RAPPORT

4 • 2005

Visitor studies in nature areas - a manual

Anders Lindhagen, Ingemar Ahlström

Skogsstyrelsen
www.svo.se

Author
Anders Lindhagen
Ingemar Ahlström

Photo
© Anders Lindhagen
Ingemar Ahlström

Paper
brilliant copy

Printed
JV, Jönköping

Edition
620 ex

ISSN 1100-0295
BEST NR 1737

Skogsstyrelsens förlag
551 83 Jönköping

Contents

Foreword

This handbook is a partial result of the ”Urban Woods for People” project which has been co-financed by the EU Life-fund.

The Swedish participants in this project have been the Regional Forestry Board of Mälardalen, the National Board of Forestry, the Municipalities of Haninge and Huddinge, the Royal Djurgården Administration and the Swedish Society for Disabled Persons.

Gunnar Nordanstig has acted as project manager for the operational production of this handbook. Ingemar Ahlström has contributed to the chapter on technical measuring equipment while Anders Lindhagen has written the remaining texts.

The handbook is mainly directed at administrators and managers of recreational areas but others that have an interest in the subject are of course welcome to use it. The overall purpose of the handbook is to describe a number of effective methods for learning more about those who currently make use of or those you would like to attract to a particular recreational area. This knowledge can then be applied for different purposes such as to increase the experience value of those who visit a recreational area or to rationalise the management and administration of it.

Introduction

This handbook has been produced with the purpose of facilitating communication between managers or administrators of a recreational area and those who visit the area. More often than not the manager is lacking information on those who visit a recreational area, how many they are, when they visit, what parts of the area are visited and what visitors actually do during their visit. With some guidance from this handbook knowledge about the visitors can be greatly improved and the manager can manage the area keeping visitor habits and desires in focus. In particular recreational areas close to urbanised centres are becoming increasingly more important for those who live in the vicinity and facilities, information and service can be enhanced functionally, practically and economically by knowing more about the visitors

A new form of land use

Over the last century, Swedish society has gone through immense change. Extensive urbanisation, in particular during period 1930-1970, has led to that about 80 % of the population now live in towns and cities. A great change in the Swedish landscape has also taken place during the same period. Traditional forms of farming and forestry have been replaced by modern methods. The use of energy to convert atmospheric nitrogen into a readily available form for plants is perhaps the most important driving force behind this landscape change. With intensive farming it became possible to grow crops with a higher yield on a significantly smaller land area. The herds of grazing livestock disappeared from the marginal lands which meant that large pastures became available for forestry.

Fig. 1 Nature especially adapted for outdoor life has been created almost all over the world. Picture from the Great Smokey mountains.

The development of new agricultural and forestry methods has led to today's situation where almost all semi-grazed land has disappeared. A landscape totally dominated by two landuse categories, production forest and fields, had now emerged. This modern landscape is considerably less accessible for people who want to get out and about compared to the pasture dominated landscape that was the norm a century ago. The pastures and meadows, have with the help of artificial fertilization and mechanization, become modern high yielding field units now only accessible during the late Autumn and Winter when they can be crossed without causing any damage to growing crops. Today dense spruce plantations replace the small fields and open landscape. The new production forest is more densely stocked, less accessible and more monoculture in its character compared to the more open grazed forests of the previous century.

The urbanised Swede has more seldom a personal relationship to forestry and agriculture. Second and third generation city dwellers lose contact with the surrounding countryside as they perhaps no longer have any direct contact to the land-based industries via friends and relatives. Even those who live in the countryside in smaller towns and villages live a different life compared to their ancestors. Most of them derive their income from sources other than from their countryside surroundings.

Fig. 2 Almost two thirds of the Swedish population pick berries or mushrooms every year.

The arrival of motorised transport as the dominant form of transport means that we travel far less on foot outdoors. The entire infrastructure, from a landscape perspective, has changed. Paths and rambling trails have, as a result of not being used, grown over and disappeared while a road network for motorised transport has developed instead. In other words the landscape has become easier to travel through by car and more difficult on foot.

Together the urbanisation process, landscape and infrastructure change have brought about a new situation which has led to a largely new form of land use. Recreational areas with facilities for outdoor pursuits, where nature is adapted and managed to fulfil the urban dwellers need of close contact with the outdoors, have been built close to urban areas. Recreational resorts have even sprung up on our coastal and mountain regions. This development is not unique for Sweden, nature areas manipulated for recreation and tourism purposes have developed in most parts of the industrialised world.

A large share of natural environments in major city regions can be classed as recreational land. Here agricultural and forestry management is adapted to suit a wide range of visitors and their outdoor motives. In addition, investments are made in facilities such as parking lots and outdoor centres as well as prepared trails, ski-tracks, stiles, campfire sites, shelters and notice boards. In more remote areas the natural environment tends to be less groomed and perhaps left to develop freely. But the need for facilities, preparation and steering of visitor flow remains.

Why measure outdoor activities?

Within a recreational area a whole range of different interests must be taken into consideration not least when planning and managing the area. There are almost an infinite number of values and benefits to take into account but they usually fall into one of four general categories:

Recreational values

Of course within a recreational area it must be possible for the general public to indulge in outdoor activities. Different visitor groups have different preferences in terms of the surroundings, facilities, crowdedness etc.

Nature values

The preservation of species, through habitat protection or continuation of a traditional management operation, may be an important aspect for many recreational areas. Quite often it is possible to combine high conservation values with high recreational values. However for certain visitor groups, a potential conflict between what is perceived as tidy and what is wild can arise.

Economical values

For every manager or administrator there are financial limitations, either in the form of an expenditure ceiling or a demand for a direct return on investment. Active forest and agriculture management can often help improve the bottom line.

Educational values

A fourth important function, especially for areas close to urbanised centres, is to use the outdoors for educational purposes. Letting children and young people come out and experience all the values of a landscape is particularly important. Within recreational areas there are plenty of opportunities to show and foster an understanding for both the conditions for the land-based industries as well as recreation and nature conservation.

Fig. 3 A stone becomes a horse. Only the imagination limits what Nature can be used for.

A good base for planning is needed to be able to take into account the different values in an effective management strategy. There is a need to know the lie of the land, the wooded areas, open ground as well as water within the area to be managed. This can usually be achieved by adapting existing forestry and agricultural planning models. Additionally one needs to document the nature conservation values within the area. Above all though the administrator needs to know what needs, wants and demands are made by visitors on the area.

A wide variety of surroundings is needed to cater for a diverse range of recreational activities. Visitors to a given recreational area have different opinions on how the landscape should be formed depending on their own particular recreational interests and requirements. A skier from southern Sweden may wish for trails through the forest several metres wide so that snow reaches the forest floor, while other visitor groups may prefer a narrower and less artificial path network. Some visitors favour a more park like area, whereas others prefer a less managed and wilder nature.

There are many questions that an administrator or manager of a recreational area can, and perhaps ought to, ask, for example:

- **How many people visit the area?**

  Is my area well visited in comparison to other recreational facilities?
- **Who are the visitors?**

  Are they families with small children, school classes, middle aged men or old age pensioners?
- **What do they do?**

  Is it bird watching or resting on a park bench?
- **Why have they chosen to come here?**
  Is it because it is close to their home or because the area offers qualities not readily available elsewhere?
- **Is it possible to increase the number of visits?**
  What are the reasons for not coming here? What barriers can be removed? Would new visitors perhaps disturb the outdoor experiences for those who already visit the area?

The more one reflects over this, the more issues are raised. How can we then find an answer to these issues?

One may assume that those who are educated to manage or design natural landscapes, such as foresters, biologists, agronomists or landscape architects, are also the best qualified to determine how a natural environment should be formed. More often than not the general public has too little knowledge, as regards nature and the possibilities about forming natural environments, to make any decision. As literally an expert in their field, a landscape architect, forester or biologist should be able to plan and decide what needs to be done in an area without first having to learn about those who visit the area or those they would like to attract. The problem with this assumption, as highlighted in several studies, is that as experts we have significantly different view of what a suitable natural environment should be like. Usually people like foresters and biologists tend to prefer a much wilder and inaccessible natural environment in comparison to the general public. Even landscape architects, it has be shown, differ from what ordinary Swedes ask for. This means that a recreational area manager must think “outside the box”, beyond his or her own points of references and reflect over the varying needs of visitors and potential visitors to the particular area to be managed.

Knowledge about the general public’s outdoor habits and preferences as regards outdoor environments proves valuable even for large-scale planning. Quantitative variables such as visitor numbers, age and gender distribution are important when for instance an urban district council is weighing investments in recreational areas against other investments in a local council budget. Furthermore such statistical information is needed when deciding on where to build new housing estates or draw a new stretch of road.

In other words there are several of good reasons for learning more about visitors to the recreational areas under ones management. Furthermore there are several useful methods for acquiring this knowledge.

This handbook seeks to describe how one can learn more about the people who visit recreational areas. Tried and tested methods for establishing how outdoor activities are pursued expressed in both quantitative and qualitative terms. Measuring outdoor pursuits has been much more common outside Sweden, especially in North America but also in Europe in countries like the UK, Denmark and Finland. These international experiences together with experiences from Swedish circumstances form the basis for the advice given in this handbook.

The first few chapters deal with theoretical terms and straightforward statistical methods that simplify both the design of the research and the interpretation of the results. Follow the advice given in these chapters and you can be assured of getting reliable results for the effort. There are countless examples of surveys that have provided useless results as a consequence of poor organisation during the planning phase. After the introductory theoretical section, follows a more practical description of the different methods that are useful for visitor studies.

Terms and calculations

Quantitative terms and units of measurement

When discussing recreational areas we often speak of visits and visitors and it is important to distinguish between the two terms. What piece of information is it we actually interested in finding? What is possible to measure with a certain piece of equipment or measurement method?

If we want to be able to compare the usage of a recreational area close to an urban centre with other locations that are used for leisure, for example Skansen or the National Museum, then we must pay careful attention to the terms used. Stadsskogen in Uppsala has registered around 540 000 visits per annum, which is a comparable level with the number of visits to the National Museum in Stockholm. Are these two places comparable as recreational locations? No of course not. Those who visit the Stadsskogen are mainly regulars and they visit the same location as much as 50 times a year. In other words, about 25 000 different people, **visitors**, account for the 540 000 or so **visits**. The National Museum on the other hand, has a much larger proportion of visitors who visit the museum a few times a year or even less often. Many of them come from other parts of the country or from other countries and perhaps visit only once or a few times in their lifetime. In fact, 80 % of the visitors to the Stadsskogen live within 2 km from it, whereas the National Museum has visitors from all over the world. The point is that a simple measurement of the number of visits can, at face value, be perceived to be of equal benefit but on closer examination are shown to be entirely different.

Therefore, in order to know what it is we measure we first need to define the terms or variables to be measured. In table 1 is a collection of some of the most important quantitative terms that can be used when surveying a recreational area.

Table 1 Definition of terms and measurement units

Term	Unit	Definition
Visits	No.	Number of visits in the surveyed area
Visitors	No.	Number of unique visitors in the surveyed area
Visit/time	No./year, No./hour	Number of visits per time unit
Visitors/time	No./year, No./hour	Number of visitors per time unit
Visit duration	minutes, hours	The length of time a visit lasts
Visit duration/time	hours/year, hours/day	The combined total of all visit durations in the surveyed area per time unit
Distance travelled in the area	metre, kilometre	Distance travelled during a visit
Distance travelled to get to the area	metre, kilometre	Distance travelled outside the area in order to get to the area to visit

The number of visits is a unit that is relatively easy to measure. However it gives no information on how much time visitors spend in the recreational area or how far they have travelled to get to there. Visitor numbers is a measure of how many different visitors make use of the surveyed area. In areas close to urban centres it is quite usual to find that many visits are made by relatively few visitors, regular guests. Further away from large urban centres the share of visitors who only visit occasionally is significantly higher.

When measuring visit pressure one also has to take into account the time factor in the measurement, for example by counting the number of visits per hour. For most recreational areas visit pressure varies a great deal over time. This variation occurs in three different time scales. The number of visits varies during hours of the day, days of a week and the seasons of a year. In addition, a more random variation can be attributed in part to the weather. When several of these variables coincide then visit pressure can be extreme. For instance the Dalby Söderskog National Park can have several thousand visits a mild Spring Sunday when the woodland flowers are in full bloom. The paths are then crowded in the small woodland on the plain outside Lund. The same woodland can be almost desolate just a few weeks prior.

Fig. 4.2 Dalby Söderskog a sunny Spring Sunday. The main car park is full and cars are parked all along the main access road. Many turn around and head off to an alternative outing destination.

It is often the peak number of visits that limit an areas ability to function as recreational area. Therefore establishing a visit pattern over time by measuring the number of visitors per hour is a highly relevant measurement. The vast majority of recreational areas have an enormous overcapacity for most of the year and only expect a surge under a few hours or days when several factors come into play.

When measuring visit pressure it is also of interest to know the visit duration. How long does each visit last? The number of visitors in an area at any given moment in time depends on the influx of visitors and how long they stay. To calculate this the visit duration is relevant and a term like total visit duration per unit of time (for example visit hours per annum) is a very useful indicator of visit pressure.

The distance visitors travel during their visit and how they travel is important information for the planning of trails and road networks. Even the distance travelled to get to the area in question is also information worth knowing. If many visitors have travelled long distances to an area it is a good indication that this area has unique qualities that may need protecting. It is also possible that similar qualities may need to be developed in other locations within the region.

Knowing the distance visitors have travelled to get to a particular area and what means of transport they have used it is possible to estimate how much money visitors spend to reach the area. Such cost estimations and valuation of recreational areas along with other intangible benefits is a science in itself and not discussed further in this handbook.

Visitor categories

In many cases, it is helpful to be able to break down measurements so that they are valid for different groups of visitors. Table 2 gives an example of various visitor categories that may be of interest.

Different visitor groups require different types of recreational environments and facilities. To some extent men and women show different visit patterns. Children use the forest differently compared to middle-aged people. Horse riders have other preferences than skiers, large visitor groups for instance a kindergarten have in part other requirements than a family with small children.

Table 2. An example of visitor categorisation

Variable	Examples of categories
Gender	Male, female
Age group	0-6, 7-15, 16-24, 25-44, 45-64, 65-80, > 80
Activity	Walks, jogging, cycling, riding, skiing, nature studies, picnic, camping, berry picking, mushroom picking
Mode of transport to the area	On foot, car, bicycle, bus
Mode of transport within the area	On foot, skies, bicycle, horse, snowmobile, car
Group size	Single, pair, three, four, five or more people who visit the area together

Qualitative terms

Apart from the previously mentioned tangible and quantitative terms, there is also a wide range of qualitative terms or issues. These can be highlighted by conducting surveys or interviews directed at those who either already visit the area or at groups who represent potential visitors, such as those who live in the vicinity. Presented below is a listing of relevant factors to research which are helpful in providing a useful basis for planning.

Purpose

Why does one visit the area? Is it for peace and quite, relaxation, exercise or is it to come home with a berry or mushroom harvest? Is it to take out the dog or exercise the horse? Is it for social reasons, to spend time with friends or family? Is it because one wants to study the natural, cultural or historical environment? Is it because it happens to be en route to another destination or is it convenient for passing the time of day in?

Fig. 5 There are many reasons for visiting the great outdoors. What is this skier looking for?

Alternatives to visiting the area

What are the alternatives for fulfilling the purpose with the visit? If the purpose is exercise then alternatives may be found in sports centres. Peace and quite can perhaps be found in a museum or place of worship.

Information

How does one obtain information about the area today? How would one like to get information about the area?

Changes to the area

What is currently lacking in the area for visitors today? What would attract new visitors? Does one want new facilities such as lighted trails, barbecue sites or boule courts? Does one want a different management of the nature area? Perhaps a desire to have woodland left untouched for development on its own or maybe glades kept open by livestock grazing?

In this handbook only simple interview and survey methods, that can provide some answers to qualitative questions, are described. If a more in-depth understanding on why people choose to do different things is required then more advanced interview and survey methods are needed. Such interview methods, their interpretation and analysis should be carried out by sufficiently trained and experienced professionals and are therefore beyond the scope of this handbook.

Occasionally there may be a need to carry out specific research targeting a particular group of visitors or potential visitors. For instance it can be those who live adjacent to the recreational area or other places from where there are already many visitors. It can also be other categories to whom one wants to pay special attention to, for example naturalists, non-Nordic citizens or people with limited mobility.

At first sight surveying those who utilise a recreational area may seem to be a daunting task. However a well thought out visitor survey is not that difficult to implement. By first thinking through what sort of information is actually needed and then putting together a well thought out plan for how to collect this information, one can with relatively simple methods get a much better basis for operative planning.

Calculation methods

Regardless of what one intends to measure or which method to use one still has to be able to interpret and analyse the results. In most cases simple descriptive statistics is quite adequate for the purpose. This chapter provides some examples on how to do easy yet important calculations based on the results. Some questions one can ask:

- How reliable is an estimation of visitor numbers?
- How can I describe trends?
- How many direct field observations are needed to get acceptable levels of reliability and accuracy in my measurement values?
- What sources of error can my estimations have?

Systematic error

All types of measurement can be subject to two kinds of error, systematic error respective random error. Below follows some examples of systematic error that can appear when implementing a visitor survey. Random error is discussed further on in the chapter.

To establish the number of visitors to a recreational area, the number of cars that used the car park beside one of the entrances was recorded over a period of time. The area displayed high visit numbers and the recorded number of cars was very high, especially during the weekends but also certain weekdays seemed to be well frequented. The person in charge of the investigation noticed that this visit pattern was not quite as it was anticipated and decided to carry out a more detailed registration of cars to the car park with a different instrument that could count and record the number of cars per hour and time of day. On analysis of the new results it was found that many cars came for a certain period on Tuesday, Thursday and Sunday evenings. These time intervals were shown to coincide with the home matches for the city’s premier league ice-hockey team. Once the car park by the ice-hockey arena was full, many going to the match used the car park by the woodland entrance instead. In other words the number of cars to the car park had been correctly measured yet still an overestimation of the number of visits to the woodland was given. With help of more detailed data broken down per hour it is quite easy to correct this type of systematic error.

Other types of systematic error may be caused by the measuring equipment itself or that those surveying, the observers, are not measuring what was originally intended. If observers are used, it is quite likely that they may have misunderstood their assignment and carry out registration differently than initially intended. It is not unusual that people comprehend instructions another way even though the instructions may seem to be written clearly and unambiguously. If judgement of what is to be recorded is part of the assignment, then this difficulty becomes more pronounced. A typical piece of information gathered using observers is visitor age, where the observers estimate the age of the observed visitors and categorise them into age groups. The results of such observations depend very much on the observer’s ability to judge a person’s age. Most of us are fairly good at estimating the age of someone close to the same age as ourselves. For instance my children are surprising good at estimating the age of other children. Often they can from a distance tell what class say first grade or third grade another child goes to even without knowing the child. However they are not able to say if an adult is 25 or 45 years old. For adults it is a similar phenomenon. University students that have been used as observers for various studies are very good at estimating the age of people within the 15 – 35 age group but have much more difficulty with children as well as middle-aged and elderly visitors. In other words different observers can be the source of different systematic errors simply because they record the same observation differently.

Fig. 6 An observer can make observations on what activities are being pursued by visitors as well as provide background information such as age and gender.

Random error

On discovery of a systematic error it is generally possible to make allowances for the error or at least redo the measurements correctly. Errors that can be attributed chance are trickier to deal with. We are not able to record those who visit every part of a larger recreational area, at least not continually over time. Furthermore it is practically impossible to interview all visitors to an area and even more impractical to send out questionnaires to all potential visitors. We can only measure the number of visitors at a few places of the survey area and send questionnaires to a selection of visitors or potential visitors. This means that each measurement we do is only based on part of the surveyed area or that we interview only some of the visitors. We can measure or interview only from a selection of locations and during a selection of times. This selection can be made through random choice or by a pre-determined plan. Regardless of how we make this choice we can never be totally certain that chance is not misleading us so that the results we get show an incorrect picture of the situation.

The way to deal with random error is to use descriptive statistics. By using simple statistical calculations we can for instance show how large the risk that the true visit frequency deviates more than 5 % from our measurement values. The danger for random error is of course higher the more varied the subject or object to be measured is. Stable values like the width of a table can be measured to a high degree of accuracy and the measurement value varies very little between different measurement times. If the table’s width has been recorded as 122.3 cm at one end, 122.1 cm in the middle and 121.6 cm at the other end then we can calculate an average value of 122.0 cm. With relatively few measurements we can obtain a true measurement value, on condition of course that we have no systematic error such as an inaccurate measuring tape. The error attributed to chance can, in this case, be assumed to be slight. On the other hand, the number of visitors to a recreational area varies notably over time and the results will differ, very much depending on when they were recorded. This means that random error is assumed to be high if too few measurements are carried out, the more measurements the less the likelihood for random error.

Measurement of visit frequency can be done for example by direct observation. As such observations cannot be done continuously; a selection of observation times has to be made. The chosen observation times will then represent the actual situation. However if one is unlucky with the selected observation times, one can as a result of chance get an under- or over estimation. If one happens to choose times that coincide with fine weather there is a likelihood of over estimation. If these observations should happen to coincide with fine weather and reach a climax during weekends, then uneven greater over estimation is likely. Naturally, fluctuations in visit flows can depend on other factors than weather and weekdays. However it serves as a reminder that we always have to keep in mind that chance affects our measurement results.

By using descriptive statistics we can show the level of certainty that our results are correct and by doing so keep random error under control.

Presented in the following sections are some easy formulas for calculating some of the more commonly used ways of presenting data from visitor surveys. This represents an attempt to compile some of the most useful statistical methods for visitor surveys. Most modern data processing programmes have ready-to-use formulas for running the calculations below. In Appendix 1 is a listing of the formulas used in the examples that follow below. Those interested in learning more about a specific calculation model should refer to special literature on statistics.

Mean value with confidence interval

When calculating the mean value from a selection of observations, one can also describe how large the risk that the true value lies outside a certain interval. This interval is called the confidence interval and can be calculated for various probability levels. In this handbook the formulas to calculate the confidence interval at 95 % is provided. This means that the true value is likely to be found within the calculated interval at 95 % certainty.

In order to determine a mean value with a confidence interval we need to know how large the spread or distribution in our observations is as well as the total number of observations. Table 3 illustrates an example of what measurement values one can get when counting visitors in a recreational area. As shown by the table the number of observed visitors varies, from a top observation of 23 visitors at 16.00 hrs on Sunday to only 2 late Saturday evening.

In total 202 visitors were recorded during 20 observation hours which gives us a mean value of 202/20=10.1 observed visitors per hour. Considering the variation between the different observation times we cannot be sure that this average is a true reflection over how many visitors actually visit the area during a normal hour. In order to quantify the size of the risk that chance is playing tricks, we need a value that describes the spread between the different observation occasions. Standard deviation *(formula 1 in Appendix 1)* is such a value.

By using standard deviation it is possible to calculate the maximum size of random error, the confidence interval *(formula 2, Appendix 1).* Sometimes the confidence interval is known as average error.

Using the figures from Table 3 the 95 % confidence interval

$$e_{95} = 2 \cdot \frac{6{,}4}{\sqrt{20}} = 2{,}9$$

This means that the true value for the number of observed visitors per hour lies with 95 % certainty in the interval 10.1±2.9. In other words with 95 % certainty the true value is found within the interval 8.2 and 13 visitors per hour.

Table 3. The recorded visitors along an observation trail in a recreational area close to an urban centre

Observation day					
No. (i)	Date	**Day**	**Hour**	**Weather**	**No. of observations**
1	2003-05-17	Monday	10	1	14
2	2003-05-17	Monday	14	2	7
3	2003-05-17	Monday	19	2	12
4	2003-05-19	Wednesday	11	1	3
5	2003-05-19	Wednesday	15	1	11
6	2003-05-19	Wednesday	18	1	18
7	2003-05-20	Thursday	9	3	5
8	2003-05-20	Thursday	13	3	3
9	2003-05-20	Thursday	21	3	5
10	2003-05-22	Saturday	8	1	8
11	2003-05-22	Saturday	10	1	10
12	2003-05-22	Saturday	11	1	4
13	2003-05-22	Saturday	15	1	22
14	2003-05-22	Saturday	18	1	18
15	2003-05-22	Saturday	21	2	2
16	2003-05-23	Sunday	9	2	6
17	2003-05-23	Sunday	12	2	6
18	2003-05-23	Sunday	14	2	10
19	2003-05-23	Sunday	16	2	23
20	2003-05-23	Sunday	20	2	15
Total					202
Number of observations (n)					20
Mean value (ȳ)					10.1
Standard deviation (s)					6.406
Confidence interval (e)					2.808

Weighed mean value

From experience we know that visitor pressure varies during different times in the week. Table 4 is a result from a surveyed week showing the distribution of different times during the week.

Table 4. The number of observations along the trail at different times

	Average number of observations	**Mean error**	**Number of observations**	**Number of hours per year**
Weekdays daytime	7.2	3.7	6	2600
Weekends daytime	11.1	5.2	8	1040
Evenings	11.7	5.5	6	1465
Weighed mean value	9.3			

As a larger share of observations were carried out during times when the area had a lot of visits, the mean value must be weighed by using the total number of hours per year in each group *(formula 3, Appendix 1)*. In this way we get a weighed mean value of 9.3 compared to mean value of 10.1 observed visitors. Likewise the confidence interval can be calculated for the weighed mean value and is 3.7 observations per hour *(formula 4, Appendix 1).*

Statistically validated differences between two mean values

Quite often it is useful to be able to compare the results from two measurements in the same area at different times, for example to find out how much the use of an area has increased or decreased. For such comparisons to be relevant, both measurements must have been taken using the same measurement method. The two mean values can be compared by using formula 5 in Appendix 1.

We now want to see if there is any difference in visit frequency between the various weather conditions displayed in table 3. 8 observations were made in fine weather, 7 observations in fair weather and 3 observations in poor weather. The mean values are 12.0, 10.1 respective 4.3 so visit frequency seems to decrease with poor weather. However as there are relatively few observations in this category and knowing that the variation between the observation times is large, we cannot be sure that the difference in visit frequency between the different weather types is statistically valid. We can calculate the confidence interval *(formula 2 in Appendix 1),* as shown in the previous example, for each of the three mean values as a first check on validity. We find that the mean value for fine weather is 12.0±4.4, for fair weather is 10.1±4.4 while the mean value for poor weather is 4.3±1.3 observed visitors. It now appears that the two categories fine- and fair weather lie very close to each other with a significantly overlapping confidence interval, while we can establish that the number of visitors decreases during poor weather. By using formula 5 in Appendix 1, a better indication is given of how certain the decrease approximation is. The formula calculates a value, t, which describes how probable it is that the two mean values are truly separated. If t >2 then we know that with 95 % certainty the two mean values are actually separate from each other. If we calculate t for the difference between the number of observed visitors during the different weather categories, we get the values shown in table 5.

Table 5. Comparison of mean value combinations

Comparison	difference	t-value
Fine-fair	12.0-10.1=1.9	0.41
Fair-poor	10.1-4.3=5.8	1.9
Fine-poor	12.0-4.3=7.7	2.7

The difference in the number of observed visitors between fine and fair weather is so small that the difference between the two mean values cannot be statistically validated (t<2). On the other hand the difference between fine and poor weather is so big that the probability of this being due to chance is very small. So despite this example having relatively few observations, especially for poor weather, we still can get results that are relatively reliable. We can be quite sure that this recreational area has more visitors during fine weather. This conclusion is of course only true for the week in May when the survey was carried out. At most, it is perhaps possible to generalise for the Spring season as a whole. However if information about the other seasons is needed then further surveys would be required. It also seems to be so that the number of visits is more or less maintained during fair weather, dropping considerably only when the weather deteriorates. This is often the scenario in recreational areas with a high proportion of woodlands that are close to urban centres. Here, activities that are not so dependant on the weather are often pursued. It would look different in recreational areas where for instance swimming was the main attraction.

In the same way as the above comparison between different types of weather was done so too can other kinds of comparisons be done such as comparing different times of year or different years.

The number of observations

When planning a survey it is sometimes useful to be able to estimate how many observations are needed to get results within a certain degree of accuracy. In order to do that one needs to have some idea on the distribution size or spread to be expected of that one wants to survey. If there are no previous surveys to fall back on then of course one has no idea, in which case one has to rely on experiences from other surveys from similar areas. If there is previous data to look through one should naturally use it to estimate as best as possible how many observations one will need *(formula 6, Appendix 1).*

Let us assume that we want to continue surveying the recreational area that was studied under a week with the results in table 3. We want to know how many observations we need to reach a certain level of probability with the result. We have noted that distribution varies somewhat, there is less spread during the day on weekdays and more during evenings and weekends. Therefore we calculate each of the three times during the week individually. In table 6 are shown the calculation results using the above mentioned formula. As the table shows a substantial number of observations will be needed if a high level of certainty is required. If a certainty level equivalent to a confidence interval of ±2 observed visitors per hour is sufficient, then it is enough with about 20 observations during daytime on weekdays, approximately 45 observations during the evenings and 50 or so observations during daytime on weekends.

Table 6 Prognosis over the number of observations needed to reach results with a certain level of probability

Error margin (observation/hour)	Number of observations		
	Weekdays daytime	Weekends daytime	Evenings
0.5	287	469	492
1	78	177	164
2	20	51	45
3	9	23	20
4	5	13	11

Surveys in two stages

Sometimes there is a need to conduct the survey in two stages. Often visitors to an area are counted from one or a few locations where most visitors are expected to pass by. These measurements seldom cover the whole recreational area as usually there are other ways visitors can enter the area and pass without being recorded by observers or measurement equipment. This means that only a proportion of the total number of visits is actually recorded. Therefore, if one wants to know how many visitors in total there are then a supplementary survey, in the form of an intensive measurement of all visitors during a short space of time, is required. For these measurements one can use extra observers and borrowed equipment. The ordinary surveying is also continued from the same locations while doing these extra total measurements. This makes it possible to check what share of the total number of visits is captured in the ordinary measurements. Since random error needs to be taken into consideration, for both the ordinary measurement and the total measurement, we also have to take into account distribution when calculating the total number of visits.

A total measurement of the number of visitors to the woodland was carried at the same time as some of the observations presented in table 3. These were done with the help of additional observers who were located by all conceivable entrances to the woodland *(see fig. 7).* The observers recorded all people who entered and departured the woodland during the observation period. The total number of visitors is calculated as the total number of incoming visitors plus the number of outgoing visitors divided by two. This offers a good approximation base provided that the majority of visits were much shorter than the observation period. This operation, with total measurement held simultaneously with the ordinary observations along the trail, was repeated on five occasions.

Table 7. A comparison between the number of observations along the trails and total number of visits

Observation no.	Incoming	Outgoing	Average	Observations along the trail	Share %
3	40	48	44	12	27.3
8	37	52	44.5	13	29.2
12	18	14	16	4	25.0
14	70	58	64	18	28.1
20	56	70	63	15	23.8
Sum/average	221	242	231.5	62	26.8

As the table illustrates a very stable proportion of visitors were observed along the observation trail. The variation remained between 23.8 and 29.2 percent of the total number of visits. With support of this information an approximation of the total number of visits per annum can be made. The number of visits is 9.3/0.268=35 visits per hour in the surveyed area. The total number of hours is 5105 per year why the total number of visits can be approximated to 35x5105=180000 visits per annum. This figure can also be complemented with a confidence interval. In this case it is enough to calculate the hourly interval in the same way (3.7x5105/0.268) from which the total number of visits can be given as 180000±70000 visits. As made obvious by this figure, the level of certainty is low in the approximation which is a consequence of the relatively few observations in this example. Significantly more observations are needed to raise the level of certainty in approximations which table 6 highlights. One way of increasing the number of observations is to use measurement equipment. More about different visitor counting technologies is described in the chapter ”Counting visitors”.

Counting visitors

There are a variety of methods that can be used to measure the extent of outdoor activities. One way is to use direct observation with or without the assistance of various instruments for automatic registration. Another method is to use questionnaires and interviews. Usually one is forced to use a combination of methods to gain reliable results with sufficient detail. This chapter discusses direct observation along with measurement using measurement equipment. Methods for quantifying outdoor activities with the aid of questionnaires and interviews are discussed in the chapter "Using interviews and questionnaires".

Direct observation

By direct observation is meant the use of observers strategically placed within the area to be surveyed. One can choose to watch over the most used entrances to the area or use a mobile observer who moves throughout the area. The mobile observer can move around the grounds, over open terrain or by aeroplane or helicopter.

The main advantage with direct observation is that the method can give a lot of valuable information that cannot be got by using automatic recorders. For example, the observer can note what activities are carried out, visitor age and gender, how many visitors come in groups, group sizes etc. If one uses a mobile observer or several observer stations it is also possible to gain helpful information on which areas have the most visitors or where most activities are carried out.

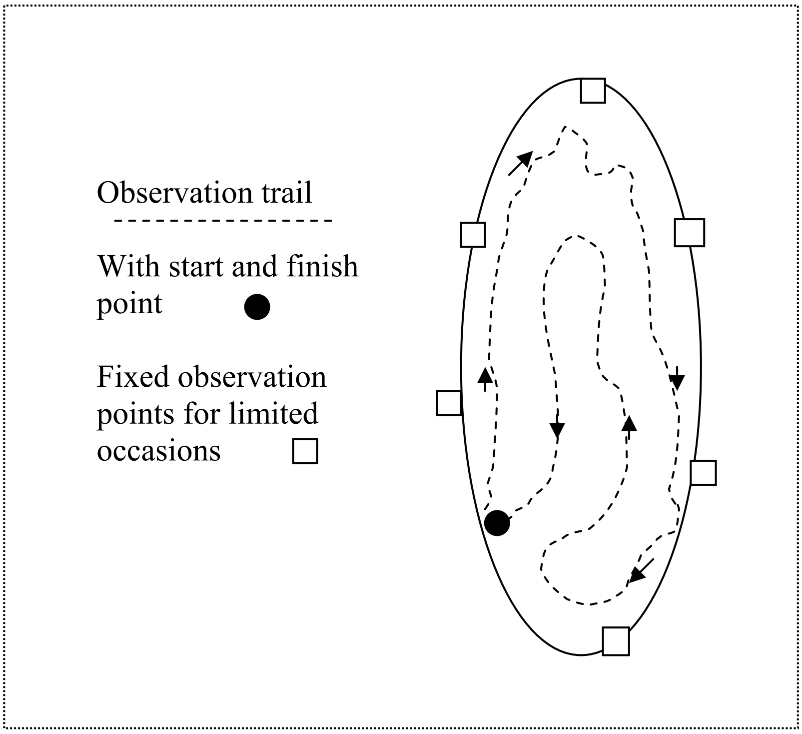

Fig. 7 Sketch of the survey area with observation trails and direct observation stations.

The main disadvantage with direct observation is that it becomes relatively expensive to implement such surveys with adequate accuracy. As mentioned in earlier chapters there is a very sizeable spread in visit pressure depending on time and weather situation. Therefore to limit the risk of random error, a high number of observations is needed. Despite a big effort with a large number of observations, the risk for random error is still relatively high making direct observation, as a method, less appropriate when for instance investigating change over time. However for planning purposes and for getting good base material the method is perfectly adequate. Another disadvantage of methods that do not measure continually over time is the risk of missing visit frequency peaks. It can be of critical importance to know how many visitors one has at the very most and when such a peak can be expected to occur.

Choice of observation times

When choosing the time to observe it is important to utilise all current available information on how the area is used. Start by excluding times when the visitor numbers are expected to be very few if any, such as night time or certain times of the year for areas with seasonal activities. Thereafter consider if there are any known visitor patterns from other similar areas to take into account. Visits to a recreational area close to an urban centre may display the following pattern:

Time observations	**Expected visitor frequency**	**Number of**
Night time 22-07 hrs	None or very few visits	No observations
Weekdays 07-17 hrs	Steady but fairly low visit frequency	Few observations
Weekdays 17-22 hrs	Steady but little higher visit frequency	Few observations
Weekends	Many visits, large variation	Many observations, holidays

This means that one should try to select observation times so that they coincide with many visits and display a large spread. Of course when one wants to calculate the visit frequency over longer periods of time, for example the number of visitors per year, then the results of the different observation occasions must first be subtotalled and then, depending on what proportion of time they represent, totalled *(formula 3 and 4, Appendix 1).*

There is also a danger that two observation periods that follow closely after one another will tend to show similar results as the odds are that a visit pattern is similar from one hour to the next. To avoid this source of error one should spread the so that they do not lie too close to each other time wise. Table 8 presents one suitable time schedule spreading observations over time.

Table 8. Suggested distribution of observation times over a four week period

Weekday	**Start time, hour**														
Weekdays	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
W1 Monday	X											X			
W1 Wednesday							X								X
W1 Friday									X					X	
W2 Tuesday					X										
W2 Thursday		X													X
W3 Monday				X									X		
W3 Wednesday						X									
W3 Friday			X								X				
W4 Tuesday								X				X			
W4 Thursday										X			X		
Total weekdays	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2
Weekends															
W1 Saturday			X						X				X		
W1 Sunday				X			X					X			
W2 Saturday	X					X		X							
W2 Sunday			X				X			X					
W3 Saturday					X						X				X
W3 Sunday		X				X				X					
W4 Saturday				X				X			X				
W4 Sunday					X				X					X	
Total weekends	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1

The selection frequency in table 8 above is as follows:

Time	**No. days**	**No. hours**	**No. obs.**	**Frequency**
Weekdays 7-18 hrs	20	220	11	0.05
Weekdays 18-22 hrs	20	80	8	0.10
Weekends 7-9 & 18-22 hrs	8	48	6	0.125
Weekends 9-18 hrs	8	72	18	0.25

In this example we have a notably higher number of midday observations during the weekends to coincide when variation or spread is anticipated to be the highest. At this point an observation every four hours is selected. The lowest frequency chosen is daytime during the weekdays as we know from experience that variation at that time is the least. Here there is only one observation every 20 hours.

What to observe

Meticulous planning on what to observe and how to observe it is required so that the results will be useable and comparable over time. An observation form on which all observations can be noted along with concise written instructions for the observers to follow is useful to have. The observers also need in-situ instruction and one should ensure that the observations are implemented as they were intended. There is always a danger that instructions are misunderstood or that the observers themselves ”simplify” or find creative ways of improving the work. Therefore it is a good idea before starting the study to indicate that one would welcome any suggestions on improving data collection after the study has been implemented. Nevertheless one must also clearly communicate the importance going ahead with data collection as planned. Otherwise the danger is that the whole survey will be spoilt due to observers being unsure how to collect the data. So it is of vital importance that the observers are well briefed and that one follows up to make sure that the observations are carried out as it was intended.

Automatic registration

Direct observation can be replaced or complemented with automatic visitor registration. By using technical equipment, counters, the number of visitors to an area can quite accurately be estimated. The greatest advantage of using such automatic counters compared with observers is that one can measure continually over time and therefore the measurement is less influenced by variation between observation occasions. The main disadvantage with such equipment is that they do not provide any information whatsoever on whom the visitors are and what they actually do with themselves.

Technical equipment

A basic requirement for any piece of technical equipment intended to be used to count visitors outdoors is that is dependable and will run without interruption. It should be able to work regardless of season or weather conditions. Out in the field it should be easy to handle, install, calibrate and take readings from or download data without needing to be an engineer.

Other aspects of significance are:

- Calibration possibilities so that birds, leaves and other debris that flashes past are not registered.
- Energy source. Battery number and type is not only significant for power consumption and lifespan between battery changes but also for the size and weight of the equipment itself.
- The possibility to hide or camouflage the equipment to avoid vandalism, interference and bogus registration.
- Range (measurement range).

Each type of system has advantages and disadvantages and different capabilities under different conditions. Therefore it is important to make your choice based on the specific conditions that prevail, such as climate and expected weather conditions, terrain, accessibility of the measuring point, routine maintenance, purpose for measuring, type of object to be measured, level of accuracy needed, where the equipment is to be used.

Should the equipment manage long measurement distances? Is it important to be able to hide it? Is it important to be able to move it often from place to place? What are the requirements for displaying data; is it sufficient with a counter that shows the total number of registrations or is a more detailed break-down needed?

How it works

In principle a piece of equipment for counting visitors is composed of the following components:

- Power source, usually a battery.
- A sensor that reacts when someone or something passes by.
- A counter that registers the number of passers-by.

Generally in more modern equipment the counter is integrated into a data collection unit that registers, saves and sorts the measurement data. The following functions are usually available for these types of counters:

- The collected data can be read for further processing, either a memory card for processing by computer, or transferred to a stationary computer or directly to a laptop on site.
- Software for the data collector.
- Software and computer for and presentation of the measurement results.

It is an advantage that the counter is integrated into a data collector so that measurements are automatically subdivided, for instance per hour. This means that the instrument needs a reading taken relatively seldom and that are good possibilities to track down any inconsistencies and check them out.

Many systems can be combined with a camera or with a video camera connected to the sensor. However, note that in Sweden the use of cameras has to be checked so that it is not in violation of laws regulating the use of camera surveillance.

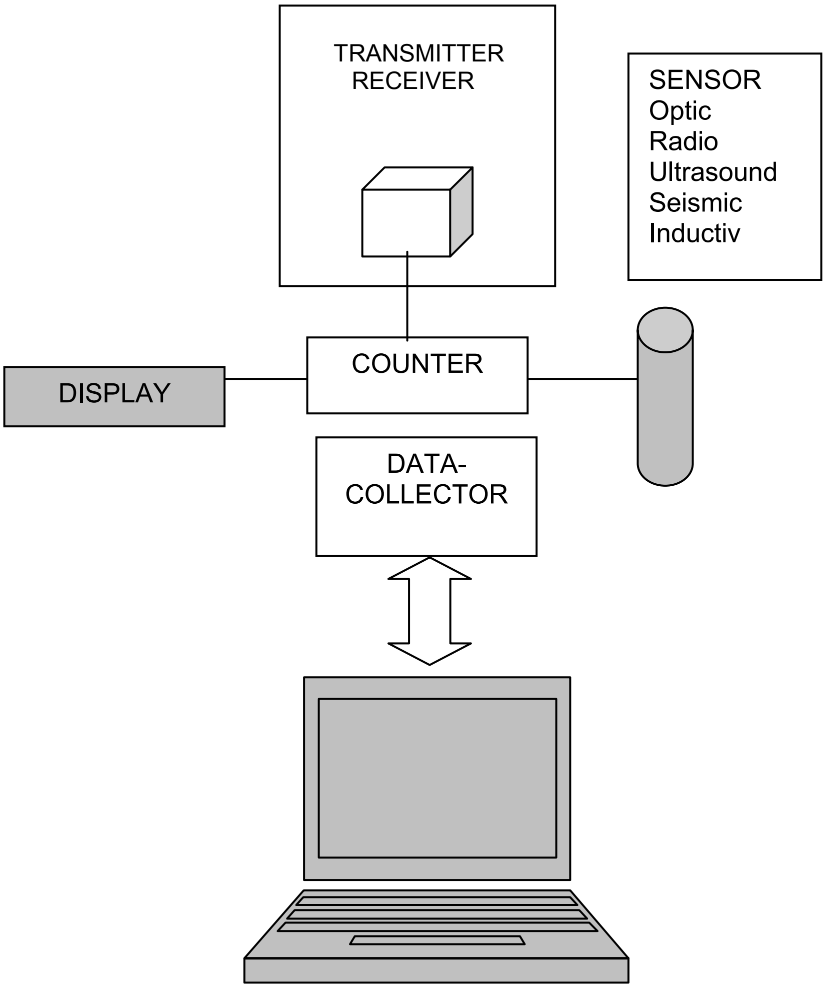

Fig. 8 Schematic illustration of an outdoor counting system for visitors.

Sensors

There are a variety of sensor types that can be found in counting equipment:

- **Optic sensor.** A beam of light that is broken when someone passes or that is reflected towards the passer by.
- **Ultrasound.** A sound cone that is broken when someone passes or that is reflected towards the passer by.
- **Radio transmitter.** A ”radio wave” between sender and transmitter and broken when someone passes through.
- **Seismic sensor.** A cable or pressure pads that react to pressure or vibration.
- **Inductive sensor.** A buried copper cable whose electro-magnetic field reacts to metal.

Optic sensors

Optic sensors work using a transmitter and receiver for light. The bottom temperature limit for most of these sensors is at around -20ºC, but there are those that manage cold down towards -40°C. For all optic sensor based systems there is a risk that the sensor lens can become dirty, foggy or covered in snow which of course affects their function and limits their usability. The risk can be minimised by using a cover of some sort. The problem with fogging up of the lens is greatest during wet weather and temperatures around 0°C but the effect can be minimised by shortening the distance between the sensor and reflector or receiver. The beam of light becomes stronger and has more penetration.

Optic sensors work according to one of three different principles:

- **Direct sensing of one-way light.**
  A beam of light from a transmitter is reflected from the measured object back to a receiver. Both the transmitter and receiver are contained in the sensor unit. Normally used for short distances < 5 metres.
- **Mirror reflecting light (retro-reflective).**
  A beam of light from the sensor units transmitter is reflected from an opposite reflector back to the sensor units receiver. The distance transmitter/receiver – reflector is < 35 metres.
- **Separate transmitter and receiver.**
  The beam of light goes from the transmitter to an opposite receiver. Allows long measurement distance in certain cases up to 90 metres. The system requires separate batteries for transmitter and receiver or a power cable between the two units.

Optic sensors work using different kinds of light:

Visible white light
White light is often used for opening doors, for example entrances to shops but it is sensitive to disturbance and can react to fog, snowfall and rain making it less suitable for equipment that is to be used outdoors for a longer period of time.

Infrared light (IR)
Infrared light is invisible to the naked eye and is used according to one of two principals; *active infrared* or *passive infrared*. Infrared light is somewhat more difficult to adjust for reflectors and receivers than ordinary white light. Therefore equipment that uses IR-light are often fitted with a sight gauge that assists during adjustment. The optic sensors used in outdoor visitor counting systems all use infrared light.

- **Active infrared light**
  Depending of the type of equipment active infrared light is used in two different ways:

  1. The transmitter sends a beam towards a reflector which then reflects the beam back to the sensor in the receiver. When the beam is broken the counter is activated and counts a passage.

  2. The sensor's transmitter sends a beam to a receiver. The counter is activated when the beam is broken.

  In both cases the infrared light is sent out as high frequency pulses. The sensor can be adjusted so that a certain number of pulses have to be blocked for a passage to be registered (sensors are often supplied to run on this setting). By using such a time lapse false registration caused by leaves, birds and other items that break the beam by passing through quickly can be avoided. When a person passes through the beam there is a slight delay before the counter is activated as this is a more diffuse detection zone. The sensor can also be set with a time lapse function which means that the counter is momentarily switched off after it has been activated so that a person passing through is able to clear the detection zone before the counter is activated again and therefore is registered only once.

In general systems with transmitters and receivers are those that allow for the longest measurement distance. Long distance between transmitters and receiver/reflectors require greater adjustment precision which is made easier if the system is equipped with a sight and or gauge.

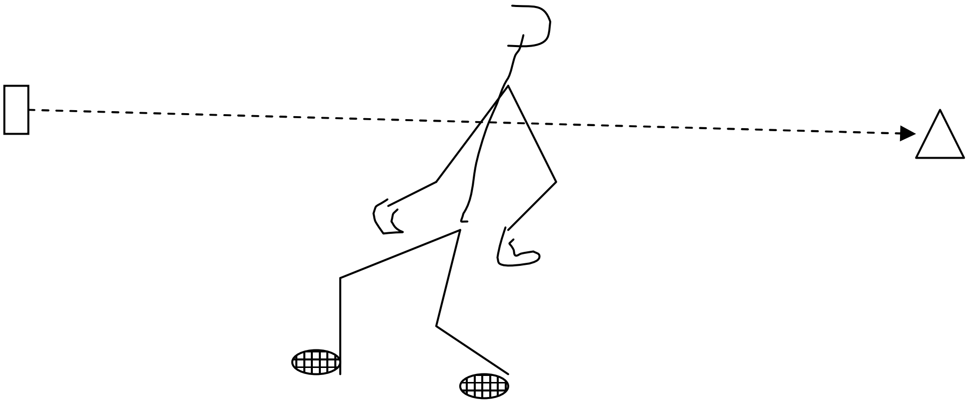

Fig. 9 A system with transmitter and receiver

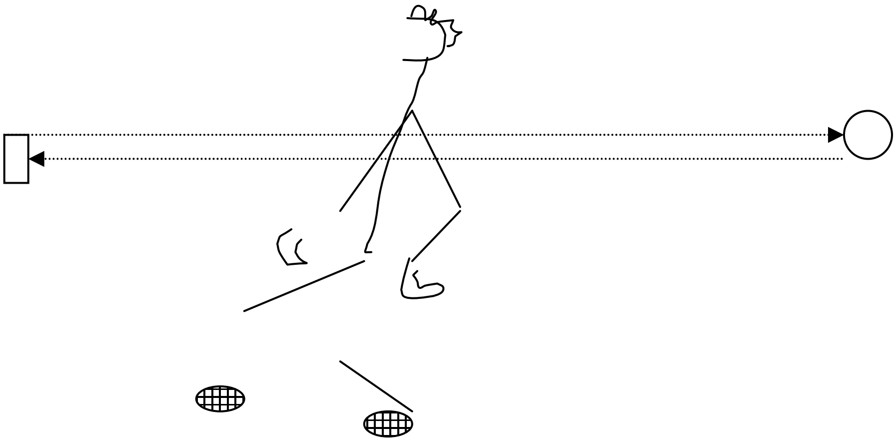

Fig. 10 Retro-reflective system

- **Passive infrared light (PIR)**
  The transmitter sends a beam of light that, instead of being reflected by a reflector, is instead reflected by the passing object, so called direct sensing. The reflected light beam goes to the receiver sensor and the counter is activated. Passive infrared light can also work so that a passing

object is registered because it has a temperature that differs from the surroundings. Equipment using passive infrared light is compact and quick and easy to install since no adjustment of the beam to reflectors or receivers is needed. However direct sensing has lower precision than other methods. The approaching light is weaker in comparison to a system with active infrared light. This gives an increased risk for incorrect registration as a result of light and temperature changes in the surrounding environment. For example the sensor may be activated by rain, snow and fog. There is also the risk of the light beam being reflected in the wrong direction due to shiny parts of clothing or items carried. Furthermore the passive system uses a wider detection zone which needs a longer time lapse. There is a chance that not everyone gets registered if they pass closely to one another. The passive infrared system is most suitable when a small light system that is quick to install is needed and/or the demand for measurement accuracy is not too high.

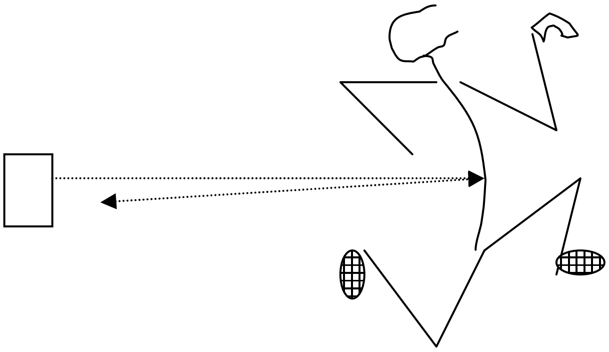

Fig. 11 Sensor using passive infrared light

Laser

A laser transmitter has a much longer reach and the thin laser beam is better able to penetrate dirt and fog on the sensor lens as well as through snow, rain and fog than infrared light. Lasers are available with both visible and invisible red light. Visible laser shows a keen red dot on the person passing something that can make it less suitable for counting visitors. For many people such laser dots give rise to sinister associations making them uncomfortable. Laser beams are not entirely safe either and it can be directly hazardous to eyesight to look directly into a sensor. A laser sensor and receiver require very high setting precision which can be difficult to obtain out in the field.

Ultrasound

Ultrasound systems function in much the same way as infrared light systems. Instead of a light beam the transmitter sends out a high frequency sound cone, either direct sensing or to a separate receiver. Once the sound cone is reflected by a passing object the counter is activated respective stopped. Just as with an IR-system one can adjust the sensor with time delay to avoid false registration of birds, leaves etc that pass through the sound cone. The sound cone has a wider spread than an infrared beam and can accept a larger recipient area to be reflected from than a light beam. The ultrasound signal intensity can be affected by changes air temperature and ultrasound sensors are more sensitive to cold than IR-sensors. Generally they tend to function poorly in temperatures below 0°C. However there are sensors for direct sensing ultrasound with a range of 6 metres that manage temperatures down to -25°C.

Radio transmitters

Equipment with radio transmitters use radio waves instead of light or sound but the principal is roughly the same. A transmitter sends out radio waves to a receiver. The units are powered with their own 9 V battery with a lifespan of about 100 days. The radio signals are sent as a stream between the transmitter and receiver. When someone passes through the radio stream the change in signal strength causes the receiver sensor to activate and register a passage. An advantage with radio waves compared to IR-equipment is that radio waves pass through materials such as plastic, plywood and a thin wood wall which means that equipment can be hidden in a box or camouflaged behind signs etc. Measurement data is registered in a separate data collector or integrated in the receiver unit. The data collector can be programmed with start times and measurement intervals spanning from minutes to days.

Seismic sensors

Seismic systems are comprised of a counter connected to a sensor that reacts to vibration or pressure. Sensor sensitivity can be adjusted along with time delay and so the system can be adapted to what is being counted whilst avoiding double counting. Basically there are two kinds of seismic sensors. In one system the sensor is in the form of a plate with a built in sensor element which reacts to pressure, for example when someone steps on it. The sensor plate and counter can be buried so that they are totally hidden from sight which eliminates the risk of vandalism and bogus recordings. The sensor can be influenced by changes in the ground such as coldness or when the ground is covered by snow that in turn affects reliability. It can also prove quite difficult to calibrate the equipment as well as decide on the right size of plate so that it registers only one step per passing person.

The other type of seismic sensor is the so called traffic counter. The sensor is composed of a long hose that reacts to pressure. There are models that have very low power consumption where a battery lasts for up to five years. The counter can be set for different time intervals and the data can be read from a display. This type of equipment is usually used to measure vehicle traffic and count axle pairs. The sensor sensitivity can be adjusted for example to disregard registration of very light vehicles such bicycles and mopeds.

Inductive sensors

Inductive systems are in principle made up of a counter connected to a buried copper cable sensor. When a metal object passes through the electro-magnetic field of the cable it activates the counter. Inductive sensors can be used to count for instance bicycles, cars, ATV´s and snowmobiles. The cable and counter can be buried underground or snow which eliminates the risk for vandalism and bogus registrations.

Mechanical counters

One can also use simple mechanical counters and these can be used on turnstiles, toilet doors or under steps.

Data retrieval

In general, all types of sensors can be connected to counters and to a data collector where the gathered data can be processed. Measurement data can be read from the counter itself, a display or transferred to a computer for presentation. Simpler models of for instance IR-equipment have accumulating counters in the transmitter/receiver unit that can be read prior and after the count period. On the more advanced models one can set the registration interval to hours, days, throughout the 24 hours, or weeks. Data is collected in a built in data collector readable from a display showing the total number registered, the total number per interval in chronological order. There are also IR-models with the option of transferring data from the collector to a PC and then getting the data out on a form or graphically illustrated. The data from equipment that use radio waves cannot be read directly on a display and instead have to be transferred from the data collector to a PC. Registered data is presented in table and diagram form and can be processed or copied to other programmes such as Excel. A disadvantage with models where data can only be read from a display is that mist can be formed on the inside of the display which can make readings difficult.

Equipment installation

In order to obtain reliable results it is important to choose the measuring location based on the equipments function and capacity. The choice of equipment must be suited to the prevailing conditions where it is to be used. It is difficult to find one system that is good for all situations. When using systems based on light, ultrasound and radio waves the counter units must be secured in a suitable and safe manner, measure at the correct height and, if needed to be concealed. There also must be free passage between the transmitter and receiver and/or reflector; tree branches or other items must not be allowed to disturb or interfere with the ”beam”. Attention to detail is required when placing and setting transmitters and receivers in order to get them to function correctly. The most reliable measurement results are obtained if the equipment is placed in an area where passers by have to pass in single file. The sensors have difficulty in separating people if they pass side by side or close together without a gap. Consideration must also be given to weather conditions as temperature, wind, moisture and fog can affect the equipment’s performance and capacity. The risk for such influence can be minimised by using shorter measurement distance and placing the units so that they are protected from snow and rain. The equipment in itself is weather proof but rain and melt water directly in front of a lens or transmitter can affect its function.

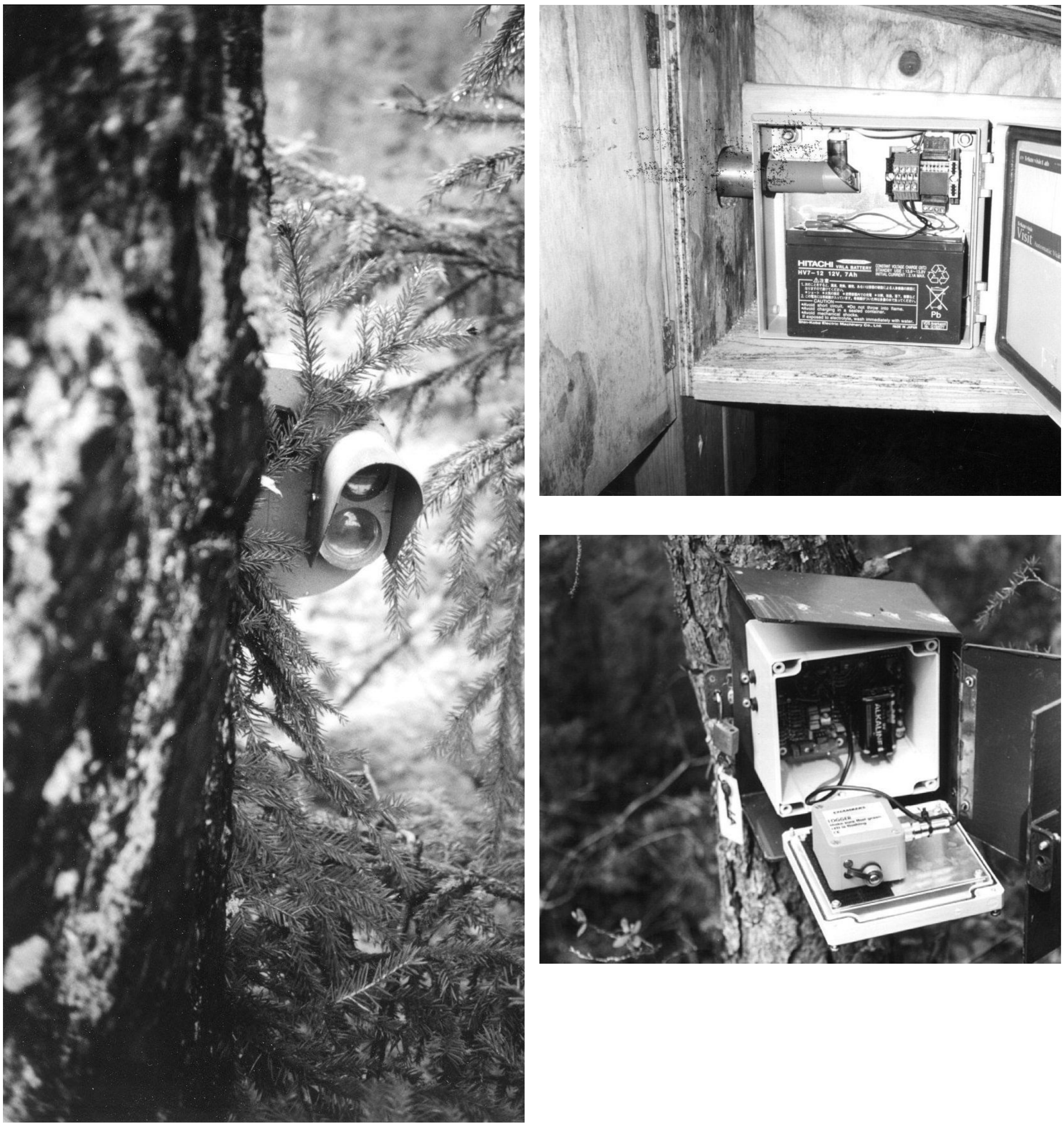

Fig. 12 Examples of ultrasound installations

The market

Turnkey systems for measuring visitors outdoors have mainly been developed by American and British manufacturers. In the United States tried and tested IR-systems are available and in the UK there are IR-systems as well as radio and seismic systems for outdoor use on the market. In Finland there are a few IR-system manufacturers. On the Swedish market there are no manufacturers or retailers of complete IR or radio systems for specific visitor counting in recreational areas. However there are several retailers of seismic systems, mainly so called traffic counters.

Measurement equipment of this kind used in Sweden has to be CE-labelled. This CE-labelling is part of an EU-directive that regulates the use of such equipment within the EU. In addition the EMC-directive on electro-magnetic compatibility is a base for CE-labelling of equipment with IR sensors. In this respect the US standard is not harmonised with the EU standard making it difficult to import such equipment from American manufacturers for use in Sweden. It is a costly and time consuming procedure with testing, manufacturer declarations and CE-labelling. Even if the equipment fulfils the requirements set out in the EMC directive there is still the need of tests and certification from an accredited American test institute.

Using interviews and questionnaires

Up until now this handbook has mainly focused on how to research the number of visitors and in some cases also how to categorise into predefined groups. As mentioned in the introduction one is often looking for answers to a long list of questions. In the following chapter a few simple interview and questionnaire methods that can be used to find answers are presented.

Establishing contact with the visitors

With these kinds of qualitative interviews and questionnaires it is important to choose the interviewees or respondents correctly. Usually we want to make a selection of interviewees in such a manner that the results can be generalised and be representative for all the visitors we have to an area. Interviewee selection must done in a representative way implying that all who visit an area should have the same chance of having their say in the interview survey. Though it is almost impossible to be entirely successful in getting a representative choice there are a number of selection methods presented later on in this chapter that help make selection as good as possible.

There are two principally different ways of reaching out to create a dialogue with visitors. Either one conducts interviews directly on site in the survey area or one gets address or a telephone number to the visitors and send questionnaires per postage or conduct telephone interviews. With postal questionnaires or telephone interviews it is also possible to reach future potential visitors who have not yet visited the area in question.

Direct interviewing of visitors in the recreational area

A visitor is approached and interviewed directly in conjunction with a visit to the area. This is an easy method suitable for areas that display high visit figures. If the area is not well frequented the method becomes expensive and inefficient as the interviewer has to wait around for new visitors to appear. It is seldom possible to persuade visitors to participate in longer more in depth interviews when meeting them out in the recreational area. Instead this method is more suited for short qualitative questions such as those in the form below.

Stadsskogen interview survey

Date:	Time: ………...............	Location: ………..................................	Weather: ……………………………

Questions:

Is your specific purpose to visit Stadsskogen?

Yes No

Where are you going?

Workplace Home Town Other ……..........

Is this the quickest route?

Yes No

Why have you chosen this route?

…………………………......………………

……………………...................……………

When was the last time you were in Stadsskogen? ....

How long have you spent in Stadsskogen this time? ....

What do you like the most about Stadsskogen? ....

....

What do you like the least about Stadsskogen? ....

....

On which street do you live? ....

Observations

Gender: Male ☐ Female ☐ Age (years): < 15 15-25 25-45 45-65 >65

Number in the same visitor group: .... Comments: ....

Activity: Cycling ☐ Exercise ☐ Walking ☐ Riding ☐ Skiing ☐ Other. ….......................................

Accompanied: Pram ☐ dog ☐ Other: ....

Fig. 13 An example of an interview form for on-site interview.

In order to be able to generalise the results from an interview series so that they are valid for all visitors to the recreational area, the visitors must be selected randomly. Normally the interview time point is chosen so that it fairly represents all times during the week and seasons of the year. Once the interviews times have been selected one must then have a strategy over how to approach the interviewees on site. If one does not have a routine for this then the danger is that the interviewer will approach and ask people who look pleasant or who otherwise seem easily approachable. In other words one needs to have a routine over which people to ask if they would participate in the interview survey. One way of achieving this is to only interview people who exit the area via a certain entrance/exit point. One decides that for the duration of the survey period to try and interview the first person who passes a specified point in the terrain after the preceding interview. Other problems that can be encountered appear when visitors arrive in groups. What usually happens is that they collectively answer the questions or take it in turns making it very tricky to attribute the answers to one person. To solve this one can either let the answers represent the entire group in question or one could try isolating the selected interviewee to ensure that only he or she is the one answering.

While conducting interviews it is also of value to make notes of those who pass the interview location without being interviewed. The interviewer can manage to make such notes if the flow of visitors flow is not too intense. This information is extremely valuable as it provides an indication of how representative the selection of interviewees actually is.

It is also important that the interviewers receive proper instruction so that they are well familiar with how to conduct the interviews. An oral briefing of the written instructions is generally required. It is also a good idea if the interviewers have an opportunity to test run by staging a few mock interviews before the real survey begins. This gives them a chance to test their ability, sort out any uncertainties and adjust any incorrectly conducted interviews.

Questionnaires and telephone interviews

There are a variety of methods for getting in contact with visitors in order to send them a questionnaire or conduct a telephone interview with:

1. **Registration of an address or telephone number**
   For more detailed surveys that take some time for the interviewee to complete it is better to collect their address or telephone number and send the questionnaire to them or conduct a telephone interview with them instead. With this method one can usually expect a high response rate on condition that one has clearly explained the purpose of the survey and perhaps even made a appointment when to call.
2. **Registration of license plates**
   One can also make a note of all the license plates of the cars parked in the car park from which the car owner’s address can be sourced and the questionnaire sent to them. However one should bear in mind that someone else other than the car owner may have used the car at the time of the survey and therefore one should in the cover letter politely point out that the person

who parked the car during that specific time is the one to answer the questionnaire. In addition some cars may be found to be owned by a company rather than a private individual in which case it is advisable to exclude such cars from the selection.

3. **Self registration**
   The use of guest books or lists where the visitor can record their name and address is also an effective way of reaching visitors, especially in the more spectacular or exotic recreational areas such as mountain parks. The prouder a visitor is of "having been there and done that", the more likely it is that he or she will sign such a guest book. For example almost everyone who visits the summit chalet by Kebnekaises southern peak signs the guest book whereas very few would do so on a walk in their local park.

4. **Questionnaires to those living close by**
   If one already knows where the majority of visitors live it can be a good idea to make a selection from some form of register. For recreational areas close to urban centres it is usually the housing estates surrounding the area and addresses can be selected and bought for instance from Dafa /SPAR or from local Municipalities who often have registers over their inhabitants. The greatest advantage of this method is that one can also reach people who never or very rarely visit the area in question and if one wants to increase the usage of the area then these potential visitors are an important group to reach.

Fig. 14 Visitor giving input on the quality of the woodland as a recreational area.

How many does one need to ask?

Just as for counting visitors in the field where the number of observations needed depends on the spread between the observations, the same is true for questionnaires. The number of answers needed depends on how many sub-groups one wants to divide the results into. Is there a need to analyse men and women separately? Does one want to study different age categories or people who pursue special outdoor activities? For example, if one wanted to study women under 22 whose special interest is snowboarding then a substantial number of interviews will be needed to make up sufficient numbers for that specific sub-group. In other words if one wants to investigate small specialist sub-groups then one has to target the selection so that one receives a sufficient number of responses from these groups.

As a general rule of thumb at least 50 replies are needed in the smallest group one wants to present results from, which means that one would have to send out a minimum of 500 questionnaires. With a response rate of 60 % this is about 300 replies. These can then be divided into a number of sub-groups for instance four age groups or the two genders. If one feels that this seems a too big and difficult task one can of course conduct a smaller survey in which case one cannot generalise the results so that it can be assumed to apply to all visitors. Nonetheless many valuable pieces of information can be obtained from a relatively small survey.

Reminders and response rate

For this type of survey it is common practice to send the questionnaire once and follow up with two reminders from which one can expect a response rate of 50 – 60 %.

Questionnaire form design or a telephone interview guide

An example of a questionnaire form is found in Appendix 2. Start by deciding what issues need answers. Then formulate the questions that can give answers to these issues. The questions should be well posed and as clear as possible. Avoid using trade terms and difficult wording. After all, the respondent must be able to understand the question in order to answer it.

Multiple choice questions or open answers?

One can choose between using questions with open answers or questions with predetermined answer choices (multiple choice questions). Multiple choice questions are in most cases preferable as they are easier for the respondent to answer and for the analyst to interpret. Questions with open answers should also be used as one does not always know every conceivable answer or one would like the respondent to motivate a specific position or opinion.

When using multiple choice questions it is critical that all reply possibilities are accounted for. If this is not possible then the respondent must have a box with something like “own alternative” or “none of the above” to tick. One should also leave room for the respondent to define what is meant by “own alternative”. Make also sure that the reply alternatives do not overlap each other. In some cases this cannot be avoided as several alternatives may be valid or correct. In such instances it is important to clearly indicate that this is purpose of the question and that more than one reply alternative may be given for that specific question.

For example a multiple choice question where one asks the respondent the distance from their home to the nearest recreational area the reply alternatives may be given as follows:

a. 0-100 m
b. 100-300 m
c. 300-1000 m
d. 1-3 km
e. 3-10 km
f. >10 km

These reply alternatives are clearly given distances and all distances, from 0 to > 10 km, are represented. Such predefined reply alternatives are in most cases preferable as they make both responding to the question and analysing the result very easy. Of course some information can be lost, especially if care is not taken when drafting the reply alternatives. Most Swedes do not have far to travel to their nearest outdoor recreational area. If instead of using the reply alternatives above, we had used the following alternatives:

a. 0-2 km
b. 2-10 km
c. 10-100 km
d. >100 km

then one would have lost a lot of precision in the material as perhaps as much as 80 % of the replies would have given alternative (a) 0-2 km as their reply.

To avoid having too many choices one can use simple open answers for questions that one knows respondents can reply without too much effort. For example it is better to ask the respondent to write down their birth year with figures rather asking them to find the right year from a long list of years.

For several reasons it is often wise to use questions with open answers, whereby the respondents can freely express their opinion. Firstly it provides an opportunity to capture new problem perspectives and issues not thought of when planning the survey. Quite often the answers given to such questions provide fresh input to new ideas and issues not previously brought up when planning the survey. Secondly, many respondents would like an opportunity to ventilate their thoughts especially if they have an interest in the issue at hand.

By all means begin the questionnaire with some simple questions that are easy and uncontroversial to reply to, so that the respondent feels comfortable in starting the questionnaire and not put-off completing it. If one has some difficult or complicated questions these should be placed in the middle of the questionnaire and not left to the end. The questionnaire should not be too long (a maximum of 8 pages), have a light, uncluttered layout with plenty of space. Many people have difficulty in reading text with small font size, 12 points is suitable.

When carrying out interviews and questionnaires one should always keep in mind that if you “ask a silly question you will get a silly answer”. In other words there is always a latent danger that the respondent can intentionally or unintentionally give a reply that for some reason is not entirely truthful. For example if you ask a visitor you meet in the recreational area how often they visit this specific area they may reply “every day”. If later on in the same interview you ask when the previous occasion they visited was, the reply is several weeks ago. This contradictory answer does not necessarily mean that the respondent wanted to be intentionally misleading. It could just as likely be that the answer to the first question was a routine ”every day” which could in fact mean “every day I am able to” when other activities or conditions such as work, weather or holidays permit. One can also interpret “every day” as an expression of wishful thinking or a longing: “I would like to visit the woodland every day if I only could find the time”. Another common phenomenon worth noting regarding responses to interviews and surveys, is that respondents try to be “good” by answering the questions “correctly”. The end result is that one has a tendency to exaggerate the positive aspects and understate the negative sides. If the respondent senses that the interviewer thinks it is good to spend a lot of time outdoors, then the respondent will more than likely reply that they spend a lot of time outdoors even if this is not entirely true. In other words it is extremely difficult in questionnaires and interviews to quantify successfully by using questions phrased such as ”How often do you visit this woodland?” as when respondents are left to estimate their own visit frequency you can be sure of getting an exaggeration. Instead one can rephrase the question by asking ”When was the last time you were out to a recreational area?”. This forces the respondent to think of a specific visit which increases the reliability of the answer. This question can be complemented with follow up questions such as ”Where did you go?”, ”What mode of transport did you use to get there?”, ”How long did you spend there?”, ”What did you do there?”, ”How happy were you with this visit?” or maybe “How happy you were with this visit?”. All of these consecutive questions give better and more reliable replies if they are connected to one specific happening, the most recent visit, compared to asking ”How do you usually travel?” or “What do you usually do?”.

So when phrasing questions and interpreting the results of questionnaires and interviews we always must bear in mind that a question will give different answers depending on how it is phrased. This also means that if one wants to repeat the survey over time or compare results from other recreational areas then one must ensure that the questions are phrased the same way.

Once all the questions have been compiled one usually discovers that the questionnaire has become too long. Long and complex questionnaires normally get poor response rates so if it is longer than eight A4 pages then it should be shortened. Consider each and every question carefully: “Is the question relevant?”, ”Can it be rephrased simpler?”, “Which are the most important questions?”. After having reedited the questionnaire a number of times it is time to test it on friends, relatives and other acquaintances. Make use of all criticisms and opinions and reedit the questionnaire one more time.

Cover letter

It is important to give a good first impression. Therefore put some time and effort into drafting a pleasant cover letter in which you explain the purpose of the questionnaire in a concise and uncomplicated manner. Explain why the recipient of the questionnaire should make an effort to complete your survey. Furthermore, it should be made clear who is conducting the survey and provide details of how to contact someone in charge of the questionnaire should one wish to ask questions. Use a nice quality paper with letterhead from the organisation responsible for the survey.

Calculating the result

It is a virtue to stick to simple calculation models that do not require too of the data that has come in. In most cases it is quite sufficient with response percentages in the different categories along with mean values for the various groups.

The same calculation methods as described in earlier chapters can be used. In addition to this one also has to work with respondent percentages. Formulas for estimating mean error and for comparing percentages for the different respondent groups can be found in Appendix 1.

Loss

Regardless of if one is conducting a telephone interview or a postal questionnaire one must keep in order those who have replied and those who have not. The selected respondents who for whatever reason have not replied are called loss. For the results to be as accurate as possible it is important to work as hard as possible to keep loss to a minimum level by sending reminders and perhaps by following up per telephone. In spite of how much effort is put into minimising loss there still will always be a certain share in which case we must ask ourselves a few questions:

- Who were those that did not reply?
- Does this loss affect the result of the investigation?

A loss analysis should always be carried out to answer these questions and can be done in several ways. To start off with look into whom in the selection has replied and who has not. Is the response rate roughly the same throughout all groups or is there a category that is over- or under represented? If the response rate is not evenly distributed throughout then one should check to see if this could have an influence on the final result. Did the young men who responded have different habits or preferences than all the other respondents? If so then establish that this is the case and make allowances for such discrepancies within the respondent population when interpreting the results. In some instances it is possible to correct the result based on how the respondent population differ from the selection frame.

One can also compare the results between those that replied directly after receiving the questionnaire and those who replied after receiving the second reminder. It is likely that responses from those who did not reply at all would be similar to those who replied so late and this serves as an indicator to what direction the missing replies had they come in would have influenced the result of the survey itself.

Planning a visitor survey

1. Find out as much as possible what is already known about how the area is used. Interview those who look after and manage the area and perhaps also representatives from organisations that use the area for their activities.

   Ask yourself questions like:

   - Are there any previous visitor surveys from the area?
   - What activities are pursued in the area?
   - How do visitors come to the area?
   - Do we know which sections of the area are the most frequented?
   - During which times of the week is the area used the most?
   - During which part of year is the area used the most?

2. Evaluate the replies to the above questions. How reliable are the answers? What is most important to find out?

3. Choose one method or a combination of methods that are suitable for this particular area. In the tables below is a summary of the advantages and disadvantages of each method.

Table 9 Summary of methods used to count visitors in Nature areas

Method	Type of area	Advantages	Disadvantages
Direct observation			
- From ground level	- Well frequented areas with relatively stable visit frequency.	- Gives additional information such as gender, activity, age etc. - A mobile observer can also survey the spatial spread of the visits.	- Can only provide random sampling surveys which decrease the reliability of the approximations. - Expensive if many samplings are required.
- From the air	- Open areas where for instance it is possible to count the number of tents.	- Large areas can be surveyed in a short space of time. The spatial spread of the visits can also be surveyed.	- Can only provide random sampling surveys which decrease the reliability of the approximations. - Expensive if many samplings are required.
Automatic registration			
- vehicle counter	- Areas to which most visitors arrive by car and where the visitor cars can be distinguished from other cars.	- Measures continually over time and supplies measurement values per time interval. - A relatively large market for vehicle counters makes it easier to get service, support etc.	- Additional information on the number of visitors per car as well as ensuring that visitors actually visited the area is needed to obtain reliable approximations.
- person counter	- All types of areas, although it is a big help if a large share of visitors have to pass a narrow path or bridge.	- Measures continually over time and supplies measurement values per time interval.	- Additional information on the number of visitors who have pass the equipment, entrance and exit visitors etc is needed to obtain reliable approximations on the total number of visitors.

Table 10 Summary of interview and survey methods used for Nature areas visitor surveys.

Method	Ways of making contact	Advantages	Disadvantages
Postal survey/telephone interview	- Addresses to neighbouring housing estates or flats from local Council or State records. - Addresses collected by personnel on-site or via self-registration. - Recording vehicle license plates and getting addresses from vehicle registration office.	- Presumptive visitors who currently do not visit the area can also be reached. - Those who visit the area often have a large chance of being included in the selection. - Those that travel by car and visit the area often have a large chance of being included in the selection.	- Those who often visit the area can be underrepresented in relation to the commitment. - Those who rarely visit the area and who could possibly be stimulated into having a more active outdoor life may possibly be underrepresented. - Those who do not travel to the area by car are not in the selection. - Recording license plates may be perceived as a breach of integrity by some visitors.
On-site interview	- Only suitable in well frequented areas and during days with high visit pressure.	- Good opportunity for dialogue and follow-on questions what can increase understanding.	- Very difficult or impossible to achieve a representative selection. - Becomes costly if many interviews are to be conducted.

Appendix 1. Listing of useful statistical formulas

Formulae

Below follows a number of useful formulae for visitor surveys. Some of them are somewhat simplified which in most cases is insignificant for practical use.

Abbreviation explanation:
$s_x =$ Standard deviation
$\bar{x} =$ mean value of all observations
$x_i =$ value of the i:th observation
$n =$ number of observations
$N =$ number of selection units

Formula 1. Calculation of standard deviation

Standard deviation is a measure for the distribution or spread of observations from the mean value.

$$s_x = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$$

Formula 2. Calculation of confidence interval at 95 % certainty

Calculates an interval within which the probability that the true mean value is to be found is given at 95 % certainty.

$$e_{95} = 2 \cdot \frac{s_x}{\sqrt{n}}$$

Formula 3. Weighed mean value

Calculates the mean value for a total population when measurements using different selection probabilities in different groups (strata) have been done. For example, different selection probabilities for different times during the week.

$$\bar{x}_{vägd} = \frac{1}{N} \sum n_i \bar{x}_i$$

Formula 4. Confidence interval for the weighed mean value

Calculates an interval within which the true mean value is to be found at 95 % certainty.

$$e_{95} = 2 \cdot \sqrt{\frac{1}{N^2} \sum N_i^2 \left(\frac{s_i^2}{n_i} \right) \left(\frac{N_i - n_i}{n_i} \right)}$$

If N_i is significantly greater than n_i then $\frac{N_i - n_i}{n_i}$ can be excluded as it will become very close to 1.

Formula 5. Comparing two mean values using the t-test

$$t = \frac{(x - y)}{\left(\frac{s_x}{\sqrt{n_x}} + \frac{s_y}{\sqrt{n_y}} \right)}$$

if $t > 2$ the difference is with 95 % certainty not due to random error in the selection.

Formula 6. Calculating the required number of observations

The total number of the population (N) is needed along with an estimation of the variance (s^2) from previous measurements or experiences.

$$n = \frac{N \cdot s^2}{D(N-1) + s^2}$$ where

$$D = \frac{\left(2\sqrt{\frac{s^2}{N}\left(\frac{N-n}{N-1} \right)} \right)^2}{4}$$

If N is significantly greater than n then $\frac{N-n}{N-1}$ can be excluded as it will become very close to 1.

Appendix 2. Questionnaire containing examples of well phrased questions

Sample questionnaire aimed at people who live in the vicinity of a recreational area

Comments and explanations provided in italics.

Begin with some straight forward questions so that the respondent can easily get started with answering the questionnaire.

Questionnaire No. …….

All questionnaires given a number so that it is easy to keep track if sending reminders.

Date —— —— ——
Year month day

A reply date is usually needed when interpreting and processing the responses.

1. Gender

Male ☐ Female ☐

Questions with few and from each other independent answer options should be given as multiple choice questions.

2. Year of birth
19..

Questions that the respondent can easily and exactly answer should be given so that they themselves give the answer. Here multiple choice questions are more difficult to fill in and provide a less accurate answer.

3. Are you a Member of any Society or organisation involved with Nature conservation, sports, environment etc?

Yes ☐ No ☐

If Yes, which? ………………………………………………………………..............................

....

4. When was your most recent leisure visit to a Nature area?

Date —— —— ——
Year month day

One or a few questions about general outdoor habits give an opportunity to compare with other surveys which provide a better overview of the current selection of respondents.

5. Do you know the recreational area WOODLANDS that is located just south of the CITY?

Yes ☐ No ☐

If you have replied Yes to question 5 please continue and reply to the remaining questions.
If you have replied No to question 5 then this was the final question. Kindly send in the questionnaire without delay.
Thank you for your time, we appreciate your participation!

6. How far from your home is the recreational area WOODLANDS?
   ……… km

7. When was the most recent time you visited the recreational area WOODLANDS?

   Date —— —— ——
   Year month day

   ☐ I have never visited the recreational area WOODLANDS before. Please skip to question 14

   Questions asking for the "most recent" limit the risk of incorrect estimations compared to questions such as "how often do you usually…?"

8. On your most recent visit to the WOODLANDS, how did you travel to get there?
   ☐ On foot
   ☐ Bicycle
   ☐ Car
   ☐ Public transport
   ☐ By other means, kindly specify ……………………………………………...................

   ....

9. Did you have company on your most recent visit to the WOODLANDS?
   ☐ I was alone
   I was together with:
   ☐ My family
   ☐ Other relatives
   ☐ Friends

   How many were you including yourself? …… persons.

10. Which activity(ies) did you and/or your group pursue on your most recent visit to the WOODLANDS? If applicable indicate several alternatives.

    ☐ Walk/hike
    ☐ Run/Jog
    ☐ Cycle
    ☐ Swim
    ☐ Sunbathe
    ☐ Pick berries
    ☐ Pick mushrooms
    ☐ Nature studies
    ☐ Ski
    ☐ Hunt
    ☐ Fish
    ☐ Dog pursuits
    ☐ Picnic
    ☐ Visit place of historical and cultural interest
    ☐ Other, kindly describe ………………………………………………........................

    ....

11. How important are the following characteristics of the recreational area WOODLANDS for you?

	Not of any importance 1	2	3	4	Very important 5
The distance from home to the area	☐	☐	☐	☐	☐
The type of Nature in the area	☐	☐	☐	☐	☐
The facilities (trails, bridges etc) available in the area	☐	☐	☐	☐	☐
The organised activities in the area	☐	☐	☐	☐	☐
Access to information about the area	☐	☐	☐	☐	☐
Other: …………………………………….	☐	☐	☐	☐	☐

A scale with five or seven levels has been proved to be most suitable. It is easier to interpret a a question when the response is give on a scale between two opposite phrases or words (such as “not of any importance” and “very important. It becomes unnecessarily complicated if words are put on all the bars (e.g. ”fairly important”, ”fairly unimportant” on the middle bars). A numerical scale makes it also possible to calculate mean value and make comparisons over time or between different visitor categories.

Questions of a more complex nature that require some thought should ideally be placed in the middle of the questionnaire when the respondent has got started and not yet become tired.

12. How important are the following purposes for a visit to the WOODLANDS to you?

	Not of any importance 1	2	3	4	Very important 5
Peace, quiet and relaxation	☐	☐	☐	☐	☐
Experience Nature	☐	☐	☐	☐	☐
Pursue specific activities	☐	☐	☐	☐	☐
Participate in societal activities	☐	☐	☐	☐	☐
Experience cultural surroundings	☐	☐	☐	☐	☐

Here a long list of various activities can be listed if needed (see for example question 10).

13. How do you get information about the WOODLANDS?

	Often 1	2	3	4	Never 5
Notice boards and signs in the area	☐	☐	☐	☐	☐
From friends and acquaintances	☐	☐	☐	☐	☐
From a society or association	☐	☐	☐	☐	☐
From school/children’s school	☐	☐	☐	☐	☐
Advertisements in the newspaper	☐	☐	☐	☐	☐
From the Internet	☐	☐	☐	☐	☐
From brochures	☐	☐	☐	☐	☐
Direct mail	☐	☐	☐	☐	☐
By telephoning an automatic answering machine	☐	☐	☐	☐	☐
Other alternative	☐	☐	☐	☐	☐

…………………………....................

14. Which of the following changes would make you to visit the recreational area WOODLANDS more often or less often?

	Much more often 1	2	As often 3	4	Much less often 5
Better maps	☐	☐	☐	☐	☐
More trails and paths	☐	☐	☐	☐	☐
More picnic tables and shelters	☐	☐	☐	☐	☐
Basic courses about Nature	☐	☐	☐	☐	☐
Guided tours	☐	☐	☐	☐	☐
Better bus connections	☐	☐	☐	☐	☐
Better information about activities	☐	☐	☐	☐	☐
Information about berry locations	☐	☐	☐	☐	☐
Information about mushroom locations	☐	☐	☐	☐	☐
Better signs in the area	☐	☐	☐	☐	☐
Better parking facilities	☐	☐	☐	☐	☐
Dog free zones	☐	☐	☐	☐	☐
Exercise areas for dogs	☐	☐	☐	☐	☐
A wilder natural environment with more dead wood	☐	☐	☐	☐	☐
A more park like woodland	☐	☐	☐	☐	☐

Feel free to give own suggestions for improvements or changes:

………………………………………………………………………………………………………

……………………………………………………………………………………………………..

It is important to try to pose neutral (not leading) questions. The above question in many surveys would have been asked so that one would have only found out what changes the respondent would like to have made. The danger is that based on the answers one may implement these changes which although many may be in favour of them just as many may not be in favour of such changes in their recreational area.

It is important to leave space for the respondent to express their opinions. These replies are often difficult to process but can give many new ideas as well as a better understanding of the replies to the other questions.

Post the questionnaire in the enclosed reply envelope.

Thank you for your time, we appreciate your participation!

Appendix 3. Literature references to published Swedish visitor surveys

Examples of visitor surveys

Eriksson U. 2003. Interviews and surveys in three urban forest areas in the Stockholm region. SLU, Dept. Forest Products and Markets, thesis no. 21.	Postal survey Recording of vehicle license plates On-site interview
Fransila J. 2003. Visitor survey in the recreation areas of Kilsbergen : a method to develop opportunities for recreation in the forests of Sveaskog, SLU, Dept. Forest Products and Markets, thesis no. 20.	Address collection on site Postal survey
Fredman P. & Hansson A. 2003. Visitors in Tyresta National Park. Etour Utredningsserien 2003:13	On-site interview
Hörnsten L., Fredman P. 2002. Visits and visitors in Fulufjället 2001 – a study of tourism prior to National Park formation. Etour, Rapportserien 2002:6.	Self-registration Postal survey Vehicle counter Person counter
Kardell L. 2003. Active outdoor pursuits in Bogesundslandet 1969-2001. SLU Dept. Environmental Forestry. Rapport 92.	Direct observation Survey
Kardell L. 1998. Notes on outdoor pursuits in Norra Djurgården. SLU Dept. Environmental Forestry. Rapport 75.	Direct observation On-site interview
Kardell L. & Lindhagen A. 1995. Stadsliden in Umeå. An urban woodland in the city centre. SLU Dept. Environmental Forestry. Rapport 61.	Direct observation Telephone interview On-site interview
Kardell L. & Lindhagen A. 1995. Changes in Växjö citizens outdoor life between 1975 och 1992. SLU Dept. Environmental Forestry. Rapport 59.	Direct observation Postal survey On-site interview
Lindhagen A. 1996. Forest Recreation in Sweden – Four Case Studies Using Quantitative and Qualitative Methods. SLU Dept. Environmental Forestry. Rapport 64.	Direct observation Postal survey Telephone interview On-site interview
Lundin M. 2004. A study of the number of visitors in three urban woods in the Stockholm area using Radio Beam Counter technique. SLU, Dept. Forest Products and Markets, thesis no. 38.	Person counter Vehicle counter
The County Administrative Board of Stockholms 2004. This is how we use the Nature Reservations. Results from a survey to 1 000 households in Stockholm County. Rapport 2004:23	Postal survey
Wall S. 2004. Rambler tourism in Lapponia – visitors, experiences and attitudes to the World Heritage Site. Etour Working paper 2004:3.	Self-registration Postal survey

Av Skogsstyrelsen publicerade Rapporter:

1988:1	Mallar för ståndortsbonitering; Lathund för 18 län i södra Sverige
1988:2	Grusanalys i fält
1990:1	Teknik vid skogsmarkskalkning
1991:1	Tätortsnära skogsbruk
1991:2	ÖSI; utvärdering av effekter mm
1991:3	Utboträffar; utvärdering
1991:4	Skogsskador i Sverige 1990
1991:5	Contortarapporten
1991:6	Participation in the design of a system to assess Environmental Consideration in forestry a Case study of the GREENERY project
1992:1	Allmän Skogs- och Miljöinventering, ÖSI och NISP
1992:2	Skogsskador i Sverige 1991
1992:3	Aktiva Natur- och Kulturvårdande åtgärder i skogsbruket
1992:4	Utvärdering av studiekampanjen Rikare Skog
1993:1	Skoglig geologi
1993:2	Organisationens Dolda Resurs
1993:3	Skogsskador i Sverige 1992
1993:5	Nyckelbiotoper i skogarna vid våra sydligaste fjäll
1993:6	Skogsmarkskalkning – *Resultat från en fyraårig försöksperiod samt förslag till åtgärdsprogram*
1993:7	Betespräglad äldre bondeskog – *från naturvårdssynpunkt*
1993:8	Seminarier om Naturhänsyn i gallring i januari 1993
1993:9	Förbättrad sysselsättningsstatistik i skogsbruket – *arbetsgruppens slutrapport*
1994:1	EG/EU och EES-avtalet ur skoglig synvinkel
1994:2	Hur upplever "grönt utbildade kvinnor" sin arbetssituation inom skogsvårdsorganisationen?
1994:3	Renewable Forests - Myth or Reality?
1994:4	Bjursåsprojektet - *underlag för landskapsekologisk planering i samband med skogsinventering*
1994:5	Historiska kartor - *underlag för natur- och kulturmiljövård i skogen*
1994:6	Skogsskador i Sverige 1993
1994:7	Skogsskador i Sverige – *nuläge och förslag till åtgärder*
1994:8	Häckfågelinventering i en åkerholme åren 1989-1993
1995:1	Planering av skogsbrukets hänsyn till vatten i ett avrinningsområde i Gävleborg
1995:2	SUMPSKOG – ekologi och skötsel
1995:3	Skogsbruk vid vatten
1995:4	Skogsskador i Sverige 1994
1995:5	Långsam alkalinisering av skogsmark
1995:6	Vad kan vi lära av KMV-kampanjen?
1995:7	GROT-uttaget. Pilotundersökning angående uttaget av trädrester på skogsmark
1996:1	Women in Forestry – What is their situation?
1996:2	Skogens kvinnor – Hur är läget?
1996:3	Landmollusker i jämtländska nyckelbiotoper
1996:4	Förslag till metod för bestämning av prestationstal m.m. vid självverksamhet i småskaligt skogsbruk.
1997:1	Sjövatten som indikator på markförsurning
1997:2	Naturvårdsutbildning (20 poäng) Hur gick det?
1997:3	IR-95 – Flygbildsbaserad inventering av skogsskador i sydvästra Sverige 1995
1997:5	Miljeu96 Rådgivning. Rapport från utvärdering av miljeurådgivningen
1997:6	Effekter av skogsbränsleuttag och askåterföring – *en litteraturstudie*
1997:7	Målgruppsanalys
1997:8	Effekter av tungmetallnedfall på skogslevande landsnäckor *(with English Summary: The impact on forest land snails by atmospheric deposition of heavy metals)*
1997:9	GIS–metodik för kartläggning av markförsurning – *En pilotstudie i Jönköpings län*
1998:1	Miljökonsekvensbeskrivning (MKB) av skogsbränsleuttag, asktillförsel och övrig näringskompensation
1998:2	Studier över skogsbruksåtgärdernas inverkan på snäckfaunans diversitet *(with English summary: Studies on the impact by forestry on the mollusc fauna in commercially uses forests in Central Sweden*
1998:3	Dalaskog - Pilotprojekt i landskapsanalys
1998:4	Användning av satellitdata – *hitta avverkad skog och uppskatta lövröjningsbehov*
1998:5	Baskatjoner och aciditet i svensk skogsmark - tillstånd och förändringar
1998:6	Övervakning av biologisk mångfald i det brukade skogslandskapet. *With a summary in English: Monitoring of biodiversity in managed forests.*
1998:7	Marksvampar i kalkbarrskogar och skogsbeten i Gotländska nyckelbiotoper
1998:8	Omgivande skog och skogsbrukets betydelse för fiskfaunan i små skogsbäckar
1999:1	Miljökonsekvensbeskrivning av Skogsstyrelsens förslag till åtgärdsprogram för kalkning och vitalisering
1999:2	Internationella konventioner och andra instrument som behandlar internationella skogsfrågor
1999:3	Målklassificering i ”Gröna skogsbruksplaner” - betydelsen för produktion och ekonomi
1999:4	Scenarier och Analyser i SKA 99 - Förutsättningar

2000:1	Samordnade åtgärder mot försurning av mark och vatten - Underlagsdokument till Nationell plan för kalkning av sjöar och vattendrag
2000:2	Skogliga Konsekvens-Analyser 1999 - Skogens möjligheter på 2000-talet
2000:3	Ministerkonferens om skydd av Europas skogar - Resolutioner och deklarationer
2000:4	Skogsbruket i den lokala ekonomin
2000:5	Aska från biobränsle
2000:6	Skogsskadeinventering av bok och ek i Sydsverige 1999
2001:1	Landmolluskfaunans ekologi i sump- och myrskogar i mellersta Norrland, med jämförelser beträffande förhållandena i södra Sverige
2001:2	Arealförluster från skogliga avrinningsområden i Västra Götaland
2001:3	The proposals for action submitted by the Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF) - in the Swedish context
2001:4	Resultat från Skogsstyrelsens ekenkät 2000
2001:5	Effekter av kalkning i utströmningsområden *med kalkkross 0 - 3 mm*
2001:6	Biobränslen i Söderhamn
2001:7	Entreprenörer i skogsbruket 1993-1998
2001:8A	Skogspolitisk historia
2001:8B	Skogspolitiken idag - en beskrivning av den politik och övriga faktorer som påverkar skogen och skogsbruket
2001:8C	Gröna planer
2001:8D	Föryngring av skog
2001:8E	Fornlämningar och kulturmiljöer i skogsmark
2001:8G	Framtidens skog
2001:8H	De skogliga aktörerna och skogspolitiken
2001:8I	Skogsbilvägar
2001:8J	Skogen sociala värden
2001:8K	Arbetsmarknadspolitiska åtgärder i skogen
2001:8L	Skogsvårdsorganisationens uppdragsverksamhet
2001:8M	Skogsbruk och rennäring
2001:8O	Skador på skog
2001:9	Projekterfarenheter av landskapsanalys i lokal samverkan – (LIFE 96 ENV S 367) Uthålligt skogsbruk byggt på landskapsanalys i lokal samverkan
2001:11A	Strategier för åtgärder mot markförsurning
2001:11B	Markförsurningsprocesser
2001:11C	Effekter på biologisk mångfald av markförsurning och motåtgärder
2001:11D	Urvalskriterier för bedömning av markförsurning
2001:11E	Effekter på kvävedynamiken av markförsurning och motåtgärder
2001:11F	Effekter på skogsproduktion av markförsurning och motåtgärder
2001:11G	Effekter på tungmetallers och cesiums rörlighet av markförsurning och motåtgärder
2001:12	Forest Condition of Beech and Oek in southern Sweden 1999
2002:1	Ekskador i Europa
2002:2	Gröna Huset, slutrapport
2002:3	Project experiences of landscape analysis with local participation – (LIFE 96 ENV S 367) Local participation in sustainable forest management based on landscape analysis
2002:4	Landskapsekologisk planering i Söderhamns kommun
2002:5	Miljöriktig vedeldning - Ett informationsprojekt i Söderhamn
2002:6	White backed woodpecker landscapes and new nature reserves
2002:7	ÄBIN Satellit
2002:8	Demonstration of Methods to monitor Sustainable Forestry, Final report Sweden
2002:9	Inventering av frötäktsbestånd av stjälkek, bergek och rödek under 2001 - Ekdöd, skötsel och naturvård
2002:10	A comparison between National Forest Programmes of some EU-member states
2002:11	Satellitbildsbaserade skattningar av skogliga variabler
2002:12	Skog & Miljö - Miljöbeskrivning av skogsmarken i Söderhamns kommun
2003:1	Övervakning av biologisk mångfald i skogen - En jämförelse av två metoder
2003:2	Fågelfaunan i olika skogsmiljöer - en studie på beståndsnivå
2003:3	Effektivare samråd mellan rennäring och skogsbruk -förbättrad dialog via ett utvecklat samrådsförfarande
2003:4	Projekt Nissadalen - En integrerad strategi för kalkning och askspridning i hela avrinningsområden
2003:5	Projekt Renbruksplan 2000-2002 Slutrapport, - ett planeringsverktyg för samebyarna
2003:6	Att mäta skogens biologiska mångfald - möjligheter och hinder för att följa upp skogspolitikens miljömål i Sverige
2003:7	Vilka botaniska naturvärden finns vid torplämningar i norra Uppland?
2003:8	Kalkgranskogar i Sverige och Norge – förslag till växtsociologisk klassificering
2003:9	Skogsägare på distans - Utvärdering av SVO:s riktade insatser för utbor
2003:10	The EU enlargement in 2004: analysis of the forestry situation and perspectives in relation to the present EU and Sweden
2004:1	Effektuppföljning skogsmarkskalkning tillväxt och trädvitalitet, 1990-2002
2004:2	Skogliga konsekvensanalyser 2003 - SKA 03
2004:3	Natur- och kulturinventeringen i Kronobergs län 1996 - 2001

2004:4	Naturlig föryngring av tall
2004:5	How Sweden meets the IPF requirements on nfp
2004:6	Synthesis of the model forest concept and its application to Vilhelmina model forest and Barents model forest network
2004:7	Vedlevande arters krav på substrat - sammanställning och analys av 3.600 arter
2004:8	EU-utvidgningen och skogsindustrin - En analys av skogsindustrins betydelse för de nya medlemsländernas ekonomier
2004:9	Nytt nummer se 2005:1
2004:10	Om virkesförrådets utveckling och dess påverkan på skogsbrukets lönsamhet under perioden 1980-2002
2004:11	Naturskydd och skogligt genbevarande
2004:12	Når vi skogspolitikens mångfaldsmål på artnivå? - Åtgärdsförslag för uppföljning och metodutveckling
2005:1	Access to the forests for disabled people
2005:2	Tillgång till naturen för människor med funktionshinder
2005:3	Besökarstudier i naturområden - en handbok
2005:4	Visitor studies in natureareas - a manual
2005:5	Skogshistoria år från år 1177-2005
2005:6	Vägar till ett effektivare samarbete i den privata tätortsnära skogen
2005:7	Planering för rekreation - Grön skogsbruksplan i privatägd tätortsnära skog

Av Skogsstyrelsen publicerade Meddelanden:

1991:2	Vägplan -90
1991:3	Skogsvårdsorganisationens uppdragsverksamhet – Efterfrågade tjänster på en öppen marknad
1991:4	Naturvårdshänsyn – Tagen hänsyn vid slutavverkning 1989–1991
1991:5	Ekologiska effekter av skogsbränsleuttag
1992:1	Svanahuvudsvägen
1992:2	Transportformer i väglöst land
1992:3	Utvärdering av samråden 1989-1990 /skogsbruk – rennäring
1993:2	Virkesbalanser 1992
1993:3	Uppföljning av 1991 års lövträdsplantering på åker
1993:4	Återväxttaxeringarna 1990-1992
1994:1	Plantinventering 89
1995:2	Gallringsundersökning 92
1995:3	Kontrolltaxering av nyckelbiotoper
1996:1	Skogsstyrelsens anslag för tillämpad skogsproduktionsforskning
1997:1	Naturskydd och naturhänsyn i skogen
1997:2	Skogsvårdsorganisationens årskonferens 1996
1998:1	Skogsvårdsorganisationens Utvärdering av Skogspolitiken
1998:2	Skogliga aktörer och den nya skogspolitiken
1998:3	Föryngringsavverkning och skogsbilvägar
1998:4	Miljöhänsyn vid föryngringsavverkning - Delresultat från Polytax
1998:5	Beståndsanläggning
1998:6	Naturskydd och miljöarbete
1998:7	Röjningsundersökning 1997
1998:8	Gallringsundersökning 1997
1998:9	Skadebilden beträffande fasta fornlämningar och övriga kulturmiljövärden
1998:10	Produktionskonsekvenser av den nya skogspolitiken
1998:11	SMILE - Uppföljning av sumpskogsskötsel
1998:12	Sköter vi ädellövskogen? - Ett projekt inom SMILE
1998:13	Riksdagens skogspolitiska intentioner. Om mål som uppdrag till en myndighet
1998:14	Swedish forest policy in an international perspective. (Utfört av FAO)
1998:15	Produktion eller miljö. (En mediaundersökning utförd av Göteborgs universitet)
1998:16	De trädbevuxna impedimentens betydelse som livsmiljöer för skogslevande växt- och djurarter
1998:17	Verksamhet inom Skogsvårdsorganisationen som kan utnyttjas i den nationella miljöövervakningen
1998:18	Auswertung der schwedischen Forstpolitik 1997
1998:19	Skogsvårdsorganisationens årskonferens 1998
1999:1	Nyckelbiotopsinventeringen 1993-1998. Slutrapport
1999:2	Nyckelbiotopsinventering inom större skogsbolag. En jämförelse mellan SVOs och bolagens inventeringsmetodik
1999:3	Sveriges sumpskogar. Resultat av sumpskogsinventeringen 1990-1998
2001:1	Skogsvårdsorganisationens Årskonferens 2000
2001:2	Rekommendationer vid uttag av skogsbränsle och kompensationsgödsling
2001:3	Kontrollinventering av nyckelbiotoper år 2000
2001:4	Åtgärder mot markförsurning och för ett uthålligt brukande av skogsmarken
2001:5	Miljöövervakning av Biologisk mångfald i Nyckelbiotoper
2001:6	Utvärdering av samråden 1998 Skogsbruk - rennäring
2002:1	Skogsvårdsorganisationens utvärdering av skogspolitikens effekter - SUS 2001
2002:2	Skog för naturvårdsändamål – uppföljning av områdesskydd, frivilliga avsättningar, samt miljöhänsyn vid föryngringsavverkning
2002:3	Recommendations for the extraction of forest fuel and compensation fertilising
2002:4	Action plan to counteract soil acidification and to promote sustainable use of forestland
2002:5	Blir er av
2002:6	Skogsmarksgödsling - effekter på skogshushållning, ekonomi, sysselsättning och miljön
2003:1	Skogsvårdsorganisationens Årskonferens 2002
2003:2	Konsekvenser av ett förbud mot permetrinbehandling av skogsplantor
2004:1	Kontinuitetsskogar - en förstudie
2004:2	Landskapsekologiska kärnområden - LEKO, Redovisning av ett projekt 1999-2003
2004:3	Skogens sociala värden
2004:4	Inventering av nyckelbiotoper - Resultat 2003

Beställning av Rapporter och Meddelanden

Skogsvårdsstyrelsen i ditt län
eller
Skogsstyrelsen,
Förlaget
551 83 JÖNKÖPING
Telefon: 036 – 15 55 92
vx 036 – 15 56 00
fax 036 – 19 06 22
e-post: sksforlag.order@svo.se
www.svo.se/forlag

I Skogsstyrelsens författningssamling (SKSFS) publiceras myndighetens föreskrifter och allmänna råd. Föreskrifterna är av tvingande natur. De allmänna råden är generella rekommendationer som anger hur någon kan eller bör handla i visst hänseende.

I Skogsstyrelsens Meddelande-serie publiceras redogörelser, utredningar m.m. av officiell karaktär. Innehållet överensstämmer med myndighetens policy.

I Skogsstyrelsens Rapport-serie publiceras redogörelser och utredningar m.m. för vars innehåll författaren/författarna själva ansvarar.

Skogsstyrelsen publicerar dessutom fortlöpande: Foldrar, broschyrer, böcker m.m. inom skilda skogliga ämnesområden.

Skogsstyrelsen är också utgivare av tidningen Skogseko.

Information of visitors and their recreational patterns can be of strategic importance for the way a recreational area is managed, on the services needed and on the needs for information to persons visiting the area. This manual presents various ways to study and to measure the number of visitors and how to design questionnaires to provide information to managers, land owners, municipalities and others engaged in recreational areas.

The manual is produced within the project EU/LIFE Urban Woods for People and is co-funded by the EU

Skogsstyrelsen
www.svo.se