
The economic contribution of the forestry sector in Scotland



Final report

September 2015

CJC CONSULTING



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September 2015

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Acknowledgements

We wish to thank Cameron Maxwell, other Forestry Commission staff, Raymond Henderson of Bidwells and members of the steering group for their assistance. We also wish to express our appreciation to all who responded to the surveys for their collaboration in this study. The National Forest Inventory staff (Ben Ditchburn, Alan Brewer and Robyn Diamantis) played a key role in facilitating the landowner survey and its analysis.

Dr Bob Crabtree
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1 Executive summary

1.1 Aims and methods

The aim of this study is to estimate the economic contribution of forestry in Scotland. More specifically it updates four indicators in the Scottish Forestry Strategy (SFS) Implementation Plan, first published in 2008:

- Forestry's contribution to Scottish Gross Value Added (GVA)
- Timber's contribution to Scottish GVA
- Forestry's contribution to Scottish tourism GVA
- Employment supported by the forestry-related sector.

GVA and employment were estimated or derived for three broad components of the 'forest industries' in Scotland:

- Forestry and timber processing
- Forestry-related recreation/tourism
- Forestry-related deer and game.

We estimated *direct* GVA and employment in these areas, *indirect* effects arising from purchases of goods and services within the sector, and *induced* effects from spending by employees.

For the purposes of the present study the forestry and timber processing sector was defined as the 'activity related to forestry, trees, woodland and primary timber processing (pulp mills, production of sawn wood, wood panels, fencing posts and woodfuel, including chips, briquettes, pellets, firewood and other woodfuel) in Scotland'. This includes forest management and primary timber processing, forestry civil engineering, haulage, agents, community groups with interests in woodland, NGOs, local authorities with woodland activity, research and education, and those activities of the Forestry Commission (FC) and Forestry Commission Scotland (FCS) which are located in Scotland.

Businesses and activities excluded from the study included secondary processing and paper production from imported pulp and most haulage from primary to secondary processors. The economic impact of the installation and operation of wood fuel boilers was excluded (being beyond the parameters of the study and considered as part of the renewable energy sector) although processing of wood for fuel and production of wood pellets was included.

Forestry and timber processing sector employment and GVA estimates were based on two postal surveys. The first covered businesses and organisations associated with forestry and timber processing, and the second, undertaken by the Forestry Commission, covered woodland landowners. Overall, the response rate to the surveys was 31% for forestry/timber processing businesses and organisations (excluding landowners) and 22% for the separate survey of landowners.

1.2 Employment

1.2.1 Businesses/organisations in forestry and timber processing

Respondents to the surveys were asked to categorise their employment according to type of activity. Table 1.1 shows the employment according to this self-categorisation. Direct employment based on the aggregated survey responses and other information was **12,143 FTEs**. Indirect and induced employment was estimated using employment multipliers adjusted for intra-forestry sector purchases (see Annex 3 for the methodology). The total employment attributable to the activities of the businesses and organisations in the sector was **19,555 FTEs**. The main sources of direct employment were the Forestry Commission (Forestry Commission Scotland including its agency Forest Enterprise Scotland which manages the National Forest Estate together with Forestry Commission Central Services and Forest Research staff located in Scotland), forest management, harvesting, and primary processing, especially sawmills.

Table 1.1 Employment and GVA in the forestry sector (2012/13)

Activity	Direct employment (FTEs)	Total employment (FTEs)	Total GVA (£m)
Forestry Commission (including Forest Research)	1,224	2,093	98.2
Forest/woodland owner/lessee	995	1,719	68.8
Land agents, consultancy, advice, legal	121	182	11.4
Forest management (incl. ground prep., fencing, planting, nurseries etc.)	1,701	2,926	92.8
Harvesting, sales of wood and timber	1,268	2,029	61.3
Misc. self-employment (planting, managing, harvesting)	1,000	1,500	60.0
Haulage/transport	810	1,223	49.4
Saw milling, production of pallet slats, fencing posts	2,227	3,474	146.9
Production of wood panels, board and pulp and paper	1,126	1,757	74.3
Production of chips, pellets	472	736	31.1
Recreation and tourism	424	551	14.1
Education, training and research	80	112	4.9
Environmental protection/conservation	117	211	10.4
Civil engineering	230	484	24.0
Local authorities	182	309	13.8
Other	166	249	10.0
Total FTEs	12,143	19,555	771

1.2.2 Forest-related recreation and tourism

Separate estimates were made of the contribution to employment of visitor expenditures associated with visits to forests. Data on visitor numbers and spend on forest visits were based on Forest Enterprise Scotland's All Forests Survey 2 of the

National Forest Estate. This was preferred to other survey sources because it is an on-site survey which is not restricted to Scottish residents. Unlike other surveys it also gives detailed information on visitor expenditure. There are no equivalent data on visits to 'private' (all other non-National Forest Estate) forests in Scotland. Using evidence from the Scottish Recreation Survey and SPANS Omnibus surveys (see Annex 1) we assumed that 60% of all categories of visit were to the National Forest Estate and 40% to private forests and adjusted the All Forests Survey 2 results upwards to reflect this.

We estimated direct employment from the All Forests Survey 2 results and then used Scottish multipliers to calculate indirect and induced employment. Our estimate of the contribution to employment (direct, indirect and induced) where forest visits were the main destination on the day was **6,312 FTE jobs**. Not all of the expenditure on visits can be described as additional employment for the Scottish economy. The additional employment impact on the Scottish economy is estimated to be between 4,270 and 5,840 FTE jobs. Assuming 50% of resident overnight trips are additional gives 5,050 additional FTE jobs.

This estimate is likely to be conservative mainly because the visitor data do not include the tourist expenditures associated with forestry's contribution to landscape and wildlife habitats in Scotland. We could not include these aspects because of a lack of reliable data but it seems likely that they make a significant contribution to tourism¹.

1.2.3 Deer and other game

A parallel assessment of the contribution to employment of deer management, game and sport shooting associated with woodland was based on other published studies by PACEC (2006, 2014)². On the basis of limited evidence we assumed conservatively that 25% of the employment related to deer and game was attributable to forestry and woodland. This percentage was used to partition the PACEC data between woodland and non-woodland in Scotland. This gave a total employment (direct, indirect and induced) of **2,260 FTE jobs** associated with deer and game. This includes both the employment derived from deer management and that derived from injections of expenditure by visitors engaged in sport shooting.

1.3 Gross Value Added (GVA)

1.3.1 Forestry and timber processing

After indirect and induced employment multipliers had been applied to each category of activity in Table 1.1 above, associated GVA was estimated from the Type II GVA multipliers given in the 2011 Input-Output Tables for Scotland (the latest available, but considered broadly applicable to 2012/13)³. The GVA to FTE employment ratios used were generally consistent with the earnings from employment data from our business survey.

¹ Bryden et al. (2010) found that wildlife watching and scenery accounted for 39% of the employment contribution of nature-based activities in Scotland. SNH Commissioned Report No. 398.

² PACEC (2014). The Value of Shooting. PACEC Cambridge. <http://basc.org.uk/the-value-of-shooting/>

² PACEC (2006). The Contribution of Deer Management to the Scottish Economy. PACEC Cambridge.

³ See Annex 3 for details of the methodology.

The total GVA of **£771m** (Table 1.1) is 0.7% of Scotland's total output GVA in 2012. This £771m GVA is substantially higher than the F4P estimate of £458.6m made in 2009 (based on 2004 data). Part of this difference will be due to inflation, but it mainly represents the more comprehensive and robust data we obtained from our business survey. In addition, there would be an expected increase in GVA since 2004 due to the major expansion in softwood deliveries (40%⁴) and associated harvesting activity, and the increase in the planted area of 55,000 ha⁵ (4% of the 2013 woodland area⁶).

1.3.2 Recreation and tourism

Expenditure by recreational visitors to Scotland's forests increases the value added of recipient businesses – most of which are in sectors, particularly accommodation, restaurants and shops, that were not covered in our business survey. Ratios of business income from visitor expenditure to GVA were obtained for different types of business from Scottish Annual Business Statistics (2012) and a GVA multiplier from the Scottish Input-Output Tables⁷ was then applied to obtain the total (direct+indirect+induced) GVA effects.

The total contribution of £263m forest visitor expenditure to Scottish GVA was estimated to be **£183m** (Table 9.6). Not all of the expenditure represents additional injections⁸ into the Scottish economy, however, and the additional economic impact of forest recreation on Scottish GVA is considered to lie in the range £120m to £164m. Assuming 50% of resident overnight trips are additional gives an impact of £142m. These estimates should be treated as indicative only because of uncertainty about the total forest visitor spend and aggregated nature of the business statistics for GVA.

1.3.3 Deer and other game

As for employment in Section 1.2.3 we assume that 25% of GVA from deer/game management and sport shooting was forestry-related. On this basis the estimated forestry-related total contribution to Scottish GVA from deer/game management and sport shooting (based on PACEC studies) was **£68m**.

1.4 Summary

Table 1.2 shows the total contributions of the forest industries to employment and GVA in Scotland (excluding deer/game). For recreation/tourism the estimates are imprecise (see Chapter 6) due, in particular, to a lack of good data on recreation associated with private forestry.

The total employment associated with the sector is **25,867 FTE jobs** (including related employment estimated through the multiplier). Of these around 80% derive from forestry and timber processing. The total contribution to GVA is **£954m⁹** (0.8% of Scottish GVA).

⁴ Forestry Statistics 2014 (comparing 2004 and 2013 softwood deliveries).

<http://www.forestry.gov.uk/website/forstats2014.nsf/TopContents?Open&ctx=AAE83F6D1BF93E5380257A3200575E08>

⁵ <http://www.forestry.gov.uk/forestry/INFD-7AQKNX>

⁶ The increase in woodland area since 1988/89 (the date of the employment survey which was the basis for the F4P estimates) is 11%.

⁷ <http://www.scotland.gov.uk/topics/statistics/browse/economy/input-output/multipliers>

⁸ The assumption is that money spent by residents on day trips to forests could readily be spent on alternative activities with little net impact on the Scottish economy.

⁹ This is gross of any subsidy payments. Published Scottish GVA is net of subsidies.

Table 1.2 Forestry sector generated employment and GVA (direct, indirect and induced) in Scotland (2012/13)

Component	Total employment (FTEs)	Total GVA (£m)
Forestry and timber processing	19,555	771
Recreation and tourism	6,312	183
Total	25,867	954

These impacts on the economy do not include the contribution made by forestry-related deer and game. For this, as set out above, we relied on data from PACEC adjusted by an estimate of the element that was forestry-related. The contribution to employment was estimated to be around **2,260 FTE jobs**, with a GVA impact of **£68m**. These include direct, indirect and induced effects.

The total forestry sector, inclusive of the multiplier, supports a substantial level of employment at around 1.5% of the workforce FTEs in Scotland (using data from the Business Register Employment Survey for 2012¹⁰, and assuming that a part time job is equivalent to 0.5 of a full time job). If jobs in secondary processing of home-grown timber were included this would increase the role of forestry in Scotland's employment. Although the geography of employment was not studied it is evident that the sector is important in supporting jobs in remote and rural locations.

Timber harvesting and processing are particularly important in generating value added and this contribution will increase with increasing output of the forest estate in the future. The value added figures do not include the substantial benefits to the public from free access to much of Scotland's forests and the contribution of forests and woodlands to landscape and wildlife (see Section 2.1.1).

¹⁰<http://www.ons.gov.uk/ons/rel/bus-register/business-register-employment-survey/2012-provisional/stb-bres--2012-provisional.html#tab-Results-by-region>

2 Background and objectives

This study is structured around the estimation of employment and Gross Value Added (GVA) of the three main sectors making up Scotland's forest industries: the forestry and timber processing sector, forest-related recreation/tourism and forest-related deer/game. These three sectors are dealt with separately in the following chapters.

In the Scottish Forestry Strategy (SFS) Implementation Plan, first published in 2008, four progress indicators relating to forestry's contribution to employment and the economy were established:

- ❑ Forestry's contribution to Scottish gross value added (which combines GVA of the contributions of Scottish grown timber production and processing, and recreation and tourism visits to Scottish woodland).
- ❑ Timber's contribution to Scottish gross value added.
- ❑ Forestry's contribution to Scottish tourism gross value added.
- ❑ Employment supported by the forestry-related sector (combines employment figures for the contribution of Scottish grown timber production and processing, and recreation and tourism visits to Scottish woodland).

This study sets out to update these indicators which were last quantified in a report (Forestry for People, F4P) by Forest Research in 2009¹¹ – although F4P relied heavily on the employment estimates from the last FC Employment Survey in 1998/99. Direct employment in the Forestry and timber processing sector was 10,253 FTEs. The direct, indirect and induced employment was estimated at 13,190 FTEs. When employment associated with visitor expenditures was included the total for direct employment was 28,103 FTEs. This and other published studies on the economic contribution of the forestry sector are described in Annex 2 along with details of the methods used in the current study.

Since 1998/99, softwood output in Scotland has increased from 4.083mt (1999)¹² to 7.030mt (2013), with the private sector proportion increasing from 42% to 60% of the total. The area of woodland in Scotland has also increased (1998 to 2013) by around 11%. The total area of woodland in 2013 was 1.41m ha of which 0.93m ha was privately owned. It might be expected that the expansion of planting, harvesting and processing would result in increased employment in the sector, although productivity gains from mechanisation in harvesting and changes in processing technology will have reduced employment per unit of output.

2.1.1 Non-market benefits

Scotland's forests provide substantial benefits to the public which are not recorded in economic statistics (as normally defined) and not explicitly valued in Forestry Commission Scotland's annual accounts. These include a wide range of ecosystem services¹³ many of which have been valued through contingent valuation and other techniques. Willis et al. (2003)¹⁴ valued the benefits from

¹¹ Forest Research (2009). A valuation of the economic and social contribution of forestry for people in Scotland. Forestry Commission Scotland.

¹² Forestry Commission. Forestry Statistics 2014. <http://www.forestry.gov.uk/forestry/inf-d-7aql5b>

¹³ Eftec (2011). Scoping study on valuing ecosystem services of forests across Great Britain. Final report to the Forestry Commission.

¹⁴ Willis, K. G., Garrod, G. Scarpa, R., Powe, N., Lovett, A., Bateman, I. J., Hanley, N. and Macmillan, D. C. (2003). The Social and Environmental Benefits of Forests in Great

biodiversity, recreation, landscape, air pollution absorption and carbon sequestration at £104.1m per year for all of the forests in Scotland. These are substantial public benefits which are important in assessing the overall net benefits from Scotland's forests and woodlands.

Nevertheless, this project concentrates on the contribution of the sector to employment and GVA in Scotland through aggregating the categories of activity agreed with FCS as representing the forestry sector for the purposes of this study.

The following chapters set out the separate contributions of each of the three parts of the sector for both jobs and GVA: Forestry and timber processing, Recreation and tourism, and Deer and other game. For Forestry and timber processing, there are separate chapters for employment and GVA.

Britain. Report to Forestry Commission, Edinburgh. Centre for Environmental Appraisal and Management, University of Newcastle upon Tyne [online] available at: [http://www.forestry.gov.uk/pdf/sebreport0703.pdf/\\$FILE/sebreport0703.pdf](http://www.forestry.gov.uk/pdf/sebreport0703.pdf/$FILE/sebreport0703.pdf)

3 Approach and surveys for the forestry and timber processing sector

3.1 Forestry and timber processing

For the purposes of the present study the forestry and timber processing sector was defined as the ‘activity related to forestry, trees, woodland and primary timber processing (pulp mills, production of sawn wood, wood panels, fencing posts and woodfuel, including chips, briquettes, pellets, firewood and other woodfuel) in Scotland’. This includes forest management and timber processing, forestry civil engineering, haulage, agents, community groups with interests in woodland, NGOs, local authorities with woodland activity, and research and education. It also includes those activities of Forestry Commission Scotland, Forest Enterprise Scotland and the Forestry Commission (FC Central Services and Forest Research) which are located in Scotland.

Businesses and activities excluded from the study included secondary processing and paper production from imported pulp and most haulage from primary to secondary processors. Some allowance is made for annual capital spend by the businesses surveyed, but major expenditures on new plant and equipment by sawmills etc., in the year covered by the survey are excluded in order to avoid undue complexity in the survey. The economic impact of the installation and operation of wood fuel boilers was excluded (being beyond the parameters of the study and more appropriately located in the renewable energy sector) although processing of wood for fuel and production of wood pellets was included. The boundary of the sector is arbitrary but similar to that used in the Forestry Commission’s (1998/99) survey of employment in forestry. Employment and GVA from activity in that part of the deer/game sector which is related to forestry is discussed in Chapter 7.

Although this definition of the sector appears well-defined it is problematic where a business or organisation has income both from forestry and other types of activity. Thus whilst some hauliers are forestry specialists others may haul timber but also other types of load. Contractors may operate both within and outside forestry. We concentrated on identifying those organisations that had a significant role in the production, management and primary processing of trees. This means that some forest-related activity will have been omitted in order to make the estimate of employment impact manageable.

The aim was to calculate direct FTE employment, wider employment impacts and related GVA in this sector in Scotland. Direct employment in the sector is best interpreted as that *associated* with forestry. It includes first round suppliers and processors. We also add in the backward linkages to suppliers, and the induced effects, using the relevant multipliers in order to estimate total FTE employment for the sector.

3.1.1 Government data

A variety of government statistics on employment, income and GVA are available for businesses and organisations, and these are classified by SIC code. The Inter-departmental Business Register (IDBR) assembles data from business and employment surveys, VAT and PAYE information. Businesses not paying PAYE or registered for VAT are not included.

A disadvantage of IDBR data is that they under-record activity in the forestry sector because not all organisations in the sector are included. There are also

problems with classification in that businesses have one SIC and this is normally self-categorised. This can mean that businesses wholly providing services to or involved in forestry may be classified under engineering or haulage etc. It is also the case that businesses active in forestry and classified with a forestry SIC can also have activities in other sectors.

The employment statistics obtained from IDBR are discussed in Section 10.1.3.

3.2 Surveys

3.2.1 Forestry and timber processing survey

In order to provide more specific economic data relating to the sector we undertook a survey of forestry sector businesses and organisations. We also wished to estimate employment in terms of FTEs and this is not available from the IDBR. Contact details were obtained from a variety of sources, including the Forestry Commission, Forest Research, Scottish Government, Community Woodlands Association, websites and other sources. The design of the sample frame and operation are described in more detail in Annex 2.

1,485 potential forestry sector businesses/organisations were identified but this undoubtedly under-recorded the total number operating in the sector in Scotland. This was thought to be especially the case with contractors where many businesses are small and have a limited public profile, with proprietors often self-employed. However, we explored all possible routes to obtain the best possible cover.

The questionnaire was designed to elicit information on FTE employment, turnover and employment costs in the 2012/13 accounting year of the recipients. We used a 100% sample for all types of business except community woodlands and NGOs where 25%¹⁵ was used. 1,329 postal questionnaires were sent out with an option to complete the paper questionnaire or to download from a web page. A reminder was sent out after one month and a number of large organisations were phoned or emailed in an attempt to improve the response.

The response rate to the forestry sector business survey was 31%.

3.2.2 Landowner survey

A similar questionnaire was sent by staff in the Forestry Commission's forest inventory and forecasting team to a sample of private woodland owners in Scotland. The sample frame was established using the National Forest Inventory (NFI) database which is the most comprehensive database on ownership and forest location available. The sampling frame was the 1ha squares on private sector woodland in Scotland selected for the 1st cycle NFI field survey. Details of the survey methodology are given in Annex 2.

514 questionnaires were sent out and a total of 111 valid completed returns were received, giving a response rate of 21.6%. This was somewhat disappointing but not atypical of landowner surveys. It is not easy to obtain responses in situations where woodland management is partially or totally delegated to agents who may not have access to both physical and financial information for the business.

3.2.3 Population level estimates

Annex 2 describes how the responses from the surveys were raised to the population level to give the results discussed below.

¹⁵ The lower sampling percentage reflected the fact that many NGOs and community woodlands were known to have little or no paid employment.

4 Employment in the forestry and timber processing sector

4.1 Introduction

We obtained estimates of direct employment in the sector from the two surveys - the Forestry and timber processing survey and the Landowner survey. The latter was organised by the Forestry Commission and both are described in Annex 2.

In the survey we asked respondents (some of whom were also active outside forestry or had non-forestry SIC codes) to estimate that part of their employment that was associated with the forestry sector. For this reason one might expect the survey approach to show higher levels of forestry sector employment than can be obtained from government data located within the Inter-Department Business Register (IDBR) (see Annex 2, 10.1.3). Respondents were asked to report only on employment in Scotland.

4.2 Landowner survey

The direct forestry-related employment estimated from grossed-up survey responses was 1,813 FTEs (Table 4.1). This did not include self-employed and agency staff, and excluded contractors. Because of the low response rate in the survey these employment figures must be treated with a degree of caution since there may be self-selection bias in the responses.

Table 4.1 Forestry-related employment from the Landowner survey (FTEs, 2012/13)

Component	Forestry-related direct employment (FTEs)
Forest owner/leasing ¹⁶	955
Deer and game	434
Recreation and tourism	424
Total FTEs	1,813

In order to compile a single dataset we removed deer and game from direct employment because all employment related to deer and game was taken from more comprehensive PACEC surveys (see Chapter 7). We used the Landowner survey results as the basis for the employment estimates relating to forest ownership and recreation/tourism (excluding employment associated with visitor spending which is analysed separately in Annex 1). The landowners' recreation-related employment is treated as distinct from the employment generated by recreation/tourist spending since this expenditure is largely made off-site on accommodation, food and travel (see Annex 1)¹⁷.

There is a possibility of double counting between the two surveys. However, we concluded that this was likely to be small. It must also be borne in mind that the forestry business survey does in any case under-estimate sector employment

¹⁶ An additional 477 self-employed FTE jobs were recorded.

¹⁷ On-site visitor expenditure (e.g. entrance fees) would lead to double counting but this is a very small element of total visitor expenditure.

because not all businesses operating in the sector could be identified and included.

4.3 Forestry and timber processing survey

The survey sample responses were raised to the overall identified population level for responses in each of the contact datasets. Where the sector had a small number of large businesses and numerous smaller ones in employment terms the population was split and the responses raised accordingly. The results will, however, be subject to sampling error given the <100% response rate, and there is also the possibility of bias due to self-selection in response.

Respondents purchasing timber were asked to indicate the proportion of home grown (Scottish) timber used in their primary processing. The average, weighted by turnover, was 96.9%. Responses in relation to employment and turnover etc. referred to all timber whatever the source (both home grown and imported timber).

Respondents were asked to allocate their direct employment by type of activity (Table 4.2). A number of adjustments were made to the grossed-up responses from the survey. The survey was unsuccessful in eliciting responses from sufficient Local Authorities to produce reliable results about their forestry-related employment. Since Forest Research undertook a detailed survey of Local Authority forest employment in 2008 we based our employment data on their estimate of 207 FTEs. However, local authorities have faced budget cuts since 2008 and reduced employment as a consequence. There was a 12% reduction in local authority employment between 2008 and 2012/13¹⁸ and the 207 FTEs were reduced accordingly to 182 FTEs. If anything this may be an over-estimate of local authority forestry employment since cuts would be expected to fall more heavily on non-statutory activity.

Civil engineering businesses (road building, bridges etc.) were not fully captured in the survey because many are not specialised in forestry. The survey only recorded 61 direct jobs categorised by respondents as civil engineering, although some engineering work may have been categorised under forest management. Evidence from National Forest Estate expenditure indicated 115 FTE direct jobs in civil engineering unaccounted for in the forestry and timber processing survey. There will also be an under-estimate for private sector forestry but no data are available on private sector expenditures on civil engineering. This is likely to be broadly similar to the level of civil engineering on the National Forest Estate. The harvest is increasingly coming from first rotation private sector forests, which means that more roading is required although the road network may be of a different density and specification from those on the National Forest Estate. We took a total of 230 direct FTEs as a conservative estimate for the sector as a whole.

This integration of the two surveys gives a direct employment estimate of 12,143 FTEs excluding employment associated with recreational spending, deer and game (Table 4.2). F4P used mainly 1988/89 data to arrive at an estimate of 10,253 FTEs in 2009. The afforested area and timber output have increased substantially since 1998/99 and this is the most likely explanation for the increased employment. But differences in survey methodology and the population of businesses surveyed will also be a factor. The major sources of employment were in harvesting, sawmilling and timber processing, forest management and the

¹⁸ <http://www.gov.scot/Topics/Statistics/Browse/Labour-Market/PublicSectorEmployment/LAPSE>

Forestry Commission (FCS, FES, and FC Central Services and Forest Research staff based in Scotland,) itself.

Table 4.2 Estimates of employment and GVA in the forestry and timber processing sector (2012/13)

Activity	Direct employment (FTEs)	Total employment (FTEs)	Total GVA (£m)
Forestry Commission (including Forest Research)	1,224	2,093	98.2
Forest/woodland owner/lessee	995	1,719	68.8
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Forest management (incl. ground prep., fencing, planting, nurseries etc.)	1,701	2,926	92.8
Harvesting, sales of wood and timber	1,268	2,029	61.3
Misc. self-employment (planting, managing, harvesting) (estimated) ¹⁹	1,000	1,500	60.0
Haulage/transport ²⁰	810	1,223	49.4
Saw milling, production of pallet slats, fencing posts	2,227	3,474	146.9
Production of wood panels, board and pulp and paper	1,126	1,757	74.3
Production of chips, pellets	472	736	31.1
Recreation and tourism	424	551	14.1
Education, training and research	80	112	4.9
Environmental protection/conservation	117	211	10.4
Civil engineering	230	484	24.0
Local authorities	182	309	13.8
Other	166	249	10.0
Total FTEs	12,143	19,555	771

4.4 Total forestry generated employment

Indirect employment resulting from the backward linkages to suppliers and indirect employment related both to direct and indirect employment were estimated using employment multipliers from the 2011 Input-Output tables for Scotland²¹. The indirect and induced multipliers were adjusted to remove intra-sector effects within the input-output tables and thus avoid double counting. This is especially important for the processing sector in order not to double count employment in

¹⁹ This estimate was based on 477 FTEs of self-employed staff recorded in the Landowner survey plus an estimate of under-recording of around 500FTEs in the Forestry Business survey population of contractors and self-employed workers which took account of the self-employed workers in the forestry sector recorded in the government Business Register Employment Survey. <http://www.ons.gov.uk/ons/rel/bus-register/business-register-employment-survey/index.html>

²⁰ This does not include haulage out of primary processing plants.

²¹ <http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output>

forest management which would be included in unadjusted Type II multipliers. The methodology is explained in more detail in Section 11.1.

Multipliers were applied to all businesses in the sector, including processors, to take into account indirect and induced effects on employment and GVA. The incorporation of forward linkages to processors was considered appropriate given that they form part of the sector as defined for the study. However, as explained in Chapter 11 these were adjusted to avoid double counting of impacts.

Since SIC codes were not available for all forestry sector businesses we applied multipliers that corresponded most closely to the categories in Table 4.2. The overall average Type II employment multiplier was 1.62.

The additional indirect and induced employment was 7,452 FTEs. This gives a total employment of 19,555 FTEs attributable to activity within the forestry and timber processing sector.

5 Gross value added in the forestry and timber processing sector

5.1 Introduction

The forestry sector GVA²² at basic prices is a measure of the contribution of the sector to the Scottish economy. F4P estimated the direct GVA of forest products and services in 2009 at £303.6m. When GVA multipliers were applied, the total direct, indirect and induced GVA was £458.6m.

GVA is not available for individual businesses from the IDBR database but is (at the aggregated 2-digit SIC level) in the Scotland Annual Business Statistics (SABS)²³. The direct GVA of forestry and logging (SIC 02) in 2012 was £114.9m, and for the manufacture of wood products (SIC 16), £360.9m. The total GVA for forestry plus wood processing was thus £475.8. This would include an element of secondary timber processing and processing of timber imported into Scotland. The manufacture of paper and paper products (SIC 17) would add another £274.2m to GVA but the major part of SIC 17 is secondary manufacturing which mainly uses imported paper pulp and outside the forestry sector as considered here.

The SABS measure of direct GVA does not include the contribution of other related sectors such as haulage. The aim in this study was to measure the total (direct, indirect and induced) contribution to national GVA generated by the forestry sector activity, both directly or indirectly.

5.2 Method

After indirect and induced employment multipliers had been applied to each category of activity in Table 4.2 above, associated GVA was estimated from the Type II multipliers given in the 2011 Input-Output Tables for Scotland (the latest available, but considered broadly applicable to 2012/13). The relevant table gives FTEs per £m of output for a sector (inclusive of indirect and induced multipliers) and GVA per £m of output. This gives the ratio between FTEs and GVA which was used to calculate GVA having determined which Input-Output sector (or combination of sectors) was most appropriate to use for each activity in Table 4.2 (see Annex 3 for more detail on this approach). The GVA to FTE employment ratios used were generally consistent with the earnings from employment data from our business survey.

5.3 Total forestry generated GVA

The total forestry and timber processing GVA of £771m (Table 4.2) is 0.7% of Scotland's total output GVA²⁴ in 2012 of £113,894m given in the Quarterly National Accounts Scotland publication (Table 3)²⁵. This £771m GVA is substantially higher than the F4P estimate of £458.6m made in 2009 (based on

²² Defined in Scottish Annual Business Statistics 2012.

<http://www.scotland.gov.uk/Resource/0045/00458058.pdf>.

²³ <http://www.gov.scot/Topics/Statistics/Browse/Business/SABS>

²⁴ In assessing the sector's net contribution to Scotland's GVA, subsidies should be subtracted, including the annual operational deficit of Forest Enterprise and grants paid to forest owners for planting.

²⁵ <http://www.gov.scot/Topics/Statistics/Browse/Economy/SNAP/expstats/aggregates/SNA/P2012Q2>

2004 data). Part of this difference will be due to inflation, but it mainly represents the more comprehensive and robust data we obtained from our business survey. In addition, there would be an expected increase in GVA as compared with 2004 due to the major expansion in softwood deliveries (40%²⁶) and associated harvesting activity, and the 4% increase in the planted area since 2004 when F4P made their estimate²⁷.

²⁶ Forestry Statistics 2014.

<http://www.forestry.gov.uk/website/forstats2014.nsf/TopContents?Open&ctx=AAE83F6D1BF93E5380257A3200575E08>

²⁷ F4P GVA estimates were based on the 1998/1999 Forestry Commission employment survey. Since 1989 there has been an 11% increase in the area of forestry in Scotland.

6 Recreation and tourism

6.1 Introduction

Where forest owners and the Forestry Commission directly employ staff to support recreation and tourism or also support indirect employment through investment in facilities and maintenance, these impacts on employment and GVA have been included in Chapter 5. What has not been included is the impact of visitor spending linked to visits to public, private and community owned forests. These visits include a wide range of activities such as walking (with or without dogs), wildlife tourism, mountain biking, cultural tourism and general leisure.

The starting point for estimating this economic contribution of recreation and tourism is the expenditure by visitors attracted to forests in Scotland. There may be on-site charges for entry, car parking and the use of facilities provided for forest visitors (e.g. bike hire), but the main expenditures associated with visits is in travel, food, drink and accommodation.

However, visits to forests are not the only source of expenditure impact because forestry's contribution to landscape and wildlife will also attract tourists. Hill et al. (2003)²⁸ surveyed tourists in the Trossachs and Borders and found that 'good scenery' was the most important of five factors for general trip location decisions. As forests are a major part of the scenery in Scotland this might suggest that forests play a key role in trip making decisions. However, forests *per se* were not ranked highly when tourists were asked why they chose to visit the region.

Unfortunately there are no data that indicate what expenditures can be linked to the contribution of forests and woodlands to Scotland's landscape and wildlife. We therefore focus on visits to forests for which data on expenditure are available.

Expenditure by visitors from outside Scotland is most clearly additional to the Scottish economy. Spending by Scottish residents who stay overnight will also be additional if it displaces a holiday outside Scotland. Expenditure by Scottish residents on day trips to forests is more likely to be part of their normal spending on recreation with less additional economic impact attributable to woodlands *per se*. The assumption here is that Scottish residents would be likely to spend money elsewhere in the Scottish economy if they had not visited the forest.

Annex 1 gives a detailed account of the approach used in estimating visitor spend and its impact on employment and GVA. This is summarised below.

6.2 Visitor expenditure

There are a number of different surveys which have estimated visit numbers to forests, and in some cases have also recorded visitor spending²⁹. We based our impact estimates on the recent All Forests Survey 2³⁰ of visits to the National Forest Estate. This is a largely on-site survey recording actual visits and is considered more reliable and useful than other surveys that are restricted to Scottish residents and rely heavily on memory.

²⁸ Hill, G., Courtney, P., Burton, R. and Potts, J., Shannon, P., Hanley, N., Spash, C., DeGroot, J., Macmillan, D. and Gelan, A. (2003). Forests' Role in Tourism. Main Report Final to the Forestry Commission.

²⁹ See Annex 1 for details of these surveys.

³⁰ All Forests Survey 2, (2013) Forestry Commission Scotland. Some additional analysis was carried out for the current study.

There were estimated to be 9.1m visits to the National Forest Estate in 2013, of which 77% were by Scottish residents (7.01m), and 23% by 'Other UK and overseas visitors' (2.09m). Most of the Scottish residents were on day trips with relatively few overnight stays (Table 6.1).

Table 6.1 Number of visits and expenditure on the day of the forest visit, by category of visitor (National forests Estate)

	Other UK and overseas visitors	Scottish visitors on overnight visits	Scottish visitors on a day trip	All visits
Number of visits per year (m)	2.093	0.910	6.097	9.10
Number of visits per year (main destination) (m)	1.088	0.473	3.17	4.73
Expenditure on the day of the visit (£ per visit):				
Food & drink	21.50	17.86	1.82	
Transport	13.44 ³¹	11.62	3.78	
Shopping	4.71	3.13	0.25	
Admission fees	1.93	1.80	0.16	
Equipment	0.47	1.22	0.05	
Other	0.93	0.35	0.03	
Accommodation	49.99	42.94	0	
Total expenditure per visit (£)	92.97	78.92	6.09	
Total expenditure (£m)	194.59	71.82	37.13	303.53
Total expenditure where the forest was the main destination (£m)	101.18	37.34	19.31	157.84

Expenditure totalled £157.8m where the National Forest Estate forest was the main destination that day. Scottish visitors on day trips were relatively unimportant in economic terms since they only accounted for 12% of expenditure. The expenditure of 'Other UK and overseas' visitors contributed 64% of the total.

There are no equivalent data on visits to 'private' (non-National Forest Estate) forests. The SRS and SPANS Omnibus surveys (see Annex 1) give some information on the proportion of visits to the National Forest Estate and private forests but this is limited to Scottish residents and contains a proportion of 'not known' responses. On the limited evidence available we assumed that 60% of all categories of visit were to the national estate and 40% to the private forestry estate, giving total visitor expenditure of £263m.

Expenditures from 'Other UK and overseas' visitors were treated as additional to the economy, whereas it is less clear that all expenditures by Scottish residents are additional. Hence expenditure was classified as either:

- Associated with visits to public and private forests: £263m³² in 2013 (economic contribution)
- Additional injections due to forest visits: £169-231m (additional economic impact).

³¹ Only includes transport on the day of the visit.

³² 157.84/0.6. See Table 6.1 and text.

Bryden et al. (2010)³³ in their study of nature based tourism in Scotland made the point that tourism expenditures recorded on the day of a visit will underestimate the total expenditure related to recreational trips because capital items are excluded unless bought that day. For example, clothing, bikes and other kit are mainly purchased at other times of year but part of this expenditure may be driven by the expectation (in our case) of visits to forests. To the extent that such capital purchases are unaccounted for, the figures given above are underestimates of spend, and therefore of economic contribution and impact.

6.3 Employment

We estimated the total employment impact of the visitor expenditure using a combination of values from the literature and IBDR³⁴ data as set out in more detail in Annex 1. The weighted mean visitor expenditure was £37,630 per job (£43,000 per FTE) (Table 6.2). This includes direct, indirect and induced employment.

Table 6.2 Employment associated with visitor expenditure

	Expenditure per job (direct+indirect+induced) (£)	Employment (jobs)	Employment (FTEs)	Total GVA (£m per year)– unadjusted for displacement
Other UK and overseas visitors'	£34,560	4,878	4,268	119.6
Scottish visitors on overnight visits	£34,630	1,796	1,571	44.4
Scottish visitors on a day trip	£59,500	541	473	18.8
All visitors weighted by expenditure	£37,630	7,215	6,312	182.8

The total employment (direct, indirect and induced) associated with visitor expenditure was calculated as 6,312 FTE jobs. However, not all visitor expenditure can be treated as an additional injection into the Scottish economy. Excluding Scottish day trippers, and allowing for uncertainty over the extent to which overnight residents inject expenditure additional within Scotland, gives additional employment of 4,270-5,840 FTEs.

6.4 Gross Value Added (GVA)

Expenditure by recreational visitors to Scotland's forests increases the value added of recipient businesses – most of which are in sectors, particularly accommodation, restaurants and shops, that were not covered in our business survey. Ratios of business income from visitor expenditure to GVA were obtained for different types of business from Scottish Annual Business Statistics (2012) and a GVA multiplier from the Scottish Input-Output Tables³⁵ was then applied to obtain the total (direct+indirect+induced) GVA effects.

The total GVA associated with forest visitor expenditure of £263m is thus £183m (Table 5.2). Not all of the expenditure represents additional injections into the

³³ Scottish Natural Heritage (2010). Assessing the economic impacts of nature based tourism in Scotland. Report 338. <http://www.snh.gov.uk/docs/B726802.pdf>

³⁴ Inter-Departmental Business Register. This gives both turnover and employment data for firms classified according to the Standard Industrial Classification (SIC). <http://www.adls.ac.uk/ons/inter-departmental-business-register/?detail>

³⁵ <http://www.scotland.gov.uk/topics/statistics/browse/economy/input-output/multipliers>

Scottish economy, and the additional economic impact of forestry on Scottish GVA is assessed to be in the range £120m to £164m. These estimates should be treated as indicative only because of uncertainty about the total forest-visitor spend and the aggregated nature of the business statistics in calculating GVA.

6.5 Conclusions

Limited information on motivations to visit Scotland's forests (and alternative destinations) means that it is difficult to identify the economic contribution of recreation and tourism with much precision. Our estimate of employment associated with forest visits where they are the main activity of the visitor on the day of their visit is 6,312 FTE jobs. Adjusting for displacement, the "additional" visitor spend would support between 4,270 and 5,840 FTE jobs in Scotland. Assuming 50%³⁶ of resident overnight trips are additional gives an aggregate impact of 5,050 additional FTEs within this range.

Associated GVA estimates are indicative but suggest total GVA associated with forest visitor expenditure of £183m with additional GVA generated in the Scottish economy of £120-164m. Assuming 50% of resident overnight trips are additional gives a GVA impact of £142m.

These estimates are likely to be conservative for two reasons. First, the All Forests Survey 2 may underestimate visitor numbers given the difficulty of capturing 100% of visits in any on-site survey. Even so we consider this survey more reliable and useful for economic analysis than the 2012 Scottish Recreation Survey or the 2013 SPANS Omnibus surveys³⁷. Second, the visitor data do not include the tourist expenditures associated with forestry's contribution to landscape and wildlife in Scotland. We could not include this aspect because of a lack of reliable data but it seems likely that it makes a significant contribution to tourism³⁸. We recommend more research on this aspect so that a more complete analysis of the impact of Scotland's forests and associated land on tourism could be derived.

³⁶ This was an assumption made in Bryden et al. (2010). SNH Commissioned Report No. 398.

³⁷ See Annex 1 for details.

³⁸ Bryden et al. (2010) found that wildlife watching and scenery together accounted for 39% of the employment contribution of nature-based activities in Scotland. SNH Commissioned Report No. 398.

7 Deer and other game

7.1 Background

Deer and other game generate a wide range of economic impacts. They may cause damage to woodlands and agriculture but provide opportunities for sport shooting and contribute to the natural heritage and the experience of visitors. The management of deer and other game has an impact on the economy through direct employment and expenditure by landowners, which has a ripple effect through the supply chain. Sport shooting of game can also contribute to the economy as a result of expenditures made by recreational shooters on fees, travel, accommodation and equipment. Finally, processing of carcasses will generate employment, and produce income for the firms involved.

It was beyond the remit of this study to undertake an in-depth analysis of the deer/game sector in Scotland. Our survey of forestry sector businesses and organisations was not appropriate for determining the expenditures of those engaged in sport shooting. PACEC (2014)³⁹ undertook a study of the economic contribution of sport shooting based on interviews in 2012 and 2013. The report is highly summarised and gives little information on methodology and no information on the multipliers used. PACEC are in the process of undertaking a further study on the costs and employment associated with deer management in Scotland but this has yet to be completed.

The only other economic studies on shooting and stalking that cover Scotland were undertaken by PACEC^{40 41} in 2006. F4P based their estimates of employment associated with game on the PACEC studies, as did Putman⁴² in 2012. Bryden et al. (2010)⁴³ in their review of nature-based tourism in Scotland estimated the impact of 'wildlife watching' and 'field sports' at 7,244 additional FTE jobs out of an estimated total of 39,078 FTEs.

7.2 Economic studies

PACEC (2014) estimated that there was £180m expenditure by first round suppliers and participants on shooting in Scotland. This generated 8,800 total FTE jobs (direct, indirect and induced). In the 2006 report on deer management 126 direct and 240 total FTEs were associated with deer management (not for sport). Including these additional jobs gives a total employment associated with deer and game in Scotland of around of 9,040 FTEs.

A parallel calculation, using the data from these reports, for the contribution to Scottish GVA gives a total contribution to GVA associated with deer and game of £270m. Within this total, deer management contributed £70.4m to total GVA.

³⁹ PACEC (2014). The Value of Shooting. PACEC Cambridge. <http://basc.org.uk/the-value-of-shooting/>

⁴⁰ PACEC (2006a). The Economic and Environmental Impact of Sport Shooting. PACEC Cambridge.

⁴¹ PACEC (2006b). The Contribution of Deer Management to the Scottish Economy. PACEC Cambridge.

⁴² Putman, R. (2012). Scoping the economic benefits and costs of wild deer and their management in Scotland. *Scottish Natural Heritage Commissioned Report No. 526*. http://www.snh.org.uk/pdfs/publications/commissioned_reports/526.pdf

⁴³ Scottish Natural Heritage (2010). Assessing the economic impacts of nature based tourism in Scotland. Report 338. <http://www.snh.gov.uk/docs/B726802.pdf>

7.3 Forestry contribution

Many game species use woodland as habitat but also use hill and/or agricultural land. Woodland is an important habitat for deer and pheasant⁴⁴ both of which are key sport species. Even so, there is no obvious way in which the economic contribution of deer and game can be partitioned between forestry and other land. Where species rely on a mix of forestry and other habitats any partitioning is arbitrary.

F4P used 40% of the UK area managed for sport shooting that is forestry as the basis for partition in Scotland. Returns to SNH⁴⁵ on cull shooting of deer species indicate whether they were shot on agricultural land, open land or woodland. This gives one indicator of habitat. Of the 98,400 (all species) shot in 2012/13, 54.8% were shot in woodland. However of the 57,190 red deer shot only 33.5% were shot in woodland.

In the Landowner survey respondents were asked to indicate the percentage of their direct deer and game employment that was related to forestry and woodland. The mean was 34.3%. However, this was a survey of landowners with woodland and is therefore biased upwards because it only sampled grid squares containing woodland. There are 1.410m ha of forestry in Scotland⁴⁶ of which 0.932m ha is private sector forest. PACEC indicates that shooting influences the management of 4.4m ha of land in Scotland. Private woodland as a proportion of this area is 21%.

Without more detailed information, we have assumed indicatively that 25% of deer and game shooting related employment in Scotland is attributable to forestry. We used this proportion to partition the PACEC data.

7.4 Estimate of employment and GVA

Applying the 25% assumption to the PACEC estimates gives total (direct, indirect and induced) employment of around 2,260 FTE jobs in the forestry sector associated with deer and game, including all deer management. The Forestry Commission's Landowner survey (see Section 4.2) indicated direct employment of 434 direct jobs from forestry-related deer and game management but this does not include the important employment element associated with the expenditure of sport shooters. Since the PACEC employment data includes not only that relating to deer management but the important element of spending by recreational shooters we use their total employment estimate of 2,260 FTEs.

As set out above, our combined figures for the PACEC studies give a total GVA contribution to Scotland's economy of £270m. Taking 25% of this gives a forestry-related contribution to total GVA of £68m.

In adding these PACEC employment and GVA estimates to the totals for the rest of the forestry sector there could be some double counting. This would occur if the multipliers applied by PACEC were not adjusted for purchases from the rest of the forestry sector. It is best therefore to treat the PACEC figures as upper bound.

⁴⁴ <http://www.gwct.org.uk/research/species/birds/common-pheasant/>

[w.snh.gov.uk/about-scotlands-nature/species/mammals/land-mammals/deer/](http://www.snh.gov.uk/about-scotlands-nature/species/mammals/land-mammals/deer/)

⁴⁵ Private communication

⁴⁶ Forestry Statistics 2013 (forest area in 2013).

<http://www.forestry.gov.uk/website/forstats2013.nsf/LUContents/D7DD6DF6687BC57880257A32004E1A4F>

8 Conclusions

8.1 Employment and GVA

Table 8.1 shows the collated contribution of the forestry industries and forest-related recreation/tourism to Scottish employment and GVA. For recreation/tourism, the estimates are imprecise (see Chapter 5) due, in particular, to a lack of data on recreation associated with private forestry.

Table 8.1 Forestry sector contribution to employment and GVA (direct, indirect and induced) in Scotland (2012/13)

Component	Total employment (FTEs)	Total GVA (£m)
Forestry	19,555	771
Recreation and tourism	6,312 ⁴⁷	183
Total	25,867	954

The total employment associated with the sector aggregates to just under 26,000 FTE jobs. Of these, around 80% derive from forestry and around 20% from recreation and tourism. The total contribution to GVA is £954m⁴⁸ (0.8% of Scottish GVA).

In addition to these contributions to the economy the sector supports a valuable deer and game resource. No direct estimate of its contribution was made in this study. Instead the results from the 2014 and 2006 PACEC studies were adjusted to give an estimated forestry-related total contribution to employment of 2,260 FTE jobs and a GVA impact of £68m. These include direct, indirect and induced effects.

The contribution of the forestry sector to Scottish value added quantified above does not include the substantial benefits to the public from free access to much of the forest estate and the contribution of forests and woodlands to landscape and wildlife (see Section 2.1.1). If a more complete assessment of the contribution of forestry to the Scottish economy were required these benefits would need to be included.

8.2 Comparison with previous studies

The total employment generated by the forestry and timber processing sector of 19,555 FTE jobs is substantially higher than the 13,190 FTEs calculated in F4P in 2009 (which was based on a 1998/99 survey). This higher figure can be explained in part by the major expansion in softwood deliveries (40%⁴⁹) and associated harvesting and haulage activity, and the 11% increase in the planted area since 1998/1999 (114,000 ha⁵⁰).

⁴⁷ Not all of this employment is additional (see Section 6.1)

⁴⁸ This is gross of any subsidy payments. Published Scottish GVA is net of subsidies.

⁴⁹ Forestry Statistics 2014.

<http://www.forestry.gov.uk/website/forstats2014.nsf/TopContents?Open&ctx=AAE83F6D1BF93E5380257A3200575E08>

⁵⁰ <http://www.forestry.gov.uk/forestry/INFD-7AQKNX>

In addition, the Type II multipliers used in F4P were quite small (on average 1.3), and only backward linkages were included. In this study we also applied adjusted multipliers to firms involved in harvesting, transport and processing in order to capture their indirect and induced impacts outside the forestry sector. It was considered realistic to include this element so that all business in the sector were analysed using a consistent methodology.

Similar reasons explain our higher estimate of the total contribution of forestry to GVA (£771m, as compared with the F4P figure of £459m at 2007/2008 prices). In particular the increased timber output with associated impacts on harvesting haulage and processing activities would be expected to substantially increase forestry's GVA contribution.

Comparison of recreation/tourism employment and GVA with F4P (see Section 10.1) is not very informative because F4P used different survey data and different assumptions about impacts on the economy. Our estimates of the contribution (Table 8.1) are lower but based on detailed on-site surveys of visitors which are considered more reliable than ex-post interviews.

The study by Hindle et al. (2014)⁵¹ on the economic contribution of Scottish Land and Estates' members indicated 10,445 total FTE jobs (including multiplier effects) from members' estates. However, comparison with this study is difficult to make since this employment included activities other than forestry and the study only covered part of the afforested area in Scotland.

⁵¹ Hindle, R. Thomson, S. Skerratt, S. McMorran, R and Onea, P. (2014). Economic Contribution of Estates in Scotland: An Economic Assessment for Scottish Land and Estates. Report to Scottish Land and Estates.

9 Annex 1 Recreation and tourism

9.1 Method and approach

To determine the contribution to the economy of forest-related recreation first requires an estimate of expenditure associated with visits to forests. This expenditure supports employment in a wide range of businesses and their supply chains.

Hill et al. (2003)⁵², in their study of Forests' Role in Tourism, made a useful distinction between two aspects: 'economic contribution' – which is the importance of an activity to a country's economy and employment; and 'economic impact' which is concerned with the effect of new or external money being injected into the economy. Economic contribution refers to those expenditures that are *associated* with forest visits. Economic impact refers to the *additional injections* of expenditure into the Scottish economy. This is an important distinction which we maintain in the analysis.

Whilst many (and typically site-specific) studies are concerned with the local economy we are concerned here with the national Scottish economy. Impacts of expenditure on employment in the local economy will be smaller than those at national level because of leakage to non-local suppliers.

9.2 Categories of visitors

From the perspective of impacts on the Scottish economy, tourists from other parts of the UK and overseas are especially important. These visitors clearly inject additional spending into the economy. Expenditure by Scottish residents will have an economic impact if the forest visit results in greater expenditure than would otherwise have taken place domestically on the day, and especially if it contributes to displacing a holiday or short break that would otherwise have been taken outside Scotland.

Most forest visits have economic significance, but in terms of their economic impact it is useful to distinguish three main categories of visitor:

1. Tourists from outside Scotland whose visit is at least partially 'forest-related'.
2. Scottish residents who stay overnight in Scotland⁵³ and have 'forest-related' expenditures.
3. Scottish residents on trips not involving an overnight stay who have 'forest-related' expenditure.

Expenditure by category 1 tourists is most clearly additional to the Scottish economy. Category 2 expenditure will often be at least in part additional as some trips will displace a holiday outside Scotland. Expenditure by category 3 visitors is generally assumed to be largely displaced in that, in the absence of forest visits, alternative recreational expenditure would take place within Scotland.

⁵² Hill, G., Courtney, P., Burton, R. and Potts, J., Shannon, P., Hanley, N., Spash, C., DeGroot, J., Macmillan, D. and Gelan, A. (2003). Forests' Role in Tourism. Main Report Final to the Forestry Commission.

⁵³ VisitScotland has a category of 'Tourism Day Visits' (visits not taken on a regular basis and outside the 'usual environment'). These would fit within this second category of visitor. Other 'Leisure Day Visits' fit within category 3. See [http://www.visitscotland.org/pdf/GBDVS Main Annual Report 2011 Final - 26 April 2012.pdf](http://www.visitscotland.org/pdf/GBDVS%20Main%20Annual%20Report%202011%20Final%20-%2026%20April%202012.pdf)

9.3 Previous economic studies

9.3.1 Introduction

Previous studies on the impact of forest recreation have concentrated either on the total forest estate in Scotland or specific forests. We include a brief comment on these studies to provide a context for the current investigation.

The F4P study examined the survey evidence available in 2007/08 and concluded that Scottish residents (categories 2 and 3 above) made 34.2m forest visits, of which 15m were classified as tourism (mean expenditure £26.89 per visit) and 19.2m as recreation (mean expenditure £5.8 per visit). Total resident tourist expenditure was estimated at £403m, and recreation expenditure of £111m. Other UK tourists were estimated to spend £25m. No estimate was made for non-UK tourists. These expenditures relate to the total forest estate and no separate estimates of expenditure were made for the National Forest Estate.

The study defined forest-related spending as expenditure directly related to recreation at forest sites, and estimated that this was associated with 17,900 direct FTE jobs (13,400 due to tourism and 3,700 to shorter trips). A conversion factor of £31,580 expenditure per FTE inclusive of the multiplier was used.

The tourist (UK including Scottish residents) contribution to Scotland's GVA (direct, indirect and induced) was estimated at £166m. Recreational expenditure by Scottish residents generated an estimated £43m GVA.

9.3.2 Aberystwyth University; Glentress and Rothiemurchus

Christie et al. (2006)⁵⁴ surveyed visitors to Rothiemurchus (privately owned) and Glentress (on the National Forest Estate). Glentress is a specialist mountain biking centre and Rothiemurchus provides opportunities for a wide range of family recreation. Daily expenditures by these visitors are unlikely to be typical of the wider estate.

Expenditure at Rothiemurchus averaged £22.29 per person (day visitors) and £39.72 (holiday visitors). At Glentress the corresponding figures were £12.48 and £45.76. However, the survey asked 'How much do you expect to spend today relating to your trip to this forest?', and this form of question is unlikely to pick up all spending on accommodation and travel. The total spend may therefore be underestimated.

Visitor expenditure at Glentress was included in the survey of all National Forest Estate forests in the 2013 All Forests Survey 2 (see above).

9.3.3 CJC Consulting (2006)

CJC Consulting reviewed the available evidence to 2006⁵⁵. Based on the first All forest survey on the National Forest Estate they estimated an annual expenditure of £77.6m by UK residents where the Scottish forest was the main destination of the visit. This was associated with employment of 2,484 FTE jobs and £35m in gross value added. However, the estimates were based on limited information because the 2004-2007 All-forest survey had not then been completed.

⁵⁴ Christie, Mike, Nick Hanley, Brain Garrod, Tony Hyde, Nick Lyons, Ariel Bergman and Stephen Hynes (2006). Valuing Forest Recreation Activities: Final Phase 2 Report. Report to the Forestry Commission, Institute of Rural Sciences, University of Wales, Aberystwyth.

⁵⁵ CJC Consulting (2006). Market and non-market benefits of Forestry for People in Scotland. Report to Forest Research.

9.4 Visitor surveys

9.4.1 National Forest Estate visitor survey

The recent All Forests Survey 2⁵⁶ is an on-site survey using face to face interviews and counters of visits to the National Forest Estate in the period November 2012 to October 2013. The survey was on-site, based on observed and counted visits and has a sound statistical base. Unlike the Scottish Recreation Survey (see below) it relies only on short-term memory recall (the day of the visit) for expenditures.

There were 9.1m visits of which 77% were by Scottish residents (7.01m), and 23% by 'Other UK and overseas visitors' (2.09m). Most of the Scottish residents were on day trips, with relatively few overnight stays (Table 9.1).

Table 9.1 Number of visits and expenditure on the day of the forest visit, by category of visitor

	Other UK and overseas visitors	Scottish visitors on overnight visits	Scottish visitors on a day trip	All visits
Number of visits per year (m)	2.093	0.910	6.097	9.10
Number of visits per year (main destination)(m)	1.088	0.473	3.17	4.73
Expenditure on the day of the visit (£ per visit):				
Food & drink	21.50	17.86	1.82	
Transport	13.44 ⁵⁷	11.62	3.78	
Shopping	4.71	3.13	0.25	
Admission fees	1.93	1.80	0.16	
Equipment	0.47	1.22	0.05	
Other	0.93	0.35	0.03	
Accommodation	49.99	42.94	0	
Total expenditure per visit (£)	92.97	78.92	6.09	
Total expenditure (£m)	194.59	71.82	37.13	303.53
Total expenditure (main destination) (£m)	101.18	37.34	19.31	157.84

Expenditure on the day of the visit (and overnight if away from home) varied from £92.97 per day for 'Other UK and overseas' visits down to £6.09 for visits by residents on a day trip (Table 9.1). The total expenditure associated with visits was estimated at £303.5m. However, not all of this can be allocated to the forest visit since this will not in all cases have been the factor that determined the expenditures. Since the forest visit only took around three hours on average, depending on the type of visitor (Table 9.1), the forest visit may not have been the

⁵⁶ All Forests Survey 2, (2013) Forestry Commission Scotland. Some additional analyses were produced for the current study.

⁵⁷ Only includes transport on the day of the visit.

main destination for the day – with other activities in some cases predominant in the trip decision. The allocation of expenditure is discussed in Section 9.5.

9.4.2 Scottish Recreation Survey (SRS) 2012

This is an Omnibus survey restricted to Scottish households. It does not therefore give any information about visitors from the rest of the UK or overseas. The survey asks about leisure and recreational trips in the last 12 months, with more detailed questions relating to the most recent visit. It does not differentiate between overnight trips and day visits except by trip duration, and no information on accommodation costs is collected.

Fifteen per cent of respondents who had made a recreational trip in the last four weeks said that woodland/forest was the main destination⁵⁸. Of these, 44% visited National Forest Estate forests and 56% other forests or did not know the ownership. The total number of visits to woodlands was 61.9⁵⁹m (National Forest Estate woodlands, 27m; other/don't know woodlands, 36.8m). This compares with an observed total for Scottish residents visiting National Forest Estate forests of 7.0m (see Table 7.1) in the All Forests 2 survey. Only 4% of SRS recorded trips were 8 hours or more (many of which will have included an overnight stay), whereas in the All Forests 2 survey 13% of Scottish residents were on overnight trips. There is thus a major disparity between the visit numbers and durations from these two surveys.

The reasons for this disparity are not known, but it could be that the choice of destinations given in the SRS does not relate well to respondents' perceptions of visits, which could include numerous types of landscape but be recorded as woodlands in the absence of appropriate alternatives. Whatever the explanation, we consider the National Forest Estate on-site survey to be more reliable in assessing numbers of visits to forests. However, we treat the on-site survey as giving lower bound estimates of visitor numbers given the possibility that the number of visits to smaller woods could be underestimated.

9.4.3 Scotland's People and Nature Survey (SPANS) 2013

This survey replaced the SRS in 2013. Unfortunately, due to changes in the questions asked it does not record the main destination of the most recent trip or collect any information on expenditure. SPANS is therefore not very informative as regards the allocation of recreation expenditure to forestry. However, it does provide some information on the types of destination of the most recent trip.

Where woodlands were visited, 39% were National Forest Estate woodlands, 26% non-National Forest Estate, and 35% not known. Of those who spent money on a trip, 41% of forest visits were to National Forest Estate forests, 20% to non-National Forest Estate and 39% not known. It is difficult to interpret these data because of the uncertainty about where the 'not known' category went. The results also differ slightly from the SRS 2012 data but the SRS does indicate the main destination of the trip (on which SPANS is uninformative).

9.5 Allocation of expenditure

The SRS and SPANS data suggest that 39-45% of Scottish resident visits are to National Forest Estate woods and 55-61% to non-National Forest Estate and 'not known'. We have no information on the location of 'not known' visits or on sites

⁵⁸ 15% of those making visits said the main destination was woodland/forest.

⁵⁹ Single visits where at least one woodland/forest was visited. The sub-categories do not sum to the total because more than one woodland may be visited in a day.

visited by 'other UK and overseas' visitors. If we split the not known 50/50, we get 56-62% of visits to National Forest Estate sites and 38-44% to non-National Forest Estate sites based on SPANS; although this only applies to Scottish residents.

Anecdotal evidence from specific sites is not very helpful since there are good examples of both National Forest Estate and private forests that have been successfully developed to attract high recreation and tourist use. The Woodland Trust⁶⁰ map of accessible woodlands (Figure 9.1) indicates more private sector woodland than National Forest Estate woodland close to the main centres of population. However, the key users from an expenditure impact viewpoint are other UK, overseas and overnight visitors (tourists) rather than local users. Hence woods with predominantly local use are less important to Scotland's employment than those used by tourists.

In the absence of any definitive information we assume that 60% of all main destination visits are to National Forest Estate sites and 40% to non-National Forest Estate sites and that this applies to the different categories of visitor given in Table 9.1.

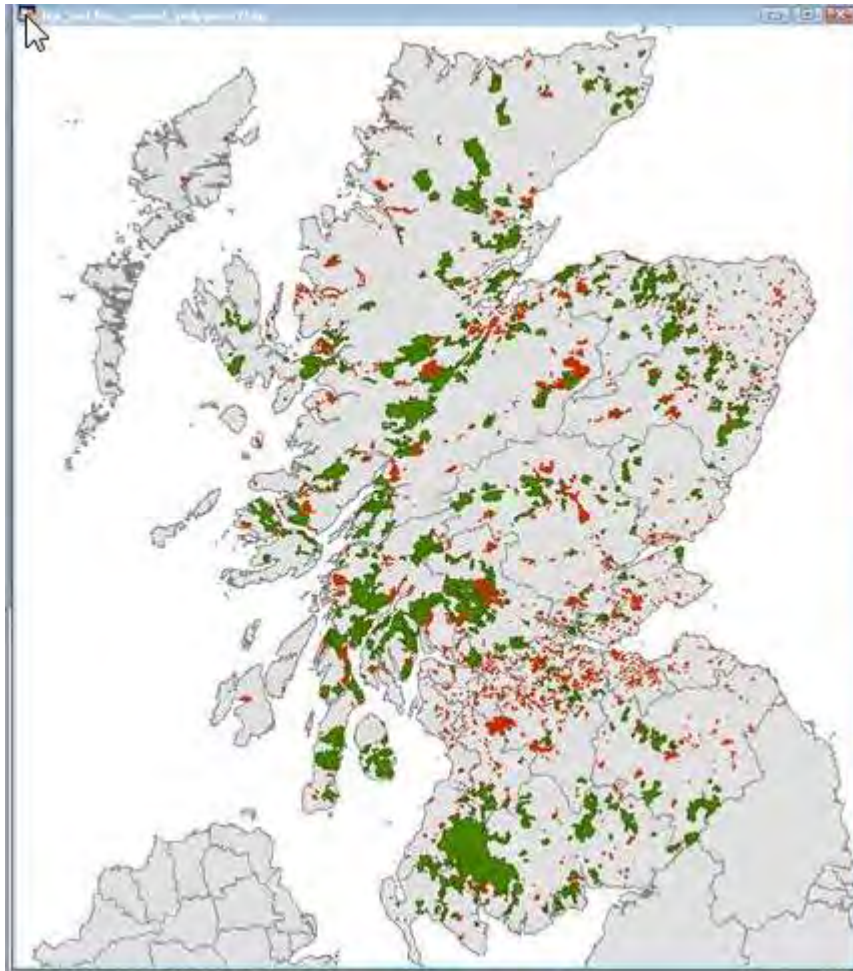


Figure 9.1 Accessible woodlands (green= National Forest Estate, red= non-National Forest Estate)

⁶⁰ Ian White provided the Figure.

Expenditure associated with visits to the National Forest Estate in 2012/13 where the forest was the main destination amounted to an estimated £157.8m (Table 7.1) and this was split between three categories of visitors. The SRS information on expenditure is quite limited. It recorded expenditure on the most recent trip but did not include travel or overnight accommodation, nor are the data presented in a useable form. We use the All-Forests 2 spend data because it is more comprehensive and likely to be more precise. Using a 60/40 ratio gives the expenditure pattern shown in Table 9.2.

Table 9.2 Total expenditure associated with visits to forests (£m)

Other UK and overseas visitors	Scottish visitors on overnight visits	Scottish visitors on a day trip	All visits
168.6	62.2	32.2	263.0

This is the expenditure associated with forest visits and is one measure of the economic significance of the forest estate as a recreational resource; although this is not all additional injection of spending into the Scottish economy. Expenditure by 'Other UK and overseas' visitors is most likely to be an additional injection but some of the domestic spend will also be additional. Where expenditure by residents substitutes for expenditure that would otherwise have flowed outside Scotland (such as non-Scottish holidays or goods and services purchased from other countries) this would be additional. We have no evidence, however, on how expenditure patterns would differ in the absence of forestry in Scotland and so take a pragmatic approach. This is to treat day trip expenditure as displaced but to regard residents making overnight trips as to an extent additional.

Expenditures are thus classified as (data from Table 9.2):

- Associated with forest visits: £263m in 2012/13 (economic contribution)
- Additional injections: £169-231m in 2012/13 (economic impact).

Bryden et al. (2010)⁶¹ in their study of nature based tourism in Scotland make the point that tourism expenditures recorded on the day of a visit will underestimate the total expenditure related to recreational trips because capital items are excluded unless bought that day. For example, clothing, bikes and other kit are mainly purchased at other times of year but part of this expenditure may be driven by the expectation (in our case) of visits to the National Forest Estate. To the extent that such capital purchases are unaccounted for, the figures given above are underestimates of spend, and therefore of economic contribution and impact.

9.6 Economic contribution and impact

Expenditures can be converted into an impact on jobs and incomes. Spending supports direct employment in recipient businesses but there are also indirect and induced effects. None of the recreational surveys track these economic impacts. We therefore need evidence from other sources.

⁶¹ Scottish Natural Heritage (2010). Assessing the economic impacts of nature based tourism in Scotland. Report 338. <http://www.snh.gov.uk/docs/B726802.pdf>

Most other studies do not use *de novo* estimates because of the difficulty of tracking beyond the first round impacts. Christie et al. (2006) use a Type II⁶² employment multiplier of £34,000 per FTE job to convert forest visitor expenditure into local jobs and incomes. Bryden et al. (2010) used a similar figure of £35,000 spending to 1FTE job for converting visitor spend into FTEs in Scotland. They considered this an appropriate average which took into account the main sectors of spend by visitors and both indirect and induced effects.

RSPB (2011)⁶³ in a study on the economic impact of RSPB reserves assumed that £44,000 of local spend supported 1FTE (taking direct and indirect employment into account). Updating these coefficients to 2014 using the Consumer Prices Index (CPI) gives £41,900 (Christie), £40,700 (Bryden), and £46,400 (RSPB). However, the RSPB coefficient refers to local employment only and would be lower if the non-local impacts were included.

We also used a different approach for estimating the impact on direct jobs. This was based on IBDR⁶⁴ data which gives the mean ratio of employment to turnover for SIC categories closest to the expenditure types recorded in the All Forests 2 survey. Table 9.3 shows the turnover/employment ratios and the direct employment associated with expenditures of the 'Other UK and overseas' category of visits.

Table 9.3 Employment – 'Other UK and overseas' visitors

Category of expenditure	Mean daily expenditure per visit (£)	Turnover associated with 1 job (£)	Direct employment (jobs per 1000 visits)	Total employment (jobs per 1000 visits)
Food and Drink	21.50	67,792	0.317	0.412
Transport	13.44	107,212	0.125	0.188
Shopping	4.71	44,612	0.106	0.137
Admission fees	1.93	37,329	0.052	0.067
Equipment/other	0.47	78,003	0.006	0.008
Other	0.93	44,612	0.021	0.027
Accommodation	49.99	35,126	1.423	1.850
TOTAL	92.97		2.05	2.69

9.6.1 Employment

Expenditure generates direct, indirect and induced employment. The Type II employment multiplier⁶⁵ is 1.3 for all categories except transport (1.5). Table 7.4 shows the total (direct+indirect+induced) employment generated by each category

⁶² Type I multipliers sum together direct and indirect effects while Type II multipliers also include induced effects. Direct effects are those within the sector and indirect effects are those in other sectors. As a result of the direct and indirect effects the level of household income throughout the economy will increase and a proportion of this will be spent on final goods and services: this is the induced effect.

⁶³ RSPB (2011). RSPB Reserves and Local Economies. RSPB. http://www.rspb.org.uk/Images/reserves_localeconomies_tcm9-290937.pdf

⁶⁴ Inter-Departmental Business Register, Standard Industrial Classification.

⁶⁵ <http://www.scotland.gov.uk/Topics/Statistics/Browse/Economy/Input-Output/Downloads/IO1998-2011latest>

of visit. A much higher expenditure is required by day trippers because their expenditure is mainly on food and drink and transport for which the turnover per job coefficients are high (see Table 6.2). The overall coefficient for all types of visitor (weighted by expenditure) is £37,630 per job.

The overall figure for all visitors (£37,630, Table 9.3) is lower than used by Bryden, Christie and RSPB. This reflects that the IDBR records employment (including part time employment) rather than FTE jobs and the expenditure required to generate or support an FTE would be higher than £37,630. For comparative purposes it is preferable to work in FTE units so we scale down employment by 12.5%⁶⁶ to give the £43,000 expenditure per FTE based on the studies reviewed above. The estimated forest visit expenditure of £263m thus contributes 6,312 FTEs (Table 9.4).

Table 9.4 Employment associated with visitor expenditure

	Expenditure per job (direct+indirect+induced) (£)	Employment (jobs)	Employment (FTEs)
Other UK and overseas visitors'	£34,560	4,878	4,268
Scottish visitors on overnight visits	£34,630	1,796	1,571
Scottish visitors on a day trip	£59,500	541	473
All visitors weighted by expenditure	£37,630	7,215	6,312

However, not all visitor expenditure can be treated as an additional injection into the Scottish economy. Excluding Scottish day trippers, and allowing for uncertainty over the extent to which overnight residents inject additional expenditure, gives additional employment of 4,270-5,840 FTEs.

9.6.2 Gross Value Added

GVA⁶⁷ is, in broad terms, the value of goods and services produced less the cost of inputs and raw materials. Value added can be calculated at business, sector, regional or national level. GVA is used to measure the performance of the national economy. Where expenditure by recreational visitors represents injections into the economy it will increase the value added of recipient businesses and contribute to Scotland's total GVA.

It was not possible to obtain GVA data for businesses at the SIC code level. Instead aggregated information was used from Scottish Annual Business Statistics (2012)⁶⁸. We applied the ratio of expenditure to GVA for relevant sectors to obtain the direct GVA impact, and then applied a GVA multiplier from

⁶⁶ £37,630 is 87.5% of £43,000.

⁶⁷ The headline measure of economic growth produced by the Scottish Government is GDP at basic prices, also known as total Gross Value Added (GVA), which is based on the output of all industries in the economy. GDP at basic prices does not include the value of taxes (and subsidies) on products (such as VAT and excise duties, which are usually paid by consumers). Product taxes (and subsidies) are measured at UK level but cannot be easily broken down to specific industries or areas of the UK. <http://scotland.gov.uk/Topics/Statistics/Browse/Economy/gdp>

⁶⁸ <http://www.scotland.gov.uk/Topics/Statistics/Browse/Business/SABS/ScotSection>

the Scottish Input-Output Tables⁶⁹ to obtain the total (direct+indirect+induced) GVA effects. The GVA multipliers vary from 1.5 to 1.7 depending on the category of business. Table 9.5 shows the calculation for 'Other UK and overseas visitors' for which the total GVA per visit is £65.8 per visit. Using only the proportion of visits where forestry was the main designation reduces this to £34.2 per visit.

Table 9.5 Gross value added: 'Other UK and overseas' visitors

Category of expenditure	Mean daily expenditure per visit (£)	Direct GVA (£ per £ expenditure)	Direct GVA (£ per visit)	Total GVA (£ per visit)
Food and Drink	21.50	0.239	5.14	8.22
Transport	13.44	0.477	6.41	9.62
Shopping	4.71	0.239	1.13	1.69
Admission fees	1.93	0.239	0.46	0.69
Equipment/other	0.47	0.239	0.11	0.17
Other	0.93	0.239	0.22	0.33
Accommodation	49.99	0.531	26.54	45.13
TOTAL	92.97		40.02	65.85

Visitor expenditure is converted to GVA in recipient businesses at a rate of £1.41-£1.70 expenditure per £GVA (Table 9.6). Other UK and overseas visitors contribute most to GVA (£119.6m) and Scottish day trip visitors least (£18.8m). The total GVA associated with forest visitor expenditure of £263m is an estimated £182.8m. The additional economic impact of forestry on Scottish GVA is in the range £120m to £164m. These estimates should be treated as indicative only because of uncertainty about the total forest visitor spend and aggregated nature of the business statistics for GVA.

Table 9.6 GVA generation (direct+indirect+ induced)

	Expenditure (£ per £ GVA)	Total expenditure (£m per year)	Total GVA (£m per year)
Other UK and overseas visitors	1.41	168.6	119.6
Scottish visitors on overnight visits	1.40	62.2	44.4
Scottish visitors on a day trip	1.71	32.2	18.8
Total		263.0	182.8

9.7 Comparisons

F4P calculated 17,400 direct jobs in recreation and tourism associated with the forest estate. This increases to 20,880 if a multiplier of 1.2 is applied. Tourist trips resulted in 16,100 additional direct and indirect jobs.

⁶⁹ <http://www.scotland.gov.uk/topics/statistics/browse/economy/input-output/multipliers>

Our estimates of additional employment based mainly on the All Forests survey 2 are much lower than those calculated by F4P. The difference can in part be explained by the fact that F4P used a relatively low conversion factor of £31,580 expenditure per FTE and applied the much higher estimate of visit numbers recorded in the Scottish Recreation Survey. The on-site All-Forests data and approach used above is considered to provide a more reliable estimate.

The F4P report calculated their GVA impacts as 37% of spend, which gives a direct tourism+recreation Scottish GVA impact of £209m for the total estate. The total impact taking into account indirect and induced GVA would be higher. Our estimate is thus somewhat lower than that given in F4P.

Our estimate of 4,270-5,840 FTE additional employment can be compared with the impact estimate of 11,989 FTEs from scenery, 15,231 from walking/mountaineering and 39,078 in total from the natural heritage in Scotland (Bryden et al., 2010)⁷⁰. Their estimate assumed 50% of resident overnight visits were additional. Using the same assumption makes our estimate of the forestry impact 5,050 FTEs. This does not seem unrealistic compared with the Bryden estimates. It suggests that forestry supports almost 20% of the scenery and walking/mountaineering-related employment in Scotland.

9.8 Conclusions

A lack of information on decisions to visit Scottish forests and woodlands (and alternative destinations) means that it is difficult to identify the economic contribution of recreation and tourism with much precision. The data on expenditures associated with visits to the private forest estate are especially limited. Our estimate of employment associated with visits as the main destination is 6,310 FTE jobs in 2012/13. The impact on the Scottish economy would be to support between 4,270 and 5,840 FTE jobs. If it is assumed that 50% of resident overnight trips are additional then there are 5,050 additional FTEs.

The GVA estimates are indicative but suggest a GVA contribution to the Scottish economy of £183m and additional economic impact of £120-164m. Assuming 50% of resident overnight trips are additional gives £142m.

F4P estimated the size of mainstream (non-tourism/deer) forestry sector employment at 10,253 FTEs. Our estimate of 6,312 FTE jobs associated with forest related recreation/tourism (4,270-5,840 additional FTE jobs) suggests that the economic contribution of recreation and tourism to employment is substantial. This is also true of GVA.

Our estimates of recreation and tourism-related employment and GVA are based solely on visits to forests. They do not include the tourism impacts from forestry's contribution to scenery, landscape and wildlife, and these may be substantial.

⁷⁰ Scottish Natural Heritage (2010). Assessing the economic impacts of nature based tourism in Scotland. Report 338. <http://www.snh.gov.uk/docs/B726802.pdf>

10 Annex 2 Previous studies and methodology

10.1 Previous studies

10.1.1 Employment in the forestry sector

The last Forestry Commission (FC) Employment Survey⁷¹ was in 1998/99, and this estimated that there were 10,694 direct FTE jobs supported by forestry in Scotland (forest nurseries, establishment, maintenance, harvesting, road construction, haulage, processing, other). Forty-nine per cent of the jobs were associated with producing timber, with the remaining 'non-forest' jobs mainly in haulage and processing.

The more recent 2009 F4P study relied heavily on the 1998/99 FC employment data. Table 10.1 summarises the F4P direct employment estimates for businesses and organisations located in Scotland. The total direct employment supported by the production and use of timber was an estimated 10,253 FTE jobs⁷².

The Forestry Commission surveys the larger sawmills (>10,000m³ of sawn wood) and estimated FTE employment of 1,450 for these mills in Scotland in 2013⁷³.

Table 10.1 F4P estimates of forestry sector direct employment in Scotland (2009)

Employer type	Direct Employment (FTEs)
Forestry Commission	1,593
Farm woodlands	646
Other private woodland owners	2,550
Forestry companies and contractors	2,223
Wood processing industries	2,494
Pulp and paper producers	350
Local authorities	207
Woodland associations	85
Forestry training, education and research	105
Total	10,253
Forest-related tourism (direct)	13,400
Forest-related recreation (direct)	4,450
Total direct employment	28,103

Forestry-related tourism and recreation supported an estimated 17,850 direct jobs. In total the sector was estimated to support 28,103 direct jobs although

⁷¹ [http://www.forestry.gov.uk/pdf/employmentsurvey99.pdf/\\$FILE/employmentsurvey99.pdf](http://www.forestry.gov.uk/pdf/employmentsurvey99.pdf/$FILE/employmentsurvey99.pdf)

⁷² The 1989 Forestry Employment survey calculated ?? direct FTE jobs in the sector.

⁷³

<http://www.forestry.gov.uk/website/forstats2014.nsf/LUContents/7FCE2A9C41268CFA802573210052A4CD>

there was considerable uncertainty about the size of the tourism and recreation contribution. A further 2,128 direct jobs were supported by the forestry-related deer/game sector.

Forest Research applied Type II multipliers to give the additional indirect (supply chain) and induced jobs. The total number of jobs associated with the sector, after applying the multipliers but excluding any wider tourism impacts, was calculated as 31,806 FTEs. This is an estimate of the jobs associated with forests and forestry, not the additional jobs that exist because of the presence of forestry.

Hindle *et al.* (2014)⁷⁴ estimated the employment and GVA for the estate sector in Scotland using a survey and aggregating to the Scottish Land and Estates (SLE) population. The total employment (including multiplier effects) of expenditure related to forestry was estimated at 497 FTE jobs. Employment related to 'sporting' was 1,134 FTEs. Only part of the sporting and tourism jobs would be related to forestry. If 41% of the sporting employment is attributed to forestry⁷⁵ 950 FTEs can be allocated to forestry and sport. This estimate relates to land in SLE membership which represents only one element of private forestry in Scotland. The 950 jobs is thus a lower bound employment estimate.

10.1.2 Gross Value Added (GVA) of the forestry sector

F4P estimated the direct GVA of forest products and services at £303.6m (at 2007/08 prices). When GVA multipliers were applied, the total direct, indirect and induced GVA was £458.6m. This was shown to be around 0.5% of the total GVA for the Scottish economy. F4P estimated the GVA indirectly from the share of forestry in forestry sector employment in each sub-sector of the economy. These GVA estimates must therefore be interpreted with care.

Hindle *et al.* (2014)⁷⁶ estimated the GVA for the SLE sector at £110.8m. No estimate was made of the contribution of estate forestry within this.

Visitor spending also generates GVA in the economy. F4P estimated the GVA of forest-related recreation (direct visitor spending attributable to woodland visits, where woodland was the primary reason for the visit) at £209m. The GVA associated with deer stalking and deer management was not estimated.

10.1.3 Inter Departmental Business Register (IDBR)

The IDBR employment data collated from various government sources is by SIC code⁷⁷ (Table 10.2). All employment in an organisation is allocated to its SIC even if a part of the activity is outside forestry. Similarly, organisations may engage in forestry activity (e.g. haulage) but their employment is recorded under a non-forestry SIC. The IDBR data is based on various sources but omits firms not VAT registered or on PAYE. Many small contractors would therefore be omitted from the IDBR statistics. Table 10.2 gives direct employment in the core SICs associated with silviculture, management and timber processing from the IDBR. This combination of production and processing gives 9,233 FTE jobs. Of these, 5,429 were in forest management and harvesting, and 3,803 in processing. If the paper and paperboard element is removed (since much of this is secondary

⁷⁴ Hindle, R. Thomson, S. Skerratt, S. McMorran, R and Onea, P. (2014). Economic Contribution of Estates in Scotland: An Economic Assessment for Scottish Land and Estates. Report to Scottish Land and Estates.

⁷⁵ See Section 7.4.

⁷⁶ Hindle, R. Thomson, S. Skerratt, S. McMorran, R and Onea, P. (2014). Economic Contribution of Estates in Scotland: An Economic Assessment for Scottish Land and Estates. Report to Scottish Land and Estates.

⁷⁷ Standard Industrial Classification.

processing or manufacturing from imported pulp) there were 8,468 direct jobs. These data do not account for forestry-related employment in other SICs that cover businesses and organisations such as landownership, haulage, land agents and education. They thus underestimate the direct employment attributable to the forestry sector.

Table 10.2 FTEs (direct) in selected SICs in Scotland (2013) (IDBR)

	Count	Employment	FTEs ⁷⁸
021 : Silviculture and other forestry activities	690	5,226	4,912
022 : Logging	70	173	163
024 : Support services to forestry	155	377	354
1610 :Sawmilling and planing of wood	85	2,200	2,068
1621 :Manufacture of veneer sheets and wood-based panels	10	1,032	970
1712 :Manufacture of paper and paperboard	15	814	765
Total	1,025	9,822	9,233

10.2 Methodology and surveys

10.2.1 Forestry sector business survey

The population of forestry sector businesses and organisations was established by obtaining contact details from a variety of sources, including the Forestry Commission, Forest Research, Scottish Government, Community Woodlands Association, professional organisations, various websites and other informal sources. Professional organisations were generally unwilling to give access to their member details due to data protection concerns but in some cases it was possible to obtain individual details of members from the websites. Since we were undertaking a parallel study for Forest Enterprise Scotland we had access to their accounts data which recorded details of all their suppliers. Landowners were as far as possible excluded from this population because a separate population of owners was sampled in the landowner survey (see below).

The population of contacts as indicated above was extended by information provided by ONS for businesses in Scotland within the forestry sector SICs (Table 2.1). These were added to the population after removal of duplicates. ONS also attempted to provide SIC codes and IDBR employment and turnover information for the businesses within our population by matching postcodes and names. Unfortunately the matching exercise was only partially successful, which meant that we could not classify all businesses and organisations by their SIC code. Instead we used the source of the contact data as the basis for structuring the survey.

1,485 potential forestry sector businesses/organisations were identified, but this undoubtedly under-recorded the total number operating in the sector in Scotland. The questionnaire was designed to elicit information on FTE employment, turnover and employment costs in the 2012/13 accounting year of the recipients. We used a 100% sample for all types of business except community woodlands and NGOs where 25% was used. 1,329 postal questionnaires were sent out with an option to complete the paper questionnaire or to download from a web page.

⁷⁸ FTEs were estimated from employment by regressing FTE on Employment for the survey responses for which both IDBR employment and survey FTEs were available. The conversion was 0.94 (SE 0.09) FTEs per unit employment.

A reminder was sent out after one month and a number of important organisations were phoned or emailed in an attempt to improve the response.

The sample returns were raised to the population level within each sub-sector. Where businesses within a subsector provided information through telephone contact the subsectors were split to minimise bias.

10.2.2 Landowner survey

A separate survey of woodland owners was undertaken by the Forestry Commission using the National Forest Inventory (NFI) database, which is the most comprehensive database on ownership and forest location available.

The sampling frame was the 1ha squares on private sector woodland in Scotland selected for the 1st cycle NFI field survey. The NFI field survey design is stratified and balanced across NFI regions, ownership sector (FC/non-FC) and mapped woodland area types, with selection probability proportional to the amount of mapped woodland in a square. There are a total of 2,763 such private sector survey sites in total in Scotland, and a sub-sample of 550 were selected for the economic survey. These were stratified by the five regions used in the design of the NFI field survey: East Scotland, North Scotland, North-East Scotland, South Scotland and West Scotland.

A total of 514 letters and accompanying questionnaires were sent to owners of forested land within these selected sites. This differs from the number of sites because more than one sample site fell on the same owner's land in some cases, and conversely it was the case occasionally that a single survey location was on more than one owners' land. There were also a few sites with no recorded owner details in the NFI owners' database.

Of these 514 questionnaires sent out, a total of 111 valid completed returns were received, giving a response rate to the questionnaires of 21.6%. Non-responses included sites where the questionnaire was returned uncompleted due to incorrect owner or contact details in the records, and instances where the questionnaire was returned uncompleted for other reasons.

The valid responses represented the woodland in 115 sample squares, so the rate of area coverage of the original sample of 550 squares was 20.9%.

The sample returns were raised to totals for the population of owners in Scotland using weightings of individual responses. This weighting factor corresponded to the number of sample squares represented by the responses of a single owner. When multiple selected sample squares fell within a single owner's holding, this weighting factor was the number of such squares.

11 Annex 3 Employment and GVA multiplier calculations

11.1 Employment and GVA multipliers

In estimating indirect (supply chain) impacts it was important not to double count indirect impacts where businesses and organisations in one activity buy from those in another. For example, in assessing the indirect impacts for Wood & Wood Products, the Type I Leontief inverse table from the 2011 Input Output Table for Scotland⁷⁹ was used to exclude purchases from Agriculture, Forest Planting, Forestry Harvesting, Other Land Transport, and other Wood & Wood Product businesses. This reduced the indirect multiplier for Wood & Wood Products from 1.714 to 1.366. A similar process reduced the indirect employment multiplier for Forestry Planting from 1.716 to 1.543; for Forestry Harvesting from 2.084 to 1.508; for Other Land Transport from 1.410 to 1.386; and for Public Administration from 1.364 to 1.348.

These are not precise adjustments as (for example) a wood processing business might buy land transport from a business other than a timber haulier, whilst the indirect impacts from a haulier's own purchases (e.g. fuel) could be double counted with those attributed to the wood processing business it supplies in the latter's second round impacts. Nevertheless, the adjustments give indirect employment ratios that will have taken out most double counting.

The 16 categories of activity for which direct impacts had been estimated (see Table 4.2) were then assigned to the closest fit Input-Output sector for quantifying Type I multipliers, or an average of Type I indirect multipliers (after our adjustments) for a relevant range of sectors was used. For example, Public Administration and Defence adjusted multipliers were used for FC staff and Local Authorities, and Construction multipliers were used for Civil Engineering.

For each relevant Input-Output sector, the Type II FTEs generated by £1m of sector output (e.g. for Forestry Harvesting) were split into Direct, Indirect and Induced, and both the indirect and induced components reduced by the ratios already established to take out double counting across sectors. Thus, for Forestry Harvesting, the 24.5 FTEs per £1m of sector output were split into Direct plus Induced (10.7 FTEs) and Indirect plus Induced (13.8 FTEs) using the Type I multipliers prior to our adjustment, and the 13.8 FTEs reduced to 6.5 FTEs using the reduction ratio calculated as above. Adding this residual Indirect plus Induced figure to the Direct plus Induced figure gave 17.2 adjusted FTEs per £1m of output. The Type II multipliers from the Input-Output Table by sector were then reduced proportionately to derive the ratios between Total Employment and Direct Employment used in our summary Employment in the Forestry Sector tables in this report (e.g. Table 4.2).

The ratio between unadjusted FTEs per £1m of output and GVA per £1m of output for the relevant sector was then applied to our Total Employment estimates by activity to give GVA per activity. The Type II Output, Income, Employment and GVA multipliers table from the 2011 Input-Output Tables for Scotland were used to derive the ratios (the Excel rather than the PDF version which gives more decimal points).

⁷⁹ The most recent currently available but there should be little variation in proportionate trade between sub-sectors from year to year.