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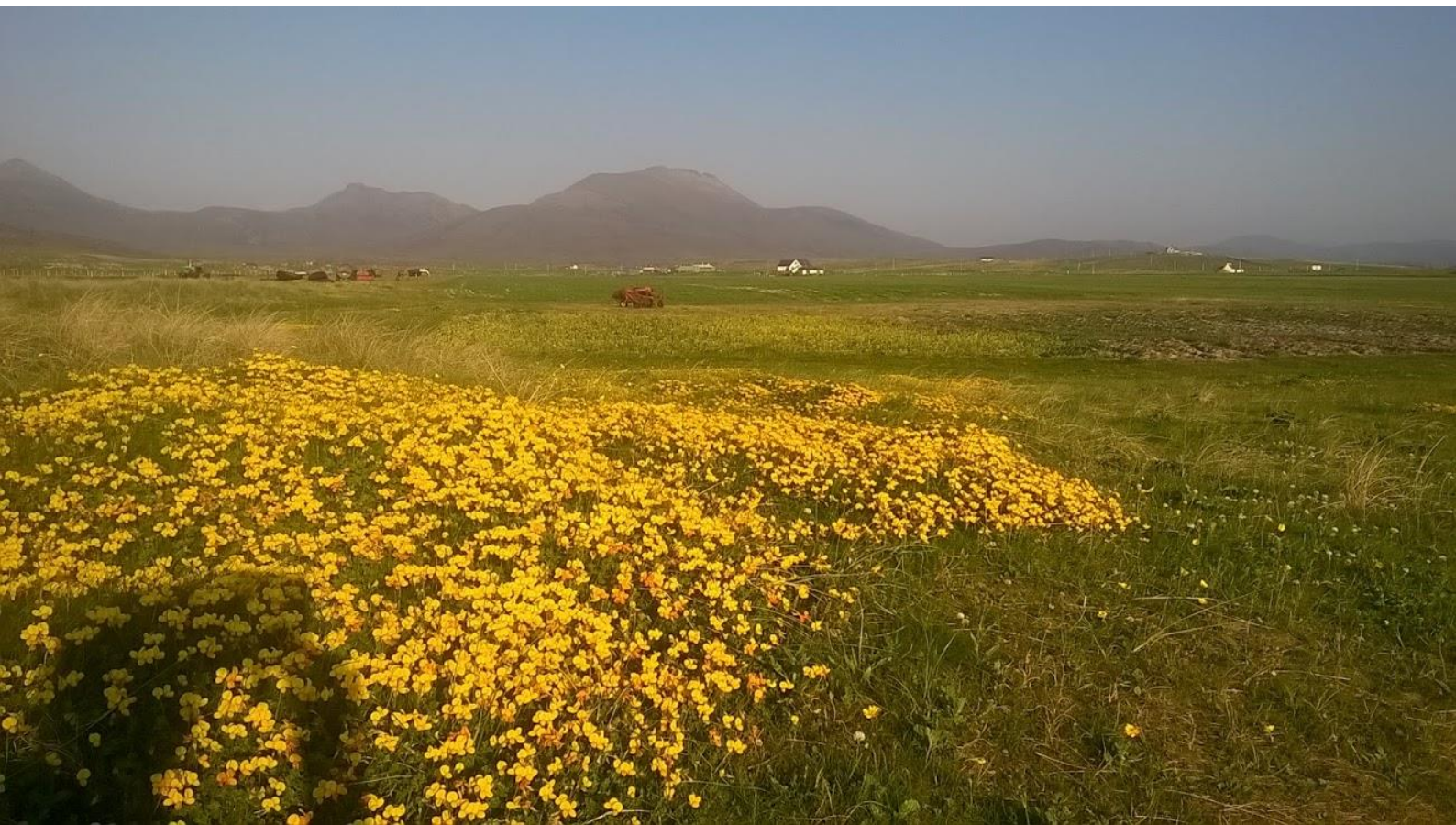
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The Scottish Sparsely Populated Area (SPA): Agricultural and key rural industry trends

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Key findings

- Data for recent years shows that the services (tertiary) sector is the most important part of the economy in both the Sparsely Populated Area (SPA), and in other rural areas and small towns. However, the 'traditional' land-based industries are far more important for employment in the sparsely populated area. These industries make a major contribution to employment in the sparsely populated parts of the Northern Isles and Southern Scotland. However, from 1991 onwards, employment in the land-based sector has fallen considerably in the SPA and across other regions.
- Assessment of the contribution to jobs made by other industries shows that accommodation and food services are more important in the SPA, than in the rural areas and small towns outside of it. However, wholesale and retail and professional/highly skilled economic activities make a smaller contribution to employment in the SPA, than they do in other rural areas and small towns and/or in urban areas.
- Following the recession of 2008-9, there is evidence of job growth in several parts of the economy in the SPA; however, overall growth in service industry jobs appears to be below that in other regions. Some industry-level job trends across in the SPA, not in SPA and urban regions (e.g. public sector/government, education) suggest that some services and economic activities are becoming centralised. This may reflect the impacts of both austerity policies and demographic changes.
- The farm workforce in the SPA is, overall, more 'part time' than that in the not in SPA region, and family labour is more important as a labour input in the SPA. The agricultural labour input within the SPA has fallen from 1991 to 2016, however the comparative decline in other rural areas and small towns was larger. The characteristics of agricultural labour are changing more rapidly outside of the SPA, than within it; there are particularly large differences in the rate of change in the use of casual and seasonal staff. There is evidence of a major decline in the agricultural sector in the sparsely populated parts of the Northern Isles (Orkney and Shetland).
- The slower adaptation of the agricultural sector in the SPA (compared with that in the not in SPA region) could reflect relatively poor access to other employment opportunities. The implications of economic changes in the SPA on the characteristics of available jobs should be considered further, as a growth in low-wage and insecure employment will not increase the rate of change in agriculture and may contribute to population decline. Additionally, the links between changes to economic activity, demographic characteristics and service provision in sparsely populated areas of Scotland is an area of high importance to future research.

1. Introduction

This working paper is an output produced for Objective O2.2ii within Research Deliverable 3.4.1 (Demographic change in remote areas), funded as part of the Scottish Government Rural Affairs, Food and the Environment Strategic Research Programme (2016-2021). Using the definition of the Scottish Sparsely Populated Area (SPA) and its sub-regions defined within previous research in this deliverable (Copus and Hopkins, 2017; Hopkins and Copus, 2018), it presents a summary of trends in employment within the agricultural sector and in other industries. Statistics on agricultural labour

are presented for the 1991-2016 period which was used in previous demographic analysis (Hopkins and Copus, 2018). Other information on employment is available for parts of this period. This working paper provides the key background information on the 'state of play' in agriculture, the land-based industries and the wider economy of the SPA, which both builds on previous and ongoing analysis (on demographic and farming land use change) and contributes to the future research activities in Research Deliverable 3.4.1. These include the development of scenarios of economic activity for 2025 and 2050 (Objective O2.3ii).

2. Background: what we know about the economy in remote and rural Scotland

To provide a background summary of issues affecting rural areas more broadly, a highly useful international overview of key characteristics of rural economies, and rural policy recommendations, was produced at the 11th OECD Rural Development Conference, held in Edinburgh in April 2018. The Conference policy statement (11th OECD Rural Development Conference, 2018) recognised:

- a) The economic vulnerability of rural areas. "Many rural dwellers have expressed discontent with the uneven impacts of globalisation. Low population density, remoteness, and limited diversity in economic structures all expose rural communities to external shocks".
- b) The need for developing the economy outside of land-based activities and tourism. "The Conference also stressed the importance of defining rural development beyond agriculture...", "Trade in food and agriculture, mining and resources, forestry and tourism have driven rural prosperity. However, with increasingly interconnected global value chains, other opportunities are emerging. OECD research has shown that manufactured goods and tradable services are strong drivers of productivity growth in rural areas."
- c) The inter-connectedness of economic development, and demographic and service delivery challenges. "Rural communities across the OECD experience a challenging combination of population decline and ageing. Maintaining the quality and scope of public services, creating economic opportunities, raising productivity levels and labour market participation, will be essential to maintain quality of life and attractiveness of rural areas both for people and for businesses."

Recent data analysis (Kleinert et al., 2018: 39-40¹) has shown that small and medium-sized enterprises (SMEs), with less than 250 employees², make a much larger contribution to private sector employment in rural areas than in other parts of Scotland, with a greater contribution in remote rather than accessible rural areas. A more restrictive set: small- and micro-businesses (with less than 50 staff) employ just over two-thirds of employees in remote rural enterprises, compared with slightly more than a half in accessible rural areas and below a third in the rest of Scotland. It is also known that some types of small businesses (e.g. the self-employed) are not recorded in some datasets (Kleinert et al., 2018: 28). Because of the importance of such businesses in rural and remote areas, this is a noticeable gap in our understanding of the rural economy.

¹ These figures are based on the Inter-Departmental Business Register (via Business in Scotland Statistics), cited at the reference given.

² For a reference for this definition, and that of micro- and small- businesses, see Ward and Rhodes (2014: 3)

Similarly, in Scotland, it is known that rural areas and small towns contain a large number of small and medium-sized enterprises relative to their population; however, it has been argued that the availability of information about rural economic activities outside of the primary sector is poor, leading to the perception that agriculture dominates (Atterton, 2016). It is also argued that technological improvements (e.g. broadband) and the advantages of rural areas are likely to increase the diversity of rural economies (Atterton, 2016). Following on from the former point, a recent economic analysis (published by RESAS) describes positive economic indicators for remote areas: Gross Value Added (GVA) growth in the most remote rural areas of Scotland equalled that of larger cities from 2007 to 2015 (Kleinert et al., 2018), and remote rural areas had the highest rates of economic activity and employment in 2016. More negatively, remote rural areas have lower average pay and a higher gender pay gap than accessible rural areas or the rest of Scotland, a much higher rate of fuel poverty than in other regions, and poorer access to key services and home internet access.

Other analysis has found that Scotland's remote small towns are associated with lower average socio-economic performance than other regions in the Urban-Rural classification (Copus and Hopkins, 2015), and some remote small towns and remote rural settlements have been assessed as highly vulnerable (Atterton, 2012). Additionally, the review of Highlands and Islands Enterprise's 'fragile areas' affected by demographic, economic and service access challenges in 2014 led to 79 Data Zones being classed as fragile: one more Data Zone in this category compared with 2008 (University of Glasgow Training & Employment Research Unit, 2014). In the years after these assessments were made, the policy climate has become far more uncertain for all regions after Brexit. However, in remote regions of Scotland, leaving the European Union is likely to exacerbate declines in agriculture and land management and lead to further adverse effects on the economy and public goods (Moxey and Thomson, 2018). In this context, for the purposes of this research project on the SPA, it is important to describe the structure of the SPA economy (and how it differs from that of other rural areas and small towns), and identify recent changes in both the 'traditional' land-based industries (including agriculture) and in other sectors of the economy.

3. Summary of analysis and structure of results

Earlier work in this project involved the identification of the part of Scotland which was sparsely populated. This drew on previous research (Gløersen et al., 2006) which described sparsity as "...the combination of low population densities and dispersed settlement patterns (that) lead to specific challenges for economic activity" (*Ibid.*: 3), highlighting the key issue of poor access to people. The Scotland-based approach used population and location data for small geographical units (2011 Census Output Areas), and calculated (for locations in Scotland's rural areas and small towns) how many people lived within 30 minutes' travel via road and ferry (Copus and Hopkins, 2017). The SPA, covering almost half the land area of Scotland, was defined as the region where less than 10,000 people (equivalent to the size of an urban settlement³) could be reached in this half-hour travel time. Therefore, Scotland was split into three regions (Figure 1):

³ In Scotland's Urban Rural Classification, an 'Other Urban Area' has a population of 10,000-124,999 (see Scottish Government Geographical Information Science & Analysis Team, Rural and Environment Science and Analytical Services Division (2018: 4).

- the SPA
- the remaining part of rural areas and small towns which were not sparsely populated ('not in SPA')
- the remaining urban areas

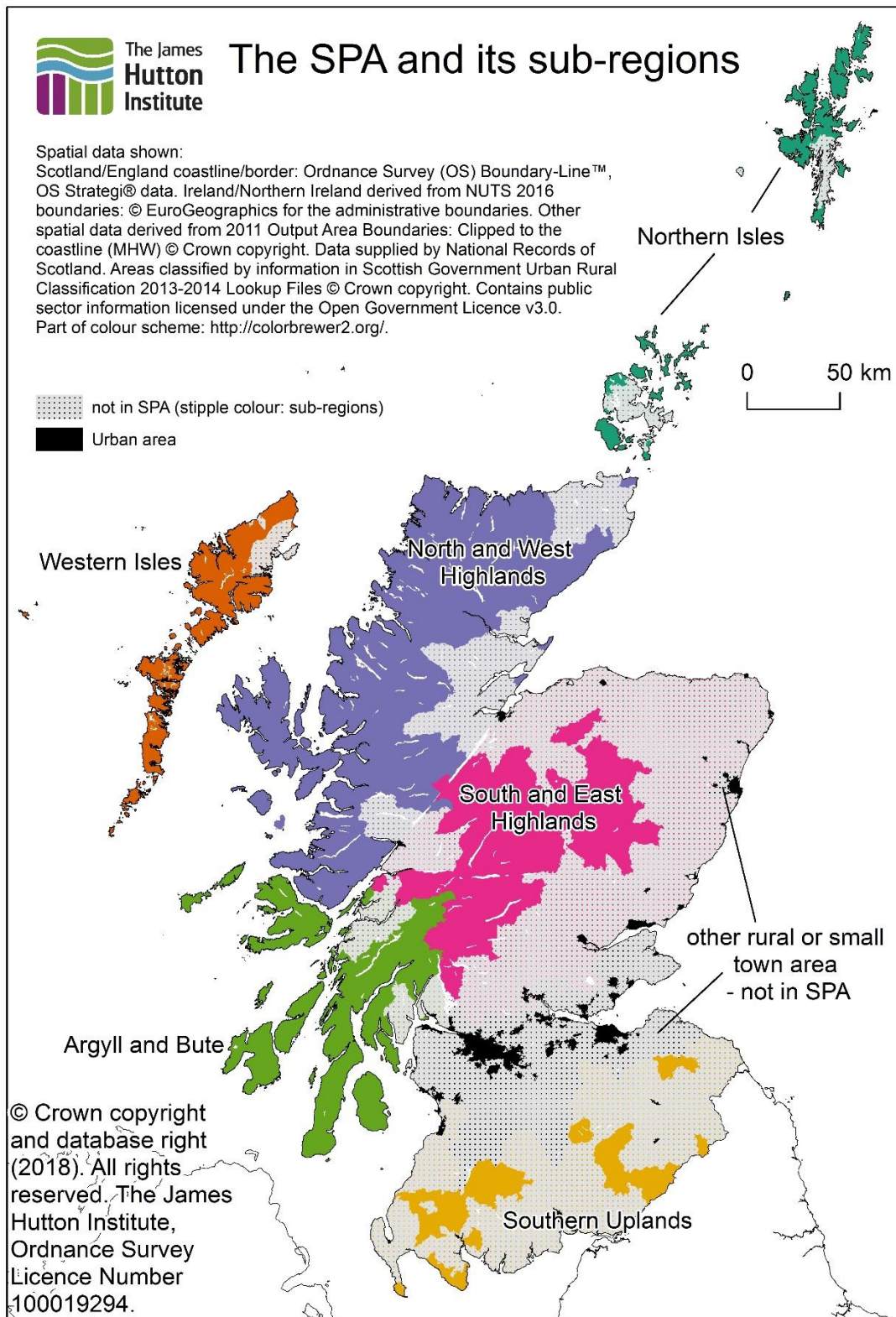
The SPA was also split up into six sub-regions, which were largely based on the local authority areas which were partly within the SPA (Hopkins and Copus, 2018: 32-3; Figure 1). The 'not in SPA' area was also divided into corresponding sub-regions, including a seventh 'other' sub-region of rural areas and small towns in central council areas, and in Aberdeen and Dundee. In addition, lookup tables were produced which allocate other geographical units (Output Areas defined in 1991 and 2001, Data Zones from 2001 and 2011, 'SCAP'⁴ Areas and agricultural parishes) to regions and sub-regions used in this research⁵: this enables statistics to be calculated for the same regions and sub-regions where data is available for other types of geographical area. In this report, statistics are provided for the full SPA, not in SPA and urban regions, and also (for some data) for the six SPA sub-regions. Some figures for sub-regions of the not in SPA area are included in the analysis of workplace population⁶.

⁴ 'Sub-Council Area Projection'. These areas have been used by National Records of Scotland for the purpose of demographic projections (see National Records of Scotland, 2016)

⁵ Lookups and data sources used: Working Paper 1 (Copus and Hopkins, 2017: see pages 17-22 and Appendix) contains a detailed description of how lookup tables were produced and the data sources used in this process. Working Paper 2 (Hopkins and Copus, 2018) contains links to full versions of all lookup tables.

⁶ Data analysis and graphs in this report were produced in R (citation for most recent version used: R Core Team, 2017) including the 'foreign' package (R Core Team, 2018).

Figure 1: The SPA and its sub-regions



Note: SPA shown in solid colours

A detailed summary of data sources used in the analysis presented in this working paper is included in Appendix 1, and for ease of reading, only a short summary is included here. The data analysis which was carried out, and the structure of the results (Section 4) is based around the following key questions:

- Section 4.1: **What is the size and structure of the SPA economy?** To answer this question, a comparison is made with the economies of other regions of Scotland. This broad overview and comparison of the importance of different industries to employment uses detailed information on employed residents from the 2011 Census, and further (more recent) data on estimated numbers of workplace jobs from the Business Register and Employment Survey (BRES) (2016). Additionally, further Census data on the workplace population was used to assess commuting behaviour at the regional and sub-regional scales.
- Section 4.2: **How has the SPA economy changed in recent years?** This analysis describes how levels of employment in different industries within the sparsely populated area, and in other regions of Scotland, has changed. Estimated job totals from 2009-2016 (source: BRES) were calculated and analysed: these demonstrate employment changes following the UK recession in 2008-9⁷.
- Section 4.3: **How have employment in agriculture, and the broader land-based industries, changed since 1991?** In this section, changes in farm labour and employment in the land-based sector (agriculture, forestry and fishing) are described, using a longer time period. The detailed information on farm labour from Scotland's annual June Agricultural Census (JAC) was used (available for all years from 1991-2016), alongside Census data on the employment of residents from 1991, 2001 and 2011.

For clarity, the results tables shown in sections 4.1 and 4.2 are 'condensed' and only show figures for primary, secondary and tertiary industries (Tables 1, 2, 3, 5), or figures for three regions (Table 4). The full, much larger tables are provided in Appendix 2, as 'Appendix Tables' with the same numbers.

4. Results

4.1. What is the size and structure of the SPA economy?

4.1.1 Structural comparison

Tables 1 and 2 summarise the employment structure within the SPA, not in SPA and Urban regions and six SPA sub-regions, showing the proportions of employed residents aged 16 to 74 who are employed in primary, secondary and tertiary industries⁸. The full results (Appendix Tables 1, 2) also show the percentages employed within various industrial sections in 2011. The industrial sections

⁷ Reference to recession: see Gregg and Wadsworth (2010)

⁸ For the purposes of this analysis, primary industries are agriculture, forestry and fishing and mining and quarrying. Secondary industries are manufacturing; electricity, gas, steam and air conditioning supply; water supply, sewerage, waste management and remediation activities and construction. Tertiary industries are all other industry sections. Based on information in BPP Learning Media (2015: 12-13) and Office for National Statistics (2009: 71).

(also referred to below as ‘sectors’) are those defined in the UK Standard Industrial Classification (2007) (Office for National Statistics, 2009).

Table 1: Overall employment breakdown within the SPA, not in SPA and Urban regions (2011)

Industry	SPA	not in SPA	Urban
All people aged 16 to 74, in employment	66,290	716,105	1,734,500
Primary industries total	10.11	6.07	1.48
Secondary industries total	17.13	19.32	16.86
Tertiary industries total	72.76	74.62	81.66

For industry groups, figures show percentages of the total number of people aged 16 to 74 in employment for the three regions. Based on residents (people aged 16 to 74 in employment), 2011. Figures shown derived from 2011 Census data (Table QS605SC). © Crown copyright. Data supplied by National Records of Scotland.

Table 2: Overall employment breakdown within the six SPA sub-regions (2011)

Industry	NI	WI	NWH	SEH	AB	SU
All people aged 16 to 74, in employment	7,019	6,383	18,782	10,531	19,957	3,618
Primary industries total	15.12	8.68	9.60	7.09	8.72	21.97
Secondary industries total	16.87	18.75	16.91	16.17	17.92	14.32
Tertiary industries total	68.02	72.57	73.49	76.74	73.36	63.71

*For industry groups, figures show percentages of the total number of people aged 16 to 74 in employment for the three regions. Based on residents (people aged 16 to 74 in employment), 2011. Figures shown derived from 2011 Census data (Table QS605SC). © Crown copyright. Data supplied by National Records of Scotland. SPA sub-regions: **N**orthern Isles, **W**estern Isles, **N**orth and **W**est Highlands, **S**outh and **E**ast Highlands, **A**rgyll and **B**ute, **S**outhern Uplands.*

The data in Table 1 shows that the SPA economy (when measured using employed residents) is broadly similar in structure to the economy of rural areas and small towns which are not sparsely populated, and (to a lesser extent) that of urban areas; however, primary industries are relatively more important in the SPA. The vast majority (c. 73%) of employed residents in the SPA work in tertiary (service) industries, with a similar figure found in the not in SPA region, although in urban areas a slightly higher proportion of residents (above 81%) worked in services. Additionally, slightly below a fifth of employed residents of all three regions worked in secondary industries (manufacturing and similar activities).

However, it is clear that primary industries: the production of raw materials, dominated by the traditional land-based sector of agriculture, forestry and fishing (Appendix Table 1), contribute to a far higher proportion of employment in the SPA than in other regions. Slightly over 9% of employed residents of the SPA work in the land-based sector, which is the fifth largest employer (out of 20 industrial sections). In non-sparsely populated rural areas, only c. 4% of residents work in land-based industries, and the sector is the eleventh largest employer. In urban areas the land-based sector makes a very small relative contribution to employment. Within the SPA, more than a fifth of employed residents in the Southern Uplands, and almost 13.5% of those in the Northern Isles, work in land-based industries (Appendix Table 2).

Further comparisons of the industrial sections show that health and social work, wholesale and retail trade (and motor repairs), construction and education make relatively large contributions to employment in all three regions (SPA, not in SPA, urban) (Appendix Table 1). The wholesale and retail sector is however a less important employer in the SPA, than in other areas: it provides work for c. 11% of employed residents in the SPA, compared with just over 14% of those in the not in SPA region and almost 15.5% of employed residents in urban areas. Similarly, the manufacturing industry is the fourth largest employer in both the not in SPA and urban regions, but is only the eighth largest employer in the SPA.

Accommodation and food service activities are far more important in sparsely populated areas (employing over 11% of employed residents as the second largest employer overall) than they are in non-sparsely populated rural areas and small towns. In both of the latter two regions, accommodation and food services is the seventh largest industrial section by employment, and it contributes approximately 6% of employment. This sector is likely to correlate strongly with tourism: nearly 17% of employed residents in the sparsely populated South and East Highlands work in accommodation and food service, and it makes a relatively large contribution to employment in the North and West Highlands and Argyll and Bute sub-regions (Appendix Table 2). In the more remote island sub-regions of the SPA, this section provides jobs for a smaller percentage of employed residents.

Finally, the arts, entertainment and recreation (and other service activities) sector provides work for 8% of employed residents in the South and East Highlands sub-region of the SPA, compared with a lower figure of about 5.4% in the SPA as a whole. The higher sub-region figure may reflect the well-established outdoor recreation activities (including skiing, walking and mountain-biking) in the Cairngorms.

To add to the analysis of employed residents described above, Table 3 (and Appendix Table 3) shows results from an analysis of more recent (2016) data which uses a different definition of employment: numbers of jobs, based on the location of workplaces (Nomis, n.d. *a,b*). These data are estimates, and are subject to a number of key caveats and limitations, which are described in Appendix 3. Therefore, the figures included in these tables, and described below, must be acknowledged as estimates and be treated with caution. Notably, they do not include jobs in farm agriculture⁹. Farm agriculture is by far the largest component of the land-based sector (agriculture, forestry and fishing): in 2016, for the whole of Scotland, there were 64,000 jobs in farm agriculture out of 76,000 jobs in agriculture, forestry and fishing¹⁰. However, due to considerable uncertainty in combining these (BRES) job totals with other data on farm labour (described in Section 4.3), the employment totals for agriculture, forestry and fishing (Appendix Table 3) and primary industries (Table 3) do not include farm agriculture, and the regional estimated job totals are not presented as percentages. These figures do include jobs in forestry and fishing, and non-farm agricultural jobs.

⁹ Aggregated farm employment data is provided by government departments and devolved governments for larger areas (Office for National Statistics, 2014) and is not included in the Data Zone-level BRES totals.

¹⁰ Figures: Business Register and Employment Survey: open access data. ONS Crown Copyright Reserved [from Nomis on 19 April 2018].

Table 3: Overall employment breakdown within the SPA, not in SPA and Urban regions (2016)

Industry	SPA	not in SPA	Urban
Primary industries (total)*	2,943	15,796	24,871
Secondary industries (total)	7,591	100,823	243,705
Tertiary industries (total)	42,256	384,620	1,680,523

*For industry groups, figures show estimated numbers of jobs (rounded to the nearest whole number) within the three regions. Figures derived from Business Register and Employment Survey: open access data. ONS Crown Copyright Reserved [from Nomis on 10 May 2018]. Source: Office for National Statistics. *-these figures exclude jobs in farm agriculture.*

Appendix Table 3 shows estimated job totals in 21 different industry sectors within the SPA, not in SPA and urban regions; and their ranks, in 2016; Table 3 presents summary statistics for the primary, secondary and tertiary groupings. The ranks confirm insights from the Census data analysis, including the importance of key sectors (health and social work, wholesale and retail trades, construction, education) to employment in all regions. Similarly, comparisons of the relative importance of industries to jobs in the three regions also support insights from the Census data. For example, the land-based industries (even with the exclusion of farm agriculture) are more important as a source of jobs in the SPA than outside it. The addition of farm labour totals from the agricultural census (Section 4.3) would further demonstrate the importance of the land-based sector (and primary industries) to the SPA.

Other sectors are also more important as a source of jobs in the SPA, compared with other regions. These include accommodation and food service activities, which was linked to the largest number of jobs of any sector in the SPA, but was ranked lower (ranks: 4th and 6th largest) in the other two regions. In the BRES data, 'arts, entertainment and recreation' is measured as a separate sector from 'other service activities', and it provides the seventh largest number of jobs within the SPA, but is relatively less important (ranks: 10th, 13th largest) in non-sparsely populated rural areas and small towns and urban areas, respectively. The 2016 jobs data also indicates that the transport and storage sector is ranked higher (6th largest number of jobs) than in other regions (ranks: 9th, 11th largest): the Census analysis (Appendix Table 1) also shows that the transport and storage sector is somewhat more important to the SPA economy than it is to the economies of other regions.

For other industries, there are further notable differences in contributions to jobs and employment across regions of Scotland. Manufacturing supports the third largest number of jobs in the not in SPA region, but is ranked 8th in the SPA (Appendix Table 3); this comparison was also observed in the Census employment data. Both the 2016 jobs data and 2011 figures suggest that the public administration and defence/compulsory social security sector has a smaller role in the economy of the SPA, compared with that of urban areas.

In 2016, other industrial sections showed a pattern of being less important in the SPA than in the not in SPA region, but most important in urban areas:

- Financial and insurance activities contributed to only a very small number of jobs in the SPA (the 19th largest total), and a relatively small number in the not in SPA region, however they were far more important in Urban areas, providing the 10th highest total of jobs (Appendix

Table 3). Similarly, the Census data analysis (Appendix Table 1) shows that this sector is a minor employer in the SPA, employing 1% of employed residents, compared with respective figures of c. 3% and c. 5.3% in the not in SPA and urban regions.

- The professional, scientific and technical sector provided the 11th highest number of jobs in the SPA, the 7th highest in other rural areas and small towns, and fifth largest in urban areas. The regional percentages of employed residents (Appendix Table 1) supports this comparison.
- Administration and support services contributed to the 12th largest number of jobs of any industrial sector in the SPA, the 8th largest in the not in SPA region, and the third largest total in the urban areas. Census employment percentages (Appendix Table 1) show a similar regional pattern.

4.1.2 Commuting behaviour

A further insight into economic activity in the SPA (and other areas) was gained from a comparison of the total number of employed residents and the workplace population. This provides an indication of the movement of workers across different areas through commuting, and identifies areas which contribute more strongly to employment, rather than residence.

Table 4 shows regional figures. In the SPA, the workplace population was around 10% smaller than the number of employed residents, indicating net commuting out of the region. In the not in SPA region, the workplace population was more than 20% smaller than the number of employed residents, suggesting a higher level of commuting out of the region compared with the SPA: this is to be expected, given the greater accessibility to urban areas (and areas of population more broadly) of non-sparsely populated locations. In urban areas, the workplace population exceeds that of employed residents by c. 8%, showing (again as expected) that it is a net recipient of commuters.

Table 4: Employed residents and workplace population of the regions (2011)

Region or sub-region	Employed residents (ER)	Workplace population (WP)	WP (% of ER)	Output Areas (OA) (n)	OA where ER > WP (%)*	OA where ER < WP (%)*
SPA	66,290	59,624	89.94	1,290	75.43	22.56
not in SPA	716,105	567,632	79.27	12,524	83.87	15.71
Urban	1,734,500	1,875,089	108.11	32,537	85.77	13.92

Employed residents and workplace population include people aged 16 to 74 in employment.

*Workplace population figures also include residents of the rest of the UK aged 16 or over who work in Scotland, but do not include Scottish residents working outside Scotland or offshore. Figures shown derived from 2011 Census data: a) Table QS605SC. © Crown copyright. Data supplied by National Records of Scotland; b) Table WP101SC. © Crown copyright 2016. Data supplied by National Records of Scotland. *-note that for a very small minority of Output Areas (178 out of 46,351 in Scotland), the ER and WP were equal. To save space these percentages are not shown in the table.*

Data for sub-regions (Appendix Table 4) shows some variation in the balance of employed residents and workplace population:

- The sparsely populated parts of the Northern and Western Isles show net ‘out commuting’; however the non-sparsely populated parts of the Northern and Western Isles had net ‘in commuting’. This can be interpreted as movement of workers to the more central towns on these islands (Kirkwall, Lerwick, Stornoway).
- While all SPA sub-regions show a surplus of employed residents, compared with workplace population, the sparsely populated part of Argyll and Bute shows the closest balance between the two values. Additionally, in the non-SPA part of Argyll and Bute, the workplace population exceeds the employed resident population by more than a quarter, reflecting commuting to Oban, Helensburgh and Dunoon and their surroundings.
- In the two SPA sub-regions across the Highlands and in the sparsely populated Southern Uplands, there is net movement of employed people out of these regions; however, this is also the case for the corresponding non-sparsely populated sub-regions. The particularly high levels of net out-commuting from the non-sparsely populated part of the South and East Highlands, and the ‘other’ non-sparsely populated areas, is likely to reflect their high accessibility to areas with a high volume of employment: the former covers a large area of the north east of Scotland and locations near Inverness, Fort William and parts of Stirling and Perth and Kinross; the latter covers non-urban parts of the central belt and other areas close to major cities.

4.2. How has the SPA economy changed in recent years?

To expand on the recent ‘snapshots’ of employment (Section 4.1), estimated numbers of jobs in different industry sectors were calculated for all years between 2009 and 2016, for the SPA, not in SPA and urban regions. The following analysis shows percentage change in estimated jobs between 2009 and 2016, and more detailed annual changes shown for selected industries. The caveats of the BRES data mentioned above (Section 4.1.1) and additional limitations (covered in Appendix 3) mean that these estimates should be interpreted with caution.

Table 5 shows a comparison of numbers of jobs in the different industrial groups in 2016 with the respective totals in 2009, for the three different regions. The full table (Appendix Table 5) has greater detail by industrial section. All figures should be viewed in the context of respective numbers of jobs (Table 3, Appendix Table 3), as large percentage changes may represent a small absolute increase or reduction in employment, if the sector has a small number of jobs.

In the SPA, the broad figures for primary, secondary and tertiary industries (Table 5) show that the primary sector outside of farm agriculture and secondary industries showed a relatively high rate of jobs growth. However, the tertiary (service) industries had only a very small increase in jobs of 1.2%. As this sector employed almost three-quarters of residents of the SPA in 2011 (and a similar percentage in other regions; Table 1), changes to jobs within this sector are of much greater importance than changes in primary and secondary jobs. The region of non-sparsely populated rural areas and small towns saw faster jobs growth in tertiary industries (4.7% growth) compared with the SPA, with a respective 3.6% increase in urban areas.

Table 5: Change in the estimated number of jobs within the SPA, not in SPA and Urban regions (2009-2016)

Industry	SPA	not in SPA	Urban
Primary industries (total)*	25.6	31.8	2.8
Secondary industries (total)	15.5	1.8	-7.4
Tertiary industries (total)	1.2	4.7	3.6

*Figures show percentage change in the estimated numbers of jobs (2009-2016, to one decimal place) within the three regions. Figures derived from a) Business Register and Employment Survey: open access data (2016); and b) Business Register and Employment Survey (excluding units registered for PAYE only): open access data (2009). Both datasets: ONS Crown Copyright Reserved [from Nomis on 10 May 2018]. Source: Office for National Statistics. *-these figures exclude jobs in farm agriculture.*

Figure 2 presents job changes in industrial sectors (Appendix Table 5), ordered by their approximate importance to regional economies, using an average of the ranks of Census employment totals and estimated job totals in the Census (2011) and BRES (2016) analyses, respectively (Appendix Tables 1, 3). This sector-level analysis shows:

- The accommodation and food service sector is an important part of the economy in the SPA, and it has seen an increase in jobs of c. 10% from 2009 to 2016. This sector is relatively less important in other rural areas and small towns, and in urban areas: in these regions, there has been a smaller growth in the number of jobs compared with that in the SPA.
- In all three regions, the wholesale and retail and health and social work sectors are major sources of employment. In the SPA, both saw very little change in jobs from 2009 to 2016 (a very small fall, only). Wholesale and retail jobs increased by 2.7% in other rural areas and small towns, where the number of jobs in health and social work had a small decline. In urban areas, jobs in the wholesale and retail sector reduced marginally from 2009 to 2016, but the health and social work sector expanded substantially over the same period, with an increase in jobs of almost 9%.
- Education also provides a large number of jobs and employment within the SPA, not in SPA and Urban regions; however, there is some difference in the regional job trend from 2009 to 2016. The number of education jobs fell by over 11% in the SPA, compared with a decline of over 6% in non-sparsely populated rural areas and small towns, and a much smaller fall (c. -2%) in urban jobs.
- Another sector where the SPA jobs trend is more negative than in other regions is public administration and defence and compulsory social security: the number of SPA jobs fell sharply, by a half. This sector reflects public sector, government activities (Office for National Statistics, 2009: 218); there was a much smaller loss of jobs in this section in non-sparsely populated rural areas and small towns (c. -13%), contrasting with a small increase in jobs (c. +4%) in urban areas.
- Within the SPA, several sections of the economy have observed jobs growth from 2009 to 2016. The arts, entertainment and other recreation sector is relatively more important to the SPA than in other areas, and it has had a very large gain in jobs (c. +74%); the number of jobs in this sector also increased sharply in rural areas and small towns outside of the SPA (c.

+58%), with a relatively small c. 17% increase in the urban region. The transportation and storage sector is another sector which appears more important to SPA employment than it is to the employment of other regions: it observed slight jobs growth (under 3%). However, the sparsely populated area saw more considerable growth in manufacturing; professional, scientific and technical activities; administrative and support services and real estate. Across these industry sections, job growth in the SPA was generally equal to or greater than comparative trends in rural areas and small towns outside of the SPA.

Figure 2 (see next page) notes: *Figures show percentage change in the estimated numbers of jobs (2009-2016). Two industry sectors are not shown on any graph (0 jobs in all regions in 2016). Note that the percentage change (y axis) scale differs between the three graphs, to show detail more effectively. *- 'Mean rank' is an approximate measure of the importance of the industry section to employment, it is a mean of the ranks of employed resident totals (Census 2011) and estimated jobs (BRES 2016), with minor adjustments (Census ranks used for Agriculture, forestry and fishing; BRES ranks used for the arts, entertainment and recreation and other services sectors). More important sectors to the regional economy are therefore to the left of each graph. Shortened names are the first four letters of sections in Appendix Table 5. Agriculture, forestry and fishing figures exclude jobs in farm agriculture. Data shown derived from a) 2011 Census data (Table QS605SC). © Crown copyright. Data supplied by National Records of Scotland. b) Business Register and Employment Survey: open access data (2016); c) Business Register and Employment Survey (excluding units registered for PAYE only): open access data (2009). Both BRES datasets: ONS Crown Copyright Reserved [from Nomis on 10 May 2018]. Source: Office for National Statistics.*

Figure 2: Change in estimated number of jobs within the SPA, not in SPA and Urban regions (2009-2016). Industry sections sorted (x axis) by approximate contribution to overall employment and jobs.

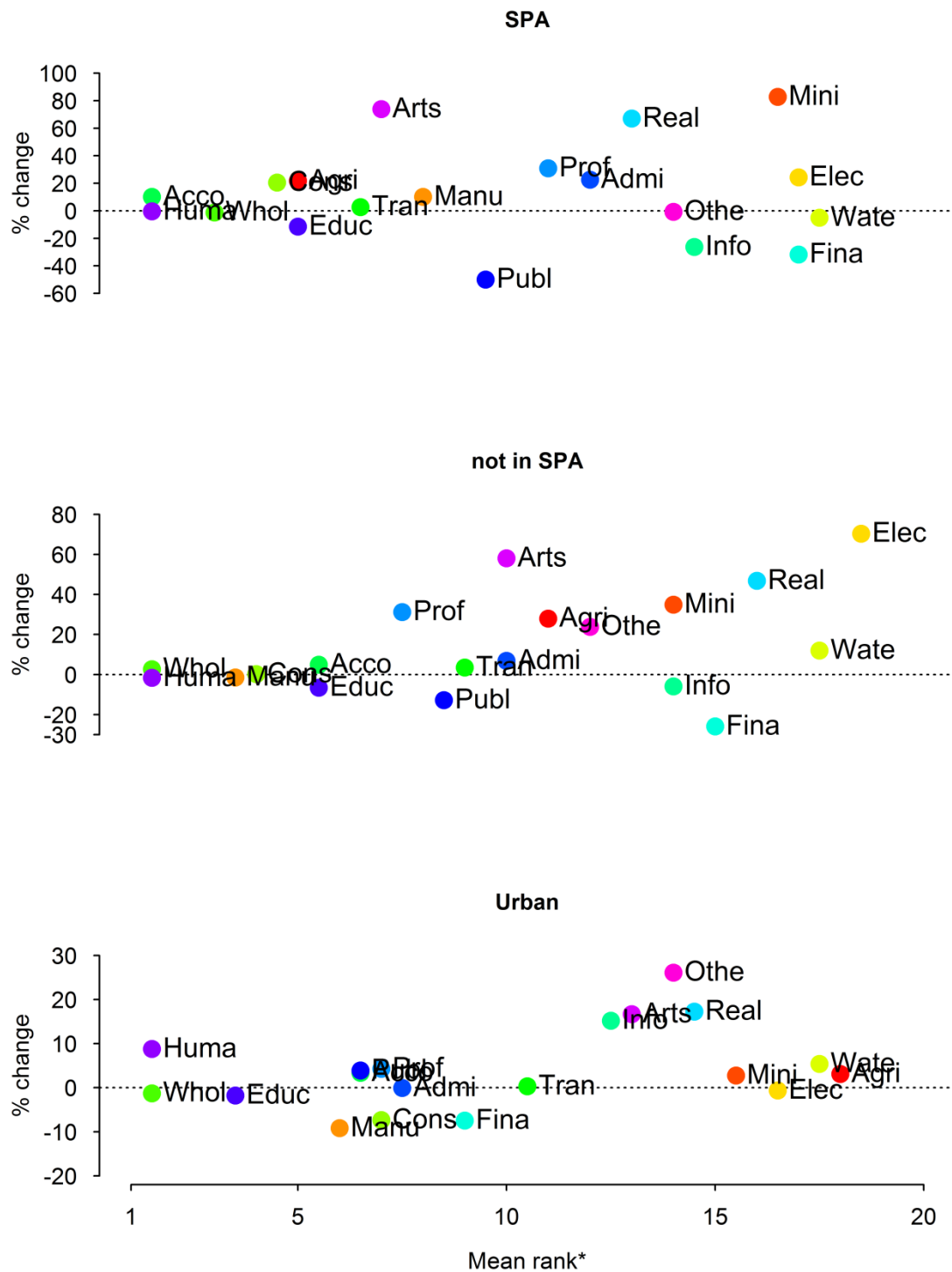
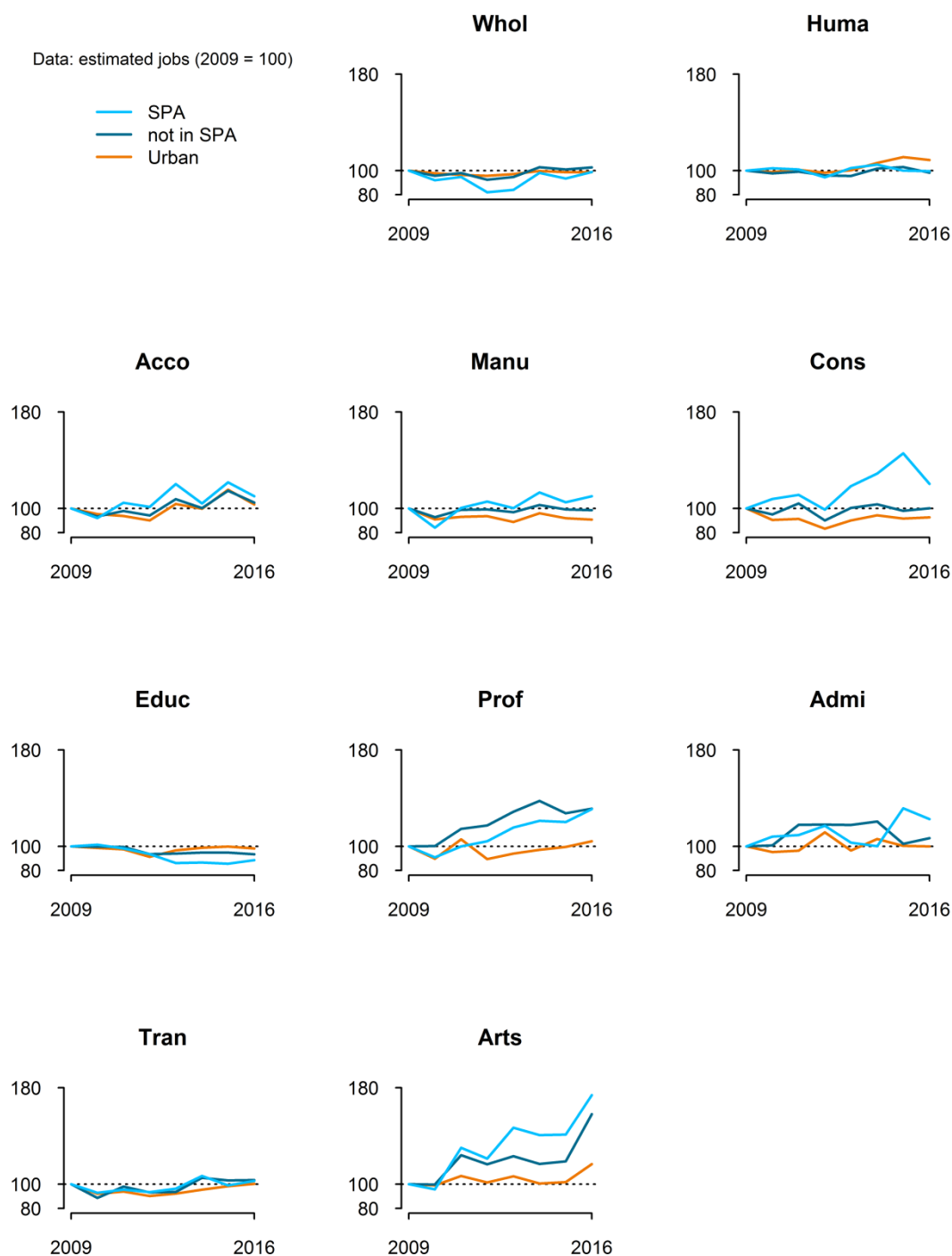


Figure 3 shows annual changes in estimated jobs in industry sections which were the 'top ten' largest employers in rural areas and small towns in 2016 (based on a sum of estimated jobs in the SPA and not in SPA regions). It can be seen that in several industries, increases and decreases in jobs within the sparsely populated area correspond to similar changes in the other two regions: in other words, the 'shape' of the graphs tend to be similar, even if the magnitude of changes is different. Conversely, the SPA saw a sharp increase in construction jobs from 2012-2015, that is not apparent in other rural areas and small towns or in urban areas. Additionally, higher variation in change between regions is evident in professional, scientific and technical activities and administrative and support service activities. Interestingly, the annual job totals also suggest a particularly sharp increase in jobs in arts, entertainment and other recreation from 2015 to 2016 in all regions.

Figure 3: Change in estimated number of jobs within selected industry sections, 2009-2016.



Industry sections shown are the ten largest employers in rural areas and small towns in 2016, based the sum of estimated jobs in the SPA and not in SPA regions. Shortened names are the first four letters of sections in Appendix Table 5. Data shown derived from a) Business Register and Employment Survey: open access data (2015-6); b) Business Register and Employment Survey (excluding units registered for PAYE only): open access data (2009-14). Both datasets: ONS Crown Copyright Reserved [from Nomis on 10 May 2018]. Source: Office for National Statistics.

4.3. How have employment in agriculture, and the broader land-based industries, changed since 1991?

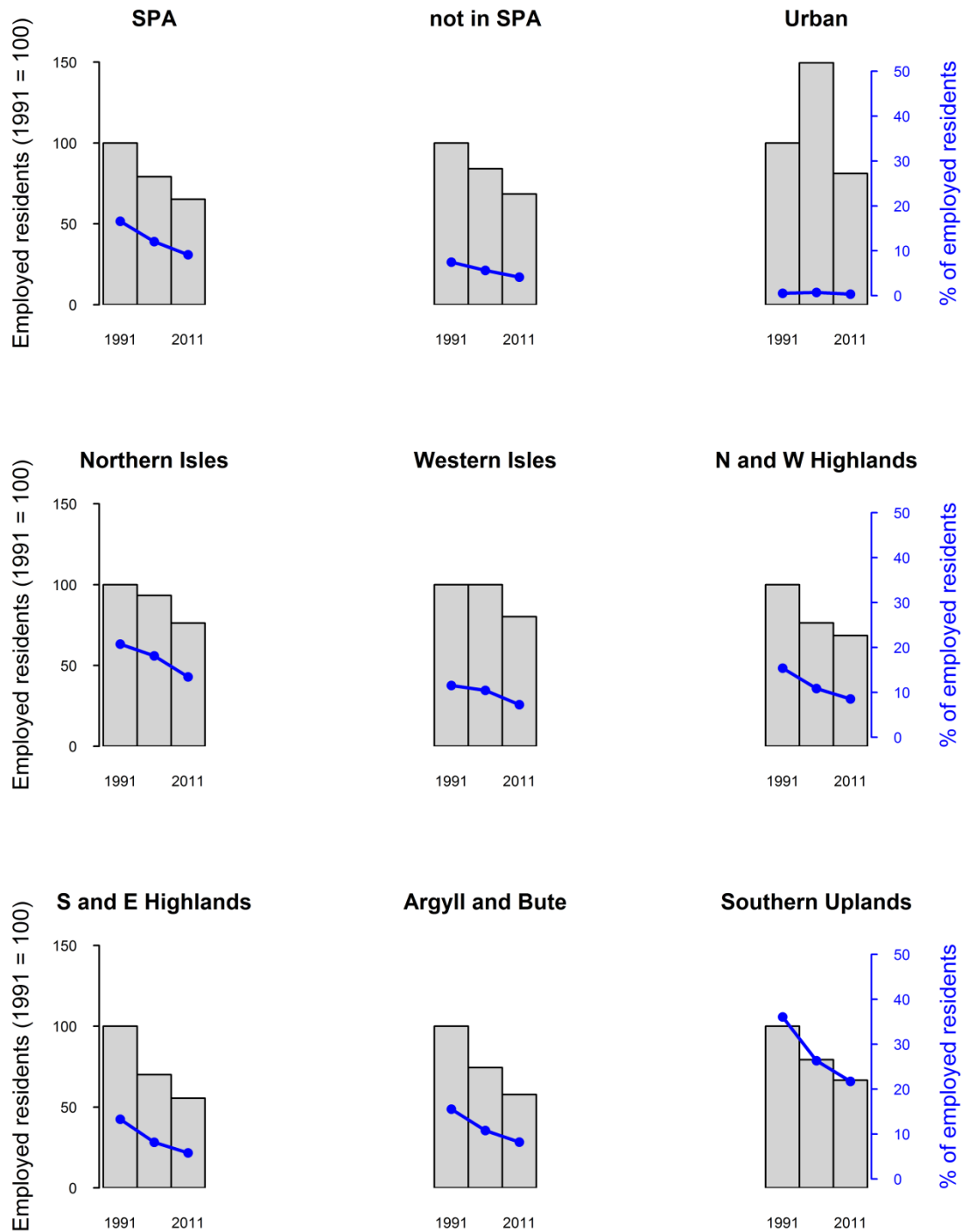
Following the economy-wide overview described above in sections 4.1 and 4.2, the following section presents a detailed overview of changes to agricultural labour, and changes to employment in the broader land-based industries of agriculture, forestry and fishing. The analysis uses two datasets which enable longer-term comparisons from the year 1991 to be made.

Table 6: Change in employment within the land-based industries in the SPA, not in SPA and Urban regions and six SPA sub-regions (1991-2011)

Region or sub-region	Employment in land-based industries (2011)	1991-2011 change (%)	2001-2011 change (%)	% of employed residents employed in land-based industries (2011)	1991-2011 change (pp)	2001-2011 change (pp)
SPA	6,044	-34.80	-17.60	9.12	-7.45	-2.94
not in SPA	29,692	-31.52	-18.52	4.15	-3.33	-1.48
Urban	6,166	-18.87	-45.77	0.36	-0.17	-0.38
Northern Isles - SPA	945	-23.79	-18.32	13.46	-7.31	-4.66
Western Isles - SPA	465	-19.83	-19.83	7.28	-4.25	-3.18
North and West Highlands - SPA	1,603	-31.50	-10.25	8.53	-6.86	-2.34
South and East Highlands - SPA	610	-44.55	-20.88	5.79	-7.51	-2.38
Argyll and Bute - SPA	1,635	-42.23	-22.33	8.19	-7.34	-2.59
Southern Uplands - SPA	786	-33.39	-16.03	21.72	-14.36	-4.60

'pp' = 'percentage points'. Note that these figures were derived from different industrial classifications, 1991 data is based on a 10% sample and uses a measure of employed and self-employed residents aged 16 and over. 2001 and 2011 data uses a measure of all people aged 16-74 in employment. Data shown derived from Census data (1991, 2001, 2011). Census data tables: SAS73 (1991), UV034 (2001), QS605SC (2011). All data: © Crown copyright. Further information on data sources included within Appendix 1.

Figure 4: Change in employment within the land-based industries in the SPA, not in SPA and Urban regions and six SPA sub-regions (1991-2011)



Bars show the number of employed residents employed in land-based industries (agriculture, forestry and fishing), blue lines show the proportion of employed residents employed in land-based industries. Note that these figures were derived from different industrial classifications, 1991 data is based on a 10% sample and uses a measure of employed and self-employed residents aged 16 and over. 2001 and 2011 data uses a measure of all people aged 16-74 in employment. Data shown

derived from Census data (1991, 2001, 2011). Census data tables: SAS73 (1991), UV034 (2001), QS6055C (2011). All data: © Crown copyright. Further information on data sources included within Appendix 1.

From 1991 to 2011, the number of employed residents who were employed in the land-based sector fell sharply (by around a third) in both the SPA and in non-sparsely populated rural areas and small towns; the proportion of employed residents working in agriculture, forestry and fishing also fell in both regions (Table 6, Figure 4). For these two regions, the change in total employment in the land-based sector was very similar in the shorter 2001-2011 period. Urban land-based employment showed more variability, with an increase in the number of residents employed in this sector from 1991 to 2001. However, in 1991, 2001 and 2011, the contribution of the land-based sector to overall employment was very small: below 1%, and there was a sharp fall (c. -46%) in the number of urban residents employed in this sector from 2001 to 2011.

The change in employment in the land-based industries from 1991 to 2011 was consistently negative across all sub-regions of the SPA, with the largest falls in total employment (over 40%) found in the sparsely populated parts of the South and East Highlands and Argyll and Bute. It is also noticeable that while nearly 22% of employed residents of the sparsely populated Southern Uplands were employed in agriculture, forestry and fishing in 2011, the respective figure was over 36% in 1991. Land-based employment contributed to more than a tenth of total employment in all six SPA sub-regions in the year 1991; however, in 2011, this was the case for only two sub-regions.

To focus further on employment in farm agriculture, the annual June Agricultural Census (JAC) is the most appropriate and detailed source of information on farm labour available. The use of this information has some caveats, including changes to the items included on census forms, which have affected a number of labour variables (see Scottish Government, 2017*a*: 31-33 and notes to tables 24-26 in Scottish Government, 2017*b*). Notably, information on farm occupiers not working on holdings was only collected by the JAC from 2011, onwards: the figures provided below on 'working occupiers' for the years 1991 to 2010 will include some non-working occupiers. It is also important to note that a large proportion of farm labour across Scotland is part-time, including (for example) a large majority of working occupiers (Scottish Government, 2017*a*: 62 (Table 8b)). Therefore, data on farm labour is presented below both in the form of numbers of people and annual work units (AWU). To summarise the latter, 1 AWU is equal to the labour of 1 full-time worker¹¹; Appendix 4 of this report describes how this was calculated from JAC data for the purposes of the analysis below. The AWU measure accounts for the balance of full- and part-time labour, and is a more realistic measure of work in agriculture, and its change over time.

¹¹ See [http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Annual_work_unit_\(AWU\)](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Annual_work_unit_(AWU)) (Accessed 16th May 2018)

Table 7: Change in the total number of working occupiers, 1991-2016.

Region or sub-region	People			AWU		
	2016	1991-2016 (%)	2001-2016 (%)	2016	1991-2016 (%)	2001-2016 (%)
Northern Isles - SPA	1,714	-27.80	-25.96	841.5	-36.35	-30.47
Western Isles - SPA	2,815	5.91	-11.84	1,086.75	-4.12	-11.29
North and West Highlands - SPA	3,947	15.04	-4.62	1,771.25	3.40	-6.49
South and East Highlands - SPA	802	-7.18	-10.29	454.25	-22.08	-16.57
Argyll and Bute - SPA	1,357	-11.37	-13.40	772.25	-25.60	-20.98
Southern Uplands - SPA	761	-6.74	-8.53	467	-22.13	-17.13
SPA	11,396	-2.38	-11.93	5,393	-15.59	-15.93
not in SPA	25,176	-13.04	-14.21	14,594.75	-25.66	-17.94

Percentage change (1991-2016, 2001-2016) shown to two decimal places. Figures shown derived from June Agricultural Census data (1991, 2001, 2016). Data tables courtesy of Agricultural Census Analysis Team, RESAS, Scottish Government.

Table 8: Change in the total farm workforce, 1991-2016.

Region or sub-region	People			AWU		
	2016	1991-2016 (%)	2001-2016 (%)	2016	1991-2016 (%)	2001-2016 (%)
Northern Isles - SPA	2,217	-22.18	-22.29	1,148	-29.33	-25.48
Western Isles - SPA	3,199	2.80	-13.28	1,291.5	-7.88	-13.45
North and West Highlands - SPA	4,989	19.33	-3.63	2,386.5	7.56	-4.88
South and East Highlands - SPA	1,315	-6.54	-13.26	827	-18.60	-17.47
Argyll and Bute - SPA	2,186	-8.11	-13.73	1,339	-21.26	-20.27
Southern Uplands - SPA	1,440	-16.52	-7.28	972	-30.55	-15.39
SPA	15,346	-1.96	-11.41	7,964	-14.93	-15.02
not in SPA	47,849	-9.57	-6.49	30,265.5	-23.61	-13.24

Percentage change (1991-2016, 2001-2016) shown to two decimal places. Figures shown derived from June Agricultural Census data (1991, 2001, 2016). Data tables courtesy of Agricultural Census Analysis Team, RESAS, Scottish Government.

Tables 7 and 8 show the 'headline' statistics of farm labour: the numbers of working occupiers and total farm workforce (working occupiers, regular staff, and casual and seasonal staff). In 2016, 15,346 people worked on farms within the SPA, equivalent to 7,964 AWU. The ratio between these figures (AWU divided by the number of people) is 0.52: the equivalent figure for the not in SPA region is 0.63, showing that agricultural labour is more part-time within the SPA than in other rural areas and small towns. For SPA sub-regions, the ratios are lowest in the remoter areas: the Western Isles (0.40), North and West Highlands (0.48) and Northern Isles (0.52); the ratios in the three other sub-regions are all above 0.6.

Between the years 1991 and 2016, the number of working occupiers in the SPA fell by c. 2.4% (Table 7); however the fall in the non-sparsely populated rural areas and small towns was much larger (c.

13%). If 2001 is taken as a starting point, both regions observed a large fall in the number of working occupiers, but with a slightly larger decline in the not in SPA region (c. -14.2%) than in the SPA (c. -11.9%). The comparative AWU figures, which provide a more meaningful value of the total labour input, show a fall of over 15.5% for farm occupiers in the SPA (1991-2016), but a more substantial reduction (more than a quarter) of AWU for farm occupiers in the not in SPA region. Information on the total farm workforce (Table 8) shows a very similar picture. Comparing 1991 and 2016, the total farm workforce fell by just under 2% in the SPA, although this masked a larger decline in farm labour input of nearly 15%. In the not in SPA region, the workforce reduced by around 9.6% (total people) and by c. 23.6% (AWU), showing again that agricultural employment in the SPA has 'held up' better than it has in other rural areas and small towns over the full time period. However, from 2001 to 2016, both regions have seen a large reduction in the farm workforce, with a greater fall in the SPA (AWU: c. -15%, compared with c. 13.2%). Published statistics for Scotland¹² show that the total farm workforce fell by slightly more than 8% from 1991 to 2016 (based on Scottish Government, 2017^{b13}), and the total number of occupiers dropped by just over 10% (based on Scottish Government, 2017^{b14}); if converted to AWU, labour inputs in Scotland fell by over 22% (total workforce) and 23% (working occupiers) (based on Scottish Government, 2017^{b15}). Therefore, in terms of both 'raw' numbers of agricultural workers and input of labour, there has been a much smaller decline in the SPA than for the country as a whole from 1991 to 2016.

These changes in farm labour can also be analysed at the sub-region level, and also at the annual resolution (Figures 5, 6). Sub-region-scale figures (Table 8) indicate a large contraction in agricultural employment in sparsely populated parts of the Northern Isles, where the size of the farm workforce declined by over a fifth from 1991 to 2016, with a similar decline from 2001 to 2016. Expressed as total labour input (AWU), the decline was over 29% from 1991-2016, and more than 25% from 2001-2016. The workforce in the Southern Uplands also contracted, with a c. 16.5% fall in the number of people from 1991 to 2016, and a fall in labour input of over 30% in the same time period. At the other extreme, the sparsely populated part of the North and West Highlands saw an increase in farm labour from 1991 to 2016 (an increase in AWU of over 7.5%), however the region saw a decline in labour input over the shorter 2001-2016 period of just below 5%. An annual overview of change in the working occupiers (Figure 5) and the total farm workforce (Figure 6) show a steady decline in overall labour inputs (AWU) in farming in both the SPA and not in SPA regions over most of the time period. In the SPA, the volume of farm labour increased slightly during the 1990s, driven by changes in the Western Isles and North and West Highlands. However, after this, labour inputs in the SPA (from both working occupiers, and farmers overall) have fallen, although with some sub-regional and inter-annual variation.

Finally, data is available on the age structure of occupiers for years between 2003 and 2016. This shows evidence that working occupiers, as a group, have aged from 2003 to 2016 in both the SPA

¹² Statistics derived from data © Crown copyright. Contains public sector information licensed under the Open Government Licence v3.0.

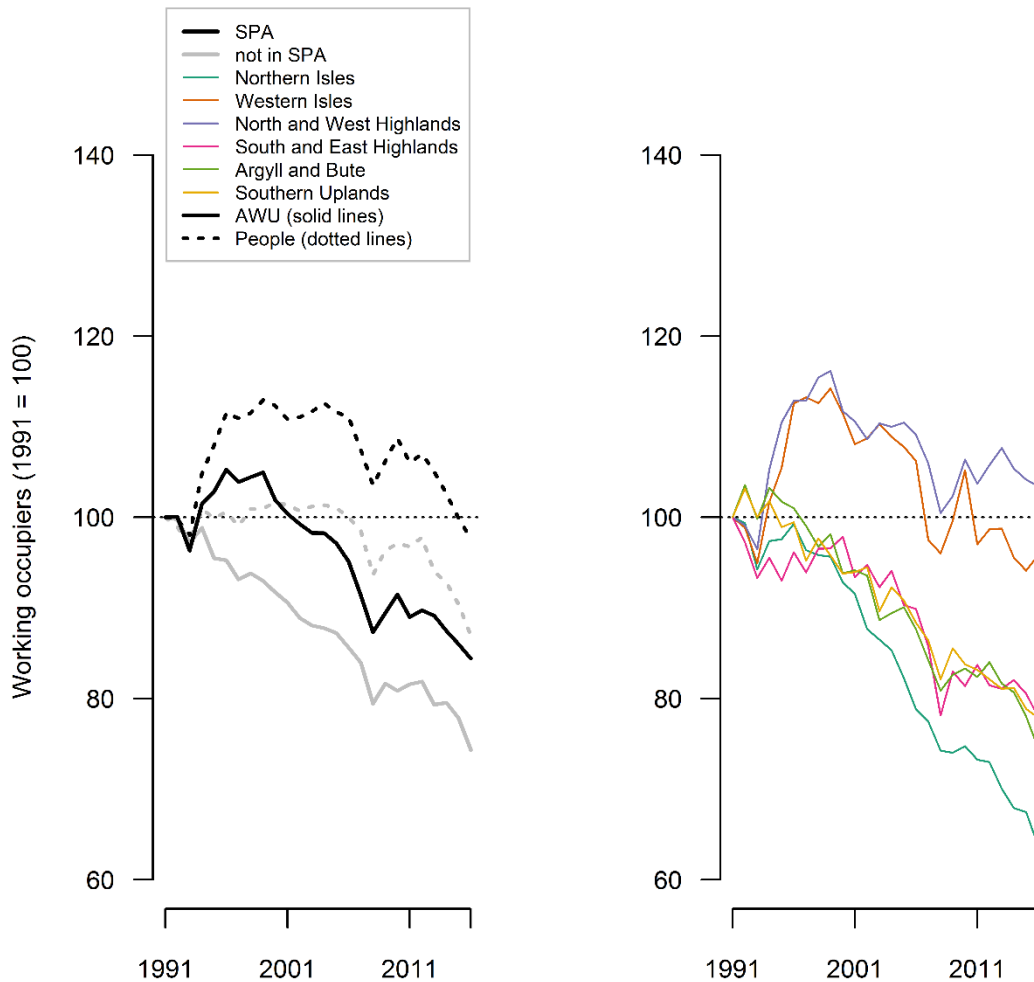
¹³ Derived from data in Table 27 - Total workforce, 1982 – 2017.

¹⁴ Derived from data in Table 24 - Occupiers and spouses doing farm work, 1982 – 2017. 'Occupiers' are defined as total occupiers plus total spouses, excluding those not working on the holding.

¹⁵ Total workforce: derived from data in Table 24 - Occupiers and spouses doing farm work, 1982 – 2017 and Table 26 - Employees, 1982 - 2016 (continued). Working occupiers: derived from data in Table 24 - Occupiers and spouses doing farm work, 1982 – 2017.

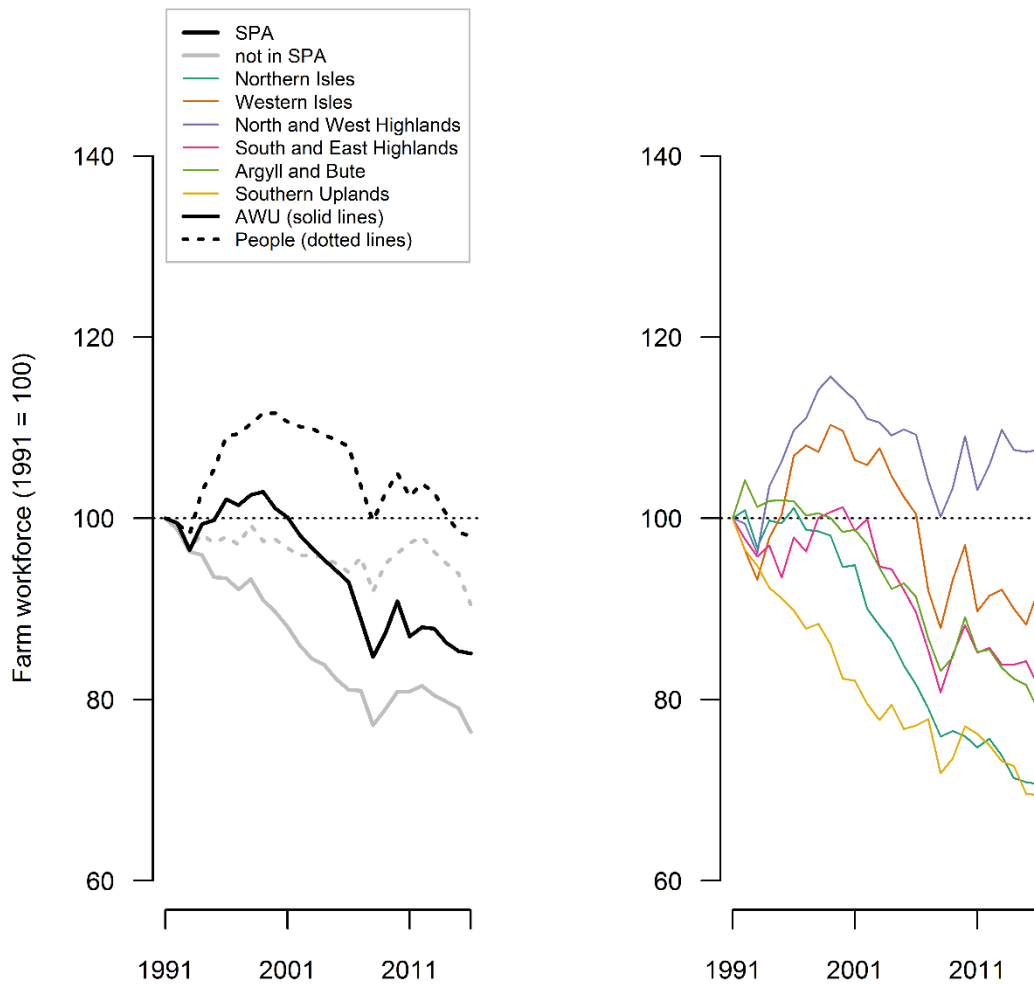
and not in SPA regions. In the SPA, 55.7% of working occupiers were aged 55 or over in 2016, an increase from the figure in 2003 (50.0%). In other rural areas and small towns, the proportion of working occupiers aged 55 or more increased to 56.7% in 2016, from 48.3% in 2003.

Figure 5: Labour: total working occupiers (annual data), 1991-2016.



Figures shown derived from June Agricultural Census data. Data tables courtesy of Agricultural Census Analysis Team, RESAS, Scottish Government.

Figure 6: Labour: total farm workforce (annual data), 1991-2016.



Figures shown derived from June Agricultural Census data. Data tables courtesy of Agricultural Census Analysis Team, RESAS, Scottish Government.

Table 9: Change in the number of regular staff, 1991-2016.

Region or sub-region	People			AWU		
	2016	1991-2016 (%)	2001-2016 (%)	2016	1991-2016 (%)	2001-2016 (%)
Northern Isles - SPA	401	5.80	-8.66	281	0.90	-8.02
Western Isles - SPA	315	-20.05	-20.25	187.5	-26.04	-22.52
North and West Highlands - SPA	791	30.74	-0.13	552.5	17.68	-0.09
South and East Highlands - SPA	436	-10.47	-16.48	353.5	-15.63	-18.27
Argyll and Bute - SPA	670	-9.21	-16.25	527	-17.01	-20.21
Southern Uplands - SPA	589	-31.19	-9.94	482.5	-38.65	-15.13
SPA	3,202	-7.43	-11.10	2,384	-16.12	-13.69
not in SPA	17,100	-20.75	-10.17	14,277.5	-26.37	-12.95

Percentage change (1991-2016, 2001-2016) shown to two decimal places. Figures shown derived from June Agricultural Census data (1991, 2001, 2016). Data tables courtesy of Agricultural Census Analysis Team, RESAS, Scottish Government.

Alongside working occupiers, two other categories of labour contribute to the total farm workforce: regular staff, and casual and seasonal staff. The former is subdivided into hired and family staff, and (from 1998 onwards) business partners. Labour trends for the total number of regular staff (Table 9) are very similar to those described above for working occupiers, and for the total farm workforce. From 1991 to 2016, the SPA saw a fall in the number of regular staff of around 7.4%; however, the rural areas and small towns not within the SPA had a much larger reduction (more than a fifth of regular staff). When expressed in terms of annual work units, the total input of work from regular staff fell by more than 16% from 1991 to 2016 in the SPA, but to a much larger degree (over 26%) in rural areas and small towns outside of the SPA. From 2001 to 2016, both the SPA and not in SPA regions had a similar decline in the number of regular staff: both in terms of the number of people in work, and their overall labour input. At the SPA sub-region level, a simple comparison of the years 1991 and 2016 (Table 9) shows an increase in labour of c. 17.7% from regular staff in the North and West Highlands, and a very small increase of labour (of less than 1%) in the sparsely populated region of the Northern Isles. All other sub-regions in the SPA have observed a reduction in labour from regular staff from 1991 to 2016.

Data is also collected on the gender of regular staff. Regular agricultural staff in rural areas and small towns inside and outside of the SPA are predominantly male, although the proportion who are male has fallen between 1991 and 2016. In 2016, 77.3% of regular staff in the SPA were male, a fall from the respective figure in 1991 (84.5%). In the not in SPA region, these figures are very similar (2016: 79.1% of regular staff were male; 1991: 86.8%).

Table 10: Change in the labour (AWU) contributed by hired and family regular staff, 1991-2016.

Region	Hired staff				Family staff				Hired staff / Family staff	
	1991	2016	1991-2016 (%)	2001-2016 (%)	1991	2016	1991-2016 (%)	2001-2016 (%)	1991	2016
SPA	1,569.5	1,245	-20.68	-11.29	1,272.5	768.5	-39.61	-27.47	1.23	1.62
not in SPA	12,985.5	8,482	-34.68	-16.92	6,405	2,832	-55.78	-22.99	2.03	3.00

Percentage change (1991-2016, 2001-2016) and ratios (1991, 2016) shown to two decimal places.

Figures shown derived from June Agricultural Census data (1991, 2001, 2016). Data tables courtesy of Agricultural Census Analysis Team, RESAS, Scottish Government.

Table 11: Change in the labour (AWU) contributed by business partners (regular staff), 2001-2016; and casual and seasonal staff, 1991-2016.

Region	Business partners		Casual and seasonal staff		
	2016	2001-2016 (%)	2016	1991-2016 (%)	2001-2016 (%)
SPA	370.5	23.91	187	43.85	-4.23
not in SPA	2,963.5	17.90	1,393.25	133.86	99.89

Percentage change (1991-2016, 2001-2016) shown to two decimal places. Figures shown derived from June Agricultural Census data (1991, 2001, 2016). Data tables courtesy of Agricultural Census Analysis Team, RESAS, Scottish Government.

A final comparison of agricultural labour is shown in Tables 10 and 11, and Figure 7: the trends for the three sub-categories of regular staff: hired staff, family staff and business partners, and the remaining casual and seasonal staff. A comparison of the volume of labour contributed by hired and family staff shows, for both the SPA and not in SPA regions, that a) the total labour input from hired staff is greater than that from family staff, and b) that hired regular labour was more important than family labour in 2016, in comparison to 1991. However, family members are relatively more important as a source of labour in the SPA: in 2016, for each AWU contributed by family staff, 1.62 AWU were contributed by hired staff. The respective figure in other rural areas and small towns was 3 AWU (Table 10).

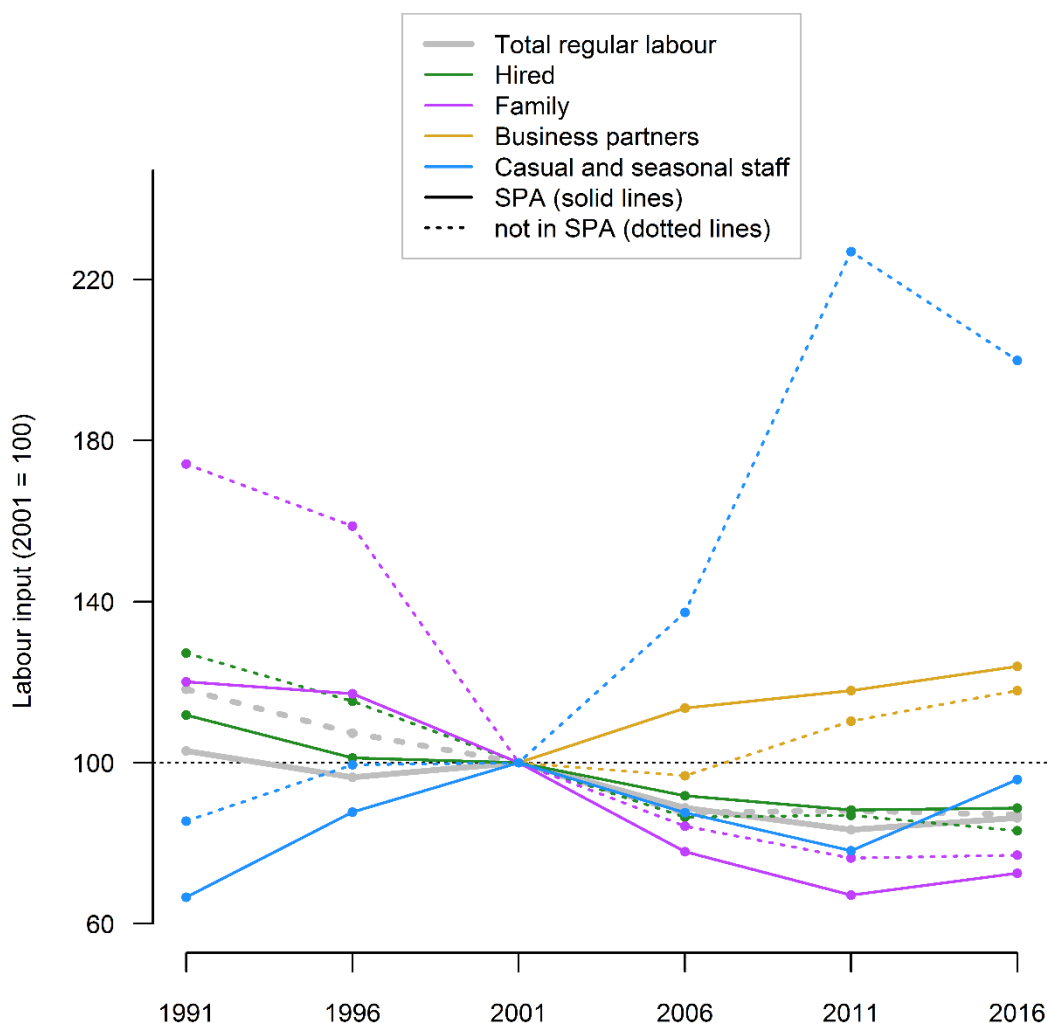
These trends have been driven by a fall in the total labour contributed by hired staff in the SPA (of over 20%) from 1991 to 2016. In the not in SPA region, the respective figure was a much larger decline (c. 34.7%). The labour input from family staff fell by almost 40% in the SPA, again comparing 1991 and 2016 values; however this input dropped by over 55% in non-sparsely populated rural areas and small towns. If the shorter and more recent 2001-2016 period is used for comparison, the falls in hired and family labour are not as large, with a smaller difference in the figures for the SPA and not in SPA regions. It is likely that the decline in family labour is partly accounted for by some family members being recorded as business partners from 1998, onwards. Figures show a very large fall in family labour input in rural areas and small towns from 1997 (7,210.5 AWU) to 1998 (4,697.5 AWU), at the same time as business partners started being recorded in the agricultural census.

Supporting this, published Scotland-wide figures (based on Scottish Government, 2017^{b16}) show that 3,560 business partners were recorded in 1998; from 1997 to 1998, the total number of regular family staff fell by 2,723.

From 2001 to 2016, the labour contribution by business partners increased in both the SPA and not in SPA regions, to a similar degree (Table 11); however, this is affected by the fact that data collection on business partners began just before this period started. Finally, the volume of labour contributed by casual and seasonal staff increased in the SPA from 1991 onwards, by almost 44%; however, the labour input from these staff fell slightly from 2001 to 2016. In rural areas and small towns outside of the SPA, the labour input from casual and seasonal staff more than doubled from 1991 to 2016 (an increase of almost 134%), and this input also increased after 2001, almost exactly doubling from 2001 to 2016 (Table 11). Changes in labour inputs provided by the three sub-categories of regular staff, and by casual and seasonal staff (Figure 7) affirm that the largest difference in labour changes between the SPA and not in SPA regions is that of casual and seasonal staff. From 2001 to 2016, the major increase in the labour contribution from casual and seasonal staff in non-sparsely populated rural areas and small towns is not apparent in the SPA.

¹⁶ Derived from data in Table 26 - Employees, 1982 - 2016 (continued). Statistics derived from data © Crown copyright. Contains public sector information licensed under the Open Government Licence v3.0.

Figure 7: Total labour inputs from regular staff and casual and seasonal staff (data at five year intervals), 1991-2016.



Note that labour inputs are AWU for regular staff, and all totals are expressed relative to 2001. Data is only shown for six years (indicated by points), due to disclosure requirements: the lines between the points do not show values for these years. Figures shown derived from June Agricultural Census data. Data tables courtesy of Agricultural Census Analysis Team, RESAS, Scottish Government.

5. Summary and policy implications

The analysis shown above was focused around three key areas: the structure of the SPA economy, in comparison with that of other rural areas and small towns, and the urban economy; evidence of recent economic changes in the SPA and other regions; and longer-term changes in labour in farm agriculture and the land-based sector. Where appropriate, and where data is available, it has been possible to measure spatial patterns of economic change, as well as changes over time. This section condenses the detailed analysis into key messages and implications, based on the three areas above.

5.1 Summary

What is the size and structure of the SPA economy?

The employment structure of the Sparsely Populated Area is broadly similar to that of rural areas and small towns which are not sparsely populated. Recent measurements of the employment of residents, and jobs, show that the service sector is the dominant part of the economy in both regions; and certain industries (health and social work, wholesale and retail trades, construction and education) are important in both regions.

The traditional land-based sector (including agriculture, forestry and fishing) is far more important as a source of employment (defined either by residents, or by jobs) in the SPA than in rural areas and small towns outside of it. Furthermore, in some parts of the SPA, this sector makes a particularly large contribution to overall employment: it employs over a fifth of employed residents in the sparsely populated Southern Uplands, and more than 13% of those in the area of the Northern Isles which is sparsely populated.

In terms of contributions to employment, accommodation and food service industries and arts and recreation are more important in the SPA than in the not in SPA region. These patterns are likely to reflect tourist and visitor activity.

There are types of economic activity which are less important as a source of employment in the SPA than they are in the 'not in SPA' region: for example, the wholesale and retail sector. In addition, as a generalisation, some industries which may be associated with higher skilled and/or professional jobs (e.g. manufacturing, professional/scientific/technical industries, finance/insurance activities, government/public sector and administration/support) are smaller contributors to employment in the SPA than in non-sparsely populated rural areas and small towns and/or urban regions.

A comparison of numbers of employed residents and the size of the workplace population shows that there is net out-commuting from the SPA to other regions of Scotland, although to a lesser extent than there is in non-sparsely populated rural areas and small towns. Sub-regional comparisons suggest different driving mechanisms, including the presence of central towns in remote areas and the relative accessibility of sub-regions to large urban areas.

How has the SPA economy changed in recent years?

Changes in the number of (estimated) jobs across all parts of the economy show an increase in the number of jobs in several industries within the SPA, from 2009 to 2016. As this period is situated immediately after the recession which affected the UK in 2008-9, some employment growth may be expected.

Some parts of the SPA economy have both seen notable growth in jobs, 'out-performing' corresponding sectors in the 'not in SPA' and urban regions. These include accommodation and food service activities, where a 10% increase in the number of jobs in this sector from 2009 to 2016 may show a growth in tourism in remote Scotland; a major expansion in employment in arts, entertainment and other recreation could have a similar underlying cause. In addition, the construction, manufacturing, administrative/support activities, real estate and mining/quarrying sectors have both gained jobs and had more positive job trends than other regions in Scotland.

Tertiary (service) industries, by far the largest economic sector, have seen a smaller percentage increase in jobs in the SPA, than they have in other rural areas and small towns or in urban areas.

In the SPA, there has been a recent major reduction in the number of jobs within ‘public administration and defence; compulsory social security’: this industrial sector reflects public sector, government activities (Office for National Statistics, 2009: 218) and this decline is very likely to reflect cuts caused by national austerity policies. However, it is noticeable that the number of jobs in this sector has fallen in rural areas and small towns outside the SPA, but to a much lesser degree, and there has been a small growth in employment in this sector in urban areas. This pattern suggests a centralisation of services, likely to be associated with cost savings, but potentially influenced by the longer-term population decline in the sparsely populated area (Hopkins and Copus, 2018).

Other trends in employment suggest centralisation of some economic activities to urban areas and accessible regions; for instance, the number of jobs in information and communication fell by over 26% in the SPA from 2009 to 2016, with a much smaller decline of less than 6% in other rural areas and small towns, and an increase in urban jobs of over 15%. Similarly, a reduction in jobs of over 11% in the education sector within the SPA (contrasting with smaller falls in jobs in this sector within other regions) may reflect the large reduction in the population of children from 1991 onwards within the SPA (Hopkins and Copus, 2018).

How have employment in agriculture, and the broader land-based industries, changed since 1991?

From 1991 to 2011, the total number of residents employed in the land-based industries fell considerably in both the sparsely populated area and in other rural areas and small towns. The contribution to overall employment made by the land-based sector has fallen in these regions, and across all sub-regions.

Agricultural labour in the SPA is more part-time in nature than in the remainder of rural areas and small towns in Scotland: this is particularly the case in the sparsely populated parts of remote areas (islands and the North and West Highlands). The balance of family and hired staff is more even in the SPA, showing that family staff are relatively more important as a source of regular labour than they are in other rural areas and small towns. These two observations are influenced by the croft farming heritage of the north and west of Scotland, and islands¹⁷: crofters typically work part-time on crofts, and many are part of crofting families (Exodus Market Research Ltd, 2014). In both the SPA and in other rural areas and small towns, the proportion of working occupiers who are older (aged 55 or over) is very similar, and the vast majority of regular staff are male.

There has been a reduction in farm labour in the SPA from 1991 to 2016. The labour contributed by working occupiers and the total farm workforce have both fallen by around 15%. However, in rural areas and small towns outside of the SPA, the amount of farm labour has declined to a somewhat greater extent. A very similar pattern is found for the labour input from regular staff, as the scale of labour reduction is greater in the not in SPA region. However, if the shorter 2001-16 period is used for comparison, the changes in these types of farm labour have been very similar for the SPA and not

¹⁷ The locations of the ‘Crofting Counties’ and ‘New Crofting Areas’ are detailed at <http://www.gov.scot/Topics/farmingrural/Rural/crofting-policy/new-crofting-areas> (Accessed 25th May 2018)

in SPA regions. Within the SPA, evidence suggests a substantial contraction of farming in the Northern Isles from 1991 onwards.

The labour contribution from casual and seasonal staff has increased dramatically in rural areas and small towns which are not sparsely populated, from 1991 to 2016. In the SPA, the volume of labour from these non-regular staff has increased considerably, although to a much lesser degree than in the not in SPA region. Additionally, the labour input from casual and seasonal staff fell slightly in the SPA from 2001 to 2016: it almost doubled in other rural areas and small towns over the same period.

5.2 Policy implications

The analysis of recent changes in job numbers suggests a major fall in employment in public services within the SPA, and provides evidence of a centralisation of these, and other economic activities, in more accessible and urban areas. These regional patterns may not automatically mean that residents of sparsely populated areas are suffering from a loss of access to services. Several public services (at UK and council levels) and related transactions and payments are accessible online, as are business and retail activities. However, despite an expansion of coverage, high speed internet access is not universal in Scotland¹⁸, many services require a physical presence in a location, and a projected future population decline in sparsely populated areas (Copus, 2018) will threaten the sustainability of some services and activities. Further research into services of general interest (SGI) within the SPA is ongoing (Wilson and Copus, 2018) and will investigate the key relationship between demographic changes and the delivery of services in sparsely populated Scotland.

The assessment of agricultural labour reveals that this is changing more rapidly in non-sparsely populated rural areas and small towns, than it is within the SPA. The (longer-term) larger scale of reductions in farm labour inputs, and major expansion of casual and seasonal labour, outside the SPA suggest greater flexibility and faster adjustment in the agricultural sector in the not in SPA region. This may be facilitated by better employment opportunities both in this region, and in the urban areas which are more accessible to the not in SPA region than to the sparsely populated area. The 'inertia' in the sparsely populated area, by contrast, may reflect relatively poor access to employment opportunities in other areas of the economy: variation in the availability of different types of jobs between the SPA and other regions is supported by the broader employment data (described in Section 4.1). Despite this, there is also a strong indication of more rapid change (and a considerable decline) of the agricultural sector in the sparsely populated parts of the Northern Isles. In this sub-region, the labour provided by working occupiers fell by over a third from 1991 to 2016, and the overall labour input fell by just under 30%. The sparsely populated Southern Uplands have also seen a large fall in agricultural labour.

Whether these trends (and other economic patterns) will continue in future is unclear, due to the considerable uncertainty facing the economy due to the Brexit process. However, a recent study focusing on remote Scotland (the Highlands and Islands) found that Brexit is likely to have negative impacts on grazing agriculture, and that leaving the EU will "...accelerate existing trends" in farming in this region, including reduced agricultural activity and employment, with further knock-on effects on other parts of the economy (Moxey and Thomson, 2018: iv). If the "...distinctive and targeted policy interventions" recommended for the farming sector in the Highlands and Islands after Brexit

¹⁸ See <https://news.gov.scot/news/95-percent-broadband-coverage> (Accessed 18th September 2018)

(Moxey and Thomson, 2018: v) are taken forward, then these could also be considered for the sparsely populated area overall.

Following from the employment and labour changes described, a key question to consider is how economic change in sparsely populated Scotland is changing the types of jobs which are available in this region. Growth in labour which is relatively low wage, part-time and/or insecure in nature is unlikely to a) increase the rate of change in agricultural labour and b) reverse negative demographic trends (i.e. decreases in the total population, and working age population: Hopkins and Copus (2018)) within the SPA. The further implications of these economic changes (and associated population changes) on the provision of services in sparsely populated areas forms a crucial topic for further research.

References

- 11th OECD Rural Development Conference (2018) Edinburgh Policy Statement on Enhancing Rural Innovation. Available at <http://www.oecd.org/cfe/regional-policy/Edinburgh-Policy-Statement-On-Enhancing-Rural-Innovation.pdf> (Accessed 28th May 2018)
- Atterton, J. (2012) Towns and rural Scotland: vibrant or vulnerable? In: Skerratt, S., Atterton, J., Hall, C., McCracken, D., Renwick, A., Revoredo-Giha, C., Steinerowski, A., Thomson, S., Woolvin, M., Farrington, J., Heesen, F. Rural Scotland in Focus 2012. Rural Policy Centre, Scottish Agricultural College, Edinburgh: pp. 27-42. Available at https://www.sruc.ac.uk/download/downloads/id/470/rural_scotland_in_focus_2012_web_version.pdf (Accessed 28th May 2018)
- Atterton, J. (2016) Scotland's rural economies – looking beyond the land-based sector. In: Skerratt, S., Atterton, J., McCracken, D., McMorran, R., Thomson S. Rural Scotland in Focus. Scotland's Rural College, Edinburgh: pp. 114-149. Available at https://www.sruc.ac.uk/downloads/file/3184/rural_scotland_in_focus_2016_-_full_report (Accessed 28th May 2018)
- BPP Learning Media (2015) Business Essentials: Business Environment Course Book. BPP Learning Media Ltd, London.
- Copus, A. (2018) Demographic Projections for the Scottish Sparsely Populated Area (SPA) 2011-2046. Available at https://www.hutton.ac.uk/sites/default/files/files/RD%203_4_1%20Working%20Paper%203%2001_2ii%20260218%20-%20published.pdf (Accessed 18th September 2018)
- Copus, A. and Hopkins, J. (2015) Mapping Rural Socio-Economic Performance (SEP): Report for Rural Communities Team, Food, Drink and Rural Communities Division, The Scottish Government. (Executive Summary) Available at <http://www.hutton.ac.uk/sites/default/files/files/SEP%20INDEX%20-%20Executive%20Summary.pdf> (Accessed 28th May 2018)
- Copus, A. and Hopkins, J. (2017) Outline Conceptual Framework and Definition of the Scottish Sparsely Populated Area (SPA). Available at http://www.hutton.ac.uk/sites/default/files/files/RD%203_4_1%20Working%20Paper%201%2001_1%20161117.pdf (Accessed 27th March 2018)
- Copus, A. and Lloyd, J. (2006) Patterns of Change in Agricultural Labour in Scotland 1998-2003. Working Paper 1: SEERAD Research Objective 618024; Rural Development Implications of Changing Agricultural Employment Patterns. SAC.
- Exodus Market Research Ltd (2014) Survey of the economic condition of crofting 2011-2014. Scottish Government Social Research Working Paper 2014. Available at <http://www.gov.scot/Resource/0046/00466743.pdf> (Accessed 25th May 2018)
- Gløersen, E., Dubois, A., Copus, A., Schürmann, C. (2016) Northern Peripheral, Sparsely Populated Regions in the European Union and in Norway. Nordregio Report 2006:2. Nordregio, Stockholm.

<http://www.diva-portal.org/smash/get/diva2:700429/FULLTEXT01.pdf> (Accessed 17th September 2018)

Gregg, P. and Wadsworth, J. (2010) Employment in the 2008-2009 recession. *Economic & Labour Market Review* 4(8): 37-43. <https://doi.org/10.1057/elmr.2010.111>

Hopkins, J. and Copus, A. (2018) A Demographic Profile of the Scottish Sparsely Populated Area (SPA) 1991-2037. Available at http://www.hutton.ac.uk/sites/default/files/files/RD%203_4_1%20Working%20Paper%20%2001_2ii%20270218%20-%20published.pdf (Accessed 27th March 2018)

Kleinert, E., Beale, G., Henderson, N., Davidson, N. (2018) Understanding the Scottish Rural Economy. RESAS (Rural & Environment Science & Analytical Services), The Scottish Government, Edinburgh. Available at <http://www.gov.scot/Resource/0053/00531667.pdf> (Accessed 28th May 2018)

Moxey, A. and Thomson, S. (2018) Post Brexit Implications for Agriculture and Associated Land Use in the Highlands and Islands. Available at https://www.sruc.ac.uk/downloads/file/3702/post_brexit_implications_for_agriculture_and_associated_land_use_in_the_highlands_and_islands (Accessed 28th May 2018)

National Records of Scotland (2016) Population and Household Projections for Scottish Sub-Council Areas (2012-based): Population projections by age and sex, and household projections by age group and household type, at sub-council area level. Available at <https://www.nrscotland.gov.uk/files//statistics/scap/scap.pdf> (Accessed 8th May 2018)

Nomis (no date *a*) Business Register and Employment Survey (excluding units registered for PAYE only) : open access. Available at http://www.nomisweb.co.uk/datasets/172_1/about.pdf (Accessed 31st May 2018)

Nomis (no date *b*) Business Register and Employment Survey : open access. Available at http://www.nomisweb.co.uk/datasets/189_1/about.pdf (Accessed 31st May 2018)

Office for National Statistics (2009) UK Standard Industrial Classification of Economic Activities 2007 (SIC 2007): Structure and explanatory notes. Palgrave Macmillan. Available at <https://www.ons.gov.uk/file?uri=/methodology/classificationsandstandards/ukstandardindustrialclassificationofeconomicactivities/uksic2007/uksic2007web.pdf> (Accessed 17th April 2018)

Office for National Statistics (2014) Methodology: Business Register Employment Survey (BRES) QMI. <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/businessregisteremploymentsurveybresqmi> (Accessed 10th May 2018)

R Core Team (2017) R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. <https://www.R-project.org/>

R Core Team (2018) foreign: Read Data Stored by 'Minitab', 'S', 'SAS', 'SPSS', 'Stata', 'Systat', 'Weka', 'dBase', R package version 0.8-70. <https://CRAN.R-project.org/package=foreign>

Scottish Government (2017 *a*) Results from the June 2017 Scottish Agricultural Census. Available at <http://www.gov.scot/Resource/0052/00525858.pdf> (Accessed 29th March 2018)

Scottish Government (2017 *b*) Abstract of Scottish Agricultural Statistics 1982 to 2017 [Excel workbook]. Available at <http://www.gov.scot/Resource/0052/00525907.xls> (Accessed 24th May 2018)

Scottish Government Geographical Information Science & Analysis Team, Rural and Environment Science and Analytical Services Division (2018) Scottish Government Urban Rural Classification 2016. Scottish Government, Edinburgh. Available at <https://www.gov.scot/Resource/0053/00533588.pdf> (Accessed 17th September 2018)

University of Glasgow Training & Employment Research Unit (2014) Review of Fragile Areas and Employment Action Areas in the Highlands and Islands: executive summary. Highlands and Islands Enterprise. Available at <http://www.hie.co.uk/common/handlers/download-document.ashx?id=25176545-481d-4be7-a747-0d0e34062df3> (Accessed 29th May 2018)

Ward, M. and Rhodes, C. (2014) Small businesses and the UK economy. House of Commons Library Standard Note: SN/EP/6078. Available at <http://researchbriefings.files.parliament.uk/documents/SN06078/SN06078.pdf> (Accessed 18th September 2018)

Wilson, R. and Copus, A. (2018) Services of General Interest (SGI) in the Scottish Sparsely Populated Area (SPA): Introduction, Classification by Delivery Mode, and Selection of Exemplar Services. Available at http://www.hutton.ac.uk/sites/default/files/files/Wilson%20and%20Copus%203_4_1%20Working%20Paper%20-%20published.pdf (Accessed 17th April 2018)

Appendix 1: Data sources

This appendix summarises and acknowledges the data sources used in the analysis within this working paper, outlining both the background information used (lookup tables and area definitions) and the data sources used in the three parts of Section 4.

Lookup tables and area definitions

Lookup tables (regions and/or sub-regions to other geographies) are available online:

- 1991 Output Areas, lookup to regions and sub-regions
(http://www.hutton.ac.uk/sites/default/files/files/RD341_OA91_LU_SPASUB6_Full.csv)
- 2001 Output Areas, lookup to regions and sub-regions
(http://www.hutton.ac.uk/sites/default/files/files/RD341_OA01_LU_SPASUB6_Full.csv)
- 2011 Output Areas, lookup to regions and sub-regions
(http://www.hutton.ac.uk/sites/default/files/files/RD341_0a11_lu_spasub6_Full.csv)
- 2001 Data Zones, lookup to regions
(http://www.hutton.ac.uk/sites/default/files/files/RD341_DZ01_LU_SPAFLAG_Full.csv)
- 2011 Data Zones, lookup to regions
(http://www.hutton.ac.uk/sites/default/files/files/RD341_DZ11_LU_SPAFLAG_Full.csv)
- Agricultural Parishes, lookup to regions and sub-regions
(http://www.hutton.ac.uk/sites/default/files/files/RD341_PARCODE_SPAFLAG_SUBREGION_6_LOOKUP_Full.csv)

The lookup tables are available for download at the links above (accessed: 29th May 2018). For a description of how the lookups were produced and the data sources used (and acknowledgements for these) see Copus and Hopkins (2017: 17-22, Appendix). Information on the content of the lookup tables is included in Hopkins and Copus (2018: Annex 2).

See Copus and Hopkins (2017) for a description of how the SPA was defined, and the data sources and methods used for this. The definition of the sub-regions used in the analysis is included in Hopkins and Copus (2018: Annex 1).

Section 4.1. What is the size and structure of the SPA economy?

Tables 1 and 2, Appendix Tables 1 and 2: 2011 Census data, downloaded from Scotland's Census (homepage: <http://www.scotlandscensus.gov.uk/>): Bulk data files: Output Area 2011. Table QS605SC. © Crown copyright. Data supplied by National Records of Scotland.

Table 3, Appendix Table 3: Business Register and Employment Survey: open access data. ONS Crown Copyright Reserved [from Nomis on 10 May 2018]. Source: Office for National Statistics. (Year 2016, resolution: 2011 Data Zones). Data downloaded from Nomis (homepage: <https://www.nomisweb.co.uk/>)

Table 4, Appendix Table 4: a) 2011 Census data, downloaded from Scotland's Census (homepage: <http://www.scotlandscensus.gov.uk/>): Bulk data files: Output Area 2011. Table QS605SC. © Crown copyright. Data supplied by National Records of Scotland. b) 2011 Census data, downloaded from Scotland's Census

(http://www.scotlandscensus.gov.uk/documents/additional_tables/WP101SCoa.xlsx). Table WP101SC. © Crown copyright 2016. Data supplied by National Records of Scotland.

Section 4.2. How has the SPA economy changed in recent years?

Table 5, Appendix Table 5: a) Business Register and Employment Survey: open access data. ONS Crown Copyright Reserved [from Nomis on 10 May 2018]. Source: Office for National Statistics. (Year 2016, resolution: 2011 Data Zones). Data downloaded from Nomis (homepage: <https://www.nomisweb.co.uk/>). b) Business Register and Employment Survey (excluding units registered for PAYE only): open access data. ONS Crown Copyright Reserved [from Nomis on 10 May 2018]. Source: Office for National Statistics. (Year 2009, resolution: 2001 Data Zones). Data downloaded from Nomis (homepage: <https://www.nomisweb.co.uk/>).

Figure 2: a) 2011 Census data, downloaded from Scotland's Census (homepage: <http://www.scotlandscensus.gov.uk/>): Bulk data files: Output Area 2011. Table QS605SC. © Crown copyright. Data supplied by National Records of Scotland. b) Business Register and Employment Survey: open access data. ONS Crown Copyright Reserved [from Nomis on 10 May 2018]. Source: Office for National Statistics. (Year 2016, resolution: 2011 Data Zones). Data downloaded from Nomis (homepage: <https://www.nomisweb.co.uk/>). c) Business Register and Employment Survey (excluding units registered for PAYE only): open access data. ONS Crown Copyright Reserved [from Nomis on 10 May 2018]. Source: Office for National Statistics. (Year 2009, resolution: 2001 Data Zones). Data downloaded from Nomis (homepage: <https://www.nomisweb.co.uk/>).

Figure 3: a) Business Register and Employment Survey: open access data. ONS Crown Copyright Reserved [from Nomis on 10 May 2018]. Source: Office for National Statistics. (Years 2015-6, resolution: 2011 Data Zones). Data downloaded from Nomis (homepage: <https://www.nomisweb.co.uk/>). b) Business Register and Employment Survey (excluding units registered for PAYE only): open access data. ONS Crown Copyright Reserved [from Nomis on 10 May 2018]. Source: Office for National Statistics. (Years 2009-14, resolution: 2001 Data Zones). Data downloaded from Nomis (homepage: <https://www.nomisweb.co.uk/>).

Section 4.3. How have employment in agriculture, and the broader land-based industries, changed since 1991?

Table 6 and Figure 4:

1991 Census data, downloaded from Casweb (<http://casweb.ukdataservice.ac.uk/>). Table SAS 73. Industry (10% Sample): Residents aged 16 and over; employees and self-employed.

(Employment figures multiplied by 10 for the purposes of this analysis)

Office of Population Censuses and Surveys; General Register Office for Scotland; Registrar General for Northern Ireland (1997): 1991 Census aggregate data. UK Data Service (Edition: 1997). DOI: <http://dx.doi.org/10.5257/census/aggregate-1991-1>. This information is licensed under the terms of the Open Government Licence [<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2>]. Census output is Crown copyright and is reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland.

2001 Census data: Table UV034. Industry: All People Aged 16 to 74 in Employment.

(Note that land-based industries defined as agricultural, hunting and forestry plus fishing for the purposes of this analysis)

Office for National Statistics; General Register Office for Scotland; Northern Ireland Statistics and Research Agency (2005): 2001 Census aggregate data (Edition: 2005). UK Data Service. DOI: <http://dx.doi.org/10.5257/census/aggregate-2001-1>. This information is licensed under the terms of the Open Government Licence [<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2>]. Census output is Crown copyright and is reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland.

2011 Census data: downloaded from Scotland's Census (homepage: <http://www.scotlandscensus.gov.uk/>): Bulk data files: Output Area 2011. Table QS605SC. © Crown copyright. Data supplied by National Records of Scotland.

All further tables and figures in Section 4.3: June Agricultural Census data (for year(s) shown). Data tables courtesy of Agricultural Census Analysis Team, RESAS, Scottish Government.

(Note that for the years 2012-2016, inclusive, JAC data tables included some records not sourced from agricultural holdings. These records contributed to the labour totals in 2014)

Appendix 2: Full results tables from sections 4.1 and 4.2

Appendix Table 1: Overall employment breakdown within the SPA, not in SPA and Urban regions (2011)

Industry	SPA	not in SPA	Urban	SPA: rank	not in SPA: rank	Urban: rank
All people aged 16 to 74, in employment	66,290	716,105	1,734,500			
Agriculture, forestry and fishing	9.12	4.15	0.36	5	11	18
Mining and quarrying	0.99	1.92	1.13	16	15	15
Manufacturing	5.57	8.45	7.97	8	4	4
Electricity, gas, steam and air conditioning supply	0.62	0.81	0.81	18	18	16
Water supply; sewerage, waste management and remediation activities	0.81	0.84	0.73	17	17	17
Construction	10.13	9.23	7.35	4	3	5
Wholesale and retail trade; repair of motor vehicles and motor cycles	10.97	14.14	15.46	3	2	1
Transport and storage	6.21	4.74	5.02	7	9	10
Accommodation and food service activities	11.33	5.77	6.30	2	7	7
Information and communication	1.51	2.09	3.06	14	14	13
Financial and insurance activities	1.00	2.98	5.27	15	13	8
Real estate activities	1.75	1.16	1.16	13	16	14
Professional, scientific and technical activities	3.64	5.23	5.27	11	8	9
Administrative and support service activities	3.48	3.83	4.59	12	12	12
Public administration and defence; compulsory social security	5.43	6.84	7.08	9	6	6
Education	8.28	8.41	8.43	6	5	3
Human health and social work activities	13.66	14.64	15.16	1	1	2
Arts, entertainment and recreation; other service activities	5.39	4.70	4.82	10	10	11
Activities of households as employers...*	0.13	0.07	0.03	19	19	19
Activities of extraterrestrial organisations and bodies	0.00	0.01	0.01	20	20	20
Primary industries total	10.11	6.07	1.48			
Secondary industries total	17.13	19.32	16.86			
Tertiary industries total	72.76	74.62	81.66			

*For industrial sections and industry groups, figures show percentages of the total number of people aged 16 to 74 in employment for the three regions. The ranks of employment totals in industrial sections are also shown (1 = largest number). Based on residents (people aged 16 to 74 in employment), 2011. Figures shown derived from 2011 Census data (Table QS605SC). © Crown copyright. Data supplied by National Records of Scotland. *- full name: "Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use"*

Appendix Table 2: Overall employment breakdown within the six SPA sub-regions (2011)

Industry	NI	WI	NWH	SEH	AB	SU
All people aged 16 to 74, in employment	7,019	6,383	18,782	10,531	19,957	3,618
Agriculture, forestry and fishing	13.46	7.28	8.53	5.79	8.19	21.72
Mining and quarrying	1.65	1.39	1.07	1.30	0.53	0.25
Manufacturing	5.78	5.51	4.26	5.75	6.55	6.16
Electricity, gas, steam and air conditioning supply	0.61	0.31	0.58	0.89	0.64	0.53
Water supply; sewerage, waste management and remediation activities	0.61	0.83	1.05	0.36	0.95	0.39
Construction	9.86	12.09	11.02	9.16	9.79	7.24
Wholesale and retail trade; repair of motor vehicles and motor cycles	10.37	9.57	11.18	11.82	10.84	11.72
Transport and storage	11.24	8.27	5.78	3.42	6.05	4.04
Accommodation and food service activities	5.31	7.14	12.50	16.94	11.40	7.55
Information and communication	1.04	1.60	1.85	1.29	1.43	1.55
Financial and insurance activities	0.31	0.66	0.97	1.17	1.18	1.55
Real estate activities	0.40	0.91	1.90	2.95	1.76	1.44
Professional, scientific and technical activities	3.08	4.09	3.96	4.30	3.06	3.54
Administrative and support service activities	2.82	2.73	3.32	4.22	3.82	2.85
Public administration and defence; compulsory social security	4.90	6.66	4.80	4.12	6.79	3.90
Education	9.76	10.06	8.66	7.28	7.65	6.61
Human health and social work activities	14.33	16.94	13.22	10.93	14.38	12.77
Arts, entertainment and recreation; other service activities	4.37	3.95	5.20	8.00	4.89	6.05
Activities of households as employers...*	0.07	0.00	0.15	0.29	0.09	0.14
Activities of extraterrestrial organisations and bodies	0.00	0.00	0.01	0.00	0.01	0.03
Primary industries total	15.12	8.68	9.60	7.09	8.72	21.97
Secondary industries total	16.87	18.75	16.91	16.17	17.92	14.32
Tertiary industries total	68.02	72.57	73.49	76.74	73.36	63.71

*For industrial sections and industry groups, figures show percentages of the total number of people aged 16 to 74 in employment for the three regions. Based on residents (people aged 16 to 74 in employment), 2011. Figures shown derived from 2011 Census data (Table QS605SC). © Crown copyright. Data supplied by National Records of Scotland. SPA sub-regions: **Northern Isles**, **Western Isles**, **North and West Highlands**, **South and East Highlands**, **Argyll and Bute**, **Southern Uplands**. *- full name: "Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use"*

Appendix Table 3: Overall employment breakdown within the SPA, not in SPA and Urban regions (2016)

Industry	SPA	not in SPA	Urban	SPA: rank	not in SPA: rank	Urban: rank
Agriculture, forestry and fishing**	2,676	6,771	2,883	9	15	19
Mining and quarrying	267	9,026	21,988	17	13	16
Manufacturing	2,973	51,622	123,675	8	3	8
Electricity, gas, steam and air conditioning supply	422	4,791	13,258	16	19	17
Water supply; sewerage, waste management and remediation activities	228	4,911	11,906	18	18	18
Construction	3,969	39,499	94,866	5	5	9
Wholesale and retail trade; repair of motor vehicles and motor cycles	6,460	76,376	288,219	3	1	2
Transport and storage	3,156	23,577	79,492	6	9	11
Accommodation and food service activities	8,942	46,934	133,369	1	4	6
Information and communication	438	7,853	63,454	15	14	12
Financial and insurance activities	200	5,161	80,229	19	17	10
Real estate activities	1,601	6,621	28,798	13	16	15
Professional, scientific and technical activities	1,838	33,776	139,445	11	7	5
Administrative and support service activities	1,752	25,333	156,790	12	8	3
Public administration and defence; compulsory social security	2,132	20,213	130,240	10	11	7
Education	4,777	36,103	149,275	4	6	4
Human health and social work activities	7,120	71,466	332,679	2	2	1
Arts, entertainment and recreation***	3,053	20,619	56,464	7	10	13
Other service activities***	787	10,587	42,071	14	12	14
Activities of households as employers...*	0	0	0	20	20	20
Activities of extraterrestrial organisations and bodies	0	0	0	20	20	20
Primary industries (total)**	2,943	15,796	24,871			
Secondary industries (total)	7,591	100,823	243,705			
Tertiary industries (total)	42,256	384,620	1,680,523			

*For industrial sections and industry groups, figures show estimated numbers of jobs (rounded to the nearest whole number) within the three regions. The ranks of estimated job totals in industrial sections are also shown (1 = largest number). Figures derived from Business Register and Employment Survey: open access data. ONS Crown Copyright Reserved [from Nomis on 10 May 2018]. Source: Office for National Statistics. *- full name: "Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use". **-these figures exclude jobs in farm agriculture. ***-note that these sections are provided separately here, they were combined into one category within the Census data analysis.*

Appendix Table 4: Employed residents and workplace population of the regions and sub-regions (2011), including sub-regions of the 'not in SPA' area

Region or sub-region	Employed residents (ER)	Workplace population (WP)	WP (% of ER)	Output Areas (OA) (n)	OA where ER > WP (%)*	OA where ER < WP (%)*
SPA	66,290	59,624	89.94	1,290	75.43	22.56
not in SPA	716,105	567,632	79.27	12,524	83.87	15.71
Urban	1,734,500	1,875,089	108.11	32,537	85.77	13.92
Northern Isles - SPA	7,019	6,238	88.87	121	81.82	17.36
Western Isles - SPA	6,383	5,074	79.49	132	82.58	14.39
North and West Highlands - SPA	18,782	16,732	89.09	354	75.14	23.73
South and East Highlands - SPA	10,531	9,504	90.25	189	71.96	27.51
Argyll and Bute - SPA	19,957	19,237	96.39	412	72.82	23.79
Southern Uplands - SPA	3,618	2,839	78.47	82	76.83	20.73
Northern Isles - not in SPA	17,261	18,031	104.46	269	80.30	19.70
Western Isles - not in SPA	6,980	7,705	110.39	121	80.17	19.01
North and West Highlands - not in SPA	39,624	34,426	86.88	704	83.24	16.48
South and East Highlands - not in SPA	228,426	161,409	70.66	3,740	84.41	15.32
Argyll and Bute - not in SPA	16,641	21,229	127.57	301	75.75	23.92
Southern Uplands - not in SPA	103,078	92,367	89.61	1,926	79.85	19.16
other rural or small town area - not in SPA	304,095	232,465	76.44	5,463	85.70	13.93

Employed residents and workplace population include people aged 16 to 74 in employment.

*Workplace population figures also include residents of the rest of the UK aged 16 or over who work in Scotland, but do not include Scottish residents working outside Scotland or offshore. Figures shown derived from 2011 Census data: a) Table QS605SC. © Crown copyright. Data supplied by National Records of Scotland; b) Table WP101SC. © Crown copyright 2016. Data supplied by National Records of Scotland. *-note that for a very small minority of Output Areas (178 out of 46,351 in Scotland), the ER and WP were equal. To save space these percentages are not shown in the table.*

Appendix Table 5: Change in the estimated number of jobs within the SPA, not in SPA and Urban regions (2009-2016)

Industry	SPA	not in SPA	Urban
Agriculture, forestry and fishing**	21.8	28.0	3.1
Mining and quarrying	82.8	34.9	2.7
Manufacturing	10.1	-1.4	-9.2
Electricity, gas, steam and air conditioning supply	24.3	70.3	-0.6
Water supply; sewerage, waste management and remediation activities	-5.0	12.0	5.4
Construction	20.4	0.2	-7.4
Wholesale and retail trade; repair of motor vehicles and motor cycles	-1.2	2.7	-1.3
Transport and storage	2.7	3.5	0.3
Accommodation and food service activities	10.1	4.9	3.4
Information and communication	-26.2	-5.9	15.2
Financial and insurance activities	-31.7	-25.9	-7.5
Real estate activities	67.0	46.8	17.3
Professional, scientific and technical activities	30.9	31.2	4.3
Administrative and support service activities	22.5	6.8	-0.1
Public administration and defence; compulsory social security	-49.9	-12.8	3.9
Education	-11.5	-6.6	-1.8
Human health and social work activities	-0.4	-1.7	8.8
Arts, entertainment and recreation***	73.9	58.1	16.7
Other service activities***	-0.7	23.8	26.1
Activities of households as employers...*	NA	NA	NA
Activities of extraterrestrial organisations and bodies	NA	NA	NA
Primary industries (total)**	25.6	31.8	2.8
Secondary industries (total)	15.5	1.8	-7.4
Tertiary industries (total)	1.2	4.7	3.6

*Figures show percentage change in the estimated numbers of jobs (2009-2016, to one decimal place) within the three regions. Figures derived from a) Business Register and Employment Survey: open access data (2016); and b) Business Register and Employment Survey (excluding units registered for PAYE only): open access data (2009). Both datasets: ONS Crown Copyright Reserved [from Nomis on 10 May 2018]. Source: Office for National Statistics. *- full name: "Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use". **-these figures exclude jobs in farm agriculture. ***-note that these sections are provided separately here, they were combined into one category within the Census data analysis.*

Appendix 3: Limitations and caveats of the use of Business Register and Employment Survey data

The analysis in sections 4.1 and 4.2 of this working paper used Data Zone-level jobs data from the Business Register and Employment Survey (BRES), which were downloaded from the Nomis website (www.nomisweb.co.uk). The specific datasets were a) Business Register and Employment Survey: open access (used for the years 2015 and 2016, available at the level of 2011 Data Zones) and b) Business Register and Employment Survey (excluding units registered for PAYE only): open access (used for the years 2009-14 inclusive, for 2001 Data Zones).

While the BRES data is an extremely useful source of information, it is important to acknowledge key caveats and uncertainties associated with these data. As already noted, the BRES figures are estimates of jobs (and logically, figures based on them are also estimated numbers of jobs). They are based on a sample of c. 80,000 businesses, and values for smaller geographical units are of lower quality than those produced for larger areas (Office for National Statistics, 2014). Additionally, as noted in Section 4.1.1, the BRES data figures for Data Zones exclude jobs in farm agriculture (Office for National Statistics, 2014). Furthermore, it is important to recognise the following issues with BRES data:

- The figures show the employment of employees and working owners; some self-employed workers who are not registered for VAT/PAYE are not included in these data¹⁹.
- A person with two part-time jobs could be counted twice in the figures, as employment is defined at the location of workplaces (Source: ONS).
- Data Zone-level figures of jobs in industrial sections, and total jobs, are provided in rounded form²⁰. In addition, to take into account of the fact that the population in some Data Zones is split between different regions and sub-regions, some of these rounded data were adjusted using information in the lookup tables produced in earlier work.
- BRES is not designed for the purpose of assessing change over time (Office for National Statistics, 2014).

Due to the limitations associated with the BRES data, the figures included in Section 4 must be acknowledged as estimates to be treated with caution. In addition, the BRES figures are presented at the regional level, only.

¹⁹ Based on definition provided on the Nomis website (Accessed 26th April 2018)

²⁰ Rounding is briefly commented on at <https://www.nomisweb.co.uk/articles/971.aspx> (Accessed 31st May 2018)

Appendix 4: Coefficients for conversion of June Agricultural Census farm labour data to annual work units

The following coefficients were used to convert data on farm labour within the June Agricultural Census, measured in numbers of people, to annual work units, based on the nature of labour (full time, part time, degrees of part time labour, casual and seasonal). These are partly based on those used in a previous analysis, which were calculated from working hours data from the Farm Accounts Survey in Scotland (Copus and Lloyd, 2006: 11). The coefficients used in this analysis are shown in the bullet points below: they are 'common sense' rounded values based on the analysis cited above and the wording of the farm labour categories.

- Full-time working occupiers, full-time regular staff: AWU = people x 1
- Part-time working occupiers: half-time or more: AWU = people x 0.75
- Part-time working occupiers: less than half-time: AWU = people x 0.25
- Part-time regular staff: AWU = people x 0.5
- Casual and seasonal staff: AWU = people x 0.25