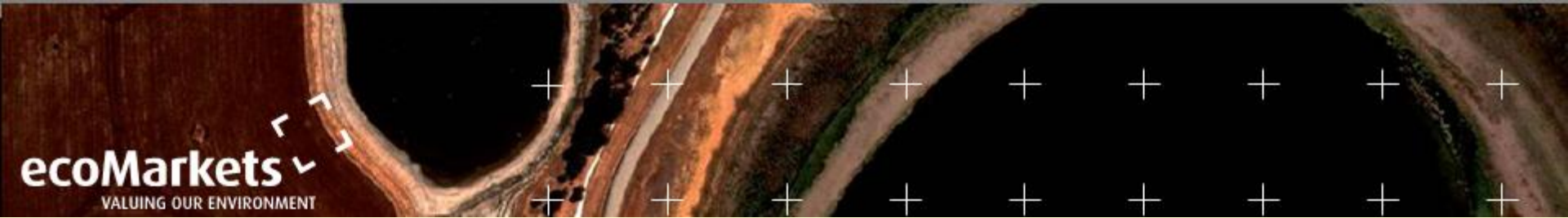


# **An empirical examination of the gains in cost-effectiveness from the use of multiple environmental outcome conservation tenders.**

Claire Edwards and Mark Eigenraam

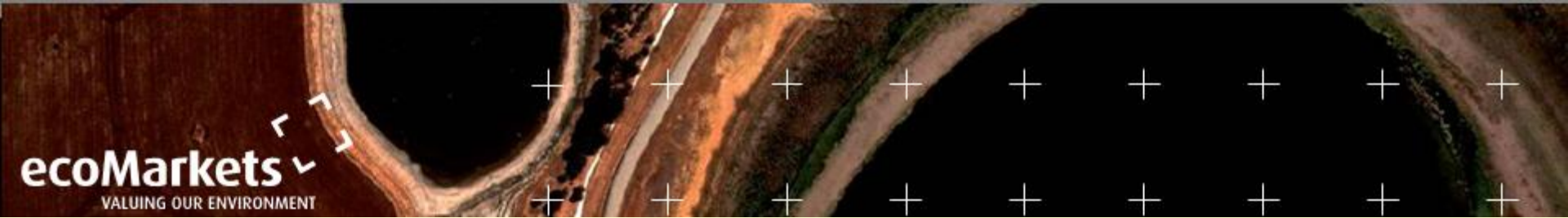
**Economic Policy Branch**

Department of Sustainability & Environment



## Background

- Lack of incentives for private landholders to produce public environmental benefit.
- Government has a co-ordination role to purchase these outcomes on behalf of society.
- Conservation tenders are a favoured way of doing this.
  - Cost revelation incentives
  - Metrics to quantify environmental benefits



# Conservation tenders

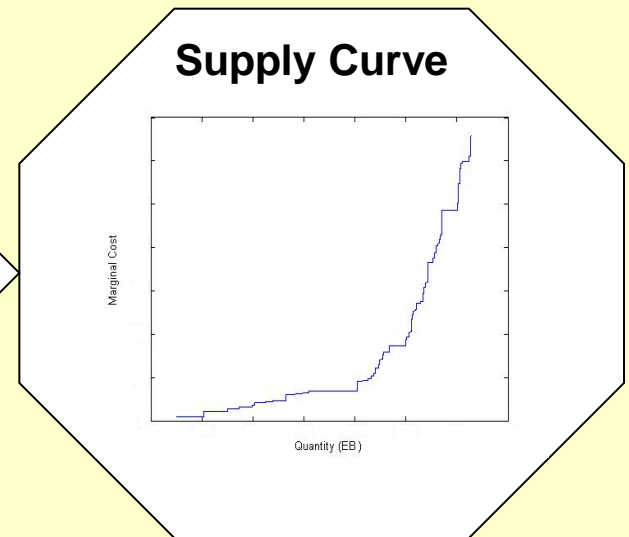
**Landholders** select management interventions and bid-price

**Agency** uses scientific metric to calculate expected environmental outcome (EB)

**Agency** ranks bids from lowest to highest \$/EB

**Agency** selects 'good value' bids until budget (or reserve price) exhausted

Successful **landholders** enter contracts with **agency**

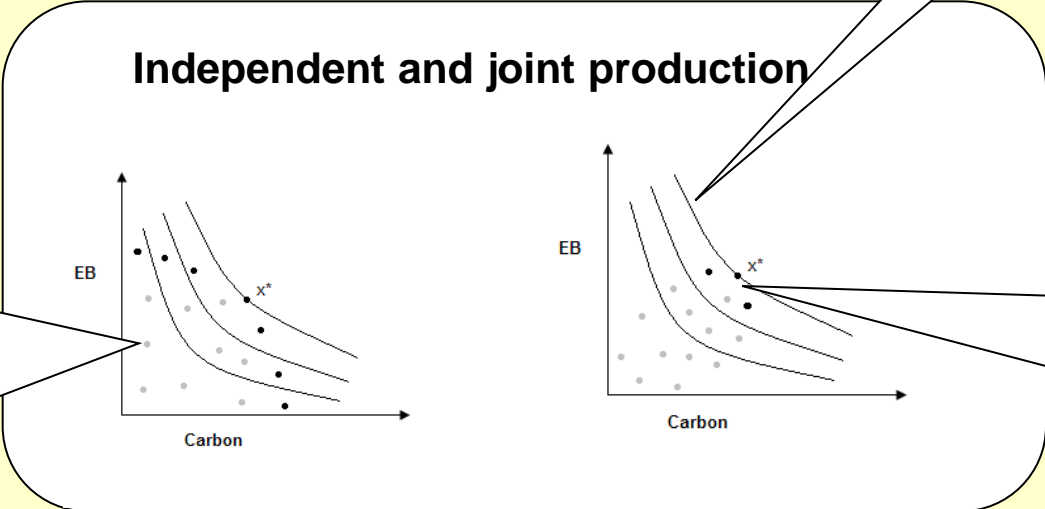


# Joint Production in Tenders

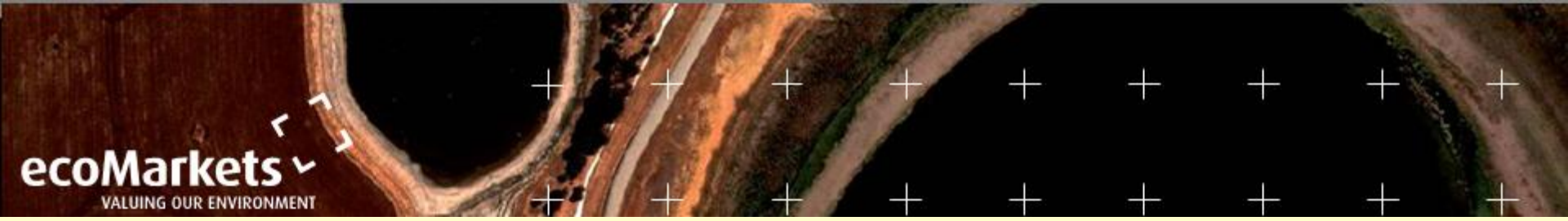
- Most tenders implemented in Victoria focus on a single environmental outcome
  - e.g. BushTender, RiverTender, Carbon Tender
- However sometime goods are jointly produced
  - e.g. revegetation may produce carbon and native vegetation outcomes.
- It is often cheaper to produce goods together than separately (economies of scope).

Society's indifference curves

Combination of bids that satisfies budget constraint

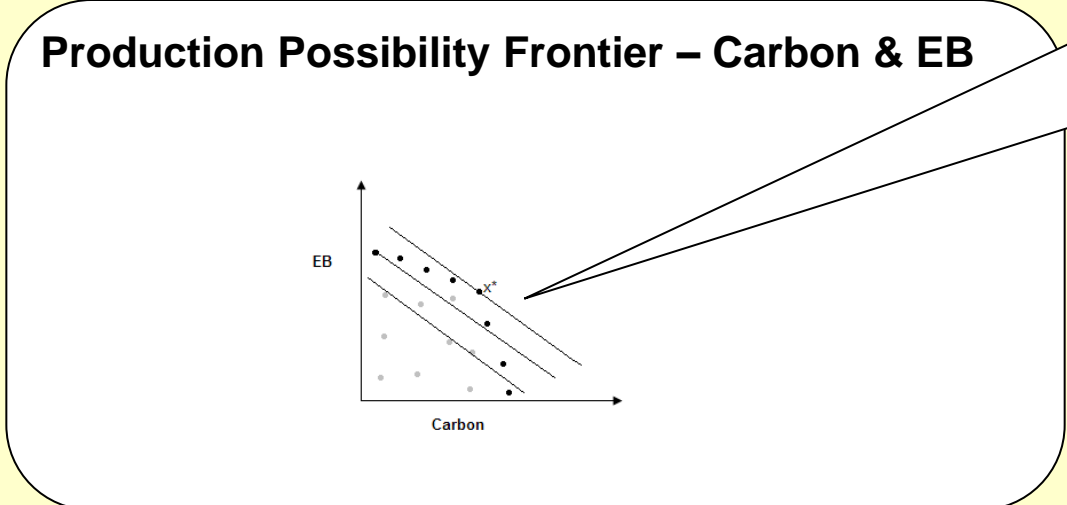


Optimal combination of bids subject to budget constraint

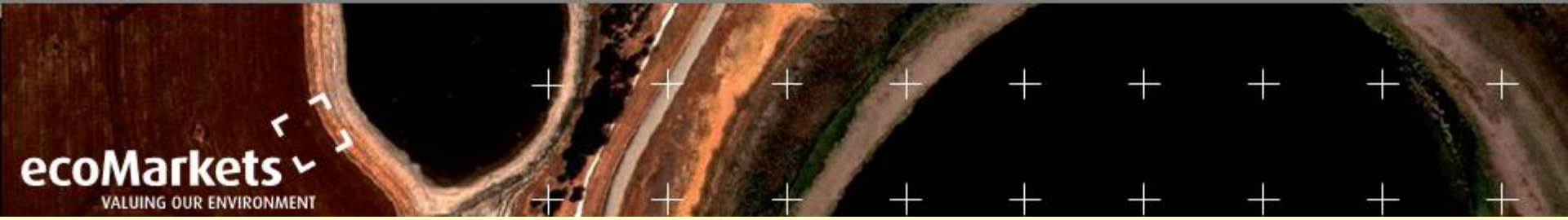


# Multiple outcome tenders

- Target two or more environmental outcomes together
- Agency preferences between outcomes represented by linear weightings.
- Overall environmental outcome is a weighted sum of individual outcomes.



Society's preferences represented by linear weightings



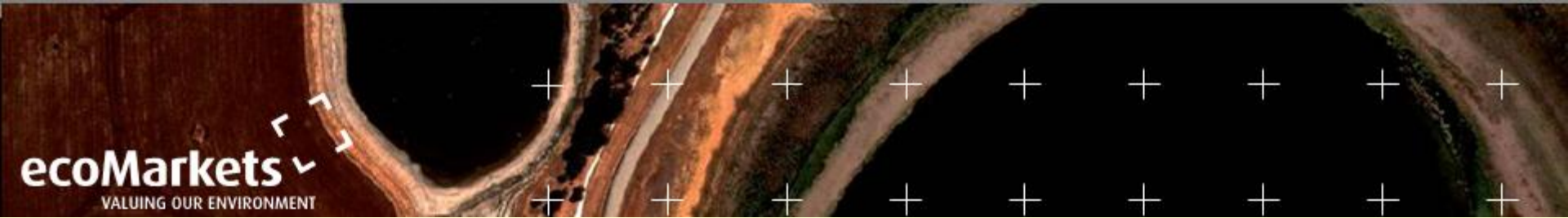
## Some Policy Options...

**BASELINE:** Multiple outcome tender focussing on carbon, river and native vegetation benefits.

**OPTION1:** Single outcome tender

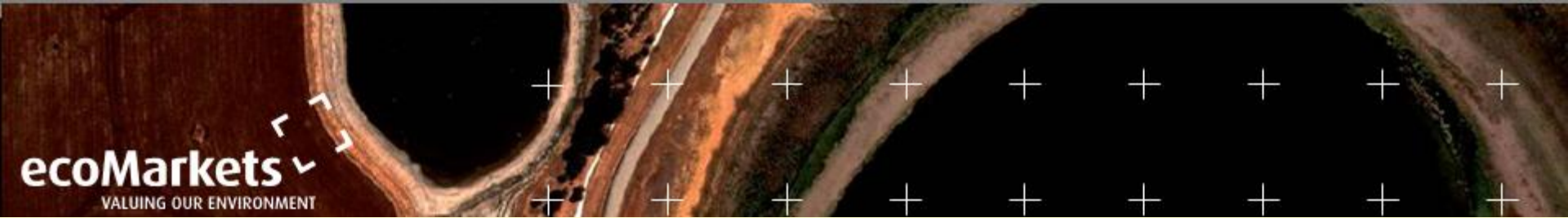
**OPTION2:** Consecutive single outcome tenders (1/3 budget allocated to each tender)

**OPTION3:** Separate Single outcome tenders (1/3 landholders assigned to each tender, 1/3 budget allocated to each tender)



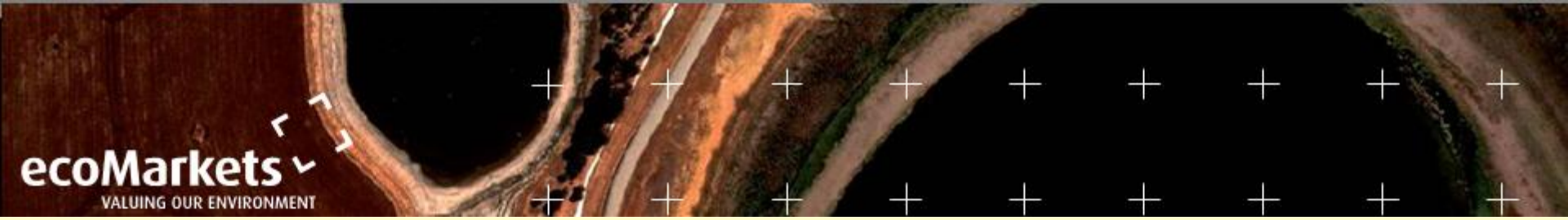
## Our Analysis...

- Synthetic datasets generated with characteristics of West Gippsland EcoTender data:
  - Bid
  - Native vegetation score
  - Carbon score
  - River score
  - EB defined to equal: Native Vegetation+Carbon+River
- Monte Carlo Analysis
  - 10,000 iterations
  - Synthetic dataset generated
  - Baseline and 3 policy alternatives computed
  - Scores recorded for each outcome and total EB
- Summary statistics calculated over simulation dataset.



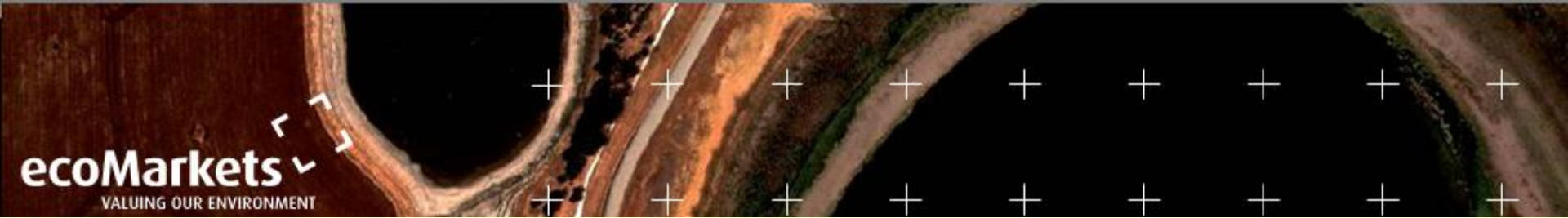
## Our Assumptions...

- Scoring systems (metrics) exist that accurately predict the relationship between landholder actions and outcomes.
- Scores for each outcome are distributed normally with the same level of variation as WG EcoTender.
- The agency values each outcome equally.
- The agency obtains constant utility for each additional unit of all outcomes – no diminishing marginal returns.

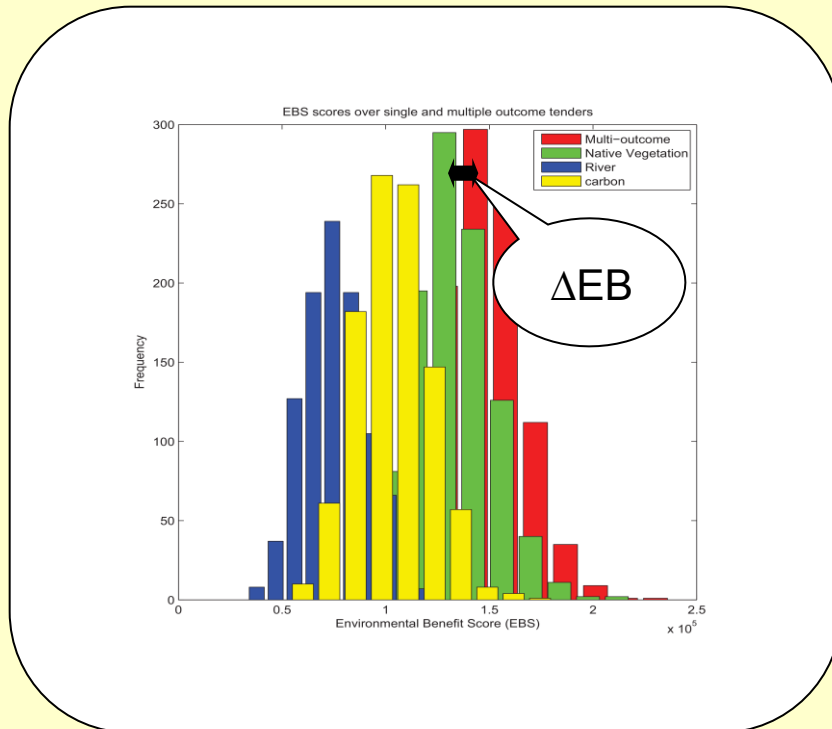


## Questions:

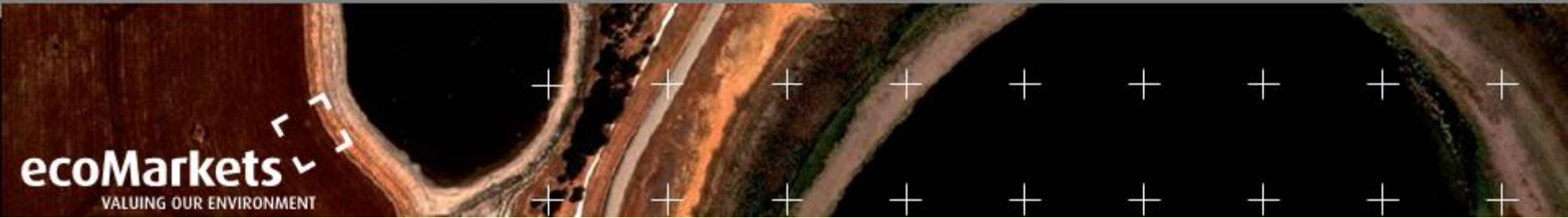
- How does the multiple outcome tender compare to the three policy alternatives in regard to the environmental benefit obtained?
- How sensitive are our comparisons to changes in the input data?



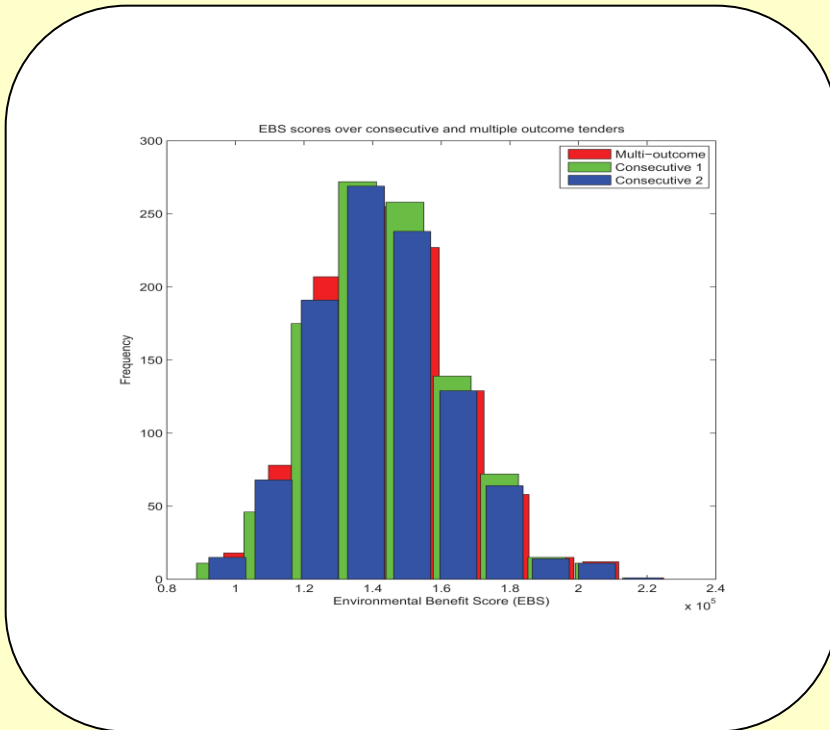
# Results: single outcome tender



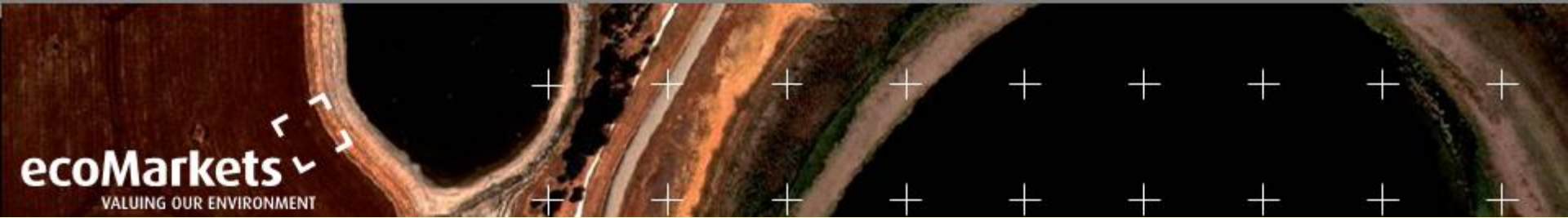
- The multiple outcome tender results in an average of 12 percent more EB than a native vegetation tender.
- EB gains (multiple/native veg) range from 3-33%
- Scores for 'carbon' and 'river' are lower due to stricter eligibility requirements preventing high EB sites being selected.



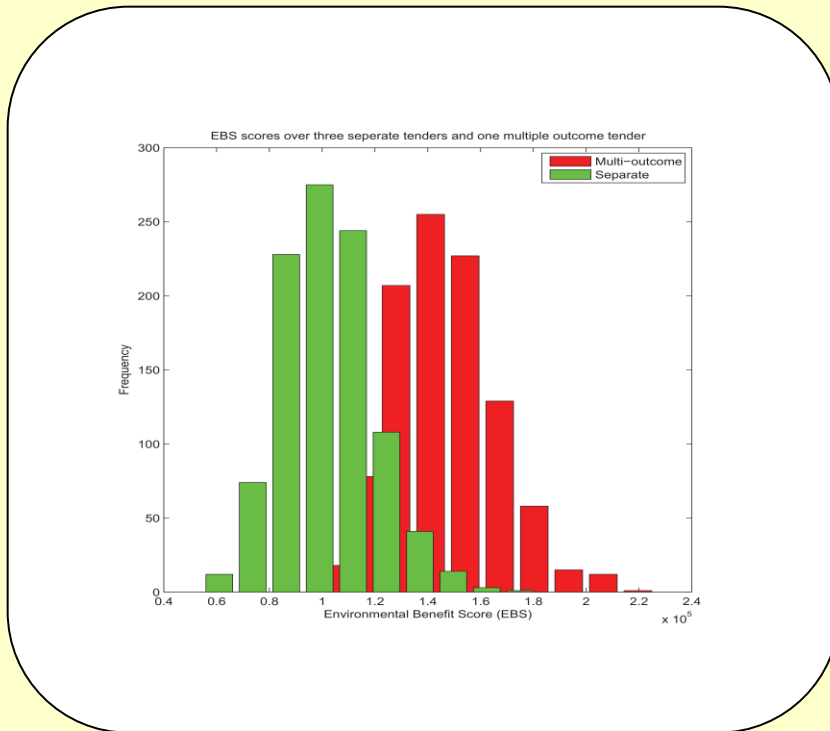
# Results: Consecutive single outcome tenders



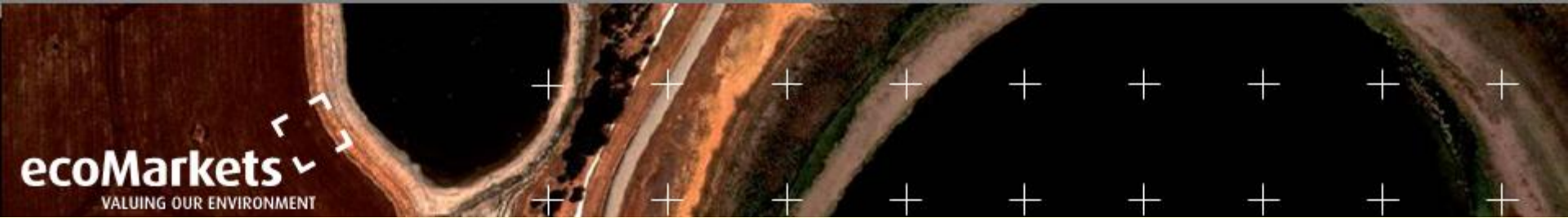
- The multiple outcome tender results in an average of 2% more EB than consecutive tenders (both orderings).
- EB gains (multiple over consecutive) range from 0-6%.
- The consecutive tender performs better than 1 single outcome tender due to all outcomes being considered.



# Results: 3 separate single outcome tenders



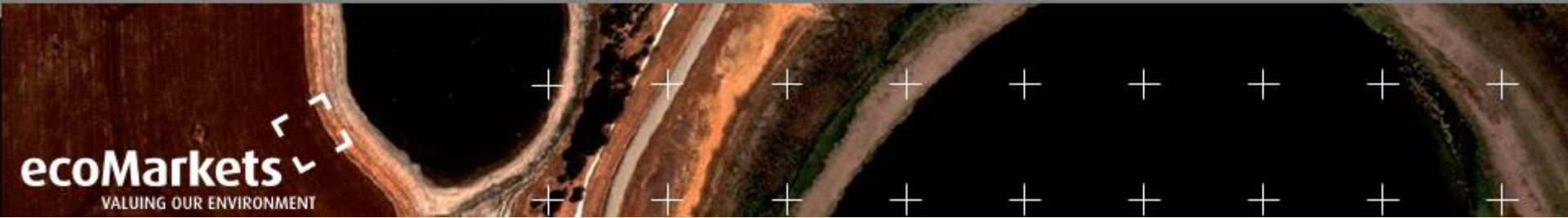
- The multiple outcome tender results in an average of 42 % more EB than 3 separate single outcome tenders.
- EB gains (multiple/3 separate) range from 12-100%
- Strict eligibility requirements in 'carbon' and 'river' tenders prevent some high EB sites being selected.



## Limitations:

In reality...

- landholders will tailor their bids to the tender they are bidding in:
  - Actions will be chosen to target outcomes scored
  - Bids will be dependent on the landholders prediction of their own score in relation to competitors scores for the outcomes considered.
  - Data used in this simulation is likely to demonstrate a higher level of joint production as it is modelled on data from a multiple outcome tender.
- Landholders are expected to self-select into tenders where they expect to perform better.
  - Tender selection in option 3 (3 separate tenders) was random.

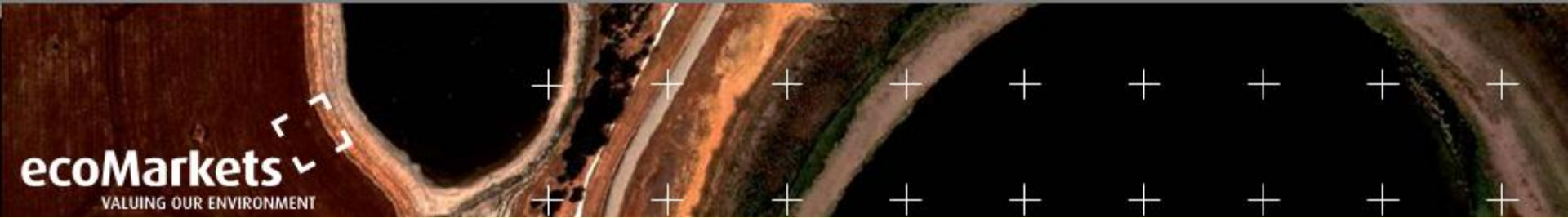


# Policy Issues:

- Results from this analysis indicate that cost-effectiveness gains can be made from running multiple outcome tenders.
- Targeting outcomes together may also reduce transaction costs (e.g. advertising, contract management etc).
- It is difficult to predict cost-effectiveness gains from running a multiple outcome tender ex-anti.

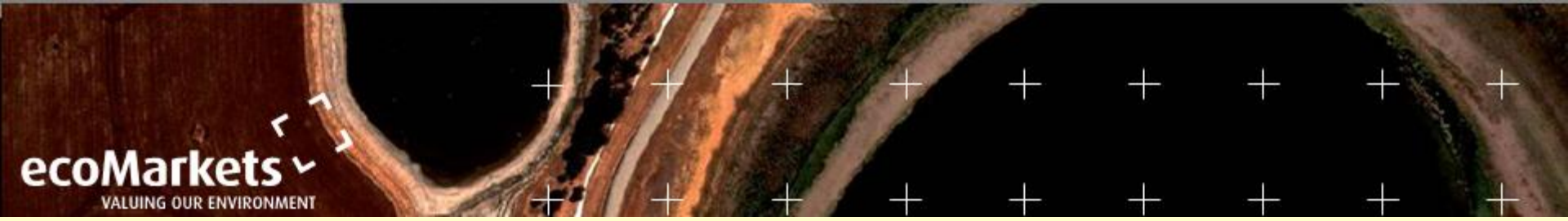
BUT

- Traditionally, different areas of government have responsibility for different outcomes.
- Co-ordination is required to target multiple outcomes together.
- Priority areas for different outcomes may not overlap.
- There is a risk to groups entering into multiple outcome tenders that less (worst case none) of their outcome is obtained.
  - Their outcome may be less cost-effective than others.
  - The metric may under-value their outcome relative to others.



## Further Work:

- Landholder behaviour under different policy options
  - Experiments
- Demand side for environmental outcomes
  - Preferences over different environmental outcomes
  - Synergies and trade-offs between outcomes
- Investigation of budget defined preferences.
  - Groups responsible for outcomes each rank on the outcome they desire.
  - Sites that are selected in more than one ranking are cost shared.



Thankyou!