Evolution of Water Allocation Plans in South Australia

using Eyre Peninsula as a case study

Steve Barnett & Simone Stewart
Groundwater Team
DEWNR

Government of South Australia
Department of Environment, Water and Natural Resources

Groundwater Management in SA

Natural Resources Management Act

Prescribed Wells Areas

- Well Construction Permits
- Concerned with quantity and salinity (not quality)

Prescribed Wells Areas

- A licence is required for extraction
- Metering of extraction and monitoring of groundwater levels and salinity
- Water Allocation Plan produced with strong community involvement
- Water trading occurs
- Annual reporting of gw level and salinity trends

Water Allocation Plans

- WAPs cover all significant good quality groundwater resources in SA (below 3000 mg/L)
- Essentially a rule book for new allocations and transfers, and sets a limit for extraction
- NRM Act requires a review every 10 years

WAP Reviews

WAPs must evolve to take into account ;

- New information and understandings of the groundwater resource
- New demands, new threats and new opportunities
- New management approaches
- Advice from the Crown Solicitor which also evolves over time

WAP Evaluation

While WAPs should rightly be judged on how effective they are for managing sustainable development and the protection of ecosystems, they should also not cause any unintended denial of access to the groundwater resource which would have been sustainable

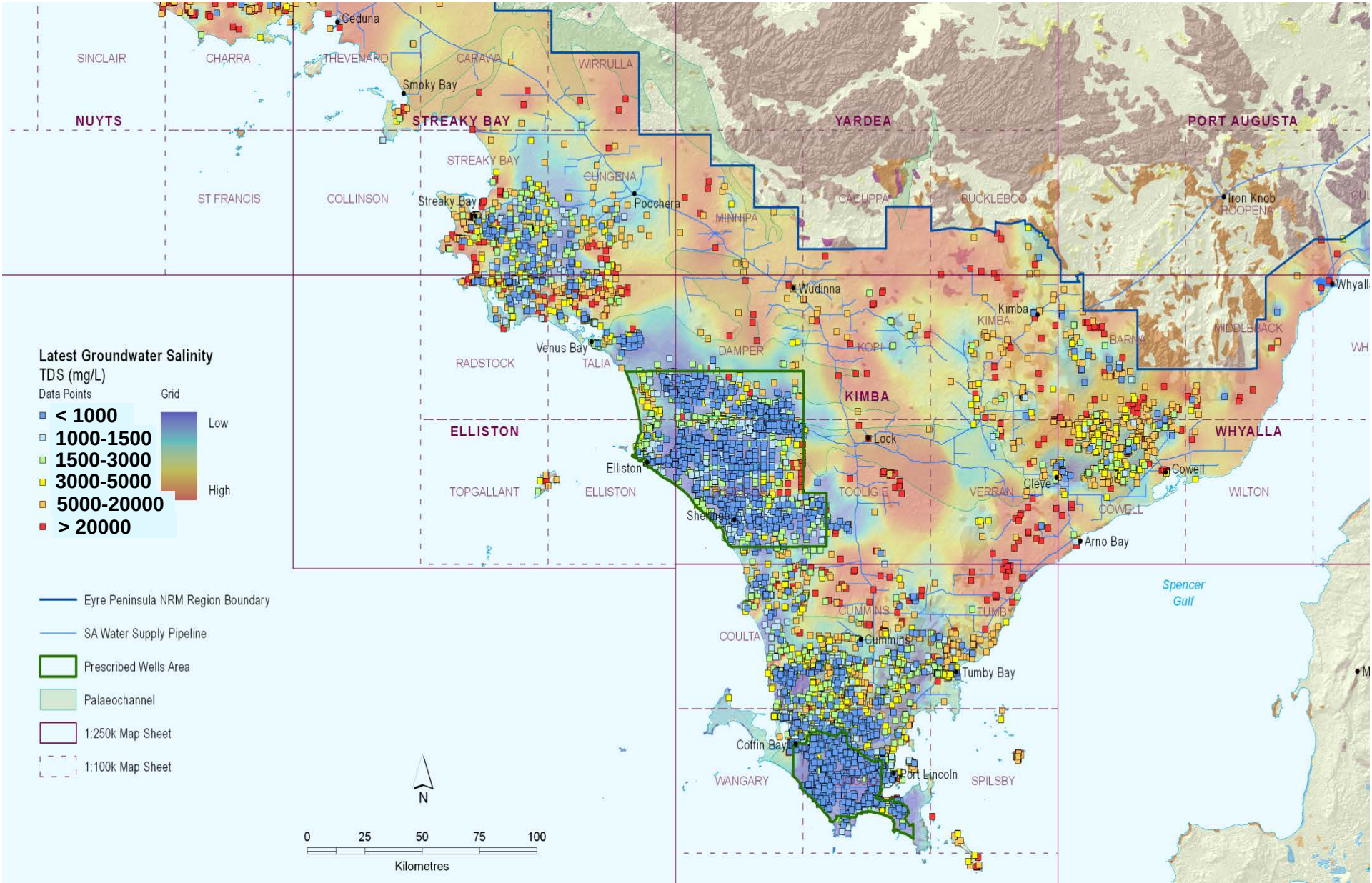
A case study

- The revision of the Water Allocation Plan for the Southern Basins and Musgrave PWAs on Eyre Peninsula presents a good case study
- Original WAP(s) were released in 2001 as a product of the existing knowledge and understanding
- Unpredictable factors such as drought and mining developments have required new approaches for the WAP revision

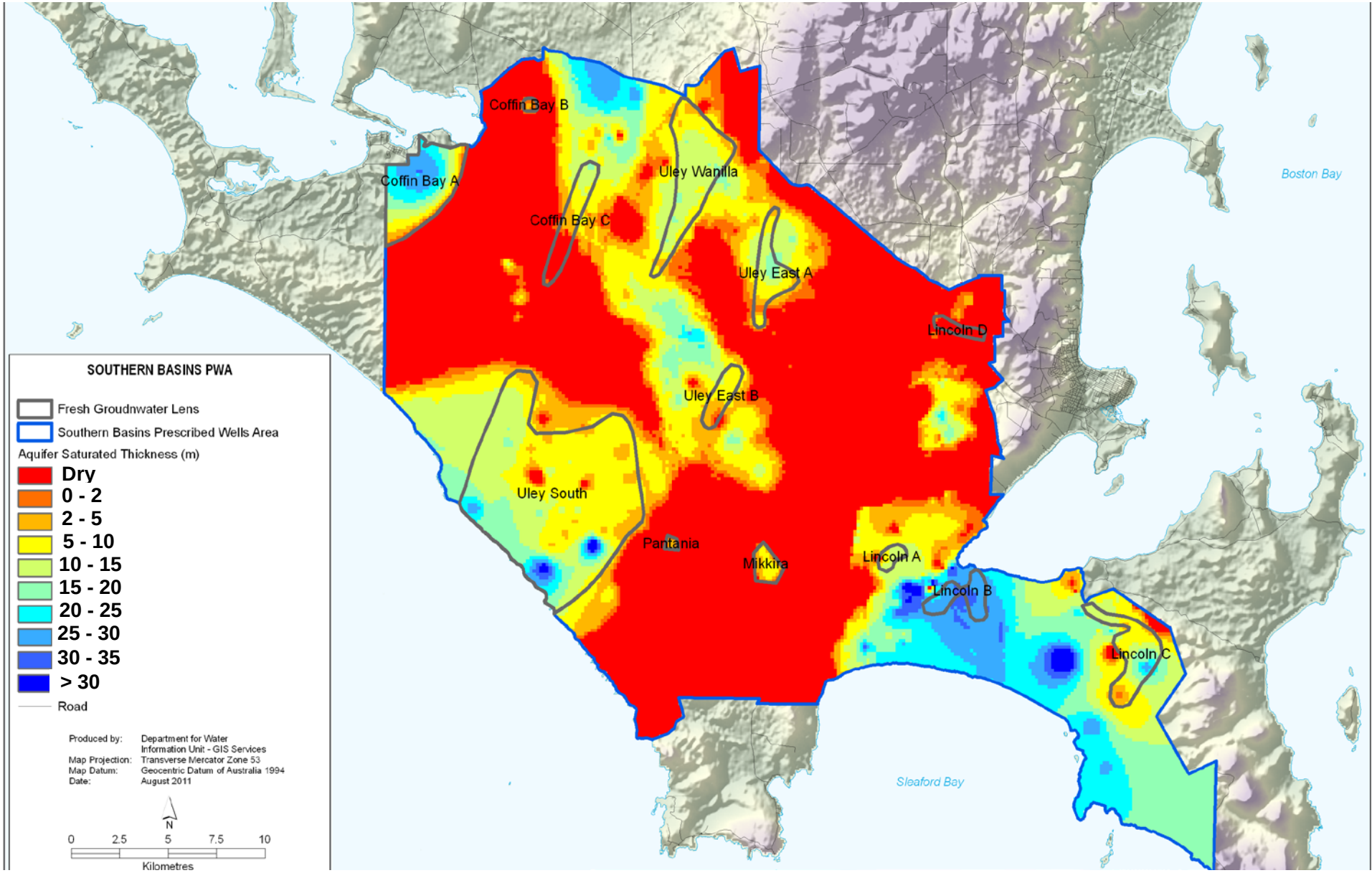
Eyre Peninsula

- Groundwater is the only source of water for most of EP which is supplied from thin Quaternary aeolianite aquifers that are entirely dependent on rainfall recharge
- Because of sensitivity to rainfall recharge, allocations are determined annually
- First area in SA to do this – good adaptive management approach to climate change in short and long term

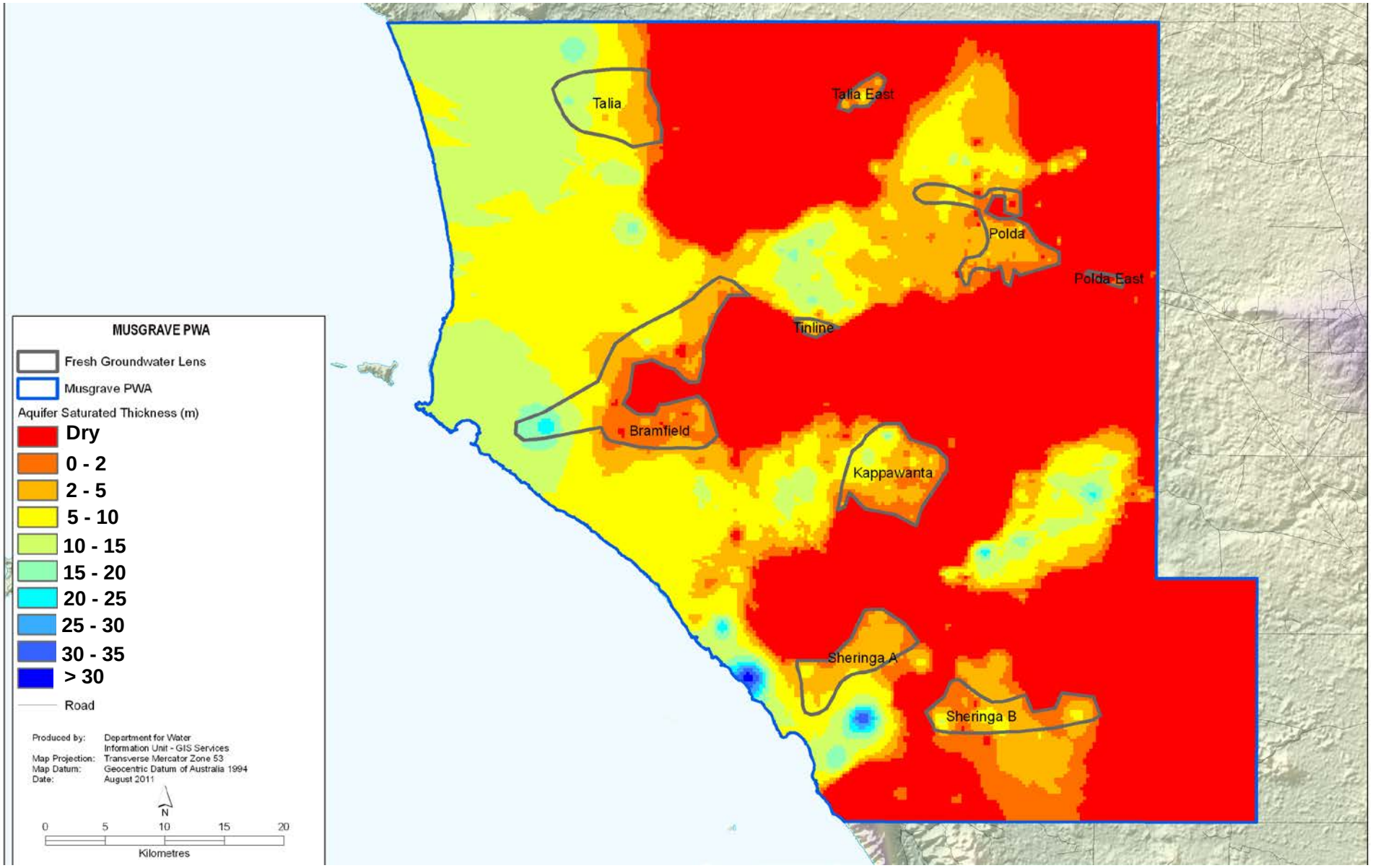
Groundwater salinity



Aquifer thickness – Southern Basins



Aquifer thickness – Musgrave

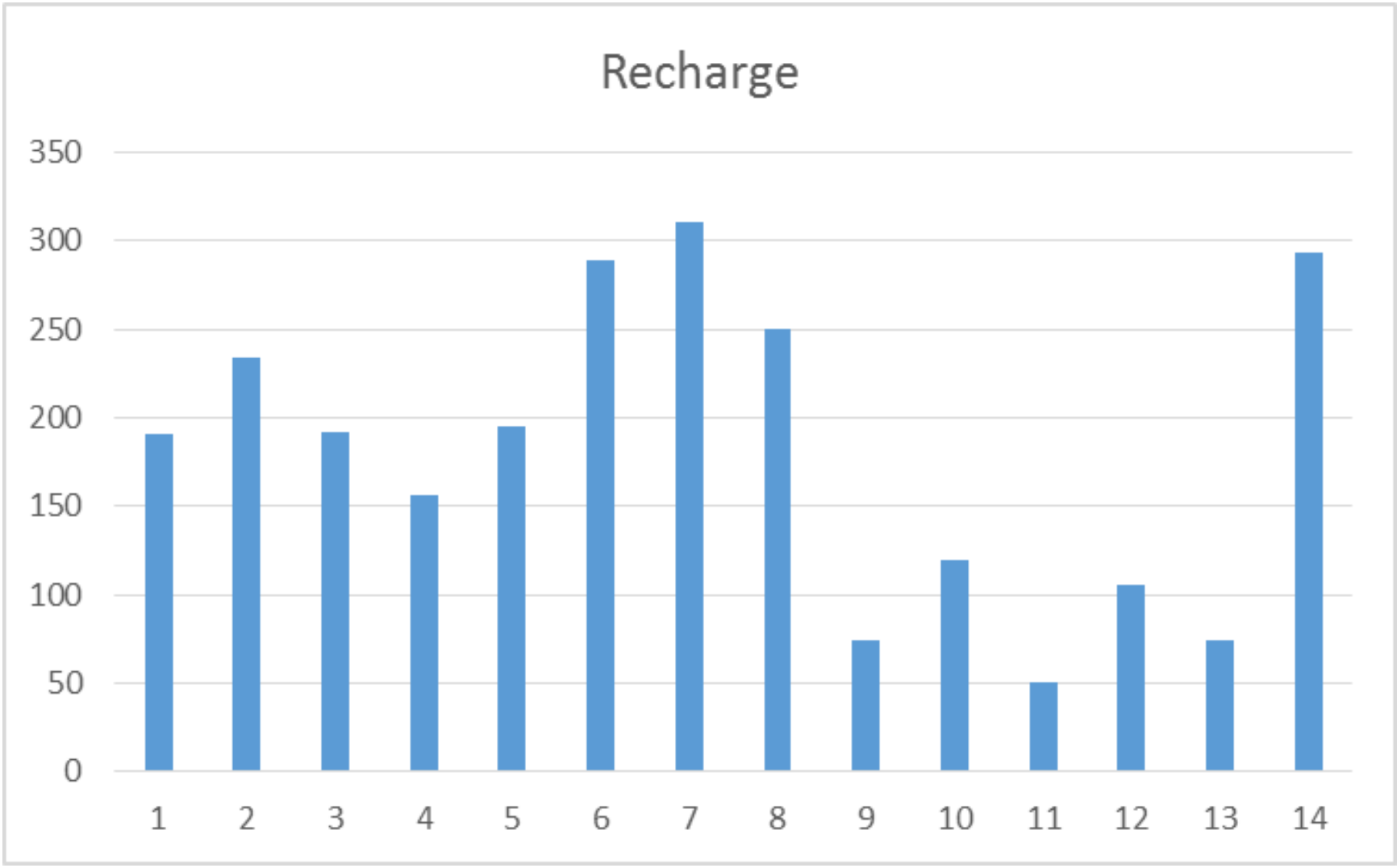


2001

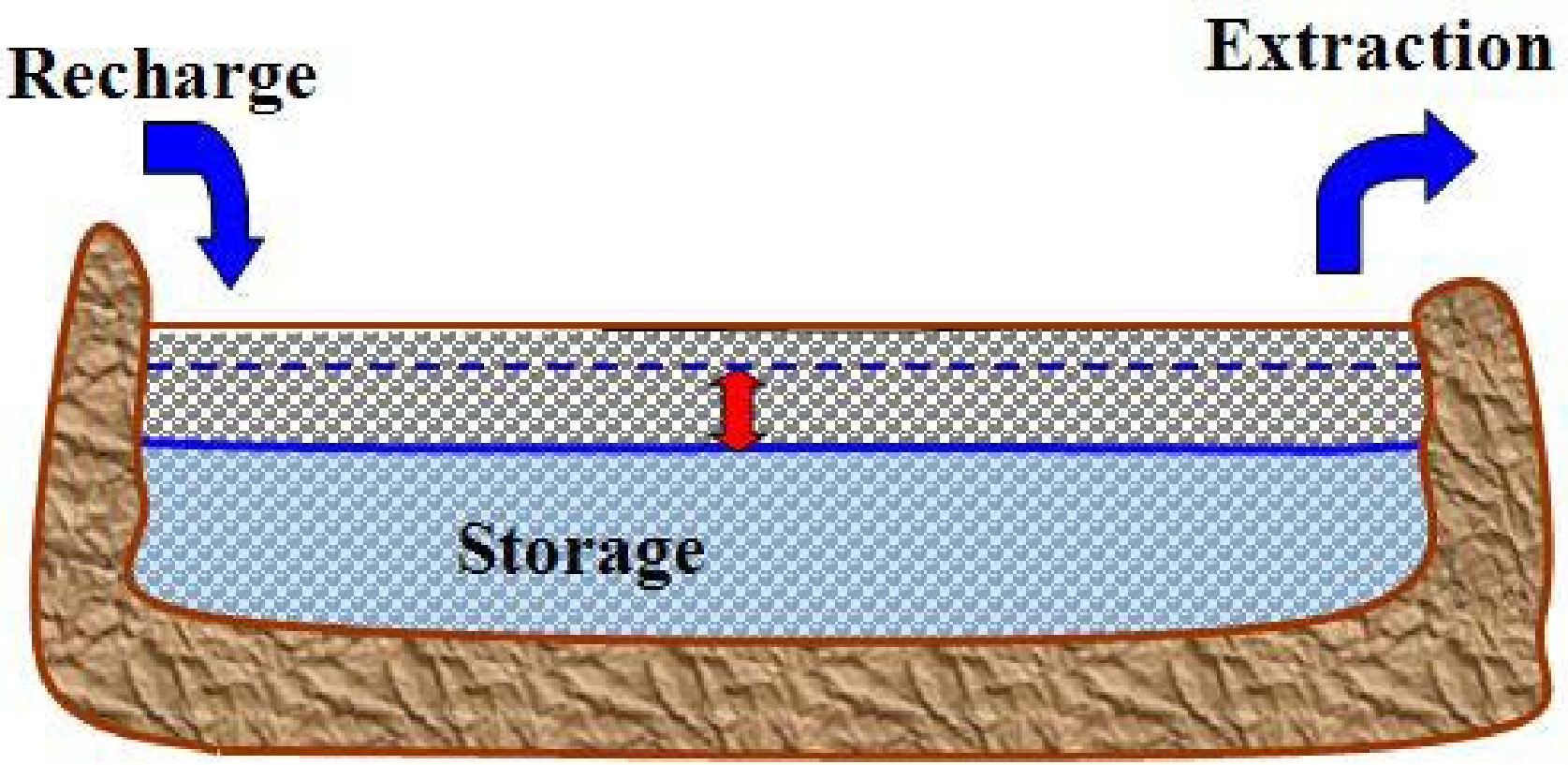
Allocations determined annually by a 10 year rolling average of recharge estimates

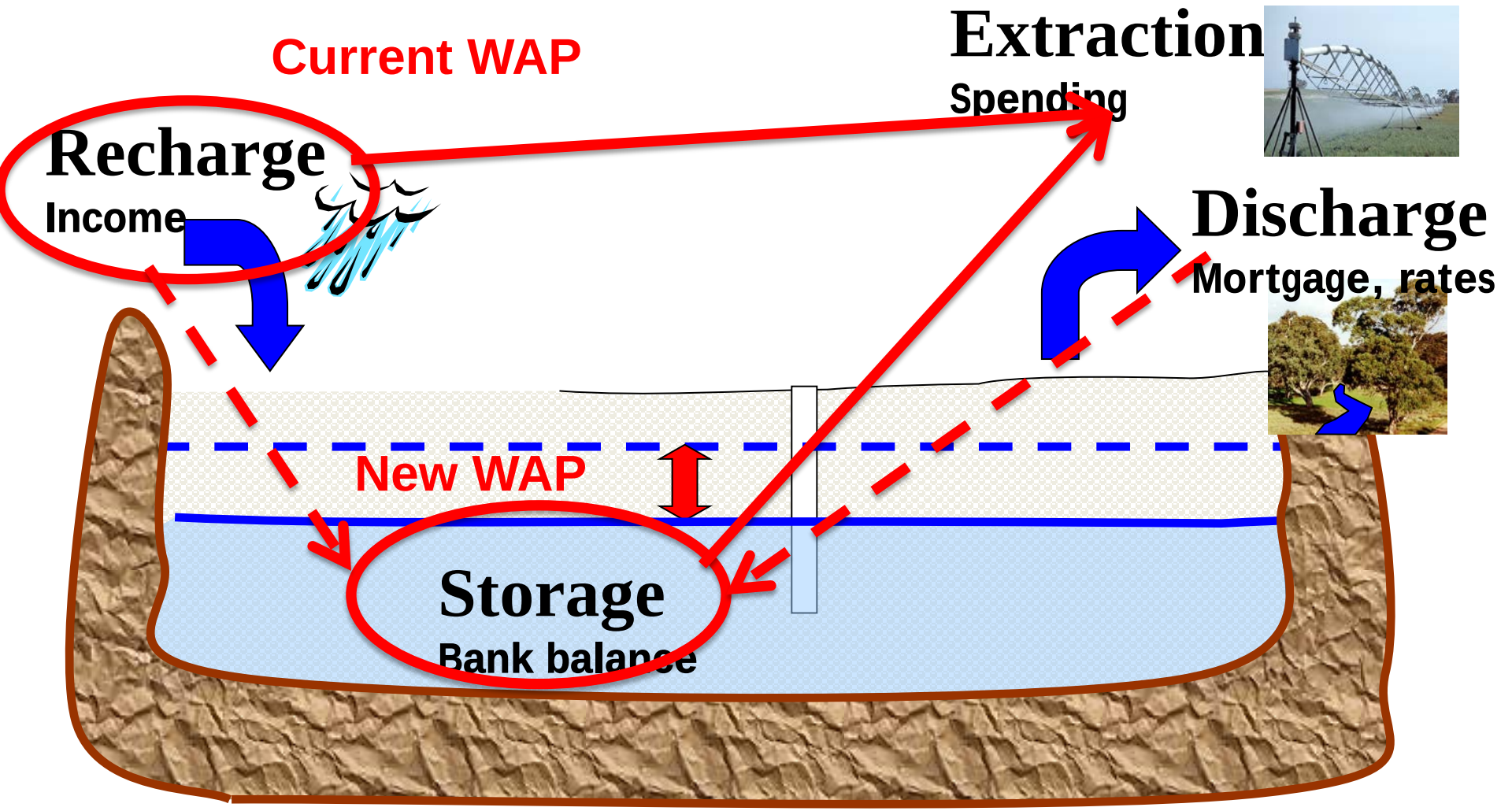
2015

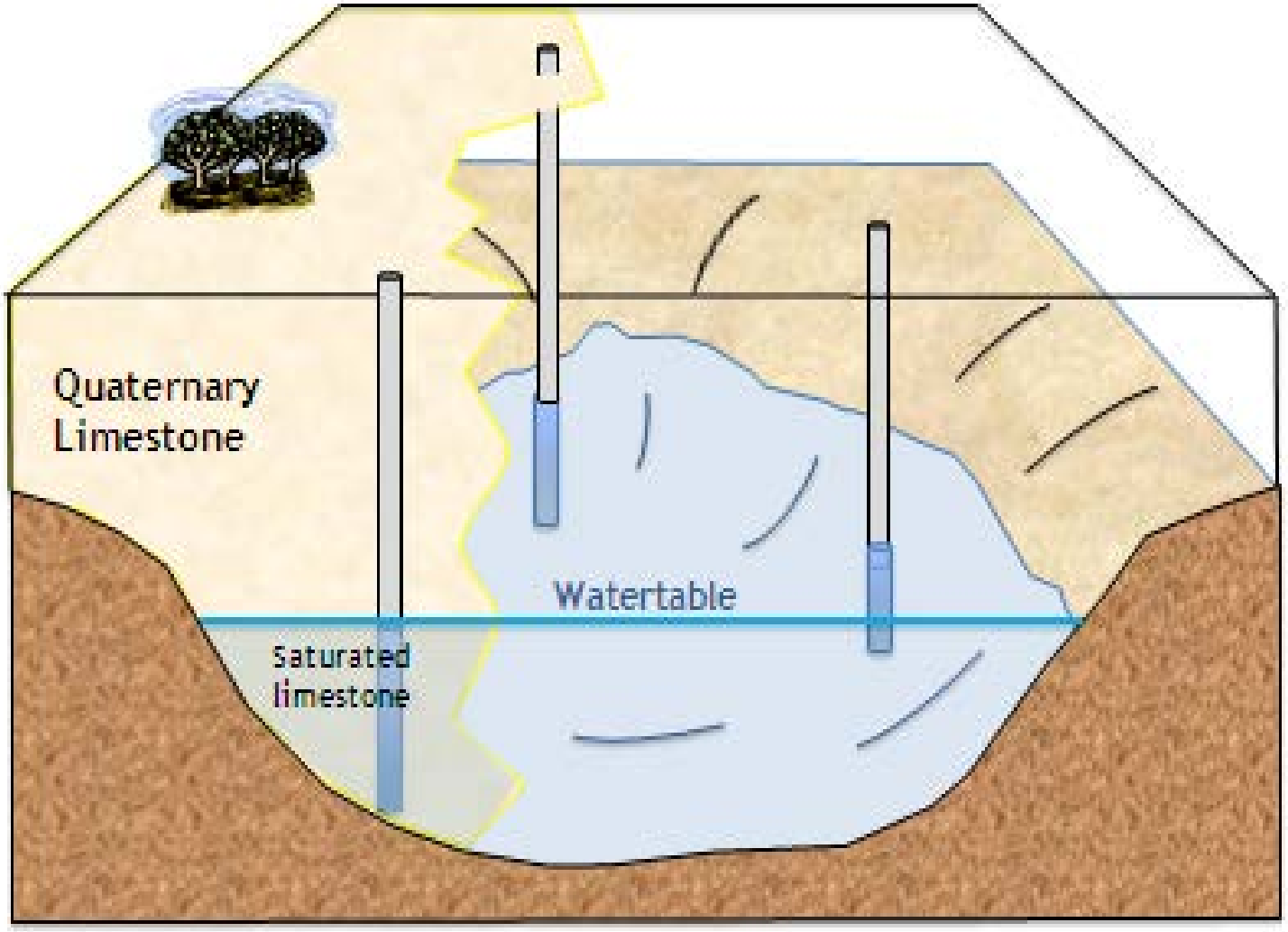
Allocations determined annually by the change in storage within the aquifer

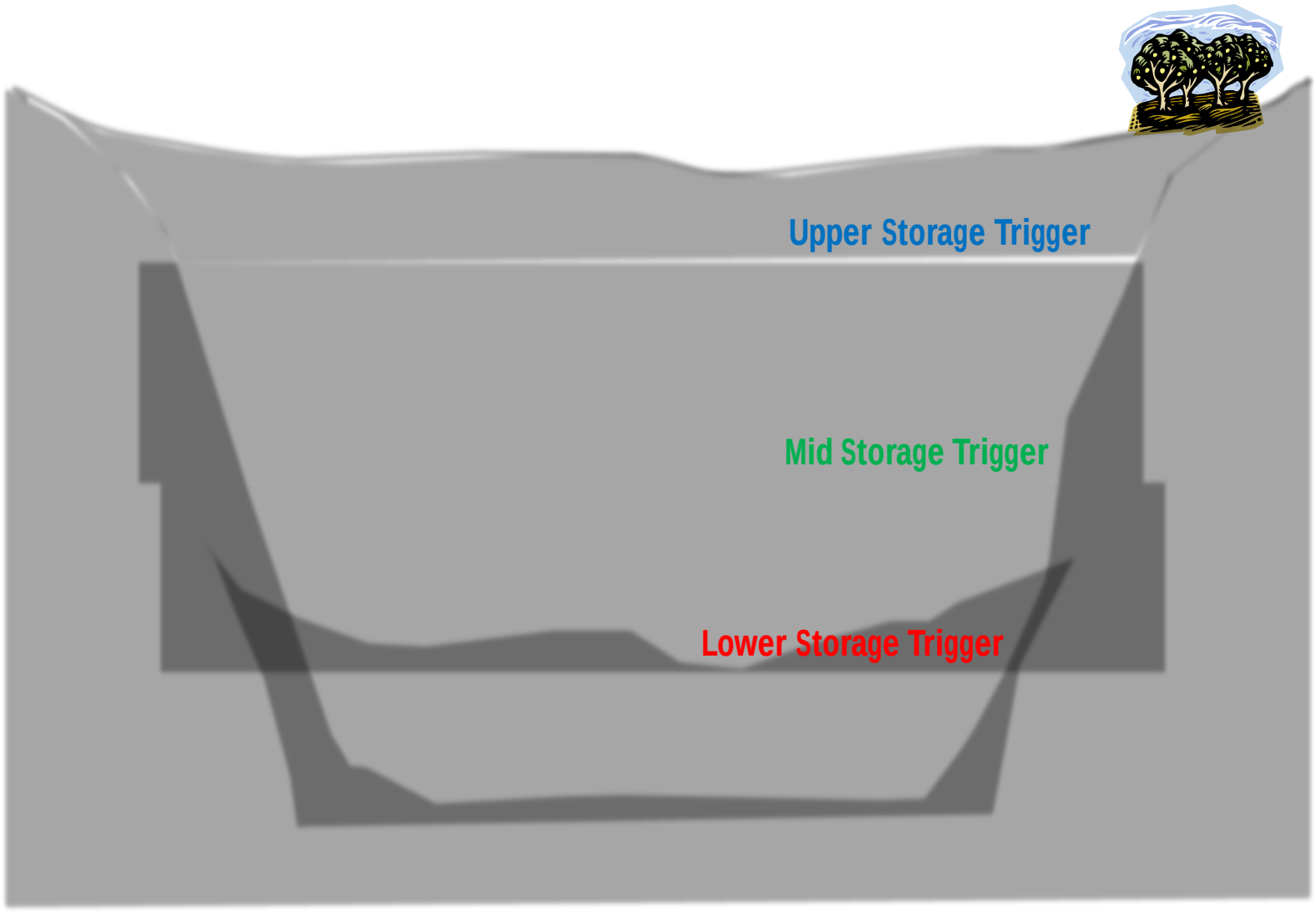

Recharge
350
300
250
200
150
100
50
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14

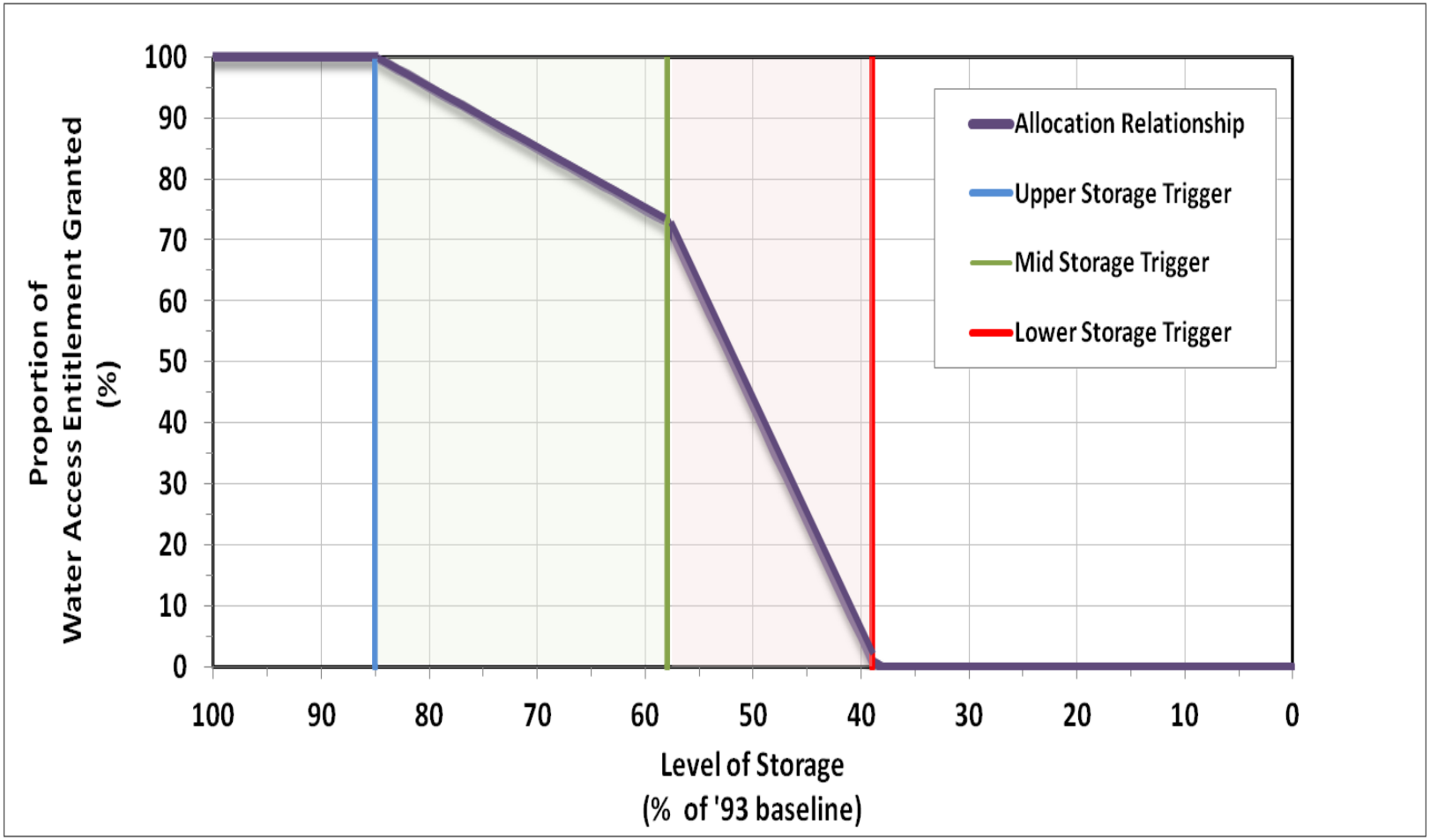
GROUNDWATER BALANCE




Current WAP
Extraction
Spending
Recharge
Income
Discharge
Mortgage, rates
New WAP
Storage
Bank balance


Quaternary
Limestone
Watertable
Saturated
limestone


Upper Storage Trigger
Mid Storage Trigger
Lower Storage Trigger


Proportion of
Water Access Entitlement Granted
(%)
100
90
80
70
60
50
40
30
20
10
0
100
90
80
70
60
50
40
30
20
10
0
Level of Storage
(% of '93 baseline)
Allocation Relationship
Upper Storage Trigger
Mid Storage Trigger
Lower Storage Trigger

Example 1: ***Level of Storage:*** ***95%***

Volume of water available for allocation: ***100%***

Allocation:

1.0 kilolitres/share

Example 2: ***Level of Storage:*** ***70%***

Volume of water available for allocation: ***85%***

Allocation:

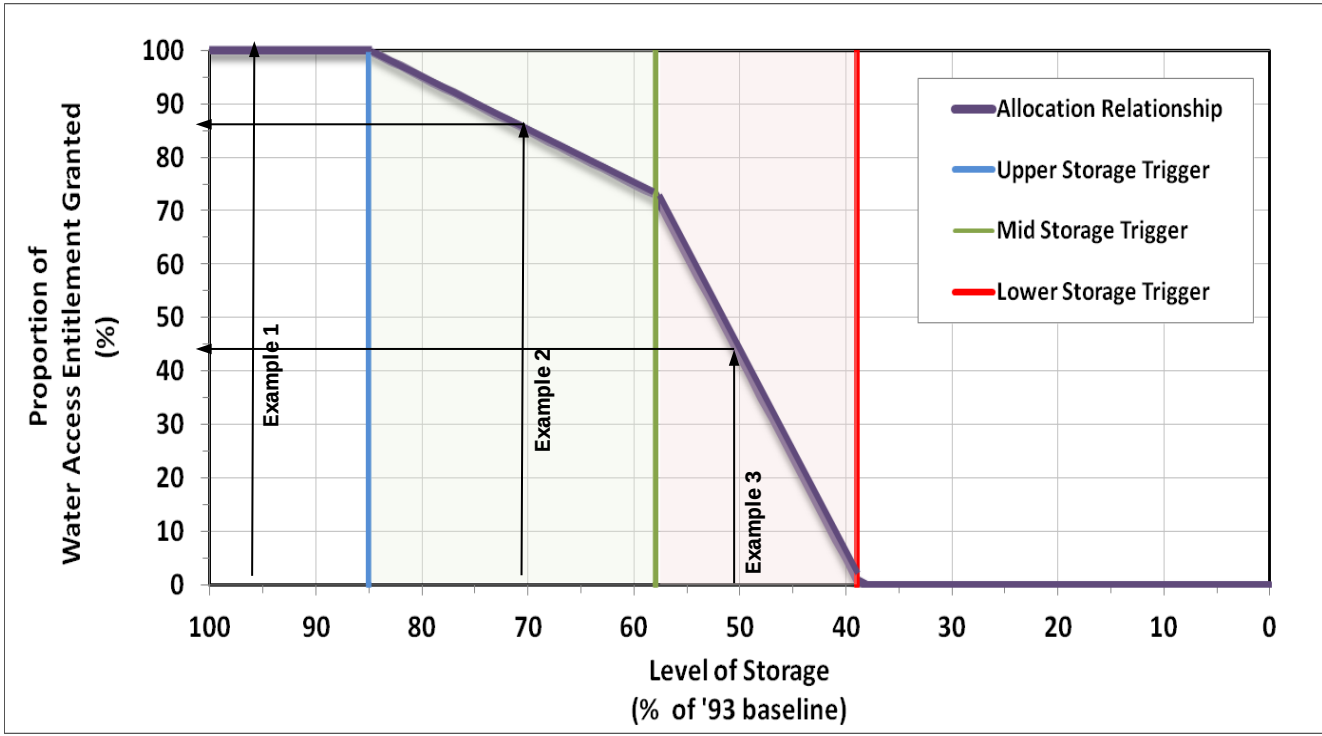
0.85 kilolitres/share

Example 3: ***Level of Storage:*** ***50%***

Volume of water available for allocation: ***42%***

Allocation:

0.42 kilolitres/share

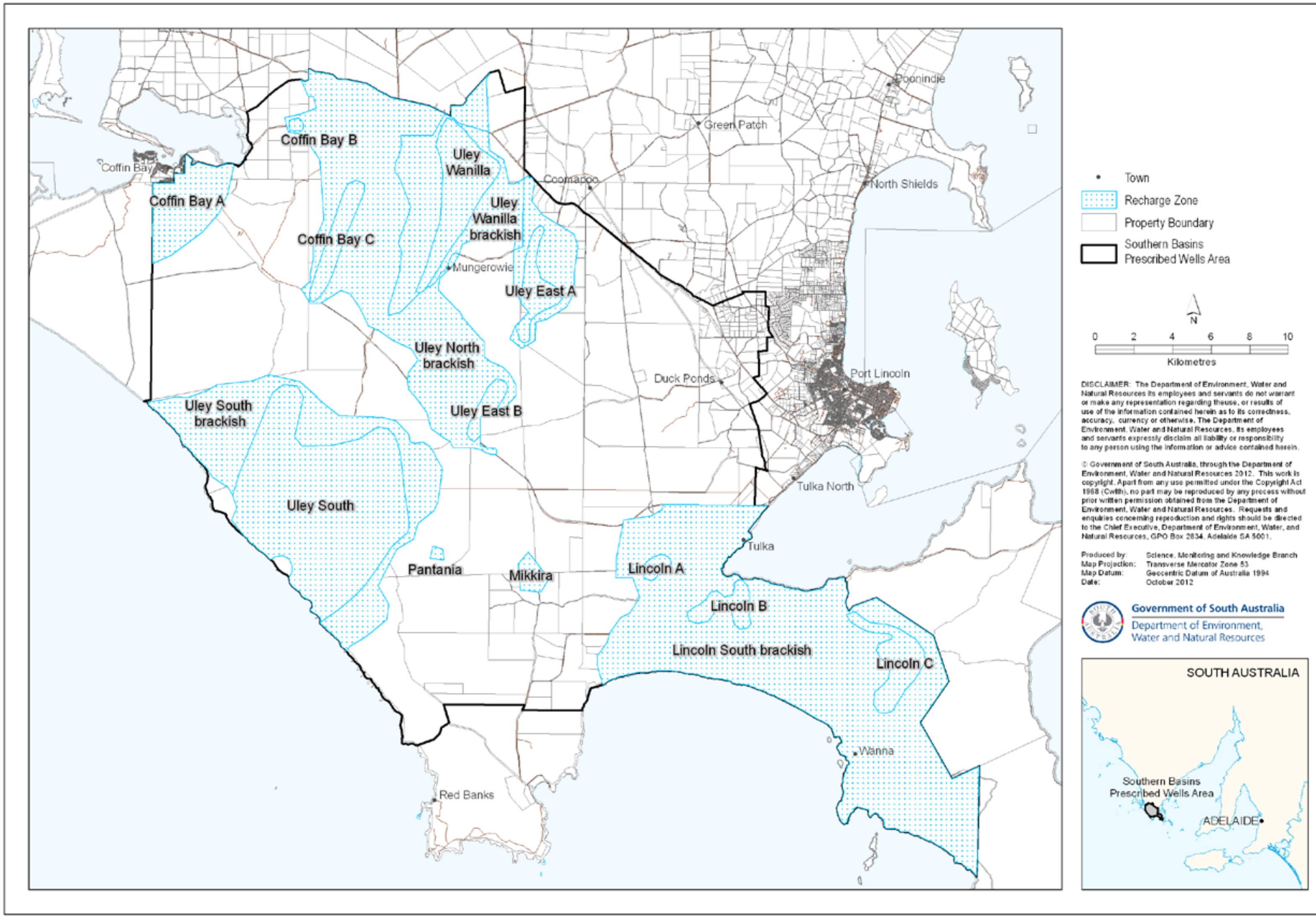


2001

Mainly concerned with low salinity lenses (<1000 mg/L) within groundwater basins, as main use of groundwater was public water supply (~99%)

2015

All resources are important and should be managed regardless of salinity (low salinity lens boundaries change over time)


Poonindie
Green Patch
Coffin Bay
Coffin Bay A
Coffin Bay B
Coffin Bay C
Uley Wanilla
Uley Wanilla brackish
Coomapoo
North Shields
Mungerowie
Uley East A
Uley North brackish
Uley East B
Duck Ponds
Port Lincoln
Uley South brackish
Uley South
Tulka North
Tulka
Pantania
Mikkira
Lincoln A
Lincoln B
Lincoln South brackish
Lincoln C
Wanna
Red Banks
Town
Recharge Zone
Property Boundary
Southern Basins Prescribed Wells Area
N
0 2 4 6 8 10
Kilometres
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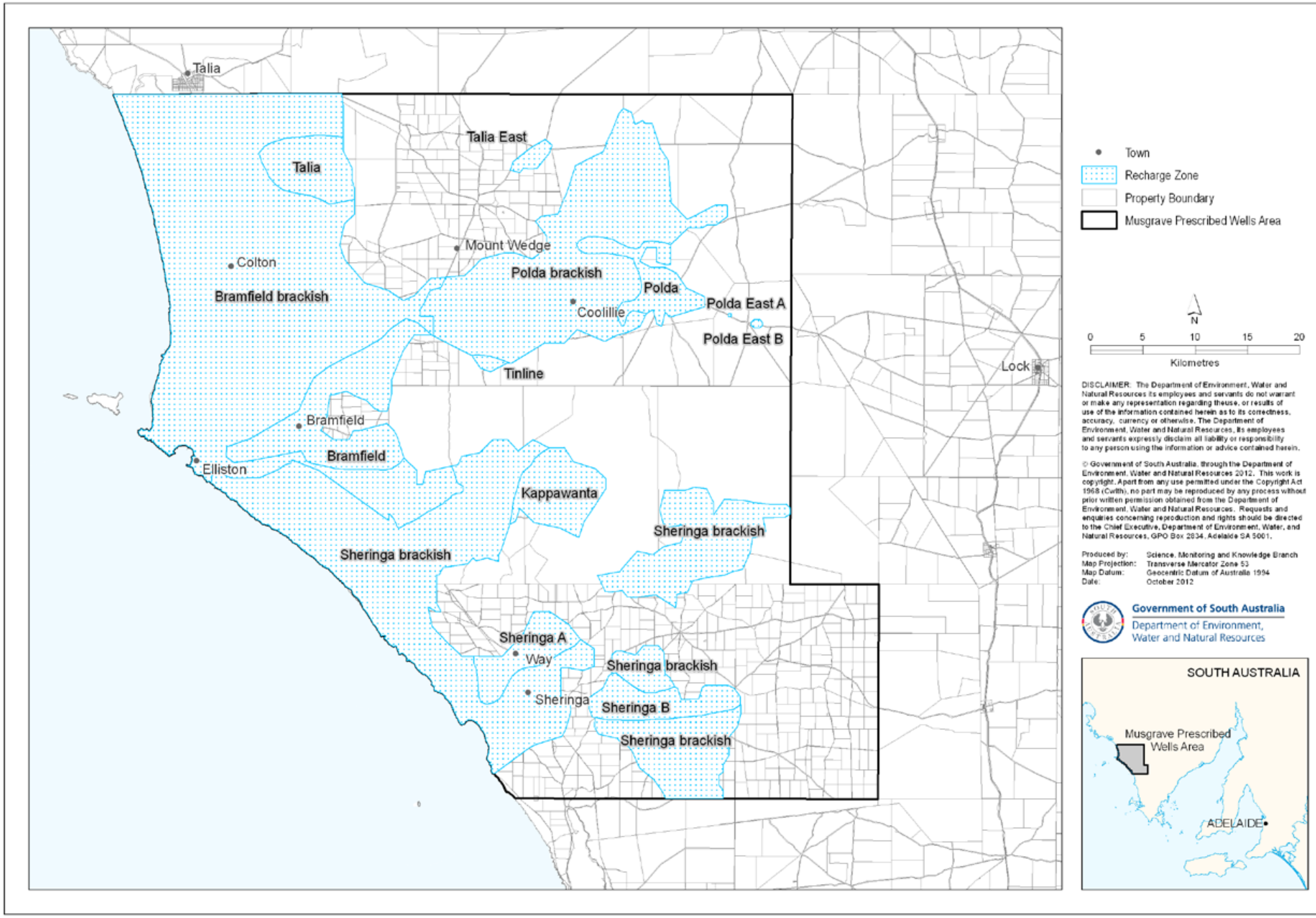
Map Projection: Transverse Mercator Zone 53
Map Datum: Geocentric Datum of Australia 1994
Date: October 2012
Government of South Australia
Department of Environment, Water and Natural Resources
SOUTH AUSTRALIA
Southern Basins Prescribed Wells Area
ADELAIDE


Talia
Talia East
Talia
Mount Wedge
Colton
Bramfield brackish
Polda brackish
Polda
Coolillie
Polda East A
Polda East B
Tinline
Lock
Bramfield
Bramfield
Elliston
Kappawanta
Sheringa brackish
Sheringa brackish
Sheringa A
Way
Sheringa brackish
Sheringa
Sheringa B
Sheringa brackish
Town
Recharge Zone
Property Boundary
Musgrave Prescribed Wells Area
N
0 5 10 15 20
Kilometres
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Musgrave Prescribed Wells Area
ADELAIDE

2001

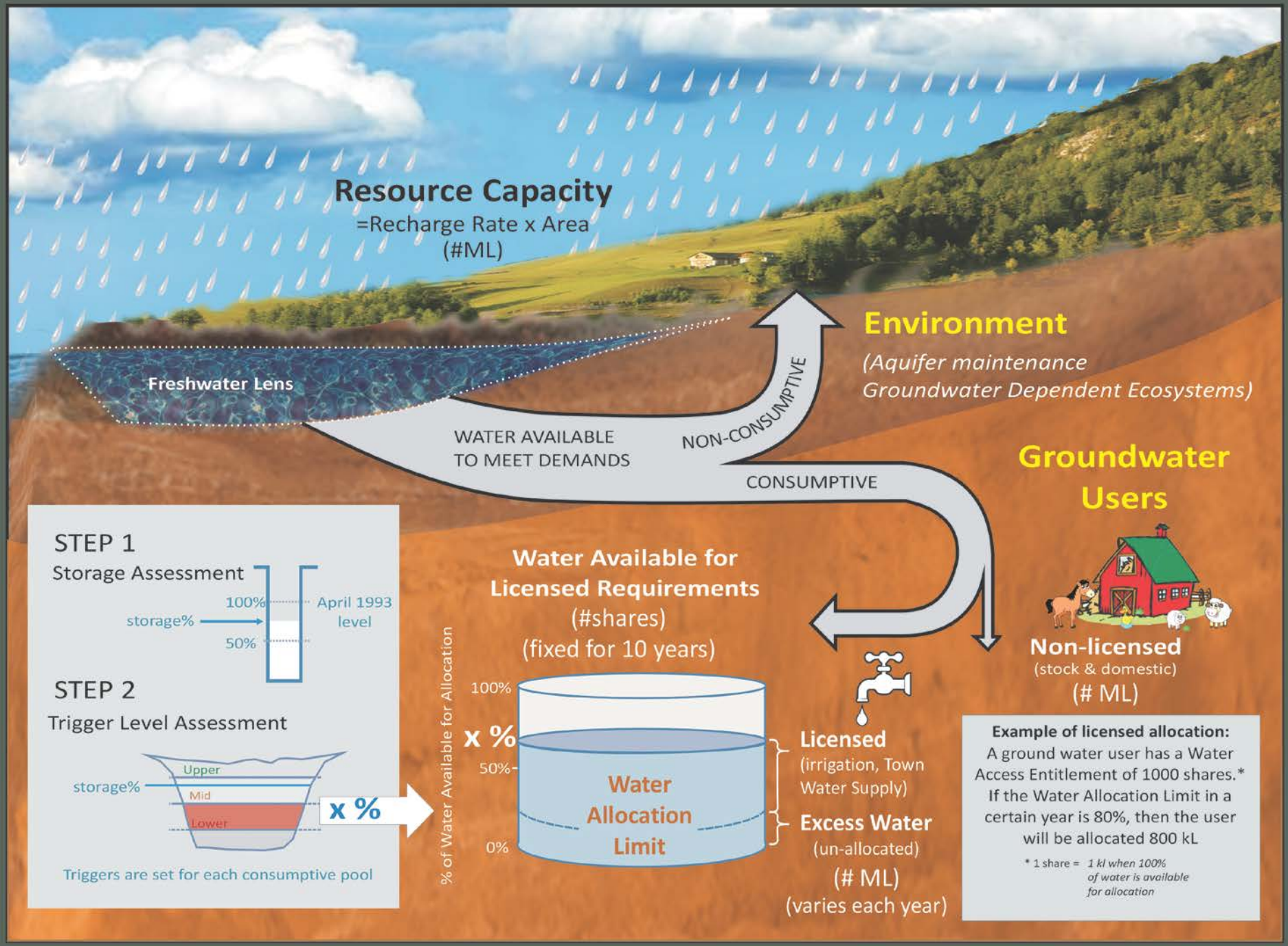
A precautionary 60% of recharge was allocated to the environment in every basin

2015

A risk-based approach in determining how much groundwater should be allocated to the environment

- Accessibility Risk -the risk to users of restricting water for consumptive use, i.e. risks to the social, cultural and economic values of not being able to access sufficient groundwater
- Environmental Risk -the risks to the aquifer and environment of extracting too much water for consumptive use

BASIN	CONSUMPTIVE DEMANDS %	ENVIRONMENTAL DEMANDS %
Coffin Bay	40	60
Uley Wanilla PWS	40	60
Uley North	50	50
Uley South PWS	70	30
Lincoln South PWS	40	60
Polda	40	60
Bramfield	40	60
Sheringa	40	60


Resource Capacity
=Recharge Rate x Area
(#ML)
Freshwater Lens
Environment
(Aquifer maintenance
Groundwater Dependent Ecosystems)
WATER AVAILABLE
TO MEET DEMANDS
NON-CONSUMPTIVE
CONSUMPTIVE
Groundwater
Users
STEP 1
Storage Assessment
100%
storage%
50%
April 1993
level
STEP 2
Trigger Level Assessment
storage%
Upper
Mid
Lower
x %
Triggers are set for each consumptive pool
Water Available for
Licensed Requirements
(#shares)
(fixed for 10 years)
% of Water Available for Allocation
100%
x %
50%
0%
Water
Allocation
Limit
Licensed
(irrigation, Town
Water Supply)
Excess Water
(un-allocated)
(# ML)
(varies each year)
Non-licensed
(stock & domestic)
(# ML)
Example of licensed allocation:
A ground water user has a Water
Access Entitlement of 1000 shares.*
If the Water Allocation Limit in a
certain year is 80%, then the user
will be allocated 800 kL
* 1 share = 1 kl when 100%
of water is available
for allocation

2001

Extraction limits fixed by the Plan despite uncertainty and lack of information on some aquifers

2015

Allows ‘new’ resources to be developed if investigations can demonstrate it can be achieved sustainably

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