



Government of Western Australia  
Department of Water and Environmental Regulation

# Draft Gnangara groundwater allocation plan

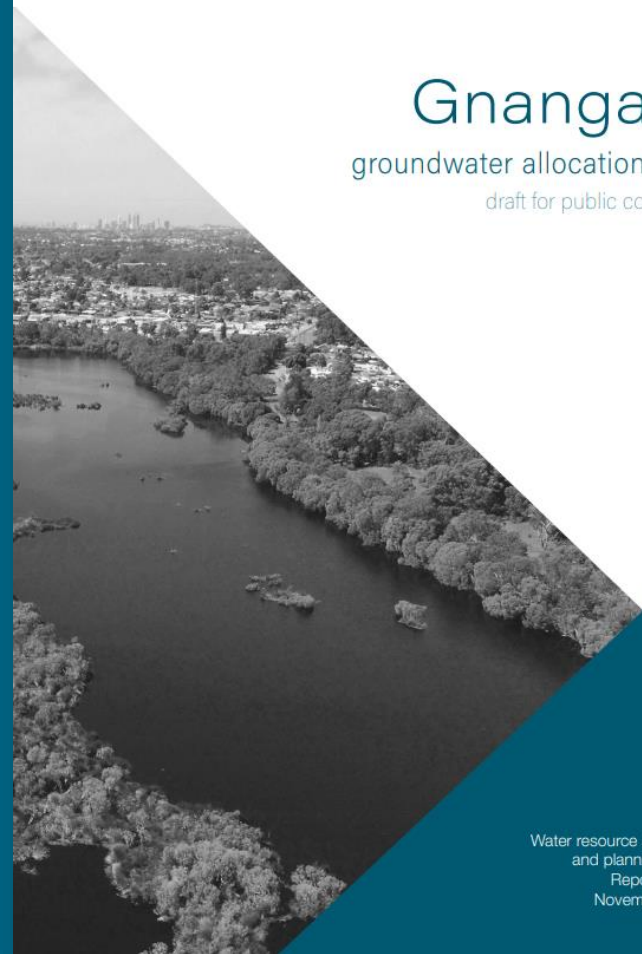
Michael Hammond and Natasha Del Borrello  
Science and Planning Directorate  
15 February 2022



Government of Western Australia  
Department of Water and Environmental Regulation

## Gnangara

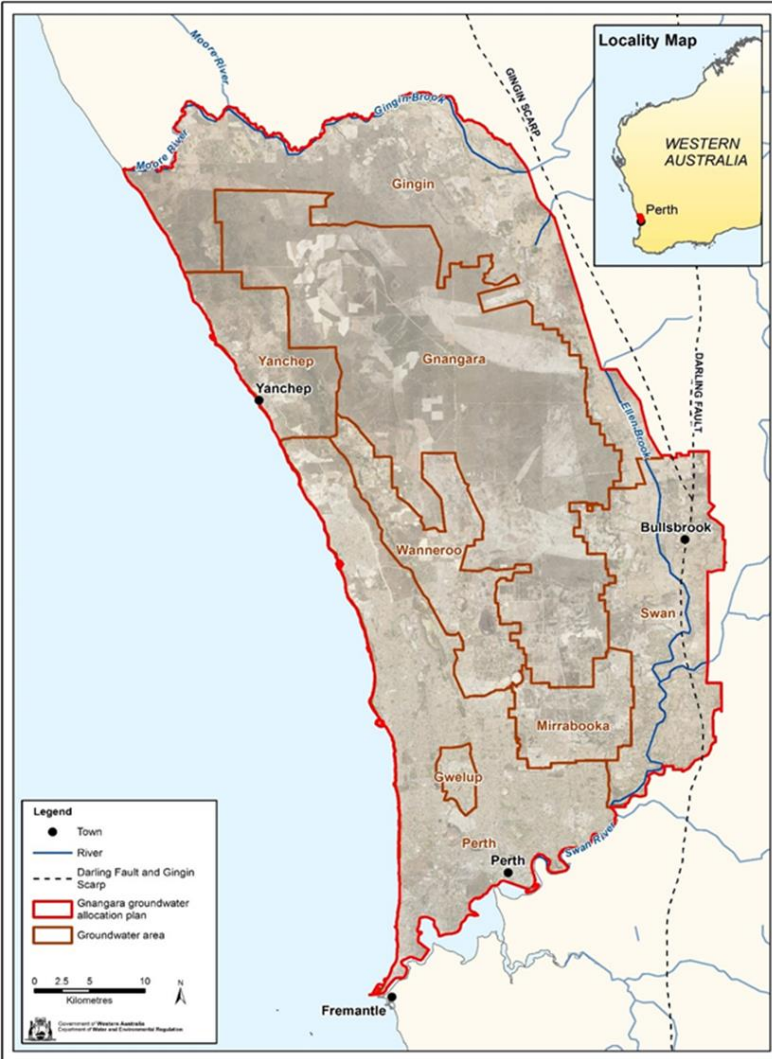
groundwater allocation plan  
draft for public comment



Water resource allocation  
and planning series  
Report no. 76  
November 2021

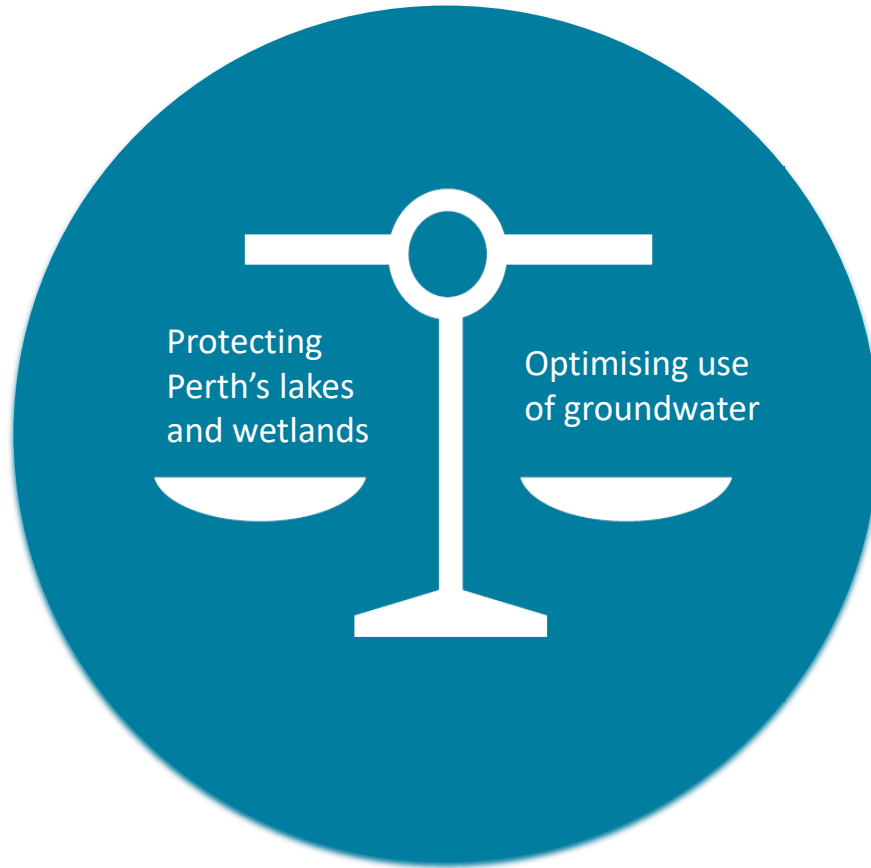
# Draft Gnangara allocation plan released for public comment until 28 February 2022

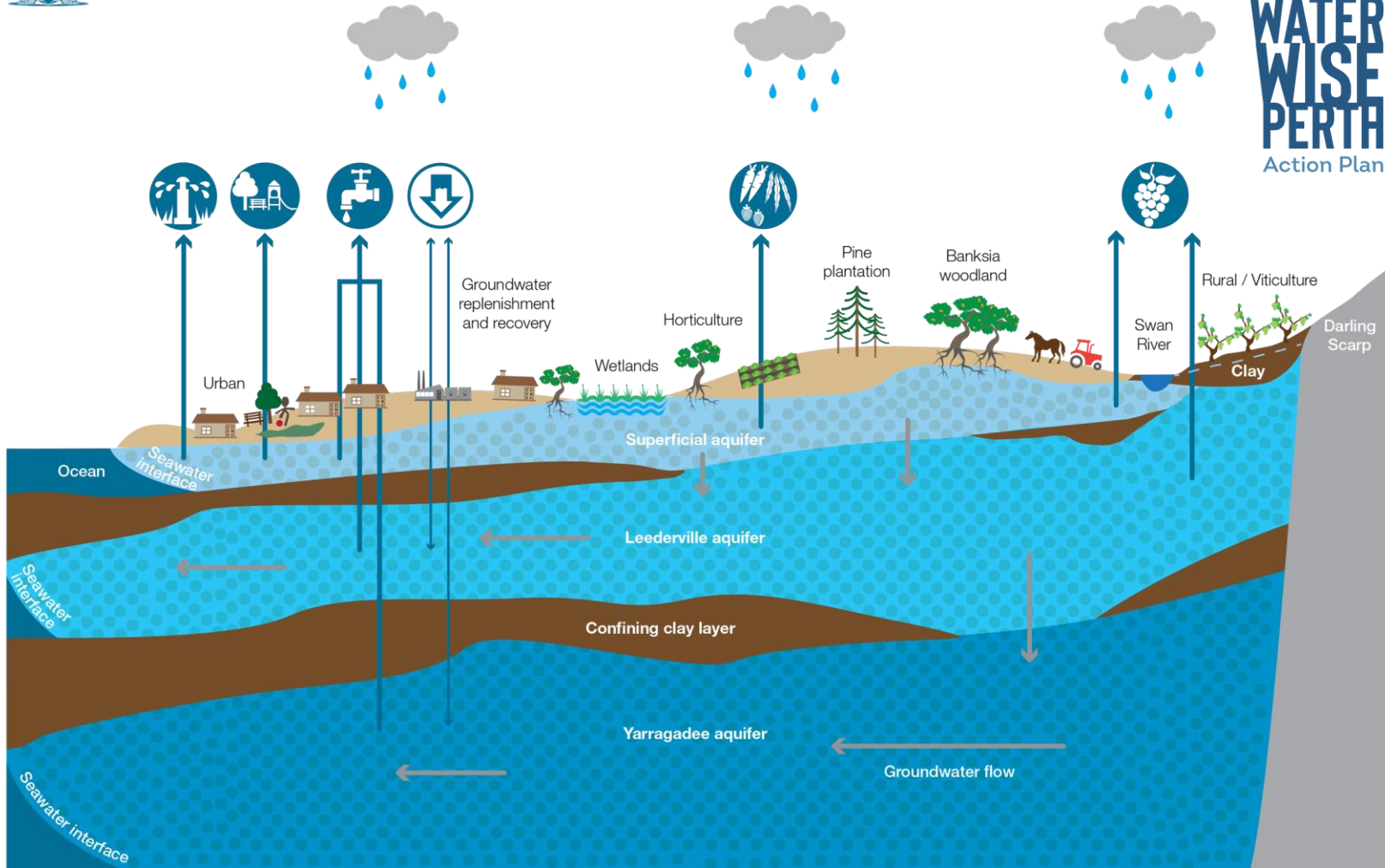
**Our goal is ...**  
To rebalance the Gnangara groundwater system by 2032 to secure our lowest cost and most accessible water source for Perth and to support a healthy environment





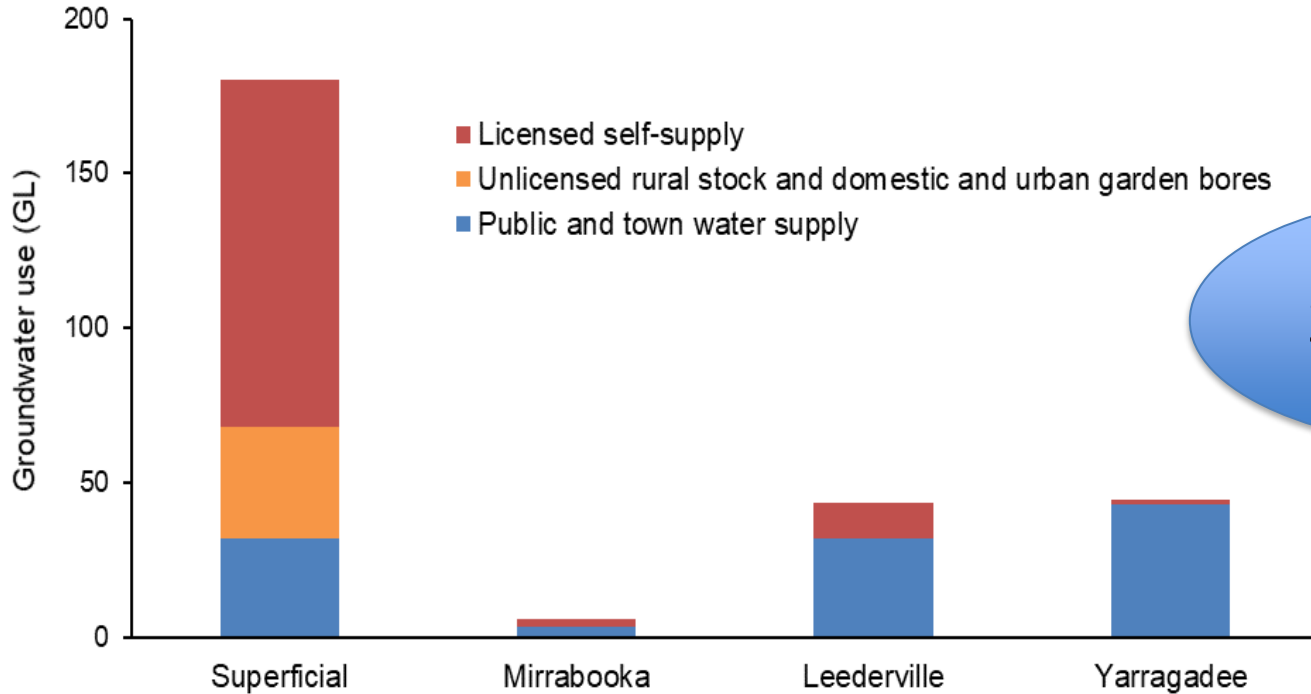
# Looking after a shared resource







# What aquifers does Gnamara groundwater come from?



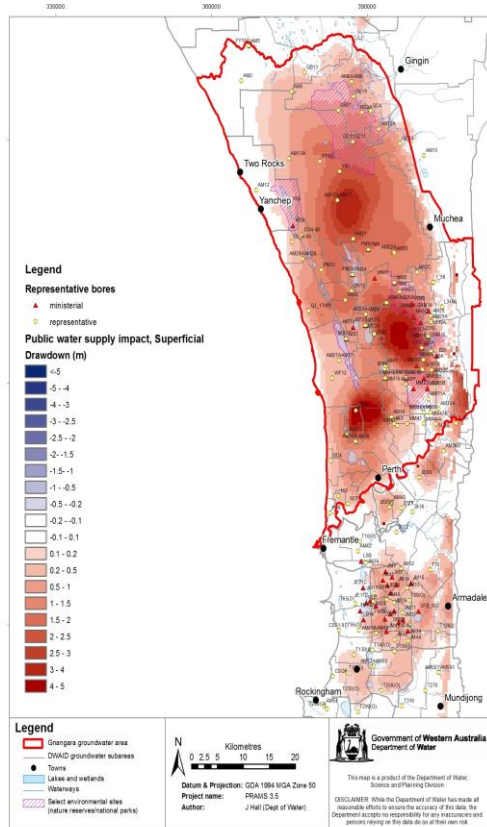
275 gegalitres



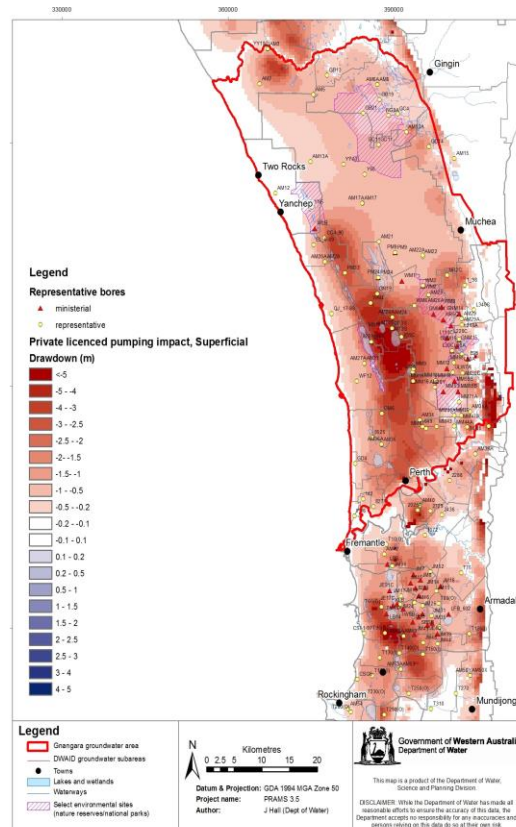


# Impact comparisons

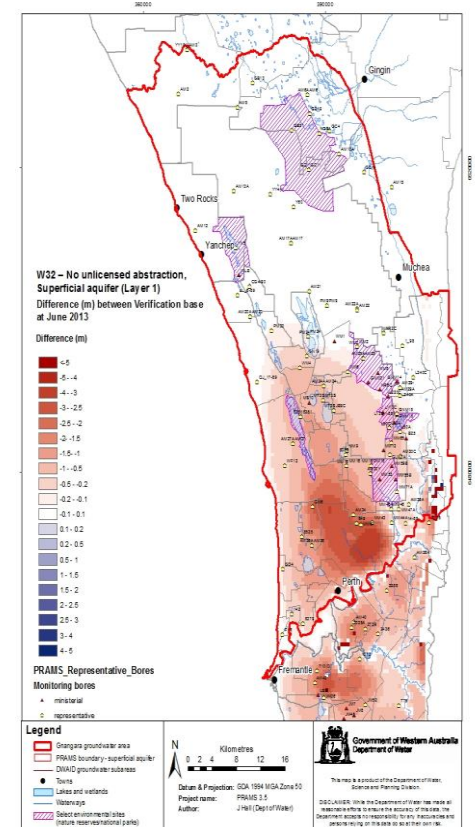
## Public water supply



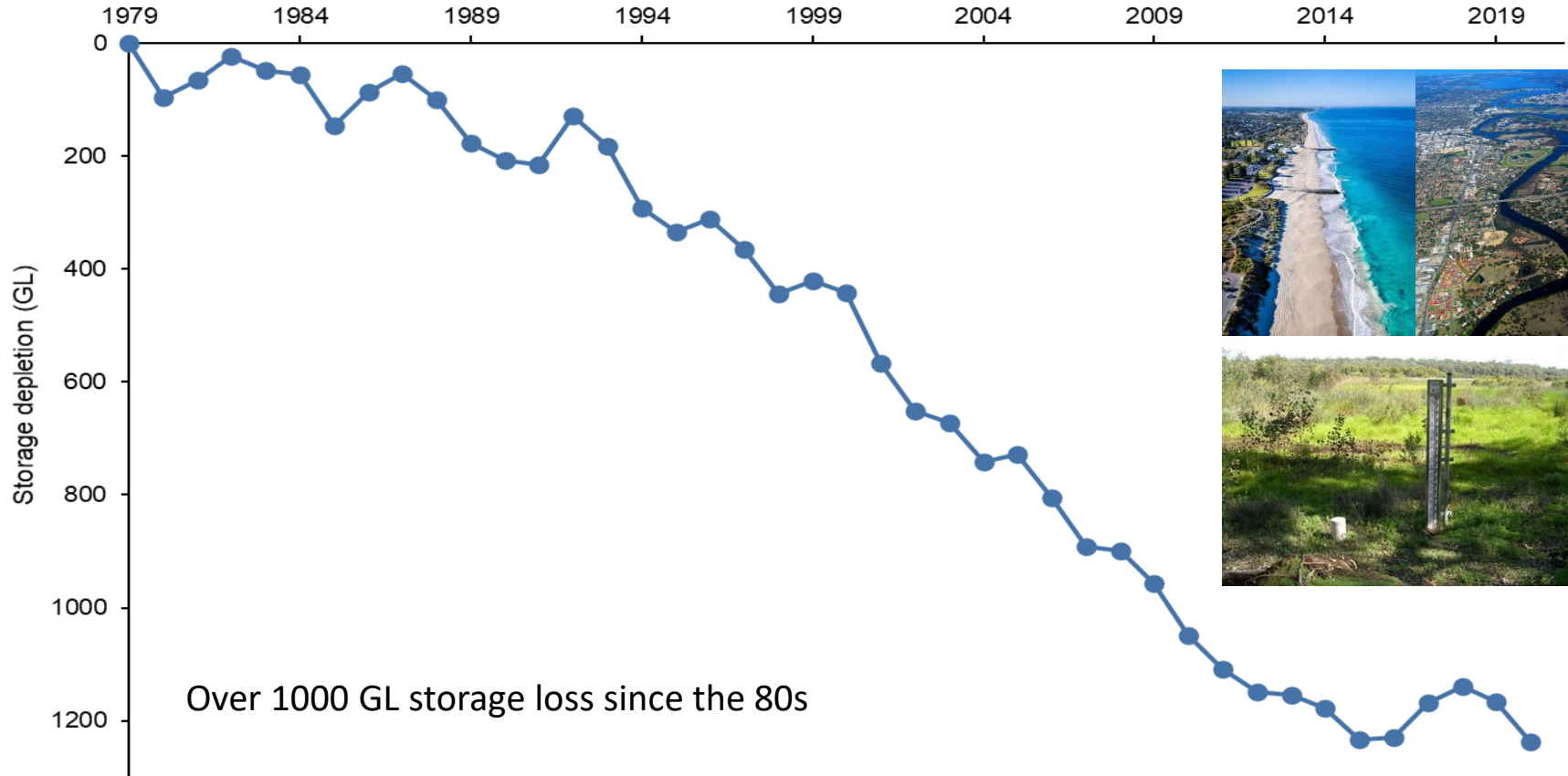
## Licensed self supply

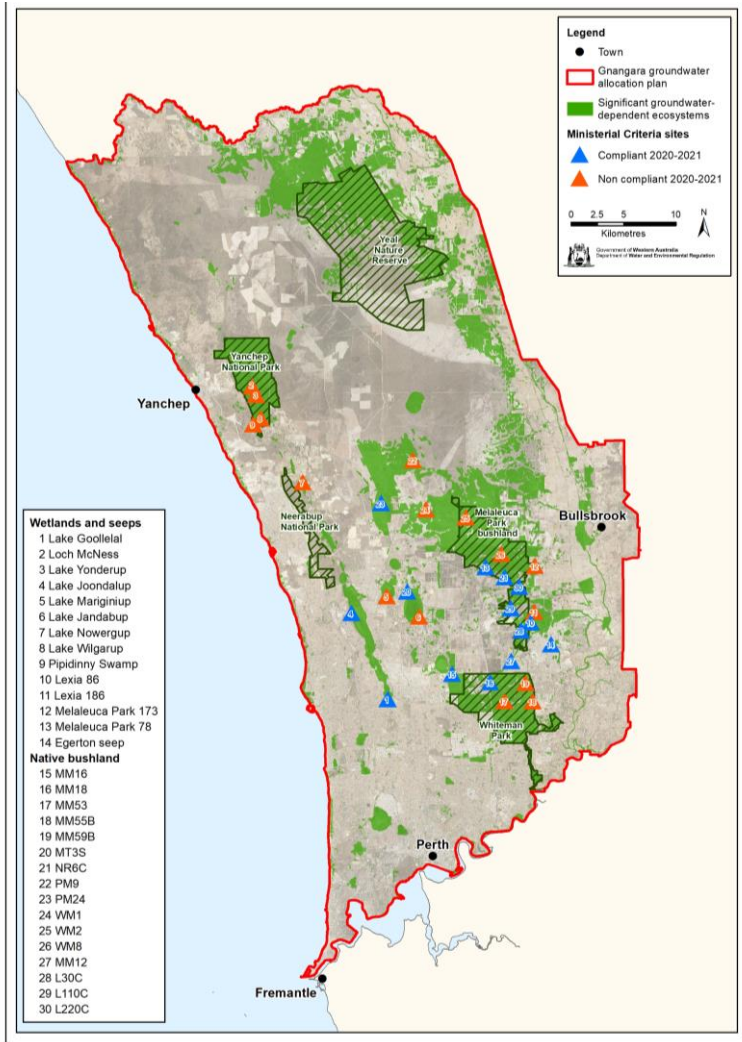


## Garden bores



# Impacts of climate change and abstraction





# Gnamptuara criteria sites

## Gnamptuara Mound Criteria (2004)

Table 1 – Monitoring Wells

Groundwater Monitoring Well	End of Summer	
	Preferred Minimum (mAHD)	Absolute minimum (mAHD)
MM16	-	38.8
MM18	-	38.6
MM53	-	33.3
MM55B	-	29.5
MM59B	-	36.3
MT3	-	43.0
NR6C	-	58.5
PM9	-	56.3
PM24	-	40.5
WM1	-	55.7
WM2	-	66.5
WM8	-	64.8
MM12 (G61610989)	-	42
L30C (G61611010)	-	47.2
L110C (G61611011)	-	55.7
L220C (G61611018)	-	52.2

## Gnamptuara Mound Criteria (2004)

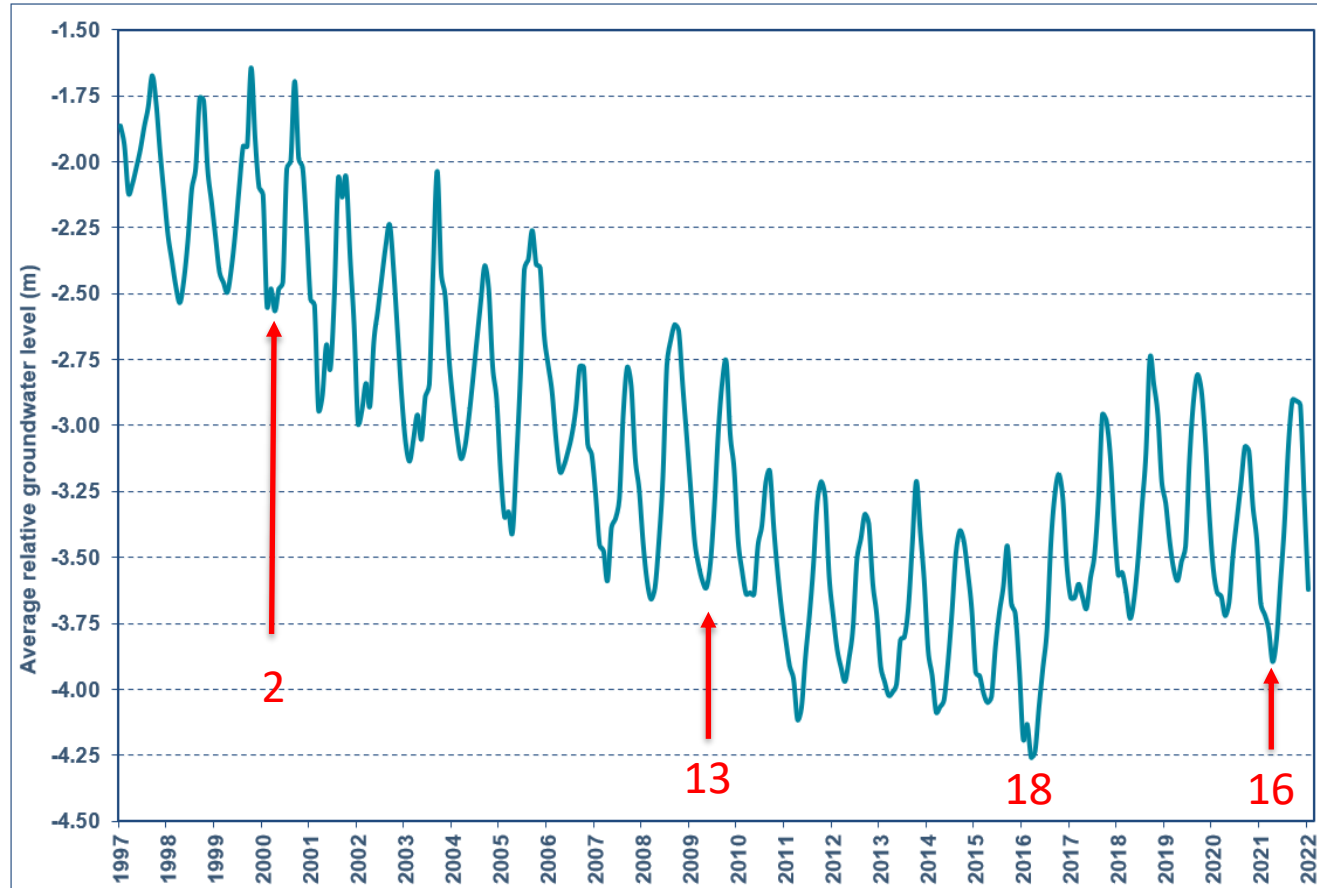
Table 2 – Wetlands

Wetlands		End of Summer (mAHD)		Spring (mAHD)	
		Preferred Minimum	Absolute minimum	Preferred Min. peak	Absolute Min. peak
Lake Goollelal	G6162517	* 26.2	26	-	-
Loch McNess	(G6162504)	-	6.95	-	-
Yonderup	(G6162505)	-	5.9	-	-
Lake Joondalup	(G6162572 staff) (G61610861 bore)	* 16.2	-	-	-
Marigninup Lake	(G6162577 staff) (G61610685 bore)	-	-	* 42.1	41.5
Lake Jandabup Artificially maintained	(G6162578)	-	44.3	* 44.7	44.2
Nowergup Lake Artificially maintained	(G6162567) (peak levels recorded)	-	-	* 17	16.8
Wilgarup	(G6162623 staff) (61618500 bore)	4.8	4.5	6.10	5.65
Pipidiny Swamp	(G6162624)	-	1.9	2.70	2.40
Lexia 86	(GNM16) G61613215	* 47.3	-	47	-
Lexia 186	(GNM15) G61613214	* 47.5	-	47.2	-
Melaleuca Park (EPP) 173	(GNM14) G6162628 staff	-	50.2	-	-
Melaleuca Park (Dampfland) 78	(GNM31) G61613231	* 65.4	65.1	-	-
Egerton	(B25) (G61618607)	-	39.29	-	-

\* water levels allowed between minimum and absolute minimum at a rate of 2 in 6 years to replicate natural drying cycles.



# Non-compliance with absolute criteria – Statement No 819





## Lake Nowergup



## Loch McNess

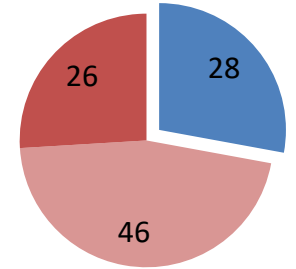


## Local investigations

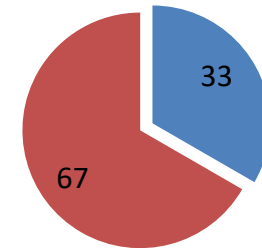
■ Reduced rainfall

■ Private

■ Public supply  
(Leederville and  
Superficial)



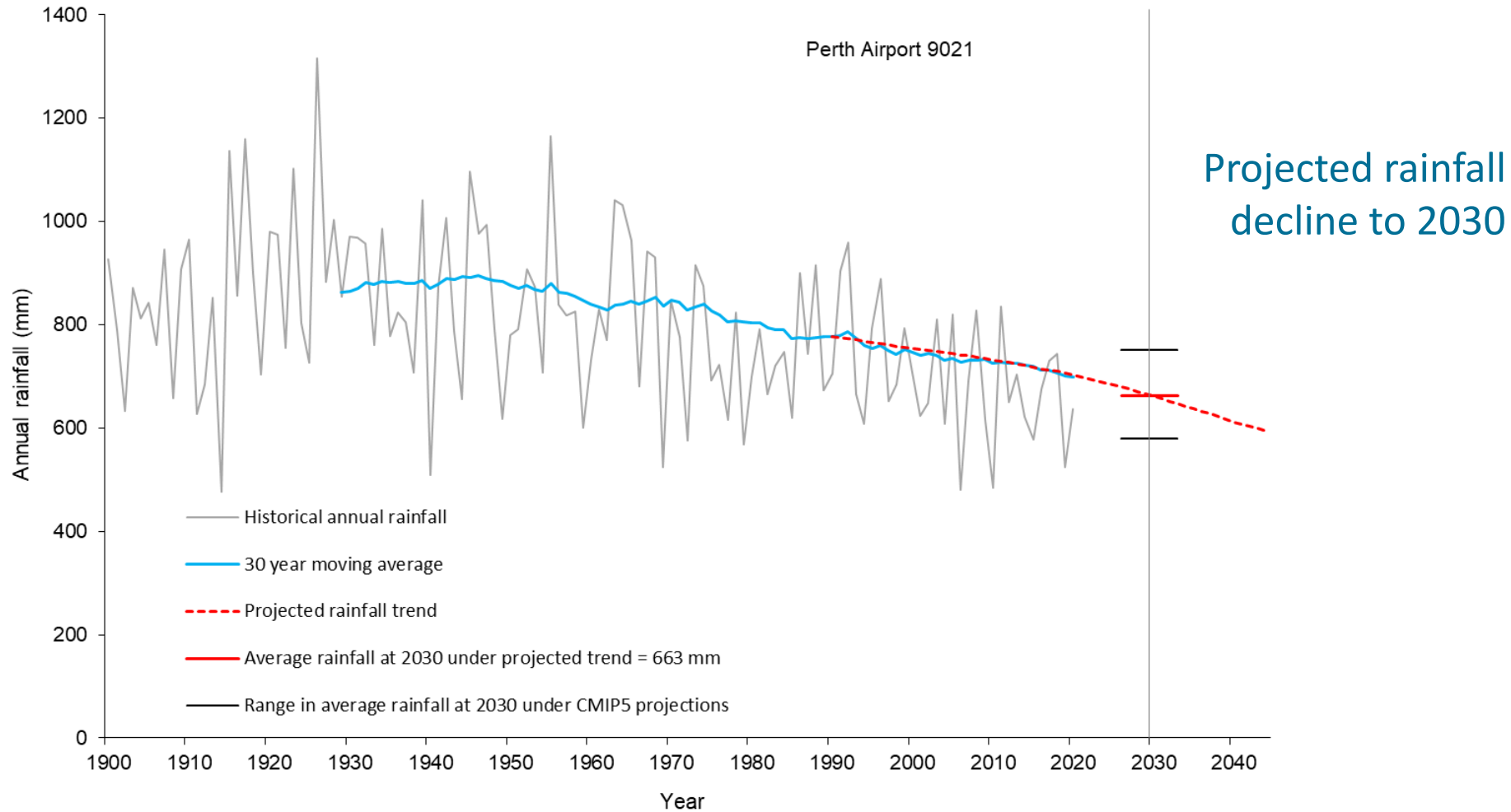
% of impacts at  
Nowergup since  
1970s



■ Reduced rainfall

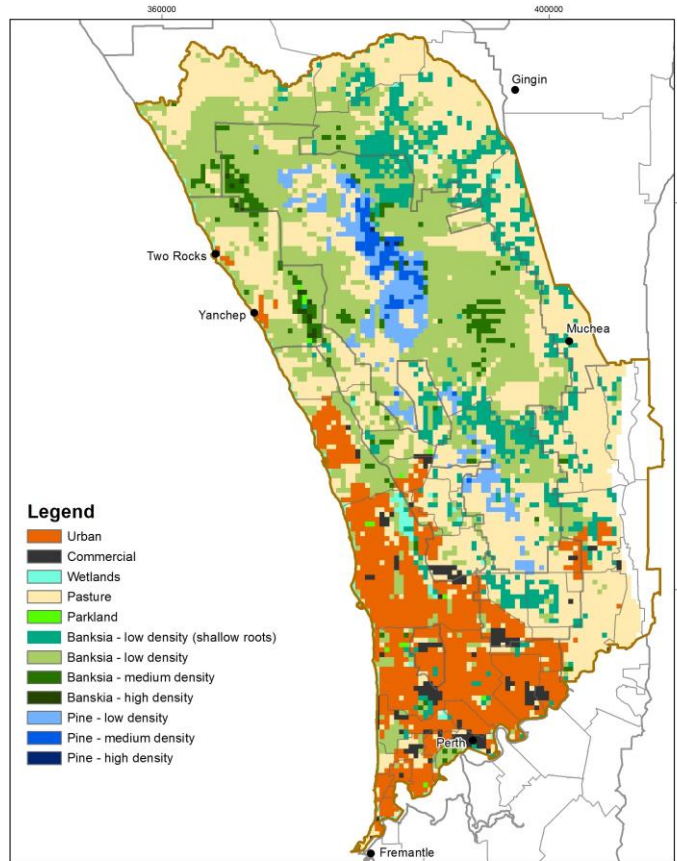
■ Public supply (Leederville)

% of impacts to  
east of Loch  
McNess since  
1990s

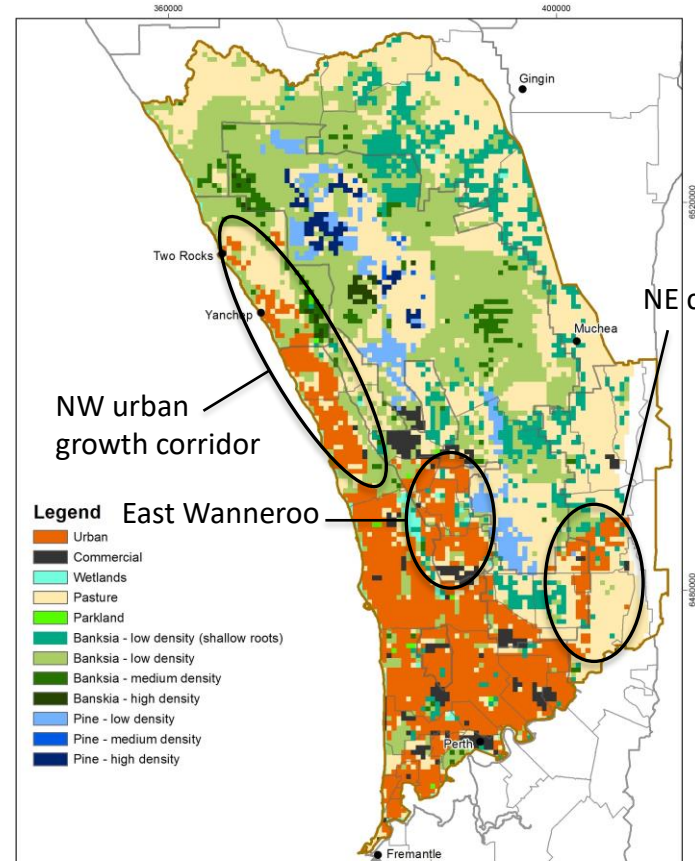


# Land use change to 2030

## Current land use



## 2030 land use



### Legend

- Urban
- Commercial
- Wetlands
- Pasture
- Parkland
- Banksia - low density (shallow roots)
- Banksia - low density
- Banksia - medium density
- Banksia - high density
- Pine - low density
- Pine - medium density
- Pine - high density

- Gngangara plan boundary
- Superficial groundwater subareas



Datum & Projection: GDA 1994 MGA Zone 50  
 Project name: PRAMS 3.5  
 Author: J Hall



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 Department of Water and Environmental Regulation, Science and Planning Directorate.

DISCLAIMER: While the department has made all reasonable efforts to ensure the accuracy of this data, the department accepts no responsibility for any inaccuracies and persons relying on this data do so at their own risk.

### Legend East Wanneroo

- Urban
- Commercial
- Wetlands
- Pasture
- Parkland
- Banksia - low density (shallow roots)
- Banksia - low density
- Banksia - medium density
- Banksia - high density
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- Gngangara plan boundary
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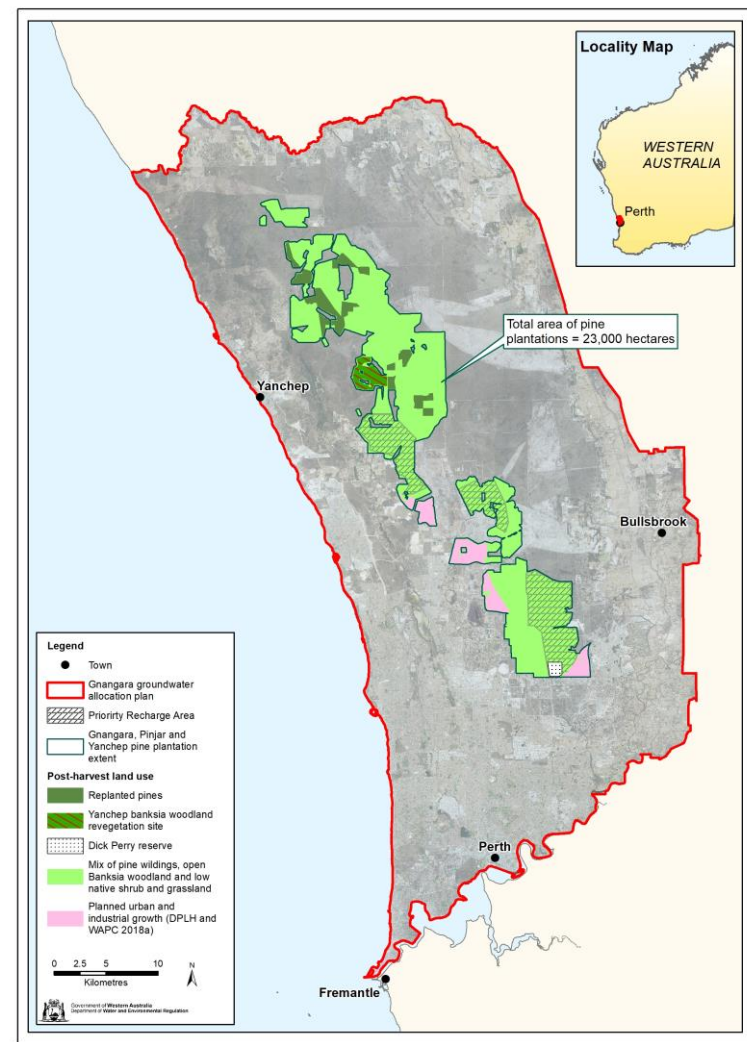


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# Managing Gnangara's pine plantations

- 23,000 hectares of pine plantation, ~75% already cleared
- Modelled post-pine land use based on Green Growth Plan
- Mix of:
  - Pine wildings, Banksia woodland and native shrub/grassland (most of the area)
  - Replanted pines
  - Future urban and industrial growth
  - Retained mature pines in Dick Perry Reserve
- Post-pine land use to achieve multiple objectives:
  - biodiversity
  - habitat and food for Carnaby's cockatoo
  - maximising groundwater recharge to support remnant wetlands and Whiteman Park





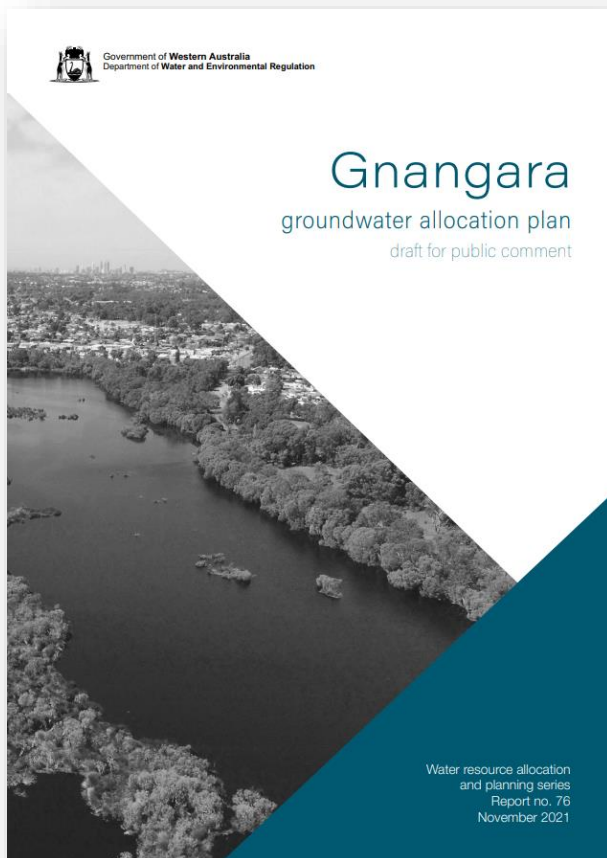
## Pines

- Modelling projects significantly improved recharge
- May take several years to achieve post-clearing recharge benefits
- Full realisation of recharge benefits may happen after 2030



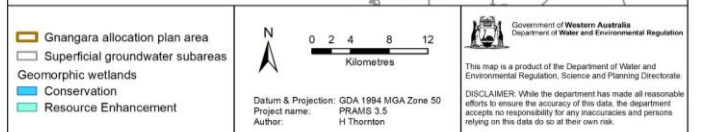
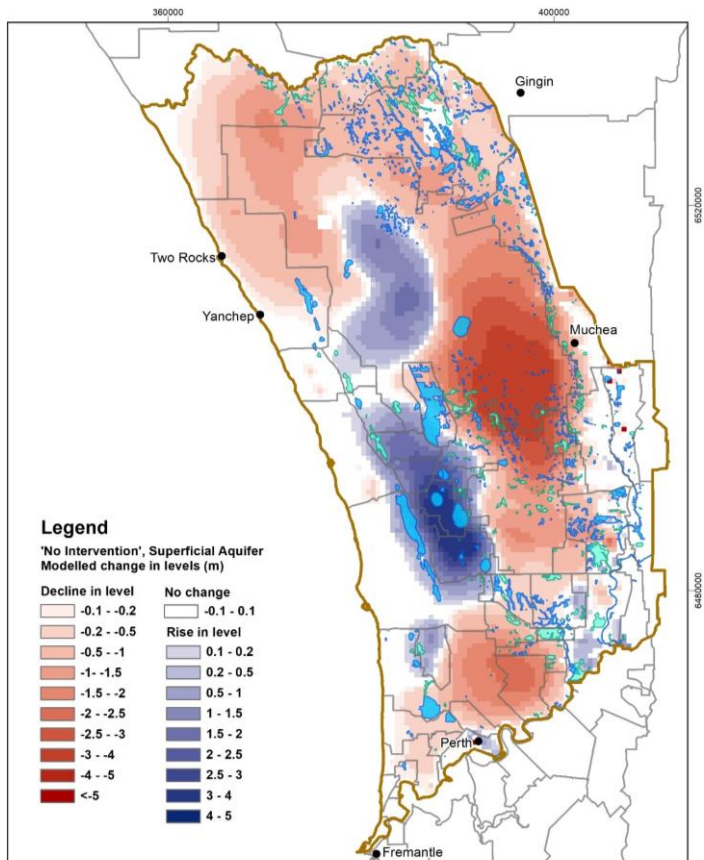


# Sharing reductions to groundwater across sectors

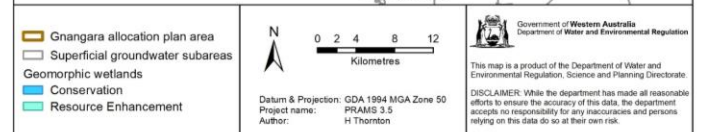
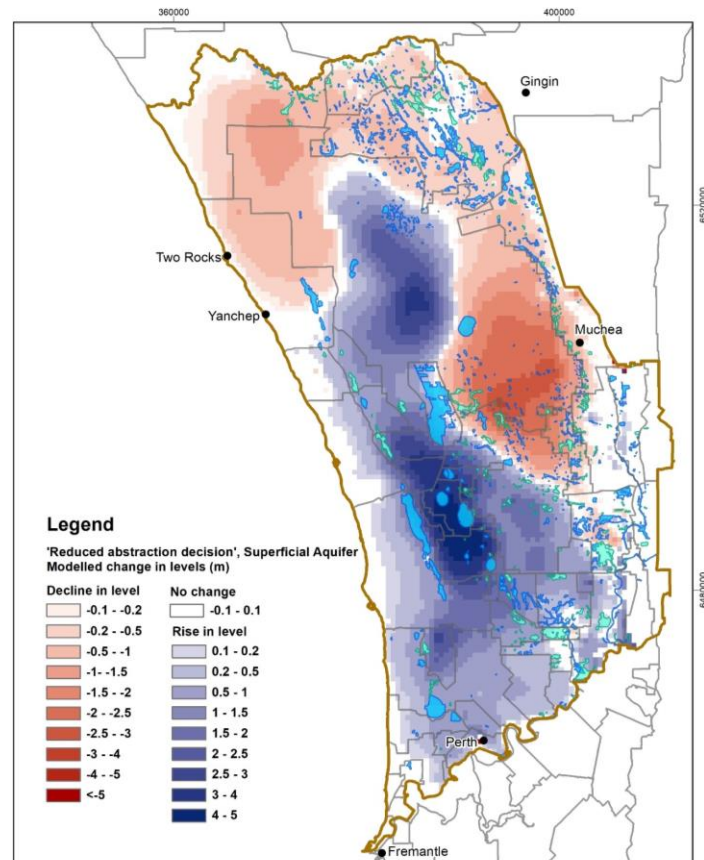


Water use category	Total water use	No. of licences	Reduction
	GL/year		GL/year
<b>Water Corporation</b>	111 GL (40%)	22	30.0
<b>Agriculture</b>	62 GL (23%)	1820	5.4
<b>Parks, gardens and recreation (schools excepted)</b>	45 GL (16%)	411	3.4
<b>Commercial, constructions, industry, mining and other non-exempt uses</b>	21 GL (8%)	370	1.4
<b>Total for licensed users</b>		2623	<b>40.3</b>
<b>Unlicensed stock and domestic use</b>	4.5 GL (2%)	–	<b>13.6</b>
<b>Domestic garden bores</b>	31.5 GL (11%)	–	
<b>Total reductions for all groundwater use</b>	<b>275 GL</b>		<b>54</b>

# No intervention



# Reduced abstraction





Consideration	No intervention	Abstraction reduction
Reduction to total annual abstraction	No reduction	54 GL
Sites where current condition will be maintained or improved:	<ul style="list-style-type: none"> <li>Wetlands and bushland around urbanising areas in East Wanneroo (such as lakes Jandabup, Mariginiup, Joondalup and Goollelal).</li> <li>Lake Gwelup.</li> </ul>	<ul style="list-style-type: none"> <li>Wetlands and bushland around Whiteman Park and west of Ellenbrook.</li> <li>North-west wetlands such as Lake Nowergup (with some supplementation) and wetlands in and around Yanchep National Park (such as Loch McNess (Wagardu) and Lake Yonderup).</li> <li>Some urban wetlands close to Perth, such as Herdsman Lake (Ngurgenboro).</li> </ul>
Number of sites where groundwater modelling showed there was a low risk of breaching the current <i>Environmental Protection Act 1986</i> criteria (currently 16 out of 30 compliant):	6/30 (significant additional non-compliance)	16/30 (no additional non-compliance)
Area of healthy groundwater-dependent ecosystems compared with now:	36% less	10% less
Volume of water at risk of acidity or salinity impacts:	13.1 GL	2.8 GL (79% less)

Outcomes of reduced abstraction, compared with 'no intervention'



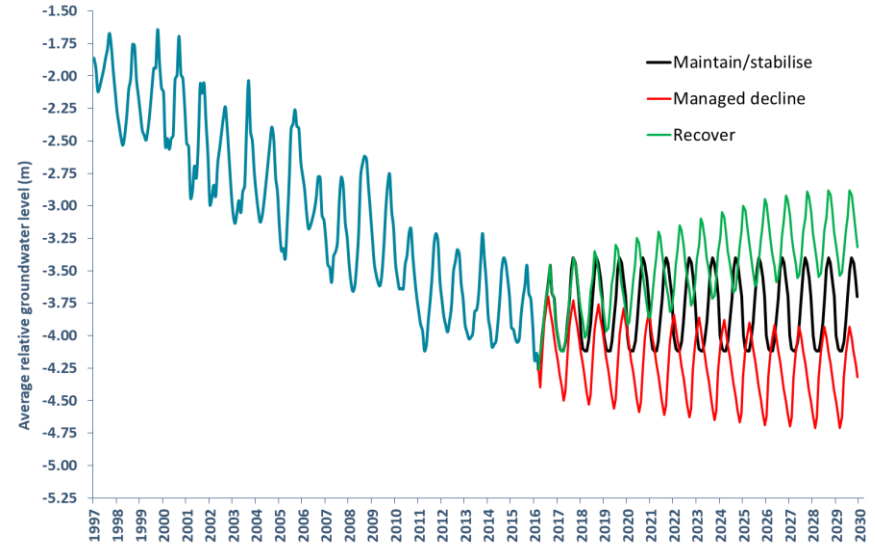
# Principles for revising criteria levels

## 1. Aim to meet current criteria where possible recognising:

- Current criteria closely reflect EWRs linked to existing management objectives and values
- lowering threshold levels may mean accepting a change to ecological values

## 2. If meeting current criteria is unlikely, aim to (in this order):

- a) Increase water levels to improve ecological health
- b) Maintain water levels to avoid further decline in water levels and ecological health
- c) Reduce the rate or magnitude of decline in water levels to limit impacts to values





## Proposed changes to water level criteria

Change to minimum criteria	Number (Total = 30)	Range (m)
Lower	12	0.1 - 2.0
Higher	3	0.4 - 0.6
Remove	1	
No change	14	

Site management objectives:

- Improve (10 sites)
- Maintain (14 sites)
- Manage decline to reduce risk of impacts (5 sites)

# Process to revise Ministerial criteria

- Unable meet all water level criteria even with proposed reductions in groundwater use
- Revised criteria proposed in Appendix G of draft plan
- Will require a change to Statement 819, in some cases to lower minimum water level criteria
- Independent assessment of proposed changes to criteria conducted by ECU
- EPA must review new proposal and assess environmental acceptability of new target levels
- EPA will consider public submissions on the draft plan as part of s46 assessment





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To make a submission on the draft Gngangara plan:

<https://www.wa.gov.au/service/natural-resources/water-resources/rebalancing-our-groundwater>

