POPGROUP USERS GROUP (PUG)

POPGROUP and HOUSEGROUP User Guides

1. This paper contains the user guidance that was written to assist POPGROUP users to produce population projections (Annex A) and household projections (Annex B) at same area level.

2. Group members are invited to provide any comments or feedback on these two documents to

3. It is anticipated that these documents will be updated on a regular basis, depending on feedback from users. Anybody who has used or intends to use the guidance should note any errors, omissions, sections that need to be clarified, and any other general comments.

Population and Migration Statistics
General Register Office for Scotland
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ANNEX A

**Small Area Projections in Scotland using POPGROUP software
Guidance Part 1: Population projections**

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Background

This guidance on small area population and household projections has been produced as part of a project funded by GRO(S) to evaluate a set of projections produced for the 23 multi-member wards of Fife Council Area. The projections were funded by Fife Council and used a standard set of data for births, deaths and population made available for Data Zones in Scotland by GRO(S). The evaluation is reported in separately by GRO(S). It resulted in the planned release of further data by GRO(S) for Data Zones and for Intermediate Areas, which allow enhancements to small area projections. Other improvements to the methodology were also identified that required extra data for Scotland. This guidance includes reference to these improvements and further data.

The main purpose of this guidance is intended to help implement in practice the standard methodology developed from this project, using the standard datasets made available by GRO(S). It also discusses key issues to address in the evaluation of projections, and in the development of effective strategies for areas where a non-standard strategy or non-standard data may be appropriate.

The examples used in this document are usually taken from projections for the multi-member wards of Fife, developed with Excel 2003, using POPGROUP and HOUSEGROUP version 3. POPGROUP functions equally with Excel 2007.

The approach described here is also used by Edge Analytics when providing a service to produce small area projections in Scotland. A very similar approach is used for small areas in England or Wales, adapted to the different data available for those countries. The approach is likely to be developed as new data become available.

'Forecast' and 'projection' are used interchangeably in this guidance.

Future developments and revisions

During the year after publication of this Guidance, it is likely that the following developments will take place that users may wish to incorporate in their practice. If possible, a revised version of this guidance will be issued.

1. Release of births by age of mother and deaths by age and sex of deceased for areas smaller than Council Areas, will allow direct estimation of age-specific schedules of fertility and mortality.

2. Experience of local authorities and health authorities will be shared to provide improvements or alternative practices.

Contents

1. Before starting

1.1.   Pre-requisites
   (a) POPGROUP software, installed.
   (b) The POPGROUP reference manual. This guidance assumes that the user is familiar with POPGROUP and that the reference manual will be referred to for help with basic usage.
From GRO(S):
   (c) Births 2001-2 by sex, and each subsequent available year, for Data Zones.
   (d) Deaths 2001-2 by age and sex, and each subsequent available year, for Data Zones.
   (e) Population mid-2001 by single year of age and sex, and each subsequent available year, for Data Zones.
   (f) National Scotland TFRs and mortality for the same mid-year periods that births and deaths are available for Data Zones. TFRs are published annually in [Vital Events Reference](#) Table 3.6 and mortality rates in Table 5.1.
From the POPGROUP website:
   (g) Scotland standards for age-specific demographic rates, and their projected future change.
From the user's own resources:
   (h) A geographical conversion table ('lookup'), specifying how each GRO(S) Data Zone is wholly or proportionately allocated to each of the user's small areas.

Other useful data referred to, also from GRO(S):
   (i) Births by age of mother for Data Zones (broad age) and Intermediate Zones (single years of age, amalgamated recent years).
   (j) Deaths by sex and age at death, for Data Zones (single year of age, amalgamated recent years).

1.2.   Which small areas?
POPGROUP version 3 allows up to forty areas in one model.

The small areas will normally cover the whole of one local authority Council Area in Scotland. It is possible to use the same method to make population projections for small areas that do not cover the whole of a local authority, or cover more than one local authority. However, the method used to estimate local household projections does assume areas that cover one local authority completely and without overlaps.

Although each small area will usually be a compact single area, the same method can be used for a classification such as collections of zones with similar deprivation scores, scattered through a local authority.

If several sets of small areas are to be projected, then a different model will be needed for each. This guidance should be followed for each set.

How small? The projection procedures will work for small areas of any population, but are not as robust for small populations as for larger populations. Smaller populations often change from year to year in ways different from past trends which are the basis for the projections. As a crude rule of thumb for which there may be exceptions, we recommend a smallest population of three thousand.

Institutions. The projection may be less reliable if a major institution is present, such as a large prison, boarding school, halls of residence or armed forces base with say more than ten per cent of the local population. The difficulty arises because such populations maintain

their age-structure through replacement of those that leave the institution by others of a younger age; the migration data available for small areas is not good enough to model this replacement precisely. The projections must be examined and used with caution for areas with large institutional populations.

An alternative strategy is to estimate the size of such an institutional population and make assumptions about its future size, outside of the projection of the rest of the population. An independent projection of these 'special populations' can then be incorporated within the POPGROUP framework, using the Special Populations sheet in the Model Setup (described in the POPGROUP manual). However, care must be taken when computing the fertility, mortality and migration rates which will be applied to the non-special population. Thus, this alternative strategy is fraught with complications that may be best avoided, by seeking the best data that does include the institutional populations.

2. The strategy for these small area projections

This guidance aims to provide practical help in using POPGROUP software and demographic information commonly available, to project the population of any areas within Scotland. Advice on the nature of the areas has been provided in the previous section.

Because the areas of interest vary according to policy priorities in different parts of Scotland and over time, the strategy uses data for births and deaths for standard small areas (mainly Data Zones) that can be aggregated by the user to their areas of interest. However, migration flows cannot be aggregated in the same way. The inflows to two neighbouring Data Zones, for example, will each include the flows between them and so the inflow to the combined area is not the sum of the two inflows.

For migration, therefore, the strategy takes a different approach. The difference between annual population estimates is used to estimate the number of migrants who must have moved, at least in net terms. For example, if an area has forty people aged 25 in one year and fifty aged 26 the next, then ten more people of that age must have entered the area than left it during the year.

The strategy uses POPGROUP to make these indirect estimates of migration in a 'training' projection based on the population estimates published by GRO(S) since the last Census year. The migration is that which is implied by and consistent with those population estimates.

The training projection at the same time calculates differences between each small area's fertility and mortality from past vital statistics of births and deaths since the last Census year.

These estimates are used in a final projection, which assumes the continuation of recent experience in each small area, but also incorporates the future changes in fertility and mortality that are expected for Scotland as a whole.

Part 1: Population projections

Steps in strategy	Summary of action or outputs for each small area		
1. Data allocated to each small area	Births since 2001	Deaths since 2001	Population estimates since 2001
2. Training projection	Local fertility differential	Local mortality differential	Local net migration
3. Migration-led projection	Local fertility and mortality differences continued, with future Scotland time trend		Local migration continued

Part 2: Household projections

Steps in strategy	Summary of action or outputs for each small area	
1. Data allocated to each small area	Population not in households	Household types
2. Scaling to Council Area household projections	Detailed age-sex household population	Household headship rates
3. Projected number of households	Uses the migration-led projection to calculate the implied number of households	
4. Housing-led projection	Uses a housing development plan to adjust migration to fill the projected households	

3. POPGROUP Model Setup

3.1. POPGROUP Model_Setup

Open, complete, run and save the Model_Setup file, as in this example and the notes below.

(a) Sheet 'General'

POPGROUP Population Estimates and Forecasts

Model Set-up Information

When complete, click this ***SET-UP*** button to create the skeleton input workbooks

POPGROUP version 3.0

File Header:	**Fife electoral ward areas**	1
Base Year of population data:	**2001**	2
Maximum number of years to be forecast:	**50**	
Directory in which to save the skeleton workbooks:	**C:\forecast\popgroup_v3\FifeWards1_skel**	3
Directory in which to save data input workbooks:	**C:\forecast\popgroup_v3\FifeWards1_inp**	3
Directory in which to save output workbooks:	**c:\forecast\popgroup_v3\FifeWards1_out**	3
Workbook containing standard rates:	**C:\forecast\PG Standard Rates\standard_scotland_2008.xls**	4

Labels for the total of all population groups.

Short Label (up to 8 characters)	Long Label	
Fife	**Fife Council Area**	5

Number of Population Groups: **23**

The order given will be used on the input and output files, and printed reports

Note: The short label is used for naming sheets in the input, model and output workbooks. It is also used for column headings throughout the system.
It must not be purely numeric.

The long label is used for headings in workbooks and reports.

No.	Short Label (up to 8 characters)	Long Label
1	**WestFife**	**West Fife and Coastal Villages**
2	**DunfNor**	**Dunfermline North**
3	**DunfCen**	**Dunfermline Central**
4	**DunfSou**	**Dunfermline South**
5	**Rosyth**	**Rosyth**
6	**InverkDB**	**Inverkeithing and Dalgety Bay**
7	**TheLochs**	**The Lochs**
8	**Cowdenb**	**Cowdenbeath**
9	**LochCard**	**Lochgelly and Cardenden**
10	**BurntKin**	**Burntisland Kinghorn and Western Kirkcaldy**
11	**KdyNorth**	**Kirkcaldy North**
12	**KdyCent**	**Kirkcaldy Central**
13	**KdyEast**	**Kirkcaldy East**
14	**GlenWest**	**Glenrothes West and Kinglassie**
15	**GlenNort**	**Glenrothes North Leslie and Markinch**
16	**GlenCent**	**Glenrothes Central and Thornton**
17	**HoFTayC**	**Howe of Fife and Tay Coast**
18	**TayBdghd**	**Tay Bridgehead**
19	**StAndrew**	**St Andrews**
20	**EastNeuk**	**East Neuk**
21	**Cupar**	**Cupar**
22	**LevenKen**	**Leven Kennoway and Largo**
23	**BuckMeth**	**Buckhaven Methil and Wemyss Villages**

Notes:

1. The base year is 2001, to allow entry of past births, deaths and population, which will be used in the 'training projection' to assess the differences between the small areas' demographic experiences.

2. The maximum number of years from the base year in POPGROUP version 3 is fifty.

3. The directory paths and names are at the convenience of the user.

4. The latest file of standard rates can be downloaded from
http://www.ccsr.ac.uk/popgroup/about/fmm.html

5. The maximum number of areas in POPGROUP version 3 is forty.

(b) Sheet 'Migration'

Migration Type 1		All migration, whetherwith rest of UK or overseas	**1**
Inward	Long Label	**In-migration from all other areas**	
Outward	Long Label	**Out-migration to all other areas**	
Inward	Short label	**IN**	
Outward	Short label	**OUT**	

Migration Type 2			**2**
Inward	Long Label		
Outward	Long Label		
Inward	Short label		
Outward	Short label		

Notes

1. In the standard strategy for small areas, information is only accurately known for the net impact of migration at each age and sex. Therefore, as in the illustration, the Migration types are limited to one flow in and out.

2. The second migration type is given blank entries.

3.2.   Check the results

Running the Model Setup will create three folders as requested. One will have skeleton files, and the other two be empty, ready for input files and output files.

On the skeleton files for fertility, mortality, the Scotland standard schedules from the latest national projections will have already been entered on the 'Sched' sheet. The time trend from the Scotland projections will be already entered on the All-Groups sheet (in this example, Fife) as age and sex specific differentials from the standard schedule in future years. The local level of fertility and mortality will be specified separately for each small area, after the training run.

On the skeleton file for migration, the 2001 Census age-sex schedule of migration rates will have already been entered.

4. Data preparation and the training run

4.1. Allocation of data to small areas

The data from GRO(S) for Data Zones must be allocated to the small areas identified in the Model Setup.

The allocation will usually be not of whole Zones but in proportion to the overlaps of each Zone with each local area, estimated through GIS or postcode directories. The creation of a Geographical Conversion Table (sometimes called 'lookup table', or 'recasting proportions') is usually undertaken in-house because the composition of the local areas is best known locally. It is not provided by GRO(S).

4.2. Local age-specific fertility and local age-sex-specific mortality

Data for births by age of mother, and for deaths by age at death have been provided by GRO(S) and can be used to create local schedules of age-specific fertility and age-sex specific mortality.

The evaluation project found that the use of local age-specific schedules of fertility and mortality makes little difference to projections of births and deaths, once the level of fertility and mortality have been estimated. Their use is marked optional below.

If used the data for births and deaths must be allocated to the small areas identified in the Model Setup, and combined with the population data to estimate local schedules for fertility and mortality.

The first edition of this guidance was prepared before the GRO(S) age-specific data were available. Further guidance will be possible at a later date.

4.3. The base population and more recent population estimates

The base population in these projections is 2001, although the projection will only start after the latest year of population estimates that are entered.

1. Open the skeleton file popbase.xls.
2. Enter the mid-2001 population estimates for each small area.
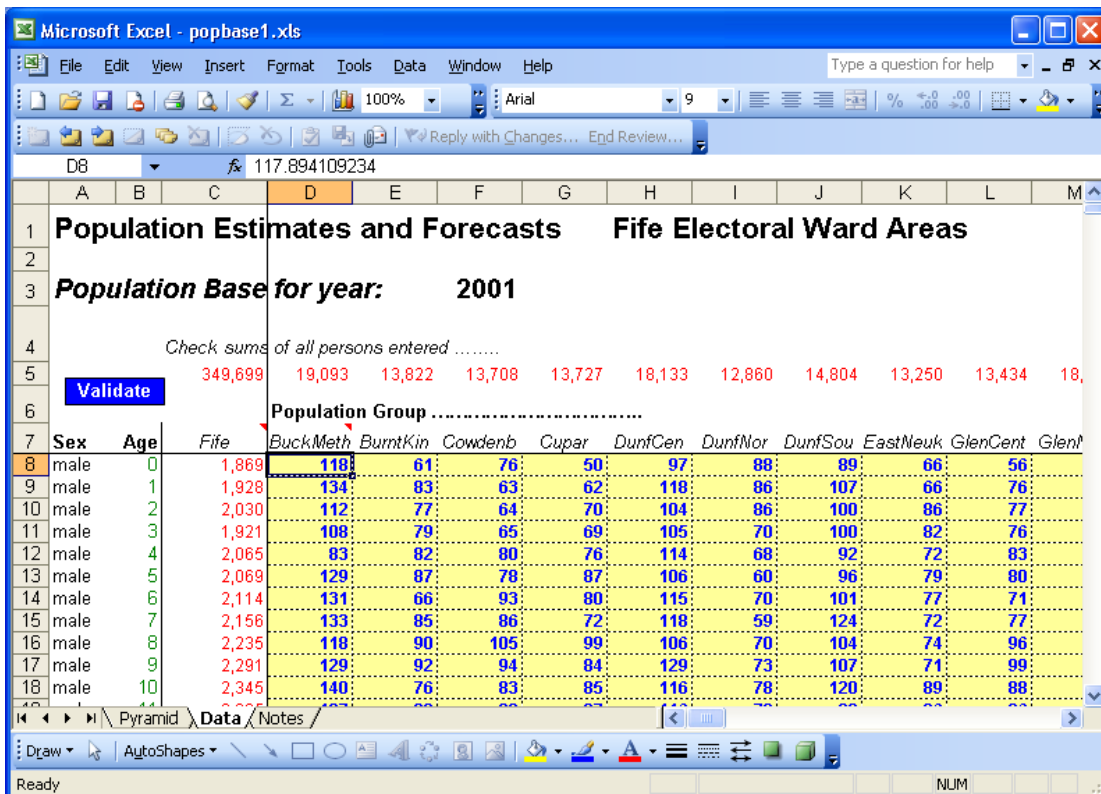
3. Validate the file by clicking the Validate button and checking the messages. Look at the population pyramids created if there are no errors.
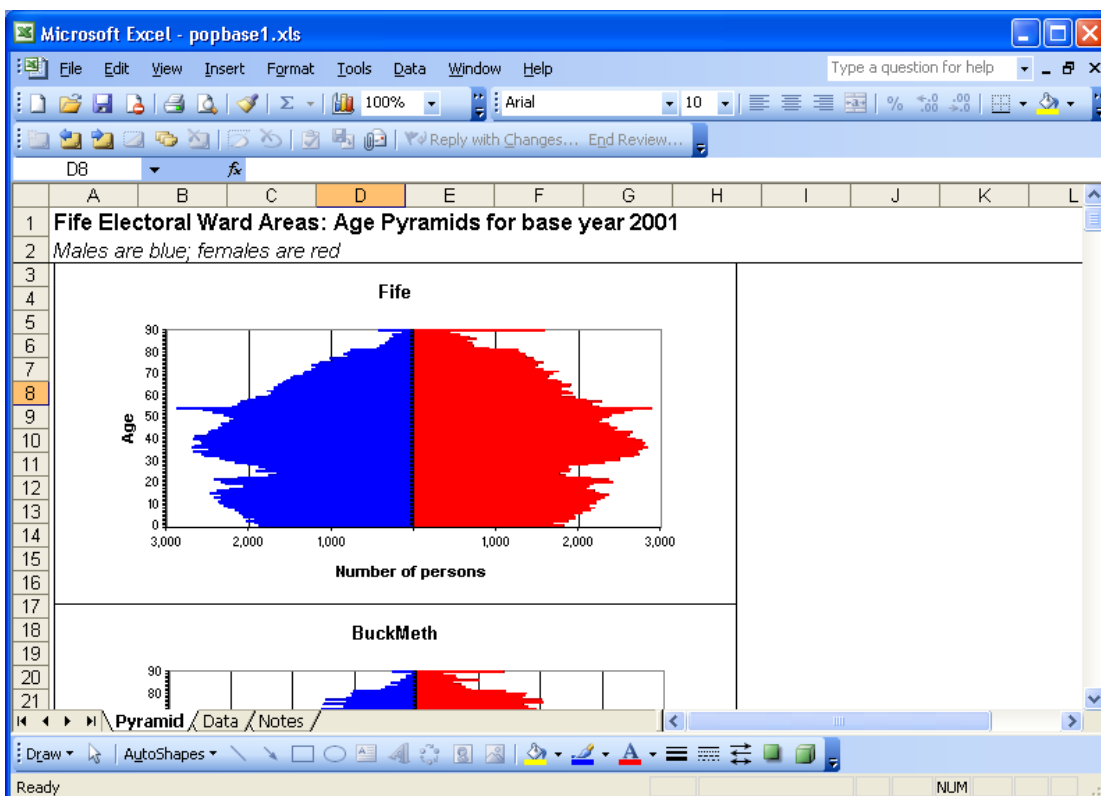
4. Add to the Notes sheet to describe what you have done (what the data represent and which file they were taken from, perhaps).

5. Save as popbase1.xls in the input directory that was created when you ran the Model Setup.

6. Open the skeleton file cons.xls.

7. On each small area sheet enter the population estimates for years since 2001, first double-clicking in the options row (22) to remove detection from the data

area below. The data are entered in the single year of age area (starting in row 71).
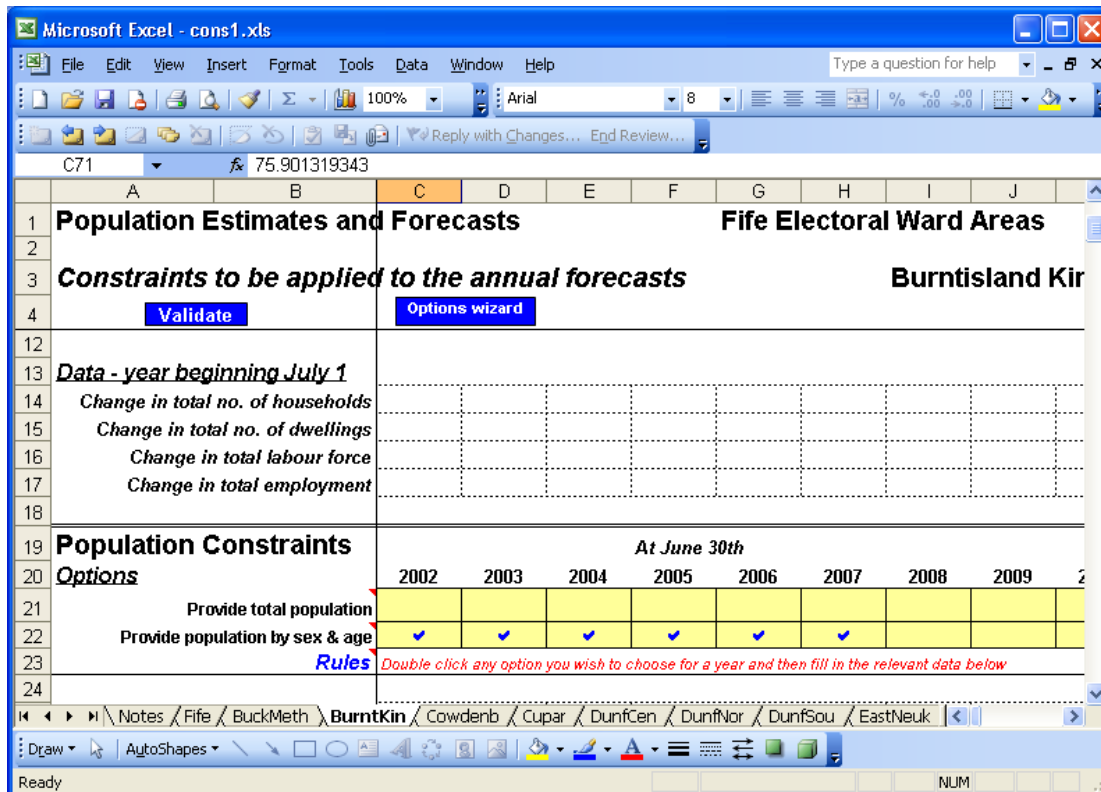
8. Validate the file by clicking the Validate button and checking the messages.

9. Add to the Notes sheet to describe what you have done (what the data represent and which file they were taken from, perhaps).

10. Save as cons1.xls in the input directory that was created when you ran the Model Setup.

4.4.   Births and fertility

1. Open the skeleton file fert.xls. Edit it as follows and save as fert1.xls in the input directory that was created when you ran the Model Setup.

2. Check that it already has a standard schedule of fertility rates on the 'Sched sheet', and a set of age-specific differentials on the 'All-groups' sheet (in our example, Fife) , which are documented on the 'Notes' sheet.

3. On each small area's sheet, enter the male and female births for each year they are known, by double clicking the years under options, which removes protection from the data area.
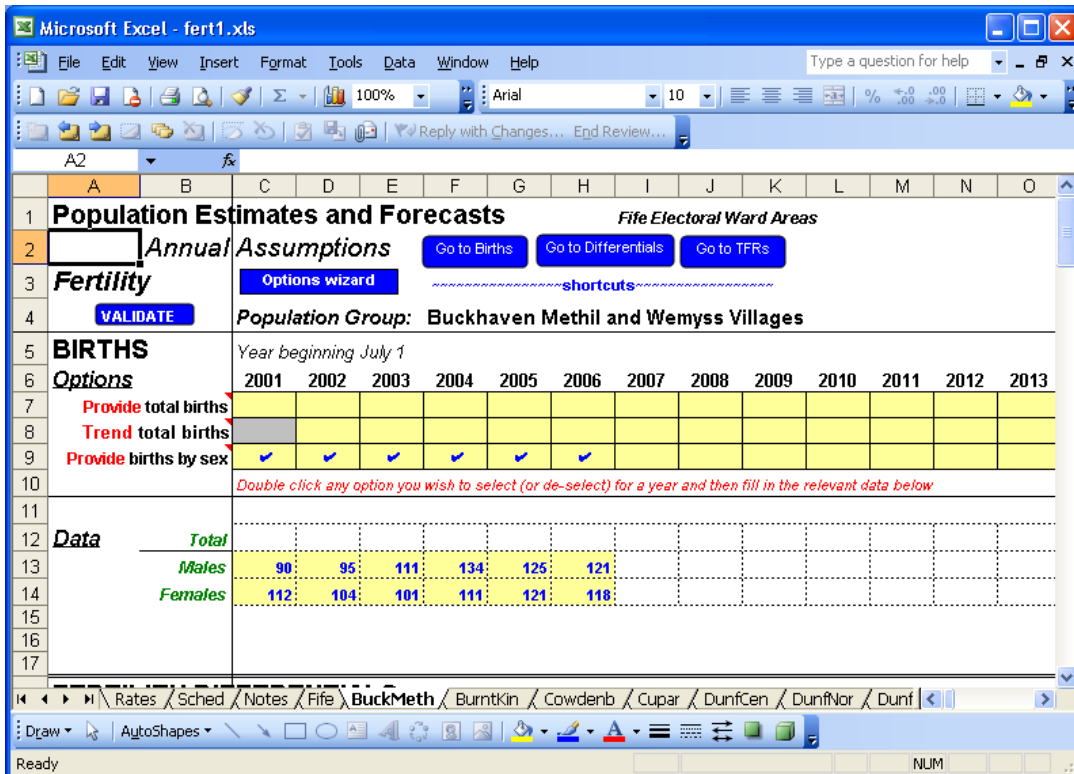
4. Optional (see above in this section). On the 'Sched' sheet, enter the local area age-specific fertility rates, by clicking the option at the top of each small area's column, which removes protection from the column.
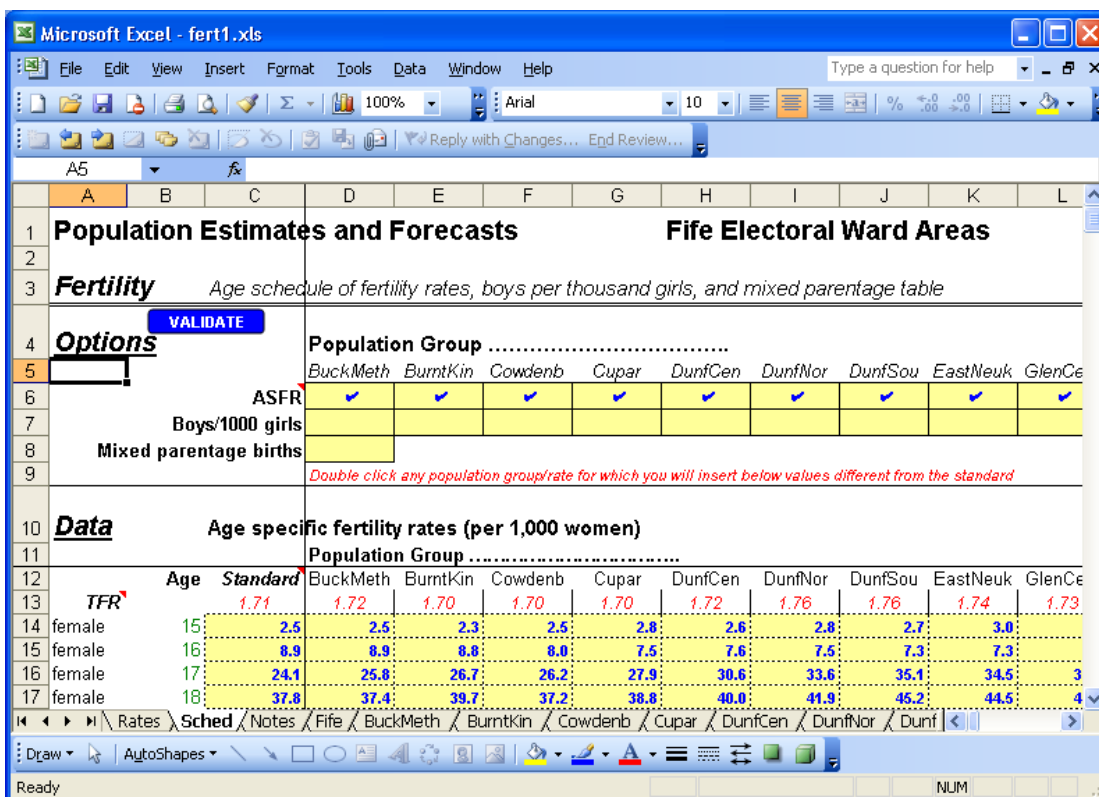
5. Add to the Notes sheet to describe what you have done (what the data represent and which file they were taken from, perhaps).

6. Validate the file by clicking the Validate button and checking the messages. Look at the chart of rates created if there are no errors. There will be only one line at

this stage, if local age-specific fertility rates have not been entered, the Scotland schedule of fertility. This is correct: the local fertility will be estimated in the next stage.

7. Save as fert1.xls in the input directory.

4.5.   Deaths and mortality

Open the skeleton file mort.xls. Edit it as follows and save as mort1.xls in the input directory that was created when you ran the Model Setup.

1. Check that it already has a standard schedule of mortality rates on the 'Sched sheet', and a set of age-sex-specific differentials on the 'All-groups' sheet (in our example, Fife), which are documented on the 'Notes' sheet.

2. On each small area's sheet, enter the male and female deaths by age group for each year they are known, by double clicking the years under options, which removes protection from the data area.
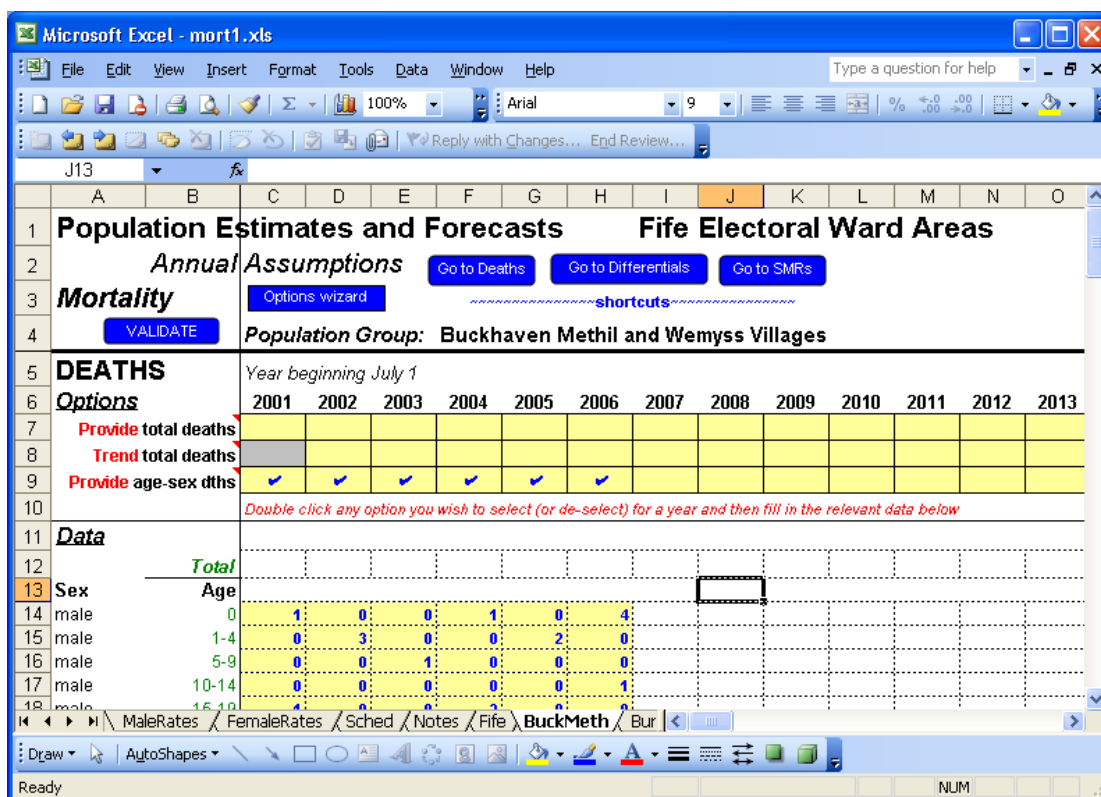
3. Optional (see above in this section). On the 'Sched' sheet, enter the local area age-sex-specific mortality rates, by clicking the option at the top of each small area's column, which removes protection from the column.
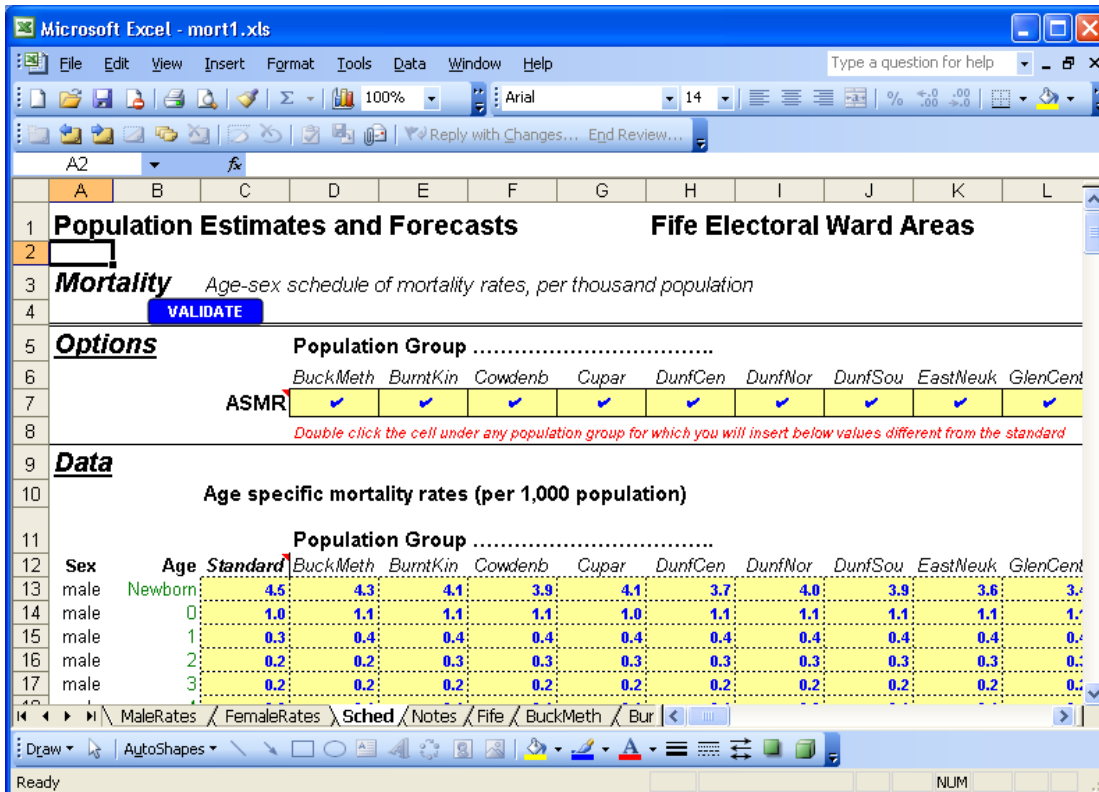
4. Add to the Notes sheet to describe what you have done (what the data represent and which file they were taken from, perhaps).

5. Validate the file by clicking the Validate button and checking the messages. Look at the charts of rates created if there are no errors. There will be only one line at this stage, if local age-specific mortality rates have not been entered, the Scotland schedule of mortality. This is correct: the local mortality will be estimated in the next stage.

6. Save as mort1.xls in the input directory

4.6. Migration

Open the skeleton files Mig_IN.xls and Mig_OUT.xls. Edit them as follows and save as Mig_IN1.xls and Mig_OUT1.xls in the input directory that was created when you ran the Model Setup.

1. Check that the two files already have a standard schedule of migration rates on the 'Sched' sheet, which is documented on the 'Notes' sheet. This is all that is needed at present. Migration will be estimated by the training run.

2. Make no changes, so there is no need to validate. Save as Mig_IN1.xls and Mig_OUT1.xls in the input directory

There are not reliable data at present to estimate local migration rates by single year of age, nor to divide migration into short distance and long distance, for the variety of small areas that may be of interest. The evaluation project concluded that, *for the purposes of population and household projections*, the focus on five-year age groups and the overall net impact of migration on population cannot and need not be improved upon.

However, analysis of migration data that do exist may be of great value to understand local population dynamics, even if not available for the exact local areas of interest, and even if not used in projections for those local areas.

There are some local areas where the age-structure of migration is highly unusual for specific ages within five-year age groups. These include areas with relatively many higher education students, who often arrive in greatest numbers at age 18, and leave at age 21 and older. The method outlined here will not capture the migration at particular ages but average it out over the five year age group. The projections should therefore be used with care, and trusted for broad age groups rather than for single years of age.

4.7. Prepare the training projection scenario

A projection is now run for the years in which local births, deaths and population are known, in order to estimate the local levels of fertility, mortality and migration in each of recent years.

Open the skeleton file POPGROUPscenario.xls. Edit it as follows and run it; it will be saved automatically as scenario_training.xls in the input directory that was created when you ran the Model Setup.

(a) Sheet 'Run_Details':

POPGROUP - Population Estimates and Forecasts

Information for this scenario

RUN THE MODEL

Scenario identifier: **Training** — 1

Contact details (to be included on all output files)

Organisation/Department Name: Fife Council
Other information xxx
(e.g. contact details) xxx
Tel: xxx
— 2

Final year for this forecast **2007** — 3

Double click to browse for directory or workbook names

Default Directory for the input workbooks: c:\forecast\popgroup_v3\FifeWards1_inp
Directory for the output workbooks: C:\forecast\popgroup_v3\FifeWards1_out
— 4

Input workbook names *(you do not need to give the .xls suffix for any workbook names)*

Input workbook names	
Base population	popbase1
Births & fertility	fert1
Deaths & Mortality	mort1
In-migration from the UK (optional)	Mig_IN1
Out-migration to the UK (optional)	Mig_OUT1
In-migration from Overseas (optional)	
Out-migration to Overseas (optional)	
Special Groups (optional)	

— 5

Save your input files before running the model.

Migration Weights

	Pop'n	Housing	LabForce
	50%	100%	100%
	50%	0%	0%
	0%	0%	0%
	0%	0%	0%

— 6

Output workbooks (named automatically from the scenario identifier)

Detailed population forecasts fore_Training
Components summary comp_Training
Summary forecasts report summ_Training
Forecast reports book fore_Training-reports

Produce dump file ☑ — 7

50 << Numbers in summary report
output book rounded to this amount
— 8

This scenario saved as: scenario_Training
last run on: *03/06/2009 at 13:58:13*

Notes for this scenario to be placed on the output files

This scenario is uses past data to estimate recent rates of fertility, mortality and migratin for each small area. — 9

Notes:

1. Enter the scenario ID.

2. Include details that will be printed on output

3. The final year for this projection should be the last year for which you entered population estimates in the constraints file (above). It will usually be later than the year used in this example, because more data will have been released since this Guidance was prepared.

4. The default input and output directories will be already filled in.

5. Specify the files to be used for this scenario: the ones you have created. If you have followed the naming suggestions above, you will fill in the names as in this illustration. (Note that POPGROUP's labels to the left of the migration files wrongly refer to 'Migration in the UK', because you are using just one area for all migration including overseas)

6. Type 50% for the 'Migration weights' for population, against MIG_OUT1. The weight for MIG_IN1 will automatically change so that the weights add to 100%. These weights are used by POPGROUP to estimate migration when making it consistent with the constraint of population estimates.

7. Tick the check box for the 'dump' file, on which the estimated migration will be output.

8. The output files are named automatically, using the scenario ID.

9. Enter documentation of what this scenario aims to do.

(b) Sheet 'Constraints_and_impacts':

Population Estimates and Forecasts

Constraints and impact on housing and labour force

Double click to browse for workbook names

Annual Constraints	cons1

Housing
Household headship rates	
Persons not in households	
Dwellings-households conversion	

Produce housing impact ☐

Labour Force
Economic activity rates	
Students	
Employment-labour force conversion	

Produce labour force impact ☐

Notes:

1. Enter the constraints file name.

4.8.   Run the training projection

When you have entered all the above information, run the scenario by clicking the button on the 'Run_Details' sheet: **RUN THE MODEL**

When the model has run successfully, the scenario file and the output files will have been saved. Explore the output using 'fore_training-reports.xls. In the next stage we will be using these output files:

comp_training.xls

fore_training-dump.xls

5. Developing input files that reflect recent local experience

This section uses output from the training scenario to modify the input for fertility, mortality and migration.

The section refers to **'average recent'** fertility, mortality and migration. GRO(S) practice for sub-national projections uses an average of the latest five years experience, with each of those years weighted equally. There may be good reasons to use a different number of years, or to weight more recent years more heavily, and this is up to the user.

5.1. Fertility – if no local fertility schedules have been used

Follow this section if the 'Sched sheet' on fert1.xls has only the standard column entered, with Scotland rates. In this section you will create a fertility differential for each small area. (Use the next section if you have already entered local fertility schedules for each small area on the 'Sched' sheet).

The comp_training.xls file contains the TFR for each local area in each past year since 2001, based on the number of births in those years.

1. Compute the average recent TFR for each small area (see example).

2. Compute the average recent TFR for Scotland. These TFRs are available from GRO(S). *Use the same years as for the average of small area TFRs*.
3. For each small area, its fertility is represented in this POPGROUP model as a *differential* from the national experience, calculated as the ratio:

<u>(Average recent TFR in the small area)</u>
(Average recent TFR for Scotland)

4. Open fert1.xls and enter this ratio in each small area sheet's area for fertility differentials. Choose the option to provide a total differential for the first year when births are not known and then choose the option to continue it in each subsequent year (see illustration. In this case the ratio was 1.14).
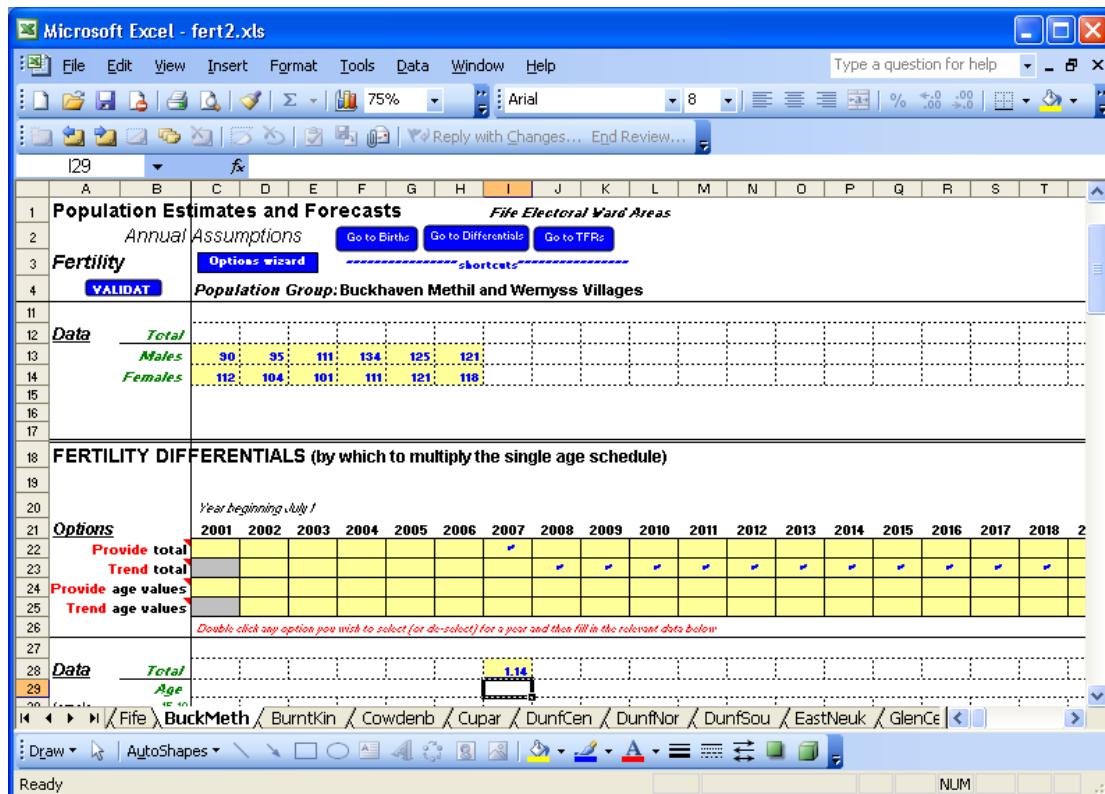
5. Enter documentation in the Notes sheet, validate the file, then save the file with a different name, fert2.xls.

There are now two sets of fertility assumptions. The file 'fert2.xls' contains the most developed local assumptions, as follows:

- For the first years, the number of boys and girls born in each local area.
- For years when the number of births is not known, a projection based on:
  o The standard schedule of age-specific fertility rates for Scotland taken from the latest national projections. ('Sched' sheet)
  o The ratio of local fertility to Scotland's fertility. (Small area sheet, total differential)
  o The future age-specific change in fertility for future years, taken from the latest national projections. (All groups sheet, age-specific differentials)

5.2.   Fertility – if local fertility schedules have been used

Follow this section if the 'Sched sheet' on fert1.xls has age-specific fertility entered for each small area, as well as the standard column. In this section you will create a fertility differential that relates the recent years used for local fertility to the year used to indicate future change. This is needed because fertility may have changed since the years used to compute the local fertility schedule. (Use the previous section if you have not entered local fertility schedules for each small area on the 'Sched' sheet).

1. Compute the average recent TFR for Scotland. These TFRs are available from Vital Events Reference Table 3.6 on the GRO(S) website. *Use the same years as for the small areas' age-specific schedule*.
2. Note the TFR for the standard schedule: this is in the 'Sched' sheet, at cell C13.
3. Compute the ratio of the average recent TFR for Scotland to the standard schedule
4. For all areas, the link between fertility estimated recently, and fertility changes foreseen in the national projection, is represented in this POPGROUP model as a *differential*, calculated as the ratio:

$$\frac{\text{(standard TFR)}}{}$$

(Average recent TFR for Scotland)

5. Open fert1.xls and enter this ratio in the 'All Groups' (in the example, Fife) sheet, in the area for fertility differentials. Choose the option to provide a total differential for the first year when births are not known, and then choose the option to continue it in each subsequent year (see illustration. In this case the ratio was 1.10).
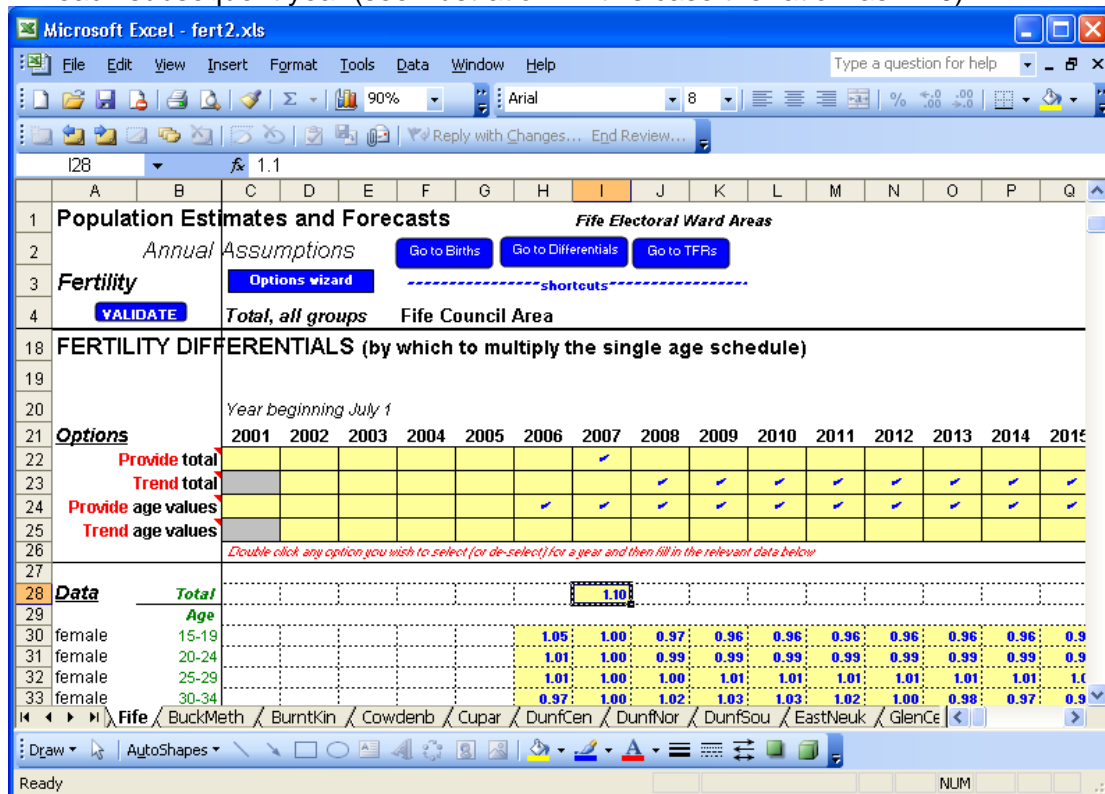
6. Enter documentation in the Notes sheet, validate the file, then save the file with a different name, fert2.xls.

There are now two sets of fertility assumptions. The file 'fert2.xls' contains the most developed local assumptions, as follows:
- For the first years, the number of boys and girls born in each local area.
- For years when the number of births is not known, a projection based on:
  - The small area's schedule of age-specific fertility rates based on recent experience ('Sched' sheet)
  - The ratio of fertility in recent years to fertility in the start year of the national projections, from Scotland estimates. (All groups sheet, total differential)
  - The future age-specific change in fertility for future years, taken from the latest national projections. (All groups sheet, age-specific differentials)

5.3.   Mortality – if no local mortality schedules have been used

Follow this section if the 'Sched sheet' on mort1.xls has only the standard column entered, with Scotland. In this section you will create a mortality differential for each small area. (Use the next section if you have already entered local mortality schedules for each small area on the 'Sched' sheet).

The comp_training.xls file contains the SMR for each local area in each past year since 2001, based on the number of deaths in those years.

1. Compute the average recent SMR for each small area (see example).

The SMR in POPGROUP measures the recent local mortality, indexed on the standard mortality, which in this case is for the Scotland at the start of the national projections. We need also to take into account the change in national mortality over that period.

2. The recent average mortality across all ages is available from Vital Events Reference Table 5.1 on the GRO(S) website. *Use the same years as for the small area average SMR.*

3. Compute the average mortality in the standard schedule, across all ages, from column B in the 'Sched' sheet.

4. Compute the differential for each local area:

(Average recent SMR in the small area) * (Scotland standard average mortality)
            100   *   (Scotland recent average mortality)

5. Open mort1.xls and enter this result in each small area sheet's area for mortality differentials. Choose the option to provide a total differential for the first year when deaths are not known and then choose the option to continue it in each subsequent year (see illustration. In this case the ratio was 1.21).

6. Enter documentation in the Notes sheet, validate the file, then save the file with a different name, mort2.xls.

There are now two sets of mortality assumptions. The file 'mort2.xls' contains the most developed local assumptions, as follows:

- For the first years, the number deaths in each local area. Within the age-groups provided, the deaths at each single year of age are distributed using the standard Scotland schedule of mortality rates.
- For years when the number of deaths is not known, a projection based on:
  o The standard schedule of age-sex-specific mortality rates for Scotland taken from the latest national projections. ('Sched' sheet)
  o The ratio of local mortality to Scotland's mortality. (Small area sheet, total differential)
  o The future age-sex-specific change in mortality for future years, taken from the latest national projections. (All groups sheet, age-sex-specific differentials)

## 5.4. Mortality – if local mortality schedules have been used

Follow this section if the 'Sched sheet' on fert1.xls has age-sex-specific mortality entered for each small area, as well as the standard column. In this section you will create a mortality differential that relates the recent years used for local mortality to the year used to indicate future change. This is needed because mortality may have changed since the years used to compute the local mortality schedule. (Use the previous section if you have not entered local mortality schedules for each small area on the 'Sched' sheet).

1. The recent average mortality is available from GRO(S). *Use the same years as were used for the small area ASMR schedules.*
2. Compute the average mortality in the standard schedule, across all ages, from column B in the 'Sched' sheet.
3. Compute the ratio of the two, which will be used by POPGROUP as a differential for all groups:

(Scotland standard average mortality)
(Scotland recent average mortality)

4. Open mort1.xls and enter this ratio in the 'All Groups' (in the example, Fife) sheet, in the area for mortality differentials. Choose the option to provide a total differential for the first year when deaths are not known, and then choose the option to continue it in each subsequent year (see illustration. In this case the ratio was 1.05).
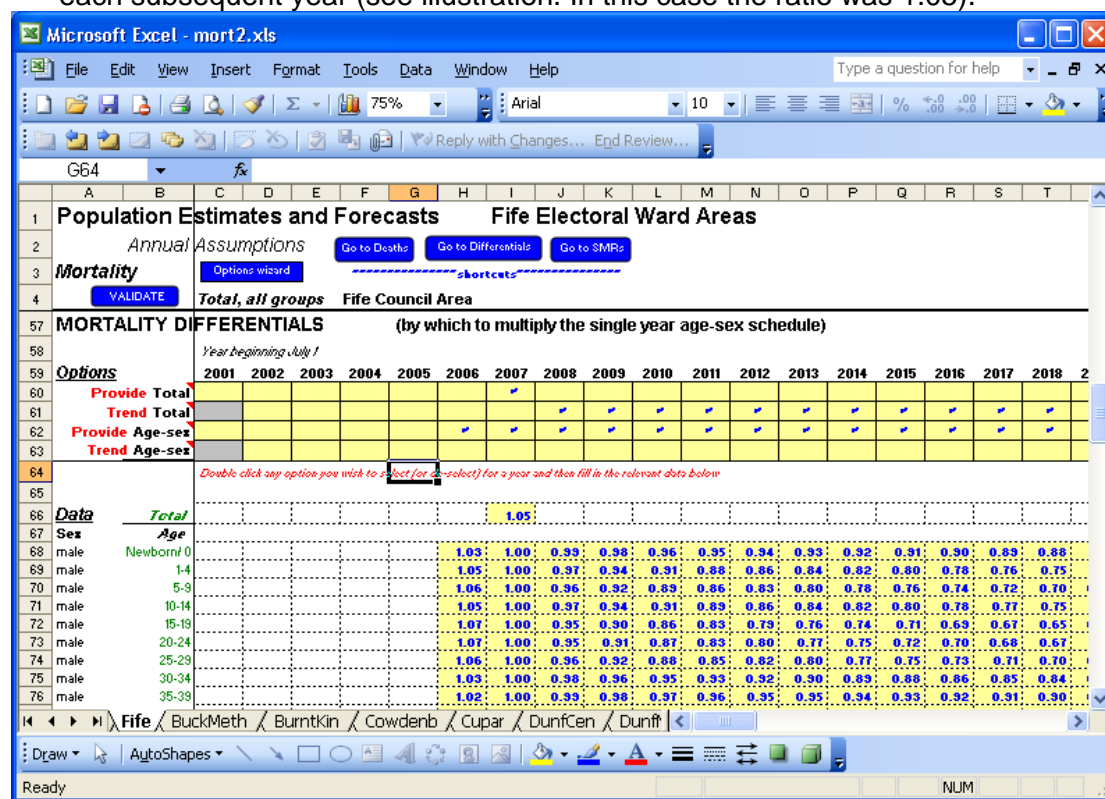
5. Enter documentation in the Notes sheet, validate the file, then save the file with a different name, mort2.xls.

There are now two sets of mortality assumptions. The file 'mort2.xls' contains the most developed local assumptions, as follows:

- For the first years, the number deaths in each local area. Within the age-groups provided, the deaths at each single year of age are distributed using the local schedule of mortality rates.
- For years when the number of deaths is not known, a projection based on:
  - The small area's schedule of age-sex-specific mortality rates based on recent experience ('Sched' sheet)
  - The ratio of mortality in recent years to mortality in the start year of the national projections, from Scotland estimates. (All groups sheet, total differential)
  - The future age-sex-specific change in mortality for future years, taken from the latest national projections. (All groups sheet, age-specific differentials)

5.5. Migration

The fore_training-dump.xls file contains the number of migrants at each age and sex, for each year since mid-2001, that are consistent with the mid-year population each year. We will use these estimates to create a set the assumptions for the future that continue recent experience.

1. Compute the average recent migration for each small area for In-migration at each age-sex group that is used in the input files (see example).

2. Open Mig_IN1.xls and enter the average of recent experience in the small area sheets. Choose the option to provide age-sex migrants in each year after the last year in which population estimates have been entered, which will remove protection from the data area. Enter the same recent average age and sex counts of migration.

3. Add documentation on the Notes sheet, validate the file, and save under a new name, Mig_IN2.xls.
4. Repeat for out-migration, adding to Mig_OUT1.xls and saving as Mig_OUT2.xls.

There are now two sets of migration assumptions. The files 'Mig_IN2.xls' and 'Mig_OUT2.xls' contain the most developed local assumptions, as follows:
- For the first years, the migration will be computed according to the population estimate in the constraints file, for each local area.
- For years after the known population estimates, a projection based on:
  - The small area's recent experience of migration, for five-year age groups (each small area sheet).
  - Within each age group, the distribution between single years of age is based on the schedule of age-sex-specific migration rates ('Sched' sheet)

In each case, only the estimate of *net* migration is robust. The division between in- and out-migration is not based on local information, but is simply calculated to be consistent with past population estimates.

6. The migration-led projection

This section prepares the scenario for a projection that continues the experience of the recent past, using the input files that have been prepared above. Such a projection is sometimes called a 'trend projection', although apart from following future fertility and mortality trends expected nationally it does not identify or continue any local trends. It maintains the same fertility and mortality differences between areas, and the same level of migration in each area.

This is also sometimes called a 'migration led' projection, in distinction to projections led by a scenario of possible housing developments when migration is projected to fill the housing that is expected to be available. We use the term 'migration led' in this guidance. 'Housing led' projections are discussed and implemented in Part 2 of this guidance.

6.1. Prepare the scenario

Open the input file 'scenario_training.xls'. Edit it as follows and run it; it will be saved automatically as scenario_mig.xls in the input directory that was created when you ran the Model Setup.

(a) Sheet 'Run_Details':

Notes:

1. Change the scenario ID.

2. The final year for this projection will depend on the uses it will be put to. Remember that projections further ahead are less reliable.

3. Amend the files to be used for this scenario. Only the population base has not changed from the training scenario. The other files have suffix 2.

4. There is no need for the dump file this time (but there is no harm in producing it if you want its output. It is much larger than any other file, because it dumps all the projection information in great detail).

5. The output files are named automatically, using the scenario ID.

6. Enter documentation of what this scenario aims to do.

(b) Sheet 'Constraints_and_impacts':

No change is needed to this sheet: it will use the same constraints file as the training run, containing the past population estimates.

6.2.   Run the projection

When you have entered all the above information, run the scenario by clicking the button on the 'Run_Details' sheet: **RUN THE MODEL**

When the model has run successfully, the scenario file and the output files will have been saved. Explore the output using 'fore_mig-reports.xls.

ANNEX B

Small Area Projections in Scotland using POPGROUP software Guidance Part 2: Household projections

Date: Last revised 18th March 2010
Author: Ludi Simpson, University of Manchester

Background

This guidance summarises a method used for making small area household projections in Scotland, and its practical implementation, as undertaken by the Centre for Census and Survey Research at the University of Manchester. The method has not been evaluated by GRO(S) in the same way as population projections (reported separately), but will be developed (see below).

The software used to develop household projections for small areas, HOUSEGROUP, was designed to replicate methods developed in the 1980s for areas within England and Wales, undertaken now by CLG. The household projections now undertaken by GRO(S) use different categories and age groups, which required some approximation in this implementation using HOUSEGROUP (see for example section 3.3 below).

For this reason, the guidance given here attempts to show the principles that apply and the practical steps required, whether using the current HOUSEGROUP software or the enhanced software due later in 2010.

The examples used in this document are taken from projections for the multi-member wards of Fife, funded by Fife Council, developed with Excel 2003, using POPGROUP and HOUSEGROUP version 3. The software functions equally with Excel 2007.

The approach described here is also used by Edge Analytics when providing a service to produce small area projections in Scotland. A similar approach is used for small areas in England or Wales, adapted to the different data available for those countries. The approach is likely to be developed as new data become available.

'Forecast' and 'projection' are used interchangeably in this guidance.

Future developments and revisions

During the year after preparation of this Guidance, it is likely that the following developments will take place that users may wish to incorporate in their practice. If possible, a revised version of this guidance will be issued.

1. 2008-based Council Area projections will be released by GRO(S).

2. A census commissioned table for each data zone will allow direct calculation of age-specific headship rates for each local area.

3. A new POPGROUP module for 'derived forecasts' will allow closer replication of GRO(S) methodology than is possible with HOUSEGROUP.

4. Experience of local authorities and health authorities will be shared to provide improvements or alternative practices.

Contents

1. Before starting

1.1. Pre-requisites

(a) POPGROUP and HOUSEGROUP software, installed.
(b) The POPGROUP and HOUSEGROUP reference manuals. This guidance assumes that the user is familiar with POPGROUP and HOUSEGROUP and that the reference manual will be referred to for help with basic usage.
(c) A small-area population forecast prepared in POPGROUP, based on recent local experience of fertility, mortality and migration, for example prepared as described in Part 1 of this Guidance. The forecast will be for the small areas within a single local authority Council Area.

From GRO(S):

(d) Population and Household projections for the Council Area. A version of these using HOUSEGROUP categories is available as "GROS_2006-based_hhproj_HOUSEGROUP_format.xls".
(e) 2001 Census data for Output Areas (see Appendix).

From the user's own resources:

(f) A geographical conversion table ('lookup'), specifying how each 2001 Census Output Area is wholly or proportionately allocated to each of the user's small areas.

1.2. Which small areas?

Guidance in Part 1 discussed the nature of small areas that can be forecast using POPGROUP software.

To extend the population projections to households, detailed estimates of household characteristics for the Council Area as a whole will be adjusted according to the less detailed information for the small area that is published in the 2001 Census. For this reason, the small areas will normally cover the whole of one local authority Council Area in Scotland, without overlaps. It is possible to use the same method to make population and household projections for small areas that cover more than one local authority or parts of one or more authority; this involves more complex merging of information from different area scales which is not referred to here.

2. The strategy for these small area projections

The household projections follow a standard approach, the same as is used by GRO(S) for Council Areas in Scotland.

1. Forecast the population by age and sex (achieved as described in Part 1 of this guidance).

2. Forecast the population not in households (those in institutions including homes, and hostels), by age and sex (section 4.2 below).

3. Forecast the headship rate for each type of household (the proportion of an age group who head a particular type of household; for example the proportion of 20-24 year olds who are lone parents). (section 4.3 below)

The software then calculates the projections:

4. Deduct the population not in households from the population, giving the household population.

5. Multiply the household population at each age by the headship rates for that age, giving the number of household heads for each type of household.

6. Add the number of household heads for each type of household across ages, giving the total number of households of each type.

The user requires information for small areas, about the population not in households and about headship rates (steps 2 and 3 above). In this strategy the information for small areas is estimated for the year 2001, by scaling Census data for small areas to the detailed estimates for the Council Area.

The population not in households is assumed to be constant in future years (a user may alter that assumption easily, by altering the input files).

The headship rates are projected forward into the future in line with GRO(S) assumptions for the Council Area. For example when a greater proportion of young people are expected to be in one-person households in Fife, this is assumed to be also the case for each small area within Fife.

A household projection is first made based on the migration-led population projections. The population projection is then adjusted according to scenarios of planned development of housing. These may include a scenario of no development at all, as well as developments envisaged in plans devised locally. The results show in which areas and by how much the population is expected to be sensitive to housing plans.

Part 2: Household projections

Steps in strategy	Summary of action or outputs for each small area	
1. Data allocated to each small area	Population not in households	Household types
2. Scaling to Council Area household projections	Detailed age-sex household population	Household headship rates
3. Projected number of households	Uses the migration-led projection to calculate the implied number of households	
4. Housing-led projection	Uses a housing development plan to adjust migration to fill the projected households	

3. HOUSEGROUP Model Set-up

3.1. HOUSEGROUP Model Set-up

Open, complete, run and save the hhset-up file, as in this example and the notes below.

(a) Sheet 'Labels'

HOUSEGROUP - Household Forecasts

Model Set-up Information

File header:	**Fife Electoral Wards**
Base Year of headship data:	**2001**

①

Directory in which to save the skeleton input workbooks: | c:\forecast\housegroup_v3\FifeWardsHh1_skel ②

Directory in which to save data workbooks: | c:\forecast\housegroup_v3\FifeWardsHh1_inp ②

Directory in which to save output workbooks: | c:\forecast\housegroup_v3\FifeWardsHh1_out ②

POPGROUP workbook containing population group labels: | c:\forecast\popgroup_v3\MODEL_SETUP_FIFEWARDS.xls ③

[*Get these POPGROUP labels*]

Labels for the total of all population groups.

Short Label (Up to 8 characters)	Long Label
Fife	Fife Council Area

Number of population groups: | **23**

The order given will be used on the input and output files, and printed reports

No.	Short Label (Up to 8 characters)	Long Label
1	BuckMeth	Buckhaven Methil and Wemyss Villages
2	BurntKin	Burntisland Kinghorn and Western Kirkcaldy
3	Cowdenb	Cowdenbeath
4	Cupar	Cupar
5	DunfCen	Dunfermline Central
6	DunfNor	Dunfermline North

④

Note: The short label is used for naming sheets in the input, model and output workbooks. It is also used for column headings throughout the system.

The long label is used for headings in

Notes:

1. The base year is 2001, to allow use of data from the 2001 Census.

2. The directory paths and names are at the convenience of the user.

3. The labels for areas can be taken from the POPGROUP file used to set up the population projections. Double-clicking this cell will bring a dialogue box to find the file. Once this file and its path have been entered, click the button below to '*Get these POPGROUP labels*'.

4. The labels have been filled automatically from the POPGROUP file named in item 3.

(b) Sheet 'Options_Selected'

HOUSEGROUP - Household Forecasts
Model set-up: chosen age groups and household types

This is the set of age groups and household types for which the model will require data. It will also be the lowest level available for reporting on household forecasts, and associated output.

Age groups	Household types	Created from
15-24	**1 person**	**<<Married couple>**
25-29	**1 adult 1+ children**	**<<Cohabiting couple>**
30-34	**2 person all adult**	**<<Lone parent>**
35-44	**2+ adult 1+ children**	**<<Other multi-person>**
45-54	**3+ person all adult**	**<<One person>**
55-59		
60-64	**Concealed family types**	**Created from**
65-74	**Not used**	**<<Concealed married couple> <Concealed cohabiting couple> <Concealed lone**
75-84		
85+		

If these groupings of age and household type are what you intended,
click the button to generate the skeleton input workbooks.

Generate skeleton workbooks

This set-up workbook will be saved as: hhset-up_FIFE

Note: The name must not be hhset-up. It will be saved in your HOUSEGROUP directory

---

Notes

1. The age groups should be changed to these, on the 'Select_Options' sheet.

2. The labels for household types should be changed to these Scotland categories, on the 'Select_Options' sheet. Select 'Combine household types', and use the dialogue box to select just one type at a time, entering the Scotland category and clicking 'OK'.

3. The label 'Not used' for 'Concealed family types' is achieved on the 'Select_Options' sheet. Select 'Combine concealed family types', and use the dialogue box to select all three types, entering the label 'Not used' and clicking 'OK'. The rate for this type will be entered as zero in the input files.

3.2. Check the results

Running the hhset-up will create three folders as requested. One will have skeleton files, and the other two be empty, ready for input files and output files.

3.3. Software limitations and development

The limit of 5 household types in HOUSEGROUP means that the finer set of GRO(S) types are amalgamated to five, as above

In HOUSEGROUP the youngest age has to be 15; GRO(S) uses 16-24 rather than 15-24. Sections 4.2 and 4.3 use a file estimated from GRO(S) Council Area projections with the HOUSEGROUP ages and household types entered in the set-up file as above.

HOUSEGROUP requires use of male and female headship rates separately, while GRO(S) headship rates are for persons. The GRO(S) rates will be entered for both males and females in HOUSEGROUP.

The 'Derived forecasts' module of POPGROUP expected later in 2010, will provide a more general facility for household projections which will allow full use of the age, sex and household type categories used by GRO(S).

4. Data preparation

4.1. Allocation of data to small areas

The Census data for Census Output Areas (see Appendix) must be allocated to the small areas identified in the Model Setup.

The allocation will usually be not of whole COAs but in proportion to the overlaps of each COA with each local area, estimated through GIS or postcode directories. The creation of a Geographical Conversion Table (sometimes called 'lookup table', or 'recasting proportions') is usually undertaken in-house because the composition of the local areas is best known locally. It is not provided by GRO(S).

4.2. Local population not in households

1. Copy from "GROS_2006-based_hhproj_HOUSEGROUP_format.xls" the Council area population not in households into the default sheet of HOUSEGROUP's POPHH.xls skeleton input file.

2. Save in your input folder as POPHH1.xls

3. Use the first column of these Council Area data, which refers to 2001, to scale the 2001 Census data for small areas (Appendix 1).

   For each age-sex group in the model:

   a. Sum the Census data on population not in households for each small area to its Council area total.

   b. Compute the ratio (Council Area population not in households) / (sum of small areas total).

   c. Multiply every small area's population not in households by this ratio.

   The small area populations not in households will now sum to the Council Area total estimated by GRO(S).

4. The adjustment will be significant in some places, because GRO(S) improved on the estimates of population not in households after consulting local authorities. The user may wish to check the estimates for each small area, and make assumptions about future change, if relevant local information is available.

5. Enter these small area population not in households into the small area sheets on POPHH1.xls.

6. Document the file, validate the file, check the messages and correct any errors, and save with the same name.

4.3.   The headship rates for small areas, using a training scenario

1. Copy from "GROS_2006-based_hhproj_HOUSEGROUP_format.xls" the Council area headship rates, into the default sheet of HOUSEGROUP's INRATES.xls skeleton input file. Copy the same rates in the Male and Female panels.

2. Enter zero in the rows labelled 'Not used'.

3. Document, save in your input folder as INRATEStraining.xls.

4. Validate, check the messages and correct any errors, save again. The validation will produce another input file, INRATEStraining-validated.xls.

5. Find the total number of each type of households in 2001 under the assumption that all small areas have the same headship rates, as follows (the discrepancy with the Census data for small areas will indicate how the common headship rates should be altered). To find this number, run HOUSEGROUP, preparing a scenario as follows, with ID 'Training':

HOUSEGROUP - Household Forecasts

Information for this scenario | **RUN THE MODEL** |

Scenario identifier: Training

Contact details (to be included on all output files)
Organisation/Department Name: Fife Wards
Other information (e.g. contact details): xxx
xxx

Final year for this forecast: **2002**   ⌐1⌐

Double click to browse for directory or workbook names   ⌐2⌐
Default directory for the input workbooks: C:\Forecast\Housegroup_v3\FifeWardsHh1_inp
Directory for the output workbooks: C:\Forecast\Housegroup_v3\FifeWardsHh1_out   ⌐2⌐

Input workbook names   *(you do not need to give the .xls suffix for any workbook names)*   ⌐3⌐
Headship rates: INRATEStraining-validated   ⌐4⌐
Population forecasts: C:\Forecast\Popgroup_v3\FifeWards1_inp\fore_mig.xls   ⌐5⌐
Persons not in households: POPHH1
Annual household constraints (optional):

Output workbooks (named automatically from the scenario identifier)

Household forecasts HHForecast_Training
Population in, and not in, households HHPopout_Training
Household headship rates OutRates_Training

This scenario saved as: scenario_Training
last run on: **07/09/2009 at 12:20:56**

Notes for this scenario, to be placed on the output files

Population not in households uses local information but maintain consistency with the GROS totals.   ⌐6⌐
Population is migration-led, reflecting recent experience.
Headship rates are the same for all small areas, based on the Council Area from the 2001 Census.

---

1. Forecast to 2002 only.

2. Input directories as named when setting up the model (see above).

3. Headship rates for the district, prepared as above.

4. Population forecasts indicate the full path and file name of those that you have already produced, for example using Part 1 of this Guidance.

5. Population not in households as prepared above.

6. Document

7. Run the scenario. You will next use one of the output files.

6. For each small area, complete the following table. Use the Census data (see Appendix), the output file HHForecast_training.xls, and compute the ratio of these two. For this ward in Fife, the headship rates are higher than Fife's average, particularly so for 1-person households.

Buckhaven Methil and Wemyss Villages	Households, from Census	Households, from Training scenario	Ratio Census / Training
1-person, pensioner age	1,472	1,369	1.08
1-person, not pensioner age	1,663	1,289	1.29
1 adult 1+ children	680	520	1.31
2 person all adult	2,506	2,630	0.95
2+ adult, 1+ children	1,604	1,793	0.89
3+ all adult	797	697	1.14
All households	8,723	8,299	1.05

7. Calculate the small area headship rates for each age and sex, by multiplying the default set of rates in INATEStraining.xls by the ratios in the last column of this table. For example, the default rates at all ages for 1 adult 1+ children (lone parent) households, should be multiplied by the ratio in the table for that household type (1.31 in the example above). And all the default rates at pensioner age for 1-person households should be multiplied by the ratio in the table for pensioner age 1-person households (1.08 in the example above).

8. Enter these headship rates in the column for 2001 on the small area sheets of the file INRATEStraining.xls, document and save as INRATES1.xls.

9. Validate, check the messages and correct any errors, and save again as INRATES1.xls.

4.4. The relationship between Households and Dwellings

The relationship between households and dwellings is computed as a ratio of the census counts for these two indicators from the 2001 Census (see Appendix). It will be used in later sections, with POPGROUP.

1. Enter this ratio households/dwellings for each small area in the first column of the POPGROUP skeleton input file (not HOUSEGROUP) HHDwel.xls.

2. If desired the relationship can be changed according to expectations of changing rates of second homes, vacant housing or households sharing the same household space (see POPGROUP reference manual).

3. Document, validate, check the messages and correct any errors, and save in the POPGROUP input folder as HHDwel1.xls.

5. A household projection based on recent demographic experience

5.1. Prepare the scenario

Open the previous HOUSEGROUP scenario file Scenario_training.xls, and edit it to use the small area headship rates, using a scenario identifier 'Mig':

HOUSEGROUP - Household Forecasts	
Information for this scenario	**RUN THE MODEL**

Scenario identifier:	Mig

Contact details (to be included on all output files)

Organisation/Department Name:	Fife Wards
Other information (e.g. contact details):	xxx xxx
Final year for this forecast:	**2026**

Double click to browse for directory or workbook names

Default directory for the input workbooks:	C:\Forecast\Housegroup_v3\FifeWardsHh1_inp
Directory for the output workbooks:	C:\Forecast\Housegroup_v3\FifeWardsHh1_out

Input workbook names   (you do not need to give the .xls suffix for any workbook names)

Headship rates:	INRATES1-validated	1
Population forecasts:	C:\Forecast\Popgroup_v3\FifeWards1_inp\fore_mig.xls	
Persons not in households:	POPHH1	
Annual household constraints (optional):		

Output workbooks (named automatically from the scenario identifier)

Household forecasts	HHForecast_Mig
Population in, and not in, households	HHPopout_Mig
Household headship rates	OutRates_Mig

This scenario saved as:	scenario_Mig
last run on:	***07/09/2009 at 12:20:56***

Notes for this scenario, to be placed on the output files

Population not in households and headship rates use local information but maintain consistency with the GROS totals.
Population is migration-led, reflecting recent experience.

1. Use the headship rates prepared to reflect local evidence from the 2001 Census.

5.2. Run the projection

When you have entered all the above information, run the scenario by clicking the button: **RUN THE MODEL**

6. The impact on housing of the population projection based on recent experience (migration-led)

This section repeats the population projection based on recent demographic experience, but additionally computes the households and dwellings that would be demanded by that projection.

HOUSEGROUP is run in the background. The POPGROUP output file comp_mig.xls will contain the number of households and the number of dwellings expected in each small area.

This section is running a previous population projection (migration-led) and in the background running the same household projection that was prepared in the previous section. The only new information will be the number of dwellings implied by this population projection.

6.1. Prepare the scenario

Open the POPGROUP input file 'scenario_mig.xls'. Edit it as follows and run it; it will be saved automatically as scenario_mig.xls in the input directory that was created when you ran the Model Setup.

(a) Sheet 'Run_Details':

You can leave this sheet unchanged, except to alter the documentation on this sheet to say that the housing impact is requested. The scenario ID can remain 'Mig', as it is the same population projection. The outputs will be the same, but contain housing information on the comp_mig.xls output file.

(b) Sheet 'Constraints_and_impacts':

In addition to the constraint of past population estimates, the household input files are also entered, and the relationship between households and dwellings.

Population Estimates and Forecasts

Constraints and impact on housing and labour force

Double click to browse for workbook names

Annual Constraints	cons1

Housing	
Household headship rates	C:\Forecast\Housegroup_v3\FifeWardsHh1_inp\INRATES1-validated
Persons not in households	C:\Forecast\Housegroup_v3\FifeWardsHh1_inp\POPHH1
Dwellings-households conversion	HHDwel1

Produce housing impact ☑

Labour Force	
Economic activity rates	
Students	
Employment-labour force conversion	

Produce labour force impact ☐

6.2. Run the projection

When you have entered all the above information, run the scenario by clicking the button on the 'Run_Details' sheet: **RUN THE MODEL**

At the foot of the comp_mig.xls file is the impact on households and dwellings of this projection.

7. The impact on population of housing plans (dwelling-led forecasts)

7.1. Prepare the constraints file

As in section 6, this will be a POPGROUP forecast, running HOUSEGROUP in the background. This time, however, the migration taken from the POPGROUP input files will be altered to meet a number of dwellings entered on the constraints file.

The constraints are often the number of extra dwellings expected each year after the latest population estimate. These are the responsibility of the user, and often are given by planners or developers. An example constraints file with dwellings specified:

Sometimes, planners wish to know what the population might be if no dwellings were constructed. The constraints file would be as follows:

7.2.   Prepare the scenario

The scenario file will be as prepared in Section 6 (migration-led) except that:

1. The Sheet 'Run_Details': enter migration weights under Housing, 50% on in-migration and 50% on out-migration.

2. The Sheet 'Run_Details' will have an ID referring to the housing scenario

3. The Sheet 'Constraints_and_impacts' will contain the name of the constraints file with housing constraints added, and

4. The Sheet 'Run_Details' will be documented to this effect.

7.3.   Run the projection

When you have entered all the above information, run the scenario by clicking the button on the 'Run_Details' sheet: **RUN THE MODEL**

The output file comp_ID.xls (The ID from the scenario) will contain at its foot the Housing constraints. The population will not be the same as in the migration-led scenario, but will reflect the migration required to fill the housing specified.

The details of how POPGROUP alters migration are given in the POPGROUP manual.

1.   Appendix: 2001 Census data

The following 2001 Census data were used when preparing the Fife household projections.

Population not in households: **CAS001**. Cells for the age-sex groups used in the Model set-up, for every Census Output Area:

	Males	Females
15-24	99+129	100+130
25-29	159	160
30-34	164	165
35-44	169+174	170+175
45-54	179+184	180+18
55-59	189	190
60-64	194	195
65-74	199+204	200+205
75-84	209+214	210+215
85+	219+224	220+225

Household types: UV066. Cells for household types, for every Census Output Area:

1-person, pensioner age	3
1-person, not pensioner age	4
1 adult 1+ children	6
2 person all adult	7+9
2+ adult, 1+ children	8+10
3+ all adult	11

Household/Dwellings ratio: UV53 and UV55. For use in file HHDwel, for every Census Output Area:

POPGROUP allows the relationship between households and dwellings to be specified in HHDwel either as the ratio between households and dwellings from the above two indicators, or in more detail as three rates of shared dwellings, vacancy, and second homes. To allow these to be explored and altered, for example if the vacancy rate at the time of the census is thought to be in error or changing over time, obtain the following cells, for every Census Output Area:

Total dwellings	UV55 cell 1
Unshared dwellings	UV55 cell 2
Shared dwellings	UV55 cell 3
Occupied household spaces	UV53 cell 2
Unoccupied household spaces	UV53 cell 3
Second home household spaces	UV53 cell 4
Vacant household spaces	UV53 cell 5