BULLDOZING OF BUSHLAND NEARLY TRIPLES AROUND MOREE AND COLLARENEBRI AFTER SAFEGUARDS REPEALED IN NSW

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BACKGROUND

This report examines changes in the rate and extent of land clearing in north-central NSW following the repeal of the *Native Vegetation Act 2003* and the introduction of the *Biodiversity Conservation Act 2017* and amendments to the *Local Land Services Act 2013*. The National Carbon Accounting System Forest Cover layer for early 2016 shows that only 6% of the study area had forest remaining while an additional 11% was in sparse woodlands (Fig 1).

Instances of clearing were detected by systematically comparing satellite images of a 22,173km^2 study area around Moree and Collarenebri in northern NSW (Fig. 1). This area was chosen for analysis because it has historically had high clearing rates.

We obtained and compared three satellite images from mid-2016, mid-2017 and mid-2018. The pictures were taken by the European Space Agency's Sentinel-2 satellite. The three images chosen for analysis were the closest to mid-year because of minimal cloud cover. This enabled us to estimate clearing rates for 2016-17 and 2017-18.[1]

The areas detected as cleared were classified by intensity of clearing (See Appendix 1 for examples):

- fully cleared (few if any trees left behind),
- partly cleared (e.g., only strips of bushland or scattered trees left), or
- paddock tree clearing (only scattered paddock trees were present and these have been wholly or partly removed).

The study excludes clearing of any type on land uses other than those with relatively natural environments according to the NSW land use map for 2014.[2]

KEY FINDINGS

SUMMARY

- **Forest and woodland cleared (fully and partly) in the study area almost tripled in one year** following repeal of the NSW Native Vegetation Act – 8,194 ha in 2017-18 compared with 2,845 ha in 2016-17. (See Table 1.)
- **5,246 ha of Koala habitat was destroyed** – 14 ha per day in 2017-18.
- **6,942 ha of Painted Honeyeater habitat was destroyed** – 19 ha per day in 2017-18.
- **Habitat for 247 native species may have been destroyed, including habitat for nine species of National Environmental Significance and two endangered species** – the Australian Painted Snipe and Mackay's Burrowing Skink. (See Table 2.)

Rates of bulldozing of native bushland have almost tripled in just one year in this area, with areas fully or partly cleared exceeding 8,000 ha in the past year (Table 1). The repeal of the *Native Vegetation Act of NSW* in August 2017 is likely to be the major reason behind the dramatic surge in forest and woodland destruction in this area. Most of the clearing in the north-central region studied occurred northwest of Walgett around Collarenebri (Fig. 1), where more native vegetation remains than around Moree.

The satellite images revealed many areas where most or all scattered paddock trees were removed (See Appendix 1, Fig. A1.3 for examples). The total area of paddocks affected was 7,892 ha for the entire study period. However, this area is not a reliable statistic because 'paddock tree densities' and 'extent removed' can vary widely. Also, paddock trees may occur as isolated trees in cultivated fields, and it would be misleading to include the cultivated areas in the areas cleared.

RATES OF CLEARING, 2016-17 AND 2017-18

Intensity	2016-17	2017-18	Change
Full	1,317ha	2,742ha	x 2.1
Part	1,528ha	5,452ha	x 3.6
All	2,845ha	8,194ha	x 2.8

TABLE 1: Rates of clearing (hectares per annum[3]) and percentage change in rates for full and part clearing in the periods 2016-17 and 2017-18. (See Appendix 1 for examples of different intensities).

1. Image dates for Collarenebri were 21 August 2016, 8 May 2017, and 13 April 2018. Image dates for Moree were 21 August 2016, 8 May 2017, and 28 April 2018. Collarenebri area was captured by the Sentinel 2 scene T55JFH and Moree by T55JGH. Sentinel imagery has a 10m resolution. That is, one pixel of the image represents an area on the earth surface of approximately 10m x 10m. Images were searched exhaustively in a grid pattern comparing one image with the next to detect changes in land cover. Polygons were drawn around detected instances of forest loss and classified as to whether fully, partly or paddock tree cleared. All detections were independently checked. Areas of polygons were calculated in the GDA MGA55 projection in ArcGIS 10.4 and summed by epoch of change and type of clearing observed. Finally, areas observed cleared were extrapolated to annual rates of clearing.

2. These were the primary uses *Conservation and Natural Environments* and *Production from Relatively Natural Environments*. Also *6.5.0 Marsh or wetland* was included as this could also be vegetated.

3. Annual rates of clearing were estimated by dividing the areas of polygons drawn around the cleared area by the number of days between the two images used to detect the changes, and then multiplying by 365 days.

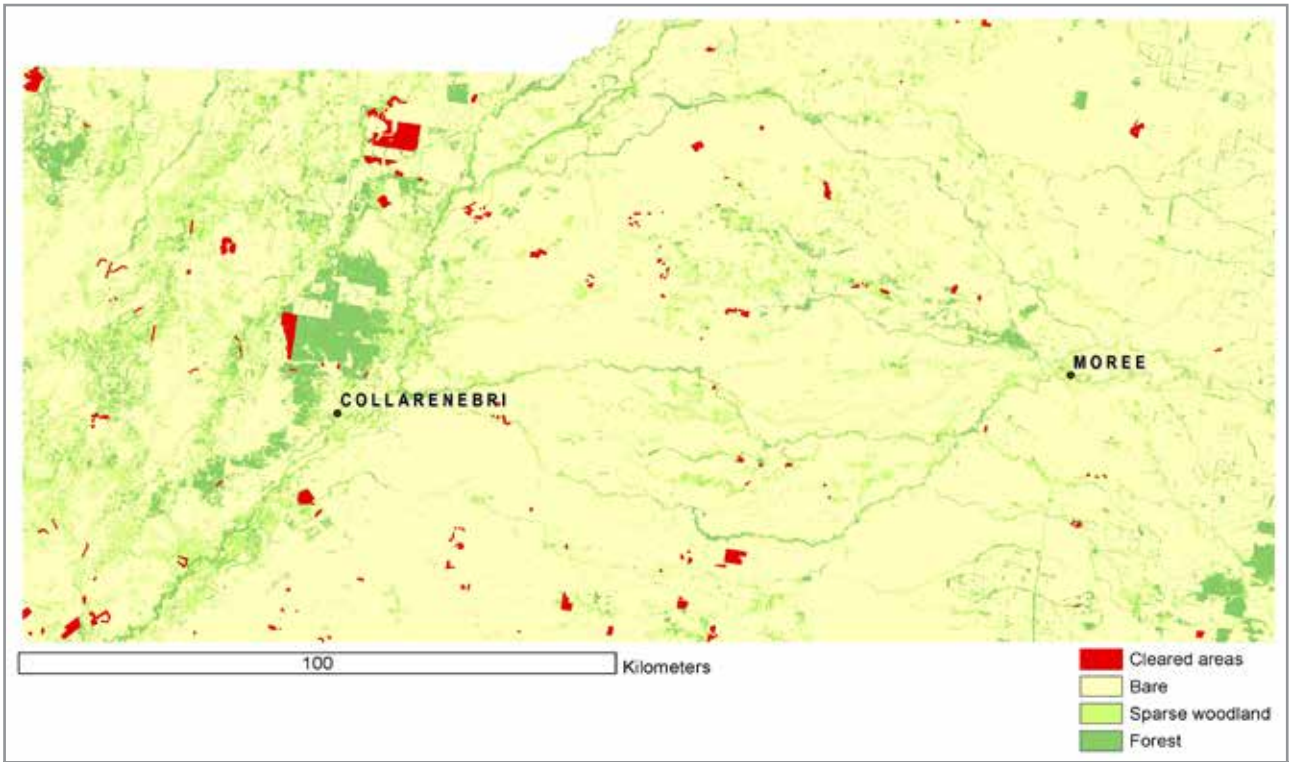

FIGURE 1: Areas where clearing was detected in the study area 2016-18 (yellow).
Note: Borders of cleared areas have been accentuated slightly to improve visibility.

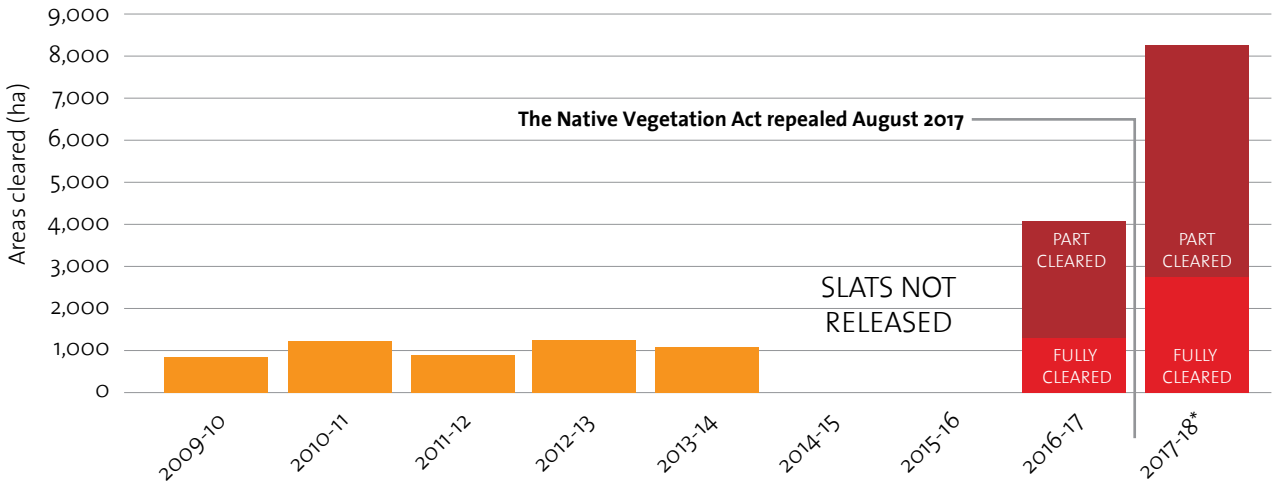

FIGURE 2: Areas cleared per annum in the study area according to NSW SLATS from 2009 to 2014 and fully or partly cleared according to this analysis for 2016-18, as per Table 1.

COMPARISON WITH STATEWIDE LAND & TREE STUDY (SLATS)

Clearing in the study area (excluding natural change, fire and plantation harvest) has hovered around 1000 ha annually from 2009 to 2014 (Fig. 2). No SLATS data have been released by the NSW government after 2014. Areas detected as fully cleared showed a major step up in 2017-18 relative to both 2016-17 and the earlier SLATS period (Fig. 2). Areas fully or partly cleared in 2016-17 and 2017-18 were both much greater than those reported by SLATS for the 2009-14 period (Fig. 2).

There is some concern that the SLATS areas cleared (Fig. 2) significantly underestimate the actual areas cleared. Statewide, clearing as reported by the National Carbon Accounting System consistently exceeds clearing estimated by SLATS by a large margin (Appendix 2). If this is true also of the study area, then the increases in clearing observed in this study will be less dramatic that those shown in Table 2.

IMPACT ON NATIVE ANIMALS AND PLANTS

Clearing in the study area has destroyed bushland that is known to be, or likely to be, habitat for nine species of national environmental significance, two of which are endangered (Table 2).

Despite this, there are no relevant referrals under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 for any of this habitat destruction.[4]

Another 124 native vertebrate species and 114 native plant species have been found in the study area (Appendix 3). However, records of occurrence are necessarily very incomplete and do not give a good representation of actual habitats. Any of these species could have been directly killed or harmed by the clearing in the study area over the 2016-18 period.

4. Selecting all referrals that might involve vegetation clearing in the study area from 2011 to March 2018 and overlaying on areas observed cleared. Referrals downloaded from http://www.environment.gov.au/fed/catalog/search/resource/details.page?uuid=%7BC65F30AC-CD38-4EC6-BD62-2A0D37C661EE%7D

Name	Status	Ecology	2016-17 Habitat destroyed[5]	2017-18 Habitat destroyed	Increase in rate of clearing
Koala	Vulnerable (EPBCA & NSW)	Unique tree-dwelling marsupial with a fragmented and declining distribution across NSW. Found only in woodlands and forests with preferred eucalypt food species. Threatened by tree clearing and fragmentation, and consequent stress, disease, car strikes, and dog attacks.	1,637 ha	5,246 ha	x 3.2
Corben's Long-eared Bat	Vulnerable (EPBCA & NSW)	Widespread but rare in woodlands and mallee of NSW. Roosts in tree hollows, crevices, and under loose bark. Threatened by woodland clearing, loss of hollow-bearing trees, and burning.	12 ha	287 ha	x 23.9
Painted Honeyeater	Vulnerable (EPBCA & NSW)	Low-density in grassy woodlands, feeding on eucalypt, mistletoe nectar, and insects. Threatened by tree clearing, especially old-growth, and livestock grazing.	1,918 ha	6,942 ha	x 3.6
Australian Painted Snipe	Endangered (EPBCA & NSW)	Rare nocturnal ground-nesting wader feeding on invertebrates in shallow inland waterways. Nests on the ground. Threatened by clearing of wetlands and stream margins, predation by cats and foxes.	70 ha	42 ha	x 0.6
Mackay's Burrowing Skink	Vulnerable (EPBCA) Endangered (NSW)	Patch occurrence in grassy eucalypt woodland of northwest NSW. Burrows in soil or shelters under logs and leaf litter. Threatened by tree-clearing and livestock grazing.	49 ha	257 ha	x 5.2
Border Thick-tailed Gecko	Vulnerable (EPBCA & NSW)	Nocturnal insect eater only found in tablelands and slopes of NSW-Qld borderlands. Threatened by tree-clearing, grazing livestock, cats and foxes.	0 ha	157 ha	Increase
Slender Darling Pea	Vulnerable (EPBCA & NSW)	Grassy woodland herb threatened by tree clearing and livestock grazing.	233 ha	1,689 ha	x 7.3
Ooline	Vulnerable (EPBCA & NSW)	Dry rainforest tree only in eucalypt and cypress inland forests and woodlands of western uplands of NSW and Qld. Only 1200 ha of known habitat remains. Threatened by land clearing, fire, and livestock grazing.	20 ha	91 ha	x 4.6

TABLE 2: Threatened species occurring in the study area that lost habitat to full or partial clearing over the study period 2016-18 (excluding areas of paddock-tree clearing).[6]

5. Areas of known-to-occur or likely-to-occur habitat as mapped in the Australian Government *Species of National Environmental Significance* database (Jan 2016 release) that were fully or partly cleared in the study period in the study area.

6. Only threatened species under the EPBC Act are shown that have actual occurrence records in the study area according to the *Atlas of Living Australia*. Threatened species with just predicted habitat in the study area but no occurrence records are excluded from the table. Status taken from http://www.environment.nsw.gov.au/threatenedspeciesapp/

EXAMPLES OF SPECIES LOSING HABITAT TO CLEARING[7]

KOALA (*PHASCOLARCTOS CINEREUS*), VULNERABLE

The Koala is a tree-dwelling, folivorous marsupial unique to Australia, and the most-loved and iconic of Australian wild animals. Koalas spend much of their lives in their eucalypt food trees where they sleep through the day and spend a few hours consuming leaves during the evening. Koalas are expert climbers and usually only descend from the canopy to locate new host trees or to disperse. Koalas are often very particular about their host tree species and are frequently reluctant to switch between eucalypt hosts. This can make the translocation of koala from one habitat to another difficult.

Koalas breed from spring to early summer, during which time males emit loud, distinctive territorial bellows. Females bear a single joey that lives in the pouch for its first six months. The joey lives with its mother until it is 12 months old, often riding on her back.

Koalas in NSW and Queensland are listed as vulnerable to extinction under national and state laws. They are threatened by destruction of food and shelter trees and forest fragmentation, which exposes koalas to higher mortalities from vehicle strike, dog attacks, stress, and disease.

In NSW, Koalas are widespread, but with a very fragmented distribution and declining numbers. Many populations are effectively isolated from one another.

The Koala lost nearly 4000 ha of known-to-occur habitat to clearing in the study area over the period of study, more than any other threatened species.

Clearing of known Koala habitat nearly doubled over the study period. About 6900 ha of known-to-occur or likely-to-occur Koala habitat was cleared in this region over the two years of the study period, primarily around Collarenebri (Table 2, Fig. 3).

The extensive clearing of paddock trees observed in this study (although only tentatively quantified) is nonetheless detrimental for Koalas. In one NSW study, 10% of Koalas observed were found in isolated paddock trees[8] and GPS tracking published in another study showed Koalas using paddock trees as stepping stones to cross cleared areas to reach remnant habitat.[9]

Koala in northern NSW © Kate Stuart

7. Sources: Menkhorst, P. & Knight, F. 2001. *A Field Guide to the Mammals of Australia*. Oxford University Press: Melbourne Simpson, K. & Day, N. 1996. *Field Guide to the Birds of Australia*. Viking: Ringwood, Victoria Wilson, S. & Swan, G. 2010. *Complete Guide to Reptiles of Australia*. New Holland Publishers Australia: Sydney http://www.environment.nsw.gov.au/threatenedspeciesapp/; https://biodiversity.org.au/afd/taxa/; https://www.dpi.nsw.gov.au/fishing/species-protection/conservation/what-current/vulnerable-species/

8. *Koala Habitat & Population Assessment for the Lismore Local Government Area, Final Report to Lismore City Council*, Biolink Ecological Consultants, September 2017.

9. Lunney, D., Crowther, M., Wallis, I., Foley, W. J., Lemon, J., Wheeler, R., Madani, G., Orscheg, C., Griffith, J. E., Krockenberger, M., Retamales, M., and Stalenberg, E. (2012b). Koalas and climate change: a case study on the Liverpool Plains, north-west New South Wales. In *Wildlife and Climate Change: Towards Robust Conservation Strategies for Australian Fauna*. (Eds D. Lunney and P. Hutchings.) pp. 150–168. (Royal Zoological Society of NSW: Sydney.)

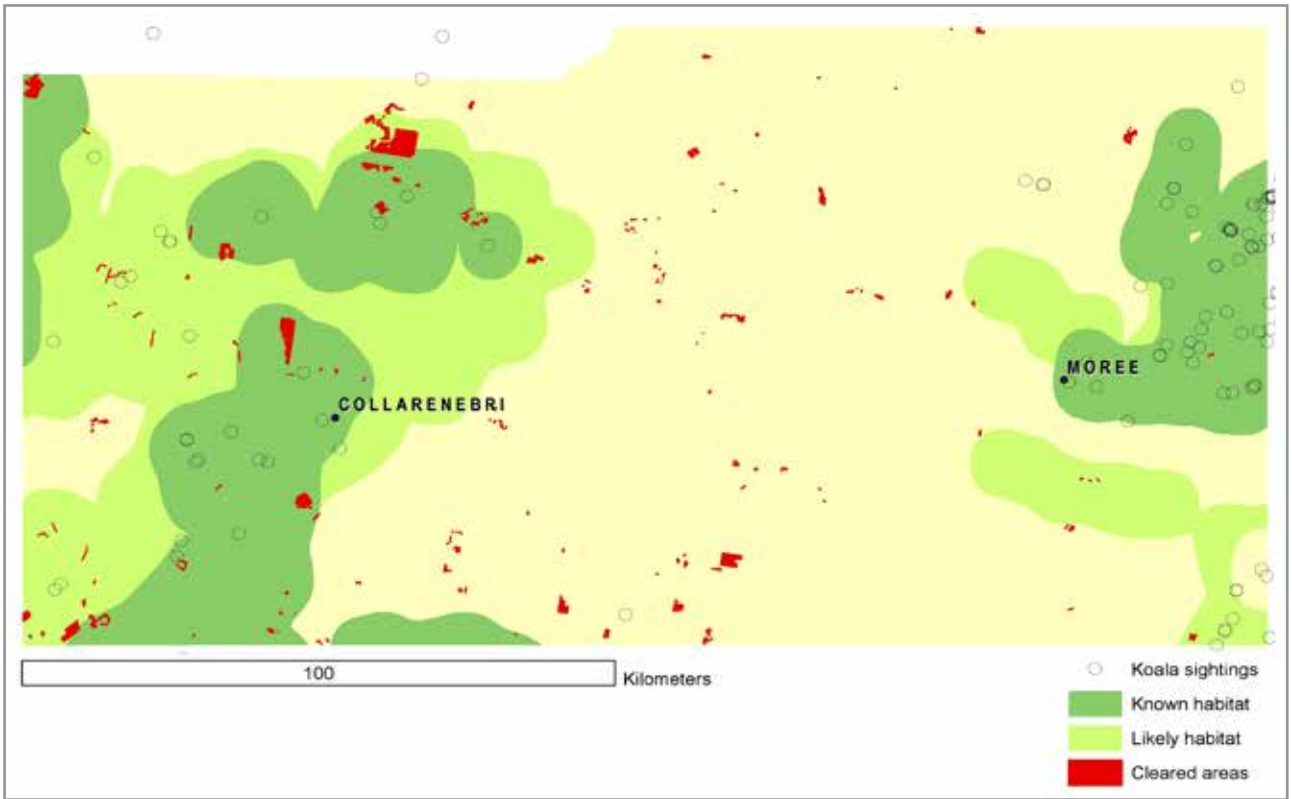

FIGURE 3: Koala habitats and sightings in the study area relative to areas detected as fully or partly cleared 2016-18.
Sources: *Species of National Environmental Significance 2016, Atlas of Living Australia*, and this analysis.
Note: Borders of cleared areas have been accentuated slightly to improve visibility.

BORDER THICK-TAILED GECKO (UVIDICOLUS SPHYRURUS), VULNERABLE

The Border Thick-tailed Gecko is an attractive small, fawn-coloured lizard flecked with brown-and-black markings and fine white dots. Border Thick-tailed Geckos have fat, rectangular tails that feature two pale cream bands and a narrow pointed tip.

Their tails are used as fat storage organs and for self-defence. When threatened, the geckos will suddenly and synchronously lift their head and tail (or just their tail) to surprise and deter predators. The tail may also function as a "head-mimic". If attacked, the predator may bite or grab the tail, rather than the head, resulting in a surviving gecko sustaining a less serious injury.

Border Thick-tailed Geckos live in the rocky understorey of woodlands and open forests. They are highly active at night and forage among stones, logs, and leaf-litter for invertebrates and other, smaller lizards.

The Border Thick-tailed Gecko is highly restricted in its distribution. In NSW the species only occurs on the tablelands and slopes of northern NSW. No accurate estimate of its population size exist. Much of its narrow range of habitat has been destroyed or degraded.

The species is listed as vulnerable under national law due to land clearing, predation by cats and foxes, habitat fragmentation, weed infestation, and livestock grazing.

Over 150 ha of known-to-occur or likely-to-occur habitat was cleared in the study area over the nearly two years of the study (Table 2). Considering the restricted range of this species, this is a major loss.

APPENDIX 1: SAMPLE IMAGERY OF AREAS CLEARED

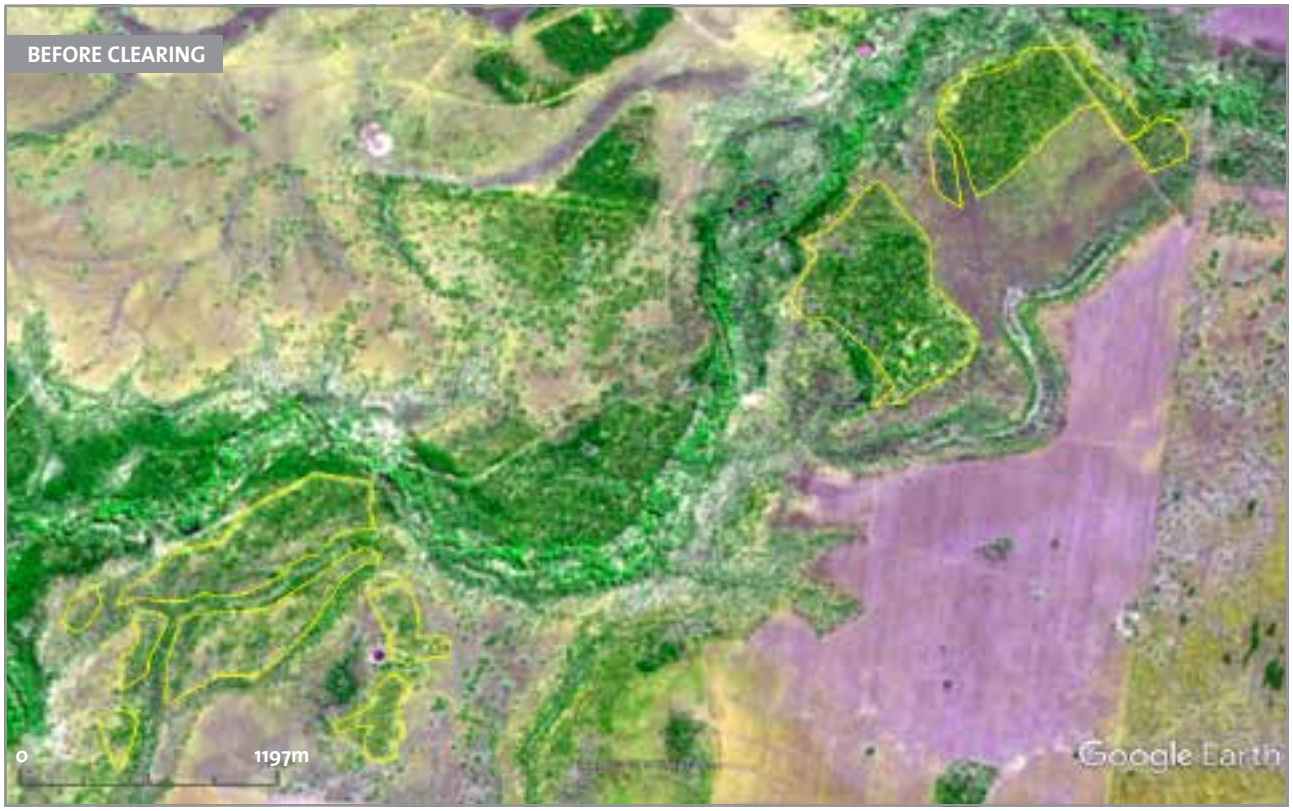

FIGURE A1.1: Example of clearing classified as "fully cleared" 2017-18, showing intact woodland prior to clearing (top) and after clearing (bottom). All images are false colour infrared to contrast tree cover (dark green) with bare ground (various shades of tan and purple).

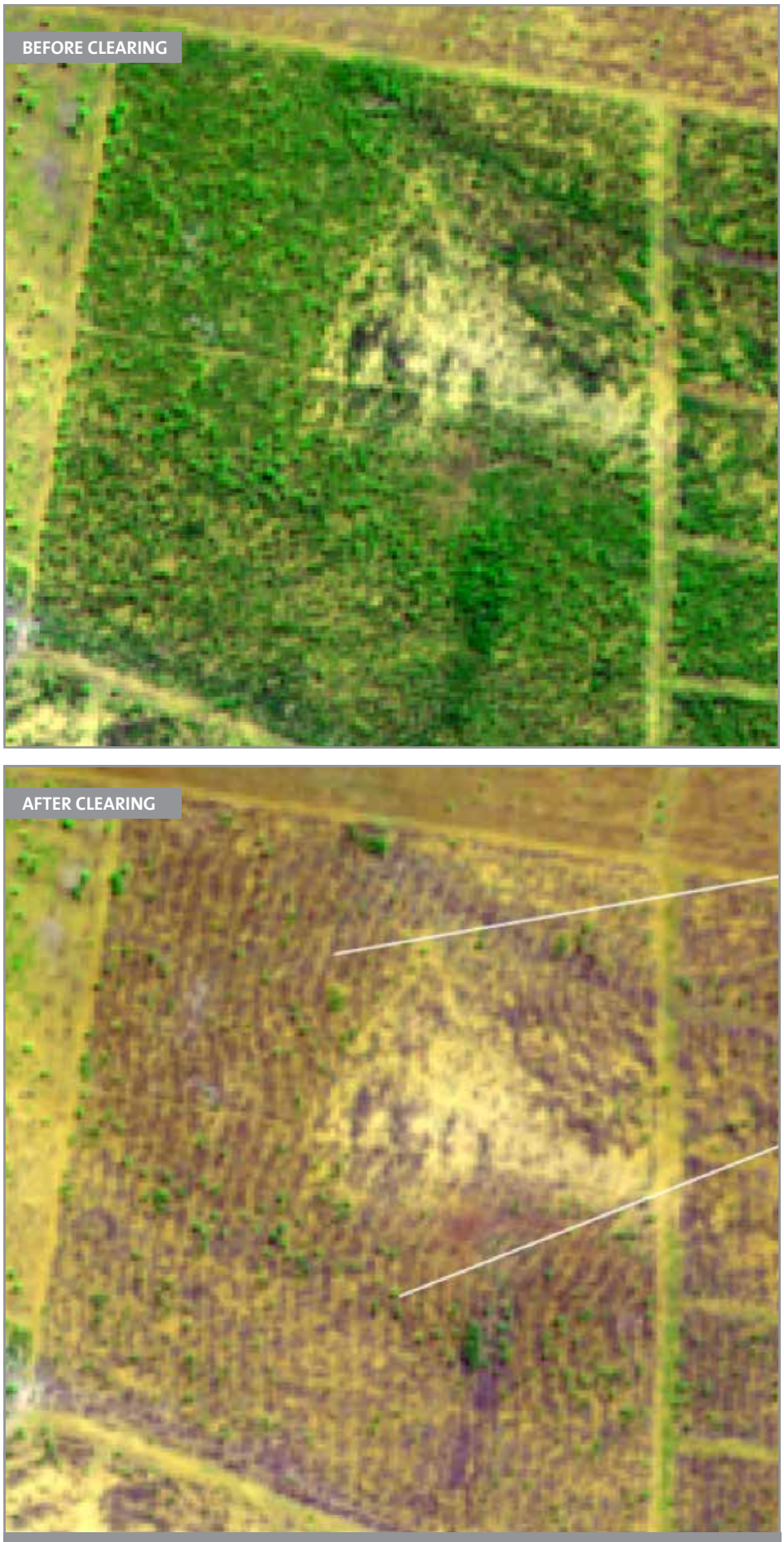

FIGURE A1.2: Clearing classified as "partly cleared" 2017-18, showing intact woodland prior to clearing (top) and after clearing following a strip pattern (bottom).

FIGURE A1.3: Example of clearing classified as "paddock-tree clearing" 2017-18, showing scattered paddock trees prior to clearing (top) and after clearing (bottom). Note: Individual trees can be discerned in the top image. The patch of trees in the middle has also been cleared at the edges. The dark purple patches indicate recently turned soil.

APPENDIX 2: AREAS CLEARED 1990–2016 IN NSW

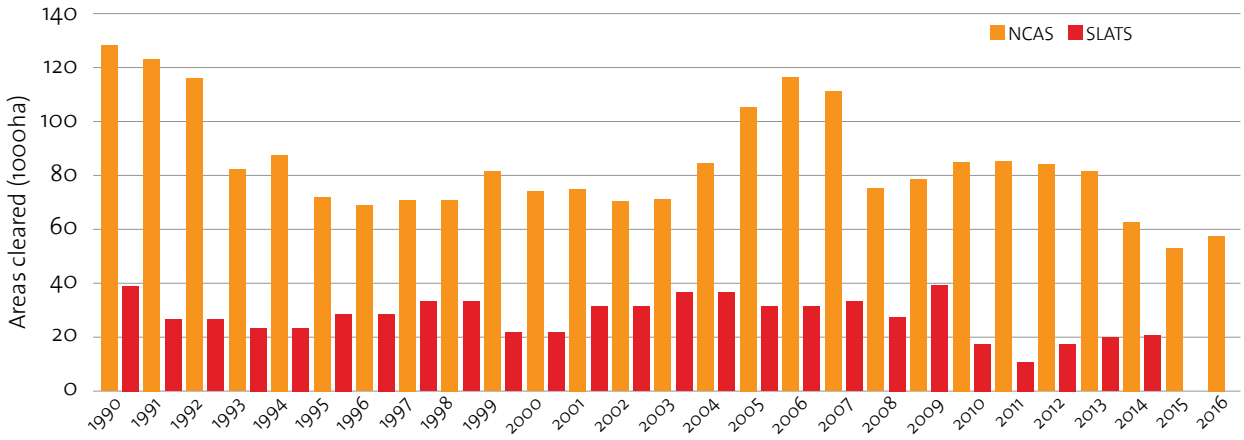

FIGURE A2.1: Comparison of total land clearing in NSW as estimated by NSW Government's Statewide Land and Tree Study (SLATS, excluding fires and plantation harvest) (red bars) and as estimated by the Australian Government's National Carbon Accounting System (NCAS) (orange bars).

APPENDIX 3: NATIVE VERTEBRATE AND PLANT SPECIES WITH RECORDS OF OCCURRENCE IN STUDY AREA

TABLE A3.1: All native vertebrate species with records of occurrences in the study area in the Atlas of Living Australia other than those in Table 2. Source: Atlas of Living Australia

Taxon	Common name	Scientific name	No. records
Mammal	Lesser long-eared bat (EPBCA VU)	*Nyctophilus geoffroyi geoffroyi*	1
Mammal	Gould's Long-Eared Bat	*Nyctophilus gouldi*	1
Mammal	Little Broad-Nosed Bat	*Scotorepens greyii*	2
Mammal	Spotted tail Quoll (EPBCA EN)	*Dasyurus maculatus*	1
Mammal	Paucident Planigale	*Planigale gilesi*	1
Mammal	Fat-Tailed Dunnart	*Sminthopsis crassicaudata*	3
Mammal	Short-Beaked Echidna	*Tachyglossus aculeatus*	1
Bird	Pacific Black Duck	*Anas superciliosa*	8
Bird	Grey Teal	*Anas gracilis*	1
Bird	Hardhead	*Aythya australis*	1
Bird	Australian Wood Duck	*Chenonetta jubata*	9
Bird	Australian Owlet-Nightjar	*Aegotheles cristatus*	5
Bird	Spine-Tailed Swift	*Hirundapus caudacutus*	3
Bird	White-Necked Heron	*Ardea pacifica*	2
Bird	Intermediate Egret	*Ardea intermedia intermedia*	2
Bird	White-Faced Heron	*Egretta novaehollandiae*	3
Bird	Nankeen Night-Heron	*Nycticorax caledonicus*	1
Bird	Australian White Ibis	*Threskiornis molucca*	1
Bird	Straw-Necked Ibis	*Threskiornis spinicollis*	1
Bird	Diamond Dove	*Geopelia cuneata*	1
Bird	Bar-Shouldered Dove	*Geopelia humeralis*	1
Bird	Peaceful Dove	*Geopelia striata*	6
Bird	Crested Pigeon	*Ocyphaps lophotes*	22
Bird	Common Bronzewing	*Phaps chalcoptera*	1
Bird	Kookaburra	*Dacelo novaeguineae*	4
Bird	Sacred Kingfisher	*Todiramphus sanctus*	3
Bird	Pallid Cuckoo	*Cacomantis pallidus*	4
Bird	Horsfield's Bronze-Cuckoo	*Chrysococcyx basalis*	1
Bird	Brown Goshawk	*Accipiter fasciatus*	1
Bird	Wedge-Tailed Eagle	*Aquila audax*	5
Bird	Whistling Kite	*Haliastur sphenurus*	2
Bird	Australian Hobby	*Falco longipennis longipennis*	2
Bird	Brown falcon	*Falco berigora berigora*	9
Bird	Nankeen Kestrel	*Falco cenchroides*	10
Bird	Dusky Moorhen	*Gallinula tenebrosa tenebrosa*	1
Bird	Purple Swamphen	*Porphyrio porphyrio*	12
Bird	Yellow-Rumped Thornbill	*Acanthiza chrysorrhoa*	7

Taxon	Common name	Scientific name	No. records
Bird	Chestnut-Rumped Thornbill	*Acanthiza uropygialis*	3
Bird	Yellow thornbill	*Acanthiza nana nana*	3
Bird	Weebill	*Smicrornis brevirostris*	4
Bird	Black-faced Woodswallow	*Artamus cinereus cinereus*	2
Bird	White-Breasted Woodswallow	*Artamus leucorynchus*	1
Bird	Pied Butcherbird	*Cracticus nigrogularis*	14
Bird	Australian Magpie	*Cracticus tibicen*	28
Bird	Grey Butcherbird	*Cracticus torquatus*	13
Bird	Black-Faced Cuckoo-Shrike	*Coracina novaehollandiae*	10
Bird	White-Winged Triller	*Lalage sueurii*	5
Bird	Brown Treecreeper	*Climacteris picumnus picumnus*	9
Bird	White-Winged Chough	*Corcorax melanorhamphos*	9
Bird	Apostlebird	*Struthidea cinerea*	16
Bird	Little Crow	*Corvus bennetti*	1
Bird	Australian raven	*Corvus coronoides coronoides*	12
Bird	Plum-Headed Finch	*Neochmia modesta*	1
Bird	Diamond Firetail	*Stagonopleura guttata*	1
Bird	Double-Barred Finch	*Stizoptera bichenovii*	3
Bird	Zebra Finch	*Taeniopygia guttata*	2
Bird	Welcome Swallow	*Hirundo neoxena*	5
Bird	Tree Martin	*Petrochelidon nigricans*	2
Bird	Fairy Martin	*Petrochelidon ariel*	3
Bird	Variegated fairywren	*Malurus lamberti lamberti*	4
Bird	Superb Fairy-Wren	*Malurus cyaneus*	2
Bird	White-Winged Fairy-Wren	*Malurus leucopterus leucopterus*	5
Bird	Brown Songlark	*Cincloramphus cruralis*	2
Bird	Rufous Songlark	*Cincloramphus mathewsi*	1
Bird	Spiny-Cheeked Honeyeater	*Acanthagenys rufogularis*	7
Bird	Blue-Faced Honeyeater	*Entomyzon cyanotis*	3
Bird	White-Fronted Chat	*Epthianura albifrons*	1
Bird	Singing Honeyeater	*Gavicalis virescens*	1
Bird	Yellow-Throated Miner	*Manorina flavigula*	24
Bird	Noisy Miner	*Manorina melanocephala*	11
Bird	Little Friarbird	*Philemon citreogularis*	8
Bird	Noisy Friarbird	*Philemon corniculatus*	5
Bird	Striped Honeyeater	*Plectorhyncha lanceolata*	4
Bird	White-Plumed Honeyeater	*Ptilotula penicillata*	10
Bird	Magpie-Lark	*Grallina cyanoleuca*	22
Bird	Restless Flycatcher	*Myiagra inquieta*	2
Bird	Australian Pipit	*Anthus novaeseelandiae*	2
Bird	Mistletoebird	*Dicaeum hirundinaceum*	4
Bird	Crested Bellbird	*Oreoica gutturalis*	4
Bird	Olive-Backed Oriole	*Oriolus sagittatus*	1
Bird	Grey Shrike-Thrush	*Colluricincla harmonica*	3
Bird	Rufous Whistler	*Pachycephala rufiventris*	3

Taxon	Common name	Scientific name	No. records
Bird	Striated Pardalote	*Pardalotus striatus*	5
Bird	Hooded Robin	*Melanodryas cucullata*	4
Bird	Jacky Winter	*Microeca fascinans*	7
Bird	Chestnut-Crowned Babbler	*Pomatostomus ruficeps*	2
Bird	Grey-Crowned Babbler	*Pomatostomus temporalis*	7
Bird	Spotted Bowerbird	*Ptilonorhynchus maculatus*	4
Bird	Grey Fantail	*Rhipidura albiscapa albiscapa*	2
Bird	New Zealand Fantail	*Rhipidura fuliginosa*	1
Bird	Willie Wagtail	*Rhipidura leucophrys*	12
Bird	Australasian Grebe	*Tachybaptus novaehollandiae*	1
Bird	Sulphur-Crested Cockatoo	*Cacatua galerita*	2
Bird	Galah	*Eolophus roseicapillus*	19
Bird	Cockatiel	*Nymphicus hollandicus*	15
Bird	Red-Winged Parrot	*Aprosmictus erythropterus*	7
Bird	Australian Ringneck	*Barnardius zonarius*	4
Bird	Port Lincoln ringneck	*Barnardius zonarius barnardi*	6
Bird	Budgerigar	*Melopsittacus undulatus*	2
Bird	Bluebonnet	*Northiella haematogaster*	13
Bird	Superb parrot (VU EPBCA, NSW)	*Polytelis swainsonii*	59
Bird	Red-Rumped Parrot	*Psephotus haematonotus*	10
Bird	Mulga Parrot	*Psephotus varius*	2
Bird	Southern Boobook	*Ninox novaeseelandiae*	1
Bird	Emu	*Dromaius novaehollandiae*	15
Bird	Little Button-Quail	*Turnix velox*	1
Reptile	Burns' Dragon	*Amphibolurus burnsi*	3
Reptile	Nobbi Dragon	*Diporiphora nobbi*	1
Reptile	Bearded Dragon	*Pogona barbata*	6
Reptile	Tessellated Gecko	*Diplodactylus tessellatus*	6
Reptile	King Brown Snake	*Pseudechis australis*	1
Reptile	Curl Snake	*Suta suta*	1
Reptile	Tree Dtella	*Gehyra variegata*	3
Reptile	Bynoe's Gecko	*Heteronotia binoei*	4
Reptile	Tree Skink	*Egernia striolata*	4
Reptile	South-Eastern Morethia Skink	*Morethia boulengeri*	4
Reptile	Red-Tailed Soil-Crevice Skink	*Proablepharus kinghorni*	1
Reptile	Lace Monitor	*Varanus varius*	1
Frog	Striped Burrowing Frog	*Cyclorana alboguttata*	1
Frog	Green Tree Frog	*Litoria caerulea*	4
Frog	Peron's Tree Frog	*Litoria peronii*	1
Frog	Little Red Tree Frog	*Litoria rubella*	3
Frog	Crucifix Frog	*Notaden bennettii*	1
Fish	Golden Perch	*Macquaria ambigua*	2

TABLE A3.2: All native plant species with occurrences in the study area other than those in Table 2. Source: Atlas of Living Australia		
Common name	**Scientific name**	**No. records**
Slender Celery	*Cyclospermum leptophyllum*	1
Australian Carrot	*Daucus glochidiatus*	2
Darling lily	*Crinum flaccidum*	1
Native Onion	*Bulbine bulbosa*	1
Variable Daisy	*Brachyscome ciliaris var. subintegrifolia*	1
	Brachyscome dentata	4
	Calotis cuneifolia	1
Bur Daisy	*Calotis lappulacea*	2
Boar Thistle	*Cirsium vulgare*	5
	Erigeron sumatrensis	1
	Leiocarpa leptolepis	2
	Pterocaulon redolens	1
	Rhodanthe floribunda	2
	Vittadinia dissecta var. hirta	1
	Vittadinia pterochaeta	2
	Lobelia concolor	3
	Goodenia fascicularis	4
	Capparis lasiantha	2
	Trianthema triquetrum	2
Lesser Joyweed	*Alternanthera denticulata*	3
	Amaranthus macrocarpus	1
	Amaranthus macrocarpus var. pallidus	1
	Stellaria angustifolia	1
	Atriplex semibaccata	2
	Chenopodium desertorum subsp. anidiophyllum	1
	Chenopodium nitrariaceum	1
	Einadia hastata	1
	Einadia nutans	8
	Einadia nutans subsp. nutans	1
	Einadia polygonoides	1
	Enchylaena tomentosa	1
	Rhagodia spinescens	2
Goathead Burr	*Sclerolaena bicornis*	2
	Sclerolaena birchii	4
Redburr	*Sclerolaena calcarata*	1
	Sclerolaena diacantha	2
	Sclerolaena muricata	5
	Sclerolaena muricata var. muricata	2
	Sclerolaena muricata var. semiglabra	1
	Sclerolaena muricata var. villosa	1
	Sclerolaena stelligera	1
	Boerhavia dominii	6

Common name	Scientific name	No. records
	Duma florulenta	2
	Rumex tenax	4
Purslane	*Portulaca oleracea*	8
Silver Wattle	*Acacia neriifolia*	1
	Acacia stenophylla	3
	Cullen tenax	2
	Glycine tabacina	1
	Neptunia gracilis f. gracilis	2
	Sesbania cannabina var. cannabina	4
	Vachellia farnesiana	5
Belah	*Casuarina cristata*	3
	Parsonsia eucalyptophylla	1
	Brunoniella australis	1
	Rostellularia adscendens var. adscendens	1
	Ajuga australis	2
	Plantago debilis	1
	Eremophila bignoniiflora	2
Winter Apple	*Eremophila debilis*	2
	Eremophila mitchellii	3
	Euphorbia drummondii	3
	Phyllanthus virgatus	1
	Sida corrugata	1
	Sida fibulifera	1
Narrow-Leaf Sida	*Sida trichopoda*	1
	Eucalyptus coolabah	7
	Eucalyptus largiflorens	6
	Eucalyptus populnea	2
	Oxalis chnoodes	1
Woody-Root Oxalis	*Oxalis perennans*	8
	Callitris glaucophylla	1
	Cyperus bifax	2
	Cyperus concinnus	2
	Cyperus gracilis	1
	Juncus subsecundus	2
White Speargrass	*Aristida leptopoda*	1
	Astrebla elymoides	1
Curly Mitchell Grass	*Astrebla lappacea*	3
Barley Mitchell Grass	*Astrebla pectinata*	1
Red Grass, Redleg Grass, Pitted Bluegrass	*Bothriochloa decipiens var. decipiens*	2
Windmill Grass	*Chloris truncata*	2
Button Grass	*Dactyloctenium radulans*	1
Queensland Bluegrass	*Dichanthium sericeum*	3
	Dichanthium sericeum sericeum	1

Common name	Scientific name	No. records
Silky Umbrella-grass	*Digitaria ammophila*	1
Cotton Panic Grass	*Digitaria brownii*	3
Spider Grass	*Digitaria divaricatissima*	1
Awnless Barnyard Grass	*Echinochloa colona*	2
	Enteropogon acicularis	5
Purple Lovegrass	*Eragrostis lacunaria*	1
Neverfail Grass	*Eragrostis setifolia*	2
Cup Grass	*Eriochloa crebra*	2
Early Spring Grass	*Eriochloa pseudoacrotricha*	1
Red Flinders Grass	*Iseilema vaginiflorum*	1
New Zealand Wind Grass	*Lachnagrostis filiformis*	2
Native Millet	*Panicum decompositum*	4
	Paspalidium aversum	2
Knottybutt Grass	*Paspalidium constrictum*	3
Warrego Grass	*Paspalidium jubiflorum*	7
Fairy Grass, Yakka Grass	*Sporobolus caroli*	4
Slender Rat's Tail Grass	*Sporobolus elongatus*	1
Green Summer Grass	*Urochloa subquadripara*	2
Swamp Buttercup	*Ranunculus undosus*	2
Supplejack, Vine Tree	*Ventilago viminalis*	1
Common Nardoo	*Marsilea drummondii*	4
Misletoe	*Amyema miquelii*	6
Wilga	*Geijera parviflora*	3
Western Rosewood, Bonaree	*Alectryon oleifolius*	6
Whitewood	*Atalaya hemiglauca*	1
	Dodonaea peduncularis	2
Blushing Bindweed	*Convolvulus erubescens*	2
	Polymeria longifolia	1
Quena	*Solanum esuriale*	4