Queensland University of Technology
Brisbane Australia

This is the author's version of a work that was submitted/accepted for publication in the following source:

Ferris, Jason, Mazerolle, Lorraine, Bennett, Sarah, Devaney, Madonna, King, Mark J., & Bates, Lyndel J. (2013) Random Breath Testing and their effectiveness revisited : an examination of RBT and Alcohol-Related Crash Data from 2000-2011 across Australia. In *ADASC 2013 6th Australasian Drug and Alcohol Strategy Conference*, 19-22 March 2013, Sydney, Australia. (Unpublished)

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Random Breath Testing and their effectiveness revisited:
An Examination of RBT and Alcohol-Related Crash Data from 2000-2011 across Australia.

Jason Ferris, Lorraine Mazerolle, Sarah Bennett,
Madonna Devaney - University of Queensland
Mark King, Lyndel Bates – CARRS-Q (QUT)

Acknowledgements

QPS

- Assistant Commissioners Peter Martin
- Chief Superintendent Bob Gee
- Road Safety and Traffic Support Managers – Monique Grigg and Lisa-Marie O'Donnell

Collaborations with:

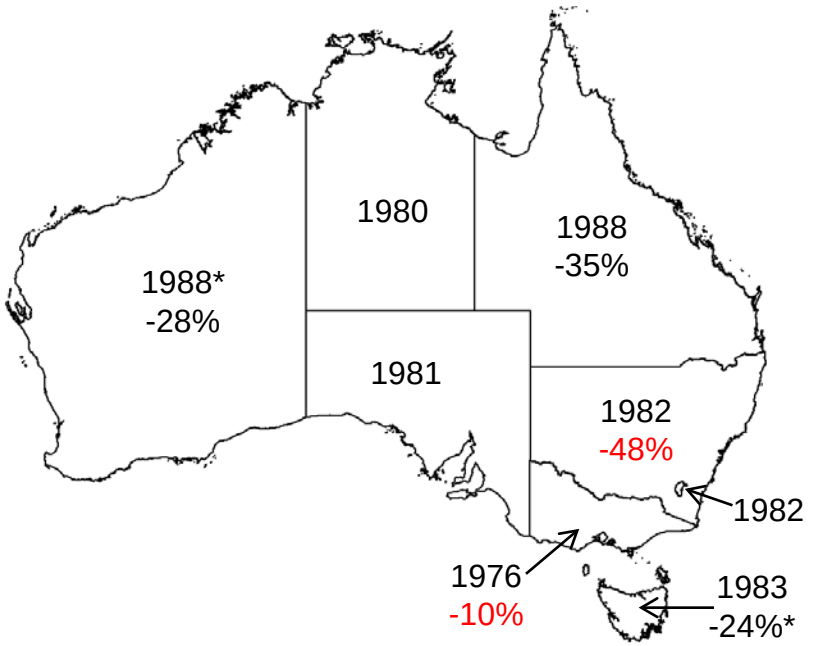
- All jurisdictions police service
- All jurisdictions department of main roads (and equivalent)
- AustRoads, South Australia

Overview of Presentation

- History of RBTs
- The predominant theory behind ‘effective’ RBTs
- Highlight initial findings from WA vs QLD comparison
- Situate these findings in the context of other state data
  - Monthly data
  - Yearly data
- Discussion of where to?

History of RBTs

- Prior to introduction of RBTs ~ 50% of drivers killed in a MVA had BAC over 0.05% g/mL
- First introduced in Victoria – 1976
- Reduction in fatalities at around roll out 10-50%
- RBTs – main drink-driving law enforcement tool
- 2000-2010 ~ 8m RBTs annually
- 2010 ~ 15m licenced drivers
- Australian RBT:LD ratio 1:2



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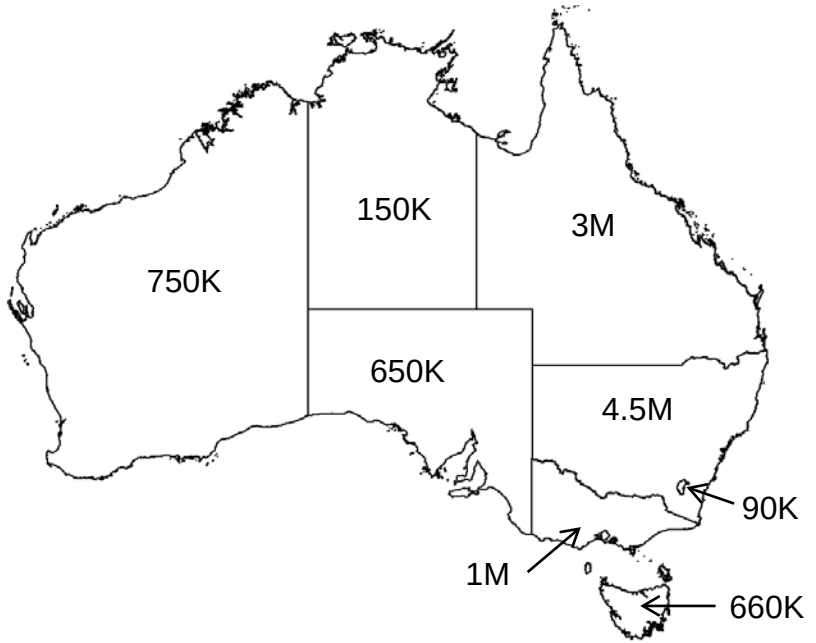
RBT rate by state

- Most states do not have a mandatory rate of RBTs
- Annual RBTs - ratio - Annual number licenced drivers
  - NSW – 1:1* ratio has been increasing
  - VIC – 1:3
  - QLD – 1:1
  - WA – 1:3* no ‘true’ rate
  - SA – 1:2
  - ACT – 1:3
  - TAS – 1.4:1
  - NT – 1:1



Deterrence theory and RBTs

- Is based on one's decision-making processes – *does the benefits of the crime outweigh the costs of getting caught*

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- *From the communities perspective:*
  - Perceived risk of getting caught – must be high
  - Punishment associated with getting caught – perceived as severe

Deterrence theory and RBTs

- Is based on one's decision-making processes – *does the benefits of the crime outweigh the costs of getting caught*

- *From the communities perspective:*
  - Perceived risk of getting caught – must be high
  - Punishment associated with getting caught – perceived as severe

- *From the procedural justice perspective:*
  - RBTs must be highly visible
  - Unpredictable
  - Difficult to evade
  - Range of consequences
  - Considered a 'high' threat by community

Taken from NDLERF monograph

Estimated Costs of RBTs

- 12 million RBTs in Australia each year
- Total annual cost of police doing RBTs in Australia = $71 million

- Cost of police doing ONE RBT = $5.92
- Average length of ONE RBT = 20 seconds per encounter

Estimates are from Papafotiou-Owens & Boorman (2011) and Vos, Carter, & Barendregt (2010)

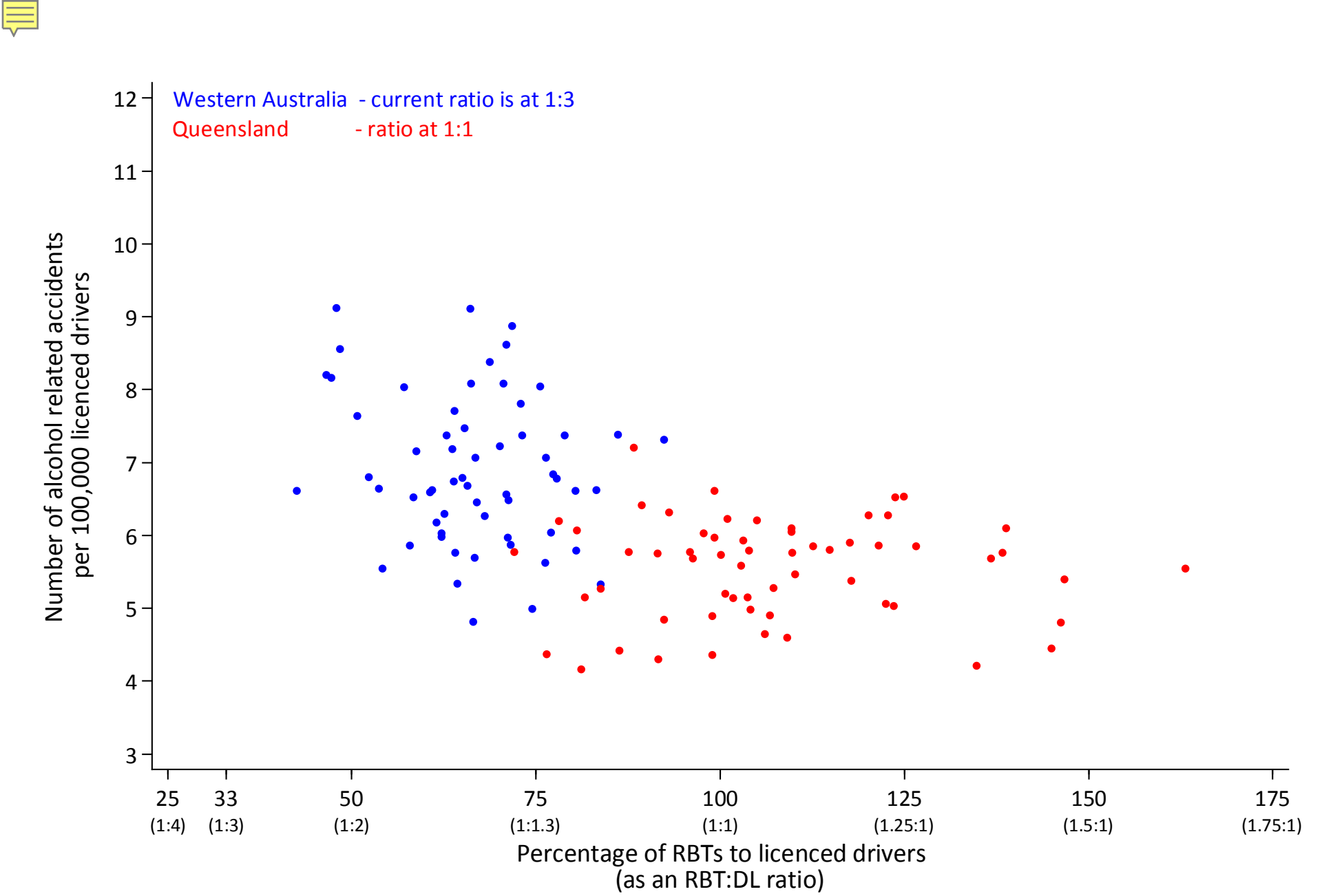
The estimated cost of MV accidents

- Estimated cost of ONE fatal crash is $2.67 million
- The cost of a hospitalised injury crash is about $266,000
- The cost of a non-hospitalised injury crash is about $14,700
- The average cost of a property damage-only crash is about $9,950

Preliminary findings based
on initial data from two states – QLD and WA
(2004-2009)

WA vs QLD

	WA	QLD
RBT : licensed driver ratio	1:3*	1:1
Population	2.3m	4.5m
State (population)	4th	3rd
Capital city (population)	75%	46%
Geographical size	2.5m km^2	1.8m km^2
Proportion urban	71%	60%
Licensed drivers	69%	71%
Current drinkers*	84%	83%
Drink-driving last 12 months	14%	9%
Odds Ratio of drivers admitting DUI p.a.	1.57	1


Western Australia - current ratio is at 1:3
Queensland - ratio at 1:1
Number of alcohol related accidents per 100,000 licenced drivers
12
11
10
9
8
7
6
5
4
3
25 (1:4)
33 (1:3)
50 (1:2)
75 (1:1.3)
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125 (1.25:1)
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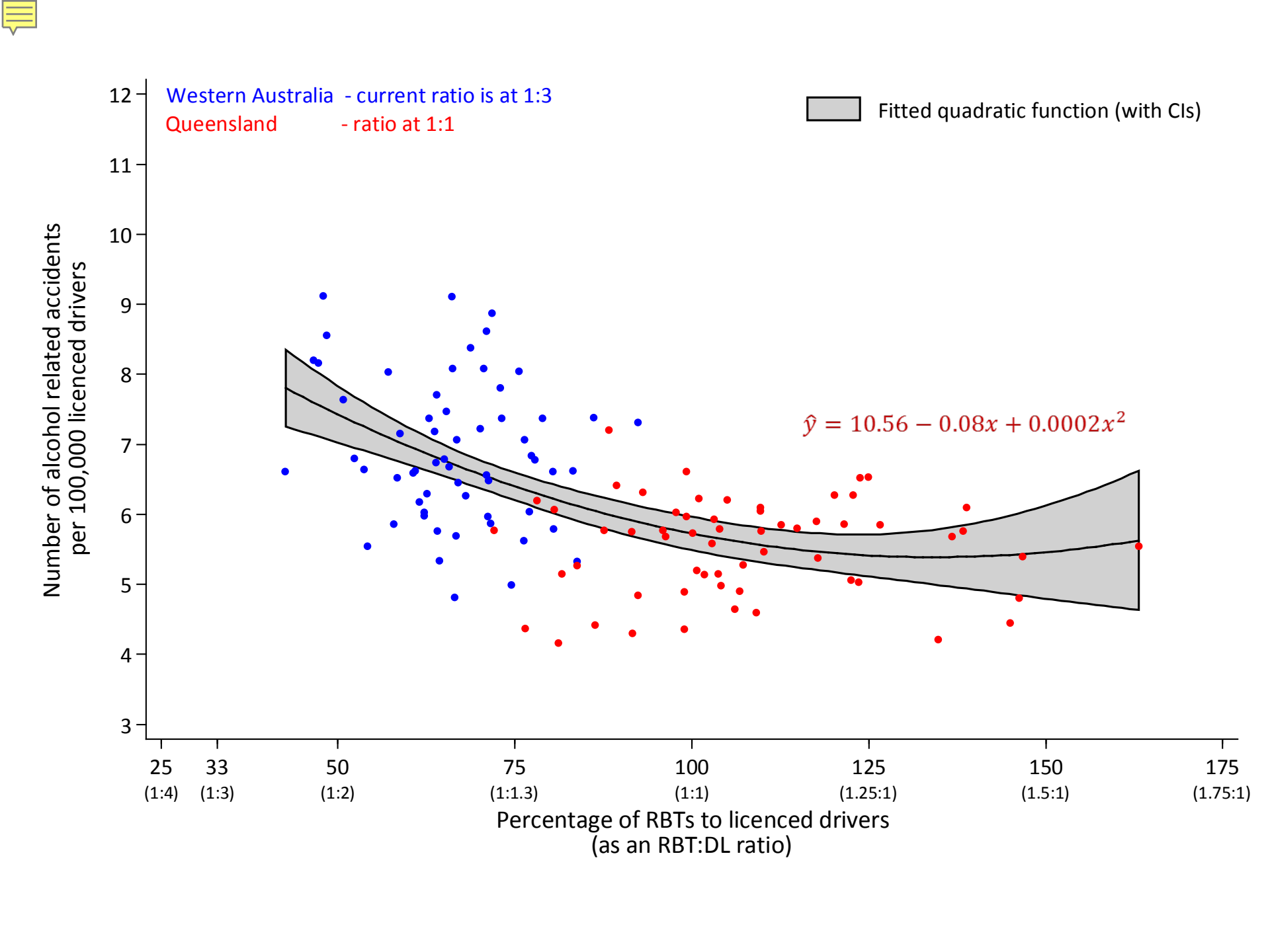
175 (1.75:1)
Percentage of RBTs to licenced drivers (as an RBT:DL ratio)


Western Australia - current ratio is at 1:3
Queensland - ratio at 1:1
Fitted quadratic function (with CIs)
$\hat{y} = 10.56 - 0.08x + 0.0002x^2$
Number of alcohol related accidents per 100,000 licenced drivers
12
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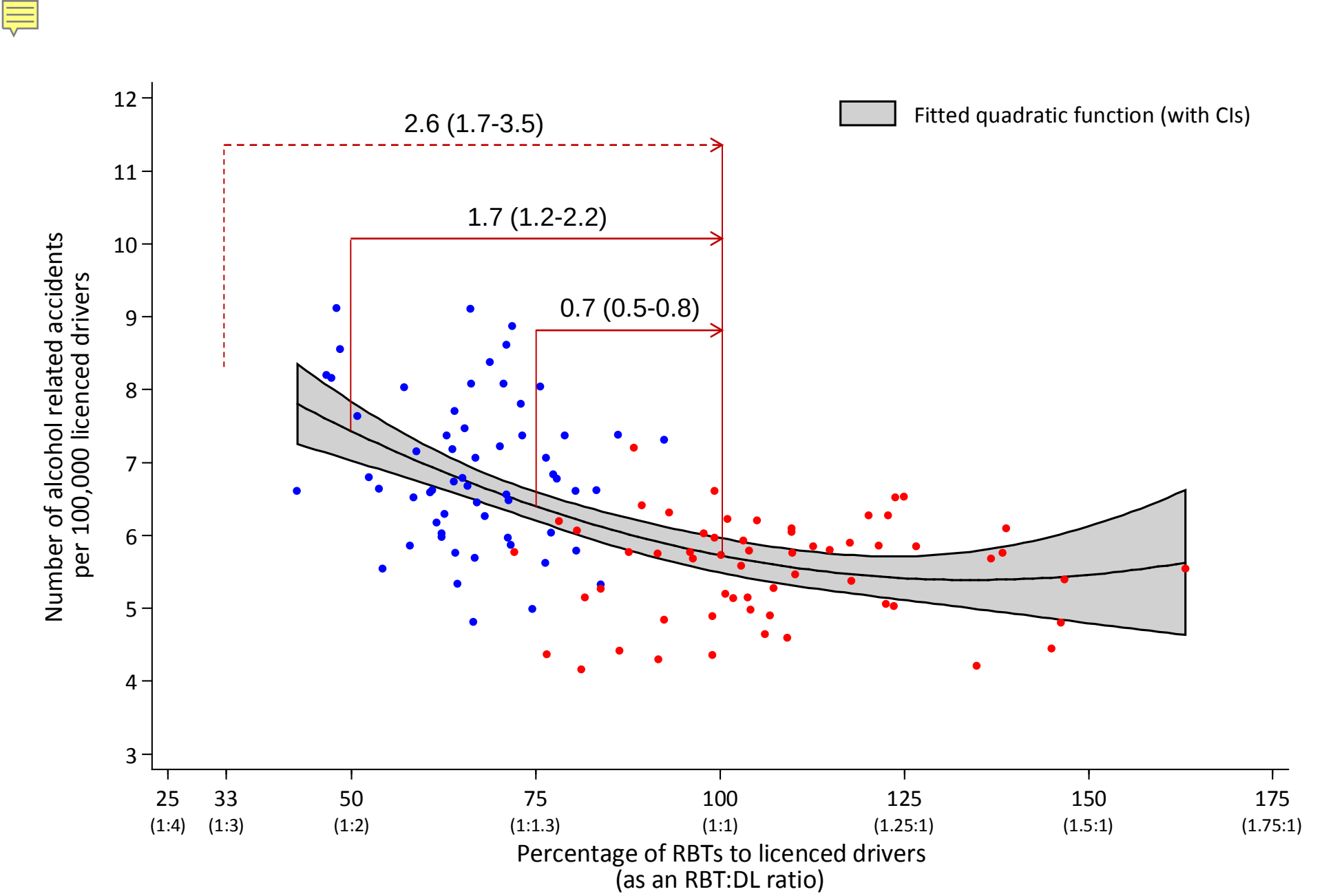
Fitted quadratic function (with CIs)
2.6 (1.7-3.5)
1.7 (1.2-2.2)
0.7 (0.5-0.8)
Number of alcohol related accidents per 100,000 licenced drivers
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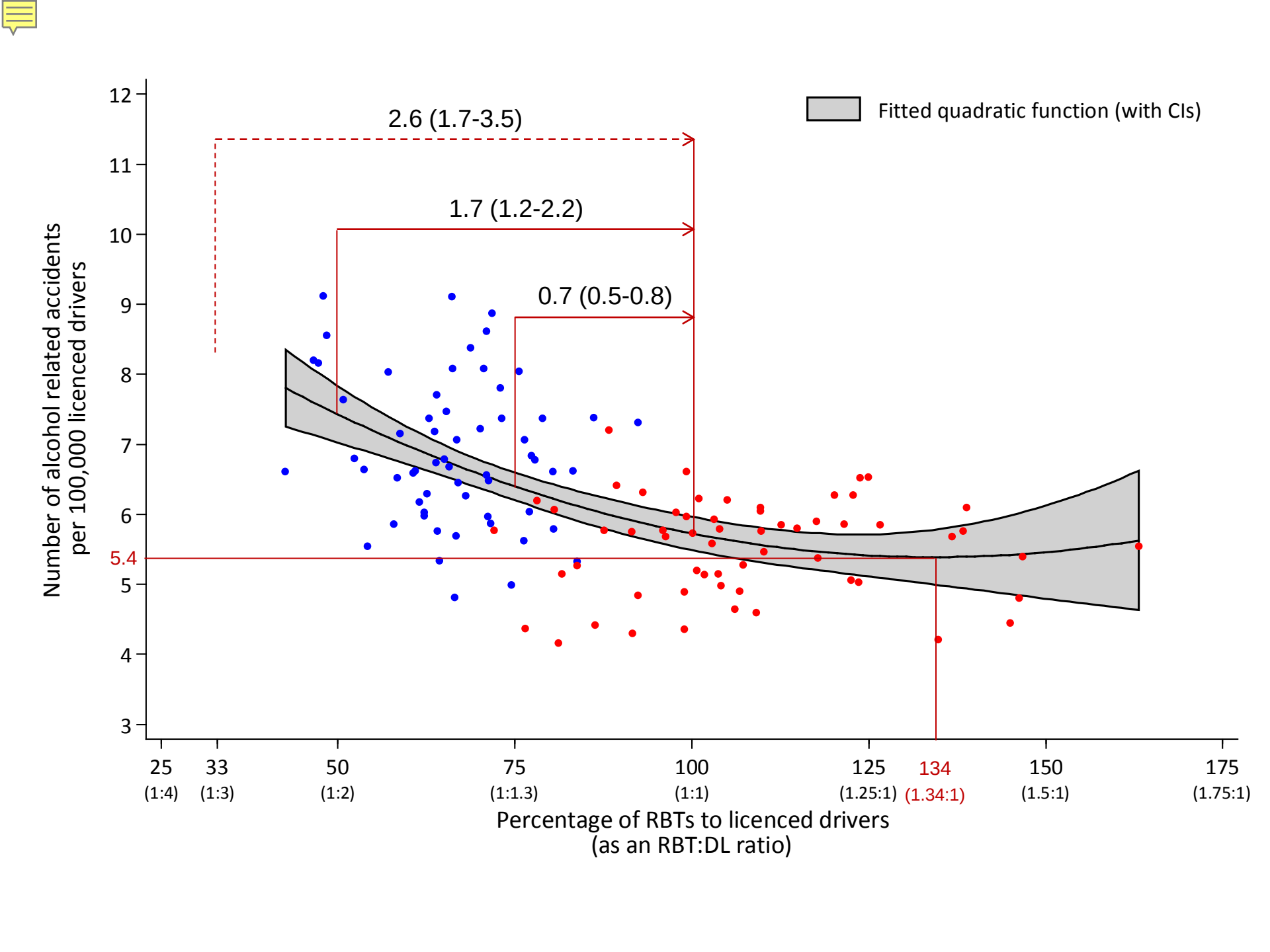
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2.6 (1.7-3.5)
1.7 (1.2-2.2)
0.7 (0.5-0.8)
5.4
Number of alcohol related accidents per 100,000 licenced drivers
12
11
10
9
8
7
6
5
4
3
25 (1:4)
33 (1:3)
50 (1:2)
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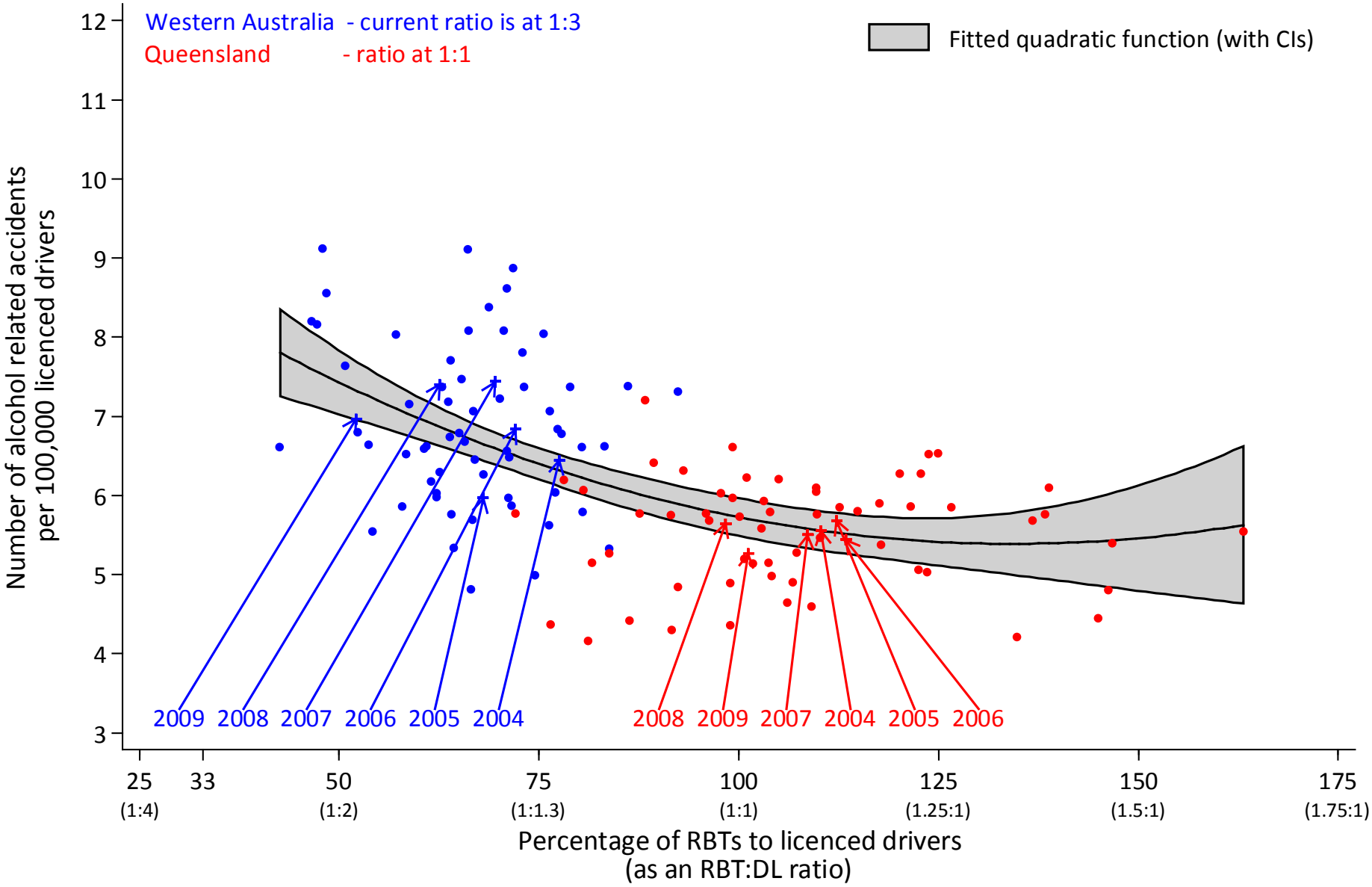
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4
3
2009 2008 2007 2006 2005 2004
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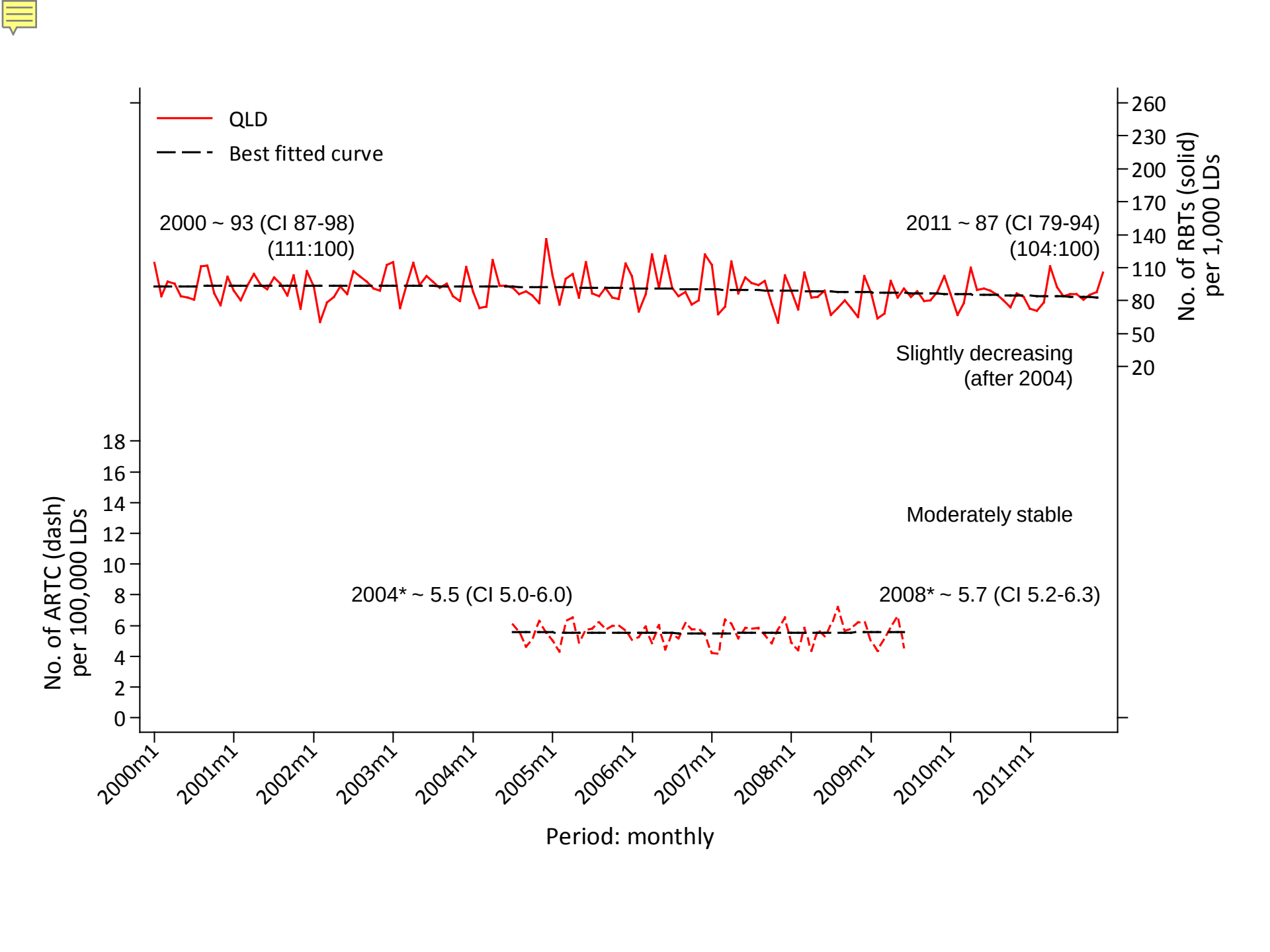
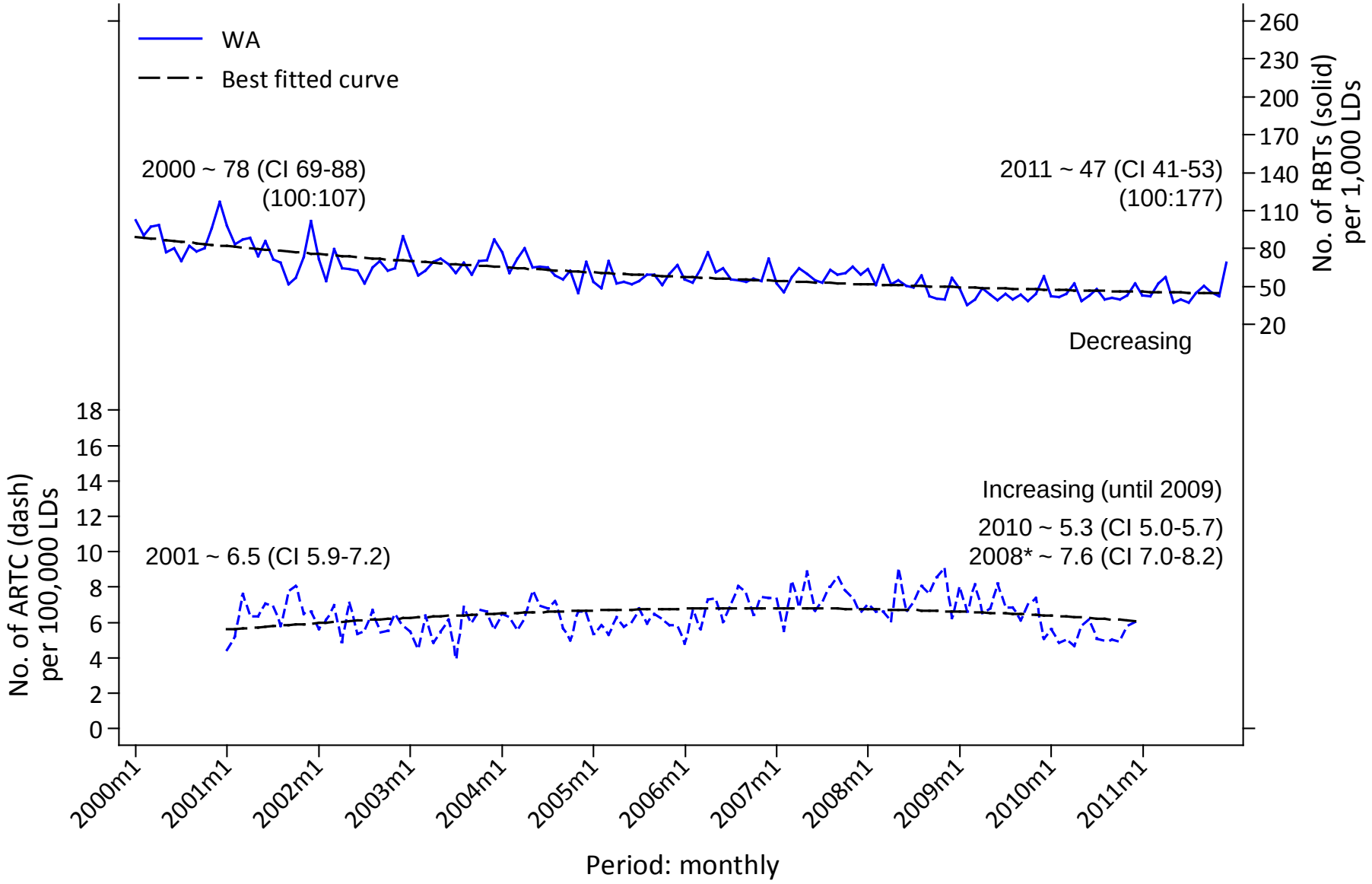
25 (1:4)
33
50 (1:2)
75 (1:1.3)
100 (1:1)
125 (1.25:1)
150 (1.5:1)
175 (1.75:1)
Percentage of RBTs to licenced drivers (as an RBT:DL ratio)

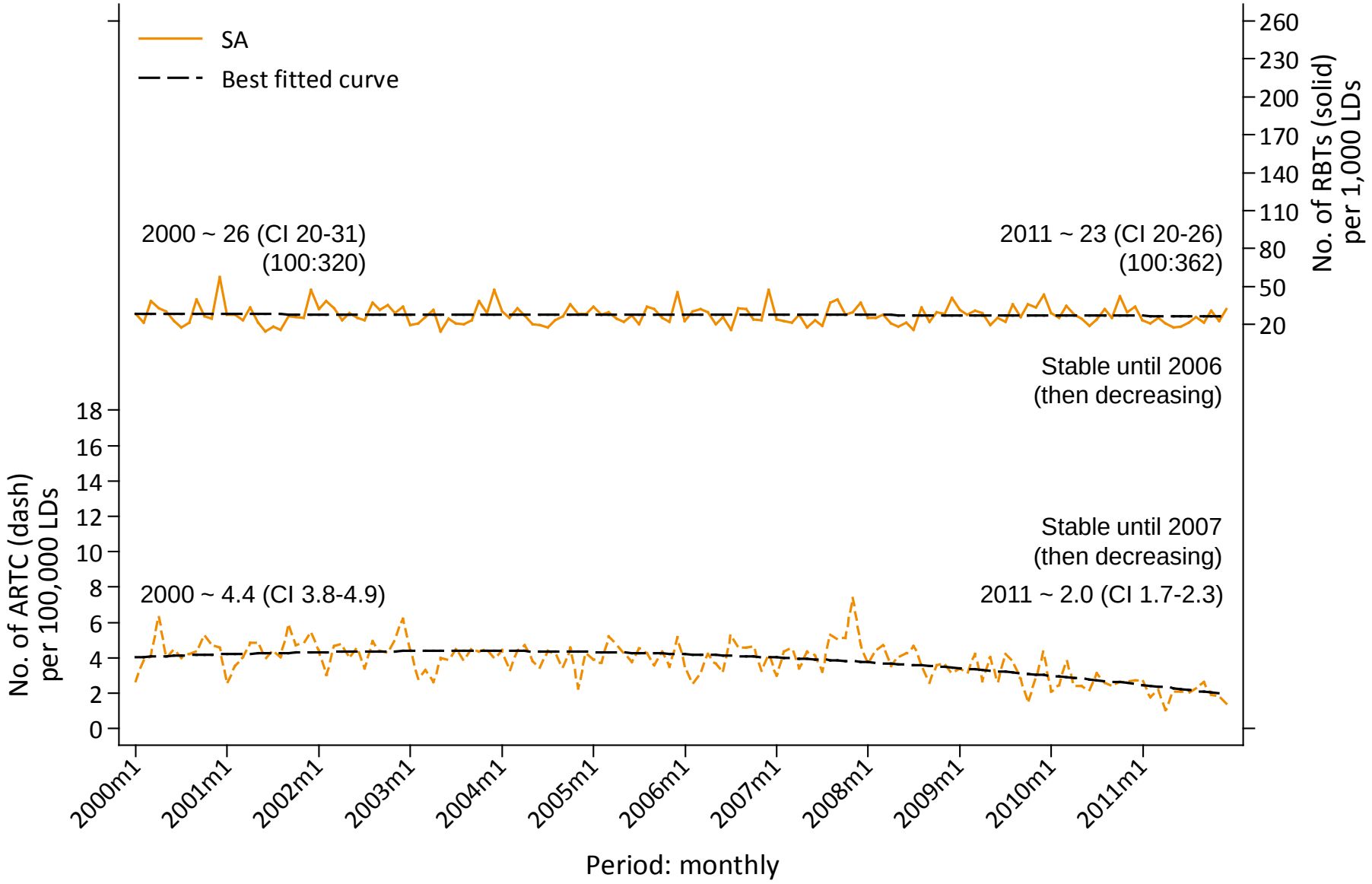
New data

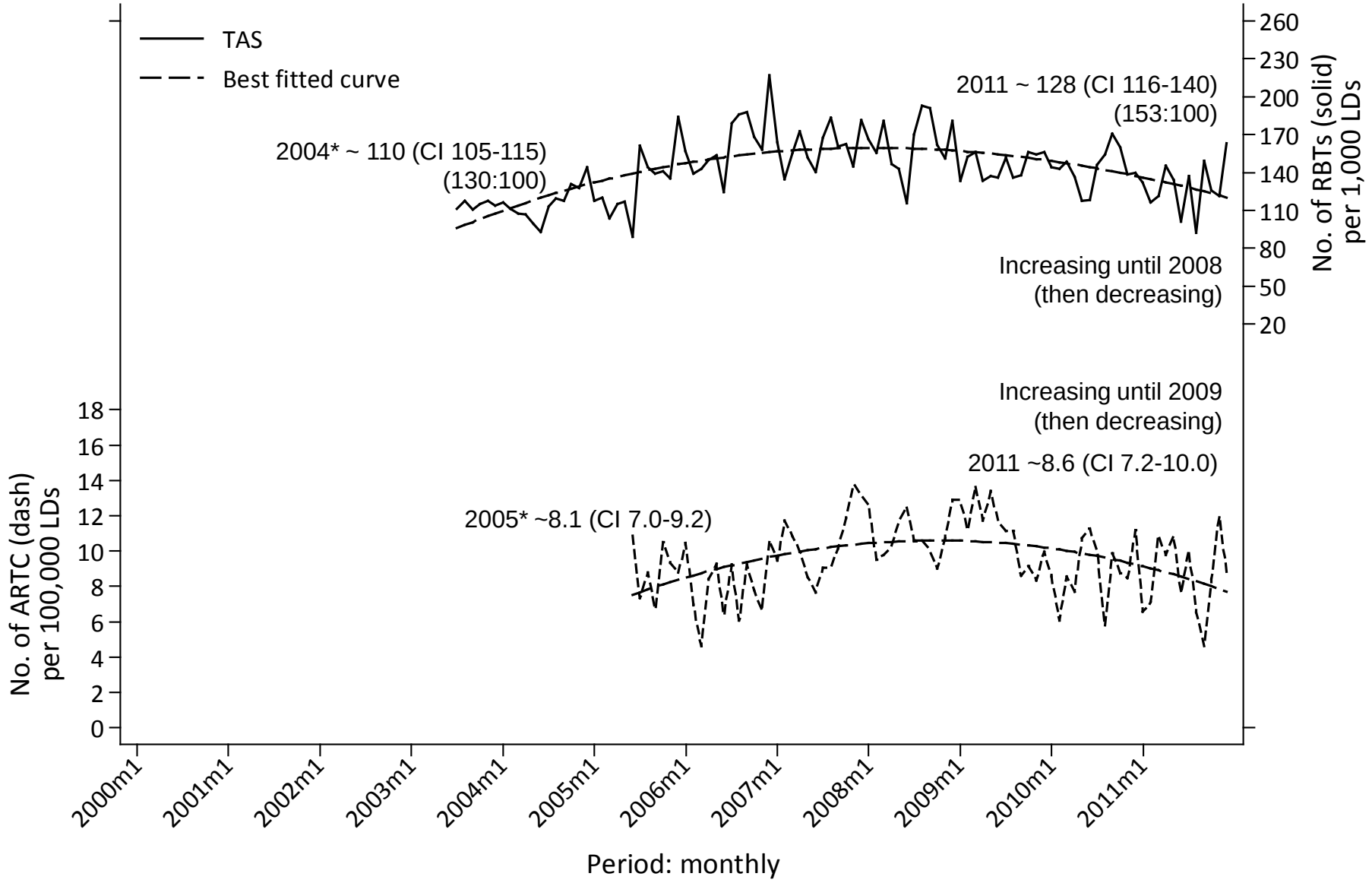
Adding in more states

(2000-2011)


QLD
Best fitted curve
2000 ~ 93 (CI 87-98)
(111:100)
2011 ~ 87 (CI 79-94)
(104:100)
Slightly decreasing
(after 2004)
Moderately stable
2004* ~ 5.5 (CI 5.0-6.0)
2008* ~ 5.7 (CI 5.2-6.3)
No. of ARTC (dash)
per 100,000 LDs
No. of RBTs (solid)
per 1,000 LDs
Period: monthly
2000m1
2001m1
2002m1
2003m1
2004m1
2005m1
2006m1
2007m1
2008m1
2009m1
2010m1
2011m1


WA
Best fitted curve
2000 ~ 78 (CI 69-88)
(100:107)
2011 ~ 47 (CI 41-53)
(100:177)
Decreasing
Increasing (until 2009)
2010 ~ 5.3 (CI 5.0-5.7)
2008* ~ 7.6 (CI 7.0-8.2)
2001 ~ 6.5 (CI 5.9-7.2)
No. of ARTC (dash) per 100,000 LDs
No. of RBTs (solid) per 1,000 LDs
Period: monthly
2000m1
2001m1
2002m1
2003m1
2004m1
2005m1
2006m1
2007m1
2008m1
2009m1
2010m1
2011m1


SA
Best fitted curve
2000 ~ 26 (CI 20-31)
(100:320)
2011 ~ 23 (CI 20-26)
(100:362)
Stable until 2006
(then decreasing)
Stable until 2007
(then decreasing)
2000 ~ 4.4 (CI 3.8-4.9)
2011 ~ 2.0 (CI 1.7-2.3)
No. of ARTC (dash)
per 100,000 LDs
No. of RBTs (solid)
per 1,000 LDs
0
2
4
6
8
10
12
14
16
18
20
50
80
110
140
170
200
230
260
2000m1
2001m1
2002m1
2003m1
2004m1
2005m1
2006m1
2007m1
2008m1
2009m1
2010m1
2011m1
Period: monthly


TAS
Best fitted curve
2004* ~ 110 (CI 105-115)
(130:100)
2011 ~ 128 (CI 116-140)
(153:100)
Increasing until 2008
(then decreasing)
Increasing until 2009
(then decreasing)
2005* ~8.1 (CI 7.0-9.2)
2011 ~8.6 (CI 7.2-10.0)
No. of ARTC (dash)
per 100,000 LDs
No. of RBTs (solid)
per 1,000 LDs
0
2
4
6
8
10
12
14
16
18
20
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200
230
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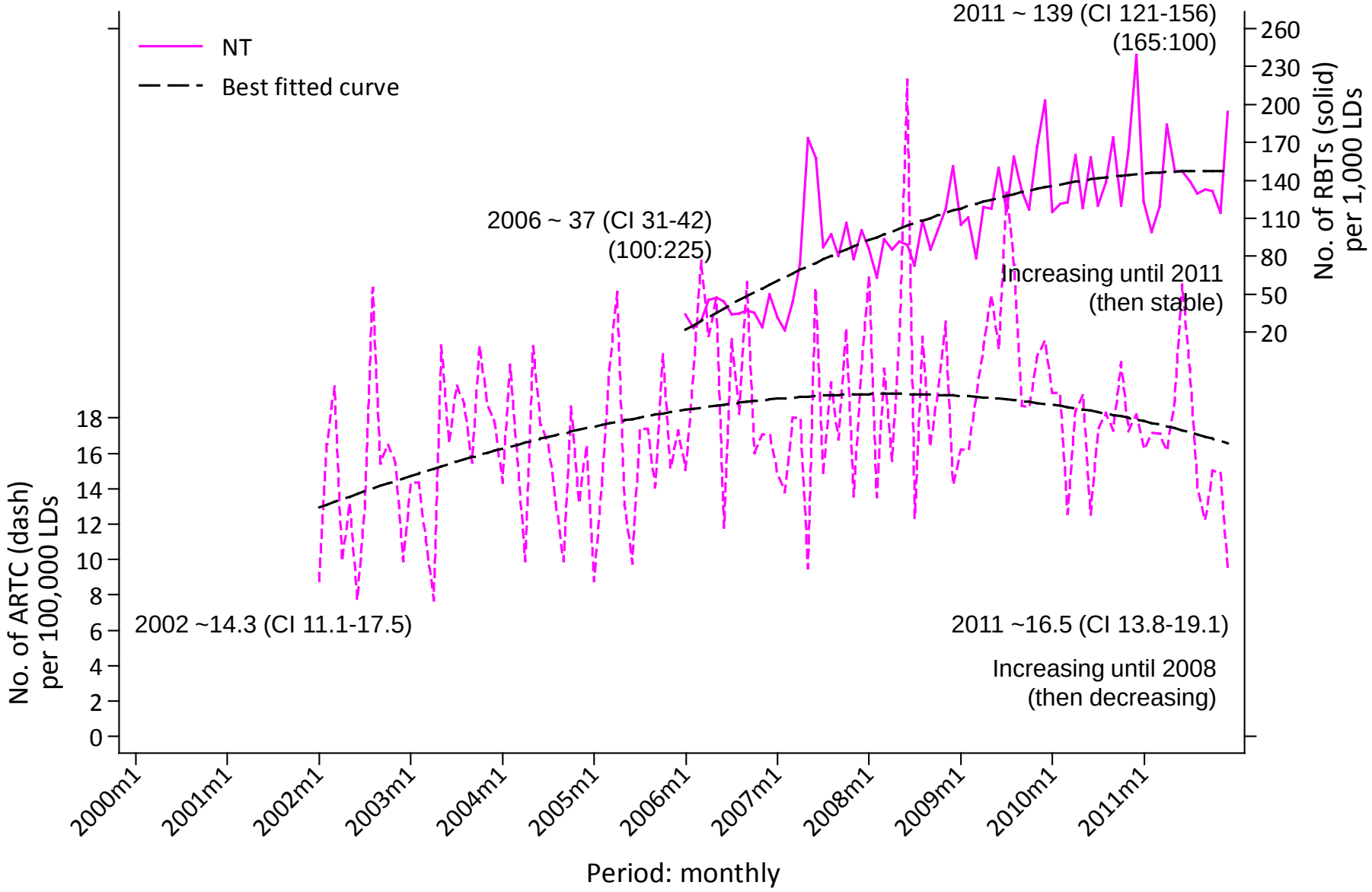
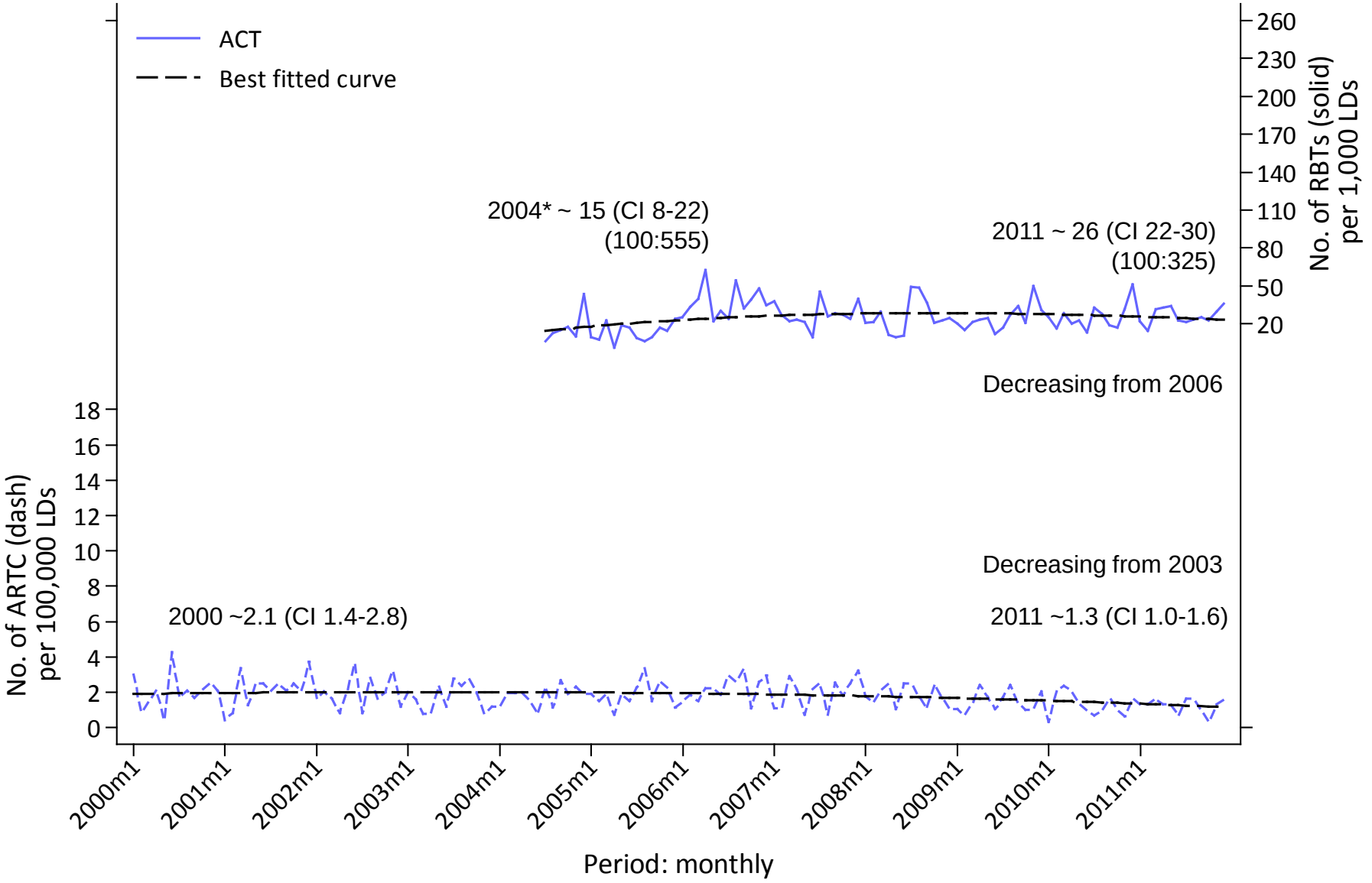
2000m1
2001m1
2002m1
2003m1
2004m1
2005m1
2006m1
2007m1
2008m1
2009m1
2010m1
2011m1
Period: monthly


NT
Best fitted curve
2011 ~ 139 (CI 121-156)
(165:100)
2006 ~ 37 (CI 31-42)
(100:225)
Increasing until 2011
(then stable)
2002 ~14.3 (CI 11.1-17.5)
2011 ~16.5 (CI 13.8-19.1)
Increasing until 2008
(then decreasing)
No. of ARTC (dash)
per 100,000 LDs
No. of RBTs (solid)
per 1,000 LDs
0
2
4
6
8
10
12
14
16
18
20
50
80
110
140
170
200
230
260
2000m1
2001m1
2002m1
2003m1
2004m1
2005m1
2006m1
2007m1
2008m1
2009m1
2010m1
2011m1
Period: monthly


ACT
Best fitted curve
2004* ~ 15 (CI 8-22)
(100:555)
2011 ~ 26 (CI 22-30)
(100:325)
Decreasing from 2006
Decreasing from 2003
2000 ~2.1 (CI 1.4-2.8)
2011 ~1.3 (CI 1.0-1.6)
No. of ARTC (dash)
per 100,000 LDs
No. of RBTs (solid)
per 1,000 LDs
0
2
4
6
8
10
12
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260
2000m1
2001m1
2002m1
2003m1
2004m1
2005m1
2006m1
2007m1
2008m1
2009m1
2010m1
2011m1
Period: monthly

Summary of 6 States - Monthly

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State	Period	RBTs:LD	Period	ARTC:LD	Comment
QLD	2000-11	Stable (↓)	2004*-09*	Stable	
WA	2000-11	Large ↓	2001-10	Large ↑	ARTC ↓ '09-'11
SA	2000-11	Stable (↓)	2000-11	↓	ARTC ↓ '07-'11
TAS	2004*-11	Unstable ↑↓	2005*-11	Unstable↑↓	Pattern of ARTC follows RBT
NT	2006-11	Large ↑	2002-11	Unstable↑↓	Since ↑ in RBTs substantial ↓ in ARTC
ACT	2004*-11	Stable ↓	2000-11	Stable (↓)	RBTs ↓ after 2006; Crashes ↓ after 2003
NSW	No monthly crash data				
VIC	No monthly RBT data				

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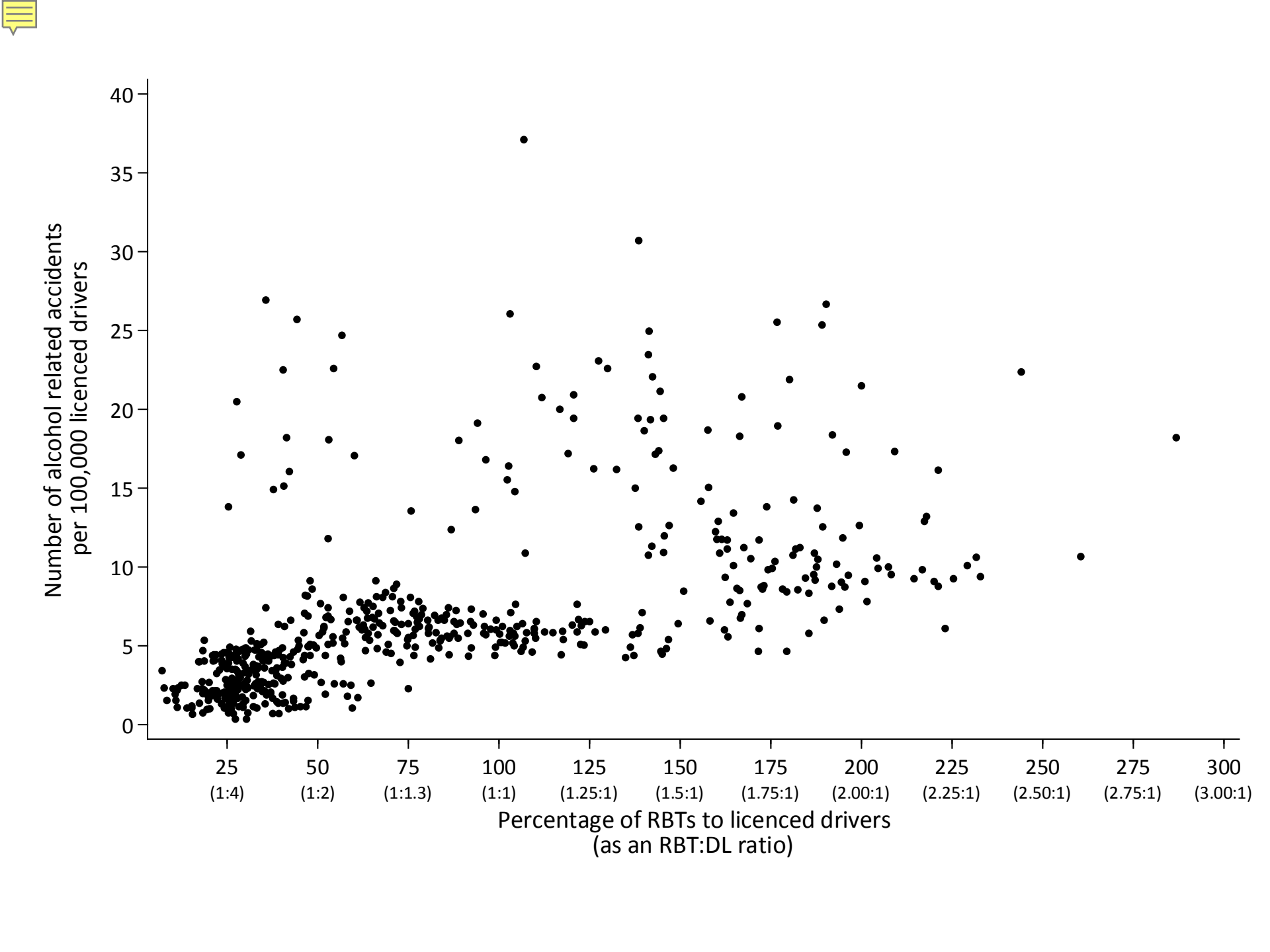
Putting all the data together
(2000-2011)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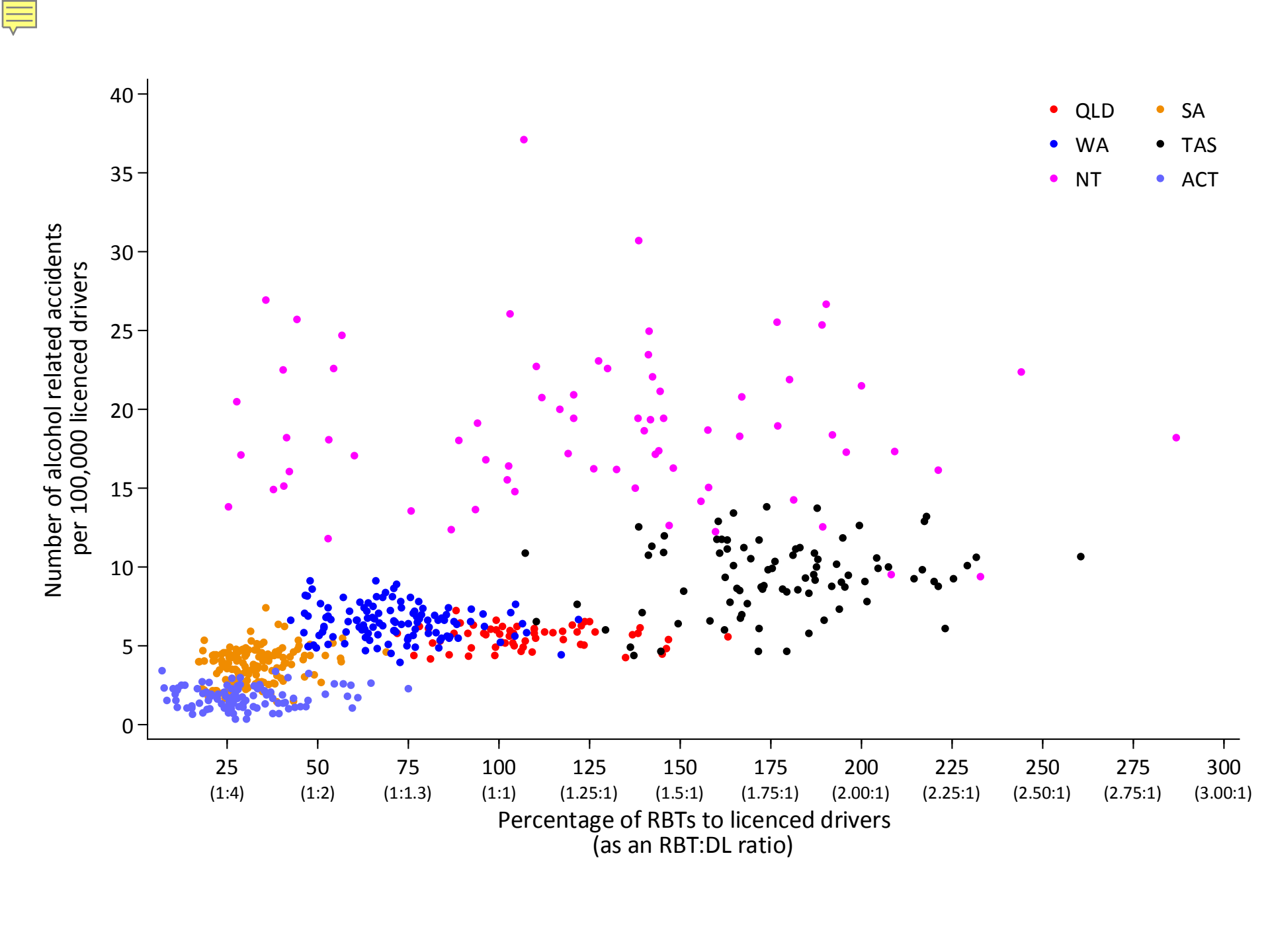
Percentage of RBTs to licenced drivers (as an RBT:DL ratio)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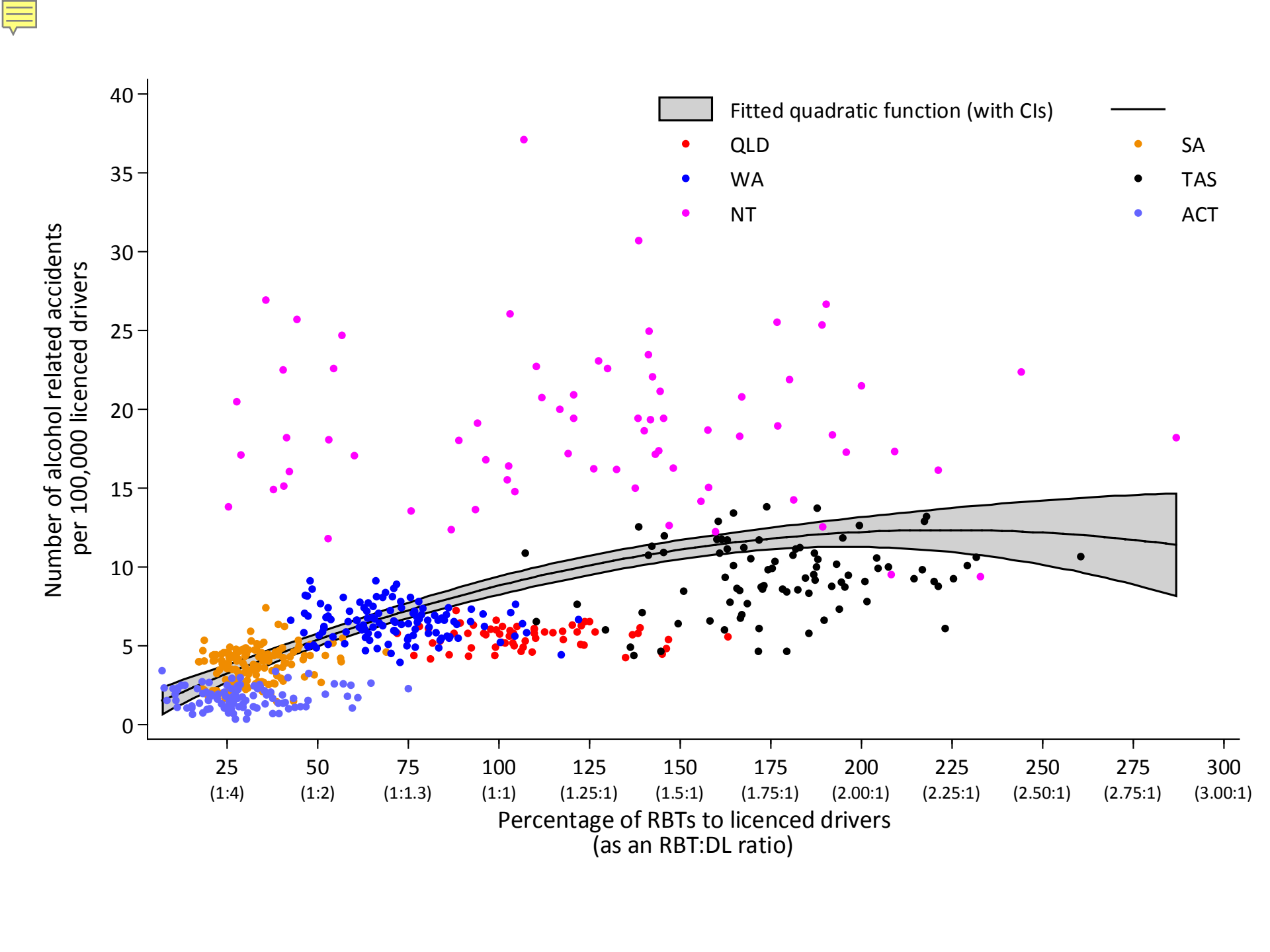
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Percentage of RBTs to licenced drivers (as an RBT:DL ratio)

One size (does not) fit all

WA vs QLD

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	QLD	WA	SA	TAS	NT	ACT
RBT : licensed driver ratio	1:1	1:3*	1:2	1.4:1	1:1	1:3
Population	4.5m	2.3m	1.6m	.5m	.2m	.4m
Rank (population)	3rd	4th	5th	6th	8th	7th
% in capital city (population)	46	75	75	42	50	99
Geographical size ($km^{2)}$	1.8m	2.5m	1.0m	0.07m	1.3m	.23m
Rank (size)	2nd	1st	4th	7th	3rd	8th
% licensed drivers	71	69	71	73	49	80*
% Current drinkers*	83	83	81	86	86	86
% Drink-driving last 12 months	9	14	13	12	15	15
Odds Ratio of drivers admitting DUI p.a.	1:00	1.57*	1.46*	1.40*	1.66*	1.71*

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Variations by state

- Geographical factors
  - Urban density
    - Kilometers and spread of sealed road
    - Proportion living in capital cities
- Operational factors
  - RBT types
    - Stationary/Booze bus
    - Roving/Mobile
  - RBT targets
    - Numbers of RBTs conducted
    - Number of positive detections
  - Operational differences between city, regional, remote

Limitations and what next?

- Changes in recording of alcohol involvement at traffic accidents
- Administrative police data have ‘0%’ BAC measures
  - These measures may represent – ‘no’ measure taken – not a zero
- Other limitation???

- We are currently modelling these data using crashes during high-alcohol hours as a proxy for alcohol related traffic crashes.
- We are looking into how the proportion of RBT types conducted impact the relationship between ARTC and RBTs

The following slides – I may not use – but they are about estimating the cost of RBTs and the effect of changing the RBT ratio – based on QLD and WA data

What does this all mean?

If we only use the WA and QLD data!

- The cost per RBT is $6.00
- In WA, doubling the ratio of RBTs LD means increasing the monthly average number of RBTs from 60,000 to 120,000: an extra 60,000 RBTs/month
- This equates to $6*60000*12 = $4.5 million dollars p.a.
- Doubling the number of RBTs from 1:2 to 1:1 *may* result in ARTC reduction of 1.7 (1.2-2.2) per 100,000 LDs per month
- WA – 1,456,480 – therefore 1.7*14= 23 ARTC per month
- ~ if 1 in 10 ARTC result in fatality – 2.3 lives per month
- $2.6 mill (cost per life) * 2.3 lives saved = is $5.9 million saved per month