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

Sean Freney[1], Peter JS Fleming[2], Danielle Stephens[3], David Kitchener[4], Jordan Smith[5], Dean Chamberlain[1]

[1]North Coast Local Land Services, South Grafton NSW 2460
[2]Vertebrate Pest Research Unit, NSW DPI, Orange NSW 2800
[3]Zoological Genetics P/L, C/P.O Inglewood, SA 5133
[4]Central Tablelands Local Land Services, Orange NSW 2800
[5]Hunter Local Land Services, Tocal NSW 2421

NSW GOVERNMENT

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

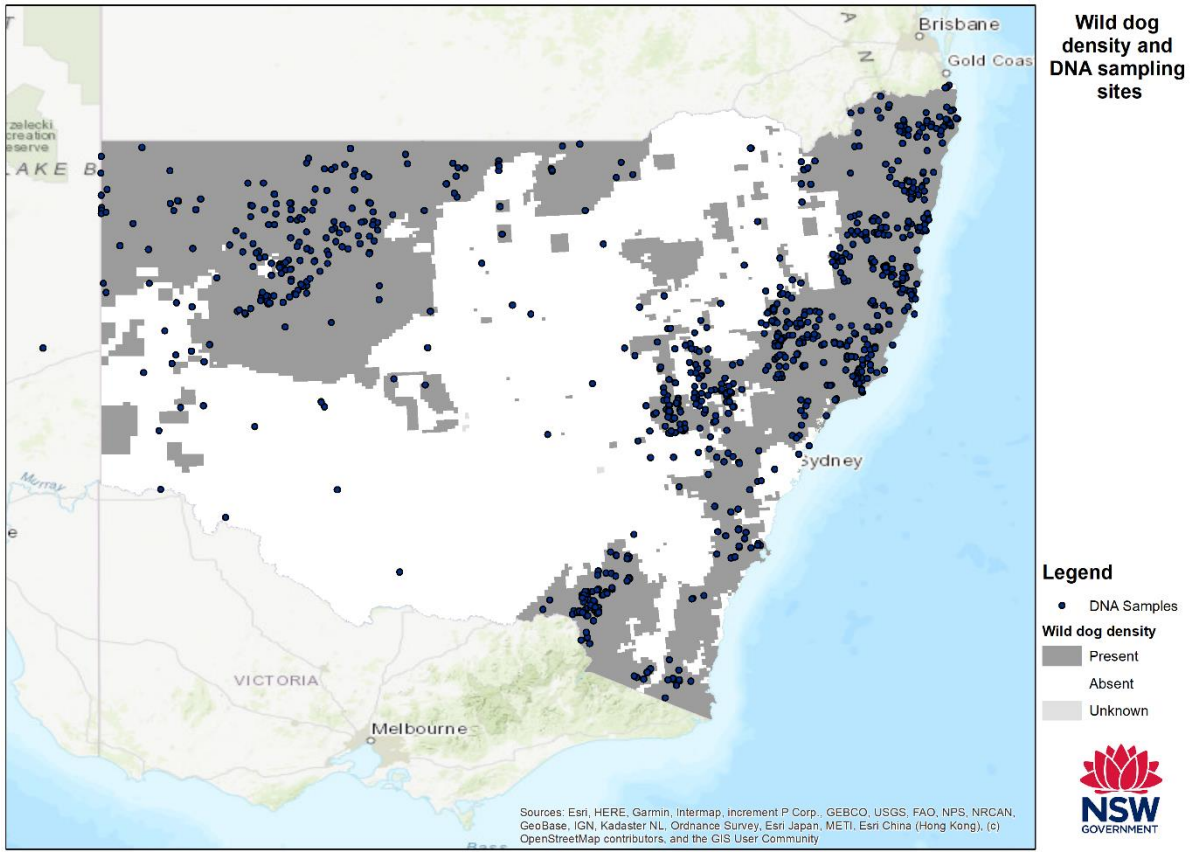
Methods: DNA Collection

Key information Needed:

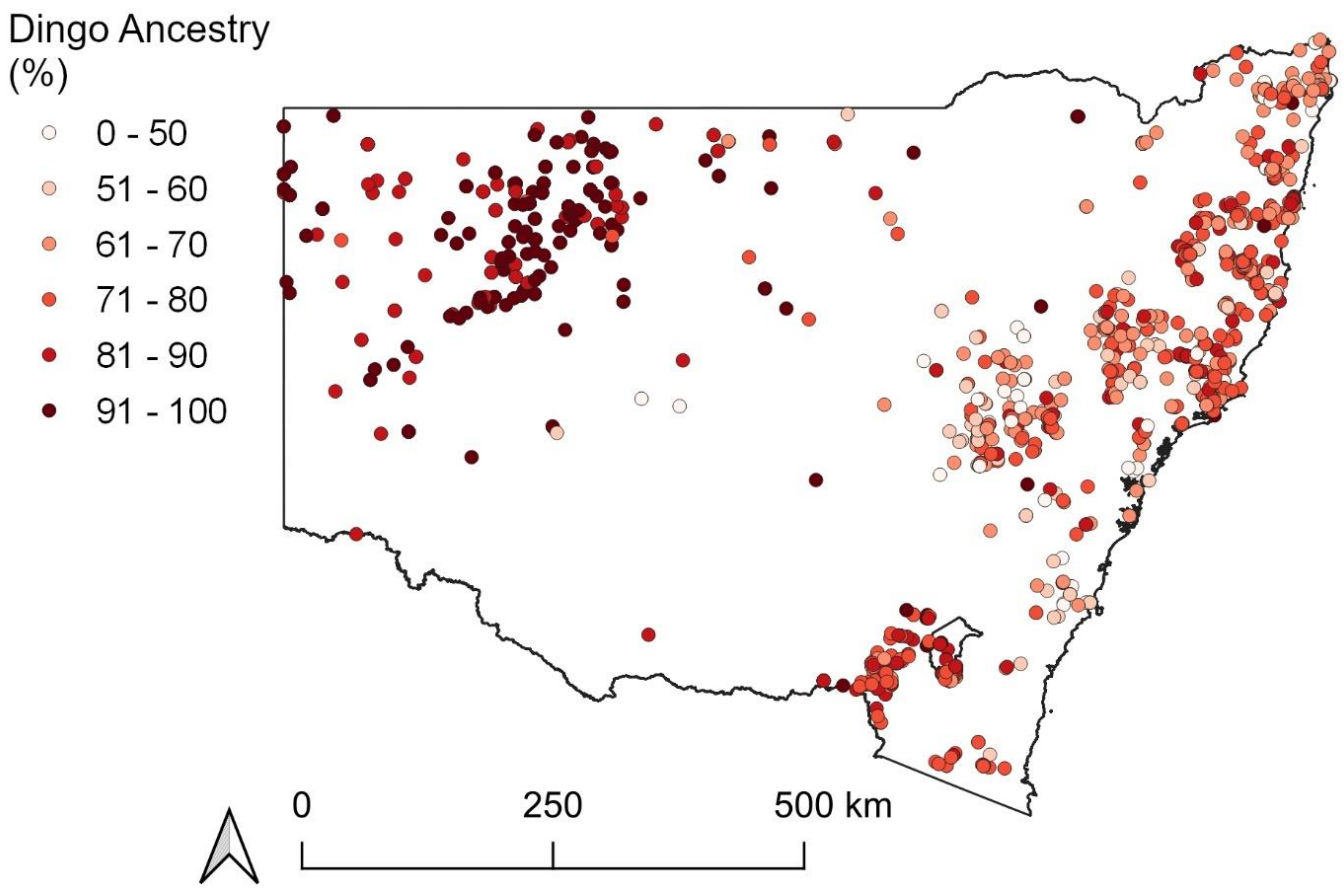
- Location
- Date
- Contact Information

Methods: Laboratory

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



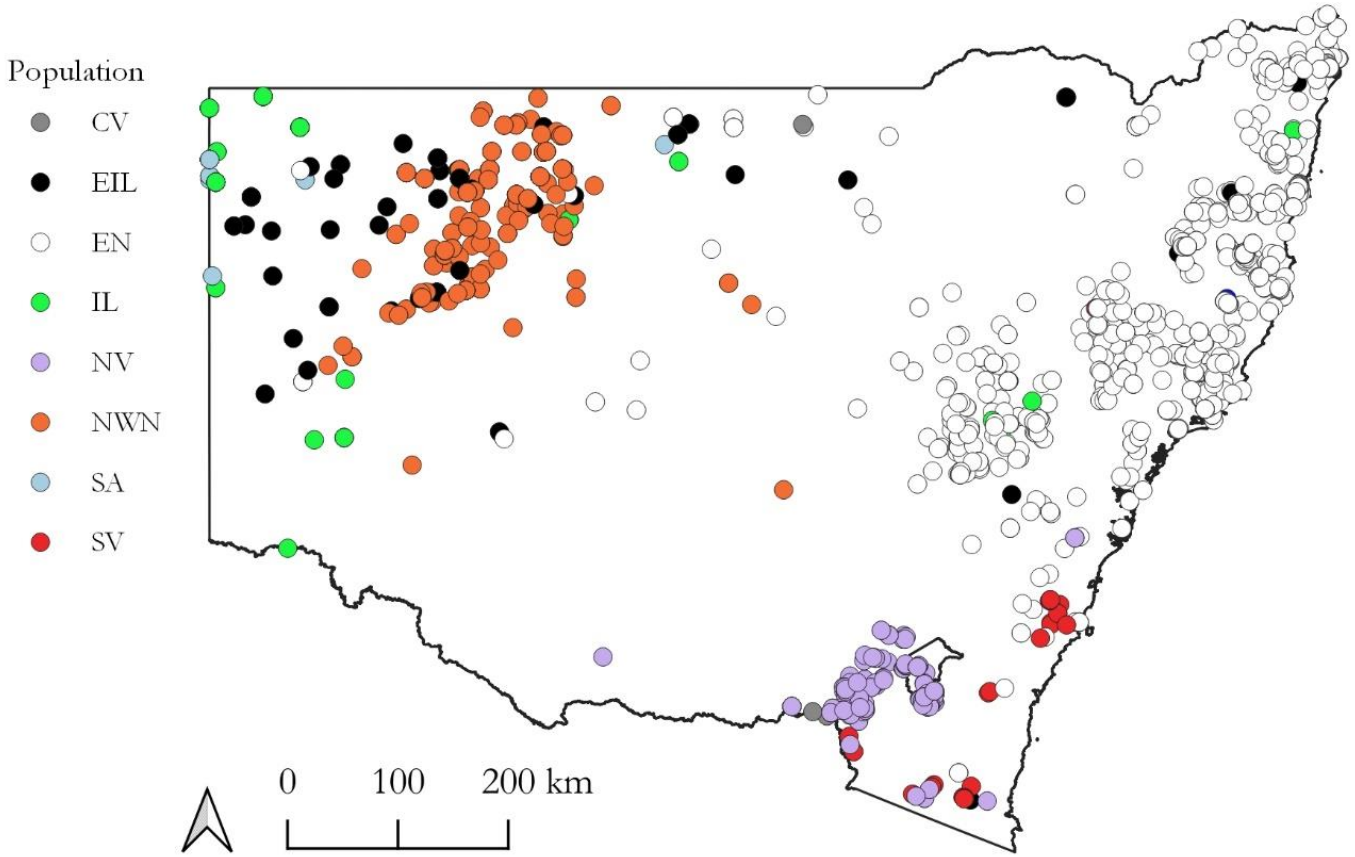
State Purity



	Criterion (% dingo)	Results	Percentage
Mean % Dingo			78.03
(SE)			(0.35)
Range %			0-100
Pure modern dog	0-9%	16	0.8
Modern dog-dominant crossbred	10-49%	43	2.0
Dingo-dominant crossbred	50-79%	1045	49.8
Possible Pure Dingo	80-89%	433	20.6
Pure Dingo	90-100%	562	26.8
Total Samples		2099	

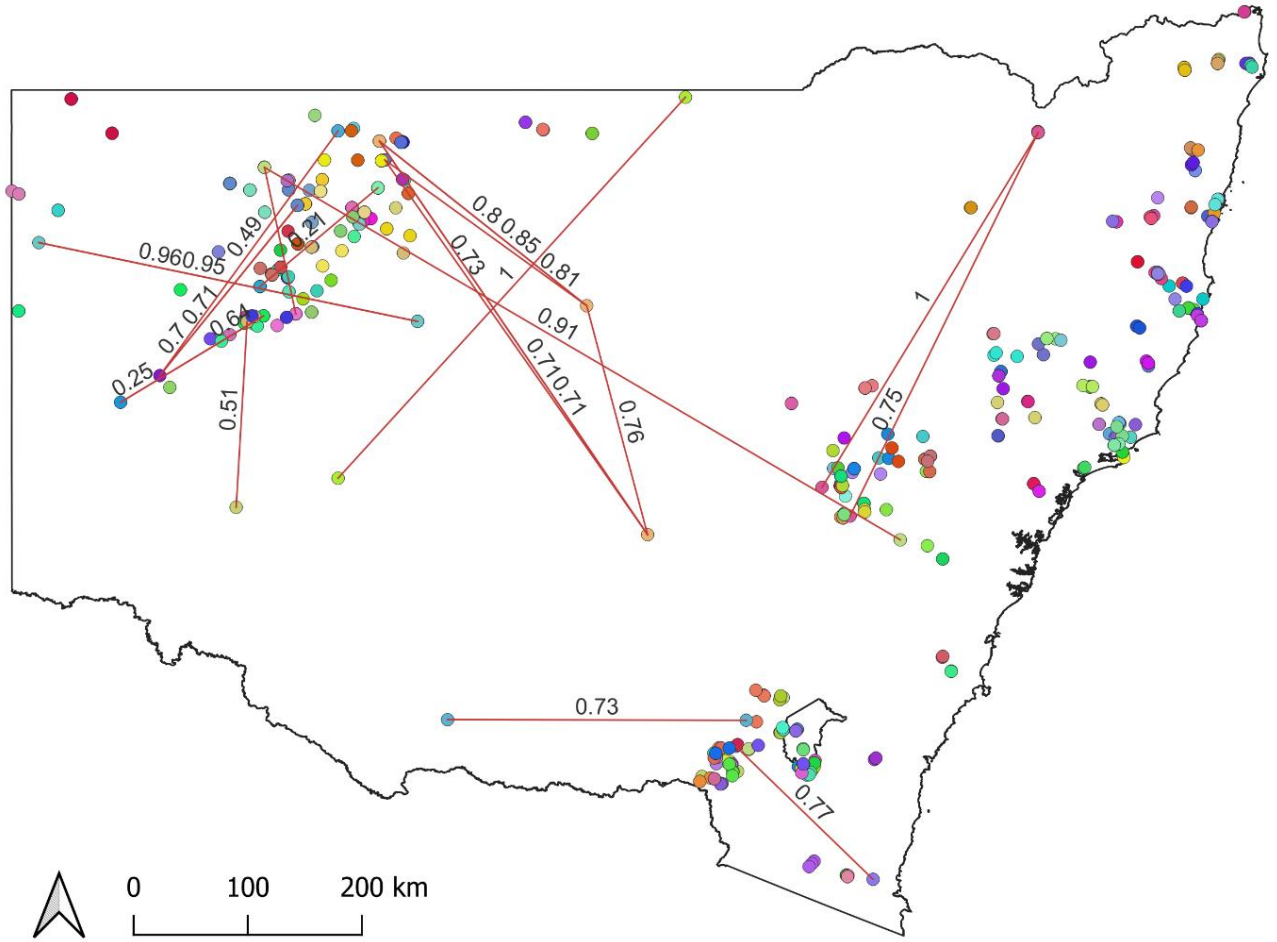
	Percentage of samples (%)	
Category	Western Division	Eastern Division
Modern dog	0.4	0.9
Modern dog-dominant crossbred	0.0	3.3
Dingo-dominant crossbred	3.9	71.9
Possible dingo	24.0	19.1
Pure dingo	71.7	4.7

State Subpopulations



- 8 Subpopulations across NSW
- 788 samples mixed

State Kin Groups



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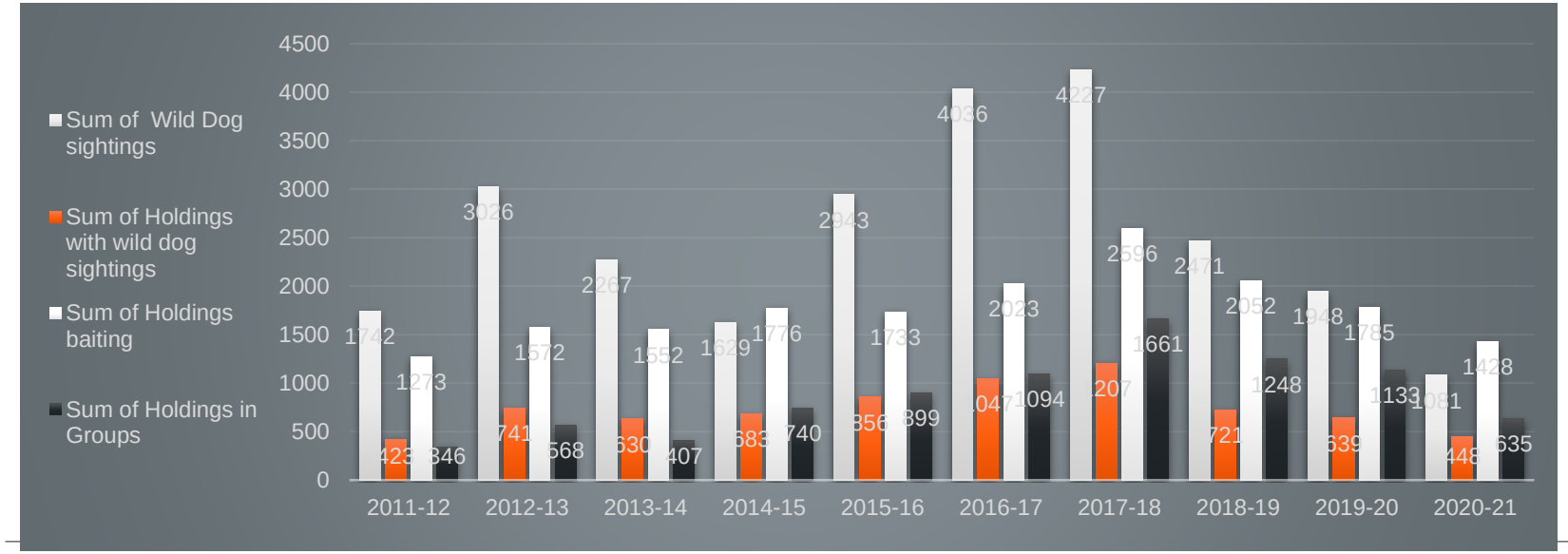
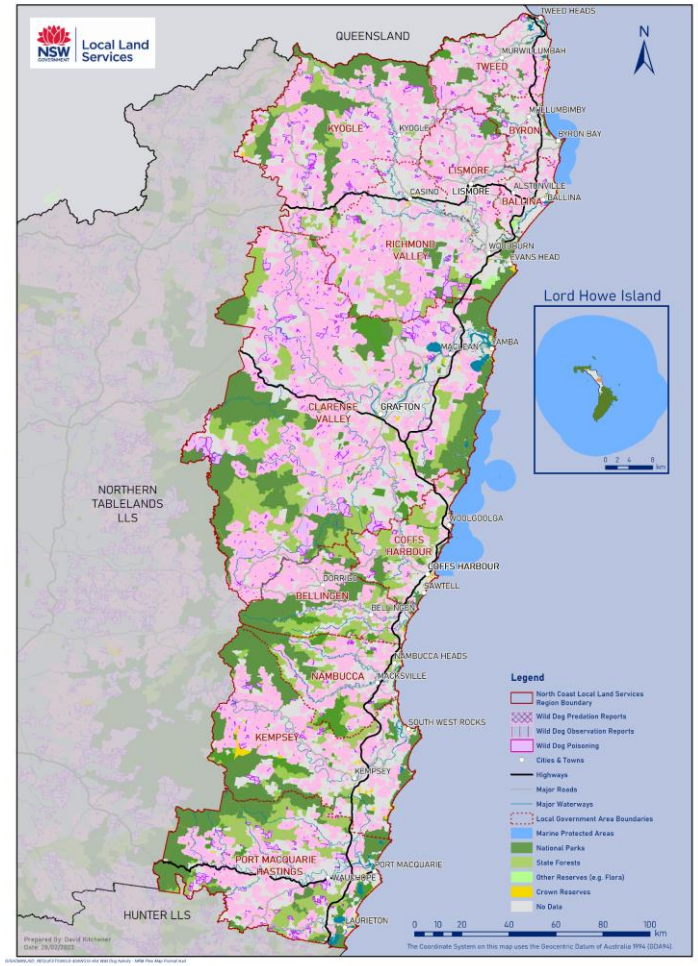
Belonged to a kin group	942
Unrelated	1149
Number of kin groups	430
Largest kin group (no. of dogs)	8
Total samples	2091

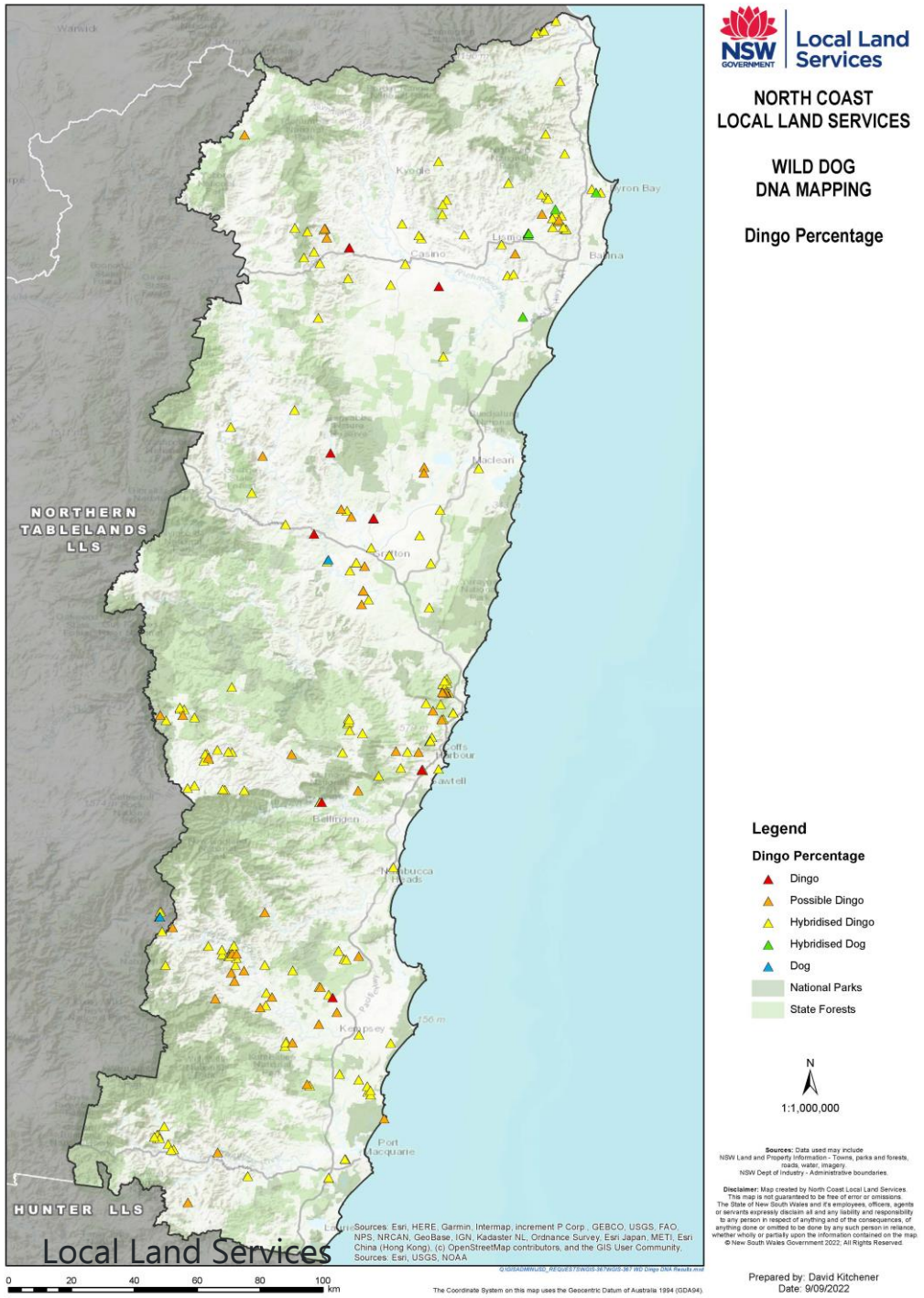
- Most kin groups within 25km
- Max separation of 377 km

The North Coast Wild Dog Breakdown

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

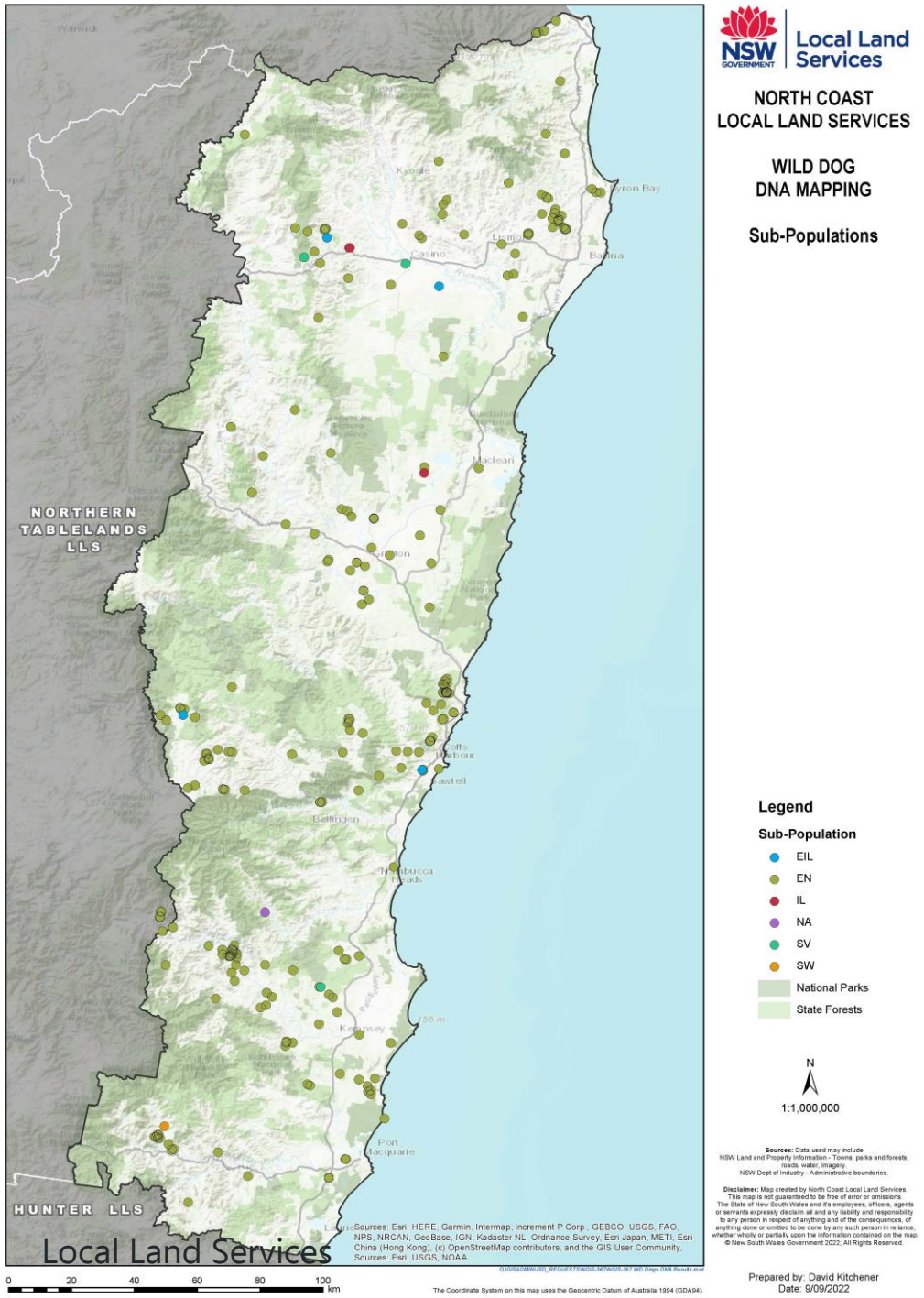






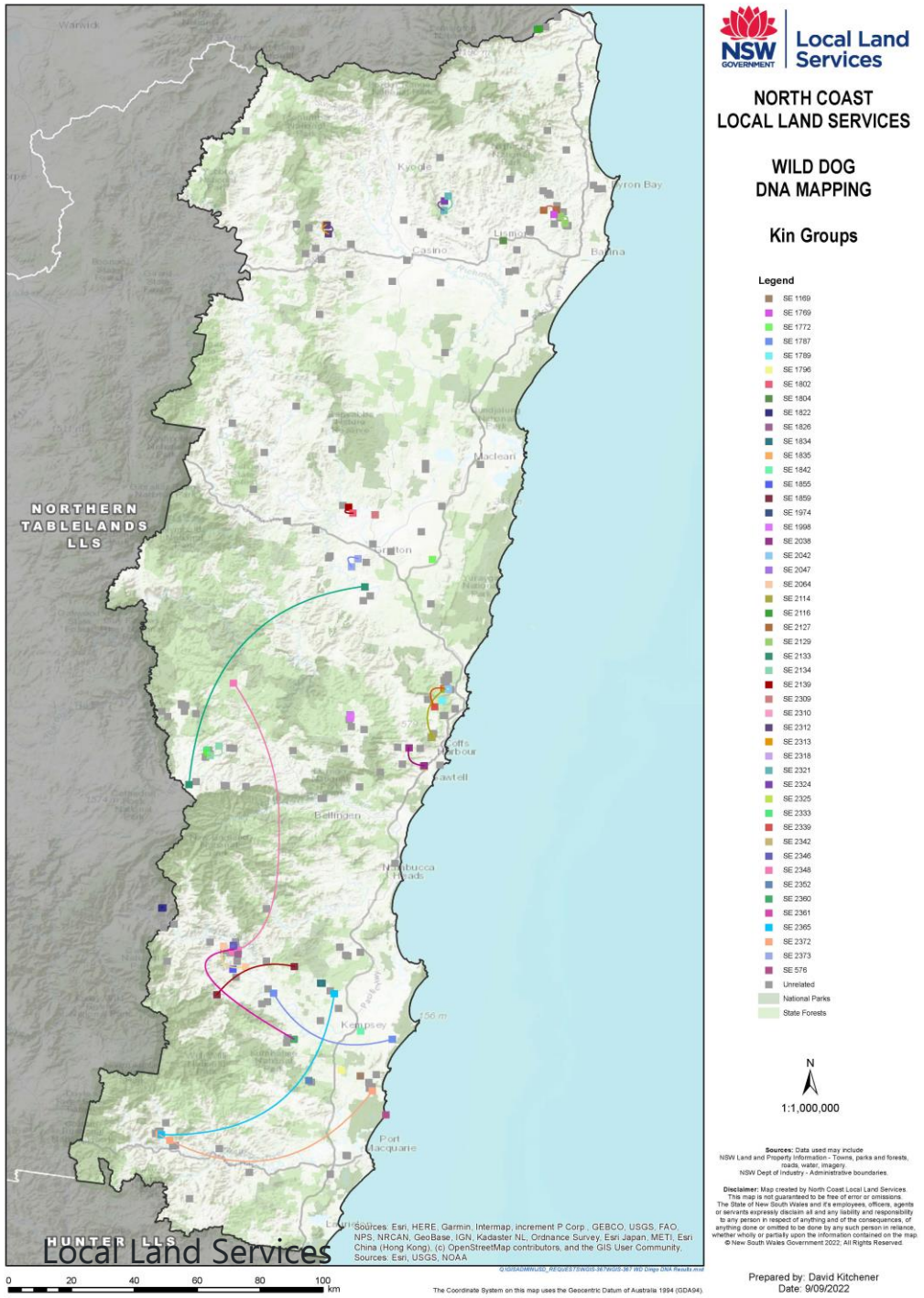
The North Coast Purity

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
Samples	338 (4 samples didn't provide dingo purity results)



The North Coast Subpopulations

- 152 samples were mixed populations

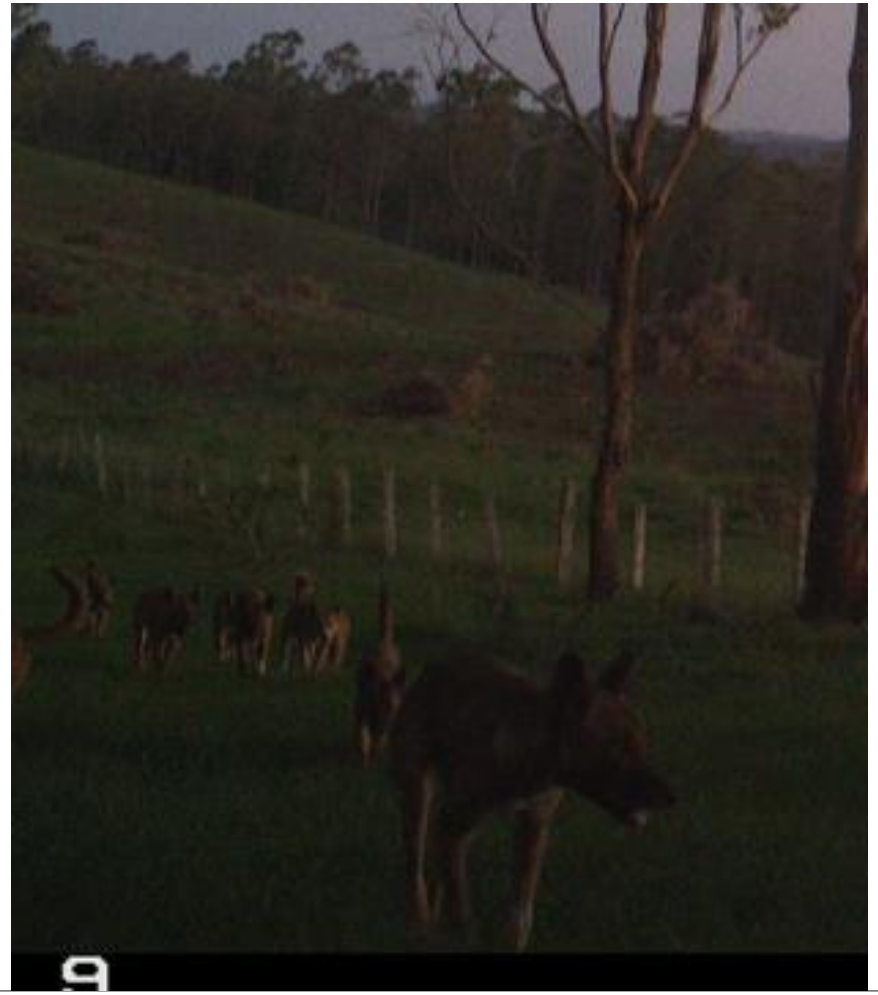


The North Coast Kin Groups

- 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

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, 30th 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.