# A review of the future of the forestry workforce in Scotland

Prepared on behalf of Lantra and the Scottish Forest and Timber Technologies Skills Group

July 2019

A review of the future of the forestry workforce in Scotland has been produced by Claire Glaister FICFor, GR Forestry Consultancy on behalf of Lantra and forms part of the work of the Scottish Forest and Timber Technologies Skills Group

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## 1. EXECUTIVE SUMMARY

This study indicates that the trees and timber workforce will need to increase in the period up to 2027 in order to undertake the forecast harvesting, restocking and new woodland creation programmes.

Table 1. Comparison of uplift in the workforce highlights the level of uplift across each of the sub sectors covered in this study and compares this with scale of increase up to 2017 which was estimated in the Future of the Forestry Workforce in Scotland[1] report.

**Table 1. Comparison of uplift in the workforce**

| Sub sector | 2017-2027 uplift | Uplift to 2017 predicted in 2010 report |
|---|---|---|
| Harvesting | 29% | 24% |
| Establishment & maintenance | 51% | 36% |
| Ground preparation | 38% | 29% |
| Timber haulage | 29% | Not recorded |
| Management & supervision (harvesting) | 28% | Not recorded |
| Primary processing | 29% | Not recorded |

Over the period 2017 to 2027, figures calculated through this study indicate that to match the projected levels of activity, overall workforce requirements could increase by 32%. This figure rises to 52% when taking attrition due to retirement into account and 72% when taking attrition due to both retirement and other factors into account.

This suggests that for every 100 people in the 2017 workforce, an additional 72 could be needed by 2027 to complete the forecast increase in industry activity.

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[1] The Future of the Forestry Workforce in Scotland, M Smither & C Fulton (2010)

## 2. INTRODUCTION

### 2.1. Background

2.1.1    A review of the future of the forestry workforce [this study] was commissioned by Lantra on behalf of the Scottish Forest and Timber Technologies Skills Group.

2.1.2.   The Scottish Forest and Timber Technologies Skills Group was established to develop a Skills Action Plan for the sector and deliver a series of actions which would grow the skills and capacity of the workforce.  Members of the group are drawn from a wide range of backgrounds and organisations including industry representatives, Scottish Forestry, Confor, ICF, Lantra, Scottish Enterprise and Skills Development Scotland and educational institutions including Edinburgh Napier University, SRUC Barony and Inverness College UHI.

### 2.2. Purpose, objectives and scope

2.2.1.   The overall purpose of this study was to highlight the scale of recruitment needed in the forestry and timber sector and thus help direct actions taken by the Scottish Forest and Timber Technologies Skills Group which aim to improve the promotion of the sector as a potential career choice.

2.2.2.   Following a similar rationale to that used in the 2010 publication, The Future of the Forestry Workforce in Scotland, the objective of the research was to review and report on the potential gap between the current trees and timber sector workforce and the capacity required to deliver its key target for woodland creation and forecasted increases in production and associated restocking.

2.2.3.   An indirect objective of this study was to assess the availability/usability of appropriate and current labour market information and establish whether a means of using such published information, together with industry statistics, could be developed in order to derive future workforce requirements in a consistent and repeatable manner.

2.2.4.  In terms of identifying the capacity required, this was split into the following two components:-

2.2.4.1.  The number of extra workers who may be needed to deliver the work associated with the anticipated uplift in activity between 2017 and 2027;

2.2.4.2.  The number of extra workers who may be needed to replace those leaving the industry (attrition) during the next decade.

2.2.5.  The scope of the study was understood to be: -

2.2.5.1.  A focus on harvesting, establishment and maintenance and ground preparation sub sectors;

2.2.5.2.  An initial investigation into the primary processing, timber haulage and nursery sub sectors;

2.2.5.3.  A study limited to businesses operating in Scotland;

2.2.5.4.  Secondary processing is beyond the scope of the study;

2.2.5.5.  The arboricultural sector is beyond the scope of the study.

## 2.3. Methodology

The methodology used for this study has been based on deriving figures from published industry forecasts, statistics and targets.  When calculating these figures, due to the current uncertainty of potential increases in productivity and operational efficiencies, no account has been taken of the advances in technology/impact of innovation in the period up to 2027 that have been predicted by industry stakeholders; it is widely anticipated however that the industry will improve both its productivity and operational efficiency over time, particularly in the harvesting and primary processing sectors.  It should also be noted that whilst technological advances and operational innovation may enable some forestry activities to be carried out on sites which are currently less accessible or operationally challenging (e.g. remote areas and/or difficult terrain), the potential impacts of working in these areas (e.g. lower machinery outputs, longer haulage distances) have also been excluded from the calculations made in this study.

Further details are provided in Appendix I: Methodology.

## 2.4. Qualifications

It should be noted that the majority of information used to review the potential gap between the current workforce and the capacity required to deliver future work programmes is based on a range of forecasts, targets and informed assumptions as limited or no statistically reliable information is available.  As such, any numbers which are provided in this report are **indicative** and should only be used as a guide; a percentage increase in workforce requirements is given to suggest the scale of change.

Whilst reasonable steps have been taken to ensure that the information contained within this report is correct, or qualified, as appropriate, it is not guaranteed or represented to be so (in either an express or implied way).  Neither the report author nor the Scottish Forest and Timber Technologies Skills Group can provide warranties for any third-party information provided and any person makes use of this report at their own risk.

## 2.5. An inter-connected industry

The forestry and timber sector incorporates the growing of tree seedlings in tree nurseries through to the planting, managing and harvesting of forests. The sector also covers value-added downstream activities of sawmilling (primary processing) and pulp and paper production, panel and board manufacturing and the development of higher value goods such as engineered wood products (secondary processing).

Each stage in the lifecycle of a forest is inter-connected and will be affected by preceding and subsequent activity; for example, the level of harvesting will be determined by past levels of tree planting and how much timber is harvested not only determines how much timber is processed by sawmills but will also govern the level of restocking required.  Similarly, the area of new woodland that is created will impact on the amount of timber which is available to harvest and process in future years and once harvested, how much of a forest needs to be restocked.

Figure 1. The forest lifecycle illustrates the different stages in the lifecycle of a managed forest.
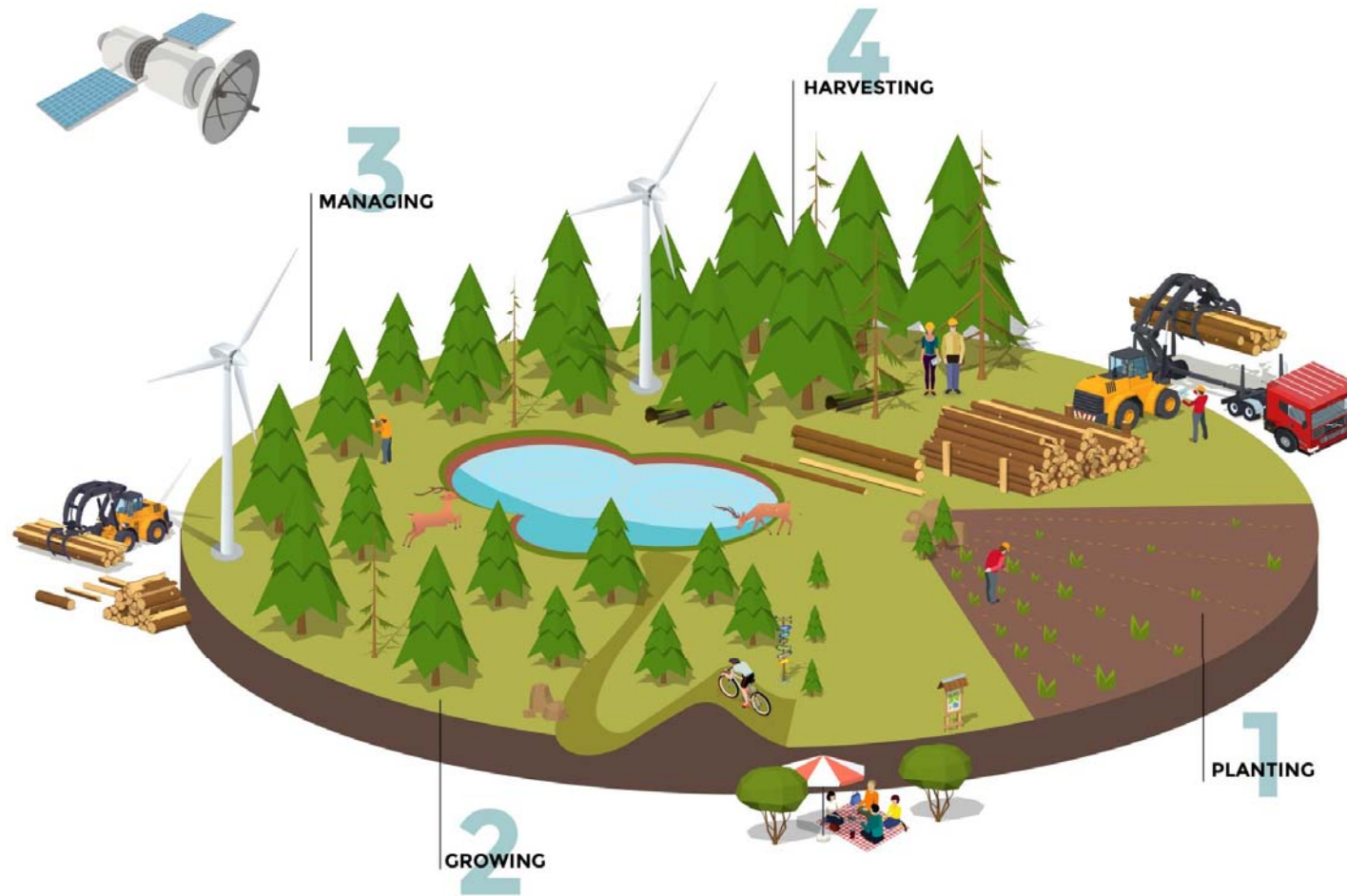
**Figure 1. The forest lifecycle**

**(Source: Coillte, 2019)**

## 2.6. A growing resource

This study indicates that the trees and timber workforce will need to increase in the period up to 2027 in order to undertake the forecast harvesting, restocking and new woodland creation programmes.

Using derived figures from industry forecasts, statistics and targets for these activities, together with assumed rates of attrition, the potential size of this increase across a number of key sub sectors has been estimated.  Where figures for these different sub-sectors have been derived from the same originating information (e.g. timber haulage and primary processing activity has been based on the level of harvesting), the potential size of the increase in workforce needed within these sub sectors is of the same scale.

Table 2. Comparison of uplift in the workforce highlights the level of uplift across each of the sub sectors covered in this study and compares this with scale of increase up to 2017 which was estimated in the 2010 report

### Table 2. Comparison of uplift in the workforce

| Sub sector | 2017-2027 uplift | Uplift to 2017 predicted in 2010 report |
|---|---|---|
| Harvesting | 29% | 24% |
| Establishment & maintenance | 51% | 36% |
| Ground preparation | 38% | 29% |
| Timber haulage | 29% | Not recorded |
| Management & supervision (harvesting) | 28% | Not recorded |
| Primary processing | 29% | Not recorded |

In order to give consideration to workforce attrition, for the purposes of this study it has been assumed that a retirement rate of 20% over 10 years between 2017 and 2027 could be anticipated as a result of the age profile of the workforce.  Similarly, it has also been assumed that another 20% of the current workforce will leave the industry due to other factors (e.g. transfer to other industries) up to 2027, resulting in an overall attrition rate of 40%.

Table 3. Projected recruitment requirements including attrition illustrates the impact of attrition due to both retirement and other factors in terms of indicative numbers in the workforce and the percentage change.  Over the period 2017 to 2027, figures indicate that to match the projected levels of activity, overall workforce requirements could increase by 32%. This figure rises to 52% when taking assumed attrition due to retirement into account and 72% when taking assumed attrition due to both retirement and other factors into account. These figures indicate therefore that for every 100 people in the 2017 workforce, an additional 72 could be needed by 2027 to complete the forecast increase in industry activity.

**Table 3. Projected recruitment requirements including attrition[2]**

| Sector | % activity uplift | | | 2017 | Recruitment in 2017-2022 | | | Recruitment in 2023-2027 | | | Projected recruitment 2017-2027 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2017-2022 | 2023-2027 | 2017-2027 | 2017 derived figures | Uplift only | Uplift + attrition @ 20% | Uplift + attrition @ 40% | Uplift only | Uplift + attrition @ 20% | Uplift + attrition @ 40% | Uplift only | Uplift + attrition @ 20% | Uplift + attrition @ 40% |
| Harvesting | 19 | 9 | 29 | 488[3] | 94 | 143 | 191 | 46 | 95 | 144 | 140 | 238 | 335 |
| Establishment & maintenance | 32 | 18 | 51 | 514[4] | 166 | 217 | 269 | 95 | 146 | 198 | 261 | 364 | 467 |
| Ground preparation | 25 | 13 | 38 | 120[5] | 30 | 42 | 54 | 16 | 28 | 40 | 46 | 70 | 94 |
| Haulage | 19 | 9 | 29 | 339[6] | 65 | 99 | 133 | 32 | 66 | 100 | 97 | 165 | 233 |
| Management & supervision | 18 | 10 | 28 | 142[7] | 26 | 40 | 55 | 14 | 28 | 42 | 40 | 68 | 97 |
| Primary processing | 19 | 9 | 29 | 2,032[8] | 394 | 597 | 800 | 193 | 396 | 599 | 587 | 993 | 1,399 |
| | | | | | | | | | | | | | |
| Totals | 21 | 11 | 32 | 3,635 | 775 | 1,138 | 1,502 | 396 | 760 | 1,123 | 1,171 | 1,898 | 2,625 |
| **% uplift** | | | | **0** | **21** | **31** | **41** | **11** | **21** | **31** | **32** | **52** | **72** |

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[2] Some figures may include impact of rounding

[3] Derived from total softwood production in Scotland 2017; IFOS Statistics, Forest Research (2018), "Forestry Statistics 2018"

[4] Derived from total new planting in Scotland up to year ending 31/03/17; IFOS Statistics, Forest Research (2018), "Forestry Statistics 2018"

[5] Derived from total new planting in Scotland up to year ending 31/03/17; IFOS Statistics, Forest Research (2018), "Forestry Statistics 2018"

[6] Derived from total softwood production in Scotland 2017; IFOS Statistics, Forest Research (2018), "Forestry Statistics 2018"

[7] Derived from total softwood production in Scotland 2017; IFOS Statistics, Forest Research (2018), "Forestry Statistics 2018"

[8] Derived from total softwood production in Scotland 2017; IFOS Statistics, Forest Research (2018), "Forestry Statistics 2018"

## 2.7. Jobs outlook

As well as encompassing more "traditional" jobs, the forestry sector is becoming recognised as one which can provide a wide range of "green jobs" within an expanding green economy.  Whilst not Scotland or UK-specific, Green Jobs in the Forest Sector[9] highlights the diverse range of jobs that will be increasingly needed in a global forestry context.  Covering a wider sector than the focus of this study and including recently emerging and future job roles, examples of these are shown in Table 4. Future job requirements in forestry.

**Table 4. Future job requirements in forestry**

| Wood production | Forest inventories and forest monitoring | Climate change | Education and research |
|---|---|---|---|
| Specialists in forest management and engineering | Remote sensing specialists | Experts in forest climate adaptation of forests | Teachers in the forest/Forest School leaders |
| Experts in wood trade, procurement and logistics | Inventory surveyors | Carbon finance advisors | University and college lecturers and technical instructors |
| Forestry machine operators | Data managers | Forest carbon specialists and modellers | Trend analysts and modellers |

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[9] Green Jobs in the Forest Sector, FAO UNECE (2018)

# 3.    PREDICTIONS

## 3.1. Industry work programmes

Information on industry work programmes have been sourced from Forest Research statistical reports and Scottish Forestry planting targets; details of the source documents are provided in Appendix II: References.

With the exception of actual production figures recorded for 2017, harvesting and restocking forecasts are based on 25-year timber availability forecasts.  These forecasts are based on potential availability rather than actual production, the latter anticipated to be lower due to operational, financial and other reasons.  For the purposes of any summary information presented in this report, an 85%[10] wood production: timber availability forecast ratio has been used.

To enable alternative conversation factors to be used and the associated impact on future workforce requirements reviewed independently, a spreadsheet has been created which allows users to change any of the main assumed figures (% wood production: timber availability, timber volume per Ha and what proportion of a 1Ha clear felled would be restocked) to those they may wish to test.

Table 5. Forecasts of industry work programmes show increases across three areas - harvesting (29% uplift), restocking (29% uplift) and new woodland creation (111% uplift).

Forecasts and targets for activity beyond 2027 are now available and indicate a further increase in new woodland creation and a slight reduction in harvesting (and associated restocking).  The impact of these changes has not been quantified as part of this study.

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[10] See Appendix III: Glossary and abbreviations for further description

## Table 5. Forecasts of industry work programmes

| | Unit | 2017 | 2022 | 2027 | Numerical increase in level of work activity up to 2027 | Percentage increase in level of work activity up to 2027 |
|---|---|---|---|---|---|---|
| **Harvesting** | | | | | **Million m³** | **Million m³** |
| Programme | Million m³ | 8.466[11] | 10.108[12] | 10.912[13] | 2.446 | 29% |
| | | | | | | |
| **Restocking** | | | | | **Hectares** | **Hectares** |
| Programme (Hectares/year) | Ha | 14,817[14] | 17,689[15] | 19,097[16] | 4,280 | 29% |
| | | | | | | |
| **New woodland creation** | | | | | **Hectares** | **Hectares** |
| Programme (hectares/year) | Ha | 7,100[17] | 12,000[18] | 15,000[19] | 7,900 | 111% |

[11] Sourced from total softwood production in Scotland 2017; IFOS Statistics, Forest Research (2018), "Forestry Statistics 2018"

[12] Derived from 85% of total softwood timber availability for 2022-2026; Forestry Commission (2016), "25-year forecast of softwood timber availability (2016)"

[13] Derived from 85% of total softwood timber availability for 2027-2031; Forestry Commission (2016), "25-year forecast of softwood timber availability (2016)"

[14] Area derived from total softwood production in Scotland 2017 @ 400m³/Ha and 70% restocked; IFOS Statistics, Forest Research (2018), "Forestry Statistics 2018"

[15] Area derived from 85% total softwood timber availability in Scotland 2022-2026 @ 400m³/Ha and 70% restocked; Forestry Commission (2016), "25-year forecast of softwood timber availability (2016)"

[16] Area derived from 85% total softwood timber availability in Scotland 2027-2031 @ 400m³/Ha and 70% restocked; Forestry Commission (2016), "25-year forecast of softwood timber availability (2016)"

[17] Sourced from total new planting in Scotland up to year ending 31/03/17; IFOS Statistics, Forest Research (2018), "Forestry Statistics 2018"

[18] Sourced from Scottish Government planting targets for 2022

[19] Sourced from Scottish Government planting targets for 2027

## 3.2. Workforce requirements

Figure 2. and Table 6. Indicative Resourcing Implications – Harvesting provide indicative figures of future workforce requirements per listed activity between 2017 and 2027 and a combined figure for harvesting activity between 2017 and 2027.  Error bars show a 5% variance against each activity.

As explained in 3.1, forecasts for harvesting are based on an 85% wood production: timber availability forecast ratio.

Predictions of future harvesting workforce requirements only take into account a potential uplift due to the increased level of activity; they take no account of attrition in the workforce due to retirement or other factors, technological advances or potential productivity gains.
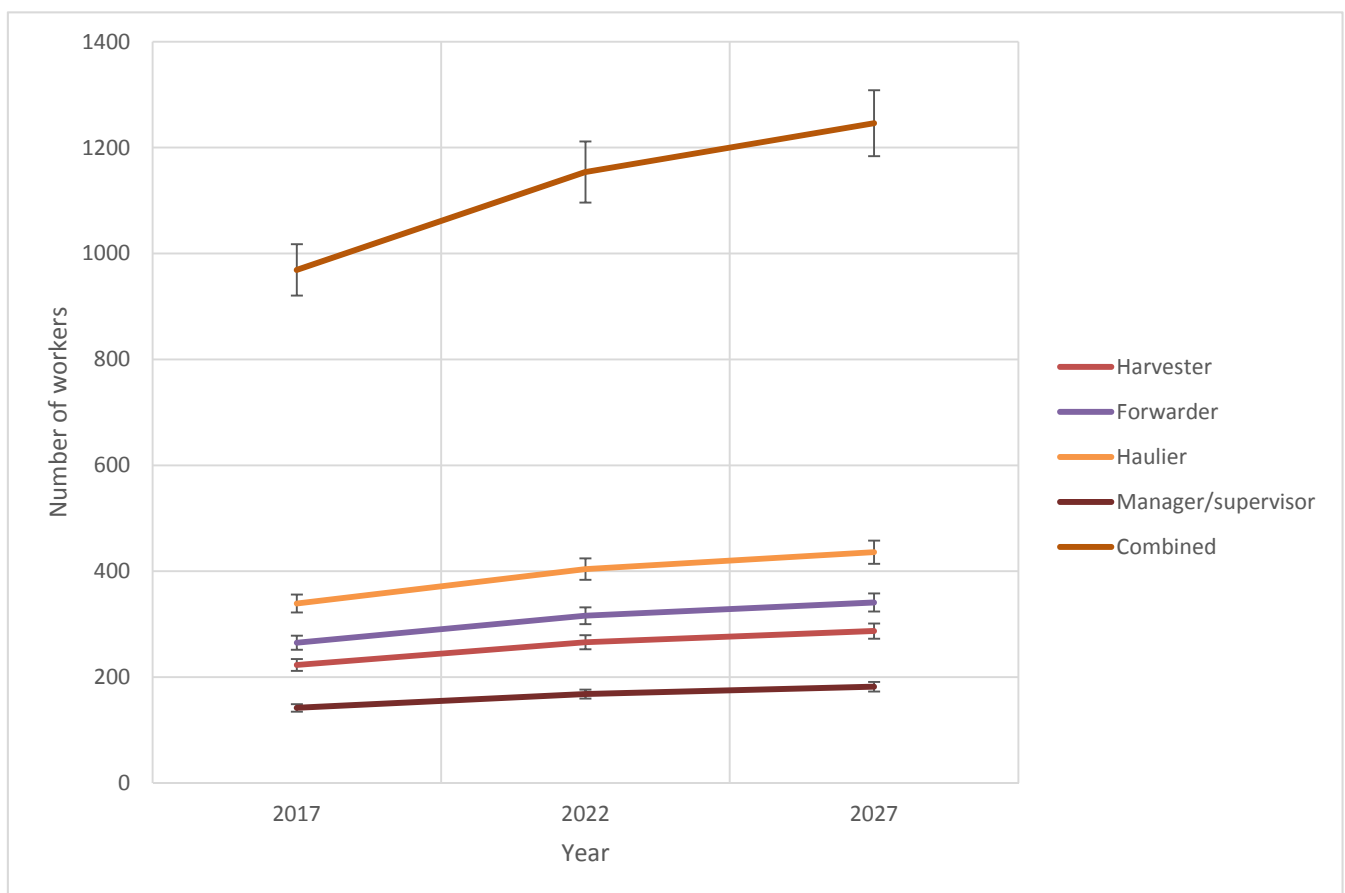


**Figure 2. Indicative Resourcing Implications - Harvesting**

**Table 6. Indicative Resourcing Implications - Harvesting[20]**

| Harvesting | Assumed outputs[21] | | Unit | 2017 (production) | 2022 (forecast) | 2027 (forecast) | Numerical increase of worker year equivalents (WYE) to 2027 | Percentage increase of WYE to 2027 |
|---|---|---|---|---|---|---|---|---|
| **Programme** | | | Million m$^3$ | **8.466** | **10.108** | **10.912** | | |
| Harvester clearfelling | 38,000 | m$^3$/year | Harvester years | 223[2.1.2.] | 266 | 287 | 64 | 29% |
| Forwarder clearfelling | 32,000 | m$^3$/year | Forwarder years | 265 | 316 | 341 | 76 | 29% |
| Timber haulage | 25,000 | m$^3$/year | WYE | 339 | 404[2.2.2.] | 436 | 98 | 29% |
| Harvesting manager | 120,000 | m$^3$/year | WYE | 71 | 84 | 91 | 20 | 28% |
| Harvesting supervisor | 120,000 | m$^3$/year | WYE | 71 | 84 | 91[2.5.2.] | 20 | 28% |
| **Combined harvesting activity** | | | | **969** | **1,154** | **1,246** | **278** | **29%** |

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[20] Some figures may include impact of rounding

[21] Provided by industry contributors

Figure 3. and Table 7. Indicative Resourcing Implications – Restocking provide indicative figures of future workforce requirements per listed activity between 2017 and 2027 and a combined figure for restocking activity between 2017 and 2027.  Error bars show a 5% variance against each activity.

As noted in 2.1. forecasts for restocking programmes are based on an 85% wood production: timber availability forecast ratio.

Predictions of future restocking workforce requirements only take into account a potential uplift due to the increased level of activity; they take no account of attrition in the workforce due to retirement or other factors, technological advances or potential productivity gains.
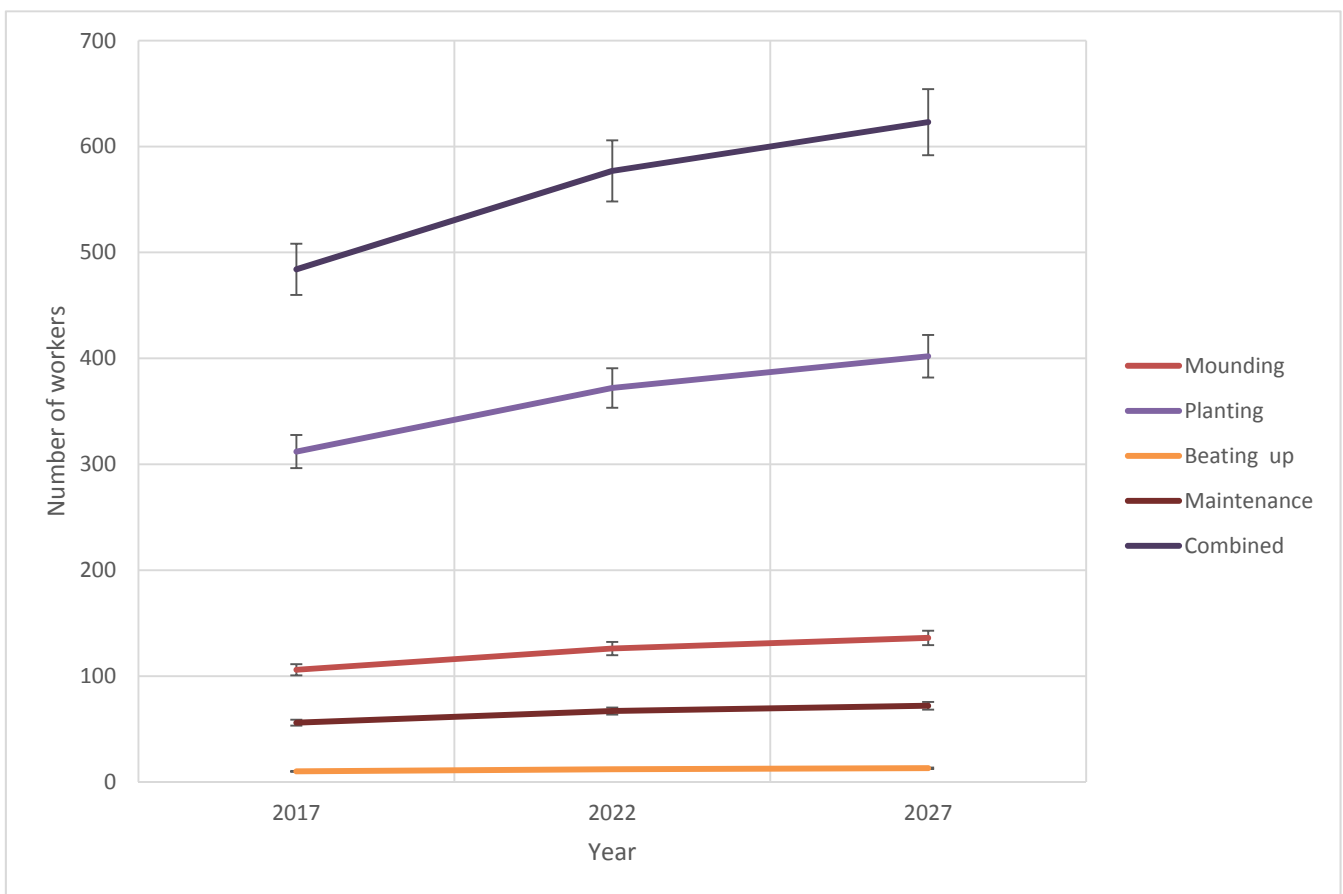


**Figure 3. Indicative Resourcing Implications – Restocking**

**Table 7. Indicative Resourcing Implications – Restocking[22]**

| Restocking | Assumed outputs[23] | | Unit | 2017 (production) | 2022 (forecast) | 2027 (forecast) | Numerical increase of WYE to 2027 | Percentage increase of WYE to 2027 |
|---|---|---|---|---|---|---|---|---|
| **Programme (Ha/year)** | **400** | **m³/Ha** | **Ha** | **14,817** | **17,689** | **19,097[2.3]** | | |
| Mounding | 140 | Ha/year | Machine years | 106[2.3.2.] | 126 | 136 | 30 | 29% |
| Restocking @ 2,700sph (incl. broadleaves) for 45% of working year (WY = 240 days) | 0.44/day | Ha/worker/day | WYE | 312 | 372[2.3.3] | 402 | 90 | 29% |
| Beat up @ 15% one year only for 45% of working year (WY = 240 days) | 2 | Ha/worker/day | WYE | 10 | 12 | 13[2.3.4.] | 3 | 30% |
| Weeding/fertilise/maintenance for 55% of working year (WY = 240 days) | 2 | Ha/worker/day | WYE | 56[2.3.5.] | 67 | 72 | 16 | 29% |
| **Combined restocking activity** | | | | **484** | **577** | **623** | **139** | **29%** |

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[22] Some figures may include impact of rounding

[23] Provided by industry contributors

Figure 4. and Table 8. Indicative Resourcing Implications – New Woodland Creation provide indicative figures of future workforce requirements per listed activity between 2017 and 2027 and a combined figure for new woodland creation activity between 2017 and 2027.  Error bars show a 5% variance against each activity.

Predictions of future new woodland creation workforce requirements only take into account a potential uplift due to the increased level of activity; they take no account of attrition in the workforce due to retirement or other factors, technological advances or potential productivity gains.
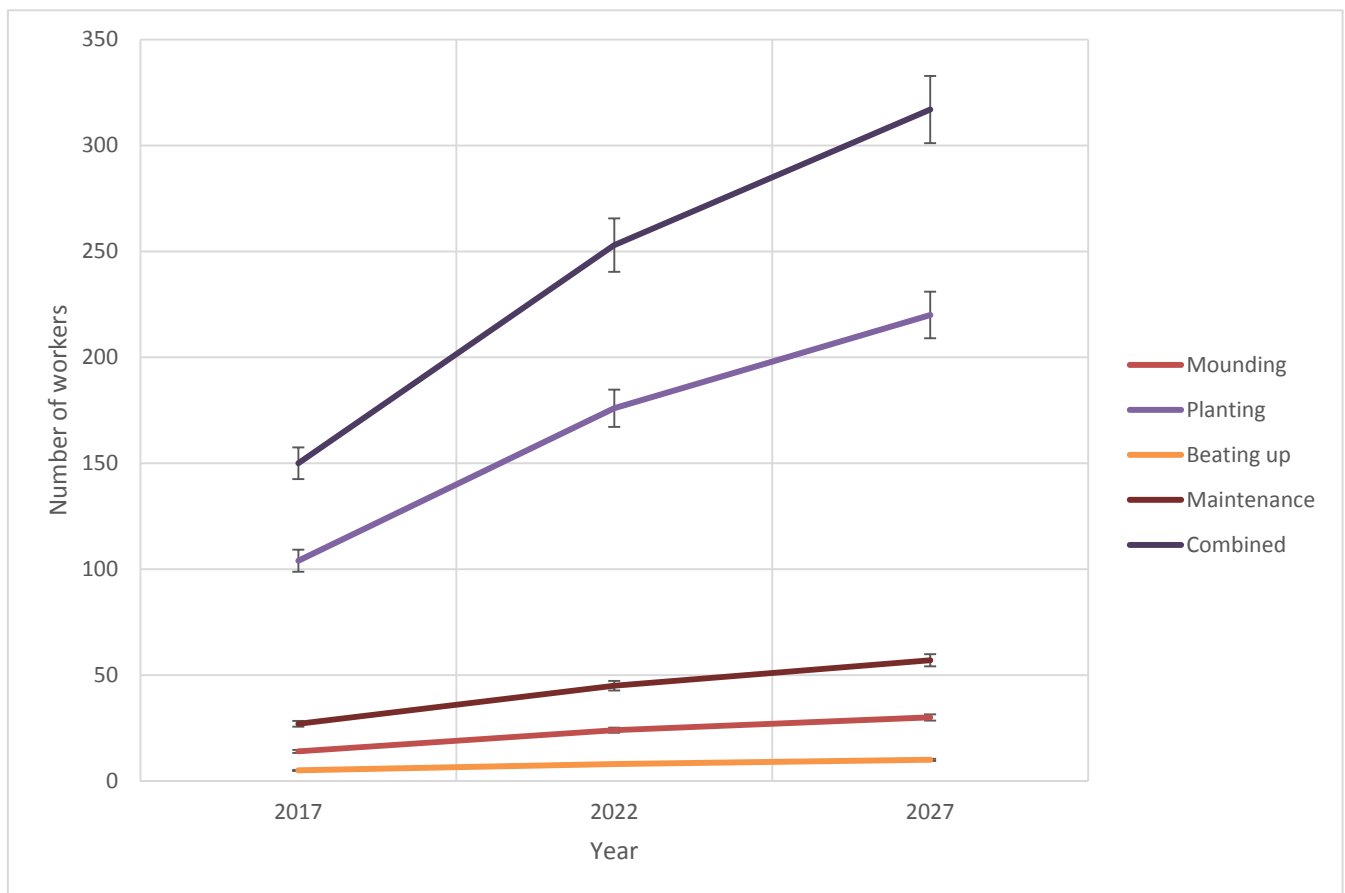


**Figure 4. Indicative Resourcing Implications – New Woodland Creation**

**Table 8. Indicative Resourcing Implications – New woodland creation[24]**

| New woodland creation | Assumed outputs[25] | | Unit | 2017 (planted) | 2022 (target) | 2027 (target) | Numerical increase of WYE to 2027 | Percentage increase of WYE to 2027 |
|---|---|---|---|---|---|---|---|---|
| **Programme (Ha/year)** | | | **Ha** | **7,100** | **12,000** | **15,000** | | |
| Mounding | 500 | Ha/year | Machine years | 14 | $24^{2.4.2.}$ | 30 | 16 | 114% |
| Planting @ 2,700sph (incl. broadleaves) for 45% of working year (WY = 240 days) | 0.63/day | Ha/worker/day | WYE | 104 | 176 | $220^{2.4.3.}$ | 116 | 112% |
| Beat up @ 15% one year only for 45% of working year (WY = 240 days) | 2 | Ha/worker/day | WYE | $5^{2.4.4.}$ | 8 | 10 | 5 | 100% |
| Weeding/fertilise/maintenance for 55% of working year (WY = 240 days) | 2 | Ha/worker/day | WYE | 27 | $45^{2.4.5.}$ | 57 | 30 | 111% |
| **Combined new woodland creation activity** | | | | **150** | **253** | **317** | **167** | **111%** |

[24] Some figures may include impact of rounding

[25] Provided by industry contributors

Figure 5. and Table 9. Indicative Resourcing Implications – Primary Processing provide indicative figures of future workforce requirements for this sub sector between 2017 and 2027 and a combined figure for primary processing activity between 2017 and 2027.  Error bars show a 5% variance against each activity.

Predictions of future primary processing workforce requirements only take into account a potential uplift due to the increased level of activity; they take no account of attrition in the workforce due to retirement or other factors, technological advances or potential productivity gains.
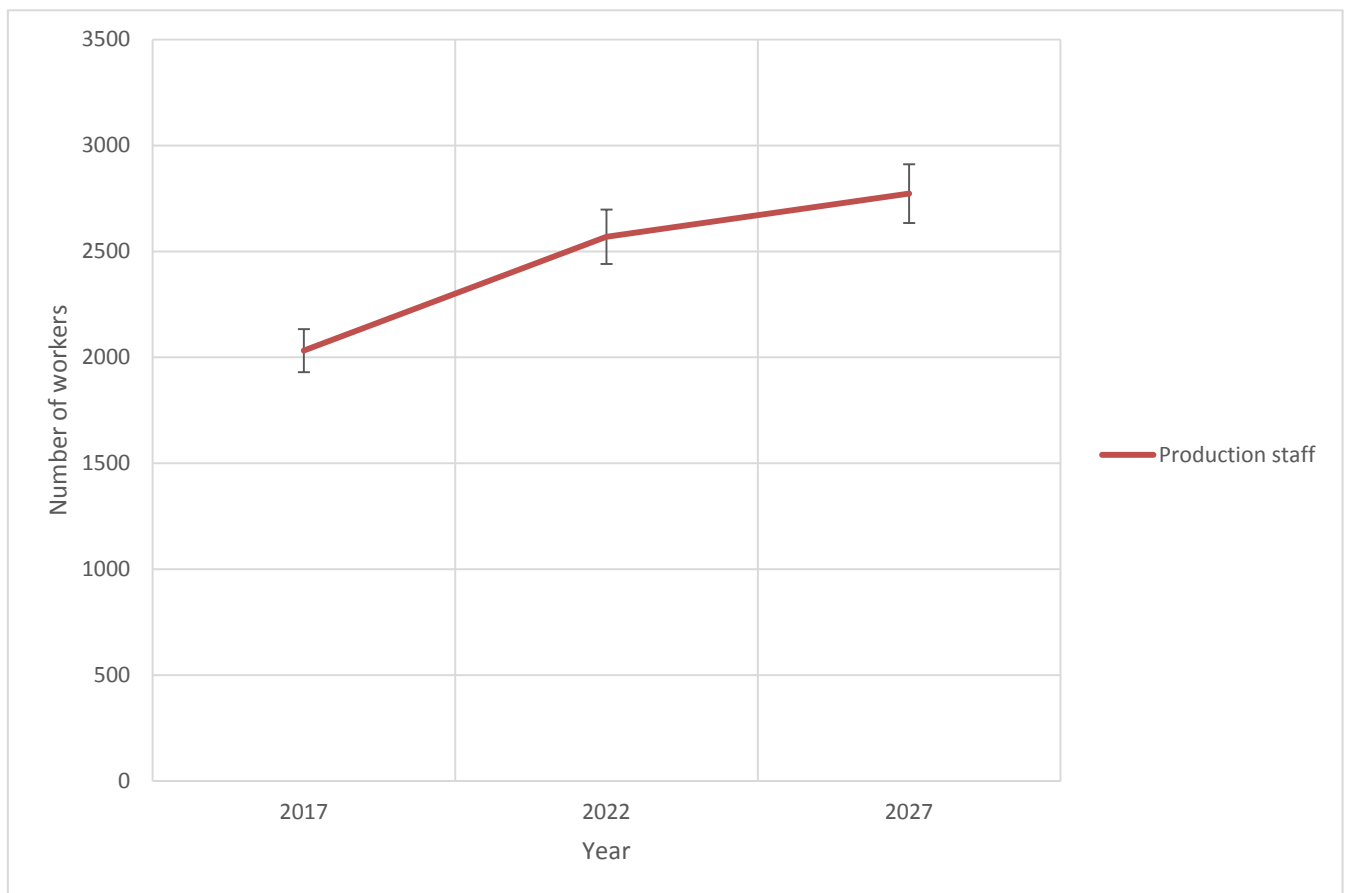


**Figure 5. Indicative Resourcing Implications – Primary processing**

**Table 9. Indicative Resourcing Implications – Primary processing**

| Primary processing | Assumed outputs[26] | | Unit | 2017 (production) | 2022 (forecast) | 2027 (forecast) | Numerical increase of WYE to 2027 | Percentage increase of WYE to 2027 |
|---|---|---|---|---|---|---|---|---|
| **Programme** | | | **Million m$^3$** | **5.080**[2.6.1.] | **6.064** | **6.547** | | |
| Production worker | 2,500 | m$^3$/year | WYE | 2,032 | 2,426[2.6.2.] | 2,619 | 587 | 29% |
| | | | | | | | | |
| **Primary processing activity** | | | | **2,032** | **2,426** | **2,619** | **587** | 29% |

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[26] Provided by industry contributors

As well as providing indicative figures for workforce requirements by industry work programmes (e.g. harvesting, restocking), the need for future recruitment has also been grouped into activity sub sectors.  Figures 6. to 11. provide indicative information on future workforce requirements between 2017 and 2027 for the activity sub sectors described in Table 10. Description of activity sub sectors.   Error bars show a 5% variance against each sub sector.

**Table 10. Description of activity sub sectors**

| Sub sectors | Description |
| --- | --- |
| Harvesting | Operators of harvesting machinery (harvesters, forwarders, skidders, skylines etc.) which cut trees and process timber.  Chainsaw operators also work within the sector, usually in conjunction with harvesters but also undertaking smaller scale operations or felling hardwoods |
| Establishment & maintenance | Planting of trees, guarding, spraying, weeding and fertilising of young trees are the major activities of this sub sector.  Other activities including hand drainage, fencing, scrub cutting and general forestry maintenance work.  Establishment work can be for new woodland creation or restocking, where new trees are planting to replace those which have been harvested |
| Ground preparation | Operators of machinery which prepare sites for planting or restocking by mounding, ploughing or dolloping |
| Timber haulage | This sub sector is involved in the transport of timber from the forest to a processing site (e.g. sawmill) |
| Management & supervision | This sub sector covers managers and supervisors who primarily work in organisations which manage areas of forestry and those who provide consultancy to assist this process |
| Primary processing | This sub sector is involved in the initial conversion of round timber to sawn product.   Products include timber for construction, fencing, pallets and furniture |
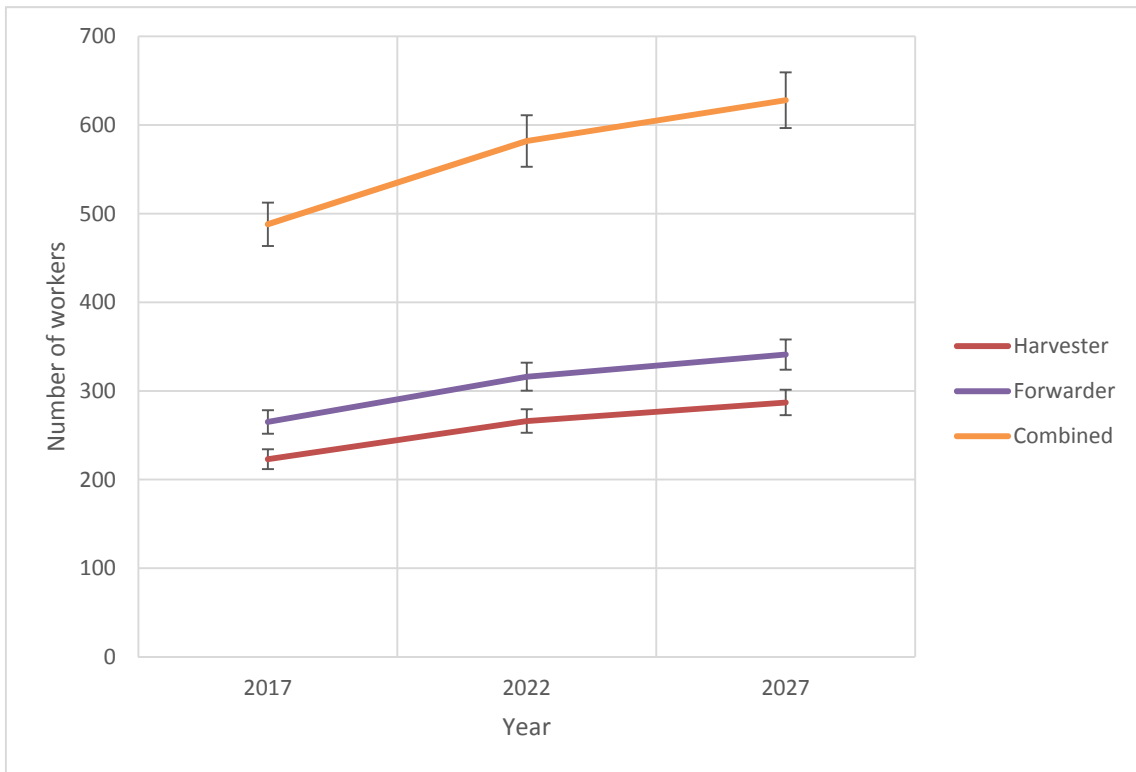
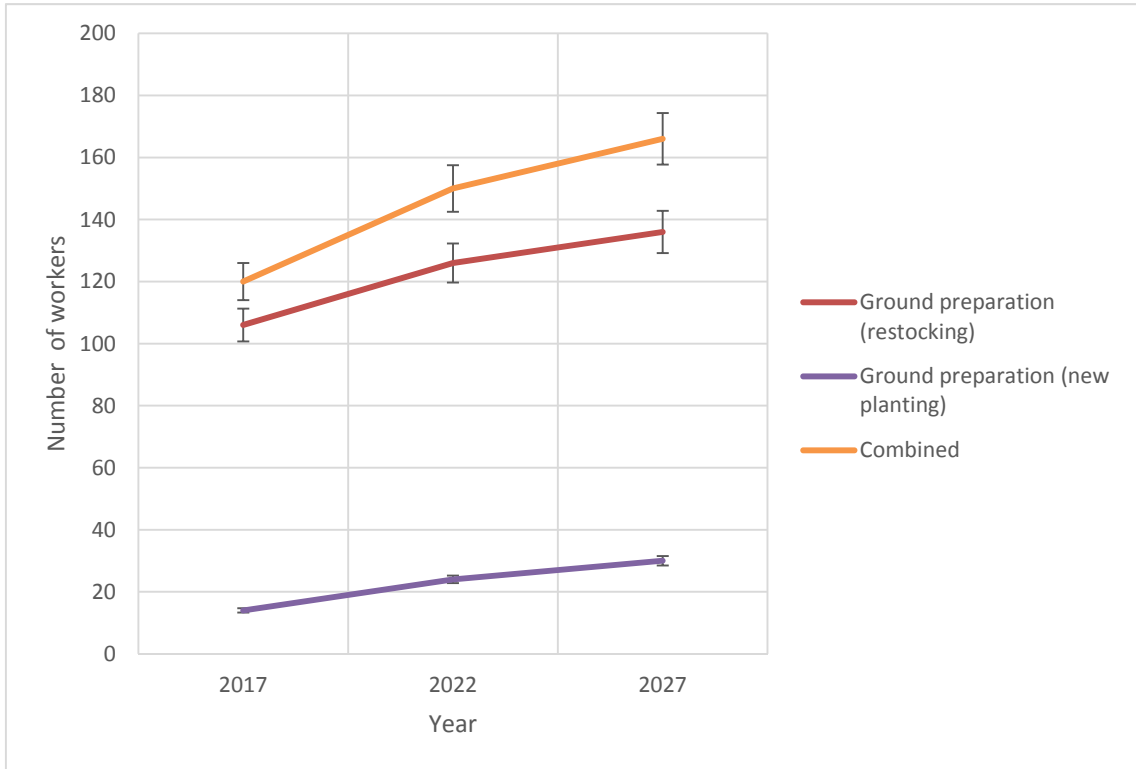**Figure 6. Harvesting**
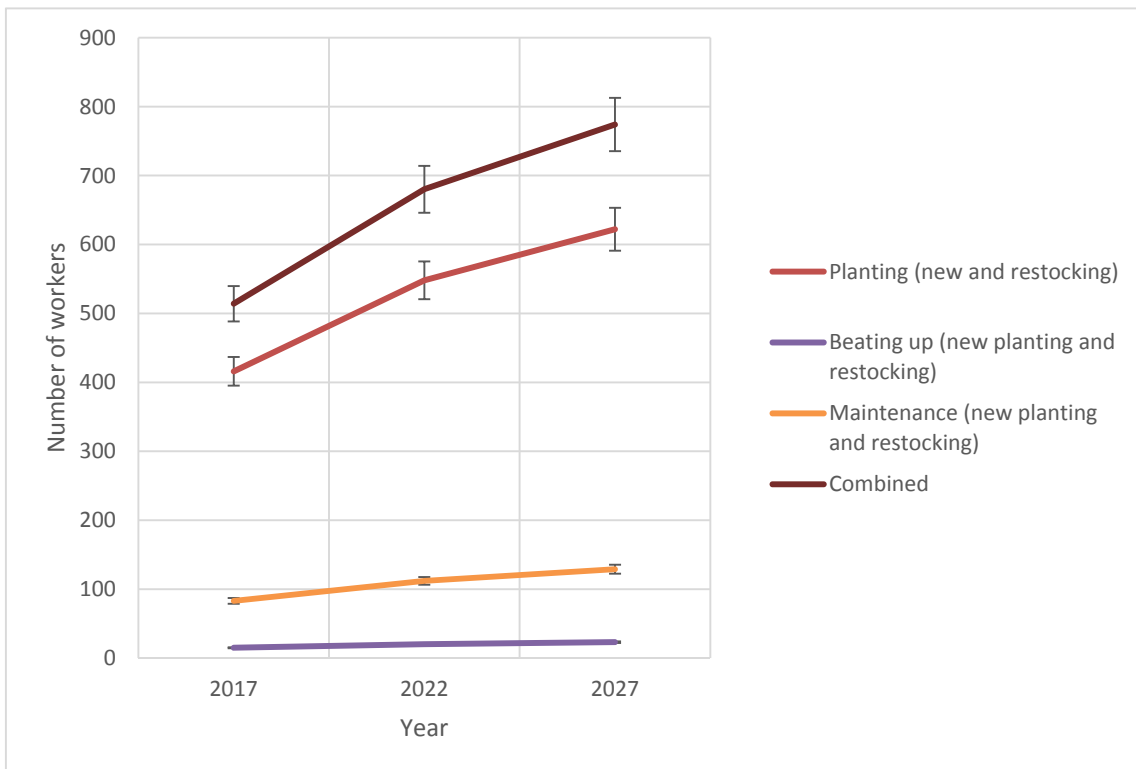


**Figure 7. Establishment & maintenance**
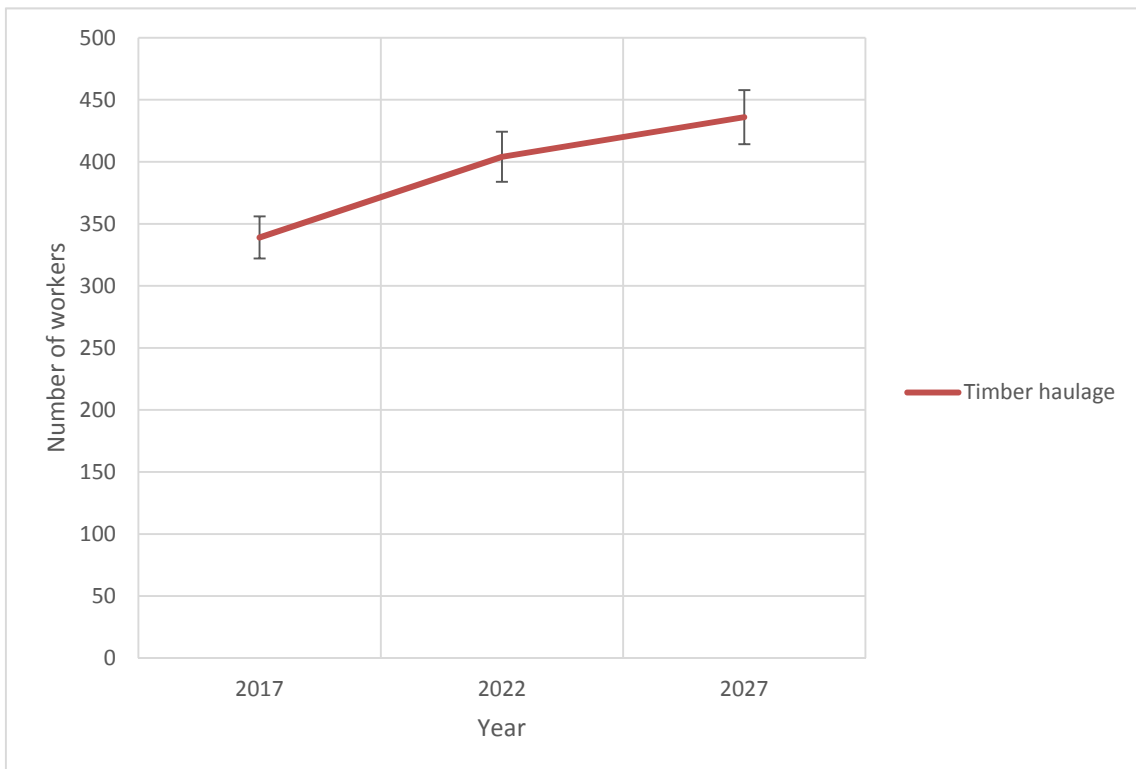
**Figure 8. Ground preparation**



**Figure 9. Haulage**

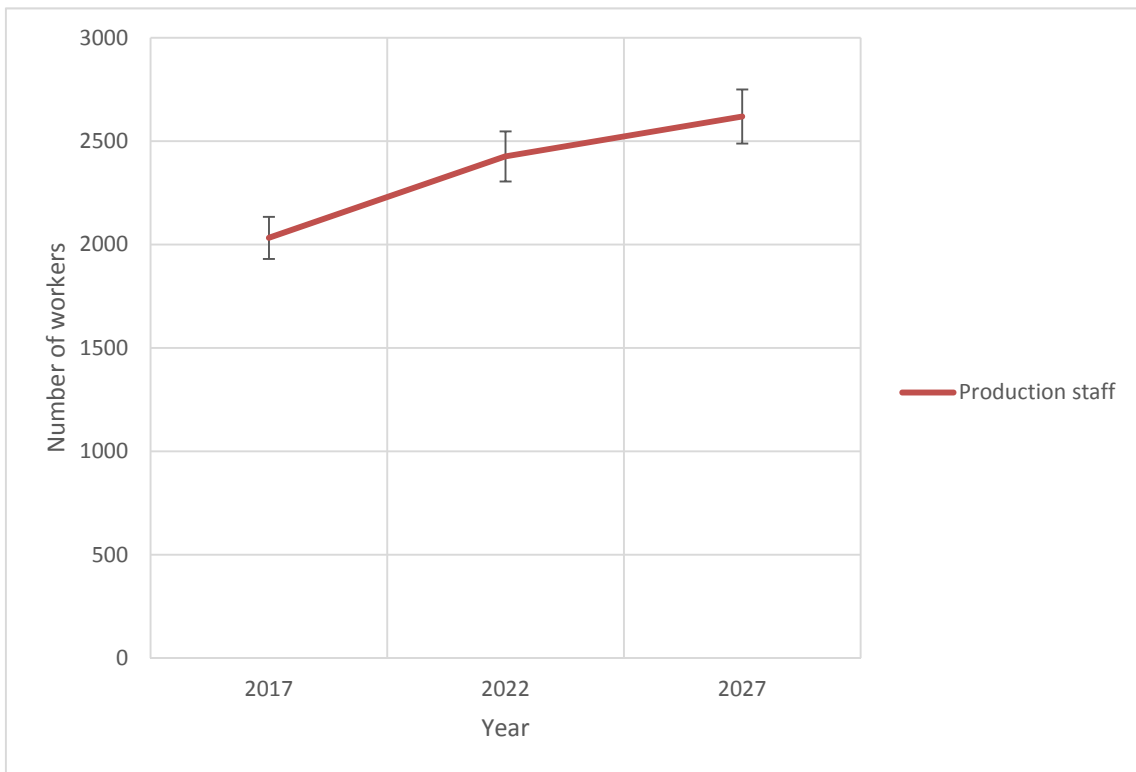**Figure 10. Management & supervision (harvesting)**

**Figure 11. Primary processing**

## 3.3. The scale of recruitment required

As can be seen from Figures 6. to 11., a significant uplift in the workforce will be required to achieve the forecast harvesting, restocking and new woodland creation programmes between 2017 and 2027.  Table 11. Indicative Resourcing Implications – Activity sub sectors summaries the uplift in each activity sub sector and indicates that an overall scale of increase of 32% will be required.

**Table 11. Indicative Resourcing Implications – Activity sub sectors**

| Activity sub sectors | 2017 (derived) | 2022 (forecast) | 2027 (forecast) | Numerical increase of WYE to 2027 | Percentage increase of WYE to 2027 |
|---|---|---|---|---|---|
| | | | | | |
| Harvesting | 488 | 582 | 628 | 140 | 29% |
| Establishment & maintenance | 514 | 680 | 775 | 261 | 51% |
| Ground preparation | 120 | 150 | 166 | 46 | 38% |
| Haulage | 339 | 404 | 436 | 97 | 29% |
| Management & supervision | 142 | 168 | 182 | 40 | 28% |
| Primary processing | 2,032 | 2,426 | 2,619 | 587 | 29% |
| | | | | | |
| **Combined activity for all sub sectors** | **3,635** | **4,410** | **4,806** | **1,171** | **32%** |

## 3.4. The impact of attrition

In a business sense, attrition is the reduction of a workforce due to factors such as retirement, permanent sickness or transfer to other industries.

In terms of attrition due to retirement, as reported in the 2010 report, whilst the average age of the forestry workforce is a real concern of the sector – it is widely recognised that the workforce is an ageing one - there is very little statistical data to confirm this and hence enable a review of the potential impacts on the workforce as a result of retirement; queries by occupation from the Office for National Statistics information didn't provide any useable data due to the sample size being too small and statistically unreliable.

In light of this and for purposes of comparison, the rate used in this study to indicate what impact attrition due to retirement may have on future workforce requirements is the same as that used in the 2010 report; 2% per annum.

Similarly, it was not possible in the course of this study to identify any information on attrition due to permanent sickness, transfer to other industries or other factors.  The rate used to indicate this impact is therefore again the same as that used in the 2010 report; 2% per annum.

Table 12. Projected recruitment requirements including attrition illustrates the impact of attrition due to both retirement and other factors in terms of indicative numbers in the workforce together with the percentage change.  Figures relate to the two five-year periods between 2017 and 2027 (2017 to 2022 and 2023 to 2027) and totals across the ten years.

Over the period 2017 to 2027, figures indicate that to match the projected levels of activity, overall workforce requirements could increase by 32%.  This figure rises to 52% when taking attrition due to retirement into account and 72% when taking attrition due to retirement and other factors into account.

It should be highlighted however that attrition rates may vary across the different activity sub sectors such that an overall uplift of 72% will not apply to all.  As noted in 2.4 above, it has not be possible in the course of this study to quantify rates of attrition; as such, Table 12. can only be used for illustrative purposes.

**Table 12. Projected recruitment requirements including attrition**

| Sector | % activity uplift | | | 2017 | Recruitment in 2017-2022 | | | Recruitment in 2023-2027 | | | Projected recruitment 2017-2027 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2017-2022 | 2023-2027 | 2017-2027 | 2017 derived figures | Uplift only | Uplift + attrition @ 20% | Uplift + attrition @ 40% | Uplift only | Uplift + attrition @ 20% | Uplift + attrition @ 40% | Uplift only | Uplift + attrition @ 20% | Uplift + attrition @ 40% |
| Harvesting | 19 | 9 | 29 | 488 | 94 | 143 | 191 | 46 | 95 | 144 | 140 | 238 | 335 |
| Establishment & maintenance | 32 | 18 | 51 | 514 | 166 | 217 | 269 | 95 | 146 | 198 | 261 | 364 | 467 |
| Ground preparation | 24 | 13 | 38 | 120 | 30 | 42 | 54 | 16 | 28 | 40 | 46 | 70 | 94 |
| Haulage | 19 | 9 | 29 | 339 | 65 | 99 | 133 | 32 | 66 | 100 | 97 | 165 | 233 |
| Management & supervision | 18 | 10 | 28 | 142 | 26 | 40 | 55 | 14 | 28 | 42 | 40 | 68 | 97 |
| Primary processing | 19 | 9 | 29 | 2,032 | 394 | 597 | 800 | 193 | 396 | 599 | 587 | 993 | 1,399 |
| | | | | | | | | | | | | | |
| Totals | 21 | 11 | 32 | 3,635 | 775 | 1,138 | 1,502 | 396 | 760 | 1,123 | 1,171 | 1,898 | 2,625 |
| **% uplift** | | | | **0** | **21** | **31** | **41** | **11** | **21** | **31** | **32** | **52** | **72** |

# 4. ADDITIONAL CONSIDERATIONS

## 4.1 For further discussion

In undertaking this review, a number of key themes have emerged from discussions with industry stakeholders.  Whilst some have been given a brief mention in the report, it has not been possible to expand on these views to any great extent or to incorporate them into the calculations or findings of this study.  However, as they could influence both the scale of recruitment required and the actions needed to address any gaps in the future workforce, the main discussion points have been summarised below for further consideration: -

- **Productivity gains and operational innovation:**  It is widely recognised that productivity levels are expected to rise as a result of technological advances, innovation and operational efficiencies.  The speed and extent to which these improvements will be adopted is uncertain but could mean that the size of the future workforce may not be as large as that indicated in this report;

- **The wider forestry and timber technology sector:**  This study has focused primarily on the "forest floor" workforce and has highlighted the difficulties of deriving meaningful future workforce requirements for others sub sectors.  If the industry is to achieve the forecast levels of activity, additional resources in other sub sectors may be required (e.g. nursery production, forest management, secondary processing);

- **Policy drivers:**  There is significant, and very welcomed, political support for the forestry and timber sector in Scotland and a current policy focus is the role it can play in the mitigation of climate change.  Were policy targets to change (e.g. increased woodland creation/use of Scottish timber in construction), this could impact on the numbers required in the future workforce;

- **Brexit:**  Whilst not quantified or specifically considered in this study, a proportion of the sector's workforce (e.g. establishment and maintenance) is undertaken by EU nationals.  The impact that Brexit may have on their ability to remain in the Scottish forestry workforce is unknown but could mean that numbers required in the future workforce may be higher than those indicated in this report;

- **Composition of the workforce:** The forestry workforce contains a significant proportion of micro-businesses.  Many mainstream support mechanisms are not easily accessible for such businesses so alternative ways of providing targeted, relevant and cost-effective support to develop the skills and capacity of the whole workforce need to be identified and delivered.

## Appendix I: Methodology

As discussed in section 2.2.3., an indirect objective of this study was to assess the availability/usability of appropriate and current labour market information and establish whether a means of using such published information, together with industry statistics, to derive future workforce capacity requirements in a consistent and repeatable manner could be developed.

With limited current and useable data being available for the forestry workforce as a whole, the methodology used in the predictions of future requirements has been focused on deriving information from published industry statistics and targets.

Assumptions and calculations for each of the activity sub sectors included in this report are explained as follows: -

## 1. Assumptions

1.1. Unless otherwise stated, the wood production and timber availability figures used in this study have been expressed in cubic metres ($m^3$) over bark standing (obs) where $1m^3$ of softwood obs is approximately equivalent to 0.818 green tonnes and 1 green tonne of softwood is approximately equivalent to $1.22m^3$ softwood obs;

1.2. A wood production: timber availability forecast ratio of 85% has been used to derive harvesting and associated activity levels;

1.3. Whilst timber availability forecasts assume that stands will be thinned, due to the variability of thinning volumes, forecasts have been used on a clear fell basis only;

1.4. A wood production: sawmill softwood deliveries ratio of 60% has been used to derive a 2017 primary processing figure[27];

1.5. A timber availability forecast: sawmill softwood deliveries ratio of 60% has been used to derive 2022 and 2027 primary processing activity levels[28];

1.6. As information on hardwood timber is not available across all reported fields, only softwood figures have been used.  As a result, the figures used under-estimate the level of harvesting activity;

1.7. A working year of 240 days (48 weeks) has been used in output calculations;

1.8. A "derived" workforce in 2017 was calculated in the same way as future predictions and used to compare against future requirements;

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[27] Derived from total UK softwood wood production and softwood sawmill deliveries in 2017; IFOS Statistics, Forest Research (2018), "Forestry Statistics 2018"

[28] Derived from 85% of total softwood timber availability forecasts for 2022-2026 & 2027-2031; Forestry Commission (2016), "25-year forecast of softwood timber availability (2016)

## 2. Calculations

### 2.1.    Harvesting

Harvesting activity programmes have been based on either the volume of softwood production in Scotland in 2017 or an 85% proportion of timber availability for the period between 2022 and 2027.

Future workforce requirements have been calculated by dividing total production (or forecast availability) by an average volume of timber produced by one forest machine (harvester of forwarder) in one year.

### 2.1.1. Activity programme

- 2017 = 6,940,000 green tonnes softwood x 1.22 (green tonne to $m^3$ conversion factor) = 8,466,800$m^{3s}$

- 2022 forecast = 11,892,000$m^3$ obs softwood x 0.85 (applied wood productions: timber availability ratio) = 10,108,200$m^3$

- 2027 forecast = 12,838,000$m^3$ obs softwood timber availability x 0.85 (applied wood production: timber availability ratio) = 10,912,300$m^3$ softwood

### 2.1.2. Forest machine outputs

- Harvester (clear felling): 38,000$m^3$/year

- Forwarder (clear felling): 32,000$m^3$/year

**Example (in 2017): Machine years (harvester) = 8,466,800 / 38,000 = 223**

## 2.2. Timber haulage

Timber haulage activity programmes have been based on either the volume of softwood production in Scotland in 2017 or an 85% proportion of timber availability for the period between 2022 and 2027.

Future workforce requirements have been calculated by dividing total production (or forecast) by the average number of cubic meters of timber one timber haulier can transport in one year[29].

### 2.2.1. Activity programme

- 2017: As per harvesting activity in Appendix I: 2.1.1. ((8,466,800m³ softwood)

- 2022 forecast: As per harvesting activity programme in Appendix I: 2.1.1. (10,108,200m³ softwood)

- 2027 forecast: as per harvesting activity programme in Appendix I: 2.1.1. (10,912,300m³ softwood)

### 2.2.2. Timber haulage - outputs

Timber lorry (average): 25,000m³/driver/year

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**Example (in 2022): Machine years (timber lorry) = 10,108,200 / 25,000 = 404**

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[29] Excludes timber transported by sea and on skellies/flats at 30 tonnes which can cross over into general haulage

**2.3. Restocking**

Restocking activity programmes have been based on the area (hectares (Ha)) of forest to be replanted.  The area to be replanted has been calculated by dividing the volume of timber harvested (actual or forecast) by a timber yield of 400m$^3$ per hectare and assuming that 70% of each Ha will be restocked.

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**Example (in 2027): 10,912,300m$^3$ timber / 400 x 0.7 = 19,097 Ha**

---

Future workforce requirements have been calculated by dividing total area by the number of hectares that could be covered by a ground preparation machine in a year and subsequently restocked, beaten up and maintained by hand over the course of a year (prorated to account for seasonality of work).

**2.3.1 Activity programme**

- 2017: 14,817 Ha

- 2022 forecast: 17,689 Ha

- 2027 forecast: 19,097 Ha

**2.3.2. Ground preparation machine outputs**

Ground prep machine: 140Ha/year

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**Example (in 2017): Machine years (e.g. mounding) = 14,817 / 140 = 106**

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### 2.3.3. Restocking outputs

Average area restocked per day: 0.44Ha

Percentage of year worked: 45% (108 days)

**Example (in 2022): Worker year equivalents = 17,689 / 0.44 / 108 = 372**

### 2.3.4. Beating up outputs

Assumed beating up level/frequency: 15% of total area/once

Average area beat up per day: 2Ha

Percentage of year worked: 45% (108 days)

**Example (in 2027): Worker year equivalents = 19,097 x 0.15 / 2 / 108 = 13**

### 2.3.5. Weeding/fertilising/maintenance outputs

Average area completed per day: 2Ha

Percentage of year worked: 55% (132 days)

**Example (in 2017): Worker year equivalents = 14,817 / 2 / 132 = 56**

**2.4. New woodland creation**

New woodland creation activity programmes have been based on either the area of new woodland planted in 2017 or the annual area targets set by the Scottish Government for 2021/22 and 2024 onwards.

Future workforce requirements have been calculated by dividing total area by the number of hectares that could be covered by a ground preparation machine in a year and subsequently planted, beaten up and maintained by hand over the course of a year (prorated to account for seasonality of work).

**2.4.1 Activity programme**

- 2017: 7,100Ha

- 2022 forecast: 12,000Ha

- 2027 forecast: 15,000Ha

**2.4.2. Ground preparation outputs**

Ground prep machine: 500Ha/year

**Example (in 2022): Machine years (e.g. mounding) = 12,000 / 500 = 24**

**2.4.3. Planting outputs**

Average area planting per day: 0.63Ha

Percentage of year worked: 45% (108 days)

**Example (in 2027): Worker year equivalents = 15,000 / 0.63 / 108 = 220**

### 2.4.4. Beating up outputs

Assumed beating up level/frequency: 15% of total area/once

Average area beat up per day: 2Ha

Percentage of year worked: 45% (108 days)

---

**Example (in 2017): Worker year equivalents = 7,100 x 0.15 / 2 / 108 = 5**

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### 2.4.5. New woodland creation – weeding/fertilising/maintenance outputs

Average area completed per day: 2Ha

Percentage of year worked: 55% (132 days)

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**Example (in 2022): Worker year equivalents = 12,000 / 2 / 132 = 45**

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## 2.5. Management & supervision (harvesting)

Harvesting management and supervision activity programmes have been based on either the volume of softwood production in Scotland in 2017 or an 85% proportion of timber availability for the period between 2022 and 2027.

Future workforce requirements have been calculated by dividing total production (or forecast availability) by an average volume of timber that could be managed by a harvesting manager together with a harvesting supervisor in in one year.

### 2.5.1. Activity programme

- 2017: As per harvesting activity in 2.1.1. ((8,468,020m$^3$ softwood)

- 2022 forecast: As per harvesting activity programme in Appendix I: 2.1.1. (10,108,200m$^3$ softwood)

- 2027 forecast: as per harvesting activity programme in Appendix I: 2.1.1. (10,912,300m$^3$ softwood)

### 2.5.2. Management & supervision outputs (harvesting)

Harvesting manager: 120,000m$^3$/person/year

Harvesting supervisor: 120,000m$^3$/person/year

**Example (in 2027): Worker year equivalents (manager) = 10,912,300 / 120,000 = 91**

## 2.6. Primary processing

In order to derive indicative information on potential labour demand in the primary processing sector, an average log input/person/year output figure has been used. Log input levels have been calculated by comparing UK softwood production and UK-grown softwood deliveries into sawmills[30] over a ten year period and applying an average conversion rate to published wood production data/timber availability forecasts.

Table 13. Conversion of UK wood production to sawmill deliveries indicates that between 2008 and 2017 an average 60% of softwood produced across the UK was delivered into UK sawmills; a 60% conversion rate has therefore been applied to the harvesting programme production/forecast figures shown in Table 2. to derive primary processing requirements.

**Table 13. Conversion of UK softwood production to sawmill deliveries**

| Year | UK softwood production (Thousand green tonnes) | Sawmill deliveries (UK grown) (Thousand green tonnes) | Conversion rate (%) |
|------|-----------------------------------------------|-------------------------------------------------------|---------------------|
| 2017 | 10,915 | 6,581 | 60 |
| 2016 | 10,745 | 6,511 | 61 |
| 2015 | 10,659 | 6,168 | 58 |
| 2014 | 11,527 | 6,725 | 58 |
| 2013 | 10,936 | 6,407 | 59 |
| 2012 | 10,095 | 6,073 | 60 |
| 2011 | 10,056 | 5,859 | 58 |
| 2010 | 9,258 | 5,616 | 61 |
| 2009 | 8,392 | 5,133 | 61 |
| 2008 | 8,238 | 4,933 | 60 |
| **TOTAL** | **100,821** | **60,006** | **60** |

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[30] Sourced from UK wood production and softwood sawmill deliveries; IFOS Statistics, Forest Research (2018), "Forestry Statistics 2018"

### 2.6.1. Activity programme

- 2017: 5,080,080m$^3$ (calculated from 60% of 8,466,800m$^3$ used for 2017 harvesting activity programme in 2.1.1.)

- 2022 forecast: 6,064,920m$^3$ (calculated from 60% of 10,108,200m$^3$ used for 2022 harvesting activity forecast in 2.1.1.)

- 2027 forecast: 6,547,380m$^3$ (calculated from 60% of 10,912,300m$^3$ used for 2027 harvesting activity forecast in 2.1.1.)

### 2.6.2. Primary processing – production outputs

Average production per log input/person/year: 2,500m$^3$

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**Example (in 2022): Worker year equivalent = 6,064,920 / 2,500 = 2,426**

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## 3. Sub sectors excluded from calculations

### 3.1 Management & supervision (forest management)

Forest management and supervision activity have not been quantified in this study. Following discussion with industry stakeholders, due to the wide variation in forest scale, age, level of operations etc., it was felt that it would not be possible to derive meaningful figures from available information.

### 3.2 Nursery production

Nursery production has not been quantified in this study. Following discussions with industry stakeholders, it was considered that there were too many variables – including seed availability and natural conditions - to be able to derive meaningful figures from the information available. It was confirmed however that if the aspirations of the sector are to be met, the industry will need to focus much more on automation and mechanisation rather than the traditional, labour intensive methods for producing trees.

## Appendix II: References

Smither, M., Fulton, C (2010) "The Future of the Forestry Workforce in Scotland"

FAO, UNECE (2018) "Green Jobs in the Forest Sector"

Glynn, M. (2017) "A Forestry Skills Study for England and Wales"

IFOS-Statistics, Forest Research (2018) "Forestry Statistics 2018"

Forest Research (2017) "Wood production 1976 – 2018 (provisional)"

National Forest Inventory, Forestry Commission (2016) "25-year forecast of timber availability"

## Appendix III: Glossary & abbreviations

| General Terms | Descriptions |
|---|---|
| Beating up | The replacement of newly planted trees which have died; even with the best planning and management, a percentage of trees will not survive the first planting season and will need to be replaced |
| Green tonne | A weight measurement of freshly felled timber before any natural or artificial drying has occurred |
| Hardwood | Wood from broadleaved trees such as oak and birch |
| Machine years | Unit to express number of machines (and hence operators) required |
| New woodland creation | Establishment of woodland on ground that was not woodland in the recent past |
| Softwood | Wood from coniferous trees such as spruce, pine and larch |
| Timber availability forecast | Forecasts of timber volume available to be harvested/bought to market rather than a forecast of timber production (i.e. how much timber is cut).  Timber availability forecasts do not take into account management objectives, financial factors or the state of the market, all of which could affect the level and timing of harvesting. |
| Timber availability forecast ratio | Assumed level of timber available which could be harvested/bought to market; 85% (i.e. 15% of timber available is not removed) |

| Abbreviations | Descriptions |
|---|---|
| FTE | Full time equivalent |
| Ha | Unit of area (Hectare) defined as 10,000 square metres (100 x 100m), approximately equivalent to 2.47 acres |
| $m^3$ | Volume measurement |
| Obs | Over bark standing - measure of timber before trees are felled |
| Sph | Stems per hectare |
| WYE | Worker year equivalent - Unit to reflect FTEs in workforce |

## Appendix IV: Survey contributors

The author would like to express their sincere thanks to all those who have contributed to this study for their invaluable advice on industry forecasts, production outputs and future workforce predictions.

| | | |
|---|---|---|
| Will | Anderson | Seafield and Strathspey Estate |
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| Scott | Dalgleish | Arbuckle Contractors |
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| Andy | Leitch | Scottish Forestry |
| David | Leslie | James Jones and Sons |
| Jock | McKie | John Deere Forestry |
| Alex | Murray | Glennon Brothers |
| James | Nott | Scottish Forestry |
| Andy | Rogers | BSW |
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