

RESAS RD 3.4.1 Demographic change in remote areas

<http://www.hutton.ac.uk/research/projects/demographic-change-remote-areas>

Working Paper 2 (Objective O1.2ii)

Version 4, February 2018

A Demographic Profile of the Scottish Sparsely Populated Area (SPA) 1991-2037

Jonathan Hopkins and Andrew Copus

The Social Economic and Geographical Sciences Group
The James Hutton Institute,
Craigiebuckler, Aberdeen.
February 2018



This working paper was funded by the Rural and Environment Science
and Analytical Services Division of the Scottish Government



Scottish Government
Riaghaltas na h-Alba
gov.scot

CONTENTS

1. Introduction	1
The Structure of this Working Paper	1
2. Analysis of 1991, 2001 and 2011 Census Data	3
Introduction	3
Total population	3
Child population	6
Working age population	8
Old age population	10
Dependency ratios	12
Gender	13
Household composition	15
3. Intercensal Trends from Mid-Year Estimates at Data Zone level.....	18
4. A first look at future trends based upon Sub Council Area Projections	22
The SCAP Area Geography and how it relates to the SPA	22
Combining SCAP Projections with Special Area Population Estimates (SAPE) in a single series	22
A first glimpse of the medium-term demographic narrative of the SPA and its sub-areas	23
Children in the SPA and its sub-areas	25
The Working Age Population (WAP) in the SPA and its sub-areas	26
The Pensioner Cohort in the SPA and its sub areas	27
Dependency Rates in the SPA and its sub areas	29
5. Towards a Demographic Narrative of the Scottish SPA 1991-2037.	30
6. Some Initial Observations about Policy Implications	30
References	31
Annex 1: The SPA Geographical Framework	32
Annex 2: Lookup tables.....	34
Annex 3: Population data sources.....	36

Acknowledgement

Any views expressed in this working paper are those of the authors and do not necessarily represent those of the funder (the Scottish Government).

Figures

Figure 1: Change in total population (1991-2016), for the SPA and rest of Scotland. Change shown relative to 1991 value (index = 100).	5
Figure 2: Change in child population (1991-2016), for the SPA and rest of Scotland. Change shown relative to 1991 value (index = 100).	7
Figure 3: Change in working age population (1991-2016), for the SPA and rest of Scotland. Change shown relative to 1991 value (index = 100).....	9
Figure 4: Change in old age population (1991-2016), for the SPA and rest of Scotland. Change shown relative to 1991 value (index = 100).	11
Figure 5: Change in total population (1996-2016), for the SPA and rest of Scotland.	20
Figure 6: Overall Population trend 1996-2037 in the SPA, Rest of Rural and Urban Scotland.....	24
Figure 7: Population Trends in the 6 SPA Sub-Areas	24

Tables

Table 1: Change in total population (1991-2011 and 1991-2016), for the SPA and rest of Scotland. ...	4
Table 2: Change in child population (1991-2011 and 1991-2016), for the SPA and rest of Scotland. ...	6
Table 3: Change in working age population (1991-2011 and 1991-2016), for the SPA and rest of Scotland.	8
Table 4: Change in old age population (1991-2011 and 1991-2016), for the SPA and rest of Scotland.	10
Table 5: Change in the dependency ratio (child + old age populations divided by working age population) (1991-2016), for the SPA and rest of Scotland.....	12
Table 6: Change in the old age dependency ratio (old age population divided by working age population) (1991-2016), for the SPA and rest of Scotland.....	13
Table 7: Change in the male and female populations (1991-2011, 1991-2016), for the SPA and rest of Scotland.	14
Table 8: Change in the proportion of households which were one person households (1991-2011), for the SPA and rest of Scotland.	15
Table 9: Change in the proportion of households with dependent children (1991-2011), for the SPA and rest of Scotland.	16
Table 10: Change in the proportion of households which were all pensioner households (1991-2011), for the SPA and rest of Scotland.	17
Table 11: Change in total population (1996-2016), for the SPA and rest of Scotland.....	19
Table 12: Total Population in the SPA and its Sub-Areas 1996-2036	23
Table 13: The Child Population in the SPA and its Sub-Regions 1996-2036	25
Table 14: Children as a Percentage of the Total Population SPA and Sub Areas 1996-2036	25
Table 15: Child Dependency Rates in the SPA and its Sub-Regions 1996-2036	26
Table 16: Working Age Population in the SPA and its Sub-Regions 1996-2036	27
Table 17: Working Age Population as a Percentage of the Total Population SPA and Sub Areas 1996-2036	27
Table 18: Population 65+ in the SPA and its Sub-Regions 1996-2036	28
Table 19: Persons 65+ as a Percentage of the Total Population SPA and Sub Areas 1996-2036	28
Table 20: Old Age Dependency Rates in the SPA and its Sub Regions 1996-2036	29

Table 21: Total Dependency Rates in the SPA and its Sub-Regions 1996-2036 29

Maps

Map 1: The Sparsely Populated Area (SPA) of Scotland and its sub-regions 2

1. Introduction

This working paper is the second output of a project funded by the Scottish Government's Rural and Environment Science and Analytical Services (RESAS) division's 2016-2020 Strategic Research Programme¹. More precisely this work has been carried out under Research Deliverable 3.4.1. The research question addressed by this project is "How do changes in the population of remote rural areas of Scotland affect the social, economic and ecological resilience of these areas?" It thus explores the land use, economic and environmental implications of demographic change in the sparsely populated areas (SPA) of Scotland.

The first step in such an exercise is to define more precisely the territory which is commonly referred to as "remote" or "sparsely populated". This question was addressed by our first working paper (Copus and Hopkins, 2017), which is available on the project's website². It describes how we identified the SPA of Scotland, using Geographic Information System (GIS) analysis which took account not only of sparsity but also the size of the population which is accessible within thirty minutes travel time. It also presents the division of the SPA into six "subregions", as a framework to allow investigation of local differences in demographic trends, economic activity, and potential consequences for provision of ecosystem services.

The Structure of this Working Paper

In this working paper we aim to present and reflect upon the available demographic data for the Scottish SPA. The main body of the text presents analysis and findings organised according to the data sources used:

1. The Population Census 1991, 2001 and 2011, using the exact definition of the SPA at output area level.
2. Annual population estimates at data zone level, which reveals more information about intercensal trends.
3. Sub-Council Area Projections (SCAP), which have a less close fit with the SPA boundary, but allow us to get an impression of the likely trends through to 2037.

Ultimately the aim is to piece together a clear narrative of recent and likely future demographic change, from the early 1990s until 2037. This is presented in the penultimate chapter. The working paper concludes with some initial reflections upon potential policy implications.

Because the SPA is built up from 2011 Census 'output areas', the smallest geographic unit in use for demographic data in Scotland, it has been necessary to make pragmatic use of approximations and estimations from various sources, as noted above. In order to keep the main body of the report as accessible and readable as possible, the technical details of methods and data sources are a)

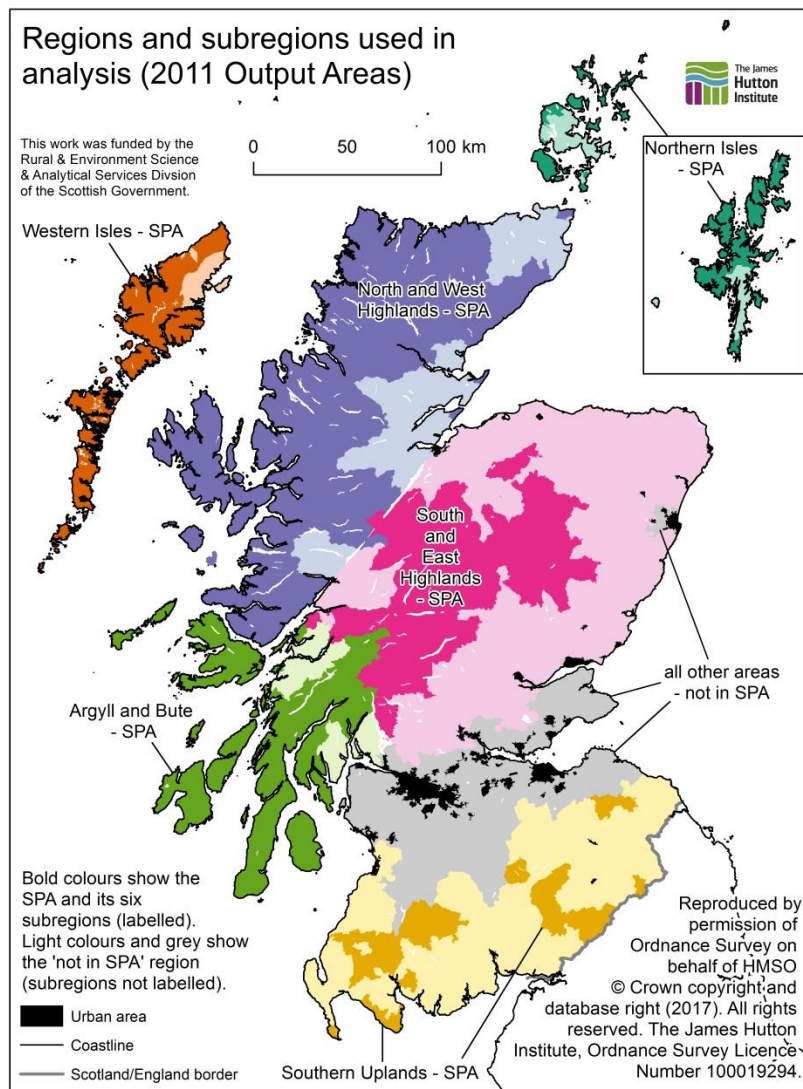
¹ <http://www.gov.scot/Topics/Research/About/EBAR/StrategicResearch/strategicresearch2016-21/srp2016-21> (Accessed 27th February 2018)

² <http://www.hutton.ac.uk/research/projects/demographic-change-remote-areas> (Accessed 27th February 2018)

described in Working Paper 1, and not reproduced in this paper, or b) presented in annexes. Data analysis used appropriate GIS and statistical software³.

The key finding which emerges from the analysis presented here is that the Scottish SPA has a demographic legacy which means that it faces decades of demographic decline, and in particular a shrinkage of its working age population, which implies serious challenges in terms of economic development.

Map 1: The Sparsely Populated Area (SPA) of Scotland and its sub-regions



The calculation of the SPA is described in Working Paper 1, available for download at the project webpage: <http://www.hutton.ac.uk/research/projects/demographic-change-remote-areas>. SPA/not in SPA areas and subregions, and urban areas derived from 2011 Output Area Boundaries: Clipped to the coastline (MHW) © Crown copyright. Data supplied by National Records of Scotland. Areas classified by Scottish Government Urban Rural Classification 2013-2014, based on information in Lookup Files (<http://www.gov.scot/Resource/0046/00464793.zip>) © Crown copyright. Contains public sector information licensed under the Open Government Licence v3.0. Scotland/England border from Ordnance Survey Strategy® data, coastline from Ordnance Survey Boundary-Line™ data. Colour scheme adapted from information at <http://colorbrewer2.org/> © Cynthia Brewer, Mark Harrower and The Pennsylvania State University.

³ Spatial data analysis and mapping: ESRI (2013) ArcGIS 10.2.1 for Desktop. ESRI, Redlands. Statistical analysis and graphs: R Core Team (2016) R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. <https://www.R-project.org/>. Some data handling used the 'foreign' package, citation: R Core Team (2015) foreign: Read Data Stored by Minitab, S, SAS, SPSS, Stata, Systat, Weka, dBase, <https://CRAN.R-project.org/package=foreign>

2. Analysis of 1991, 2001 and 2011 Census Data

Introduction

This section describes observed population change in rural areas and small towns across Scotland from 1991 onwards, with a focus on the SPA and its six sub-regions (Map 1, see Annex 1 for further information on the definition of sub-regions). Figures for urban areas and also presented for comparison.

The data sources used for this analysis were Census data tables from 1991, 2001 and 2011, and mid-year population estimates for 2016, published by National Records of Scotland. The Census data are available for output areas, while the population estimates are produced for 2011 Data Zones. As the SPA and sub-regions described above were defined at the level of 2011 Output Areas, lookup tables (Annex 2) were used to allocate the older Output Areas and the 2011 Data Zones to regions and sub-regions, and to adjust Data Zone-level populations, where necessary. More details of the data sources and methods used to create these lookup tables are included in Working Paper 1 and Annex 2. In the tables and text which follows, 2016 population figures are shown in order to reflect the most recent available information. However due to differences in the data source, and its geography, the commentary on trends is based on the strictly comparable (1991-2011) Census data only.

Total population

In 2011, 137,542 people lived within the SPA, compared with a population of just below one and a half million in rural areas and small towns outside of the SPA, and approximately 3.7 million people who lived in urban areas (Table 1). Almost 31% of the SPA population lived in Argyll and Bute, and more than 28% in the North and West Highlands sub-region. The smallest sub-region, in terms of population was the Southern Uplands, with only 6% of the SPA population.

The SPA population in Argyll and Bute (42,445) was larger than the population in other rural areas and small towns in Argyll and Bute (34,244). In the Western Isles the non-SPA population, clustered around Stornoway was roughly equal to the SPA population spread over the rest of the islands. In the Northern Isles and North and West Highlands sub-regions, the SPA population was slightly less than half the size of the non-SPA population. The populations of the SPA sub-regions of Southern Uplands and South and East Highlands were less than 5% of the size of those of the comparative non-SPA areas. Finally, nearly two-thirds of a million people lived in other non-SPA parts of rural and small town Scotland in 2011.

The figures in Table 1 and Figure 4 show that the total population of the SPA fell by 1.8% from 1991 to 2011, which contrasts with a c. 9% increase in the population of the rural areas and small towns which are not within the SPA, and c. 5% in urban areas. Whilst the two Highlands sub-regions of the SPA recorded population growth, all other SPA sub-regions saw a decline in population of more than 5% over the 1991-2011 period.

Table 1: Change in total population (1991-2011 and 1991-2016), for the SPA and rest of Scotland.

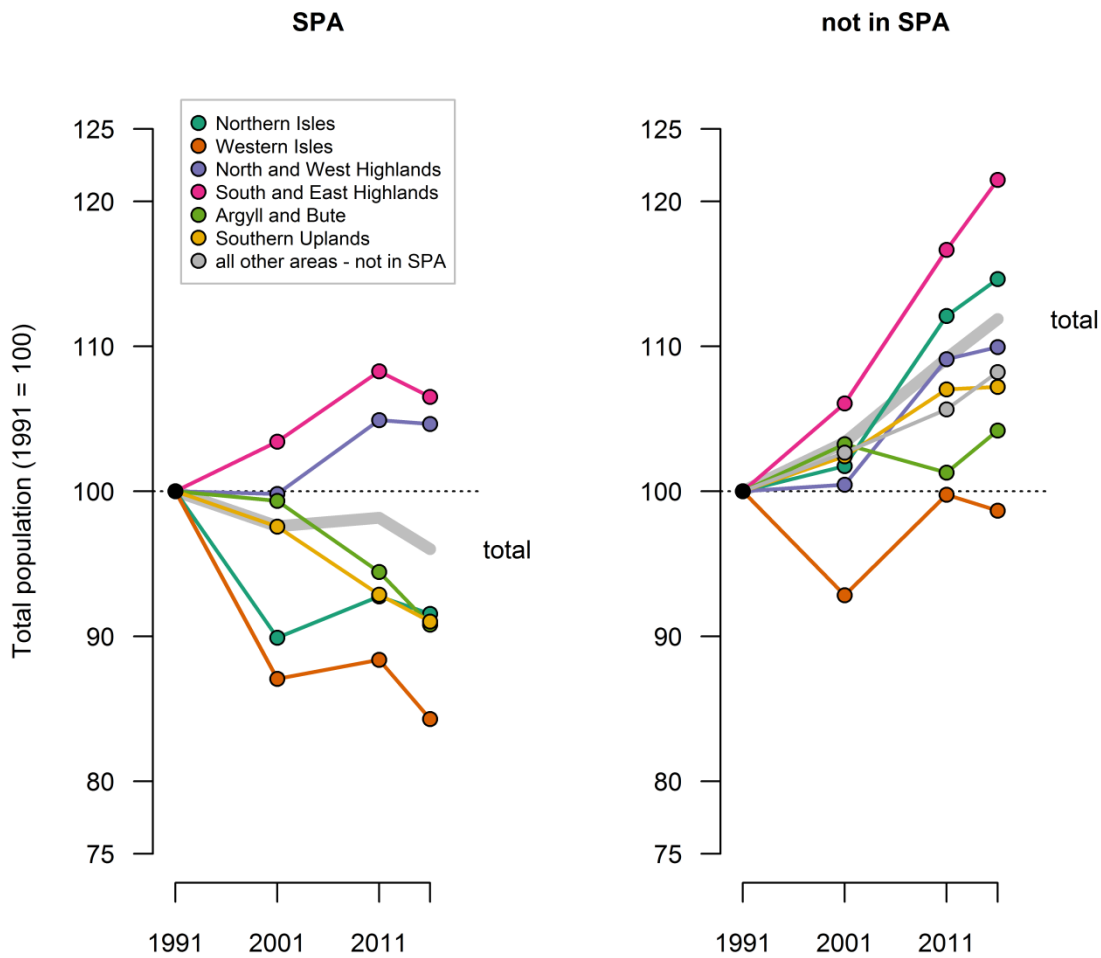
Region or sub-region	Total population, 2011	% of SPA population	1991-2011 (%)	1991-2016 (%)
Northern Isles - SPA	13,429	9.8	-7.25	-8.45
Western Isles - SPA	13,577	9.9	-11.62	-15.71
North and West Highlands - SPA	39,214	28.5	4.91	4.65
South and East Highlands - SPA	20,604	15.0	8.28	6.51
Argyll and Bute - SPA	42,445	30.9	-5.56	-9.19
Southern Uplands - SPA	8,273	6.0	-7.13	-8.98
SPA	137,542	100.0	-1.83	-3.99
Northern Isles - not in SPA	31,087		12.09	14.65
Western Isles - not in SPA	14,107		-0.23	-1.34
North and West Highlands - not in SPA	82,233		9.12	9.95
South and East Highlands - not in SPA	450,038		16.66	21.48
Argyll and Bute - not in SPA	34,244		1.29	4.20
Southern Uplands - not in SPA	219,578		7.03	7.21
other rural or small town area - not in SPA	641,534		5.65	8.23
not in SPA	1,472,821		9.16	11.89
Urban	3,685,040		4.98	7.13

Data shown derived from Census data (1991, 2011) and National Records of Scotland Population Estimates (Current Geographic Boundaries) (2016). Census data tables: SAS02 (1991), LC1117SC (2011). All data: © Crown copyright. Further information on data sources included within Annex 3.

It is notable that the SPA and 'non SPA' parts of each of the six areas in Scotland show sharp contrasts in population change. For instance, the area of the Northern Isles within the SPA lost over 7% of its population from 1991 to 2011, but the area (mainly around Lerwick and Kirkwall) which was not defined as sparse, had population growth of over 12%. Additionally, the sparsely populated area of the Western Isles had a population decline of about 12%, however the 'not in SPA' part of the Western Isles saw a much smaller loss of population (less than 0.25%) from 1991 to 2011. These figures suggest that the concentrations of people, economic activity and services around Lerwick, Kirkwall and Stornoway have had a very strong influence on population change.

The fastest growing area of rural/small town Scotland was the part of the South and East Highlands which was not in the SPA: the population of this area increased by almost 17% from 1991 to 2011. This covers a considerable area of rural Scotland which is relatively accessible to urban areas (Aberdeen, Dundee, Perth, Stirling, Inverness). As is well known, the North East of Scotland experienced strong economic growth from 1991 onwards. This seems to have 'spilled over' in terms of population growth into the South and East Highlands area of the SPA.

Figure 1: Change in total population (1991-2016), for the SPA and rest of Scotland. Change shown relative to 1991 value (index = 100).



Data shown derived from Census data (1991, 2001, 2011) and National Records of Scotland Population Estimates (Current Geographic Boundaries) (2016). Census data tables: SAS02 (1991), CS002 (2001), LC1117SC (2011). All data: © Crown copyright. Further information on data sources included within Annex 3.

Child population

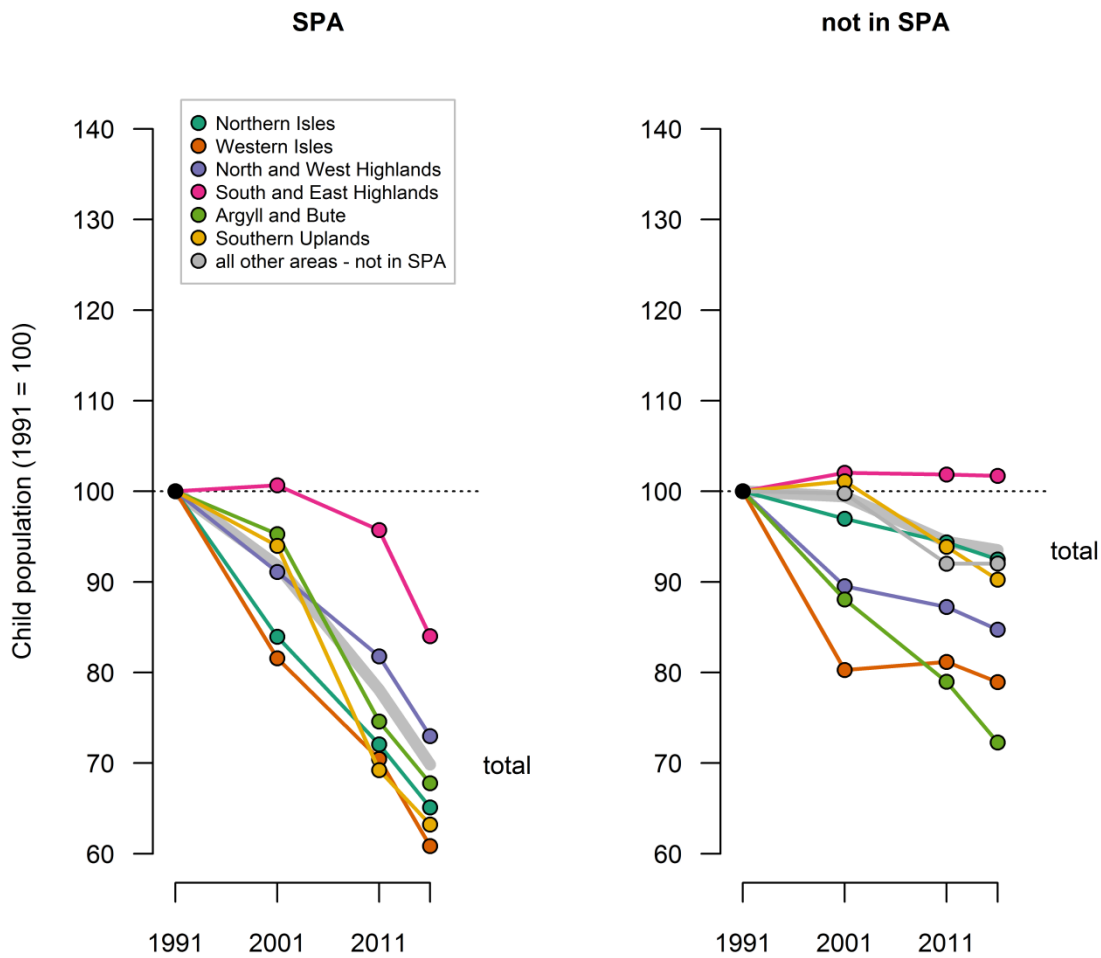
From 1991 to 2011, there was a considerable decline (of around 22%) in the population aged under 16 years of age in the SPA (Table 2, Figure 2). The reduction in the number of children was smaller in the two Highlands sub-regions, however the population of children in all other SPA sub-regions fell by over 25%. Across the non-sparsely populated area of rural and small town Scotland, the number of children fell by a much lower rate (a decline of 5.6% from 1991 to 2011), whilst in urban areas the child population dropped by a little over 10%. It is notable that the child population reduced sharply in the non-sparsely populated parts of the Western Isles (c. -19%) and Argyll and Bute (c. -21%), showing a similar trend to that found in the SPA sub-regions for these areas (c. -30%, -25% respectively). However, the scale of the reduction in the population of children in the part of the Northern Isles which was not sparsely populated (c. -5%) was much smaller than that in the SPA sub-region in the Northern Isles (c. -28%).

Table 2: Change in child population (1991-2011 and 1991-2016), for the SPA and rest of Scotland.

Region or sub-region	Child population, 2011	1991-2011 (%)	1991-2016 (%)
Northern Isles - SPA	2,432	-27.94	-34.89
Western Isles - SPA	2,229	-29.55	-39.16
North and West Highlands - SPA	6,364	-18.21	-27.01
South and East Highlands - SPA	3,309	-4.28	-15.99
Argyll and Bute - SPA	6,444	-25.41	-32.23
Southern Uplands - SPA	1,161	-30.77	-36.77
SPA	21,939	-21.91	-30.16
Northern Isles - not in SPA	5,665	-5.63	-7.52
Western Isles - not in SPA	2,449	-18.83	-21.05
North and West Highlands - not in SPA	14,802	-12.77	-15.28
South and East Highlands - not in SPA	82,945	1.85	1.70
Argyll and Bute - not in SPA	5,680	-21.02	-27.72
Southern Uplands - not in SPA	36,915	-6.12	-9.76
other rural or small town area - not in SPA	116,724	-7.99	-7.96
not in SPA	265,180	-5.56	-6.49
Urban	629,212	-10.22	-9.58

Data shown derived from Census data (1991, 2011) and National Records of Scotland Population Estimates (Current Geographic Boundaries) (2016). Census data tables: SAS02 (1991), LC1117SC (2011). All data: © Crown copyright. Further information on data sources included within Annex 3.

Figure 2: Change in child population (1991-2016), for the SPA and rest of Scotland. Change shown relative to 1991 value (index = 100).



Data shown derived from Census data (1991, 2001, 2011) and National Records of Scotland Population Estimates (Current Geographic Boundaries) (2016). Census data tables: SAS02 (1991), CS002 (2001), LC1117SC (2011). All data: © Crown copyright. Further information on data sources included within Annex 3.

Working age population

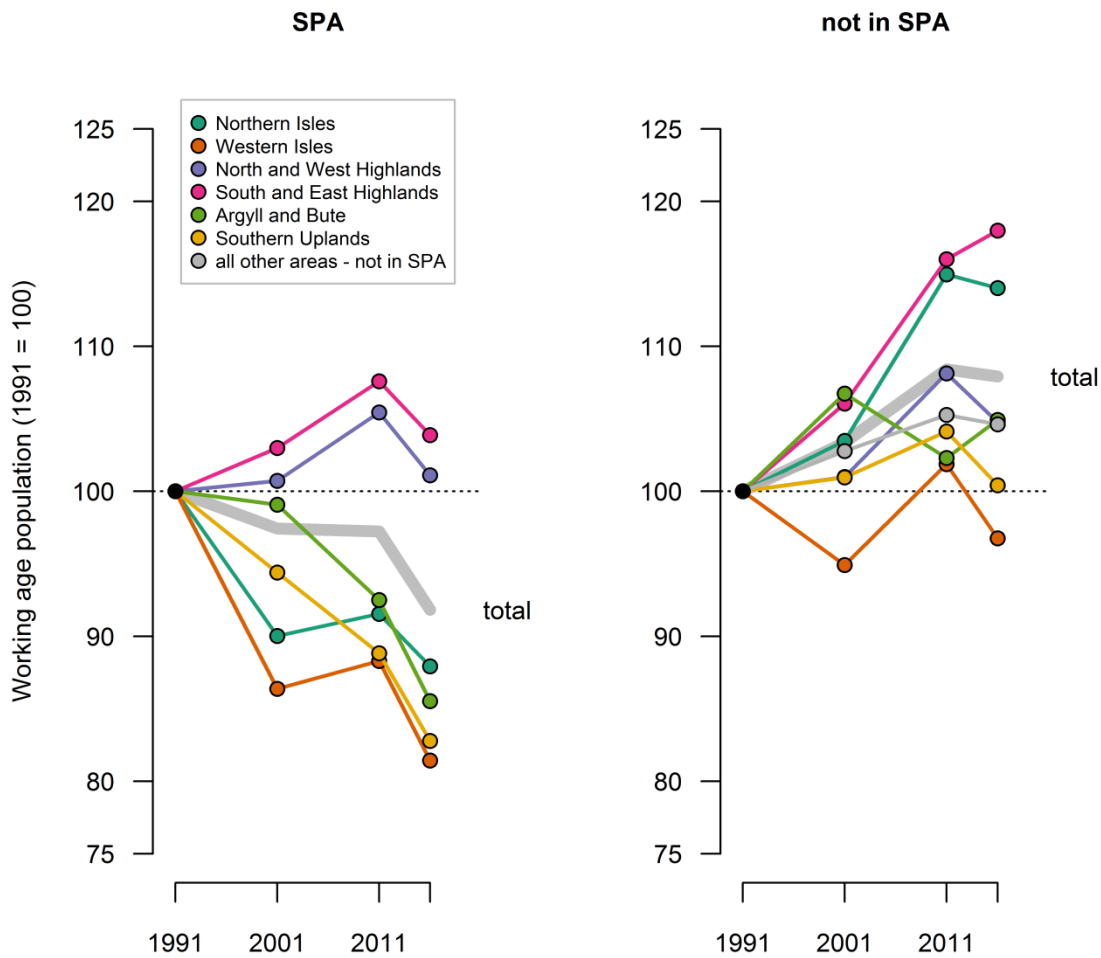
The working age population declined in the SPA by approximately 2.8% from 1991 to 2011. This figure contrasts with an increase in the working age population of over eight per cent for the part of rural and small town Scotland outside of the SPA, and a similar increase for this population in urban areas over the same time period (Table 3, Figure 3). The overall picture is quite similar to that for the total population described above. The two Highlands sub-regions in the SPA observed growth in the population aged 16-64 from 1991 to 2011, however the four other sub-regions saw a fall in this population of over 7%, with particularly large declines in the Western Isles (-11.7%) and Southern Uplands (-11.2%). The population trend in some SPA sub-regions contrasted quite sharply with that in the corresponding non-SPA area. For instance, the working age population in the Northern Isles – SPA sub-region fell by around 8.5%, but in the area of the Northern Isles which was not sparsely populated, there was a considerable increase (c. 15%) in the working age population. Similarly, the working age population fell in the sparsely populated area in the Western Isles, Argyll and Bute and the Southern Uplands, but the parts of these areas outside of the SPA observed small increases in their working age population from 1991 to 2011.

Table 3: Change in working age population (1991-2011 and 1991-2016), for the SPA and rest of Scotland.

Region or sub-region	Working age population, 2011	1991-2011 (%)	1991-2016 (%)
Northern Isles - SPA	8,288	-8.45	-12.08
Western Isles - SPA	8,193	-11.70	-18.58
North and West Highlands - SPA	24,343	5.44	1.11
South and East Highlands - SPA	12,764	7.60	3.88
Argyll and Bute - SPA	25,496	-7.50	-14.48
Southern Uplands - SPA	5,024	-11.17	-17.22
SPA	84,108	-2.76	-8.17
Northern Isles - not in SPA	20,135	14.96	14.03
Western Isles - not in SPA	8,844	1.88	-3.25
North and West Highlands - not in SPA	51,623	8.13	4.77
South and East Highlands - not in SPA	284,869	16.01	17.98
Argyll and Bute - not in SPA	21,571	2.30	4.93
Southern Uplands - not in SPA	134,485	4.13	0.42
other rural or small town area - not in SPA	412,336	5.27	4.61
not in SPA	933,863	8.41	7.92
Urban	2,470,767	8.64	9.08

Data shown derived from Census data (1991, 2011) and National Records of Scotland Population Estimates (Current Geographic Boundaries) (2016). Census data tables: SAS02 (1991), LC1117SC (2011). All data: © Crown copyright. Further information on data sources included within Annex 3.

Figure 3: Change in working age population (1991-2016), for the SPA and rest of Scotland. Change shown relative to 1991 value (index = 100).



Data shown derived from Census data (1991, 2001, 2011) and National Records of Scotland Population Estimates (Current Geographic Boundaries) (2016). Census data tables: SAS02 (1991), CS002 (2001), LC1117SC (2011). All data: © Crown copyright. Further information on data sources included within Annex 3.

Old age population

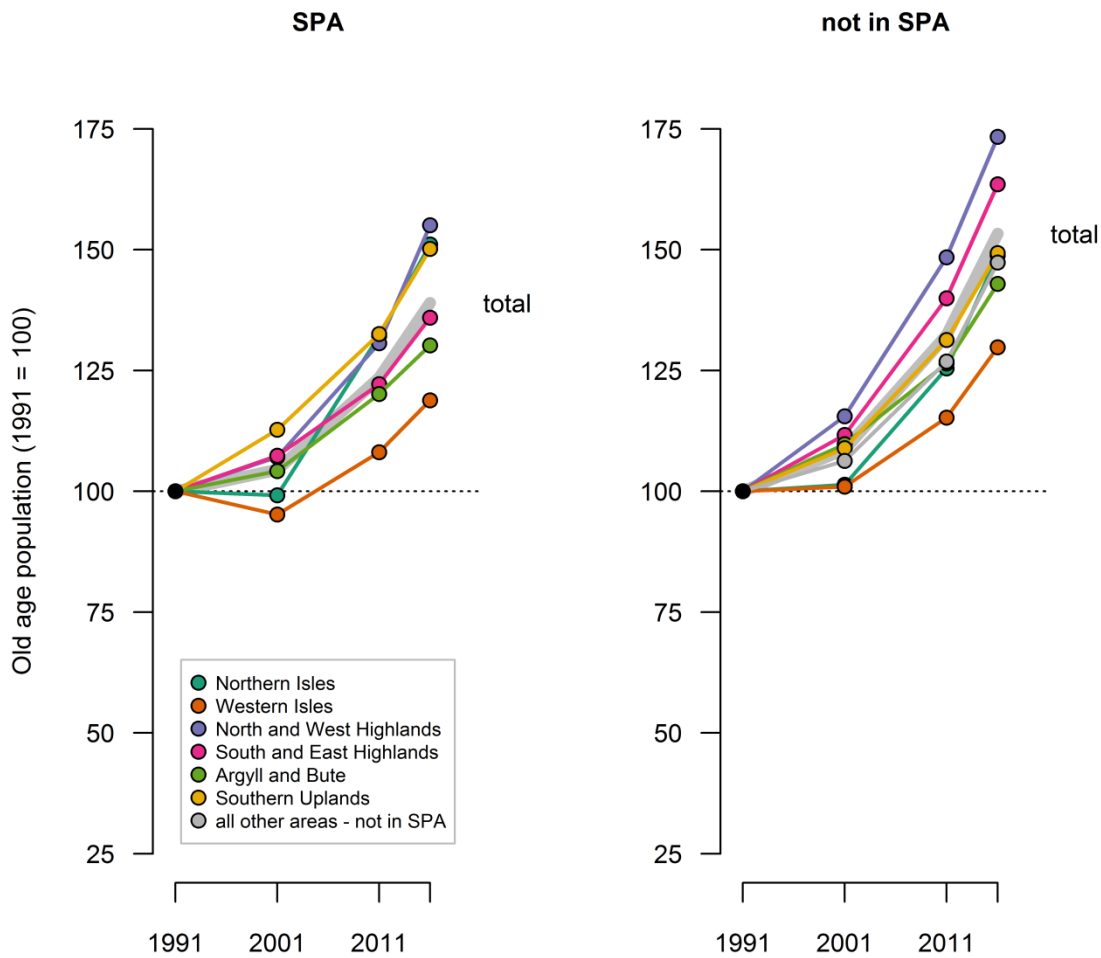
Table 4 and Figure 4 show that the size of the old age population has grown considerably in all areas of rural and small town Scotland from 1991 to 2011, with a higher rate of increase for areas which were not sparsely populated (c. +32%) compared with the sparsely populated area as a whole (c. +23%). The older population in urban areas has also grown from 1991 onwards, at a somewhat lower rate (c. +9%) than found in the non-urban areas. Within the SPA, the population of older people has increased fastest in the Southern Uplands sub-region, and slowest in the Western Isles sub-region. There is a notable contrast between the relatively low rate of growth in the older population in the SPA part of the Western Isles (an increase of just over 8%) and the considerable expansion of this population in the other remote island region (Northern Isles, with an increase of over 32%).

Table 4: Change in old age population (1991-2011 and 1991-2016), for the SPA and rest of Scotland.

Region or sub-region	Old age population, 2011	1991-2011 (%)	1991-2016 (%)
Northern Isles - SPA	2,709	32.15	51.10
Western Isles - SPA	3,155	8.08	18.85
North and West Highlands - SPA	8,507	30.66	55.06
South and East Highlands - SPA	4,531	22.16	35.92
Argyll and Bute - SPA	10,505	20.15	30.23
Southern Uplands - SPA	2,088	32.57	50.18
SPA	31,495	23.48	39.00
Northern Isles - not in SPA	5,287	25.43	48.81
Western Isles - not in SPA	2,814	15.23	29.81
North and West Highlands - not in SPA	15,808	48.42	73.38
South and East Highlands - not in SPA	82,224	39.96	63.53
Argyll and Bute - not in SPA	6,993	26.48	42.94
Southern Uplands - not in SPA	48,178	31.32	49.29
other rural or small town area - not in SPA	112,474	26.85	47.36
not in SPA	273,778	32.30	53.34
Urban	585,061	9.35	20.75

Data shown derived from Census data (1991, 2011) and National Records of Scotland Population Estimates (Current Geographic Boundaries) (2016). Census data tables: SAS02 (1991), LC1117SC (2011). All data: © Crown copyright. Further information on data sources included within Annex 3.

Figure 4: Change in old age population (1991-2016), for the SPA and rest of Scotland. Change shown relative to 1991 value (index = 100).



Data shown derived from Census data (1991, 2001, 2011) and National Records of Scotland Population Estimates (Current Geographic Boundaries) (2016). Census data tables: SAS02 (1991), CS002 (2001), LC1117SC (2011). All data: © Crown copyright. Further information on data sources included within Annex 3.

Dependency ratios

In 2011, the sparsely populated area had a dependency ratio of 0.64 (Table 5) or between six and seven likely dependents for every ten people of working age. The respective figure for rural areas and small towns which were not sparsely populated was 0.58, with a much lower ratio of 0.49 found in urban areas. From 1991 to 2011, the dependency ratio in the SPA increased (+0.02), at a similar rate to that of the 'not in SPA' region (+0.01), although the dependency ratio of urban areas fell over the same period (-0.05). Within the SPA, the Southern Uplands has observed the largest increase in the dependency ratio of any of the sub-regions (+0.07 from 1991-2011), followed by Argyll and Bute (+0.03).

Table 5: Change in the dependency ratio (child + old age populations divided by working age population) (1991-2016), for the SPA and rest of Scotland.

Region or sub-region	Dependency ratio			
	1991	2001	2011	2016
Northern Isles - SPA	0.60	0.60	0.62	0.67
Western Isles - SPA	0.66	0.67	0.66	0.71
North and West Highlands - SPA	0.62	0.60	0.61	0.68
South and East Highlands - SPA	0.60	0.61	0.61	0.64
Argyll and Bute - SPA	0.63	0.64	0.66	0.73
Southern Uplands - SPA	0.57	0.63	0.65	0.73
SPA	0.62	0.62	0.64	0.69
Northern Isles - not in SPA	0.58	0.56	0.54	0.59
Western Isles - not in SPA	0.63	0.59	0.60	0.66
North and West Highlands - not in SPA	0.58	0.57	0.59	0.66
South and East Highlands - not in SPA	0.57	0.57	0.58	0.62
Argyll and Bute - not in SPA	0.60	0.55	0.59	0.59
Southern Uplands - not in SPA	0.59	0.61	0.63	0.70
other rural or small town area - not in SPA	0.55	0.55	0.56	0.60
not in SPA	0.57	0.57	0.58	0.62
Urban	0.54	0.53	0.49	0.52

Data shown derived from Census data (1991, 2001, 2011) and National Records of Scotland Population Estimates (Current Geographic Boundaries) (2016). Census data tables: SAS02 (1991), CS002 (2001), LC1117SC (2011). All data: © Crown copyright. Further information on data sources included within Annex 3.

Table 6 provides further evidence of an aging population across all non-urban areas of Scotland: the size of the old age population relative to the working age population has increased in both the SPA (+0.08) and in non-urban areas outside the SPA (+0.05) from 1991 to 2011; this ratio has been stable (+0.0015, to four decimal places), over the same period, in urban areas. Values show that the old age population was approximately 40% of the working age population in the Western Isles, Southern Uplands and Argyll and Bute sub-regions of the SPA in 2011.

Table 6: Change in the old age dependency ratio (old age population divided by working age population) (1991-2016), for the SPA and rest of Scotland.

Region or sub-region	Old age dependency ratio			
	1991	2001	2011	2016
Northern Isles - SPA	0.23	0.25	0.33	0.39
Western Isles - SPA	0.31	0.35	0.39	0.46
North and West Highlands - SPA	0.28	0.30	0.35	0.43
South and East Highlands - SPA	0.31	0.33	0.35	0.41
Argyll and Bute - SPA	0.32	0.33	0.41	0.48
Southern Uplands - SPA	0.28	0.33	0.42	0.51
SPA	0.29	0.32	0.37	0.45
Northern Isles - not in SPA	0.24	0.24	0.26	0.31
Western Isles - not in SPA	0.28	0.30	0.32	0.38
North and West Highlands - not in SPA	0.22	0.26	0.31	0.37
South and East Highlands - not in SPA	0.24	0.25	0.29	0.33
Argyll and Bute - not in SPA	0.26	0.27	0.32	0.36
Southern Uplands - not in SPA	0.28	0.31	0.36	0.42
other rural or small town area - not in SPA	0.23	0.23	0.27	0.32
not in SPA	0.24	0.25	0.29	0.34
Urban	0.24	0.24	0.24	0.26

Data shown derived from Census data (1991, 2001, 2011) and National Records of Scotland Population Estimates (Current Geographic Boundaries) (2016). Census data tables: SAS02 (1991), CS002 (2001), LC1117SC (2011). All data: © Crown copyright. Further information on data sources included within Annex 3.

Gender

For rural areas and small towns both inside and outside of the SPA, the changes to the male and female populations were similar from 1991 to 2011 (Table 7), and the percentage of the total population which was female remained relatively similar for both areas over this time period. The male and female populations are closer in size in the SPA than outside of it: 50.58% of the SPA population was female in 2011, with a respective figure of 51.08% for the 'not in SPA' region. The gender 'balance' was somewhat less even in urban areas in 2011. Some of the sub-regions of the SPA have seen subtle changes from 1991 to 2011, with the proportion of population which was female moving closer to 50% by 2011 in most sub-regions.

Table 7: Change in the male and female populations (1991-2011, 1991-2016), for the SPA and rest of Scotland.

Region or sub-region	Male population		Female population		Proportion of population which is female		
	1991-2011 (%)	1991-2016 (%)	1991-2011 (%)	1991-2016 (%)	1991 (%)	2011 (%)	2016 (%)
Northern Isles - SPA	-8.74	-9.66	-5.65	-7.17	48.40	49.24	49.08
Western Isles - SPA	-13.12	-18.38	-10.03	-12.88	48.65	49.52	50.28
North and West Highlands - SPA	3.68	3.73	6.14	5.57	50.02	50.61	50.46
South and East Highlands - SPA	9.28	8.22	7.31	4.87	50.97	50.52	50.19
Argyll and Bute - SPA	-4.72	-8.04	-6.34	-10.27	51.80	51.38	51.19
Southern Uplands - SPA	-8.18	-8.81	-6.07	-9.15	49.78	50.34	49.68
SPA	-2.19	-4.09	-1.46	-3.89	50.39	50.58	50.44
Northern Isles - not in SPA	13.99	16.96	10.27	12.43	50.94	50.11	49.95
Western Isles - not in SPA	-1.35	-1.12	0.83	-1.55	51.15	51.69	51.04
North and West Highlands - not in SPA	8.58	9.22	9.64	10.66	50.87	51.12	51.20
South and East Highlands - not in SPA	16.73	22.09	16.60	20.89	50.76	50.73	50.51
Argyll and Bute - not in SPA	4.57	11.59	-1.74	-2.63	51.99	50.44	48.58
Southern Uplands - not in SPA	7.13	7.21	6.93	7.20	51.48	51.43	51.47
other rural or small town area - not in SPA	6.03	8.41	5.29	8.05	51.43	51.26	51.35
not in SPA	9.48	12.38	8.86	11.42	51.22	51.08	51.00
Urban	6.75	9.29	3.38	5.18	52.53	51.73	51.57

Data shown derived from Census data (1991, 2001, 2011) and National Records of Scotland Population Estimates (Current Geographic Boundaries) (2016). Census data tables: SAS02 (1991), CS002 (2001), LC1117SC (2011). All data: © Crown copyright. Further information on data sources included within Annex 3.

Household composition

The Census datasets contain questions on household composition, enabling a comparison of change from 1991 to 2011 in types of households (one person, with dependent children, all pensioner) which could provide evidence for demographic change. The proportion of households with only one resident increased by approximately five percentage points in both the SPA and non-SPA areas from 1991-2011 (Table 8), but there was a higher proportion of households which were one person households in the SPA (c. 35% in 2011) than in rural areas and small towns outside the SPA (29.5%). While the percentage of all households which had dependent children fell from 1991 to 2011, this decline was larger for the SPA (-6.9 percentage points) than for the 'not in SPA' area (slightly less than five percentage points), and the proportion of households with dependent children was lower in the SPA than in rural and small town areas outside of the SPA (Table 9). Finally, the proportion of households with no residents other than pensioners stayed reasonably constant from 1991 to 2011 for both the SPA and the non-urban areas outside it (Table 10). All pensioner households were slightly more common in the SPA than they were in the 'not in SPA' region, in 2011.

Table 8: Change in the proportion of households which were one person households (1991-2011), for the SPA and rest of Scotland.

Region or sub-region	Proportion of households which were one person households		1991-2011 (percentage points)	Total households, 2011
	1991 (%)	2011 (%)		
Northern Isles - SPA	25.83	32.13	6.29	5,880
Western Isles - SPA	29.70	38.21	8.51	6,287
North and West Highlands - SPA	29.92	33.47	3.55	17,837
South and East Highlands - SPA	29.61	32.85	3.24	9,147
Argyll and Bute - SPA	31.48	37.55	6.07	20,130
Southern Uplands - SPA	28.31	32.49	4.18	3,786
SPA	29.88	34.97	5.09	63,067
Northern Isles - not in SPA	27.06	33.72	6.65	13,795
Western Isles - not in SPA	28.09	36.21	8.12	6,289
North and West Highlands - not in SPA	25.16	30.28	5.12	35,804
South and East Highlands - not in SPA	23.84	27.48	3.64	188,810
Argyll and Bute - not in SPA	29.09	34.28	5.18	15,031
Southern Uplands - not in SPA	26.61	31.46	4.86	98,105
other rural or small town area - not in SPA	23.76	29.53	5.77	275,133
not in SPA	24.56	29.53	4.97	632,967
Urban	29.96	36.64	6.68	1,676,743

Data shown derived from Census data (1991, 2011). Census data tables: SAS27 and SAS42 (1991), KS105SC (2011). All data: © Crown copyright. Further information on data sources included within Annex 3.

Table 9: Change in the proportion of households with dependent children (1991-2011), for the SPA and rest of Scotland.

Region or sub-region	Proportion of households with dependent children		
	1991 (%)	2011 (%)	1991-2011 (percentage points)
Northern Isles - SPA	33.94	23.93	-10.01
Western Isles - SPA	30.62	21.70	-8.92
North and West Highlands - SPA	29.28	22.36	-6.92
South and East Highlands - SPA	26.74	22.15	-4.59
Argyll and Bute - SPA	26.90	20.64	-6.27
Southern Uplands - SPA	26.92	19.36	-7.56
SPA	28.57	21.68	-6.89
Northern Isles - not in SPA	31.55	26.21	-5.34
Western Isles - not in SPA	33.33	25.68	-7.65
North and West Highlands - not in SPA	33.80	26.57	-7.23
South and East Highlands - not in SPA	32.52	27.95	-4.57
Argyll and Bute - not in SPA	31.62	24.65	-6.97
Southern Uplands - not in SPA	28.82	24.70	-4.12
other rural or small town area - not in SPA	33.36	28.36	-5.00
not in SPA	32.35	27.41	-4.94
Urban	29.48	25.60	-3.88

Data shown derived from Census data (1991, 2011). Census data tables: SAS27 and SAS46 (1991), KS105SC (2011). All data: © Crown copyright. Further information on data sources included within Annex 3.

Table 10: Change in the proportion of households which were all pensioner households (1991-2011), for the SPA and rest of Scotland.

Region or sub-region	Proportion of households which were all pensioner households		
	1991 (%)	2011 (%)	1991-2011 (percentage points)
Northern Isles - SPA	22.80	24.83	2.03
Western Isles - SPA	26.05	26.50	0.44
North and West Highlands - SPA	25.89	25.51	-0.38
South and East Highlands - SPA	29.39	27.03	-2.36
Argyll and Bute - SPA	28.86	29.42	0.55
Southern Uplands - SPA	25.90	29.32	3.42
SPA	27.09	27.24	0.15
Northern Isles - not in SPA	23.65	20.99	-2.67
Western Isles - not in SPA	25.32	23.17	-2.15
North and West Highlands - not in SPA	22.41	23.04	0.63
South and East Highlands - not in SPA	23.92	23.18	-0.73
Argyll and Bute - not in SPA	24.87	25.43	0.56
Southern Uplands - not in SPA	27.74	26.78	-0.97
other rural or small town area - not in SPA	22.60	21.95	-0.65
not in SPA	23.88	23.20	-0.68
Urban	23.92	19.82	-4.09

Data shown derived from Census data (1991, 2011). Census data tables: SAS27 and SAS47 (1991), KS105SC (2011). All data: © Crown copyright. Further information on data sources included within Annex 3.

3. Intercensal Trends from Mid-Year Estimates at Data Zone level

As mentioned earlier, the SPA boundary was defined in terms of (2011 Population Census) Output Areas, because Data Zones are rather large in areas where the population is thinly spread. However, sticking with the output area definition limits our options in terms of demographic data sources - only the Census provides data at this level of detail, which means that there are ten-year gaps in our time series. Therefore, despite the boundary mismatch, an analysis at Data Zone level is well worthwhile, since it opens up the possibility to explore intercensal changes through the use of NRS' Special Area Population Estimates (SAPE).

Data Zone-level population data is available for years between 1996 to 2016 as mid-year population estimates. Almost all of these data (1996-2014, inclusive) were at the level of 2001 Data Zones, and the 1996-2013 data were sourced from the Scottish data portal at statistics.gov.scot. The 2014 data were downloaded from a file available at the National Records of Scotland website (nrscotland.gov.uk). The most recent population estimates (2015, 2016) were available for 2011 Data Zones, and were downloaded from statistics.gov.scot. Using lookup tables produced within this research project (Copus and Hopkins, 2017; full lookup tables in Annex 2 of this paper), these data were used to assess population change in rural areas and small towns in Scotland, including regions within and outside of the SPA. Due to the change in geographical unit of resolution at the very end of the time series, population changes there should be treated with caution, and assessed in the context of the more fine-grained analysis contained in Section 2.

Figures in Table 11 show a reassuringly similar pattern of population change compared with the comparative figures derived from Census Output Area-level data (Table 1). From 1996 to 2011, the SPA saw a fall in population of just over two percent (-2.15%). This is close to the respective figure (-1.83%, Table 1) calculated for the slightly longer period of 1991 to 2011, from Census data in these years. Further comparisons of estimate- and Census-based figures for these time periods show almost identical figures for the 'not in SPA' region (+9.18% vs. +9.16%) although there is a slightly larger difference in Urban population change values (+2.34 vs +4.98). Over the period 1996-2016, the SPA as a whole lost around five per cent of its population. The two sub-regions in the Highlands saw an increase in population from 1996 to 2016, but all other sub-regions saw a population decline. In three SPA sub-regions, the overall population decline was over 10%. Meanwhile, rural areas and small towns which were not defined as sparsely populated had an increase in population of almost 9% from 1996 to 2016. All parts of the 'not in SPA' region saw an overall growth in population, with the highest rate of growth (over fifteen per cent) found in the South and East Highlands. The population of urban areas also grew by c. 5.5%.

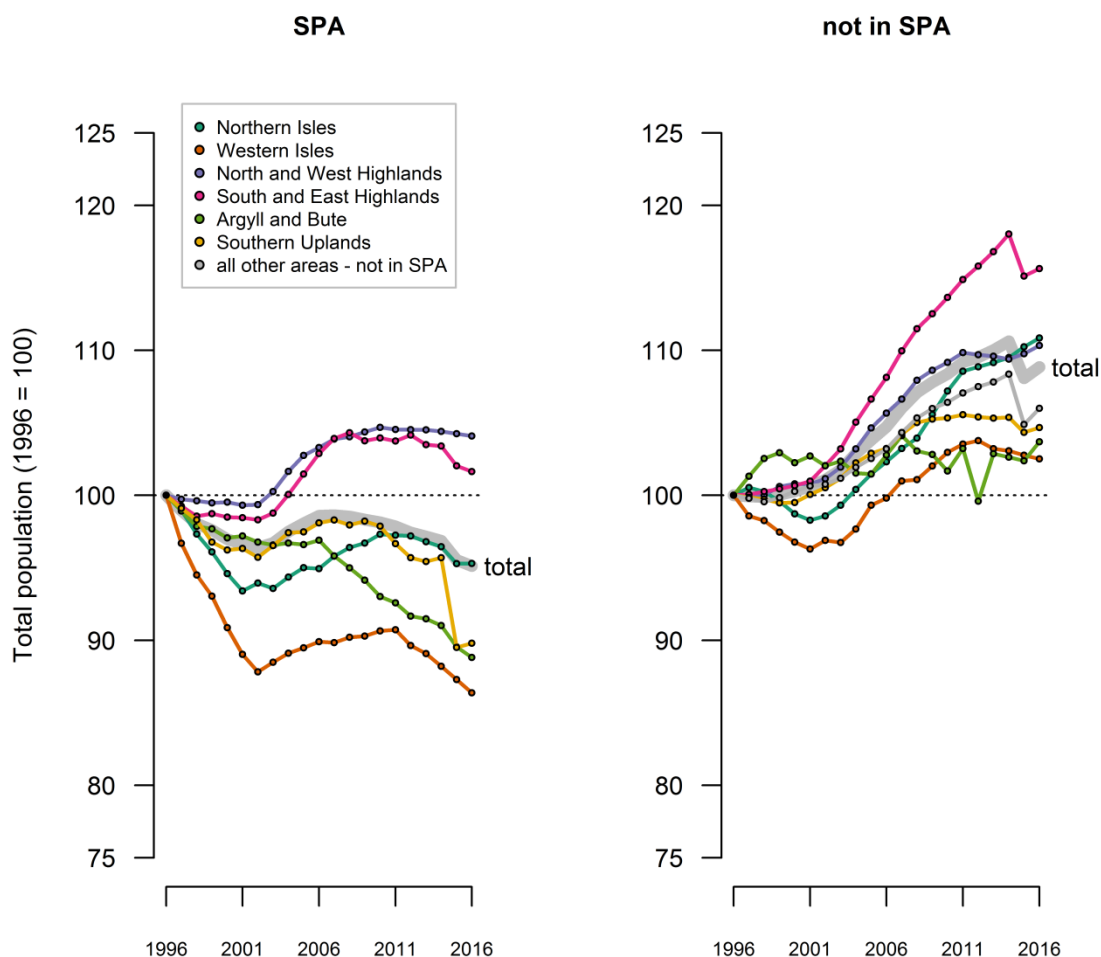
Table 11: Change in total population (1996-2016), for the SPA and rest of Scotland.

Region or sub-region	Total population, 1996	1996-2011 (%)	1996-2016 (%)
Northern Isles - SPA	13,908.4	-2.76	-4.70
Western Isles - SPA	14,991.1	-9.28	-13.62
North and West Highlands - SPA	37,579.6	4.54	4.09
South and East Highlands - SPA	19,942.8	3.75	1.63
Argyll and Bute - SPA	45,953.8	-7.42	-11.19
Southern Scotland - SPA	9,029.7	-3.34	-10.21
SPA	141,405.4	-2.15	-4.88
Northern Isles - not in SPA	28,681.6	8.55	10.86
Western Isles - not in SPA	13,608.9	3.54	2.51
North and West Highlands - not in SPA	75,099.7	9.84	10.34
South and East Highlands - not in SPA	405,258.7	14.88	15.63
Argyll and Bute - not in SPA	33,975.2	3.22	3.69
Southern Scotland - not in SPA	210,145.9	5.56	4.67
other rural or small town output area	620,007.3	7.07	6.00
not in SPA	1,386,777.0	9.18	8.86
Urban	3,564,007.0	2.34	5.52

Population figure shown to one decimal place, percentage change figures shown to two decimal places. Figures derived from National Records of Scotland Historical Population Estimates (pre-2001, historical geographic boundaries), Mid-Year Population Estimates (historical geographical boundaries), Population Estimates (Current Geographic Boundaries). All data: © Crown copyright. Data supplied by National Records of Scotland. Further information on data sources included within Annex 3.

Figure 5: Change in total population (1996-2016), for the SPA and rest of Scotland.

Change shown relative to 1996 value (index = 100).



Data shown derived from National Records of Scotland Historical Population Estimates (pre-2001, historical geographic boundaries), Mid-Year Population Estimates (historical geographical boundaries), Mid-2014 Small Area Population Estimates Scotland, Population Estimates (Current Geographic Boundaries). All data: © Crown copyright. Data supplied by National Records of Scotland. Further information on data sources included within Annex 3.

In addition to these spatial patterns, the direction and rates of population change have been somewhat variable over time (Figure 5). The SPA (Figure 5, left graph) overall saw a decline in population from 1996 to c. 2002, with sharp falls in the Western and Northern Isles. However, from c. 2002 to around 2007, this trend reversed and the SPA population increased. However, the remainder of the time series to 2016 has seen a steady fall in the population of the SPA. Over this latter period, the subregion-level graphs show that population growth in the North and West and South and East Highlands, and Northern Isles, started to level off and enter a slow decline; however other parts of the SPA have experienced a longer duration of population loss.

Collectively, the non-SPA rural areas and small towns (Figure 5, right graph) saw a small growth in population from 1996 to the early 2000s, with evidence of a decline in population in non-sparsely populated parts of the Northern and Western Isles. However, population growth in the not in SPA region accelerated from c. 2002, and the region broadly maintained this faster rate of population growth to c. 2014. Population growth over this period appears fastest in the South and East Highlands – not in SPA subregion. There is somewhat lower confidence in data points for 2015 and 2016, due to the change in the Data Zone unit from the older version used to 2014. The graphs for the not in SPA region, and two subregions with proportionally very large populations (South and East Highlands, all other rural and small town areas) have a clear downward ‘step’ from 2014 to 2015, and a return to population growth from 2015 to 2016. However, slightly earlier values (from c. 2009 to 2014) for the not in SPA region, and for some of its subregions, suggest a slower rate of population growth (or population stability) at the end of the record, compared with the rate of growth recorded during most of the 2000s decade.

4. A first look at future trends based upon Sub Council Area Projections

The Sub Council Area Projection (SCAP) areas are an *ad hoc* geography devised by National Records of Scotland in order to explore potential for demographic projections for areas smaller than those of our current local government geography. Nevertheless, the SCAP areas are still much larger than either the output area building blocks upon which the SPA area is based, or data zones, and before summarising the results it will be helpful to explain the motivation for the SCAP area analysis. It could, of course, be argued that this section of our report is made redundant by the more geographically focused projections which are presented in the third working paper (Copus, 2018) on the basis of data for the exact SPA territory and aggregations of output area data. This is true, but the SCAP area projections, combined with the Special Area Population Estimates give us a relatively quick way to begin forming a picture of the demographic narrative associated with the SPA and its six sub-regions. It also allows for direct comparison of the SPA with the trends in other (rural and urban) parts of Scotland. Through this we get a first appreciation, based upon official published projections, of the diversity within the SPA, of the sensitivity of projections both to the age structure in the base period, and the assumptions made about migration.

The SCAP Area Geography and how it relates to the SPA

Sub-Council Area Projections (SCAP) were produced by National Records Scotland (NRS) in 2016 (National Records of Scotland, 2016) as an experimental exercise. Population projections, with 2012 as a base year, were estimated through to 2037. The geography for which these projections were made is unique to this exercise. Scotland was divided into 301 areas, each comprised of a set of (2001) data zones. These areas were suggested by the 32 Councils. In the majority of council areas the SCAP areas were based on multi-member ward boundaries, but some councils opted for policy or service related areas. For example, Highland Council chose Housing Market Areas. Across Scotland the SCAP areas had an average population of 17,653 (in 2012), but vary considerably in size, from 2,075 (Stromness Parish) to 79,072 (Inverness). Around three-quarters of SCAP Areas (73.8%) had a population below 20,000⁴.

Clearly there can be no exact match between the SCAP areas and the SPA area, which has been defined using the much smaller 2011 output areas as building blocks. However, it has proved feasible to make a link between the SPA (and its sub-regions) and the larger SCAP areas. The first working paper within this research contains information on this lookup and a map of the SCAP areas (Copus and Hopkins, 2017: see 17-22 and Appendix).

Combining SCAP Projections with Special Area Population Estimates (SAPE) in a single series

A lookup table for 2001 data zones provided on the NRS website allows us to aggregate Special Area Population Estimate (SAPE) data to SCAP areas. By linking together SAPE and SCAP tables it is

⁴ Population data sourced/derived from National Records of Scotland: Population and Household Projections for Scottish Sub-Council Area Projections (2012-based): data table at <https://www.nrscotland.gov.uk/files//statistics/scap/scap-population-results-summary-alltables.xlsx> (Accessed 6th July 2017). Data: © Crown Copyright 2016.

possible to “stitch together”⁵ a continuous series of population estimates/projections covering the four decades from 1996 to 2037. These data sources also allow an analysis of age structure, in this case aggregated to three groups; 0-15 (children), 16-64 (working age population - WAP) and 65+ (pensioners). These three age groups allow an analysis of dependency rates, which are crucial in terms of the capacity for economic development, the cost of service provision, and the overall sustainability of rural communities.

A first glimpse of the medium-term demographic narrative of the SPA and its sub-areas

Table 12 shows the population of the SPA and its sub-regions (approximated from SCAP regions). According to this approximation the population of the SPA, as a whole, stood at about 136,000 in 2011 (about 2.5% of the Scottish total). The largest of the sub-areas (by population) was Argyll and Bute, with almost 43,000. The smallest is the Southern Uplands at less about 8,600. These absolute numbers are approximations, due to the mismatch between the SPA and SCAP area boundaries. Nevertheless, comparison with Table 1 shows that the SCAP-based estimates are of a similar order of magnitude. The value of these data lies in the light they can shed upon the trajectory of future change, and the evolving composition of the populations in terms of age structure.

Table 12: Total Population in the SPA and its Sub-Areas 1996-2036

SPA Sub-Area	1996	2001	2006	2011	2016	2021	2026	2031	2036
	Estimated Population				Projected Population				
Northern Isles	13,868	13,001	13,317	13,788	13,889	14,001	14,084	14,074	13,952
Western Isles	14,909	13,349	13,457	13,583	12,840	12,184	11,529	10,768	9,933
NW Highlands	37,373	37,317	38,868	39,568	38,988	38,236	37,275	36,240	34,663
SE Highlands	16,546	16,474	17,156	17,657	17,934	18,206	18,481	18,734	18,865
Argyll and Bute	45,717	44,643	44,519	42,764	39,726	37,719	35,587	33,226	30,600
Southern Uplands	8,854	8,697	8,708	8,693	8,496	8,347	8,174	7,952	7,673
SPA Total	137,268	133,482	136,025	136,052	131,873	128,693	125,129	120,994	115,685
Non SPA Rural	1,272,686	1,274,633	1,322,742	1,369,724	1,386,670	1,407,420	1,426,535	1,440,815	1,448,639
Urban	3,682,237	3,656,085	3,674,333	3,794,123	3,988,157	4,085,141	4,181,249	4,136,010	4,203,914
Scotland	5,092,190	5,064,200	5,133,100	5,299,900	5,506,700	5,621,254	5,732,913	5,697,818	5,768,238

Sources: National Records Scotland; Annual Population Estimates and Sub-Council Area Projections.

Note: Prior to 2027 the SPA population has been calculated from Table 1 of the SCAP area projection report, which contains summary data for 2012 to 2026. For later years (ending in 2037) the detailed tables, for each council area, are the source. This difference is indicated by the grey text in the last two columns of this table (and those which follow). Both these sources are available for download from <https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-projections/population-and-household-sub-council-area-projections>

Figure 6 shows the population trend in the group of SCAP areas which are wholly, or mostly, in the SPA, compared with the rest of rural and small-town Scotland, and those which are in urban areas. It is immediately clear why the SPA is a legitimate focus for this project. During early years of this century the long-term trend of demographic decline in the SPA was reversed. However, the rate of growth slowed by 2007, and by 2010 it appears to have reverted to a negative trend, which is projected to continue right through to 2037. By this date the SPA’s population will be 15% smaller than its 2007 peak. By contrast both the non-SPA rural areas and urban Scotland exhibit more or less continuous population growth, from the turn of the century to 2037, both expanding by approximately 15% over this period.

⁵ Some caution should be exercised since the SAPE data has been generated at different times, using different base years. However, the series was created from the most recent revisions for each year.

Figure 6: Overall Population trend 1996-2037 in the SPA, Rest of Rural and Urban Scotland

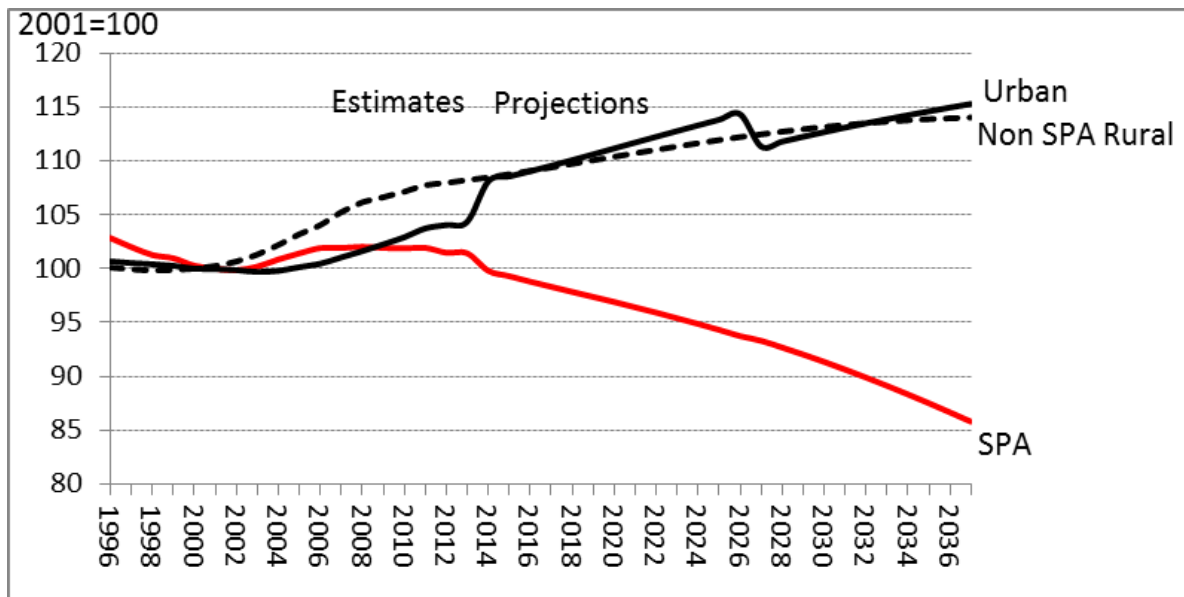
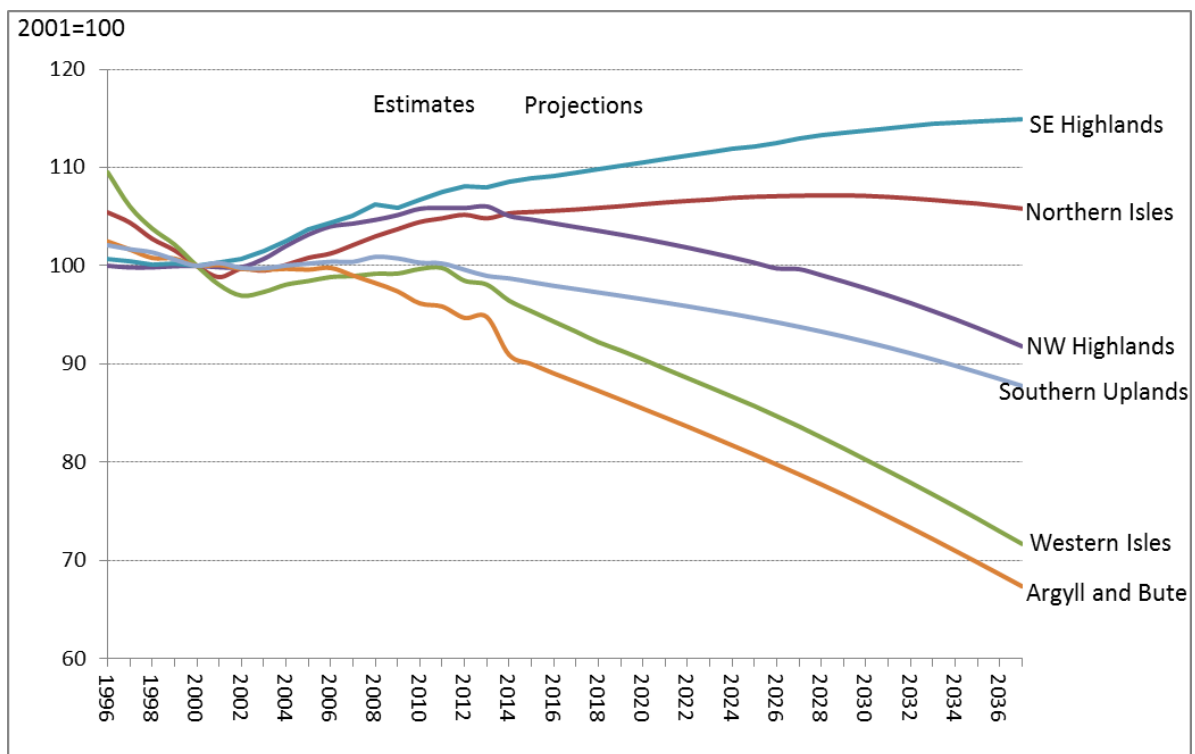


Figure 7: Population Trends in the 6 SPA Sub-Areas



The SPA is by no means homogeneous in terms of its population trends (Figure 2). Two sub-areas, the Northern Isles and the SE Highlands appear to show significant growth⁶ (7% and 15% respectively), whilst all the other SPA sub-areas exhibit decline. The most rapid and substantial

⁶ However, it is important to keep in mind that the SCAP areas do not fit the SPA boundary very well, and when analysis is carried out for the SPA as defined in terms of output areas, these increases turn out to be the result of incorporating towns such as Lerwick and Kirkwall, and the accessible rural areas around them.

decline is forecast for Argyll and Bute, where the 2037 population is projected to be more than 30% down on the 2001 level. The Western Isles SPA also shows a rapid decline – losing almost 30% of its 2001 population by 2037. The NW Highlands and Southern Uplands SPA sub-areas are forecast to lose approximately 10% of their population.

Children in the SPA and its sub-areas

Again, the absolute numbers in Table 13 (because of the SCAP/SPA boundary mismatch) should not be the main focus of interest here. The data suggests that the number of children in the SPA has fallen steadily from almost 27,000 in 1996 to a little over 22,000 in 2011, and that the official projections point to a continuing decline to around 18,000 in 2026 and 16,000 in 2036. The last column in Table 14 shows that the predicted percentage change over the three decades following 1996 (for the SPA as a whole) is almost 34%. This compares to around 8% for the rest of rural Scotland and 3% in Scotland’s urban areas. The percentage change varies considerably between SPA sub-areas, from only -13.5% in the SE Highlands to -54% in the Western Isles, and -41% in Argyll and Bute.

Table 13: The Child Population in the SPA and its Sub-Regions 1996-2036

SPA Sub-Area	1996	2001	2006	2011	2016	2021	2026	2031	2036
	Estimated Child Population				Projected Child Population				
Northern Isles	3,197	2,831	2,610	2,542	2,396	2,482	2,490	2,492	2,417
Western Isles	3,079	2,560	2,347	2,183	1,852	1,660	1,413	1,237	1,006
NW Highlands	7,569	7,092	6,764	6,571	5,964	5,594	5,196	4,815	4,334
SE Highlands	3,082	3,039	2,977	2,891	2,669	2,658	2,669	2,723	2,722
Argyll and Bute	8,608	8,340	7,587	6,632	5,837	5,399	5,019	4,635	4,116
Southern Uplands	1,695	1,608	1,474	1,403	1,317	1,314	1,288	1,243	1,158
SPA Total	27,229	25,469	23,758	22,222	20,035	19,108	18,074	17,145	15,754
Non SPA Rural	262,121	252,840	246,565	245,915	238,882	241,361	241,424	243,835	243,684
Urban	729,634	692,065	655,912	647,966	654,885	688,363	706,231	712,090	707,688
Scotland	1,018,984	970,374	926,235	916,103	913,802	948,831	965,729	973,070	967,126

Sources: National Records Scotland; Annual Population Estimates and Sub-Council Area Projections.

In 1996 almost 20% of the SPA population were children. By 2016 this is estimated to have fallen to 15%, and by 2036 the figure is below 14%. Children form a larger component in non-SPA rural Scotland, and their share declined less rapidly - over the same period the equivalent figures were 20.6%, 17.2%, and 16.8%. In urban Scotland they were at a slightly lower level, but again the share is forecast to hold up better.

Table 14: Children as a Percentage of the Total Population SPA and Sub Areas 1996-2036

SPA Sub-Area	1996	2006	2016	2026	2036	% Change
	Children as a Percentage of the Population					1996-2026
Northern Isles	23.1	19.6	17.2	17.7	17.3	-22.1
Western Isles	20.7	17.4	14.4	12.3	10.1	-54.1
NW Highlands	20.3	17.4	15.3	13.9	12.5	-31.4
SE Highlands	18.6	17.3	14.9	14.4	14.4	-13.4
Argyll and Bute	18.8	17.0	14.7	14.1	13.5	-41.7
Southern Uplands	19.1	16.9	15.5	15.8	15.1	-24.0
SPA Total	19.8	17.5	15.2	14.4	13.6	-33.6
Non SPA Rural	20.6	18.6	17.2	16.9	16.8	-7.9
Urban	19.8	17.9	16.9	17.4	16.8	-3.2
Scotland	20.0	18.0	17.0	17.2	16.8	-5.2

Interestingly, in 1996 children accounted for more than one fifth of the population in both the Island sub-areas, and in the NW Highlands, whilst in the more southerly SPA sub-areas the proportion was slightly lower. By 2016 the proportion was around 15% in all the sub areas except the Northern Isles, where it was still over 17%. In 2026 and 2036 the Northern Isles child population is still about 17%, whilst the Western Isles has declined to 12% by 2026 and 10% in 2036. The NW Highlands reach a level of around 12.5% by 2036, whilst the other areas seem to “bottom out” at between 13-15%. The set of changes reported in Table 14 seem to point to a rather serious contraction of the 0-15 age group across the SPA, but especially in the Western Isles and the NW Highlands, where the change appears little short of catastrophic.

Table 15: Child Dependency Rates in the SPA and its Sub-Regions 1996-2036

SPA Sub-Area	1996	2001	2006	2011	2016	2021	2026	2031	2036
	Estimated Child Dependency Ratio				Projected Child Dependency Ratio				
Northern Isles	0.36	0.34	0.31	0.30	0.29	0.31	0.33	0.35	0.35
Western Isles	0.34	0.32	0.28	0.26	0.25	0.25	0.24	0.24	0.24
NW Highlands	0.33	0.31	0.27	0.27	0.26	0.26	0.26	0.27	0.26
SE Highlands	0.30	0.30	0.28	0.26	0.25	0.25	0.25	0.26	0.27
Argyll and Bute	0.31	0.31	0.28	0.26	0.26	0.27	0.28	0.30	0.31
Southern Uplands	0.31	0.30	0.27	0.27	0.27	0.28	0.29	0.31	0.31
SPA Total	0.32	0.31	0.28	0.27	0.26	0.27	0.27	0.29	0.29
Non SPA Rural	0.32	0.31	0.29	0.28	0.28	0.29	0.29	0.31	0.31
Urban	0.30	0.29	0.27	0.26	0.26	0.27	0.28	0.28	0.28
Scotland	0.31	0.30	0.27	0.26	0.26	0.28	0.28	0.29	0.29

One way in which the implications of changing age structures are commonly illustrated is by the estimation of “dependency ratios”. These are simply the ratio of dependent parts of the population (children and the elderly) as a ratio to the working age population (WAP). Table 15 shows that in 1996 the ratio of 0-15 population to the WAP in 1996 was 0.32 in both SPA and non-SPA rural. In urban Scotland it was lower, at 0.30. By 2016 the SPA ratio was down to 0.26, while the rest of rural Scotland was on 0.28 and urban Scotland on 0.26. By the 2026 the SPA is predicted to recover to 0.27 and by 2036 to 0.29. Both the rest of rural Scotland and urban Scotland are forecast to make similar recoveries in child dependency ratios. As we have seen this cannot be due to increasing child population, but must be a function of the declining denominator (WAP).

The Working Age Population (WAP) in the SPA and its sub-areas

According to the approximation based on SCAP areas (Table 16) the WAP segment of the SPA population was around 85,000 in 1996, falling to about 77,000 in 2016, 66,000 in 2026 and just 55,000 by 2037. This represents a fall from just over 60% of the total population at the beginning of the period to less than 50% at the end (Table 17). Throughout the period the SPA’s working age population share is consistently a few percentage points below that of the rest of rural Scotland, and is slightly further below that of urban Scotland.

Table 16: Working Age Population in the SPA and its Sub-Regions 1996-2036

SPA Sub-Area	1996	2001	2006	2011	2016	2021	2026	2031	2036
	Estimated Working Age Population				Projected Working Age Population				
Northern Isles	8,772	8,214	8,471	8,602	8,295	7,918	7,601	7,176	6,928
Western Isles	9,043	8,062	8,303	8,299	7,515	6,743	5,996	5,103	4,265
NW Highlands	23,079	23,250	24,613	24,540	23,191	21,662	19,921	17,980	16,370
SE Highlands	10,298	10,188	10,696	10,928	10,889	10,790	10,682	10,422	10,227
Argyll and Bute	28,162	27,287	27,358	25,767	22,336	20,146	17,838	15,397	13,362
Southern Uplands	5,492	5,350	5,366	5,274	4,946	4,664	4,368	4,038	3,776
SPA Total	84,846	82,351	84,806	83,409	77,172	71,923	66,404	60,116	54,929
Non SPA Rural	808,860	810,127	846,267	866,299	850,752	837,594	821,820	795,398	775,206
Urban	2,394,484	2,394,167	2,438,012	2,537,725	2,537,492	2,537,185	2,528,015	2,510,075	2,511,319
Scotland	3,288,190	3,286,645	3,369,085	3,487,433	3,465,416	3,446,702	3,416,240	3,365,588	3,341,454

Sources: National Records Scotland; Annual Population Estimates and Sub-Council Area Projections.

Between 1996 and 2026 the WAP segment of the SPA population is forecast to decline by more than 20%, whilst that for non-SPA rural areas is predicted to increase by 1.6% and that of urban Scotland by 5.6% (Table 17). The largest reductions in WAP (1996-2026) are forecast for Argyll and Bute and the Western Isles, both losing more than 30%. The SE Highlands, by contrast is predicted to show a gain of almost 4%.

Table 17: Working Age Population as a Percentage of the Total Population SPA and Sub Areas 1996-2036

SPA Sub-Area	1996	2006	2016	2026	2036	% Change
	WAP as a Percentage of the Population					1996-2026
Northern Isles	63.3	63.6	59.7	54.0	49.7	-13.4
Western Isles	60.7	61.7	58.5	52.0	42.9	-33.7
NW Highlands	61.8	63.3	59.5	53.4	47.2	-13.7
SE Highlands	62.2	62.3	60.7	57.8	54.2	3.7
Argyll and Bute	61.6	61.5	56.2	50.1	43.7	-36.7
Southern Uplands	62.0	61.6	58.2	53.4	49.2	-20.5
SPA Total	61.8	62.3	58.5	53.1	47.5	-21.7
Non SPA Rural	63.6	64.0	61.4	57.6	53.5	1.6
Urban	65.0	66.4	63.6	60.5	59.7	5.6
Scotland	64.6	65.6	62.9	59.6	57.9	3.9

The Pensioner Cohort in the SPA and its sub areas

The estimated number of persons aged 65 or over in the SPA area in 1996 was just over 25,000. By 2016 it is estimated to be almost 35,000, and by 2036 it is forecast to reach 45,000. This represents a 62% increase in the 30 years after 1996 (Table 18). Interestingly the pensioner age group expanded even more (+80%) in the non-SPA rural areas over the same period, and by a smaller proportion (+47%) in the urban areas of Scotland.

Table 18: Population 65+ in the SPA and its Sub-Regions 1996-2036

SPA Sub-Area	1996	2001	2006	2011	2016	2021	2026	2031	2036
	Estimated Pensioner Population				Projected Pensioner Population				
Northern Isles	1,899	1,956	2,237	2,644	3,199	3,601	3,993	4,406	4,607
Western Isles	2,788	2,727	2,807	3,100	3,474	3,781	4,120	4,427	4,661
NW Highlands	6,726	6,975	7,491	8,458	9,910	11,111	12,341	13,445	13,958
SE Highlands	3,167	3,248	3,484	3,838	4,387	4,775	5,154	5,589	5,915
Argyll and Bute	8,947	9,016	9,574	10,365	11,553	12,174	12,731	13,194	13,122
Southern Uplands	1,667	1,740	1,868	2,016	2,233	2,368	2,519	2,672	2,738
SPA Total	25,192	25,662	27,461	30,421	34,756	37,810	40,858	43,733	45,001
Non SPA Rural	201,705	211,666	229,910	257,510	296,946	328,317	363,085	401,582	429,749
Urban	558,119	569,853	580,409	608,433	674,799	735,418	819,904	913,845	984,907
Scotland	785,016	807,181	837,780	896,364	1,006,501	1,101,546	1,223,846	1,359,160	1,459,658

Sources: National Records Scotland; Annual Population Estimates and Sub-Council Area Projections.

Of the sub-areas of the SPA Argyll and Bute, the Western Isles and the NW Highlands stand out as having particularly large pensioner cohorts, reaching more than 40% of the population towards the end of the projection period. The largest increases in pensioners are predicted for the Northern Isles and the NW Highlands, with smaller increases in the Western Isles, and in Argyll and Bute, the SE Highlands and Southern Uplands (Table 19).

Table 19: Persons 65+ as a Percentage of the Total Population SPA and Sub Areas 1996-2036

SPA Sub-Area	1996	2006	2016	2026	2036	% Change
	Pensioners as a Percentage of the Population					1996-2026
Northern Isles	13.7	16.8	23.0	28.3	33.0	110.3
Western Isles	18.7	20.9	27.1	35.7	46.9	47.8
NW Highlands	18.0	19.3	25.4	33.1	40.3	83.5
SE Highlands	19.1	20.3	24.5	27.9	31.4	62.8
Argyll and Bute	19.6	21.5	29.1	35.8	42.9	42.3
Southern Uplands	18.8	21.5	26.3	30.8	35.7	51.1
SPA Total	18.4	20.2	26.4	32.7	38.9	62.2
Non SPA Rural	15.8	17.4	21.4	25.5	29.7	80.0
Urban	15.2	15.8	16.9	19.6	23.4	46.9
Scotland	15.4	16.3	18.3	21.3	25.3	55.9

The shifts in WAP and pensioner cohorts are both reflected in old age dependency rates (Table 20). In 1996 the SPA old age dependency rate (0.30) was already well above that of the non-SPA rural areas of Scotland (0.25) and that of urban Scotland (0.23). By 2016 it was estimated at 0.45, in 2026 it is predicted to reach 0.62, and by 2036, 0.82. These figures are well above those for non-SPA rural and urban areas, which reach 0.53 and 0.39 respectively by 2037. Of the SPA sub-areas the Western Isles exhibits the highest old age dependency rates, starting off in 1996 at 0.31, and climbing to 1.09 in 2036. So, by this date the number of pensioners in the Western Isles is predicted to exceed the number in the working age cohort. Rates are also high in the NW Highlands, Argyll and Bute and the Southern Uplands, but slightly lower in the Northern Isles and SE Highlands.

Table 20: Old Age Dependency Rates in the SPA and its Sub Regions 1996-2036

	1996	2001	2006	2011	2016	2021	2026	2031	2036
SPA Sub-Area	Estimated Old Age Dependency Ratio				Projected Old Age Dependency Ratio				
Northern Isles	0.22	0.24	0.26	0.31	0.39	0.45	0.53	0.61	0.66
Western Isles	0.31	0.34	0.34	0.37	0.46	0.56	0.69	0.87	1.09
NW Highlands	0.29	0.30	0.30	0.34	0.43	0.51	0.62	0.75	0.85
SE Highlands	0.31	0.32	0.33	0.35	0.40	0.44	0.48	0.54	0.58
Argyll and Bute	0.32	0.33	0.35	0.40	0.52	0.60	0.71	0.86	0.98
Southern Uplands	0.30	0.33	0.35	0.38	0.45	0.51	0.58	0.66	0.73
SPA Total	0.30	0.31	0.32	0.36	0.45	0.53	0.62	0.73	0.82
Non SPA Rural	0.25	0.26	0.27	0.30	0.35	0.39	0.44	0.50	0.55
Urban	0.23	0.24	0.24	0.24	0.27	0.29	0.32	0.36	0.39
Scotland	0.24	0.25	0.25	0.26	0.29	0.32	0.36	0.40	0.44

Dependency Rates in the SPA and its sub areas

The overall dependency ratio is simply the sum of the child and pensioner ratios. It represents the ratio of the dependent cohorts to the size of the WAP. Thus in 1996 the ratio for Scotland as a whole was 0.55, meaning that the dependent population equated to 55% of the WAP (Table 21). At this date the non-SPA rural dependency rate was two percentage points above the Scottish average, whilst the urban rate was one percent below it. The SPA average was seven percentage points above the national average. By 2016 the relationship between the rates remained the same, but the gap had widened, with the SPA 16 percentage points above the Scottish average. By 2026 the margin is projected to reach twenty-five percentage points, and by 2037 more than forty percentage points. Of the sub-areas the Western Isles and Argyll and Bute consistently have the highest dependency rates, and the NW Highlands, and the Southern Uplands also exceed unity by 2036. The rates for the Northern Isles and SE Highlands are slightly lower, though still well above those for the non-SPA rural and urban areas.

Table 21: Total Dependency Rates in the SPA and its Sub-Regions 1996-2036

	1996	2001	2006	2011	2016	2021	2026	2031	2036
SPA Sub-Area	Estimated Total Dependency Ratio				Projected Total Dependency Ratio				
Northern Isles	0.58	0.58	0.57	0.60	0.67	0.77	0.85	0.96	1.01
Western Isles	0.65	0.66	0.62	0.64	0.71	0.81	0.92	1.11	1.33
NW Highlands	0.62	0.61	0.58	0.61	0.68	0.77	0.88	1.02	1.12
SE Highlands	0.61	0.62	0.60	0.62	0.65	0.69	0.73	0.80	0.84
Argyll and Bute	0.62	0.64	0.63	0.66	0.78	0.87	1.00	1.16	1.29
Southern Uplands	0.61	0.63	0.62	0.65	0.72	0.79	0.87	0.97	1.03
SPA Total	0.62	0.62	0.60	0.63	0.71	0.79	0.89	1.01	1.11
Non SPA Rural	0.57	0.57	0.56	0.58	0.63	0.68	0.74	0.81	0.87
Urban	0.54	0.53	0.51	0.50	0.52	0.56	0.60	0.65	0.67
Scotland	0.55	0.54	0.52	0.52	0.55	0.59	0.64	0.69	0.73

5. Towards a Demographic Narrative of the Scottish SPA 1991-2037.

In broad brush terms the total population of the SPA was in decline during the 1990s but saw a brief period of expansion during the first decade of the new century. By 2007 or 2008 this increase was reversed and the falling trend is projected to continue for at least two decades into the future. The rather negative prognosis for the SPA contrasts with the more positive future which is foreseen for the rest of Scotland, both rural and urban.

This divergence in the demographic development of the SPA, compared to the rest of Scotland is associated with an age structure which is both a legacy of past out-migration and is a key driver of the future trend. The key demographic issue for the SPA is not an excess of elderly people, but the relatively small number of children and young people, which in the years to come will translate into a small working age population, which will have serious implications for the workforce and economy. The relatively small cohorts in the child bearing age will, unless counterbalanced by substantial in-migration, lead to a vicious cycle of decline.

These generalisations for the SPA as a whole mask a degree of regional differentiation. The SPA parts of the Northern Isles, for example, exhibit some more positive age structural characteristics and trends, presumably as a consequence of oil industry-related in-migration at the end of the last century. At the other extreme the Western Isles seem likely to perform well below the SPA average in the coming decades. The SCAP projections data suggest that the greatest decline will be in Argyll and Bute, a fact that is the more sobering since this SPA sub-region accounts for more for more than twice the population of either of the Island areas.

6. Some Initial Observations about Policy Implications

The forecast decline in population of the SPA raises a number of questions, including:

- What will be the implications be for the rural economy, and for key sectors such as farming/crofting, and tourism?
- Following on from this, what could be the effects upon land use and land management, and thus upon the environment and ecosystems of the region?
- What will be the consequences be in terms of demand for, and cost of provision, of the various services which are required by the resident population and businesses?
- To what extent is there a danger that population reductions could emasculate communities, and rob them of the social capital which determines the capacity for endogenous development?

All these questions will be addressed by the RESAS research deliverable (3.4.1) to which this working paper is a contribution. Findings will be made available on the project's web page (<http://www.hutton.ac.uk/research/projects/demographic-change-remote-areas>).

References

Copus, A. (2018) *Demographic Projections for the Scottish Sparsely Populated Area (SPA) 2011-2046*. Available at

http://www.hutton.ac.uk/sites/default/files/files/RD%203_4_1%20Working%20Paper%203%20O12ii%20260218.pdf

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%20O11%20161117.pdf (Accessed 27th February 2018)

National Records of Scotland (2016) *Population and Household Projections for Scottish Sub-Council Areas (2012-based)*. National Records of Scotland, Edinburgh. Available at

<https://www.nrscotland.gov.uk/files//statistics/scap/scap.pdf> (Accessed 27th February 2018)

Annex 1: The SPA Geographical Framework

As described within Working Paper 1 (Copus and Hopkins, 2017), the SPA was defined using 2011 Census Output Areas, based on the total population accessible within 30 minutes' travel from each Output Area. Output Areas in rural areas and small towns in Scotland (n = 13,814, defined using the Urban Rural Classification available from the Scottish Government) were used in these calculations; 1,290 Output Areas were defined as being within the SPA, and the remainder (n = 12,524) were classified as outside of it ('not in SPA').

To split these Output Areas into sub-regions, two pieces of information were initially used – an SPA 'flag' (showing whether the Output Area was in the SPA or not) and the local authority area which the Output Area was in. The latter was created using a code within the Output Area boundaries file which showed the council area, and this was converted to a meaningful name using information from the 2011 Census Indexes.

Data used:

National Records of Scotland. 2011 Output Area Boundaries: Clipped to the coastline (MHW). Download: <http://www.nrscotland.gov.uk/files/geography/output-area-2011-mhw.zip>. © Crown copyright. Data supplied by National Records of Scotland.

Scottish Government Urban Rural Classification 2013-2014 Lookup Files: lookup table for 2011 Output Areas. Download: <http://www.gov.scot/Resource/0046/00464793.zip> © Crown copyright. Contains public sector information licensed under the Open Government Licence v3.0.

National Records of Scotland. 2011 Census Indexes: Comma Separated Value (CSV) files: table COUNCIL AREA 2011 LOOKUP. Download: <https://www.nrscotland.gov.uk/files/geography/2011-census-indexes-csv.zip> © Crown copyright. Data supplied by National Records of Scotland.

The SPA flag and local authority information were used to divide these output areas into sub-regions:

- **Northern Isles:** the part of the SPA within Shetland and Orkney
- **Western Isles:** the SPA within the Comhairle nan Eilean Siar council area
- **North and West Highlands and South and East Highlands:** the SPA within the local authorities of Highland, Moray, Aberdeenshire, Angus, Perth and Kinross and Stirling. The Great Glen was used to split the SPA into two regions which cover the Scottish Highlands (described below).
- **Argyll and Bute:** the SPA within the Argyll and Bute council area, and the Isle of Arran (a part of North Ayrshire)
- **Southern Uplands:** the SPA located within Dumfries and Galloway, the Scottish Borders, and South Ayrshire.

As noted above, an issue arose in that a 'Highlands' based sub-region would cover a very large area, if it was based on the local authorities of Highland, Moray, Aberdeenshire, Angus, Perth and Kinross and Stirling. Therefore, the Great Glen (Fort William – Loch Ness – Inverness) was used to split these

output areas into 'North and West Highlands' and 'South and East Highlands' regions. GIS data - the location of population weighted centroids and the watercourses in the Great Glen – was used for this split.

Data used:

National Records of Scotland. 2011 Output Area – Population Weighted Centroids. Download: <http://www.nrscotland.gov.uk/files/geography/output-area-2011-pwc.zip> © Crown copyright. Data supplied by National Records of Scotland.

Ordnance Survey. Open Map Local – Surface Water Area. Contains Ordnance Survey data © Crown copyright and database right 2015. Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v1.0.

The parts of rural areas and small towns which were a) in the local authority areas and b) outside of the SPA (not defined as sparsely populated), were classified into six corresponding 'not in SPA' sub-regions. Figures for the remaining rural and small town areas in Scotland: in local authority areas across the central belt, North and East Ayrshire, Lanarkshire, Fife, Aberdeen City and Dundee, were also produced. This 'all other areas – not in SPA' region represents rural areas and small towns which were particularly accessible to the large urban areas of Scotland.

Annex 2: Lookup tables

Working Paper 1 (Copus and Hopkins, 2017) contains a detailed description of how geographical units other than 2011 Output Areas were allocated to different regions and subregions, and the data sources used to produce the lookup tables. These other geographies are the versions of Output Areas used in the 1991 and 2001 Censuses, the two types of Data Zones (defined in 2001 and 2011), Sub-Council Area Projection (SCAP) Areas and Agricultural Parishes. These lookup tables were used to produce demographic statistics at regional and subregional levels, which have been reported within this working paper. While the Appendix of Working Paper 1 includes links to parts of the lookup tables which relate to the SPA, the box below identifies the full versions of the lookup tables which show **all geographical units and their accompanying region/subregion definitions**. Links to these tables are also provided at the RD3.4.1 project website (<http://www.hutton.ac.uk/research/projects/demographic-change-remote-areas>) in the ‘Research outputs from RD3.4.1...’ section. In the analysis contained within Section 2 and 3 in this Working Paper, population data available at the level of Data Zones was modified, where appropriate, based on the information in these lookup tables. **To reiterate, please consult working paper 1 (Copus and Hopkins, 2017), specifically the section headed “Best Fit Overlay Geographies for Key Data Sources” (pages 17-22) and Appendix, for a full description of methods and data used.**

Lookup tables:

2011 Output Areas, lookup to regions and subregions – [download](#)

1991 Output Areas, lookup to regions and subregions – [download](#)

2001 Output Areas, lookup to regions and subregions – [download](#)

2011 Data Zones, lookup to regions – [download](#)

2011 Data Zones, lookup to subregions – [download](#)

2001 Data Zones, lookup to regions – [download](#)

2001 Data Zones, lookup to subregions – [download](#)

SCAP Areas, lookup to regions – [download](#)

SCAP Areas, lookup to subregions – [download](#)

Agricultural Parishes, lookup to regions and subregions – [download](#)

Note:

The geographical units are shown in the lookup table as a code (Output Areas, Data Zones), a numerical identifier (the “AG_PARCODE” for the Agricultural Parishes) or a name (SCAP Areas). The lookup tables for the 1991 and 2001 Output Areas show two types of code for each Output Area, in the first two columns of the table. These codes were sourced from the spatial data for the older Output Areas shown in Table A1 within Working Paper 1.

Regions and subregions are shown by the SPAFLAG and SUBREGION_6 columns, respectively.

Lookup tables related to Data Zones and SCAP Areas contain a column "PCTPOP", which shows the proportion of the total population (scaled between 0 and 1) of the larger unit within the region or subregion.

The lookup table for Agricultural Parishes contains the column "PCT_PARISH_AREA" which shows the proportion of the parish area (scaled between 0 and 1) within the region. The "PCT_PARISH_AREA" column does not apply to the subregion.

A Data Zone or SCAP Area can appear on more than one row of the same lookup table. This shows that the population of the Data Zone or SCAP Area was split between two (or more) regions or subregions, each recorded on a separate row. In these cases, the "PCTPOP" information can be used to modify the population figure for the Data Zone or SCAP Area.

Annex 3: Population data sources

Section 2 contains the most detailed analysis of demographic trends in this working paper: it covers the 1991-2016 period, and is primarily based on fine-grained Output Area-level data. Population data for Output Areas (1991, 2001, 2011) and Data Zones (2016) was linked to the relevant lookup tables, with population counts adjusted where required for the Data Zone-level figures.

Data used:

1991 Census data, downloaded from Casweb (<http://casweb.ukdataservice.ac.uk/>):

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. Data used from tables SAS02, SAS27, SAS42, SAS46, SAS47.

2001 Census data, downloaded from Casweb (<http://casweb.ukdataservice.ac.uk/>):

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. Data used from tables UV65 and CS002. (Note: data from table UV65 is not shown in Chapter 5)

2011 Census data, downloaded from Scotland's Census: Data Warehouse: Bulk data files (<http://www.scotlandscensus.gov.uk/ods-web/download/getDownloadFile.html?downloadFileIds=SNS%20Data%20Zone%202011%20blk>):

2011 Census © Crown copyright. Data supplied by National Records of Scotland. Data used from tables KS105SC and LC1117SC.

National Records of Scotland Population Estimates (Current Geographic Boundaries), downloaded from statistics.gov.scot (<http://statistics.gov.scot/data/population-estimates-current-geographic-boundaries>). Contains public sector information licensed under the Open Government Licence v3.0. © Crown copyright. Data supplied by National Records of Scotland. - **2016**

Following this analysis, Section 3 presents an assessment of total population change for rural areas and small towns in Scotland from Data Zone figures, available from 1996 to 2016, inclusive. While these Data Zone-level data have the advantage of being available at annual intervals, they have the disadvantage of requiring an adjustment to produce estimated values for the various regions and subregions. Population estimates available at the resolution of 2001 Data Zones were used from 1996 to 2014, for the years 2015 and 2016, data for 2011 Data Zones were used. The vast majority of

these data were downloaded from the statistics.gov.scot resource. 2014 data at the level of Data Zones was not available from statistics.gov.scot at the time of the data download (26th January 2018), therefore the appropriate file was sourced from the National Records of Scotland website.

Data used:

1996-2000: Historical Population Estimates (pre-2001, historical geographic boundaries), downloaded from statistics.gov.scot (<http://statistics.gov.scot/data/historical-population-estimates>). Contains public sector information licensed under the Open Government Licence v2.0. © Crown copyright. Data supplied by National Records of Scotland.

2001-2013: Mid-Year Population Estimates (historical geographical boundaries), downloaded from statistics.gov.scot (<http://statistics.gov.scot/data/population-estimates>). Contains public sector information licensed under the Open Government Licence v2.0. © Crown copyright. Data supplied by National Records of Scotland.

2014: Mid-2014 Small Area Population Estimates Scotland. Table 1a: Estimated population by sex, five year age group and 2001 Data Zone area: 30 June 2014 (Persons). Downloaded from <https://www.nrscotland.gov.uk/files//statistics/population-estimates/sape2014/2014-sape-t1ap.csv>. © Crown copyright. Data supplied by National Records of Scotland.

2015-2016: Population Estimates (Current Geographic Boundaries), downloaded from statistics.gov.scot (<http://statistics.gov.scot/data/population-estimates-current-geographic-boundaries>). Contains public sector information licensed under the Open Government Licence v3.0. © Crown copyright. Data supplied by National Records of Scotland.