.1	17.7	n.s.
Protect personal property	44.7	42.4	n.s.
Help others	11.7	8.1	n.s.
Prepare to evacuate	65.4	61.5	n.s.
Do nothing	3.1	8.1	*
Mean number of action categories	*2.12*	*1.89*	***

Significance: *** p<0.001; **;p<0.01:*:p<0.05 n.s. = no statistical significance

Age

With regard to actions predicted by age, Table 5.18 shows that it is the youngest and oldest age groups that are significantly less likely to form their own assessment of risk and are likely to take fewer actions overall.

Table 5.18 Action and age of respondent

	18-24 years (45) (%)	25-44 years (138) (%)	45-64 years (164) (%)	65-79 years (154) (%)	80+ years (39) (%)	Sig.
Actions at Flood Watch						
Form own assessment of risk	20.0	39.9	26.8	30.5	20.5	*
Seek advice/information	28.9	26.8	21.3	28.6	25.6	n.s.
Minimise water entry	8.9	16.7	16.5	16.9	12.8	n.s.
Protect personal property	31.1	29.0	34.1	35.7	20.5	n.s.
Help others	4.4	7.2	7.9	8.4	7.7	n.s.
Prepare to evacuate	24.4	21.7	32.9	23.4	25.6	n.s.
Do nothing	26.7	20.3	22.0	18.8	38.5	n.s.
Mean number of action categories	*1.18*	*1.41*	*1.40*	*1.44*	*1.13*	
Actions at Flood Warning						
Form own assessment of risk	20.0	42.0	29.9	35.7	30.8	*
Seek advice/information	31.1	25.4	25.0	33.1	43.6	n.s.
Minimise water entry	26.7	26.1	24.4	26.0	15.4	n.s.
Protect personal property	33.3	48.6	42.7	48.7	25.6	*
Help others	4.4	8.0	9.1	9.7	10.3	n.s.
Prepare to evacuate	44.4	38.4	42.1	44.2	35.9	n.s.
Do nothing	11.1	7.2	10.4	7.8	20.5	n.s.
Mean number of action categories	*1.60*	*1.88*	*1.73*	*1.97*	*1.62*	
Actions at Severe Flood Warning						
Form own assessment of risk	13.3	34.8	29.3	32.5	30.8	n.s.
Get advice about what to do	22.2	29.7	29.9	35.1	56.4	**
Minimise water entry	11.1	22.5	25.0	18.2	17.9	n.s.
Protect personal property	33.3	48.6	43.3	46.8	25.6	n.s.
Help others	8.9	8.7	9.8	12.3	5.1	n.s.
Prepare to evacuate	64.4	63.0	66.5	63.0	51.3	n.s.
Do nothing	11.1	5.8	5.5	3.9	7.7	n.s.
Mean number of action categories	*1.53*	*2.07*	*2.04*	*2.08*	*1.87*	

Significance: *** $p<0.001$; **;$p<0.01$:*:$p<0.05$ n.s. = no statistical significance

Inaction by age and gender

With a view to understanding more about those who say they would take no action on receiving a flood warning, inaction was explored for the possible effects of age and gender. Table 5.19 details the percentages of men and women in different age groups who fall into this action response category. Two groups were found to be significantly more likely than the rest to do nothing even when asked to imagine a severe flood warning scenario: men aged under 24; and middle-aged women.

Table 5.19 Inaction at all levels of flood warning by age and gender

Age	Flood Watch			Flood Warning			Severe Flood Warning		
	Male (%)	Female (%)	Sig.	Male (%)	Female (%)	Sig.	Male (%)	Female (%)	Sig.
Under 24	40.9%	13.0%	*	9.1%	13.0%	n.s.	13.6%	8.7%	n.s.
N	*22*	*23*		*22*	*23*		*22*	*23*	
25-44	23.7%	17.7%	n.s.	8.5%	6.3%	n.s.	3.4%	7.6%	n.s.
N	*59*	*79*		*59*	*79*		*59*	*79*	
45-64	17.6%	25.6%	n.s.	2.7%	16.7%	**	1.4%	8.9%	*
N	*74*	*90*		*74*	*90*		*74*	*90*	
65-79	16.1%	22.4%	n.s.	4.6%	11.9%	n.s.	1.1%	7.5%	*
N	*87*	*67*		*87*	*67*		*87*	*67*	
80+	26.7%	45.8%	n.s.	13.3%	25.0%	n.s.	6.7%	8.3%	n.s.
N	*15*	*24*		*15*	*24*		*15*	*24*	

Significance: *** $p<0.001$; **;$p<0.01$:*:$p<0.05$ n.s. = no statistical significance

Employment status

With one exception, employment status was not a significant factor in defining intended flood warning response. At Severe Flood Warning, the employed people amongst our sample were found to be significantly more likely to take steps to minimise water entry and the unemployed significantly less likely to do so (27% compared to 4.5%: $p<0.05$).

5.5 Summary

This section provides a brief review of findings based on responses to the scenarios posed in the survey:

- The majority of respondents (77%) report that they would take action in response to all levels of flood warning; the percentage taking action increases with the severity of warning.
- At Flood Watch, 22 per cent of respondents claim that they would do nothing; 78 per cent intend to take action.
- At Flood Warning, 10 per cent claim they would do nothing; 90 per cent intend to take action.
- At Severe Flood Warning, six per cent of respondents claim they would do nothing; 94 per cent intend to take action.
- Taking no action at Flood Watch significantly predicts doing nothing at subsequent levels of flood warning.
At Flood Watch, the most likely type of action was to protect personal property; the second most likely action was to form an assessment of flood risk.
- At Flood Warning, protecting personal property remained the most likely action, followed by making preparations for evacuation.
- At Severe Flood Warning, the most likely action was to prepare to evacuate.

- At an All Clear, the most likely action would be to do nothing, claimed by 34 per cent of respondents.
- Significant area differences were observed in terms of the types of actions most likely to be taken and the likelihood of doing nothing in response to a warning. Those living in Midlands Region are significantly more likely than respondents from other Regions to do nothing at Flood Watch or Flood Warning whereas those in Thames Region are the least likely to take no action.
- Single pensioners are the most likely group to take no action at Flood Watch.
- Home owners are significantly more likely than tenants to take steps to minimise water entry into their property.
- Women, especially the middle-aged, are more likely than men to take no action following Flood Warning and Severe Flood Warning.

6 Conclusions and recommendations

This section draws together points arising from the discrete studies conducted for the Public Response to Flood Warning project. It discusses the key findings of our research, and makes suggestions and recommendations to the Environment Agency.

The findings from our quantitative analyses indicate that the majority of the at risk population say they would take some action in response to flood warnings and that most of the people with previous experience of flood consider the actions they took to have been 'effective'.   Findings clearly demonstrate that the percentage of people taking action increases steadily with the severity of warning, and that the actions most likely to be taken at each warning stage are broadly appropriate. These are encouraging results for the Environment Agency.

Our research also shows, however, that a small proportion of the at-risk population (6%) say they would take no action at all even if they were to receive a Severe Flood Warning. Inaction at the earliest stage of flood warning significantly predicts a lack of response at all later stages. Understanding the characteristics of this group and considering how best to target information and support to them should be a priority for the Environment Agency and further research to this end is suggested.

However, it is important to note that our findings highlight the necessity of considering people's responses to flood warning in context; factors such as previous flood experience, individual and household characteristics, local knowledge and awareness and conditions pertaining to flooding and flood warning are all important here. Taking no action, or forming one's own assessment of risk, may well be an appropriate response in certain cases; it is possible that some of those who report inaction are the very people who have a high level of awareness and who are very well prepared with regard to flood event. These people may be exhibiting the personal responsibility or active citizenship which the Environment Agency hopes to encourage (Barnett et al 2005). This area needs further investigation in conjunction with the development of research tools that are sufficiently sensitive to evaluate the context within which actions are taken.

A qualitative exploration of 'effective action' showed that participants' understanding is not far removed from that currently held by the Environment Agency, although the concept was not used spontaneously by any of our respondents.   Whereas the Environment Agency has to date considered 'effectiveness' in terms of avoiding material damage and loss of life, the public's interpretation is often based on a more pragmatic and realistic approach; findings suggest a concentration upon damage-limitation rather than prevention.

We found, too, that many actions designated as appropriate in response to flood warning were those that would alleviate psychological as well as physical or material discomfort; participants highlighted the need to 'do something' in the face of danger. They included actions designed to protect the safety and comfort of pets, family members and vulnerable neighbours and frequently focused more upon belongings of sentimental value than upon expensive items. Qualitative findings reveal that this was particularly evident amongst people with prior experience of flooding where non-economic losses were often the hardest to bear. In addition, we found that what might be considered appropriate action for one household, or in one set of circumstances,

may not be so in another. Assessments of 'effectiveness' were found to be affected by sense of preparedness, flood-severity, personal circumstances and attitudes towards material loss.

The degree to which an individual or household felt prepared for flood was found to play a key role in people's perceptions of effectiveness with regard to their actions in response to flood warnings; indeed, this was the single most significant factor in predicting reported effective action. Preparedness is concerned with both long and short term factors, and included feeling adequately informed about how and when to act as well as taking preparatory defensive action both in advance of and immediately prior to possible flood. This highlights the importance of flood warnings and flood-related advice from the Environment Agency as well as a fostering of self-help and community action. Being prepared for flood is an important part of living with flood risk, and the 'feeling' of preparedness may well act as a buffer against psychological distress.

The finding that high value is placed upon saving treasured memorabilia and domestic pets highlights the importance of factors that impact upon psychological well-being following a flood event and lends support to the existing body of knowledge in this field (e.g. Tapsell et al 2002; Thrush et al 2005b). Where psychological well-being is protected, people may be cushioned against physical ill-health and its concomitant economic impacts (e.g. lost working days, use of health services, etc.). It is likely, therefore, that saving items of 'non-economic' value may well yield its own economic benefits and is thus far from negligible in terms of effective action.

Interesting area differences were apparent in the secondary analysis and the survey. These concerned the percentage of flooded respondents who reported their actions as effective, the type of actions mentioned, and the likelihood of no action at all. A full exploration of the factors underlying these differences was beyond the scope of this study as they are likely to reflect flood and community characteristics, local topography and demography, features of local flood awareness campaigns and local relationships between Environment Agency staff and the At Risk population. Understanding the reasons that account for these area differences is an important area for future research.

The survey revealed further significant differences in terms of individual characteristics and the likelihood of taking action in response to flood warning. Unsurprisingly, single pensioners were the category most likely not to respond at Flood Watch; this is a group already known to the Environment Agency as particularly vulnerable in terms of ability to take action. More unexpected, however, were the findings that young men and middle-aged women were likely to say they would do nothing in response to flood warnings, even at the most severe level.

The finding that women in this middle age group are less likely to take action is particularly surprising given that research on environmental awareness and action often concludes that this group are *more* aware and active than others, particularly with reference to local issues (DETR 1998; DEFRA 2002). There is a clear need for further investigation and a suitably targeted approach here. Whereas it may be hard to reach young men, involving and informing middle-aged women (a visible and 'settled' category in terms of accessibility) should not prove difficult and would yield worthwhile results in terms of flood-warning response.

One important survey finding in terms of future Environment Agency research concerns the differences between prompted and unprompted answers. The increase in both number and type of responses that appeared once participants were presented with a list of possible actions is likely to confound the proper understanding of public response

to flood warning. Since people faced with impending flood may well have no such a list to hand, it is suggested that in future surveys a more realistic assessment of possible response would be gained by seeking answers only to unprompted questions or scenarios.

Our qualitative study revealed considerable differences in knowledge and awareness between the flooded and non-flooded at-risk public.   Whereas it is unfortunately the case that experience of flooding will almost inevitably result in an enhanced knowledge and awareness, it is important that efforts are made to improve knowledge levels amongst the non-flooded public.   This will in turn impact upon the degree to which a household is prepared for possible flood. Our findings suggest that personal contact is preferred wherever possible and a proactive approach from the Environment Agency, with visits to at-risk areas before as well as after events or periods of threatened flood, may well prove fruitful. Trust in the Environment Agency was also found to be a relevant factor, both in terms of warning response and public satisfaction.   Fostering a good relationship with local communities is key here, as is the provision of area-specific information.

6.1 Recommendations

Findings from this project suggest several recommendations for the Environment Agency. When conducting future research, three recommendations are proposed:

- In order to achieve a more accurate and detailed assessment of appropriate action in response to flood warning, it is recommended that research tools are sufficiently sensitive to allow for an evaluation of context.
- In future research into public response to flood warning, seek unprompted rather than prompted responses.
- Adopt a uniform age stratification in all Environment Agency research in order to ensure comparability between studies.

With regard to enhancing public response to flood warning, we propose the following:

- Understanding the reasons why certain people report taking no action in response to flood warning, and considering how best to tailor information and support to these groups, should be a priority for the Environment Agency. This research highlights the importance of targeting women, particularly the middle-aged, with regard to increasing their awareness of flood warning and a knowledge of how to take appropriate action.
- Further research is recommended in order to build on an understanding of reasons for area differences in response to flood warning.

With specific regard to flood warnings, it is suggested that the Environment Agency consider the following recommendations:

- It is recommended that the Environment Agency explores the possibility of making flood warnings more area-specific.
- Should the content or means of dissemination of flood warnings be altered in any way, it is vital that steps are taken to ensure the warning content is clear, sufficiently differentiated and conveys a suitable sense of urgency and that the methods of dissemination are clearly and widely understood by the at-risk public.

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Appendices

Appendix 1

Construction of 'action' scale

Using the Post event 2001 survey, an 'action' scale was created, which quantified how much, and what type, of mitigating actions people took to combat the flood event.

Table A2.1 Post events 2001 – Items Used to Construct 'Actions' Scale.

Survey Variable	New Variable	Scores / Weights
qloc (acted on advice to listen to local radio)	wradio	(Yes = **1**) (No = **0**)
qflo (acted on advice to telephone Floodline)	wfldline	(Yes = **2**) (No = **0**)
qwa (acted on advice to warn neighbours)	wwarnn	(Yes = **2**) (No = **0**)
qval (acted on advice to move valuables upstairs)	wmoveval	(Yes = **4**) (No = **0**)
qyou (acted on advice to move to safe place – evacuate)	wmovehh	(Yes = **4**) (No = **0**)
qwarm (acted on advice to take warm clothes and supplies to a safe place)	wwarmcl	(Yes = **4**) (No = **0**)
qpow (acted on advice to prepare for power cut – get a torch ready)	wlosspow	(Yes = **2**) (No = **0**)
qblo (acted on advice to use sandbags)	wsandbag	(Yes = **3**) (No = **0**)
qboa (acted on advice to use floodboards)	wflgates	(Yes = **3**) (No = **0**)
qswi (acted on advice to switch off gas / electricity)	wswitch	(Yes = **3**) (No = **0**)
qchec (acted on advice to check gas / electricity before re-using them)	wcheck	(Yes = **3**) (No = **0**)
qtap (acted on advice to boil tap water)	wtap	(Yes = **2**) (No = **0**)
qcars (acted on advice to move car to safe place)	wcars	(Yes = **3**) (No = **0**)
qlist (acted on advice to listen out for warnings)	wlisten	(Yes = **1**) (No = **0**)
qweb (acted on advice to check EA website)	wweb	(Yes = **1**) (No = **0**)

Reliability analysis was carried out on this scale to confirm satisfactory internal consistency, based on the average inter-item correlation. Cronbach's scores of 0.76 for the Post event 2001 'actions' scale was calculated and confirms a satisfactory level of inter-item correlation.

Appendix 2

Criteria for Focus Group Recruitment

Focus groups to be recruited from the following categories of people living within the Environment Agency floodplain.   6 people per focus group wherever possible.

Older People:
Over 65 years of age, with a focus on the frail elderly
Mix of men and women

Parents of Young child(ren):
One or more children, at least one of whom is 5 years or below.
Mix of men and women if possible
Age immaterial
Lone- or two-parent families

Owner Occupiers:
Home owners
To include some single-storey homes if possible (flats, bungalows, mobile homes etc)
18-70 years of age (mix of ages if possible)
Mix of men and women

Tenants:
Living in rented accommodation (privately rented, housing association or Council; short or long-term let but not holiday lets)
To include some single-storey homes if possible (flats, bungalows, mobile homes etc)
18-70 years of age (mix of ages if possible)
Mix of men and women if possible

People with Disability or Long-term Illness or their Carers:
Age and gender immaterial but a mix of both wherever possible
People with disability or those with long-term illness or carers with such a person in their household.

Appendix 3

Topic Guide for Focus Group Discussions and In-depth Interviews

1   Introduction and Background

(Welcome everyone and thank them for attending).

Introduce self and briefly explain research. Stress independent nature of study, although commissioned by EA. Explain need for audio recording, obtain permission and assure anonymity.   (Ask group to introduce themselves).

Determine whether or not participants have received flood warning in the past.
In what form? (AVM, leaflets, internet Floodline, radio, tv etc)?

2   Unprompted Awareness:

Can participants describe the Environment Agency's flood warning codes? Ask for details of text, colour, images, sequence of warnings etc.

3   Prompted Awareness:

Use Visual Aids: Sets of cards: each set containing four cards, one for each EA warning code (icons and level of warning)

Do you recognise these?

Where have you come across them?

Can you explain the meaning of each?

If dissension in group, what do you think this warning should mean?

Explore order of warning severity

Have you seen/heard these warnings in sequence before? Where?

4   Understanding of Flood Warning Codes

Visual Aids: each code in its correct order of warning severity. For each code, ask…

What does this particular warning mean to you?

What does it mean for your own safety? The safety of other people in your household? The safety of your home and your property?

5 Credibility of Flood Warning Codes and Other Methods of Warning

(Visual Aids: Retain complete set of codes as above)

Are these warnings relevant to your particular circumstances?

Do you use any other form/indicators of flood warning? (*prompt:* neighbours; river levels; weather forecasts; media messages; etc)

Do you use these in conjunction with EA warnings? EA warnings only? Other indicators only?

Which form of warning is most relevant to your circumstances?

How much trust do you place in the EA warning codes? Do you trust them above any other signs of possible flooding?

If not, what other indicators/signs would you place more trust in?

6 Satisfaction with Flood Warning Codes
(Visual Aids: Retain complete set of codes as above)

Do you think the various codes do the job they are intended to do? (Explore each code in turn, including EA sequence). Does/would each code level prompt you to take action?

Are they good enough or could they be improved in any way? How?

What would be the most useful way of warning you of impending flood?

7 Action in response to Flood Warning and Barriers to Action

Ask for each code level:

If you received one of these warnings, would you take action for your own safety? the safety of your property? The safety of others in your household?

What, if anything, would inhibit you from taking action?

Explore effectiveness of actions

8 Access to Flood Warning Codes and Evaluation of Dissemination Methods

(In each case, check topic not already covered…..)

If previous knowledge of codes, how did you first learn about these flood warning codes?

If no experience of codes, ask where they think such information might be obtained.

Do you have access to other sources of information about possible flooding (information from neighbours, local Council, observation of natural signs etc.)?

How do you get this information?

Have you received warnings from any other source? (neighbours, Council, observation of river, weather etc)

Are there any other ways you obtain information about possible flooding in your area?

Explore opinions of the various ways in which the EA disseminates flood warnings:

Explore pros and cons of : AVM

Floodline

Leaflets

Literature (determine what type)

Internet Floodline

Radio/tv

Personal contact (telephone)

Finally, are there any other ways in which you would like to receive flood warnings?

Thank, close and pay!

APPENDIX 4

Survey questionnaire

ACTIONS IN RESPONSE TO FLOOD WARNING

ENVIRONMENT AGENCY

UniS

SP/660

7.1   SHOW ID and Letter of Authority

Introduce yourself as an interviewer from Quality Fieldwork, an independent social research agency. We are helping the Environment Agency and the University of Surrey to conduct a survey with householders who live in areas which are at risk of flooding and we would appreciate your help.

Flood experience in current home

1. How long have you lived at your current address?

Less than one year	1 to 5 years	6-10 years	11-20 years	Over 20 years
1	2	3	4	5

2. Including yourself, how many people are there in each of these age groups living within your household.

Age group	Number
Children under 5 Years	
Children aged 6-9 Years	
Children aged 10-17 Years	
Adults 18-64	
Adults 65-74	
Adults 75+	
Total people in household	

I would like to ask you a few questions about any flooding experience you may have had here.

3. Has this property ever been flooded while you have lived here?

Yes	No	Don't know
1	2	3
Ask Q4	Go to Q8	Go to Q8

4. How many times have you been flooded at this address?

Once	2-3 times	4-6 times	7+ times	Don't know
1	2	3	4	5

SHOW CARD A

5. Thinking now about the last time your property was flooded. What areas were affected?
MULTICODE POSSIBLE

Above ground floor level (ie. within your home)	1
Garage	2
Any other outbuildings	3
Your garden	4
Your drive	5
Don't know	6
Other (Please state)	7

6. Thinking of the most recent occasion, did you have any warning that your property might flood before it actually did?

Yes, had warning	No, no warning	Don't know
1	2	3
Ask Q7	Go to Q8	Go to Q8

SHOW CARD B
7. In which of these ways did you receive this warning?   MULTICODE POSSIBLE

Recorded telephone message from the Environment Agency	01
Personal telephone call from Environment Agency	02
You telephoned Floodline	03
From a neighbour/friend/relative	04
From a Flood Warden /other neighbourhood scheme	05
From the Emergency Services (ie. Police, Fire Brigade, Local Authority)	06
From a radio announcement/broadcast	07
From a television announcement/broadcast	08
From a warning siren, loudspeaker or church bells	09
From viewing Teletext or CEEFAX	10
From viewing the Environment Agency web site	11
Personal observation/saw water level rising	12
Don't know/can't remember	13
Other (please specify)	14

8. We have asked you about any flood experience you have had at your current address, but we would like to know about any previous flood experience you may have had at any time. Have you ever been flooded before at any previous address?

Yes	No
1	2

We want you to imagine yourself in various different flood situations. We will describe the situation and we would like you to say what you would do in each case.

Scenario 1 FLOOD WATCH

SHOW SCENARIO 1 AND READ OUT

It is 6.00pm in November and you are at home watching TV when you hear that a Flood Watch has been declared in your area which means that flooding is possible, and the situation could worsen.

9. Imagine this scenario, that a flood watch has been declared, and imagine you and your family in your home. What sort of things do you think you, or another household member would do?
DO NOT PROMPT but code the responses nearest to those listed below.

Interviewer: We are interested in the response of the whole household.

UNPROMPTED FLOOD WATCH:	
Do nothing	01
Form own assessment of flood risk (Probe.. in what way? And code below)	
Watch water levels	02
Listen/watch out for warnings	03
Listen to local/national radio/TV stations for further information	04
Check the Environment Agency website	05
Get advice about what to do (Probe.. in what way? And code below)	
Contact friends and family for help or advice	06
Contact Emergency Services (Police/Local Council)	07
Contact the Environment Agency for further information (ie. Floodline)	08
Take steps to minimise water entering the property (Probe.. in what way? And code below)	
Block doorways/airbricks with sandbags etc	09
Put flood boards or flood gates in place	10
Block toilet	11
Protect personal property (Probe.. in what way? And code below)	
Move valuable/personal belongings upstairs or to a safe place	12
Move property out of reach of the flood (ie. Put furniture/appliances on bricks or empty bottom shelves)	13
Move cars to a safe place	14
Protect family members (Probe.. in what way? And code below)	
Prepare or move pets/livestock to a safe place	15
Keep track of family members and pets	16
Help others (Probe.. in what way? And code below)	
Warn your neighbours	17
Help neighbourhood/community prepare for flood	18
Prepare and muster into safe place resources required to get through a possible flood (Probe.. in what way? And code below)	
Take warm clothing and/or food/water and/or medication with you to a safe place	19
Move yourself or others in the household to a safe place	20
Be prepared to be evacuated	21
Switch off gas and/or electricity	22
Be prepared for a loss of power (e.g. take a torch)	23
Lock/secure home	24
Other, please specify (Probe)	

> It is lunchtime on a Sunday in August. It has been raining all weekend and you receive an automatic telephone call from the Environment Agency telling you that a Flood Warning has been issued for your area. This means that the river is expected to overflow defences and banks and that flooding is expected, and you need to act now.

Unprompted actions...

10. Imagine this scenario, that a flood warning has been declared, and imagine you and your family in your home. What sort of thing do you think you, or another household member would do?

DO NOT PROMPT but code the responses nearest to those listed below.

Interviewer: We are interested in the response of the whole household.

UNPROMPTED FLOOD WARNING:	
Do nothing	01
Form own assessment of flood risk (Probe.. in what way? And code below)	
Watch water levels	02
Listen/watch out for warnings	03
Listen to local/national radio/TV stations for further information	04
Check the Environment Agency website	05
Get advice about what to do (Probe.. in what way? And code below)	
Contact friends and family for help or advice	06
Contact Emergency Services (Police/Local Council)	07
Contact the Environment Agency for further information (ie. Floodline)	08
Take steps to minimise water entering the property (Probe.. in what way? And code below)	
Block doorways/airbricks with sandbags etc	09
Put flood boards or flood gates in place	10
Block toilet	11
Protect personal property (Probe.. in what way? And code below)	
Move valuable/personal belongings upstairs or to a safe place	12
Move property out of reach of the flood (ie. Put furniture/appliances on bricks or empty bottom shelves)	13
Move cars to a safe place	14
Protect family members (Probe.. in what way? And code below)	
Prepare or move pets/livestock to a safe place	15
Keep track of family members and pets	16
Help others (Probe.. in what way? And code below)	
Warn your neighbours	17
Help neighbourhood/community prepare for flood	18
Prepare and muster into safe place resources required to get through a possible flood (Probe.. in what way? And code below)	
Take warm clothing and/or food/water and/or medication with you to a safe place	19
Move yourself or others in the household to a safe place	20
Be prepared to be evacuated	21
Switch off gas and/or electricity	22
Be prepared for a loss of power (e.g. take a torch)	23
Lock/secure home	24
Other, please specify (Probe)	

Scenario 3 SEVERE FLOOD WARNING

SHOW SCENARIO 3 AND READ OUT

> It is early evening in October and has been raining for several days. All the family members are at home. You then receive an automatic telephone call from the Environment Agency telling you that a Severe Flood Warning has been issued for your area. This means that severe flooding of homes, roads and land is expected with imminent danger to life and property.

Unprompted actions...
11. Imagine this scenario, that a severe flood has been declared, and imagine you and your family in your home. What sort of thing do you think you, or another household member would do?

DO NOT PROMPT but code the responses nearest to those listed below.

UNPROMPTED SEVERE FLOOD WARNING:	
Do nothing	01
Form own assessment of flood risk (Probe.. in what way? And code below)	
Watch water levels	02
Listen/watch out for warnings	03
Listen to local/national radio/TV stations for further information	04
Check the Environment Agency website	05
Get advice about what to do (Probe.. in what way? And code below)	
Contact friends and family for help or advice	06
Contact Emergency Services (Police/Local Council)	07
Contact the Environment Agency for further information (ie. Floodline)	08
Take steps to minimise water entering the property (Probe.. in what way? And code below)	
Block doorways/airbricks with sandbags etc	09
Put flood boards or flood gates in place	10
Block toilet	11
Protect personal property (Probe.. in what way? And code below)	
Move valuable/personal belongings upstairs or to a safe place	12
Move property out of reach of the flood (ie. Put furniture/appliances on bricks or bottom shelves)	13
Move cars to a safe place	14
Protect family members (Probe.. in what way? And code below)	
Prepare or move pets/livestock to a safe place	15
Keep track of family members and pets	16
Help others (Probe.. in what way? And code below)	
Warn your neighbours	17
Help neighbourhood/community prepare for flood	18
Prepare and muster into safe place resources required to get through a possible flood (Probe.. in what way? And code below)	
Take warm clothing and/or food/water and/or medication with you to a safe place	19
Move yourself or others in the household to a safe place	20
Be prepared to be evacuated	21
Switch off gas and/or electricity	22
Be prepared for a loss of power (e.g. take a torch)	23
Lock/secure home	24
Other, please specify (Probe)	

Interviewer: We are interested in the response of the whole household.

Scenario 4 ALL CLEAR

SHOW SCENARIO 4 AND READ OUT
Over the last few days you experienced flooding in your garden and you had expected the flood waters to enter your home. The waters have now receded and you have just received an automatic telephone call from the Environment Agency informing you that an All Clear has been declared for your area. This means that there are no flood warnings in force in your area until further notice.

Unprompted actions...
12. Imagine this scenario, that an All Clear has been declared and imagine you and your family in your home. What sort of thing do you think you, or another household member would do?

UNPROMPTED ALL CLEAR:	
Do nothing	01

Get home back to normal (Probe.. in what way? And code below)

Bring furniture/belongings back downstairs	02
Reconnect utilities / appliances	03

Form own assessment of flood risk   (Probe.. in what way? And code below)

Watch water levels	04
Listen/watch out for any further warnings	05
Listen to local/national radio/TV stations for further information	06
Check the Environment Agency website	07

Get advice about what to do   (Probe.. in what way? And code below)

Contact friends and family to inform them	08
Contact Emergency Services (Police/Local Council) for further information	09
Contact the Environment Agency for further information (ie. Floodline)	10

Help others (Probe.. in what way? And code below)

Inform your neighbours	11
Help neighbours	12

Other, please specify

Interviewer: We are interested in the response of the whole household

PROMPTED ACTIONS USE SHOW CARDS NOW
READ OUT: During the course of this research we have been talking to many different people in many different flood situations asking them what they did either before or during a flood event.

We would now like to repeat the scenarios but this time suggesting some of these actions that other people have taken during a flood event. However, I would emphasise that not all these things would be appropriate for your family or situation.

Scenario 1 FLOOD WATCH   SHOW SCENARIO 1 AND READ OUT

It is 6.00pm in November and you are at home watching TV when you hear that a Flood Watch has been declared in your area which means that flooding is possible, and the situation could worsen.

SHOW CARD C

13. This lists some of the types of advice which other householders have found useful in the past. Thinking about the scenario above where a flood watch has been declared, which of these, if any, do you think you, or anyone in your household, would do. Please give me the numbers from the card which best reflect what you believe you/your household would do.

PROMPTED FLOOD WATCH:	
Do nothing	01
Form own assessment of flood risk	
Watch water levels	02
Listen/watch out for warnings	03
Listen to local/national radio/TV stations for further information	04
Check the Environment Agency website	05
Get advice about what to do	
Contact friends and family for help or advice	06
Contact Emergency Services (Police/Local Council)	07
Contact the Environment Agency for further information (ie. Floodline)	08
Take steps to minimise water entering the property	
Block doorways/airbricks with sandbags etc	09
Put flood boards or flood gates in place	10
Block toilet	11
Protect personal property	
Move valuable/personal belongings upstairs or to a safe place	12
Move property out of reach of the flood (ie. Put furniture/appliances on bricks or empty bottom shelves)	13
Move cars to a safe place	14
Protect family members	
Prepare or move pets/livestock to a safe place	15
Keep track of family members and pets	16
Help others	
Warn your neighbours	17
Help neighbourhood/community prepare for flood	18
Prepare and muster into safe place resources required to get through a possible flood	
Take warm clothing and/or food/water and/or medication with you to a safe place	19
Move yourself or others in the household to a safe place	20
Be prepared to be evacuated	21
Switch off gas and/or electricity	22
Be prepared for a loss of power (e.g. take a torch)	23
Lock/secure home	24
Other. (Please secify. Probe)	

It is lunchtime on a Sunday in August. It has been raining all weekend and you receive an automatic telephone call from the Environment Agency telling you that a Flood Warning has been issued for your area. This means that the river is expected to overflow defences and banks and that flooding is expected, and you need to act now.

PROMPTED FLOOD WATCH:

Scenario 2 FLOOD WARNING   SHOW SCENARIO 2 AND READ OUT

SHOW CARD D
14. This lists some of the types of advice which other householders have found useful in the past. Thinking about the scenario above where a flood warning has been declared, which of these, if any, do you think you, or anyone in your household, would do. Please give me the numbers from the card which best reflect what you believe you/your household would do.

PROMPTED FLOOD WARNING:

Do nothing	01

Form own assessment of flood risk

Watch water levels	02
Listen/watch out for warnings	03
Listen to local/national radio/TV stations for further information	04
Check the Environment Agency website	05

Get advice about what to do

Contact friends and family for help or advice	06
Contact Emergency Services (Police/Local Council)	07
Contact the Environment Agency for further information (ie. Floodline)	08

Take steps to minimise water entering the property

Block doorways/airbricks with sandbags etc	09
Put flood boards or flood gates in place	10
Block toilet	11

Protect personal property

Move valuable/personal belongings upstairs or to a safe place	12
Move property out of reach of the flood (ie. Put furniture/appliances on bricks or empty bottom shelves)	13
Move cars to a safe place	14

Protect family members

Prepare or move pets/livestock to a safe place	15
Keep track of family members and pets	16

Help others

Warn your neighbours	17
Help neighbourhood/community prepare for flood	18

Prepare and muster into safe place resources required to get through a possible flood

Take warm clothing and/or food/water and/or medication with you to a safe place	19
Move yourself or others in the household to a safe place	20
Be prepared to be evacuated	21
Switch off gas and/or electricity	22
Be prepared for a loss of power (e.g. take a torch)	23
Lock/secure home	24

Other, please specify (Probe)

Scenario 3 Severe FLOOD WARNING SHOW SCENARIO 3 AND READ OUT

It is early evening in October and has been raining for several days. All the family members are at home. You then receive an automatic telephone call from the Environment Agency telling you that a Severe Flood Warning has been issued for your area. This means that severe flooding of homes, roads and land is expected with imminent danger to life and property.

SHOW CARD E
15. This lists some of the types of advice which other householders have found useful in the past. Thinking about the scenario above where a severe flood warning has been declared, which of these, if any, do you think you, or anyone in your household, would do. Please give me the numbers from the card which best reflect what you believe you/your household would do.

PROMPTED SEVERE FLOOD WARNING:	
Do nothing	01
Form own assessment of flood risk	
Watch water levels	02
Listen/watch out for warnings	03
Listen to local/national radio/TV stations for further information	04
Check the Environment Agency website	05
Get advice about what to do	
Contact friends and family for help or advice	06
Contact Emergency Services (Police/Local Council)	07
Contact the Environment Agency for further information (ie. Floodline)	08
Take steps to minimise water entering the property	
Block doorways/airbricks with sandbags etc	09
Put flood boards or flood gates in place	10
Block toilet	11
Protect personal property	
Move valuable/personal belongings upstairs or to a safe place	12
empty · Move property out of reach of the flood (ie. Put furniture/appliances on bricks or bottom shelves)	13
Move cars to a safe place	14
Protect family members	
Prepare or move pets/livestock to a safe place	15
Keep track of family members and pets	16
Help others	
Warn your neighbours	17
Help neighbourhood/community prepare for flood	18
Prepare and muster into safe place resources required to get through a possible flood	

Take warm clothing and/or food/water and/or medication with you to a safe place	19
Move yourself or others in the household to a safe place	20
Be prepared to be evacuated	21
Switch off gas and/or electricity	22
Be prepared for a loss of power (e.g. take a torch)	23
Lock/secure home	24
Other, please specify (Probe)	

THANK YOU VERY MUCH. WE HOPE YOU FOUND THAT INTERSTING.

SO THAT WE CAN UNDERSTAND THE RESPONSES TO OUR SURVEY BETTER I WOULD LIKE TO FINISH OFF BY ASKING YOU SOME QUESTIONS ABOUT YOU, YOUR FAMILY AND YOUR HOME

16.   **Gender**

Male	1
Female	2

17.   **Marital status**

Married or living as married	1
Separated /Divorced	2
Widowed	3
Single, never married	4

18.   **In which age group do you fall?**

18-24 years	1	65-79 Years	4
25-44 Years	2	80+	5
45-64 Years	3		

SHOW CARD F

19. Please can you tell me which of these ethnic groups you would describe yourself as belonging to?

White, British	01	Asian or Asian British – Indian	11
White, Irish	02	Asian or Asian British – Pakistani	12
White, Any other white background	03	Asian or Asian British – Bangladeshi	13
Mixed – White and Black Caribbean	04	Asian or Asian British – Any other Asian background	14
Mixed – White and Black African	05		
Mixed – White and Asian	06	Other ethnic groups - Chinese	15
Mixed – Any other mixed background	07	Other (please specify)	16
Black or Black British-Caribbean	08		
Black or Black British – African	09		
Black or Black British – Any other Black background	10		

20. Is English your first language?

Yes	1
No	2
Don't know	3

21.   Does anyone in your household have any long-term illness, health problems or disability which limited your / their daily activities or the work you/ they could do (including problems which are due to old age)?

Yes	**Ask Q22**
No	**GO TO Q23**

22.   If yes, what type of disability?

Hearing difficulties	1
Visual difficulties	2
Physical difficulties	3
Learning difficulties	4
Other disabilities or difficulties	5
Don't know	6

23.   Do you …

Own your own home	1
Rent from the council	2
Rent from a housing association	3
Rent from a private landlord	4
Live in accommodation tied to job	6
Other (specify)	7

24. Is your home…

A detached House	1
A semi-detached house	2
A terraced or end-of terrace house	3
A bungalow	4
A flat or maisonette with floor(s) above ground level	5
Ground floor / basement flat	6
A caravan, mobile home or houseboat	7
Other (specify)	8

25. And could you tell me approximately when this property was built? Which decade?

Before 1970	1
During the 1970s	2
During the 1980s	3
During the 1990s	4
Since 2000	5
Don't know	6

SHOW CARD G

26. **Which of these activities best describes what you are doing at present?**

Employee in full time job (30 hours plus)	1	Unemployed and looking for work	6
Employee in part time job (16-30 hours)	2	Full-time education at school, college or university	7
Self employed full or part time	3	On a Government supported training programme	8
Full time at home	4	Doing something else _____	
Wholly retired from work	5		

SHOW CARD H

27. Can you please indicate which one of the following letters represents your gross household income per week, month, or year? Please give me a LETTER from the card.

Letter	Gross income per week	Gross income per month	Gross income per year	CODE ONE
D	Under £100	Under £400	Under £5,000	1
K	£100-£199	£400-£799	£5,000-£9,999	2
S	£200-£399	£800-£1,599	£10,000-£19,999	3
P	£400-£599	£1,600-£2,399	£20,000-£29,999	4
M	£600-£799	£2,400-£3,199	£31,150-£41,550	5
B	£800-£999	£3,200-£3,999	£41,550-£51,999	6
U	£1,000 or more	£4,000 or more	£52,000 or more	7

SHOW CARD I

28. What is your highest educational qualification?

University degree	1
Teaching qualification, HNC/HND, BEC/TECH Higher, BTEC Higher	2
City & Guilds Full Technological Certificate, Nursing qualifications	3
A levels, City & Guilds Advanced/Final level	4
O levels, GCSEs, CSEs, City & Guilds Craft/Ordinary level	5
Other qualifications	6
No qualifications	7

SHOW CARD J
29. Occupation

Please could you indicate which of these occupations **best** describes the sort of work the main wage earner in your household does or did in their last job.

PLEASE TICK <u>ONE BOX ONLY</u>	
Modern professional occupations *Such as:* teacher - nurse - physiotherapist - social worker - welfare officer - artist - musician – police officer (sergeant or above) - software designer	1
Clerical and intermediate occupations *such as:* secretary - personal assistant - clerical worker - office clerk - call centre agent - nursing auxiliary - nursery nurse	2
Senior managers or administrators **(usually responsible for planning, organising and co-ordinating work and for finance)** **such as:** *finance manager - chief executive*	3
Technical and craft occupation **such as: motor mechanic - fitter - inspector - plumber - printer - tool maker - electrician - gardener - train driver**	4
Semi-routine manual and service occupation **such as: postal worker - machine operative - security guard - caretaker - farm worker - catering assistant - receptionist - sales assistant**	5
Routine manual and service occupations *such as:* HGV driver - van driver - cleaner - porter - packer - sewing machinist - messenger - labourer - waiter / waitress - bar staff	6
Middle or junior managers **such as: office manager - retail manager - bank manager - restaurant manager - warehouse manager - publican**	7
Traditional professional occupations *such as:* accountant - solicitor - medical practitioner - scientist - civil / mechanical engineer	8

QUALITY CONTROL: PLEASE PRINT

QF Address no **(First column on address sheet)**	
Respondent Name	
Address	
30. TOWN/VILLAGE	
31. COUNTY	
32. POSTCODE **(Full postcode very important please)**	
Telephone	
INTERVIEWER	

33. CODE FROM ADDRESS SHEET (SECOND COLUMN)	
1.00 Anglian	1
2.00 Midlands	2
3.00 North East	3
4.00 North West	4
5.00 Southern	5
6.00 South West	6
7.00 Thames	7
8.00 Wales	8

We are The Environment Agency. It's our job to look after your environment and make it **a better place** – for you, and for future generations.

Your environment is the air you breathe, the water you drink and the ground you walk on. Working with business, Government and society as a whole, we are making your environment cleaner and healthier.

The Environment Agency. Out there, making your environment a better place.