



Managing Fleurieu Wetlands: Determining ecological response to water regime.



Australian Government
National Water Commission



Government of South Australia
Department of Water, Land and
Biodiversity Conservation



Outline

- Recap water allocation planning in the MLR and gaps in knowledge
- Propose some possible approaches to a water research program
- Facilitate discussion / brainstorming





Recapping workshop 1

- Many with an interest in swamps, with management aims that cross scales
 - Landholders
 - Conservation groups/Restoration programs
 - NRM Boards and State Government
 - Federal Government
- Water allocation planning
 - Regional scale
 - Largely dealt with by NRM Boards and State Government

Hydrology, and hence WAP, has an influence on all swamp management aims and approaches



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The nature of policy-based decisions

- Policies are set out to determine acceptable levels of development – these levels in physical sciences are relatively easy to develop. But for biology?
-wordy, hopeful and often no *practical* assistance:
 - *“The management of natural wetlands should aim to provide adequate water in an ecologically appropriate regime and of appropriate quality so as to maintain wetland functions and ecological values”* policy guideline from the State NRM Plan

My interpretation: ‘we actually have no idea how much water you can use without compromising the environment’



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Water allocation planning - MLR

- For each geomorphic reach type, determine ecologically critical characteristics of the flow regime
- Develop measures of these (metrics)
- Ensure policies protect these
- For the MLR done using
 - combination of expert opinion, clever use of existing data value-added through modelling
- Currently can be thought of as null hypotheses





Environmental water provisions to wetlands on the Fleurieu Peninsula (WMLR)

- A target of meeting 95% (c.f. 85%) of metrics of EWRs has been accepted for wetlands
 - Thought this will maintain the ecosystem at a low-moderate level of risk
- This equates to an allocation limit of 10% of runoff (c.f. 25%), with a provision of low flows from all dams larger than 5ML.
- Both of these thresholds need testing to determine and *demonstrate* their success in achieving aims





Knowledge gaps in WAP

- Key knowledge gaps/research needs
(from workshop 1, Jason VanLaarhoven, DWLBC)
 - Relative dependence on different water sources.
 - Relationship between Swamp ‘health’ and changes in the flow regime.
 - Thresholds, time-lag, recoverability.
 - Low flows, freshes, bankfull, overbank.





Relative dependence on different water sources

- Surface water, groundwater - which is most important for what process, and when?
 - Critical to determine – may be allocated differently
- How does each different water resource development affect these?
 - Change of landuse vs pumping from a well vs having an onstream farm dam

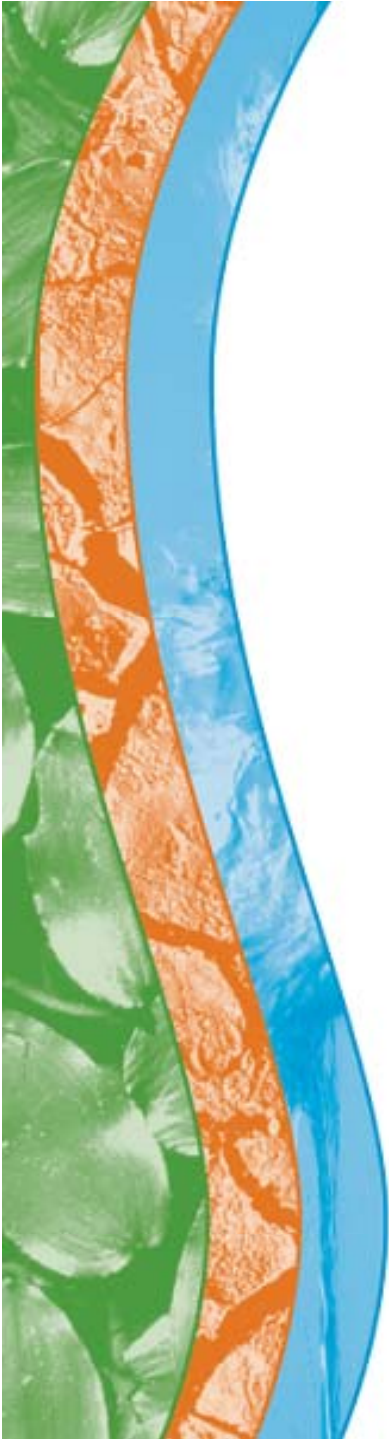




Relationship between swamp 'health' and changes in the flow regime

- Definition of health?
 - Critical point to clarify in quantifiable terms (usually avoided)
 - Effectively WAP equates regime with health – ideally would have agreed definitions and direct measures of 'health'





How might a project look?

- From Workshop1:
 - agreed testing the 10 and 25% thresholds was critical for WAP
 - Actually a test of the metrics and the underlying functional theories
 - Also agreed that a ‘production impact’ component was critical
 - I have not addressed, but should be included as it is critical understanding
 - Don’t lose this!

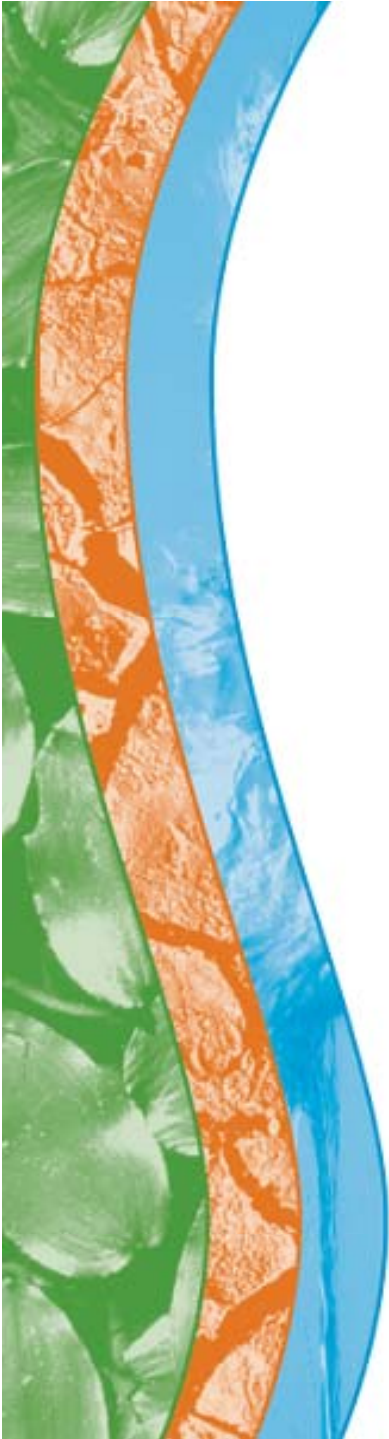




How might a project look?

- Could create a series of expected swamp 'character types' under different water availability scenarios
 - Effectively a state-transition model based on the level of water availability
 - What does a supply unlimited swamp 'look like' and how does swamp character change along a water availability continuum
 - Would be an effective tool:
 - Water allocation and restoration planning
 - Monitoring and evaluation
 - Rapid assessment
 - Community extension



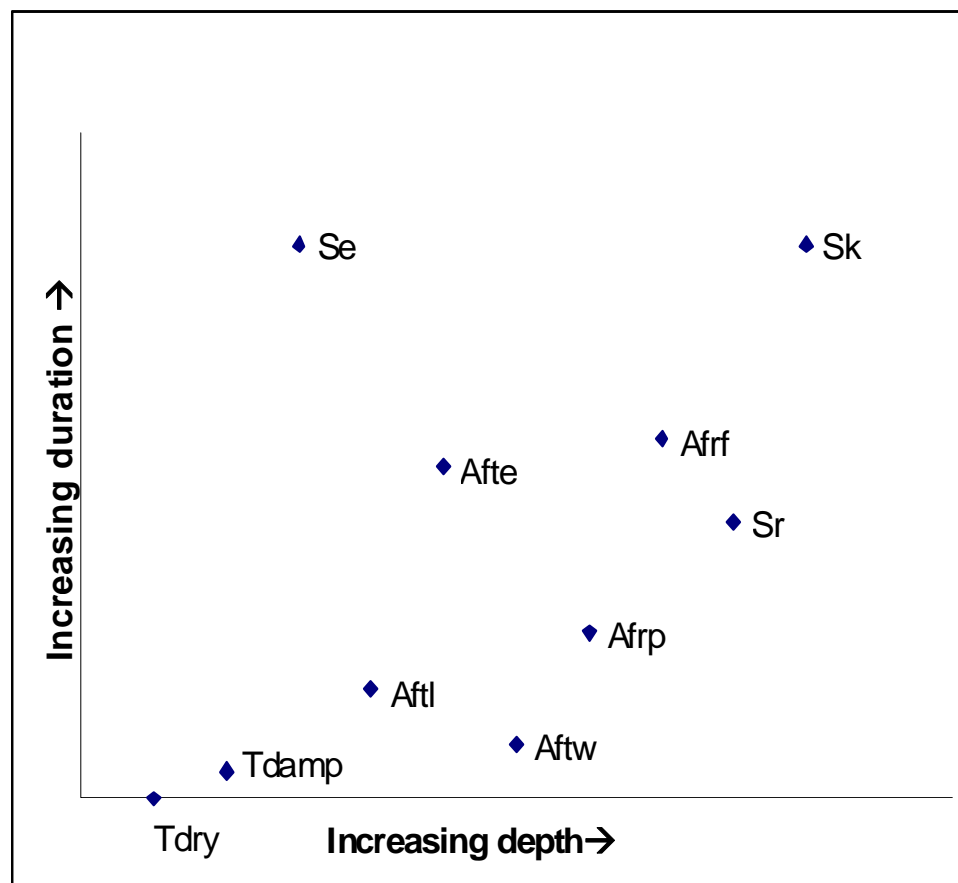


Initial investigations

- Meta-analysis of existing data, value adding to it through:
 - Remote sensing survey – to determine 'wet' vs 'dry' swamps
 - Classify swamps into categories
 - Modelling
 - Eg synthetic streamflow records to interpret vegetation patterns
 - GIS modelling – eg on water use, edaphic, landuse or other criteria
- Base analyses on functional groupings



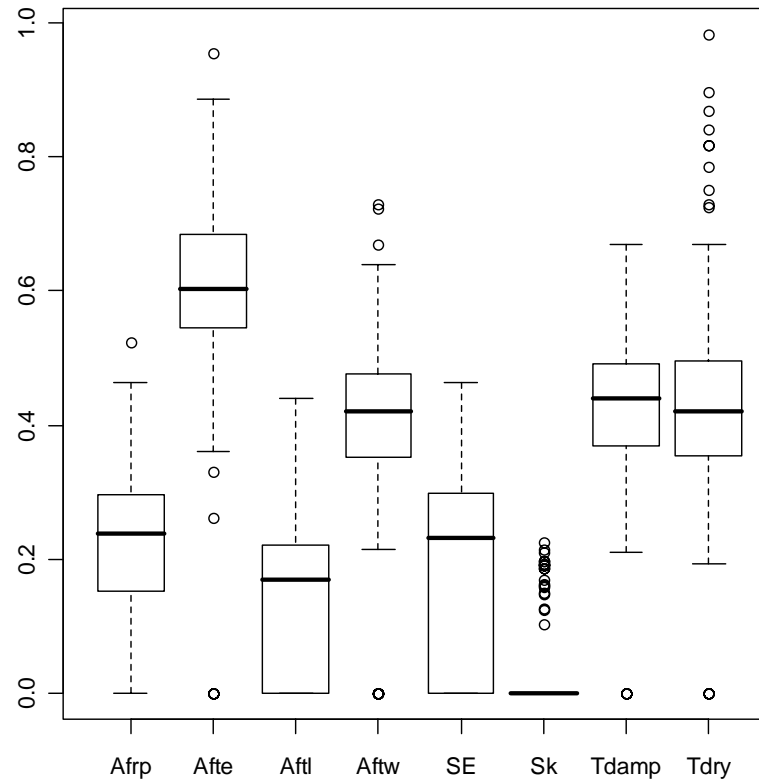
Vegetation functional groups



From unpub. EWR workshop report (SA MDB NRM/DWLBC).
Adapted from work by M. Casanova, M. Brock, J. Nicol, T.
Doeg and others (apologies to any missing persons!)

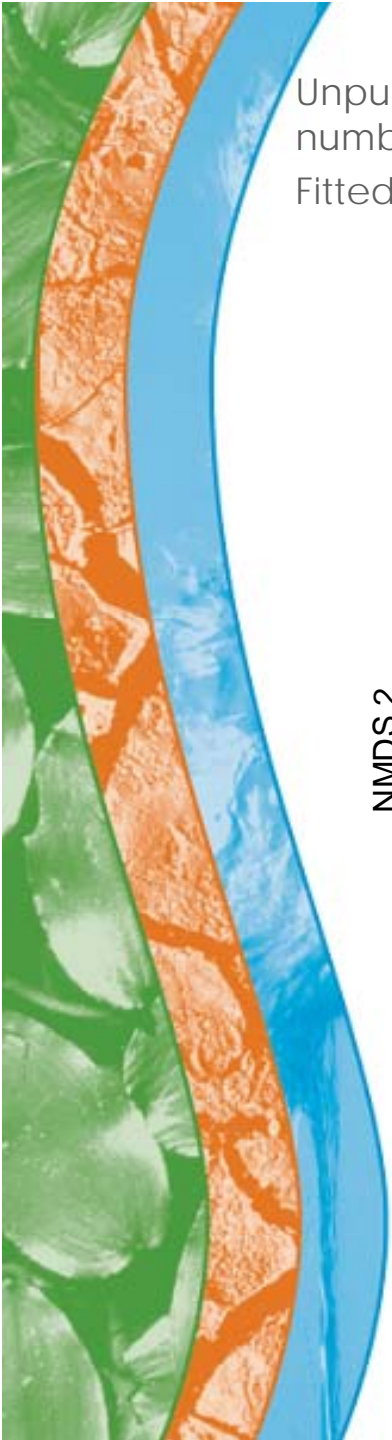


Vegetation functional groups – perched wetlands only

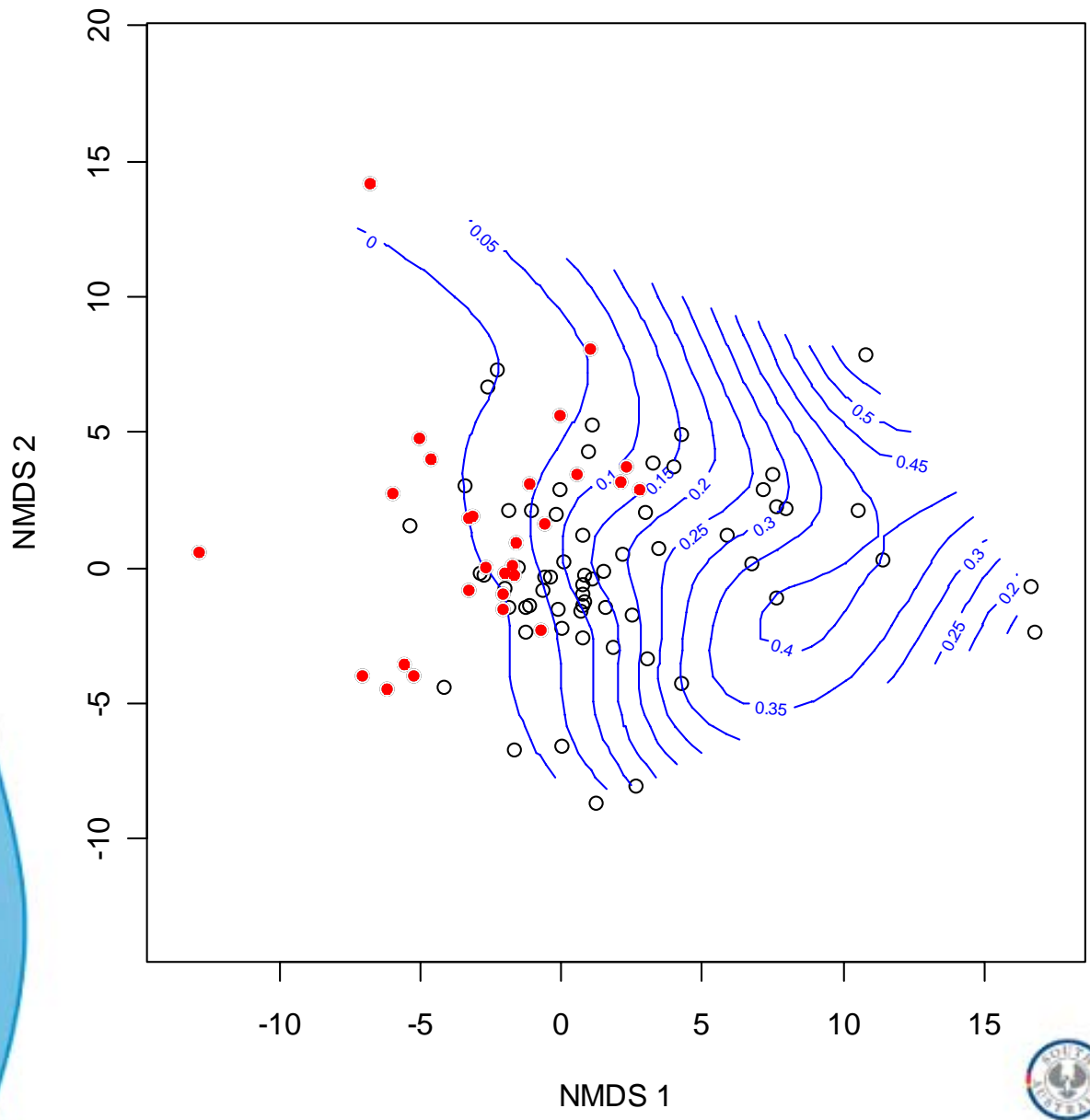


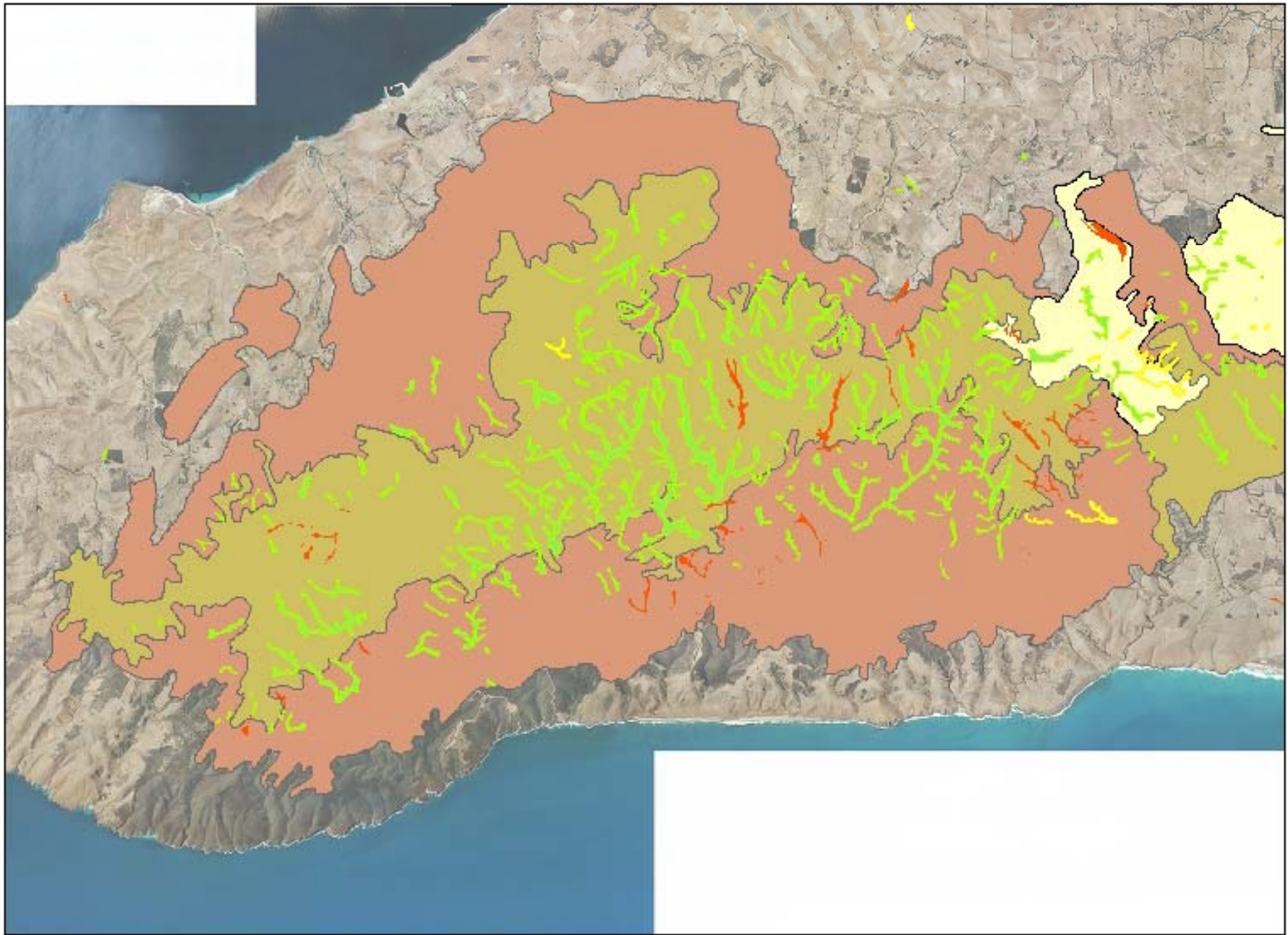
Unpublished summary of SAWID data – proportional number of species in each VFG, perched swamps only.





Unpublished summary of SAWID data – NMDS of swamp vegetation by proportional number of species in each VFG, perched swamps only.
Fitted surface is estimated catchment water use (% of total resource)







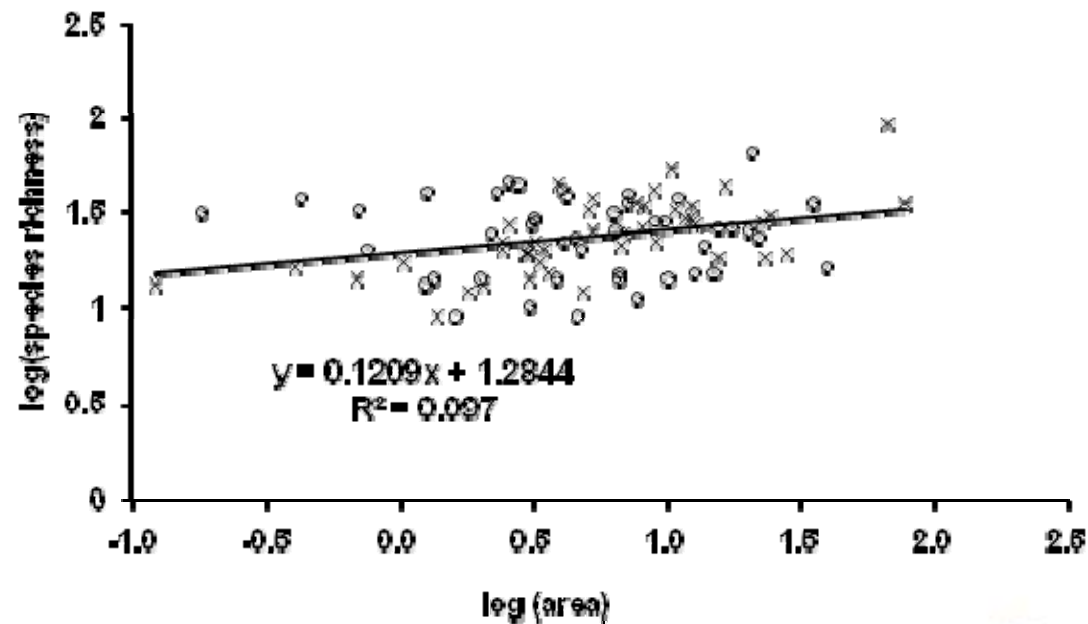
Project phases

- Meta-analysis and planning (Yr 1)
 - using existing and derived data, develop expectations of swamp types under different water supply
 - design of field and lab program
 - Establish monitoring infrastructure
- Field and laboratory experimentation (Yr 2 - 4)
 - Confirm and refine the state models
 - Quantify critical thresholds that may lead to transitions
 - Selection of long-term field trial sites for ongoing work (RP)
- Reporting and communication (Yr 5+)
 - Development of field 'typing' guides
 - Involvement in WAP policy review (esp. 10% rule)
 - Ongoing monitoring and refinement

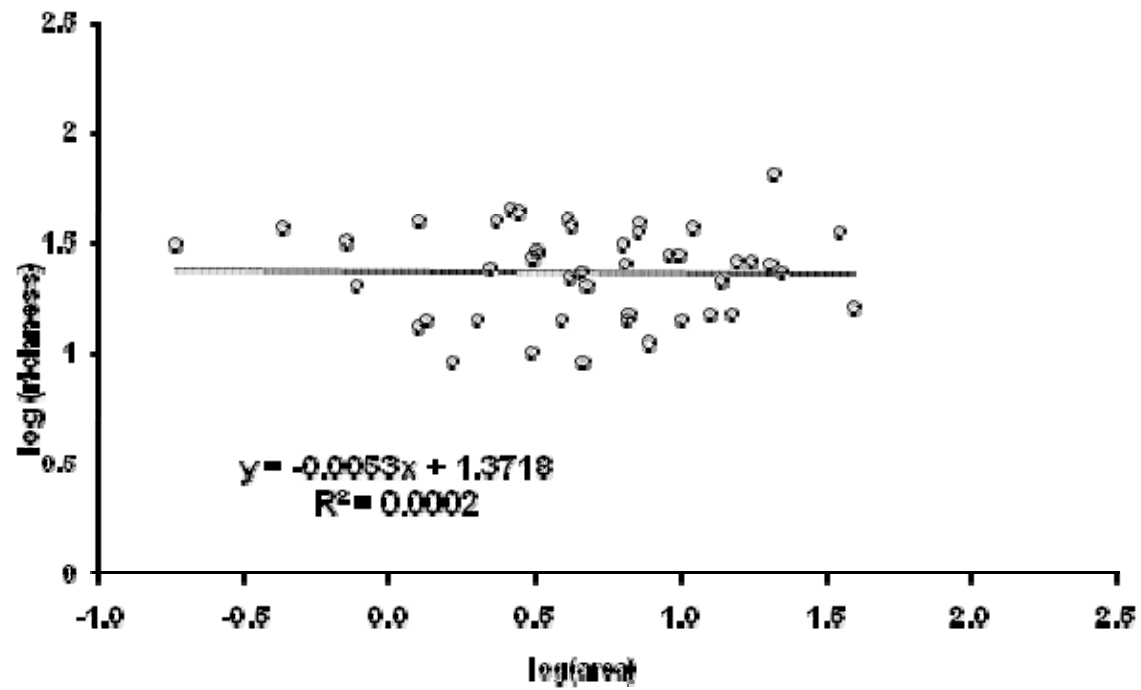


Example of meta-analysis potential: species-area model

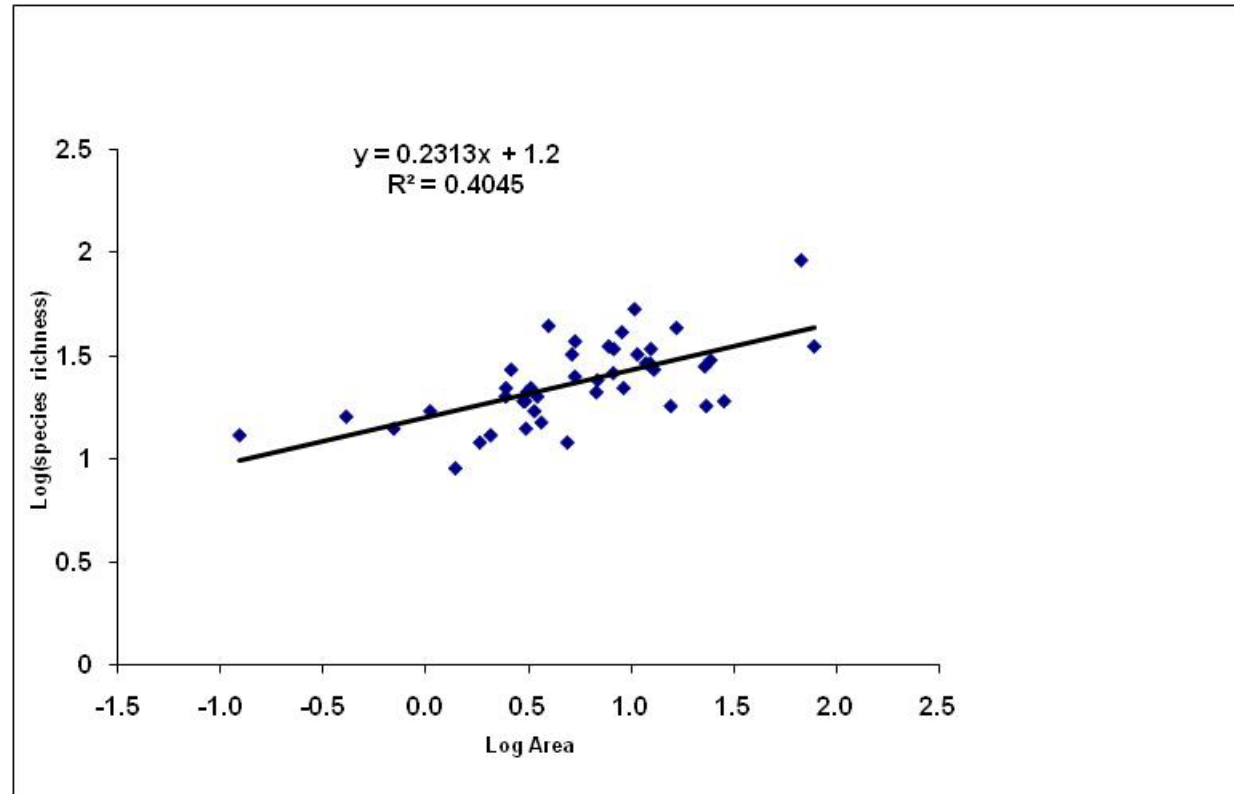
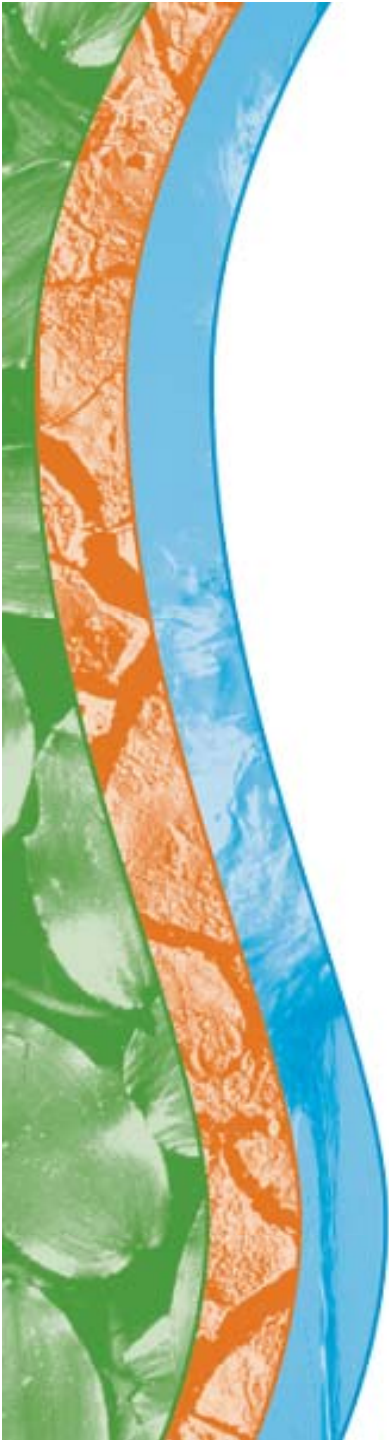
- Returning to the question of 'health' – we could see biodiversity as a measure.
 - Is wetland area correlated with species richness in perched swamps?



Grazed sites only.



Non-grazed sites only.



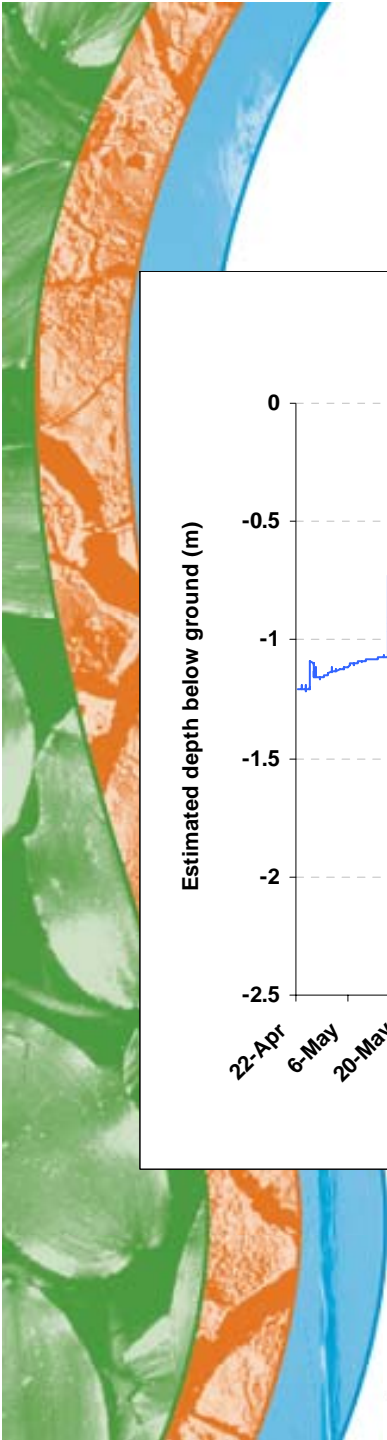


Potential field investigations

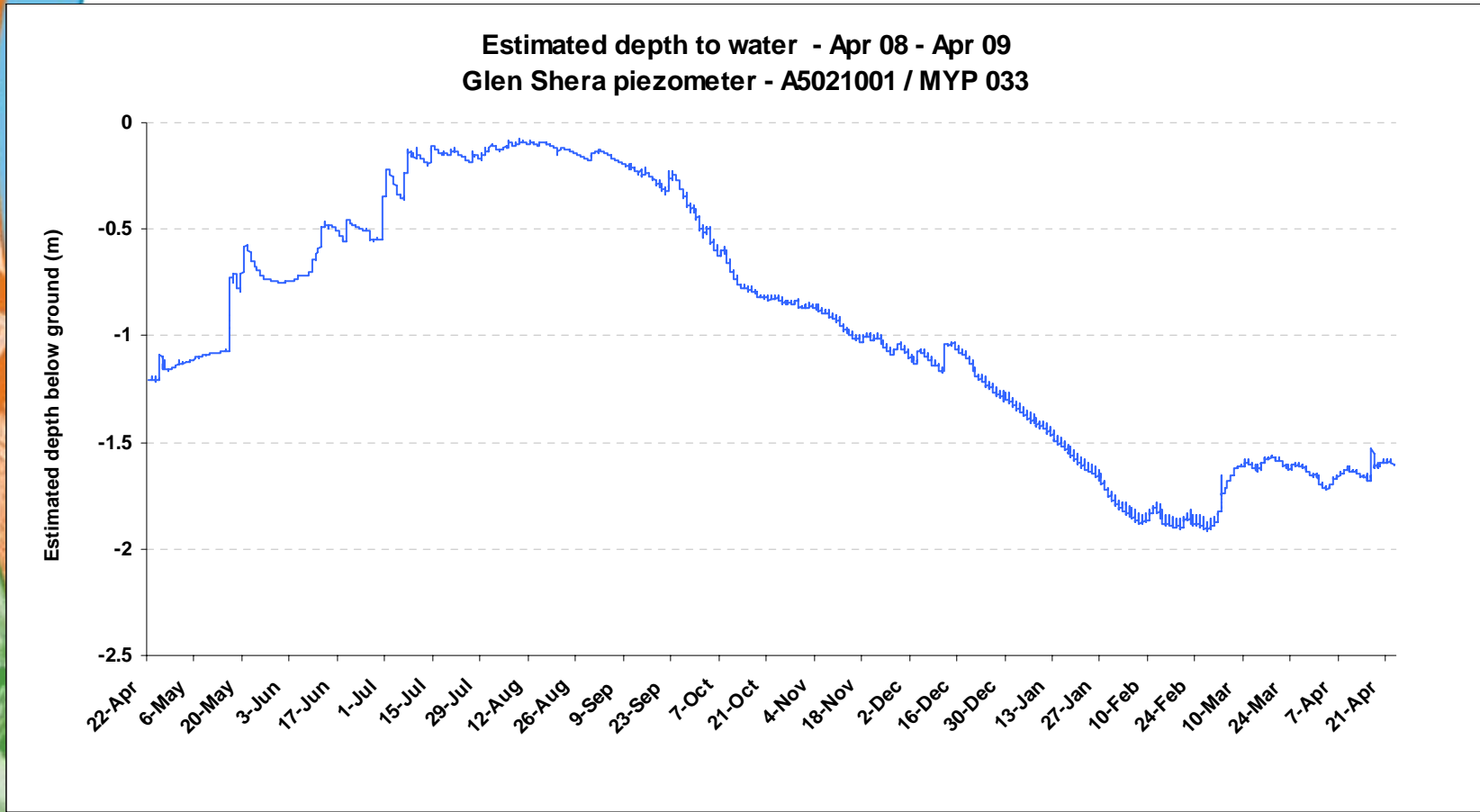
- Glen Shera swamp (Stipiturus CP)
 - Shallow observation well (~ 3m) with data logger deployed in April 2008
 - 12 months+ of hourly water level readings
 - Digital elevation model
 - Link observed vegetation to water regime
 - From this begin to establish 'envelopes of wetness' favouring a given functional group at the site







Estimated depth to water - Apr 08 - Apr 09
Glen Shera piezometer - A5021001 / MYP 033



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