Fatal and non-fatal outcomes: an investigation into some differences in relation to the August 2011 report from the UK Missing Person Behaviour Study

by Dave Perkins

The Centre for Search Research. Ashington, Northumberland, UK

August 2012

Abstract

The August 2011 report from the UK Missing Person Behaviour Study gives statistics relating to fifteen categories of missing person. The purpose of these is to help to plan searches. Statistics relating to where the missing person was found are particularly valuable in this respect; statistics relating to how far the missing person was found from the place where they were last known to be can provide a useful check on the overall search plan. Both items of information are given for each category.

The investigation described here has shown that, for those categories with sufficient data to support analysis, there were significant differences between the location and distance statistics for missing persons who were found alive compared with missing persons who were found dead. In addition, there was a strong indication that this result would also hold for categories with insufficient data for individual analysis.

This suggests that the plan put together to search for a person missing in a particular locality who is assumed to be still alive should be different from the plan put together to search for them if they are assumed to be dead. This is considered to be an important result.

This paper does not address the problem of predicting whether the missing person will be found alive or dead. The way in which scenarios can help the search planner to deal with that is discussed in the appendices.

The results of this investigation can be used instead of the August 2011 statistics for missing despondents and dementia sufferers; for all other categories they should be used to supplement to the August 2011 statistics.

Contents

Part 1: introduction

Part 2: preliminary investigation

Part 3: detailed investigation

Section 1: despondents

Section 2: dementia

Section 3: all other categories

Part 4

Part 1: introduction

The UK Missing Person Behaviour Study: reporting the results

The August 2011 report from the UK Missing Person Behaviour Study[1] (UKMPBS) gives statistics for fifteen categories of missing person. These statistics include the location at which the missing person was found and how far they were found from the point where they were last known to be (their last known point or position, referred to as their LKP). These statistics do not differentiate between incidents in which the missing person was found alive (from now on referred to as 'non-fatal incidents') and incidents in which the missing person was found dead (from now on referred to as 'fatal incidents').

The current investigation

The purpose of this investigation is to see if reporting fatal and non-fatal incidents separately would make any difference to the reported statistics. If there is no difference between, for example, the locations where fatalities and non-fatalities are found for a particular category then we can legitimately use the existing statistics; but if there is a difference then it would be useful for the search planner to have access to separate statistics for each of these outcomes.

The investigation uses the same data as was used to produce the August 2011 UKMPBS report.

Reporting conventions

In all of the reports from the UKMPBS, the number of persons being reported on, either as a complete category or as part of a category influences the way in which the statistics are reported.[2] A similar approach has been adopted in this report.

A simplification that has been found to be useful in the past is to group the locations at which missing persons have been reported as found. The way this is done is shown in table 1. The names of the location groups shown in table 1 will be used throughout this paper, and will usually be referred to as 'locations'. This means that, for example, whether the missing person was found in an inhabited building (which would have been reported originally as 'habitation') or was found in a building not intended for human habitation, for example a farm building for sheltering livestock (which would have been reported as 'building / shelter') the location will simply be referred to as 'building'.

Appendices 1 to 4 on pages 35 to 37 are taken from the August 2011 report, and give the definitions and terminology used in all UKMPBS reports. The same terminology will be used throughout this paper. It is recommended that the reader refers to these appendices if they are not familiar with the terminology used.

Table 1: Grouping of locations at which the missing person is reported found ('reported locations')

location group ('locations')	location names used in the incident reporting process ('reported locations')
building	building / shelter **and** habitation
linear feature	stream / ditch **and** wall / fence line
travel aid	path / track **and** road
trees	forest / woodland **and** forest edge / clearing

Part 2: preliminary investigation

The initial analysis using the combined data for all categories

The preliminary investigation began with an analysis of the combined data for all fifteen categories. The only distinction made was between fatalities and non-fatalities; if these were found to be different in terms of either the location at which the missing person was found or how far they were found from their LKP then it would be worth investigating further by looking at the individual categories.

Table 2 shows the results. It gives the number and percentage of incidents in which the missing person was found in each location, with fatalities and non-fatalities shown separately. Analysis did indeed show that there is a significant difference* between fatal and non-fatal incidents. Fig 1 is a graphical representation of the results in table 2, and clearly shows that the two sets of statistics are different.

Table 2: Numbers of fatal and non-fatal incidents, by location found

location	fatalities		non-fatalities	
	n	*%*	n	*%*
building	18	*7*	346	*37*
linear feature	30	*11*	64	*7*
open ground	48	*18*	151	*16*
travel aid	21	*8*	241	*26*
trees	59	*23*	96	*10*
water	86	*33*	27	*3*
	262	*100*	925	*100*

Table 3 shows in percentiles, for the same data, how far from their LKP the missing person was found, with fatalities and non-fatalities shown separately. Analysis showed that there is a significant difference between fatal and non-fatal incidents; fig. 2 gives the results in graphical form.

* throughout this paper, 'significant' means statistically significant at the 5% level

Fig. 1: Graph of the percentages of fatal and non-fatal incidents, by location found
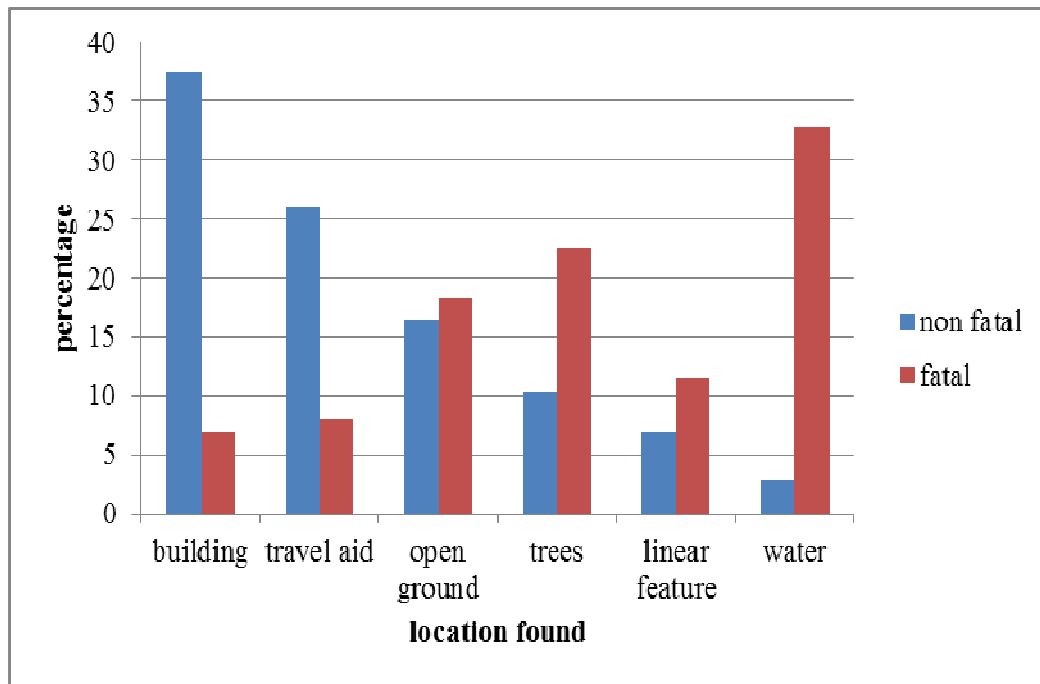
The investigation so far has shown that overall there is a significant difference between fatal and non-fatal incidents with regard to location found and distance found from LKP. To summarise:

- the most frequently occurring locations at which non-fatalities are found are in a building or on a travel aid; 63% of non-fatalities are found in these locations compared with only 15% of fatalities

- the most frequently occurring locations at which fatalities are found are in water or in or next to trees; 53% of fatalities are found in these locations compared with only 13% of non-fatalities

- 50% of fatalities are found within 1 km of their LKP, compared with 2 km for non-fatalities

- 70% of fatalities are found within 2 km of their LKP, compared with 4 km for non-fatalities

This suggests that there would be some value in investigating the individual categories. But which categories?

Table 3: Percentiles of fatal and non-fatal incidents, by kms found from LKP

percentile	fatalities kms	non-fatalities kms
10	0.2	0.1
20	0.3	0.5
30	0.5	0.8
40	0.8	1.0
50	1.0	2.0
60	1.4	2.6
70	2.0	4.0
80	3.5	6.0
90	7.0	12
100	39	510

Fig. 2: Percentiles of fatal and non-fatal incidents, by kms found from LKP
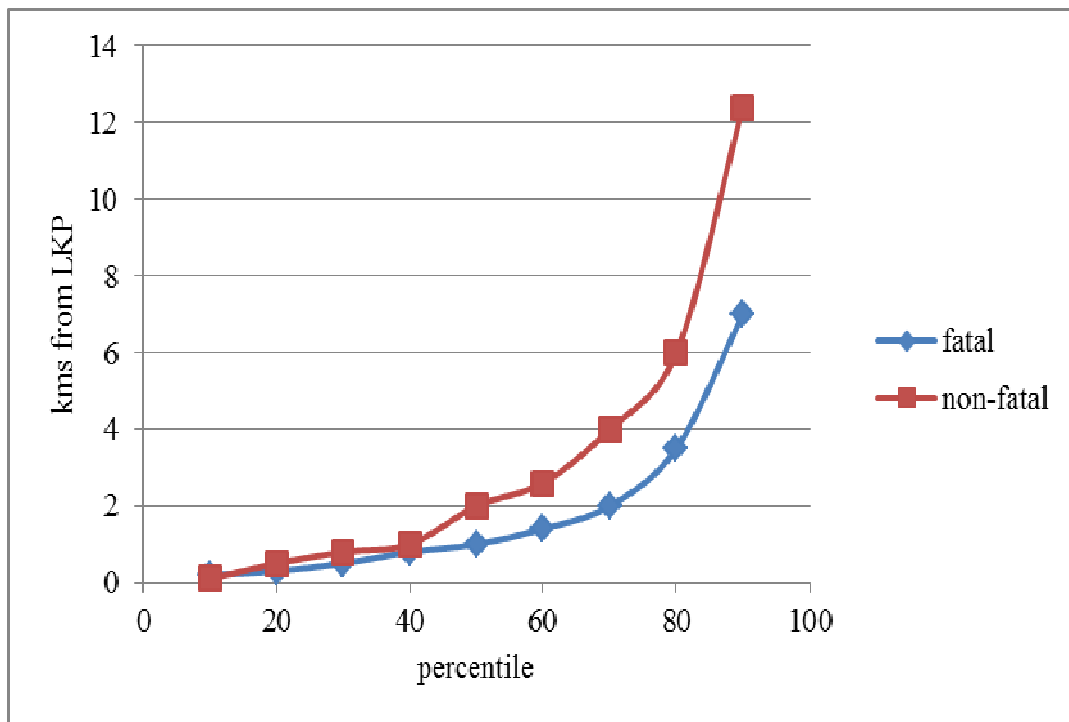
Selecting categories for investigation

Table 4 shows, for each category, the total number of incidents, the number of fatalities, the number of non-fatalities and the number of incidents in which the missing person was not found. The percentages refer to the percentage of fatalities, non-fatalities and 'not found' within each category. Categories are shown in sequence from most frequent to least frequent total number of incidents.

Table 4: Numbers of fatal, non-fatal and 'no trace' incidents, by category

category	number of incidents	fatalities		non-fatalities		not found	
		n	%	n	%	n	%
despondent	457	**148**	*32*	266	*58*	43	*9*
dementia	194	**34**	*18*	154	*79*	6	*3*
walker (solo)	132	22	*17*	108	*82*	2	*2*
child aged 1 to 16 years	113	3	*3*	110	*97*	0	*0*
walkers (group)	95	2	*2*	93	*98*	0	*0*
other vulnerables	83	11	*13*	68	*82*	4	*5*
psychological illness	63	13	*21*	40	*63*	10	*16*
developmental problems	37	2	*5*	33	*89*	2	*5*
substance related	33	10	*30*	20	*61*	3	*9*
miscellaneous	29	6	*21*	20	*69*	3	*10*
water related	11	9	*82*	1	*9*	1	*9*
health related	8	2	*25*	6	*75*	0	*0*
fell-runner	7	1	*14*	6	*86*	0	*0*
mountain biker	6	1	*17*	5	*83*	0	*0*
climber	3	2	*67*	1	*33*	0	*0*
	1271	266	*21*	931	*73*	74	*6*

In order to compare fatalities and non-fatalities in the individual categories we will need to analyse the locations and distances from LKP at which fatalities and non-fatalities have been found. For the results to have a satisfactory degree of robustness the category needs to have a reasonable amount of data. All categories apart from 'water related' (which we will ignore because of the small number of incidents it contains) have fewer fatalities than non-fatalities. The number of fatalities therefore gives us a simple way of deciding which categories are suitable for analysis.

From a statistical point of view the robustness or level of confidence that we have in the results depends on the amount of data; the more data that we have then the greater will be our level of confidence in the results.

Any decision about which categories to include involves a compromise: if we go for a high level of confidence then we will need a large amount of data, and that will exclude all categories except 'despondent'; if we go for a lower level of confidence then that implies less data, and that will include categories other than 'despondent'.

With this in mind, calculation had shown that a suitable cut-off was 30 items of data. Categories with 30 or more fatalities ($n \geq 30$) would be analysed, and categories with fewer than 30 fatalities ($n < 30$) would not. Similarly, any sub-division of a category, for example by terrain or gender, with $n \geq 30$ would be analysed; those with $n < 30$ would not.

The convention (shown in table 4) of using bold type to highlight either categories or sub-divisions of a category with $n \geq 30$ will be used throughout the paper.

The categories Despondent and Dementia (see table 4) were therefore analysed. Between them, they account for 651 reported incidents (51% of all UKMPBS reported incidents), 182 fatalities (68% of all UKMPBS reported fatalities), 420 non-fatalities (45% of all UKMPBS reported incidents involving a non-fatality) and 49 incidents in which the missing person was not found (66% of all UKMPBS incidents reported as 'no trace').

All the other categories will be merged to form a single category referred to as 'all other categories' in the analysis. This contains 620 reported incidents, with 84 fatalities, 511 non-fatalities and 25 missing persons not found.

Part 3: investigation by category

Section 1: despondent

Category definition: any person who is thought to have disappeared deliberately, generally as a consequence of one or more of the following:

- o an intention to commit suicide, either with an explicit threat or considered to be likely based on a history of previous attempts or threats
- o depression, either diagnosed or suspected
- o stress or distress, due to either personal or domestic problems

General statistics: n = 457 for all searches

Table 5: Despondent, outcome by gender

gender	number of incidents	fatalities n	fatalities %	non-fatalities n	non-fatalities %	not found n	not found %
male	292	99	*34*	161	*55*	32	*11*
female	142	37	*26*	97	*68*	8	*6*
not reported	23	12	*52*	8	*35*	3	*13*
	457	148	*32*	266	*58*	43	*9*

The percentages refer in each case to the percentage of fatalities, non-fatalities and missing persons not found by gender.

Table 6: Despondent, females, outcome by reported characteristic[3]

reported characteristic	number of incidents	fatalities n	fatalities %	non-fatalities n	non-fatalities %	not found n	not found %
suicide threatened	41	9	*22*	31	*76*	1	*2*
stress or personal distress	33	5	*15*	26	*79*	2	*6*
depression	44	13	*30*	27	*61*	4	*9*
previous suicide attempts	26	7	*27*	17	*65*	2	*8*

Table 7: Despondent, males, outcome by reported characteristic

reported characteristic	number of incidents	fatalities		non-fatalities		not found	
		n	%	n	%	n	%
suicide threatened	84	18	*21*	58	*69*	8	*10*
stress or personal distress	74	24	*32*	40	*54*	10	*14*
depression	51	26	*51*	22	*43*	3	*6*
previous suicide attempts	34	16	*47*	13	*38*	5	*15*

In tables 6 and 7 the percentages are the percentage of the total number of incidents with that reported characteristic for which the outcome was a fatality, a non-fatality or the missing person not being found.

Analysis of the data in tables 6 and 7 showed the following:

- the overall fatality rate for females was 24%; there was no significant difference between the overall fatality rate and the fatality rate for any of the reported characteristics

- the overall fatality rate for males was 35%; the fatality rate associated with a threat of suicide was significantly lower (21%) and the fatality rate associated with depression was significantly higher (51%); stress or personal distress, or a history of suicide attempts, when taken on their own, did not make a significant difference to the fatality rate

These comments correspond to the comments made on page 21 of the UKMPBS August 2011 report.

Table 8: Despondent, outcome by terrain type

terrain type	number of incidents	fatalities		non-fatalities		not found	
		n	%	n	%	n	%
farmland	131	**36**	*27*	82	*63*	13	*10*
urban	109	**32**	*29*	69	*63*	8	*7*
trees*	95	**37**	*39*	47	*49*	11	*12*
moorland	61	11	*18*	46	*75*	4	*7*
water margin	45	25	*56*	15	*33*	5	*11*
crags / broken ground	16	8	*50*	7	*44*	1	*6*
	457	149	*33*	266	*58*	42	*9*

*'trees' consists of terrain types plantation (dense) and woodland (open) combined

The percentages refer in each case to the percentage of fatalities, non-fatalities and missing persons not found for each type of terrain.

According to the selection criterion adopted earlier (n ≥ 30), table 8 suggests that terrain types farmland, urban and trees are suitable for further investigation. These are discussed in turn.

Despondents, incidents in farmland

Table 9: Despondent, farmland, outcome by gender

gender	number of incidents	fatalities		non-fatalities		not found	
		n	%	n	%	n	%
male	75	23	*31*	44	*59*	8	*11*
female	54	11	*20*	38	*70*	5	*9*
not reported	2	2	*100*	0	*0*	0	*0*
	131	36	*27*	82	*63*	13	*10*

Table 9 shows that there is insufficient data to carry out any further analysis by gender, and therefore the data for all farmland incidents involving despondents was analysed together to see if there were differences between fatalities and non-fatalities. This analysis showed that both locations and distances from LKP at which fatalities and non-fatalities were found were significantly different (tables 10, 11 and 12). Figs. 3 and 4 show this quite clearly.

Table 10: Numbers of fatal and non-fatal incidents involving despondents in farmland, by location found

location	fatalities		non-fatalities	
	n	%	n	%
building	4	*11*	41	*51*
linear feature	5	*14*	2	*2*
open ground	7	*20*	6	*7*
travel aid	3	*9*	21	*26*
trees	6	*17*	9	*11*
water	10	*29*	2	*2*
	35	*100*	81	*100*

Table 11: Numbers of fatal and non-fatal incidents involving despondents in farmland, by location found, details

location	fatalities		non-fatalities	
	n	%	n	%
building				
building / shelter	4	*11*	14	*17*
habitation	0	*0*	27	*33*
linear feature				
stream / ditch	3	*9*	1	*1*
wall / fence line	2	*6*	1	*1*
travel aid				
path / track	3	*9*	5	*6*
road	0	*0*	16	*20*
trees				
forest / woodland	1	*3*	5	*6*
forest edge / clearing	5	*14*	4	*5*

Fig. 3: Percentages of fatal and non-fatal incidents involving despondents in farmland, by location found
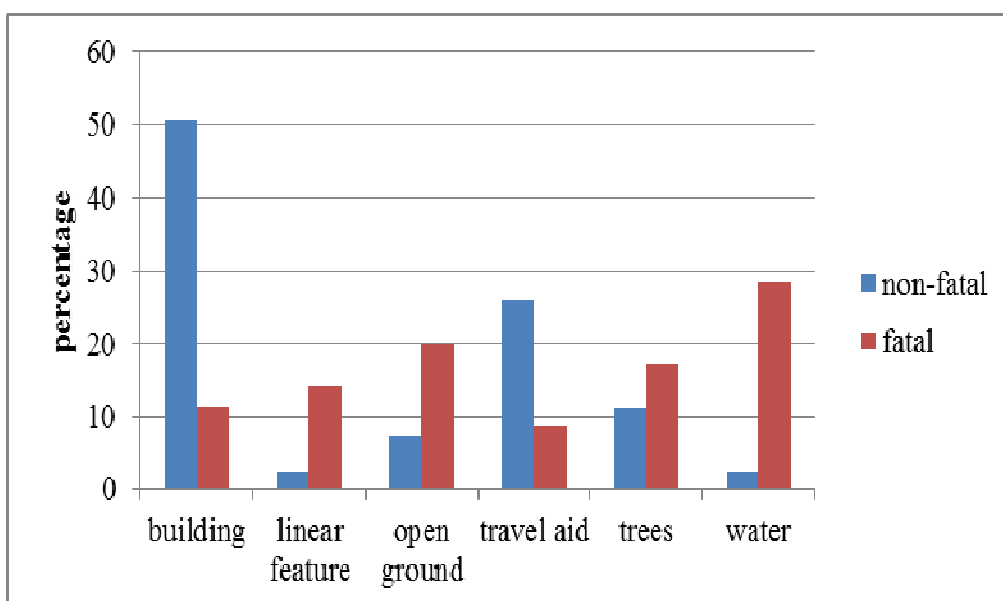
Table 12: Percentiles of fatal and non-fatal incidents involving despondents in farmland, by kms found from LKP

percentile	fatalities kms	non-fatalities kms
10	0.1	0.0
20	0.3	0.2
30	0.5	0.5
40	0.5	0.8
50	1.0	1.1
60	1.1	2.0
70	1.7	4.0
80	2.4	8.0
90	6.4	18
100	39	150

Fig. 4: Percentiles of fatal and non-fatal incidents involving despondents in farmland, by kms found from LKP
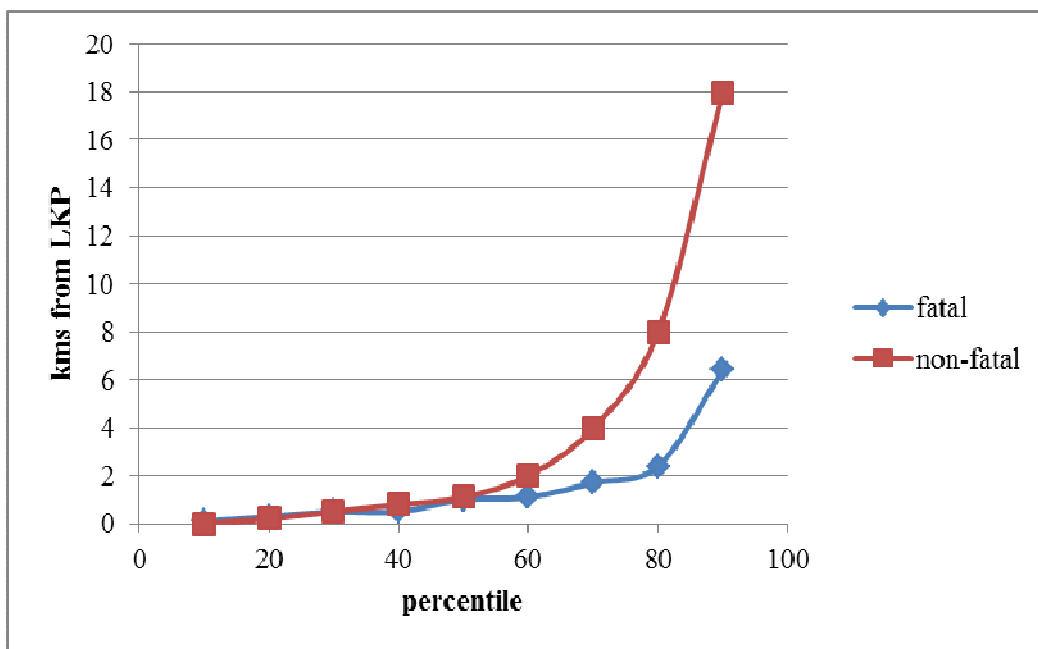
Guidelines for searching for despondents in farmland

The following comments are based on the statistics shown above for despondents missing in farmland. The Search Manager should be aware that other factors (for example the incident history and a knowledge of the local area) play an important part in scenario construction.

1.   If you suspect that the missing person is alive:

If you suspect that the missing person is alive, use the information for non-fatal incidents in tables 10, 11 and 12. There was insufficient data to distinguish between males and females. The following ideas will probably influence your most likely scenarios:

- o   the missing person is in a building (51%) or on a travel aid (26%)

- o   if they are in a building they are twice as likely to be in a habitation (33%) as in a building / shelter (17%)

- o   if they are on a travel aid they are three times as likely to be on a road (20%) as on a path / track (6%)

2.   If you suspect that the missing person is dead:

If you suspect that the missing person is dead, use the information for fatal incidents in tables 10, 11 and 12. There was insufficient data to distinguish between males and females. The following ideas will probably influence your most likely scenarios:

- o   the missing person is in water (29%) or in open ground (20%)

- o   the missing person might be in trees (17%), or in or by a linear feature (14%)

3.   If you do not wish to commit yourself to assuming that the missing person is either alive or dead:

If you do not wish to commit yourself to any assumption about the condition of the missing person, the information in tables 9 and 10 can be combined to give the following:

- o   the missing person is alive in a building (32%)

- o   the missing person is alive on a travel aid (16%)

- o   the missing person is not going to be found (10%)

- o   the missing person is dead in water (8%)

- o   the missing person is alive in trees (5%)

- o   the missing person is dead in open ground (5%)

These are similar to the values given for despondents missing in farmland in the 2011 UKMPBS report,[4] but with the added information about the condition in which the missing person is found.

Details of how these values are determined are given in appendix 5 on page 38.

Be aware that the August 2011 report from the UKMPBS[4] suggests that female despondents in farmland are more likely than males to be found in water, whereas males are more likely than females to be found in open ground.

Information about creating scenarios is given in appendix 6 on page 40.

Despondents, incidents in urban areas

Table 13: Despondent, urban, outcome by gender

gender	number of incidents	fatalities		non-fatalities		not found	
		n	%	n	%	n	%
male	51	13	25	32	63	6	12
female	46	13	28	31	67	2	4
not reported	12	6	50	6	50	0	0
	109	31	29	69	63	8	7

Table 13 shows that there is insufficient data to carry out an analysis by gender, and therefore the data for all urban incidents involving despondents was analysed together.

Analysis showed that the locations in which fatalities and non-fatalities are found are significantly different (tables 14 and 15). This is clearly shown by fig. 5. There was, though, no significant difference between the distances from LKP at which fatalities and non-fatalities were found.

Table 14: Numbers of fatal and non-fatal incidents involving despondents in urban terrain, by location found

| location	fatalities		non-fatalities	
	n	%	n	%
building	4	13	44	64
linear feature	1	3	2	3
open ground	5	16	2	3
travel aid	1	3	13	19
trees	4	13	4	6
water	16	52	4	6
	31	100	69	100

Table 15: Numbers of fatal and non-fatal incidents involving despondents in urban terrain, by location found, details

location	fatalities		non-fatalities	
	n	%	n	%
building				
building / shelter	3	*10*	11	*16*
habitation	1	*3*	22	*48*
linear feature				
stream / ditch	0	*0*	1	*1*
wall / fence line	1	*3*	1	*1*
travel aid				
path / track	0	*0*	2	*3*
road	1	*3*	11	*16*
trees				
forest / woodland	2	*6*	3	*4*
forest edge / clearing	2	*6*	1	*1*

Fig 5: Percentages of fatal and non-fatal incidents involving despondents in urban terrain, by location found
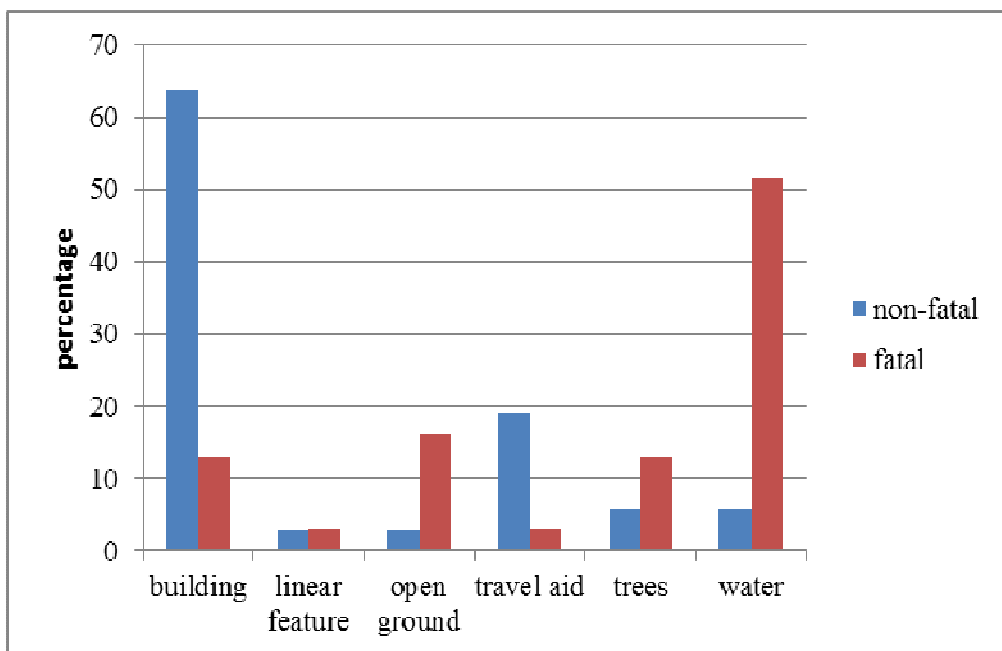
Guidelines for searching for despondents in urban areas

The following comments are based on the statistics shown above for despondents missing in urban areas. The Search Manager should be aware that other factors (for example the incident history and a knowledge of the local area) play an important part in scenario construction.

1.   If you suspect that the missing person is alive:

If you suspect that the missing person is alive, use the information for non-fatal incidents in tables 14 and 15. There was insufficient data to distinguish between males and females. The following ideas will probably influence your most likely scenarios:

- o   the missing person is in a building (64%) or on a travel aid (19%)

- o   if they are in a building they are three times as likely to be in a habitation (48%) as in a building / shelter (16%)

- o   if they are on a travel aid they are five times as likely to be on a road (16%) as on a path / track (3%)

2.   If you suspect that the missing person is dead:

If you suspect that the missing person is dead, use the information for fatal incidents in tables 14 and 15. There was insufficient data to distinguish between males and females. The following ideas will probably influence your most likely scenarios:

- o   the missing person is in water (52%) or in open ground (16%)

- o   the missing person might be in a building (13%), or in trees (13%)

- o   if they are in a building they are three times as likely to be in a building / shelter (10%) as in a habitation (3%)

3.   If you do not wish to commit yourself to assuming that the missing person is either alive or dead:

If you do not wish to commit yourself to assuming that the missing person is either alive or dead, the information in tables 13 and 14 can be combined to give the following:

- o   the missing person is alive in a building (40%)

- o   the missing person is dead in water (15%)

- o   the missing person is alive on a travel aid (12%)

- o   the missing person is not going to be found (7%)

- o   the missing person is dead in open ground (5%)

These are similar to the values given for despondents missing in urban areas in the 2011 UKMPBS report,[4] but with the added information about the condition in which the missing person is found.

Details of how these values are determined are given in appendix 5 on page 38.

Information about creating scenarios is given in appendix 6 on page 40.

Despondents, incidents in trees

This terrain type is a combination of the data for plantations (dense) and woodland (open).

Table 16: Despondent, trees, outcome by gender

gender	number of incidents	fatalities		non-fatalities		not found	
		n	*%*	n	*%*	n	*%*
male	75	29	*39*	35	*47*	11	*15*
female	18	6	*33*	12	*67*	0	*0*
not reported	2	2	*100*	0	*0*	0	*0*
	95	37	*39*	47	*63*	11	*12*

Table 16 shows that there is insufficient data to carry out an analysis by gender, and therefore the data for all incidents involving despondents in trees was analysed together. Analysis showed that the locations in which fatalities and non-fatalities are found are significantly different; this is shown in fig. 5. There were no significant differences between the distances from LKP at which fatalities and non-fatalities were found in this terrain type.

Table 17: Numbers of fatal and non-fatal incidents involving despondents in trees, by location found

| location	fatalities		non-fatalities	
	n	*%*	n	*%*
building	0	*0*	11	*24*
linear feature	0	*0*	1	*2*
open ground	2	*5*	1	*2*
travel aid	2	*5*	7	*15*
trees	30	*81*	24	*52*
water	3	*8*	2	*4*
	37	*100*	46	*100*

Table 18: Numbers of fatal and non-fatal incidents involving despondents in trees, by location found, details

location	fatalities		non-fatalities	
	n	%	n	%
building				
building / shelter	0	0	2	4
habitation	0	0	9	20
linear feature				
stream / ditch	0	0	1	2
wall / fence line	0	0	0	0
travel aid				
path / track	2	5	3	7
road	0	0	4	9
trees				
forest / woodland	24	65	17	37
forest edge / clearing	6	16	7	15

Fig 5: Percentages of fatal and non-fatal incidents involving despondents in plantations and woodland, by location found
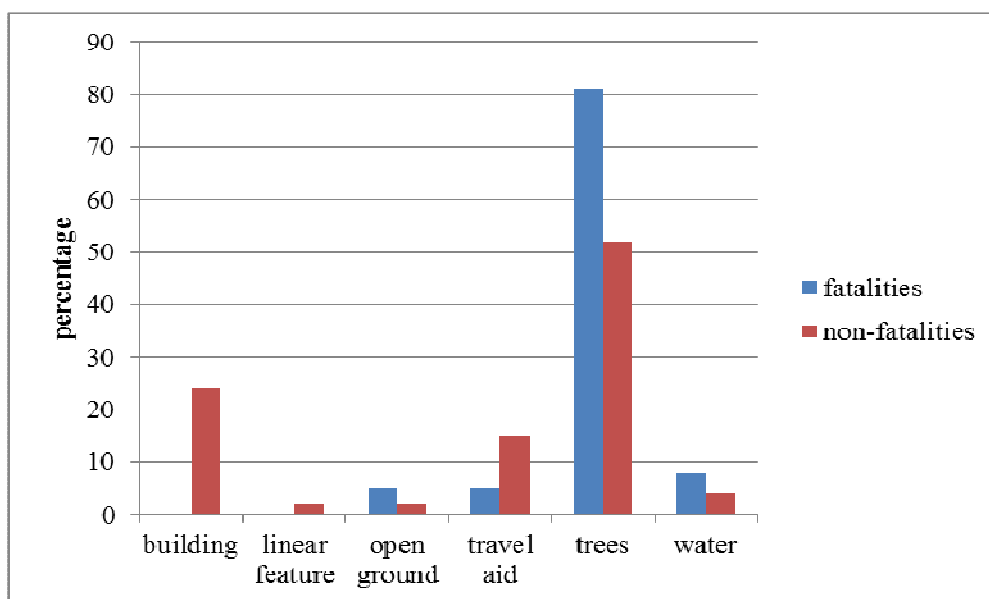
Guidelines for searching for despondents in trees

The following comments are based on the statistics shown above for despondents missing in trees. The Search Manager should be aware that other factors (for example the incident history and a knowledge of the local area) play an important part in scenario construction.

1. If you suspect that the missing person is alive:

If you suspect that the missing person is alive, use the information for non-fatal incidents in tables 17 and 18. There was insufficient data to distinguish between males and females. The following ideas will probably influence your most likely scenarios:

- o the missing person is in trees (52%) or in a building (24%)

- o if they are in a trees they are more than twice as likely to be in forest / woodland (37%) as forest edge / clearing (15%)

- o if they are in a building they are five times as likely to be in habitation (20%) as in building / shelter (4%)

2. If you suspect that the missing person is dead:

If you suspect that the missing person is dead, use the information for fatal incidents in tables 17 and 18. There was insufficient data to distinguish between males and females. The following ideas will probably influence your most likely scenarios:

- o the missing person is in trees (81%)

- o they are four times as likely to be in forest / woodland (65%) as in forest edge / clearing (16%)

3. If you do not wish to commit yourself to assuming that the missing person is either alive or dead:

If you do not wish to commit yourself to assuming that the missing person is either alive or dead, the information in tables 16 and 17 can be combined to give the following:

- o the missing person is alive in trees (33%)

- o the missing person is dead in trees (32%)

- o the missing person is alive in a building (15%)

- o the missing person is not going to be found (12%)

- o the missing person is alive on a travel aid (10%)

These are similar to the values given for despondents missing in plantations and woodland in the 2011 UKMPBS report,[4] but with the added information about the condition in which the missing person is found.

Details of how these values are determined are given in appendix 5 on page 38.

Information about creating scenarios is given in appendix 6 on page 40.

Despondents, incidents in all other types of terrain

Combining the data for terrain types moorland, water margin and crags / broken ground gives a total of 122 incidents, of which 44 (36%) resulted in fatalities, 68 (56%) resulted in the missing person being found alive, and in 10 incidents (8%) the missing person was not found. The data for males and females is analysed together.

Table 19: Numbers of fatal and non-fatal incidents involving despondents in all other types of terrain, by location found

location	fatalities		non-fatalities	
	n	%	n	%
building	1	2	16	24
linear feature	5	11	6	9
open ground	3	7	12	18
travel aid	2	5	16	24
trees	12	27	7	10
water	21	48	10	15
	44	100	67	100

Analysis showed that the locations in which fatalities and non-fatalities are found are significantly different, particularly with respect to the number of fatalities found in water and trees, and the number of non-fatalities found in buildings. This is shown in fig. 6.

Fig 6: Percentages of fatal and non-fatal incidents involving despondents in all other types of terrain, by location found
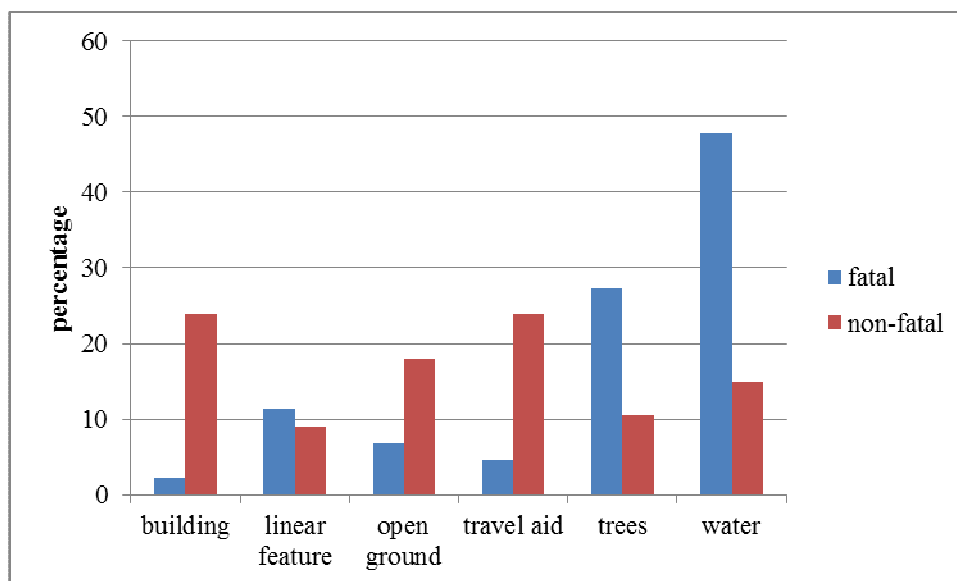
Table 20: Numbers of fatal and non-fatal incidents involving despondents in all other types of terrain, by location found, details

location	fatalities		non-fatalities	
	n	%	n	%
building				
building / shelter	1	2	9	13
habitation	0	0	7	10
linear feature				
stream / ditch	3	7	5	7
wall / fence line	2	5	1	1
travel aid				
path / track	1	2	7	10
road	1	2	9	13
trees				
forest / woodland	10	23	6	9
forest edge / clearing	2	5	1	1

Further analysis showed that the distances from LKP at which fatalities and non-fatalities were found were significantly different (table 21 and fig. 7).

Table 21: Percentiles of fatal and non-fatal incidents involving despondents in all other types of terrain, by kms found from LKP

percentile	fatalities kms	non-fatalities kms
10	0.14	0.30
20	0.20	0.50
30	0.50	0.94
40	0.66	1.4
50	1.0	2.0
60	1.2	3.0
70	2.0	3.8
80	2.4	8.0
90	6.2	16
100	30	150

Fig. 7: Percentiles of fatal and non-fatal incidents involving despondents in other terrain types, by kms found from LKP
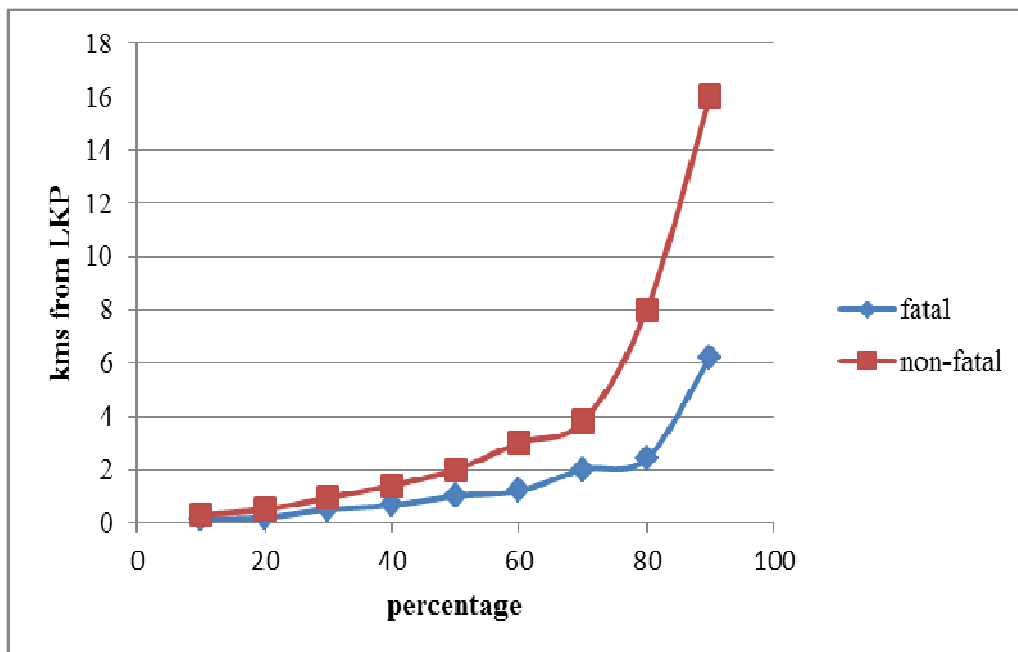
Guidelines for searching for despondents in all other types of terrain

The following comments are based on the statistics shown above for despondents missing in other types of terrain. The Search Manager should be aware that other factors (for example the incident history and a knowledge of the local area) play an important part in scenario construction.

1. If you suspect that the missing person is alive:

If you suspect that the missing person is alive, use the information for non-fatal incidents in tables 19 and 20. There was insufficient data to distinguish between males and females. The following ideas will probably influence your most likely scenarios:

- o the missing person is in a building (24%) or on a travel aid (24%)

- o the missing person is in open ground (18%) or in water (15%)

2. If you suspect that the missing person is dead:

If you suspect that the missing person is dead, use the information for fatal incidents in tables 19 and 20. There was insufficient data to distinguish between males and females. The following ideas will probably influence your most likely scenarios:

- o the missing person is in water (48%) or in trees (27%)

- o if they are in trees they are five times as likely to be in forest / woodland (23%) as forest edge / clearing (5%)

3. If you do not wish to commit yourself to assuming that the missing person is either alive or dead:

If you do not wish to commit yourself to assuming that the missing person is either alive or dead, the information in tables 17 and 19 can be combined to give the following:

- o the missing person is dead in water (17%)

- o the missing person is alive in a building (13%)

- o the missing person is alive on a travel aid (13%)

- o the missing person is alive in open ground (10%)

- o the missing person is dead in trees (10%)

Details of how these values are determined are given in appendix 5 on page 38.

Information about creating scenarios is given in appendix 6 on page 40.

Section 2: dementia

Category definition: this category contains all missing persons with some form of dementia, including those suffering from Alzheimer's Disease.

General statistics: n = 194 for all searches

Table 22: Dementia, outcome by gender

gender	number of incidents	fatalities		non-fatalities		not found	
		n	*%*	n	*%*	n	*%*
male	123	22	*18*	97	*79*	4	*3*
female	59	11	*19*	46	*78*	2	*3*
not reported	12	1	*8*	11	*92*	0	*0*
	194	34	*18*	154	*79*	6	*3*

The percentages refer in each case to the percentage of fatalities, non-fatalities and missing persons not found by gender.

Table 23: Dementia, outcome by terrain type

	number of incidents	fatalities		non-fatalities		not found	
		n	*%*	n	*%*	n	*%*
urban	99	16	*16*	82	*83*	1	*1*
farmland	65	11	*17*	52	*80*	2	*3*
others*	30	7	*23*	20	*67*	3	*10*
	194	34	*18*	154	*79*	6	*3*

* 'others' means crags / broken ground, moorland, plantation, water margin and woodland

The percentages refer in each case to the percentage of fatalities, non-fatalities and missing persons not found for each type of terrain.

All incidents in which the missing person was not found (reported as 'no trace') or their condition, location or distance from LKP was not reported were excluded from the analysis.

Table 23 shows that there is insufficient data to carry out an analysis by terrain type, and therefore the data for all incidents involving dementia was analysed together. This showed

that there was a significant difference between the locations at which the missing person was found in fatal and non-fatal incidents.

Table 24: Dementia, location found, fatal and non-fatal incidents

| | fatal | | non-fatal | |
	n	%	n	%
building	3	9	41	27
linear feature	12	35	25	16
open ground	5	15	22	14
travel aid	3	9	53	35
trees	3	9	10	7
water	8	24	2	1
	34	100	153	100

Fig. 8: Dementia, location found, fatal and non-fatal incidents
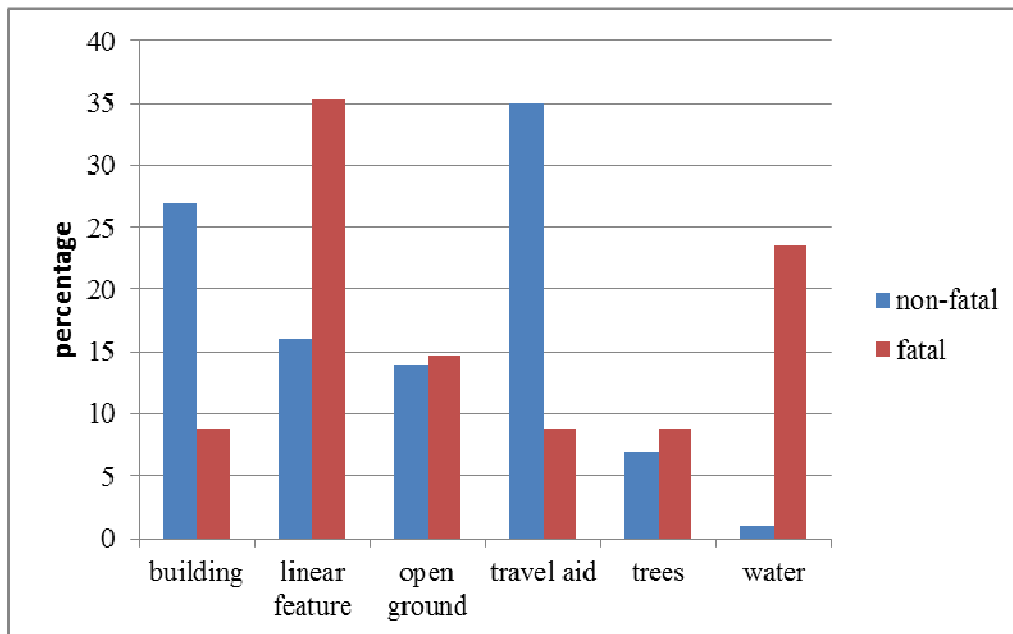
Table 25: Dementia, location found, fatal and non-fatal, details

	fatal		non-fatal	
	n	*%*	n	*%*
building				
building / shelter	2	*6*	11	*7*
habitation	1	*3*	30	*20*
linear feature				
stream / ditch	9	*26*	8	*5*
wall / fence line	3	*9*	17	*11*
travel aid				
path / track	3	*9*	13	*8*
road	0	*0*	40	*26*
trees				
forest / woodland	2	*6*	7	*5*
forest edge/clearing	1	*3*	3	*2*

No overall difference was found between fatalities and non-fatalities with regard to the distance from LKP at which the missing person was found, although there was some indication, despite the small numbers involved, that female fatalities were found closer to LKP than female non-fatalities.

Guidelines for searching for dementia sufferers

The following comments are based on the statistics shown above for dementia sufferers. The Search Manager should be aware that other factors (for example the incident history and a knowledge of the local area) play an important part in scenario construction.

1. If you suspect that the missing person is alive:

If you suspect that the missing person is alive, use the information for non-fatal incidents in tables 24 and 25. There was insufficient data to distinguish between males and females. The following ideas will probably influence your most likely scenarios:

  o the missing person is on a travel aid (35%) or in a building (27%)

  o if they are on a travel aid they are three times as likely to be on a road (26%) as on a path / track (8%)

  o if they are in a building they are three times as likely to be in a habitation (20%) as in a building / shelter (7%)

2. If you suspect that the missing person is dead:

If you suspect that the missing person is dead, use the information for fatal incidents in tables 24 and 25. There was insufficient data to distinguish between males and females. The following ideas will probably influence your most likely scenarios:

  o the missing person is in or by a linear feature (35%) or in water (24%)

  o if they are in or by a linear feature they are twice as likely to be by a wall / fence (17%) as in or by a stream / ditch (8%)

3. If you do not wish to commit yourself to assuming that the missing person is either alive or dead:

If you do not wish to commit yourself to assuming that the missing person is either alive or dead, the information in tables 22 and 24 can be combined to give the following:

  o the missing person is alive on a travel aid (28%)

  o the missing person is alive in a building (21%)

  o the missing person is alive in or by a linear feature (13%)

  o the missing person is alive in open ground (11%)

  o the missing person is dead in in or by a linear feature (6%)

These are similar to the values given for dementia sufferer in the 2011 UKMPBS report,[5] but with the added information about the condition in which the missing person is found.

Details of how these values are determined are given in appendix 5 on page 38.

Information about creating scenarios is given in appendix 6 on page 40.

Section 3: all other categories

This includes all categories other than despondents and dementia combined together.

General statistics: n = 620 for all searches

Table 26: All other categories, outcome by gender

gender	number of incidents	fatalities n	%	non-fatalities n	%	not found n	%
male	405	67	*17*	318	*79*	20	*5*
female	140	9	*6*	127	*91*	4	*3*
not reported	75	8	*11*	66	*88*	1	*1*
	620	84	*14*	511	*82*	25	*4*

The percentages refer in each case to the percentage of fatalities, non-fatalities and missing persons not found by gender.

Table 27: All other categories, outcome by terrain type

	number of incidents	fatalities n	%	non-fatalities n	%	not found n	%
crag / broken ground	68	13	*19*	52	*76*	3	*4*
farmland	117	24	*21*	87	*74*	6	*5*
moorland	214	12	*6*	200	*93*	2	*1*
trees*	65	8	*12*	51	*78*	6	*9*
urban	126	10	*8*	110	*87*	6	*5*
water	30	17	*57*	11	*37*	2	*7*
	620	84	*14*	511	*82*	25	*4*

* 'trees' means plantation and woodland.

The percentages refer in each case to the percentage of fatalities, non-fatalities and missing persons not found for each type of terrain.

All incidents in which the missing person was not found (reported as 'no trace') or their condition, location or distance from LKP was not reported were excluded from the analysis.

Table 27 shows that there is insufficient data to carry out an analysis by terrain type, and therefore the data for all incidents involving 'all other categories' was analysed together. This analysis showed that there was a significant difference between the locations at which the missing person was found and the distance they were found from LKP for fatal and non-fatal incidents.

Table 28: All other categories, location found, fatal and non-fatal incidents

	fatal		non-fatal	
	n	*%*	n	*%*
building	6	*7*	192	*38*
linear feature	7	*9*	28	*6*
open ground	26	*32*	108	*21*
travel aid	10	*12*	131	*26*
trees	5	*6*	42	*8*
water	28	*34*	7	*1*
	82	*100*	508	*100*

Fig. 9: Graph of 'all other categories', location found, fatal and non-fatal incidents
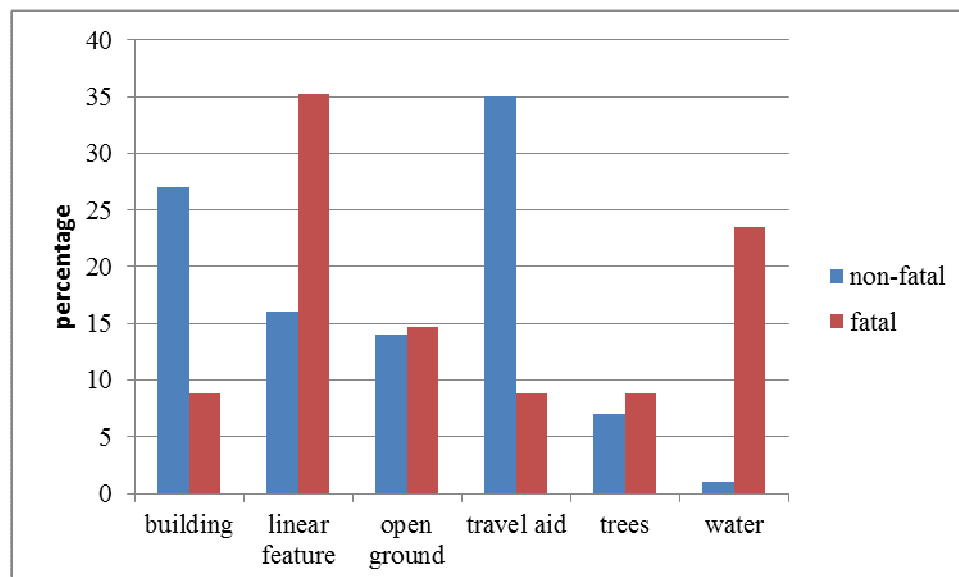
Table 29: Other categories, location found, fatal and non-fatal, details

	fatal		non-fatal	
	n	*%*	n	*%*
building				
building / shelter	2	*2*	75	*15*
habitation	4	*5*	117	*23*
linear feature				
stream / ditch	6	*7*	12	*2*
wall / fence line	0	*0*	16	*3*
travel aid				
path / track	8	*10*	55	*11*
road	2	*2*	76	*15*
trees				
forest / woodland	3	*4*	31	*6*
forest edge/clearing	2	*2*	11	*2*

Table 30: percentiles of fatal and non-fatal incidents involving all other categories, by kms found from LKP

percentile	fatalities kms	non-fatalities kms
10	0.1	0.1
20	0.3	0.5
30	0.5	1.0
40	0.8	1.5
50	1.0	2.0
60	1.8	3.0
70	3.0	4.0
80	4.8	5.6
90	7.9	10
100	24	510

Fig. 10: Percentiles of fatal and non-fatal incidents involving 'all other categories', by kms found from LKP
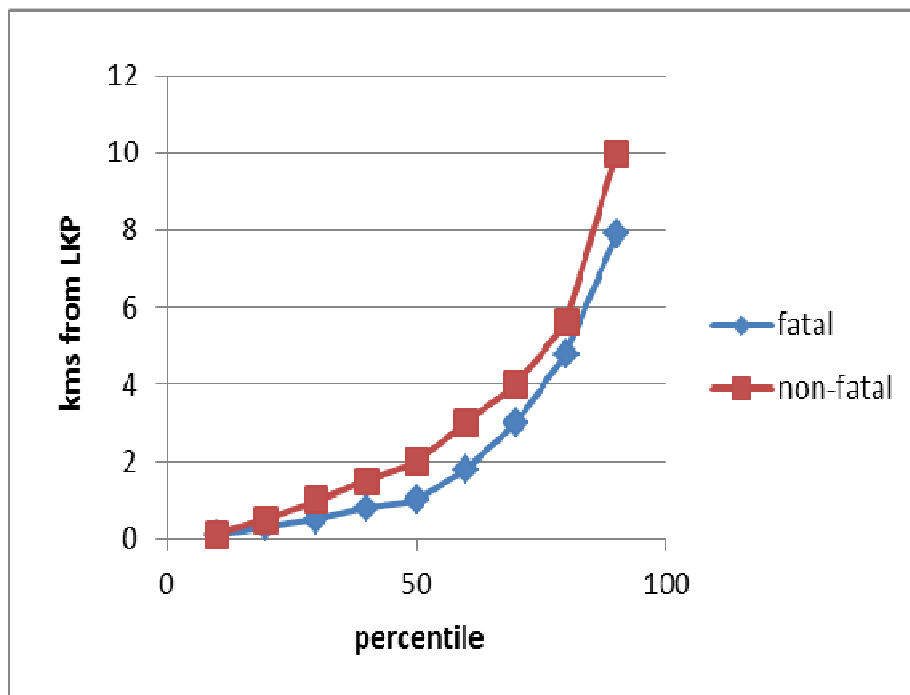
Guidelines for searching for all other categories

The following comments are based on the statistics shown above for categories other than despondents and dementia sufferers. The Search Manager should be aware that other factors (for example the incident history and a knowledge of the local area) play an important part in scenario construction.

1. If you suspect that the missing person is alive:

If you suspect that the missing person is alive, use the information for non-fatal incidents in tables 28 and 29. There was insufficient data to distinguish between males and females. The following ideas will probably influence your most likely scenarios:

- o the missing person is in a building (38%) or on a travel aid (26%) or in open ground (21%)

2. If you suspect that the missing person is dead:

If you suspect that the missing person is dead, use the information for fatal incidents in tables 28 and 29. There was insufficient data to distinguish between males and females. The following ideas will probably influence your most likely scenarios:

- o the missing person is in water (34%) or in open ground (32%)

3. If you do not wish to commit yourself by assuming that the missing person is either alive or dead:

If you do not wish to commit yourself to assuming that the missing person is either alive or dead, the information in tables 26 and 28 can be combined to give the following:

- o the missing person is alive in a building (31%)

- o the missing person is alive on a travel aid (21%)

- o the missing person is alive in open ground (17%)

- o the missing person is alive in trees (7%)

- o the missing person is alive in or by a linear feature (5%)

- o the missing person is dead in water (5%)

Details of how these values are determined are given in appendix 5 on page 38.

Information about creating scenarios is given in appendix 6 on page 40.

Part 4

Appendices: definitions and terminology

Appendix 1: Category definitions

Children aged 1 to 16 years … children whose chronological age is in the range 1 to 16 years, and who have had a history of normal development

Climber … a climber on or off route, accessing into or out of the climb

Dementia … a person with some form of dementia, including those suffering from Alzheimer's Disease

Despondent … any person who is thought to have disappeared deliberately, generally as a consequence of one or more of the following:

  ◦ an intention to commit suicide, either with an explicit threat or considered to be likely based on a history of previous attempts or threats

  ◦ depression, either diagnosed or suspected

  ◦ stress or distress, due to either personal or domestic problems

Developmental Problems … a person with a mental age that is very different from their chronological age

Fell-runner … either a competitor in an event, or training, or out for a recreational run, or orienteering

Health Related … a person who has gone missing primarily as a result of problems relating to their health; a person whose behaviour is influenced by their current medical condition

Miscellaneous … a person who cannot be assigned to one of the other categories

Mountain Biker … a person for whom the bicycle was the main means of transport, on or off road

Other Vulnerables … a person with significant mental impairment other than those covered by the categories Dementia, Developmental Problems, Psychological Illness and Substance Related

Psychological Illness … a person identified by a medical practitioner as suffering from a mental illness; they may be undergoing treatment, either at home or in an appropriate unit

Substance Related … a person for whom the abuse of alcohol or drugs played a significant part in their being missing

Walker (solo) … a walker of any age who is thought to be on their own; they might have become detached from a group

Walkers (group) … a group of two or more persons of any age of the same or mixed gender engaged in any form of recreational walking; examples are a group on a DoE expedition, cadets on a march or a group of people walking together in an informal manner.

Water Related … a person engaged in an activity on or in water

Appendix 2: Terrain types

crag / broken ground … rugged upland

farmland … lowland arable or pasture

moorland … remote areas of upland or wilderness where rocky outcrops are in the minority

plantation (dense) … developed forest or plantation

urban … within the confines of a city, town or village or hamlet

water margin … coastline, shoreline of large bodies of water or rivers, as well as the water itself

woodland (open) … parkland or wooded area where passage is relatively easy

Appendix 3: Outcome - the condition of the subject if found

fatality … dead when found

injured … needed significant medical treatment when found

unhurt … did not need significant medical treatment when found

no trace … not found

Appendix 4: Location - the feature that best describes where the person was found

building / shelter … any man-made structure not usually used or intended for human habitation

forest / woodland … any forest or plantation where progress is difficult except on paths, tracks or roads

forest edge / clearing … open woodland, or adjacent to a forest or wood, or a significant open area within a forest or wood

habitation … a man-made structure used or intended for human habitation

open ground … not on, in or immediately adjacent to any other location described here

path / track … not metalled (paved), may be suitable for vehicles

road … metalled (paved), classified or unclassified

stream / ditch … a drainage that can be easily crossed on foot

wall / fence line … any man-made structure enclosing an area of land

water / water's edge … in or adjacent to a body of water that could not be easily crossed on foot

Appendix 5: guidelines for searching: fatalities and non-fatalities considered together

This explains how the guideline values have been calculated for despondents missing in farmland. A similar process has been used for the other guidelines.

Based on what has happened in past incidents, table 9 suggests that the probability that the missing person will be found dead is 36 / 131, or 27%, and table 10 tells us that the probability of them being found in a building is 11%, the probability that they are found in or by a linear feature is 14% and so on.

Table 9 also tells us, from past incidents, that the probability of the missing person being found alive is 63%, and table 10 tells us that if they are found alive then the probability that they will be found in a building is 51%, in or by a linear feature 2% and so on.

Table 9 also tells us that there is a 10% chance that the missing person will not be found.

We can represent the overall situation by means of a *probability tree diagram*, using values from tables 9 and 10:

(a) condition if found and probability	(b) location found and probability	overall probability (a) x (b)	rank (position)
dead 0.27	building 0.11	0.27 x 0.11 = 0.0297, or 3%	10
	linear feature 0.14	0.27 x 0.14 = 0.0378, or 4%	9
	open ground 0.20	0.27 x 0.20 = 0.0540, or 5%	6
	travel aid 0.09	0.27 x 0.09 = 0.0243, or 2%	11
	trees 0.17	0.27 x 0.17 = 0.0459, or 5%	7
	water 0.29	0.27 x 0.29 = 0.0783, or 8%	4
alive 0.63	building 0.51	0.63 x 0.51 = 0.3213, or 32%	1
	linear feature 0.02	0.63 x 0.02 = 0.0126, or 1%	12
	open ground 0.07	0.63 x 0.07 = 0.0441, or 4%	8
	travel aid 0.26	0.63 x 0.26 = 0.1638, or 16%	2
	trees 0.11	0.63 x 0.11 = 0.0693, or 7%	5
	water 0.02	0.63 x 0.02 = 0.0126, or 1%	13
not found 0.10		10%	3

Thus the most likely outcome is that the missing person will be found alive in a building (32%), followed by found alive on a travel aid (16%), followed by not found (10%), then found dead in water (8%), then found alive in trees (5%) and so on. Notice that these are the suggested scenarios given on page 16.

These results should be used with care when creating scenarios. In the early stages of the search the priority will be to find the missing person alive, and by using the combined values it is possible for the combined likelihood to be biased towards a fatality. In the above example, the probability that the missing person will be found dead in water is relatively high (29%), and therefore that possibility appears near to the top of the rankings. The search manager may not wish to commit resources to deal with that possibility at the start of the search, but may want to allocate appropriate resources later if the missing person has not been found.

Appendix 6: creating scenarios – fatality or non-fatality?

The UKMPBS reports four possible outcomes for a missing person incident; these are

- the missing person was found alive and unhurt

- they were found alive and injured

- they were found dead

- they were not found (reported as 'no trace')

The current report has merged the data for incidents in which the missing person was found unhurt or injured, and refers to them as non-fatalities. If we ignore the possibility that the missing person is not found, that leaves two alternative outcomes for each incident: a fatality or a non-fatality.

In most cases it is difficult to predict the outcome with any degree of certainty. The approach suggested in appendix 5 is to assume that the missing person is alive in the early stages of the search (in particular for the Initial Response) unless there is sufficient evidence to suggest otherwise.

If the outcome is a fatality, the three possibilities (ignoring homicides) are that death was natural, accidental or self-inflicted. All three will be covered by the following analysis. There is a useful discussion on suicides in Gibb and Woolnough.[6]

Fatal and non-fatal scenarios: what are the important facts?

Thorough investigation is an important part of incident management. The following facts about the incident and the person who is missing will be needed for scenario construction, and should be the outcome of that investigation.

1. **The missing person profile**

- the category that the missing person belongs to: some categories have a significantly higher fatality rate than others, and within a category there may be significant differences between incidents in different types of terrain (for example, the fatality rate for despondents in terrain type 'water margin' is 56%, compared with 26% in farmland); similarly between genders (for example, no fatalities were reported in the 19 incidents involving solo female walkers, compared with 16% of reported incidents for male solo walkers)

- their capability and health: what was their physical condition; were they taking any medication, and if so when did they last take it, did they have it with them and what would happen if they did not take it; could they have suffered a fatal episode such as a stroke or heart attack; what frame of mind were they in … were they depressed, had

they been experiencing any recent form of stress or distress, either through their work, personal relationships or due to health problems

- what did they have with them: were they properly prepared or had they 'just disappeared'; did it look as though they intended to return; was this activity part of their normal routine

2. The incident history

- what did they set out to do: were they engaged in a hazardous activity; how did the level of risk compare to their level of experience and expertise; did they have suitable clothing and equipment

- how long have they been missing: how likely are they to be able to survive for that length of time in the prevailing conditions; how does this compare with the length of time that other persons in the same category have been missing and have been found alive; is this a significant date for them, for example the anniversary of the death of a close relative or friend

- the area in which they are missing and are possibly still located: is there anything that could be considered to be hazardous to this person; in the case of male despondents, are they close to a location of some significance to them … significant locations can have a particular relevance in the case of missing male despondents.[7]

- did they tell anyone where they were going and what they intended to do: at first sight this may seem relevant in the case of people who declare their intention to commit suicide, but the statistics for male despondents do not always confirm what appears to be the obvious outcome[3,8]

- weather conditions: how likely were they to be able to survive in the conditions that have occurred since they went missing

There is no simple formula for mixing these factors and arriving at an answer. Some will be more important than others. Each incident needs to be taken on its own merits. However, since this study has shown that the locations in which fatalities and non-fatalities are found are significantly different, some overall strategy for scenario construction that takes that into account is highly desirable. The following procedure is suggested:

- in the early stages of the search, unless there are a significant number of fact to suggest otherwise, you should construct scenarios that assume that the missing person is alive

- if it is not possible to arrive at a satisfactory decision regarding a fatality or non-fatality, use the guidelines for each category that give suggestions for scenarios that cover both outcomes (also discussed in appendix 5)

- as time passes, include some or more scenarios that allow for a fatality

- eventually base the majority of your scenarios on the statistics for fatalities

Suggestions for each of these three options are given in the guidelines for each category and type of terrain.

Scenario construction: some general guidelines

When properly constructed, scenarios offer realistic suggestions as to what might have happened to the missing person and therefore where searching should take place. Examples of scenarios that do not satisfy this final requirement might be:

- the missing person is lost

- they went for a walk and did not come back

- they have had an accident

While any of these might be true, they do not help us to decide where to search.

Some general guidelines for constructing scenarios are:

- scenarios should fit in with the known facts about the missing person and the incident … when and where they were last seen, what they had with them and so on

- they should fit in with Missing Person Behaviour statistics for the appropriate category, terrain and gender; bear in mind that scenarios for a particular incident might need to cover two or more different types of terrain, for example a person who is missing from a location on the edge of a town in an agricultural area (terrain types urban and farmland, depending on which way they went from LKP)

- they should contain a likely destination and route(s) to get there

- they should suggest an outcome (fatality or non-fatality)

- between them, they should suggest a variety of possibilities rather than focus on one outcome

The Search Manager should try to construct three or four scenarios for the incident.

Acknowledgements

References

1   Perkins, D., Roberts, P. and Feeney, G., (August 2011), *The UK Missing Person Behaviour Study*, The Centre for Search Research, available free of charge from URL: http://www.searchresearch.org.uk/www/ukmpbs/current_report

2   ibid, pages 6 and 7

3   ibid, page 20

4   ibid, table 18 page 22

5   ibid, table 12 page 17

6   Gibb, G.J. and Woolnough, P., *Missing Persons*, Aberdeen: Grampian Police, 2007, pages 17 to 26, available free of charge from URL: http://www.searchresearch.org.uk/www/ukmpbs/other_documents

7   Perkins, D., Roberts, P. and Feeney, G., (August 2011), *The UK Missing Person Behaviour Study*, The Centre for Search Research, page 25

8   ibid, page 21