

Marne Saunders water forum, 25 February 2022

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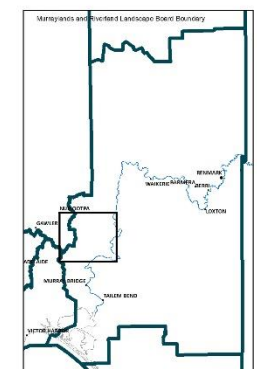
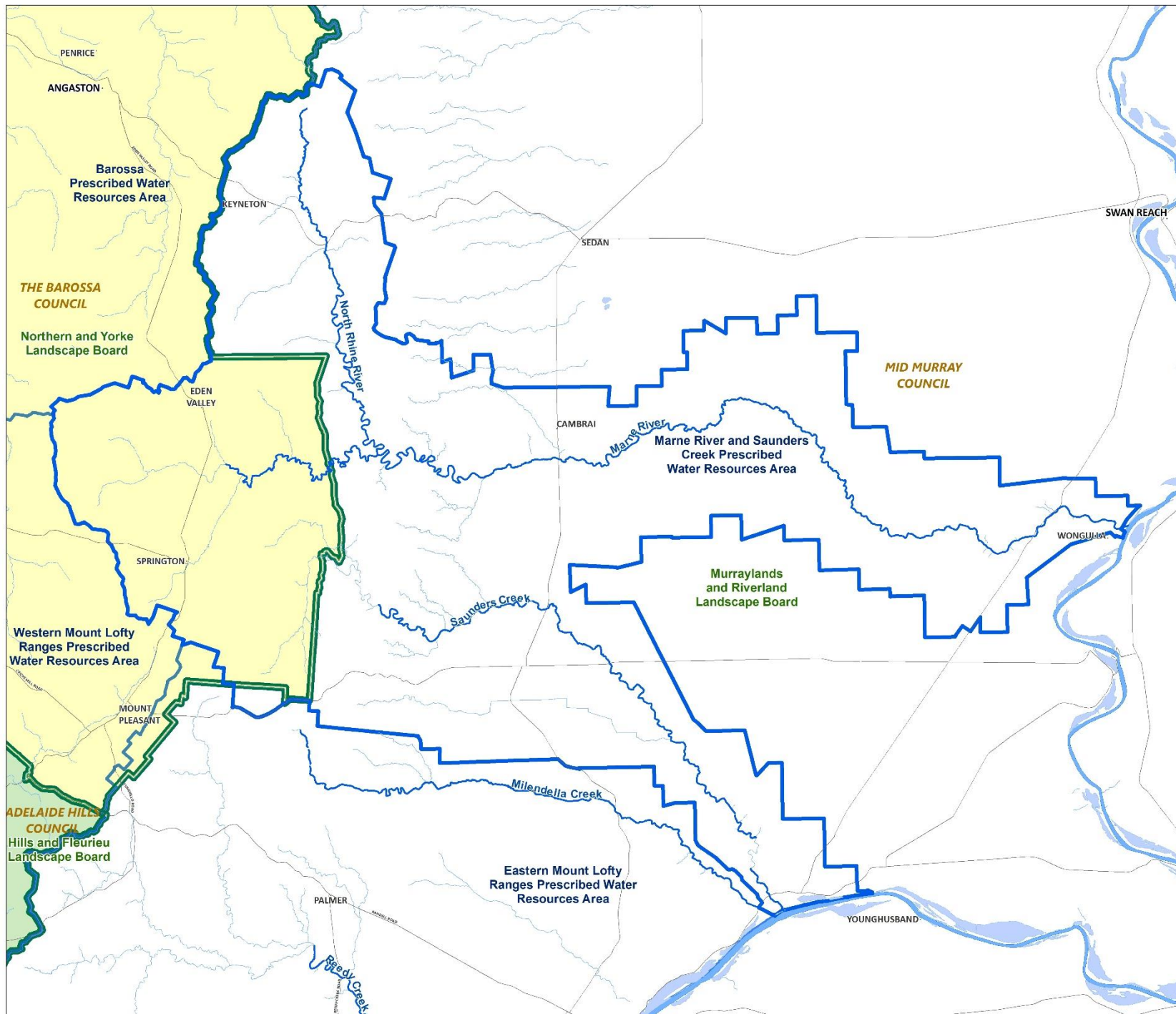
Marne Saunders Water Forum

25 February 2022

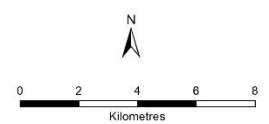


Autumn 2020 – Marne River at Jutland Rd crossing – Spring 2020

Marne River and Saunders Creek Prescribed Water Resources Area



- Marne River and Saunders Creek Prescribed Water Resources Area
- Other Prescribed Water Resources Areas
- Landscape Board Boundary
- Major watercourse
- Main Roads
- River Murray
- Water bodies
- Adelaide Hill Council
- The Barossa Council
- Mid Murray Council



Thank you for coming



More information: <https://www.landscape.sa.gov.au/mr>

Contact: Mel White on mobile: 0428 113 442
or email: melissa.white@sa.gov.au

Marne Saunders Prescribed Water Resources Area

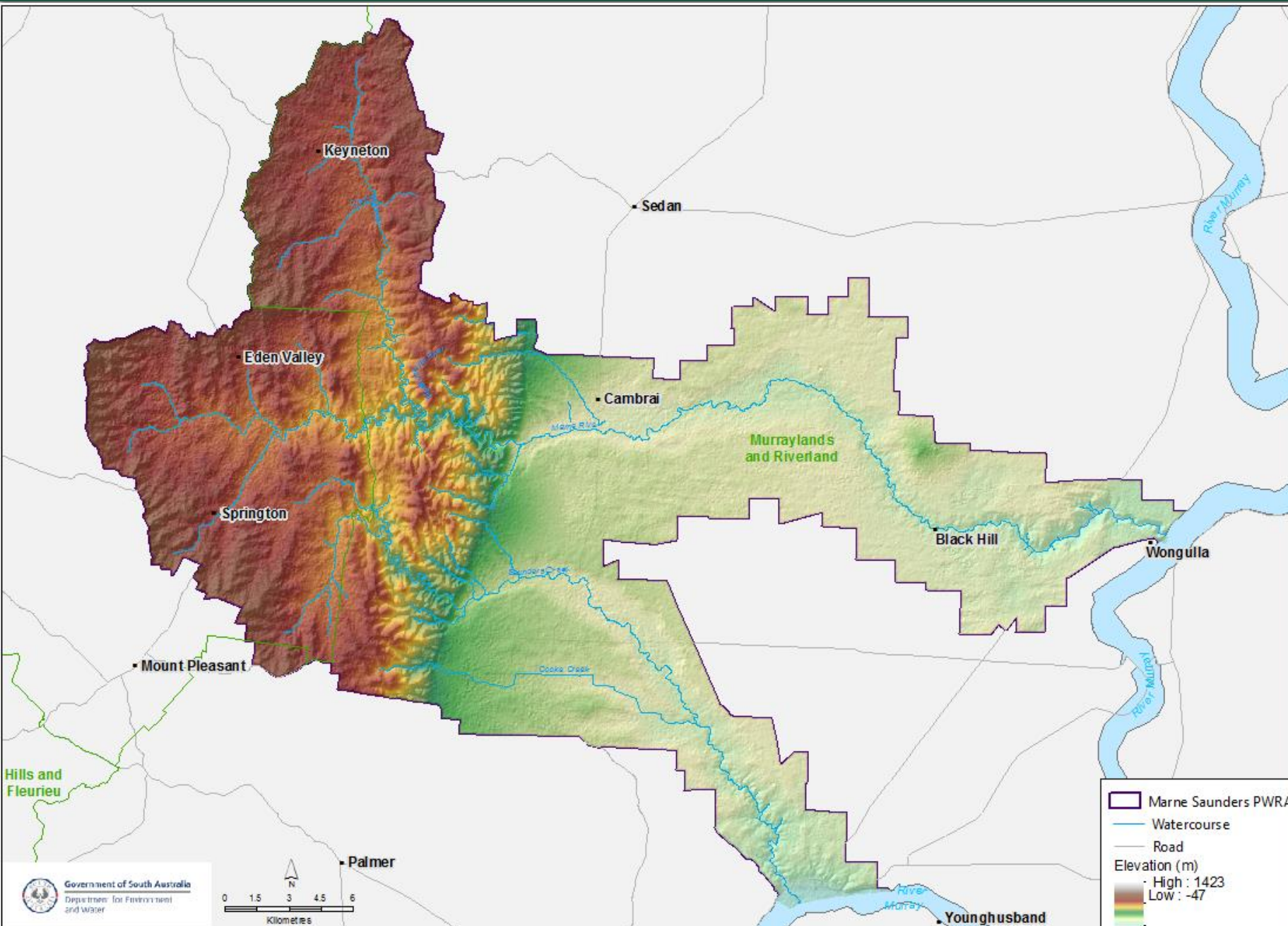
Surface water resources overview and trends



Government of South Australia
Department for Environment
and Water

Kumar Savadamuthu, Daniel Penney

Marne Saunders PWRA – Topography & Surface water features



- Around 400m AHD on Western extent
- Higher rainfall 800mm/a
- Steep decline through the Gorge along the Palmer Fault line
- Gently sloping floodplain d/s Palmer Fault
- Lower rainfall 250mm/a

South Australian Murray-Darling Basin
Natural Resources Management Board

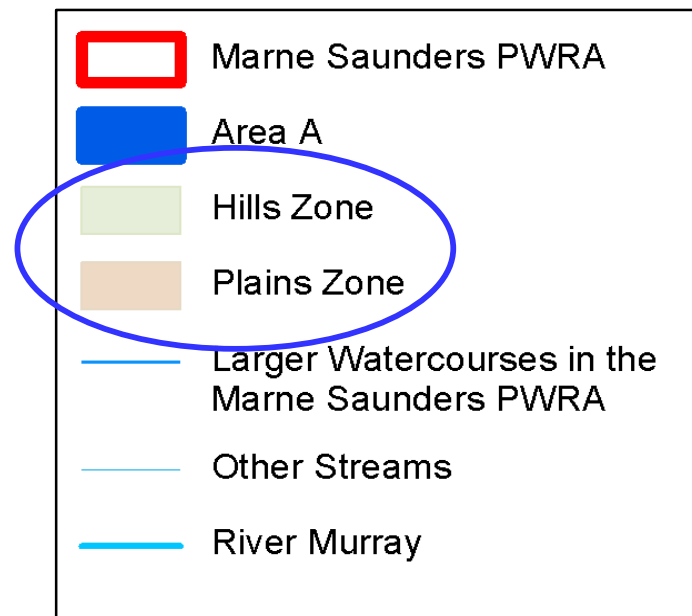
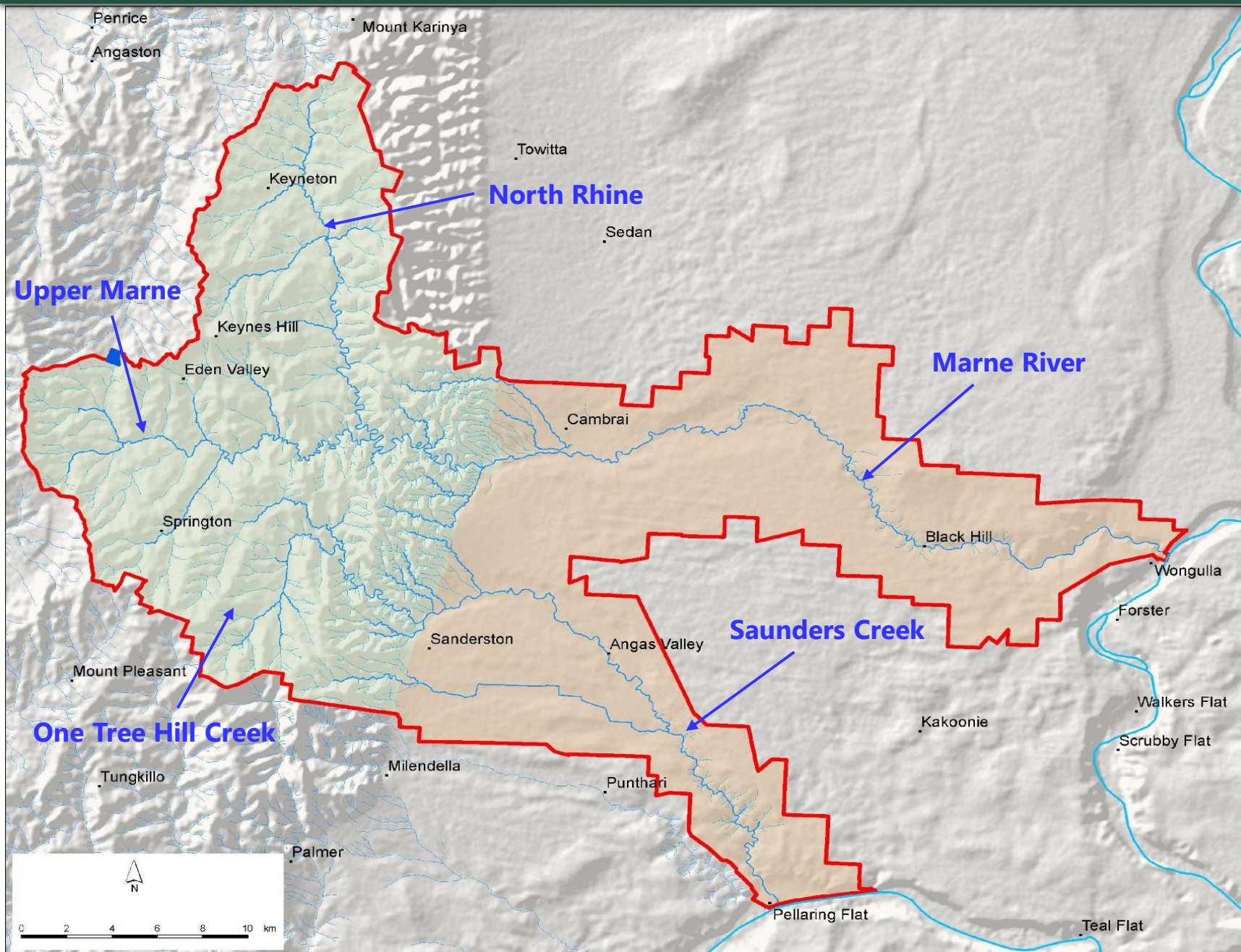
The Water Allocation Plan for the Marne Saunders Prescribed Water Resources Area



- **This is among the first WAPs in the state to define and actually quantify EWRs and provisions**
- Describes the PWRA's surface water, groundwater resources and water dependant ecosystems in great detail
- Content of this presentation is taken largely from the WAP, except for the more recent analysis ...

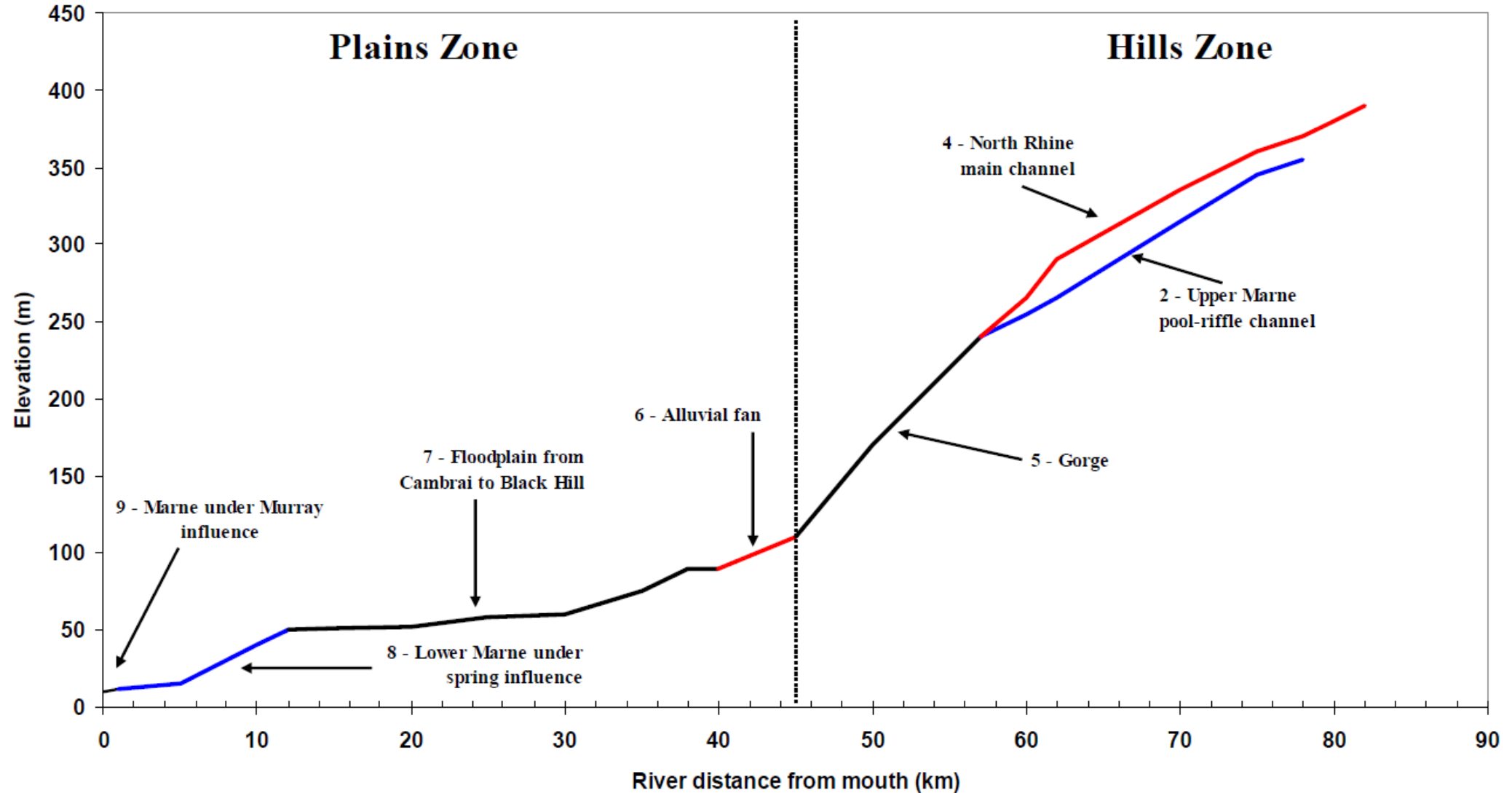


Marne Saunders PWRA – Streams & Zones



Marne Saunders PWRA – Topography & Surface water features

Figure 4 Longitudinal profile of the Marne and North Rhine Rivers showing reach delineations. Elevations based on field survey of low flow control levels using differential GPS. River distances measured from 1:50,000 topographic maps.

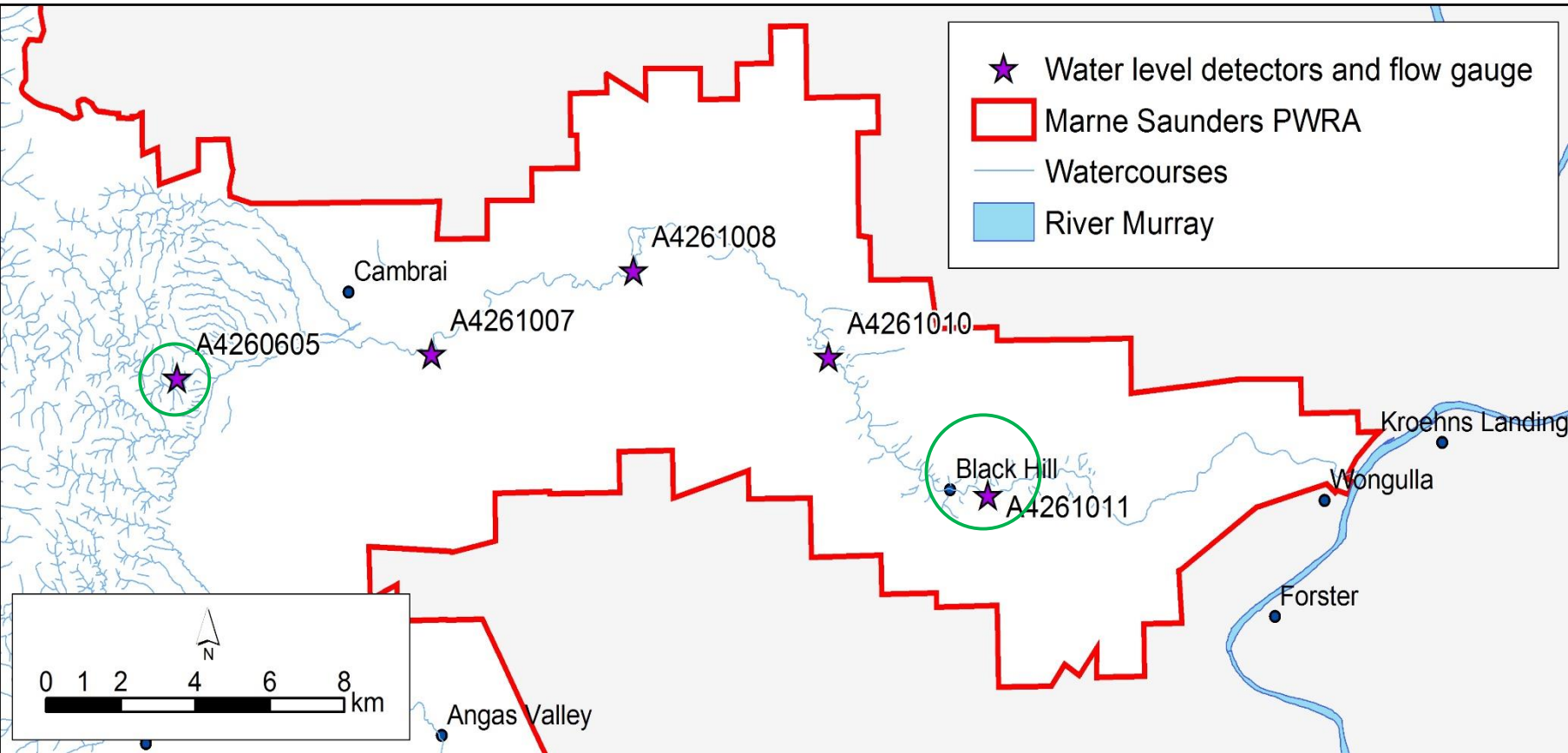


Marne Saunders PWRA – Flow & Runoff in Lower catchments

Marne Saunders WAP, pgs. 18 & 19

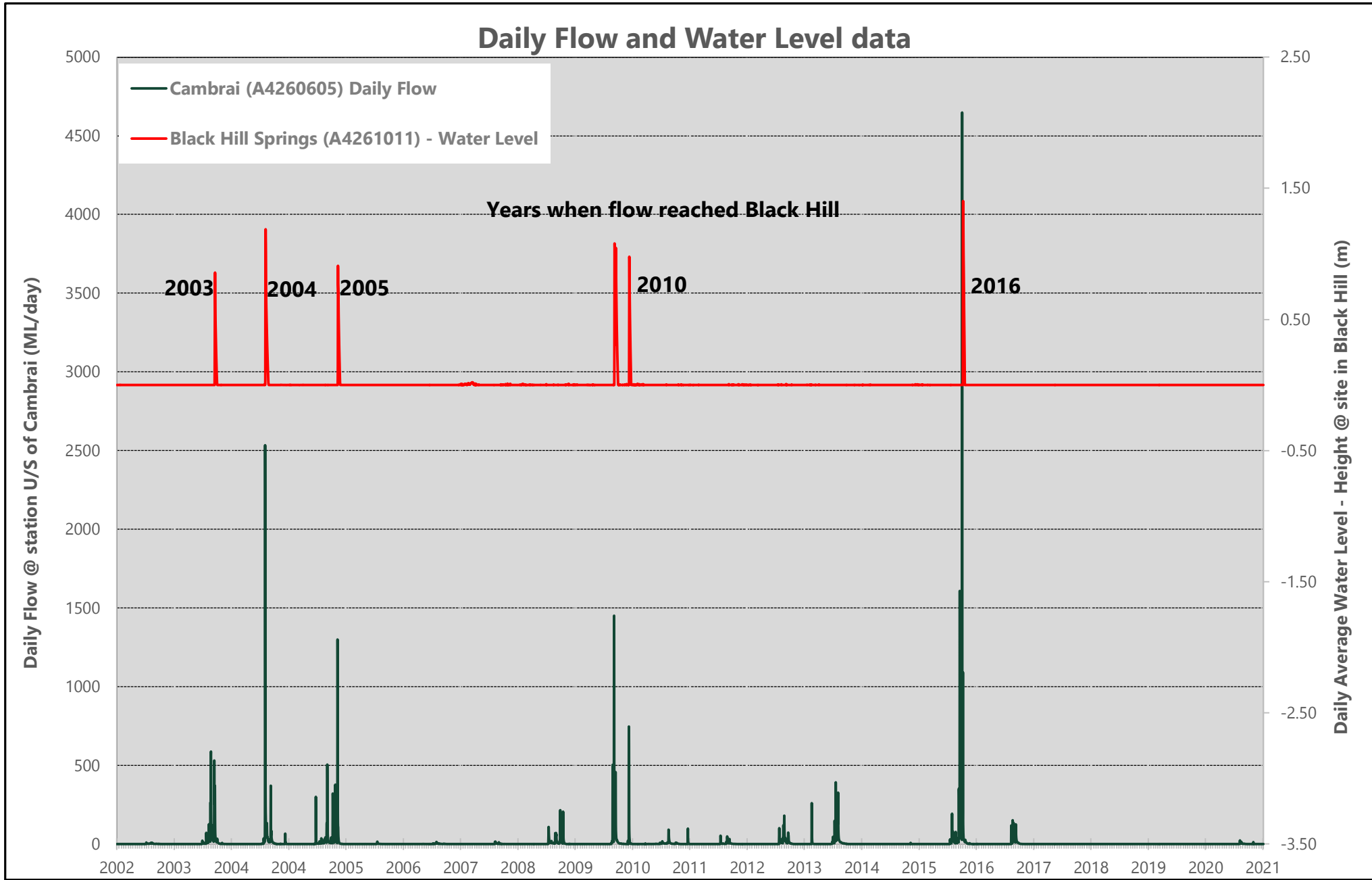
- The bulk of flow in the Lower Marne River and Lower Saunders Creek between the mouths of the gorges and Black Hill (Marne) or Lenger Reserve (Saunders) typically **originates in the hills zone**. These sections can be described as “losing” watercourses, as surface flows are lost from the watercourse as they percolate into the floodplain sediments, recharging the underground water below.
- There are few watercourses in the lower catchments besides the Marne River and Saunders Creek channels. A few minor tributaries are present, draining from the foothills and also in the incised lower reaches closer to the River Murray (e.g. around Black Hill in the Marne).
- Rainfall is low and there is little local generation of runoff.
- Water level detectors have been in place along the Lower Marne since 2001 to assess the loss of streamflow along the watercourse. Preliminary data analysis shows that **at least 4,000 ML of cumulative flow** is required at the Marne Gorge flow gauging station before flow will reach the downstream water level detector site near Black Hill.
- Flow from the Upper Marne to the mouth at the River Murray is now uncommon, having occurred in 1992, 1996 and 2004 in recent times (R. Laucke, personal communication). Flow from the Upper Saunders to the mouth is even more uncommon given the smaller discharge from this area, and it is not known when this last occurred.

Marne Saunders PWRA – Flow & Water Level Monitoring sites



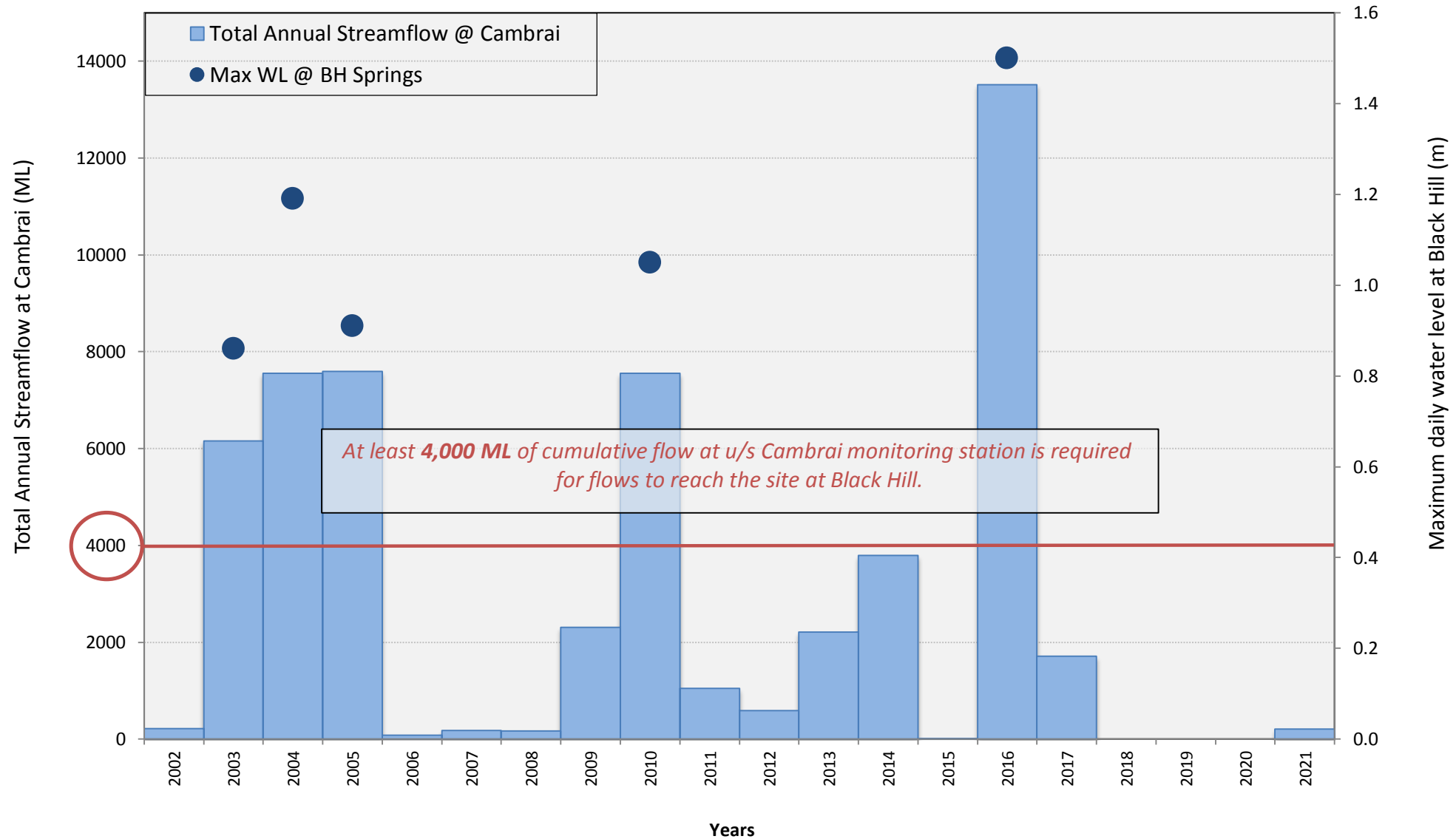
- A4260605 – long-term flow monitoring – u/s of Cambrai since early 1970s.
- A4261011 – most d/s site, water level data, established 2001.
- Other sites – water level data since 2002.
- Data in next slide.....

Years when flows reached Black Hill...



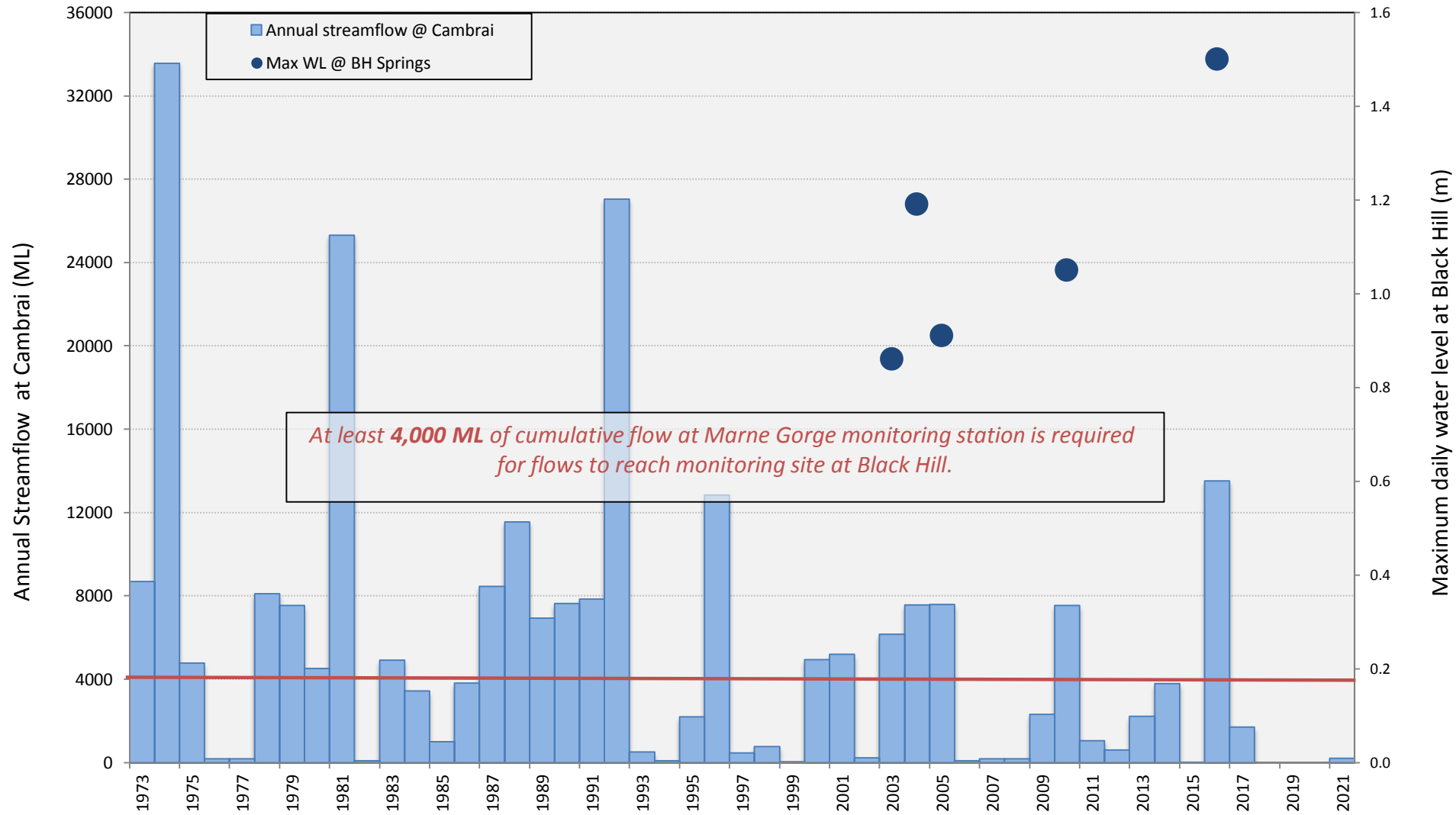
How much total flow needed ... to reach Black Hill...

Annual flow data @ Cambrai (2002 to 2021)

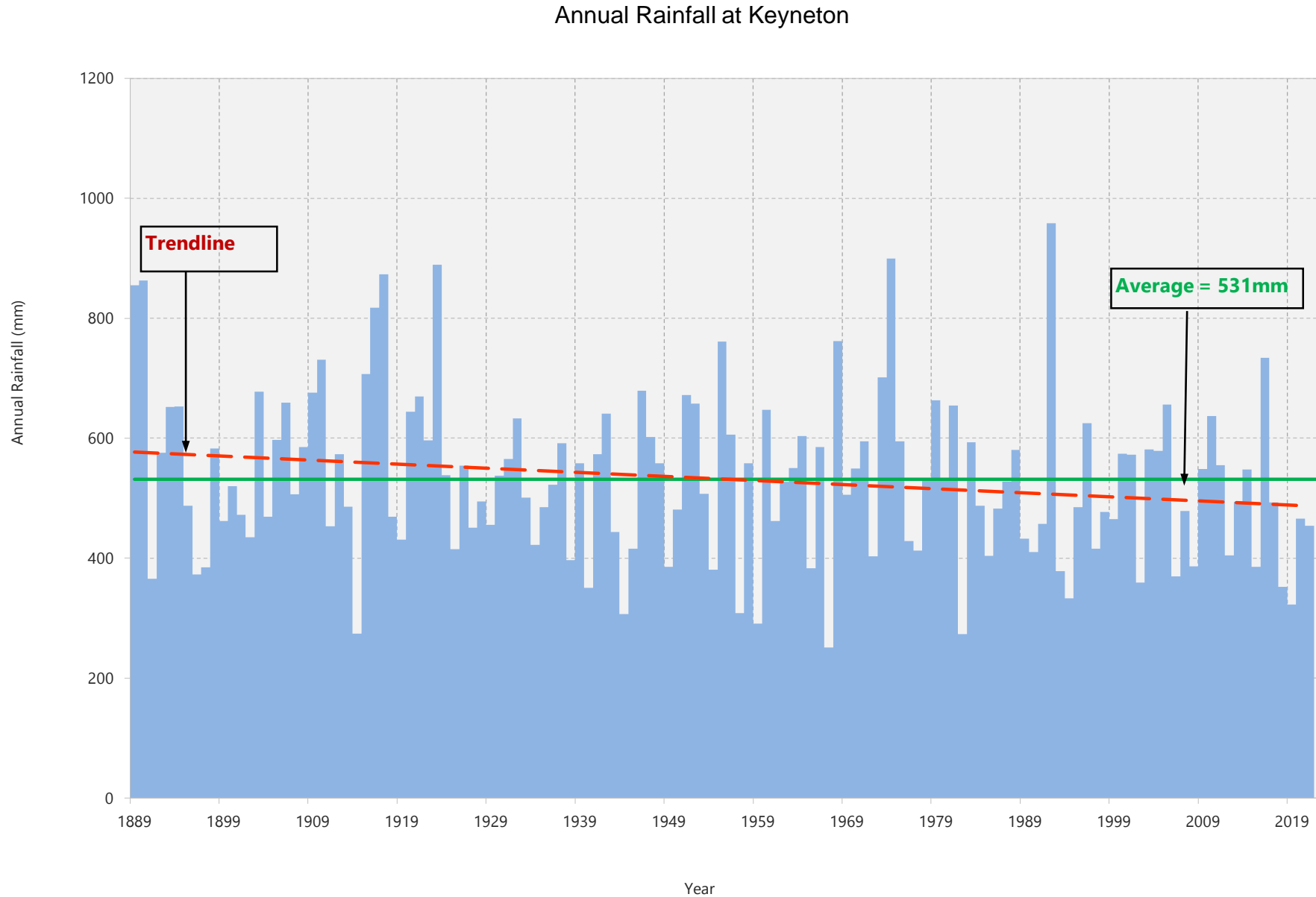


Long-term annual flow data at Cambrai.

Long-term annual flow data @ Cambrai



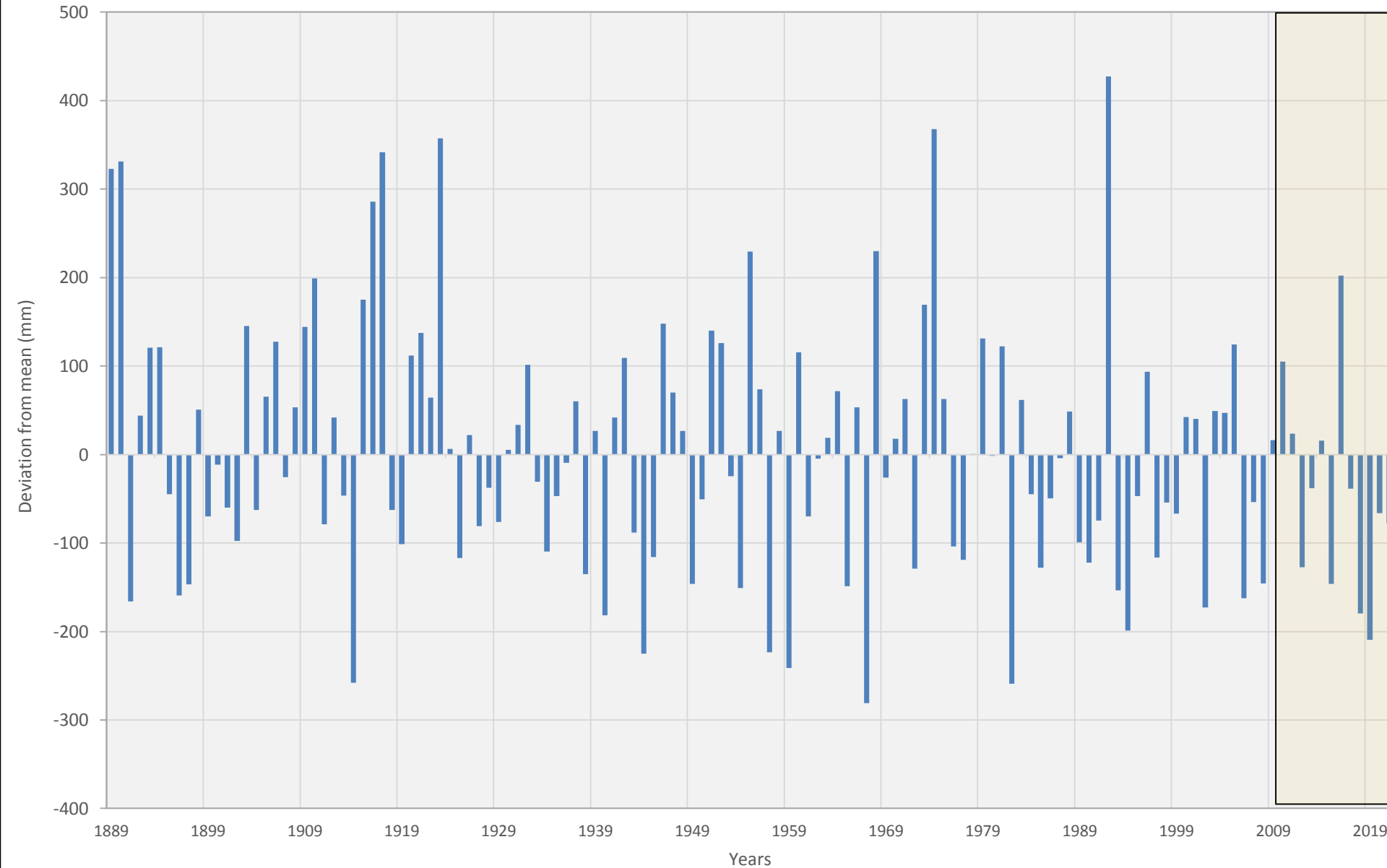
Long-term annual rainfall data, Keyneton..



- Long-term decreasing trend at Keyneton
- Since 2016, all years have been lower than average rainfall years.

Annual rain – Deviation from average..

Annual Rain @ Keyneton - Deviation from long-term average



- Last 5 years – long sequence of consecutive dry years..

Climate change

- Reduction in annual rain
- Increased Temp. & Evap
- Change in seasonality (rainfall pattern)
- Increased frequency of very DRY / WET years
- Reduction in Catchment Yield – runoff generated from hills
- Reduction and/or change in frequency of flow reaching Black Hill ??



Thanks....



For further info. contact:
Kumar Savadamuthu, Principal Hydrologist
Kumar.Savadamuthu@sa.gov.au
0407201391



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of South Australia

Department for
Environment and Water

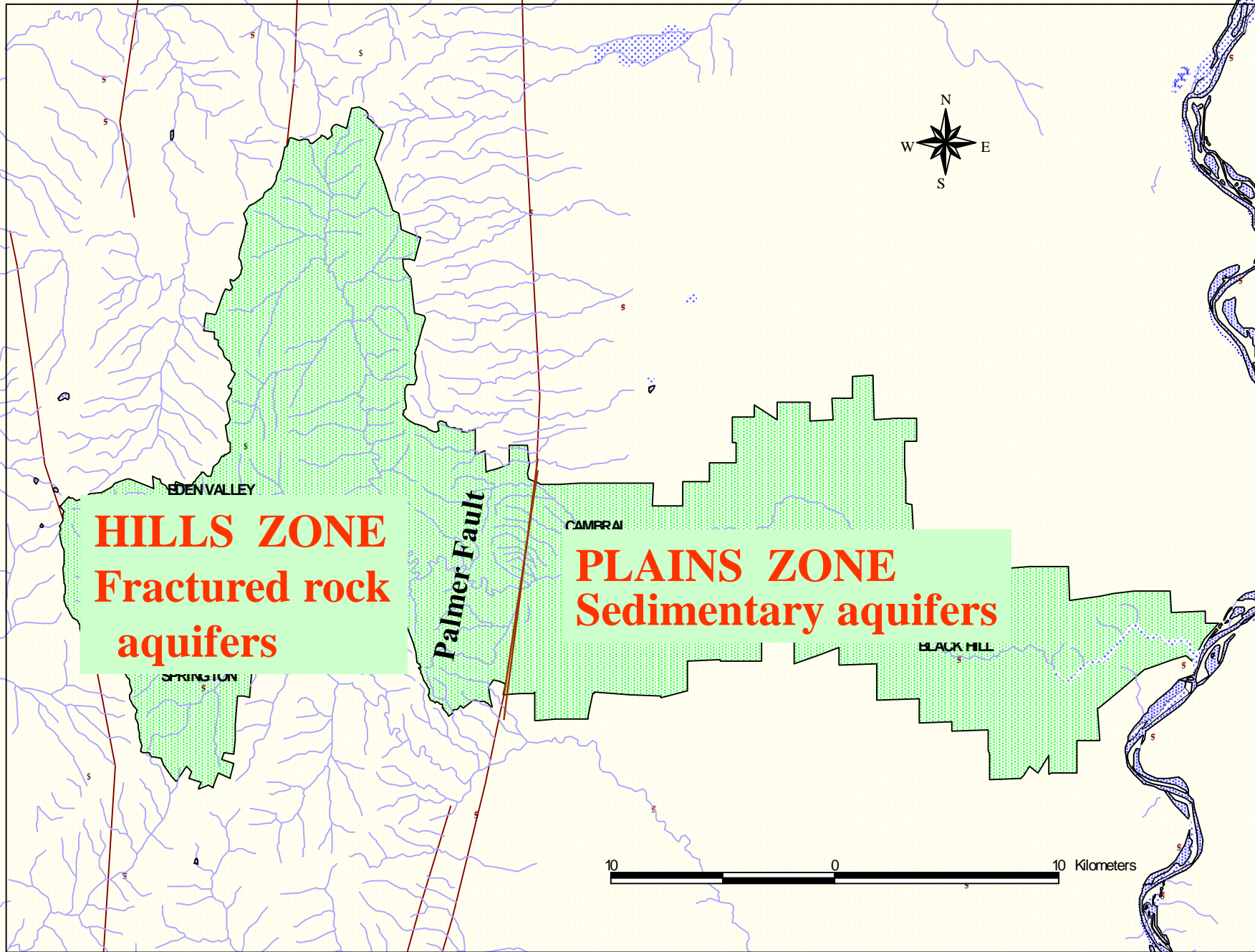
Marne Saunders PWRA

STATUS OF GROUNDWATER RESOURCES

Steve Barnett
Principal Hydrogeologist
Water Science Unit



Government of South Australia
Department for Environment
and Water



HILLS ZONE
Fractured rock
aquifers

PLAINS ZONE
Sedimentary aquifers

Palmer Fault

EDEN VALLEY

SPRINGTOWN

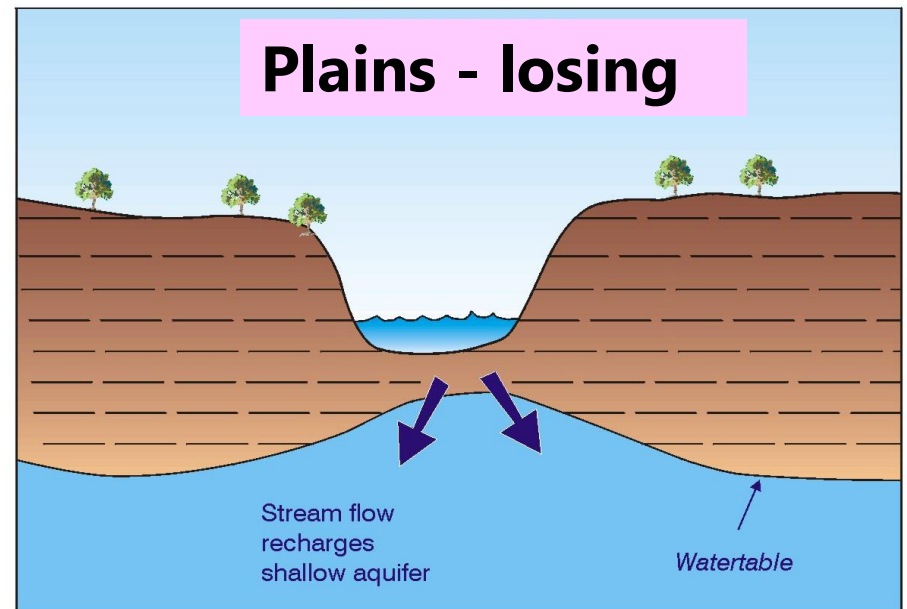
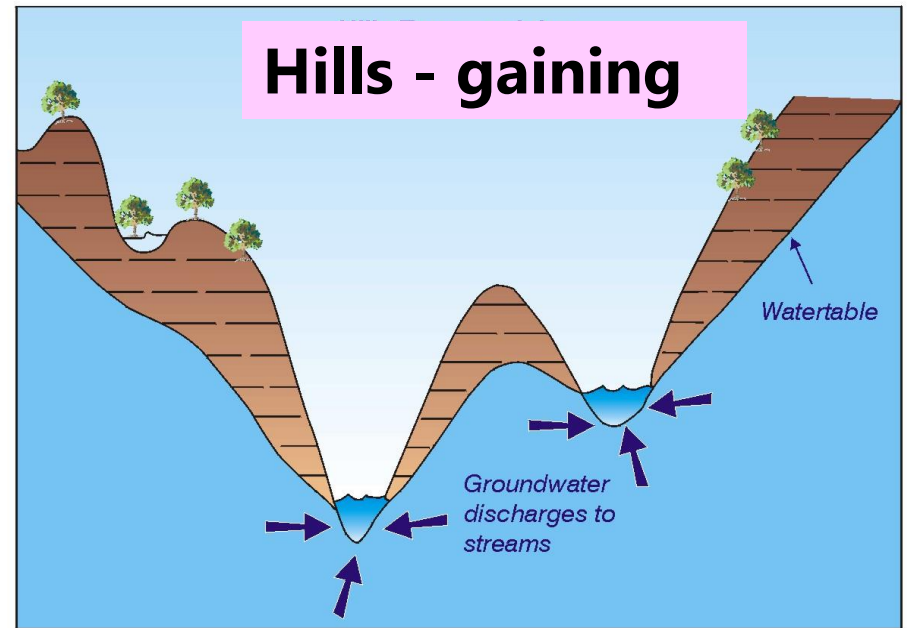
CAMPRAI

BLACK HILL

10 0 10 Kilometers

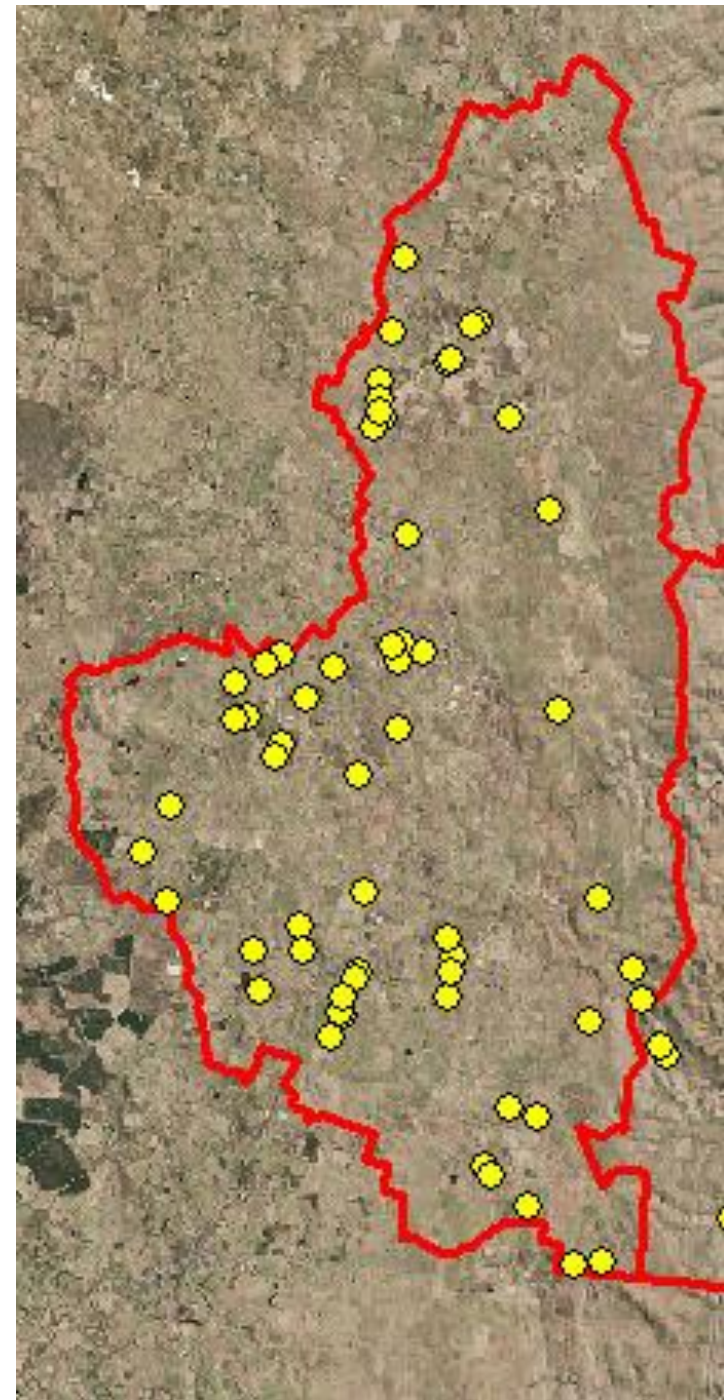
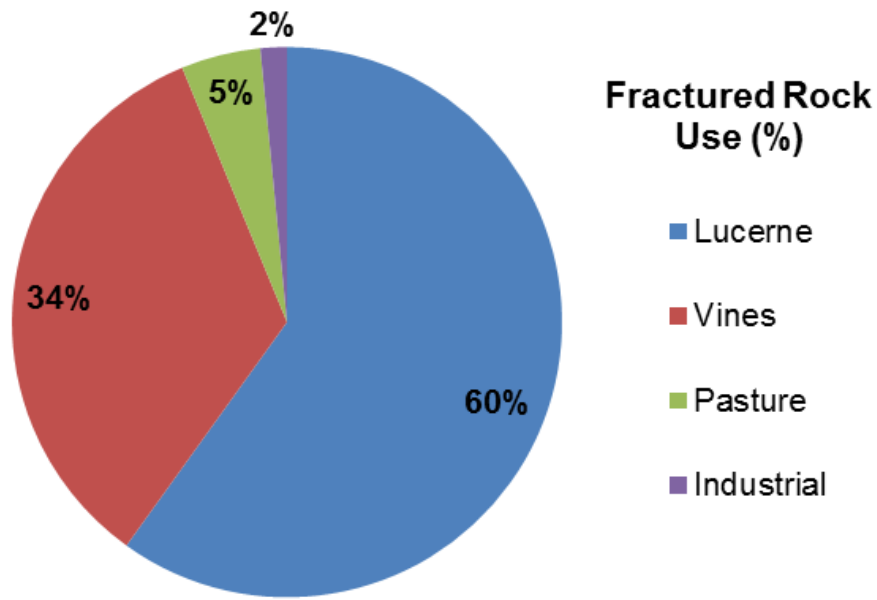


Groundwater Stream interaction

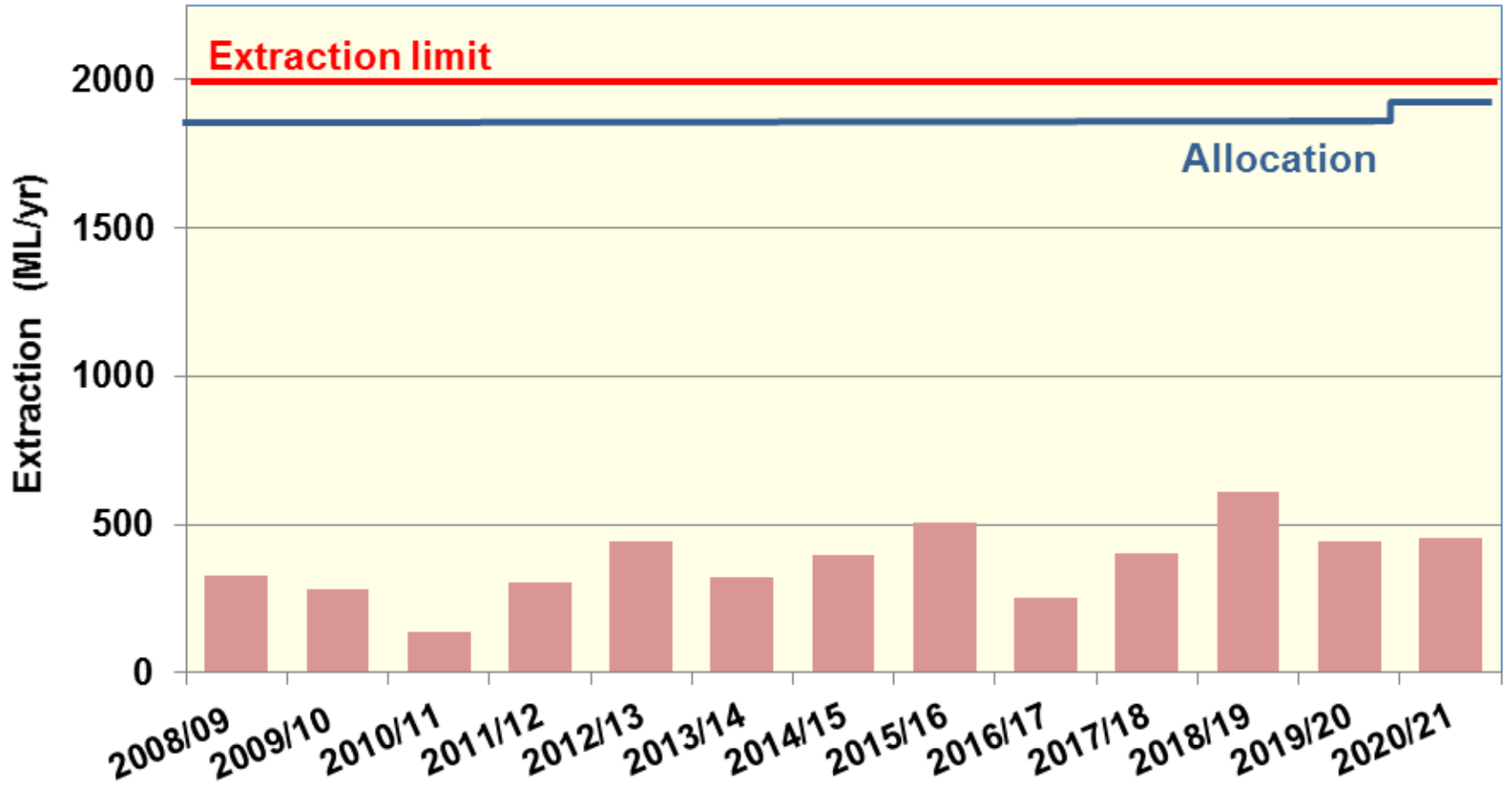


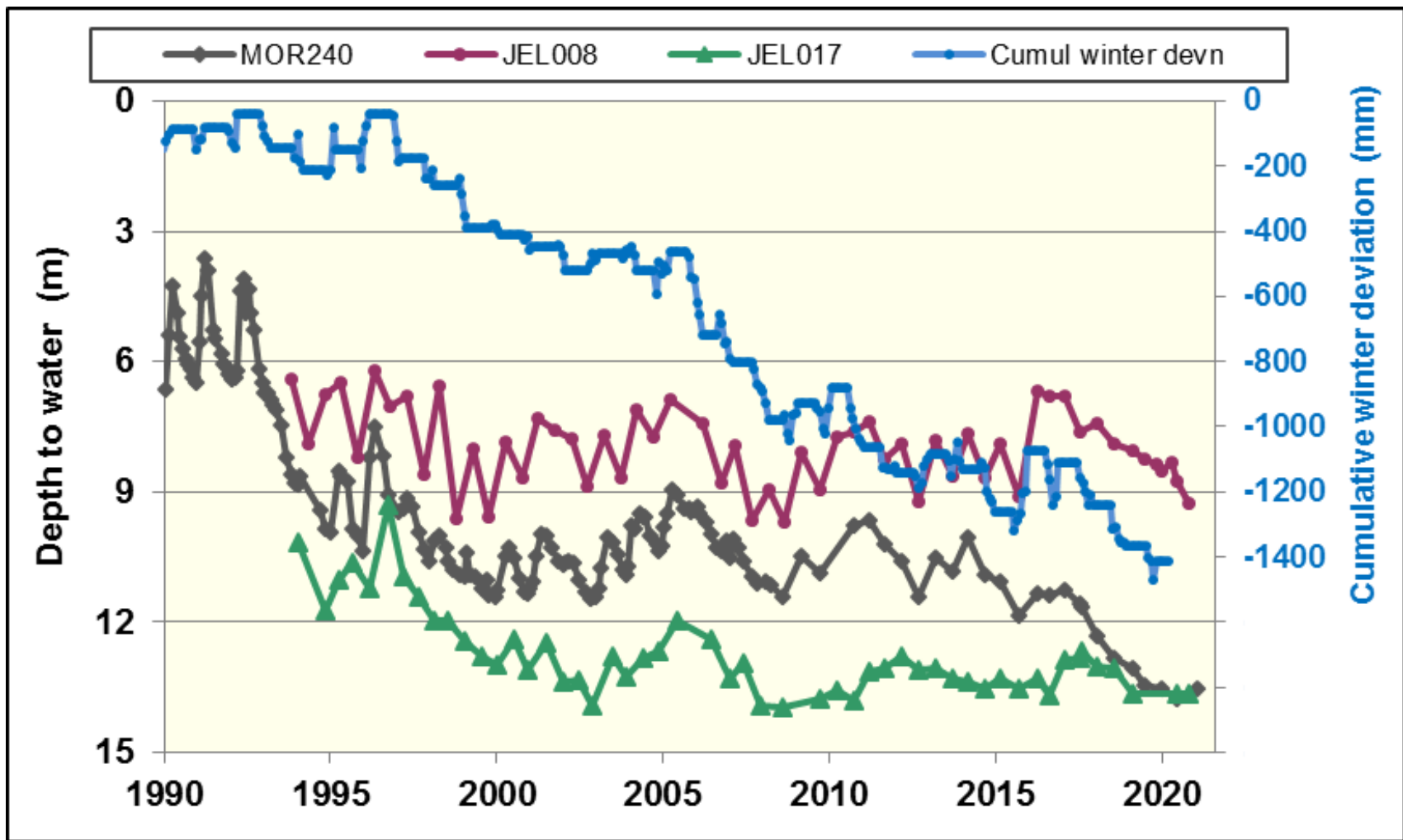
HILLS ZONE

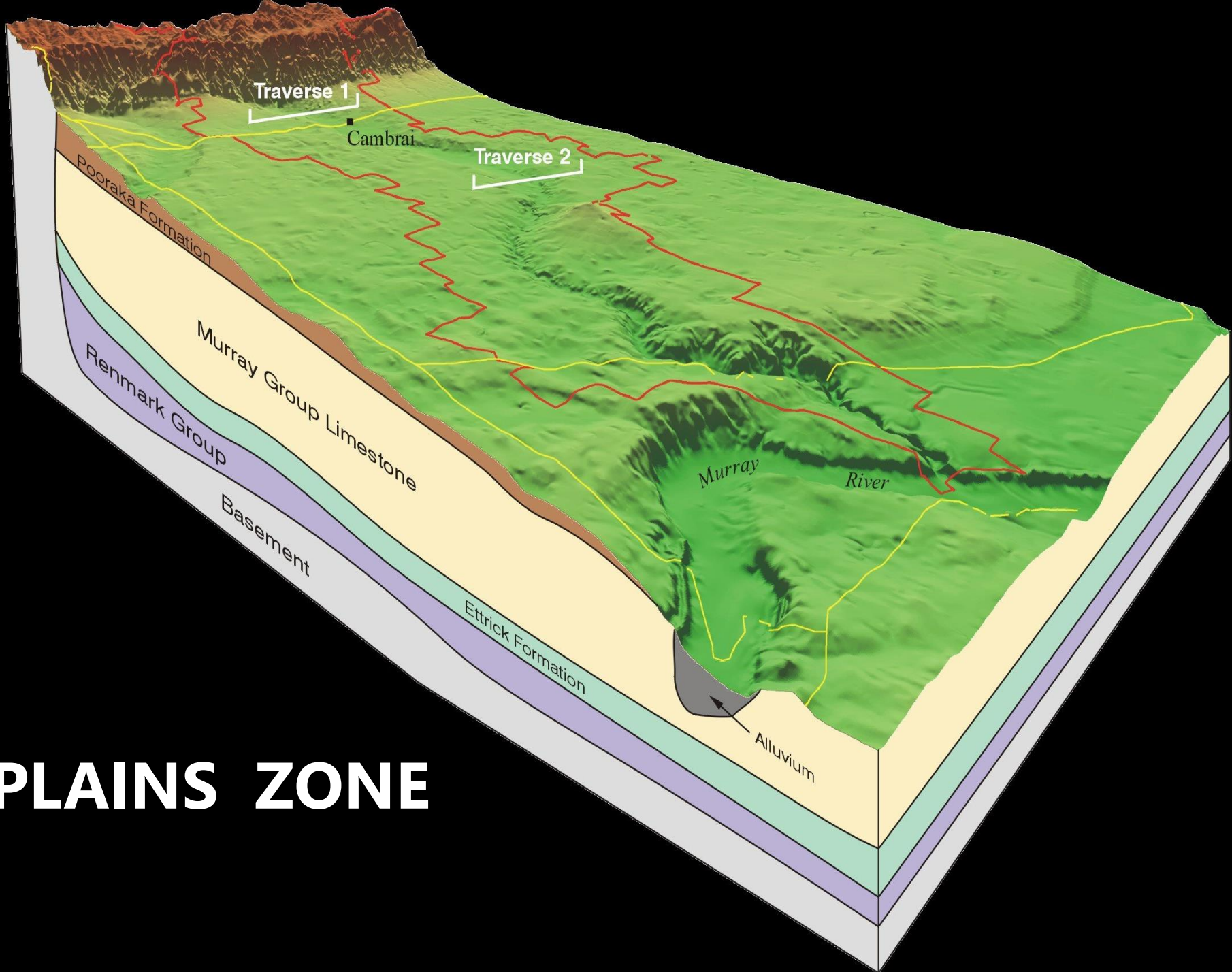
- Fractured rock aquifers
- Variable yields and salinities



FRA

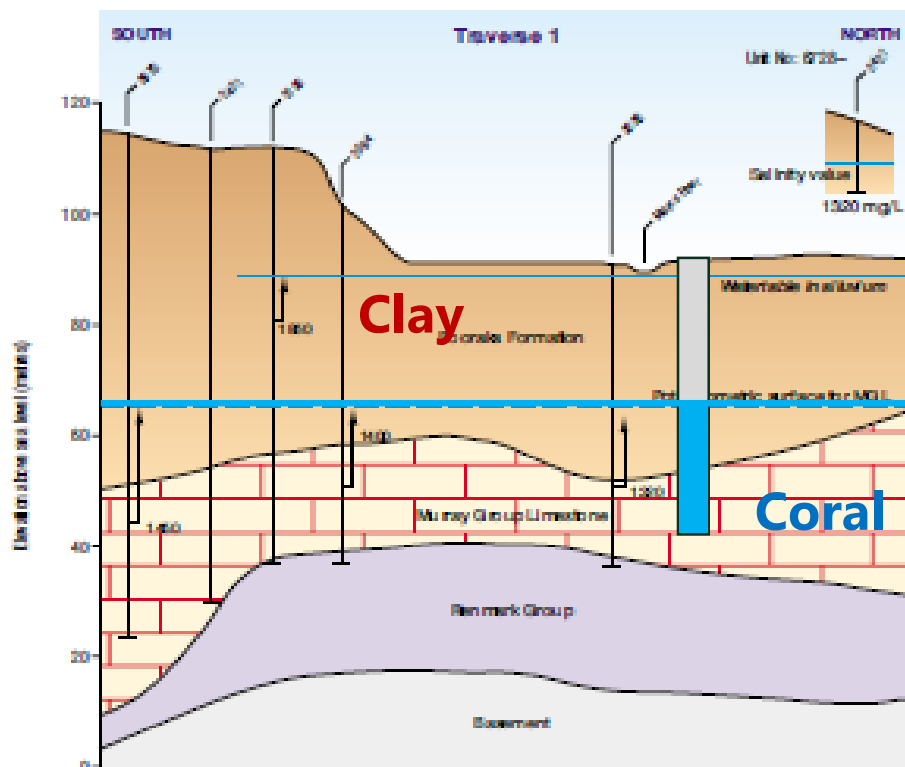




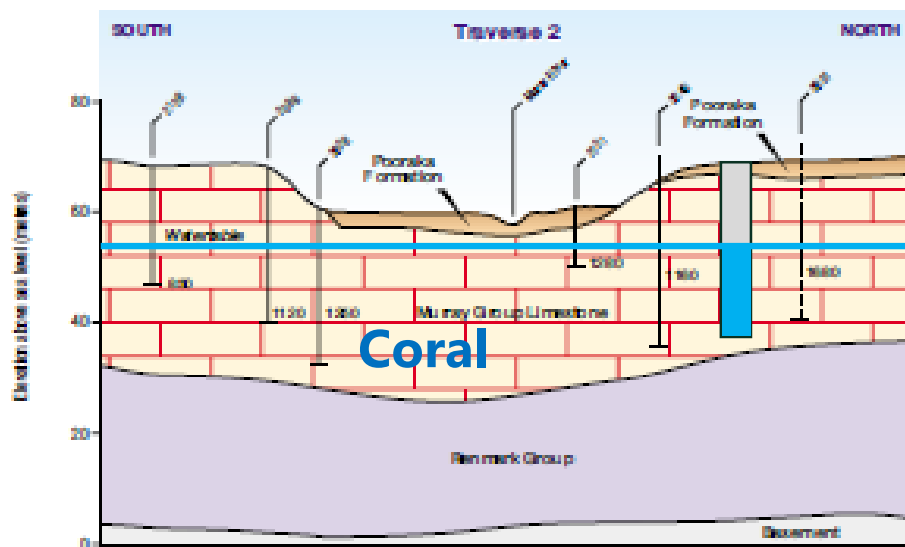


PLAINS ZONE

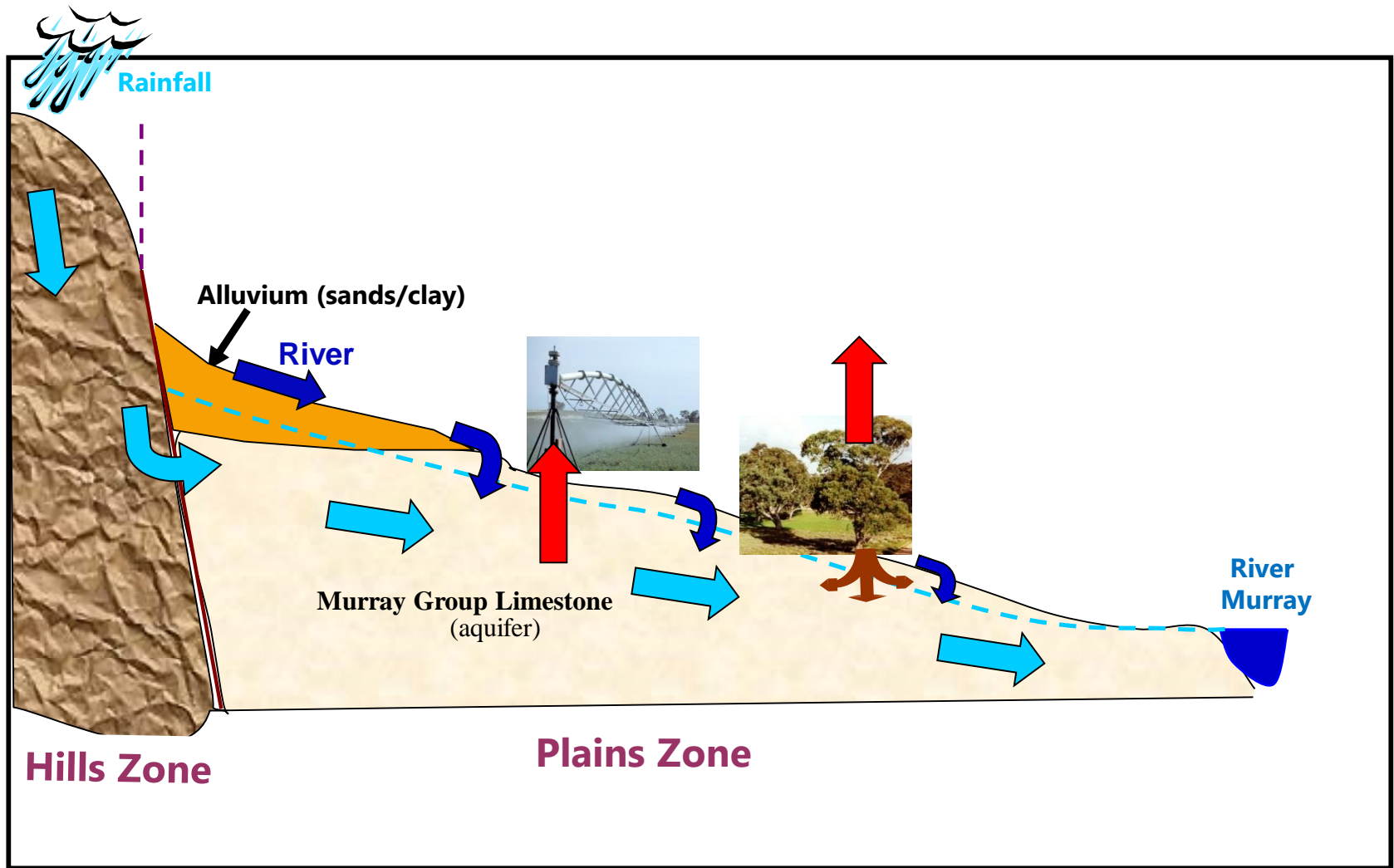
**Confined –
Upstream of main
road**



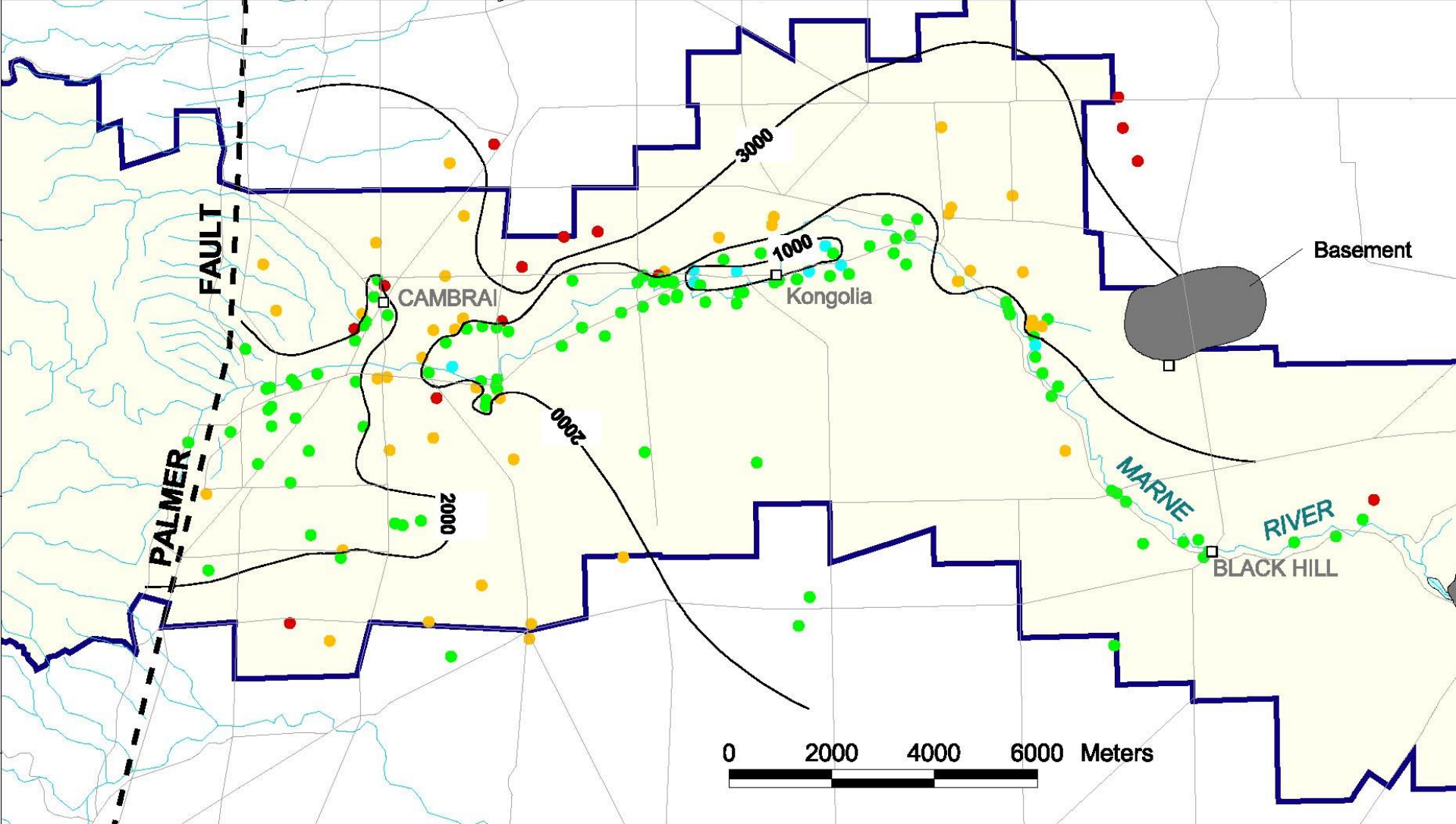
**Unconfined –
Downstream of main
road**

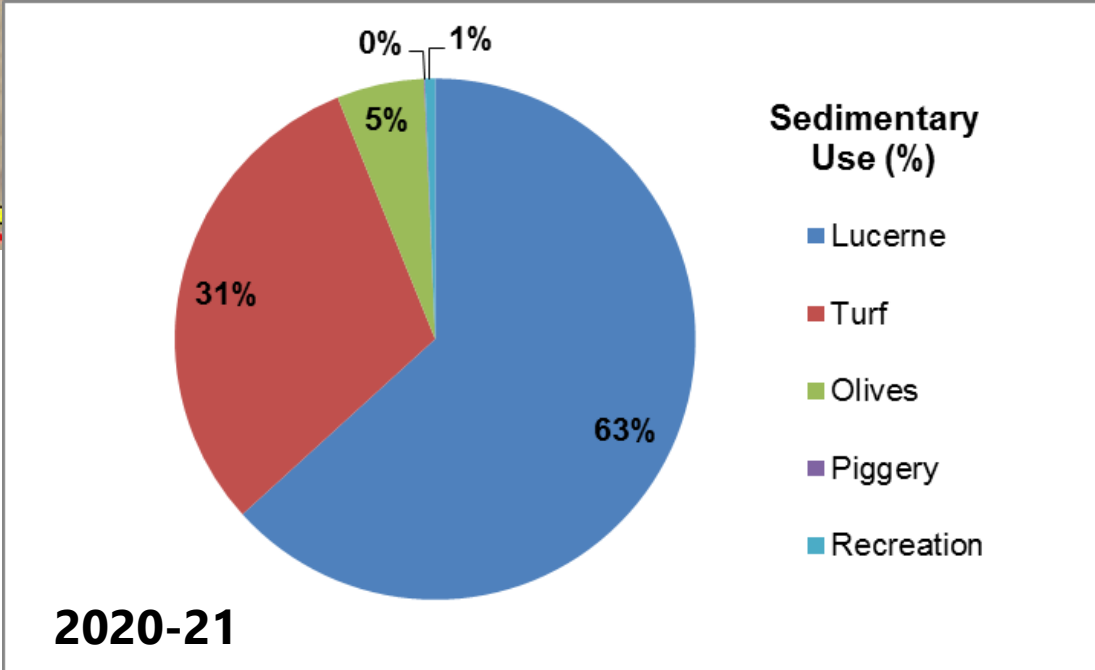
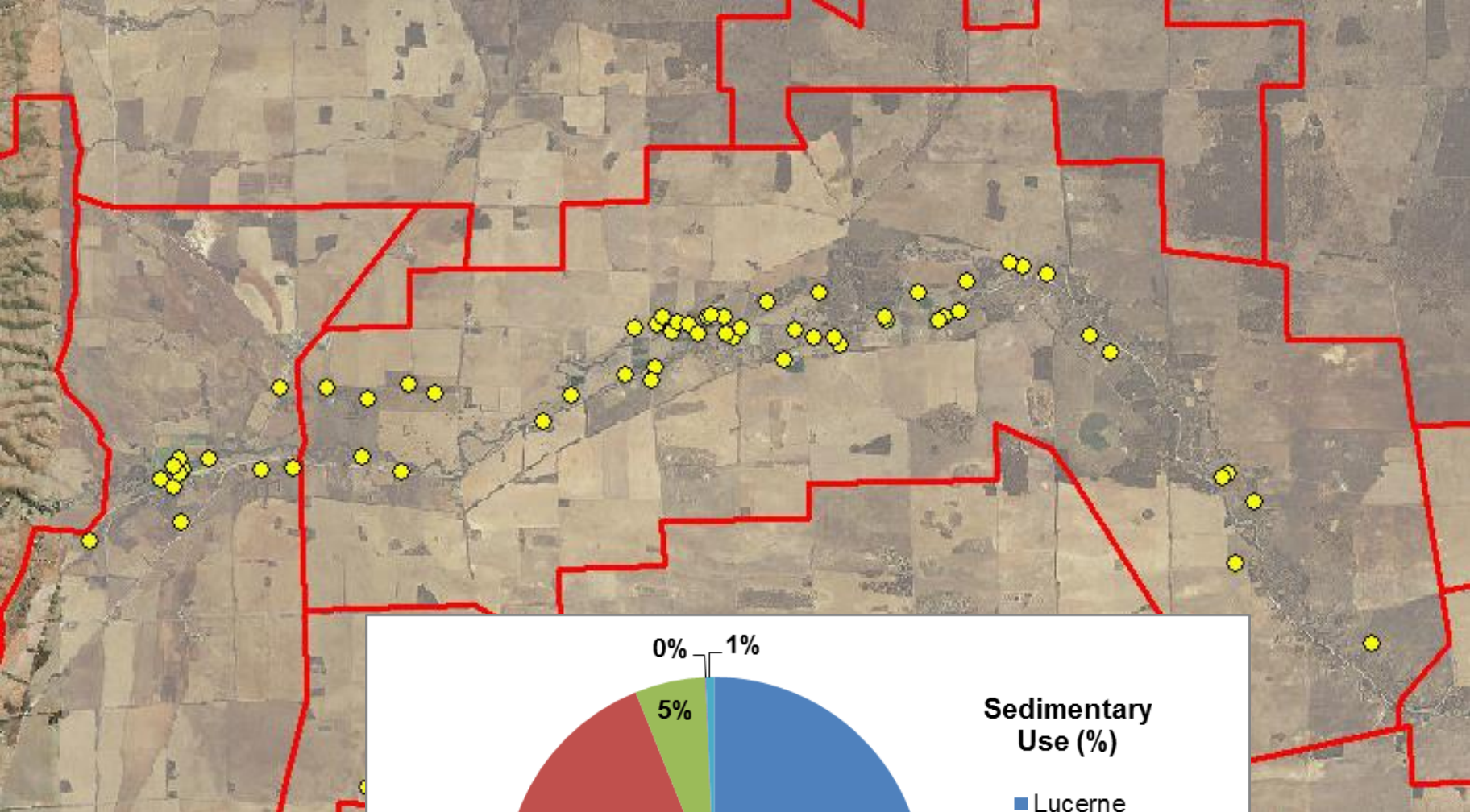


Recharge and discharge mechanisms

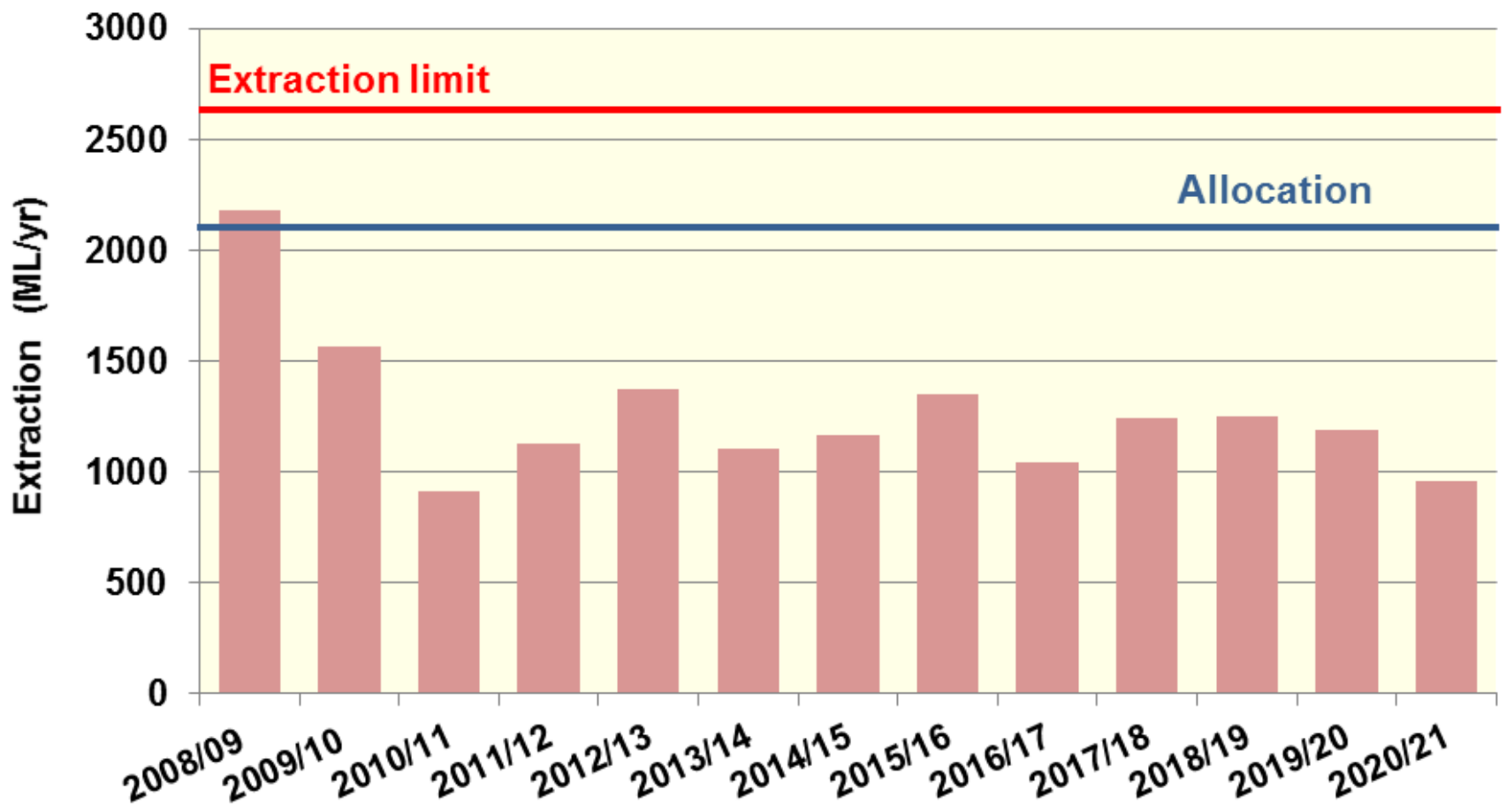


Groundwater salinity

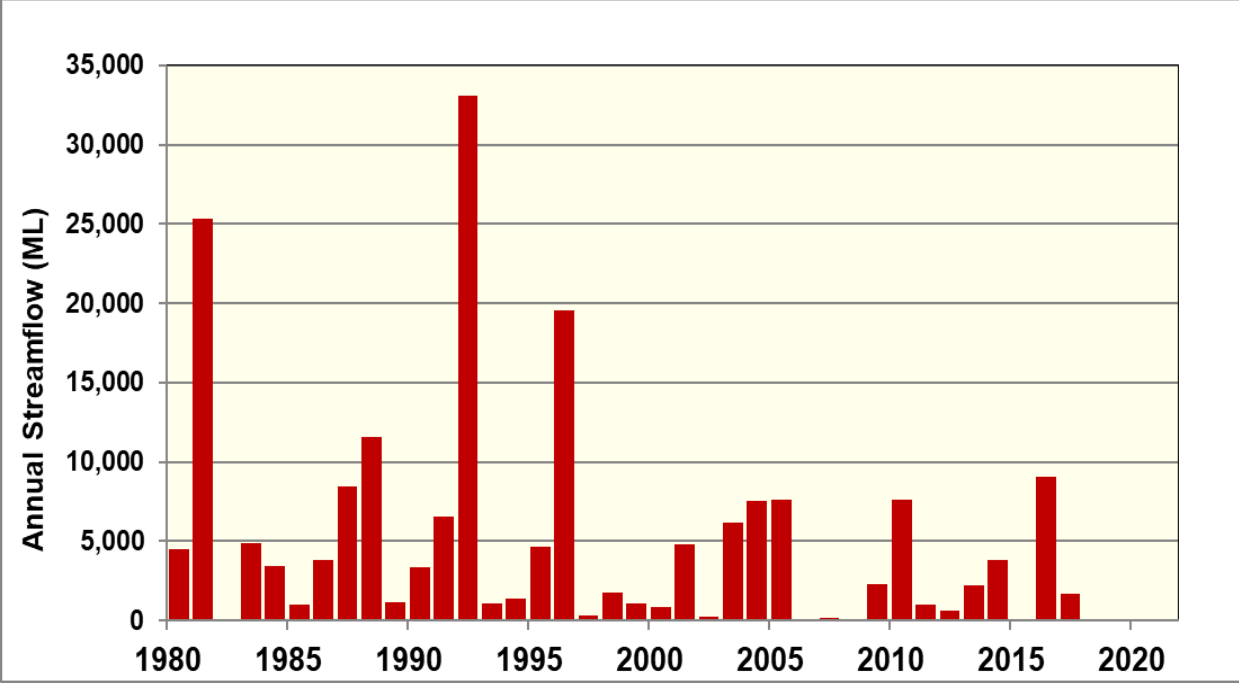
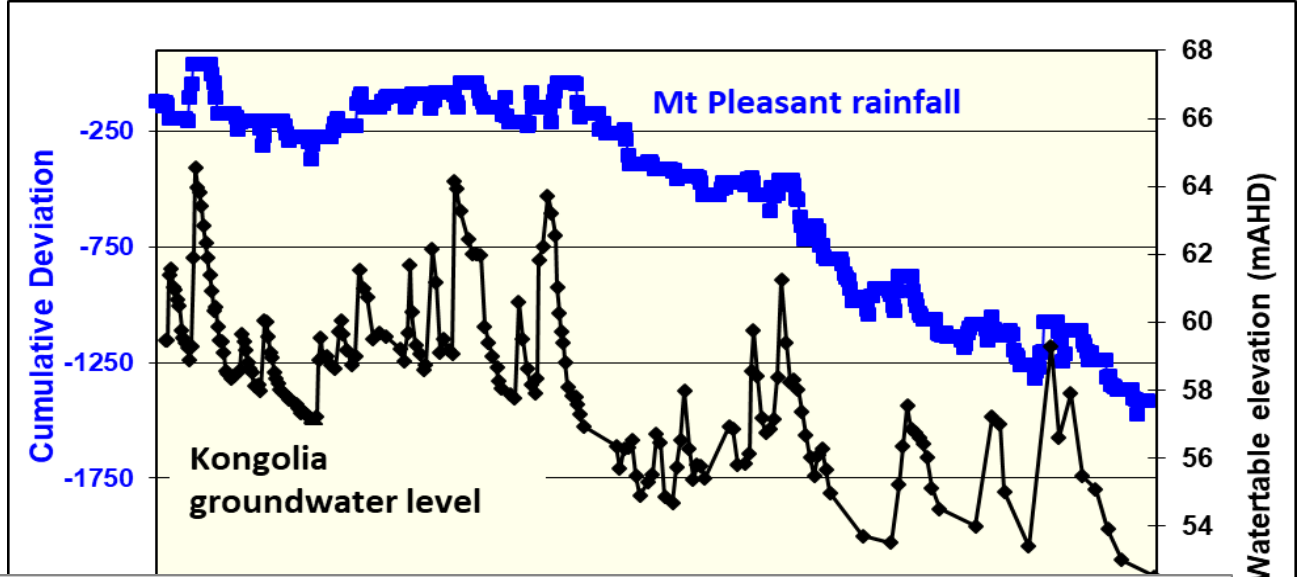


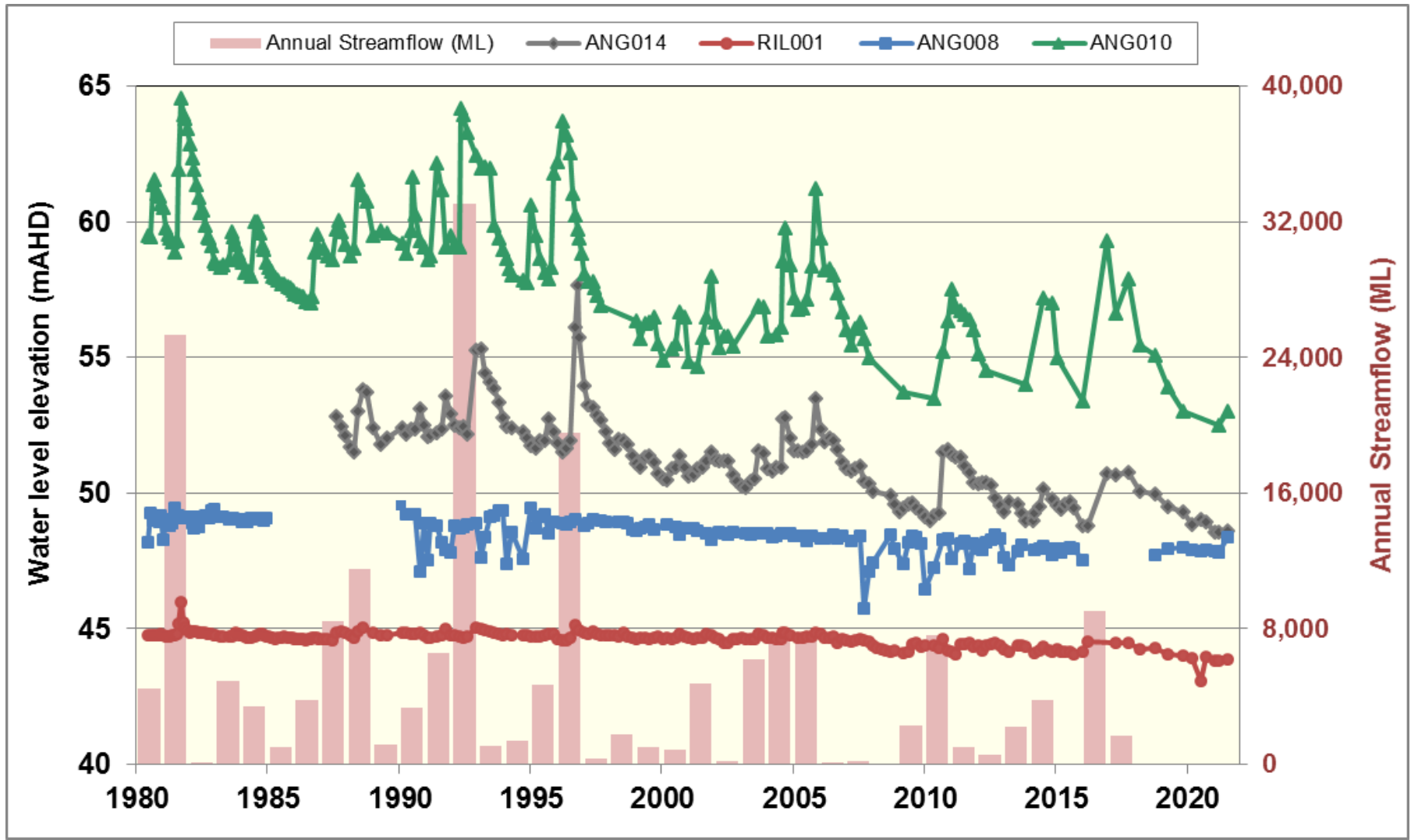


MGL

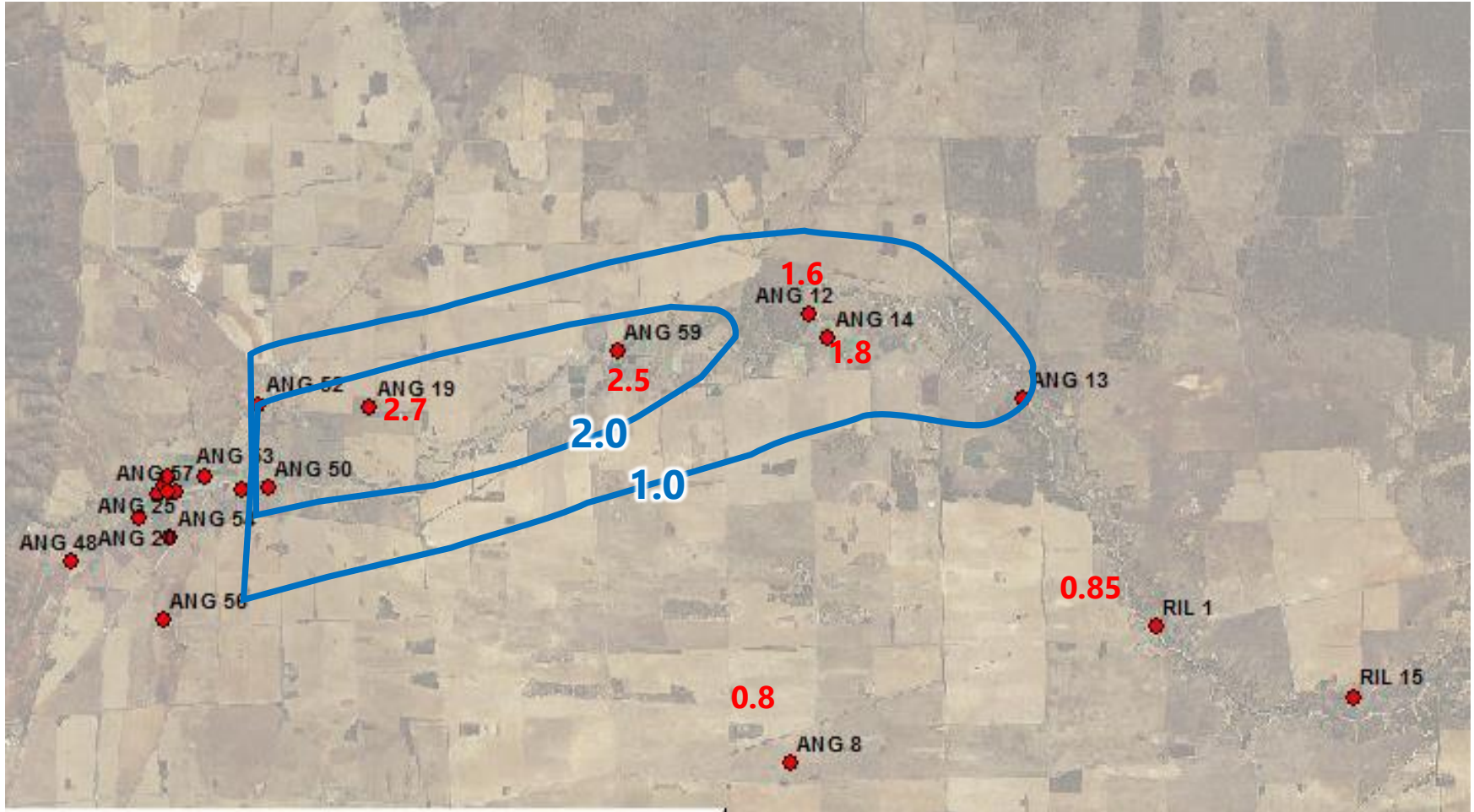


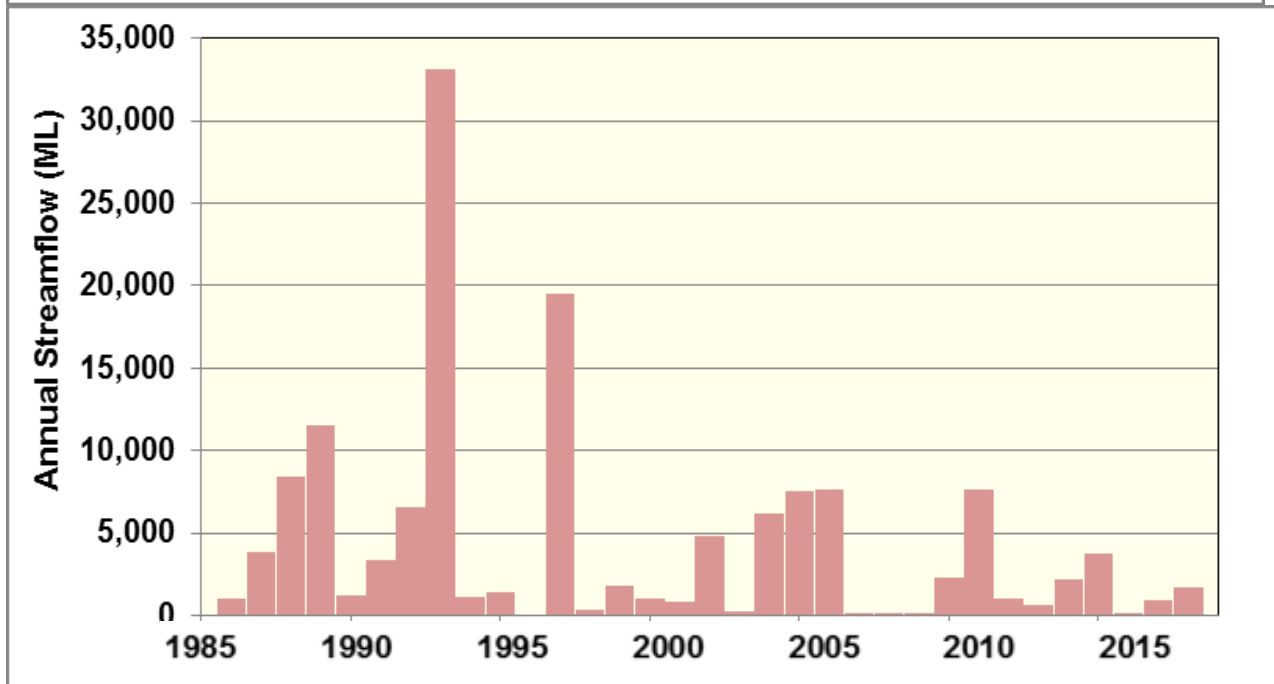
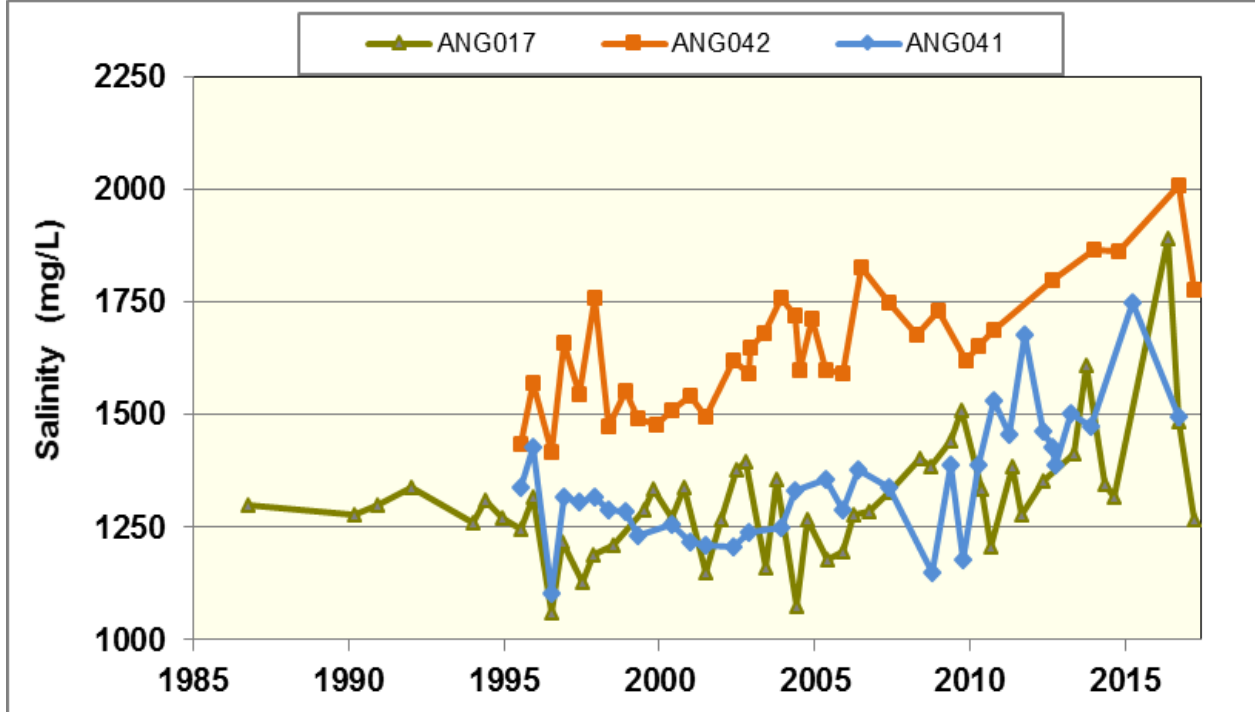
Rainfall → Streamflow → GW level





Water level decline since 2000



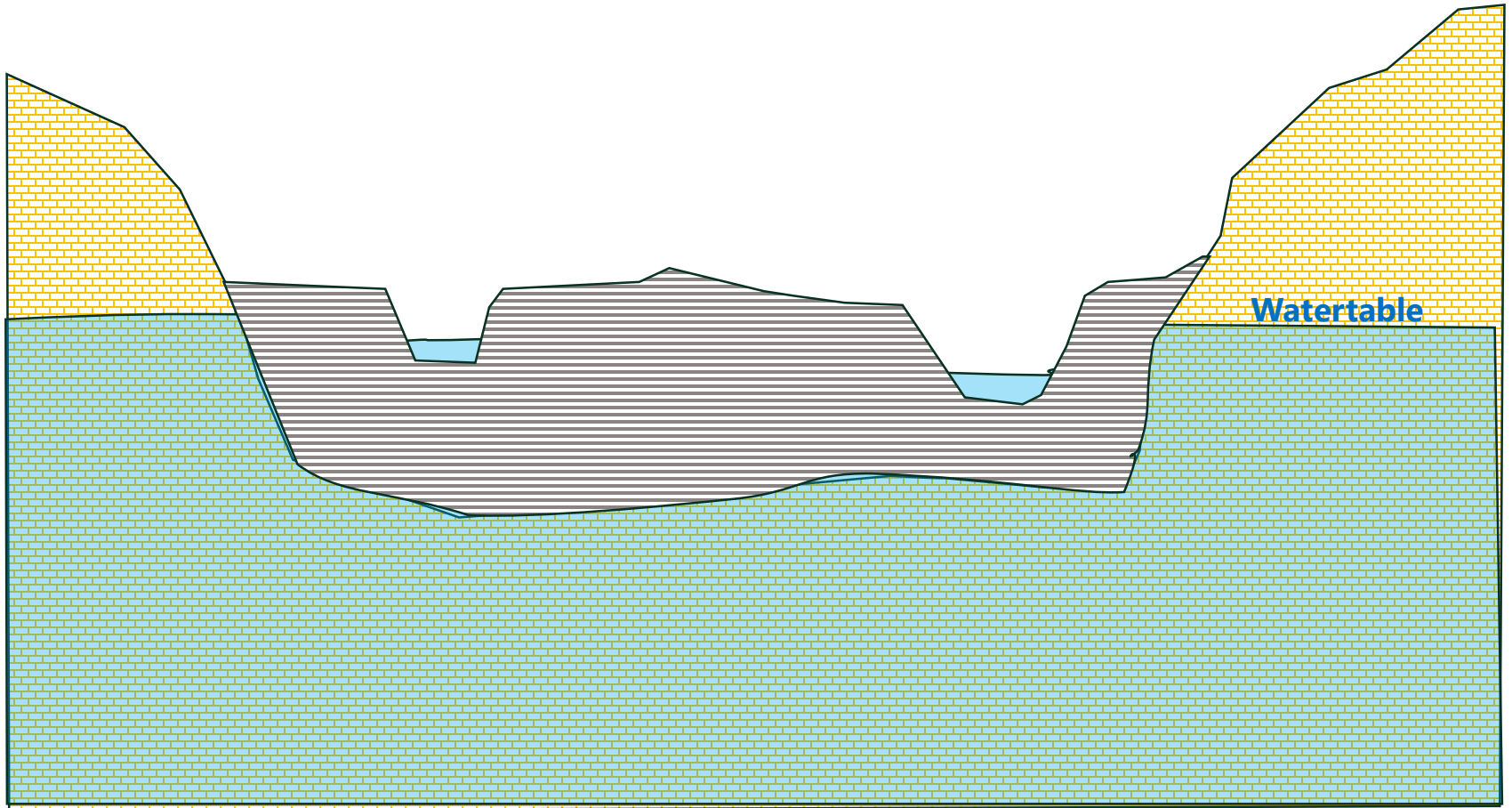


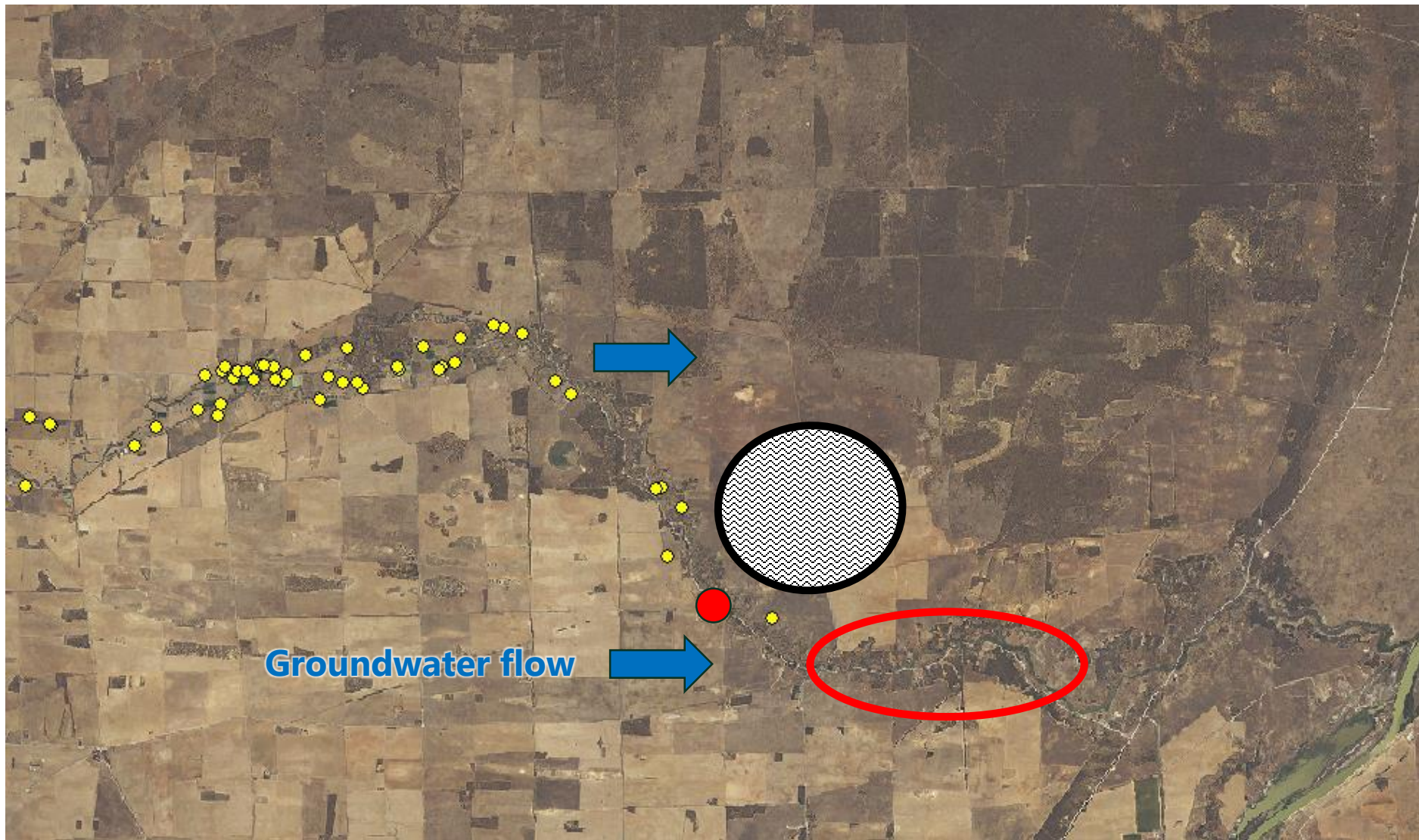
Irrigation not the only extraction

- Red gums transpire water from rainfall, streamflow and groundwater
- Sap flow measurements indicate EV up to 200 ML/yr from the floodplain (~1200 ML/yr pumped)

Black Hill springs/waterholes

- Contained within black silty alluvium within the river valley
- Probably limited connection with regional limestone aquifer (waterholes have higher salinity than limestone aquifer)
- Limestone water levels declined by 0.85 m over 25 years
- Strongly reliant on surface water flows

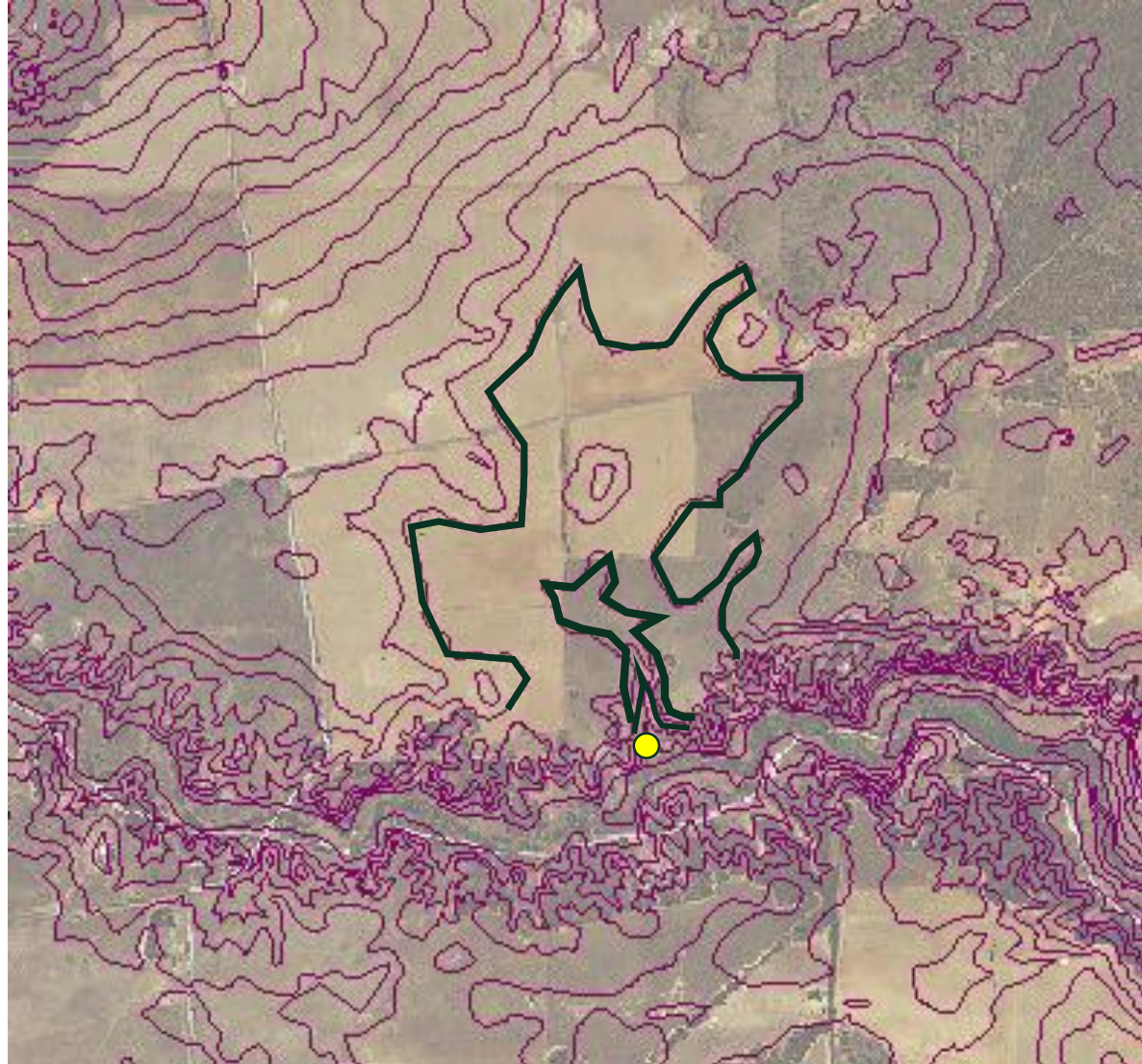




Irrigation is not impacting on the springs

Black Hill springs Sec 324

**Fed by rainfall
falling on
catchment on
side of Black Hill**



Options for maintaining groundwater supplies

Bore deepening

- About 14 licenced wells could be deepened by about 10m
- If enough interest, could negotiate a 'bulk' discount from driller

Renmark Gp confined aquifer

- Deep and expensive drilling (sandscreen)
- Unpredictable, no guarantee of useful supply
- WAP has an allocation limit of 500 ML/yr with no current use



Summary

- Recharge from streamflow is the main control on groundwater levels on the Plains
- Periods of below average rainfall will reduce streamflow and lead to a gradual decline in groundwater levels
- There is potential to deepen some bores
- Irrigation is not affecting the Black Hill springs



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of South Australia

Department for
Environment and Water

Freshwater fishes of Marne Saunders



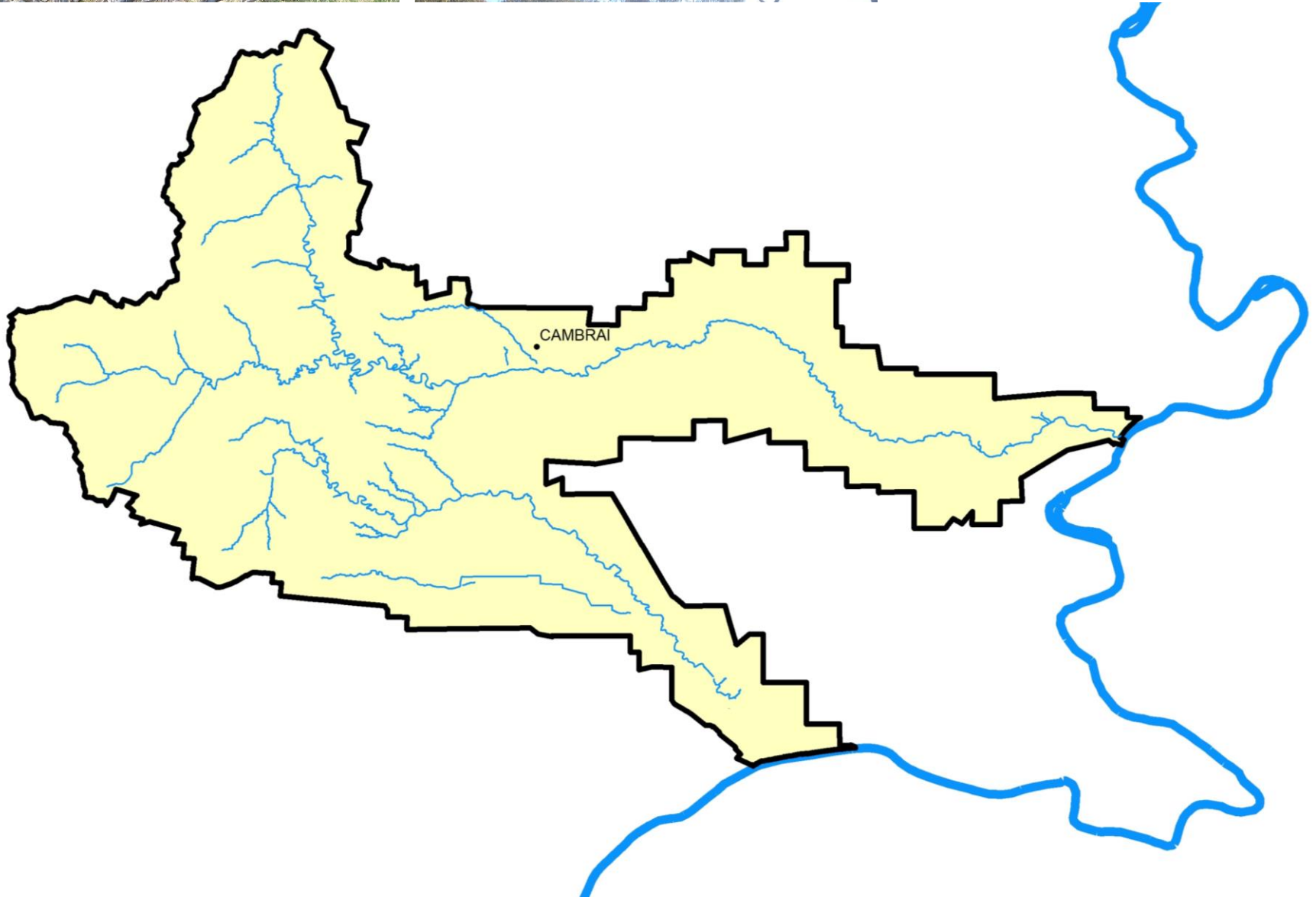
Nick Whiterod

AQUASAVE - NatureGlenelgTrust

Fish and flow

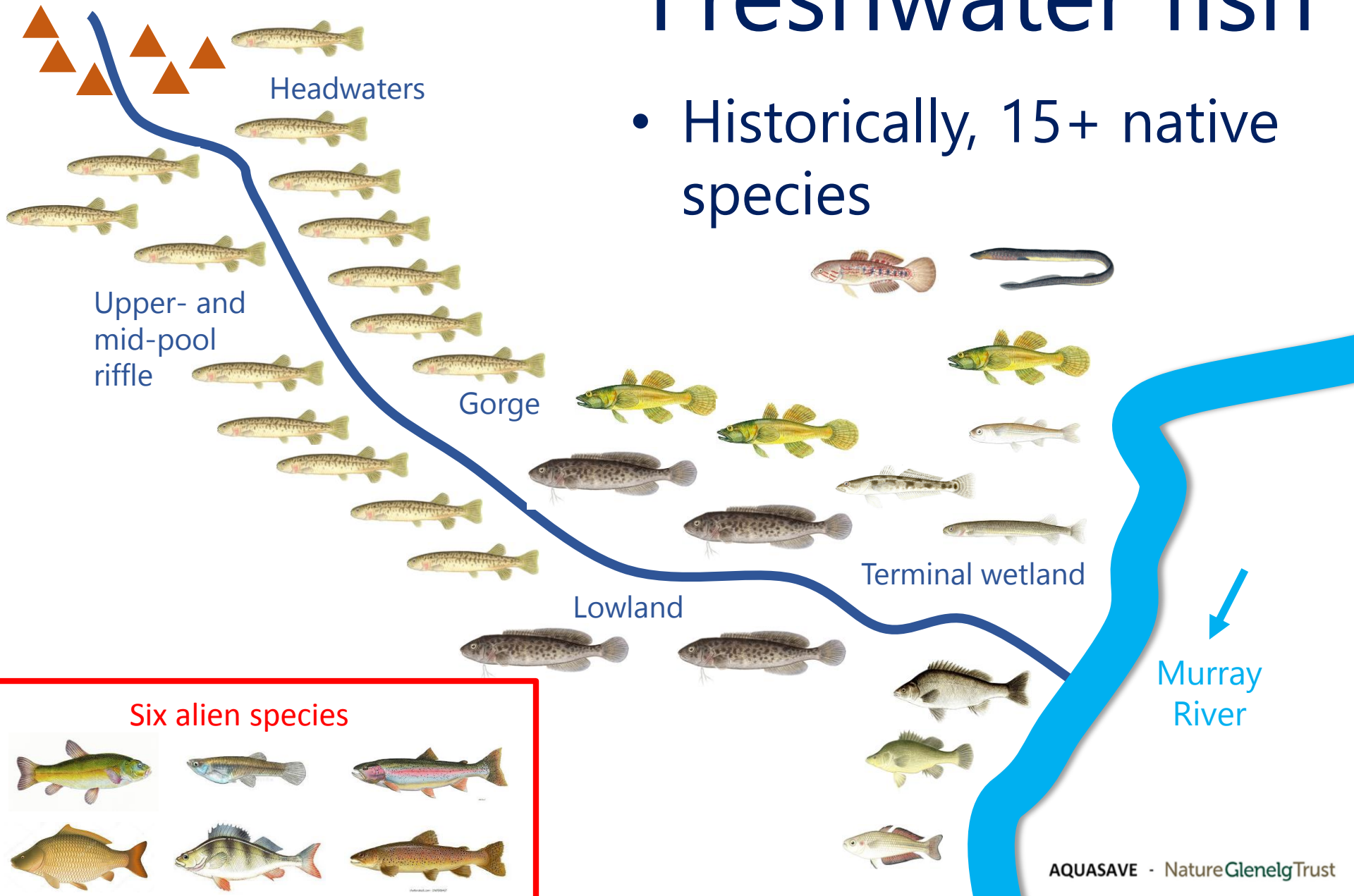
- Flow is critical for freshwater fish
 - *Rely on water for survival (flow regime)*
 - *Some have specific requirements for flow & connectivity*
 - *They response to prevailing conditions & environmental change*
- Changes (past, current & future) in Marne Saunders flows will regulate fish communities

Aquatic habitats



Freshwater fish

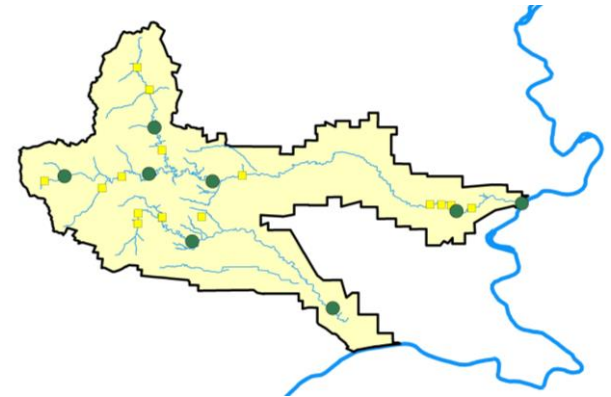
- Historically, 15+ native species



Understanding fish

- Field sampling

- 159 site visits across 2001 to 2021
- Baseline surveys (2003-04) & repeat condition monitoring (2007 onwards)



Fish species

- ~19,000 fish; 12 species (10 native)
- Alien eastern gambusia dominant (~65%)

Twenty year review

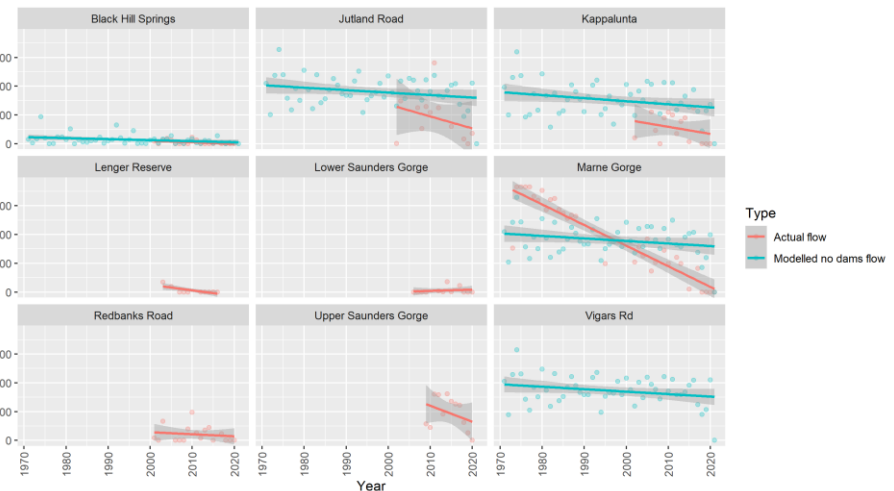
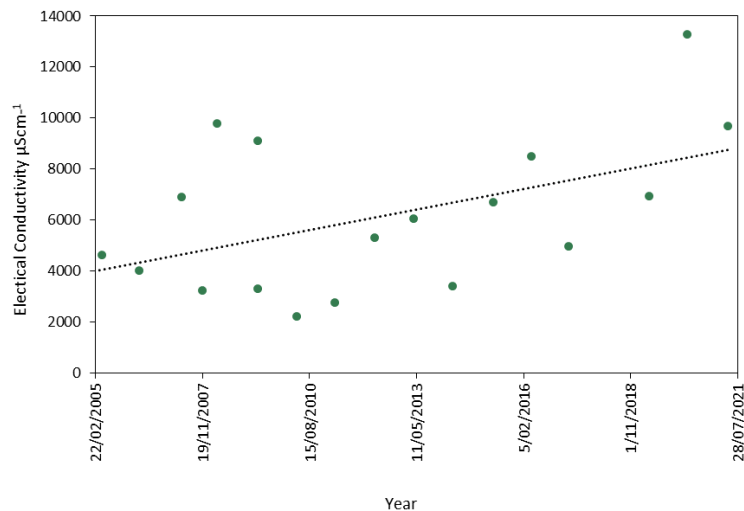
- Linking with water quality & flow





Trends over time

- Critical elements of flow declining
- Less (& deteriorated) aquatic habitats



Aquatic habitats



Upper- and mid-pool riffle



Gorge



Terminal wetland



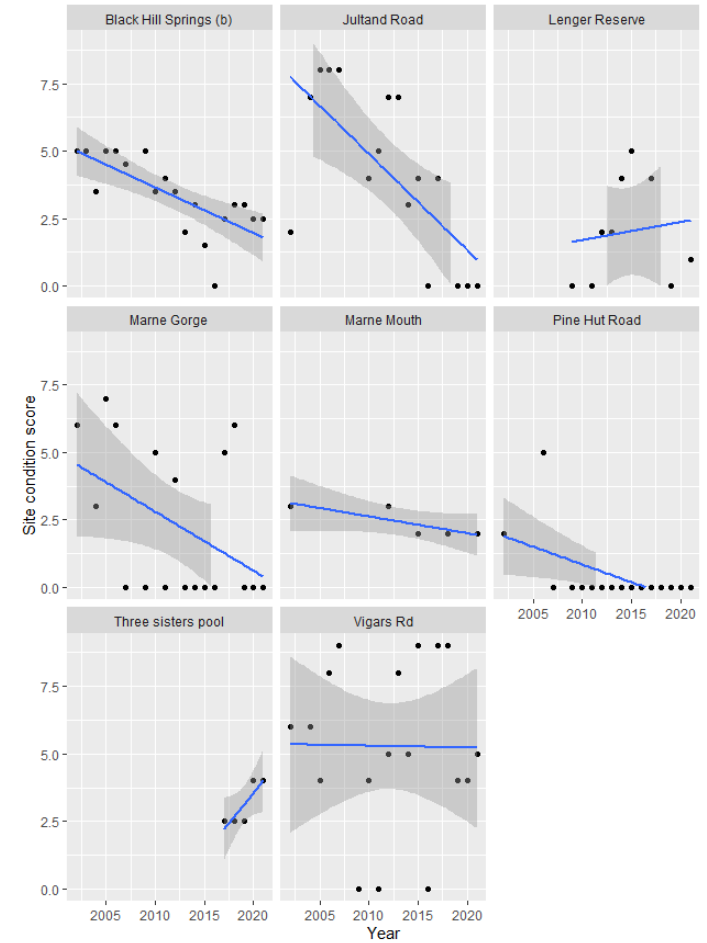
Lowland



Murray River

Trends over time

- Simplification & decline of freshwater fish

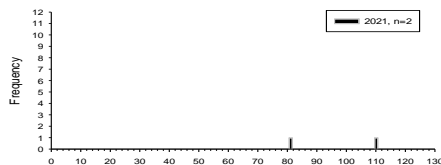
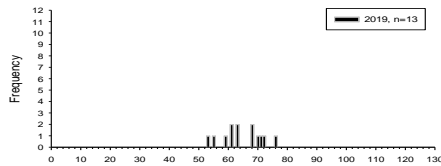
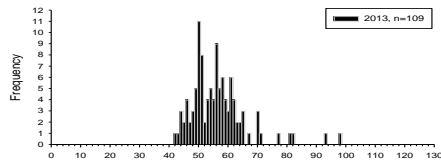


Decline over time

Obscure galaxias

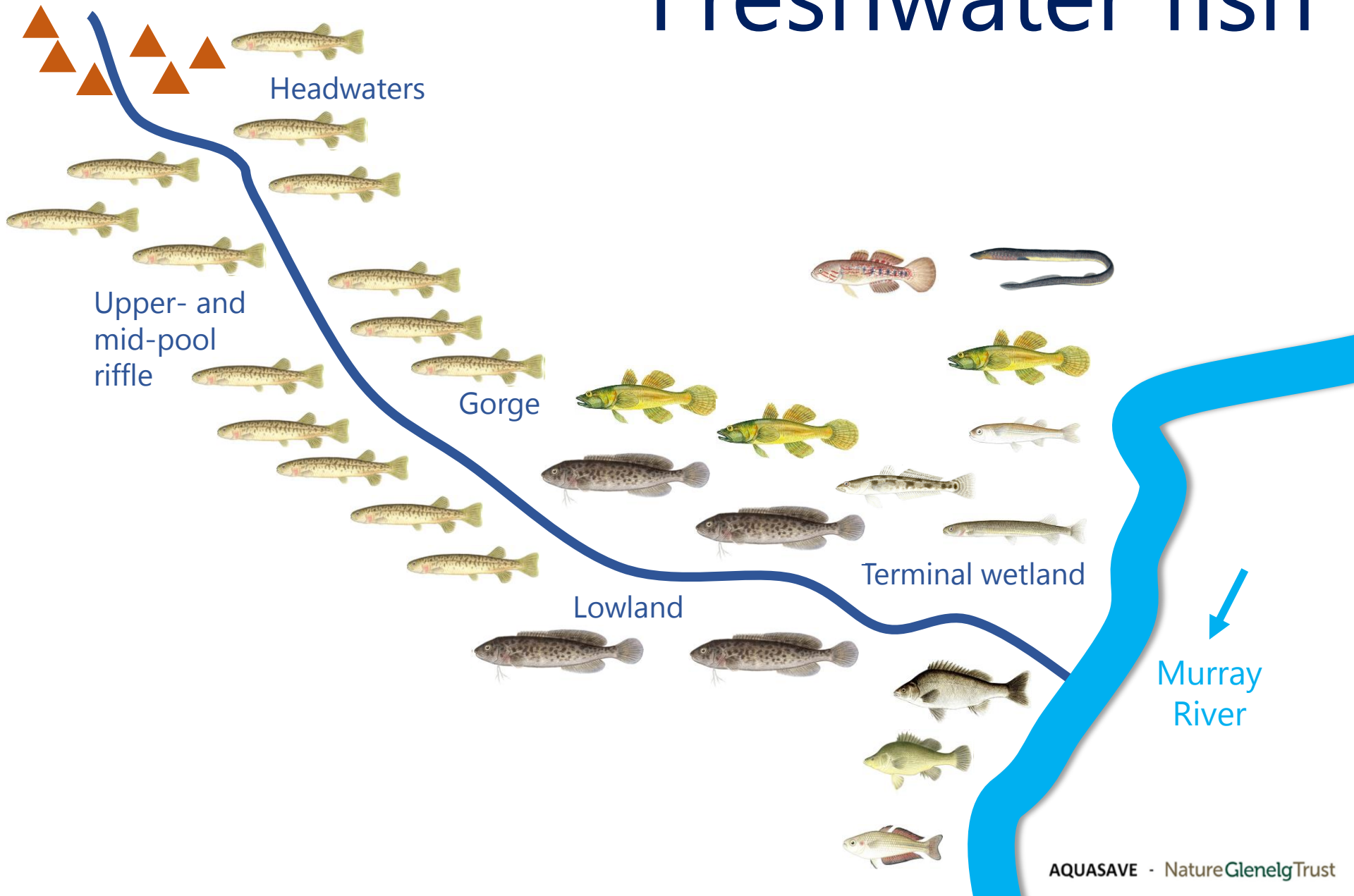


River blackfish

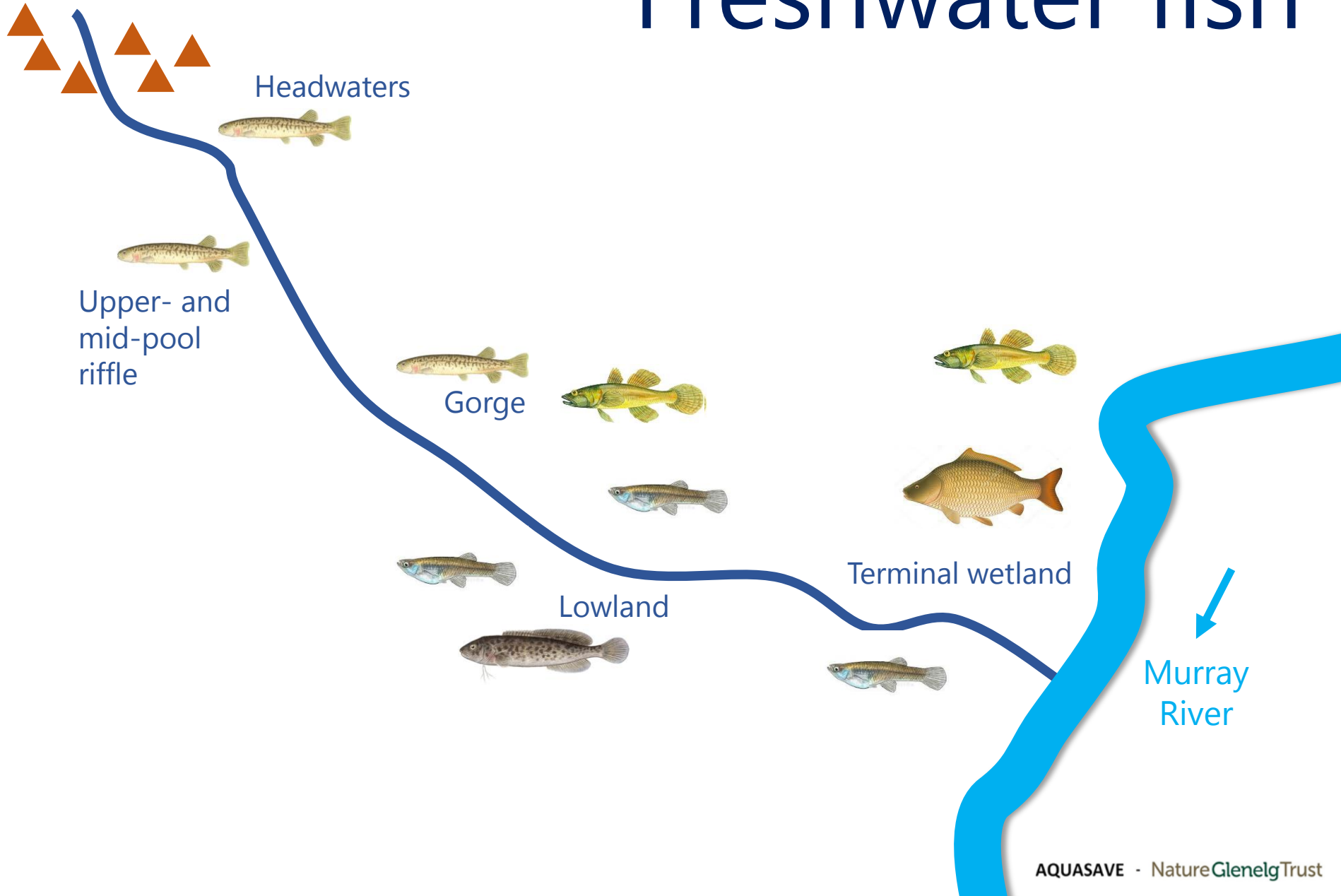


- Few individuals
- Lack of spawning (& recruitment)
- Functionally extinct?

Freshwater fish



Freshwater fish



Summary

- Aquatic habitats & freshwater fish under threat
- Management focus on remaining populations
 - *Regional and localised actions*
- Freshwater fish continue to be useful indicators



A review of the status of water resources and fish communities within the Marne Saunders Prescribed Water Resource Area

Ruan Gannon¹, Nick Whiterod¹ and Douglas Green²

Report to the Murraylands and Riverland Landscape Board

 **LANDSCAPE**
SOUTH AUSTRALIA
MURRAYLANDS AND RIVERLAND



December 2021

Flows for the Future

Marne Saunders Water Forum
February 2022



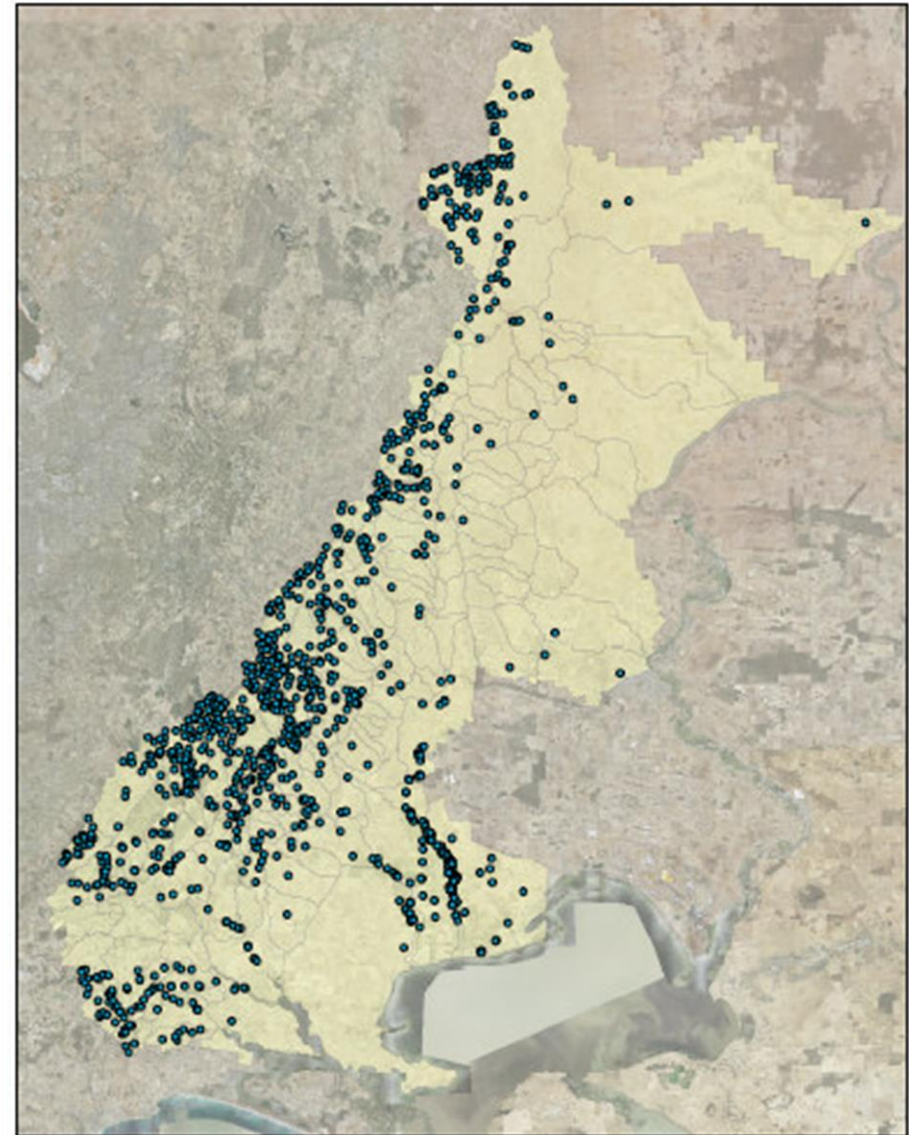
Government of South Australia
Department for Environment
and Water



Australian Government

Introduction

- There are 8000 dams intercepting natural flows throughout the EMLR.
- This change to flow patterns is a major driver of declining catchment health.
- The Flows for the Future program seeks to re-establish natural water flow patterns in streams affected by water capture in the EMLR.
- Delivery of the program ensures there is an environmentally sustainable level of take in accordance with the Murray-Darling Basin Plan.



Legend

- Priority Sites
- Eastern_Mount_Lofty_Ranges

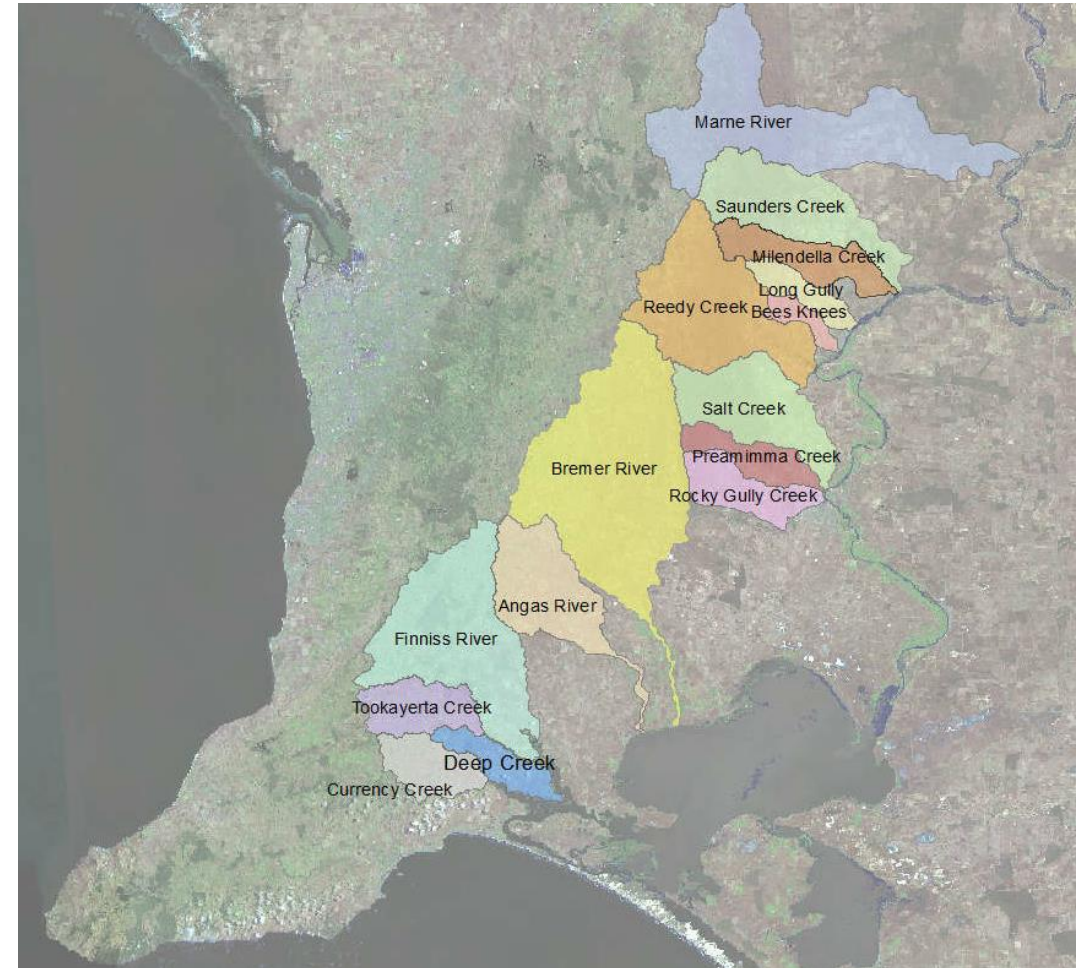


Produced by: State Infrastructure and Operations
Department for Environment and Water
1000 Meston Road, Mt Barker, SA
5013
Data Source:
Copyright: 2017
Preparation:
Date: 2017

Significance of the information presented in this map is limited to the information and data provided. The Department for Environment and Water does not warrant the accuracy or completeness of the information presented in this map. The Department for Environment and Water is not responsible for any loss or damage arising from the use of this map.

Program delivery area

- Catchments within the Eastern Mount Lofty Ranges are funded by the Flows for the Future Program.
- For continuity the program is delivered at a catchment level, such as the Marne Saunders Catchment.



What is this program about?

The program delivers key policy defined in the Marne Saunders Water Allocation Plan, acting to;

- effectively **manage water resource** in the Marne Saunders catchment
- seek a **balanced position**
- consider the **needs of existing and future users**
- **support current water allocations**
- maintain and where possible rehabilitate **water-dependent ecosystems** by providing their water needs.
- deliver on SA's Basin Plan and Water Resource Plan commitments.

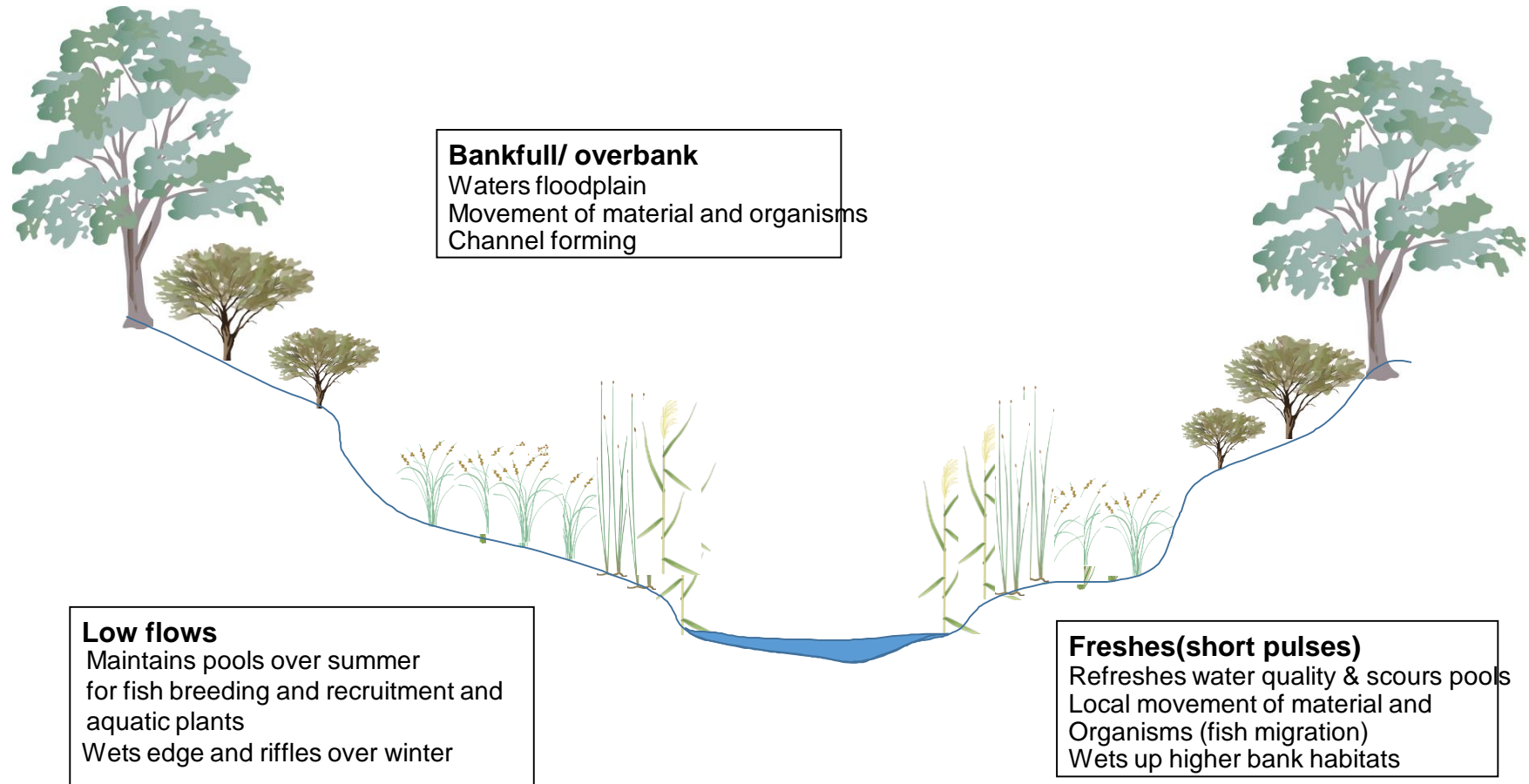


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and Water

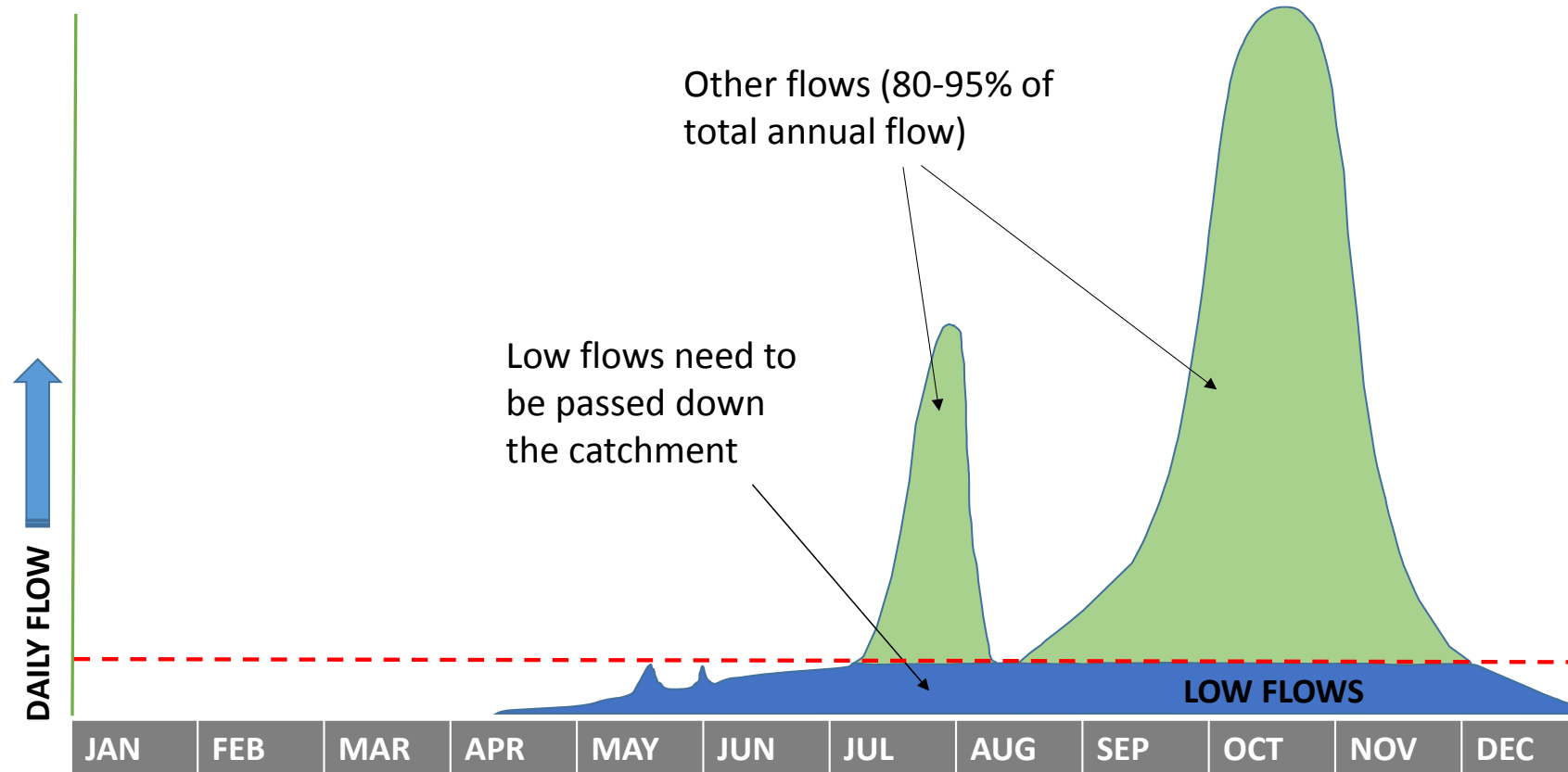


Australian Government

What are Low Flows ?

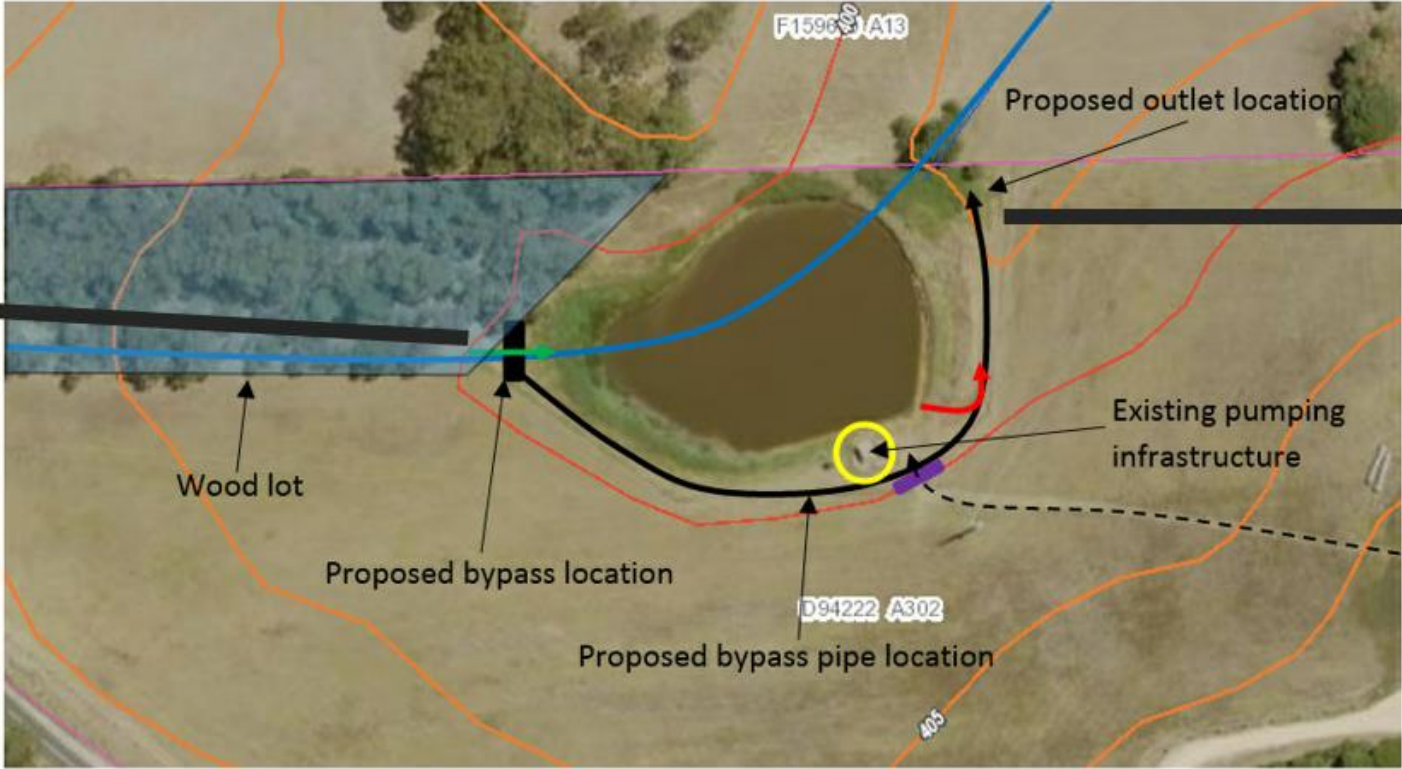


What are Low Flows?



GENERALISED STREAM FLOW – MT LOFTY RANGES

What is a Low Flow Device?



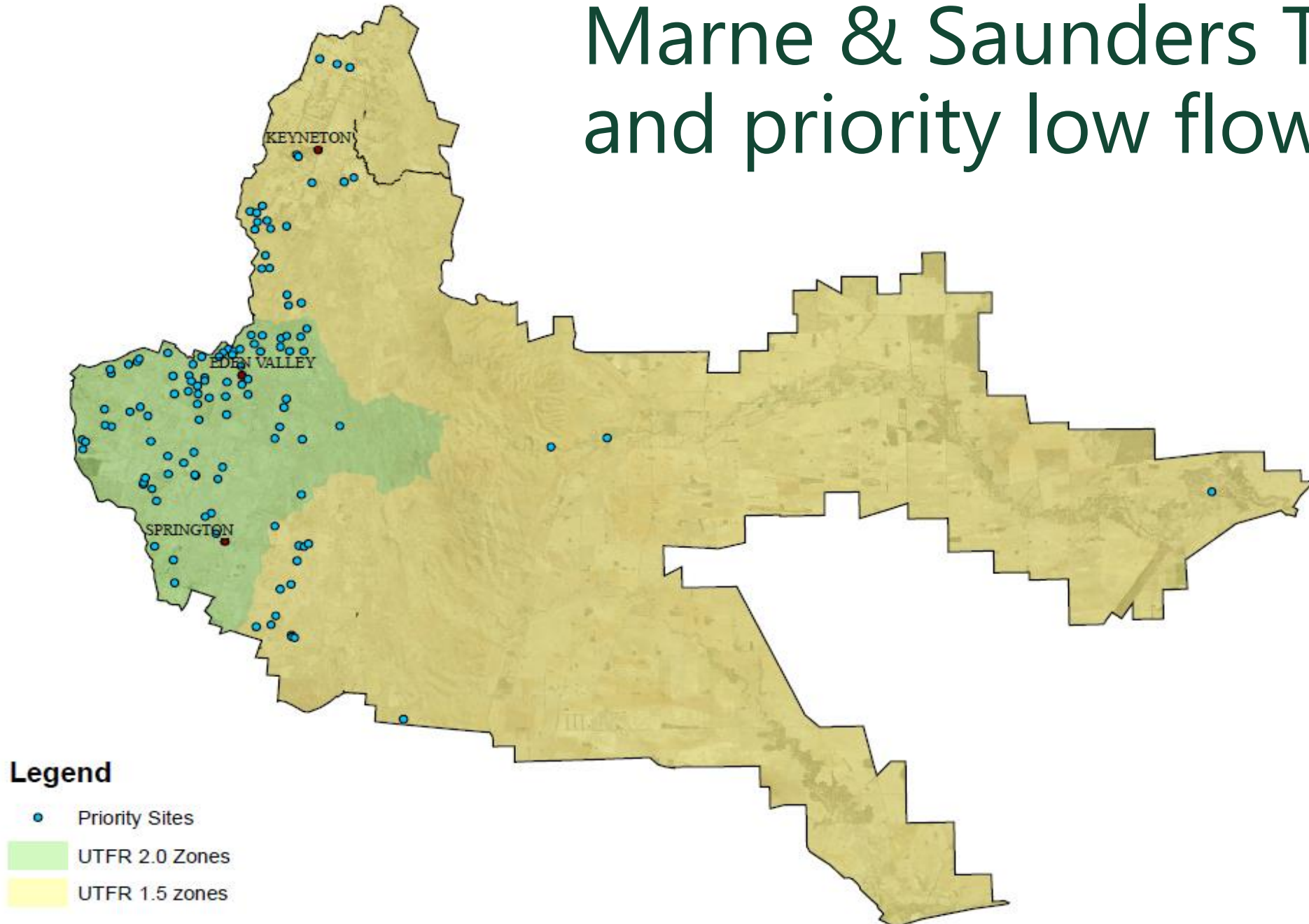
Legend	
	Access Gate
	Water Course
	Inlet
	Spillway
	Access Track
	Property Boundary

How is the flow rate (TFR) determined?

- The Threshold Flow Rate (TFR) is based on the minimum environmental flow required to sustain flora and fauna.
- A Threshold Flow Rate is the rate at or below which water is to be left (not captured or extracted) and allowed to carry on into the downstream watercourse.
- The rate varies per site relative to the size of the catchment and the characteristics of the surface water management zone. Factors such as evaporation and surface run off vary between zones.
- The WAP specifies TFR's calculations. The aim is to balance current allocations and usage with sustaining long term resource use and environmental health.



Marne & Saunders TFR zones and priority low flow sites



Program Participation in the Marne & Saunders

- There are 117 priority sites in the Marne Saunders.
- To date, our team have spoken with landholders at 113 of these sites to discuss voluntary participation in the program.
- Currently, there are 79 sites (including watercourse diversions) are contributing low flows.
- The target for the Program is to return 169 ML to the catchment. Current delivery has returned 112 ML.



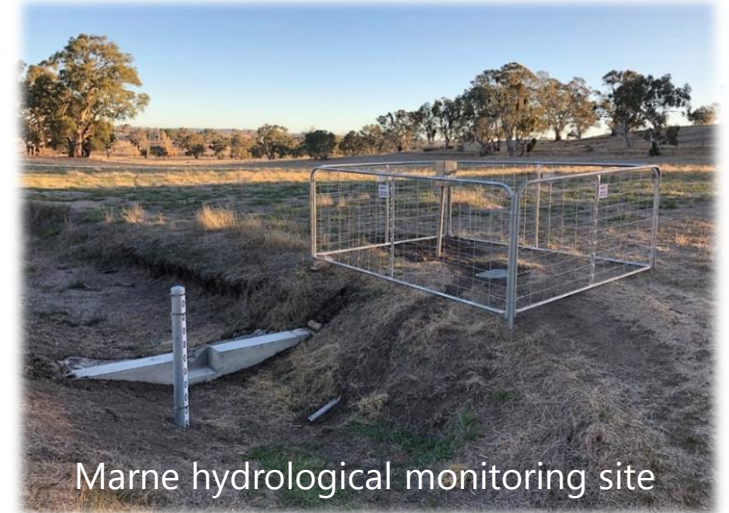
Outcomes for the Marne & Saunders

- The main benefits of passing low flows will be achieved locally.
- Improvements to those environments with the passing of low flows will include:
 - hydration of soils which will, in turn,
 - support struggling remnant vegetation, leading to
 - improved habitat for a greater diversity and abundance of macroinvertebrates, native fish, and other aquatic and riparian vertebrate species.



Demonstrating success and adapting to change

- verify our understanding with site-scale and catchment-scale data;
- demonstrate that low flow devices are working; and
- show that the passing of flows is altering local flow regimes and,
- in turn, increasing the resilience of ecosystems.



Listening to the community



Thankyou



Questions



Government of South Australia
Department for Environment
and Water



Government
of South Australia

Department for
Environment and Water

A scenic view of a river flowing through a wooded area. The water is calm, reflecting the surrounding trees and sky. Large, gnarled tree trunks frame the scene on both sides. The text is overlaid in white, centered on the image.

Citizen Science
Community collaborations
sharing knowledge
&
monitoring the health of
the Marne and Saunders catchments

Water Watch and Waterbug Bioblitzes

Waterwatch : Water quality – salinity and turbidity (fine sediments) and flow data

Waterbug Bioblitzes: Macroinvertebrates

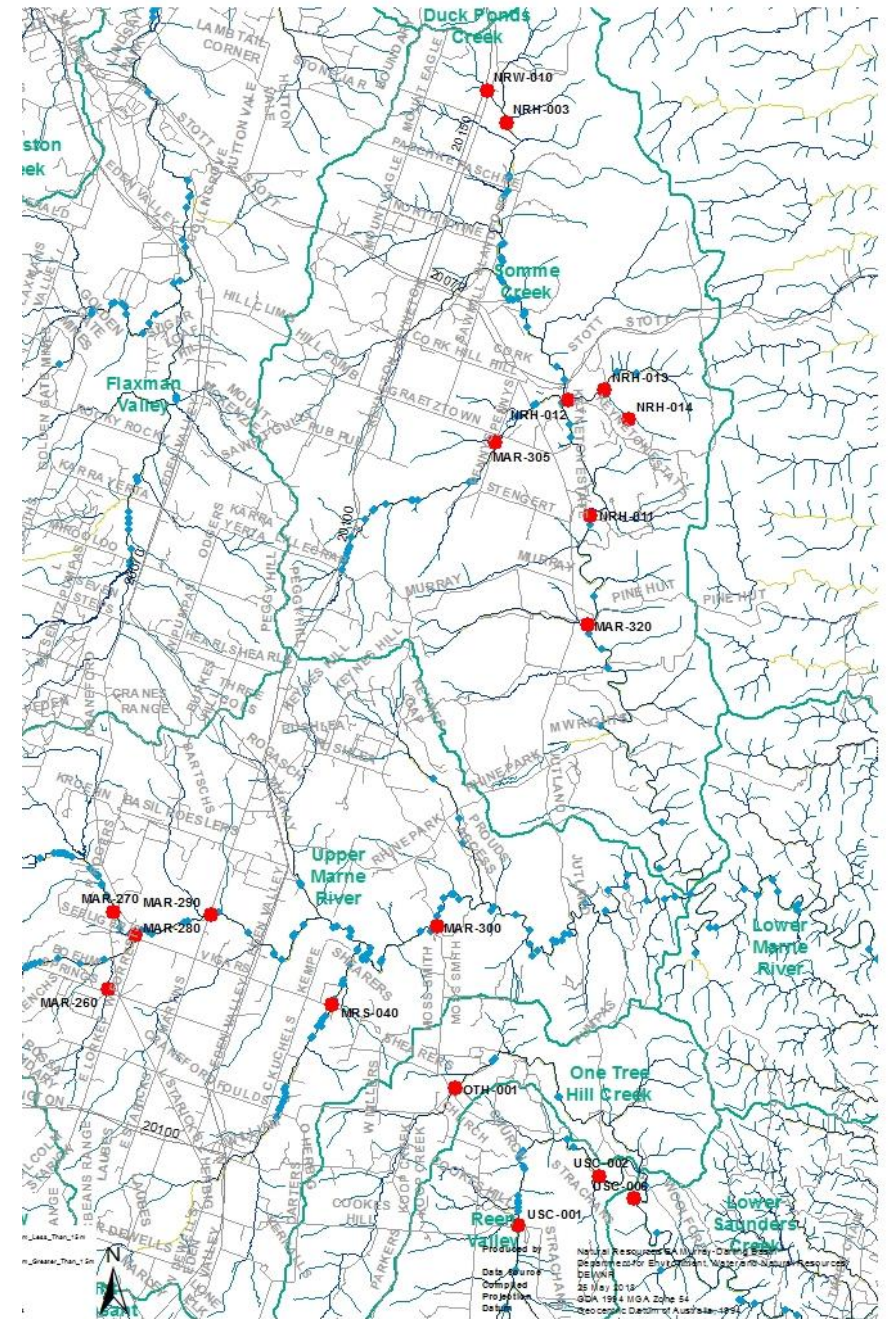
Linking with Flows for the Future program and a range of community collaborators

Always looking for more community members to join; training and equipment provided.





- Sites - Monitored since 2010 in the catchment
- Collect salinity, turbidity (fine sediments) and flow information
- Monthly from May- November
- See when and where salinities rise
- When rains come, how far the flows reach over time
- Shared on a public database
- A few volunteers have left the area recently, looking for more volunteers



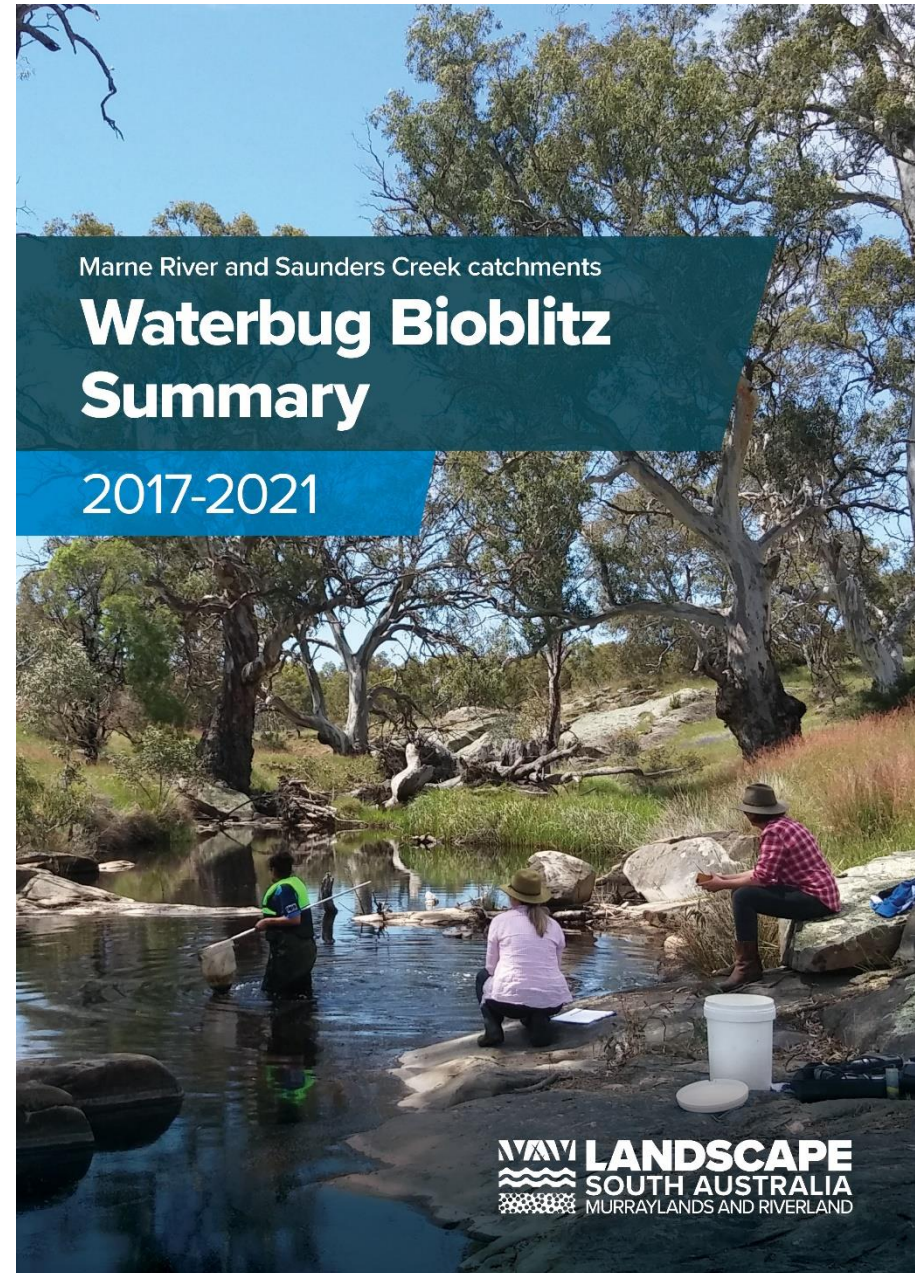
Waterbug Bioblitz

- Sites - selection of waterwatch sites and key sites relative to lowflow bypasses
- Field day in October each year
- Collect water quality data and waterbug samples
- Sort and identify waterbugs
- Results will be shared on a public database
- Partnership project
- More volunteers welcome



Waterbug bioblitzes 5 year review

- Compiling 5 years of waterbug data, starting to look at trends over time.
- Generally a series of isolated pools by October, important refuges.
- 2021 - rare Phantom Midge, one of our experts, Doug Green, had only ever seen one other in SA creeks.

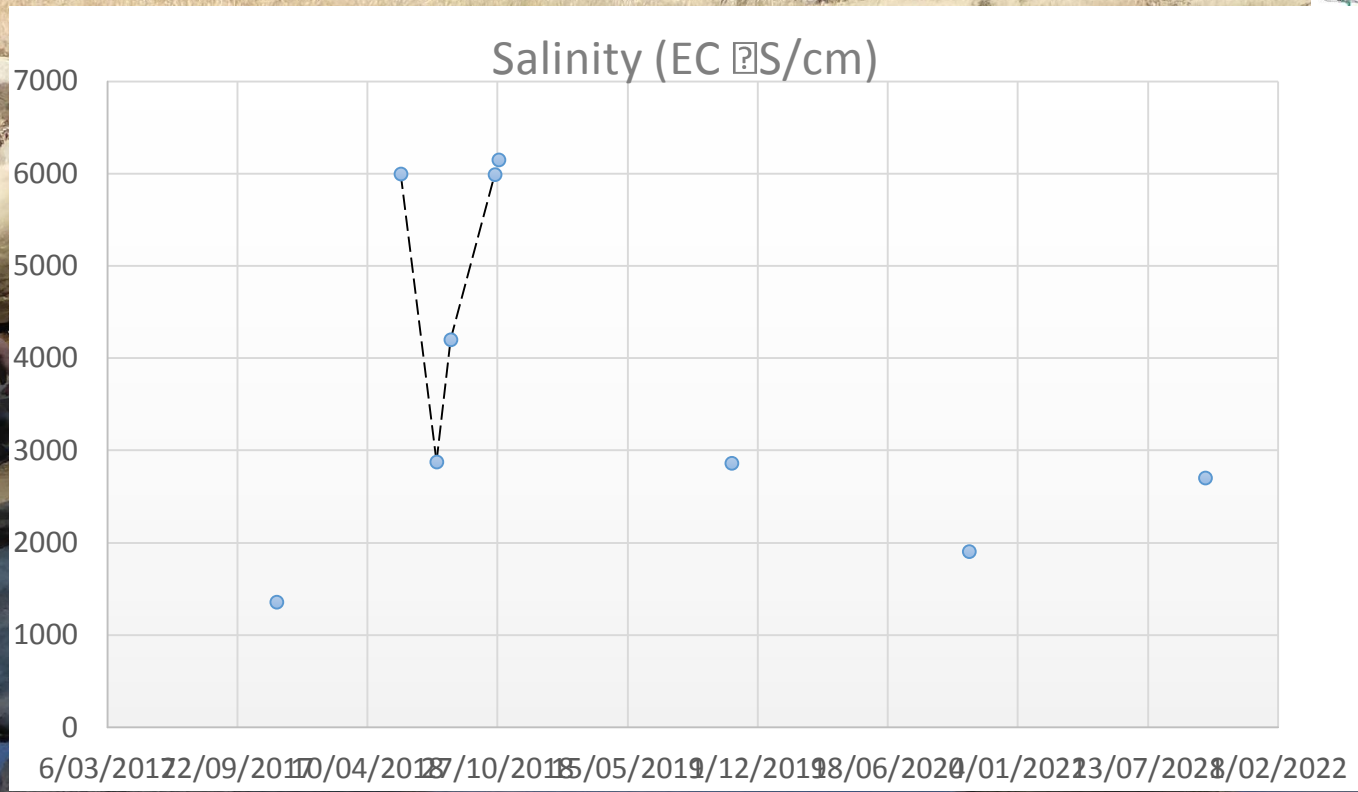
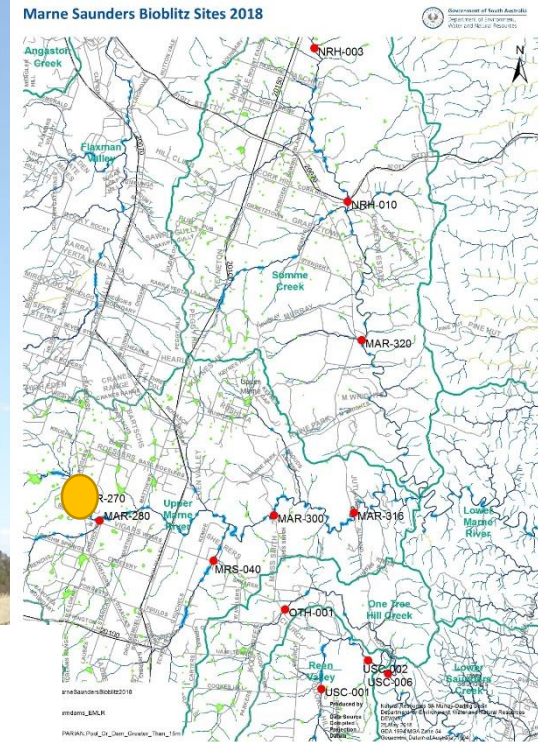


Cranford Rd MAR-270

Isolated pool October 2017-2020, Flowing in 2021 *

Pool Waterbug Diversity

2017 High
2018 Moderate
2019 Moderate
2020 Moderate
2021 Moderate*

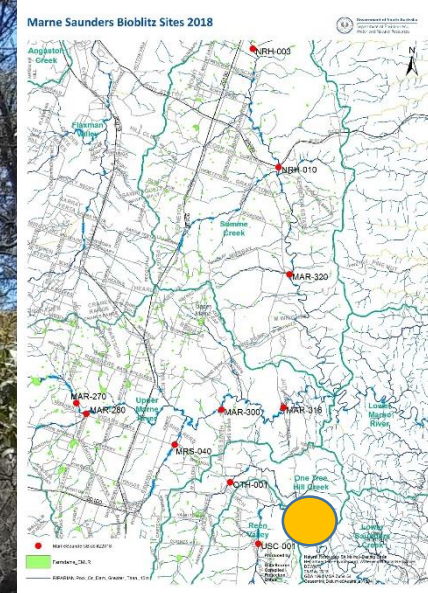


Upper Saunders Creek USC -002/6

Isolated pool by October 2017-2021

Pool Waterbug Diversity

2017 Moderate +
2018 Moderate +
2019 Moderate
2020 Moderate +
2021 Moderate



Water Security in South Australia

Piloting a Water Security Strategy for the Barossa

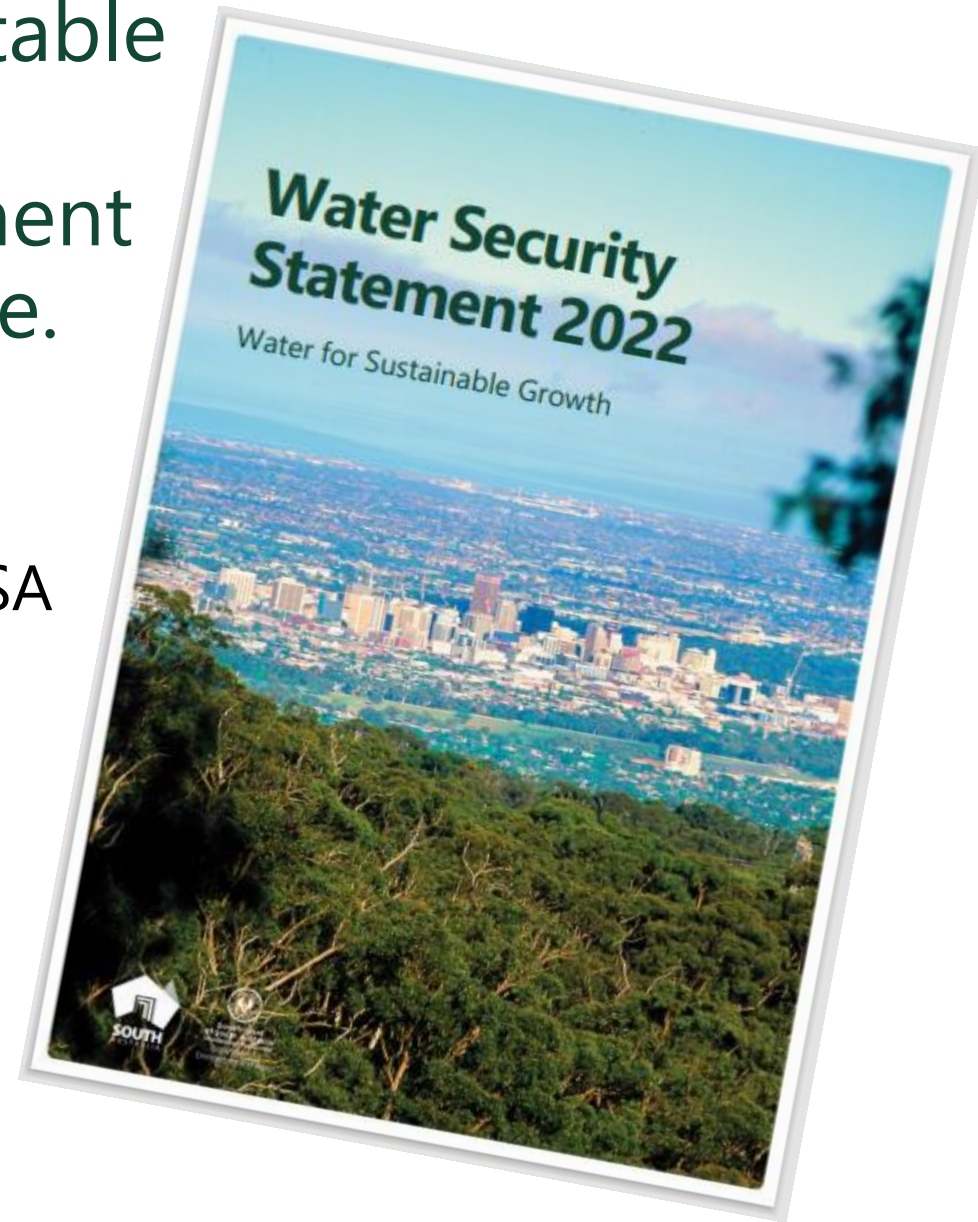
Peta Brettig

Water Security Team, Department for Environment and Water

February 2022

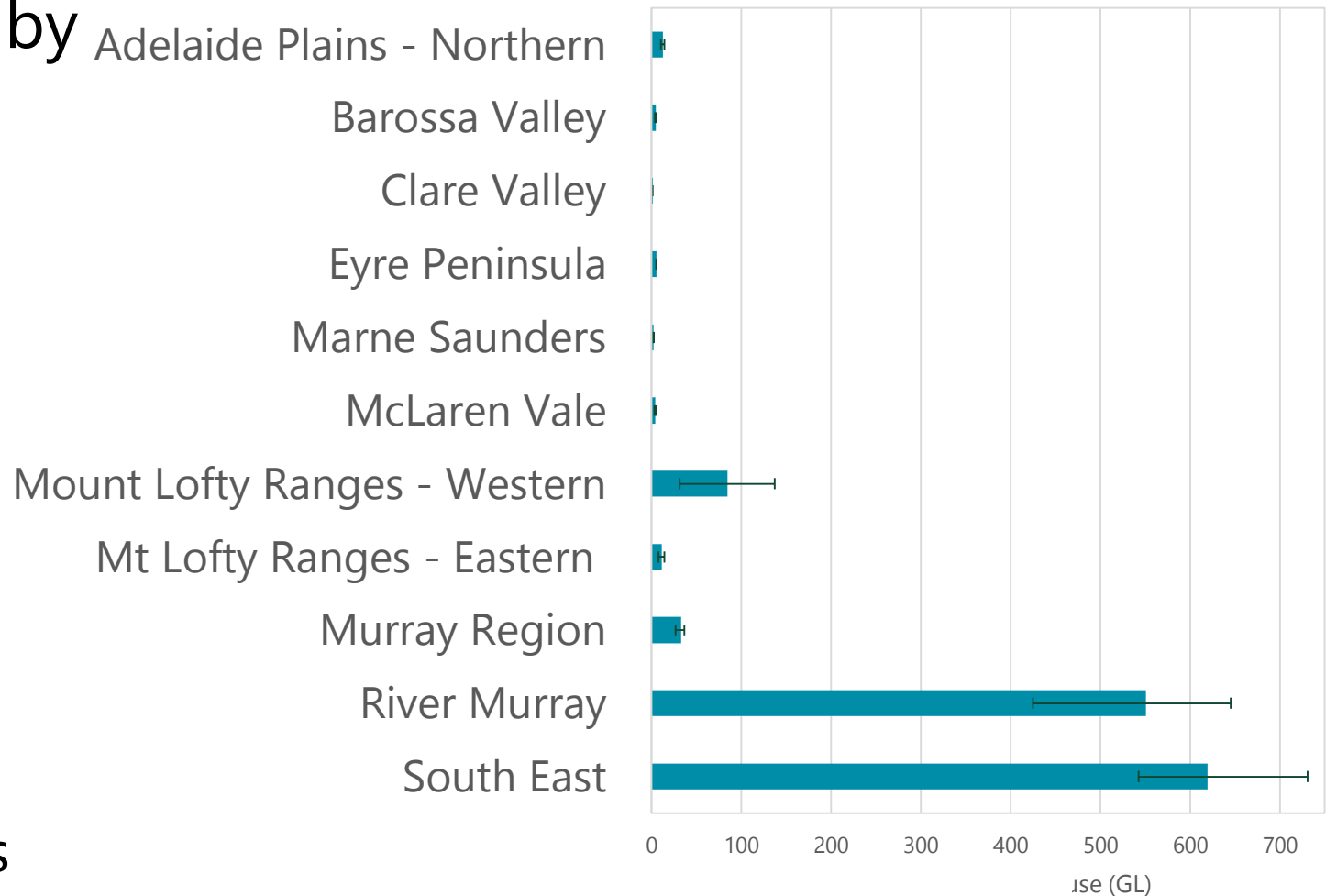
Water security is about having an acceptable quantity and quality of water for people, communities, industry and the environment that is affordable now and into the future.

- Water Security Statement:
 - Provides overview of water security status across SA
 - Opportunity to have water security conversations
 - Sets water security priorities out to 2024
 - *Water Industry Act 2012* requirement



Water security in SA

- Water security profile varies by region based on:
 - water resources,
 - industries supported
 - investment in infrastructure
- Key challenges:
 - Recent extended drought
 - Climate change impacts
 - Growth in water demand
 - Fit for purpose local solutions
 - Cost of infrastructure (*CAPEX and OPEX*)



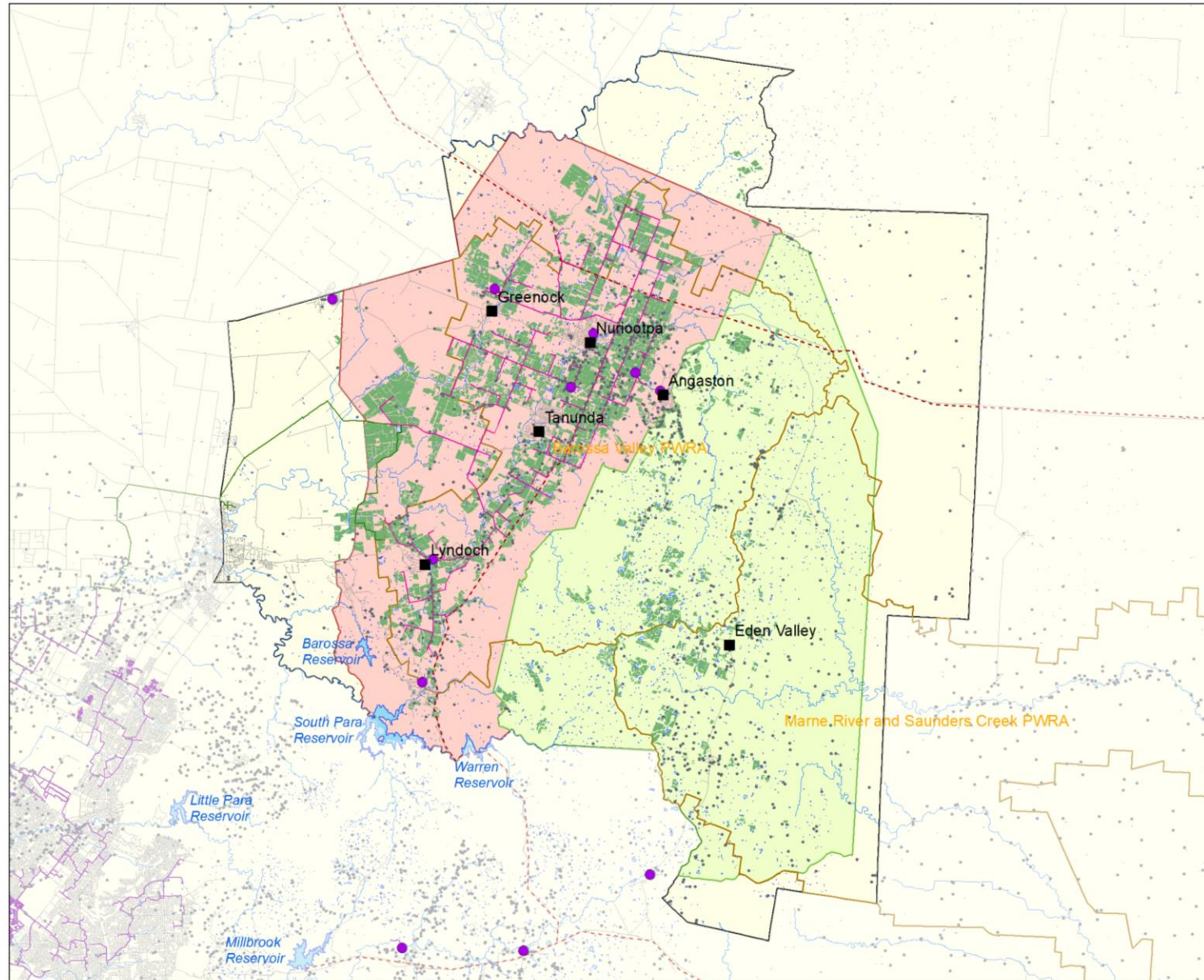
Average annual water use (GL)
2015-16 to 2018-19

Strategic priorities for water security

- 1. Climate resilience**
- 2. Water as an enabler of sustainable economic growth**
- 3. Ecologically sustainable water resource management**
- 4. Provision of critical human water needs**
- 5. Full implementation of the Murray-Darling Basin Plan**
- 6. Aboriginal water interests**
- 7. Integrated urban water management**
- 8. Innovation and competition in the water industry**
- 9. Data, analytics and insights for the digital water future**
- 10. Growing the South Australian water sector**

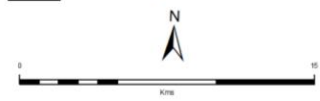


Barossa Water Security Strategy



Barossa Water

- Major town
- Wastewater reuse scheme
- Drillhole
- Farm Dam
- Recycled water pipeline
- BIL pipeline
- Gawler water reuse scheme pipelin
- - - SA Water pipeline
- Major watercourse
- SA Water mains network
- Reservoir
- vineyard_block
- Prescribed water resource area
- Barossa Valley GI region
- Eden Valley GI region
- Barossa GI zone



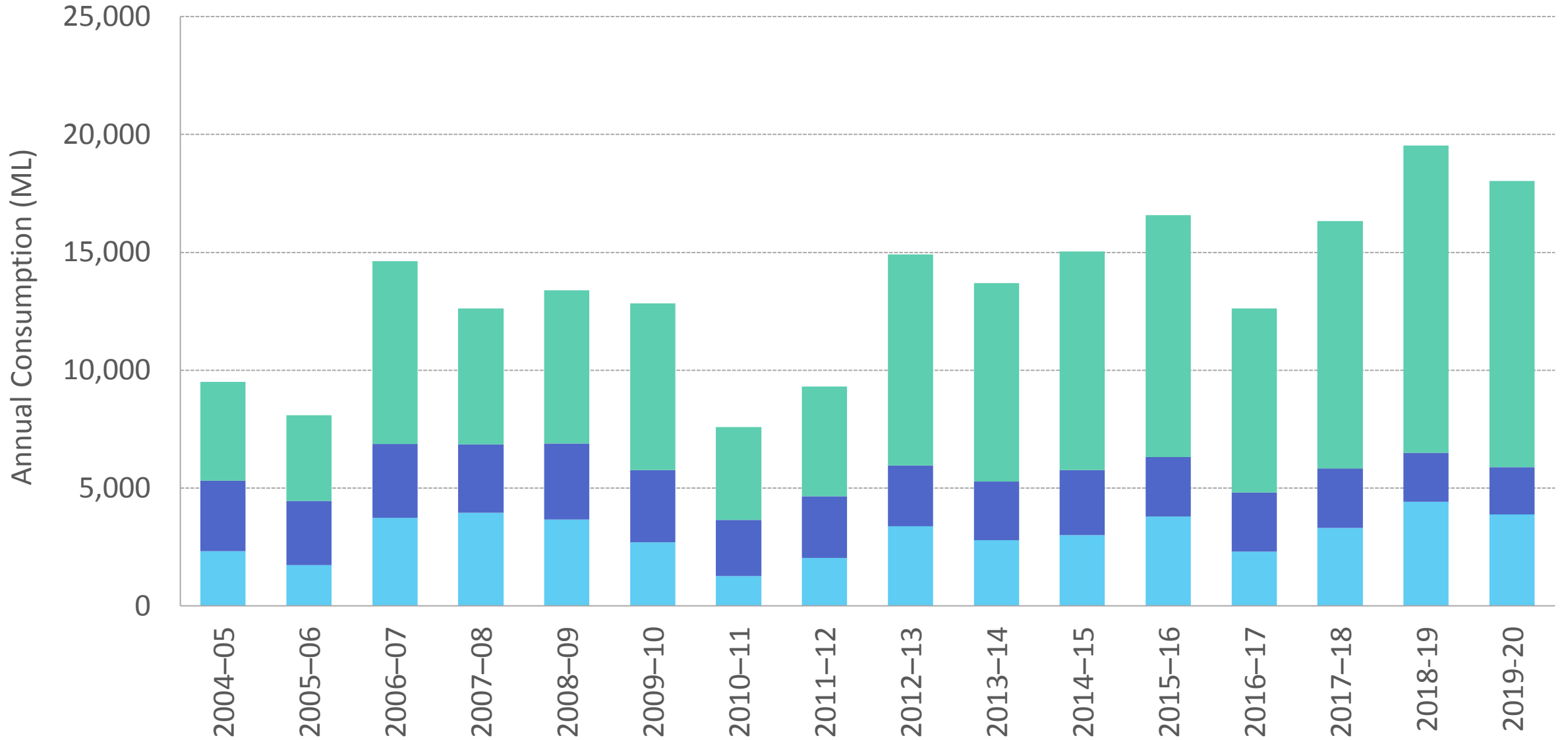
Produced by Science and Information Branch
Department for Environment and Water

Data Source ENVGIS, Wine Australia, SW Water
Compiled February 2021
Projection Lambert Conformal Conic
Datum Geocentric Datum of Australia, 1994

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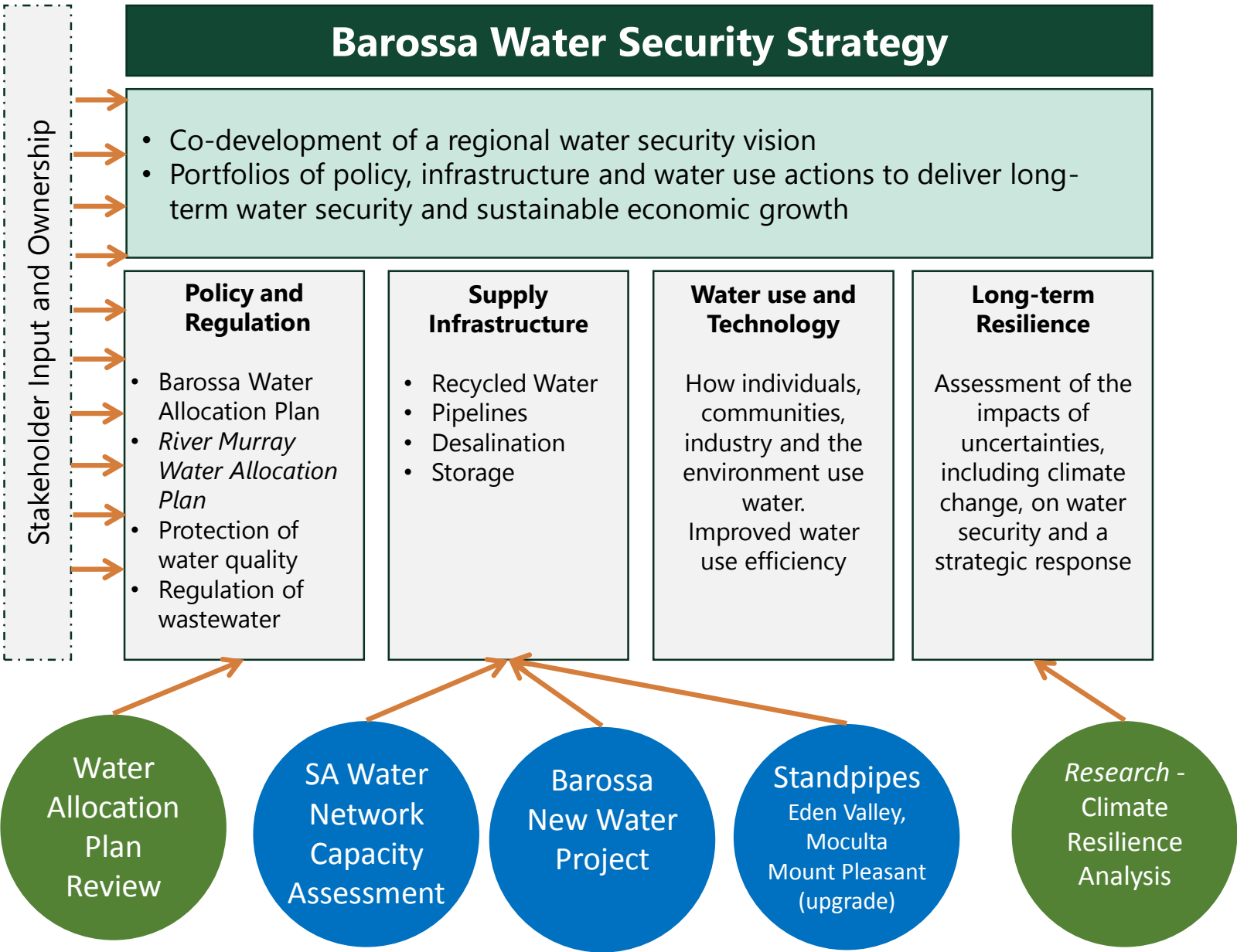
■ Groundwater ■ Surface water ■ Imported water - River Murray



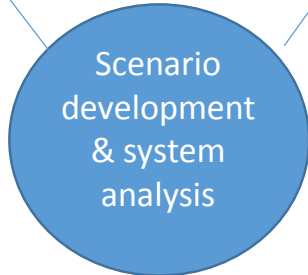
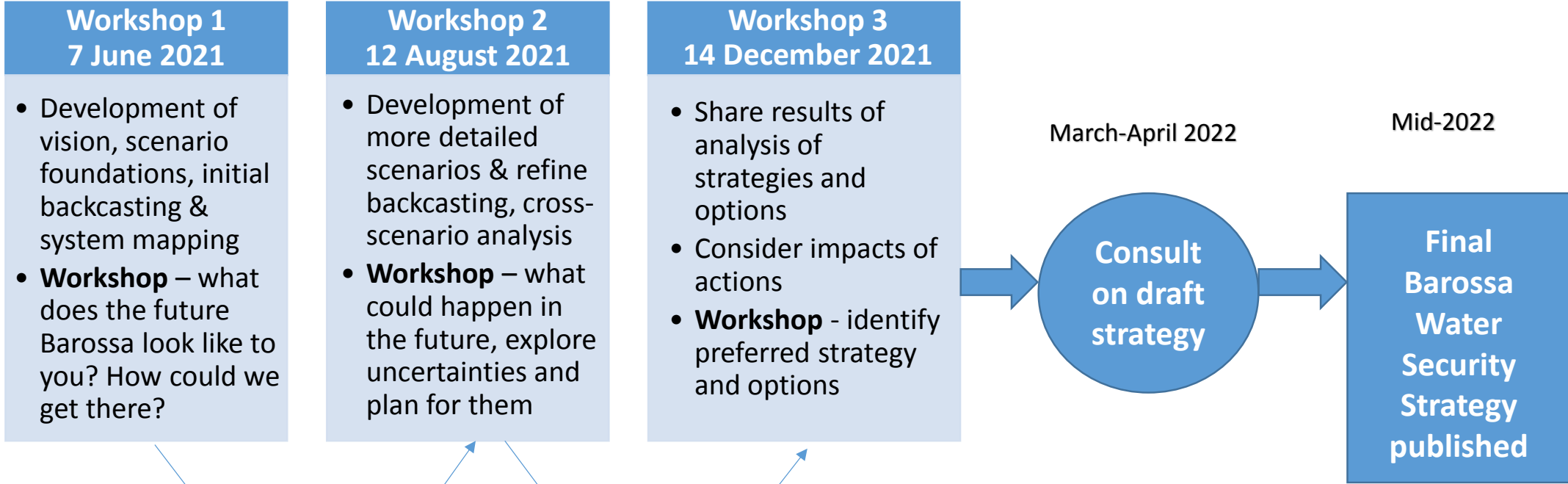
Why a Barossa water security strategy?

- To ensure there is an acceptable quantity and quality of water for communities, industry and the environment that is affordable now and into the future.
- To complement “traditional” water allocation planning undertaken by government, and deliver solutions to water management challenges.
- To identify and support investment in enhanced water security outcomes.

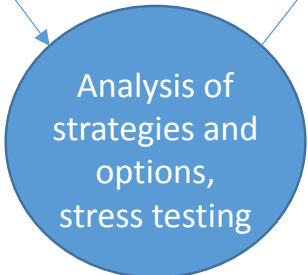
- A 30-year time horizon
- A shared vision of water security
- Utilisation of scenarios to explore key uncertainties
- Pathways for the implementation of plausible actions
- Economic and hydrological analysis



Process



June - July



September - November



Vision

Barossa is:

- an internationally recognised food, wine and agricultural region that supports diverse businesses, communities and ecosystems.
- underpinned by reliable long term availability of water (of acceptable price and quality), renewable energy, biodiversity and regenerative agricultural practices.
- strengthened by its unique Indigenous and non-indigenous cultural heritage.
- resilient and innovative - able to effectively adapt to future opportunities and challenges.



Government of South Australia
Department for Environment
and Water

Impacts of climate change

- A mid-range estimate for the next 30 years is that there will be 6% less rainfall and 3.5% more potential evapotranspiration than a 1976 to 2005 baseline period.
- This would result in reduced streamflow and groundwater recharge and more variable seasonal climate conditions.
- Water security across the last decade provides a good guide to projected water security challenges projected under a mid-range 2050 climate change scenario.
- With no action to address water security the reliability of water for irrigation will decrease and environmental flows will decline.

WATER-RELATED
PILLARS

Integrated supply and demand management for water security



Regenerative land management for water security



Healthy waterways and water-dependent ecosystems



SUPPORTING
PILLAR

Business innovation and diversification

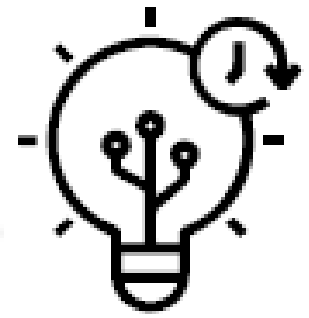
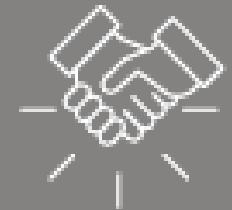


Education and knowledge management for adaptive water management



FOUNDATIONAL
PILLAR

Collaborative adaptive governance



FUTURE

Water For Growth

- National Water Grid Authority
 - \$3.5 billion fund from Australian Government
- Infrastructure
 - Northern Adelaide Irrigation Scheme
 - McLaren Vale Treated Water Storage
 - Connections package – mid scale infrastructure
- Business cases
 - Northern Water
 - Barossa New Water, Eden Valley, Clare Valley

Contacts and Further Information

www.environment.sa.gov.au/topics/water/water-security

Dr Ashley Kingsborough,
Team Leader Water Security, DEW
E: ashley.kingsborough@sa.gov.au

Peta Brettig
Principal Policy Officer, DEW
E: peta.brettig@sa.gov.au



Government of South Australia
Department for Environment
and Water

PIRSA

On-farm Emergency Water Infrastructure Rebate Scheme

Rachael Kelly
February 2022



On-Farm Emergency Water Infrastructure Rebate Scheme

Aim:

- assist primary producers to be more resilient for future droughts

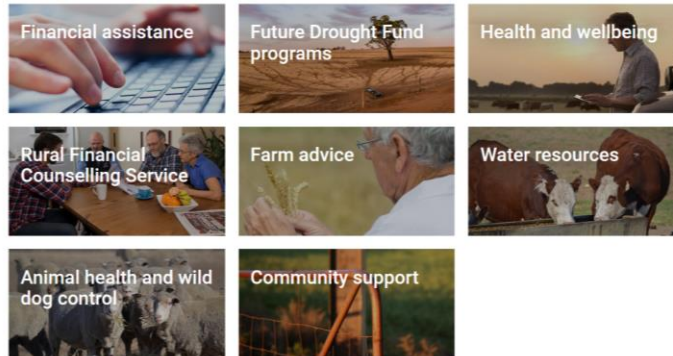
Eligible activities:

- water storage devices such as tanks and troughs associated with stock watering;
- water pumps;
- de-silting of existing dams, where you can demonstrate that the property does not have access to groundwater;
- drilling of new stock water bores and associated power supply such as generators, desalinisation plants

Applications close 5pm 30 April 2022.



Drought hotline 1800 931 314



Drought support

The Government of South Australia's \$21 million Drought Support Package aims to support farm families, local businesses and rural communities dealing with drought conditions.

Activities under the program

Under the program, eligible farmers can access:

- Wellbeing support through the [Family and Business support \(FaB\)](#) mentor program.
- Increased services through Rural Business Support, [including Rural Financial Counselling Services](#).

Page Last Reviewed: 09 Aug 2021

Guidelines are available on the [Drought Hub - Financial Assistance page](#).