

# Population potential in Scotland: defining a Sparsely Populated Area



Jonathan Hopkins and Andrew Copus

## Background, method

Demographic and economic changes within peripheral areas of Scotland have major impacts on the delivery of ecosystem and public services. To study these in detail, it is first necessary to define where the sparsely populated area (SPA) is. To do this, we adapted the **population potential** concept and method described by researchers at Nordregio, Sweden in 2006, which is the "...number of persons that can be reached" from different locations<sup>1</sup>. This measure captures meaningful constraints on social and economic behaviour, and is therefore preferable to a simpler population density-based threshold<sup>1</sup>. Additionally, we developed the approach by including travel time in the calculation.

We calculated the number of people<sup>2</sup> who lived (in 2011) within 30 minutes travel from all 13,814 Output Areas in rural areas and small towns in Scotland. This time is appropriate as a commuting threshold, and is also used in the Scottish Government's Urban Rural Classification<sup>3</sup> to define 'accessible' areas. We used data on the location and population of Output Areas in England, Wales and Scotland. A transport network was 'built' which included the road network and ferry links in Scotland. To calculate travel times, the following data were used:

- Ordnance Survey (OS) Open Roads data (roads, junctions, road classifications)
- OS Strategi® data (ferry routes and ferry journey times, also location of settlements (used to identify roads in urban areas))
- data within OS OpenData Viewer (ferry terminal locations)
- Scottish Government Geographic Information Science & Analysis Team work on the 2013-2014 Urban Rural Classification<sup>4</sup> (average road speeds)

## Results

The map (overleaf) shows **the population<sup>2</sup> who lived within 30 minutes travel from Output Areas**. It shows access to people based on the population distribution, and the location, density and quality of transport links. Results show that:

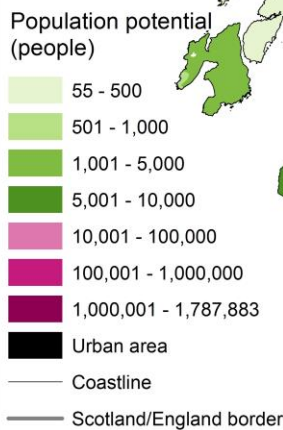
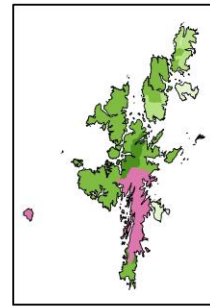
- On average, areas in rural areas and small towns in Scotland could access **240,458.0 people** (mean) in 30 minutes.
- The Output Area with the greatest access to people was located in North Lanarkshire, to the east of Glasgow. **1,787,883 people** were within 30 minutes travel. Population potential values of over one million were found in several areas around Glasgow.
- By contrast, there were **nine Output Areas** where **less than 100 people** could be reached within half an hour's travel. These are associated with small islands in Orkney, Shetland and Argyll and Bute.

We defined a population potential threshold for the SPA using sensitivity analysis, including mapping, aiming to define a broadly homogenous area and a reasonable threshold for the Scottish context. Finally, **the SPA was defined as the area with a population potential of less than 10,000 people accessible within 30 minutes travel. This is the area shown in shades of green on the map. This area covers slightly less than half (48.7%) of the area of Scotland, and had 2.6% of the population.** The SPA covers large areas of the west coast, the Highlands and Islands, and some more isolated areas in southern Scotland. However, it excludes the surroundings of Stornoway, Kirkwall, Lerwick, Thurso, Wick, Fort William, Oban and Stranraer. The chosen population threshold corresponds to the size of an 'Other' Urban Area within the Urban Rural Classification<sup>3</sup>.

# Population potential in Scotland (2011 Output Areas, rural areas and small towns)

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The calculation of population potential is described in Working Paper 1, available for download at the project webpage: <http://www.hutton.ac.uk/research/projects/demographic-change-remote-areas>. Shaded areas shown 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 Strategi® data, coastline from Ordnance Survey Boundary-Line™ data. Colour scheme adapted from scheme at <http://colorbrewer2.org/> © Cynthia Brewer, Mark Harrower and The Pennsylvania State University.

Map showing population potential, and the SPA definition (green shading) in rural areas and small towns in Scotland

## Further information

This research note forms a short summary of the material within Working Paper 1 "Outline Conceptual Framework and Definition of the Scottish Sparsely Populated Area (SPA)", available from the project webpage (<http://www.hutton.ac.uk/research/projects/demographic-change-remote-areas>). Full details of data sources, acknowledgements, and methods/software used, are included within the Working Paper.

<sup>1</sup> Gløersen, E., Dubois, A., Copus, A., Schürmann, C. (2006) Northern Peripheral, Sparsely Populated Regions in the European Union and in Norway. Nordregio Report 2006:2. Nordregio, Stockholm. Available at <http://www.nordregio.se/Templates/NordRegio/Pages/PublicationPage.aspx?id=493&epslanguage=en> (Accessed 12<sup>th</sup> July 2017). The quotation in the above text is from page 3 of this report.

<sup>2</sup> Population data used: 2011 Census data. © Crown copyright. Data supplied by National Records of Scotland / Source: Office for National Statistics. Contains public sector information licensed under the Open Government Licence v3.0.

<sup>3</sup> see <http://www.gov.scot/Topics/Statistics/About/Methodology/UrbanRuralClassification> (Accessed 12th July 2017)

<sup>4</sup> Scottish Government Geographic Information Science & Analysis Team (GI-SAT) Rural and Environment Science and Analytical Services Division (2014) Scottish Government Urban/Rural Classification: 2013 – 2014. The Scottish Government, Edinburgh. Available at [www.gov.scot/Resource/0046/00464780.pdf](http://www.gov.scot/Resource/0046/00464780.pdf) (Accessed 12th July 2017)



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Contact: **Andrew Copus** [andrew.copus@hutton.ac.uk](mailto:andrew.copus@hutton.ac.uk)  
**Social, Economic & Geographical Sciences**  
The James Hutton Institute,  
Craigiebuckler, Aberdeen AB15 8QH