3rd Biennial Rosenberg International Forum on Water Policy

# *Innovations in* Salinity Management


*by*

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***Deputy Chief Executive***

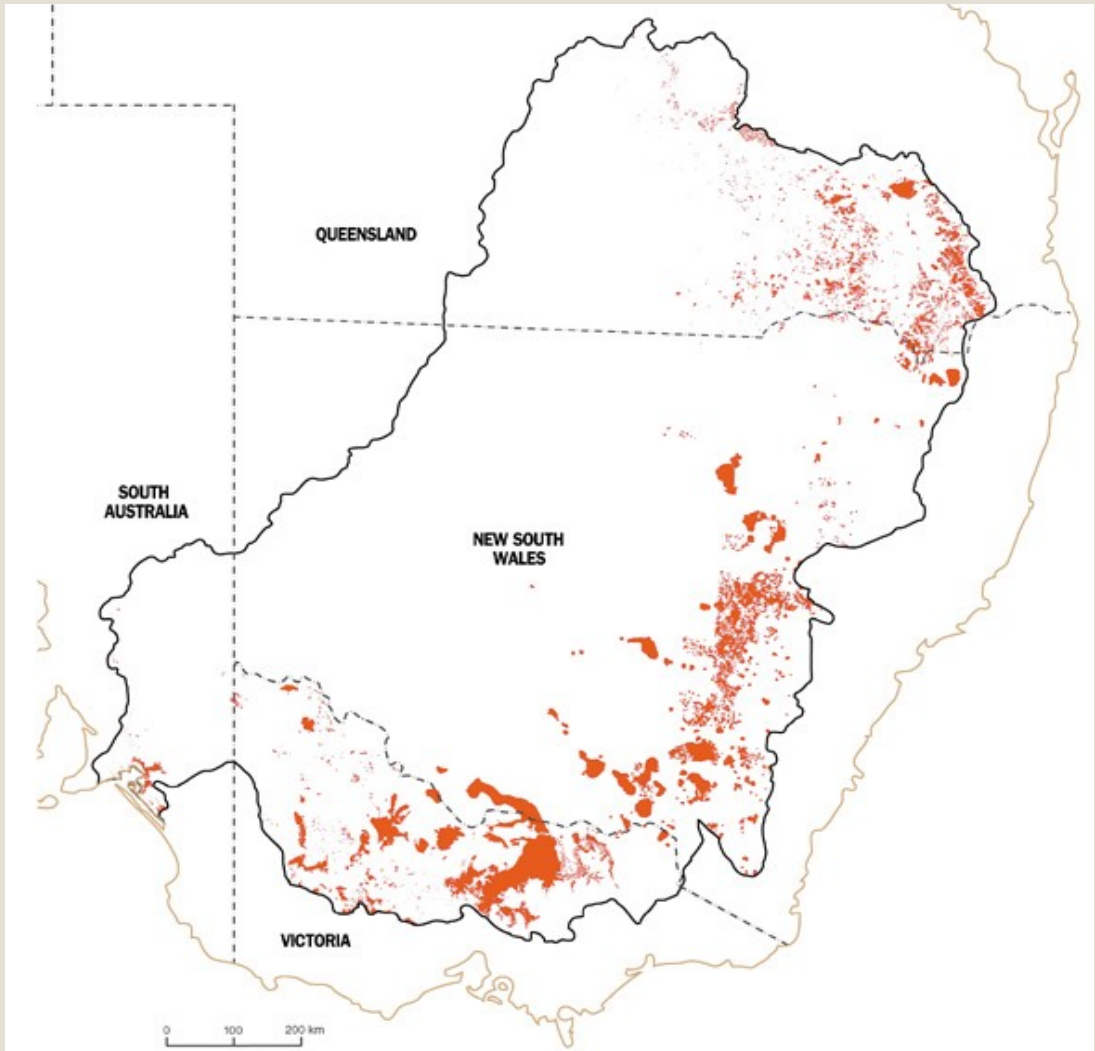
*Murray-Darling Basin Commission*


MURRAY-DARLING BASIN COMMISSION

# The Murray-Darling Basin


MURRAY-DARLING BASIN COMMISSION

# The Murray-Darling Basin

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# Salt Affected Land

| Asset | 2000 | 2020 | 2050 |
|---|---|---|---|
| Agricultural land (ha) | 4,650,000 | 6,371,000 | 13,660,000 |
| Remnant and planted perennial vegetation (ha) | 631,000 | 777,000 | 2,020,000 |
| Length of streams and lake perimeter (km) | 11,800 | 20,000 | 41,300 |
| Rail (km) | 1,600 | 2,060 | 5,100 |
| Roads (km) | 19,600 | 26,600 | 67,400 |
| Towns (number) | 68 | 125 | 219 |
| Important wetlands (number) | 80 | 81 | 130 |

*Source: National Land and Water Resources Audit (2000)*

# Estimated River Salinity Murray-Darling Basin 1998-2100

| River | Average River Salinity (EC) | | | |
|---|---|---|---|---|
| | 1998 | 2020 | 2050 | 2100 |
| **River Murray** | | | | |
| Morgan, SA | 570 | 670 | 790 | 900 |
| Murrumbidgee, NSW | 250 | 320 | 350 | 400 |
| Avoca, Vic | 1,440 | 1,470 | 2,220 | 2,990 |
| Loddon, Vic | 870 | 880 | 900 | 970 |
| Campaspe, Vic | 600 | 600 | 610 | 610 |
| Goulburn-Broken, Vic | 130 | 140 | 230 | 230 |
| **Darling River** | | | | |
| Menindee, NSW | 360 | 430 | 490 | 530 |
| Macquarie, NSW | 620 | 1,290 | 1,730 | 2,110 |
| Castlereagh, NSW | 640 | 760 | 1,100 | 1,230 |
| Namoi, NSW | 680 | 1,050 | 1,280 | 1,550 |
| Gwydir, NSW | 560 | 600 | 700 | 740 |
| Condamine-Balonne, QLD | 210 | 1,040 | 1,040 | 1,040 |

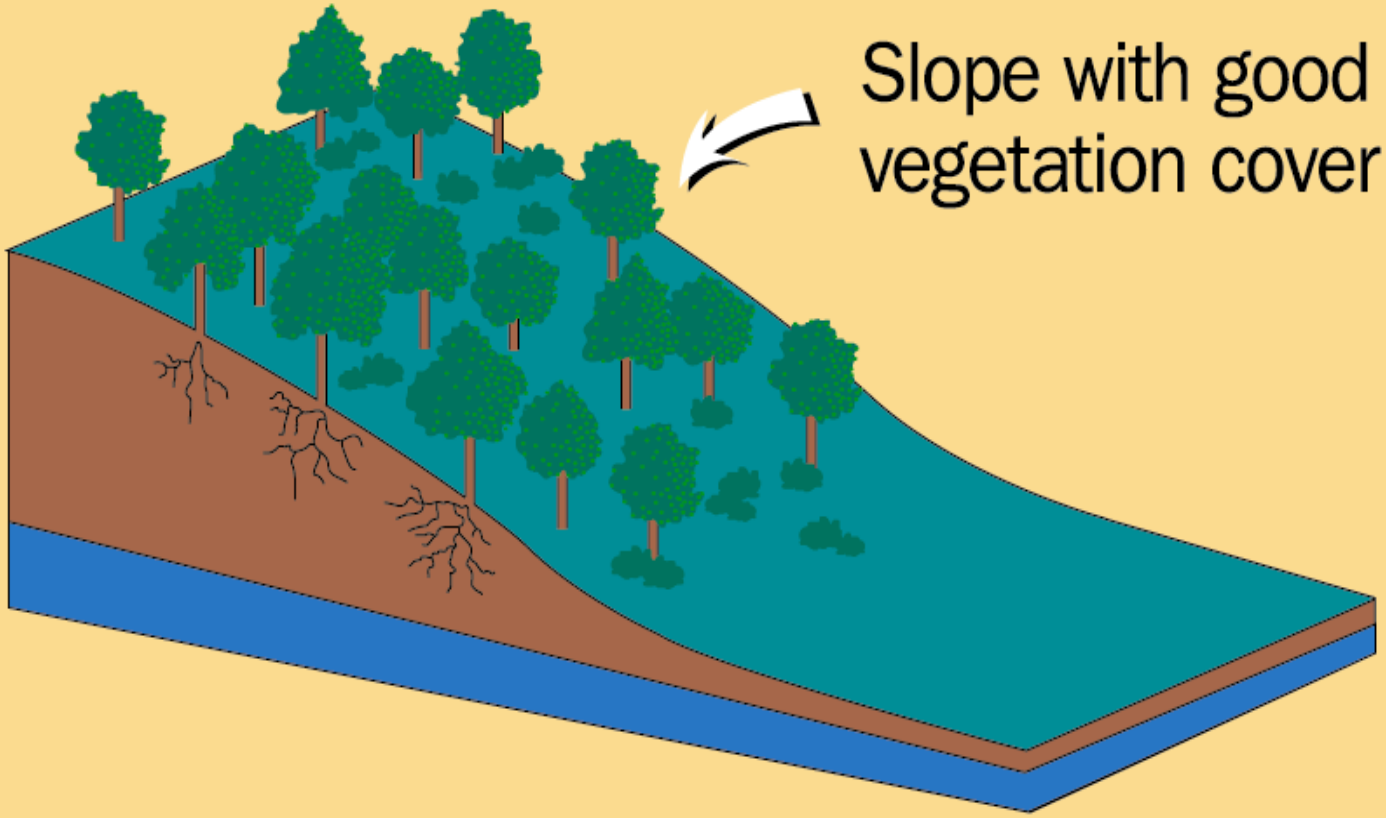
*Source: National Land and Water Resources Audit (2000)*

# Annual Costs in Eight Priority Catchments Murray-Darling Basin, 2000

| | Lower estimate ($m/yr) | Upper estimate ($m/yr) | Best estimate ($m/yr) | Proportion (%) |
|---|---|---|---|---|
| Local Government | - | - | 15 | 6 |
| Households | 41 | 139 | 90 | 36 |
| Businesses | 8.5 | 9.0 | 8.7 | 4 |
| State government agencies & utilities | - | - | 16 | 4 |
| Environment | ? | ? | ? | - |
| Agricultural producers | - | - | 122 | 48 |
| **Total** | **202** | **301** | **252** | |

*Source: Wilson (2000)*

# Dryland Salinisation



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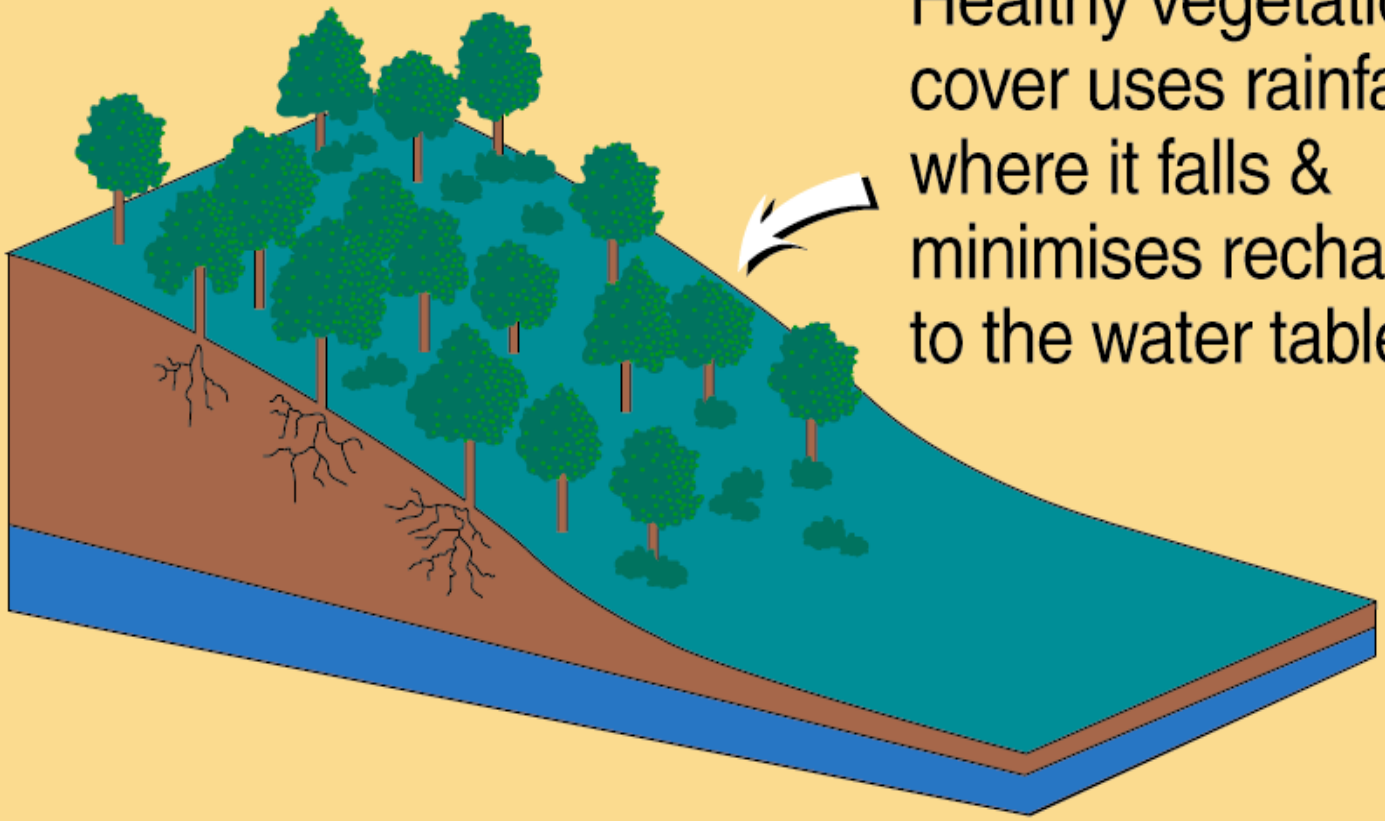
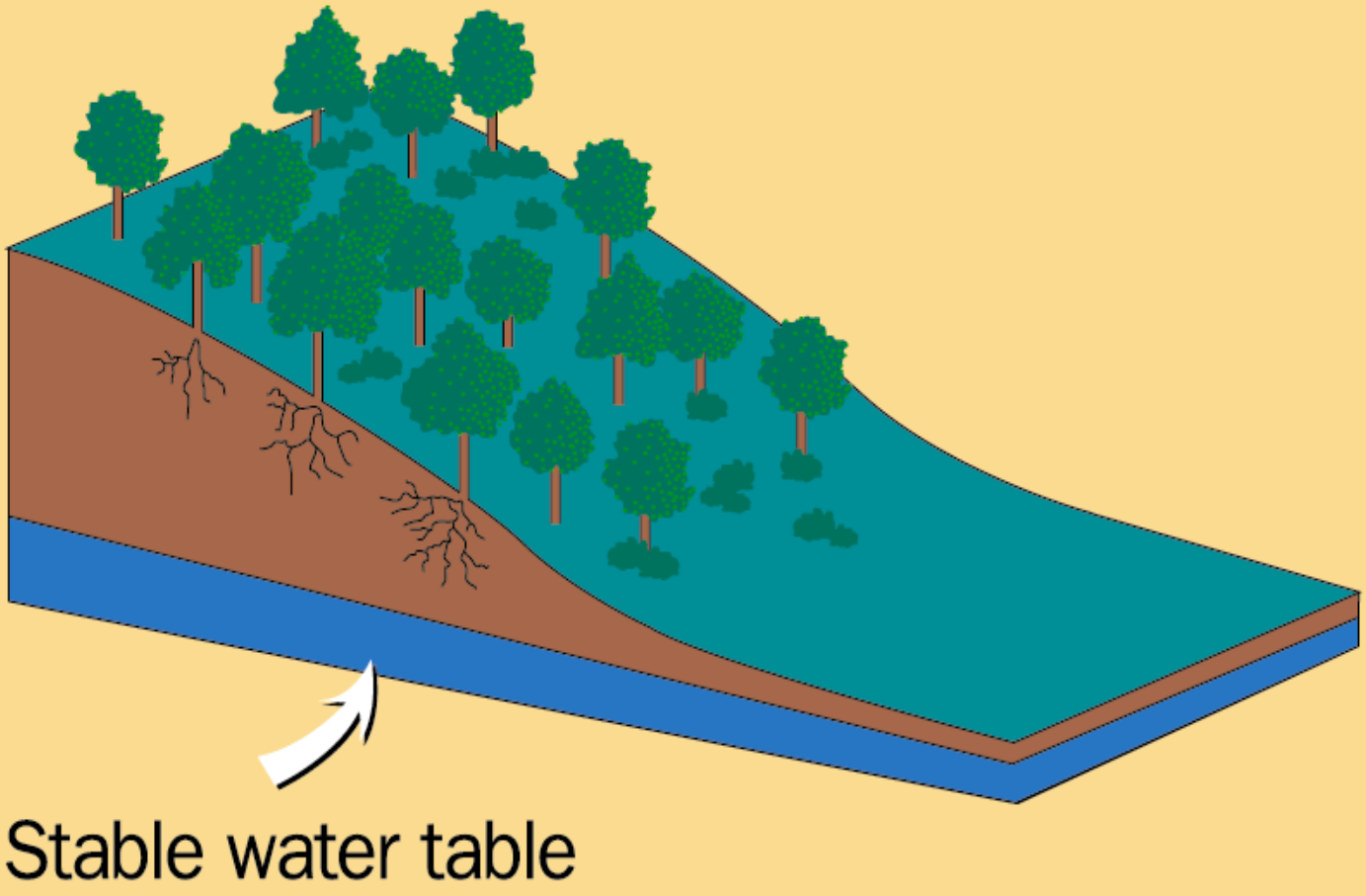


Healthy vegetation cover uses rainfall where it falls & minimises recharge to the water table

# Dryland Salinisation



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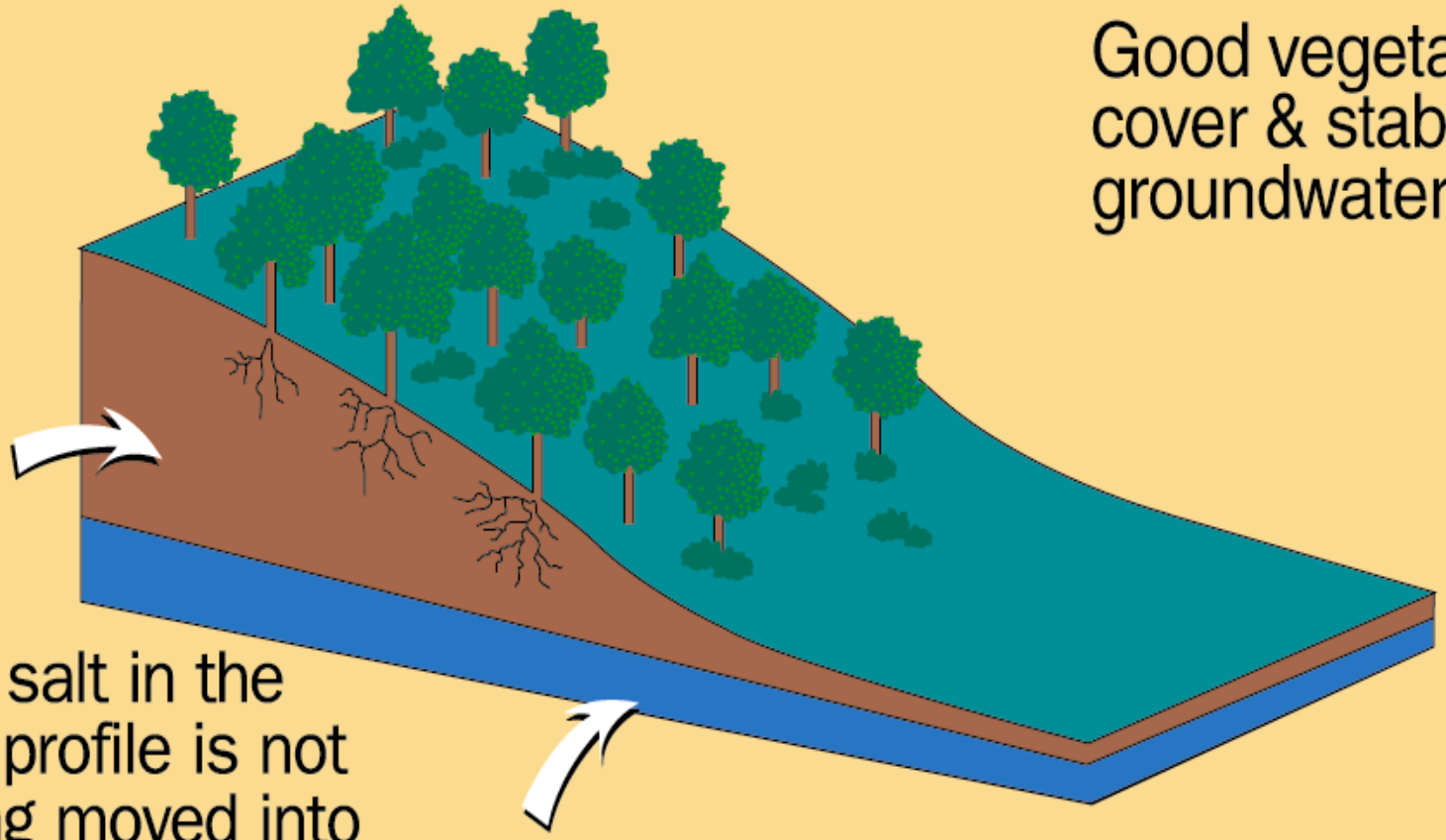
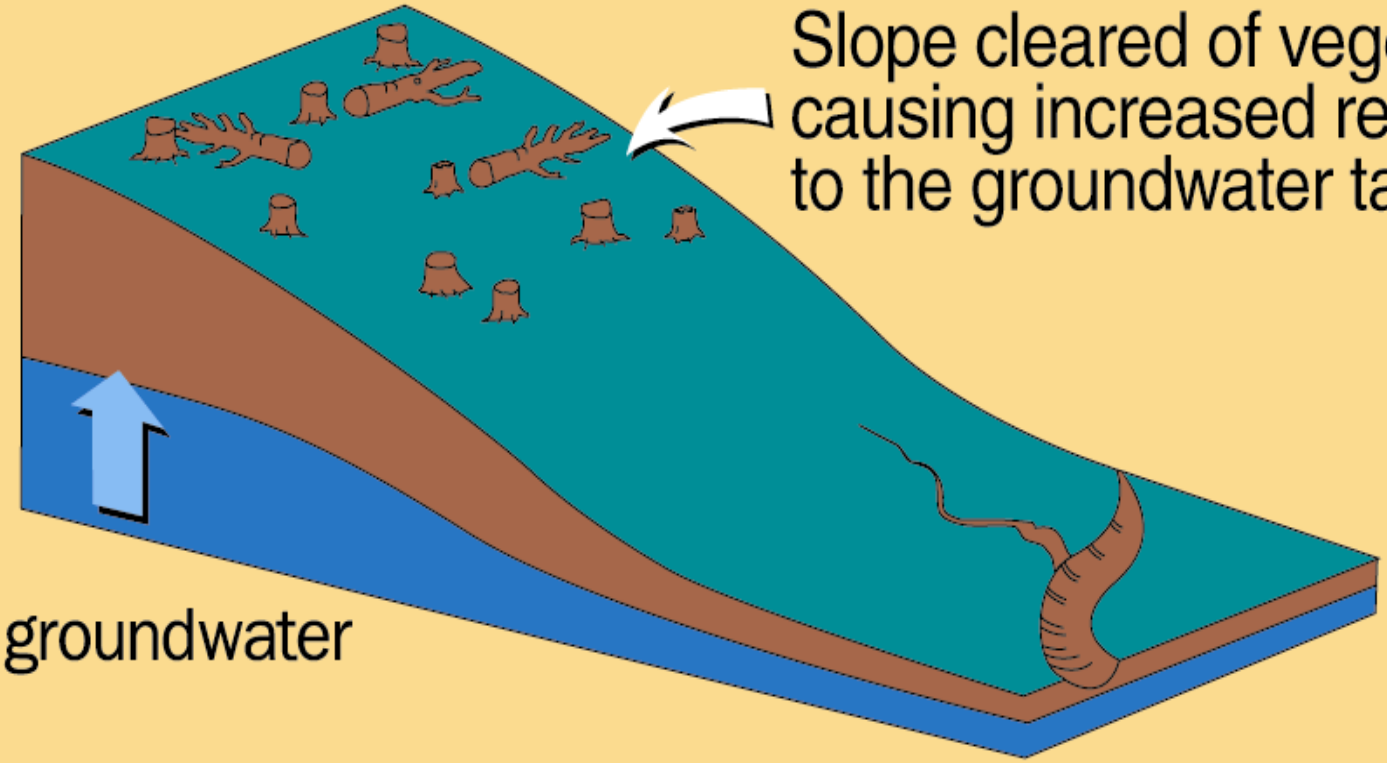


Good vegetation cover & stable groundwater table

The salt in the soil profile is not being moved into streams or to the soil surface

The groundwater level is low so it does not carry salt water to the soil surface or large volumes to the streams

# Dryland Salinisation



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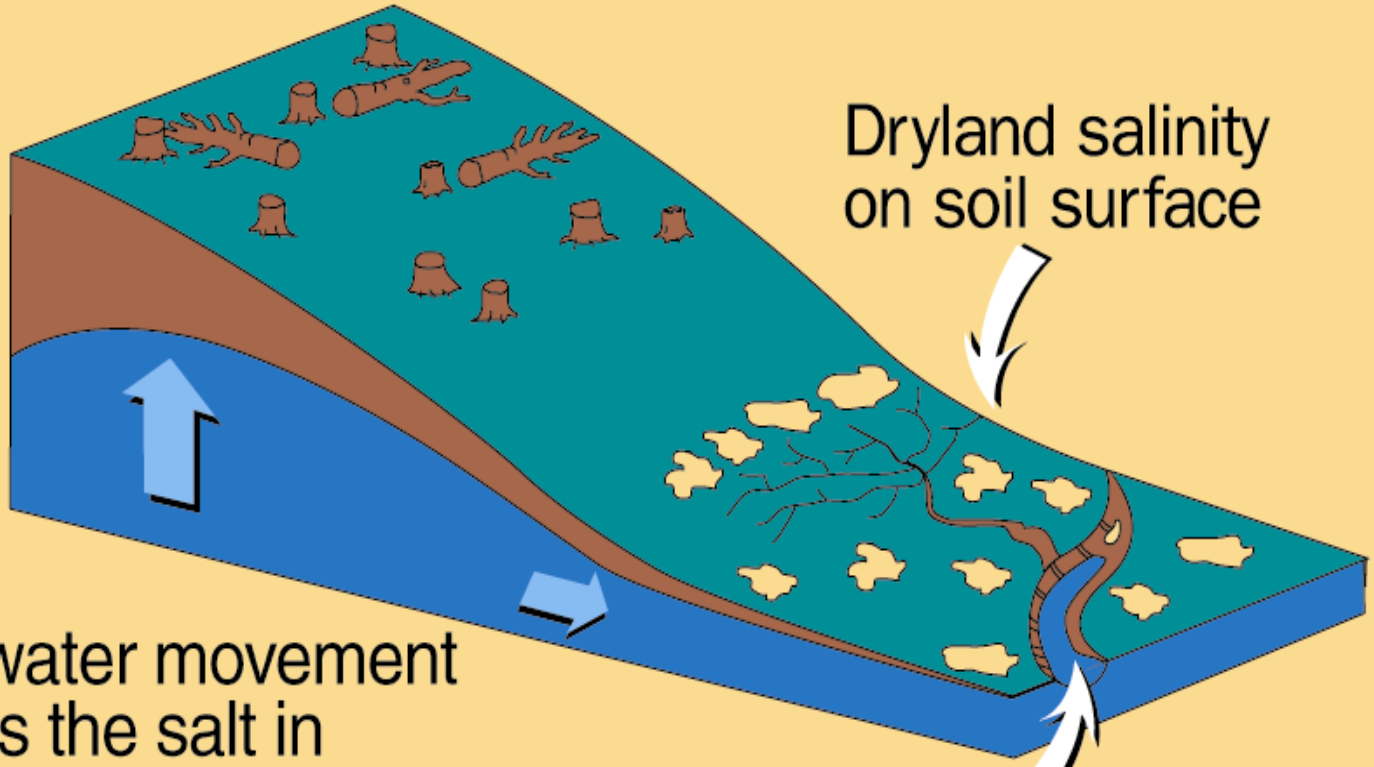


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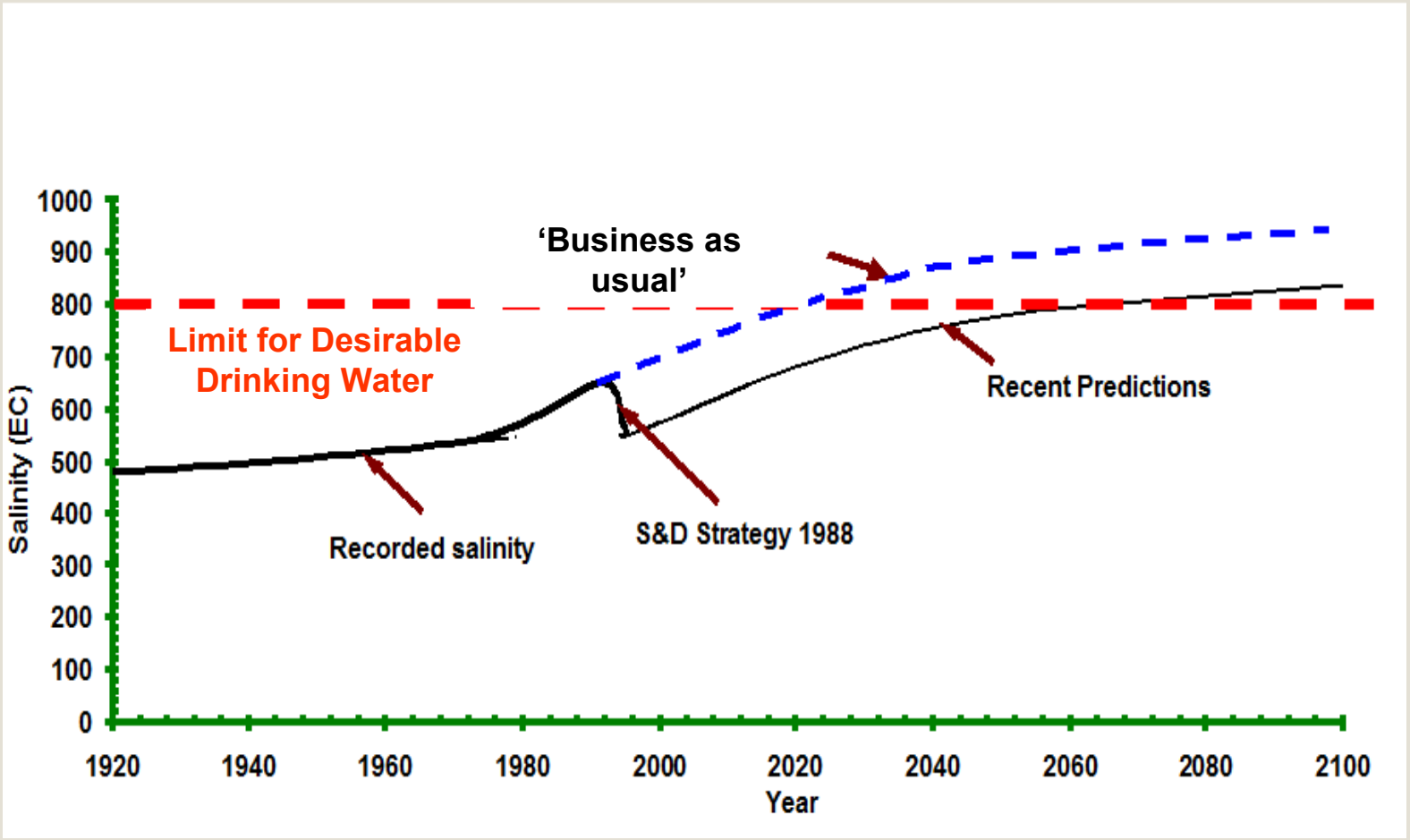
# What can be done about salinity?

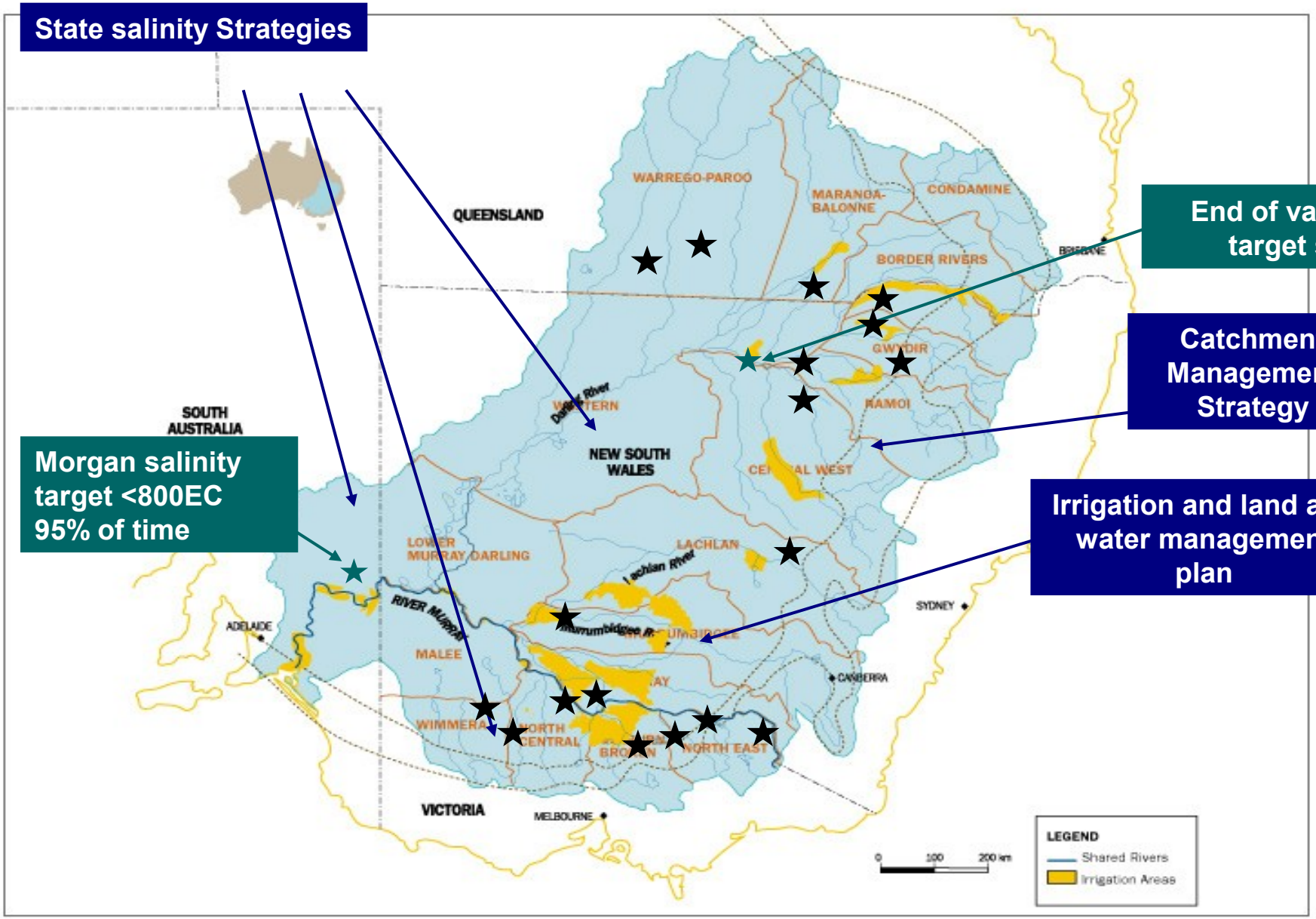
- Dilution flows
- Groundwater salt interception works
- High water using farming systems
- Forestry for environmental services
- Salt as a resource
  - Forage production systems
  - Aquaculture
  - Industrial products

# Achievement of the Salinity & Drainage Strategy

## (Measured at Morgan, South Australia)



# Salinity Strategy in Summary

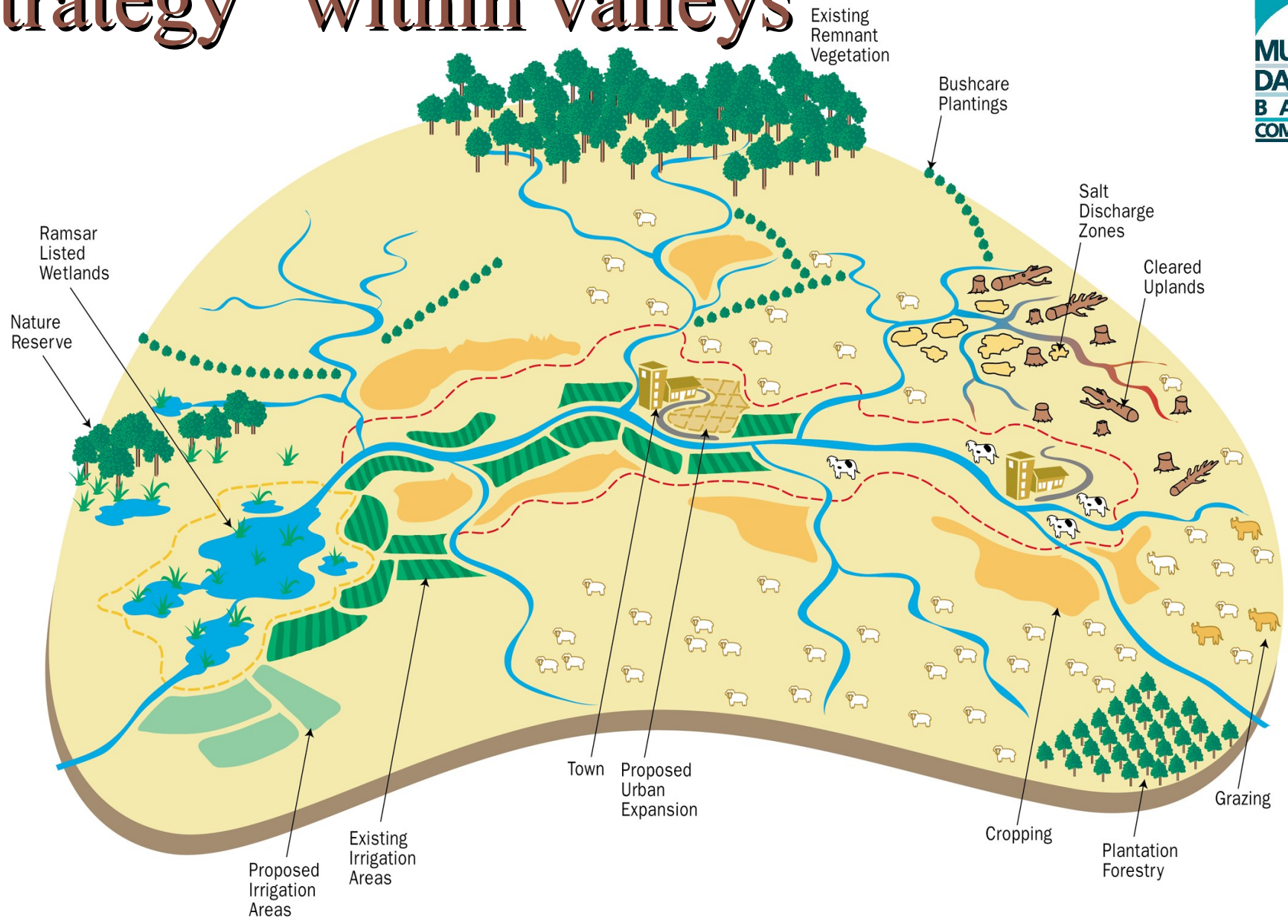


# Murray-Darling Basin Salinity Management Strategy

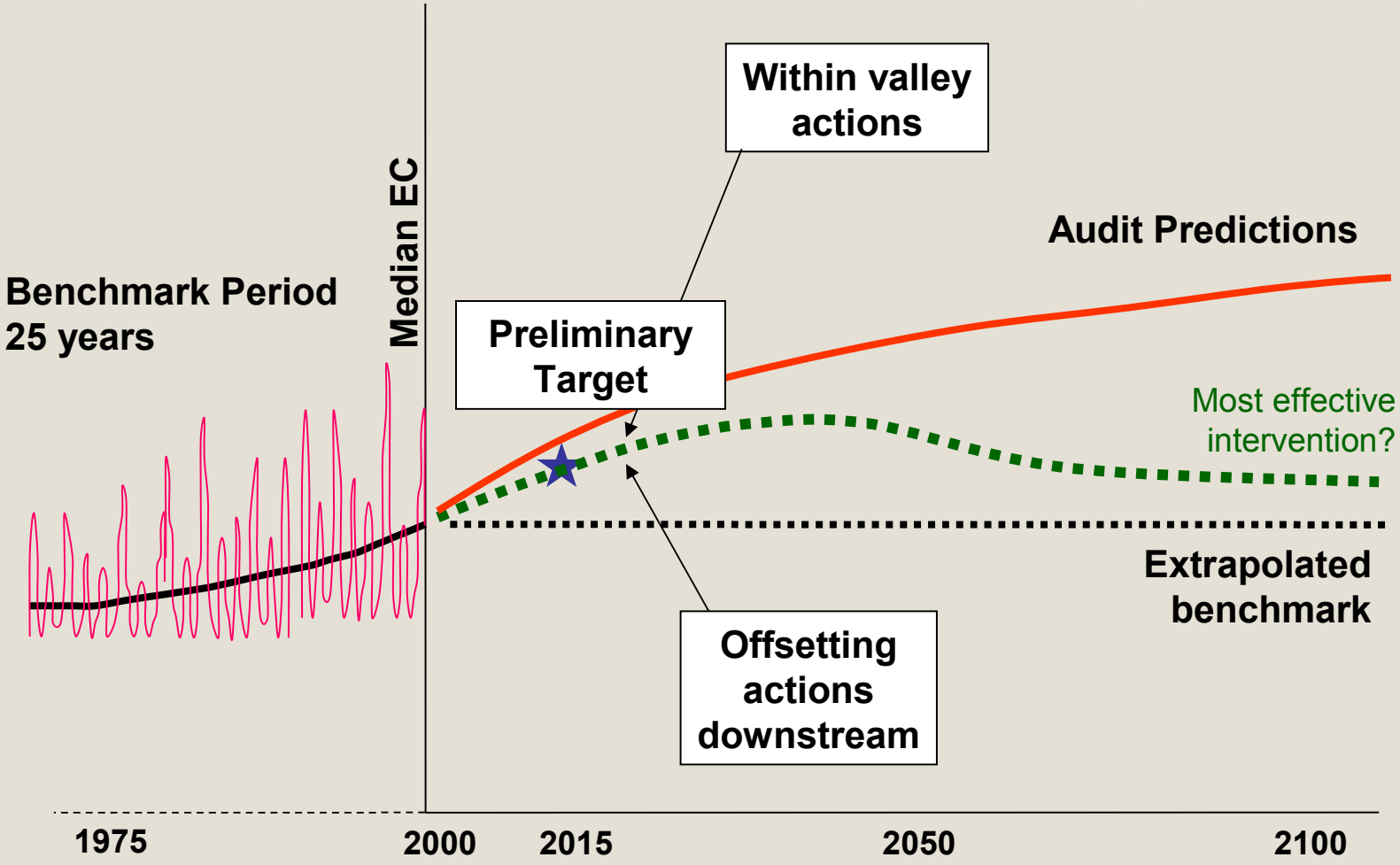
**Objectives**

- Maintain water quality in shared rivers
- Control rise in salinity of tributary rivers
- Control land degradation and protect important natural values and built assets
- Maximise net benefits

# Strategy "within valleys"



# End-of-Valley Salinity Targets (balancing of effort)



# Accountability in Salinity Management: Credits and Debits

| | NSW | VIC | SA | QLD | Basin Total |
|---|---|---|---|---|---|
| **A Register** (New development and works) | | | | | |
| **State accountability (A)** | ✓ | ✓ | ✓ | ✓ | |
| **B Register** (Legacy of history, catchment and land management actions) | | | | | |
| **Shared responsibility (A & B)** | | | | | ✓ |

# Seven Year Program of Works

## Credits

- Joint program of salt interception schemes (61 EC)

- Environmental flows and catchment management actions (10 EC)

## Debits

- New irrigation development from water trading (30 EC)

- Legacy of history - past actions (41 EC)

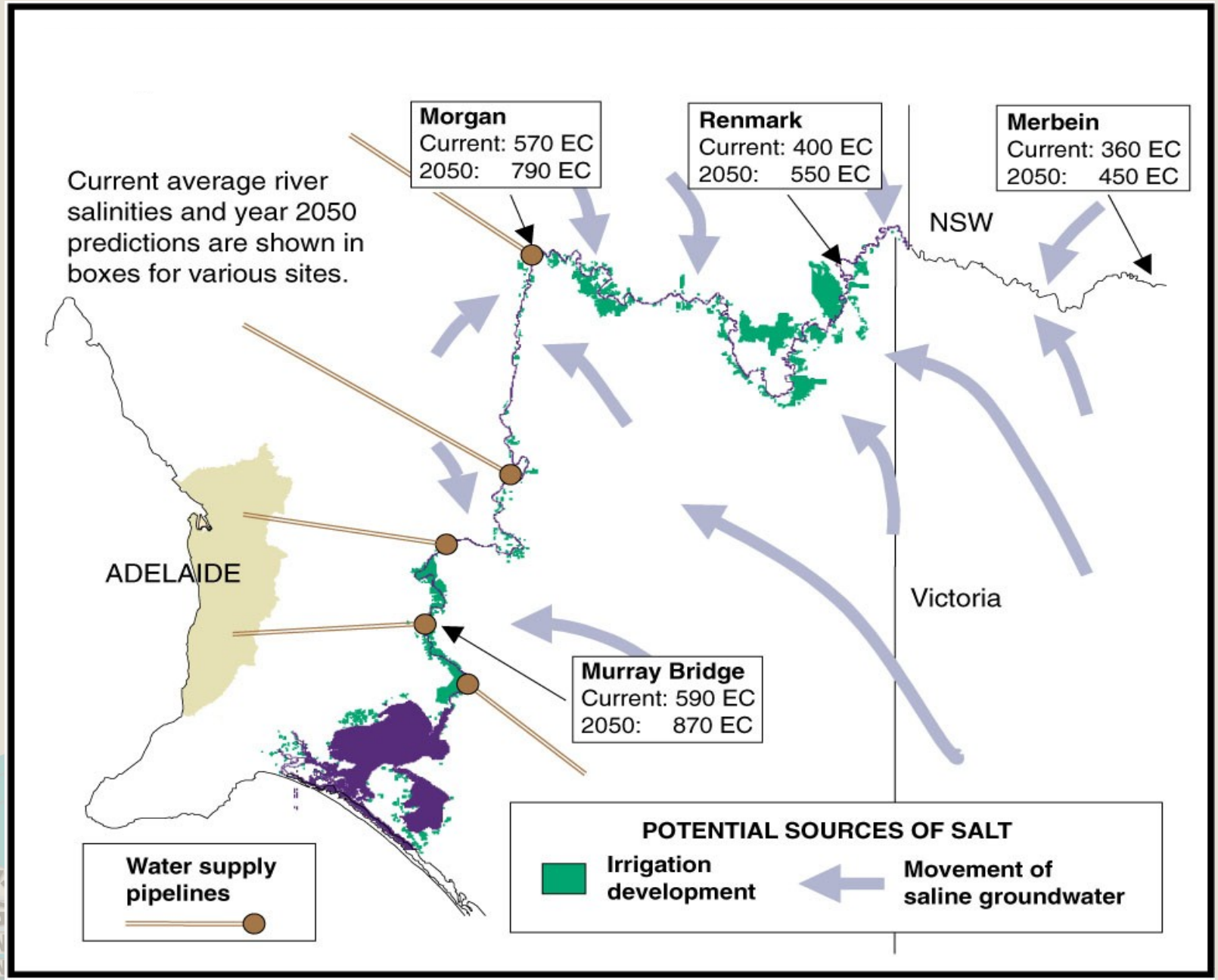
# Water Use Efficiency in Irrigated Agriculture

| Land Use | Percentage Water Used | Water Use ML/ha | Water Returns $/ML |
|---|---|---|---|
| Fruit, Vegetables | 13 | 3-7 | 500-1,300 |
| Cotton | 16 | 7 | 450 |
| Dairying | 40 | 7 | 100 |
| Rice | 11 | 11 | 30 |
| Extensive agriculture | 9 | 3-4 | 0-120 |
| All irrigation | 100 | 7 | 195 |

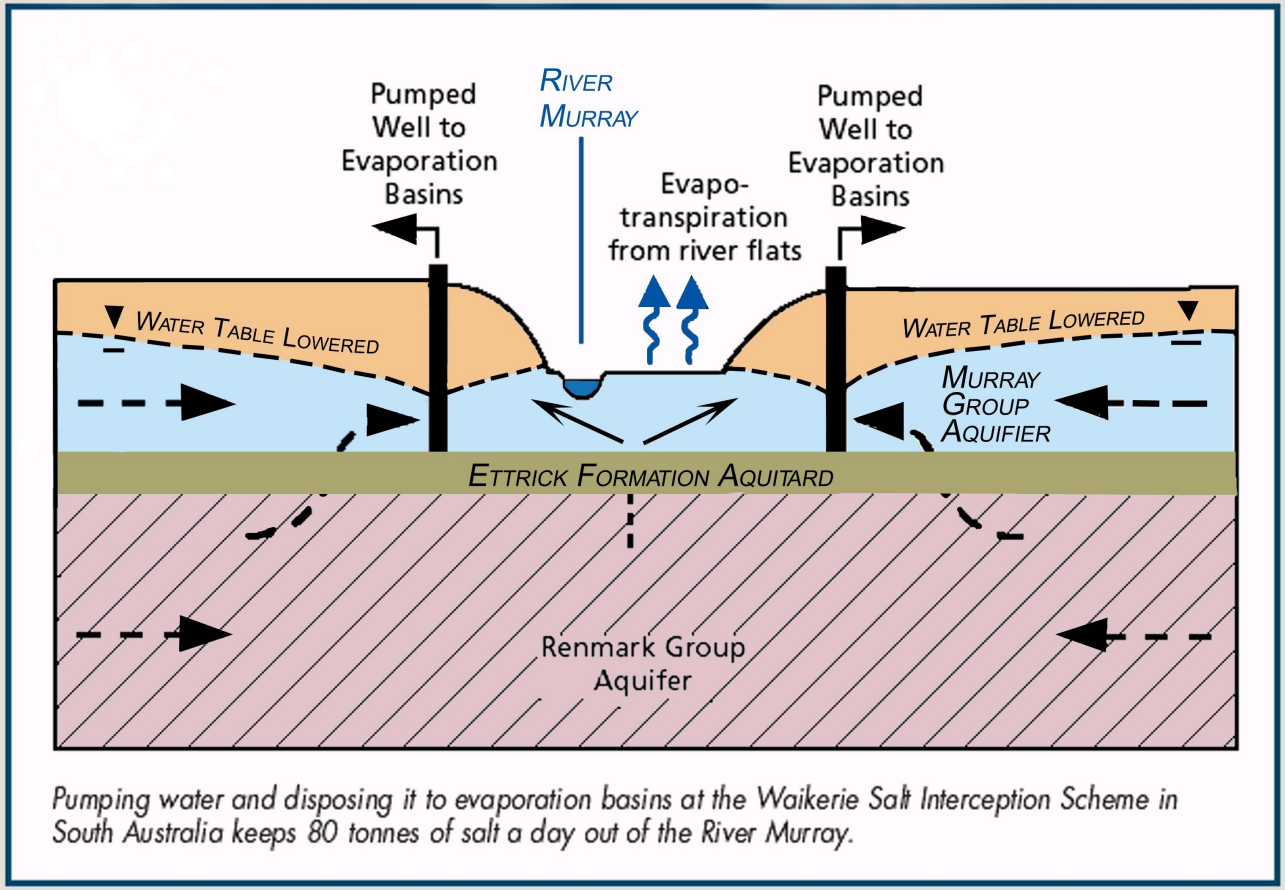
- *The figures in this table have been aggregated from the source table, and approximations included.*
- *They are Australia-wide and based on 1996/97 data.*

*Source: National Land and Water Resources Audit (2002)*

# Saline Groundwater Flows to the River

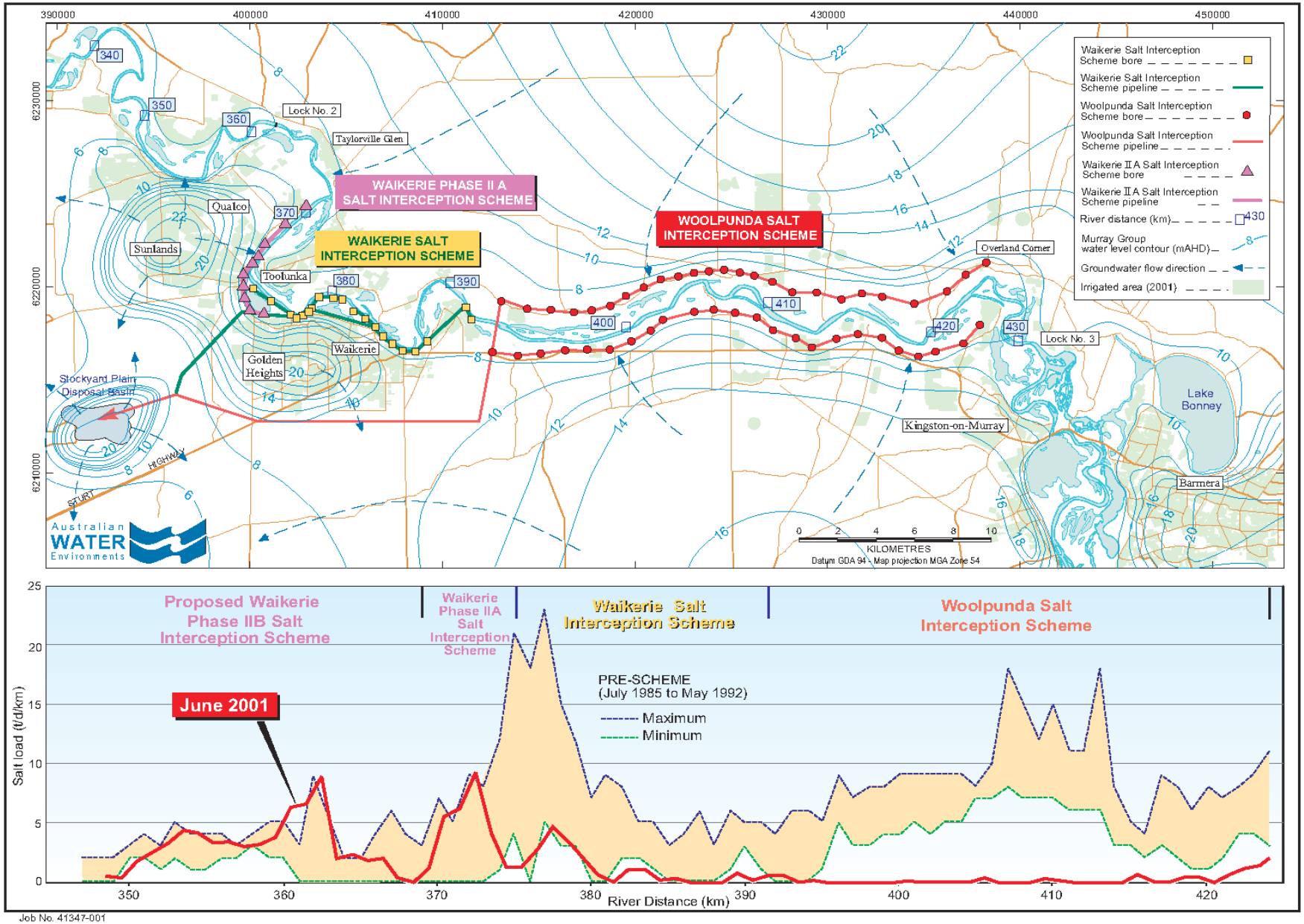


# Principles Behind Salt Interception Schemes



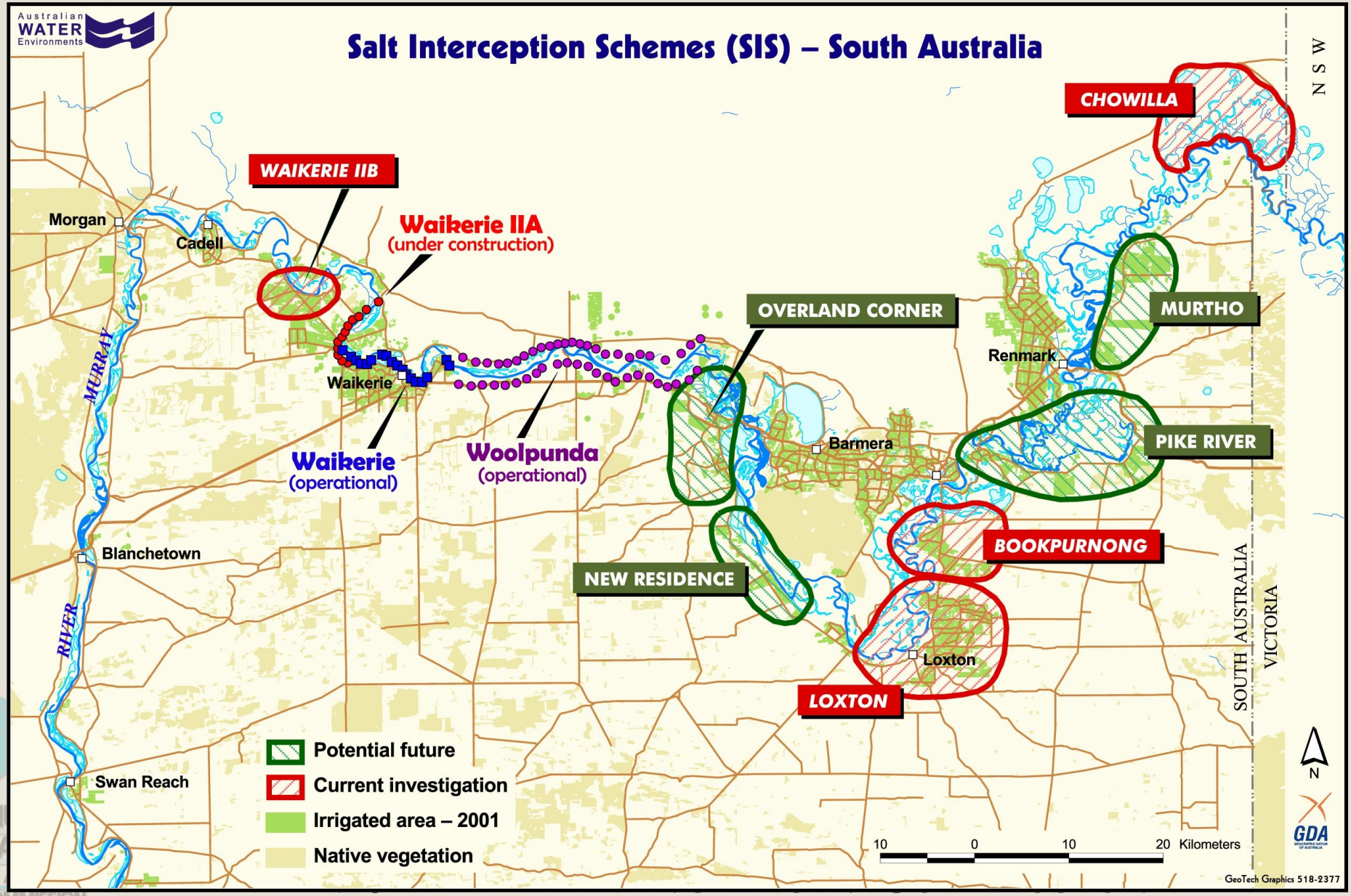

*Pumping water and disposing it to evaporation basins at the Waikerie Salt Interception Scheme in South Australia keeps 80 tonnes of salt a day out of the River Murray.*

# Current Schemes




Job No. 41347-001

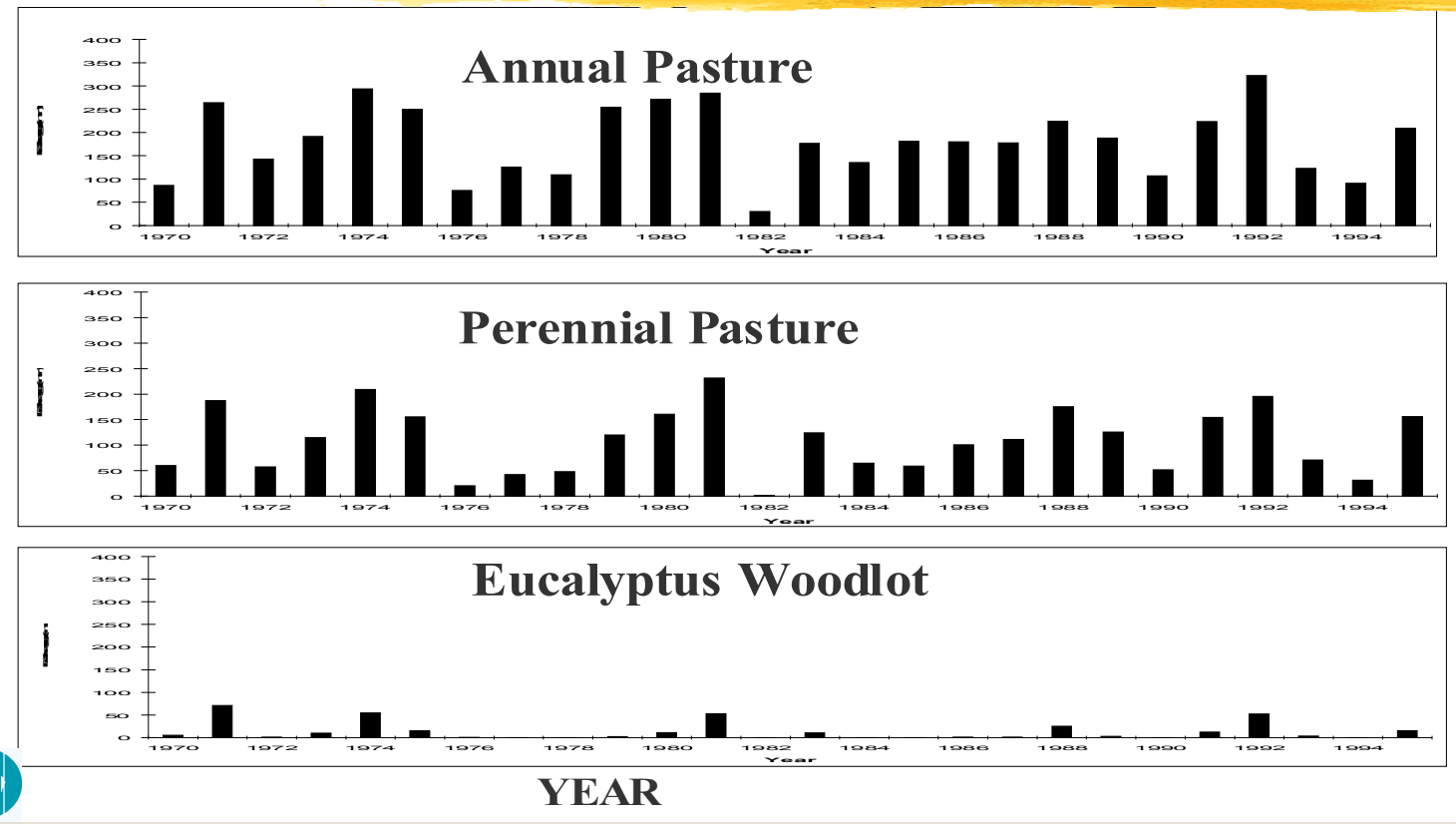
# Future Schemes



# Effectiveness of Dryland Farming Systems

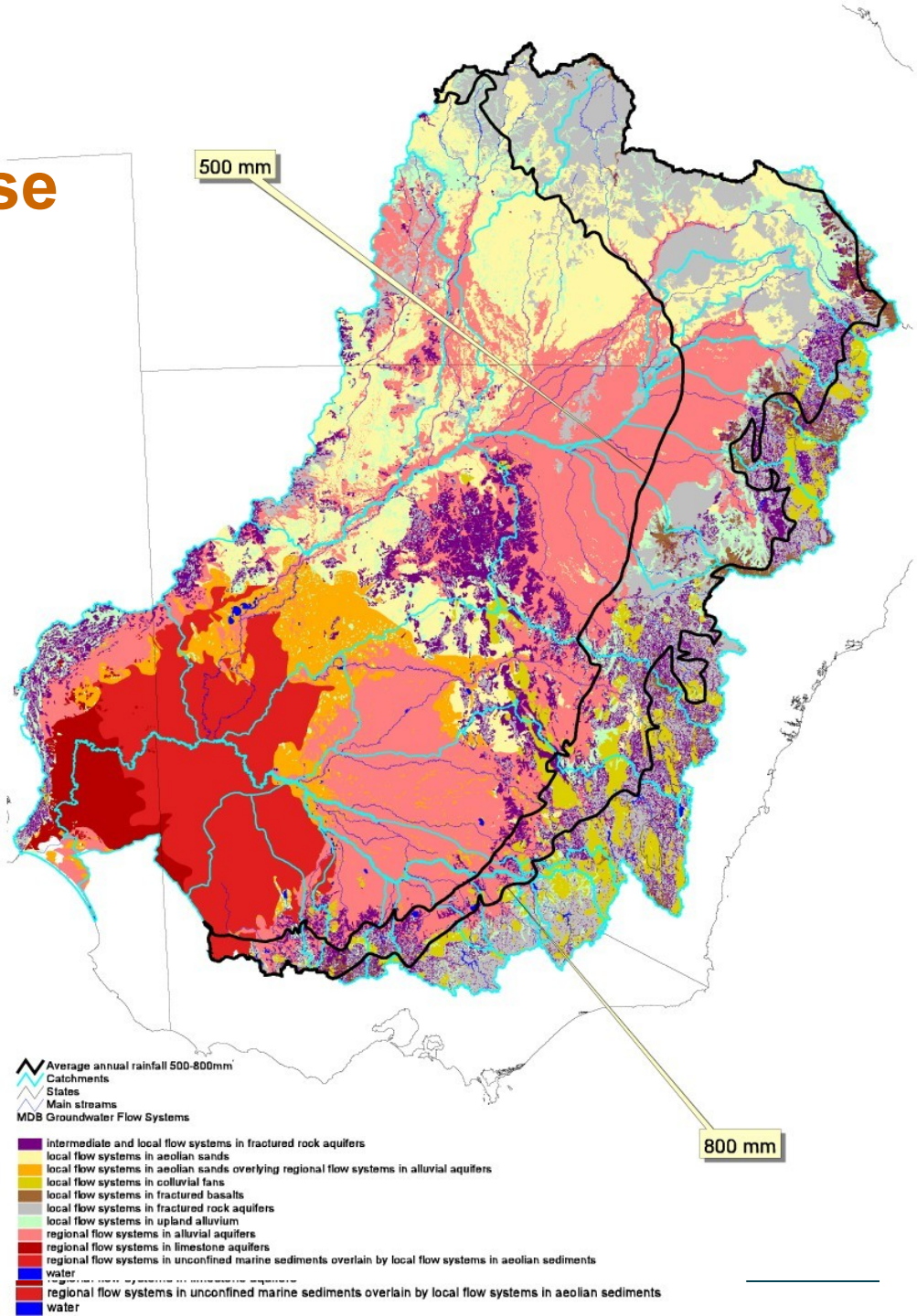
**Simulated annual deep drainage at Hamilton under annual and perennial pasture and Eucalyptus woodlot for 1970 to 1995**

Commercial-in-Confidence

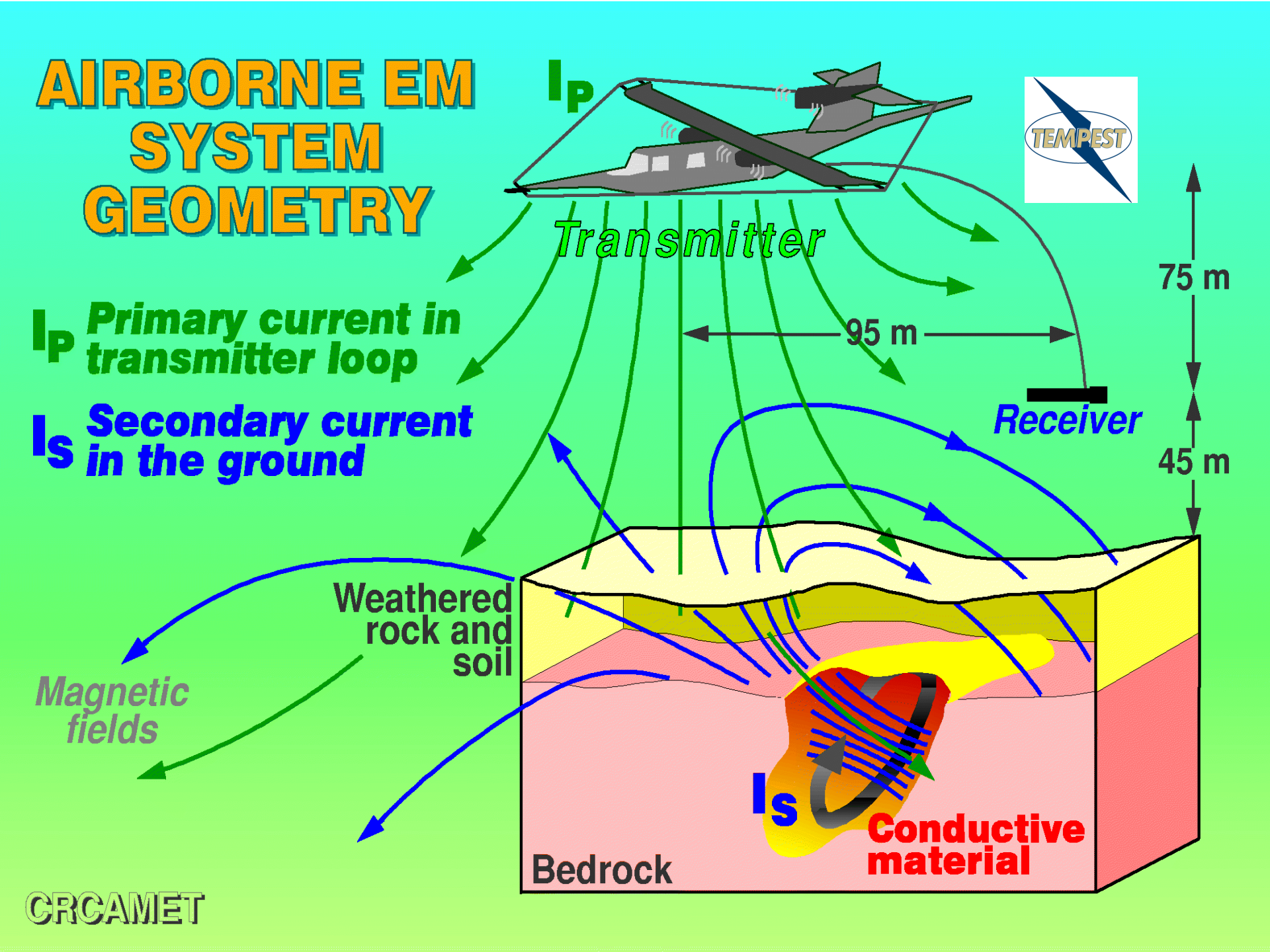


# Targeting Reforestation

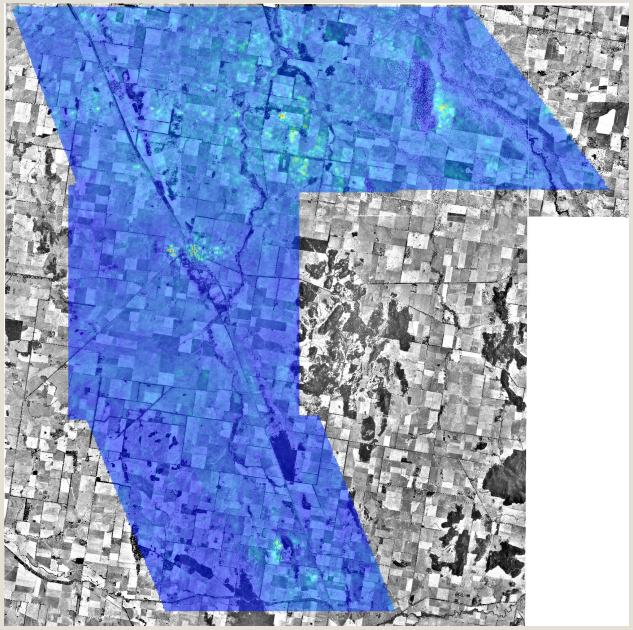
- **Groundwater Response**

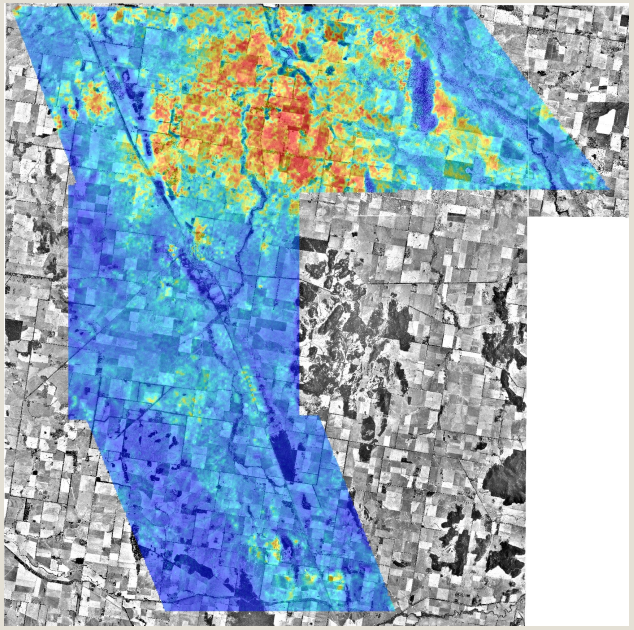


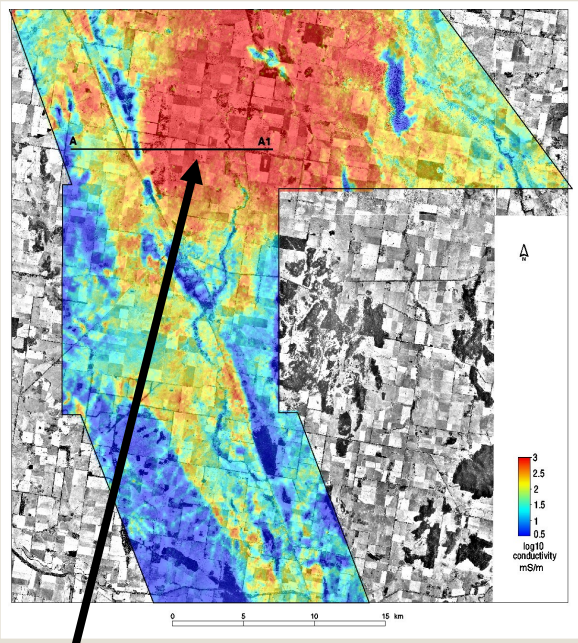
# AIRBORNE EM SYSTEM GEOMETRY



# Airborne Electromagnetics Locates Salt





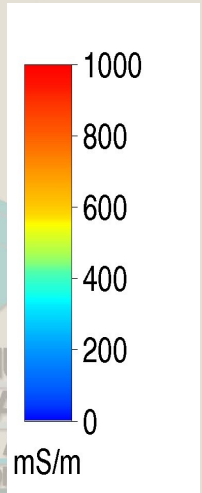


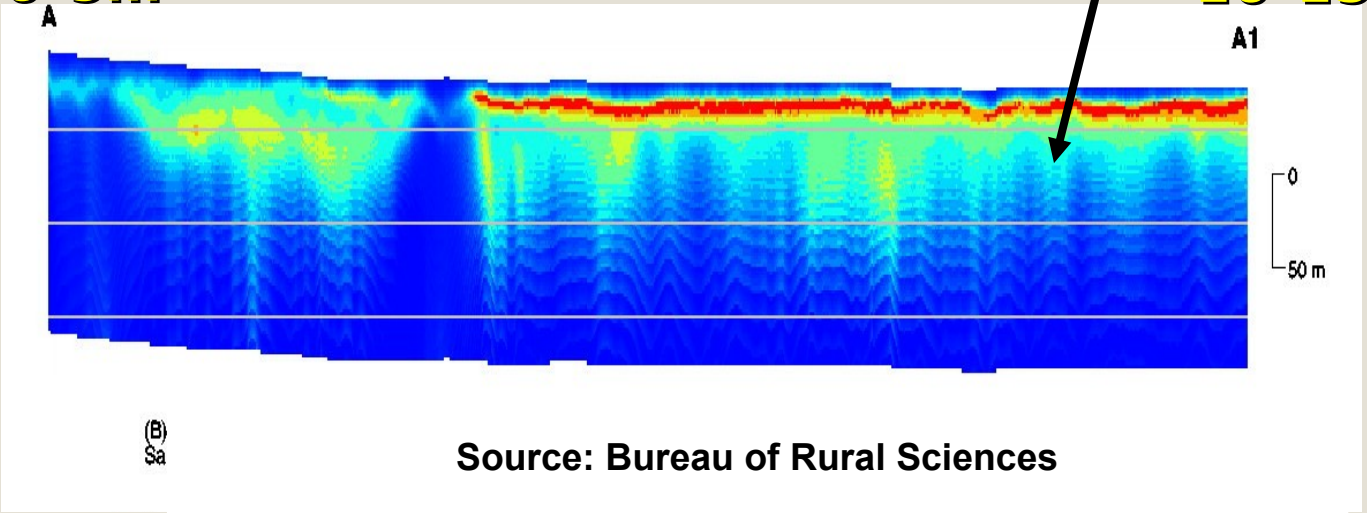

Conductivity

0-5m

5-10m

10-15m




Source: Bureau of Rural Sciences

# Woolpunda Salt Interception Scheme