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Flying-fox Camp Habitat Research

SEPTEMBER 2016

Objective

Assess the potential of establishing, enhancing and/or restoring suitable habitat in or near contentious camps in NSW, with a view to creating suitable camp habitat away from human settlements.

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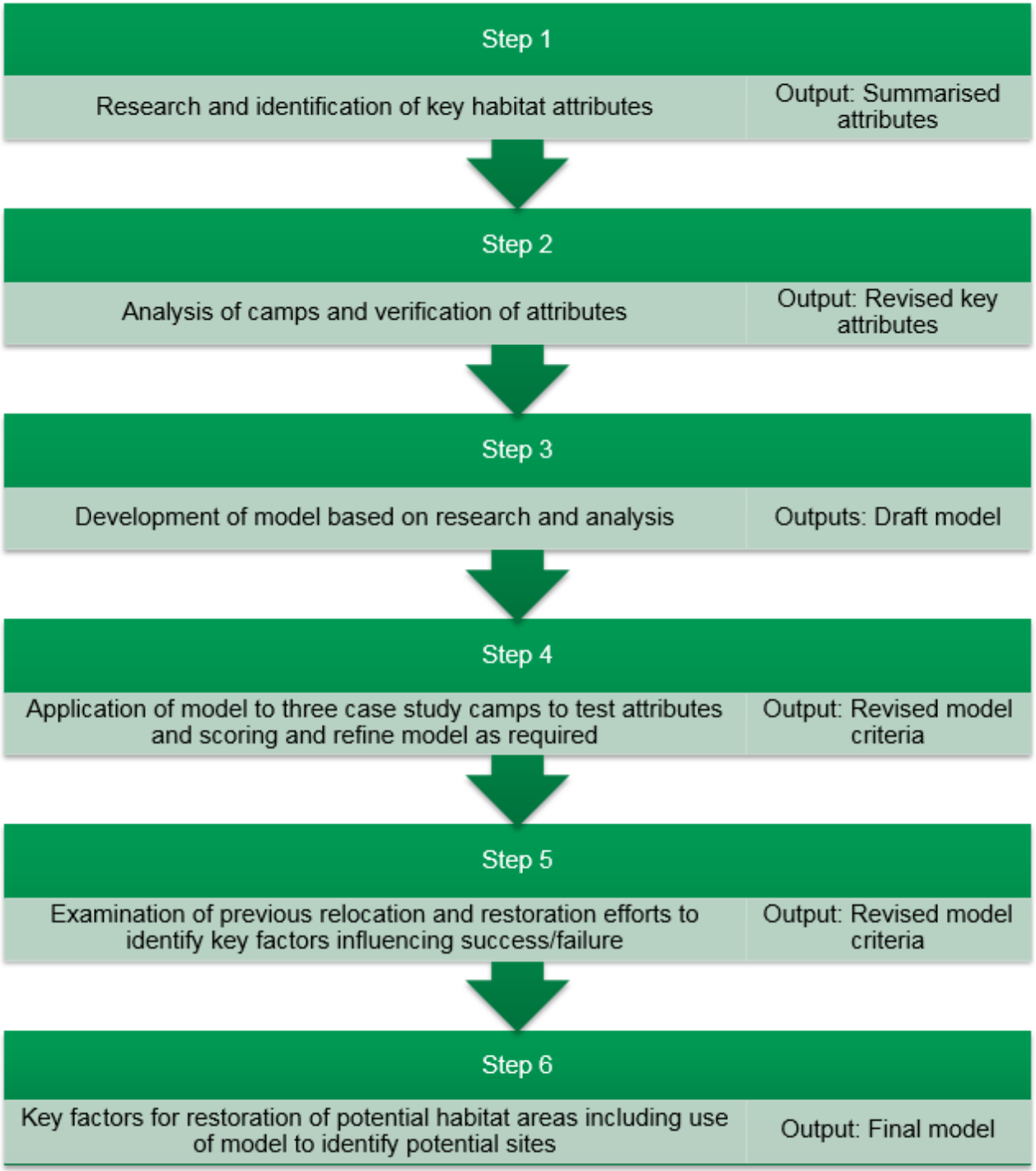
Process


Step 1
Research and identification of key habitat attributes
Output: Summarised attributes
Step 2
Analysis of camps and verification of attributes
Output: Revised key attributes
Step 3
Development of model based on research and analysis
Outputs: Draft model
Step 4
Application of model to three case study camps to test attributes and scoring and refine model as required
Output: Revised model criteria
Step 5
Examination of previous relocation and restoration efforts to identify key factors influencing success/failure
Output: Revised model criteria
Step 6
Key factors for restoration of potential habitat areas including use of model to identify potential sites
Output: Final model

Habitat attributes

Landscape features

Water	Sites < 500 m of watercourses preferred with those < 200 m having higher priority.
Aspect	Flat sites preferred followed by sites with a S/SE aspect.

Camp vegetation

Vegetation type	Sites dominated by favoured species preferred.
Roost tree height	Vegetation communities containing trees > 5 m preferred.
Structure	Emergent trees and mid-storey indicate suitable structure.

Foraging resources

Proximity to foraging habitat	Sites closest to high value resources (i.e. within 20 km of top 1 or 2 ranks mapped by Eby and Law 2008) being more highly scored.
Alternative food resources	Proximity to supplementary resources has been included in the model using proximity to urban areas as a proxy.

- *Casuarina* species
- *Eucalypt* species
- *Corymbia* species
- *Angophora* species
- *Lophostemon* species
- *Melaleuca* species
- rainforest species
- mangrove species.

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Habitat attributes

Proximity to urban areas

203 camps across NSW analysed:

33% within an urban area
30% located within 500m of an urban area
9% within 1km
72%

Distance to urban area	Proximity to urban areas, with closer sites more highly scored.

Land size

Land area	Sites > 3 ha for small camps and 10 hectares for large camps preferred to allow for sustainable occupancy and movement within the area (restoration consideration).

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Habitat attributes

Microclimate (considerations for restoration)

Temperature and humidity	Trees around camp periphery to allow movement during HSEs/influxes. Mid-storey roosting opportunities to meet roosting preferences of different species and as refuge from extreme weather.
	If possible in warmer regions select sites that have access to cooling breezes.

Site use

History of occupancy (proposed site)	Sites used frequently and recently favoured over those used intermittently.
Proximity to camp (proposed site)	Close proximity to known camp scored more highly.
Alternatives available	Alternative habitat availability will influence likelihood of a camp moving to a predicted site.
Species	Species of FF using the camp will influence the likelihood of establishing an alternative site

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Potential constraints

- Proximity to:
  - residents, businesses or future urban growth areas
  - airports
  - equine precincts
  - other sensitive sites such as schools, day care centres and hospitals
- Level of fidelity to the original camp
- Historic occupancy of original camp.

Model

- Scoring system
- 2 part model:
  1. GIS component
  2. Manual scoring tool (Excel spreadsheet)

Scoring

	Habitat attributes								
	For use in GIS model								
Score	Proximity to water	Presence of favoured vegetation	Nightly commute				Distance to urban area	Slope	
			Rank 1	Rank 2	Rank 3	Rank 4			
0	>500 m	No favoured species	>50 km	>50 km	>50 km	>20 km	>20km	>15° incline	<
1	400 – 500 m	<25% of vegetation is favoured species	-	-	20-50 km	<20 km	10 - 20 km	10-15° incline	1
2	300 – 400 m	25% - 50% of vegetation is favoured species	-	20-50 km	<20 km	-	1 - 10 km	5-10° incline	2
3	200 – 300 m	50 – 75 % of vegetation is favoured species	20-50 km	<20 km	-	-	0 - 1 km	Flat - 5° incline	3
4	< 200 m	>75%-100% of vegetation is favoured	<20 km	-	-	-	Within urban area	Flat OR within 100 m of waterway	>
Total maximum	4	4	4	3	2	1	4	4	

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Scoring

	Habitat attributes												
	For use in GIS model								Detailed input to assess and score potential alternative sites				
Score	Proximity to water	Presence of favoured vegetation	Nightly commute				Distance to urban area	Slope	Area	Vegetation structure	Vegetation height	Proximity to existing camp	Historic occupancy at proposed site
			Rank 1	Rank 2	Rank 3	Rank 4							
0	>500 m	No favoured species	>50 km	>50 km	>50 km	>20 km	>20km	>15° incline	<1 ha	Cleared site	< 5 m	>10 km	No known use
1	400 – 500 m	<25% of vegetation is favoured species	-	-	20-50 km	<20 km	10 - 20 km	10-15° incline	1-2 ha	Mid-storey intact – no emergent trees	5 – 8 m	5 km – 10 km	Rare (occupied in <20% of years and not continuously)
2	300 – 400 m	25% - 50% of vegetation is favoured species	-	20-50 km	<20 km	-	1 - 10 km	5-10° incline	2-3 ha	Emergent trees only with mid-storey intact	8 – 10 m	1000 m – 5 km	Irregular (occupied 20-80% of years, but not continuously)
3	200 – 300 m	50 – 75 % of vegetation is favoured species	20-50 km	<20 km	-	-	0 - 1 km	Flat - 5° incline	3-9 ha	Canopy 70 - 100% with mid-storey intact	10 - 12 m	500 – 1000 m	Annual (occupied in >80% of years but not continuously)
4	< 200 m	>75%-100% of vegetation is favoured	<20 km	-	-	-	Within urban area	Flat OR within 100 m of waterway	>9 ha	Canopy and mid-storey intact	>12 m	< 500 m	Continuous (year-round occupancy)
Total maximum	4	4	4	3	2	1	4	4	4	4	4	4	4

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	Constraint factors			
	For use in GIS model			
Score	Distance to residents*	Distance to sensitive sites	Distance to rural uses	Distance to airports
0	> 300 m	>200 m	> 1 km	> 13 km
1	200 – 300 m	150 – 200 m	750 m – 1 km	6.5 - 13 km
2	100 – 200 m	100 – 150 m	500 – 750 m	3 – 6.5 km
3	50 – 100 m	50 – 100 m	200 – 500 m	1 – 3 km
4	< 50 m	< 50 m	< 200 m	< 1 km
Total maximum	4	4	4	4

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	Constraint factors					
	For use in GIS model				Detailed input (potential site only)	
Score	Distance to residents*	Distance to sensitive sites	Distance to rural uses	Distance to airports	Period of use at original camp	History of occupancy at original camp
0	> 300 m	>200 m	> 1 km	> 13 km	N/A	N/A
1	200 – 300 m	150 – 200 m	750 m – 1 km	6.5 - 13 km	<2 years	Rare – occupancy in less than 20% of years
2	100 – 200 m	100 – 150 m	500 – 750 m	3 – 6.5 km	2 – 5 years	Irregular – occupancy 20-80%
3	50 – 100 m	50 – 100 m	200 – 500 m	1 – 3 km	5 – 10 years	Annual (occupied in 80% of years)
4	< 50 m	< 50 m	< 200 m	< 1 km	>10 years	Continuous
Total maximum	4	4	4	4	4	4

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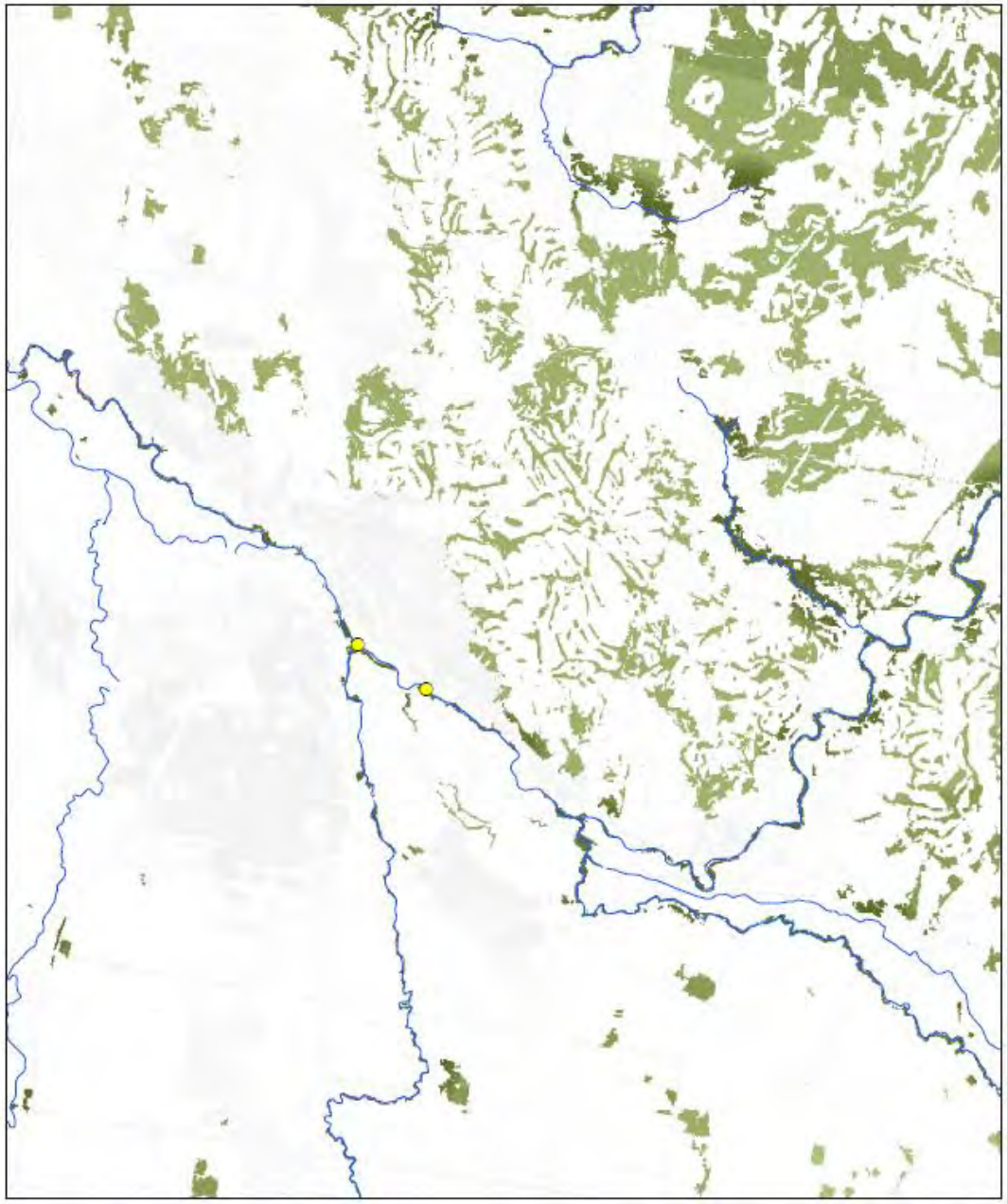
Habitat



Tamworth Map 1 - Flying-fox habitat attributes scored low to high

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Flying Fox Roost Habitat Research Project

Existing flying-fox camp

Perennial creeks

Property boundaries

Habitat attributes score

High : 18

Low : 9

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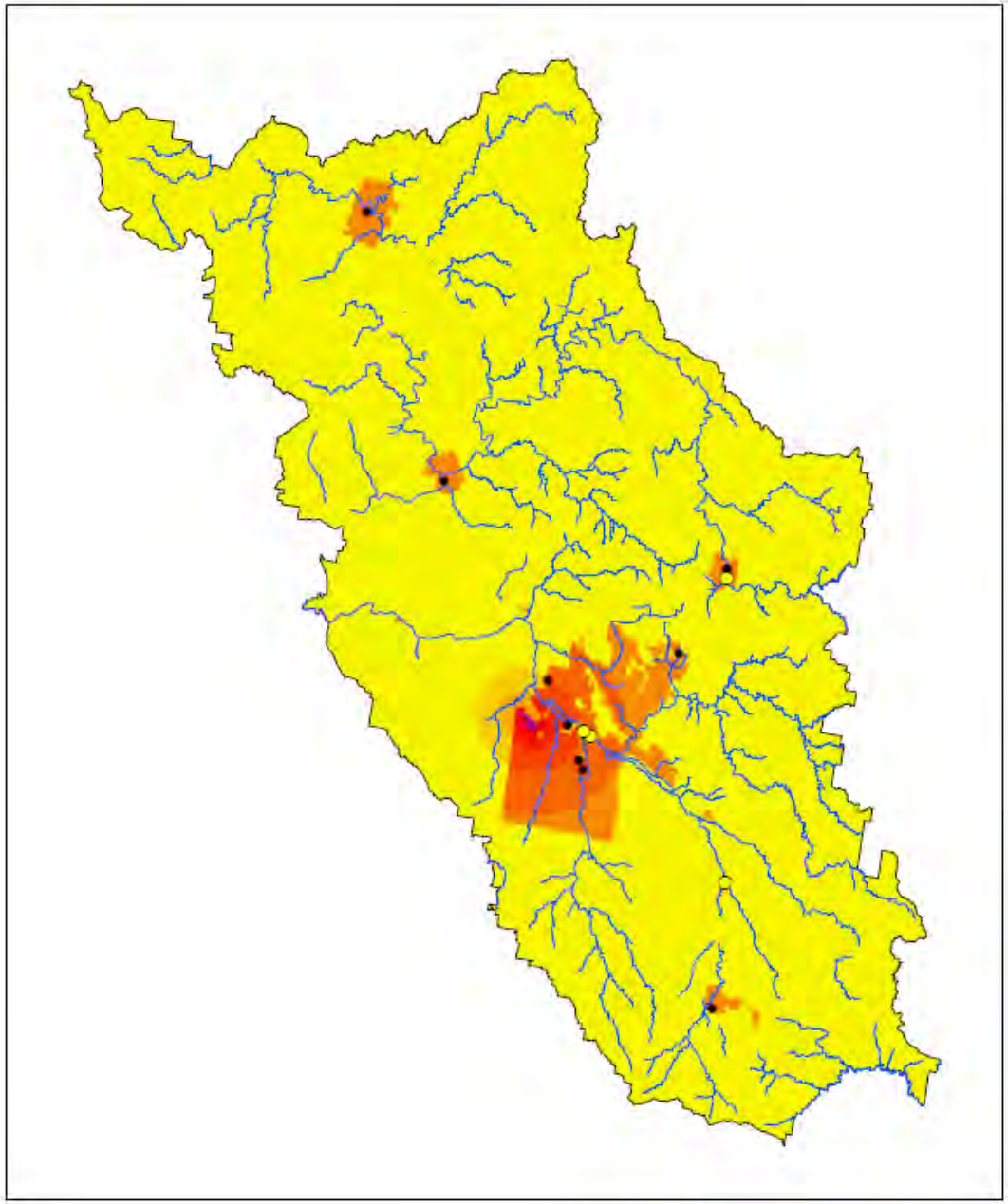
Constraints



Tamworth Map 2 - Constraining features (with potential for human/flying-fox conflict) scored high to low

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Flying Fox Roost Habitat Research Project

Existing flying-fox camp

Equine precinct (including showgrounds)

Perennial creeks

Airport

Constraints

High : 10

Low : 0

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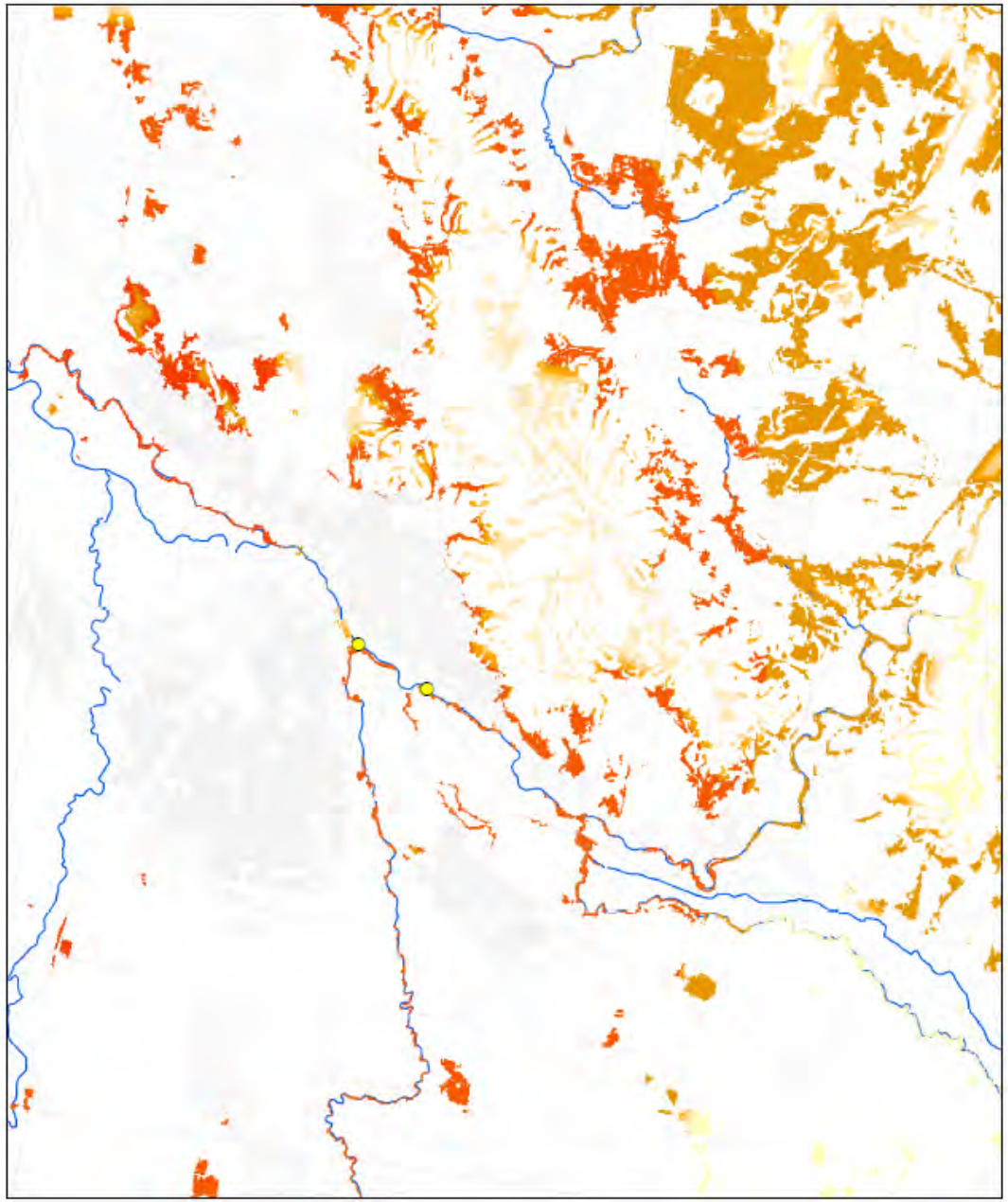
Habitat and constraints



Tamworth Map 3 - Constraining features within flying-fox habitat

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Flying Fox Roost Habitat Research Project

Existing flying-fox camp

Property boundaries

Perennial creeks

Constraints

0 1 2 3 4 5 6 7 8

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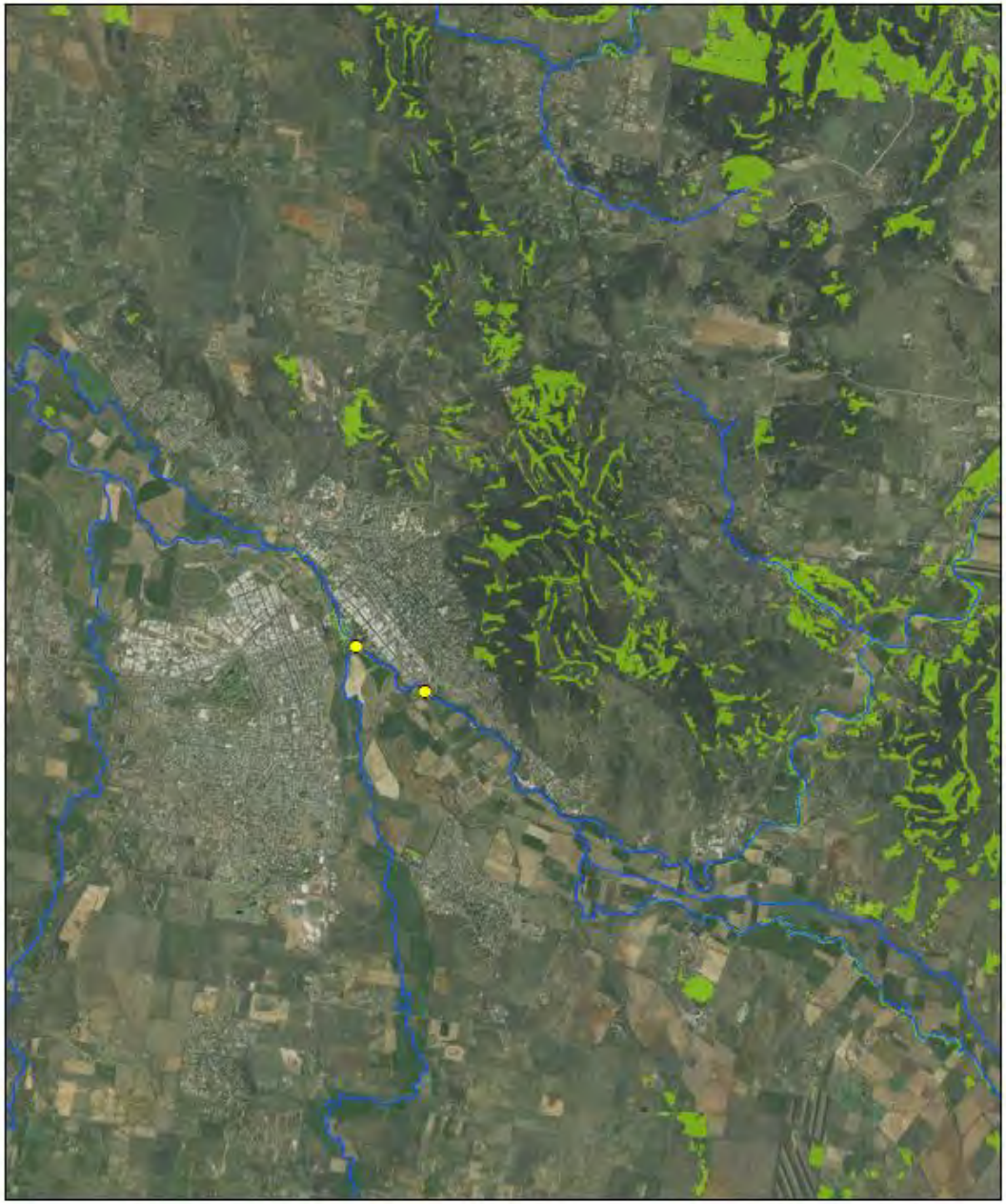

Tamworth - Medium to high quality potential flying-fox habitat with low to medium constraints

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Flying Fox Roost Habitat Research Project

Existing flying fox camp
Perennial creeks
Medium-high habitat with low-medium constraints

M-H habitat with L-M constraints

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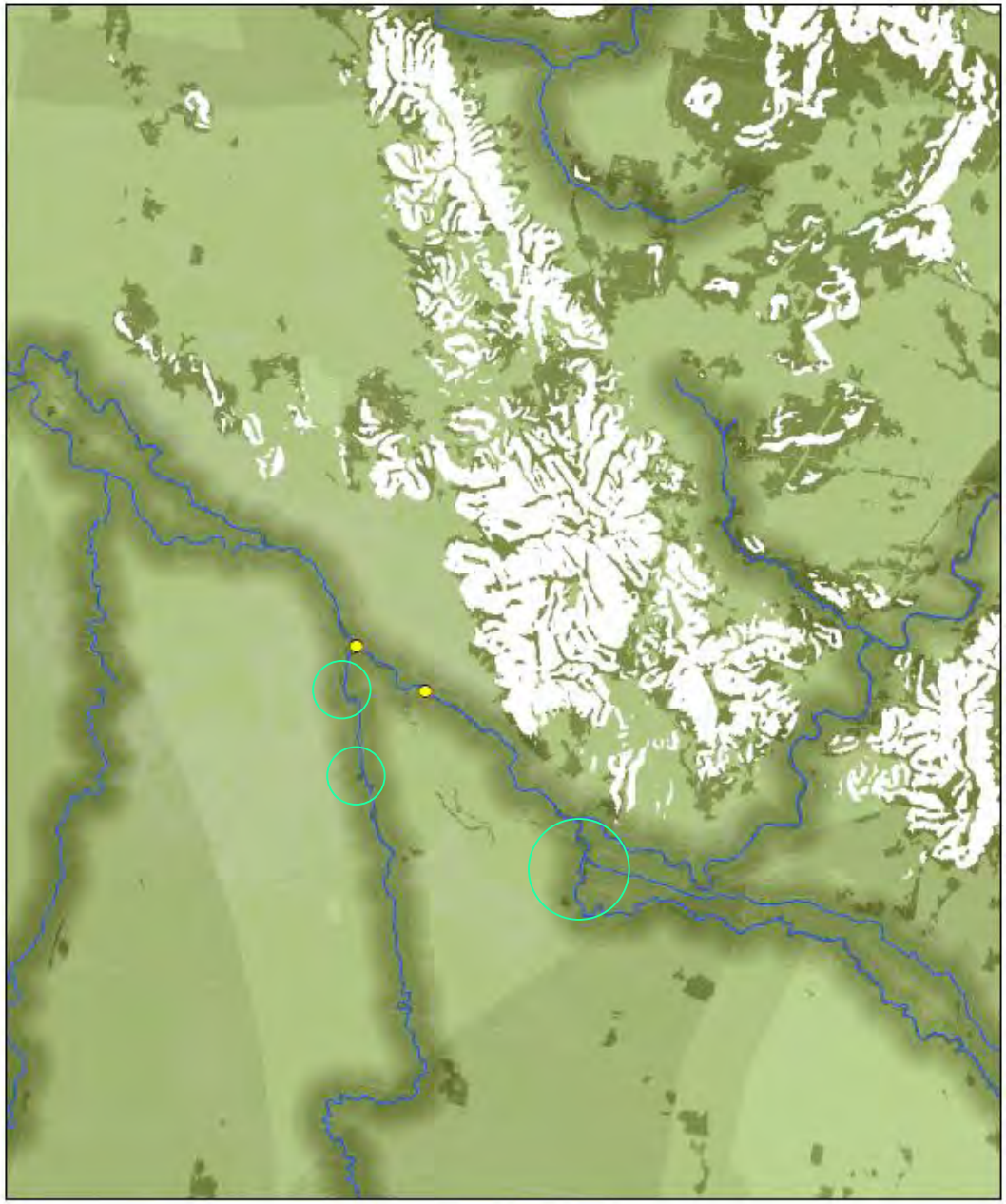
Potential restoration sites



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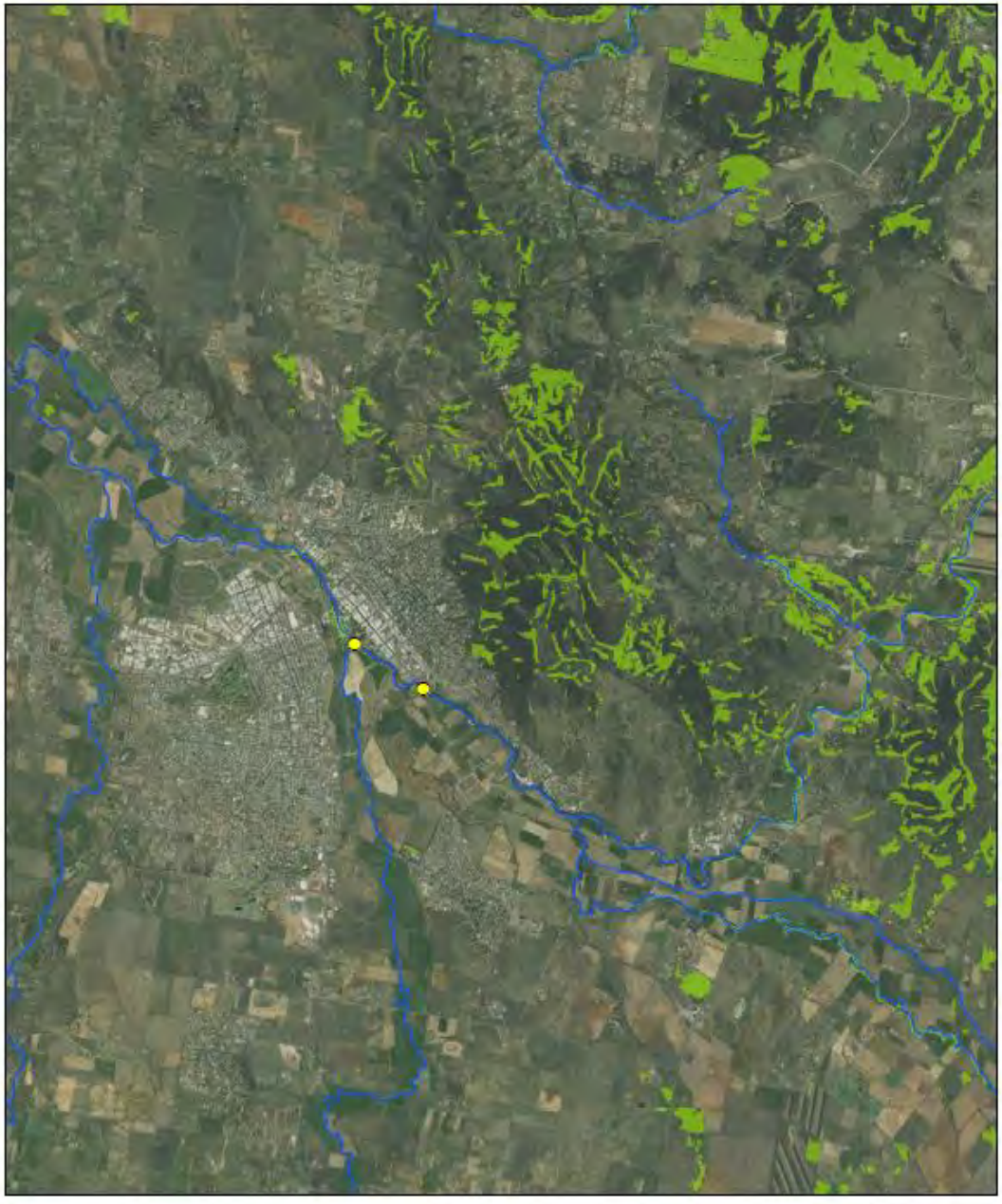

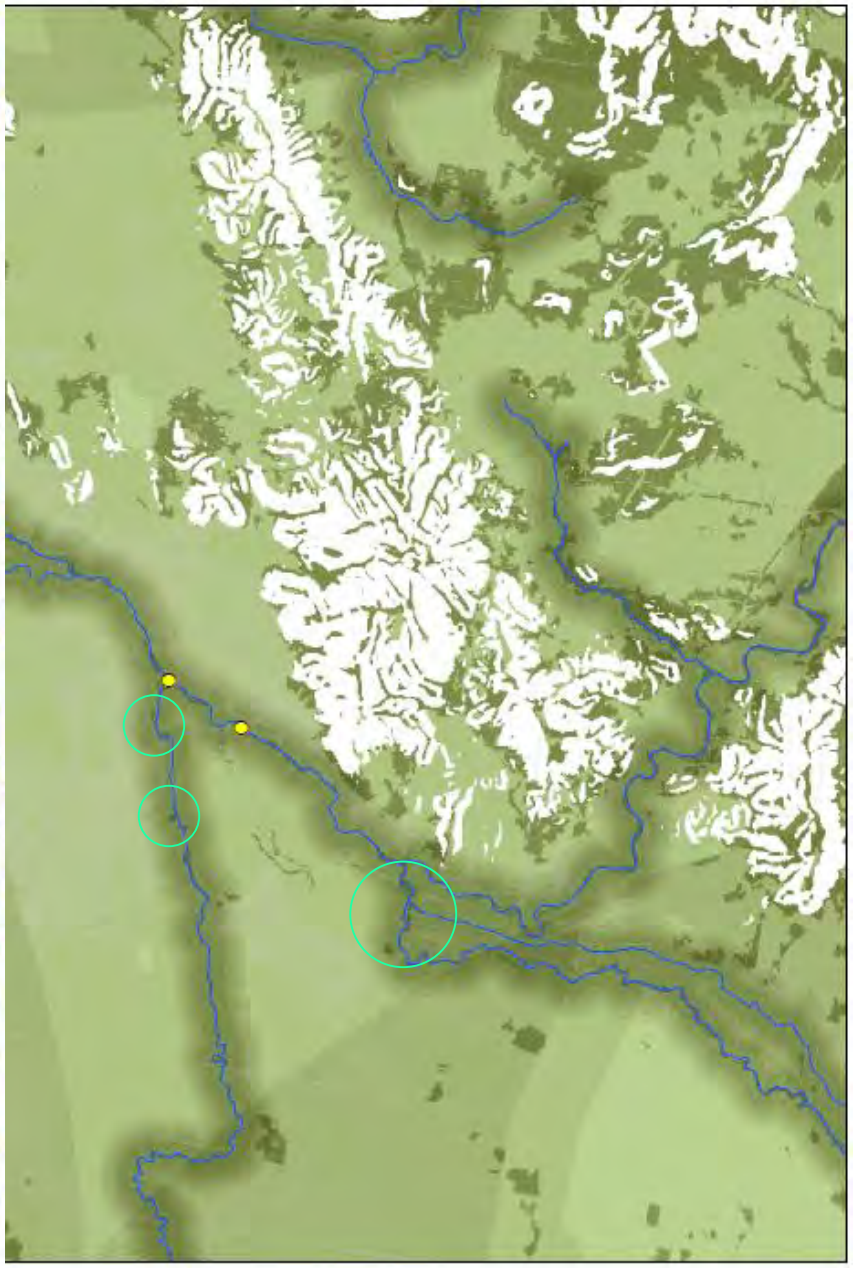

Tamworth - Medium to high quality potential flying-fox habitat with low to medium constraints

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Flying Fox Roost Habitat Research Project

Existing flying fox camp
Perennial creeks
Medium-high habitat with low-medium constraints

otential flying-fox habitat

Heritage NSW
t Research Project

Existing flying-fox camp
Perennial creeks
Property boundaries

Habitat attributes score
High : 22
Low : 9

Manual scoring

		Habitat attribute scores*													Constraint factor scores*								
		Initial score (recommended through GIS analysis if possible)					Extra case-by-case assessment of potential sites								Initial score (recommended through GIS analysis if possible)				Extra case-by-case assessment of potential sites (potential site only)				
Site		Proximity to water	Presence of favoured vegetation	Nightly commute	Distance to urban area	Slope	Area	Vegetation structure	Vegetation height	Proximity to existing camp	Historic occupancy at proposed site	Potential habitat score - GIS	Potential habitat score - additional desktop / 26	Potential habitat score following site assessment (potential site only) / 46	Distance to residents*	Distance to sensitive sites	Distance to rural uses	Distance to airports	Period of use at original camp	History of occupancy at original camp	Constraints score - GIS	Constraints score - additional desktop / 16	Constraints score following site assessment (potential site only) / 24
Example - Tamworth case study. Refer to accompanying report for detail.																							
Original camp																							
King George V St camp	GIS score from spatial data	4	Y	8	4	Y						16			4	**	0	1			5		
	Manual score - site-specific desktop analysis	4	4	8	4	4							24		4	4	3	1				12	
Potential site																							
Opposite Bicentennial Park	GIS score from spatial data	4	Y	8	4	Y						16			1	**	0	1			2		
	Manual score - site-specific desktop analysis	4	3	8	4	4							23		0	0	0	1				1	
	Refined score from site assessment	4	3	8	4	4	0	3	1	2	1			30	0	0	0	1	3	3			7

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Key points

- The model can assist land managers identify suitable sites that may be enhanced or restored… no guarantees, but restoration always a good thing! Key factors for success identified (+refer to published guidelines).

- Preferable to improve known camp sites in a way that reduces conflict and provides for long-term camp sustainability.

- Where relocation from a high conflict site is required, providing suitable alternatives + modification to deter re-establishment generally needed. Providing year-round foraging resources nearby may assist.

- Lack of available longitudinal data for habitat restoration projects – needed in future to evaluate success.

- Reducing conflict long-term process and relies on providing (and protecting) suitable camp habitat in low conflict locations. Where unavailable, we must attempt to create it, with efforts informed by ongoing research.

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Thank you

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