# A preliminary bio-economic analysis of wild dog management in northern NSW

Salahadin Khairo[1], Oscar Cacho[2], David Hadley[3], Peter Fleming[4] and Robyn Hean[5]

[1,4 & 5] Strategy & Policy Branch, NSW Department of Primary Industries
[2 & 3] Graduate School of Business; UNE Business School, The UNE, Armidale

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# The context – the problem

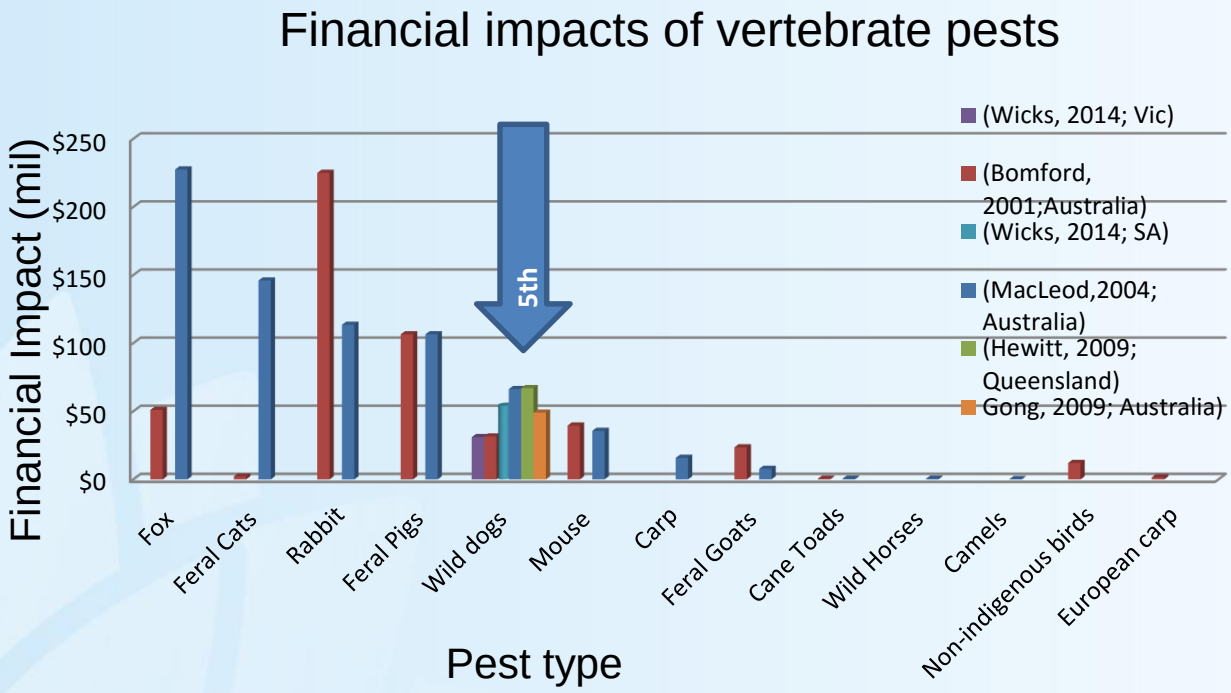

*"… over the past three-and-a-half-years the attacks have costed .. $205,000, with one dog in particular wreaking havoc despite concerted efforts to trap it."*

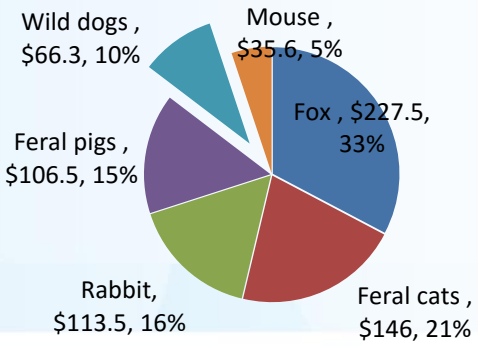
*"…One block which previously carried a thousand ewes now has a hundred cows, reducing his income in that area by 50 to 60 per cent."*

*"..are causing tensions in rural communities"*

*Source: http://www.abc.net.au/news/2014-02-26/wild-dog-trapper-concerns/5284526*

# The context – annual financial cost estimates



# Objectives

1. To identify and estimate the major costs associated with wild dog impacts in northern NSW livestock industries

2. To evaluate the long term costs and benefits of alternative wild dog management strategies, ranging from uncoordinated unilateral actions to collective control by landholders - considering spatial and temporal scales and

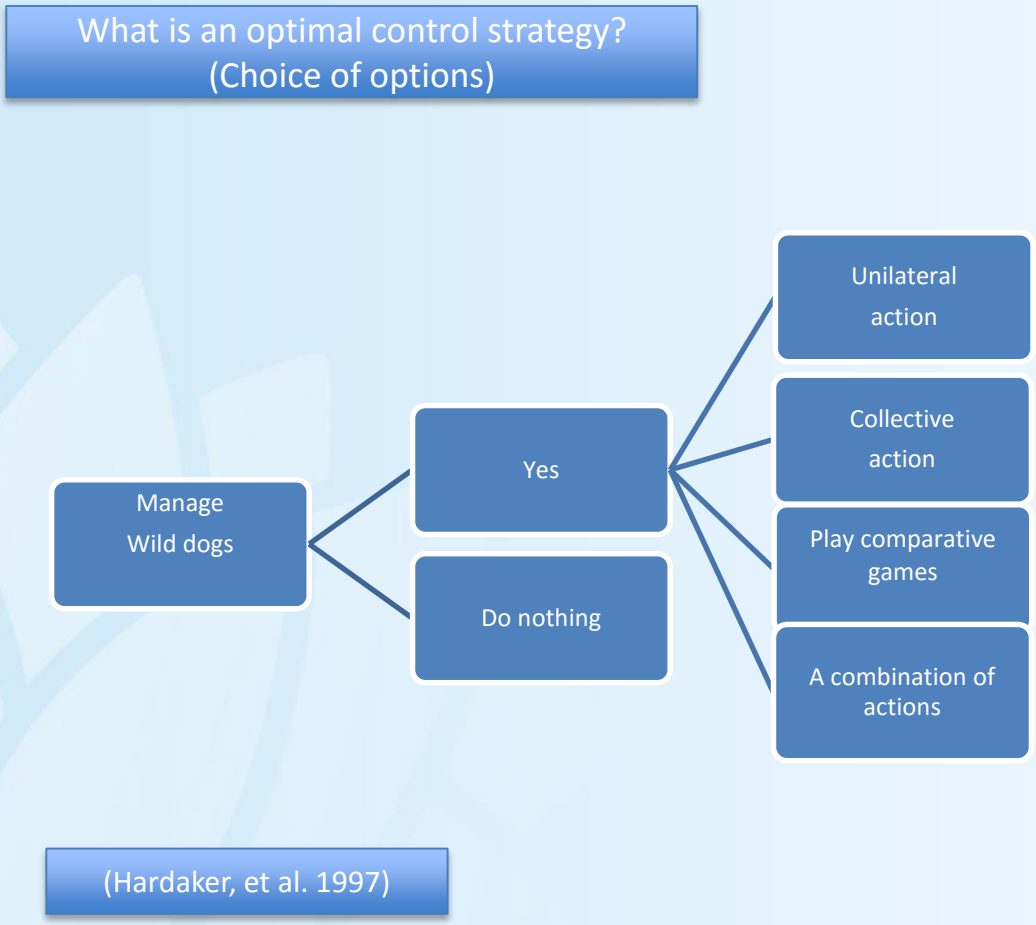
3. To assess the potential roles of policy instruments in promoting optimal control of wild dogs at spatial and temporal scales

# Characteristics of the problem - variability

- Difference in wild dog density across time and space
- Difference in enterprises run
- Biological pest –externality
- Different public attitudes towards the management of wild dog


(Saunders and West, 2009)

# Variable management decisions

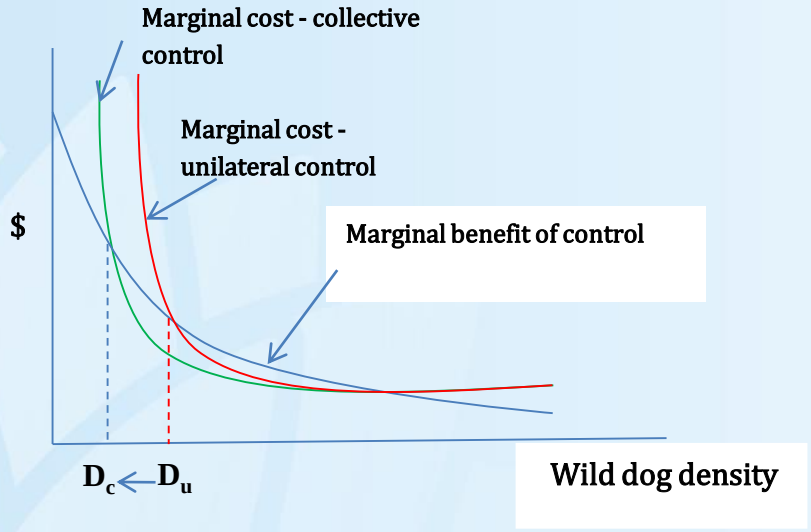



Choice of a management strategy depends on

1. perception of the risk
2. history and frequency of predation
3. location
4. enterprise type
5. budget

# Conceptual model –optimal control

3. What are the optimal solutions (mathematical bio-economic )




(Tisdell, 2010)

Benefit is maximised when Marginal Cost of Control = Marginal Benefit of Control

Collective and unilateral optimal control levels may be different

Unilateral decision is based on maximising benefit from an individual perspective

Collective decision is based on maximising benefit from a collective perspective

# Analytical model: collective or unilateral actions

*Internalises externality*

$$\pi^{c} = \underset{x_{st}}{Max} \int_{0}^{\infty} e^{-\delta t} \sum_{s \in \theta} \left[ (P_t - C_{st}) Y(b_{St}) - D(ND(b_{1t}, b_{2t}, b_{3t}, \ldots b_{St})) - k(b_{St}, x_{st}) \right] dt$$

Where

P = price of livestock

C = marginal cost of production at location s in time t

$Y$ = level of production at location s in time t

$b_{st}$ = wild dog population at location s in time t

$x_{st}$ = control level at location s in time t

D ( ) = external damage function

k = control cost function

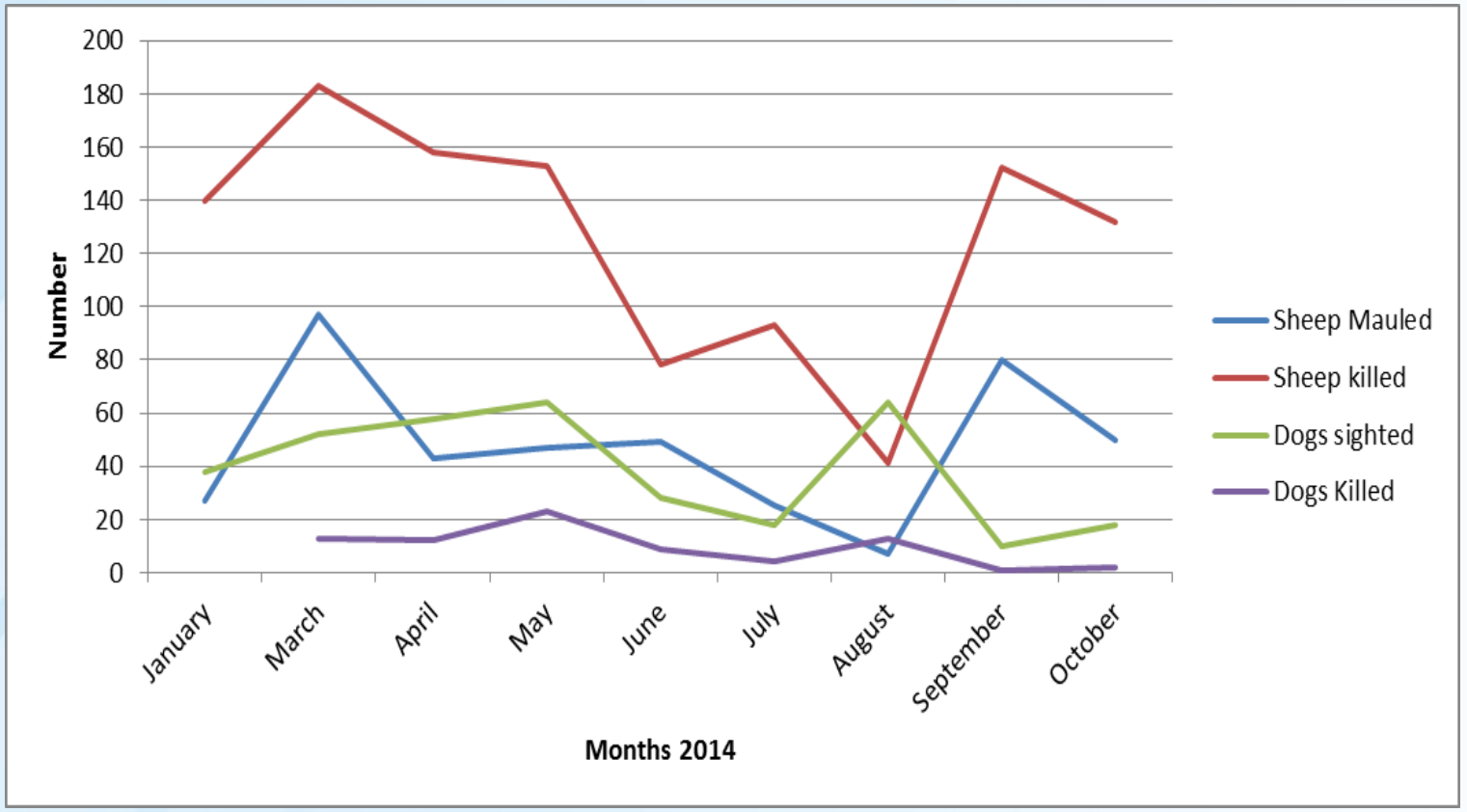
(Richards, et al. 2010), - economics of invasive species

# Assumptions and data

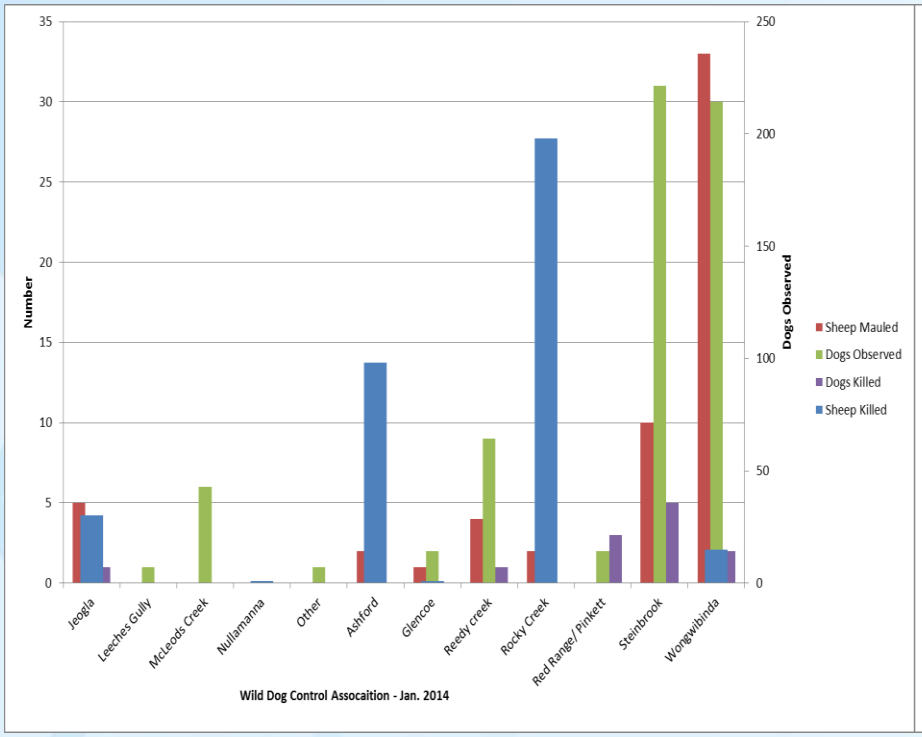
- Solve for steady-state values -
  - state variable, wild dog population, bs
  - level of control, xs
  - Dispersion coefficient
  - Conversion coefficient in the model;
- Choose representative livestock producers, with unilateral and collective decisions on wild dog control, across north-south and east-west of the study area;

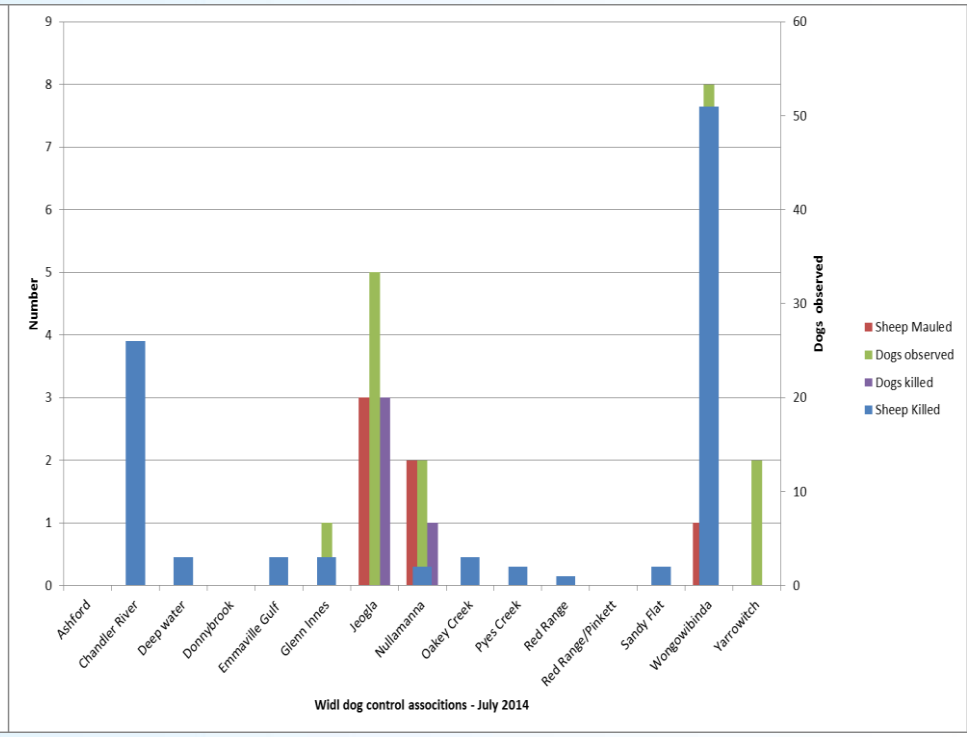
- Collect data using surveys of producers, livestock sale yards and abattoirs and collect data on the major costs associated with wild dog predation and attack;

# Preliminary observation 1. Damage cost varies across seasons



# Preliminary observation 2– Damage cost varies across the region and is unpredictable



# Concluding remarks and ongoing work

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1. Wild dogs will continue to impose an economic impact on the sheep industry because economic analysis may not favour eradication;
2. May provide insight into a cost effective time and location for controlling dogs

## On going work

1. To evaluate the long term costs and benefits of alternative wild dog management strategies (uncoordinated unilateral actions to collective control) considering spatial and temporal scales

2. What is the socially optimal level of wild dog control and which market based instruments are the best for achieving optimal level of wild dog control?

(Richards, 2009)

Department of Primary Industries

Thanks