Cyclone Resilience through Academic and Industry Partnership

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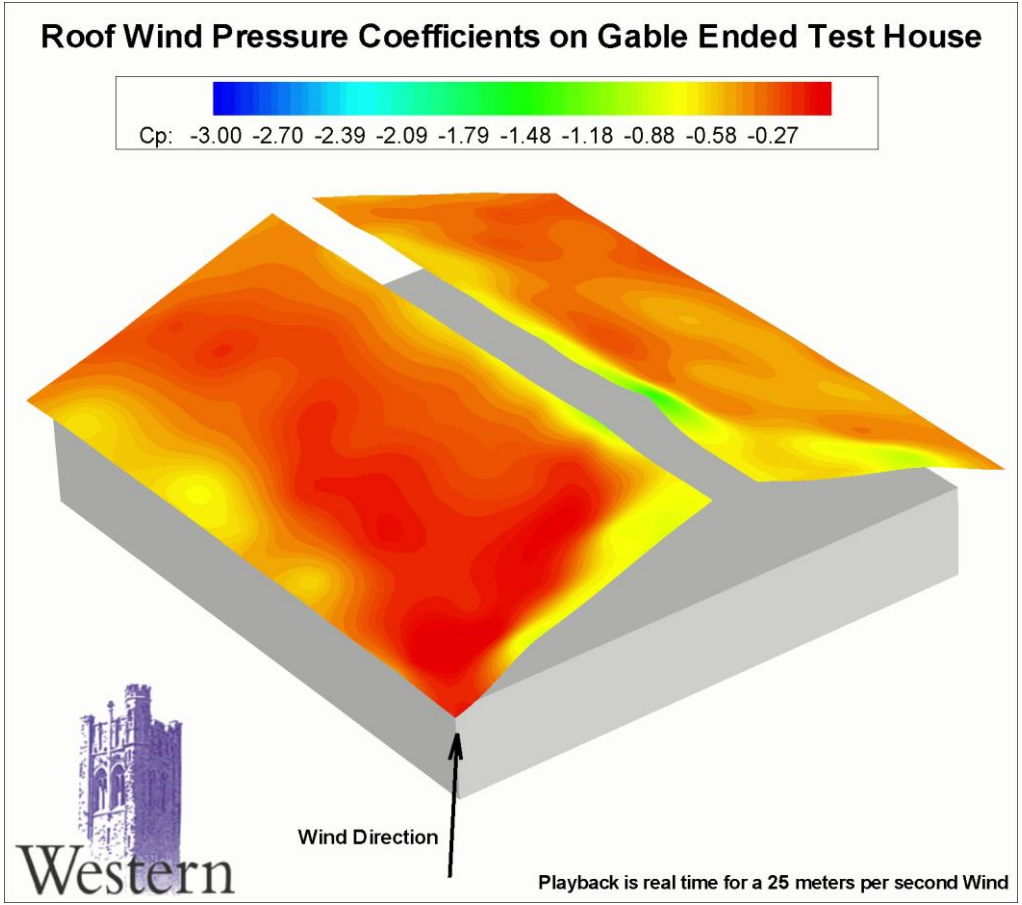
Why housing? Common but complex

- They are where we shelter – so have to be secure
- Traditional process – evolved from holding roof up not down
- Many elements, closely spaced
- There is load sharing, so no easily defined load path

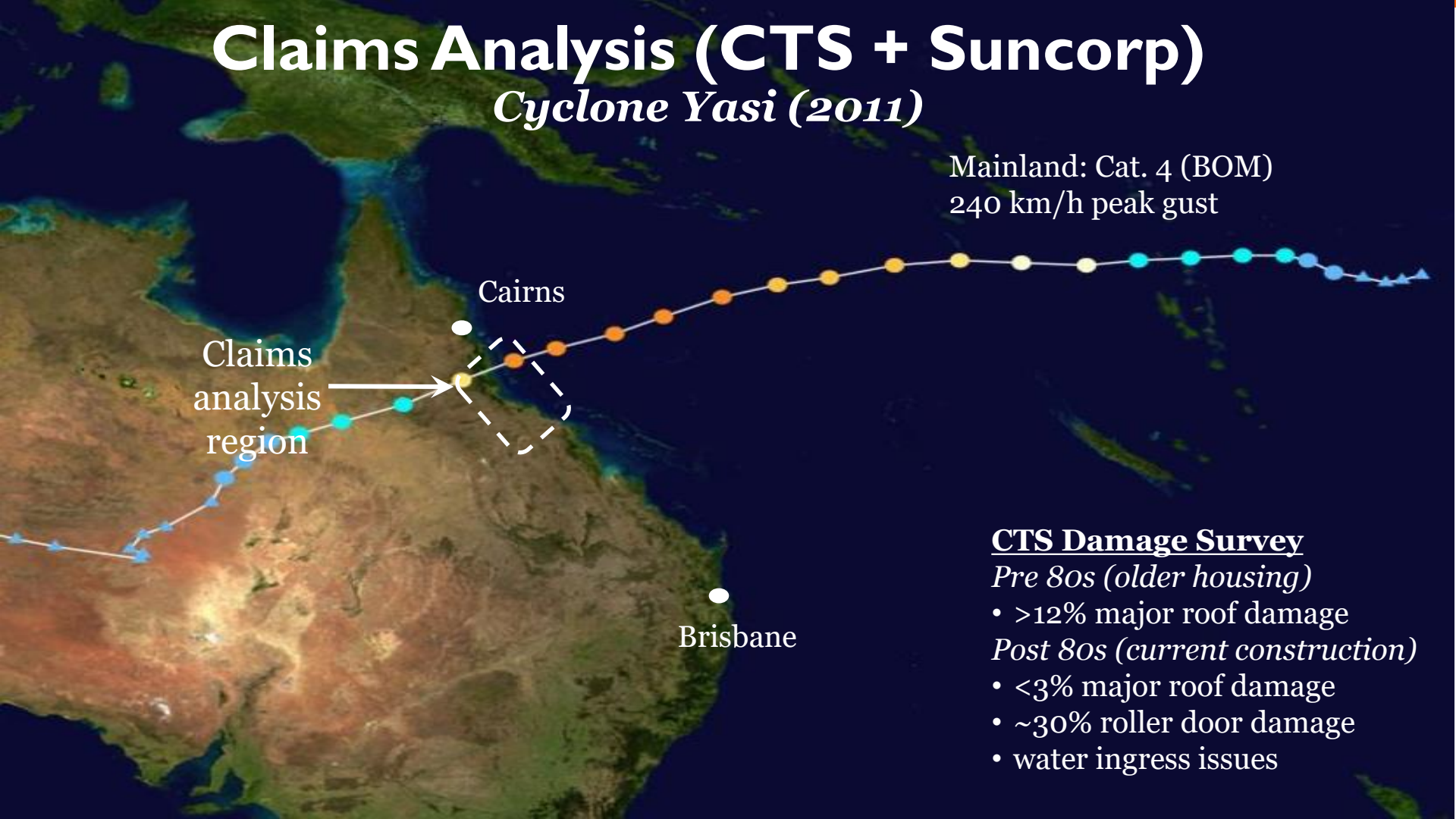
Local Wind Field Parameters



- Approach terrain category
- Shielding
- Topography
- Height of building
- Orientation of building

Claims Analysis (CTS + Suncorp)

Cyclone Yasi (2011)



CTS Damage Survey

Pre 80s (older housing)

- >12% major roof damage

Post 80s (current construction)

- <3% major roof damage
- ~30% roller door damage
- water ingress issues

Data Overview

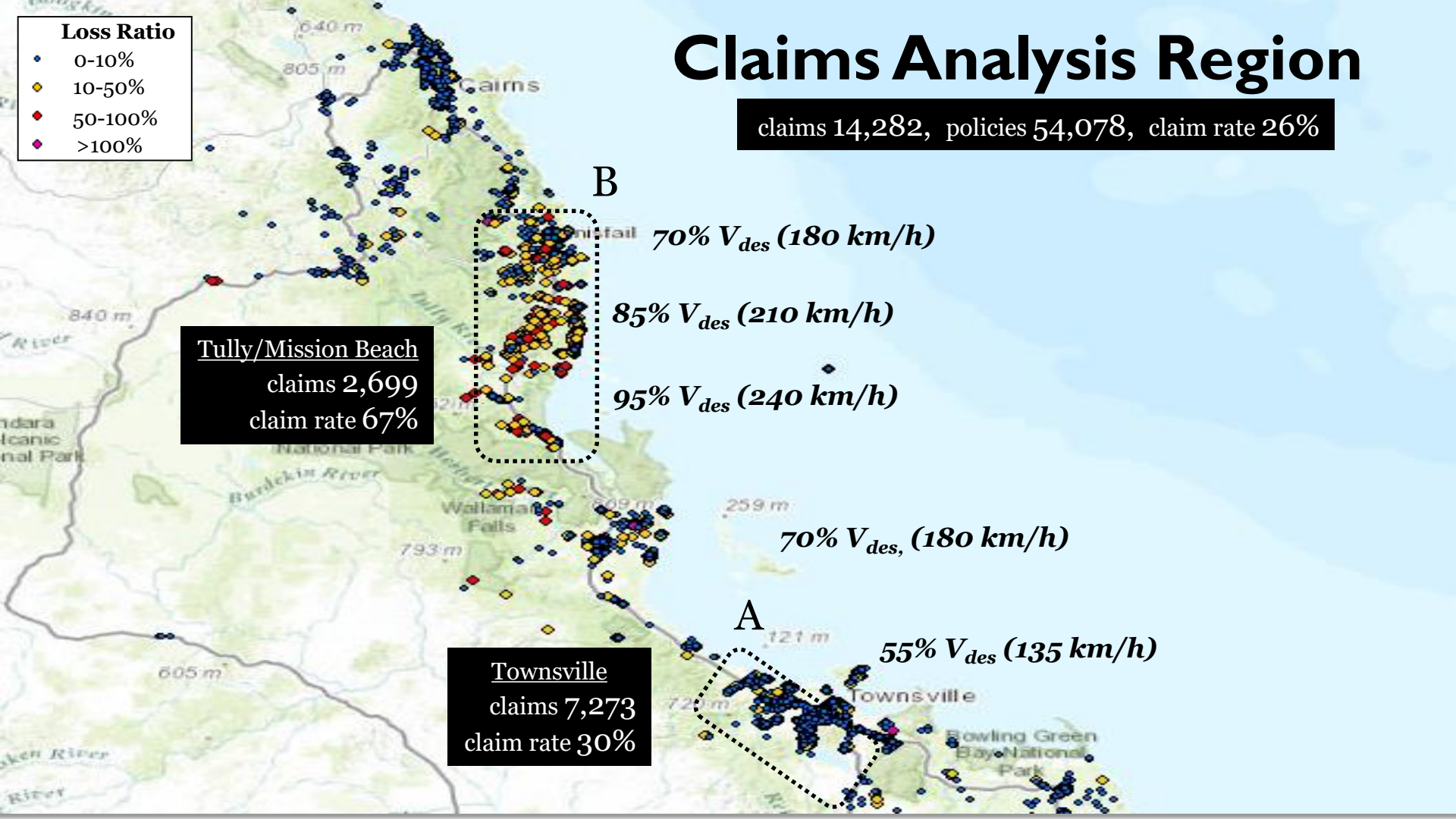
Claims Data

- 14,282 claims (aggregate)
- Loss, ins. value, lat/long, home age, damage description
- Wind speeds: num. models, street signs, few anemom.
- 179 assessors reports, random subset (photos, etc.)

Methodology

- Loss ratio proxy for damage intensity (claim/ins. value)

Damage Intensity	Loss Ratio Range
No Damage	0 (i.e. no claim)
Minor	0-10%
Moderate	10-50%
Severe	50-100%

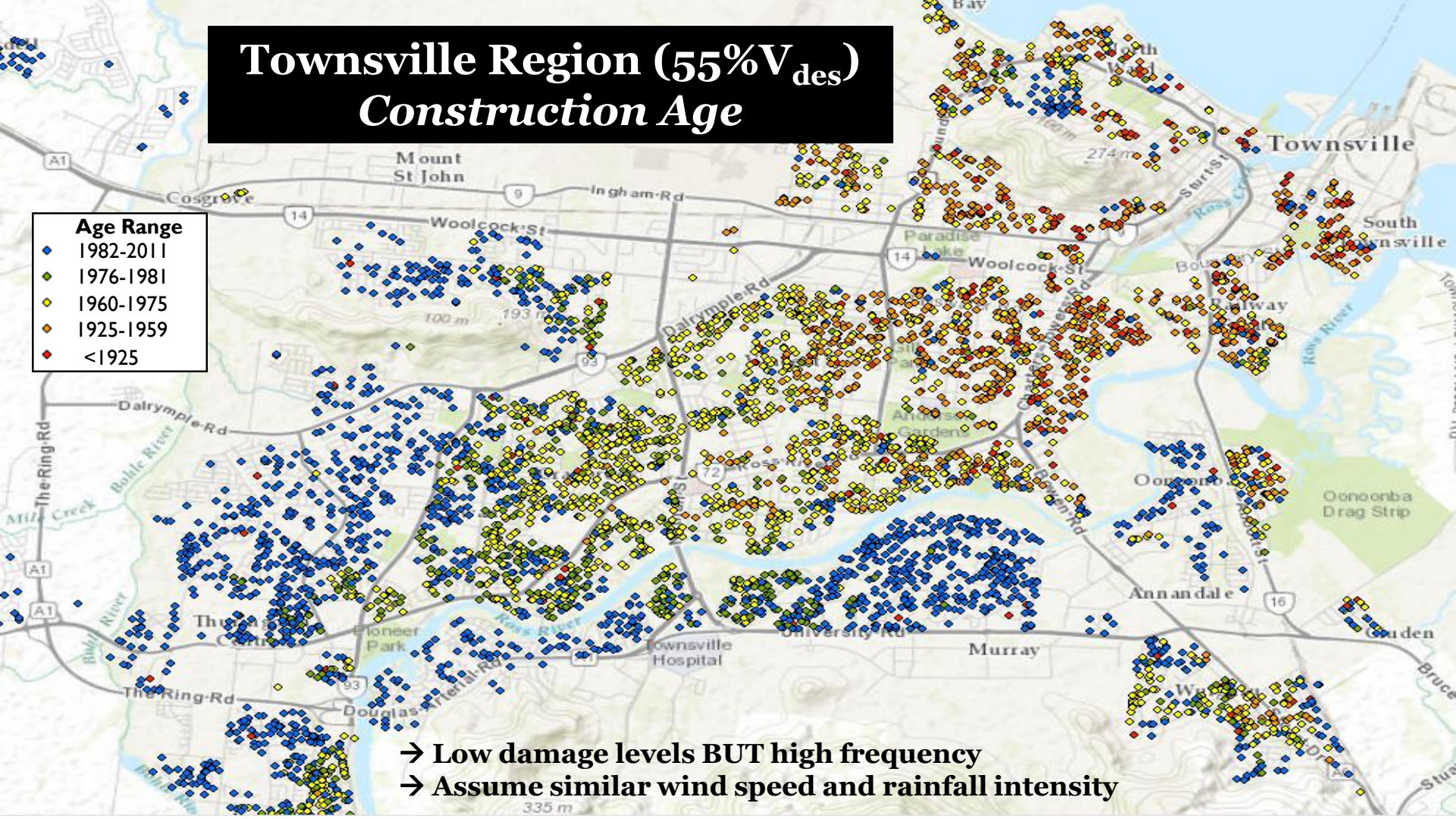

Loss Ratio
0-10%
10-50%
50-100%
>100%
Claims Analysis Region
claims 14,282, policies 54,078, claim rate 26%
B
70% V_{des} (180 km/h)
85% V_{des} (210 km/h)
95% V_{des} (240 km/h)
Tully/Mission Beach
claims 2,699
claim rate 67%
70% V_{des}, (180 km/h)
A
55% V_{des} (135 km/h)
Townsville
claims 7,273
claim rate 30%
Cairns
Townsville
Bowling Green Bay National Park
Wallaman Falls
Burdekin River
640 m
805 m
840 m
793 m
259 m
121 m
605 m

Structural Failures (Older housing)

Water Ingress Failures (Age independent)

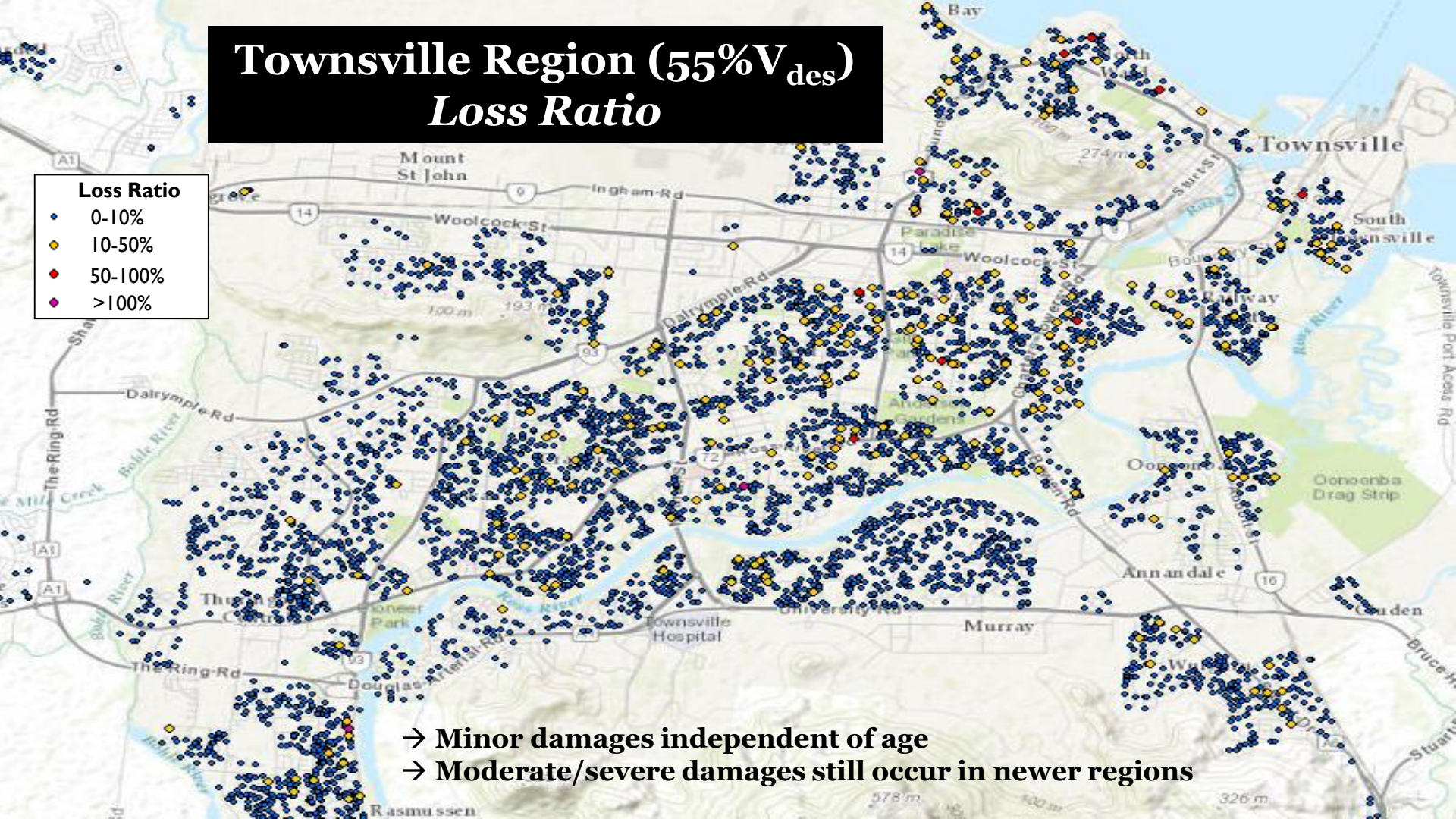
Auxiliary Items and Maintenance (Age independent)

Townsville Region ($55\%V_{des}$)
Construction Age



→ **Low damage levels BUT high frequency**
→ **Assume similar wind speed and rainfall intensity**

Townsville Region (55%V_{des})
Loss Ratio



→ **Minor damages independent of age**
→ **Moderate/severe damages still occur in newer regions**

Insured Loss – Townsville (55% Vdesign)

Proportion of Claims	Proportion of Cost	Loss Ratio
94%	60%	0-10%
5%	32%	10-50%
<1%	6%	50-100%
<1%	2%	>=100%
$63,575,021		Net Loss

Small claim
High frequency

Large claim
Low frequency

→ Primarily damage from auxiliary items (i.e. minor debris, shade sails, water ingress, fences)
→ Severe damages still occur in both old (structural) and new (water ingress) housing

Key Findings and Recommendations

- Roofing, window, water ingress → dominate loss
- Pre-code housing at relatively > risk of structural damage
- **Modern housing still vulnerable**
- Minor damages independent of housing age (high frequency)

<u>Recommendations for Mitigation (Existing housing)</u>

1. Structural roof upgrading
2. Opening (i.e. windows, doors, etc.) protection upgrading
3. Community education/outreach

How do we get homeowners to invest in mitigation?

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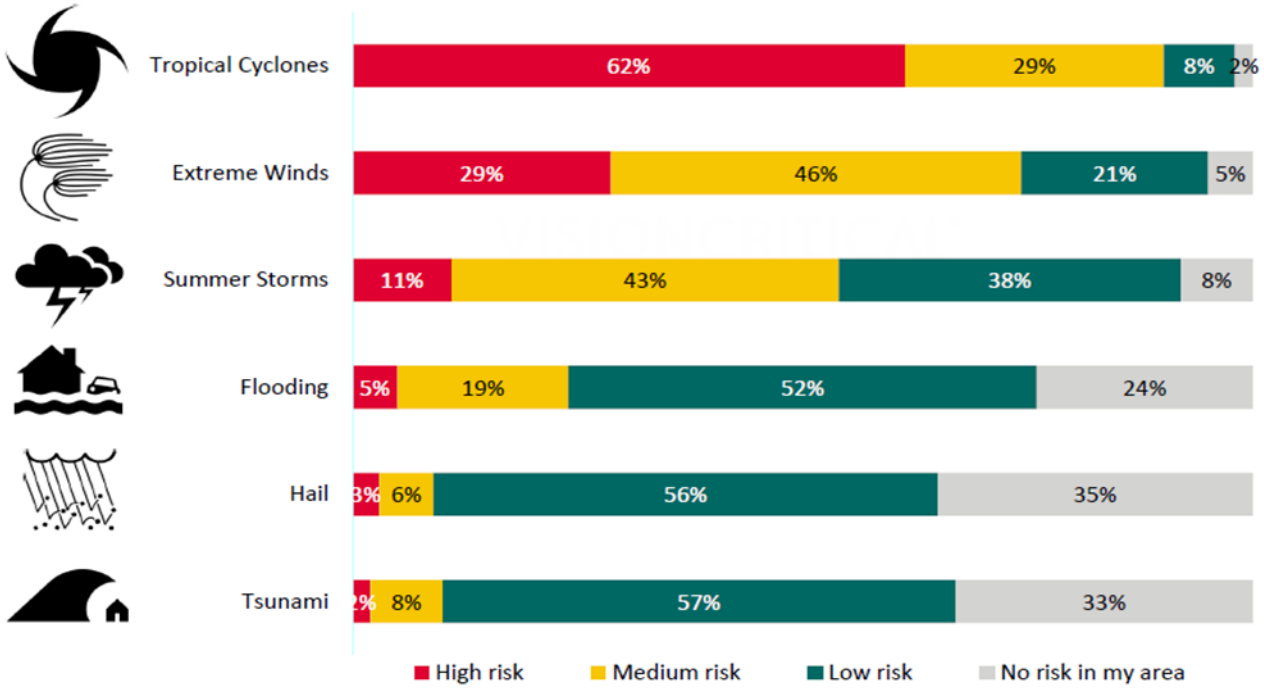
Understanding Behavior Change

Understanding Behaviour Change

Customer survey



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Natural Hazard Insurance Pricing

How does it work?

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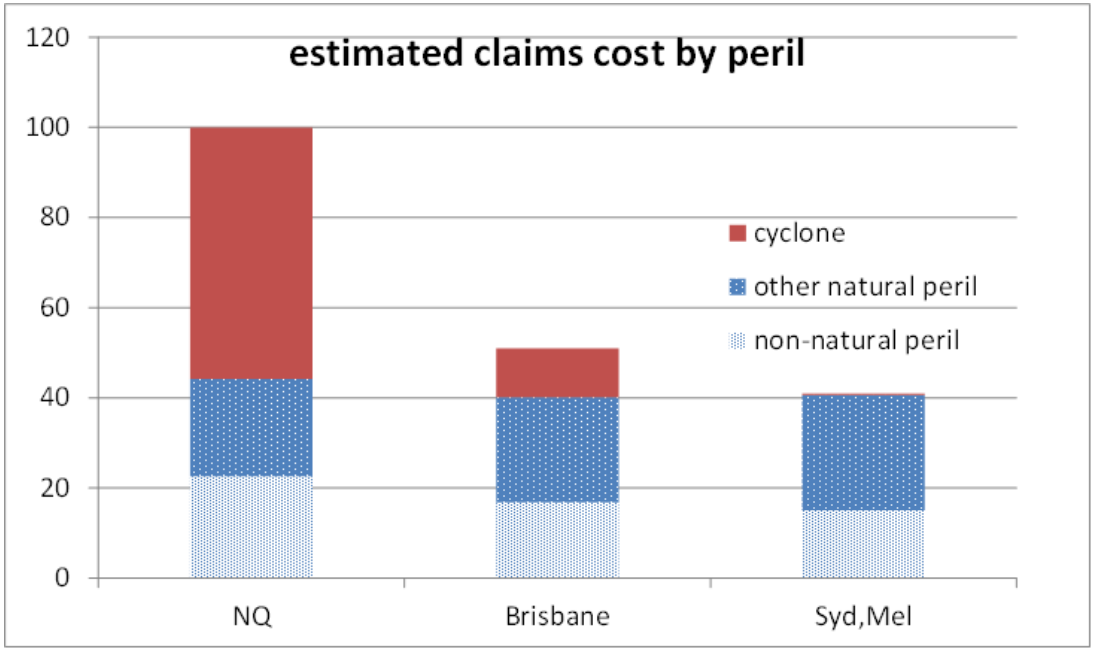
Natural hazard Insurance Pricing

Premium Breakdown



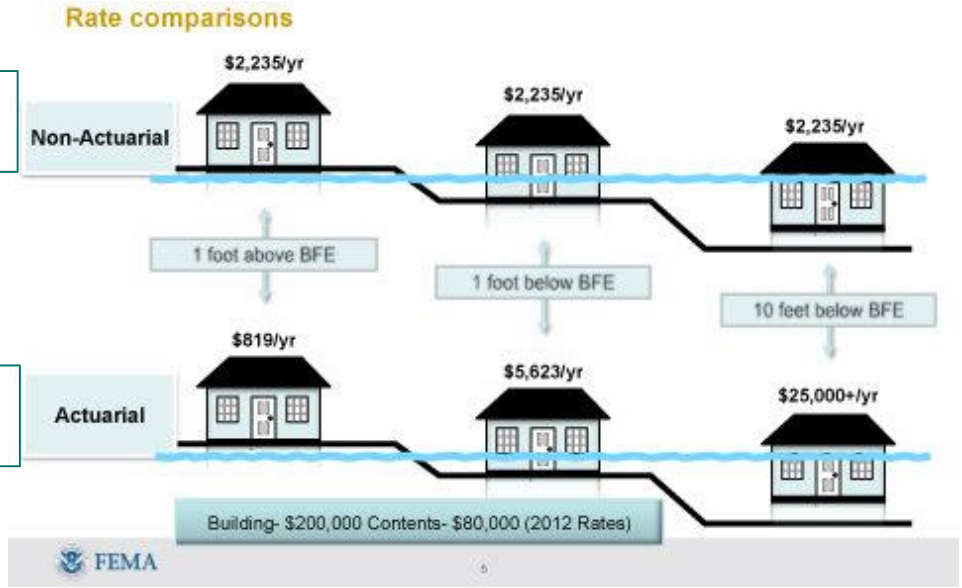
Australian Government Actuary: Report on Home and Contents Insurance Prices in North Queensland: page 5, 2014

Natural Hazard Insurance Pricing

Risk pricing vs risk pooling

Pooled risk
poor price signal

Address level risk
Strong price signal



- Evolution of insurance pricing has removed cross subsidies across customers
- Strong price signal has led to affordability issues for high risk areas
- Address the underlying risk and price reduces

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Cyclone Resilience Benefit

Introduction

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Cyclone Resilience Benefit

Introduction

Cyclone Resilience Benefit

Key points of vulnerability as basis for question structure

Roofs

Window and door openings

Preparedness

Sheds

Size of the benefit depends on:

- Roof upgrades – largest driver of benefit as largest structural vulnerability addressed
- Location of home – largest potential benefits go to mitigation in the most cyclone prone areas
- Age of home – work done to pre 1980s properties will see largest benefits

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Cyclone Resilience Benefit

Findings

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Cyclone Resilience Benefit

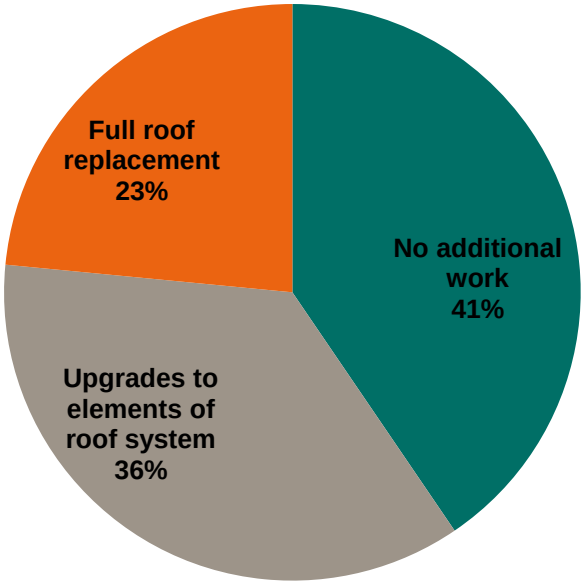
Findings

- 14,400 customers have received the CRB since launch (end of June)
- Average saving around $100
- Reductions ranging from $20 to $400+

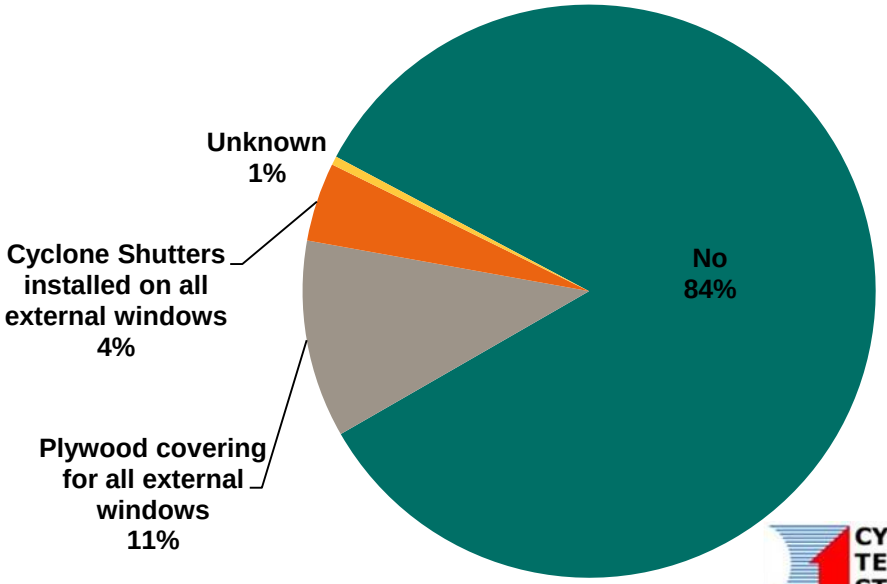
Cyclone Resilience Benefit

Findings

Pre 1980s roof improvements



Cyclone protection for windows (all ages)



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Building Community Cyclone Resilience

Next steps

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Thank you!

As the next stage of research, CTS, Suncorp, and Qld Gov't are working to develop tools (e.g. mobile app) to help the community better understand housing vulnerability in cyclones.