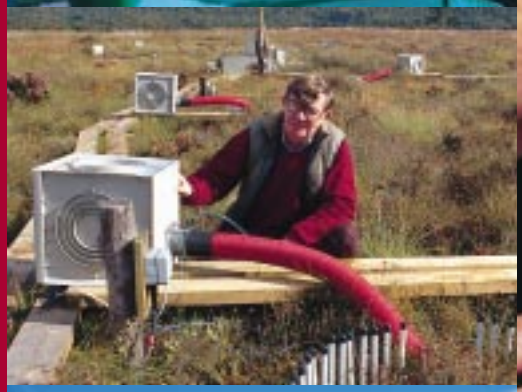
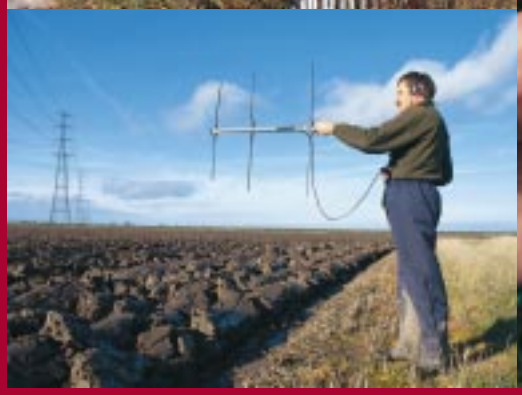
ENGLISH NATURE

Report Number
683

Visitor access patterns on the Dorset heathlands

English Nature Research Reports





working today
for nature tomorrow

English Nature Research Reports

Number 683

Visitor access patterns on the Dorset heathlands

Ralph Clarke (CEH)
Durwyn Liley (Footprint Ecology)
John Underhill-Day (RSPB)
Rob Rose (CEH)

You may reproduce as many additional copies of this report as you like for non-commercial purposes, provided such copies stipulate that copyright remains with English Nature, Northminster House, Peterborough PE1 1UA. However, if you wish to use all or part of this report for commercial purposes, including publishing, you will need to apply for a licence by contacting the Enquiry Service at the above address. Please note this report may also contain third party copyright material.

ISSN 0967-876X
© Copyright English Nature 2006

Cover note

Project officer	Nick Squirrell, Dorset Team Nick.squirrell@english-nature.org.uk
Contractors	Ralph Clarke (CEH) Durwyn Liley (Footprint Ecology) John Underhill-Day (RSPB) Rob Rose (CEH)

The views in this report are those of the author(s) and do not necessarily represent those of English Nature

This report should be cited as:
CLARKE, R., LILEY, D., UNDERHILL-DAY, J. & ROSE, R. 2005. Visitor access patterns on the Dorset heathlands. *English Nature Research Reports*, No. 683.

Acknowledgements

This project was funded by English Nature. We are grateful to Graham Bathe for supporting the project, and thanks also to Doug Kite, Andrew Nicholson & Nick Squirrell for their thoughts, ideas and useful discussion. We are also grateful to all the site managers and organisations that provided access permission and their support.

The questionnaire fieldwork was co-ordinated by Kevin Cook, and the questionnaires themselves conducted by Kevin and various others.

Summary

Visitor surveys and questionnaire studies typically focus on single sites and such studies rarely provide information that allows broad conclusions to be drawn. Only with information collected in a standard way across a range of sites can a general understanding of access patterns be achieved. Such an understanding would allow the development of predictive models of access patterns and could be useful in guiding both policy (for example in identifying sites where new housing may create bottlenecks in the numbers of visitors to sites) or land management (to inform access management plans and guide, for example, the location of car-parks or other infrastructure associated with access).

The need for this understanding is particularly crucial for lowland heathland sites. Heathland areas are granted open access within the Countryside and Rights of Way Act (2000). In addition, lowland heathland often occurs adjacent to, or close to, areas with high human populations and as such high numbers of human visitors may be expected to visit. Heathland sites are also known to support sensitive and threatened wildlife and the sites themselves are protected by both national and international law.

Here we present data collected from 20 different heathland access points across Dorset. The range of access points included both urban and more rural heaths and included ones with and without parking facilities. At each point similar periods (one weekend and one week day) of surveys were conducted. These surveys involved asking all people leaving the site a number of simple questions, including which postcode they had travelled from, where they had been and why they were visiting the heath. Surveys were conducted for identical time periods (16 hours total) at all sites.

A total of 632 people were interviewed using the questionnaire. Nearly two-thirds (64%) of people interviewed were visiting the heath on their own, but they formed only 41% of all visitors to the heath. Average usage (total number of visitors) at the weekend compared to weekdays was about the same or only slightly higher. The relative usage of the heaths during different periods of the day varied between access points. The mid-morning period (10-12am) had the most recorded visitors overall; it was also the period with the highest (or joint highest) visitor rates for nine of the 20 access points.

More than half (59%) of all people arrived at access points by car and a further 36% arrived by foot. Relative use of cars compared to arriving on foot varied enormously between access points. This was because sites varied in both the car-parking provision (which ranged from large car-parks to no parking provision) and in the number of people living within walking distance of the site. Where car-parking was provided, 85% came by car/van; otherwise 23% came by car/van and managed to find somewhere to park nearby.

Of the 59% of visitors who arrived by car, none had driven less than 300m, 8% came from within 1km of the access point and 31% came from within 2km. Half the people coming by car lived an estimated 3.7km away. Of the people who walked to the site, 75% had walked less than 500m to reach the heath, and 89% had walked less than 1km.

There were no statistically significant correlations between either the total number of visitors, or visitor groups, and the number of houses within any fixed distance up to 10 km. There were no statistically significant correlations between either number of visitor groups or total

number of visitors and the size of the heath in terms of either the length of perimeter or area which was deemed visitable heathland.

The proportion of people living at a certain distance that actually visit the heath (travelling either by car or on foot) clearly declined with distance away from the access point. By plotting this decline a method is presented which will allow predictions to be made of visitor numbers at alternative sites. Such an approach could also be used to predict visitor numbers as a consequence of changes in the amount of housing surrounding a heathland – for example from new development.

Both the distance travelled on the heath and the penetration distance (distance out onto the heath) are related to the area of the heath. Neither the average distance walked on a heath or the penetration distances were correlated with the presence of parking facilities at the access points, so although heaths with parking attract more people arriving by car, such people do not walk any less or further than other visitors once at the heath. Follow-up statistical tests found no consistent differences in the average distance walked or penetrated onto a heath between those who walked to the heath and those who came by car/van.

Eighty percent of the 632 people interviewed in total were mainly using the heaths to walk their dog(s). There was no significant difference in the proportion of visitors coming to walk their dog when comparing sites with and without car-parking. Overall, 90-94% of the 741 dogs with the questioned people were not on a lead while on the heaths. The average total distance walked by dog-walkers was 2181m, with an average penetration distance onto the heath of 698m. 83% of dog walkers did not penetrate further than 1km onto the heath.

Contents

Acknowledgements
Summary

1 Introduction....11

2 Methods....12

2.1 Selection of sample survey heathland access points....12
2.2 Balancing the timing of surveying usage of heaths and access points....14
2.3 Field questionnaire....14
2.4 Calculation of population living within the heath access point catchment....15

3 Results....15

3.1 Time of year when people visit most....15
3.2 Size of visitor group and total number of visitors....15
3.3 Adults or children....16
3.4 Usage during different periods of the day or week....16
3.5 Reason for visiting the heath....18
3.6 Mode of transport to heath access point and dependence on parking facilities....19
3.7 Dog walkers and parking facilities....20
3.8 People wandering off the main heath tracks and paths....20
3.9 Behaviour of dogs and dog-walkers....20
3.10 Distances travelled to each heath access point....22
3.11 Factors influencing the number of people accessing each heath....25
3.12 Visitor numbers and parking....26
3.13 Visitor numbers and the size of heath....26
3.14 Visitor numbers and housing density within fixed distances....27
3.15 Distances and route travelled on each heath access point....31

4 Discussion....33

4.1 Towards an access management toolkit for lowland heathlands?....33
4.2 Why is there variation between sites in the proportion of people living close by that visit them?....35
4.3 Further steps?....35

5 References....36

Appendix 1 The questionnaire....39

Appendix 2 Access points from which visitors travelled....41

Appendix 3 Maps of routes taken on individual sites....43

Research Information Note

1 Introduction

A number of studies have noted the impacts which have resulted from access by people and their pets onto lowland heaths and the perception by a substantial proportion of the public is that heaths are open spaces for recreation and amenity (RSPB 1988, de Molenaar 1998, Atlantic Consultants 1996, 2003, Haskins 2000, Underhill-Day 2005). These pressures are particularly noticeable on those heaths adjoining urban and suburban residential areas (Haskins 2000), but the implementation of the Countryside and Rights of Way Act 2000, which has given a legal right of access to most heathlands, brings the issue of the impacts of public access to sensitive wildlife sites into sharp focus.

The south east corner of the county of Dorset holds some 17% of the UK lowland heathland, of which over 90% has been designated Sites of Special Scientific Interest (Michael 1996). Over 7950ha of the Dorset heathland has been designated as Special Areas of Conservation and nearly 8170 ha classified as a Special Protection Area under the EC Birds and Habitats Directives. Within the same area of south east Dorset there is also one of the largest conurbations in the south west of England, Bournemouth and Poole, with a population of over 300,000, as well as 4.5 million tourists visiting the Isle of Purbeck annually. This generates considerable pressures on the nearby heaths from both residents and visitors. This pressure varies between the more rural heaths and those located close to the residential areas. This gradient of urban pressure has been quantified by calculating the area of housing and the actual number of residential properties surrounding each heathland site (Liley & Clarke 2003).

Public access to lowland heathland has been found to lead to an increase in wild fires, the introduction of alien plants and animals, the deposition of nutrients, loss of vegetation and soil erosion and disturbance by humans and their pets, all of which can harm the flora and fauna (eg de Molinaar 1998, Haskins 2000, Underhill-Day 2005).

Several recent studies have been commissioned by English Nature to investigate the disturbance effects of people and their pets on three of the rarer characteristic breeding birds of lowland heaths, the nightjar, woodlark and Dartford warbler. All have identified disturbance effects to breeding populations ranging from changes in their settlement patterns and lowered nesting densities, to reduced productivity and changes in the timing of nesting (Liley & Clarke 2002, Liley & Clarke 2003,Taylor 2002, Murison 2002, Mallord 2005).

A number of surveys of heathland visitors have been conducted during recent years and have investigated, inter alia, their origins, their reasons for visiting, how often they come and how long they stay. Most of these studies have sampled single sites and do not therefore have rigorously tested wider application, or, where a number of sites have been covered, they have been conducted in a non-random and restricted way (LMRU 1996, Stride 2001, RSPB 2001, MORI 2004, Rose & Clarke 2005).

Despite these problems a number of general conclusions can be drawn about visitor patterns to lowland heaths in southern England:

- The heaths people visit, their main activities following their arrival, and often, how long they stay, are heavily influenced by their mode of travel, whether on foot or by vehicle

- At all sites examined, there is an overwhelming majority of dog walkers over other users.
- The spatial pattern of use by visitors is largely determined by the location, type and size of access points and the network of paths and tracks on site
- There are differences in the reasons for visiting, frequency of visit and length of stay between residents and tourists visiting heaths
- There are many similarities between the visiting patterns at heaths of similar character, even when these are in different areas.

It is also apparent from a number of the surveys that most visitors keep to the paths, and almost none of them keep their dogs on leads, so that disturbance away from paths is more likely to be from the dogs than their owners.

Given the undoubted effect that public access has on the internationally recognised heathland habitat and its wildlife, and our incomplete knowledge of the behaviour of the people who visit, it seemed appropriate to try and obtain a better understanding of public visiting both to and on this important biotope.

In view of the wealth of existing data and the body of recent research in Dorset, it was decided that this study should also be carried out on the Dorset heaths. Supported by funding from English Nature, this survey therefore set out to investigate visitor behaviour through systematic sampling in a way which would:

1. allow conclusions to be drawn on the types of visitor and patterns of visitor use on the Dorset heaths generally within statistical confidence limits
2. determine the catchment areas from which visitors travel to particular types of access point
3. enable accurate estimates to be made of the distances and routes travelled by people from different user groups
4. permit predictions to be made on patterns of access through the preparation of a model which includes these data

2 Methods

2.1 Selection of sample survey heathland access points

Twenty access points onto heathlands were selected, all on different heathland sites. The access points were carefully selected to provide a balance and range of urban and rural heaths. Ten access points had car parking either at or immediately adjacent to the heathland entrance, ranging from actual car-parks to lay-bys to wide verges where parking is allowed. The remaining ten points were, for example, paths starting adjacent to housing estates, where parking is available on surrounding streets. The access points selected are given in Table 1 and their locations shown in Figure 1.

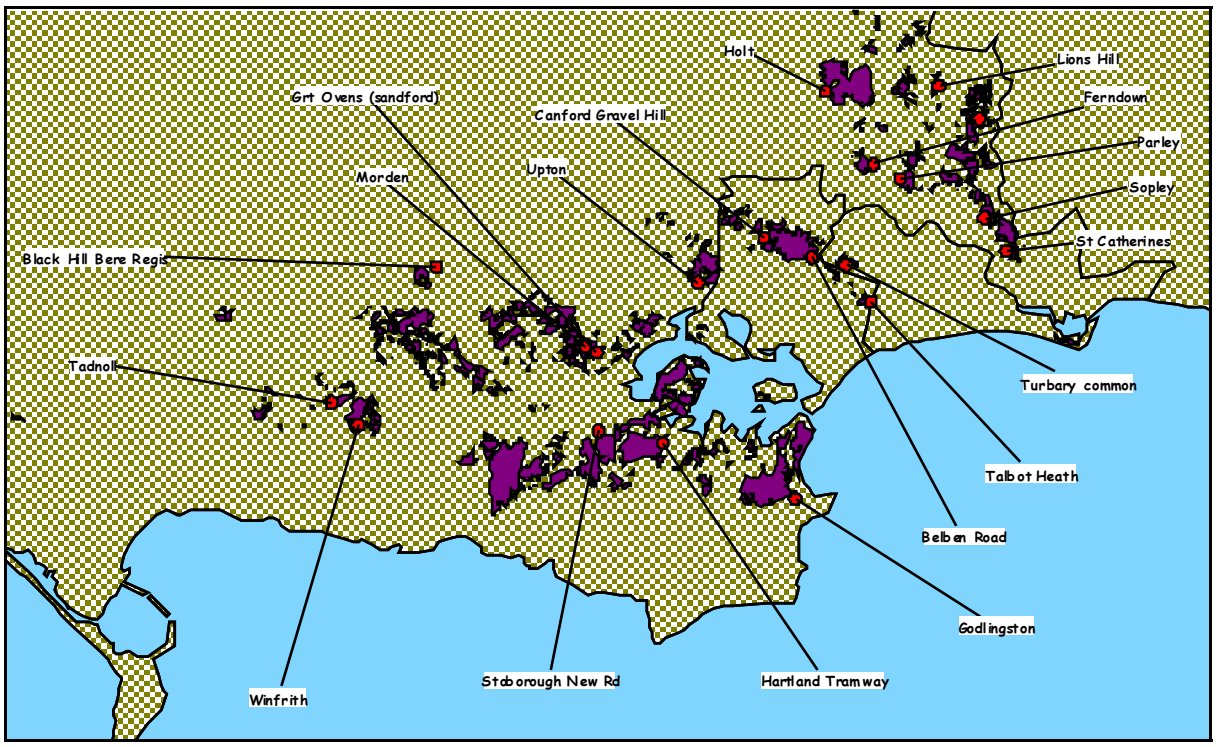


Figure 1 Location of access points (red dots) used in this study and extent of existing heathland in Dorset (purple)

Table 1 Access points included in this study

Parking	Access point	Name of heath	Approximate 'visitable area' of heath (ha)[1]	Description of access point
+	Avon Heath S. Park	Avon Heath	144	Car-park with numerous tracks and paths entering heath
	Belben Road	Canford Heath	331	Path from road in housing estate
	Black Hill Bere Regis	Black Hill	136	Public footpath at edge of village
+	Canford Gravel Hill	Canford Heath	331	Large lay-by
	Ferndown	Ferndown	121	Public footpath from road in housing estate
	Godlingston	Godlingston	428	Public footpath at edge of Studland village
	Grt Ovens (sandford)	Great Ovens	253	Foot access from road in housing estate
+	Hartland Tramway	Hartland Moor	337	Track onto heath from lane with wide verges for parking
+	Holt	Holt Heath	502	Car-park with numerous tracks and paths entering heath and forestry
	Lions Hill	Lions Hill	29	Path from road in housing estate
+	Morden	Great Ovens / Morden Bog	1273	Small car-park with tracks onto heath either side of road

[1] "visitable area" is the total area at the site available for people to walk / cycle etc.

Parking	Access point	Name of heath	Approximate 'visitable area' of heath (ha)[1]	Description of access point
+	Parley	West Parley	184	Public footpath from road in housing estate
+	Sopley	Sopley Common & Ramsdown	72	Car-park with numerous tracks and paths entering heath and forestry
	St Catherines	St Catherines / Town Common	175	Path from road in housing estate
	Stoborough New Rd	Stoborough / Hartland Moor	97	Footpath onto heath and gate onto grassland fields (open access). Small lay-by on lane for parking.
+	Tadnoll	Tadoll Heath	26	Roadside parking and track onto heath.
+	Talbot Heath	Talbot Heath	43	Public footpath from edge of housing
	Turbary common	Turbary Common	39	Track starting end of road
	Upton	Upton Heath	216	Footpath at footbridge crossing dual carriageway and providing access from housing onto heath
+	Winfrith	Winfrith Heath	145	Roadside parking and track onto heath.

2.2 Balancing the timing of surveying usage of heaths and access points

The period of the day and week are likely to influence both the rate and type of heathland usage by visitors. Therefore great care was taken to ensure that the usage of each heath access point was assessed in a statistically balanced manner. Each access point was surveyed for a total of eight two-hour periods, split into four periods during the weekend (Saturday-Sunday) and four periods during week-days (Monday-Friday). Within both weekend and weekday visits, each access point was surveyed during each of the following periods within a day: 7-9am, 10-12am, 1-3pm and 5-7pm.

The questionnaire sample survey was carried out on 34 days within the period from August 10 to October 9 2004. A total of 632 people were interviewed using the questionnaire.

2.3 Field questionnaire

During a two-hour survey period, all visitors leaving the access point were counted and asked to fill in a brief questionnaire (Appendix 1). The questionnaire was designed to be simple and brief so as to maximise the participation and cooperation of those leaving the heath access point who were often using the heaths in a regular routine with little current time to spare. When interviewing a heath visitor using the questionnaire, the total number of people (adults and children separately) walking with them in their group/party was recorded, but only one person was interviewed per group. Interviewees were asked for their home postcode to enable us to determine how far they had come, how they had travelled to the heath, their reasons for coming, their frequency of visiting, identifying the route taken on the heath via a site map. Additional information was collected from people who were walking one or more dogs.

1. Number of people (adults and children) in the party.
2. Whether the person interviewed visits more often at different times of year.
3. From which postcode did they travel to reach the site.

4. The form of transport used to reach the site.
5. Whether they entered the heath from a different access point.
6. The route taken on the heath.
7. The main purpose of the visit.
8. The number of dogs, if any.
9. If walking dogs whether they were let off the lead.
10. Whether the route taken was following tracks / paths or was cutting across the heath.
11. Whether the dog(s), if present, strayed off the path.

2.4 Calculation of population living within the heath access point catchment

The questionnaire results will indicate the total distance and the mean distance people travel to a given type of access point. A national postcode database containing the geographic location and the number of residential dwellings (ie houses) within each postcode area was used within a GIS system to determine the number of houses within each of a range of distances from each access point (see Liley & Clarke 2003 for further details of the postcode database).

3 Results

3.1 Time of year when people visit most

Although all of the people were questioned during the period from mid August to mid October 2004, they were asked in which season they most often visited the heath. Overall, 92% of all of the people interviewed said they visited the heath 'all year round' and this was the true for at least two-thirds (minimum 67%) of the people interviewed at every heath access point. Five percent of all people said they mostly visited during the summer; the only noticeable exception was Hartland tramway for which 5 (18%) of the 28 people interviewed said they most often walked along during the winter. As such a high proportion of the people interviewed visited throughout the year, any seasonal patterns were not analysed further.

3.2 Size of visitor group and total number of visitors

A total of 632 people were interviewed using the questionnaire. Nearly two-thirds (64%) of people interviewed were visiting the heath on their own, but they formed only 41% of all visitors to the heath (Table 2).

Table 2 Group size by site. + Denotes sites with parking

	No. of visitors in group						Total number of visitors
Heath access point	**1**	**2**	**3**	**4**	**Over 4 (number in brackets)**	**Total no. of Groups**	
Avon Heath south park +	54	22	1	2	(5)(5)	81	119
Belben Road	12	4	1	0	0	17	23
Black Hill Bere Regis	5	3	0	0	0	8	11
Canford Gravel Hill +	22	15	4	0	0	41	64

Heath access point	No. of visitors in group						Total number of visitors
	1	2	3	4	Over 4 (number in brackets)	Total no. of Groups	
Ferndown	20	2	0	0	0	22	24
Godlingston	2	7	1	0	(6) (12)	12	37
Great Ovens Sandford	20	4	1	0	0	25	31
Hartland Tramway +	8	18	1	0	(7)	28	54
Holt +	20	15	2	1	(27)	39	87
Lions Hill	14	4	1	0	0	19	25
Morden +	16	8	4	1	0	29	48
Parley +	39	10	0	1	0	50	63
Sopley +	18	13	3	0	(6) (7)	36	66
St Catherines	32	14	2	2	0	50	74
Stoborough New Rd	17	5	1	1	0	24	34
Tadnoll +	9	13	2	2	0	26	49
Talbot Heath +	13	2	1	1	0	17	24
Turbary common	26	11	0	2	0	39	56
Upton	44	3	2	0	0	49	56
Winfrith +	13	6	1	0	0	20	28
Number of groups	404	179	28	13	8	632	
% of all groups	64%	28%	5%	2%	1%	100%	
Number of visitors	404	358	84	52	75		973
% of all visitors	41%	37%	9%	5%	8%		100%

A further 37% of visitors were with one other person; and 9% of visitors were in groups of three. Only eight people questioned (<1%) were in a group of more than four people with one exceptionally large group of 27 runners from Poole running club on their annual run one Saturday afternoon on Holt heath, but these eight groups constituted 8% of all visitors. The total number of people in groups interviewed across all sites was 973.

3.3 Adults or children

Although the age or age class of people was not recorded, the number of children (under 16 year olds) in each group was recorded. Overall, children comprised only 9% of the all the people recorded visiting the heaths; the percentage of children was never more than 17% (at Sopley) and no children were in the groups interviewed visiting Black Hill, Ferndown, Great Ovens or Winfrith. Hereafter analyses are based on the total number of people recorded at each heath access point, regardless of whether they were adults or children.

3.4 Usage during different periods of the day or week

The survey was designed to ensure that an equal amount of time was spent recording the number of people using each heath access point during each part of the day. Because it was expected that heathland usage might be different on Saturday and Sunday than on weekdays, a decision was made to spend the same amount of time surveying usage at the weekend as

during the weekdays. The percentage of all people using each heath access point who were recorded during the weekend is given in Table 3.

If weekend usage per day was no greater than the average daily usage during the weekdays, then one would expect roughly half of the total number of observed visitors to be recorded over the weekend. A Chi-square test of the null hypothesis of equal daily rates of usage at the weekend as on week-days, for each access point separately, was only statistically significant ($p < 0.05$) for the combined data and for Godlingston, Sopley, Tadnoll and Holt. However, Holt involves the very large group of weekend runners- highlighting the lack of independence in visitor counts. Therefore the analysis was repeated using the percentage of people interviewed (ie only one person per visitor group) who visited at the weekend; weekend use was only statistically significantly greater than 50% for the Holt access point and for the overall analysis of all points combined (percentages in brackets in Table 3). The conclusion is that average usage at the weekend is slightly higher on weekends.

The relative usage of the heaths during different periods of the day varied between heath access points (Table 3). However, the mid-morning period 10-12am had the most recorded visitors overall; it was also the period with the highest (or joint highest) visitor rates for nine of the 20 heath access points (highlighted in bold in Table 3).

Table 3 Percentage of people recorded visiting each heath access point during different periods of the day and week; highest percentages during day highlighted in bold; percentages in brackets are based on the interviewed people only

	Percentage of people visiting during period						Total number of visitors
Heath access point	week-end		7-9am	10-12am	1-3pm	5-7pm	
Avon Heath south park +	57	(53)	18	**44**	19	19	119
Belben Road	48	(47)	**30**	**30**	17	22	23
Black Hill Bere Regis	73	(75)	**55**	18	18	9	11
Canford Gravel Hill +	61	(56)	13	25	**31**	**31**	64
Ferndown	42	(41)	29	**38**	13	21	24
Godlingston	73	(58)	0	24	**76**	0	37
Great Ovens Sandford	58	(56)	**29**	23	23	26	31
Hartland Tramway +	57	(64)	4	**41**	30	26	54
Holt +	85	(79)	7	32	**47**	14	87
Lions Hill	68	(63)	16	**32**	**32**	20	25
Morden +	48	(52)	10	27	17	**46**	48
Parley +	59	(60)	17	29	21	**33**	63
Sopley +	62	(56)	20	14	**41**	26	66
St Catherines	51	(52)	16	**32**	**32**	19	74
Stoborough New Rd	56	(67)	15	18	12	**56**	34
Tadnoll +	69	(65)	6	**53**	14	27	49
Talbot Heath +	42	(41)	17	**42**	8	33	24
Turbary common	45	(36)	23	**41**	13	23	56
Upton	59	(53)	**41**	18	18	23	56
Winfrith +	54	(50)	**36**	14	18	32	28
Overall	59	(56)	17	**31**	27	25	973

3.5 Reason for visiting the heath

All of the people interviewed were asked what their principle reason was for visiting the heath that day (Table 4). Eighty percent of the 632 people interviewed in total were mainly using the heaths to walk their dog(s); such people are hereafter referred to as the 'dog walkers'.

Ten percent of all those interviewed said their main reason for being on the heath was just to walk. Of the remaining 10%, 2% had been jogging, 2% had been cycling and 1% had been horse-riding on the heath; the principal reason for visiting the heath for the 'others' was very varied ranging from bird watching (5 people) to using it as a short-cut to get to/from the shops (8 people) or work (4 people), to collecting heather flowers, flying a kite and even 'planting a tree'!

Table 4 Total number of people interviewed at each heath access point, classified by their principle reason for visiting the heath

		Principle reason for visiting								
Heath access point	**car park**	**dog walking**	**walking**	**jogging**	**cycling**	**horse riding**	**picnic**	**other**	**total**	**% dog walking**
Avon Heath south park	+	80	1	0	0	0	0	0	81	99
Belben Road		14	3	0	0	0	0	0	17	82
Black Hill Bere Regis		6	2	0	0	0	0	0	8	75
Canford Gravel Hill	+	39	1	0	1	0	0	0	41	95
Ferndown		19	1	0	0	0	0	2	22	86
Godlingston		3	8	0	0	1	0	0	12	25
Great Ovens Sandford		20	3	2	0	0	0	0	25	80
Hartland Tramway	+	10	12	1	0	0	0	5	28	36
Holt	+	33	1	1	0	3	1	0	39	85
Lions Hill		17	0	0	0	0	0	2	19	89
Morden	+	17	2	3	5	0	0	2	29	59
Parley	+	45	3	1	0	1	0	0	50	90
Sopley	+	31	3	1	0	0	0	1	36	86
St Catherines		45	4	1	0	0	0	0	50	90
Stoborough New Rd		15	4	0	0	1	0	4	24	63
Tadnoll	+	24	2	0	0	0	0	0	26	92
Talbot Heath	+	15	1	0	1	0	0	0	17	88
Turbary common		14	7	0	1	0	0	17	39	36
Upton		40	1	1	5	0	0	2	49	82
Winfrith	+	17	2	0	0	1	0	0	20	85
Total number		504	61	11	13	7	1	35	632	80
%		79.7	9.7	1.7	2.1	1.1	0.2	5.5		

People were also asked if they had a secondary reason for visiting the heath. Bird-watching was given as the secondary (or principal) reason for using the Hartland tramway access for 13 of the 36 people interviewed, but very rarely for any other heath. Nearly three-quarters (73%) of dog-walkers said walking their dog was the only reason they were visiting the heath, while nearly all of the rest said they also came for the walk. This suggests that if alternative locations were used by dog-walkers then current overall visit rates might be reduced, perhaps by up to 60% (ie by three quarters of 80%).

3.6 Mode of transport to heath access point and dependence on parking facilities

Over all 20 heath access points together, more than half (59%) of all the people arrived at the heath by car and a further 36% arrived on foot (Table 5). However, relative use of cars compared to arriving on foot varied enormously between heath access points. No one came by car and practically all people walked to the Belben Road, Black Hill, and Great Ovens Sandford heath access points, whereas over 85% of people came by car to the Avon Heath south park, Canford Gravel Hill, Hartland tramway, Sopley and Tadnoll heath access points.

Parking facilities varied between points, with some having designated parking facilities and others having ad hoc parking nearby (Table 6); in general, where parking facilities were available 85% came by car/van; otherwise only 23% came by car/van and managed to find somewhere to park nearby.

Table 5 Numbers (and percentages in brackets) of people interviewed using each form of transport to get to/from each heath access point

Heath access point	with car park	Form of transport							Total people
		car	van	%car/van	foot		cycle	horse	
Avon Heath south park	+	80	0	(99)	1	(1)	0	0	81
Belben Road		0	0	(0)	17	(100)	0	0	17
Black Hill Bere Regis		0	0	(0)	8	(100)	0	0	8
Canford Gravel Hill	+	36	3	(95)	0	(0)	2	0	41
Ferndown		0	1	(5)	20	(91)	1	0	22
Godlingston		6	0	(50)	5	(42)	0	1	12
Great Ovens Sandford		0	0	(0)	23	(92)	2	0	25
Hartland Tramway	+	25	1	(93)	1	(4)	1	0	28
Holt	+	34	1	(90)	0	(0)	0	4	39
Lions Hill		2	0	(11)	17	(89)	0	0	19
Morden	+	20	3	(79)	1	(3)	4	1	29
Parley	+	30	0	(60)	18	(36)	0	2	50
Sopley	+	34	1	(97)	1	(3)	0	0	36
St Catherines		35	0	(70)	15	(30)	0	0	50
Stoborough New Rd		5	0	(21)	18	(75)	0	1	24

Heath access point	with car park	Form of transport							Total people
		car	van	%car/van	foot		cycle	horse	
Tadnoll	+	23	1	(92)	2	(8)	0	0	26
Talbot Heath	+	5	0	(29)	11	(65)	1	0	17
Turbary common		3	0	(8)	29	(74)	7	0	39
Upton		8	0	(16)	35	(71)	6	0	49
Winfrith	+	13	1	(70)	5	(25)	0	1	20
Overall		359	12	(59)	227	(36)	24	10	632

Table 6 Percentage of all people interviewed who arrived by car or by foot to access points with and without parking facilities. Range of percentages for individual access points given in brackets

	Percentage arriving by:		total number of people
	car/van	on foot	
parking facilities	85% (29-99)	11% (0-65)	367
no parking facilities	23% (0-70)	71% (30-100)	265
total number	359	227	632

Of those few people who did not get to the access points either by car/van or on foot, 10 people arrived by horse (notably four people to Holt including one by pony and trap); while 24 arrived by bicycle, including 7 cyclists to and on Turbary common (Table 5).

3.7 Dog walkers and parking facilities

Overall, the percentage of dog-walkers was higher at access points with parking facilities (85%) than at those points without parking facilities (74%), but the differences were not consistent across heaths (range 36-99% dog-walkers on heaths with parking, 25-90% on heaths without parking; see Table 4). Consequently neither a Student's t test or a non-parametric Mann-Whitney test found any statistically significant differences between heath access points with and without parking facilities in the average or median percentage of visitors who were walking their dogs (test $p = 0.27$ and 0.10 respectively).

3.8 People wandering off the main heath tracks and paths

People were asked whether or not they had stayed on the main tracks and path while on the heath. Overall, only 17% said they wandered off the main tracks and paths (Table 7). The heath access points from which the highest percentages of people went off the main tracks were Great Ovens Sandford, St Catherines and Winfrith.

3.9 Behaviour of dogs and dog-walkers

Dog-walkers were asked if they kept all, some or none of their dogs on a lead while on the heath. Nearly ninety percent said they let all of their dogs off the lead while on the heath, including the two people with four or more dogs. Only 8% said they kept all of their dogs on a lead.

Overall, 90-94% of the 741 dogs with the questioned people were not on a lead while on the heaths. The only noticeable exceptions were at Ferndown and Talbot Heath where 9 of the 20

dogs and 7 of 20 dogs respectively (all groups of 1-2 dogs) were said to have been kept on leads.

Dog walkers were also asked whether or not they and/or their dogs stayed on the main tracks and paths across the heath (Table 7). Overall, 82% of the 417 dog walkers who replied said they stayed on the main tracks. However, in one-third of these cases, their dogs wandered off the tracks. Nearly always when people went off the tracks so did their dogs. Overall, nearly half (47%) of all dogs went off the main tracks and paths on the heath (Table 7). The heaths with the highest amounts of off-track use by dogs were Godlingston (three dogs only) and Stoborough (76% of 17 dog-walkers).

Of the 509 of the interviewed people with dogs, 65% had one dog, 29% had two, 4% had three, 2% had four or more including two individuals exercising seven and nine dogs (Table **8**). There is some evidence that dog-walkers with more than two dogs are more likely to let them wander off the main tracks and both large groups of dogs were allowed off their leads to wander off the main tracks (Table 8).

In summary, although over 80% of people keep to the main tracks, roughly half of all dogs wander off the main tracks.

Table 7 Percentage of visitor groups and/or their dogs who went off the main heath tracks

	all *n* groups		all *n* dogs		% of all groups with dogs			
					people off track		people on track	
Heath access point	**% off tracks**	***n***	**% dogs off tracks**	***n***	**dogs off**	**dogs on**	**dogs off**	**dogs on**
Avon Heath south park +	14	80	54	76	14	0	40	46
Belben Road	0	17	29	14	0	0	29	71
Black Hill Bere Regis	13	8	50	6	17	0	33	50
Canford Gravel Hill +	20	41	62	37	22	0	40	38
Ferndown	27	22	45	11	9	0	36	55
Godlingston	8	12	100	3	0	0	100	0
Great Ovens Sandford	36	25	55	20	35	0	20	45
Hartland Tramway +	19	26	45	11	36	0	9	55
Holt +	5	37	31	29	7	0	24	69
Lions Hill	11	19	57	7	29	0	28	43
Morden +	17	29	44	18	11	0	33	56
Parley +	2	50	35	17	0	0	35	65
Sopley +	22	36	41	32	19	0	22	59
St Catherines	31	49	53	45	22	9	31	38
Stoborough New Rd	25	24	76	17	24	6	53	18
Tadnoll +	8	26	25	24	8	0	17	75
Talbot Heath +	24	17	13	8	0	0	13	88
Turbary common	13	39	50	6	50	0	0	50
Upton	9	45	25	20	10	0	15	75
Winfrith +	40	20	63	16	38	0	25	38
Overall	17%	622	47%	417	17%	1%	30%	52%

Table 8 Number of dogs in each visitor group and the percentage which went off the main tracks

	Number of dogs in group					
	1	**2**	**3**	**4**	**>4**	**Total**
number of groups	329	147	22	11	2	509
% of all the groups with dogs	65%	29%	4%	2%	<1%	100%
total numbers of dogs	329	294	66	36	16	741
% of all dogs	44%	40%	9%	5%	2%	100%
% of dogs going off tracks	46%	45%	72%	56%	100%	50%

3.10 Distances travelled to each heath access point

Each interviewed visitor was asked for their home postcode. A Geographic Information System (GIS) with the geographic locations of all postcodes was then used to estimate the straight line distance from the person's home to the heath access point. This approach provided a good approximation of the distribution and range of distances people travel to each access point. Any distances greater than 10 km were classed as '>10km'. In total 427 of the 632 people interviewed gave full valid postcodes from which the distance to the access point could be calculated. Half of the remaining people would only give the first four characters (eg BH20) of their postcode, referred to as the postcode stem. Where the range of recorded distances for all visitors to a particular access point from places with the same post code stem was relatively small, the missing distances from the same stem postcode to the same heath were set to the median of the observed distances. However, this infilling of numerous missing values made very little difference to the distribution of distances travelled to any of the access points. Therefore all subsequent analyses and statistics are based solely on the estimated distances to the access points from the full valid postcodes only. (Figure 2, Table 9).

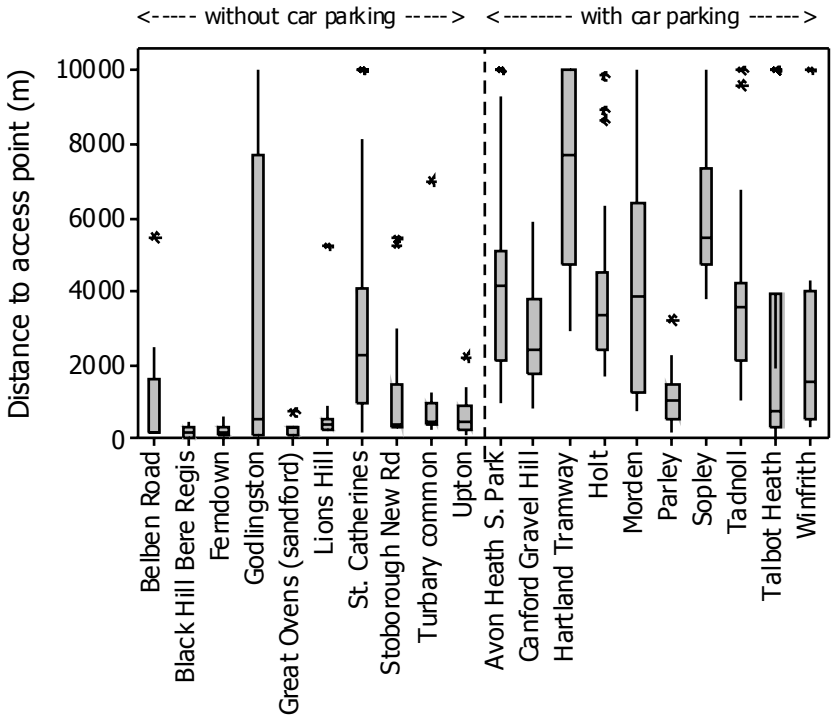


Figure 2 Boxplots of the distribution of distances people travelled to each heath access point. Box denotes inter-quartile (25-75 percentile) range; horizontal line denotes median and * denotes individual high values.

The boxplot distributions of distances for Godlingston in Figure 2 could be slightly misleading in that it is based on the known travelling distances of only four visitors who distances from home to the access point were 64m, 130m, 880m and >10km; other access points are based on more information.

Table 9 Median and range of distances (m) travelled to each heath access point with^{+} and without parking facilities for the groups of visitors providing full valid home postcodes.

Heath access point	car park	groups(*n*)	median (m)	min (m)	max (m)
Belben Road		11	158	158	5471
Black Hill Bere Regis		7	180	44	460
Ferndown		13	185	74	572
Godlingston		4	509	64	>10000
Great Ovens Sandford		19	268	118	734
Lions Hill		17	371	201	5219
St Catherines		42	2257	181	>10000
Stoborough New Rd		22	398	330	5431
Turbary common		17	464	254	6986
Upton		29	436	109	2189
Avon Heath south park	+	61	4113	960	>10000
Canford Gravel Hill	+	29	2362	780	5925
Hartland Tramway	+	25	7706	2906	>10000
Holt	+	23	3343	1671	9831
Morden	+	18	3859	756	>10000
Parley	+	22	1066	130	3242

Heath access point	car park	groups(*n*)	median (m)	min (m)	max (m)
Sopley	+	24	5440	3744	>10000
Tadnoll	+	23	3553	1073	>10000
Talbot Heath	+	10	747	38	>10000
Winfrith	+	11	1527	323	>10000
Access points	- without parking	181	398	44	>10000
	- with parking +	246	3750	38	>10000
Overall		427	1827	38	>10000

It is immediately apparent that the typical distance that people have travelled to a heath, or more specifically, a heath access point, is much greater if the access point has adjacent parking facilities. Without parking facilities, the median distance travelled to the access points is only about 400m, whereas the overall median distance travelled to the heath access points with parking is nearly 4km (Table 9).

This is related to the fact that 85% of the visitors to access points with parking come by car/van whereas without parking the majority (71%) of visitors come on foot (Table 6). The distance people walk to a heath is generally much less than the distance they drive by car/van (Table 9, Figure 3). Three-quarters of the people who came on foot lived and travelled less than 500m away, whereas only 2% of people arriving by car/van lived within the same distance. Ninety percent of people walking to a heath access point lived within 1100m and 95% had travelled no more than 3000m. In contrast, half of the people coming by car lived an estimated 3.7km or more away and 10% of those driving to the site lived at least 8.8km away (Table 10).

Table 10 Distances (m) travelled from home to heath access points, overall and separately for people who came by car/van and on foot

Mode of transport to heath access point	Maximum distance travelled (m) by percentages of visitors				
	25%	**50%**	**75%**	**90%**	**95%**
car/van	1760	3700	5300	8800	>10000
foot	200	330	500	1100	3000
All	420	1800	4400	7300	>10000
	Percentage of people travelling less than critical distances				
	300m	500m	1000m	2000m	3000m
car/van (n = 263)	0%	2%	8%	31%	43%
foot (n = 146)	44%	75%	89%	92%	95%
All (n = 427)	16%	28%	37%	52%	62%

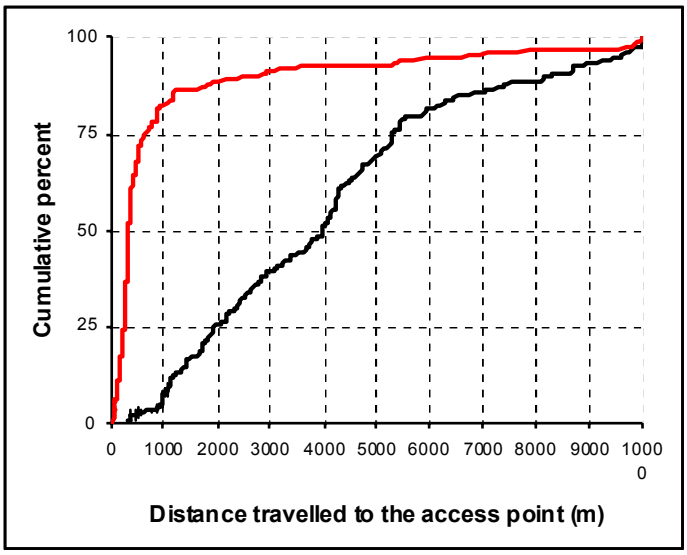


Figure 3 Distribution of the distances travelled to heath access points by car/van (black) and on foot (red).

3.11 Factors influencing the number of people accessing each heath

Because all of the people within a group visiting a heath tend to stay together and effectively act as one unit, the analyses of frequency of usage of the different heaths and access points was usually based on the number of groups recorded (ie interviewed) at each access point. This avoids the pseudo-replication and undue influence on statistical relationships of occasional large groups of people such as the group of 27 runners. However, overall patterns and conclusions would usually be very similar as over 90% of people came on their own or with just one other person.

Table 11 Number of visitors through each heath access point with[+] and without parking facilities, together with the estimated visitable area and perimeter length

Heath access point	car park	groups	total visitors	Average visitors per hour	Heath area visitable (ha)	Heath perimeter visitable (km)
Belben Road		17	23	1.44	331	15.5
Black Hill Bere Regis		8	11	0.69	136	5.9
Ferndown		22	24	1.50	121	5.1
Godlingston		12	37	2.31	428	18.5
Great Ovens Sandford		25	31	1.94	253	8.6
Lions Hill		19	25	1.56	29	2.5
St Catherines		50	74	4.63	175	7.4
Stoborough New Rd		24	34	2.13	97	4.8
Turbary common		39	56	3.50	39	3.3
Upton		49	56	3.50	216	9.6
Avon Heath south park	+	81	119	7.44	144	5.5
Canford Gravel Hill	+	41	64	4.00	331	15.5
Hartland Tramway	+	28	54	3.38	337	11.8
Holt	+	39	87	5.44	502	14.1
Morden	+	29	48	3.00	1273	23.6

Heath access point	car park	groups	total visitors	Average visitors per hour	Heath area visitable (ha)	Heath perimeter visitable (km)
Parley	+	50	63	3.94	184	6.3
Sopley	+	36	66	4.13	72	3.9
Tadnoll	+	26	49	3.06	26	2.9
Talbot Heath	+	17	24	1.50	43	4.0
Winfrith	+	20	28	1.75	145	10.1
					Average	Average
Access points - without parking		265	371	2.32	182	8.1
Access points - with parking	+	367	602	3.76	306	9.7
Overall		632	973	3.04	244	8.9

3.12 Visitor numbers and parking

Overall, of all 632 interviewed visitors to the 20 heath access points, more than half (58%) had used the 10 heath access points with car parking facilities. However, neither a Student's t test or a non-parametric Mann-Whitney test found any statistically significant differences between heath access points with and without parking facilities in the average or median number of groups of people visiting a heath (test $p = 0.15$ and 0.19 respectively) (Table 11). Repeating the same tests using the total number of people in the interviewed groups for each access point did show marginally statistically significant differences between access points with and without parking (test $p = 0.046$ and 0.070 respectively) (Table 11)

In conclusion, there is some evidence that there tends to be slightly more visitors at access points with parking facilities.

3.13 Visitor numbers and the size of heath

There were no statistically significant correlations between either number of visitor groups or total number of visitors and the size of the heath in terms of either the length of perimeter or area which was deemed visitable heathland (Figure 4, Table 11).

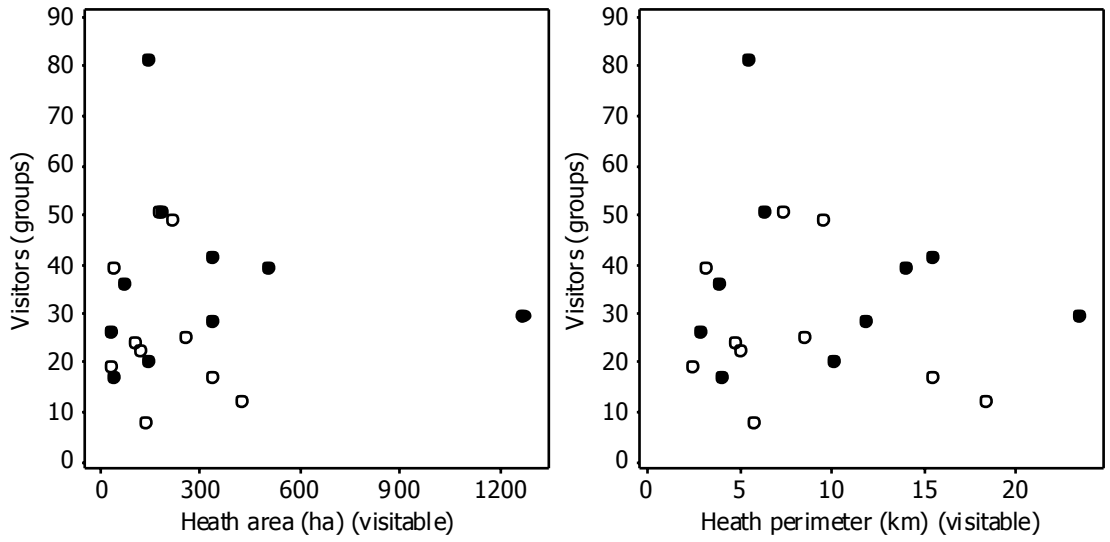


Figure 4 Number of visitors (groups) at each heath access point in relation to its visitable heath area and perimeter length for access points with (●) and without (○) parking facilities.

3.14 Visitor numbers and housing density within fixed distances

A map of all sites and the postcodes from which people travelled to visit those sites is given in Appendix 2. This provides an illustration of the distances and catchments for each site. The Geographic Information System (GIS) of the number of residential dwellings (ie houses) in each postcode was used to determine the estimate of the number of houses within a range of fixed distances of each of the 20 heath access points. This was done for distance steps of 100m up to 1000m, 1200, 1500m, 2000m, 2500, and then in steps of 1000m up to 10000m (Table **12**). There were no statistically significant correlations between either total number of visitor groups or total number of visitors and the number of houses within any of the fixed distances (
Table **12**, Figure 5).

Table 12 Correlations between number of visitors (groups and total) at each access point and the number of houses within fixed distances, the visitable heath area and perimeter length, for all points and separately for those with/without parking

	Visitors (groups)			Total visitors		
Distance (m)	All	Without parking	With parking	All	Without parking	With parking
500	-0.04	0.48	-0.12	-0.26	0.35	-0.35
1000	-0.06	0.43	-0.25	-0.27	0.29	-0.43
2000	-0.02	0.43	-0.25	-0.18	0.35	-0.41
3000	-0.02	0.45	-0.26	-0.15	0.40	-0.40
5000	0.10	0.48	-0.15	-0.02	0.45	-0.27
7000	0.16	0.45	-0.04	0.05	0.40	-0.15
10000	0.31	0.49	0.22	0.18	0.42	0.08
Visitable heath - area	-0.03	0.023	-0.08	0.10	-0.04	-0.01
perimeter length	-0.11	-0.23	-0.13	0.04	-0.03	-0.04

Table 13 Number of visitors (groups and total people) through each heath access point with[+] and without parking facilities, together with the number of houses within fixed distances of the access point

	Visitors (groups)	visitors		Houses within			
Heath access point		total	per hour	500m	1000m	3000m	10000m
Belben Road	17	23	1.44	214	1856	28589	162356
Black Hill Bere Regis	8	11	0.69	587	675	794	9744
Ferndown	22	24	1.50	648	2744	10687	159776
Godlingston	12	37	2.31	177	235	1158	39512
Great Ovens Sandford	25	31	1.94	248	830	3563	40289
Lions Hill	19	25	1.56	366	1116	5717	63373
St Catherines	50	74	4.63	470	1131	14161	139047
Stoborough New Rd	24	34	2.13	138	499	3083	20284

Heath access point		Visitors (groups)	visitors		Houses within			
			total	per hour	500m	1000m	3000m	10000m
Turbary common		39	56	3.50	1031	4139	36551	171340
Upton		49	56	3.50	715	2097	15233	103755
Avon Heath south park +		81	119	7.44	0	67	2969	84291
Canford Gravel Hill +		41	64	4.00	78	678	18363	144561
Hartland Tramway +		28	54	3.38	0	0	123	42022
Holt +		39	87	5.44	13	47	1782	68804
Morden +		29	48	3.00	0	181	3006	37729
Parley +		50	63	3.94	284	1131	10236	165139
Sopley +		36	66	4.13	65	91	3665	141713
Tadnoll +		26	49	3.06	0	18	1112	10352
Talbot Heath +		17	24	1.50	292	2839	48519	172466
Winfrith +		20	28	1.75	35	73	525	7141
					median number of houses			
Access points	without parking	265	371	2.32	418	1124	23804	83564
	with parking	367	602	3.76	24	82	13604	76548
Overall		632	973	3.04	196	677	15816	76548

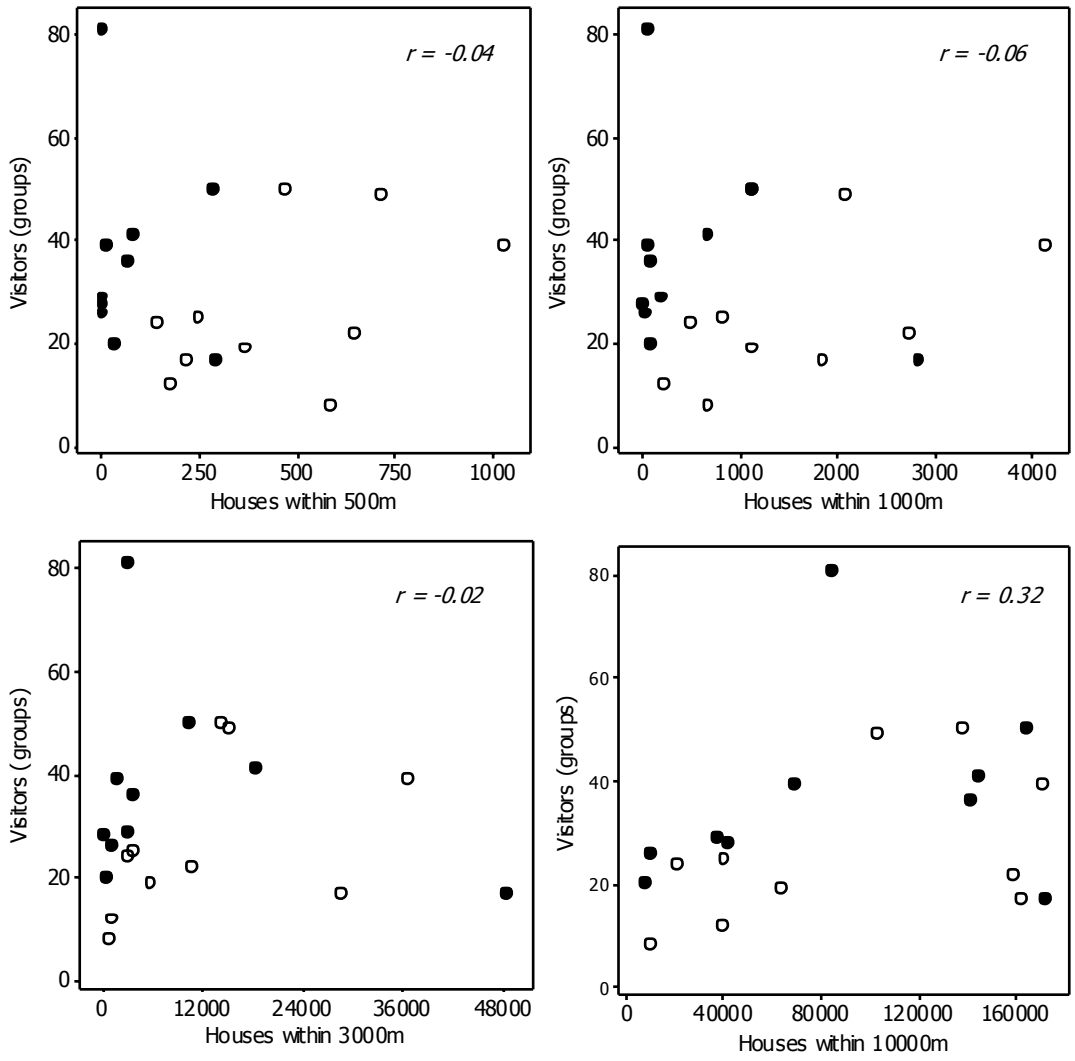


Figure 5 Number of visitors (groups) at each heath access point in relation to the number of houses within fixed distances of each access point with (●) and without (○) parking facilities.

However, the access points which have parking facilities tend to have relatively fewer people living within 10km and far fewer within all distances up to 3km (Table 13, Figure 5).

Amongst the 10 access points without parking facilities, there is some evidence that the number of visitors is positively correlated with the number of houses within any fixed distances (up to 10km) of the access point (Figure 6, Table 13). However, perhaps because of the small sample size (10 points), none of the correlations are statistically significant (minimum $p = 0.167$).

This pattern makes sense in that, we have already established that over 80% of visitors to access points with parking come by car whereas over 70% walk to access points without parking facilities (Table 6). Therefore, as walkers tend to travel much shorter distances to visit a heath than people in cars, it is likely that the number of people visiting heaths via access points without parking will tend to depend on the number of people and houses within walking distance, and especially a short walking distance, of the access point.

The above approach seeks to directly relate the number of visitors to a site with the number of houses surrounding that site. An alternative way of examining this relationship is to calculate the proportion of residents (within a given distance band) who visit a given access point. This proportion is calculated by dividing the number of people living within a given distance band by the number who actually visited the heath. This proportion was expressed as an hourly rate for each distance band, adjusted for each site to account for those people who did not disclose their full postcode. The number of people within each distance band is calculated by multiplying the number of houses by 2.36 (the mean number of people per household in the UK, from the office of national statistics, 2005). For those people that travel by car or by foot, the proportion of residents visiting the heath declines with increasing distance from the access point (Figures 6 & 7). Such an approach provides a method to predict or model access patterns on a wider scale.

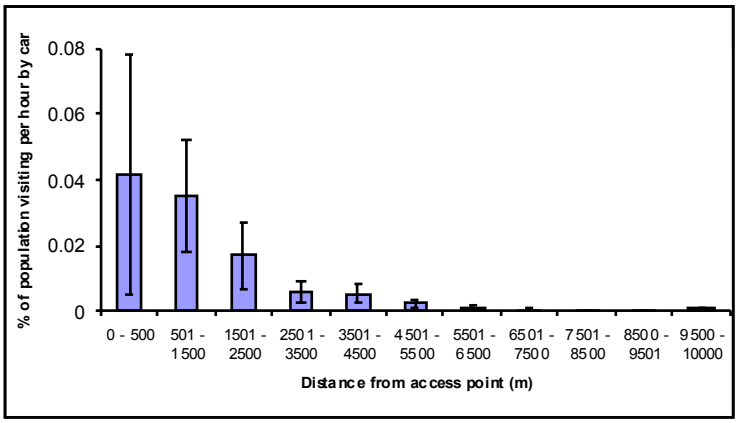


Figure 6 Proportion of population visiting each access point, per hour by car, in relation to the distance away from the access point at which they live.

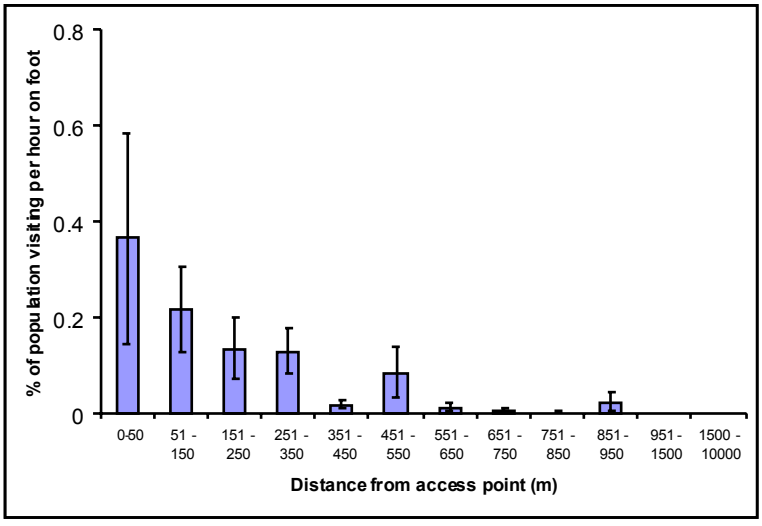


Figure 7 Proportion of population visiting each access point, per hour on foot, in relation to the distance away from the access point at which they live.

3.15 Distances and route travelled on each heath access point

Each person interviewed (as they were leaving the heath) was asked to indicate on a map of the site which route and where they had just walked. This was coded onto the survey results and subsequently converted into a total distance (in metres) walked on the heath using a GIS. The distance from the access point to the mid-point of the visitor's walk (on the GIS) was used as a measure of how far the person went into the heath and is referred to as the 'penetration distance' (m). These routes are mapped for all sites in Appendix 3. It is clear from these maps that circular routes are commonly followed.

The penetration distance measurement provides a useful measure of how far onto the heath visitors will stray from the access point. Despite the average dog-walk route being 2.2km, 83% of dog walkers do not penetrate further than 1km onto to the heath (Figure 8).

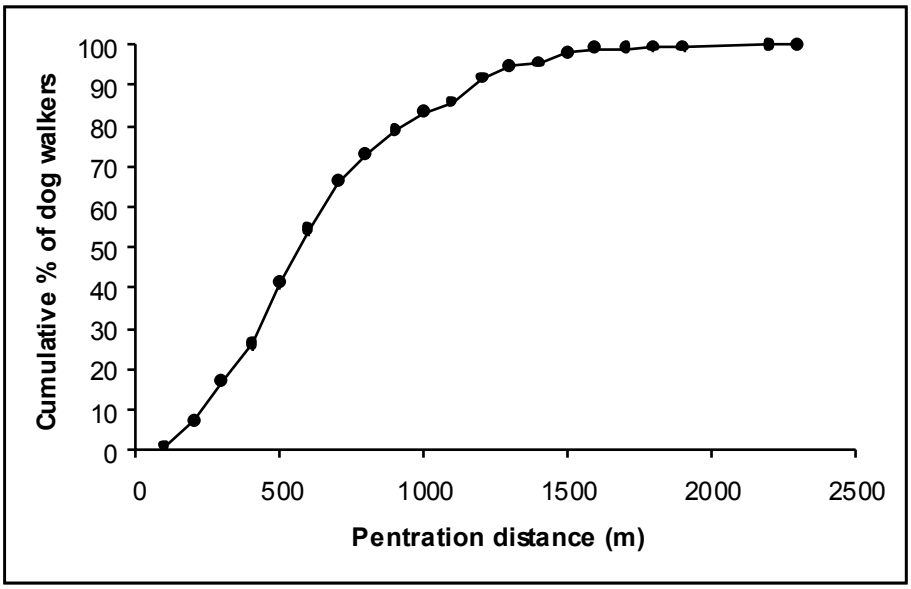


Figure 8 Cumulative frequency of the penetration distance onto heath, dog walkers only.

Both the distance travelled on the heath and the penetration distance are related to the area of the heath, as one might expect (Table 14, Figure 6); with Spearman rank correlations of 0.85 and 0.77 respectively across the 20 access points. Neither the average distance walked on a heath or the penetration distances are correlated with the presence of parking facilities at the access points, so although heaths with parking attract more people arriving by car, such people do not walk any less or further than other visitors (Figure 6). Follow-up statistical tests found no consistent differences in the average distance walked or penetrated onto a heath between those who walked to the heath and those who came by car/van (Mann-Whitney p = 0.629).

Table 14 Mean and range of distances (m) travelled on the heaths and the penetration distance (m) from each access point with[+] and without parking facilities (sorted by visitable area)

Heath access point	Heath area visitable (ha)		Distance travelled on the heath (m)			Penetration distance (m)		
		groups (*n*)	mean (m)	min (m)	max (m)	mean (m)	min (m)	max (m)
Lions Hill	29	19	867	422	1352	294	139	406
Turbary common	39	39	761	376	2258	271	172	599
Stoborough New Rd	97	24	2053	517	4268	741	210	1538
Ferndown	121	22	2107	526	4069	660	184	1242
Black Hill Bere Regis	136	8	3738	2124	5023	1146	717	1354
St Catherines	175	50	1936	433	4985	491	194	794
Upton	216	49	2313	233	5772	714	92	1519
Great Ovens Sandford	253	25	2392	668	8013	795	261	2127
Belben Road	331	17	2451	425	5521	960	138	2121
Godlingston	428	12	4015	1419	7427	*	*	*
Tadnoll[+]	26	26	1747	760	3044	557	283	865
Talbot Heath[+]	43	17	1078	321	2084	375	179	670
Sopley[+]	72	36	1288	568	2029	462	127	712
Avon Heath south park[+]	144	81	2248	684	4663	745	274	1587
Winfrith[+]	145	20	2128	667	5106	877	242	1653
Parley[+]	184	50	2226	764	6276	643	330	1578
Canford Gravel Hill[+]	331	41	3175	448	7282	1000	190	2166
Hartland Tramway[+]	337	28	2816	741	4670	1183	249	1701
Holt[+]	502	39	3211	448	7885	1012	172	2390
Morden[+]	1273	29	3609	602	8621	1086	272	2373

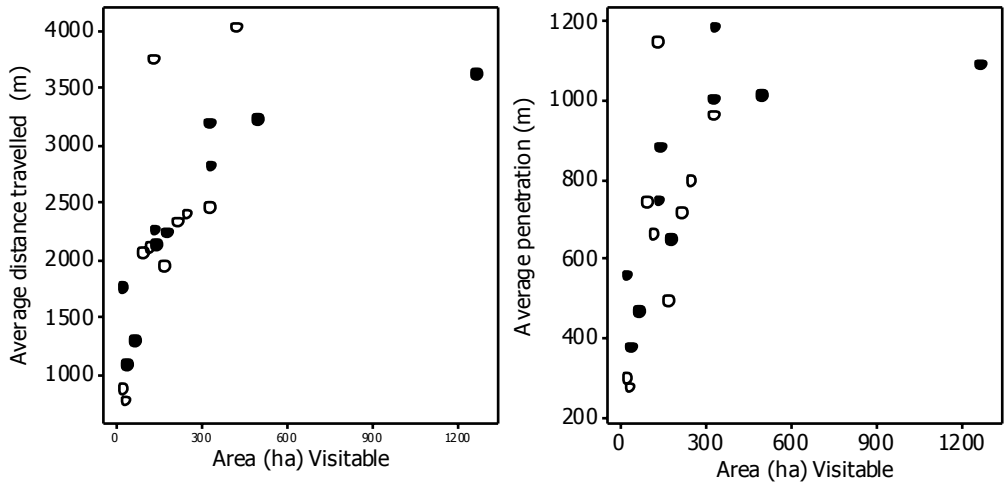


Figure 9 Average distance travelled on a heath in relation to its visitable heath area for access points with (●) and without (○) parking facilities.

At fifteen of the 20 access points, dog walkers walked a shorter distance on the heath than other visitors (Table 15). Also the average penetration distance of dog-walkers was less than that of other visitors on 13 of the nineteen heaths.

Table 15 Average distance travelled on the heath from each access point by dog-walkers, others and all visitors (shortest distance highlighted in bold)

	Average distance travelled on the heath (m)			Penetration distance (m)		
Heath access point	**dog-walker**	**others**	**all users**	**dog-walker**	**others**	**all users**
Belben Road	**2280**	3250	2451	**863**	1414	960
Black Hill Bere Regis	3825	3478	3738	**1139**	1166	1146
Ferndown	2246	**1228**	2107	686	**491**	660
Godlingston	**3541**	4173	4015	*	*	*
Great Ovens Sandford	**2092**	3593	2392	**700**	1175	795
Lions Hill	**845**	1059	867	**287**	351	294
St Catherines	**1906**	2288	1936	495	**439**	491
Stoborough New Rd	**1966**	2264	2053	**690**	864	741
Turbary common	1158	**539**	761	286	**262**	271
Upton	**2291**	2410	2313	**711**	728	714
Avon Heath south park +	2257	**1500**	2248	749	**475**	745
Canford Gravel Hill +	**3117**	4301	3175	**977**	1437	1000
Hartland Tramway +	**2629**	2957	2816	**1057**	1277	1183
Holt +	**3149**	3549	3211	**990**	1132	1012
Morden +	**2712**	5076	3609	**920**	1356	1086
Parley +	**2144**	2970	2226	**619**	862	643
Sopley +	**1279**	1358	1288	463	**457**	462
Tadnoll +	**1734**	1902	1747	**555**	574	557
Talbot Heath +	1190	**556**	1078	412	**204**	375
Winfrith +	2180	**1918**	2128	**865**	926	877
Overall average	**2181**	2489	2241	**698**	813	719

4 Discussion

We believe this piece of work to be the first piece of analysis to look across a range of different lowland heathland sites and attempt to understand the underlying access patterns across those sites. We have been able to highlight both the types and levels of access which appear to be consistent between access points. Similarly we have demonstrated where there is variability between sites.

4.1 Towards an access management toolkit for lowland heathlands?

The key questions in this study ask how far people travel to reach a heath, how they travelled and where they go on the heath. With knowledge of how far people travel and how they travel to get to a heath it should be possible to predict the numbers visiting a given access point by knowing how many people live in the area surrounding the heath. Knowing the distance that people travel on the heath it should then be possible to determine access levels across heaths themselves.

We have shown that the number of visitors to a heath, either a heath with a car park or a heath without, is not straight forward to predict from the total number of people living within a certain distance of the heath. With a greater sample size of sites a statistically significant relationship may be present, at least for sites with no parking facilities (Figure 6). By considering the total population living in each distance band, and then plotting the proportion of that population visiting the heaths by foot or by car (Figures 7 & 8) the overall trend is informative. The proportion of visitors declines with increasing distance. The large error bars present for each distant band highlight the variation between sites, but are also statistical, in that the actual numbers of visitors are so low, such that a difference of one visitor (especially in the initial distance bands) can account for the large standard errors.

The trends shown in Figures 6 & 7 do provide a means to predict changes in visitor numbers that may occur at a given site as a result of changes in housing allocation or following a new housing development. As a hypothetical example, the impact of a development of 500 houses at 525m from an access point could be calculated as follows:

> We would predict 500 houses to hold a population of 1180 people (500 x 2.36).
>
> From Figure 6: 0.035% ($\pm$ 0.017%) of the population living 501 – 1500m from the heath are predicted to visit by car, per hour
> 1180 x 0.035% ($\pm$ 0.017%) = 0.41 people ($\pm$ 0.21 people).
>
> From Figure 7: 0.086% ($\pm$ 0.054%) of the population living 451 – 550m from the heath are predicted to visit on foot, per hour
> 1180 x 0.086% ($\pm$ 0.054%) = 1.01 people ($\pm$ 0.64 people).
>
> Therefore a total of 1.42 ($\pm$ 0.85) extra people would be expected to visit, per hour.

Various distances have been suggested at which development close to a heathland site will be unlikely to have an impact on the numbers of visitors to that site. Here we demonstrate a means by which such development applications can be put into context. We also show, across a range of sites, that 75% of visitors coming to a site on foot come from within a straight-line distance of 500m. Visitors coming by car clearly travel much further, with 75% of visitors coming from with 5.3km of the site.

The vast majority of visitors visit heaths to walk their dogs, very few other access types were encountered.

Although 80% of people on a heath at any one time are dog-walkers, many of these people walk their dog on the heath daily or at least much more regularly than the typical non-dog walker. Therefore the percentage of different people visiting a heath within a year who come with a dog will be much less than 80%. The type of person who visits a heath daily rather than once or twice a year is therefore over 100 times more likely to be on the heath at any one time, including during our questionnaire survey periods. It is not known whether regular visitors tend to have a greater or less impact on the heath and its wildlife per visit than occasional visitors.

Dog-walkers walk an average of 2.2km, typically a circular route, with the central point (ie the distance out onto the heath) of c.700m from the access point itself. These figures should

help provide a useful basis to help site car parks and access points to reduce dog numbers on parts of a heath, as well as in the provision of alternative open space.

4.2 Why is there variation between sites in the proportion of people living close by that visit them?

Heathland sites do vary in their individual character, and the range of sites used in this study, covering small urban heaths and large, well-known heaths will inevitably mean that there will be variation between sites. Sites such as the Whitesheet car-park at Holt are large car-parks marked on OS maps and with a large range of routes and paths extending out onto the heath. It would seem likely that such sites would attract different people to the small urban sites. At Hartland Tramway a number of visitors were birdwatchers and were visiting to use the bird-hide overlooking the saltings and Poole Harbour. Yet even when sub-sets of visitors – for example dog walkers visiting on foot – are used in the analysis, there still appears to be considerable variation.

The distinction between parking and no-parking facilities was, in reality, difficult to make and may in fact be a difficult way to categorise access points. At each point used in the study it was possible to park nearby, albeit on the verge, in the gateway or along nearby roads. There were in fact only two access points where all visitors arrived on foot. The variation between access points was actually in the ease of parking and the amount of parking spaces actually available.

A further factor could be that the straight line distance to the postcode is used in the analysis, and this measure does not take into account barriers (such as main roads or rivers) which may mean the actual distance necessary to travel to the site is much greater. A further variable not addressed in the study is alternative sites. As is evident from Appendix 2, there are clearly postcodes which are equidistant between a number of heathland sites. People may also visit other sites besides heathland, and residents in Poole and Bournemouth have a variety of green space locations which may attract people away from a given access point. With a knowledge of the location of all the potential sites within a geographic area, it might be possible to develop a predictive model by assuming, for example, that at a given postcode residents will choose to visit their nearest heathland. The quality of housing, even possibly a measure such as garden size, may also influence the likelihood of a resident visiting a heath to walk their dog. Such measures were beyond the scope of this study.

4.3 Further steps?

This work follows from a series of species specific studies looking at the impact of human disturbance on heathland birds in Dorset. These studies have highlighted the lack of a general understanding, across heathland sites, of access patterns. This study has attempted to fill the gap and complete the circle.

Further gaps in our understanding still exist, and the following areas may warrant further investigation:

1. With a greater sample size (number of sites) is a robust, predictive model of heathland access levels possible?
2. By using the penetration distance of dog walkers and buffering access points, it would be possible to determine the areas of the Dorset Heathland SPA that fall outside the

bounds of the average dog walk. It would also be possible to overlay bird territory centres and investigate the extent to which areas within 700m of access points are avoided.

3. Extending the analysis to attempt to consider the alternative sites that exist for each postcode.
4. Dog walkers maybe considered as a distinct "community" of users. Further research could consider their attitudes to the use of heathlands and alternative sites in relation to the extent to which they keep dogs on a lead and to look at the proportion of dog owners that use the heathlands and why, if alternative sites exist, they prefer the heathlands.
5. In an area of high tourism, what proportion of the visitors to heaths are tourists, and how does this visitor pressure vary seasonally.

5 References

ATLANTIC CONSULTANTS. 1996. *Attitude survey of the value of heathlands*. Report to English Nature. Truro: Atlantic Consultants.

ATLANTIC CONSULTANTS. 2003. *Public perceptions of heathland in Dorset.* Final Report to The Urban Heaths Partnership. Truro: Atlantic Consultants.

DE MOLINAAR, H.J.G. 1998. *On-the-spot appraisal of the Dorset heathland, UK*. Report and recommendations to the standing committee on The Convention on the Conservation of European Wildlife and Natural Habitats. Strasbourg: Council of Europe.

HASKINS, L.E. 2000. Heathlands in an urban setting-effects of urban development on heathlands of south-east Dorset. *British Wildlife*, 4, 229-237.

LAND MANAGEMENT RESEARCH UNIT. 1996. *The New Forest sport and recreation study*. Portsmouth: University of Portsmouth Enterprise Ltd.

LILEY, D., & CLARKE, R.T. 2002. Urban development adjacent to heathland sites in Dorset the effect on the density and settlement patterns of Annex I bird species. *English Nature Research Reports,* No. 463.

LILEY, D., & CLARKE, R.T. 2003. The impact of urban development and human disturbance on the numbers of nightjar *Caprimulgus europaeaus* on heathlands in Dorset, England. *Biological Conservation,* 114, 219-230.

MALLORD, J.W. 2005. *Predicting the consequences of human disturbance, urbanisation and fragmentation for a woodlark* Lullula arborea *population*. PhD Thesis. University of East Anglia.

MICHAEL, N. 1996. Lowland heathland: wildlife value and conservation status. *English Nature Research Reports,* No. 188.

MORI. 2004. Bourley and Long Valley Heath users survey. MORI Social research Institute.

MURISON, G. 2002. The impact of human disturbance on the breeding success of nightjar *Caprimulgus europaeus* on heathlands in south Dorset, England. *English Nature Research Reports,* No. 483.

THE OFFICE OF NATIONAL STATISTICS. 2005. National Statistics. Available from: http://www.statistics.gov.uk

ROSE, R.J., & CLARKE, R.T. 2004. Urban impacts on Dorset heathlands: Analysis of the heathland visitor questionnaire survey and heathland fire incidence data sets. Centre for Hydrology and Ecology. *English Nature Research Reports,* No. 624.

RSPB. 1989. *Lowland heathland. A habitat under threat.* Devon: RSPB.

RSPB. 2001. A visitor survey at Woolmer Forest, Hampshire. Unpublished

STRIDE, A. 2001. Survey of heathland use: Winfrith and Sandford Heaths. Unpublished Report. Wareham: RSPB.

TAYLOR, E. 2002. *Predation risk in woodlark* Lullula arborea *habitat: the influence of recreational disturbance, predator abundance, nest site characteristics and temporal factors*. MSc. Dissertation. University of East Anglia.

UNDERHILL-DAY, J.C. 2005. A literature review of urban effects on lowland heaths and their wildlife. *English Nature Research Reports*, No. 623.

Appendix 1 The questionnaire

1. How many people in total, including yourself are there with you here today for this visit ? IF MORE THAN ONE: **How many adults and how many children ?**

Adults (16+)		1	2	3	4	5	6	7	8	9+
Children (under 16)	0	1	2	3	4	5	6	7	8	9+

2. Do you tend to visit this area more often at certain times of the year. ? If YES **when ?** SINGLE CODE ONLY.

Winter (December to February)	1
Spring (March to May)	2
Summer (June to August)	3
Autumn (spetember to November)	4
No	5
Don't know	6

3. From which postcode did you travel to reach this site? IF DON'T KNOW: **How far did you travel to reach this site?**

POSTCODE:	DISTANCE (POSTCODE NOT KNOWN):

4. How did you get here? SINGLE CODE ONLY. ADD IF NECESSARY: **What form of transport did you use?**

Car	1
Van	2
Bus / Coach	3
Motorcycle	4
Bicycle	5
Horse	6
On foot	7
Other (WRITE IN & CODE 8)	8

5. Did you enter the heath from here or from somewhere else?

Entered from this access point	1
Entered from a different access point	2
Don't know	3

6. **Where have you walked during your visit to this area today?** SHOW VISITOR AERIAL PHOTOGRAPH AND ANNOTATE COPY. IF NECESSARY ASK FOR LANDMARKS.

---

7. **What was the main purpose of your visit today.** MULTICODE OK.

Dog walking	1
Walking	2
Jogging / running	3
Motor-cycling	4
Bicycling	5
Horse-riding	6
Picnic	7
Other (WRITE IN & CODE 8)	8

IF DOGS:

8. **Can I just check, how many dogs do you have with you for today for this visit?**

Dog/s	1	2	3	4	5	6	7	8	9+

---

9. **During your visit, did you let your dog/s off the lead, or did they remain on their leads all the time.** SINGLE CODE ONLY.
IF MORE THAN ONE DOG: **Was that all or some of them you let off the lead?**

Let off lead:	
One / all	1
some	2
On lead/s all the time	3
Don't know	4

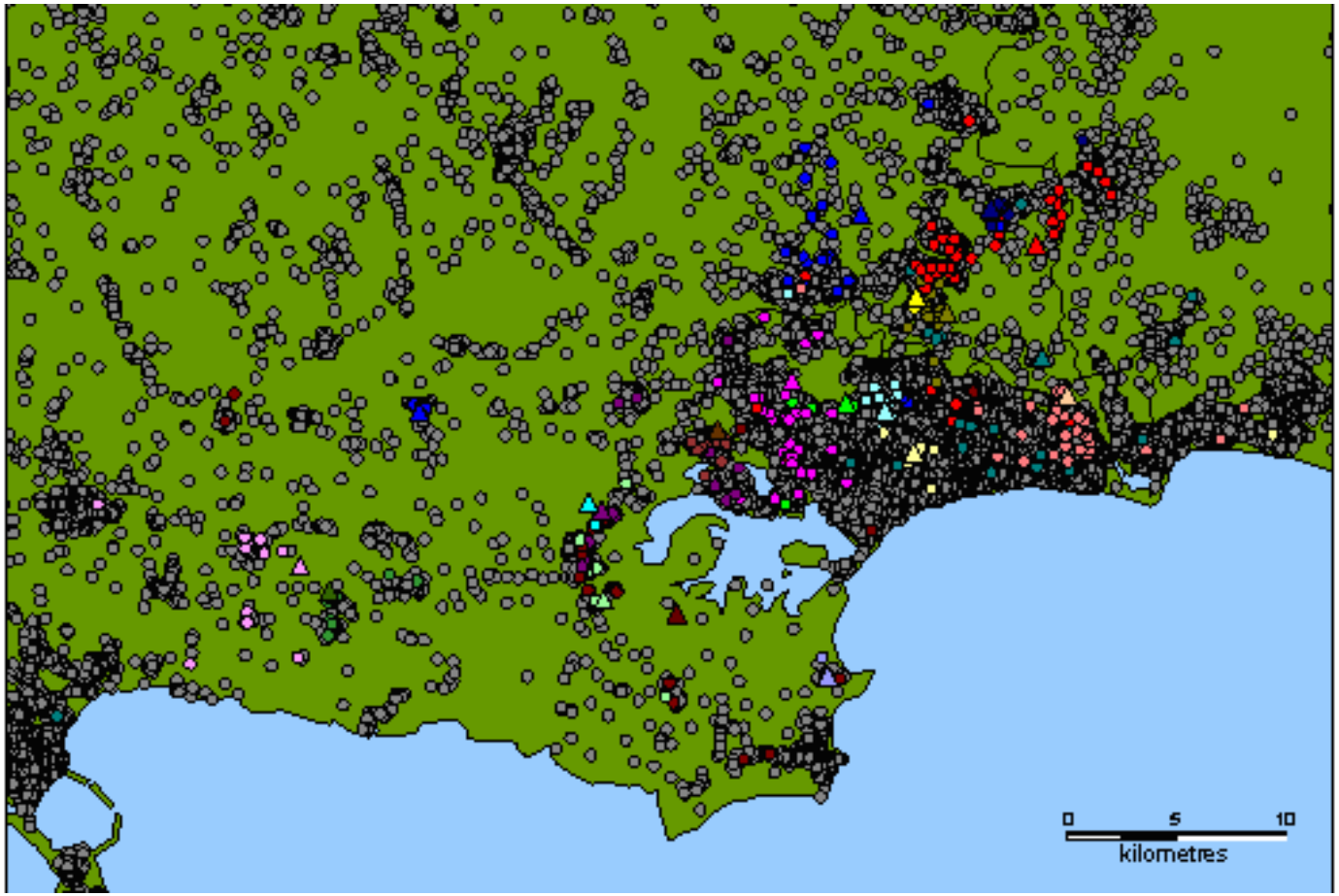
---

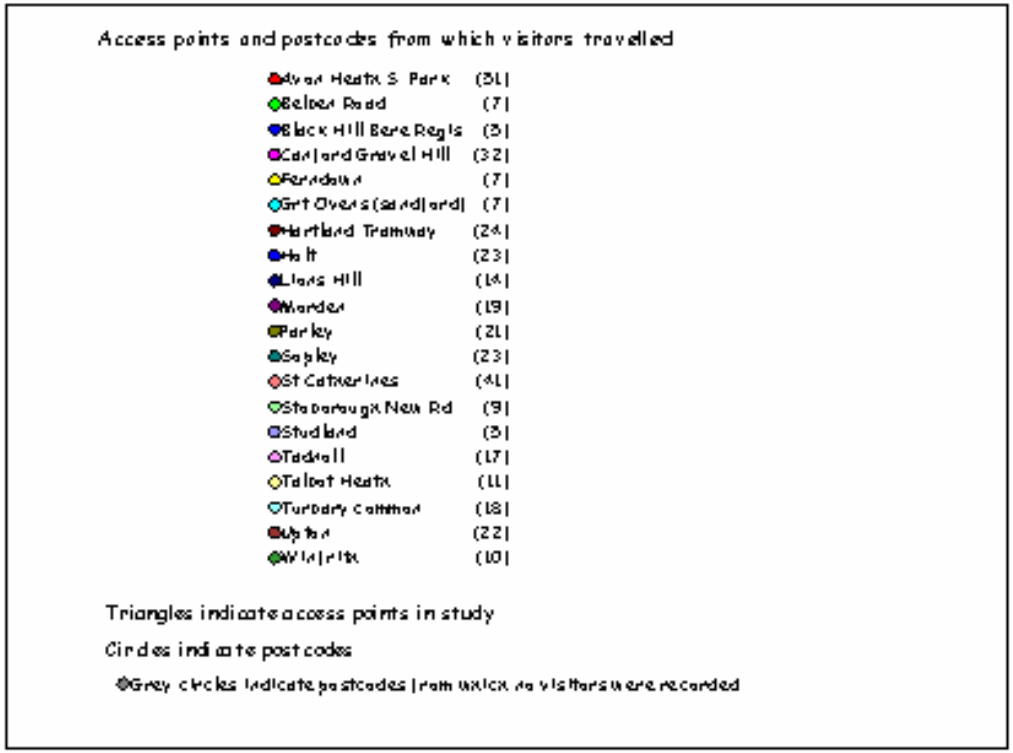
10. **Did you (and / or any of the people with you) go off the main tracks during your visit today, or did you (all) stay on them all the time?**

Off main tracks	1
On main tracks	2
Don't know	3

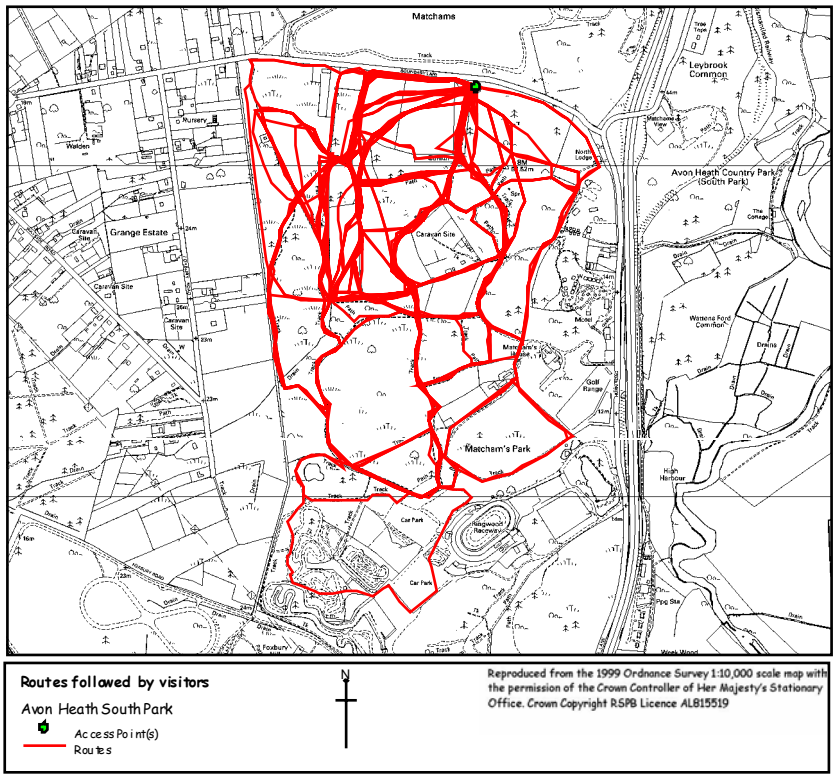
Appendix 2 Access points from which visitors travelled

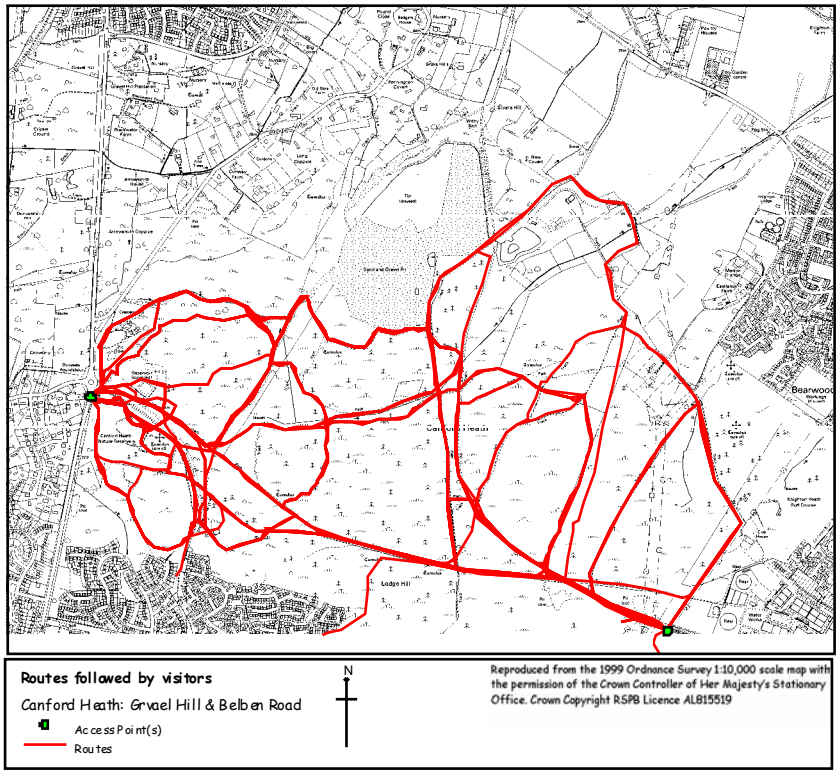
For legend, see next page

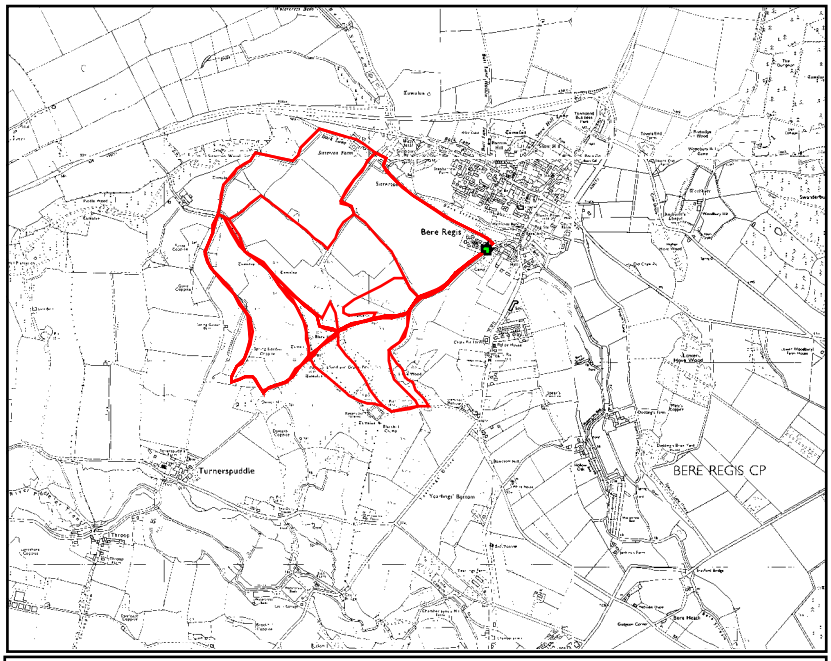



Access points and postcodes from which visitors travelled
Triangles indicate access points in study
Circles indicate post codes
Grey circles indicate postcodes from which no visitors were recorded

Appendix 3 Maps of routes taken on individual sites







Routes followed by visitors

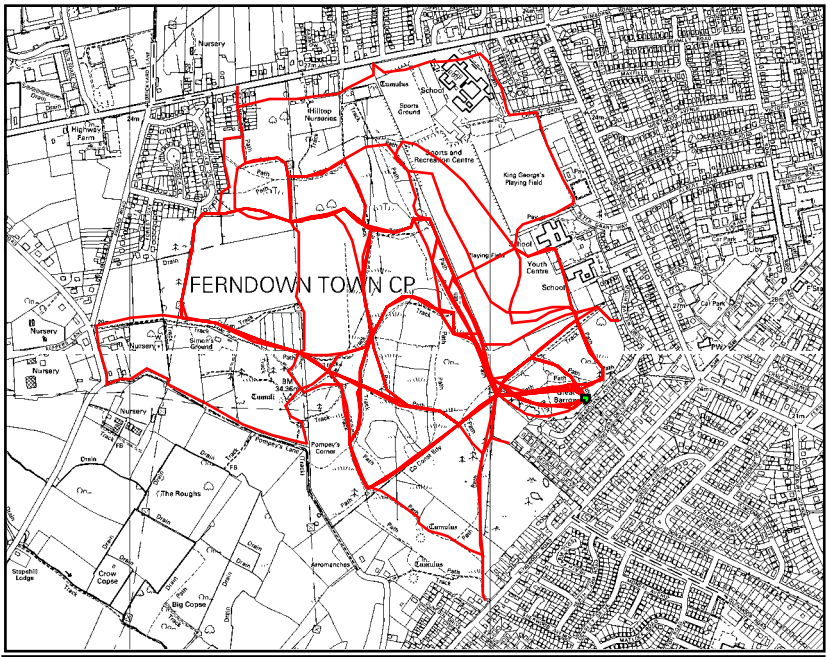
Black Hill (Bere Regis)

Access Point(s)

Routes

N

Reproduced from the 1999 Ordnance Survey 1:10,000 scale map with the permission of the Crown Controller of Her Majesty's Stationary Office. Crown Copyright RSPB Licence AL815519



Routes followed by visitors

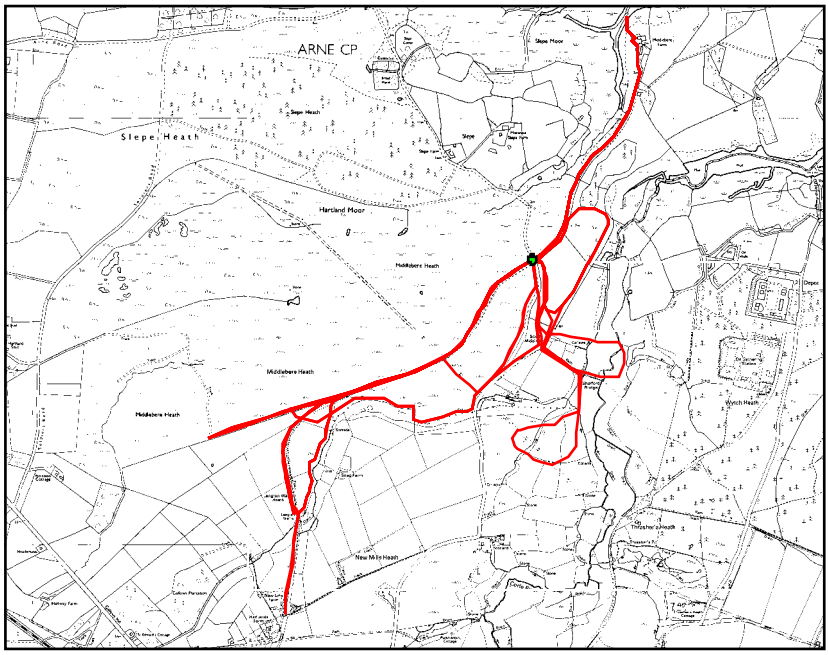
Ferndown

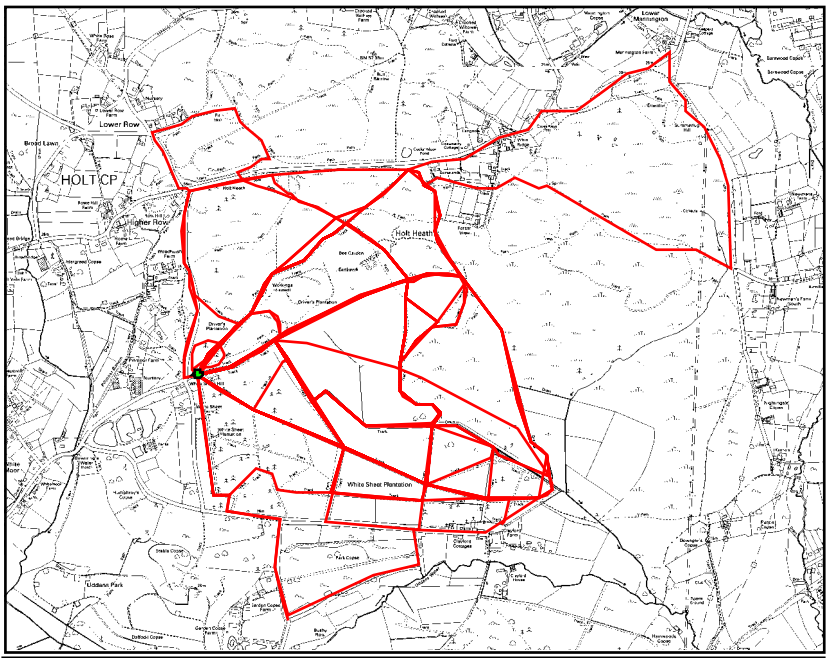
Access Point(s)

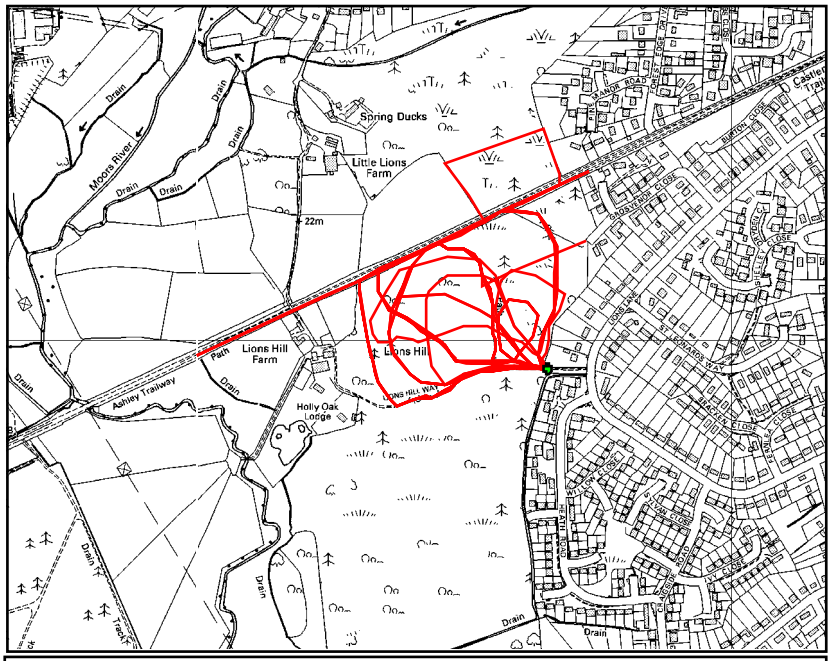
Routes

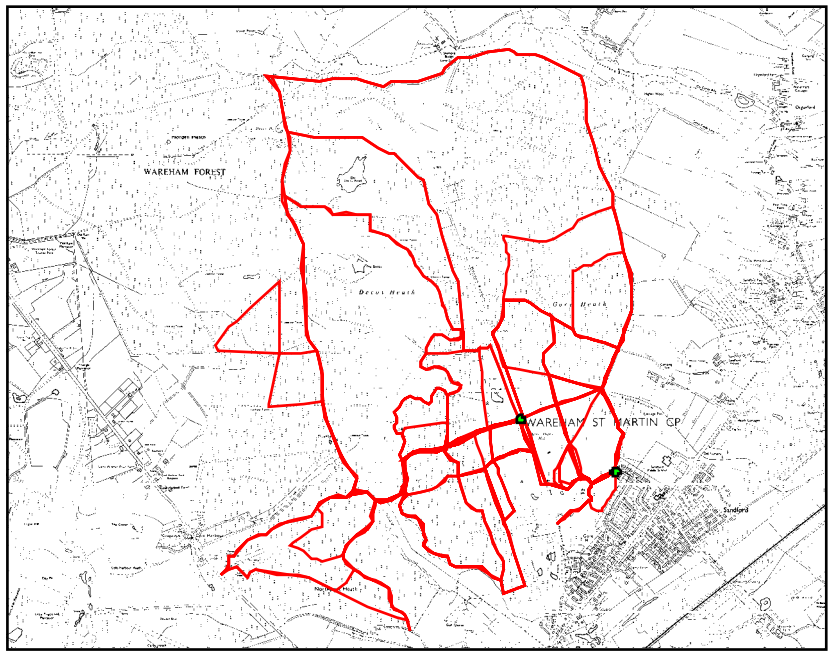
N

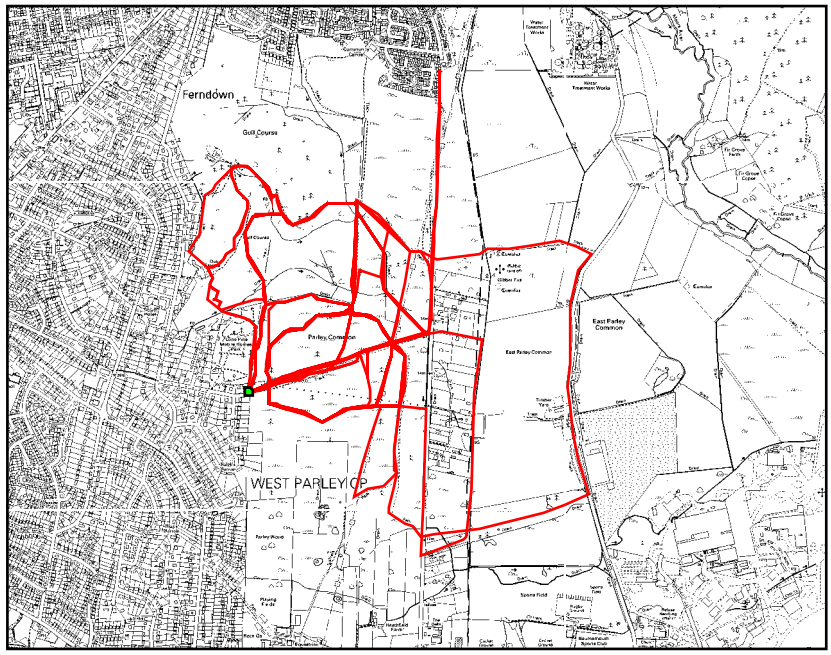
Reproduced from the 1999 Ordnance Survey 1:10,000 scale map with the permission of the Crown Controller of Her Majesty's Stationary Office. Crown Copyright RSPB Licence AL815519


ARNE CP
Slepe Heath
Hartland Moor
Middlebere Heath
Middlebere Heath
Middlebere Heath
New Mills Heath
Wych Heath
Routes followed by visitors
Hartland Tramway
Access Point(s)
Routes
N
Reproduced from the 1999 Ordnance Survey 1:10,000 scale map with the permission of the Crown Controller of Her Majesty's Stationary Office. Crown Copyright RSPB Licence AL815519


HOLT CP
Lower Row
Higher Row
Holt Heath
White Sheet Plantation
Routes followed by visitors
Holt
Access Point(s)
Routes
N
Reproduced from the 1999 Ordnance Survey 1:10,000 scale map with the permission of the Crown Controller of Her Majesty's Stationary Office. Crown Copyright RSPB Licence AL815519


Spring Ducks
Little Lions Farm
Moore River
Drain
22m
Lions Hill Farm
Lions Hill
Path
Ashley Trailway
Holly Oak Lodge
Track
Routes followed by visitors
Lions Hill
Access Point(s)
Routes
N
Reproduced from the 1999 Ordnance Survey 1:10,000 scale map with the permission of the Crown Controller of Her Majesty's Stationary Office. Crown Copyright RSPB Licence AL815519


WAREHAM FOREST
WAREHAM ST MARTIN CP
Sandford
Routes followed by visitors
Marden and Great Ovens (Sandford)
Access Point(s)
Routes
N
Reproduced from the 1999 Ordnance Survey 1:10,000 scale map with the permission of the Crown Controller of Her Majesty's Stationary Office. Crown Copyright RSPB Licence AL815519



Routes followed by visitors

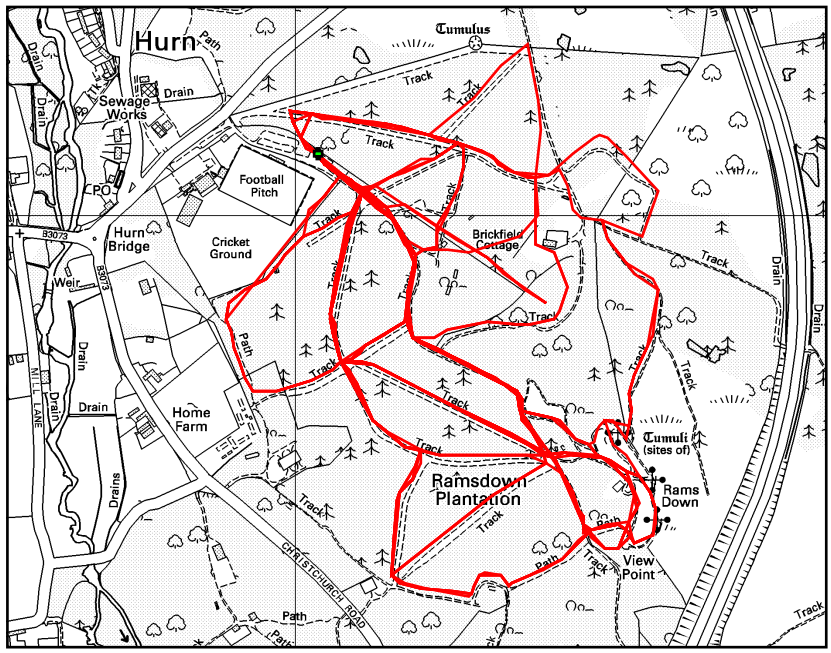
Parley

Access Point(s)

Routes

N

Reproduced from the 1999 Ordnance Survey 1:10,000 scale map with the permission of the Crown Controller of Her Majesty's Stationary Office. Crown Copyright RSPB Licence AL815519



Routes followed by visitors

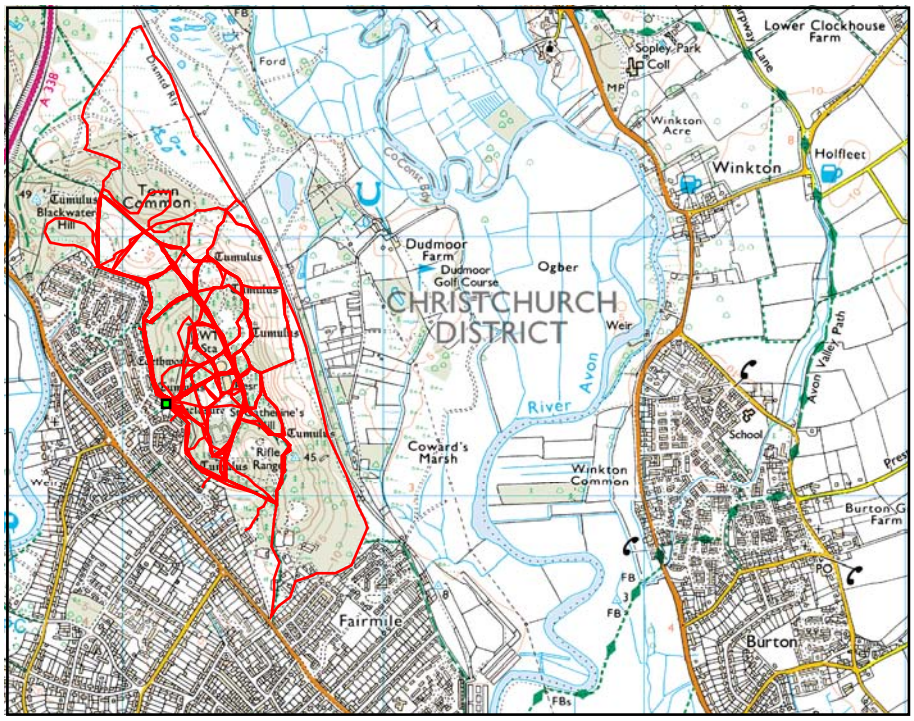
Sopley

Access Point(s)

Routes

N

Reproduced from the 1999 Ordnance Survey 1:10,000 scale map with the permission of the Crown Controller of Her Majesty's Stationary Office. Crown Copyright RSPB Licence AL815519



Routes followed by visitors

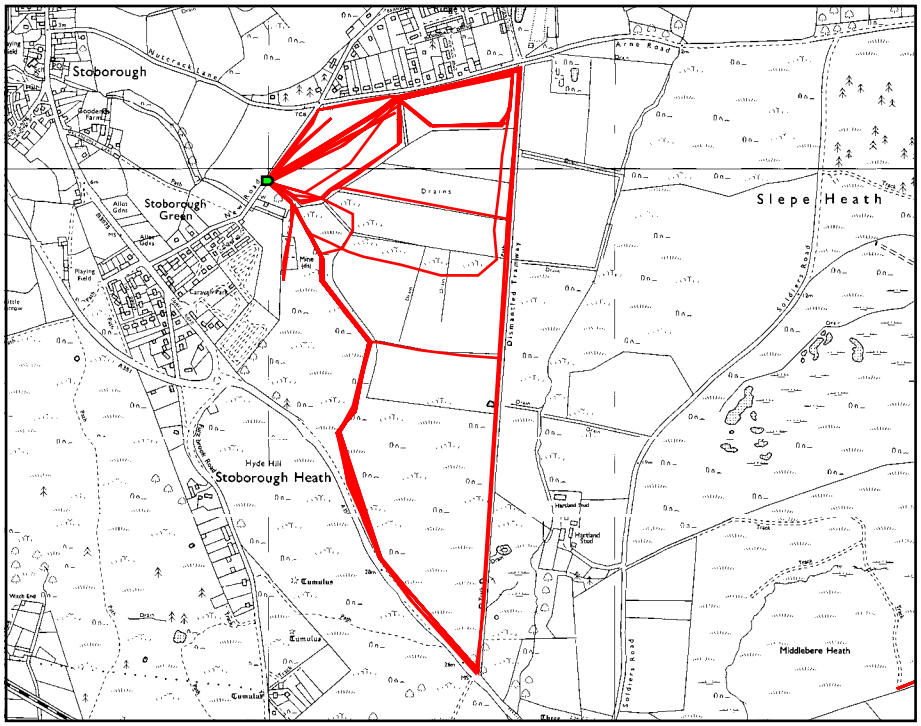
Parley

Access Point(s)

Routes

N

Reproduced from the 1999 Ordnance Survey 1:25,000 scale map with the permission of the Crown Controller of Her Majesty's Stationary Office Crown Copyright RSPB Licence AL815519



Routes followed by visitors

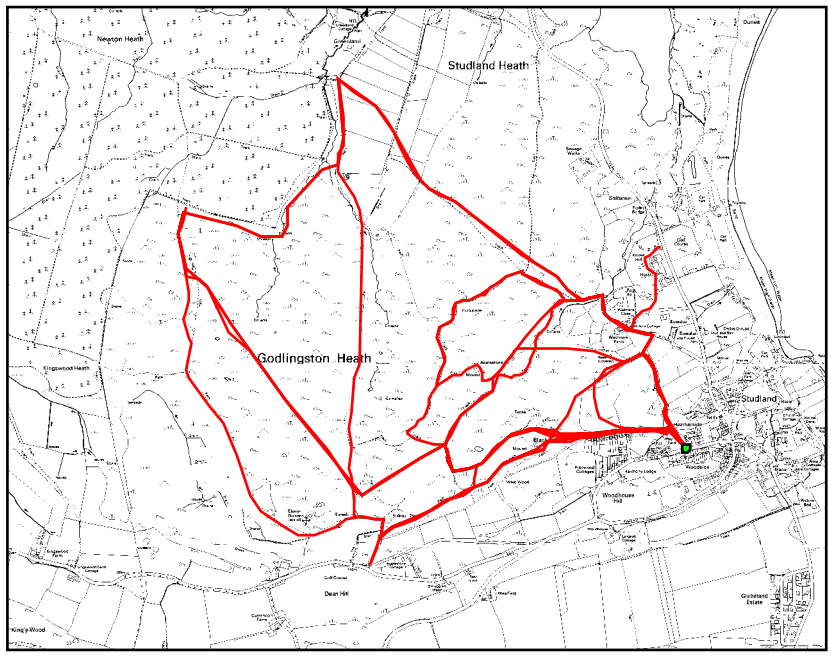
Stoborough New Road

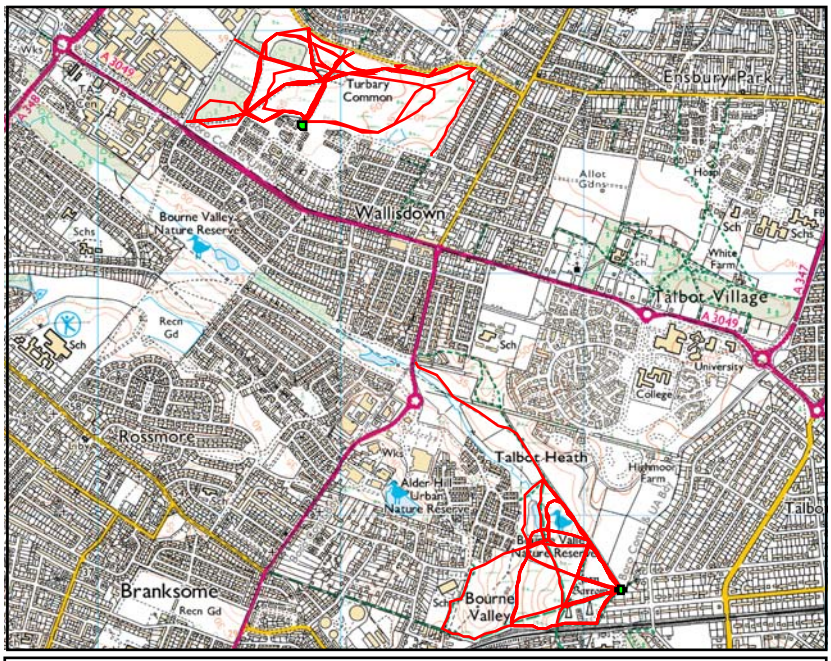
Access Point(s)

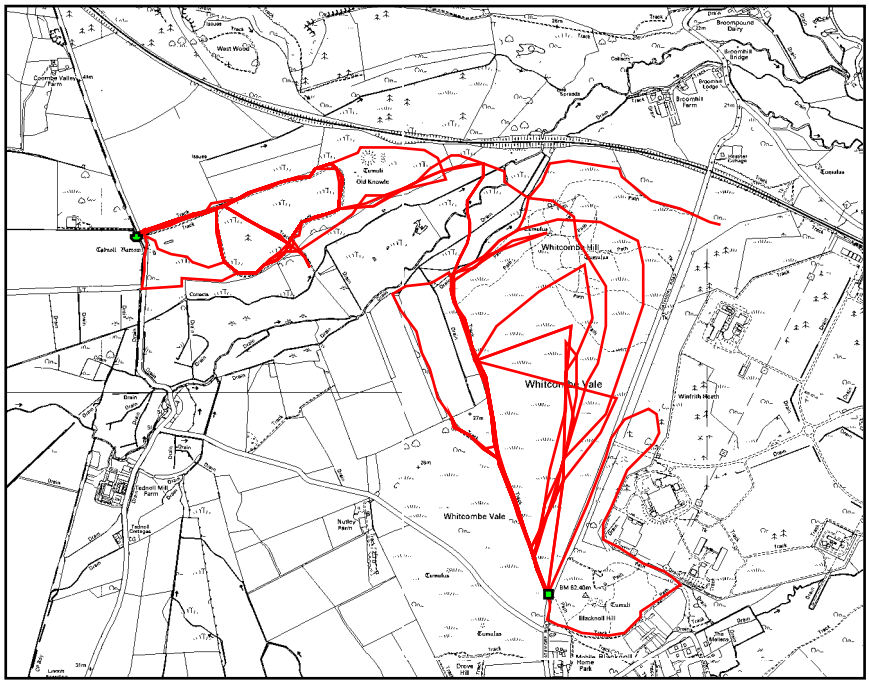
Routes

N

Reproduced from the 1999 Ordnance Survey 1:10,000 scale map with the permission of the Crown Controller of Her Majesty's Stationary Office. Crown Copyright RSPB Licence AL815519


Studland Heath
Godlingston Heath
Studland
Routes followed by visitors
Studland
Access Point(s)
Routes
N
Reproduced from the 1999 Ordnance Survey 1:10,000 scale map with the permission of the Crown Controller of Her Majesty's Stationary Office. Crown Copyright RSPB Licence AL815519


Turbary Common
Ensbury Park
Wallisdown
Bourne Valley Nature Reserve
Talbot Village
Talbot Heath
Alder Hills Urban Nature Reserve
Rossmore
Branksome
Recn Gd
Bourne Valley
Routes followed by visitors
Parley
Access Point(s)
Routes
N
Reproduced from the 1999 Ordnance Survey 1:25,000 scale map with the permission of the Crown Controller of Her Majesty's Stationary Office. Crown Copyright RSPB Licence AL815519



Routes followed by visitors

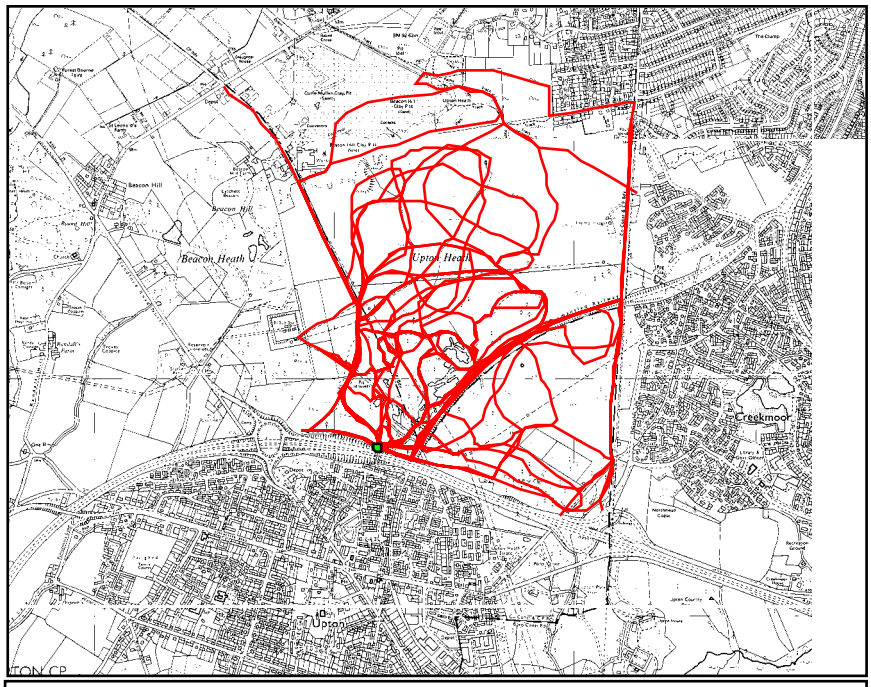
Winfrith and Tadnoll

Access Point(s)

Routes

N

Reproduced from the 1999 Ordnance Survey 1:10,000 scale map with the permission of the Crown Controller of Her Majesty's Stationary Office. Crown Copyright RSPB Licence AL815519



Routes followed by visitors

Upton

Access Point(s)

Routes

N

Reproduced from the 1999 Ordnance Survey 1:10,000 scale map with the permission of the Crown Controller of Her Majesty's Stationary Office. Crown Copyright RSPB Licence AL815519

ENGLISH NATURE

Research Information Note

English Nature Research Reports, No. 683

Visitor access patterns on the Dorset heathlands

Report Authors: Clarke, R., Liley, D., Underhill-Day, J. & Rose, R. Date: 2005
Keywords: Conservation, access, heathland, heath, Dorset, Special Protection Area, Special Area of Conservation, Ramsar

Introduction

The south east corner of the county of Dorset holds some 17% of the UK lowland heathland, of which over 90% has been designated Sites of Special Scientific Interest (Michael 1996). Over 7950ha of the Dorset heathland has been designated as Special Areas of Conservation and nearly 8170 ha classified as a Special Protection Area under the EC Birds and Habitats Directives. Within the same area of south east Dorset there is also one of the largest conurbations in the south west of England, Bournemouth and Poole, with a population of 400,000, as well as 4.5 million tourists visiting the Isle of Purbeck annually. This generates considerable pressures on the nearby heaths from both residents and visitors. This pressure varies between the more rural heaths and those located close to the residential areas.

Public access to lowland heathland has been found to lead to an increase in wild fires, the introduction of alien plants and animals, the deposition of nutrients, loss of vegetation and soil erosion and disturbance by humans and their pets, all of which can harm the flora and fauna.

What was done

The contractors interviewed 632 people using a specially designed questionnaire with 10 questions at 20 different public access points onto a variety of lowland heathland areas across Dorset. Visitors were asked for their post codes to permit the estimation of their travel distance to the sites and their walking routes on site were mapped. The questionnaire data was analysed along with the geographical data from the routes travelled to, and whilst on, the heathlands. The plotting of walked routes into a GIS allowed a novel approach to considering visitor impacts, the calculation of penetration distance, to be analysed. This data set provides a valuable snapshot of visitor activity across the heathlands

Results and conclusions

1 Nearly two-thirds (64%) of people interviewed were visiting the heath on their own, but they formed only 41% of all visitors to the heath.
2 Average usage (total number of visitors) at the weekend was about the same as on weekdays.
3 More than half (59%) of all people arrived at access points by car and a further 36% arrived by foot.

Continued

4 The typical distance that people travelled to reach an access point, was much greater if the access point had adjacent parking facilities. Without parking facilities, the median distance travelled was only about 400m, whereas the overall median distance travelled to the heath access points with parking was nearly 4km.

5 Three-quarters of the people who came on foot lived and travelled less than 500m away, whereas only 2% of people arriving by car/van lived within the same distance.

6 Eighty percent of the 632 people interviewed in total were mainly using the heaths to walk their dog(s). There was no significant difference in the proportion of visitors coming to walk their dog when comparing sites with and without car-parking.

7 Overall, 90-94% of the 741 dogs with the questioned people were not on a lead while on the heaths.

8 The average total distance walked by dog-walkers was 2181m, with an average penetration distance onto the heath of 698m. 83% of dog walkers did not penetrate further than 1km onto the heath.

English Nature's viewpoint

The effects of visitor pressure on heathland are of conservation concern. Previous research has focussed particularly on impacts due to arson as well as disturbance of nightjars, woodlark etc. This report deals directly with the patterns of use, types of users and distances travelled to a range of urban and rural heathlands. The research links in well to conservation aims to reduce urban related impacts by providing important evidence that will allow policy aimed at diverting pressures onto alternative sites and changing regular users' attitudes and behaviour to be refined and assessed.

Selected references

DE MOLINAAR, H.J. G. 1998. *On-the-spot appraisal of the Dorset heathland, UK*. Report and recommendations to the standing committee on The Convention on the Conservation of European Wildlife and Natural Habitats. Strasbourg: Council of Europe.

LILEY, D. & CLARKE, R.T. 2002. Urban development adjacent to heathland sites in Dorset the effect on the density and settlement patterns of Annex I bird species. *English Nature Research Reports,* No 463. .

LILEY, D. & CLARKE, R.T. 2003. The impact of urban development and human disturbance on the numbers of nightjar *Caprimulgus europaeaus* on heathlands in Dorset, England. *Biological Conservation,* 114, 219-230.

ROSE, R.J., CLARKE R.T. 2005. Urban impacts on Dorset Heathlands: Analysis of the heathland visitor questionnaire survey and heathland fires incidence data sets. *English Nature Research Reports,* No. 624.

UNDERHILL-DAY, J.C. 2005. A literature review of urban effects on lowland heaths and their wildlife. *English Nature Research Reports,* No. 623.

Further information

English Nature Research Reports and their *Research Information Notes* are available to download from our website: www.english-nature.org.uk

For a printed copy of the full report, or for information on other publications on this subject, please contact the Enquiry Service on 01733 455100/101/102 or e-mail enquiries@english-nature.org.uk

ENGLISH NATURE

English Nature is the Government agency that champions the conservation of wildlife and geology throughout England.

This is one of a range of publications published by:
External Relations Team
English Nature
Northminster House
Peterborough PE1 1UA

www.english-nature.org.uk

© English Nature 2002/3

Cover printed on Character Express, post consumer waste paper, ECF.

ISSN 0967-876X

Cover designed and printed by Status Design & Advertising, 2M, 5M, 5M.

You may reproduce as many copies of this report as you like, provided such copies stipulate that copyright remains with English Nature, Northminster House, Peterborough PE1 1UA

If this report contains any Ordnance Survey material, then you are responsible for ensuring you have a license from Ordnance Survey to cover such reproduction.

Front cover photographs:
Top left: Using a home-made moth trap.
Peter Wakely/English Nature 17,396
Middle left: Co_2 experiment at Roudsea Wood and Mosses NNR, Lancashire.
Peter Wakely/English Nature 21,792
Bottom left: Radio tracking a hare on Pawlett Hams, Somerset.
Paul Glendell/English Nature 23,020
Main: Identifying moths caught in a moth trap at Ham Wall NNR, Somerset.
Paul Glendell/English Nature 24,888

CHARTER MARK
Awarded for excellence