Coastal demographics in Victoria

Background research paper prepared for the Victorian Marine and Coastal Council





Environment, Land, Water and Planning

Author

Dr Fiona McKenzie, Principal Researcher, Land Use and Population Research, DELWP.

Photo credit

Photo: Metung 2008 taken by Anne Barlow DELWP

© The State of Victoria Department of Environment, Land, Water and Planning 2020



This work is licensed under a Creative Commons Attribution 4.0 International licence. You are free to re-use the work under that licence, on the condition that you credit the State of Victoria as author. The licence does not apply to any images, photographs or branding, including the Victorian Coat of Arms, the Victorian Government logo and the Department of Environment, Land, Water and Planning (DELWP) logo. To view a copy of this licence, visit

http://creativecommons.org/licenses/by/4.0/

ISBN 978-1-76077-450-9 (pdf/online/MS word)

Disclaimer

This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

Accessibility

If you would like to receive this publication in an alternative format, please telephone the DELWP Customer Service Centre on 136186, email customer.service@delwp.vic.gov.au, or via the National Relay Service on 133 677 www.relayservice.com.au. This document is also available on the internet at www.delwp.vic.gov.au.

Contents

| Executive Summary | . 3 |
|---|-----|
| Context | 3 |
| Population distribution and growth | 3 |
| Migration and age structure | 3 |
| Part-time and peak populations | 4 |
| Housing | 4 |
| Tourism | 4 |
| Marine and coastal industries | 5 |
| Coastal hazards and risk | 5 |
| Impacts of extreme events | 5 |
| 1. Introduction | .7 |
| 2. Population | . 8 |
| 2.1 Population distribution and settlement patterns | 8 |
| 2.2 Population growth | 10 |
| 2.3 Age structure | 12 |
| 2.4 Migration and natural increase | 13 |
| 2.5 Part-time coastal populations | 13 |
| 2.6 Estimating part-time populations | 15 |
| 3. Economic activity along the coast | 18 |
| 3.1 Tourism | 18 |
| 3.2 Marine and coastal industries | 19 |
| 4. Coastal settlement | 21 |
| 4.1 Coastal housing types | 21 |
| 4.2 Coastal building activity | 21 |
| 4.3 House prices | 22 |
| 5. Issues associated with coastal populations | 24 |
| 5.1 Population growth | 24 |
| 5.2 Population impacts | 24 |
| 5.3 Hazards and risk | 25 |
| 5.4 Impacts of extreme events on populations | 28 |
| 6. Conclusion | 31 |

List of Figures

| 1. | Population concentration along the Victorian coast, 2016 | 2 |
|-----|---|----|
| 2. | Population density in Victoria, Statistical Area Level 2 (SA2), 2017 | 3 |
| 3. | Change in population density in Victoria, Statistical Area Level 2 (SA2), 2017 | 3 |
| 4. | Average annual population change, Victorian coastal Statistical Areas Level 2 (SA2), west to east, 2016-2017 | 4 |
| 5. | Average annual population change, selected Australian coastal areas by Statistical Areas Level 2 (SA2), 2006-2016 | 5 |
| 6. | Age structure of Victorian coastal regions, aggregated Statistical Areas Level 2 (SA2), 2016 | 6 |
| 7. | Proportion of dwellings that were unoccupied on census night 2016, Statistical Areas Level 2 (SA2) along Victoria's Coast, west to east | 8 |
| 8. | Vacancy rates coastal centres (excl. Geelong & Melbourne) 1981 to 2016 | 9 |
| 9. | Variation in population levels, Phillip Island and Lorne | 10 |
| 10. | Peak population estimates for selected coastal towns (overnight capacity in residential buildings and tourist accommodation), 2012-2016 | 11 |
| 11. | Monthly water consumption, Torquay, 2001 to 2006 | 11 |
| 12. | Victorian tourism regions which abut the coast | 12 |
| 13. | Visitor numbers, selected tourism regions along the Victorian coast, year ended March 2018 | 12 |
| 14. | Visitor nights, selected tourism regions along the Victorian coast, years ending March 2013 to 2018 | 13 |
| 15. | Contribution of tourism to Gross Regional Product (GRP), selected tourism regions along the Victorian coast, year ended March 2017 | 13 |
| 16. | Employment in tourism, selected tourism regions along the Victorian coast, year ended March 2017 | 13 |
| 17. | Numbers employed in marine and coastal industries, Victorian coastal regions, aggregated Statistical Areas Level 2 (SA2), 2016 | 14 |
| 18. | Dwelling type, Victorian coastal regions, aggregated Statistical Areas Level 2 (SA2), 2016 | 15 |
| 19. | Number of building approvals for houses and flats, Statistical Areas Level 2 (SA2), 2007 to 2017 | 16 |
| 20. | Median house price, coastal towns and suburbs, 2017 | 17 |
| 21. | Visitor numbers to selected Victorian coastal tourism regions 2014 to 2018 | 18 |
| 22. | Selected indicators of population vulnerability, coastal Statistical Areas Level 2 (SA2), 2016 | 21 |
| 23. | Bushfire Management Overlay (BMO), Victorian coastal Local Government Areas 2018 | 23 |
| 24. | Population change for selected coastal towns affected by major bushfires, 1981 to 2016 | 23 |
| 25. | Population change for selected coastal towns affected by major floods, 1981 to 2016 | 24 |
| | | |

List of Tables

| 1. | Largest coastal settlements in Victoria, excluding Melbourne and Geelong, 2016 | 2 |
|----|---|----|
| 2. | Population change, coastal and non-coastal Victoria, 2007 to 2017 | 5 |
| 3. | Components of population growth, coastal regions of Victoria based on Statistical Areas Level 2 (SA2s), 2016 to 2017 | 7 |
| 4. | Victorian coastal towns with dwelling vacancy rates above 50% on census night, August 2016 | 9 |
| 5. | Types of part-time and mobile populations | 10 |
| 6. | Vulnerability indicators of relevance to demographic risk analysis of natural hazards | 20 |

Executive Summary

Context

The purpose of this report is to inform policy initiatives being undertaken through the *Marine and Coastal Act 2018*. The Act provides for the making of a Marine and Coastal Policy, followed by a Marine and Coastal Strategy. The latest demographic and census-based data is used in this report to provide an overview of issues associated with population and settlement along the Victorian coast.

This report utilises time series data for population and housing. Most of these data area sourced from ABS census and Office of the Valuer-General housing data, with time-series databases that have been developed by the DELWP Land Use and Population Research Branch.

The "marine and coastal environment" is defined in the *Marine and Coastal Act 2018* as the area "between the outer limit of Victorian coastal waters and 5 kilometres inland of the high-water mark of the sea". This includes:

- (a) the land (whether or not covered by water) to a depth of 200 metres below the surface of that land;
- (b) any water covering the land referred to in paragraph(a) from time to time;
- (c) the biodiversity associated with this land and water (M&C Act 2018, Sec. 5(1)).

Population distribution and growth

Melbourne dominates Victoria in terms of population size and density. Metropolitan suburbs along Port Phillip Bay display much greater population density than all other areas of the Victorian coast. These suburbs have also seen an increase in population and density over the past decade, especially in areas close to the central city and in new suburban developments around South Werribee and Point Cook. The Mornington Peninsula has also seen population growth and, in some cases, an increase in population density.

Outside Melbourne there is relatively strong population growth in coastal areas within 2 hours drive of the metropolitan area. Geelong, Bellarine Peninsula, Surf Coast and Bass Coast have all experienced growth, although not as high as in Melbourne. While there has been some increase in population density, the level is nowhere near as great as in Melbourne.

Apart from some growth in regional centres like Warrnambool, population growth along the majority of Victoria's coastline is quite modest and, in some coastal areas more distant from Melbourne, population decline is evident. Such areas are often sparsely settled, in part because of public land. These include: Otways, Wilsons Promontory and Far East Gippsland National Parks as well as numerous foreshore reserve and state parks.

It is often assumed that coastal areas are growing much faster than non-coastal areas. In Victoria this is not the case. Recent rates of coastal population growth have been lower than for non-coastal areas. In 2017, the coastal population of Victoria formed a slightly smaller proportion of the Victorian population than it had a decade earlier.

Coastal areas of Australia continue to attract both visitors and new residents. While population growth along the Victorian coast is generally not as strong as in some other states, it is relatively high in locations close to Melbourne. Melbourne itself has been growing at record levels in the past decade and this has the potential to place pressure on coastal areas through day visits, tourism and demand for housing in particular locations. Furthermore, increasing population density in coastal suburbs of Melbourne may create an increasing level of impact along the Port Phillip Bay coastline and may expose larger numbers of people to coastal impacts of climate change.

Migration and age structure

In-migration can directly affect population levels, but it can also affect the age structure of populations. Bass Coast and Far East Gippsland display a much older age structure because of their attraction to retirees – the largest group in their population is in the 60 to 69-year age category. Within these regions there are towns with much higher proportions of older people although these often have larger proportions of younger retirees (60-69) than older age groups (70+). The latter are more likely to move to centres with more services as they age. Regional cities like Bairnsdale are particularly important for providing health and aged care services for a broad hinterland including the Gippsland Lakes and East Gippsland region.

Coastal settlements that attract high numbers of retirees may grow in the short term but the older age structure resulting from this in-migration may dampen future population growth because there are relatively few residents of child-bearing age. The Mornington Peninsula and Bass Coast region display this pattern and, as a result, their levels of natural increase (births minus deaths) has not been very strong. Growth in such regions is driven by continued inflow of retirees rather than by high numbers of births. In contrast to this is an area like the Bellarine Peninsula. Traditionally this was a predominantly retirement location, but it has increasingly become a dormitory for Geelong and hence more couples and young families have been attracted to centres like Torquay. Populations that contain a large proportion of young adults are likely to have higher levels of natural increase because there are more people of child bearing age. The very high levels of growth in Melbourne are driven by combination of younger age structure, and high levels of migration from overseas.

Part-time and peak populations

Most measures of population are based on numbers of people who are resident in a location. However, some areas experience a large difference between the size of their resident population and the size of the population at particular times of the day, week or year.

Part-time populations may comprise different groups of people. For example, those who own holiday homes, those who visit and stay in commercial accommodation and those who are day visitors. There is no single source of data to measure the size of part time populations and, by definition, they are dynamic and variable across times of the day, week and year. Nevertheless, insights into the scale of part-time populations can be gained by considering numbers of: holiday homes (a proxy measure can be gained from the ABS census); overnight stays (commercial accommodation data); and, day visitors (tourism data).

Coastal areas generally experience peak populations during summertime although there may be other peaks on public holidays or for particular events. Peak populations place demands upon infrastructure, services and facilities. They may also have environmental impacts such as: habitat damage or fragmentation; introduction of weeds; wildlife road kill; and, increased fire-ignition risk (accidental or deliberate). In addition, marine and riverine systems may be affected by human activities which lead to: changes in oxygen content, turbidity, run-off, pollution and water harvesting. Such activities can include swimming, boating, camping and walking.

While the management of such visitor populations is often included in an environmental management plan, it should be noted that the *total number* of people may be less important than the behaviours of those people, the vulnerability of particular environments or the timing of visits. For this reason, a variety of policy responses (education, access restrictions to certain places at certain times) may be required.

Housing

In areas outside of Melbourne, detached housing forms the majority of housing types along the coast. For most regions, this type of housing accounts for around 90 percent of dwellings. Higher density living options such as flats form less than five percent of dwellings in coastal areas outside Melbourne. Melbourne's coastal areas, on the other hand have nearly half of all dwellings being semi-detached units or flats, highlighting the greater density of residential dwellings in metropolitan locations.

Dwelling approvals data indicate that the greatest construction activity along the coast in recent years has been in and around Melbourne and Geelong. Separate houses account for most of the building approvals and high levels can be found along the metropolitan coast and in Geelong, Bellarine Peninsula, Surf Coast and Bass Coast. Although numbers of approvals for apartments are smaller, these tend to be more concentrated in the metropolitan areas around Port Phillip Bay. Popular holiday and retirement destinations such as Phillip Island, Surf Coast and Bass Coast have lower levels of approvals for flats than Melbourne, but a higher level than areas further away from the metropolitan area.

While coastal areas are often assumed to have high house prices due to high levels of consumer demand, there is actually great variation depending on: proximity to urban centres; accessibility and service provision; landscape qualities, and historical factors. Low-lying wetland areas around Westernport Bay are relatively close to Melbourne, yet they do not have the amenity value of locations with ocean frontage such as those along the southern end of Mornington Peninsula and hence price differences are evident. There is also variation in accessibility and infrastructure provision hence coastal locations such as Loch Sport and Seaspray, while popular for holiday makers, have relatively low housing prices.

Tourism

Tourism accounts for a significant amount of economic activity in coastal regions. Domestic visitors outnumber international visitors to Victoria's coastal attractions and most of these are day visitors. The Mornington Peninsula receives the most day visitors of those coastal areas presented and this reflects the access which it has to the large population of metropolitan Melbourne. Areas further from Melbourne such as Great Ocean Road and Gippsland receive a larger share of the domestic overnight visitors. It is worth noting that Melbourne is not the only source of tourists in the domestic market. Visitors from other regions and from interstate are also included.

The larger numbers of overnight visitors to the Great Ocean Road and Gippsland tourist regions is reflected in data on visitor nights. Since 2013, these two regions have recorded consistently higher numbers of visitor nights than other coastal locations presented in this analysis. The Great Ocean Road tourist region also derives more economic benefit from its tourism industry than other coastal regions and it recorded the highest number of tourismrelated jobs along coastal Victoria, followed by Mornington Peninsula.

Marine and coastal industries

Census data reveal a number of coastal and marinerelated industries which are important for local employment. These industries range from primary industries such as fishing, processing industries, and service-based industries like water transport. The industry profile of these sectors varies with distance from Melbourne. More distant areas such as the far west and far east coasts have a higher number of persons employed in primary sectors such as fishing and aquaculture. Boat building and associated services account for a higher number of jobs in Geelong and metropolitan Melbourne. Melbourne also accounts for many people employed in water transport, due largely to the size of its port facilities.

Coastal hazards and risk

Natural hazards such as bushfire, flood, storm surge, and landslide, occur along the Victorian coast. The concept of risk is related to both the hazard as well as the number of people who may be affected by such hazards. For this reason, understanding demographics is important for determining the risks associated with exposure to natural hazards. Where people live in or near such hazards, or indeed if they even visit areas containing such hazards, then the risk equation changes because more people are potentially exposed. The Great Ocean Road region, for example, is one of the highest risk locations for bushfire because of: the proximity of towns like Lorne and Anglesea to the Otway Ranges; the high numbers of visitors to the region especially in summer months when fire risk is highest; and, the road configuration which makes evacuation difficult.

Particular groups within the population may have higher or lower levels of risk depending on their demographic and economic characteristics. Hence, the concept of risk involves the interplay of hazard, exposure and vulnerability. Specific vulnerability indicators are used in this report to highlight characteristics associated with an individual's level of vulnerability before, during, or after a disaster. For example, safety and evacuation issues are often heightened as people move into elderly age brackets. While individual older people may be fit and active, aggregate data show that number of people needing assistance increases with age. Because many coastal areas attract retirees, ageing in place can lead to communities having older age structures. Where coastal towns are predominantly older in age structure, there are particular issues regarding the preparedness and response to emergency events such as flooding and fire.

Another point of vulnerability can relate to whether people are familiar with an area and its natural hazards. Locations which have a large number of residents who are new to the area may require targeted education for newcomers who may be unfamiliar with local hazards. Coastal areas with high proportions of newcomers are found in some metropolitan locations as well as in: Phillip Island; Geelong; Torquay; and, Ocean Grove-Barwon Heads.

Population characteristics change over time. Hence patterns of vulnerability and risk can also change over time. Sometimes changing characteristics occur because people move into or out of a community. Other changes occur within a population. Children may be born, increasing the number of infants in a community, or people may age in place, causing an increase in numbers of older people. Population mobility can present particular challenges for risk assessment and emergency management. Towns may vary in population size by a factor of four or five during particular seasons of the year. Popular visitor and holiday locations such as the Great Ocean Road region have particularly high fire risk and areas around the Gippsland Lakes may face flooding risks (riverine or tidal). Planning for natural hazards therefore requires an understanding of both permanent and part-time populations.

Impacts of extreme events

It might be expected that the largest and most damaging bushfires or floods would leave a legacy of population loss, yet this is not necessarily borne out by population data. The 1983 Ash Wednesday fires, for example, severely affected the coastal towns of Aireys Inlet and Anglesea yet, despite the devastation wrought by the fires, the impact on longterm population growth was surprisingly small. Other towns affected by these fires, such as Cockatoo and Upper Beaconsfield in the Dandenong Ranges, also showed this pattern of subsequent population growth. The Black Saturday fires of February 2009 did not affect coastal areas, however, despite the even greater devastation wrought by these fires, the impacts on population growth in areas like Kinglake and Marysville were relatively small. While populations fell between the 2006 and 2011 Censuses, there has been subsequent recovery in population numbers. Likewise, there appears to be little impact on total population numbers after major flood events. In fact, population change is more likely to be affected by age structure and migration patterns than by environmental events.

1. Introduction

This report is a revised and updated version of a 2013 research paper prepared for the Victorian Coastal Council (VCC) to inform the development of the *Victorian Coastal Strategy 2014*. The research paper on *Population and Settlement along the Victorian Coast* undertaken by the Spatial Analysis and Research (now LU&PR) Branch in 2013, was recognised by the Victorian Coastal Council as a valuable input for the development of policy within the 2014 Coastal Strategy. A similar research paper is being sought in 2018 for the development of the Marine and Coastal Policy.

The purpose of this report is to inform policy initiatives being undertaken through the *Marine and Coastal Act 2018*. The Act provides for the making of a Marine and Coastal Policy, followed by a Marine and Coastal Strategy.

The Marine and Coastal Policy will:

- outline policy for the marine and coastal environment;
- guide decision makers in achieving the objectives of the Act for marine and coastal planning and management; and,
- include a marine spatial planning framework that establishes a process for achieving integrated and coordinated planning and management of the marine environment.

The Marine and Coastal Strategy will:

- set out the actions required to implement the Marine and Coastal Policy.
- include an implementation plan that sets out time frames for implementation of actions and identifies agencies responsible for delivering those actions.

The latest demographic and census-based data is used in this report to provide an overview of issues associated with population and settlement along the Victorian coast. The report largely follows the structure and content of the report prepared by for the VCC in 2013. An additional area of interest is to consider whether extreme events (flood, fire, storm) have had any impact on populations. Ninety-six percent of the Victorian coast is in public ownership (DELWP 2018a, p. 4), unlike coastal areas in most other Australian States. At the most basic level the coast is where land and ocean meet. For legal purposes the coast may be defined by high or low water mark, for landscape assessment purposes it may be regarded as the area which can be viewed from the beach - in some cases a limited littoral zone bounded by cliffs, in other cases a broad landscape with long views inland (DSE 2006, pp. 1, 3). In the Victorian Coastal Strategy, the coast is defined as encompassing "coastal, estuarine and marine environments on both public and private land" (VCC 2014, p. 96).

Researchers have used other definitions, often constrained by the pattern of administrative data units such as ABS Statistical Areas (SAs) or Local Government Areas (LGAs).

Of relevance to this report is the definition used in the Victorian *Marine and Coastal Act 2018*. It refers to the "marine and coastal environment" which is defined in the as the area "between the outer limit of Victorian coastal waters and 5 kilometres inland of the high-water mark of the sea". This includes:

- (a) the land (whether or not covered by water) to a depth of 200 metres below the surface of that land;
- (b) any water covering the land referred to in paragraph(a) from time to time;
- (c) the biodiversity associated with this land and water (M&C Act 2018, Sec. 5(1)).

This report utilises time series data for population and housing. Most of these data area sourced from ABS census and Office of the Valuer-General housing data, with time-series databases that have been developed by the DELWP Land Use and Population Research Branch.

2. Population

2.1 Population distribution and settlement patterns

Victoria's population is highly concentrated in its capital city, Melbourne. Figure 1 shows its dominance as a population centre. Regional cities like Geelong, Warrnambool and Ballarat are also evident on the map. Outside these centres, the coastal regions of Victoria show areas of population concentration closer to Melbourne – Bellarine and Mornington Peninsula, Surf Coast and Phillip Island. But many areas of the coastline are sparsely settled, in part because of public lands. These include: Otways, Wilsons Promontory and Far East Gippsland National Parks as well as numerous foreshore reserve and state parks.





Sources: ABS census 2016 and DELWP 2018b Towns in Time

Victoria has a number of large cities located on the coast. Melbourne itself is located on Port Phillip Bay, although most of the metropolitan area and its population lie inward from the coast. The urban area of Melbourne had a population of 4.2 million in 2016. Geelong also has bay-side frontage and extends inland, containing a total population of 155,899. Apart from these two cities, Warrnambool, Ocean Grove-Barwon Heads and Torquay-Jan Juc are the largest coastal cities in Victoria (table 1).

The Bellarine and Surf Coasts are located in close proximity to Geelong which makes them increasingly popular as commuter locations as well as maintaining their traditional role as holiday and retirement destinations for Melbourne and Geelong residents. The Mornington Peninsula, which is located within the metropolitan Melbourne region, also plays this role. The resident population of towns on the Bellarine Peninsula amounts to around 67,800 people (figure 1). Other concentrations of population are found around Westernport (8,600) Phillip Island (7,900) and further east around the Gippsland Lakes (12,600).

Table 1: Largest coastal settlements in Victoria,excluding Melbourne and Geelong, 2016

| Urban Centre | Population 2016 |
|---|-----------------|
| Geelong | 155,889 |
| Warrnambool | 30,384 |
| Ocean Grove-Barwon Heads | 17,444 |
| Torquay-Jan Juc | 16,530 |
| Drysdale-Clifton Springs | 12,128 |
| Leopold | 11,549 |
| Portland | 9,779 |
| Portarlington-St Leonards, Indented Hea | d 6,672 |
| Lakes Entrance | 6,100 |
| Inverloch | 4,870 |
| Cowes | 4,857 |
| Point Lonsdale-Queenscliff | 3,502 |
| Paynesville | 3,176 |
| Port Fairy | 3,004 |

Source: DELWP 2018b, Towns in Time

As well as dominating Victoria in terms of population size, Melbourne also has high population density. Metropolitan suburbs along Port Phillip Bay display much greater population density than all other areas of the Victorian coast (figure 2). These suburbs have also seen an increase in population and density over the past decade, especially in areas close to the central city and in new suburban developments around South Werribee and Point Cook (figure 3). The Mornington Peninsula has also seen an increase in population density. Outside Melbourne, there has been some increase in coastal population density areas within 2 hours drive of the metropolitan area, including: Geelong; Bellarine Peninsula; Surf Coast; and, Bass Coast. However, the level and rate of growth is much lower than Melbourne.





Source: ABS Regional Population Growth, cat. no. 3218.0

Figure 3: Change in population density in Victoria, Statistical Area Level 2 (SA2), 2001 to 2017



Source: ABS Regional Population Growth, cat. no. 3218.0

2.2 Population growth

During the 2000s, some of the fastest regional population growth rates in Victoria were in coastal areas close to Melbourne – suburban locations such as Point Cook, Mornington Peninsula (especially Dromana), coastal parts of Geelong, the Bellarine Peninsula and the Surf and Bass Coast regions (figure 4). More distant coastal areas have generally had lower population growth rates, and in some cases population decline was recorded for the 2016-17 period.

Figure 4: Average annual population change, Victorian coastal Statistical Areas Level 2 (SA2), west to east, 2016-2017



Source: ABS Regional Population Growth, cat. no. 3218.0

It is often assumed that coastal areas are growing much faster than non-coastal areas. In Victoria this is not the case. During the decade to 2017, rates of growth along the coast were lower than both noncoastal areas and Victoria as a whole with average annual growth rates ranging from 1.4% (coastal) to 2% (non-coastal) (table 2). This is due, in part to the rapid growth seen in Melbourne over that decade, particularly to the north and west, and also the growth of inland centres such as Bendigo and Ballarat and the non-coastal suburbs of Geelong. In 2017, the coastal population of Victoria formed a slightly smaller proportion of the Victorian population than it had a decade earlier.

| | Estimated Resident Population (ERP) | | Change in ERP | | | Average annual population growth | | | |
|----------------------|-------------------------------------|------------------|---------------|---------|----------------|----------------------------------|------------------|-----------------|-------------------|
| | 2007 | 2012 | 2017 | 2007-12 | 2012-17 | 2007-17 | 2007-12 | 2012-17 | 2007-17 |
| Coastal Victoria | 756,035 | 810,110 | 881,989 | 54,075 | 71,879 | 125,954 | 1.4 | 1.7 | 1.6 |
| Non-Coastal Victoria | 4,397,487 | 4,843,319 | 5,441,617 | 445,832 | 598,298 | 1,044,130 | 2.0 | 2.4 | 2.2 |
| Victoria | 5,153,522 | 5,653,429 | 6,323,606 | 499,907 | 670,177 | 1,170,084 | 1.9 | 2.3 | 2.1 |
| | Coastal pop | 'n as a % of Vic | toria's pop'n | | | | | | |
| | 14.7 | 14.3 | 13.9 | | Coastal Victor | ia includes Statistic | al Areas Level 2 | (SA2) which are | e contiguous with |

Table 2: Population change, coastal and non-coastal Victoria, 2007 to 2017

Source: ABS Regional Population Growth, cat. no. 3218.0

The coastal areas of Victoria differ from those in other States. Much of the coastline is in public ownership and population growth is generally lower than that found in New South Wales, Queensland or Western Australia. Figure 5 shows growth rates along the eastern seaboard, Adelaide region and south west coast of Western Australia. Between 2006 and 2016, Victorian coastal areas showed lower rates of growth than in central coastal areas of New South Wales and southern coastal areas of Queensland. Western Australia and South Australia show strong coastal growth around their capital cities while the south-western corner of Western Australia also shows strong population growth. the Victorian coastline. Non-coastal comprises the remaining SA2s across Victoria





Source: ABS Census 2016 Time Series Database

2.3 Age structure

Coastal settlements sit within a broader context of population characteristics. Overall, there is a general difference between the age structure profiles of rural and urban areas. Rural areas in Victoria are characterised by large gaps in the young adult age groups due to net out-migration of this age group, many of whom move to larger centres for education and employment opportunities. Regional centres such as Geelong are more likely to retain this age group while Melbourne is a net attractor of young adults, having high proportions of its population in the 20 to 39-year old age bracket (figure 6).

Some coastal areas display a much older age structure because of their attraction to retirees – Bass Coast and Far East Gippsland show this pattern quite distinctly with the highest proportion of their population being in the 60 to 69-year age category. In Far East Gippsland this represents 20 percent of the population. Within these regions there are towns with much higher proportions of older people. In East Gippsland, the towns of Port Albert, Loch Sport; and, Raymond Island each recorded more than 30 percent of their population aged 60 to 69 years in 2016. While these smaller coastal towns have high proportions in younger retirement age groups (60-69 years), older age groups are more likely to move to centres with more services as they age. Centres like Bairnsdale are particularly important for providing health and aged care services for a broad hinterland including the Gippsland Lakes and East Gippsland region. Nearby Raymond Island has higher proportions aged 60-69 compared to Bairnsdale (30% compared to 13%) but in the 70 to 79-year age category this reverses (6% compared to Bairnsdale's 23%). The higher proportion for Bairnsdale continues for all ages above 70 years.



Figure 6: Age structure of Victorian coastal regions, aggregated Statistical Areas Level 2 (SA2), 2016

Source: ABS Census 2016

2.4 Migration and natural increase

Migration includes movement at a variety of geographical scales: within a local area or region; to or from Melbourne; interstate, or overseas. Migration is a key component of population growth, the other being natural increase which is the difference between the number of births and deaths in a population. These components of population change are related to age structure as well. Populations that contain a large proportion of young adults are likely to have higher levels of natural increase because there are more people of child bearing age (hence more births than deaths). Conversely, a higher proportion of older age groups in a population can lead to a higher number of deaths than births natural decrease. Both these demographic patterns can be seen along Victoria's coast with larger centres like Melbourne having younger age structures compared to other locations.

In-migration can directly affect population levels, but it can also affect the age structure of populations. Coastal settlements that attract high numbers of retirees may grow in the short term but the older age structure resulting from this age-specific migration may dampen future population growth.

Table 3 highlights the different components of population growth across Victoria's coastal regions. Areas in the far west of the state have net outflows of young adults who are attracted to larger centres for education and employment. Hence the level of natural increase is very low (in fact, it is natural decrease where deaths outnumber births). The Mornington Peninsula and Bass Coast region have high levels of net in-migration but, because much of this has comprised retirees over many years, natural increase has not been very strong. Growth in such regions is driven by continued inflow of retirees rather than by high numbers of births.

In contrast to this is an area like the Bellarine Peninsula. Traditionally this was a predominantly retirement location, but it has increasingly become a dormitory for Geelong and hence more couples and young families have been attracted to centres like Torquay. Thus, natural increase as well as net inmigration contributes to population growth.

The very high levels of growth in Melbourne are driven by combination of younger age structure, and high levels of migration from overseas.

Table 3: Components of population growth, coastal regions of Victoria based on Statistical Areas Level 2 (SA2s), 2016 to 2017.

| | Components of growth 2016-17 | | | |
|------------------------|------------------------------|---------------------------|---------------------------|--|
| | Natural increase | Net internal migration | Net overseas migration | |
| Far West Coast | 46 | -342 | 263 | |
| Surf Coast & Bellarine | 239 | 1,695 | 345 | |
| Geelong | 413 | 1,044 | 786 | |
| Melbourne | 2,459 | 273 | 4,947 | |
| Peninsula | -4 | 1,392 | 524 | |
| Bass Coast | 2 | 820 | 140 | |
| Far East Coast | -85 | 260 | 67 | |

Source: ABS Regional Population Growth, cat. no. 3218.0

2.5 Part-time coastal populations

A key characteristic of most coastal settlements is the relatively high proportion of houses which are vacant for periods of time during the year (figure 7). These are usually holiday homes, with non-residents visiting for various lengths of time. The Community Attitudes and Behaviour Study (Ipsos 2012, p. 34) found that 17 percent of survey respondents reported having access to a Victorian beach house owned by themselves or family. Qualitative research indicated that many also have access to beach houses owned by friends. Typically, these dwellings will be inhabited during summer time and key holiday periods. There may also be considerable changes in levels of habitation between week day and weekends. Because the ABS Census is conducted during winter time on a week night, the data on unoccupied dwellings can be used as a general proxy for holiday homes on the coast.



Figure 7: Proportion of dwellings that were unoccupied on census night 2016, Statistical Areas Level 2 (SA2) along Victoria's Coast, west to east

Source: ABS Census 2016

A total of 36,800 unoccupied dwellings were counted in Victorian coastal towns and cities (excluding Melbourne and Geelong) by the 2016 census. This represents an average winter vacancy rate of around 37 percent. Although absolute numbers of dwellings – both occupied and unoccupied, have increased over the past 3 decades, the proportion of unoccupied dwellings has remained reasonably consistent within the range of 35 to 40 percent (figure 8).



Figure 8: Vacancy rates coastal centres (excl. Geelong & Melbourne) 1981 to 2016 No. dwellings ('000) % of total dwellings

Victorian coastal towns with the highest levels of housing vacancy are shown in table 4.

Table 4: Victorian coastal towns with dwellingvacancy rates above 50% on census night, August2016

| | Total no. dwellings | Unoccupied dwellings | Percentage unoccupied |
|-----------------------------|------------------------|-------------------------|--------------------------|
| Sandy Point | 659 | 566 | 85.9 |
| Smiths Beach* | 546 | 450 | 82.4 |
| Lorne | 1,807 | 1,364 | 75.5 |
| Loch Sport | 1,695 | 1,253 | 73.9 |
| Ventnor* | 988 | 709 | 71.8 |
| Aireys Inlet-Fairhaven | 1,636 | 1,155 | 70.6 |
| Golden Beach-Paradise Beach | 752 | 508 | 67.6 |
| Venus Bay | 1,683 | 1,135 | 67.4 |
| Surf Beach-Sunderland Bay* | 909 | 585 | 64.4 |
| Anglesea | 2,914 | 1,826 | 62.7 |
| Flinders | 701 | 436 | 62.2 |
| Cape Paterson | 1,045 | 640 | 61.2 |
| Marengo | 271 | 162 | 59.8 |
| Cowes* | 5,457 | 3,255 | 59.7 |
| Cape Woolamai* | 1700 | 993 | 58.4 |
| Apollo Bay | 1,445 | 827 | 57.2 |
| Shoreham | 413 | 232 | 56.2 |
| Wimbledon Heights* | 304 | 159 | 52.3 |
| Rhyll* | 463 | 239 | 51.6 |
| Point Lonsdale-Queenscliff | 3,443 | 1,772 | 51.5 |
| Cape Schanck | 328 | 167 | 50.9 |
| Coronet Bay | 839 | 421 | 50.2 |

* located on Phillip Island

Source: ABS Census 2016, Urban Centre Rural Locality

2.6 Estimating part-time populations

Most measures of population are based on numbers of people who are resident in a location. The national census of population and housing provides a 5-yearly snapshot of people's location on a particular night. However, some areas experience a large difference between the size of their resident population and the size of the population at particular times of the day, week or year.

Part-time populations may comprise different groups of people (table 5). For example, those who own holiday homes, those who visit and stay in commercial accommodation and those who are day visitors. Summertime population peaks occur in coastal areas. While the count of unoccupied dwellings gives some idea of the level of second homes in these locations, it does not provide information about visitor populations.

Table 5: Types of part-time and mobile populations

| ТҮРЕ | CHARACTERISTICS | POTENTIAL IMPACTS |
|---------------------|--|---|
| Weekend populations | Weekend holiday makers utilising second homes or commercial accommodation | Weekend tourism creates demand for accommodation and retail services thereby creating local employment and wealth generation |
| Holidaymakers | Holiday populations may be many times higher than the resident population | Often creates congestion and can stretch capacity of local shops, services and infrastructure but also adds to economy |
| Daytrippers | Daytrippers to coasts and other attractions | Can create road congestion and high demand on services |
| Festival attendees | One-off off events that attract thousands | Local accommodation and infrastructure capacity may be stretched but can have major positive impacts on local economy |
| Seasonal workers | May number in thousands: fruit pickers, contractors, seasonal tourist workers | Demand for tourist or temporary accommodation, hotels, caravan parks. Also demand for schools, retail, health and other services |
| Working populations | Monday to Friday working population may be several times the resident population | Creates demand for further employment in retailing and other services but can create congestion |

Source: McKenzie et al. 2007

Peak populations place demands upon infrastructure, services and facilities, many of which are funded by local authorities or staffed by volunteers. Where there is a large difference between resident and peak populations, stress can be placed on local services. The largest differences between resident and peak populations can reflect a particular event such as a festival or sporting event. Some areas will experience very high population peaks. Phillip Island, for example, attracts an additional 44,000 people during the annual Motor Bike Grand Prix. Other areas may have smaller numbers of visitors but the peak may represent a very large proportional increase. In the case of Lorne, the additional 20,000 people visiting for the annual Pier to Pub swim in January each year represents a 20-fold increase over the base population (figure 9).





Sources: ABS Census 2016; DELWP 2018b; Austadiums 2018; The Age $\,11/1/14$

Measuring mobile populations is inherently difficult, precisely because of its movement. While peak populations may be highly visible, there are less obvious movements of people into and out of areas all the time. In a single location, the population may differ greatly between 10am and 10pm, between Monday and Saturday, or between April and December. While a variety of estimation techniques are available, there is no single measure which will cover all aspects of a dynamic population flow.

Peak population estimates take into account potential population should unoccupied dwellings and tourist accommodation be utilised. A count of unoccupied dwellings is provided by the ABS Census and this number has been multiplied by the average household size for regional Victoria in 2016 (2.4 persons). Tourist accommodation data has been obtained from AAA Tourism and the number of persons in tourist accommodation determined on the basis of either 2 persons per bedroom, or a person capacity where this was stated (figure 10). This dataset is from 2012 – more recent data are unavailable as internet sources of accommodation information have emerged and the distribution of such data makes a single point of collection more difficult.



Figure 10: Peak population estimates for selected coastal towns (overnight capacity in residential buildings and tourist accommodation), 2012-2016

Sources: ABS Census 2016; AAA Tourist accommodation data 2012 In a study examining the population dynamics of Phillip Island and Torquay (SGS 2007), it was found that both locations have a strong summer-time population peak owing to the number of holiday homes and attractiveness for day-trippers. In order to estimate the scale of population fluctuations a number of proxy indicators were examined and their suitability for informing population estimations determined. Indicators included: rubbish collection; tourist centre enquiries; water consumption; traffic counts: tourist visitor survey data, survey of tourist accommodation; ABS census (unoccupied dwellings), and non-resident home owners. Of these indicators, water consumption provided some of the best indications of the pattern of annual peaks and troughs (figure 11).

In the Coastal Attitudes and Behaviour Study (Ipsos 2012), 84 percent of those surveyed (N=971) reported having made at least one day-trip to the coast in the previous year with the average number of day trips being 23.4. Over half the respondents (57%) had made an overnight trip to the Victorian coast in the same period. The average number of overnight trips was 5.6. Of those who had visited the coast, around a quarter had visited the regional encompassing Geelong, Bellarine Peninsula and Surf Coast while around 20 percent had visited the

Mornington Peninsula. Visitation was higher among those living close to the coast (within 5 kilometres) with 26 percent visiting daily and 86 percent at least once a month (Ipsos 2012, p. 17).

Figure 11: Monthly water consumption Torquay, 2001-06





3. Economic activity along the coast

3.1 Tourism

Tourism accounts for a significant amount of economic activity in coastal regions. While the tourism regions for which such data are collected include inland areas as well as coastal, areas such as the Great Ocean Road and Phillip Island can be assumed to be drawing tourists to many coastal attractions (figure 12). For the purpose of analysis presented in this section, four tourist regions are

Figure 12: Victorian tourism regions which abut the coast

selected on the basis of having the greatest coastal component in their land area. These are: Great Ocean Road, Geelong and Bellarine, Mornington Peninsula, Phillip Island and Gippsland. The regions of Melbourne and Yarra Valley and Dandenong ranges have not been included in the analysis because, even though they abut the coast, most of their area contains inland tourist attractions.

Yarra Valley & Dandenong Ranges Gippsland Great Ocean Road Mornington Peninsula Phillip Island

Source: DEDJTR 2018a

Domestic visitors far outnumber international visitors to Victoria's coastal attractions (figure 13). Of those domestic tourists in the year to March 2018, the majority were day visitors. The Mornington Peninsula receives the most day visitors of those coastal areas presented and this reflects the access which it has to the large population of metropolitan Melbourne. Areas further from Melbourne such as Great Ocean Road and Gippsland receive a larger share of the domestic overnight visitors. It is worth noting that Melbourne is not the only source of tourists in the domestic market. Visitors from other regions and from interstate are also included. Figure 13: Visitor numbers, selected tourism regions along the Victorian coast, year ended March 2018



Sources: DEDJTR 2018b, 2018c, 2018d, 2018e, 2018f.

The larger numbers of overnight visitors to the Great Ocean Road and Gippsland tourist regions is reflected in the number of visitor nights (figure 14). Since 2013, these two regions have recorded consistently higher numbers of visitor nights than the other locations presented in this analysis.

Figure 14: Visitor nights, selected tourism regions along the Victorian coast, years ending March 2013 to 2018

Total visitor nights 8,000 Great Ocean Road 7,000 Gippsland 6.000 5,000 Mornington Peninsula 4.000 Geelong & Bellarine 3,000 Phillip Island 2,000 1,000 0 2013 2014 2015 2016 2017 2018 Sources: DEDJTR 2018b, 2018c, 2018d, 2018e, 2018f.

The Great Ocean Road tourist region derives more economic benefit from its tourism industry than other coastal regions in terms of contribution to Gross Regional Product (GRP). Direct and indirect contributions to GRP for this region totalled nearly a billion dollars for the year ending March 2018 (figure 15).

Figure 15: Contribution of tourism to Gross Regional Product (GRP), selected tourism regions along the Victorian coast, year ended March 2017



Sources: DEDJTR 2018b, 2018c, 2018d, 2018e, 2018f.

The Great Ocean Road region also recorded the highest number of tourism-related jobs along coastal Victoria (figure 16). These numbered around 8,300, with an additional 2,900 indirect jobs being supported by the tourism industry in the year ending March 2018. Mornington Peninsula also recorded high levels of employment related to tourism with 6,700 direct jobs and 2,400 indirect jobs reported in the sector.

Figure 16: Employment in tourism, selected tourism regions along the Victorian coast, year ended March 2017



3.2 Marine and coastal industries

Census data provide information about the industries in which people are employed. At the most detailed level, these can reveal a number of coastal and marine-related industries which are important for local employment. These industries range from primary industries (such as fishing) through to processing and service-based industries.

The profile of these selected industries varies with distance from Melbourne (figure 17). More distant areas such as the far west and far east coasts have a higher number of persons employed in primary sectors such as fishing and aquaculture. Boat building and associated services account for a higher number of jobs in Geelong and metropolitan Melbourne. Melbourne also accounts for many people employed in water transport, due largely to the size of its port facilities.





Source: ABS Census 2016, Industry of employment 4-digit ANZSIC codes.

4. Coastal settlement

4.1 Coastal housing types

In areas outside of Melbourne, detached housing forms the majority of housing types along the coast. For most regions, this type of housing accounts for around 90 percent of dwellings (figure 18). In terms of higher density living options such as flats, these form less than five percent of dwellings in coastal areas outside Melbourne. Melbourne's coastal areas, on the other hand have nearly half of all dwellings being semi-detached units or flats, highlighting the greater density of residential dwellings in metropolitan locations.

Figure 18: Dwelling type, Victorian coastal regions, aggregated Statistical Areas Level 2 (SA2), 2016 % total dwellings



Source: ABS Census 2016

4.2 Coastal building activity

Dwelling approvals data indicate that the greatest construction activity along the coast in recent years has been in and around Melbourne and Geelong (figure 19). Separate houses account for most of the building approvals and high levels can be found along the metropolitan coast and in Geelong, Bellarine Peninsula, Surf coast and Bass Coast. Although numbers of approvals for apartments are smaller, these tend to be more concentrated in the metropolitan areas around Port Phillip Bay. Popular holiday and retirement destinations such as Phillip Island, Surf Coast and Bass Coast have lower levels of approvals for flats that Melbourne, but a higher level than areas further away from the metropolitan area. Although not all dwelling approvals progress to completion stage, the drop off rate is generally below 10 per cent. Also, there is often a time lag between approvals and completions, so the data presented below may not necessarily reflect the number of houses built during the period.



Figure 19: Number of building approvals for houses and flats, Statistical Areas Level 2 (SA2), 2007 to 2017

Source: ABS Building Approvals, cat. no. 8731.0

4.3 House prices

While coastal areas are often assumed to have high house prices due to high levels of consumer demand, there is actually a great deal of variety depending on: proximity to urban centres; accessibility and services; landscape qualities, and even historical factors. Brighton and Queenscliff for example, have been the favoured location for wealthy Melbournians for over a century (figure 20). In more recent times, locations along the Great Ocean Road Coast such as Lorne have seen strong growth in house prices. Low lying wetland areas around Westernport Bay are relatively close to Melbourne, yet they do not have the amenity value of locations with ocean frontage such as those along the southern end of Mornington Peninsula and hence price differences are evident. There is also variation in accessibility and infrastructure provision hence coastal locations such as Loch Sport and Seaspray, while popular for holiday makers, do not have the highest housing prices.

Figure 20: Median house price, coastal towns and suburbs, 2017



Source: DELWP 2018c

5. Issues associated with coastal populations

5.1 Population growth

Coastal areas of Australia continue to attract both visitors and new residents. Growth of resident populations along the Victorian coast is generally not as strong as in some other states however it is relatively high in locations close to Melbourne. Melbourne itself has been growing at record levels in the past decade and this has the potential to place pressure on particular coastal areas through day visits, tourism and demand for housing.

Areas to the south of Geelong have sustained very high rates of population growth over recent decades. Land use planning policy has directed much of this growth to occur inland from the coast to avoid sprawl along the coast. While this has been successful in land use terms, the total number of people living in the Bellarine Peninsula and Surf Coast regions has grown substantially.

At the same time, visitor populations have increased in all tourism regions along the Victorian coast (figure 21)

Fig 21: Visitor numbers to selected Victorian coastal tourism regions 2014 to 2018



* includes: domestic day visitors; domestic overnight visitors; and, international overnight visitors. Sources: DEDJTR 2018b, 2018c, 2018d, 2018e, 2018e

5.2 Population impacts

Increased numbers or concentrations of people (either resident or visitor) may result in environmental impacts such as:

- damage of habitats
- soil compaction and erosion
- wildlife road kill
- plant damage from trampling
- introduction of weeds
- habitat fragmentation from development of housing and infrastructure
- removal of vegetation during the construction of infrastructure

- increased fire-ignition risk (accidental or deliberate)
- impacts on aquatic systems through changes to oxygen content, turbidity, run-off, pollution and water harvesting
- changes in nutrients from activities in the water (e.g. swimming, boating) and in areas around rivers and estuaries (e.g. camping, walking). (Spenceley et al. 2015, p. 739).

These impacts may be heightened during peak periods. Coastal areas generally experience peak populations during summertime although there may be other peaks on public holidays or for particular events. Peak populations may increase environmental impacts due to the volume of people using the coast and adjacent marine areas for swimming, boating, camping and walking.

It is important to recognise that the impact of population is not always linear. The *total number* of people may be less important than the behaviours of those people, the vulnerability of particular environments or the timing of visits. In other words, people have unequal impacts on environments depending on their behaviour, age, and density. Environments themselves are dynamic and may be more or less vulnerable at different times. It is for this reason that there is no single population capacity number that can guide visitor management. Rather, a variety of policy responses (education, access restrictions to certain places at certain times) may be required.

There are examples of visitor population management approaches in response to concerns about overcrowding and negative impacts on delicate environmental or cultural assets. Controlling access, limiting numbers and applying fees are potential tools, however the more difficult question is how impacts can be assessed and measured in order to refine prevention measures. A number of frameworks have been developed for impact management such as Limits of Acceptable Change (LAC) and Visitor Impact Management (VIM) (Spenceley et al 2015, pp. 743-44). Rather than focussing on simply numbers, such approaches rely on identification of concerns and issues; development of resource management objectives; management options; implementation actions and monitoring of conditions. The process of identifying issues and monitoring responses provides an important dynamic process of evaluation and adjustment rather than simply aiming for a particular number of visitors to a sensitive location. Many of

these approaches are used in sustainable tourism and ecotourism practices.

5.3 Hazards and risk

Natural hazards occur along the Victorian coast for example: bushfire, flood, storm surge, and landslide, The concept of risk is related both to the hazards but also to those who may be affected by such hazards. For this reason, understanding demographics is important for determining the risks associated with exposure to natural hazards. Bushfire, for example is a natural phenomenon to which Australian ecosystems are well adapted. Where people live in or near such hazards, or indeed if they even visit areas containing such hazard, then the risk equation changes because more people are exposed to the hazard. Other hazards like floods can also pose risks to people. Many aspects of demographics are important in understanding this risk profile and the characteristics of populations which may indicate higher or lower levels of vulnerability.

The concept of risk involves the interplay of hazard, exposure and vulnerability (Canterford 2011). Vulnerability refers to the degree to which individuals and communities may be impacted by the hazard. While general analysis of vulnerability is valuable for risk assessment, it should be noted that individuals will vary in how they respond to and recover from an emergency event. Vulnerability assessment, therefore, is only indicative of the potential impacts.

Work undertaken by Canterford (2009; 2011) outlines the factors which may increase the vulnerability of individuals and communities. These factors were developed for use by the Geoscience Australia Risk Impact and Analysis Group and are based on literature review and stakeholder feedback. The indicators were used in a demographic analysis for the Bushfire CRC (Cooperative Research Centre) which was undertaken following the Black Saturday fires in Victoria in February 2009 (Canterford 2009). They have been used subsequently in an analysis of demographic factors affecting bushfire risk (McKenzie & Canterford 2016, 2018).

The framework of vulnerability indicators was developed in order to better assess the risk exposure of particular people. While measures of vulnerability are indicative (they cannot predict how a particular individual will respond to a specific event), research studies have shown that some characteristics are associated with an individual's level of vulnerability before, during, or after a disaster. These form the basis of the framework of indicators presented in table 6 below. These indicators may be important predisaster (e.g. preparedness) or post-disaster (e.g. ability to recover).

| Indicator | Comments | References |
|-------------------------|---|---|
| Young at risk | The very young are at risk because they are dependent on others for care. | Buckle 2001; Buckle et al. 2001; Yelataysi et al 2009 |
| Elderly at risk | Elderly tend to be more frail, have more health issues and may be dependent on others for care. While individual older people may be fit and active, aggregate data show that the number of people needing assistance increases with age. | Buckle 2001; Buckle et al. 2001; Yelataysi et al 2009 |
| Single parents | Single parents may face the demands of dependant children but with no additional support. | Buckle et al. 2001 |
| Volunteering | People who undertake volunteer activity within their community are more likely to have social networks which can be of assistance in times of emergency by providing information, support and resources. | Maguire & Hagan 2007 |
| Income | Low income households may face more difficulty in recovering materially from a disaster. They may also be underinsured or uninsured. | Buckle 2001; Buckle et al. 2001; Insurance Council of Australia 2008; Yelataysi et al. 2009 |
| New to region | If a person has moved to an area in recent years, they may be unfamiliar with local environmental hazards and may be unaware of procedures for preparing for, or responsing to, an emergency. | Bushnell & Cottrell 2007; Li 2009 |
| Public housing | Socio-economic disadvantage is a requirement for receiving public housing and those who are disadvantaged are likely to have a variety of social and economic problems that may require additional support in an emergency situation. | Collins 2005; Cutter et al. 2003 |
| Education level | People with high levels of education are more likely to understand a range of information related to risk and preparation as well as warnings information. | Tobin 1999; Cutter et al. 2003; Insurance Council of Australia 2008 |
| Need assistance | People who identify that they have a need for assistance with self-care are likely to need help in an emergency, for instance with evacuation. | Buckle 2001; Buckle et al. 2001; Handmer 2006; Yelataysi et al. 2009 |
| Car ownership | People with no car access will be unable to evacuate themselves in an emergency. | Handmer 2006 |
| Insufficient English | People with limited English may find it more difficult to access or understand various emergency messages and information. | Buckle et al. 2001; Yelataysi et al. 2009 |
| Unoccupied dwellings | Absentee owners may not have high levels of engagement with the local community nor may they have the time to attend meetings or undertake full fire preparations on their property. | Canterford 2009 |

Table 6: Vulnerability indicators of relevance to demographic risk analysis of natural hazards

Source: McKenzie & Canterford 2018

The maps presented in figure 22 show some of these vulnerability indicators for Victorian coastal areas. The selection highlights indicators which may be relevant for particular geographical locations. For example, Bass Coast displays a high level of: older age groups; low income; and, need for assistance. These are likely to be related – older age groups will generally have lower income levels than those still in the workforce and need for assistance, on average, increases with age. Comparing this to the hazard maps suggests that flooding or sea level rise may be of particular relevance. More detailed analysis can be undertaken using these types of indicators.

While individual older people may be fit and active, aggregate data show that number of people needing assistance increases with age. Safety and evacuation issues are often heightened as people move into elderly age brackets. Migration of retirees from urban to regional areas may create a need for education of these newcomers if they are unfamiliar with local hazards. This is important for emergency services as an older age profile can potentially limit volunteer resources as well as placing a relatively high proportion of people at risk.

Because many coastal areas attract retirees, ageing in place can lead to communities having older age structures. Examples along the Victorian coast include the Gippsland Lakes communities of Paynesville and Raymond Island, each having 18 percent of their population aged 75 years and over in 2016 compared to the Victorian average of 9 percent in this age group. Shoreham (19%), Point Lonsdale-Queenscliff (18%) and Cowes (17.5%) also recorded very high proportions aged 75 years and over. Where coastal towns are predominantly older in age structure, there are particular issues regarding the preparedness and response to emergency events such as flooding and fire.

Figure 22: Selected indicators of population vulnerability, coastal Statistical Areas Level 2 (SA2), 2016



Source: DELWP unpublished data based on ABS census 2016

Population characteristics change over time. Hence patterns of vulnerability can also change over time. Sometimes changing characteristics occur because people move into or out of a community. Other changes occur within a population. Children may be born, increasing the number of infants in a community, or people may age in place, causing an increase in numbers of older people.

People are also increasingly mobile and this can create difficulties in knowing the size of a coastal population at a particular time of the year or day of the week. Most population measures are based on where people usually live or work, yet people can be highly mobile. For example, people may have more than one residence. The high proportion of unoccupied dwellings in coastal areas is indicative of the existence of many holiday homes which are usually unoccupied at the time of the Census which is held in winter, outside of peak holiday season.

Population mobility can present particular challenges for risk assessment and emergency management. Towns may vary in population size by a factor of four or five during particular seasons of the year. Popular visitor and holiday locations such as the Great Ocean Road region have particularly high fire risk. Planning for fire therefore requires an understanding of both permanent and part-time populations.

Summertime population peaks occur in coastal areas and this is also the period of highest fire hazard in Victoria. The impacts of bushfire events will be much greater during times of peak population. More people will be exposed to the hazard, and evacuation procedures are likely to be more difficult due to congestion. Safety education and evacuation plans can be difficult where people are highly mobile. Many visitors are likely to be unfamiliar with local hazards, risk-minimisation strategies, or emergency procedures and escape routes. While hazards such as flood, landslide and storm surge are not caused directly by humans (climate change notwithstanding), bushfires can be ignited by people and hence, high numbers of people in a location may increase ignition risk.

Population mobility and the attraction of coastal areas for those seeking to relocate (e.g. retirees and seachangers) can also create a relatively new population in some areas. If a person has moved to an area in recent years, they may be unfamiliar with local environmental hazards and may be unaware of local procedures for preparing for, or responding to, an emergency. Coastal areas with high proportions of newcomers are found in some metropolitan locations as well as in: Phillip Island; Geelong; Torquay; and, Ocean Grove-Barwon Heads.

5.4 Impacts of extreme events on populations

Extreme events such as bushfire and flood have the potential to have major impacts on communities. Victoria is prone to serious bushfires and coastal areas along the far west and east coasts, Otway Ranges and Wilsons Promontory display very high levels of fire hazard, as evidenced by the locations in which Bushfire Management Overlays are applied (figure 23). While these areas are all subject to the hazard, the risk to people varies because of the settlement concentration and visitation patterns. The Great Ocean Road region, for example, is one of the highest risk locations because of the proximity of towns like Lorne and Anglesea to the Otway Ranges, the high numbers of visitors to the region especially in summer months when fire risk is highest, and the road configuration which makes evacuation difficult.



Fig 23: Bushfire Management Overlay (BMO), Victorian coastal Local Government Areas 2018

It might be expected that the largest and most damaging bushfires would leave a legacy of population loss, yet this is not necessarily borne out by population data. The Ash Wednesday fires of February 1983 severely affected the coastal towns of Aireys Inlet and Anglesea. The Otways fire complex which affected these towns caused the loss of 3 lives and 729 houses (Victorian Government 1984, Annex. H).

Despite the devastation wrought by the fires, the impact on long-term population growth was surprisingly small (figure 24). Other towns affected by the Ash Wednesday fires, such as Cockatoo and Upper Beaconsfield in the Dandenong Ranges also showed this pattern of subsequent population growth (McKenzie & Canterford 2018. p. 7). The Black Saturday fires of February 2009 did not affect coastal areas, however, despite the even greater devastation wrought by these fires, the impacts on population growth in areas like Kinglake and Marysville were relatively small. While populations fell between the 2006 and 2011 Censuses, there has been subsequent recovery in population numbers.

Fig 24: Population change for selected towns affected by major bushfires, 1981 to 2016



Source: DELWP 2018b, Towns in Time

Flooding is also a common coastal hazard in Victoria. The Gippsland Lakes area has a history of major flood events due to its estuarine environment. Population data show little impact of these floods on total numbers (figure 25). In fact, population change in these areas is much more likely to be affected by age structure and migration patterns than by environmental events.

Source: DELWP 2018d



Fig 25: Population change for selected coastal towns affected by major floods, 1981 to 2016

Source: DELWP 2018b, Towns in Time

6. Conclusion

Levels of population concentration and growth along the Victorian coast are variable. Population growth is largely confined to areas within and near Melbourne, rather than along the entire coastline. This means that certain areas like the Bellarine and Mornington Peninsulas, Surf Coast and Bass Coast are likely to experience greater impacts from population than many other coastal areas.

The fact that Victoria has most of its coastal foreshore in public ownership also contributes to limited impact from settlement sprawl and planning regulations have helped to channel new development inland, rather than along the actual coastline. Nevertheless, resident populations are only one part of the coastal population story, with visitor populations often being much higher than resident populations especially in popular holiday locations such as the Great Ocean Road and parts of Gippsland.

In an increasingly mobile world, visitor populations (day visitors and overnight) are likely to present more challenges than residential populations. This is partly due to the scale of visitation and to the fact that it is often concentrated to particular areas and at particular times of the year or the week. Visitor populations may also present a challenge where education forms an important part of environmental protection and risk management. People who are unfamiliar with a particular area may be unaware of their potential environmental impact and may have little experience dealing with natural hazards such as fire and flood.

An issue that may increase in importance in the future is that of populations at risk of natural hazards along the coast. Victorian coastal areas have always faced risks of fire, flood and storm. But with concentrations of older age groups along the coast and increasing risk due to climate change, these risks may be faced by a larger number of people. Around Port Phillip Bay, population is becoming more concentrated through higher density residential development. Thus, more people will be exposed to coastal hazards in the future.

References

AAA Tourism 2012, unpublished tourist accommodation data, Melbourne.

ABS (Australian Bureau of Statistics), *Building Approvals Australia*, cat. no. 8731.0, Canberra.

ABS (Australian Bureau of Statistics), *Census of Population and Housing 2016*, Canberra.

ABS (Australian Bureau of Statistics), *Regional Population Growth Australia*, cat. no. 3218.0, Canberra.

Austadiums (Australian Stadiums and Sport) 'Phillip Island Grand Prix Circuit Crowds', website accessed 9/8/2018. http://www.austadiums.com/stadiums/stadiums_crowds.php?id=175

Buckle, P. 2001, 'Managing community vulnerability in a wide area disaster', *Australian Journal of Emergency Management*, 16(4): 13-18.

Buckle, P., Marsh, G. and Smale, S. 2001, *Assessing Resilience and Vulnerability: Principles, Strategies and Actions*, EMA Project 15/2000.

Bushnell, S. and Cottrell, A. 2007, 'Increasing community resilience to bushfire – implications from a North Queensland community case study', *Australian Journal of Emergency Management*, 22(2): 3-9.

Canterford, S. 2009, 'Demographic analysis' in Bushfire CRC, *Victorian 2009 Bushfire Research Response, Final Report.*

Canterford, S. 2011, 'Locating people spatially: 2006, 2010 and 2.36pm on Friday', *Australasian Journal of Regional Studies* 17(1): 46-59.

Collins, T. 2005, 'Households, forests and fire hazard vulnerability in the American west: a case study of a California community', *Environmental Hazards*, 6(1): 23-37.

Cutter, S., Boruff, B. and Shirley, W. 2003, 'Social vulnerability to environmental hazards', *Social Science Quarterly*, 84(2): 242-261.

DEDJTR (Department of Economic Development, Jobs, Transport and Resources) 2018a, *Victoria's Tourism Regions* map, Victorian Government, Melbourne.

DEDJTR (Department of Economic Development, Jobs, Transport and Resources) 2018b, *Phillip Island Tourism Summary, year ending March 2018,* Factsheet published by the Tourism Events and Visitor Economy (TEVE) Research Unit, July 2018.

DEDJTR (Department of Economic Development, Jobs, Transport and Resources) 2018c, *Great Ocean Road Tourism Summary, year ending March 2018*, Factsheet published by the Tourism Events and Visitor Economy (TEVE) Research Unit, July 2018. DEDJTR (Department of Economic Development, Jobs, Transport and Resources) 2018d, *Gippsland Tourism Summary, year ending March 2018,* Factsheet published by the Tourism Events and Visitor Economy (TEVE) Research Unit, July 2018.

DEDJTR (Department of Economic Development, Jobs, Transport and Resources) 2018e, *Geelong and the Bellarine Tourism Summary, year ending March 2018,* Factsheet published by the Tourism Events and Visitor Economy (TEVE) Research Unit, July 2018.

DEDJTR (Department of Economic Development, Jobs, Transport and Resources) 2018f, *Mornington Peninsula Tourism Summary, year ending March 2018*, Factsheet published by the Tourism Events and Visitor Economy (TEVE) Research Unit, July 2018.

DELWP (Department of Environment, Land, Water and Planning) 2018a, *Victoria's Marine and Coastal Reforms Final Transition Plan*, Victorian Government, Melbourne.

DELWP (Department of Environment, Land, Water and Planning) 2018b, Towns in Time, Land Use and Population Research, Victorian Government, Melbourne.

DELWP (Department of Environment, Land, Water and Planning) 2018c, *A Guide to Property Values Annual data and analysis from Valuer-General Victoria 2017*, Victorian Government, Melbourne.

DELWP (Department of Environment, Land, Water and Planning) 2018d, 'Bushfire Management Overlay', Vicmap ANZVI0803002864.

DSE (Department of Sustainability and Environment) 2006, *Coastal Spaces Landscape Assessment Study*, Victorian Government, Melbourne.

Handmer, J. 2006, 'American exceptionalism or universal lesson? The implications of Hurricane Katrina for Australia', *Australian Journal of Emergency Management*, 21(1): 29-42.

Insurance Council of Australia 2008, *Improving Community Resilience to Extreme Weather Events*.

Ipsos-Eureka Social Research Institute, 2012, *Coastal and Marine Environment Community Attitudes & Behaviour (Wave Four) Report*, prepared for Victorian Coastal Council, Ipsos Project: 11-000498-01 Melbourne.

Li, G. 2009, 'Tropical cyclone risk perceptions in Darwin, Australia: A comparison of different residential groups', *Natural Hazards*, 48(3): 365-382.

Maguire, B. and Hagan, P. 2007, 'Disasters and communities: Understanding social resilience', *Australian Journal of Emergency Management*, 22(2): 16-20.

Marine and Coastal Act 2018, No. 26 of 2018, authorised by the Chief Parliamentary Counsel, Victorian Parliament, Melbourne.

McKenzie, F, Martin, J. Paris, C. and Reynolds, J. 2007, 'Mobility and multiple residential dynamics in contemporary city regions', paper presented at State of Australian Cities conference Adelaide, December 2007.

McKenzie, F. and Canterford, S. 2016, *Demographics for Fire Risk Analysis. Regional Victoria and Peri-urban Melbourne*, Victorian Government, Melbourne and GeoScience Australia, Canberra.

McKenzie, F. and Canterford, S. 2018, *Demographics for Bushfire Risk Analysis. Regional Victoria and Peri-urban Melbourne*, Victorian Government, Melbourne and GeoScience Australia, Canberra.

SGS Economics and Planning 2007, *Impacts of Coastal Population Fluctuations*, report prepared for Department of Sustainability and Environment, Victorian Government. Melbourne.

Spenceley, A., Kohl, J., McArthur, S., Myles, P., Notarianni, M., Paleczny, D., Pickering, C. and Worboys, G. L. 2015, 'Visitor management', in G. L. Worboys, M. Lockwood, A. Kothari, S. Feary and I. Pulsford (eds) Protected Area Governance and Management, pp. 715– 750, ANU Press, Canberra.

The Age, 11/01/14, 'Record finish for winner at Lorne's Pier to Pub', article by Stephen Cauchi, accessed on- line 5 Nov<u>ember 2015. http://www.theage.com.au/</u>victoria/record-finish-for-winner-at-lornes-pier-to-pub-20140111-30no3.html.

Tobin, G. 1999, 'Sustainability and community resilience: the holy grail of hazards planning?' Environmental Hazards, 1(1): 13-25.

VCC (Victorian Coastal Council) 2014, *Victorian Coastal Strategy*, Victorian Government, Melbourne.

VCC (Victorian Coastal Council) 2013, *Population and Settlement along the Victorian Coast. Background Research Paper to inform the Victorian Coastal Strategy 2013*, prepared by Fiona McKenzie, Victorian Government, Melbourne.

Victorian Government 1984, *Report of the Bushfire Review Committee on Bushfire Disaster Preparedness and response in Victoria, Australia, following the Ash Wednesday Fires 16 February 1983,* Melbourne.

Yelataysi, S., Ozceylan, D., Fiedrich, F., Harrald, J. and Jefferson, T. 2009, 'A framework to integrate social vulnerability into catastrophic natural disaster preparedness planning'. In *Proceedings of TIEMS 2009 Annual Conference*, Istanbul, June 9th-11th.