

# Using DNA for managing wild dogs: a dive into the NSW project

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# Introduction

- Australian Project with over 9000 samples.
- 2304 samples submitted in NSW as of June 2022.
- Focussed on informing efficient and effective management.
- Follows the taxonomic view of Jackson *et al.* 2017.



# Why DNA is a useful tool to inform management strategies

- Helps to understand the management scale
  - What area of control is needed for it to be effective?
  - How far are subpopulations spreading?
  - Where did your dog come from?
- 
- Necessary collaboration between groups/ regions
- 
- Purity



# Methods: DNA Collection

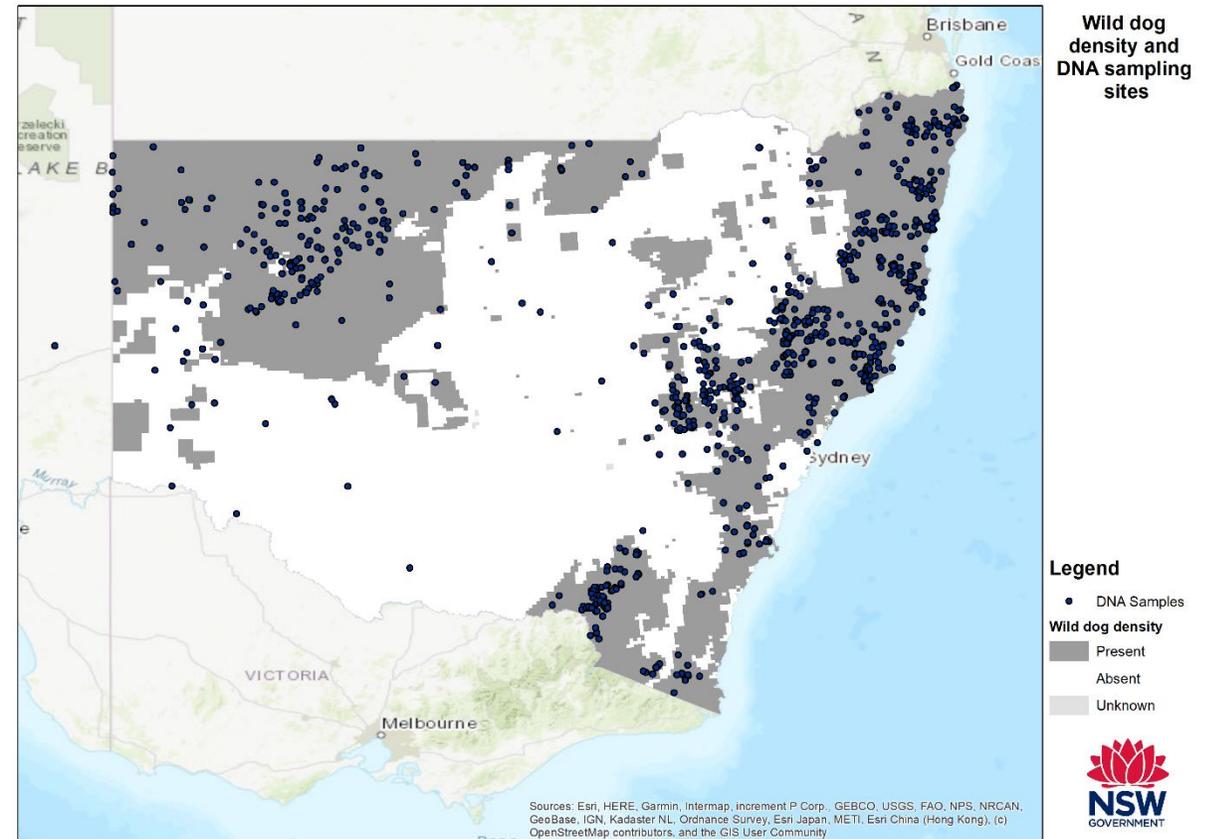
## Key information Needed:

- Location
- Date
- Contact Information



# Methods: Laboratory

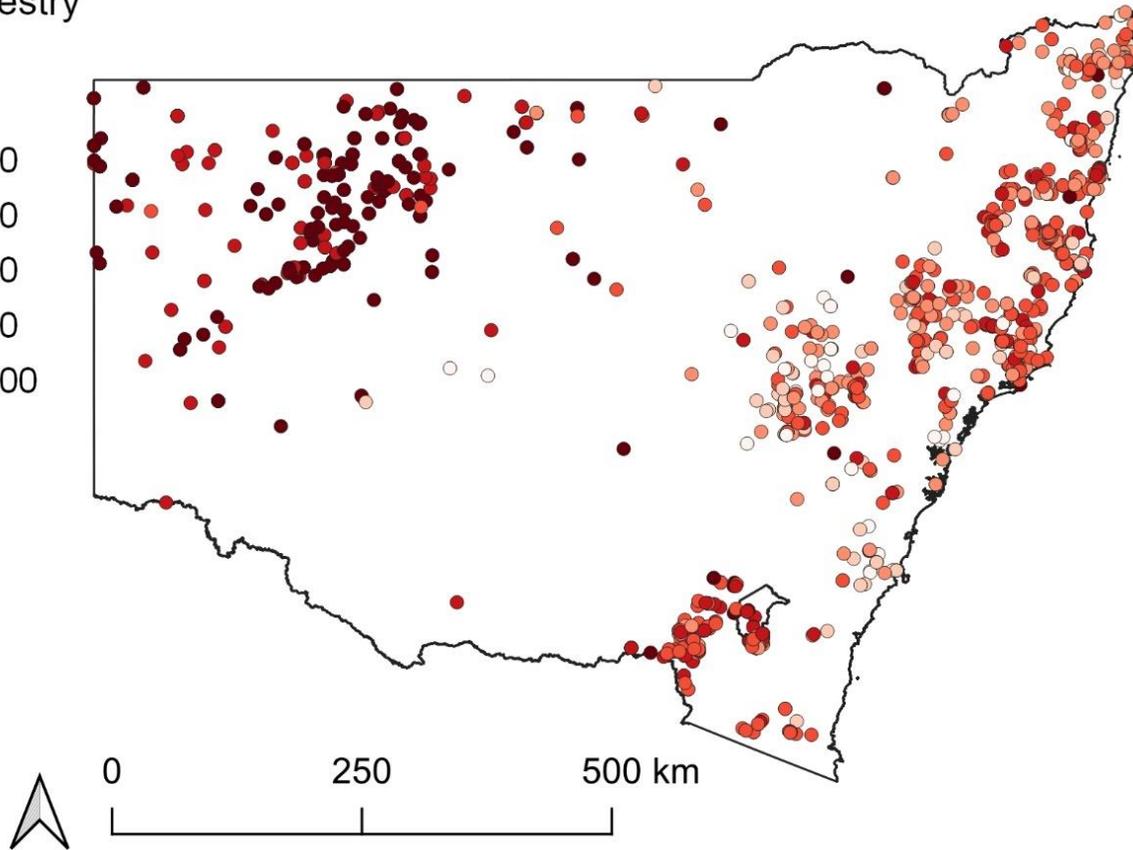
- 23 microsatellite markers used for Purity Testing
- 11 microsatellite markers included for relatedness and population structure



# State Purity

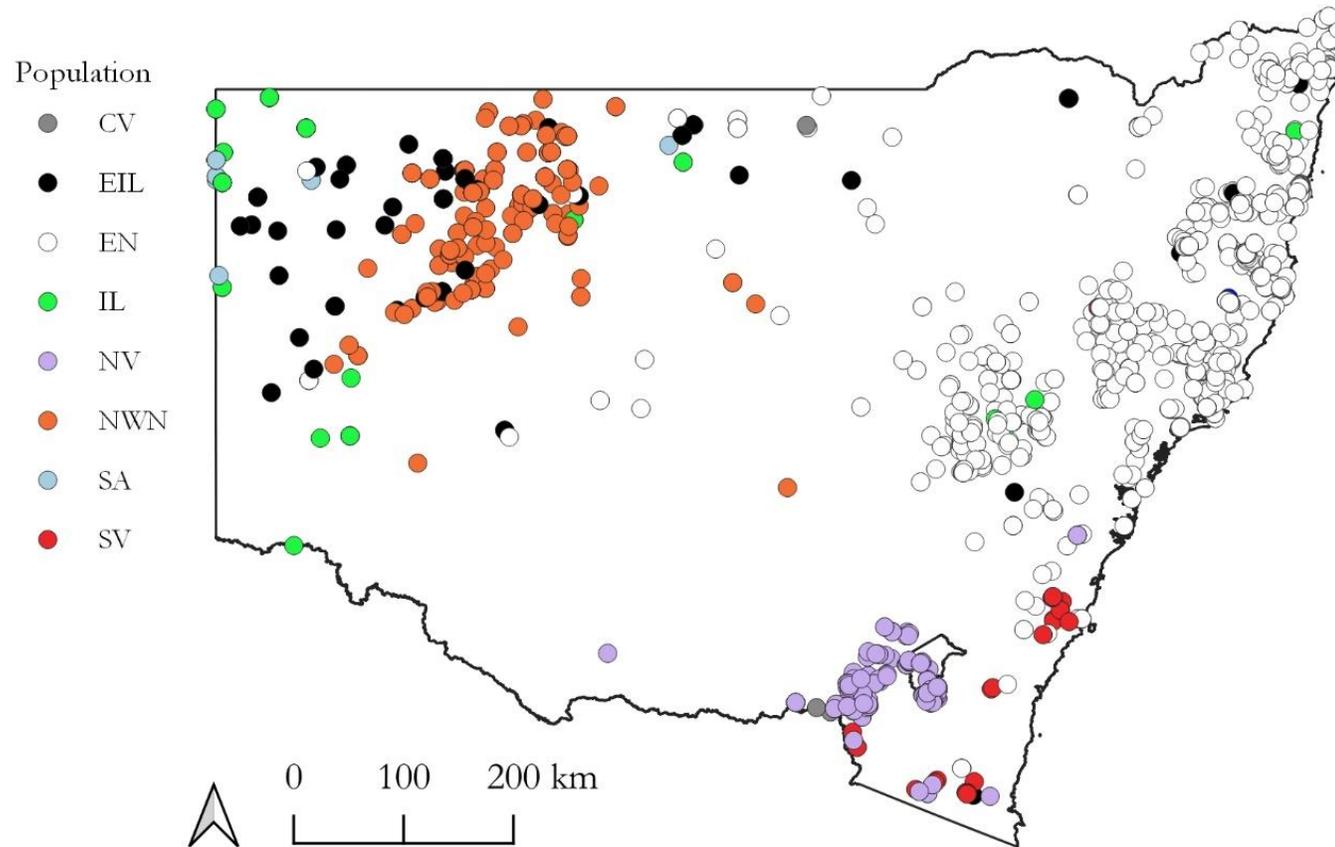
## Dingo Ancestry (%)

- 0 - 50
- 51 - 60
- 61 - 70
- 71 - 80
- 81 - 90
- 91 - 100



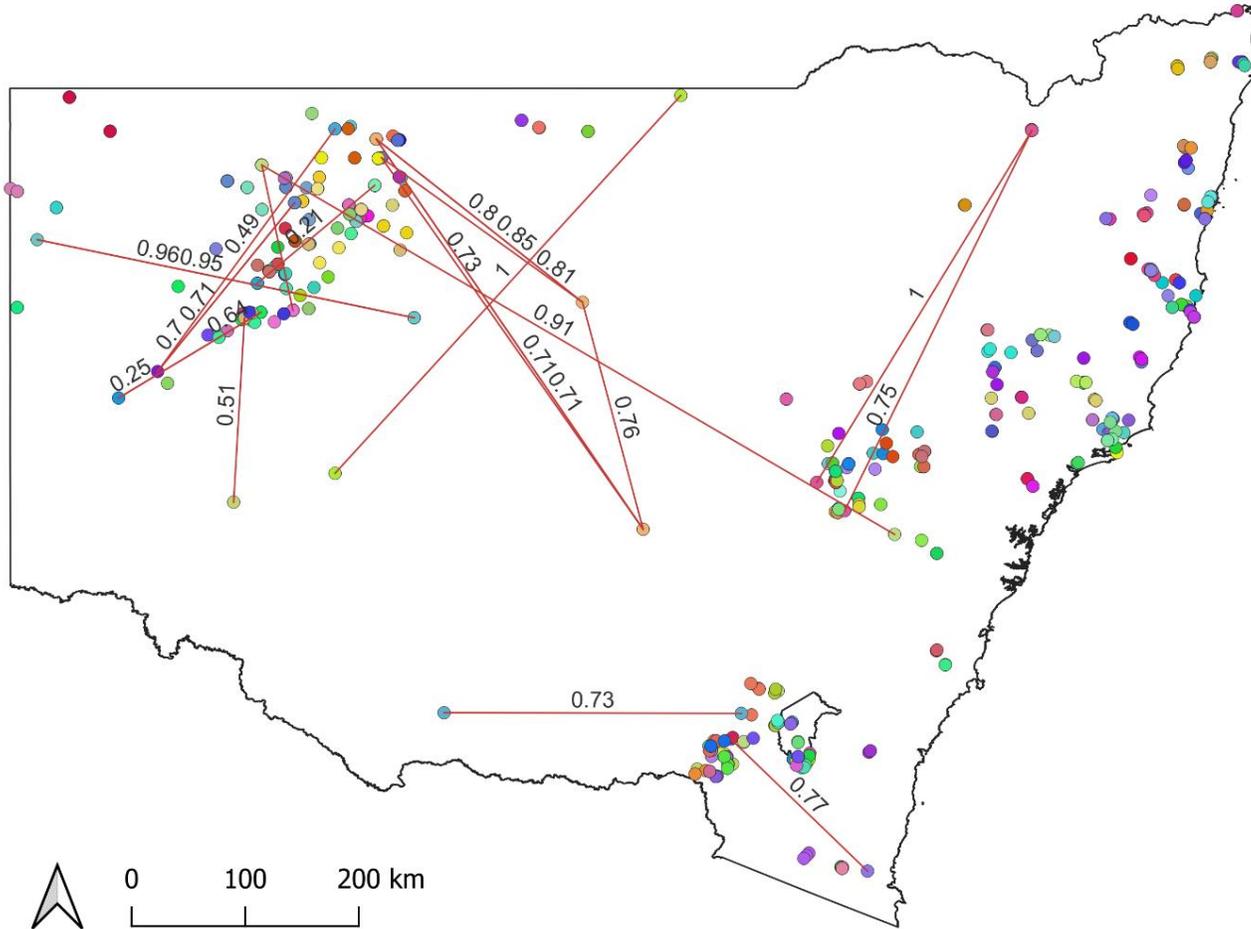
	Criterion (% dingo)	Results	Percentage
<b>Mean % Dingo</b>			78.03
<b>(SE)</b>			(0.35)
<b>Range %</b>			0-100
<b>Pure modern dog</b>	0-9%	16	0.8
<b>Modern dog-dominant crossbred</b>	10-49%	43	2.0
<b>Dingo-dominant crossbred</b>	50-79%	1045	49.8
<b>Possible Pure Dingo</b>	80-89%	433	20.6
<b>Pure Dingo</b>	90-100%	562	26.8
<b>Total Samples</b>		2000	
	<b>Percentage of samples (%)</b>		
<b>Category</b>	Western Division	Eastern Division	
<b>Modern dog</b>	0.4	0.9	
<b>Modern dog-dominant crossbred</b>	0.0	3.3	
<b>Dingo-dominant crossbred</b>	3.9	71.9	
<b>Possible dingo</b>	24.0	19.1	
<b>Pure dingo</b>	71.7	4.7	

# State Subpopulations



- 8 Subpopulations across NSW
- 788 samples mixed

# State Kin Groups

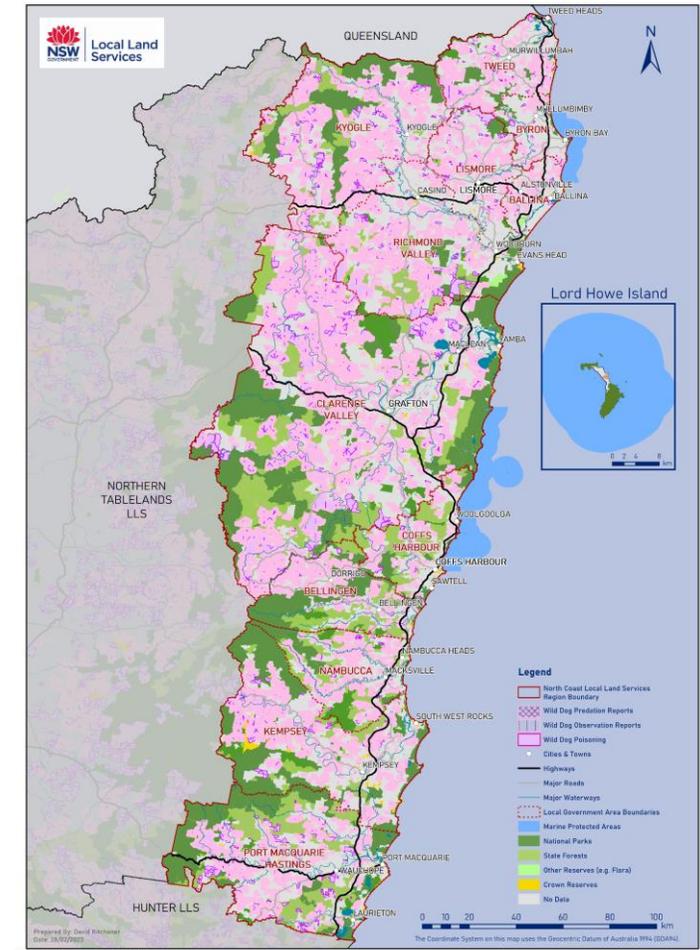
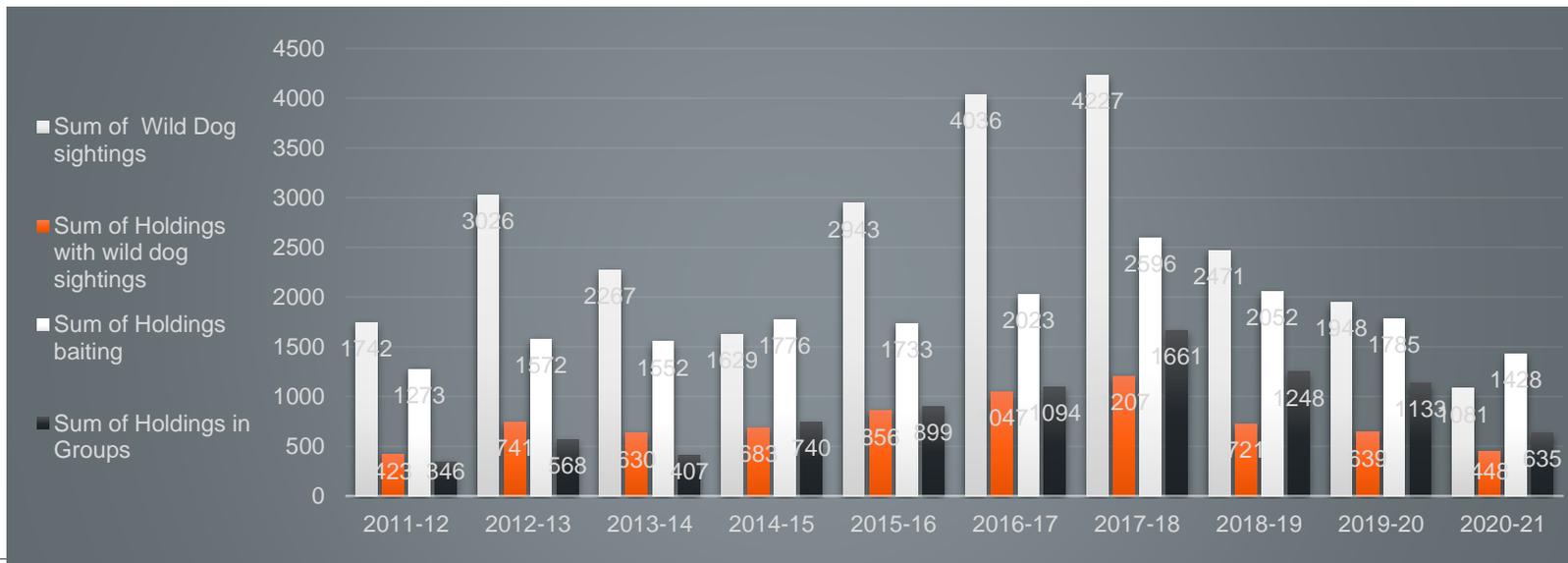


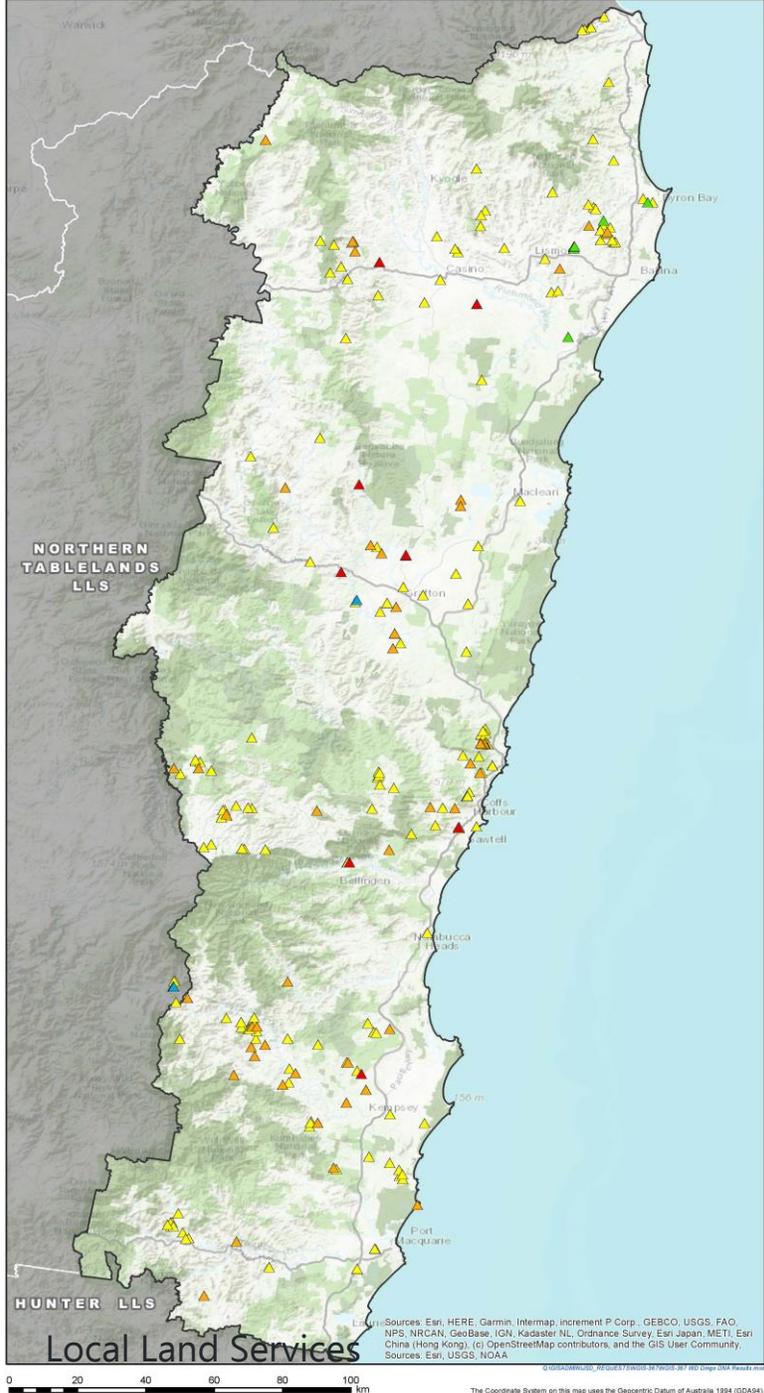
	n
Belonged to a kin group	942
Unrelated	1149
Number of kin groups	430
Largest kin group (no. of dogs)	8
Total samples	2091

- Most kin groups within 25km
- Max separation of 377 km

# The North Coast Wild Dog Breakdown

- Purple shaded area
  - Observation, sightings, tracks etc
  - Predation reports
  - Wild dog poisoning





**Legend**

**Dingo Percentage**

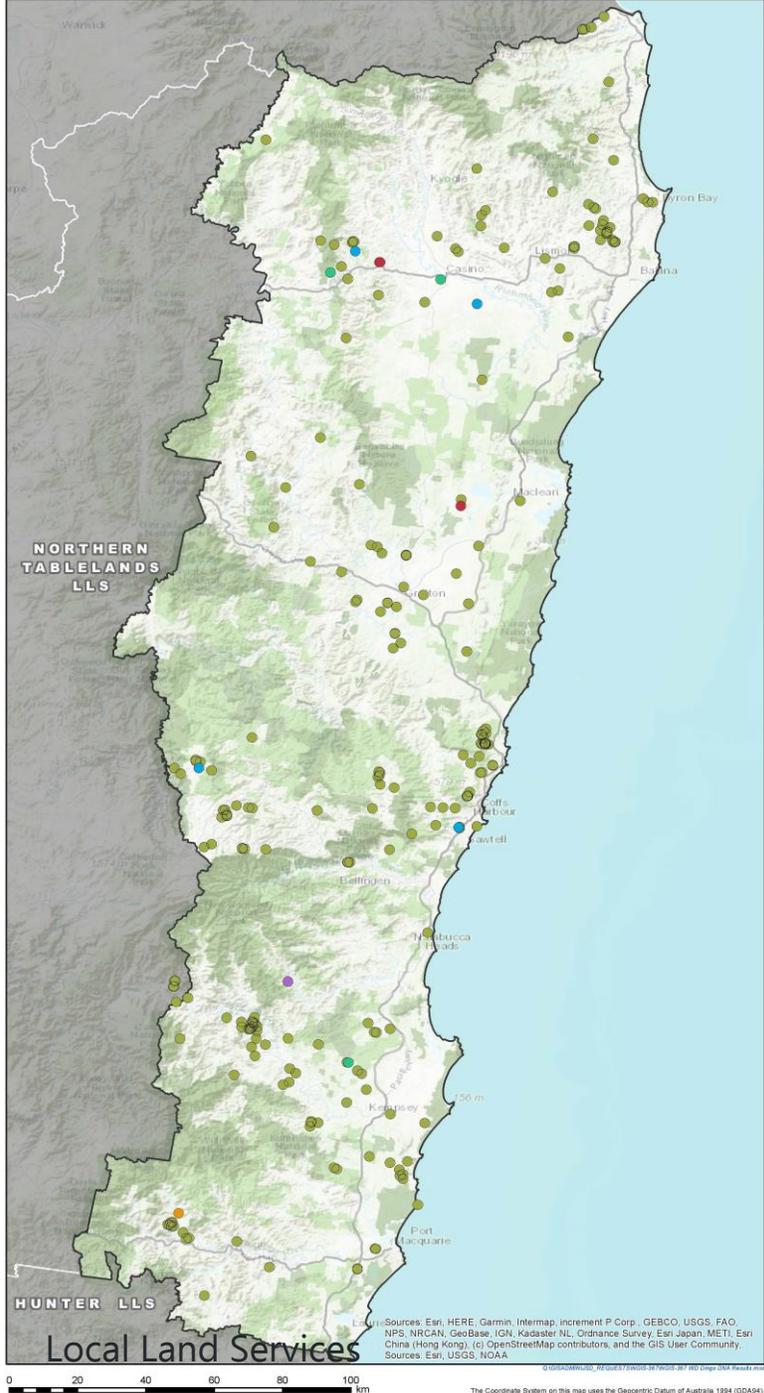
- ▲ Dingo
- ▲ Possible Dingo
- ▲ Hybridised Dingo
- ▲ Hybridised Dog
- ▲ Dog
- National Parks
- State Forests

N  
1:1,000,000

Sources: Data used may include NSW Land and Property Information, Tourism, parks and forests, roads, water, imagery, NSW Dept of Industry - Administrative boundaries.  
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# The North Coast Purity

Genetic testing	Results
Mean %Dingo	69.83%
Range %	0%-100%
Number Pure	9
Number Possible Pure	55
Number High Dingo Hybrid	265
Number High Dog Hybrid	7
Number Modern Dog	2
<b>Samples</b>	<b>338 (4 samples didn't provide dingo purity results)</b>



# The North Coast Subpopulations

- 152 samples were mixed populations

**Legend**

**Sub-Population**

- EIL
- EN
- IL
- NA
- SV
- SW

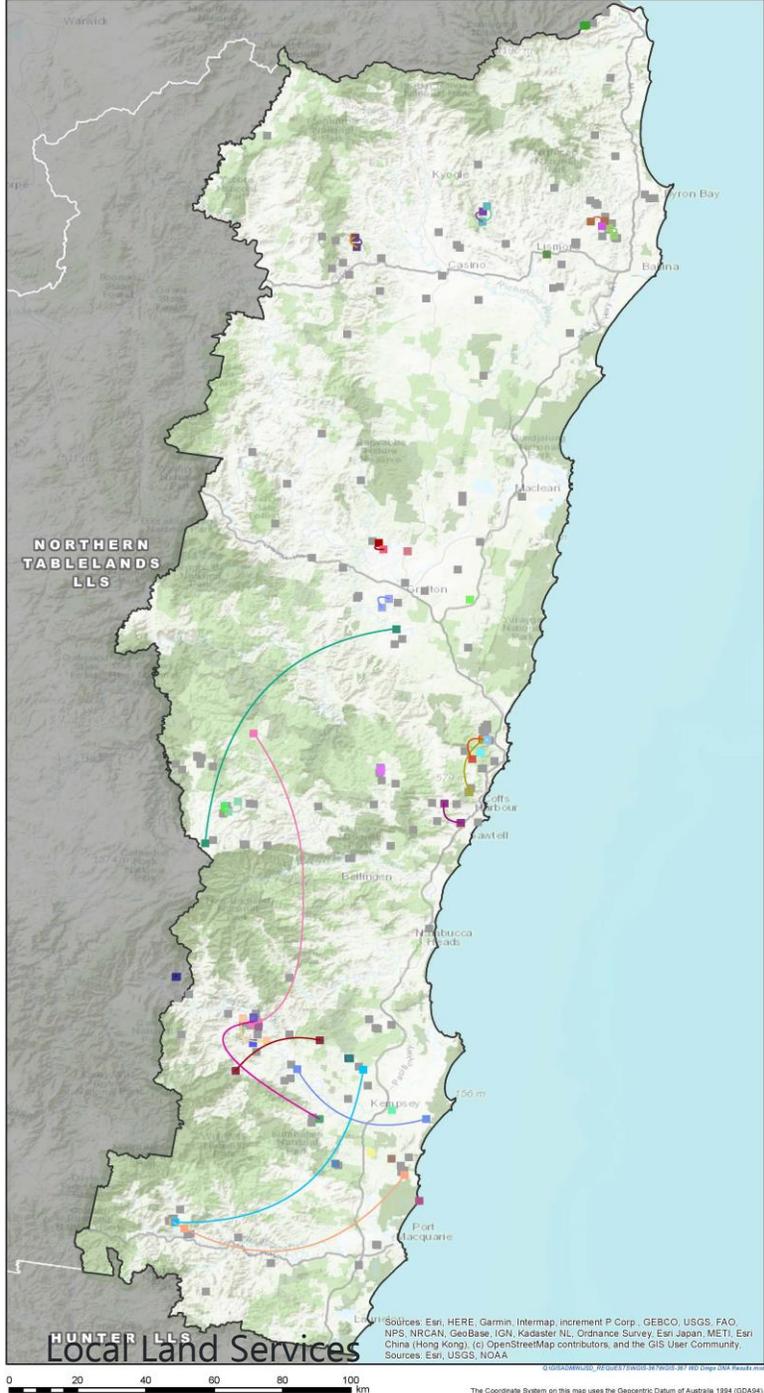
■ National Parks

■ State Forests

N  
1:1,000,000

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Legend

- SE 1169
- SE 1769
- SE 1772
- SE 1787
- SE 1789
- SE 1796
- SE 1802
- SE 1804
- SE 1822
- SE 1826
- SE 1834
- SE 1835
- SE 1842
- SE 1855
- SE 1859
- SE 1974
- SE 1998
- SE 2038
- SE 2042
- SE 2047
- SE 2064
- SE 2114
- SE 2116
- SE 2127
- SE 2129
- SE 2133
- SE 2134
- SE 2139
- SE 2309
- SE 2310
- SE 2312
- SE 2313
- SE 2318
- SE 2321
- SE 2324
- SE 2325
- SE 2333
- SE 2339
- SE 2342
- SE 2346
- SE 2348
- SE 2352
- SE 2390
- SE 2361
- SE 2365
- SE 2372
- SE 2373
- SE 576
- Unrelated
- National Parks
- State Forests



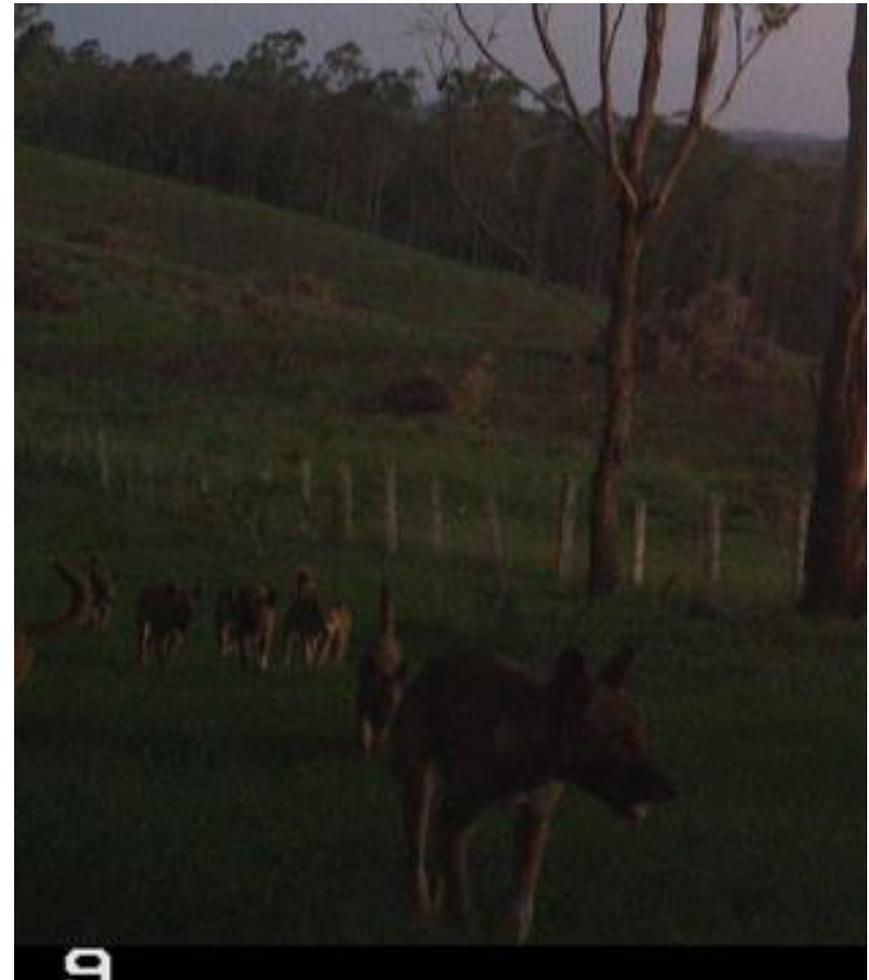
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# The North Coast Kin Groups

- 93 samples were allocated to 48 kin groups.
- Maximum north-south dispersal was 85.5km (SE2348)
- Maximum east-west dispersal was 59.7km (SE2372)

# Key take homes

- Wild dog populations are not decreasing at the state scale.
- Pure and possibly pure dingoes predominate in the western division.
- The more sample gaps we can fill the greater clarity we have.
- Highlights the need for landscape-scale control programs.



# Where to next?

- Further data analysis and clean up
- Targeting current sampling gaps.
- Publishing Scientific articles



# Thank you to everyone involved

- Particularly landholders and LLS Biosecurity Teams
- Research programs like this are a good way to get landholders involved
- However, the results need to be passed back to the landholders or they will soon lose interest in programs



# Questions?



# References



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1. Fleming P, Freney S, Jackson S, Worsley P, and Stephens D (2023) Using DNA for Managing Wild Dogs (Wild dog gene flow project). Final Report to Special Purposes Pest Management Rate Committee, 30<sup>th</sup> April 2023.
  2. Stephens D, Wilton AN, Fleming PJS, and Berry O (2015) Death by sex in an Australian icon: A continent-wide survey reveals extensive hybridization between dingoes and domestic dogs. *Molecular Ecology* 24, 5643-5656.
  3. Jackson SM, Groves CP, Fleming PJS, Aplin KP, Eldridge MDB, Gonzalez A, and Helgen KM (2017) The wayward dog: Is the Australian native dog or dingo a distinct species? *Zootaxa* 4317, 201-224.