Lower Limestone Coast Water Allocation Plan Amendment

Acceptable impact

Groundwater modelling

NOTE: This presentation has additional note pages added to assist those who didn't attend a session understand the content. These pages are clearly labelled as note pages and reference the slide that they relate to. They reflect the key messages for the slide but may not reflect everything presented due to questions or points of interest raised in a session.

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Acknowledgement of Country



The Limestone Coast Landscape Board acknowledges and respects the traditional custodians of the ancestral lands and waters of the region. We acknowledge elders past and present and we respect the deep feelings of attachment and relationship of Aboriginal peoples to country.

The Limestone Coast Landscape Board is committed to walking with First Nations to manage our landscape.

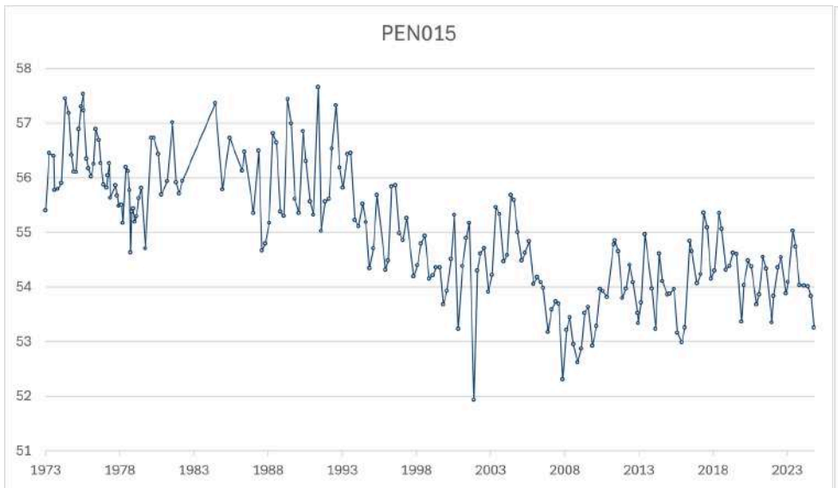
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Process update

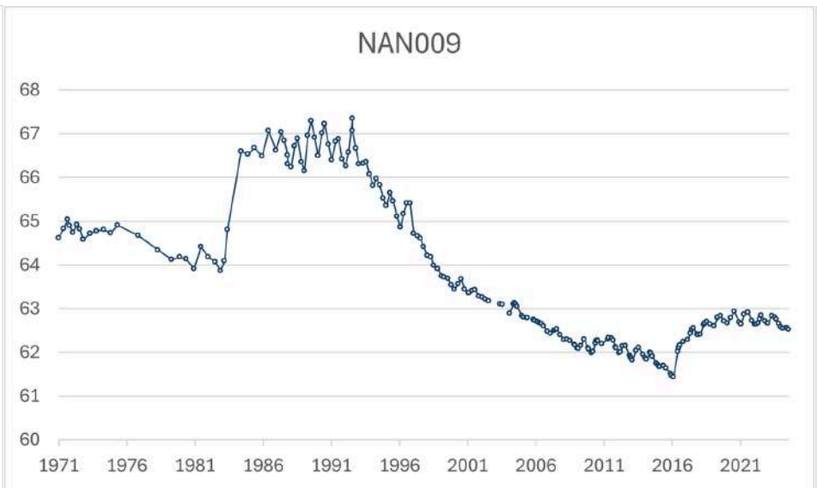
- Plan was reviewed 2022-23 with a decision to amend
- Amendment started March 2024, expected to run to end of 2027
- Last year we introduced some preliminary ideas for licensing system change:
  - Entitlement vs allocation
  - Management zones
  - Consumptive pools
  - Water classes
- Since then:
  - Continuing to develop these concepts
  - Working on guiding principles for the revised Plan
  - Working through methodology for acceptable impact and adaptive management
  - No policy revision or new policy element has been finalised

Dry times

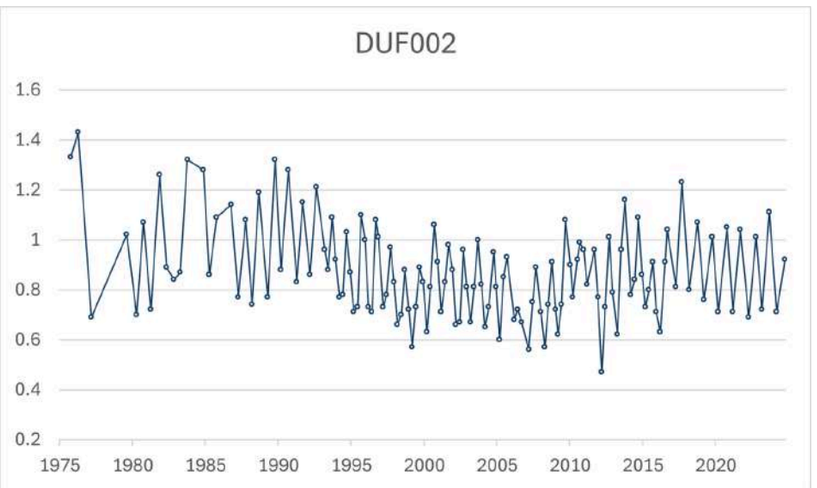
- Region experiencing dry times
- Observation well data available online
  - Different trends
  - Some showing limited recovery at spring reading in 2024



Under irrigation



Under forestry



Little to no extraction

Why we're here

- Decisions on water allocation benefit from community and stakeholder input
- Opportunity to:
  - Share different perspectives
  - Solve problems
  - Inform decisions that affect the everyone
- Revising sustainable allocation is within scope of the process
  - Revising current allocation using a different approach
- There will be some measure of conflict
  - When respectful of other views, it can serve to balance communities' ecological, economic and social needs

Sustainable allocation

- Global challenge
  - Historical over allocation
  - Overuse
  - Legislation and policy improvement needed
  - Impacts from a changing and more variable climate



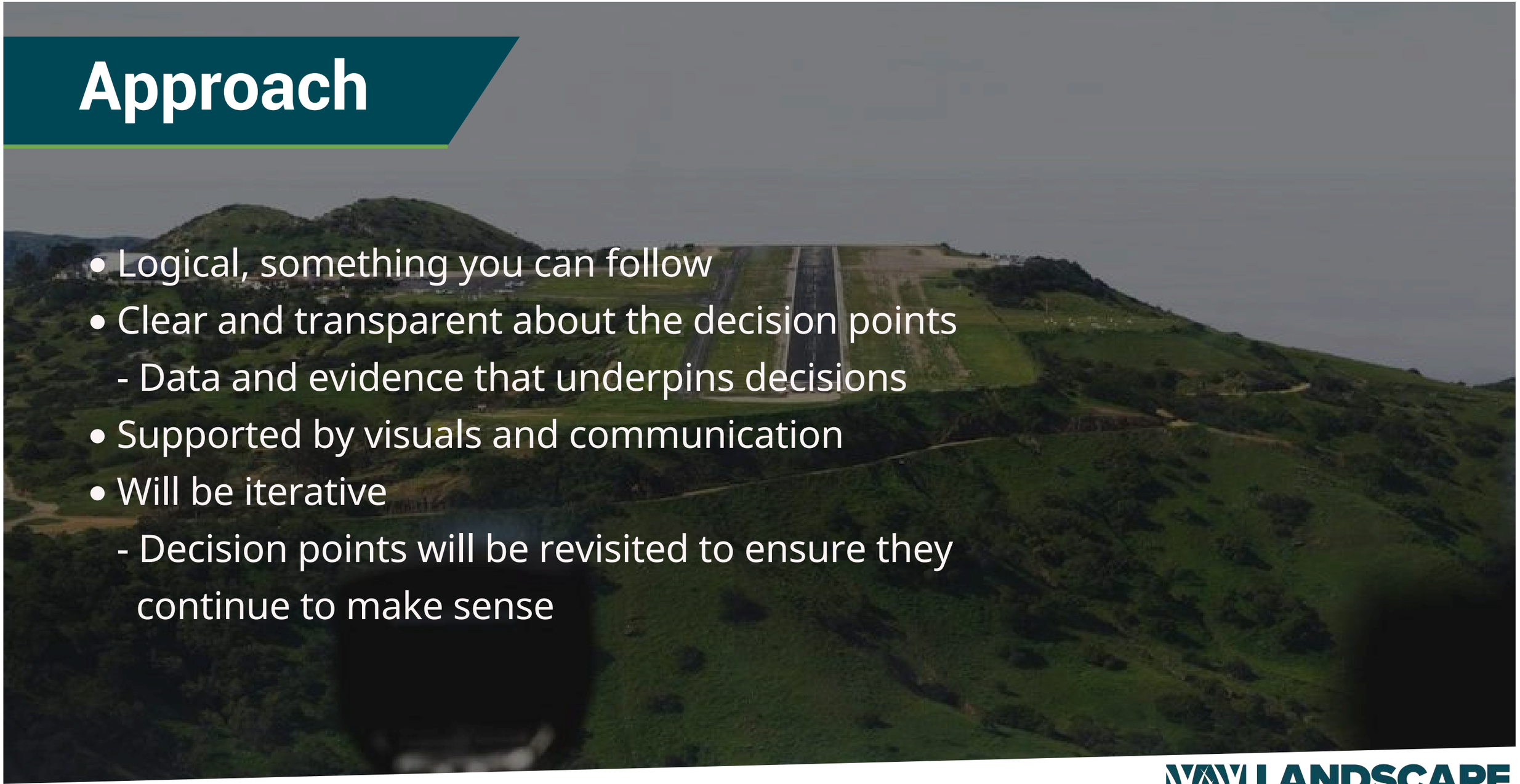
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Acceptable impact

- Extraction of groundwater creates a change in the water resource
  - Creates an impact on users and systems dependent on the resource
  - It's not whether the impact will occur, the question is the location, magnitude and timing of impacts
- Range of impacts:
  - Depletion of storage (mining) of the aquifer
  - Increasing groundwater salinity
  - Reduced availability of groundwater to dependent ecosystems
  - Loss of production for consumptive users

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Approach



- Logical, something you can follow
- Clear and transparent about the decision points
  - Data and evidence that underpins decisions
- Supported by visuals and communication
- Will be iterative
  - Decision points will be revisited to ensure they continue to make sense

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Starting point

- Work through addressing historical over allocation
  - In alignment with:
    - Legislation
    - National policy
    - Industry sustainability frameworks
  - Majority view seems to oppose mining of the resource
- Historical over allocation
  - Ongoing declining trend: current climate, current use, use at full allocation
  - Identify where this occurs, pathways to stabilisation
  - Reductions are the primary mechanism
    - Alignment with operation of the Plan

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Notes to accompany: Slide 10

The next page:

- Provides a first look at where ongoing declines in groundwater levels may be occurring at:
  - Current climate (10 years of climate to 2022)
  - Current use (average use over life of Plan)
- No decisions have been made based on this, it is a first pass look for information purposes only
- Unconfined management areas in red have observation wells that show an ongoing declining trend in groundwater levels

Ongoing decline

Current climate

Current use

Bangham	Donovans	Joanna	Mayurra	Riddoch	Western Flat
Beeamma	Duffield	Joyce	Minecrow	Rivoli Bay	Woolumbool
Benara	Fox	Kennion	Monbulla	Ross	Young
Blanche Central	Frances	Killanoola	Moorak	Short	Zone 2A
Bool	Glenburnie	Kongorong	Mount Benson	Smith	Zone 3A
Bowaka	Glenroy	Lacepede	Mount Muirhead	Spence	Zone 5A
Bray	Grey	Lake George	Moyhall	Stewarts	
Coles	Hacks	Landseer	Murrabinna	Struan	
Comaum	Hindmarsh	Lochaber	Myora	Symon	
Compton	Hynam East	Macdonnell	Ormerod	Townsend	
Conmurra	Hynam West	Marcollat	Peacock	Waterhouse	

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Notes to accompany: Slide 11

The next page:

- Provides a first look at where ongoing declines in groundwater levels may be occurring at:
  - Current climate (10 years of climate to 2022)
  - Use at full allocation
- No decisions have been made based on this, it is a first pass look for information purposes only
- Unconfined management areas in red have observation wells that show an ongoing declining trend in groundwater levels

Ongoing decline

Current climate

Current allocation (full use of allocation)

Bangham	Donovans	Joanna	Mayurra	Riddoch	Western Flat
Beeamma	Duffield	Joyce	Minecrow	Rivoli Bay	Woolumbool
Benara	Fox	Kennion	Monbulla	Ross	Young
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Notes to accompany: Slide 12

The next page:

- Provides a first look at where ongoing declines in groundwater levels may be occurring at:
  - Current climate (10 years of climate to 2022)
  - Current use (average use over life of the Plan)
  - Use at full allocation
- No decisions have been made based on this, it is a first pass look for information purposes only
- Confined management areas in red have observation wells that show an ongoing declining trend in groundwater levels
- Consideration will need to be given to the fact that the confined aquifer doesn't recharge like the unconfined aquifer

Ongoing decline

Current climate

Current use

Current allocation (full use of allocation)

Current use x current climate	Current allocation (full use) x current climate
Kalangadoo	Kalangadoo
Kingston	Kingston
Lucindale	Lucindale
Millicent	Millicent
Taratap	Taratap
Wirrega	Wirrega
Zone 1A	Zone 1A
Zone 2A	Zone 2A
Zone 3A	Zone 3A
Zone 4A	Zone 4A

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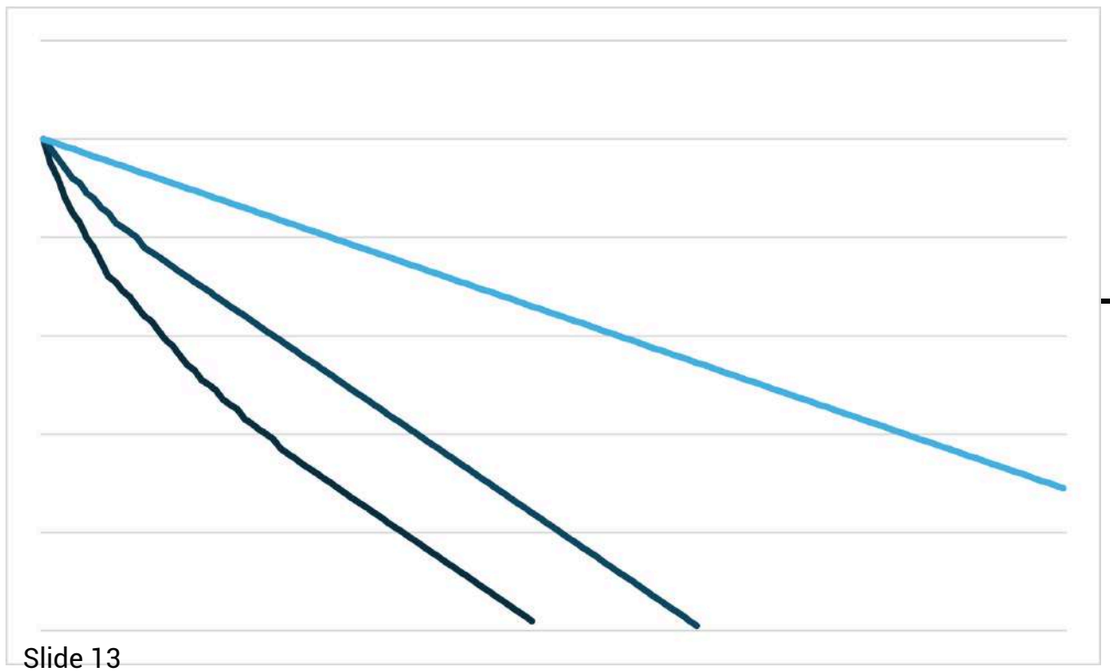
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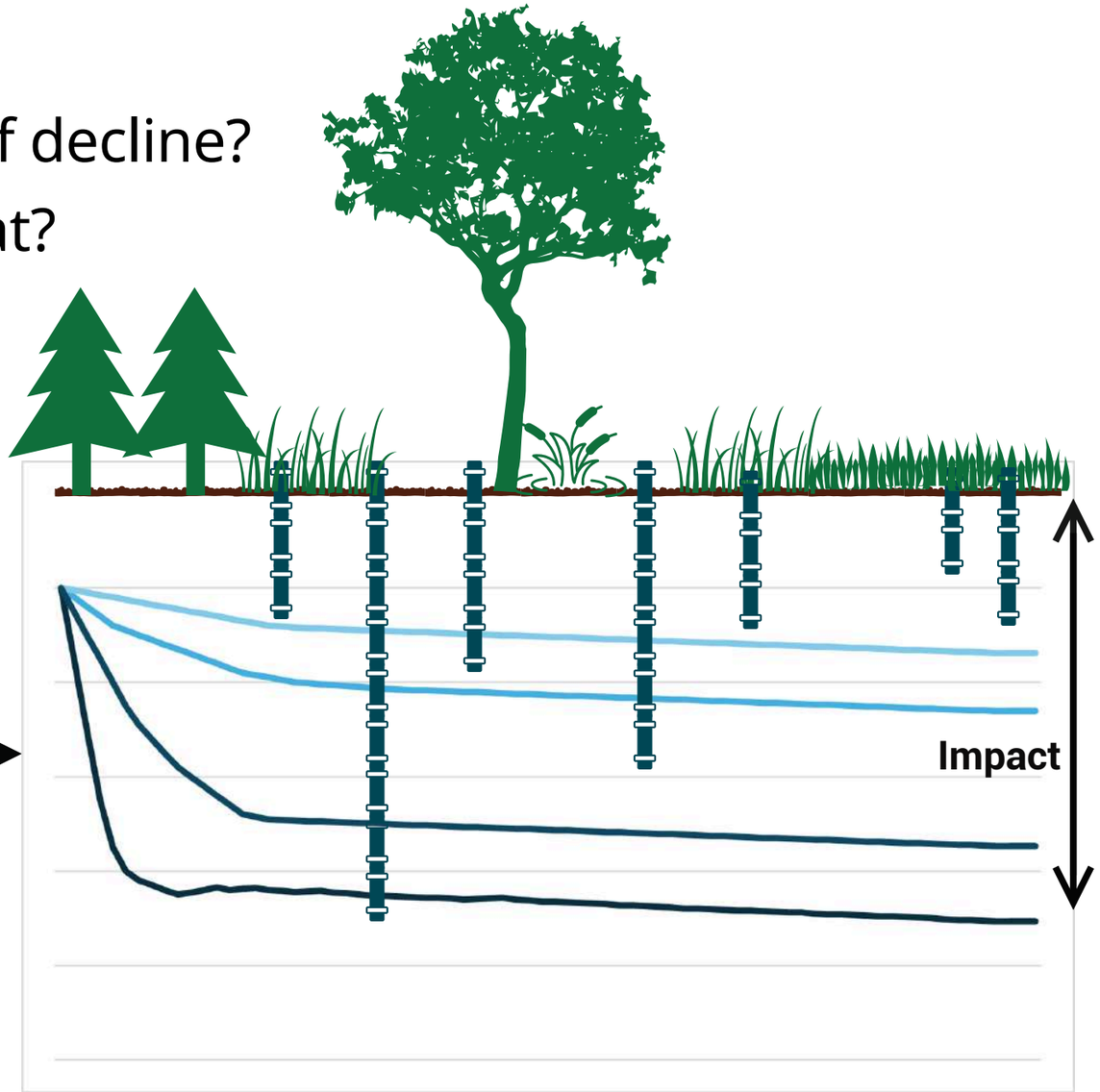
The next page:

- Is provided to assist in understanding acceptable impact, there is no real data in the example provided, it is purely conceptual
- Ongoing declining trends in groundwater levels will look different across the prescribed wells area. Some will be steep declines, others will be slow
- There is a need to work through how to achieve a stabilisation of the ongoing declining trend, how to find a new level
- Stabilisation can occur at different depths to groundwater. There will be different impacts of stabilising deeper vs shallow
- Impacts could include loss of wetlands, deepening of bores and changes in water quality
- There is no one right level or answer, it is a question of the impacts we accept at the new level

Decline to stabilisation

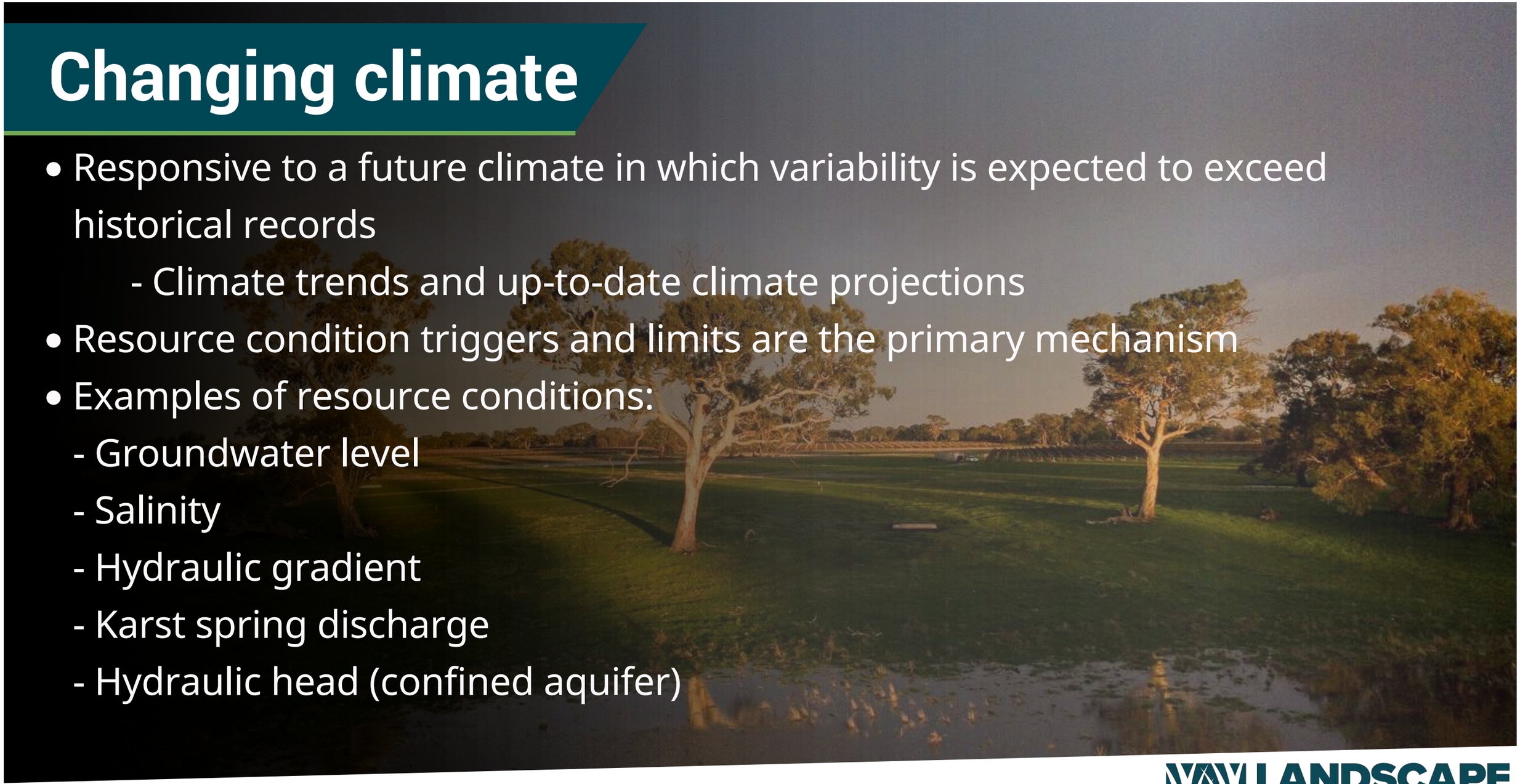
- What is required to achieve stabilisation of decline?
- At what level does groundwater stabilise at?
- What are the impacts of that new level?





Changing climate

- Responsive to a future climate in which variability is expected to exceed historical records
    - Climate trends and up-to-date climate projections
- Resource condition triggers and limits are the primary mechanism
- Examples of resource conditions:
    - Groundwater level
    - Salinity
    - Hydraulic gradient
    - Karst spring discharge
    - Hydraulic head (confined aquifer)



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Notes to accompany: Slide 15

The next page:

- Provides the trigger in the Plan as an example of a trigger
- The Plan does not have an action associated with this trigger
- The Plan does not provide sufficient information to analyse whether the trigger has been exceeded
- The analysis provided assumes how it could have been assessed
- Unconfined management areas in red have an observation well that has exceeded the trigger in the life of the Plan

Trigger

The trigger is considered to have been exceeded when there is an average water level decline of greater than 0.1 metres/year over the preceding five years

Bangham	Donovans	Joanna	Mayurra	Riddoch	Western Flat
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Triggers and limits

- Protect the resource in response to:
  - Climate variability
  - Long term hotter, dryer climate trend
- Clearly layout what happens when
- Example actions associated with a trigger:
  - Notification and investigation
  - Limit trade or returning trade
  - Restrictions or lifting restrictions
- Example actions associated with a limit:
  - Restrictions
  - Review of Plan
- Triggers and limits may need to be hit for consecutive years before an action results

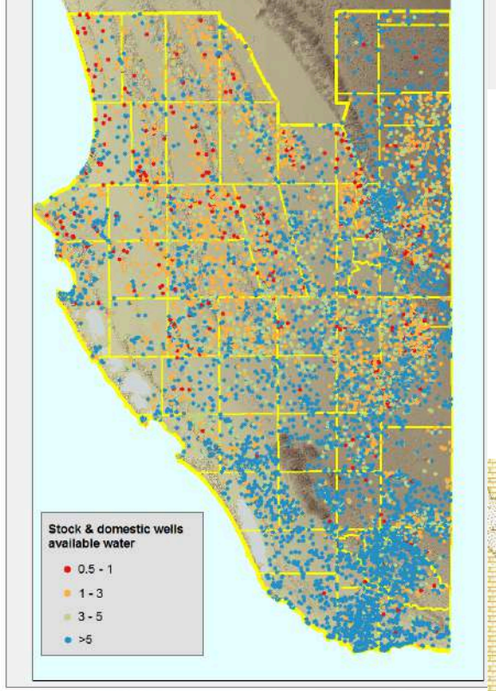
The tools

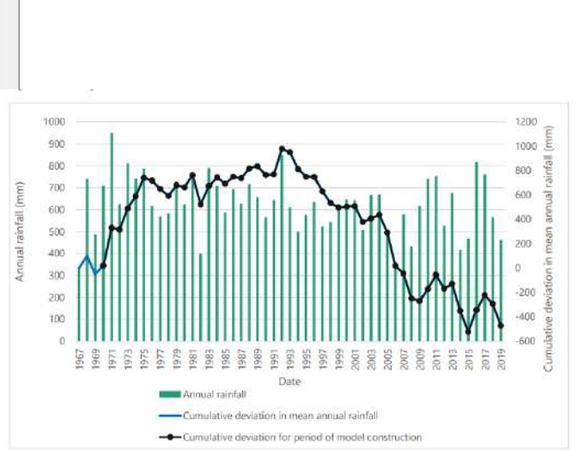
- Monitoring
- Water Observations From Space (WOfS)
- Allocation and use
- Climate projections
- Feedback, local knowledge, stakeholder insights
- Groundwater models
  - Simplification of a complex reality
  - Model dynamic processes
  - Helps us understand the impacts
  - Test scenarios
  - Doesn’t give us the ‘right’ answer

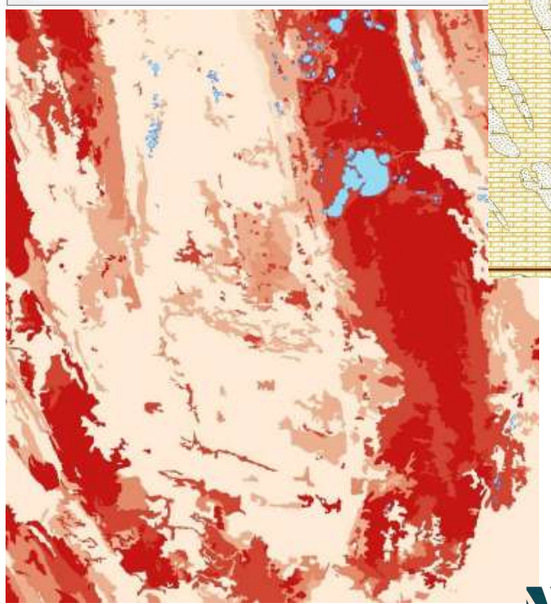
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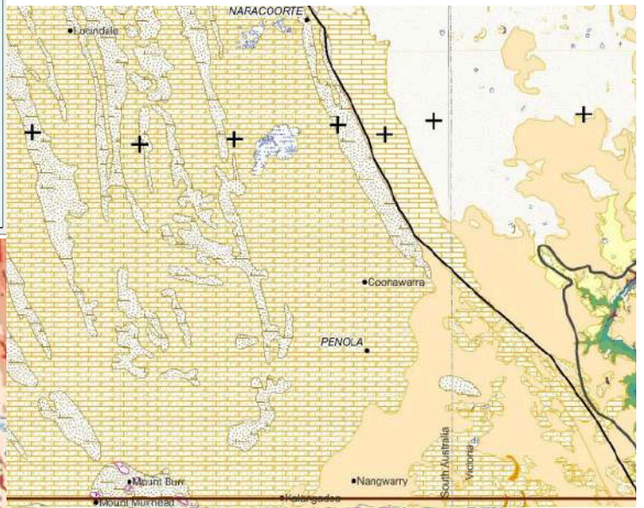
Groundwater modelling

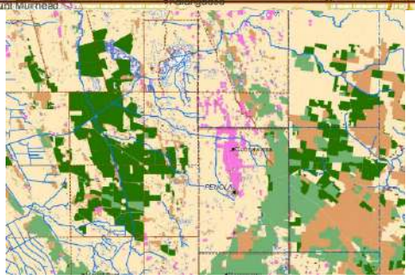
- Gather data:
  - Rainfall
  - Drillhole data
  - Monitoring data
  - Allocation, pumping data, recharge interception
  - Geophysical data
  - Geology/lithology
  - Water quality
  - Digital elevation - topography
  - Recharge calculations
  - Regional flows from Victoria
  - Discharge to coast
  - Evapotranspiration
  - Drains, wetlands, groundwater dependent ecosystems
  - Previous reports











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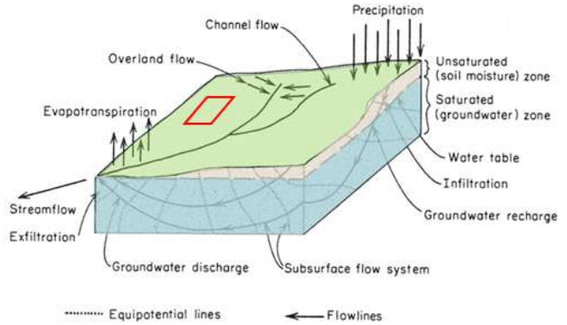
Notes to accompany: Slide 19

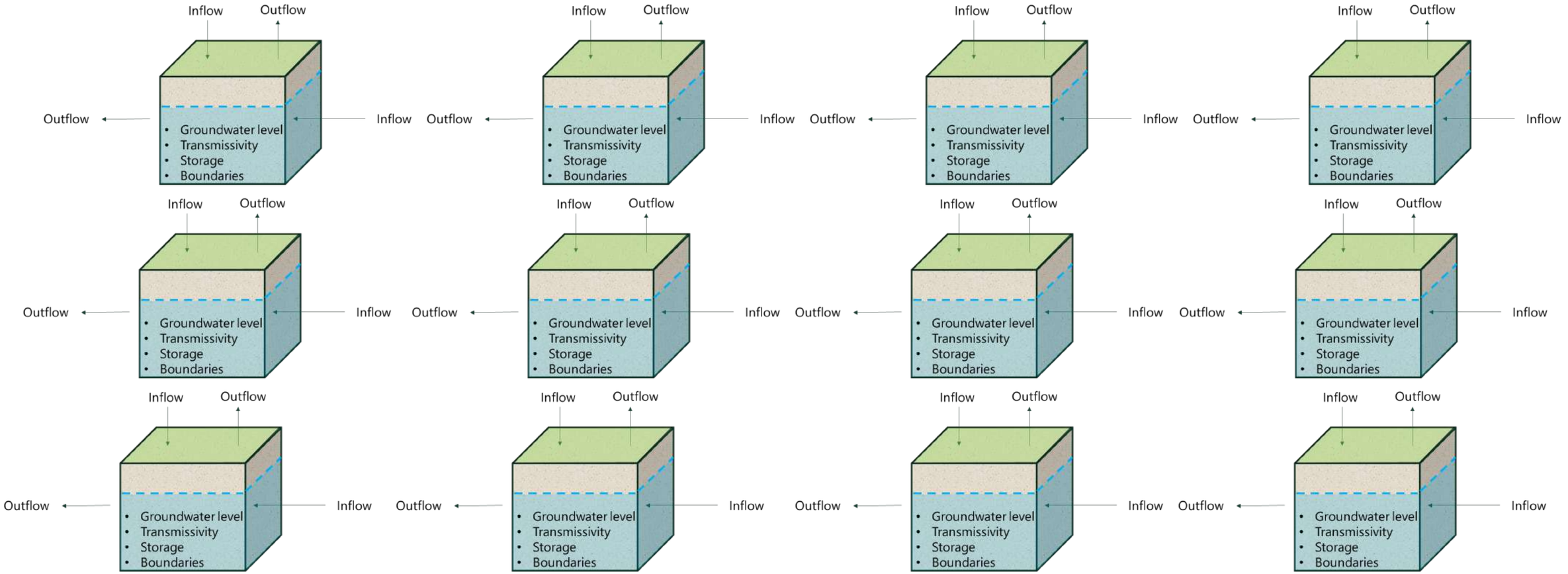
The next page:

- Provides a simplistic overview of how groundwater models work
- A model area is chosen, this can be small or large, depending on the data available and the questions being explored
- The model area is then broken down into 3D cubes. Size again can vary depending on the data available and the questions being explored
- Data is then applied to each cube - what is known about that area
- When the model runs, what happens in one cube then impacts the cubes beside it - ultimately modelling the dynamic processes playing out as water is removed from the system until it finds a new level

Groundwater modelling

Model area:

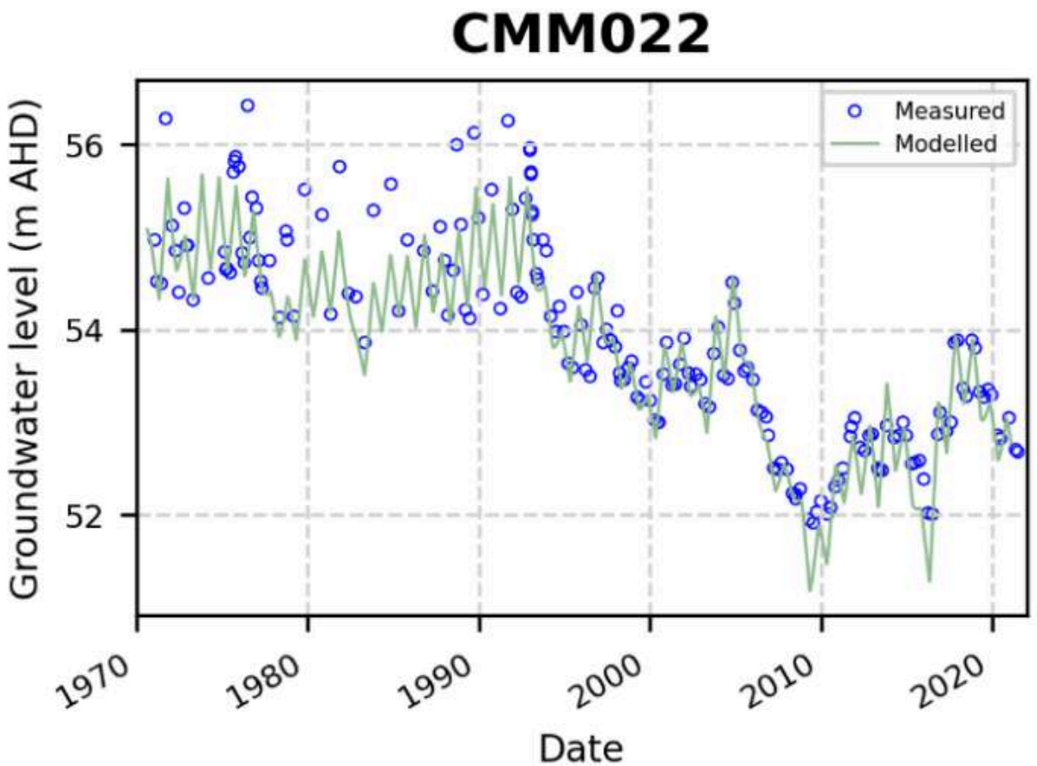


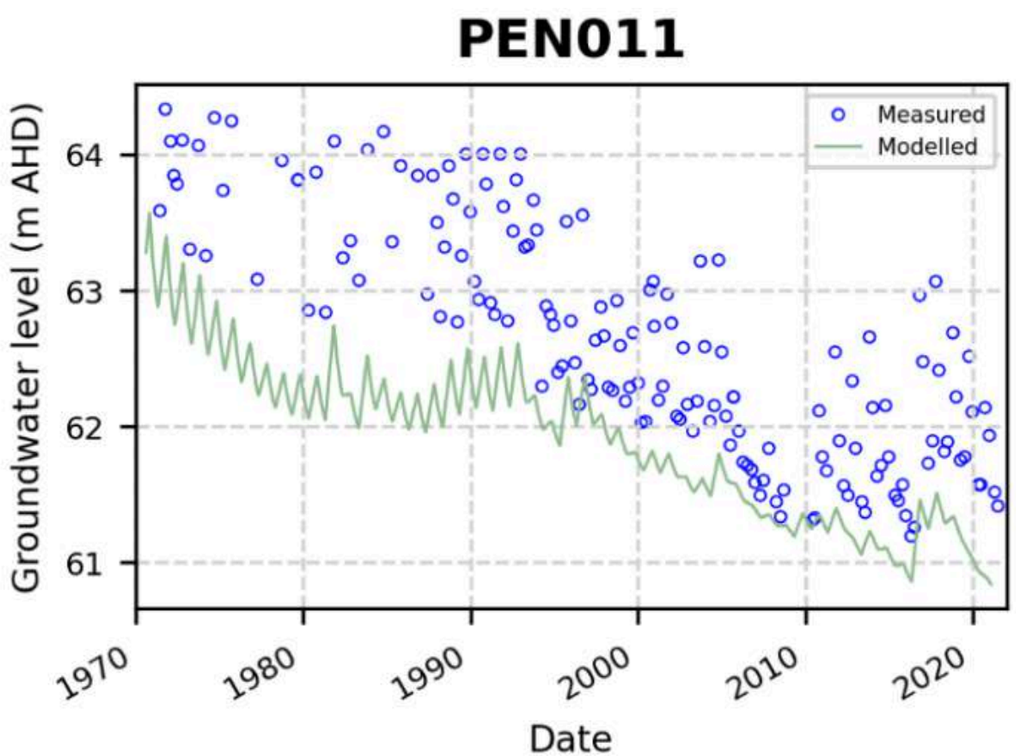


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Calibration

- Compare modelled outputs with actual data





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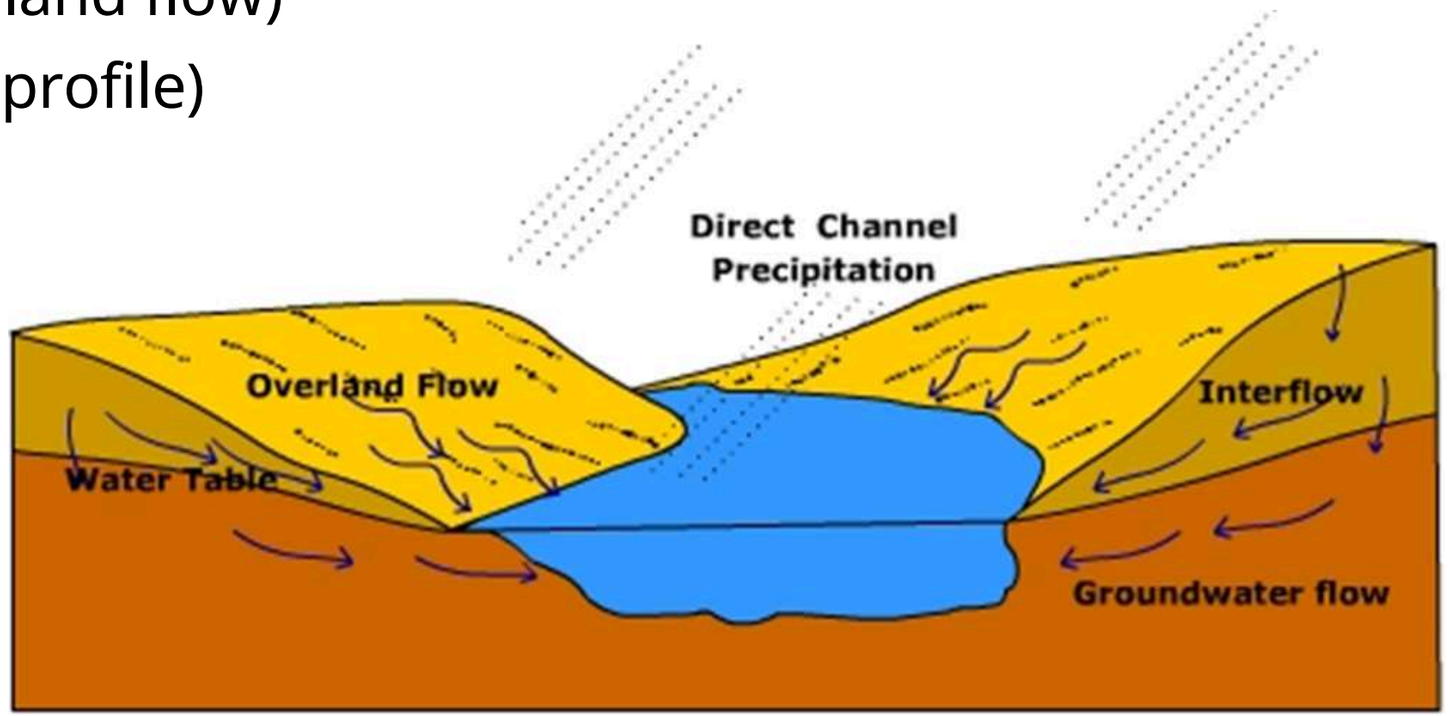
But what about the drains?

- Responsibility of the South Eastern Water Conservation and Drainage Board
- Purpose:
  - Reduce flooding and waterlogging
  - Manage salinity
  - Protecting highly valued natural environments



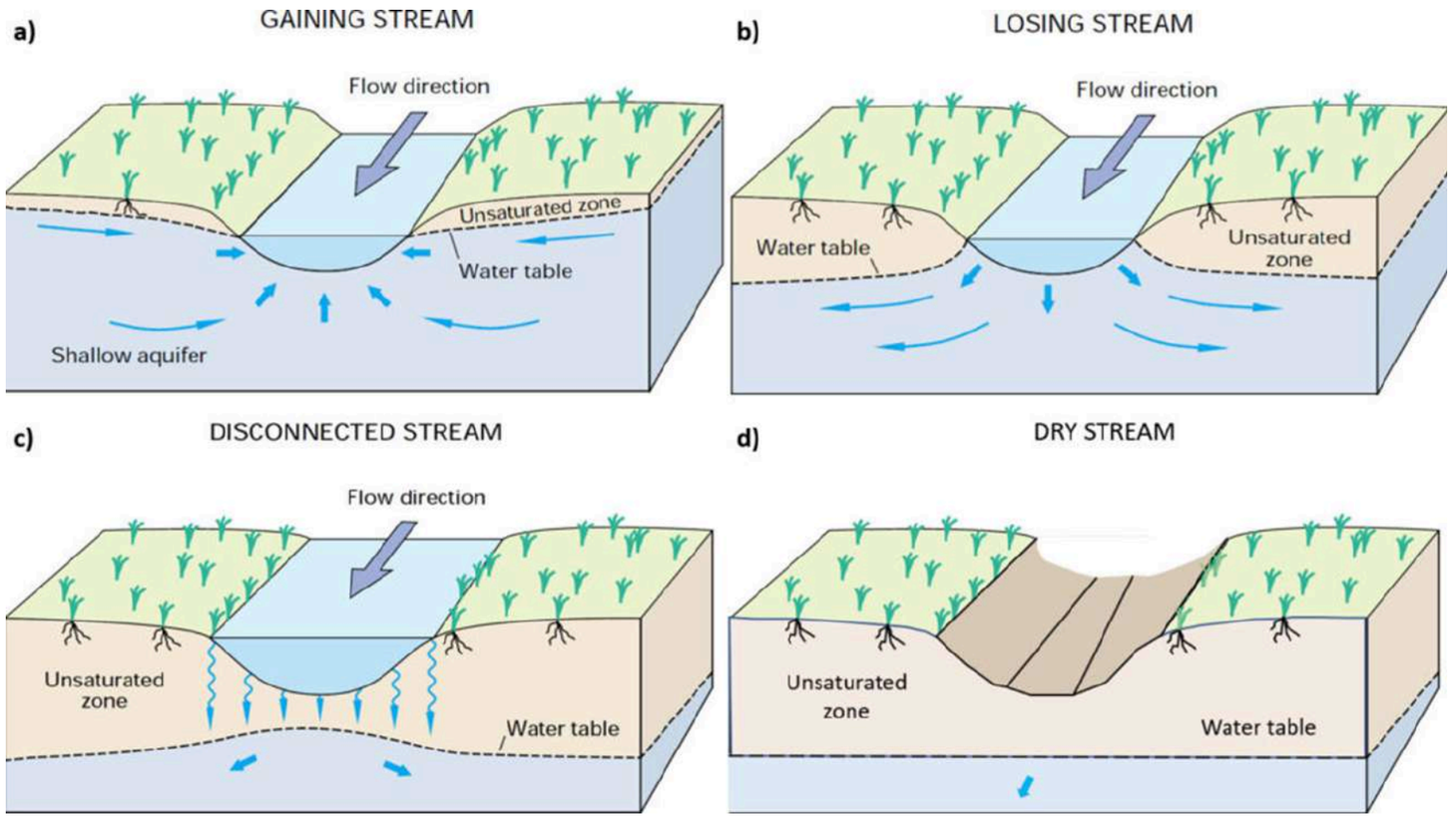
Drain function

- Drains function like streams
- Flow is driven by three sources:
  - Surface water run-off (overland flow)
  - Interflow (through the soil profile)
  - Groundwater baseflow

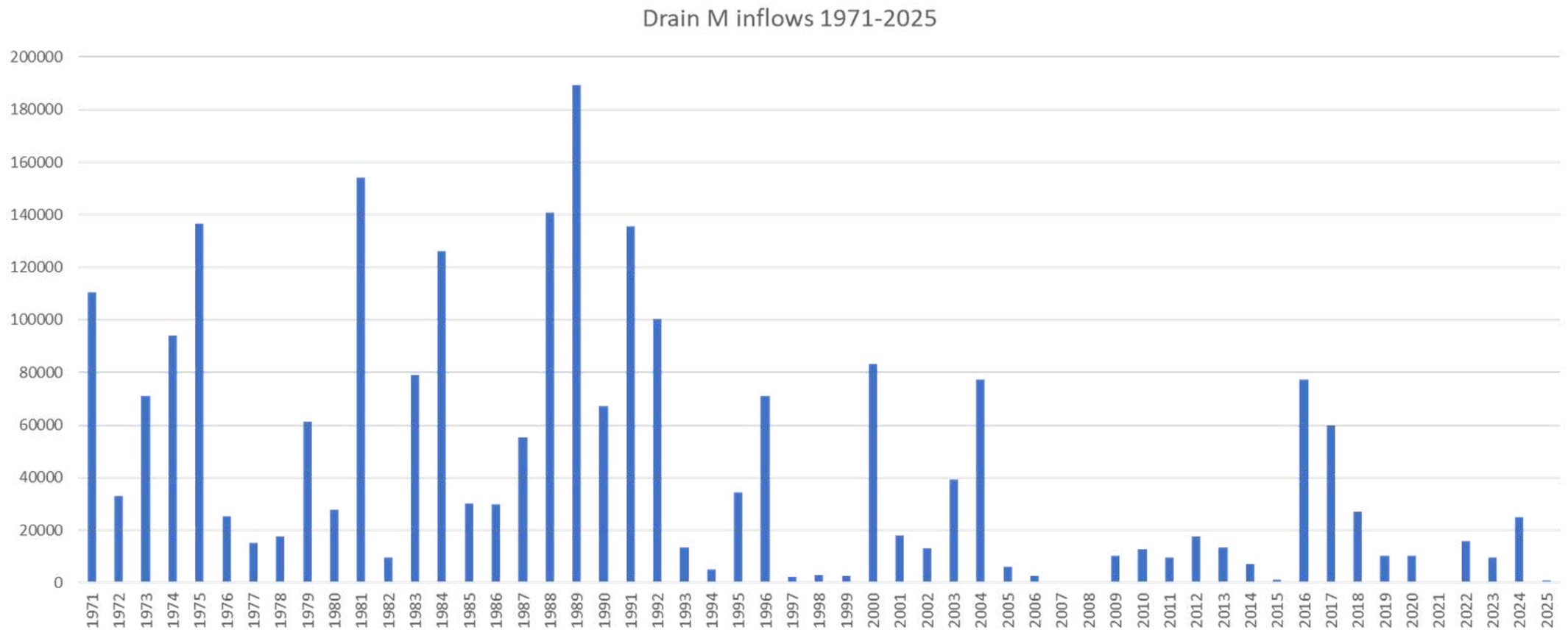


Drain function

- Hotter, dryer climate
- Declining groundwater levels
- Change in relationship between surface water and groundwater
- Transition from gaining to losing system



Flows



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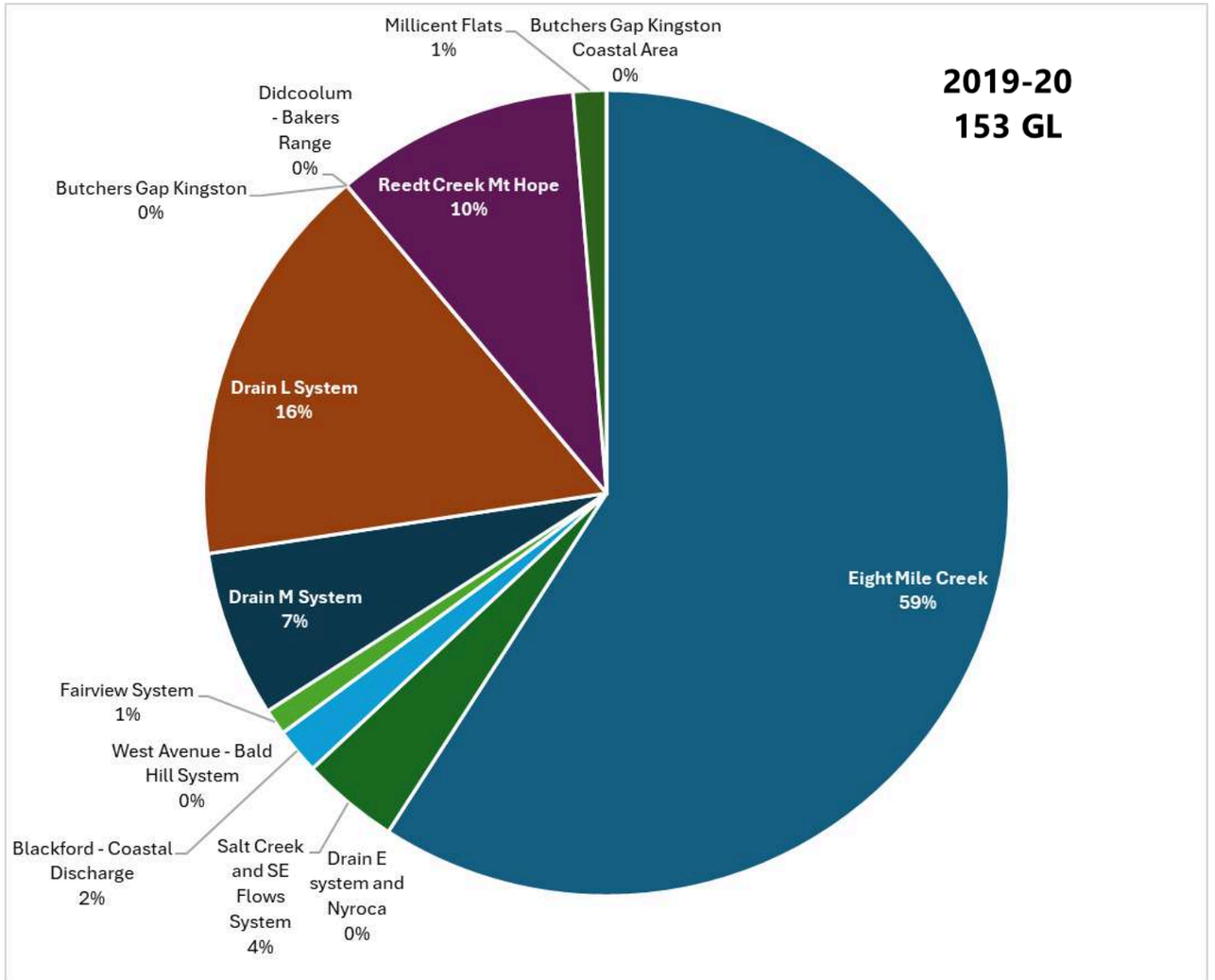
Flows

Drains:

- ~207 GL - 10 year average
- ~165 GL - 5 year average
- ~83 - 110 GL from Eight Mile Creek
- Leaves ~55 GL – 82 GL
- Quality?
- Commitments: ~150 GL

Groundwater:

- Used: ~512 GL
- Unused: ~446 GL
- Total allocation: 958 GL



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Pathways

- From a water security perspective pathways for alternative water resources, such as drain water, should be investigated
- Likely place based solutions for certain circumstances
  - Not large scale opportunities
- Some projects underway:
  - Lake Hawdon North
  - Karst Springs
- Insufficient credible pathways to influence amendment process



Next steps

- Continue to develop starting decision points for acceptable impact to test with stakeholders
- Provide some further information on how the consumptive pools might work and get feedback
- One-on-one sessions available through April and May

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