Brolga and Wind Farms: Recent Knowledge Gains, the Interim Guidelines and Key Future Issues



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Presentation Outline

- Background
- Interim Brolga Guidelines
- Case Study
- Key Considerations for Industry
- Conclusion

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0417-09/05/07-M-M
Brolga
Kakadu NP, NT, Australia
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Brolga *Grus rubicunda*

- Vulnerable in Victoria, New South Wales and South Australia, listed under relevant State legislation
- Listed as ‘migratory’ under the Cwth *Environment Protection and Biodiversity Conservation Act 1999*
- Action Statement and Recovery Plans in place
- Subject to a range of threatening processes (largely wetland drainage, fox predation)

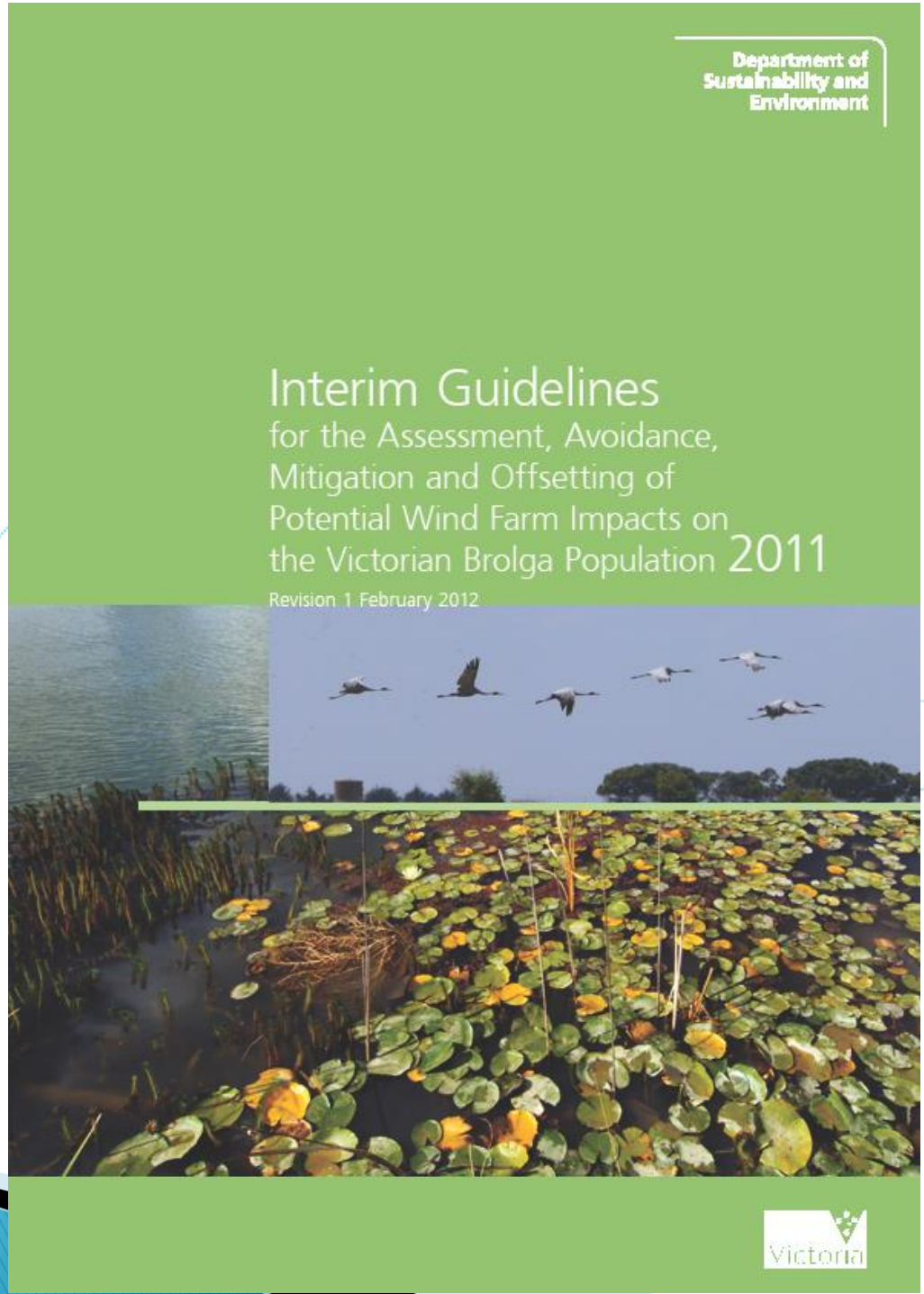
Distribution and Population

- Abundant and widespread occurring across northern and south-eastern Australia
- In Victoria, the species occurs in the western part of the state and on the Northern Plains adjacent to Murray River
- Australian population estimated to be 20,000 to 100,000
- Victorian population
  - 1980s and 1990s – 600 to 650 individuals
  - 2007 – 465-576 individuals

Distribution in Victoria

+ before 1970, ■ since 1970

[from *Atlas of Victorian Wildlife*, NRE 1998a]



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Interim Brolga Guidelines

- Conservative approach to assessing and managing the effects of wind farms
- Consider cumulative impacts of the wind industry on the Victoria Brolga population
- Ensure that there is no 'net effect' of wind farms on Brolga
- Goal of achieving a positive effect for the population
- Avoid or mitigate all potential impacts to Brolga home ranges (3.2 km and 5 km turbine-free buffer radius for breeding and flocking sites, respectively)

Case Study – South West Victoria

Study objectives

- Habitat assessments at nesting and flocking sites
- Determine Brolga home range during breeding season and appropriate buffer distances

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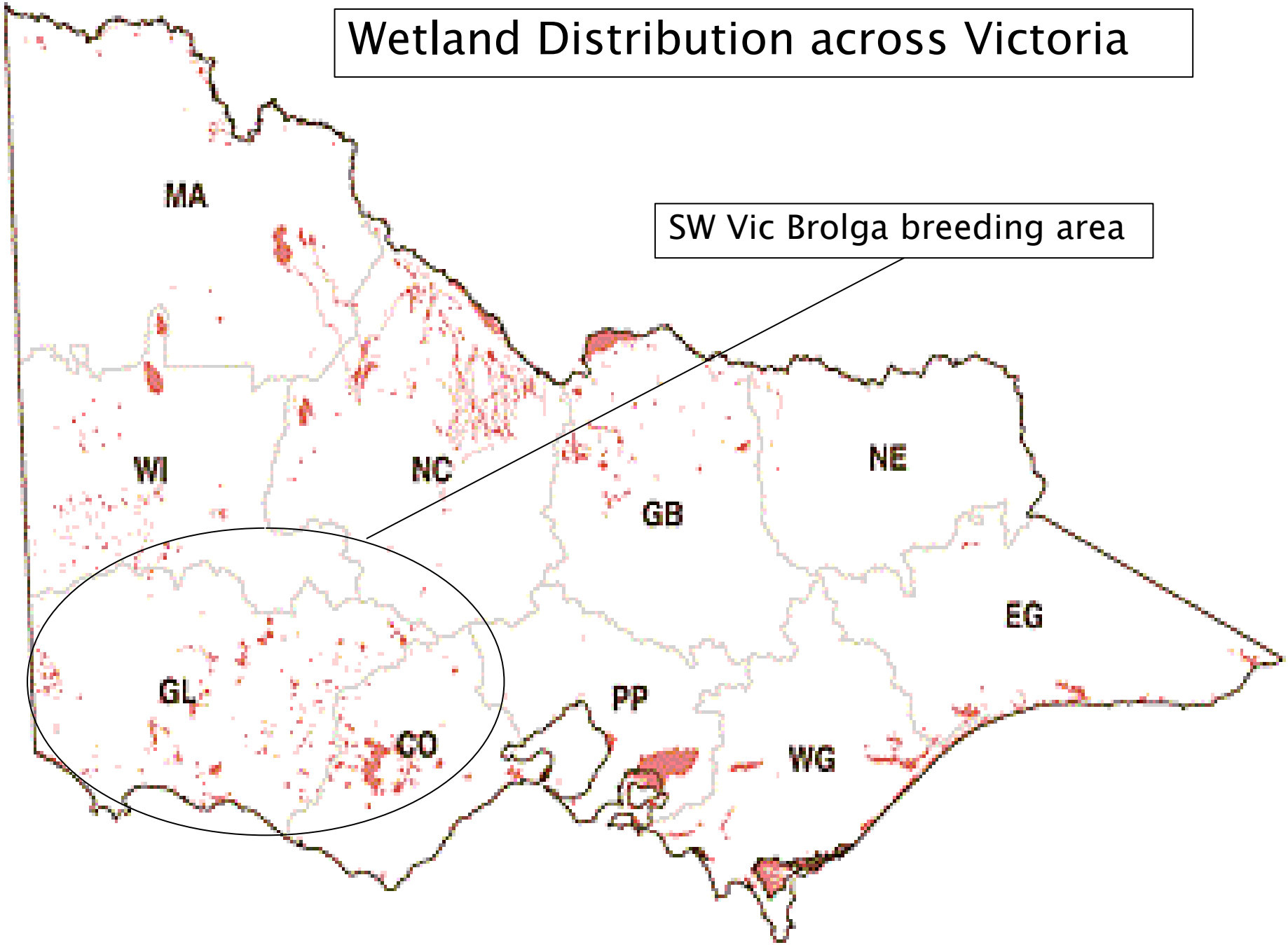
Wetland Distribution across Victoria
SW Vic Brolga breeding area
MA
WI
NC
GB
NE
EG
GL
CO
PP
WG

Case Study – South West Victoria

Methods (habitat assessments)

- Under the guidelines all wetlands with a previous Brolga nest record require a buffer if suitable habitat is present (not drained or planted)
- 332 breeding sites (VBA, previous reports and landholder discussions)
- 236 wetlands within 5 kms of the wind farm, 30 within the wind farm boundary
- Rated as Low – High or Not Suitable based on wetland habitat characteristics relevant to brolgas (some wetlands were not assessed)

Case Study – South West Victoria

Results (habitat assessments)

- 156 breeding locations had suitable habitat (i.e. just less than half)
- Many breeding records were not in a wetland!!
- Only 2 wetlands within the wind farm had high suitability for brolga breeding, and 16 within 5 kms
- 25 wetlands with suitable habitat for brolga breeding within the wind farm, 89 within 5 kms

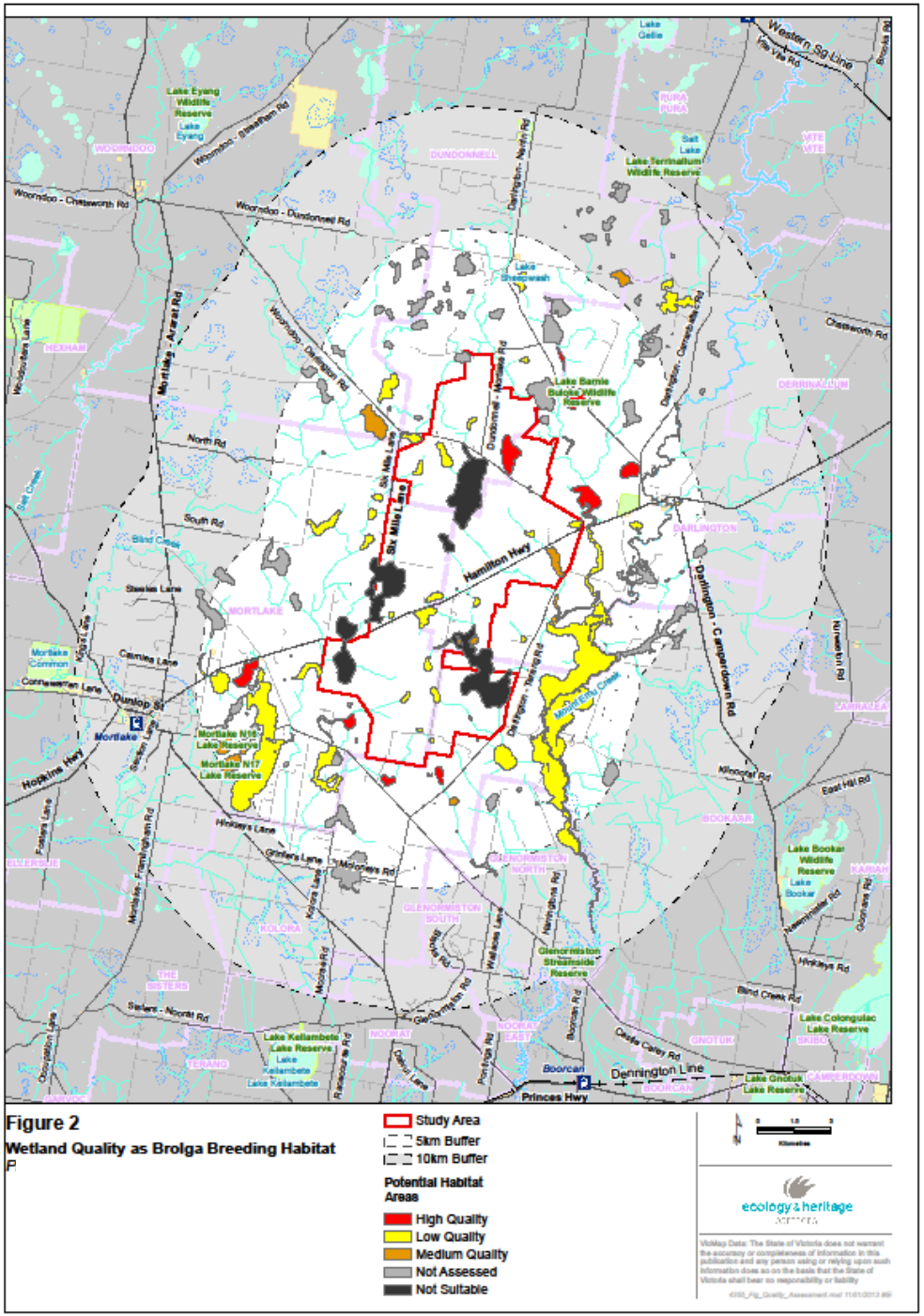

Figure 2

Wetland Quality as Brolga Breeding Habitat

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Case Study – South West Victoria

Methods – breeding requirements

- Active nest searches during the breeding season (between July and December)
- All Brolga 'breeding' records from the Victorian Biodiversity Atlas
- The site of each record was then visited, where possible, up to six times between September and December 2012
- For each individual bird, the estimated location (lat. and long.) was provided, and the presence of eggs or chick was noted
- Location/behaviour was recorded

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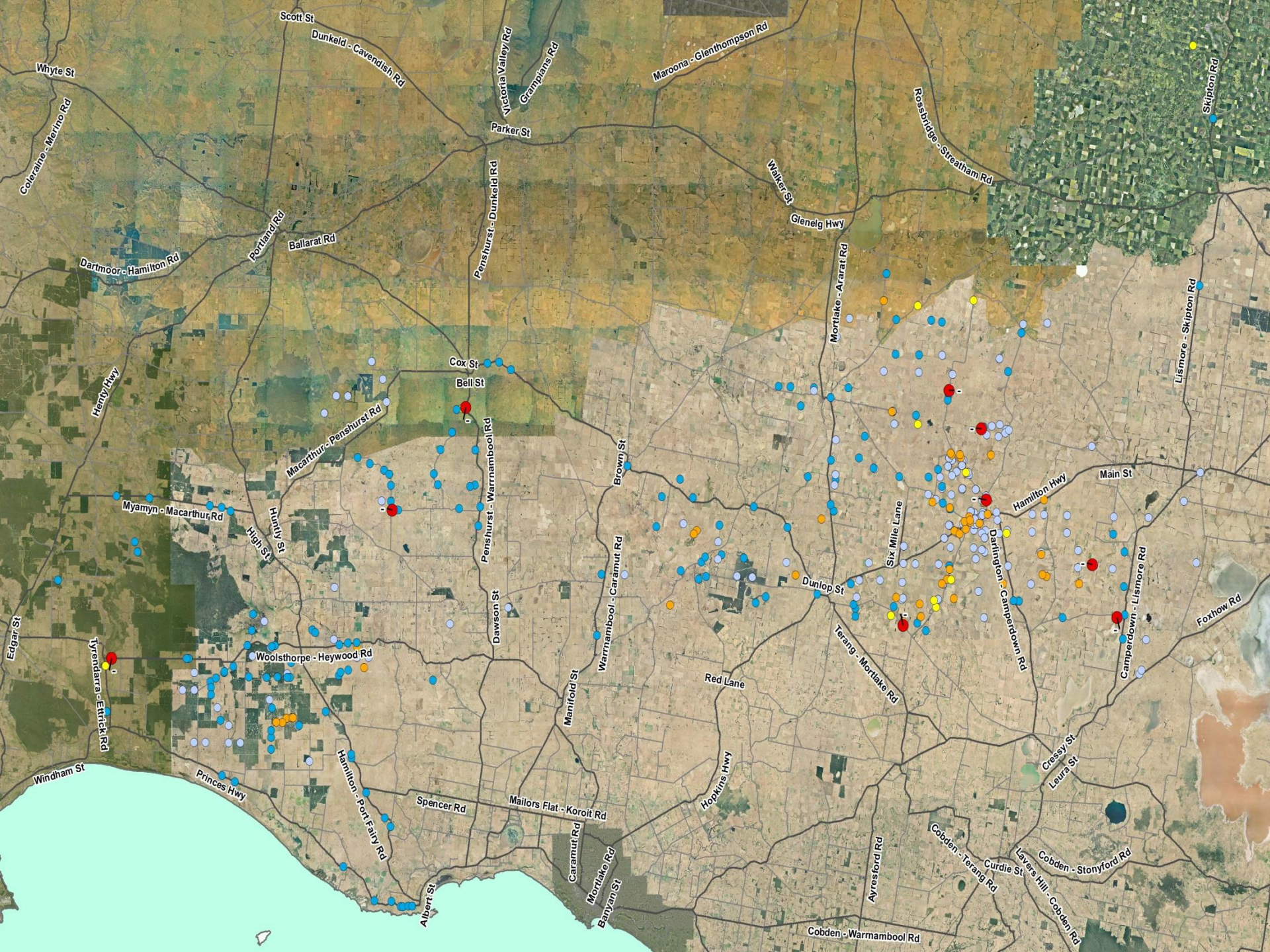
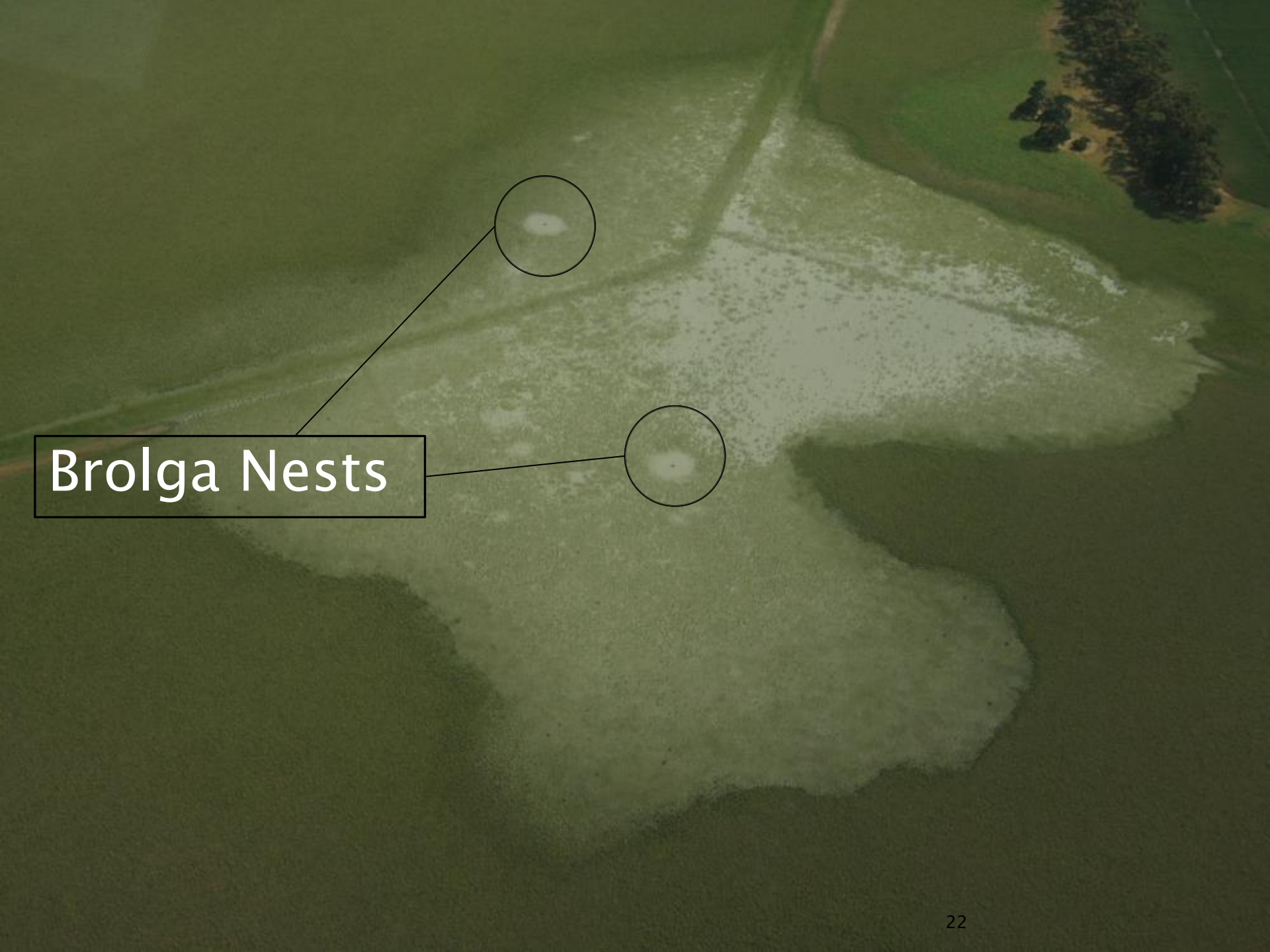

Scott St
Dunkeld - Cavendish Rd
Victoria Valley Rd
Grampians Rd
Maroona - Glenthompson Rd
Skipton Rd
Whyte St
Coleraine - Merino Rd
Parker St
Rossbridge - Streatham Rd
Penshurst - Dunkeld Rd
Walker St
Glenelg Hwy
Portland Rd
Ballarat Rd
Dartmoor - Hamilton Rd
Mortlake - Ararat Rd
Lismore - Skipton Rd
Cox St
Bell St
Henty Hwy
Macarthur - Penshurst Rd
Penshurst - Warrnambool Rd
Brown St
Hamilton Hwy
Main St
Myamyn - Macarthur Rd
Hunt ly St
High St
Six Mile Lane
Darlington - Camperdown Rd
Dunlop St
Camperdown - Lismore Rd
Foxhow Rd
Edgar St
Dawson St
Warrnambool - Caramut Rd
Terang - Mortlake Rd
Woolsthorpe - Heywood Rd
Red Lane
Tyrendarra - Ettrick Rd
Manifold St
Cressy St
Leura St
Windham St
Princes Hwy
Hamilton - Port Fairy Rd
Spencer Rd
Mailors Flat - Koroit Rd
Hopkins Rd
Caramut Rd
Mortlake Rd
Ayresford Rd
Cobden - Terang Rd
Curdie St
Layers Hill - Cobden Rd
Cobden - Stonyford Rd
Albert St
Banyan St
Cobden - Warrnambool Rd

Case Study – South West Victoria

Methods

- Data recorded:
  - the stage of breeding on discovery
  - location of each Brolga and approximate nest location
- Nests were then visited repeatedly until the nesting attempt was successful (i.e. chicks fledged) or was abandoned
- Nest sites were visited a maximum of three times per day (once each in the periods 7–11am, 11am–3pm, 3–7pm)
- Home range size (in hectares) through analysis using standard kernel estimation techniques (Symbolix 2013)


Brolga Nest


Brolga Nests

Case Study – South West Victoria

Results (breeding success)

- Over 500 wetlands were visited
- Data consisted of observations of nine brolga nests
- All nests failed with no successful recruitment into the popn. (only two nests recorded any chick activity)
- Egg stage and approximately one half of all observations recorded the brolga on the nest
- The number of individual brolga observations per nest varied between 2 and 56

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Case Study – South West Victoria

Results

	Nest 1	Nest 2	Nest 3	Nest 4	Nest 5	Nest 6	Nest 7	Nest 8	Nest 9
Number of surveys:	2	15	1	17	18	8	28	20	33
Number of individual brolga observations:	4	18	2	28	27	16	39	35	56
Number of observations with brolga on nest:	0	11	1	1	9	8	28	20	31
Breeding stages recorded:	Egg	Egg	Egg	Chick only	Egg & Chick	Egg	Egg	Egg	Egg

Table 1: Summary of surveys and brolga movements observed.

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Case Study – South West Victoria

Results (home range analysis)

Nest ID	50% (m)	75%(m)	90%(m)	95%(m)	99%(m)
Nest 2*	34	52	86	124	124
Nest 4	296	366	428	466	526
Nest 5	207	382	495	559	651
Nest 6	136	240	333	377	440
Nest 7	89	134	321	564	564
Nest 8	105	191	330	404	494
Nest 9	125	234	493	636	766
Combined	**114**	**262**	**405**	**497**	**679**

Table 3: Radius of containment at key percentage levels for each nest individually and combined.
**Nest 2 should be treated with caution due to very low data counts.*

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Proposed updates to the Guidelines

Home range / buffer distances

- Two studies have shown almost exactly the same values. Likely that this is a general value for SW VIC given geographic extent and differences in environmental conditions

Source	Home range area (hectares)		Radius of containment buffer (metres)	
	95%	99%	95%	99%
This study – all pairs	52.34	80.09	497	679
Biosis Research (2011) – all pairs	30.6	110.9	513	687
This study - movements during incubation	39.5	64.22	493	690
Biosis Research (2011) - movements during incubation	20.2	86	444	605
This study - post-hatching movements	53.33	80.12	529	628
Biosis Research (2011) - post-hatching movements	41.2	116.5	478	620

Proposed updates to the Guidelines

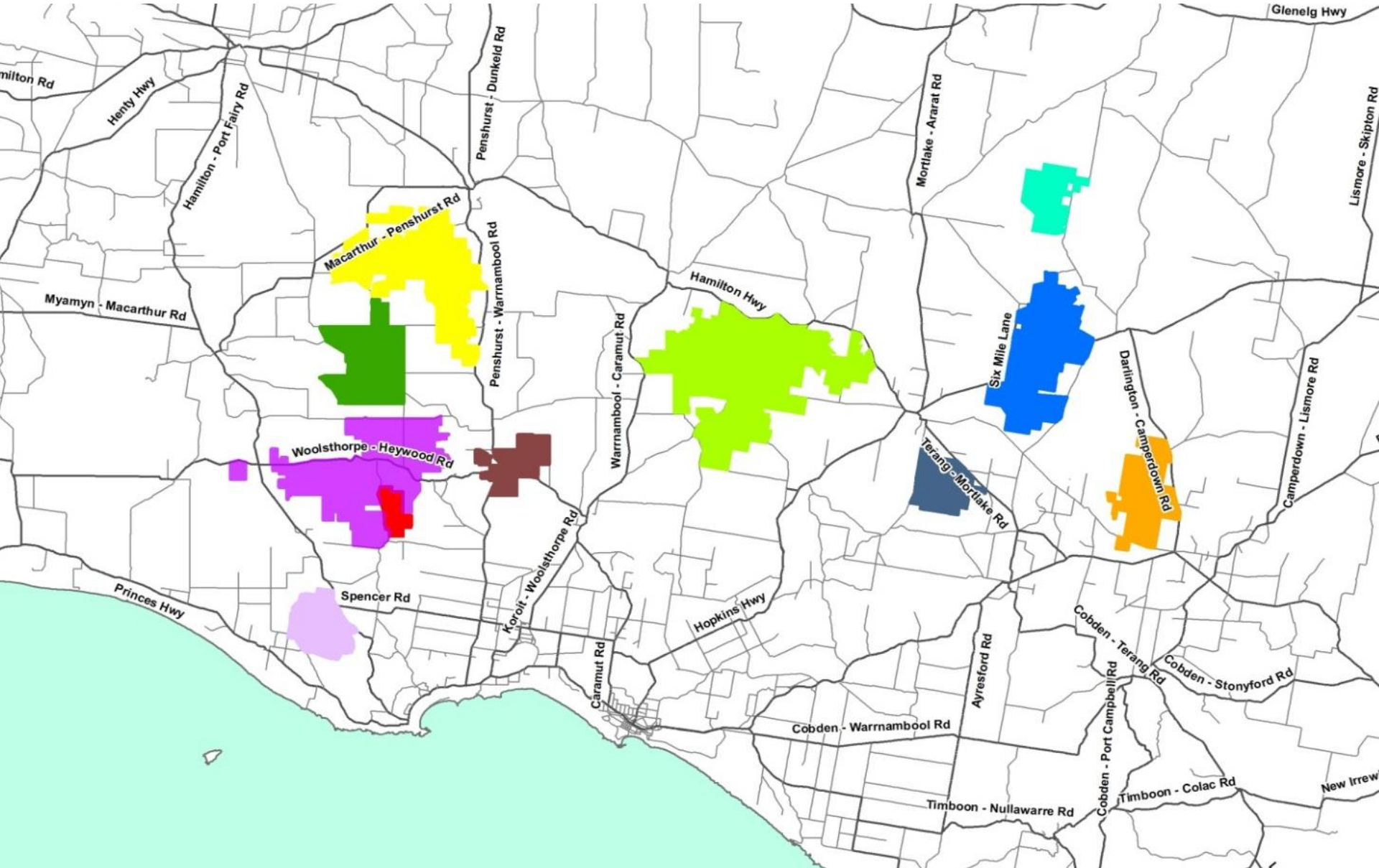
Home range / buffer distances

- DEPI should improve spatial data on important Brolga breeding habitat across the SW and make it publicly available
- Assists all levels of Government in ensuring accurate and consistent planning decisions

Cumulative impacts

- DEPI should take a more pro-active approach in determining cumulative impacts
- Proponents may be following all guidelines, but Brolgas may still decline

Proposed updates to the Guidelines



Future Consideration for Industry

Home range / buffer distances

- Adequate buffers from high quality breeding wetlands appear to be known now
- No information on actual impacts – Macarthur will be a test case for this
- Ongoing pre and post-construction monitoring
  - Site aversion / displacement
  - Breeding success
  - Direct turbine mortality
  - Barriers to migration
  - Other disturbances
- Guidelines for other threatened species should continue to be refined in light of new information

Conclusion

- Ground truth historical data to determine the suitability of habitat for 'breeding' records
- Buffer distances around known and potential breeding sites should be determined at each site
- Buffers could be refined to 800 m – 1 km around breeding site (proportion of flights need to be considered)
- Turbine configuration should consider spatial orientation of wetlands
- Cumulative impacts for multiple wind farms (birds avoid turbines but issues with spatial location of WF in the landscape)

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Acknowledgments

- Elizabeth Stark (Symbolix) for home range analysis
- Various landowners for property access and information on Brolga presence and breeding sites
- The Victorian Department of Environment and Primary Industry (DEPI) for Brolga data, including breeding sites
- Colleagues at Ecology and Heritage Partners, other wind farm proponents and consultants

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