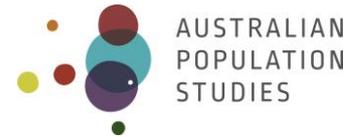

Introductory Guide



An introduction to population projections for Australia

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Abstract

Background

Population projections for Australia are produced by many organisations. They differ in projected population numbers, methods used, level of output detail, temporal extent, frequency of revision, quality and purpose, and they are not always easy to find.

Aims

This paper provides a brief guide to many of the population projections prepared for Australia in recent years. It gives an overview of projection methods and selected results, a brief commentary on key aspects of the projections, and shows readers where to find more data and information.

Data and methods

Projections data were obtained from the various organisations producing projections. They are presented in order of spatial detail: national scale, States and Territories; large sub-state regions; and then local and small areas.

Results

The ABS and State and Territory Governments are the main producers of population projections and forecasts in Australia, and generally these projections are good quality. They cover a wide variety of spatial scales from the national level to local areas, such as SA2s. A great deal of projections data and information is now freely available online.

Conclusions

Population projections and forecasts can be very useful data for a wide variety of planning, policy and research purposes. But it is important to be aware of their limitations.

Key words

Population projections; population forecasts; projections data; Australia

1. Introduction

Population projections are calculations of population beyond the latest population estimate based on assumptions about the future of fertility, mortality and migration. Projected populations, and sometimes also projected births, deaths and migration, are used in a wide variety of planning, policy development, service delivery, market assessment, and research activities, as well as in public debates about Australia's future. For example:

- State and Territory governments formulate urban and regional plans which take into account the future demand for housing, schools, hospitals, public transport, and so on;
- utility companies wish to plan for future electricity, water and sewage treatment needs;
- the Commonwealth Government uses projections to assess the likely costs of future health provision and aged pensions (as shown in its Intergenerational Reports, e.g. Australian Treasury 2015);
- the Australian Electoral Commission uses short-term projections of enrolments to vote to adjust electoral boundaries to ensure constituencies are likely to contain roughly equal numbers of electors (e.g. Australian Electoral Commission 2017).

Projections are also sometimes used as interim population estimates for the present because official Estimated Resident Populations (ERPs) are published some time after their reference dates (between around 6 and 15 months depending on geographical scale and level of demographic detail).

Population projections for Australia are produced by many organisations. They differ in projected population numbers, methods used, level of output detail, temporal extent, frequency of revision, quality, and purpose. And they are not always easy to find on the web. The aim of this paper is to provide a brief guide to many of the population projections prepared for Australia in recent years. It gives an overview of methods employed, data outputs, where projections data and accompanying information can be obtained, along with a few comments about the projections. National projections are covered first, followed by those for States and Territories, major sub-state regions, and then local and small areas. Details of the projections are not presented and interested readers are encouraged to look up the web resources listed in the paper to find out more. Projections of other demographic variables, such as households, living arrangements, dwellings, populations by Indigenous status, school enrolments and so on, are outside the scope of the paper. Be aware that all projections mentioned in the paper (along with URLs) refer to those publically available as of 30th April 2019. Projections are revised regularly and may have been updated since the time this article was finalised.

Before proceeding any further I define the meanings of some common projections terms such as projection horizon, jump-off year, and the difference between a projection and a forecast. These are listed in Box 1.

Box 1: Projections terminology

Jump-off year: the starting year of population projections; the year in which they ‘jump off’ into the demographic future. It is sometimes also known as the launch year.

Population estimate: the population for a past or current point in time derived from demographic information available for that time.

Population projection: a calculation of population beyond the jump-off year based on certain assumptions about the future of fertility, mortality and migration (and sometimes other variables).

Projection series: a projection with a specified combination of fertility, mortality and migration assumptions (often labelled low, medium, or high; or sometimes labelled with letters and numbers).

Projection scenario: a projection based on a vision, story, or set of particular circumstances (e.g. restrictive immigration policy scenario; major new employer scenario; mine closure scenario).

Population forecast: a population projection deemed to be the most likely future population; a prediction. (Therefore all forecasts are projections, but many projections are not forecasts).

Projection/forecast horizon: the time period between the jump-off year and the final year of the projections/forecasts.

Projection assumptions: data inputs to the projection calculations which usually include the assumed future of fertility, mortality, and migration (and sometimes other input variables, e.g. housing developments). If more broadly defined, projection assumptions also implicitly or explicitly include qualitative elements, such as expectations about future immigration policy, and the absence of major disasters.

Probabilistic projections/forecasts: projections/forecasts which are expressed as a range of future populations, often with prediction intervals. Prediction intervals consist of a range with a probability of future population lying within that range.

Deterministic projections/forecasts: projections/forecasts which are expressed as a single set of values; most national projections and almost all subnational projections are of this type.

Net migration: The value of inward migration minus outward migration, such as Net Interstate Migration (NIM) which is interstate in-migration minus interstate out-migration, or Net Overseas Migration (NOM) which is immigration (which the Australian Bureau of Statistics (ABS) terms NOM arrivals) minus emigration (NOM departures).

Directional migration: Flows of migration from one country or region to another; for example, migration from overseas to Australia (immigration), or from New South Wales to other jurisdictions within Australia (interstate out-migration).

Source: the author

2. Population projections for Australia

2.1. National population projections

The best known population projections for Australia are those produced by the **Australian Bureau of Statistics (ABS)** in their Population Projections, Australia publication. Updated every five years, the most recent ABS projections were released in November 2018 (ABS 2018a). These projections start from a jump-off year of 2017 and cover a projection horizon of almost 50 years, ending in 2066. The ABS applies a standard cohort-component model¹ incorporating directional migration flows (immigration and emigration) constrained to total Net Overseas Migration (NOM) assumptions (ABS 1999). Most emphasis is placed on three main projection series – A, B and C – which are often interpreted as high, medium and low series. A further 69 projection series with differing fertility, mortality and migration assumptions are also prepared and are available for download from the ABS website. Series B is generally interpreted by users to be a forecast, though ABS deliberately avoids the term ‘forecast’ and emphasises that all its future population numbers are merely projections.

The Series B projection sees Australia’s population increasing from 24.6 million in 2017 to 42.6 million by 2066, the result of a long-run Total Fertility Rate of 1.80, Net Overseas Migration of 225,000 per annum, and modest and decelerating increases in life expectancy at birth (86.0 years for females and 83.0 years for males by the end of the projection horizon). The projected population growth rate gradually declines into the future because population ageing results in the number of deaths rising slightly faster than births, and because a fixed level of Net Overseas Migration in the context of an increasing population represents a falling crude rate of net migration.

The projection assumptions are based primarily on recent levels of fertility and Net Overseas Migration observed over the last few years, and the small increases in life expectancy observed in recent years. These trends are assumed to continue. Interestingly, life expectancy at birth is expected to rise by very little and is less optimistic than in the previous set of ABS projections (ABS 2013), and by the 2060s is over 2 years of life lower. Some users may wish to download projection series 26 which incorporates the ABS high life expectancy assumptions (increasing to 87.7 years and 89.2 years for males and females respectively by 2065-66). The Series 26 projection is 1.1 million higher than Series B by 2066, nearly all of which is in the 65+ age group. Figure 1 illustrates the latest ABS Series B projection alongside several others for Australia, while Figure 2 presents some of the assumptions on which those projections were based. Box 2 includes URLs which will take readers to these and other projections mentioned in the paper.

The **United Nations Population Division** updates population projections for Australia every two years as part of its World Population Prospects publication (UN 2017a). This publication contains projections for all countries of the world (except the very smallest) along with projections for the world as a whole. The projections in the 2017 Revision of World Population Prospects start from a jump-off year of 2015 and extend all the way out to 2100. The UN uses a cohort-component model with five year age groups which proceeds forward in five year intervals; overseas migration is generally projected as net migration numbers due to the lack of reliable data on immigration and

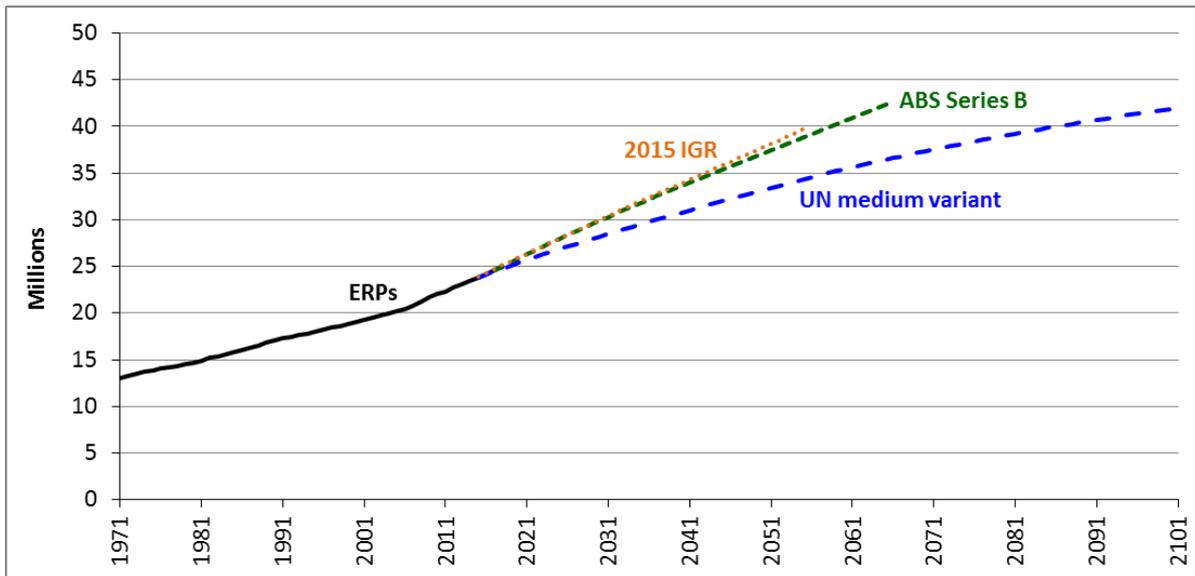
¹ For basic introductions to the cohort-component model see Rowland (2003) chapter 12, or Smith et al. (2013) chapters 3 to 7. For a description of subnational and multiregional cohort-component models see Rees (1997) and the review in Rees et al. (2015).

emigration flows for all countries (UN 2017b). The demographic transition model (Dyson 2010) provides the over-arching theoretical framework for setting fertility and mortality assumptions, so that all countries are assumed to progress through the transition from high to low fertility and mortality rates. Net Overseas Migration is assumed to remain constant until 2045-50 if recent numbers have been stable, and then decline to half that number by 2095-2100. This approach was taken because it “represents a compromise between the difficulty of predicting the levels of immigration or emigration for each country of the world over such a far horizon, and the recognition that net migration is unlikely to reach zero in individual countries” (UN 2017b p. 30).

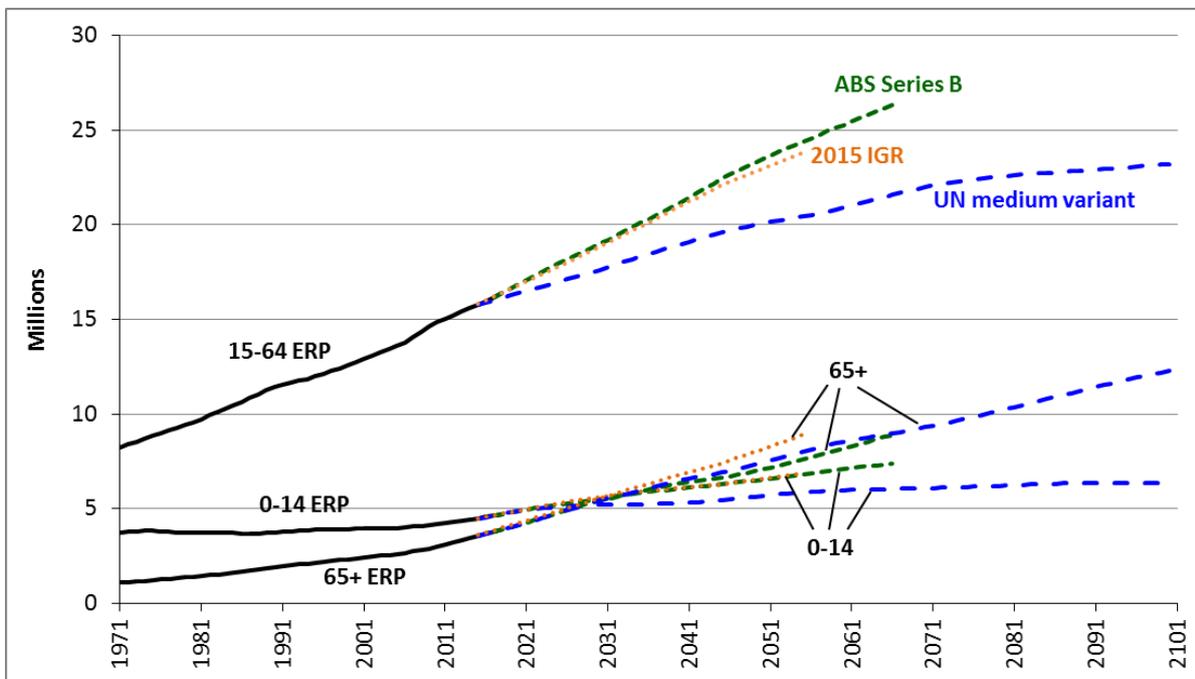
The UN’s projection assumptions for Australia consist of a long-run TFR varying slightly between 1.76 and 1.80, life expectancy reaching 87.3 years for males and 90.5 years for females by 2060-65 (and 91.5 and 94.7 years respectively by 2095-2100), and Net Overseas Migration set to an annual average of 150,000 from 2020 to 2050, declining gradually to 75,000 by 2095-2100. The UN assumptions for mortality and migration differ considerably from those of the ABS Series B projection, with the UN selecting much higher life expectancy and much lower Net Overseas Migration levels. According to the UN’s main series projection, Australia’s population is projected to increase from 23.8 million in 2015 to 41.8 million by 2100. By 2066 it is expected pass 36.6 million (7 million lower than the ABS Series B projection). Differences with ABS projections are largely due to NOM assumptions and are particularly noticeable in the 0-14 and 15-64 age groups (Figure 1b). The UN projections comprise nine variants as well as probabilistic projections created from probabilistic fertility and mortality inputs (though, interestingly, not probabilistic overseas migration inputs). Outputs from, and information about, these alternative projections can be found at the webpage listed in Box 2.

Intergenerational reports are prepared by the **Australian Treasury** every few years, with the most recent being the 2015 report (Australian Treasury 2015). The purpose of these reports is to “assess the long-term sustainability of current Government policies and how changes to Australia’s population size and age profile may impact economic growth, workforce and public finances” (Australian Treasury 2015 p. xxiii). The assessment is underpinned by a series of demographic and economic projections looking ahead over the next four decades. The population projections are prepared with a standard cohort-component model. Treasury’s projection for Australia’s population in 2055 is 39.7 million, the result of a Total Fertility Rate of 1.90, life expectancy at birth increasing to 87.5 years for males and 90.1 years for females by 2050, and long-run Net Overseas Migration levels of 215,000 per annum.

Population projections for Australia are also produced by other organisations and individuals as occasional or one-off exercises. Three examples are mentioned here. The **Productivity Commission** created population projections as part of the report *An Ageing Australia* (Productivity Commission 2013). Their projections from 2012 to 2060 put the national population at 38.3 million by the end of the projection horizon. **Lutz et al.** (2018) created projections for most countries of the world by educational status from 2015 to 2100. Their medium scenario has Australia’s total population at 32.5 million by 2050 and 43.6 million by 2100. **Bell et al.** (2011) prepared probabilistic population forecasts for Australia from 2010 to 2051. Their forecasts included a 95% prediction interval for Australia’s total population in 2051 spanning 29.4 to 43.0 million, with the median of the distribution at 36.1 million.



(a) Projections of Australia’s total population

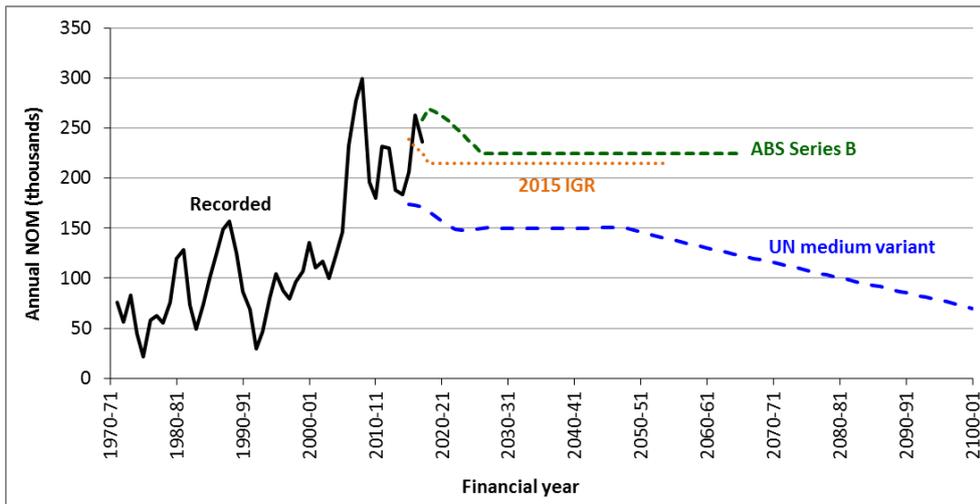


(b) Projections of Australia’s population aged 0-14, 15-64 and 65 years and over

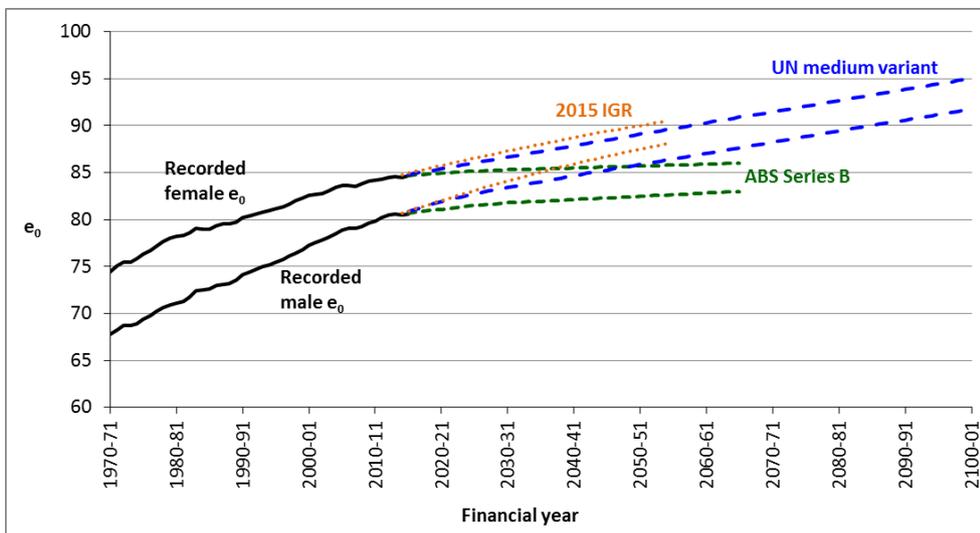
Figure 1: Some recent projections of Australia’s population

Notes: ERP = Estimated Resident Population

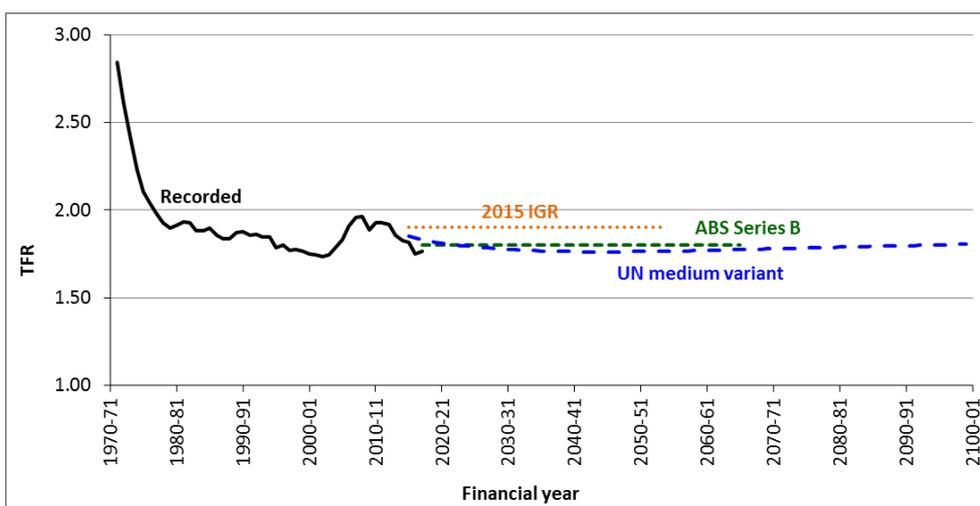
Sources: ABS (2018a; 2018b), UN (2017a), Australian Treasury (2015)



(a) Net Overseas Migration assumptions



(b) Life expectancy at birth assumptions



(c) Total Fertility Rate assumptions

Figure 2: Assumptions behind some recent projections of Australia’s population

Notes: TFR = Total Fertility Rate; e_0 = life expectancy at birth

Sources: ABS (2014; 2018a; 2018b), Human Mortality Database (2017), UN (2017a), Australian Treasury (2015)

2.2. Projections at the State and Territory scale

The ABS and State and Territory Governments all produce population projections at the State and Territory scale every few years. ABS State and Territory projections are published as part of its Population Projections, Australia publication (ABS 2018a). These projections have a high profile because they are published by the national statistical office. Because they are produced using a consistent method, and have net interstate migration summing to the logical value of zero across all jurisdictions, the projections are useful for analyses involving all States and Territories across Australia. State and Territory Governments produce projections for their own State/Territory as a whole, plus projections for a variety of sub-state geographies, with updates mostly prepared every 2 to 5 years. These projections are important because government departments within that State or Territory are required to use them in their analysis, planning and budgeting. Data and information on all these projections can be obtained from the URLs listed in Box 2.

The **ABS** projects State and Territory populations with a cohort-component model which is similar to the national-scale model but with the addition of interstate migration. Interstate in- and out-migration flows are handled as directional (rather than net) migration flows but are constrained to be consistent with assumed Net Interstate Migration (NIM) totals. The model is not a fully multi-regional model with flows between each State/Territory and every other, but a bi-regional type which handles in- and out-migration flows between each State/Territory and the remainder of the country (ABS 1999; Wilson and Bell 2004). In the latest set of ABS projections medium variant NIM assumptions are based on the average NIM values of the last 10 years. Series B State and Territory population projections are illustrated in Figure 3 alongside those produced by State and Territory Governments. A log scale is used in the graph to clearly show the projected trends of the less populous states and territories.

All State and Territory Governments make use of cohort-component projection models of various types. Most projection models use directional (rather than net) migration, which is conceptually better and avoids implausible outputs. Some models work with five year age groups and projection intervals, though most use single year ages and intervals; some State and Territory Governments produce only one set of projections while others produce multiple series. Medium series projections often use assumptions which deliver similar results to the ABS Series B projections in terms of total population, which is probably a mix of similar thinking and a desire to avoid having to explain to users why their projections are so different.

The **New South Wales** Department of Planning and Environment produces official NSW Government population projections for NSW. High, medium and low series are produced. The latest projection covers a horizon of 2011 to 2041 and the medium series puts the NSW population at 10.46 million by the end of that period (NSW Department of Planning and Environment 2016). These projections are fractionally lower than those of the ABS.

The Department of Environment, Land, Water and Planning in **Victoria** produces population projections for its Victoria in Future publication. Only one projection series is published. The latest 'Victoria in Future 2016' projections cover the period 2011 to 2051 at the State level and show Victoria's population increasing from 5.54 million to 10.09 million over those four decades (Victorian

Department of Environment, Land, Water and Planning 2016). These are a little lower than the ABS Series B projections.

The **Queensland** Government Statistician's Office prepares the official population projections for that State. High, medium and low series are published. Its latest projections were published in 2018 and extend from 2016 to 2066. The medium series projections indicate growth from 4.85 million to 9.51 million over the projection horizon (Queensland Government Statistician's Office 2018), showing marginally higher growth than the ABS Series B projection.

Western Australia Tomorrow is the publication produced by the Department of Planning, Lands and Heritage containing population forecasts for Western Australia (Western Australian Planning Commission 2018). These projections are unusual in that they are formally labelled 'forecasts' and are produced by a form of probabilistic cohort-component model. Within the probabilistic forecasts five alternative projection trajectories are distinguished, labelled bands A, B, C, D and E. The latest Band C (medium series) forecasts envision WA's population growing from 2.35 million in 2011 to 3.25 million by the end of the projection horizon in 2031 (Western Australian Planning Commission 2018), which is slightly higher than ABS Series B projection.

Tasmania's latest population projections were published recently and include high, medium and low series. The medium series show the State's population growing from 522,000 in 2017 to 577,000 by 2067 (Tasmanian Department of Treasury and Finance 2019). The projected trajectory of Tasmania's total population is close to the latest ABS Series B projection.

The **Northern Territory's** projected population is calculated as the sum of separate projections for its Indigenous and non-Indigenous residents, a feature which is unique amongst the State and Territory Government population models. The cohort-component model incorporates overseas and interstate migration flows, permits changes to reported Indigenous status over time, and allows the Indigenous status of newly-born babies to differ from those of their mothers. The four projection series are labelled Main, Current, High and Low. The main series from the latest projections has the population growing from 246,000 in 2016 to 352,000 by 2046; the Indigenous population is expected to increase from 75,000 in 2016 to 104,000 by 2046 while the non-Indigenous population is projected to grow from 171,000 to 247,000 over the same projection horizon (NT Department of Treasury and Finance 2019). The NT's total population is a little under the ABS Series B projection until the 2040s.

The current **Australian Capital Territory** Government population projections start from a jump-off year of 2017 and extend out to 2058 (ACT Government 2019). Only one projections series was published. The projections indicate that the population will increase from 412,000 in 2017 to 703,000 by 2058, which is a very similar growth trajectory to the latest ABS Series B projections.

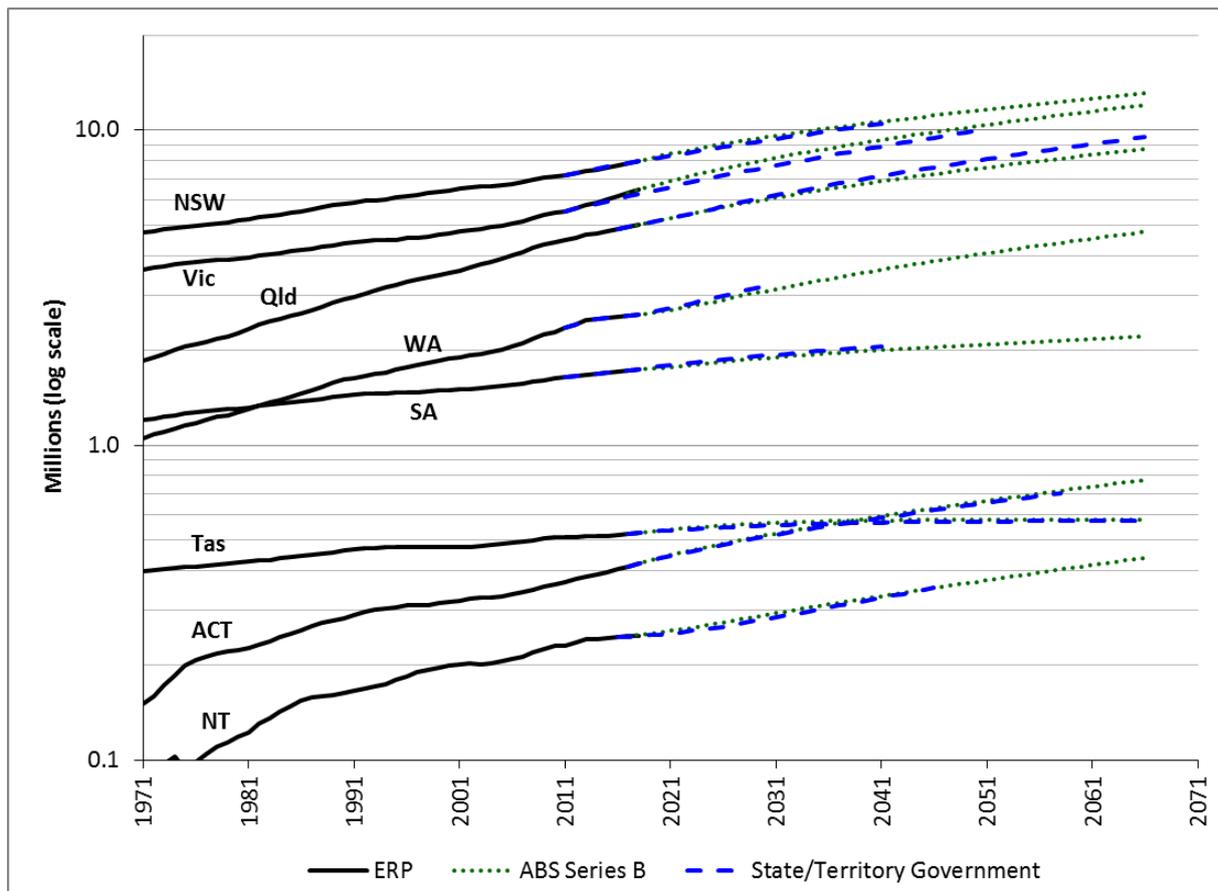


Figure 3: Some recent projections of State and Territory populations

Notes: State and Territory Government medium/main series projections are shown.

Sources: ABS (2018a), NSW Department of Planning and Environment (2016), Victorian Department of Environment, Land, Water and Planning (2016), Queensland Government Statistician's Office (2018), Western Australian Planning Commission (2018), Tasmanian Department of Treasury and Finance (2019), NT Department of Treasury and Finance (2019), ACT Government (2019).

2.3. Projections for large sub-state regions

The **ABS** projections in Population Projections, Australia include projections for Greater Capital City Statistical Areas and balance of State/Territory regions. They are produced using a cohort-component model projecting internal migration flows in and out of each region constrained to a total net internal migration assumption. The latest Series B projections suggest an increasing concentration of population in Australia's metropolitan regions over the coming decades (ABS 2018a). The combined population of the capital cities is expected to grow from 16.6 million in 2017 (67.3% of the national population) to 32.1 million by 2066 (75.3%). By the end of the projection horizon Sydney and Melbourne are projected to be 9.7 and 10.2 million, respectively, with Brisbane the next largest at 4.8 million. The greatest proportional increase, however, is projected for Greater Darwin (149,000 in 2017 and 333,000 in 2066). Projections of metropolitan growth such as these tend to gain lots of media attention, but the demographic outcomes for other regions can look very different. The Rest of South Australia and Rest of Tasmania are projected to decline in population and experience considerable amounts of population ageing.

Some **State and Territory Government** projections are published for Greater Capital City Statistical Areas as well as for other large sub-state regions. In some cases these projections are created directly, but in others they are created by building up from smaller geographical areas. Table 1 lists the large sub-state regions for which projections are published in the current sets of projections. In Queensland, for example, projections are published for Brisbane Greater Capital City Statistical Area and all other SA4 regions of the State (Queensland Government Statistician's Office 2018). Under the medium series projections Brisbane grows from 2.36 million in 2016 to 3.67 million by 2041 (which is very close to the latest ABS Series B projection). Population growth is anticipated for all other regions of Queensland with the exception of Queensland – Outback where the total population remains largely unchanged.

Table 1: State and Territory Government projections for large sub-state regions

| State/Territory | Sub-state regions |
|-----------------|--|
| NSW | Projection Regions, defined as aggregations of local government areas; Local Health Districts |
| Vic | Major Regions, defined as Melbourne Greater Capital City Statistical Area and SA4 areas across the rest of the State |
| Qld | Brisbane Greater Capital City Statistical Area and SA4 regions across the rest of the State |
| SA | Statistical Divisions |
| WA | <i>No large sub-state regions in the current projections output</i> |
| Tas | <i>No large sub-state regions in the current projections output</i> |
| NT | Regions, defined as SA3 areas; SA4 regions |
| ACT | Districts, defined as SA3 areas |

Sources: See Figure 3.

2.4. Projections for local and small areas

For many users, local and small area population projections are the most useful. They inform planning, budgeting, and service delivery at the local scale, and small area projections can also be aggregated up to a variety of custom-defined regions. In some cases they can generate strong local reactions, such as objections from a mayor when projections show population decline or little growth, or protests from local community groups about anticipated rapid growth viewed as likely to adversely affect the character and quality of life of a local neighbourhood.

The ABS does not produce local or small area projections as part of its official projections output (though it does prepare them as a consultancy on behalf of other organisations). The key producers of local and small area projections are **State and Territory Governments** who tend to publish Local Government Area (LGA) and/or SA2 area projections, as shown in Table 2. See Box 2 for URLs. Often local and small area projections in metropolitan regions are derived from cohort-component models linked to housing unit models (Foss 2002; Wilson 2011), which are based on assumptions about expected future dwelling growth. The incorporation of dwelling data in these projections can result in substantially different outputs compared to trend-based projections. For example, the populations of urban fringe areas experiencing considerable increases in the amount of residential land becoming available will not be projected accurately from trend-based models. But reasonable projections may be obtained via housing-unit models if the land development and dwelling forecasts are about right.

Table 2: State and Territory Government projections for local and small areas

| State/Territory | Areas |
|-----------------|---|
| NSW | Local Government Areas |
| Vic | Local Government Areas; Victoria in Future Small Areas (aggregations and modifications of SA2 areas which nest into LGAs) |
| Qld | Local Government Areas; SA2 areas |
| SA | Local Government Areas; Statistical Local Areas |
| WA | SA2 areas |
| Tas | Local Government Areas |
| NT | <i>No local or small areas in the current projections output</i> |
| ACT | SA2 areas |

Sources: See Figure 3

A variety of other organisations also prepare local and small area projections from time to time. The Commonwealth **Department of Social Services** (2014) has published SA2 area projections by age and sex for the whole of Australia. They were prepared by the ABS as a consultancy and cover a projection horizon of 2012 to 2027, so are a little old now. Their main advantage is the use of a common method and data inputs across the whole country. However, the migration assumptions are purely trend-based so projections for SA2 areas within metropolitan regions should be used with caution beyond just a few years into the projection horizon. This also applies to certain non-metropolitan local areas, such as mining towns (e.g. Taylor et al. 2014).

The **Australian Electoral Commission** obtains short-term SA1 area population projections from time to time (usually as a consultancy from the ABS). They are used to calculate likely numbers of enrolled electors over the next few years for the purpose of electoral boundary redistributions. The enrolment projections are generally made available, but not the population projections on which they are based (e.g. Australian Electoral Commission 2017).

Several **consulting firms** also produce local and small area projections. For example, id prepares projections for many local government areas which are freely available if councils place them on their websites. id also creates smaller geographical areas in its Small Area Forecast Information (SAFI) product (id 2018). Pitney Bowes produces SA1 area population projections (Pitney Bowes 2018). The small area projections are prepared on a consulting basis and must be paid for.

3. Concluding remarks

Population projections and forecasts can be very useful inputs to decision-making, policy formulation, budgeting, and planning. But it is important to be aware of their limitations. Strictly, population projections, as statements about future population under certain assumptions, are correct provided they have been calculated correctly. This is the case most of the time – but not always. However, population forecasts will almost certainly turn out to be in error to some extent. This can be due to a suboptimal choice of projection model, subsequent revisions to the jump-off population and historical demographic components, random noise, and deviations in actual fertility, mortality and migration from the projection assumptions. As a general rule:

- the further a forecast extends into the future the greater the error;
- the smaller the population the greater the error; and

Box 2: Selected population projections for Australia and where to obtain them

Population projections produced by the Commonwealth Government

Population Projections, Australia – ABS

<http://www.abs.gov.au/ausstats/abs@.nsf/mf/3222.0>

Intergenerational Report – Australian Treasury

<https://treasury.gov.au/intergenerational-report/>

An Ageing Australia – Productivity Commission

<https://www.pc.gov.au/research/completed/ageing-australia>

SA2 population projections – Department of Social Services

[https://www.gen-agedcaredata.gov.au/Resources/Access-data/2014/August/Population-projections,-2012-\(base\)-to-2027-for-al](https://www.gen-agedcaredata.gov.au/Resources/Access-data/2014/August/Population-projections,-2012-(base)-to-2027-for-al)

Population projections produced by State and Territory Governments

NSW: Population projections – Department of Planning & Environment

<https://www.planning.nsw.gov.au/projections>

Vic: *Victoria in Future* – Department of Environment, Land, Water & Planning

<https://www.planning.vic.gov.au/land-use-and-population-research/victoria-in-future-2016>

Qld: Population Projections – Queensland Government Statistician's Office

<http://www.qgso.qld.gov.au/subjects/demography/population-projections/index.php>

SA: Department of Planning, Transport and Infrastructure

https://www.saplanningportal.sa.gov.au/data_and_research/population_projections_and_demographics

WA: *WA Tomorrow* – Department of Planning, Lands and Heritage

<https://www.dplh.wa.gov.au/information-and-services/land-supply-and-demography/western-australia-tomorrow-population-forecasts>

Tas: Population Projections – Department of Treasury & Finance

<https://www.treasury.tas.gov.au/economy/economic-data/2019-population-projections-for-tasmania-and-its-local-government-areas>

NT: Population Projections – Department of Treasury & Finance

<https://treasury.nt.gov.au/df/economic-group/population-projections>

ACT: Population projections – Treasury and Economic Development Directorate

<https://apps.treasury.act.gov.au/snapshot/demography/act>

Population projections produced by overseas organisations

World Population Prospects – United Nations Population Division

<https://population.un.org/wpp/>

Population projections by educational status – Wittgenstein Centre

<http://dataexplorer.wittgensteincentre.org/wcde-v2/>

Population projections produced by consulting firms

Many local and small area projections are produced by consulting firms. Summary data may sometimes be freely available but generally these projections must be paid for. Examples include:

Small Area Forecast Information (SAFI) projections – id

<https://home.id.com.au/services/population-forecasting/small-area-population-forecasts-safi/>

SA1 area projections – Pitney Bowes

<https://www.pitneybowes.com/au/data/demographic-data/estimates-projections-australia.html>

Note: URLs correct as of 30th April 2019.

- the greater the volatility of migration the greater the error

(Smith et al. 2013; Wilson et al. 2018). Forecast errors are often larger than many users realise.

Projections and forecasts can also be subject to another form of error – misinterpretation and misreporting. Net Overseas Migration projections are regularly misinterpreted as immigration (which is only correct in the absence of emigration!). Sometimes population projections are interpreted as population targets or policies (which would only be correct if a projection had been expressly created as such). For example, the reporting of Australia’s population passing the 25 million milestone in 2018 was reported by some news outlets (deliberately not cited) as “33 years ahead of schedule” based on ABS projections from the late 1990s, as if those ABS projections were part of a national population policy.

Population projections are highly sensitive to input assumptions, and these can vary considerably from one projection to another (as Figure 2 shows). Generally assumptions do not attempt to predict trend changes or cyclical paths, but instead aim for a smooth trajectory through the middle of an undulating pattern. Assumptions are sometimes based on statistical models, and sometimes on judgement. In reality they often involve a mix of art and science. In Australia, overseas migration contributes the bulk of error in national population forecasts while at the state and regional scales both internal and overseas migration tend to contribute most of the error (Wilson 2007, 2012). The variability of overseas migration makes it especially challenging to forecast and there is no robust mathematical model available which has proven to give accurate migration forecasts, at least in the medium and long-term (Disney et al. 2015). The history of fertility forecasting is also not an unqualified success despite a large literature attempting to understand and forecast period and cohort fertility (Bohk-Ewald et al. 2018). Mortality forecasting at the national scale has been subject to a great deal of research attention and there are an ever increasing number of sophisticated models to choose from (Booth and Tickle 2008; Janssen 2018). Generally, errors in mortality forecasts are lower than those of fertility and migration. Nonetheless, mortality models are almost all extrapolative models. Should a major change in mortality trends occur, as appears to be the case in the US and UK at the moment, errors could be larger than in the past.

Before using a set of projections, it is valuable to ask who prepared them and why. That may go some way to explaining the choice of projection assumptions and the way in which projection outputs are presented. No set of projections is ever completely objective and free of analysts’ judgments. For example, given the sensitivity about population decline in Australia, projections for local areas currently experiencing population decline sometimes err on the ‘optimistic’ side by showing much less decline, or even no decline, in the future. State/Territory projections may be influenced by the incumbent Government’s view on whether recent population growth is too high or too low, or an explicit population policy. Projections produced by consulting firms will sometimes reflect the assumptions, or aspirations, of the client.

It is also sensible to conduct a quick assessment of the plausibility of any set of projections you are considering using (see also Smith et al. 2013 pp. 385-390; Wilson 2017). While most projections have been generated by good models and sensible assumptions, this is not universally the case. Treat projections which have been produced using models incorporating net migration numbers or net migration rates with caution (Rogers 1990; Wilson 2016). They have the potential to generate

implausible or impossible outcomes. At the local level in growing urban regions, it is also worth checking that projections are based on anticipated housing developments. Be wary of purely trend-based local area projections in such regions. Projected age-sex structures should generally evolve slowly and will often maintain characteristic peaks and troughs across the peak migration age groups (late teens to late 30s), as well as continued population ageing. For example, if a local population age structure has a large peak across the late teens and early twenties due to a higher education institution then you would expect that peak to be maintained in the projections. In addition, projected total population, births, deaths and migration flows should follow on smoothly from observed trends – unless there are good reasons for such changes. The projected age pattern of sex ratios should also change gradually in the projections.

In summary, this paper has provided a brief guide to Australian population projections data at various geographical scales. It has introduced many (though not all) of the projections produced for Australia in recent years, and included some brief comments on the limitations of projections. It is hoped that the guide proves a useful starting point for exploring population projections data and understanding the context and broader processes involved in population projections preparation.

Key messages

- Population projections are calculations of population beyond the latest population estimate based on assumptions about the future of fertility, mortality and migration.
- Population projections are used in planning, policy development, service delivery, market assessment, research activities, and public debate.
- The ABS and State and Territory Governments are the main producers of population projections and forecasts in Australia.
- A great deal of projections data and information is now freely available online (Box 2).
- Be aware of the limitations of projections and forecasts.

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