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Urban impacts on Dorset Heathlands:  
Analysis of the heathland visitor questionnaire survey  
and heathland fires incidence data sets

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**Urban impacts on Dorset Heathlands: Analysis of the  
heathland visitor questionnaire survey and heathland fires incidence data sets**

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# 1. Introduction

This report has been commissioned by Dorset Environmental Records Centre (DERC). It is a sub-project that is part of a wider project brief provided by English Nature on the impacts of urban developments that are adjacent to some of the heathlands of Dorset as shown in Figure 1. The Urban Heaths LIFE Project is co-funded by the EU LIFE-nature fund and aims to combat the urban pressures on Natura 2000 heathlands in south east Dorset.

This projects purpose is to analyse and comment on two existing sets of data collected under the Urban Heaths Life Project (UHLP). These data sets comprise of a database of all the fire incidents that have been recorded by DERC from within the UHLP heathland sites and the results of a visitor survey questionnaire carried out on the same sites in 2003.

The main aims of the report can be summarised as follows:

## a) The UHLP Heathland Visitor Survey Questionnaire

- To investigate the distances travelled by heathland visitors and the modes of transport used.
- To understand the main recreational usages of the urban heaths.
- To identify patterns in timing of visits and time spent on the heaths by different user groups.
- To distinguish between different proportions of usage by user groups on different heaths.

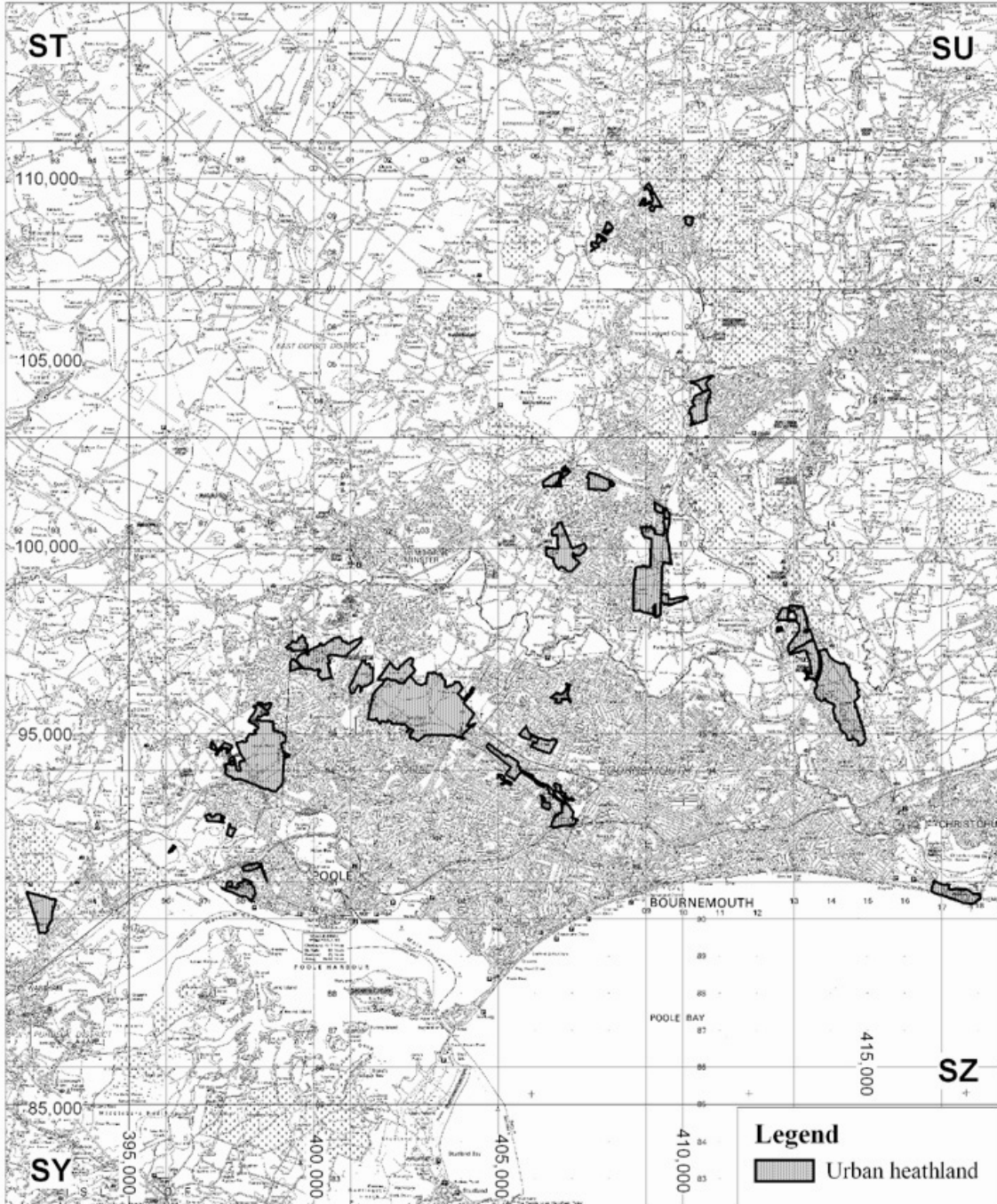
## b) The UHLP Incident Reporting data set

- To compare the frequencies of fire incidents between different years, months, times of day and between different heaths.
- To comment on the size of fires.
- Assess changes in the patterns of fire incidents between the 1993/98 and 2002/03 periods.

In addition this report documents the methodology used for the processing of the visitor questionnaire survey information and discusses the limitations of both the methodology and the data that has been collected. Recommendations for further work to improve our knowledge of the impacts of urbanization on the heathlands of Dorset are made.



**Figure 1: Component sites covered by the Urban Heaths LIFE Project**



Scale 1:150000



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## **2. Methods and data description**

This section is in two parts. The visitor survey and questionnaire methodology and data processing and description are dealt with in detail. Methodologies for the recording of fire incidence reporting have already been documented by Kirby & Tantram (1999) and in the Urban Heaths LIFE Project Incident Reporting Final Report for 2002. The methods used for data manipulation and statistical analyses for both sets of data are also included within this section.

### **2.1 Survey questionnaire methodology**

The survey questionnaire used in the 2003 survey is a modified version of the pilot questionnaire used in 2002. The method of use was to approach visitors on the heath and ask if they were prepared to answer some questions about their visit to the heath. The interviews were carried out by Urban Heath Life Project wardens as a part of their normal daily duties. The date, time and heathland location for the interviews was not pre-determined or structured and no information on survey effort or the number of interview requests that were declined was recorded. Only one questionnaire was filled in for each group of visitors and addresses were checked for duplicates, thus all of the 193 completed questionnaires are independent in terms of the groups of individuals questioned and represent a sum total of 396 people. The survey was conducted over a total of 18 heathland sites. The questionnaire consisted of 21 questions (1 to 7 and 9 to 22) to be answered by the visitors and additional data on group size, age profile, number of bikes, dogs and horses and information on the time, date and weather conditions to be completed by the wardens. Only questions 1 to 7 and the additional data collected by the wardens were used in the data analyses below and details of the data description a full explanation of the statistical analyses are given in Appendix 1. Information on questions 9 to 22 and tabulated summaries of the results are given in Appendix 2.

#### **2.1.1 Survey questionnaire analysis methods**

The data was supplied by DERC in site specific EXCEL spreadsheet format. This was rationalized into a single data table in MINITAB release 14. Most of the analyses were done using the MINITAB statistical package. The analyses performed were nonparametric Chisquare tests for association of response variables (ie answers) and Kruskal-Wallis rank order tests for differences between groups or types of response. Where the number in one or more response categories were low the statistical tests were re-done using exact forms of the tests using the specialist statistical package STATXACT (Cytel 1998)

### **2.2 Fires data description**

The data recorded are all the fire incidents that have been reported. These range from minor incidents where less than  $1\text{m}^2$  of vegetation was burnt to major incidents where tens of hectares have been burnt. The information included site, date, time of day when first reported and, for some records only the extent of heathland burnt. Each incident is recorded separately.

### **2.2.1 Data sources**

The data used originated from two fires data sets. Data on the fires between 1993 and 1998 were records assembled for the Monitoring Heathland fires in Dorset Project (DETR 1999) and the data for 2002 and 2003 were collected as part of the UHLP and collated by DERC. The methods of data capture for the 1993 to 1998 data and the recommendations for setting up the UHLP fires database are given by Kirby & Tantram (1999).

### **2.2.2 Data preparation**

Data from the UHLP was provided by DERC in the form of an ACCESS database. It consisted of a total of 1056 incidents recorded between April 2002 and December 2003. There were 563 incidents of fire the remainder being motorcycling, fly tipping, cycling off bridleways, vandalism etc. The data fields in the database that were used in the analysis were as follows: Fire start time, day, month, year, day of the week and site (heath) name. A comparable set of fields for the same heathland sites was extracted from the DETR database for 1993 to 1998. This consisted of a total of 2813 records.

### **2.2.3 Data analysis**

The analyses performed were nonparametric Chisquare tests with one or two-way comparisons of proportions giving particular responses and Kruskal-Wallis rank order tests for differences between groups.

## **3. Results**

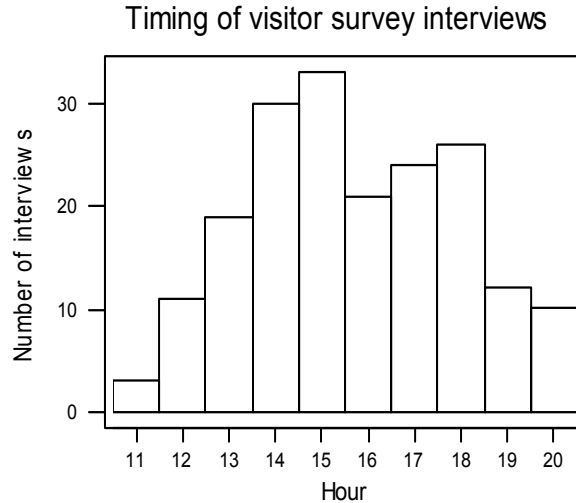
This section displays and describes the results of the analyses that were deemed to be relevant to urban impacts on heathland and for which valid tests could be done with the data provided. The reporting of the results and statistical significance will be given here. Where statistical tests have been done the section is marked with an asterisk and full details of the statistical test results are given in Appendix 1.

### **3.1 Questionnaire results**

A total of 193 questionnaires were completed by visitors to Urban Heath Life Project (UHLP) sites in 2003. The survey was conducted during the school summer holiday period between 23 July and 1 September.

#### **3.1.1.1 The timing of visits by walkers and drivers**

Interviews were conducted on both week days (91 records) and at weekends (96 records) during the survey period. Data was collected between 11:00 and 20:00 hrs.



**3.1.1.2 \*Are there differences between the proportions of weekend and weekday visitors walking or driving to the heath?**

There is no statistically significant difference in the pattern of week day and weekend usage of the heaths by either those that walk to the heath or those that drive for the survey period.

**3.1.1.3 \*Are there differences in the time of day that visitors either walk or drive to the heath?**

Data was collected between the hours of 11:00 and 20:30. There are no significant differences between the timing of visits of those who walk to the heath and those who drive during that part of the day.

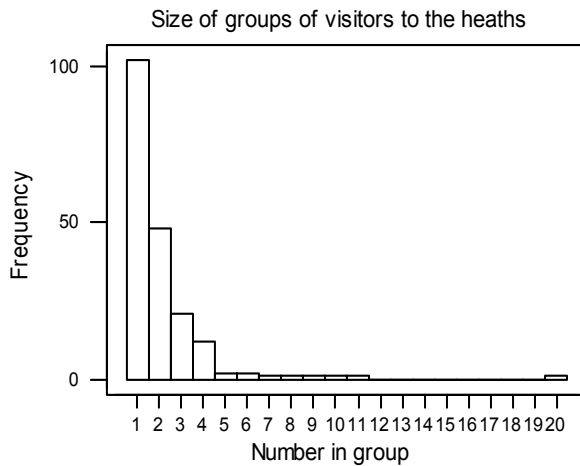
**Summary of results for the timing of visits**

- The data suggest that there is no difference in the relative numbers of visitors who walk or drive cars to the heath between week days and weekends.
- The time that visits are made is not related to the mode of transport to the heath.
- The peak time for visiting is mid-afternoon with a secondary peak at 18:00 hours. Note that no information on early morning usage was collected.

**3.1.2 The size and age composition of the groups that completed the questionnaire**

**3.1.2.1 How many people are in the groups?**

Most of the respondents to the questionnaire were on their own on the heath (102, 52.8% of replies), in pairs (48, 24.9% of replies) or in groups of three (21, 10.9% of replies) or four (12, 6.2% of replies). The remaining 10 groups (5.2% of replies) were from groups of five or more up to 11 with a single group of 20 doing military training.



**3.1.2.2 \*Are there differences between the size of groups that walk to the heath and those who travel by car?**

No, the group sizes were evenly distributed between walkers and car drivers (means 2.14 and 1.83 people respectively).

**3.1.2.3 What is the age range of the individuals on the heath?**

There were 10 individuals less than 20 years of age interviewed on the heath (six girls and four boys). This included two boys and one girl aged less than 10 years of age. The remaining 92 individual visitors that were interviewed were evenly spread between men and women and between the age groups of 20 to 50 years old and those who are over 50 years old.

**3.1.2.4 What is the age range of the groups?**

Of the 91 groups of two or more people interviewed 18 were made up of individuals less than 20 years of age. Six of these groups comprised of boys and girls, nine were just boys and three only girls. The groups that included one or more older people (20 years or more) were mostly mixed rather than single sex groups with pairs being more frequent than larger groups.

**3.1.2.5 \*Are there differences in the age range of visitors who travel to the heath by car rather than walk?**

No. Having removed groups of less than 20 years old from the analysis respondents that included an older member in the group were statistically no more likely to have travelled to the site by car than younger people.

**Summary of results for group size, gender and age range of the visitors to the heaths**

- Heathlands attract visitors of both sexes and all ages.
- Lone visitors were the most common respondents along with couples and family groups.
- There is little data from larger groups.

- There are no statistical differences between the size of the groups that visit the heaths by car and on foot.
- Older visitors are no more likely to have travelled by car than younger people.

### 3.1.3 Access to the heaths

This section deals with the distances travelled and the modes of transport used by visitors to the heath.

#### 3.1.3.1 How far do people travel to get to the urban heaths?

Of the 193 responses 182 gave local (BH) post codes or addresses and 11 from further afield. These included four from within a 40 mile radius (two with Dorchester (DT) postcodes, one from Southampton (SO) and one from Wiltshire) and seven from locations elsewhere in the country that are not within a days travelling distance.

#### 3.1.3.2 \*What distance do visitors travel to the local heaths?

Using data from 'local' (BH) postcodes only there was a statistically significant difference between the distances walked and the distances driven to the heath. The 86 responses from individual or groups of walkers gave a mean walking distance of 378m (median 258m and upper quartile 448m). Twenty eight (32.6%) of the groups of walkers had travelled over 400m and 6 over 1000m with a maximum of 2263m. The 50 responses from car drivers gave a mean distance of 4,213m (lower quartile 1,117m and median 2,220m). Three of the car journeys that were made were less than 400m.

#### 3.1.3.3 How do visitors travel to the heath?

The majority of visitors walk to the heath and most of the other visitors travel by car (see table below).

	Number of responses	%	Total number of individuals	%
<b>Walk</b>	104	53.9	222	56.1
<b>Car</b>	72	37.3	132	33.3
<b>Cycle</b>	12	6.2	32	8.0
<b>Bus</b>	2	1.0	5	1.3
<b>Other</b>	3	1.6	5	1.3

#### 3.1.3.4 \*Does the mode of transport of visitors to the heath differ on different heaths?

There were statistically significant differences in the relative proportions of walkers and car drivers between the sites. This is illustrated by the fact that visitors to Ham Common are predominantly car drivers and visitors to Turbary Common almost exclusively arrived on foot.

### 3.1.3.5 \*Are there differences in the distances visitors walk to the individual heaths?

The distances walked to different heaths did not differ significantly. However, three sites Ferndown Common, Lions Hill and Talbot Heath had median walking distances of more than 400 m.

### 3.1.3.6 \*Are there differences in the distances visitors travel by car to the individual heaths?

The distances travelled by car to different heaths also showed a tendency for some heaths being more attractive to visitors from further afield but the differences in this set of data were not significant. Heaths such as Ham Common and Parley Common that had a higher proportion of car visitors tended to have greater catchment areas.

### 3.1.3.7 Are there differences in the distances visitors cycle to the individual heaths?

There is insufficient data on the distances travelled by cyclists to the heaths to compare statistically with other forms of travel. However from the five respondents who gave full postcodes three travelled less than 400m to the heath and the others travelled 2,164m and 3,397m.

### 3.1.3.8 How many visitors live within the 400m development control consultation zone of the heaths?

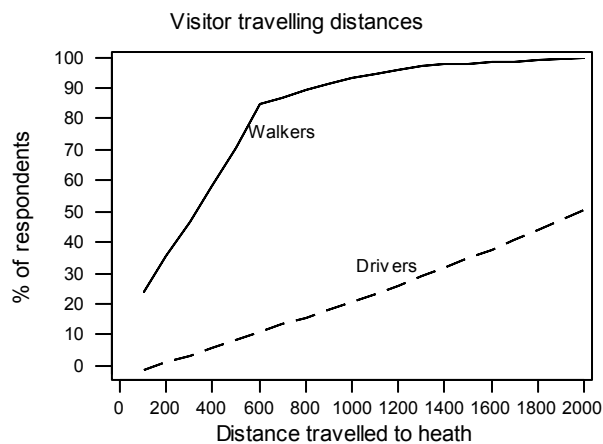
A large proportion of visitors who walk and almost all those who drive cars to the heaths live outside the 400m radius of the heath.

Travel distances of the 145 respondents with full postcodes.

	<400m	Individuals	>400m	Individuals
<b>Car</b>	3	5	47	86
<b>Walk</b>	58	124	28	60
<b>Other</b>	3	6	6	13
<b>Total</b>	<b>64</b>	<b>135</b>	<b>81</b>	<b>159</b>

The table above shows that 54.1% of visitors to the heath travel more than 400m to visit the heath. The graph below shows that more than 80% of the visitors that walk to the heath travel less than 600m but 52% of those who drive to the heath travel more than 2 km.



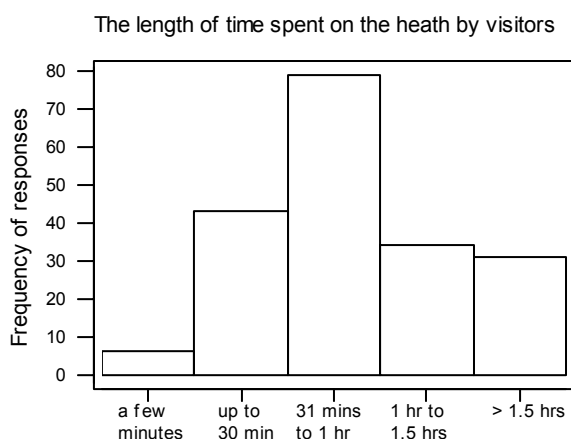


### Summary of results on access to the heaths

- The vast majority (94.3%) of visitors to the heaths live locally, that is they are resident in the Bournemouth postcode area. However, more than half of local visitors to the heath (54.1%) live outside the accepted 400m development control consultation zone around the heath.
- More than 80% of walkers live less than 600m of the heath but 52% of visitors who drive to the heath live more than 2 km from the heath.
- The majority of visitors walk to the heath (56.1%) and most of the other visitors travel by car (33.3%). However, the relative numbers of visitors who either walk or travel by car varies between heathland sites.
- There is no evidence that walkers walk further to some heaths than others. However, although it was not statistically significant there was an indication that car drivers may travel further to some heaths than others.
- There is insufficient data to assess travel distances of cyclists or those using other modes of transport.

#### 3.1.4 Time spent on the heath

In addition to the total number of visitors to the heaths another important factor is the amount of time that the visitors spend on each visit.



The six recorded responses for ‘a few minutes’ on the site were added to the ‘up to 30 minutes category for the following analyses.

**3.1.4.1 \*Are there differences in the time visitors spend on different heaths?**

Overall there are statistically significant differences in the time spent at the site between heaths. This is mostly due to other activities not associated with the heathland being done at the site such as visiting the beach at Ham Common and fishing in ponds on some sites.

**3.1.4.2 \*Are there differences in the time spent on the heath by car visitors and those who walk to the heath?**

There are no statistically significant differences in the time spent on the heath by walkers and car drivers.

**3.1.4.3 \*Are there differences in the time spent by those who walk to the heath on different heaths?**

There are no statistically significant differences in the time spent on the heath by visitors who walk to different heaths.

**3.1.4.4 \*Are there differences in the time spent on the heath by car visitors to different heaths?**

There are statistically significant differences in the time spent on the heath by visitors who drive to different heaths. This result is associated with other site activities see 3.1.4.1 (above).

**3.1.4.5 \*Do the weather conditions affect the length of time spent on the heath?**

There is no statistical evidence that the length of time spent on the heath is weather dependent during the study period.

## Summary of results on time spent on the heaths by visitors

- The average time spent on the heath is less than one hour with only 16% of visitors staying for more than one and a half hours.
- There are no differences between the duration of visits of those who arrive at the heath by car or on foot.
- It has been shown that the duration of visits made by walkers to different heaths does not vary but that of car drivers does.
- From this data set there is no evidence that the time spent on the heath is associated with the weather conditions.

### 3.1.5 Reasons for visiting the heath

This question prompted a total of 241 replies from the 193 completed questionnaires. No information on the primary reason for visiting was requested.

Activity	Number of replies	% of replies
Walking	33	13.7
Dog walking	109	45.3
Jogging	2	0.8
Mountain biking	14	5.8
BMX bike riding	2	0.8
Horse riding	3	1.2
Nature watching	28	11.7
Hanging about	16	6.6
Other	34	14.1

The majority of groups interviewed (56.5%) were walkers with one or more dogs. Leisure activities, walking, nature watching and cycling (mountain biking and BMX biking) were also important accounting for 17.1%, 14.5% and 8.3% of the groups respectively. There were few respondents who classified jogging and horse riding as one of their reasons for visiting the heath. The 'Other' category included a wide range of activities many not associated with the heath, in particular fishing and going to the beach at Ham Common and those who use the heath as a short cut. The 'Hanging about' category (ie no specific reason to be on the heath) was recorded on eight heaths.

Because dog walkers make up the majority of heath users interviewed the following analyses are based on comparisons of this group with all other groups.

#### 3.1.5.1 \*Are there differences in the proportion of dog walkers on each heath?

The data show statistically significant differences between the relative numbers of dog walkers and other users of the heaths on different heaths. There is insufficient data to analyse this result further but the most likely factor is the number of non-heathland attractions resulting in an increased number of visitors who are not walking dogs (see section 3.1.4 above).

### **3.1.5.2 \*Are there differences between the relative numbers of visitors with dogs who walk to the heath and those who drive cars?**

Although it is not statistically significant at the 95% confidence level the data suggests that there is a tendency for a larger proportion of dog owners walk to the heath than drive to the heath.

### **3.1.5.3 \*Do dog walkers walk further to the heath than other heath users?**

There is no statistical evidence for this. The median distance walked by dog walkers to a heath is 271.5m compared with 252.5m for non-dog walkers.

### **3.1.5.4 \*Do dog walkers drive further to the heath than other heath users?**

Dog walkers drive significantly less distance to the heath than those drivers visiting the heath for other reasons. The median distance travelled by car for dog walkers is 1,643m but for other heath users it is 6,766m.

## **Summary of results for reasons for visiting the heath**

- The majority of groups interviewed were walkers with dogs (56.5%) but heaths are also used for a number of other leisure activities.
- Some heaths have a higher proportion of dog walkers than others.
- Dog walkers walk similar distances to the heaths as other visitors.
- The distance that dog walkers drive to the heath is considerably less than the distance other heathland visitors drive to the heath.

## **3.1.6 Frequency of visits to the heath**

This section provides some information on how often different groups of visitors use the heaths.

### **3.1.6.1 \*Are there differences in the frequency of visits by visitors to the heath who travel by car visitors and those who walk to the heath?**

Yes, the statistical analysis shows that those who walk to the heath are more likely to visit more regularly than those who visit by car.

### **3.1.6.2 \*Are there differences in the frequency of visits by visitors on different heaths?**

Consistent differences between heaths were found using the whole data set and amalgamating the frequency categories into three groups ('daily', 'weekly' & 'occasional') but this was not the case when analysing walkers and car drivers separately.

### **3.1.6.3 \*Are there differences in the frequency of visits by walkers who walk dogs and those who visit for other reasons?**

There are significant differences between the frequency with which dog walkers and other visitors walk to the heaths. Eighty percent of the dog walkers who walked to the site did so at

least once a day whereas only 29.4% of the other heath users visited daily and none of those visited more than once a day.

### 3.1.6.4 \*Are there differences in the frequency of visits by car drivers who walk dogs and those who visit for other reasons?

There are significant differences between the frequency with which dog walkers and other visitors drive to the heaths. The pattern is similar to that for the walkers but less pronounced, with dog owners visiting on a more regular basis with 43.6% visiting once a day or more often whereas none of the other heath users visited every day.

### 3.1.6.5 \*Is there a difference in the relative numbers of dog walkers and other users of the heath on sunny days?

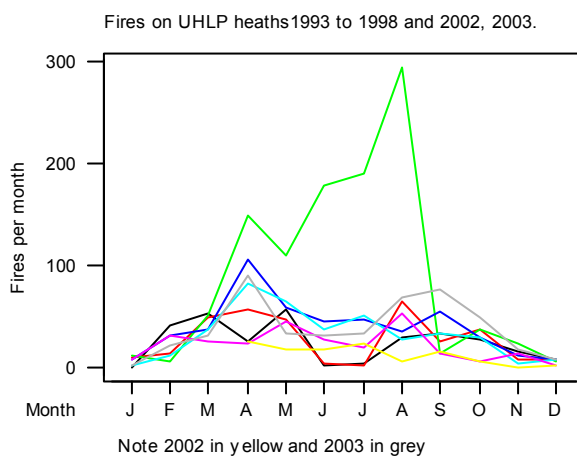
There are no significant differences in the relative numbers of dog walkers and other heath visitors between dry days (sunny and overcast) and rainy days (unsettled weather conditions).

## Summary of results on the frequency of visits by visitors

- Visitors who walk to the heath are more likely to visit the heath regularly than those who visit by car.
- Dog walkers are the most regular visitors with 80% of those who walk their dogs to the heath visiting at least once a day.
- The weather conditions at the time of visit appeared to have no significant effect on the composition of heath users.

## 3.2 Fire incidence results

The figure below shows the number of fires recorded in each month for each year: 1993 to 1998 and for the two years of the UHLP (2002 and 2003).



### **3.2.1 Annual and seasonal data**

There are six complete years of data for 1993 to 1998, there is data from April onwards for 2002 and complete data for 2003. Summer and winter seasons were divided into two equal six month periods (April to September and October to March). This summer season coincides with the period when the temporary wardens are employed on the urban heaths.

#### **3.2.1.1 \*Are there differences in the number of fires that occur annually?**

Yes, the test of the null hypothesis that there are no real differences in the underlying annual rate of occurrence of fires between years for the years between 1993 and 1998 and 2003. Removing the data for 1995 gives a similarly significant result. There is a wide variation in the total number of fires that can be expected in any one year.

#### **3.2.1.2 \*Are there differences in the numbers winter of fires between years?**

The number of fires recorded in the winter (the period outside of when temporary wardens are employed) is lower than the number recorded in the summer. However, there is a great deal of variability in the total numbers of fires in the winter months. Although variable there is no statistical evidence that any of the winters recorded has been exceptional in terms of the number (either high or low numbers) of fires.

#### **3.2.1.3 \*Are there differences in the numbers summer of fires between years?**

The number of summer fires is also very variable, results for the years 1993 to 1998, 2002 and 2003. Removing the data for the exceptional summer of 1995 gives a similar result.

#### **3.2.1.4 \*Are there differences in the numbers of summer fires between the 1990's data and the UHLP data sets?**

Due to the small number of data points, 6 in the 1990's and 2 in the UHLP data no statistically significant differences between the data sets could be detected. Omitting 1995 data gives similar results.

### **Summary of results for annual and seasonal data**

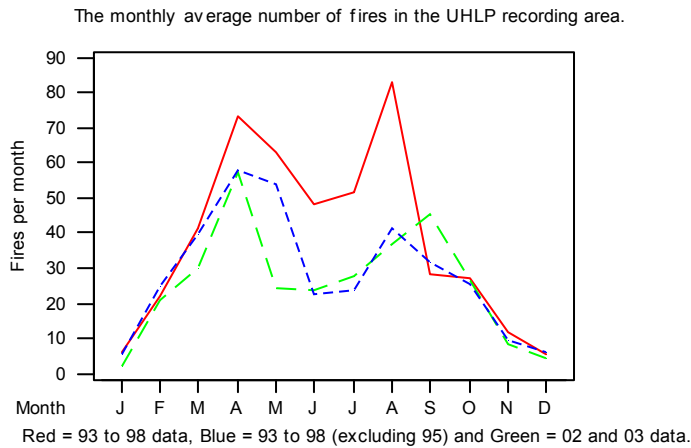
- The number of fire incidents varies widely between years.
- Fires are more common in the summer than the winter months.
- The number of both summer fires and winter fires is highly variable.
- There is no evidence that fires are more or less common in 2002-2003 than they were in 1993-1998.

### **3.2.2 Monthly patterns of fires**

There are data for a total of 93 months. Fires occur in any month of the year and only 2 months have no fires recorded. Sixty eight months (73.1% of the total recorded) have had 10 or more fires recorded and 41 months (44.1%) have 30 or more fires (an average of about one each day). The maximum number of fires recorded in any month was 294 (in August 1995).



The figure below shows the average number of fires per month in 1993 to 1998 (two values including 1995 in red and excluding 1995 in blue) and for the two years of the UHLP (2002 and 2003) in green.



**3.2.2.1 \*Is there variation in the number of fires in different months of the year and in the monthly numbers of fires in different years?**

Yes. The numbers of fires varies between months throughout the year.

**3.2.2.2 \*Do the numbers of fires in individual months vary year-on-year?**

With the exception of the data collected for the numbers of fires in December all the other months vary significantly year-on-year either with or without the inclusion of 1995 data.

**3.2.2.3 \*Is there any evidence that the number of fires in any month has changed between the 1990's and 2002/03 data sets?**

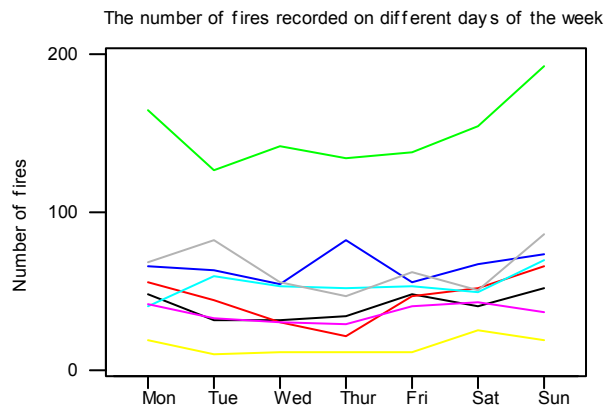
There is no significant difference in the monthly number of fires (for any month) between the sets of data.

**Summary of results for monthly data**

- Whilst there are general patterns for fire risk at certain times of the year the situation is highly variable both between and within years.
- From the available data April and May are the peak months for fires in most years followed by a reduction in June and July with a smaller peak in August. The 1995 summer however shows increasing numbers of fires throughout the summer.
- In general March and October have more fire incidents than the other winter months.
- There is no evidence for a change in the numbers or pattern of fire incidents between the 1990s dataset and that collected in 2002/03.

### 3.2.3 Daily pattern of fires

It is important to ensure that fire protection effort is maximized on those days when most fires occur. The figure below shows the total number of fires recorded on different days of the week for the different years.



#### 3.2.3.1 \*Are there differences in the daily pattern of fires in the 1990's?

There are statistically significant differences in the underlying annual rate of occurrence of fires between days of the week during the 1990s.

#### 3.2.3.2 \*Are there differences in the daily pattern of fires in the UHLP dataset?

There are statistically significant differences in the underlying annual rate of occurrence of fires between days of the week during 2002 and 2003.

#### 3.2.3.3 \*Are there differences between the daily patterns of fires in the 1990's and the UHLP dataset?

The daily fire patterns for the two datasets show no statistically significant differences.

#### 3.2.3.4 \*Are there differences in the daily pattern of summer fires in the 1990's?

There are significant differences in the underlying annual rate of occurrence of fires between days of the week during the 1990s.

#### 3.2.3.5 \*Are there differences in the daily pattern of summer fires in the UHLP dataset?

There are differences in the underlying annual rate of occurrence of fires between days of the week during 2002 and 2003.

#### 3.2.3.6 \*Are there differences between the daily patterns of summer fires in the 1990's and the UHLP dataset?

The daily fire patterns for the two datasets show no significant differences.

## **Summary of results for daily pattern of fires**

- Fires occur frequently on every day of the week both throughout the year and in the summer only.
- There is significant variation in the frequency of fires on different days of the week with in general fewer fires between Tuesday and Thursday than between Friday and Monday.
- The daily fire patterns are similar for both data sets.

### **3.2.4 Time of day that fires are reported**

This is an indication of the start time of the fire. It is important to note any changes in fire pattern to ensure that fire protection effort is maximized at the peak times.

#### **3.2.4.1 Are there differences in the timing of fires between the 1990's data and the UHLP dataset?**

There are no statistical differences in the start time of fires between the two data sets. Both have a median fire start time of between 16:00 and 17:00 hours.

#### **3.2.4.2 \*Are there differences in the timing of fires between months of the year?**

There are small but statistically significant differences in the start times of fires in different months of the year. This result is primarily due to the start times of fires that occur in October, November and December being slightly earlier (between 15:00 and 16:00) than the other months of the year (between 16:00 and 17:00).

#### **3.2.4.3 \*Are there differences in the timing of fires between days of the week?**

There are small but statistically significant differences in the start times of fires on different days of the week with Monday fires being later (but still between 16:00 and 17:00) and Saturday and Sunday fires slightly earlier (between 15:00 and 16:00) than the other days of the week.

#### **3.2.4.4 \*Are there differences in the timing of fires between school days and school weekday holidays?**

The timing of fires is similar during school days and school holidays. Only UHLP data was used for this analysis.

## **Summary of results on time of day that fires are reported**

- Fires can occur at any time of the day or night but more than 75% of fires occur between the hours of 12:00 and 21:00.
- The pattern of fires is similar for both data sets.
- There are small differences in fire start times between summer and winter and days of the week. These findings suggest that it is the weather conditions and state of the vegetation is an important factor in the timing of fires with mid-afternoon the most likely time.

### **3.2.5 Fire patterns on different heaths**

The differences in the number of fires recorded on each site and the number of fires per unit area on each site have been explored for the 1993/98 data by Kirby and Tantram (1999). This section considers the possible changes in fire frequency between the two surveys.

#### **3.2.5.1 \*Are there differences in the annual numbers of fires on each heath between data sets?**

Using data for the 13 heaths that had at least 10 fires recorded in the 1990's data set significant differences in the numbers of fires on different heaths between the two surveys were found. There was however no obvious trend in the changes in fire pattern.

#### **3.2.5.2 Are there differences in the numbers of summer fires on each heath between data sets?**

Using data for the 13 heaths in the analysis above significant differences in the numbers of summer fires on different heaths between the two surveys were found.

### **Summary of results for fire patterns on different heaths**

- There are statistically significant differences in the numbers of fires recorded on different heaths between the two surveys. However the table suggests that there has been no major change in the distribution of heathland fires.

### **3.2.6 The area of heathland burnt**

Of the 452 fires reported in 2002/03 only 203 had burn area estimates. These amounted to a total of 96.6ha. The largest burn was estimated at 60ha on Upton Heath (62.1% of the area of burnt heath recorded). Only 6 fires resulted in burn areas of more than 1 ha (representing 85.3ha, 88.3% of the burnt heath recorded) and 83% of fires were less than 1000m<sup>2</sup> in area.

Assuming that all the area of fires which resulted in more than 1000m<sup>2</sup> of heathland being burnt were recorded the average area of unrecorded fires (estimated from the recorded fires of between 1 and 1000m<sup>2</sup>) would be 190m<sup>2</sup>. This would add a further 4.73ha of burnt heathland to the total.

Thus in a year when the fire number was high (compared with the other years recorded) the total area burnt was estimated to be 101.3 ha.

### **Summary of results for the size of fires**

- The above illustrates that a high proportion of fires have a very small effect on the overall area of heathland. However, if these small fires are unchecked they can result in major incidents.
- All of the six large (>1ha), fires recorded in 2002 and 2003 occurred in March, April or May. However Kirby & Tantram (1999) report the peak times for large fires in January and July. Moore (1962) reported that the major heath fires in 1960 were mostly in May and the fires of 1976 were in July and August.

## **4. Discussion**

### **4.1 The visitor survey questionnaire**

Due to the survey methods used estimates of the total numbers of visitors to the heaths cannot be made. Therefore many of the analyses are based on comparing groups of visitors. Also there is not enough data on some groups of heath users (such as cyclists, horse riders etc.) to be able to make valid comparisons. Therefore the findings presented are based on the analyses that can be done and they do not necessarily reflect their relative importance to nature conservation aims. Recommendations for extending and improving data acquisition are made in the following section.

#### **4.1.1 The timing of visits by walkers and drivers**

To be able to understand the likely impacts of visitors to the heaths it is important to obtain information on what days and what time of day people make their visits. The patterns of time of usage of the heaths by visitors cannot be fully investigated by the data due to the following constraints:

- All interviews were carried out on both week days and at weekends during the period 23 July to 1 September. These results cannot be extrapolated to other times of the year.
- The first recorded interviews were taken at 11:00. Other surveys such as the Burnham Beeches visitor survey (Barnard 2003) show that early morning is also a popular visiting time. No inference as to the early morning usage of the heaths can be made.

The data suggest that there is no difference in the relative numbers of visitors who walk or drive cars to the heath between week days and weekends. This result is valid for the summer holiday period, however, patterns may change outside of the main summer holiday season particularly during school term time. The finding that the time that visits are made is not related to the mode of transport to the heath further illustrates the similarities between walkers and car drivers in their uses of the urban heaths. Thus urban heaths are not seen as a venue for a full day out but are used for rather shorter visits.

#### **4.1.2 Group size, gender and age range of the visitors to the heaths**

The analysis of the size and composition of groups of visitors was done to characterise the types of people who visit the heaths. Although it is possible to use postcode data to group individuals into socio-economic classes no such analysis has been attempted. The results assume that the 193 respondents reflect the full range of heath users. Heathlands attract visitors of both sexes and of all ages. A comparative survey of an urban heath (Sandford Heath) and a rural heath (Winfrith Heath), (Stride 2001) indicated differences in the age distribution of visitors between sites with visitors to the urban heath being predominantly young (under 20 years old) and visitors to the rural heath having a wide range of ages. This is not reflected in this survey of urban heaths with none of the sites having visitors that are mostly under the age of 20 years old and where sufficient data exists for a site the age range of visitors is distributed across a wide range. A large number of visitors visit the heaths singly with couples and small family groups also common. There were few data from larger

groups. There were no differences between the size of the groups that visit the heaths by car and on foot. With the exception of those aged under 20 years old all age groups showed similar proportions of car drivers and walkers.

#### **4.1.3 Access to the heaths**

Almost all of the visitors to the heaths live within the Bournemouth post code area and most travel short distances to their local heath. More than half of the visitors to heathland live outside the 400m consultation zone that has been defined for development control purposes to consider the additional use that proposed development would place on urban heaths. The majority of visitors walk to the heath and most of the other visitors travel by car. However, the relative numbers of visitors who either walk or travel by car varies between the different heathland sites. This is probably due to differences in the ease of access for walkers and parking areas for car drivers. It may also be linked to the perceived quality of the experience of the specific heaths because there is an indication that car drivers may be prepared to travel further to some heaths than others. These favoured heaths tend to have additional interests (fishing lakes or a beach) or better facilities (such as adequate parking).

#### **4.1.4 Time spent on the heaths by visitors**

An important factor in assessing the usage of the heaths is the amount time spent on the heath by visitors at each visit. This will also be reflected by the types of activity the heaths are used for. The average time spent on the heath is less than one hour. This is similar to the findings of the visitor survey at Bourley and Long Valley SSSI (Count on us, 2003). In general there are no differences between the duration of visits of those who arrive at the heath by car or on foot although on some heaths the length of stay by car drivers is site specific. The time spent on the heath is not associated with the weather conditions. However, as almost all visits to the heath are relatively short it is difficult to show a difference in time spent and these data do not provide information on the frequency of visits during different weather conditions.

#### **4.1.5 Reasons for visiting the heath**

The urban heaths are used for a number of other leisure activities by people with widely differing and possibly conflicting interests. However the majority of groups interviewed were walkers with a dog (56.5%). This figure may have been even higher if interviews had been carried out earlier in the morning. Other studies have shown that dog walking is a popular early morning activity (Barnard 2003).

Dog walkers walk similar distances to the heaths as other visitors but the average driving distance is considerably less than for other heath users. There is also some evidence that some heaths have a higher proportion of dog walkers than others. These facts suggest that in areas where there are no alternative sites that are suitable for dog walking close at hand the heaths may have a greater intensity of use.

#### **4.1.6 Frequency of visits by visitors**

Visitors who visit the heath regularly are those that live close to the heath and walk to the heath rather than those who visit by car. The most regular visitors are dog walkers with 80% of those who walk their dogs to the heath visiting at least once a day. For the survey period the weather conditions at the time of visit appeared to have no significant effect on the composition of heath users. However, because the survey does not estimate the total numbers



of visitors the attractiveness of visiting the heath under different weather conditions is not known.

## **4.2 Fires incidence data**

The fires data is a complete set of the reported heathland fires and their locations for the periods 1993 to 1998 and 2002 and 2003. There are area estimates for 203 of the 559 fires reported in 2002 and 2003.

### **4.2.1 Annual and seasonal variation in fire numbers**

The number of fires varies widely between years with both the number of summer fires and winter fires being highly variable. The number of fires recorded in the summer months however is considerably greater than in the winter.

### **4.2.2 Monthly variation in fire numbers**

Whilst there are general patterns for fire risk at certain times of the year evidence from the available data shows that April and May are the peak months for fires in most years followed by a reduction in June and July with a smaller peak in August. The 1995 summer however shows increasing numbers of fires throughout the summer. However the fire risk is dependent on the recent weather conditions and thus the situation is highly variable both between and within years. Although the summer months are when most fires occur March and October have on average more fire incidents than the other winter months. From the data used here there is no evidence for a change in the numbers or pattern of fire incidents between the 1993 to 1998 period and the years 2002 and 2003.

### **4.2.3 The daily pattern of fires**

Fires occur frequently on every day of the week both throughout the year and in the summer only. There is significant variation in the frequency of fires on different days of the week with in general fewer fires during the mid-week period between Tuesday and Thursday than over the weekend between Friday and Monday. These daily fire patterns are similar for both data sets.

### **4.2.4 The time of day that fires are reported**

The results show that fires can occur at any time of the day or night but that more than 75% of fires occur between the hours of 12:00 and 21:00. This pattern of fires is similar for both data sets and is probably linked to the optimum dryness of the vegetation, the increase in sea breezes in the afternoon and the maximum number of visitors on the heath. There are small differences in fire start times between summer and winter and days of the week. These differences are of little practical significance but reflect the generally wetter conditions in the winter and small changes in the peak visiting times of heath users. These findings suggest that it is the weather conditions and state of the vegetation that is important factor in the timing of fires with mid-afternoon the most likely time.

### **4.2.5 Fire patterns on different heaths**

The data analysis shows that there are statistically significant differences in the numbers of fires recorded on different heaths between the two surveys. However there has been no major

change in the distribution of heathland fires with those heaths that had the highest proportion of fires in the 1993 to 1998 data set still having the most fires in the 2002 and 2003 data.

#### **4.2.6 The size of fires**

The data for the size of area burnt shows that a high proportion of fires have a very small effect on the overall area of heathland and the total area of heathland that was estimated to be burnt in 2003 (101.3 ha) is very small proportion of the total area of heathland in the UHLP region. However, a large fire on a small heath could have a major ecological effect and if small fires are not dealt with promptly and remain unchecked they can result in major incidents. Summarizing the data for the six large (>1ha), fires that were recorded in 2002 and 2003 shows that they all occurred in March, April or May. However Kirby & Tantram (1999) report the peak times for large fires in January and July. Moore (1962) reported that the major heath fires in 1960 were mostly in May. The fires of 1976 were in July and August. These findings suggest that although most of the large fires occur at the peak fire times mentioned above large fires can occur at almost any time of the year.

## **5. Limitations of the data sets**

### **5.1 Questionnaire data**

The points below highlight the uncertainties that are inherent in the methodology used and in questionnaire data in general.

- The data was not collected in a systematic way therefore no estimates of the total number of visitors can be made.
- The amount of recorder effort that was made on different sites was not recorded, thus site differences may bias some of the general conclusions.
- The number of refusals to answer the questionnaire was not recorded. This may bias results if certain groups of visitors are more likely to refuse than others.
- When answering questions some interviewees will give the answer that they think the interviewer wants rather than their own opinion. This is likely to be most common when known contentious issues are concerned.

### **5.2 Fire incidence data**

These data represent an almost complete record of the total number of fires that have occurred on the heaths during the survey periods.

- The natural variation in the incidence of heath fires is likely to obscure anything other than large scale changes in the number of fire incidence and small trends in the pattern of fire numbers will only become apparent when many more years of data have been collected.
- The lack of information on the area burnt by fires means that accurate estimates of the amount of heathland vegetation lost to malicious or accidental fires cannot be made. However, it is likely that those fires that do not have area estimates are part of the group of small fires where the area of heathland burnt was of little significance.

## **6. Recommendations**

### **6.1 Visitor surveys**

The following recommendations are made to improve the quality and extent of the data that can be collected using the existing questionnaire format.

- Undertake interviews at different times of the year to include holiday and non-holiday periods, week days, weekends, bank holidays etc. This should include times when there is a high risk of fires and when wildlife disturbance such as nesting seasons are important considerations.
- Include early mornings as part of the times interviews are carried out.
- Record the amount of recorder effort used on each site.
- Note any refusals to give interviews, state reasons and assess the likely user group.

### **6.2 Other methods**

Other methods of assessing heathland usage by the public and the public perception of heathlands that can be employed include observational studies (surveillance) and mailing questionnaires.

#### **6.2.1 Observational studies**

This involves observing and recording the frequency of visits or counting the number of visitors at set periods of time and observing their behaviour. A well designed surveillance survey will:

- Allow estimates of total visitor numbers to be made.
- Provide unbiased information on visitor behaviour.

It is important to be able to quantify the intensity of use of the heaths and also to obtain some independent information on visitor behaviour to assess the validity of the questionnaire results. For example visitors may over-estimate their time of visit to the heath and an observation study at Burnham Beeches (Barnard 2003) showed that although when questioned 95% of dog owners said they cleared up their dogs faeces the observed figure was between 19% and 46%.

#### **6.2.2 Mailshot questionnaire**

Having demonstrated that almost all visitors to the heaths are resident within the 'local' Bournemouth area it is possible to do a targeted mailshot. This could be useful in providing information on the local resident's familiarity with heathlands and heathland issues and the general level of importance given to the local heath.

## 7. References

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- STRIDE, A. 2001. *Survey of heathland use: Winfrith and Sandford Heaths*. RSPB internal report.
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## Appendix 1. Survey questionnaire data description

This section details the methods of data preparation for questions 1 to 7 and the additional information obtained by the interviewers during the interview. It explains how free format answers and multiple response answers have been categorized and recorded in the database. The section also includes reference to the nature of the less common responses (usually attributed to the 'other' category) and indicates from which heath these originated as many are site specific.

### Question 1. What is your full postcode?

All 193 responses had postcodes that could be traced to a region, ie BH, DT, MK etc. There were 182 responses with local (BH, Bournemouth area) postcodes 134 had full post codes or street names from which a post code could be obtained and the straight line distance between the postcode centroid and the heath site access point was calculated to 1 m accuracy. Local (BH) postcode addresses that were greater than 8 kilometres from the access point were omitted during the data processing stage by DERC. However, for these analyses the information was recovered by estimation (100 m accuracy) from maps and an additional 11 'local' travelling distances were added to the database.

### Question 2. How did you travel here today?

The options given were: **Walk, Car, Bus, Motorcycle, Bicycle, Horse and Other**. There were 193 single answer responses to this question. The 'Other' category includes jogged, skates, scooter (all single responses from Canford heath). It should be noted that there were no responses for bus or motorcycle.

### Question 3. How long did it take you to travel here?

The options were: **less than 5 minutes, 5 to 15 minutes, 16 to 30 minutes, >30 minutes**. There were 193 single answer responses to this question.

### Question 4. How long will you spend here today?

The options were: **A few minutes, less than 30 minutes, 30 minutes to 1 hour, 1 to 1.5 hours and over 1.5 hours**. There were 193 single answer responses to this question.

### Question 5. What was your reason for visiting today?

The options were: **Walking, dog walking, jogging, mountain biking, BMX bike riding, horse riding, nature watching, hanging about and other**. There were 193 responses some of which were multiple responses. However, walking and dog walking and mountain biking and BMX bike riding were deemed to be mutually exclusive activities (ie any response that included a dog in the group has been classified as dog walking as an activity rather than just walking). The 'Other' category includes a wide range of activities. These are; Photography (Avon), inspect management (Upton), short cut (Parley, Turbary and Kinson, four responses), exercise (Town Common, Ham Common three responses), collecting plants (Talbot), Monitoring marsh gentian (Parley), quiet read (Kinson), fishing (Ham Common four responses), going to the beach (Ham Common three responses), berry picking (Canford, Bourne Bottom).

**Question 6. How often do you visit the site?**

The options were: More than once a day, Daily, More than once a week, weekly, monthly and occasionally. There were 193 single answer responses to this question.

**Question 7. Which entrance did you use today?**

Where appropriate the interviewees were asked to identify the entrance used on a map. These entrances were coded A to Z depending on the site. There were 159 responses. These data were used in conjunction with the postcode information obtained in Question 1 to estimate the distance travelled to the site.

**Additional data recorded by the interviewer during the interview were:**

**Number of people in the group** including their gender and age, in the following age ranges: under 10, 10 to 20, 21 to 30, 31 to 40, 41 to 50, 51 to 60 and 60+.

**Heath**

**Date**

**Time**

**Weather conditions:** Sunny, overcast, raining or mixed.

**Warden:** Name.

There are 193 responses for the Number of people in the group and Heath but three sets of missing data for date, time and weather conditions.



## Appendix 2. Details of statistical tests and statistical significance

This appendix gives the statistical test information that was used to answer the questions in the Results section.

### 3.1.1 The timing of visits by walkers and drivers

#### 3.1.1.1 Are there differences between the proportions of weekend and weekday visitors walking or driving to the heath?

There is no statistically significant difference in the pattern of week day and weekend usage of the heaths by either those that walk to the heath or those that drive (Chi-Square = 1.636,  $df = 1$ ,  $p = 0.201$ ).

Week day			Weekend		
Walk	Drive	% Walk	Walk	Drive	% Walk
54	30	64.3	47	39	54.7

#### 3.1.1.2 Are there differences in the time of day that visitors either walk or drive to the heath?

Data was collected between the hours of 11:00 and 20:30. There are no significant differences between the timing of visits of those who walk to the heath and those who drive during that period (Chi-Square = 14.683,  $df = 9$ ,  $p = 0.100$ ).

### 3.1.2 The age and composition of the groups that completed the questionnaire

Number in the group	Age of oldest person in the group						
	< 10	10 to 20	21 to 30	31 to 40	41 to 50	51 to 60	60+
1	3	7	7	14	25	17	29
2	0	6	5	7	11	8	11
3	0	5	3	7	2	1	3
4	0	2	0	1	2	3	4
5+	0	5	2	0	1	1	1

#### 3.1.2.2 \*Are there differences between the size of groups that walk to the heath and those who travel by car?

No, the group sizes were evenly distributed between walkers and car drivers (means 2.14 and 1.83 respectively, Chi-Square = 4.919,  $df = 4$ ,  $p = 0.296$ ).

### 3.1.2.5 Are there differences in the age range of visitors who travel to the heath by car rather than walk?

No. Having removed groups of less than 20 years old from the analysis respondents that included an older member in the group were statistically no more likely to have travelled to the site by car than younger people (Chi-Square = 4.726, df = 4,  $p = 0.317$ ).

	Age of the oldest person in the group					All ages
	21 to 30	31 to 40	41 to 50	51 to 60	60+	
Walk	8	11	25	13	29	86
Car	6	15	16	16	17	70

### 3.1.3 Access to the heaths

#### 3.1.3.2 What distance do visitors travel to the local heaths?

Using data from 'local' (BH) postcodes only there was a statistically significant difference between the distances walked and the distances driven to the heath ( $H = 76.87$ , df = 1,  $p = 0.000$  (adjusted for ties)).

#### 3.1.3.5 Does the mode of transport of visitors to the heath differ on different heaths?

The only modes of transport that had sufficient numbers of responses to be statistically tested were walking and travelling by car. There were significant differences in the relative proportions of walkers and car drivers between the sites (Chi-Square = 46.908, df = 17,  $p < 0.000$ ).

Heath	Walk	Car	Cycle	Bus	Other	Total
Avon Heath	0	2	0	0	0	2
Bourne Bottom	2	1	0	0	0	3
Canford Heath	14	10	5	0	3	32
Dewlands Common	2	0	0	0	0	2
Ferndown Common	4	8	0	0	0	12
Great Ovens	1	1	0	0	0	2
Ham Common	9	23	0	0	0	32
Kinson Common	10	3	1	0	0	14
Lions Hill	4	0	0	0	0	4
Lytchett Central	1	0	0	0	0	1
Lytchett East	4	1	0	0	0	5
Parley Common	3	3	0	1	0	7
Slop Bog	3	0	0	0	0	3
Stephens Castle	2	3	1	0	0	6
Talbot Heath	4	1	0	0	0	5
Town Common	6	6	2	0	0	14
Turbary Common	26	1	2	0	0	29
Upton Heath	9	9	1	1	0	20
All sites	104	72	12	2	3	193

### **3.1.3.6 Are there differences in the distances visitors walk to the individual heaths?**

The distances walked to different heaths did not differ significantly ( $N = 86$ ,  $H = 19.64$ ,  $df = 15$ ,  $p = 0.186$ ).

### **3.1.3.7 Are there differences in the distances visitors travel by car to the individual heaths?**

The distances travelled by car to different heaths also showed a tendency for some heaths being more attractive to visitors from further afield but the differences in this set of data were not significant ( $N = 50$ ,  $H = 18.65$ ,  $df = 11$ ,  $p = 0.068$ ).

## **3.1.4 Time spent on the heath**

### **3.1.4.1 Are there differences in the time visitors spend on different heaths?**

Overall there are differences in the time spent at the site between heaths (Chi-Square = 71.94,  $df = 51$ , Exact  $p = 0.0225$ ).

### **3.1.4.2 Are there differences in the time spent on the heath by car visitors and those who walk to the heath?**

There are no significant differences in the time spent on the heath by walkers and car drivers (Chi-Square = 3.743,  $df = 3$ ,  $p = 0.291$ ).

### **3.1.4.3 Are there differences in the time spent by those who walk to the heath on different heaths?**

There are no significant differences in the time spent on the heath by visitors who walk to different heaths (Chi-Square = 60.014,  $df = 48$ ,  $p = 0.114$ ).

### **3.1.4.4 Are there differences in the time spent on the heath by car visitors to different heaths?**

There are significant differences in the time spent on the heath by visitors who drive to different heaths (Chi-Square = 57.06,  $df = 39$ , Exact  $p = 0.0127$ ).

### **3.1.4.5 Do the weather conditions affect the length of time spent on the heath?**

There is no evidence that the length of time spent on the heath is weather dependent (Chi-Square = 0.580,  $df = 3$ ,  $p = 0.901$ ).

## **3.1.5 Reasons for visiting the heath**

### **3.1.5.1 Are there differences in the proportion of dog walkers on each heath?**

The data show significant differences between the relative numbers of dog walkers and other users of the heaths on different heaths (Chi-square = 33.363,  $df = 17$ , Exact  $p = 0.0039$ ).

**3.1.5.2 Are there differences between the relative numbers of visitors with dogs who walk to the heath and those who drive cars?**

Although it is not significant at the 95% confidence level (Chi-Square = 3.116, df = 1,  $p = 0.078$ ) the data suggests that a larger proportion of dog owners walk to the heath than drive to the heath.

Mode of transport to the heath	Visitors with no dogs	Visitors with one or more dogs
Walk	34	70
Car	33	39

**3.1.5.2 Do dog walkers walk further to the heath than other heath users?**

There is no statistical evidence for this (N = 86, H = 0.01, df = 1,  $p = 0.941$ ).

**3.1.5.3 Do dog walkers drive further to the heath than other heath users?**

Dog walkers drive significantly less distance to the heath than those drivers visiting the heath for other reasons (N = 50, H = 11.30, df = 1,  $p = 0.001$ ).

**3.1.6 Frequency of visits to the heath**

	> Once a day	Daily	> Once a week	Weekly	Monthly	Occasionally	All
Walk	30	36	20	7	3	8	104
Car	2	15	18	7	10	20	72
All	32	51	38	14	13	28	176

**3.1.6.1 Are there differences in the frequency of visits by visitors to the heath who travel by car visitors and those who walk to the heath?**

Yes, those who walk to the heath are more likely to visit more regularly than those who visit by car (Chi-Square = 37.589, df = 5,  $p = 0.000$ ).

**3.1.6.3 Are there differences in the frequency of visits by walkers who walk dogs and those who visit for other reasons?**

There are significant differences between the frequency with which dog walkers and other visitors walk to the heaths (Chi-square = 35.147, df = 5, P = 0.0000).

**3.1.6.4 Are there differences in the frequency of visits by car drivers who walk dogs and those who visit for other reasons?**

There are significant differences between the frequency with which dog walkers and other visitors drive to the heaths (Chi-square = 31.215, df = 5, P = 0.0000).

### **3.1.6.5 Is there a difference in the relative numbers of dog walkers and other users of the heath on sunny days?**

There are no significant differences in the relative numbers of dog walkers and other heath visitors between dry days (sunny and overcast) and rainy days (unsettled weather conditions) (Chi-Square = 0.617,  $df = 1$ ,  $p = 0.432$ ).

## **3.2 Fire incidence results**

### **3.2.1 Annual and seasonal data**

#### **3.2.1.1 Are there differences in the number of fires that occur annually?**

Yes, the test of the null hypothesis that there are no real differences in the underlying annual rate of occurrence of fires between years for the years between 1993 and 1998 and 2003 gives Chi-Square = 997.764,  $df = 6$ ,  $p = 0.0000$ . Removing the data for 1995 gives a similarly significant result with Chi-Square = 101.962,  $df = 5$ ,  $p = 0.0000$ .

#### **3.2.1.2 Are there differences in the numbers winter of fires between years?**

The number of fires recorded in the winter (the period outside of when temporary wardens are employed) is lower (mean 113) than the number recorded in the summer (mean 348). However, there is a great deal of variability in the total numbers of fires in the winter months. Results for the winters of 1993-1994, 1994-1995, 1995-1996, 1996-1997, 1997-1998 and 2002-2003 gives Chi-Square = 33.50,  $df = 5$ ,  $p = 0.0000$ .

#### **3.2.1.3 Are there differences in the numbers summer of fires between years?**

The number of summer fires is also very variable, results for the years 1993 to 1998, 2002 and 2003 gives Chi-Square = 1556.84,  $df = 6$ ,  $p = 0.0000$ . Removing the data for the exceptional summer of 1995 gives a similar result with Chi-Square = 233.366,  $df = 6$ ,  $p = 0.0000$ .

#### **3.2.1.4 Are there differences in the numbers of summer fires between the 1990's data and the UHLP data sets?**

Due to the small number of data points (6 in the 1990's and 2 in the UHLP) the highest level of significance that is achievable (ie both UHLP values being either higher or lower than those in the 1990's data set) is  $p = 0.0714$ . The Mann-Whitney test statistic  $W = 33.0$ ,  $n = 6$ ,  $2$ ,  $p = 0.6171$ . No significant differences between the data sets could be detected. Omitting 1995 gives similar results  $W = 21.0$ ,  $n = 5$ ,  $2$ ,  $p = 0.8465$ .

### 3.2.2 Monthly patterns of fires

The table below gives the monthly, seasonal and annual fire numbers for the years in which they were recorded.

Month	1993	1994	1995	1996	1997	1998	Average	2002	2003	Average
Jan	0	9	10	7	2	7	5.8 (5.0)	*	2	2.0
Feb	41	13	5	30	11	30	21.7 (25.0)	*	21	21.0
Mar	53	48	50	37	36	25	41.5 (39.8)	*	30	30.0
Apr	24	57	149	105	82	23	73.3 (58.2)	25	90	57.5
May	56	47	110	58	64	45	63.3 (54.0)	16	32	24.0
Jun	2	3	178	44	36	27	48.3 (22.4)	17	30	23.5
Jul	3	2	190	46	50	18	51.5 (23.8)	23	32	27.5
Aug	29	65	294	34	26	52	83.3 (41.2)	5	68	36.5
Sept	33	24	12	54	33	13	28.2 (31.4)	15	76	45.5
Oct	27	37	36	29	28	5	27.0 (25.2)	4	49	26.5
Nov	14	6	22	11	3	12	11.3 (9.2)	0	16	8.0
Dec	6	7	5	7	7	1	5.5 (5.6)	2	6	4.0
Apr to Sept	147	198	933	341	291	178	348 (231)	101	328	
Oct to March	117	115	137	96	100		113 (104)	59		59
Total	288	318	1061	462	378	258	341 (461)	*	452	

#### 3.2.2.1 Is there variation in the number of fires in different months of the year and in the monthly numbers of fires in different years?

The numbers of fires varies between months throughout the year and also there is variability in the same month between years (Chi-Square = 918.102, df = 77,  $p = 0.000$ ).

#### 3.2.2.2 Do the numbers of fires in individual months vary year-on year?

With the exception of the data collected for the numbers of fires in December all the other months vary significantly year-on-year either with or without the inclusion of 1995 data.

#### 3.2.2.3 Is there any evidence that the number of fires in any month has changed between the 1990's and 2002/03 data sets?

Knowing that the highest level of significance that is achievable is  $p = 0.0714$  (ie both UHLP values being either higher or lower than those in the 1990's data set) only the data for May fits these criteria (values in 2002 and 2003 are both lower than the 1990's data set). Thus we have one case in twelve and by chance we would expect one in fourteen. Therefore there is no significant difference in the monthly number of fires between the sets of data.

### 3.2.3 Daily pattern of fires

#### 3.2.3.1 Are there differences in the daily pattern of fires in the 1990's?

There are differences in the underlying annual rate of occurrence of fires between days of the week during the 1990s (Chi-Square = 39.9607, df = 6,  $p = 0.0000$ ).

### 3.2.3.2 Are there differences in the daily pattern of fires in the 2000's?

There are differences in the underlying annual rate of occurrence of fires between days of the week during the 2000s (Chi-Square = 18.9195, df = 6,  $p = 0.0043$ ).

### 3.2.3.3 Are there differences between the daily patterns of fires in the 1990's and the 2002/03 dataset?

The daily fire pattern for the two datasets show no significant differences (Chi-Square = 7.358, df = 6,  $p = 0.289$ ).

### 3.2.3.4 Are there differences in the daily pattern of summer fires in the 1990's?

There are differences in the underlying annual rate of occurrence of fires between days of the week during the 1990s (Chi-Square = 25.3420, df = 6,  $p = 0.0003$ ).

### 3.2.3.5 Are there differences in the daily pattern of summer fires in the 2000's?

There are differences in the underlying annual rate of occurrence of fires between days of the week during the 2000s (Chi-Square = 14.0233, df = 6,  $p = 0.0294$ ).

### 3.2.3.6 Are there differences between the daily patterns of summer fires in the 1990's and the 2002/03 dataset?

The daily fire patterns for the two datasets show no significant differences (Chi-Square = 2.756, df = 6,  $p = 0.839$ ).

## 3.2.4 Time of day that fires are reported

The table below indicates the start times of heahland fires recorded in the two recording periods.

	Time	1990s data (n=2665)		2000s data (n=533)	
		% of total	% per hour	% of total	% per hour
<b>Early morning</b>	03:00 to 07:00	2.70	0.54	3.38	0.68
<b>Morning</b>	08:00 to 11:00	8.52	2.13	9.76	2.44
<b>Lunchtime</b>	12:00 to 14:00	18.65	6.22	18.01	6.00
<b>Afternoon</b>	15:00 to 17:00	30.32	10.11	34.52	11.52
<b>Evening</b>	18:00 to 21:00	28.63	7.16	25.52	6.38
<b>Night</b>	22:00 to 02:00	11.18	2.24	8.82	1.76

### 3.2.4.1 Are there differences in the timing of fires between the 1990's data and the 2000's data?

There are no statistical differences in the start time of fires between the two data sets, ( $W = 4265173.0$ ,  $N = 2665$  &  $533$ ,  $P = 0.8976$ ).

### 3.2.4.2 Are there differences in the timing of fires between months of the year?

There are small but significant differences in the start times of fires in different months of the year ( $H = 68.15$   $df = 11$   $P = 0.000$ ).

### 3.2.4.3 Are there differences in the timing of fires between days of the week?

There are small but significant differences in the start times of fires on different days of the week ( $H = 24.05$   $df = 6$   $p = 0.001$ ).

### 3.2.4.4 Are there differences in the timing of fires between school days and school weekday holidays?

The timing of fires is similar during school days and school holidays ( $W = 41009.1$ ,  $N = 216$  &  $150$ ,  $p = 0.1666$ ). Only UHLP data was used for this analysis.

## 3.2.5 Fire patterns on different heaths

This table shows the percentage distribution of fires on different sites recorded in the two surveys. The 13 heaths used for the analyses above are shaded.

	% of all fires		% change	% of summer fires		% change
	1993/98 n = 2776	2002/03 n = 452		1993/98 n = 2088	2002/03 n = 429	
<b>Bourne Bottom</b>	25.35	32.94	+7.59	24.76	28.35	+3.59
<b>Broadmoor Copse</b>	0.00	0.24	+0.24	0.00	0.30	+0.30
<b>Canford Heath</b>	25.49	21.96	-3.53	24.86	22.56	-2.30
<b>Corfe Hills</b>	5.62	2.63	-2.99	5.32	2.44	-2.88
<b>Cranbourne Common</b>	0.36	0.24	-0.12	0.29	0.00	-0.29
<b>Dewlands</b>	1.71	2.15	+0.44	1.48	1.83	+0.35
<b>Ebblake</b>	0.07	0.48	+0.41	0.05	0.61	+0.56
<b>Ferndown Common</b>	4.41	4.06	-0.35	4.26	4.57	+0.31
<b>Hamworth Common</b>	9.31	6.68	-2.63	9.34	7.93	-1.41
<b>Horton Common</b>	0.04	0.24	+0.20	0.05	0.00	-0.05
<b>Hurn (airport)</b>	4.62	4.06	-0.56	5.46	4.57	-0.89
<b>Kinson Common</b>	11.34	10.50	-0.84	12.21	10.98	-1.23
<b>Noon Hill</b>	0.18	1.91	+1.73	0.24	2.13	+1.89
<b>Parley Common</b>	2.99	5.73	+2.74	3.16	7.01	+3.85
<b>Upton Heath</b>	6.68	5.49	-1.19	6.47	6.10	-0.37
<b>Wareham Forest</b>	1.00	0.48	-0.52	1.29	0.30	-0.99
<b>Westmoors</b>	0.85	0.24	-0.61	0.77	0.30	-0.47

### 3.2.5.1 Are there differences in the annual numbers of fires on each heath between data sets?

Using data for the 13 heaths that had at least 10 fires recorded in the 1990's data set significant differences in the numbers of fires on different heaths between the two surveys were found (Chi-Square = 33.060,  $df = 12$ ,  $p = 0.001$ ).



### **3.2.5.2 Are there differences in the numbers of summer fires on each heath between data sets?**

Using data for the 13 heaths in the analysis above significant differences in the numbers of summer fires on different heaths between the two surveys were found (Chi-Square = 24.625,  $df = 12$ ,  $p = 0.0167$ ).



## Appendix 3. Summary data for survey questions not analysed in this report

This section details the methods of data preparation for questions 9 to 22 in the same way as questions 1 to 7 were described in section 2.1.1. It explains how free format answers and multiple response answers have been categorized and recorded in the database. The description also includes reference to the nature of the less common responses (usually attributed to the ‘other’ category) and indicates from which heath these originated as many are site specific. Summary results in the form of tabulated numbers of responses are given but no detailed analysis has been done.

### Question 8.

There is no question 8 on the form used in 2003.

### Question 9. *Have you seen any of the following?*

The options were:	Responses
Footpath signs	85
Bridleway signs	64
Dog bins	140
Dog waste signs	66

There were 193 respondents some of whom gave multiple responses and some nil responses.

### Question 10. *Do you read the notices on the site?*

The options were:	Responses
Always	87
Glance/read if interested	69
Rarely/never	15
Never seen any	22

There were 193 respondents.

### Question 11. **What type of land do you think this is? (choose all that apply).**

The options were:	Responses
Common land,	57
Heathland,	132
Nature Reserve,	89
Wasteland,	6
Other.	12

There were 193 responses some of which were multiple responses.

Twelve responses were given in the ‘Other’ category. These were Woodland (Slop Bog), the local place name (Bourne Bottom), play area, (Kinson Common, Turbary Common), Council land (Turbary Common, two responses), forestry (Canford), disused clay pit or quarry (Ham

Common and Stephens castle), ‘bog, woodland and saltmarsh’(Lytchett east), pine trees (Ferndown,), and a field (Kinson Common).

**Question 12. This site is an internationally important heathland. What do you think the heath is important for? (Choose as many as you like).**

<b>The options were:</b>	<b>Responses</b>
<b>Open space for recreation</b>	59
<b>Wildlife</b>	165
<b>Picturesque</b>	40
<b>Quietness</b>	37
<b>Other</b>	11

There were 188 positive responses some of which were multiple responses and 5 nil responses.

Other descriptions were: Fishing (Ham Common), heritage site (Canford), Army Training (Canford, Ham Common), Old area (Kinson, Upton Heath), archaeology (Kinson), holiday makers (Canford), amenity area (Talbot Heath, Town Common), SSSI (Turbary Common).

**Question 13. What do you like about the heath?**

This is an open question.

<b>The responses were categorized into:</b>	<b>Description includes</b>	<b>Responses</b>
<b>Peaceful</b>	Quiet, sheltered	73
<b>Wildlife</b>		41
<b>Good paths</b>	Path network, walking	27
<b>Cycle</b>	Biking area	7
<b>Open</b>	Fresh air	48
<b>Dog walking</b>		25
<b>Views</b>	Scenery, varied, water, lakes and stream, woods, heather, some trees	50
<b>Natural</b>	Unspoilt, wilderness	13
<b>Local</b>	Easy access	23
<b>Good area</b>		19
<b>Hobbies</b>	Includes fishing, training and photography	8
<b>Play area</b>	Includes freedom, hiding, get away (from home, parents), hanging out	12
<b>Other</b>	Includes free, free parking (Ham Common), short cut (Kinson, Turbary Common), always been here (Lytchett east), should be built on (Upton).	8

There were 193 responses some of which were multiple responses.

**Question 14. The following can be seen as being damaging on the heath. Which do you think are damaging and then choose up to three that you would like to see tackled on the heath?**

<b>The options were:</b>	<b>a) Damaging</b>	<b>b) Like to see tackled</b>
<b>BMX bikes</b> (trick bikes),	70	12
<b>Den building,</b>	33	4
<b>Dog disturbance of wildlife,</b>	62	15
<b>Dog mess,</b>	117	59
<b>Fly tipping,</b>	97	35
<b>Fires,</b>	169	102
<b>Garden waste,</b>	67	11
<b>Horse riding</b> (off bridleways),	38	2
<b>Mountain bikes</b> (off bridleways),	68	13
<b>Motorbikes</b>	144	70
<b>Other.</b>	26	8

For part (a) of this question ‘Which do you think are damaging’ there were 193 positive respondents some of which gave multiple responses giving a total of 891 responses.

The ‘Other’ category includes the following activities that were seen to be damaging: Graffiti (Canford heath), smell (Canford heath), kids (Canford heath), Litter (Ferndown, Ham Common, Turbary Common, 5 responses), trees being damaged (Ferndown, Kinson, Parley, Town Common), broken glass (Ferndown, 2 responses), humans (Ferndown), dumped cars (Kinson, Lytchett east), travellers (Parley), Landrovers (Slop), sandboarding (Stephens Castle), gorse (Stephens Castle), gangs of kids/vandalism (Town Common, 3 responses), unsupportive residents (Town Common).

For part (b) of this question ‘choose up to three damaging activities that you would like to see tackled on the heath’ there were 50 nil responses and 143 positive responses some of which were multiple responses giving 331 in total.

The ‘Other’ category of activities that should be tackled includes: stopping trees being chopped down (Lytchett east, Ferndown), broken glass (Ferndown), litter (Ham Common, Turbary, 4 responses).

**Question 15. If you became aware that something that you were doing on the heath was causing damage, would you be willing to change what you do?**

This is an open question but the responses can be restricted to three types of answer as follows: Yes, No and Depends. Depends includes those who would agree to restrictions on an activity but not an outright ban and those who would agree to restrict some activities if restrictions on other activities were relaxed.

<b>Response</b>	<b>Number</b>
<b>Yes</b>	177
<b>No</b>	4
<b>Depends</b>	12

**Question 16. Is there anything you do not like on your heath?**

This is an open question. The responses were categorized as follows:

<b>Response</b>	<b>Description</b>	<b>Number</b>
<b>No</b>		82
<b>Litter.</b>	Includes broken glass, burned out cars, fly tipping and general litter	22
<b>Dog fouling</b>		30
<b>Motorbikes,</b>	Includes quad bikes	12
<b>Fires</b>		10
<b>Poorly maintained paths,</b>	Includes poor access paths, too narrow, overgrown, rutted, muddy,	15
<b>Eyesores,</b>	Includes pylons, reservoirs, houses, fences.	6
<b>Lack of management</b>	Includes dead trees, too much gorse, grass not cut, area loss	16
<b>Wildlife</b>	Includes snakes, swans, spiders, ticks, horses.	10
<b>People</b>	Includes tourists, vandals, travellers, teenagers, dodgy men	10

There were 193 positive respondents some of them gave multiple responses giving a total of 213 responses. The response ‘No’ is mutually exclusive from all the other responses.

**Question 17. Do you know of anything being done to protect your heath?**

This was an open question.

<b>The responses were categorized as follows:</b>	<b>Category includes:</b>	<b>Responses</b>
<b>Wardens</b>		31
<b>No</b>		73
<b>Yes</b>		13
<b>UHLP</b>		5
<b>HCT</b>		2
<b>DWT</b>		1
<b>Erosion mmanagement</b>		7
<b>Heather restoration</b>		4
<b>Tree/scrub clearing</b>		19
<b>Bracken spraying</b>		4
<b>Grazing</b>		3
<b>Fencing/gates</b>		10
<b>Firebreaks</b>		2
<b>Signs</b>		5
<b>Community groups</b>	Local residents, volunteers, Friends of Kinson Common & Town Common.	11
<b>Local services, includes Council and fire service.</b>		4
<b>Education in schools</b>		2
<b>Legislation</b>	Planning restrictions, bridleway restrictions, SSSI, National Park and EU conservation status.	10
<b>This questionnaire</b>		2

There were 193 responses some of them multiple. The response ‘Yes’ and ‘No’ were mutually exclusive and exclusive from all the other specific responses.

**Question 18. Is there anything that you would like to be done to improve your enjoyment of the heath?**

This was an open question.

<b>The responses were categorized as follows:</b>	<b>Responses include</b>	<b>Responses</b>
<b>Path clearance</b>	more access, better paths	27
<b>No</b>		78
<b>Litter removal</b>	all types of litter and refuse	15
<b>More dog bins</b>	, includes regular maintenance.	15
<b>More seats/benches</b>		21
<b>More wardens</b>	includes more aggressive wardening!	7
<b>More signs</b>	, includes site maps path routes and education material	14
<b>More bridleways</b>	horse riding and cycling routes	8
<b>Stop motorcycles</b>		6
<b>Stop fires</b>		6
<b>Increase management</b>	Erosion control, mowing, cutting down trees, firebreaks, more fences, more people management.	11
<b>Reduce management</b>	leave trees, less people management (access restrictions).	5
<b>Other</b>	play area (Canford, Ham Common), football pitch (Parley), bird hide (Canford, 2 responses), car parking (Ham Common 'near lake', Town Common), toilets (Kinson, Turbary), get rid of ticks (Lytchett east) and nettles (Kinson).	11

There were 193 responses some of them multiple. The response 'No' is mutually exclusive from all the other responses.

**Question 19. Do you know who manages this heath?**

The responses were recorded by the interviewer as: correct, incorrect and don't know.

	<b>Responses</b>
Correct	46
Incorrect	5
Don't know	142

There were 193 mutually exclusive responses.

**Question 20. Have you heard of any of these heathland projects?**

<b>The options were</b>	<b>Yes</b>	<b>No</b>
<b>Hardy's Egdon Heath/Tomorrow's heathland heritage</b>	28	165
<b>RSPB Dorset Heathlands Project</b>	49	144
<b>Urban Heath LIFE Project</b>	46	147

Yes/No responses were recorded for each option in all 193 interviews.

**Question 21. Would you be interested in becoming involved with helping to look after your heath?**

This was an open question.

The responses were categorized as ‘yes’, ‘no’ or ‘maybe’ single word answers as given in the table.

	<b>Responses</b>
<b>Yes</b>	52
<b>No</b>	124
<b>Maybe</b>	17

Some of the respondents gave reasons these included: under ‘yes’ 6 respondents already do help, under ‘no’ 17 said that they didn’t have enough spare time and ‘maybe’ included two responses that would help to improve cycle access.

**Question 22. Is there anything that you would like to know concerning this heath?**

This was an open question.

<b>The responses were categorized as follows:</b>	<b>Responses include</b>	<b>Responses</b>
<b>No.</b>		137
<b>General interest,</b>	Heathland walks (Ham Common)	9
<b>Planning protection,</b>	Will it be built on? (Ham Common, 3 responses, Upton)	14
<b>Ownership,</b>	Will it be sold? (Upton),	2
<b>Management,</b>	Grazing issues, (Turbery), Japanese Knotweed treatment (Turbery), why is it so overgrown (Turbery), Why cut down trees (Town Common), who is responsible (Lions Hill, Stephen’s Castle, Town Common),	18
<b>Bye-laws,</b>	re: travellers (Turbery), access for bikes and horses (Great Ovens, Town Common).	7
<b>Wildlife</b>		4
<b>History</b>		2

There were 193 single answer responses.





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