

Embracing ticketing data insights and moving beyond the box of self-reports

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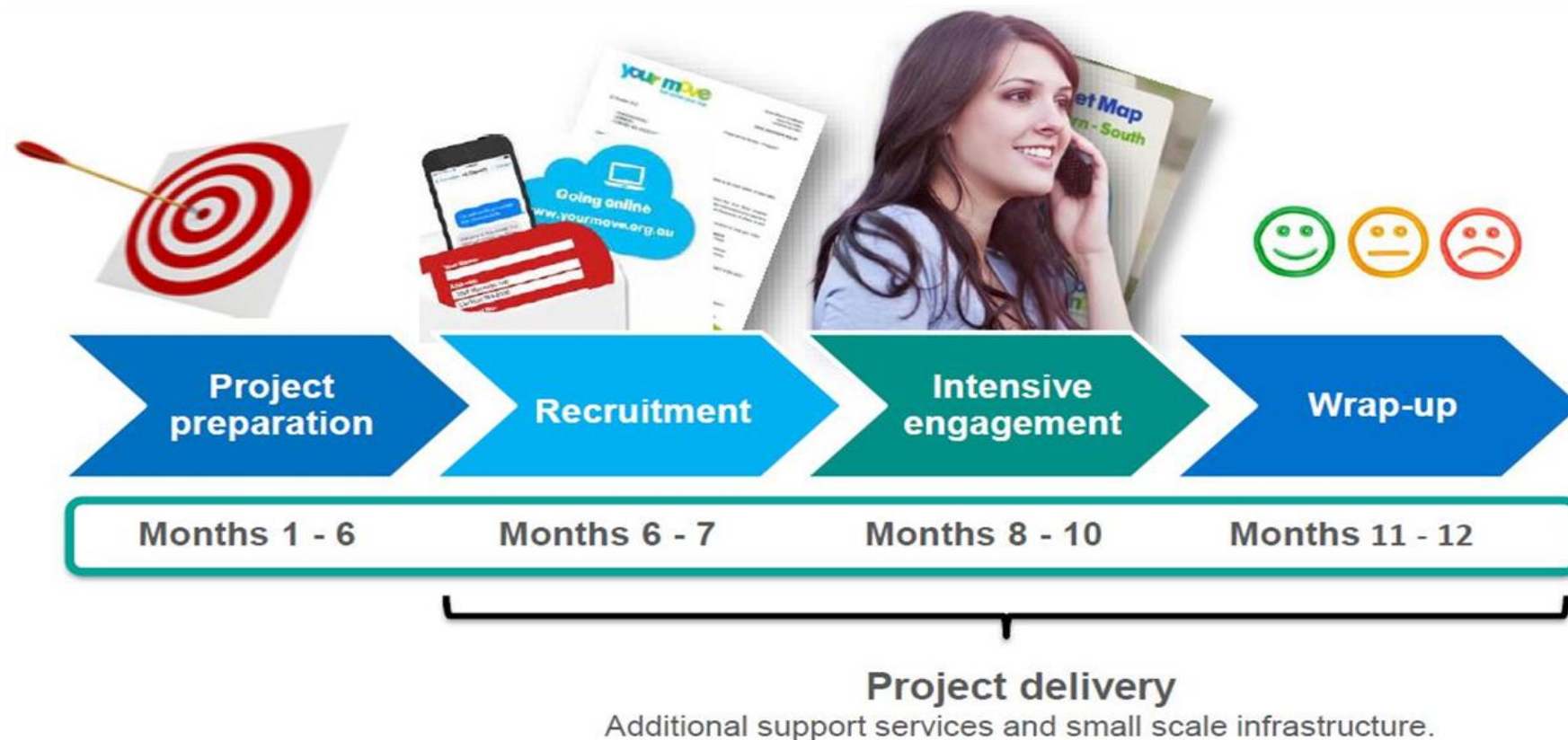
Your Move

- Travel Behaviour Change program
- Purpose?
 - ↑ walking, cycling and public transport
 - ↓ reliance on the car
- Why?
 - Improve health & environment
 - Reduce congestion
 - Maximise efficiency of the transport network



'Your Move' Travel Behaviour Change

- Multi-stage 'coaching' approach
 - Personalised Service + Ongoing Support
- Localised + Tailored Information
- Leveraging Cognitive Dissonance
- Influencing Social Norms
- Enabling Social Diffusion



The Box...

Limitations of previous evaluations

- Self-reports
- Inadequate controls
- Insufficient sample sizes
- Seasonal variations



Why Unbox The Box??

1. Change of government =
 - Needed to determine the impact of *Your Move* on Public Transport patronage
2. Meshblock ticketing data =
 - Opportunity to trial a new way of analysing *Your Move* project impacts
3. Future Public Transport Infrastructure =
 - Opportunity to consider using results for justification of future *Your Move* projects



Your Move Projects

	Cockburn August 2013 – April 2014	Wanneroo April 2015 – December 2015
Targeted households	34,000	64,000
Households reached	11,300	11,700
Individuals reached	33%	18%

Your Move Projects

Cockburn

August 2013 –
April 2014

Wanneroo

April 2015 –
December 2015

**DoT and DSR
joint investment**

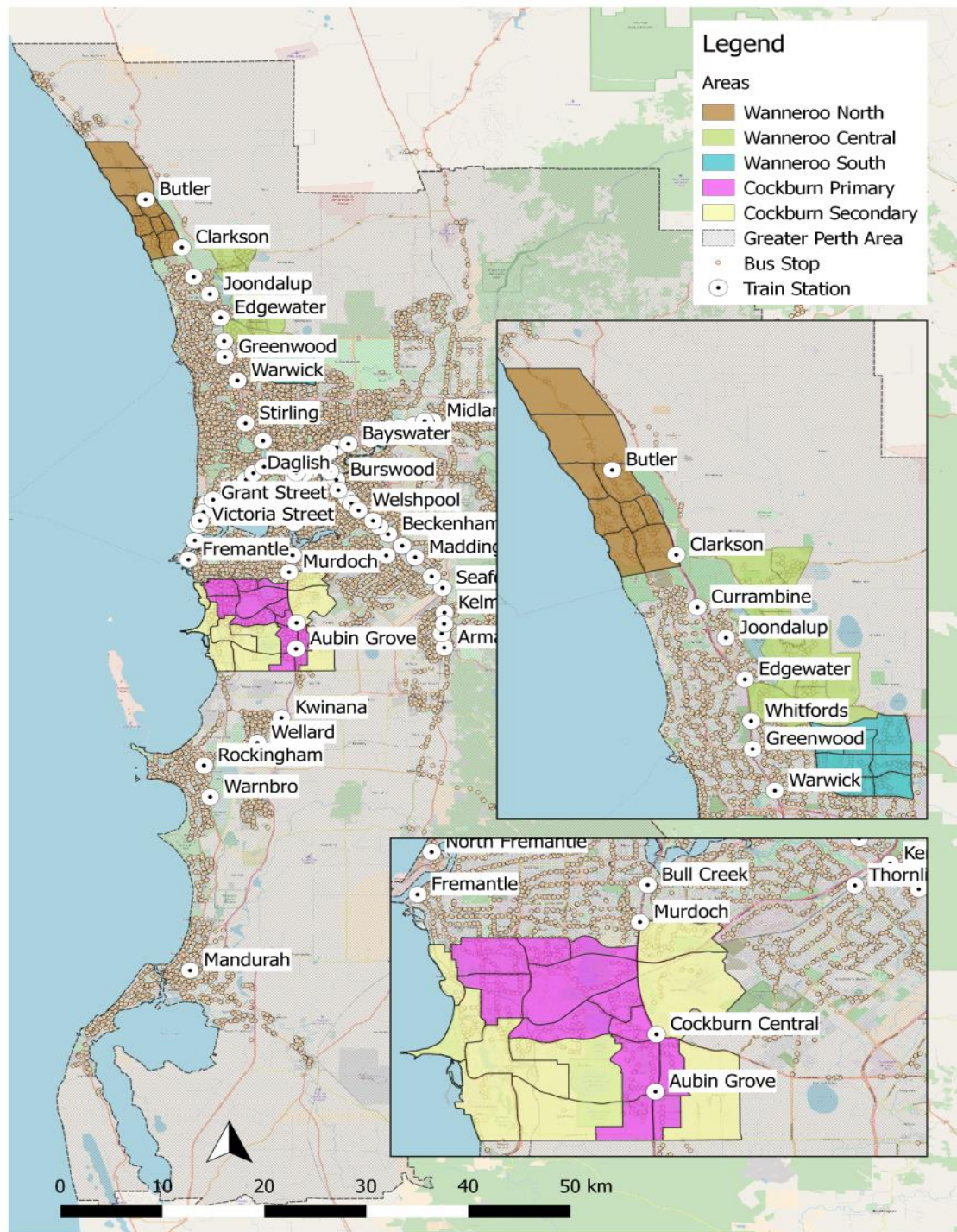
\$2.05 million

\$2.18 million

**Total
investment
(partnerships,
in-kind + DoT FTE)**

\$2.85 million

\$3.11 million



Wanneroo

Analysis periods

- Pre-intervention – Calendar Year 2014
- During intervention – Calendar Year 2015
- Post Year 1 (2016)
- Post Year 2 (2017)

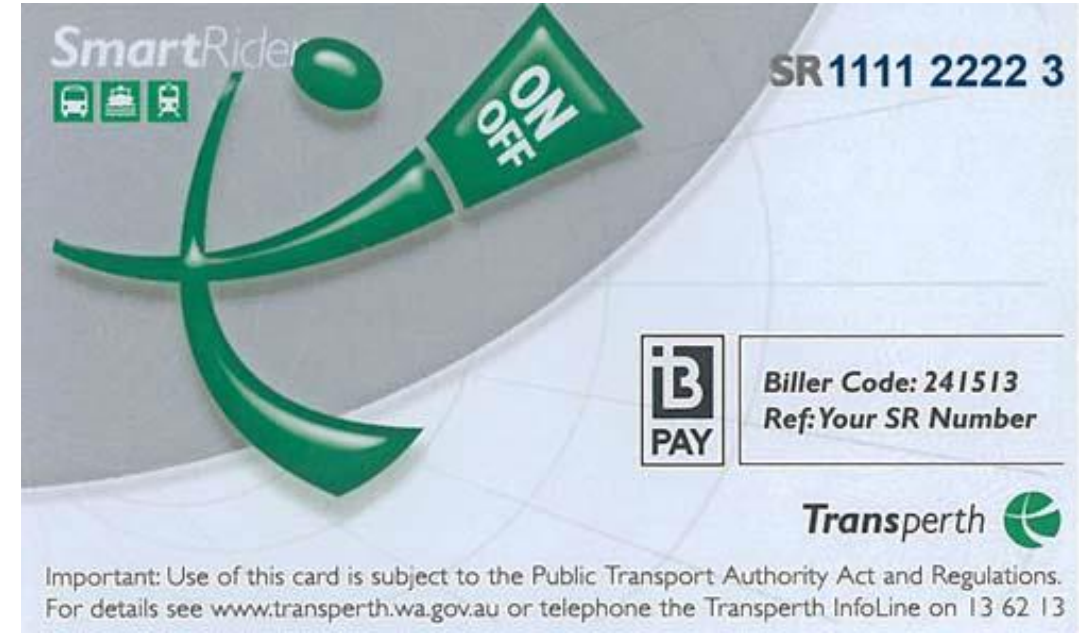
Cockburn

Analysis periods

- Pre-intervention – Financial Year 2012/13
- During intervention – Financial Year 2013/14
- Post Year 1 (14/15)
- Post Year 2 (15/16)
- Post Year 3 (16/17)
- Post Year 4 (17/18)

Smart Card analysis

- PTA collaboration
- ABS 'meshblock'
- De-identified data
 - 85% with meshblocks
 - Monthly aggregated Tag-Ons
 - First tag of the day only
- Data Analysis Australia



What does the SR data look like?

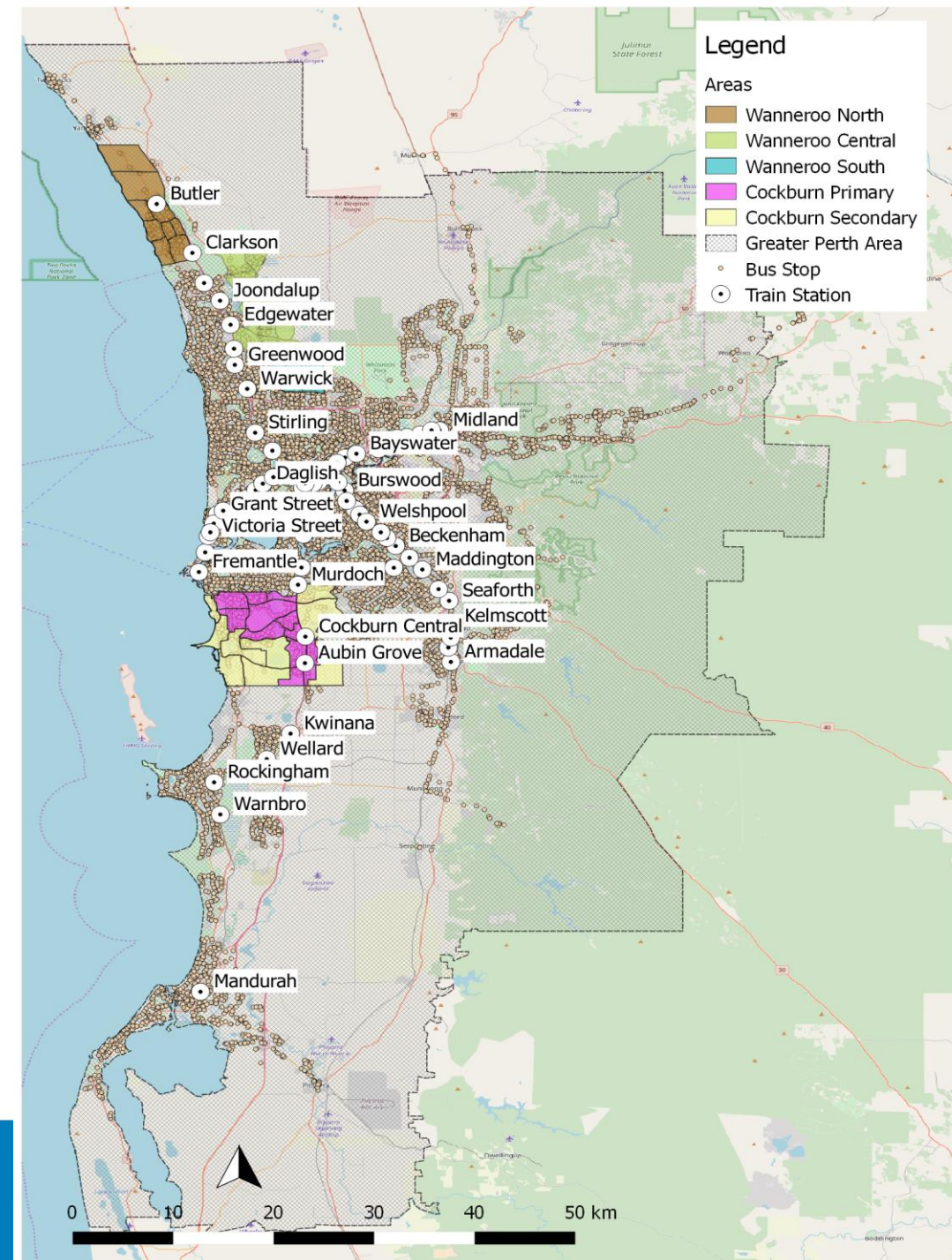
	A	B	C	D	E	F	G	H	I	J	K	L
1	Station Name	Yr-Mth	JnyStart	JnyStart	JnyStartMod	FirstStation X	FirstStation Y	BusRoute	MultiModal	MBCODE16	CustomerID	NumBoardings
2		2015-09	115.8572	-31.9529	B	0	0	60	N		4912401	1
3	Mosman Park	2012-11	115.7572	-32.0071	T	115.75721389	-32.00708611		N	5.0084E+10	5256969	1
4	Wellard	2016-02	115.8172	-32.2639	T	115.81717111	-32.26390111		N		4174487	2
5		2013-05	115.8526	-31.8302	B	0	0	344	N		4301444	1
6		2013-12	115.9351	-31.9553	B	0	0	935	N		5605459	2
7		2015-07	115.9123	-31.9538	B	0	0	36	N		4844260	10
8	Shenton Park	2017-01	115.8055	-31.9595	T	115.80551167	-31.95946389		N	5.005E+10	3702789	1
9		2012-10	115.8137	-31.7819	B	0	0	467	N		5482265	11
10		2015-04	115.7594	-31.8943	B	0	0	990	N		1890034	1
11	Grant Street	2017-04	115.7648	-31.9868	T	115.76483222	-31.98676611		N	5.0084E+10	4684303	1
12	Perth	2013-07	115.8581	-31.9516	T	115.85809944	-31.95156889		N	5.0296E+10	4737595	1
13		2016-08	115.857	-31.95	B	0	0	84	N		5307182	1
14	Edgewater	2015-05	115.7787	-31.772	T	115.77871722	-31.77204833		Y	5.0151E+10	4563121	11
15	Bassendean	2017-05	115.9463	-31.8968	B	115.94713889	-31.90367389	956	Y		4882783	1
16		2015-10	115.9297	-32.0898	B	0	0	205	N		3736766	1
17		2015-02	115.6946	-31.6703	B	0	0	481	N		4642552	1
18		2015-09	115.6493	-32.5962	B	0	0	594	N		3419407	2
19		2012-10	115.8474	-31.8706	B	0	0	371	N		4686215	2
20	Rockingham	2016-05	115.7612	-32.2901	T	115.76124389	-32.29011833		Y	5.0392E+10	5274562	1
21	Elizabeth Quay	2017-06	115.8554	-31.9567	T	115.85537111	-31.95672389		N		2158486	1
22	Canning Bridge	2015-03	115.8165	-32.0306	B	115.85613667	-32.00972778	910	Y		4629177	1
23		2014-10	115.827	-32.061	B	0	0	504	N		5100779	13
24	Perth	2017-06	115.8581	-31.9516	T	115.85809944	-31.95156889		N	5.0392E+10	3731611	1
25	Stirling	2015-06	115.8049	-31.8943	T	115.80485333	-31.89433833		N	5.0151E+10	3405074	1
26		2016-04	115.8572	-31.9529	B	0	0	67	N		666656	1
27		2014-03	115.8201	-31.7672	B	0	0	467	N		4683017	1
28	Perth	2014-04	115.8483	-31.9092	B	115.85809944	-31.95156889	19	Y		4091166	2
29		2013-06	115.8649	-31.9205	B	0	0	362	N		5192749	1
30		2015-08	115.8935	-32.0399	B	0	0	98	N		5052227	14
31	Bassendean	2014-06	115.968	-31.7809	B	115.94713889	-31.90367389	956	Y		3235210	2
32	Cannington	2013-03	115.945	-32.0136	T	115.94495722	-32.01355444		N	5.0133E+10	4707365	1
33		2012-12	115.8851	-31.9222	B	0	0	68	N		4460356	1
34		2014-05	115.8742	-31.8829	B	0	0	888	N		4352020	4
35	Perth	2014-07	115.8417	-31.8451	B	115.85809944	-31.95156889	835	Y		3836000	1

ANALYSIS

1. Comparison area definition

Goal to reduce issues of variability

- Similar LGA?
- Halo?
- All of Perth
 - ✓ minus CBD and outer regions



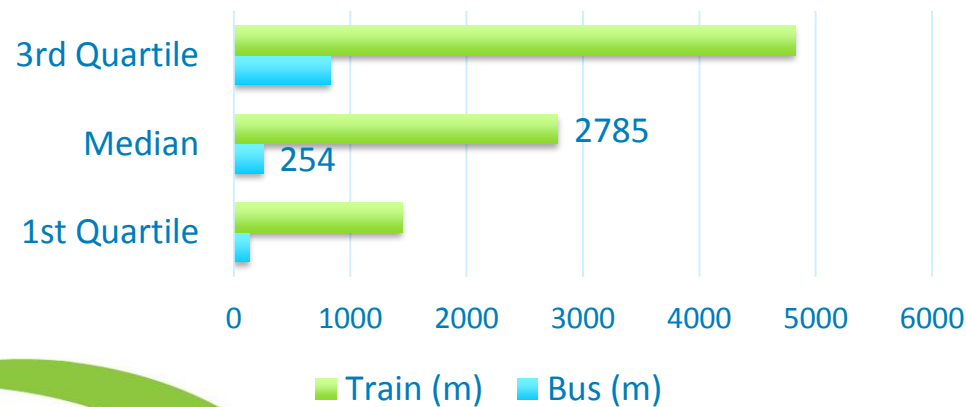
ANALYSIS

2. Data Cleaning

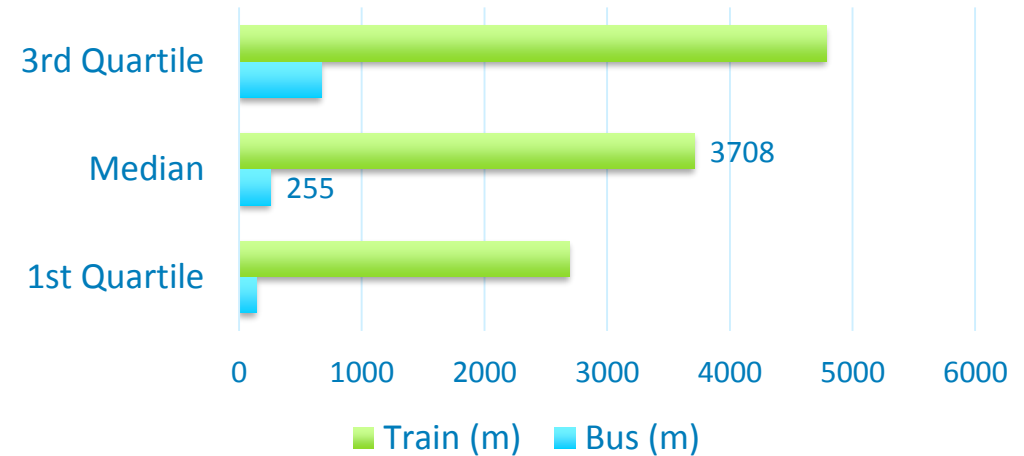
Screening applied

- Valid MB if <2km from bus tag on
- Valid MB if <6km from train tag on

Distances from Cockburn meshblocks to Bus and Train services

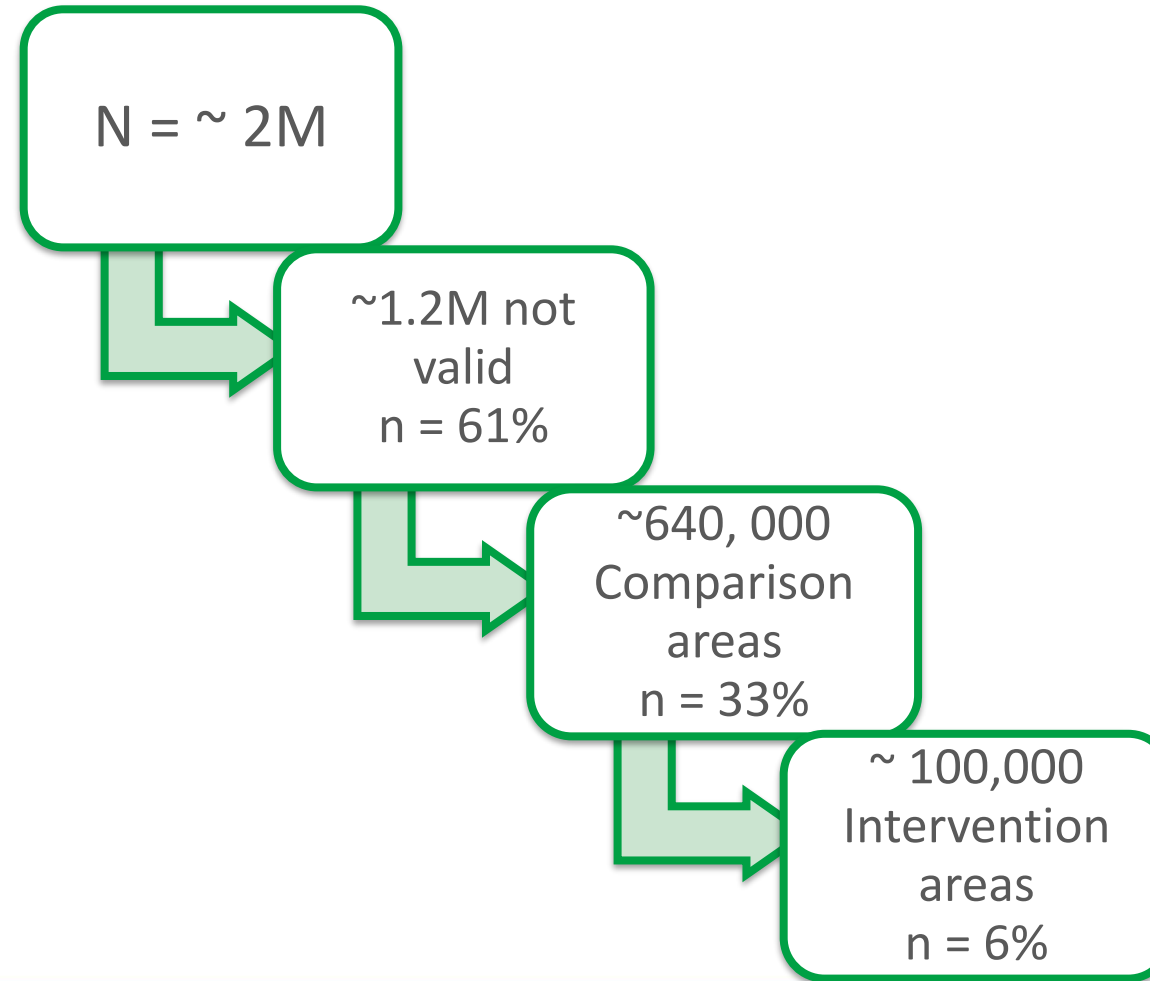


Distances from Wanneroo meshblocks to Bus and Train services



ANALYSIS

3. Method of Classifying Customers



ANALYSIS

4. Population growth

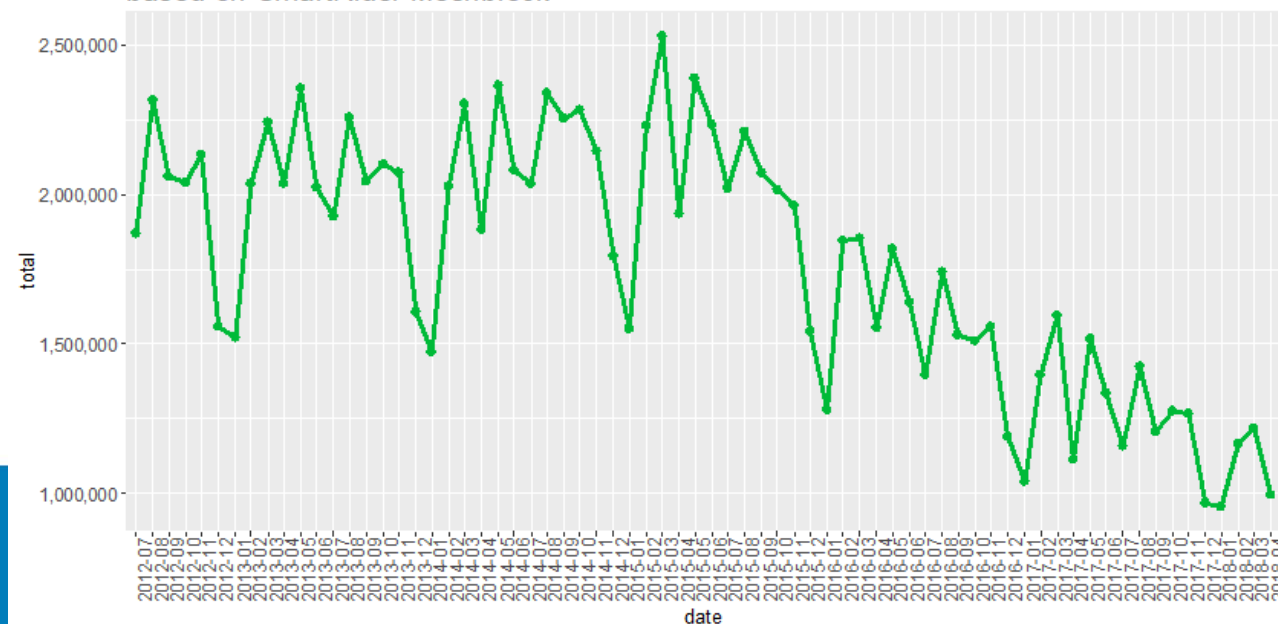
Accounted for by restricting the year on year analysis to customers that travelled in:

- Pre-intervention
- During
- Post year 1

Total Trips by Month (Bus or Train) Pre Program to Post Program based on SmartRider Meshblock



Total Trips in Comparison Area by Month (Bus or Train) Pre Program to Post Program based on SmartRider Meshblock



ANALYSIS

5. Odds ratios & Chi-Square tests

Odds Ratios account for 'pre' to 'post' intervention changes for populations of vastly different sizes, e.g.

	Post-intervention	Pre-intervention	With groups ratios	Odds ratio
Intervention area	A	B	A/B	$1 - \left\{ \frac{A/B}{C/D} \right\}$
Comparison area	C	D	C/D	

Key Findings: Cockburn

1. Over 5 years, Your Move Cockburn resulted in an **additional 385,650 public transport trips**
2. Existing customers travelled ***significantly more*** than in the comparison area
3. Growth in new customers in project area was ***significantly greater*** than in the comparison area
4. As patronage declined in the rest of Perth, it remained steady among the Cockburn customers

Key Findings: Cockburn

	FY 2013/14 (delivery)	FY 2014/15	FY 2015/16	FY 2016/17	FY 2017/18	Total
Percentage change in trips per year (Relative to pre-program, adjusted for change in Comparison Area)	+2.1%	+3.0%	+4.4%	+6.3%	+7.2%	-
Change in number of trips per year (Relative to pre-program, adjusted for change in Comparison Area)	35,766	50,449	73,645	105,668	120,123	385,651
Farebox revenue per year (Relative to pre-program, adjusted for change in Comparison Area)	\$74,121	\$61,434	\$131,886	\$344,582	\$463,010	\$1,075,033



Population growth accounted for in these years

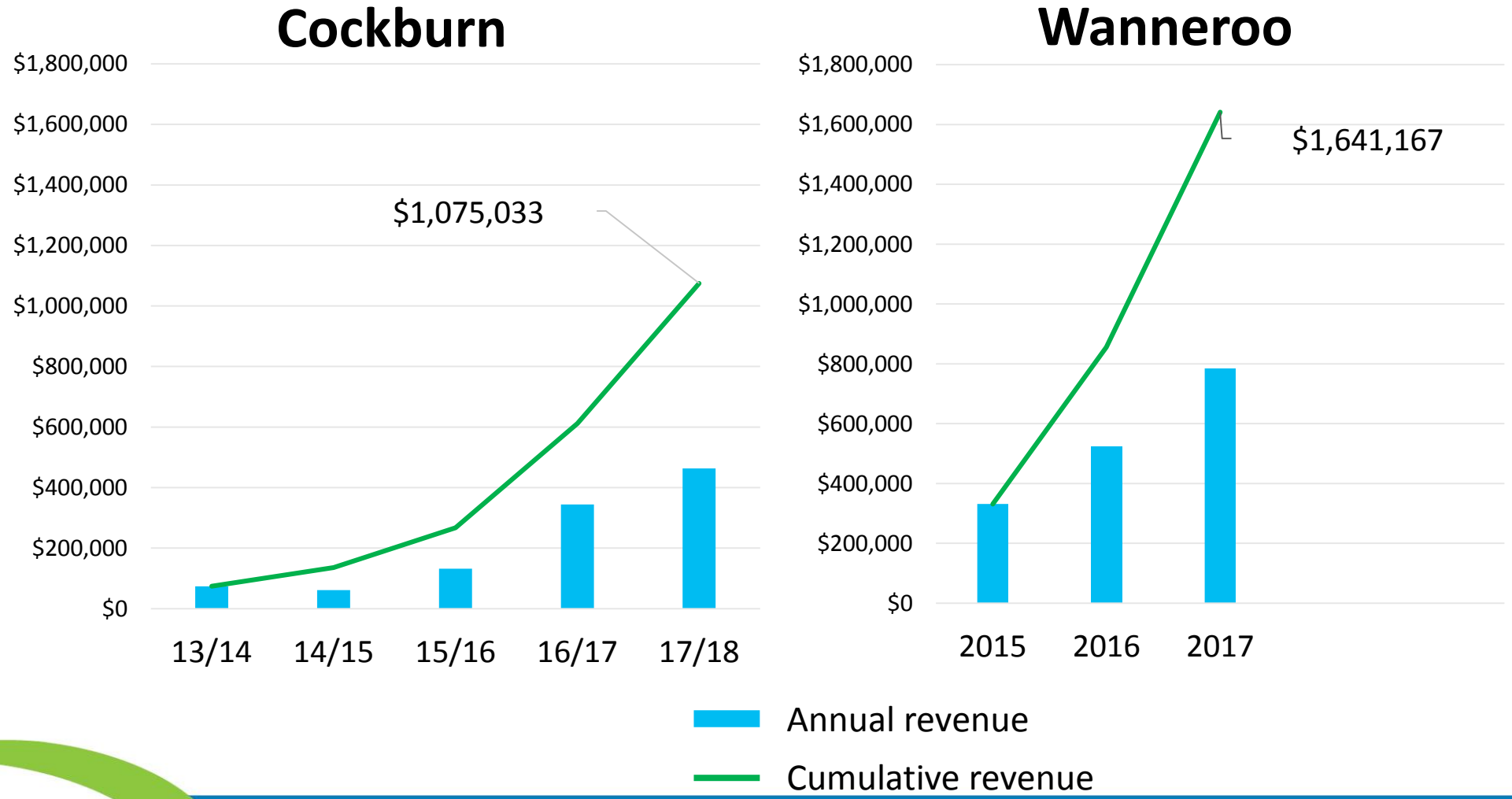
Key Findings: Wanneroo

1. Over 3 years, Your Move Wanneroo resulted in an **additional 230,064 public transport trips**
2. Existing customers travelled ***significantly more*** than in the comparison area
3. Growth in new customers in project area was ***significantly greater*** than in the comparison area
4. As patronage declined in the rest of Perth, it remained steady among the Wanneroo customers

Key Findings: Wanneroo

	2015 (delivery)	2016	★ 2017	Total
Percentage change in trips per year <i>(Relative to pre-program, adjusted for change in Comparison Area)</i>	+2.0%	+3.0%	+4.0%	-
Change in number of trips per year <i>(Relative to pre-program, adjusted for change in Comparison Area)</i>	49,840	77,873	102,351	230,064
Farebox revenue per year <i>(Relative to pre-program, adjusted for change in Comparison Area)</i>	\$331,369	\$524,743	\$785,055	\$1,641,167

Farebox Revenue following Your Move



Benefit / Cost Ratio: Cockburn

Your Move COCKBURN	Total Benefit (STEM)	Cost (2014 dollar)	Benefit / Cost Ratio
2016	\$2.52 M		
2017	\$2.06 M		
2018	\$1.56 M		
2016 – 2018 cumulative*	\$6.14 M	\$2.85 M	2.53

*3 years of benefits / 2 years of total project costs
(ATAP guidelines recommend modelling 3 years of TBC benefits)

Benefit / Cost Ratio: Wanneroo

Your Move WANNEROO	Total Benefit (STEM)	Cost (2015 dollar)	Benefit / Cost Ratio
2016	\$3.55 M		
2017	\$2.84 M		
2018	\$2.18 M		
2016 – 2018 cumulative*	\$8.58 M	\$3.11 M	2.76

*3 years of benefits / 2 years of total project costs
(ATAP guidelines recommend modelling 3 years of TBC benefits)

Key Messages

- Your Move = **Patronage** ▲
 - New customers + existing customers
 - Your Move project areas bucked the declining patronage in whole system
- \$2,716,200 actual Fare Box Revenue
 - All years/areas combined
- Benefit / Cost Ratios = high return on investment
- By minimising costs of self-report evaluation, more money can be put into delivering *Your Move* projects

Future Applications

1. Use the 'observed' Public Transport (PT) figures
- +
2. Your Move project cost per individual
- to
3. Determine a Perth-specific diversion rate for PT
- &
4. Justify business cases using Perth-specific estimates

Comments, Questions, Discussion?



Next project

- Bike Shed + Park & Ride SR data:
 - Question: Impact of cycling infrastructure on multi-modal Mode Shift?
 - Pre / post construction of primary and secondary cycling routes
 - starting with 2 station clusters along the network where infrastructure was constructed between 2014 and 2018
 - Comparison locations
 - aggregate of similar station clusters along the network where no cycling infrastructure was delivered in the same period
 - Pending outcome, apply Mode Shifts to STEM base cases for 'WtoPT' & 'P&R' and estimate BCRs for those infrastructure projects
 - Feedback loop: consider ways to triangulate with other cycling data sources

