Lower Limestone Coast

Amendment process to revise the Plan







Confined Aquifer
Kingston Management Area

LANDSCAPE SOUTH AUSTRALIA LIMESTONE COAST

Kingston Management Area

Current Plan

- Permissible annual volume= 25,000 ML
- Target management level = 40,089 ML
- Average usage ~ 12,300 ML
- Modelled sustainable use ~ 15,000 ML
- Relies on allocation being under-used and self-managed
- Ongoing risk of activation of unused water



LANDSCAPE SOUTH AUSTRALIA LIMESTONE COAST

Kingston Management Area

Current Plan

Addressing over-allocation in the Kingston management area:

- Principles 232 – 234

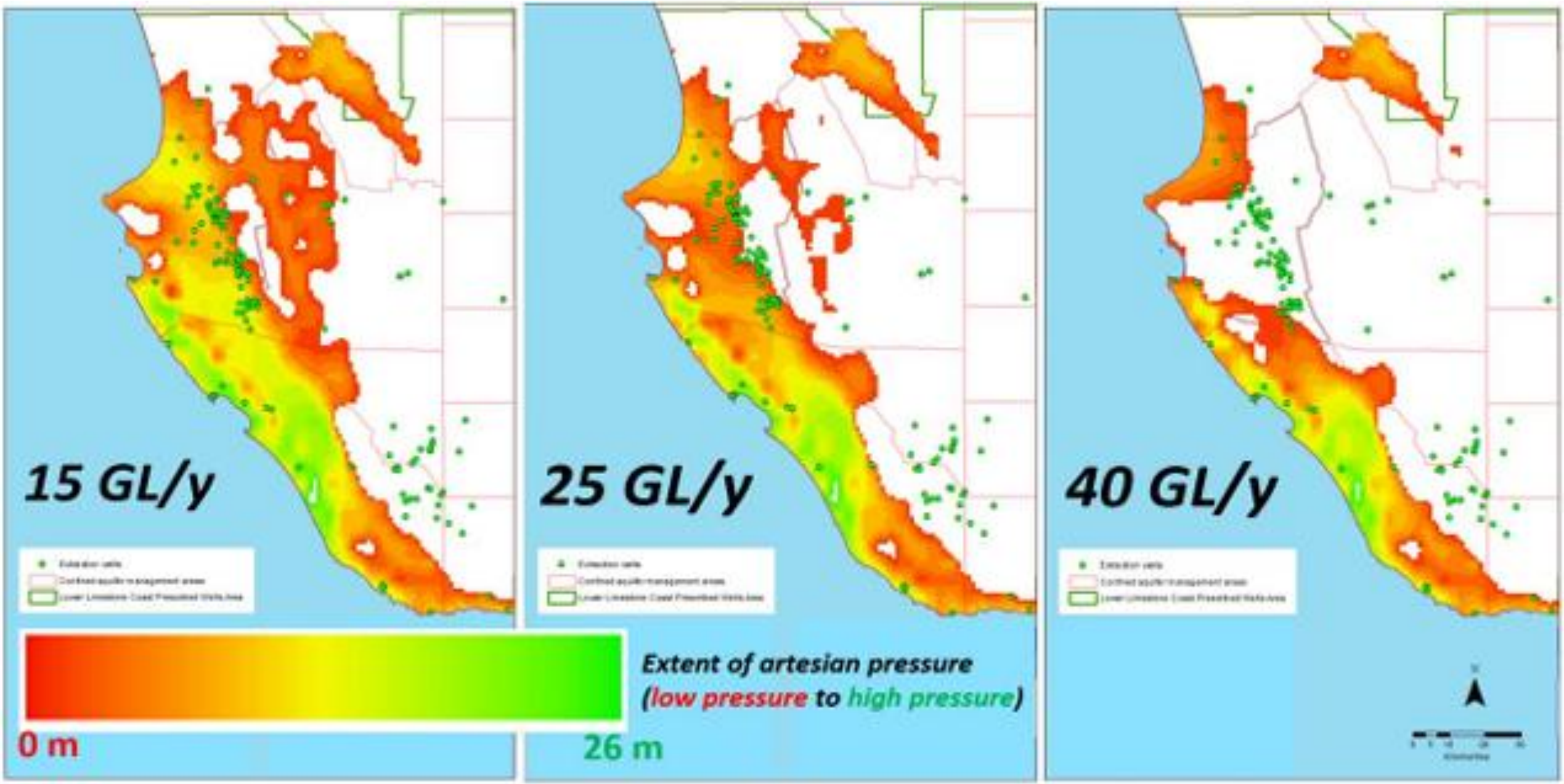
  "If in the Kingston management area the sum of metered extraction plus the allowance for stock and domestic use minus any volumes returned to the source aquifer by geothermal energy or mining activities, exceeds 25,000 ML/year in any water use year and the area is identified as at high or very high risk of degradation through a risk assessment, all components of water (taking) allocations in the management area should be reduced."

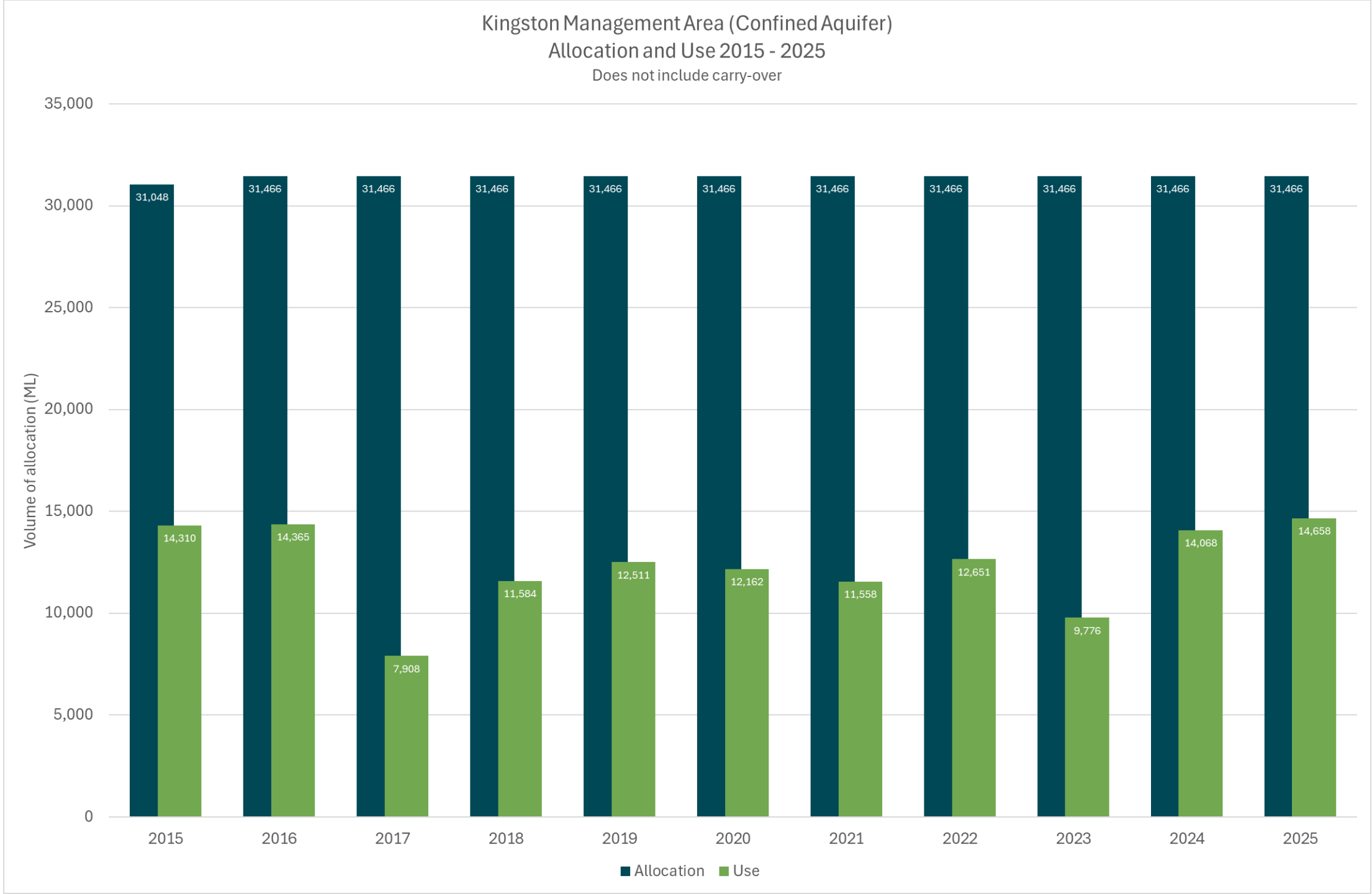
- High risk =
  - Reductions to allocations so extractive allowances ≤ 25,000ML



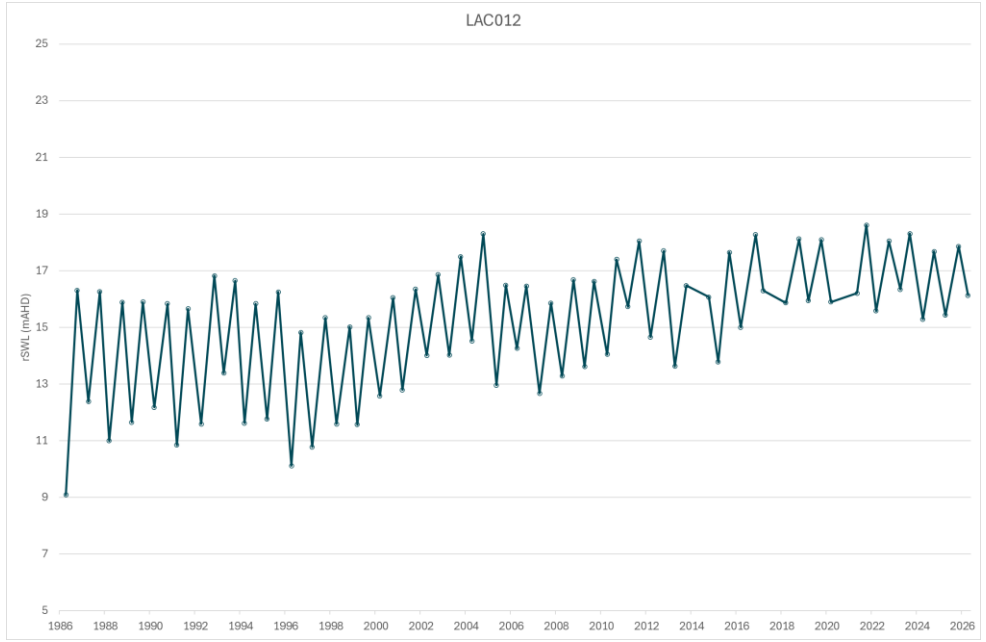
Photo: Steve Bourne

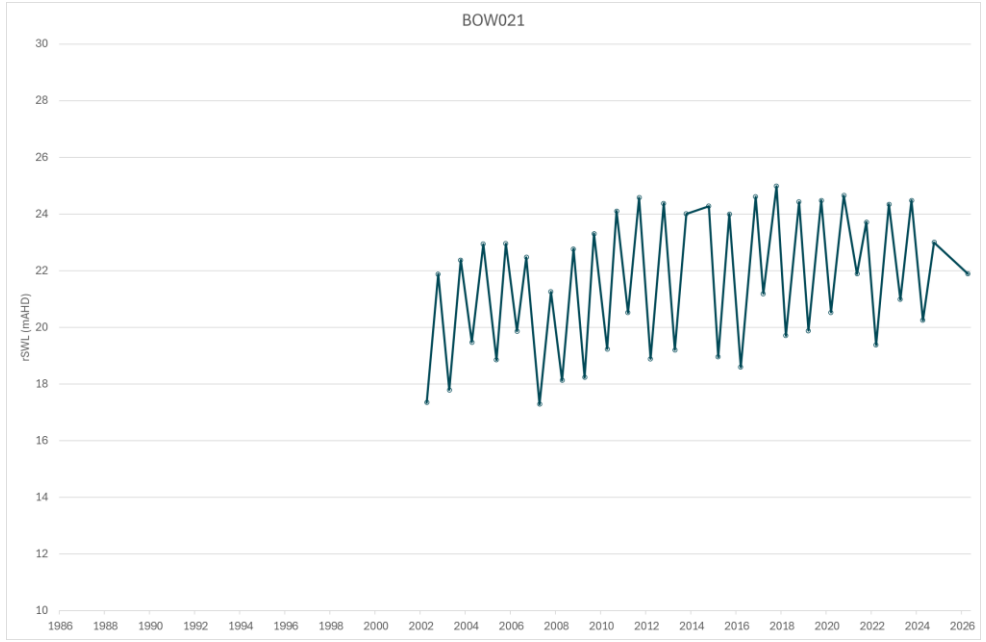
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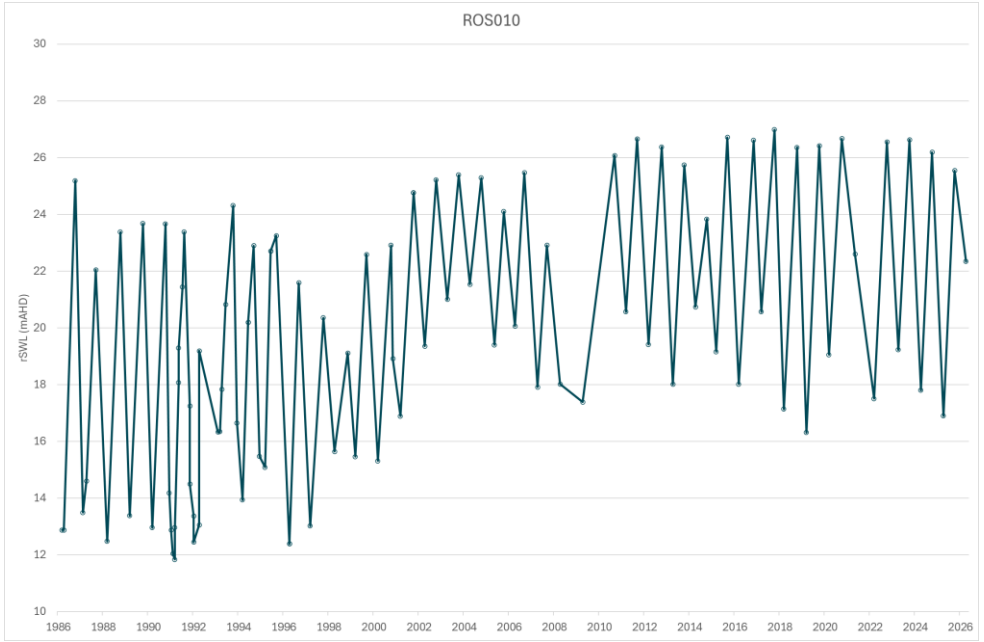

15 GL/y
25 GL/y
40 GL/y
Extent of artesian pressure
(low pressure to high pressure)
0 m
26 m

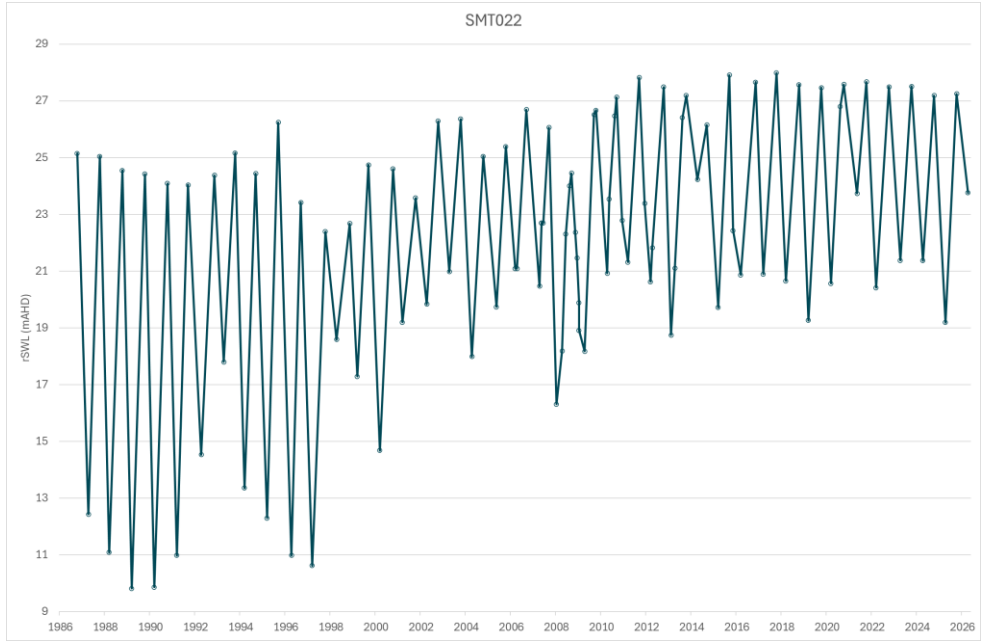


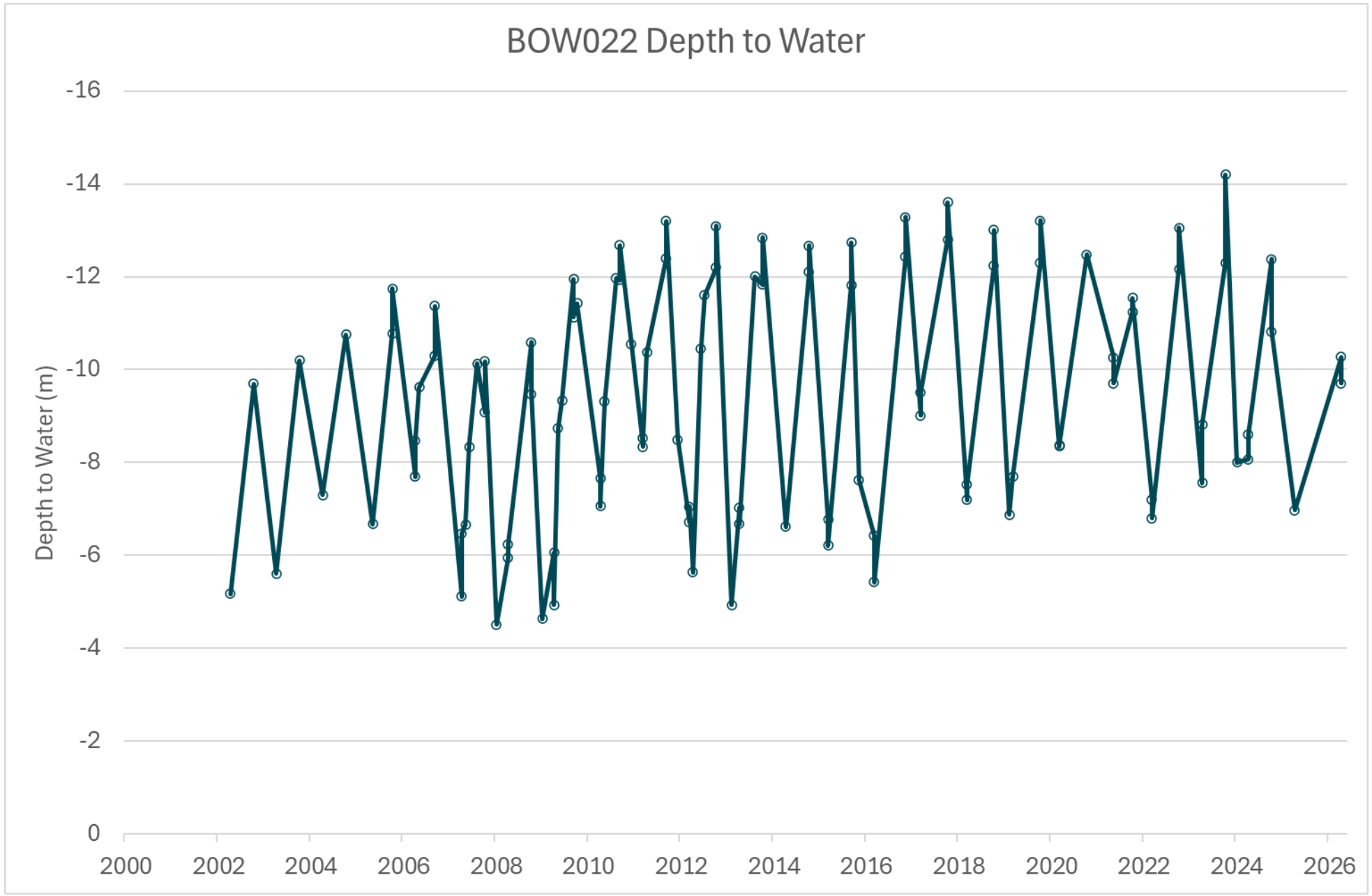
2024 and 2025 use unverified


LAC012
rSWL (mAHD)
25
23
21
19
17
15
13
11
9
7
5
1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022 2024 2026


BOW021
rSWL (mAHD)
30
28
26
24
22
20
18
16
14
12
10
1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022 2024 2026


ROS010
rSWL (mAHD)
30
28
26
24
22
20
18
16
14
12
10
1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022 2024 2026

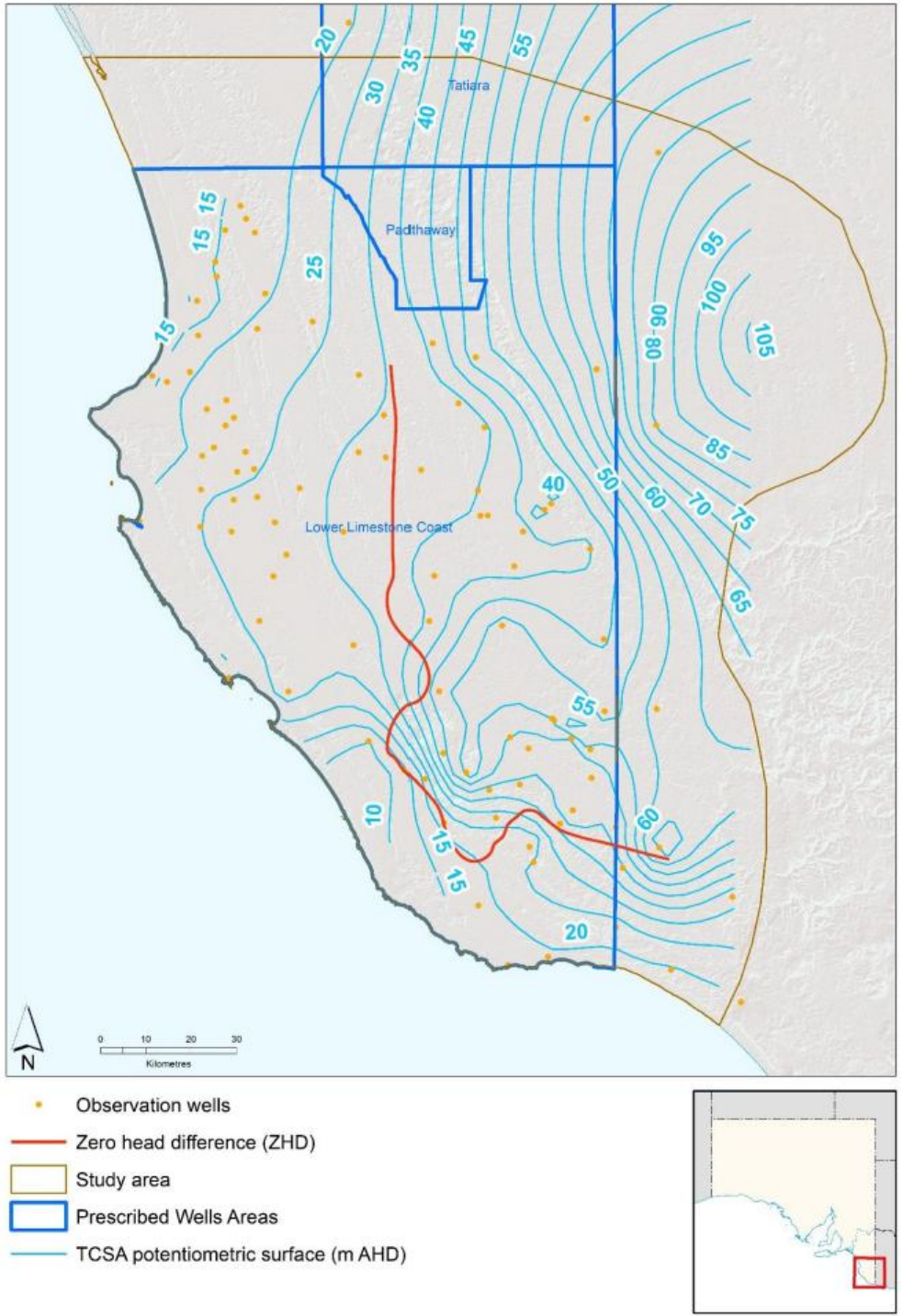

SMT022
rSWL (mAHD)
29
27
25
23
21
19
17
15
13
11
9
1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022 2024 2026


BOW022 Depth to Water
Depth to Water (m)
-16
-14
-12
-10
-8
-6
-4
-2
0
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026

Kingston Management Area

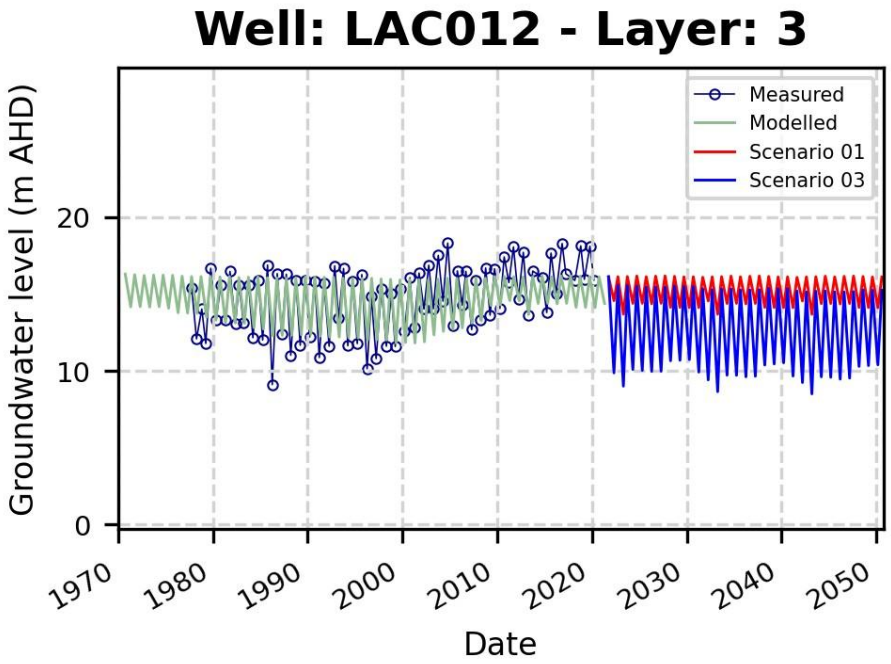
Groundwater modelling

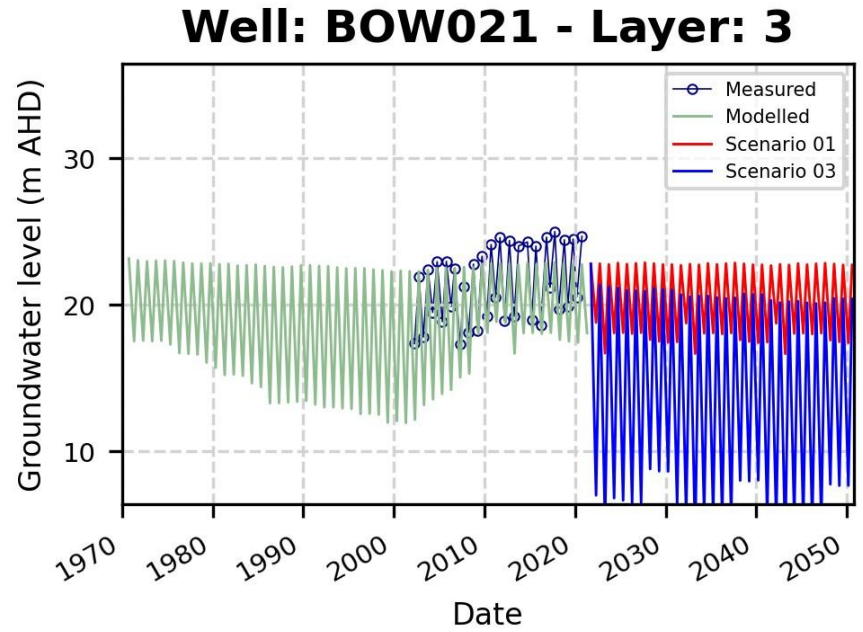
- Regional model updated
- Includes unconfined aquifer layer
- Updated extraction and observation well data
- Projections to 2050
- Two use scenarios modelled
  - Current use and current climate
  - Full use of allocation and current climate
- Additional scenario 25,000 ML to be completed

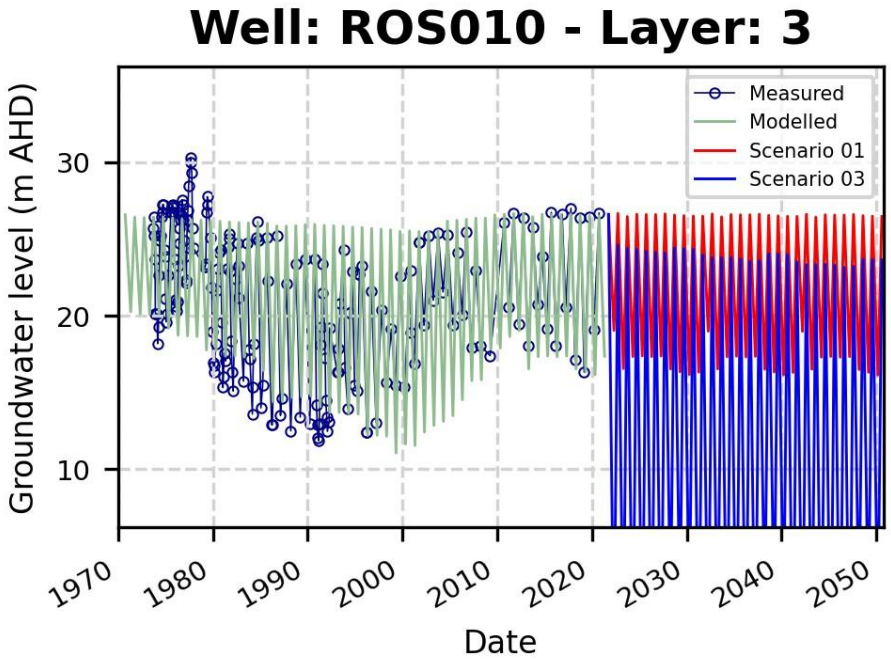


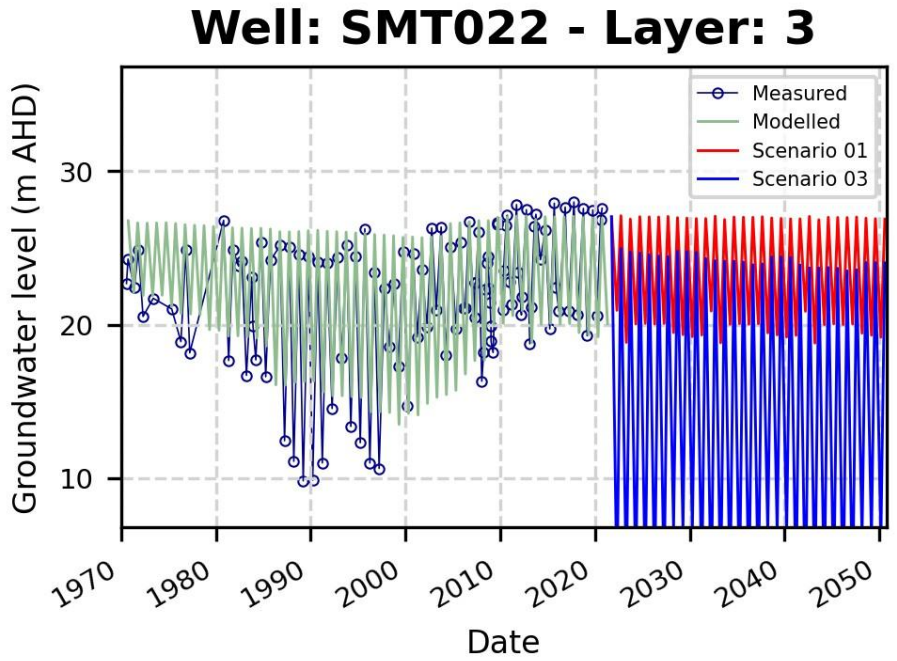
LANDSCAPE SOUTH AUSTRALIA LIMESTONE COAST

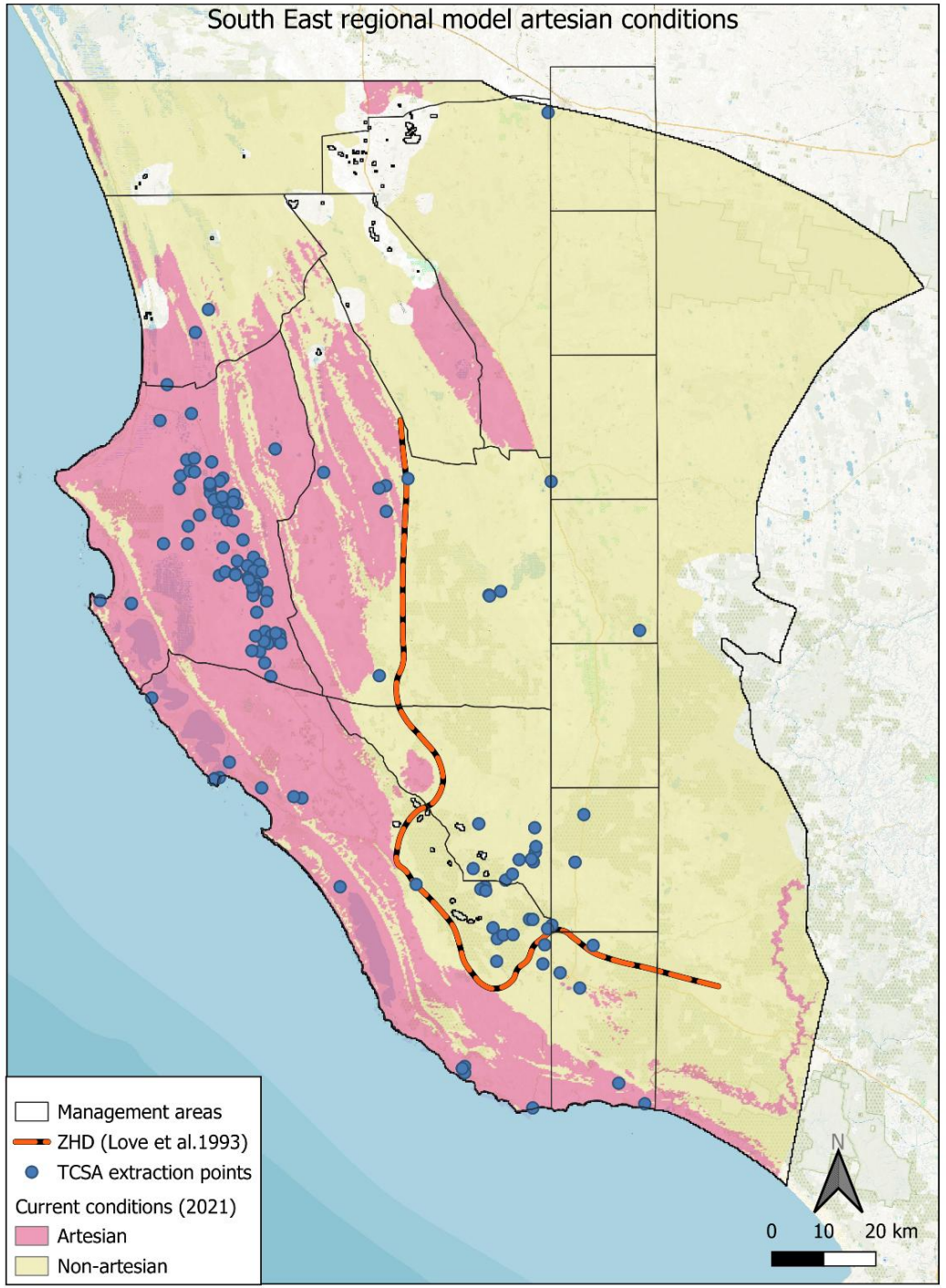
OFFICIAL

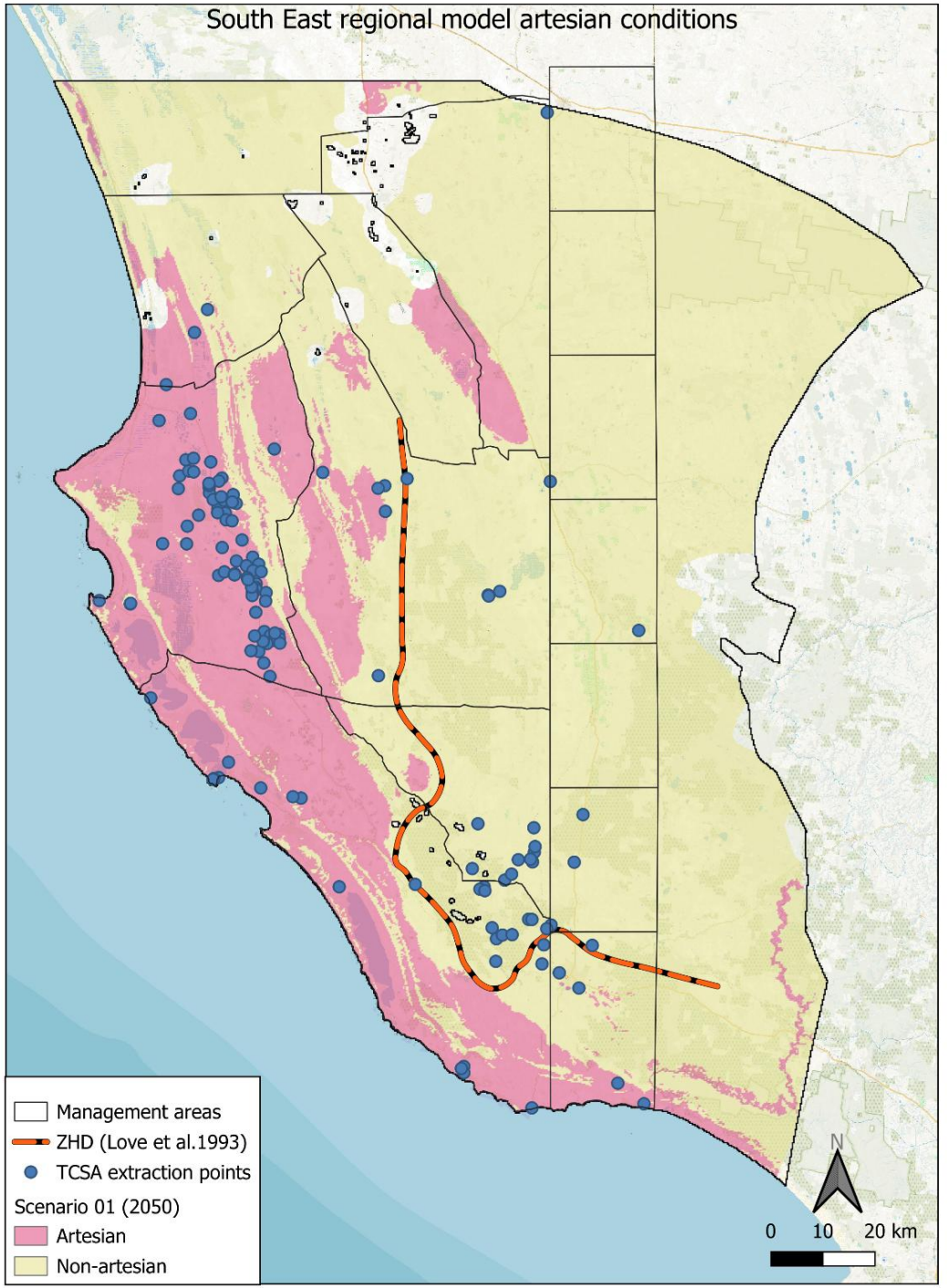

Well: LAC012 - Layer: 3
Measured
Modelled
Scenario 01
Scenario 03
Groundwater level (m AHD)
0
10
20
1970
1980
1990
2000
2010
2020
2030
2040
2050
Date


Well: BOW021 - Layer: 3
Measured
Modelled
Scenario 01
Scenario 03
Groundwater level (m AHD)
10
20
30
1970
1980
1990
2000
2010
2020
2030
2040
2050
Date

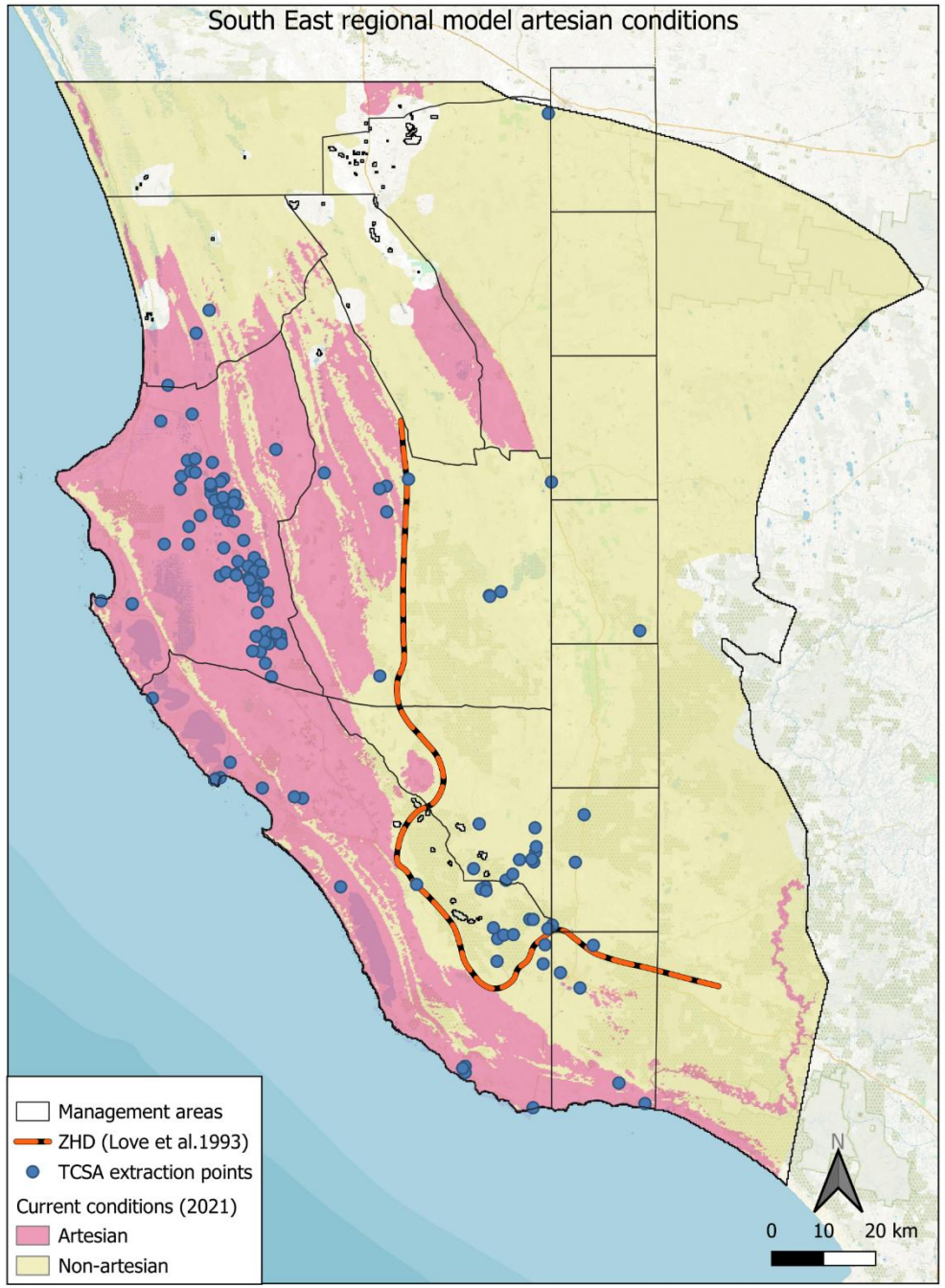

Well: ROS010 - Layer: 3
Measured
Modelled
Scenario 01
Scenario 03
Groundwater level (m AHD)
10
20
30
1970
1980
1990
2000
2010
2020
2030
2040
2050
Date

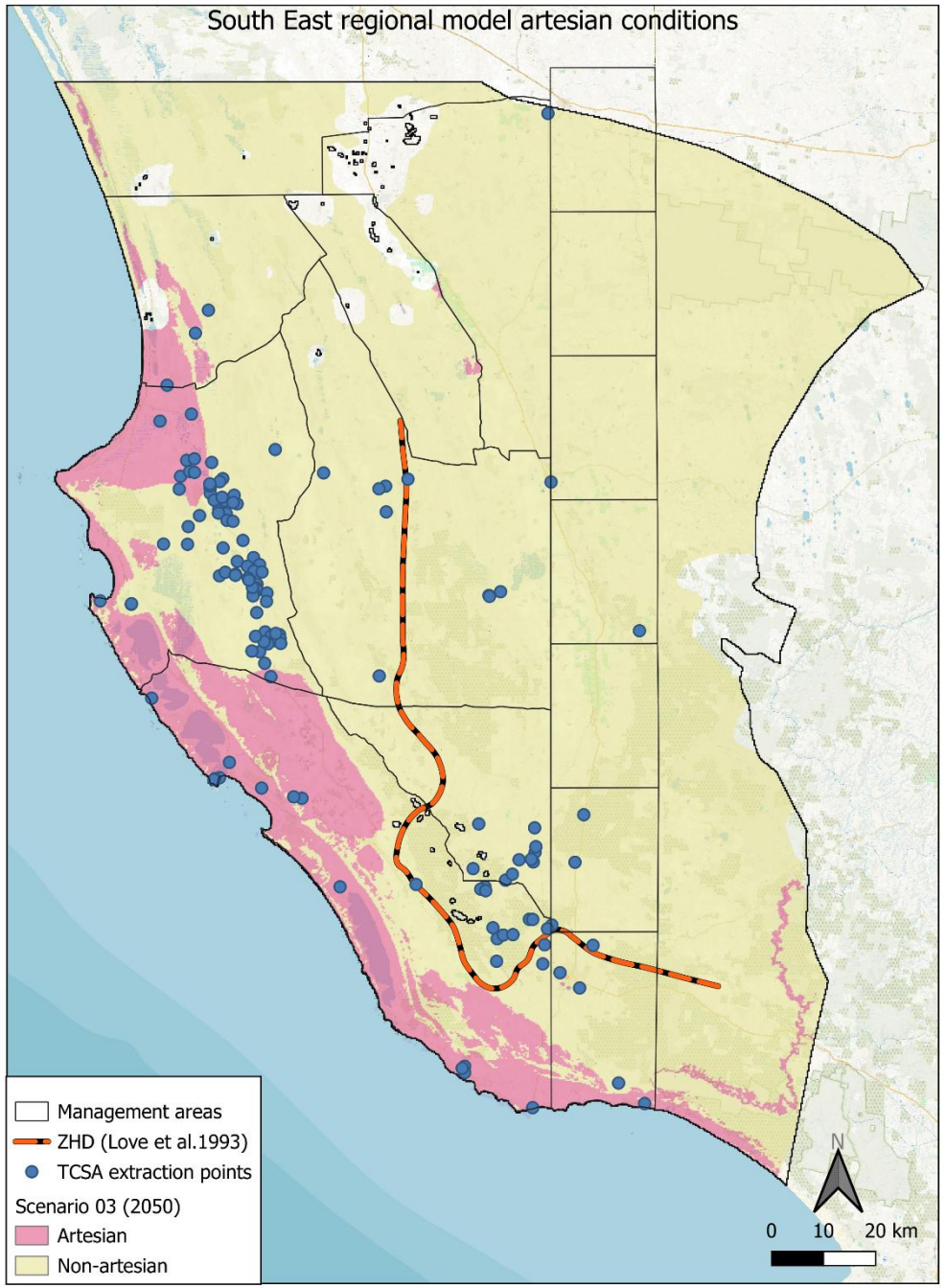

Well: SMT022 - Layer: 3
Measured
Modelled
Scenario 01
Scenario 03
Groundwater level (m AHD)
10
20
30
1970
1980
1990
2000
2010
2020
2030
2040
2050
Date


South East regional model artesian conditions
Management areas
ZHD (Love et al.1993)
TCSA extraction points
Current conditions (2021)
Artesian
Non-artesian
N
0
10
20 km


South East regional model artesian conditions
Management areas
ZHD (Love et al.1993)
TCSA extraction points
Scenario 01 (2050)
Artesian
Non-artesian
N
0
10
20 km

OFFICIAL


South East regional model artesian conditions
Management areas
ZHD (Love et al.1993)
TCSA extraction points
Current conditions (2021)
Artesian
Non-artesian
N
0
10
20 km


South East regional model artesian conditions
Management areas
ZHD (Love et al.1993)
TCSA extraction points
Scenario 03 (2050)
Artesian
Non-artesian
N
0
10
20 km

Kingston Management Area

Key concerns

- Maintaining artesian pressure
  - Stock and domestic bores
  - Irrigation bores
  - Aquifer integrity
- Hydraulic gradient
  - Transverse flow (east to west)
  - Water quality
- Maintaining gradient between the unconfined and confined aquifers
  - Water quality
- Impact of seasonal lows
  - Stock and domestic bores
- Projections with current use generally stable
- Projections with full use of allocation = loss of artesian pressure
- Current allocations ~ 125% of PAV (25,000 ML/yr)



Photo: Steve Bourne

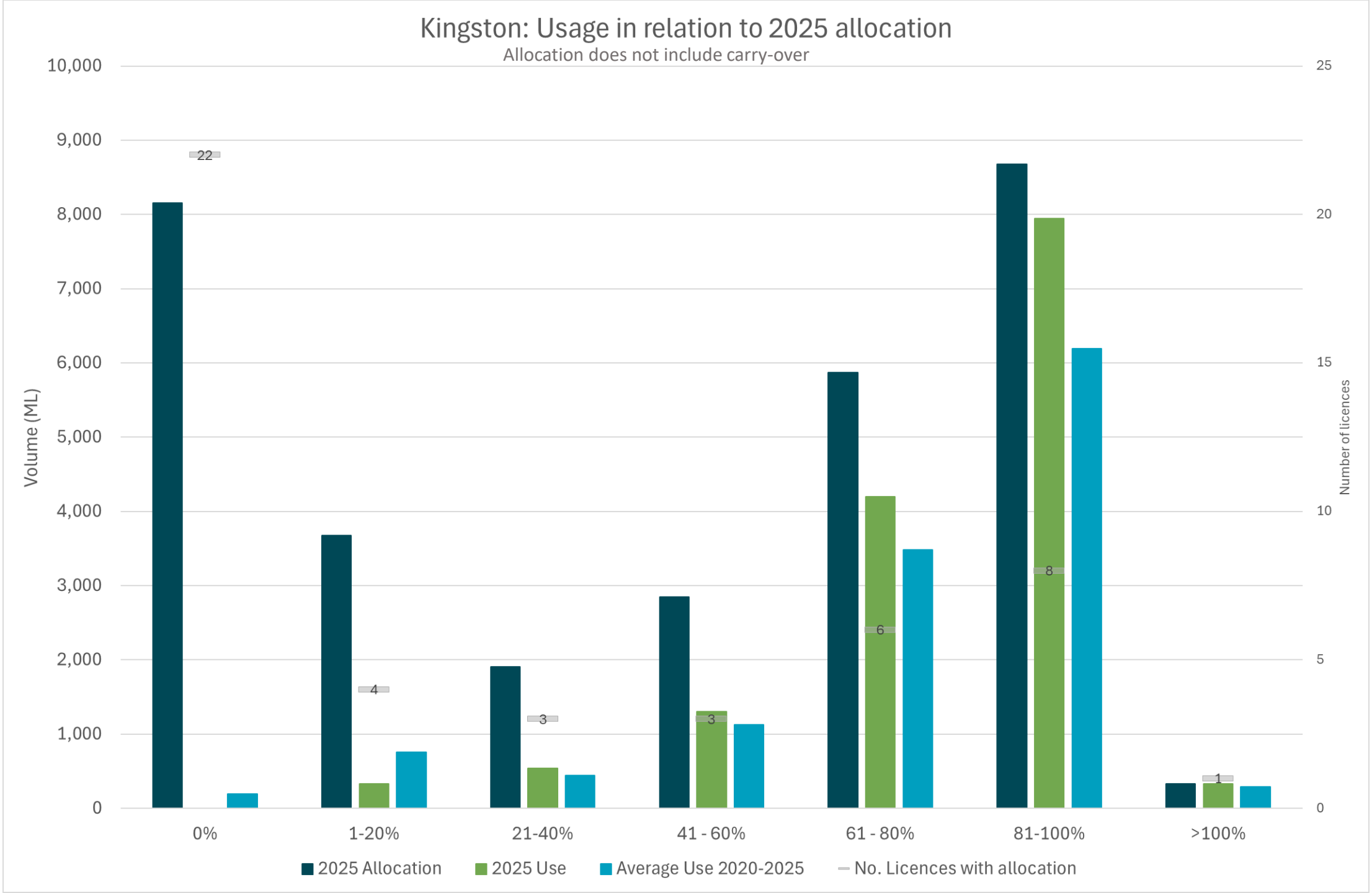
Kingston Management Area

Management Tools

- Reduction of entitlements
  - Permanent reduction of licence
  - Use to address over-use and/or over allocation
- Restrictions of allocations
  - Temporary
  - Manage measured impacts to resource
  - Needs to impact use
  - Adaptive management framework set out in Plan



LANDSCAPE SOUTH AUSTRALIA LIMESTONE COAST


Kingston: Usage in relation to 2025 allocation
Allocation does not include carry-over
Volume (ML)
Number of licences
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
25
20
15
10
5
0
22
4
3
3
6
8
1
0%
1-20%
21-40%
41 - 60%
61 - 80%
81-100%
>100%
2025 Allocation
2025 Use
Average Use 2020-2025
No. Licences with allocation

Adaptive management

Manage water use in response to the condition of the resource

- Specify an indicator of resource condition
- Set triggers and limits
- Determine management response
  - To resource condition triggers
  - To resource condition limits
  - On recovery of resource
- Set out schedule of actions (what happens when)



LANDSCAPE SOUTH AUSTRALIA LIMESTONE COAST

Kingston Management Area

Resource condition indicator

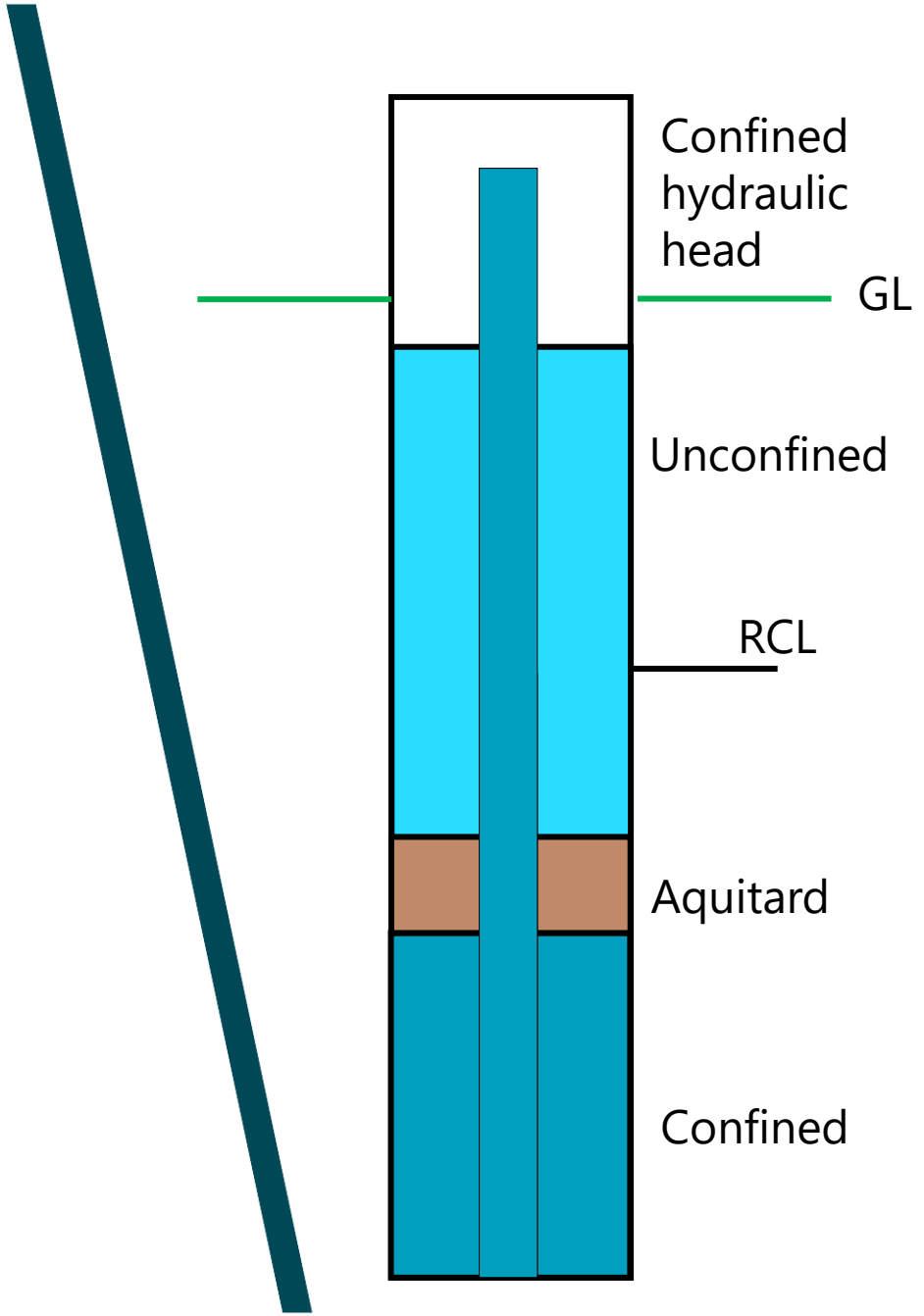
- Artesian pressure (hydraulic head)?

Resource condition limit

- Protection of artesian pressure
  - Autumn low?
  - Reference year?
  - Loss of artesian metre-age? (“artesian-ness”)?
  - Spatial extent of artesian water?

Resource condition triggers

- Determine once RCL clarified and tested



LANDSCAPE SOUTH AUSTRALIA LIMESTONE COAST

Kingston Management Area

Management response examples

- Notify licensees
- Investigate causes and spatial extent
- No transfers in
- Suspend carry-over
- Restrictions (percentages required to impact use)

- Considerations:
  - Conditions under which restrictions are lifted
  - When to lift restrictions to maintain recovery and avoid risk of immediate decline
  - Time needed for recovery is proportional to time taken to implement responses


Photo: Sue Botting

LANDSCAPE SOUTH AUSTRALIA LIMESTONE COAST

Kingston Management Area

Next steps

- Review modelling outputs from different use scenarios
- Assess artesian hydraulic head pressure conditions under each scenario
- Assessment of stock and domestic wells
- Scope out adaptive management options for discussion
- Further consultation with Kingston water users re adaptive management framework
- Model testing of adaptive management framework

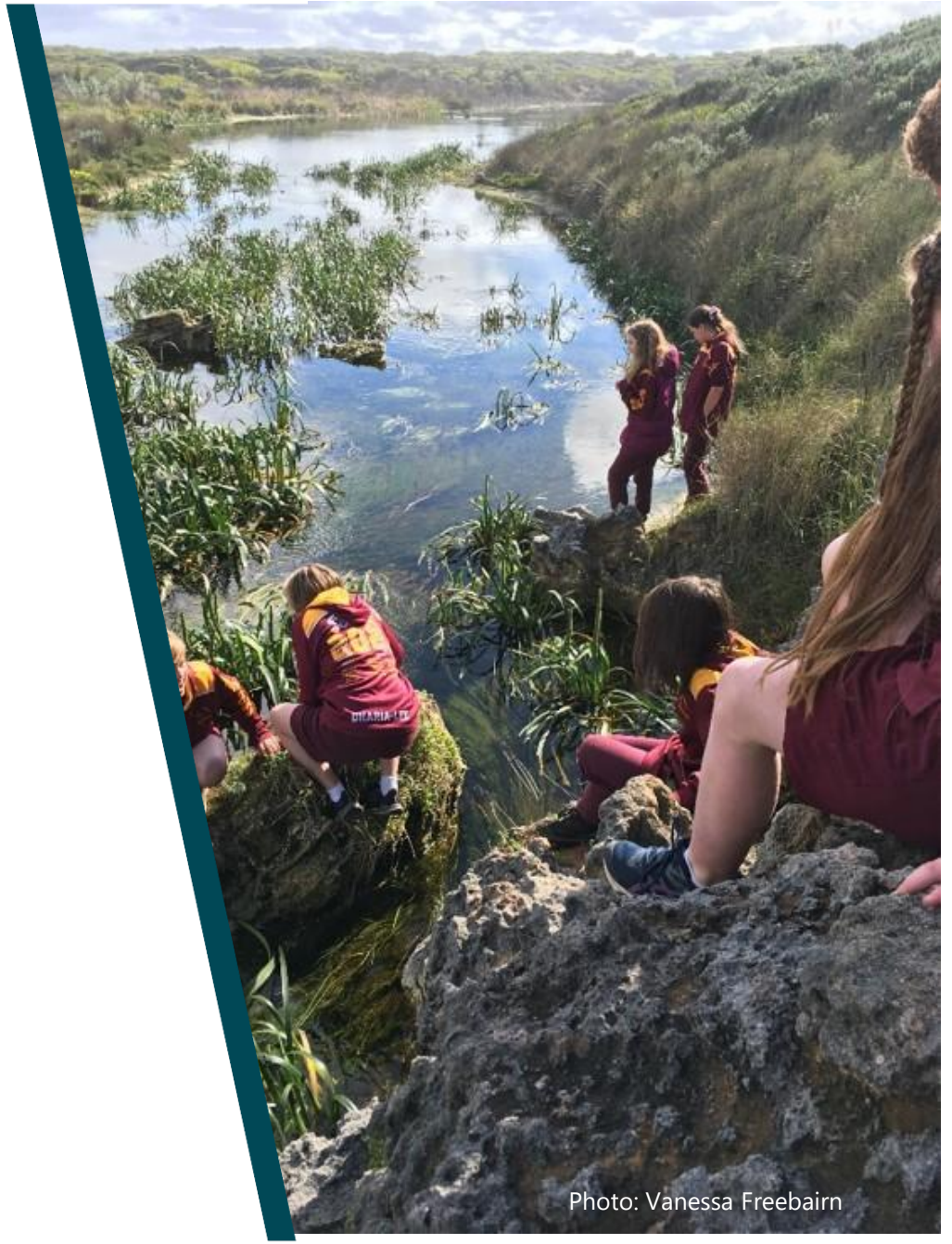


Photo: Vanessa Freebairn

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LANDSCAPE SOUTH AUSTRALIA LIMESTONE COAST

