

Innovating down the cost curve at Bungulla Farms

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Need for productivity lift...

Wheat	Ukraine 2015	Australia 2015	Bungulla 2018		
Total costs (\$/ha)	\$446/Ha	\$376/Ha	\$287/Ha		
Yield, T/Ha	3.25	1.82	1.5	2	2.5
Production cost, \$/T	\$133/T	\$207/T	\$192	\$144	\$115

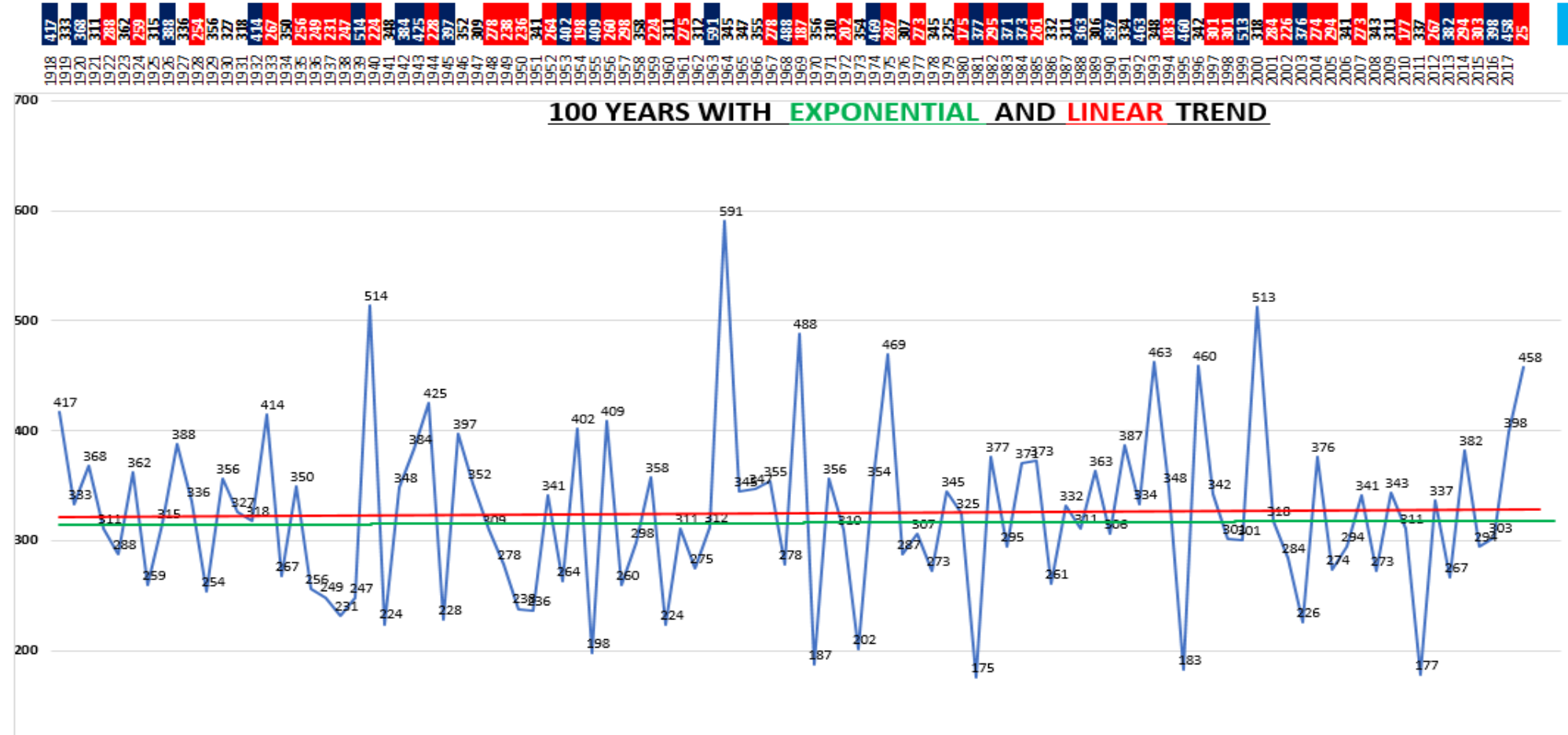
— Less of a tonnes per ha (yield target)
and ...

- ...more of a total factor productivity sort of farmer (ROI target)....
- How important is articulation of ROI target?

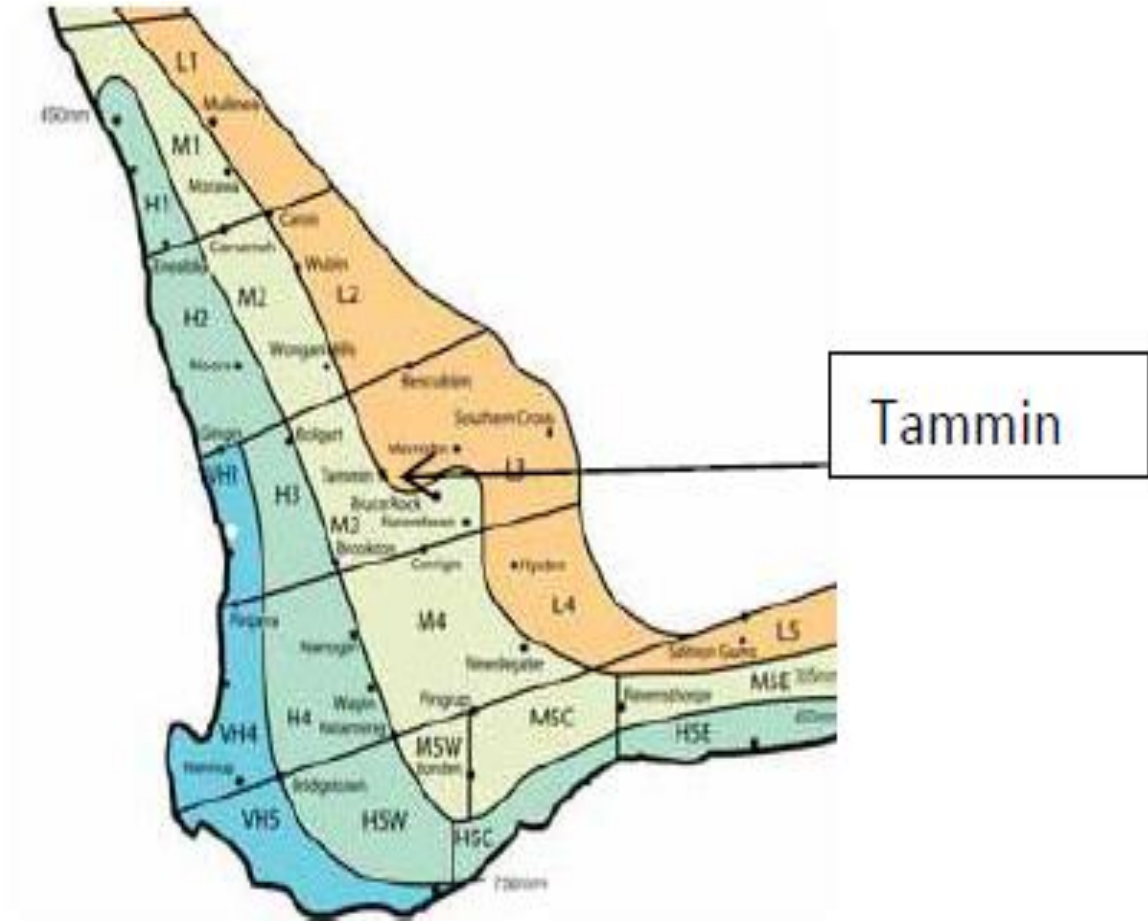
Focus on range, not average...



Years Averages



Farm borders low rainfall zone...



Further complicated by increased heat during crop flowering..., shifting distribution & frosts

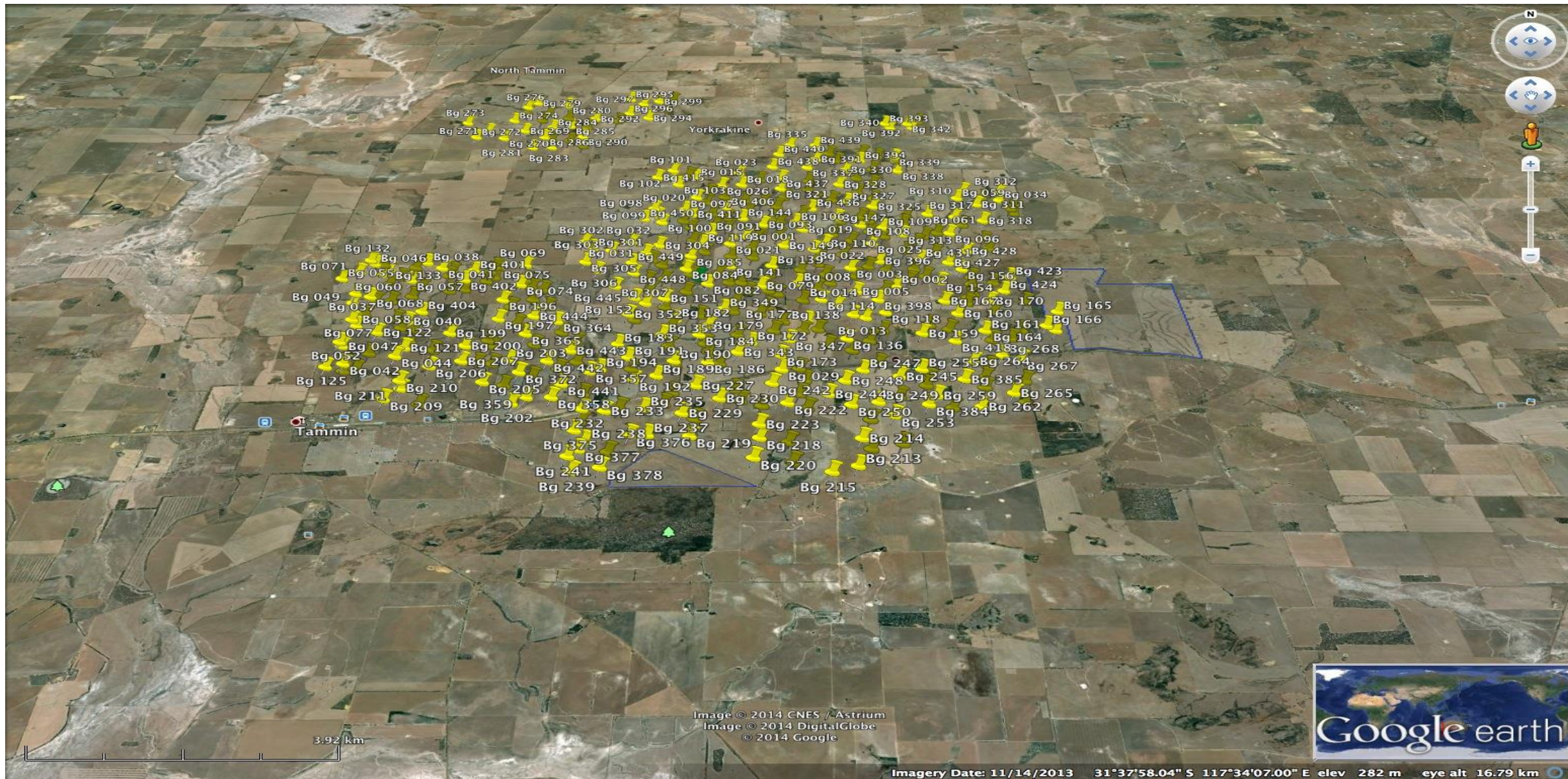
Sept 1 – Oct 7, 1951 - 2017 Temperature Maximums Degrees Celsius, at Kellerberrin (number of days)

	1951-60	1961-70	1971-80	1981-90	1991-00	2001-10	2008-17	2009-14
>30C	11	14	7	11	5	10	19	12
>32C	2	5	2	3	3	5	10	5
>34C	1	1	1	0	0	2	6	4

Science and economics driven investments

Innovation	Year trialled	Year fully adopted	Benefit description	Value estimate
Extensive soil testing sites	2008	2018	Currently ~ 570 sites provide extensive data to monitor soil conditions	
Variable rate technology	2008	2010; ongoing	Cost reductions in fertiliser, lime and chemicals applications	1 year payback
Fallowing	2006	2009	Weed control efficiency / weed herbicide resistance strategy; soil amelioration and civil programs	
Weedseeker	2009	2009	Greatly reduced chemical application	2 year payback
Liquid fertiliser adoption Liquid calcium / P / K (DKP, Optima)	2012	2013	Operational efficiency (boom and aerial), better suited to climate, less acidic N Corrects pH around merging seedling	11.3% improved ROI; 17% operational efficiency improvement
Hybrid canola seed use			Early season vigour and finish; less susceptible to poor seasonal conditions	\$25/ha
Canola seed singulation	2015 -	Under development	Greatly reduced seeding rates of expensive hybrid seeds	\$25/ha, gross saving
9,000T silo complex	2012 direct marketing	2014	Operational, logistical and sales efficiencies, able to meet contract specifications	20% ROI
Backhaul / continuous trucking	Ditto	2014	Ditto	20% ROI
Wheat varieties better suited to feed production	Under trial	Under trial	Lower protein wheats produce more energy, requiring less N which lifts yields and places crop under less climatic risk i.e. less risk from cliff face protein effect	
Greater proportion of hedged prices for exported grain (swaps, no FX) and local sales (forward contracts)			Less production variability implies greater opportunity to hedge larger proportions of the crop if opportune.	

Data integration: soil site testing (570+)



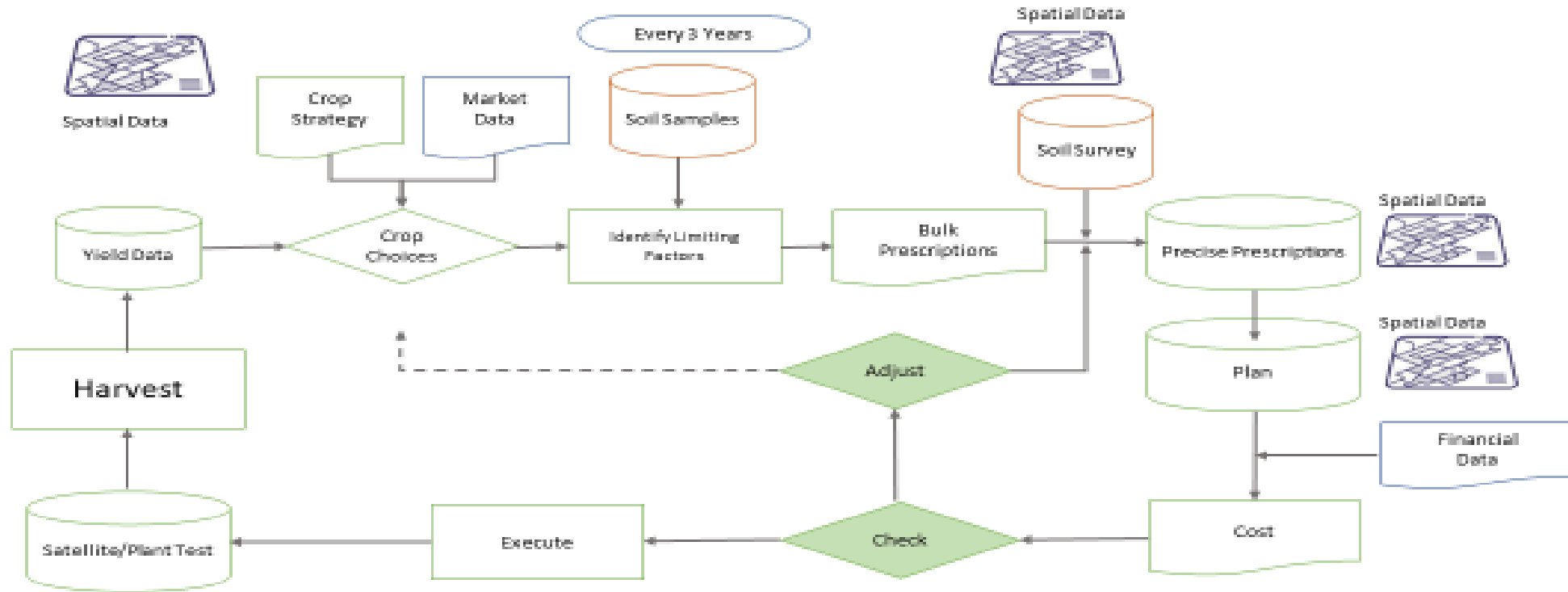
Data integration

- From above: NDVI, satellite and drone (under trial)
- From below: soil (mapping and tests), yield and machinery data
- Integrated using: AgWorld and My John Deere (physical), Xero (accounting), P2P Agri (farm management)
- Looking into the farm as 3D.... Technology development and machine learning
- Capital deepening – hiatus on capital widening since 2012

Impact on data integration on farm work flows....

Bungulla Farms

Process Map v.2 Update 2018



Recap: securing cashflow to finance innovation down the cost curve...

Secure cashflow, t0
Secure cashflow, t1
Secure cashflow, t2
Secure cashflow, t3

Sacrifice some upside yield to secure downside yield
Retain staff via hard and soft incentives
Increase staff capacity via training, permanency
Machinery resell prices built into margin calculation
New machinery and R&M schedule to avoid breakdowns

Lower BE COP: VC & VC + Cost of Capital including Target ROI

Capital widening - 10kha, 2012
Capital deepening - innovation

- 'Balanced' fertiliser app'n
- Liquids
- IT
- Computerised storage (ToT)
- Transport
- Etc.

\$COP,t1/ ha (wheat)
\$COP,t2/ ha (wheat)
\$COP,t3/ ha (wheat)
\$0.7 & 1.3/ha (wheat, 2018)

— A next step :

On farm Wi-Fi

- Cheap data from Wi-Fi lowers transaction costs of actual cost breakdowns
- Boom

Boom logistics

Boom operating cost, \$/ha

Cost @ theoretical efficiency (1), 75ha/hr	Cost @ reduced efficiency (.87)	Cost @ improved efficiency (.97)
\$6.01/ha	\$6.51/ha	\$6.12/ha

NPV of improvement in boom logistics

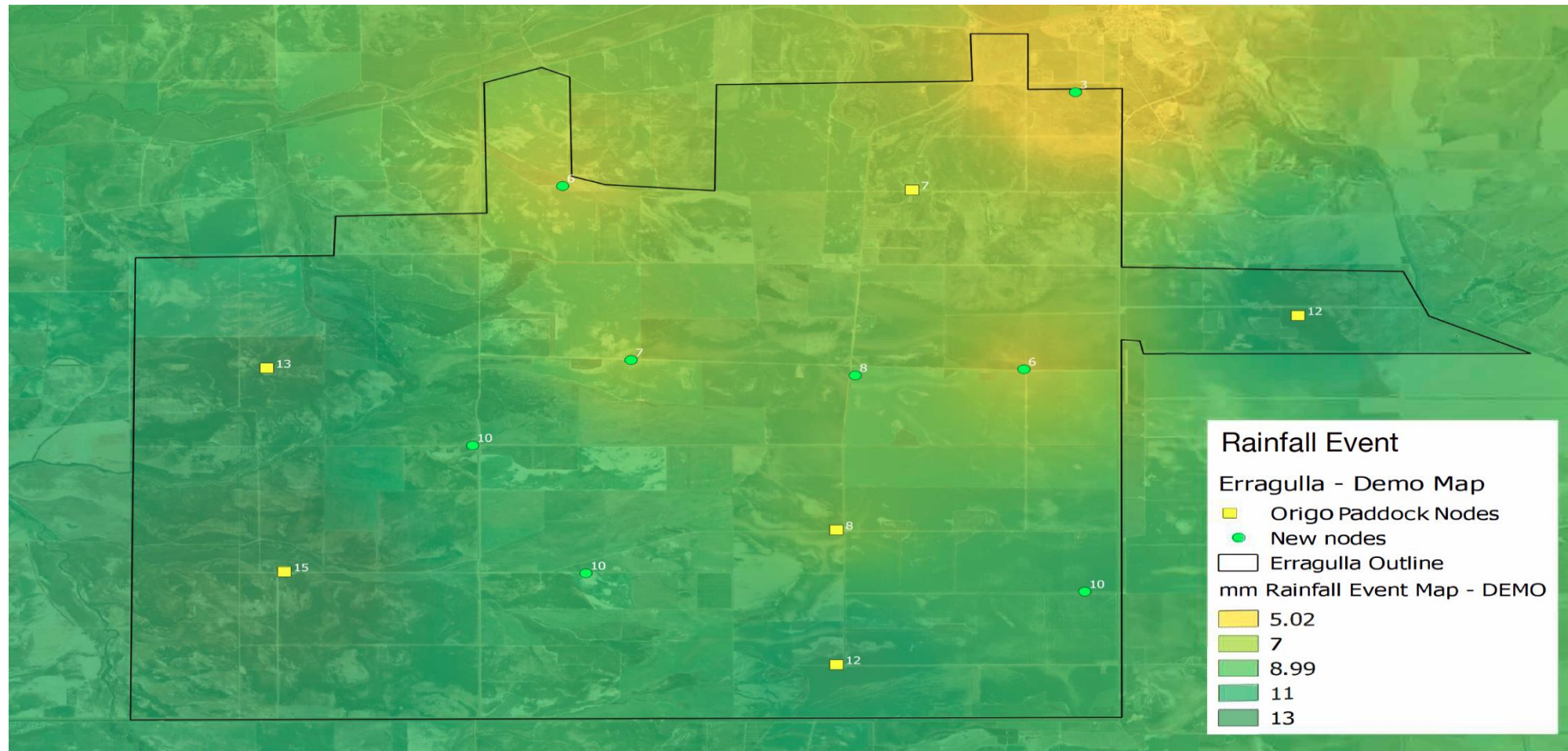
Capital cost	Operating cost, \$/ha	Benefit	NPV@ 20% discount rate
10,328ha x \$2.10 = \$21,690	10,328ha x \$0.34 = \$3,470	52,387ha x \$0.39 = \$20,448	\$24,236

— A next step :

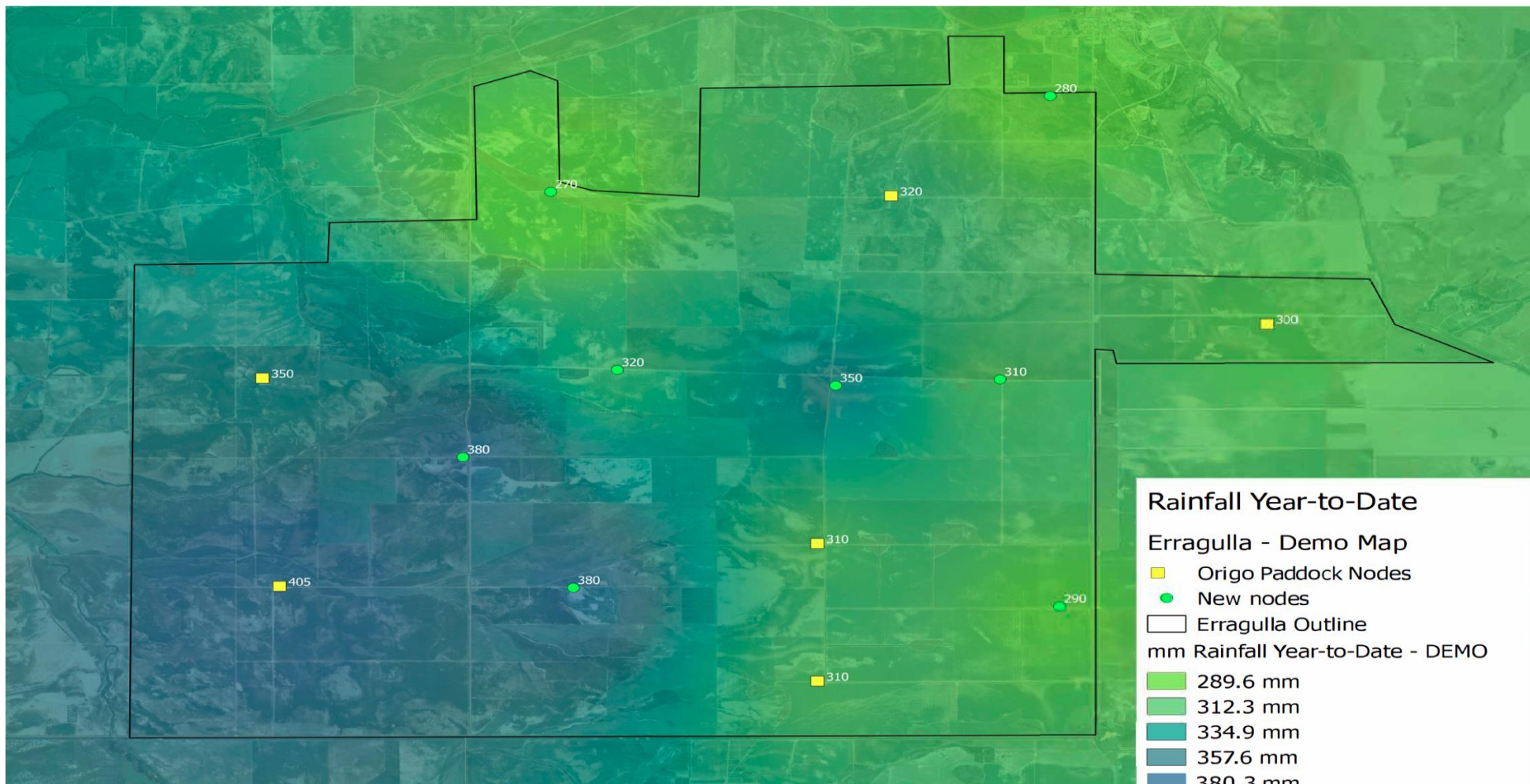
On farm Wi-Fi

- Cheap data from Wi-Fi lowers transaction costs of actual cost breakdowns
- Boom
- What else do you envisage from the Wi-Fi?

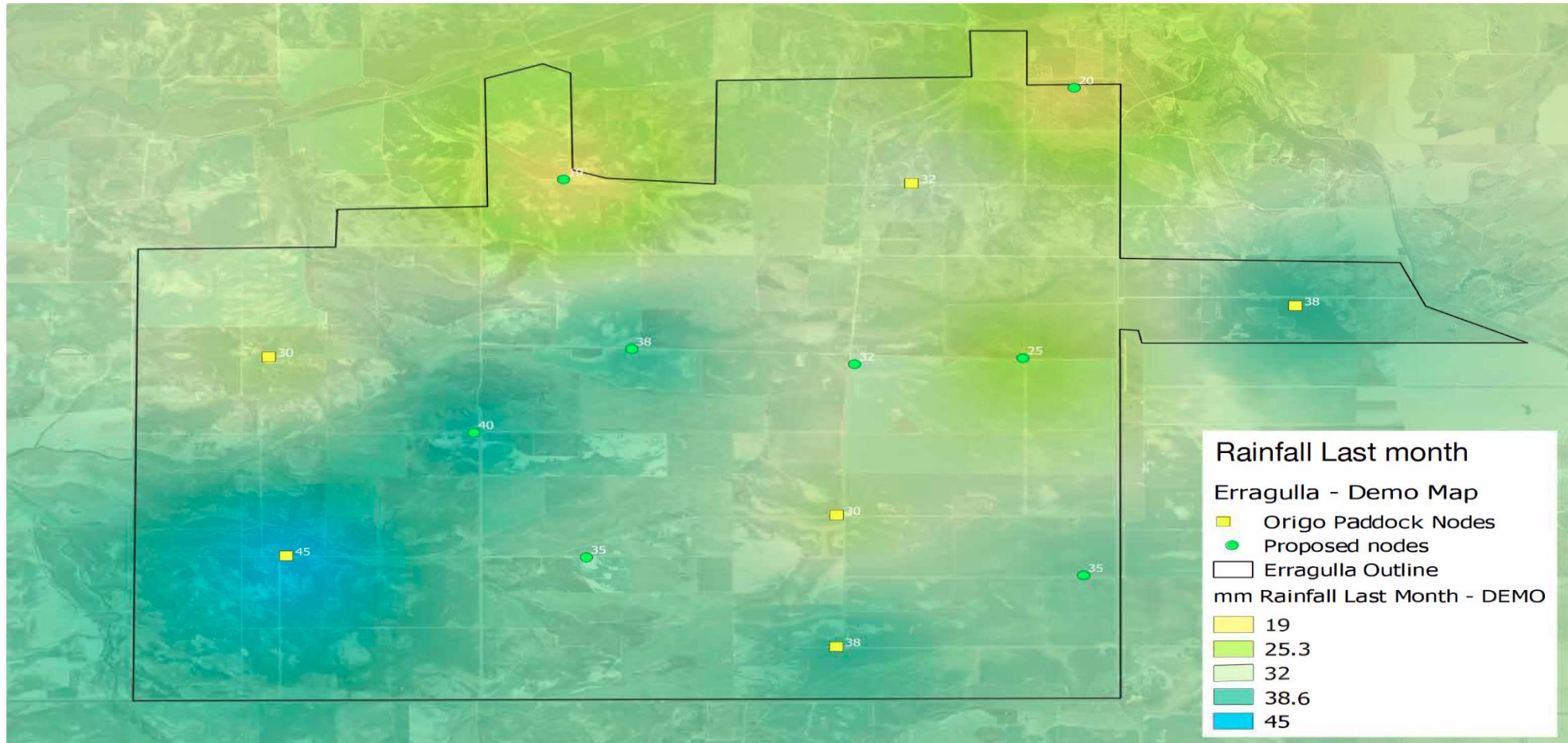
Rainfall map 1, upcoming season...



Rainfall map 2, upcoming season..



Rainfall map 3, upcoming season..



Public policy and adoption..

- Kingwell et al, 2014, drivers of total factor productivity:
 - *Use* of embodied technology in new machinery
 - *Ability* to make good business decisions (lessening management complexity)
- Take-up of PA patchy. Limited by:
 - 1. Lack of connectivity, on farm and to the web:
 - 2. Unfamiliarity with technology
 - 3. Lack of related skills
- Confidence in technology: need for independent verification
- Management complexity complicated by farm consolidations / age of farmers

Policy responses, examples

- Connectivity: roll out of fibre and wireless (e.g. DPIRD Digital Farm Grant)
- Roll out of interchangeable on farm webs (e.g. DPIRD / GRDC, Open Ag Tech – Proof of Concept Project)
- Demonstration IoT solutions (IoT Decision Ag Grants – Grower Groups & Ag colleges)
- Extension re skill development in business decisions and IT adoption? (e.g. SEPWA Data Trial of a Private LTE network, Digital research stations kit out at Merredin and Katanning. What else?)