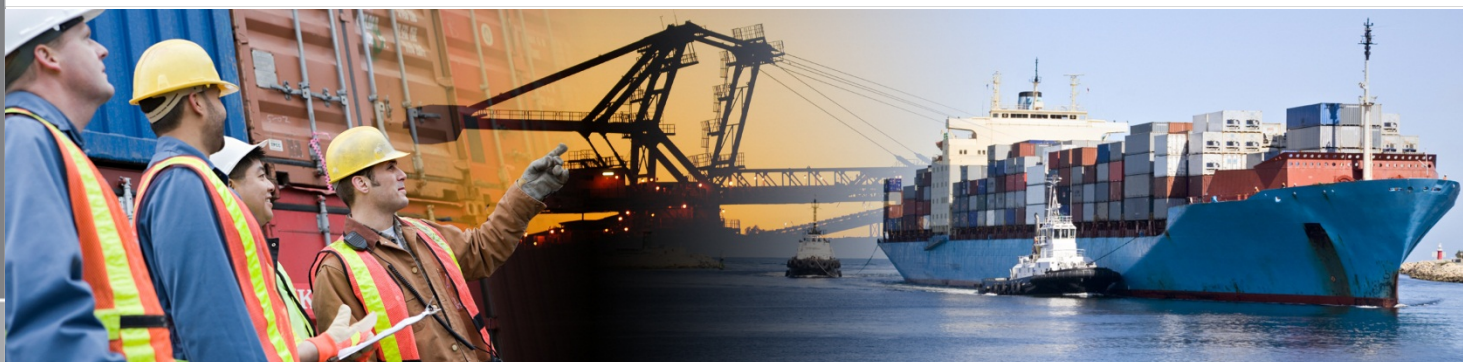




Australian Government

Department of Infrastructure and Regional Development

Bureau of Infrastructure, Transport and Regional Economics



Ports: job generation in the context of regional development

At a Glance

- Jobs and economic activity in and around a port vary with the type of port, industry structure of the region and the geographic scales being examined. This study uses the state governments' destination zones as a basis for defining port boundaries.
- European evidence suggests a positive impact from port activities on the regional economy. In a region with one million workers, an increase of one million tonnes of throughput was associated with an increase of around 400–600 jobs, spreading well beyond port areas.
- This information sheet departs from the traditionally broad approach of a port impact study. It focuses only on the jobs within port precincts.
- The ports in scope are 17 nationally significant ports, which were selected based on ship calls, throughput and international sea trade values. They include ports in major capital cities as well as some regional ports. Australia mostly imports containerised cargo and exports bulk cargo. Two types of ports were defined—Specialised Bulk Ports and Mixed Ports.
- The ABS census data is used to examine jobs located within the port precinct. In 2011, a total of 78 325 people worked at the 17 major port precincts. The three largest employing industries were Manufacturing (22 per cent of the jobs), Transport, Postal and Warehousing (19 per cent) and Construction (13 per cent). About 10 per cent of the jobs are specific port-related jobs in sub-industries such as stevedoring, water transport support, freight forwarding, warehousing and storage services, and customs agency services.
- Throughput at Australia's major ports varies depending on the port's type, role and function in the region. Between 2001–02 and 2011–12, Port Hedland, Dampier and Newcastle (Specialised Bulk Ports) dominated trade with the largest total throughput of 1490, 1444 and 1028 million tonnes, respectively.
- In 2011, the principal occupations of workers in the major port precincts are Technicians and Trade workers (23 per cent), followed by Machinery Operators and Drivers (17 per cent). The education profile of port workers is generally lower than the profile of Australian full-time workers. A large share of the port workers had Certificate level qualifications (35 per cent), followed by Year 11 or 12 schooling with no identified post-school qualification (20 per cent). A further 17 per cent had Bachelor Degree and higher level qualifications.
- Based on census 2011, the workers at the Specialised Bulk Ports tend to be younger (median age of 40 years), work longer hours (47 per cent work more than 49 hours per week), and earn a higher weekly income (averaging \$2089) than the workers at the Mixed Ports (\$1569). The average personal weekly income of full-time workers at both types of port is higher than the Australian average for a full-time worker (\$1344).

Introduction

This Information Sheet presents recent evidence on jobs at Australian ports. It examines 17 Australian major ports that are of national economic significance. These major ports are selected based on the level of activity as measured by ship calls (visits), throughput and the value of trade. Australia depends on the productivity and sustainability of its ports. Over 99 per cent of Australia's international trade relies on seaborne transport—through our ports—and around a quarter of the domestic freight task in terms of tonne kilometres is carried by ships (Ng et. al. 2013). This significant trade positions ports as well as the maritime sector and the broader transport industry as important generators of jobs. This study improves understanding of the nature of jobs located within port precincts. It examines the composition of all jobs within port precincts, not just those within the transport industry.

This Information Sheet is part of a set of BITRE studies which profile employment in and around significant transport infrastructure sites—airports, ports and transport hubs—in a series of three information sheets¹. By focusing on localised jobs, this study is narrower than a conventional port impact study, usually measuring the direct, indirect and induced impacts of port activity (along the supply chain) which extend well beyond the port precinct boundaries. In port impact studies, jobs generated is one of many impacts of a port.

Port Master Plans: a critical tool for development and analysis

'Australia's major ports sit within each of our major cities, largely as container ports, and as key economic centres in our regions as bulk commodity ports. They are large, immovable nodes that are the import and export hubs for Australia's tradeable resources. The need for long term planning of this infrastructure, and their relationship to economic activity and communities, is clear – as our economy and society continues to develop and expand, so too will the activity in and around Australia's ports.' (Infrastructure Australia, 2013, p.50).

Each port requires effective planning to achieve its goals as reflected in the aspiration set out in the port's master plan. Nationally, port operations and the related land side logistics chains are imperative to the competitiveness of Australian businesses (National Transport Commission, 2011). Yet in some cases, port strategic/master plans do not exist or remain as 'in-confidence' documents, implying a missed opportunity for engaging with all stakeholders.² Under current national ports and freight initiatives, priorities for action include realising best practice master plans. Port master planning is considered to be central to increasing productivity, investment confidence and environment protection, through improved land use planning and corridor protection in and around Australian ports. Spatial data on land use within a port master plan can address operational issues leading to improved productivity of a port (Ports Australia 2013). Master plans provide information to analyse opportunities for investment.

Port master plans help clarify and communicate the port vision and provide a strategic framework for port authorities. They are useful in considering internal and external factors impacting on current and future operations and for understanding the broader network concept beyond the port boundary. Given the diversity of operation of Australia's ports it can be expected that the level of detail of master plans will vary depending on location, scale of activities, economic drivers, and the way the port interfaces with the community. A master plan helps to engage with stakeholders (Ports Australia 2013). Unfortunately many of Australia's ports have yet to publish spatial data in their master plan. Infrastructure Australia identified that in 2013, despite the national ports and freight initiatives, only a small number of ports have a long term master plan³ with spatial data. A background study on 'Current port planning practice in Australia' (GHD 2010) noted that there were issues of transparency and accessibility in obtaining port plans in the public domain despite the ports' regulatory obligation.

This study has used some available master plans as a basis for defining port precincts alongside spatial data on land side *security regulated port* (SRP) zones. Details of the approach used to define port precincts are provided in the next section.

¹ See BITRE 2013a for airports, and BITRE 2014a, forthcoming for transport hubs.

² Infrastructure Australia and the National Transport Commission 2010, Background Paper 2 "Current port planning practices in Australia" April 2010

³ Infrastructure Australia 2013, National Infrastructure Plan.

Approach of the study

Key question

Historically, ports were the origin of many cities—providing links between places and trading partners, creating prosperity and urban growth (Ferrari et.al. 2012). Two questions arise. Are ports still relevant as drivers of urban growth? In particular, what is the role of ports as a generator of jobs? To address these questions, it is important for this study first to analyse the characteristics of jobs, industries and workers at port precincts as follows:

- Current employment in port precincts
- Types of employing industries in ports
- Occupational and educational mix of employed persons in ports
- Demographic characteristics of workers: age, status of employment, hours worked per week, and average weekly income.

At present there is a gap in knowledge about the types of economic activities and job generation capacity within port precincts. There are different types of port operations across Australia, which impact widely on job and worker profiles. The significance of filling in this knowledge gap is heightened because:

- Ports are seen as one of the catalysts for regional economic development—to generate jobs and attract economic activities. This is often a justification for public and private investments in port infrastructure and expansion.
- Understanding job and industry profiles and worker demographics can assist in planning for current and future ports as well as in harnessing regional development opportunities.

Aims

The main aim of the information sheet is to compile baseline data on jobs at nationally significant port precincts. A typology of ports is used to better understand the link between port activities and localised jobs. The study is expected to inform policy makers and various stakeholders, including port authorities and business operators—through evidence based analysis of port employment.

Methods, scope and data

Techniques for analysing employment impacts of ports vary depending on the type of port activity, regional characteristics, purpose of analysis and availability of data (Notteboom 2010). The approach used here to estimate employment within port precincts is a practical way to address the specific aim of understanding the magnitude and nature of jobs (Box 1) and workers at major Australian ports.

Box 1 Measuring port jobs

Jobs generated by a port include i) the number of workers employed directly at the port, ii) the number of jobs indirectly generated in the supply chain and iii) induced employment arising from expenditure by direct and indirect employees. Port impact studies are often not clear whether direct employment includes only direct maritime and port-service related jobs at the port or also includes all on-site jobs, such as jobs at a mining site located within the port boundary. The job estimates for Australian ports presented here take into account all jobs in the port precinct. They can be directly related to ports (*port-related jobs*) and also in transport and other industries within the defined boundary of a *port precinct*.

It is also often unclear whether port job estimates in many international studies are the raw sum of casual, part-time and full-time jobs or whether they have been converted to a full-time equivalent measure. Different methods of measuring job impacts of seaports raise an issue of comparability of jobs across ports. The port job estimates presented here are based on a count of employed persons who reported a place of work in the port precinct, irrespective of whether they are working on a full-time or part-time basis.

The analysis in the following section is focused on jobs that are located at the major port precincts. It does not attempt to capture all employment impacts, which include direct, indirect and induced jobs. It also does not aim to count employed persons in the broader maritime industry beyond the defined port precincts, as was done by Bowles (2011). Traditionally, port impact studies use a direct survey of ports and rely on national accounting systems for calculating trade volumes, industry purchase and sales, and industry employment (Boske and Cuttino 2003). In 2001, for example, the Bureau of Transport Economics⁴ conducted the Port Gladstone impact study, which estimated the direct effect of the port and the subsequent flow on effects to other sectors of the regional economy. Estimates of direct employment effects were based on a survey of 59 organisations involved in Gladstone port-related activities and input-output tables were used to estimate the flow-on effect to other industries in the region (BTE 2001).

Notteboom (2010) notes that there is not any standardised European-wide methodology to measure employment impacts of seaports. Many port authorities and government agencies in Europe produce their own port employment estimates. There is a great diversity in measurement methods including definition of a port's geographic boundary, data used, and also calculation method. The lack of availability of data is a significant challenge and impacts on the quality of research results as well as relative comparability. Each Port authority in Europe, for example, uses its own basis for estimating direct and indirect employment, and decides on its own concepts of geographic boundaries and economic activities. Lack of transparency and a standardised method result in scarcely any acceptance of the results by the stakeholders (Notteboom 2010; Doms 2012).

The current study departs from the traditional approach as it focuses on the jobs located at port precincts. A common census-based methodology enables estimates for the port precincts to be compared. The use of the ABS census data provides estimates of total jobs and port-related jobs at the port precinct. The estimates are conservative, replicable, and are not influenced by input-output tables and modelling assumptions.

Method

This study estimates jobs in port precincts using ABS census data for small areas, rather than by conducting a survey of port-related firms. A similar framework was used for the airport employment study which produced estimates of jobs at airport sites (BITRE 2013a). In the absence of formal port boundaries (accessible spatial port master plans), BITRE defines a *port precinct* by establishing boundaries through identifying Destination Zones (DZs) that encompass Security Regulated Port (SRP) zones and by taking into account land use data at the ABS mesh block scale.

Estimates of employment are based on a small scale geography (DZ) for which employment data is available from the ABS Census of Population and Housing 2011 through TableBuilderPro. The employment data is a count of the total number of employed persons who reported a place of work in the relevant DZs at the time of the census, irrespective of whether they are working on a full-time or part-time basis. The census employment data will differ from the estimates provided by port authorities, which will typically consist of average total persons employed by the authority. As each port authority has its own basis for calculating jobs, the number may not be comparable across ports.

BITRE used port's *land-side SRP zone* to locate the port site. The SRP comprises an area of port land to which access is controlled. This area, which may not necessarily connect into one contiguous land unit, is usually within the boundaries of a port facility or is land under the control of a port operator/port service provider. The boundaries of the port precincts were established by a GIS process of overlaying land-side SRP zones with the state governments' DZ boundaries for 2011 (available from the ABS)⁵. After identifying the relevant DZs where these restricted zones are located, the relevant land use data for ABS mesh blocks within these

⁴ In 2001 BITRE was known as the Bureau of Transport Economics (BTE).

⁵ DZs were developed by individual state and territory government transport authorities primarily for the analysis of commuting patterns and for the development of transport policy (ABS 2012). DZs vary in size. For example the Port of Darwin has a DZ of 0.4 square kilometres, whilst in Dampier it expands to 15,082 square kilometres.

DZs were examined to establish a DZ or set of DZs which provided a useful approximation to the broader port precinct.

These DZ-based port boundaries are referred to as port precincts. They contain the landside SRP zones for each port, as well as surrounding areas with port-related activities. In many cases, some surrounding rural, residential, industrial or parkland areas are also captured because the relevant DZ is relatively encompassing.

In regional areas, sometimes there is only one large DZ covering the entire land SRP zone but also picking up a much wider area surrounding the port, including residential, industrial, and agricultural and parkland areas. Care should be exercised when examining ports with a large land area, particularly for Dampier and Port Walcott ports in Western Australia. As employment data is not published at a more refined geographic scale than DZ, this means that the port employment estimates may capture a range of other activities, particularly Mining and Manufacturing. The detailed classification of DZs to ports is presented in Appendix A.

Scope

The ports in scope of this analysis are 17 nationally significant ports which were identified based on activity measures, namely ship calls or visits, throughput, and international sea trade values (the sum of inbound and outbound trade). Figure 1 shows the locations of the 17 major ports.

Figure 1 Australia's 17 major ports



These major ports include ports in major capital cities, as well as some regional ports which service regional areas. Some of the regional ports are dominated by specific bulk commodities (Port Hedland, Port of Dampier in Western Australia) whilst others are mixed use (the Port Kembla in New South Wales, Devonport in Tasmania and the Port of Townsville in Queensland)

The 17 major ports vary in their scale of operation and characteristics. The ports can be grouped into two types:

- **Mixed Ports** with a range of activities including servicing containerised, break-bulk or non-containerised cargo and sometimes also passenger ships.
- **Specialised Bulk Ports** with activity principally handling bulk cargo, often including mining and manufacturing activities on site.

Table 1 Seventeen in-scope major ports by type

<i>Mixed Ports</i>	<i>State/Territory</i>	<i>Specialised Bulk Ports</i>	<i>State/Territory</i>
Adelaide	South Australia	Dampier*	Western Australia
Brisbane	Queensland	Gladstone	Queensland
Burnie*	Tasmania	Hay Point	Queensland
Darwin	Northern Territory	Newcastle	New South Wales
Devonport*	Tasmania	Port Hedland	Western Australia
Fremantle	Western Australia	Port Walcott*	Western Australia
Geelong*	Victoria		
Melbourne	Victoria		
Port Botany/Sydney	New South Wales		
Port Kembla	New South Wales		
Townsville	Queensland		

Note: *BITRE's DZ based boundaries for these ports extend far beyond the port site. This will include a range of activities, industries and land uses. Job estimates for these ports should be interpreted with caution.

Source: BITRE analysis.

Data

The main data used is the ABS Census of Population and Housing 2011. The census data on employed persons by place of work was obtained from TableBuilderPro at the DZ and Statistical Area 2 (SA2) scale. The data was disaggregated by industry, based on Australian and New Zealand Standard Industry Classification 2006 (ANZSIC 2006) at the 1, 2, and 4 digit scale. The data was also disaggregated by a range of characteristics, namely, occupation, level of education, age, personal weekly income, status of employment, and hours of work. The analysis focuses on all jobs that are located in the port precinct, as defined previously.

Economic benefits of ports: review of literature

Ferrari et. al. (2012) suggest that economic impacts of port infrastructure are similar to other transport infrastructure. This relates to ports' crucial role within international trade flows—accounting for almost 80 per cent of total world trade. Port activities might have an even greater impact on regional economies when compared to other transport infrastructure as ports generate strong externalities in the case of hinterland areas in the United States (Clark et. al. 2004). However, the positive effects of port activities on the regional economy—particularly on jobs—have slowed down, including through changes in technology in shipping, such as containerisation and more capital intensive handling systems (Musso et. al. 2000).

Ferrari et. al. (2012) report a positive impact from port activities on the regional economy. It analysed 560 European Union (EU) regions between 2000 and 2006 and examined throughput for the main 116 ports. The study suggests a positive and significant impact of seaport activities on employment levels in the hinterland regions. Parameter estimates show that in a region with one million workers, an increase of 1 million tonnes of port throughput is associated with an immediate increase of about 400-600 jobs. The study also finds that port activities have a lower impact on service employment as port-related services are not necessarily localised in the port areas (Ferrari et. al. 2012). As argued by Merk et. al. (2011) high value added port-related employment is often centralised in metropolitan areas, rather than within a port precinct.

A recent OECD study on ports suggests that well-functioning ports are linked to many economic benefits, which include lower costs of trade, generation of employment and value added, as well as attracting other economic activities. It also finds that doubling the port efficiency of two trading countries will increase their bilateral trade volume by 32 per cent. An increase of one million tonnes of port throughput is also associated with an increase of 300 jobs in the trading region in the short term. Moreover, these benefits spill over to surrounding industries and firms. Less than 5 per cent of the economic linkages with suppliers take place in ports, with the larger share taking place in the main economic centres (OECD 2013a). The study also recognises three main models for cities benefiting from their ports:

- Maritime service clusters to attract relevant high value added services, such as maritime finance, consulting, law and engineering services.
- Industrial development around ports to be close to imported/exported resources and consumer markets.
- Waterfront development to capitalise on port and maritime heritage and as a catalyst for urban growth (OECD, 2013b).

Ports vary in their governance and operations, so the impact of port throughput on jobs depends on these characteristics, with private ports found to have a larger impact on regional employment (Ferrari et.al. 2012).

Australia's major ports

Australia's ports are crucial for its economy since over 99 per cent of its international cargo by weight passes through its seaports, totalling over 1.1 billion tonnes in 2011–12. Export dominates Australia's international sea trade by weight, consisting mainly of mining and agricultural products shipped in bulk. The rest is imports consisting of mineral fuels, passenger motor vehicles, machinery and transport equipment etc. The significance of ports is further indicated by the value of international cargo, with over A\$407 billion passing through ports in 2011–12.⁶

Australia mostly imports containerised cargo and exports bulk cargo. Bulk cargo mainly consists of coal, iron ore and grain exports. Recently, bulk cargo accounted for over 91 per cent of Australia's sea cargo by weight, whilst containerised cargo accounted for 6 per cent, and the rest was break bulk cargo⁷ (3 per cent). Over 90 per cent of containerised cargo is shipped through the top five capital city ports, particularly Botany Bay, Port of Melbourne and Port of Brisbane (ABS 2013).

Australia's international sea trade continues to grow. The sea freight for the last decade is shown in Figure 2 (by value) and Figure 3 (by weight). The seaborne international trade through the 17 major ports (as listed in Table 1) accounted for the majority of total Australian trade during the period of 2001–02 to 2011–12, ranging between 90 and 92 per cent by value and around 88 per cent by weight.

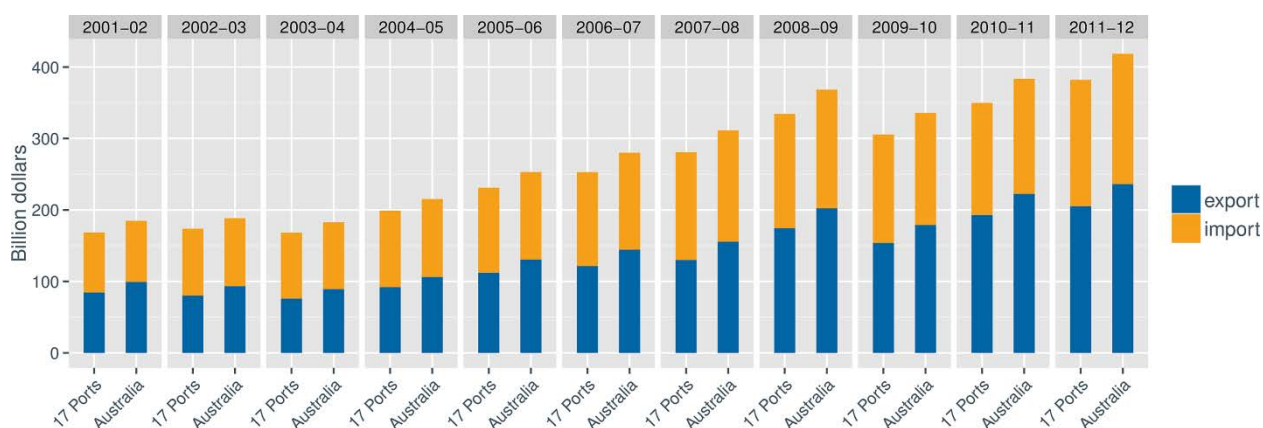
In 2011–12, a record high of \$418.5 billion worth of international cargo moved across Australian ports and \$382 billion of it was through the 17 major ports. This represented an average annual rate of growth in trade value of about 8.5 per cent for both Australia and the major ports between 2001–02 and 2011–12. In recent years, exports have accounted for over 53 per cent of the total value of Australia's international sea trade.

In 2011–12, in terms of weight, a record high 1.07 billion tonnes of international cargo moved across Australian ports and 0.94 billion tonnes of it was through the 17 major ports. This represented an average annual rate of growth of around 7 per cent each for both Australia and the major ports between 2001–02 and 2011–12. There was little change in the proportions of exports and imports of cargo by weight during the past decade.

⁶ ABS, International cargo statistics (unpublished).

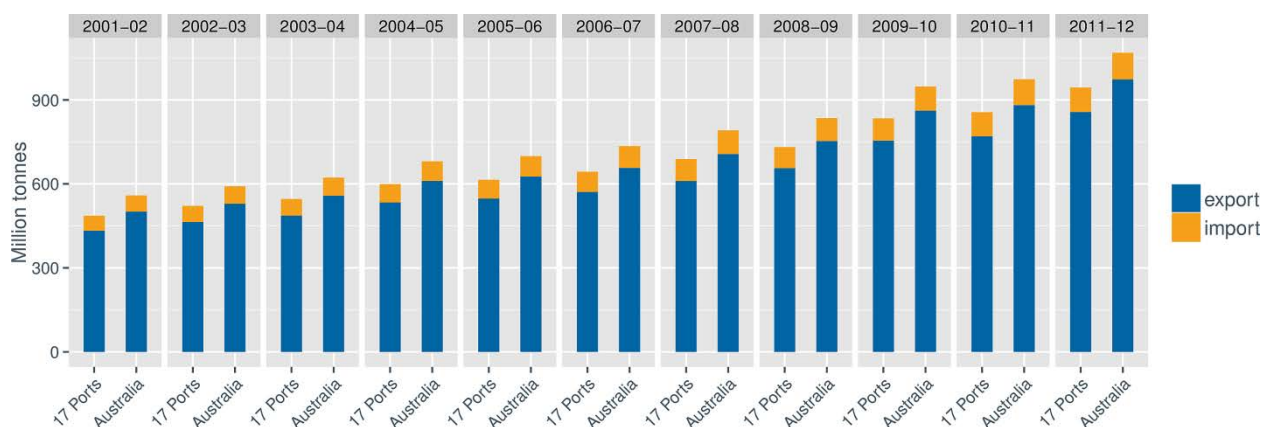
⁷ Break bulk cargo is general cargo which is loaded into ships as individual pieces and not containerised and nor it in the form of dry or liquid bulk. Examples include unpacked motor vehicles and heavy lifts and equipment (Shipping Australia 2012).

Figure 2 Value of international sea trade, Australia and 17 major ports, 2001–02 to 2011–12



Source: ABS, International cargo statistics, various years, unpublished data.

Figure 3 Weight of international sea trade, Australia and 17 major ports, 2001–02 to 2011–12



Source: ABS, International cargo statistics, various years, unpublished data.

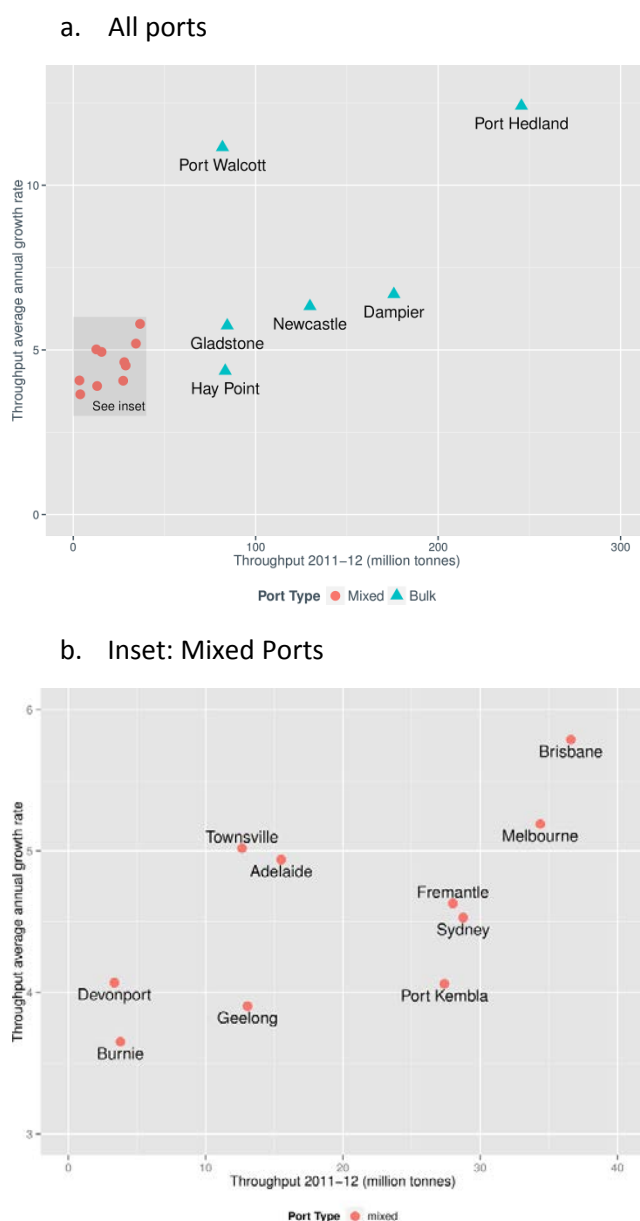
Throughput volume and growth

Throughput of the major ports varies depending on the port type and its role and function in the region. Between 2001–02 and 2011–12, Port Hedland, Dampier and Newcastle (all are Specialised Bulk Ports) dominated trade by volume, with the largest total throughput of 1490, 1444 and 1028 million tonnes, respectively.

Figure 4 shows a scatter plot of the ports throughput in 2011–12 and their average annual growth rates in the past decade (2001–02 to 2011–12). The big three Pilbara ports—Port Hedland, Port Walcott and Dampier (all with iron ore as a major export)—feature as high growth and high throughput ports. Port Hedland, in particular, stands out as a fast growing port with an average annual growth rate of 12.4 per cent and also had the highest throughput. Port Walcott has been growing at 11.2 per cent per annum, the second highest growth port, whilst Dampier had the second highest throughput in the country in 2011–12. The six specialised bulk ports dedicated to processing and exporting mining commodities of iron ore and coal typically show large volume and growth of throughput.

In the past decade, throughput for ports of Newcastle, Brisbane, Gladstone, Melbourne and Townsville grew at average rates between 5.0 and 6.3 per cent per annum. The ports of Adelaide, Fremantle and Sydney grew by less than 5 per cent per annum, with Burnie growing the slowest (3.7 per cent). Darwin is a Mixed Port which grew at the fastest pace (35.2 per cent per annum) over the decade; however it started from a very low base of throughput in 2001–02 (1.1 million tonnes), which was the lowest among the 17 major ports.

Figure 4 Throughput volume in 2011–12 and average annual growth rates in the past decade



Note: The average annual growth rates refer to the period 2001–02 to 2011–12. Port of Darwin is an outlier; it started with the smallest throughput and had the highest growth; it is not shown in the plot.

Source: BITRE analysis of ABS international cargo statistics, unpublished, and BITRE 2013, Australian Sea Freight.

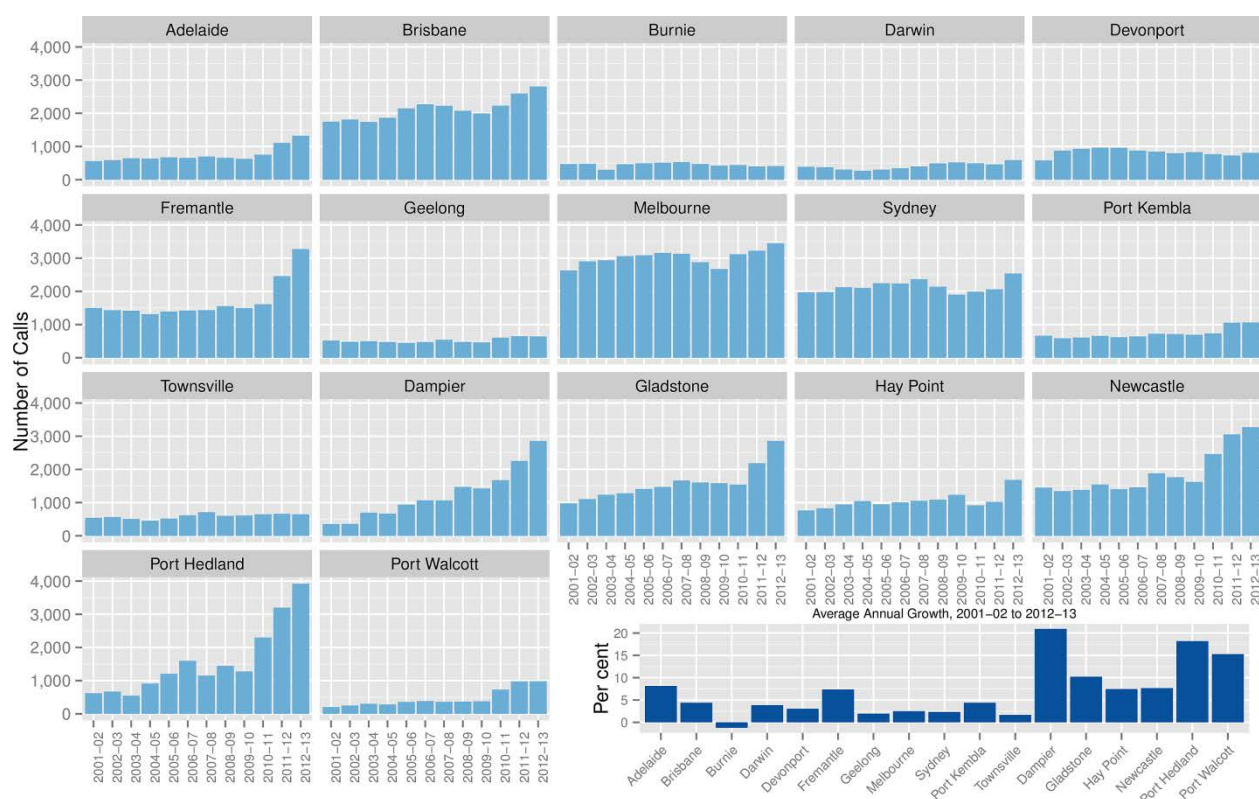
Factors influencing the number of ships visiting Australian ports—as suggested by the Productivity Commission (1991)—include:

- Availability of high technology cargo handling equipment
- Sufficient areas of cargo storage and assembly activity
- Good interfaces with no congestion in the connecting rail and road networks and/or the land transport modes (freight trains and trucks)
- One stop advanced port information systems: good coordination in planning and timely information exchange of supply chains by cargo owners
- Government policy settings and operational regulations (noise, light, and weight).

The top three ports with the highest number of port calls in recent years are Port Hedland, Port of Melbourne and Port of Newcastle, as shown in Figure 5. The ports with some of the highest average annual growth rates of port calls in the past decade (2001–02 to 2012–13) include Dampier, Port Hedland, and Port Walcott, which are Specialised Bulk Ports (see the last panel of Figure 5). Port of Burnie suffered fluctuation around a typically low number of port calls, resulting in a negative rate of growth. However, most ports increased the number of port calls throughout the period. The only exception was the year 2009–10

following the global financial crisis in late 2008, when demand generally dampened and many of the ports experienced a decline in the number of port calls.

Figure 5 Port calls by cargo and passenger ships and average annual growth rates, Major ports, 2001–02 to 2012–13



Source: BITRE analysis of Lloyd's List Intelligence Australian ship calls data, unpublished, various years.

Employment by industry

Seaports create direct employment which includes the jobs in which local firms provide goods and services, such as through cargo handling, ship operations and nautical and administrative services. These jobs mainly rely on port activities (Notteboom 2010, p.2). As previously described, difficulties in accurately capturing the major port boundaries impact on the degree of confidence in the estimates of jobs for individual port, so only 11 individual port results are presented here. The remaining six ports either have less than 5 per cent of port-related jobs; their boundaries encroach into residential areas or other jobs centres; or the identified area has land use patterns that are not compatible with port characteristics. For example, in 2011, the Geelong port precinct with an area of 6.7 square kilometres contained 2984 jobs. However, less than 4 per cent of the jobs are in port-related industries with the majority of the jobs in the Manufacturing industry (60 per cent). Port Hedland, Port Walcott, Dampier, Geelong, Burnie and Devonport are combined as the 'Other six major ports' in Table 2.

Table 2 presents estimates of the number of persons employed in 2011 at the major port precincts (11 individual ports and six combined ports), based on ABS census data. The 11 port precincts have an employment total of 49 375 jobs and the other six ports have a combined total of 28 950 jobs, resulting in 78 325 jobs for the 17 major ports. The five largest employing ports with over 6500 jobs are the ports of Melbourne (9214 jobs), Gladstone (7435 jobs), Newcastle (6927 jobs), Brisbane (6763 jobs) and Port Kembla (6588 jobs). In contrast, the port of Townsville, with one of the smallest numbers of port calls in 2011–12 (658 ship visits) had a relatively small number of jobs in the port precinct (436 jobs).

The Transport, Postal, and Warehousing industry (1 digit scale ANZSIC) had the highest share of employment (53 per cent or 2090 jobs) in Port Botany (Sydney). The ports of Melbourne and Brisbane had the largest number of jobs in the transport industry (2321 and 2292 respectively). In contrast, the smaller ports with less activity, such as the ports of Townsville, Adelaide and Hay Point, show the lowest estimates of Transport, Postal and Warehousing jobs.

Port-related jobs reflect direct employment at the port precinct, mainly providing services to ports. The jobs depend on port activity and would disappear if the activity were to cease (Notteboom 2010). The port-related jobs (4 digit scale ANZSIC) comprise jobs in the following sub-industries:

- Shipbuilding and Repair Services
- Water Transport Support Services
- Stevedoring Services
- Port and Water Transport Terminal Operations
- Other Water Transport Support Services
- Customs Agency Services
- Freight Forwarding Services
- Other Transport Support Services
- Warehousing and Storage Services
- Grain Storage Services.

The proportion of port-related jobs at the ports of Hay Point, Sydney (Port Botany), Fremantle and Townsville is relatively high, at between 28 and 35 per cent (Table 2). In terms of the magnitude of port-related jobs, three large ports dominate with over 1000 jobs, namely the ports of Melbourne (1343 jobs), Sydney (1223 jobs) and Brisbane (1109 jobs).

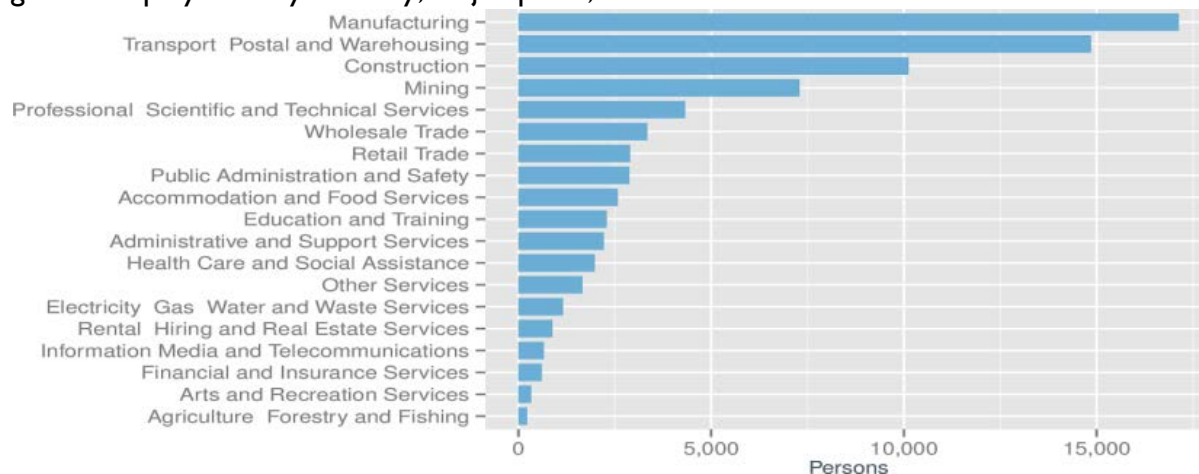
Table 2 Number of persons employed and port calls at selected major ports, 2011

Ports	Jobs in port precinct	Port-related jobs	Share of Port related jobs (per cent)	Transport, Postal, Warehousing (TPW) jobs	Share of TPW jobs (per cent)	Port Calls 2011–12
Melbourne	9 214	1,343	14.6	2 321	25.2	3 491
Gladstone	7 435	582	7.8	915	12.3	2 840
Newcastle	6 927	597	8.6	1 293	18.7	3 269
Brisbane	6 764	1,109	16.4	2 293	33.9	2 888
Port Kembla	6 588	359	5.4	910	13.8	1 067
Sydney	3 927	1,223	31.1	2 090	53.2	2 391
Adelaide	2 516	212	8.4	338	13.4	1 366
Fremantle	2 509	815	32.5	1 126	44.9	3 239
Darwin	1 918	192	10.0	583	30.4	525
Hay Point	1 141	319	28.0	370	32.4	1 392
Townsville	436	151	34.6	208	47.7	658
Other 6 major ports	28 950	669	2.8	2 407	8.3	9 067
Total 17 major ports	78 325	7 571	9.7	14 854	18.6	32 193

Source: BITRE analysis of ABS Census of Population and Housing 2011 data by DZ of work; Lloyd's List Intelligence, Australian ship movements (unpublished data).

In 2011, a total of 78 235 employed persons were estimated to work in the 17 major port precincts. Figure 6 shows how total jobs in port precincts are distributed across 19 industry classifications (ANZSIC 2006 1 digit level). The three largest employing industries at the major ports are Manufacturing (22 per cent of the jobs); Transport, Postal and Warehousing (19 per cent); and Construction (13 per cent). Mining is also a significant employing industry (9 per cent), followed by Professional, Scientific and Technical Services (6 per cent) and Wholesale Trade (4 per cent).

Figure 6 Employment by industry, major ports, 2011



Source: ABS Census of Population and Housing 2011 data by DZ of work.

Manufacturing is a major employing industry in the port precincts of Port Kembla (4413 employed persons), Brisbane (2052) and Geelong (1794). In Port Kembla, the main employing sub-industry is Primary Metal and Metal Product Manufacturing, covering 94 per cent of the total manufacturing jobs. The Bluescope Steel steelmaking plant is located at the port. The export of steel ceased by 2012, but production for the domestic market continues. The manufacturing jobs in 2011 included both activities. In the Brisbane Port, the manufacturing jobs are spread over a number of sub-industries, including Petroleum and Coal Product Manufacturing and Basic Chemical and Chemical Product Manufacturing. In the Geelong Port, the majority of employed persons in manufacturing worked in a range of sub-industries which are not necessarily related to the port, such as in Transport Equipment Manufacturing, and Textile, Leather, Clothing and Footwear Manufacturing.

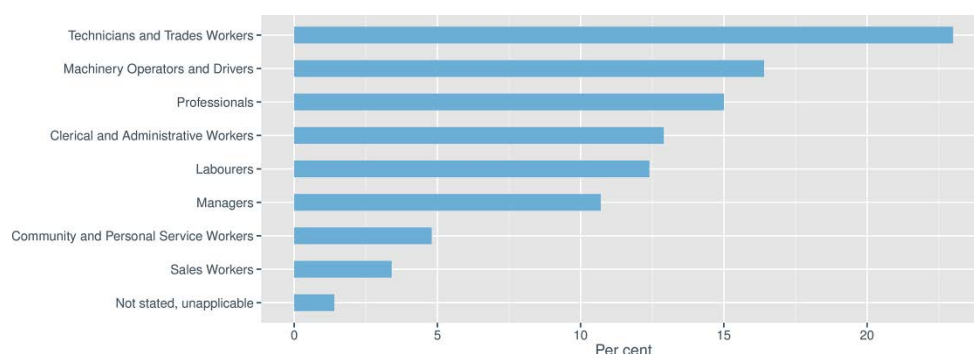
Demographic characteristics of workers

Total jobs in the major port precincts cover a range of industry divisions and port workers also have a mix of occupations and educational qualifications. Figure 7 shows two charts of jobs at the 17 major ports by occupational and educational qualification classifications in 2011. More than half of workers in the major port precincts are in three key occupations: Technicians and Trades Workers (23 per cent); Machinery Operators and Drivers (16 per cent); and Professionals (15 per cent). Labourers make up just over 12 per cent of the share of workers in the major ports, whilst Managers represent a slightly lower share (11 per cent).

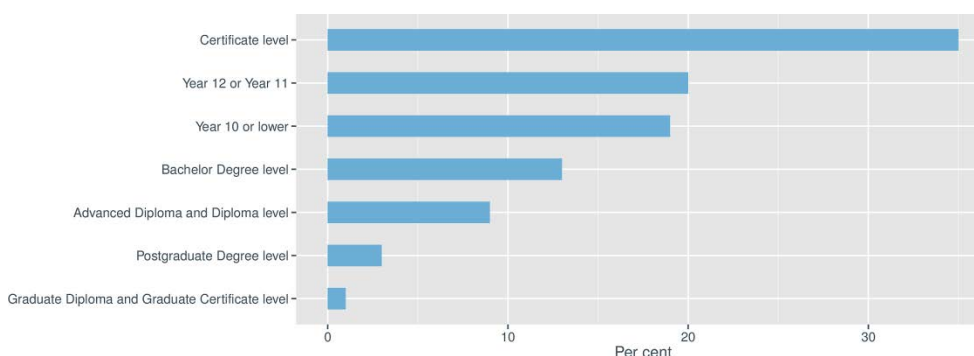
The education profile of port workers in the 17 major port precincts is generally lower than the profile of Australian full-time workers. The port workers with post-school qualifications that fall within the Australian Standard Classification of Education (ASCED) were: 35 per cent had Certificate level qualification, while 17 per cent had Bachelor Degree level or higher qualifications, and 9 per cent had Advanced Diploma or Diploma level qualifications. The equivalent education qualification shares for Australia are 35 per cent, 29 per cent and 10 per cent respectively. Around 20 per cent of the port workers completed Year 11 or 12 schooling, while 19 per cent completed Year 10 or less (and had no identified post-school qualifications).

Figure 7 Occupational and educational qualification mix of workers, major ports, 2011

a. Occupation



b. Education



Note: Refers to highest educational qualifications. Those assigned to Year 12 or Year 11, and Year 10 or lower categories had no identified post-school qualifications.

Source: BITRE analysis of ABS Census of Population and Housing 2011 data by DZ of work by occupation and education level.

Mixed and Specialised Bulk Ports

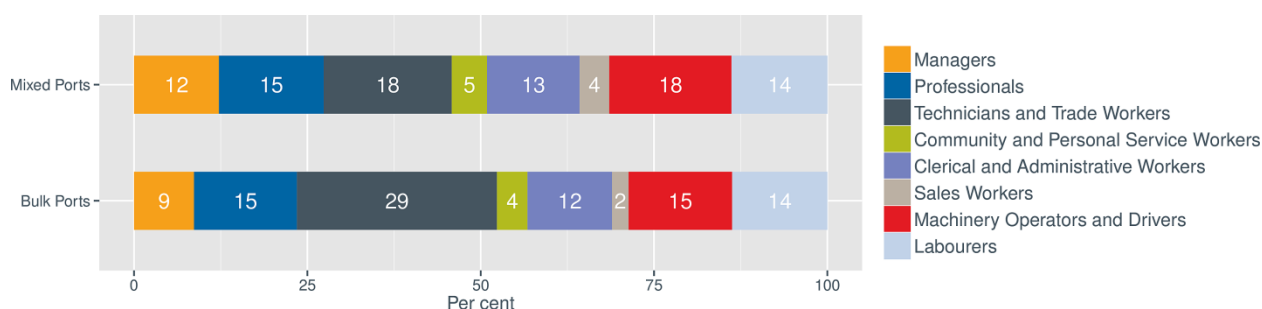
The six Specialised Bulk Ports that dominate the export task form two distinct categories: Port Hedland, Dampier and Port Walcott/Cape Lambert are mostly iron ore ports, while Newcastle, Hay Point and Gladstone are mostly coal ports (BITRE 2013b). Specialised Bulk Ports—in contrast to containerised ports—typically cover a processing task, such as crushing, screening or blending iron ore or coal, in addition to other port activities. The rest of the major ports are Mixed Ports, which are mainly containerised ports. The different specialised activities of the different types of port are reflected in the skills and demographic characteristics of the employees.

Focusing on the two types of port—Mixed and Specialised Bulk Ports (Bulk Ports for short)—among the 17 major ports, Figure 8 shows the occupational and educational qualification mix of port workers in these port precincts. In terms of occupation mix, Figure 8a shows the Bulk Ports had a larger share of Technicians and Trade workers (29 per cent) in the total workforce than the Mixed Ports (18 per cent). However, the Bulk Ports had a smaller share of Managers (9 per cent) and Machinery Operators and Drivers (15 per cent) than the Mixed Ports (12 per cent and 18 per cent, respectively). Both types of ports had similar shares of Labourers.

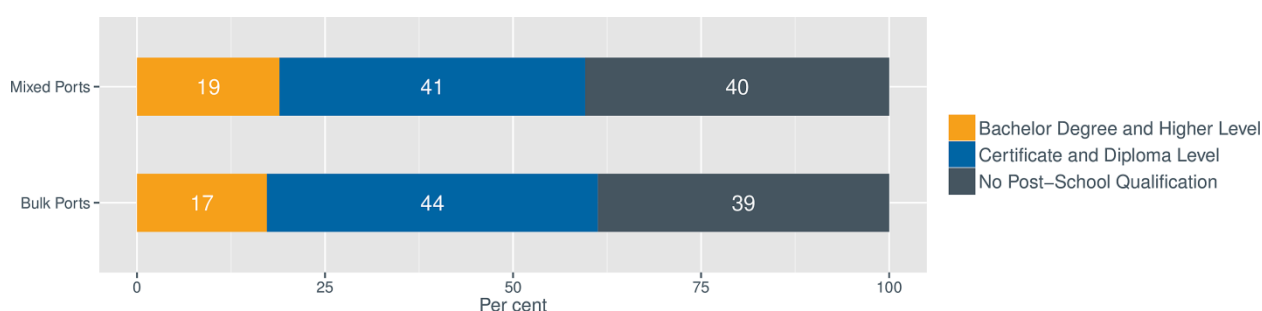
In terms of educational qualification in three broad categories (Figure 8b), the Bulk Ports had a smaller share of employees with Bachelor Degree and higher qualifications (17 per cent) than the Mixed Ports (19 per cent). However, the Bulk Ports had a larger share of employees with Certificate or Diploma/Advanced Diploma level qualification (44 per cent) than the Mixed Ports (41 per cent).

Figure 8 Occupational and educational qualification mix of workers at Mixed and Bulk Ports 2011

a. Occupation



b. Education



Source: ABS Census of Population and Housing 2011 data by DZ of work, by occupation and education.

Table 3 presents demographic characteristics in 2011 for the workers of the Mixed and Bulk Ports. It also provides statistics for workers in 11 individual major ports, covering median age, median personal weekly income, the proportion that have full-time employment status and the proportion who work long hours (more than 49 hours per week).

The median age of the Bulk Port workers tends to be younger (40 years) than the Mixed Port workers (42 years). The median age of Port Kembla workers is the oldest (45 years), followed by the port of Townsville (44 years), while the median age of port of Melbourne is the youngest (39 years).

The majority of port workers are employed full-time, ranging between 71 per cent and 93 per cent. The Bulk Ports had 88 per cent of their workers employed full-time, whilst the figure for the Mixed Ports was 83 per

cent. Both are higher than the Australian full-time employment share (68 per cent) as shown in Figure 9. The ports of Adelaide, Port Kembla and Sydney had the highest share of workers with full-time status (above 90 per cent).

Workers at the Specialised Bulk Ports tend to work longer hours, with 47 per cent of them working longer than 49 hours per week. The share of workers at the Mixed Ports who work these long hours is lower at 21 per cent; however it is still higher than the national share (17 per cent). Workers in the ports of Hay Point, Newcastle and Gladstone, all of them are bulk ports, had the largest proportion working long hours (more than 49 hours per week).

Table 3 Demographic characteristics of workers at Mixed and Bulk Ports, and selected major ports, 2011

	Median age (years)	Average personal weekly income (\$)	Share of full-time workers (per cent)	Share working more than 49 hours/week (per cent)
Mixed Ports	42	1 569	83	21
Bulk Ports	40	2 089	88	47
Adelaide	41	1 706	93	20
Brisbane	42	1 563	89	28
Darwin	40	1 505	87	27
Fremantle	43	1 622	79	20
Gladstone	40	1 657	83	29
Hay Point	42	2 042	89	39
Melbourne	39	1 578	81	22
Newcastle	41	1 618	85	30
Port Kembla	45	1 800	91	18
Sydney	43	1 576	91	22
Townsville	44	1 587	71	20

Note: There are six Bulk Ports, including the ports of Dampier, Port Hedland and Port Walcott, which are not shown individually. The figures for the Bulk Ports take into account all six ports, and so the Bulk Port totals can lie outside the range of the three reported Bulk Ports.

Source: ABS Census of Population and Housing 2011 data by DZ of work.

The different tasks, remoteness and skills of port workers affect their average weekly personal income. Despite the smaller shares of high skill occupations and educational qualifications in the Bulk Ports, these jobs require working longer hours, often away from home. Full-time workers at the Bulk Ports enjoy a large income premium—55 per cent more weekly personal income—over the Australian average income of \$1 344 for full-time workers⁸. The average personal weekly income of full-time Bulk Port workers is \$2 089. Workers at Bulk Ports also had higher average income than workers in the region (Statistical Area 4 or SA4) where the ports are located as shown in Table 4.

Table 4 Average weekly income, Bulk Ports and the region, 2011

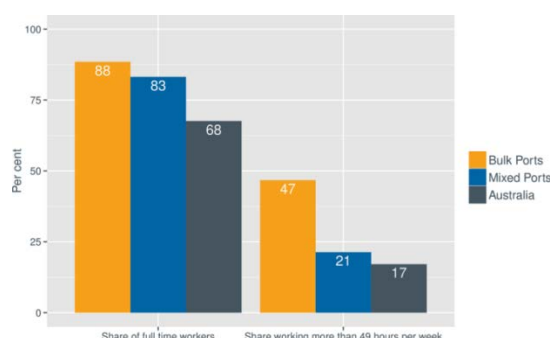
	Location	Income (\$)	Location	Income (\$)	Location	Income (\$)	Location	Income (\$)
SA4	Western Australia - Outback	1 674	Fitzroy	1 229	Mackay	1 323	Newcastle and Lake Macquarie	1 065
Port	Dampier	2 434	Gladstone	1 657	Hay Point	2 042	Newcastle	1 618
	Port Hedland	2 286						
	Port Walcott	1 808						

Source: ABS Census of Population and Housing 2011 data by DZ of work data.

The workers at Mixed Ports also enjoy a 17 per cent weekly income premium over the national average income of a full-time worker. The average income at Mixed Ports is \$1 569. Workers at Port Kembla had a relatively high average weekly income (\$1 800). In contrast, workers in the ports of Darwin, Brisbane, Melbourne, Sydney and Townsville had lower average weekly income (between \$1 500 and \$1 600).

⁸ BITRE estimated average income using midpoint income of each census income range, with negative, nil and not stated income responses excluded from the calculation and the “\$2000 or more” category assigned a \$3000 value (based on evidence from the ABS Survey of Income and Housing 2009-10 and ABS special tabulations of average census income).

Figure 9 Share of employees working full-time and long hours at Mixed and Bulk Ports, 2011



Source: ABS Census of Population and Housing 2011 data by DZ of work.

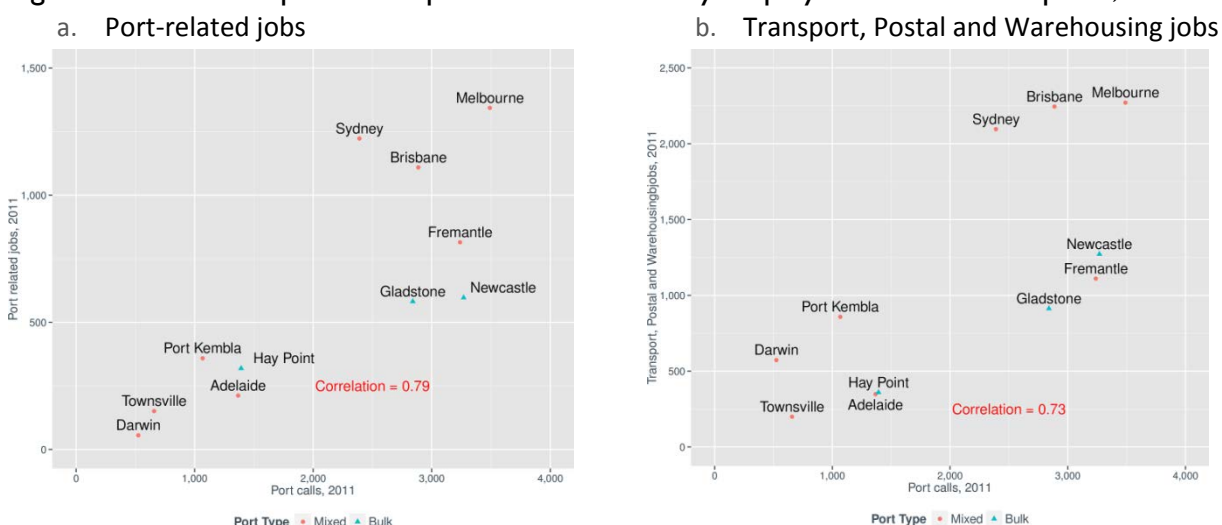
Relationship of throughput, port calls and jobs at the selected port precincts

This section focuses on examining the relationship of port activity measures (such as port calls and throughput) to the number of jobs that are located in the major port precincts. Throughput at the major ports varies depending on port type and the port's roles and functions in the region. The number of ships visiting a port (port calls) is a significant factor affecting trade volumes and shipping patterns, which connects to productivity of a port terminal (BITRE 2009). The number of port-related jobs, as defined previously, is expected to have a positive relationship with the number of port calls. These jobs relate to employment in port sites (such as in Water Transport Support Services, Stevedoring Services, Port and Water Transport Terminal Operations, Customs Agency Services, and Freight Forwarding Services).

As shown in Figure 10, the number of port-related jobs at the selected 11 port precincts is closely connected to port activity, as represented by the number of port calls. The first scatter plot shows a high positive correlation of 0.79 between port calls and port-related jobs. The second plot shows a slightly lower positive correlation of 0.73 between port calls and Transport, Postal and Warehousing jobs. The port of Melbourne appears in both charts as having the most port calls and the most jobs in the specified industry at the port precinct.

Port calls had a stronger positive correlation with the number of jobs in the specified industry at ports than did throughput. Throughput had a lower positive correlation with both the number of transport jobs and port-related jobs at the port precinct (just below 0.40). Particularly with Bulk Ports, the association of throughput and port-related jobs is not as strong. Compared to conventional general cargo, the handling of bulk cargo is less labour-intensive. Conventional general cargo is the largest generator of dock-related jobs (Notteboom 2010).

Figure 10 Relationship between port calls and industry employment at selected ports, 2011



Notes: Data on port calls in 2011 are for the calendar year and relate to 11 ports i.e., the ports of Adelaide, Brisbane, Darwin, Fremantle, Gladstone, Hay Point, Melbourne, Newcastle, Port Kembla, Sydney and Townsville. The job counts by place of work in 2011 are conservative, due to census under-enumeration, non-response and coding issues.

Source: BITRE analysis of ABS Census of Population and Housing 2011 data by DZ of work; ABS 2013, International cargo statistics (unpublished data); BITRE 2013, Australian coastal freight (unpublished data) and Lloyd's List Intelligence, 2013, Australian ship movements (unpublished data).

The major ports vary significantly in scale, geography, trade profiles, roles and governance, resulting in different activities within the port precincts. Table 5 provides a summary of port activities for the selected port precincts, covering total jobs in port precincts, port calls, throughput and the average annual growth rates of port calls and throughput for the past decade. In 2011–12, the ports of Melbourne, Newcastle and Fremantle had the most port calls among the selected major ports. In the past decade, the ports of Gladstone, Newcastle and Adelaide had the largest average annual rates of growth of port calls (between 7.1 per cent and 8.4 per cent), while the ports of Sydney (0.4 per cent), Darwin (1.7 per cent), Melbourne and Townsville (2.1 per cent each) had the lowest rates. The number of port calls and the rate of growth reflect competitiveness (port efficiency and connectivity), capacity and geographic position of ports.

In 2011–12, among the selected major ports, the Port of Newcastle had the highest throughput (130 million tonnes), followed by the ports of Gladstone, Hay Point and Port Kembla (over 82 million tonnes each). In the past decade, the ports of Darwin, Sydney and Port Kembla had the largest average annual growth rates (between 11.2 per cent and 35.2 per cent), while the ports of Hay Point and Fremantle had the lowest rates (4.4 per cent and 4.6 per cent, respectively) among the selected major ports.

In terms of jobs at the port precinct in 2011, the ports of Melbourne, Gladstone and Newcastle were the three largest employing ports, while the ports of Townsville, Darwin and Hay Point had the lowest number of jobs among the selected port precincts. The broader jobs in the port precincts may extend well beyond narrow port-related activity, and beyond the transport industry.

Table 5 Jobs at selected port precincts, port calls and throughput, 2011–12

Ports	Total jobs in port precinct	Port calls	Annual growth* Port calls (per cent)	Throughputs (million tonnes)	Annual growth* Throughput (per cent)	Area of precinct (square kilometre)
Melbourne	9 214	3 491	2.1	34	5.2	10.1
Gladstone	7 435	2 840	8.4	84	5.7	56.1
Newcastle	6 927	3 269	7.7	130	6.3	33.4
Brisbane	6 764	2 888	4.0	37	5.8	43.5
Port Kembla	6 588	1 067	4.8	27	11.2	12.7
Sydney	3 927	2 391	0.4	29	12.4	3.6
Adelaide	2 516	1 366	7.1	16	4.9	6.8
Fremantle	2 509	3 239	5.1	28	4.6	2.9
Hay Point	1 141	1 392	3.0	83	4.4	102.3
Darwin	814	525	1.7	11	35.2	1.2
Townsville	436	658	2.1	13	5.0	3.7

Notes: *Average annual growth refers to a period between 2001–02 and 2011–12. Port calls and throughput data refer to financial year.

Source: BITRE analysis of ABS Census of Population and Housing 2011 data by DZ of work; ABS, International cargo statistics (unpublished data); BITRE 2013, Australian coastal freight (unpublished data) and Lloyd's List Intelligence, Australian ship movements (unpublished data).

More jobs surround ports

As suggested by the OECD (2013b), port and waterfront development covering industrial development, high value added services and activities surrounding ports, have been shown to encourage urban growth. Port performance varies and the benefit of a port may not necessarily be confined to the immediate areas adjacent to the port. A port's ability to generate jobs within and surrounding the precinct is often associated with a strong and coordinated long term planning framework in the port and urban area. Strength of ports is indicated by a strong inland network, such as the incorporation of inland freight distribution centres and terminals, as well as the existence of regional production systems and large consumption markets. Many international ports respond by creating logistics parks inside the ports, which is associated with Free Trade Zones (FTZs). FTZs emerge near load centres to achieve logistics integration and better serve the usually fragmented production and consumption systems (Notteboom and Rodrique 2005).

As Jong (2012) argues, the importance of ports for cities is no longer self-evident. There is an increasing competition for space between residential population and jobs, as well as port activities. The Australian coastline is under pressure with over 85 per cent of people living within 50 kilometres of the coast. Ports are also under pressure from intense urban growth so land for ports and freight centres is highly contested. Ports need well-connected networks of areas using a range of modes, including water, road and rail. But

most importantly, ports and freight infrastructure need to be integrated seamlessly into the urban context (Jong 2012; CSIRO 2013). A number of ports face local constraints that impair growth and efficiency, particularly the lack of land for expansion (Notteboom and Rodrique 2005). The following case study of the Port of Brisbane in Box 2 illustrates integration between port and urban master plans to achieve urban growth.

Box 2 Port of Brisbane: development within the Australia TradeCoast region

The case of Brisbane port illustrates the point of integrating master planning of the port with city-wide planning. The port is managed by The Port of Brisbane Pty Ltd (PBPL) under a 99 year lease from the Queensland government. Owned by Q Port Holdings, PBPL oversees the development and management of a range of land-uses, including industrial, transport operations, marine infrastructure, retail, commercial and environmental buffers on Brisbane Core Port Land.

The port is Queensland's largest multi-cargo port, with facilities for containers, general cargo, motor vehicles and bulk. The multi commodity port is a primary import port with total throughput in 2012–13 of 37.2 million tonnes. It also provides berthing for Australian naval vessels and is a gateway for the cruise industry.

The Queensland Port Strategy, which was released in May 2014, includes a mandatory requirement for key ports to have master plans. The master plan needs to consider the 'relationship beyond traditional port boundaries, operational, economic, environmental and social issues including supply chain connections and surrounding land uses'. Brisbane port is unique as its development plan has been integrated within a larger city plan. The concept of driving economic activities through the use of space around Brisbane port and the airport started in 1999 by developing the Australia TradeCoast (ATC) region. The ATC has been integrated in regional and urban planning as a main economic development area supported by transport infrastructure. It is a significant source of job generation in various industries, and an export and logistics hub.⁹

Within 15 years of its development, there were 32 industry precincts within the ATC region. Brisbane Airport is an important precinct with nine commercial precincts for activities such as freight warehousing and distribution centres. TradeCoast Central Precinct has 120 hectares of master planned industrial community and corporate office park. Business activities within the Australia TradeCoast region include around 1500 businesses with over 60 000 employees.¹⁰

The Port of Brisbane (Fisherman Islands) precinct is the primary location of the port operation. The port has 1047 hectares of land holdings and 999 hectares of wetland. The Brisbane Multimodal Terminal provides the interface between road, rail and sea transport. Major tenants include DP World, Patrick Terminals, Patrick Port Logistics, Australian Amalgamated Terminals, Sunstate Cement, Queensland Bulk Handling and Patrick Autocare. The port Central precinct is being developed to include a commercial and business retail precinct, providing facilities for the Port of Brisbane. Construction is underway to build wharves 11 and 12, which will be home to Brisbane Container Terminal Pty Ltd, a subsidiary of Hutchinson Holding Ltd. As trade and shipping grow, the port facilities are expected to meet demand for port services and other industrial development. The ATC is expected to continue as a major regional employment generator in the future. The combined port, industrial and trade development supported by current and future transport infrastructure will add to the current 60 000 jobs at the ATC.

Figure 11 shows the growth rate of activity between 2001–02 and 2011–02 for the selected ports, comparing it with the respective city rate of job growth between 2001 and 2011. The average annual rates of throughput growth are generally higher than the city average growth rates in the same period. Apart from the ports of Darwin, Sydney and Townsville, the average annual rates of port calls growth are larger than the rates of job growth in the relevant city.

The OECD (2013a) suggests the significance of partnerships as the key to success for port and freight protection:

'Alignment of planning is essential to resolve the port-city mismatch. Such an alignment guarantees that port and city mutually reinforce rather than oppose each other, and could take the form of common master plans and aligned land use planning.'

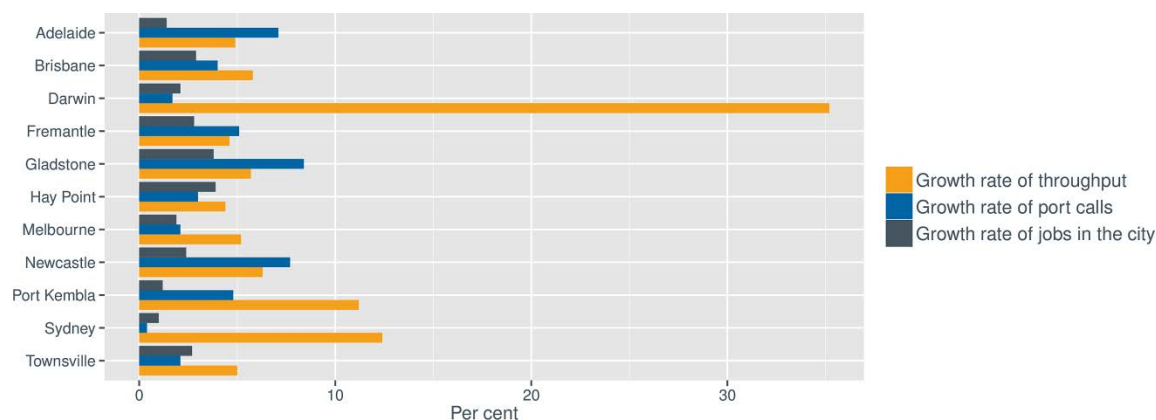
Policy alignment is dependent on different variables - the role of port authorities, functions of cities, the involvement of cities in their ports, the role of the national government, the involvement of the port in urban

⁹ South East Queensland Regional Plan.

¹⁰ Source: <http://www.australiatradecoast.com.au/the-region/land-development/>

development and finally the way in which strategic planning is used as mechanism to involve stakeholders.’ (OECD 2013a in Ports Australia 2014, p.26)

Figure 11 Growth rates of city, port calls and throughput for selected major ports, 2001–02 to 2011–12



Notes: The employment growth rate was calculated at the Statistical Division scale for capital cities and at the Local Government Area scale for the rest. Mackay was used for the port of Hay Point because of its proximity. Changes to DZ boundaries over time prevented an estimation of jobs growth in the selected port precincts.

Source: BITRE analysis of ABS Census of Population and Housing 2011 data by DZ of work; ABS International cargo statistics (unpublished data); BITRE 2013, Australian coastal freight (unpublished data) and Lloyd's List Intelligence, Australian ship movements (unpublished data).

Economic activities around ports—particularly the association, magnitude and type of jobs surrounding ports—can be explored by identifying the jobs within a *buffer zone*, defined as DZs within a 0.5 kilometre distance of the port precinct boundary. The jobs within the buffer zone may reflect activities connected with ports. Table 6 shows jobs within the buffer zone. Based on the 2011 place of work data, the buffer zones of the ports of Melbourne (70 432), Brisbane (42 886) and Newcastle (30 744) contained the largest number of employed persons. In these three ports, the number of jobs in the buffer zone was larger than the total port jobs, ranging between four to seven times as many jobs as were located in the respective port precincts. In these three cases, extending 0.5 kilometres beyond the port precinct boundary has captured part of an adjacent employment hub, such as the Brisbane Airport or the fringes of the central business district.

Table 6 Jobs in buffer zone of selected major ports and the top three employing industries, 2011

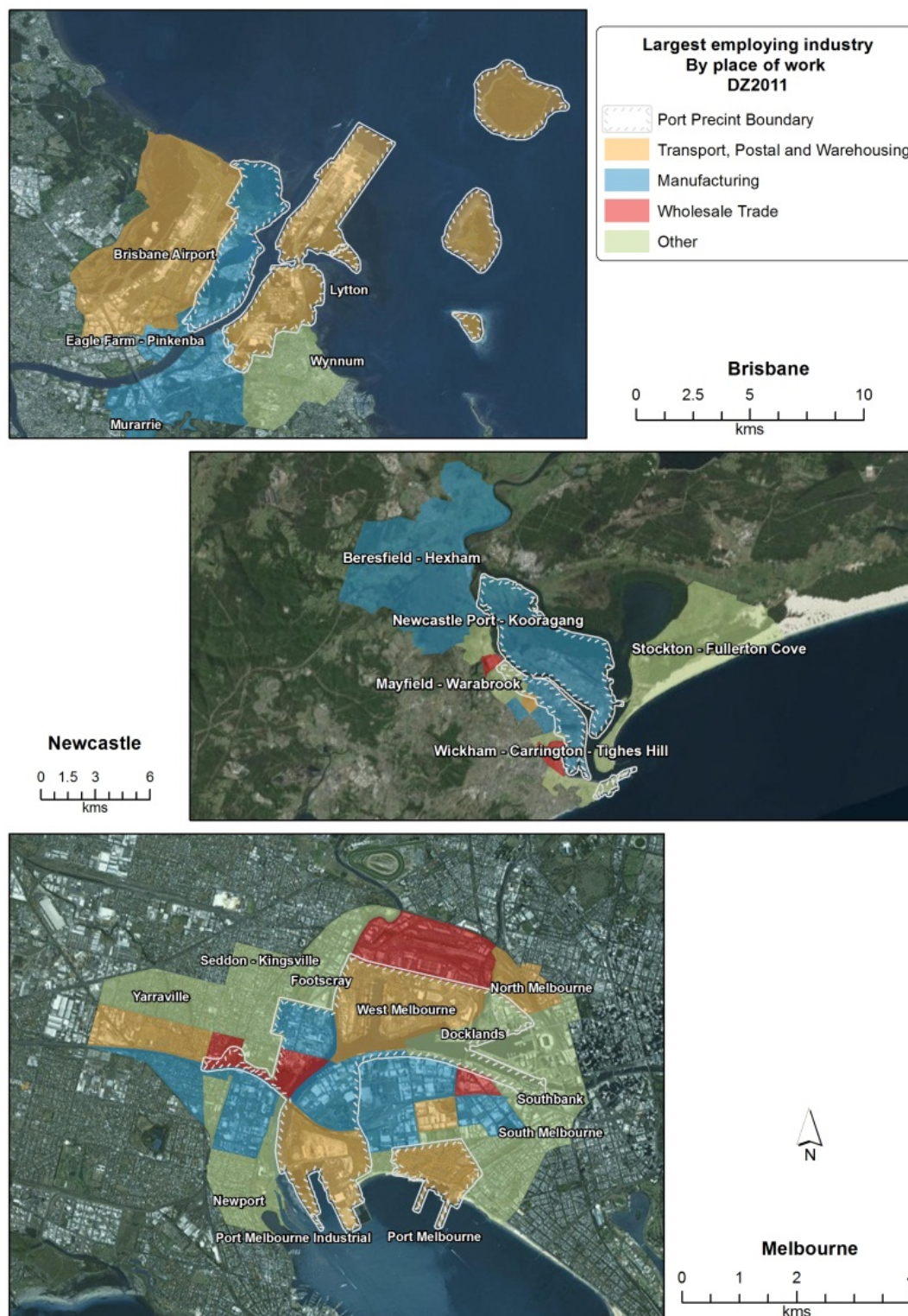
Port	Jobs in buffer zone	Largest employer	Employed persons	2nd Largest employer	Employed persons	3rd Largest employer	Employed persons
Adelaide	902	Manufacturing	316	Retail Trade	102	Professional, Scientific and Technical Services	98
Brisbane	42 886	Transport, Postal and Warehousing	10 063	Manufacturing	8 748	Retail Trade	3 366
Darwin	13 142	Public Administration and Safety	3 686	Professional, Scientific and Technical Services	1 313	Retail Trade	1 093
Fremantle	9 593	Accommodation and Food Services	1 464	Retail Trade	1 110	Public Administration and Safety	1 076
Gladstone	6 286	Manufacturing	1 119	Health Care and Social Assistance	876	Health Care and Social Assistance	805
Hay Point	3 400	Transport, Postal and Warehousing	710	Agriculture, Forestry and Fishing	538	Manufacturing	392
Melbourne	70 432	Financial and Insurance Services	13 623	Manufacturing	7 739	Professional, Scientific and Technical Services	7 671
Newcastle	30 744	Health Care and Social Assistance	3 945	Professional, Scientific and Technical Services	3 420	Public Administration and Safety	3 338
Port Kembla	20 929	Manufacturing	5 417	Construction	2 131	Retail Trade	1 940
Sydney	7 808	Manufacturing	2 169	Transport, Postal and Warehousing	1 564	Wholesale Trade	1 143
Townsville	11 845	Public Administration and Safety	2 435	Professional, Scientific and Technical Services	1 363	Accommodation and Food Services	1 338

Note: Job figures relate to 0.5 kilometre buffer zone only and exclude jobs located in the port precinct.

Source: BITRE analysis of ABS Census of Population and Housing 2011 data, by DZ of work.

Figure 12 illustrates the largest employing industry by port precinct and buffer zone—in the ports of Brisbane, Newcastle and Melbourne. Manufacturing and transport dominate as the largest employing industries within the port precincts and the buffer zones. Wholesale Trade is the main employing industry in a number of DZs.

Figure 12 Largest employing industry in port precincts and buffer zones within 0.5 kilometres distance, 2011



Source: BITRE analysis of ABS Census of Population and Housing 2011 by DZ of work. Service Layer Credits: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Both the Manufacturing and Transport, Postal and Warehousing industries show a significant number of employed persons in the buffer zones. For example, Manufacturing is the largest employing industry in the buffer zones of the ports of Adelaide (316), Gladstone (1119), Port Kembla (5417) and Sydney (2169). Transport, Postal and Warehousing is the largest employing industry in the buffer zones of the ports of Brisbane and Hay Point. Financial and Insurance Services is the largest employer in the buffer zone of the Melbourne Port, whilst for Newcastle Port it is Health Care and Social Assistance. Public Administration and Safety is the largest employing industry for the buffer zones surrounding the ports of Darwin and Townsville.

DZs in and around Brisbane Port have Transport, Postal and Warehousing and Manufacturing as the largest employing industries. Newcastle Port has only one DZ within its precinct and buffer with Transport as the largest employing industry, whilst seven DZs show Manufacturing as the largest employing industry and two DZs show Wholesale Trade as the largest employer. The DZs in and around Port Melbourne mainly have Transport, Postal and Warehousing and Manufacturing as the largest employers. Some DZs in and around the port have Wholesale Trade as the largest employing industry. The rest of the DZs further away from the ports show a range of largest employing industries, which are grouped as 'Other'.

Concluding remarks

There is a need for long-term planning of port infrastructure, and integrating this with metropolitan strategic planning, in order to improve the productivity of ports and the surrounding regional economies. Although the positive effects of port activity on the regional economy, particularly on jobs, has slowed down due to changes in technology in shipping infrastructure, the evidence on the number of jobs in the major port precincts and the surrounding buffer zones indicates that a port's ability to generate jobs remains important.

This information sheet presents recent evidence on jobs at 17 Australian major port precincts that are of national economic significance based on the level of activity as measured by ship calls, throughput and the value of trade. The ABS 2011 census-based employment data shows that a total of 78 325 people worked at the 17 major port precincts. The three largest employing industries were Manufacturing (22 per cent of the jobs), Transport, Postal and Warehousing (19 per cent) and Construction (13 per cent). About 10 per cent of the jobs are specific port-related jobs in sub-industries such as stevedoring, water transport support, freight forwarding, warehousing and storage services, and customs agency services.

Manufacturing is the largest employing industry and is most prominent at the ports of Port Kembla, Brisbane and Geelong. The type of manufacturing jobs in port precincts varies. Sometimes the manufacturing jobs are closely connected to the function of the port (for example, Port Kembla) and at other times the connection is less clear.

A common dataset and methodology enables estimates of total jobs and port-related jobs, the employing industries and the demographic characteristics of workers to be compared across the port precincts. A gap in the study relates to the lack of consistent data to estimate the growth of jobs over time in the port precincts. However, this information sheet has established a set of replicable port precinct boundaries, which can serve as a basis for future estimates of job growth at ports, when new census data becomes available.

Appendixes

Appendix A—Major Australian port precincts and buffer zones: geographical areas

Port	Port precinct DZ code 2011	Land use pattern	Area (km ²)	Buffer zone DZ code 2011
Adelaide	411001148	Parkland, Residential	6.8	411001147, 411001305, 411001308
Brisbane	310141822, 310361609	Parkland, Industrial, Education	43.5	310171820, 310201823, 310211821, 310211824, 310361608, 310371611
Burnie*	610771024	Industrial, Residential, Transport, Parkland, Hospital/Medical	2.2	610751001, 610771021, 610771022, 610771023, 610801108
Dampier*	512238050, 512238052	Parkland, Industrial, Residential, Commercial, Education, Hospital/Medical	15101.3	512248042
Darwin	710021124, 710021388, 710171189	Parkland, Industrial, Commercial,	1.2	710021037, 710021194, 710021302, 710081011, 710081085, 710081206, 710121116, 710151198, 710171908, 710381280
Devonport	610851039, 610861044	Residential, Parkland, Agricultural, Industrial, Education	22.8	610851040, 610871070, 610881081, 610891101, 610901103
Fremantle	511651170, 511651175, 511651177	Commercial, Parkland, Industrial, Residential	2.9	510341168, 511641173, 511651169, 511651174, 511651176, 511651178, 511651179, 511651180, 511651181, 511651182, 511651183, 511651185, 511651186, 511651187
Geelong*	210383169, 210383183, 210473168, 210473176	Residential, Education, Commercial, Parkland, Industrial, Transport	6.7	210383165, 210383167, 210383180, 210383181, 210383182, 210383189, 210473173, 210473174, 210473175, 210473220, 210473221
Gladstone	311971225, 311991228, 311991229, 312021235	Parkland, Residential, Industrial, Commercial, Education, Agricultural	56.1	311961236, 311981226, 311991227, 311991230, 312001224, 312031234, 312041231
Hay Point	313521181	Residential, Agricultural, Industrial, Parkland	102.3	313521182, 313521183, 313571180
Melbourne	211181074, 211181077, 211271104, 211311096, 213441423, 213521435, 211301175, 211311094	Parkland, Industrial, Transport, Residential, Commercial	10.1	211181075, 211181078, 211181079, 211181080, 211231107, 211231109, 211261076, 211271105, 211271106, 211301171, 211301177, 211301178, 211301179, 211311095, 211311097, 211311098, 211311172, 211311173, 211311174, 211311176, 211321186, 211321187, 213441418, 213441419, 213441420, 213441421, 213441422, 213481455, 213481456, 213481459, 213501434, 213501438, 213521425, 213521426, 213521427, 213521428, 213521429, 213521430, 213521431, 213521432, 213521433, 213521439
Newcastle	112276895, 112297006, 112306908, 112306909, 112306910, 112356958, 112309999	Industrial, Parkland, Commercial, Residential, Education	33.4	112236790, 112246940, 112276891, 112276892, 112276893, 112276894, 112297002, 112297005, 112297007, 112316841, 112316842, 112326988, 112356957, 112356959
Port Kembla	111337480, 111337481, 111337482	Industrial, Parkland	12.7	111227196, 111307499, 111307500, 111307501, 111307502, 111307503, 111307506, 111347460, 111347462, 111467345, 111497402, 111497403, 111497404, 111497405
Port Hedland*	512228041	Residential, Education, Hospital/Medical, Industrial, Parkland, Commercial	94.2	512188010, 512198040, 512208051
Port Walcott*	512238050	Parkland, Agricultural, Industrial, Residential, Commercial, Education	15082.0	512248042
Sydney/Port Botany	113201519, 113241534, 113241535, 113241536, 113249999	Industrial, Residential, Parkland, Transport	3.6	113201520, 113201521, 113211485, 113231501, 113501807, 113501808, 113501812, 113501814
Townsville	314881107	Parkland, Industrial	3.7	314881108, 314881109, 314901100, 314901102, 314901103, 314901104, 314911110

Notes: A DZ is identifiable by a 9 digit code. This comprises the State/Territory, SA2 and DZ identifier code. A DZ identifier is only unique within a state or territory. DZs do not have names. DZs are built from mesh blocks and aggregate to a subset of the ASGS regions. Mesh block land use category is not in any order.

*Employment estimates are not provided individually for these ports as the DZs extended well beyond the port sites, incorporating other job centres, agricultural, commercial, parkland and residential areas, so that data for the DZ based port precinct is not considered representative. Source: BITRE analysis of DZ, mesh block and SRP zone boundaries.

Appendix B—Profile of Ports

Adelaide

Port Adelaide, the principle port of South Australia, is situated on the eastern side of the Gulf of St Vincent, in the main shipping lane between the west and east coast ports of Australia, with entrance through the port from the Gulf of St Vincent. It is the main service point for shipping in South Australia and managed by Flinders Ports Pty Ltd (FPPL). The port consists of the inner and outer harbours and lies within the metropolitan area of the City of Adelaide (BITRE 2006).¹¹ Port calls have grown at an average annual rate of 7.1 per cent and throughput at 4.9 per cent in the past decade (2001–02 and 2011–12).

The Port Adelaide site was approximated by a single DZ for 2011. Based on 2011 Census data, the Adelaide port precinct is estimated to contain 2520 jobs. Manufacturing was the main employing industry (61 per cent) followed by Transport, Postal and Warehousing (13 per cent). Other significant industries at the port include Public Administration and Safety and Professional, Scientific and Technical Services (7 per cent each).

Brisbane

The Port of Brisbane is Australia's third largest container port and the largest multi-cargo port in Queensland, offering 29 operating wharfs with facilities for containers, general cargo, motor vehicles and bulk. The port spans over 7 kilometre of quay line between the Port of Brisbane and upriver facilities. It is situated at the mouth of the Brisbane River and managed by the Port of Brisbane Pty Ltd which is owned by Q Port Holdings. The top traded commodities by weight include coal, crude and refined oils, iron and steel, and cereal (Port of Brisbane 2013). Port calls grew at an average annual rate of 4.0 per cent and the rate for throughput was higher at 5.8 per cent in the past decade.

The Port of Brisbane site was approximated by two DZs for 2011. Based on 2011 Census data, the Brisbane port precinct was estimated to contain 6760 jobs. The Transport, Postal and Warehousing industry was the largest employing industry (34 per cent), followed by Manufacturing (30 per cent) and the Construction and Wholesale industries (8 per cent each).

Burnie

The Port of Burnie is situated on the western shore of Emu Bay. The Bay faces a northerly direction and offers 4 operating berths for bulk and non-bulk cargo. Export of forest product is one of the port's significant operations, although recently it experienced a downturn in global markets. The port area is located in front of the city on mostly reclaimed land and is the closest Tasmanian port to the mainland, which provides easy access for shipping.¹² Port calls had contracted at an average annual rate of –1.7 per cent, although throughput grew at the rate of 3.7 per cent in the past decade. Work on an \$8 million upgrade of the port started in March 2014.¹³

The Port site is far smaller than the identified DZ within which the port is located. The port site cannot be closely approximated by DZ boundaries for 2011. The DZ contains other mesh block-based land uses, including industrial, residential, transport, parkland and hospital/medical sites, and contains a large part of the town centre. The DZ containing the port was estimated to contain 1170 jobs, and covered more than twice the port area.

Dampier

Port Dampier is Australia's second largest bulk port and is located in the Pilbara region. The port is based on an off-shore island and is managed by the Pilbara Port Authority. The port activities are export-based and focus on dry bulk and energy commodities, with over half of the value of its commodities in iron ore, and the rest in energy based exports (condensate, LNG and LPG) and salt. Dampier's port facilities include some production and logistic operations such as Rio Tinto iron ore exports, Dampier Salt exports, Woodside Energy's Karratha Gas Plant and Woodside Energy's Pluto Gas Plant (BITRE 2013b). The international trade by value has been growing at an average annual rate of 13.8 per cent in the past ten years. Port calls grew at

¹¹ <http://www.qube.com.au/ports-and-bulk/facilities/adelaide-facility>; BITRE 2006, Working Paper 65.

¹² TasPorts Annual Report 2012/13.

¹³ ABC news, <http://www.abc.net.au/news/2014-02-02/burnie-port/5233150>.

an average annual rate of 20.4 per cent and the rate for throughput was lower at 6.7 per cent in the past decade.

The Port Dampier site is far smaller than the two large DZs within which it is located, which sprawl over 15 101 square kilometre. This port cannot be closely approximated by DZ boundaries for 2011. The two DZs cover a range of mesh-block-based land uses, including parkland, industrial, residential, commercial, education and water. The port precinct includes a large part of the town centre and also includes Port Walcott. The two DZs containing the port were estimated to contain 7900 jobs.

Darwin

The Port of Darwin is Australia's northern gateway. It is located within the dedicated East Arm logistics precinct and managed by Darwin Port Corporation. The port is expected to support major projects in the mining, oil and gas sectors, particularly with the construction of the second LNG plant in Darwin harbour. It is one of the fastest growing ports in Australia in the past decade (although it started at a lower base) with average annual rates of 19.2 per cent for the trade value and 35.2 per cent for throughput.

The Port site was approximated by three DZs for 2011. Based on 2011 Census data, the port precinct was estimated to contain 1920 jobs. Transport, Postal and Warehousing was the largest employing industry (30 per cent), followed by Wholesale Trade (12 per cent) and Public Administration and Safety (9 per cent).

Devonport

The Devonport facility offers services for cargo and passenger/cruise vessels. Most of its container trade comes from Melbourne. It is managed by the Tasmanian Ports Corporation, as are the other four Tasmanian ports—Burnie, Hobart, Bell Bay and King Island. They are in relatively close proximity and the distances around the island are small for containerised and break-bulk cargo, so there is an incentive for the ports to compete for trade. Port calls grew at an average annual rate of 2.3 per cent and the rate of growth for throughput was higher at 4.1 per cent in the past decade. In 2012, there were 731 ship calls and 44 per cent of them were passenger ships.

The Port site is a small part of the two DZs in which it is located, so cannot be closely approximated by DZ boundaries for 2011. The two DZs containing the port include the town centre and were estimated to contain 5020 jobs.

Fremantle

The Port of Fremantle is Western Australia's (WA) largest general cargo port, operating both Inner Harbour and Outer Harbour. It is managed by Fremantle Port Authority. The Inner Harbour, situated at the mouth of the Swan River, handles the majority of WA's containers, break-bulk, livestock and motor vehicles. The Outer Harbour, situated 20 kilometres south at Kwinana in Cockburn Sound, handles bulk cargo, comprising crude petroleum, wheat, alumina, refined petroleum and iron ore. The port experienced strong growth in trade for 2012–13, with total throughput increasing by 12.2 per cent from the previous year to a record 31.7 million tonnes. General and break-bulk cargo are handled at common user berths on North Quay and Victoria Quay, whilst liquid and dry bulk cargo are handled at Cockburn Sound—Kwinana. Kwinana Bulk Terminal is planned for major infrastructure upgrades with new export chutes on the jetty conveyor to increase the load out rates for coal and iron ore (Fremantle Port Authority 2013). Port calls grew at an average annual rate of 5.1 per cent and the rate for throughput was lower at 4.6 per cent in the past decade.

The port site was approximated by three DZs for 2011. Based on 2011 Census data, the port precinct (as represented by the three DZs) was estimated to contain 2510 jobs. Transport, Postal and Warehousing is the largest employing industry (45 per cent), followed by Education and Retail Trade (8 per cent each).

Geelong

The Port of Geelong's major facilities are located around the shore of Corio Bay, from Point Wilson in the north to Point Henry in the south. It is the second largest port in Victoria, with crude oil and petroleum products as the main trade, and also some grain, woodchips and fertiliser. There are 15 berths, including specialist and general cargo berths, with the refinery and tanker berths on the northern side of the port and the smelter berth on the southern side, near Point Henry. The general purpose berths, wharves, storage and processing facilities are located between the refinery and smelter. The port's major facilities are owned by

Ports Pty Ltd and managed by Geelong Port, whilst GrainCorp owns and operates a specialist grain pier.¹⁴ Port calls grew at an average annual rate of 2.2 per cent and the growth rate for throughput was higher at 3.9 per cent in the past decade.

The Port site represents a small part of the four DZs in which it is located and so it cannot be closely approximated by DZ boundaries for 2011. The DZs containing the port include the North Geelong industrial area with automotive, freight and transport, engineering and manufacturing plants, and also retail businesses (such as Target, Coles Group International, Cotton On Clothing). The four DZs were estimated to contain 9750 jobs.

Gladstone

The Port of Gladstone is located in the harbour of Port Curtis and is bounded by Curtis Island to the north and Facing Island to the east. The port consists of six main wharf centres covering 16 wharfs with break-bulk facilities at Boyne and Auckland Point wharfs. Auckland Point is operated by the Gladstone Ports Corporation and handles break-bulk, dry bulk, general cargo, as well as petroleum and chemical products. The port has additional activities processing coal and bauxite (aluminium ore) into aluminium. The principal coal facilities are the RG Tanna Coal Terminal and Barney Point Coal Terminal, which are common-user facilities with extensive landside coal facilities, operated by Gladstone Ports Corporation. Auckland Point expects increased activities as Curtis Island, off Gladstone, is developing facilities for LNG processing from coal seam gas to be exported by sea (BITRE, 2013b; Shipping Australia Ltd 2012). Port calls grew at an average annual rate of 8.4 per cent and the rate for throughput was lower at 5.7 per cent in the past decade.

The port site was approximated by four DZ for 2011. Based on 2011 Census data, the port precinct (as represented by the four DZs) was estimated to contain 7430 jobs. Manufacturing was the largest employing industry (19 per cent), followed by Transport, postal and warehousing (12 per cent) and Construction and Professional, Scientific and Technical services (9 per cent each).

Hay Point

The Port of Hay Point is situated adjacent to the Great Barrier Reef World Heritage Area and about 40 kilometres south of Mackay. The port is one of the largest coal export ports in the world and the second largest coal export port in Australia in 2012. It comprises Dalrymple Coal Terminal, which is leased from the Queensland government, and Hay Point Coal Terminal, which is owned by BHP Billiton Mitsubishi Alliance and operated by Hay Point Services. Both coal terminals service the mines in the Bowen Basin and have rail in-loading facilities, onshore stockpile yards and offshore wharves (Port of Hay Point 2013). Port calls have grown at an average annual rate of 3.0 per cent and the growth rate for throughput was higher at 4.4 per cent in the past decade.

The port site was approximated by a single DZ, which covered over 102 square kilometres with almost 90 per cent as agricultural land. Based on 2011 Census data, the port precinct as represented by this DZ, and was estimated to contain 1140 jobs. Transport, postal and warehousing was the largest employing industry (32 per cent), followed by Construction (18 per cent) and Mining (14 per cent).

Melbourne

The Port of Melbourne is Australia's largest Mixed Port for containerised, automotive and general cargo, with the highest number of ship calls in 2011–12, including cruise ship visits. The port and most of its related infrastructure extends westwards from the Bolte Bridge river crossing to the west bank of the Maribyrnong River and includes large parcels of land south of the West Gate Freeway (M1) around Webb Dock. Overall, the Port of Melbourne Corporation owns and manages around 510 hectares of port land with 34 commercial berths covering a total berth length of nearly seven kilometres. The port offers a number of multipurpose terminals handling both containerised, non-containerised, break bulk as well as liquid and dry bulk cargoes. It also serves the heritage-listed Station Pier as Victoria's cruise shipping gateway (Port of Melbourne Corporation 2013). Port calls grew at an average annual rate of 2.1 per cent and the growth rate for throughput was 5.2 per cent in the past decade.

¹⁴ Econsearch 2012, Geelong Port Economic Impact Study.

The port site has been approximated by eight DZs for 2011, covering just over 10 square kilometres. Based on 2011 Census data, the port precinct (as represented by the eight DZs) was estimated to contain 9210 jobs. Transport, Postal and Warehousing was the main employing industry (25 per cent), followed by Manufacturing (19 per cent) and Professional, Scientific and Technical services (9 per cent).

Newcastle

The Port of Newcastle is the world's largest coal export port, in addition to handling break bulk, liquid and dry bulk cargo and also some containerised cargo. It is an estuary port on the Hunter River, protected by two breakwaters. The main shipping channel is known as the South Arm or Steelworks Channel. The port is situated in the city of Newcastle and is managed by Newcastle Port Corporation. The port consists of four areas with each focused on a particular trade. Carrington, Mayfield and Walsh Point sites handle general as well as dry and liquid bulk cargo, whilst the Kooragang site focuses on coal. Coal has been central to the development of the port and the Hunter Valley. Between 2002 and 2012, coal exports from the port increased by 95 per cent to a record of 134 million tonnes in 2012. By 2012–2013 the total trade throughput reached 148.8 million tonnes. There are 20 berths within the port, with 9 of them allocated to coal and the rest are to general cargo. The expansion of Port Waratah Coal Services (PWCS) Kooragang terminal continued in 2012–13 (Newcastle Port Corporation 2013). Port calls grew at an average annual rate of 7.7 per cent and the throughput rate of growth was 6.3 per cent in the past decade.

The port site has been approximated by seven DZs for 2011, covering over 33 square kilometres. Based on 2011 Census data, the port precinct (as represented by the seven DZs) was estimated to contain 6930 jobs. Manufacturing was the main employing industry (24 per cent), followed by Transport, Postal and Warehousing (19 per cent) and Professional, Scientific and Technical Services (14 per cent).

Port Botany/Sydney

Port Botany in Sydney is one of the largest containerised port in Australia, situated in Botany Bay. It is the main service point for containerised shipping in NSW. Both the intermodal operations at Enfield Intermodal Logistic Centre (ILC) and the port have been managed by the NSW Ports Consortium since April 2013. The ILC plays an important part in the development of the intermodal network to increase the rail movement of containers through Port Botany. Construction of the second bulk liquid berth marine structure at the port was completed by 2012, allowing an increase in capacity as two vessels can berth at the same time (Sydney Ports Corporations 2012). Port calls have grown at an average annual rate of 0.4 per cent, with a much higher growth rate for throughput of 12.4 per cent in the past decade.

The Port Botany port site was approximated by five DZs for 2011. Based on the 2011 Census data, the port precinct (as represented by the five DZs) was estimated to contain a total of 3920 jobs. The Transport, Postal and Warehousing industry was by far the major employing industry (53 per cent), followed by Manufacturing, Wholesale Trade and Public Administration and Safety (9 per cent each).

Port Hedland

Port Hedland is situated in an inlet in the coastline, which is the Inner Harbour. The port is the world's largest bulk-export port; mainly exporting iron ore as well some bulk cargo including manganese and salt. The berths within the Inner Harbour include the berths at Finucane Island, Nelson Point, Burgess Point, Anderson Point, Utah Point and South West Creek. Most of the berths are able to service a larger class of bulk vessels. There are landside facilities at the port for stockpiling, blending and transferring of ores. The iron ore exported through Port Hedland is mainly mined by BHP Billiton and Fortescue, with mines being up to 425 kilometres away from the port (BITRE, 2013b). Port calls grew at an average annual rate of 17.8 per cent and the rate for throughput was 12.4 per cent in the past decade.

The port site has been approximated by one single DZ for 2011, which covered over 94 square kilometres of parkland and industrial land. Based on 2011 Census data, the port precinct (as represented by this DZ) was estimated to contain 5880 jobs. Mining was the largest employing industry (30 per cent), followed by Construction (20 per cent) and Transport, Postal and Warehousing (11 per cent).

Port Kembla

The Port Kembla terminals are situated in both the Outer Harbour and the Inner Harbour. Port Kembla services Sydney and regional NSW and is an important gateway for international trade for general and break-

bulk cargo, container and motor vehicles. Port Kembla Port Corporation is a NSW Government corporation responsible for the management of the port. The trade is mainly dominated by coal, coke and steel finished products, which are the principal break-bulk cargo. Port calls grew at an average annual rate of 4.8 per cent and the rate for throughput was higher at 11.2 per cent in the past decade.

The port site was approximated by three DZs for 2011. Based on 2011 Census data, the port precinct (as represented by the three DZs) was estimated to contain 6580 jobs. Manufacturing was by far the largest employing industry (67 per cent), followed by Transport, postal and warehousing (14 per cent) and Construction (5 per cent).

Port Walcott/Cape Lambert

Cape Lambert's port facility is situated within the administrative area of Port Walcott and is Australia's third largest iron ore port. The port has offshore berths linked by jetties. The port processes and exports iron ore from Rio Tinto's mining operations and Rio Tinto joint venture companies. The current Rio Tinto offshore facility is a 2.7 kilometre jetty with four berths in addition to landside facilities for stockpiling and other processing tasks. Port calls grew at an average annual rate of 16.9 per cent and the growth rate for throughput was 11.2 per cent in the past decade.

An attempt was made to approximate the port precinct using DZ boundaries for 2011. However the DZ that contains Port Walcott covers a land area of 15 082 square kilometres and also includes part of Port Dampier. As a result, Port Walcott cannot be adequately approximated using DZ boundaries.

Townsville

The Port of Townsville is a commercial port, situated 1360 kilometres north of Brisbane and adjacent to the Great Barrier Reef Marine Park. There are nine operational berths including a tanker berth. The port is managed by The Port of Townsville Limited, a statutory Queensland government owned corporation, whose responsibilities includes overseeing the port's commercial activities relating to its infrastructure and maintenance. The port supports the North West and North East Minerals Provinces, including Mount Isa and Greenvale nickel refinery and surrounding regional and agricultural industries. It is also a port of call for cruise ships and naval vessels. Located in relatively close proximity to Asian trading partners, it is a significant trade gateway for northern Australia. The port handles a diverse mix of commodities, particularly nickel ore, oil and petroleum imports, and also sugar and fertilizer exports (Port of Townsville, 2013). Port calls grew at an average annual rate of 2.1 per cent and throughput at a higher rate of 5.0 per cent in the past decade.

The port site has been approximated by a single DZ for 2011, covering some 3.7 square kilometres. Based on 2011 Census data, the port precinct (as represented by this DZ) was estimated to contain 440 jobs. Transport, Postal and Warehousing was the main employing industry (48 per cent), followed by Manufacturing (14 per cent) and Construction (11 per cent).

References

- Australian Bureau of Statistics (ABS) 2012, *Census of Population and Housing, Destination Zones, August 2011* (December 2012 release), Cat. 8000.0, ABS, Canberra.
- ABS 2013, *International cargo statistics* (unpublished data), Canberra.
- Bureau of Transport Economics 2001, *Regional Impact of the Port Gladstone*, Working Paper 47, BTE, Canberra.
- BITRE 2006, *Container and Ship Movements through Australian Ports 2004–05 to 2024–25*, Working Paper 65, BITRE, Canberra.
- BITRE 2009, *Australian container ports in an international context*, Information Paper 65, BITRE, Canberra.
- BITRE 2013a, *Employment Generation and Airports*, Information Sheet 46, BITRE, Canberra.
- BITRE 2013b, *Australia's bulk ports*, Research Report 135, BITRE, Canberra.
- BITRE 2014, *Major transport-based employment hubs*, Information Sheet (forthcoming), BITRE, Canberra.
- Boske L and Cuttino J 2003, Measuring the Economic and Transportation Impacts of Maritime-related Trade, *Maritime Economics and Logistics*, 5, pp.133-157, Palgrave Macmillan, Rotterdam, The Netherlands.
- Bowles M 2011, So just how many people are employed in the Australian maritime industry, *Australian Journal of Maritime and Ocean Affairs*, 2011, Vol. 3, No. 1, pp. 1-14.
- Clark X, Dollar D and Micco A 2004, Port Efficiency, Maritime Transport Costs, and Bilateral Trade, *Journal of Development Economics*, Vol. 75, No. 2, pp. 417-450.
- CSIRO 2013, *Our resilient coastal Australia* National Research Flagship Wealth from oceans, Canberra, in Ports Australia, 2014, Leading Practice: Ports and Supply Chain Protection.
- Department of Infrastructure and Transport 2011, *Stronger shipping for a stronger economy – Regulation Impact Statement*, A framework to revitalise the Australian shipping industry, 82 pp, DIT, Canberra.
- Dooms M 2012, Port economic contribution to local economy, *Port Economics*, European Union.
- EconSearch Pty Ltd 2012, *Economic Impact of the Port of Geelong*, Report prepared for Victorian Regional Channels Authority, Adelaide.
- Ferrari C, Merk O, Bottasso A, Conti M and Tei A 2012, *Ports and Regional Development: a European Perspective*, OECD Regional Development Working Papers, 2012/07, 30 pp, OECD Publishing, Paris.
- Fremantle Ports 2013, *Fremantle Ports Annual Report 2012*, 140 pp, Fremantle, Western Australia.
- GHD 2010, *Current port planning practices in Australia*, Background Paper 2 for NPS, Infrastructure Australia and National Transport Commission.
- Hall PV and Jacobs W 2012, Why are maritime ports (still) urban, and why should policymakers care? *Maritime Policy & Management*, Vol. 39, No. 2, pp. 189-206.
- Infrastructure Australia 2013, *National Infrastructure Plan*, Infrastructure Australia, Australian Government, 140.
- Jong C 2012 *Tools for successful long term planning of ports and cities: Amsterdam case*, presentation to Australia's ports and cities conference.
- Merk O, Ducruet C, Dubarle P, Haezendonck E and Dooms M 2011, *The Competitiveness of Global Port-Cities: The Case of Seine Axis* (Le Havre, Rouen, Paris, Caen), France, OECD Regional Development Working Papers, 2011/07, 117 pp, OECD, Paris.
- Merk O and Dang T 2013, The Effectiveness of Port-City Policies: a comparative approach, *OECD Regional Development Working Papers*, 2013/25, OECD, Paris.
- Musso E, Benacchio M and Ferrari C 2000, Ports and Employment in Port Cities, *International Journal of Maritime Economics*, Vol. 2, No. 4, pp. 283-311.
- National Transport Commission 2011, *National Ports Strategy*, Infrastructure for an economically, socially, and environmentally sustainable future, NTC, Melbourne.
- Newcastle Port Corporation 2013, *Newcastle Port Corporation 2012-13 Annual Report and the Media Release*, 9 August 2013, Newcastle, New South Wales.
- Ng A, Sun D and Bhattacharjya J 2013, Port choice of shipping lines and shippers in Australia, *Asian Geographer*, Vol. 30, No. 2, pp. 143-168.
- North Queensland Bulk Ports Corporation 2013, *Port of Hay Point Fact Sheet*, 4 November 2013, North Queensland Bulk Ports Corporation, Mackay, Queensland.
- Notteboom T E and Rodrique J-P 2005, Port regionalization: towards a new phase in port development, *Maritime and Policy Management*, Vol. 32, No. 3, pp. 297-313.

Notteboom T E 2010, *Dock labour and port-related employment in the European seaport system: Key factors to port competitiveness and reform*, Report prepared for European Sea Ports Organisation (ESPO), Brussels, Belgium.

OECD 2013a, *Competitiveness of Port Cities*, report of Working Party on Territorial Policy in Urban Areas, OECD, Paris.

OECD 2013b, *The competitiveness of Global Port-Cities: Synthesis Report* (Merk O, Ed.), OECD, Paris.

Ports Australia 2013, *Leading Practice: Port Masters Planning, Approaches and Future Opportunities*, Ports Australia, Sydney.

Ports Australia 2014, *Leading Practice: Ports and Supply Chain Protection, Current Practice & Future Opportunities*, Ports Australia, Sydney.

Port of Brisbane Pty Ltd 2013, *Shipping Handbook 2013/2014*, Port of Brisbane, Queensland.

Port of Melbourne Corporation 2013, *Annual Report 2012-13*, Melbourne.

Port of Townsville 2013, *Annual Report 2012-13*, Townsville

Productivity Commission 1991, *Port Authority Services and Activities*, Report 31, Australian Government Publishing Service, Canberra.

Shipping Australia Ltd 2009, *Break Bulk Shipping Study*, Shipping Australia Ltd, Sydney.

Shipping Australia Ltd 2012, *Snapshot of Break Bulk Shipping Study*, Shipping Australia Ltd, Sydney.

Sydney Ports Corporation 2012, *Annual Report 2011-12*, Sydney Ports Corporation, Sydney.

© Commonwealth of Australia 2014

ISSN 1440-9593

ISBN 978-1-922205-91-9

INFRA 2251 SEPTEMBER 2014

Creative Commons Attribution 3.0 Australia Licence is a standard form licence agreement that allows you to copy, communicate and adapt this publication provided that you attribute the work to the Commonwealth and abide by the other licence terms. A summary of the licence terms is available from <http://creativecommons.org/licenses/by/3.0/au/deed.en>.

The full licence terms are available from <http://creativecommons.org/licenses/by/3.0/au/legalcode>.

This publication should be attributed in the following way; Bureau of Infrastructure, Transport and Regional Economics (BITRE), Ports: Job generation in the context of regional development, BITRE, Canberra.

Acknowledgement

Prepared by Dr Catharina Williams. For further information on this publication please contact bitre@infrastructure.gov.au.

Use of the Coat of Arms

The Department of the Prime Minister and Cabinet sets the terms under which the Coat of Arms is used. Please refer to the Department's Commonwealth Coat of Arms and Government Branding web page <http://www.dpmc.gov.au/guidelines/index.cfm#brand> and in particular, the Guidelines on the use of the Commonwealth Coat of Arms publication.

Contact us

This publication is available in PDF format. All other rights are reserved, including in relation to any Departmental logos or trade marks which may exist. For enquiries regarding the licence and any use of this publication, please contact:

Department of Infrastructure and Regional Development
Bureau of Infrastructure, Transport and Regional Economics (BITRE)
GPO Box 501, Canberra ACT 2601, Australia

Phone: (international) +61 2 6274 7210

Fax: (international) +61 2 6274 6855

Email: bitre@infrastructure.gov.au

Website: www.bitre.gov.au