

# Groundwater Dependent Ecosystems

<<GDEs>>

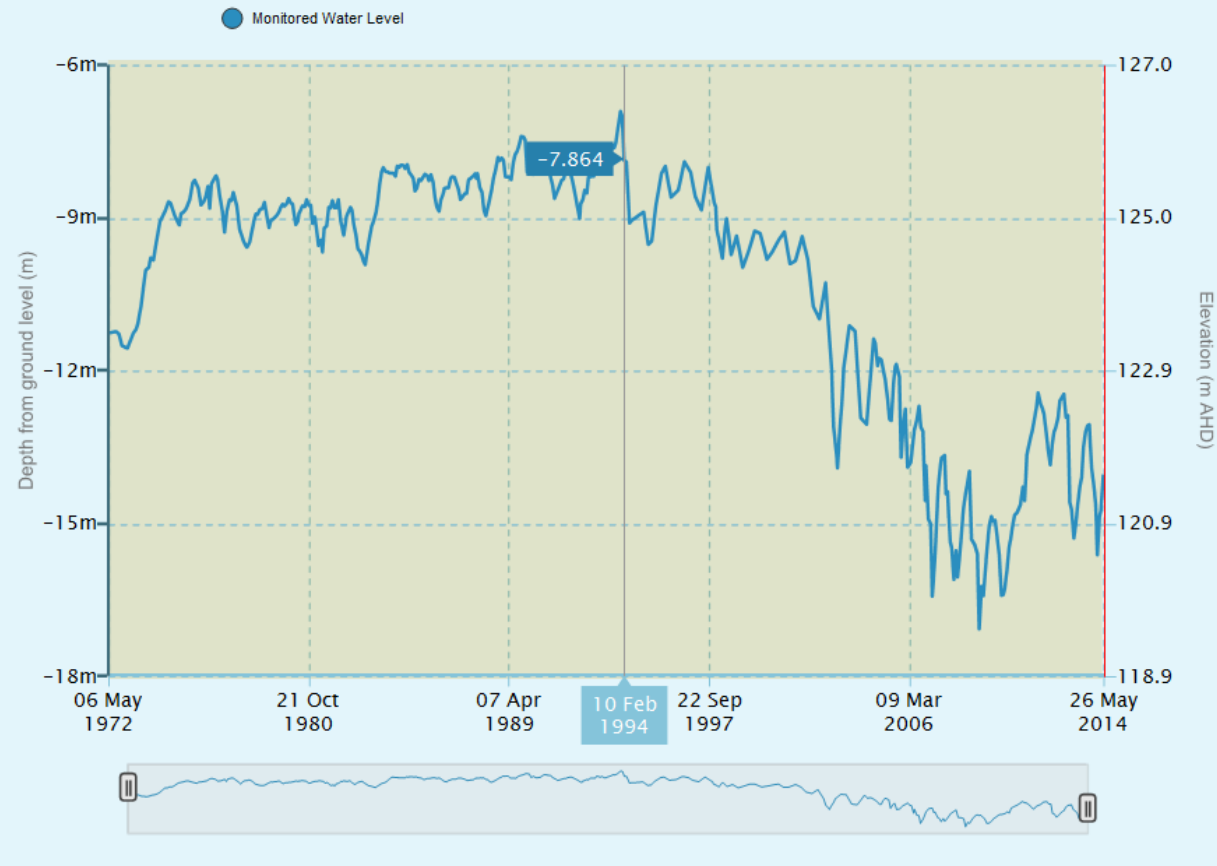
Just another acronym, or do we really  
need to know?



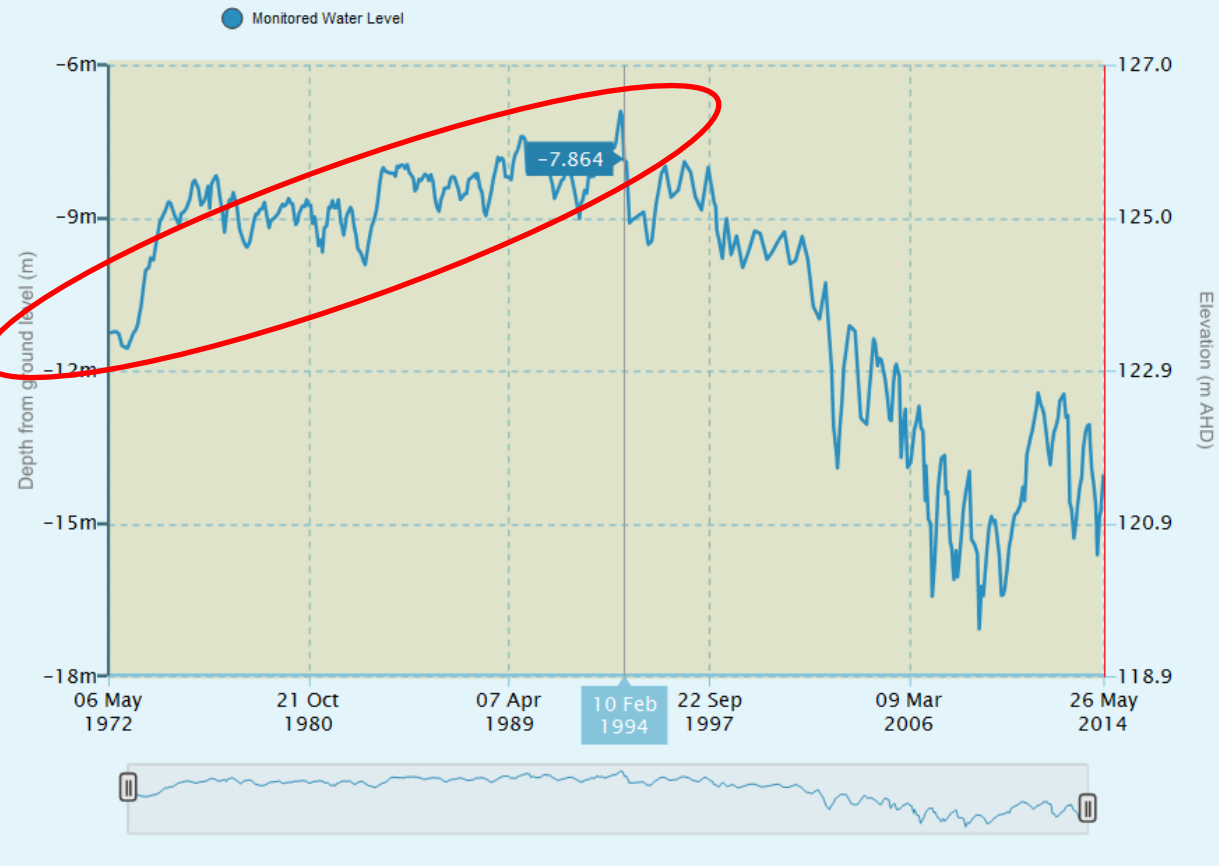
**CDM  
Smith**

# Policy governed by climate

Monitoring for bore: 51640



Monitoring for bore: 51640



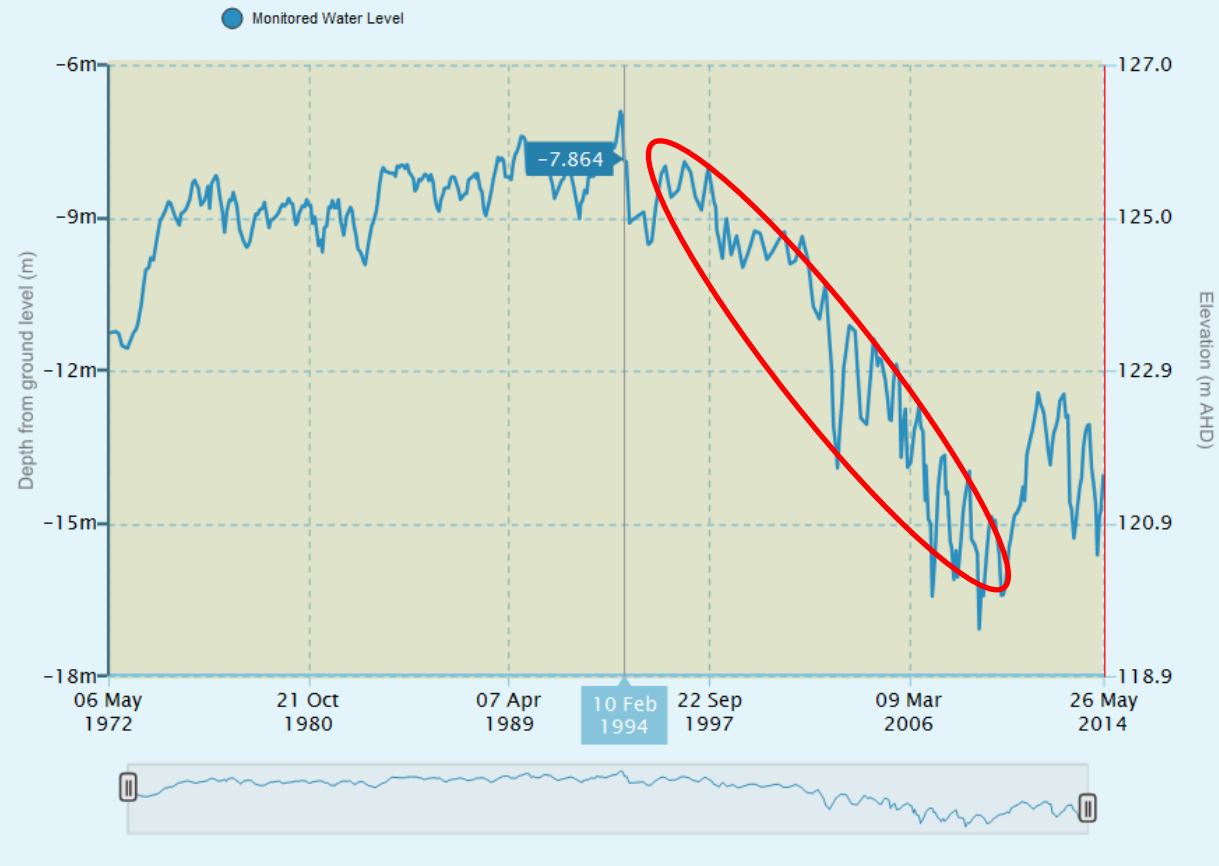
GW = a threat of salinity

Sold Telstra

Land and Water Programmes

Rising tide of dryland salinity

Monitoring for bore: 51640



Falling GW level – drought

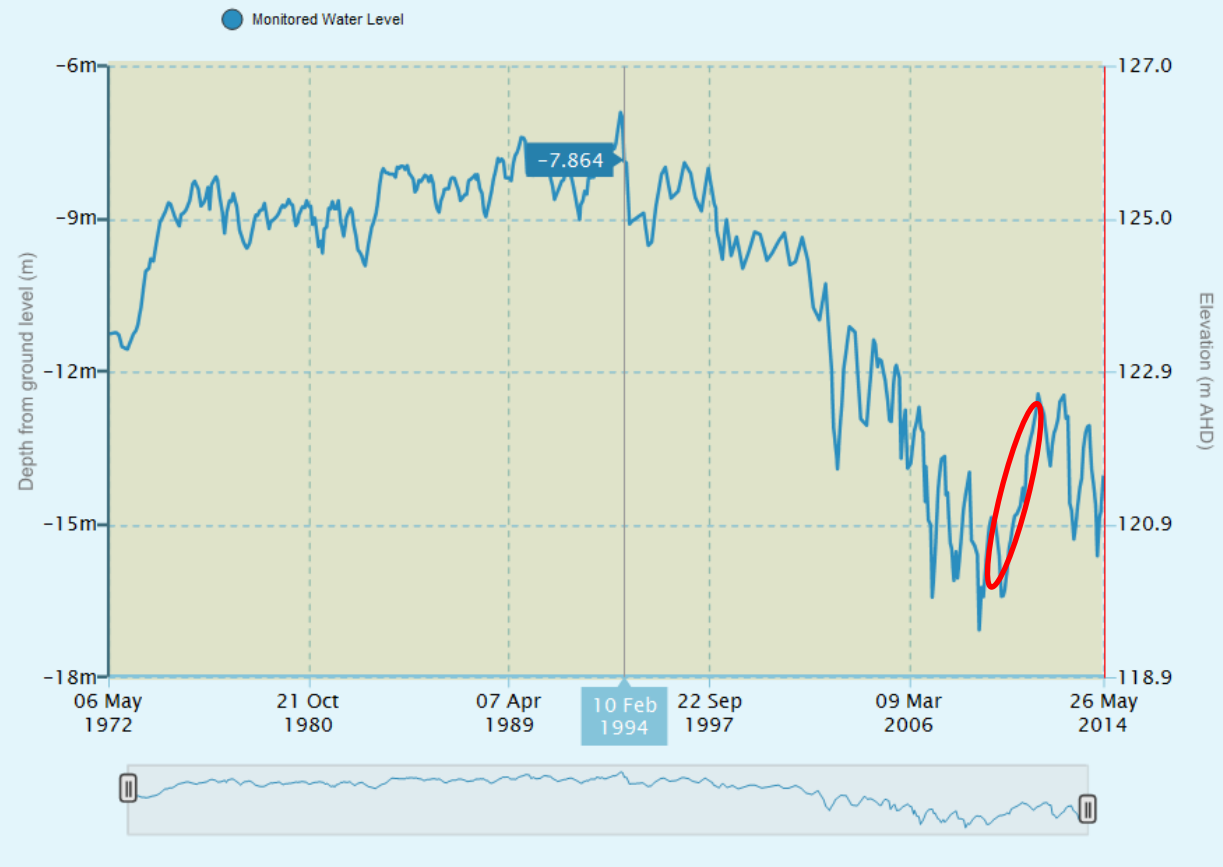
GW use up – less surface water

Perfect Storm

Low surface flow

Falling GW levels

Monitoring for bore: 51640



## Floods

- Everything's fine and dandy
- Shift in perception of issues
- No longer have a salinity issues
- Funding shifts or dries up

# What is a GDE

Any part of a life cycle that  
integrates GW is a GDE

Lets ignore the obvious = Springs /soaks /  
aquifers



# History

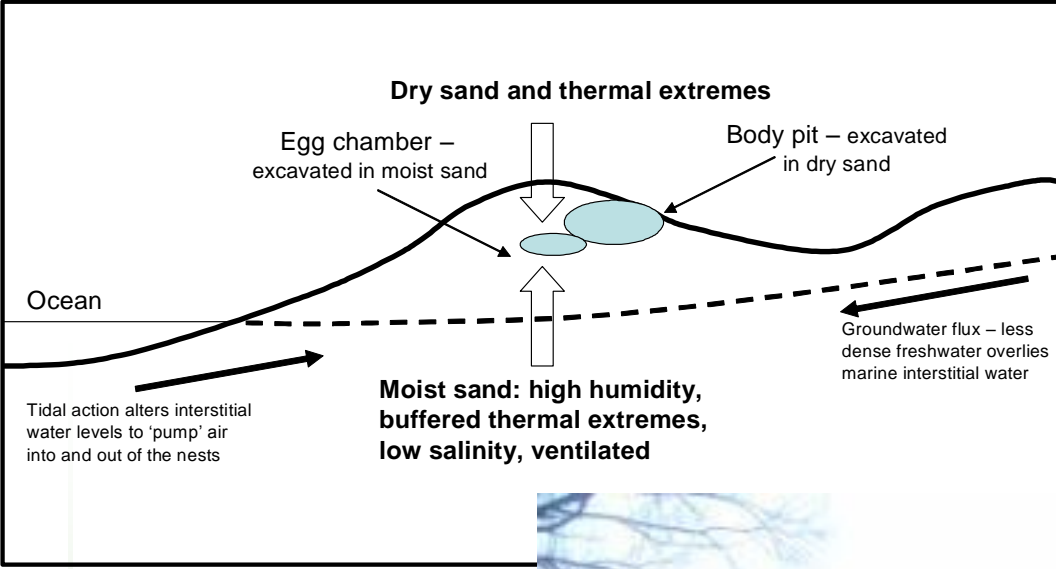
- 1980's = All about GAB Springs
- 1996 = COAG recognition
- 2002 = NSW Put in some policy
- 2004 = National Water initial (Land and Water Australia)
  
- GDE Atlas
  - First National definition of a GDE
  - First national definition of Groundwater
  
  - The First national map  
All mining leases, large scale extraction of groundwater have to take into account GDES
- 2016 = Victoria – Ministerial guidelines on GDES
- 2017 = AESC Guidelines on assessing impacts to GDEs

# Cave and aquifer



Platypu

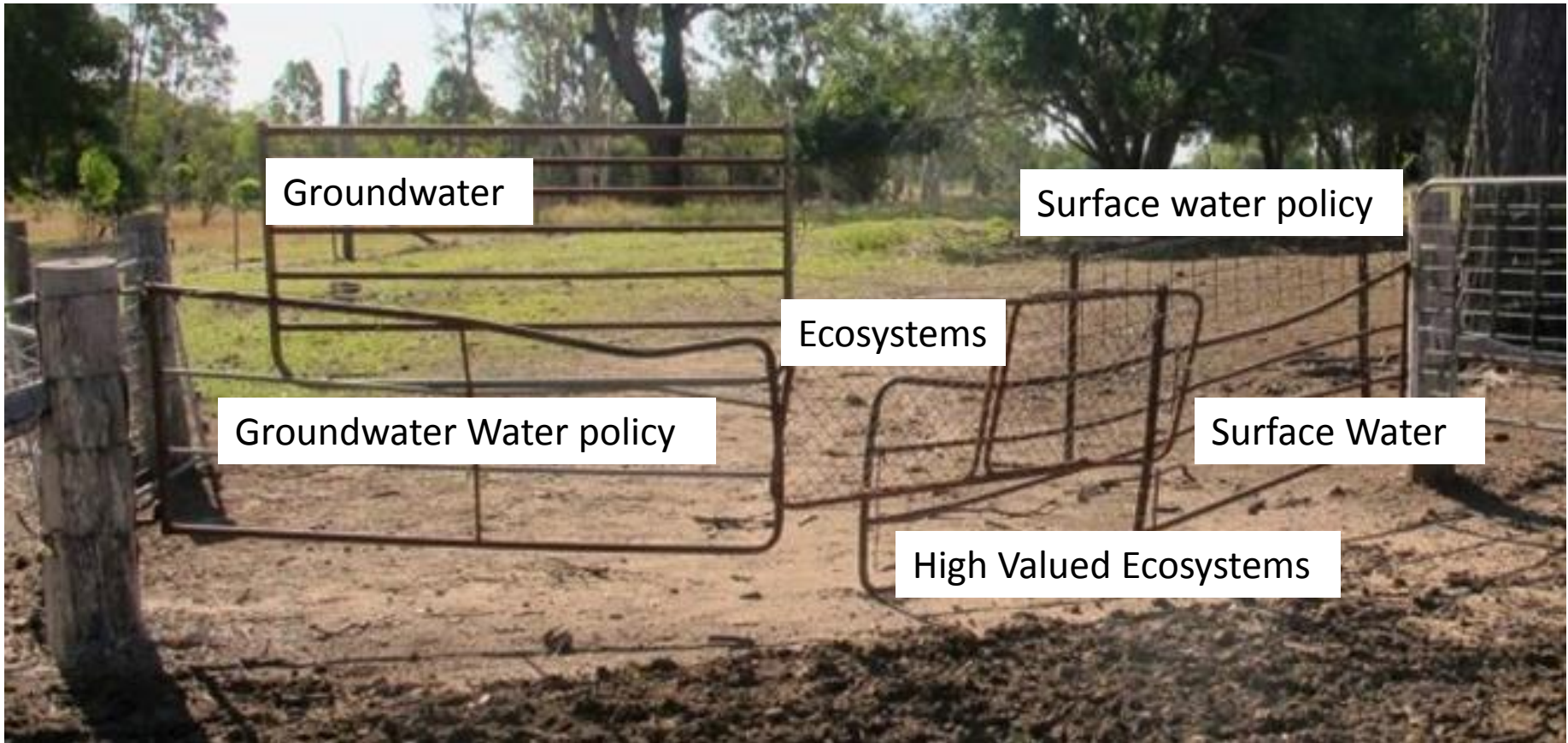




# The issue



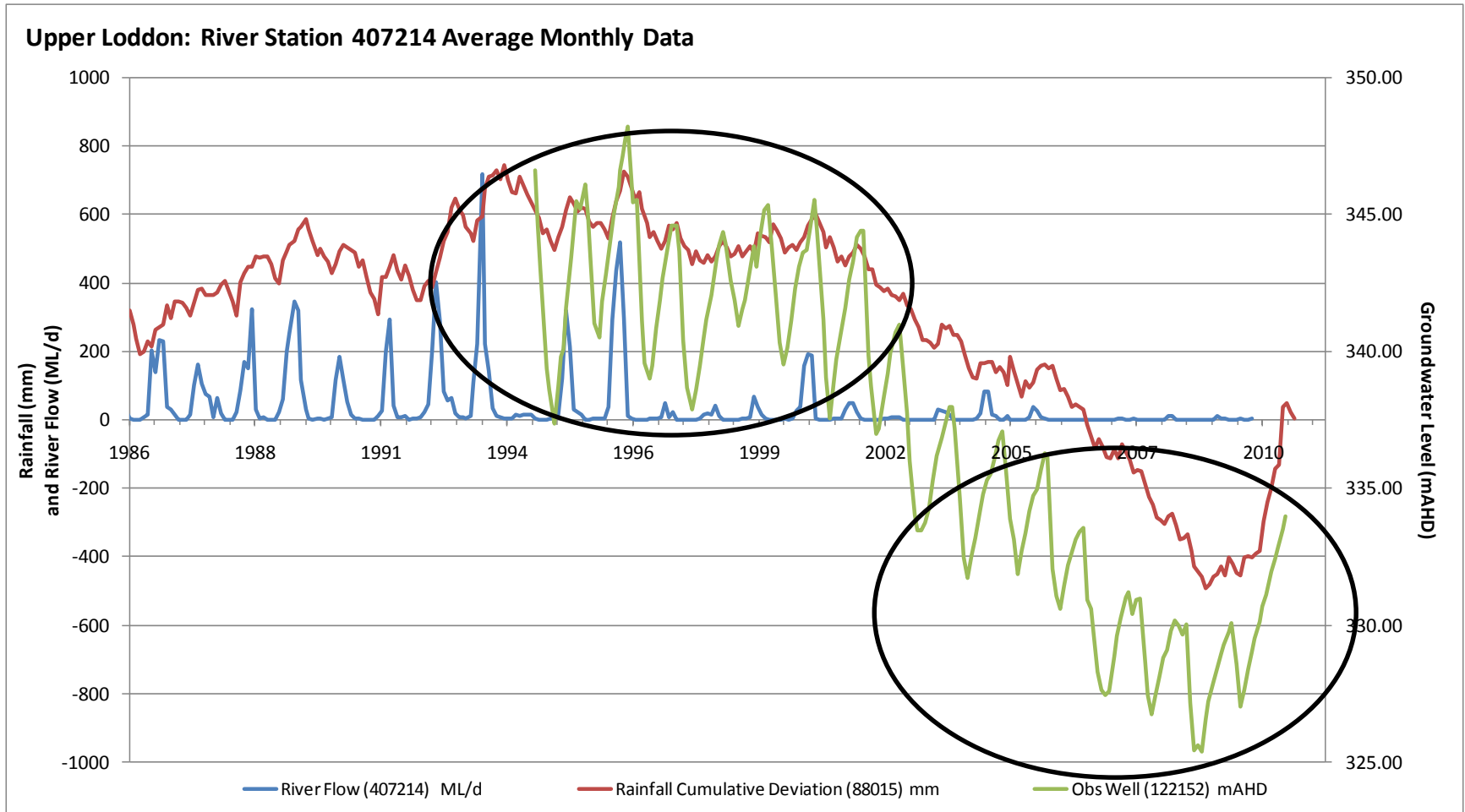
# The issue



# Risk to GDEs – water management

- GW extraction
  - Irrigation, town water supply, mining
- Changes to surface water flow management
- Urbanisation
  - Reduces recharge and reduces groundwater discharge
  - Changes quality of runoff

# Perfect storm





# Urbanisation

## It isn't the obvious GDEs we need to understand

- Growling grass frog and fungal pathogen *Batrachochytrium dendrobatidis*
- Increased salinity and temperature provides resistance to the disease
- Persistent populations found within groundwater discharge zones
- Landscape change = increase in surface water flow into stream

Ecological Applications, 24(4), 2014, pp. 650–662  
© 2014 by the Ecological Society of America

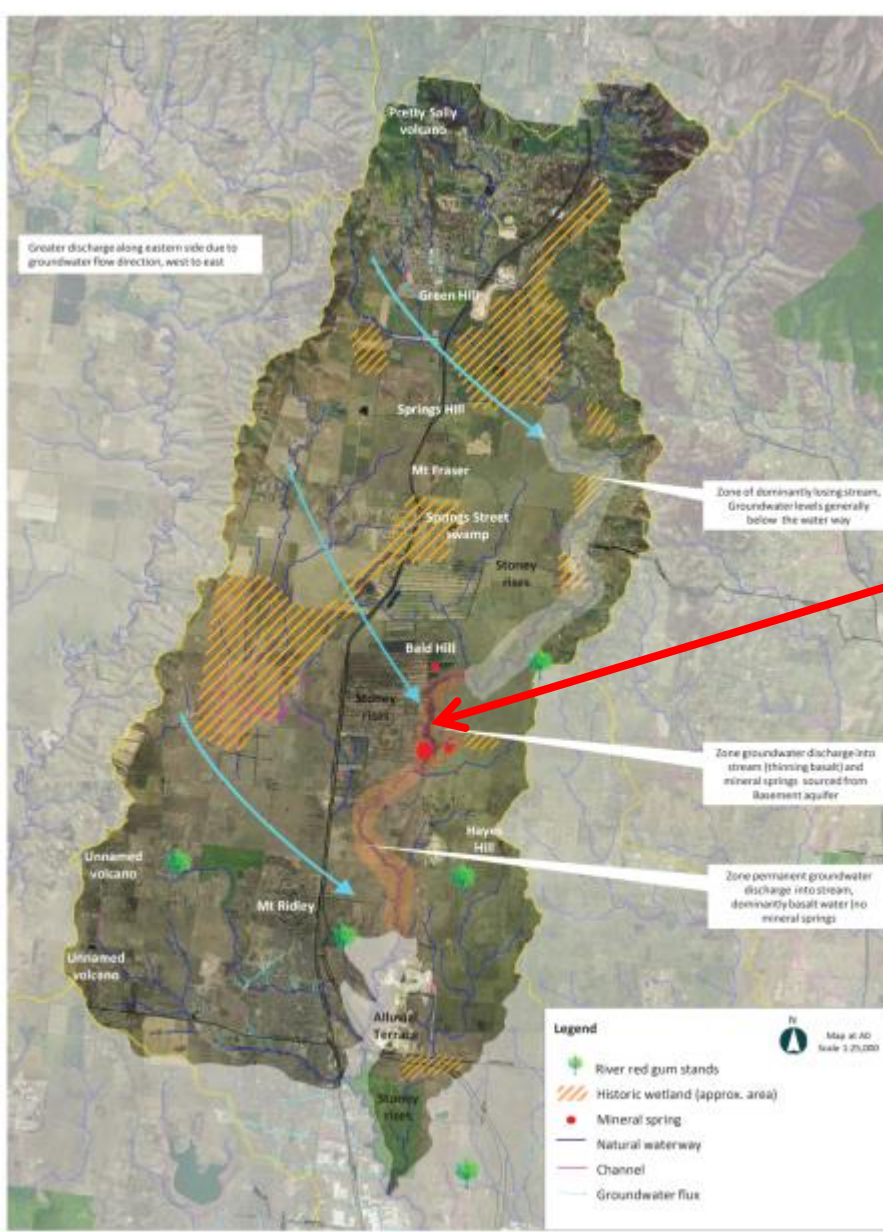
Wetland characteristics influence disease risk for a threatened amphibian

GEOFFREY W. HEARD,<sup>1,3</sup> MICHAEL P. SCROGGIE,<sup>2</sup> NICK CLEMANN,<sup>2</sup> AND DAVID S. L. RAMSEY<sup>2</sup>

<sup>1</sup>School of Botany, University of Melbourne, Victoria 3010 Australia

<sup>2</sup>Arthur Rylah Institute for Environmental Research, Department of Environment and Primary Industries, P.O. Box 137, Heidelberg, Victoria 3084 Australia

# Upper Merri Creek

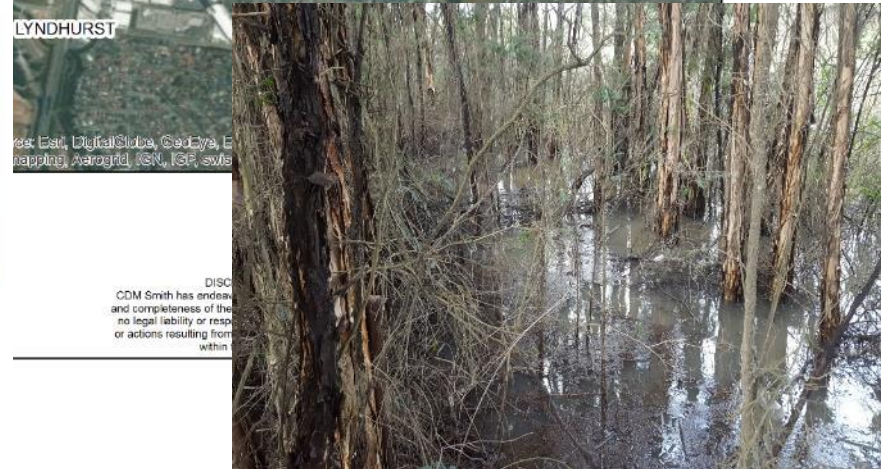


Zone of discharge of slightly saline and warmer groundwater

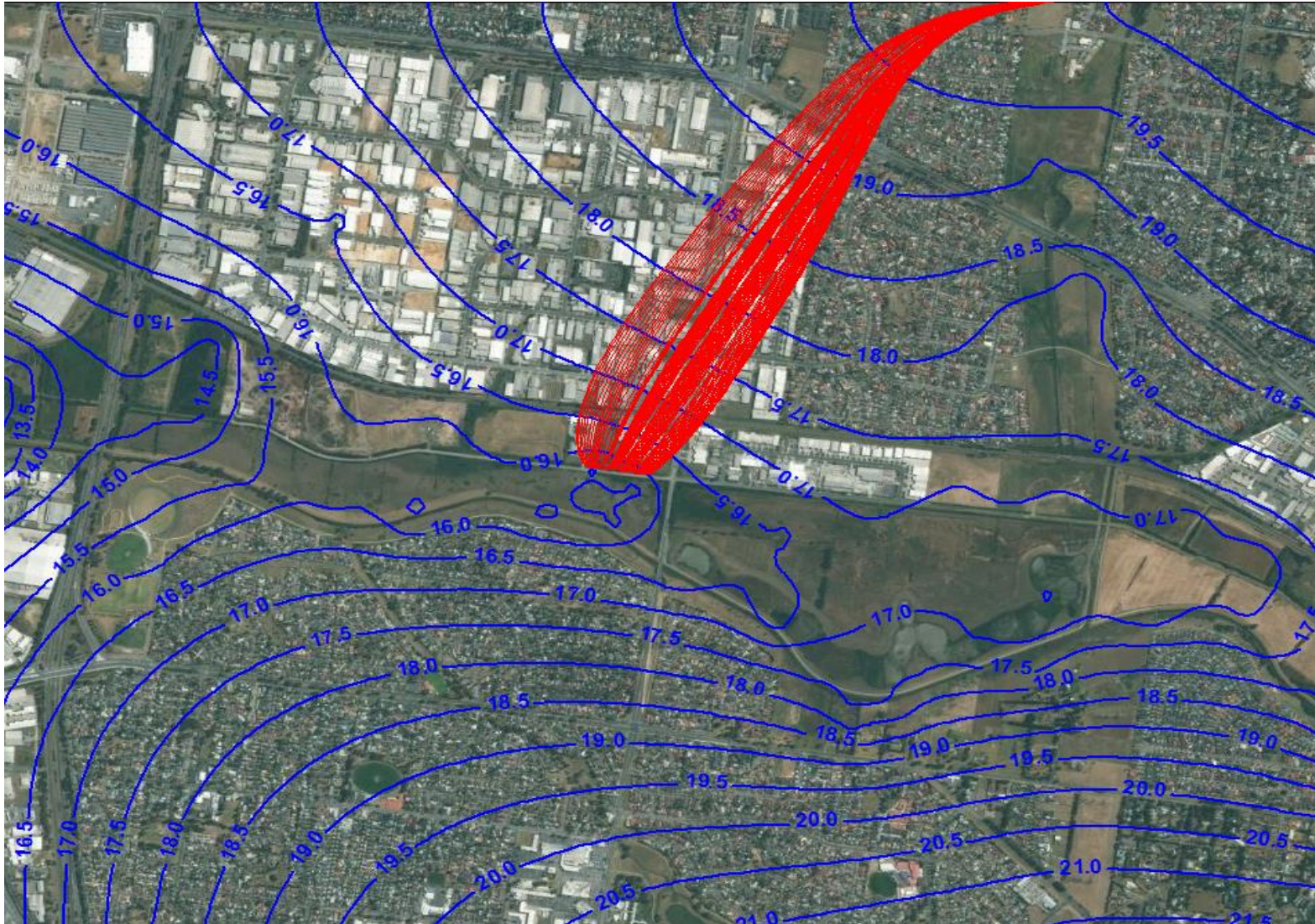
Resilience to virus



# Hallam Rd GDE = Drain



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# Landscape connection

*“Stream Refuges”....In dry periods, hold the genetics for future generation*



# Cultural connection



*belief in the Rainbow Snake, a personification of fertility, increase (richness in propagation of plants and animals) and rain, is common throughout Australia. It is a creator of human beings, having life-giving powers that send conception spirits to all the waterholes.*

*"Journey in Time", Reed 1993*

*One of the key symbols of creation is the rainbow serpent. Mr. Moggridge says its journey from underground to the surface also represents groundwater rising to the top via springs. Aboriginal people's understanding of their groundwater system permeates Dreamtime stories.*



# Old stories

## Rainbow Serpent Rockhole



The old people say that this is where the rainbow serpent came up from the ground leaving this rock hole behind. At this rock hole a particular grass grows. There is a story about the grass.(See 'The curlew and the moon')

There are other rockholes towards Woollogorang Station where that Rainbow Serpent also came up – one of them is called screwdriver

**Frank at the Rainbow Serpent rockhole.**

## The focus on GDEs

National frameworks on how to assess – GDE Tool Box

Increased awareness and recognition

National data collation program



## GDE Atlas - Data regarding GDEs

### Before the GDE Atlas

- No public source of information regarding GDEs
- More often or not GDEs were overlooked

**Layers**

- Groundwater Dependent Ecosystems
  - Aquatic GDE
  - Terrestrial GDE
  - Subterranean GDE
- Areas of update
- Inflow Dependent Ecosystems
- Water management
- Hydrology
- Hydrogeology
- Environment
- Base maps

