

Overhead Line Designers Forum, August 2022
Hardwood Poles – Supply Considerations



Australian Hardwood Poles

Dan Batchelor – Connetics, National Supply Chain Manager





Australian Hardwood Poles

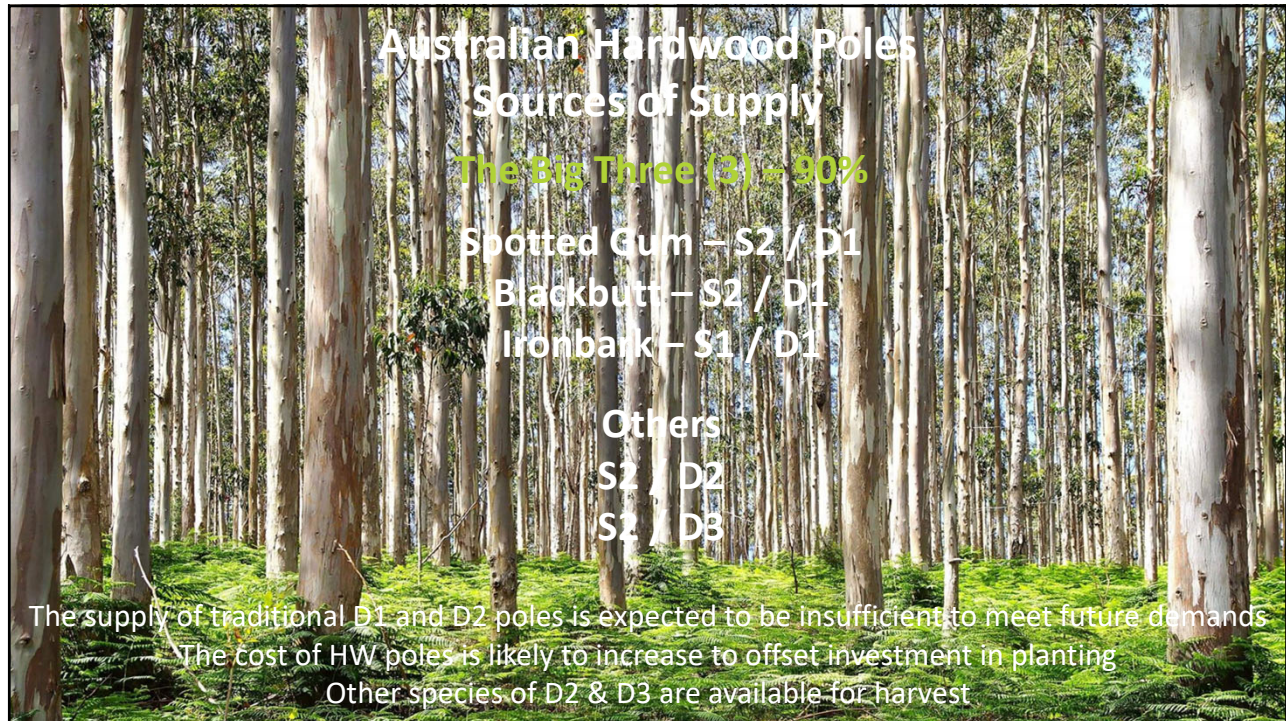
- Where HW poles come from –plantation / forest
- Growth patterns
- Common species used in utility poles
- Grading process
 - Strength 35%
 - Durability
 - Form 65%
- Strengths by region
- The treatment process
- Forecast of HW pole supply

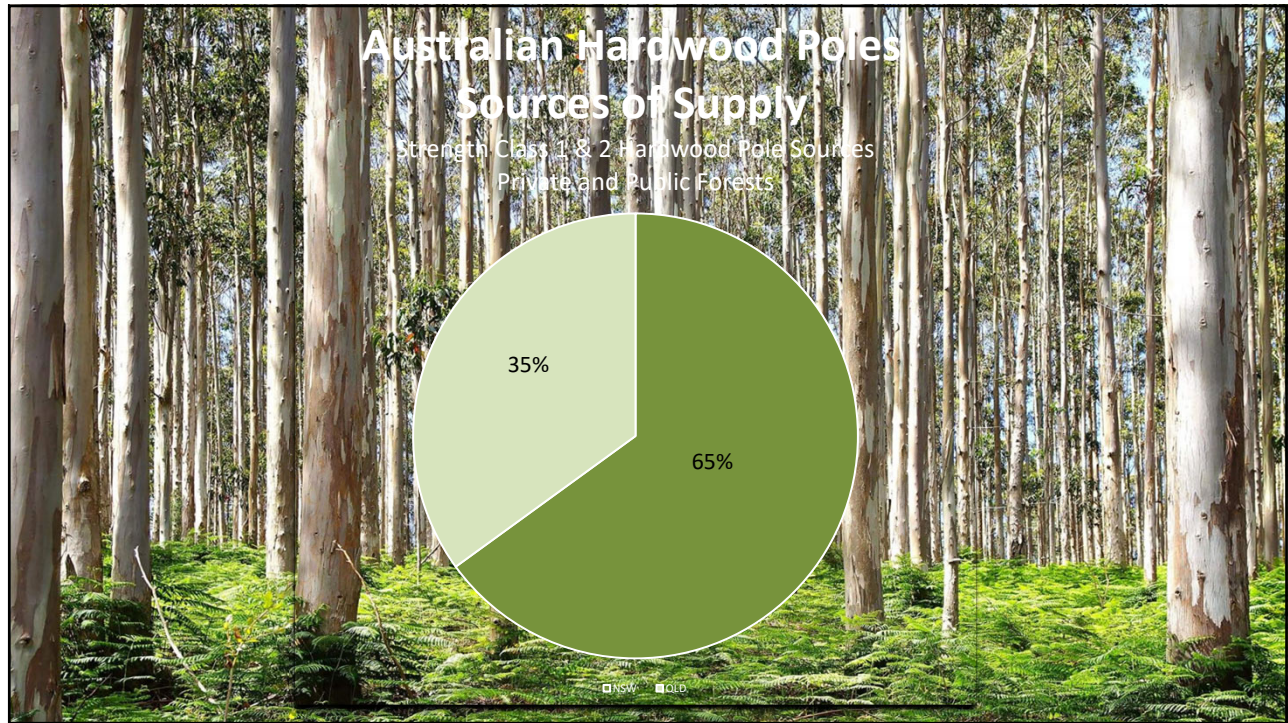


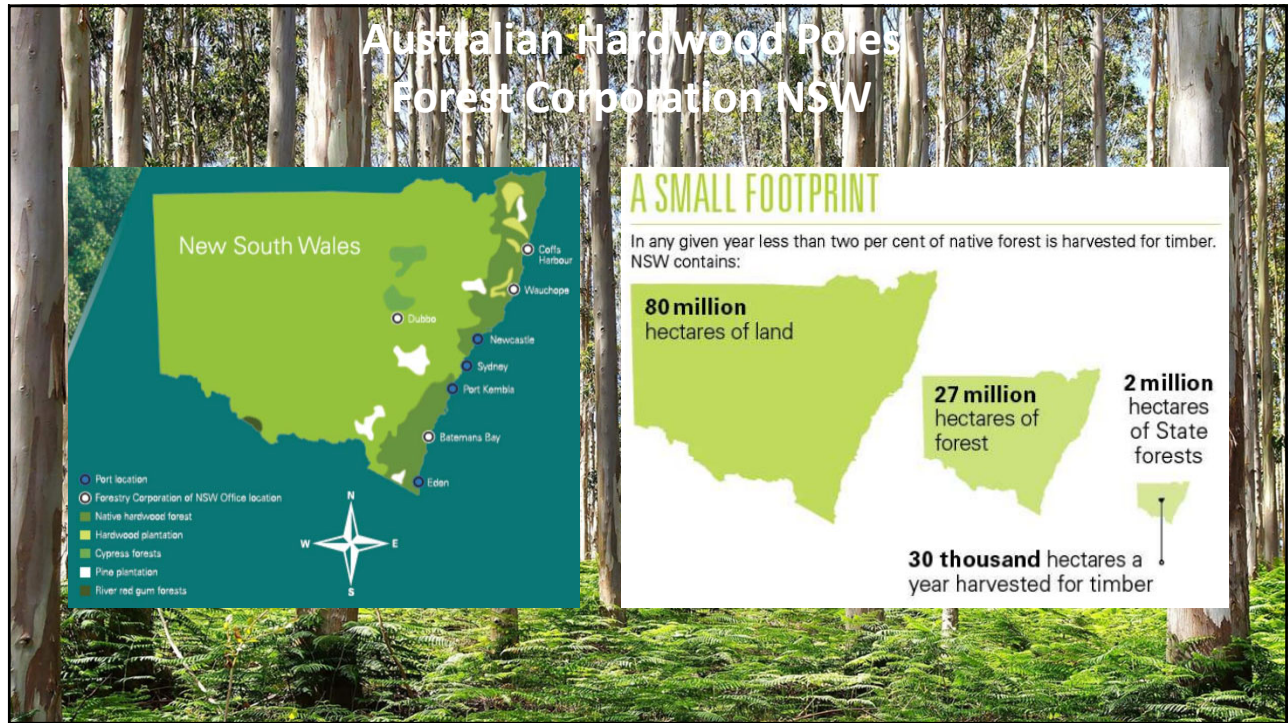
Australian Hardwood Poles Sources of Supply

Native Regrowth Forests Hardwood Plantation Forest

We are reliant on a stable HQ saw log business
50/ 50 Split between Private Properties and State Owned







Australian Hardwood Poles Sources of Supply

Currently FCNSW model is by **Managed Allocation**

- Williams Timber
- Coffs Harbour Hardwoods
- DTM Timbers (Dale & Meyers)
- Koppers Wood Products

2028 — Likely Shift To **Contested Market**

WT WILLIAMS | **CHH COFFS HARBOUR HARDWOODS** | **DTM Timber VALUE FOR LIFE** | **KOPPERS**


Australian Hardwood Poles Timber Sourcing & Selection

Selective Harvesting
Ensures only trees suitable for purpose are felled

Gap Harvesting
Regenerative – self sown from surrounds
Regenerates local genetics

Clear Felling
Followed by re-planting from seedlings
Generally used to restore genetics in a region

Merchandising
Purchase entire lot, keep poles, on sell balance



Australian Hardwood Poles

Determine Species
(Strength/ Durability)

Measure
(kN)

Assess Form
(Select / Standard)



Australian Hardwood Poles Preparation

Racking
Drying timber (season sap wood)
3-4 months (Moisture <28%)

Dressing
Cut to length / capped / plate base



Australian Hardwood Poles Durability

Bark

- Protects
- Transports Sugars
- Cells divide to cause growth in girth

Sap Wood

- Transports water & mineral salts
- Low density

Heart Wood

- New sap wood grows A outside
- Sap wood towards centre ceases to function
- Becomes impregnated with oils, gums and resins
- High density
- Creates inherent resistance to decay / insects





Australian Hardwood Poles Treatment

Autoclave
CCA Treatment

Vacuum Pressure Impregnation

Drying
Fixation of Chemicals




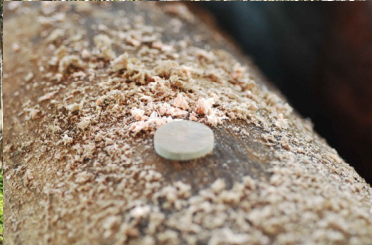

Australian Hardwood Poles CCA by VPI Process

- Copper – Fungicide
- Chrome – Fixes CCA components to timber (resistant to leaching / weathering)
- Arsenic – Insecticide & fungicide



Australian Hardwood Poles CCA treatment verification

- Cored (filled)
- Ground
- XRF (X-ray fluorescence)
- Retention 1.2% (Cu + Cr + As)

Heartwood generally unaffected by CCA treatment due to density & presence of gums, resins and oils

Australian Hardwood Poles Durability

Inherent resistance to decay and insect attack
Classifications 1 - 4

AS5604 – 2005 Durability Classification System

Durability Class	Probable in ground life expectancy (years)	Probably above ground life expectancy (years)
1	Greater than 25	Greater than 40
2	15 – 25	15 – 40
3	5 – 15	7 – 15
4	0 - 5	0 - 7

Probe depth 25mm
 Probe speed 50mm/min
 Probe ground test 50mm/min
 Probe look

Australian Hardwood Poles Durability

Initial Design Service Life Values

Table 19 Initial design service life^a values for round poles in Climate Zone B (Leicester, Wang et al. 2003)

Timber type	In-ground decay class ^b	Treatment ^c	Design service life (years)		
			Pole diameter 200 mm	Pole diameter 300 mm	Pole diameter 400 mm
Treated hardwood	1	H4	40	60	80
		H5	60	80	100
	2	H4	40	50	60
		H5	50	70	80
	3	H4	35	40	50
		H5	40	50	60
	4	H4	25	30	35
		H5	30	35	40
Untreated hardwood ^d	1	-	40	60	70
	2	-	25	35	45

^a Service-life defined as the time that it takes for the pole to lose 30% of its initial strength. If maintenance action is undertaken a further delay to the progress of decay would be expected.
^b As per AS 5604 – 2005 ^c As per AS 1604.1 – 2005 for CCA and creosote ^d Desapped poles

Australian Hardwood Poles Form

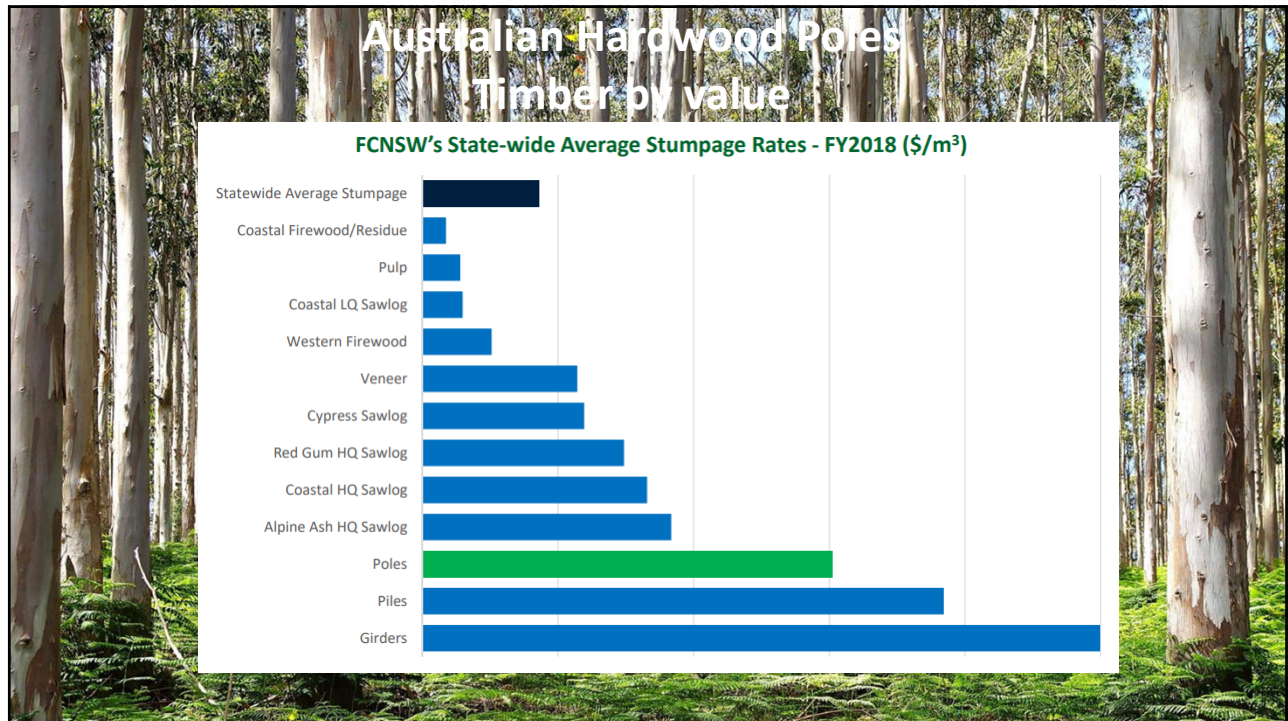
- Diameter +
- Ovality +
- Straightness

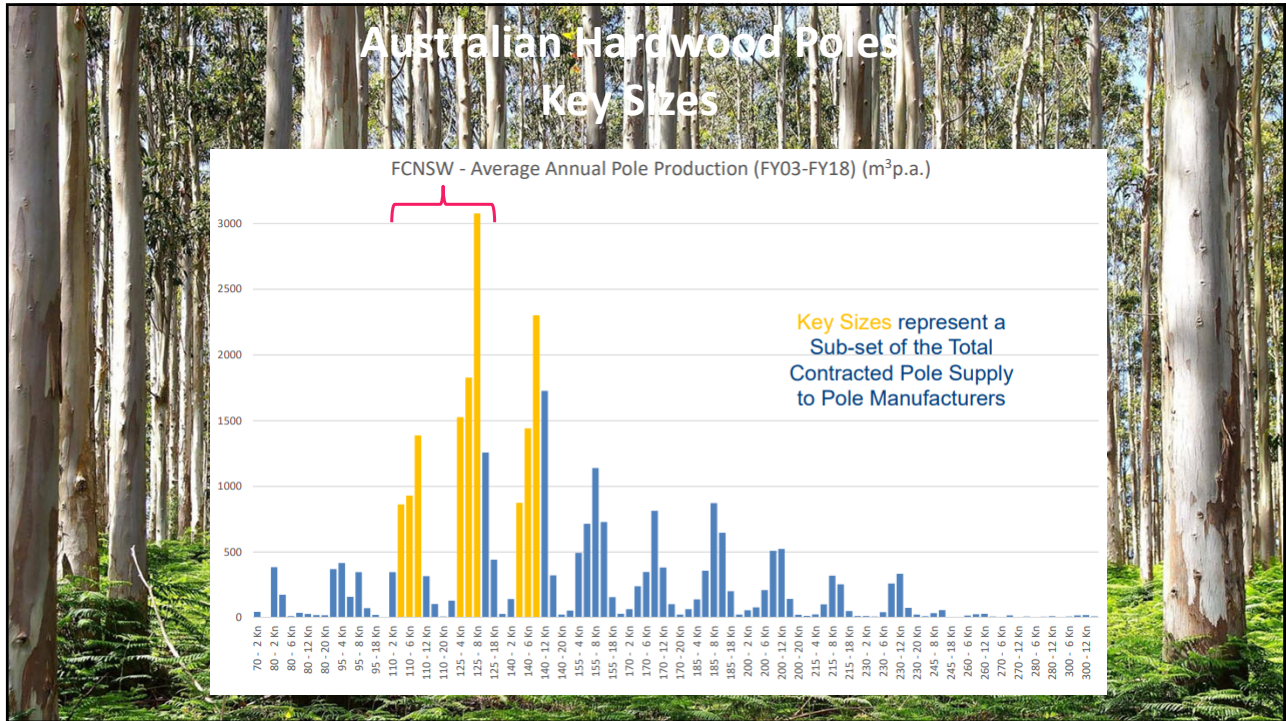
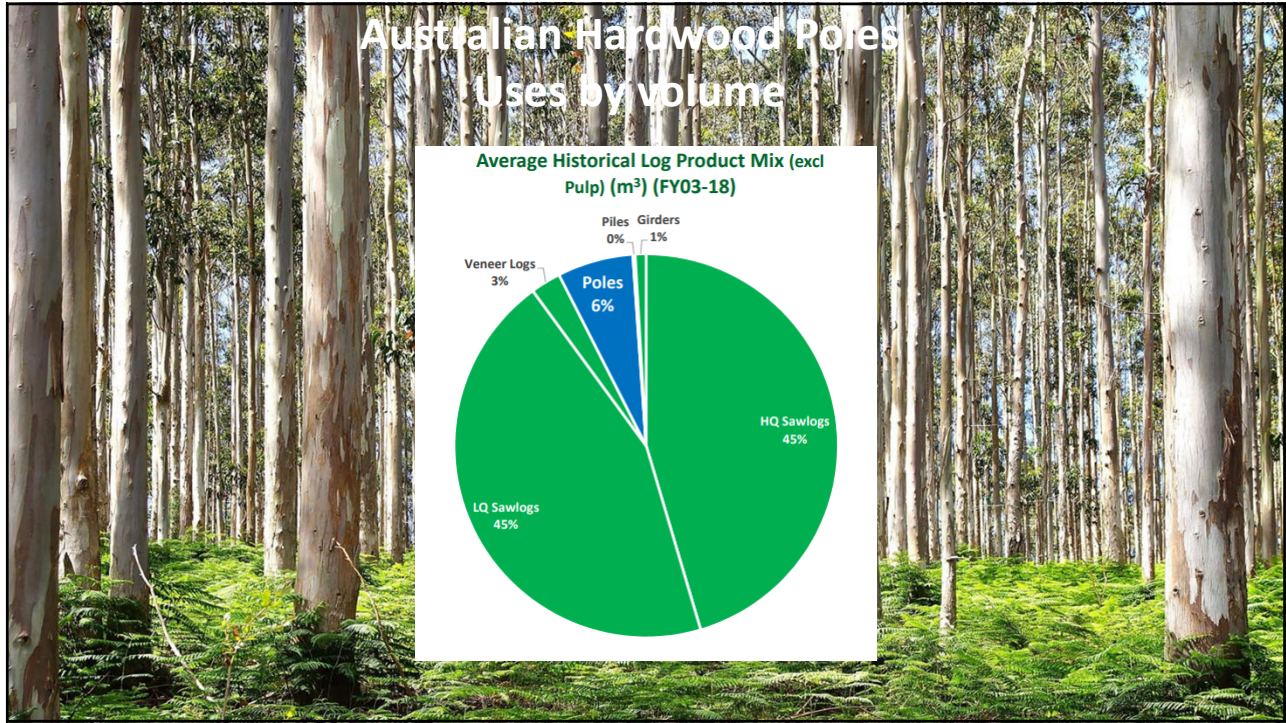
(a) Single sweep and multiple sweep (pole outline not crossed by P q)
 (b) Multiple sweep (pole outline crossed by P₁ q₁)
 (c) Crook
 (d) Kink
 (e) Butt sweep

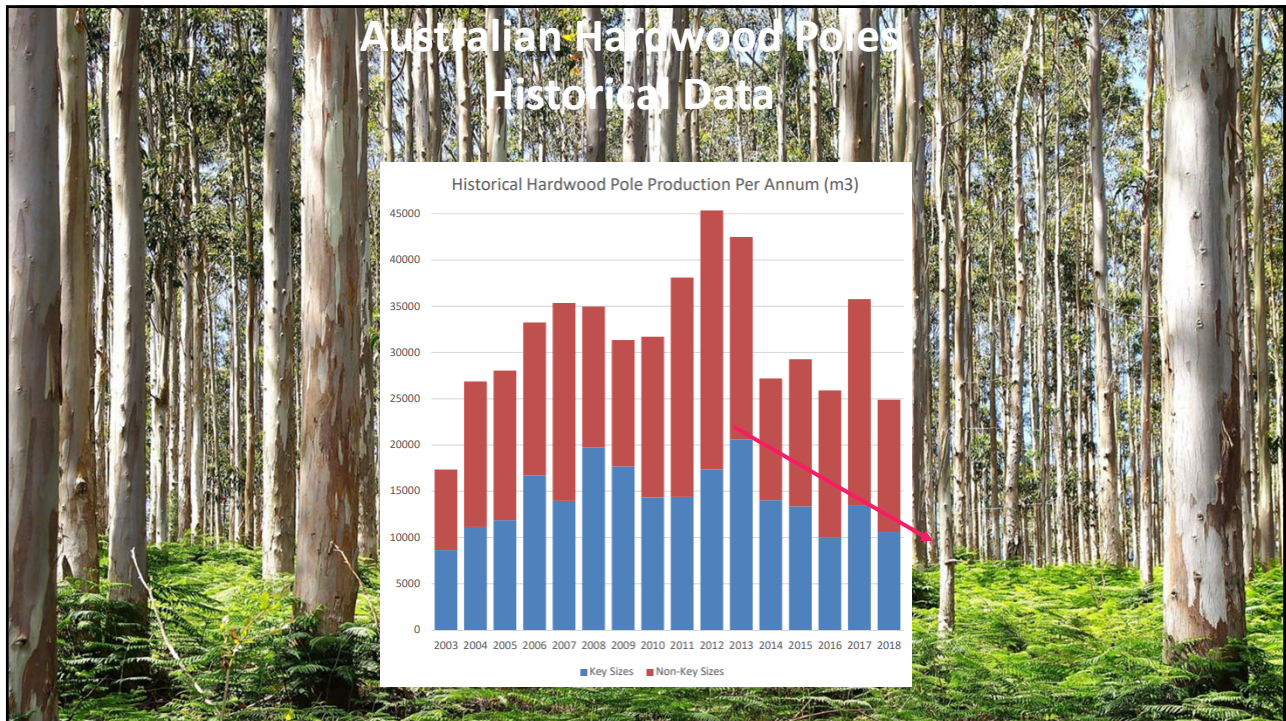
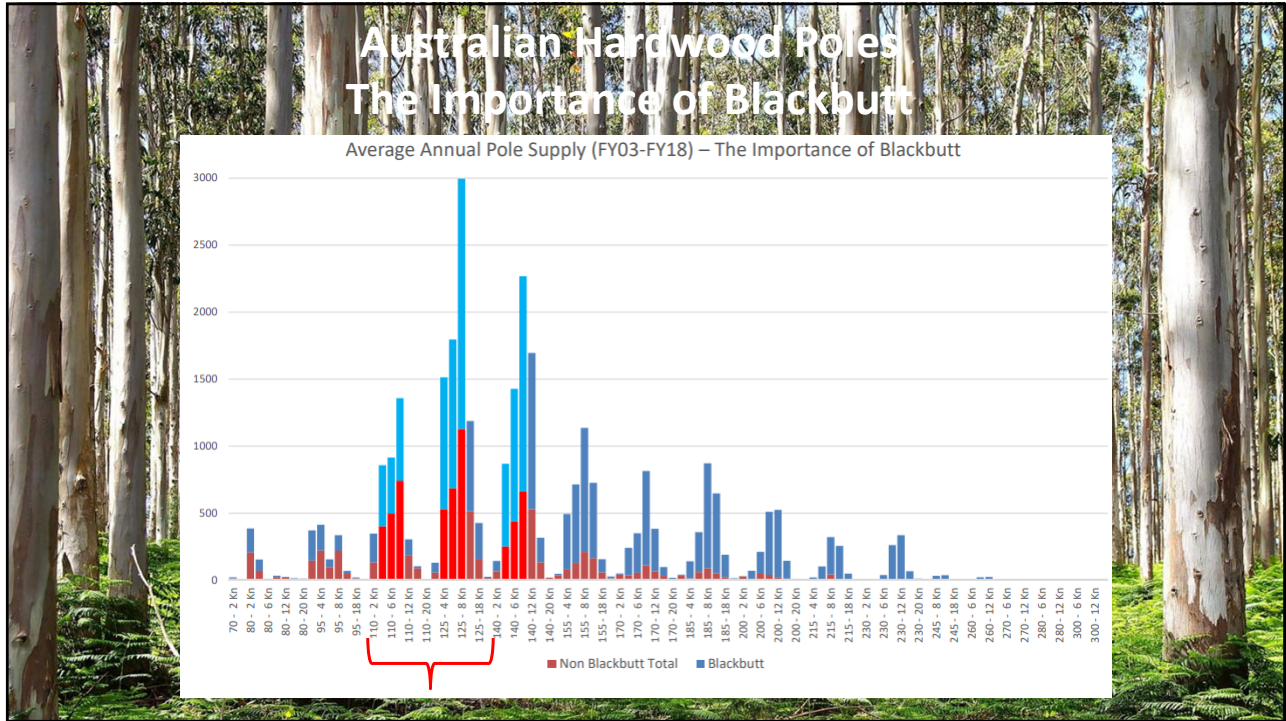
AS3818.11 – 2009 Timber – Heavy Structural Products – Visually Graded
Part 11 – Utility Poles

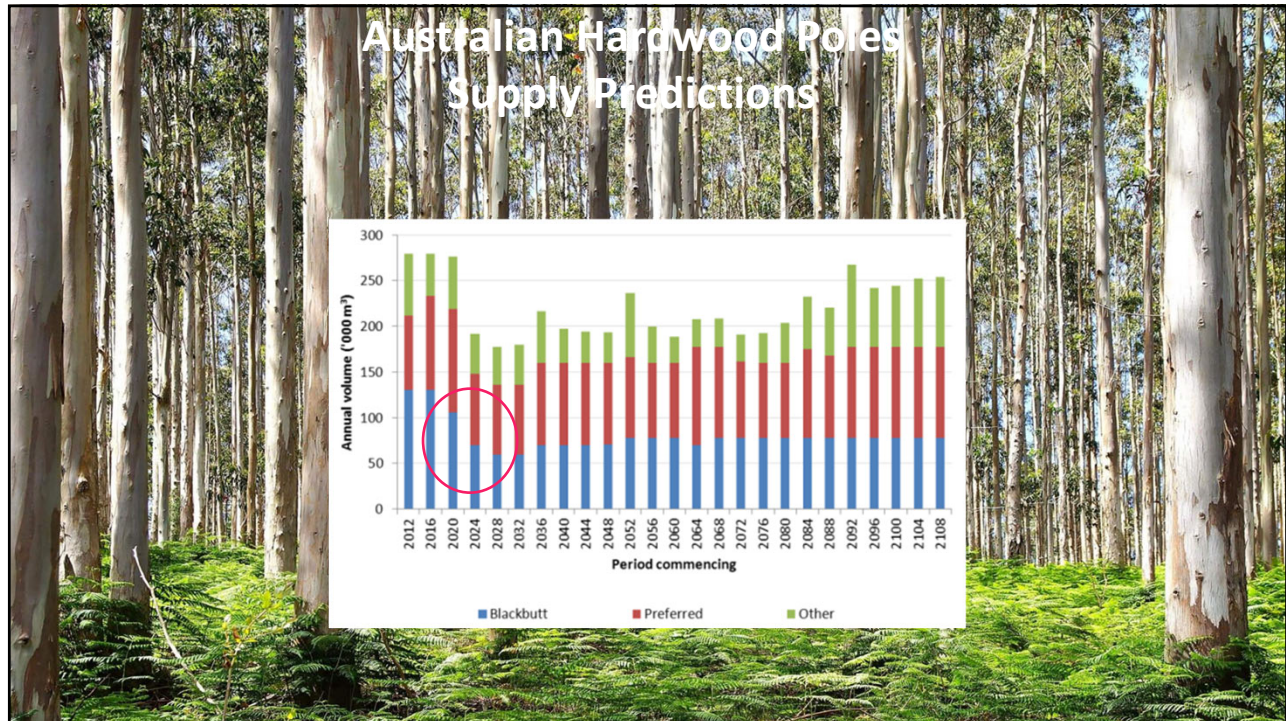
Australian Hardwood Poles Strength Variations NSW / QLD

Pole Capacity calculation:	12.5 8kN HW Pole (1)	12.5 8kN HW Pole (2)	
Total pole length	12.5	12.5	m
Embedment Depth	2	1.85	m
Ground Line Diameter	295	294	mm
Tip Diameter	190	187.5	mm
Butt Diameter	315	312.5	mm
Strength Group	s2	s2	(S1-S4)
Factor of Safety	2.5	4	(Working Stress Design, 2.5-4 depending on utility)
Combined short term limit states factor	0.72	0.72	From AS4676
Combined long term limit states factor	0.41	0.41	
Average timber bending strength	86	86	MPa
Characteristic bending strength	80	80	MPa
Approximate density	1175	1175	kg
Capacities			
Working Load Limit	8.3	5.0	kN
Short term limit states	13.8	13.5	kN
Long term limit states	7.9	7.7	kN
Unfactored Average capacity	20.6	20.1	kN
Unfactored Characteristic capacity	19.2	18.7	kN
Approximate mass	828	813	kg
Approximate Min Volume	0.654	0.642	m ³
"Min" Mid length Dia	252.5	250	mm
	<small>12.5m 8kN QLD S2 (BB/SG) 12.5m 4kN NSW S2 (BB/SG)</small>		









Australian Hardwood Poles Takeaways

- Greater diversification and less reliance by utilities on 'Key Size' pole
- Greater understanding of 'Appropriate' NZ classifications
- Consider use of lower Strength and Durability Class hardwood species

