

Burnham Beeches

Visitor Survey

2015/16

A Research Report for Burnham Beeches

By

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Executive Summary

The 2015/16 Burnham Beeches visitor study extends the previous survey from 2010/11 (based on an original survey in 2002/03 and a pilot study in 2000) to provide up-to-date estimates of annual visitor numbers for Burnham Beeches. Since the 2010/11 survey, a number of management initiatives have been implemented including, dog control orders on 1st December 2014 and charges for car parks at weekends and on bank holidays from 1st August 2011 (at the three designated car parks: the Stag, the Dell and along Lord Mayor's Drive). On 1st April 2016, these car park charges were increased.

During 2015 and 2016, thirteen surveys were undertaken covering one bank holiday, six weekend days (with two weekends covered by paired half days to count over both the Saturday and Sunday) and six weekdays (with one week covered by two part days). The survey was designed to cover all four seasons. Visitors were recorded at each of nine entrances, selected to ensure a full coverage of the diversity of entrance and to make sure the major entrances were properly surveyed. Different entrances were surveyed with different sampling efforts depending on their usage (as ascertained during previous surveys, where in 2002/03 and 2010/11 several of the smaller entrances showed similar results to each other and some entrances were used much more frequently than others). At the major entrance on Lord Mayor's Drive East (LMDE), vehicles entering were counted, classified as to type (car, van, motorbike, etc.) and the number of occupants (adults, children and dogs) were recorded. At all entrances (including LMDE), visitors not arriving by car were categorised depending on their age (adults or children), their mode of entry (by walking, using a wheelchair, cycling, or on horseback), and whether they had a dog, or dogs, with them or not.

There were an estimated 551400 visitors per year in 2015/16. The proportion recorded as entering the site by car is reduced from the previous surveys possibly due to changes in management. Most vehicles entering the site are used by visitors so ATC counts should properly reflect visitor numbers and not (for example) trades-people. A smaller number of dogs have been estimated as using the site during this survey compared to 2010/11, but comparable to the survey in 2002/03.

The model produced in 2010/11 (based on that produced in 2002/03) has been updated and refined to reflect the data gathered during this 2015/16 survey. The model using the ATC data shows a stabilization of visitor numbers over the years with the major changes being in the mode of access used. A protocol for using the model has been included, as have suggestions for further ways of refining the accuracy of estimates.

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Introduction

This report presents an updated estimate of Burnham Beeches visitor numbers using a series of surveys during 2015/16 to modify the previous model (last updated in 2012/13). The last comprehensive estimate of visitor numbers at Burnham Beeches was in 2010/11 following a survey of five entrances for fifteen days spread over the year (informed by a previous study in 2002/03 and a pilot study in 2000). This resulted in an estimate of some 585000 annual visitors. A short assessment of the initial impact of car park charging (from 1st August 2011) was made in 2012/13 (Wheater & Cook 2013) which indicated a small decline in car usage by visitors (at least to the designated car parks) following charging, reducing the estimate of annual visitor numbers to around 540000. However, this was based on only one year of data following car park charging (in a year with poor weather on some peak periods) and did not take into account the closure of the Stag public house in August 2012. Other management changes have taken place since the last major survey, including the introduction of dog control orders in December 2014 and an increase in car park charging in April 2016. The current survey aimed to update the annual estimate taking into account as many changes as possible.

Survey objectives

1. Estimate the annual total of visitors to Burnham Beeches.
2. Estimate the total annual numbers (and where possible the associated errors) in the following categories:
 - a. Cars (including vehicle occupants: adults and children), identifying whether changes to car parking charges have had an impact on vehicle usage;
 - b. Pedestrians (adults and children);
 - c. Wheelchair users;
 - d. Cyclists;
 - e. Horse riders;
 - f. Dogs (including those arriving by car and those with walkers).
3. Update the model produced in 2010/11 to enable ATC data to be used to estimate annual visitor numbers in the future.
4. Examine the possible impact of type of day (bank holidays, weekends and weekdays) on the numbers of visitors.

5. Examine changes over time (where possible across all three surveys: 2002/03, 2010/11, and 2015/16).
6. Begin to establish if there are changes to the visitor numbers as a result of the weather on particular days

Methods

Survey methods

A selection of entrances and times of the year were used for the survey based on refinements of the original survey in 2002/03 and the follow up survey in 2010/11. Nine entrances were surveyed to examine the changes in management (especially the introduction of charges) since the last survey and to include a new entrance (Currier's Lane). This latter entrance seems to be used more than in the past, when it was not really considered an entrance to the site. Pumpkin Hill was initially counted since it was seen as a (minor) entrance in previous surveys. However, the small car park associated with it has now closed and it became evident that it is no longer being used. Since 2007, the only entrance through which vehicles can enter is Lord Mayor's Drive East (LMDE) which was surveyed to count the different types of vehicle entering and to gain occupancy rates for adult and child passengers and any dogs carried within the vehicles. All entrances were surveyed for pedestrians, counting whether they were adults or children and whether they entered on foot, in wheelchairs, using cycles, or on horseback. Smaller entrances (allocated as such following previous surveys) were observed for less time than were more major entrances (Table 1).

Table 1 **Entrances surveyed**

Entrance	Extent of Survey (hours*)
Bedford Drive	35
Coronation Cottages	37
Currier's Lane	21
Egypt Lane	27
Lord Mayor's Drive East**	99
Lord Mayor's Drive West / The Dell	96
Park Lane	25
Pumpkin Hill	1
Stag car park	32

*Rounded to the nearest hour

**Vehicles were surveyed for 105 hours on LMDE to cover approximately the same time periods as the surveys for pedestrian traffic

Thirteen survey dates were chosen during 2015/16 to cover the entire year, with one bank holiday, six weekdays and six weekend days (including several roughly half day samples to cover the morning and afternoon of paired days within a selected

week or weekend). Weekday surveys usually took place near to either weekend or bank holiday surveys (see Table 2).

Table 2 Survey dates 2015/16

Date	Day	Type of Day	Number of Survey Hours*
1 st November 2015	Sunday	Weekend	34
3 rd November 2015	Tuesday	Weekday	31
16 th December 2015	Wednesday	Weekday	33
23 rd January 2016	Saturday	Weekend	36
12 th March 2016**	Saturday	Weekend	20
13 th March 2016**	Sunday	Weekend	22
22 nd March 2016	Tuesday	Weekday	32
2 nd May 2016	Monday	Bank holiday	44
14 th June 2016**	Tuesday	Weekday	20
15 th June 2016**	Wednesday	Weekday	12
27 th July 2016	Wednesday	Weekday	44
30 th July 2016**	Saturday	Weekend	17
31 st July 2016**	Sunday	Weekend	29

*Rounded to the nearest hour

** Half day surveys covering the morning or afternoon of paired days for 2 weekend and 1 weekday surveys

Automatic Traffic Counters (ATCs) have been employed at the entrance / exit of Lord Mayor's Drive East since 2008. Since then daily records have been collated, on a monthly basis, and used to inform management. The ATC counts coinciding with the periods of survey (days and, as far as possible, particular hours) were extracted from the ATC database and compared with the observer records from the survey. It should be noted that some ATC data are missing due to breakdown of the system over the years (including whole months for September and October 2011). For ATC data to be valuable in estimating visitor numbers, it was important to be able to identify the occupancy rate of the vehicles for each category of visitor (adults and children) and how many dogs are carried in vehicles. On each survey date, the number of vehicles entering the site (via LMDE) were counted and classified according to type: cars, people carriers, mini-buses, coaches, motorbikes and vans/lorries. Vehicles were stopped and the number of occupants (adults, children and dogs) were recorded in each. For all the entrances surveyed, the numbers of visitors were counted and identified according to whether they were adults or children and what mode of transport they were currently using (walking, using a wheelchair, cycling, or on horseback) and how many dogs (if any) they had with them. Note that it was not possible to distinguish people arriving by car and parking up outside the site from 'true' walkers. Survey data were collected by a number of

different observers (Burnham Beeches staff and volunteers) who were trained by staff at Burnham Beeches. A bespoke recording form system was employed using two types of form: for vehicle numbers and occupancy at LMDE, and for visitor numbers (except those in cars at LMDE) at all entrances. Data were then entered into a database written in MS-Access, which used entry sheets replicating the data recording sheets to reduce data entry error. Data entry was by Burnham Beeches staff and volunteers. Data were cleaned and error checked by the authors in consultation with the original data recording forms and staff at Burnham Beeches. The number of data errors were extremely low, reflecting the care taken by the team of volunteers and the design of the data recording and management systems used.

Data analysis and visitor number model

Data were extracted from the database (MS-Access) into MS-Excel for checking, manipulation, screening and first stage analysis. Subsequent analysis used StatView (V5.0.1) and FCStats (a statistical program written by the authors using MS-Excel). Graphs were produced using MS-Excel and StatView. The visitor number estimation model designed by the authors in MS-Excel following the 2002/03 survey (and updated in 2010/2011 and 2012/13) was refined to:

- a) include updated conversion factors (used to estimate total visitor numbers from the ATC data) based on improved data from this more extensive survey utilizing more entrances, covering a wider period of the year, and targeting the different types of visitor entering the site;
- b) incorporate changes to visitor practice over the years (e.g. car occupancy and mode of access);
- c) take account of changes to management (e.g. changes to car parking including charging).

Errors were estimated based on the variation between samples and also on differences between ATC and survey data. The ATC data extracted were matched as far as possible to the same time periods as the survey data, giving comparisons of the numbers of vehicles entering the site.

Daily traffic data were also examined against solar radiation for the 2016 records. In addition, where possible, ATC data were modelled against the known parameters calculated at each survey point (2002/3, 2010/11 and 2015/16) to look for trends against changes in management (i.e. for vehicle access and charges).

Survey Results and Discussion

A wide variation of counts were found from the surveys (Table 3) with most visitors (adults and children) arriving on the Bank Holiday and weekend days compared to weekdays (Table 4). The majority of vehicles accessing the site are cars and people carriers (Figure 1), although a number of lorries and vans were also present (some of which may contain genuine visitors, whilst others were service vehicles for the site, including the café). People carriers are sometimes difficult to distinguish in terms of seat number since they vary in this and some seats may be folded at the time of the survey, hence being difficult to record in a consistent fashion. It is therefore reasonable to combine these categories since the majority of other cars have five seats. Few mini-buses or coaches were recorded during the surveys and hence do not seem to have a major impact on vehicle numbers. Although, where these are used by school groups they may impact on the estimates of the numbers of children entering the site. Smaller motorbikes, mopeds and scooters may not trigger the ATCs, and the relatively low numbers of these recorded during the surveys suggest that any omission from the ATC data is unlikely to be a significant source of error in estimating visitor numbers.

Table 3 *Summary of vehicular access at Lord Mayor's Drive East (numbers per hour of the surveys)*

Type of day	Number of vehicles	Adult passengers	Child passengers
Bank Holiday	31.3	57.6	21.0
Weekend	42.9	76.2	24.7
Weekday	34.1	49.7	8.7

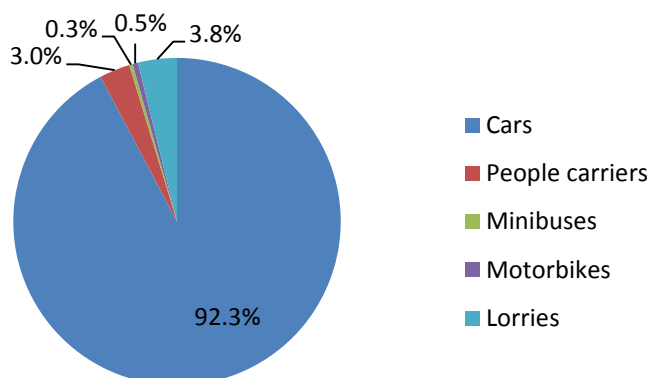


Figure 1 *Types of vehicles accessing the site*

Table 4 Summary of non-vehicular access
(numbers per hour of the surveys)

Entrance	Type of Day	Adults walking	Children walking	Wheelchair users	Adults cycling	Children cycling	Adults on horses	Children on horses
Bedford Drive	Bank Holiday	7.5	1.8	0.0	0.0	0.5	0.0	0.0
	Weekend	9.8	1.5	0.7	0.3	0.1	0.0	0.0
	Weekday	4.7	0.9	0.0	0.0	0.0	0.0	0.0
Coronation Cottages	Bank Holiday	2.3	0.0	0.0	1.0	0.0	0.0	0.0
	Weekend	6.7	0.7	0.0	0.1	0.4	0.0	0.0
	Weekday	4.7	0.5	0.0	0.2	0.0	0.0	0.0
Currier's Lane	Bank Holiday	2.8	4.0	0.0	0.0	0.0	0.0	0.0
	Weekend	3.2	0.4	0.0	0.0	0.0	0.0	0.0
	Weekday	2.0	0.0	0.0	0.0	0.0	0.1	0.0
Egypt Lane	Bank Holiday	10.3	0.3	0.0	0.0	0.0	0.0	0.0
	Weekend	5.1	0.2	0.0	0.9	0.4	0.0	0.0
	Weekday	3.5	0.2	0.0	0.2	0.0	0.0	0.0
Lord Mayor's Drive East	Bank Holiday	23.5	4.2	0.0	3.7	1.9	0.2	0.0
	Weekend	21.9	4.7	0.2	4.0	1.0	0.2	0.1
	Weekday	8.5	1.3	0.1	1.8	0.4	0.0	0.0
Lord Mayor's Drive West	Bank Holiday	4.7	1.0	0.0	1.0	0.5	0.0	0.0
	Weekend	7.7	0.8	0.0	0.2	0.0	0.0	0.0
	Weekday	4.5	3.5	0.0	0.0	0.0	0.0	0.0
Park Lane	Bank Holiday	5.7	0.3	0.0	0.7	0.3	0.0	0.0
	Weekend	7.8	0.5	0.0	0.5	0.0	0.0	0.0
	Weekday	2.2	0.1	0.0	0.8	0.0	0.4	0.0
Pumpkin Hill	Weekend	2.0	0.0	0.0	0.0	0.0	0.0	0.0
Stag car park	Bank Holiday	7.6	2.3	0.0	2.9	0.7	0.0	0.0
	Weekend	12.9	3.0	0.0	2.5	0.3	0.0	0.1
	Weekday	4.3	0.4	0.0	1.8	0.0	0.1	0.0

Comparison of entry points

During 2015/16, the proportion of visitors entering through each point showed some changes compared to 2010/11 and 2002/03 (Figure 2). In the main, there has been an increase in the proportion of visitors seen at Bedford Drive, Coronation Cottages and Lord Mayor's Drive East. There have been decreases at Park Lane and (especially) Lord Mayor's Drive West / The Dell.

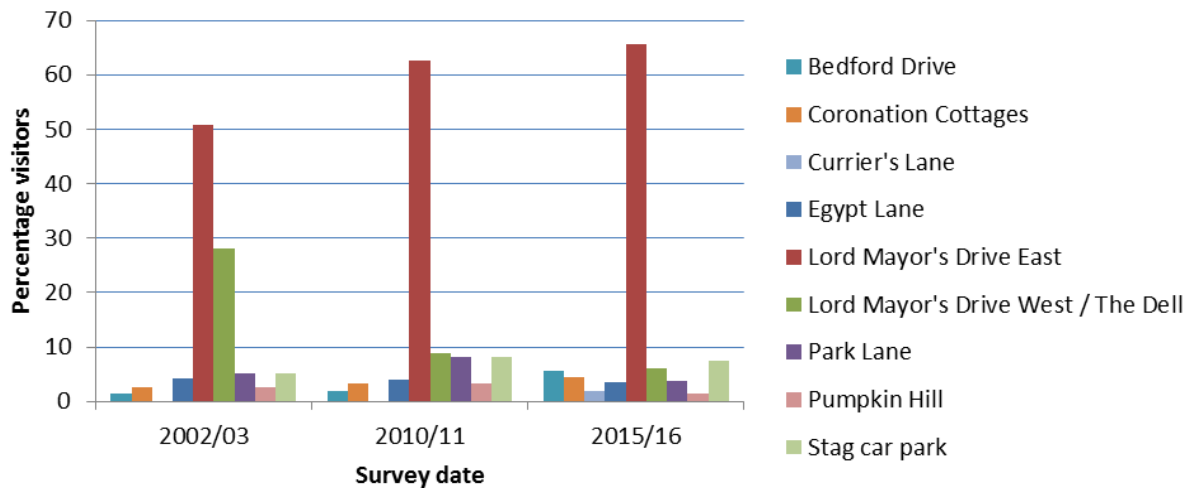


Figure 2 Percentage visitors accessing each entrance

NB: the figures for Bedford Drive, Coronation Cottages and Park Lane for 2010/11 are calculated on the basis of surrogates identified from the 2002/03 survey and there were no counts at Currier's Lane before 2015/16.

Impact of type of day on visitor numbers

There is a variation between the visitor numbers with type of day, with weekdays being (unsurprisingly) lower than both the weekends and the May Bank Holiday Monday surveyed for both adults and children (Figure 3).

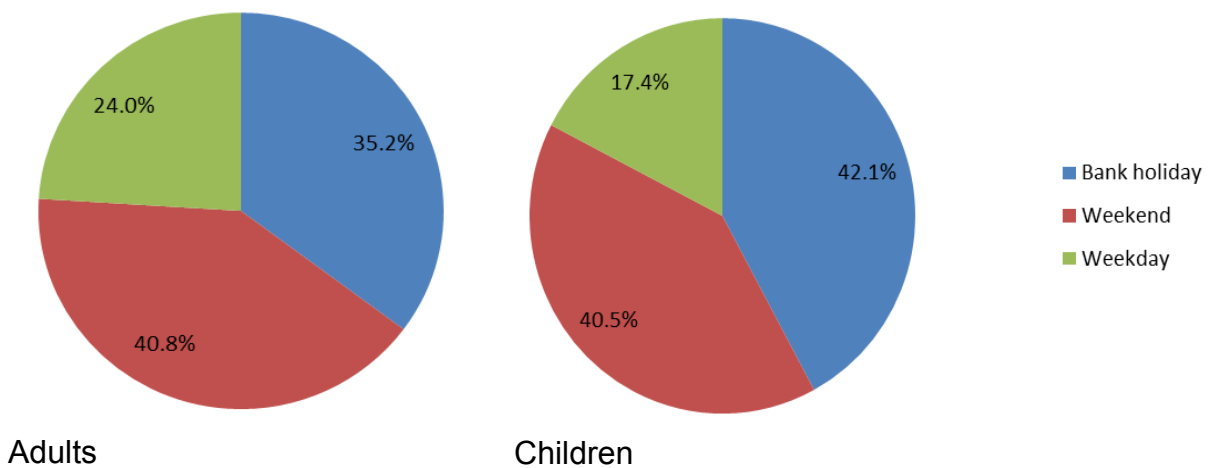


Figure 3 Percentage visitors accessing on each type of day surveyed
Based on daily means

Type of visitor and access type

From the estimates, around 83% of visitors to Burnham Beeches are adults and most of these (over 50%) travel by car through Lord Mayor's Drive East (Figure 4). Taking into account that nearly 60% of children enter the site by car through LMDE, and that the number using cars and then walking in through other entrances has not been estimated during this survey, it can be seen that car travel is the most important route to the site. This confirms the estimate of 69% of respondents to the Public Consultation in 2009 stating that they travelled by car (Wheater 2009). However, it should be noted that the number of vehicles has declined (at least through Lord Mayor's Drive East) over the years (Figure 5). The chart is broken down by month showing clear peaks in October, reflecting the interest in the site during the most impressive stage of "autumn colours". Cycling is not an insignificant mode of transport for either adults (5.2%) or children (4.4%). Horse riding is at a lower level and restricted to a small number of entrances. There are relatively few visitors who are wheelchair users which may reflect the level of need or be indicative of issues of access (e.g. appropriate surfaces). Of course more wheelchair users may enter through LMDE by car and park on-site.

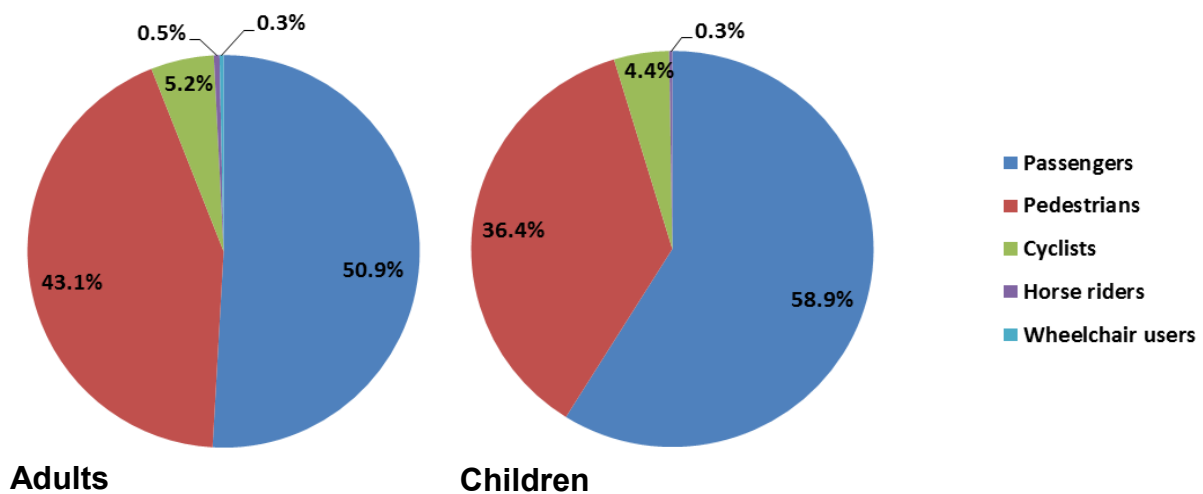


Figure 4 Comparison of modes of access

* Note that pedestrians includes those arriving by car and parking off-site before walking into the site.

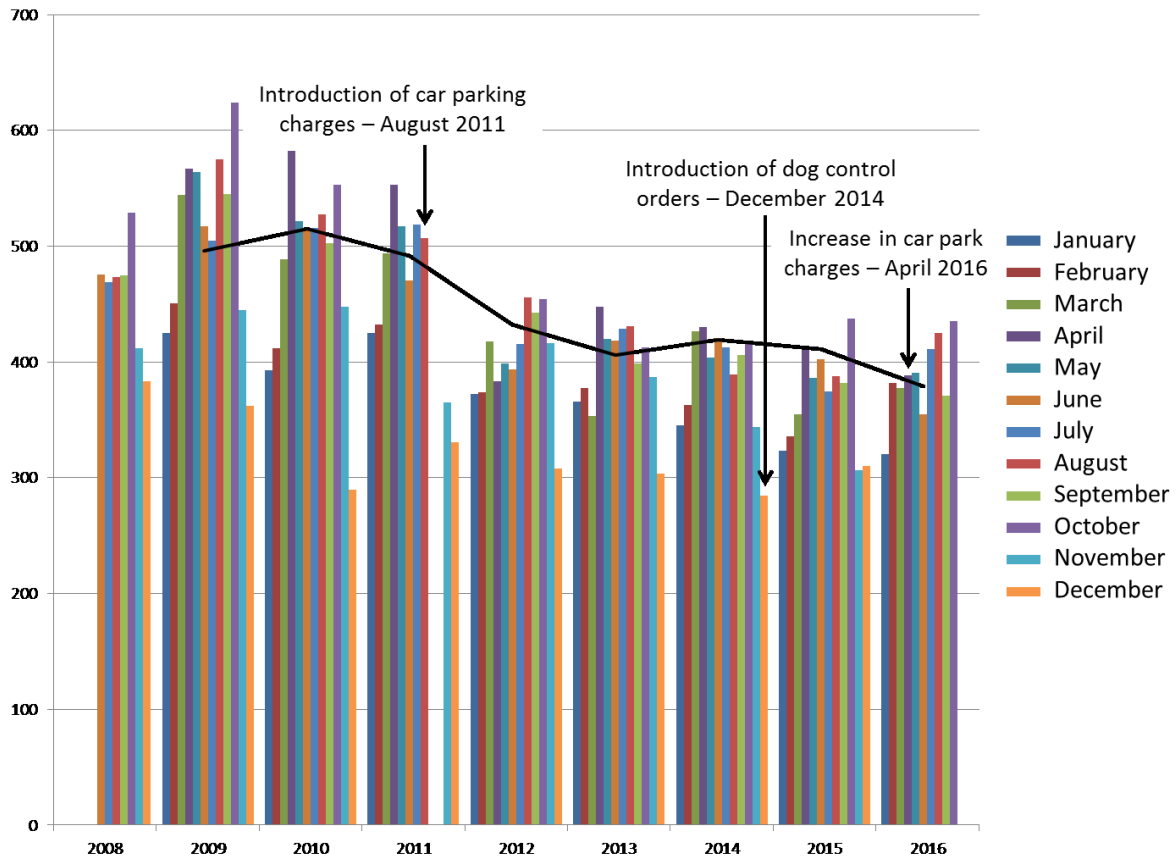


Figure 5 Vehicle numbers over time
(the solid black line indicates a moving average across the years)

Comparison of ATC and observation data

Readings taken from the ATC and observational data on the same dates showed absolute differences between these of between 0.1% and 26.6% (an average of 10.9% of the mean traffic levels overall). The ATC data were more frequently lower than the survey counts which may be due to averages for the former being influenced by low counts towards the beginning of the first hour and end of the last hour of data capture (ATC data were reported in blocks of hours whereas survey counts were given to the minute). This may also explain why the shorter survey periods (half days) tended to show larger mismatches between the two data types, because the quieter hours will be disproportionately represented in these data. There were also some breaks taken by observers during the day in some surveys which cannot be fully accommodated in comparisons since the ATC data are measured over whole hours. It is not known how representative such differences are over the whole year and what influences year and day may have. However, individual daily differences may cancel out since over the whole survey period there were 37.9 cars per hour observed *cf* 37.3 per hour recorded by ATCs (an average difference of 1.6% on mean traffic levels overall).

There have been some errors creeping into the ATC data, exacerbated by failure of counters. However, in 97.1% of occasions from June 2008 until October 2016, the differences between the survey and ATC data were within 20% of the average of the two. There is a tendency for the incoming ATC to record more than the outgoing ATC. It is likely that such anomalies are due to the location of the ATCs and/or problems with localised parking forcing motorists to avoid one ATC or another on occasions and hence being recorded as incoming, when leaving and *vice versa*. Since vehicles can neither be lost nor created on site, the average value of the ATCs has been taken as indicative of traffic levels. This situation has improved since 2010/2011, possibly by the movement of the ATCs and altering the junction so that counts now more accurately reflect the true flows of traffic.

There was an increase in traffic along Lord Mayor’s Drive from 2008 to 2011 followed by a fall as charges were introduced. There has been an additional small decrease in 2015 and 2016 but there does not as yet appear to have been a noticeable reduction in traffic since the increase in charges in April 2016 (Figure 5).

Dogs

Dog walking is an important activity (29% of respondents – Wheater 2009) and of those walked in Burnham Beeches over the year (Table 5), 60.7% arrive by car through Lord Mayor’s Drive. Of those entering the site on foot, Bedford Drive and Egypt Lane have the highest numbers (Figure 6). Car occupancy of dogs is around 0.64 per car (ranging from about 0.4 on bank holidays, through 0.5 at weekends to 0.7 on weekdays). This range probably reflects the regular visitors by car who walk their dogs very frequently (possibly daily).

	2002/03	2010/11	2015/16
Annual estimate	128921	215502	142751
By car	99017	105341	86650
Walking	29904	105530	56101

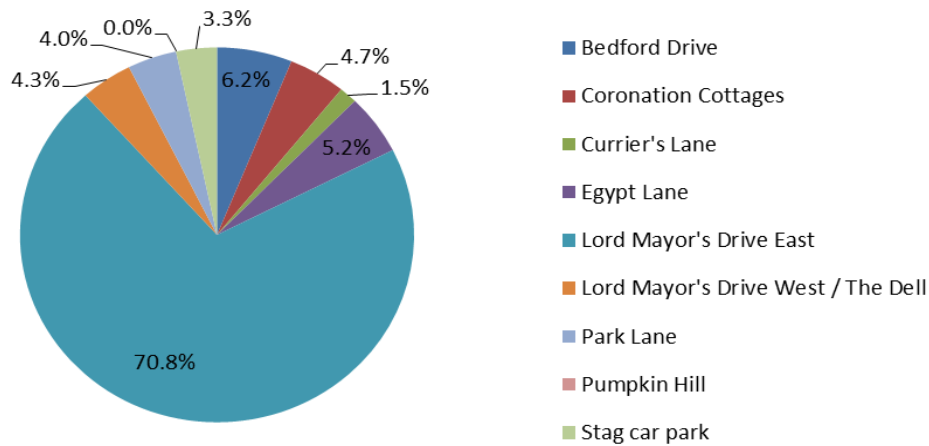


Figure 6 Entrances used by dog walkers

Weather conditions

The availability of a local weather station enabled a brief assessment of how changes in weather can impact on visitor numbers. For 2016, there was a strong correlation between the amount of solar radiation per day and the number of cars entering the site ($r_s = 0.568$, $n = 257$, $P < 0.0001$: see Figure 7). There are a number of outliers that were on days when filming or other events were taking place, leading to a larger number of vehicles than would perhaps be expected for the weather conditions at the time. If these outliers are removed this strengthens the correlation ($r_s = 0.710$, $n = 243$, $P < 0.0001$).

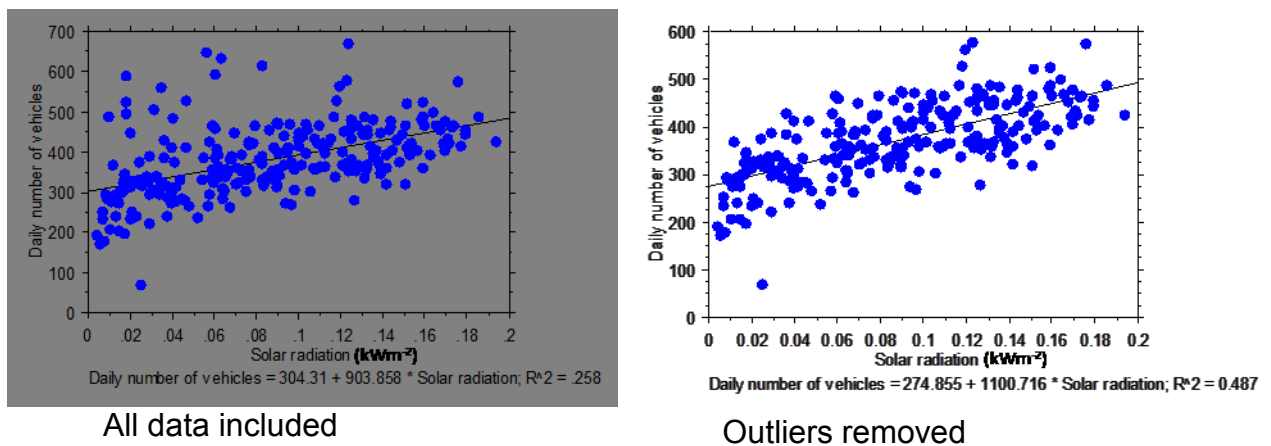
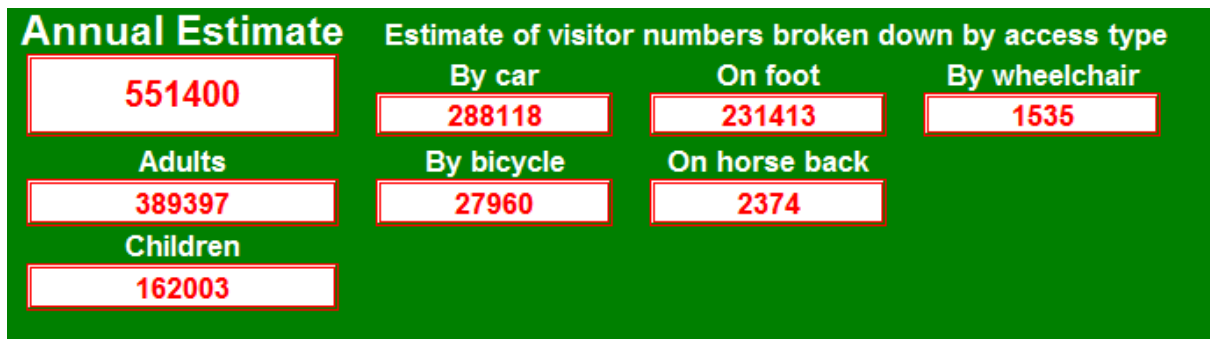


Figure 7 Scatterplots of daily number of vehicles against solar radiation

Model

A model for estimating visitor numbers was originally produced in 2002/03 and refined in 2010/11 and 2012/13. This uses ATC data to estimate visitor numbers on the basis of knowledge of the proportion of visitors entering via LMDE and the car occupancy of adults and children. The model provides the capability of being updated in several ways: adding current ATC data; amending the mean occupancy levels in vehicles; and amending the proportion of visitors using different modes of access. The latter two points require observational surveys to validate changes over time and with modified management practice. Using the updated model with current mean car numbers from ATC data, and updating both occupancy levels and the ratio of modes of transport to access the site (from the survey), the new model gives estimates for 2015/16 of:



NB: due to rounding errors, the totals in the model and those elsewhere in the report may not match perfectly

The model can be used in several ways to generate future estimates:

- by inputting ATC data for different types of days either across a season or using mean values per day type (NB: if using mean values in the model, the “number of days observed” should be set to 1);
- by modifying the car occupancy after short term additional surveys to check that the original estimates stand;
- by including peak days such as Autumn colour or particularly warm weekends in Spring and Autumn (NB: the assumption at present is that for such peak days, peak weekends equate to bank holiday levels of visitors, whilst peak weekdays equate to weekend levels of use. It would be desirable to test this assumption further using ATC data).

Comparisons between surveys

Several changes are apparent here between the survey periods. Modelling visitor numbers using the conversion factors calculated from the early (2002/03), mid (2010/11 and updated in 2012/13), and later (2015/16) models show an initial rise in

visitors from 2008 to 2010/11 followed by a decline at the time of the introduction of car parking charges. These estimates stayed reasonably consistent during 2012 to 2014 and then rose slightly for 2015/16 (Figure 8). These data assume that the vehicle usage and car occupancy rates stayed consistent between surveys. If these variables changed earlier, then the increase shown here for 2015, would have occurred earlier in the cycle. It is interesting to note that dog control orders came in on 1st December 2014 which might have influenced some visitor numbers associated with dog walking.

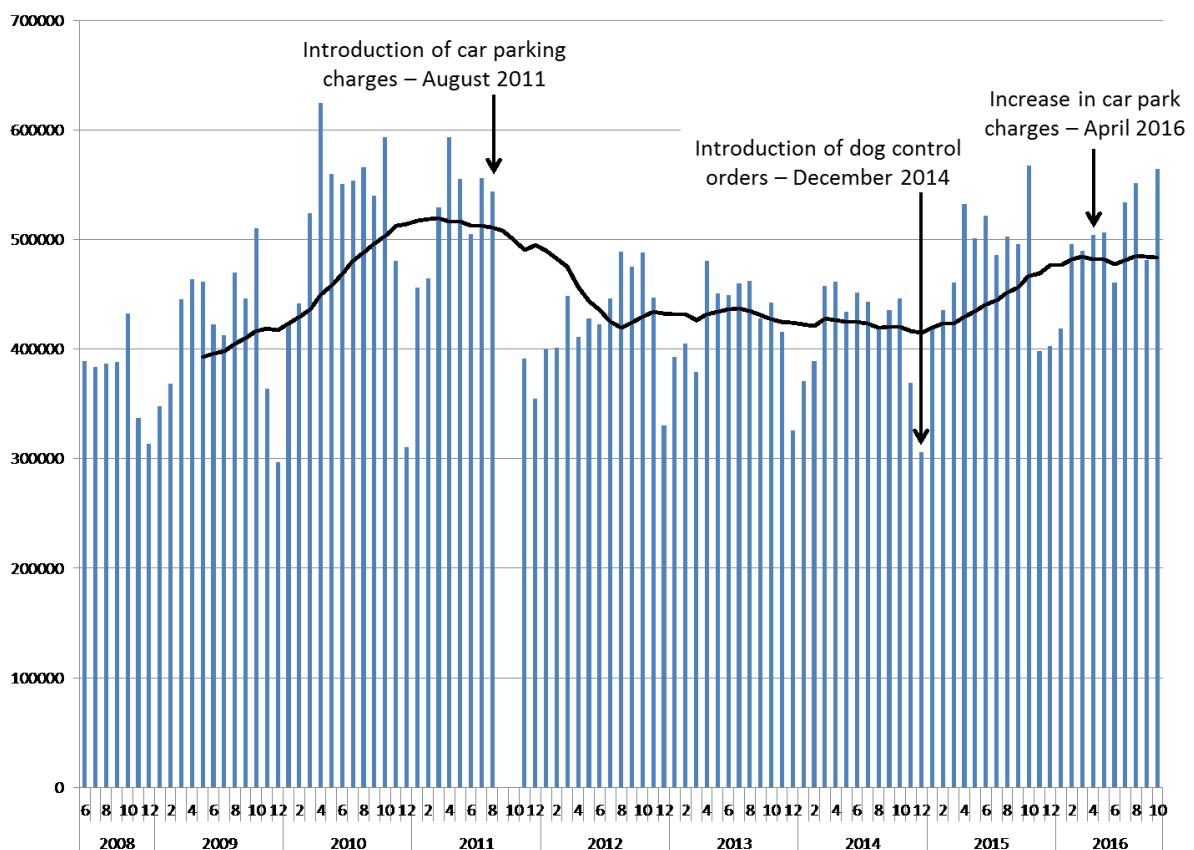


Figure 8 *Estimates of annual visitor numbers based on monthly ATC data*

The bars indicate annual visitor number estimates based on modelling individual monthly ATC data using the model produced at the preceding survey. The solid black line indicates a moving average across the years. Note ATC data are missing for September and October 2011

The three models give different estimates for each type of visitor (adult and child) and for different types of access (Table 6). These estimates do indicate relatively stable annual visitor numbers with car use reducing and foot traffic and cycling increasing. There are similar wheelchair usages, although in all surveys these may be an underestimate if those entering by vehicle through LMDE were not recorded.

The changes in horse riding may be due to the reduced number of entrances surveyed in 2010/11 and the “real” numbers may be similar to the 2002/03 and 2015/16 estimates. All of the estimates, except for the update in 2012/13, used the associated surveys to provide occupancy numbers for vehicles and the ratios between the number of visitors entering the site by vehicle compared to other modes of transport.

	2002/03	2010/11	2012/13*	2015/16
Overall visitors	482776	585106	540918	551400
By car	372764	327917	303152	288118
On foot	81415	230818	213387	231413
By wheelchair		1574	1455	1535
By bicycle	25685	24229	22399	27960
On horseback	2912	474	438	2374

* Estimates for 2012/13 used the same parameters as the model produced for 2010/11 with updated ATC data.

The estimates in Table 6 are based on different vehicle occupancy rates identified during the three surveys (Table 7). It is interesting to note that for both adults and children, car occupancy has increased over the years, whilst the proportion using cars seems to have reduced, and the annual estimated number of visitors remains very similar. But it is worth noting that there may be an underestimate of car usage by those not parking in official car parks.

	2002/03*	2010/11	2015/16
Adults Bank holidays		1.71	1.87
Adults Weekends	1.68	1.70	1.76
Adults Weekdays	1.41	1.44	1.40
Children Bank holidays		0.56	0.68
Children Weekends	0.33	0.49	0.57
Children Weekdays	0.19	0.22	0.24

*Bank holidays were not surveyed in 2002/03

Similar patterns to visitor numbers were found for dogs on site with a more dramatic increase in the early years followed by a reduction after 2011 and a further smaller reduction in 2015/16 (Figure 9). Again, care must be taken to recognize that car occupancy of dogs (Table 8) and usage of different entrances by dog walkers are captured at fixed points (at the times of the various surveys) and are applied in the model from the survey date onwards. However, the underlying change in behavior may have occurred earlier in the cycle. In addition, in the early (2002/03) survey vehicles were not stopped so dogs were estimated visually as they drove past. This was likely to give an under estimate of the numbers of dogs being carried in cars. Further, the early data also included some vehicles (around 17%) that appeared to be using the site as a short cut which would complicate estimates of those using the site for dog walking. The lower number of smaller entrances surveyed in 2010/11 may have introduced errors in estimating the ratios between those driving dogs onto the site and those walking them in. Bedford Drive, Coronation Cottages and Park Lane were not surveyed in 2010/11 but contributed around 15% of dog walkers in 2015/16, a smaller estimate than was made using surrogate entrances in 2010/11.

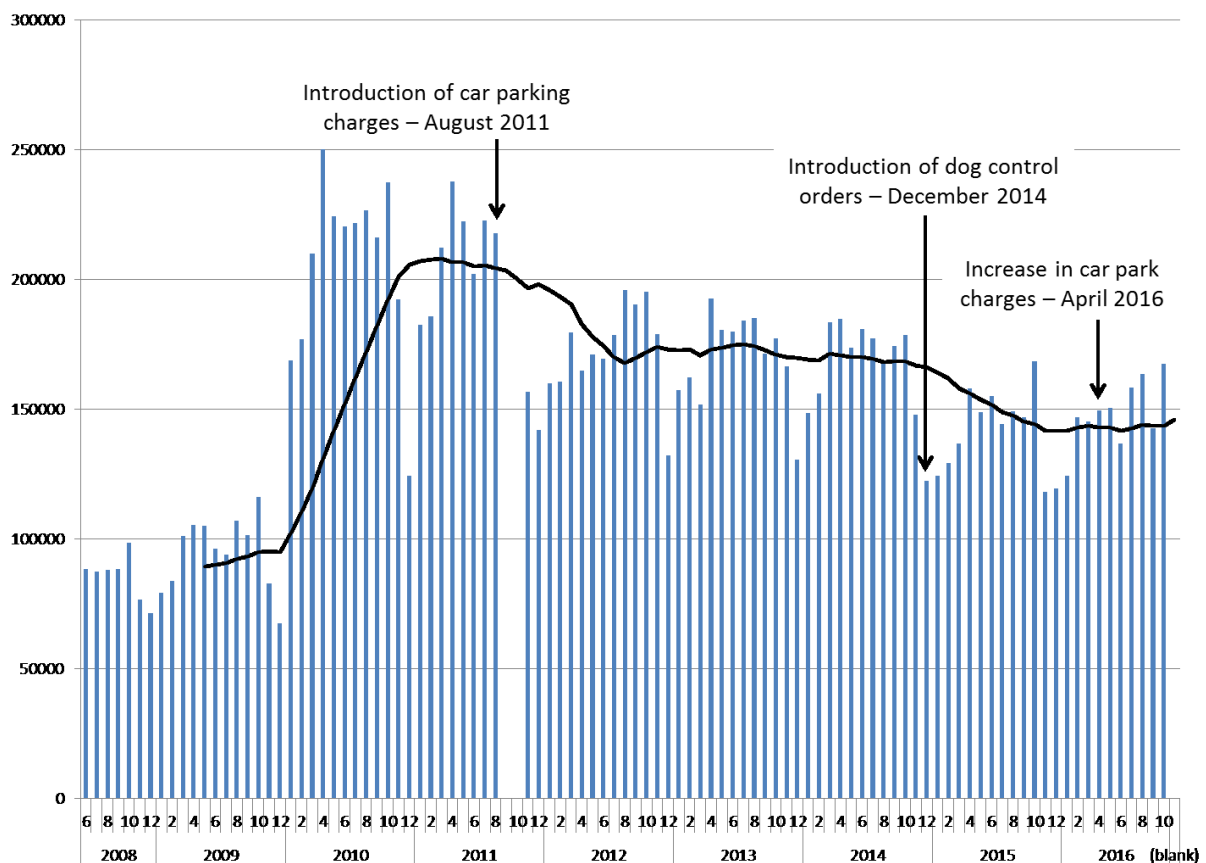


Figure 9 *Estimates of annual dog numbers based on monthly ATC data*

The bars indicate annual visitor number estimates based on modelling individual monthly ATC data using the model produced at the preceding survey. The solid black

line indicates a moving average across the years. Note ATC data are missing for September and October 2011

Table 8 Comparisons of car occupancies of dogs between surveys

	2002/03*	2010/11	2015/16
Bank holidays		0.530	0.396
Weekends	0.384	0.532	0.512
Weekdays	0.402	0.667	0.701

*Bank holidays were not surveyed in 2002/03

Limitations

As with all surveys based on relatively low numbers of samples (due to resource limitations), the number of replicates (particularly the low number of bank holidays surveyed and the lack of replicates within each season for each day type) influences the reliability of the estimates. The reliance on the entrances in 2010/11 showing similar patterns to those in 2002/03 may have led to increased error, especially since the management has changed over the years. Therefore in 2015/16, increased effort was put in place to cover all the entrances (*cf* 2010/11) but at the cost of reducing the number of hours surveyed at each entrance.

Changes in management (including the introduction of dog control orders) could have impacted on the proportions of people using the different modes of transport and entrances used to access the site. Changes to car parking in between surveys (including increasing charges) may also have had an impact. Such changes can only be picked up by the surveys and cannot be accommodated by the model based on ATC data between surveys.

No counts were specifically targeted at events or periods of particular interest such as the 'autumn colour' period when numbers may be particularly high during times of good weather. The survey in November does cover this period, but did not show elevated visitor counts compared to a few months later. However, weather conditions at this time of year may be particularly influential on visitor numbers.

Conclusions

The 2015/16 survey has demonstrated reasonable levels of similarity between the observations and the ATC counts for traffic. The updated model builds on those previously produced to update, and improve the accuracy of, the car occupancy figures, improve the knowledge of visitor activity across the year and on different types of days, and establish the patterns of usage at minor entrances in comparison with the major one at Lord Mayor's Drive East. The updated model provides an estimate of 551400 visitors per year in 2015/16, a 1.9% increase on the previous estimate from 2012/13.

Recommendations

The ATC data along Lord Mayor's Drive should continue to provide a reasonable data source for the estimation of visitor numbers until significant changes in visitor behavior occurs. The model allows either accumulated data (from many days) or means (by entering the 'number of days sampled' in any day type as '1') to be entered. This refined model does provide very similar results to the estimates obtained directly from observations during the survey and should enable a larger degree of variation to be accounted for.

This model relies heavily on the ATC data as a proxy for visitor numbers. The extent to which this is valid depends on the impact of changes to the management of the site. Therefore, a priority for future surveys should:

- a) use the same methodology to identify any changes resulting from changes to car parking charges.

Further surveys could also:

- b) maintain coverage of minor entrances to ensure that variation across entrances is adequately covered;
- c) increase coverage of seasonal/daily variation covered fairly lightly or not at all in this survey (e.g. peak colour, seasonality, time of day, bank holidays);
- d) include some early morning counts of visitors (especially in the summer months) to capture data on (especially) early morning walkers;
- e) identify the number of people arriving by car at the minor entrances (this could be included in future surveys and could be checked by "quick and dirty" counts of the proportions entering the site having parked, compared to the total number walking onto the site);

- f) examine the impact (if any) of the dog control orders on dog walking and the associated modes of access (including by using the dog transect data currently being obtained).

It would also be relatively straightforward to further develop the model using ATC data by including the incorporation of additional factors such as:

- a) comparisons of the same time period before and after any management changes;
- b) further examination of the impact of weather conditions (using local weather data) to identify how the complexity of interacting variables may be used to predict visitor numbers – this should not need a further survey but could be modelled from weather data and the ATC counts;
- c) examination of seasonality including spring and autumn peaks;
- d) the influence of school holidays;
- e) the influence of special events;
- f) further quantification of the errors implicit in the estimates.

References

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