

# Maximising genetic diversity in translocated populations of clonal saltmarsh plants

*A case study on *Wilsonia backhousei**

Sommerville K, Rossetto M, Pulkownik A (2013)  
Wetlands Ecology and Management **21**, 339-351



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# Background

Coastal saltmarsh – saline, periodically flooded, many clonal plants

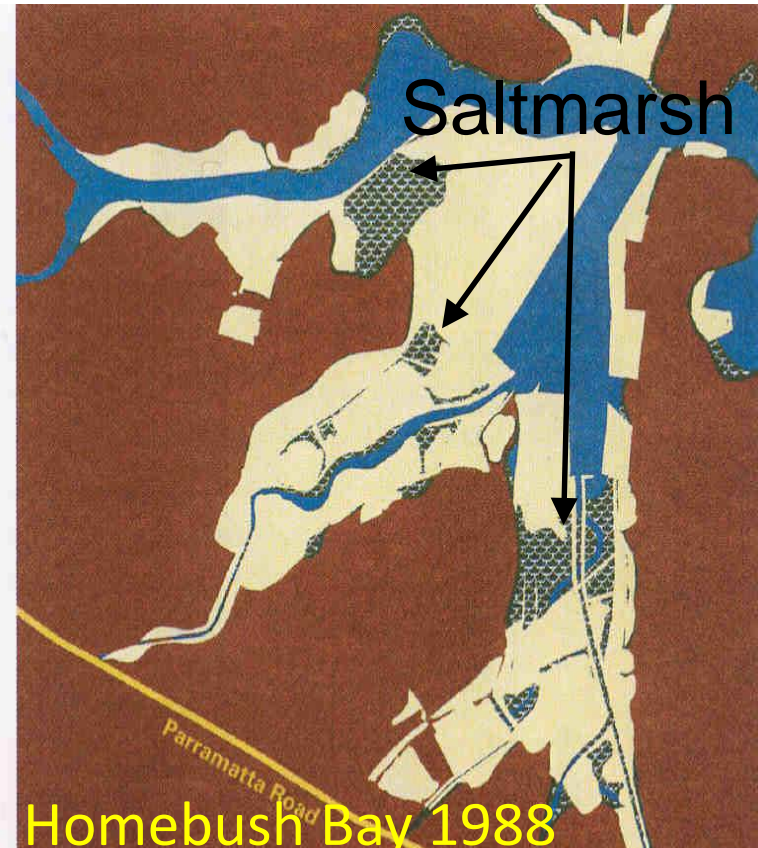
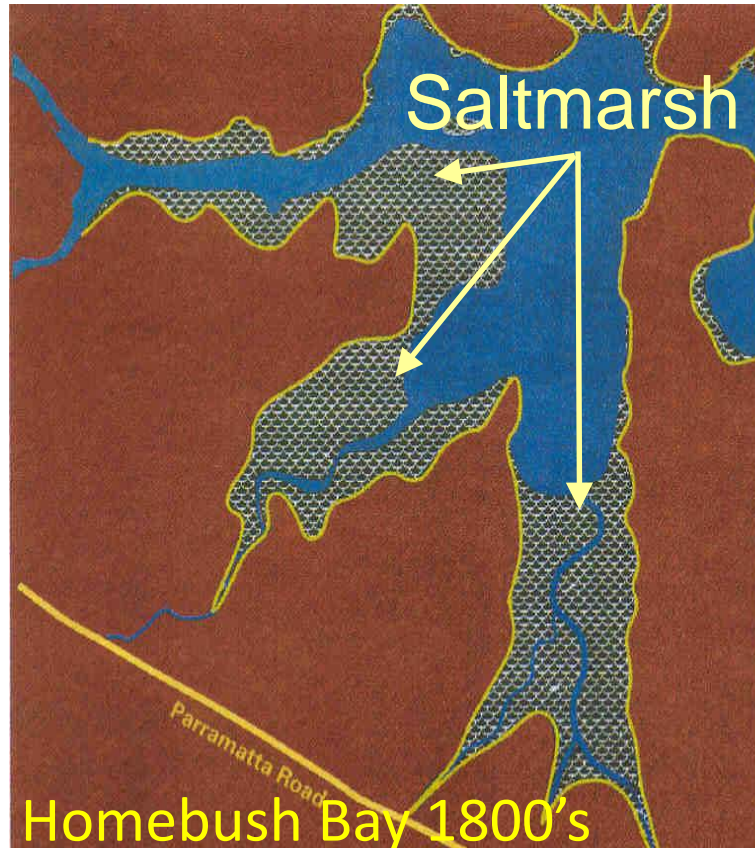


Voyager Point NSW – dry and flooded by a king tide



# Background

Coastal saltmarsh is endangered in NSW, vulnerable nationally



Source: Sydney Olympic Park Authority

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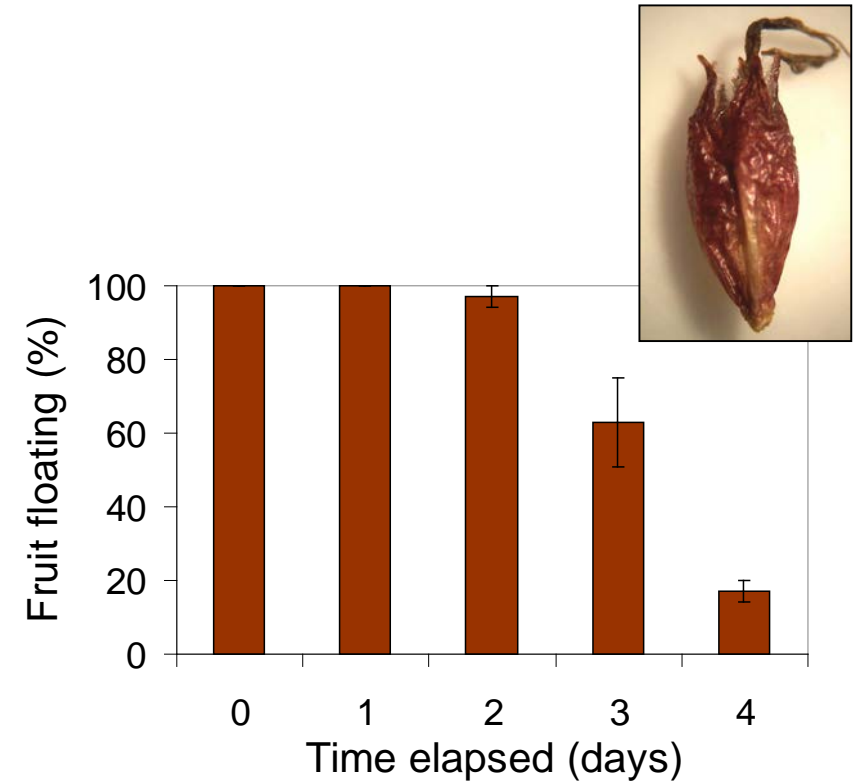
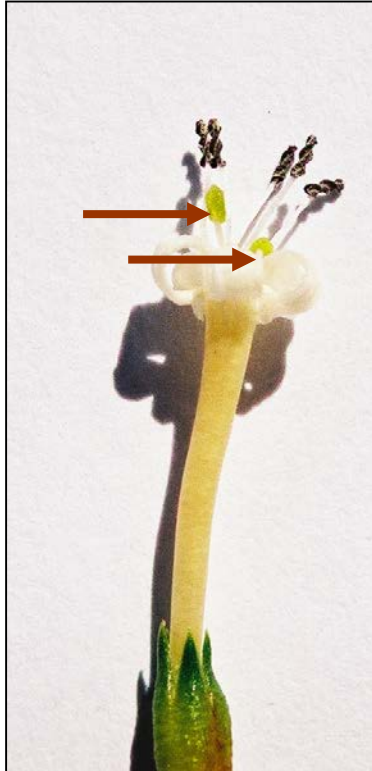
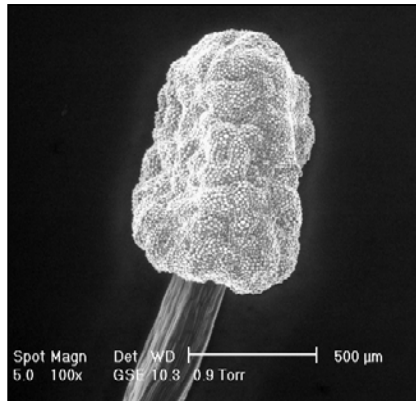
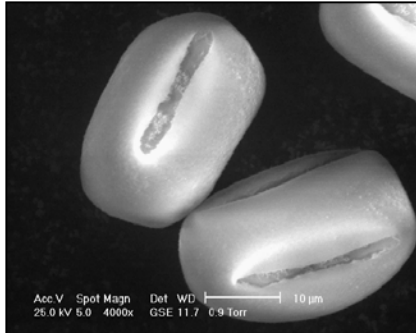
# Background

*Wilsonia backhousei* – endemic, clonal, individuals hard to distinguish



# Background

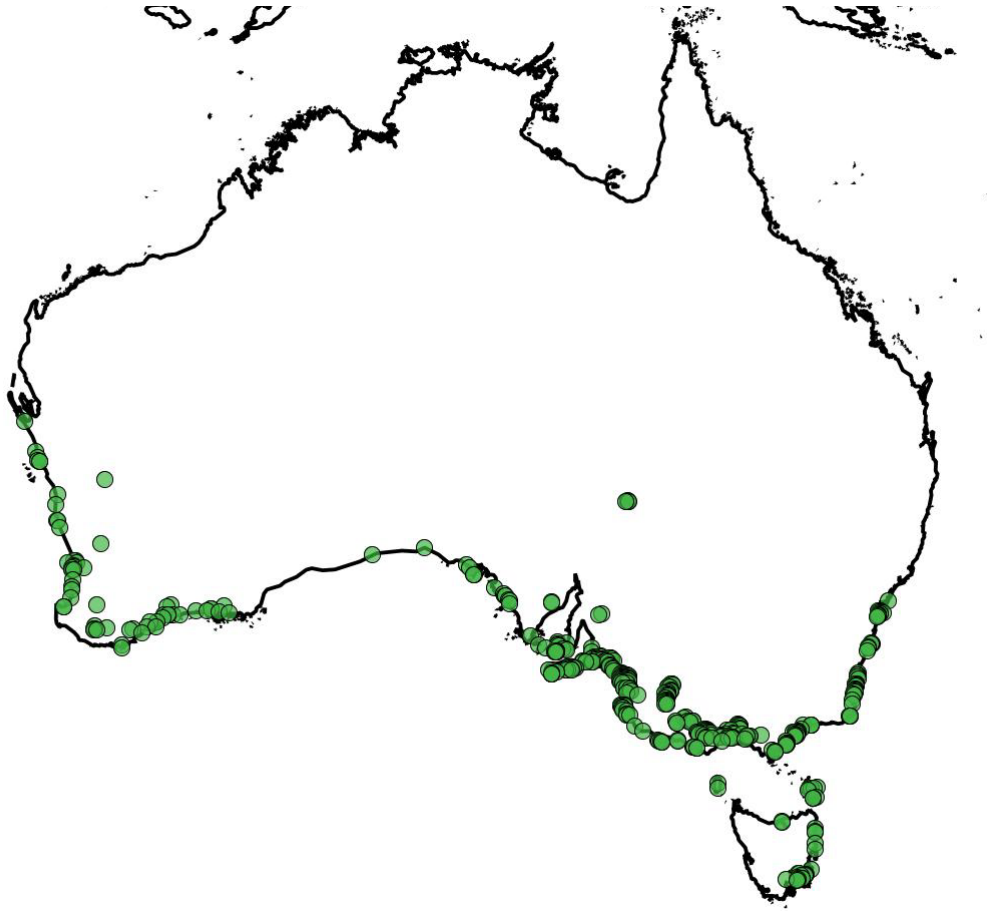
*Wilsonia backhousei* – outbreeding, wind pollinated, dispersed by tides



Sommerville *et al.* (2012) *Aquatic Botany* **99**, 1-10.

# Methods

## Study location

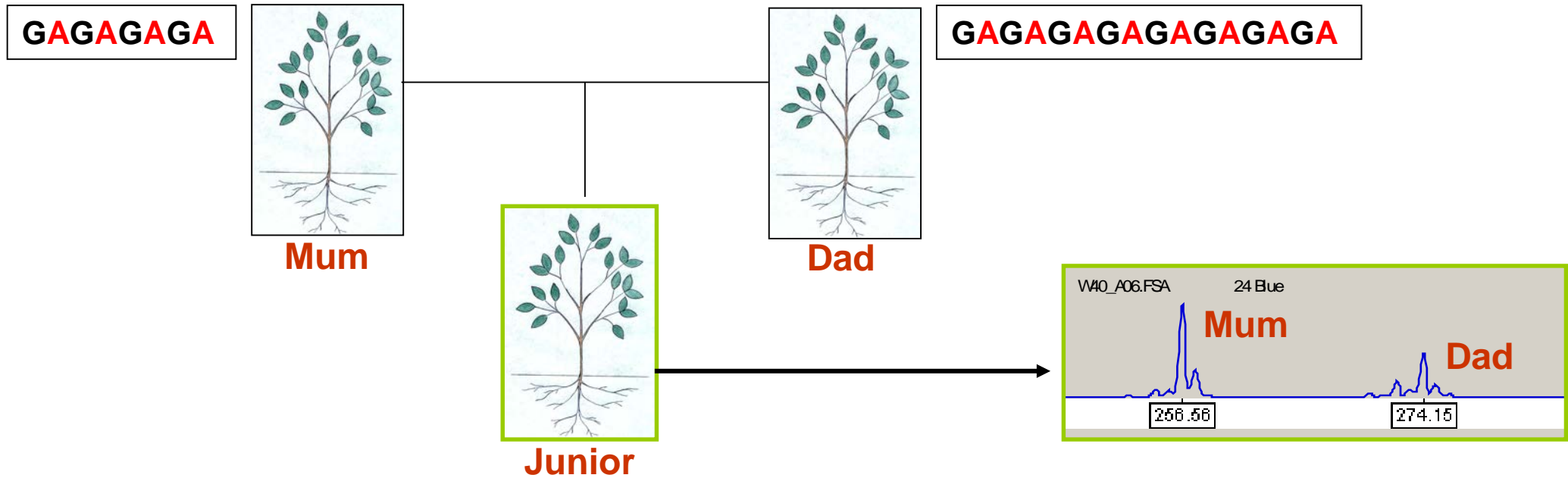




# Methods

## Genetic diversity

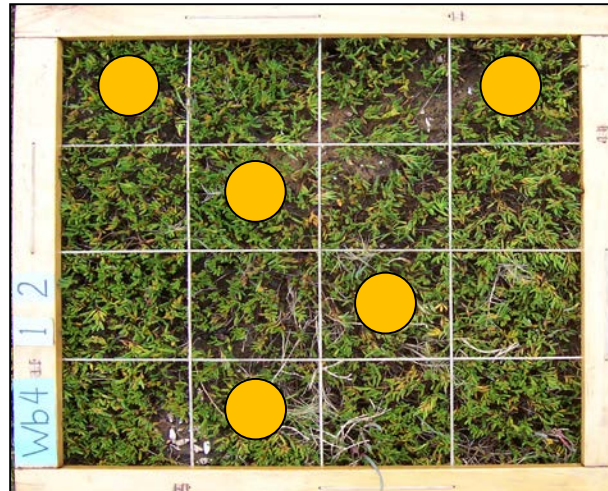
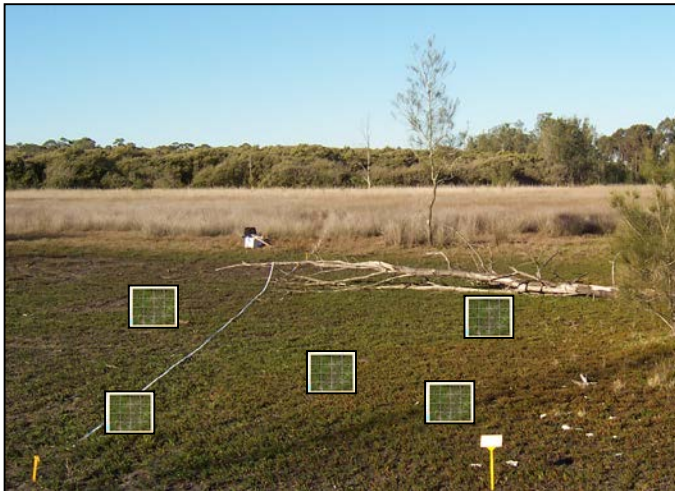
- 13 populations, 236 samples
- Individuals identified using 8 microsatellite markers + GenClone2



# Methods

## Reproductive success

- 3-5 quadrats per site, 5 subdivisions per quadrat
- % cover; number flowers, fruit, seed
- Soil moisture, pH, salinity





# Results

## Diversity not related to site size

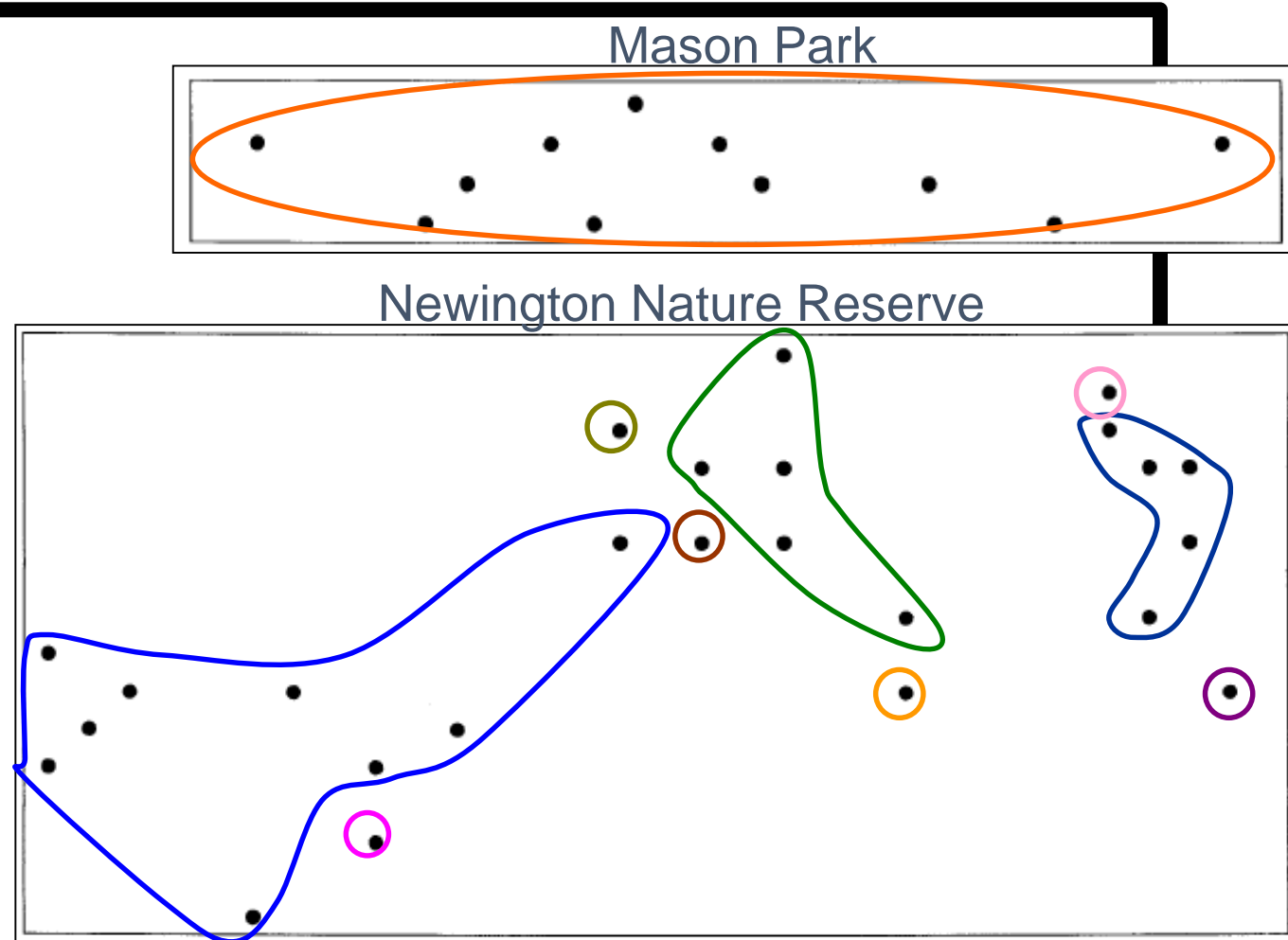
- 1 to 26 individuals per site
- One ind. covered 225m<sup>2</sup>
- No individuals at > 1 site

## PCoA and Structure analysis

- Extent of gene flow

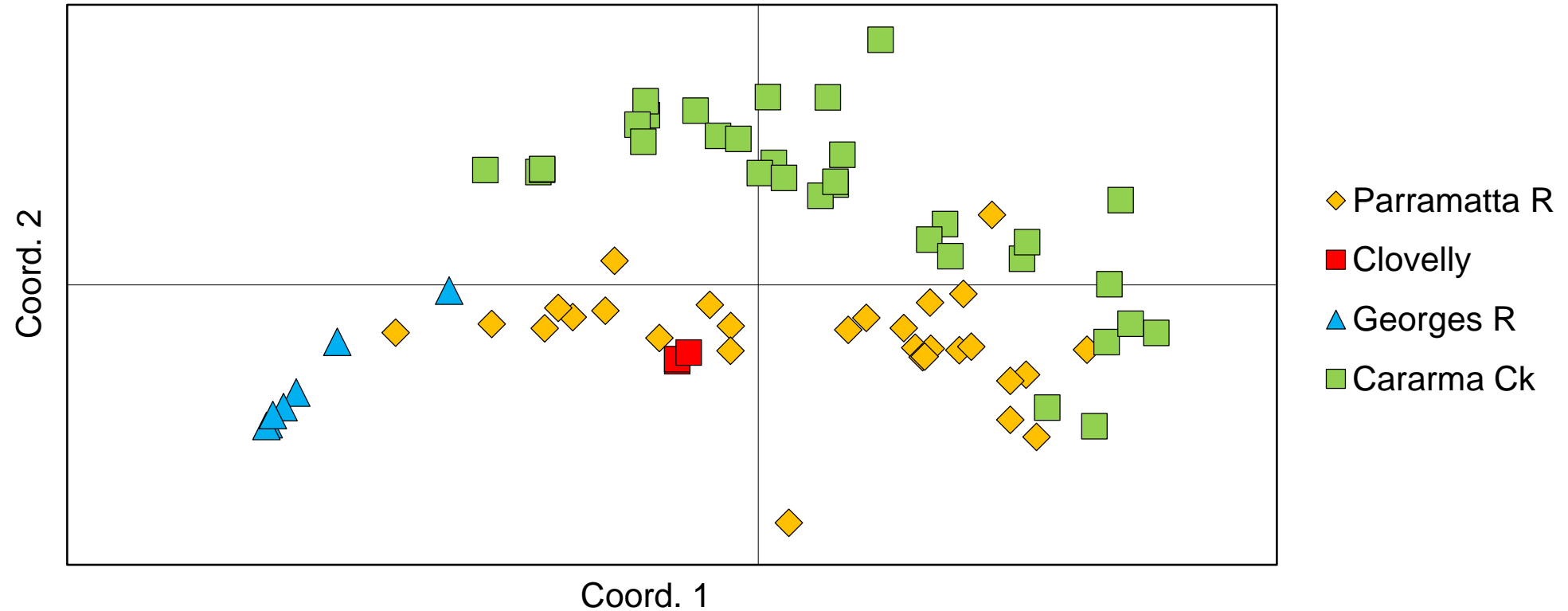
## Ordinal logistic regression

- Factors affecting seed yield



# Results

Gene flow is chiefly within estuaries



# Results

Sites that produce seed have sig. more diversity than those that don't ( $P = 0.001$ )

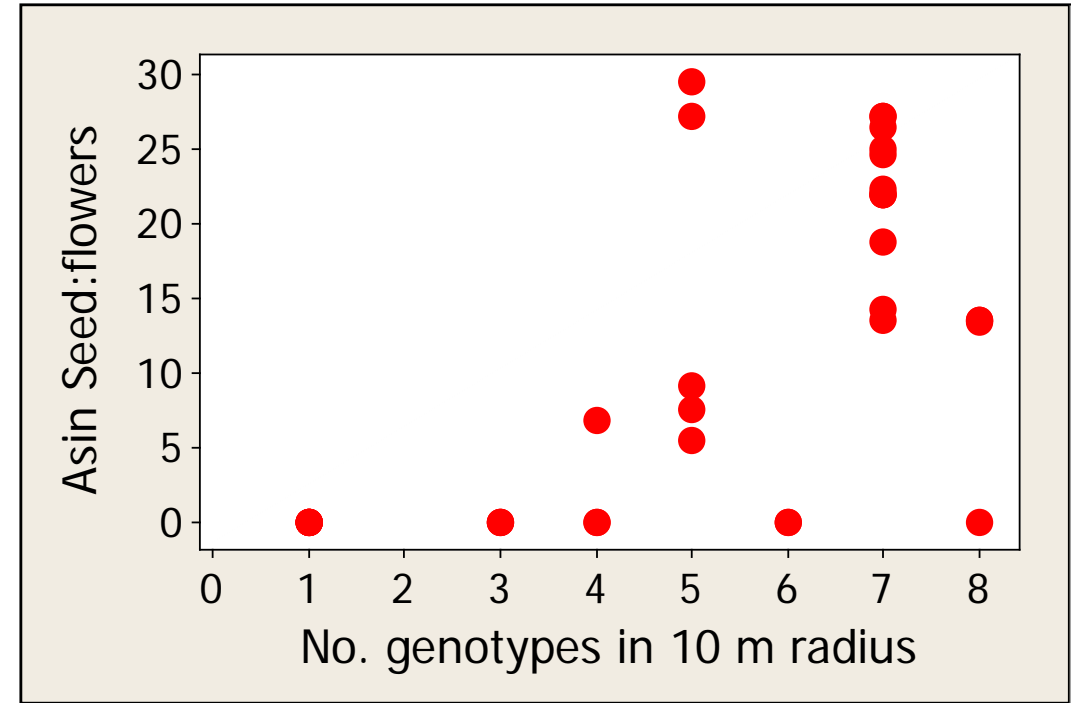
Site	Avg GD*	Seed
Cabbage Tree Creek	11.06	✓
Cararma Inlet	10.89	✓
Newington Nature Reserve - Wharf	7.67	✓
Newington Nature Reserve - North East	5.64	✓
Newington Sea Wall - 2	3.53	✓
Voyager Point	3.39	Rare
Clovelly	0.83	✗
Ermington	0.60	✗
Newington Sea Wall - 1	0.33	✗
Mason Park	0.00	✗
Melrose Park	0.00	✗

\*GD = genetic distance



# Results

Seed yield increased significantly with increasing soil water ( $P = 0.003$ ) and number of individuals in a 5m radius ( $P = 0.003$ )



Pearson Correlation = 0.551,  $P = 0.014$

# Applications

## Maximising adaptive potential

Results explain performance of pops in SOPA

- Nursery area
  - Plants grown from cuttings from one site
  - Material planted into mounds
    - no tide influence, widely separated
  - Only 2 individuals represented
  - Poor seed set
- Engineered creek bank
  - 13 individuals (source not recorded)
  - Tidal influence
  - Good seed set



# Applications

## Maximising adaptive potential

- Translocation
  - Collect seed, or
  - Collect cuttings from multiple populations
  - Collect from within an estuary
  - Plant a mix of individuals in 5m radius
  - Place within reach of king tides
- Management
  - No seed production indicates
    - Low genetic diversity, or
    - Too much distance between individuals, or
    - Insufficient water





# Acknowledgements

## Funding



SydneyOlympicPark 



## Field and laboratory assistance

- Caroline Connelly, Janine Wech, Patti Kuhl, Ray Kilduff

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