

# Supporting a Green Recovery: an initial assessment of nature-based jobs and skills



**NatureScot**

Scotland's Nature Agency  
Buidheann Nàdair na h-Alba

# RESEARCH REPORT

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Research Report No. 1257

## **Supporting a Green Recovery: an initial assessment of nature-based jobs and skills**

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## Supporting a Green Recovery: an initial assessment of nature-based jobs and skills

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A clear focus on nature-based jobs - their economic potential, workforce and skills requirements - will enable the nature sector to play its part in providing fair work and tackling inequalities in a low carbon and green economy. The monumental impact of COVID-19 on Scotland's economy is giving rise to an immediate need to protect and create jobs, and reduce inequalities, by building a green recovery and supporting a longer-term transition towards a net-zero economy.

The Advisory Group on Economic Recovery (AGER) recognised that the industries underpinned by Scotland's natural capital have an essential role to play in supporting economic recovery. The AGER called for measures to support natural capital and prioritise nature-based solutions and investments, as a way of boosting the economy whilst supporting climate mitigation and biodiversity enhancement. In response, the Scottish Government's Economic Recovery Implementation Plan (ERIP) highlighted the need for a jobs-focused recovery, with innovation playing a key role in an environmentally sustainable and green economy. In line with a Programme for Government 2019-20 commitment, a Climate Emergency Skills Action Plan will shortly be published, to help ensure that Scotland's workforce has the rights skills to reap the benefits of a transition to a net-zero economy.

This is the first baseline analysis of nature-based jobs across Scotland and it is a vital step in increasing our understanding of where opportunities lie and where barriers need to be overcome. We defined the nature-based sector as including:

- Nature-based activities, such as nature-based solutions, land use, marine management & fisheries, green finance, urban green infrastructure, as well as
- sectors highly dependent on natural capital, such as tourism and food and drink (also called nature-dependent sectors).

Renewable energy generation was excluded from this assessment.

Analysis of official data sources was combined with a series of stakeholder interviews to establish a baseline, estimate future demand and analyse skills development requirements. It builds on a previous report, 'The Economic Impact of Scotland's Natural Environment', which demonstrated the importance of the natural environment to economic growth and quality of life.

This work provides an evidence base and short initial assessment of future employment opportunities related to nature-based jobs and the skills required to do them. In line with Just Transition principles, this assessment also identifies equalities issues to be addressed in supporting a more inclusive and diverse workforce across Scotland, with participation and progression in the labour market for all regardless of gender, age, race or disability.

The increase in skilled jobs needed to meet long term Scottish climate and biodiversity targets is a big opportunity for the Scottish wellbeing economy. This initial assessment suggests that strategic action by a broad alliance of partners, within and across nature-based sectors, is needed to support the growth of a diverse, gender balanced, highly skilled workforce.

While estimating future demand is challenging across all sectors, the analysis shows that:

- Jobs in the nature-based sector are a significant contribution to the Scottish economy amounting to 195,000 jobs or 7.5% of Scotland's workforce in 2019. This is likely to be an underestimate, given the difficulty in separately identifying a number of key nature-based sectors. Although nature-dependent sectors (tourism and food and drink) dominate all nature-based jobs, core nature-based sectors are exhibiting strong growth. Nature-based jobs grew at more than 5 times the rate of all jobs in Scotland in the period 2015-19 and accounted for one third of all job growth in Scotland in this period.
- Significant further growth in nature-based jobs is anticipated, on the back of expansion in activities required to meet our net-zero targets. Plans and proposals for a five-fold increase in peatland restoration, near doubling of tree planting and additional investment in the Woodland Carbon Code, along with other mechanisms for carbon off-setting all point to an expansion of employment. Some sectors, while welcoming an expansion of nature-based activities, caution that there is a potential time lag to allow for increased workforce capacity and upskilling.
- Nature-based job roles are just emerging in some activities e.g. urban green infrastructure and green finance<sup>1</sup> but are expected to develop quickly as demand for these roles grow.
- The balance of nature-based jobs differs by type of region. Primary sectors (agriculture, fishing and forestry) dominate in rural and remote areas while nature dependent sectors – tourism and food and drink - dominate in urban areas. If new nature-based jobs are located in the same proportion as existing nature-based jobs, almost a third will arise in Island and Remote Areas (30.2%) and 62.2% in Mainly Rural areas, some of which are currently challenged by depopulation and out-migration of working age people. Plans for skills development should recognise the regional variation in potential employment and help ensure that a highly-skilled local workforce is able to reap the benefit of nature-based jobs.

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<sup>1</sup> Limited information could be gleaned from official statistics on the current scale of urban green infrastructure or green finance sectors.

- Sectors are heavily gender-segregated with low female employment across many nature-based activities and broad parity between genders only achieved in nature dependent sectors such as Accommodation and Food & Drink. Additionally, a number of nature-based sectors have an ageing workforce so their recruitment requirements will be significantly higher in the short to medium term. Aligning with wider efforts on talent attraction, improving the profile of nature-based sectors and making clearer the career progression routes within them will help attract and retain a more diverse workforce.

Across nature-based sectors some shared challenges and opportunities for skills development were identified.

**Increased stability in the nature-based sector:** building confidence in the policy framework across the whole of the nature-based sector will help to realise the full employment potential. The sector needs to have a secure policy framework to encourage investment in capacity and skills in order to increase activity over the medium to long term and provide opportunities for the sector to be more strategic in their recruitment, development and progression of staff. The annual cycle of government spending can act as a barrier for some parts of the sector in terms of investing in staff skills and capacity.

**Operational posts:** employers reported that graduate and post-graduate jobs were relatively easy to fill but there are challenges in filling skilled operational posts. A lack of applicants or a lack of experienced candidates for operational posts was reported, as well as stiff competition for the same skills from other sectors. Operational skills are often recruited locally or engaged through sub-contracting arrangements and the nature and size of these businesses can mean that supporting work-based learning may be challenging. A strategic approach to skills planning across and between sectors, allied with good connections between local labour markets and training providers is essential in addressing these skills shortages.

**Business structure and size:** many businesses in nature-based sectors are small and micro enterprises, with seasonally changing labour demands and where costs and availability of training can be challenging. However, it is not the case that employers in rural and remote rural areas do not train, as some areas (particularly in the Highland and Islands) have national-average participation rates. Lessons from these areas need to be shared with other regions. Consideration should be given to workforce-sharing initiatives, which allow smaller employers to share the costs of training and upskilling and help to create viable, year-round jobs, making the potential of losing skilled workers to other sectors less likely. The increase in blended learning, combining digital and practical delivery of formal skills training, which has taken place during the pandemic, should be maintained by providers. This is particularly the case in relation to specialist training, which is often challenging for small firms to secure at a cost-effective rate. Accrediting skills gained through volunteering – for many young people, a potential route into the environmental and land-based sectors – would benefit both individuals and businesses seeking qualified staff with practical experience.

**Sector engagement as a career destination:** a number of sectors highlighted that awareness of their sector and the range of jobs involved is not well-understood. Nature-based jobs need to offer clear career progression routes in order to attract a better gender and ethnic balance and broaden the workforce demographic. Increasing security within the nature-based sectors will provide a platform for investment in skills and for recruits to build expertise and progress in their careers.

**Modern Apprenticeships:** increasing the uptake of Modern Apprenticeships – for which many nature-based jobs are well-suited - will require some innovation around supervisory

support and administration to remove time, cost and capacity barriers for small businesses. Additional targeted support to help with the additional costs of participation in rural areas should also be considered. Shared apprenticeship schemes and group training have been used elsewhere to help defray these costs for small organisations. Further innovation in delivery method such as a greater element of online delivery needs to be considered. This is an issue in all remote rural areas that may have greater resonance post-pandemic. A partnership approach should be adopted to explore how such delivery models can be used across similar nature-based activities.

**Multi-disciplinary and transferable skills;** natural capital approaches increase the need for holistic and multi-disciplinary teams at all levels. Current and future development of nature-based activities will require a blend of technological and multi-disciplinary skills, some of which are not typically associated with the nature sector. Climate literacy and an understanding of natural capital must become core skills across all disciplines. Partnerships with Higher Education Institutes will support research in nature-based solutions and ensure practical and effective tools, including remote sensing, robotics and data analytics, are available for nature-based sectors. As sectors innovate, a broad range of transferable skills in the workforce will be essential to allow movement between existing and emerging nature-based jobs.

This initial assessment provides information and ideas to help inform investments in the skills system, both nationally and regionally, and ensure that the current and future workforce have the skills they need to secure high quality and sustainable jobs. Further work will be needed to gain a better understanding of skills pathways for individual nature-based sectors.

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## 1. INTRODUCTION

The rate of global change in nature during the past 50 years is unprecedented in human history. For terrestrial and freshwater ecosystems climate change is having a direct impact and it is also exacerbating the impact of wider land use change and drivers of biodiversity loss, as set out in the IPBES Global Assessment Report on Biodiversity and Ecosystem Services.

The need for a green recovery from the COVID-19 pandemic supports Scotland's longer-term transition towards a net-zero economy. Natural capital activities have been identified as being central to a green recovery from the coronavirus (COVID-19) pandemic by The [Advisory Group on Economic Recovery](#) (AGER) led by Benny Higgins. The AGER report calls for investment in natural capital as part of the response to COVID-19, supporting the six principles set out by the Committee for Climate Change including using climate investments to support the economic recovery and jobs.

The Scottish Government's response through the [Programme for Government 2020-21](#) has set out a national mission to create new, quality green employment with a particular focus on young people and set out investment programmes in green jobs and natural capital activities such as peatland restoration and forestry. As a concept, natural capital is defined as 'the stock of renewable and non-renewable resources (e.g. plants, animals, air, water, soils, and minerals) that combine to yield a flow of benefits to people'<sup>2</sup>. These benefits include the full range of contributions to human wellbeing from nature and go far beyond what can be bought and sold on traditional economic markets<sup>3</sup>.

The objective of this research is to provide an evidence base and short initial assessment of future employment opportunities related to investment in natural capital and the skills required to do them as part of the green recovery and transition towards a net-zero economy. It uses available evidence and interviews with key stakeholders to establish:

- a baseline of current nature-based jobs and an estimate of future demand
- an indication of the distribution of these jobs across the regions in Scotland
- an analysis of the skills required for these jobs, the level of skills required and the likely skill shortages and skills gaps
- typical pathways into employment for these occupations and the likely sources for recruits
- the roles that organisations (e.g. public, private and third sector partnerships) might play in working with industry to address the sector's skills demands.

Considering the disproportionate impact of Coronavirus on young people's employment, the study has explored the opportunities for young people to enter into employment and the skills necessary for them to benefit fully from the green recovery. It has also considered equalities issues where possible to support a more inclusive and diverse workforce.

This will contribute to the development of the Climate Emergency Skills Action Plan and highlight where investment in skills development is required to support a just transition to a net-zero economy.

This research focuses on the following 'nature-based' activities as defined by NatureScot. These are a subset of the broader definition of Natural Capital and this study notably excludes energy generation from renewable sources such as windfarms and carbon capture and storage as these have been considered elsewhere:

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<sup>2</sup> Natural Capital Coalition , [www.naturalcapitalcoalition.org](http://www.naturalcapitalcoalition.org)

<sup>3</sup> Scotland's Natural Capital Asset Index, SNH Information Note, March 2019.

- nature-based solutions; (peatland restoration, flood risk management, blue carbon and the restoration / management of coastal ecosystems, woodland restoration, management of invasive non-native species - INNS);
- low carbon and regenerative land use (including agriculture, forestry, wildlife management)
- sustainable marine management and fisheries
- environmental green finance (that excludes renewable energy generation)
- urban green infrastructure, including planning, ecological engineering, active travel networks,
- sectors highly dependent on natural capital (especially tourism and food & drink)

We use the term nature-based jobs, or the nature-based sector, to refer to this set of activities.

NatureScot's definition of the natural environment from the Economic Impact of Scotland's Natural Environment (EISNE) report<sup>4</sup> was used as a starting point for a definition of nature-based employment that could be used to review current statistics on the scale and trends in such jobs.

The EISNE study carried out a detailed analysis of the contribution of nature to 128 individual sectors and used various techniques to estimate the contribution of the environment to each. A subset of 26 sectors were judged to have significant links to the environment with at least 20% of the activities in each of these sectors being linked to the environment. The definition of the nature-based activities used these 26 sectors as a starting point. Two adjustments were necessary:

- A number of sectors included in the 2008 study have been excluded as they do not conform to the list of nature-based activities specified above – namely, construction, membership organisations, sewerage & refuse disposal and water supply.
- We updated the Standard Industrial Classification Codes from SIC (2003) to the current SIC(2007) definitions. These were undertaken as 'best-fit' as individual sector and subsector definitions differ. Details of the approach are set out in Annex 1.

Discussions with 27 stakeholders have focused on the current employment and skills base of nature-based jobs. The interviews focused on current recruitment and training issues, whether these vary by location and job roles and how these are expected to evolve in future. Also explored were opportunities to expand employment and how an increase in nature-based activities will change the demand for employees and skills. The interviews also sought to establish the extent to which this will help secure sustained employment and potential career progression for the workforce. Heavily gendered job roles were reported as an issue in most areas and the potential actions that may help improve the gender and ethnic balance of employees were a key focus of discussions.

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<sup>4</sup> The Economic Impact of Scotland's Natural Environment, Scottish Natural Heritage/Cambridge Econometrics, 2008.

## 2. NATURE-BASED EMPLOYMENT AND SKILLS BASELINE

### 2.1 Introduction

What follows is a 'best-fit' analysis as official statistics cannot discern nature-based activities.

As noted in the introduction, while nature-based activities will be undertaken in a wide range of locations, some are predominantly related to rural and remote rural locations. This adds to the challenges as data on small sectors in rural areas do not support detailed analysis. In some cases the evidence presented is partial or relates to the rural economy as a whole in Scotland.

The Business Register and Employment Survey (BRES) is regarded as the definitive source of official Government employee and employment statistics by industry. It is based on a survey of approximately 85,000 businesses and intended for analysis of data at a regional level.

BRES measures jobs (both full time and part time) and also includes working owners (for example, sole proprietors and partners). It is important to note that BRES counts jobs rather than employees and excludes jobs in businesses not registered for VAT/PAYE<sup>5</sup>. Unregistered business represent some 72% of all businesses with zero employees in Scotland in 2019<sup>6</sup>. Sole traders in rural and remote rural are more likely to be unregistered and so their absence from these statistics needs to be borne in mind<sup>7</sup>.

This is an issue for a dataset covering rural and remote rural areas and sectors that are known for a high-degree of sub-contracting. Nevertheless, BRES remains the most robust dataset available.

The following tables set out the scale of nature-based employment from official statistics using the detailed nature-based SIC codes set out in Annex 1 as being the closest definition to NatureScot's nature-based activities.

### 2.2 Size and trends in nature-based employment

The data presented from each source is not the raw BRES data for the number of jobs in nature-based sectors but have been adjusted to reflect the proportion of these jobs dependent on nature, using the nature-based weightings for sectors from the EISNE report (and, in the case of SIC 91, the SRUC report). In the vast majority of cases, the number of nature-based jobs is less than the number of jobs in the sector as a whole<sup>8</sup>.

#### 2.2.1 How large is nature-based activity in Scotland?

There are an estimated 195,345 nature based jobs in Scotland (equivalent to 7.5% of all jobs). This is made up of 171,538 nature-based jobs based on analysis from BRES plus an additional estimated 23,807 'missing' unregistered zero employee businesses. We estimate

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<sup>5</sup> BRES Employment includes employees plus the number of working owners and so BRES includes self-employed workers as long as they are registered for VAT or Pay-As-You-Earn (PAYE) schemes.

<sup>6</sup> Businesses in Scotland: 2019 accessed at <https://www.gov.scot/publications/businesses-in-scotland-2019/>.

<sup>7</sup> Estimating how much employment in unregistered zero employee businesses is not straightforward. In 2018 there were 9,092 registered zero employee businesses in nature-based sectors weighted on the same basis as the dataset. Taking the Scottish ratio of registered to unregistered this would imply that some 22,810 unregistered businesses that employ just the owner are not included in the BRES statistics reported here.

<sup>8</sup> Proportions of nature-dependent jobs for each sub-sector are detailed in Annex 1.

that on a full-time equivalent (FTE) basis, the number of nature-based jobs in Scotland totals 166,721 FTE jobs<sup>9</sup>.

Based on official BRES data, nature-based jobs increased by 12,031 between 2015 and 2019, accounting for one-third (31.7%) of all job growth in Scotland during this period. The increase of 12,031 jobs was equivalent to a 7.5% increase – five times the rate of increase of all jobs across Scotland (1.5%).

Table 1. Total nature-based jobs in Scotland 2015-19

Year	Nature-Based Jobs	Total Jobs	%Total Jobs	Nature-Based Jobs + Unregistered Single Person Businesses	%Total Jobs	FTE Jobs
2015	159,507	2,564,000	6.2%	184,911	7.2%	158,290
2016	157,669	2,586,500	6.1%	180,283	7.0%	155,981
2017	162,343	2,572,500	6.3%	185,795	7.2%	157,660
2018	169,977	2,611,500	6.5%	192,800	7.4%	164,331
<b>2019</b>	<b>171,538</b>	<b>2,602,000</b>	<b>6.6%</b>	<b>195,345</b>	<b>7.5%</b>	<b>166,721</b>
<b>2015-19 change</b>	<b>12,031</b>	<b>38,000</b>	-	<b>10,434</b>		<b>8,432</b>
<b>% change</b>	<b>7.5%</b>	<b>1.5%</b>	-	<b>5.6%</b>		<b>5.3%</b>

Source: ONS Business Register and Employment Survey weighted by EISNE sectoral weights. Data may not sum due to rounding

It is not possible to separately account for all elements in the NatureScot definition of nature-based activities. In particular, it is not possible to obtain specific data on nature-based solutions, environmental green finance or urban green infrastructure activities.

This implies that both are an underestimate of the full range of nature-based jobs. However:

- many of the activities in the nature-based solution activities are likely to be included in either agriculture forestry or fishery sectors.
- environmental green finance is as yet a very small sector and unlikely to alter the overall total significantly. Similarly, while increasing in policy importance, urban green infrastructure activity is unlikely to account for large numbers of jobs.
- it is possible that some nature-based activities are included in construction sub-sectors: *42910 Construction of water projects* and *42990 Construction of civil engineering projects* are the only subsectors where nature-based activity might reasonably be expected to occur<sup>10</sup>. In 2019 these two sub-sectors accounted for 12,850 jobs or around 9% of all construction employment. It is debatable whether all these activities are nature-based an option is to use EISNE proportion for environment-related construction of 22.2%. This would mean just over 2,850 of the jobs in these subsectors are nature-based.

<sup>9</sup> BRES provides a count of the number of part-time and full-time jobs. To estimate the number of full-time equivalent (FTE) jobs we have used the Annual Survey of Hours and Earnings but this data does not provide any detail for individual sectors. We calculated the ratio of part-time hours worked to full-time hours worked for Scotland. This is a reasonable approximation for the nature-jobs sectors as a whole but would not be appropriate to calculate FTE jobs at sub-sector level as the average number of hours worked will vary.

<sup>10</sup> At five digit level all other sub-sectors in construction would appear to exclude nature-based activity but further investigation of the allocation of activity such as peatland restoration and urban green infrastructure to specific sub-sectors would be required.

## 2.2.2 How does the nature-based jobs estimate compare with other measures?

This estimate of nature-based jobs has been compared to previous estimates of nature dependent employment in Scotland.

*Table 2. Comparison of nature-based jobs estimate with other sector benchmarks*

Source	Year	Headline Jobs	Direct Jobs	Reasons for differential
Nature-based jobs	2019		195,345 166,721	Total jobs FTE jobs
EISNE	2008	242,500	154,000	Estimate includes indirect and induced employment effects & wider range of sectors
SRUC	2018	290,100	160,032	Differences in definition of nature-based sectors and % attributed to natural environment and use of multipliers
Forestry	2012-13	25,000	2,788	Estimate includes indirect and induced employment effects & wider range of sectors

Source: The Economic Impact of Scotland's Natural Environment, Scottish Natural Heritage/Cambridge Econometrics (2008); Scotland's Natural Economy: Sustainable Growth Potential, SRUC (2020); The Economic Contribution of the Forestry Sector in Scotland, CJC Consulting (2015)

The EISNE report estimated total employment at 242,000 in 2003. This figure differs from the above in a number of important respects:

- The 242,000 impact includes indirect and induced employment effects and so includes the jobs associated in the respective supply chain of environment dependent sectors and the impact of income generated in these sectors on the wider economy. A more comparable measure is the 154,000 direct jobs identified in the report.
- The EISNE estimate covers a wider range of sectors than are captured in the nature-based activities. Notable differences are sewerage, membership organisations, water and construction. The methodology used to calculate direct jobs in the EISNE report is not entirely clear but if these sectors are removed this would reduce the direct job estimate to 112,375 jobs.

Another analysis of the contribution of the natural economy to Scotland estimated total employment to be 290,100<sup>11</sup>. There are differences in the definition of the natural economy and nature-based activities:

- Energy, including renewables is included in the natural economy definition amounting to 67,000 jobs and mining activities accounting for 2,400 jobs.
- The weighting of jobs in each sector that are dependent on nature varies with EISNE weights being consistently below those of the SRUC report – for example under EISNE 80% of agriculture jobs are classified as nature-based but 100% of agriculture employment is included in the natural economy in the SRUC report. Re-calculating the employment data using EISNE weighting reduces the size of the natural economy by just over 60,000 jobs (with the available information it is not possible to be precise with this estimate).

<sup>11</sup> Scotland's Natural Economy: Sustainable Growth Potential, SRUC, July 2020. Based on BRES data.

- Taken together these changes suggest that a more comparable employment estimate for the natural economy would be 160,032 jobs.

A study of the economic impact of forestry in Scotland<sup>12</sup> reported a total impact of 25,867 full-time equivalent jobs. As with the previous studies, there are a number of definitional differences:

- Direct jobs in forestry amount to 12,143 jobs. The application of multipliers and linkages increase this impact to the full 25,867 jobs.
- A number of sectors included in the total impact of forestry in this analysis are included in other nature-based activities in Table 3 e.g. jobs in manufacturing wood and wood products, recreation and tourism, etc
- Other activities included in this impact assessment are not included in the nature jobs definition e.g. civil engineering, local authorities and jobs in the Forestry Commission itself, forest landowners and agents.
- Finally, all jobs in the sectors are included in the forestry impact whereas this analysis includes only that proportion of jobs that are based on nature.

Placing the impact of forestry results on an equivalent basis to nature-based jobs has 3,500 forestry jobs in 2019 compared to 2,778 in 2012/13. Other sectors such as Manufacturing of wood etc. have 2,775 nature-based jobs in 2019 compared to 1,715 direct jobs 2012/13.

### 2.2.3 Nature-based jobs by sub-sector

- Based on BRES data, almost two-thirds of all nature-based jobs in 2019 were concentrated in two sectors: Agriculture (35.3%) and Food and Beverage Serving Activities (24.7%) with all Food and Drink dependent employment accounting for 35% of the total of nature-based employment.

Table 3. Nature-based jobs in Scotland by sub-sector 2015-19

Sub-sector	2015	2016	2017	2018	2019	2015-19	% change
01+: Agriculture (+ Agency Workers)	54,500	54,100	58,500	58,500	60,500	6,000	11%
02: Forestry and logging	2,625	3,150	2,975	3,150	3,500	875	33%
03: Fishing and aquaculture	3,768	5,054	5,054	5,945	6,270	2,502	66%
10: Manufacture of food products	9,339	9,174	9,347	8,972	9,150	-188	-2%
11: Manufacture of beverages	9,018	7,543	8,072	11,578	9,024	6	0%
15: Manufacture of leather and related products	743	891	891	891	842	99	13%
16: Manufacture of wood and wood products	2,590	3,515	2,590	3,145	2,775	185	7%
55: Accommodation	17,850	17,250	16,950	15,750	21,750	3,900	22%
56: Food and beverage service activities	45,000	39,900	42,300	46,350	42,450	-2,550	-6%
79:11-79:12: Travel agencies and tour operators	1,225	1,425	1,525	1,425	1,275	50	4%

<sup>12</sup> CJC Consulting. 2015. The Economic Contribution of the Forestry Sector in Scotland, September 2015.

Sub-sector	2015	2016	2017	2018	2019	2015-19	% change
91:02-91:04: Museums and other cultural activities	3,450	3,800	3,800	4,050	4,250	800	23%
93: Sports activities and amusement and recreation activities	9,400	11,868	10,340	10,223	9,753	353	4%
<b>Total</b>	<b>159,507</b>	<b>157,669</b>	<b>162,343</b>	<b>169,977</b>	<b>171,538</b>	<b>12,031</b>	<b>8%</b>
<b>Total + employment at unregistered single-person businesses</b>	<b>184,911</b>	<b>180,283</b>	<b>185,795</b>	<b>192,800</b>	<b>195,345</b>	<b>10,434</b>	<b>6%</b>

Source: ONS Business Register and Employment Survey weighted by EISNE sectoral weights. Data may not sum due to rounding

- Although sectors dependent on nature dominate total nature-based jobs, core natural capital sectors grew strongly between 2015 and 2019: Agriculture (+6,000, +11%), Fishing and Aquaculture (+2,502, +66%) and Forestry (+875, +33%)
- During this period, jobs fell in Food and Beverage Serving Activities (-2,550, -6%) and Manufacture of Food Products (-188, -2%)

#### 2.2.4 Nature-based jobs by type of area

- In 2019, the largest share of all nature-based jobs was in Mainly Rural (45.8%), followed by Urban with Substantial Rural (23.8%), and Larger Cities (20.9%). Islands and Remote accounted for just 9.3% of all nature-based jobs
- The shares of nature-based jobs across these areas have been very stable over time, with minimal changes in employment share between 2015 and 2019.

Table 4. Total nature-based jobs by type of area 2019

	2015	2016	2017	2018	2019
<b>Islands &amp; Remote</b>	9%	9%	9%	9%	9%
<b>Mainly Rural</b>	45%	45%	46%	45%	46%
<b>Urban with Substantial Rural</b>	25%	25%	24%	24%	24%
<b>Larger Cities</b>	22%	21%	21%	21%	21%

Source: ONS Business Register and Employment. Data may not sum due to rounding

- Between 2015 and 2019, all regions experienced an increase in nature-based jobs, with 'Mainly Rural' accounting for almost two-thirds of the total increase

Table 5. Total nature-based jobs in Scotland 2015-19

	2015	2016	2017	2018	2019	2015-19	% Change
<b>Islands &amp; Remote</b>	14,286	14,236	14,427	15,169	15,921	1,635	11.4%
<b>Mainly Rural</b>	71,302	71,539	74,119	77,231	78,606	7,304	10.2%
<b>Urban with Substantial Rural</b>	39,719	39,188	39,588	41,344	40,741	1,022	2.6%
<b>Larger Cities</b>	34,583	33,416	33,866	36,367	35,830	1,248	3.6%
<b>Scotland</b>	<b>159,507</b>	<b>157,669</b>	<b>162,343</b>	<b>169,977</b>	<b>171,538</b>	<b>12,031</b>	<b>7.5%</b>

Source: ONS Business Register and Employment. Data may not sum due to rounding

- The balance of nature-based jobs differs by region. In Islands and Remote, over 70% of nature-based jobs are in primary sectors
- In Mainly Rural, over half (59.7%) of nature-based jobs are in primary sectors
- In Urban with Substantial Rural, nature-based jobs are more evenly spread throughout sectors, with the largest share in tourism and recreation sectors (52.4%)
- In Larger Cities, most nature-based jobs are in the tourism and recreation sectors (87.0%)

Table 6. Nature-based jobs by sector and type of area 2019

	Islands & Remote	Mainly Rural	Urban with Substantial Rural	Larger Cities
01+: Agriculture (+ Agency Workers)	58.7%	51.7%	24.9%	1.5%
02: Forestry and logging	1.2%	3.1%	1.5%	0.4%
03: Fishing and aquaculture	11.9%	4.9%	0.5%	0.5%
<b>Primary Sectors</b>	<b>71.8%</b>	<b>59.7%</b>	<b>26.9%</b>	<b>2.3%</b>
10: Manufacture of food products	2.5%	4.9%	7.6%	4.9%
11: Manufacture of beverages	2.7%	3.8%	9.6%	4.3%
15: Manufacture of leather and related products	0.0%	0.1%	1.6%	0.3%
16: Manufacture of wood and wood products	0.3%	1.9%	2.0%	1.2%
<b>Manufacturing Sectors</b>	<b>5.6%</b>	<b>10.7%</b>	<b>20.8%</b>	<b>10.7%</b>
55: Accommodation	11.3%	12.0%	11.0%	16.7%
56: Food and beverage service activities	7.1%	11.8%	29.8%	55.3%
79:11-79:12: Travel agencies and tour operators	0.1%	0.3%	0.8%	1.9%
91:02-91:04: Museums and other cultural activities	1.9%	1.9%	2.0%	4.5%
93: Sports activities and amusement and recreation activities	2.2%	3.6%	8.7%	8.5%
<b>Sectors dependent on Natural capital</b>	<b>22.6%</b>	<b>29.6%</b>	<b>52.4%</b>	<b>87.0%</b>
Total Nature-Based Jobs	100.0%	100.0%	100.0%	100.0%

Source: ONS Business Register and Employment Survey. Data may not sum due to rounding.

### 2.2.5 Nature-based employment by age and gender

Data from the Annual Population Survey (APS), was obtained by special request in order to secure more detailed disaggregation by sub-sector than is available from published sources. APS measures numbers of people employed and so it is possible to obtain analyses by age and gender that are not available from BRES.

This is a sample survey and data are therefore subject to a margin of uncertainty. Where cells contain red text/figures, either sample sizes were too small to provide reliable estimates or were based on a small sample size, which may result in less precise estimates. Other data are based on larger sample sizes. This is likely to result in estimates of higher precision, although they will still be subject to some sampling variability.

- The core nature-based sectors are heavily gendered with males in over three-quarters of employment in each of the Low carbon and Regenerative Land use and Sustainable Marine Management sectors. Similar imbalances are reported for most of the other nature-based activities
- Sectors dependent on nature are more evenly gendered with the exception of Manufacture of wood and wood products which is 90% male.

- APS results for age structures for the individual sectors are based on a limited number of responses and some are repressed due to very small sample sizes. Nevertheless, it is clear that Agriculture has a particularly ageing workforce with 56% of people in employment over 50. Across Scotland as a whole, some 32.5% of people in employment are over 50.
- Fisheries, Aquaculture and Forestry do not have a particularly ageing workforce with a lower than average proportion of people in employment in the 50-64 age range but repressed data cells hamper any robust analysis. Nature dependent sectors have a younger workforce meaning that the age distribution is similar overall for nature-based jobs.

Table 7. Total nature-based employment in Scotland by gender and age 2019

Natural Capital Activity	Male	Female	16-24	25-49	50-64	65+
<b>Nature Based Solutions:</b>						
Peatland restoration	-	-	-	-	-	-
Woodland restoration	-	-	-	-	-	-
Management of INNS	-	-	-	-	-	-
Blue carbon	-	-	-	-	-	-
Flood risk management	-	-	-	-	-	-
<b>Low Carbon and Regenerative Land Use:</b>						
Agriculture	76%	24%	9%	35%	35%	21%
Forestry & Logging	78%	22%	0%	63%	n/a	n/a
<b>Sustainable Marine Management:</b>						
Fisheries	82%	18%	n/a	58%	24%	n/a
Aquaculture	76%	24%	n/a	66%	23%	n/a
<b>Environmental Green Finance</b>	-	-	-	-	-	-
<b>Urban Green Infrastructure:</b>						
Planning	-	-	-	-	-	-
Ecological engineering	-	-	-	-	-	-
Active travel	-	-	-	-	-	-
<b>Highly Dependent Sectors:</b>						
Tourism & Leisure <sup>13</sup>	47%	53%	27%	46%	21%	6%
Food & Drink	53%	47%	29%	48%	22%	2%
Manufacture of wood & wood products	90%	10%	n/a	51%	37%	n/a
Manufacture of leather & leather products	n/a	n/a	n/a	63%	n/a	n/a

Source: ONS Annual Population Survey weighted by EISNE sectoral weights. Data may not sum due to rounding. Red text denotes low sample sizes and so these data points are subject to a wider margin of error.

### 2.2.6 Women in Agriculture case study

The Women in Agriculture Task Force was established in 2017 to address barriers to women working in the agricultural sector. Training was highlighted as an important issue and the work of the Taskforce provides a useful example of how training and skills development can be focused on the needs of under-represented groups.

<sup>13</sup> Tourism & Leisure 'employment by age' data is for 2018, as age data is missing for 'Travel Agencies and Tour Operators' in 2019

## Women in Farming and the Agricultural Sector

Following the publication of the [Women in Farming and the Agricultural Sector](#) in 2017, Scotland's First Minister established the Women in Agriculture Taskforce. The Taskforce was asked to bring forward practical solutions to enable Scottish agriculture to start breaking down the barriers faced by women.

Research with women in 2017 identified that access to appropriate training was a key issue:

- Fewer than half the respondents reported that they could access all the knowledge they needed to develop their role on their farms.
- A quarter of respondents indicated that they would not feel comfortable at current training events because the events are primarily attended by men.
- The research identified significant demand for business skills, livestock care and large machinery operations.
- Access to skills development would give participants the confidence to take on leadership roles in their businesses and agricultural organisations.

Sourcing information on the agricultural training provision is not straightforward across a fragmented provider landscape, particularly in remote rural areas. While improving information on existing training provision will help, the Taskforce found that there was a fundamental mismatch between providers' view that there is no demand from women and the view that there is lack of appropriate courses from many survey respondents.

Recommendations for ensuring that more females participate in agricultural training have a wider relevance:

- Advertise widely and well in advance with an emphasis that all are welcome. Use a suitable digital platform to detail existing education and training provision.
- Raise the profile of agriculture among women and the different career opportunities available and the market for different skills in the sector.
- Appropriate design of course content such that the selection of topics for training that include those identified by women in Scottish Agriculture and ensure that practical activities are appropriate to the physical strength of trainees.
- Use female trainer wherever possible and consider whether a course might function better as a women-only course? Additional support is available to cover the potential higher costs of such provision.
- Accessibility of the training in terms of support so that women with caring responsibilities can attend and choice of location for the venue and timing of the event

These elements will be taken forward by the Women in Agriculture Development Programme (WiADP) announced by Scottish Government in September 2019.

The Taskforce also produced a range of recommendations across Leadership, Succession, Childcare in rural areas, New entrants into farming and Health and Safety which are mutually supportive of these training recommendations. An Equality Charter for Scottish Agriculture will be established and mainstreamed into all Scottish Government agricultural and related policies. This will create a platform to support participating agricultural businesses and organisations in their commitment to gender equality.

## 2.3 Nature-based activity case studies

Case studies investigating the opportunities offered by nature-based employment in other countries exemplify how natural capital can be utilised to aid the recovery from COVID-19; both in the long-term and the short-term (*details are in Annex 2*). In New Zealand, Kaimahi

for Nature is the NZ\$200 million fund focused on working with businesses who are looking to make staff redundant with the aim of reaching workers before they become unemployed and giving businesses the opportunity to temporarily re-deploy staff into environmental projects. This method allows a quick influx of workers into the sector for immediate action, but will also allow individuals, who may not have a job to return to, to gain experience within the nature-based sector for potential future employment.

In South Africa, the GreenMatter project has focused efforts on trying to assist graduates into employment through 24 month work-integrated learning. This is intended to help bridge the gap between the knowledge gained from Higher Education and the skills actually required for successful employment within the nature-based sector.

## **2.4 Summary of nature-based employment**

Key points from the BRES dataset that approximates nature-based jobs are:

- Around 195,345 jobs were in nature-based sectors in 2019. This is only an approximation given the difficulty of separately identifying a number of key nature-based sectors in official employment data – Nature-Based Solutions, Urban Green Infrastructure and Environmental Green Finance. This figure is based on 171,538 from analysis of BRES and includes an estimate for unregistered single-person businesses of 23,807.
- On an FTE basis, the number of nature-based jobs totaled 166,721 FTE jobs in 2019
- Nature-based jobs grew at five times the rate of all jobs in Scotland 2015-19 (7.5% compared to 1.5%) and accounted for one third (31.7%) of all job growth across Scotland during this period.
- Sectors are heavily gendered with broad parity only achieved in sectors dependent on natural capital.
- Not all sectors have an aging workforce as far as can be discerned. Agriculture, in particular, has over half the workforce over 50 in 2019.
- Although nature dependent sectors (tourism, food & drink) dominate total nature-based jobs, core nature-based sectors grew strongly between 2015 and 2019
- Primary sector jobs represent the majority of nature-based jobs in Mainly Rural areas and the vast majority in Islands and Remote.

The following section looks at recent evidence on skills issues relating to nature-based jobs.

### 3. EVIDENCE ON EMPLOYMENT AND SKILLS IN NATURE BASED RELATED SECTORS AND PLACES

#### 3.1 Rural skills issues

The challenges of the labour market in rural Scotland were set out in The Skills Action for Plan for Rural Scotland<sup>14</sup>. The Action plan contains a useful analysis of the Employer Skills Survey for those regions that only contained Local Authorities that are classified as rural by the RESAS definition – Scottish Borders, Dumfries and Galloway and Highlands and Islands.

As noted in the introduction, while natural capital activities will be undertaken in wide range of locations, some are predominantly related to rural and remote rural locations. In some cases the evidence presented is partial or relates to the rural economy as a whole in Scotland. However, the evidence is a robust insight into employer attitudes to employment and training in rural areas.

Key findings were:

- fewer companies undertook training in the South of Scotland, than in other parts of the country. This was not the case in Highlands and Islands but the latter still reported above average skill gaps among their employees.
- firms in these areas were less likely to have recruited in the past 12 months but nevertheless had a similar pattern of hard-to-fill vacancies as Scotland as a whole – reporting a low number of applicants, a low number with the required skills and transport issues (Highlands and Islands) or poor terms and conditions (Dumfries and Galloway).

The survey also highlighted issues with access and take up of training:

- *Business structure* – firms are typically small and micro and there is long-standing evidence that such smaller organisations struggle to find the time to train or even source and manage what types of training may benefit their business<sup>15</sup>. For some, the nature of their sector means labour demand fluctuates over the season adding to the complexity of securing appropriately skilled staff at the right time. Lantra report that 96% of businesses in the land-based sector in Scotland have a workforce of ten staff or fewer, compared with 80% across all sectors in Scotland<sup>16</sup>.
- *Access to labour with appropriate skills* – the demography of sparsely populated areas, access to transport, childcare and the cost of accommodation relative to the wages available in many sectors. Many businesses have relied on EU migrant workers to fill the gaps with Agriculture, Forestry and Fishing and Hotels and Restaurants among the most dependent sectors. While Brexit will create further uncertainty, at a national level the number of EU employees in Scotland peaked at 153,000 (5.7% of total employment) in 2017, but still stood at 151,000 in 2019. So while Brexit may have slowed in-migration, there has so far been no significant increase in return-migration.
- *Access to learning provision* is an issue with public transport time-consuming and costly for those without access to a car. Securing specialist training that is cost-effective to deliver is also a challenge with small firms and a number of sectors also recognise that their attractiveness is an issue for many potential applicants. Working outside is a particular issue for nature-based activities and widely recognised that not all individuals are suited to working outdoors year-round.

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<sup>14</sup> SDS. 2019. Skills Action Plan for Rural Scotland 2019-21: Priorities for Action, June 2019.

<sup>15</sup> There is a clear progression by size with just 1% of large employers (250+) report that they did no training, 4% of 25-249 but 43% of those employing 2-4 and 21% of those employing 5-9. Engagement in Modern Apprenticeship is a particular issue among those employing fewer than 10 employees. CPC (2015) Barriers faced by SMEs and Micro business in offering Apprenticeships in Scotland, SDS, July 2015.

<sup>16</sup> LANTRA (2015) LMI Factsheet Scotland 2015 citing Inter-departmental Business Register (IDBR) data.

Although not universal across all activities, stakeholders highlighted the divide between nature-based job roles requiring higher level skills that were often recruited from a national or international labour market (such as ecologists or marine scientists) and operational skills more often recruited locally or engaged through sub-contracting arrangements (e.g. excavator and other equipment operators).

While such employees (or sub-contractors) would need formal qualifications (e.g. a degree in ecology or a vocational qualification in land-based machinery) at a minimum to be considered for a position, discussions with stakeholders highlighted that 'field' experience was highly valued in all staff roles. Having an understanding in theory of restoration techniques or having the technical skills to operate machinery were not the same as having applied this knowledge and built up practical experience of similar work. This was particularly the case for equipment operators.

Once employed, the nature-based sector workforce can access further learning but this is often developed through on-the-job non-accredited training methods, rather than full, recognised qualifications.

The Employer Skills Survey findings on employers' perception of future skills needs for environmental sectors<sup>17</sup> highlights the need to build a broad-range of skills, some of which are not typically associated with the sector:

- technical skills (e.g. food safety and security, animal handling and care; disease identification and control; implementing new technology including genetic engineering, energy and fuel security)
- ICT skills (e.g. robotics, sensors, application of data analytics)
- leadership/management skills (e.g. succession planning; entrepreneurial skills, knowledge transfer)
- essential skills (i.e. literacy, numeracy and communication, health and safety).

A number of stakeholders highlighted that current and future development of nature-based activities would require a blend of technology and multi-disciplinary input to develop nature-based solutions. This was often highlighted as being at odds with the wider public perception of the sectors themselves as being old, male and relatively unskilled.

Modern Apprenticeship (MA) starts in nature-based frameworks are dominated by starts in Food and Drink and Hospitality. These two nature-dependent sectors account for 83% of all MA starts while other nature-based sectors account for 17%. The latter have grown by almost 8% over the period whereas Food and Drink and Hospitality have fallen by almost 12%. The data runs up to March 2020 and so will not reflect the impact of C-19 on these two sectors. It is clear that Food and Drink and Hospitality have a more significant involvement in Modern Apprenticeships with one MA start for every 24 jobs in these sectors. Excluding these sectors nature-based activity has one start for every 101 jobs.

*Table 8. Nature-based Modern Apprenticeship starts 2015-20 All Levels and Ages for Scotland*

	2015-16	2016-17	2017-18	2018-19	2019-20	% Change
<b>Nature-based excl F&amp;D and Hospitality</b>	654	659	715	706	700	7.7%
<b>Food &amp; Drink and Hospitality</b>	3,870	3,954	3,846	3,593	3,422	-11.6%
<b>All nature-based</b>	4,524	4,613	4,561	4,299	4,122	-8.9%

Source: Skills Development Scotland

<sup>17</sup> Lantra. 2015. Labour Market Information for Land-based, Aquaculture and Environmental Industries, Scotland Factsheet 2015.

These results do not paint a picture of wholly non-engaged employers, especially in Highlands and Islands, but do highlight that skills transitions in rural areas are more challenging. Work-based learning is highly suited to many nature-based jobs but discussions with companies and projects delivering natural capital activity point to:

- the additional costs and challenges of supervising trainees in the field when these are often in remote locations, and the common concern with the management and administration costs associated with Modern Apprenticeships. This is over and above the issues facing smaller organisations in resourcing these functions.
- concern in more rural areas, that a decline in working age population is making it more and more difficult to secure new recruits. Some also mentioned that faced with seasonal and part-time work, individuals often work in more than one job, and for some this fluidity means that when better paid or more permanent employment becomes available, individuals are used to churn.

### **3.2 Demography of rural areas**

De-population in Scotland's 'sparsely populated areas' (SPA) is likely to have an impact on the ability of employers to fill jobs in nature-based sectors, particularly those where the majority of employment is in remote and rural areas – Fishing (96%), Aquaculture (90%) and Agriculture (83%) – and where there is an ageing workforce with large replacement demand requirements – primarily Agriculture.

Scotland's SPAs account for 41.5% of the land area of Scotland. The James Hutton Institute report, 'Population Projections and an Introduction to Economic-Demographic Foresight for Scotland's Sparsely Populated Areas (2018-43)' (September 2020), highlighted potentially serious challenges for economic development resulting from historic and future population decline and the shrinkage of the SPA's working age population.

In terms of the SPA's historic population growth, total population declined during the 1990s and, although it grew briefly at the turn of the millennium, this increase had reversed by 2007/08. In recent years (2011 to 2018), the population of the SPA has declined by 2.4%, compared to population change of +3.5% in Central Scotland, Aberdeen and Dundee, and +1.0% in other smaller cities, towns and rural areas.

The relatively small number of children and young people will translate into a continued de-population and, importantly for jobs, further decline in the working age population. The report projected that, if recent trends continue to 2043, the SPA as a whole is projected to lose 18.6% of its total population and 25.5% of its working age population. Within the SPA, the projections are least negative for the northern Isles and parts of the Highlands, and most negative for North Ayrshire SPA (the Isle of Arran) (-32% total population, -35% working age population), and Na h-Eileanan an Iar SPA, Southern Scotland SPA and Argyll and Bute SPA (-21 to 24% total population, -27 to -33% working age population).

While other areas of Scotland are not without demographic challenges (i.e. the working age population is projected to decline throughout the nation), the projections are less severe: Central Scotland, Aberdeen and Dundee are forecast to experience a 1.4% increase in total population and a 1.0% decline in the working age population, while other smaller cities, towns and rural areas are forecast to experience a 5.9% decline in total population and an 11.4% decline in the working age population.

The earlier Hutton report, 'Demographic Projections for the Scottish Sparsely Populated Area (SPA) 2011-2046' (February 2018), highlighted that a legacy of decades of age selective out-migration had rendered the population structure incapable of reversing this decline, with any growth dependent upon substantial in-migration of persons of childbearing age. Population stability would require net migration of 500-1,000 people per year.

While the report stresses that the implications of these trends should not be over-stated (i.e. the SPA accounts for less than 3% of Scotland's population and does not include the entirety of rural Scotland, with demographic projections for the 'rest of rural and small town' Scotland being less negative), these trends are worth bearing in mind when looking at future employment and skills requirements in those nature-based sectors that are rooted in remote rural areas. Relevant to this research, the Hutton Institute is due to update its recent population projections using an 'economic-demographic' approach. This will integrate sectoral employment, commuter flow and migration data to estimate the potential impacts of future economic change on the population in sub-regions.

### **3.3 Summary of skills issues in rural areas**

Key issues in nature-based skills that can be drawn from the literature are that:

- on average, there are lower levels of formal training due to a predominance of micro businesses. Some rural areas, however, have national average participation rates so there may be actions here than could improve take-up elsewhere.
- many nature-based jobs are ideally suited to work-based learning but new approaches will be required to remove barriers to Modern Apprenticeships and other vocational training courses in rural areas and very small businesses.
- a multi-skilled workforce will be required in future to add specific skills to the existing workforce e.g. in nature-based solutions, in agro-forestry etc.
- there is an increasing demand for higher level digital and technology skills as remote sensing, robotics and the use of data analytics grow.
- demand for additional employees will challenge an ageing population so nature-based jobs need to offer clear career progression routes and specific sectors need to highlight the role that they play in enhancing natural capital and contributing to net-zero targets.
- attracting a more gender and ethnic balance into the workforce will also be vital to ensure sufficient labour in future. Some actions have been taken but more needs to be done to reach out into schools and engage people from outside rural areas to reverse significant declines in the working age population in the long term. Training which focuses on the needs of under-represented groups may be useful in addressing gender and ethnic balance.

#### **4. NATURE BASED STAKEHOLDER PERSPECTIVES**

The following table summarises the discussions with stakeholders on nature based employment and skills. A number of discussions highlighted that recent or emerging skills analyses are in process and the responses captured in the following table reflect initial thinking on skills issues and the likely timing of any changes.

Table 9. Stakeholder views on nature-based employment and skills issues

Natural Capital Activity	Activity future prospects	Skills issues
<b>Nature based Solutions:</b>		
Peatland restoration	<p>Scaling up peatland restoration welcome but daunting. Peatland Action restored 4,000 ha in 2019-20 and new PfG target 20,000 ha. Significant increases in activity will take time to resource 10-25% increase in first year but five-fold increase may take 3-5 years to secure.</p> <p>Sustained funding plans will do as much for skills development as increased levels of funding. A shift away from annual funding rounds will help projects build capacity and plan for a more sustainable workforce.</p> <p>Securing sites to restore can take considerable time to negotiate with landowners to secure agreement to restore and clarify expected impact on local ecology, water quality and grazing.</p>	<p>Project management and project officer (graduate) skills in good supply from Scotland, UK and EU.</p> <p>Availability of ecology and similar 'nature' graduates not considered to be an issue at present but lack of experience of working in the field and wider skills – communication and management etc (to support partnership working and working with volunteers) are also important in new candidates.</p> <p>Administration and monitoring and reporting seen as potential skill shortage areas. However, skilled excavator operatives experienced in working in difficult terrain are in short supply.</p> <p>Courses on peatland restoration available for qualified operatives but difficult to shorten field experience.</p> <p>Competition from Forestry and civil engineering (A9 dualling and HS2) that may offer higher wages and more consistent employment to skilled machinery operatives.</p> <p>Should be ideal for Modern Apprenticeship to support progression but smaller scale projects concerned about the cost of supervision on remote sites and administrative support.</p>

Natural Capital Activity	Activity future prospects	Skills issues
Woodland restoration	<p>Expect woodland restoration to increase in scale through greater public sector interest in funding 'public good' and some signs that corporate sector are keen to invest in natural capital activity e.g. Brew Dog purchase and funding of woodland restoration in Highlands.</p> <p>PfG expansion of Woodland Carbon Code will add to this interest but difficult to estimate likely scale of expansion over next 3-5 years. Some stakeholders suggested that the value of the WCC may double in the medium-term. The expectation is that activity will increase and this will require additional employment.</p>	<p>Woodland restoration has been a charitable/ publicly funded activity and so can suffer from short-term funding problems described above.</p> <p>Skills required of their staff also overlap – communication and persuasion skills among project managers to engage with landowners alongside silviculture to ensure correct approach is taken. Some projects use volunteer workers and these require supervision and training in safe working practices.</p> <p>Operational skills are relatively straightforward silvicultural skills. However, there is a clear overlap in some of these functions with forestry operations who reportedly pay higher rates. Expansion of forestry activities will impact on the available skilled labour for both sub-sectors.</p>
Management of INNS	<p>Expectation that expansion of natural capital activities will include further support for invasive species removal. Sustained effort required to secure eradication of species from locations.</p> <p>As yet the scale of any increase is unclear. Support from corporate sector is possible but may focus on plant INNS rather than management of invasive animals due to potential image issues with culling of species.</p> <p>Public and charitable funding of INNS management expected to remain the case in future.</p>	<p>Skills are not an issue as projects deliver short-courses on safe use of chemicals and animal handling, etc.</p> <p>Reliance on volunteer support to run existing activities at a typically greater scale than woodland or peatland restoration may provide a progression route. Volunteers can play a role in INNS and restoration for a range of reasons but some would welcome the opportunity to accredit skills gained during their experience and progress to employment.</p> <p>Research has found that many volunteers wish to enter into paid employment within the environmental and land-based sector either as career-changers or young entrants.<sup>18</sup></p>

<sup>18</sup> Lantra. 2008. Volunteer Skills Research, March 2008.

Natural Capital Activity	Activity future prospects	Skills issues
Blue carbon	<p>The marine biotechnology sector is still at an early stage although the opportunity is huge if the Scottish research establishment can be aligned with the demands of industry. The absence of the offshore wind power and carbon sequestration subsectors in this definition does not reduce the need for research scientists to help support marine environment, coastal management, fisheries and aquaculture sectors.</p>	<p>A pipeline of Marine scientists from a range of disciplines will be required. MASTS have suggested the development of Doctoral Training Programme (DTP) to be shared across HEIs in Scotland that focuses on marine natural capital but also includes ecologists, biologists, economists and behavioural change specialists. A greater focus on considering whole-systems in planning restoration and maintenance will demand a more multidisciplinary approach. A DTP will develop Masters as well as PhDs and link closely with natural capital sectors. All qualifications should include a period in industry of at least 12 months. Such a programme might support 20 students per annum at a cost of around £2m but expect to secure support from Research Councils. Remote sensing and data analytics to help drive marine conservation will also be necessary.</p>

Natural Capital Activity	Activity future prospects	Skills issues
<p>Flood risk management</p>	<p>Discussion with civil engineering companies exploring natural capital activities suggests that it is too early to see coastal and sustainable drainage systems at scale. As with many areas of Natural Capital activities there are a number of pilot schemes but this has yet to translate into mainstream consideration of such solutions. New developments are adopting net gain principles for biodiversity (although not yet formally adopted in planning regulations) and expect to see natural capital development options included in future when clients ask for them to be considered. The role of funding or commissioning agencies (e.g. Transport Scotland, National Infrastructure Bank and utilities) in promoting nature-based options will be important in bringing these into consideration.</p> <p>Work already undertaken by NatureScot to highlight the potential for nature-based approaches has been well-received by the sector but there is a need to highlight good practice case studies to potential buyers, civil engineering companies and planning authorities.</p> <p>Utilities are looking at how natural capital activities can (i) help them achieve net-zero/ low carbon commitments and (ii) play a role in their day-to-day operations e.g. protection of assets such as electricity sub-stations from flood damage. Similar consideration from Network Rail and other utilities. Energy supply company is in the early stages of considering whether and how natural capital approaches may protect sub-stations from flooding events, etc. Officer appointed summer 2020 to consider how NC approaches can be used across their business areas but not expected to deliver projects in the short term.</p>	<p>The design of nature-based options for development projects will require additional higher level skills. Network Rail recently recruited two ecologists to central planning team to add capacity. As with other nature-based activities such skills are readily available.</p> <p>At an operational level experience of natural capital projects will be required but these will not alter basic civil engineering and construction skills. At present larger civil engineering companies are able to draw on in-house ecologists and other specialists. These are currently engaged on net gain analyses etc. The introduction of natural capital options in development proposals are seen as a next step in this process but will only start when clients ask for them to be considered.</p> <p>Firms expect to build expertise internally or buy-in specialist knowledge in early projects and develop internal capacity. Larger firms operate with national recruitment process and deploy staff as necessary. They expect to be able to respond to demand flexibly through redeployment of existing staff and cross-departmental learning. Some local (rural) based firms are seeing a lack of people as an issue in sustaining recruitment.</p>

Natural Capital Activity	Activity future prospects	Skills issues
<p><b>Low Carbon Regenerative Land Use:</b></p>		
<p>Agriculture</p>	<p>Natural capital approaches are being considered but the shift from Common Agricultural Policy post Brexit is seen as the prime driver to encouraging more natural capital practices.</p> <p>Cultural change away from traditional ways of working the land will be an issue but demonstration projects are already underway e.g. James Hutton Institute Glensaugh farm, where the aim is to demonstrate the impact of climate-positive farming not only on biodiversity but also on the bottom-line.</p> <p>Reduction in marginal hill farming and automation may lead to stable or slow decline in workforce but others suggest that natural capital activities – such as more frequent stock movements may increase the need for labour. Some stakeholders believe that changing land use – peatland and forestry may mean more diversified farming activity into agro-forestry as practiced in some Nordic countries.</p>	<p>Farming practices may change but nature-based activities are not expected to change skill requirements per se. However, some additional skills may be necessary to help farmers diversify, e.g. forestry management. This implies additional modules rather than full re-training and will need to be delivered flexibly.</p> <p>A number of stakeholders felt that agricultural college courses were still focused on short-term maximising production rather than making a sustainable surplus over the longer term.</p> <p>A number of stakeholders were adopting digital data-led land management projects. Low tilling and introduction of lightweight machines to avoid ground compaction, application of new technology to micro-dose and improve soil health are being brought in by farmers. These require very different digital and data analytic degree and postgraduate skills in the supply chain that are in high demand across the economy. Those providing the service have to offer other benefits such as greater responsibility to attract and retain their staff as other sectors can easily outbid them on wages.</p> <p>Technology is increasingly being applied to agricultural processes to improve land management and soil health with increasing remote sensing and data analytics. Edinburgh University is working on inter-disciplinary projects analysing satellite data to help produce detailed forecasts of deforestation, flooding, landslips and assess biodiversity. A new joint project with Leeds University is seeking to develop the analysis of satellite and other datasets using AI-techniques and machine learning to work with industry on end-user friendly applications across land-based and marine sectors. The project is a Centre for Doctoral Training and will host 16 PhD students.</p>

Natural Capital Activity	Activity future prospects	Skills issues
Forestry	<p>Significant increase in tree planting was announced in Programme for Government for 18,000 ha of additional trees by 2024/25 and increase of 50% on current levels (12,000 ha 2020/21). This will require additional employees at each stage of the production process – seed nurseries, planting, management and eventually felling and processing.</p> <p>In advance of this announcement the sector was already predicting an increase in workforce of almost a third<sup>19</sup> due to forecast growth for timber products to 2027 and by 72% when replacement demand (e.g. employees retiring or leaving the industry) is taken into account.</p> <p>Re-working existing forecasts for new woodland creation suggest that the additional planting will require 380 employees - an increase of 130 on current levels<sup>20</sup>. In addition, replacement demand would run at around 150 employees based on industry estimates. Increases in restocking and harvesting imply an increase of 139 jobs with replacement demand of around 250. Similarly harvesting will increase by 278 jobs with 500 replacement jobs. Altogether this implies an increase of 550 jobs and replacement demand of 900 employees.</p> <p>Sub-contracted supply-chain consists of relatively small businesses that do not have the resources to scale up, so Scottish Forestry already supporting capacity building through capital investment in additional nursery facilities.</p>	<p>Recruiting and training additional employees to support this increase in capacity will also have to occur. This will also be a challenge for the smaller businesses in the supply chain especially as the existing workforce is already dependent on migrant labour (up to 40%). Estimates that up to 50% of the workforce are self-employed and this may impact on data capture<sup>21</sup>. As noted earlier and in replacement demand estimates, the workforce is ageing and predominately male.</p> <p>Forestry has a good track record of technology adoption. The wider introduction of remote sensing technology will reduce employment demand in managing/ monitoring stock but scale of expansion will still require increased employment. Higher technical skills will be required to manage remote sensors and analyse data. Monitoring of carbon sequestration will also be required in relation to reporting impact for off-set investment and this may also require carbon finance experts. At the same time, there will be less need for staff to walk the forests and will help improve the productivity of the sector.</p> <p>Attracting young people and others to opportunities in forestry will require a focus on career progression and highlight the relatively good salaries available – up to £50,000 for the most experienced harvesting machine operatives. Skills Action Plan identifies that the sector has few generally accepted career progression routes.</p> <p>Targeted recruitment used in the past to engage with females with science qualifications and ex-services personnel. Career pathways not well-understood and sector will need to appeal to wider and more diverse group of young people in future. This is already a key action in the sector skills plan. The adoption of Modern Apprenticeships is much lower than might be expected with fewer than 20 forestry starts in 2019-20 in this sector but may also take up Land-based MAs.</p>

<sup>19</sup> Lantra and SFTT. 2019. A Review of the future of the forestry workforce in Scotland, July 2019.

Natural Capital Activity	Activity future prospects	Skills issues
Wildlife management	<p>Limited feedback but some view that gamekeeping and associated activities help provide career progression for some alongside wildlife ranger posts in National Parks etc. No expectation that the size of this sector will change significantly.</p> <p>In the medium term, the increased forestry cover will mean that deer management may require more staff.</p>	<p>No evidence that skills for this group need to change but land management practices and awareness of natural capital activities will be required.</p> <p>College and HE courses are already including natural capital issues in their curriculum but report that new enrolments have suffered as the number of young people declines at the same time that many were attracted to HE courses elsewhere.</p> <p>Some concern that grouse landowners who deliver much of their current training in-house and on-the-job may be slow to adopt natural capital practices. The sector also has a sub-contracting model and new practices may take time to embed.</p>
<b>Sustainable marine management:</b>		
Fisheries	<p>Sector employment has grown steadily between 2015 and 2019. Stakeholders point to the outturn of the Brexit negotiations as being key to the future trend in the industry. Ageing cohort of fishers has been identified in discussions. Relatively closed recruitment – word of mouth recruitment from family and friends has also been mentioned as a particular issue to opening up access to a wider labour pool. Sector has adopted sustainable fishing practices but some stakeholders suggest that aquaculture may have to increase production to help meet future demand.</p>	<p>No substantial shift in skills envisaged. New technology may refine existing approaches but post-Brexit trade deal is key to size of catch and workforce.</p> <p>Sector skills plan actions to help with succession for older workers and attract younger people into the industry.</p>

<sup>20</sup> Lantra and SFTT. 2019. Forecast employment required for 15,000 ha so this figure is a 20% increase and takes no account of additional jobs in nursery capacity or forest management that are also implied by this expansion.

<sup>21</sup> SFTT. 2020. Forestry Skills Action Plan, May 2020.

Natural Capital Activity	Activity future prospects	Skills issues
<p>Aquaculture</p>	<p>Long-term plan to expand aquaculture with a Strategic Growth plan suggesting a doubling of turnover to £3.6bn by 2030 and that this will require an additional 18,000 jobs<sup>22</sup>. A proportion of these additional jobs would arise not only from production but also expansion of the activities of aquaculture’s supply chain. These estimates do not take into account the proportion of these jobs that would be considered nature-based. A doubling of jobs directly employed in the aquaculture sector would increase employment by 1,625 (nature-based) jobs to 2030. A similar increase in nature-based jobs in the supply chain would deliver a further 6,720 jobs. Without taking into account the expansion of the supply chain these represent a significant increase in employment of 8,345.</p> <p>The development of seaweed sector for its potential to sequester carbon and an input into beauty, medicine and food industries needs to be considered alongside the larger salmon and other fish farming segments.</p> <p>As with Fisheries, the post-Brexit trade deal will have a significant bearing on the future development of the sector but as UK demand is currently larger than Scottish production this may have only a short-term impact.</p>	<p>Growth plan highlights the need for more high-level marine and biotech scientists to research (marine science, marine biotechnology) on fish health, disease and sustainable food sources. These skills are particularly important for the development of seaweed farming with pilot farm in operation at the Scottish Association of Marine Sciences.</p> <p>The introduction of new digital technology will require new skills alongside need for greater engineering input into cage construction and development of sensor technology, automation and data analytics to make use of the additional information.</p> <p>However, the doubling of the sector to 2030 will provide a significant recruitment challenge. As with other nature-based sectors, there is a need to raise the profile of the sector and ensure that it can attract young people (especially more females to better balance the workforce) with additional information on the nature of the sector and career development opportunities.</p> <p>The sector has a good reputation for workforce development and some employers have invested in housing for staff to help overcome the constraints of working in remote rural areas. In 2019-20 over 80 people started Modern Apprenticeships in the aquaculture sector and further development of this provision will be necessary.</p>

<sup>22</sup> Scottish Food and Drink. 2016. Aquaculture Growth to 2030: A strategic Plan for farming Scotland’s seas.

Natural Capital Activity	Activity future prospects	Skills issues
<p><b>Environmental Green Finance</b></p>	<p>The sub-sector is expected to support and codify Corporate investment and commitments to net-zero by firms (striking a balance between transition to low carbon production and use of offsets). The Scottish Government is currently developing tools to help structure investment in Natural Capital and identification of revenue streams and potential sources and modes of investment.</p> <p>Estimates for England suggest that this represents 3,700 (2% of LCREE employment) in 2018 and is forecast to grow to 58,500 (8%) by 2030<sup>23</sup> including both consultancy and financial services servicing all green sectors including activities outside of the nature jobs definition. It is not possible to identify which of these jobs would relate to renewable energy finance but it is likely to be the majority. Jobs expected to increase in line with wider LCREE employment.</p> <p>PfG Expansion of Woodland Carbon Code and Peatland Carbon Code to support increase in private sector investment in Natural Capital activities.</p> <p>Scottish National Infrastructure Bank will have a primary mission to support a Just Transition and is expected to consider investment in public goods.</p>	<p>Expansion of 'Financing (natural) Green' will require improved understanding of natural capital in the finance industry but unclear whether this is awareness and understanding of natural capital activities or a shift in finance skills. Financing of renewables is already almost mainstream.</p> <p>The sector already employ highly qualified but very responsive skills and the expectation is that those involved will transition from similar financial and legal practices as and when demand arises.</p> <p>The increasing scale of Woodland Carbon Credits and Peatland Carbon Credits may well require additional finance skills in monitoring and managing the return on investment arising to corporates seeking to offset their carbon footprint.</p>

<sup>23</sup> LGA. 2019. Local green jobs – accelerating a sustainable economic recovery, April 2020

Natural Capital Activity	Activity future prospects	Skills issues
<p><b>Urban Green Infrastructure</b></p>		
<p>Planning</p>	<p>Raising awareness of natural capital role in planning and development options.</p> <p>Existing planning framework no barrier to use of natural capital in development plans but Scottish Planning Framework NPF4 will explicitly address meeting biodiversity and low carbon targets to 2050. Its introduction is expected Q4 2021. Some stakeholders suggested that until developers are required to put forward natural capital activity as part of their proposals there will be limited movement. Adoption of biodiversity net gain approaches into applications in advance of them being required suggests that the sector can be encouraged to put forward proposals in advance of regulation.</p> <p>Emerging guides and benchmarks: Building with Nature<sup>24</sup> are raising the profile of what can be achieved with natural capital approaches in development plans.</p>	<p>SDS Planning Skills report forthcoming. Some concerns that skills in Planning Authorities necessary to judge natural capital activities (e.g. ecologists) have been eroded through austerity. Some LAs have already made it known that natural capital approaches are welcomed in development proposals and there are no barriers to others adopting the same position.</p> <p>Role of natural capital in achieving development goals not yet fully integrated into Higher Education teaching but NatureScot masterclass workshops raising profile among profession and buying organisations (e.g. Network Rail, utilities, Transport Scotland etc).</p>

<sup>24</sup> <https://www.buildingwithnature.org.uk/how-it-works>. See also case study examples in new build masterplan in South Ayrshire and Forth Valley Royal Hospital.

<b>Natural Capital Activity</b>	<b>Activity future prospects</b>	<b>Skills issues</b>
Ecological engineering	<p>Industry interest in nature-based options for development plans but not clear that key decision-makers esp. among clients have yet to buy in to NC approaches.</p> <p>Need to raise awareness of NC solutions and long-term costs/ benefits to ensure options included in planning Signs that infrastructure will adopt 'net gain' planning approach to biodiversity and nature-based projects will be seen as an extension of this approach and a mechanism to achieve a gain. Still early stages but further development expected over next 1-3 years.</p> <p>'Infrastructure' companies – energy networks, water, Network Rail are engaging in natural capital approaches but still considering where they can support their business practices and their cost benefit case studies. Ofgem requiring energy companies to report on natural capital activities from 2021.</p>	Some recruitment of specialist ecologists (e.g. Network Rail) HE courses to include more NC examples for planners and engineers to ensure higher profile across professions.
Active travel	Increasing interest in post C-19 travel to combine with healthy lifestyles.	No significant new skills required.
<b>Highly dependent Sectors:</b>		
Tourism & Leisure	Participation limited by Covid-19. Tourism strategy highlights Scotland's natural capital and wide recognition of its contribution to a successful visitor economy.	Post C-19 tourism is going to be different but as yet it is unclear whether nature-based sectors will have additional skills issues to address. Active and outdoor holiday sector may well increase in scale but very uncertain at this stage.

Natural Capital Activity	Activity future prospects	Skills issues
Food & Drink	<p>Natural products, clean water and provenance are essential for many parts of the industry. Scotland Food and Drink wish to be closely associated with sustainable natural food sources and clean water etc as part of their brand presentation. Environmental, low energy, low water and anaerobic digestion, and biomass etc power sources are all in scope.</p> <p>Businesses welcome the natural capital concept but need more time to work out what the concept may mean for themselves. Some have chosen to off-set their carbon footprint but this is not something that is expected from the sector as a whole.</p> <p>Covid-19 has put great pressure on sector either being too busy (often lower-cost products) or not busy enough (higher cost higher quality products that may make more of provenance etc). So those parts of the F&amp;D sector more attuned to nature-based approaches may well also be struggling in the market at present.</p>	<p>Environmental officers are common across larger F&amp;D businesses. No view that nature-based approaches will require additional skills in the operation of the business but it is too early to say how this may develop.</p> <p>Covid-19 has focused attention on leadership skills at all levels as individuals have stepped up to address the challenges of Covid-19. The emergence of 'natural' leaders who get things done at all levels is something employers recognise and want to enable to support the flexibility and resilience of their operations.</p>

Natural Capital Activity	Activity future prospects	Skills issues
<p>Timber Products</p>	<p>Already highly mechanised, using digital processes to ensure demand for different types of timber are communicated to felling teams electronically for selection of appropriate trees. Expectation that Scottish timber for construction will increase to 2.6 million cubic metres in 2021/22 up from 2.2 m<sup>3</sup> in 2018.</p> <p>Primary processing of forestry production is estimated to increase by 587 jobs to 2027<sup>25</sup>. This subsector is also estimated to have a replacement demand of 40% which will require a further 812 recruits.</p> <p>Scottish Forest and Timber Technologies Industry Leadership group exploring further engineered timber construction products. Expansion of the sector to process increased timber harvesting will challenge recruitment and as with other sectors employers may need to look to recruit displaced workers from other sectors impacted by Covid-19. The Scottish Government announced £25m to a Transition Training Fund to support around 10,000 people to help re-train to a new sector.</p>	<p>Post Brexit still unclear what may happen with estimated 40% of workforce from EU and other countries (Canada) that may require replacement. Current data suggests that return migration is not yet an issue but future employment growth will not be able to draw on these sources as heavily as in the past.</p> <p>Increasing the awareness and engagement among young people and those who may have lost their jobs due to Covid-19 with training in an expanding sector will be important.</p>

Source: CPC interviews with key stakeholders

<sup>25</sup> Lantra and SFTT. 2019. A review of the future of the forestry workforce in Scotland, July 2019.

## **5. CONCLUSIONS AND ISSUES ARISING**

### **5.1 Nature-based jobs baseline**

- This initial assessment shows that jobs in the nature-based sector are a significant contribution to the Scottish economy amounting to 195,345 jobs or 7.5% of Scotland's workforce in 2019. We estimate that on a full-time equivalent basis, this equates to 166,721 nature-based FTE jobs in Scotland in 2019.
- Nature-based jobs have grown at five times the rate of all jobs in Scotland (in the period 2015 – 2019), i.e. by 7.5% compared to 1.5%, and have accounted for one-third of all job growth in Scotland.
- This is likely to be an underestimate, given the difficulty in separately identifying a number of key nature-based sectors. There is insufficient data to separately identify some nature-based activities (nature-based solutions, environmental green finance and urban green infrastructure). For some of these activities it is likely that they are already included in the estimate of nature-based jobs alongside other agricultural, forestry or maritime employment. It is also possible that some jobs have been left out as they may reside in subsectors including civil engineering etc.
- Compared to other estimates of environmental or natural capital jobs, this research confirms a similar magnitude of nature based jobs found from other studies although the difference can be explained by different definitions and assumptions. The EISNE report also includes multipliers and linkages to the wider economy that are relevant for an economic impact assessment but not for the purposes of this study.
- The balance of nature-based jobs differs by region. Primary sectors (agriculture, fishing and forestry) dominate in rural and remote areas while nature dependent sectors – tourism and food and drink - dominate in urban areas.
- Although sectors dependent on natural capital dominate all nature-based jobs, core nature-based sectors grew strongly between 2015 and 2019. Mainly Rural areas accounted for almost two-thirds of the total increase.
- Nature-based jobs are typically heavily gendered with at least three-quarters of people in employment in 'core' sectors being male. The food and drink and tourism sectors help redress the balance. Discussions with stakeholders highlight that this is an issue at operational level and they have taken steps to remove any barriers without substantive success.
- Data is not able to support an analysis of ethnic minority employment in nature-based jobs and employment. Anecdotal feedback suggests that ethnic minority employment is low.
- Agriculture stands out as the sector with a particularly ageing workforce. Data limitations prevent more detailed analysis of other sub-sectors but Fisheries skills reports note an ageing workforce in that sector too.

### **5.2 Future trends in nature-based jobs**

Nature-based jobs are a subset that are drawn from range of sectors some of which have already laid down plans for the expansion of employment and others who are still considering how their sector may develop in future. This means that any statement of the 'baseline' situation will quickly go out of date.

A number of regulatory issues around Brexit will impact on the development of key natural capital sectors directly through any trade agreements and indirectly through the consequent changes in regulation of the environment and food standards and also in terms of the labour market through the changes to immigration rules. We have not attempted to work out the possible permutations but simply noted where they appear to be particularly relevant.

The number of nature-based jobs has increased in terms of jobs since 2015-19 by five times the growth in jobs across Scotland. Future trends in employment for Nature-based jobs are positive for 'core' sectors:

- Public sector funding for nature-based solutions and low carbon and regenerative land use suggest significant increases in:
  - o Peatland restoration by up to five times current scale of activity
  - o An increase in woodland restoration
  - o A near-doubling of new tree plantation from current levels in forestry
  - o An expectation of new agricultural policy that will directly support farmers to apply natural capital approaches to land use
- Longer-term expansion of aquaculture to around twice its current size by 2030
- Early indications that corporate interest in supporting natural capital activities through CSR or carbon credit investments will bring forward further private sector investment in natural capital activities.
- The establishment of the Scottish National Infrastructure Bank and its primary objective to support a Just Transition in late 2020.

It has not been possible to put quantitative estimates to all these potential developments that are likely to increase nature-based jobs in Scotland required to meet net-zero. For example, while a number of stakeholders reported that they expected significant expansion of Woodland and Peatland Carbon Credits schemes as more private sector businesses seek to offset their carbon, it is very difficult to forecast the scale and timing of such an expansion.

*Table 10. Estimated nature-based jobs growth by sector*

	<b>New jobs</b>	<b>Replacement jobs</b>	<b>Total</b>
Peatland restoration	356	Medium/high	
Woodland restoration	?	Medium/high	
Blue carbon ex energy	?	Medium/high	
Forestry	550	900	1,450
Agriculture	Slight increase to accommodate more labour intensive techniques	High	
Aquaculture	8,345	High	
Fisheries	Highly dependent on trade deal	High	
Environmental Green Finance	Transition from existing jobs with limited growth	Low/medium	
Urban Green Infrastructure	Gradual increase	Medium/ high	

Source: CPC estimates

If the additional jobs are located in the same proportion as existing nature-based jobs, almost a third will arise in Island and remote areas (30.2%) and 62.2% in Mainly rural areas. These are the areas with least capacity in their labour markets to accommodate this expansion. It is possible that the challenges faced by the Food & Drink and Hospitality sectors from the pandemic will release potential employees for the core sectors but the majority of these jobs are located in Larger cities and Urban with substantial rural areas.

We have not attempted to forecast the employment trajectories of sectors dependent on nature. The impact of the pandemic on food & drink and particularly hospitality has been significant and given the scale of these sectors, total nature-based jobs will fall in the short to medium term. Timber products and processing is expected to grow in line with increased harvesting of forestry in Scotland.

Table 11. Future trends in sectors dependent on nature

Sector dependent on nature future trends	
<b>Food &amp; Drink</b>	High value added foodstuffs suffering while lower cost convenience food has grown significantly implies that nature-based segment weaker in short term
<b>Hospitality</b>	Not expected to recover pre-pandemic levels until 2023/24 but international travel may take longer
<b>Timber processing</b>	587+812 = 1,399 to 2027

Source: Stakeholder discussions, PWC UK Hotels Forecast 2020-21, Lantra and SFTT 2019.

### 5.3 Skills issues for nature-based jobs

A very common response among stakeholders was that additional sustained funding will provide a more stable footing for their activities and enable them to plan over the medium-term. Many felt that this was essential to support longer-term contracts, employment progression and investment in the skills of their workforce over the longer term.

Although not universal across all activities stakeholders highlighted the divide between job roles requiring higher level skills that were often recruited from a national or international labour market (such as ecologists or marine scientists etc) and operational skills more often recruited locally or engaged through sub-contracting arrangements (e.g. excavator and other equipment operators).

While most employers reported that graduate and post-graduate job roles were relatively easy to fill, many reported that operational posts were more challenging. A lack of applicants or a lack of experienced candidates for operational posts was more often reported as well as stiff competition for the same skills from other sectors such as civil engineering. Graduate skills that are in demand from other sectors such as software development, digital processes and data analytics were an exception. These jobs roles are relative rare currently but many see them as vital to the future development of remote sensing and application of data to more efficient and effective land management practices.

Nature-based job roles are just emerging in some activities e.g. urban green infrastructure and environmental green finance but are expected to develop quickly as demand for these roles grow. Network Rail and some utility providers have recently recruited staff to develop their policies on natural capital projects. In both activities nature-based skills were expected to evolve from existing skilled staff adapting and learning with additional specialist support.

Increasing awareness of nature-based approaches was seen as essential. In engineering or infrastructure projects, nature-based solutions will generally only be introduced when clients and commissioning agencies ask for consideration of them. NatureScot has undertaken work raising the profile of nature-based activities in key sectors and other institutions have established demonstration projects to raise awareness of their potential effectiveness. Regulation was seen as a major factor determining the speed of change e.g. post-CAP agricultural support regime and the trade negotiations relating to the fishing industry.

Currently almost all sectors are made up of predominately smaller organisations with sub-contracting prevalent in many nature-based sub-sectors. This means:

- More risk averse businesses who offer short, seasonal and temporary contracts.
- Less likely to engage in structured training and progression through Modern Apprenticeships or other formal courses at Colleges etc even though many of the job roles themselves are ideally suited to work-based learning.
- Recruitment is more of a burden and they are more likely to use informal methods (word of mouth) to try and source new employees.

While many organisations welcome the prospect of an expansion of nature based activities, they caution that:

- It will take them time to increase capacity. Scottish Forestry has been able to invest in the capacity of nurseries to ensure that the supply of saplings will not constrain their planting targets. However, this has not been possible in other areas where:
  - It will take some time to negotiate project activities (e.g. with landowners) to restore peatland or woodland.
  - While the operational skills involved in undertaking these activities do not take long to acquire (12-18 months for most machine operators), the experience of working in difficult terrain safely and effectively can take longer.

A number of the core nature-based jobs are by their nature based in sparsely populated areas that are suffering from long-term migration trends that are shrinking the local working age population. For activities that predominately attract male workers this is already becoming an issue for employers. These skills are also in demand in construction and civil engineering and major investment projects are expect to draw on the same pool of experienced labour (e.g. A9 dualling). Low carbon energy projects will also add to the demand for similar skills.

It is possible that the challenges faced by the food & drink and hospitality sectors from the pandemic will release potential employees for the core sectors but the majority of these jobs are located in Larger cities and Urban with substantial rural areas. A few stakeholders speculated that the pandemic may alter peoples' outlook and desire to work in rural areas but there is no evidence of this to date.

#### **5.4 Potential actions to support nature-based jobs and skills**

Potential actions suggested in stakeholder discussions for NatureScot and partners to consider include:

*Nature-based sector business size and structure:*

- There is a presumption that some nature-based jobs are seasonal and dependent on uncertain funding streams. More durable support over 3-5 years will provide a platform for recruits to build expertise and progress in their careers especially if the sectors can be encouraged to undertake workforce development.
- The expansion of nature-based jobs will present a particular strain on remote rural areas. A strategic approach to skills planning across and between sectors, allied with good connections between local labour markets and training providers is an essential in addressing these skills shortages.
- Many businesses in nature-based sectors are small and micro enterprises who frequently do not engage in formal training. It is not the case that employers in rural and remote rural areas do not train as some areas (e.g. Highland and Islands) have national-average participation rates. Examples of good practice from these areas need to be shared with other remote rural areas to help raise participation rates.
- Fair work may mean that more durable jobs will need to be created from working across different sectors at different times of the year. At the moment this is left to the individual to manage as best they can. Some consideration should be given to establishing shared workforces where different sectors jointly invest in individuals and pool the labour so they create a viable job for the individual and a sustained employment for their businesses.

*Engaging young people and non-traditional groups:*

- Improving the profile of key sectors and their role in achieving net-zero carbon targets in Scotland. A number of sectors have highlighted that awareness of their sector and the range of jobs involved in working in the sector is not well-understood. This is particularly the case among young people. Sharing lessons on what works across all nature-based sectors will be important as what works in forestry may well also help agriculture etc.
- A number of nature-based sectors have highly gendered workforces often combined with an ageing workforce so their recruitment requirement will be significantly higher in future. Successful models of engaging higher numbers of female employees (e.g. Women in Agriculture) need to be highlighted and approaches to reducing any remaining barriers shared.
- Where volunteers have engaged with natural capital activities there may be a number of potential candidates who would be interested in employment in future. An issue is the learning that these individuals have already gained during their voluntary experience and whether this can be recognized so that they can be fast-tracked into qualified employment. This may be one route to enabling some nature-based activities such as peatland restoration to increase their capacity more quickly than might otherwise be possible.

*Promoting greater take up of formal training to add disciplines to the existing workforce:*

- Access to formal skills training has been an issue but COVID-19 has demonstrated that it is possible to deliver training online. The increase in blended learning, combining digital and practical delivery of formal skills training, which has taken place during the pandemic, should be maintained by providers. This is particularly the case in relation to specialist training, which is often challenging for small firms to secure at a cost-effective rate. This will be particularly important for those in remote areas or those who are looking to add to their skills but cannot afford to take time off to access training.
- Work-based learning particularly Modern Apprenticeships should be an ideal platform for skills development but increasing the take up will require some innovation around supervisory support and administration. Shared apprenticeship schemes and group training have been used elsewhere to help defray these costs for small organisations. A partnership based approach should be adopted to explore how such delivery models can be used across similar nature-based activities. Additional targeted support to help with the additional costs of participation in rural areas should also be considered.

*Developing higher level skills and stronger partnerships with Higher Education research:*

- Improve engagement of Higher Education Institutes (HEIs). There is a need to ensure that graduates and post-graduate students engage with nature-based industry throughout their studies. This was highlighted by the HE stakeholders themselves. This will help improve the experience and understanding of undergraduates and provide them with an insight to the practical demands of working in a nature-based sector. A similar issue exists at post-graduate level but there is also the opportunity to increase the relevance of post-graduate research.
- An important aspect is developing the partnership between HEIs undertaking research that will help support the delivery of nature-based solutions and increase the relevance and application of their research outputs. HEIs are engaging with individual industry groups but broader support across natural capital activities will help ensure strong partnerships develop. Data analytics and the application of remote sensor data (drones and satellite imagery) to inform and track the impacts of innovative land management practices will be essential to providing evidence on carbon impacts and the benefits of nature-based activities.

- While a number of stakeholders felt that the recruitment of graduate and post-graduate skills was less of an issue, some felt that it was important to ensure that the pipeline of PhDs who are skilled in Natural Capital activities would be important in future. Multidisciplinary teams are a feature of Natural Capital activities and ensuring that future postdocs have natural capital core science training such as marine science or biotechnology but also includes ecologists, economists and behavioural change specialists will be important to support the next generation of natural capital activity.

*Future actions for NatureScot and partners:*

- Stakeholders in the Nature-based solutions and Low Carbon and regenerative land use all anticipate that the expected increase in investment in natural capital activity, either through increased public sector investment or off-set investment, will demand a greater level of monitoring and reporting on the impact of the natural capital activities. This was likely to require some form of remote sensing and there would be new skills required to collate and analyse the results.
- Nature-based jobs are continuing to emerge and so it is vital that NatureScot keeps ahead of developments as they mature. This initial report has been able to articulate the employment growth and skills issues in those sectors where plans are further ahead. There are other sectors – such as Environmental Green finance and to some extent Blue carbon – where more time will be required to shape the scale and nature of jobs in these sectors.

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## **ANNEX 1: DEFINING THE NATURE-BASED SECTOR**

### *Background*

This annex considers the issues arising from different definitions of nature-based jobs. The aim is to agree on a definition relating to SIC codes so that we can use this to undertake a baseline data analysis of nature-based jobs and skills within Scotland.

We have identified three key reports that have sought to define the Scottish natural economy sector for varying purposes:

- The Economic Impact of Scotland's Natural Environment, Scottish Natural Heritage/Cambridge Econometrics (2008) EISNE
- Scotland's Natural Economy: Sustainable Growth Potential, Scotland's Rural College/BiGGAR Economics (2020)
- Scottish Natural Capital Accounts, Office for National Statistics (2020)

The table below lists the sectors included within each report's definition of the natural economy/sectors strongly reliant on the natural economy. A primary difference between the EISNE research and the recent SRUC report is the use of Standard Industrial Classification (2003) in the former and SIC (2007) in the latter. SICs are periodically updated to better reflect changes in the nature of economic activity. This means that EISNE and SRUC are not directly comparable with (slightly) different definitions in even in some broad sector (i.e. highest level classification such as 'tourism') having some changes in their detailed subdivisions. It is possible to access data on the weighting on how the SIC (2003) compares to SIC (2007) but this may prove very complex.

### *Initial Mapping of Nature-based activities to SIC codes*

Therefore, we have taken the activities identified in the scoping document for this assignment and used the SIC (2007) definitions at broad sector level to 'best-fit'. This mapping is set out in the second table. This means that:

- Agriculture, forestry and logging, Fishing and aquaculture and sectors highly dependent on Natural capital (Tourism, Food and Drink manufacture and manufacture of goods from wood) are directly available
- Each of these need to be weighted to include the extent to which they are reliant on natural capital and the weights used by the previous reports are included in summary in the second column (the sectors and weights are appended in detail)
- Although the Scottish Natural Capital Accounts provide a helpful categorisation they do not relate directly to SIC codes.
- This categorisation excludes Mining/ Extraction and Energy Supply broad sectors from SRC (2020) definition and Construction from EISNE.

We have reviewed the Standard Industrial Classification (SIC) codes to explore whether any of the 2007 subdivisions may be used for 'Nature-Based Solutions', 'Green Finance' and 'Urban Green Infrastructure'. This raises a number of issues:

- It was agreed with NatureScot that Leisure and Recreational activities be retained but that Water supply be excluded in the definition.
- How to capture employment relating to 'Nature-Based Solutions', 'Green Finance' and 'Urban Green Infrastructure'. At best some of these activities appear to be included as part of subdivisions alongside other activities, e.g. 711112 'Urban planning and landscape architectural activities' is as close as you will get to the planning activity but this would be all activity under this classification. There is no specific subdivision on flood management/ restoration of coastal activities etc. Although these activities remain in the definition, there will be no baseline data from official sources.

Jobs and employment data have been weighted against the share of sector activities which have been found to be 'nature-based'. All weightings have been taken from the report, 'The Economic Impact of Scotland's Natural Environment' (Cambridge Econometrics, 2008), except 'Museums and Other Cultural Activities', which has been taken from the report, 'Scotland's Natural Economy: Sustainable Growth Potential' (BiGGAR Economics, 2020).

<b>Sector</b>	<b>Weighting</b>
<b>Low Carbon and Regenerative Land Use:</b>	
Agriculture (SIC 01)	80% (share of farms that are members of assurance schemes/compliant with pollution regs)
Forestry and Logging (SIC 02)	70% (55% of Scottish forests certified under UKWAS, but all forests receiving Forestry Commission grant-aid must meet the UK Forest Standard, therefore assumed to be 70%)
<b>Sustainable Marine Management:</b>	
Fishing (SIC 03.1)	96% of Scottish fish stocks included (4% cod, which is over-fished, is not included)
Aquaculture (SIC 03.2)	68.4% (share that meet environmental impact standards)
<b>Highly Dependent Sectors: Tourism &amp; Leisure</b>	
Accommodation (SIC 55)	30% (60% of hotel nights booked by holiday makers, half of these visiting due to environment)
Travel agencies and tour operators (SIC 79.1)	20% (40% tourists from within Scotland, half to see the natural environment)
Museums and other cultural activities (SIC 91.02-91.04)	40% (share of tourism spend that is nature-based)
Sports and recreation (SIC 93)	23.5% (share of spend by Scottish councils on culture, recreation and sport that is associated with greenspace and country parks)
<b>Highly Dependent Sectors: Food &amp; Drink</b>	
Processing and preserving of meat and production of meat products (SIC 10.1)	28% (based on relative turnover)
Processing and preserving of fish, crustaceans and molluscs (SIC 10.2)	
Processing and preserving of fruit and vegetables (SIC 10.3)	
Manufacture of vegetable and animal oils and fats (SIC 10.4)	
Manufacture of dairy products (SIC 10.5)	6% (share of dairy products that are organic (OMSCO))
Manufacture of grain mill products, starches and starch products (SIC 10.6)	80% (share of agricultural output assured/compliant with pollution controls)
Manufacture of bakery and farinaceous products (SIC 10.7)	29% (36% of inputs from Scottish agriculture to Scottish food industry and 80% of this is assured/compliant with pollution controls)
Manufacture of other food products (SIC 10.8)	
Manufacture of prepared animal feeds (SIC 10.9)	26.4% (two-thirds of feed is imported, one third is sourced from Scotland of which 80% is assured/compliant with pollution controls)
Spirits and wines (SIC 11.01-11.04)	76% (2/3 of input to product is water - Scotch Whisky Distilling Industry Sector Report plus 29% of other third based on 36% of inputs from Scottish agriculture to Scottish food industry and 80% of this is assured/compliant with pollution)
Beers and ales (SIC 11.05-11.06)	95% (water makes up circa 93% of the beverage by weight plus 29% of other third based on 36% of inputs from Scottish agriculture to Scottish food industry and 80% of this is assured/ compliant with pollution controls)

<b>Sector</b>	<b>Weighting</b>
Manufacture of soft drinks; production of mineral waters and other bottled waters (SIC 11.07)	97% (bottled water production (100% water): soft drink production (65% water) / ratio of bottled water to soft drink production in Scotland of 10:1)
Food and beverage service activities (SIC 56)	30% (60% of hotel nights booked by holiday makers, half of these visiting due to environment)
<b>Highly Dependent Sectors: Wood &amp; Wood Products</b>	
Manufacture of wood and wood products (SIC 16)	37% sawing and planing of wood (Net imports = 63% of hard and soft woods in UK; certified wood used)
<b>Highly Dependent Sectors: Leather &amp; Leather Products</b>	
Manufacture of leather and related products (SIC 15)	99% (based on 20:1 water use to hide use in production, with 80% of hides included as assured/compliant)

## ANNEX 2: INTERNATIONAL CASE STUDIES

### Green Skills - New Zealand

The programme was launched as a response to the Covid-19 impact on the New Zealand economy in September 2020. The programme invests in natural capital activities that will support New Zealand's natural environment, quickly create jobs for those already unemployed or in danger of losing their jobs and are in activities that are suited to those who have worked outdoors where new skills can be accessed relatively quickly. New Zealand's natural environment is its primary draw for international tourists and this investment will help sustainability of the tourism sector in the long term. This represents a major investment of \$NZ1.245 billion (£637.7m) over four years to create 11,000 new jobs.

The programme objectives are:

- to support between 11,000-13,000 jobs quickly and with a regional spread.
- to deliver enduring benefits for healthy waterways, biodiversity, climate change and cultural values
- to support sustainable land use and implementation of regulatory requirements including for freshwater, biodiversity and climate change.

Ministers have strategic oversight of the programme but are supported by a Jobs for Nature Reference Group with a mix of public, private sector members and an independent chair. The group advises Ministers on where and when funding should be made available; monitors project deliverables and reports on project outcomes. In addition the group is responsible for co-ordination between agencies, stakeholders and landowners and advises on regional engagement in particular with Māori, regional councils, and the primary sector. They also advise on communications with stakeholders to ensure they know what funding is available, how to apply and deadlines or timing constraints:

Projects will be assessed according to their employment and environmental benefits:

<b>Jobs for Nature Assessment Principles</b>	
<b>Employment Assessment</b>	<b>Environmental Assessment</b>
1) Provide a mix of: Jobs to address immediate employment Enduring jobs leading to careers that fill known capacity and capability gaps Jobs for employees of distressed businesses	1) Targeting of projects: a) Evidence that projects have been designed with a holistic view of ecosystems and catchment, or b) Projects target interventions that are known to have broad and strong influence on environmental outcomes c) Projects fit within a regional/ catchment strategy
2) Jobs that address existing employment disparities: a) Rangatahi/ youth b) Maori	2) Projects create enduring outcomes beyond the life of the funding
3) Training and capability building either within projects or dedicated funding	3) Projects are linked to long-term monitoring and reporting of environmental outcomes
	4) Across the programme there are projects that: a) increase the quality of knowledge and data used to design and evaluate b) trial innovative approaches

The initiative is primarily focused on additional employment while the New Zealand recovers from the pandemic. This is expected to arise through:

- Direct recruitment of people out of work and
- Helping businesses maintain their workforce and do conservation work as they move towards economic recovery. Kaimahi for Nature is the \$200 million fund focused on working with businesses who are looking to make staff redundant with the aim of reaching workers before they become unemployed and giving businesses the opportunity to temporarily re-deploy staff into environmental projects. The expectation is that they will then return to their previous jobs once the economy recovers.

No specific training support is identified for new recruits but NZ already provides a range of (re-) training support for individuals looking to start a new career. For the most part the intention is providing employment in relatively accessible jobs where short-term on-the-job training can be provided directly.

Department	Project activities	Funding
Ministry for the Environment	Regional environmental projects to improve freshwater	\$NZ433m
	Freshwater and at-risk catchments improvement fund	\$NZ67m
Department of Conservation (DOC)	Kaimahi for Nature Restoring Nature: returning native bush, rivers and stream to health	\$NZ200m \$NZ154m
Ministry for Primary Industries, Land Information NZ, DOC	Protecting Nature: biosecurity, including weed and pest/predator control	\$NZ315m
Ministry of Business Innovation & Employment	Fencing waterways, water reticulation and riparian management	\$NZ41m
Ministry for Primary Industries – Te Uru Rakau	One Billion Trees – some funding available for water quality action	\$NZ35m

The programme consists of four parts:

1) \$433 million for new jobs in regional and environmental projects

- 4,000 jobs over 5 years
- Improving the health of New Zealand’s waterways
- Restoring mini-wetlands - Wetland (swamps, bogs, salt marshes and lakes etc) is an attempt to return wetlands to healthy ecosystems
- Stabilise river banks
- Removing sediment to provide passage for fish
- The package allows businesses considering redundancy to redeploy staff on environmentally focussed projects

2) \$315 million for pest eradication and management

There are 4 initiatives involved:

1. \$148 million for the Department for Conservation to ramp up pest control and eradication and additionally securing certain forests in New Zealand
2. \$28 million for the Ministry for Primary Industries to get the populations of wallabies in certain areas under control
3. \$40 million for Land Information NZ to undertake pest and weed control in rivers

4. \$100 million for jobs to help control the number of wilding pines
  - Wilding pines are a species of conifers that are invasive and so must be controlled
  - Training needed here due to various deforestation techniques such as: chain saw operation, operating heavy machinery and using helicopters

3) \$200 million for Department of Conservation jobs for nature programmes

- Funding will be provided to create jobs such as:
  - Boosting predator control efforts
  - Restoring wetlands
  - Improving tracks
- Department of Conservation will work with Councils, local *iwi* (Maori nations) and local businesses to provide nature based jobs
- This particular package acts as a coupling maintaining workforce and doing conservation work at the same time
- The nature programmes are delivered through regional groups called 'Alliances'
- Alliances include Treaty Partner, regional council and regional staff
- Alliance environmental projects - employers redeploy their employees to these projects to learn skills in fencing, trapping and horticulture

4) \$154 million for new jobs enhancing biodiversity

- 1800 new jobs
- Work to protect and restore indigenous biodiversity and habitats particularly revegetation of private and public conservation land and riparian planting
- Many of these jobs are temporary which would suggest only a short courses or on-the-job training would be required.

### **GreenMatter Young Biodiversity Professionals Programme, South Africa**

Many young academics find the transition from higher education into work and utilising their knowledge to impact real-life problems. The project offers a work-integrated learning programme to 15 individuals on a graduate internship programme for 24 months designed to facilitate high level skills development in the field.

The programme sits under the Department of Environmental Affairs National Human Capital Development strategy specifically developed for the biodiversity sector. At the same time the placement of interns with a collection of biodiversity projects will have their capacity increased. The pilot aims to collate information to inform future decisions through knowledge generation and capacity building.

The main objectives of the project are:

- Developing the knowledge base of young professionals who can respond better to the complex biodiversity issues of South Africa.
- To ensure that there is wider demographic transformation for the biodiversity sector by facilitating the transfer of practical skills and knowledge.
- To provide young professionals the opportunity to complement the core business functions of the organisations that they are a part of through mentoring and coaching.
- Equip participants with life/soft skills, technical experience, and business acumen to improve employability as well as leadership potential.
- Establish networks through the GreenMatter Fellowship that promote information sharing throughout the biodiversity sector.

A key component of this Biodiversity Young Professionals programme is the role of the established GreenMatter Fellowship programme which connects a community of outstanding youth champions and leaders at post-graduate level. Many of these fellows are engaging in cutting edge research and community work and the next phase from their studies is to transfer them into the workforce for greater impact.

The pilot is tracking participants as they enter the workforce but also providing a forum for supporting career decisions with the network of biodiversity projects, HEIs and the peer group of other interns.

Close working between the interns and project is expected to boost the chances of the graduates finding work immediately or after further post-graduate study at their HEI.



# NatureScot

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