

Incomplete surveys for environmental impact assessments jeopardise threatened species recovery

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Pacific Conservation Biology

Incomplete surveys for environmental impact assessments jeopardise threatened species recovery

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Supplementary Material Table S1: *Information extracted from referrals.*

Category	Specific Information
Project details	<ul style="list-style-type: none">- Bioregion- Project type (e.g., Mine Development, Urban Development, Pipelines and Transmission Lines)- Project size- Referral ID- Referral year

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	<ul style="list-style-type: none">- Referral title- Latitude and Longitude- State the referral occurred in- Vegetation type
Survey effort	<ul style="list-style-type: none">- Scat searches- Camera traps- Habitat assessments- Spotlighting- Other (provide details)- Reconnaissance survey (Yes/No)
Quoll habitat	<ul style="list-style-type: none">- Yes (proponent determined)- No (proponent determined)- Yes (cross-checked as part of this project)- No (cross-checked as part of this project)
Significant impact	<ul style="list-style-type: none">- Yes (proponent determined)- No (proponent determined)

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Supplementary Material Table S2: Refined spreadsheet of referrals showing the

Year	Project Type	Project Size (ha)	Bioregion	Quoll Habitat Y/N	Impact Habitat Y/N	Reconnaissance Survey (minimum requirements)				Other Supplementary detection methods		Evidence of Quolls Y/N	Critical Quoll Habitat as identified by proponent Y/N (2016)	Targeted Quoll Surveys Y/N (2016+)	Significant Impact Y/N (Proponent self-assessment in referral documentation)	Mitigation: Threatened Species Y/N	Mitigation: Quolls Y/N		
						Camera Trapping	Scat Searches	Field-validated habitat mapping	Have three key reconnaissance survey methods been done?	Traps (cage/Elliott)	Spotlighting								
						if Y, effort: No. trap nights (no.cameras X no. nights)	Y/N	Y/N	Y/N	Y/N	if Y, effort: No. trap nights (no.traps X no. nights)							Y/N	
2007	Urban Development	1	South Eastern Queensland	Yes	Yes	NA	NA	No	NA	No	NA	No	NA	NA	No	Yes	No		
2007	Mine Development	1,448	Brigalow Belt North	Yes	Yes	NA	NA	No	Yes	NA	No	NA	NA	NA	No	Yes	No		
2007	Road and Rail Development	200	Brigalow Belt North	Yes	Yes	NA	NA	Yes	Yes	NA	No	NA	Yes	NA	NA	No	Yes	No	
2007	Road and Rail Development	5,000	South Eastern Queensland	Yes	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	Yes	No	
2007	Road and Rail Development	1	Brigalow Belt North	No	Yes	NA	NA	Yes	Yes	NA	No	NA	No	NA	NA	No	Yes	No	
2008	Revegetation Activities	233	Brigalow Belt South	No	No	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	No	No	
2008	Pipelines and Transmission Lines	4	Brigalow Belt South	Yes	Yes	NA	NA	Yes	Yes	NA	No	NA	Yes	NA	NA	No	Yes	No	
2008	Road and Rail Development	77	Brigalow Belt North	No	Yes	NA	NA	No	Yes	NA	No	NA	No	NA	NA	No	Yes	No	
2008	Mine Development	245	Brigalow Belt North	Yes	Yes	NA	NA	Yes	Yes	NA	Yes	No mention	Yes	NA	NA	No	Yes	No	
2008	Urban Development	14	Central Mackay Coast	Yes	Yes	NA	NA	No	Yes	NA	No	NA	No	NA	NA	No	Yes	No	
2008	Urban Development	1	Einisleigh Uplands	No	No	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	Yes	No	
2008	Urban Development	1	Brigalow Belt North	No	No	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	No	No	
2008	Urban Development	6	South Eastern Queensland	Yes	Yes	NA	NA	No	Yes	NA	No	NA	No	NA	NA	No	Yes	No	
2008	Urban Development	1	Central Mackay Coast	No	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	No	No	
2008	Urban Development	1	Wet Tropics	No	No	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	No	No	
2008	Pipelines and Transmission Lines	1	Darwin Coastal	Yes	Yes	NA	NA	Yes	No	NA	No	NA	No	NA	NA	No	Yes	Yes	
2008	Urban Development	2	South Eastern Queensland	Yes	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	No	No	
2008	Urban Development	1,300	Wet Tropics	Yes	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	Yes	No	No	
2008	Urban Development	1	Brigalow Belt North	No	No	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	Yes	No	
2008	Renewable Energy Generation	600	Brigalow Belt South	No	Yes	NA	NA	Yes	Yes	NA	No	NA	No	NA	NA	No	Yes	No	
2008	Mine Development	24	Arnhem Coast	Yes	Yes	NA	NA	Yes	No	NA	Yes	72	Yes	Yes	NA	NA	No	Yes	Yes
2008	Urban Development	1	South Eastern Queensland	No	No	NA	NA	No	NA	NA	No	NA	No	NA	NA	Yes	No	No	
2008	Mine Development	2,311	South Eastern Queensland	No	Yes	NA	NA	No	Yes	NA	No	NA	No	NA	NA	No	Yes	No	
2008	Urban Development	28	Einisleigh Uplands	No	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	No	No	
2008	Urban Development	12	Einisleigh Uplands	No	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	No	No	
2008	Road and Rail Development	2	South Eastern Queensland	Yes	Yes	NA	NA	Yes	Yes	NA	No	NA	Yes	NA	NA	No	Yes	No	
2008	Mine Development	12,000	Pilbara	No	Yes	NA	NA	Yes	Yes	NA	Yes	No mention	Yes	NA	NA	No	Yes	No	
2008	Mine Development	6,215	Gascoyne	Yes	Yes	NA	NA	Yes	Yes	NA	Yes	10	No	No	NA	NA	No	Yes	No
2008	Road and Rail Development	1	Wet Tropics	No	Yes	NA	NA	No	Yes	NA	No	NA	Yes	NA	NA	No	Yes	No	
2008	Mine Development	10	Pilbara	Yes	Yes	NA	NA	Yes	Yes	NA	No	NA	Yes	NA	NA	No	Yes	Yes	
2009	Pipelines and Transmission Lines	1	South Eastern Queensland	Yes	Yes	NA	NA	No	Yes	NA	No	NA	Yes	NA	NA	No	Yes	No	
2009	Urban Development	90	Brigalow Belt North	Yes	Yes	NA	NA	Yes	Yes	NA	No	NA	No	NA	NA	No	No	No	
2009	Urban Development	4	Brigalow Belt North	No	Yes	NA	NA	Yes	Yes	NA	No	NA	No	NA	NA	No	Yes	No	
2009	Urban Development	3	Brigalow Belt North	No	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	Yes	No	
2009	Road and Rail Development	2	Brigalow Belt North	Yes	Yes	NA	NA	Yes	No	NA	No	NA	Yes	NA	NA	No	Yes	No	
2009	Urban Development	340	Brigalow Belt South	Yes	Yes	NA	NA	Yes	Yes	NA	No	NA	No	NA	NA	Yes	No	No	
2009	Urban Development	20	Brigalow Belt North	Yes	Yes	NA	NA	Yes	No	NA	No	NA	Yes	NA	NA	No	Yes	No	
2009	Pipelines and Transmission Lines	4	South Eastern Queensland	No	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	Yes	No	
2009	Pipelines and Transmission Lines	1	South Eastern Queensland	No	Yes	NA	NA	Yes	Yes	NA	No	NA	Yes	NA	NA	No	No	No	
2009	Mine Development	7	Einisleigh Uplands	No	Yes	NA	NA	No	No	NA	No	NA	No	NA	NA	No	No	No	
2009	Road and Rail Development	33	Brigalow Belt South	Yes	Yes	NA	NA	Yes	Yes	NA	No	NA	Yes	NA	NA	No	Yes	No	
2009	Urban Development	323	Brigalow Belt North	Yes	Yes	NA	NA	Yes	Yes	NA	No	NA	No	NA	NA	No	Yes	No	
2009	Urban Development	22	Brigalow Belt North	Yes	Yes	NA	NA	Yes	Yes	NA	No	NA	No	NA	NA	No	No	No	
2009	Port Development Onshore	1	Pilbara	No	No	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	No	No	
2009	Mine Development	150	Brigalow Belt North	Yes	Yes	NA	NA	Yes	Yes	NA	No	NA	Yes	NA	NA	No	No	No	
2009	Urban Development	2	South Eastern Queensland	No	No	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	No	No	
2009	Mine Development	800	Pilbara	Yes	Yes	NA	NA	Yes	No	NA	Yes	No mention	No	No	NA	NA	No	No	
2009	Mine Development	21,316	Pilbara	No	Yes	NA	NA	Yes	Yes	NA	No	NA	Yes	NA	NA	No	Yes	No	
2009	Urban Development	3	South Eastern Queensland	No	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	No	No	
2009	Pipelines and Transmission Lines	1,402	Brigalow Belt South	Yes	Yes	NA	NA	Yes	Yes	NA	No	NA	Yes	NA	NA	No	Yes	No	
2009	Road and Rail Development	1	South Eastern Queensland	Yes	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	Yes	No	
2009	Urban Development	11	South Eastern Queensland	No	No	NA	NA	Yes	Yes	NA	No	NA	No	NA	NA	No	Yes	No	
2009	Pipelines and Transmission Lines	38	South Eastern Queensland	Yes	Yes	NA	NA	Yes	Yes	NA	No	NA	Yes	NA	NA	No	Yes	No	
2009	Urban Development	51	Brigalow Belt North	Yes	Yes	NA	NA	No	Yes	NA	No	NA	No	NA	NA	No	Yes	No	

headings/information captured and used for data analysis.

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						Camera Trapping	Scat Searches	Field-validated habitat mapping	Have three key reconnaissance survey methods been done?	Traps (cage/Elliott)	Spotlighting								
						if Y, effort: No. trap nights (no.cameras X no. nights)	Y/N	Y/N	Y/N	Y/N	if Y, effort: No. trap nights (no.traps X no. nights)							Y/N	
2010	Road and Rail Development	10	Pine Creek	No	No	NA	NA	No	NA	No	NA	No	NA	NA	No	No	No		
2010	Urban Development	6	South Eastern Queensland	No	No	NA	NA	Yes	Yes	NA	No	NA	No	NA	NA	No	No	No	
2010	Road and Rail Development	1	South Eastern Queensland	No	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	Yes	No	
2010	Urban Development	1	Wet Tropics	Yes	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	No	No	
2010	Mine Development	42	Arnhem Coast	Yes	Yes	NA	NA	Yes	No	NA	Yes	72	Yes	Yes	NA	NA	No	Yes	Yes
2010	Mine Development	399	Brigalow Belt North	Yes	Yes	NA	NA	Yes	Yes	NA	Yes	No mention	No	No	NA	NA	No	Yes	No
2010	Port Development Onshore	1	South Eastern Queensland	No	No	NA	NA	No	No	NA	No	NA	No	NA	NA	No	Yes	No	
2010	Urban Development	127	South Eastern Queensland	No	Yes	NA	NA	Yes	Yes	NA	Yes	492	Yes	No	NA	NA	No	Yes	No
2010	Urban Development	1	Brigalow Belt South	No	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	No	No	
2010	Urban Development	1	South Eastern Queensland	No	Yes	NA	NA	Yes	Yes	NA	No	NA	Yes	NA	NA	No	No	No	
2010	Mine Development	1,023	South Eastern Queensland	Yes	Yes	NA	NA	Yes	Yes	NA	Yes	660	Yes	No	NA	NA	No	Yes	No
2010	Road and Rail Development	1	Brigalow Belt South	Yes	Yes	NA	NA	Yes	Yes	NA	Yes	25	Yes	No	NA	NA	No	No	No
2010	Road and Rail Development	1	South Eastern Queensland	No	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	Yes	No	No	
2010	Renewable Energy Generation	9	Brigalow Belt South	Yes	Yes	NA	NA	No	NA	NA	No	NA	No	NA	NA	No	No	Yes	No
2010	Road and Rail Development	1	South Eastern Queensland	Yes	Yes	NA	NA	Yes	Yes	NA	Yes	No mention	Yes	No	NA	NA	No	Yes	No
2010	Renewable Energy Generation	8	Wet Tropics	Yes	Yes	NA	NA	Yes	Yes	NA	Yes	392	Yes	No	NA	NA	No	Yes	No
2010	Road and Rail Development	1	South Eastern Queensland	Yes	Yes	NA	NA	No	No	NA	No	NA	No	No	NA	NA	No	No	No
2010	Road and Rail Development	75	Pilbara	No	Yes	NA	NA	Yes	Yes	NA	No	NA	No	NA	NA	No	Yes	No	No
2016	Road and Rail Development	3,000	Pilbara	Yes	Yes	Yes	No mention	No	No	No	No	NA	No	Yes	Yes	No	Yes	Yes	Yes
2016	Road and Rail Development	18	South Eastern Queensland	Yes	Yes	Yes	7	No	No	No	Yes	1,430	No	No	Yes	No	Yes	No	No
2016	Urban Development	4	Central Mackay Coast	Yes	Yes	Yes	84	Yes	Yes	Yes	Yes	230	Yes	Yes	Yes	No	Yes	Yes	Yes
2016	Road and Rail Development	47	Brigalow Belt North	No	No	NA	NA	NA	NA	NA	No	NA	NA	No	No	No	Yes	Yes	Yes
2016	Port Development Onshore	1	Brigalow Belt North	Yes	No	NA	NA	NA	NA	NA	No	NA	NA	No	No	No	No	Yes	No
2016	Port Development Onshore	1	Brigalow Belt North	Yes	No	NA	NA	NA	NA	NA	No	NA	NA	No	No	No	No	Yes	No
2016	Road and Rail Development	1	South Eastern Queensland	No	No	NA	NA	NA	NA	NA	No	NA	NA	No	No	No	No	No	No
2016	Port Development Onshore	132	Darwin Coastal	Yes	No	NA	NA	No	No	No	No	NA	No	No	No	No	No	Yes	No
2016	Mine Development	18	South Eastern Queensland	No	No	NA	NA	NA	NA	NA	No	NA	NA	No	No	No	No	Yes	No
2016	Urban Development	48	South Eastern Queensland	Yes	No	NA	NA	Yes	Yes	No	No	NA	No	Yes	No	No	No	Yes	No
2016	Road and Rail Development	65	South Eastern Queensland	Yes	No	NA	NA	NA	NA	NA	No	NA	NA	No	No	No	No	Yes	No
2016	Road and Rail Development	13	Wet Tropics	No	No	NA	NA	NA	NA	NA	No	NA	NA	No	No	No	No	Yes	No
2016	Port Development Onshore	5	Brigalow Belt South	No	No	Yes	10	Yes	Yes	Yes	Yes	10	Yes	No	No	No	No	Yes	No
2016	Port Development Onshore	3	Brigalow Belt North	No	No	NA	NA	NA	NA	NA	No	NA	NA	No	No	No	No	Yes	No
2016	Renewable Energy Generation	453	Brigalow Belt North	No	No	NA	NA	No	No	No	No	NA	No	No	No	No	No	Yes	No
2016	Mine Development	893	Arnhem Coast	Yes	Yes	Yes	6	Yes	Yes	Yes	Yes	310	Yes	No	No	No	No	No	No
2016	Urban Development	1	South Eastern Queensland	Yes	No	NA	NA	No	No	No	No	NA	No	No	No	No	Yes	No	No

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						Camera Trapping	Scat Searches	Field-validated habitat mapping	Have three key reconnaissance survey methods been done?	Traps (cage/Elliott)	Spotlighting						
						If Y, effort: No. trap nights (no. cameras x no. nights)		Y/N	Y/N	Y/N	If Y, effort: No. trap nights (no. traps x no. nights)						
2017	Urban Development	410	South Eastern Queensland	Yes	Yes	No	NA	No	Yes	No	No	No	No	No	No	Yes	No
2017	Road and Rail Development	30	Victoria Bonaparte	Yes	Yes	No	NA	No	No	No	NA	No	No	No	No	Yes	No
2017	Mine Development	1	Pine Creek	No	No	NA	NA	NA	NA	No	NA	NA	No	No	No	No	No
2017	Mine Development	40	Brigalow Belt South	Yes	Yes	Yes	No mention	Yes	Yes	Yes	80	Yes	No	Yes	Yes	No	Yes
2017	Mine Development	7,366	Pilbara	Yes	Yes	Yes	1,140	Yes	Yes	Yes	No mention	Yes	Yes	Yes	Yes	No	Yes
2017	Mine Development	9	Pilbara	Yes	Yes	Yes	48	Yes	Yes	Yes	No mention	No	No	Yes	Yes	No	Yes
2017	Renewable Energy Generation	205	Brigalow Belt South	Yes	Yes	No	NA	No	Yes	No	NA	No	No	No	No	Yes	No
2017	Road and Rail Development	6	South Eastern Queensland	Yes	Yes	No	NA	No	Yes	No	NA	No	No	No	No	Yes	No
2017	Renewable Energy Generation	2,375	Brigalow Belt North	Yes	Yes	No	NA	Yes	Yes	No	NA	Yes	No	No	No	Yes	No
2017	Urban Development	140	Brigalow Belt South	No	Yes	Yes	No mention	Yes	Yes	Yes	NA	No	No	No	No	Yes	No
2017	Mine Development	23	South Eastern Queensland	Yes	Yes	Yes	12	Yes	Yes	Yes	NA	Yes	No	No	No	Yes	No
2017	Mine Development	272	Barastigh Island	No	Yes	Yes	No mention	Yes	Yes	Yes	NA	Yes	No	No	No	Yes	No
2017	Road and Rail Development	350	South Eastern Queensland	No	No	NA	NA	NA	NA	No	NA	NA	No	No	No	Yes	No
2017	Renewable Energy Generation	540	Brigalow Belt North	Yes	Yes	No	NA	Yes	Yes	No	NA	Yes	No	No	No	Yes	No
2017	Renewable Energy Generation	1,181	Brigalow Belt North	Yes	Yes	Yes	24	No	Yes	No	NA	No	No	No	No	Yes	No
2017	Urban Development	1	Wet Tropics	No	No	NA	NA	NA	NA	No	NA	NA	No	No	No	Yes	No
2017	Port Development Onshore	29	Darwin Coastal	Yes	Yes	NA	NA	No	Yes	No	NA	No	No	No	No	Yes	Yes
2018	Renewable Energy Generation	1,443	Brigalow Belt North	No	No	Yes	No mention	Yes	Yes	Yes	NA	Yes	No	No	No	Yes	No
2018	Mine Development	1,013	Pilbara	Yes	Yes	Yes	491	Yes	Yes	Yes	NA	No	Yes	No	Yes	Yes	Yes
2018	Road and Rail Development	3	Arnhem Plateau	Yes	Yes	No	NA	No	No	No	NA	No	No	No	No	Yes	No
2018	Renewable Energy Generation	707	Brigalow Belt South	Yes	Yes	Yes	12	Yes	Yes	Yes	198	Yes	No	No	No	Yes	No
2018	Road and Rail Development	40	Brigalow Belt South	Yes	Yes	Yes	No mention	Yes	Yes	No	NA	No	No	No	No	Yes	No
2018	Urban Development	2	Pilbara	No	No	NA	NA	NA	NA	No	NA	NA	No	No	No	No	No
2018	Renewable Energy Generation	36	South Eastern Queensland	Yes	Yes	Yes	16	Yes	Yes	Yes	No mention	Yes	No	No	No	Yes	No
2018	Renewable Energy Generation	278	Wet Tropics	Yes	Yes	NA	NA	No	Yes	No	NA	No	No	No	No	Yes	No
2018	Mine Development	1	Wet Tropics	No	No	NA	NA	NA	NA	NA	NA	NA	No	No	No	Yes	No
2018	Pipelines and Transmission Lines	305	Pilbara	Yes	Yes	NA	NA	NA	NA	NA	NA	No	No	No	No	No	No
2018	Pipelines and Transmission Lines	11	Pilbara	Yes	Yes	Yes	No mention	Yes	Yes	No	NA	No	Yes	No	Yes	Yes	Yes
2018	Road and Rail Development	47	South Eastern Queensland	Yes	Yes	No	NA	Yes	Yes	No	NA	Yes	No	No	No	Yes	No
2019	Mine Development	998	Pine Creek	Yes	Yes	No	NA	No	No	No	NA	No	No	No	No	Yes	No
2019	Urban Development	29	Brigalow Belt North	Yes	Yes	Yes	514	Yes	Yes	No	NA	Yes	No	Yes	No	Yes	Yes
2019	Urban Development	6	South Eastern Queensland	No	No	NA	NA	NA	NA	NA	NA	NA	No	No	No	Yes	No
2019	Urban Development	48	Brigalow Belt North	Yes	Yes	No	NA	No	Yes	No	NA	No	No	No	No	Yes	No
2019	Renewable Energy Generation	326	South Eastern Queensland	Yes	Yes	Yes	60	Yes	Yes	Yes	456	Yes	Yes	No	No	No	Yes