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Commuting across Perth and Peel: unpacking patterns, measures and policy implications

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Introduction

Since the 1950s, planners guided and directed the growth of Perth and Peel through various strategic plans. Initially, they aimed to accommodate economic growth and the Australian suburban dream of home and car ownership. However, later, they sought to address issues associated with rising commuting from the suburbs to Perth's central core through the distribution of employment growth vis-à-vis a metropolitan hierarchy of urban centres and the upgrading of transport and road services. All these strategies utilised employment self-sufficiency to benchmark commuting reduction and jobs/housing balance.

Nonetheless, commuting has continued to challenge the liveability and infrastructure efficiency of Perth and Peel – with the population rises of the most recent mining boom only intensifying pressures. Therefore, as in previous strategies, the contemporary *Directions 2031* (WAPC, 2010) and *Perth and Peel@3.5 Million* (WAPC, 2015) also identify employment self-sufficiency as a means to measure the equity of job distribution.

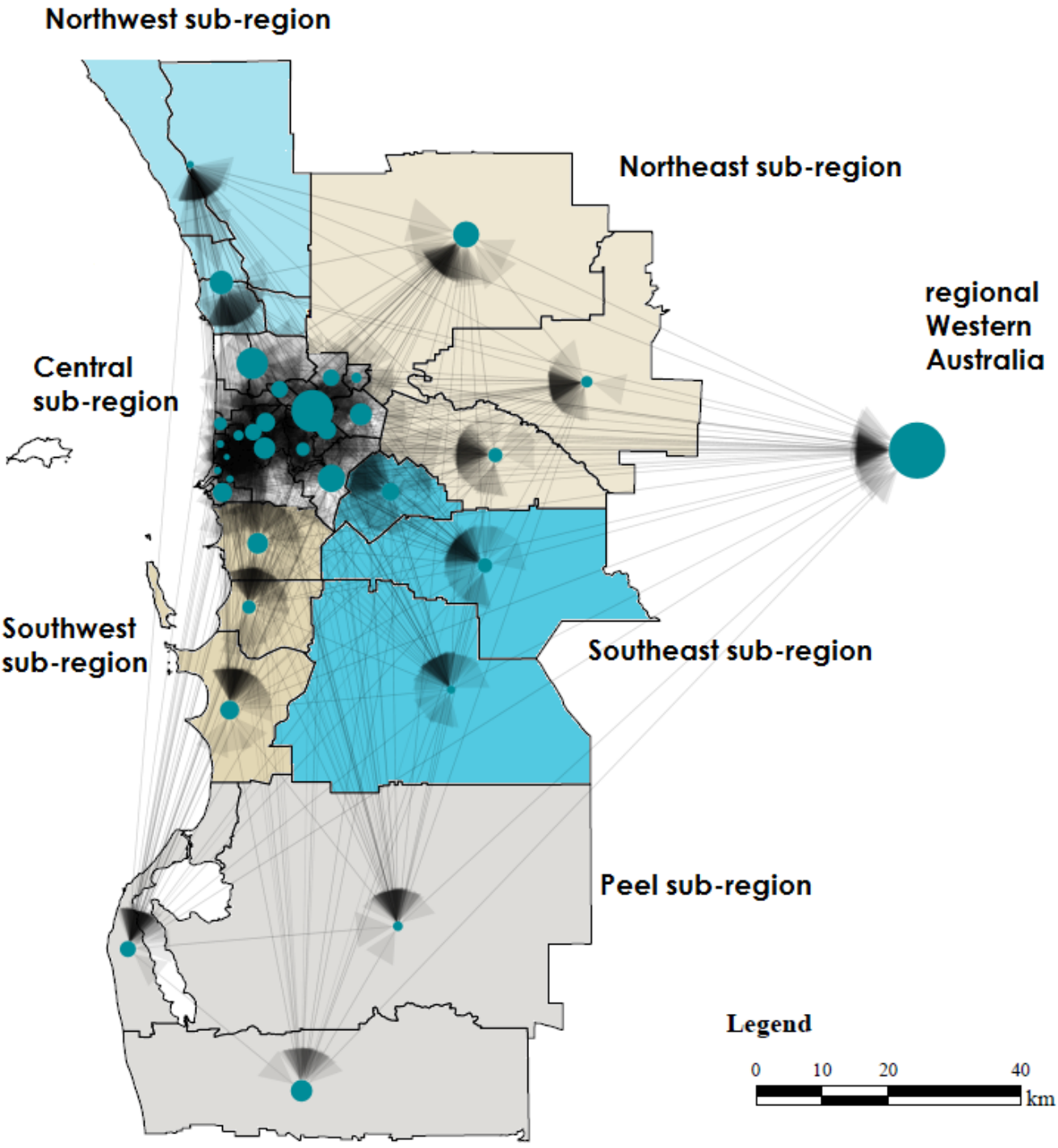
This FACTBase will examine inter-regional commuting[1] across Perth and Peel, including the large fly-in fly-out workforce living in the metropolitan area and working in regional Western Australia. It identifies key areas of employment using 2011 ABS place of work and place of residence data disaggregated by local government area (LGA) as well as by metropolitan Perth and Peel sub-regions. It then outlines three comparative ratios to benchmark the home and work relationship – jobs/housing balance, employment self-sufficiency and employment self-containment. These are computed for metropolitan planning sub-regions, and compared to the measure of employment self-sufficiency used in *Perth and Peel@3.5 Million*. It concludes with a summary of key findings and policy recommendations and the merit of current measurements in addressing commuting issues.

Commuting patterns

This section examines ABS 2011 employment commuting patterns across Perth and Peel by LGA. Overlain onto a map of the metropolitan sub-region, figure 1 identifies the number of jobs in each LGA by the size of the circles. Arrows indicate direction of flow, origin to destination LGAs, with their size representing numbers of commuters. The majority of commuters travel from outer sub-regions into the Perth Central LGAs and regional Western Australia, demonstrating limited outer sub-regional cross-flows. As such, figure 1 reflects the continued strong hub-and-spoke infrastructure development of Perth and Peel around the Central sub-region despite decades of activity centre planning in outer sub-regions.

1 Commuting is defined as inter-LGA or inter-sub-regional for the purpose of this FACTBase.

Figure 1
Metropolitan sub-region commuting by Local Government Area, 2011, size of arrows indicates number of commuters, size of circles is number of workers



Source: Adapted from ABS(2011)

With the actual number of jobs and workers in each LGA, Table 1 unpacks the broader commuting origin and destination story of figure 1. The top ten LGAs outside of Perth city for employment opportunities were: Stirling, Canning, Swan, Joondalup, Belmont, Wanneroo, Melville, Cockburn, Fremantle and Subiaco, as well as regional WA. LGAs having the least employment also had the lowest residential populations. These were primarily Perth's most wealthy suburbs (Martinus, 2014a, 2014b, 2014c), comprised of Peppermint Grove, Mosman Park, East Fremantle, Cottesloe and others Waroona, Serpentine-Jarrahdale, Murray, Claremont and Bassendean.

Perth city is the key commuting destination LGA in Western Australia, attracting by far the highest number of workers (123,440) compared to its resident working population (8,496). Other LGAs where the number of jobs outstrips resident worker numbers are: Belmont, Subiaco, Canning, Fremantle, Nedlands and Victoria Park.

Regional WA is also a key commute destination for Perth and Peel residents, providing just under 20,000 jobs. In contrast, key residential LGAs which have a higher working population than jobs are commuter origin LGAs. These are concentrated primarily in the Perth and Peel outer metropolitan areas of: Joondalup, Wanneroo, Gosnells, Rockingham, Armadale and Cockburn, as well as the inner metropolitan LGAs of Melville and Stirling.

Table 1
Total working population and jobs by LGA, 2011

LGA	Total jobs	Total resident workers	Excess jobs to resident workforce	LGA	Total jobs	Total resident workers	Excess jobs to resident workforce
Armadale	13,101	25,920	-12,819	Mosman Park	1,975	4,353	-2,378
Bassendean	5,675	6,438	-763	Mundaring	7,809	15,603	-7,794
Bayswater	18,199	28,194	-9,995	Murray	5,134	4,951	183
Belmont	33,349	15,108	18,241	Nedlands	17,972	9,025	8,947
Cambridge	10,283	11,688	-1,405	Peppermint Grove	869	553	316
Canning	51,993	38,394	13,599	Perth	123,440	8,496	114,944
Claremont	5,627	4,028	1,599	Rockingham	24,094	41,449	-17,355
Cockburn	29,534	40,863	-11,329	Serpentine-Jarrahdale	3,154	7,608	-4,454
Cottesloe	2,411	3,480	-1,069	South Perth	11,536	19,477	-7,941
East Fremantle	2,010	3,301	-1,291	Stirling	68,181	88,082	-19,901
Fremantle	24,501	12,092	12,409	Subiaco	24,129	8,457	15,672
Gosnells	20,791	44,458	-23,667	Swan	47,208	46,666	542
Joondalup	38,493	73,397	-34,904	Victoria Park	23,548	14,994	8,554
Kalamunda	13,089	23,950	-10,861	Vincent	18,348	16,257	2091
Kwinana	11,447	10,910	537	Wanneroo	31,710	62,495	-30,785
Mandurah	16,843	23,313	-6,470	Waroona	1,980	1,357	623
Melville	31,533	44,136	-12,603	WA Regional	223,765	204,238	19,527

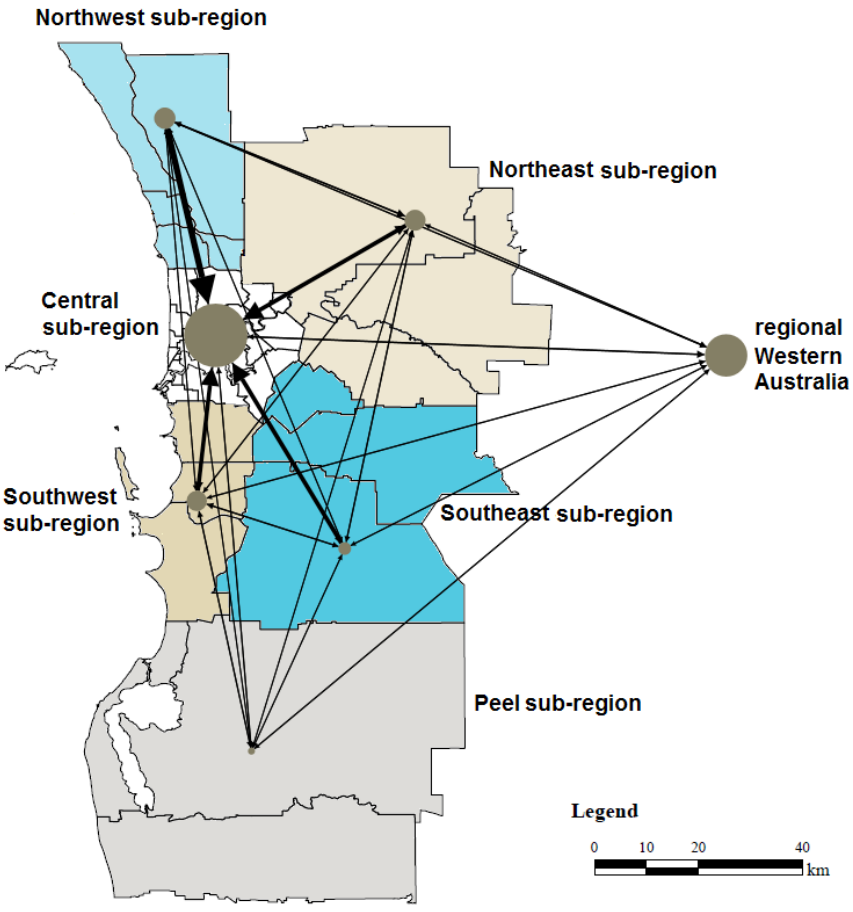
Source: Adapted from ABS (2011)

The strategic planning and sustainability framework for commuting

The relatively small spatial unit of a LGA provides only limited understanding of how employment and housing patterns relate to commuting within the broader strategic and sustainability planning framework of Perth and Peel. The hierarchical distribution of strategic centres means employment opportunities are not evenly spread across all LGAs. As such *Directions 2031* and *Perth and Peel@3.5 Million* aggregates LGAs into larger sub-regions, each with its own unique character. These sub-regions provide 'an important mechanism for managing urban growth and achieving the increased urban consolidation and residential housing choice required to accommodate our anticipated long-term population growth' (WAPC, 2015, p.8). Given that increasing employment opportunities in the respective sub-regions is a critical component in maximising the use of existing infrastructure, minimising inter-regional commuting is essential for Perth and Peel's strategic sustainable urban and economic growth.

This section presents sub-regional commuting patterns. The size of the circles in figure 2 indicates the number of jobs of each sub-region, and the size of the arrows indicates the numbers of commuters. The Central sub-region has substantially more employment opportunities than any of the other sub-regions, drawing workers primarily from immediately adjacent areas. This is followed by regional Western Australia, with 23,852 jobs filled by workers coming from the metropolitan region, and then the three outer metropolitan sub-regions of Northwest, Northeast and Southwest. The majority of the commuter flows into the outer sub-regions are from those living in the Central sub-region, with only Northwest and Northeast sub-regions demonstrating significantly higher cross-commuting flows. Table 2 extrapolates the data from figure 2 through a breakdown of where workers live and where they work.

Figure 2
Commuting by sub-region, 2011 (size of circles denotes number of jobs, thickness of lines and size of arrows denotes size of commuting workforce)



Source: Adapted from ABS (2011)

Table 2
Sub-regional flows of working residents to jobs[2]

From \ To	Regional WA	Central	Northwest	Northeast	Southeast	Southwest	Peel	**Total residents**
Regional WA	197,876	3,257	613	1,394	216	368	514	**204,238**
Central	7,495	281,403	10,055	15,379	6,079	10,682	470	**331,563**
Northwest	4,265	65,222	55,212	8,962	682	1,407	50	**135,800**
Northeast	3,395	39,804	3,271	36,309	2,218	1,133	58	**86,188**
Southeast	2,395	40,764	478	4,126	24,793	4,990	381	**77,927**
Southwest	3,720	38,497	424	1,637	2,634	43,201	2,888	**93,001**
Peel	2,582	3,464	100	243	407	3,216	19,593	**29,605**
Total Jobs	**221,728**	**472,411**	**70,153**	**68,050**	**37,029**	**64,997**	**23,954**	**958,322**

Source: Adapted from ABS (2011)

Sub-regional commuting performance measures

Indicators are a key means to benchmark the performance of regions against each other and over time. In terms of commuting, three measures are jobs-housing balance (JHB), employment self-sufficiency (ESS) and employment self-containment (ESC). All are widely used in strategic planning and targeting; and, despite being different, they are often used interchangeably.

JHB is the ratio of total jobs in the sub-region, whether or not they are filled by local residents, to working population, whether or not they work in the local sub-region. In contrast to JHB, ESS and ESC calculations incorporate commuting movements. ESS is the proportion of workers working locally to total local jobs where a higher value means more local workers are employed locally. ESC is the proportion of workers working locally to total local labour force where a higher value means less outward travel for work. As such, comparing commuting between sub-regions requires ESS or ESC. Table 3 exemplifies the calculations of these different measures. In sub-regions seeking to reduce high outward commuting through more local employment, such as Perth and Peel outer metropolitan areas, ESC is the more appropriate measure (Biermann and Martinus, 2013).

Table 3
Example calculation for alternative measures using ABS 2011 journey-to-work data

	Work in Northwest	Work in other sub-regions	Total Northwest labour force
Reside in Northwest	55,212 (*a*)	80,588	135,800 (*b*)
Reside in other sub-regions	14,941		
Total Northwest jobs	70,153 (*c*)		
JHB (c/b) = 52%	ESS (a/c) = 79%		ESC (a/b) = 41%

Source: adapted from Biermann and Martinus (2013)[3]

2 Employment self-sufficiency of *Perth and Peel@3.5 Million* is different to JHB figures here as *Perth and Peel@3.5 Million* uses adjusted ABS labour force data (see WAPC, 2015, p.37).
3 Differs from Biermann and Martinus (2013) as this FACTBase includes Regional WA commuting numbers.

With the strategic objective of reducing the need to travel, *Perth and Peel@3.5 Million* provides ESS ratios identifying how employment future growth might minimise commuting through a more equitable distribution of jobs. However, the ESS calculation method is in reality JHB[4] containing no information on whether workers are living in their sub-region of employment. The use of JHB is based on the assumption that 'bring[ing] work opportunities closer to where people live, reduce[s] the need for long costly commutes and increase[s] the economic sustainability of individual sub-regions' (p.38). This is not necessarily the case given the uneven distribution in the *types* of jobs found in each sub-region, particularly the disproportionate number of knowledge-based service work found in the Central sub-region compared to other sub-regions.

Table 4 compares the three different employment and housing ratio measures using ABS data, highlighting significant differences between each. From a job/housing point of view, Perth Central is substantially higher at 142 per cent than the other sub-regions – this is an indication of the *potential* number of residents (rather than actual) that could be employed in the region. However, in reality, only 60 per cent of its jobs (ESS) are filled by its residents, the remaining 40 per cent by in-commuting labour. ESC, on the other hand, highlights the large proportion of Central residents which both work and live there – 85 per cent.

The substantially lower number of jobs in all other sub-regions means less potential employment opportunities for residents. This translates to a lower percent JHB ratio, the highest being found in Peel (81 per cent), Northeast (79 per cent) and Southwest (70 per cent). In other words, the JHB ratio shows the percentage of residents who could work locally if *all* local jobs were filled by local residents. The ESS of Northwest (79 per cent), Southeast (67 per cent) and Peel (82 per cent) sub-regions were higher than their respective JHB, signifying a high degree of resident workers filling local jobs. Whilst this may appear to be good, it may also be an indication of lower wage jobs, such as retail or tourism, where workers are more likely to be local compared to high-paid specialised work. For ESS of Northeast (53 per cent) and Southwest (66 per cent), the potential number of jobs residents can fill (JHB) underestimates the actual number filled by local workers. In all outer sub-regions except for Peel, a low ESC indicates that most resident workers do not work locally. Using the JHB as a measurement tool in these areas over-estimates the proportion of local residents actually working locally (by 11 per cent in Northwest, 37 per cent in Northeast, 16 per cent in Southeast, 24 per cent in Southwest and 15 per cent in Peel).

Table 4
Sub-regional comparison of employment and housing ratios (%), JHB, ESS and ESC, 2011

Sub-region	Central	Northwest	Northeast	Southeast	Southwest	Peel
JHB	142	52	79	48	70	81
ESS	60	79	53	67	66	82
ESC	85	41	42	32	46	66

Source: Adapted from ABS (2011)

4 Employment self-sufficiency is described in *Perth and Peel@3.5 Million* as 'the quantity of jobs in a given area as a proportion of that area's resident labour force' (WAPC, 2015, p.38).

Conclusion

This FACTBase presents an overview of commuting patterns across Perth and Peel, placing these in the context of Perth's metropolitan strategies, as well as various benchmarking measures to access sub-regional performance in reducing commuting by delivering local jobs to residents. Despite the complex pattern of commuting across the metropolitan region, it finds a general imbalance in the distribution of work with inner LGA's attracting larger numbers of commuters than outer ones. At an aggregated sub-regional level, this pattern is amplified, with the emergence of some reverse commuting from Perth city to surrounding outer regions but limited cross-commuting between outer regions. The large number of commuters to the Perth Central sub-region reflects a strong monocentric employment pattern despite attempts to decentralise through activity centre development. There are three key factors which may have caused this. First, its substantially larger growth as an employment region relative to employment growth in outer sub-regions, and second, the significantly higher value of its jobs, higher paid, skilled and knowledge-based work, compared to other sub-regions (Biermann and Martinus, 2013). Third, the metropolitan hub-and-spoke approach to infrastructure provision with limited development of transport infrastructure and planning between spokes.

Employment self-sufficiency, employment self-containment and jobs-housing balance were discussed as possible measures to benchmark regional performance in reducing commuting. The ESS used in current Perth and Peel strategic planning documents is found to be a measure of jobs-housing balance, with no information regarding commuting movements. This implies that all sub-regions have a lower proportion of residents working locally than calculated using JHB as it underestimates outbound commute compared to ESS. As a critical input to transport infrastructure planning, travel demand estimation based on high JHB will accordingly underestimate the need for travel. This will result in under investment in infrastructure. For sub-regions interested in minimising out-bound commuting, ESC then is a better measure to target and track progress of how well increases in local employment opportunities have reduced out-commuter flows.

However, in general such targets overly-simplify an extremely complex issue for the purpose of delivering 'achievable' outcomes or performance indicators. As noted by O'Connor and Healy (2004), 'many of the home- and job-location decisions are being made by smaller, one person or two person-two income households, where one (or both) might be employed part-time, the majority are car drivers and the housing decision might be for rental rather than purchase. Hence, we are not dealing with the close one-to-one relationship between suburban jobs and suburban houses envisaged in earlier research' (p.30). As such, the merit of using ESS and ESC as planning targets will be enhanced by better understandings of the spatial distribution of different types of jobs and, more specifically, how to attract high-value high-skilled jobs away from the metropolitan core to the sub-regions.

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About FACTBase

FACTBase is a collaborative research project between the Committee for Perth and The University of Western Australia to benchmark the liveability of Perth and its global connectedness through an examination of Perth's economic, social, demographic and political character.

The FACTBase team of academics and researchers condense a plethora of existing information and databases on the major themes, map what is happening in Perth in pictures as well as words, and examine how Perth compares with, and connects to, other cities around the world.

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