

South West Marine Research Program



Outline

1 South West Marine Research Program

Kate Sprogis- *Murdoch University*

2 Population viability analysis

Oliver Manlik- *University of New South Wales*

3 Management applications

Phil Coulthard- *Dolphin Discovery Centre*

Aim:

To assess the
long-term viability
of the dolphin
population



South West Marine Research Program



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graph TD; A[South West Marine Research Program] --> B[Diet and foraging ecology  
Shannon McCluskey  
PhD 2007-2013]; A --> C[Population abundance and habitat use  
Dr Holly Smith  
2007-2012]; A --> D[Conservation genetics  
Claire Daniel  
PhD 2007-2013]; C --> E[Habitat Modelling and population dynamics  
Kate Sprogis  
PhD 2011 - 2014]; C --> F[Population viability analysis and conservation genetics  
Oliver Manlik  
PhD 2011-2014];
```

Diet and foraging ecology

Shannon McCluskey

PhD 2007-2013

Population abundance and habitat use

Dr Holly Smith

2007-2012

Conservation genetics

Claire Daniel

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Habitat Modelling and population dynamics

Kate Sprogis

PhD 2011 - 2014

Population viability analysis and conservation genetics

Oliver Manlik

PhD 2011-2014

Study Area

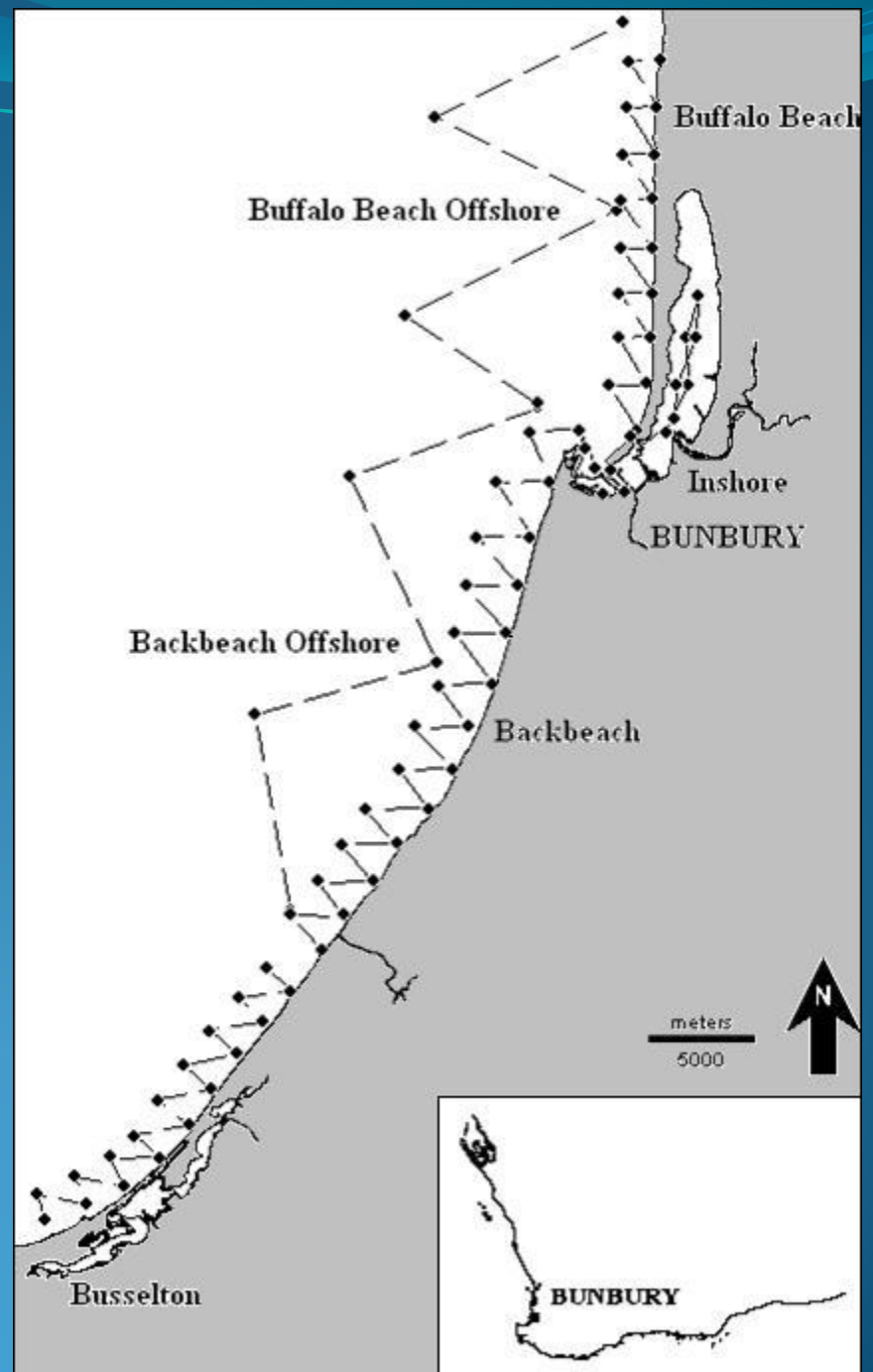
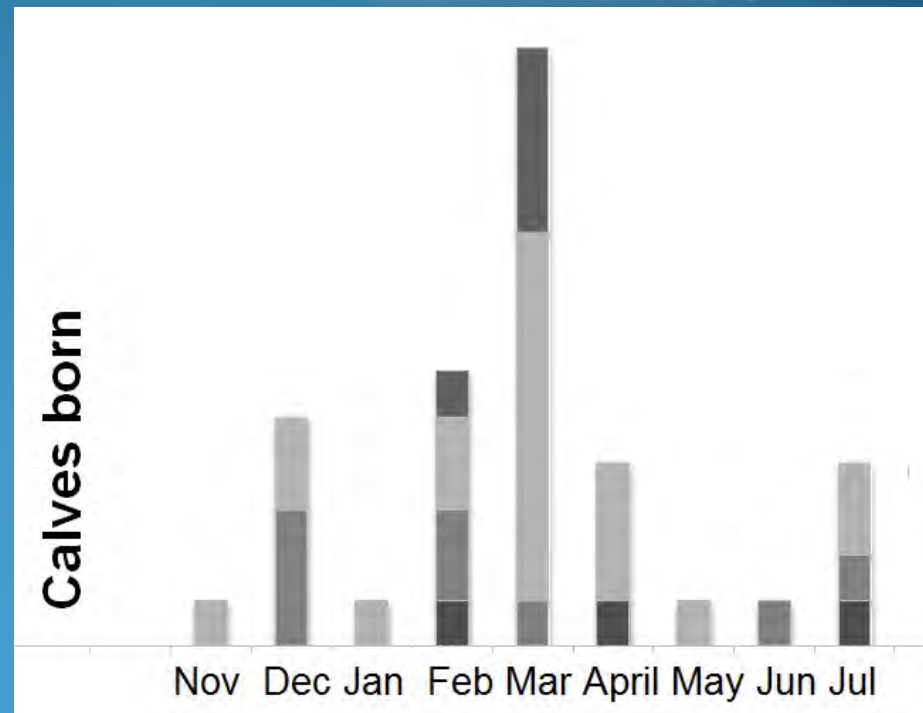


Photo- Identification



Applications:

- Peak calving season
- Abundance
- Survival rates
- Reproductive rates



Population Viability Analysis

Oliver Manlik

(University of New South Wales)



Population Viability Analysis

- **Forecast the viability of population:**
How does population size change in the future?
- **Analysis of influence on population viability:**
Which factor has greatest influence on population viability?



METHODS

- **Computer Modeling: VORTEX**
- **Data:**

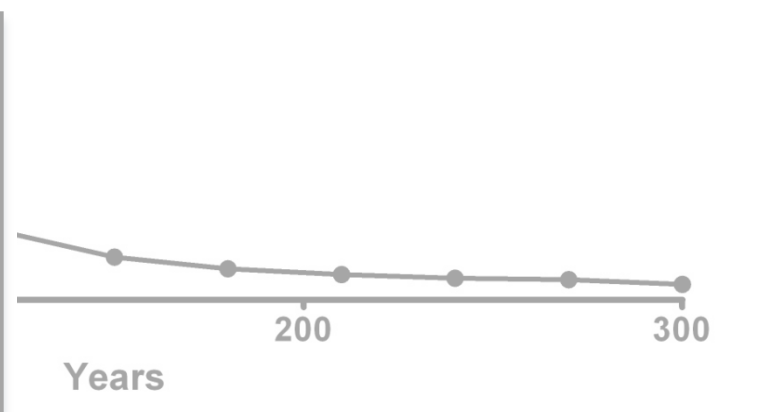
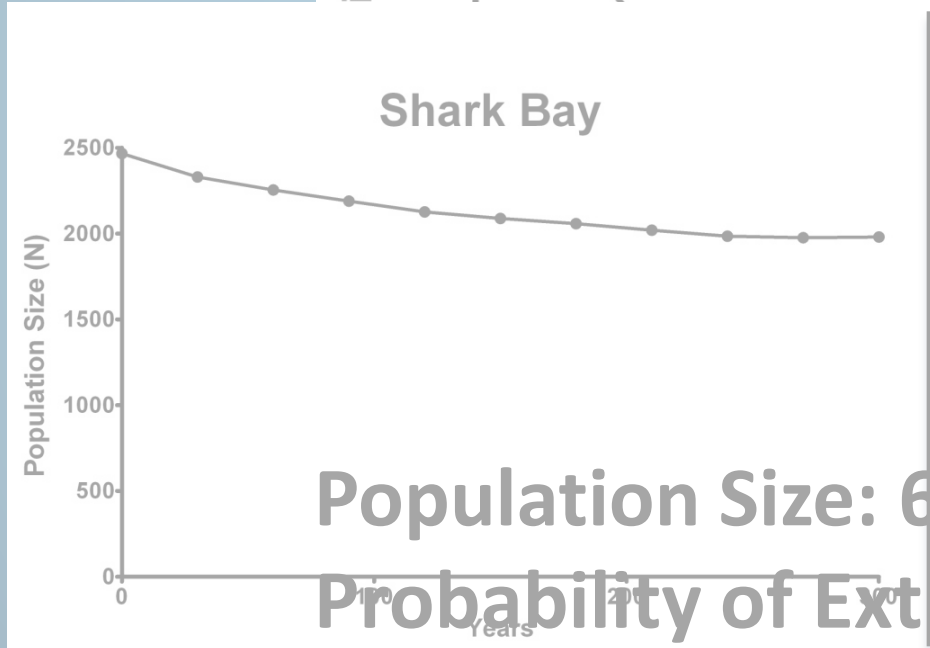
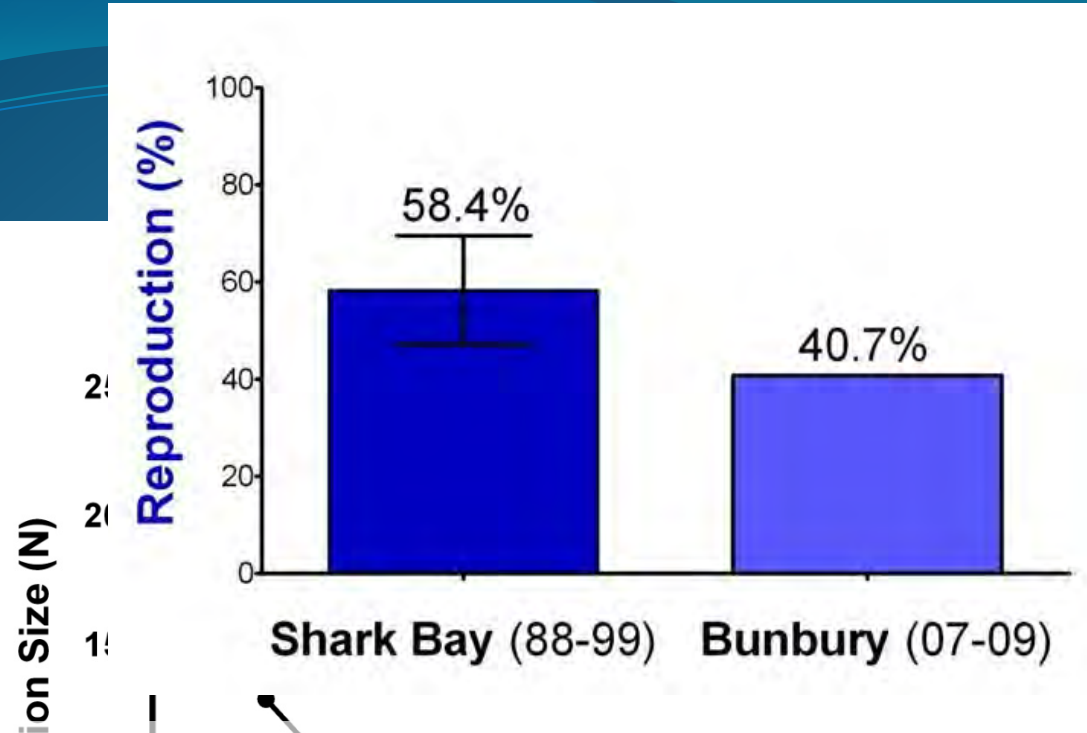
BUNBURY

- **Reproductive rates:** % Females breeding/3-years
• 1 three-year time period: 2007-2009
- **Survival rates:** % surviving/3-years
• Population size: 267
- Forecast: 300 years

SHARK BAY

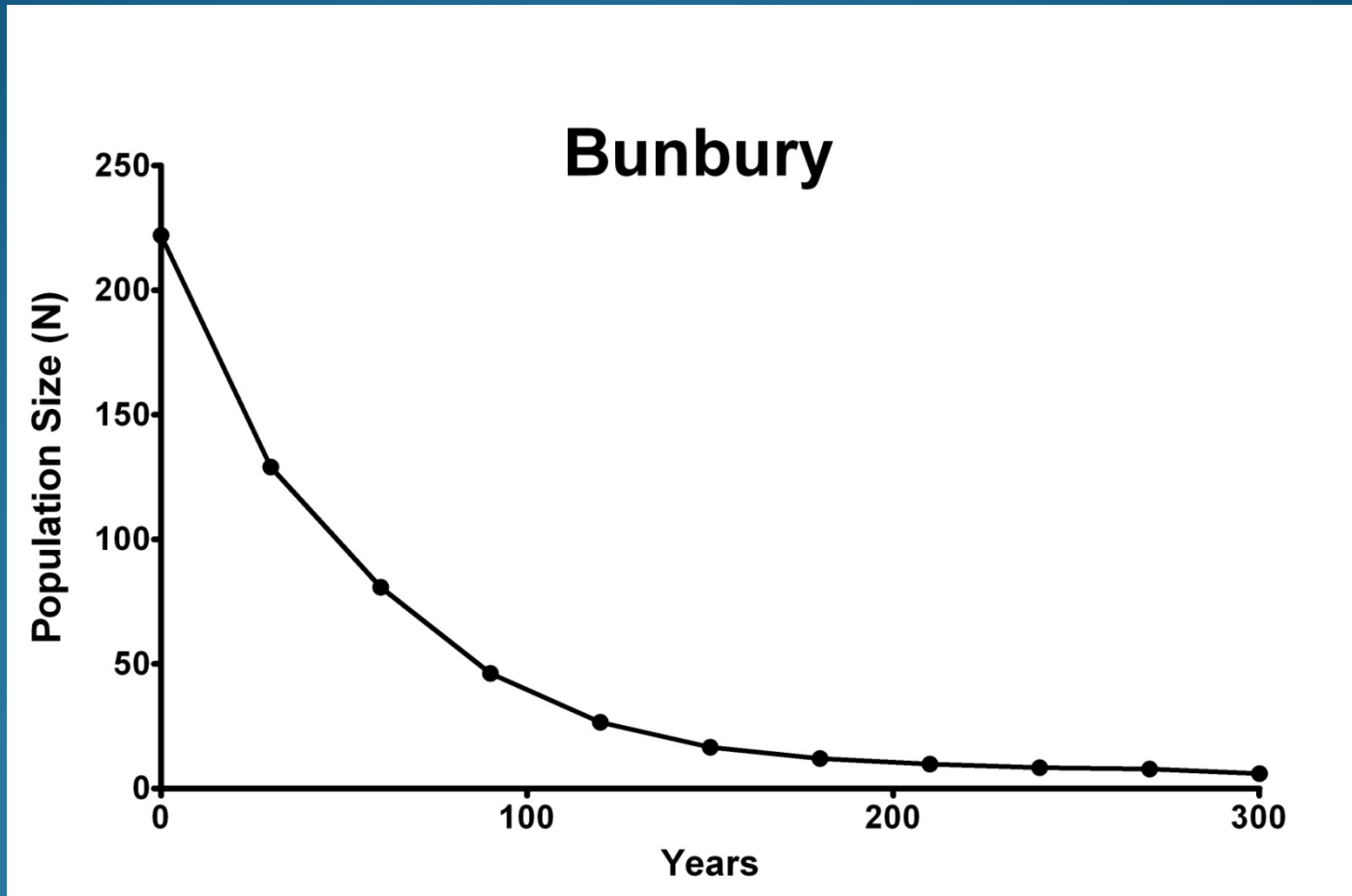
- **Sex ratio, age class distribution,**
max. & 4th age to reproductive age, etc.
- **migration rates** 1988-1999
- Population size: 2888



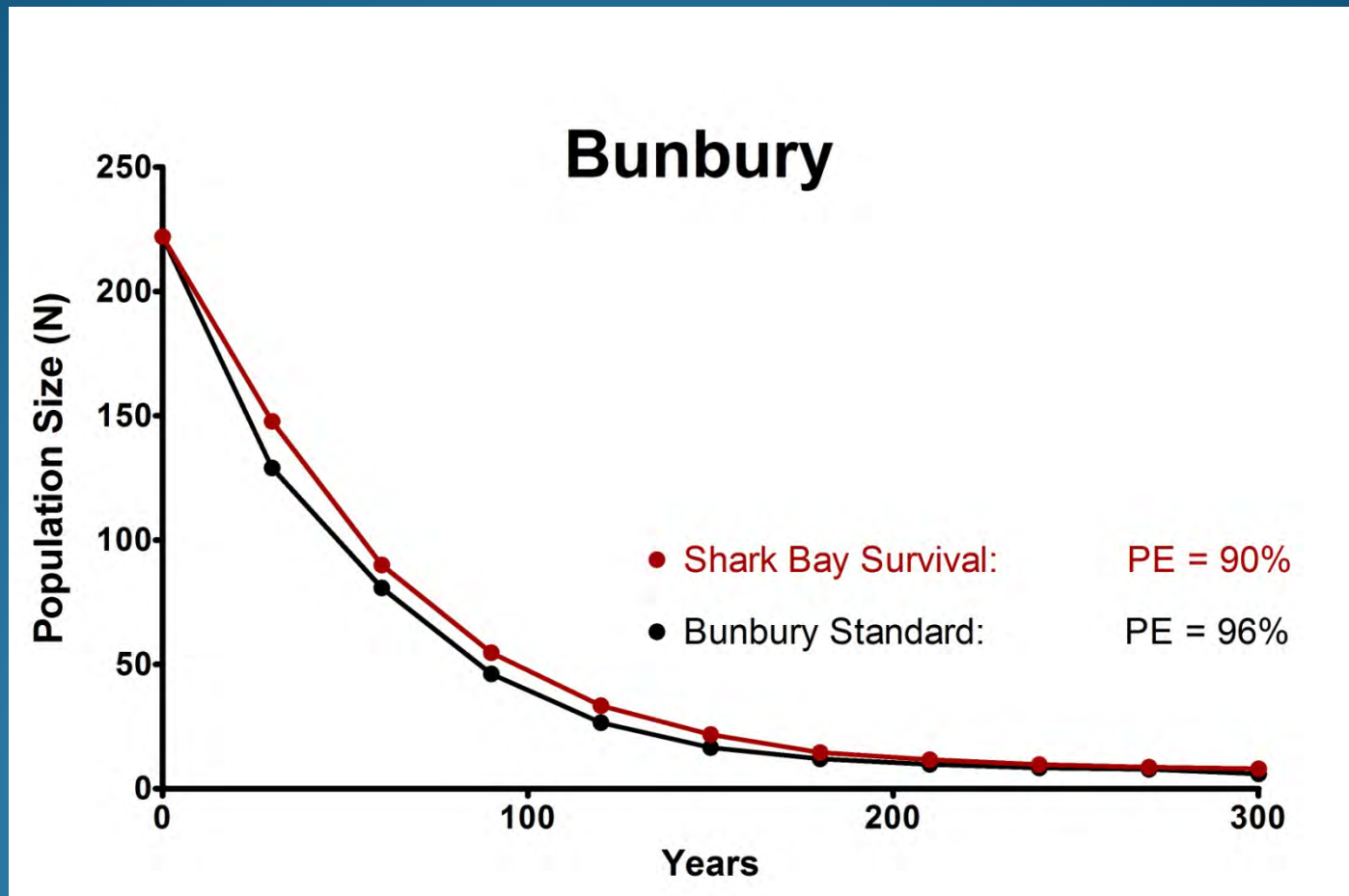


Population Size: 6
Probability of Extinction: 96%

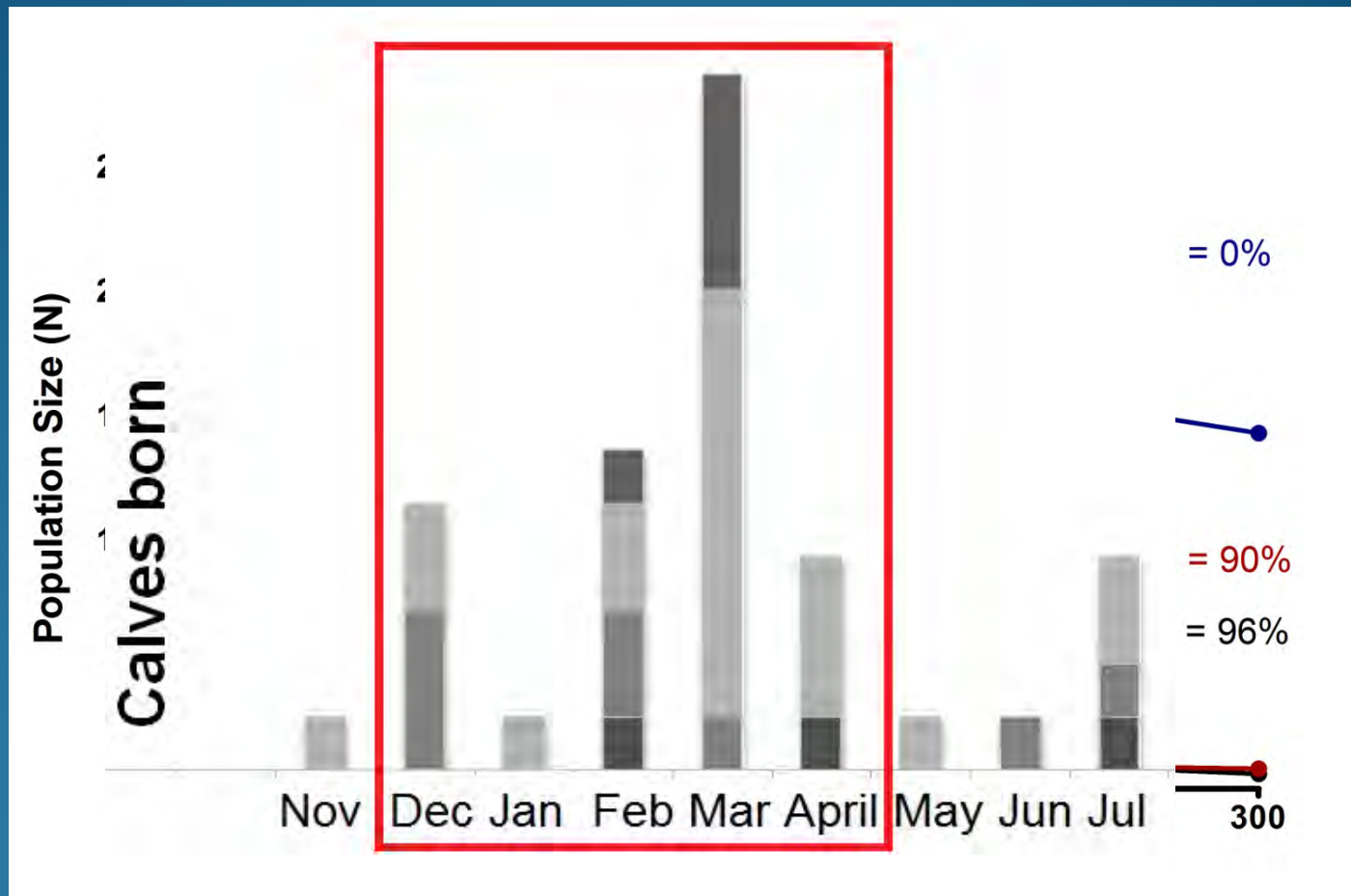
Substitution: Reproductive & Survival Rates



Substitution: Reproductive & Survival Rates



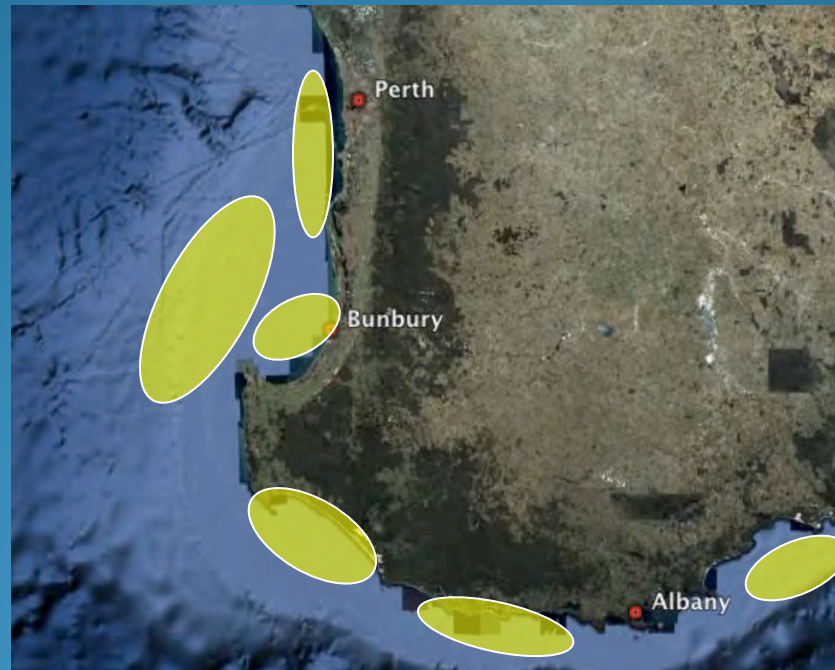
Substitution: Reproductive & Survival Rates



- Difference in viability: Reproduction
- Decline in Bunbury population can be prevented...

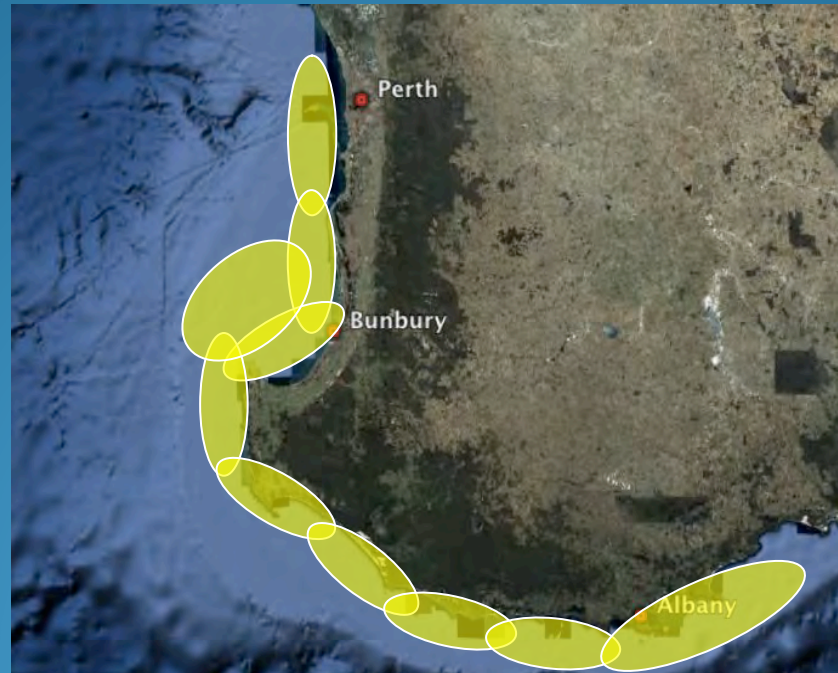
Genetic analysis by Claire Daniel:

Is the Bunbury population connected to other populations by migration?



Genetic analysis by Claire Daniel:

Is the Bunbury population connected to other populations by migration?



SUMMARY

- Bunbury population forecast to decline & at risk of extinction
- **Main reason for projected decline: Low Reproduction**
- Forecast decline can be reversed if we can boost reproduction
- **Immigration might have “rescue effect”**



Management Application

Phil Coulthard

(Dolphin Discovery Centre)

Knowledge = Responsibility

Eco-Tourism

An important role to play

Eco-Tourism

The Dolphin Discovery Centre The Complete Dolphin Interactive Experience



Eco-Tourism = Wild Experience

Sea World



V's

Real World



Eco-Tourism = Education



ecoguide
AUSTRALIA
CERTIFIED
GUIDE



The Boys



The Girls



A photograph of two dolphins leaping from the surface of the ocean. The dolphins are white with grey dorsal fins and are captured in mid-air, with their bodies arched upwards. The water is a deep blue with visible ripples and some white foam from the dolphins' movement. The text "Boys Fight" is overlaid in the upper right corner.

Boys Fight

Boys Make Up



The Boys Chase the Girls



Boys Find the Girls



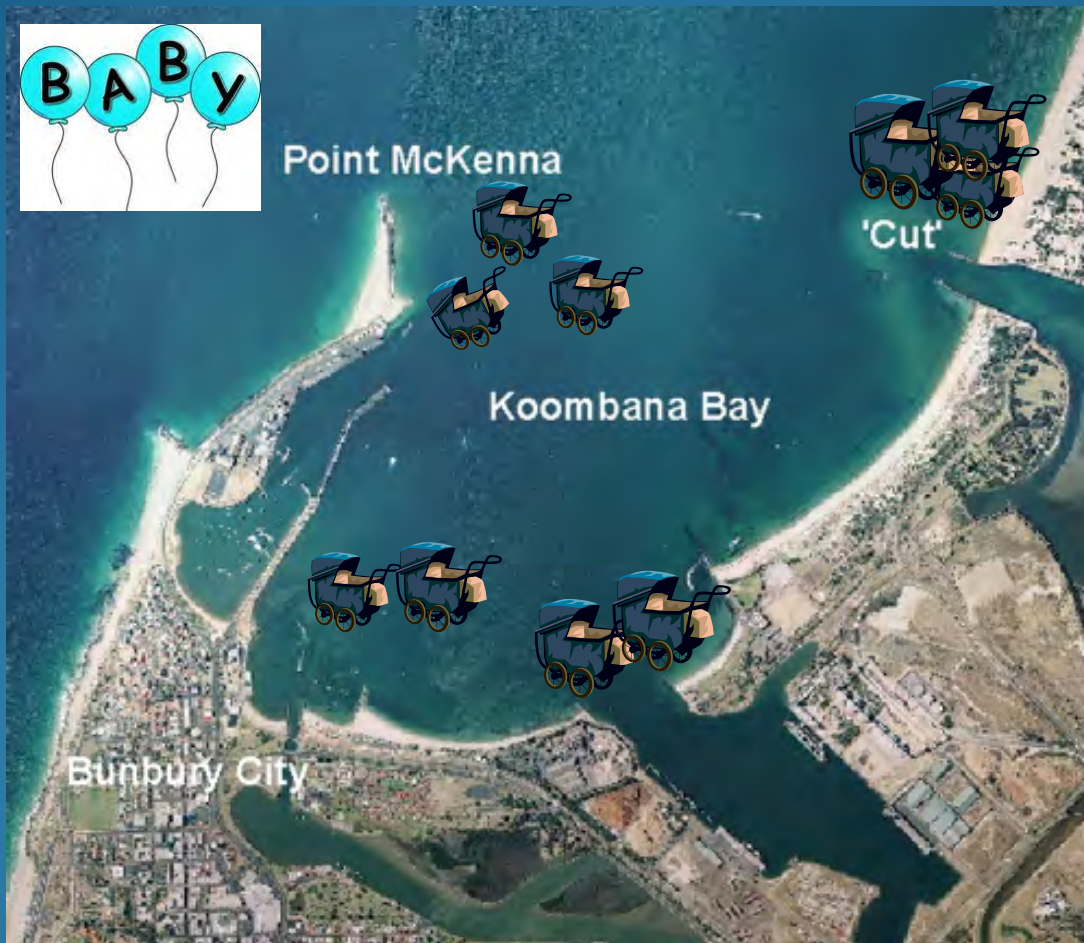
Boys Leave the Girls



**Baby is Born (4 years of
peace)**



Eco-Tourism = Understanding



Eco-Tourism = Minimal Impact





Then
SNORKEL LINES

Anchoring

NOW!!



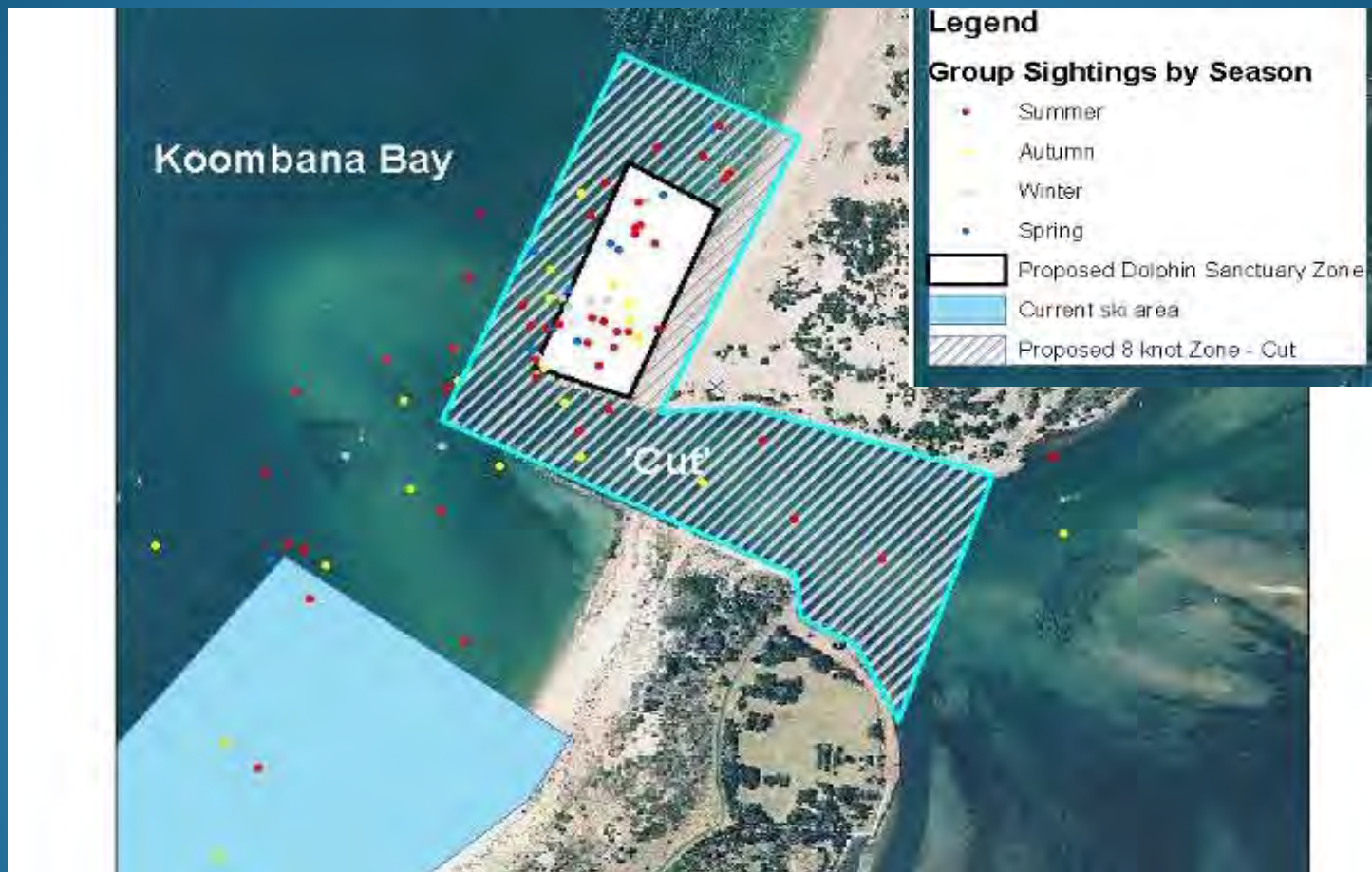
Interaction Then



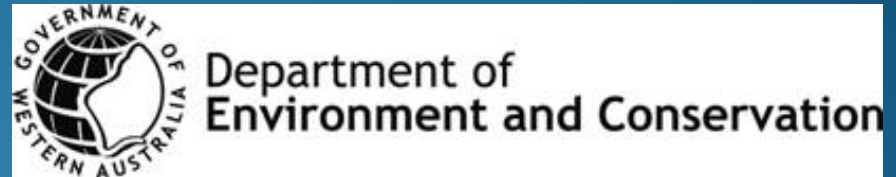
Interaction NOW



Eco-Tourism = Management



Eco-Tourism = Awareness



Eco-Tourism = Community Involvement



Eco-Tourism = Conservation



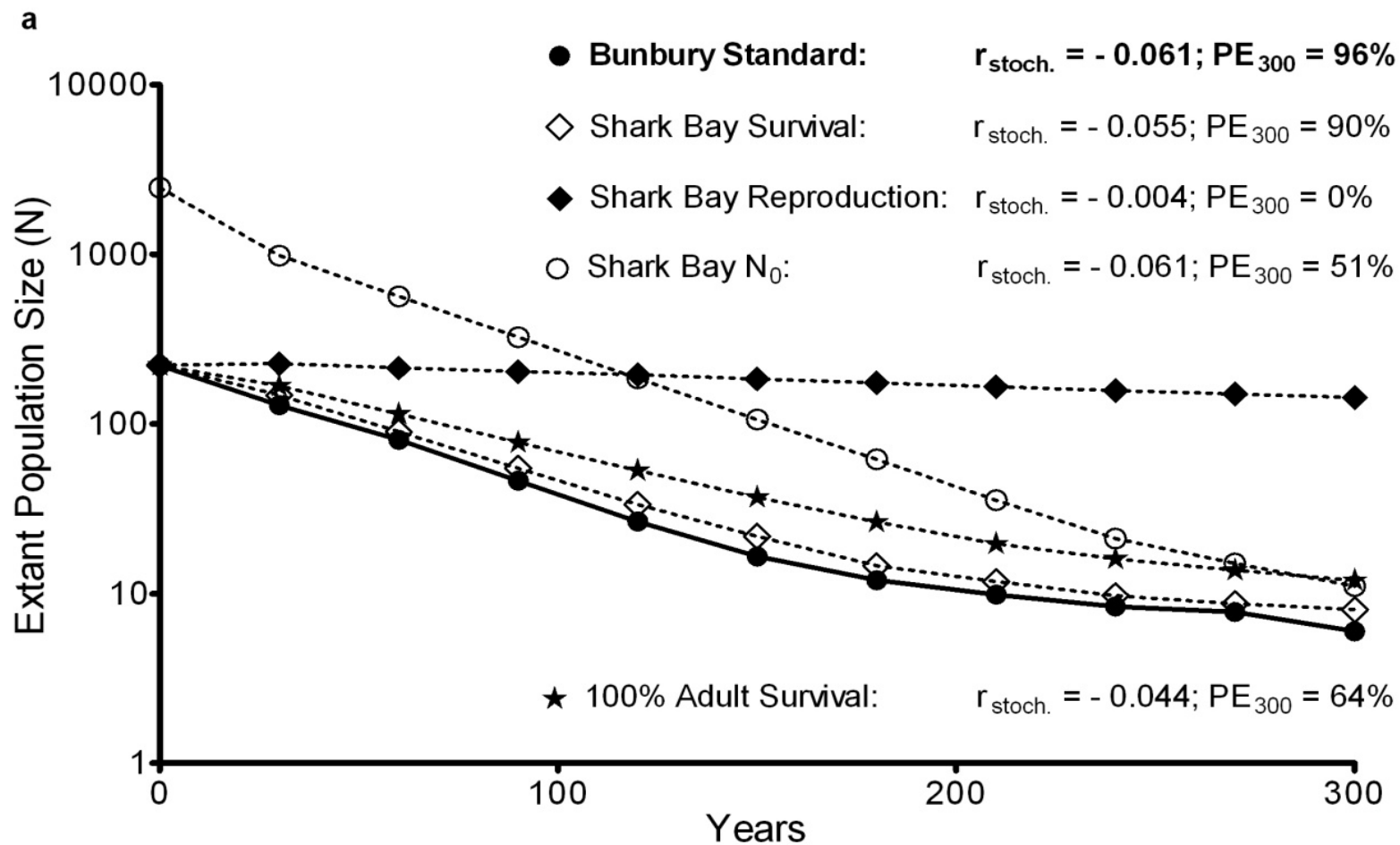


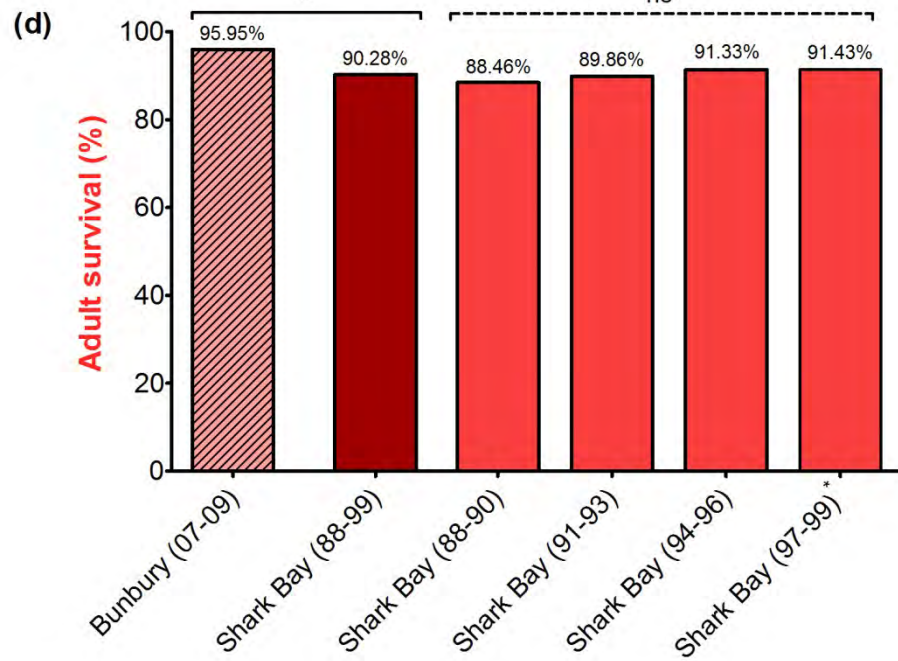
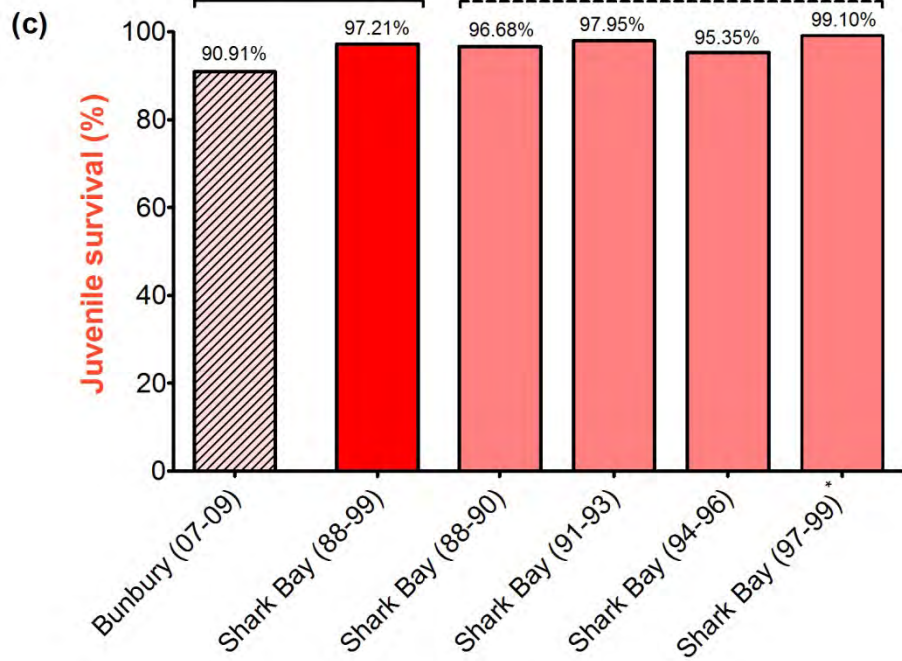
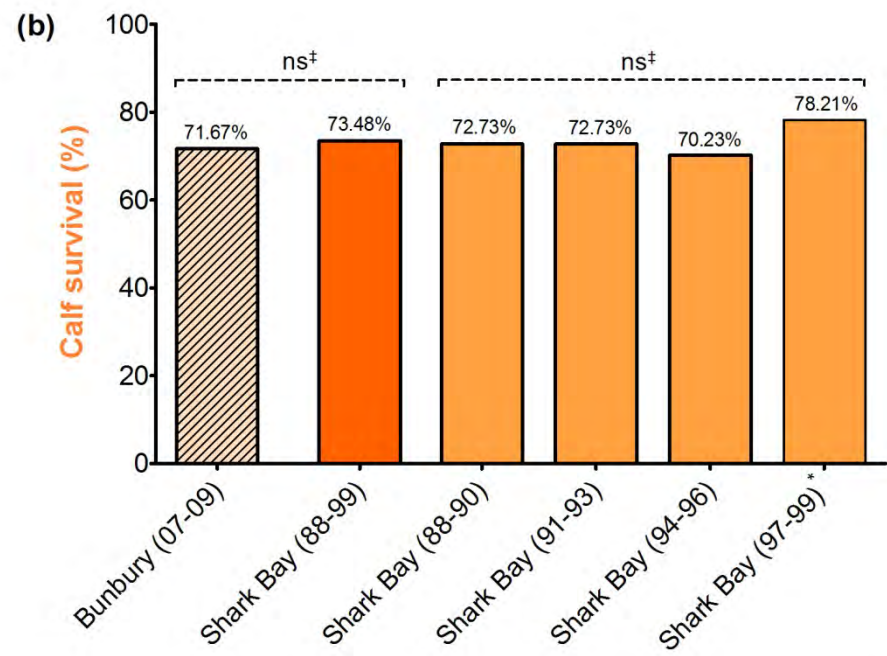
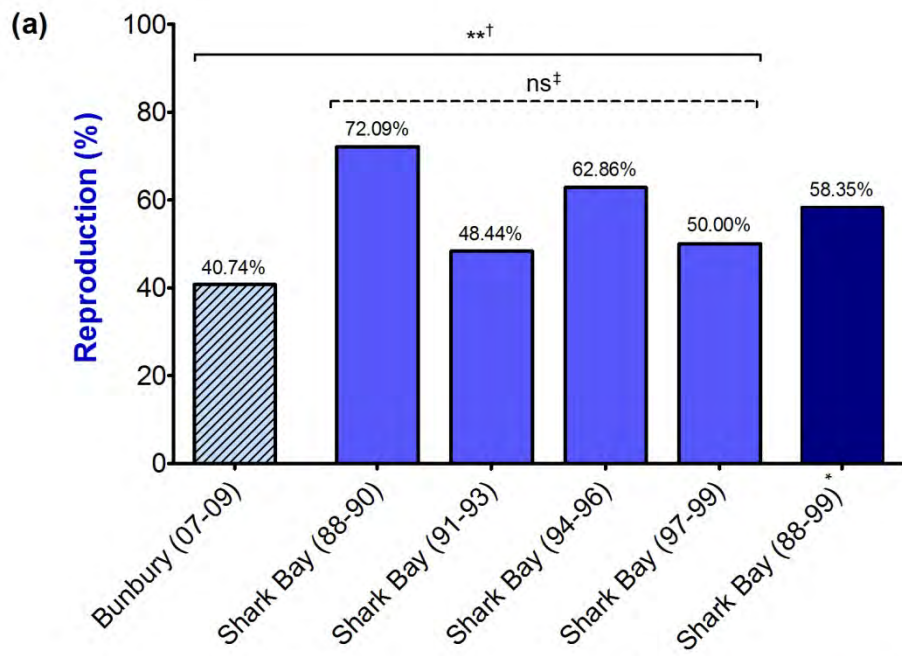
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© KATE SPROGIS MUCRU







	Shark Bay	Bunbury
Population structure		
Population subdivision	2 subpopulations: East & West	NA
Number of individuals dispersing/three-year	1.50*	NA
Initial population size	2888 [†] (East: 1444; West: 1444)	267
Carrying capacity	4000 (East: 2000; West: 2000)	370
Age class distribution (%)		
Calves	14.67 (N = 54)	16.87 (N = 41)
Juveniles	30.16 (N = 111)	24.69 (N = 60)
Adults	55.16 (N = 203)	58.44 (N = 142)
Sex ratio used for distribution of age classes	50:50 (male:female)	45:55 (male:female)
Reproductive system		
Age class (age) at maturity: females	≥ 4 (≥ 12)	≥ 4 (≥ 12)
Age class (age) at maturity: males	≥ 5 (≥ 15)	≥ 5 (≥ 15)
Maximum age class (age) to reproduce	10 (30-33)	10 (30-33)
Sex ratio at birth	50:50 (male:female)	50:50 (male:female)
Three-year reproductive rates (%) [‡]	40.74 (SD _{EV} 13.54)	58.35 (SD _{EV} 9.38)
Males in breeding pool (%)	56.5	56.5
Three-year survival rates (%)[‡]		
Calves	73.48 (SD _{EV} 3.36)	71.67 (SD _{EV} 3.60)
Subadults 1 [§]	95.71 (SD _{EV} 2.28) 98.94 (SD _{EV} 1.23) 96.92 (SD _{EV} 2.66)	97.21 90.91 (SD _{EV} 2.79)
Subadults 2 [§]		
Subadults 3 [§]		
Adults	90.28 (SD _{EV} 1.40)	95.95 (SD _{EV} 0.58)

Predictive Accuracy of PVAs

Predictive accuracy of population viability analysis in conservation biology

Barry W. Brook, Julian J. O'Grady, Andrew P. Chapman, Mark A. Burgman, H. Resit Akçakaya and Richard Frankham

Nature 404, 385-387(23 March 2000)

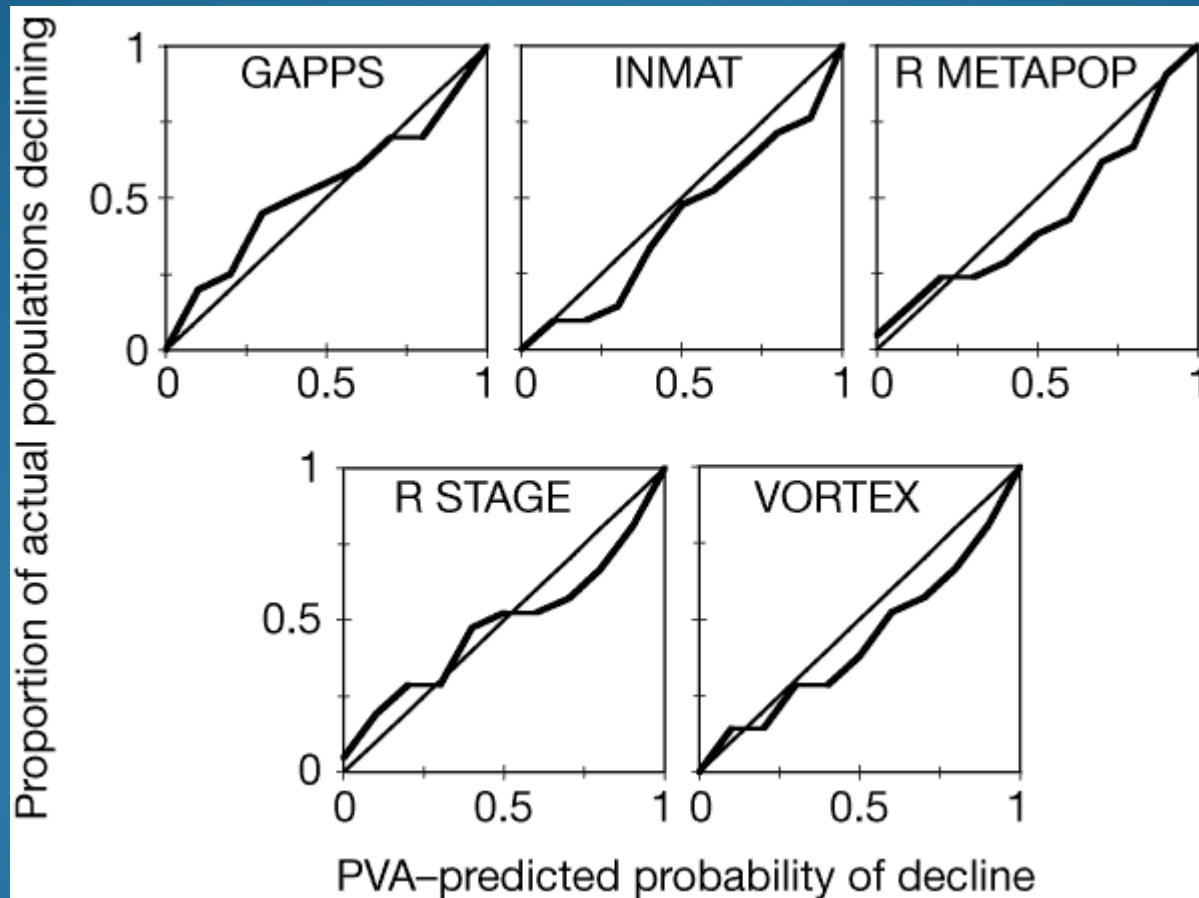


Figure 1

December to April

Calves born

