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AUSTRALIA



Applying hydrocarbon systems analysis to assess aquitard hydraulic performance

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Disclaimer & Disclosure

Disclaimer

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Disclosure

The UQ Centre for Coal Seam Gas is currently funded by the University of Queensland 22% (\$5.0 million) and the Industry members 78% (\$17.5 million) over 5 years. An additional \$3.0 million is provided by industry members for research infrastructure costs.

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Our Research Question

Understanding methane occurrence in the groundwater of coal basins:

Can we use historical O&G and Water Monitoring data to help define a baseline?

Can we define a quantitative approach to estimating the distribution of Flux to Surface?

What does this say about aquitard performance?



<http://www.miningaustralia.com.au/news/no-conclusion-yet-for-condamine-river-csg-seepage>

Soil Gas

Year	Location	No. of Samples	Methane Range [ppm]
1983	Giligulgul (Wandoan)	258	2.5 - 48
1987	Chinchilla	58	1.2 - 25.5
1988	St George	314	1.9 - 89.1
	Bungil (South of Roma)	322	0.1 - 48.7
1989	Kalima (near Roma)	158	1.7 - 14.8
	Chinchilla	150	1.7 - 22.1
1991	Glenmorgan	534	8.09 - 42.45

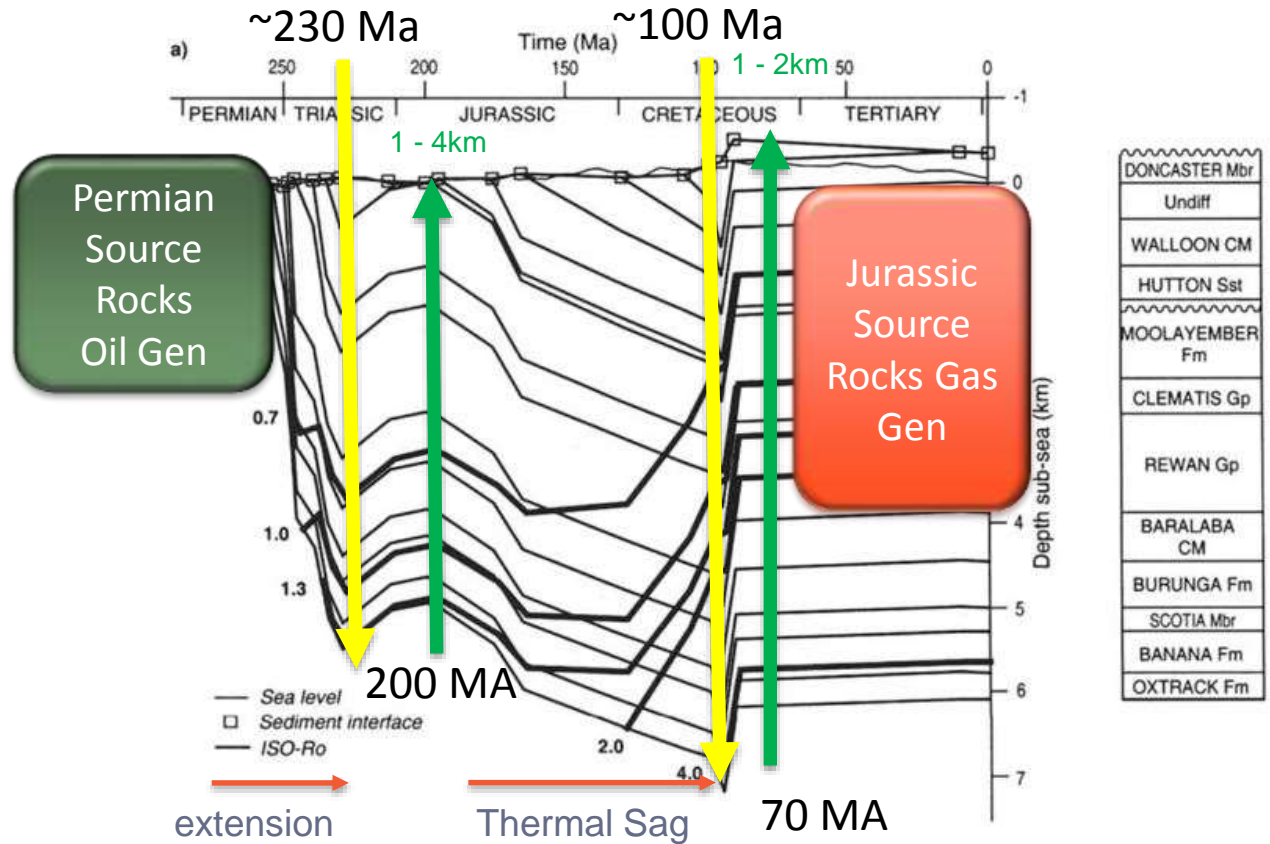
Gas Fields Commission, Queensland



How we explored the research question...

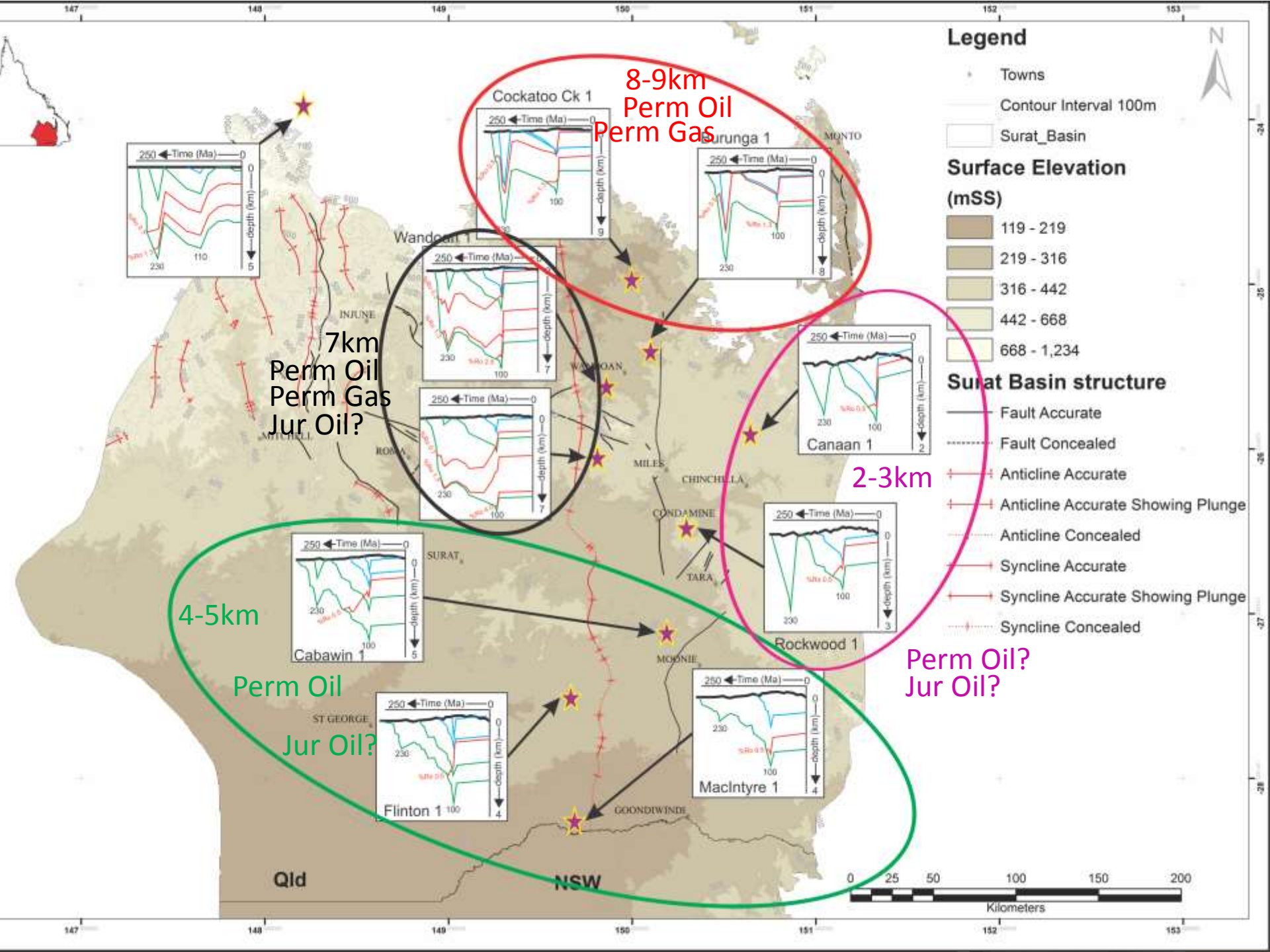
Create a Hydrocarbon Habitat:

- Burial History
- Source Rock
- H/C Generation
- H/C Pools
- H/C migration fingerprints



Chris Boreham 1999





Legend

- Towns
- Contour Interval 100m
- Surat_Basin

Surface Elevation (mSS)

- 119 - 219
- 219 - 316
- 316 - 442
- 442 - 668
- 668 - 1,234

Surat Basin structure

- Fault Accurate
- Fault Concealed
- Anticline Accurate
- Anticline Accurate Showing Plunge
- Anticline Concealed
- Syncline Accurate
- Syncline Accurate Showing Plunge
- Syncline Concealed

8-9km
Perm Oil
Perm Gas

7km
Perm Oil
Perm Gas
Jur Oil?

2-3km

4-5km

Perm Oil
Jur Oil?

Perm Oil?
Jur Oil?

Cockatoo Ck 1

Surunga 1

Wandooan 1

Canaan 1

Cabawin 1

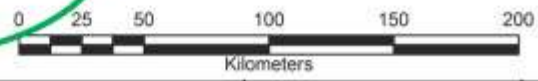
Rockwood 1

Flinton 1

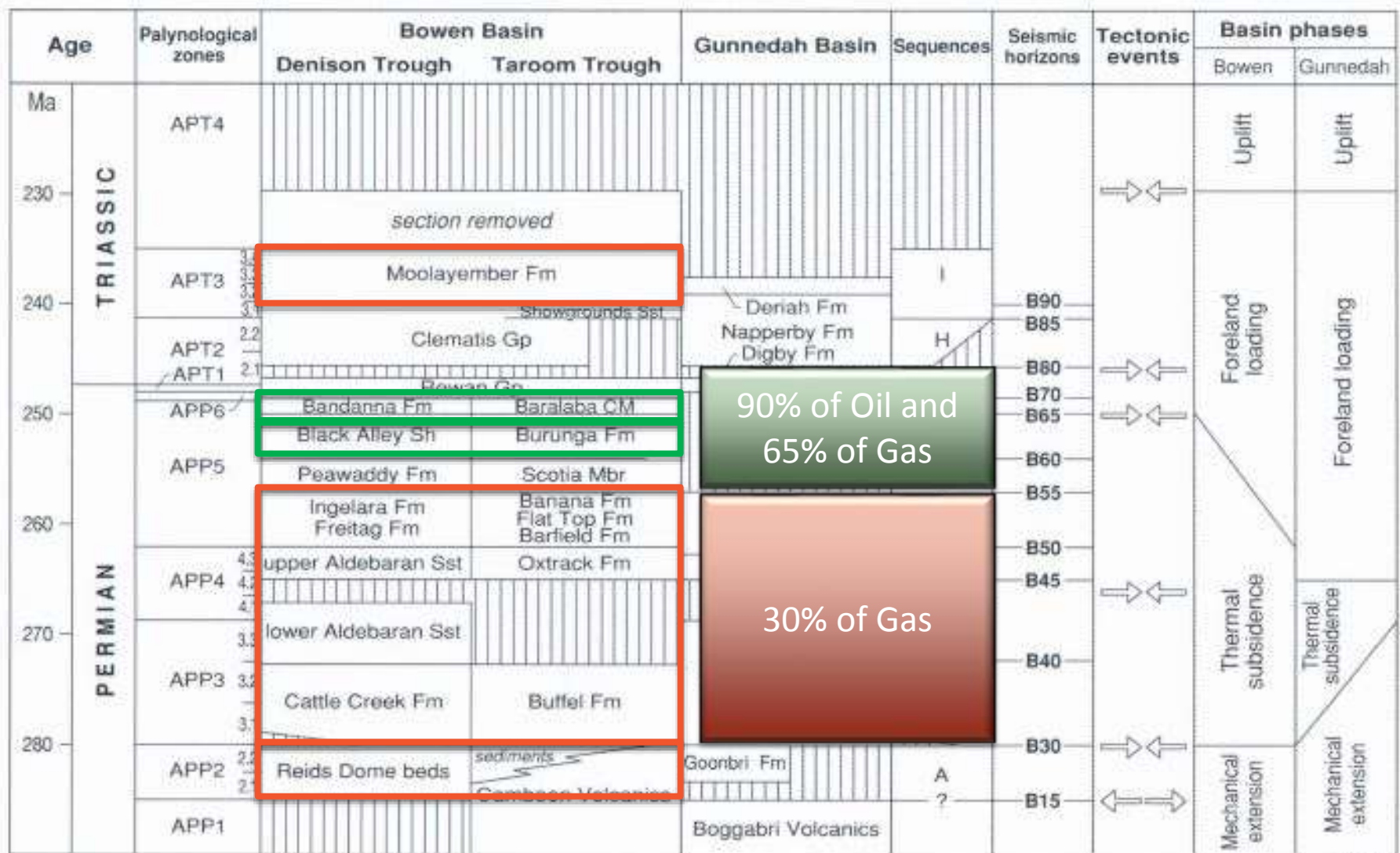
MacIntyre 1

Qld

NSW



Bowen and Surat Hydrocarbon Generation (Boreham and others)



12/A210



Where did all the hydrocarbon Go?



Calculated H/C generation (50% uncertainty)

- >3,400 billion barrels of Oil
- >2,700 billion barrels Oil equiv Gas (Shaw et al. 2000)

Discovered Con & CSG

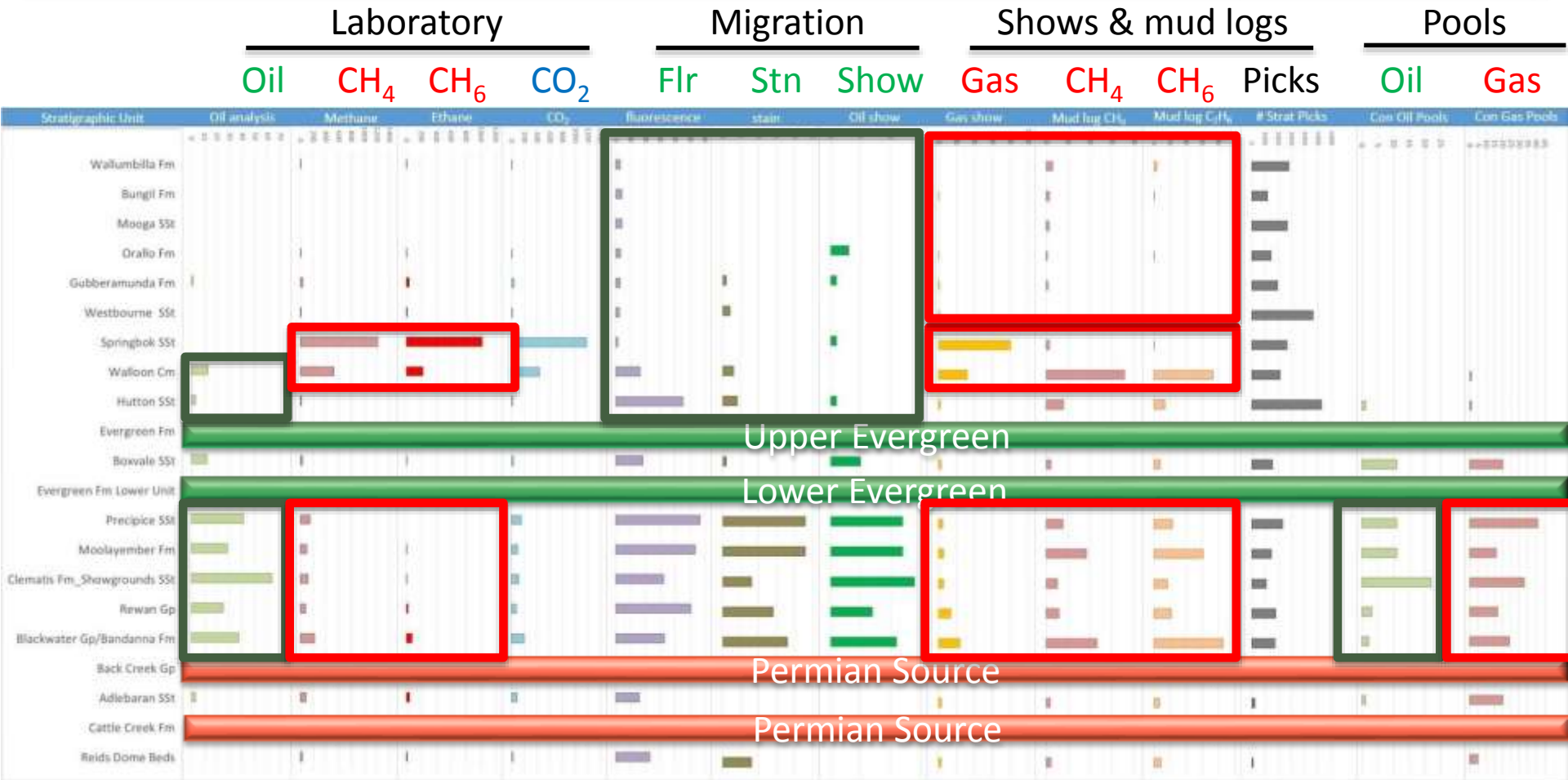
- >57 million barrels oil
- >5.6 billion barrels equiv Gas
- BREE (2014)

Still in source rock? Leaked out? Still to be found?



What we found: Summary of Hydrocarbon Indicators

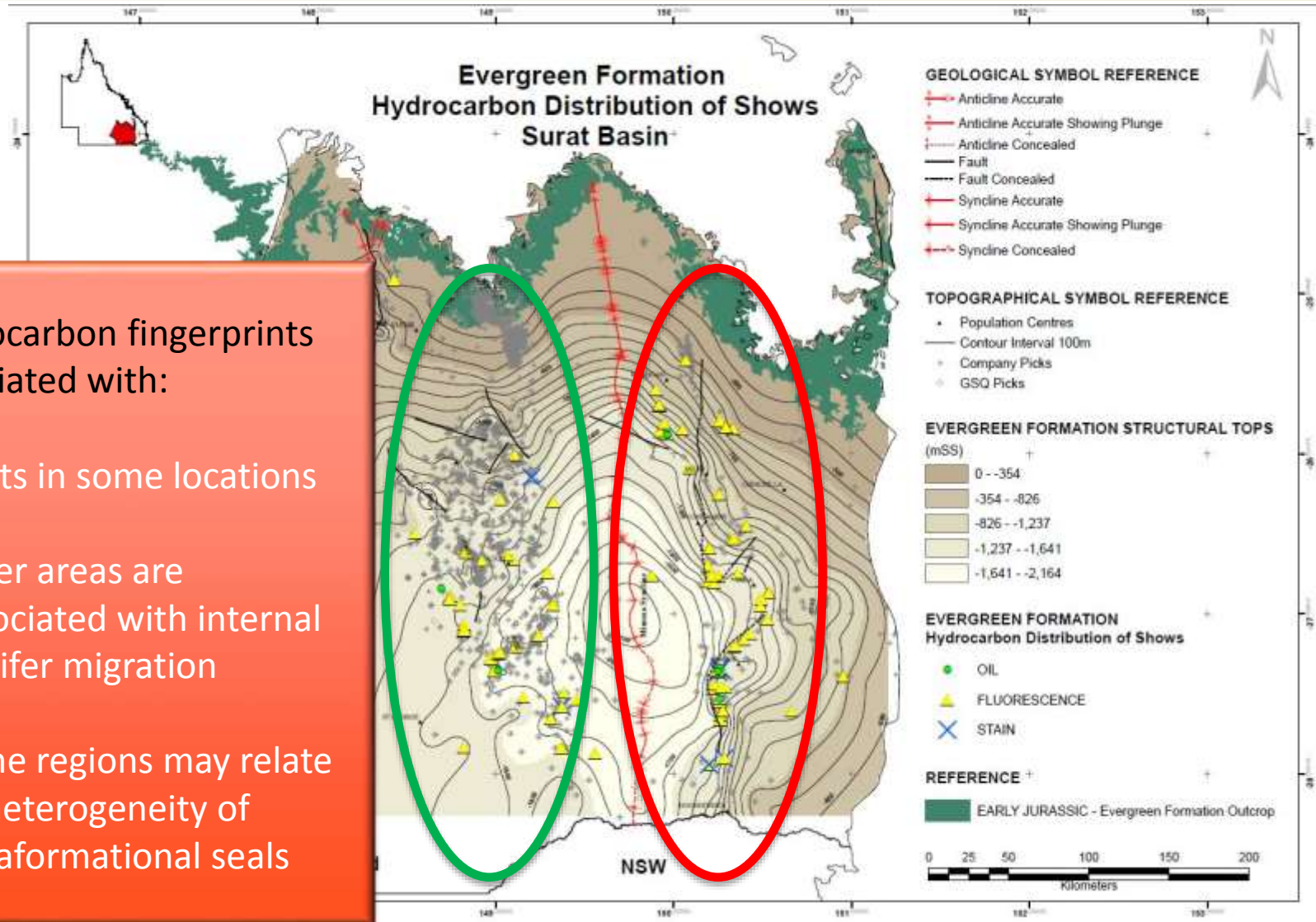
Pools below the Evergreen (plus Walloons Gas) and Migration between Evergreen and Surface



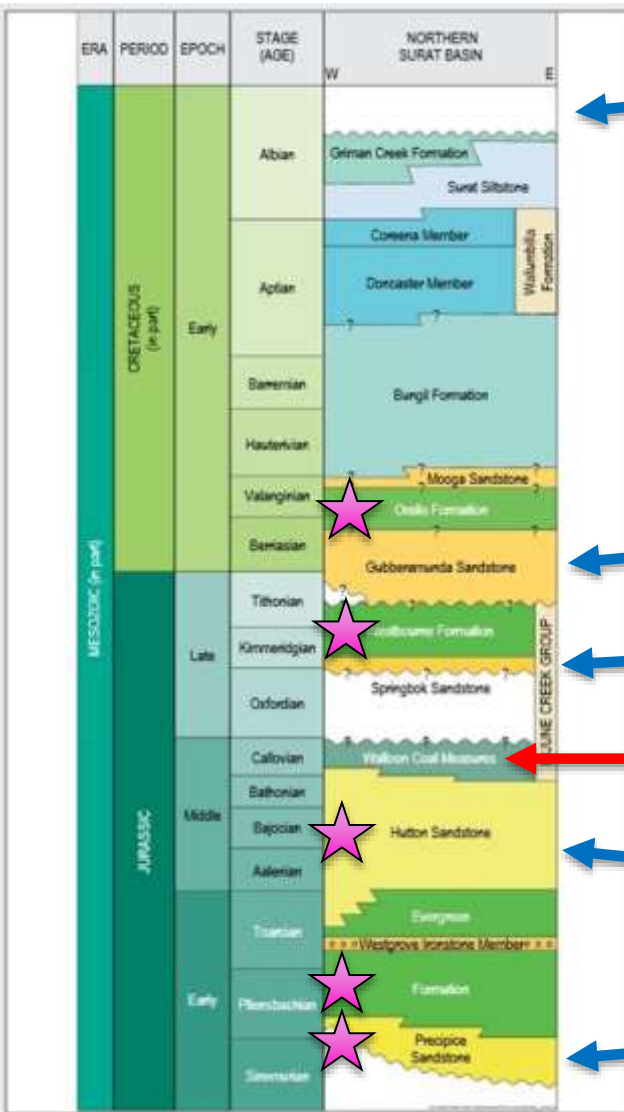
What we found: Fingerprints of oil migration

Hydrocarbon fingerprints associated with:

- faults in some locations
- other areas are associated with internal aquifer migration
- some regions may relate to heterogeneity of intraformational seals



What Next?



Alluvial Aquifers

Gubberamunda Sst Aquifer

Springbok Sst Aquifer

Commercial coal seam methane (Walloon CM)

Hutton Sst Aquifer

Precipice Sst Aquifer

- Model saturated formation water degassing
- Model minor coal methane contributions
- Estimate flux from Biogenic methane production displacing thermogenic methane
- Build a methane flux distribution tied to surface measurements



THANK YOU

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