Estimating visits numbers: Infra-red and manual counts, and case study examples

1. General points on infra-red counters and manual counts

1.1 Installing infra-red and other counters

Clearly the characteristics of the site and the type of counter selected will affect these issues. Based on experience in installing infra-red and other counters, the following recommendations are made.

1. The number of counters needs to be sufficient to capture most of the visits to the site but not so many as to lead to many multiple passages.
2. The burden in terms of staff time for reading and maintenance needs to be considered when deciding on the number and type of counters to be installed. Walking along a river or seafront taking readings and checking a large number of counters can be very time consuming.
3. Sites under general surveillance or unobtrusive sites may reduce the risk of vandalism of counters, which can be high.
4. Firm fastening points and very robust counters are required as vandals have been known to remove or dismantle counters.
5. Access points need to be narrow enough to be within the range of infra-red counters and fixing points need to comply with the manufacturers instructions.
6. Places where people congregate and may stand in front of counters blocking the passage need to be avoided.
7. Sites where people pass for other purposes e.g. to visit cafes, toilets or visitor centres should be avoided.
8. Exposed sites should be avoided as some counters can be affected by wind.
9. The practicality of the siting for the purposes of maintenance and count reading should be considered.

Scottish Natural Heritage's Recreation and Access Officer, on the basis of their studies, may be able to provide general advice on locating and calibrating counters, on types of counter and on suppliers of counters. The Forestry Commission in Scotland is another possible source of advice.

In addition to installing and collecting people counter data, the following four steps need to be undertaken.

1.2 Manual calibration counts

The raw count data of passages past a point needs to be translated into adult passages past the point through manual calibration of the count data. Experience with infra-red counters has indicated that the raw count data generally substantially overestimates the number of adult visits. Overestimates may occur in the following ways.

1. Children and dogs may be registered.
2. An adult walking slowly may register more than one count.
3. Small vehicles: pushchairs, wheelchairs, bicycles, as well as ladders, long fishing equipment may register large numbers on the counter.
4. Children playing or running to and fro or people deliberately passing their hands in front of the beam may distort the count.
5. A visitor may pass a single counter several times during the course of a visit.

Underestimates can occur due to:
1. People standing in front of an infra-red counter blocking the beam.
2. Several people passing side by side, in groups

Manual calibration should be undertaken for an extended period at each counter. Scottish Natural Heritage in its recent information sheet (Scottish Natural Heritage, no date) advises that for each counter, a calibration survey should be undertaken over four or five periods of at least one hour covering a range of times of day and weekdays as well as weekends. Each separate survey period should cover at least 100 people and the length of survey time should be adjusted to ensure that that number is counted. The calibration for each counter should thus cover at least 300 to 450 counts

A calibration factor can then be derived for each counter:

$$\frac{\text{Number of eligible visitors (adults aged 18 and over) observed during the manual count period}}{\text{Counter reading during the manual count period}}$$

1.3 Survey data on passages past counters and correction for multiple and non-passes

Survey data are also required to estimate:

1. The proportion of visitors missed by the counters. It will normally be impossible to cover all the possible access points to a site and a site may be open along its boundary without defined access points. Therefore, it is necessary to establish how many visitor access the site without passing any of the counter points through a survey question on how the site was accessed.
2. The number of multiple passages past counters by visitors during the course of a visit. It is necessary to ask survey questions to establish which counter points the visitor has passed and how many times each point has been passed during a visit through a series of survey questions.

If a CV survey is undertaken, these questions can be incorporated into the CV survey questionnaire; otherwise a short personal interview survey of visitors incorporating these questions would need to be undertaken.

In the Cliftonville survey respondents were asked the following questions to correct for non-passage past counters and multiple passages:

Q1 'In the course of your visit today so far, how many times if at all have you passed each of these points?

Respondents were shown a card listing the 6 counter points and a map indicating their location

Q2 ‘ During the remainder of your visit today, how many times if at all, do you expect to pass each of these points?
Respondents were again shown the list and map.

From this survey data a counter correction factor for multiple passes and non passage -can be derived.

1.4 Calculation of visitor numbers where data are missing

Regression analysis can be used to predict what the visit numbers are likely to be at a counter for which data is missing for a particular day or period by using the relationship between that counter and another counter for which data is available.

1.5 Aggregation of the data over the year

Where, as is commonly the case, infra-red or other count data are installed for only part of the year, it is necessary to extrapolate from the data available to derive data for the year as a whole. Examples of different ways in which this may be done are given in the Cliftonville case study below (Figure 8.1). In addition, Green (2003) provides guidance and data on variations in visit numbers which can also be used as a guide (Table 1). It is noticeable that the pattern of visits over the year to different types of sites shows significant variations. Therefore, it is necessary to decide to which type of site: e.g. country park, heritage or RSPB reserve, the site under study is most similar. However, Green’s data for forest sites indicates that even between similar types of site, there can be marked variations in seasonal usage and this is also shown in Table 1 for country parks.

Table 1: Variations in visit numbers over the year (source: Green 2003)

	January	February	March	April	May	June	July	August	September	October	November	December
Total tourism trips by UK residents to England	0.46	0.54	0.66	0.80	0.79	0.73	0.85	1.00	0.77	0.75	0.52	0.75
National Trust properties	0.14	0.00	0.00	0.50	0.64	0.55	0.68	1.00	0.45	0.36	0.23	0.00
RSPB reserves	0.73	0.45	0.45	0.82	1.36	1.18	0.91	1.00	0.64	0.73	0.55	0.45
The Wallace Collection	0.00	0.00	0.00	0.91	1.00	1.03	0.96	1.00	0.85	1.01	1.12	0.92
Imperial War Museum	0.71	0.95	1.01	0.85	0.73	0.71	0.88	1.00	0.64	0.88	0.71	0.50
Cabinet War Rooms	0.39	0.44	0.69	0.60	0.68	0.77	0.89	1.00	0.74	0.73	0.51	0.38
HMS Belfast	0.33	0.48	0.57	0.77	0.51	0.51	0.75	1.00	0.44	0.64	0.30	0.25
Duxford	0.39	0.44	0.69	0.60	0.67	0.77	0.89	1.00	0.74	0.73	0.51	0.38
English Heritage - mean	0.06	0.11	0.28	0.39	0.50	0.83	0.72	1.00	1.06	0.39	0.22	0.06
Dinton Pastures Country Park	0.00	0.00	0.00	0.00	0.94	0.65	0.74	1.00	0.72	0.76	0.47	0.42
Wat Tyler country park	0.04	0.15	0.12	0.42	0.38	0.35	0.50	1.00	0.54	0.23	0.08	0.04

(Please replace this table with the one at the end with the figures filled in)

2. Case study of the calculation of annual visit numbers: Cliftonville, near Margate, Kent

2.1 Installing infra-red counters

As part of the assessment of the benefits of coastal recreation at Cliftonville, near Margate Kent in 1993, infra-red counters were installed by Thanet District Council. The seafront at Cliftonville under investigation comprised a section of about seven-eighths of a mile in length on three levels, the beach itself, a lower promenade on a concrete sea wall with slipways protecting eroding cliffs along part of the site and a cliff top with a promenade, shelters and grassed areas. Under the 'Do nothing' option without further cliff toe protection, cliff erosion would continue and damage to the beach, and cliff top promenade would be sustained and parts would be threatened with closure. Two options for cliff toe protection with a concrete sea wall and promenade or a rock faced sea wall and narrower promenade to protect areas currently without a sea wall were proposed.

There is open access to the cliff top at either end of the study area from the road and along most of the length of the cliff top promenade. There are three points where the cliff top promenade crosses a bridge and there is access to the lower promenade and beach from the cliff top at eleven points. Infra-red counters were sited by Thanet District Council at the following six points covering the main access points but not all of them and the use of the three levels and the length of the site.

1. Across Newgate Gap Bridge (Across clifftop promenade)
2. Walpole Bay stairs (stairs from cliff top to Beach)
3. Across Hodges Gap Bridge (across cliff top promenade)
4. Across the top of the Jet Ski stairs (stairs to the beach from cliff top)
5. Across Sackett's Bridge (across the cliff top promenade)
6. Across the top of Sacketts Gap (road leading from cliff top to beach)

Counter data were available for the period from April 14 to September 29 1993.

2.2 Manual calibration count methods

Manual counts were conducted to monitor and establish the relationship between the passages recorded by the counter and the actual passages by adult visitors to the seafront by two observers over a 5-week period from 30 July to 1 September. A 30-minute count was taken at each counter point on each of the allocated count days. The counter at which the observer started was rotated to ensure that manual counts were taken at each counter at different times of day.

A calibration count record was completed at each counter on a count calibration record form. The number on the infra-red counter was noted at the start and completion of the manual count. To obtain a detailed record of the number of adults passing the counter, passages were separated into the following categories:

Adults aged 18 and over

Children and young people under 18
Those of whose age the observer was uncertain
Dogs (any size)
Adults with other equipment were recorded separately e.g. a man pushing a woman in a wheel chair
An adult pushing a pram or pushchair containing a child;
An adult on or pushing a bike.

Additional comments on special factors affecting the count and the weather conditions throughout the day were noted in case they affected the reliability of the counter.

A counter calibration factor was then determined to correct for mis-counts due to environmental factors and invalid counts (e.g. passages of children or dogs etc.). The counter calibration factor was calculated for each counter for each day as:

$$\frac{\text{Number of eligible visitors (adults aged 18 and over) observed during the manual count period}}{\text{Counter reading during the manual count period.}}$$

2.3 Survey data on passages past counters and correction for multiple and non-passes

As infra-red counters were placed at only 6 points along the seafront, visitors could have been missed by the count or they could have been recorded more than once as they passed along the seafront.
Questions were therefore included in the CV survey to establish the number of multiple passages past each counter and the number of non-passages among the visitors who were interviewed on site.

Respondents were asked:
'In the course of your visit so far today how many times if at all have you walked across these clifftop bridges' and the names of the three bridges were then read out. They were then asked.
'How many times if at all have you used any of these ways down to the lower promenade and beach so far today' for eight access points including the three with infra-red counters.
Respondents were also asked on how many times they expected to use the same bridges and access points during the remainder of their visit. On the basis of this data, a counter correction factor for multiple passages could be calculated:

$$\frac{\text{the total number of passages past a counter point during visits indicated by the respondents}}{\text{the total number of respondents}}$$

Using the counter calibration factor for non-adults etc and the counter correction factor for multiple passages, overall adjusted count data for each counter point can be arrived at.

The calculation of this overall adjusted count data number using the counter calibration factor for non-adults etc. and the counter correction factor for multiple passages can be illustrated using the data in Table 1.

Newgate Gap: Overall adjusted count data for August 1 = $\frac{4753 \times 0.42}{2.94} = 679$

Table 2. Implementation of the correction factors calculated from the manual counts for August 1 1993

Date: August1 1993	Actual Daily infra-red count	Counter Calibration Factor for Non-adults etc. (constant)	Adjusted count data for non-adults etc.	Counter Correction factor for multiple passes (constant)	Overall Adjusted count data for August 1
Newgate Gap	4753	0.42	1996	2.94	679
Walpole Bay stairs	3036	0.58	1760	3.46	509
Hodge's Gap Bridge	2486	0.52	1293	2.07	624
Jet Ski	659	0.62	409	3.54	115
Sackett's Gap Bridge	3468	0.30	1040	3.04	342
Sackett's Gap	1334	0.33	440	3.04	145
	15,736				2,414

2.4 Calculation of visitor numbers where data are missing

Technical and other problems with counters meant that data were missing for some counters for some days. It was therefore, necessary to calculate the visit numbers where the data were missing to complete the data set. Using regression analysis, it was possible to arrive at regression equations with which to calculate the likely number of visitors past the counters for which data was missing on a particular day using data from the counters for which information was available. Table 3 illustrates these equations.

Table 3. Calculation of visitor numbers where data are missing

Infra-red counter point	Regression equation
Newgate Gap	= (1.54 Walpole Bay Stairs) + 488
Walpole Bay Stairs	= (1.74 Jet-ski Stairs) + (0.28 Newgate Gap) + 56
Hodge's Gap Bridge	= (0.25 Sackett's Bridge) + (0.49 Walpole Bay Stairs) + 464
Jet Ski Stairs	= (0.24 Walpole Bay Stairs) + 23
Sackett's Gap Bridge	= (0.82 Sackett's Gap) + (0.34 Hodge's Gap Bridge) + 290
Sackett's Gap	= (0.33 Sackett's Gap Bridge) + (0.21 Walpole Bay stairs) – 81.0

2.5 Aggregation of the data over the year

At Cliftonville, infra-red counter data were available from 14 April to 29 September 1993. Therefore it was necessary to extrapolate from this available count data to the annual visit data. The degree to which visit numbers vary over the year is the critical factor here. Furthermore, there is likely to be a marked seasonal variation in the types of visitor (local, day and staying) who visit certain types of site such as coastal sites although the variation may be less for river sites which attract a large number of local visitors (Fouquet *et al*. 1991). One method of expressing variation between visit numbers in different months of the year is by the ratio of the number of visits in the peak week (usually August Bank Holiday week) to those in the lowest week (usually sometime in February). For sites such as local parks this ratio can be as low as 4 to 1; for sites which attract mainly day and staying visitors the ratio can be as high as 40 to 1 (Collins 1977).

Two estimates of annual visit numbers were made using the weekly index of visitors (Figure 8.1) published by the Countryside Commission in 1977 (Collins, 1977). These figures have been computed from ticket sales to 5 Ancient monuments and 16 Forestry Commission sites in 1975. Over the period April to September for which infra-red count data were available, the visit pattern at Cliftonville was broadly comparable to that for the Ancient Monuments and Forests (Garner *et al*. 1994).

Two weeks which contained a full set of data for all counters were chosen as base weeks: July 6-12 and July 20-26. In order to estimate the visit numbers for each week of the year for which infra-red count data were not available, a visit ratio was calculated using the ratios in the Ancient monument data for the base week and the week for which data were not available. The visit ratio between the weeks April 6-12 and July 6-12 was calculated as follows:

40:77 = 40/77 = visit ratio 0.52.

(40 and 77 are the ratios in the Ancient Monument Index for the weeks April 6-12 and July 6-12 respectively shown in Figure 8.1)

As the visit numbers for the week July 6-12 were known to be 5,730 from the infra-red count, the visit numbers for the week April 6-12 could then be calculated using the visit ratio:

0.52 x 5,730 = 2976 visits for April 6-12.

The visit numbers for the other weeks for which there was no infra-red count data available were calculated in this way and a similar procedure was used based on the second base week, July 20-26 as a test of sensitivity. Total annual visit numbers were computed as 135,660 based on July 6-12 and
146,287 based on July 20-26 figures.

This procedure makes the assumption that seasonal visiting at the site will be similar to that at the Ancient monuments. These procedures are likely to give conservative estimates at any sites where there is a high proportion of local visitors. Visiting by local people is usually less spread more evenly around the year than would be the case at Ancient Monuments or Forests which tend to attract high proportions of holidaymakers and day visitors over summer and holiday periods. Furthermore the Ancient Monument data is very old and may not fully reflect current

holiday and visiting patterns. Where reliable year round data are available that are more recent, more local or comparable to the site under investigation an index based on those data could be derived and used in a similar way.

Figure 8.1 Ticket sales at 5 Ancient Monuments and 16 Forestry Commission sites in 1975 (weekly totals, indexed on the average of 5 peak weeks – w/c July 20 to w/c August 17)